B757 MANUAL SUPPLEMENT - ATP 3510
SECTION 1 CHAPTER 27
CONTROL PAGE - ISSUE 5

A. File the attached Temporary Revision/Alerts in the Manual Supplement in ATA Chapter/Section/Subject/Page sequence

B. File this Control Page in front of the Chapter TRs/Alerts.

C. The following list shows active TRs/Alerts together with TRs/Alerts added by this control page.

Chapter Section Subject	Page		TR/Alert No.
27-31-01	405	* Boe	27-1004
27-31-05	412	Alert	27-559
27-31-05	403	* Boe	27-1005
27-31-06	405	* Boe	27-1006
27-31-15	405	* Boe	27-1007
27-62-00	101	Boe	27-1003

D. Remove and Destroy the following TRs/Alerts:

* Indicates TRs/Alerts issued with this control page

ELEVATOR - REMOVAL/INSTALLATION

TEMPORARY REVISION 27-1004

FILING INSTRUCTIONS

This temporary revision applies only to the AMM document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm manual, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated Jan 28/02.

Revision reason: Changed the grease callout from BMS 3-24 to BMS 3-33 and updated Metric numbers.

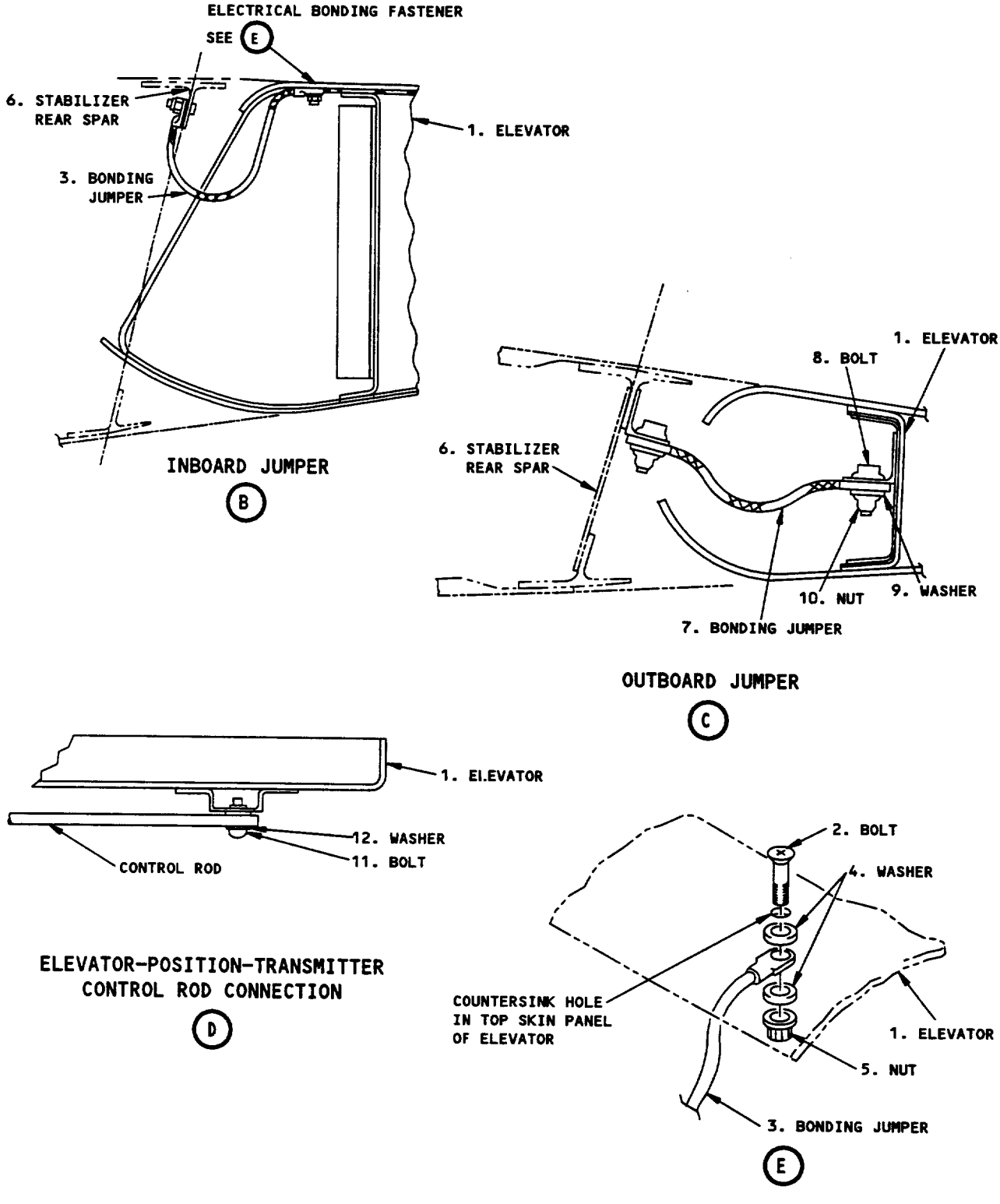
This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

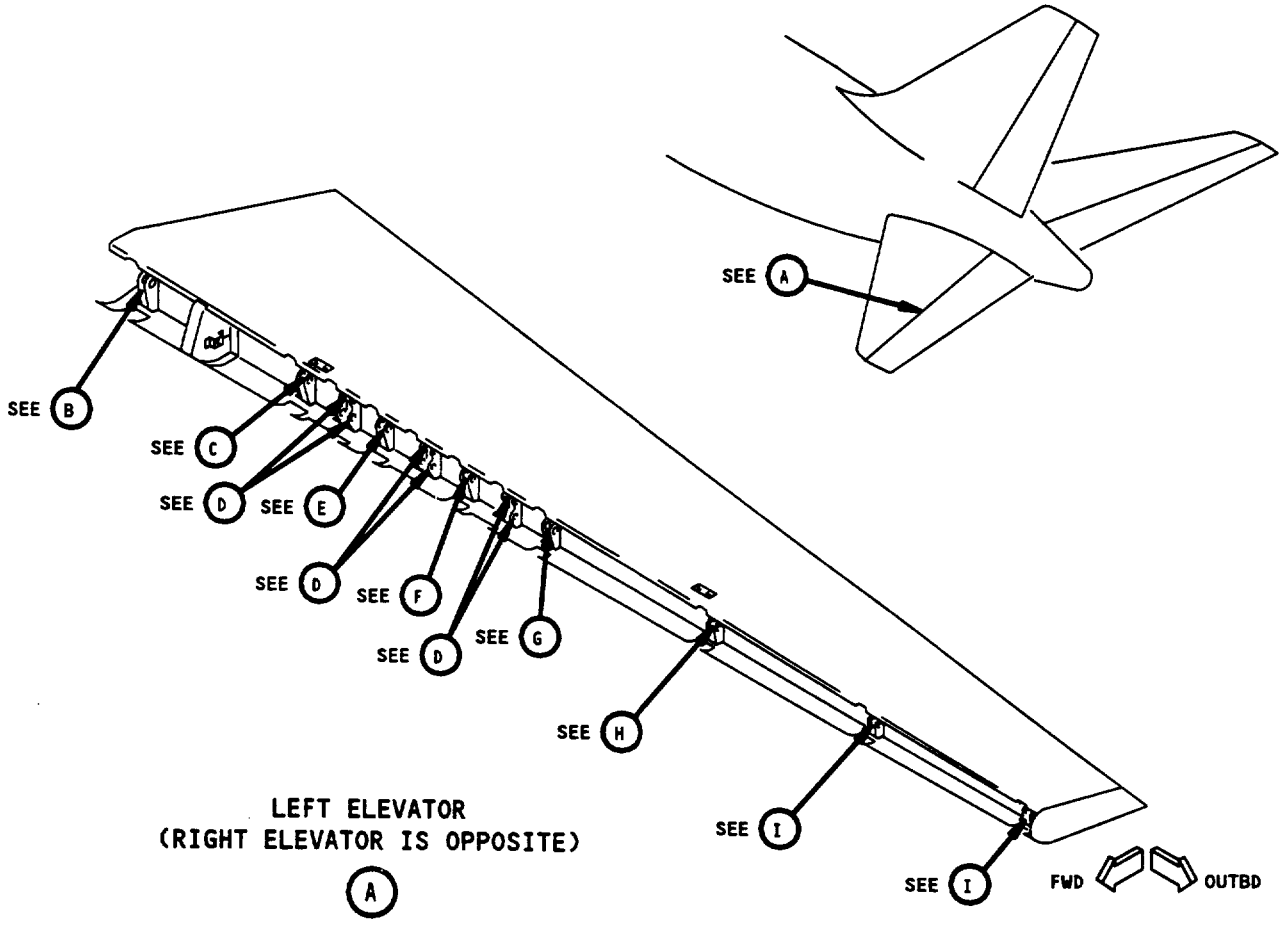
PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
401	SEP 20/90	01						
402	MAY 28/99	04						
403	JAN 28/01	04						
404	DEC 20/89	01						
* 405	DEC 20/89	01						
* 406	NOV 16/01	01.1						
* 407	DEC 20/89	01						
* 408	NOV 16/01	01.1						
409	SEP 28/01	01						
410	SEP 20/97	01						
* 411	NOV 16/01	01.1						
* 412	SEP 28/01	01						
* 413	NOV 16/01	01.1						
* 414	NOV 16/01	01.1						
415	MAY 28/99	01						
416	SEP 20/90	01						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.



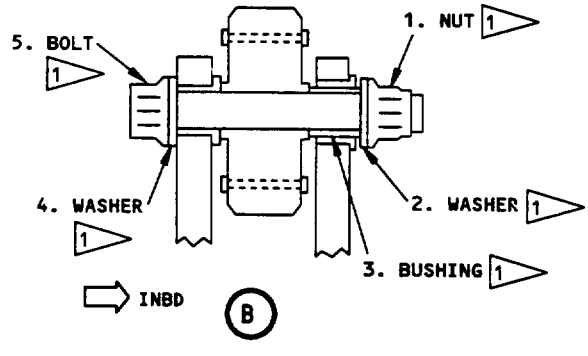
Elevator Installation
Figure 401 (Sheet 2)

21164

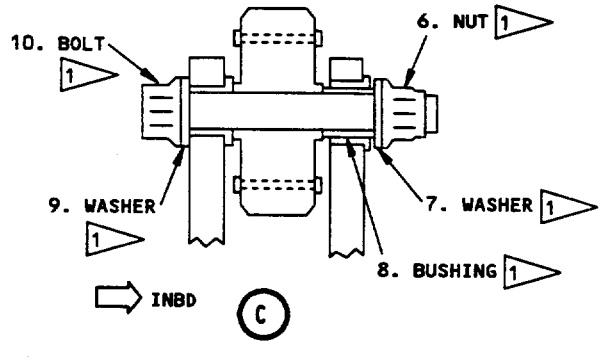


LEFT ELEVATOR
(RIGHT ELEVATOR IS OPPOSITE)

A



B



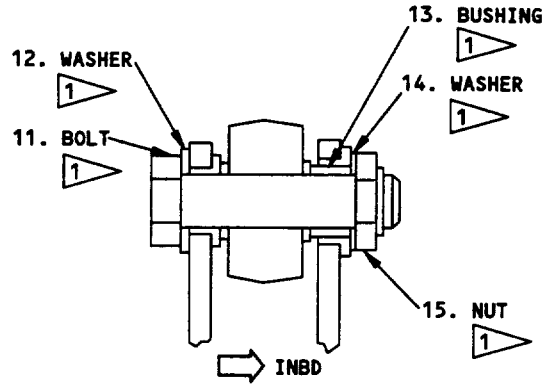
C

1 INSTALL BOLTS, BUSHINGS, FLOATING, BEARINGS, WASHERS, AND NUTS WITH BMS 3-33 GREASE AND REMOVE ANY UNWANTED GREASE

2 TIGHTEN AFTER THE LOCKNUT (27) IS TIGHT AGAINST THE HINGE LUG BUSHING

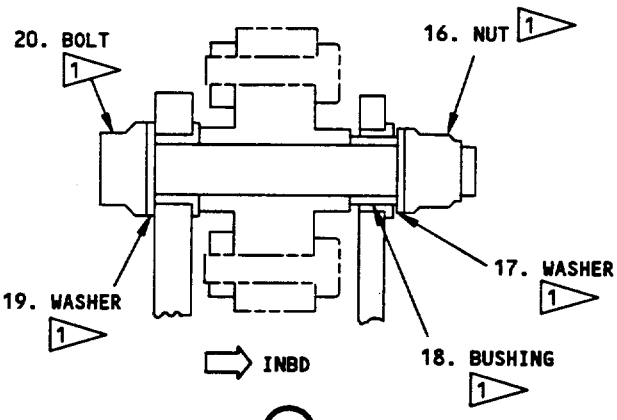
3 DOUBLETWIST THE LOCKWIRE TO ATTACH ON THE OUTBOARD SIDE OF THE HINGE FITTING

Elevator Hinge Connections
Figure 402 (Sheet 1)

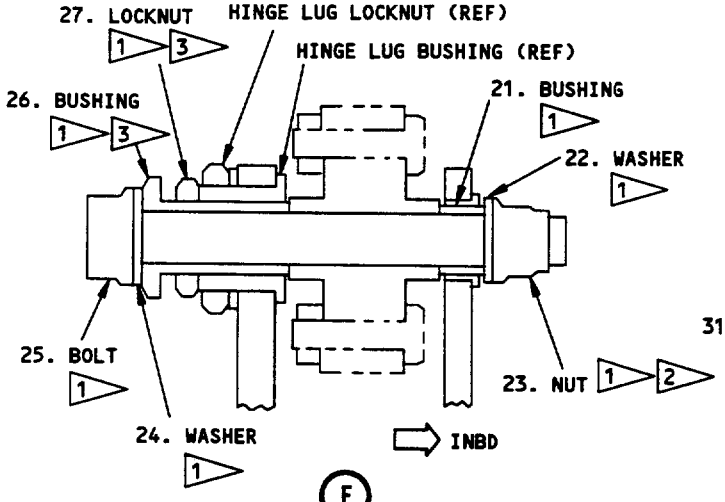


POWER-CONTROL-ACTUATOR CONNECTION

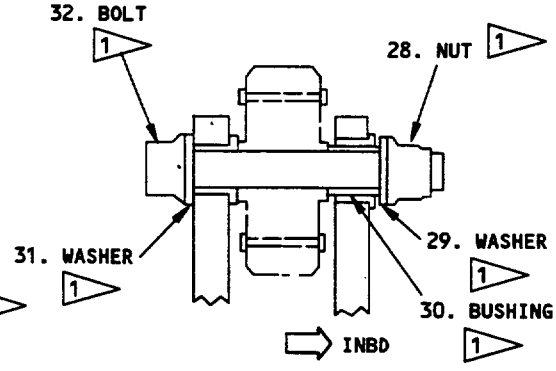
D



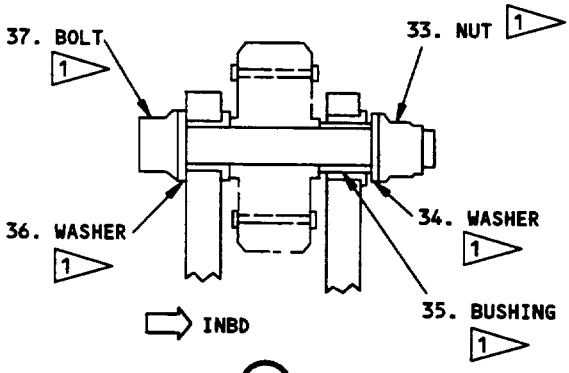
E



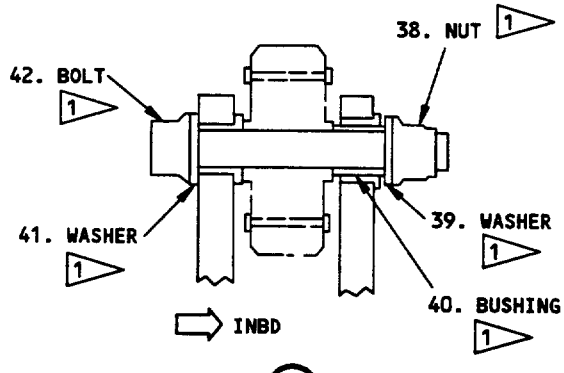
F



G



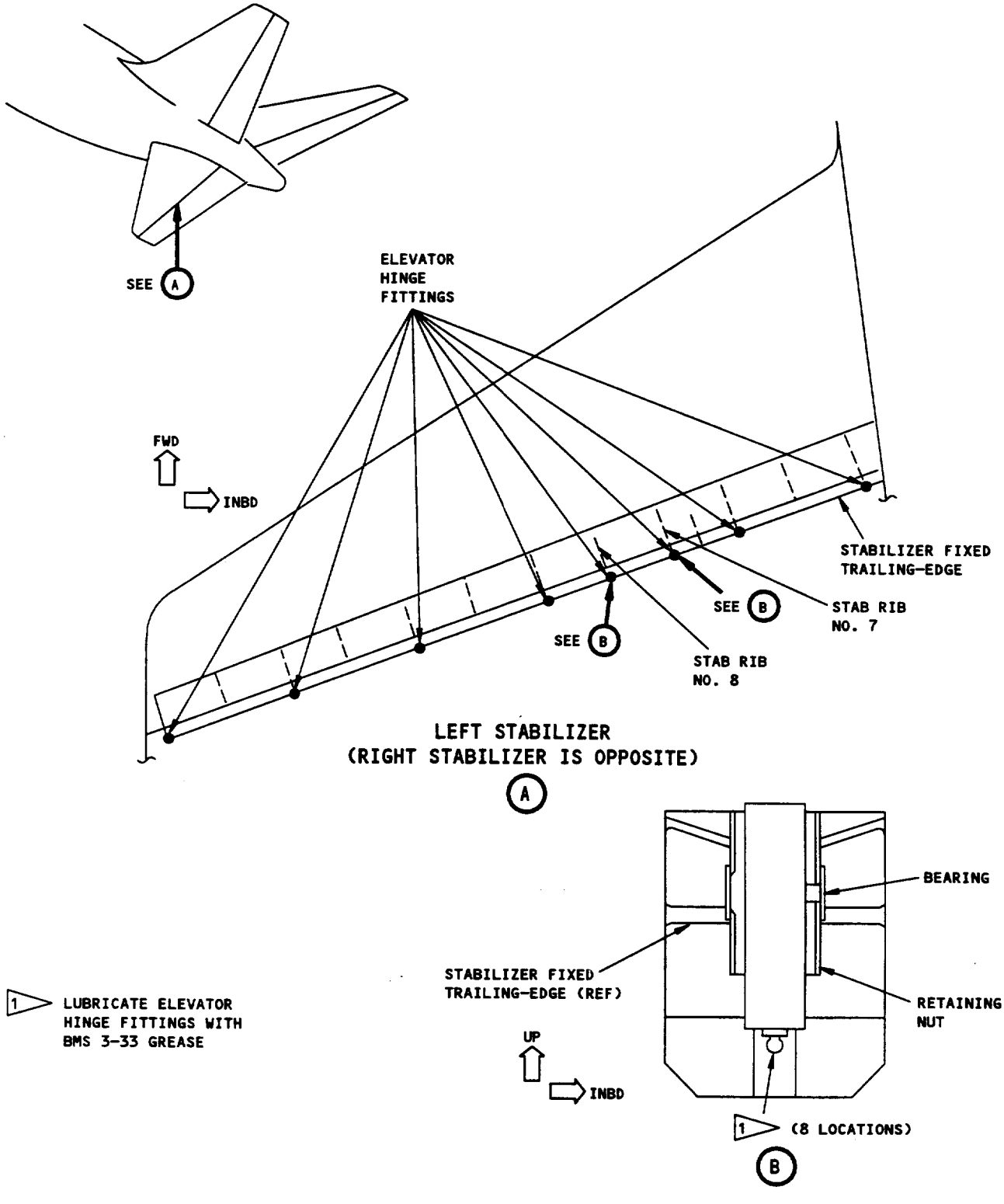
H



I

Elevator Hinge Connections
Figure 402 (Sheet 2)

21167



Elevator Hinge Fittings
Figure 403

D. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 12-21-04/301, Elevator Control System Servicing (Lubrication)
(3) AMM 20-10-21/401, Bonding Jumpers and Ground Leads
(4) 20-30-03/201, Finishing Materials
(5) 24-22-00/201, Electrical Power - Control
(6) 27-02-00/601, Flight Controls Surfaces
(7) 27-31-00/501, Elevator Control System
(8) 27-31-01/601, Elevator
(9) 27-31-05/601, Elevator Power Control Actuator
(10) 27-38-00/501, Elevator Position Indicating System
(11) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(12) 51-21-10/701, Decorative Exterior Finishes
(13) 51-24-02/701, Conductive Coating for Exterior Fiberglass and Kevlar

E. Access
(1) Location Zones
330 Left Horizontal Stabilizer and Elevator
340 Right Horizontal Stabilizer and Elevator

(2) Access Panels

335AB/335BB/335DB/ 335EB/335FB/335GB	Left Horizontal Stabilizer Rear Spar to Trailing Edge
345AB/345BB/345DB/ 345EB/345FB/345GB	Right Horizontal Stabilizer Rear Spar to Trailing Edge

F. Prepare for Installation

S 864-011
(1) Make sure the seals at the stabilizer trailing edge are in good condition.

S 024-026
(2) If the seals at the stabilizer trailing edge are damaged, replace the damaged seals.

S 864-012
(3) Make sure that the bearing retaining nuts in the elevator hinge fittings at stabilizer ribs No. 7 and No. 8 are tightened to 440-650 lb-in (49.7-73.4 newton-meters).

NOTE: IF it is necessary to tighten the bearing retaining nuts, use the B27069 tool.

S 434-013

(4) Hand fit all bushings and bolts before installation.

NOTE: This can require removal of burrs that are inside the bushings and smoothing out sharp edges.

S 644-014

(5) Fully lubricate the elevator hinge bearings (8 locations) and the rod ends of the elevator PCA and reaction links (6 locations) with BMS 3-33 grease.

NOTE: Turn the parts to make sure they are fully lubricated and clean off unwanted grease.

S 644-015

(6) Apply a layer of BMS 3-33 grease to all hinge bolts (5, 10, 11, 20, 25, 32, 37, 42), the inner surface of bushings (3, 8, 13, 18, 26, 30, 35, 40) and the inner surface of all stabilizer hinge bearings.

G. Install the Elevator

S 434-016

(1) Loosely install bushing (26) and locknut (27) to the elevator hinge lug.

NOTE: The end of the bushing will not be farther than the face of the hinge lug bushing. Bushing (26) will be adjusted and locked in position by locknut (27) afterwards.

S 494-017

CAUTION: MAKE SURE THE ELEVATOR IS HELD UNTIL THE PCA'S ARE CONNECTED. DO NOT DAMAGE THE ELEVATOR SKIN. SEVERE DAMAGE TO THE ELEVATOR CAN RESULT

(2) Do these steps to install the sling to the elevator (Fig. 401):
(a) Install the sling to the elevator.

(b) On a replacement elevator, remove the plug bolts from the elevator upper skin panel.
(c) Install the forward inboard and outboard hoist ring assemblies.
(d) Install the aft clamp assembly.
(e) Attach the elevator sling shackle to the hoist equipment.
(f) Lift the elevator to the level of the attach points on the horizontal stabilizer.

S 864-029

(3) Move the elevator to the stabilizer trailing edge such that the elevator lugs fit with the stabilizer hinges.

S 434-004

(4) Install the elevator connecting parts as follows:
(a) Install bolt (20), washers (17, 19), bushing (18), and tighten nut (16) to 440-650 lb-in (49.7-73.4 newton-meters).
(b) Install bolt (5), washers (2, 4), bushing (3), and tighten nut (1) to 150-250 lb-in (16.9-28.2 newton-meters).
(c) Install bolt (10), washers (7, 9), bushing (8), and tighten nut (6) to 150-250 lb-in (17.0-28.2 newton-meters).
(d) Install bolt (32), washers (29, 31), bushing (30), and tighten nut (28) to 150-250 lb-in (17.0-28.2 newton-meters).
(e) Install bolt (37), washers (34, 36), bushing (35), and tighten nut (33) to 150-250 lb-in (17.0-28.2 newton-meters).
(f) Install bolts (42), washers (39, 41), bushings (40), and tighten nuts (38) to 150-250 lb-in (2 locations) (17.0-28.2 newton-meters).
(g) Install bolt (25) as follows:
1) Turn bushing (26) in the hinge lug bushing until it touches the horizontal stabilizer hinge fitting bearing with finger-tight force.
2) Tighten locknut (27) against the hinge lug bushing to 90-120 lb-in (10.2-13.5 newton-meters).
3) Doubletwist lockwire bushing (26) and locknut (27) to attach on the outboard side of the elevator hinge fitting.

NOTE: Lockwire must prevent clockwise and counterclockwise movements.

4) Install bolt (25), washers (22 and 24), bushing (21), and nut (23), and tighten nut (23) to 440-650 lb-in (49.7-73.4 newton-meters).

(h) Install three sets of bolts (11), washers (12, 14), bushings (13), and nuts (15) in the PCA's reaction link hinges.

NOTE: To tighten nut (15) make sure that the nut run-on torque before clamp-up is 90-400 lb-in (10.2-45.1 newton-meters), then tighten to 1300-2000 lb-in (147-224 newton-meters).

(i) Install three sets of bolts (11), washers (12, 14), bushings (13), and nuts (15) in the PCA hinges.

NOTE: To tighten nut (15) make sure that the nut run-on torque before clamp-up is 90-400 lb-in (10.2-45.1 newton-meters), then tighten to 1300-2000 lb-in (147-225 newton-meters).

(j) Do these steps to install the inboard bonding jumper (3):

NOTE: Bolt (2) is an electrical bonding fastener to the elevator upper skin panel.

1) Prepare, clean and apply BMS 10-21 Type I to the countersink hole in the elevator upper skin panel (Ref 51-24-02).
2) Install bolt, washers, jumper and nut (2, 4, 3, and 5) dry.
3) Finish the head of bolt (2) as follows:
   a) Apply one coat BMS 10-79, Type II primer (Ref 51-21-10).
   b) Apply BMS 10-86, Type I or II, gray (Ref 51-21-10).
4) Finish nut (5) and jumper (3) end as follows:
   a) Apply one coat of BMS 10-11, Type I primer after the bonding jumper is installed (Ref 51-21-10).
   b) Seal with BMS 5-95.

(k) Do these steps to install the outboard bonding jumper (7):
1) Install bolt, jumper, washer and nut (8, 7, 9 and 10).
2) Finish bolt (8), nut (10) and jumper (7) end as follows:
   a) Apply one coat of BMS 10-11, Type I primer after the bonding jumper is installed (Ref 51-21-10).
   b) Seal with BMS 5-95.

(l) Use a milliohmeter to do an electrical resistance test at the inboard and outboard jumper locations as follows:
1) Measure electrical resistance between the upper skin panel of the elevator and the stabilizer rear spar for the above locations.

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER JAN 28/01. THIS LIST CREATED AT 2001/11/09.15:39:31 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
12-1001	JUL 18/01	SEP 28/01	12-21-09
27-1002	FEB 02/01	# 27-1003	27-62-00
27-1003	MAR 07/01	MAY 28/01	27-62-00
27-1004	NOV 16/01	* ACTIVE	27-31-01
32-1002	OCT 05/01	* ACTIVE	32-35-00
35-1001	JAN 29/01	MAY 28/01	35-21-04
71-1002	NOV 05/01	* ACTIVE	71-00-03
72-1002	JUL 20/01	SEP 28/01	72-00-00

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED JAN 28/02.
\# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

ALERT No. 27-559

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS ENGINEERING (TECHNICAL INFORMATION SERVICES, G2, TBA, S401, P. O. BOX 10, HEATHROW AIRPORT, HOUNSLOW, MIDDLESEX TW6 2JA).
CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 27-31-05 Page 412

REASON FOR REVISION

To add a caution.

ACTION

TASK 27-31-05-424-067

3. Install the Power Control Actuator (PCA)

E. Elevator PCA Installation

Ignore existing step (11) and read the following:

(11) CAUTION: ENSURE A MINIMUM CLEARANCE OF 0.20 INCHES EXISTS BETWEEN HYDRAULIC TUBING AND THE ADJACENT STRUCTURE WHEN CONNECTING RIGID HYDRAULIC LINES.

Connect the hydraulic lines (10) to the PCA (9).

ELEVATOR POWER CONTROL ACTUATOR (PCA)/REACTION LINK - REMOVAL/INSTALLATION

TEMPORARY REVISION 27-1005

FILING INSTRUCTIONS

This temporary revision applies only to the AMM document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm manual, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated Jan 28/02.

Revision reason: Changed the grease callout from BMS 3-24 to BMS 3-33.

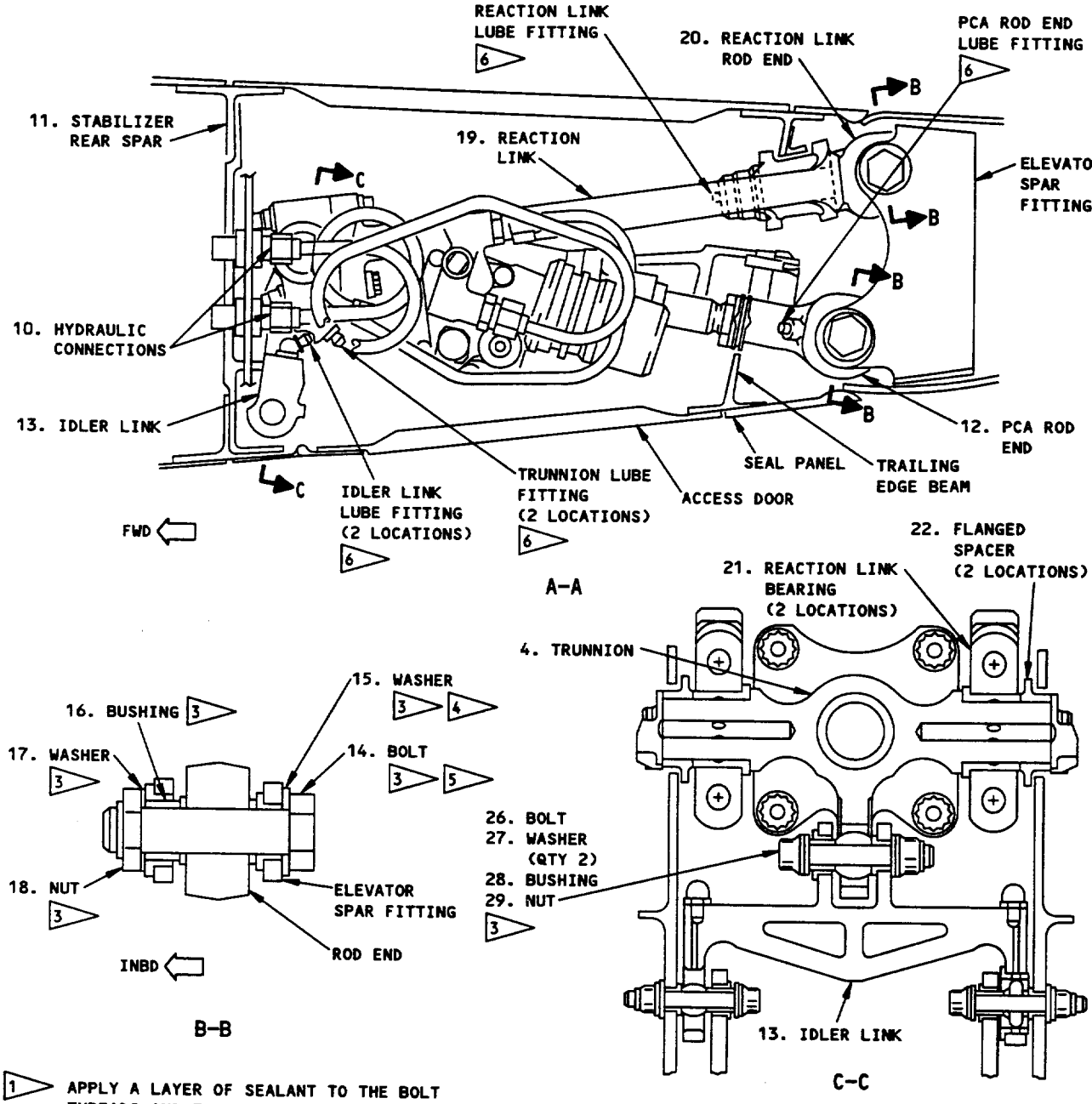
This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

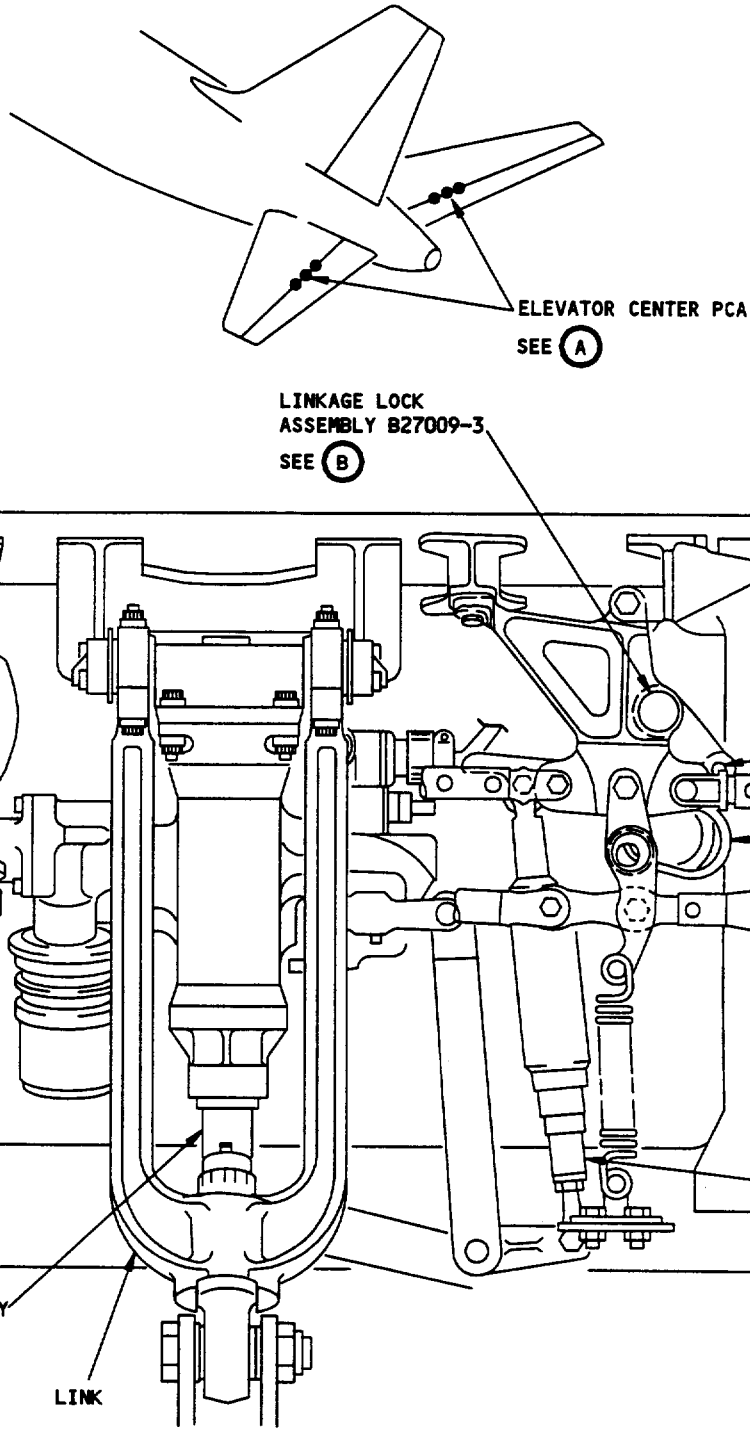
PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
401	JUN 20/90	01	423	JUN 20/95	02			
402	JUN 20/90	01						
* 403	NOV 16/01	01.1						
* 404	JUN 20/90	01						
405	JUN 20/90	01						
406	JUN 20/90	01						
* 407	SEP 20/96	01						
* 408	NOV 16/01	01.1						
409	SEP 28/01	01						
410	SEP 28/01	01						
* 411	SEP 28/01	01						
* 412	NOV 16/01	01.1						
* 413	JAN 20/99	01						
* 414	NOV 16/01	01.1						
415	JUN 20/97	01						
416	JUN 20/95	01						
417	JAN 28/01	01						
418	SEP 28/01	01						
* 419	SEP 28/01	01						
* 420	NOV 16/01	01.1						
* 421	NOV 16/01	01.1						
* 422	JAN 20/99	02						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.



1. APPLY A LAYER OF SEALANT TO THE BOLT THREADS AND THREAD END OF THE SHANK AND INSTALL BOLTS, WASHERS, AND NUTS. CLEAN ANY UNWANTED SEALANT
2. APPLY A LAYER OF SEALANT TO THE MATING SURFACE BEFORE INSTALLATION
3. INSTALL THE BOLTS, BUSHINGS, WASHERS, AND NUTS WITH BMS 3-33 GREASE. CLEAN ANY UNWANTED GREASE
4. INSTALL THE WASHER WITH THE CHAMFER POINTED TO THE HEAD OF THE BOLT
5. INSTALL THE BOLT WITH THE HEAD OUTBOARD
6. FULLY LUBRICATE WITH BMS 3-33 GREASE. TURN THE PARTS TO MAKE SURE THAT THERE IS SUFFICIENT LUBRICATION. CLEAN ANY UNWANTED GREASE

Elevator Power Control Actuator (PCA) and Reaction Link Installation
Figure 401 (Sheet 2)



ELEVATOR CENTER PCA
LEFT WING SHOWN (RIGHT WING OPPOSITE)

(A)

Elevator PCA Lockout Equipment Installation
Figure 402 (Sheet 1)

D. Prepare for the Removal

S 224-003
(1) Supply electrical power (Ref 24-22-00).

S 864-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 864-005
(3) Move the stabilizer to 6 units of trim.

S 864-006
(4) Remove the pressure from the right, center and left hydraulic systems and reservoirs (AMM 29-11-00).

NOTE: The right hydraulic system supplies the power to the outboard PCAs. The left hydraulic system supplies the power to the middle PCAs. The center hydraulic system supplies the power to the inboard PCAs.

S 864-009
(5) Pull both control columns to full aft and hold them in this position with ropes.

S 494-008
(6) Attach a DO-NOT-OPERATE tag on each control column.

S 864-010

(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-011

(8) Move the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-012

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF RIGHT
   (c) 11C13, STAB TRIM SHUTOFF LEFT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (i) 11J10, PCU MON SENSOR
   (j) 11J11, PCU MON MOD

S 014-014

(10) Open the access panel, 335DB (left elevator PCAs) or 345DB (right elevator PCAs) (Ref 06-42-00).

S 024-013

(11) Remove the seal panel and the trailing edge beam aft of the access panel (Fig. 401, Section A-A).

S 494-015

WARNING: INSTALL THE TWO ELEVATOR LOCK ASSEMBLIES (PCA AND PCA LINKAGE LOCK ASSEMBLIES) BEFORE YOU DO WORK ON THE PCA OR PCA LINKAGES. INSTALL THE PCA LINKAGE LOCK ASSEMBLY BEFORE THE PCA LOCK ASSEMBLY. MAKE SURE THE ELEVATOR CONTROL COLUMN IS HELD TO THE FULL AFT POSITION WHILE YOU INSTALL THE LOCK ASSEMBLIES. ACCIDENTAL MOVEMENT OF THE PCA CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(12) Manually turn the elevator up and install the elevator PCA lockout equipment with the steps that follow (Fig. 402):

   NOTE: A force of approximately 60 pounds (266 newtons) on the elevator trailing edge is necessary to lift the elevator.

   (a) Install the PCA linkage lock assembly on the elevator center PCA linkage (Detail B).

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-31-00/501, Elevator Control System
(4) 27-31-05/601, Elevator Power Control Actuator

D. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

E. Elevator PCA Installation (Fig. 401)

S 644-029
(1) Lubricate the trunnion (4) and the idler link (13) with BMS 3-33 grease through the grease fittings (Section A-A).

NOTE: Turn the parts to make sure that there is sufficient lubrication, and remove unwanted grease.

S 224-030
(2) Do a check for the permitted wear on the PCA attach points (Ref 27-31-05).

S 104-031
(3) Clean the mating surfaces between the PCA (9) and the trunnion (4), and remove all of the remaining sealant.

S 624-032
(4) Apply a layer of sealant to the faying surface of the PCA (9) and put the PCA against the faying surface of the trunnion (4).

S 434-033
(5) Install the bolts (1), washers (2), and nuts (3) to the PCA with wet sealant.

S 434-034
(6) Tighten the nuts (3) to 90-125 pound-inches (10.2-14.1 newton-meters)

NOTE: Make sure the trunnion and the flanged

S 644-035
(7) Fully lubricate the PCA rod end (12) with BMS 3-33 grease through the grease fittings (Section A-A).

S 434-036
(8) Put the PCA rod end (12) into the elevator spar fitting and install with a bolt (14), washers (15, 17), bushing (16), and nut (18) with BMS 3-33 grease.

S 434-037
(9) Make sure that the run-on torque for the nut (18) is 90-400 (10-45 newton-meters) pound-inches, then tighten the nut to 1300-2000 pound-inches (147-225 newton-meters).

S 094-038
(10) Remove the plugs from the hydraulic lines (10) and the caps from the PCA ports (9).

S 434-039
(11) Connect the hydraulic lines (10) to the PCA (9).

S 434-040
(12) Align the pogo rod (5) to the PCA summing lever and install the bolt (6), washer (7), and nut (8).

NOTE: It is necessary to adjust the elevator PCA pogo rod if the adjustment for the pogo rod was changed while disconnected (Ref 27-31-00).

S 434-041
(13) Connect the electrical connector to the PCA (9).

S 094-042
(14) Remove the elevator PCA lockout equipment (Fig. 402).

S 094-044
(15) Remove the DO-NOT-OPERATE tags from the control columns.

S 864-043
(16) Release the control columns and put them back to the center position.

S 864-092

(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
  (a) 11B19, STAB TRIM ALT (IF INSTALLED)
  (b) 11C12, STAB TRIM SHUTOFF RIGHT
  (c) 11C13, STAB TRIM SHUTOFF LEFT
  (d) 11H11 or 11C05, STAB TRIM CONT L
  (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (f) 11H18, FLT CONT SHUTOFF TAIL CTR
  (g) 11H20, STAB TRIM CONT R
  (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
  (i) 11J10, PCU MON SENSOR
  (j) 11J11, PCU MON MOD

S 864-090

(18) Move the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-091

(19) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 644-048

(20) Fully lubricate the link bearing with MIL-G-23827 grease before you adjust the PCA.

S 724-068

(21) If you only replace one elevator PCA, then do these steps:
  (a) Pressurize the hydraulic system to one of the the PCAs that was not replaced (AMM 29-11-00/201).

NOTE: The center hydraulic system supplies pressure to the inboard PCA. The left hydraulic system supplies pressure to middle PCA. The right hydraulic system supplies pressure to the outboard PCA.

(b) Keep a record of the exact position of the elevator trailing edge at the index plate.
(c) Remove hydraulic power from the PCA that was not replaced (AMM 29-11-00/201).
(d) Supply hydraulic power to the other PCA that was not replaced (AMM 29-11-00/201).
(e) Keep a record of the exact position of the elevator trailing edge at the index plate.
(f) Remove hydraulic power from the PCA (AMM 29-11-00/201).
(g) Supply hydraulic power to the replaced elevator PCA (AMM 29-11-00/201).
(h) Keep a record of the exact position of the elevator trailing edge at the index plate.
(i) Make sure that this position is +/- 0.05 inch (1.27 mm) from the first two positions.
(j) If this position is not +/-0.05 inch (1.27 mm) from the first two positions, then do these steps:
    1) Cut the lockwire of the input pogo rod of the replaced PCA.
    2) Adjust the input pogo rod to move the elevator to +/- 0.05 inch of first two positions.

        NOTE: When you rig the PCA pogo rods, you must adjust the surface upward toward the index plate and not downward. Therefore, the linkage of the unpowered PCA's should be pushed forward to eliminate possibility of a hydraulic lock.

        If you adjust the surface too far above the index plate, it is necessary to pull the linkage of the unpowered PCA's aft to relieve a hydraulic lock. This will move the surface down below the index plate so you can re-rig the sufarce.

    3) Do a check of the input pogo rod end for correct thread engagement. Make sure that a 0.045 inch (1.14 mm) diameter pin can not be installed in the inspection hole.
    4) Tighten the input pogo rod check nut. Do not lockwire.
        a) Make sure that the elevator does not move when you tighten the input pogo rod check nut.
    5) Lockwire the check nut on the input pogo rod end.
(k) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-31-00/501, Elevator Control System
(4) 27-31-05/601, Elevator Power Control Actuator

D. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

E. Reaction Link Installation (Fig. 401)

S 224-069
(1) Do a check on the permitted wear for the reaction link (19) (Ref 27-31-05).

S 644-070
(2) Lubricate the trunnion (4), idler link (13), reaction link rod end (20), and PCA rod end (12) through the grease fittings with BMS 3-33 grease.

NOTE: Turn the parts to make sure that there is sufficient lubrication, and clean all unwanted grease.

S 104-071
(3) Remove all the used sealant and clean the faying surfaces between the reaction link (19) and its bearings (21).

S 104-072
(4) Remove all the used sealant and clean the mating surfaces between the PCA (9) and the trunnion (4).

S 624-073
(5) Apply a layer of sealant to the mating surface of the PCA (9), and put the PCA against the faying surface of the trunnion (4).

S 434-074
(6) Install the bolts (1), washers (2), and nuts (3) on the PCA with wet sealant.

S 434-075
(7) Tighten the nuts to 90-125 pound-inches (10.2-14.1 newton-meters).

S 644-076
(8) Apply a layer of sealant to the mating surface of the reaction link bearing (21), the assembled reaction link (19) and its bearings (21), and the trunnion (4).

S 434-077
(9) Install the bolts (23), washers (24), and nuts (25) to the reaction link with wet sealant.

S 434-078
(10) Tighten the nuts to 90-125 pound-inches (10.2-14.1 newton-meters).

NOTE: Make sure the trunnion (4) and the flanged spacers (21) can turn freely.

S 434-079
(11) Move the trunnion (4) into the idler link (13) and install the bolt (26), washers (27), bushing (28), and nut (29) with BMS 3-33 grease.

S 434-080
(12) Move the reaction link rod end (20) and the PCA rod end (12) to the elevator spar fitting and install the bolts (14), washers (15, 17), bushings (16) and nuts (18) with BMS 3-33 grease.

S 434-081
(13) Make sure the run-on torque for the nut is 90-400 pound-inches (10.2-14.1 newton-meters), then tighten the nut to 1300-2000 pound-inches (147-225 newton-meters)

S 094-082
(14) Remove the plugs from the hydraulic lines (10) and the caps from the PCA ports (9).

S 434-083
(15) Align the pogo rod (5) with the PCA summing lever and install the bolt (6), washer (7), and nut (8).

NOTE: It is necessary to adjust the elevator system if the adjustment of the pogo rod was changed while disconnected (Ref 27-31-00).

S 434-084
(16) Connect the electrical connector to the PCA (9).

S 424-085
(17) Connect the pressure sensor conduit to the stabilizer rear spar only if you are to install the right outboard PCA reaction link (Fig. 403).

S 094-086
(18) Remove the elevator PCA lockout equipment (Fig. 402).

S 094-087
(19) Remove the DO-NOT-OPERATE tags from the control columns.

S 864-044
(20) Release the control columns and put them back to the center position.

S 864-093
(21) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF RIGHT
(c) 11C13, STAB TRIM SHUTOFF LEFT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-094
(22) Move the RIGHT and LEFT STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-095
(23) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 824-048
(24) Adjust the power control actuator (Ref 27-31-00).

S 724-049
(25) Do a test on the elevator travel limits (Ref 27-31-00).

S 724-096
(26) Do a test on the Elevator PCU Monitor System (Ref 27-31-00).

F. Put the Airplane Back to Its Usual Condition

S 424-017
(1) Install the trailing edge beam and the seal panel.

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER JAN 28/01. THIS LIST CREATED AT 2001/11/09.17:32:20 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
12-1001	JUL 18/01	SEP 28/01	12-21-09
27-1002	FEB 02/01	# 27-1003	27-62-00
27-1003	MAR 07/01	MAY 28/01	27-62-00
27-1004	NOV 16/01	* ACTIVE	27-31-01
27-1005	NOV 16/01	* ACTIVE	27-31-05
32-1002	OCT 05/01	* ACTIVE	32-35-00
35-1001	JAN 29/01	MAY 28/01	35-21-04
71-1002	NOV 05/01	* ACTIVE	71-00-03
72-1002	JUL 20/01	SEP 28/01	72-00-00

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED JAN 28/02.
\# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

EFFECTIVITY

ALL

ELEVATOR POWER CONTROL ACTUATOR (PCA) INPUT LINKAGE - REMOVAL/INSTALLATION

TEMPORARY REVISION 27-1006

FILING INSTRUCTIONS

This temporary revision applies only to the AMM document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm manual, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated Jan 28/02.

Revision reason: Changed the grease callout from BMS 3-24 to BMS 3-33.

This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
401	DEC 20/90	01						
402	DEC 20/90	01						
403	DEC 20/90	01						
404	DEC 20/90	01						
* 405	NOV 16/01	01.1						
* 406	DEC 20/92	01						
* 407	NOV 16/01	01.1						
* 408	JAN 20/99	01						
409	MAR 20/91	02						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.

S 494-007

(6) Attach DO-NOT-OPERATE tags on the control columns.

S 864-008

(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-009

(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOFF position.

S 864-010

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF RIGHT
   (c) 11C13, STAB TRIM SHUTOFF LEFT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (i) 11J10, PCU MON SENSOR
   (j) 11J11, PCU MON MOD

S 014-011

(10) Open the access panel for the elevator PCAs, 335DB (left elevator PCAs) or 345DB (right elevator PCAs) (Ref 06-42-00).

S 034-012

(11) Remove the seal panel and the trailing edge beam that is aft of the access panel that you removed.

S 494-013

WARNING: INSTALL THE PCA LOCK ASSEMBLY BEFORE YOU REMOVE OR INSTALL THE PCA INPUT LINKAGE. MAKE SURE THE CONTROL COLUMNS ARE IN THE FULL AFT POSITION WITH DO-NOT-OPERATE TAGS ATTACHED TO THEM BEFORE YOU INSTALL THE PCA LOCK ASSEMBLY. INJURY TO PERSONS OR DAMAGE TO THE ELEVATOR CAN OCCUR.

(12) Manually lift the elevator trailing edge up and install the PCA lock assembly (Fig. 402).

NOTE: A force of approximately 60 pounds (266 newtons) on the elevator trailing edge is necessary to lift the elevator. The PCA lock assembly can be installed on the inboard, center, or outboard PCA.

S 044-014

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 864-015

(14) Remove electrical power (Ref 24-22-00).

E. Remove the PCA Input Linkage (Fig. 401)

NOTE: The steps that follow apply to the outboard, center, and inboard PCA linkages unless specified differently.

S 034-016

(1) On the center and outboard PCA linkages only, disconnect the centering spring from the crank assembly (View C and D).

S 034-017

(2) Disconnect the two ends of the pogo rod and remove the pogo rod.

NOTE: Do not change the adjustment of the pogo rod while it is disconnected. If you do, you will have to adjust the elevator system.

S 034-018

(3) Disconnect the interconnect rods from the crank assembly.

S 034-019

(4) On the inboard PCA linkage only, disconnect the PCA input rod from the crank assembly (View B).

S 034-020
(5) Remove the fasteners, bearings, and bushings that connect the crank assembly to the swing link assembly (View A-A, B-B, and C-C).

S 024-021
(6) Remove the crank assembly.

S 034-022
(7) Remove the fasteners, bearings, and bushings that connect the swing link assembly to the support brackets (View A-A, B-B, and C-C).

S 024-023
(8) Remove the swing link assembly.

TASK 27-31-06-424-024

3. Install the PCA Input Linkage

A. Consumable Materials
(1) Grease, Corrosion Preventive - BMS 3-33

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 27-31-00/501, Elevator Control System
(3) 27-61-00/201, Spoiler Speedbrake Control System.

C. Access
(1) Location Zones

211/212	Control Cabin
335/345	Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels

335DB/345DB	Elevator PCAs

D. Install the PCA Input Linkage (Fig. 401)

NOTE: Apply a layer of grease on all of the bolts, nuts, bearings and bushings before you install them.

S 424-025
(1) Install the fasteners, bearings and bushings to connect the swing link assembly to the support brackets (View A-A, B-B, and C-C).

S 424-026
(2) Install the fasteners, bearings and bushings to connect the crank assembly to the swing link assembly (View A-A, B-B, and C-C).

S 434-027
(3) Connect the interconnect rods to the crank assembly.

S 434-028
(4) On the inboard PCA linkage only, connect the PCA input rod to the crank assembly (View B).

S 434-029
(5) Connect the two ends of the pogo rod.

NOTE: If you changed the adjustment of the pogo rod while it was disconnected, do the elevator PCA adjustment (Ref 27-31-00).

S 434-030
(6) On the center and outboard PCA linkages only, connect the centering spring to the crank assembly (View C and D).

S 094-031
(7) Remove the PCA lock assembly (Fig. 402).

S 094-032
(8) Remove the rope and DO-NOT-OPERATE tags from the control columns and let the control columns go to the neutral position.

S 864-033
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-034
(10) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-035
(11) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 824-036
(12) Do the adjustment for the elevator PCAs (Ref 27-31-00).

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER JAN 28/01. THIS LIST CREATED AT 2001/11/09.19:16:57 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
12-1001	JUL 18/01	SEP 28/01	12-21-09
27-1002	FEB 02/01	# 27-1003	27-62-00
27-1003	MAR 07/01	MAY 28/01	27-62-00
27-1004	NOV 16/01	* ACTIVE	27-31-01
27-1005	NOV 16/01	* ACTIVE	27-31-05
27-1006	NOV 16/01	* ACTIVE	27-31-06
32-1002	OCT 05/01	* ACTIVE	32-35-00
35-1001	JAN 29/01	MAY 28/01	35-21-04
71-1002	NOV 05/01	* ACTIVE	71-00-03
72-1002	JUL 20/01	SEP 28/01	72-00-00

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED JAN 28/02.
\# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

ELEVATOR AFT QUADRANTS - REMOVAL/INSTALLATION

TEMPORARY REVISION 27-1007

FILING INSTRUCTIONS

This temporary revision applies only to the AMM document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm manual, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated Jan 28/02.

Revision reason: Changed the grease callout from BMS 3-24 to BMS 3-33.

This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
401	DEC 20/90	01						
402	DEC 20/90	01						
403	DEC 20/90	01						
404	DEC 20/90	01						
* 405	NOV 16/01	01.1						
* 406	NOV 16/01	01.1						
* 407	NOV 16/01	01.1						
* 408	NOV 16/01	01.1						
* 409	JAN 20/99	01.101						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.

S 864-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right hydraulic system (Ref 29-11-00).

S 864-006

(5) Move the horizontal stabilizer until Dimension B on the stabilizer actuator ballscrew is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 401).

S 864-007

(6) Remove the pressure from the right hydraulic system (Ref 29-11-00).

S 214-008

(7) Make sure the pressure is removed from the left and center hydraulic systems (Ref 29-11-00).

S 864-009

(8) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-010

(9) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-011

(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11B19, STAB TRIM CONT ALT (IF INSTALLED)
- (b) 11C12, STAB TRIM SHUTOFF LEFT
- (c) 11C13, STAB TRIM SHUTOFF RIGHT
- (d) 11H11 or 11C05, STAB TRIM CONT L
- (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
- (f) 11H18, FLT CONT SHUTOFF TAIL CTR
- (g) 11H20, STAB TRIM CONT R
- (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

E. Remove the Aft Quadrants (Fig. 402)

S 494-012

(1) Install rig pin E/ST6 in the base of the captain's control column.

S 494-013
(2) Install the rig pins E/ST8 and E/ST9 in the left and right elevator's middle PCAs.

S 494-014
(3) Attach tags to identify the captain's and the first officer's elevator control cables.

S 034-015
(4) Disconnect the captain's and the first officer's elevator control cables.

NOTE: All three turnbuckles must loosened to make allowances for the cable tension regulator.

S 034-016
(5) Disconnect the left and right output control rods from the output arms on the aft quadrant.

NOTE: Do not change the adjustment of the output control rods.

S 034-017
(6) Remove the asymmetry limiter actuator (Ref 27-31-03).

S 034-018
(7) Use the spring removal tool to remove the decentering springs on the elevator feel unit.

NOTE: There are 4 springs. The force of the installed spring is 100 pounds (445 newtons).

S 034-019
(8) Disconnect the two control rods for the elevator feel unit from the torque tube levers on the aft quadrant.

S 034-020
(9) Disconnect the three servo control rods for the autopilot pitch control from the torque tube levers on the aft quadrant.

S 034-021
(10) Remove the two cam springs from the override mechanism on the aft quadrant.

S 034-022
(11) Remove the three fasteners that hold the first officer's aft quadrant and torque tube to the captain's aft quadrant and torque tube.

S 024-023
(12) Remove the first officer's aft quadrant and torque tube.

S 034-024
(13) Remove the indexer bracket on the aft quadrant.

S 034-025
(14) Remove the two fasteners that hold the captain's aft quadrant and torque tube to the support structure of the torque box.

S 024-026
(15) Remove the captain's aft quadrant and torque tube.

TASK 27-31-15-424-027

3. Install the Aft Quadrant

A. Equipment
(1) Removal Tool, Decentering Springs, Elevator - B27060-1

B. Consumable Materials
(1) Corrosion Preventive, BMS 3-33

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-31-00/501, Elevator Control System
(4) 27-31-03/401, Asymmetry Limiter Actuator

D. Access
(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Elevator Aft Quadrants

E. Install the Elevator Aft Quadrants (Fig. 402)

NOTE: You must apply a layer of corrosion preventive grease on all fasteners, bushings, and bearings that will be installed at movable joints.

S 434-028
(1) Install the two fasteners that attach the captain's aft quadrant and torque tube to the support structure of the torque box and tighten the nuts as follows:
(a) Tighten the inner nut to 50-60 pound-inches (5.6-6.7 newton-meters).

(b) Tighten the outer nut to 10 pound-inches (1.1 Nm).

NOTE: Do not try to tighten the inner nut again.

S 434-029
(2) Install the indexer bracket on the aft quadrant.

S 434-030
(3) Install the three fasteners to attach the first officer's aft quadrant and torque tube to the captain's aft quadrant and torque tube.

S 434-031
(4) Install the two cam springs on the override mechanism.

S 434-032
(5) Install the asymmetry limiter actuator (Ref 27-31-03).

S 094-033
(6) Remove the identification tags and connect the captain's and the first officer's elevator control cables to the aft quadrants.

S 434-034
(7) Connect the left and right output control rods to the output arms on the aft quadrant.

S 434-035
(8) Connect the two control rods for the elevator feel unit to the aft quadrant flanges.

S 434-036
(9) Use the spring removal tool to install the four decentering springs on the elevator feel unit.

S 434-037
(10) Connect the three control rods for the autopilot pitch control servo (APCS) to the aft quadrant flanges.

S 094-038
(11) Remove rig pins E/ST6, E/ST8 and E/ST9.

S 824-039
(12) Do the adjustment for the elevator control system (Ref 27-31-00).

S 714-040
(13) Do the operational test for the elevator control system (Ref 27-31-00).

F. Put the Airplane Back to Its Usual Condition

S 864-041

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11B19, STAB TRIM CONT ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 214-042

(2) Make sure the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 214-043

(3) Make sure the L, R and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 864-044

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-045

(5) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-046

(6) Close the access door for the aft quadrants, 313AL (Ref 06-42-00).

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER JAN 28/01. THIS LIST CREATED AT 2001/11/09.20:42:14 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
12-1001	JUL 18/01	SEP 28/01	12-21-09
27-1002	FEB 02/01	# 27-1003	27-62-00
27-1003	MAR 07/01	MAY 28/01	27-62-00
27-1004	NOV 16/01	* ACTIVE	27-31-01
27-1005	NOV 16/01	* ACTIVE	27-31-05
27-1006	NOV 16/01	* ACTIVE	27-31-06
27-1007	NOV 16/01	* ACTIVE	27-31-15
32-1002	OCT 05/01	* ACTIVE	32-35-00
35-1001	JAN 29/01	MAY 28/01	35-21-04
71-1002	NOV 05/01	* ACTIVE	71-00-03
72-1002	JUL 20/01	SEP 28/01	72-00-00

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED JAN 28/02.
\# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

FAULT ISOLATION

TEMPORARY REVISION 27-1003

FILING INSTRUCTIONS

This temporary revision replaces Temporary Revision 27-1002, which should be removed and destroyed.

This temporary revision applies only to document D633N132. For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm supplement, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

This temporary revision will be incorporated in the revision dated May 28/01.

Revision reason: Added the main landing gear truck tilt sensor.

This temporary revision furnishes an advance copy of the enclosed page(s) which supersede any previously issued page(s). The information thereon is to be used until this revision is either incorporated or rescinded.

At the end of this TR there is a TR Status Report for document D633N132.

REVISED LIST OF EFFECTIVE PAGES FOR THIS DOCUMENT

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
* 101	MAY 28/99	01						
* 102	JUN 20/91	01						
* 103	JUN 20/91	01						
* 104	JUN 20/91	01						

* INDICATES PAGE INCLUDED IN THIS TEMPORARY REVISION.

AUTO-SPEEDBRAKE CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ASSEMBLY - (FIM 22-32-00/101)				
AUTOTHROTTLE MICROSWITCH PACK, M966				
ACTUATOR - AUTO-SPEEDBRAKE, M577	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
CIRCUIT BREAKER -	1		FLT COMPT, P11	
AUTO SPEED BRAKE, C1023		1	11G11	*
CLUTCH - AUTO SPEEDBRAKE NO-BACK	2	1	FLT COMPT, CONTROL STAND P10	27-62-02
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
DELAY - (FIM 31-01-36/101)				
AUTO-SPEEDBRAKE TIME, M963				*
DIODE - (FIM 31-01-37/101)				
AUTO-SPEEDBRAKE LIGHT ISOL, R10213 [1]				*
LEVER - SPEEDBRAKE	1	1	FLT COMPT, CONTROL STAND P10	27-62-01
LEVERS - (FIM 76-11-00/101)				
FORWARD THRUST				
REVERSE THRUST				
LIGHT - AUTO SPD BRK, L15	1	1	FLT COMPT, P5, AUX ANN M10394	*
MECHANISM - SPEEDBRAKE		1	FLT COMPT, CONTROL STAND P10	27-62-02
PANEL - (FIM 30-31-00/101)				
AUXILIARY ANNUNCIATOR, M10394				
RELAY - (FIM 32-09-00/101)				
AIR/GND SYS 1, K167				
AIR/GND SYS 2, K211				
RELAY - (FIM 31-01-36/101)				
AUTO-SPEEDBRAKE AIR/GND 1, K87				
AUTO-SPEEDBRAKE AIR/GND 2, K88				
AUTO-SPEEDBRAKE EXTEND, K217				
AUTO-SPEEDBRAKE RETRACT, K218				
AUTO-SPEEDBRAKE WARNING, K220				
RELAY - (FIM 31-01-37/101)				
LANDING GEAR TILT PRESSURE, K550				
RESISTOR - (FIM 31-01-37/101)				
AUTO-SPEEDBRAKE LIGHT ISOL, R10214 [1]				

* SEE THE WDM EQUIPMENT LIST

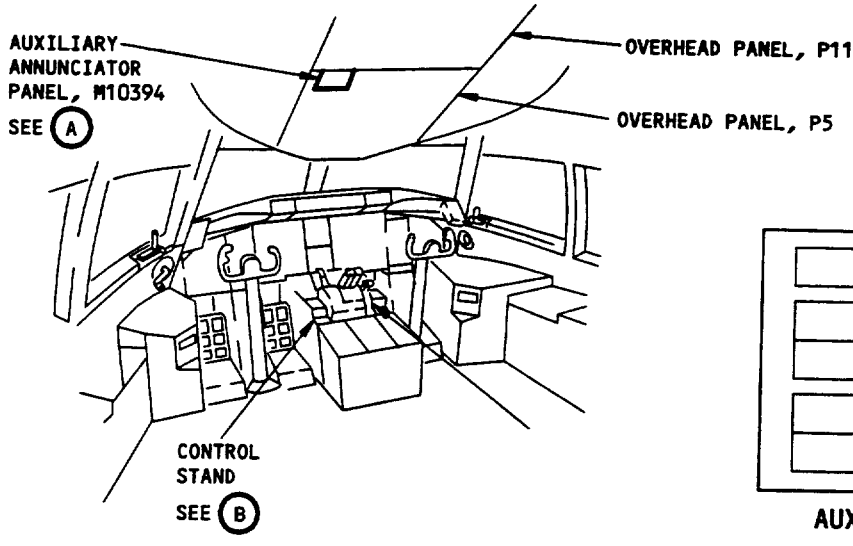
[1] IF INSTALLED (POST-SB 31-19)

Auto-Speedbrake Control System - Component Index
Figure 101 (Sheet 1)

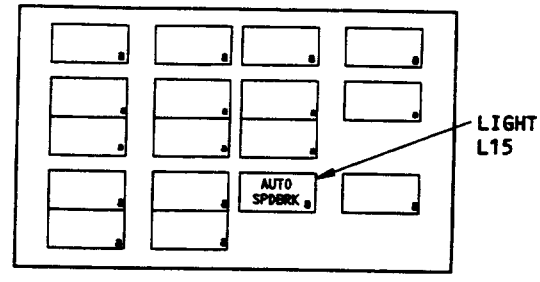
AUTO-SPEEDBRAKE CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - AUTO-SPEEDBRAKE ARMING, S371	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
SWITCH - LEFT SPEEDBRAKE RETRACT LEVER POSITION, S10	2	1	113AL, FWD EQUIP COMPT, AUTO-THROTTLE MICROSWITCH PACK ASSEMBLY M966	27-62-07
SWITCH - LEFT GEAR TILT PRESSURE, S452 (REF 32-30-00, FIG. 101)				
SWITCH - REVERSE THRUST LEVER POSITION, S374	1	1	FLT COMPT, CONTROL STAND P10	27-62-08
SWITCH - RIGHT SPEEDBRAKE RETRACT LEVER POSITION, S14	2	1	113AL, FWD EQUIP COMPT, AUTO-THROTTLE MICROSWITCH PACK ASSEMBLY M966	27-62-07
SWITCH - RIGHT GEAR TILT PRESSURE, S453 (REF 32-30-00, FIG. 101)				
SWITCH - SPEEDBRAKE LEVER POSITION, S493 (REF 31-51-00, FIG. 101)				
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 1, TS35	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 2, TS36	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 3, TS37	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02

Auto-Speedbrake Control System - Component Index
Figure 101 (Sheet 2)

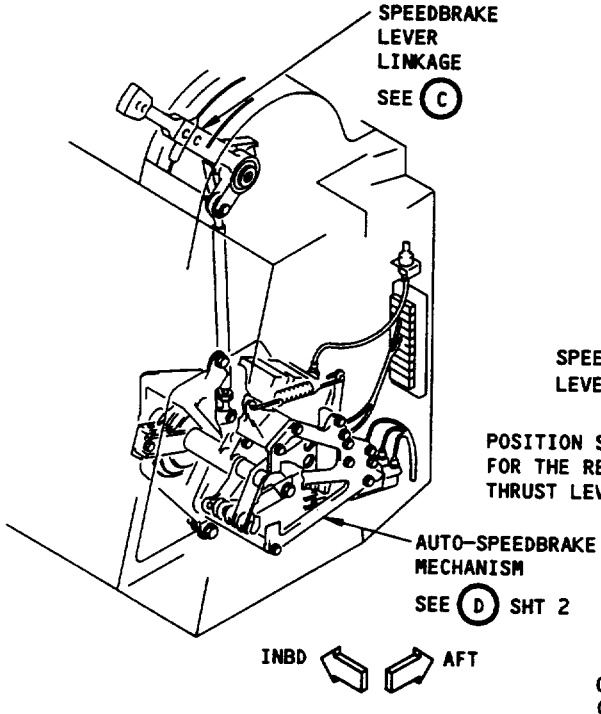


FLIGHT COMPARTMENT



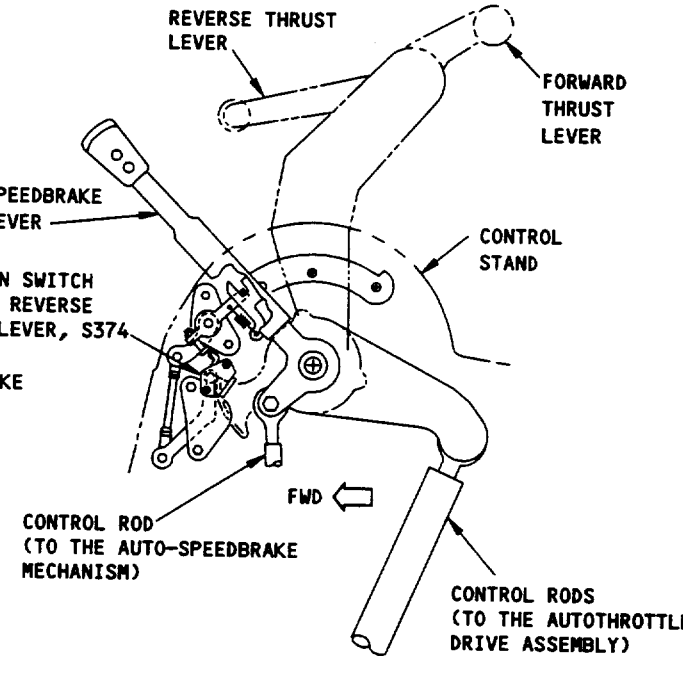
AUXILIARY ANNUNCIATOR PANEL, M10394

(A)



CONTROL STAND

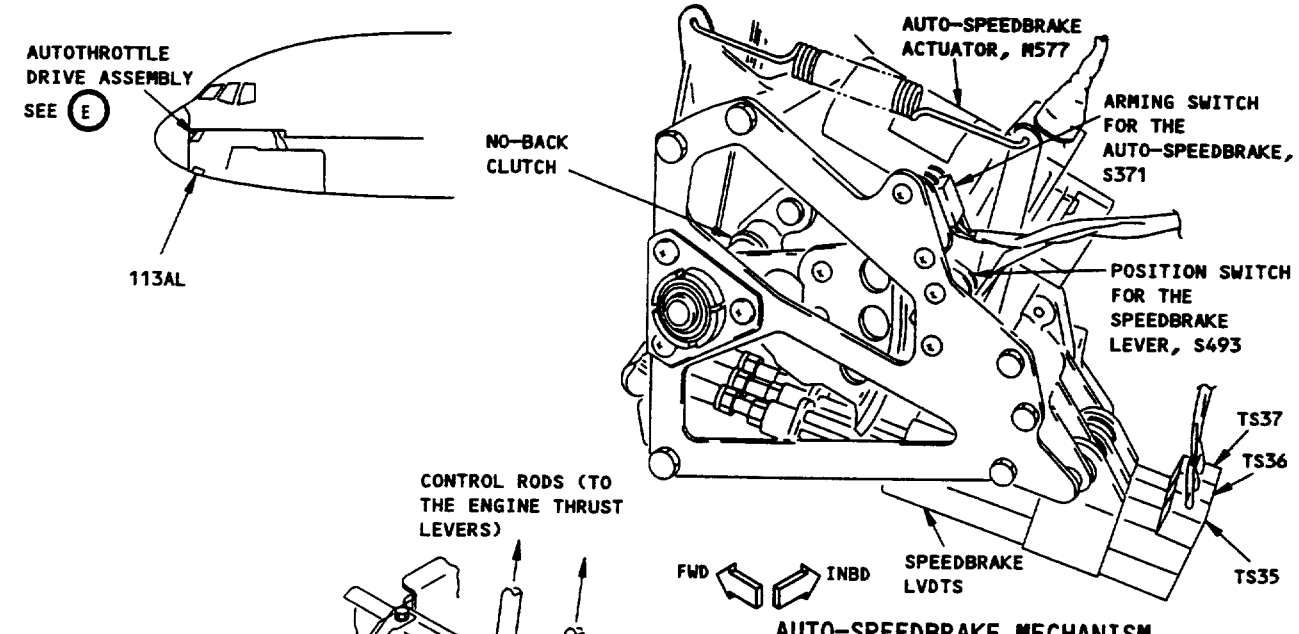
(B)



SPEEDBRAKE LEVER LINKAGE

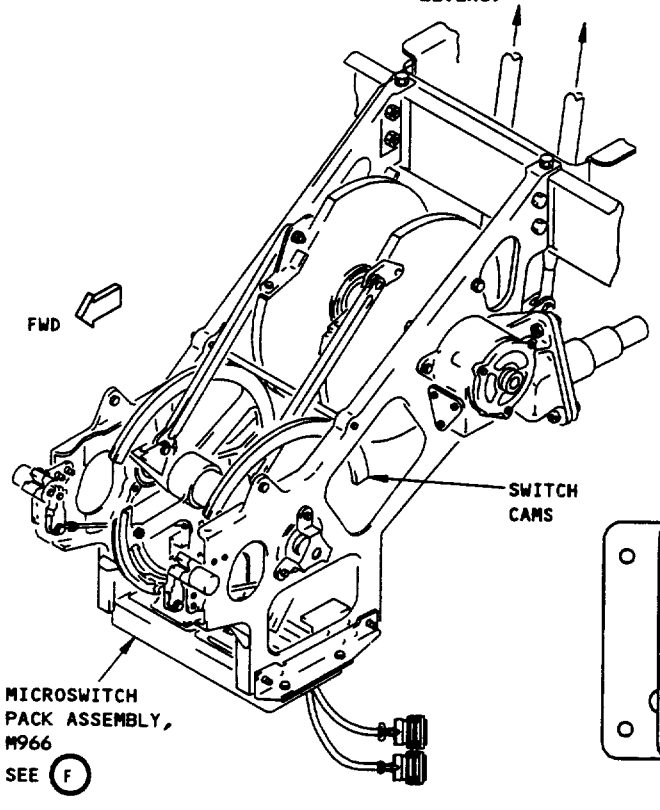
(C)

Auto-Speedbrake Control System - Component Location
Figure 102 (Sheet 1)



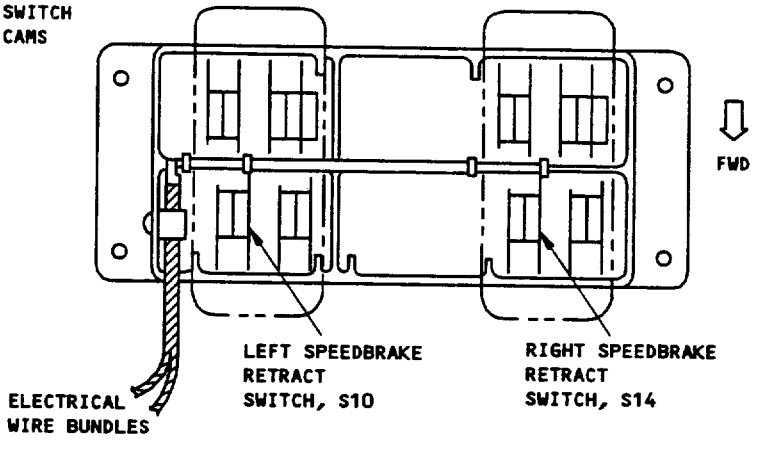
AUTO-SPEEDBRAKE MECHANISM

(D) FROM SHT 1



AUTOTHROTTLE DRIVE ASSEMBLY

(E)



MICROSWITCH PACK ASSEMBLY, M966
(BOTTOM VIEW)

Auto-Speedbrake Control System - Component Location
Figure 102 (Sheet 2)

TEMPORARY REVISION STATUS REPORT FOR DOCUMENT D633N132

THIS LIST CONTAINS ALL TRs WITH TR DATES AFTER MAY 28/00. THIS LIST CREATED AT 2001/02/28.18:06:31 UTC

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT
27-1001	JUN 05/00	SEP 28/00	27-81-18
27-1002	FEB 02/01	# 27-1003	27-62-00
27-1003	MAR 07/01	* ACTIVE	27-62-00
28-1001	SEP 29/00	JAN 28/01	28-22-11
32-1001	OCT 26/00	JAN 28/01	32-42-11
35-1001	JAN 29/01	* ACTIVE	35-21-04
70-1001	DEC 14/00	JAN 28/01	70-12-04
73-1001	JUN 26/00	SEP 28/00	73-11-06

TR NUMBER	TR DATE	DATE INCORPORATED	SUBJECT

* INDICATES TR WAS ACTIVE AT THE TIME OF THIS REPORT;
REMOVE IT WHEN YOU RECEIVE THE REGULAR REVISION DATED MAY 28/01.
# INDICATES TR WAS SUPERSEDED BY THE TR LISTED.

EFFECTIVITY

ALL

GPA Group plc

PAGE	DATE	CODE
CHAPTER 27 TAB		
FLIGHT CONTROLS		
EFFECTIVE PAGES SEE LAST PAGE OF LIST FOR NUMBER OF PAGES		
27-CONTENTS		
1	SEP 28/06	GUI
2	MAY 28/06	GUI
3	SEP 28/06	GUI
4	JAN 20/08	GUI
R 5	JAN 20/09	GUI.1
6	SEP 20/98	GUI
7	SEP 28/01	GUI
8	MAR 20/97	GUI
9	MAR 20/97	GUI
10	MAR 20/97	GUI
11	MAY 28/06	GUI
12	SEP 28/02	GUI
13	SEP 28/02	GUI
14	SEP 28/02	GUI
15	JAN 28/02	GUI
16	SEP 20/08	GUI
17	JAN 28/03	GUI
18	MAY 28/00	GUI
19	MAY 28/00	GUI
20	SEP 28/01	GUI
21	JAN 28/06	GUI
22	MAY 28/00	GUI
23	JAN 28/06	GUI
24	JAN 28/06	GUI
25	MAY 28/07	GUI
26	MAY 28/07	GUI
27	MAY 28/06	GUI
28	MAY 20/08	GUI
29	SEP 28/07	GUI
30	SEP 28/07	GUI
31	SEP 28/07	GUI
32	BLANK	
27-00-00		
1	JAN 28/01	02
2	MAR 20/90	01
3	JUN 20/96	01
4	JAN 20/08	03
27-00-01		
1	MAY 28/01	01
2	JAN 28/01	03
27-00-01		
201	MAY 28/01	01
202	DEC 20/90	03
203	DEC 20/89	01
204	DEC 20/89	01
27-00-01		CONT.
205	JUN 20/88	06
206	DEC 20/89	14
207	DEC 20/89	02
208	JUN 20/88	02
209	DEC 20/89	15
210	DEC 20/89	02
211	SEP 20/92	11
212	DEC 20/90	07
213	DEC 20/90	17
214	DEC 20/90	05
215	DEC 20/89	02
216	DEC 20/89	03
217	DEC 20/89	14
218	DEC 20/89	02
27-00-02		
R 201	JAN 20/09	01.1
202	BLANK	
27-01-00		
501	MAY 20/08	01
502	MAY 20/08	01
503	SEP 28/06	01
504	SEP 28/06	01
505	SEP 28/06	01
506	SEP 28/06	01
507	SEP 28/06	01
508	SEP 28/06	01
509	SEP 28/06	01
510	SEP 28/06	01
27-02-00		
601	JAN 28/03	01
602	JAN 28/06	01
603	JAN 28/06	01
604	JAN 28/06	01
605	JAN 28/06	01
606	JAN 28/06	01
607	JAN 28/06	01
608	JAN 28/06	01
609	JAN 28/06	01
610	JAN 28/06	01
611	MAY 20/08	01
612	JAN 28/06	01
613	SEP 20/08	01
614	JAN 28/06	01
615	JAN 28/06	01
616	JAN 28/06	01
617	JAN 28/06	01
618	JAN 28/06	01
619	JAN 28/06	01
620	JAN 28/06	01
621	JAN 28/06	01
622	JAN 28/06	01
623	JAN 28/06	01
624	JAN 28/06	01
625	JAN 28/06	01
626	JAN 28/06	01
27-09-00		
1	MAY 28/99	04
2	DEC 15/83	01
3	MAR 20/93	03
4	SEP 20/98	06
5	JAN 28/01	01
6	DEC 20/92	01
7	JAN 28/02	01
8	JAN 28/02	02
9	JAN 28/02	01
10	JAN 28/02	06
11	JAN 28/02	04
12	JAN 28/02	07
13	JAN 28/02	08
14	JAN 28/02	01
15	JAN 28/02	01
16	JAN 28/02	03
17	JAN 20/08	02
18	JAN 28/02	02
19	JAN 28/02	02
20	JAN 28/02	02
21	JAN 28/02	13
22	JAN 28/02	08
23	JAN 28/02	07
24	JAN 28/02	12
25	SEP 28/01	09
26	SEP 28/01	17
27	MAY 20/98	16
28	JUN 20/95	10
29	JUN 20/95	11
30	JUN 20/95	07
31	JUN 20/95	07
32	SEP 28/01	11
33	SEP 28/01	09
34	JAN 28/00	07
35	JUN 20/95	06
36	JAN 20/98	11
37	JUN 20/95	09
38	JUN 20/95	09
39	JUN 20/95	07
40	BLANK	
27-09-00		
101	INT BLANK	
R 102	JAN 20/09	01.101
R 103	MAY 28/03	05.101
R 104	MAY 28/03	07.101
R 105	MAY 28/03	04.101
R 106	MAY 28/03	02.101
27-09-00		
201	MAY 20/98	01
202	MAR 20/92	01
203	JUN 20/92	01
204	JAN 20/99	02
205	MAY 20/98	01
206	JAN 20/99	03
R 207	JAN 20/09	01.101
R 208	JAN 20/09	01.101

GPA Group plc

PAGE	DATE	CODE
27-09-00		CONT.
209	DEC 20/92	01
210	DEC 20/92	01
R 211	JAN 20/09	01.101
R 212	JAN 20/09	03.101
R 213	JAN 20/09	03.101
R 214	JAN 20/09	03.101
R 215	JAN 20/09	03.101
216	BLANK	
27-11-00		
1	JUN 20/94	01
2	DEC 15/85	01
3	SEP 28/04	02
4	MAY 28/07	02
5	JUN 15/86	02
6	JUN 20/91	03
7	DEC 15/83	02
8	SEP 15/82	01
9	MAR 20/90	01
10	MAR 20/90	01
11	JAN 28/02	02
12	JAN 28/02	02
13	MAR 15/87	02
14	MAR 15/87	02
15	MAY 28/07	02
16	BLANK	
27-11-00		
101	SEP 28/04	12
102	MAY 28/07	01
103	JUN 20/91	04
104	JUN 20/91	01
27-11-00		
501	SEP 28/06	01
502	MAY 28/05	02
503	MAY 28/05	02
504	MAY 28/05	02
505	MAY 28/05	02
506	MAY 28/05	02
507	DEC 20/89	03
508	DEC 20/89	01
509	MAY 28/05	02
510	JAN 28/04	01
511	JAN 28/02	01
512	JAN 28/02	01
513	JAN 28/02	02
514	JAN 28/02	02
515	SEP 28/99	02
516	SEP 28/99	02
517	JAN 28/04	02
518	JAN 28/04	02
519	JAN 28/04	02
520	JAN 28/04	02
521	JAN 28/04	02
522	JAN 28/04	02
523	SEP 28/99	02
524	JAN 28/04	02

PAGE	DATE	CODE
27-11-00		CONT.
525	SEP 28/06	02
526	SEP 28/06	02
527	SEP 28/06	02
528	SEP 28/06	02
529	SEP 28/06	02
530	SEP 28/06	02
531	SEP 28/06	02
532	SEP 28/06	02
533	SEP 28/06	02
534	SEP 28/06	02
535	SEP 28/06	02
536	SEP 28/06	02
537	SEP 28/06	02
538	SEP 28/06	02
539	SEP 28/06	05
540	SEP 28/06	02
541	SEP 28/06	05
542	SEP 28/06	05
27-11-02		
401	MAY 28/99	02
402	MAY 28/99	01
403	JAN 28/03	01
404	MAY 28/99	02
405	JAN 28/02	02
406	JAN 28/02	02
407	JAN 28/02	02
408	JAN 28/02	02
27-11-02		
601	JUN 20/91	01
602	SEP 20/94	01
603	SEP 20/94	01
604	JAN 28/02	01
27-11-03		
201	SEP 28/04	04
202	MAY 28/01	01
203	JAN 20/08	01
204	JAN 20/08	01
205	JAN 20/08	04
206	JAN 20/08	01
207	JAN 20/08	04
208	JAN 20/08	01
209	JAN 20/08	06
210	JAN 20/08	06
211	JAN 20/08	03
212	JAN 20/08	04
213	JAN 20/08	04
214	JAN 20/08	03
215	JAN 20/08	03
216	BLANK	
27-11-14		
201	MAY 20/98	01
202	MAY 28/01	01
203	JUN 20/91	04
204	JUN 20/91	01

PAGE	DATE	CODE
27-11-14		CONT.
205	JUN 20/91	04
206	MAY 20/98	01
207	SEP 20/91	04
208	JUN 20/91	01
209	JAN 28/02	01
210	JAN 28/02	01
211	JUN 20/91	01
212	SEP 28/04	02
213	SEP 28/06	04
214	MAY 28/07	03
215	MAY 28/07	05
216	JAN 20/08	01
217	JAN 20/08	01
218	MAY 20/08	01
219	MAY 20/08	01
220	MAY 20/08	01
27-11-16		
401	MAY 28/01	01
402	JAN 28/02	04
403	JAN 28/02	02
404	SEP 20/91	04
405	SEP 20/91	01
406	SEP 20/91	01
407	JAN 28/02	01
408	SEP 28/01	01
409	SEP 20/91	01
410	MAY 28/01	03
411	SEP 20/91	01
412	BLANK	
27-11-17		
401	JUN 20/90	01
402	DEC 20/89	03
403	JUN 20/90	01
404	DEC 20/89	01
405	SEP 28/00	01
406	SEP 28/00	02
407	DEC 20/89	01
408	BLANK	
27-11-17		
601	MAR 20/90	01
602	MAR 20/90	01
603	DEC 20/89	01
604	MAY 28/05	01
27-11-20		
201	SEP 28/02	01
202	MAY 28/05	01
203	JUN 20/90	01
204	JUN 20/90	01
205	JAN 28/05	01
206	JAN 28/05	01
207	JUN 20/90	01
208	JUN 20/90	01
209	JAN 28/05	01
210	JAN 28/05	01

GPA Group plc

PAGE	DATE	CODE
27-11-20		CONT.
211	JAN 28/02	01
212	JAN 28/02	01
213	JAN 28/02	01
214	JUN 20/90	01
215	MAY 28/06	01
216	JAN 28/02	01
217	JUN 20/90	01
218	BLANK	
27-11-20		
601	SEP 20/97	01
602	MAR 20/90	01
603	DEC 20/89	01
604	JAN 28/02	01
605	DEC 20/89	01
606	MAY 28/05	01
27-11-21		
401	MAY 28/99	01
402	MAY 28/02	03
403	SEP 28/99	01
404	SEP 28/07	03
405	SEP 28/07	01
406	JAN 28/05	03
407	JAN 28/05	05
408	MAY 28/99	01
27-11-21		
601	MAR 20/90	01
602	MAR 20/90	01
603	DEC 15/86	01
604	JAN 28/02	01
27-18-00		
1	SEP 20/92	01
2	MAR 20/90	01
27-18-00		
101	SEP 20/94	01
102	SEP 20/94	01
103	SEP 20/94	01
104	MAR 20/96	01
27-18-00		
501	JAN 28/04	01
502	DEC 20/93	01
503	DEC 20/89	01
504	DEC 20/89	03
R 505	JAN 20/09	02.1
506	MAR 20/90	01
507	MAR 20/90	01
R 508	JAN 20/09	02.101
R 509	JAN 20/09	02.101
R 510	JAN 20/09	01.101
R 511	JAN 20/09	07.101
R 512	JAN 20/09	15.101
513	JAN 28/02	13
514	JAN 20/99	12

PAGE	DATE	CODE
27-18-00		CONT.
515	JAN 28/02	12
516	JAN 28/02	04
517	MAR 20/90	11
518	BLANK	
27-18-01		
401	MAR 20/90	04
402	MAR 20/90	01
403	MAY 28/01	01
404	MAR 20/90	02
405	JAN 28/02	01
406	BLANK	
27-21-00		
1	MAY 20/98	01
2	JAN 28/02	01
3	JUN 15/84	01
4	JAN 28/02	01
5	DEC 15/83	01
6	JUN 15/84	01
7	JAN 28/02	01
8	DEC 15/83	01
9	JAN 28/02	01
10	JUN 15/84	01
11	JAN 28/02	04
12	MAR 20/96	03
13	JUN 15/87	03
14	JUN 15/87	04
15	MAR 20/93	02
16	JAN 28/02	03
17	DEC 15/86	02
18	JUN 20/91	02
19	JAN 28/02	03
20	JAN 28/02	01
21	JAN 28/02	01
22	JAN 28/02	03
23	MAY 20/98	03
24	MAR 15/87	03
25	SEP 20/98	02
26	MAR 15/87	04
27	MAR 20/93	03
28	MAR 15/87	03
29	JAN 28/02	03
30	JAN 28/02	02
31	JAN 28/02	02
32	JAN 28/02	03
33	SEP 20/98	03
34	SEP 20/98	02
35	JAN 28/02	04
36	JAN 28/02	03
37	SEP 20/98	03
38	SEP 20/98	05
39	SEP 20/98	06
40	BLANK	

PAGE	DATE	CODE
27-21-00		
101	MAR 20/94	03
102	JUN 20/92	06
103	MAR 20/94	01
104	JUN 20/92	01
105	JUN 20/92	06
106	JUN 20/92	01
107	JUN 20/92	04
108	BLANK	
27-21-00		
501	SEP 28/01	02
502	SEP 20/98	01
503	SEP 20/98	02
504	SEP 20/98	01
505	SEP 20/98	01
506	SEP 20/98	01
507	SEP 20/98	01
508	SEP 20/98	01
509	SEP 20/98	01
510	SEP 20/98	01
511	SEP 20/98	01
512	SEP 20/98	02
513	SEP 28/01	04
514	SEP 20/98	02
515	SEP 20/98	02
516	JAN 28/02	02
517	SEP 20/98	02
518	SEP 20/98	02
519	JAN 28/02	01
520	SEP 28/00	03
521	SEP 28/00	01
522	JAN 28/00	08
523	JAN 28/00	05
524	JAN 28/00	08
525	MAY 28/99	04
526	MAY 28/99	06
527	SEP 28/01	07
528	MAY 28/99	06
529	JAN 28/02	04
530	JAN 28/02	06
531	SEP 28/01	12
532	SEP 28/02	08
533	SEP 28/01	13
534	SEP 28/02	07
535	SEP 28/02	05
536	SEP 28/01	12
537	SEP 28/01	09
538	SEP 20/08	05
539	SEP 28/04	07
540	JAN 28/02	04
541	JAN 28/02	04
542	JAN 28/02	04
543	JAN 28/02	05
544	JAN 28/02	05
545	JAN 28/02	05
546	JAN 28/02	05
547	JAN 28/02	05
548	JAN 28/02	05

GPA Group plc

PAGE	DATE	CODE
27-21-00		CONT.
549	JAN 28/02	05
550	JAN 28/02	05
551	JAN 28/02	05
552	SEP 28/01	09
553	SEP 28/01	09
554	SEP 28/01	08
555	JAN 28/02	04
556	JAN 28/02	04
557	SEP 28/01	07
558	SEP 28/01	11
559	SEP 28/01	08
560	SEP 28/01	08
561	SEP 28/00	10
562	SEP 28/00	10
563	SEP 28/01	09
564	SEP 28/00	11
565	JAN 28/02	05
566	JAN 28/02	05
567	JAN 28/02	07
568	JAN 28/02	06
569	JAN 28/02	06
570	JAN 28/02	06
571	JAN 28/02	06
572	JAN 28/02	05
573	MAY 28/01	07
574	MAY 28/01	07
575	JAN 28/02	05
576	MAY 28/01	09
577	JAN 28/02	05
578	MAY 28/01	09
579	MAY 28/01	08
580	MAY 28/01	11
580A	MAY 28/01	10
580B	JAN 28/02	06
580C	MAY 28/01	10
580D	JAN 28/02	08
580E	MAY 28/01	10
580F	MAY 28/01	10
580G	JAN 28/02	06
580H	MAY 28/01	10
580I	JAN 28/03	03
580J	JAN 28/03	04
580K	JAN 28/03	03
580L	BLANK	
27-21-02		
401	MAR 20/90	01
402	JAN 28/00	01
403	JAN 28/00	02
404	JAN 20/99	01
405	JAN 28/00	01
406	JAN 28/02	01
407	JAN 28/00	01
408	MAR 20/93	01

PAGE	DATE	CODE
27-21-03		
401	MAR 20/90	01
402	MAR 20/90	01
403	MAR 20/90	01
404	SEP 28/07	01
405	JAN 28/02	01
406	MAR 20/90	01
27-21-05		
401	SEP 28/07	01
402	DEC 20/90	06
403	SEP 20/98	02
404	MAR 20/90	02
405	MAR 20/90	01
406	SEP 28/07	02
407	SEP 28/07	10
408	SEP 28/07	08
409	DEC 20/90	04
410	DEC 20/96	07
411	SEP 28/07	09
412	DEC 20/90	01
413	SEP 28/07	01
414	BLANK	
27-21-06		
201	MAR 20/95	01
202	JUN 20/90	01
203	JUN 20/90	01
204	JUN 20/90	01
205	JUN 20/90	01
206	JUN 20/90	01
207	JUN 20/90	01
208	MAR 20/95	01
209	JAN 28/02	01
210	JAN 28/02	01
211	JAN 28/02	01
212	JAN 28/02	01
213	JAN 28/02	01
214	JAN 28/02	01
215	JAN 28/02	01
216	BLANK	
27-21-12		
201	MAR 20/93	02
202	JAN 20/99	02
203	MAR 20/94	01
204	JUN 20/93	01
205	MAR 20/90	01
206	JAN 20/99	03
207	JAN 28/01	02
208	JUN 20/95	03
209	JAN 28/02	01
210	JAN 28/05	02
211	JAN 28/05	02
212	JAN 28/05	02
213	JAN 28/05	02
214	JAN 28/05	03
215	JAN 28/02	02
216	SEP 28/01	03

PAGE	DATE	CODE
27-21-12		CONT.
217	JAN 28/02	04
218	MAR 20/94	05
219	JAN 20/99	03
220	JAN 20/99	02
221	MAR 20/95	04
222	JAN 20/99	01
223	JAN 20/99	04
224	JAN 20/99	02
225	SEP 28/02	02
226	BLANK	
27-21-13		
201	JUN 20/90	01
202	JAN 28/01	01
203	JAN 20/98	01
204	JUN 20/90	01
205	MAR 20/94	01
206	MAR 20/94	01
207	MAY 28/06	01
208	JAN 28/05	01
209	MAY 28/06	01
210	MAY 28/06	01
211	MAY 28/06	01
212	MAY 28/06	02
213	SEP 28/01	02
214	JUN 20/90	02
27-21-17		
401	JUN 20/91	01
402	MAY 28/00	02
403	JUN 20/91	02
404	JUN 20/91	02
405	JUN 20/91	02
406	JUN 20/91	03
407	MAY 28/03	02
408	MAY 28/03	06
409	JAN 28/02	07
410	JUN 20/91	03
27-21-17		
601	MAY 28/00	02
602	MAY 28/00	02
603	JAN 20/99	04
604	SEP 28/00	03
605	SEP 28/00	04
606	BLANK	
27-21-19		
R 401	JAN 20/09	03.1
402	SEP 20/90	04
403	SEP 20/90	04
404	SEP 20/90	04
405	SEP 20/90	04
406	MAR 20/93	04
407	SEP 20/90	04
408	SEP 20/90	04
409	JAN 28/02	02
410	JAN 28/02	02

GPA Group plc

PAGE	DATE	CODE
27-21-19		CONT.
411	JAN 28/02	02
412	SEP 20/90	03
27-21-20		
201	JAN 28/05	01
202	JUN 20/90	01
203	JUN 20/90	01
204	JUN 20/90	01
205	JAN 28/01	01
206	JUN 20/90	01
207	JAN 20/98	01
208	SEP 28/06	01
209	JAN 20/98	01
210	JAN 28/05	01
211	SEP 28/06	01
212	SEP 28/06	01
213	JAN 28/02	01
214	JUN 20/90	01
215	MAR 20/93	02
216	JUN 20/90	01
217	JAN 28/02	01
218	JAN 28/02	01
219	JAN 28/02	01
220	JAN 28/02	01
221	MAY 28/99	01
222	BLANK	
27-21-21		
401	SEP 28/99	01
402	JUN 20/90	01
403	SEP 28/04	01
404	JUN 20/90	01
405	SEP 28/99	01
406	JUN 20/90	01
407	JAN 28/05	01
408	SEP 20/94	01
409	JAN 28/05	01
410	JAN 28/05	01
411	JAN 28/05	01
412	JAN 28/05	01
413	JAN 28/05	01
414	BLANK	
27-21-21		
601	JUN 20/90	01
602	JUN 20/90	01
603	JAN 28/02	01
604	JAN 28/02	01
27-21-23		
201	MAR 20/93	02
202	JUN 20/91	02
203	DEC 20/90	01
204	MAR 20/93	02
205	MAR 20/93	02
206	MAR 20/93	02
207	MAY 20/98	01
208	JAN 28/02	28

PAGE	DATE	CODE
27-23-00		
1	JAN 20/99	02
2	DEC 15/82	01
3	DEC 15/85	01
4	DEC 15/85	01
5	JAN 20/99	02
6	MAR 20/90	01
7	JAN 28/02	01
8	JAN 28/02	02
9	MAR 20/90	15
10	JAN 20/99	01
27-23-00		
101	DEC 20/90	17
102	DEC 20/90	02
103	DEC 20/90	02
104	DEC 20/90	02
105	DEC 20/90	02
106	DEC 20/90	16
107	DEC 20/90	15
108	BLANK	
27-23-00		
501	SEP 28/01	01
502	JUN 20/90	01
503	JUN 20/90	01
504	JUN 20/90	01
505	SEP 28/04	01
506	SEP 28/04	01
507	SEP 28/01	01
R 508	JAN 20/09	01.1
R 509	JAN 20/09	01.101
R 510	JAN 20/09	01.101
511	JUN 20/90	02
512	BLANK	
27-23-01		
201	MAY 28/01	01
202	SEP 20/90	01
203	JAN 28/05	01
204	MAY 28/01	01
27-23-02		
401	JUN 20/90	01
402	SEP 28/02	01
403	SEP 28/02	01
404	SEP 28/02	01
27-23-51		
201	MAY 28/99	02
202	MAY 28/99	02
203	SEP 20/97	02
204	MAY 28/01	02
205	MAY 28/99	02
206	MAY 28/01	02

PAGE	DATE	CODE
27-28-00		
1	JUN 15/83	01
2	SEP 15/82	01
3	MAR 15/86	01
4	BLANK	
27-28-00		
101	SEP 20/94	01
102	SEP 20/94	01
27-28-00		
501	DEC 20/93	01
502	JUN 20/92	02
503	JUN 20/90	01
504	MAY 20/08	01
505	JUN 20/90	01
506	JUN 20/90	01
507	JAN 28/06	02
508	JAN 28/06	02
509	JAN 28/06	01
510	JAN 28/06	01
511	JAN 28/02	01
512	BLANK	
27-28-01		
201	JUN 20/90	01
202	JUN 20/90	01
203	JUN 20/90	01
204	JUN 20/90	01
205	JUN 20/90	01
206	BLANK	
27-31-00		
1	JAN 28/02	01
2	JAN 28/02	01
3	JAN 28/02	01
4	JAN 28/02	01
5	JAN 28/02	01
6	DEC 20/91	01
7	DEC 15/86	03
8	DEC 15/86	03
9	DEC 15/85	01
10	DEC 15/85	01
11	SEP 20/90	01
12	MAR 15/86	01
13	DEC 15/85	01
14	JAN 20/99	01
15	JAN 28/02	01
16	JAN 28/02	01
17	JAN 28/02	01
18	JAN 28/02	01
19	MAY 28/03	04
20	MAY 28/00	04
21	DEC 15/85	02
22	MAY 28/00	06

GPA Group plc

PAGE	DATE	CODE
27-31-00		
101	JUN 20/92	01
102	JUN 20/92	01
103	JUN 20/92	01
104	JUN 20/92	01
105	JUN 20/92	01
106	JUN 20/92	01
107	JUN 20/92	01
108	BLANK	
27-31-00		
501	MAY 28/99	01
502	MAY 28/99	04
503	MAR 20/95	01
504	MAR 20/95	04
505	MAY 28/02	01
506	MAR 20/96	01
507	MAR 20/95	03
508	MAY 28/02	04
509	MAY 28/02	01
510	MAR 20/95	01
511	MAR 20/95	01
512	MAR 20/95	01
513	MAY 28/99	01
514	MAY 20/08	01
515	MAR 20/95	01
516	JAN 20/99	01
517	JAN 20/99	01
518	JAN 20/99	01
519	JAN 20/99	01
520	JAN 20/99	01
521	JAN 20/99	07
522	JAN 20/99	01
523	JAN 20/99	01
524	JAN 20/99	07
525	MAY 28/99	09
526	MAY 28/00	03
527	MAY 28/00	03
528	MAY 28/02	03
529	MAY 28/02	04
530	MAY 20/08	06
531	JAN 28/06	03
532	MAY 28/99	10
533	MAY 28/02	08
534	MAY 28/04	10
535	MAY 28/04	15
536	SEP 28/04	06
537	SEP 28/04	06
538	SEP 20/91	02
539	MAY 28/05	08
540	MAY 28/02	07
541	MAY 20/08	09
542	JAN 28/06	06
543	JAN 28/06	06
544	JAN 28/06	06
545	JAN 28/06	06
546	MAY 28/99	06
547	JAN 28/06	09
548	MAY 28/99	07

PAGE	DATE	CODE
27-31-00		CONT.
549	MAY 28/02	05
550	DEC 20/92	07
551	MAY 28/02	05
552	JAN 28/04	05
553	MAY 28/02	04
554	MAY 28/02	05
555	MAY 28/02	05
556	MAY 28/02	05
557	MAY 28/02	05
558	MAY 28/02	05
559	MAY 28/02	05
560	JAN 28/02	05
561	MAY 28/02	09
562	MAY 28/99	10
563	MAY 20/08	06
564	JAN 28/06	06
565	MAY 28/02	09
566	MAY 28/02	14
567	MAY 28/02	13
568	MAY 28/02	09
569	MAY 28/03	09
570	MAY 28/02	09
571	MAY 28/02	09
572	MAY 28/02	08
573	MAY 28/02	08
574	MAY 28/99	08
575	MAY 28/02	08
576	JAN 28/02	08
577	MAY 28/02	08
578	JAN 28/02	08
579	MAY 28/02	08
580	MAY 28/02	07
580A	MAY 28/02	07
580B	JAN 28/06	07
580C	MAY 28/03	09
580D	MAY 28/99	10
580E	JAN 20/99	08
580F	MAY 28/02	02
580G	MAY 28/05	08
580H	MAY 28/05	08
580I	MAY 28/03	07
580J	MAY 28/03	07
580K	MAY 28/05	09
580L	MAY 28/02	02
580M	MAY 28/05	02
580N	MAY 28/05	02
580O	MAY 28/05	04
580P	MAY 28/05	04
580Q	SEP 28/03	04
580R	SEP 28/03	04
580S	SEP 28/03	04
580T	SEP 28/03	04
580U	SEP 28/03	04
580V	SEP 28/03	04
580W	SEP 28/03	04
580X	SEP 28/03	04
580Y	MAY 28/02	15
580Z	MAY 28/99	04

PAGE	DATE	CODE
27-31-00		CONT.
581	MAY 28/02	04
582	MAY 28/02	04
582A	MAY 28/02	04
582B	MAY 28/02	04
582C	MAY 28/02	09
582D	JAN 28/07	09
582E	MAY 28/02	08
582F	MAY 28/03	08
582G	MAY 28/03	08
582H	MAY 28/02	08
582I	MAY 28/02	08
582J	MAY 28/02	14
582K	MAY 28/02	14
582L	MAY 28/02	12
582M	MAY 28/02	13
582N	MAY 28/99	14
582O	MAY 28/02	13
582P	SEP 28/02	12
582Q	SEP 28/02	12
582R	MAY 28/02	09
27-31-01		
401	SEP 20/90	01
402	MAY 28/99	04
403	JAN 28/01	04
404	DEC 20/89	01
405	DEC 20/89	01
406	MAY 28/02	01
407	DEC 20/89	01
408	MAY 28/02	01
409	SEP 28/07	01
410	JAN 28/05	01
411	SEP 28/07	01
412	JAN 28/05	01
413	JAN 28/05	01
414	JAN 28/05	01
415	JAN 28/05	01
416	BLANK	
27-31-01		
601	MAR 20/90	01
602	MAR 20/90	01
603	JAN 28/02	01
604	BLANK	
27-31-02		
401	JAN 28/07	01
402	JAN 28/02	01
403	JAN 28/02	01
404	JAN 28/03	02
405	JAN 28/03	02
406	JAN 28/03	02
407	JAN 28/03	02
408	JAN 28/03	01

GPA Group plc

PAGE	DATE	CODE
27-31-03		
401	DEC 20/90	02
402	DEC 20/90	01
403	DEC 20/90	01
404	JAN 20/99	02
405	JAN 20/99	02
406	MAY 28/01	01
407	SEP 28/02	01
408	BLANK	
27-31-05		
401	MAY 28/02	01
402	MAY 28/02	01
403	MAY 28/02	01
404	JUN 20/90	01
405	JUN 20/90	01
406	JUN 20/90	01
407	MAY 28/02	01
408	MAY 28/02	01
409	MAY 28/02	01
410	SEP 28/07	01
411	SEP 28/07	01
412	SEP 28/07	01
413	SEP 28/07	01
414	MAY 28/02	01
R 415	JAN 20/09	01.1
416	MAY 28/02	01
417	JAN 28/01	01
418	SEP 28/07	01
419	SEP 28/07	01
420	SEP 28/07	01
421	SEP 28/07	01
422	SEP 28/07	01
423	JAN 28/05	03
424	SEP 28/07	01
425	SEP 28/07	01
426	JAN 28/05	03
427	JAN 28/05	03
428	BLANK	
27-31-05		
601	MAY 28/05	01
602	JAN 28/00	01
603	JAN 28/00	01
604	MAY 28/05	01
605	MAR 20/90	01
606	MAR 20/90	01
607	JAN 28/02	01
608	BLANK	
27-31-06		
401	DEC 20/90	01
402	DEC 20/90	01
403	DEC 20/90	01
404	DEC 20/90	01
405	JAN 28/02	01
406	DEC 20/92	01
407	MAY 28/02	01
408	JAN 20/99	01

PAGE	DATE	CODE
27-31-06		CONT.
409	MAR 20/91	02
410	BLANK	
27-31-10		
401	SEP 20/94	01
402	JAN 28/06	01
403	MAR 20/90	01
404	JAN 20/99	01
405	SEP 20/91	01
406	JAN 28/02	01
407	JAN 28/06	01
408	JAN 28/06	01
409	JAN 20/99	01
410	BLANK	
27-31-10		
601	MAR 20/90	01
602	JAN 28/02	01
603	MAR 20/90	01
604	BLANK	
27-31-11		
401	SEP 28/02	02
402	SEP 28/02	02
403	SEP 28/02	02
404	SEP 28/02	02
27-31-12		
401	MAY 28/04	04
402	MAY 28/04	02
403	MAY 28/04	01
404	MAY 28/04	03
405	MAY 28/04	02
406	MAY 28/04	07
407	MAY 28/04	02
408	SEP 28/04	03
409	SEP 28/04	02
410	BLANK	
27-31-13		
401	DEC 20/90	01
402	DEC 20/90	01
403	DEC 20/90	01
404	JAN 28/02	01
405	SEP 20/91	01
406	SEP 20/91	01
407	SEP 20/91	01
408	SEP 20/91	01
409	JAN 28/07	01
410	SEP 20/91	01
411	JAN 28/02	01
412	JAN 28/02	01
413	SEP 20/93	01
414	BLANK	

PAGE	DATE	CODE
27-31-15		
401	JAN 28/07	01
402	JAN 28/02	01
403	DEC 20/90	01
404	DEC 20/90	01
405	JAN 28/02	01
406	JAN 28/02	01
407	MAY 28/02	01
408	JAN 28/02	01
409	JAN 20/99	01
410	BLANK	
27-31-16		
401	JAN 28/07	01
402	JAN 28/02	01
403	DEC 20/90	01
404	DEC 20/90	01
405	DEC 20/90	01
406	JAN 28/02	01
407	JAN 28/02	01
408	JAN 28/02	01
409	DEC 20/90	01
410	JAN 28/02	01
411	JAN 28/02	01
412	DEC 20/90	01
27-31-17		
201	JAN 28/07	01
202	MAY 28/05	04
203	JAN 28/02	01
204	MAR 20/95	01
205	MAR 20/95	01
206	MAY 28/05	01
207	MAR 20/95	01
208	MAR 20/95	01
209	MAR 20/95	01
210	MAR 20/95	01
211	JAN 28/05	01
212	MAY 20/08	01
213	MAY 28/05	04
214	MAY 28/05	04
215	JAN 28/02	05
216	SEP 28/04	01
217	SEP 28/04	04
218	SEP 28/04	05
27-31-18		
401	JAN 28/07	01
402	DEC 20/90	01
403	DEC 20/90	01
404	DEC 20/90	01
405	JAN 28/02	01
406	MAY 28/05	01
407	JAN 28/05	01
408	JAN 28/05	01
409	MAY 28/05	01
410	JAN 28/02	01
411	JAN 20/99	01
412	BLANK	

GPA Group plc

PAGE	DATE	CODE
27-31-19		
401	SEP 28/99	01
402	DEC 20/90	01
403	JAN 28/01	01
404	JAN 28/07	01
405	MAY 20/98	01
406	JAN 28/02	01
407	JAN 20/99	03
408	JAN 28/02	01
409	MAY 28/05	01
410	BLANK	
27-31-21		
401	JAN 28/07	01
402	JAN 28/02	01
403	DEC 20/90	01
404	DEC 20/90	01
405	JAN 28/02	01
406	JAN 28/02	01
407	JAN 20/99	01
408	DEC 20/92	02
27-31-21		
601	DEC 20/90	01
602	DEC 20/90	01
603	DEC 20/90	01
604	DEC 20/90	01
27-31-23		
501	SEP 20/91	01
502	DEC 20/91	01
503	DEC 20/90	03
504	JAN 28/02	01
505	JAN 28/02	01
506	DEC 20/90	01
27-32-00		
1	SEP 20/98	03A
2	SEP 20/98	02A
3	JUN 15/87	01A
4	SEP 20/89	04A
5	JAN 28/00	02A
6	JAN 28/02	03A
7	JAN 28/02	04A
8	JAN 28/02	01A
9	SEP 20/98	06A
10	SEP 20/98	02A
27-32-00		
101	JUN 20/93	09A
102	DEC 20/88	01A
103	JUN 20/93	08A
104	BLANK	
27-32-00		
501	SEP 20/98	07A
502	SEP 20/98	02A
503	SEP 20/98	02A
504	SEP 20/98	05A
27-32-00		CONT.
505	JAN 20/08	10A
506	SEP 28/99	02A
507	SEP 28/01	03A
508	JAN 28/05	02A
509	SEP 28/02	03A
510	SEP 20/98	02A
511	SEP 20/98	10A
512	SEP 20/98	09A
513	SEP 20/98	10A
514	SEP 20/98	08A
515	SEP 20/98	06A
516	SEP 20/98	08A
517	SEP 20/98	09A
518	SEP 28/99	10A
519	SEP 20/98	11A
520	SEP 20/98	05A
27-32-01		
401	MAY 28/01	01
402	MAR 20/93	02
403	MAY 28/01	01
404	MAY 28/01	03
27-32-02		
401	MAY 28/01	04
402	SEP 20/93	04
403	MAY 28/01	04
404	MAY 28/01	04
27-32-05		
401	SEP 20/94	01
402	JAN 28/02	01
403	MAR 20/93	02
404	DEC 20/94	01
27-38-00		
1	SEP 15/82	01
2	MAR 20/90	01
27-38-00		
101	SEP 20/94	14
102	SEP 20/94	14
27-38-00		
501	JAN 20/99	01
502	SEP 20/90	01
503	SEP 20/90	01
504	SEP 20/90	01
505	SEP 20/90	01
506	SEP 28/05	02
507	MAY 20/08	02
508	SEP 28/05	03
509	SEP 28/05	03
510	JAN 28/06	03
511	JAN 28/06	03
512	JAN 28/06	03
513	JAN 20/99	05
514	BLANK	
27-38-02		
401	JAN 28/07	01
402	DEC 20/90	01
403	DEC 20/90	01
404	DEC 20/90	04
405	DEC 20/90	01
406	JAN 20/99	02
407	DEC 20/90	01
408	JAN 28/02	01
409	JAN 20/99	02
410	BLANK	
27-41-00		
1	SEP 28/04	11
2	JAN 28/02	04
3	SEP 28/04	06
4	DEC 20/90	03
5	JAN 28/02	03
6	JAN 28/02	04
7	MAR 20/93	03
8	JAN 28/02	04
9	JAN 20/99	04
10	MAR 15/87	01
11	JAN 28/02	04
12	JAN 28/02	03
13	MAY 28/03	07
14	MAY 28/03	08
15	MAY 20/98	07
16	MAR 15/87	01
R 17	JAN 20/09	04.101
R 18	BLANK	
27-41-00		
101	MAR 20/94	03
102	MAR 20/91	03
103	MAR 20/91	01
104	MAR 20/91	03
27-41-00		
501	JAN 28/01	03
502	MAY 28/00	04
503	JAN 28/02	04
504	JAN 28/02	03
505	SEP 28/00	03
506	MAY 28/00	01
507	SEP 28/06	01
508	JAN 28/01	03
509	JAN 20/99	01
510	JAN 20/99	01
511	JAN 20/99	01
512	SEP 28/00	03
513	SEP 28/00	03
514	SEP 28/00	05
515	SEP 28/00	05
516	JAN 28/03	02
517	JAN 28/03	02
518	JAN 28/03	05
519	JAN 28/07	08
520	JAN 28/03	11

GPA Group plc

PAGE	DATE	CODE
27-41-00		CONT.
521	JAN 28/03	12
522	JAN 28/03	08
523	JAN 28/02	09
524	JAN 28/01	04
525	JAN 28/01	03
526	JAN 28/01	03
527	MAY 28/04	13
528	MAY 28/04	13
529	MAY 28/04	13
530	MAY 28/04	13
531	JAN 28/07	11
532	MAY 28/04	13
533	MAY 28/04	11
534	MAY 28/04	14
535	MAY 28/04	14
536	JAN 28/07	13
537	MAY 28/04	15
538	MAY 28/04	16
539	MAY 28/04	15
540	MAY 28/04	14
541	MAY 28/04	13
542	MAY 28/04	15
543	MAY 28/04	16
544	MAY 28/04	16
545	MAY 28/04	14
546	MAY 28/04	15
547	MAY 28/04	15
548	MAY 28/04	14
549	MAY 28/04	13
550	MAY 28/04	15
551	MAY 28/04	16
552	MAY 28/04	14
553	MAY 28/04	15
554	MAY 28/04	14
555	MAY 28/04	14
556	MAY 28/04	14
557	MAY 28/04	14
558	MAY 28/04	15
559	MAY 28/04	14
560	MAY 28/04	15
561	MAY 28/04	15
562	MAY 28/04	15
563	MAY 28/04	15
564	MAY 28/04	14
565	MAY 28/04	13
566	MAY 28/04	14
567	MAY 28/04	14
568	MAY 28/04	13
569	MAY 28/04	14
570	MAY 28/04	13
571	MAY 28/04	14
572	MAY 28/04	14
R 573	JAN 20/09	14.101
574	MAY 28/04	14
575	MAY 28/04	14
576	MAY 28/04	16
577	MAY 28/04	16
578	MAY 28/04	16
27-41-00		CONT.
579	MAY 28/04	16
580	MAY 28/04	16
580A	MAY 28/04	15
580B	MAY 28/04	16
580C	MAY 28/04	16
580D	MAY 28/04	15
580E	MAY 28/04	16
580F	MAY 28/04	17
580G	MAY 28/04	17
580H	BLANK	
27-41-01		
401	SEP 20/93	01
402	DEC 20/90	01
403	DEC 20/90	01
404	JAN 28/02	01
405	SEP 20/93	01
406	BLANK	
27-41-03		
401	MAR 20/94	02
402	DEC 20/90	02
403	DEC 20/90	02
404	SEP 20/97	03
405	SEP 20/97	02
406	BLANK	
27-41-05		
201	JAN 28/07	01
202	JUN 20/91	03
203	JAN 28/02	03
204	JUN 20/93	01
205	DEC 20/90	03
206	MAY 28/06	05
207	JAN 28/02	05
208	SEP 20/94	03
27-41-07		
401	JAN 28/07	03
402	DEC 20/90	03
403	JAN 20/99	03
404	JUN 20/93	02
405	JAN 28/02	04
406	JAN 28/02	05
27-41-10		
401	SEP 28/02	01
402	SEP 20/90	01
403	SEP 20/90	01
404	SEP 28/02	01
405	SEP 20/90	01
406	SEP 20/90	01
407	MAY 28/05	01
408	SEP 20/90	01
409	SEP 20/90	01
410	SEP 28/02	01
411	MAY 28/04	01
412	SEP 20/90	01
27-41-10		CONT.
413	SEP 28/02	02
414	SEP 28/02	03
415	SEP 28/05	04
416	BLANK	
27-41-10		
601	SEP 28/06	02
602	JAN 28/03	01
603	JAN 28/03	01
604	JAN 28/03	01
605	SEP 28/03	01
606	MAY 28/05	01
607	SEP 28/03	01
608	JAN 28/06	01
609	MAY 28/03	01
610	JAN 28/06	01
611	JAN 28/06	01
612	BLANK	
27-41-11		
401	SEP 28/02	01
402	DEC 20/90	01
403	JAN 28/05	05
404	SEP 28/02	02
405	SEP 28/02	05
406	SEP 28/02	04
27-41-13		
401	JAN 20/99	01
402	DEC 20/90	01
403	DEC 20/90	01
404	MAR 20/97	02
405	JAN 20/99	04
406	JAN 28/02	01
27-41-14		
601	SEP 28/02	01
602	JAN 28/03	01
603	JAN 28/03	01
604	SEP 28/02	01
605	JAN 28/03	01
606	MAY 28/05	01
607	JAN 28/03	01
608	JAN 28/02	01
609	JAN 28/02	01
610	SEP 28/02	01
27-41-17		
401	MAY 28/01	01
402	JAN 28/02	01
403	JAN 28/02	01
404	MAY 28/01	01
27-48-00		
1	JAN 28/07	01
2	DEC 20/90	04
3	JUN 20/93	03
4	SEP 28/00	01

GPA Group plc

PAGE	DATE	CODE
27-48-00		CONT.
5	JAN 28/02	01
6	JAN 28/02	01
27-48-00		
101	DEC 20/90	03
102	DEC 20/90	03
103	DEC 20/90	03
104	DEC 20/90	03
27-48-00		
501	JAN 28/01	05
502	JAN 28/01	05
503	DEC 20/90	04
504	MAR 20/90	01
505	MAY 28/00	03
506	JUN 20/93	03
507	JAN 28/01	01
R 508	JAN 20/09	01.1
R 509	JAN 20/09	05.1
R 510	JAN 20/09	06.101
R 511	JAN 20/09	06.101
R 512	JAN 20/09	06.101
R 513	JAN 20/09	06.101
514	JAN 28/01	05
515	JAN 28/02	08
516	JAN 28/01	05
517	JAN 28/01	05
518	JAN 28/01	05
519	JAN 28/01	05
520	JUN 20/93	03
521	JAN 28/01	06
522	BLANK	
27-48-01		
401	MAY 20/08	04
402	MAY 20/08	05
403	DEC 20/90	03
404	MAY 20/08	08
405	MAY 20/08	07
406	BLANK	
27-48-03		
401	DEC 20/90	01
402	DEC 20/90	01
403	DEC 20/90	01
404	DEC 20/90	01
405	JAN 20/99	02
406	DEC 20/93	03
27-48-06		
401	JAN 20/99	01
402	DEC 20/90	04
403	JAN 20/99	01
404	DEC 20/90	04

PAGE	DATE	CODE
27-51-00		
1	JUN 15/84	02
2	MAR 20/90	01
3	JAN 28/02	01
4	JAN 28/02	01
5	JAN 28/02	01
6	JAN 28/02	01
7	JAN 28/02	01
8	JAN 28/02	01
9	SEP 15/86	02
10	SEP 15/86	01
11	MAR 15/87	04
12	JAN 28/02	05
13	JAN 28/02	04
14	JAN 28/02	01
15	MAY 28/02	01
16	MAR 20/93	04
17	SEP 15/86	01
18	SEP 15/86	01
19	SEP 20/88	03
20	SEP 20/89	09
21	SEP 28/00	05
22	SEP 15/82	01
23	SEP 20/89	08
24	MAR 20/90	03
25	JAN 28/02	07
26	JAN 28/02	05
27	SEP 28/04	12
28	JUN 20/96	06
29	JUN 20/96	06
30	DEC 20/90	07
31	JUN 20/96	06
32	JUN 20/96	08
33	JAN 28/02	06
34	JAN 28/02	06
27-51-00		
101	INT BLANK	
102	SEP 20/98	21
103	SEP 20/98	01
104	SEP 20/98	01
105	SEP 20/98	01
106	SEP 20/98	01
107	SEP 20/98	01
108	INT BLANK	
109	INT BLANK	
110	SEP 20/98	01
111	SEP 20/98	04
112	BLANK	
27-51-00		
201	SEP 28/01	01
202	SEP 20/90	01
203	SEP 20/90	01
204	SEP 20/90	01
205	SEP 20/90	01
206	SEP 20/90	01
207	SEP 28/01	01
208	SEP 20/90	01

PAGE	DATE	CODE
27-51-00		CONT.
209	SEP 20/90	01
210	SEP 20/90	01
27-51-00		
501	MAY 28/01	01
502	DEC 20/89	01
503	DEC 20/89	01
504	DEC 20/89	01
505	DEC 20/89	01
506	DEC 20/89	01
507	DEC 20/89	01
508	DEC 20/89	01
509	DEC 20/90	03
510	SEP 20/98	01
511	MAY 28/01	04
512	MAY 28/01	05
513	SEP 20/08	07
514	SEP 20/08	05
515	JAN 28/04	05
516	MAY 28/05	07
517	JAN 28/04	10
518	SEP 28/03	08
519	JAN 28/02	19
520	MAY 28/01	05
521	MAY 28/01	10
522	MAY 28/01	09
523	MAY 28/01	23
524	JAN 28/00	04
525	DEC 20/90	07
526	DEC 20/90	08
527	DEC 20/90	08
528	DEC 20/95	07
529	MAY 28/01	04
530	MAY 20/98	06
531	JAN 28/02	05
532	MAY 20/98	10
533	DEC 20/90	04
534	DEC 20/94	06
535	MAY 28/00	04
536	DEC 20/90	08
537	JUN 20/91	11
538	DEC 20/90	10
539	JUN 20/91	11
540	DEC 20/90	19
541	DEC 20/90	18
542	DEC 20/90	14
543	DEC 20/90	12
544	DEC 20/90	11
545	DEC 20/90	11
546	SEP 28/01	15
547	JAN 28/07	15
548	DEC 20/96	15
549	JAN 20/99	13
550	JAN 28/02	11
551	SEP 28/99	11
552	BLANK	

GPA Group plc

PAGE	DATE	CODE
27-51-00		
601	MAY 28/06	01
602	JAN 20/99	01
603	JAN 20/99	01
604	JAN 20/99	01
605	JAN 28/02	01
606	JAN 20/99	01
607	JAN 28/02	01
608	JAN 20/99	01
609	MAY 28/05	01
610	JAN 20/99	01
611	MAY 28/05	01
612	MAY 28/05	01
613	MAY 28/05	01
614	MAY 28/06	01
615	MAY 28/05	01
616	MAY 28/05	01
617	MAY 28/01	01
618	MAY 28/05	01
619	MAY 28/05	01
620	MAY 28/05	01
621	MAY 28/05	01
622	BLANK	
27-51-01		
201	SEP 28/06	08
202	DEC 20/90	03
203	SEP 28/06	02
204	MAY 28/01	06
205	SEP 28/01	11
206	SEP 28/01	22
207	JAN 28/02	13
208	MAY 28/05	11
209	SEP 28/01	07
210	SEP 28/01	06
211	SEP 28/01	06
212	MAY 28/05	09
213	JUN 20/93	05
214	MAY 28/99	03
27-51-02		
401	MAY 28/06	01
402	SEP 20/08	01
403	SEP 28/06	01
404	MAY 20/98	02
405	MAY 20/98	01
406	MAY 20/98	01
407	SEP 20/08	01
408	MAY 20/98	01
409	MAY 20/98	01
410	MAY 20/98	01
411	MAY 20/98	01
412	SEP 28/00	01
413	SEP 28/00	01
414	SEP 28/00	01
415	JAN 28/01	01
416	JAN 28/02	01
417	SEP 28/07	01
418	JAN 28/05	01

PAGE	DATE	CODE
27-51-02		CONT.
419	SEP 20/08	01
420	JAN 28/05	01
421	JAN 28/05	01
422	BLANK	
27-51-02		
501	SEP 28/07	01
502	MAR 20/90	01
503	MAR 20/90	01
504	MAR 20/90	01
505	MAR 20/90	01
506	SEP 28/07	01
507	SEP 28/07	01
508	JAN 28/02	01
509	JUN 20/95	02
510	JAN 28/01	01
511	JAN 28/02	01
512	JAN 28/02	03
513	SEP 28/05	01
514	JAN 28/02	01
515	DEC 20/93	01
516	MAY 28/07	01
517	SEP 28/07	01
518	SEP 28/07	02
519	SEP 28/02	02
520	JAN 28/02	03
521	DEC 20/93	04
522	DEC 20/93	06
523	DEC 20/93	04
524	SEP 28/01	07
525	JAN 28/02	07
526	BLANK	
27-51-02		
601	JAN 28/01	01
602	MAR 20/90	01
603	MAR 20/90	01
604	MAY 28/99	01
605	JAN 28/02	01
606	JAN 28/02	01
607	JAN 28/02	01
608	JAN 28/02	01
609	JAN 28/02	01
610	JAN 28/02	01
611	JAN 28/02	01
612	JAN 28/02	01
613	JAN 28/02	01
614	BLANK	
27-51-03		
401	JAN 28/02	01
402	SEP 20/90	01
403	SEP 20/90	01
404	SEP 20/90	01
405	JAN 28/02	01
406	JAN 28/02	01
407	JAN 28/02	01
408	JAN 28/02	01

PAGE	DATE	CODE
27-51-03		CONT.
409	JAN 28/02	01
410	JAN 28/02	01
27-51-05		
401	MAR 20/90	01
402	MAR 20/90	01
403	MAR 20/90	01
404	SEP 28/06	01
405	JAN 28/02	01
406	MAR 20/90	01
27-51-06		
401	JAN 28/02	01
402	MAY 28/99	30
403	SEP 28/01	27
404	MAY 28/99	30
405	SEP 28/01	28
406	SEP 28/07	01
407	MAY 20/98	01
408	MAY 20/98	01
409	MAY 20/98	01
410	MAY 20/98	04
411	MAY 20/98	03
412	MAY 20/98	04
413	SEP 28/06	05
414	JAN 28/05	07
415	JAN 28/05	07
416	JAN 28/05	08
417	JAN 28/05	12
418	JAN 28/05	09
27-51-07		
401	SEP 28/02	01
402	SEP 20/90	01
403	SEP 20/90	01
404	SEP 28/02	01
405	SEP 28/07	01
406	SEP 28/02	01
407	SEP 28/02	01
408	BLANK	
27-51-08		
401	SEP 28/99	01
402	MAY 28/02	01
403	SEP 20/90	01
404	JAN 28/02	01
405	SEP 28/99	01
406	SEP 28/07	01
407	SEP 28/99	01
408	JAN 28/02	01
27-51-09		
401	MAR 20/93	02
402	JUN 20/90	01
403	JUN 20/90	01
404	MAR 20/93	02
405	SEP 28/07	01
406	JUN 20/90	01

GPA Group plc

PAGE	DATE	CODE
27-51-09		CONT.
407	SEP 20/90	01
408	SEP 20/90	01
27-51-10		
401	JAN 28/02	01
402	JAN 28/02	01
403	SEP 20/90	01
404	SEP 20/90	01
405	SEP 20/90	01
406	SEP 28/07	01
407	JAN 28/02	04
408	JAN 28/02	04
409	JAN 28/02	03
410	BLANK	
27-51-11		
401	MAY 20/98	01
402	MAY 28/01	01
403	SEP 20/90	01
404	SEP 28/07	02
405	JAN 20/98	02
406	JAN 20/98	01
407	JAN 20/98	01
408	JAN 20/98	01
R 409	JAN 20/09	02.1
410	JAN 28/02	02
411	MAY 28/01	02
412	JAN 28/02	02
27-51-11		
601	MAY 28/01	01
602	JUN 20/95	01
603	JAN 28/02	01
604	DEC 20/92	01
605	JAN 28/02	01
606	JAN 28/02	01
607	JAN 28/02	01
608	SEP 28/07	01
609	JAN 28/02	01
610	MAY 28/02	01
611	SEP 20/08	01
612	JAN 28/02	01
613	MAY 28/01	01
614	MAY 28/01	01
615	MAY 28/01	01
616	MAY 28/01	01
617	MAY 28/05	01
618	MAY 28/01	01
27-51-12		
401	SEP 28/01	01
402	MAY 20/98	01
403	MAY 20/98	01
404	SEP 28/06	01
405	MAY 20/98	01
406	MAY 28/00	01
407	MAY 20/98	01
408	JAN 28/02	01

PAGE	DATE	CODE
27-51-12		CONT.
409	SEP 28/06	01
410	SEP 28/06	01
411	JAN 28/02	01
412	SEP 20/90	01
413	SEP 20/98	01
414	BLANK	
27-51-12		
501	JUN 20/94	01
502	SEP 28/99	01
503	JAN 28/02	01
504	JAN 28/02	01
505	JAN 28/02	01
506	JAN 28/01	01
507	JAN 28/02	01
508	DEC 20/93	01
509	MAY 28/01	01
510	JAN 28/02	01
511	MAR 20/96	01
512	JUN 20/94	01
513	MAY 28/01	01
514	BLANK	
27-51-13		
401	JAN 28/02	01
402	JAN 28/02	02
403	SEP 28/07	02
404	SEP 28/06	01
405	MAY 20/98	01
406	JAN 28/02	01
407	MAY 20/98	01
408	SEP 28/07	02
409	SEP 28/07	02
410	SEP 28/07	02
27-51-14		
401	SEP 28/00	01
402	SEP 20/90	01
403	SEP 28/06	02
404	JAN 28/02	01
405	MAY 20/98	01
406	SEP 28/00	01
407	SEP 28/00	01
408	SEP 28/07	01
409	JAN 28/05	03
410	SEP 28/06	03
411	SEP 28/07	04
412	BLANK	
27-51-14		
501	SEP 28/07	01
502	SEP 28/07	01
503	JAN 28/01	01
504	JAN 28/02	01
505	JAN 28/01	01
506	JAN 28/01	01
507	JAN 28/01	01
508	JAN 28/01	01

PAGE	DATE	CODE
27-51-14		CONT.
509	JAN 28/01	01
510	JAN 28/01	01
511	JAN 28/01	01
512	JAN 28/01	01
513	JAN 28/01	01
514	JAN 28/01	04
515	JAN 28/03	02
516	JAN 28/03	01
517	JAN 28/03	03
518	JAN 28/03	04
519	JAN 28/03	04
520	JAN 28/03	04
521	JAN 28/03	04
522	JAN 28/03	02
523	JAN 28/03	04
524	BLANK	
27-51-15		
401	MAY 28/01	01
402	MAR 20/93	01
403	SEP 20/90	01
404	JAN 28/02	01
405	MAY 28/01	01
406	JAN 28/02	01
407	JAN 28/02	01
408	JAN 28/02	01
409	JAN 28/02	01
410	MAY 28/01	01
27-51-15		
601	SEP 20/93	01
602	MAR 20/90	01
603	JAN 28/02	01
604	BLANK	
27-51-16		
401	JUN 20/90	01
402	JUN 20/90	01
403	JUN 20/90	01
404	SEP 28/07	01
405	JAN 28/02	01
406	BLANK	
27-51-17		
401	JAN 28/02	01
402	MAY 28/99	25
403	SEP 28/01	27
404	SEP 28/07	01
405	MAY 20/98	01
406	MAY 20/98	01
407	MAY 20/98	01
408	MAY 20/98	04
409	JAN 28/00	03
410	JAN 28/00	03
R 411	JAN 20/09	07.1
412	JAN 28/05	07
413	SEP 28/06	09
414	JAN 28/05	09

GPA Group plc

PAGE	DATE	CODE
27-51-17		CONT.
415	JAN 28/05	10
416	JAN 28/02	16
27-51-18		
401	MAY 28/01	01
402	MAR 20/90	01
403	MAR 20/90	01
404	MAR 20/90	01
405	SEP 28/07	01
406	SEP 28/07	01
407	SEP 28/01	01
408	MAY 28/01	04
409	MAY 28/01	04
410	MAY 28/01	03
27-51-21		
401	MAY 28/01	01
402	SEP 28/07	01
403	SEP 20/90	02
404	SEP 20/90	01
405	SEP 20/90	01
406	SEP 20/90	01
407	MAY 28/01	01
408	MAY 28/01	01
R 409	JAN 20/09	01.1
R 410	JAN 20/09	02.101
411	SEP 28/06	04
412	MAY 28/01	03
413	MAY 28/01	02
414	BLANK	
27-51-21		
601	MAY 28/05	01
602	JUN 20/95	01
603	MAY 28/05	01
604	DEC 20/92	01
605	SEP 28/07	01
606	SEP 28/07	01
607	SEP 28/07	01
608	MAY 20/98	01
609	SEP 28/07	01
610	JAN 28/05	01
611	MAY 28/01	01
612	MAY 28/01	01
613	MAY 28/05	01
614	MAY 28/05	01
615	MAY 28/01	01
616	BLANK	
27-51-22		
401	SEP 28/06	01
402	SEP 20/90	01
403	SEP 20/90	01
404	SEP 20/90	01
405	MAY 28/00	01
406	JAN 28/02	01
407	SEP 28/06	01
408	SEP 28/06	01

PAGE	DATE	CODE
27-51-22		CONT.
409	SEP 28/06	01
410	BLANK	
27-51-22		
501	JUN 20/94	01
502	MAY 28/04	01
503	JAN 28/02	01
504	JAN 28/02	01
505	JAN 28/02	01
506	DEC 20/93	01
507	SEP 28/04	01
508	JAN 28/02	01
509	JAN 28/02	01
510	JAN 28/02	01
511	JUN 20/94	01
512	SEP 28/04	01
27-51-23		
401	MAY 28/07	02
402	JAN 28/02	01
403	SEP 20/90	01
404	SEP 20/90	01
405	MAY 28/07	02
406	MAY 28/07	02
407	JAN 28/02	01
408	MAY 28/07	01
409	MAY 28/07	01
410	BLANK	
27-51-23		
601	JAN 28/01	01
602	MAR 20/90	01
603	JAN 28/02	01
604	JAN 28/02	01
27-51-24		
401	SEP 28/05	01
402	SEP 28/05	06
403	DEC 20/90	03
404	SEP 28/05	04
405	SEP 28/05	03
406	SEP 28/05	15
407	SEP 28/05	07
408	SEP 28/05	04
409	SEP 28/05	06
410	BLANK	
27-51-25		
201	JAN 28/06	01
202	JAN 28/06	01
203	JAN 28/06	02
204	SEP 28/07	01
205	SEP 28/07	01
206	SEP 28/99	01
207	SEP 20/90	01
208	SEP 20/90	01
209	SEP 20/90	01
210	MAY 28/99	01

PAGE	DATE	CODE
27-51-25		CONT.
211	MAY 28/99	01
212	MAY 28/01	02
213	MAY 28/01	02
214	SEP 28/07	26
215	JAN 20/99	01
216	JAN 20/99	01
217	JAN 28/06	05
218	SEP 28/07	01
219	SEP 28/07	03
220	SEP 28/07	03
221	SEP 28/07	02
222	SEP 28/07	02
223	JAN 28/06	01
224	BLANK	
27-51-26		
401	SEP 28/03	01
402	SEP 28/03	03
403	SEP 20/90	01
404	SEP 28/03	01
405	SEP 28/07	02
406	SEP 28/07	03
407	SEP 20/90	01
408	JAN 28/02	01
409	DEC 20/90	03
410	SEP 20/90	01
411	SEP 20/90	01
412	SEP 20/90	01
413	JAN 28/05	02
414	JAN 28/05	03
415	SEP 28/03	03
416	SEP 28/03	04
417	SEP 20/90	04
418	SEP 20/90	06
419	SEP 20/90	04
420	SEP 20/90	01
421	MAY 28/05	18
422	DEC 20/91	17
423	SEP 28/01	08
424	SEP 28/01	08
425	SEP 20/90	03
426	BLANK	
27-51-27		
201	JAN 28/02	01
202	SEP 20/90	01
203	JAN 28/02	02
204	JAN 28/02	01
205	SEP 28/07	01
206	JAN 28/05	01
207	SEP 20/90	01
208	JAN 28/05	01
209	JAN 28/05	01
210	JAN 28/05	02
211	JAN 28/05	02
212	JAN 28/05	01
213	JAN 28/05	13
214	JAN 28/05	01

GPA Group plc

PAGE	DATE	CODE
27-51-28		
201	SEP 20/98	01
202	SEP 20/90	01
203	SEP 20/90	01
204	JAN 28/02	01
205	SEP 20/90	01
206	SEP 20/90	01
207	DEC 20/90	03
208	MAY 28/01	08
209	SEP 20/98	16
210	SEP 28/07	06
211	JAN 28/02	04
212	JAN 28/02	05
213	SEP 20/98	03
214	MAY 28/01	06
215	SEP 20/98	03
216	MAY 28/01	09
217	JAN 28/05	16
218	MAY 28/01	06
219	SEP 20/98	03
220	MAY 28/01	07
221	JAN 28/05	14
222	SEP 20/98	06
223	MAY 28/01	04
224	SEP 20/98	08
225	SEP 28/01	23
226	SEP 28/01	11
227	JAN 28/01	05
228	MAY 28/01	04
27-51-29		
201	MAY 28/99	01
202	MAY 28/01	13
203	JUN 20/91	03
204	SEP 20/94	10
205	JUN 20/91	04
206	SEP 20/90	01
207	SEP 20/90	01
208	SEP 20/90	01
209	JAN 28/05	01
210	MAY 28/06	01
211	JAN 28/05	01
212	JAN 28/05	01
213	JAN 28/05	01
214	JAN 28/05	01
215	JAN 28/05	01
216	MAY 28/99	09
217	MAY 28/99	15
218	SEP 20/94	01
219	SEP 20/94	13
220	SEP 28/02	21
221	SEP 28/02	01
222	SEP 28/02	04
223	SEP 28/02	04
224	SEP 28/02	10
225	MAY 28/01	08
226	MAY 28/99	07
227	MAY 28/01	04
228	MAY 28/01	04

PAGE	DATE	CODE
27-51-29		CONT.
229	MAY 28/99	11
230	MAY 28/99	04
231	MAY 28/01	09
232	MAY 28/01	09
233	MAY 28/99	10
234	MAY 28/01	04
235	MAY 28/99	10
236	BLANK	
27-51-30		
201	DEC 20/93	01
202	DEC 20/90	01
203	MAY 28/01	09
204	JUN 20/91	03
205	JUN 20/91	19
206	MAY 28/01	01
207	MAY 28/01	02
208	DEC 20/90	01
209	DEC 20/93	01
210	DEC 20/90	15
211	JAN 28/02	06
212	JAN 28/02	16
213	JAN 28/02	07
214	JUN 20/91	06
215	MAY 28/01	05
216	BLANK	
27-51-31		
201	MAY 28/00	01
202	JAN 28/02	01
203	SEP 28/06	01
204	JAN 28/06	01
205	JAN 28/06	02
206	SEP 28/06	02
207	JAN 28/06	01
208	JAN 28/06	01
209	SEP 28/06	02
210	SEP 28/06	02
211	SEP 28/06	02
212	JAN 28/06	02
213	JAN 28/06	02
214	JAN 28/06	02
215	JAN 28/06	02
216	JAN 28/06	05
27-51-32		
401	JAN 28/02	01
402	MAY 28/01	01
403	MAY 28/01	01
404	SEP 20/90	01
405	SEP 20/90	01
406	DEC 20/90	03
407	JAN 28/02	01
408	JUN 20/96	03
409	JUN 20/96	03
410	JAN 20/98	03
411	DEC 20/92	04
412	JAN 28/02	01

PAGE	DATE	CODE
27-51-32		CONT.
413	JAN 28/02	02
414	BLANK	
27-51-32		
601	JUN 20/90	01
602	JAN 28/01	01
603	MAY 28/05	01
604	BLANK	
27-51-33		
401	SEP 20/93	03
402	SEP 20/90	01
403	MAR 20/94	01
404	SEP 20/90	01
405	SEP 20/90	01
406	SEP 20/93	02
407	SEP 20/90	01
408	BLANK	
27-51-34		
401	MAY 28/01	01
402	JAN 20/99	01
403	JUN 20/90	01
404	JUN 20/90	01
405	SEP 28/07	01
406	SEP 20/98	01
407	MAY 28/01	01
408	BLANK	
27-58-00		
1	MAY 20/98	01
2	MAY 20/98	01
3	JAN 28/02	01
4	JAN 28/02	01
5	JAN 28/02	01
6	JAN 28/02	01
7	JAN 28/01	01
8	MAY 20/98	01
27-58-00		
501	DEC 20/90	01
502	DEC 20/90	01
503	JAN 28/01	01
504	MAR 20/93	02
27-58-01		
501	MAY 28/01	04
502	JAN 20/08	01
503	DEC 20/90	01
504	SEP 28/04	01
505	DEC 20/90	01
506	DEC 20/90	01
507	MAY 28/04	01
508	JAN 28/01	01
509	DEC 20/90	01
510	DEC 20/90	01
511	DEC 20/90	01
512	DEC 20/90	01

GPA Group plc

PAGE	DATE	CODE
27-58-01		CONT.
513	DEC 20/90	03
514	MAY 28/01	03
515	MAY 28/01	03
516	MAY 28/01	03
517	JAN 28/05	08
518	JAN 28/05	05
519	JAN 28/05	06
520	JAN 28/05	05
521	JAN 28/05	05
522	MAY 28/01	04
523	MAY 28/01	04
524	JUN 20/95	04
525	JUN 20/95	04
526	MAY 28/01	04
527	JUN 20/94	09
528	MAY 28/01	06
529	MAY 28/01	05
530	DEC 20/90	05
531	MAY 28/01	05
532	MAY 28/01	05
533	MAY 28/01	05
534	MAY 28/01	06
27-58-02		
401	SEP 28/07	01
402	SEP 28/07	01
403	MAY 28/07	01
404	BLANK	
27-58-03		
401	MAY 28/01	01
402	DEC 20/90	03
403	DEC 20/90	01
404	DEC 20/90	01
405	SEP 28/07	01
406	SEP 28/07	03
407	DEC 20/90	01
408	BLANK	
27-60-00		
1	DEC 15/85	01
2	BLANK	
27-61-00		
1	MAR 15/87	02
2	MAR 15/87	01
3	JUN 20/96	01
4	MAR 20/92	01
5	SEP 20/95	02
6	MAR 15/87	02
7	MAY 28/01	03
8	JUN 20/92	01
9	SEP 15/82	01
10	MAR 15/87	02
11	JAN 28/02	01
12	JAN 28/02	03
13	JAN 28/02	04
14	JAN 28/02	01

PAGE	DATE	CODE
27-61-00		CONT.
15	JAN 28/02	01
16	JAN 28/02	01
17	MAR 20/92	02
18	BLANK	
27-61-00		
101	SEP 20/97	03
102	DEC 20/90	01
103	DEC 20/90	01
104	DEC 20/90	01
105	MAR 20/92	01
106	BLANK	
27-61-00		
201	SEP 28/01	01
202	SEP 20/90	01
203	SEP 20/90	01
204	SEP 20/90	01
205	SEP 20/90	01
206	SEP 20/92	03
207	SEP 20/92	02
208	SEP 20/90	01
209	SEP 20/92	03
210	SEP 20/92	03
211	SEP 20/92	03
212	SEP 28/01	05
213	SEP 20/92	02
214	SEP 20/92	02
215	SEP 20/92	03
216	SEP 20/92	03
217	SEP 20/92	03
218	SEP 20/92	02
219	SEP 20/92	01
220	SEP 20/92	01
27-61-00		
501	DEC 20/95	01
502	SEP 20/90	01
503	SEP 28/07	01
504	MAY 28/01	03
505	SEP 20/90	02
506	SEP 20/90	02
507	JUN 20/96	01
508	SEP 20/90	01
509	SEP 20/90	04
510	SEP 28/07	04
R 511	JAN 20/09	04.1
512	SEP 28/06	04
513	JAN 28/02	01
514	JAN 28/06	03
515	MAY 28/01	04
516	SEP 20/90	01
517	SEP 28/99	06
518	SEP 28/99	06
519	JAN 28/06	08
520	JAN 28/06	08
521	JAN 28/06	08
522	SEP 28/99	07

PAGE	DATE	CODE
27-61-00		CONT.
523	JAN 28/03	05
524	JAN 28/03	05
525	JAN 28/02	05
526	SEP 20/97	04
527	SEP 20/97	04
528	MAY 28/07	03
529	JAN 28/06	04
530	JAN 28/06	04
531	JAN 28/06	05
532	JAN 28/06	05
533	JAN 28/06	05
534	JAN 28/06	05
535	SEP 28/99	06
536	JAN 28/02	06
537	JAN 28/02	06
538	SEP 28/99	06
539	JAN 28/02	06
540	SEP 28/99	07
541	SEP 28/99	07
542	SEP 28/99	07
543	SEP 20/97	08
544	SEP 28/99	08
545	JAN 28/02	08
546	SEP 28/07	06
547	MAY 28/07	05
548	MAY 28/07	05
549	MAY 28/07	05
550	SEP 28/07	06
551	MAY 28/07	07
552	MAY 28/07	07
553	MAY 28/07	08
554	MAY 28/07	07
555	MAY 28/07	09
556	MAY 28/07	01
557	MAY 28/07	10
558	MAY 28/07	11
559	MAY 28/07	11
560	MAY 28/07	10
561	MAY 28/07	09
562	MAY 28/07	11
563	MAY 28/07	14
564	MAY 28/07	10
565	MAY 28/07	12
566	MAY 28/07	10
567	MAY 28/07	11
568	MAY 28/07	10
569	MAY 28/07	11
570	MAY 28/07	11
571	MAY 28/07	10
572	MAY 28/07	11
573	MAY 28/07	11
574	MAY 28/07	10
575	MAY 28/07	10
576	MAY 28/07	11
577	MAY 28/07	11
578	MAY 28/07	10
579	MAY 28/07	12
580	MAY 28/07	13

GPA Group plc

PAGE	DATE	CODE
27-61-00		CONT.
580A	MAY 28/07	12
580B	MAY 28/07	12
580C	MAY 28/07	12
580D	MAY 28/07	13
580E	MAY 28/07	11
580F	MAY 28/07	10
580G	MAY 28/07	08
580H	MAY 28/07	07
580I	MAY 28/07	05
580J	MAY 28/07	02
580K	MAY 28/07	01
580L	BLANK	
27-61-01		
401	MAR 20/96	01
402	SEP 20/97	01
403	SEP 20/97	04
404	SEP 20/97	02
405	SEP 28/07	02
406	JAN 28/05	02
407	JAN 28/05	02
408	JAN 28/05	02
409	JAN 20/98	01
410	JAN 20/98	01
411	JAN 20/98	01
412	JAN 20/98	01
413	JAN 20/98	01
414	JAN 20/98	01
415	JAN 20/98	01
416	JAN 20/98	01
417	JAN 28/02	01
418	JAN 28/05	04
419	JAN 28/05	02
420	JAN 28/05	03
421	JAN 28/05	02
422	JAN 20/98	01
423	JAN 28/05	03
424	JAN 28/01	01
425	JAN 20/98	01
426	JAN 28/02	01
427	JAN 28/05	02
428	JAN 28/05	03
429	JAN 28/05	04
430	JAN 28/05	03
431	JAN 28/05	04
432	JAN 28/05	03
433	JAN 28/05	04
434	JAN 28/05	06
435	JAN 28/05	07
436	BLANK	
27-61-02		
201	JAN 28/06	01
202	SEP 20/97	03
203	JAN 28/06	02
204	SEP 20/97	02
205	JAN 28/02	01
206	MAY 28/06	01
27-61-02		CONT.
207	SEP 20/97	02
208	SEP 28/06	02
209	JAN 28/05	02
210	SEP 28/05	02
211	JAN 28/06	04
212	SEP 28/06	02
213	MAY 28/06	02
214	MAY 28/06	02
215	MAY 28/06	02
216	MAY 28/06	02
27-61-04		
401	JAN 28/02	01
402	SEP 20/90	01
403	SEP 20/97	03
404	SEP 20/97	02
405	SEP 20/97	04
406	SEP 20/97	02
27-62-00		
1	SEP 28/01	01
2	MAR 20/90	01
3	MAR 15/87	01
4	JUN 15/86	01
5	MAY 20/08	05
6	MAR 20/90	01
7	MAY 20/08	01
8	JAN 28/02	01
9	MAY 28/04	05
10	BLANK	
27-62-00		
101	MAY 28/99	01
102	JUN 20/91	01
103	JUN 20/91	01
104	JUN 20/91	01
27-62-00		
501	JAN 28/06	01
502	JAN 28/06	16
503	SEP 20/90	01
504	SEP 20/90	01
505	MAY 28/01	02
506	DEC 20/93	02
507	MAY 28/01	25
508	SEP 20/90	01
509	SEP 20/90	01
510	SEP 28/00	06
511	SEP 20/90	01
512	SEP 28/07	11
513	JAN 28/01	25
514	SEP 28/00	18
515	SEP 20/97	12
516	JAN 28/06	01
517	JUN 20/96	02
518	JAN 28/06	03
519	JAN 28/01	02
520	JAN 28/06	03
27-62-00		CONT.
521	JAN 28/01	14
522	JAN 28/01	12
523	JAN 28/05	19
524	JAN 28/01	24
525	JAN 28/01	20
526	JAN 28/01	16
527	JAN 28/01	17
528	JAN 28/06	22
529	JAN 28/06	04
530	MAY 20/08	09
531	SEP 20/08	12
532	MAY 28/06	19
533	MAY 28/06	05
534	SEP 28/04	31
535	MAY 28/06	24
536	BLANK	
27-62-01		
401	SEP 28/01	07
402	SEP 20/90	01
403	SEP 20/90	01
404	SEP 28/01	09
405	SEP 28/01	08
406	SEP 20/97	11
407	SEP 20/97	08
408	BLANK	
27-62-02		
201	JAN 28/00	01
202	SEP 20/90	01
203	SEP 20/90	01
204	SEP 20/90	01
205	JAN 20/99	01
206	SEP 20/90	01
207	SEP 20/97	03
208	SEP 20/90	01
209	SEP 20/97	19
210	JAN 28/00	07
211	JAN 28/00	06
212	JUN 20/96	04
213	JAN 28/00	05
214	MAY 28/00	05
215	JAN 28/00	06
216	JAN 28/00	09
217	SEP 28/06	08
218	SEP 28/06	20
219	SEP 28/01	11
220	SEP 28/01	19
221	SEP 20/97	09
222	SEP 20/97	07
223	SEP 20/97	06
224	SEP 20/97	14
225	SEP 28/01	07
226	SEP 20/97	04

GPA Group plc

PAGE	DATE	CODE
27-62-07		
501	JAN 28/01	09
502	SEP 20/90	01
503	MAY 28/01	01
504	JAN 28/01	09
27-62-08		
201	DEC 20/95	09
202	MAY 28/01	16
203	SEP 20/90	01
204	SEP 20/90	02
205	SEP 20/90	02
206	JAN 28/02	05
207	SEP 20/90	02
208	SEP 20/90	10
27-81-00		
1	DEC 15/83	01
2	DEC 15/83	01
3	SEP 15/83	01
4	MAY 20/08	01
5	DEC 15/83	01
6	SEP 15/82	01
7	SEP 15/82	01
8	DEC 15/83	01
9	DEC 15/83	01
10	JUN 15/86	01
11	SEP 20/93	01
12	SEP 20/89	01
13	SEP 20/89	01
14	DEC 15/82	01
15	SEP 15/82	01
16	MAR 20/90	01
17	MAR 15/87	02
18	MAY 28/02	GUI
19	MAY 28/01	03
20	MAR 20/90	01
21	MAY 28/99	02
22	JAN 20/08	01
23	MAY 28/99	01
24	SEP 28/01	01
25	MAY 28/99	06
26	MAY 28/99	04
27	MAY 28/99	03
28	MAY 28/01	06
29	MAY 28/01	07
30	MAY 28/01	03
31	JAN 28/02	01
32	JAN 28/02	06
33	JAN 28/02	09
34	JAN 28/02	16
35	JAN 28/02	18
36	JAN 28/02	11
37	JAN 28/02	10
38	JAN 28/02	09
39	JAN 28/02	06
40	JAN 28/02	07
41	MAY 28/99	07
42	BLANK	

PAGE	DATE	CODE
27-81-00		
101	SEP 20/91	16
102	MAY 20/98	01
103	MAR 20/91	01
104	MAR 20/91	01
105	MAR 20/91	01
106	MAR 20/91	01
107	MAR 20/91	01
108	MAY 28/01	02
109	MAR 20/91	01
110	SEP 28/99	01
111	SEP 20/91	01
112	SEP 20/91	02
113	SEP 20/91	01
114	SEP 28/99	01
27-81-00		
201	SEP 28/01	01
202	MAY 28/99	01
203	SEP 28/01	01
204	MAY 20/08	01
205	MAY 28/99	01
206	MAY 20/08	01
207	MAY 20/08	01
208	SEP 28/01	01
209	MAY 20/08	01
210	SEP 28/01	01
211	SEP 28/99	01
212	SEP 28/99	01
27-81-00		
501	SEP 28/02	01
502	JAN 28/01	04
503	DEC 20/89	01
504	JAN 28/01	05
505	DEC 20/90	05
506	DEC 20/90	04
507	JAN 28/04	05
508	JAN 28/02	01
509	DEC 20/89	01
510	JAN 28/00	01
511	JAN 28/02	01
512	SEP 28/04	05
513	SEP 28/05	07
514	JAN 28/02	10
515	JAN 28/02	10
516	JAN 20/99	01
517	JAN 28/02	01
518	MAY 28/99	01
519	MAY 28/99	02
520	MAY 28/99	01
521	MAR 20/90	01
522	DEC 20/89	01
523	MAY 20/08	09
524	MAY 20/08	18
525	MAY 20/08	14
526	MAY 20/08	09
527	SEP 28/04	04
528	MAY 20/08	12

PAGE	DATE	CODE
27-81-00		CONT.
529	MAY 20/08	12
530	MAY 20/08	12
531	MAY 20/08	11
532	MAY 20/08	10
533	MAY 20/08	16
534	MAY 20/08	18
535	MAY 20/08	14
536	MAY 20/08	16
537	MAY 20/08	16
538	MAY 20/08	16
539	MAY 20/08	13
540	MAY 20/08	14
541	MAY 20/08	15
542	MAY 20/08	16
543	MAY 20/08	12
544	MAY 20/08	13
545	MAY 20/08	16
546	MAY 20/08	25
547	MAY 20/08	20
548	MAY 20/08	16
549	MAY 20/08	19
550	MAY 20/08	14
551	MAY 20/08	16
552	MAY 20/08	16
553	MAY 20/08	14
554	MAY 20/08	12
555	MAY 28/99	29
556	JAN 28/05	29
557	MAY 20/08	17
558	JAN 28/05	12
559	JAN 28/05	13
560	BLANK	
27-81-01		
401	JAN 20/99	01
402	DEC 20/90	01
403	SEP 28/01	01
404	MAR 20/94	01
405	JAN 20/99	01
406	JUN 20/95	02
407	JAN 28/02	01
408	JAN 28/02	01
409	SEP 20/94	01
410	JAN 28/02	01
411	MAY 28/03	09
412	MAY 28/03	05
413	MAY 28/03	07
414	MAY 28/03	03
415	MAY 20/08	03
R 416	JAN 20/09	13.1
417	MAY 20/08	22
418	MAY 20/08	07
419	MAY 20/08	04
420	MAY 20/08	05
421	MAY 20/08	05
422	MAY 20/08	05
423	MAY 20/08	06
424	MAY 20/08	15

GPA Group plc

PAGE	DATE	CODE
27-81-01		CONT.
425	MAY 20/08	20
426	MAY 20/08	11
427	MAY 20/08	16
428	MAY 20/08	23
429	MAY 20/08	15
430	MAY 20/08	10
431	JAN 28/07	07
432	JAN 28/07	09
433	JAN 28/07	07
434	JAN 28/07	08
435	JAN 28/07	12
436	MAY 20/08	14
437	MAY 20/08	14
438	MAY 20/08	10
27-81-01		
601	MAY 20/08	01
602	MAY 28/06	01
603	MAY 28/06	01
604	MAY 28/06	01
27-81-02		
401	JAN 20/99	01
402	DEC 20/90	01
403	JAN 28/02	01
404	MAR 20/94	02
405	SEP 20/08	01
406	JAN 28/02	22
407	MAR 20/95	01
408	SEP 28/02	01
409	DEC 20/95	01
410	SEP 20/94	02
411	MAY 28/01	02
412	MAY 28/01	02
413	MAY 28/01	01
414	MAY 28/99	01
415	MAY 28/99	01
416	MAY 20/08	02
417	MAY 20/08	02
418	JAN 28/05	02
419	JAN 28/05	02
420	JAN 28/05	03
421	MAY 20/08	03
422	MAY 20/08	03
423	MAY 20/08	02
424	JAN 28/05	02
425	JAN 28/05	02
426	JAN 28/05	22
427	JAN 28/05	03
428	JAN 28/05	03
429	JAN 28/05	03
430	JAN 28/05	20
431	JAN 28/06	03
432	JAN 28/05	03
433	JAN 28/05	03
434	JAN 28/05	24
435	MAY 20/08	15
436	MAY 20/08	13

PAGE	DATE	CODE
27-81-02		
601	MAY 20/08	01
602	SEP 28/06	01
603	SEP 20/90	01
604	SEP 20/90	01
605	SEP 20/90	01
606	BLANK	
27-81-06		
201	DEC 20/94	01
202	DEC 20/90	01
203	JAN 28/03	01
204	DEC 20/90	01
205	DEC 20/90	03
206	MAY 28/01	03
207	DEC 20/90	04
208	MAY 28/06	03
209	DEC 20/90	02
210	DEC 20/90	02
211	DEC 20/90	02
212	DEC 20/91	02
213	DEC 20/91	02
214	DEC 20/90	05
215	DEC 20/90	03
216	DEC 20/90	06
217	DEC 20/90	05
218	JAN 28/02	08
219	DEC 20/90	05
220	BLANK	
27-81-07		
401	JAN 20/99	01
402	MAY 28/02	01
403	MAY 28/02	01
404	MAY 28/01	04
405	DEC 20/90	01
406	JUN 20/97	01
407	JAN 28/02	01
408	DEC 20/90	01
409	DEC 20/90	01
410	JAN 28/02	01
411	DEC 20/90	03
412	DEC 20/90	02
413	MAY 28/06	02
414	JAN 28/05	02
415	JAN 28/02	02
416	JAN 28/04	02
417	SEP 28/01	04
418	JAN 28/02	05
419	DEC 20/90	02
420	DEC 20/90	04
421	DEC 20/90	04
422	JAN 28/02	04
423	SEP 28/01	12
424	DEC 20/90	03

PAGE	DATE	CODE
27-81-08		
201	JAN 20/99	01
202	MAY 28/02	01
203	MAY 28/02	01
204	MAY 28/01	02
205	MAY 28/02	01
206	MAY 28/02	02
207	SEP 28/07	01
208	SEP 28/07	01
209	JAN 28/05	01
210	JAN 28/05	02
211	SEP 20/90	02
212	SEP 20/90	02
213	SEP 20/90	01
214	MAY 28/01	01
27-81-09		
401	SEP 28/04	01
402	MAY 20/08	01
403	MAY 20/08	01
404	MAY 28/00	01
405	MAY 20/08	01
406	SEP 28/03	02
407	SEP 28/03	02
408	SEP 28/03	02
409	SEP 28/03	02
410	BLANK	
27-81-10		
401	JAN 20/99	01
402	MAY 28/01	01
403	JAN 28/02	01
404	SEP 20/90	01
405	MAY 20/08	01
406	MAY 20/08	01
407	MAY 20/08	01
408	MAY 20/08	01
409	MAY 20/08	01
410	SEP 20/90	01
411	MAY 20/08	01
412	BLANK	
27-81-10		
601	MAY 20/08	01
602	JAN 28/02	01
603	JAN 28/02	01
604	JAN 28/02	01
605	JAN 28/02	01
606	JAN 28/02	01
607	JAN 28/02	01
608	BLANK	
27-81-11		
401	MAR 20/92	01
402	MAR 20/92	01
403	MAR 20/92	01
404	JAN 28/02	01

GPA Group plc

PAGE	DATE	CODE
27-81-11		
601	SEP 20/90	01
602	SEP 20/90	01
603	SEP 20/90	01
604	JAN 28/02	01
605	JAN 28/02	01
606	JAN 28/02	01
607	JAN 28/02	01
608	JAN 28/02	01
609	JAN 28/02	01
610	BLANK	
27-81-12		
401	JAN 20/99	01
402	MAY 28/01	01
403	SEP 20/90	01
404	SEP 20/90	01
405	MAY 20/08	01
406	SEP 20/90	01
407	MAY 20/08	01
408	MAY 20/08	01
409	MAY 20/08	01
410	BLANK	
27-81-12		
601	JAN 28/01	01
602	MAR 20/90	01
603	JAN 28/02	01
604	BLANK	
27-81-13		
401	JUN 20/92	01
402	SEP 28/05	01
403	SEP 28/05	01
404	BLANK	
27-81-13		
601	SEP 20/90	01
602	SEP 20/90	01
603	JAN 28/02	01
604	MAY 28/05	01
27-81-15		
401	JAN 20/99	01
402	MAY 28/01	01
403	SEP 20/90	01
404	SEP 20/90	01
405	JUN 20/93	01
406	JAN 28/02	01
407	MAY 28/01	01
408	JUN 20/93	01
27-81-18		
401	MAY 28/99	02
402	SEP 28/07	02
403	MAY 28/02	03
404	SEP 28/06	03
405	SEP 20/90	01
406	DEC 20/90	03

PAGE	DATE	CODE
27-81-18		CONT.
407	SEP 28/07	03
408	MAY 20/08	04
409	SEP 28/06	04
R 410	JAN 20/09	06.1
411	SEP 28/07	11
412	SEP 28/07	14
413	SEP 28/06	14
414	SEP 28/06	20
415	SEP 28/06	13
416	SEP 28/06	08
417	SEP 28/06	08
418	MAY 20/08	09
419	MAY 20/08	09
420	MAY 20/08	09
27-81-18		
601	SEP 28/01	03
602	MAY 20/08	03
603	JAN 28/00	03
604	DEC 20/96	02
605	DEC 20/96	02
606	DEC 20/96	02
607	DEC 20/96	02
608	DEC 20/96	03
609	DEC 20/96	03
610	MAY 20/08	02
611	DEC 20/96	05
612	MAY 28/01	05
613	JAN 28/07	06
614	MAY 20/08	08
615	MAY 20/08	05
616	BLANK	
27-81-20		
401	MAY 28/99	01
402	MAY 28/99	01
403	MAY 28/99	01
404	MAY 28/99	01
405	MAY 28/99	01
406	MAY 20/08	01
407	MAY 20/08	01
408	MAY 20/08	01
409	MAY 20/08	01
410	MAY 20/08	01
411	MAY 20/08	01
412	MAY 20/08	01
27-81-20		
801	MAY 20/08	01
802	MAY 20/08	01
803	MAY 28/99	01
804	BLANK	
27-81-41		
401	SEP 28/07	01
402	MAY 28/99	01
403	JAN 28/02	01
404	MAY 28/99	01

PAGE	DATE	CODE
27-81-41		CONT.
405	SEP 28/02	01
406	SEP 28/02	01
407	SEP 28/02	01
408	SEP 28/02	01
409	SEP 28/02	01
410	MAY 20/08	02
411	SEP 28/02	02
412	SEP 28/07	02
413	SEP 28/02	02
414	JAN 28/04	02
415	SEP 28/02	02
416	MAY 20/08	01
27-81-41		
501	MAY 28/99	01
502	MAY 28/99	01
503	JAN 28/02	01
504	JAN 28/02	01
505	MAY 28/99	01
506	MAY 28/99	01
507	MAY 28/02	03
508	MAY 20/08	01
509	MAY 20/08	01
510	MAY 20/08	02
511	SEP 28/03	02
512	MAY 28/02	04
513	SEP 28/03	03
514	MAY 28/02	06
515	MAY 20/08	07
516	BLANK	
27-81-42		
401	SEP 28/02	01
402	SEP 28/02	02
403	SEP 28/03	02
404	SEP 28/03	02
405	SEP 28/02	02
406	SEP 28/02	02
407	SEP 28/02	02
408	SEP 28/02	02
409	SEP 28/02	02
410	SEP 28/02	02
27-81-42		
501	MAY 28/99	01
502	MAY 28/01	03
503	MAY 28/99	03
504	MAY 28/99	02
505	MAY 28/99	02
506	SEP 28/01	04
507	MAY 28/01	04
508	BLANK	
27-88-00		
1	MAY 28/99	01
2	SEP 15/83	01
3	JAN 28/02	01
4	JAN 28/02	01

GPA Group plc

PAGE	DATE	CODE
27-88-00		
101	MAR 20/91	13
102	MAR 20/91	01
27-88-00		
501	MAY 28/99	01
502	BLANK	
27-88-01		
401	JAN 20/99	01
402	MAY 28/99	01
403	MAY 28/99	01
404	MAY 28/99	02
405	MAY 20/08	02
406	MAR 20/95	01
407	MAY 28/99	01
408	BLANK	

PAGE	DATE	CODE

PAGE	DATE	CODE

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

TABLE OF CONTENTS

CHAPTER 27 - FLIGHT CONTROLS

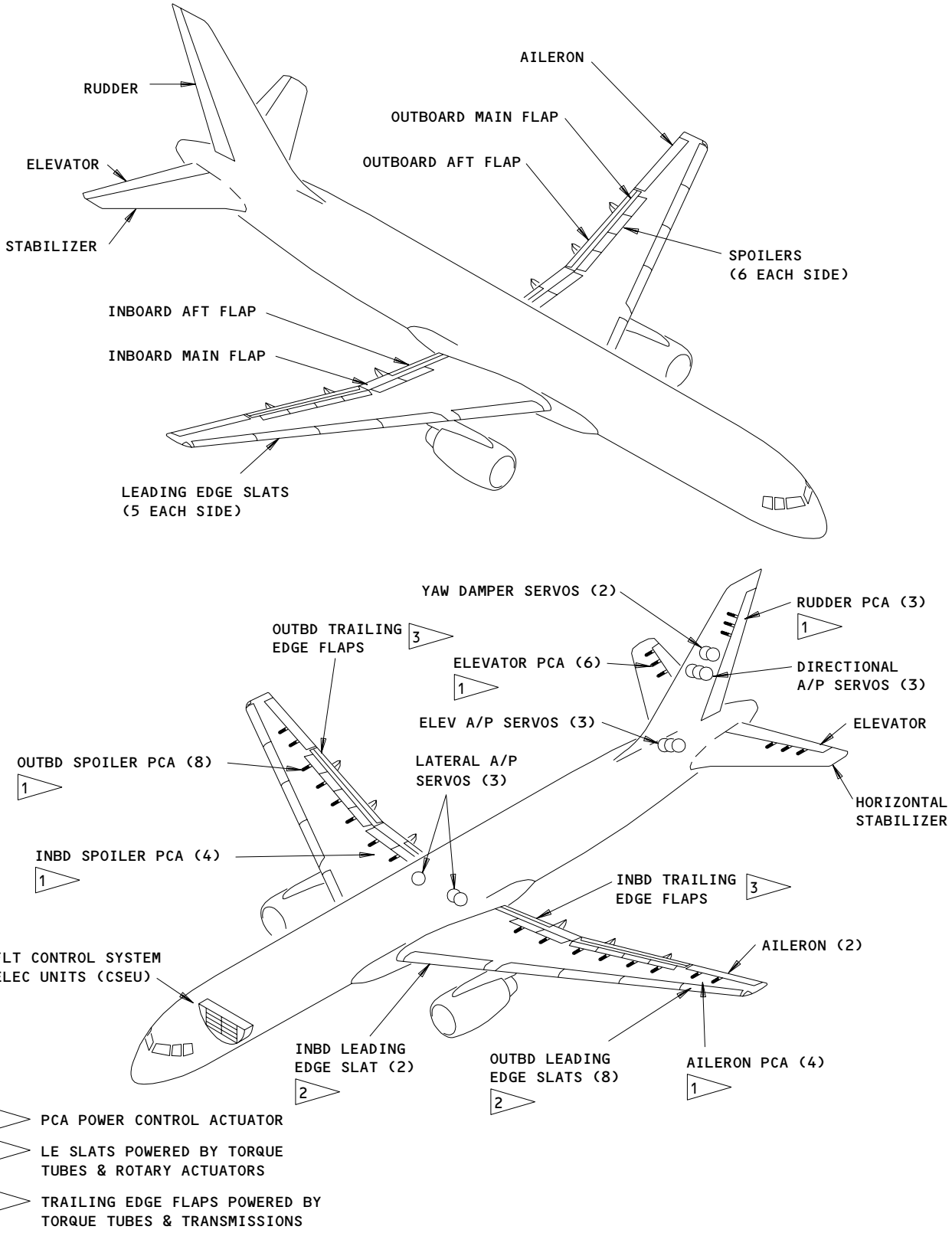
TABLE OF CONTENTS

CHAPTER 27 – FLIGHT CONTROLS

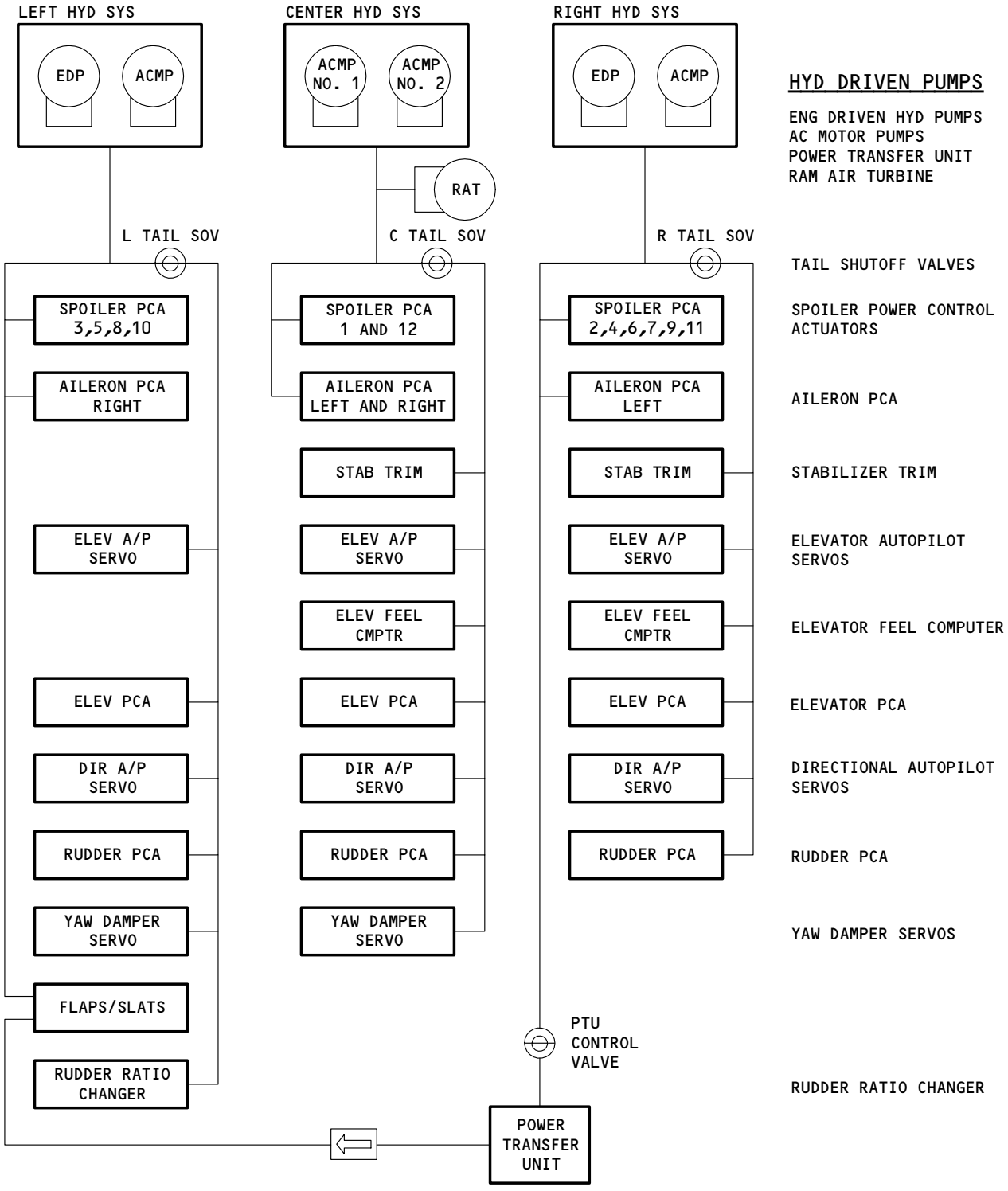
TABLE OF CONTENTS

FLIGHT CONTROLS - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. Aerodynamic characteristics of the 757 have been tailored to reduce drag and provide high performance. Single leading edge slats and trailing edge flaps are used for high aerodynamic efficiency, functional reliability, and low maintenance requirements. Hydraulically powered conventional flight controls with redundant systems provide fail-safe control throughout the flight envelope.
2. Introduction (Fig. 2)
   A. Primary Flight Controls
      (1) The primary flight controls of the airplane are the ailerons, elevators, and rudder. Each control surface is powered by power control actuators (PCA's) that are cable operated. Each PCA receives hydraulic power from a separate hydraulic system. The primary flight controls use all three hydraulic systems for redundancy. There is no reversion to manual control of the surfaces if hydraulic power fails.
   B. Secondary Flight Controls
      (1) The secondary flight controls are the spoiler/speedbrakes, horizontal stabilizer, leading edge (LE) slats, and trailing edge (TE) flaps.
      (2) Six spoiler/speedbrakes are installed on each wing. They are hydraulically powered and electronically controlled. The spoiler/speedbrakes receive hydraulic power from all three hydraulic systems.
      (3) Five LE slats are installed on each wing. The slats are powered either hydraulically or electrically. Normally, hydraulic motors rotate drive shafts that drive the rotary actuators. Electric motors power the drive shafts as a backup. The slats receive hydraulic power from the left system.
      (4) Two TE flaps (inboard and outboard) are installed on each wing. The flaps are powered either hydraulically or electrically. Normally, hydraulic motors rotate drive shafts that drive rotary actuators. Electric motors power the drive shafts as a backup. The flaps receive hydraulic power from the left system.



Flight Controls Introduction
Figure 1



Flight Control – Hydraulic Distribution
Figure 2

(5) The horizontal stabilizer is hydraulically powered and electrically controlled. The stabilizer receives power from the right and center hydraulic systems.

C. Flight Control Actuators, Servos, and Electronics

(1) Three autopilot lateral control servos (ALCS) provide automatic control . Each ALCS is powered by a separate hydraulic system. The ALCS's have internal servovalves for autopilot inputs. All of the ALCS's have the same part number.

(2) A total of twenty-five power control actuators move the control surfaces. Each PCA uses one of the three hydraulic systems.

(3) Six autopilot servos provide electronic control inputs to the flight control systems. There are three elevator servos and three directional servos. The elevator and directional servos use all three hydraulic systems. Each hydraulic system supplies one elevator servo and one directional servo. The two pitch augmentation servos are also supplied by separate hydraulic systems.

(4) Two yaw damper servos provide gust damping inputs to the rudder system. Each servo uses one of two hydraulic systems. The two yaw damper servos have the same part number.

(5) The control system electronics unit (CSEU) is a group of power supply and electronic modules used in the flight control system. There are two (left and right) CSEU's installed for redundancy.

D. Flight Controls - Hydraulic Distribution

(1) Three independent hydraulic systems provide power to the flight controls. Each system uses a combination of pumps to supply power.

(2) Flight control redundancy is provided by the use of multiple hydraulic systems. The aileron, elevator, rudder, and spoiler PCA's use all three hydraulic systems. The elevator and directional servos and ALCS's each use one of the three hydraulic systems. The slats, flaps, and rudder ratio changer use a single hydraulic system.

(3) The ram air turbine (RAT) is an emergency hydraulic source. The RAT is used in the event of a double engine failure. The RAT is used by the primary flight control system only.

(4) The tail shutoff valves are used for system isolation. The valves are provided for ground use only. The valves are normally open in flight.

(5) Safety harness attachment receptacles are provided on the wing and horizontal stabilizer upper surfaces for use by maintenance personnel working high above ground (Ref 20-10-27, Flight Controls Safety Harness Receptacle).

FLIGHT CONTROL CABLES - DESCRIPTION AND OPERATION

1. General
   A. The flight control cables transmit pilot control inputs to the related control surfaces. A typical control cable ends at a drum or quadrant using swaged terminals. The cables are tensioned to the proper rigging load by turnbuckles. Long cable runs are supported by idler pulleys. Air pressure seals are used to reduce pressure loss when cables are routed through pressure bulkheads and decks.
   B. Control cable runs are identified by code letters which identify cable function (AMM 27-00-01/201).
2. Component Details
   A. Ailerons
      (1) Aileron control cables are routed from the left and right control column quadrants, under the flight deck and main cabin compartment floors. The cables pass through sloping pressure deck air pressure seals and are deflected by pulleys into the main gear wheel wells. The cables on the left side stop at the lateral control feel, centering and trim mechanism. The cables on the right side stop at the quadrant for the lateral control override mechanism. Cables from the feel, centering and trim mechanism operate the left side aileron power control actuators (PCAs). Cables from the override mechanism control the right side PCAs.
   B. Rudder
      (1) Rudder control cables are routed from the left and right forward quadrants, under the flight deck and main cabin compartment floors. The cables pass through aft pressure bulkhead airseals into the horizontal stabilizer compartment, then up into the vertical fin. The cables are attached to the aft quadrant of the rudder feel, centering, and trim mechanism which uses control rods to operate the PCAs.
   C. Elevator
      (1) Elevator control cables start at the forward quadrants of the cable tension regulator; the left set is routed through the main cabin compartment ceiling. The right set travels beneath the main deck floor. Both sets pass through the air seals of the aft pressure bulkhead into the horizontal stabilizer compartment. The right set is routed up above the elevator feel unit and is attached to the lower aft quadrants. The left set of cables cross each other and they are attached to the upper aft quadrant on the elevator feel unit.

D. Flaps/Slats

(1) A single cable wraps around the drum of the flap control lever. One set of cables run aft on the airplane right side to the power drive unit of the trailing edge. A set of cables run from the aft side of the trailing edge power drive unit to the leading edge power drive unit. All cable runs are below the main cabin compartment and pass through air pressure seals in the sloping pressure deck into the main gear wheel wells. Cables for leading edge power drive unit pass through the wing root pressure seals.

FLIGHT CONTROL CABLES - MAINTENANCE PRACTICES

1. General
   A. This procedure supplies flight control cable data to be used for reference purpose only. Refer to Chapter 27 Illustrated Part Catalog (IPC) for current cable part number, dimensions, materials and fittings. The figures that follow supply data for the flap, slat, aileron, rudder, elevator, and horizontal stabilizer trim cable systems. To remove or install a control cable, refer to AMM 20-10-03/401.

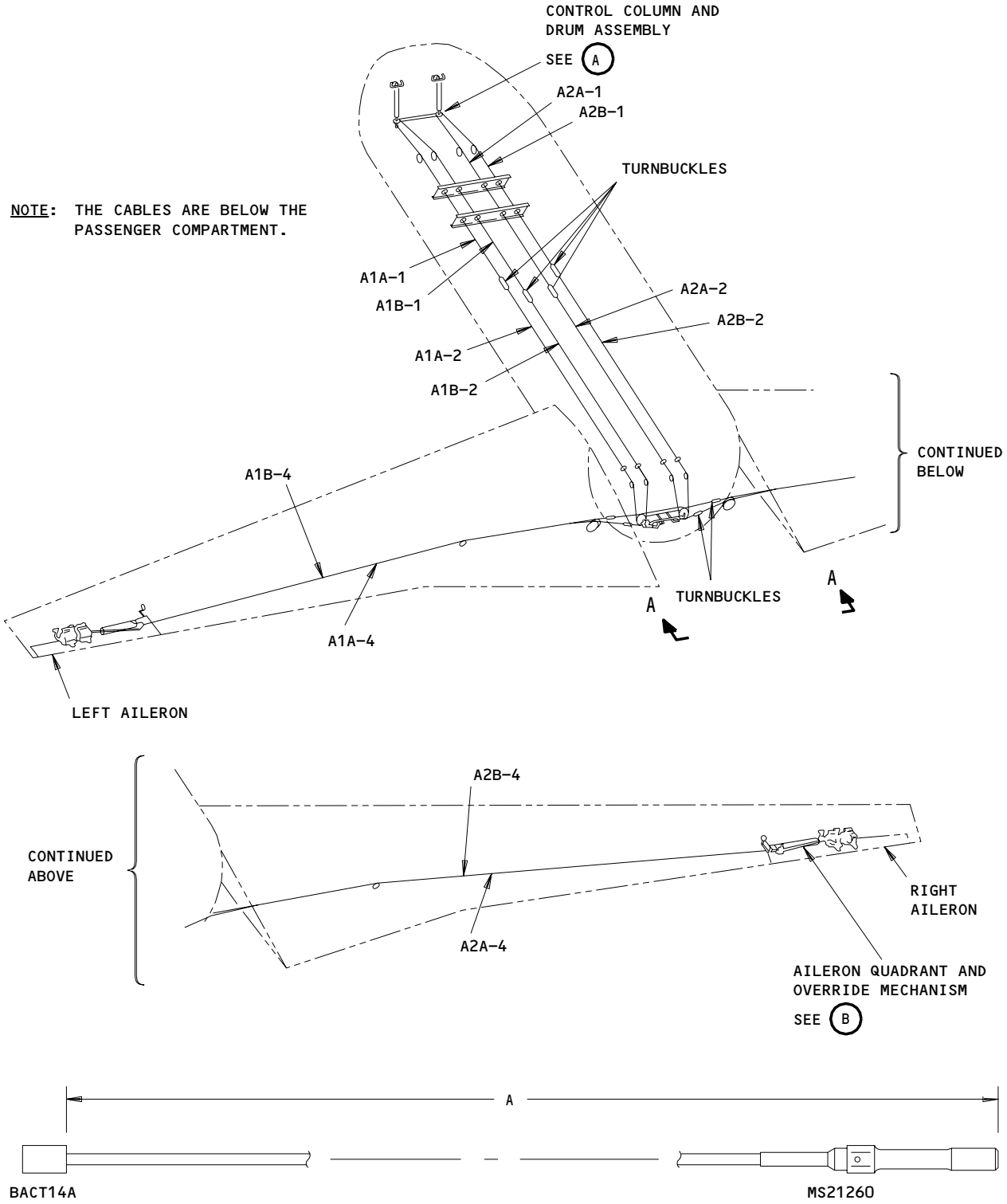
      NOTE: You can mix zinc-only and tin-zinc coated cables but opposite cable segments in the same cable loop must be of the samte type (example: in Fig. 202, cables A2A-2 and A2B-2 must be replaced together with both new cables either zinc-only or tin-zinc). This will prevent asymetric cable stretch that can make cable rigging bad.

TASK 27-00-01-992-001

2. Refer to the Figures that Follow for the Cable Data
   A. General
      (1) Aileron Control Cables (Fig. 202)
      (2) Rudder Control Cables (Fig. 203)
      (3) Elevator Control Cables (Fig. 204)
      (4) Stabilizer Trim Control Cables (Fig. 205)
      (5) Flaps/Slats Control Cables (Fig. 206)
      (6) Control Cable Seal Locations (Fig. 207)

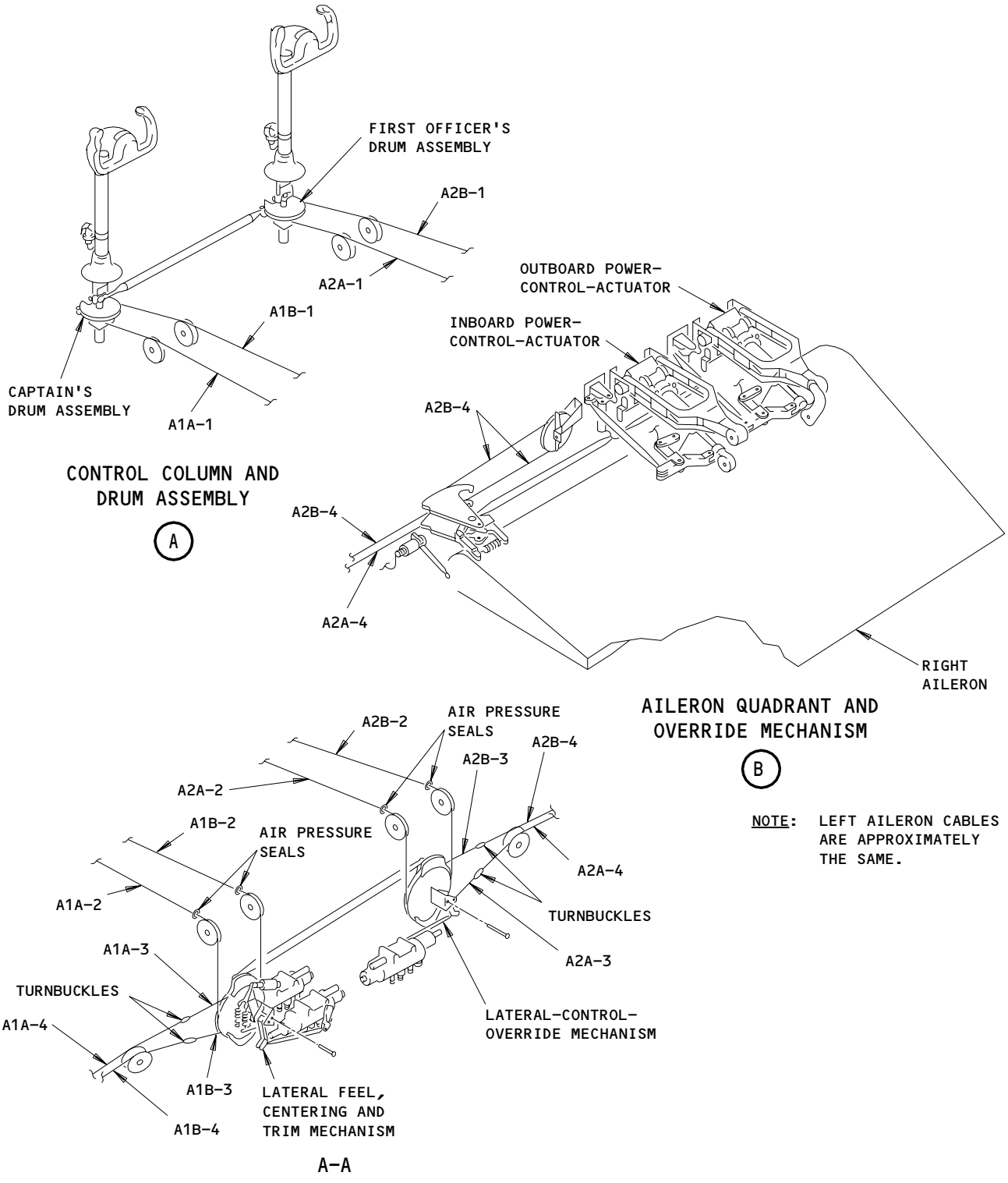
CONTROL SYSTEM	CABLE CODE	CABLE FUNCTION
AILERON	A1A	AILERON CONTROL – R AIL UP, L AIL DOWN
	A1B	AILERON CONTROL – L AIL UP, R AIL DOWN
	A2A	AILERON CONTROL, RIGHT WING – R AIL UP, L AIL DOWN
	A2B	AILERON CONTROL, RIGHT WING – L AIL UP, R AIL DOWN
RUDDER	RA	RUDDER CONTROL – RUDDER RIGHT
	RB	RUDDER CONTROL – RUDDER LEFT
ELEVATOR (LEFT SYSTEM)	E1A	ELEVATOR CONTROL – ELEV DOWN (AIRPLANE NOSE DOWN)
	E1B	ELEVATOR CONTROL – ELEV UP (AIRPLANE NOSE UP)
(RIGHT SYSTEM)	E2A	ELEVATOR CONTROL – ELEV DOWN (AIRPLANE NOSE DOWN)
	E2B	ELEVATOR CONTROL – ELEV UP (AIRPLANE NOSE UP)
STABILIZER POSITION	SP1A	STABILIZER-MOVEMENT-LIMITS AND POSITION
	SP1B	STABILIZER-MOVEMENT-LIMITS AND POSITION
	SP2A	STABILIZER-MOVEMENT-LIMITS AND POSITION
	SP2B	STABILIZER-MOVEMENT-LIMITS AND POSITION
	SP3A	STABILIZER-MOVEMENT-LIMITS AND POSITION
	SP3B	STABILIZER-MOVEMENT-LIMITS AND POSITION
FLAPS	WFA	WING TRAILING-EDGE-FLAPS-CONTROL – FLAPS UP
	WFB	WING TRAILING-EDGE-FLAPS-CONTROL – FLAPS DOWN
SLATS	LESA	LEADING-EDGE-SLATS CONTROL – SLATS UP
	LESB	LEADING-EDGE-SLATS CONTROL – SLATS DOWN

Flight Control Cable Functions
Figure 201



EXAMPLE OF THE CABLE LENGTH

Aileron Control Cables
Figure 202 (Sheet 1)

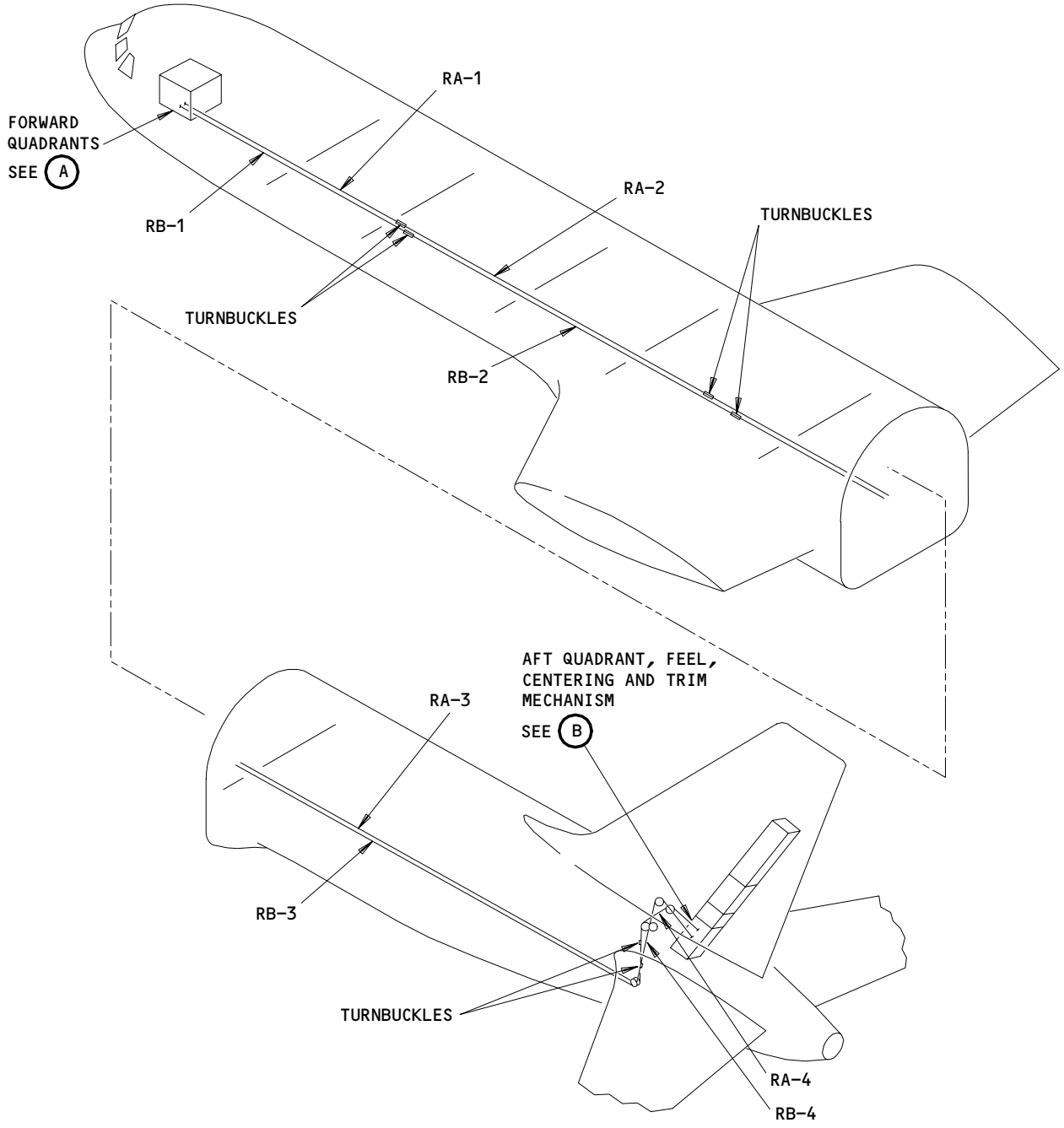


Aileron Control Cables
Figure 202 (Sheet 2)

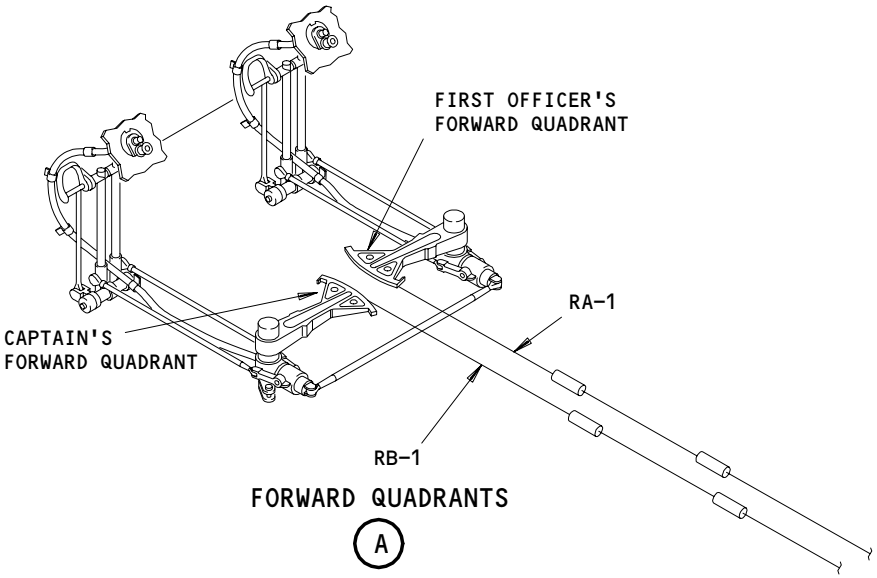
AILERON CABLES					FITTINGS		
CABLE CODE	NO. REQ.	PART NUMBER	"A" LENGTH (INCH)	"B" LENGTH (INCH)	-1	-2	-3
A1A-1	1	BACC2C4CO3555EG	355.5	___	BACT14A4	MS21260L4LH	___
-2	1	BACC2C4CO4969FG	496.9	___		MS21260L4RH	___
-3	1	BACC2C4COO236FG	23.6	___		MS21260L4RH	___
-4	1	BACC2C4CO5668EG	566.8	___		MS21260L4LH	___
A1B-1	1	BACC2C4CO3750EG	375.0	___		MS21260L4LH	___
-2	1	BACC2C4CO4776FG	477.6	___		MS21260L4RH	___
-3	1	BACC2C4COO180EG	18.0	___		MS21260L4LH	___
-4	1	BACC2C4CO6516FG	651.6	___		MS21260L4RH	___
A2A-1	1	BACC2C4CO3380EG	338.0	___		MS21260L4LH	___
-2	1	BACC2C4CO5146FG	514.6	___		MS21260L4RH	___
-3	1	BACC2C4COO180EG	18.0	___		MS21260L4LH	___
-4	1	BACC2C4CO5722FG	572.2	___		MS21260L4RH	___
A2B-1	1	BACC2C4CO3555EG	355.5	___		MS21260L4LH	___
-2	1	BACC2C4CO4969FG	496.9	___		MS21260L4RH	___
-3	1	BACC2C4COO326EG	32.6	___		MS21260L4LH	___
-4	1	BACC2C4CO6369FG	636.9	___	BACT14A4	MS21260L4RH	___

WIRE ROPE: CARBON STEEL TYPE I, COMPOSITION A (TZ), 1/8-INCH DIA, 7 X 19
FITTINGS: CORROSION RESISTANT STEEL

Aileron Control Cables
Figure 202 (Sheet 3)

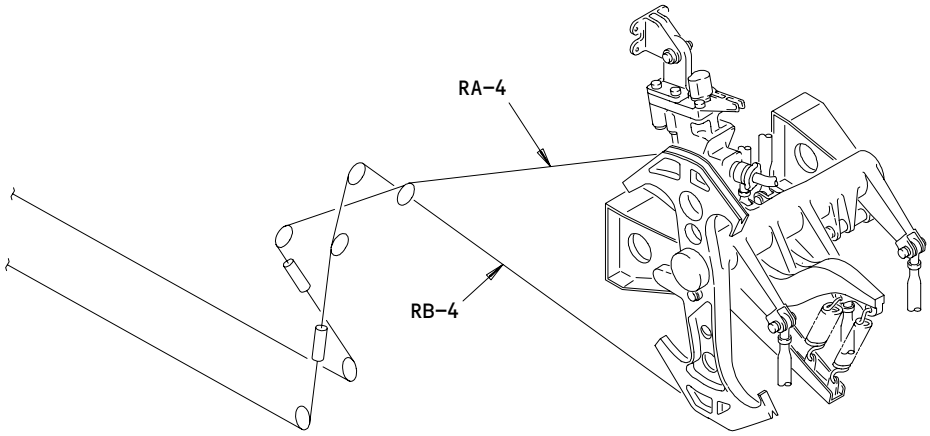


Rudder Control Cables
Figure 203 (Sheet 1)



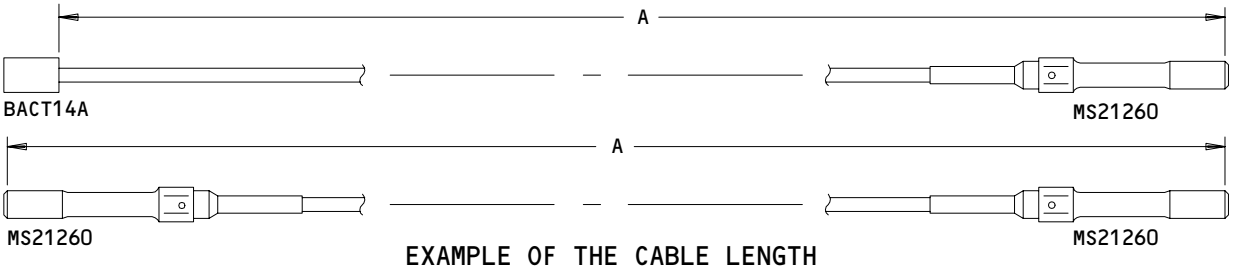
FORWARD QUADRANTS

A



AFT QUADRANT, FEEL, CENTERING
AND TRIM MECHANISM

B



EXAMPLE OF THE CABLE LENGTH

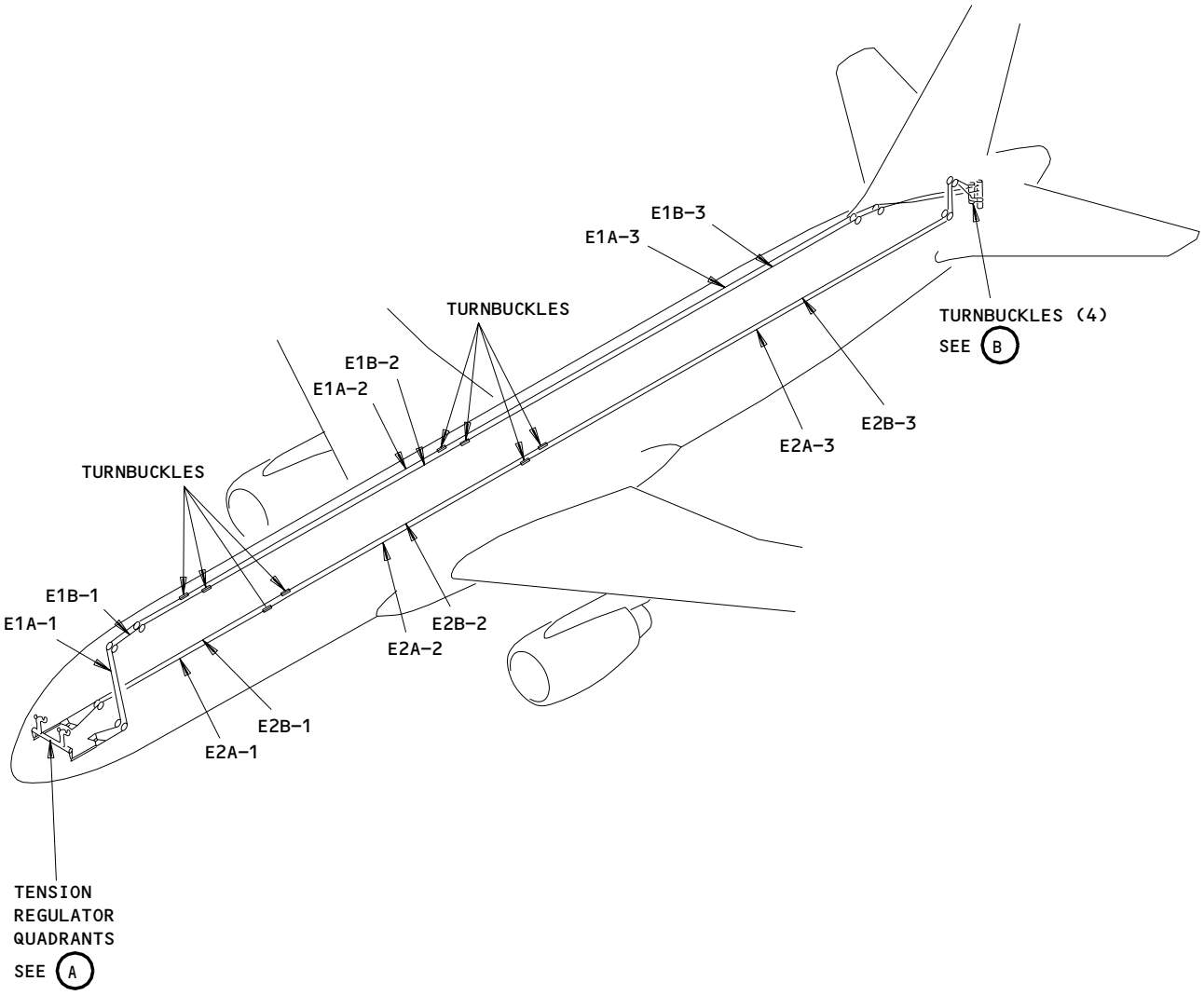
Rudder Control Cables
Figure 203 (Sheet 2)

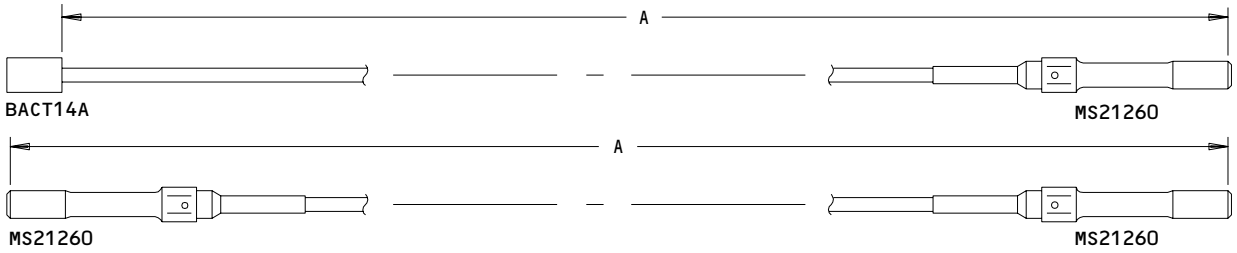
RUDDER CABLES					FITTINGS		
CABLE CODE	NO. REQ.	PART NUMBER	"A" LENGTH (INCH)	"B" LENGTH (INCH)	-1	-2	-3
RA-1	1	BACC2C4C034O4FG	340.4	___	BACT14A4	MS21260L4RH	___
-2	1	BACC2C4C04371EF	437.1	___	MS21260L4RH	MS21260L4LH	___
-3	1	BACC2C4C07299EF	729.9	___	MS21260L4RH	MS21260L4LH	___
-4	1	251N3269-3	162.0	___	BACT14A4	MS21260L4LH	___
RB-1	1	BACC2C4C0358OFG	358.0	___	BACT14A4	MS21260L4RH	___
-2	1	BACC2C4C0438OEF	438.0	___	MS21260L4RH	MS21260L4LH	___
-3	1	BACC2C4C0731OEF	731.0	___	MS21260L4RH	MS21260L4LH	___
-4	1	BACC2C4C01444EG	144.4	___	BACT14A4	MS21260L4LH	___

WIRE ROPE: CARBON STEEL TYPE I, COMPOSITION A (TZ), 1/8-INCH DIA, 7 X 19

FITTINGS: CORROSION RESISTANT STEEL

Rudder Control Cables
Figure 203 (Sheet 3)

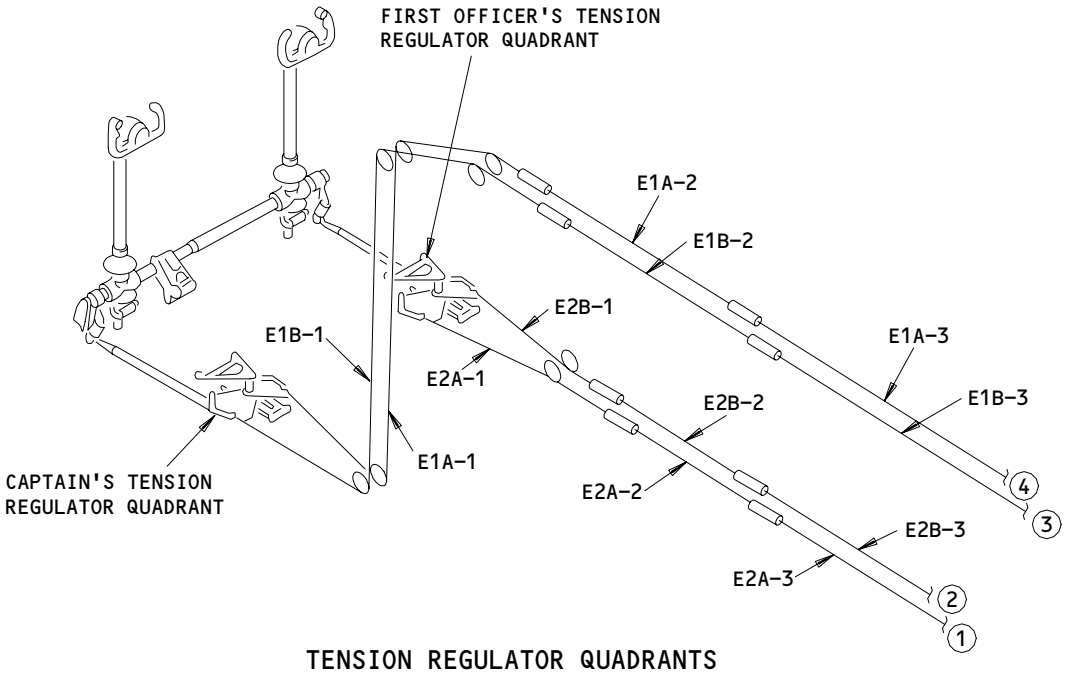




EXAMPLE OF THE CABLE LENGTH

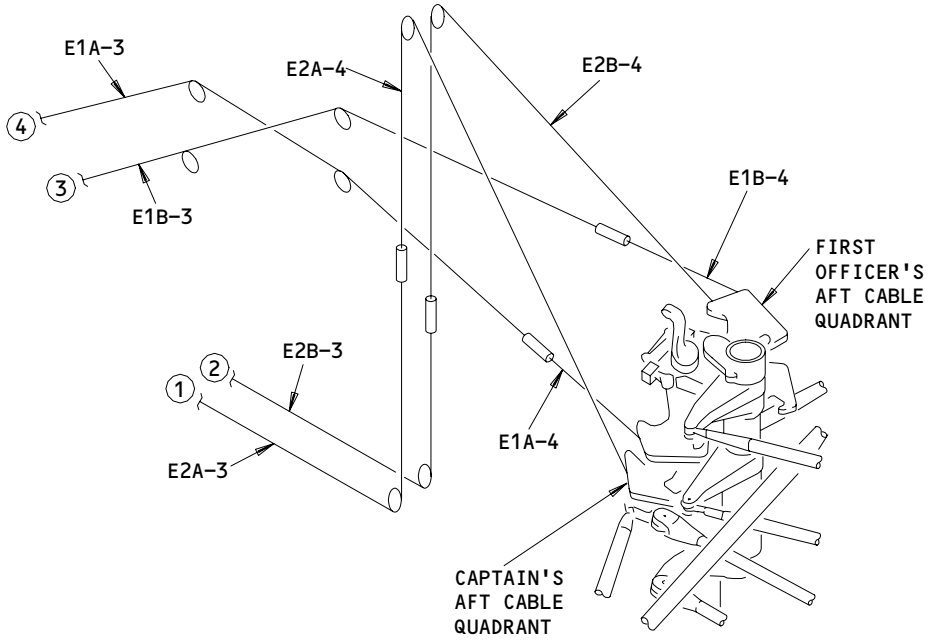
Elevator Control Cables
Figure 204 (Sheet 1)

56137



TENSION REGULATOR QUADRANTS

A



TURNBUCKLES

B

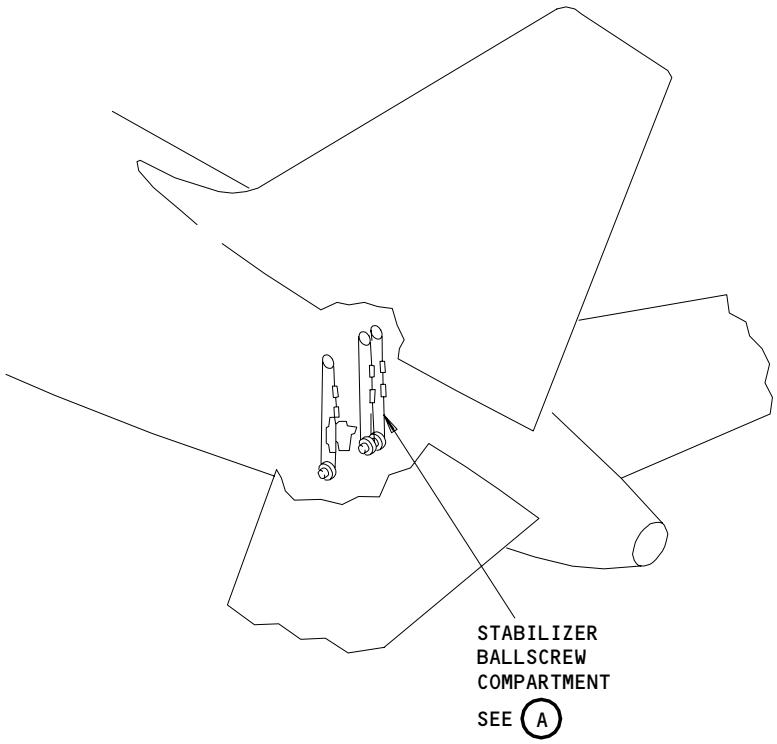
Elevator Control Cables
Figure 204 (Sheet 2)

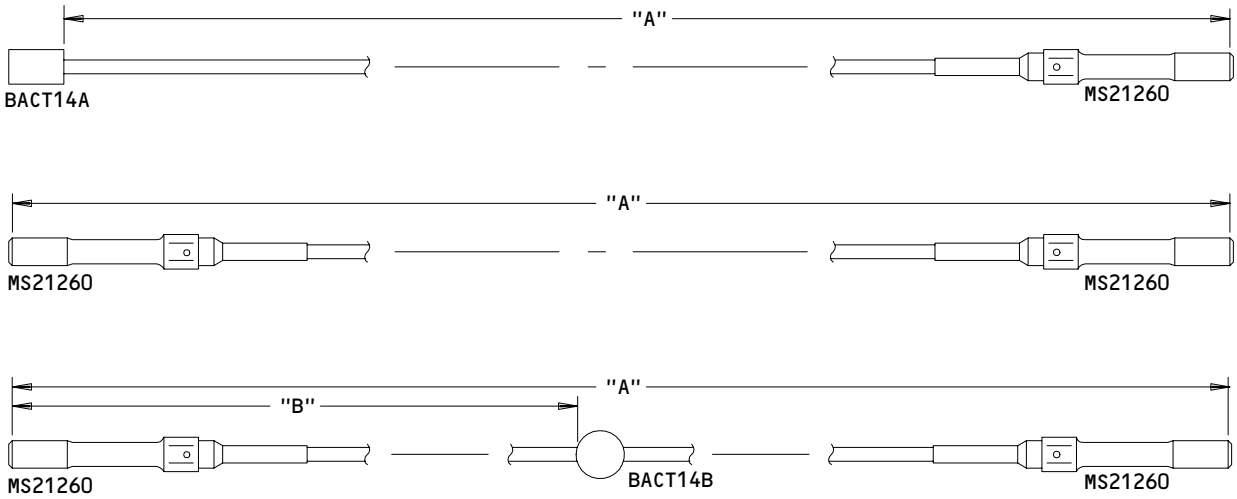
ELEVATOR				FITTINGS	
CABLE CODE	NO. REQ.	PART NUMBER	"A" LENGTH (INCH)	-1	-2
E1A-1	1	BACC2C4C03909FG	390.9	BACT14A4	MS21260L4RH
-2	1	BACC2C4C05174EF	517.4	MS21260L4RH	MS21260L4LH
-3	1	BACC2C4C07436EF	743.6	MS21260L4RH	MS21260L4LH
-4	1	BACC2C4C00230EG	23.0	BACT14A4	MS21260L4LH
E1B-1	1	BACC2C4C03675FG	367.5	BACT14A4	MS21260L4RH
-2	1	BACC2C4C05174EF	517.4	MS21260L4RH	MS21260L4LH
-3	1	BACC2C4C07766EF	776.6	MS21260L4RH	MS21260L4LH
-4	1	BACC2C4C00125EG	12.5	BACT14A4	MS21260L4LH
E2A-1	1	BACC2C4C03187FG	318.7	BACT14A4	MS21260L4RH
-2	1	BACC2C4C04366EF	436.6	MS21260L4RH	MS21260L4LH
-3	1	BACC2C4C07359EF	735.9	MS21260L4RH	MS21260L4LH
-4	1	BACC2C4C01605EG	160.5	BACT14A4	MS21260L4LH
E2B-1	1	BACC2C4C03374FG	337.4	BACT14A4	MS21260L4RH
-2	1	BACC2C4C03976EF	397.6	MS21260L4RH	MS21260L4LH
-3	1	BACC2C4C07359EF	735.9	MS21260L4RH	MS21260L4LH
-4	1	BACC2C4C01809EG	180.9	BACT14A4	MS21260L4LH

WIRE ROPE: CARBON STEEL TYPE I, COMPOSITION A (TZ), 1/8-INCH DIA, 7 X 19

FITTINGS: CORROSION RESISTANT STEEL

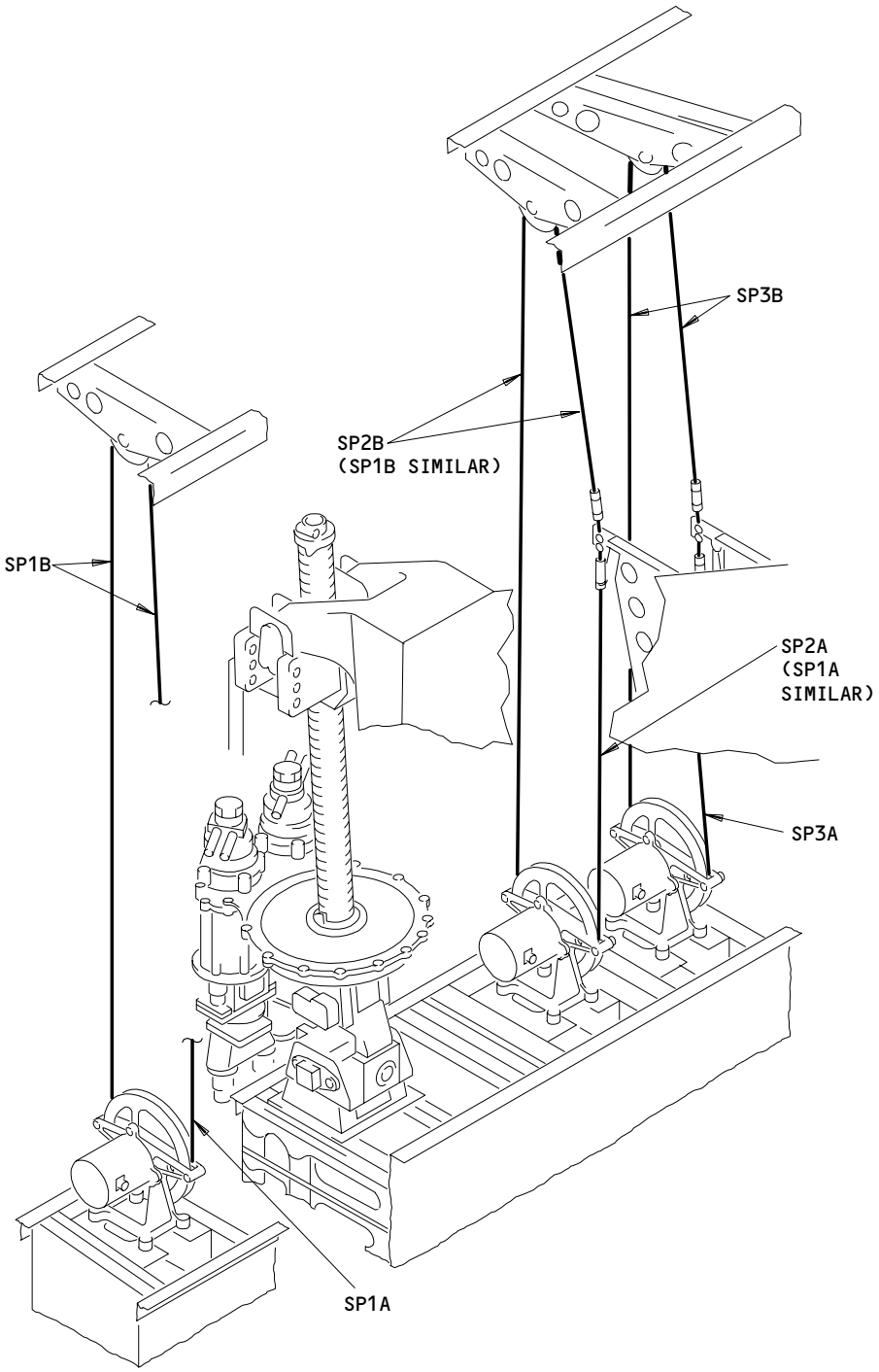
Elevator Control Cables
Figure 204 (Sheet 3)





EXAMPLE OF THE CABLE LENGTH

Horizontal Stabilizer Trim Control Cables
Figure 205 (Sheet 1)



STABILIZER BALLSCREW COMPARTMENT

(A)

Horizontal Stabilizer Trim Control Cables
Figure 205 (Sheet 2)

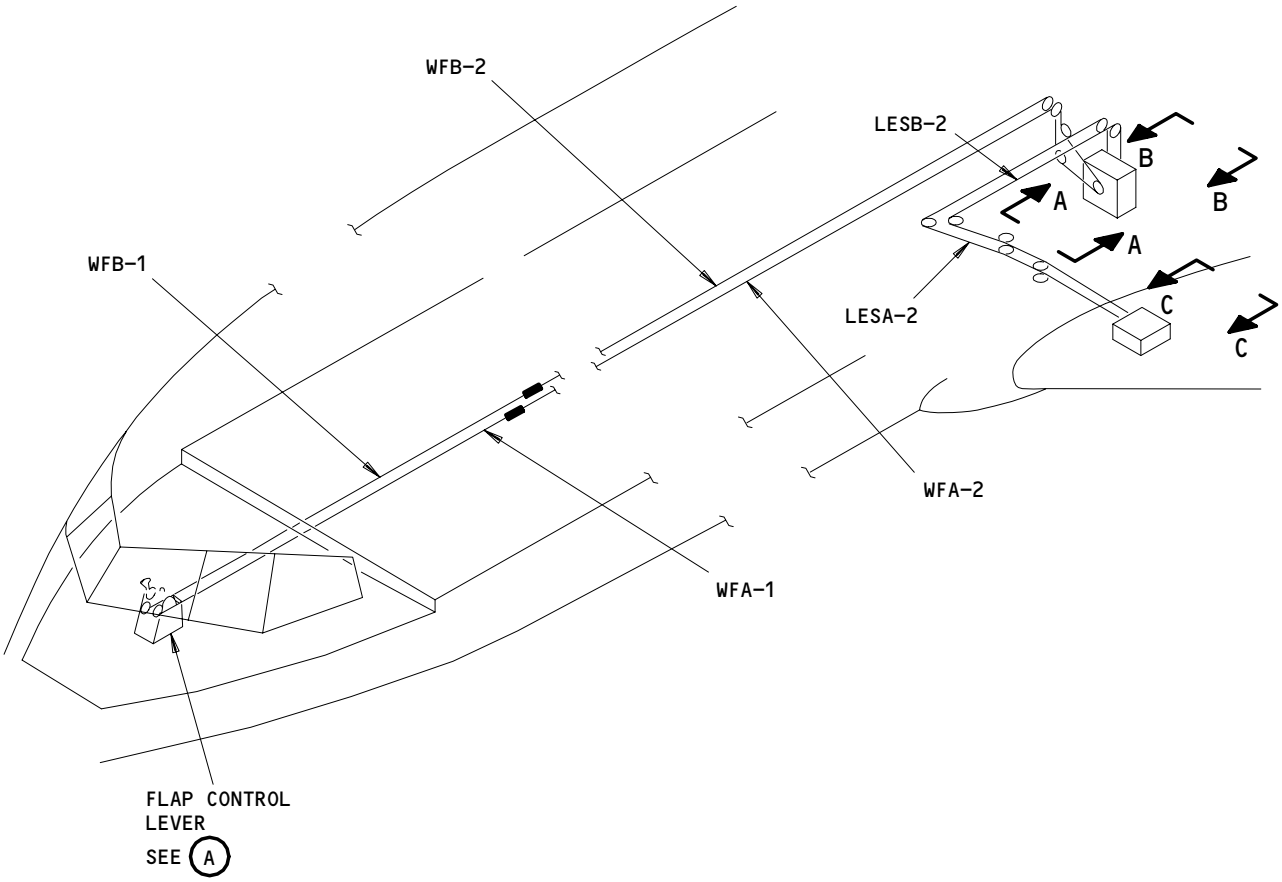
STABILIZER TRIM					FITTINGS		
CABLE CODE	NO. REQ.	PART NUMBER	"A" LENGTH (INCH)	"B" LENGTH (INCH)	-1	-2	-3
SP1A	1	BACC2C3D00494FG	49.4	___	BACT14A3	MS21260L3RH	___
SP2A	1	BACC2C3D00494FG	49.4	___	BACT14A3	MS21260L3RH	___
SP3A	1	BACC2C3D00494FG	49.4	___	BACT14A3	MS21260L3RH	___
SP1B	1	BACC2C3D01294FG	129.4	___	BACT14A3	MS21260L3RH	___
SP2B	1	BACC2C3D01294FG	129.4	___	BACT14A3	MS21260L3RH	___
SP3B	1	BACC2C3D01294FG	129.4	___	BACT14A3	MS21260L3RH	___

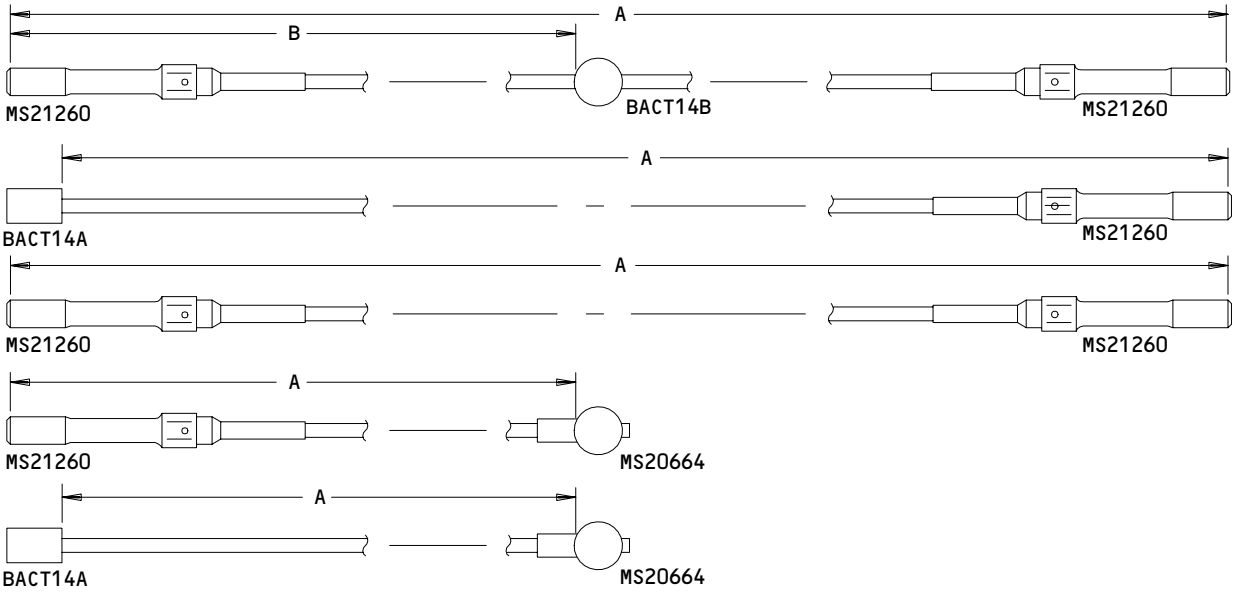
WIRE ROPE: CARBON STEEL TYPE I, COMPOSITION A (TZ), 3/32-INCH DIA, 7 X 7

FITTINGS: CORROSION RESISTANT STEEL

NOTE: THE "B" LENGTH IS MEASURED FROM THE MS21260L3RH TERMINAL END.

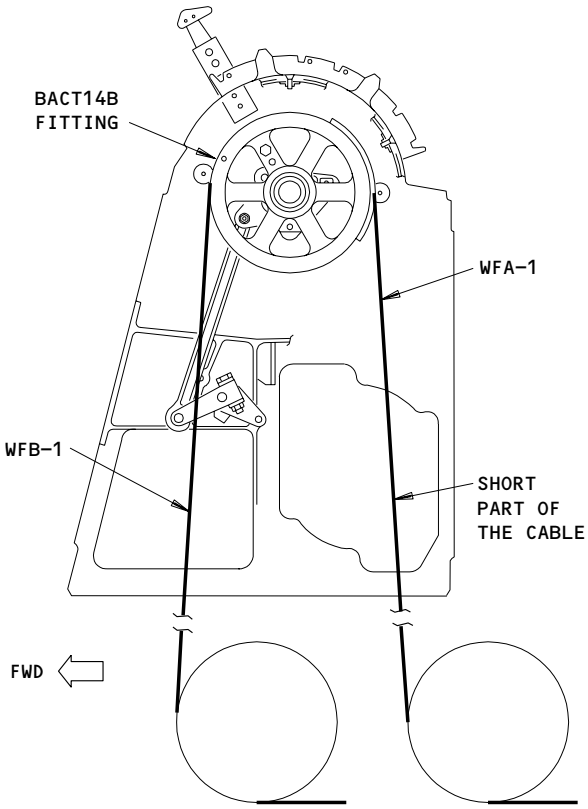
Stabilizer Trim Control Cables
Figure 205 (Sheet 3)



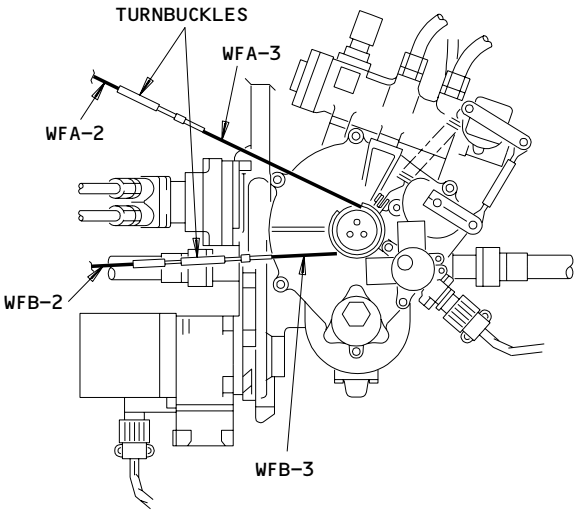


EXAMPLE OF THE CABLE LENGTH

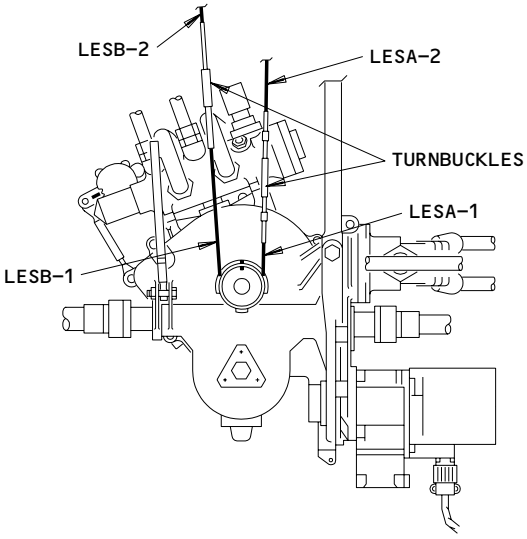
Flaps/Slats Control Cables
Figure 206 (Sheet 1)



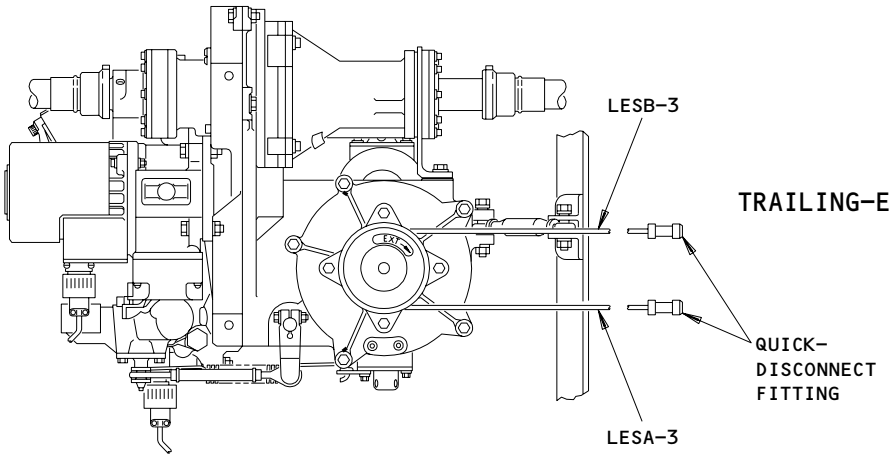
FLAP CONTROL LEVER
A



TRAILING-EDGE POWER-DRIVE-UNIT
A-A



TRAILING-EDGE FLAP POWER-DRIVE-UNIT
B-B



LEADING-EDGE SLAT POWER-DRIVE-UNIT
C-C

Flaps/Slats Control Cables
Figure 206 (Sheet 2)

FLAPS/SLATS CABLES					FITTINGS		
CABLE CODE	NO. REQ.	PART NUMBER	"A" LENGTH (INCH)	"B" LENGTH (INCH)	-1	-2	-3
WFA-1 WFB-1	1	251T2050-81	733.9	381.2	MS21260L3LH	MS21260L3RH	BACT14B3
WFA-2	1	BACC2C3D05113DF	511.3	___	MS21260L3RH	MS21260S3RH	___
-3	1	BACC2C3D00129CG	12.9	___	BACT14A3	MS21260S3LH	___
WFB-2	1	BACC2C3D05059CE	505.9	___	MS21260L3LH	MS21260S3LH	___
-3	1	BACC2C3D00136DG	13.6	___	BACT14A3	MS21260S3RH	___
LESA-1	1	BACC2C3D00119DG	11.9	___	BACT14A3	MS21260S3RH	___
-2	1	BACC2C3D02468CJ	246.8	___	MS20664C3	MS21260S3LH	___
-3	1	BACC2C3D00254GJ	25.4	___	BACT14A3	MS20664C3	___
LESB-1	1	BACC2C3D00113CG	11.3	___	BACT14A3	MS21260S3LH	___
-2	1	BACC2C3D02455DJ	245.5	___	MS20664C3	MS21260S3RH	___
-3	1	BACC2C3D00213GJ	21.3	___	BACT14A3	MS20664C3	___

WIRE ROPE: CARBON STEEL TYPE I, COMPOSITION A (TZ), 3/32-INCH DIA, 7 X 7
FITTINGS: CORROSION RESISTANT STEEL

NOTE: THE "B" LENGTH IS MEASURED FROM THE MS21260L3RH TERMINAL END.

Flaps/Slats Control Cables
Figure 206 (Sheet 3)

CABLE SYSTEM	NO. OF SEALS	LOCATION	ACCESS PANEL NO.
AILERON	4	SLOPING PRESSURE DECK	MAIN-GEAR WHEEL-WELLS/PASSENGER COMPARTMENT
RUDDER	2	AFT PRESSURE BULKHEAD	311AL
ELEVATOR	4	AFT PRESSURE BULKHEAD	311AL
STABILIZER TRIM	4	AFT PRESSURE BULKHEAD	311AL
FLAP/SLAT	2	RIGHT WHEEL-WELL CEILING	MAIN-GEAR WHEEL-WELL

Air Pressure Seals
Figure 207

53313

FLIGHT CONTROL SHEAR RIVETS - MAINTENANCE PRACTICES

TASK 27-00-02-302-003

1. Flight Control Shear Rivets References

A. General

(1) Shear rivets provide a means by which normal operation of essential flight systems can be maintained in the event of failure or jamming of related or interconnected secondary systems. Each shear rivet location is marked by a SHEAROUT placard that includes the quantity and part number of the shear rivet. The chart below contains a list of all the shear rivets that are used in the flight control system along with the references to the related maintenance manual sections.

MAINTENANCE MANUAL SECTION	RIVET TYPE	PART THAT CONTAINS THE SHEAR RIVET
27-11-14/201	BACR15BB5AD	Arm Assembly - Lateral Feel, Centering, and Trim Mechanism
27-21-12/201		Output Crank - Rudder Ratio Changer
27-21-17/401	BACR15BB4B1	Output Link - Yaw Damper Summing Lever
27-21-20/201	BABC30MB6A1	Lever Assembly - PCA Input, Rudder Control
27-31-06/401	NAS1398CW5	Crank Assembly - PCU Input, Elevator Control
27-48-00/501		LSTM Cables - Stabilizer
27-51-26/401	BACR15BA4D	Output Drum - Trailing Edge Flap Power Drive Unit

FLIGHT CONTROL LATERAL TRIM CORRECTION - ADJUSTMENT TEST

1. General
   A. This procedure supplies the data that is necessary to adjust the trailing edge flaps for straight and level flight. The procedure will decrease the quantity of rudder and aileron trim that is needed during flight at a constant speed.
   B. This adjustment installs and/or removes shims from each outboard-flap-track location for each of the two outboard flaps. The installation of more shims will move the flap trailing edge up. The removal of shims will make the flap trailing edge move down.
   C. Make sure that the control system components are in rig when the trim problems occur and during this procedure. Make sure that the rudder-ratio-changer rigging does not permit too much rudder movement when the airplane changes speed. Also, it is important that the trailing edge flaps be symmetrical.
   D. Do a test flight with these conditions to find the aileron trim and rudder trim input required to maintain a straight and level flight during cruise and landing:
      (1) Flight Speed: Approximately 0.80 mach (for cruise)
      (2) Altitude: Approximately 30,000 feet or higher (cruise)
          Approximately 16,000 feet (landing).
      (3) Flap Position: UP (cruise)
          30 (landing).
      (4) Fuel Load: Symmetric.
      (5) Hold wings level with the control wheel.
      (6) If necessary, apply the aileron trim to maintain wings level.
      (7) If necessary, apply rudder trim to maintain straight heading.
   E. Keep a record of the rudder trim and aileron trim required to maintain a straight and level flight.
   F. Keep a constant speed of .80 mach and an altitude of 30,000 feet or more.
   G. Do not adjust the flight control surfaces if the rudder trim error is 3 units or less, and the aileron trim error is 1/2 unit or less.

      It is up to the airline to decide what values of trim are excessive and make adjustments as necessary.

      You are not required to reduce the trim, but by reducing the trim you will save fuel.

      NOTE: The following values are the aileron and rudder trim limits for a new airplane (shown as reference only).

Flap Setting	Aileron Trim	Rudder Trim	Speed	Condition
Up	0.5	1.0	0.8	Cruise
30	1.0	1.0	Vref	Descent

H. If the amount of rudder trim required is "excessive", do the rudder rigging (AMM 27-21-00/501).
I. If the amount of aileron trim required is "excessive", do the steps in this procedure to find the causes.

TASK 27-01-00-825-001

2. Trailing Edge Flap Adjustment

A. Equipment
(1) TE Flap PDU Lock - B27008-1

B. Consumable Materials
(1) A00247 Sealant, BMS 5-95

C. References
(1) 27-11-00/501, Aileron and Aileron Trim Control System
(2) 27-18-00/501, Aileron Position Indicating System
(3) 27-21-00/501, Rudder and Rudder Trim Control System
(4) 27-31-00/501, Elevator Control System
(5) 27-51-00/501, Trailing Edge Flap System
(6) 27-51-02/501, Inboard Trailing Edge Flaps
(7) 27-51-14/501, Outboard Trailing Edge Flaps
(8) 27-51-31/201, Outboard TE Flap Track Fairings
(9) 27-61-00/501, Spoiler/Speedbrake Control System
(10) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

D. Access
(1) Location Zones
566/666 Outboard Forward Flap
567/667 Outboard Aft Flap

E. Do a Check for Other Possible Causes

S 225-002
(1) Make sure that the incorrect trim condition is not caused by a rigging problem or an out of tolerance system. Before you do the adjustment, make sure that these systems are in tolerance.
(a) Make sure that each main wing tank has at least a 1000 pound (453.6 Kg) fuel load. The fuel load must be divided equally (±5%) so that each main wing tank has the same fuel load.
(b) Make sure that the outboard-trailing-edge flaps are not out of tolerance. Make sure that the right outboard flap and the left outboard flap are symmetrical (use a tolerance of 0.14 degrees). Correct the rigging if it is necessary (Ref 27-51-00/501).

NOTE: The flaps must be up and pressurized for a minimum of 30 seconds before you measure the flap angles.

(c) Make sure that the inboard trailing-edge flaps are in tolerance. Correct the rigging if it is necessary (Ref 27-51-02/501).

NOTE: The flaps must be up and pressurized for a minimum of 30 seconds before you measure the flap angles.

(d) Make sure that the ailerons are in tolerance. Make sure the aileron trailing-edges align with the flap trailing-edges when the ailerons are in their neutral position (use a tolerance of 0.12 inch (3.0 mm) (Ref 27-11-00/501).

(e) Make sure that the spoilers are in tolerance. Make sure that the .06 inch (1.5 mm) gap between the spoiler trailing edge and the flaps up position is correct. Correct the alignment if it is necessary (Ref 27-61-00/501).

(f) Make sure that spoiler breakout does not occur before the control wheel has been turned clockwise or counterclockwise 8 degrees (Ref 27-61-00/501).

(g) Make sure that each elevator is aligned with its trailing-edge index plate (use a tolerance of 0.10 inch (2.54 mm)) when the stabilizer jackscrew dimension B is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (6 units of stabilizer trim). Correct the rigging if it is necessary (Ref 27-31-00/501).

(h) Set the ratio changer module to the test (or high speed) position. Trim the rudder trailing edge until it aligns with the neutral position on the index plate (use a tolerance of 0.05 inch). Set the ratio changer module to normal and make sure that the rudder trailing edge does not move (use a tolerance of 0.15 inch (3.81 mm)) (Ref 27-21-00/501).

F. Find the Shim Values (Fig. 501)

S 225-003

(1) Write the aileron trim necessary during flight. Circle LLW when it is necessary to add trim to lower the left wing (right wing was heav y). Cirlce LRW when it is necessary to add trim to lower the right wing (left wing was heavy).

S 935-004

(2) Use the chart and find the necessary shim value.

S 845-005
(3) If possible, install 1/2 of the total shim value on one wing and remove 1/2 the shim value from the other. If the problem was LLW then a shim is added to the left wing and removed from the right wing. If the problem was LRW then a shim is removed from the left wing and added to the right wing.

NOTE: The thickness of the shim material removed from one wing added to the thickness installed on the other wing must equal the total shim value. The maximum shim thickness permitted is .35 inch (8.9 mm). This includes every shim that has been installed.

G. Prepare for Adjustment

S 865-006

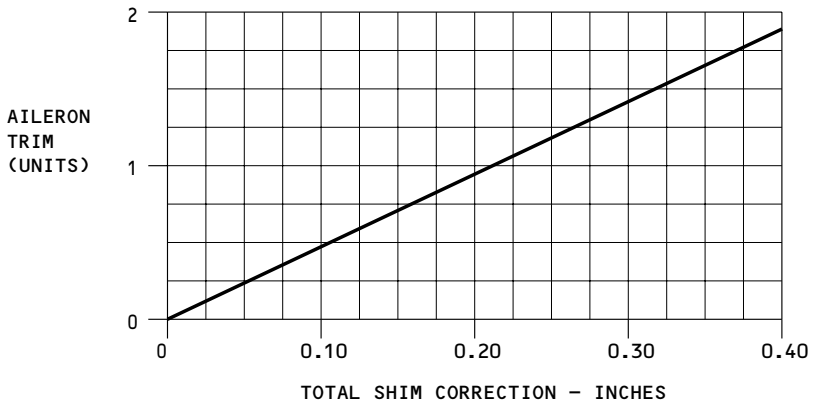
WARNING: MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE CONTROL SURFACES ARE FULLY POWERED AND CAN CAUSE INJURY OR DAMAGE.

(1) Supply hydraulic power to the left hydraulic system (Ref 29-11-00).

S 825-007
(2) Move the flap lever to 30 unit detent.

S 865-008
(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 865-009
(4) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR



NECESSARY SHIM THICKNESS: 0.211 INCHES/UNIT TRIM

AILERON TRIM ERROR (UNITS) _____ LLW / LRW

TOTAL SHIM CORRECTION (INCHES) _____

SHIM–CORRECTION TO RIGHT–WING (INCHES) _____ ADD / REMOVE

SHIM–CORRECTION TO LEFT–WING (INCHES) _____ ADD / REMOVE

NOTE: ADD THE SHIM–CORRECTION TO RIGHT–WING TO THE SHIM–CORRECTION TO LEFT–WING TO GET THE TOTAL SHIM CORRECTION

IF POSSIBLE, INSTALL 1/2 THE TOTAL SHIM VALUE ON ONE WING AND REMOVE 1/2 THE SHIM VALUE FROM THE OTHER

Lateral Trim Adjustments
Figure 501

S 865-010

(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 025-011

(6) Remove the flap-track aft fairings (Ref 27-51-31).

S 435-012

(7) Install rig pins TE-4 and TE-5 in the bellcrank (Fig. 502).

H. Procedure

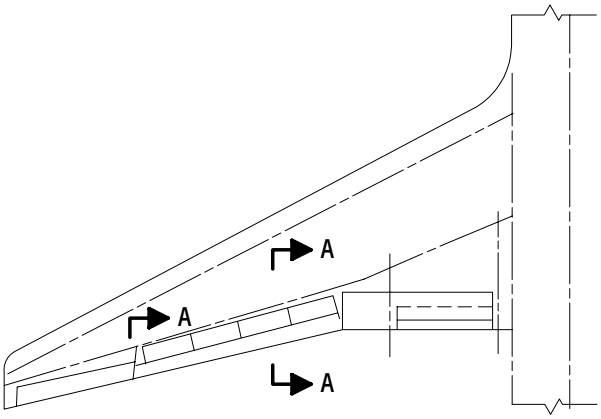
S 825-013

(1) If the problem is LLW trim (right wing heavy), do the steps that follow:
(a) Remove the bolts that attach the outboard flap to the outboard flap carriages (Fig. 502).
(b) Remove shims from the right outboard flap or add shims to the left outboard flap (or do both) to get the necessary shim thickness change. Shims must be added or removed equally from both the carriages of a flap.

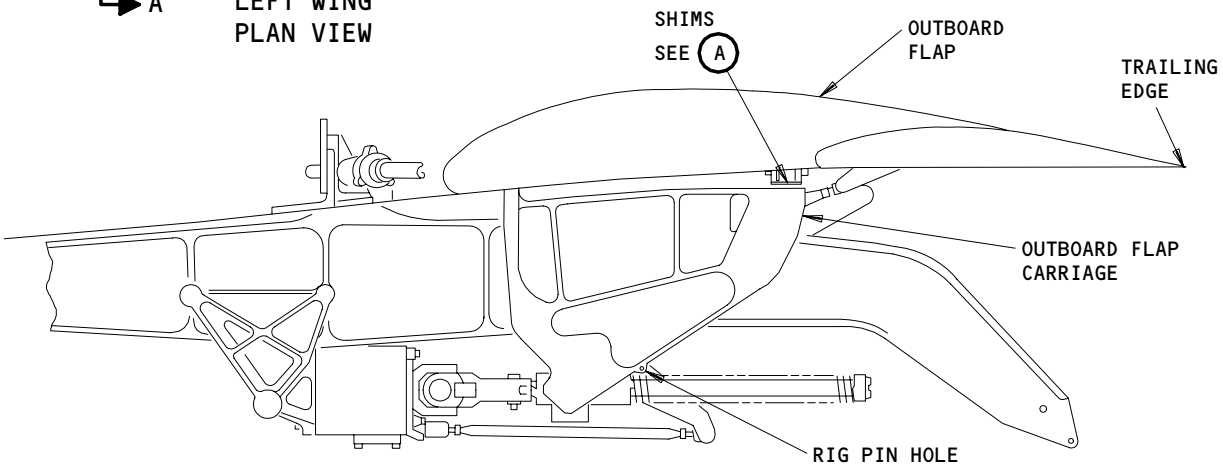
NOTE: The maximum permitted shim thickness is .35 inch (8.9 mm). This includes every shim that is installed on the flaps.

S 825-014

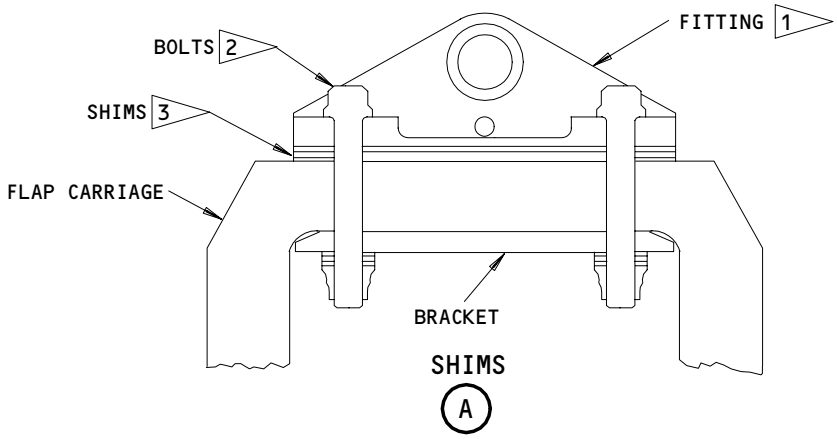
(2) If the problem is LRW trim (left wing heavy), do the steps that follow:
(a) Remove the bolts that attach the outboard flap to the outboard flap carriages (Fig. 502).



LEFT WING
PLAN VIEW



A–A



SHIMS
A

1 INSTALL THE FITTING WITH FAYING SURFACE SEALANT

2 SEAL THE BOLTS AFTER INSTALLATION WITH BMS 5–95 SEALANT

3 THE MAXIMUM SHIM THICKNESS CAN NOT BE MORE THAN 0.35 INCH

Outboard Trailing Edge Flap
Figure 502

(b) Remove shims from the left outboard flap or add shims to the right outboard flap (or both) to get the necessary shim thickness change. Shims must be added or removed equally from both carriages of a flap (Fig. 502).

NOTE: The maximum permitted shim thickness is .35 inch (8.9 mm) this includes every shim that is installed on the flaps.

S 035-015

(3) Remove rig pins TE-4 and TE-5 from the bellcrank.

S 865-016

WARNING: MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE CONTROL SURFACES ARE FULLY POWERED AND CAN CAUSE INJURY OR DAMAGE.

(4) Supply pressure to the left hydraulic system (Ref 29-11-00).

S 865-017

(5) Position the flap lever to the zero position (FLAPS UP). Stop for at least 30 seconds.

S 865-018

(6) Remove the power from the left hydraulic system (Ref 29-11-00).

S 225-019

(7) Make sure that the wing trailing edge, the spoiler gaps, and the fairing clearances are in tolerance (Ref 27-51-14). Make sure to check the symmetry and angle tolerances.

S 225-020

(8) Write the distance that the aileron inboard trailing edge has to move to align with the flap trailing edge in Fig. 503.

S 825-021

(9) Adjust the ailerons until they are aligned with the new flap position (Ref 27-11-00). The outboard flaps must be on the ground rollers, without any applied loads, during the adjustment.

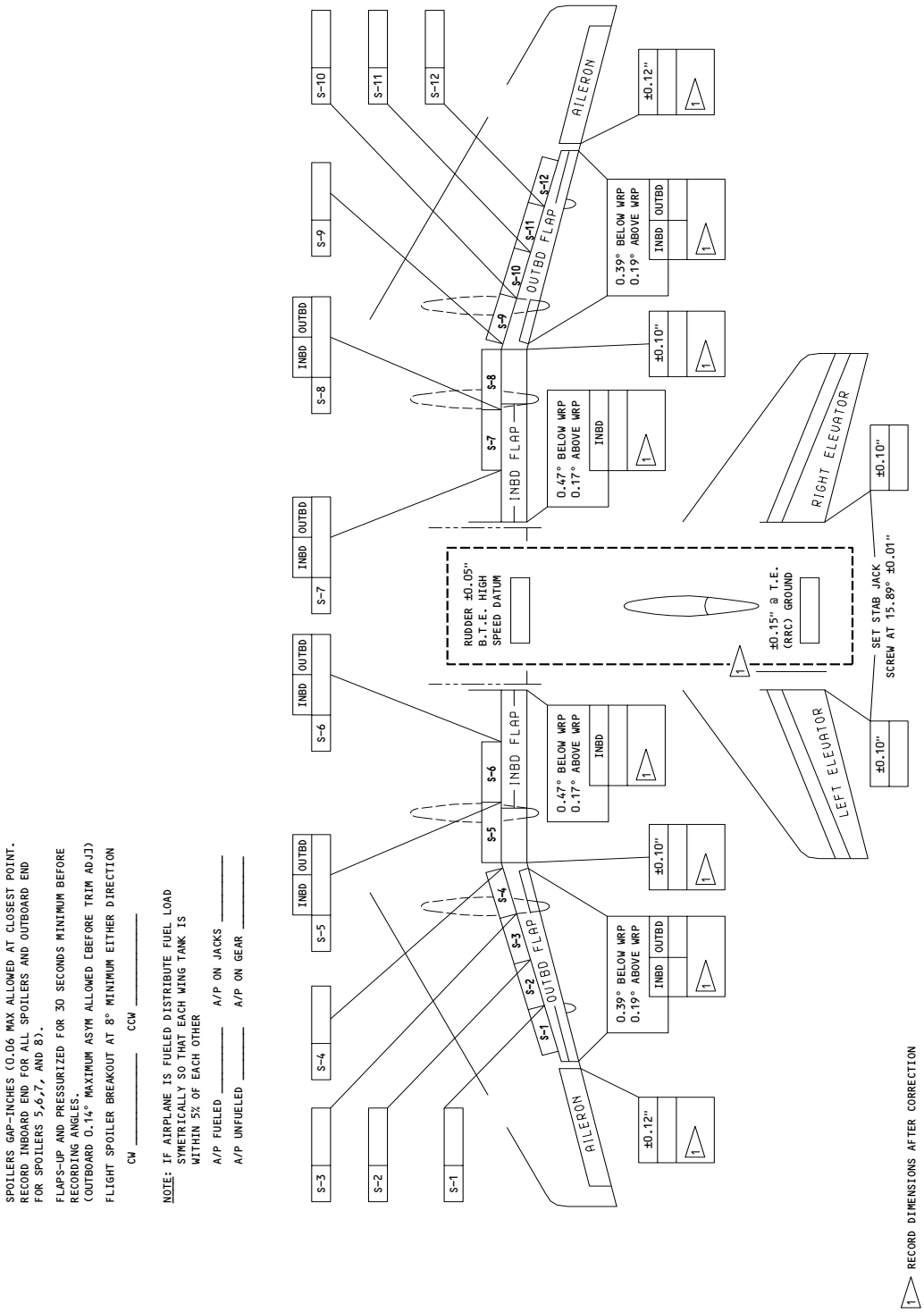
S 825-022

(10) Adjust the aileron position indicators (Ref 27-18-00).

I. The Flight-Controls Surface-Alignment Record

S 225-023

(1) Figure 503 contains the Flight-Control Surface-Alignment data. Use this data to make sure that the control surface alignment is correct. Do an alignment check after an overhaul, rigging, or a control-surface replacement-procedure has been done. Keep an alignment record for each airplane since this will help to locate problems before they become bad.



Flight Controls Surface Mismatch Record
Figure 503

167828

FLIGHT CONTROLS SURFACE - INSPECTION/CHECK

1. General
   A. This procedure contains tasks that examine the rudder, elevators, ailerons, and spoilers for too much freeplay. Freeplay is the unwanted movement of a control surface when it is held in position by a fully powered power control actuator (PCA). Freeplay is measured at the trailing edge of the control surface and is caused by wear in the PCA linkages.

TASK 27-02-00-736-001

2. Elevator Freeplay - Check
   A. General
      (1) Some freeplay in the PCA linkages is permitted, but the wear must be divided equally between the linkage components. If one component is worn more than the other components in the system, you must repair it.
   B. Equipment
      (1) Dial Indicator, Accurate to 0.001 inch (0.03 mm) and a minimum stroke of 1 inch (25 mm) - Commercially Available
      (2) Device to Hold the Dial Indicator, tightly against the fuselage

          NOTE: A machine shop tool commercially available (magnetic base with fixed rod and movable extension rod for dial indicator installation) can be used.
      (3) Spring Force Scale, Push-Type (0 to 150 Pound (0-68.0 Kg) Range) - Commercially Available
   C. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-31-05/601, Elevator Power Control Actuator
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   D. Access
      (1) Location Zones
          336 Left Elevator
          346 Right Elevator
          211 Control Cabin, Left
          212 Control Cabin, Right

E. Prepare for the Inspection/Check

S 866-002
(1) Supply electrical power (AMM 24-22-00/201).

S 866-112

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Supply pressure to the right and center hydraulic systems (AMM 29-11-00/201).

S 866-065
(3) Use the control wheel switches to move the horizontal stabilizer to approximately 6 units of trim.

S 866-117
(4) Move the RIGHT STAB TRIM SHUTOFF and the CENTER STAB TRIM SHUTOFF switches on the control stand panel, P10, to the CUTOUT position.

S 866-067
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 866-004
(6) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 866-005
(7) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 866-006
(8) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

F. Elevator Freeplay - Check

S 866-068

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do the applicable group of steps to supply hydraulic power to one of the three PCAs for each elevator (do only the steps for the PCA you want to supply the power to):

NOTE: Measure the freeplay for each of the three PCAs that move the elevator. During the measurement, make sure only one of the three elevator PCAs has power at a time.

(a) Do these steps to supply hydraulic power to the outboard PCAs:
1) Supply pressure to the right hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H28, FLT CONT SHUTOFF TAIL RIGHT
3) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF R switch on the P61 panel to ON.
(b) Do these steps to supply hydraulic power to the middle PCAs:
1) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT
3) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF L switch on the P61 panel to ON.
(c) Do these steps to supply hydraulic power to the inboard PCAs:
1) Supply pressure to the center hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H18, FLT CONT SHUTOFF TAIL CTR

3) Remove the DO-NOT-OPERATE tag and move the FLT CONT SHUTOFF C switch on the P61 panel to ON.

S 866-008

(2) Do these steps to put the control column in its neutral position:
   (a) Move the control column quickly in a longitudinal direction approximately 1 inch (25 mm) away from the neutral position 5 times.
   (b) Release the control column and let it go to its neutral position.
   (c) Attach DO-NOT-OPERATE tags to the control columns.

S 486-106

CAUTION: USE A DIAL INDICATOR WITH AT LEAST A 1-INCH (25MM) STROKE TO PREVENT DAMAGE TO THE INDICATOR.

(3) Do the steps that follow to attach the dial indicator to the side of the fuselage (Figure 601):
   (a) Use tape and a steel plate to attach the magnetic base to the fuselage just aft of the elevator trailing edge.
   (b) Put the dial indicator plunger 1.0 inch (25 mm) forward of the elevator trailing edge.
   (c) Make sure the dial indicator cannot move.

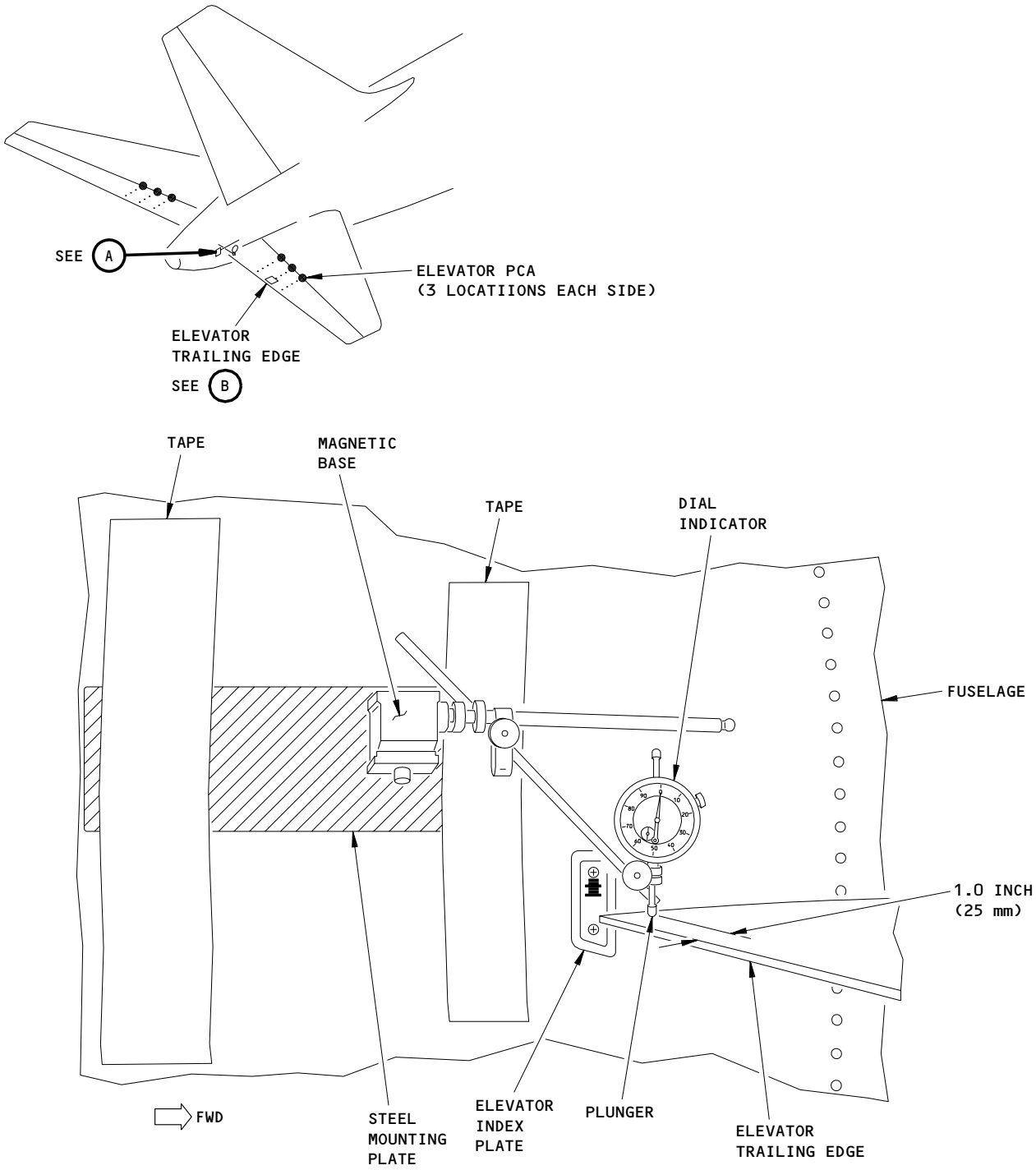
S 226-096

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE ELEVATOR SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 mm) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 mm).

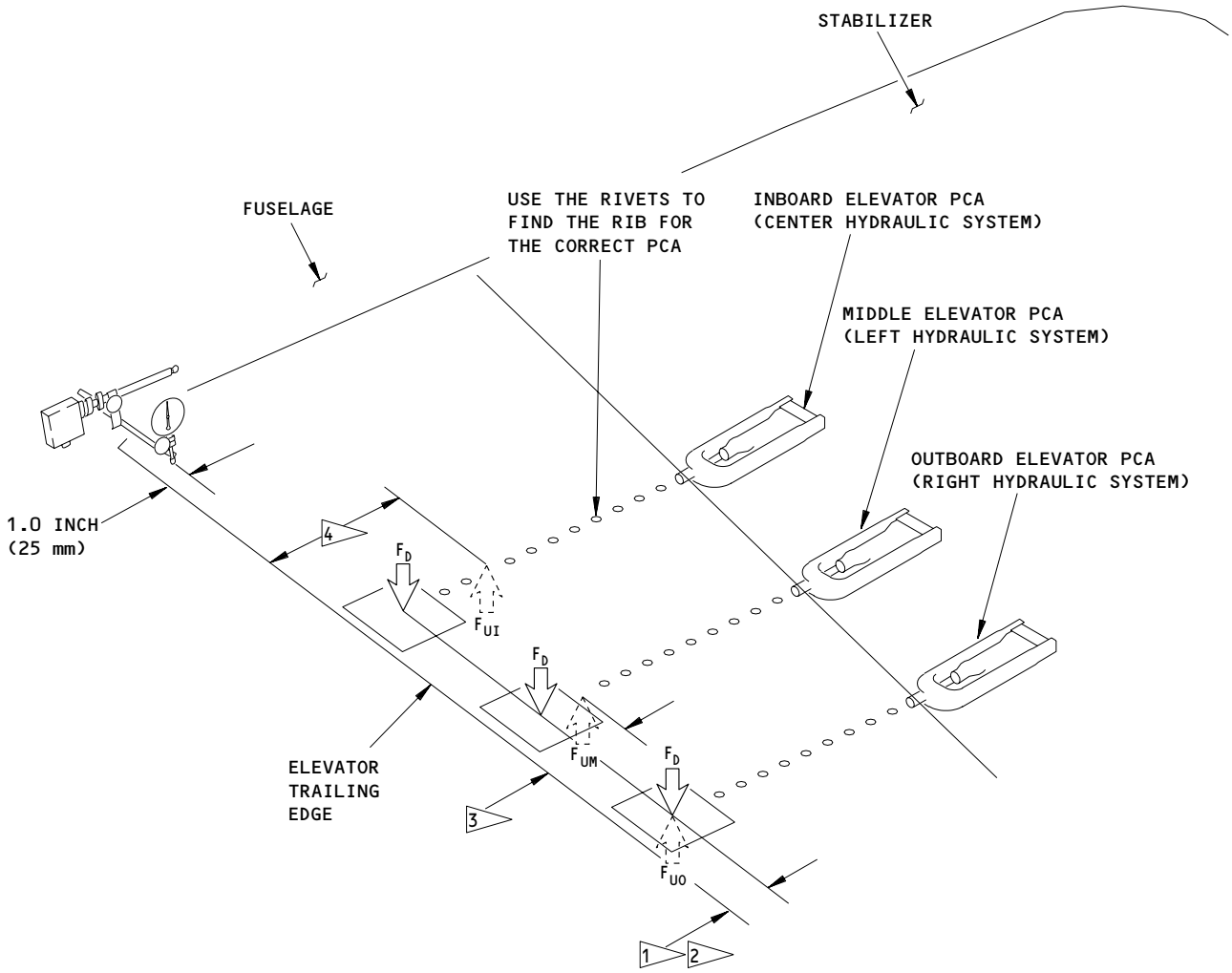
(4) Use the force scale to apply a force of 40 +/- 5 pounds (178 +/- 22 newtons) to the top of the elevator for 15 seconds or until the elevator movement stops. Apply this force on the elevator rib opposite the powered PCA and approximately 2 inches (50 mm) forward of the elevator trailing edge.

   NOTE: Use the longitudinal row of fasteners on the elevator skin to identify the rib.

   The right hydraulic system powers the outboard actuators, the left hydraulic system powers the center actuators, the center hydraulic system powers the inboard actuators.



Elevator Freeplay Check
Figure 601 (Sheet 1)



RIGHT ELEVATOR TRAILING EDGE
(LEFT ELEVATOR TRAILING EDGE IS OPPOSITE)

(B)

1 APPLY THE DOWNWARD FORCE (F_D) OF 40 ±5 POUNDS (178 ±22 NEWTONS) APPROXIMATELY 2 INCHES (50 mm) FORWARD OF THE ELEVATOR TRAILING EDGE. APPLY THE FORCE (F_D) AT THESE THREE LOCATIONS WITH THE SUBJECT PCA AT THAT LOCATION PRESSURIZED. THE OTHER TWO PCAs SHOULD NOT BE PRESSURIZED DURING THE FREEPLAY TEST OF THE SUBJECT.

2 AT THE OUTBOARD PCA, APPLY THE UPWARD FORCE (F_{UO}) APPROXIMATELY 2.0 INCHES (50 mm) FORWARD OF THE ELEVATOR TRAILING EDGE.

3 AT THE MIDDLE PCA, APPLY THE UPWARD FORCE (F_{UM}) APPROXIMATELY 4.8 INCHES (120 mm) FORWARD OF THE ELEVATOR TRAILING EDGE.

4 AT THE INBOARD PCA, APPLY THE UPWARD FORCE (F_{UI}) APPROXIMATELY 7.5 INCHES (190 mm) FORWARD OF THE ELEVATOR TRAILING EDGE.

Elevator Freeplay Check
Figure 601 (Sheet 2)

S 096-010

(5) Remove the force from the top of the elevator.

S 866-011

(6) Stop for 15 seconds or until the elevator movement stops.

S 226-107

(7) Adjust the dial indicator to zero.

S 226-069

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE ELEVATOR SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 MM) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 MM).

(8) Use the force scale to slowly apply a force of 80 +/- 10 pounds (356 +/- 44 newtons) to the bottom of the elevator for 15 seconds or until the elevator movement stops. Apply this force along the elevator rib opposite the powered PCA and at the following locations:

- OUTBOARD PCA: Approximately 2.0 inches (50 mm) forward of the elevator's trailing edge.
- MIDDLE PCA: Approximately 4.8 inches (120 mm) forward of the elevator's trailing edge.
- INBOARD PCA: Approximately 7.5 inches (190 mm) forward of the elevator's trailing edge.

NOTE: Use the longitudinal row of fasteners on the elevator skin to indentify the rib.

- The RIGHT hydraulic system powers the OUTBOARD actuators.
- The LEFT hydraulic system powers the CENTER actuators.
- The CENTER hydraulic system powers the INBOARD actuators.

S 226-124
(9) Record the dial indicator reading or scale reading with the force applied .

S 866-125
(10) Remove the 80 pound (356 newtons) force.

S 226-109
(11) Do steps (4) thru (10) again (for the same PCA and side) to get a second freeplay measurement.

S 226-110
(12) Make sure that the difference between the first and the second elevator freeplay measurement is not more than 0.040 inch (1.02 mm).

S 226-017
(13) If the difference between the first and second elevator freeplay measurement is more than 0.040 inch (1.02 mm), then do these steps:
(a) Do a check of the dial indicator installation.
(b) Do the steps (4) thru (11) again until the difference between the two elevator freeplays is not more than 0.040 inch (1.02 mm) .

S 226-123
(14) If the first or second elevator freeplay measurements is more than 0.340 inch (8.64 mm), examine the PCA rod ends and the reaction link bearings and idler link for too much wear or refer to the Fault Isolation Manual (FIM 27-31-00/101).

S 866-019
(15) Remove the power from the hydraulic system that was pressurized (AMM 29-11-00/201).

S 866-120
(16) Move the applicable FLT CONTROL SHUTOFF L, R, or C switch on the P61 panel to OFF. Attach a DO-NOT-OPERATE tag and make sure the switch position light comes on.

NOTE: Make sure all the switches are in their OFF positions.

S 216-072

(17) Make sure these circuit breakers on the P11 panel are open:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 736-020

(18) Do the elevator freeplay check again for each of the remaining PCAs. Make sure only one PCA (for each of the two elevators) is pressurized during the check.

G. Put the Airplane Back to Its Usual Condition

S 866-021

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT
(c) 11H17, FLT CONT SHUTOFF TAIL LEFT
(d) 11H18, FLT CONT SHUTOFF TAIL CTR
(e) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 866-022

(2) Move the RIGHT STAB TRIM SHUTOFF and the CENTER STAB TRIM SHUTOFF switches on the P10 panel to their NORM positions.

S 866-023

(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 866-024

(4) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 27-02-00-736-025

3. Rudder Freeplay - Check

A. General

(1) Some freeplay in the PCU linkages is permitted, but the wear must be divided equally between the linkage components. If one component is worn more than the other components in the system, you must repair it.

(2) During this check, the wind/air velocities at the rudder must be below 5 mph. If it is necessary, perform this check indoors.

B. Equipment

(1) Dial Indicator, Accurate to 0.001 inch (0.03 mm) and a minimum stroke of 1 inch (25 mm) - Commercially Available

(2) Device to Hold the Dial Indicator, tightly against the fuselage

NOTE: A machine shop tool commercially available (magnetic base with fixed rod and movable extension rod for dial indicator installation) can be used.

(3) Spring Force Scale, Push-Type 0 to 150 Pound (0-667 newtons) Range (1-pound resolution and 10% accuracy) - Commercially Available

C. References

(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zone

325 Rudder
211 Control Cabin, Left
212 Control Cabin, Right

E. Prepare for the Inspection/Check

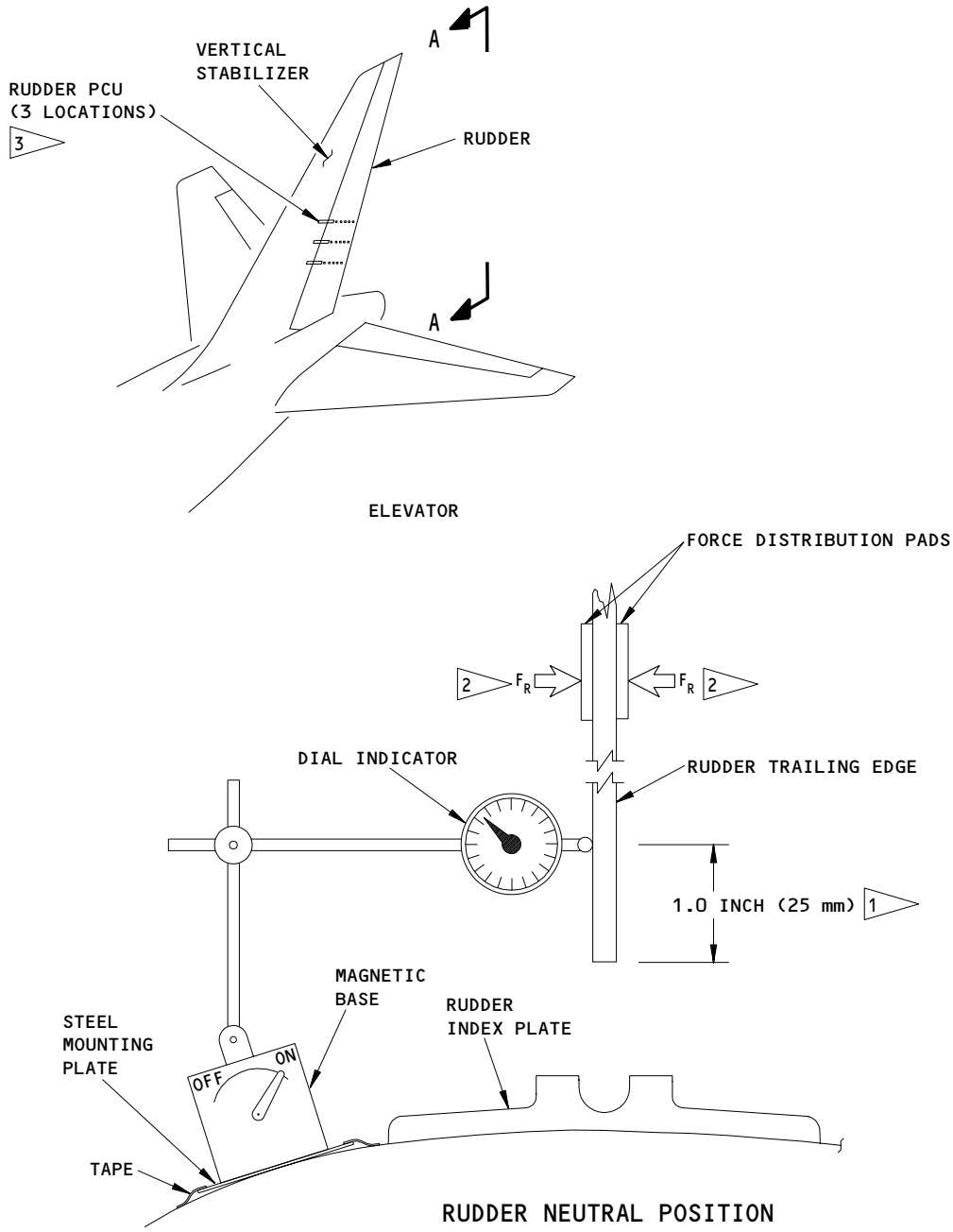
S 866-026

(1) Supply electrical power (AMM 24-22-00/201).

S 866-015

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND THE STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL EQUIPMENT AND PERSONS ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY THE HYDRAULIC POWER. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Supply pressure to the left hydraulic system (AMM 29-11-00/201).



RUDDER NEUTRAL POSITION

A-A

1 PLACE THE DIAL INDICATOR PLUNGERS APPROXIMATELY 1.0 INCH (25 mm) FORWARD OF THE RUDDER TRAILING EDGE AND 1.0 INCH (25 mm) FROM THE BOTTOM OF THE RUDDER.

2 APPLY A 30 ±3 POUNDS (133 ±13 NEWTONS) FORCE TO THE LEFT SIDE OF THE RUDDER FIRST, THEN THE RIGHT SIDE OF RUDDER. CENTER THE FORCE ON THE FORCE DISTRIBUTION PAD. BE SURE TO PROTECT THE RUDDER SURFACE WITH A FORCE DISTRIBUTION PAD.

3 APPLY F_R AT THESE 3 LOCATIONS, WITH THE PCU AT THAT LOCATION PRESSURIZED. THE OTHER TWO PCUs SHOULD NOT BE PRESSURIZED DURING THE FREEPLAY TEST OF THE SUBJECT PCU.

Rudder Freeplay Check
Figure 602

S 866-097

(3) Move the rudder pedals quickly for approximately 5 cycles and do this check:
(a) Make sure the rudder pedals are in their neutral positions.
(b) Attach DO-NOT-OPERATE tag to the rudder pedals.

S 826-030

(4) Operate the rudder trim switch on the aft electronic control panel, P8, until the rudder trim indicator shows zero units of trim.
(a) Make sure the rudder is in its neutral position.

S 866-127

(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C10, RUD TRIM
(b) 11J17, RUDDER TRIM POS

S 866-031

(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 866-032

(7) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 866-033

(8) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

F. Rudder Freeplay - Check

S 866-101

WARNING: THE RUDDER IS A FULLY POWERED SURFACE. MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE CONTROL SURFACE BEFORE YOU SUPPLY HYDRAULIC POWER. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do the applicable group of steps to supply hydraulic power to one of the three PCUs for the rudder (do only the steps for the PCU you want to supply the power to):

NOTE: Measure the freeplay for each of the three PCUs that move the rudder. During the measurement, make sure only one of the three rudder PCUs has power at a time.

(a) Do these steps to supply hydraulic power to the bottom PCU:
1) Supply pressure to the center hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-OPERATE tag from the rudder pedals.
3) Move the rudder pedals quickly for approximately 5 cycles and do this check:

NOTE: This step releases the remaining pressure in the top and middle PCUS.

a) Make sure the rudder pedals are in their neutral positions.
4) Attach DO-NOT-OPERATE tag to the rudder pedals.
5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H18, FLT CONT SHUTOFF TAIL CTR
6) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF C switch on the P61 panel to ON.

(b) Do these steps to supply hydraulic power to the middle PCU:
1) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT
3) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF L switch on the P61 panel to ON.

(c) Do these steps to supply hydraulic power to the top PCU:
1) Supply power to the right hydraulic system only (AMM 29-11-00/201).
2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H28, FLT CONT SHUTOFF TAIL RIGHT
3) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF R switch on the P61 panel to ON.

S 486-098

WARNING: DO NOT MOVE THE RUDDER PEDALS DURING THE RUDDER FREEPLAY MEASUREMENT. THE RUDDER MOVES VERY QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the steps that follow to attach the dial indicator or a scale (ruler with 0.001 or 0.010 inch (0.03 or 0.25 mm) increments) against one side of the rudder (dial indicator) or next to the rudder lower trailing edge (scale) (See Fig. 602):
   (a) Use double face tape and a steel plate to attach the magnetic base to the fuselage just aft of the rudder trailing edge.
   (b) Use adjustable rods to attach the dial indicator to the fixed rod of the magnetic base.
   (c) If you do not have a dial indicator or mounting accessories available, you can use a scale with 0.001 or 0.010 inch (0.03 or 0.3 mm) increments with the steps that follow:
      1) Attach a pointer vertically to the right side of rudder lower trailing edge with tape. Make sure the lower end of the pointer is close to the scale installed in the next step, but does not touch it at any time.
      2) Attach the scale to the tail cone surface horizontally (and centered with respect to the pointer installed previously) with double face tape, and continue after indicator instructions given below.
   (d) Put the indicator plunger approximately 1.0 inch (25 mm) forward of the trailing edge and 1.0 inch (25 mm) above the bottom edge.
   (e) Give a load to the dial indicator until the needle moves to approximately mid-travel.
   (f) Adjust the dial indicator to zero.

S 496-039

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE RUDDER SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 mm) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 mm).

(3) Use the force scale to apply a 30 ± 3 pound (133 +/- 13 newtons) force to the left side of the rudder. Apply this force on the rudder rib opposite the middle PCU and 1 to 2 inches (25 to 50 mm) forward of the trailing edge.

   NOTE: Use the horizontal row of fasteners on the rudder skin to identify the rib.

S 226-040

(4) Keep the force constant until the dial indicator stops moving, but not less than 30 seconds.

S 226-041

(5) Record the distance the rudder trailing edge moves with the force applied.

S 866-073

(6) Slowly remove the load from the left side of the rudder.

NOTE: Do not adjust the dial indicator to zero even if it does not return to the original zero.

S 496-074

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE RUDDER SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 mm) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 mm).

(7) Use the force scale to apply a 30 ± 3 pound force (133 +/- 13 newtons) to the right side of the rudder. Apply this force on the rudder rib opposite the middle PCU and 1 to 2 inches (25 to 50 mm) forward of the trailing edge.

NOTE: Use the horizontal row of fasteners on the rudder skin to identify the rib.

S 226-043

(8) Keep the force constant until the dial indicator stops moving, but not less than 30 seconds.

S 226-044
(9) Record the distance the rudder trailing edge moves with the force applied.

S 866-128
(10) Remove the 30 pound (133 newton) force.

S 226-045
(11) Add the distance the rudder moved left to the distance it moved right to find the total distance the rudder moved and record.

S 226-099
(12) Do the steps (3) through (11) again (for same PCU) to get a second freeplay measurement.

S 226-131
(13) If the difference between the first and second rudder freeplay measurement is more than 0.040 inch (1.02 mm), then do these steps:
(a) Make sure the dial indicator base did not move.
(b) Do steps (3) through (11) again until the difference between two measurements of the total rudder freeplay is not more than 0.040 inch (1.02 mm).

S 226-133
(14) Make sure the total distance the rudder moved in either the first or second test is not more than 0.40 inch (10.1 mm).

NOTE: The rudder movement for a new airplane is approximately 0.23 inches (5.8 mm) (this is a satisfactory value for the rudder movement). If the measured movement is less than this value, make sure only one of the three PCUs has power.

(a) If the total rudder movement in either measurement is more than 0.40 inch (10.2 mm), examine the bearings, bushings and bolts at each joint of the PCU rod end, reaction link, hanger link, and hinges in the PCU installation being tested for too much wear.

(b) Do the steps (3) through (14) again until the total distance the rudder moved in either the first or second test is not more than 0.40 inch (10.2 mm).

S 866-046

(15) Remove the power from the hydraulic system that was pressurized (AMM 29-11-00/201).

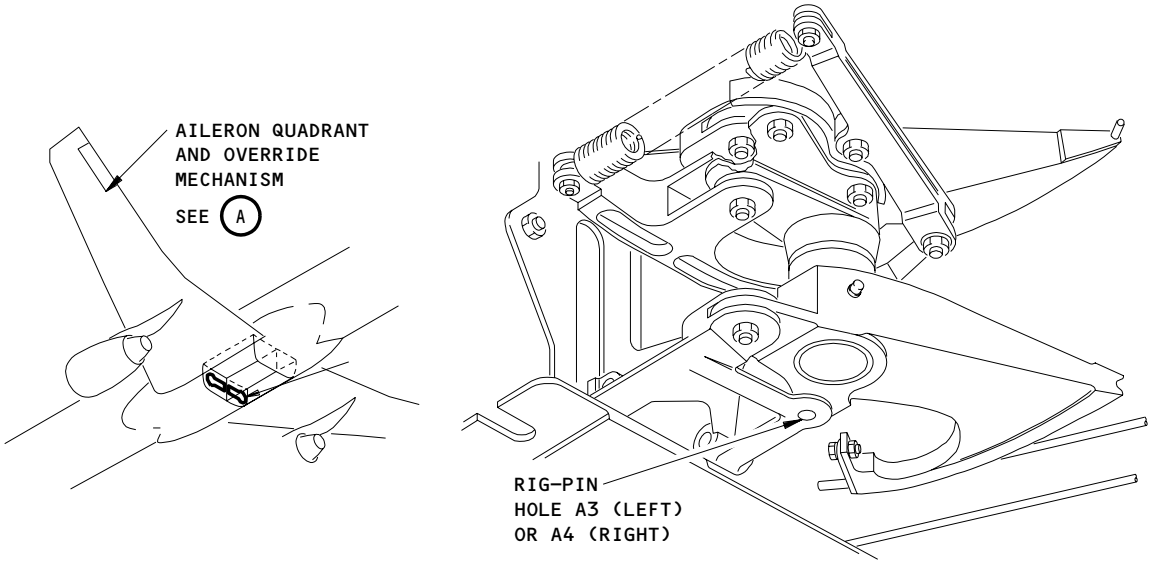
S 866-076

(16) Move the applicable FLT CONTROL SHUTOFF L, R, or C switch on the P61 panel to OFF. Attach a DO-NOT-OPERATE tag and make sure the switch position light comes on.

NOTE: Make sure all the switches are in their OFF positions.

S 216-100

(17) Make sure these circuit breakers on the P11 panel are open:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT



AILERON QUADRANT AND OVERRIDE MECHANISM
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

A

Aileron-Quadrant Rig Pin Location
Figure 603

S 736-135

WARNING: MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE RUDDER BEFORE YOU CHANGE HYDRAULIC SYSTEMS. RIGGING DIFFERENCES BETWEEN THE PCUs CAN CAUSE THE RUDDER TO MOVE SUDDENLY. INJURY TO PERSONS OR DAMAGE TO THE EQUIPMENT CAN OCCUR.

(18) Do the rudder freeplay check again for each of the remaining PCUs. Make sure only one PCU is pressurized during the check.
(a) Remove dial indicator before you pressurize a different PCU.

G. Put the Airplane Back to Its Usual Condition

S 866-050
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J17, RUDDER TRIM POS

S 866-130
(2) Remove the DO-NOT-OPERATE tag from the rudder pedals.

S 866-051
(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 866-052
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-02-00-736-053

4. Aileron Freeplay - Check

A. General
(1) Some freeplay in the PCA linkages is permitted, but the wear must be divided equally between the linkage components. If one component is worn more than the other components in the system, you must repair it.

B. Equipment
(1) Dial Indicator, Accurate to 0.001 inch (0.03 mm) and a minimum stroke of 1 inch - (25 mm) Commercially Available
(2) Device to Hold the Dial Indicator, tightly against the fuselage

NOTE: A machine shop tool commercially available (magnetic base with fixed rod and movable extension rod for dial indicator installation) can be used.

(3) Spring Force Scale, Push-Type (0 to 150 Pound (0-667 newtons) Range) - Commercially Available
(4) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
(a) A3 - P/N B20003-23
(b) A4 - P/N B20003-23

C. References
(1) AMM 20-10-24/201, Rig Pins
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-11-20/601, Aileron - PCA Inspection/Check
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
568 Left Aileron
668 Right Aileron
211 Control Cabin, Left
212 Control Cabin, Right

E. Prepare for the Inspection/Check

S 866-054
(1) Supply electrical power (AMM 24-22-00/201).

S 866-040

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND THE STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL EQUIPMENT AND PERSONS ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY THE HYDRAULIC POWER. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 826-056

(3) Operate the aileron trim switches on the aft electronic control panel, P8, until the aileron trim indicator shows zero units of trim.

S 866-077

(4) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 866-078

(5) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 866-082

(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 486-057

WARNING: INSTALL RIG PINS A3 AND A4 TO PREVENT MOVEMENT OF THE AILERONS DURING THE FREEPLAY MEASUREMENT. THE AILERONS MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Install rig pins A3 and A4 in the aileron quadrant as shown (Fig. 603).

F. Aileron Freeplay - Check

S 866-058

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND THE STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL EQUIPMENT AND PERSONS ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY THE HYDRAULIC POWER. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do the applicable group of steps to supply hydraulic power to one of the two aileron PCAs:
(a) Do this step to supply power to the outboard PCA for the left aileron:
1) Supply pressure to the right hydraulic system only (AMM 29-11-00/201).

(b) Do this step to supply hydraulic power to the outboard PCA for the right aileron:
1) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).
(c) Do this step to supply hydraulic power to the inboard PCAs for the two ailerons:
1) Supply pressure to the center hydraulic system only (AMM 29-11-00/201).

S 226-060

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE AILERON SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 mm) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 mm).

(2) Use the force scale to apply a 10 - 14 pound (44.5-62.2 newtons) force to the bottom of the aileron. Center this force between the PCAs and 2 inches (50 mm) forward of the aileron trailing edge.

S 496-093

CAUTION: USE A DIAL INDICATOR WITH AT LEAST A 1-INCH STROKE TO PREVENT DAMAGE TO THE INDICATOR.

(3) Do the steps that follow to attach the dial indicator to the top wing structure just outboard of the aileron, or to attach a scale vertically on the fixed structure adjacent to the aileron lower trailing edge.
(a) Use a double face tape and a steel plate to attach the magnetic base to the top wing structure outboard of the aileron.
(b) Use adjustable rods to attach the dial indicator to the fixed rod of the magnetic base.
(c) Put the indicator plunger near the aileron trailing edge.
(d) Give a load to the dial indicator until the needle moves to approximately mid-travel.

(e) Adjust the dial indicator to zero.
(f) If you do not have a dial indicator or mounting accessories available, you can use a scale with 0.001 or 0.010 inch (0.03 or 0.3 mm) increments with the steps that follow:
1) Attach a pointer (pointing to the adjacent fixed surface) to the aileron lower trailing edge with tape.
2) Attach the scale to the fixed surface adjacent to the aileron lower trailing edge with double face tape, and continue after dial indicator instructions given below.

NOTE: Set the aileron neutral position point on the scale with pointer installed on aileron lower trailing edge when attaching the scale.

S 866-121
(4) Remove the force from the bottom of the aileron.

S 226-061
(5) Use the force scale to apply a 10-14 pound force (45-62 newtons) to the top of the aileron. Center this force between the PCAs and 2 inches (50 mm) forward of the aileron trailing edge.

S 226-080
(6) Measure and keep a written record of the distance the aileron moves down. Do this check:
(a) Make sure the aileron movement is not more than 0.12 inch (3.1 mm).

S 226-088
(7) Do the freeplay check again and do these checks:
(a) Make sure the dial indicator base did not move.
(b) Make sure the last measurement is approximately the same as the first.

S 226-104
(8) If the aileron movement is more than 0.120 inches (3.05 mm), examine the PCA rod ends, the hinge bearings, and the reaction link bearings for too much wear (AMM 27-11-20/601).

S 866-089
(9) Remove the power from the hydraulic system that was pressurized (AMM 29-11-00/201).

S 226-092
(10) Do the aileron freeplay check again for each of the remaining PCAs. Make sure only one PCA (for each aileron) is pressurized during the check.

G. Put the Airplane Back to Its Usual Condition

S 096-095
(1) Remove rig pins A3 and A4.

S 866-063
(2) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 866-113
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-02-00-736-065

5. Spoiler Freeplay - Check

A. Equipment
(1) Dial Indicator, Accurate to 0.001 inch (0.03 mm) and a minimum stroke of 1 inch - (25 mm) Commercially Available
(2) Device to Hold the Dial Indicator, tightly against the fuselage

NOTE: A length of "T" beam (approximately 3 inches (8 mm) long) and adjustable rods designed for use with dial indicators can be used.

(3) Spring Force Scale, Push-Type (0 to 150 Pound (0-677 newtons) Range) - Commercially Available

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-51-00/201, Trailing Edge Flap System
(3) AMM 78-31-00/201, Thrust Reverser System
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zones

565/665	Spoilers No. 1, No. 12
564/664	Spoilers No. 2, No. 11
563/663	Spoilers No. 3, No. 10
562/662	Spoilers No. 4, No. 9
554/654	Spoilers No. 5, No. 8
553/663	Spoilers No. 6, No. 7

D. Prepare for the Inspection/Check

S 866-114
(1) Supply electrical power (AMM 24-22-00/201).

S 866-061

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(2) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 866-062

WARNING: THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 866-069

(4) Extend the trailing edge flaps (AMM 27-51-00/201).

S 866-118

(5) Do the deactivation procedure for the flaps (AMM 27-51-00/201).

S 866-115

(6) Move the speedbrake lever to its down-and-locked detent position.

S 866-072

(7) Make sure the control wheels are in their neutral positions.

NOTE: The neutral position is found when the control wheels are in their center positions with zero units of trim. Make sure you can easily install and remove rig pin A1 in the lateral control feel, centering, and trim mechanism.

S 866-084

WARNING: MAKE SURE THE SPOILERS ARE IN THEIR DOWN POSITIONS BEFORE YOU OPEN THE CIRCUIT BREAKERS SHOWN BELOW. THE SPOILERS WILL RETRACT IN LESS THAN ONE SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC or FLT CONT ELEC 1L AC
(b) 11C7, CSEU 1L DC or FLT CONT ELEC 1L DC
(c) 11C8, CSEU 2L AC or FLT CONT ELEC 2L AC

(d) 11C9, CSEU 2L DC or FLT CONT ELEC 2L DC
(e) 11G17, CSEU 1R AC or FLT CONT ELEC 1R AC
(f) 11G18, CSEU 1R DC or FLT CONT ELEC 1R DC
(g) 11G27, CSEU 2R AC or FLT CONT ELEC 2R AC
(h) 11G28, CSEU 2R DC or FLT CONT ELEC 2R DC

E. Spoiler Freeplay - Check

S 226-063

CAUTION: USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE SPOILER SURFACE. USE A PAD THAT IS AT LEAST 5 INCHES (130 mm) LONG AND HAS A WIDTH OF AT LEAST 5 INCHES (130 mm).

(1) Use the force scale to apply a 10-12 pound force (45-53 newtons) force to the bottom of the spoiler. Apply this force opposite the PCA and 1 to 2 inches (25-50 mm) forward of the spoiler trailing edge.

S 496-094

CAUTION: USE A DIAL INDICATOR WITH AT LEAST A 1-INCH STROKE TO PREVENT DAMAGE TO THE INDICATOR.

(2) Do the steps that follow to attach the dial indicator to the top wing structure forward of the spoiler.
(a) Use tape to attach the "T" beam to the top wing structure forward of the spoiler.

NOTE: The "T" beam can be attached to the top surface of the flaps if the flaps are in the extended position.

(b) Use adjustable rods to attach the dial indicator to the flange of the "T" beam.
(c) Put the indicator plunger at the spoiler trailing edge.
(d) Make sure the dial indicator cannot move.
(e) Adjust the dial indicator to zero.

S 866-085
(3) Remove the force from the bottom of the spoiler.

S 226-076
(4) Use the force scale and apply a 10-12 pound (45-53 newtons) force to the top of the spoiler.

S 226-086
(5) Measure and keep a record of the distance the spoiler moves. Do this check:
(a) Make sure that the spoiler freeplay (movement) is not more than 0.20 inch (5.1 mm).

S 226-087
(6) If the spoiler freeplay is more than 0.20 inch (5.1 mm), examine these components for too much wear:
(a) The actuator rod end bearing, bolt, and bushing
(b) The actuator trunnion pivot joint components
(c) The spoiler hinge bearing, bolt, and bushing.

S 226-078
(7) Do the above steps again for each of the twelve spoiler panels.

F. Put the Airplane Back to Its Usual Condition

S 866-079
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC or FLT CONT ELEC 1L AC
(b) 11C7, CSEU 1L DC or FLT CONT ELEC 1L DC
(c) 11C8, CSEU 2L AC or FLT CONT ELEC 2L AC
(d) 11C9, CSEU 2L DC or FLT CONT ELEC 2L DC
(e) 11G17, CSEU 1R AC or FLT CONT ELEC 1R AC
(f) 11G18, CSEU 1R DC or FLT CONT ELEC 1R DC
(g) 11G27, CSEU 2R AC or FLT CONT ELEC 2R AC
(h) 11G28, CSEU 2R DC or FLT CONT ELEC 2R DC

S 216-080
(2) Make sure the amber SPOILERS light on the P5 panel is off.

S 866-081
(3) Push the RESET switch on all four PSMs. Stop for 31 seconds.

NOTE: If it is necessary, temporarily open these circuit breakers to set the PSM Faultball:

11J2, EICAS CMPTR L
11J29, EICAS CMPTR R

S 216-082
(4) Make sure the PSM faultballs are black.

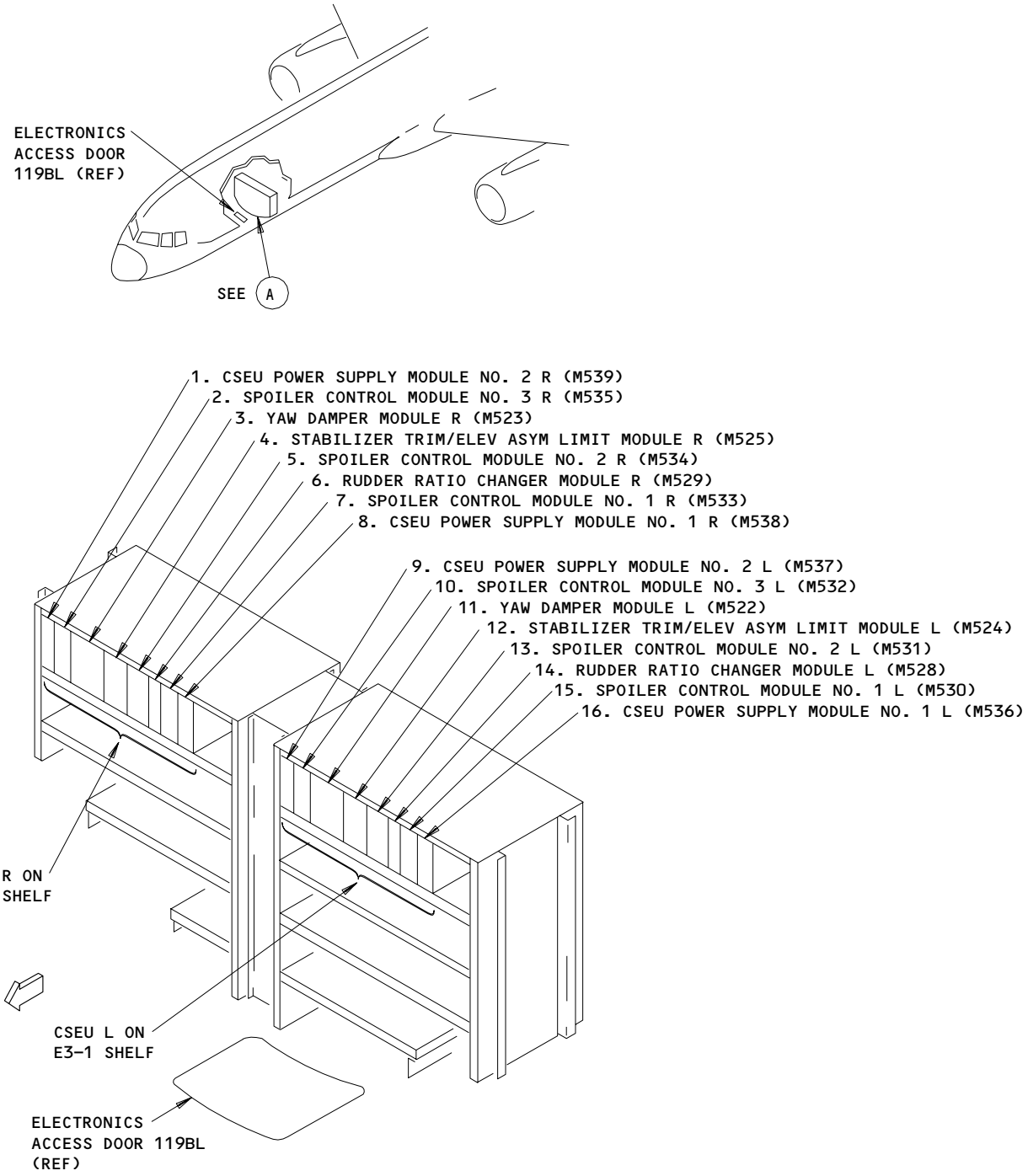
S 866-116
(5) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 866-102
(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 866-103
(7) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

FLIGHT CONTROL SYSTEM ELECTRONICS UNIT (CSEU) - DESCRIPTION AND OPERATION

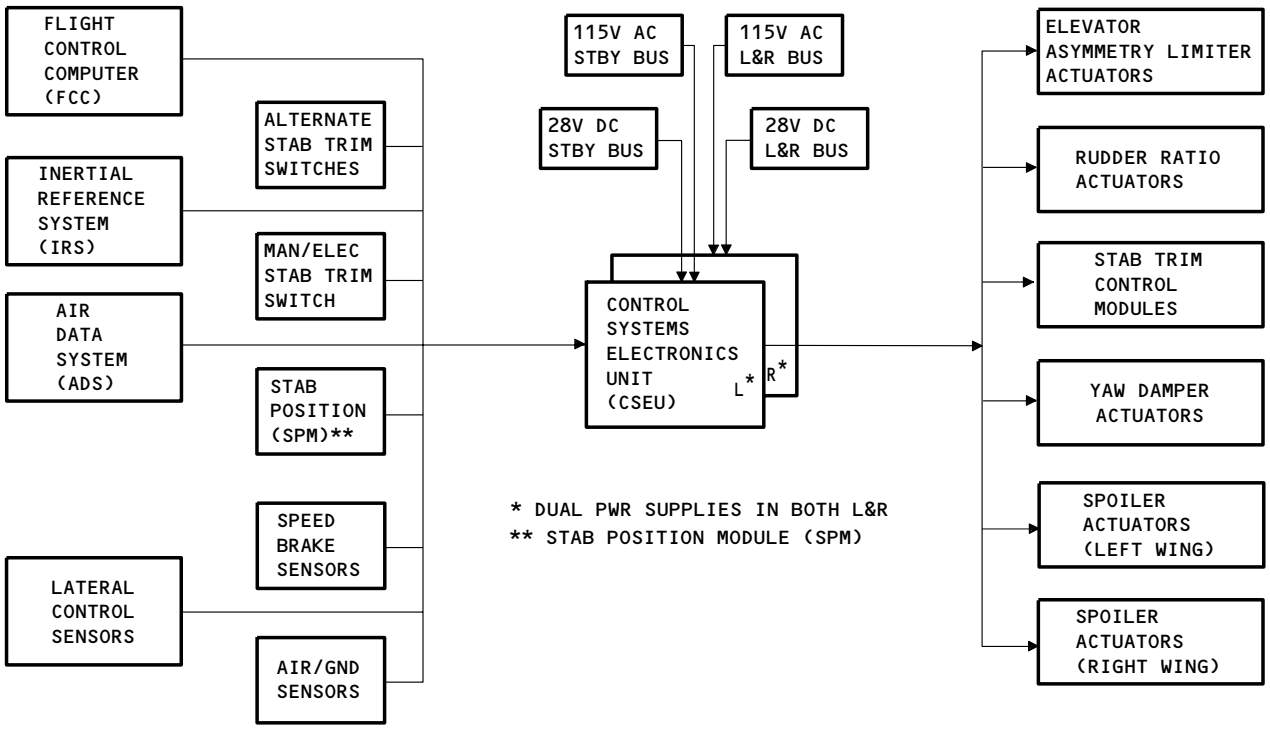
1. General (Fig. 1)
   A. The Control System Electronics Unit (CSEU) is a collection of flight control modules and four power supply modules. The CSEU is energized by its own power supply modules.
   B. The CSEU interfaces with other primary airplane systems to provide the computation and control functions for yaw damping (Ref 22-21-00), stabilizer trim (Ref 27-41-00), elevator travel limit (Ref 27-31-00), rudder control authority (Ref 27-21-00), and spoiler deployment (Ref 27-61-00).
   C. The system consists of independent left and right CSEUs. All modules are line replaceable units (LRU). Equivalent modules can be changed between equivalent shelf positions on the left and right CSEUs.
   D. The left CSEU is on the top E3-1 shelf, and the right CSEU is on the top E4-1 shelf. These shelves are found in the main electronics equipment center. Access is thru the electronics access door, 119BL, found on the bottom of the fuselage, aft of the nose wheel well.
   E. The CSEU consists of these modules (and equipment numbers):
      (1) Yaw damper module (YDM) (M522 LH; M523 RH)
      (2) Rudder ratio changer module (RRC) (M528 LH; M529 RH)
      (3) Stabilizer trim/elevator asymmetry limit module (SAM) (M524 LH; M525 RH)
      (4) Spoiler control module (SCM) (M530, M531, M532 LH; M533, M534, M535 RH)
      (5) Power supply module (PSM) (M536, M537 LH; M538, M539 RH)
   F. The CSEU modules provide the electrical interface between the sensors and the signal sources. These include the air/ground logic sensors, the hydraulic pressure sense signals, the pilot's and first officer's flight control transducers, and the control surfaces transducers and actuators.
   G. Built-In-Test Equipment (BITE) in the CSEU modules supply continuous monitor features specified for the monitor circuits. When the CSEU is powered, the background is continuously monitored for faults, and the inflight failure data is stored.
2. Component Details (Fig. 2)
   A. Yaw Damper Module (YDM)
      (1) The YDM gets the sensor inputs from these systems:
         (a) Air Data Computer
         (b) Inertial Reference Unit
         (c) Modal Suppression Accelerometer
      (2) The YDM uses these inputs to dampen undesirable sideslip and roll and to provide turn coordination and gust load relief. If one of the YDMs fails, the other YDM takes over all control functions. The two YDMs supply rudder commands which drive the yaw damper servos. These servos control the rudder mechanical linkage and the rudder power control actuators. Refer to 22-21-00 for more information.



MAIN ELECTRONICS EQUIPMENT CENTER

A

Flight Control System Electronics Unit (CSEU)
Figure 1



CSEU System Interface
Figure 2

B. Rudder Ratio Changer (RRC) Function
   (1) The RRC varies rudder control authority as a function of airplane speed. Two RRCs are installed. One RRC is always in control and the other is on standby. If one RRC fails, the other RRC takes over the control functions. The RRC uses airspeed inputs from the air data computers (ADC) and the SAMs to control rudder deflection. Refer to 27-21-00 for more information.

C. Stabilizer Trim/Elevator Asymmetry Limit Function (SAM)
   (1) The SAM supplies stabilizer trim control and elevator asymmetry limit functions relative to the airspeed, and the airspeed output to the RRC. Two SAMs are installed. One SAM is always in control and the other is on standby. If one SAM fails, the other SAM switches over when the airplane is in the mach/speed trim mode, or if two or more flight control computers (FCC) are engaged.
   (2) Two SAMs are installed, one on the E3-1 and one on the E4-1 shelf in the main equipment center. Either SAM will provide the automatic control of the horizontal stabilizer position.
   (3) The trim up or trim down commands for the stabilizer can come to the SAM from one of these four sources:
      (a) An engaged flight control computer (FCC).
      (b) The air data computer (ADC) based on mach/speed data received from the airspeed sensors.
      (c) The manual electric trim switches on the control wheels.
      (d) The alternate trim switches on the center control stand.
   (4) The SAM built-in test equipment (BITE) monitors its electrical circuits, and its input and output signals. When a fault is detected, the SAM sets one of its eleven faultballs to yellow. The SAM BITE also activates the STAB TRIM warning light and EICAS message to show a system failure.
   (5) The SAM gets ADC inputs and supplies its outputs to the elevator asymmetry limiter actuators to limit the elevator travel. Electrical information supplied from the FCC, ADC, stabilizer position modules (SPM), stabilizer trim control modules (STCM), aisle stand trim levers (ASTL), and captain's and first officer's trim switches, controls the stabilizer trim operation. Refer to 27-41-00 and 27-31-00 for more information.

D. Spoiler Control Module (SCM)
   (1) The SCMs are part of the airplane's lateral control and speedbrake systems. Inputs to the pilot's or first officer's control wheel, or the speedbrake handle cause their transducers to send electrical signals to the SCMs. The SCMs then send the applicable signals to the spoiler power control actuators (PCAs) for spoiler deployment.

(2) A total of six SCMs control the twelve spoilers. Each SCM controls a symmetrical spoiler pair, one on the left wing and one on the right wing. The spoilers are deployed during flight or landing to reduce lift and increase drag. Refer to 27-61-00 for more spoiler information.

(3) The newer model SCMs have a BITE display on the front panel and will be referred to as the -200 series SCMs. The older model SCMs have faultballs and will be referred to as the -100 series SCMs. The -200 and -100 series SCMs are interchangeable and can be installed in a mixed configuration in any of the six SCM shelf positions.

(4) The -200 series SCMs have an expanded capacity for fault detection and can isolate the fault to the possible defective component. The BITE display shows a list of the existing faults at its shelf position, and can show the fault history and the SCM position during the fault. When a -200 series SCM is available, it will provide the fastest and best fault isolation for spoiler system troubleshooting.

(5) For an all -100 series SCM configuration, the most effective maintenance occurs when there are -117 and -118 SCMs installed at shelf positions 1R and 2R. This is because there are two types of the older -100 series SCMs: the -112/-114 SCMs, and the -117/-118 SCMs. The -117 and -118 SCMs have an improved ground speedbrake delay circuit which reduces the risk of a nuisance fault if a transient signal occurs in the air/ground system.

(6) For an airplane that has the -100 and -200 series SCMs installed, the most effective maintenance usually occurs when you have at least one -200 series SCM installed on each shelf. The best location for the two -200 series SCMs are at the 1R and 3L shelf positions, preferably with a -117 or -118 SCM installed at shelf position 2R. If only one -200 series SCM is available, install it at 1R. If an intermittent problem occurs at a given shelf location, or when it is necessary to replace an SCM during the fault isolation procedure, a -200 series SCM is recommended for installation there.

(a) When you use a -200 series SCM for troubleshooting an intermittent problem, it must be installed in the correct shelf location at the time the fault occurs for it to make a record in fault history. Use the fault monitor data below and the existing pilot reports to determine the best shelf location to install the -200 series SCM. Keep the -200 series SCM installed during subsequent airplane flights to let the SCM make a record of the intermittent fault. If the fault occurs again but is not recorded, move the -200 series SCM to a different shelf position and monitor the subsequent flights.

(7) One -200 series SCM, installed in any shelf location, will monitor these inputs:
  (a) The two actuators controlled by the SCM.
  (b) The three control wheel transducer inputs (Captain's or First Officer's) for the shelf with this SCM installed.
  (c) The three speedbrake lever transducer inputs (one of each of the three dual LVDTs) for the shelf with this SCM installed.
  (d) The PSM VALID signals from the two power supply modules (PSM) which supply power to the shelf with this SCM installed.
  (e) The three 26v ac signals from the PSMs which supply power to the shelf with this SCM installed.
  (f) The three air/ground signals that come to the SCM.

    NOTE: There are four relays which supply inputs to the spoiler system. Thus, two -200 series SCMs (one in position 2L or 3L, and the other in any position except 2L and 3L) are needed to monitor these inputs at the same time.

  (g) The pressure switch for the hydraulic system that supplies power to the actuators controlled by this SCM.
  (h) The interlock signal from the adjacent SCM on the same shelf.
  (i) The SCM itself.

E. Power Supply Module (PSM)
  (1) The PSM supplies the CSEU with the necessary dc regulated and ac unregulated power. A total of four PSMs (two for the left CSEU and two for the right CSEU) are installed.
  (2) The two PSMs in each CSEU use power combining (dc) and power changeover (ac) networks to make sure there is continuity to the CSEU loads if one PSM fails. Either PSM can carry the entire CSEU load. However, there is no power combining between the left CSEU PSMs (M536, M537) and the right CSEU PSMs (M538, M539).
  (3) The PSMs (M536, M537) for the left CSEU receive the 28-volt dc and 115-volt ac power sources from the dc and ac standby buses. The PSMs (M538, M539) for the right CSEU receive the 28-volt dc and 115-volt ac power sources from the main left and right dc and ac buses.

(4) Power generated by the PSMs also supplies the linear variable differential transformers (LVDT), and the rotary variable differential transformers (RVDT), for the position monitor and feedback function of the applicable flight controls and control surfaces. The LVDTs and the RVDTs are frequently referred to as the transducers.

3. Operation

A. Functional Description

(1) CSEU power supply module distribution (Fig. 3).

(2) CSEU air/ground and hydraulic discrete inputs (Fig. 6).

(a) Each of the control modules within the left and right CSEUs receives air/ground mode signals and hydraulic pressure sense signals. The module uses these signals to enable or inhibit its own CSEU functions.

(b) Four air/ground relays supply air/ground discrete signals to the CSEU when a proximity switch electronics unit (PSEU) signal is received (Ref 32-09-02).

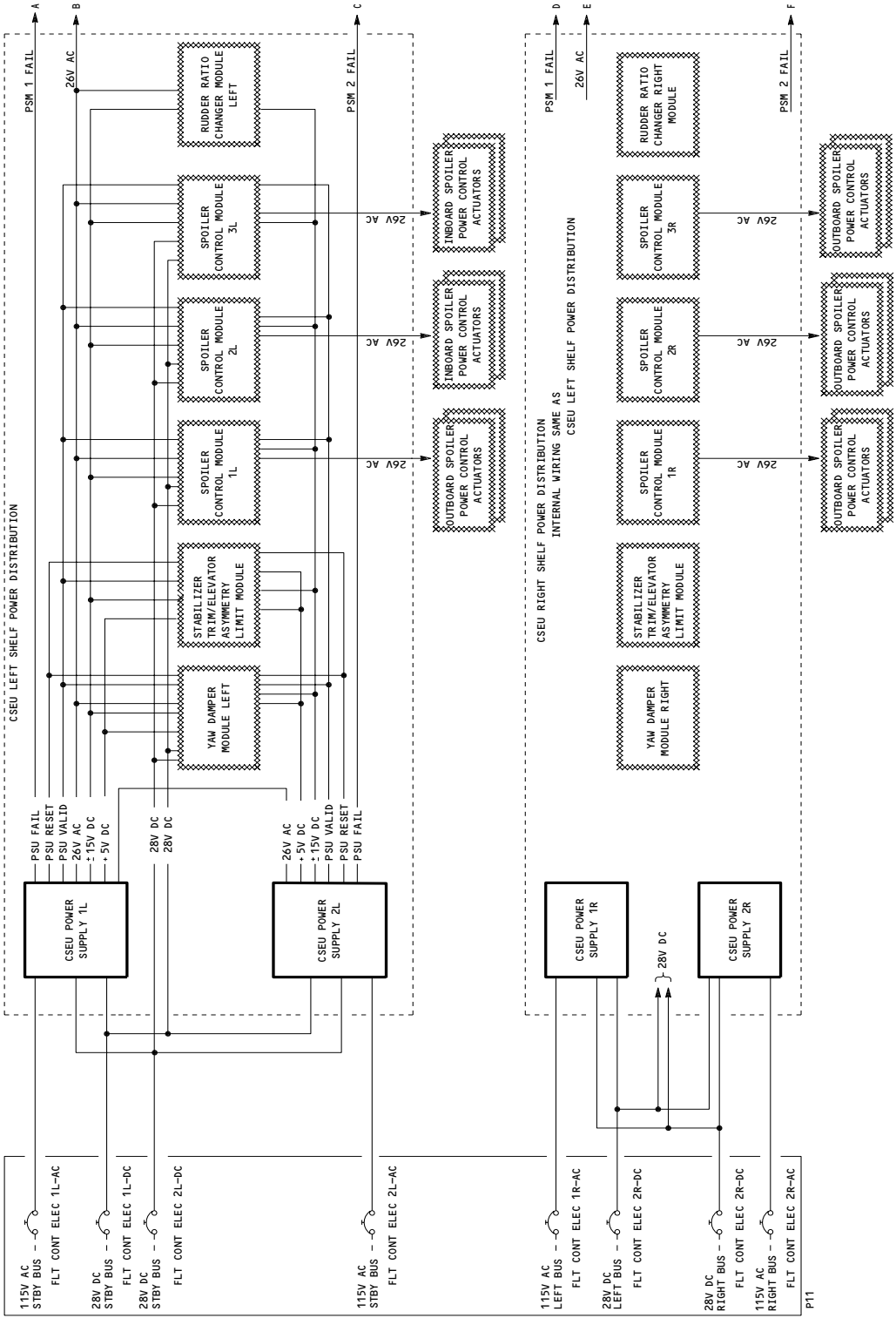
(c) The air/ground relays energize when the PSEU output signal to the CSEU is a ground, which indicates the main gear truck is not tilted (the airplane is in the ground mode).

(d) Examples of the air/ground discrete effects in the ground mode on the CSEU function include the enable of the rudder ratio changer ground tests, and the enable of the speedbrake commands by the SCM.

(e) Hydraulic pressure sense switches operate from the left, right and center hydraulic systems. These switches provide a high and low pair of logic discrete signals (pressure is valid/pressure is not valid) to the CSEU (Ref 29-11-00).

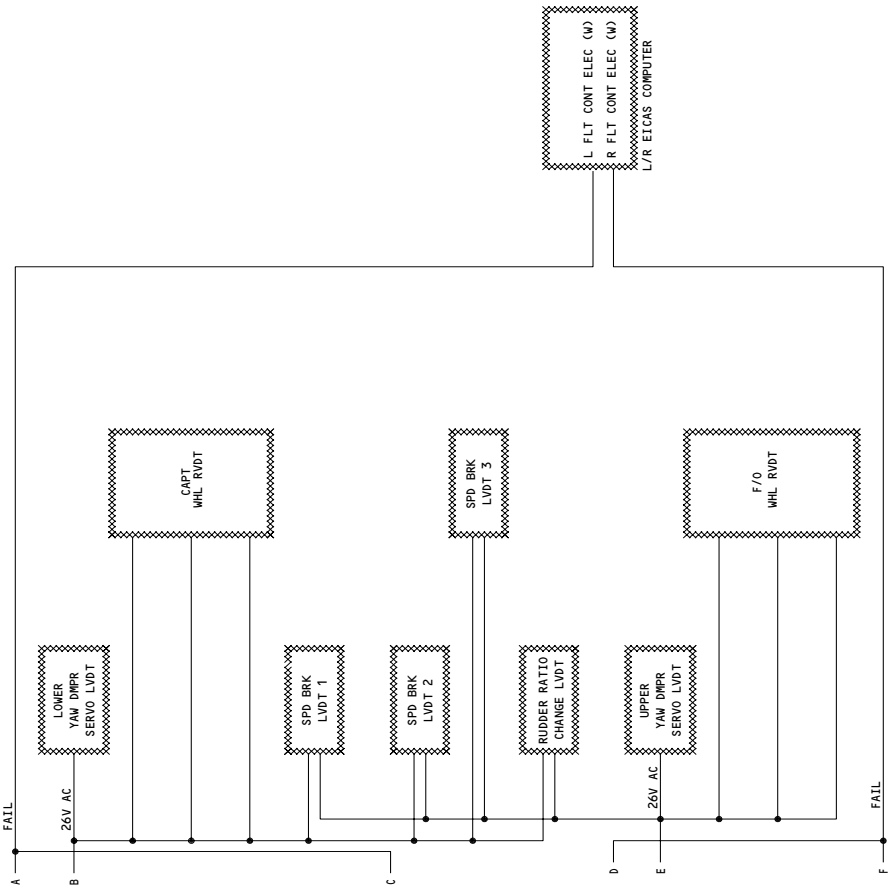
(f) Examples of a valid hydraulic pressure discrete (the system pressure is good) affecting the CSEU function include the enable of the engage relays for the rudder ratio changer in the air, and the enable of the monitor of SCM failures.

(g) An invalid air/ground discrete or a hydraulic pressure discrete to the CSEU will cause an AIR/GRD, a HYD PRESS, or other applicable faultball (or fault message on modules with BITE displays) to show a failure.



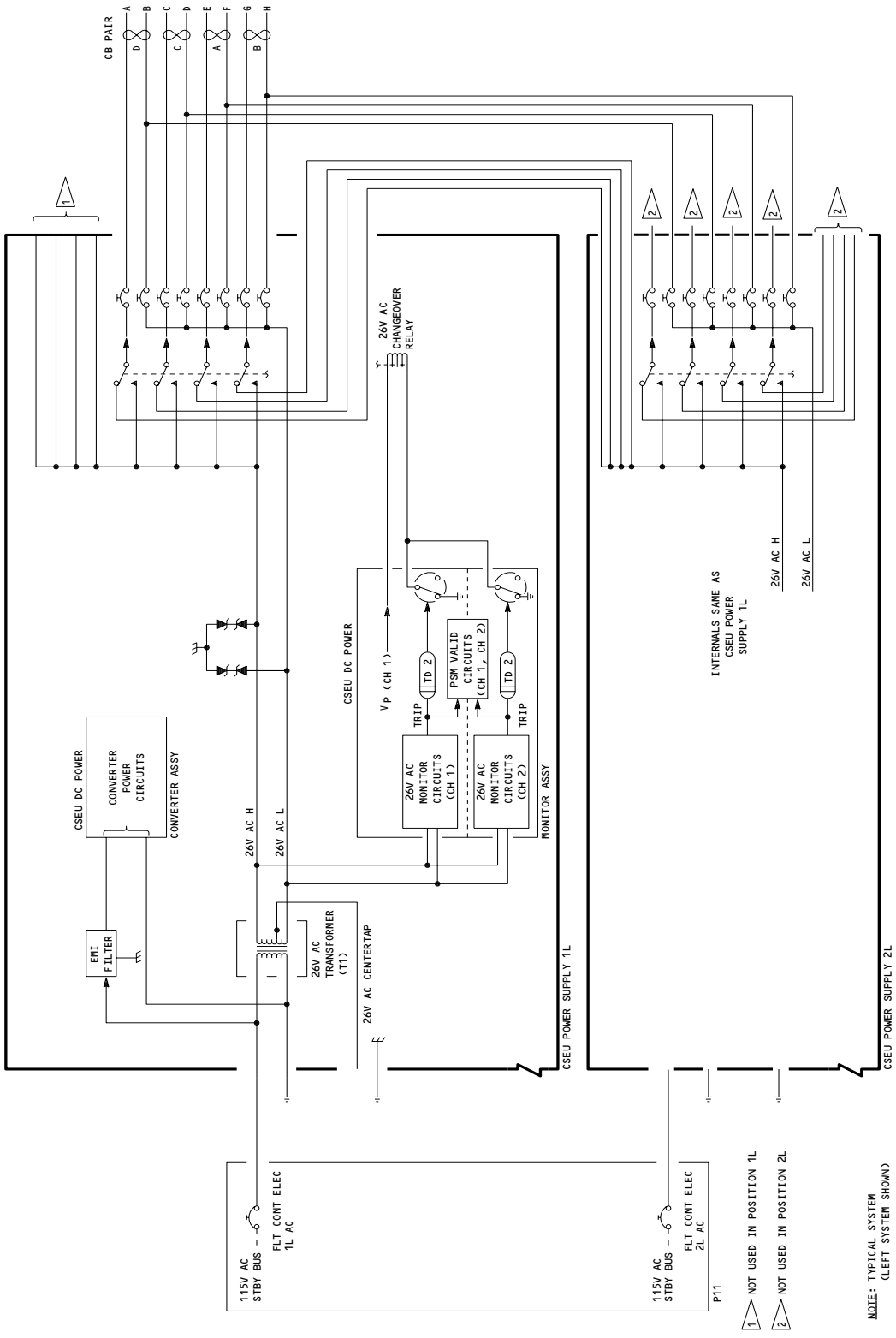
CSEU Power Distribution Schematic
Figure 3 (Sheet 1)

206246



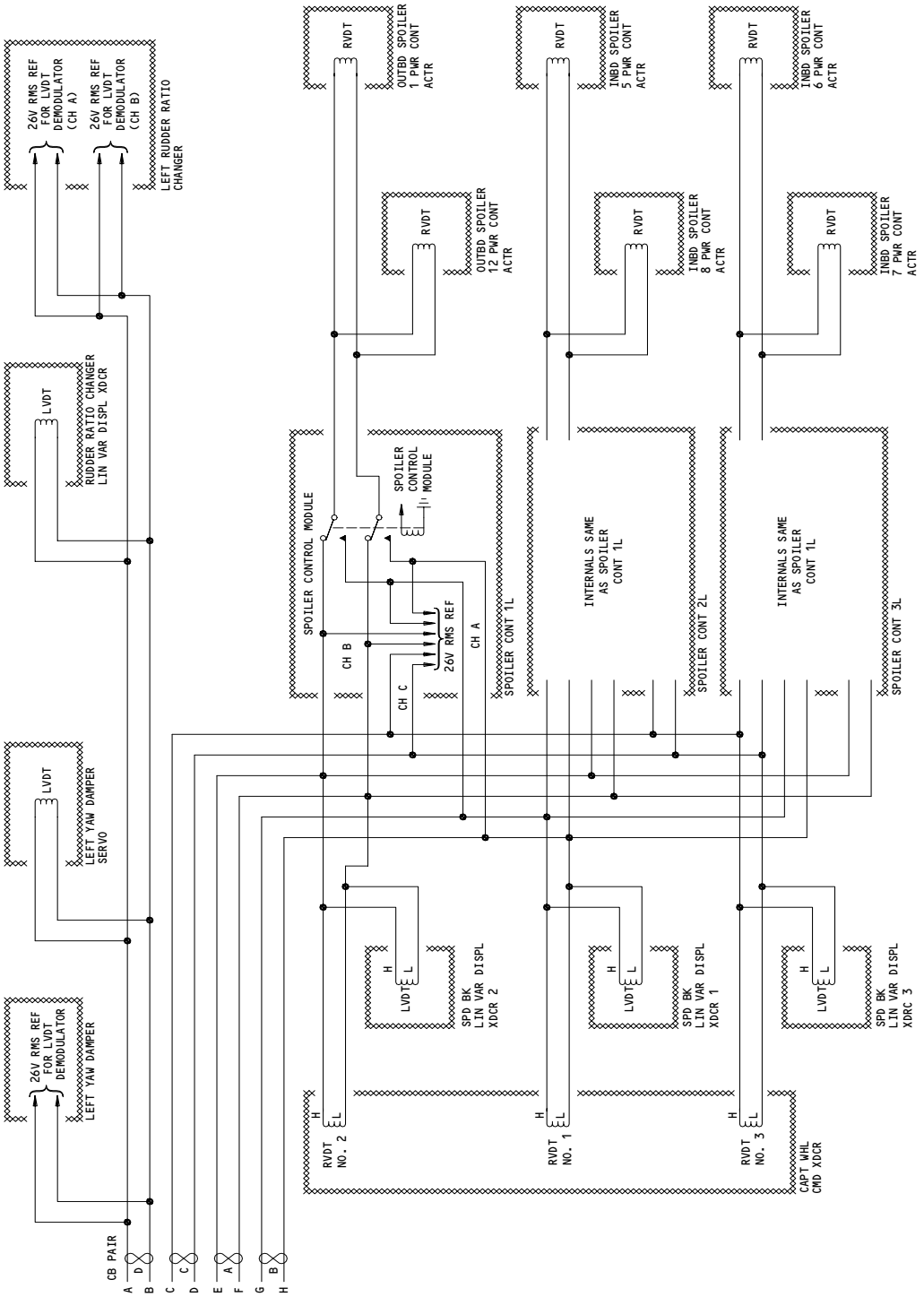
CSEU Power Distribution Schematic
Figure 3 (Sheet 2)

207340



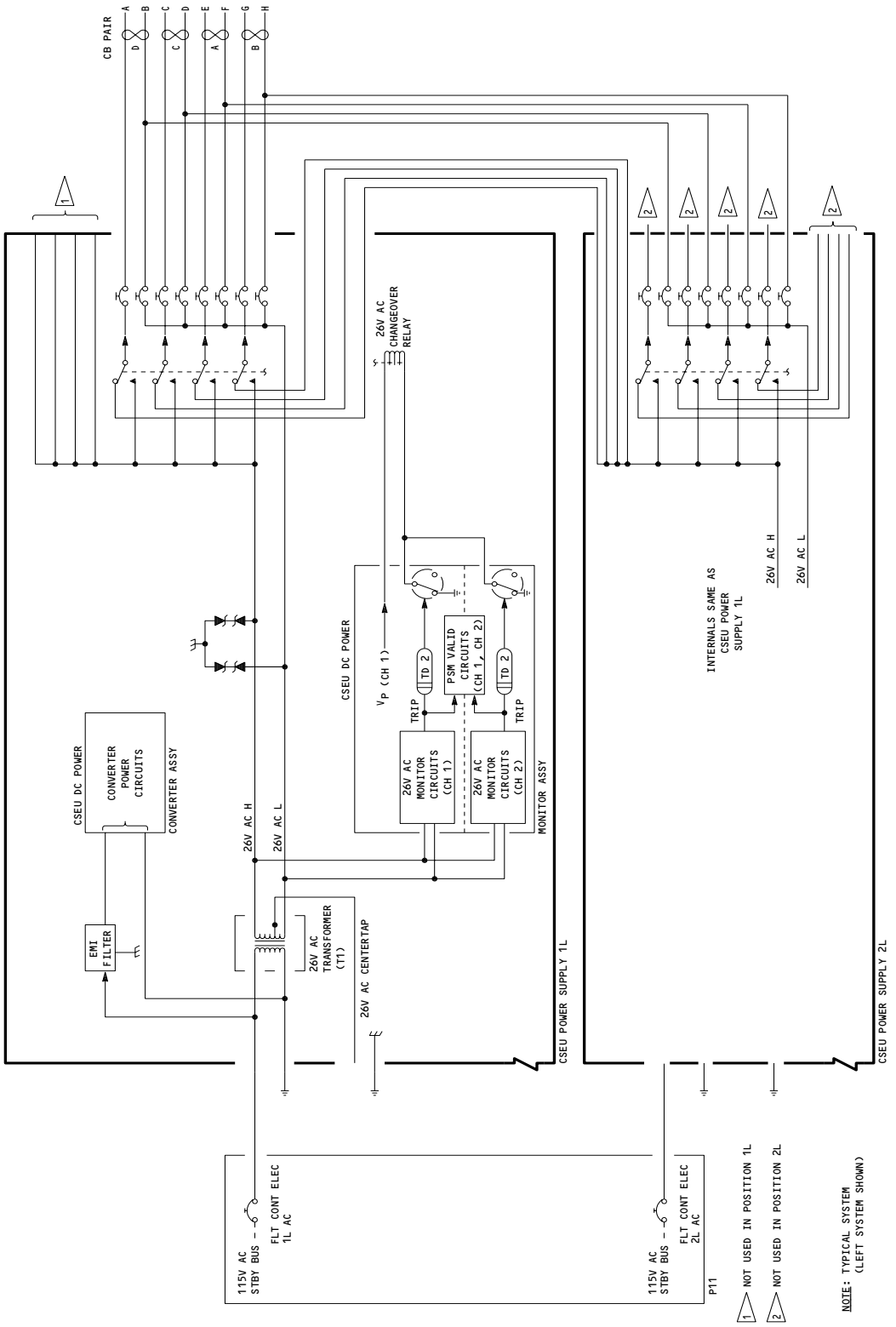
CSEU AC Power Schematic
Figure 4 (Sheet 1)

757843



NOTE: EXAMPLE SYSTEM (THE LEFT SYSTEM IS SHOWN)

CSEU AC Power Schematic
Figure 4 (Sheet 2)



CSEU AC Power Schematic
Figure 4 (Sheet 3)

(3) Power Supply Module (PSM)

(a) The PSMs are powered from the airplane 115v ac, 400-Hz power bus. PSM internal monitor circuitry can use either 115v AC or 28 volt DC power to see a module fault.

(b) The PSMs supply power to the following components:
1) Stabilizer Trim/Elevator Asymmetry Limit Module
2) Spoiler Control Module
3) Yaw Damper Module
4) Rudder Ratio Changer Module
5) Excitation for the above LRU LVDTs and RVDTs

(c) Each PSM provides the following outputs:
1) ±15v dc power distribution buses from six separate dc power regulators.
2) ±5v dc power distribution bus from a single +5v dc power regulator.
3) 26v ac power distribution.

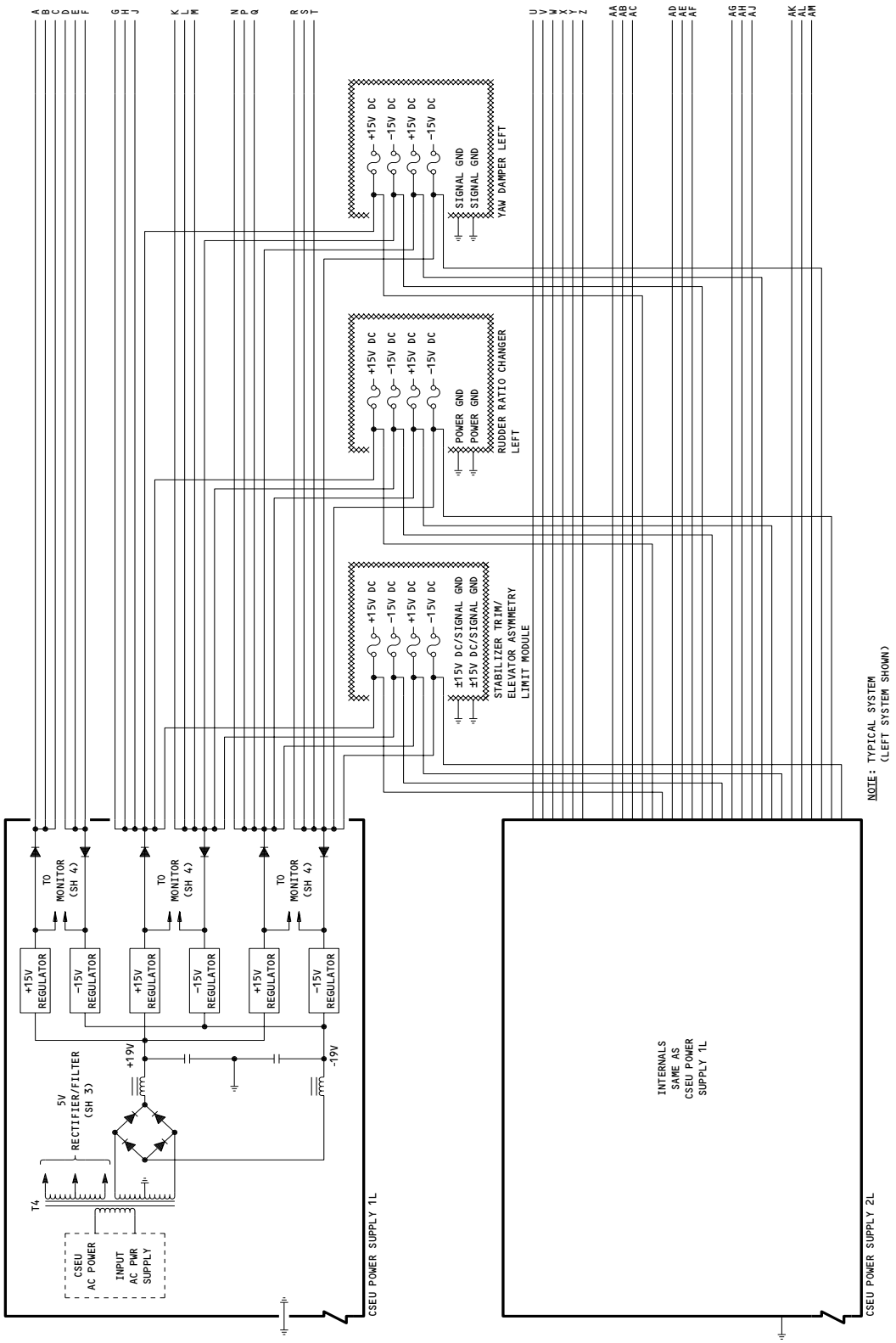
(d) DC power output lines from the PSM on the same shelf are connected inside each CSEU so that a loss of either PSM will not cause the loss of any CSEU.

(e) 26v ac output lines are connected to the change-over circuitry inside the two PSMs on the same shelf. If one PSM fails, the change over circuitry will switch over to the other PSM and continue to supply 26v ac to the CSEU.

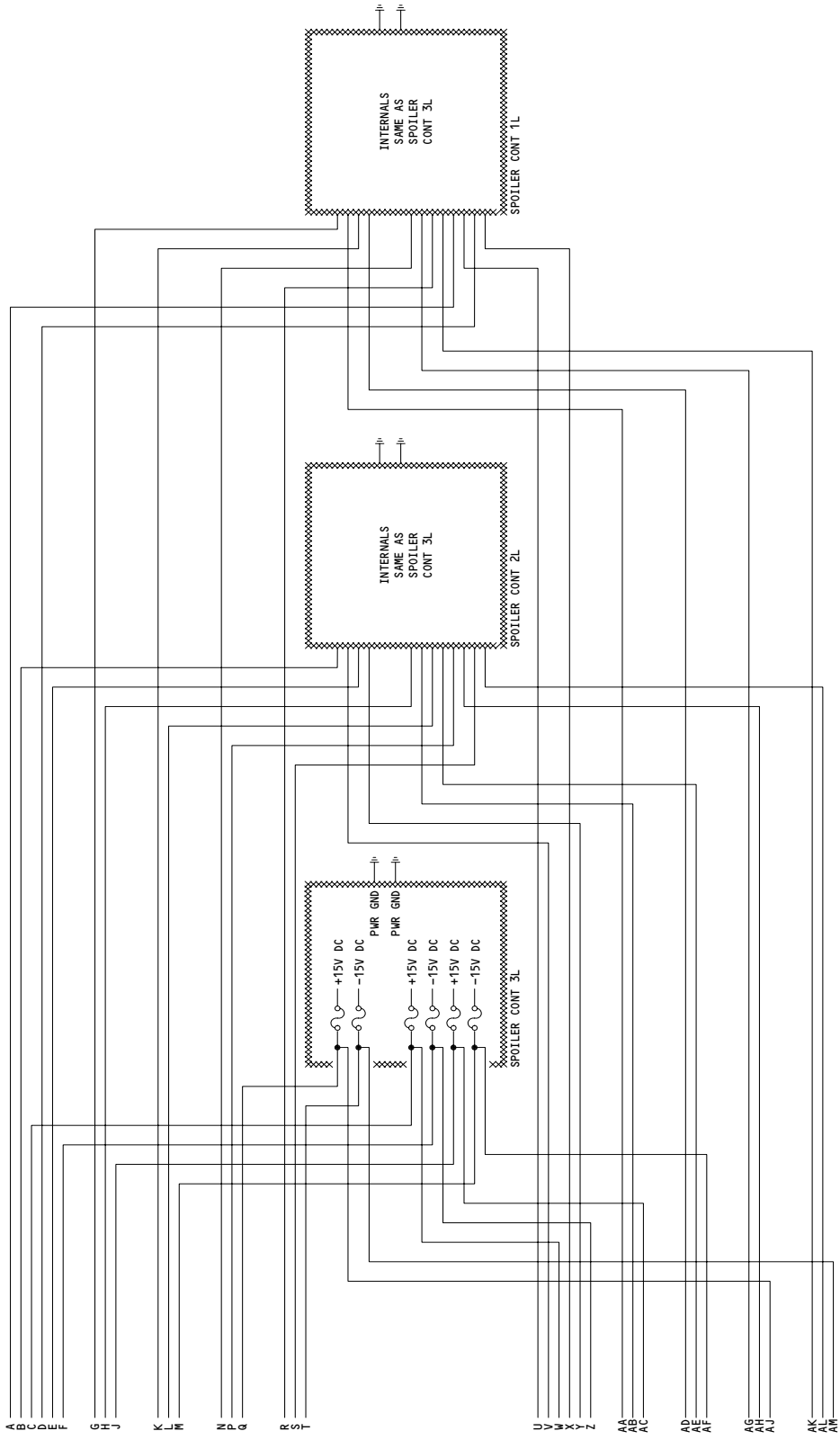
(f) Four ac power output lines from the PSM supply 26v AC to the demodulator circuits in the SCMs, the YDMs, and the RRCs. These lines also provide 26v AC excitation to the control wheel transducers (3), the speedbrake lever transducers (3), the spoiler power control actuators (6), the yaw damper servo (1), and the rudder ratio changer (1).

(g) Front panel mounted circuit breakers in each of the two sides of the 26v ac line protect the PSM from shorted components and help to troubleshoot these faults. But an open circuit breaker does not set the PSM MODULE faultball to yellow.

(h) Under normal conditions, the "A" subchannel of the SCM controls the spoiler panels. The 26v ac excitation voltage for the spoiler PCA RVDTs comes from the PSM circuit which supplies the SCMs "A" subchannel. If the SCM makes a "switch" decision, control of the spoiler panels and PCA excitation are switched to the "B" subchannel.

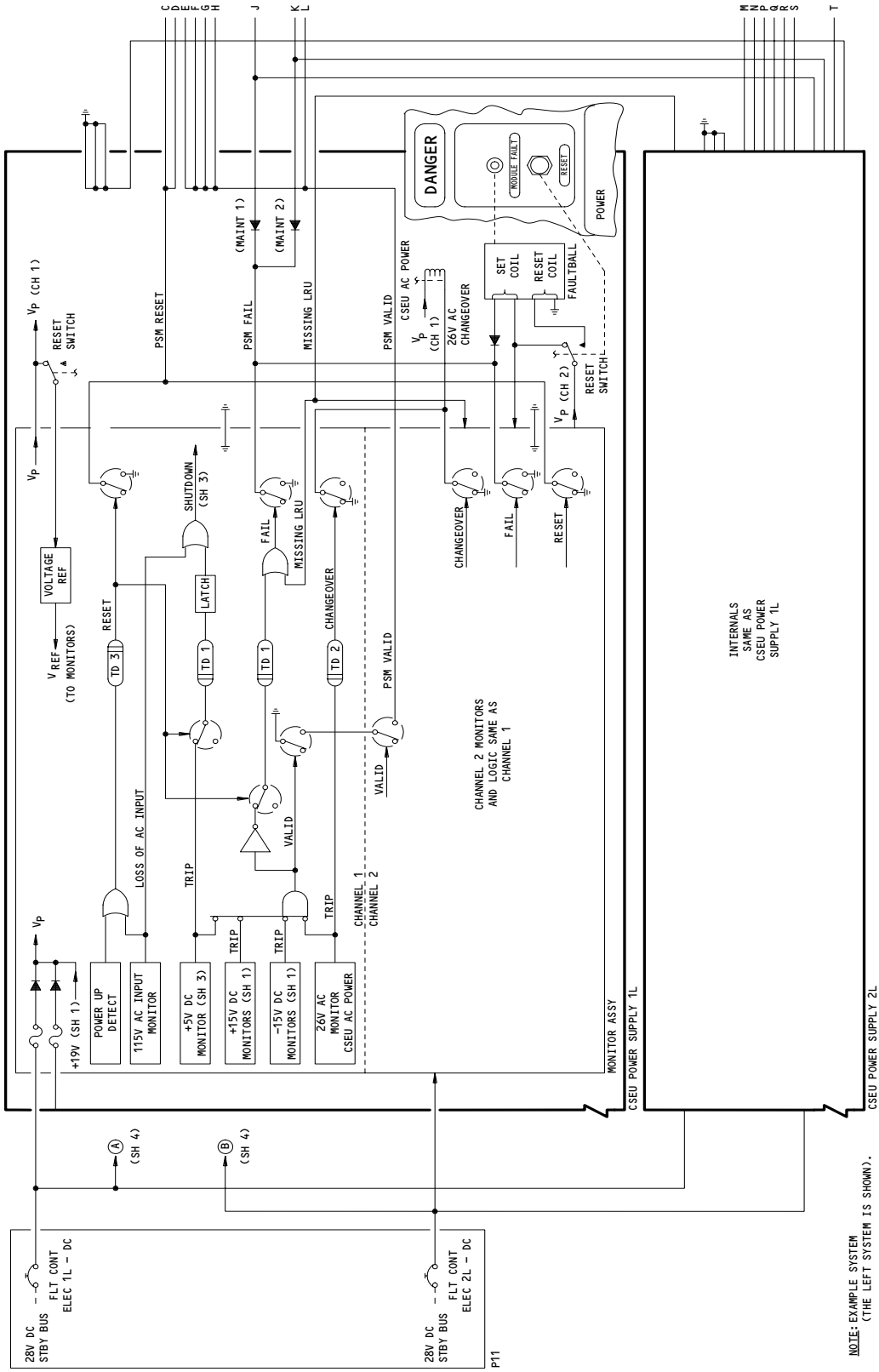


CSEU DC Power Schematic
Figure 5 (Sheet 1)

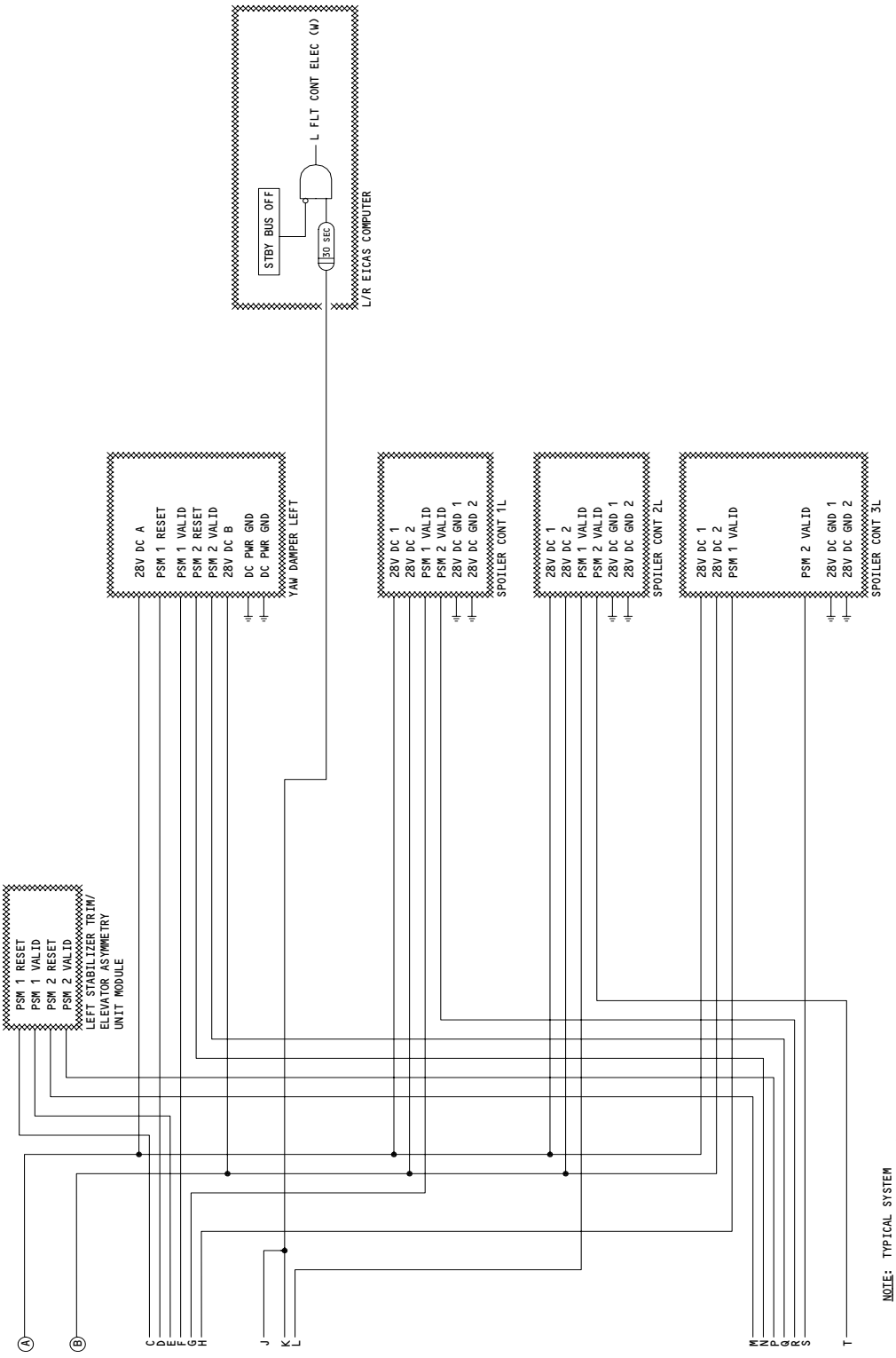


NOTE: EXAMPLE SYSTEM
(THE LEFT SYSTEM IS SHOWN)

CSEU DC Power Schematic
Figure 5 (Sheet 2)

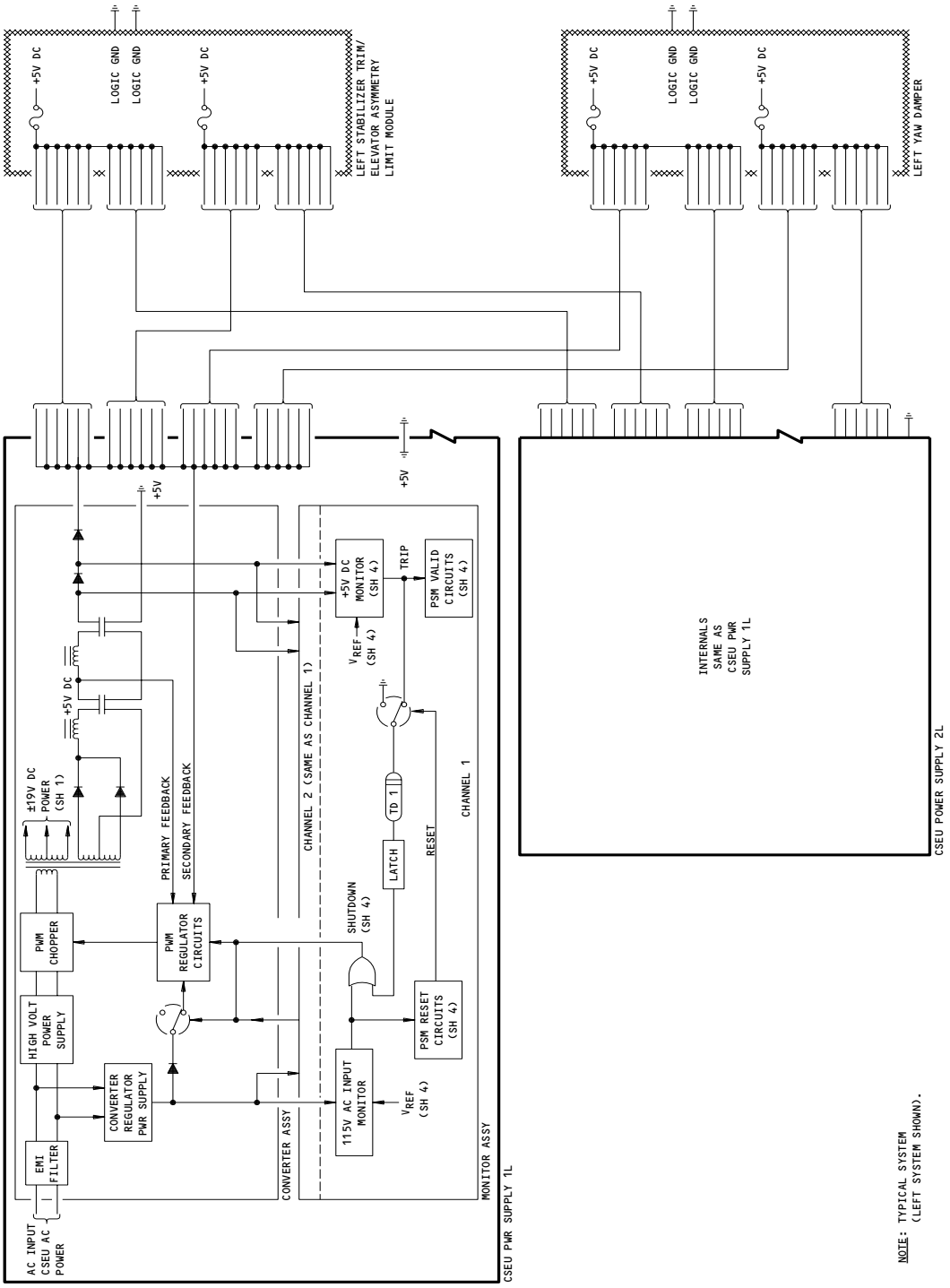


CSEU DC Power Schematic
Figure 5 (Sheet 3)



NOTE: TYPICAL SYSTEM
(LEFT SYSTEM SHOWN).

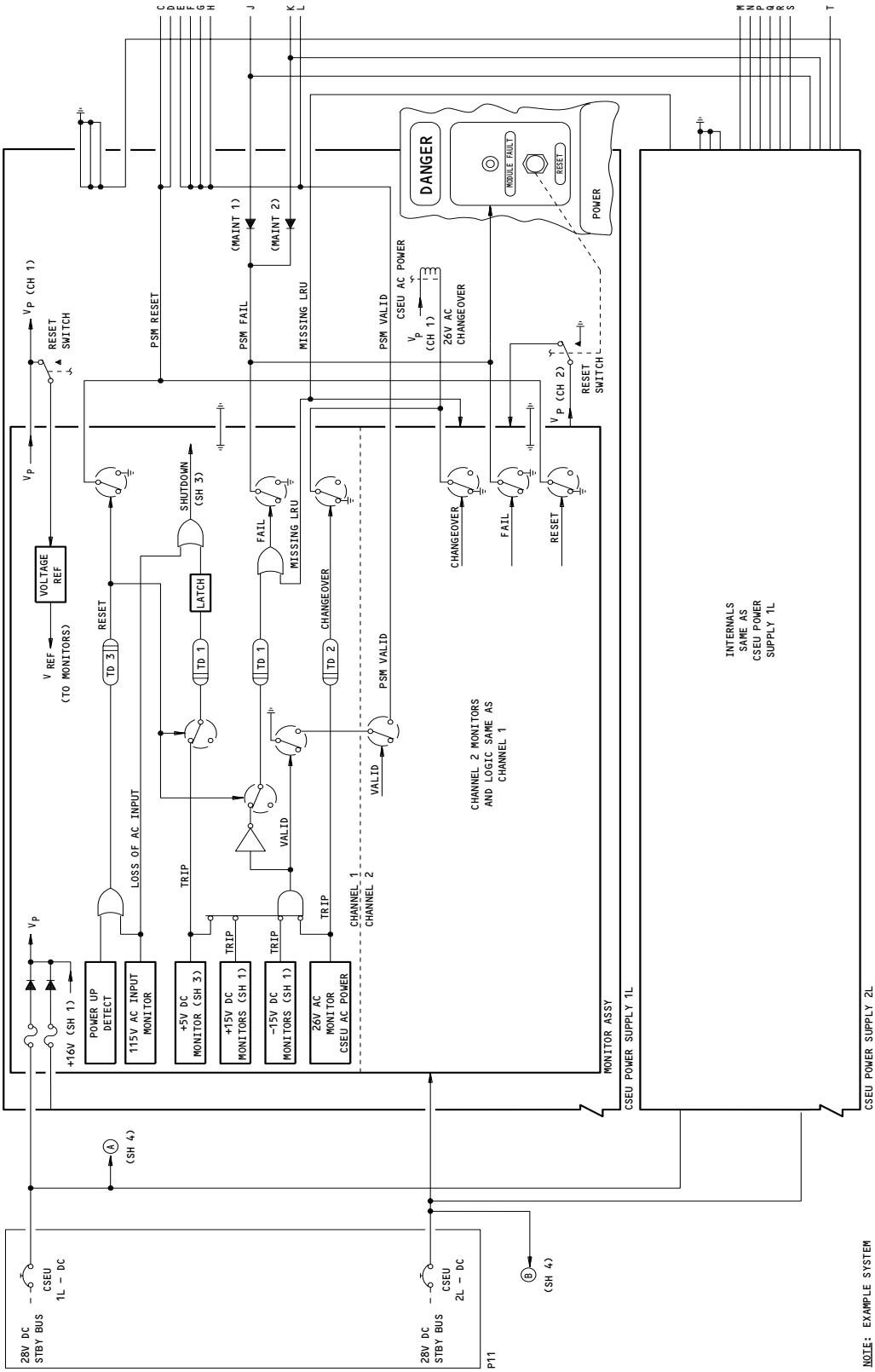
CSEU DC Power Schematic
Figure 5 (Sheet 4)



CSEU DC Power Schematic
Figure 5 (Sheet 5)

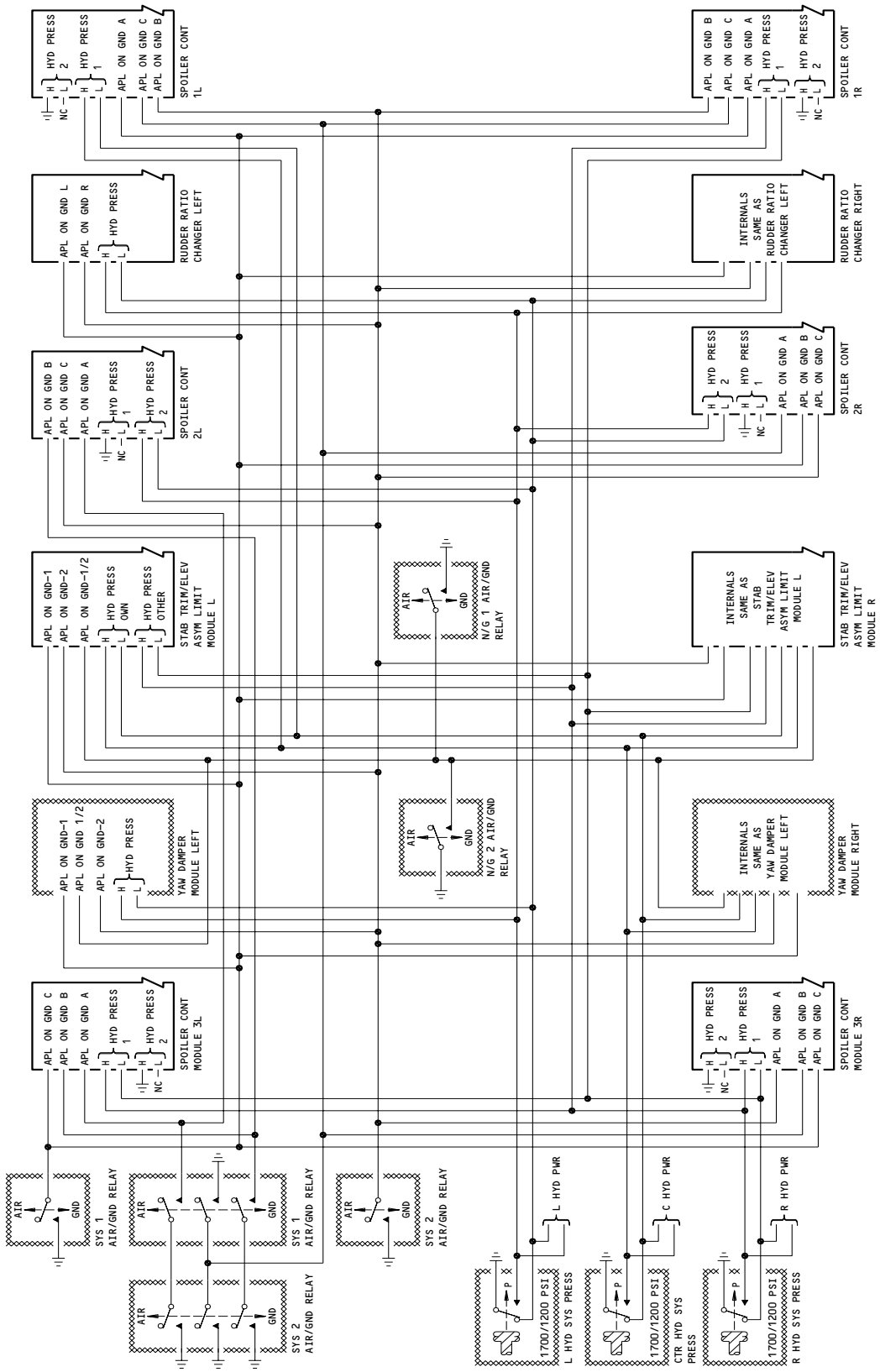
NOTE: TYPICAL SYSTEM
(LEFT SYSTEM SHOWN).

207350



CSEU DC Power Schematic
Figure 5 (Sheet 6)

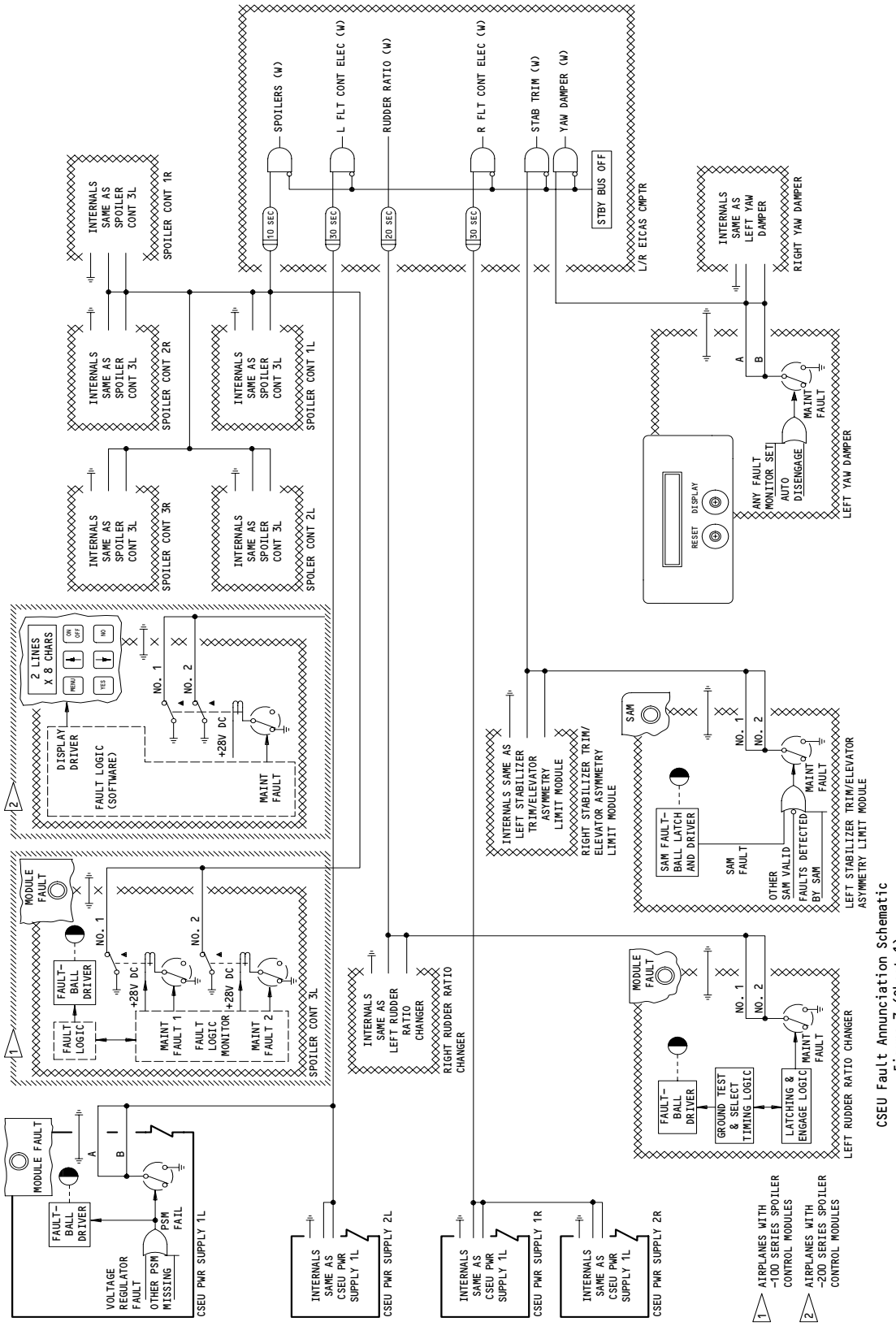
F09681



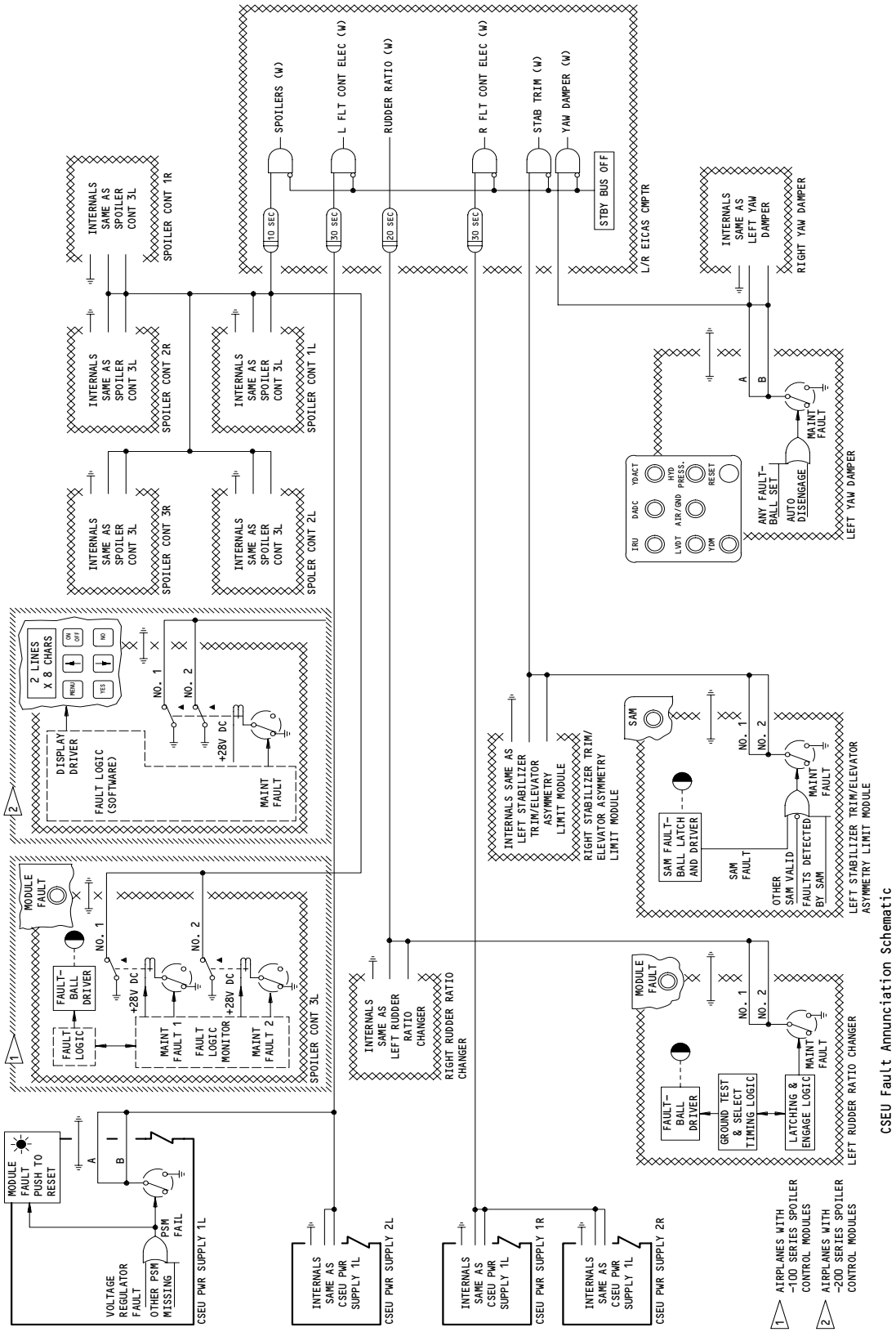
CSEU Air/Ground and Hydraulic Discrete Inputs
Figure 6

207359

(4) Stabilizer Trim/Elevator Asymmetry Limit Module (SAM)
  (a) The stabilizer trim system controls the airplane pitch axis during flight by up or down movement of the horizontal stabilizer leading edge. Movement up of the horizontal stabilizer will move the airplane nose down. Movement down of the horizontal stabilizer will move the airplane nose up.
  (b) The stabilizer trim system has these trim modes:
    1) Manual Electric Control Trim Mode - pilot command's to the control wheel trim the stabilizer manually.
    2) Alternate Manual Trim Mode - pilot command's to the center control stand trim the stabilizer manually.
    3) Auto Trim Mode - the autopilot flight control computers (FCC) trim the stabilizer automatically.
    4) Mach/Speed Trim Mode - the stabilizer is trimmed as the mach increases or at lower airspeeds when the flaps are down. The Mach/Speed Trim System is active when manual, electric, and automatic trim commands are not present.
  (c) Refer to 22-22-00 for more information on autotrim mode.
  (d) Refer to 22-24-00 for more information on mach/speed trim mode.
  (e) Manual electric control trim mode:
    1) In manual electric control trim mode, the stabilizer control is from the dual electric trim switches on the control wheels. When you push these switches up or down, you send commands to the two SAMs which then transmit the signals to the control and arm solenoid valves in the left and right STCM. When these valves operate, the hydraulic pressure is applied to release the secondary brake to the applicable hydraulic trim motor and drive the stabilizer jackscrew.
    2) The electric trim switches will send the necessary signals to the two SAMs to drive the stabilizer at the full rate. Stabilizer movement will continue until you release the switches, or until the electrical limit switches operate.
    3) Manual electric trim has priority over the other electric trim modes, except for the multichannel autoland mode (when the autoland mode is selected for two or three FCCs).
  (f) Alternate manual trim mode:
    1) The alternate manual trim mode is controlled by inputs to the alternate stab trim switches on the center control stand.
    2) These input commands bypass the SAM and send its trim command directly to the stabilizer trim control module (STCM). Refer to 27-41-05/201 for more information on the STCM.
(5) CSEU fault annunciation (Fig. 7).
  (a) Fault monitor circuits monitor electrical networks and supply fault annunciation and warning of failures in each CSEU module. The fault annunciations are the applicable amber lights on pilots' overhead panels, P5.



CSEU Fault Annunciation Schematic
Figure 7 (Sheet 1)



CSEU Fault Annunciation Schematic
Figure 7 (Sheet 2)

F09711

(b) The Engine Indication and Crew Alerting System (EICAS) display on pilots' center instrument panel supplies the EICAS messages via the EICAS computers. The applicable module faultballs on the face of the module or the applicable fault indications in the module memory also latch.
1) A minor maintenance failure, such as a PSM FAIL discrete, or a first failure of any monitored function in either CSEU, supplies a CSEU failure signal to the EICAS display through the EICAS computers.
2) Maintenance messages appear on the display when the ECS/MSG button on the EICAS maintenance panel (located on side panel P61 in flight deck) is selected.
3) A more serious failure, such as the double failure of a redundant module (SAM or RRC), or the failure of an output device that makes crew awareness and possible corrective action necessary, makes the appropriate amber light come on, on the P5 panel.

B. CSEU BITE (Fig. 7)
(1) Each CSEU module faceplate contains faultballs or fault lights (or a BITE display) as part of the continuous BITE monitor function to identify the faults down to the LRU level, which includes the intermittent faults, within its system.
(2) Faultballs, when unlatched, show the color black for normal system operation, and show yellow (when latched) for a fault indication. When you push the maintenance reset button, you clear (unlatch) the faultball unless the fault is still present.
(3) The faultballs, EICAS messages (maintenance, status, advisory or caution), and amber lights operate in combinations to indicate failures.
(4) A module fault on a PSM or a RRC latches the MODULE FAULT indication.
(5) A module fault on a -100 series SCM also latches the MODULE FAULT faultball. A module fault on a -200 series SCM latches a SCM FAULT message into the EXISTING FAULTS memory.
(6) A module fault on the YDM causes a YDM fault message to be recorded.
(7) In addition to faultballs for fault indication, the RRC module contains a BITE test switch. By placing the switch from NORMAL to TEST, hydraulic power is applied to extend the RRC actuator in 15 seconds. The IN TEST light on the module comes on and stays on for 15 seconds. The TEST FAIL faultball latches if the test fails.
(8) Power Supply Module (PSM)
(a) All PSM outputs are continuously monitored. When 115v AC is applied and an output is out of tolerance, its monitor will set the fault on the PSM and enable the EICAS message L(R) FLT CONT ELEC.
(b) In a CSEU shelf, removal of either PSM also activates the EICAS message L(R) FLT CONT ELEC and sets the MODULE fault on the installed PSM.
(c) After power up, the PSM will continuously monitor its outputs for power failures.

(d) For a +5v dc output power loss the internal monitor circuitry will shut down the module, set PSM "MODULE" fault, and enable L(R) FLT CONT ELEC message on EICAS.
(e) For a ±15v dc output power loss the internal monitor circuitry will set PSM "MODULE" fault, and enable L(R) FLT CONT ELEC message on EICAS.
(f) For a 26v ac output power loss the internal monitor circuitry will transfer control to standby module, set PSM "MODULE" fault, and enable L(R) FLT CONT ELEC message on EICAS.
(g) Pushing the reset button on the PSM front panel will reset the monitor circuits and the MODULE fault.

(9) Stabilizer Trim/Elevator Asymmetry Limit Module (SAM)
(a) The SAMs continuous built-in test equipment (BITE) monitors enable it to detect abnormal conditions and set the applicable faultball, STAB TRIM message, and light indicator. These eleven faultballs are used to identify internal faults and interfacing line replaceable units (LRU) faults:
1) SAM
a) The SAM faultball is set when the SAMs arm, or when the control channels disagree, or when the internal control processing unit fails. The SAM faultball is reset by the RESET switch, and will remain reset if there are no faults.
b) When the SAM faultball is set, the other faultballs and fault annunciations are inhibited.
c) A SAM fault inhibits these modes:

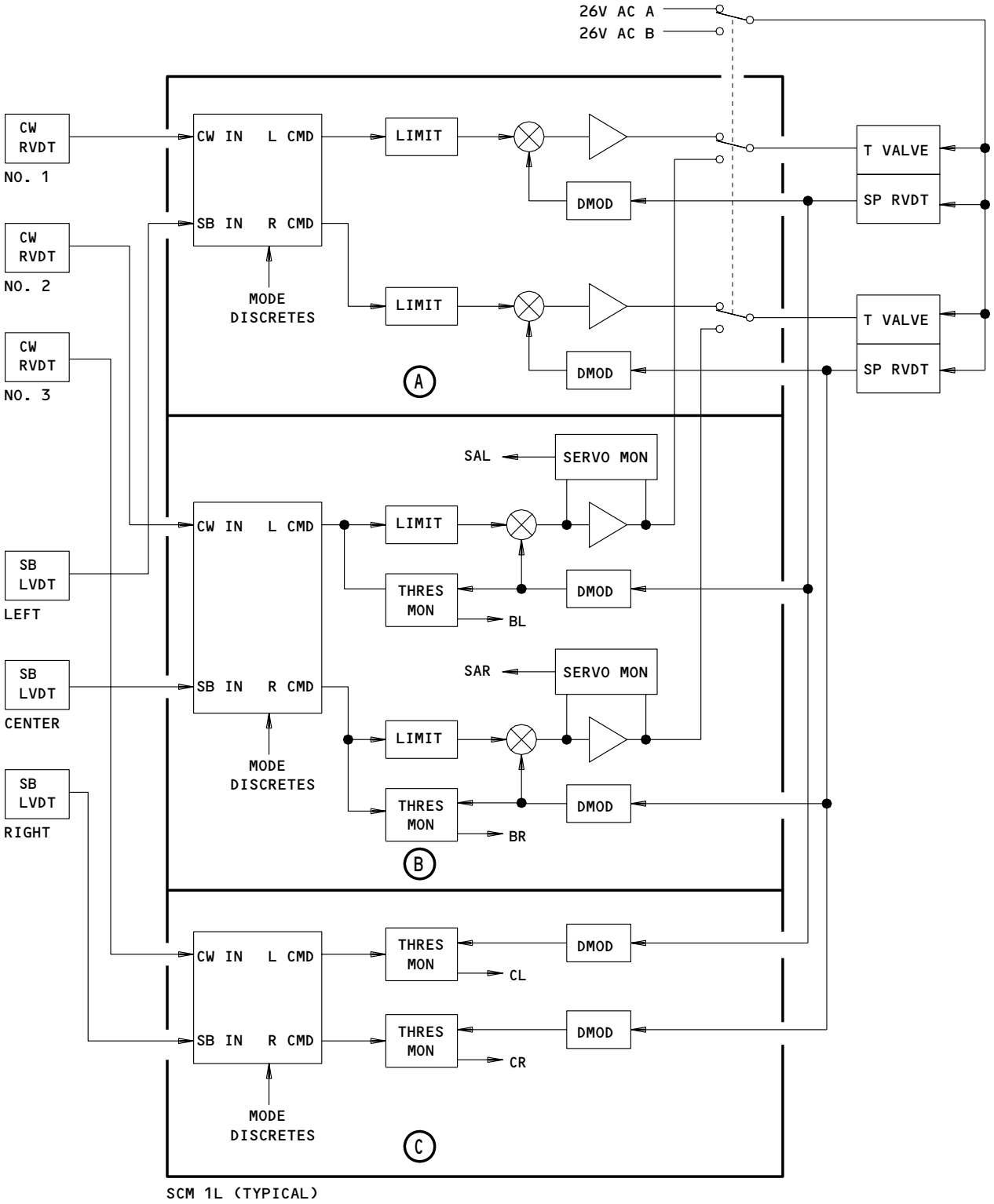
Autotrim
Mach/Speed Trim
Aileron Lockout
Rudder Ratio Changer
Elevator Asymmetry Limit

2) FCC
a) The FCC faultball is set by the SAMs FCC input monitors. The left SAM monitors inputs from left and center FCCs and the right SAM monitors inputs from right and center FCCs. FCC fault is cleared on the ground if valid FCC data is received. FCC faults are cleared in air if valid FCC data is received for two seconds.
3) ADC
a) The ADC faultball is set if the primary or secondary computed mach number or computed airspeed from the ADC's disagree. ADC fault is cleared on the ground if valid ADC data is received. In the air mode, valid ADC data received for at least 30 seconds will clear the ADC fault.

4) COL TRIM SW
   a) The COL TRIM SW faultball is set when the input coincidence monitor detects a fault in the thumb switch inputs.
5) MAN LEVER SW
   a) The MAN LEVER SW faultball is set when its input monitor detects a fault in the manual input controls on the center control stand for the alternate manual trim mode. If the control is closed, or the control is out of detent for longer than 30 seconds, and the hydraulic pressure is high on either system the MAN LEVER SW faultball will be set. This faultball can be cleared by the RESET switch.
6) HYD PRESS SW
   a) The HYD PRESS SW faultball is set when the hydraulic low discrete and the hydraulic high discrete from the electric hydraulic pump pressure switch are in the same state (both high or low). This faultball can be cleared by pressing the RESET switch.
7) STCM
   a) STCM faultball is set when the STCM secondary brake released (brake pressure switch S1 closed) for two seconds without a valid trim command or when the secondary brake is not released (brake pressure switch S1 opened) within two seconds of a valid trim command. STCM monitor is disabled during standby manual trim or column manual trim commands.
8) SPM
   a) SPM faultball is set if the stabilizer position signal input exceeds the nose up stabilizer travel limit or an open circuit occurs for longer than 1.5 seconds.
   b) Faultball can be reset by pushing the RESET switch. On ground, SPM faultball will clear immediately if valid data is received.
9) AIR/GND
   a) AIR/GND faultball is set by a comparison disagreement of the three air/ground inputs to the SAM. Faultball will autoreset with a GND/AIR or AIR/GND transition.
10) FSEU
   a) FSEU faultball is set when a disagreement exists between the three flaps position inputs from the flap slat electronic units (FSEU).
   b) FSEU faultball may be cleared by cycling the flaps (extend-retract-extend or retract-extend-retract).
11) ELEV ASY L ACT
   a) ELEV ASY L ACT faultball is set by an elevator asymmetry limiter fault. The faultball is set if a disagreement between commanded and actual position exists for 9 seconds or if the actuator feedback signal shows both extended and retracted conditions at the same time.

(b) When any SAM's faultball is set, a white STAB TRIM message is also displayed on EICAS.
1) Pressing the RESET switch on the front panel of the SAM clears all faultballs unless fault is still present.
(c) The amber STAB TRIM message and light indicator are set when the SAM detects a half rate trim during electric trim mode or only one of the STCM secondary brakes is released after received manual electric trim command.
(d) The UNSCD STAB TRIM message on EICAS and light indicator are illuminated when the SAM unscheduled trim monitor detects that the stabilizer moves more than 0.3 degrees in either direction without a valid SAM trim command in the appropriate direction.

(10) Fault Indications on the Spoiler Control Module (SCM)
(a) Fault Isolation in the SCM
1) The redundancy management function of the SCM checks the circuitry and input signals for possible fault conditions. It issues "switch" or "switch inhibit" actions as required to maintain system operation and to determine first or second fault status. This circuitry also generates applicable panel light and/or EICAS indications and sends fault data to the maintenance monitor.
2) AIRPLANES WITH -100 SERIES SCMs;
The maintenance monitor determines which units are at fault (RVDT, LVDT, PCA, or SCM), and sets the appropriate faultballs on the SCM front panel.
3) AIRPLANES WITH -200 SERIES SCMs;
The maintenance monitor detects faults and records the applicable fault message into memory. To identify the defective airplane components, you must operate the BITE display on the SCM front panel to show the fault messages and fault details (Figs. 12, 13). See the SCM front panel for the other items available with the BITE display.
4) Figure 8 is a block diagram of the SCM showing inputs from the control wheel RVDTs and the speed brake LVDTs to each of the three subchannels: active (A), standby (B), and model (C). Subchannel A normally drives the spoiler PCAs. Feedback from the PCA is used for nulling the command signal and is also fed to the threshold monitors in the B and C subchannels for comparison with the command signals. The servo amplifiers in subchannel B are also monitored.
5) Redundancy management first checks the servo amplifiers in subchannel B (SAL and SAR). A bad amplifier results in a "switch inhibit" decision since the standby subchannel is inoperative. If the servos check good, the command signals in subchannels B and C are compared with the PCA feedback signals in the threshold monitors (BR, BL, CR, and CL).
6) A fault detected in either B or C results in a "switch inhibit" condition. Faults in both B and C subchannels will result in a "switch" decision. In either case, the decision constitutes a "first fault" and generates a SPOILERS message on the EICAS maintenance page.



Redundancy Management Schematic
Figure 8

7) AIRPLANES WITH -100 SERIES SCMs;
If the detected fault is caused by a bad transducer (input or feedback), the maintenance monitor will determine which transducer is bad. If no fault is detected in the transducers, the fault is in the module itself. Timing for the fault logic is given below:

T0 = 0.0 sec: Starts at the leading edge of the failure logic (SAL+SAR+BL+CL+CR) of the B or C subchannel.

T1 = 0.4 sec: A "switch" or "switch inhibit" decision is made. If "switch inhibit", the maintenance monitor checks for SB or CW transducer failures.

T2 = 1.4 sec: Gives the spoiler panel time to move to the commanded position after a channel switch. If the fault does not clear, a PCA fault-ball is set. If it does clear, a different applicable faultball will be set (SB or CW XDCR or MODULE FAULT).

8) AIRPLANES WITH -200 SERIES SCMs;
If the detected fault is caused by one of the inputs to the SCM, a fault message for the input will be stored in the SCM memory. If no input fault is detected, then either the PCA or the SCM module is defective. Timing for the fault logic is given below:

T0 = 0.0 sec: Starts at the leading edge of the failure logic (SAL+SAR+BL+CL+CR) of the B or C subchannel.

T1 = 0.4 sec: A "switch" or "switch inhibit" decision is made.

T2 = 1.4 sec: If a "switch inhibit" decision was made at time T1, a module fault is set. If a "switch" decision was made at time T1 and the spoiler panel does not move to the commanded position, a PCA fault is set.

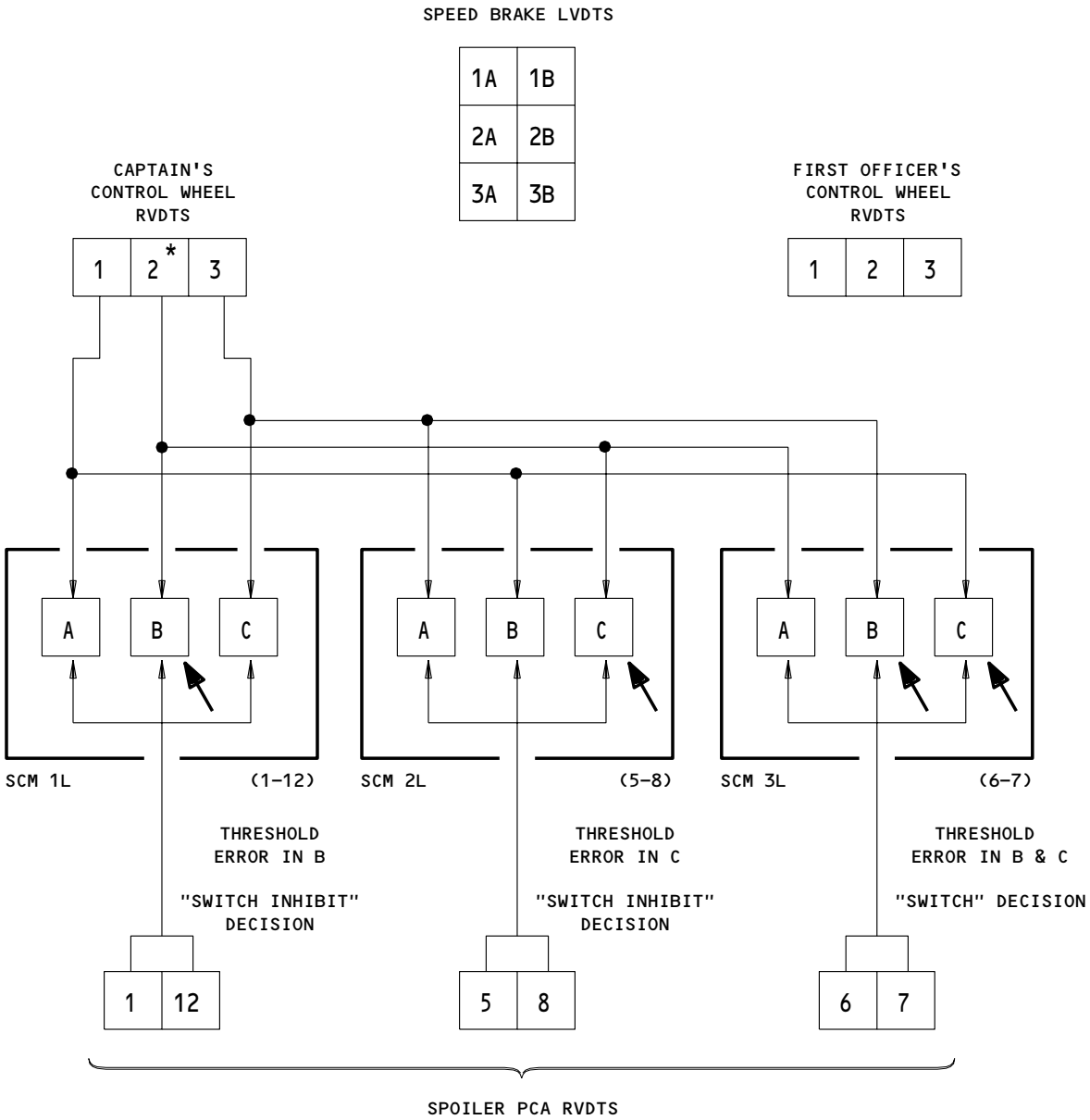
9) An explanation of how the redundancy management and the maintenance monitor work will be discussed below using the captain's inputs and a failure of control wheel RVDT #2.

(b) Redundancy Management

1) The captain's control wheel RVDTs 1, 2, and 3 are connected to the active (A), standby (B), and model (C) subchannels in each of the SCMs in the left CSEU as shown in Fig. 9. The captain's speed brake lever LVDTs 1A, 2A, and 3A are connected in a similar arrangement. The first officer's inputs are connected to the SCMs in the right CSEU using the same pattern. In this example, all subchannel B servo amplifiers are assumed to check good. Captain's control wheel RVDT #2 is bad.
2) In SCM 1L, the threshold monitor of subchannel B detects a difference in the command from RVDT #2 and the feedback from the spoiler PCA which has been driven to the correct position by subchannel A (i.e., RVDT #1). Thus a "switch inhibit" decision is made by redundancy management. Spoiler control remains with subchannel A.
3) In SCM 2L, the model subchannel, C, receives the bad signal from RVDT #2 and so an error is detected between it and the PCA feedback. A "switch inhibit" decision is made here, also.
4) Module 3L has the bad RVDT #2 signal applied to the active subchannel, A, which drives the spoiler panels to the wrong position. The threshold monitors in both subchannels B and C detect errors between their (good) commands and the (bad) feedback signal. These dual errors result in a "switch" decision by redundancy management. Control of the spoiler panels is switched to subchannel B.
5) At this point, the faulty RVDT has not yet been determined. The threshold monitors only detect a difference in the command and feedback signals. They cannot determine which is in error. That is left to the maintenance monitor.

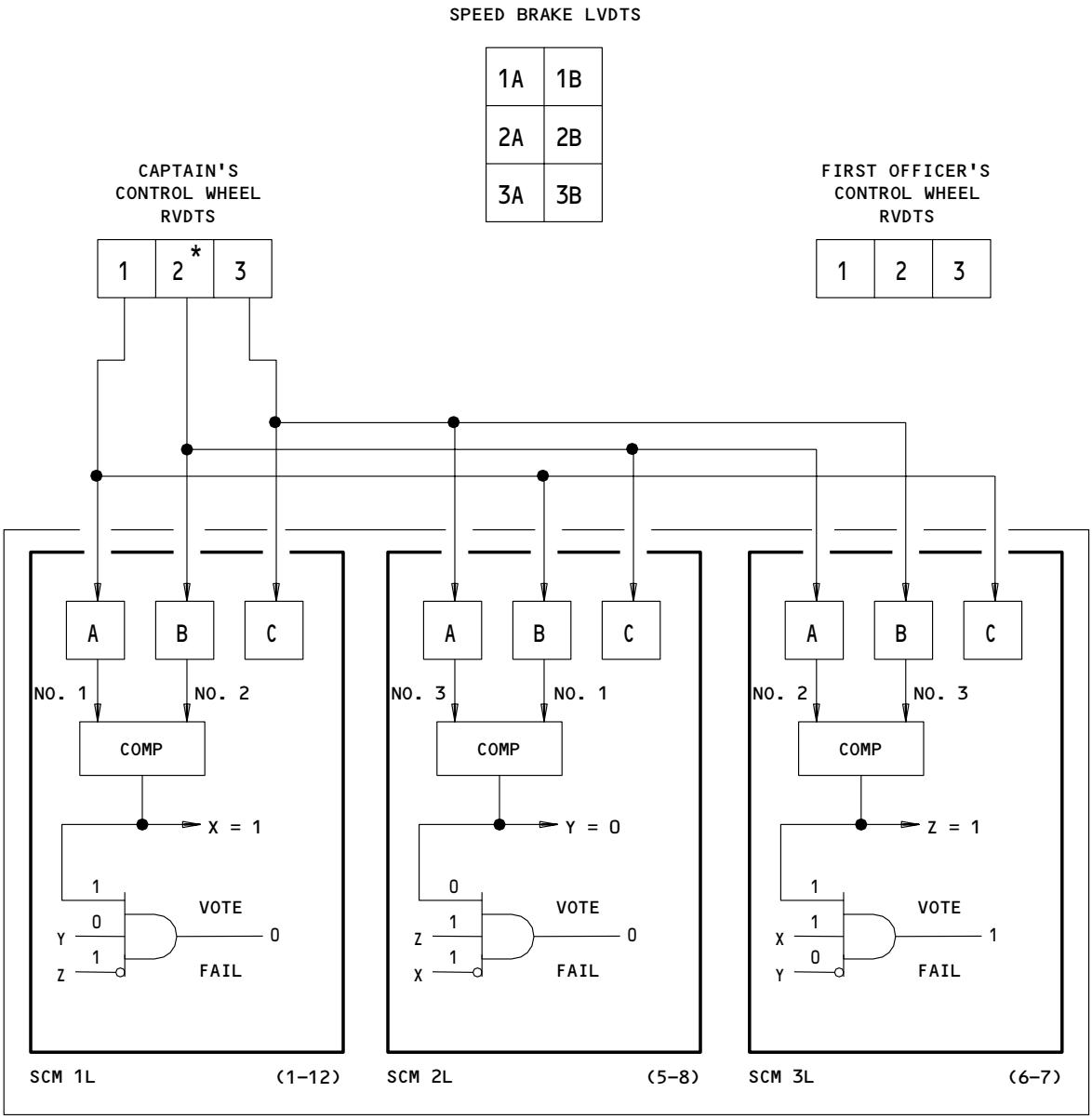
(c) AIRPLANES WITH -100 SERIES SCMs;
Maintenance Monitor

1) The maintenance monitor uses a comparator circuit for transducer inputs to the A and B subchannels of the SCM and a voting logic circuit which uses inputs from all three SCM comparator circuits to determine which transducer is at fault. Identical circuits monitor the RVDTs and the LVDTs (Fig. 10).



* = BAD RVDT
A = ACTIVE SUB–CHANNEL
B = STANDBY SUB–CHANNEL
C = MODEL SUB–CHANNEL
= SUB–CHANNEL DETECTING ERROR

Redundancy Management
Figure 9



CSEU-L (TYPICAL)

* = BAD RVDT

A = ACTIVE SUB-CHANNEL

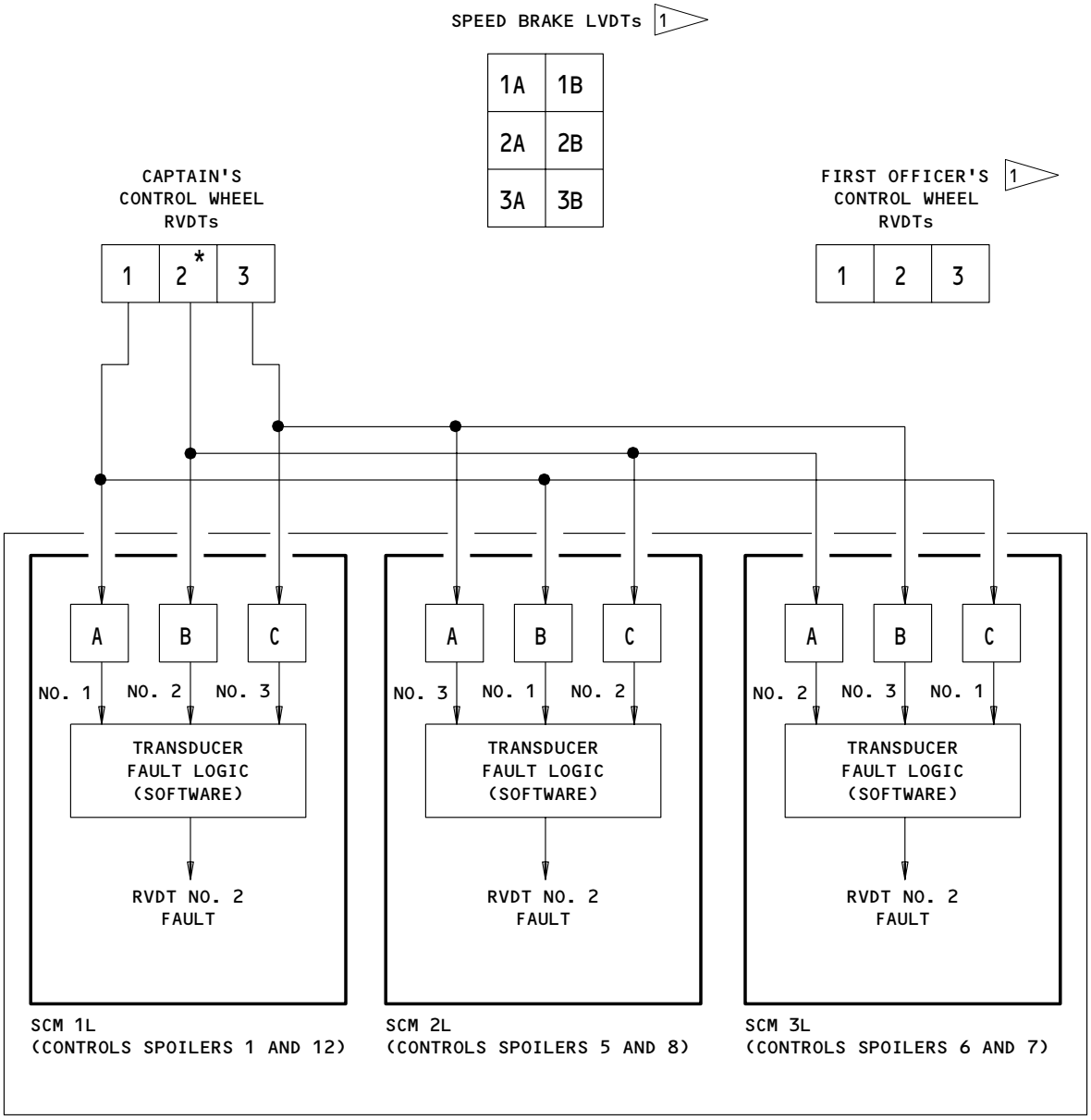
B = STANDBY SUB-CHANNEL

C = MODEL SUB-CHANNEL

NOTE:
COMPARATOR OUTPUT = 1 IF INPUTS DISAGREE

Maintenance Monitor Transducer Failure Detection
Figure 10

334634



CSEU–L (EXAMPLE)

* = BAD RVDT

A = ACTIVE SUB–CHANNEL

B = STANDBY SUB–CHANNEL

C = MODEL SUB–CHANNEL

1 THESE COMPONENTS HAVE EQUIVALENT CIRCUIT CONNECTIONS TO THE SCMs AS THE CAPTAIN'S CONTROL WHEEL RVDTs

Maintenance Monitor Transducer Failure Detection
Figure 10A

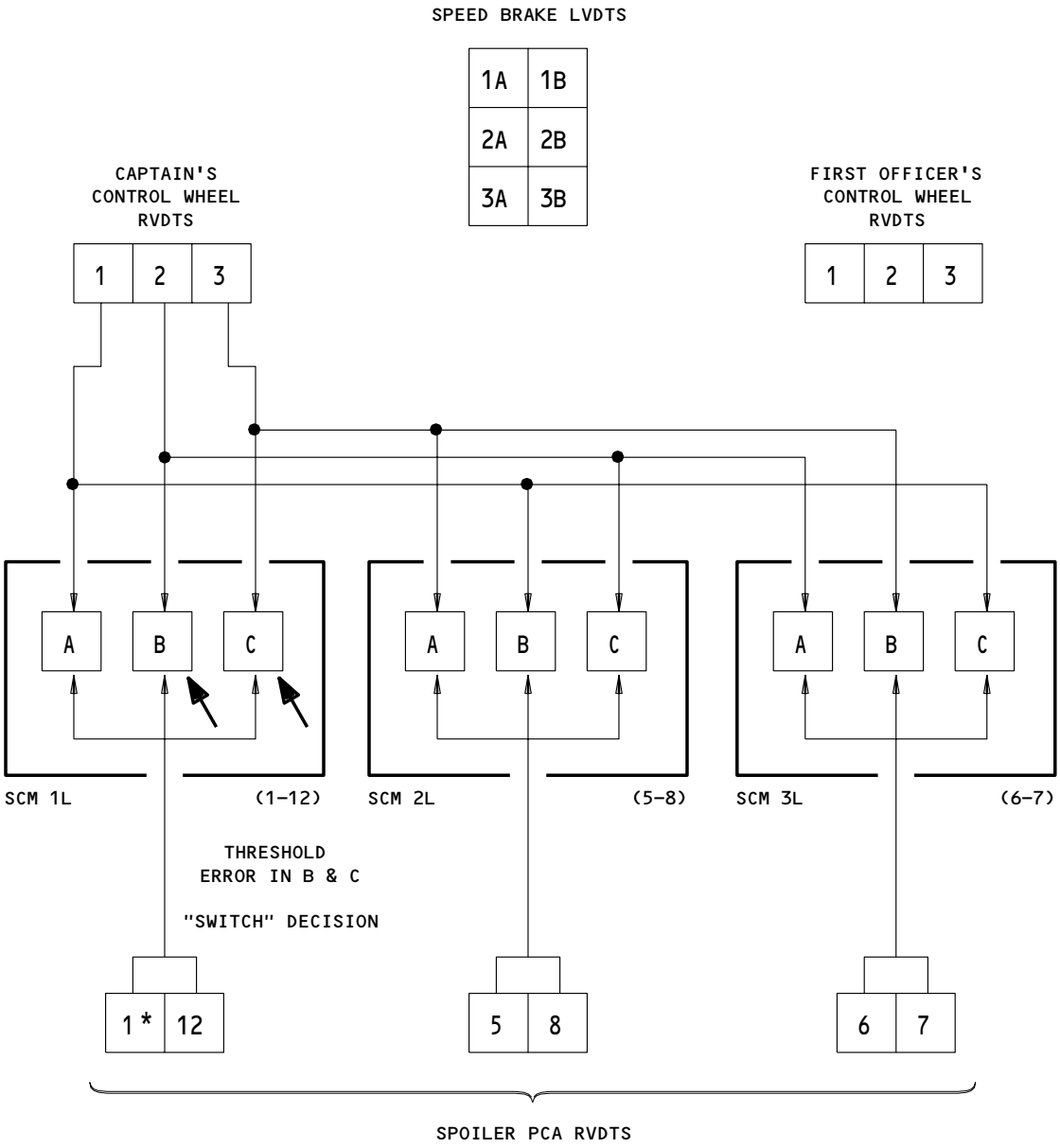
A13395

2) The comparator produces a logic one if the two inputs disagree and a logic zero if they agree. Output (X, Y, and Z in Fig. 10) is fed to all three SCMs. In the example above, SCM 1L compares RVDTs #1 and #2 which produces a logic one at X since the two signals disagree. SCM 2L compares RVDTs #1 and #3. Since both agree, the comparator outputs a logic zero at Y. SCM 3L, comparing RVDTs #2 and #3, produces a logic one at Z since the two do not agree.
3) The required input for the voting logic is 1-1-0 on the three leads to the AND gate. The logic used to set the faultball is a VOTE FAIL and a "switch" decision. This condition is met, in the example, only in SCM 3L. Therefore, the RVDT faultball (CW XDCR) is set on this SCM.
4) The faultball will always be set on the SCM whose active subchannel, A, is receiving input from the faulty transducer (RVDT or LVDT). Table 1 identifies which control wheel or speedbrake lever transducer is at fault when a given faultball is set.

Table 1: Control Wheel and Speedbrake Lever Faultballs

SCM With XDCR Faultball Set	Faulty Transducer CW RVDT	SB LVDT
1L	1 (Capt)	Left
2L	3 (Capt)	Right
3L	2 (Capt)	Center
1R	1 (F/O)	Left
2R	3 (F/O)	Right
3R	2 (F/O)	Center

5) Spoiler PCA feedback RVDT faults require an additional step for detection (Fig. 11). The threshold monitor detects a difference between the command and feedback signals and causes a "switch" decision. This is because both B and C subchannels detect errors.
6) After the subchannels have been switched, the PCA will receive a signal from a different RVDT. If either the control wheel transducer or the speedbrake lever transducer were at fault, the threshold error would go away after the changeover, and the applicable XDCR faultball would be set.
7) If the fault does not go away within 1.4 seconds of the changeover, the PCA is at fault. The PCA faultball will be set on the SCM which made the "switch" decision. There is no way to tell if the faultball is set from a defective PCA on the right or the left wing.
8) The module faultball indicates a problem with the SCM itself and can be set in one of three ways:
   a) When there is a fault detected in either subchannel B or subchannel C, but not both (a "switch inhibit" decision), no other faults have been detected, and time T1 (0.4 sec) has elapsed,



* = BAD RVDT
A = ACTIVE SUB–CHANNEL
B = STANDBY SUB–CHANNEL
C = MODEL SUB–CHANNEL
= SUB–CHANNEL DETECTING ERROR

PCA RVDT Failure Detection
Figure 11

b) When there is a fault detected in B and C subchannels (i.e., a "switch" decision), no other faults have been detected, and time T2 (1.4 sec) has elapsed; and

c) When an RVDT or LVDT fault is indicated by the comparator circuit and a "switch inhibit" decision has been made (fault in B or C but not both).

9) Pushing the RESET button on the SCM front panel clears any faultballs which are set. If fault still exists, faultballs will set again when the RESET button is released.

(d) AIRPLANES WITH -200 SERIES SCMs;
Maintenance Monitor

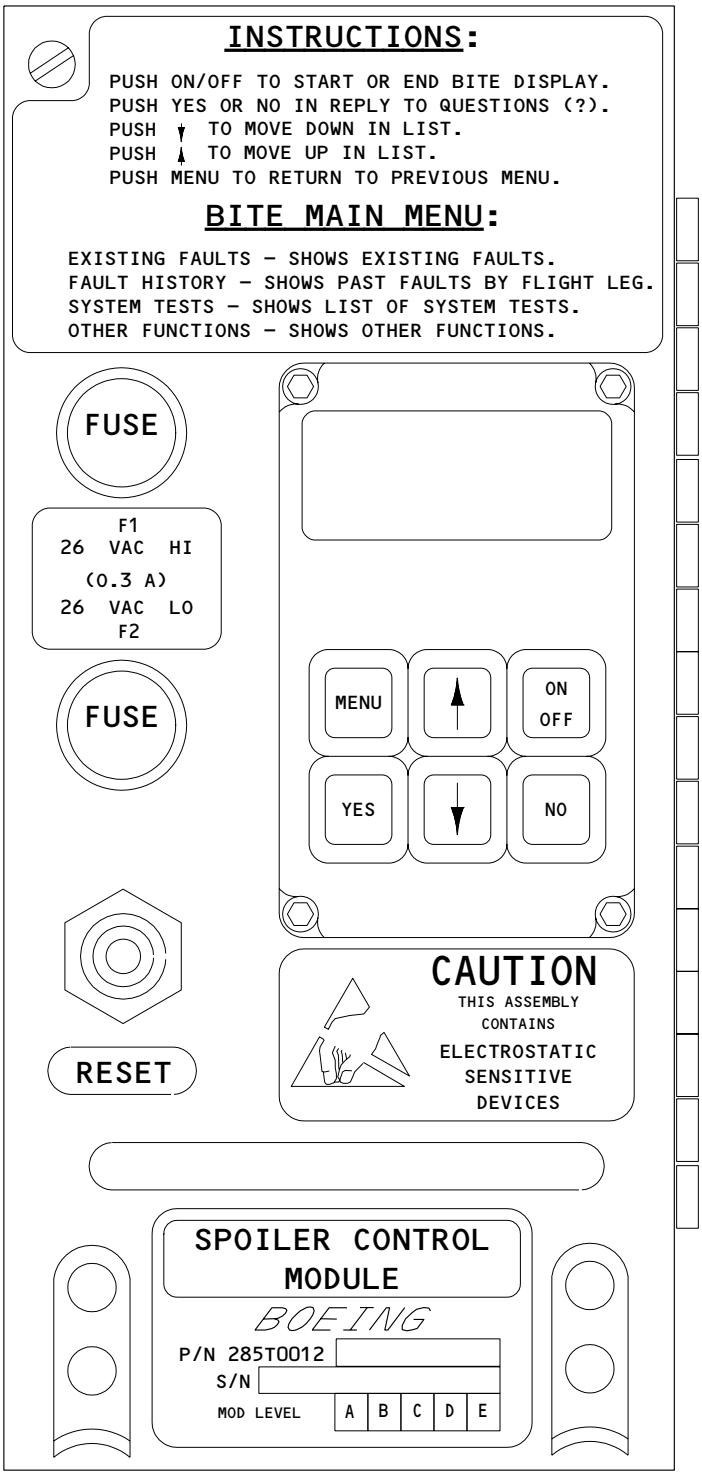
1) The maintenance monitor reads and compares the three input signals from the captain's control wheel transducers. If one input signal does not agree with the other two signals, the maintenance monitor moves the control away from the defective transducer (Fig. 10A). A CW RVDT FAULT message and fault details are stored in the existing fault memory to identify the defective control wheel RVDT unit (Fig. 13).

(11) AIRPLANES WITH -100 SERIES SCMs;
Fault Logic Anomalies

(a) The faultball logic is designed to indicate failures of the units they address. Other failures, however, can cause faultballs to set. Module faultballs can be set by a fault in the Air/Ground system itself or in any of the individual relays that provide air/ground discretes to the SCM. Truck tilt switch failures can also set SCM module faultballs. Breaks in the wiring between any of the transducers (LVDTs and RVDTs) and the SCM can cause module faultballs to set. These problems are addressed in the Control System Electronics Unit Fault Isolation, 27-09-00-1.

C. Control

(1) The CSEU module operates automatically whenever it is powered; it has no operating controls or adjustments.



Spoiler Control Module (-200 Series) With BITE Display
Figure 12

FAULT MESSAGE	DISCUSSION
SCM FAULT	THIS FAULT SHOWS WHEN A PROBLEM IS DETECTED IN THE SPOILER CONTROL MODULE (SCM) WHICH SHOWS THIS MESSAGE. IF THE SCM SHELF POSITION IS CHANGED, THIS FAULT WILL CONTINUE TO SHOW ON THE SAME SCM.
SCM 1L FAULT SCM 1R FAULT SCM 2L FAULT SCM 2R FAULT SCM 3L FAULT SCM 3R FAULT	THIS FAULT SHOWS WHEN A SCM ON THE SAME SHELF DETECTS: 1) A DIFFERENT SCM THAT IS NOT INSTALLED CORRECTLY 2) A CIRCUIT BOARD ON THE DIFFERENT SCM THAT IS DISLODGED 3) A DISCONNECTED INTERCONNECT WIRE BETWEEN THE TWO SCMs.
26 VAC 27-61-13 26 VAC 27-61-14 26 VAC 27-61-15 26 VAC 27-61-16 26 VAC 27-61-17 26 VAC 27-61-18	THIS FAULT SHOWS WHEN A SCM DETECTS A 26V AC POWER SIGNAL THAT IS LESS THAN 16.5V AC. A DEFECTIVE POWER SUPPLY MODULE (PSM), OR A SHORTED CIRCUIT IN THE SPEEDBRAKE TRANSDUCER, THE CONTROL WHEEL TRANSDUCER, THE SCM, OR THE WIRING BETWEEN THESE COMPONENTS, CAN CAUSE THIS FAULT. THIS FAULT WILL SHOW ON ALL 3 SCMs ON THE SAME SHELF IF THERE IS A DEFECTIVE PSM. ALSO, THE WIRING DIAGRAM MANUAL (WDM) REFERENCE SHOWN IN THE FAULT DETAILS WILL AGREE ON ALL 3 SCMs.
A/G SYS1 FAULT A/G SYS2 FAULT AIR/GND FAULT	EACH SCM HAS 3 AIR/GROUND SENSOR INPUTS. AN OPEN VOLTAGE GIVES A SIGNAL THAT THE AIRPLANE IS IN THE AIR. A GROUND VOLTAGE GIVES A SIGNAL THAT THE AIRPLANE IS ON THE GROUND. THIS FAULT SHOWS WHEN 1 OF THE 3 AIR/GROUND INPUTS DISAGREES FOR 25 SECONDS, OR WHEN A DISAGREE OCCURS DURING A REDUNDANCY MANAGEMENT OPERATION (A "SWITCH" OR A "SWITCH INHIBIT" ACTION). THIS FAULT CAN SHOW WHEN YOU CHANGE THE AIR/GROUND STATE OF THE AIRPLANE DURING NORMAL MAINTENANCE OPERATIONS.
SB LVDT FAULT	THERE ARE 3 SPEEDBRAKE TRANSDUCERS (LINEAR VARIABLE DIFFERENTIAL TRANSFORMERS OR LVDTs) FOR EACH SHELF. EACH TRANSDUCER SENDS A SIGNAL TO EACH SCM. THIS FAULT SHOWS WHEN 1 OF THE SPEEDBRAKE TRANSDUCER SIGNALS IS OUT OF THE TOLERANCE RANGE OF THE OTHER 2 SIGNALS. FOR A DEFECTIVE LVDT, THIS FAULT WILL SHOW ON ALL 3 SCMs ON THE SAME SHELF. IF THIS FAULT SHOWS TWO TIMES ON THE SAME SCM, THEN ALL 3 OF THE SPEEDBRAKE TRANSDUCER SIGNALS WERE OUT OF THE TOLERANCE RANGE WITH EACH OTHER.
CW RVDT FAULT	THERE ARE 3 CONTROL WHEEL TRANSDUCERS (ROTARY VARIABLE DIFFERENTIAL TRANSFORMERS OR RVDTs) FOR EACH SHELF. EACH TRANSDUCER SENDS A SIGNAL TO EACH SCM. THIS FAULT SHOWS WHEN 1 OF THE CONTROL WHEEL TRANSDUCER SIGNALS IS OUT OF THE TOLERANCE RANGE OF THE OTHER 2 SIGNALS. FOR A DEFECTIVE RVDT, THIS FAULT WILL SHOW ON ALL 3 SCMs ON THE SAME SHELF. IF THIS FAULT SHOWS TWO TIMES ON THE SAME SCM, THEN ALL 3 OF THE CONTROL WHEEL TRANSDUCER SIGNALS WERE OUT OF THE TOLERANCE RANGE WITH EACH OTHER.

-200 Series SCM - Fault Message Description
Figure 13 (Sheet 1)

FAULT MESSAGE	DISCUSSION
PSM 1 FAULT PSM 2 FAULT	THIS FAULT SHOWS WHEN A SCM DOES NOT RECEIVE A VALID POWER SIGNAL FROM THE PSM ON THE SAME SHELF. THIS USUALLY OCCURS WHEN THERE IS A DEFECTIVE PSM. FOR A DEFECTIVE PSM, THIS FAULT WILL SHOW ON ALL 3 SCMs ON THE SAME SHELF. THIS FAULT ALSO SHOWS WHEN THERE IS A WIRING FAULT FROM THE PSM TO THE SCM THAT SHOWS THIS FAULT.
PCA 1 FAULT PCA 2 FAULT PCA 3 FAULT PCA 4 FAULT PCA 5 FAULT PCA 6 FAULT PCA 7 FAULT PCA 8 FAULT PCA 9 FAULT PCA 10 FAULT PCA 11 FAULT PCA 12 FAULT	A POWER CONTROL ACTUATOR (PCA) IS THE UNIT AT THE WING WHICH USES THE HYDRAULIC PRESSURE TO RAISE AND LOWER THE SPOILER PANEL. EACH SCM CONTROLS A SYMMETRICAL PAIR OF PCAs, ONE ON THE LEFT WING AND ONE ON THE RIGHT WING. THIS FAULT SHOWS WHEN THE SCM ATTEMPTS TO CONTROL THE POSITION OF THE SPOILER BUT IS NOT ABLE TO. THE PCA NUMBER CAN BE USED TO FIND THE WING LOCATION OF THE POSSIBLE DEFECTIVE COMPONENTS. THE FAULTS "PCA 1" TO "PCA 6" CORRESPOND TO THE SPOILERS 1 (OUTBOARD) TO 6 (INBOARD) ON THE LEFT WING. THE FAULTS "PCA 7" TO "PCA 12" CORRESPOND TO THE SPOILERS 7 (INBOARD) TO 12 (OUTBOARD) ON THE RIGHT WING.
L HYD PRESS SW R HYD PRESS SW C HYD PRESS SW	THE HYDRAULIC SYSTEM PRESSURE SWITCHES SEND VALID HYDRAULIC DISCRETE SIGNALS TO THE SCMs. THESE SIGNALS ARE A PAIR OF HIGH AND LOW LOGIC INPUTS. THIS FAULT SHOWS WHEN THE HYDRAULIC INPUTS TO THE SCM ARE NOT IN THE USUAL CONDITION. THIS FAULT IS USUALLY CAUSED BY A FAILURE OF THE HYDRAULIC PRESSURE SWITCH, AND DOES NOT IMPLY THAT THE HYDRAULIC PRESSURE IS LOW.
L HYD PRESS LO R HYD PRESS LO C HYD PRESS LO	THIS FAULT SHOWS THE SCM DETECTS LOW HYDRAULIC PRESSURE. ONLY ONE OF THESE FAULT MESSAGES CAN SHOW ON A SINGLE SCM. ADDITIONAL AMBER LIGHTS AND EICAS MESSAGES WILL OCCUR IF THE HYDRAULIC PRESSURE STAYS LOW.
SPOILER SHUTDOWN	THIS FAULT SHOWS WHEN THE SCM DOES A SHUTDOWN OF THE SPOILER PANEL IT CONTROLS. A SPOILER SHUTDOWN ALSO SENDS A CAUTION MESSAGE TO THE TOP EICAS DISPLAY.
AMBR DUE TO HYD	THIS FAULT SHOWS WHEN THE SCM SENDS A CAUTION MESSAGE TO THE TOP EICAS DISPLAY WHILE IT DETECTS LOW HYDRAULIC PRESSURE.
27-00-13 WIRING	THIS FAULT SHOWS WHEN THE SCM DETECTS A FAILURE OF THE HYDRAULIC INPUTS, AND THE HYDRAULIC INPUTS ARE WIRED SO THAT THE SCM ALWAYS DETECTS VALID HYDRAULIC PRESSURE.
SCM ERROR	THIS FAULT SHOWS WHEN A SCM MONITOR DETECTS AN ERROR FOR A SCM THAT IS NOT APPLICABLE FOR THAT SHELF POSITION.
NO CSEU POWER	THIS FAULT SHOWS WHEN THE "PSM 1 VALID" AND THE "PSM 2 VALID" LOGIC SIGNALS SENT TO THE SCM ARE FALSE. THIS USUALLY OCCURS WHEN THE CIRCUIT BREAKERS FOR THE TWO PSMs ON ONE SHELF ARE NOT CLOSED.

-200 Series SCM - Fault Message Description
Figure 13 (Sheet 2)

A14448

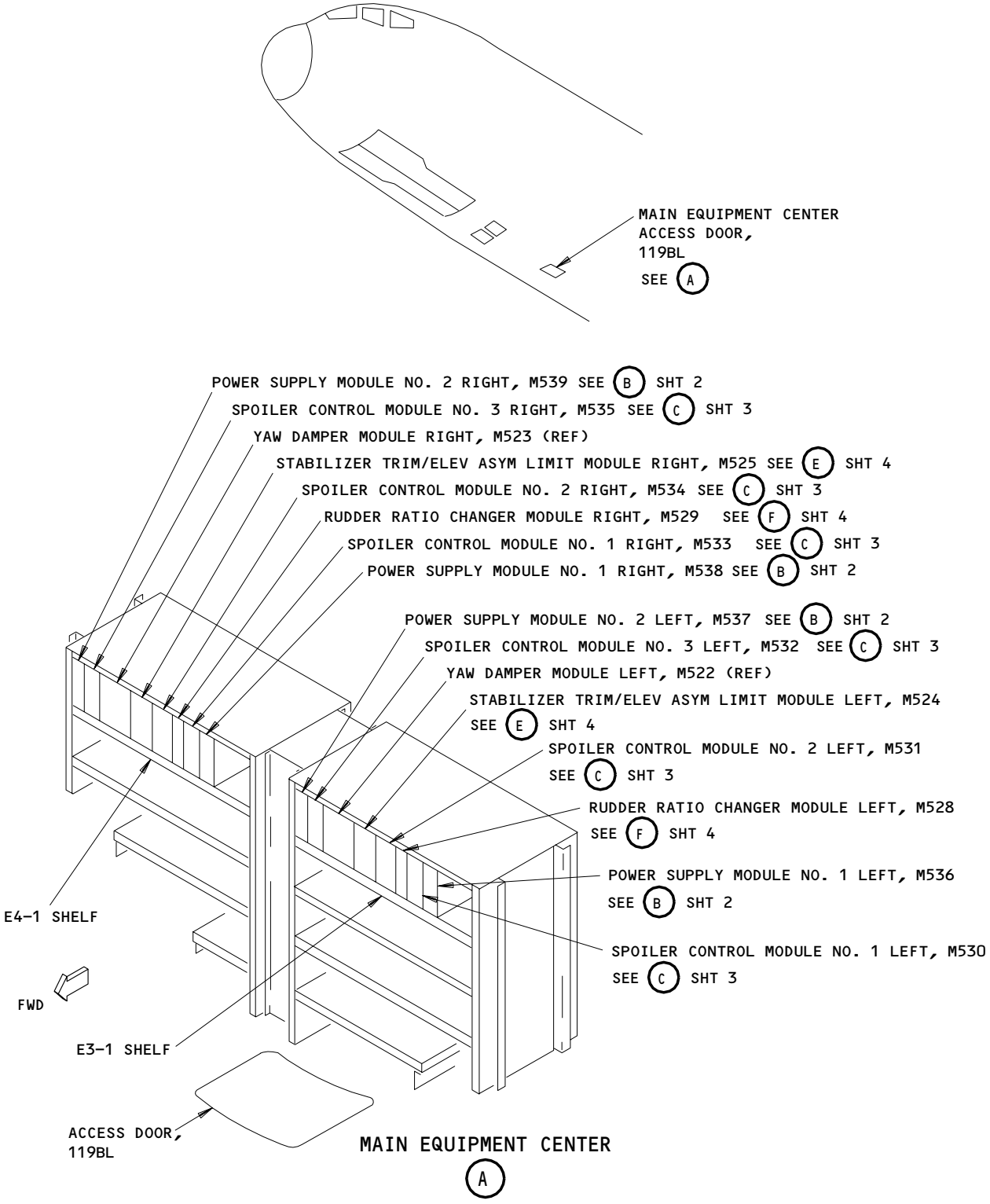
THIS PAGE INTENTIONALLY LEFT BLANK

CONTROL SYSTEM ELECTRONICS UNIT

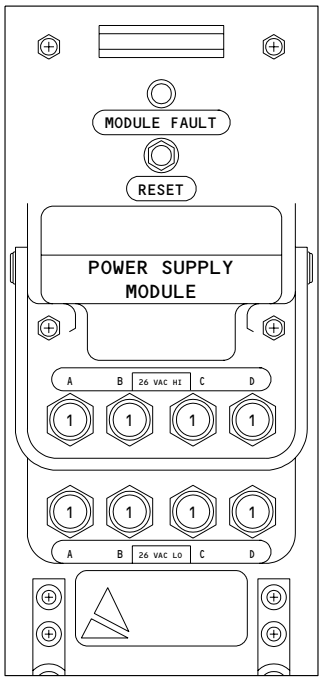
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER –	--		FLT COMPT, P11	*
FLT CONT ELEC 1L AC, C1538		1	11C6	*
FLT CONT ELEC 1L DC, C1534		1	11C7	*
FLT CONT ELEC 1R AC, C1536		1	11G17	*
FLT CONT ELEC 1R DC, C1531		1	11G18	*
FLT CONT ELEC 2L AC, C1537		1	11C8	*
FLT CONT ELEC 2L DC, C1533		1	11C9	*
FLT CONT ELEC 2R AC, C1535		1	11G27	*
FLT CONT ELEC 2R DC, C1532		1	11G28	*
MODULE – POWER SUPPLY NO. 1 LEFT, M536	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – POWER SUPPLY NO. 1 RIGHT, M538	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – POWER SUPPLY NO. 2 LEFT, M537	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – POWER SUPPLY NO. 2 RIGHT, M539	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – RUDDER RATIO CHANGER LEFT, M528	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – RUDDER RATIO CHANGER RIGHT, M529	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – SPOILER CONTROL NO. 1 LEFT, M530	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – SPOILER CONTROL NO. 1 RIGHT, M533	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – SPOILER CONTROL NO. 2 LEFT, M531	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – SPOILER CONTROL NO. 2 RIGHT, M534	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – SPOILER CONTROL NO. 3 LEFT, M532	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – SPOILER CONTROL NO. 3 RIGHT, M535	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – STABILIZER TRIM/ELEV ASYM LIMIT LEFT, M524	1	1	119BL, MAIN EQUIP CTR E3-1	27-09-00
MODULE – STABILIZER TRIM/ELEV ASYM LIMIT RIGHT, M525	1	1	119BL, MAIN EQUIP CTR E4-1	27-09-00
MODULE – YAW DAMPER LEFT, M522 (FIM 22-21-00/101)				
MODULE – YAW DAMPER RIGHT, M523 (FIM 22-21-00/101)				

* SEE THE WDM EQUIPMENT LIST

Control System Electronics Unit – Component Index
Figure 101



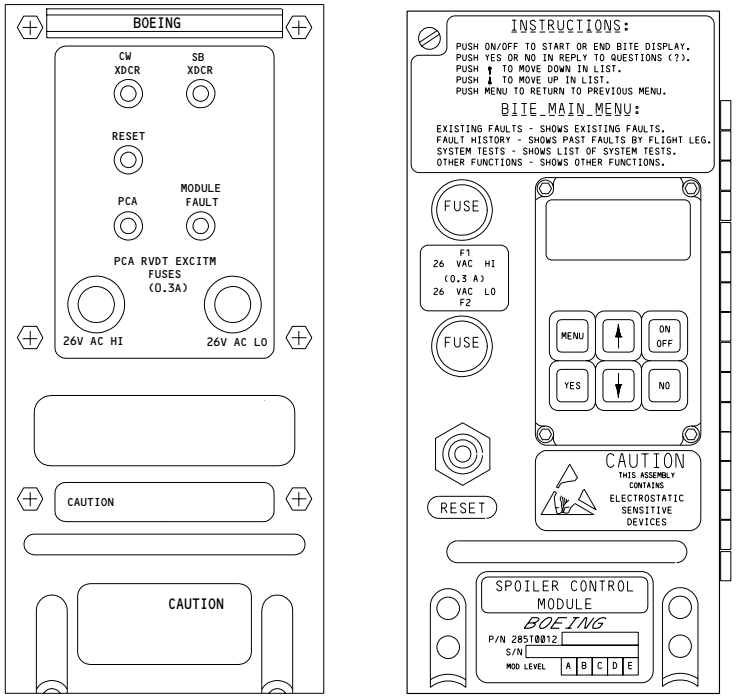
Control System Electronics Unit - Component Location
Figure 102 (Sheet 1)



POWER SUPPLY MODULE

B

Control System Electronics Unit - Component Location (Detail from Sht 1)
Figure 102 (Sheet 2)

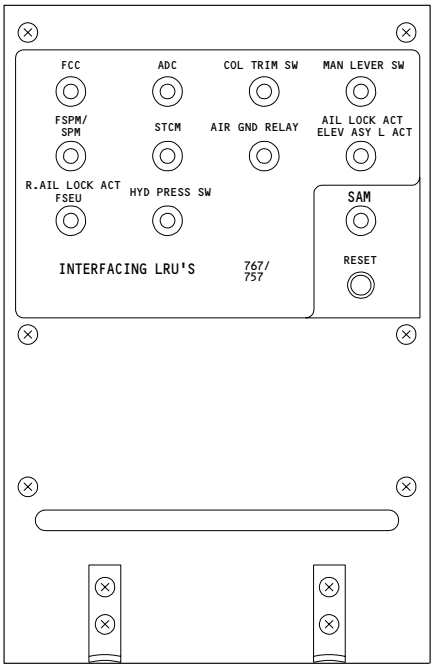


(-100 SERIES) (-200 SERIES)

SPOILER CONTROL MODULE

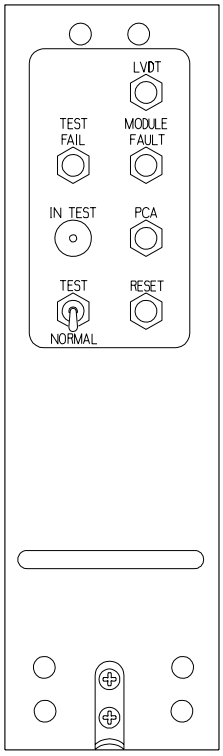
C

Control System Electronics Unit - Component Location (Detail from Sht 1)
Figure 102 (Sheet 3)



STABILIZER TRIM/ELEVATOR ASYMMETRY MODULE

(E)



RUDDER RATIO CHANGER MODULE
(EXAMPLE)

(F)

Control System Electronics Unit - Component Location (Details from Sht 1)
Figure 102 (Sheet 4)

FLIGHT CONTROL SYSTEM ELECTRONICS UNIT (CSEU) - MAINTENANCE PRACTICES

1. General
   A. This procedure has a removal, installation and installation test task for these flight control system electronics unit (CSEU) modules (referred to as modules):
      (1) The CSEU Power Supply Modules M536, M537, M538, M539
      (2) The Spoiler Control Modules M530, M531, M532, M533, M534, M535
      (3) The Stabilizer Trim/Elevator Asymmetry Limit Modules M524, M525 (referred to as the SAM)
      (4) The Rudder Ratio Changer Modules M528, M529
   B. The removal, installation and installation test tasks for the yaw damper modules M522, M523 are in 22-21-04/401.
   C. The modules are on shelf 1 of equipment racks E3 and E4 in the main equipment center. The modules are all rack-mounted components.
   D. All of these modules have static sensitive components. You must use the specified maintenance manual procedures when you touch the modules.

TASK 27-09-00-002-001

2. Remove the Module
   A. References
      (1) 20-10-01/401, E/E Rack-Mounted Components
      (2) 20-41-01/201, Electro-Static Sensitive Devices
      (3) 27-61-00/201, Spoiler/Speedbrake Control System
   B. Access
      (1) Location Zones
          119 Main Equipment Center

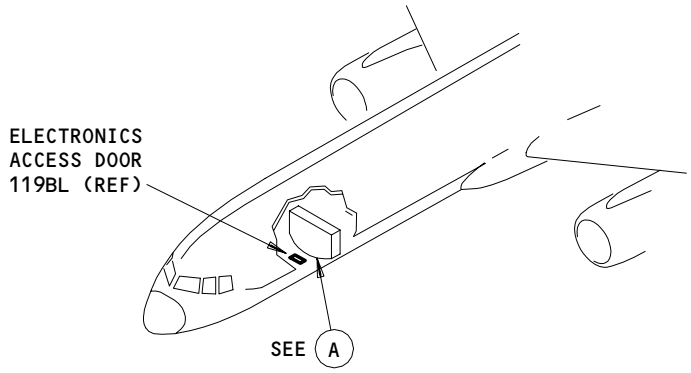
      (2) Access Panels
          119BL Main Equipment Center Access

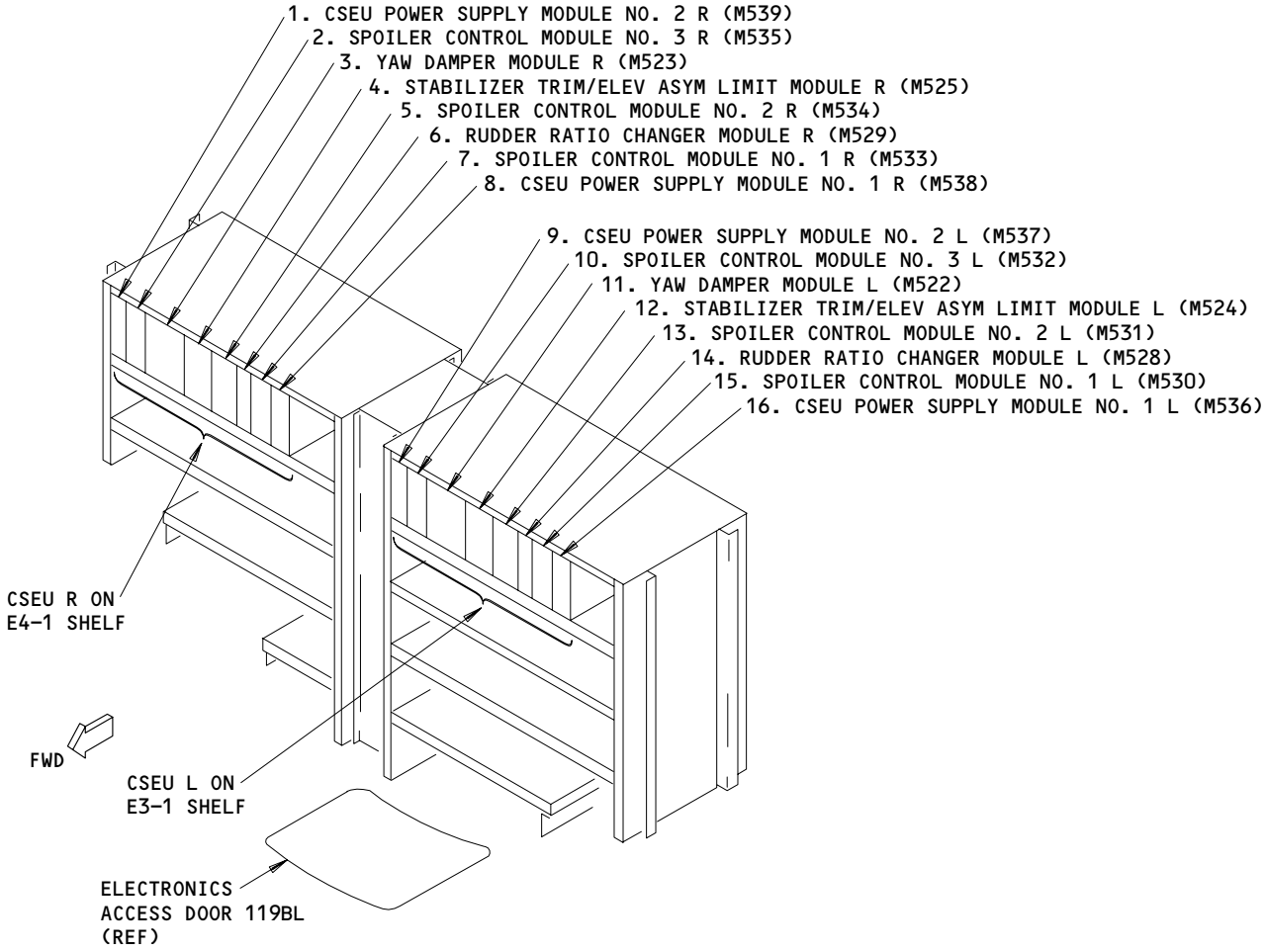
   C. Prepare for the Removal

      S 912-002

      CAUTION: DO NOT TOUCH THE MODULE BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE MODULE.

      (1) Do the procedure for devices that are sensitive to electrostatic discharge (Ref 20-41-01).

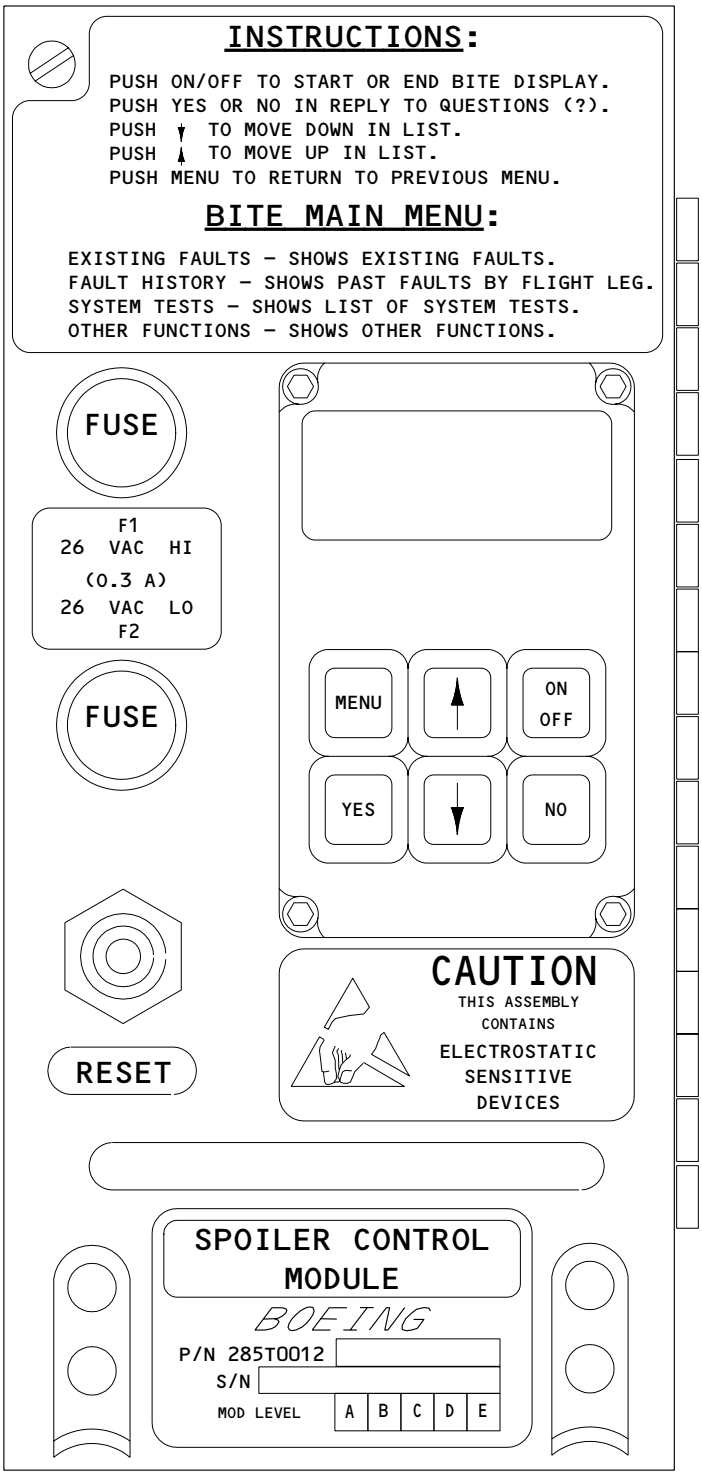




MAIN ELECTRONICS EQUIPMENT CENTER

A

CSEU Module Installation
Figure 201



Spoiler Control Module (-200 Series) With BITE Display
Figure 202

S 042-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

D. Remove the Module

S 862-004

(1) For all modules, open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, FLT CONT ELEC 1L AC
(b) 11C7, FLT CONT ELEC 1L DC
(c) 11C8, FLT CONT ELEC 2L AC
(d) 11C9, FLT CONT ELEC 2L DC
(e) 11G17, FLT CONT ELEC 1R AC
(f) 11G18, FLT CONT ELEC 1R DC
(g) 11G27, FLT CONT ELEC 2R AC
(h) 11G28, FLT CONT ELEC 2R DC

S 862-005

(2) For the stabilizer trim/elevator asymmetry limit module, also open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H11 or 11C5, STAB TRIM CONT LEFT

NOTE: This circuit breaker has two possible grid locations.

(b) 11H20, STAB TRIM CONT RIGHT
(c) 11J12, ELEVATOR LIMIT

S 862-044

(3) For the rudder ratio changer module, also open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11G10 or 11D18, RUD RATIO

NOTE: This circuit breaker has two possible grid locations.

TASK 27-09-00-402-007

3. Install the Module

A. References

(1) 20-10-01/401, E/E Rack-Mounted Components

(2) 20-41-01/201, Electro-Static Sensitive Devices

(3) 27-61-00/201, Spoiler/Speedbrake Control System

B. Access

(1) Location Zones

119 Main Equipment Center

(2) Access Panels

119BL Main Equipment Center Access

C. Install the Module

S 982-074

(1) For an all -100 series SCM configuration, the most effective maintenance occurs when there are -117 and -118 SCMs installed at shelf positions 1R and 2R. This is because there are two types of the older -100 series SCMs: the -112/-114 SCMs, and the -117/-118 SCMs. The -117 and -118 SCMs have an improved ground speedbrake delay circuit which reduces the risk of a nuisance fault if a transient signal occurs in the air/ground system.

S 982-075

(2) For an airplane that has the -100 and -200 series SCMs installed, the most effective maintenance usually occurs when you have at least one -200 series SCM installed on each shelf. The best location for the two -200 series SCMs are at the 1R and 3L shelf positions, preferably with a -117 or -118 SCM installed at shelf position 2R. If only one -200 series SCM is available, install it at 1R.

(a) If an intermittent problem occurs at a given shelf location, or when it is necessary to replace an SCM during the fault isolation procedure, a -200 series SCM is recommended for installation there.

(b) The -200 series SCMs have an expanded capacity for detection and isolation of faults. When a -200 series SCM is available, it will provide the fastest and best fault isolation for spoiler system troubleshooting.

S 042-016

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 912-008

CAUTION: DO NOT TOUCH THE MODULE BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE MODULE.

(4) Do the procedure for devices that are sensitive to electrostatic discharge (Ref 20-41-01).

S 422-045

(5) If both the 285T0017-103 and -104 CSEU power supply modules are installed you should do this step. This step will make the best use of the -104 module:
(a) Install the -104 modules in the 1L (M536) and 1R (M538) positions. You can move a -103 module from these positions to the 2L (M537) or 2R (M539) positions.

S 422-009

(6) Install the module (Ref 20-10-10).

S 862-010

(7) For all modules, remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11C6, FLT CONT ELEC 1L AC
(b) 11C7, FLT CONT ELEC 1L DC
(c) 11C8, FLT CONT ELEC 2L AC
(d) 11C9, FLT CONT ELEC 2L DC
(e) 11G17, FLT CONT ELEC 1R AC
(f) 11G18, FLT CONT ELEC 1R DC
(g) 11G27, FLT CONT ELEC 2R AC
(h) 11G28, FLT CONT ELEC 2R DC

S 862-011
(8) For the SAM, also remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11H11 or 11C5, STAB TRIM CONT L

NOTE: This circuit breaker has two possible grid locations.

(b) 11H20, STAB TRIM CONT RIGHT
(c) 11J12, ELEVATOR LIMIT

S 862-012
(9) For the rudder ratio changer module, also remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11G10 or 11D18, RUD RATIO

NOTE: This circuit breaker has two possible grid locations.

S 442-017
(10) Do the activation procedure for the spoilers if you did the deactivation procedure (Ref 27-61-00).

S 712-013
(11) Do the procedure, CSEU Modules Installation Test, for the applicable module.

TASK 27-09-00-712-014

4. CSEU Modules Installation Test

A. References
(1) AMM 22-00-02/201, Autoflight BITE
(2) 24-22-00/201, Electrical Power - Control
(3) 27-21-00/501, Rudder and Rudder Trim System - Adjustment/Test
(4) 27-61-00/201, Spoiler/Speedbrake Control System
(5) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

B. Access
(1) Location Zones
119/120 Flight Compartment

C. Prepare to do a Test of the CSEU Modules

S 862-018
(1) Supply electrical power (Ref 24-22-00).

S 712-020
(2) Make sure there are no faults shown on the front of the CSEU power supply module.

NOTE: A faultball will be yellow if it is latched to show there is a fault in the module. The faultball will be black if it is not latched which shows there is no fault in the module.

D. Do a System Test for the Spoiler Control Modules (SCMs)

S 862-046

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the left, center and right hydraulic systems and reservoirs (Ref 29-11-00/201).

S 282-047
(2) Make sure the control wheel is in the neutral position.

S 282-048
(3) Make sure the speedbrake lever, on the pilot's aft control stand P8, is in the down-and-locked position.

S 862-049
(4) Push the ECS MSG button on the EICAS MAINT panel on the right side panel, P61.

S 862-022
(5) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEEDBRAKE

S 862-023
(6) Push the RESET button on each of the six SCMs.

S 282-049
(7) AIRPLANES WITH -200 SERIES SCMs;
Do these steps to make sure EXISTING FAULTS? shows on the BITE display for each of the -200 series SCMs:

(a) Push the ON/OFF button on the front panel of each -200 series SCM to the ON position.
(b) If EXISTING FAULTS? does not show on the BITE display, you must enter the correct shelf position in the display:
1) Push the NO button to show the correct shelf position.
2) Push the YES button two times to select and confirm the correct shelf position.

NOTE: EXISTING FAULTS? will now show in the display.

(c) Push the ON/OFF button on the front panel of each -200 series SCM to the OFF position.

S 282-050
(8) Make sure the SPOILERS light is off, and the EICAS message SPOILERS does not show on the top or bottom display.

S 282-051
(9) Make sure all persons and equipment are away from all control surfaces.

S 862-052
(10) Make sure the airplane is in the ground mode (Ref 32-09-02/201).

NOTE: When you change the air/ground state of the airplane, an air/ground system fault will occur if the air/ground signals disagree for more than 25 seconds.

NOTE: Use at least 10 seconds to complete each of the flight control movements that follow. Before you begin the next movement, hold the flight control in its position for 4 seconds.

S 862-053
(11) Move the speedbrake lever from the down-and-locked position to the full-up position.

S 862-054
(12) Move the control wheel from the neutral position to the full right position.

S 862-055
(13) Move the control wheel back to the neutral position.

S 862-056
(14) Move the control wheel from the neutral position to the full left position.

S 862-057
(15) Move the control wheel back to the neutral position.

S 862-058

(16) Move the speedbrake lever from the full-up position to the down-and-locked position.

S 862-073

WARNING: OBEY THE PROCEDURE THAT PUTS THE AIRPLANE IN THE AIR MODE. IF YOU DO THE PROCEDURES INCORRECTLY, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(17) Put the air/ground relay system (systems No. 1 and No. 2) in the air mode (Ref 32-09-02/201).

NOTE: ON AIRPLANES WITH -200 SERIES SCMs, if you follow an air to ground transition in 10 seconds or less with a full speedbrake command, you will advance the flight leg data stored in the FAULT HISTORY memory. The SCM does not prevent the advance of the flight leg data in the procedure that follows.

S 862-060

(18) Move the speedbrake lever from the down-and-locked position to the full-up position.

S 862-061

(19) Move the control wheel from the neutral position to the full right position.

S 862-062

(20) Move the control wheel back to the neutral position.

S 862-063

(21) Move the control wheel from the neutral position to the full left position.

S 862-064

(22) Move the control wheel back to the neutral position.

S 862-065

(23) Move the speedbrake lever from the full-up position to the down-and-locked position.

S 282-066

(24) Make sure the SPOILERS light does not come on, and the EICAS message SPOILERS does not show on the top or bottom display.

S 282-067
(25) AIRPLANES WITH -100 SERIES SCMs;
Make sure all faultballs on the front panels of each of the -100 series SCMs do not show yellow.

S 812-068
(26) If the SPOILERS light does not come on, the EICAS message SPOILERS does not show on the top or bottom display, and no faultballs show yellow on -100 series SCMs, then the spoiler system and the spoiler control modules operate correctly.

S 862-072
(27) Put the air/ground relay system back to the ground mode (Ref 32-09-02/201).

S 862-069
(28) Remove the hydraulic power if it is not necessary (Ref 29-11-00/201).

S 862-024
(29) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
(a) 11G11, AUTO SPEEDBRAKE

E. Do a Test of the Stabilizer Trim/Elevator Asymmetry Limit Module (referred to as the SAM)

S 862-025
(1) Pressurize the left, center and right hydraulic systems and reservoirs (Ref 29-11-00).

S 862-027
(2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:

NOTE: When you open these circuit breakers you prevent nuisance aural warning alerts. You also make sure probe/sensor heat is not accidentally supplied.

(a) 11B18, WARN ELEX B

(b) 11J33, WARN ELEX A

S 862-028

(3) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6L15, PITOT HEAT CAPT MAIN
(b) 6L16, PITOT HEAT L AUX
(c) 6L17, L AOA HEAT
(d) 6L21, PITOT HEAT R AUX
(e) 6L22, PITOT HEAT F/O MAIN
(f) 6L23, R AOA HEAT

F. Do a Test of the Left SAM

S 862-029

(1) Use the trim switches on the control wheel to set the stabilizer at four units of trim.

S 042-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 862-031

(3) Open these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11G17, FLT CONT ELEC 1R AC
(b) 11G27, FLT CONT ELEC 2R AC

S 712-032

(4) Do a test of the left SAM, as follows:
(a) Set the C STAB TRIM switch, on the pilots' aft control stand P8, to the CUTOUT position.

(b) Make sure the yellow STAB TRIM light, on the pilots' overhead panel P5, is off.
(c) Move the trim switches on the control wheel in the up direction.
(d) Make sure the STAB TRIM light, on the pilots overhead panel P5, comes on.
(e) Make sure the EICAS message, STAB TRIM, shows on the top display.
(f) Set the C STAB TRIM switch to the NORM position.
(g) Push the RESET switch on the left SAM module in the main equipment center.
(h) Move the trim switches on the control wheel in the up direction.
(i) Make sure the STAB TRIM light, on the pilots' overhead panel P5, goes off.
(j) Make sure the EICAS message, STAB TRIM, does not show on the top display.
(k) Close these circuit breakers on the overhead circuit breaker panel, P11:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G27, FLT CONT ELEC 2R AC

S 712-038
(5) Do the procedure, MCDP Ground Test 65 - Stab Trim (AMM 22-00-02/201). This procedure does a test of the interface between the SAM module and the flight control computer.

S 442-039
(6) Do the activation procedure for the spoilers if you did the deactivation procedure (Ref 27-61-00).

G. Do a Test of the Right SAM

S 862-034
(1) Use the trim switches on the control wheel to set the stabilizer at four units of trim.

S 042-085
(2) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 862-036
(3) Open these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11C6, FLT CONT ELEC 1L AC
(b) 11C8, FLT CONT ELEC 2L AC

S 712-037
(4) Do a test of the right SAM, as follows:
(a) Set the R STAB TRIM switch on the pilots' aft control stand, P8, to the CUTOUT POSITION.
(b) Make sure the yellow STAB TRIM light on the pilots' overhead panel, P5, is off.
(c) Move the trim switches on the control wheel in the down direction.
(d) Make sure the STAB TRIM light on the pilots' overhead panel, P5, comes on.
(e) Make sure the EICAS message, STAB TRIM, shows on the top display.
(f) Set the R STAB TRIM switch on the pilots' aft control stand, P8, to the NORM position.
(g) Push the RESET switch on the right SAM module in the main equipment center.
(h) Move the trim switches on the control wheel in the down direction.
(i) Make sure the STAB TRIM light on the pilots' overhead panel, P5, goes off.
(j) Make sure the EICAS message, STAB TRIM, does not show on the top display.
(k) Close these circuit breakers on the overhead circuit breaker panel, P11:
1) 11C6, FLT CONT ELEC 1L AC

2) 11C8, FLT CONT ELEC 2L AC

S 712-040

(5) Do the procedure, MCDP Ground Test 65 - Stab Trim (AMM 22-00-02/201), to do a test of the interface between the SAM module and the flight control computer.

S 442-041

(6) Do the activation procedure for the spoilers if you did the deactivation procedure (Ref 27-61-00).

H. Do a Test of the Rudder Ratio Changer Module

S 712-042

(1) Do a test of the rudder ratio changer module (Ref 27-21-00).

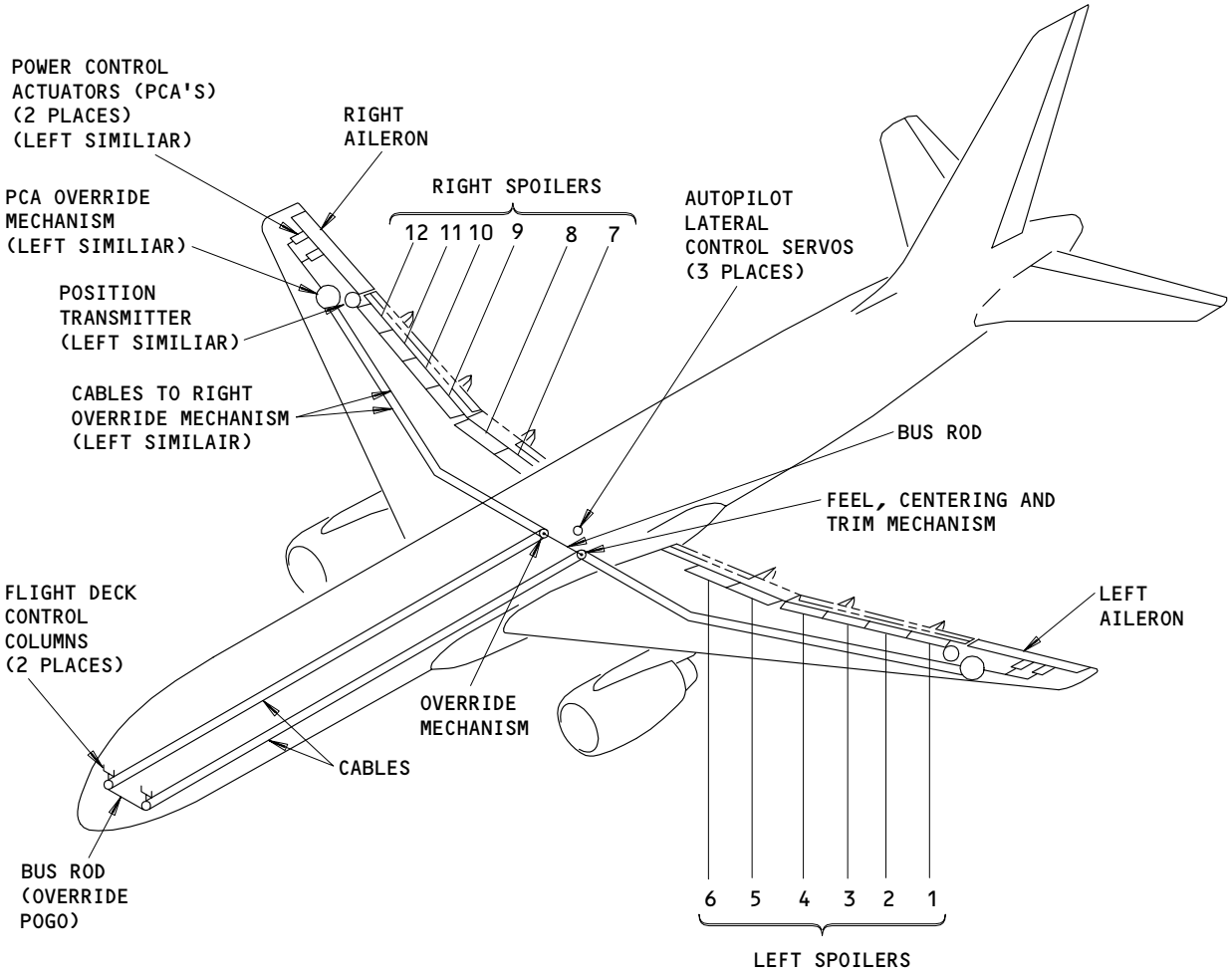
I. Put the Airplane Back to Its Usual Position

S 862-043

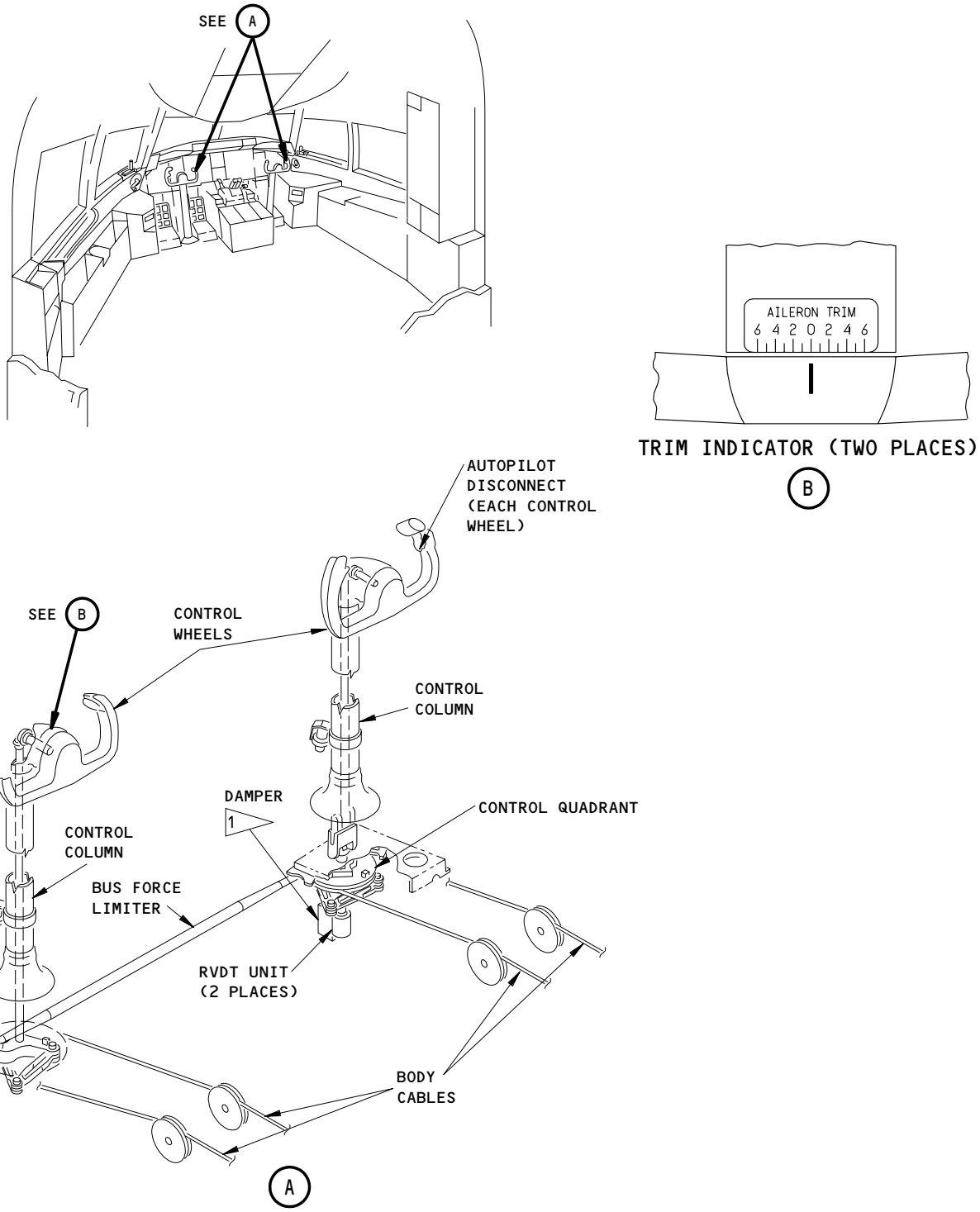
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

AILERON AND AILERON TRIM CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1, 5)
   A. The ailerons, assisted by the spoilers (Ref 27-61-00, Description and Operation), provide lateral control of the airplane. There are two ailerons; one at the outboard trailing edge of each wing. Each aileron is moved by two power control actuators (PCAs) which move the aileron up and down.
   B. Control wheels in the flight deck regulate aileron movement. The control wheels actuate cables which in turn actuate the PCAs. The PCAs are powered by separate hydraulic systems to allow aileron control in the event of a single hydraulic failure.
   C. The autopilot system (Ref 22-13-00, Description and Operation) controls the ailerons electrically. Autopilot commands actuate the PCAs and back-drive the control wheels.
   D. The aileron trim system operates the ailerons and control wheels electrically to adjust the ailerons to a neutral or trimmed (wings level) position. The trim indicator on the control wheels shows the degree of trim.
2. Component Details
   A. Lateral Control Wheel (Fig. 2)
      (1) The control wheel drives a drum at the base of the control column to operate the aileron system. The bus force limiter links the captain's and first officer's control drums to ensure symmetrical input. Control wheel rotation actuates cables which run aft to lateral control mechanisms in the left and right main gear wheel wells.
      (2) Control wheel travel is ±82.5° to the left and right of the control wheel neutral position. Maximum corresponding aileron travel is 21° up and 21° down for about 55° control wheel travel. The remaining 30° of travel drive the spoiler RVDT units. An autopilot disconnect button is located on the control wheel. The aileron trim indicator is on the top of the control wheel.
   B. Aileron Control Drum and Bus Force Limiter Assembly (Fig. 2)
      (1) The aileron control drum houses the aileron control quadrant. The quadrant rotates body cables which drive the lateral control mechanisms in the wheel wells for the left and right main landing gear. Connected to the drum are spoiler RVDT units (Ref 27-61-00, Description and Operation).
      (2) The bus force limiter links both control drums so that they operate in unison. It also provides a two-way breakout in the event a control wheel becomes inoperable. The force limiter is spring-loaded in both directions so that either control wheel can operate independently of the other, if necessary.



Aileron System
Figure 1



Aileron Control
Figure 2

(3) AIRPLANES WITH CONTROL WHEEL DAMPER;
A control wheel damper is attached to the First Officer quadrant. The purpose of the damper is to minimize rapid control wheel input to the aileron. The control wheel damper is located adjacent to the aileron position transducer. The damper crank assembly that connects to the quadrant has shear-out rivets. The damper is a self contained unit. There are no servicing requirements for this unit.

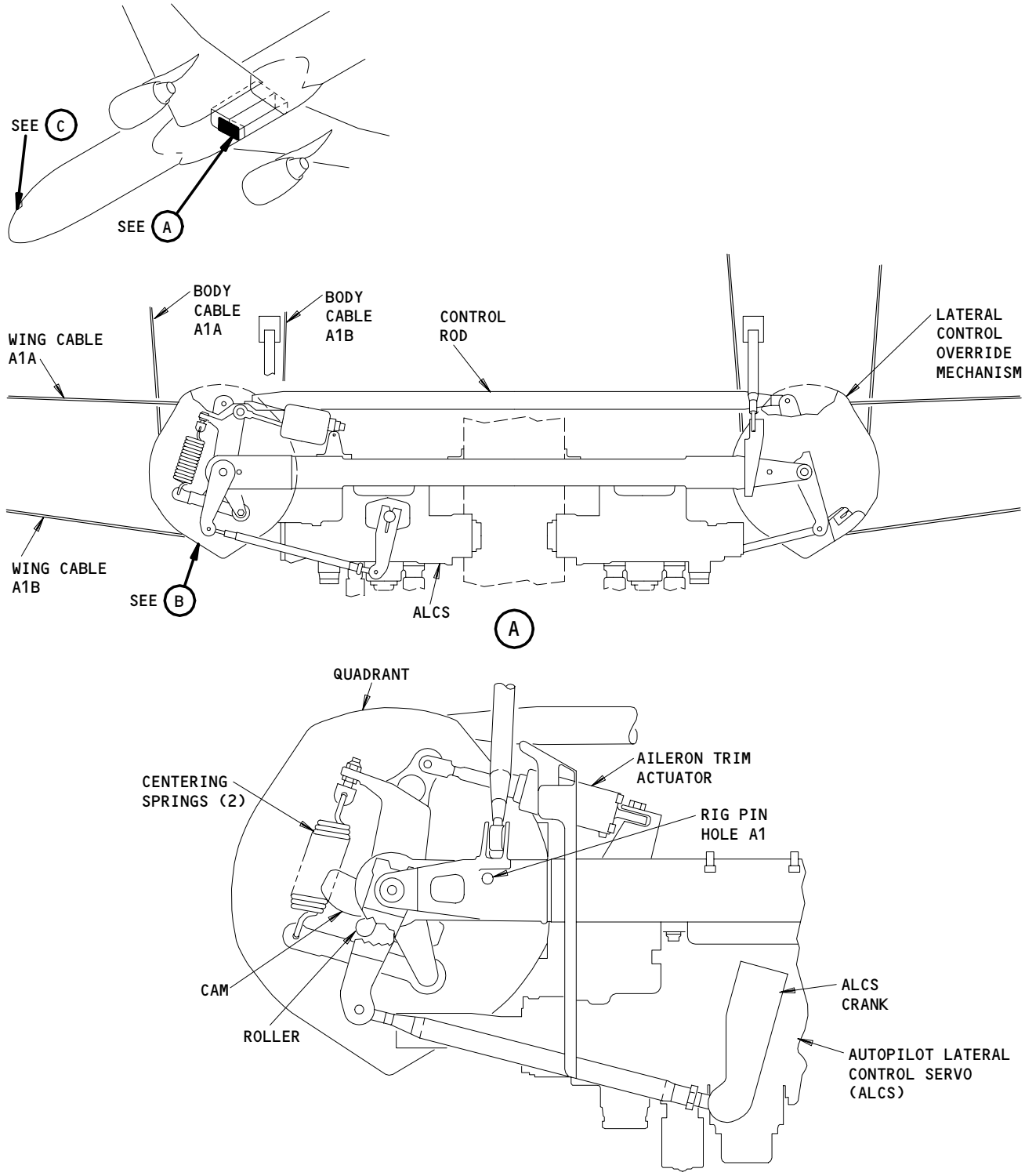
C. Lateral Feel, Centering, and Trim Mechanism (Fig. 3)
(1) The lateral feel, centering, and trim mechanism, located in the wheel well for the left main landing gear, mechanically drives the left aileron PCAs. A control rod connects the mechanism to the lateral control override mechanism in the wheel well for the right main landing gear. The feel, centering, and trim mechanism also has an override cam to allow operation of the right aileron if the left side becomes jammed (the left side has a shearout).
(2) Two centering springs keep the ailerons in a neutral position when there are no commanded inputs. Command inputs are either manual from the control wheel and cables or hydraulic from the autopilot system. The autopilot lateral control servo (ALCS) cranks input autopilot commands directly to the feel, centering, and trim mechanism.

D. Aileron Trim Switches (Fig. 3)
(1) The aileron trim switches are located on the aft electronic control panel (P8). The trim switches must be operated together to provide electrical input to the trim actuator.

E. Aileron Trim Actuator (Fig. 3, 10)
(1) The aileron trim actuator is mounted on the support box and connected to the feel, centering, and trim mechanism. The actuator receives electrical signals from the trim switches. The trim actuator extends or retracts, adjusting the neutral position.

F. Lateral Control Override Mechanism (Fig. 4)
(1) The lateral control override mechanism is located in the wheel well of the right main landing gear. A control rod connects the lateral control override mechanism to the feel, centering, and trim mechanism so that left and right ailerons respond equally to command inputs. A crank connects the override mechanism to the right ALCS to provide autopilot control. Override springs and a cam allow operation of the left aileron should the right side become jammed.

G. Aileron Quadrant and Override Mechanism (Fig. 5)
(1) The aileron quadrant and override mechanism is located inboard of the PCAs in the wing trailing edge. A control rod connects the quadrant and override to the PCA input crank.
(2) The aileron quadrant transmits control wheel or autopilot commands to the PCAs. The override mechanism provides a breakout to allow continued use of one aileron should the other become jammed.



FEEL, CENTERING, AND TRIM MECHANISM

B

Lateral Feel, Centering, and Trim Mechanism
Figure 3 (Sheet 1)

64626

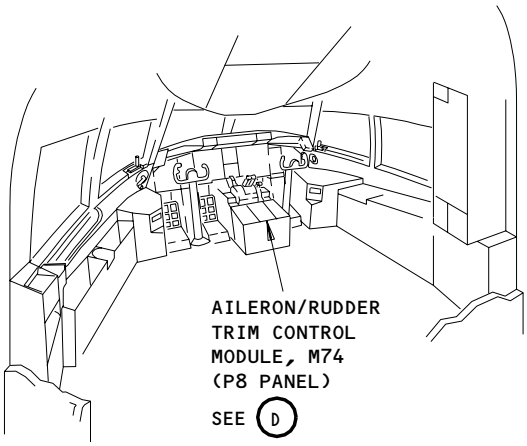
H. Power Control Actuators (PCAs) (Fig. 6)

(1) The PCAs are mounted side-by-side on the wing rear spar. Each PCA consists of an actuator with internal control and shuttle valves. The actuator rod end is attached to a bracket on the aileron. The summing levers connect each PCA with the aileron quadrant input crank. Reaction links provide the mechanical reaction path forces to raise and lower the ailerons.

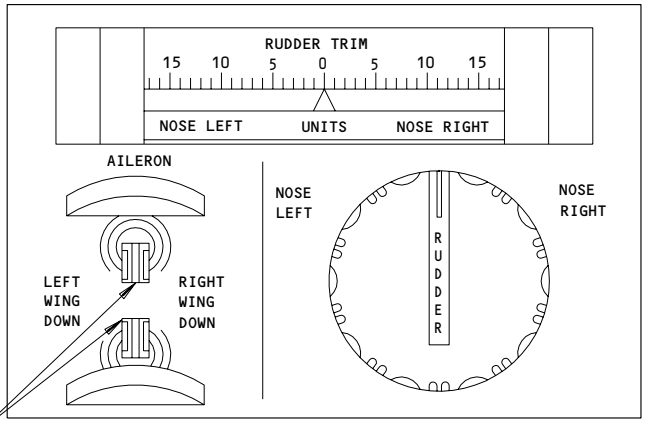
(2) Each PCA is powered by a separate hydraulic system. The left aileron outboard PCA receives pressure from the right hydraulic system; the right aileron outboard PCA receives pressure from the left hydraulic system. The left and right aileron inboard PCAs are powered by the center hydraulic system.

I. Aileron (Fig. 7)

(1) The aileron is mounted on the wing trailing edge at five hinge points. The aileron has full 40° travel; 20 ±1° deflection down, 20 ±1° deflection up. The autopilot provides full aileron deflection. Aileron trim is limited to 11.6° down and 11.6° up. The aileron position transmitter is mounted on the aileron surface and wing rear spar (Ref 27-18-00, Description and Operation).



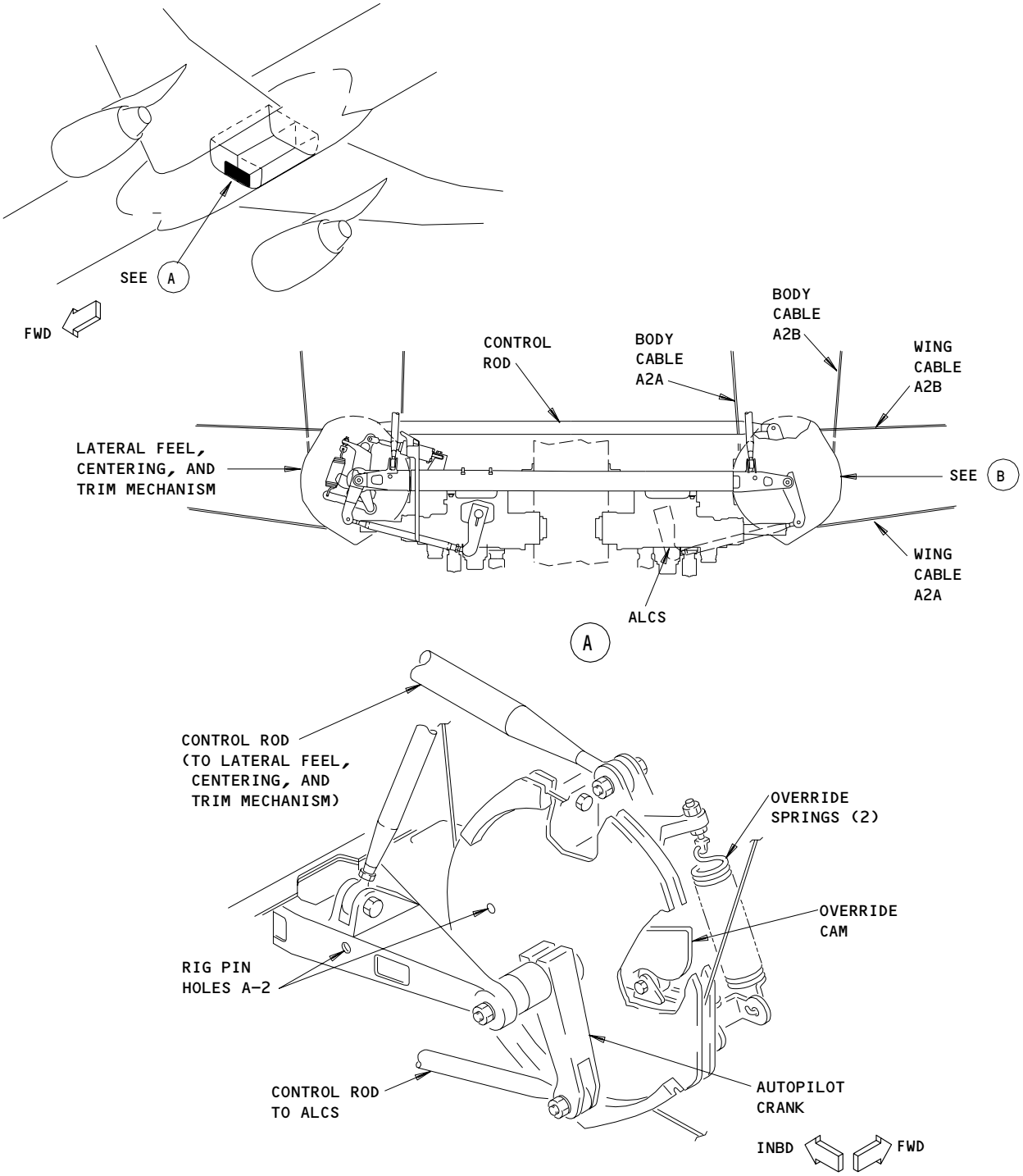
FLIGHT COMPARTMENT
C



AILERON TRIM
SWITCHES

AILERON/RUDDER TRIM CONTROL
MODULE, M74 (P8 PANEL)
D

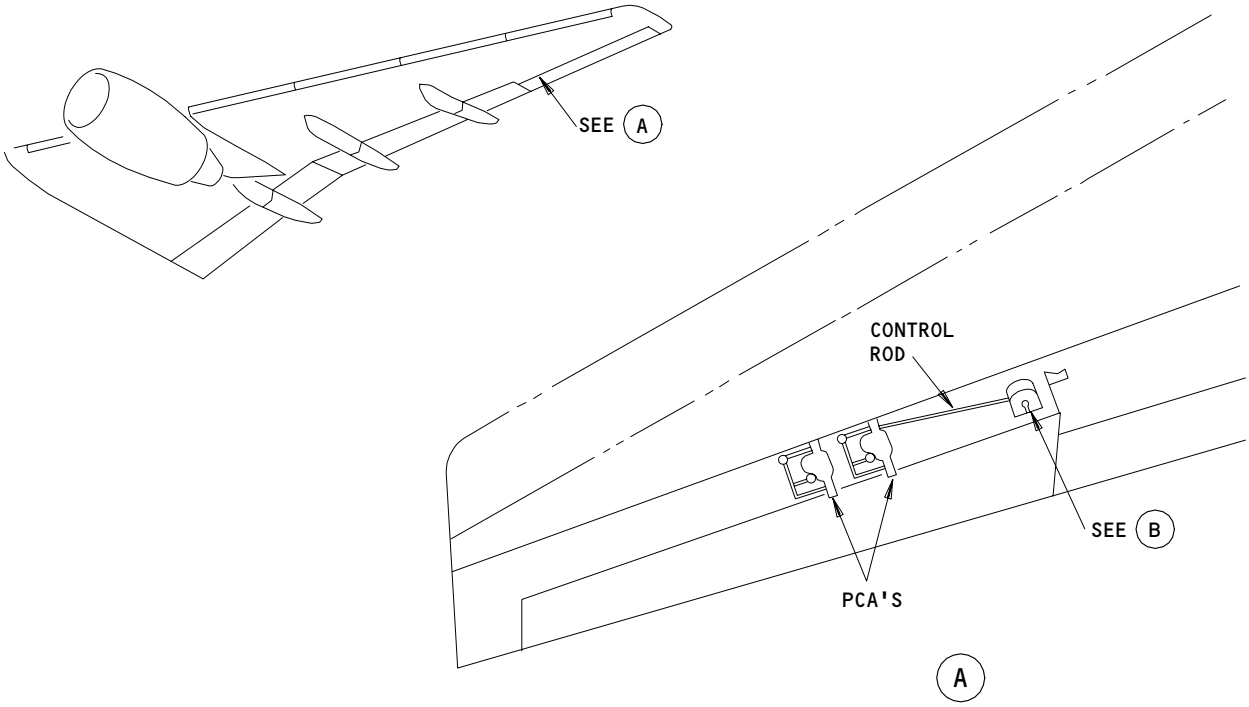
Lateral Feel, Centering, and Trim Mechanism
Figure 3 (Sheet 2)



LATERAL CONTROL OVERRIDE MECHANISM

B

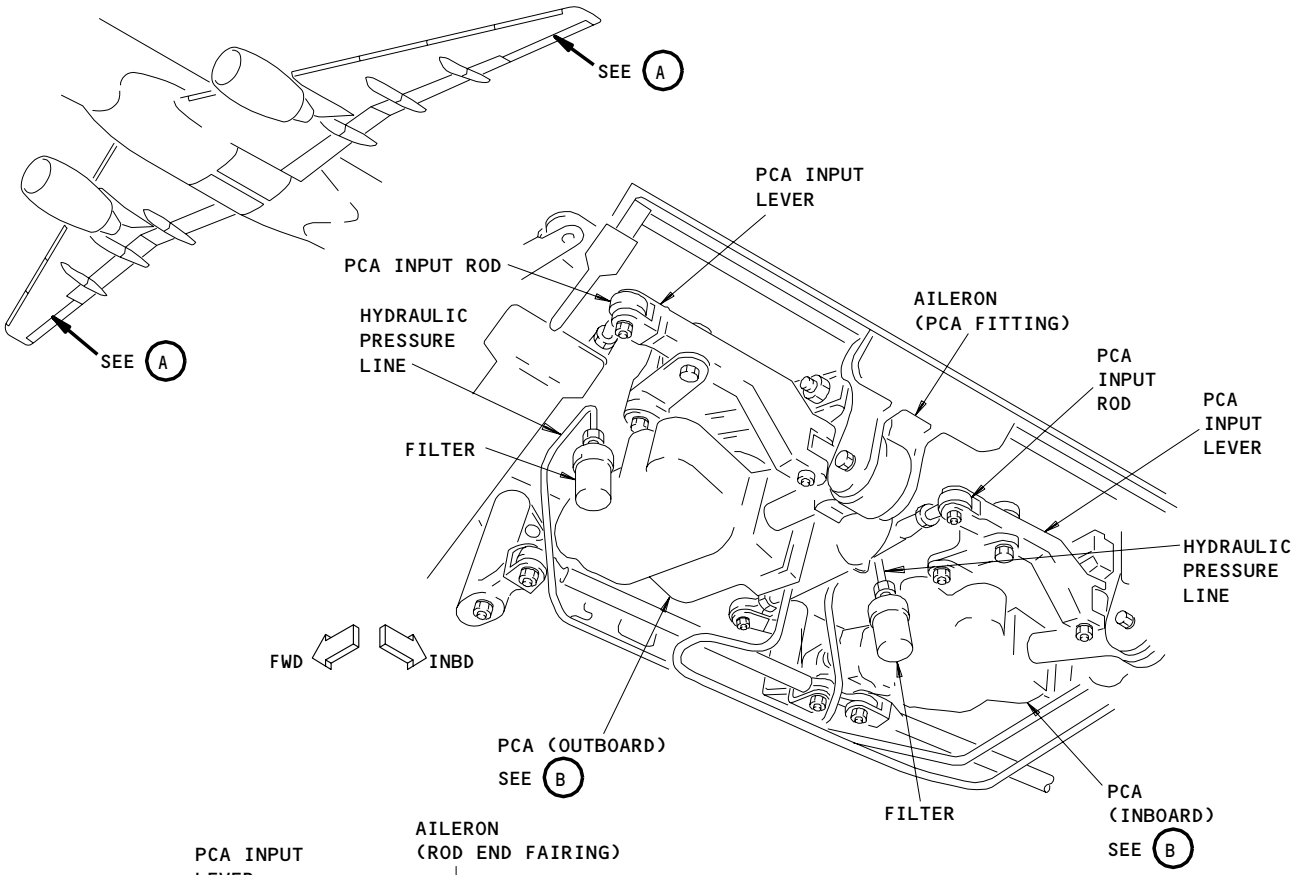
Lateral Control Override Mechanism
Figure 4



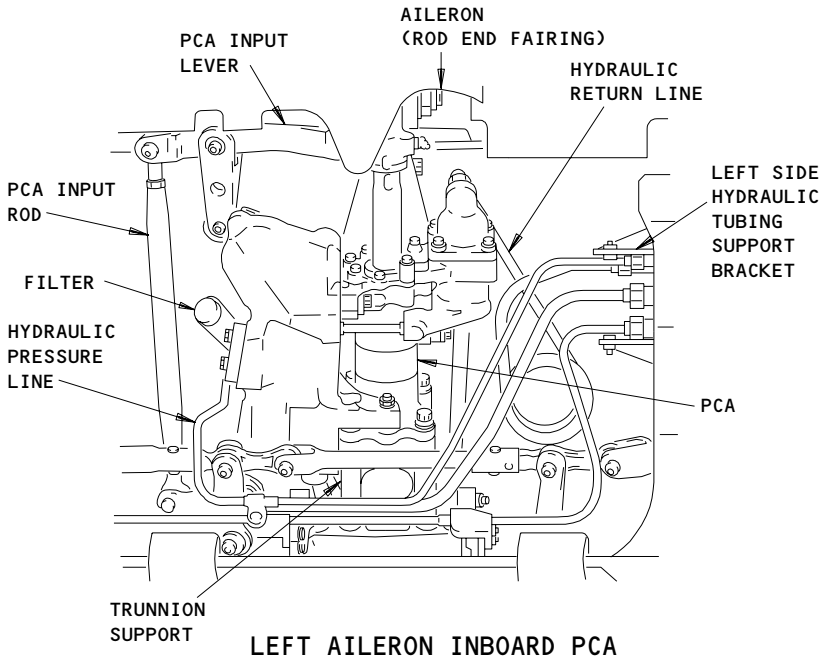
AILERON QUADRANT AND OVERRIDE MECHANISM

B

Aileron Quadrant and Override Mechanism
Figure 5

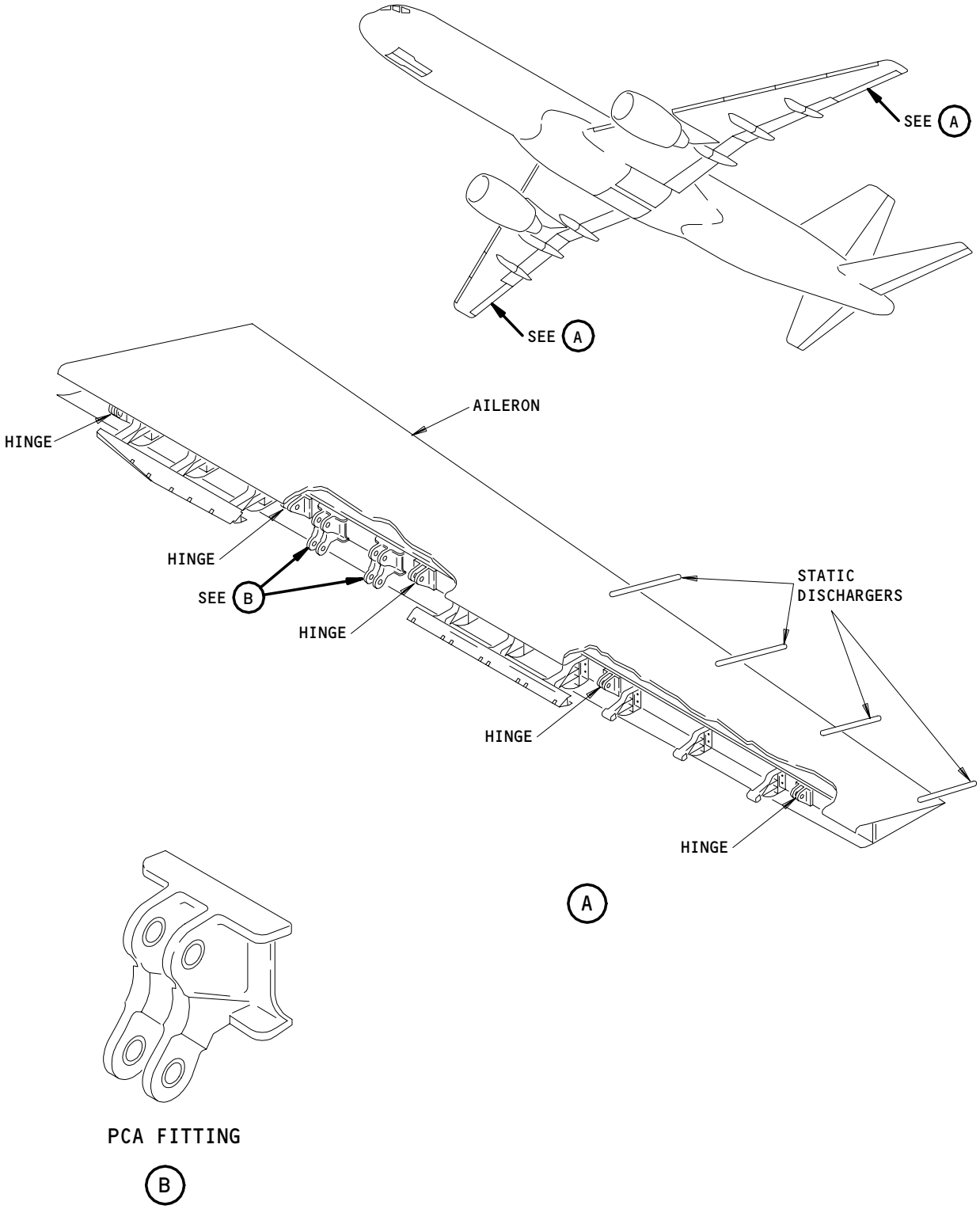


AILERON PCA
(LEFT SIDE SHOWN,
RIGHT SIDE EQUIVALENT)
A



LEFT AILERON INBOARD PCA
B

Power Control Actuators
Figure 6



Aileron Panel
Figure 7

3. Operation

A. Functional Description (Fig. 8, 9, 10)

(1) Manual Operation

(a) Control wheel rotation provides the initial manual command inputs to the lateral control system. Control cables relay commands to lateral control mechanisms in the left and right main gear wheel wells.

(b) The feel, centering, and trim mechanism and the lateral control override mechanism receive cable command inputs from the control wheel. Linked by a control rod, the mechanisms act together through control cables commanding left and right ailerons equally, but in opposite directions.

(c) The aileron quadrant receives cable commands from the left or right wheel well mechanisms. As the quadrant rotates, it moves mechanical linkage to the PCAs. This causes the PCA servo valve to port hydraulic power to the actuators. Under hydraulic pressure, the actuator extends or retracts and the aileron is raised or lowered as required.

(2) Abnormal Operation

(a) Each aileron component has a breakout or override so that the aileron system will remain operable should it or a downstream component become jammed.

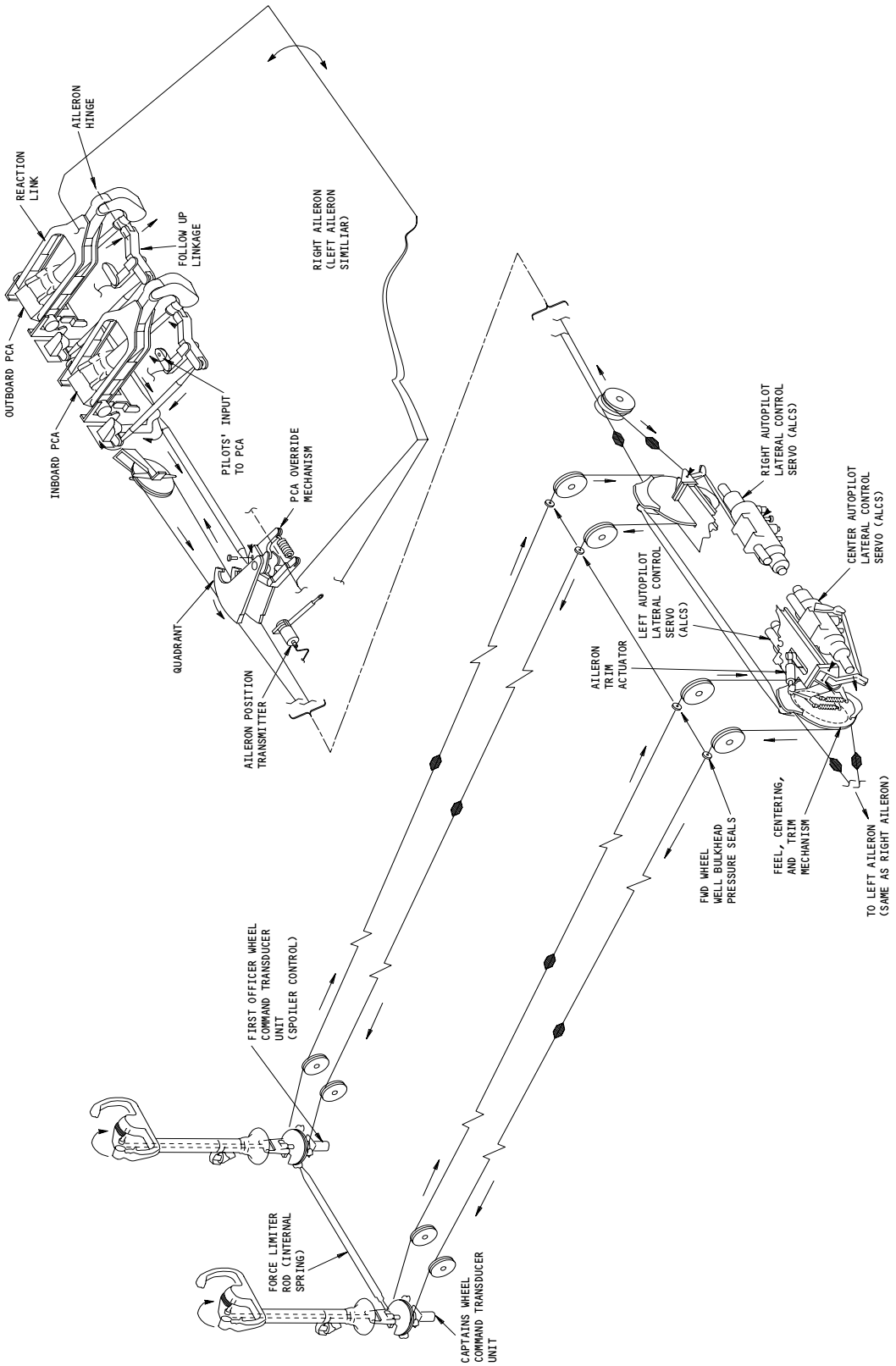
(b) The captain's and first officer's control wheels are joined by a bus force limiter rod. Should either control wheel become inoperable, the force limiter's two-way spring allows the other wheel to operate the remaining aileron system independently.

(c) The feel, centering, and trim mechanism and the lateral control override mechanism each have an override or shear joint to allow continued operation of one should the other become jammed.

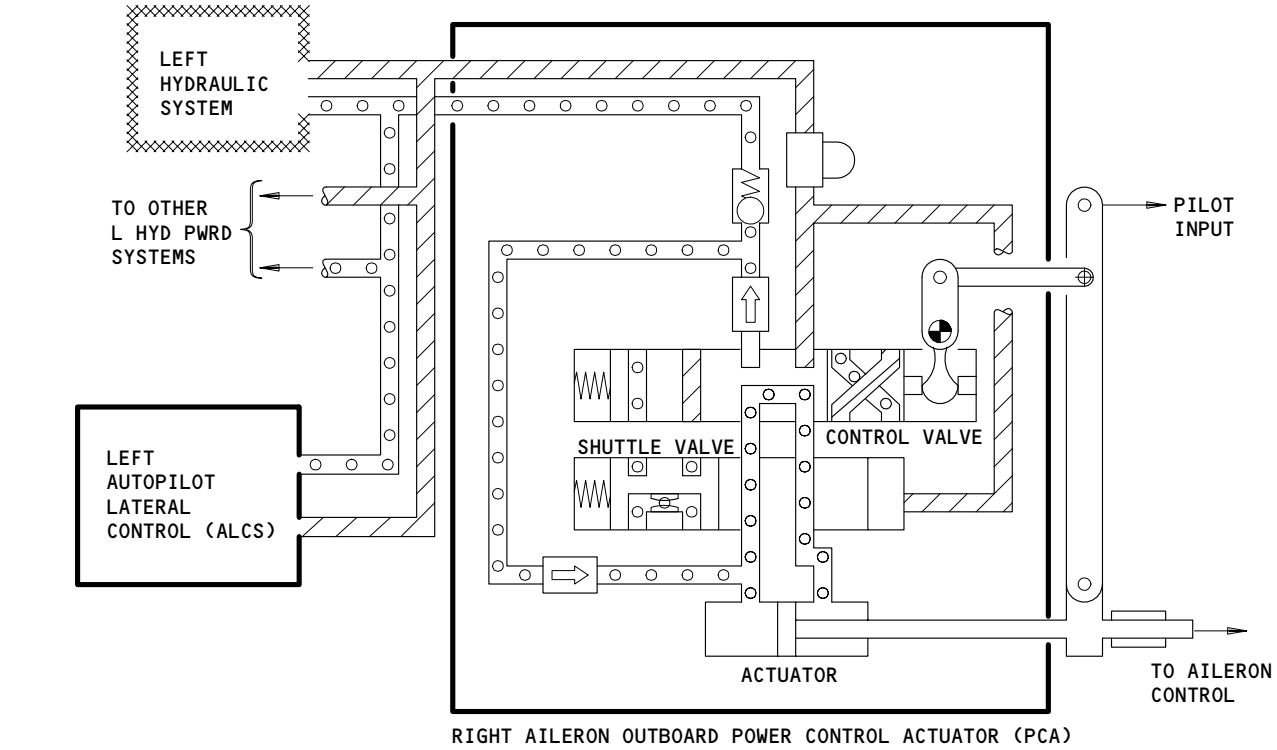
(d) The wing aileron override mechanism can allow break out of a PCA jam or an aileron quadrant jam. These overrides ensure continued use of the remaining aileron.

(3) Autopilot Operation

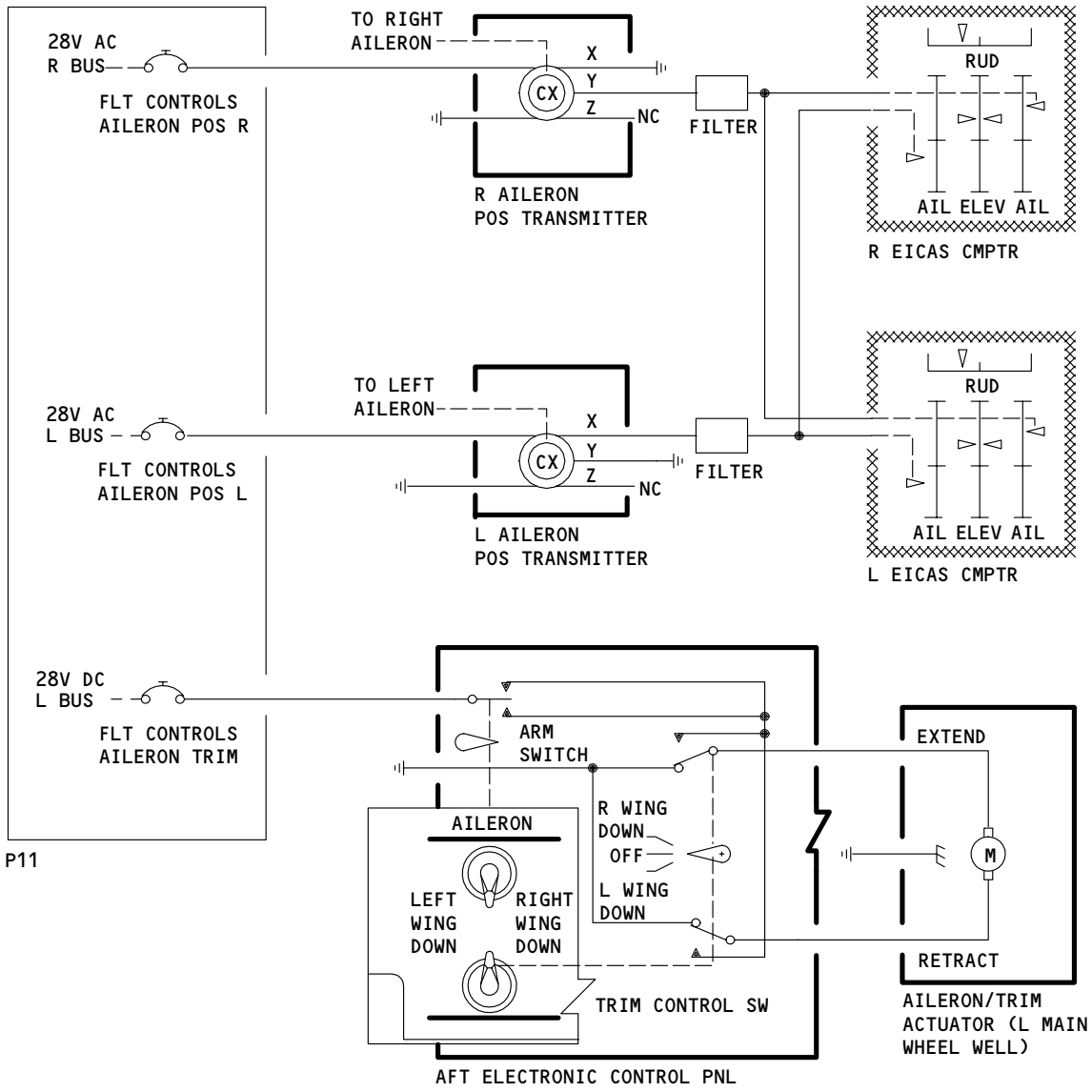
(a) The autopilot lateral control servos (ALCS's) receive commands directly from the autopilot system. The ALCS's are linked directly to the wheel well mechanisms by cranks. Autopilot commands cause the cranks to move which drive the wheel well mechanisms. Actual aileron control remains the same as with manual operation.



Aileron Control System Schematic (Mechanical)
Figure 8



Aileron Control System Schematic (Hydraulic)
Figure 9



Aileron Control System Schematic (Electrical)
Figure 10

B. Control

(1) Provide electrical power (Ref 24-22-00).
(2) Check that EICAS circuit breakers on overhead circuit breaker panel P11 are closed (6 places).
(3) Press STATUS button on pilot's display select panel P9 to display control surface position indicator on lower EICAS display unit.

WARNING: TO PREVENT INJURY OR DAMAGE, CLEAR PERSONNEL AND EQUIPMENT FROM CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. KEEP AREA CLEAR WHEN OPERATING CONTROL SURFACES.

(4) Provide left, center, and right hydraulic system power (Ref 29-11-00).
(5) Aileron operation (lateral control wheel)

CAUTION: AIRPLANES WITH CONTROL WHEEL DAMPER; DO NOT TURN THE AILERON WHEEL QUICKLY AND CONTINUOUSLY FOR MORE THAN 30 SECONDS, THE DAMPER MAY OVERHEAT. ALLOW 10 MINUTES FOR THE DAMPER TO COOL.

(a) Rotate either control wheel in clockwise direction. Left aileron will move down and right aileron will move up.
(b) Rotate either control wheel counterclockwise. Left aileron will move up and right aileron will move down.
(c) Place control wheels in neutral position.

(6) Aileron operation (aileron trim actuator)
(a) Hold aileron trim switches in LEFT WING DOWN or RIGHT WING DOWN position. Control wheels will move in response to switch commands.

(7) Remove hydraulic power.
(8) Remove electrical power.

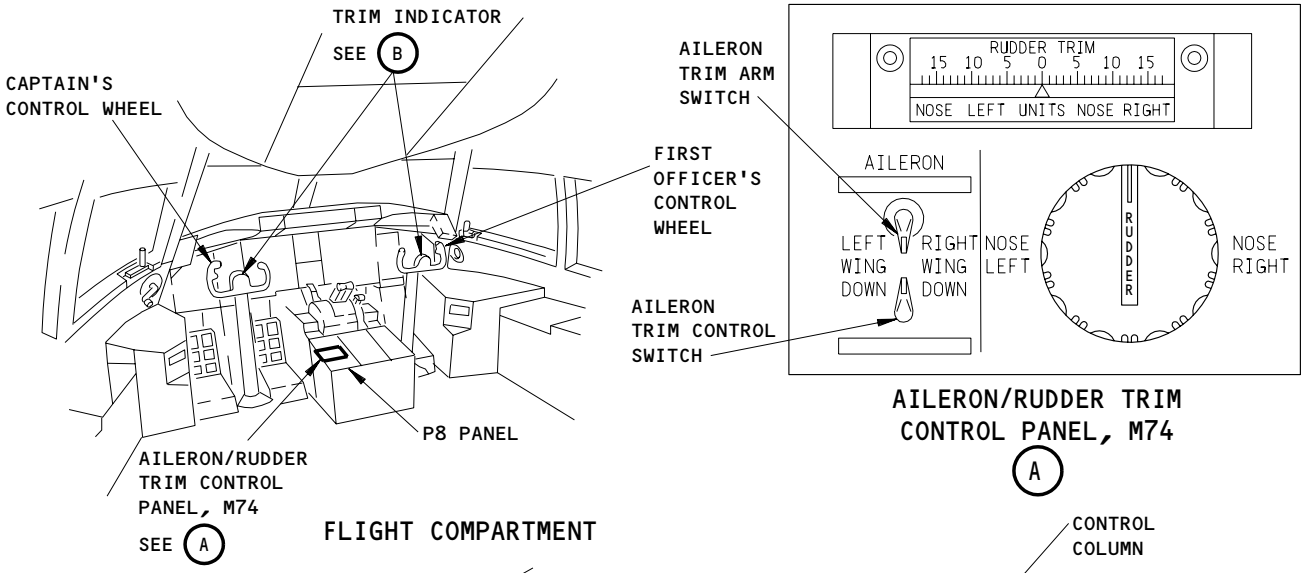
AILERON AND AILERON TRIM CONTROL SYSTEM

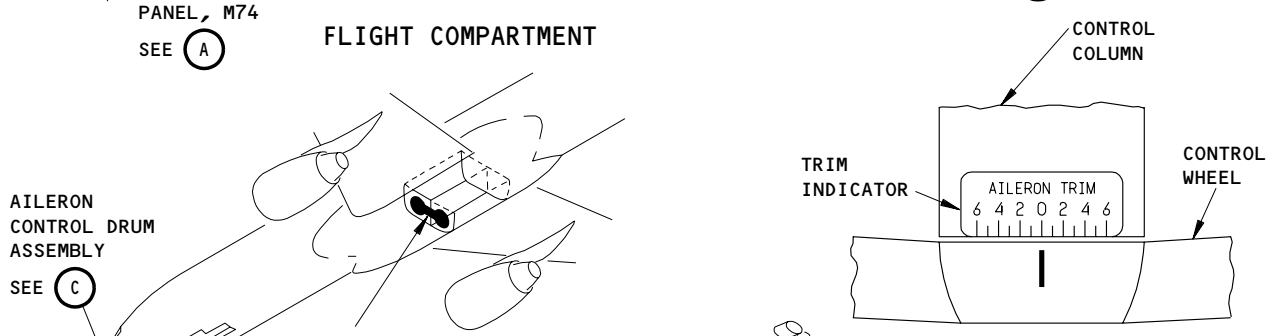
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR (PCA) - AILERON POWER CONTROL	3	4	561CB,661CB	27-11-20
ACTUATOR - LATERAL TRIM, M488	2	1	LEFT MAIN GEAR WHEEL WELL, LATERAL CONTROL FEEL, CENTERING AND TRIM MECHANISM	27-11-14
AILERON - 568,668	3	2	WING TRAILING EDGE	27-11-21
ASSEMBLY - AILERON CONTROL DRUM	1	2	113AL, FWD EQUIP COMPT	27-11-03
CABLES - CONTROL (REF MM 27-00-01/201)				
CIRCUIT BREAKER	1		FLT COMPT, P11	
AILERON POS L, C4099		1	11J14	*
AILERON POS R, C4100		1	11J23	*
AILERON TRIM, C1035		1	11J15	*
DAMPER - CONTROL WHEEL 1	1	2	113AL, FWD EQUIP COMPT	27-11-03
FILTER - AILERON PCA	3	4	561CB,661CB, AILERON PCA	27-11-20
INDICATOR - AILERON TRIM	1	2	FLT COMPT, CONTROL WHEEL	27-11-00
LIMITER - BUS FORCE	1	1	113AL, FWD EQUIP COMPT	27-11-03
MECHANISM - AILERON QUADRANT AND OVERRIDE	3	2	561AB,661AB	27-11-18
MECHANISM - LATERAL CONTROL FEEL, CENTERING, AND TRIM	2	1	LEFT MAIN GEAR WHEEL WELL, FWD BULKHEAD	27-11-14
MECHANISM - LATERAL CONTROL OVERRIDE	2	1	RIGHT MAIN GEAR WHEEL WELL, FWD BULKHEAD	27-11-16
PANEL - AILERON/RUDDER TRIM CONTROL, M74	1	1	FLT COMPT, P8	*
SERVO (ALCS) - (REF 22-13-00, FIG. 101)				
CENTER AUTOPILOT LATERAL CONTROL, M10041				
LEFT AUTOPILOT LATERAL CONTROL, M10040				
LEFT AUTOPILOT LATERAL CONTROL, M10042				
SWITCH - AILERON TRIM ARM	1	1	FLT COMPT, P8, AIL/RUD TRIM CONT PANEL, M74	*
SWITCH - AILERON TRIM CONTROL	1	1	FLT COMPT, P8, AIL/RUD TRIM CONT PANEL, M74	*
UNIT - (REF 27-61-00, FIG. 101)				
SPOILER TRANSDUCER (RVDT), TS5081,TS5082				
WHEEL - LATERAL CONTROL	1	2	FLT COMPT, CONTROL COLUMN	27-11-02

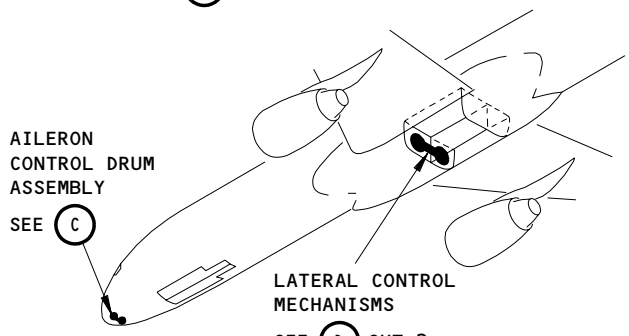
* SEE THE WDM EQUIPMENT LIST

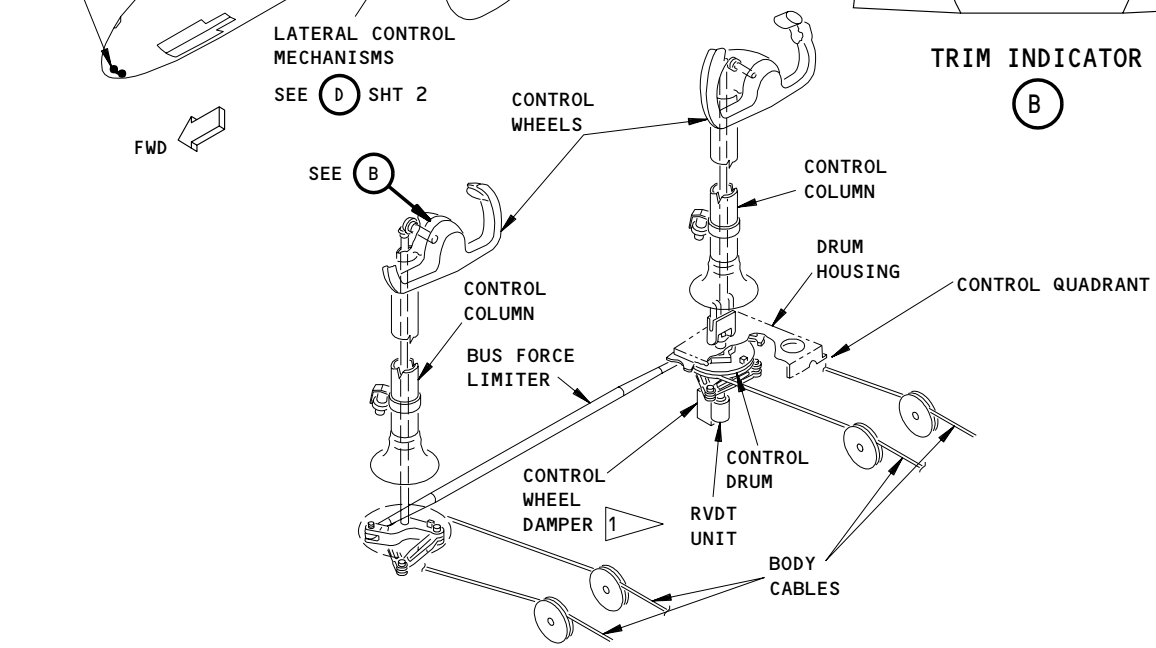
1 AIRPLANES WITH CONTROL WHEEL DAMPER (SB 27A0147 OR PRR 54530-257S)

Aileron and Aileron Trim Control System - Component Index
Figure 101



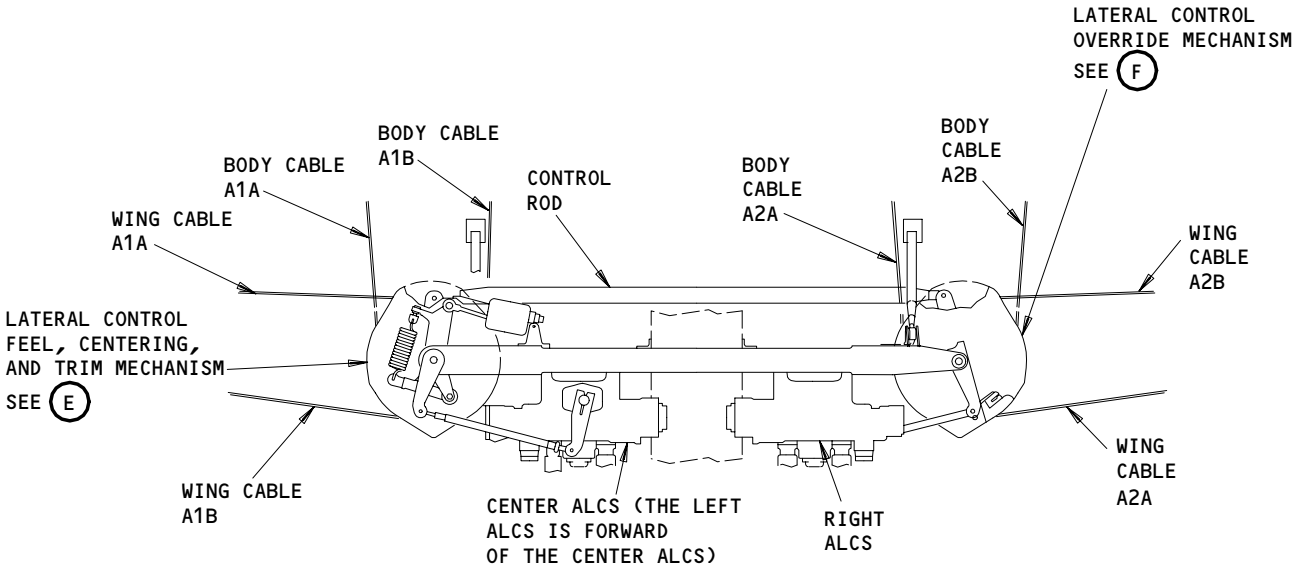






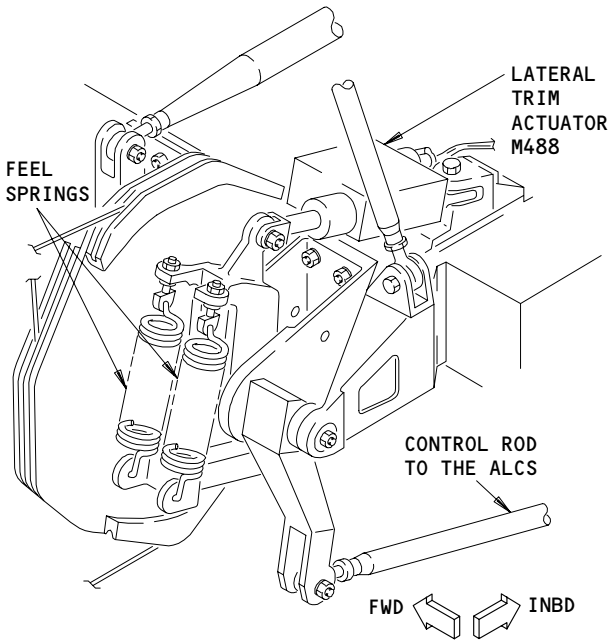
1 AIRPLANES WITH CONTROL WHEEL DAMPER (PRR 54530-257S, SB 757-27A0146 OR SB 757-27A0147)

Aileron and Aileron Trim Control - Component Location
Figure 102 (Sheet 1)



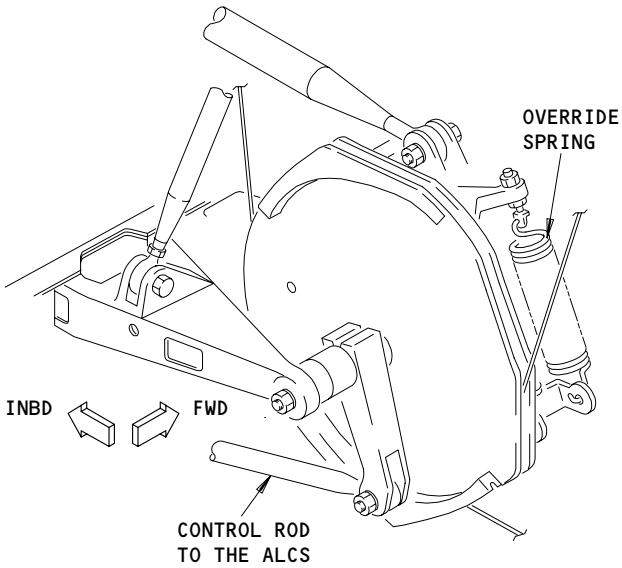
LATERAL CONTROL MECHANISMS

D FROM SHT 1



LATERAL CONTROL FEEL, CENTERING, AND TRIM MECHANISM

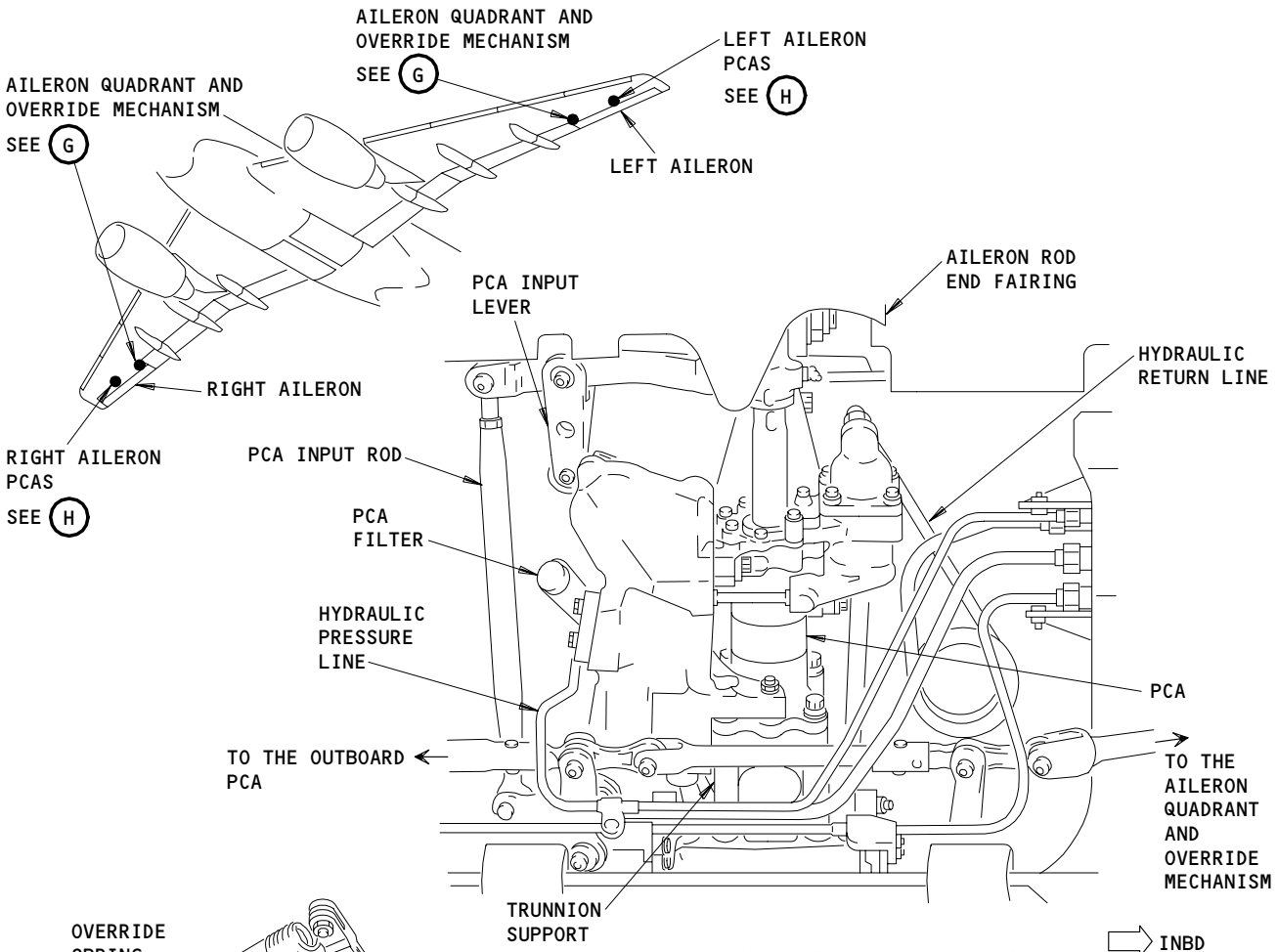
E



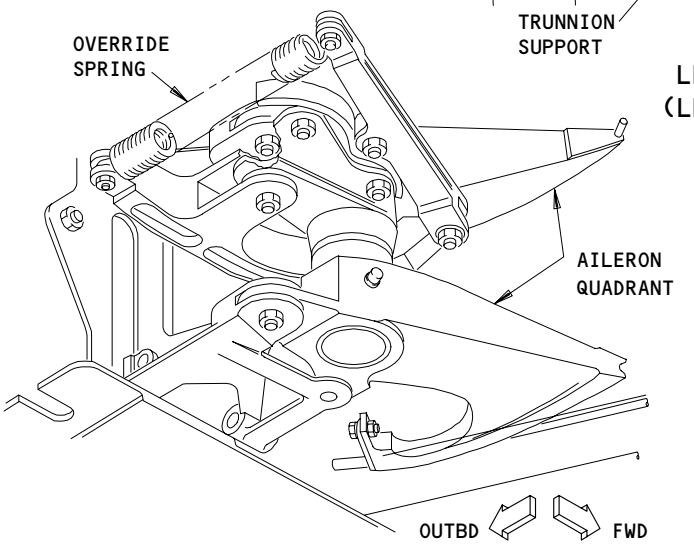
LATERAL CONTROL OVERRIDE MECHANISM

F

Aileron and Aileron Trim Control – Component Location
Figure 102 (Sheet 2)



LEFT OR RIGHT AILERON PCA
(LEFT INBOARD PCA IS SHOWN)
H



AILERON QUADRANT AND OVERRIDE MECHANISM
(LEFT SIDE SHOWN, RIGHT SIDE IS OPPOSITE)
G

Aileron and Aileron Trim Control - Component Location
Figure 102 (Sheet 3)

AILERON AND AILERON TRIM CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains these tasks:

      - Operational Test - Aileron and Aileron Trim Control
      - Adjustment - Aileron and Aileron Trim Control
      - System Test - Aileron and Aileron Trim Control

      - AIRPLANES WITH CONTROL WHEEL DAMPER;
        System Test - Control Wheel Damper

      - Aileron Bus Force Limiter and the Aileron Control Override Mechanism - Test (for Scheduled Maintenance Only)
      - Single Hydraulic System Aileron Control - Test (for Scheduled Maintenance Only)

TASK 27-11-00-715-001

2. Operational Test - Aileron and Aileron Trim-Control System
   A. General
      (1) This procedure is used to make sure that the ailerons and the aileron-trim-control system operate correctly. Special equipment is not necessary.
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems

   C. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)
          211/212 Control Cabin

   D. Prepare for the Test

      S 865-002
      (1) Supply electrical power (AMM 24-22-00/201).

S 865-003

(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 825-004

(3) Push the STATUS button on the display select panel, P9, to show the control-surface position-indicator on the bottom EICAS display.

S 865-005

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

(4) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201).

E. Aileron Response Test

S 215-006

(1) Turn one of the two control wheels clockwise and hold it there for 2 seconds and do the checks that follow:
(a) Make sure that the left aileron moves down and the right aileron moves up.
(b) Make sure that the ailerons move smoothly from their full down position to their full up position.
(c) Make sure that the amber SPOILERS light on the P5 panel is OFF. Make sure that the SPOILERS message does not come into view on the top EICAS display.

S 215-007

(2) Turn one of the two control wheels counterclockwise and do the checks that follow:
(a) Make sure that the left aileron moves up and the right aileron moves down.
(b) Make sure that the ailerons move smoothly from their full down position to their full up position.
(c) Make sure that the amber SPOILERS light on the P5 panel is OFF. Make sure that the SPOILERS message does not come into view on the top EICAS display.

F. Single Hydraulic System Aileron Control Test

S 865-008

(1) Remove the power from the center and right hydraulic systems (AMM 29-11-00/201).

NOTE: If the aileron surface is not powered, it can move down a small distance. This condition is not unusual.

The aileron surface can move up when the control wheel is turned. This is because of the breakout of the wing override mechanism, and the aileron PCU summing lever which moves the rod ends when the PCU control valve bottoms.

S 865-009

(2) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).

S 215-010

(3) Turn one of the two control wheels full clockwise and do the check that follows:
   (a) Make sure that the right aileron moves up when the control wheel is turned. Make sure that the left aileron does not move.

S 215-011

(4) Turn the control wheel full counterclockwise and do the check that follows:
   (a) Make sure that the right aileron moves down when the control wheel is turned. Make sure that the left aileron does not move.

S 865-012

(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-013

(6) Supply pressure to the center hydraulic system (AMM 29-11-00/201).

S 215-014

(7) Turn the control wheel full clockwise and do the check that follows:
   (a) Make sure that the right aileron moves up and the left aileron moves down.

S 215-015

(8) Turn the control wheel full counterclockwise and do the check that follows:
   (a) Make sure that the right aileron moves down and the left aileron moves up.

S 865-016
(9) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 865-017
(10) Supply pressure to the right hydraulic system only (AMM 29-11-00/201).

S 215-018
(11) Turn the control wheel full clockwise and do the check that follows:
(a) Make sure that the left aileron moves down when the control wheel is turned. Make sure that the right aileron does not move.

S 215-019
(12) Turn the control wheel full counterclockwise and do the check that follows:
(a) Make sure that the left aileron moves up when the control wheel is turned. Make sure that the right aileron does not move.

S 825-020
(13) Move the control wheel to its neutral position.

S 865-021
(14) Supply pressure to the left and center hydraulic systems (AMM 29-11-00/201).

G. Aileron Trim Control Test

S 215-022
(1) Move the aileron trim switches on the aft electronic-control panel, P8, to RIGHT WING DOWN. Hold the switches in this position until the control wheel movement stops and do the checks that follow:
(a) Make sure that the control wheels turn clockwise approximately 30 degrees from the neutral position.

S 215-023
(2) Move the aileron trim switches to LEFT WING DOWN. Hold the switches in this position until the control wheel movement stops and do the checks that follow:
(a) Make sure that the control wheels turn counterclockwise 30 +/- 2 degrees from the neutral position.

S 825-024
(3) Move the aileron trim switches to their neutral position.

NOTE: It might be necessary to rotate the control wheel in the left and right directions in decreasing amounts until the neutral position can be determined by feel.

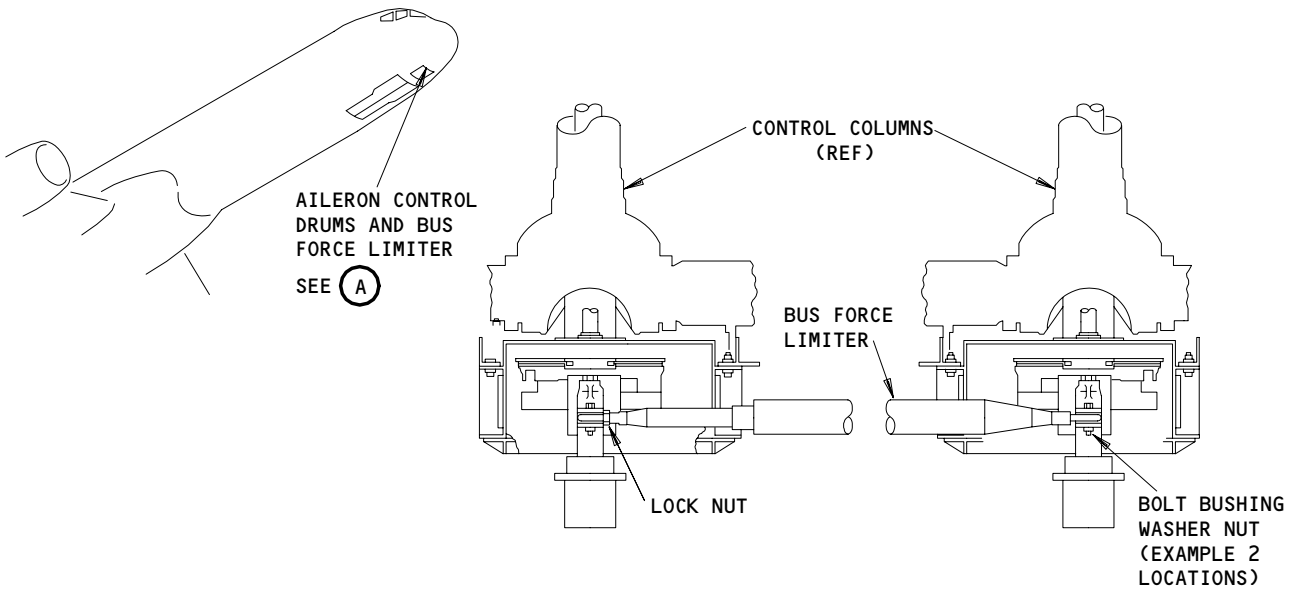
H. Aileron Bus Force Limiter and the Aileron (Lateral) Control Override Mechanism - Test

S 825-025
(1) Hold the captain's control wheel in its neutral position.

S 215-026
(2) Turn the first-officer's control wheel fully clockwise, then counterclockwise, and release.
(a) Do these checks:
1) Make sure the right aileron operates when you turn the control wheel.
2) Make sure the control wheel moves smoothly and does not need too much force.

S 825-028
(3) Hold the first officer's control wheel in its neutral position.

S 215-027
(4) Turn the captain's control wheel fully clockwise, then counterclockwise, and release.
(a) Do these checks:
1) Make sure the left aileron operates when you turn the control wheel.



AILERON CONTROL DRUMS AND BUS FORCE LIMITER
(AFT VIEW)
A

Aileron Control-Drum Adjustment
Figure 501

2) Make sure the control wheel moves smoothly and does not need too much force.

I. Put the Airplane Back to Its Usual Condition

S 865-029

(1) Remove electrical power if it is not necessary (Ref 24-22-00/201).

TASK 27-11-00-825-030

3. Adjust the Aileron and Aileron Trim Control System

A. General

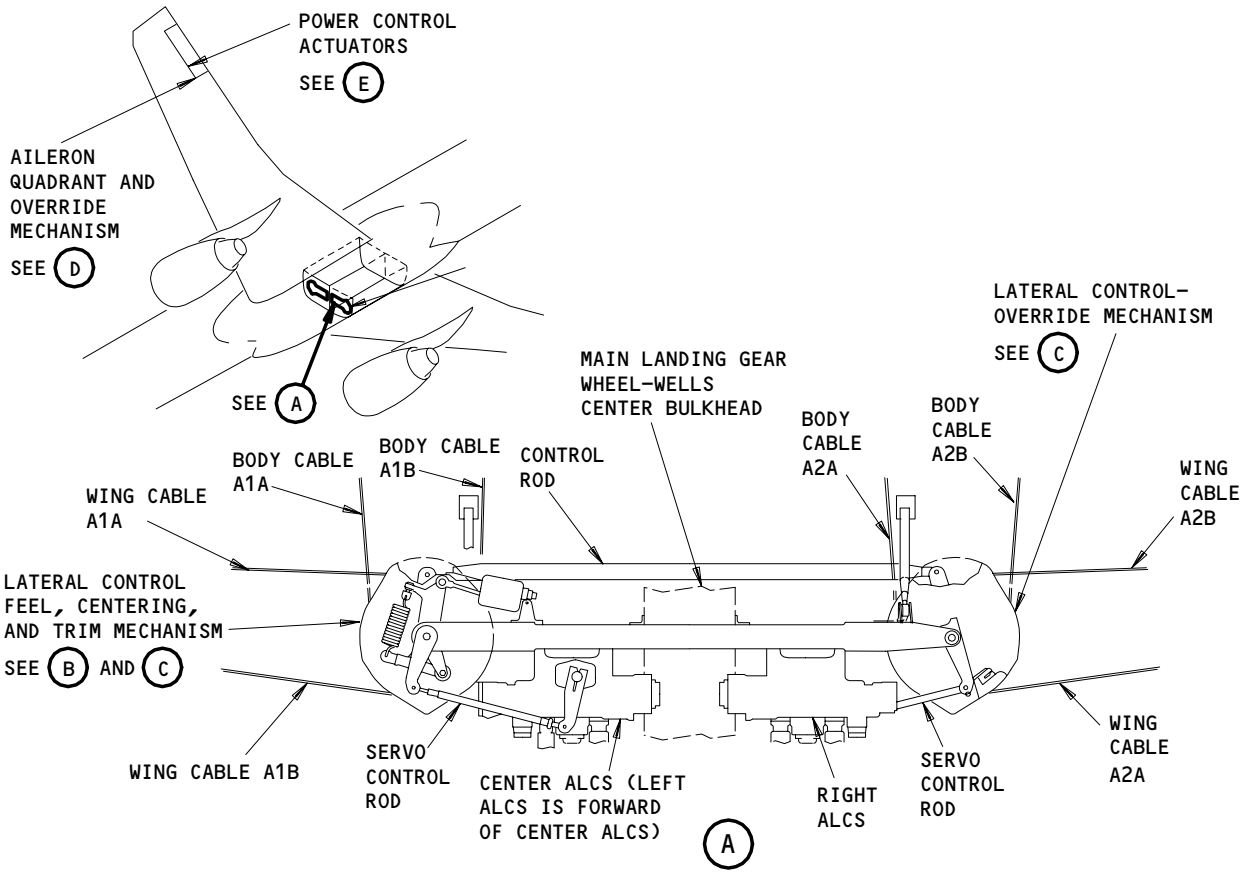
(1) SYSTEM ADJUSTMENT SEQUENCE — This task adjusts the aileron control system and its components in the sequence that follows. This sequence is recommended for a complete system adjustment:

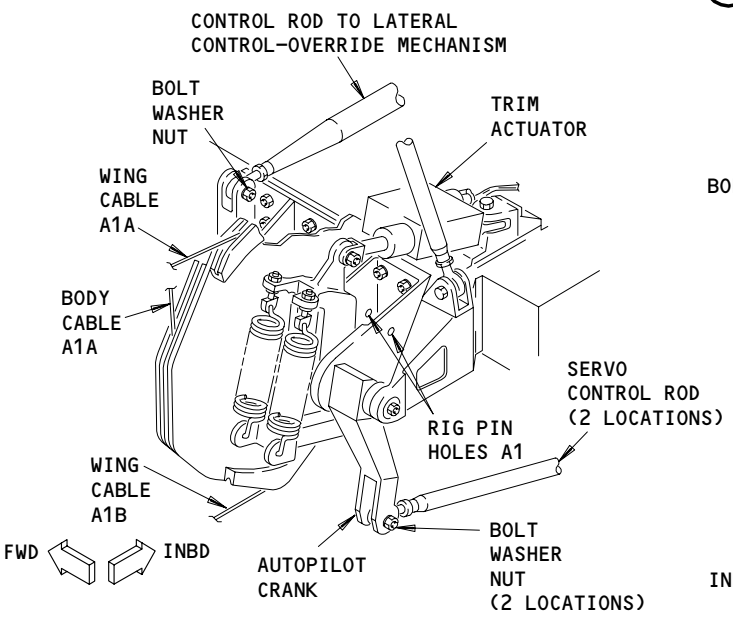
ADJUSTMENT	COMPONENT/MECHANISM
G	Control Wheel
H	Aileron Body Cable
I	Left Wing Cables
J	Right Wing Cables
K	Aileron PCU

(2) OUT OF SEQUENCE ADJUSTMENTS - It is possible to adjust some components in a different sequence. You must do some other adjustments before the component adjustment and some adjustments after it is done. The necessary adjustments are as follows:

ADJUSTMENT	COMPONENT YOU WILL ADJUST OUT-OF-SEQUENCE	ADJUSTMENTS YOU MUST DO BEFORE	ADJUSTMENTS YOU MUST DO AFTER
G	Control Wheel	NONE	NONE
H	Aileron Body Cables	G	NONE
I	Left Wing Cables	G	NONE
J	Right Wing Cables	G	NONE
K	Aileron Power Control Actuator	G,H,I,J	NONE

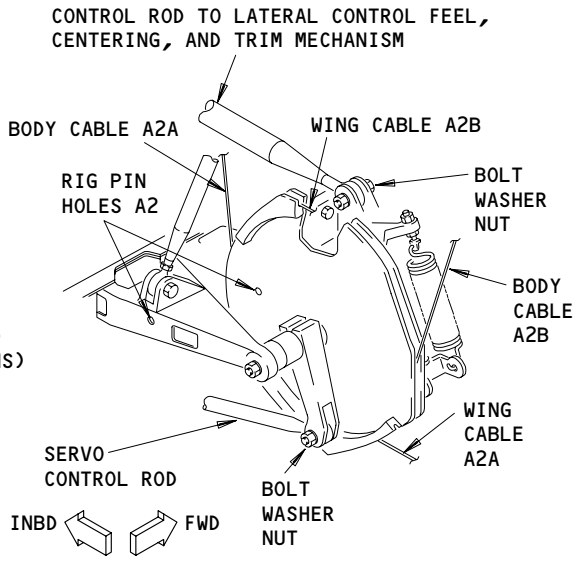
(3) Before this procedure is done, make sure that the airplane temperature is stable (use a tolerance of ±5°F) along the cable. Make sure that the temperature has been stable for at least one hour.





LATERAL CONTROL FEEL, CENTERING, AND TRIM MECHANISM

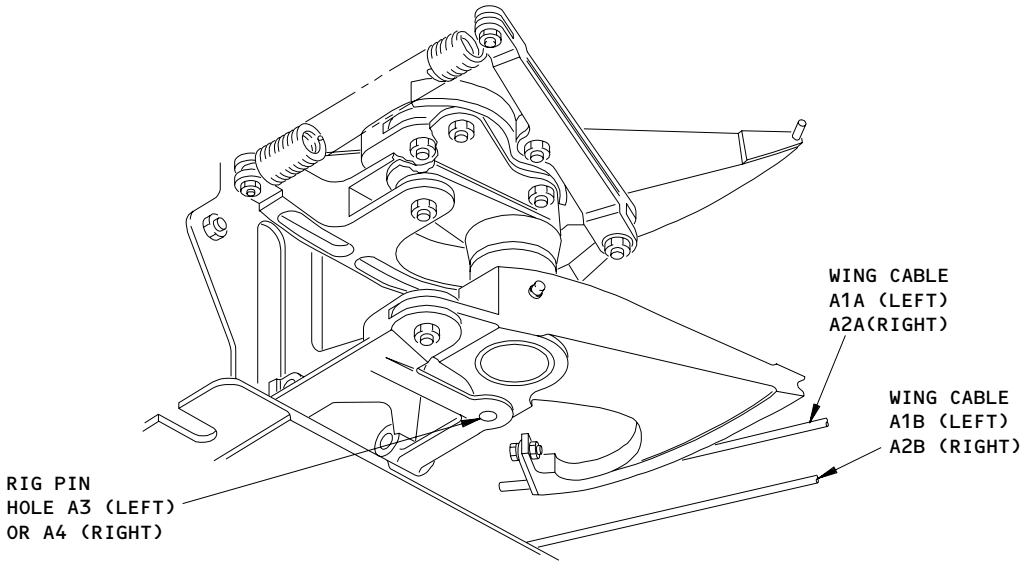
B



LATERAL CONTROL–OVERRIDE MECHANISM

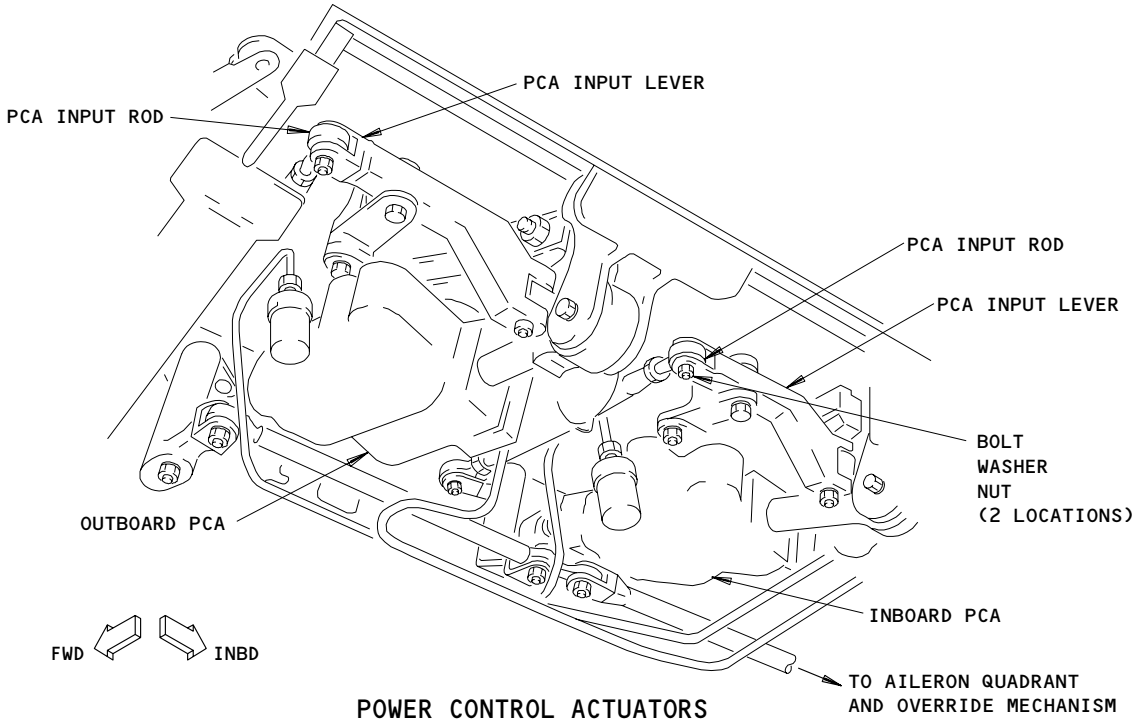
C

Aileron and Aileron Trim Control–System Adjustment
Figure 502 (Sheet 1)



AILERON QUADRANT AND OVERRIDE MECHANISM
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

D



POWER CONTROL ACTUATORS
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

E

Aileron and Aileron Trim-Control System Adjustment
Figure 502 (Sheet 2)

B. Equipment
(1) Control Wheel Adapter Equipment - A27021-97 or -98
(2) Control Wheels Rigging Beam - B27049-1
(3) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
(a) A1 - P/N B20003-27
(b) A2 - P/N B20003-25
(c) A3 - P/N B20003-23
(d) A4 - P/N B20003-23

C. Consumable Materials
(1) D00015 Grease, Corrosion Preventive - BMS 3-24

D. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 06-44-00/201, Wing Access Doors and Panels
(3) 20-10-03/401, Control Cables
(4) 20-10-24/201, Rig Pins
(5) 24-22-00/201, Electrical Power - Control
(6) 27-51-00/201, Trailing Edge Flap System
(7) 27-51-00/501, Trailing Edge Flap System
(8) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
(9) 32-00-15/201, Landing Gear Door Locks
(10) 32-00-20/201, Landing Gear Downlocks

E. Access
(1) Location Zones

113	Area forward of NLG wheel well (Left)
561	Rear spar to TE (Left)
661	Rear spar to TE (Right)

(2) Access Panels

113AL	Flight/Landing Gear/Engine Control Components
561AB	Aileron Quadrant (Left)
561CB	Aileron Power Limit (Left)
661AB	Aileron Quadrant (Right)
661CB	Aileron Power Limit (Right)

F. Prepare for Adjustment

S 015-031
(1) Open access door 113AL (AMM 06-41-00/201).

S 015-032
(2) Open access panels 561AB and 561CB (left aileron) and 661AB and 661CB (right aileron) (AMM 06-44-00/201).

S 865-033
(3) Supply electrical power (AMM 24-22-00/201).

S 865-034
(4) Retract the trailing edge flaps.

S 865-035
(5) Do the deactivation procedure for the flaps (AMM 27-51-00/201).

S 495-036
(6) Make sure the downlocks for the nose and main landing gear are installed (AMM 32-00-20/201).

S 495-037

WARNING: MAKE SURE THAT THE DOOR LOCKS ARE INSTALLED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(7) Open the main gear doors and install the door locks (AMM 32-00-15/201).

G. Adjust the Control Wheels (Fig. 501)

S 825-231
(1) Put the captain's and first officer's control wheel in neutral.

NOTE: Neutral is achieved by clamping a straight edge across the lower surface of each wheel.

S 825-039
(2) Use a clamp to attach the rigging beam to the control wheels.
(a) Make sure the lower surfaces of the two control wheels touch the rigging beam.

S 035-038
(3) Disconnect the bus-force-limiter rod from the first-officer's drum assembly.

S 035-040
(4) Remove the lockwire and loosen the locknut on the bus-force-limiter rod.

S 825-041
(5) Adjust the length of the bus-force-limiter rod until the attach bolt can be easily installed.

S 435-043
(6) Tighten the locknut to 75-100 pound-inches (8.5-11.3 newton-meters) and install the lockwire.
(a) Make sure the rod end threads cover at least 1/2 of the inspection holes at each end of the bus-force-limiter rod.

S 435-042
(7) Install the bolt, bushing, washer, and nut at the rod end. Apply grease if it is necessary.

S 085-232
(8) Remove the rigging beam from the control wheels.

S 435-233
(9) If you are installing or replacing the column and/or drum installations, do the steps that follow:

NOTE: The following tasks are completed with no control cables installed.

(a) Move the control wheels to neutral and install the control-wheel adapter equipment and the protractor.

NOTE: To identify the neutral position, attach a rigging beam across the bottom of the control wheels. The neutral position is found when the control wheel surfaces are no more than 0.05 inch (1.27 mm) away from the rigging beam surface.

(b) Make sure the bus-force-limiter rod (pogo) is adjusted correctly with straight edge isntalled across the control wheels.
1) Remove the rigging beam from the control wheels.
2) Turn the captain's control-wheel clockwise and then counterclockwise full travel and do the check that follows:
3) Make sure the control wheel moves a minimum of 82.5 degrees in each direction.
4) Do the above step again for the first-officer's control-wheel.

5) Make sure that the torque that is necessary to move the opposite wheel is less than 4 pound-inches (0.45 Nm).
6) Remove the control-wheel adapter equipment.

H. Adjust the Aileron Body Cables A1A, A1B, A2A, and A2B (Fig. 502)

NOTE: Make sure that the control wheels are adjusted correctly (see the control wheel adjustment procedure) before you do the aileron body-cable adjustment.

S 825-050
(1) Center the aileron trim system by operating the aileron trim switches on the aft electronic-control panel, P8. Make sure that rig pin A1 can be easily put into the lateral feel, centering and trim mechanism. Make sure that the roller is centered on the feel cam.

S 035-051
(2) Remove rig pin A1.

S 825-052
(3) When new cables are installed, it is recommended that they be initially tightened to two times the rigging value shown in Table 1. Cycle the cables through their full travel 20 times and then decrease their tension to the value shown in Table 1.

NOTE: See AMM 20-10-03/401 for Control Cables Removal/Installation instructions.

S 825-053
(4) Do not adjust the aileron cables until these conditions are satisfactory:
(a) The airplane temperature must be stable (use a tolerance of ±5°F) along the cable and have been stable for at least one hour.

(b) Make sure that the cables are not bent by the fairleads, rubstrips, or grommets that are in the system.
(c) Make sure that the cable guards are installed correctly and that the pulleys turn freely.
(d) Make sure that no more than two threads show at the turnbuckles when the system is rigged correctly.
(e) Make sure that the clip locks are installed on the turnbuckles.
(f) Make sure that you can see the rod-end threads through the control-rod inspection-holes after the adjustment is done.

S 035-054
(5) Disconnect one end of the control rod from the lateral feel, centering, and trim mechanism. Disconnect the other end of the control rod from the lateral-control override mechanism.

S 825-055
(6) Move the control wheels to neutral.

NOTE: To identify the neutral position, attach a rigging beam across the bottom of the control wheels. The neutral position is found when the control wheel surfaces are no more than 0.05 inch (1.27 mm) away from the rigging beam surface.

S 825-056
(7) Adjust the body cables to the values shown in Table 1. Make sure that rig pins A1 and A2 can be easily installed.

S 435-057
(8) Install rig pins A1 and A2.

S 435-059
(9) Connect the control rod between the lateral feel, centering and trim mechanism and the lateral control override mechanism. Adjust the length if it is necessary. Make sure that the bolts at each end can be easily installed.

NOTE: If it is necessary, adjust the control rod end that is connected to the lateral-control override mechanism.

S 035-060

(10) Remove the rigging beam. Turn the control wheels clockwise and then counterclockwise. Make sure that the control wheels go back to neutral.

S 825-061

(11) Move the control wheels to neutral.

NOTE: To identify the neutral position, attach a rigging beam across the bottom of the control wheels. The neutral position is found when the control wheel surfaces are no more than 0.05 inch (1.27 mm) away from the rigging beam surface.

TEMP °F (± 5°F)	BODY CABLES A1A, A1B, A2A & A2B (± 10 LBS)	WING CABLES A1A, A1B, A2A & A2B (± 10 LBS)
110	118	98
90	109	89
80	104	84
70	100	80
60	96	76
50	92	72
40	88	68
30	84	64
10	75	55
-10	67	47
-30	59	39
-40	53	33

Aileron Cable Rigging Loads
Table 1

I. Adjust the Left Wing Cables A1A and A1B (Fig. 502)

NOTE: Make sure that the control wheels are adjusted correctly (see the control wheel adjustment procedure) before you do the left wing cable adjustment.

S 825-062

(1) When new cables are installed, it is recommended that they be initially tightened to two times the rigging value shown in Table 1. Cycle the cables through their full travel 20 times and then decrease their tension to the value shown in Table 1.

S 825-063

(2) Do not adjust the aileron cables until these conditions are satisfactory:
   (a) The airplane temperature must be stable (use a tolerance of ±5°F) along the cable and have been stable for at least one hour.
   (b) Make sure that the cables are not bent by the fairleads, rubstrips, or grommets that are in the system.
   (c) Make sure that the cable guards are installed correctly and that the pulleys turn freely.
   (d) Make sure that no more than two threads show at the turnbuckles when the system is rigged correctly.
   (e) Make sure that the clip locks are installed on the turnbuckles.
   (f) Make sure that you can see the rod-end threads through the control-rod inspection holes after the adjustment is done.

S 825-064

(3) Operate the aileron trim switches on the P8 panel until rig pin A1 can be easily installed. Make sure that the roller is centered in the feel cam.

S 435-065

(4) Install rig pin A1.

S 825-066
(5) Adjust the left wing cables A1A and A1B tensions to the values shown in Table 1. Make sure that rig pin A3 can be easily installed in the left aileron quadrant-and-override mechanism.

S 035-156
(6) Remove rig pins A1 and A3.

J. Adjust the Right Wing Cables A2A and A2B (Fig. 502)

NOTE: Make sure that the control wheels are adjusted correctly (see the control wheel adjustment procedure) before you do the right wing cable adjustment.

S 825-068
(1) When new cables are installed, it is recommended that they be initially tightened to two times the rigging value shown in Table 1. Cycle the cables through their full travel 20 times and then decrease their tension to the value shown in Table 1.

S 825-069
(2) Do not adjust the aileron cables until these conditions are satisfactory:
(a) The airplane temperature must be stable (use a tolerance of ±5°F) along the cable and have been stable for at least one hour.
(b) Make sure that the cables are not bent by the fairleads, rubstrips, or grommets that are in the system.
(c) Make sure that the cable guards are installed correctly and that the pulleys turn freely.
(d) Make sure that no more than two threads show at the turnbuckles when the system is rigged correctly.
(e) Make sure that the clip locks are installed on the turnbuckles.
(f) Make sure that you can see the rod-end threads through the control-rod inspection holes after the adjustment is done.

S 825-070
(3) Operate the aileron trim switches on the P8 panel until rig pin A2 can be easily put into the lateral-control override mechanism.

S 435-071
(4) Install rig pin A2.

S 825-072
(5) Adjust the right wing cables A2A and A2B to the tension values shown in Table 1. Make sure that rig pin A4 can be easily installed in the right aileron quadrant-and-override mechanism.

S 035-073
(6) Remove rig pins A2 and A4.

K. Adjust the Aileron Power Control Actuators (PCAs) (Fig. 502)

NOTE: Make sure that the control wheels, the aileron body cables, and the left and right wing cables are adjusted correctly (per adjustment procedures described in this manual) before you do the adjustment of the aileron power control actuator.

S 225-074
(1) If a change has been made which could affect the rig of the trailing edge flaps, you must do the steps to make sure that the trailing edge flaps are rigged correctly (AMM 27-51-00).

S 865-075

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA DURING THEIR OPERATION.

(2) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 825-076
(3) Move the control wheels to their neutral position.

S 435-077
(4) Install rig pin A3 in the left aileron quadrant-and-override mechanism.

S 865-078
(5) Remove the power from the left, center and right hydraulic systems (AMM 29-11-00/201).

S 035-079
(6) Disconnect the left inboard PCA input-rod from the PCA input lever and loosen the locknuts at the two ends.

S 865-080
(7) Supply pressure to the right hydraulic system (AMM 29-11-00/201).

S 825-081
(8) Adjust the left outboard PCA input-rod to make the inboard trailing edge of the left aileron align with the outboard trailing-edge of the flaps (use a tolerance of 0.06 inch (1.5 mm)). Tighten the input rod locknuts at the two ends.

NOTE: When you adjust the aileron, move the aileron trailing edge from a lower position to a higher position.

A straight edge can be used to measure this dimension. Put the straight edge across the aileron inboard-trailing-edge top surface and the main flap outboard-trailing-edge top surface. Measure the vertical distance between the control surfaces to find the neutral position.

S 865-082
(9) Remove the power from the right hydraulic system (AMM 29-11-00/201).

S 225-083
(10) Make sure that the left aileron inboard-trailing-edge is aligned with the flap outboard-trailing-edge. If it is not aligned, keep a record of the difference.

S 435-084
(11) Connect the left inboard PCA input-rod to the left inboard PCA input-lever. Tighten the nut to 50-80 pound-inches (5.6-9.0 Nm).

S 865-085
(12) Supply pressure to the center hydraulic system (AMM 29-11-00/201).

S 825-086
(13) Adjust the left inboard PCA input-rod to make the left aileron inboard-trailing-edge align with the flap outboard-trailing-edge. Make sure that the left aileron inboard trailing edge is in the same position it was before (use the record you kept for the outboard PCA and a vertical tolerance of 0.06 inch (1.5 mm) from that dimension).

S 435-087
(14) Tighten the locknuts on the inboard PCA input-rod.

S 865-088
(15) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 035-213
(16) Remove the rig pin A3 from the left aileron quadrant-and-override mechanism.

S 435-158
(17) Install rig pin A4 in the right aileron quadrant-and-override mechanism.

S 035-160
(18) Disconnect the right inboard PCA input-rod from the PCA input lever and loosen the locknuts at the two ends.

S 865-161
(19) Supply pressure to the left hydraulic system (AMM 29-11-00/201).

S 825-162
(20) Adjust the right outboard PCA input-rod to make the right aileron inboard-trailing-edge align with the outboard-trailing-edge of the flaps (use a tolerance of 0.06 inch (1.5 mm)). Tighten the input rod locknuts at the two ends.

NOTE: When you adjust the aileron, move the aileron trailing edge from a lower position to a higher position.

A straight edge can be used to measure this dimension. Put the straight edge across the aileron inboard-trailing-edge top surface and the main flap outboard-trailing-edge top surface. Measure the vertical distance between the control surfaces to find the neutral position.

S 865-163
(21) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 225-164
(22) Make sure that the right aileron inboard-trailing-edge aligns with the flap outboard-trailing-edge. If it is not aligned, keep a record of the difference.

S 435-165
(23) Connect the right inboard PCA input-rod to the right inboard PCA input-lever. Tighten the nut to 50-80 pound-inches (5.65-9.0 Nm).

S 865-166
(24) Supply pressure to the center hydraulic system (AMM 29-11-00/201).

S 825-167
(25) Adjust the right inboard PCA input-rod to make the right aileron inboard-trailing-edge align with the flap outboard-trailing-edge. Make sure that the right aileron inboard-trailing-edge is in the same position it was before (use the record you kept for the outboard PCA and a vertical tolerance of 0.06 inch (0.5 mm) from that dimension).

S 435-168
(26) Tighten the locknuts on the inboard PCA input-rod.

S 865-169
(27) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 035-214
(28) Remove the rig pin A4 from the right aileron quadrand-and-override mechanism.

S 865-170

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

(29) Supply pressure to the left, center and right hydraulic systems. (AMM 29-11-00/201).

S 225-171
(30) Turn the control wheel counterclockwise approximately 50 degrees, then clockwise. Move the control wheel to the neutral position. Make sure that the aileron inboard-trailing-edge is aligned with the main flap outboard-trailing-edge (Use a tolerance of 0.06 inch (1.5 mm)). If it is not aligned, do the adjustment steps again.

S 225-089

(31) Make sure that the aileron outboard-trailing-edge aligns with the wing tip (use a tolerance of 0.5 inch (1.27 cm)).

L. Put the Airplane Back to its Usual Condition

S 095-090

WARNING: MAKE SURE THAT THE DOOR LOCKS ARE REMOVED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY OR DAMAGE.

(1) Remove the main gear door locks and close the doors (AMM 32-00-15)/201.

S 865-172

(2) Remove hydraulic power (AMM 29-11-00/201).

S 865-173

(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-174

(4) Close access door 113AL.

S 415-175

(5) Close access panels 561AB, 561CB, 661AB, 661CB.

TASK 27-11-00-735-091

4. System Test - Aileron and Aileron Trim Control System

A. Equipment

(1) Control Wheels Rigging Beam - B27049-1

(2) Control Wheel Protractor Assembly - A27021-30 or A27021-29 (kit)

(3) Torqometer - TER6FUA
Snap-on Tools International LTD.
2801 80th St. P.O. Box 1410,
Kenosha, Winsconsin, USA 53141-1410

(4) Dial Type Torque Wrench - 6169A
Stanley-Proto Industrial Tools,
Department BR
14117 Industrial Park Blvd. N.E.
Covington, Georgia 30209
Phone (770) 787-3800 (1-800-800-8665, in USA only)
(5) Control Wheel Adapter Equipment -
A27021-97 or -98
(6) Stopwatch, Commercially Available

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/201, Trailing Edge Flap System
(3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Main Systems

C. Access
(1) Location Zones
568 Aileron (Left)
668 Aileron (Right)
211/212 Control Cabin

D. Prepare for the Test

S 865-176
(1) Supply electrical power (AMM 24-22-00/201).

S 865-092

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA DURING THEIR OPERATION.

(2) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 865-177
(3) Fully retract the trailing edge flaps.

S 865-178
(4) Do the deactivation procedure for the flaps (AMM 27-51-00/201).

S 865-179
(5) Make sure that the speedbrake lever is in the down-and-locked position.

E. Control Wheel Test

S 865-093
(1) Make sure that this circuit breaker of the overhead panel, P11, is closed:
(a) 11J15, AILERON TRIM

S 215-094
(2) Move the aileron trim switches on the aft electronic-control panel, P8, to LEFT WING DOWN. Make sure that the control wheels move counterclockwise.

S 825-180
(3) Operate the aileron trim switches to move the control wheel back to the neutral position.

NOTE: The neutral trim position is achived when the index mark on the top of the control wheel is aligned with the center mark on the decal on top of the control column.

S 865-181
(4) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J15, AILERON TRIM

S 215-095
(5) Move the aileron trim switches to LEFT WING DOWN. Make sure that the control wheels do not move.

S 865-096
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J15, AILERON TRIM

S 825-097
(7) Operate the aileron trim switches on the P8 panel until the trim indicator shows zero units of trim.

S 215-098
(8) Turn each control wheel clockwise and then counterclockwise full travel. Move the control wheel to its neutral position and do the checks that follow:
(a) Make sure that each control wheel moves smoothly and does not need too much force.
(b) Make sure that the left and right ailerons move smoothly when the control wheel is turned. Make sure that spoilers 1 thru 3, 5 thru 8, and 10 thru 12 operate smoothly when the control wheel is turned.

NOTE: The spoilers are numbered 1 thru 12 from left outboard to right outboard.

S 825-099
(9) Move the control wheel to its neutral position.

S 095-216
(10) Remove the cover plate/map holder from the control wheel.

S 495-100
(11) Install the control-wheel adapter equipment and protractor on the control wheels.

S 225-101
(12) Turn each control wheel clockwise and then counterclockwise full travel and do the checks that follow:
(a) Make sure the control wheel moves a minimum of 82.5 degrees in each direction.

S 095-102
(13) Remove the protractor.

S 495-103
(14) Attach a clamp to the captain's control wheel to hold it in neutral.

S 225-104
(15) Turn the first-officer's control-wheel counterclockwise full travel.
(a) Make sure that the maximum torque is between 273 and 333 pound-inches.

NOTE: The maximum torque will occur when the control wheels are approximately 85 degrees apart.

S 225-105
(16) Turn the first-officer's control-wheel clockwise full travel and measure the necessary torque. Make sure that the maximum torque is between 273 and 333 pound-inches (30.8-37.6 Nm). Move the first-officer's control-wheel to neutral.

F. Aileron Response with a Single Hydraulic Source Test

S 865-106
(1) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).

S 215-107
(2) Turn one of the two control wheels full clockwise and then counterclockwise. Make sure that the right aileron operates when the control wheel is turned. Make sure that the left aileron does not move.

NOTE: Because of the breakout of the wing override mechanism, the left aileron can move a small distance.

An aileron without power can move down a small distance. This condition is not unusual.

S 865-108

(3) Supply pressure to the center hydraulic system only (AMM 29-11-00/201).

S 215-109

(4) Turn the control wheel clockwise and then counterclockwise. Make sure that the left and right ailerons operate when the control wheel is turned.

S 865-110

(5) Supply pressure to the right hydraulic system only (AMM 29-11-00/201).

S 215-111

(6) Turn one of the two control wheels full clockwise and then counterclockwise. Make sure that the left aileron operates when the control wheel is turned. Make sure that the right aileron does not move.

NOTE: Because of the breakout of the wing override mechanism, the right aileron can move a small distance.

S 825-112

(7) Move the control wheel to its neutral position.

S 865-113

(8) Supply the pressure to the left and center hydraulic systems (AMM 29-11-00/201).

G. System Feel, Centering, and Trim Test (to determine control wheel breakout force)

S 495-220

(1) Remove the cover plate/map holder from the control wheel, if it is installed.

S 225-219

(2) Install the control wheel protractor on captain's control wheel, if not installed.

S 225-221
(3) Center the protractor on the control wheel.

S 865-218
(4) Supply electrical power (AMM 24-22-00/201), if it is turned off.

S 865-229

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA DURING THEIR OPERATION.

(5) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201), if systems are not pressurized.

S 215-222
(6) Move the aileron trim switches on the aft electronic-control panel, P8, to set neutral trim.

NOTE: The neutral trim position is achieved when the index mark on the top of the control wheel is aligned with the center mark on the decal on top of the control wheel.

S 095-223
(7) Turn the control wheel clockwise and counterclockwise to shake out the control system.

S 825-224
(8) Move the aileron trim switches to reset neutral trim on the control wheel index mark if/as required.

S 825-225
(9) Zero the protractor on captain's control wheel.

S 825-114

(10) Operate the aileron trim switches on the P8 panel until the trim indicator shows zero units of trim.

S 725-263

(11) Check the centering of the control wheel.

(a) Turn the control wheel clockwise from neutral to 6 units (30 degrees) of trim and back to 2 units (10 degrees). Hold it temporarily and release:

1) Use the trim unit scale on the control column to make sure the control wheel returns to neutral position (± 0.4 units).

(b) Turn the control wheel counterclockwise from neutral to 6 units (30 degrees) of trim and back 2 units (10 degrees). Hold it temporarily and release:

1) Use the trim unit scale on the control column to make sure the control wheel returns to neutral position (± 0.4 units).

(c) Turn the captain's control wheel clockwise from neutral to full travel then release the wheel.

1) Use the trim unit scale on the control column to make sure the control wheel returns to neutral position (± 0.4 units).

(d) Turn the captain's control wheel counterclockwise from neutral to full travel then release the wheel.

1) Use the trim unit scale on the control column to make sure the control wheel returns to neutral position (± 0.4 units).

(e) If the control wheel did not center within +/- 0.4 units tolerance then increase the centering spring tension by tightening the spring adjustment nuts on the centering unit by 1/4 turn each (AMM 27-11-14/201), and do the steps for control wheel centering again.

S 735-265

(12) AIRPLANES WITHOUT THE CONTROL WHEEL DAMPER;
Check the control wheel torque.

(a) There are two ways to measure the control wheel torque:

1) Spring Scale (0 to 20 pounds (0-9 Kg) 1 % accuracy)

a) Apply force at 6.50 ±0.25 inches (165.1 ±6.3 mm) radius perpendicular within 10 degrees to a line through the center of wheel rotation.

2) Torque Wrench (0 to 100 inch-pounds 1% accuracy)
a) Install the control wheel adapter.

(b) Control wheel test fixtures (protractors, etc.) must be statically balanced such that after setup for this test the static balance of the lateral control system is not changed by more than 1.0 inch-pound (0.113 Nm), as measured about the wheel pivot at any position of rotation.

(c) Turn the wheel clockwise, make sure the breakout force is within the limits.
1) Measure breakout torque at the point of first movement of the aileron surface in reference to the outboard flap or adjacent wing structure.
2) Torque required: 42 inches-pounds (4.7 Nm) maximum
or
Force required: 6.5 pounds (28.9 newtons) maximum.

(d) Do these steps to measure the torque at full clockwise travel (85 ±2 degrees):
1) Move the wheel until the stop is just touched and measure the wheel angle.
a) Full travel (85 degrees) required, ± 2 degrees.
2) Move the wheel approximately 2 degrees back from the stop position and take the torque or force measurement.
a) Torque required: 140 inch-pounds (15.8 Nm) maximum
or
Force required: 21.5 pounds (95.6 Newtons) maximum.

(e) Repeat the torque check in the counterclockwise direction.

S 735-266

(13) AIRPLANES WITH THE CONTROL WHEEL DAMPER;
Check the control wheel torque.

(a) Remove the protractor from the control wheel.

(b) Install the control wheel adapter equipment on the control wheel.

(c) Use a small (0 to 100 inch-pounds 1% accuracy) torque wrench. See adapter fixture balance requirement noted below:
1) Control wheel test fixtures must be statically balanced such that after setup for this test the static balance of the lateral control system is not changed by more than 1.0 inch-pound (0.113 Nm), as measured about the wheel pivot at any position of rotation.

(d) Use the torque wrench to slowly rotate the control wheel clockwise from neutral at a rate of about 1 to 2 degrees per second to 1 unit (5 ±0.5 degrees) of trim.
(e) Make sure the torque is not greater than 49.5 pounds-inches.
(f) Slowly rotate the control wheel clockwise from neutral at a rate of about 1 to 2 degrees per second to 2 units (10 ±0.5 degrees) of trim.
(g) Make sure the torque is not greater than 55.5 pound-inches.
(h) To measure torque at full travel (85 ±2 degrees) do the steps that follow:
1) Move the wheel until the stop is just touched and measure the wheel angle.
2) Full travel (85 degrees) required, ± 2 degrees.
3) Move the wheel approximately 2 degrees back from the stop position and take the torque measurement.
4) Make sure that the torque at full travel is between 100 and 140 pound-inches.
(i) Repeat the torque check in the counterclockwise direction.

S 735-268
(14) Do the centering and torque check again if necessary to make sure that the two are in limits at the same time.

S 085-269
(15) Remove the control wheel adapter, if installed.

S 725-270
(16) Check the control wheel trim.
(a) Move the aileron trim switches on the P8 panel to RIGHT WING DOWN and hold them there. When the control wheel movement stops, do the steps that follow:
1) Make sure that the control wheels turn clockwise.
2) Make sure that the captain's control wheel turns 30 ± 2 degrees from neutral position.
(b) Move the aileron trim switches on the P8 panel to LEFT WING DOWN and hold them there. When the control wheel movement stops, do the steps that follow:
1) Make sure that the control wheels turn counterclockwise.
2) Make sure that the captain's control wheel turns 30 ± 2 degrees from neutral position.
(c) Move the aileron trim switches to their neutral position.

NOTE: It might be necessary to rotate the control wheel in the left and right directions in decreasing amounts until the neutral position can be determined by feel.

S 095-228

(17) Remove the control wheel protractor on captain's control wheel, if not needed.

H. Aileron Response Test

S 865-124

(1) Make sure that these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 865-125

(2) Push the STATUS button on the display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 215-126

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA DURING THEIR OPERATION.

(3) Turn the control wheel clockwise full travel in less than 1/2 second and do the checks that follow:
(a) Make sure that the left aileron moves down and the right aileron moves up.
(b) Make sure that the ailerons move full travel in less than one second.

S 225-127

(4) Turn the control wheel from full counterclockwise to neutral in less than 1/2 second and do the checks that follow:
(a) Make sure that the ailerons are aligned with the wing. Keep a record of the difference.

NOTE: A straight edge can be used to measure this dimension. Put the straight edge across the aileron inboard-trailing-edge top surface and the main flap outboard-trailing-edge top surface. Measure the vertical distance between the control surfaces to find the neutral position. This distance must not be more than 0.12 inch (3 mm).

(b) Make sure that the ailerons move to neutral in less than one second.

S 225-128

(5) Do the above two steps again when the control wheel is turned counterclockwise. The left aileron will move up and the right aileron will move down.

S 865-129

(6) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 225-130

(7) Measure the distance between the aileron inboard-trailing-edge top surface and the main flap outboard-trailing-edge top surface. Subtract this dimension from the record you kept. Make sure that the difference is not more than 0.06 inch (1.5 mm).

S 225-131

(8) Make sure that the aileron outboard-trailing-edge aligns with the wing tip (use a tolerance of 0.5 inch (12.7 mm)).

S 215-132

(9) Turn the control wheel clockwise and then counterclockwise. Make sure that the ailerons move correctly when the control wheel is turned.

S 865-133

(10) Supply pressure to the center hydraulic system (AMM 29-11-00/201).

S 865-134

(11) Remove the power from the left and right hydraulic systems (AMM 29-11-00/201).

S 225-135

(12) Measure the distance between the aileron inboard-trailing- edge top surface and the main flap outboard-trailing-edge top surface. Subtract this dimension from the record you kept. Make sure that the difference is not more than 0.06 inch (1.5 mm).

S 225-136
(13) Make sure that the aileron outboard-trailing-edge aligns with the wing tip (use a tolerance of 0.5 inch (12.7 mm)).

S 215-137
(14) Turn the control wheel clockwise and then counterclockwise. Make sure that the ailerons move correctly when the control wheel is turned.

S 865-138
(15) Supply pressure to the left and right hydraulic system (AMM 29-11-00/201).

S 825-139
(16) Make sure that the aileron trim is in neutral.

S 225-140
(17) Turn the control wheel clockwise and then counterclockwise. Make sure that the ailerons move up and down 20 ± 1 degrees or 8.68 ±0.44 inches.

NOTE: Use a bubble protractor or scale to measure the aileron movement.

I. Aileron Wing Override Test

S 865-141
(1) Retract the trailing edge flaps.

S 865-142
(2) Do the deactivation procedure for the flaps (AMM 27-51-00/201).

S 865-143

WARNING: TO PREVENT INJURY OR DAMAGE, REMOVE THE POWER FROM THE LEFT, RIGHT, AND CENTER HYDRAULIC SYSTEMS BEFORE YOU DO THE AILERON OVERRIDE TEST.

(3) Remove the power from the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 495-144

(4) Install the control wheel adapter equipment on the control wheels.

S 825-145

(5) Manually move the left aileron to the neutral position and hold it there.

S 225-146

(6) Turn the captain's control wheel counterclockwise 65 ± 2 degrees. Make sure that the torque needed to hold the control wheel in position is 150-200 pound-inches (17.0-22.6 Nm). Move the control wheel to its neutral position.

NOTE: The torque can be measured with a torque wrench or a spring scale. If a spring scale is used to measure the torque, apply a vertical force to the control wheel at the 6.5 inch (165.1 mm) control wheel radius.

S 825-147

(7) Manually move the right aileron to the full up position and release it. Manually move the left aileron to the full up position and hold it there.

S 225-182

(8) Turn the captain's control wheel clockwise 65 ± 2 degrees. Make sure that the torque needed to hold the control wheel in position is 150-200 pound-inches (17.0-22.6 Nm). Move the control wheel to its neutral position .

S 825-148

(9) Manually move the left aileron to the neutral position.

S 825-149
(10) Manually move the right aileron to the neutral position and hold it there.

S 225-150
(11) Turn the captain's control wheel clockwise 65 ± 2 degrees. Make sure that the torque needed to hold control wheel in position is 150-200 pound-inches (17.0-22.6 Nm). Move the control wheel to its neutral position.

S 825-151
(12) Manually move the left aileron to the full up position and release it. Manually move the right aileron to the full up position and hold it there.

S 225-152
(13) Turn the captain's control wheel counterclockwise 65 ± 2 degrees. Make sure that the torque needed to hold the control wheel in position is 150-200 pound-inches (17.0-22.6 Nm). Move the control wheel to its neutral position.

S 825-153
(14) Manually move the right aileron to the neutral position.

S 225-154
(15) Do the above steps again for the first officer's control wheel.

S 095-155
(16) Remove the control wheel adapter equipment.

J. Put the Airplane Back to its Usual Condition.

S 865-212
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-11-00-725-234

5. AIRPLANES WITH CONTROL WHEEL DAMPER;
System Test - Control Wheel Damper

A. References
(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 27-11-03/201, Control Wheel Damper
(3) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems

B. Access
(1) Location Zones
568 Aileron (Left)
668 Aileron (Right)
211/212 Control Cabin

C. Prepare for the Test

S 865-235
(1) Supply electrical power (AMM 24-22-00/201).

S 865-236
(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 865-237

WARNING: TO PREVENT INJURY OR DAMAGE,MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED.STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

(3) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

D. Control Wheel Damper System Test

S 865-238
(1) Set aileron trim at maximum travel in either direction.

S 825-246

CAUTION: DO NOT CONTINOUSLY OPERATE THE CONTROL WHEEL AT HIGHT RATES FOR MORE THAN 30 SECONDS. CONTINUOUSLY OPERATION OF THE CONTROL WHEEL AT HIGH RATES FOR MORE THAN 30 SECONDS, CAN CAUSE DAMAGE TO THE DAMPER. ALLOW TEN MINUTES FOR COOL-DONW.

(2) Use the trim position scale on the top of the control wheel as an indicator of wheel position, rotate the captains or first officers control wheel slowly back and forth at a constant rate between 6 units CW and 6 units CCW from zero trim mark.

NOTE: One cycle consists of moving the wheel from 6 units in one direction to 6 units in the other direction and back to the starting position. The time required to complete each cycle should be about 4 seconds.

(a) Make a note of the magnitude of the wheel wheel force and smoothness of wheel movement.

S 825-241

(3) Slowly increase the rate of control wheel motion until the wheel is moved through one complete cycle in one second.
   (a) Make sure there is no increase in control wheel force should be noticed.

S 825-243

(4) Continue to increase the rate of control wheel motion until two complete cycles are completed in one second.
   (a) As the control wheel rate increases, the damper should start increasing the control wheel force when the wheel is moved through about 1.5 cycles in one second.
   (b) Make sure the onset of damping should be smooth and no chatter, binding or other roughness should be felt.
   (c) After the damper begins to add force to the control wheel, the amount of force that it adds should continue to increase as the control wheel rate increases.
   (d) When the wheel is moved through two or more complete cycles in one second, the wheel force should be significantly higher than that observed in the above steps.

      NOTE: Beyond 3.5 to 4 complete cycles per second the wheel is about 30 Pounds. Do not attempt to measure the wheel force due to high wheel rate.

      1) Make sure that there is no chatter, binding or other roughness felt at any control wheel rate.
      2) Make sure that no sound produced by the damper is audible in the flight deck.

S 225-244

(5) If the control wheel force does not change as indicated above, then do these steps:

   NOTE: There are no stops internal to the damper, so it can be moved through 360 degrees of rotation without damage. A small amount of gear noise from the damper is normal. Observe the damper duty cycle limitations noted in the caution.

   (a) Disconnect the damper rod from the damper crank.

(b) Rotate the damper crank arm manually back and forth at a constant rate to complete a cycle in about 10 seconds.

NOTE: A cycle consists of moving the damper arm 90 degrees in either directions and then back to the starting position.

1) Make a note of the dampers resistive force and smoothness of rotation.

(c) Gradually increase the rate of crank arm movement until the arm is moved through 1 cycle in 3 seconds.
1) Make sure that there is no increase in force or small increase in force should be required to move the crank arm at this rate.

(d) Continue to increase the rate of crank arm motion until one complete cycle is completed in one second.
1) As the rate increases, the crank arm force should start increasing when the arm is moved through one cycle in 2.0 to 2.5 seconds.
a) Make sure the onset of damping should be smooth: no chatter, binding or other roughness should be felt.
2) After the crank arm force begins to increase, the amount of force should continue to increase as the rate increases.
3) When the arm is moved through one complete cycle in 1 second, the force should be significantly higher than that observed in the above steps.
a) Make sure that there is no chatter, binding or other roughness at any rate.

(e) Re-connect the damper rod to the damper crank.

(f) If the damper does not perform as described, or the crank does not rotate smoothly, replace the control wheel damper (AMM 27-11-03/201).

S 865-254

(6) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-11-00-715-183

6. Aileron Bus Force Limiter and the Aileron Control Override Mechanism - Test

NOTE: This is a scheduled maintenance task.

A. References
   (1) 24-22-00/201, Electrical Power - Control
   (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Prepare for the Test

   S 865-184
   (1) Supply electrical power (Ref 24-22-00/201).

   S 215-185
   (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
      (a) EICAS (6 locations)

   S 865-186
   (3) Push the STATUS switch on the display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

   S 865-187

   WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

   (4) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

C. Aileron Bus Force Limiter and the Aileron Control Override Mechanism - Test

   S 865-188
   (1) Hold the captain's control wheel in its neutral position.

S 215-189
(2) Turn the first officer's control wheel fully clockwise, then counterclockwise, and release.
(a) Do these checks:
1) Make sure the right aileron operates when you turn the control wheel.
2) Make sure the control wheel moves smoothly and does not need too much force.

S 865-190
(3) Hold the first officer's control wheel in its neutral position.

S 215-191
(4) Turn the captain's control wheel fully clockwise, then counterclockwise, and release.
(a) Do these checks:
1) Make sure the left aileron operates when you turn the control wheel.
2) Make sure the control wheel moves smoothly and does not need too much force.

S 865-192
(5) Remove electrical power if it is not necessary (Ref 24-22-00/201).

TASK 27-11-00-715-193

7. Single Hydraulic System Aileron Control - Test

NOTE: This is a scheduled maintenance task.

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Prepare for the Test

S 865-194
(1) Supply electrical power (Ref 24-22-00/201).

S 215-195

(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 865-196

(3) Push the STATUS switch on the display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 865-197

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

(4) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

C. Single Hydraulic System Aileron Control - Test

S 865-198

(1) Remove the power from the center and right hydraulic systems (Ref 29-11-00/201).

NOTE: If an aileron does not have power, it can move down a small distance. This condition is not unusual.

The aileron surface can move up when the control wheel is turned. This is because of the breakout of the wing override mechanism, and the aileron PCU summing lever which moves the rod ends then the PCU control valve bottoms.

S 215-200

(2) Turn the captain's control wheel fully clockwise and do these checks:
(a) Make sure the right aileron moves up.

(b) Make sure the left aileron does not move.

S 215-201
(3) Turn the control wheel fully counterclockwise and do these checks:

NOTE: You may experience an increase in the resistance near the end of the control wheel travel. This is because of the tension in the override mechanism.

(a) Make sure the right aileron moves down.
(b) Make sure the left aileron does not move.

S 865-202
(4) Remove the power from the left hydraulic system (Ref 29-11-00/201).

S 865-203
(5) Supply pressure to the center hydraulic system only (Ref 29-11-00/201).

S 215-204
(6) Turn the control wheel fully clockwise and do these checks:
(a) Make sure the right aileron moves up.
(b) Make sure the left aileron moves down.

S 215-205
(7) Turn the control wheel fully counterclockwise and do these checks:
(a) Make sure the right aileron moves down.
(b) Make sure the left aileron moves up.

S 865-206
(8) Remove the power from the center hydraulic system (Ref 29-11-00/201).

S 865-207
(9) Supply pressure to the right hydraulic system only (Ref 29-11-00/201).

S 215-208
(10) Turn the control wheel fully clockwise and do these checks:

NOTE: You may experience an increase in the resistance near the end of the control wheel travel. This is because of the tension in the override mechanism.

(a) Make sure the left aileron moves down.
(b) Make sure the right aileron does not move.

S 215-209
(11) Turn the control wheel fully counterclockwise and do these checks:
(a) Make sure the left aileron moves up.
(b) Make sure the right aileron does not move.

S 865-210
(12) Move the control wheel to its neutral position.

S 865-211
(13) Remove the power from the right hydraulic system (Ref 29-11-00/201).

LATERAL CONTROL WHEEL - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task is to remove the control wheel and the other task is to install it. This procedure contains the data that is necessary to install a control wheel that has a stabilizer trim switch, an autopilot disengage switch, and a microphone switch. This procedure contains data that is necessary for the removal and installation (On-Airplane) of the aft bearing in the control wheel.

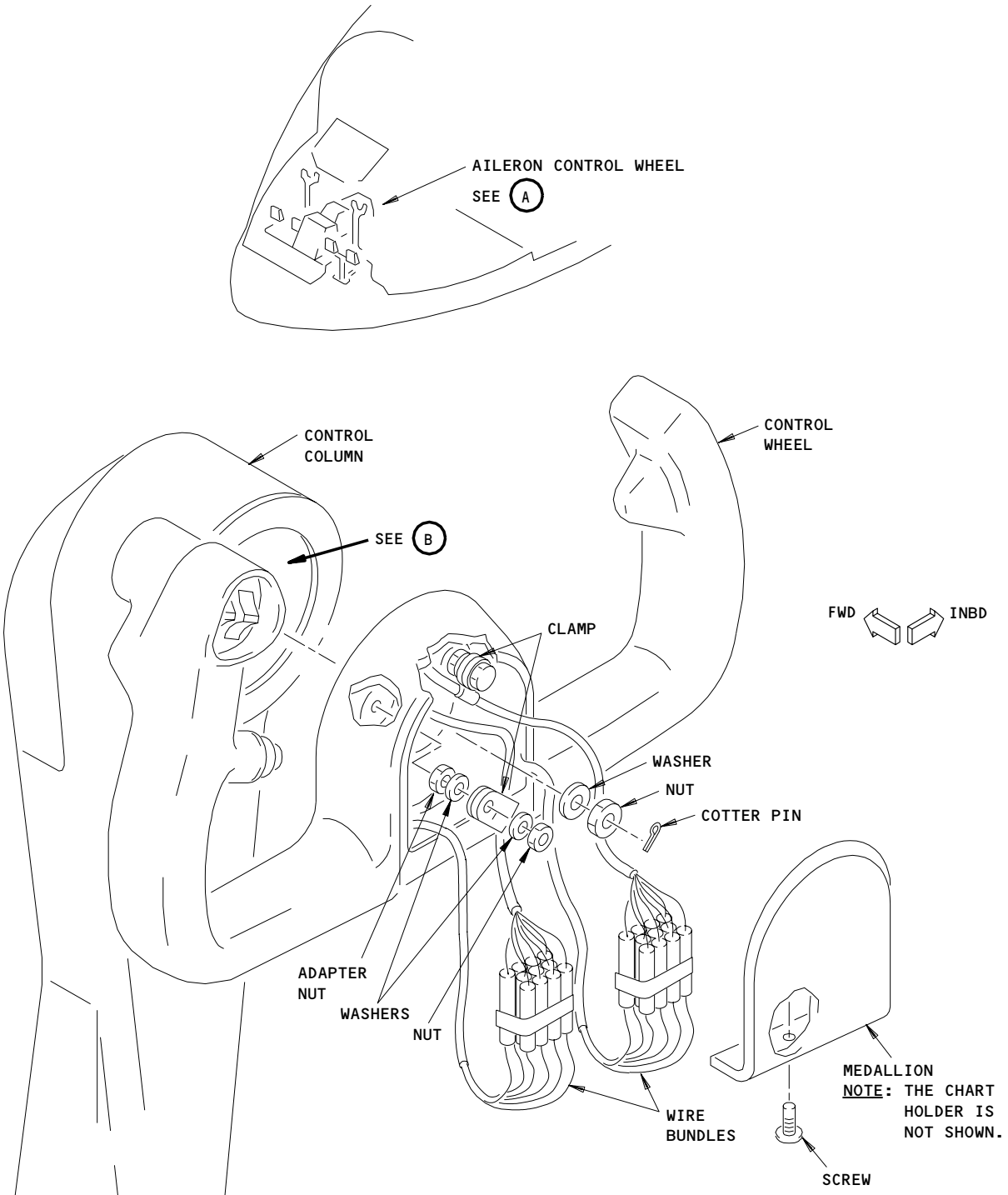
   TASK 27-11-02-024-001

2. Remove the Aileron Control Wheel
   A. Equipment
      (1) Wire Extraction Tool, Commercially Available
   B. References
      (1) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin

   D. Prepare for Removal

      S 864-002
      (1) Remove the power from the left, center, and right hydraulic systems (Ref 29-11-00).

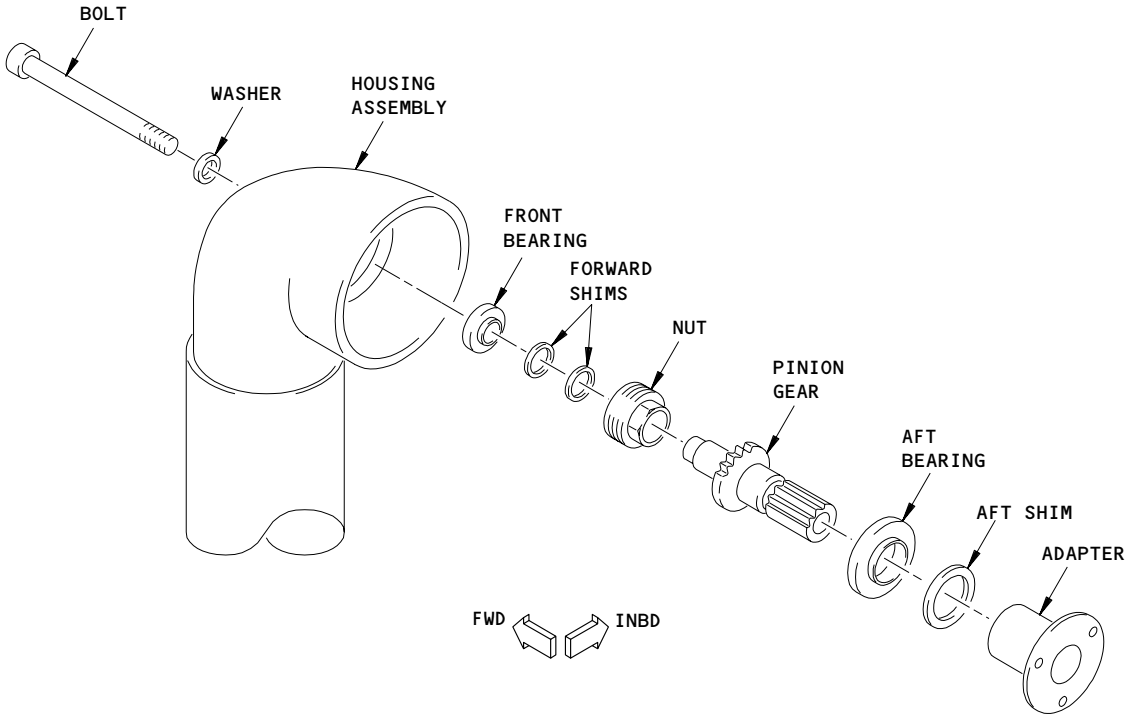
      S 864-003
      (2) Open these circuit-breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C05 or 11H11, STAB TRIM CONT L
          (b) 11H20, STAB TRIM CONT R
              or STAB TRIM CONT RIGHT
          (c) INTERPHONE circuit-breakers:
              1) 11C25
              2) 11C26
              3) 11G29
              4) 11G30
          (d) 11E17, FLT CONT CMPTR PWR L
              or FLT CONT COMPUTER POWER LEFT



AILERON CONTROL WHEEL

A

Lateral Control Wheel Installation
Figure 401 (Sheet 1)



AILERON CONTROL WHEEL

B

Lateral Control Wheel Installation
Figure 401 (Sheet 2)

K22223

(e) 11E18, FLT CONT CMPTR SERVO L
or FLT CONT COMPUTER SERVO LEFT
(f) 11E20, FLT CONT CMPTR PWR CENTER
or FLIGHT CONT CMPTR PWR CTR
(g) 11E21, FLT CONT CMPTR SERVO CENTER
or FLIGHT CONT CMPTR SERVO CTR
(h) 11E35, FLT CONT CMPTR PWR R
or FLT CONT CMPTR PWR RIGHT
(i) 11E36, FLT CONT CMPTR SERVO R
or FLT CONT CMPTR SERVO RIGHT

E. Procedure (Fig. 401)

S 034-028

(1) If you need to remove the aft bearing in the control wheel (On-Airplane) do the steps that follow:
(a) Remove medallion and wire bundle clamps from control wheel. Keep hardware for installation.
(b) Remove cotter pin, castellated nut, washers and bolt from the center of the control wheel. keep hardware except cotter pin.
(c) Remove control wheel from control column without disconnecting wire bundles.

CAUTION: TO PREVENT INCORRECT BACKLASH CONDITIONS. KEEP THE AFT AND FORWARD SHIMS THAT YOU REMOVE AND INSTALL SHIMS IN THE SAME ORDER YOU FIND THEM INSTALLED AT EACH LOCATION.

(d) Remove adapter and aft bearing shim. Keep hardware for installation.
(e) Make a reference (index) mark on the aft bearing/pinion gear and column housing.
(f) Remove pinion gear with aft bearing and forward shims. keep shims for installation.
(g) Remove aft bearing from pinion gear on the bench using a shop aid tool (i.e collar) to drive bearing out of pinion gear.

S 034-027

(2) If you need to remove the control wheel from the control column disconnecting wire bundles, do the steps that follow:
(a) Remove the medallion from the control wheel as shown (Fig. 401).
(b) Use the wire extraction tool to disconnect the wires at their connectors. Mark the wires for identification.
(c) Remove the cotter pin and the nut from the center of the control wheel. Let the bolt stay where it is.
(d) Remove the clamps from the wire bundles and tag the wire bundles for identification.
(e) Remove the control wheel and the adapter while you carefully remove the wire bundle. Do not remove the gear or the shims when you pull out the adapter.
(f) Remove the adapter from the control wheel.

TASK 27-11-02-424-010

3. Install the Aileron Control Wheel

A. Equipment
   (1) Insulation Tester, Commercially Available
   (2) Scale, Accurate to .001 inch (0.025 mm)

B. Parts
   (1) Washers, AN960XC616

C. References
   (1) 22-00-02/201, Maintenance Monitor
   (2) 22-11-01/401, Flight Control Computers

D. Access
   (1) Location Zones
       211/212 Control Cabin

E. Procedure (Fig. 401)

S 434-030

(1) Install the aft bearing (On-Airplane) in the control wheel, with the steps that follow:
   (a) Apply a coat of grease to the inside of the new aft bearing and install aft bearing on pinion gear.
   (b) Install forward shims on pinion gear and install pinion gear in the column housing.
   (c) Make sure that the reference (index) marks on the aft bearing/pinion gear and column housing line up.
   (d) Seat bearing inside the column housing by installing the aft shim, adapter, bolt, washers, and castellated nut.

       NOTE: Align aft shim to adapter.

   (e) Tighten castellated nut to 50-75 pound-inches (5.7-8.5 Nm).
   (f) Remove the castellated nut, washers, bolt and adapter to make sure the aft shim stays installed on the shoulder of the pinion gear.
   (g) Install the adapter on the control wheel with the necessary bolts, washers, and nuts (3 locations). Install the bolt heads on the adapter side.
   (h) Do these steps to install the nut on the bolt in the center of the control wheel:
       1) Put the washer and nut on the bolt.
       2) Tighten the non-flanged castellated nut (thickness of 0.219 inch (5.6 mm) aproximately) to 50-75 pound-inches (5.7-8.4 Nm) , or the flanged castellated nut (thickness of 0.400 inch (1.0 cm) aproximately) to 95-160 pound-inches (10.7-18.0 Nm).##

3) Make sure the slots in the nut align with the hole in the bolt.

NOTE: If it is necessary, install one or two washers to make the slots align with the hole in the bolt.

4) Install the cotter pin through the nut and the bolt.
5) Make sure the cotter pin is engaged in the nut.

(i) Install the clamps on the wire bundles (2 locations). Install the washers and the nuts that hold the clamps and the wire bundles to the control wheel.

(j) Install the medallion on the control wheel.

NOTE: Make sure the wire bundles are not held too tightly by the medallion.

(k) Turn the control wheel full right and then full left. Make sure the control wheel moves freely.

S 434-029

(2) Install the control wheel (wire bundles disconnected) with the steps that follow:

(a) Install the adapter on the control wheel with the necessary bolts, washers, and nuts (3 locations). Install the bolt heads on the adapter side.

(b) Push the wires through the hole in the top of the control wheel. With the shims in position, install the adapter and the control wheel to the gear in the control column.

(c) Do these steps to install the nut on the bolt in the center of the control wheel:

1) Measure and keep a written record of the thickness of the nut for the control wheel.
2) Do these steps to install a nut that has a thickness of approximately 0.219 inch (5.56 mm):

NOTE: This nut does not have a flange.

a) Put the washer and nut on the bolt.
b) Tighten the nut to 50-75 pound-inches (5.7-8.4 Nm).

3) Do these steps to install a nut that has a thickness of approximately 0.400 inch (1.0 cm):

NOTE: This nut has a flange on it.

a) Put the washer and nut on the bolt.
b) Tighten the nut to 95-160 pound-inches (10.7-18.0 Nm).

4) Make sure the slots in the nut align with the hole in the bolt.

NOTE: If it is necessary, install one or two washers to make the slots align with the hole in the bolt.

5) Install the cotter pin through the nut and the bolt.
6) Make sure the cotter pin is engaged in the nut.

(d) Connect the wire bundles. Remove the identification tags after they are used.
(e) Pull lightly on each wire to check the connections.
(f) Install the clamps on the wire bundles (2 locations). Install the washers and the nuts that hold the clamps and the wire bundles to the control wheel.
(g) Turn the control wheel full right and then full left. Make sure the control wheel moves freely.
(h) Do a continuity check of the electrical circuits for each switch.
(i) Remove the flight control computers (AMM 22-11-01/401).
(j) Do the high-potential electrical-insulation tests that follow:

NOTE: Do these tests on the wire ends located at the bottom of the control column. Turn the control wheel full right and then full left during the test.

1) Do a check between each wire and ground, and also between the wires that follow:
   a) White-Orange to Black
   b) White-Violet to Violet
   c) White-Black to Orange
   d) White/Black-Orange to Brown
   e) White-Red to White-Violet
   f) Pink to Pink
   g) White-Red to White-Red
   h) Brown to White-Blue
   i) Yellow to White-Yellow
   j) Green to White-Green
   k) Black/Blue to White-Black
   l) Black/Yellow to White-Brown
   m) Black/Grey to White-Pink
   n) Blue to Black-Yellow
   o) Black/Green to Red-Green
2) Make sure that the insulation resistance is at least 100 megohms.
3) Make sure that the insulation test does not cause an insulation failure.

(k) Install the medallion on the control wheel.

NOTE: Make sure the wire bundles are not held too tightly by the medallion.

(l) Install the flight control computers (AMM 22-11-01/401).
(m) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11E17, FLT CONT CMPTR PWR L
or FLT CONT COMPUTER POWER LEFT
2) 11E18, FLT CONT CMPTR SERVO L
or FLT CONT COMPUTER SERVO LEFT
3) 11E20, FLT CONT CMPTR PWR CENTER
or FLIGHT CONT CMPTR PWR CTR
4) 11E21, FLT CONT CMPTR SERVO CENTER
or FLIGHT CONT CMPTR SERVO CTR
5) 11E35, FLT CONT CMPTR PWR R
or FLT CONT CMPTR PWR RIGHT
6) 11E36, FLT CONT CMPTR SERVO R
or FLT CONT CMPTR SERVO RIGHT
(n) Do the MCDP test 11 A/P DISC SW (Ref 22-00-02). Make sure that no fault messages come into view.

F. Put the Airplane Back to its Usual Condition

S 864-025
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C05 or 11H11, STAB TRIM CONT L
(b) 11H20, STAB TRIM CONT R
or STAB TRIM CONT RIGHT
(c) INTERPHONE circuit-breakers:
1) 11C25
2) 11C26
3) 11G29
4) 11G30

LATERAL CONTROL WHEEL INSPECTION/CHECK

1. General
   A. This procedure contains the data necessary to examine the control wheels for too much unwanted movement.

TASK 27-11-02-226-011

2. Lateral Control Wheel Freeplay - Check
   A. Equipment
      (1) Control Wheel Protractor - A27021-29
      (2) Control Wheel Adapter Equipment - A27021-82
      (3) The Control Wheel Lock Assembly from the Control Wheel Adapter Equipment - A27021-81
      (4) Spring Scale - Commercially Available
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Check

      S 216-018
      (1) Make sure the aileron trim indicator shows zero units of trim.

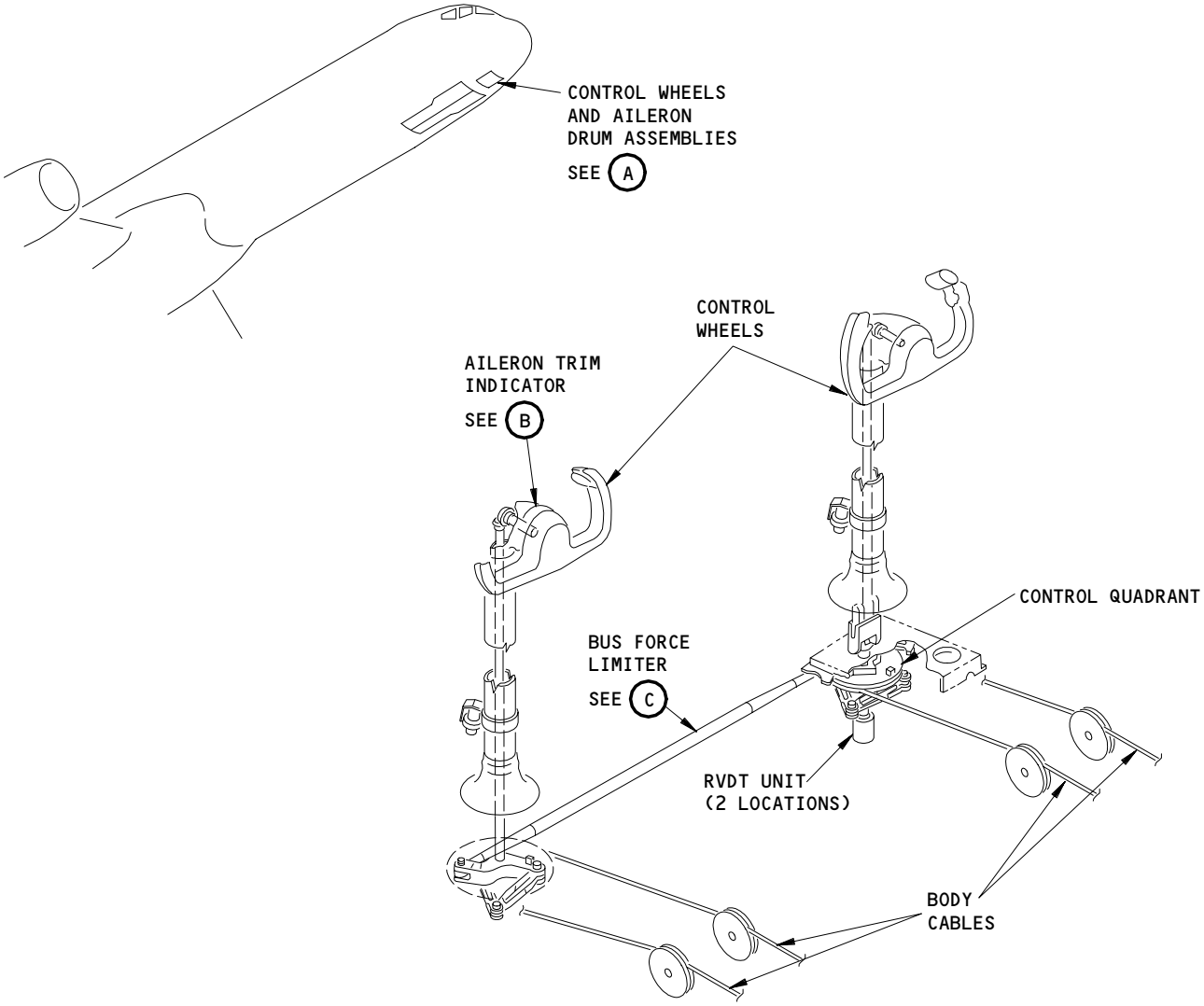
      S 486-002
      (2) Install the control wheel adapters on the captain's and the first officer's control wheels. Do this check:
          (a) Make sure the control wheel adapter touches the lower part of the control wheel.

      S 486-003
      (3) Install the protractor on the captain's (first officer's) control wheel.

      S 496-013
      (4) Install the control wheel lock assembly on the first officer's (captain's) control wheel.

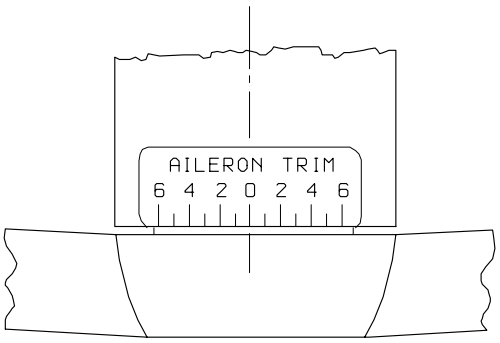
          NOTE: Use the lock assembly to hold this control wheel at neutral during the check.

   D. Procedure



CONTROL WHEELS AND AILERON DRUM ASSEMBLIES

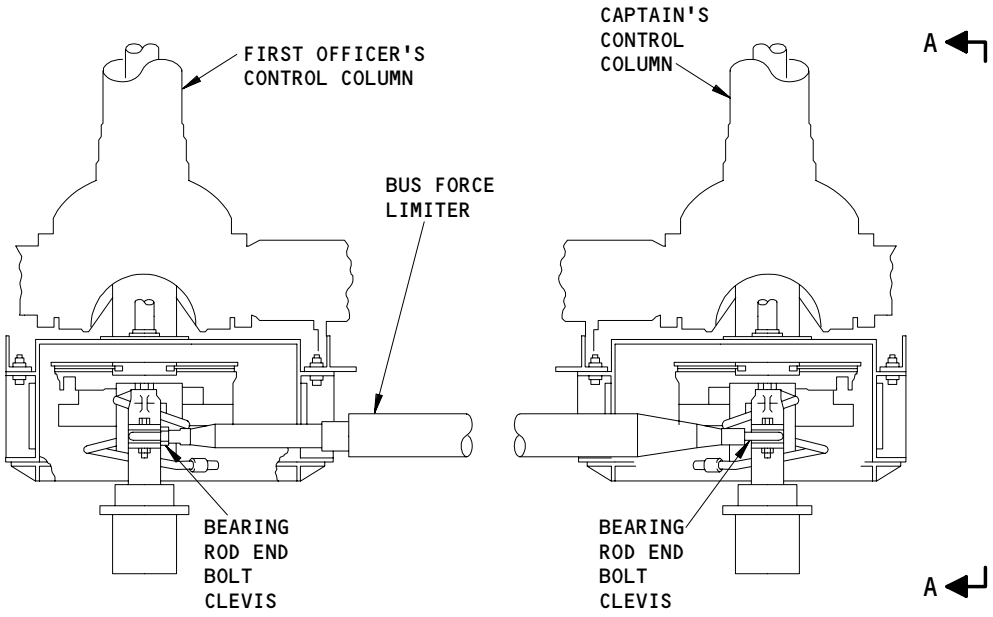
A



AILERON TRIM INDICATOR

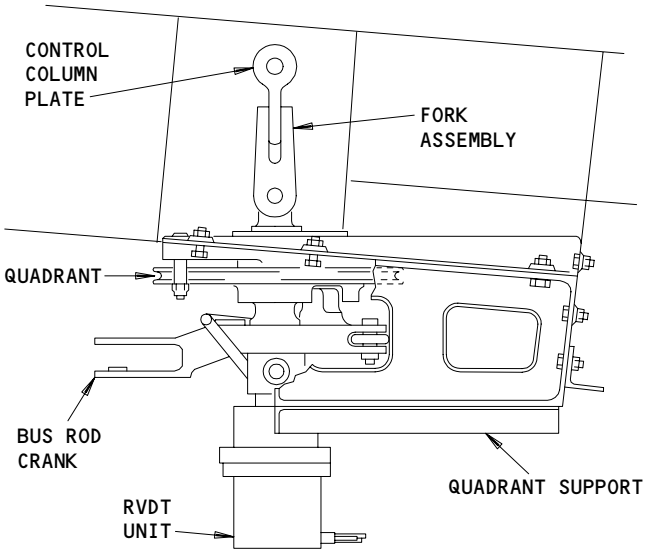
B

Lateral Control Wheels and Aileron Control Drum Quadrant Assemblies
Figure 601 (Sheet 1)



BUS FORCE LIMITER
(VIEW IN AFT DIRECTION)

C



A-A

Lateral Control Wheels and Aileron Control Drum Quadrant Assemblies
Figure 601 (Sheet 2)

S 866-005
(1) Apply a 2 pound force (0.2 Nm), in the up direction, at the right outer edge of the captain's (first officer's) control wheel.

S 826-006
(2) Set the control wheel protractor to zero.

S 226-017
(3) Apply a 2 pound force (0.2 Nm), in the down direction, at the right outer edge of the captain's (first officer's) control wheel. Do this check:
(a) Make sure the control wheel does not move more than 2 degrees.

NOTE: Measure from the protractor zero position.

S 226-014
(4) If the control wheel moves more than 2 degrees, examine these components for too much wear (Fig. 601):
(a) The rod end, bolt, clevis, and bearing at the ends of the bus force limiter.
(b) The plate assembly at the aileron control fork assembly.
(c) The plate assembly for the control column at its connection to the torque tube.
(d) The bevel gear set for the control column.
(e) The plate assembly for the control column.

E. Put the Airplane Back to Its Usual Condition

S 096-015
(1) Remove the control wheel lock assembly.

S 096-016
(2) Remove the control wheel adapters and the protractor.

AILERON CONTROL DRUM ASSEMBLY - MAINTENANCE PRACTICES

1. General
   A. This procedure contains three tasks. The first task contains the data that is necessary to remove the aileron drum assembly, the bus force limiter, or the damper as needed. The second task contains the data that is necessary to install these components. The third task contains the data that is necessary to do a test of these components.

TASK 27-11-03-022-005

2. Remove Aileron Control Drum and Components
   A. General
      (1) This task contains two procedures, one to remove the aileron control drum, and one to remove the bus force limiter. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the " Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) Main Gear Door Locks (Ref 32-00-15)
   C. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 25-50-01/401 Ceiling Panels
      (4) AMM 27-21-05/401, Rudder Jackshaft and Forward Quadrant
      (5) AMM 27-61-04/401, Spoiler RVDT Unit
      (6) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
      (7) AMM 32-00-15/201, Landing Gear Door Locks
      (8) AMM 32-00-20/201, Landing Gear Downlocks
   D. Access
      (1) Location Zone
          113 Area Forward of NLG Wheel Well

      (2) Access Panel
          113AL Flight/Landing Gear/Engine Control Components

   E. Prepare for Removal

      S 862-051
      (1) Supply electrical power (Ref 24-22-00).

      S 212-052
      (2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 492-001

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 862-006

(4) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 012-007

(5) Open access door 113AL (Ref 06-41-00).

S 022-008

(6) Remove the rudder pedal pushrods (Ref 27-21-05).

F. Remove Aileron Control Drum (Fig. 201)

S 862-009

(1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11E17, FLT CONT CMPTR PWR LEFT
(b) 11E18, FLT CONT CMPTR SERVO LEFT
(c) 11E20, FLT CONT CMPTR PWR CENTER
(d) 11E21, FLT CONT CMPTR SERVO CENTER
(e) 11E35, FLT CONT CMPTR PWR RIGHT
(f) 11E36, FLT CONT CMPTR SERVO RIGHT

S 022-010

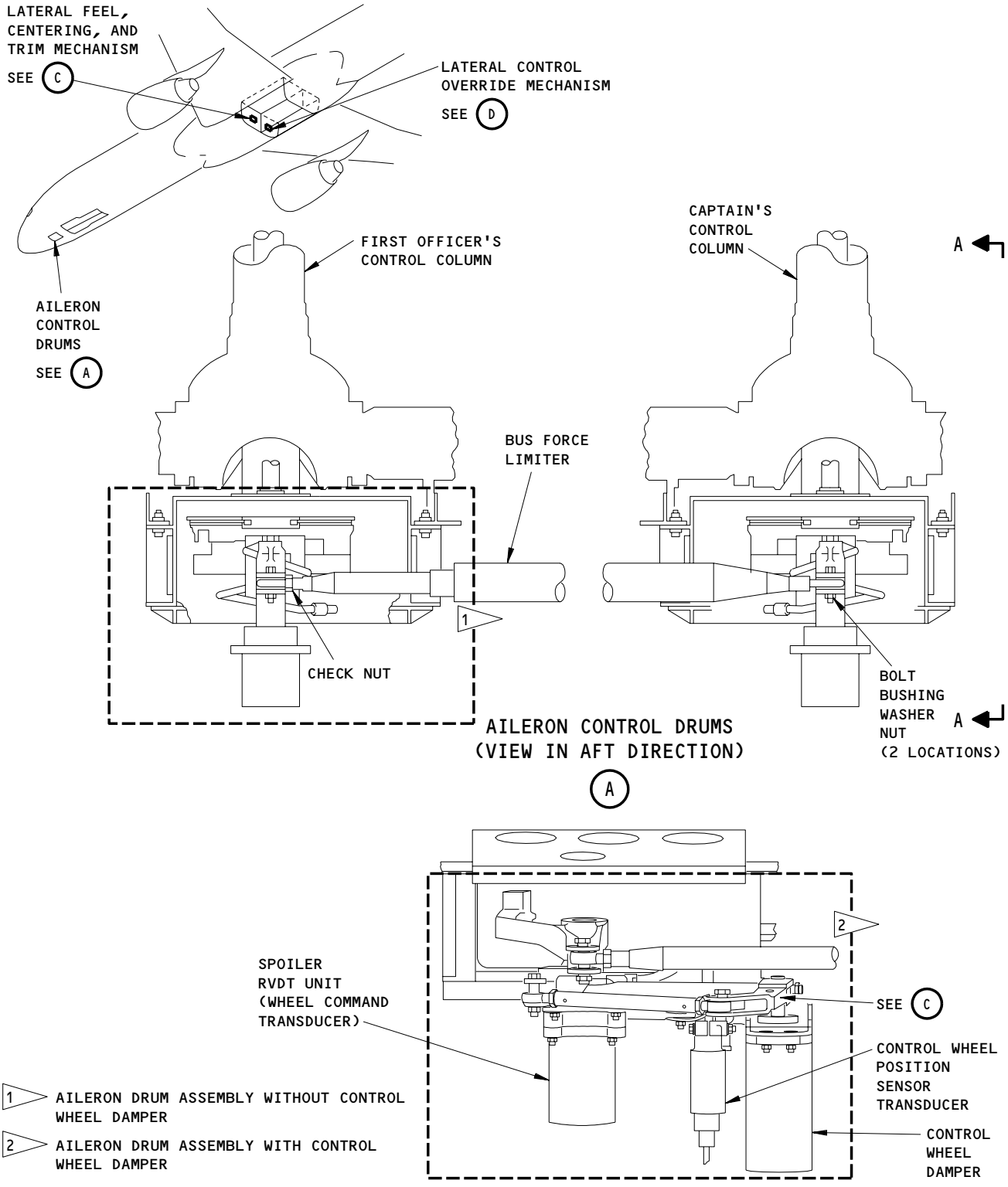
(2) Remove the spoiler RVDT unit (Ref 27-61-04).

S 032-002

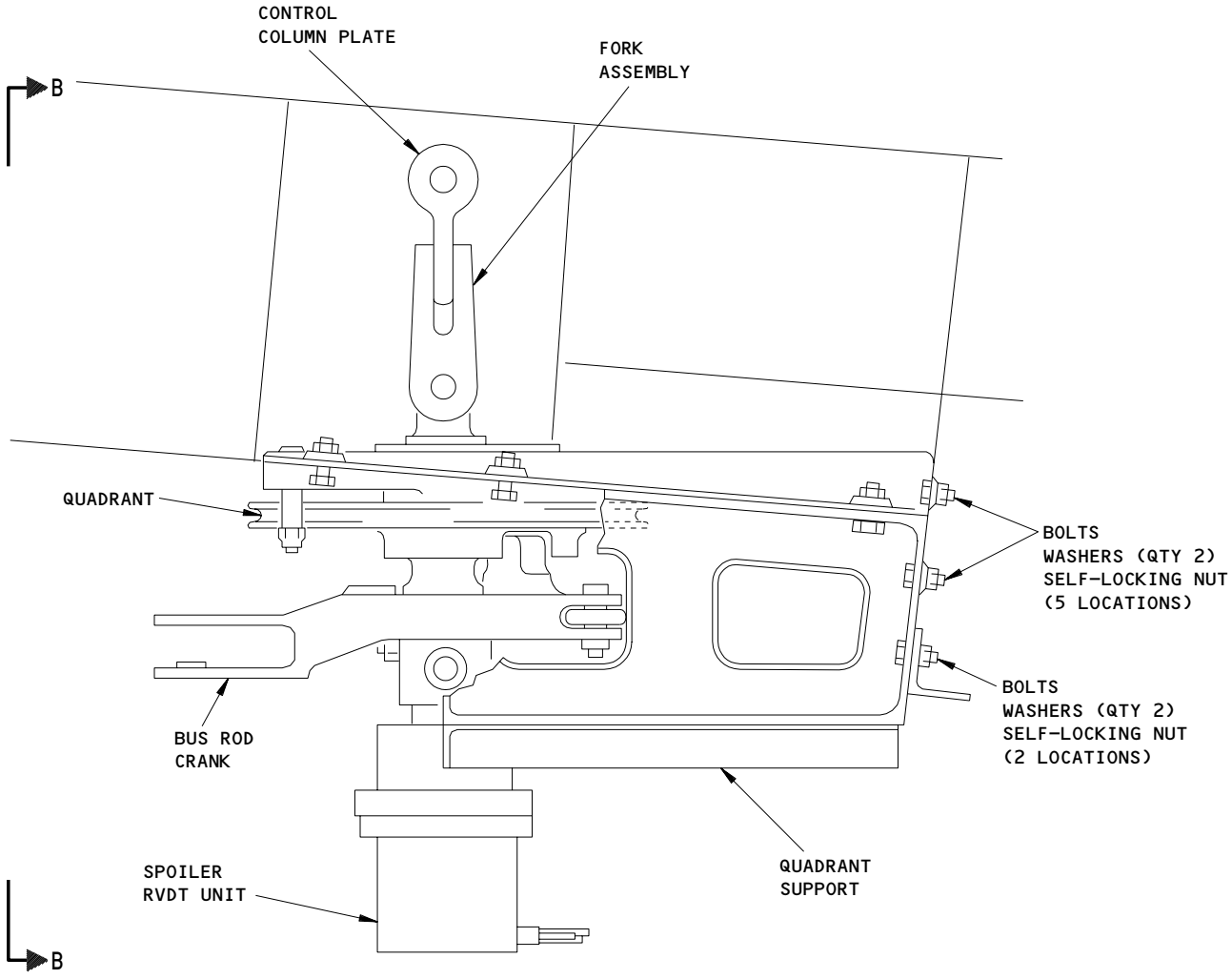
(3) Disconnect these items:
(a) Disconnect cables A1A and A1B or A2A and A2B from the quadrant and tag them for identification.

NOTE: The turnbuckles for cables A1A and A1B are located behind the ceiling panel inboard of the panel adjacent to the forward cargo door. The turnbuckles for cables A2A and A2B are located behind the ceiling panel just inboard of and adjacent to the forward cargo door (AMM 25-50-01/401).

(b) Disconnect the bus force limiter from the captain's drum assembly.
1) Remove the bolt, bushing, washer, and the nut.

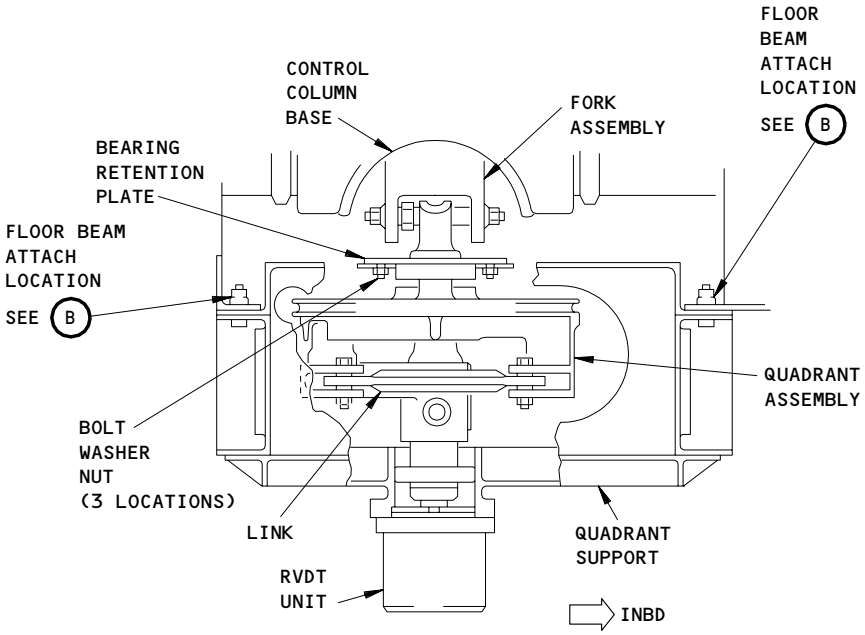


Aileron Control Drum Installation
Figure 201 (Sheet 1)

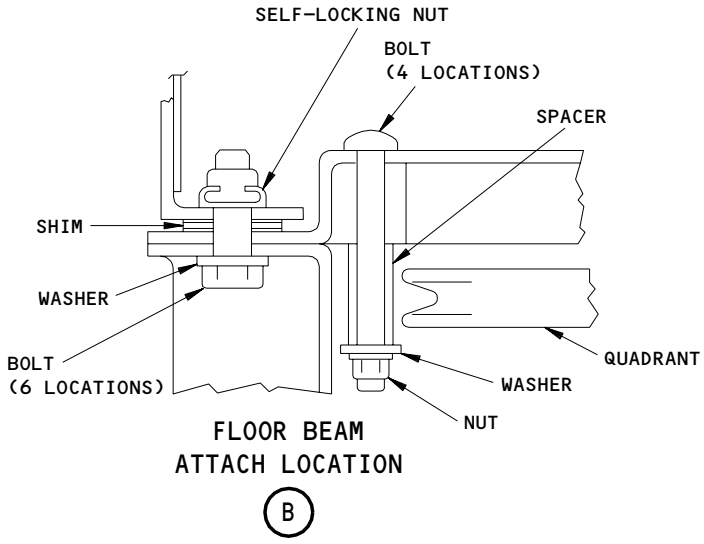


A-A

Aileron Control Drum Installation
Figure 201 (Sheet 2)

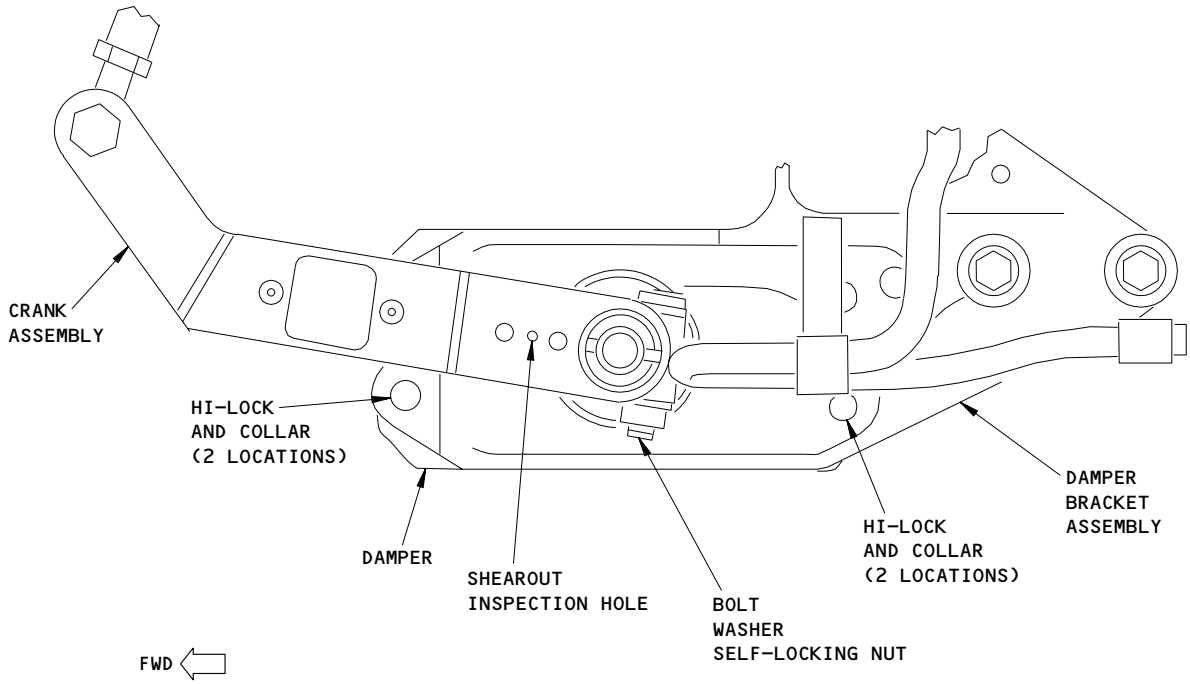


B–B



FLOOR BEAM
ATTACH LOCATION
B

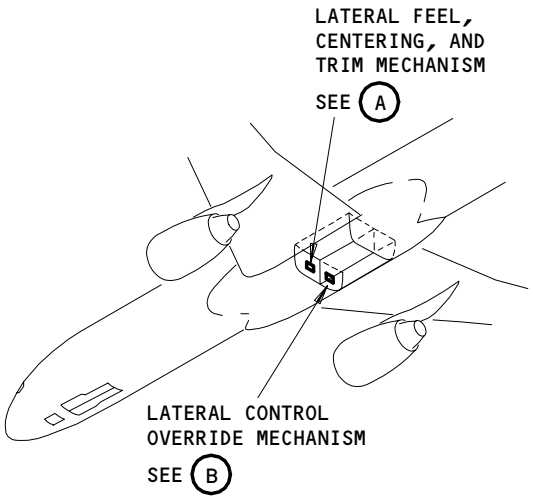
Aileron Control Drum Installation
Figure 201 (Sheet 3)

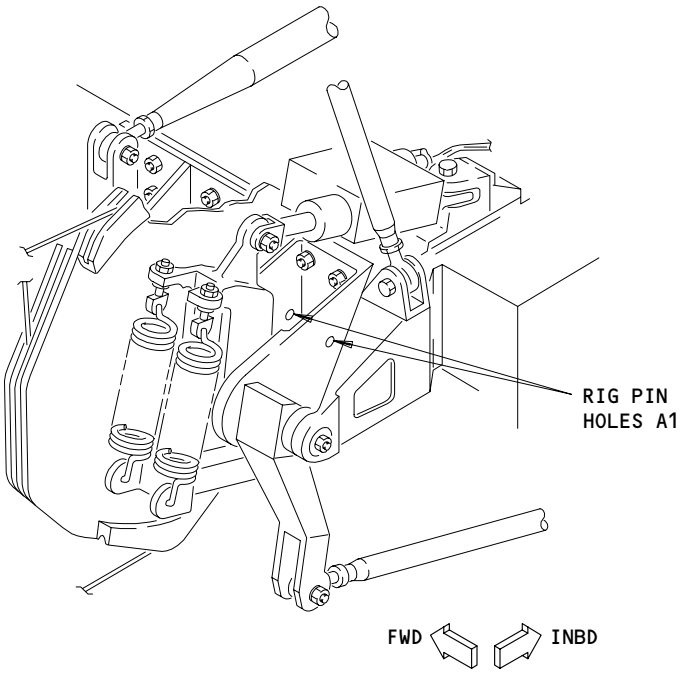


DAMPER ASSEMBLY

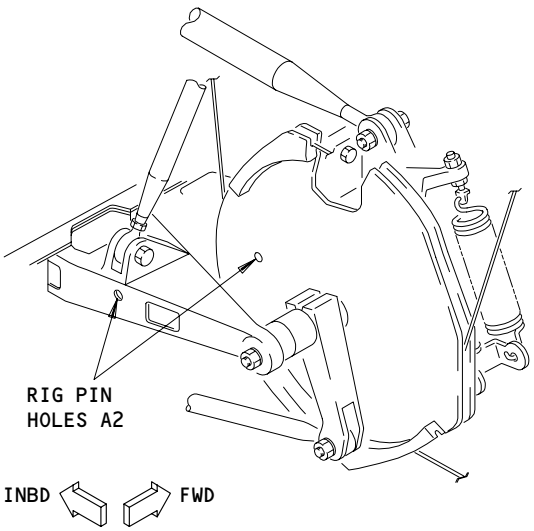
C

Aileron Control Drum Installation
Figure 201 (Sheet 4)



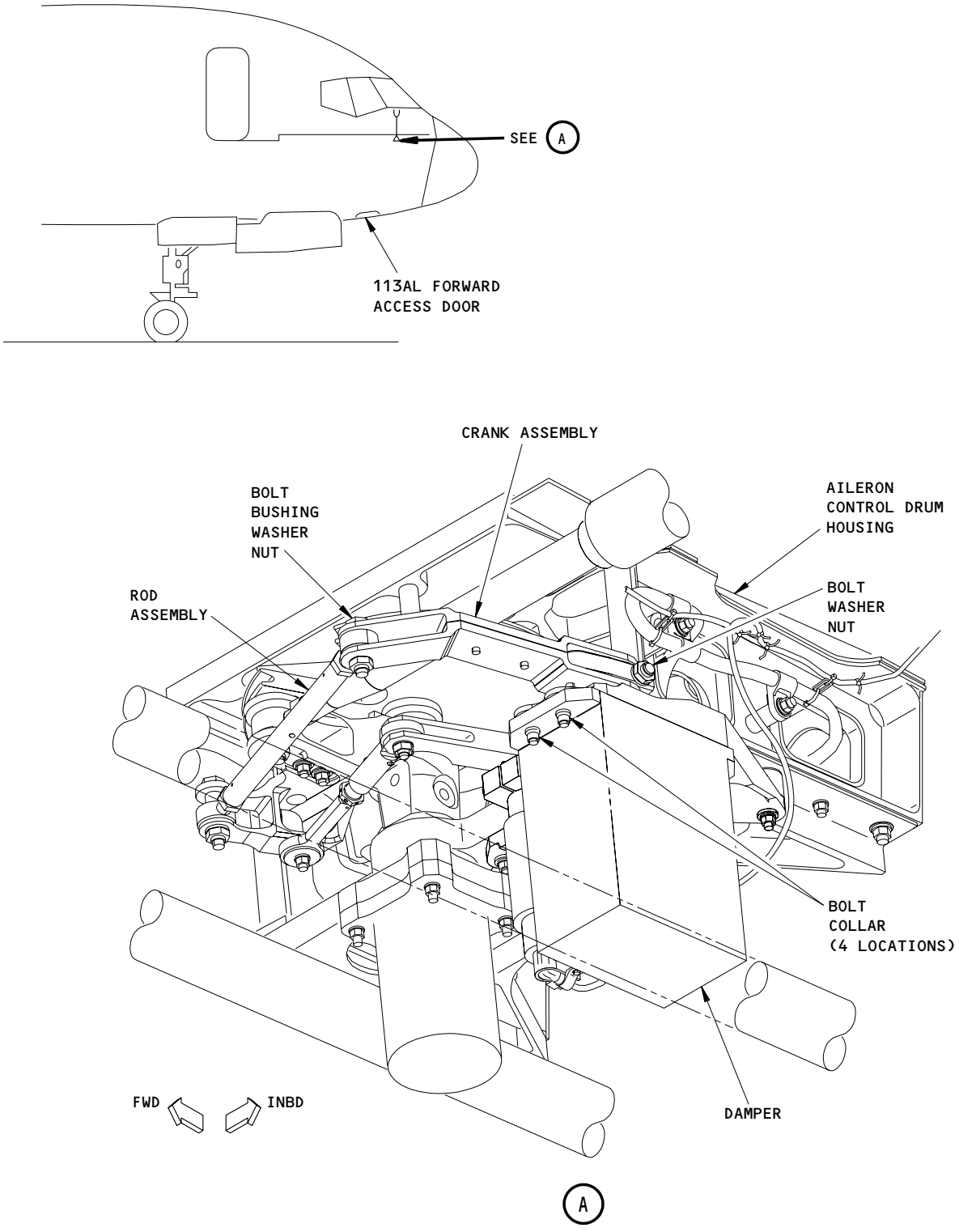


LATERAL FEEL, CENTERING,
AND TRIM MECHANISM
A



LATERAL CONTROL OVERRIDE MECHANISM
B

Lateral Control Mechanism
Figure 202



Control Wheel Damper Installation
Figure 203

(c) Disconnect the bus force limiter from the first officer's drum assembly.
1) Remove the bolt, bushing, washer, and the nut.

S 032-011
(4) Do these steps to disconnect the drum assembly from the aft support structure:
(a) Remove the bolt, washer, and the nut (5 locations).
(b) Remove the bolt, washer, and the nut (2 locations).

S 032-012
(5) Do these steps to disconnect the drum assembly from the floor beams:
(a) Remove the bolt, washer, shim, and the nut (6 locations).
(b) Remove the bolt, washer, and the nut (3 locations).

S 022-013
(6) Lower the drum assembly and remove it.

G. Remove Bus Force Limiter (Fig. 201)

S 032-016
(1) Do this step to disconnect the bus force limiter from the captain's drum assembly:
(a) Remove the bolt, bushing, washer, and the nut.

S 032-017
(2) Do this step to disconnect the bus force limiter from the first officer's drum assembly:
(a) Remove the bolt, bushing, washer, and the nut.

H. Remove or disconnect the damper (not on all aiplanes) from the aileron control drum (first officer's control column side), as needed. (Fig. 203)

NOTE: No adjustment will be necessary when re-installing the damper, if the original installation and adjustment of the rod/damper crank assemblies are kept unchanged.

S 022-092
(1) Do these steps to remove the control wheel damper from the aileron control housing.
(a) Remove the bolt, bushing, washer, and nut to disconnect the crank arm from the rod assembly.
(b) Remove the bolt, washer, and nut to disconnect the other end of the crank assembly from the control wheel damper.
(c) Remove the bolts and collars (4-locations) to remove the control wheel damper from the drum housing.

TASK 27-11-03-422-018

3. Install Aileron Control Drum and Components

A. General

(1) This task contains two procedures, one to install the aileron control drum, and one to install the bus force limiter. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the " Put the Airplane Back to its Usual Condition" group of steps.

B. Equipment

(1) Control Wheels Rigging Beam - B27049-1
(2) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
  (a) A1 - P/N B20003-27
  (b) A2 - P/N B20003-25
(3) Cable Tensiometer, Commercially Available

C. Consumable Materials

(1) C00174 Finish, MIL-C-16173 - Grade 2

D. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 20-10-24/201, Rig Pins
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-21-05/401, Rudder Jackshaft and Forward Quadrant
(5) AMM 27-61-04/401, Spoiler RVDT Unit
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 27-11-00/501, Aileron Control Wheel Damper - System Test

E. Access

(1) Location Zone
  113 Area Forward of NLG Wheel Well

(2) Access Panel
  113AL Flight/Landing Gear/Engine Control Components

F. Install Aileron Control Drum (Fig. 201)

S 822-021

(1) Lift the drum assembly into position. Make sure that the fork assembly is engaged around the control column plate.

S 432-022

(2) Do these steps to connect the drum assembly to the aft support structure:
  (a) Temporarily install the forward bolts that attach the drum assembly to the floor beams. Make sure that the clearance between the floor beams and the drum assembly is equal for each of the six bolts (use a tolerance of ±0.01 inch (0.25 mm)).
  (b) Use shims to adjust the clearance to the value found in the above step.

(c) Remove the bolts and install the shims. Install the bolts, washers, and nuts (6 locations).
(d) Install the bolts, washers, and nuts that hold the drum assembly to the bearing reduction plate (3 locations).
(e) Install the bolt, washer, and nut (5 locations).
(f) Install the bolt, washer, and nut (2 locations).

S 432-023
(3) Do these steps to install the bus force limiter:
(a) Install the control wheel rigging beam.
(b) Loosen the jam nut and adjust the bus force limiter until the bolts can be easily installed.
(c) Install the bolt, bushing, washer, and nut that connects the bus force limiter to the drum assembly. Tighten the nut (2 locations).
(d) Apply the finish to the rod end threads. Make sure that the threads show in at least one-half of the inspection hole.
(e) Tighten the jam nut and lockwire.
(f) Remove the control wheel rigging beam.

S 492-024
(4) Install this rig pin (Fig. 202):

NOTE: The aileron trim system must be in its center position for the rig pin to be easily installed.

(a) A1 (for the lateral feel, centering, and trim mechanism) if the captain's control drum will be removed.
(b) A2 (for the lateral control override mechanism) if the first officer's control drum will be removed.

S 492-025
(5) Install the rigging beam across the bottom surfaces of the control wheels.

S 432-053
(6) Connect cables A1A and A1B or A2A and A2B.

S 092-026
(7) Remove rig pin A1 or A2.

S 822-027
(8) Do these steps if new control cables have been installed:
(a) Tighten the cables to two times the value shown in Table 1.
(b) Remove the rigging beam from the control wheels.
(c) Cycle the control wheel 20 times through its full travel range.
(d) Install the rigging beam.

S 822-028

(9) Adjust the cables to the value shown in Table 1.

NOTE: Before the cables are adjusted, make sure that the airplane temperature is stable (use a tolerance of ±5°F) along the cable. Make sure that the temperature has been stable for at least one hour.

Table 1
Aileron Cable Tension

TEMP °F ± 5°	BODY CABLES A1A, A1B, A2A, A2B ± 10 lbs
110	118
90	109
80	104
70	100
60	96
50	92
40	88
30	84
10	75
-10	67
-30	59
-40	53

S 092-029

(10) Remove the rigging beam.

S 212-030

(11) Cycle the control wheel through one full travel cycle and do the checks that follow:

(a) Make sure that rig pins A1 (for the lateral feel, centering, and trim mechanism) and A2 (for the lateral-control override mechanism) can be easily installed (Fig. 202).

(b) Make sure that no more that two threads show at the turnbuckles when the system is rigged correctly.
(c) Make sure that the cables are not bent by the fairleads, rubstrips, or grommets that are in the system.
(d) Make sure that the cable guards are installed correctly and that the pulleys turn freely.
(e) Make sure that the bottom surfaces of the control wheel touch the straight edge when rig pins A1 and A2 are installed. One bottom surface can be 0.03 inch (0.76 mm) away from the straight edge.
(f) Remove the rig pins.

S 432-031
(12) Install the clip locks on the turnbuckles.

S 422-032
(13) Install the spoiler RVDT unit (Ref 27-61-04).

S 422-033
(14) Install the rudder pedal pushrods (Ref 27-21-05).

S 862-034
(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11E17, FLT CONT CMPTR PWR LEFT
(b) 11E18, FLT CONT CMPTR SERVO LEFT
(c) 11E19, FLT CONT CMPTR PWR CENTER
(d) 11E21, FLT CONT CMPTR SERVO CENTER
(e) 11E35, FLT CONT CMPTR PWR RIGHT
(f) 11E36, FLT CONT CMPTR SERVO RIGHT

S 222-035
(16) Do the test procedure below for the aileron control drums and bus force limiter.

G. Install Bus Force Limiter (Fig. 201)

S 492-036
(1) Install the control wheel rigging beam.

S 422-037
(2) Do these steps to install the bus force limiter:
(a) Loosen the jam nut and adjust the bus force limiter until the bolts can be easily installed.
(b) Install the bolt, bushing, washer, and nut that connects the bus force limiter to the drum assembly. Tighten the nut (2 locations).
(c) Apply the finish to the rod end threads. Make sure that the threads show in at least one-half of the inspection hole.
(d) Tighten the jam nut and lockwire.

S 092-038
(3) Remove the control wheel rigging beam.

S 222-039
(4) Do the test procedure below for the aileron control drums and bus force limiter.

H. Install or connect the damper (not on all airplanes) to the aileron control drum (first officer's control column side), as needed. (Fig. 203)

NOTE: No additional adjustment is necessary when re-installing the damper, if the original installation and adjustment of the rod/damper crank assemblies are unchanged.
If you have replaced the damper, do the damper test shown later in this procedure.

S 422-093
(1) Do these steps to install the control wheel damper on the aileron control drum housing.
(a) Put the control wheel damper in position and install and tighten the bolts and collars (4-locations).
(b) Connect the crank assembly to the control wheel damper and install and tighten the bolt, washer, and nut.
(c) Connect the crank assembly to the rod assembly by installing the bolt, bushing, washer, and nut.
(d) Do the Aileron Control Wheel Damper System Test (27-11-00/501).

I. Put the Airplane Back to its Usual Condition

S 092-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 862-040
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-041
(3) Close access door 113AL (Ref 06-41-00).

TASK 27-11-03-722-042

4. Aileron Control Drums and Bus Force Limiter - Test

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems

B. Access
(1) Location Zones
211 Control Cabin (Left)
212 Control Cabin (Right)

C. Prepare to Test

S 862-043
(1) Supply electrical power (Ref 24-22-00).

S 862-044
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 212-045
(3) Make sure that all the rig pins have been removed.

S 862-046
(4) Make sure that these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 822-047
(5) Push the STATUS switch on the display select panel, P9, to show the control surface position indicator on the bottom EICAS display.

S 862-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

D. Test Aileron Control

S 212-048
(1) Turn the captain's control wheel clockwise. Do the checks that follow:
(a) Make sure the first officer's control wheel turns clockwise.
(b) Make sure the right aileron moves up and the left aileron moves down.

E. Put the Airplane Back to its Usual Condition

S 862-049
(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-050
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

LATERAL CONTROL FEEL, CENTERING, AND TRIM MECHANISM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains these tasks:

      - Feel, Centering, and Trim Mechanism and Its Components - Removal
      - Feel, Centering, and Trim Mechanism and Its Components - Installation
      - Feel, Centering, and Trim Mechanism - Adjustment/Test

TASK 27-11-14-022-008

2. Feel, Centering, and Trim Mechanism and Its Components - Removal
   A. General
      (1) This task contains two procedures, one to remove the feel, centering, and trim mechanism, and one to remove the trim actuator. Because this task contains two procedures, do only the applicable groups of steps.

      To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) AMM 25-50-01/401, Ceiling Panels
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
      (5) 32-00-15/201, Landing Gear Door Locks
      (6) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones
          143/144 MLG Wheel Well
          561 Rear Spar to Trailing Edge

      (2) Access Panel
          561AB Aileron Quadrant

   D. Prepare for the Removal

      S 862-009
      (1) Supply electrical power (Ref 24-22-00/201).

S 862-014
(2) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11J15, AILERON TRIM

S 212-010
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20/201).

S 492-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (Ref 32-00-15/201).

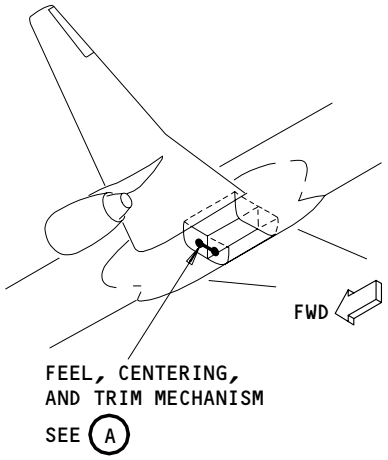
E. Lateral Trim Actuator - Removal (Fig. 201)

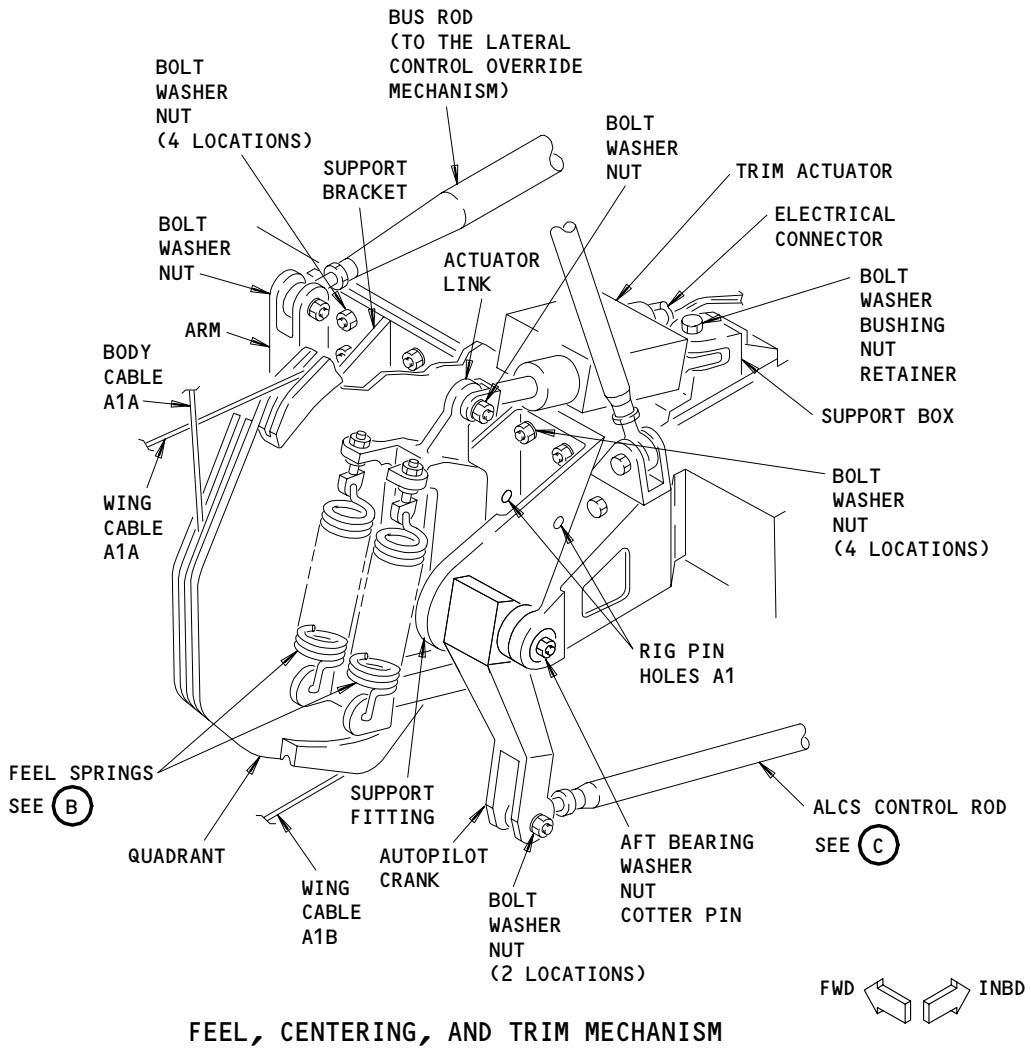
S 032-015
(1) Disconnect these components:
(a) The electrical connector from the trim actuator
(b) The actuator from the actuator link
(c) The actuator from the support box.

S 022-016
(2) Remove the trim actuator.

F. Feel, Centering, and Trim Mechanism - Removal (Fig. 201)

S 032-080
(1) Disconnect these components from the feel, centering, and trim mechanism:
(a) The control rods for the center and left autopilot lateral control servos (ALCSs) (2 locations)
(b) The bus rod (for the lateral control override mechanism).

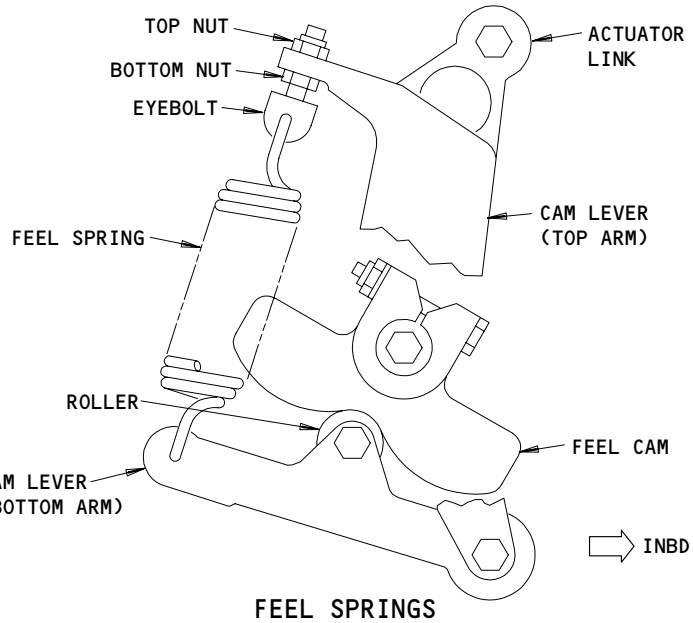




FEEL, CENTERING, AND TRIM MECHANISM

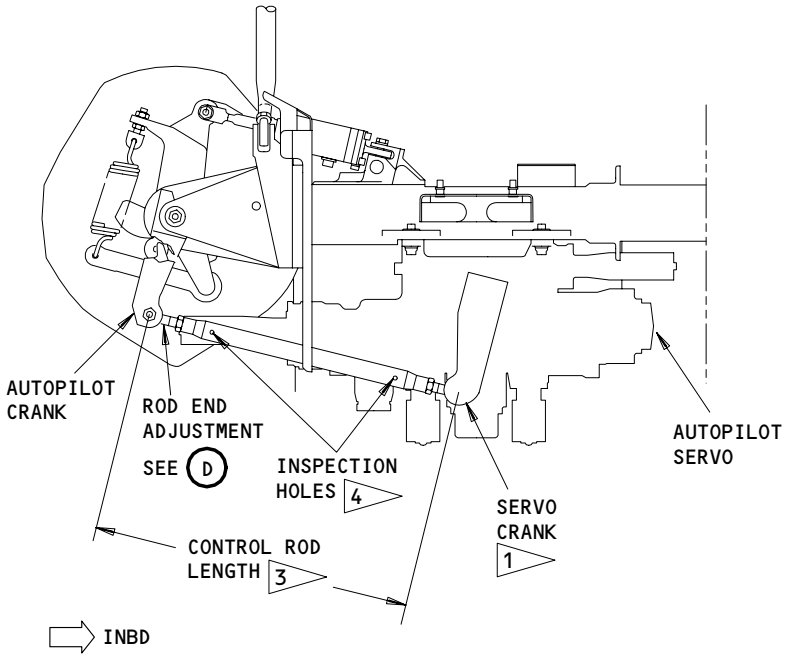
(A)

Lateral Feel, Centering, and Trim Mechanism Installation
Figure 201 (Sheet 1)



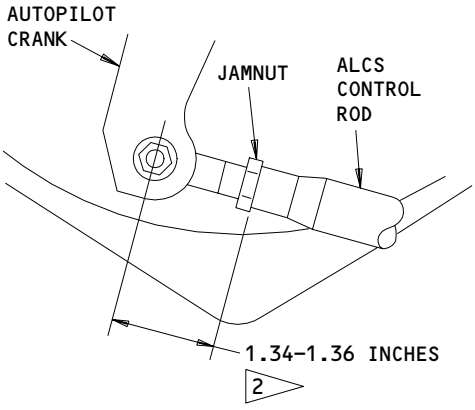
FEEL SPRINGS

B



ALCS CONTROL ROD
(CENTER ALCS SHOWN, LEFT ALCS IS FORWARD)

C

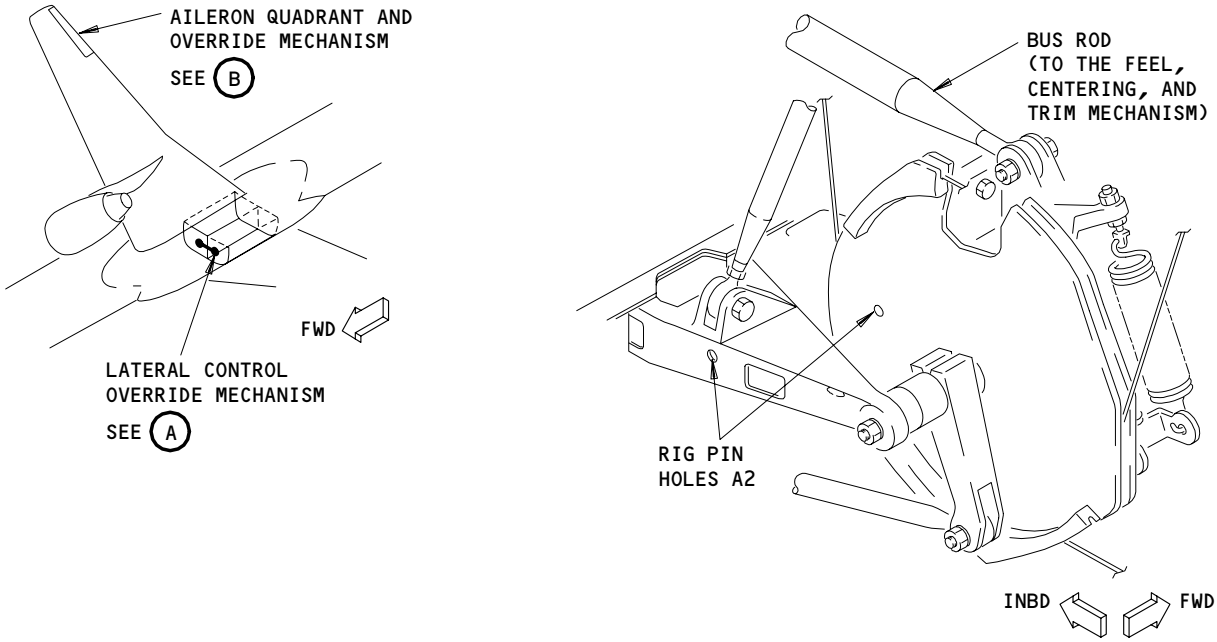


ROD END ADJUSTMENT

D

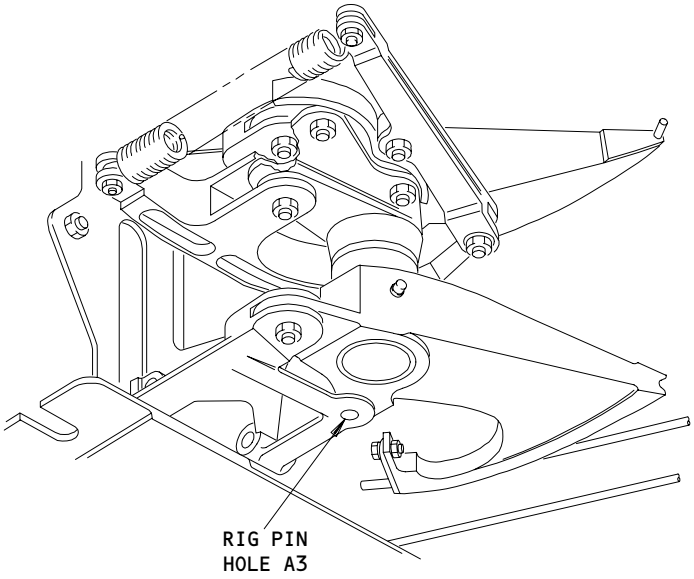
1. DO NOT DISCONNECT THE ROD END FROM THE SERVO CRANK
2. ADJUST THE ROD END FOR THE AUTOPILOT CRANK AS SHOWN, THEN ADJUST THE CONTROL ROD LENGTH
3. TURN THE CONTROL ROD BODY UNTIL THE LENGTH OF THE CONTROL ROD IS APPROXIMATELY 12.51 INCHES
4. MAKE SURE YOU CANNOT PUT A 0.063 INCH DIAMETER ROD THROUGH THE INSPECTION HOLES AFTER YOU DO THE ALCS ADJUSTMENT

Lateral Feel, Centering, and Trim Mechanism Installation
Figure 201 (Sheet 2)



LATERAL CONTROL OVERRIDE MECHANISM

(A)



AILERON QUADRANT AND OVERRIDE MECHANISM
(ONE MECHANISM ON EACH WING)

(B)

Lateral Feel, Centering, and Trim Mechanism Installation
Figure 202

S 012-071
(2) Open access panel 561AB (Ref 06-44-00/201).

S 032-019
(3) Disconnect these components:
(a) The electrical connector from the trim actuator.
(b) Body cables A1A and A1B and wing cables A1A and A1B from the quadrant. Tag the cables for identification.

NOTE: The turnbuckles for body cables A1A and A1B are behind the ceiling panel that is inboard of the ceiling panel adjacent to the forward cargo door (AMM 25-50-01/401). The turnbuckles for wing cables A1A and A1B are outboard of the feel, centering, and trim mechanism.

(c) The trim actuator from the actuator link.

S 032-020
(4) Remove these components:
(a) The bolts that connect the support bracket to the airplane (4 locations).
(b) The bolts that connect the support fitting to the airplane (4 locations).

S 022-021
(5) Remove the feel, centering, and trim mechanism.

TASK 27-11-14-422-022

3. Feel, Centering, and Trim Mechanism and Its Components - Installation

A. General

(1) This task contains two procedures, one to install the feel, centering, and trim mechanism, and one to install the trim actuator. Because this task contains two procedures, do only the applicable groups of steps.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
(a) A1 - P/N B20003-27
(b) A2 - P/N B20003-25
(c) A3 - P/N B20003-23
(2) Control Wheel Rigging Beam - B27049-1
(3) Cable Tensiometer - Commercially Available
(4) Control Wheel Adapter Equipment - A27021-97 or -98

C. Consumable Materials
(1) C00259, Primer - BMS 10-11

D. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-13-03/401, Autopilot Lateral Control Servo
(4) 24-22-00/201, Electrical Power - Control
(5) 27-11-00/501, Aileron and Aileron Trim Control System
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(7) 32-00-15/201, Landing Gear Door Locks

E. Access
(1) Location Zones

143/144	MLG Wheel Well
561	Rear Spar to Trailing Edge

(2) Access Panels

561AB	Aileron Quadrant

F. Lateral Trim Actuator - Installation (Fig. 201)

S 432-024
(1) Put the actuator on the support box with the drain holes down and do this step:
(a) Install the bolt, bushing, nut, and the nut retainer.

S 492-025
(2) Install rig pin A1 (for the feel, centering, and trim mechanism).

S 432-026
(3) Connect the electrical connector to the trim actuator.

S 862-069
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J15, AILERON TRIM

S 432-002
(5) Do these steps to connect the trim actuator to the actuator link:
(a) Operate the aileron trim switches until you can easily install the bolt that connects the actuator clevis to the actuator link.
(b) Install the bolt, washer, and nut that connects the actuator to the actuator link.

S 092-027
(6) Remove rig pin A1.

S 212-028
(7) Do these steps to do a check of the lateral trim actuator:
(a) Move the aileron trim switches to LEFT WING DOWN and do this check:
1) Make sure the control wheels turn counterclockwise.
(b) Move the aileron trim switches to RIGHT WING DOWN and do this check:
1) Make sure the control wheels turn clockwise.

G. Feel, Centering, and Trim Mechanism - Installation (Fig. 201)

S 372-072
(1) Apply the primer to the surface of the aft bearing that mates with the bracket.

S 822-029
(2) While the primer is wet, put the feel, centering, and trim mechanism in its correct position in the left wheel well.

S 432-030
(3) Install these components:
(a) The bolts that connect the support bracket to the airplane (4 locations).

(b) The bolts that connect the support fitting to the airplane (4 locations).

S 822-031

(4) Make sure the cam roller is in the center of the feel cam.

S 492-073

(5) Install rig pin A1 (for the feel, centering, and trim mechanism).

S 432-032

(6) Connect the electrical connector to the trim actuator.

S 862-033

(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11J15, AILERON TRIM

S 822-034

(8) Operate the aileron trim switches until you can easily install the bolt that connects the actuator clevis to the actuator link.

S 492-035

(9) Install these rig pins:
(a) A2 (for the lateral control override mechanism)
(b) A3 (for the aileron quadrant and override mechanism)

S 222-074

(10) Make sure that the length of the ALCS control rod is correct (Fig. 201).

S 822-075

(11) If it is necessary, do these steps to adjust the ALCS control rod:
(a) Adjust the rod end on the autopilot crank end of the control rod to 1.34 to 1.36 inches (34.0-34.5 mm).
1) Tighten the jamnut.

(b) Turn the control rod body (to adjust the rod end at the autopilot servo) until the control rod is approximately 12.51 inch (31.7 cm) long.

S 432-038

(12) Connect these components:
(a) The ALCS control rod to the autopilot crank (2 locations)
(b) The bus rod (for the lateral control override mechanism) to the arm
(c) Body cables A1A and A1B to the feel, centering, and trim mechanism
(d) Wing cables A1A and A1B to the feel, centering, and trim mechanism.

S 092-039

(13) Remove rig pins A1, A2, and A3.

S 822-040

(14) Do these steps if you installed new cables:
(a) Install the control wheel rigging beam.
(b) Tighten the cables to two times the value shown in Table 1.
(c) Remove the rigging beam.
(d) Move the control wheel through its full travel range 20 times.

S 492-041

(15) Install the control wheel rigging beam.

S 822-042

(16) Adjust the cable tension to the value shown in Table 1.

NOTE: Before you do the adjustment, make sure the cable temperature is stable (use a tolerance of ±5°F). Make sure the temperature was stable for at least one hour.

TEMP °F ± 5° F	BODY CABLES A1A, A1B ± 10 LBS	WING CABLES A1A, A1B ± 10 LBS
110	118	98
90	109	89
80	104	84
70	100	80
60	96	76
50	92	72
40	88	68
30	84	64
10	75	55
-10	67	47
-30	59	39
-40	53	39

Aileron Cable Tension
Table 1

S 092-043
(17) Remove the control wheel rigging beam.

S 212-044
(18) Make sure you can easily install and remove rig pins A1, A2, and A3 at the same time.

S 432-045
(19) Install clip locks on the turnbuckles.

S 822-046
(20) Adjust the ALCS servos (Ref 22-13-03/401).

S 822-047

(21) Do the Adjustment/Test procedure below for the Feel, Centering, and Trim Mechanism.

S 412-076

(22) Close access panel 561AB (Ref 06-44-00/201).

H. Put the Airplane Back to Its Usual Condition

S 092-007

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15/201).

S 862-049

(2) Remove electrical power if it is not necessary (Ref 24-22-00/201).

TASK 27-11-14-822-070

4. Feel, Centering, and Trim Mechanism - Adjustment/Test

A. Equipment

(1) Control Wheel Adapter Equipment - A27021-97 or -98

(2) Control Wheel Protractor - A27021-30 or Protractor Kit A27021-29

(3) Torqometer - TER6FUAA
Snap-on Tools International LTD.
2801 80th St.P.O.Box 1410,
Kenosha, Winsconsin, USA 53141-1410

(4) Dial Type Torque Wrench - 6169A
Stanley-Proto Industrial Tools,
Department BR
14117 Industrial Park Blvd.N.E.
Covington, Georgia 30209
Phone (770)787-3800 (1-800-800-8665,in USA only)

B. References

(1) 24-22-00/201, Electrical Power - Control

(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(3) 32-00-15/201, Landing Gear Door Locks

(4) 32-00-20/201, Landing Gear Downlocks

C. Access

(1) Location Zones
211/212 Control Cabin

D. Prepare for the Adjustment

NOTE: Before you adjust the feel springs, make sure the control wheels, aileron body cables, left and right wing cables, and aileron power control actuators are adjusted correctly (AMM 27-11-00/501).

S 212-001

(1) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20/201).

S 492-003

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (Ref 32-00-15/201).

S 862-077

(3) Operate the aileron trim switches on the P8 panel until the trim indicator shows zero units of trim for the aileron trim to be at neutral.

S 862-099

(4) Install wheel protractors on the wheels and set to neutral using a straight edge as follow:

(a) Put the captain's and first officer's control wheels in neutral.

NOTE: Neutral is achived by clamping a straight edge across the lower surface of each wheel.

S 862-100

(5) With straight edge removed, move pilot's wheel clockwise and then counterclockwise to the stop positions. Do not load wheel over two pounds (0.91 kilogram) at the circunference of 6.5 inches (0.165 meter). Travel must be ± 82.5 degrees minimum.

S 862-101

(6) With straight edge removed, move copilot's wheel clockwise and then counterclockwise to the stop positions. Do not load wheel over two pounds (0.91 kilogram) at the circunference of 6.5 inches (0.165 meter). Travel must be ± 82.5 degrees minimum.

S 862-102
(7) With wheels starting at neutral, load one wheel clockwise, then counterclockwise until opposite wheel just starts to move. Maximum torque required to be achived must be 4.0 pound-inches (0.45 newton meter).

S 862-052
(8) Remove electrical power (Ref 24-22-00/201).

S 862-092
(9) Remove the power from the left, center and right hydraulic systems (AMM 29-11-00/201).

S 862-089
(10) Jiggle the captain's control wheel to make sure it is in the neutral detent.

E. AIRPLANES WITHOUT CONTROL WHEEL DAMPER;
Feel Springs - Adjustment

S 862-078
(1) Turn the control wheel counterclockwise to 6 units (30 degrees) of trim and then back to 2 units (10 degrees) of trim, then release.

S 212-090
(2) Make sure the control wheel goes back to its neutral position within ± 0.4 unit of trim (± 2 degrees).

S 862-091
(3) Do the last two steps above again, except turn the control wheel clockwise.

S 862-093
(4) Measure the control wheel breakout force in both directions with a spring scale or equivalent tool. Force must be less than 6.5 pounds (0.73 newton meter) at the wheel radius of 6.5 inches (0.165 meter) 42.25 inch-pounds (4.77 Nm) maximum.

S 862-094
(5) If the control wheel centers correctly, no adjustment is necessary.

S 862-096

(6) If the control wheel fails to re-center, check the system for potential high friction causes. If no problems are found increase the feel cam spring tension by alternately adjusting the two tensioning nuts 1/4 revolution at a time. Loosen spring side jam nuts (bottom nuts) then adjust tensioning nuts (top nuts) 1/4 turn and re-tighten jamnuts.

NOTE: Make sure the eyebolt threads show equally above each of the top nuts.

S 862-095

(7) Re-center and jiggle the captain's control wheel.

S 862-097

(8) Measure the control wheel breakout force in both directions with a spring scale or equivalent tool. Force must be less than 6.5 pounds (0.73 newton meter) at the wheel radius of 6.5 inches (0.165 meter) 42.25 pound-inches (4.77 Nm) maximum.

S 862-098

(9) If necessary, do the adjustment procedure again until the control wheel re-centers.

S 222-059

(10) Do these steps to do a check of the feel spring adjustment.

NOTE: The System Feel, Centering, and Trim Test (AMM 27-11-00/501) includes this check.

(a) Remove the cover plate/map holder from the control wheel.
(b) Install the control wheel adapter equipment and protractor on captain's control wheel, and center the protractor on the control wheel.
(c) Hit the control wheel lightly to make sure it is in its neutral position.
(d) Measure the torque that is necessary to turn the control wheel 1 to 2 degrees away from its neutral position.
(e) Make sure the torque is less or equal to 42 pound-inches (4.7 Nm).
(f) Remove the control wheel adapter equipment and protractor.

F. AIRPLANES WITH CONTROL WHEEL DAMPER;
Feel Springs - Adjustment

NOTE: The intent of this feel spring adjustment is to adjust the centering springs to the lowest possible value that will allow the wheel to meet the centering requirement of the 6-2 return-to-center test. That test is used to verify the wheel centering characteristics. Remove the wheel torque adaptor before checking control wheel centering.

S 822-109

(1) Loosen the bottom nut for the feel springs (2 locations).

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

S 822-110

(2) Loosen the top nuts until only 2 threads show above the nut.

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

S 822-111

(3) Turn the control wheel clockwise to 6 units of trim, then back to 2 units, and then release the control wheel.

NOTE: When you turn the control wheel to a trim unit, make sure that the center line on the control wheel is aligned with the "trim unit" line width on the column (each trim unit is equal to 5 degrees of the wheel angle).

S 822-112

(4) Make sure that the control wheel goes back to its neutral position, 0 unit of trim.

S 822-113
(5) If the control wheel does not go back to its neutral position, 0 unit of trim, then do the following steps:
(a) If the control wheel is within 0 ±0.4 units of trim, tap the control wheel lightly with a finger.
(b) If the control wheel does not go back to its neutral position, 0 unit of trim, then do this step:
1) Tighten the top nut of the two feel springs 1/4-turn each (adjust each spring by the same amount).

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

(c) Do the "turn the control wheel clockwise" steps again.

S 822-114
(6) If the control wheel does go back to its neutral position, 0 unit of trim, then turn the control wheel counter clockwise to 6 units of trim, then back to 2 units, and then release the control wheel.

NOTE: When you turn the control wheel to a trim unit, make sure that the center line on the control wheel is aligned with the "trim unit" line width on the column (each trim unit is equal to 5 degrees of the wheel angle).

S 822-115
(7) Make sure that the control wheel goes back to its neutral position, 0 unit of trim.

S 822-116
(8) If the control wheel does not go back to its neutral position, 0 unit of trim, then do the following steps:
(a) If the control wheel is within 0 ±0.4 units of trim, tap the control wheel lightly with a finger.
(b) If the control wheel does not go back to its neutral position, 0 unit of trim, then do this step:
1) Tighten the top nut of the two feel springs 1/4-turn each (adjust each spring by the same amount).

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

(c) Do the "turn the control wheel clockwise" steps again.

S 822-117
(9) Make sure that the eyebolt threads show equally above each of the top nuts.

S 822-118
(10) Tighten the bottom nut for the feel springs (2 locations).

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

S 822-119
(11) Torque the top nuts for the feel springs to 50-75 pound-inches (5.6-8.5 Newton-meters).

NOTE: When you turn the nuts on the spring eyebolts, do not let the eyebolts turn.

S 732-121
(12) Check the control wheel torque.
(a) Use the torque wrench to slowly rotate the control wheel clockwise from neutral at a rate of about 1 to 2 degrees per second to 1 unit (5 ±0.5 degrees) of trim.
(b) Make sure the torque is not greater than 49.5 pounds-inches.
(c) Slowly rotate the control wheel clockwise from neutral at a rate of about 1 to 2 degrees per second to 2 units (10 ±0.5 degrees) of trim.
(d) Make sure the torque is not greater than 55.5 pound-inches.
(e) To measure torque at full travel (85 ±2 degrees) do the steps that follow:
1) Move the wheel until the stop is just touched and measure the wheel angle.
2) Full travel (85 degrees) required, ± 2 degrees.
3) Move the wheel approximately 2 degrees back from the stop position and take the torque measurement.
4) Make sure that the torque at full travel is between 100 and 140 pound-inches.
(f) Repeat the torque check in the counterclockwise direction.

G. Feel, Centering, and Trim Mechanism - Test

S 862-060
(1) Supply electrical power (Ref 24-22-00/201).

S 862-061

(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 822-062

(3) Push the STATUS switch on the display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 862-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 212-063

(5) Turn the control wheel clockwise and do these checks:
(a) Make sure the left aileron moves down.
(b) Make sure the right aileron moves up.

S 212-064

(6) Turn the control wheel counterclockwise and do these checks:
(a) Make sure the left aileron moves up.
(b) Make sure the right aileron moves down.

S 212-065

(7) Release the control wheel and do this check:
(a) Make sure the control wheel goes back to its neutral position.

S 212-066

(8) Make sure that the control wheels and the ailerons move smoothly through their full travel range.

H. Put the Airplane Back to Its Usual Condition

S 492-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15/201).

S 862-067
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 862-068
(3) Remove electrical power if it is not necessary (Ref 24-22-00/201).

LATERAL CONTROL OVERRIDE MECHANISM - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and the installation tasks for the lateral control override mechanism.

TASK 27-11-16-024-001

2. Lateral Control Override Mechanism - Removal (Fig. 401)
   A. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 25-50-01/401, Cargo Compartment Ceiling Lining
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones
          730 Left Main Landing Gear and Doors
          740 Right Main Landing Gear and Doors
          668 Aileron

      (2) Access Panel
          661AB Aileron Quadrant and Override Mechanism

   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00/201).

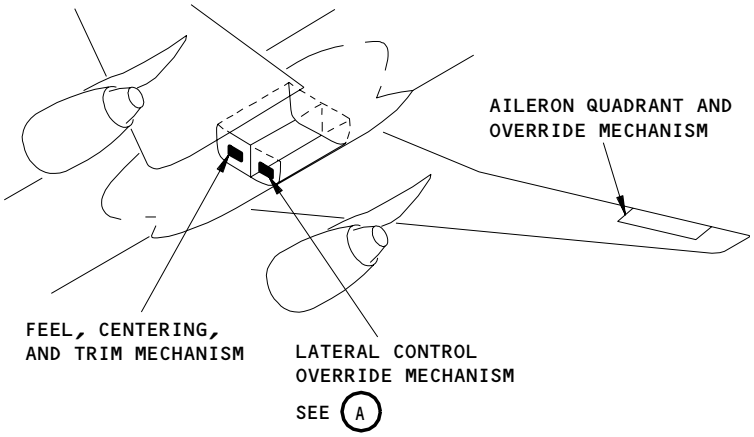
      S 494-003
      (2) Make sure the landing gear downlocks are installed (Ref 32-00-20/201).

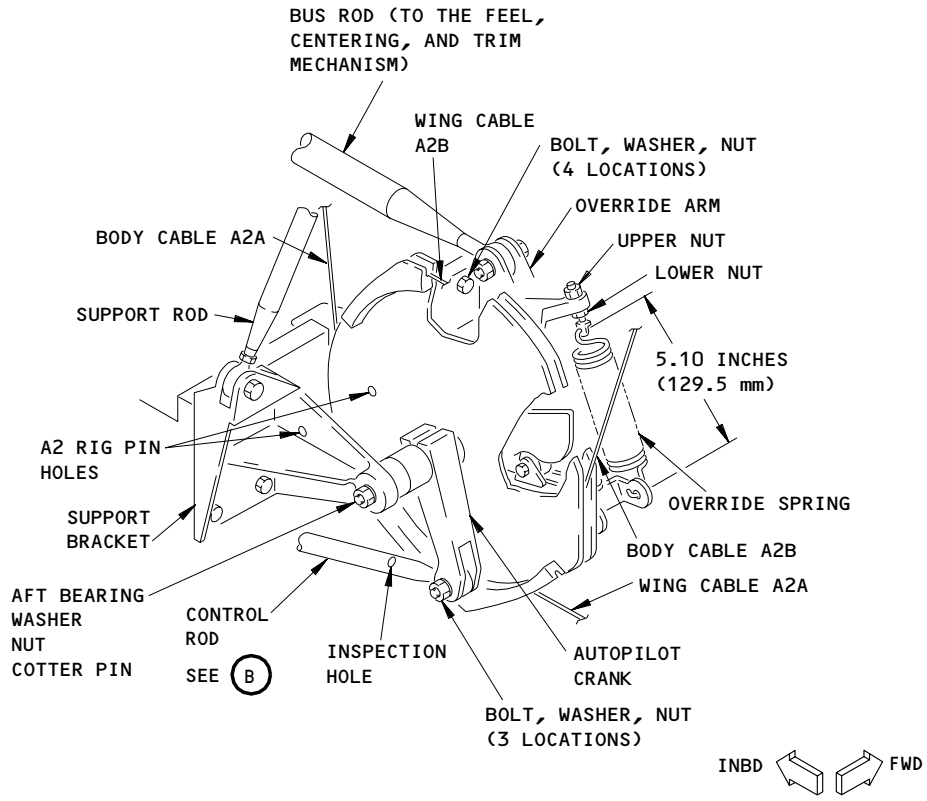
      S 494-004

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the main gear doors and install the door locks (Ref 32-00-15/201).

      S 014-006
      (4) Open the access panel, 661AB (Ref 06-44-00/201).

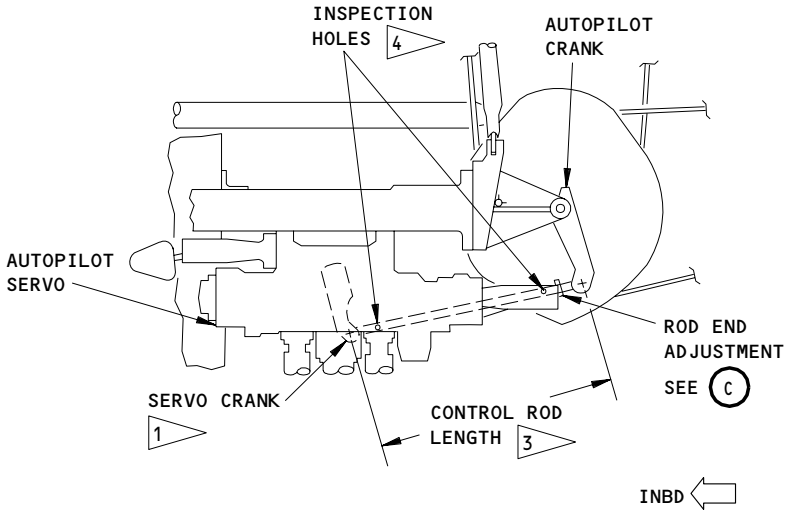




LATERAL CONTROL OVERRIDE MECHANISM

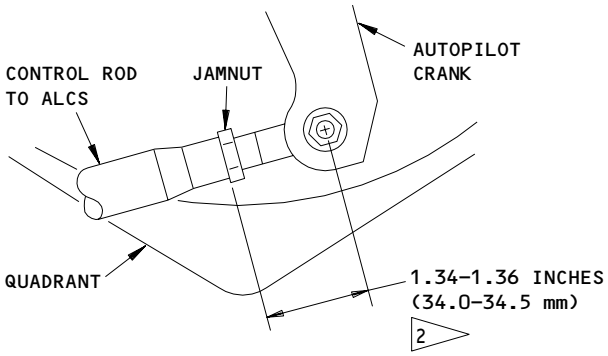
A

Lateral-Control Override Mechanism Installation
Figure 401 (Sheet 1)



CONTROL ROD

B



ROD END ADJUSTMENT

C

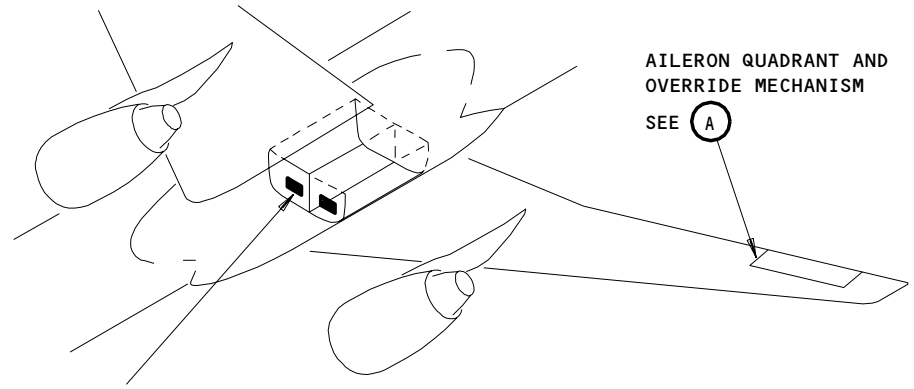
1 DO NOT DISCONNECT THE ROD END FROM THE SERVO CRANK

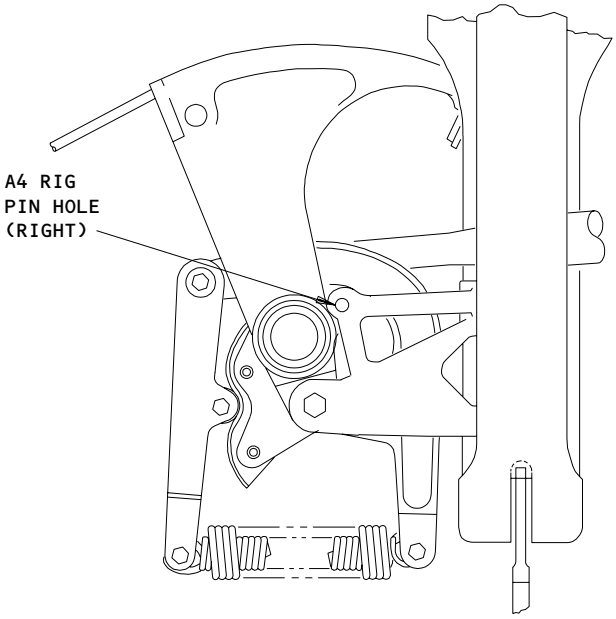
2 ADJUST THE ROD END FOR THE AUTOPILOT CRANK AS SHOWN, THEN ADJUST THE CONTROL ROD LENGTH

3 TURN THE CONTROL ROD BODY UNTIL THE LENGTH OF THE CONTROL ROD IS APPROXIMATELY 12.51 INCHES (317.75 mm)

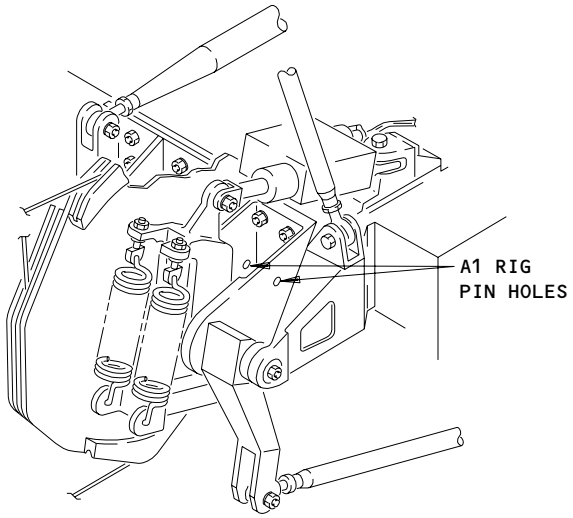
4 MAKE SURE YOU CANNOT PUT A 0.063 INCH (1.60 mm) DIAMETER ROD THROUGH THE INSPECTION HOLES AFTER YOU DO THE ALCS ADJUSTMENT

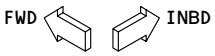
Lateral-Control Override Mechanism Installation
Figure 401 (Sheet 2)





AILERON QUADERANT AND
OVERRIDE MECHANISM
A





FEEL, CENTERING
AND TRIM MECHANISM
B

Lateral Control Override Mechanism Installation
Figure 402

D. Lateral Control Override Mechanism - Removal

S 034-007

(1) Disconnect these components from the lateral control override mechanism:
   (a) The bus rod
   (b) The ALCS control rod
   (c) Body cables A2A and A2B and wing cables A2A and A2B and tag them for identification.

NOTE: You can find the turnbuckles for body cables A2A and A2B behind the ceiling lining that is adjacent to the forward cargo door. Refer to 25-50-01/401 for the applicable removal procedure.

You can find the turnbuckles for wing cables A2A and A2B near the lateral control override mechanism.

S 034-045

(2) Remove these components:
   (a) The bolts that connnect the forward support bracket to the airplane structure (4 locations).
   (b) The nut and washer that holds the mechanism to its aft bracket.

S 024-012

(3) Remove the lateral control override mechanism.

TASK 27-11-16-424-013

3. Lateral Control Override Mechanism - Installation (Fig. 401)

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
   (a) A1 - P/N B20003-27
   (b) A2 - P/N B20003-25
   (c) A4 - P/N B20003-23

(2) Cable Tensiometer - Commercially Available
(3) Control Wheel Rigging Beam - B27049-1

B. Consumable Materials
(1) C00259 Primer - BMS 10-11

C. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-13-03/401, Autopilot Lateral Control Servo
(4) 24-22-00/201, Electrical Power - Control
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zones
730 Left Main Landing Gear and Doors
740 Right Main Landing Gear and Doors
668 Aileron

(2) Access Panel
661AB Aileron Quadrant and Override Mechanism

E. Lateral Control Override Mechanism - Installation

S 374-052
(1) Apply primer to the surface of the aft bearing that mates with the bracket.

S 864-053
(2) While the primer is wet, put the lateral control override mechanism in its correct position in the right wheel well.

S 434-016
(3) Install the bolts that connect the forward support bracket to the airplane (4 locations).

S 214-054
(4) Make sure the cam roller is in its center detent.

S 214-055
(5) Make sure that the length of the override springs is 5.10 inches (12.95 cm).

S 824-046
(6) Do these steps if the length of the springs is not correct:
  (a) Loosen the bottom nut and adjust the spring to a length of 5.10 inches (12.95 cm).
  (b) Tighten the nuts.
  (c) Do the procedure again for the other spring.

S 494-062
(7) Install these rig pins (Fig. 402):
  (a) A2 (in the override mechanism)
  (b) A1 (in the feel, centering, and trim mechanism)
  (c) A4 (in the aileron quadrant and override mechanism)

S 214-057
(8) Make sure the length of the ALCS control rod is correct (Fig. 401).

S 824-047
(9) If it is necessary, do these steps to adjust the ALCS control rod:
  (a) Adjust the rod end of the autopilot crank end of the control rod to 1.34 to 1.36 inches (34.0-34.5 mm).
    1) Tighten the jamnut.
  (b) Turn the control rod body (to adjust the rod end at the autopilot servo) until the control rod is approximately 12.51 inch long.

S 434-048
(10) Connect these components:
  (a) The ALCS control rod to the autopilot crank.
  (b) The bus rod (from the feel, centering, and trim mechanism) to the arm
  (c) Body cables A2A and A2B to the lateral control override mechanism.

(d) Wing cables A2A and A2B to the lateral control override mechanism.

S 094-049

(11) Remove rig pins A1, A2, and A4.

S 824-050

(12) Do these steps if you installed new cables:
(a) Install the control wheel rigging beam.
(b) Tighten the cables to two times the value shown in Table 1.
(c) Remove the control wheel rigging beam.
(d) Move the control wheel through its full travel range 20 times.

S 424-026

(13) Install the control wheel rigging beam.

S 824-027

(14) Adjust the cables to the value shown in Table 1.

NOTE: Before you do the adjustment, make sure the cable temperature is stable (use a tolerance of +/- 5 degrees F). Make sure the temperature was stable for at least one hour.

TEMP °F ± 5° F	BODY CABLES A2A and A2B ± 10 LBS	WING CABLES A2A and A2B ± 10 LBS
110	118	98
90	109	89
80	104	84
70	100	80
60	96	76
50	92	72
40	88	68
30	84	64
10	75	55
-10	67	47
-30	59	39
-40	53	39

Aileron Cable Tension
Table 1

S 094-058
(15) Remove the control wheel rigging beam.

S 214-059
(16) Make sure you can easily install and remove rig pins A1, A2, and A4 at the same time (Fig. 402).

S 754-031
(17) Turn the control wheel through its full travel range and do these checks:
  (a) Make sure the pulleys turn freely and do not touch the pulley guards.
  (b) Make sure the fairleads, rub-strips, and grommets do not touch the cables.
  (c) Make sure the control wheel goes to neutral when you release it.
  (d) Make sure that no more than two threads show at the turnbuckles.

S 434-032
(18) Install the clip locks on the turnbuckles.

S 824-033
(19) Adjust the autopilot servos (Ref 22-13-03/401).

S 214-060
(20) Make sure these circuit breakers on the overhead panel, P11, are closed:
  (a) EICAS (6 locations)

S 864-035
(21) Push the STATUS switch on the pilot's display-select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 864-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(22) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 714-037
(23) Turn the control wheel clockwise and do this check:
(a) Make sure the right aileron moves up and the left aileron moves down.

S 714-038
(24) Turn the control wheel counterclockwise and do this check:
(a) Make sure the right aileron moves down and the left aileron moves up.

S 864-061
(25) Turn the captain's control wheel fully counterclockwise and use a clamp to hold it there.

S 214-051
(26) Turn the first officer's control wheel through its full travel range and do these checks:
(a) Make sure the ailerons operate correctly.
(b) Make sure the right aileron moves fully up.

S 864-040
(27) Remove the clamp from the captain's control wheel.

F. Put the Airplane Back to Its Usual Condition

S 094-041

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15/201).

S 864-042
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 864-043
(3) Remove electrical power if it is not necessary (Ref 24-22-00/201).

S 414-044
(4) Close the access panel, 661AB (Ref 06-44-00/201).

AILERON QUADRANT AND OVERRIDE MECHANISM - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task is to remove the aileron quadrant and override mechanism and the other is to install it.

TASK 27-11-17-024-001

2. Remove the Aileron Quadrant and Override Mechanism
   A. Equipment
      (1) Landing Gear Door Locks (Ref 32-00-15)
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)
          730 Left Main Landing Gear and Doors
          740 Right Main Landing Gear and Doors

      (2) Access Panels
          561AB (Left Wing)
          561BB (Left Wing)
          661AB (Right Wing)
          661BB (Right Wing)

   D. Procedure

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

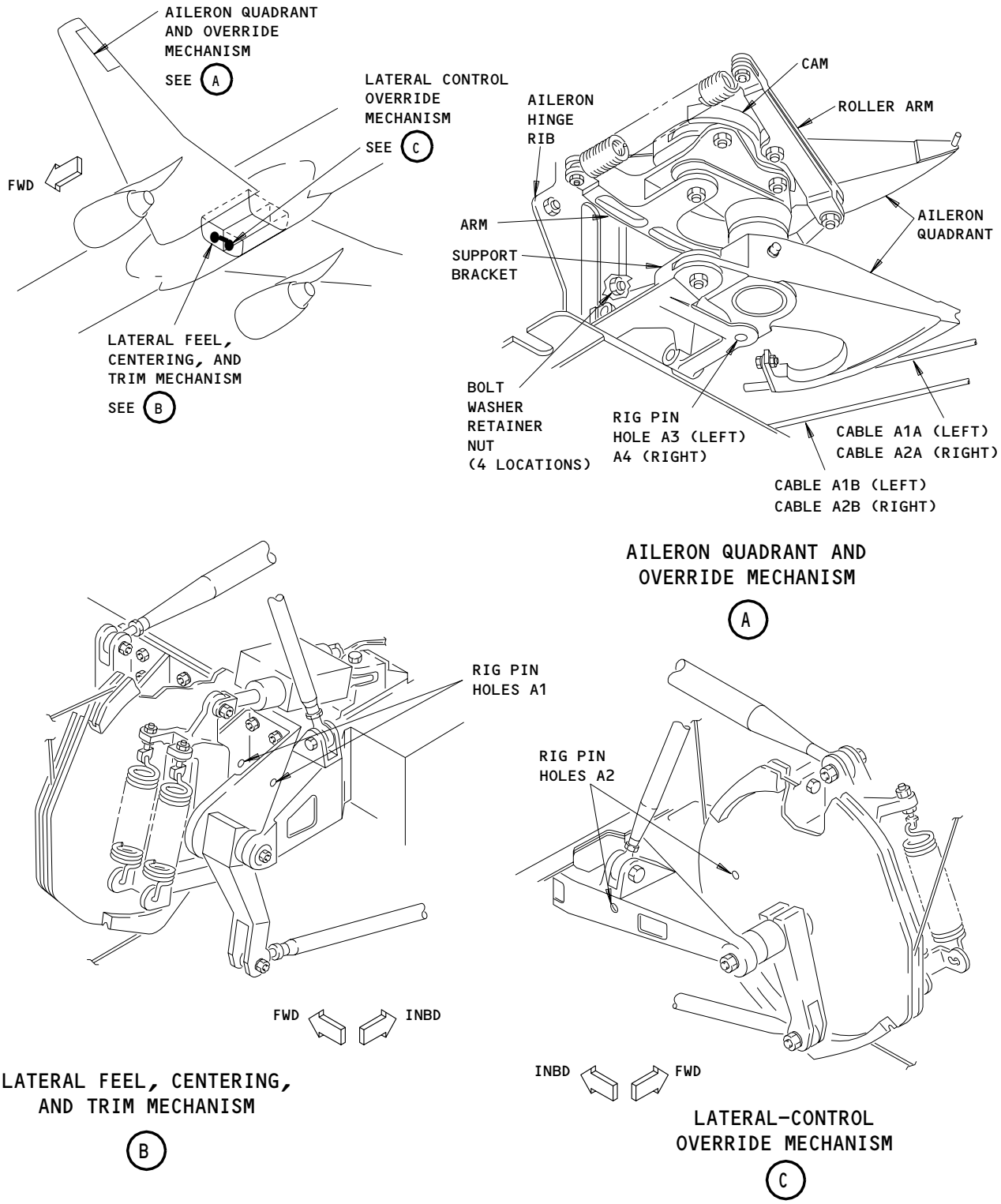
      S 494-003
      (2) Make sure that the landing gear downlocks are installed (Ref 32-00-20).

      S 494-004

      WARNING: MAKE SURE THAT THE DOOR LOCKS ARE INSTALLED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the main gear doors and install the door locks (Ref 32-00-15).

      S 864-005
      (4) Remove power from the left, center, and right hydraulic systems (Ref 29-11-00).



Aileron Quadrant and Override Mechanism Installation
Figure 401

S 014-006
(5) Open access panels 561AB and 561BB (left wing) or 661AB and 661BB (right wing) (Ref 06-44-00).

S 824-007
(6) Remove the tension from wing cables A1A and A1B (left) or A2A and A2B (right).

NOTE: The turnbuckles are located outboard of the lateral control mechanisms in the wheel wells.

S 034-008
(7) Disconnect wing cables A1A and A1B (left) or A2A and A2B (right) from the aileron control quadrant and override mechanism. Use tags to identify the cables.

S 034-009
(8) Pry the cam roller arm from the cam to access the bolt that connects the control rod to the mechanism. Disconnect the control rod from the mechanism.

S 024-010
(9) Disconnect the mechanism and the support bracket from the hinge rib.

TASK 27-11-17-424-011

3. Install Aileron Quadrant and Override Mechanism

A. General
(1) This task contains the data that is necessary to install and test the Aileron Quadrant and Override Mechanism. For the applicable wear limit data, refer to 27-11-17.

B. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) A1 - P/N B20003-27
(b) A2 - P/N B20003-25
(c) A3 - P/N B20003-23
(d) A4 - P/N B20003-23
(2) Cable Tensiometer, commercially available

C. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-11-17/601, Aileron Quadrant and Override Mechanism
(3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zones
568 Aileron (Left)
668 Aileron (Right)
730 Left Main Landing Gear and Doors
740 Right Main Landing Gear and Doors

(2) Access Panels
561AB (Left Wing)
561BB (Left Wing)
661AB (Right Wing)
661BB (Right Wing)

E. Install the aileron quadrant and override mechanism (Fig. 401).

S 824-012
(1) Align the support bracket with the hinge-rib attach-points.
(a) Install and tighten the bolts, washers, retainers, and nuts (4 locations).

S 824-013
(2) Turn the quadrant until rig pin A3 (left) or A4 (right) can be easily installed.

S 434-014
(3) Connect the control rod to the mechanism.

S 434-015
(4) Install the rig pin that follows:

NOTE: The aileron trim system must be centered for the rig pin to be easily installed. The trim switches are located on the aft electronic-control-panel, P8.

(a) A1 (lateral feel, centering, and trim mechanism) if the left aileron quadrant and override mechanism is to be installed (View B).
(b) A2 (lateral-control override-mechanism) if the right aileron quadrant and override mechanism is to be installed (View C).

S 434-016
(5) Connect wing cables A1A and A1B (left) or A2A and A2B (right) to the mechanism.

S 034-017
(6) Remove rig pins A1 and A3 (Left) or A2 and A4 (Right).

NOTE: The two steps that follow are necessary only if new cables have been installed.

S 834-018
(7) Tighten the cables to two times the value shown in Table 1.

S 864-019
(8) Cycle the control wheel 20 times to its maximum travel limits.

S 834-020

(9) Adjust the cables to the value shown in Table 1.

NOTE: The airplane temperature must be stable (±5°F) along the cable and have been stable for at least 1 hour.

Table 1
Aileron Cable Rigging Loads

TEMP °F ±5°	WING CABLES A1A, A1B, A2A, A2B ±10 LBS
110	98
90	89
80	84
70	80
60	76
50	72
40	68
30	64
10	55
-10	47
-30	39
-40	33

S 834-021

(10) Cycle the cables through one full-travel cycle. Make sure that the tension is correct, and do a check as follows:

(a) Make sure that rig pins A1 (feel, centering, and trim mechanism) and A3 (left aileron-quadrant and override mechanism) or A2 (lateral-control override mechanism) and A4 (right aileron-quadrant and override mechanism) can be easily installed and removed.

(b) Make sure that no more than two threads show at the turnbuckles.

(c) Make sure that no fairleads, rub-strips, or grommets touch the cables.
(d) Make sure that the pulleys turn freely.

S 434-022
(11) Install the clip locks on the turnbuckles.

F. Test the aileron-quadrant and override mechanism as follows:

S 864-023
(1) Make sure that all the rig pins have been removed.

S 864-024
(2) Make sure that the EICAS circuit-breakers on the overhead panel, P11, are closed.

S 824-025
(3) Push the STATUS button on the pilots' display-select-panel, P9, to show the control-surface position-indicator on the bottom EICAS display.

S 864-026

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA WHEN THE CONTROL SURFACES ARE OPERATED.

(4) Supply pressure to the left, center, and right hydraulic systems (Ref 29-11-00).

S 214-027
(5) Turn the control wheel clockwise.
(a) Make sure that the right aileron moves up and the left aileron moves down.

S 214-028
(6) Turn the control wheel counterclockwise.
(a) Make sure that the right aileron moves down and the left aileron moves up.

S 864-029
(7) Move the control wheel to the neutral position.

G. Put the airplane back to its usual condition.

S 094-030

WARNING: MAKE SURE THAT THE DOOR LOCKS ARE REMOVED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Remove the main-gear door-locks and close the doors (Ref 32-00-15).

S 864-031
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-032
(3) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-033
(4) Close the access panels that you removed.

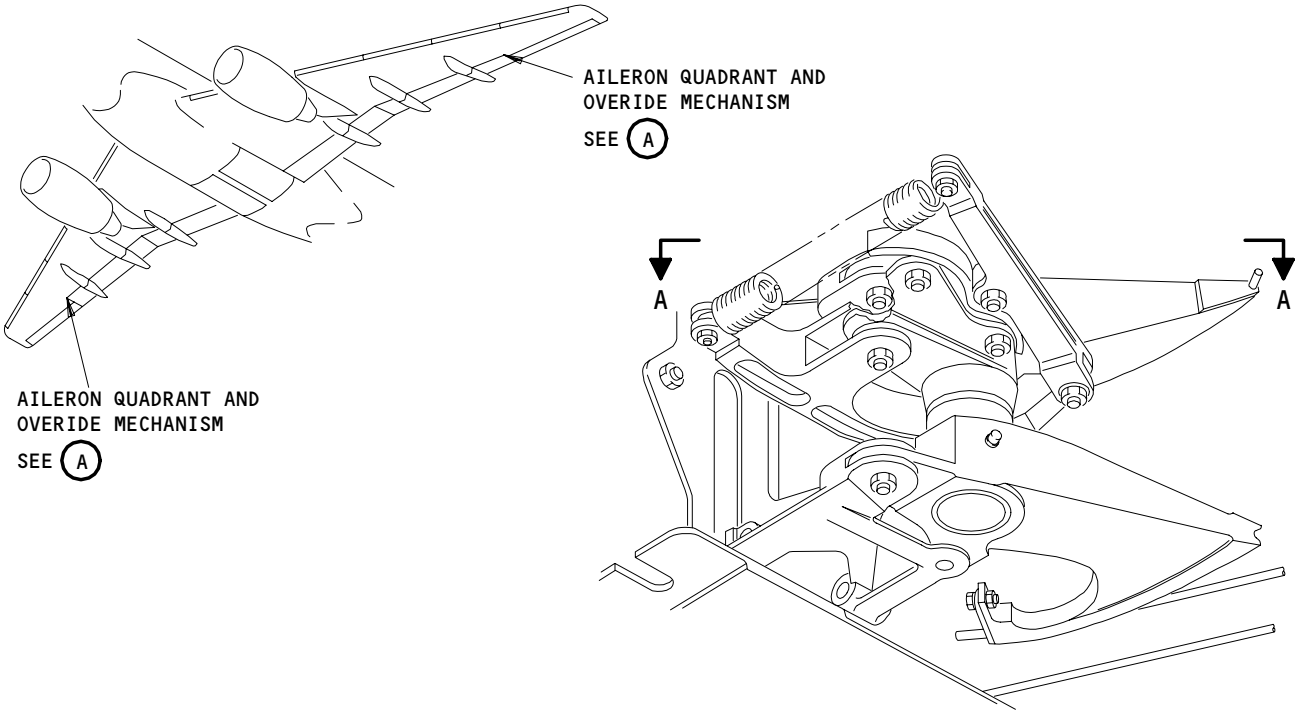
AILERON QUADRANT AND OVERRIDE MECHANISM INSPECTION/CHECK

1. General
   A. This procedure supplies the data that is necessary to examine the Aileron Quadrant and Override mechanism for wear. It does not supply any data that is necessary to access, remove, or install these components. Refer to the Aileron Quadrant and Override Mechanism Removal-Installation procedure for this data.

   TASK 27-11-17-206-001
2. Aileron Quadrant and Override Mechanism Wear Limits
   A. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)

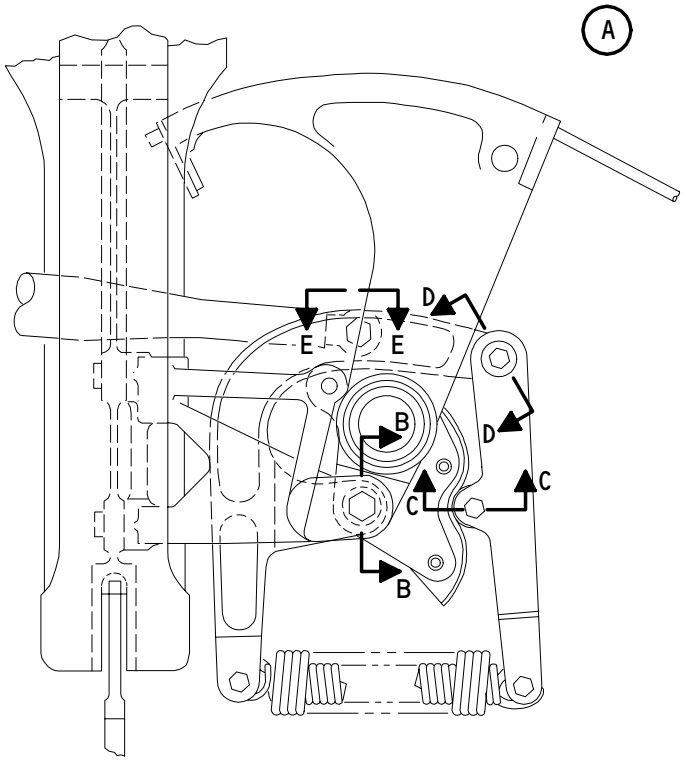
   B. Procedure

      S 226-002
      (1) Use the supplied data (Fig. 601) to examine the Aileron Quadrant and Override mechanism for too much wear.



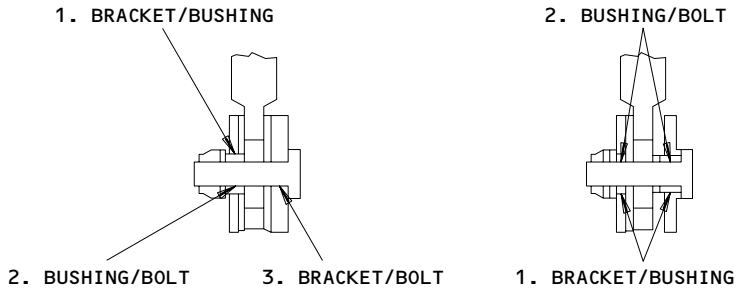
AILERON QUADRANT AND OVERRIDE MECHANISM
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

(A)

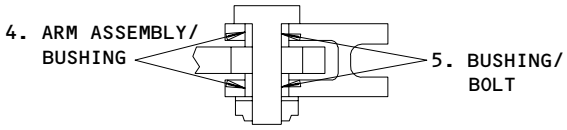


A-A

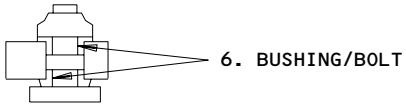
Aileron-Quadrant and Override-Mechanism Wear-Limits
Figure 601 (Sheet 1)



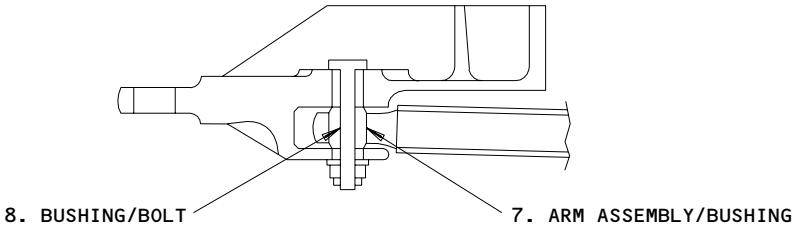
B-B



C-C



D-D



E-E

Aileron-Quadrant and Override-Mechanism Wear-Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BRACKET	ID	0.3750 (9.525)	0.3756 (9.540)	0.3760 (9.550)	0.0026 (0.066)		X	1
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3734 (9.484)		X		
2	BUSHING	ID	0.2495 (6.337)	0.2505 (6.363)	0.2509 (6.373)	0.0030 (0.076)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2497 (6.342)		X		
3	BRACKET	ID	0.2500 (6.350)	0.2540 (6.452)	0.2550 (6.477)	0.0071 (0.180)		X	1
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2479 (6.297)		X		
4	ARM ASSY	ID	0.3750 (9.525)	0.3756 (9.540)	0.3760 (9.550)	0.0026 (0.066)		X	1
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3734 (9.484)		X		
5	BUSHING	ID	0.2495 (6.337)	0.2505 (6.363)	0.2507 (6.368)	0.0028 (0.071)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2479 (6.297)		X		
6	BUSHING	ID	0.2500 (6.350)	0.2515 (6.388)	0.2524 (6.411)	0.0045 (0.114)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2479 (6.297)		X		
7	ARM ASSY	ID	0.3750 (9.525)	0.3756 (9.540)	0.3760 (9.550)	0.0026 (0.066)		X	1
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3734 (9.484)		X		
8	BUSHING	ID	0.2495 (6.337)	0.2505 (6.363)	0.2509 (6.373)	0.0030 (0.076)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2479 (6.297)		X		

1 THIS PART CAN BE REPAIRED.

Aileron-Quadrant and Override-Mechanism Wear-Limits
Figure 601 (Sheet 3)

AILERON POWER CONTROL ACTUATOR (PCA) AND REACTION LINK - MAINTENANCE PRACTICES

1. General
   A. This procedure contains four tasks. The first two tasks contain the removal and installation data for the aileron PCAs and reaction links. The second two tasks contain the removal and installation data for the aileron PCA filter.

TASK 27-11-20-022-006

2. Aileron PCA and Reaction Link - Removal
   A. Equipment
      (1) Aileron Actuator Lock - B27010-5
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          561/661 Rear Spar to Trailing Edge

      (2) Access Panels
          561/661AB Aileron Quadrant
          561/661CB Aileron Power Limit
          561/661DB Aileron Actuator
          561/661EB Aileron Actuator

   D. Prepare for Removal

      S 862-007
      (1) Supply electrical power (Ref 24-22-00).

      S 012-008
      (2) Open these access panels (Ref 06-44-00):
          (a) 561AB and 561CB (left wing)
          (b) 661AB and 661CB (right wing).

      S 012-009
      (3) Remove the applicable PCA rod end fairings (Ref 06-44-00):
          (a) 561DB (for the left inboard PCA)
          (b) 561EB (for the left outboard PCA)
          (c) 661DB (for the right inboard PCA)
          (d) 661EB (for the left outboard PCA).

      S 862-010
      (4) Remove the pressure from the left, right, and center hydraulic systems (Ref 29-11-00).

      S 822-011
      (5) Manually move the aileron (1) to its full up position.

S 492-012
(6) Install the aileron actuator lock on a PCA (4) that you will not remove.

E. Remove the PCA (Fig. 201)

S 032-013

CAUTION: MAKE SURE THE HYDRAULIC LINES ARE DISCONNECTED FROM THE PCA BEFORE IT IS MOVED. DAMAGE TO EQUIPMENT WILL OCCUR IF THEY STAY CONNECTED.

(1) Disconnect these components:
(a) The hydraulic lines (5, 9) from the PCA (4) and do this step:
1) Install a cap on the hydraulic lines (5,9) and the actuator ports.
(b) The input rod (2) from the PCA input lever (3)
(c) The PCA rod end (4) from the aileron (1).

S 032-014
(2) Do these steps to disconnect the PCA from the trunnion support:
(a) Turn the PCA (4) down until you can get access to the bolts (6) that connect the actuator to the trunnion support.
(b) .00. Disconnect the PCA (4) from the trunnion support (8).

NOTE: Do not remove bearing, nuts, or retainers from trunnion support assembly unless necessary for repair or replacement.

(c) Remove the PCA (4).

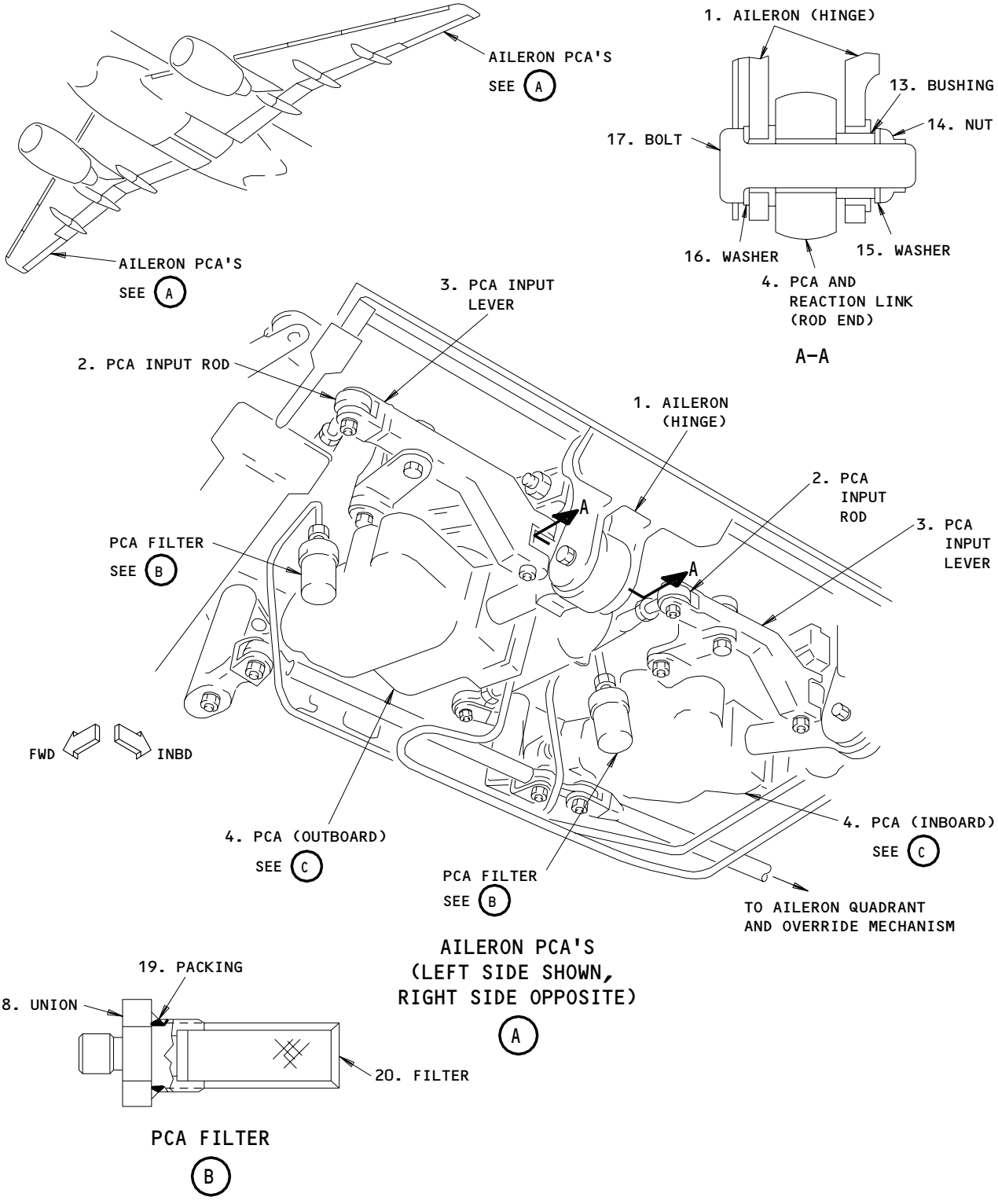
S 032-015
(3) RIGHT AILERON INBOARD PCA;
Disconnect the tubing support bracket (22) from the wing structure.

F. Remove the Reaction Link (Fig. 203)

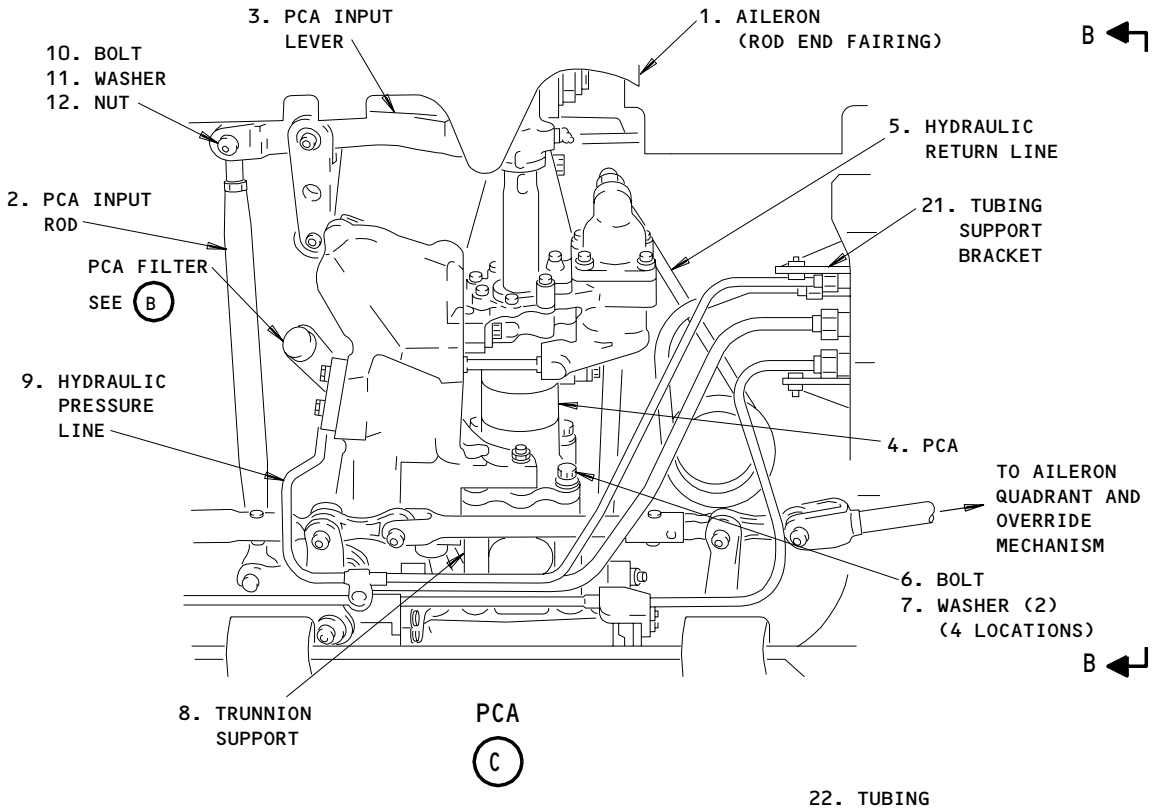
S 032-068
(1) Disconnect the rod end for the reaction link from the aileron (1).

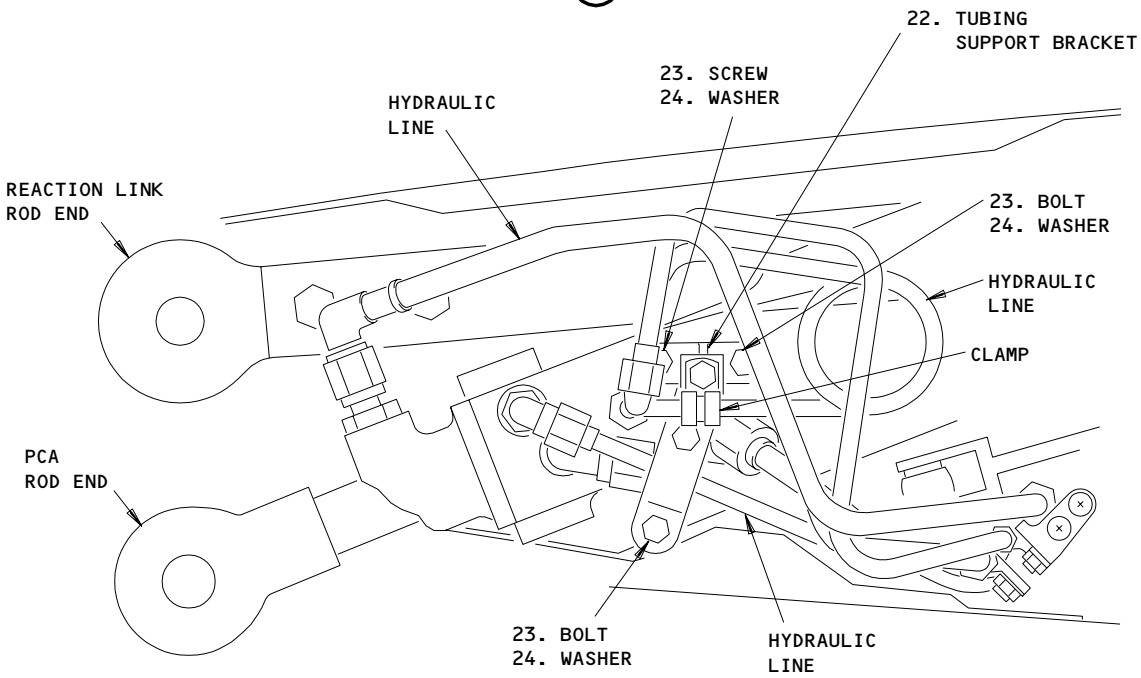
S 032-016
(2) Remove these components:
(a) The lube fittings from the bolt that connects the reaction link to the trunnion support (View A-A)
(b) The bolts, washers, collars, and pins that connect the reaction link halves to the trunnion support (View C).
(c) The bolts, washers, and nuts that connect the reaction link halves to the rod end.

S 022-017
(3) Remove the reaction link halves from the trunnion support and the rod end.



Aileron PCA Maintenance
Figure 201 (Sheet 1)





RIGHT AILERON INBOARD PCA
B-B

Aileron PCA Maintenance
Figure 201 (Sheet 2)

TASK 27-11-20-422-018

3. Aileron PCA and Reaction Link - Installation

A. Equipment

(1) Rig Pins from set B20003-XX (Ref 20-10-24):

(a) A3 - P/N B20003-23

(b) A4 - P/N B20003-23

(2) Scale - accurate to 0.01 inch (0.25 mm), Commercially Available

B. Consumable Materials

(1) D00015 Grease, Corrosion Preventive - BMS 3-24

(2) A00247 Sealant, BMS 5-95

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	4	Left Aileron PCA	27-11-20	01	400
	19	Packing (O-ring)		51	270
	20	Filter			275

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	4	Right Aileron PCA	27-11-20	02	340
	19	Packing (O-ring)	27-11-20	51	270
	20	Filter			275

D. References

(1) 06-44-00/201, Wing Access Doors and Panels

(2) 20-10-24/201, Rig Pins

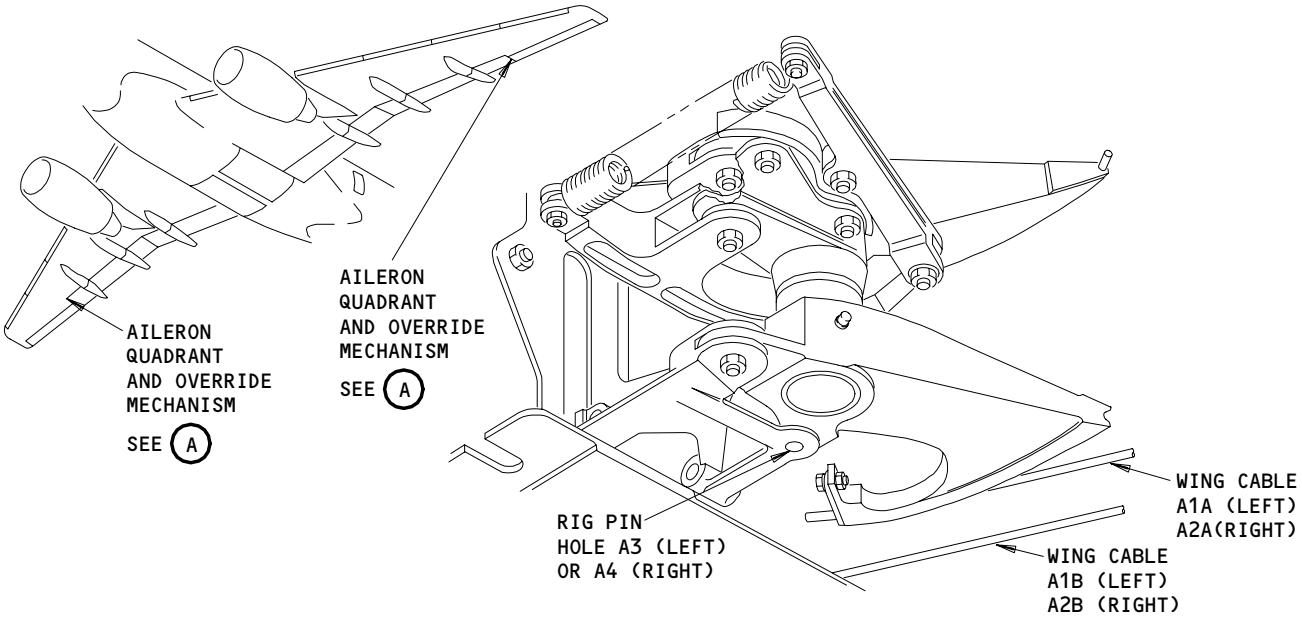
(3) 24-22-00/201, Electrical Power - Control
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

E. Access
(1) Location Zones
561/661 Rear Spar to Trailing Edge

(2) Access Panels
561/661AB Aileron Quadrant
561/661CB Aileron Power Limit
561/661DB Aileron Actuator
561/661EB Aileron Actuator

F. Install the Reaction Link (Fig. 203)

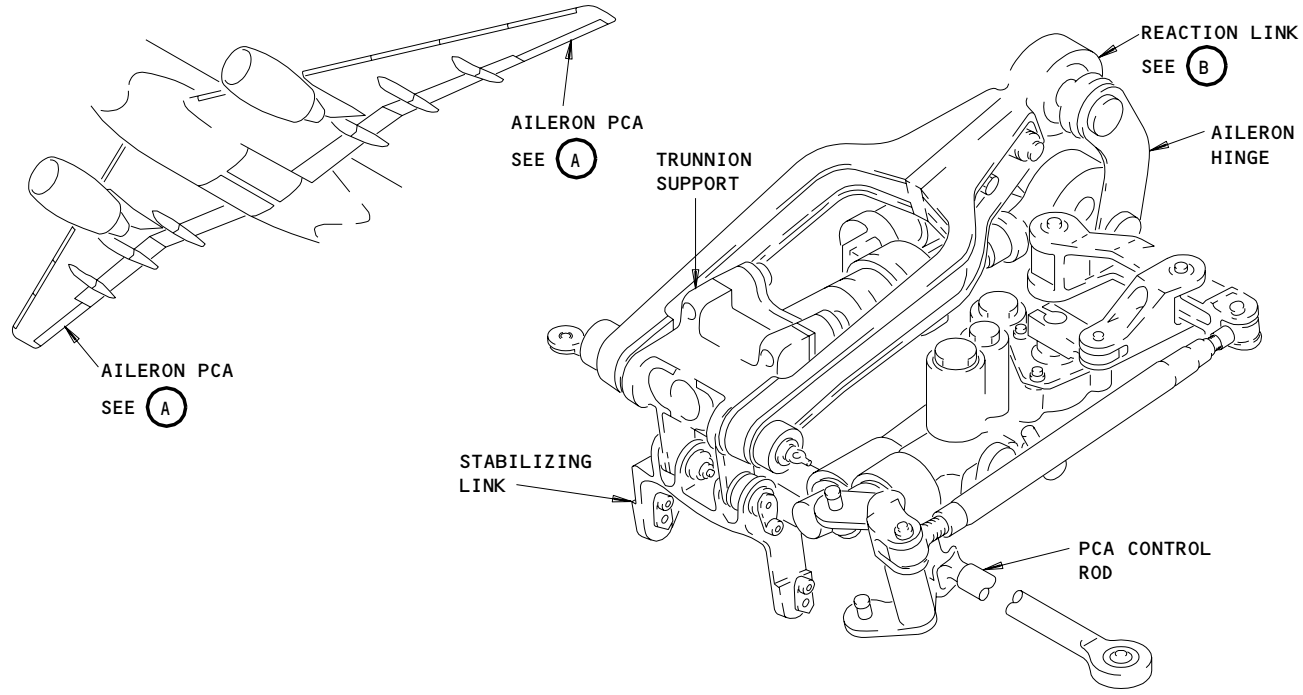
S 432-067
(1) Do these steps to connect the reaction link rod end to the aileron (1):
(a) Install the washer (16) and the bolt (17).
(b) Install the bushing (13), washer (15), and the nut (14). Do these steps:
1) Make sure the torque that is necessary to turn the nut (14) before it touches the aileron is 90 - 400 pound-inches (10.1-45.1 Nm).



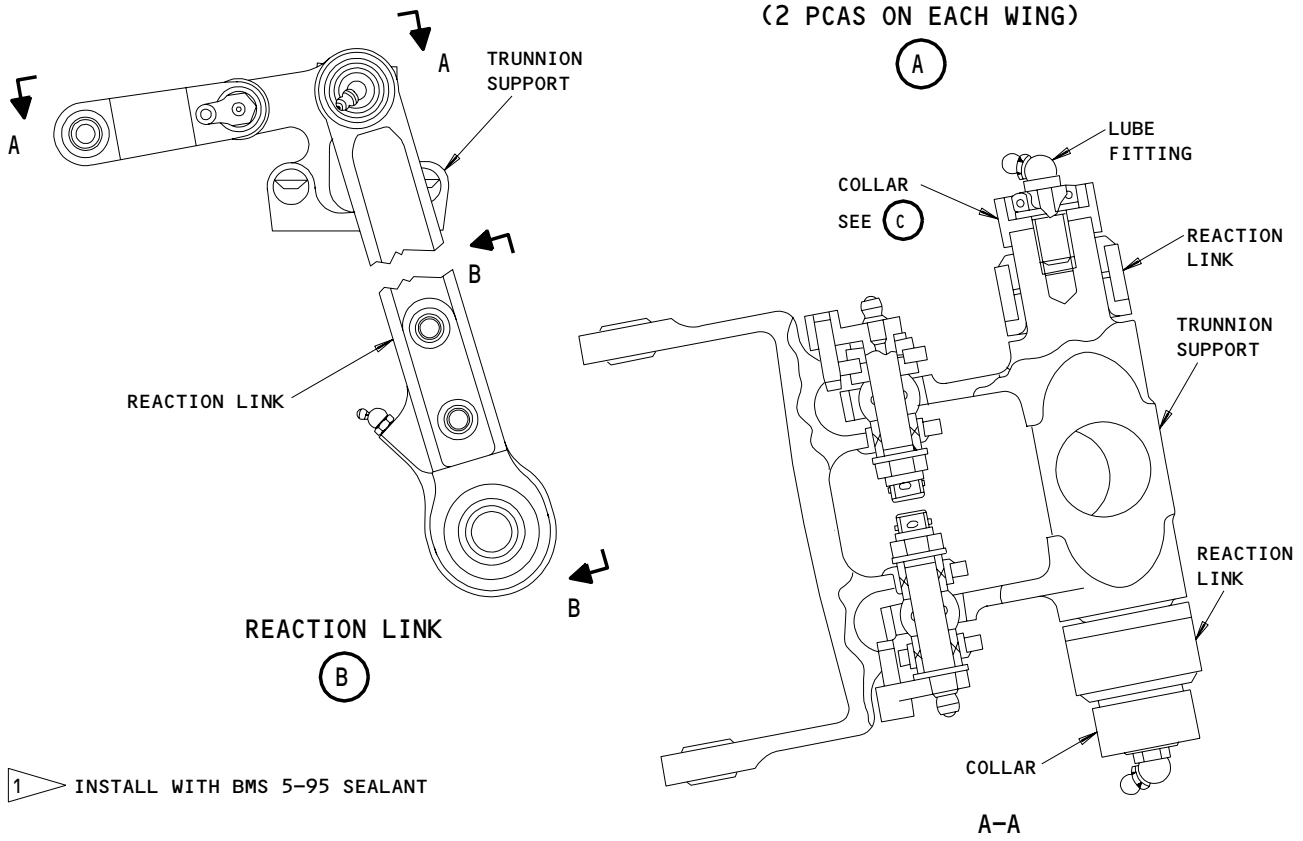
AILERON QUADRANT AND OVERRIDE MECHANISM
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

A

Rig Pin Locations
Figure 202



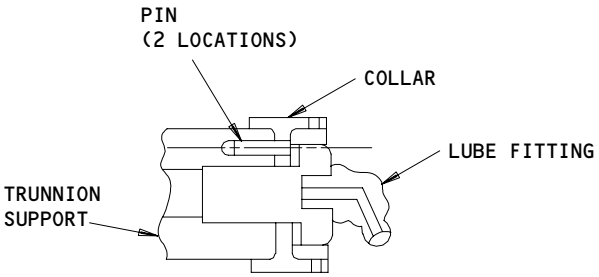
AILERON PCA
(2 PCAS ON EACH WING)
A



REACTION LINK
B

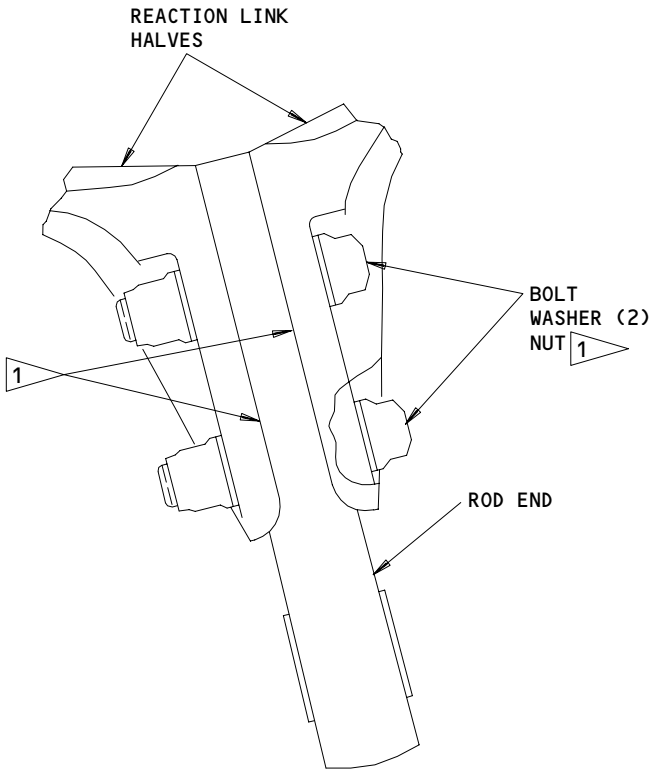
A-A

Aileron PCA Reaction Link Installation
Figure 203 (Sheet 1)



COLLAR

C



B–B

Aileron PCA Reaction Link Installation
Figure 203 (Sheet 2)

2) Tighten the nut (14) to 1300 - 2000 pound-inches (146.8-225.9 Nm).

S 432-019

(2) Connect these components:
(a) The reaction link halves to the trunnion support.
(b) The reaction link halves to the rod end. Tighten the bolts to 370 - 690 pound-inches (41.8-77.9 Nm).

NOTE: Use the sealant to fay seal the reaction link halves to the rod end. Apply sealant to the bolts after installation.

S 432-020

(3) Install the collars, pins, washers, bolts, and the lube fittings that connect the reaction link to the trunnion support (View C).

NOTE: Apply sealant to the pin during installation.

S 642-021

(4) Lubricate all the fittings with grease.

G. Install the PCA (Fig. 201)

S 432-022

(1) Do this step to connect the PCA (4) to the trunnion support (8):
(a) Make sure the retainers an nuts are installed in the trunnion support assembly.
(b) Install the bolt (6), washers (7), and the nut (4 locations). Tighten the nut to 275 - 512 pound-inches (31.0-57.8 Nm).

S 432-023

(2) Do these steps to connect the PCA rod end (4) to the aileron (1):
(a) Install the washer (16) and the bolt (17).

(b) Install the bushing (13), washer (15), and the nut (14). Do these steps:
1) Make sure the torque that is necessary to turn the nut before it touches the aileron is 90 - 400 pound-inches (10.2-45.2 Nm).
2) Tighten the nut to 1300 - 2000 pound-inches (146.8-225.9 Nm).

S 432-024
(3) Do this step to connect the input rod (2) to the input lever (3):
(a) Install the bolt (10), washer (11), and the nut (12). Tighten the nut to 50 - 80 pound-inches (5.6-9.0 Nm).

S 432-025
(4) Connect the hydraulic lines (5, 9) to the PCA.

S 432-026
(5) RIGHT INBOARD AILERON PCA;
Install the bolt (23) and washer (24) that connect the tubing support bracket to the wing structure (3 locations). Tighten the bolt to 20 - 30 pound-inches (2.3-3.4 Nm).

S 642-027
(6) Lubricate the PCA grease fittings with grease after installation.

S 092-028
(7) Remove the actuator lock.

H. Adjust the Aileron PCA

NOTE: This procedure is applicable when one of the two aileron PCAs (on each wing) is replaced.

S 492-029
(1) Move the control wheels to their neutral positions and install this rig pin:
(a) A3 (for the left aileron quadrant and override mechanism) to adjust a PCA for the left aileron.

(b) A4 (for the right aileron quadrant and override mechanism) to adjust a PCA for the right aileron.

S 862-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply pressure to the hydraulic system that supplies the PCA that was not replaced (Ref 29-11-00).

NOTE: The left system supplies the right aileron outboard PCA. The right system supplies the left aileron outboard PCA. The center system supplies the left and right aileron inboard PCAs.

S 222-030

(3) Make sure the inboard trailing edge of the aileron is aligned with the outboard trailing edge of the main flap (use a tolerance of 0.06 inch). If the trailing edges are not aligned, do the procedure to adjust the aileron power control actuators (PCAs) (Ref 27-11-00/501).

S 862-031

(4) Remove the power from the hydraulic system that supplies the PCA that was not replaced (Ref 29-11-00).

NOTE: All hydraulic power must be removed.

S 822-032

(5) Loosen the locknuts on the input rod for the PCA that was replaced.

S 862-001

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Supply pressure to the hydraulic system that supplies the PCA that was replaced (Ref 29-11-00).

S 822-033

(7) Do these steps to adjust the aileron PCA:

(a) Adjust the PCA input rod until the aileron trailing edge is below the main flap trailing edge (retracted) a small distance.

(b) Adjust the input rod for the PCA to move the aileron up and do this check:

NOTE: Always move the aileron up when you do the last control rod adjustment.

1) Make sure the inboard trailing edge of the aileron is aligned with the outboard trailing edge of the main flap (use a tolerance of +/- 0.06 inch (+/- 1.5 mm)).

(c) Tighten the control rod locknuts and do this check:

1) Make sure the aileron position does not change.

S 222-034

(8) Make sure the outboard trailing edge of the aileron is aligned with the wing tip (use a tolerance of ± 0.50 inch (12.7 mm)).

S 862-035

(9) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 092-036

(10) Remove rig pin A3 or A4.

I. Aileron PCA - Test

S 862-037

(1) Make sure these circuit breakers on the overhead panel, P11, are closed:

(a) EICAS (6 locations)

S 862-038

(2) Push the STATUS switch on the pilot's display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 862-002

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 212-039
(4) Turn the control wheel to its full counterclockwise position and do these checks:
(a) Make sure the left aileron moves up and the right aileron moves down.
(b) Make sure the ailerons move smoothly through their full travel range.

S 212-064
(5) Turn the control wheel to its full clockwise position and do these checks:
(a) Make sure the left aileron moves down and the right aileron moves up.
(b) Make sure the ailerons move smoothly through their full travel range.

S 222-040
(6) Move the control wheel to its neutral position and do this check:
(a) Make sure the inboard trailing edge of the aileron is aligned with the outboard trailing edge of the main flap (use a tolerance of ± 0.06 inch (1.5 mm)).

S 212-041
(7) Examine the PCA hydraulic connections for leaks.

J. Put the Airplane Back to Its Usual Condition

S 862-042
(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-043
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-044
(3) Install the applicable PCA rod end fairings (Ref 06-44-00):
(a) 561DB (for the left inboard PCA)
(b) 561EB (for the left outboard PCA)
(c) 651DB (for the right inboard PCA)
(d) 661EB (for the left outboard PCA).

S 412-045
(4) Close these access panels (Ref 06-44-00):
(a) 561AB and 561CB (left wing)
(b) 661AB and 661CB (right wing).

TASK 27-11-20-022-046

4. Aileron PCA Filter - Removal

A. References
(1) 06-44-00/201, Wing Access Doors and Panels

(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, RIght and Center) Hydraulic Systems

B. Access
(1) Location Zones
561/661 Rear Spar to Trailing Edge

(2) Access Panels
561/661CB Aileron Power Limit

C. Prepare for Removal

S 862-004
(1) Supply electrical power (Ref 24-22-00).

S 862-047
(2) Remove the pressure from the left, right, and center hydraulic systems (Ref 29-11-00).

S 012-048
(3) Open access panel 561CB (for the left wing) or 661CB (for the right wing) (Ref 06-44-00).

D. Remove the Filter (Fig. 201)

S 862-049
(1) Lift the aileron to a position that is one-half of full travel.

S 032-050
(2) Disconnect the hydraulic pressure line (9) from the PCA (4) and do this step:
(a) Install a cap on the hydraulic line.

S 032-051
(3) Remove these components:
(a) The union (18)
(b) The packing (19).

S 022-052
(4) Remove the filter (20).

TASK 27-11-20-422-065

5. Aileron PCA Filter - Installation

A. Consumable Materials
(1) D00054 Lubricant, Hydraulic System O-rings, Backup Rings, Fittings - MCS 352B

B. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zones
561/661 Rear Spar to Trailing Edge

(2) Access Panels
561/661CB Aileron Power Limit

D. Install the Filter (Fig. 201)

S 642-053
(1) Apply lubricant to the union (18) and the packing (19) before installation.

S 432-054
(2) Install these components:
(a) The filter (20) in the PCA pressure port
(b) The packing (19) and the union (18).

S 432-055
(3) Connect the hydraulic line (9) to the PCA (4).

E. Aileron PCA — Test

S 862-056
(1) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 862-057
(2) Push the STATUS switch on the pilot's display select panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 862-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 212-058

(4) Turn the control wheel to its full counterclockwise position and do these checks:
   (a) Make sure the left aileron moves up and the right aileron moves down.
   (b) Make sure the ailerons move smoothly through their full travel range.

S 212-059

(5) Turn the control wheel to its full clockwise position and do these checks:
   (a) Make sure the left aileron moves down and the right aileron moves up.
   (b) Make sure the ailerons move smoothly through their full travel range.

S 222-060

(6) Move the control wheel to its neutral position and do this check:
   (a) Make sure the inboard trailing edge of the aileron is aligned with the outboard trailing edge of the main flap (use a tolerance of ± 0.06 inch (1.5 mm)).

S 212-061

(7) Examine the PCA hydraulic connections for leaks.

F. Put the Airplane Back to Its Usual Condition

S 862-062
(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-063
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-066
(3) Close access panel 561CB (left wing) or 661CB (right wing) (Ref 06-44-00).

AILERON POWER CONTROL ACTUATOR (PCA) AND REACTION LINK-INSPECTION/CHECK

1. General
   A. This procedure supplies the data that is necessary to examine the aileron PCA and the Aileron-PCA Reaction-Link assembly for wear. It does not supply the data that is necessary to access, remove, or install the aileron PCA. Refer to the aileron PCA Removal/Installation procedure for this data.

TASK 27-11-20-206-001

2. Examine The Aileron PCA For Wear
   A. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)

   B. Procedure

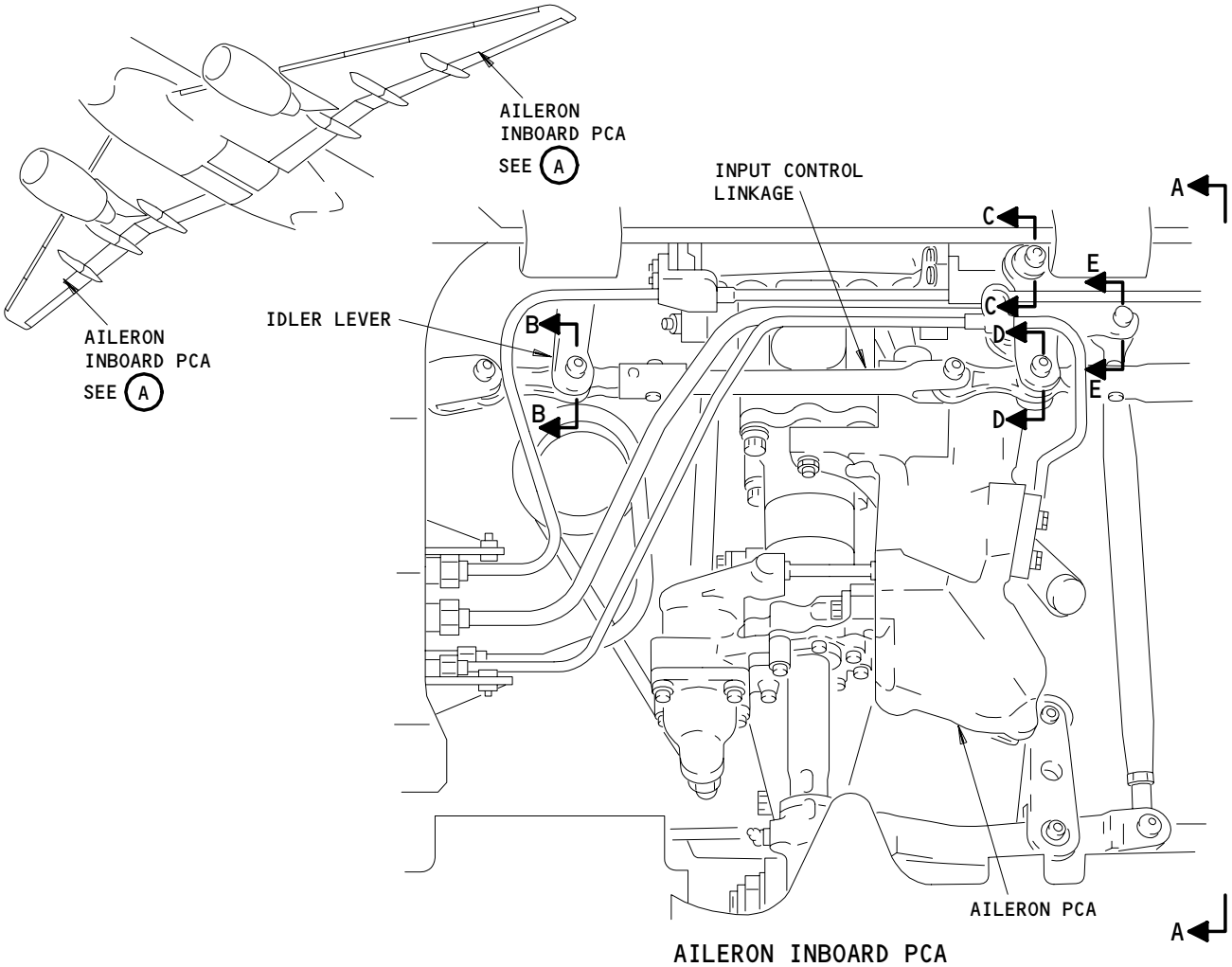
      S 226-002
      (1) Use the supplied data (Fig. 601) to examine the aileron PCA for too much wear.

TASK 27-11-20-206-003

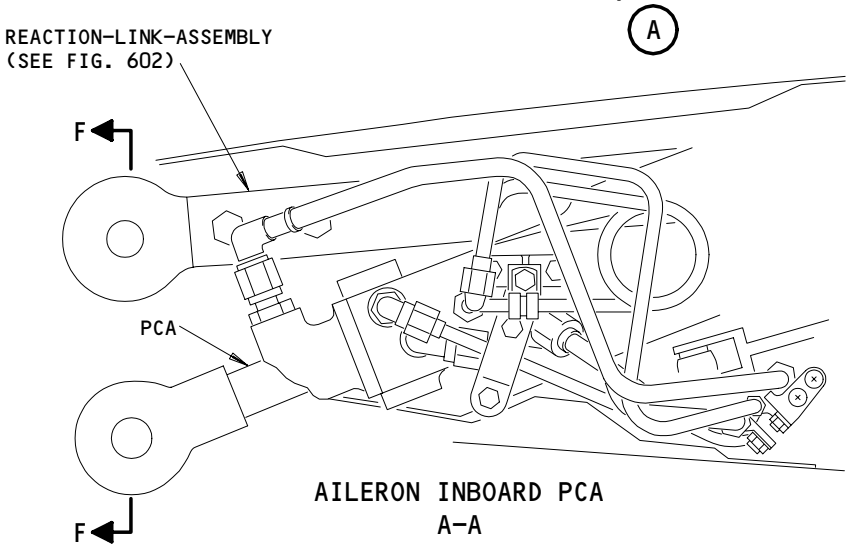
3. Examine The Aileron-PCA Reaction-Link Assembly For Wear
   A. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)

   B. Procedure

      S 226-004
      (1) Use the supplied data (Fig. 602) to examine the Aileron-PCA Reaction-Link assembly for too much wear.



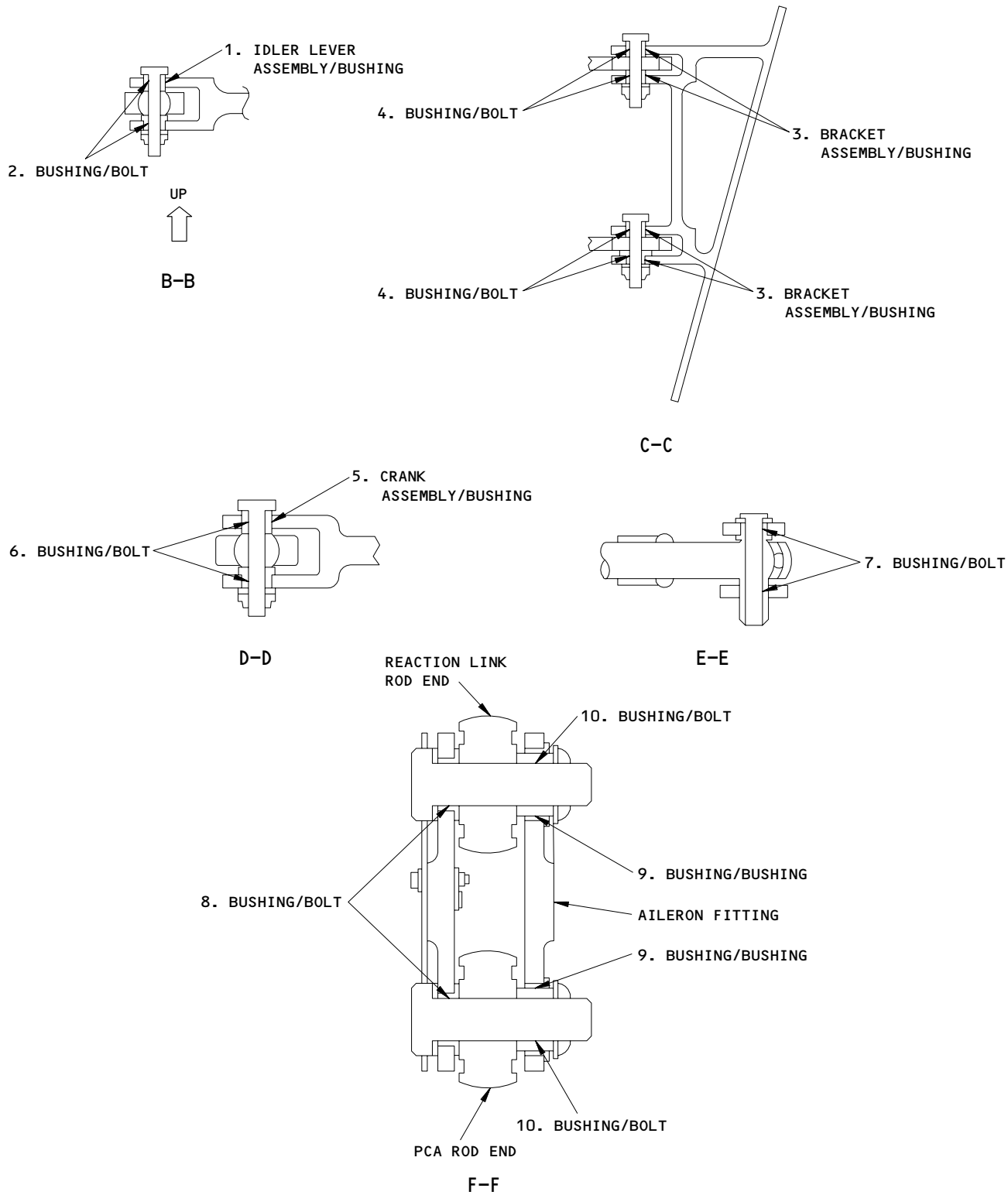
AILERON INBOARD PCA
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)
(A)



AILERON INBOARD PCA
A-A

Aileron-PCA Wear Limits
Figure 601 (Sheet 1)

238503



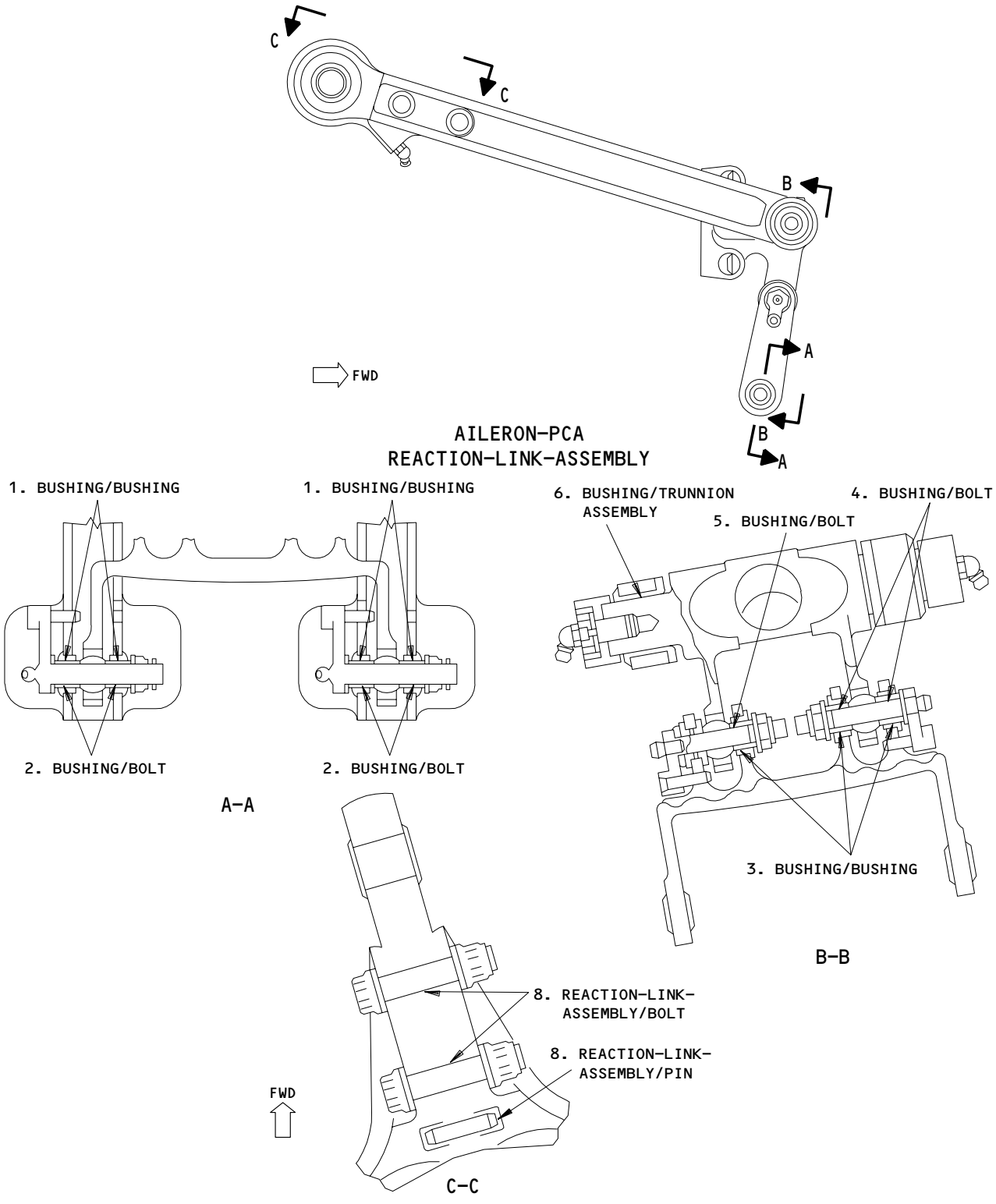
Aileron-PCA Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	IDLER LEVER ASSY	ID	0.3750 (9.525)	0.3756 (9.540)	0.3759 (9.548)	0.0021 (0.053)		X	1
	BUSHING	OD	0.3470 (8.814)	0.3745 (9.512)	0.3738 (9.495)		2		
2	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2505 (6.363)	0.0020 (0.051)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2485 (6.312)		X		
3	BRACKET ASSY	ID	0.3750 (9.525)	0.3756 (9.540)	0.3759 (9.548)	0.0021 (0.053)		X	1
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3738 (9.495)		2		
4	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2505 (6.363)	0.0020 (0.051)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2485 (6.312)		X		
5	CRANK ASSY	ID	0.3750 (9.525)	0.3756 (9.540)	0.3759 (9.548)	0.0021 (0.053)		X	1
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3738 (9.495)		2		
6	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2505 (6.363)	0.0020 (0.051)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2485 (6.312)		X		
7	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2505 (6.363)	0.0020 (0.051)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2485 (6.312)		X		
8	BUSHING	ID	0.7500 (19.050)	0.7505 (19.063)	0.7508 (19.070)	0.0031 (0.079)	X		
	BOLT	OD	0.7480 (18.999)	0.7490 (19.025)	0.7477 (18.992)		X		
9	BUSHING	ID	1.0630 (27.000)	1.0635 (27.013)	1.0638 (27.021)	0.0037 (0.094)	X		
	BUSHING	OD	1.0605 (26.937)	1.0615 (26.962)	1.0601 (26.927)		X		
10	BUSHING	ID	0.7490 (19.025)	0.7500 (19.050)	0.7503 (19.058)	0.0026 (0.066)	X		
	BOLT	OD	0.7480 (18.999)	0.7490 (19.025)	0.7477 (18.992)		X		

1 REAM THE HOLE IN THE FITTING TO THE MAXIMUM WEAR LIMIT.

2 REPLACE WITH AN OVERSIZE BUSHING.

Aileron-PCA Wear Limits
Figure 601 (Sheet 3)



Aileron-PCA Reaction-Link-Assembly Wear Limits
Figure 602 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.5595 (14.211)	0.5600 (14.224)	0.5603 (14.232)	0.0020 (0.051)	X		
	BUSHING	OD	0.5585 (14.186)	0.5590 (14.199)	0.5583 (14.181)		X		
2	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3757 (9.543)	0.0019 (0.048)	X		
	BOLT ASSY	OD	0.3740 (9.500)	0.3745 (9.512)	0.3738 (9.495)			X	1
3	BUSHING	ID	0.5595 (14.211)	0.5600 (14.224)	0.5603 (14.232)	0.0005 (0.013)	X		1
	BUSHING	OD	0.5585 (14.186)	0.5590 (14.199)	0.5583 (14.181)		X		
4	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3757 (9.543)	0.0004 (0.010)	X		
	BOLT ASSY	OD	0.3740 (9.500)	0.3745 (9.512)	0.3738 (9.495)			X	1
5	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3758 (9.545)	0.0005 (0.013)	X		
	BOLT	OD	0.3740 (9.500)	0.3745 (9.512)	0.3738 (9.495)			X	1
6	BUSHING	ID	1.0015 (25.438)	1.0020 (25.451)	1.0023 (25.458)	0.0005 (0.013)	X		
	TRUNNION ASSY	OD	0.9998 (25.395)	1.0000 (25.400)	0.9996 (25.390)			X	1
7	REACTION LINK ASSY	ID	0.4371 (11.102)	0.4375 (11.113)	0.4379 (11.123)	0.0004 (0.010)		X	1
	BOLT	OD	0.4360 (11.074)	0.4370 (11.100)	0.4358 (11.069)		2		
8	REACTION LINK ASSY	ID	0.3125 (7.938)	0.3135 (7.963)	0.3135 (7.963)	---		X	1
	PIN	OD	0.3128 (7.945)	0.3136 (7.965)	0.3128 (7.945)			X	1

1 THIS PART CAN BE REPAIRED.
2 REPLACE WITH AN OVERSIZE BOLT

Aileron-PCA Reaction-Link-Assembly Wear Limits
Figure 602 (Sheet 2)

AILERON - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task is to remove the aileron and the other is to install it.

TASK 27-11-21-024-001

2. Remove the Aileron
   A. Equipment
      (1) Aileron Sling - B27012-1
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 27-11-20/201, Aileron Power Control Actuator (PCA)
      (3) AMM 27-51-00/201, Trailing Edge Flap System
      (4) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
   C. Access
      (1) Location Zones
          558 Aileron (Left)
          668 Aileron (Right)

      (2) Access Panels
          561AB/661AB
          561BB/661BB
          561CB/661CB
          561DB/661DB
          561EB/661EB

   D. Prepare for Removal

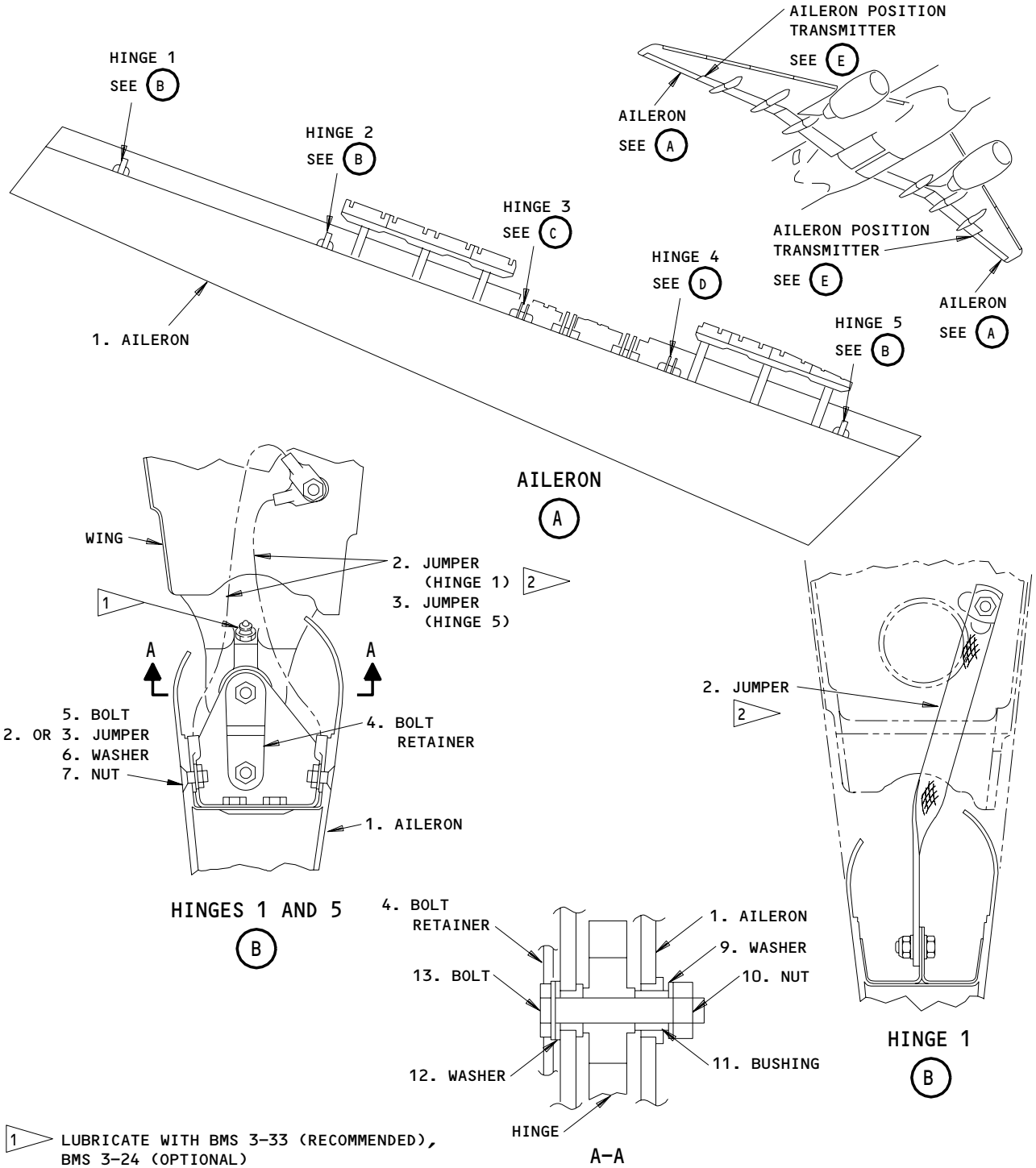
      S 864-002
      (1) Remove the power from the left, center, and right hydraulic systems (AMM 29-11-00/201).

      S 864-003
      (2) Do the deactivation procedure for the trailing edge flaps (AMM 27-51-00/201).

      S 014-004
      (3) Open the access panels that follow:
      561AB, 561BB, 561CB, 561DB, and 561EB (left wing) or
      661AB, 661BB, 661CB, 661DB, and 661EB (right wing)
      (AMM 06-44-00/201).

      S 434-005
      (4) Attach the aileron sling with a hoist to the aileron (1).
   E. Remove the Aileron (Fig. 401)

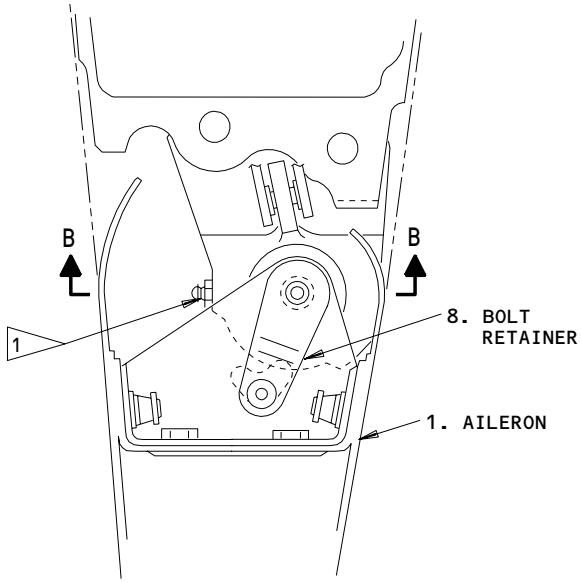
      S 034-006
      (1) Disconnect the aileron-position-transmitter control-rod (19) from the aileron (1).



1 LUBRICATE WITH BMS 3-33 (RECOMMENDED), BMS 3-24 (OPTIONAL)

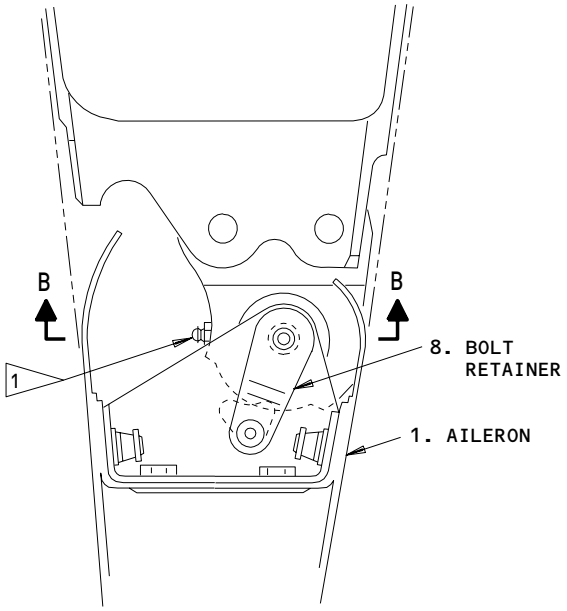
2 YOU CAN INSTALL A (IPC ITEM 35 OR 35J) JUMPER CABLE AT THIS LOCATION BUT MAKE SURE THAT YOU COMPLETE THE ELECTRICAL BONDING AND GROUNDING REQUIREMENTS.

Aileron Installation
Figure 401 (Sheet 1)



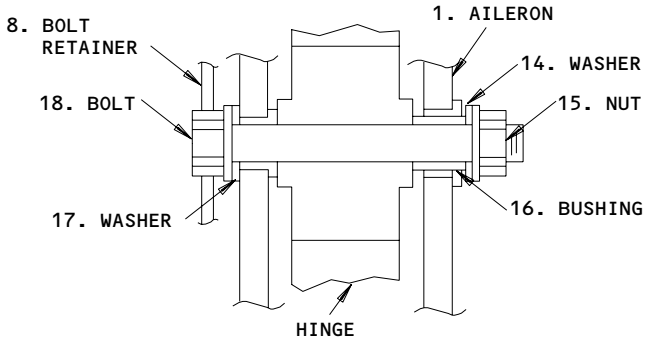
HINGE 3

C

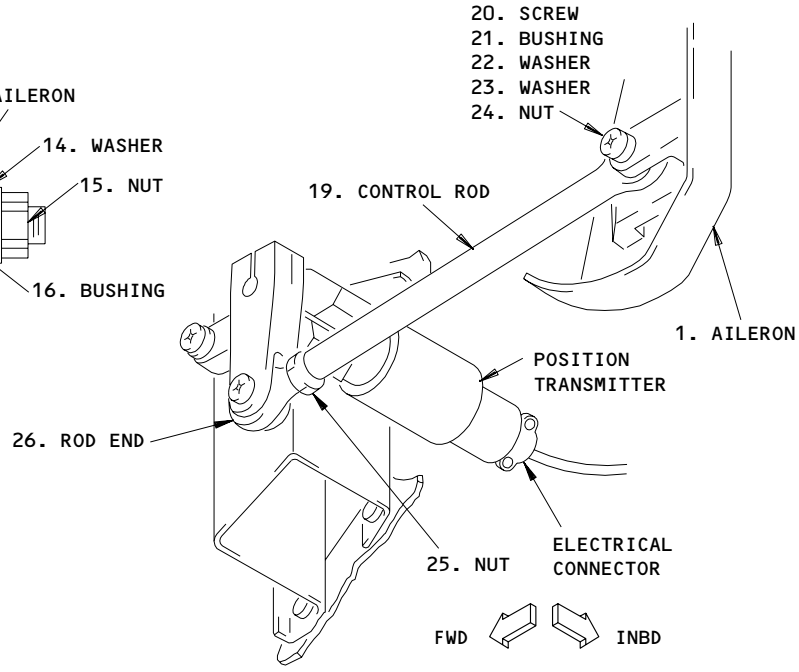


HINGES 2 AND 4

D



B–B



AILERON POSITION TRANSMITTER

E

Aileron Installation
Figure 401 (Sheet 2)

S 034-007
(2) Disconnect the PCA input rods from the PCA input-levers (AMM 27-11-20/201).

S 034-008
(3) Disconnect the PCA's from the aileron (1) at the rod end (AMM 27-11-20/201).

S 034-037
(4) Disconnect the single bonding jumper from hinge 1.

S 034-038
(5) Disconnect bonding jumpers (2, 3) from hinge 5.

S 034-010
(6) Disconnect the hinges from the aileron (1).

S 024-011
(7) Remove the aileron.

NOTE: If it is necessary, the trailing edge flaps can be operated after the aileron has been removed. Make sure that there are no loose components near the flaps before they are operated.

S 034-012
(8) Remove the aileron sling from the aileron.

TASK 27-11-21-424-013

3. Install the Aileron

A. General
(1) This procedure contains only the data that is necessary to install the aileron. Refer to AMM 27-11-21/601 for the applicable wear-limit data.

B. Equipment
(1) Aileron Sling - B27012-1

C. Consumable Materials
(1) D00633 Grease BMS-3-33 (Preferred)
(2) D00015 Grease - BMS 3-24 (Alternate)

(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

D. Parts

(1) Refer to the AIPC for more data on the components that are contained in the tables that follow:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Aileron	27-11-21	01	141,146

E. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) FIM 22-00-04/101, Autoflight BITE MCDP Ground Tests - Support
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-11-00/501, Aileron and Aileron Trim Control System
(5) AMM 27-11-20/201, Aileron Power Control Actuator (PCA)
(6) AMM 27-11-21/601, Aileron Inspection/Check
(7) AMM 27-18-00/501, Aileron Position Indicating System
(8) AMM 27-51-00/201, Trailing Edge Flap System
(9) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems

F. Install the Aileron (Fig. 401)

S 434-014

(1) Attach the aileron sling with a hoist to the aileron.

S 864-015

(2) Retract the trailing edge flaps.

S 864-034

(3) Do the deactivation procedure for the trailing edge flaps (AMM 27-51-00/201).

S 824-016
(4) Move the aileron (1) into position.

S 434-017
(5) Connect hinges 1, 2, and 5.
(a) Put the bolt (13) through the retainer (4), the bushing (11), the washers (9, 12), and the nut (10). Tighten the bolt to 95-125 pound-inches (10.7-14.1 Nm).

NOTE: Coat hinge bolts with grease.

S 434-018
(6) Connect hinges 3 and 4.
(a) Put the bolt (18) through the bushing (16), the washers (14, 17), and the nut (15). Tighten the bolt to 180-250 pound-inches.
(b) Install the retainer (8) on the bolt (18).

S 434-022
(7) Connect the single bonding jumper to hinge 1.
(a) Install the bolts (5), washers (6), and nuts (7).

S 434-023
(8) Connect bonding jumpers (2, 3) to hinge 5.
(a) Install the bolts (5), washers (6), and nuts (7).

S 034-024
(9) Remove the sling from the aileron (1).

S 434-026
(10) Connect the PCA rod-ends to the aileron (AMM 27-11-20/201).

S 414-041
(11) Close access panel 561CB/661CB.

S 214-025
(12) Move the aileron manually through its full travel. Make sure that the aileron moves smoothly. Move the aileron back to its neutral position.

S 014-042
(13) Open access panel 561CB/661CB.

S 434-027
(14) Connect the PCA input-rods to the PCA input-levers (AMM 27-11-20/201).

S 824-028
(15) Adjust the PCAs to aileron installation (AMM 27-11-00/501).

S 434-029
(16) Connect the aileron position-transmitter control-rod (19) to the aileron (1).
(a) Install the screw (20), bushing (21), washers (22 and 23), and nut (24).

S 824-030
(17) Adjust the position transmitter if a new aileron is installed or if the position sensor or its attach fittings are moved (AMM 27-18-00/501).

S 824-039
(18) Do the MCDP Test #66 - XDCR Outputs if the same aileron is installed and the position sensor or its attach fittings are not changed (FIM 22-00-04/101, Fig. 109).
(a) If the aileron position is in the MCDP #66 test limits, the aileron installation is ok.
(b) If the aileron position is not in the MCDP #66 test limits, adjust the position transmitter (AMM 27-18-00/501).

G. Put the Airplane Back to its Usual Condition

S 864-031
(1) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 864-032
(2) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-033

(3) Replace the access panels that were removed (AMM 06-44-00/201).

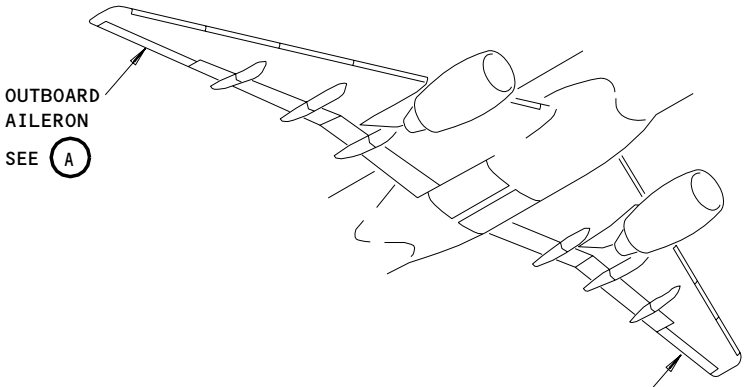
AILERON - INSPECTION/CHECK

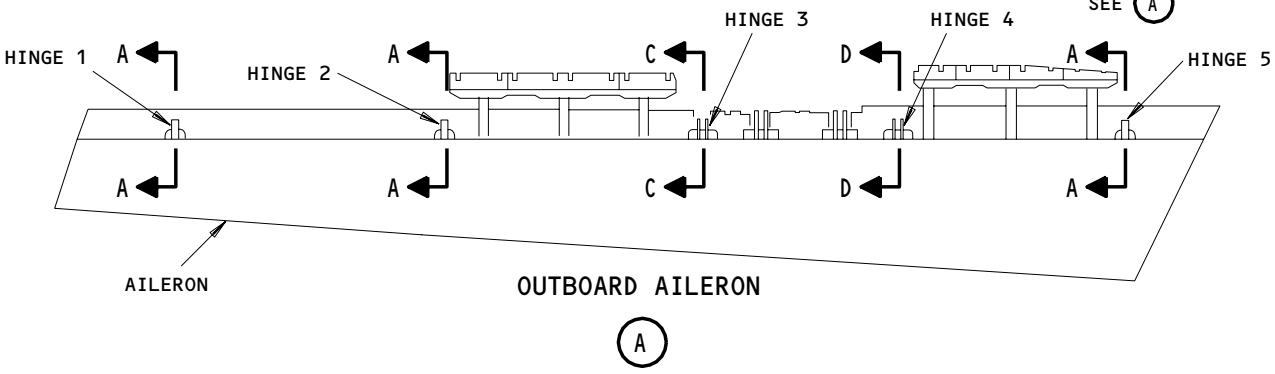
1. General
   A. This procedure supplies the data that is necessary to examine the ailerons for wear. It does not supply the data that is necessary to access, remove, or install any of the aileron components. Refer to the aileron Removal/Installation procedure for this data.

   TASK 27-11-21-206-001
2. Examine the Aileron for wear
   A. Access
      (1) Location Zones
          568 Aileron (Left)
          668 Aileron (Right)

   B. Procedure

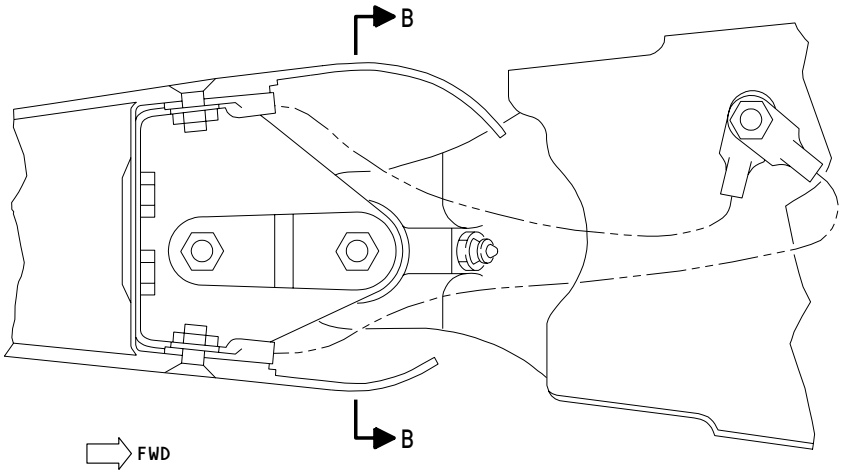
      S 226-002
      (1) Use the supplied data (Fig. 601) to examine the aileron and its components for too much wear.



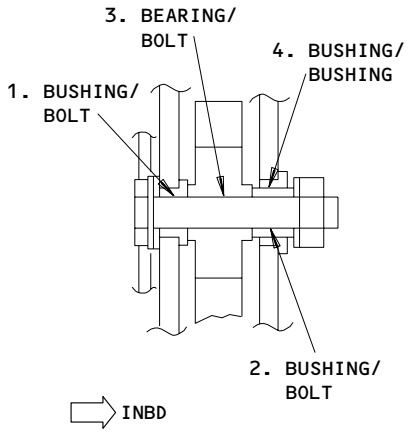


OUTBOARD AILERON

(A)

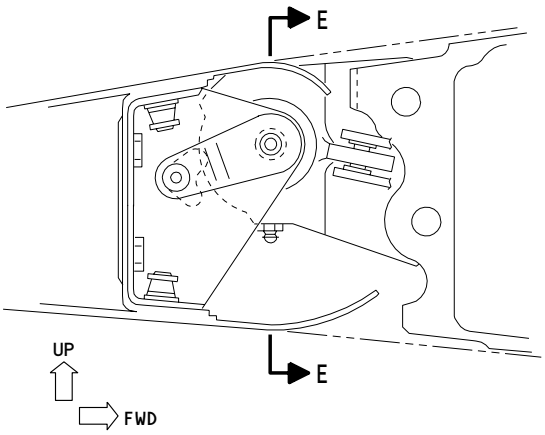


HINGES 1,2, AND 5
A-A

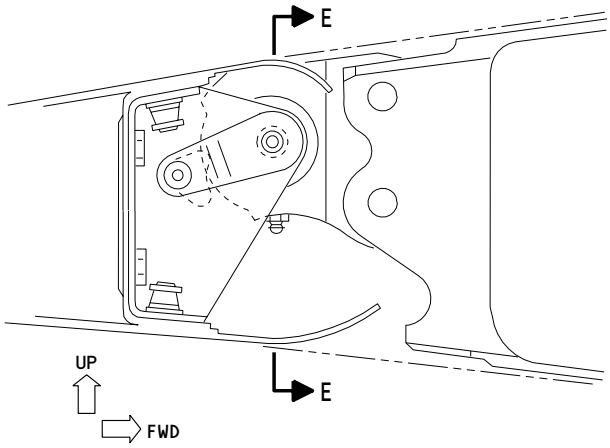


B-B

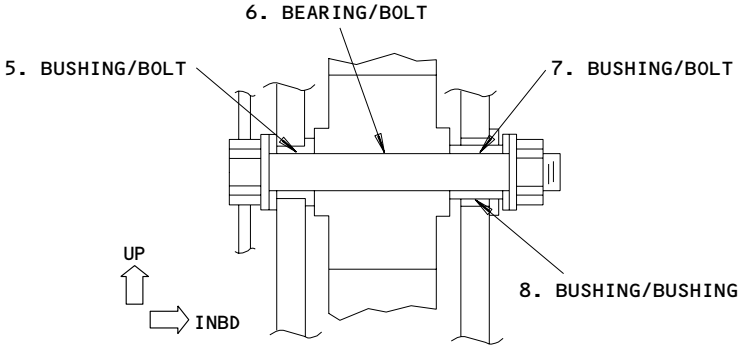
Aileron Wear Limits
Figure 601 (Sheet 1)



HINGE 3
C–C



HINGE 4
D–D



E–E

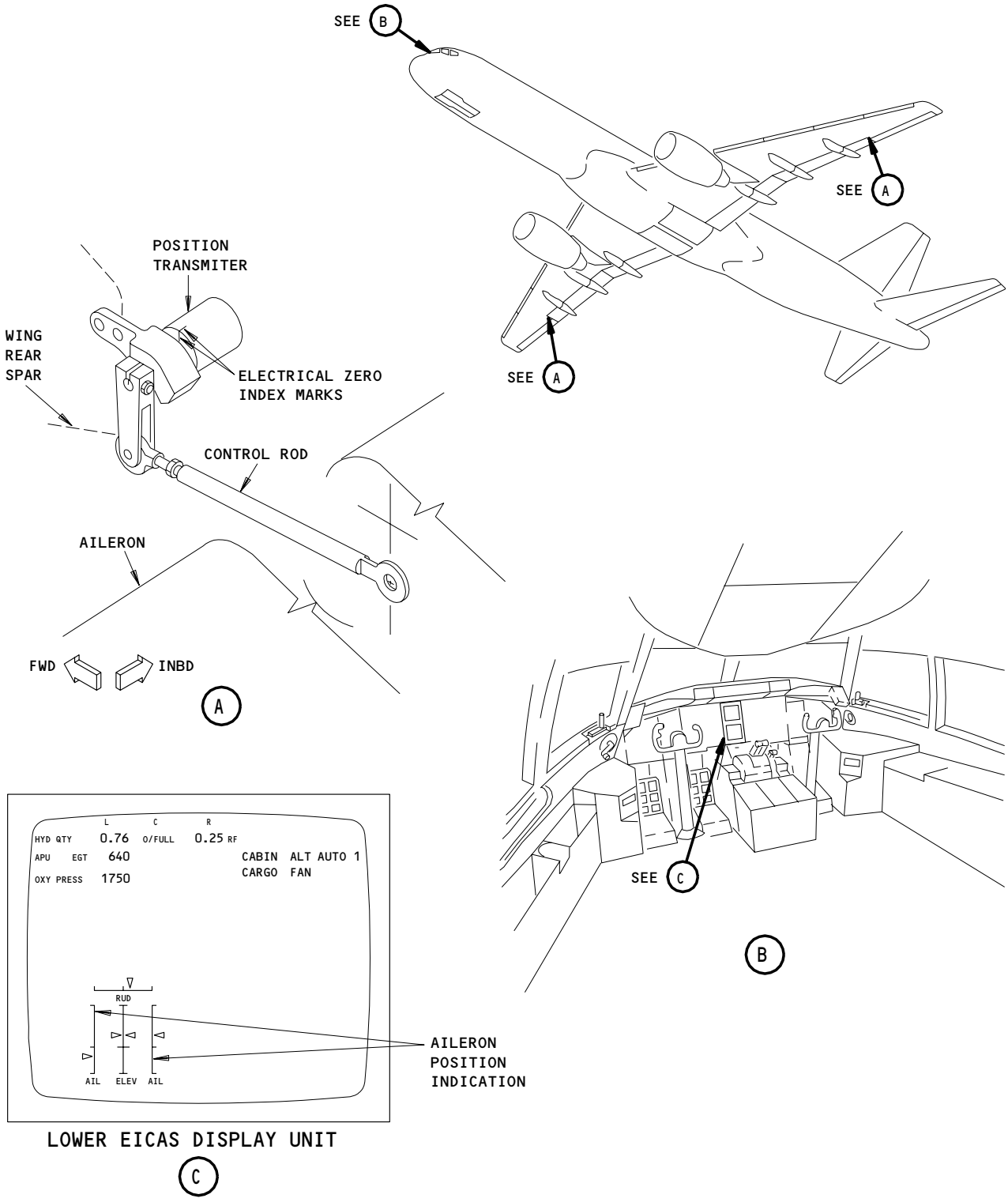
Aileron Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2455 (6.236)		X		
2	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2545 (6.464)		X		
3	BEARING	ID	0.2495 (6.337)	0.2500 (6.350)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2450 (6.223)		X		
4	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3805 (9.665)	0.0050 (0.127)	X		
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3706 (9.413)		X		
5	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3110 (7.899)	0.3120 (7.925)	0.3081 (7.826)		X		
6	BEARING	ID	0.3120 (7.925)	0.3125 (7.938)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3110 (7.899)	0.3120 (7.925)	0.3075 (7.811)		X		
7	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3110 (7.899)	0.3120 (7.925)	0.3080 (7.823)		X		
8	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		

Aileron Wear Limits
Figure 601 (Sheet 3)

AILERON POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The aileron position indicating system provides the flight crew with visual indication of aileron angular displacement.
2. Component Details (Fig. 1)
   A. Flight Control Surface Position Indicator
      (1) The flight control surface position indicator is displayed on the status page of the lower EICAS screen. The indicator shows the position of the ailerons, rudder, and elevators.
   B. Aileron Position Transmitter
      (1) The position transmitters are accessible through panels on the wing lower surface. Adjustable control rods attach the transmitters to the ailerons. The transmitter is rigged to electrical zero when the aileron is faired with wing structure.
3. Operation
   A. Functional Description
      (1) When the aileron deflects, it drives the control rod which provides an electrical signal in the transmitter. The voltage is proportional to the amount of aileron movement. The EICAS computer receives the signal and displays aileron position when the status button is pressed. Two pointers indicate aileron position separately.
   B. Control
      (1) Aileron position indicating is automatic when power is on. Both left and right bus power supplies the system when the AILERON POS circuit breakers L and R are closed.
      (2) To display aileron position indicator, press STATUS button on pilot's select display panel P9.



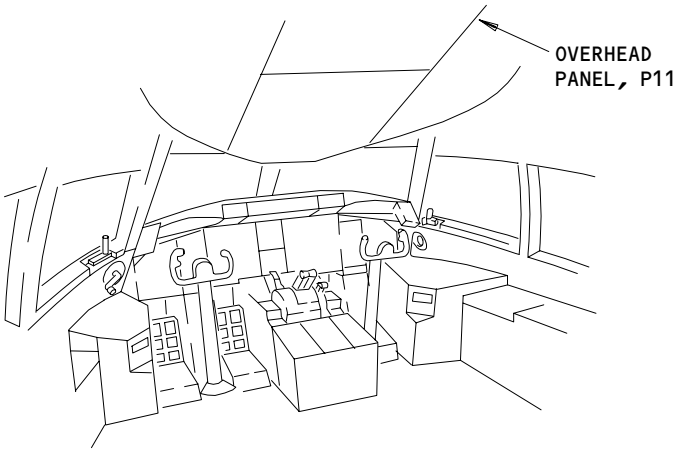
Aileron Position Indicating System
Figure 1

AILERON POSITION INDICATING SYSTEM

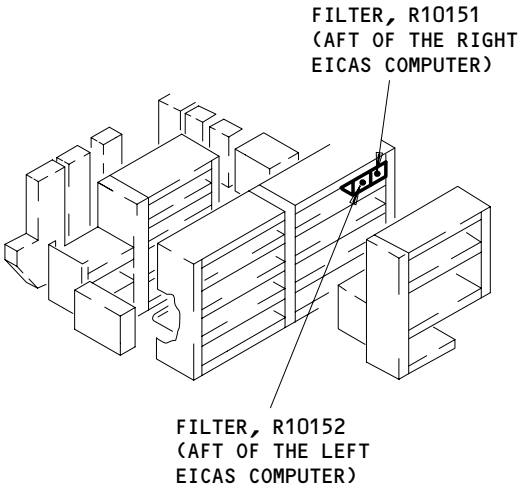
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	1		FLT COMPT, OVERHEAD PANEL, P11	*
AILERON POS L, C4099		1	11J14	*
AILERON POS R, C4100		1	11J23	*
AILERON TRIM, C1035		1	11J15	
COMPUTER - (FIM 31-41-00/101) L EICAS, M10181				
COMPUTER - (FIM 31-41-00/101) R EICAS, M10182				
FILTER, R10151,R10152	1	2	119BL, MAIN EQUIP CTR, E4-2	*
TRANSMITTER - LEFT AILERON POSITION, M10225	2	1	561AB, L OUTBD AILERON	27-18-01
TRANSMITTER - RIGHT AILERON POSITION, M101226	2	1	661AB, R OUTBD AILERON	27-18-01

* SEE THE WDM EQUIPMENT LIST

Aileron Position Indicating System - Component Index
Figure 101

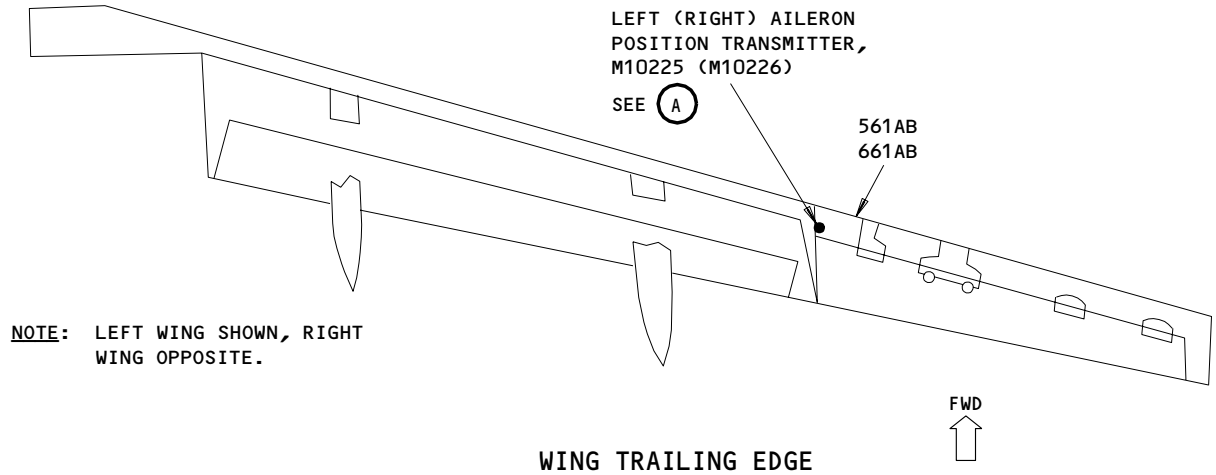


FLIGHT COMPARTMENT

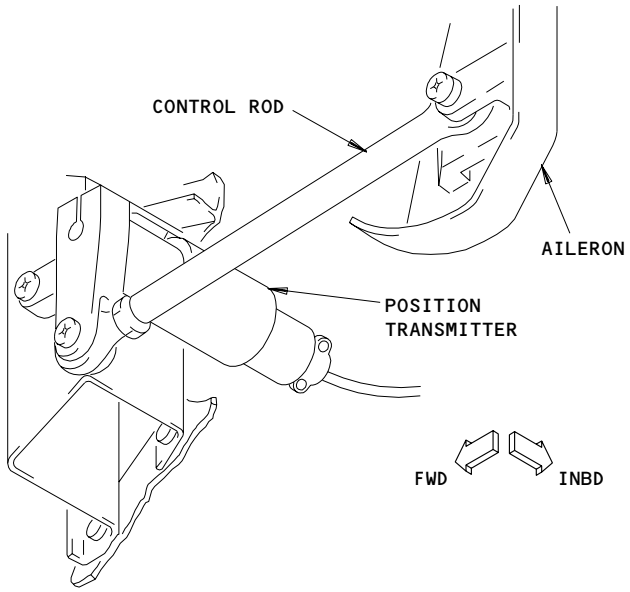


MAIN EQUIPMENT CENTER

Aileron Position Indicating System - Component Location
Figure 102 (Sheet 1)



WING TRAILING EDGE
BOTTOM VIEW



LEFT (RIGHT) AILERON POSITION TRANSMITTER,
M10225 (M10226)

A

Aileron Position Indicating System – Component Location
Figure 102 (Sheet 2)

Not Used
Figure 103

AILERON POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. One task is an operational test and the other is a system adjustment. A system test is not necessary.

TASK 27-18-00-715-001

2. Operational Test - Aileron Position Indicating System
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Procedure

      S 865-002
      (1) Supply electrical power (Ref 24-22-00).

      S 865-003

      WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

      (2) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201).

      S 825-004
      (3) Operate the aileron trim switches on the aft electronic control panel, P8, until the aileron trim indicator shows zero units of trim. Make sure that the control wheels are in neutral.

      NOTE: Use a tolerance of +/- one-half an arrow width.

      S 865-005
      (4) Make sure that these circuit breakers on the overhead panel, P11, are closed:
      (a) EICAS (6 locations)

      S 865-006
      (5) Push the STATUS button on the pilot's select-display panel, P9, to show the aileron position indicator on the bottom EICAS display.

S 215-007
(6) Move the EICAS computer-select switch on the P9 panel to L and do the check that follows:
(a) Make sure that the aileron position pointers are aligned with the mid-scale mark on the aileron position indicator.

NOTE: use a tolerance of +/- one-half an arrow width.

S 215-008
(7) Turn the control wheel clockwise and do the check that follows:
(a) Make sure that the left aileron position pointer moves down and the right position pointer moves up.

S 215-009
(8) Turn the control wheel counterclockwise and do the check that follows:
(a) Make sure that the left aileron position pointer moves up and the right position pointer moves down.

S 215-010
(9) Move the EICAS computer-select switch on the P9 panel to R and do the check that follows:
(a) Make sure that the aileron position pointers are aligned with the mid-scale mark on the aileron position indicator.

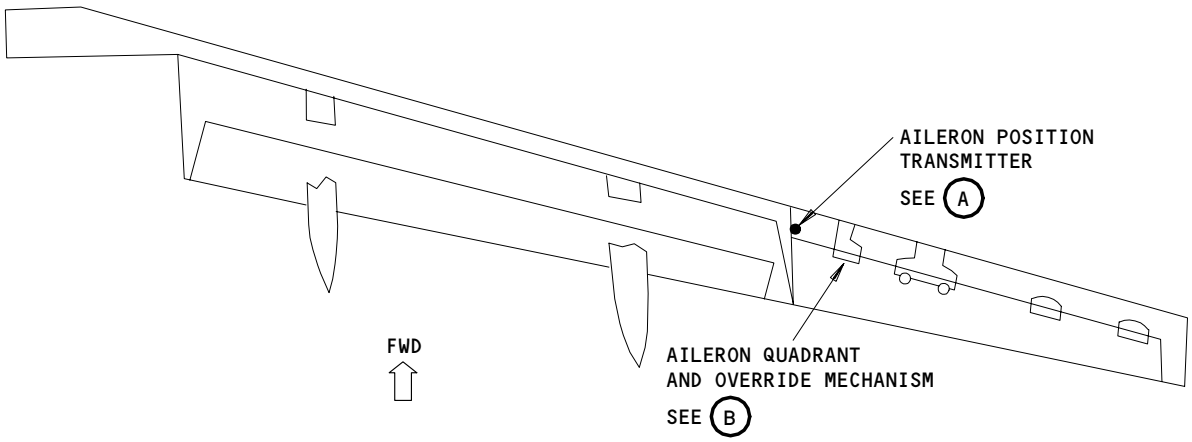
NOTE: Use a tolerance of +/- one-half an arriw width.

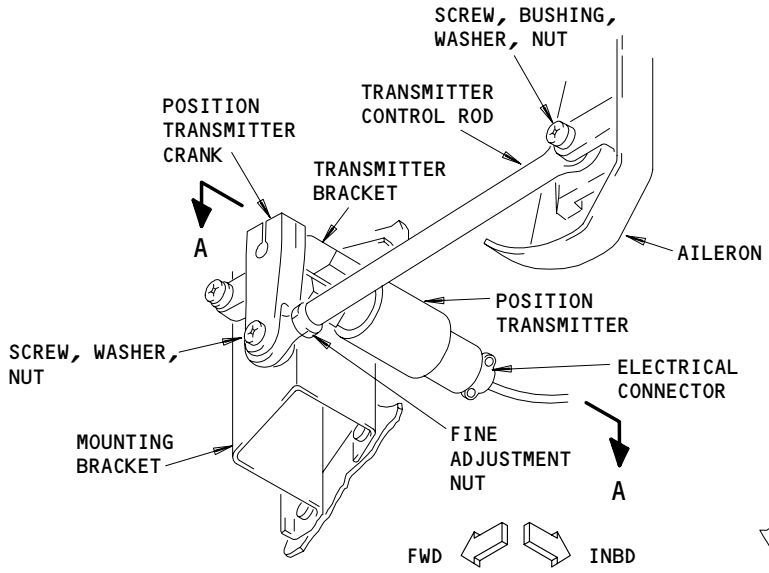
S 215-011
(10) Turn the control wheel clockwise and do the check that follows:
(a) Make sure that the left aileron position pointer moves down and the right position pointer moves up.

S 215-012
(11) Turn the control wheel counterclockwise and do the check that follows:
(a) Make sure that the left aileron position pointer moves up and the right position pointer moves down.

S 865-013
(12) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J14, AILERON POS LEFT

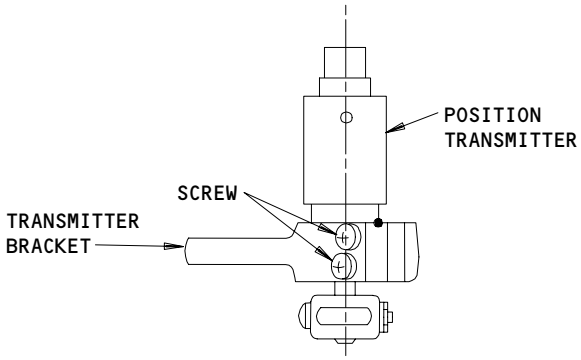
S 215-014
(13) Turn the control wheel clockwise and do the check that follows:
(a) Make sure that the left aileron position pointer shows no movement and the right position pointer moves up.



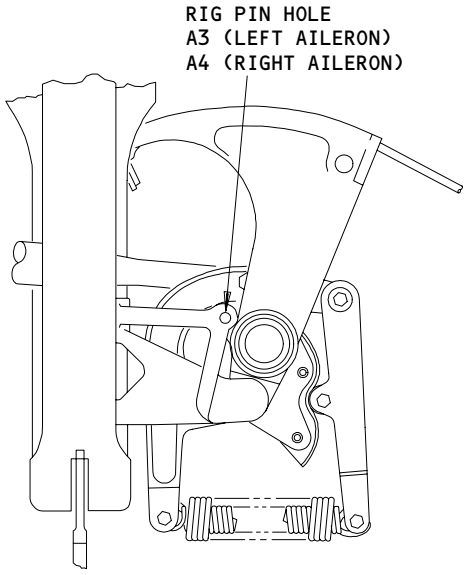


AILERON POSITION TRANSMITTER

A



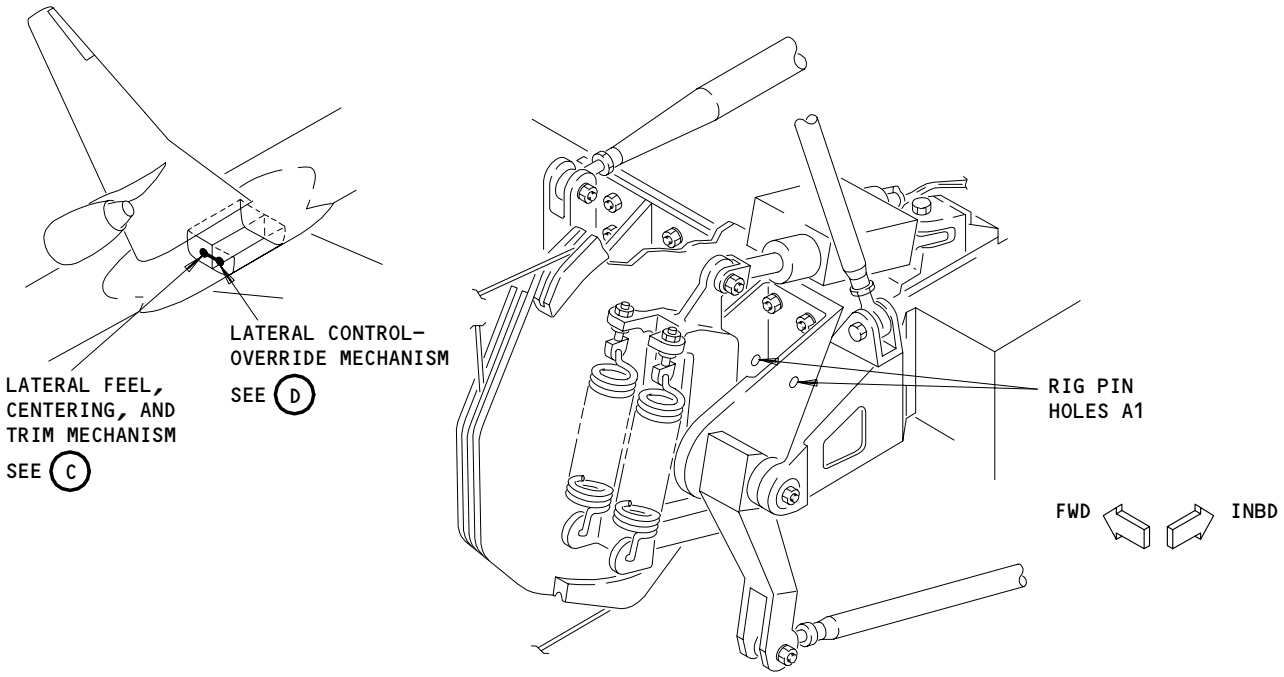
A–A



AILERON QUADRANT AND OVERRIDE MECHANISM

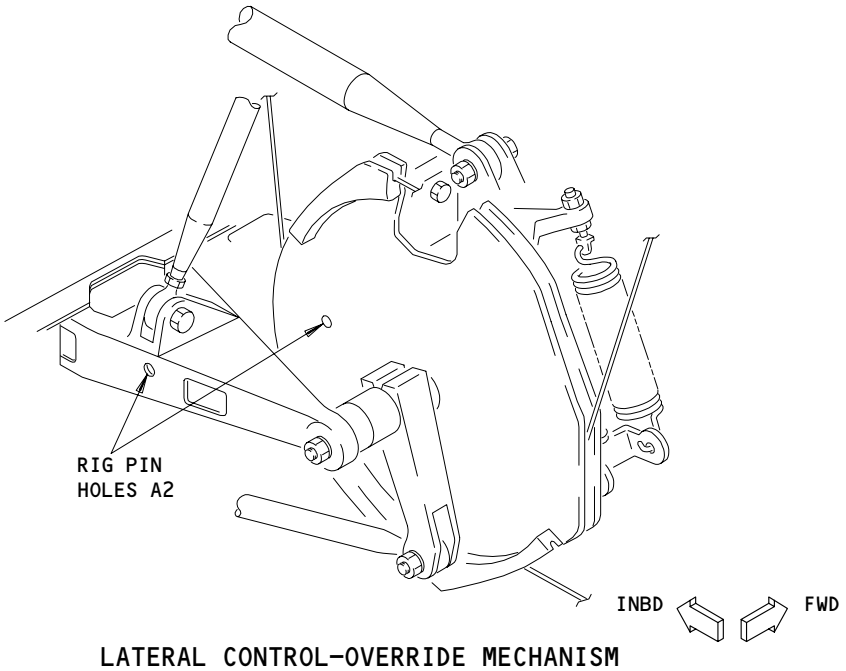
B

Aileron Position-Indicating System Adjustment
Figure 501 (Sheet 1)



LATERAL FEEL, CENTERING, AND TRIM MECHANISM

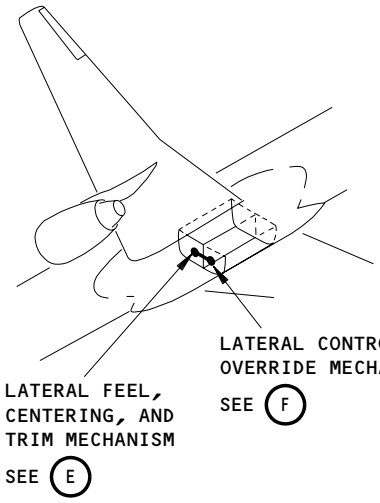
C

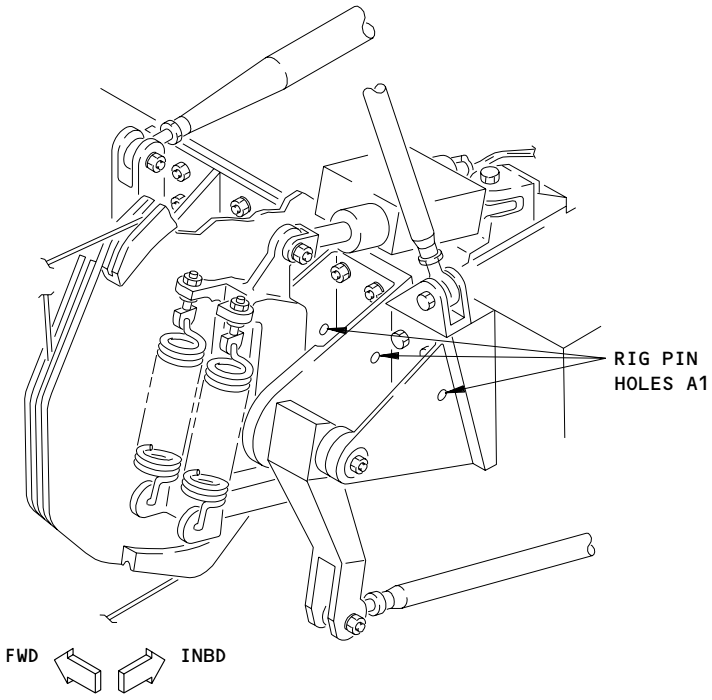


LATERAL CONTROL-OVERRIDE MECHANISM

D

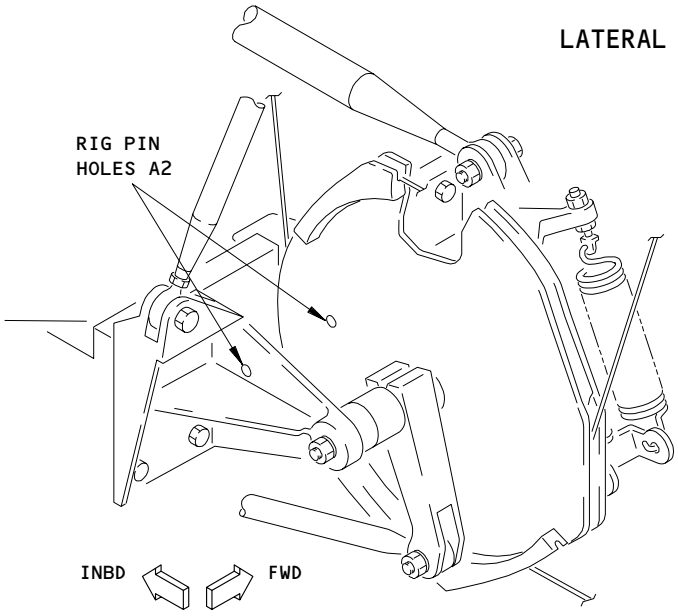
Aileron Position-Indicating System Adjustment
Figure 501 (Sheet 2)





LATERAL FEEL, CENTERING, AND TRIM MECHANISM

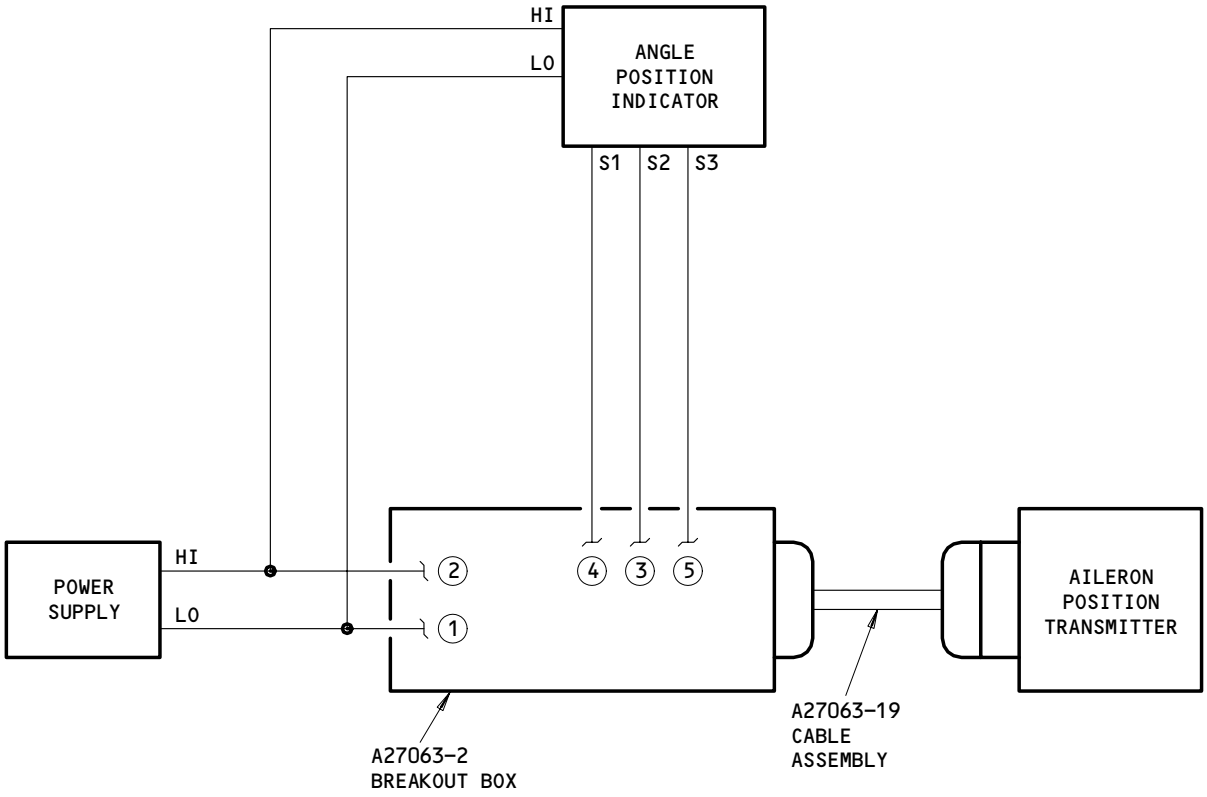
(E)



LATERAL CONTROL OVERRIDE MECHANISM

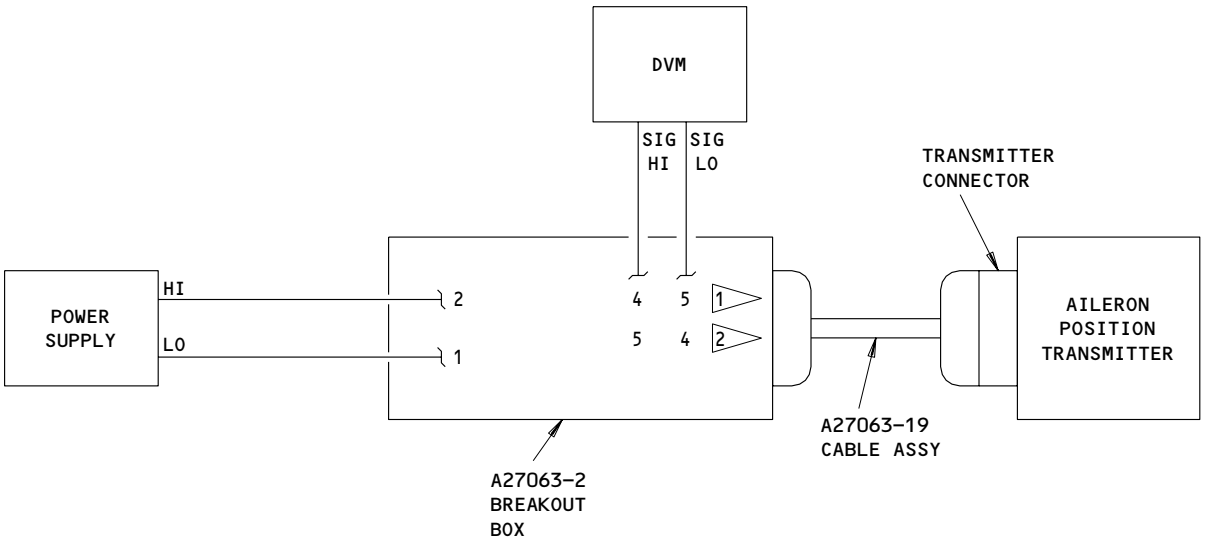
(F)

Aileron Position Indicating System Adjustment
Figure 501 (Sheet 3)

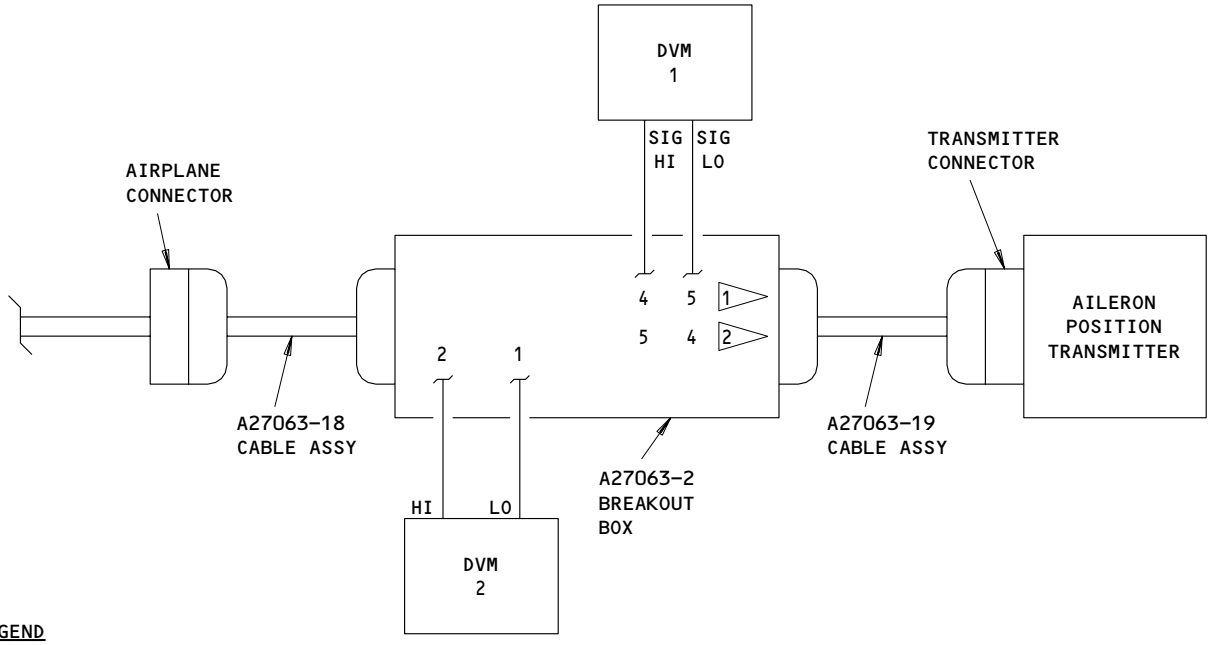


METHOD 1

Aileron Position-Transmitter Adjustment
Figure 502 (Sheet 1)



METHOD 2



LEGEND

DVM – DIGITAL VOLTMETER

NOTE: IF ONLY ONE DVM IS USED, MONITOR THE AIRPLANE POWER AS SHOWN (DMV 2). THEN CONNECT IT TO THE BREAKOUT BOX AS SHOWN (DVM 1) TO DO THE

METHOD 3

1 RIGHT AILERON POSITION TRANSMITTER

2 LEFT AILERON POSITION TRANSMITTER

Aileron Position-Transmitter Adjustment
Figure 502 (Sheet 2)

S 865-015
(14) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J22 or 11J23, AILERON POS RIGHT

S 215-016
(15) Turn the control wheel clockwise and then counterclockwise and do the check that follows:
(a) Make sure that the aileron position pointers do not move.

S 825-017
(16) Move the control wheel to its neutral position.

S 865-018
(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11J14, AILERON POS LEFT
(b) 11J22 or 11J23, AILERON POS RIGHT

S 865-019
(18) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-020
(19) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-18-00-825-064

3. Adjustment - Aileron Position Indicating System

A. General
(1) Make sure that the aileron PCAs are rigged correctly before you adjust the aileron position transmitters (Ref 27-11-00).

B. Equipment
(1) Main Gear Door Locks (Ref 32-00-15)
(2) Rig Pins from set B20003-XX (Ref 20-10-24)
(a) A1 - P/N B20003-27
(b) A2 - P/N B20003-25
(c) A3 - P/N B20003-23
(d) A4 - P/N B20003-23
(3) Equipment that is necessary for the adjustment (Procedure 1):
(a) Angle Position Indicator (API) - 8810
North Atlantic Model (North Atlantic Industries Inc., Hauppauge, New York)
(b) Breakout Box, Cables - A27063-91 (Preferred)
Position Transmitter Tester - PTTS-892B (Alternate)
Phase Synchronous Voltmeter - 101-ACX (Alternate)

(c) Power Supply - Powertron Model 5900 (Industrial Equipment Corp., Port Washington, New York)

(4) Equipment that is necessary for the adjustment (Procedure 2):

(a) Breakout Box, Cables - A27063-91 (Preferred)
Position Transmitter Tester - PTTS-892B (Alternate)
Phase Synchronous Voltmeter - 101-ACX (Alternate)

(b) Digital Voltmeter (DVM) - 8020B (John Fluke Manufacturing Co. Inc., Everett, Washington)

(c) Power Supply - Powertron Model 5900 (Industrial Equipment Corp., Port Washington, New York)

(5) Equipment that is necessary for the adjustment (Procedure 3):

(a) Breakout Box, Cables - A27063-91 (Preferred)
Position Transmitter Tester - PTTS-892B (Alternate)
Phase Synchronous Voltmeter - 101-ACX (Alternate)

(b) Digital Voltmeter (DVM) - 8020B (one is necessary, two are recommended) (John Fluke Manufacturing Co., Inc., Everett, Washington)

C. Consumable Materials

(1) A00226 Tamper-proof putty - BMS 8-45

D. References

(1) 06-44-00/201, Wing Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-11-00/501, Aileron and Aileron Trim Control System
(5) 27-51-00/201 - TE Flaps (Operation)
(6) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
(7) 32-00-15/201, Landing Gear Door Locks
(8) 32-00-20/201, Landing Gear Downlocks

E. Access

(1) Location Zones

561 Rear Spar to MLG Support Beam (Left)
661 Rear Spar to MLG Support Beam (Right)

(2) Access Panels

561AB Aileron Quadrant (Left)
661AB Aileron Quadrant (Right)

F. Prepare for the Adjustment (Fig. 501)

S 015-021

(1) Open access panels 561AB and 661AB (Ref 06-44-00).

S 865-022
(2) Supply electrical power (Ref 24-22-00).

S 865-023

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE CONTROL SURFACES DURING THEIR OPERATION.

(3) Supply pressure to the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 495-024
(4) Make sure that the landing gear downlocks are installed (Ref 32-00-20).

S 495-025

WARNING: MAKE SURE THAT THE DOOR LOCKS ARE INSTALLED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY OR DAMAGE.

(5) Open the main gear doors and install the door locks (AMM 32-00-15/201).

S 865-026
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11J14, AILERON POS LEFT
(b) 11J22 or 11J23, AILERON POS RIGHT

S 865-027
(7) Make sure that the trailing edge flaps are fully retracted (AMM 27-51-00/201).

S 495-028

WARNING: DO NOT OPERATE THE AILERON CONTROL WHEELS. THE AILERON POSITION TRANSMITTERS WILL BE ADJUSTED WITH THE HYDRAULIC POWER ON. ACCIDENTAL AILERON MOVEMENT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(8) Attach DO-NOT-OPERATE tags to the two aileron control wheels.

S 825-029
(9) Make sure that the aileron trim indicator (located on top of the aileron control wheel) is at zero. If it is not at zero, operate the two aileron trim switches on the P8 panel to move the trim indicator to zero.

S 495-030
(10) Attach DO-NOT-OPERATE tags to the aileron trim switches on the P8 panel.

S 225-031
(11) Make sure that the aileron trailing edge aligns with the TE-flap trailing-edge. A tolerance of ± 0.06 inch (+/- 1.5 mm) is permitted.

NOTE: Compare the top surfaces of the aileron and flap trailing edges to measure this dimension.

S 825-032
(12) To adjust the left aileron position indicator, make sure that rig pins A1 and A3 can be easily installed. Remove rig pins A1 and A3.

S 825-033
(13) To adjust the right aileron position transmitter, make sure that rig pins A2 and A4 can be easily installed. Remove rig pins A2 and A4.

G. Do the Aileron Position Indicating System Adjustment that follows:

NOTE: Four procedures are supplied to adjust the aileron position transmitters.

PROCEDURE 1 uses an angle position indicator (API).
PROCEDURE 2 uses a separate power supply, a digital voltmeter (DVM), and breakout box equipment.
PROCEDURE 3 uses airplane power, breakout box equipment, and a digital voltmeter (DVM). Two DVMs are recommended.
PROCEDURE 4 does not use special tools. It adjusts the transmitter until the position indicator arrow aligns with the mid-scale mark of the position indicator on the EICAS status display.

S 225-044
(1) Make sure that the length of the transmitter control rod is 8.52 ± 0.03 inches (216.4 +/- 0.7 mm). Measure this length from bolt center to bolt center. If the length is not correct, do the adjustment that follows:
(a) Disconnect the transmitter control rod from the aileron.
(b) Turn the control rod one-half turn at a time to get the specified length.

NOTE: Do not break the lockwire at the fine adjustment nut.

(c) Connect the control rod to the aileron. Tighten the nut to a torque of 30 to 35 pound-inches (3.4-3.8 Nm).

S 825-055

(2) Adjust The Aileron Position Transmitter (PROCEDURE 1):
   (a) Remove the electrical connector from the position transmitter.
   (b) Connect the Angle Position Indicator (API) to the transmitter as shown (Fig. 502).
   (c) Operate the API.
   (d) Loosen the screws that hold the transmitter in the transmitter bracket.

      NOTE: Loosen the screws sufficiently to let the transmitter turn in its bracket.

   (e) Turn the transmitter in its bracket until the API indicator shows 0 ± 0.5 degree.

      NOTE: The transmitter must be adjusted to 0 ± 0.125 degree to be satisfactory. To get this precision, it is necessary to do more steps.

   (f) Tighten the screws that hold the transmitter in its bracket.
   (g) Make sure that the API shows 0 ± 0.125 degrees. If the indication shown is not correct, do the adjustment that follows:
      1) Remove the lockwire from the fine adjustment nut on the transmitter control rod.
      2) Turn the fine adjustment nut until the indication on the API is correct.

         NOTE: One turn of the adjustment nut changes the API indication by 0.3 degrees.

      3) Make sure that the length of the control rod is not more than 8.52 ± 0.10 inches (216.4 +/- 2.5 mm).

         NOTE: If the control rod length and the transmitter voltage are not correct at the same time, turn the transmitter body. If the transmitter is turned in its bracket, tighten the screws and apply the tamper proof putty.

      4) Install the lockwire to hold the adjustment nut in position.
   (h) Stop the API.
   (i) Disconnect the API from the position transmitter.
   (j) Connect the airplane electrical connector to the position transmitter.
   (k) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
      1) 11J14, AILERON POS LEFT

2) 11J22 or 11J23, AILERON POS RIGHT

(l) Do the aileron position-indicating system operational test.

S 825-056

(3) Adjust The Aileron Position Transmitter (PROCEDURE 2)

(a) Disconnect the electrical connector from the position transmitter.

(b) Connect the breakout box and cable assembly to the position transmitter as shown (Fig. 502).

(c) Connect a digital voltmeter (DVM) to the breakout box at pins 4 (SIG HI) and 5 (SIG LO).

(d) Connect the power supply to the breakout box at pins 1 (LO) and 2 (HI). Adjust the power supply to 26 ± 0.02 volts ac RMS.

(e) Make sure that the output voltage as shown on the DVM is 0 ± 0.050 volts ac RMS. If the voltage shown on the DVM is not correct, do the adjustment that follows:

1) If large adjustments are necessary, adjust as follows:

a) Loosen the screws that hold the transmitter in its bracket.

b) Turn the transmitter in its bracket until the output voltage shown on the DVM is very near the specified voltage.

c) Tighten the screws that hold the transmitter in its bracket.

2) If fine adjustments are necessary, adjust as follows:

a) Cut the lockwire at the fine adjustment nut on the transmitter control rod.

b) Turn the fine adjustment nut until the specified voltage is shown on the DVM.

3) Make sure that the length of the control rod is not more than 8.52 ± 0.10 inches (216.4 +/- 2.5 mm).

NOTE: If the control rod length and the transmitter voltage are not corect at the same time, turn the transmitter body. If the transmitter is turned in its bracket, tighten the screws and apply the tamper proof putty.

4) Install the lockwire to hold the fine adjustment nut in position.
5) Make sure that the specified voltage is shown on DVM.

(f) Disconnect the power supply, DVM, and cable assembly from the breakout box.
(g) Disconnect the cable assembly from the position transmitter.
(h) Connect the airplane electrical connector to the position transmitter.
(i) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11J14, AILERON POS LEFT
2) 11J22 or 11J23, AILERON POS RIGHT
(j) Do the aileron position-indicating system operational test.

S 825-057

(4) Adjust The Aileron Position Transmitter (PROCEDURE 3):
(a) Disconnect the electrical connector from the position transmitter.
(b) Connect the cable assemblies to the airplane electrical connector, the position transmitter, and the breakout box, as shown (Fig. 502).
(c) Connect the digital voltmeters (DVM 1 and DVM 2) to the appropriate pins on the breakout box.

NOTE: If only one DVM is used, connect it at the DVM 2 position first to monitor airplane power. After the airplane power has become stable, move the DVM to the DVM 1 position and monitor the position transmitter output.

(d) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11J14, AILERON POS LEFT
2) 11J22 or 11J23, AILERON POS RIGHT
(e) Make sure that the airplane input voltage is between 24 and 30 volts ac RMS at DVM 2.

NOTE: After the airplane voltage has become stable, the DVM can be moved to the DVM1 position to monitor transmitter output.

(f) Make sure that the output voltage as shown on DVM 1 is 0 ± 0.050 volts ac RMS. If the voltage shown on DVM 1 is not correct, do the adjustment that follows:
1) If large adjustments are necessary, adjust as follows:
a) Loosen the screws that hold the transmitter in its bracket.
b) Turn the transmitter in its bracket until the output voltage shown on DVM 1 is very near the specified voltage.
c) Tighten the screws that hold the transmitter in its bracket.
2) If fine adjustments are necessary, adjust as follows:
a) Cut the lockwire at the fine adjustment nut on the transmitter control rod.
b) Turn the fine adjustment nut until the specified voltage is shown on DVM 1.
3) Make sure that the length of the control rod is not more than 8.52 ± 0.10 inches (216.4 +/- 2.5 mm).

NOTE: If the control rod length and the transmitter voltage are not correct at the same time, turn the transmitter body. If the transmitter is turned in its bracket, tighten the screws and apply the tamper proof putty.

4) Install lockwire to hold the fine adjustment nut in position.
5) Make sure that the specified voltage is shown on DVM 1.
(g) Disconnect the DVMs and cable assemblies from the breakout box.
(h) Disconnect the cable assemblies from the aileron position transmitter and the airplane electrical connector.
(i) Connect the airplane electrical connector to the position transmitter.
(j) Do the aileron position-indicating system operational test.

S 825-058
(5) Adjust The Aileron Position Transmitter (PROCEDURE 4):
(a) Make a communications connection between a person in the control cabin and a person at the wing. Have the person in the control cabin monitor the aileron position-indicator (on the EICAS status display) while the wing person adjusts the transmitter.

(b) Make sure that the airplane electrical connector is connected to the aileron position transmitter.

(c) Make sure that these circuit breakers on the P11 panel are closed:
   1) EICAS (6 locations)
   2) 11J14, AILERON POS LEFT
   3) 11J22 or 11J23, AILERON POS RIGHT

(d) Push the STATUS button on the pilot's select-display panel, P9, to show the aileron position-indicator on the bottom EICAS display.

(e) Make sure that the aileron trim indicator (located on the top of the aileron control wheel) is at zero.

(f) Make sure that the left (right) aileron position-indicator pointer is aligned with the mid-scale position mark on the EICAS position indicator. If it is necessary, adjust the transmitter as follows:
   1) If large adjustments are necessary, adjust as follows:
      a) Loosen the screws that hold the transmitter in its bracket.
      b) Turn the transmitter in its bracket until the position-indicator pointer is on the mid-scale mark of the position indicator.
      c) Tighten the screws that hold the transmitter in its bracket.
   2) If fine adjustments are necessary, adjust as follows:
      a) Cut the lockwire at the fine adjustment nut on the transmitter control rod.
      b) Turn the fine adjustment nut until the position-indicator pointer is on the mid-scale mark of the position indicator.
   3) Make sure that the length of the control rod is not more than 8.52 ± 0.10 inches (216.4 +/- 2.5 mm).

      NOTE: If the control rod length and the transmitter voltage are not correct at the same time, turn the transmitter body. If the transmitter is turned in its bracket, tighten the screws and apply the tamper proof putty.

4) Install the lockwire to hold the fine adjustment nut in position.
5) Make sure that the position indicator pointer is aligned with the mid-scale mark.

(g) Do the aileron position-indicating system operational test.

H. Put the Airplane Back to its Usual Condition.

S 095-059

(1) Remove the DO-NOT-OPERATE tags from the aileron control wheels and the aileron trim switches on the P8 panel.

S 095-060

WARNING: MAKE SURE THAT THE DOOR LOCKS ARE REMOVED CORRECTLY. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY OR DAMAGE.

(2) Remove the main gear door locks and close the doors (Ref 32-00-15).

S 865-061

(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-062

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 415-063

(5) Close access panels 561AB and 661AB.

AILERON POSITION TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains 2 tasks. The first task contains the data that is necessary to remove the aileron position transmitter. The second task contains the data that is necessary to install it.

TASK 27-18-01-024-003

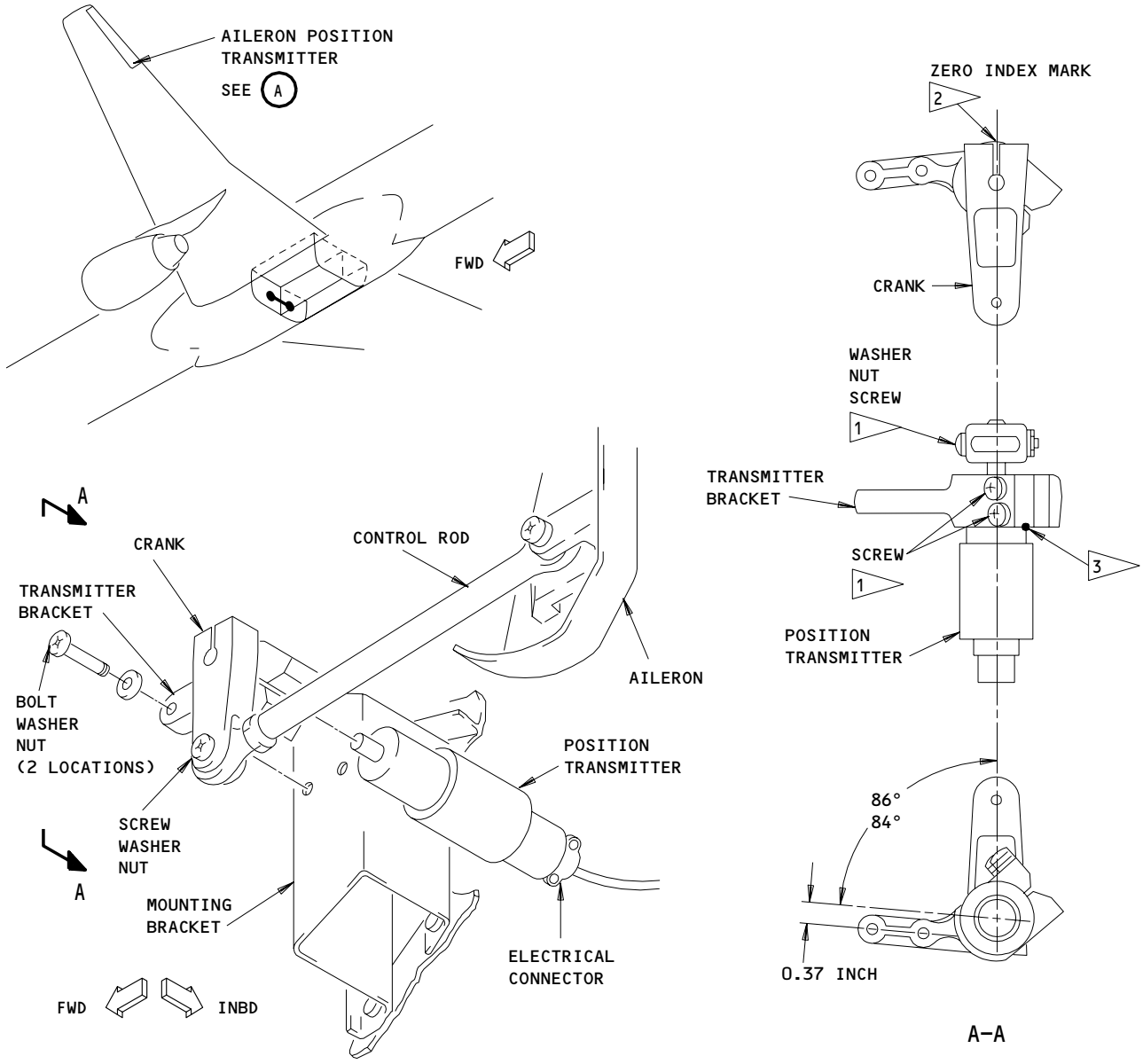
2. Remove Aileron Position Transmitter
   A. Equipment
      (1) Main Gear Door Locks (Ref 32-00-15)
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones
          561 Rear Spar to Trailing Edge (Left)
          661 Rear Spar to Trailing Edge (Right)

      (2) Access Panels
          561AB Aileron Quadrant (Left)
          661AB Aileron Quadrant (Right)

   D. Prepare for Removal

      S 864-004
      (1) Supply electrical power (Ref 24-22-00).

      S 864-005
      (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11J14, AILERON POS LEFT



AILERON POSITION TRANSMITTER

A

1 MAKE SURE THAT THESE SCREWS ARE IN THE CORRECT TRANSMITTER GROVE

2 THE ZERO INDEX MARK MUST ALIGN WITH THE CENTERLINE OF THE CRANK

3 APPLY THE TAMPER–PROOF PUTTY AFTER THE POSITION TRANSMITTER IS ALIGNED

Aileron Position Transmitter Installation
Figure 401

(b) 11J22 or 11J23, AILERON POS RIGHT

S 214-006
(3) Make sure that the downlocks for the nose and main landing gear are installed (Ref 32-00-20).

S 494-001

WARNING: USE AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the main gear and install the door locks (Ref 32-00-15).

S 984-007
(5) Move the control wheels to their neutral position.

S 864-008
(6) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 014-009
(7) Open access panel 561AB (left) or 661AB (right) (Ref 06-44-00).

E. Remove Aileron Position Transmitter (Fig. 401)

S 034-010
(1) Disconnect the airplane connector from the position transmitter.

S 034-011
(2) Disconnect the control rod from the crank.

S 024-013
(3) If only the transmitter will be replaced, remove the screws that connect the transmitter to the transmitter bracket and remove the transmitter.

S 024-012
(4) Remove the bolts that connect the transmitter bracket to the mounting bracket, and remove the assembly.

TASK 27-18-01-424-014

3. Install Aileron Position Transmitter

A. Equipment
(1) Bonding Meter - Model T477W, Avtron Manufacturing Inc., Cleveland, Ohio

B. Consumable Materials
(1) A00226 Putty, Tamperproof - BMS 8-45

C. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 20-10-22/701, Metal Surface Cleaning/Painting

(3) 24-22-00/201, Electrical Power - Control
(4) 27-18-00/501, Aileron Position Indicating System
(5) 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zones

561 Rear Spar to Trailing Edge (Left)
661 Rear Spar to Trailing Edge (Right)

(2) Access Panels

561AB Aileron Quadrant (Left)
661AB Aileron Quadrant (Right)

E. Install Aileron Position Transmitter (Fig. 401)

S 124-015

(1) Use a rotary bonding brush or a rotary abrasive disk to clean and prepare the transmitter and bracket mating surfaces (Ref 20-10-22). Make sure to get a good electrical bond.

S 434-016

(2) Install the transmitter in its bracket. Install the screws in the bracket but do not tighten them.

NOTE: Make sure that the screw that is nearest the transmitter shaft is in the transmitter body groove (Fig. 401).

S 824-017

(3) Install the screw, washer and nut that hold the crank on the transmitter shaft. Do the checks that follow:
(a) Make sure that the slot in the crank is aligned with the zero index mark on the transmitter shaft (Fig. 401).
(b) Make sure that the screw is in the transmitter shaft groove. Tighten the nut.

S 824-018

(4) Keep the crank aligned with the index mark and install the transmitter bracket at 84 to 86 degrees to the crank (View A-A). Tighten the screws.

S 224-019

(5) Make sure that the resistance between the bracket and the transmitter is not more than 0.0025 ohms.

S 434-020

(6) Apply the tamperproof putty.

S 824-021

(7) Align the transmitter bracket with the mounting bracket and the crank with the transmitter control rod.

S 434-022

(8) Install the bolts, washers, and nuts that attach the transmitter bracket to the mounting bracket. Tighten the nut to 30-35 pound-inches.

S 434-023

(9) Install the screw, washer, and nut that connect the crank to the control rod. Tighten the nut to 5-10 pound-inches (0.6-1.1 Nm).

S 824-024

(10) Adjust the aileron position transmitter (Ref 27-18-00).

F. Put the Airplane Back to its Usual Condition

S 864-025

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11J14, AILERON POS LEFT
   (b) 11J22 or 11J23, AILERON POS RIGHT

S 094-002

WARNING: USE AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-026

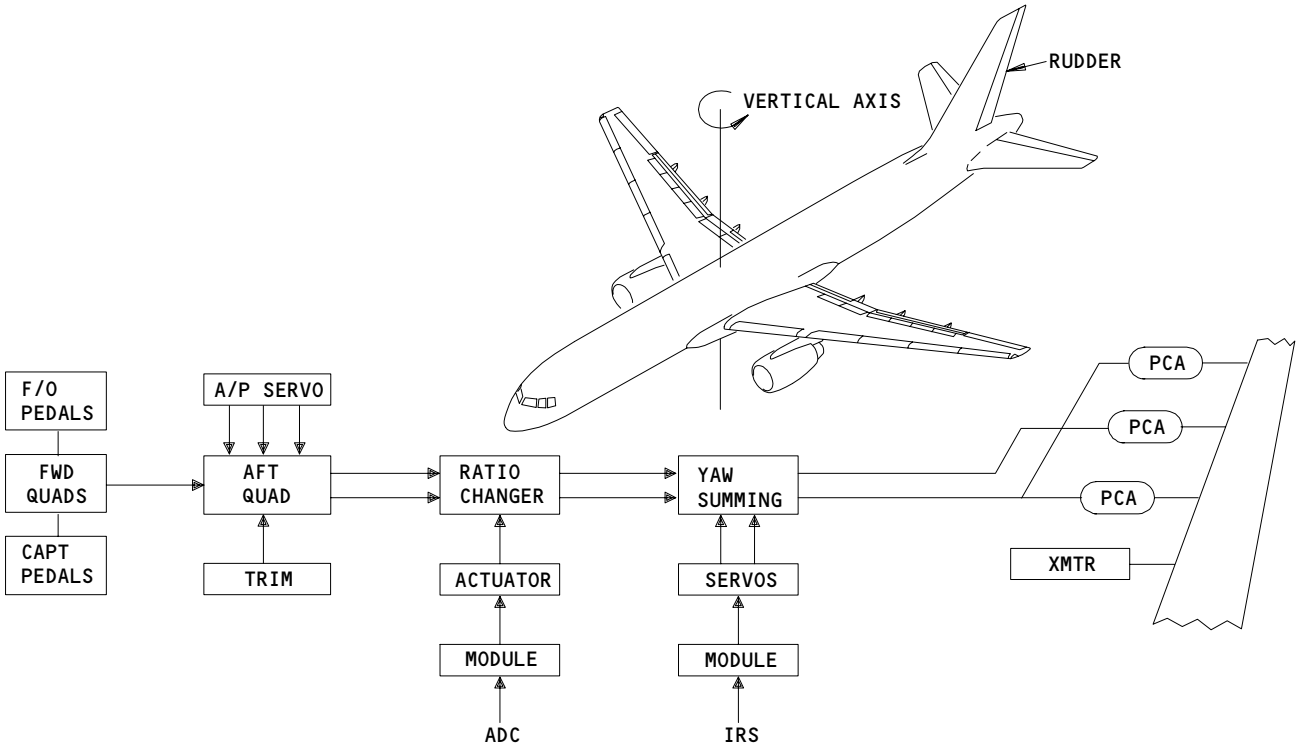
(3) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-027

(4) Close access panel 561AB (left) or 661AB (right) (Ref 06-44-00).

RUDDER AND RUDDER TRIM CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The rudder and rudder trim control system provides directional control and stability around the vertical axis. This section provides a detailed description of the rudder control system components and their operation. Tail hydraulic shutoff valve description and operation is found in Section 27-23-00. Rudder position indication system description and operation is found in Section 27-28-00.
   B. Description and operation of the rudder ratio changer modules (RRCMs) is covered in the following paragraphs. Removal and installation of the modules is covered in 27-09-00/201.
   C. Control (Fig. 1)



Rudder and Rudder Trim Control
Figure 1

52603

(1) The captain's and first officer's rudder pedals provide rudder control through a cable and linkage system to the power control actuators (PCAs) at the rudder. An electric actuator which repositions the feel and centering springs provides rudder trim control about system centered position. Trim switches on the aft electronic control panel P8 control the trim actuator. Three directional autopilot servos are also connected to the input controls. A rudder ratio changer system in the input linkage reduces rudder control commands as a function of airspeed. Yaw damper servo outputs, summed with other control inputs, provide a command signal to the PCAs.

(2) The rudder is powered by the three hydraulic PCAs. Each PCA is independently supplied with pressure by one of three separate hydraulic systems. Any one PCA is capable of providing the required rudder travel.

D. Indication

(1) Rudder position is indicated on the EICAS status page from the rudder position transmitter. A trim position indicator next to the rudder trim switch on aft electronic control panel P8 displays the amount of rudder trim. An amber RUDDER RATIO caution light and EICAS message identifies an inoperative ratio changer system. A yaw damper INOP light for each yaw damper indicates yaw damper inoperative or OFF.

2. Component Details

A. Rudder Pedals (Fig. 2)

(1) Two sets of rudder pedals are located below the captain's and first officer's instrument panel. Each pair have rig pin holes R1 located in the pedal arms below the flight deck floor. Access to this area is through access door (113AL) forward of the nose gear wheel well. Pedal travel is limited to about 3.7 inches (94 mm) from neutral in each direction by stops on the two forward quadrant and jackshaft assemblies.

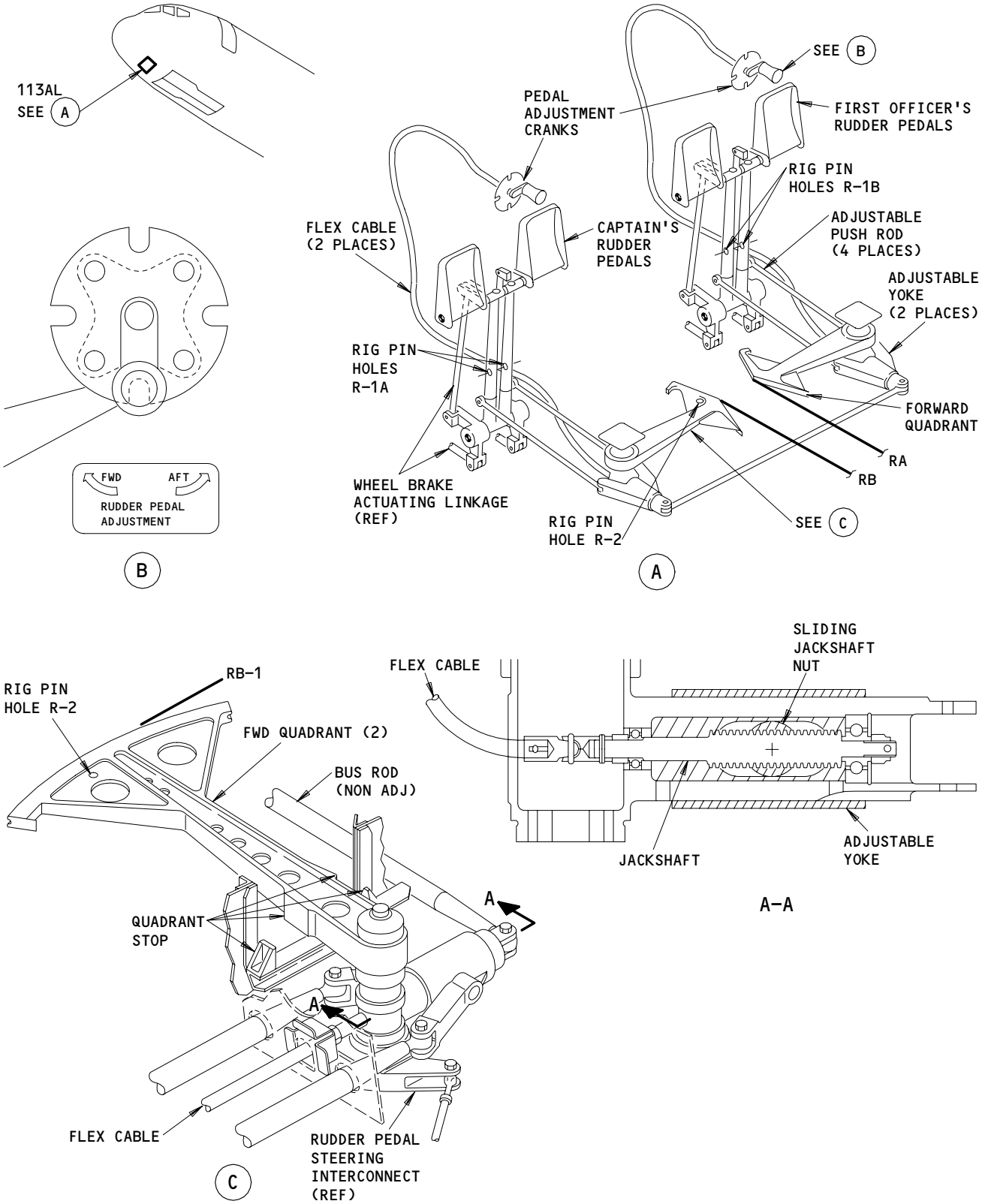
B. Forward Quadrant and Jackshaft Assembly

(1) An adjustable yoke is mounted on the aft side of each forward quadrant. The yoke is attached to the pedals by two control/push rods and is operated by a cable-driven jackshaft to provide fore and aft pedal adjustment. A bus rod ties both forward quadrants together, so either set of pedals provides input to both quadrants.

(2) The quadrants are the forward terminal for the rudder cables. The left quadrant has stop bumpers that contact structural stops to limit pedal movement. The left quadrant also contains rig pin hole R2 which is used to rig the rudder pedals and set cable tension.

C. Pedal Adjustment Crank

(1) The captain's and first officer's adjustment cranks are found on the pedal cover front panel. The cranks adjust pedals independently of one another and are detented to retain position. Each crank turns a flex cable which drives the jackshaft yoke.

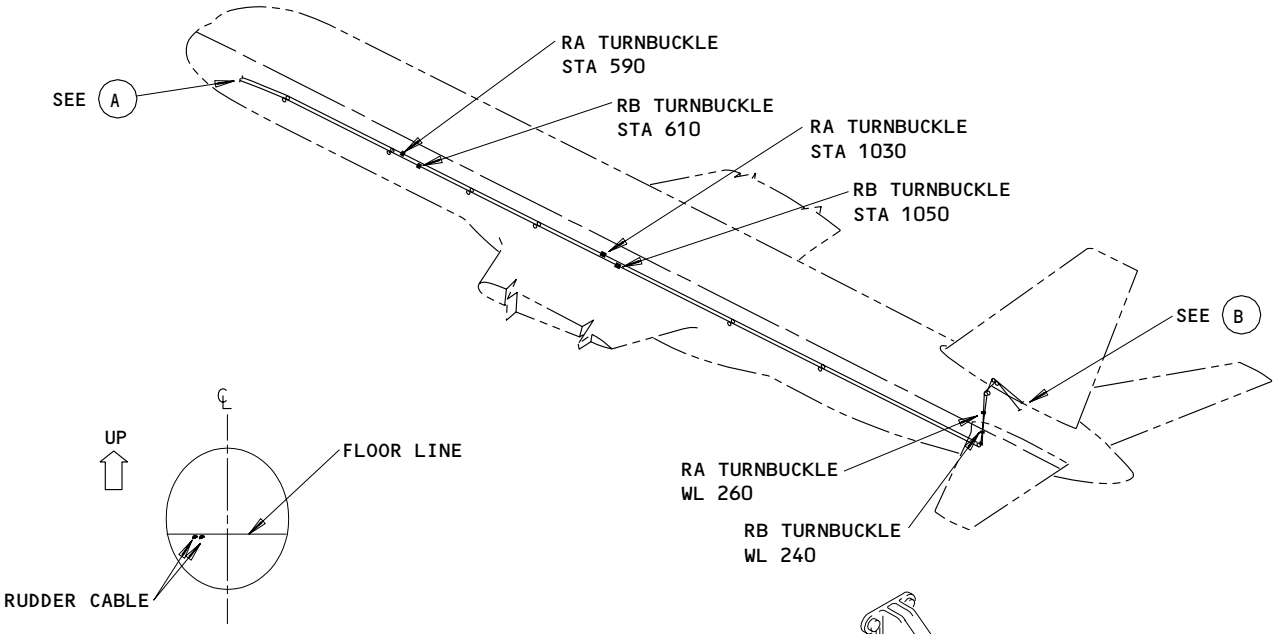


Rudder Pedals and Jackshaft Assembly
Figure 2

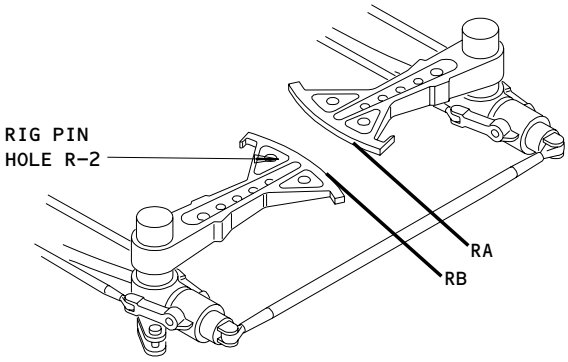
D. Rudder Control Cables (Fig. 3)
   (1) Two control cables are attached at the left and right forward quadrants under the flight deck floor. The cables run under the main cabin compartment and through the aft pressure bulkhead, up to the aft quadrant.
   (2) Three turnbuckles per cable are used for adjusting cable tension with rig pin R2 and R3 installed. Access to the forward set of turnbuckles is through the forward cargo compartment ceiling. The center set is accessed through the cabin floor and the aft set through access door 311AL.

E. Aft Quadrant, Feel, Centering and Trim Mechanism (Fig. 4)
   (1) The aft quadrant, feel, centering and trim mechanism is located at the base of the vertical fin, above the autopilot servos. All mechanism inputs and outputs are connected to its offset torque tube. The aft quadrant transfers cable inputs from the rudder pedals to the torque tube. The quadrant also back-drives the cable system in response to rudder movement caused by autopilot and trim inputs. Other input sources are the trim actuator and three directional autopilot servos. The torque tube output consists of two control rods/pogos which provide ratio changer mechanism input. Two aft quadrant stops limit rotation of the aft quadrant. Rig pin hole R-3 provides a rigging position to fix the aft quadrant to the structural support.
   (2) Feel and centering functions are provided by a cam-roller-spring mechanism. It provides an increasing feel force to rudder pedal input and a centering force to return pedals and rudder to neutral when pedal deflection is removed. The mechanism consists of two arms, spring-joined at the wide end, and connected to the trim actuator at the other. The lower arm contains a roller which follows a detented cam face. The cam face is attached to the torque tube and pivots around the torque tube axis of rotation. Pedal force to move the roller out of the cam face detent is 14 pounds, (62 Newtons)increasing with pedal deflection to 72 pounds (320 Newtons) at full travel.

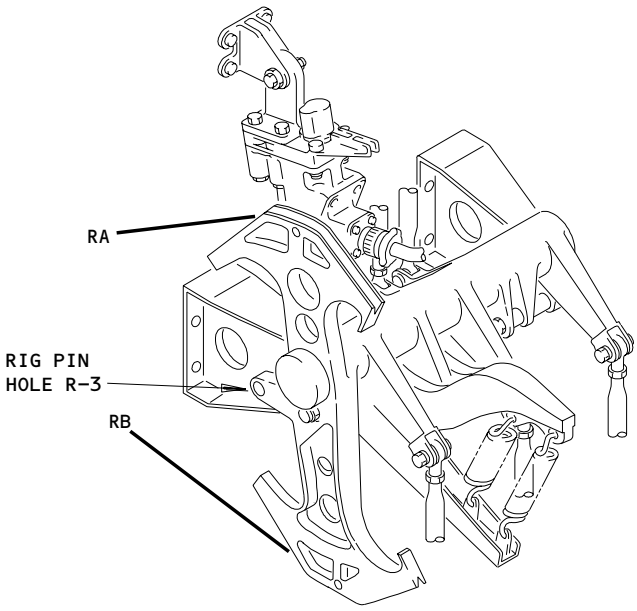
F. Rudder Trim Actuator
   (1) The housing of the rudder trim actuator is attached to the vertical fin rear spar and the rod end is connected to the feel, centering and trim mechanism. Trim commands from the trim switch cause the actuator to extend or retract, which rotates the feel, centering and trim mechanism. This provides a new zero force pedal position corresponding to the trimmed rudder position. The actuator provides the ground point for the feel, centering and trim mechanism.



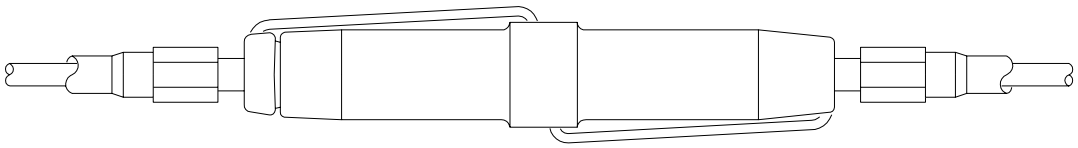
CABLE LOCATION
(FUSELAGE CROSS SECTION)
(VIEW LOOKING FORWARD)



A

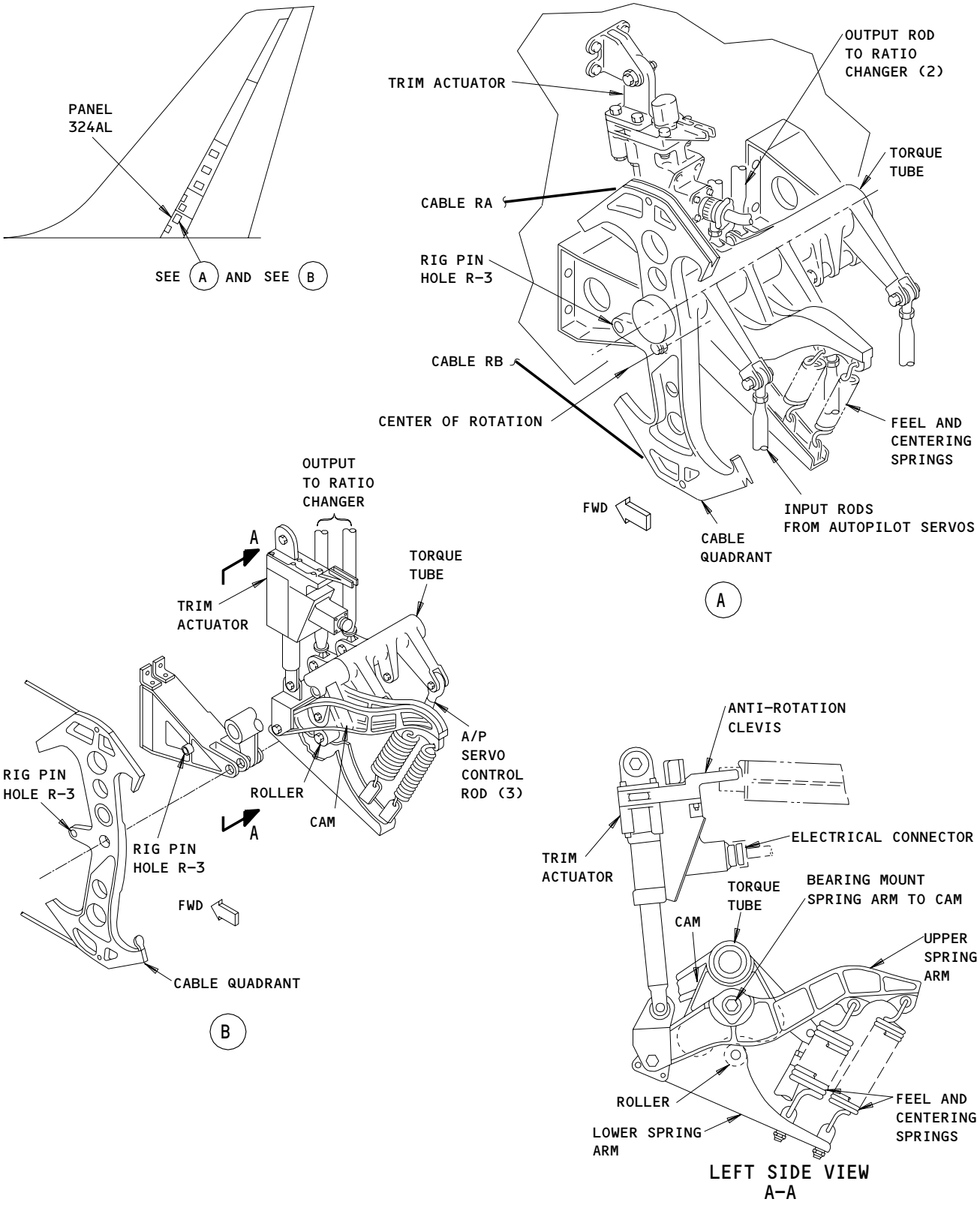


AFT QUADRANT
B



TURNBUCKLE INSTL
(TYPICAL)

Rudder Control Cables
Figure 3



Feel, Centering and Trim Mechanism
Figure 4

(2) The actuator uses an acme screw design for irreversibility and is powered by a self-contained dc motor that operates on 28 volts dc. Limit switches on the actuator control its stroke. An RVDT inside the actuator drives the flight deck trim position indicator on panel P8. The trim indicator shows units of trim since rudder trim in degrees is dependent on ratio changer position. The maximum trim authority is ± 21.9 degrees (rudder travel rate of 1.1 degrees per second) and minimum trim authority is ± 2.5 degrees (rudder travel rate of 0.13 degrees/sec). Actuator stroke is ±1.37 inches (+/- 34.8 mm) and needs about 16.7 seconds for full travel in one direction.

G. Rudder Thermal Compensating Linkage (Fig. 8 and 13)

(1) The rudder thermal compensating linkage consists of a upper and lower compensating rod, multiplier crank, input crank and associated hardware. The input crank attaches to the yaw damper summing lever extends through the fin rear spar to the upper compensating rod. The upper compensating rod (adjustable rod) is attached to the multiplier crank which connects both to structure and to the lower compensating rod which is attached to a support bracket attached to the fin rear spar at the lower end. The lower compensating rod is nonadjustable.

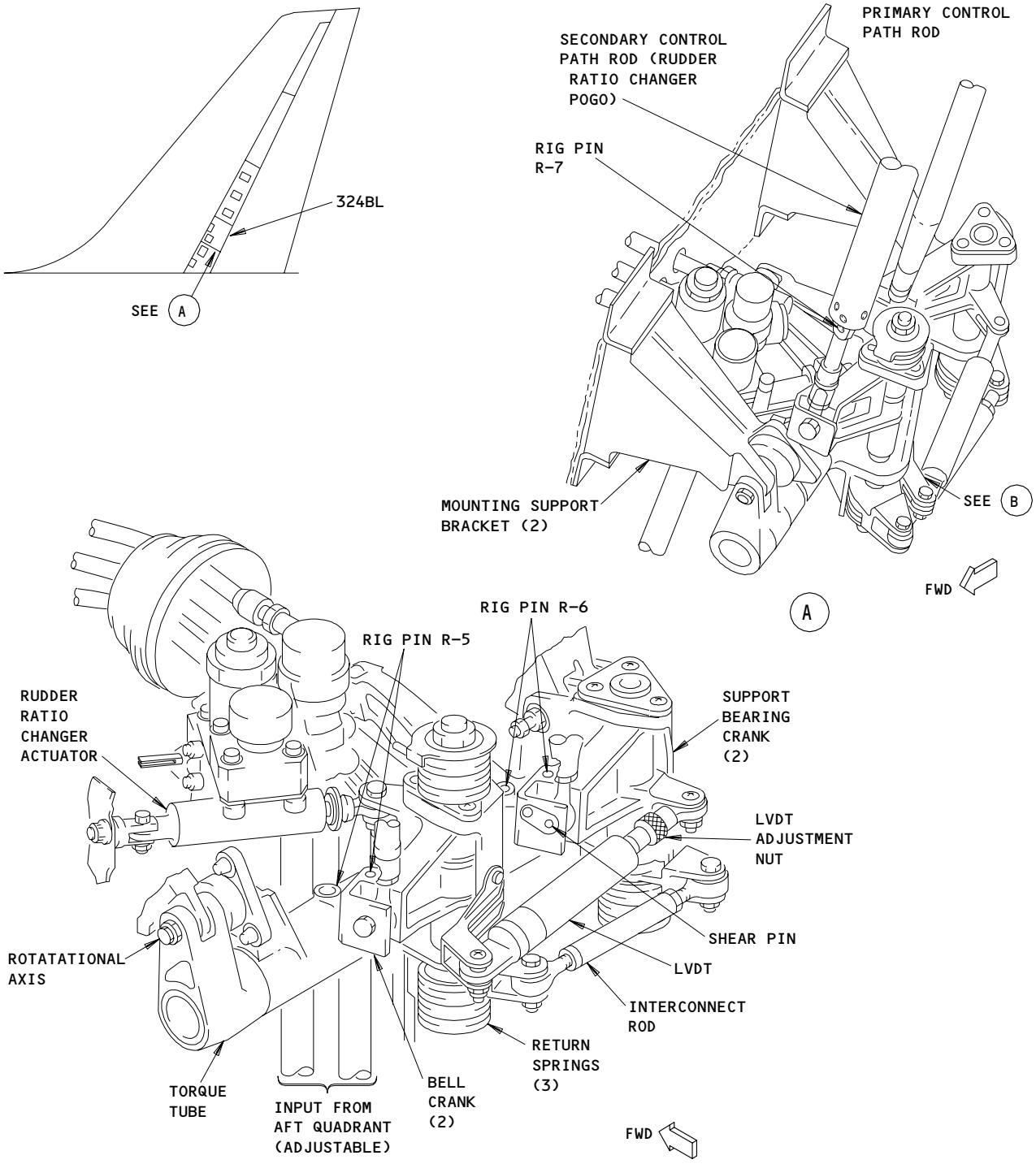
(2) During climb, structure cools faster than rudder control linkage. This causes rudder to shift left due to different expansion rates of the structure and rudder control linkage, requiring right rudder trim to compensate. As temperatures equalize during cruise, rudder trim is gradually removed, leaving only the normal cruise trim requirements. Opposite conditions occur during descent, as structure warms faster than rudder control linkage.
The rudder thermal compensating linkage eliminates the need for manual rudder trim in such situations. The lower compensating rod expands/contracts at the same rate as the rudder control linkage. Therfore, when the structure is expanding/contracting faster than the rudder linkage, the compensating linkage repositions the input crank, providing input to the yaw damper summing lever to counteract rudder deflection due to different expansion/contraction rates between structure and rudder control linkage.

H. Autopilot Rollout Guidance Servos

(1) The three autopilot rollout guidance servos, located directly below the feel, centering and trim mechanism, are driven by the flight control computers. These servos are normally disengaged and are used for autoland rollout guidance only (Ref 22-13-00).

I. Rudder Ratio Changer Mechanism (Fig. 5)

(1) The rudder ratio changer mechanism is mounted in the vertical fin directly above the aft quadrant feel, centering and trim mechanism. The mechanism limits the rudder travel as a function of airspeed; as airspeed increases, available rudder travel decreases. The ratio changer output is driven by an electrohydraulic actuator and controlled by signals from one of two rudder ratio changer modules (RRCM).



Ratio Changer Actuator
Figure 5

(2) The rudder ratio changer modules (RRCM) are located in the main equipment center on shelves E3 and E4. The modules receive 28 volts dc from bus L and are controlled by the RUD RATIO circuit breaker located on overhead circuit breaker panel P11.

(3) The ratio changer has an offset torque tube with two inputs and two outputs. The two inputs come from the aft quadrant, feel, centering and trim mechanism through two control rods. The control rods are adjustable for rigging purposes. Output comes from two control rods mounted on the left and right ratio changer cranks. The cranks are tied together by an interconnect rod, and move together at the same time as the actuator extends or retracts. The left crank mounts the ratio changer actuator rod end; both cranks are spring-loaded to return the mechanism to the low speed position (actuator retracted, crank arms swung out) in the event of hydraulic failure. Rig pins R5 and R6 fix the cranks to the torque tube in the high speed position.

J. Linear Variable Differential Transformer (LVDT)

(1) An LVDT is mounted on the ratio changer and driven by the right crank. Dual channels provide position feedback signals to the two rudder ratio changer modules (RRCM). The left LVDT channel supplies signals to the left RRCM and the right channel supplies the right RRCM. The LVDT has an adjustment nut for rigging purposes. The LVDT is powered by 26 volts ac from PSM 1R and 1L.

K. Primary Control Linkage - Load Limiting

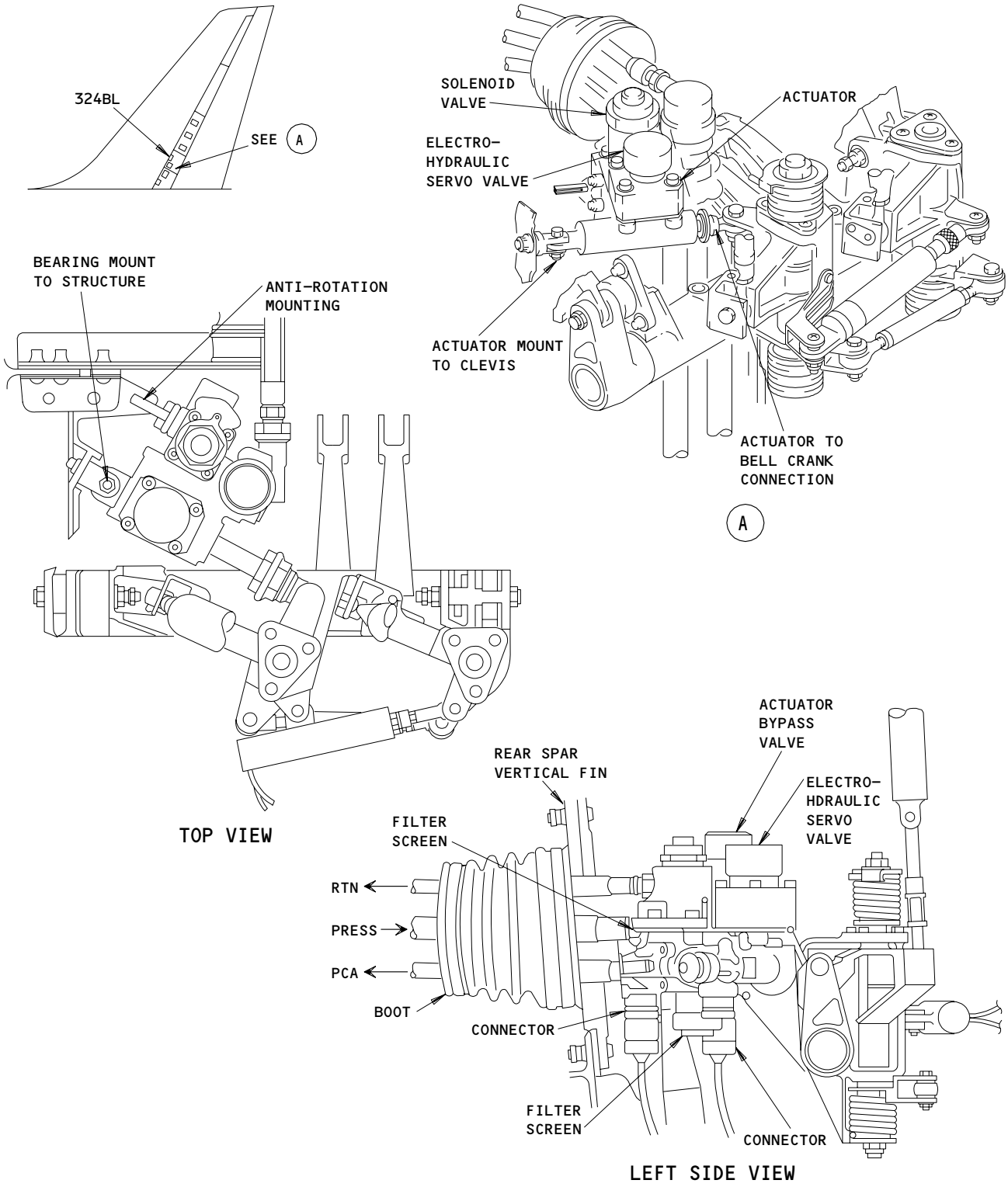
(1) A shearout is located on the right ratio changer crank. The shearout protects the primary control linkage between the ratio changer and yaw damper summing lever in the event of a jam.

L. Secondary Control Linkage

(1) The secondary control linkage includes a pogo between the left ratio changer crank and the yaw damper summing lever. The ratio changer output pogo limits the force fight in the two control paths due to component tolerances and is slightly biased to reduce lost motion by preloading the linkage joints. Rod end bearings are called out on the pogo rod decals. Breakout load is 46-56 pounds (204-249 Newtons) . Extension/retraction is +/-3.3 inches (84 mm). Rig pin hole R7, which controls the amount of pogo bias, is located at the end closest to the ratio changer mechanism.

M. Rudder Ratio Changer Actuator (RRCA) (Fig. 6)

(1) The RRCA is located on top and to the left of the ratio changer. The RRCA is attached to the ratio changer support bracket mounted on the vertical fin aft spar. The RRCA piston rod end is attached to the left ratio changer crank. The actuator has four line replaceable units: a solenoid valve, an electrohydraulic servo valve (EHSV), and two filter screens. The solenoid valve controls the hydraulic supply to the RRCA. The EHSV controls the rate and direction of hydraulic flow within the RRCA. The filter screens provide filtering of the hydraulic fluid input.



Ratio Changer Actuator
Figure 6

(2) Inputs to the RRCA consist of hydraulic pressure from the left hydraulic system and electrical signals to the solenoid valve and EHSV. Outputs from the RRCA are hydraulic pressure to the middle power control actuator (PCA) and mechanical drive to the left ratio changer crank.

N. Yaw Damper Summing Lever (Fig. 8)

(1) The summing levers are located directly above the ratio changer mechanism. The levers sum control inputs from the ratio changer together with yaw damper servo inputs and outputs to the PCA control rods.

(2) The torque tube has four connecting lugs for the primary and secondary control path summing levers and two crank arms for the yaw damper servo input linkage and the yaw damper bias pogo.

(3) The yaw damper pogo is parallel with the yaw damper servo inputs. It provides a ground point for the control linkage in case of yaw damper servo input linkage failure and is slightly biased to remove linkage backlash. Pogo breakout force is 22.5 to 32.5 pounds (100 to 144 newtons). Rig pin R8, at the lower end of the pogo, fixes the amount of bias.

O. Yaw Damper Servos

(1) Two servos are mounted side-by-side on the vertical fin aft spar. Their purpose is to provide rudder input commands for dutch roll damping and gust load relief. Left and center hydraulic systems power the servos (Ref 22-21-00).

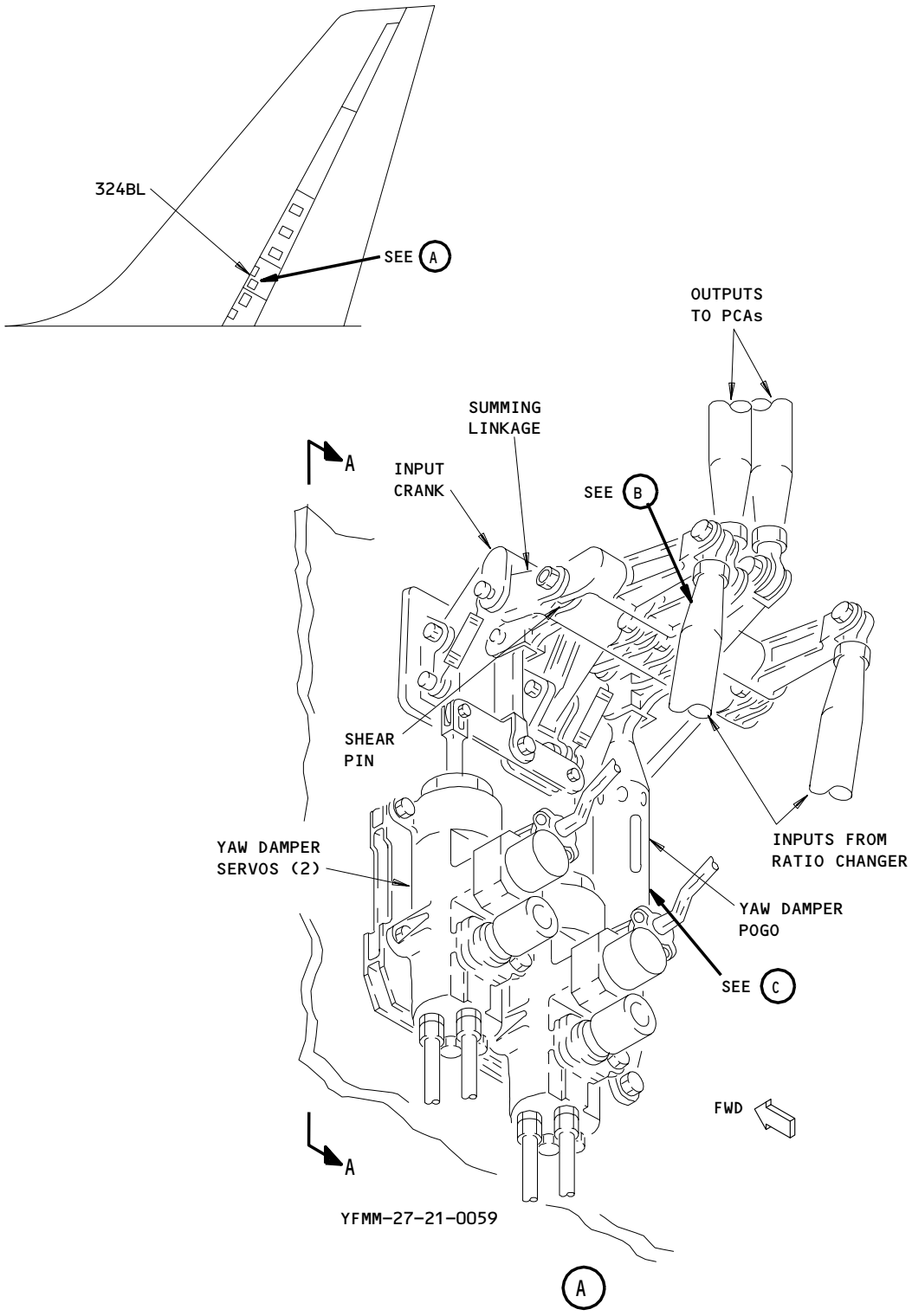
P. Power Control Actuators (PCAs) (Fig. 9)

(1) The three rudder PCAs are interchangeable. Each PCA is controlled by primary control path inputs and the middle and lower PCAs receive secondary control path inputs. The upper PCA is powered by the right hydraulic system, the middle PCA by the left system (through the RRCA) and the lower PCA is powered by the center system.

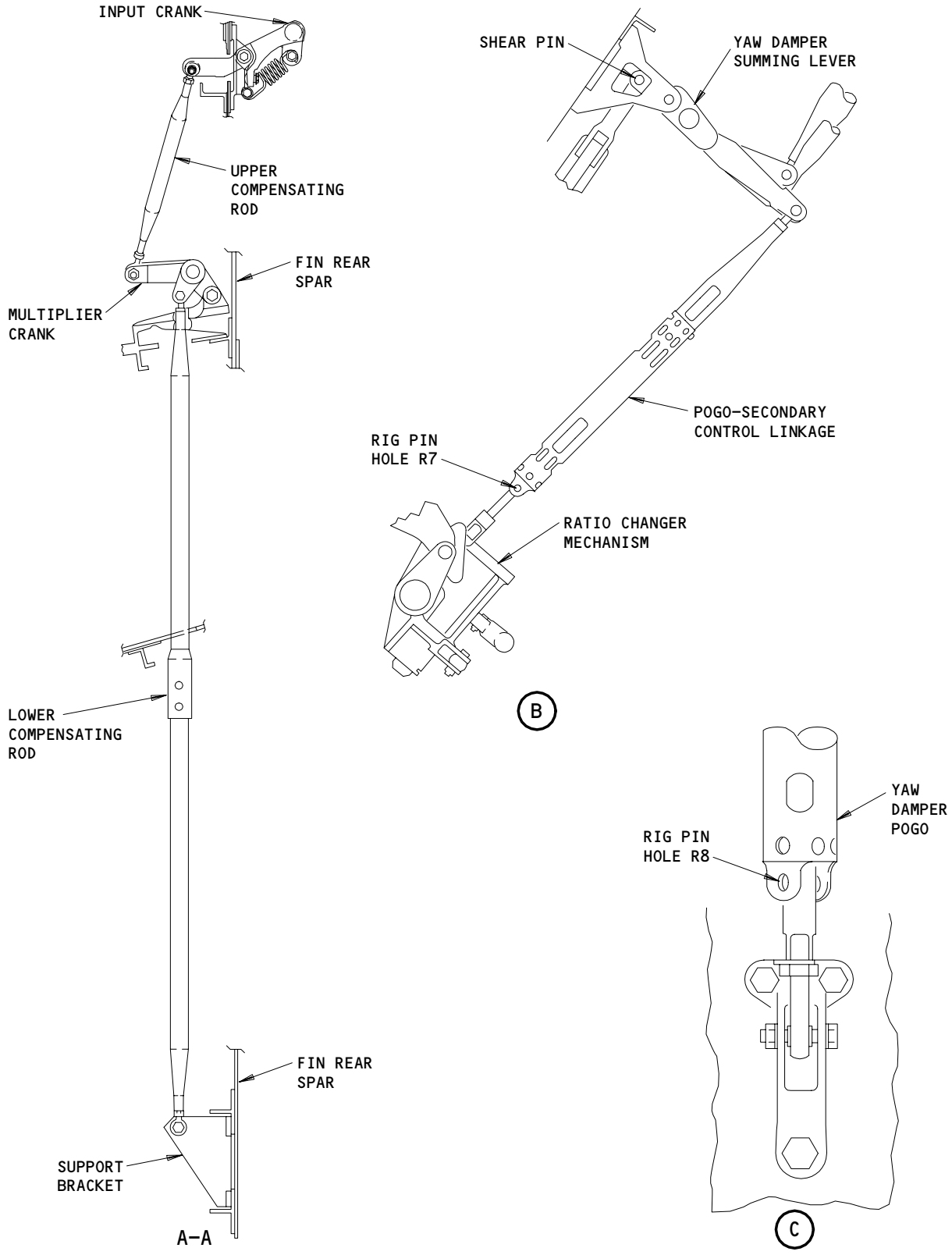
(2) The PCAs are mounted parallel in a vertical row above the yaw damper summing lever, between the vertical fin rear spar and rudder front spar. The PCA cylinder base is mounted on a trunnion block connected to the vertical fin rear spar; the rod end is mounted to the rudder front spar.

(3) On each PCA, there are two relief valves that operate at 3500 psi and reset at 3200 psi. Two anti-cavitation check valves and one inlet check valve have 8-psi cracking pressures in the free flow direction. A check valve in the return line (from each side of the piston) prevents cavitation. A compensator with a volume of 4 cubic inches and a 110-psi cracking pressure acts as an accumulator and a relief valve. It keeps pressurized fluid in the PCA when it is without power. This compensator also supplies leakage make-up fluid. A 250 micron filter, located in the pressure line, removes unwanted contamination from the hydraulic fluid before it enters the PCA.

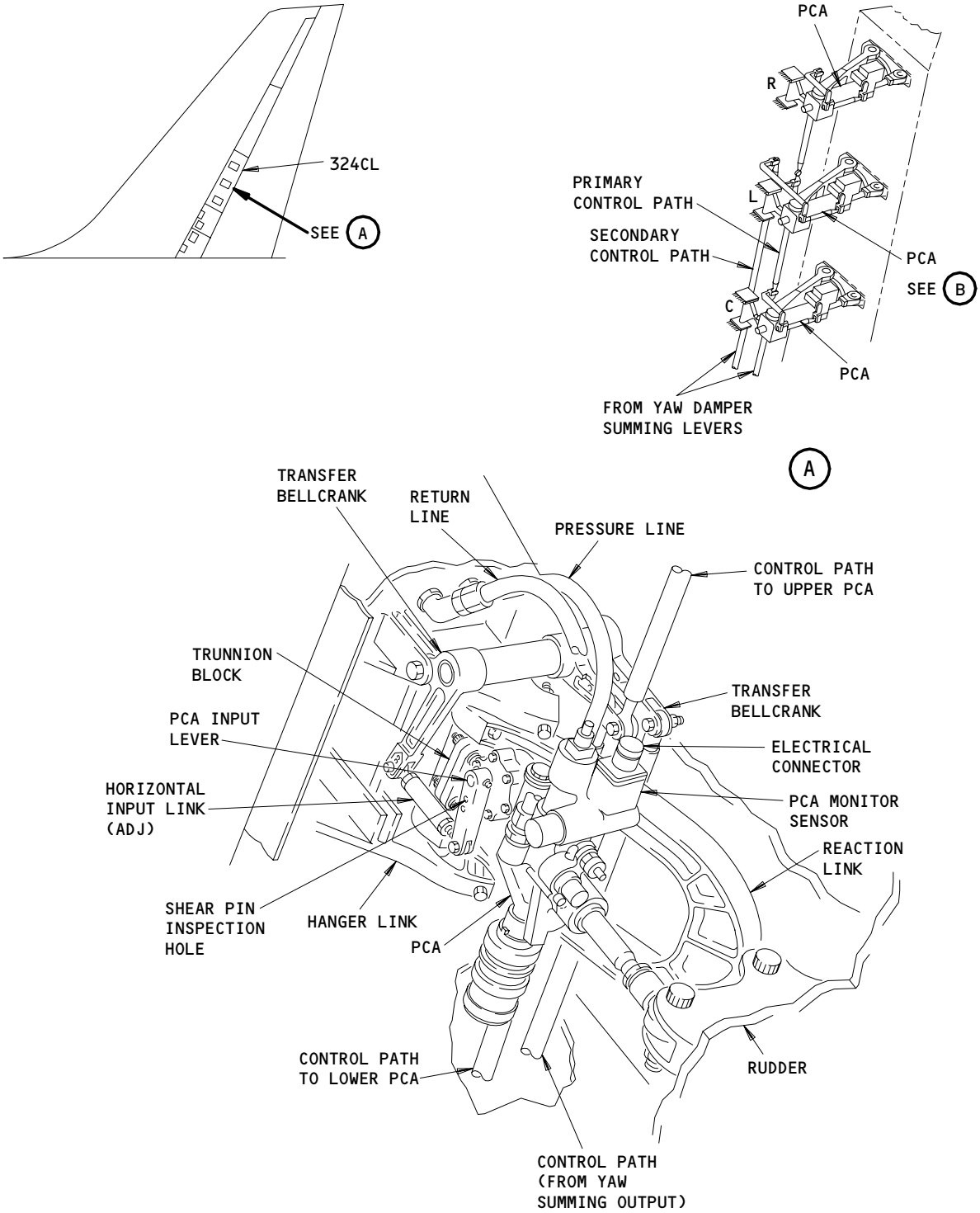
Not Used
Figure 7



Yaw Damper Summing Lever
Figure 8 (Sheet 1)



Yaw Damper Summing Lever
Figure 8 (Sheet 2)



MIDDLE PCA

B

Rudder Power Control Actuators (PCAs)
Figure 9

(4) The only line replaceable unit (LRU) on the PCA is the 250 micron screen/filter located in the pressure inlet line. Other parts of the PCA are not LRUs because the tests necessary to make sure the PCA operates correctly use hydraulic pressures and flows greater than those available on the airplane.

(5) One of the relief valves is an independent unit. The other is integral with the PCA monitor sensor. The sensor senses pressure change across the PCA piston during pre-flight ground check. A control valve jam or disconnect or an input linkage disconnect is then sensed due to abnormal pressure difference and the failure noted on lower EICAS display unit status page (Ref 27-23-00).

(6) The PCA control valve is biased in the retract direction (left rudder) by a coil spring. This removes backlash in the linkage and assures the control valve is positioned off null in the event of internal linkage disconnect. The control valve input linkage has full overtravel capability from each extreme input position.

Q. PCA Reaction Link

(1) The reaction link provides mechanical feedback from rudder surface movement to reposition the actuator body and null out the valve input. One end is connected to the rudder front spar on the right side of the rudder pivot. The other end is connected to the trunnion assembly. Curved slots on top and bottom of the trunnion assembly provide retention for the PCA in the event of a reaction link or hanger link failure. The trunnion right side is connected to and supported by the bearing mounted hanger on vertical fin rear spar.

R. PCA Linkages

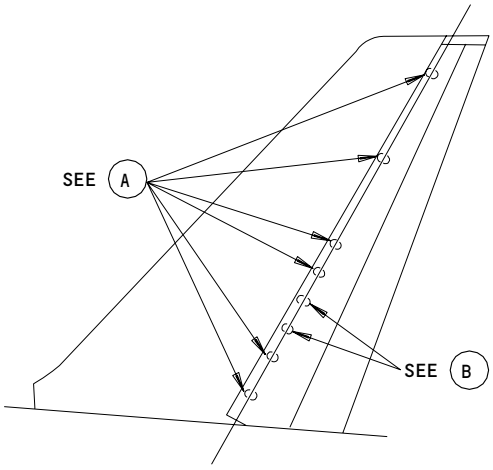
(1) The PCA linkages transfer inputs from the yaw damper summing lever to the actuators through control rods and torque tube levers. The primary control path (right side) provides input to the middle PCA torque tube lever. Control input is continued through the primary control path to the lower and upper PCAs via non-adjustable rods. The secondary control path (left side) connects the summing lever to the lower PCA torque tube lever and is non-adjustable.

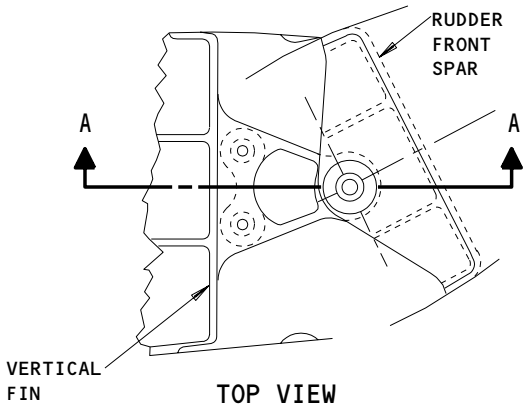
(2) Shearout rivets are provided at each PCA input valve lever to protect against a jam in the PCA control valve or linkage.

S. Rudder Structure (Fig. 10)

(1) The rudder is constructed of graphite epoxy over a nomex honeycomb. The rudder weighs about 334 pounds (151 Kg) and is about 30 feet tall (9.15 m).

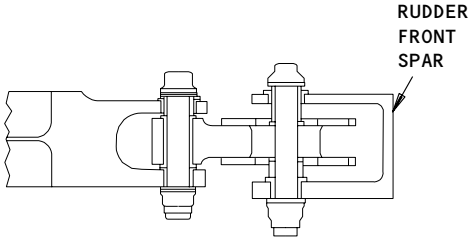
(2) Eight hinge fittings are mounted between the vertical fin rear spar and the rudder front spar. Two thrust hinges provide rudder positioning. Six hinges are expansion link hinges needed to account for the difference in thermal expansion between the graphite rudder and aluminum hinges. A seal between the rudder front spar and fin rear spar prevents airflow across the hinge line at all deflection angles. Hoisting points are located at the rudder front spar between the bottom two hinges and between the sixth and seventh hinges from the bottom.





TOP VIEW
EXPANSION LINK HINGE
(TYP)

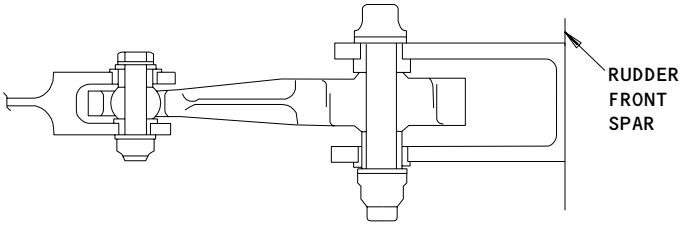
A



THRUST HINGE
(TYP)

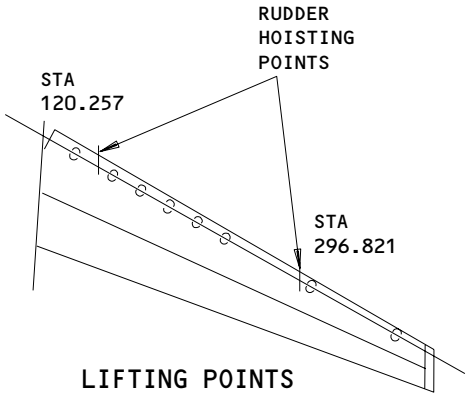
STA 156.074
STA 181.034

B



EXPANSION LINK HINGE (TYP)
A-A

STA 93.534
STA 131.108
STA 206.006
STA 230.972
STA 305.871
STA 380.765



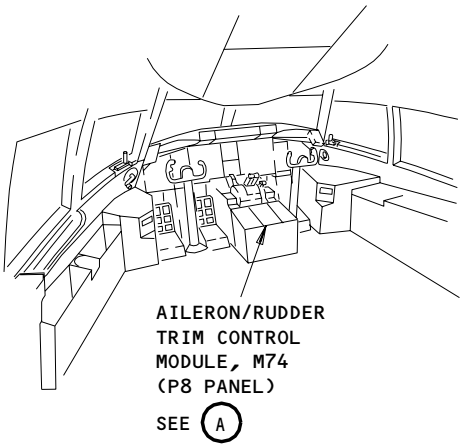
LIFTING POINTS

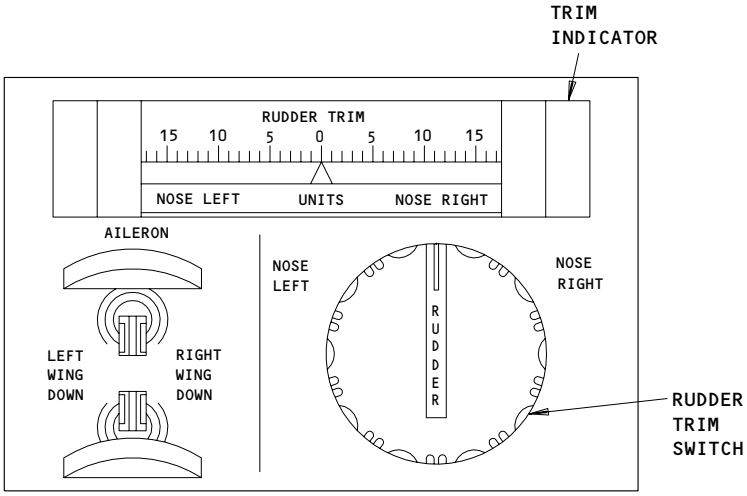
Rudder Structure
Figure 10

T. Rudder Trim Control Switch and Indicator (Fig. 11)

(1) The rudder trim switch is located on aft electronic control panel P8 and activates arming and control switches which direct electrical input to the rudder trim actuator motor. The switch is spring-loaded to return to neutral. The RUD TRIM circuit breaker is located on overhead circuit breaker panel P11 and receives 28 volts dc from the dc standby bus.

(2) The trim position indicator is driven electrically by a transmitter in the rudder trim actuator on the feel, centering and trim mechanism. The indicator shows up to 17 units of left or right trim. The indicator is located on P8 next to the rudder trim knob and is powered by 28 volts ac from left bus. The RUDDER TRIM POS circuit breaker is located on P11.





AILERON/RUDDER TRIM CONTROL
MODULE, M74 (P8 PANEL)
A

Rudder Trim Control and Indication
Figure 11

3. Operation

A. Functional Description (Fig. 12)

(1) Pedal Adjustment

(a) Pedal adjustment cranks drive the adjustable yokes through a flexible cable. Rotation of the crank causes rotation of a jackshaft which moves the yoke forward or aft. Control rods attached between the rudder pedals and yokes move the pedals in the direction of yoke movement, adjusting the closeness to the pilot.

(2) Rudder Pedal Steering Interconnect Mechanism

(a) The rudder pedal linkage is connected to the steering cables through an interconnect mechanism. The rudder pedal steering interconnect mechanism is located below the flight compartment door under the captain's side console. It is used to engage or disengage rudder input into the nose wheel steering system. Cable motion for driving the rudder pedal interconnect mechanism is provided by strut mounted piston linkage. Rudder pedal steering is engaged depending on nose landing gear oleo position.

(3) Pedal Input to Feel, Centering and Trim Mechanism

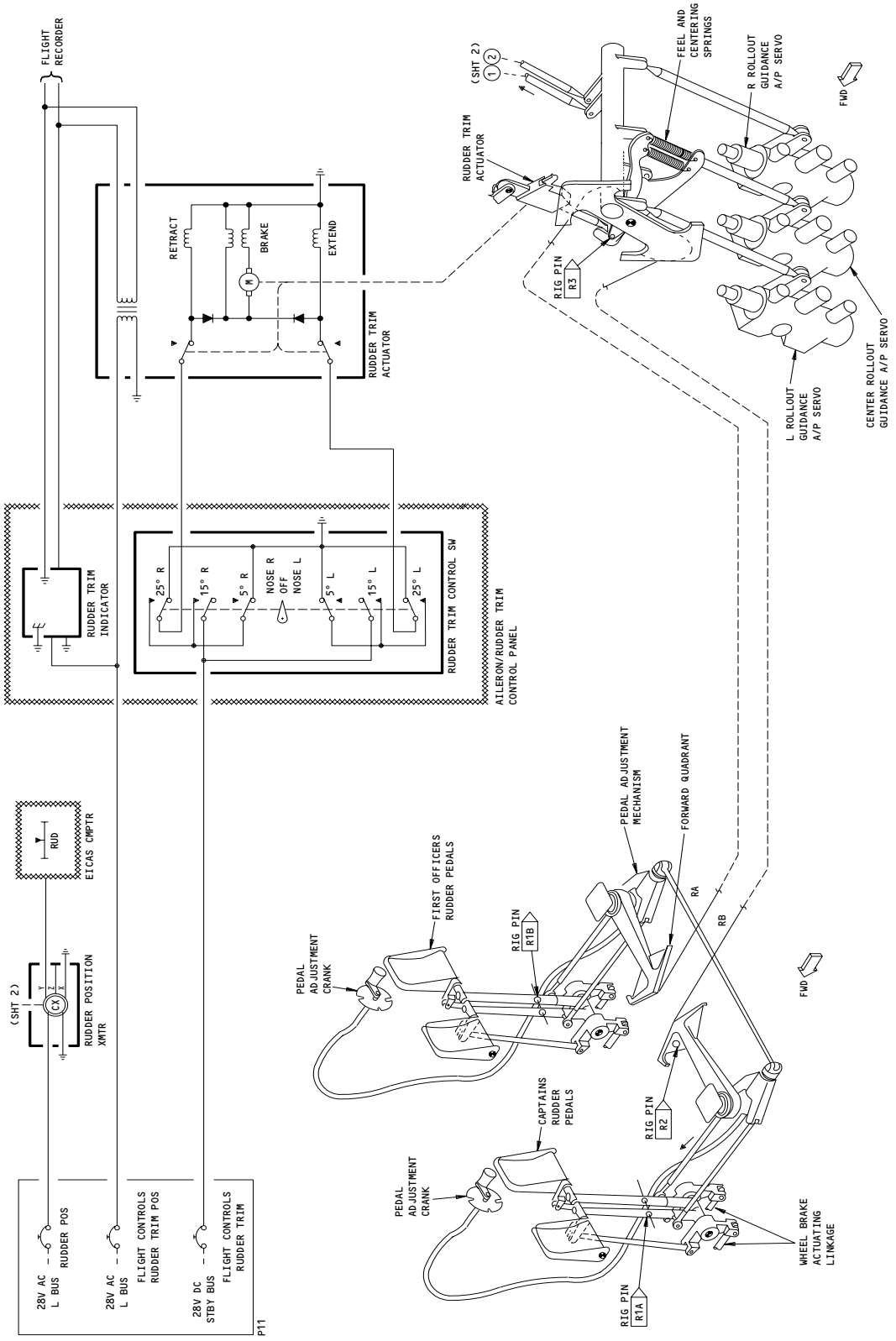
(a) Each set of pedals drives its forward quadrant through two control rods. Pushing on one pedal causes its forward quadrant to rotate. The forward quadrants are tied together by a nonadjustable bus rod. Pedal input causes the forward quadrants to rotate in opposite directions, which backdrives the other set of pedals and rotates the aft quadrant.

(4) Rudder Feel, Centering and Trim Mechanism

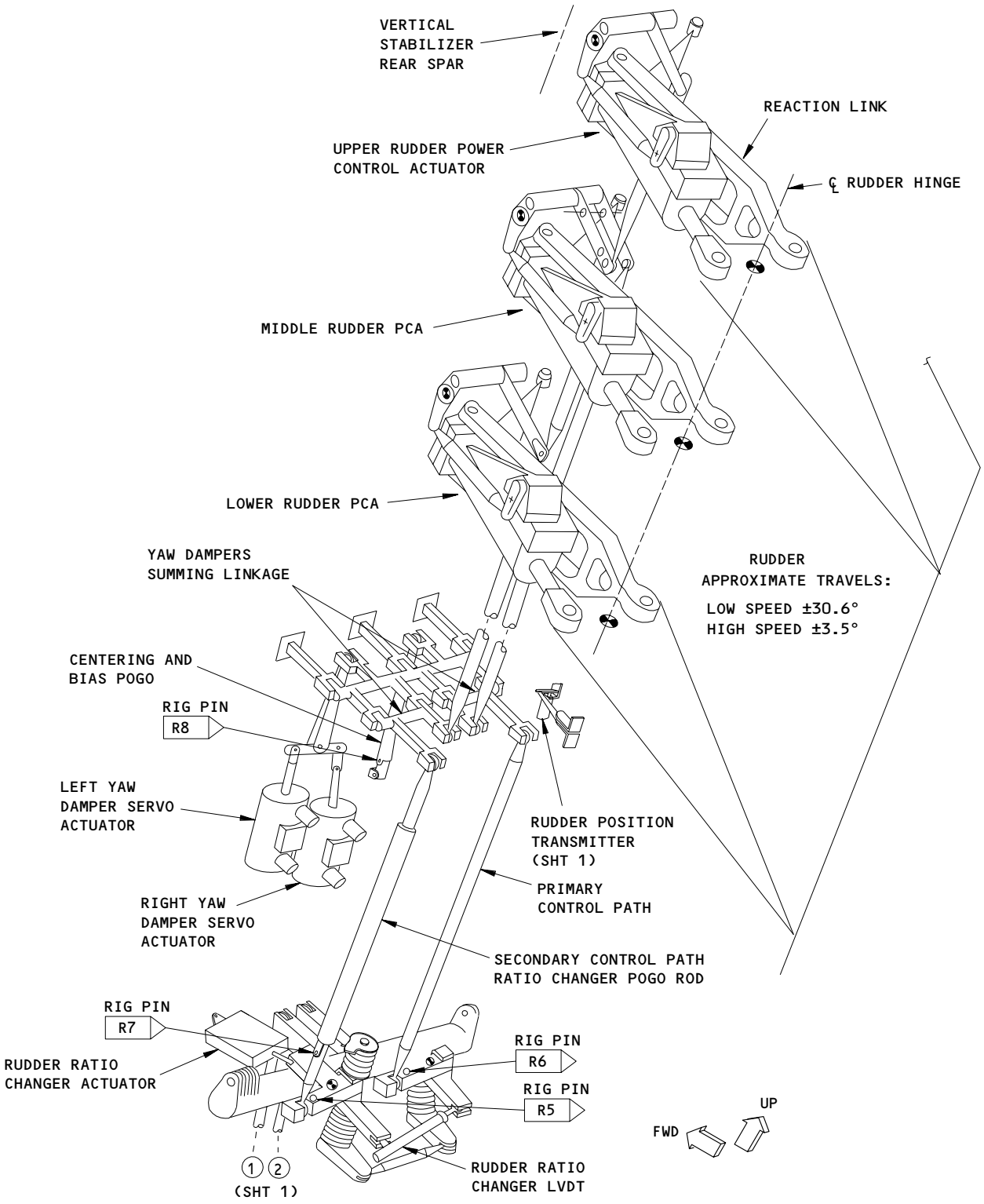
(a) Flight crew inputs through the rudder pedals and inputs from the autopilot servos provide a rotational force to the offset torque tube of the feel, centering and trim mechanism. A cam plate mounted on the torque tube also rotates, forcing a roller to ride up the inclined cam face. As the roller rides up the cam, it causes the spring arms to spread, causing the tension spring to stretch. As a result, the spring load increases and when the input is removed, this load drives the cam plate back to the detent position. This back drives the pedals to the centered or trimmed position.

(b) Feel force is the resistance to rudder pedal movement experienced by the flight crew. This force is produced by spring tension when the roller is forced to climb the inclined surface of the cam plate. An initial feel force of about 14 pounds (62 Newtons) increases to approximately 72 pounds (320 Newtons) at full rudder deflection.

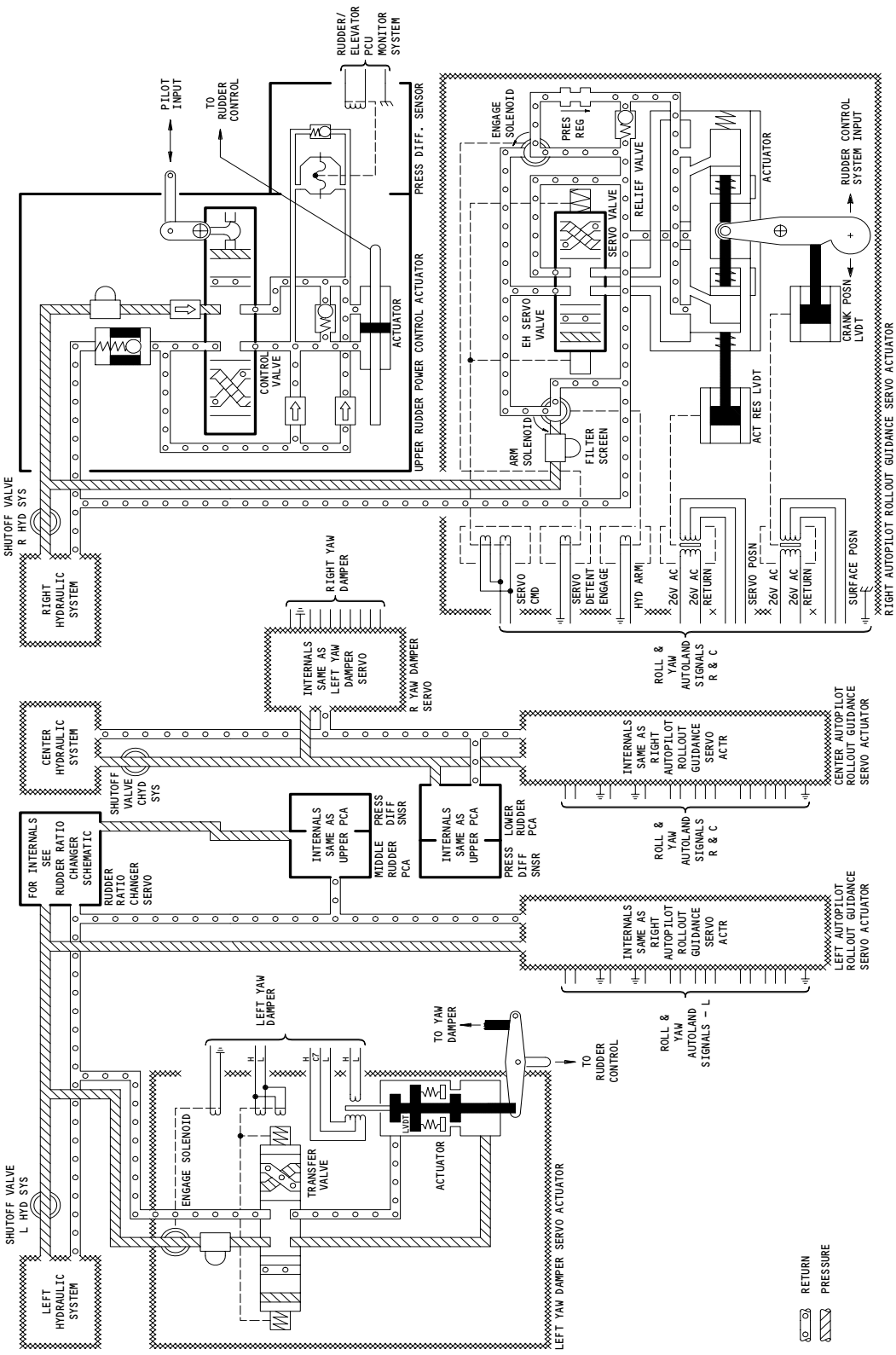
(c) The rod end of the trim actuator is connected to the lower spring arm of the cam roller assembly. As the actuator extends/retracts, the spring arms are forced to rotate about the bearing mount on the cam. The roller in the lower spring arm is held in the cam detent by the spring force. The cam is forced to follow the roller movement, causing the torque tube to rotate.



Rudder and Rudder Trim Control System
Figure 12 (Sheet 1)



Rudder and Rudder Trim Control System
Figure 12 (Sheet 2)



Rudder and Rudder Trim Control System
Figure 12 (Sheet 3)

(5) Trim Control Switch

(a) The rudder trim switch in the flight deck provides input to the trim actuator. Rotating the trim knob arms the trim motor circuit and selects either the extend mode for left rudder trim or the retract mode for right trim. The switch is powered by 28 volts ac from the left bus.

(b) Movement of the trim switch through the 5° position removes the system ground. Movement through the 15° position arms the trim motor circuit. Rotation through the 25° position closes the control switch and selects the extend (left trim) or retract (right trim) operation. The switch has a mechanical stop at the 30° position.

(6) Trim Actuator

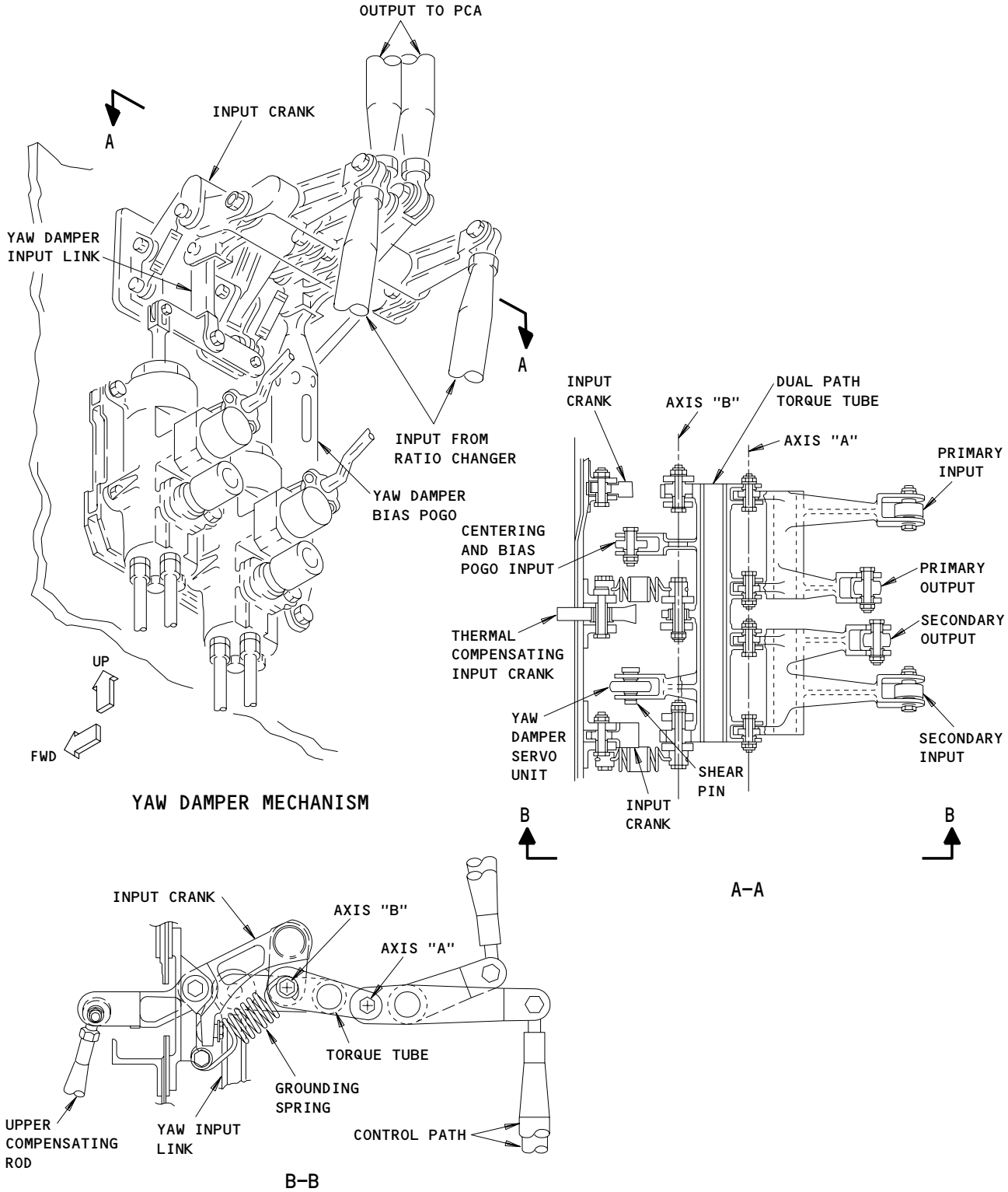
(a) The trim actuator is driven by a self-contained electric motor. The motor drive is controlled by the rudder trim switch or by activation of an internal limit switch. An electromagnetic brake prevents actuator overrun and internal mechanical stops prevent overtravel in case of a limit switch malfunction.

(7) Trim Position Indicator

(a) The trim actuator has a self-contained position transmitter driven by a gear train. The transmitter sends a signal to the indicator which is summed with a feedback signal from the indicator's rebalance potentiometer. When the potentiometer shaft is in the proper position, the feedback signal cancels the transmitter signal and the indicator displays the present trim position. When changing the trim position, the transmitter signals are not cancelled by the potentiometer signal, resulting in a difference signal. This difference signal causes a dc amplifier to drive the indicator dc motor, pointer-driven roller and rebalance potentiometer in the correct direction to cancel out the transmitter signal and display the new trim position.

(8) Yaw Damper Summing Lever (Fig. 13)

(a) The summing lever combines the displacement inputs from the manual control system and the yaw damper system. These inputs are series summed and the resultant displacement is the input to the rudder PCAs. The bias pogo provides a ground point for the summing lever in case of a failure in the yaw damper servos and output linkage.



Yaw Damper Summing Lever
Figure 13

(b) The yaw damper link is held fixed by the yaw damper servos which in turn hold the torque tube fixed. Primary and secondary control inputs from the ratio changer rotate about the torque tube along with the output rods. Yaw damper servo inputs cause the torque tube to rotate driving the output rods. Inputs from both the yaw damper servos and ratio changer control rods are combined to make the output to the PCAs.

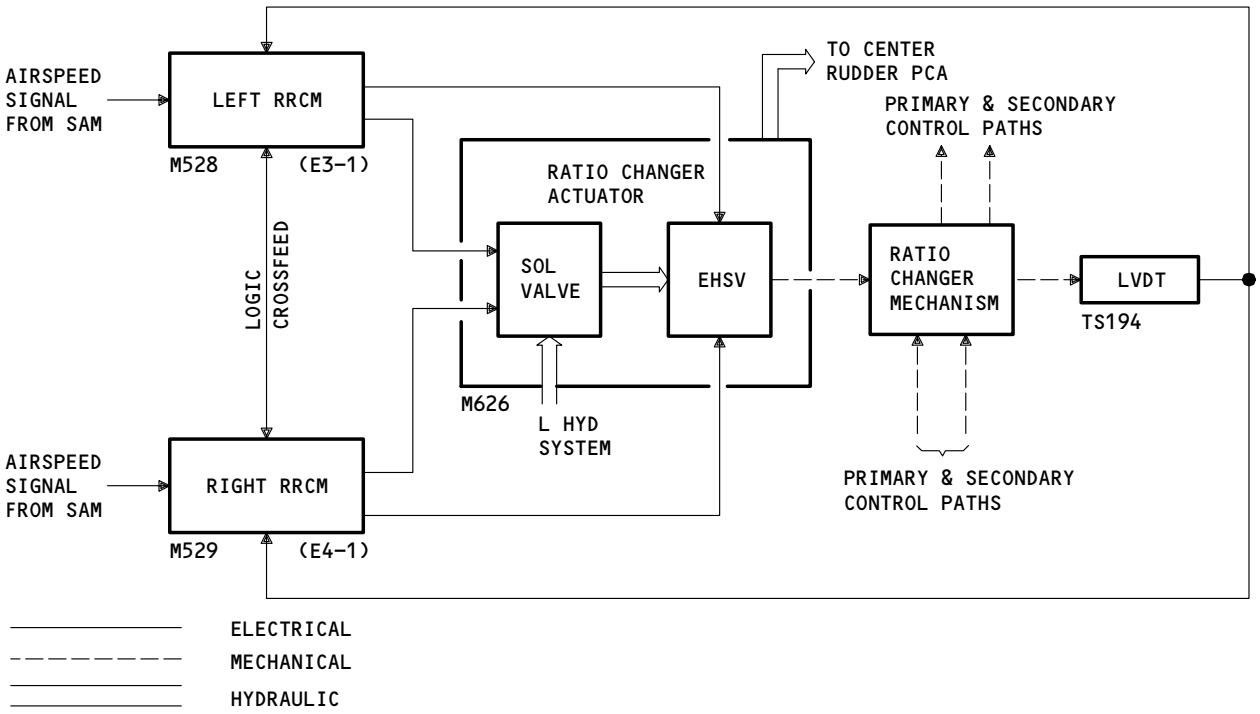
(9) Power Control Actuator (PCA) (Fig. 12)

(a) Each PCA is supplied hydraulic pressure by a separate system. Input to the PCA control valve comes from the yaw damper summing lever output, through the PCA linkages.

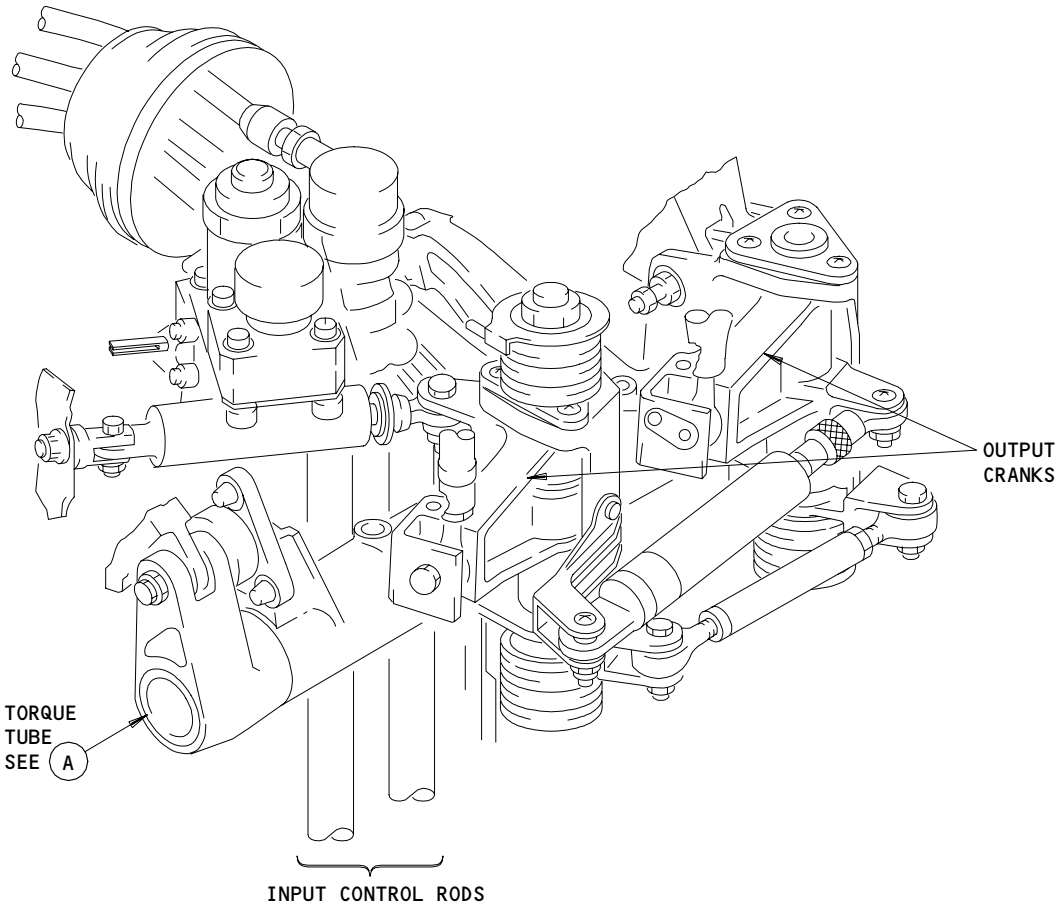
(b) When the input lever is moved, hydraulic pressure is ported to either the retract or extend side of the piston. The opposite side is connected to the return line. As the piston drives the rudder surface, the reaction link backdrives the actuator body through the trunnion block. This action provides feedback to null out input command.

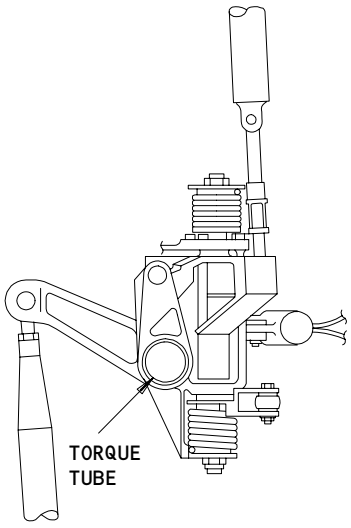
(c) Counterclockwise rotation of the PCA input lever ports pressure to the retract side of the actuator which causes left rudder. Clockwise rotation of the PCA input lever ports pressure to the extend side of the actuator, which causes right rudder.

(10) Rudder Ratio Changer System (Fig. 14, 15 and 16)

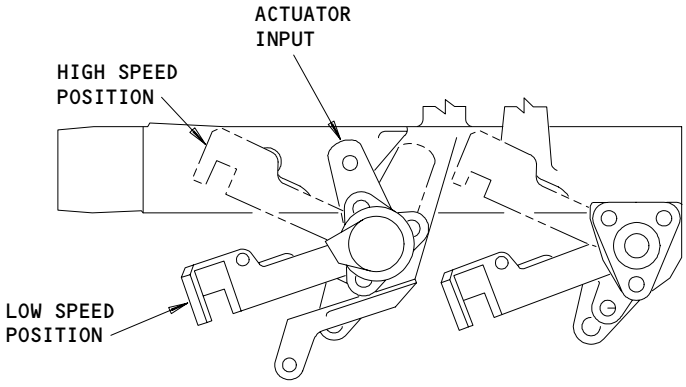


Ratio Changer Block Diagram
Figure 14



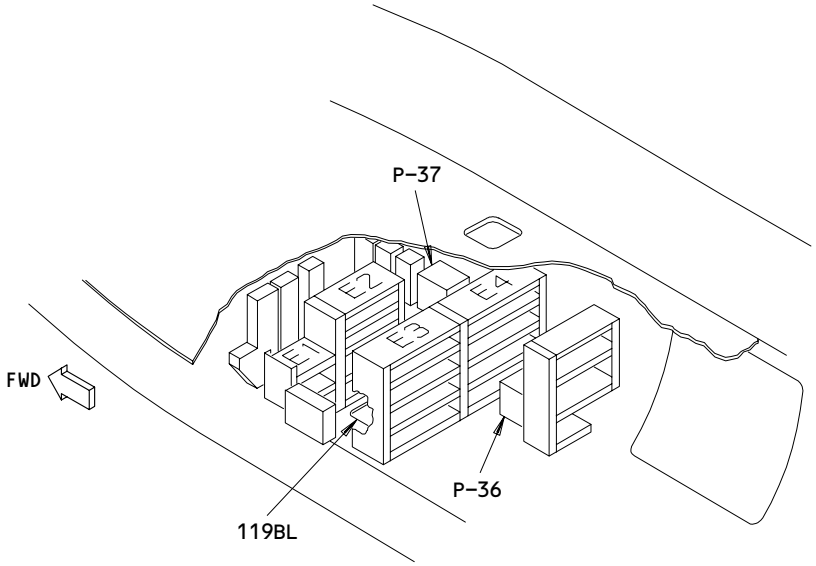


RUDDER RATIO CHANGER SYSTEM
(LEFT SIDE VIEW)
(A)

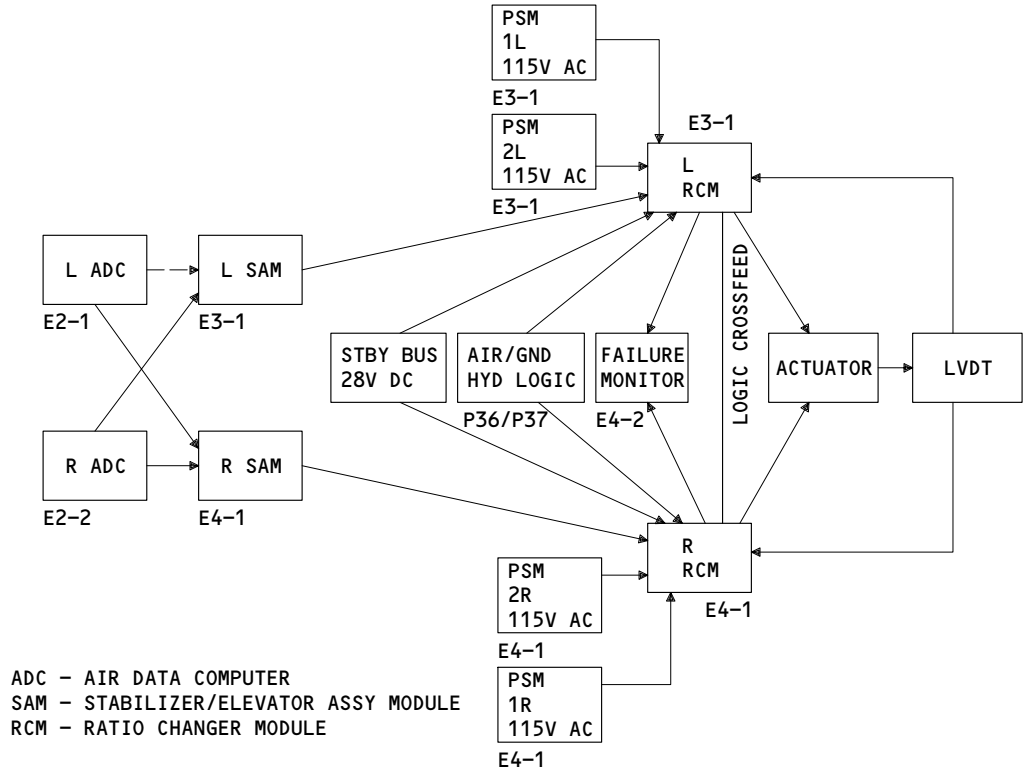


RUDDER RATIO CHANGER SYSTEM
(TOP VIEW)
(B)

Ratio Changer Operation
Figure 15



MAIN EQUIPMENT CENTER



Ratio Changer Module Interface
Figure 16

(a) The ratio changer system varies the amount of maximum rudder travel as a function of airspeed. The system provides structural protection and approximately constant rudder pedal response over the entire airplane operating speed range. The rudder ratio changer actuator (RCCA) is electrohydraulic and driven by two separate analog control channels.

(b) The RRCA mechanically varies the output of the ratio changer mechanism. In the low speed position, the RRCA is retracted and the left and right ratio changer cranks are swung out farther from the ratio changer torque tube axis of rotation. This increases the up or down control rod movement to the yaw damper as the torque tube rotates from control inputs. As airspeed increases, the RRCA is commanded to extend, causing the left and right cranks to swing inward. This decreases the control rod movement, which results in smaller control inputs to the yaw damper and PCAs. Rudder response varies from 30.6 degrees up to 127 knots to 3.5 degrees at 410 knots for full pedal travel.

(c) The rudder ratio changer system uses two digital air data computers (DADC), two stabilizer/elevator assymmetry modules (SAM), two rudder ratio changer modules (RRCM), a dual element LVDT and ratio changer mechanism. The system is arranged to form two independent computation channels, each of which can provide the rudder ratio changer function. The two channels each with one DADC, SAM, RRCM and pitot-static sensors operate in the active-standby mode and control the RRCA.

(d) Calibrated airspeed is sensed by the DADC and sent to the SAM unit. One DADC acts as the primary data source and the other as a secondary. Each DADC continuously monitors the pitot-static sensor data and self-monitors its own operation.

(e) Each SAM receives airspeed data from both DADCs. These signals are converted into two independent program airspeed signals Vpa and Vpc (designated ARM and CONTROL) and are sent to the corresponding RRCM. Each SAM monitors DADC data input, its own operation, and Vpa/Vpc agreement. Each SAM also generates a Vp VALID signal and sends it to the RRCM to signify its output is valid.

(11) Rudder Ratio Changer Module (RRCM) (Fig. 17 and 18)

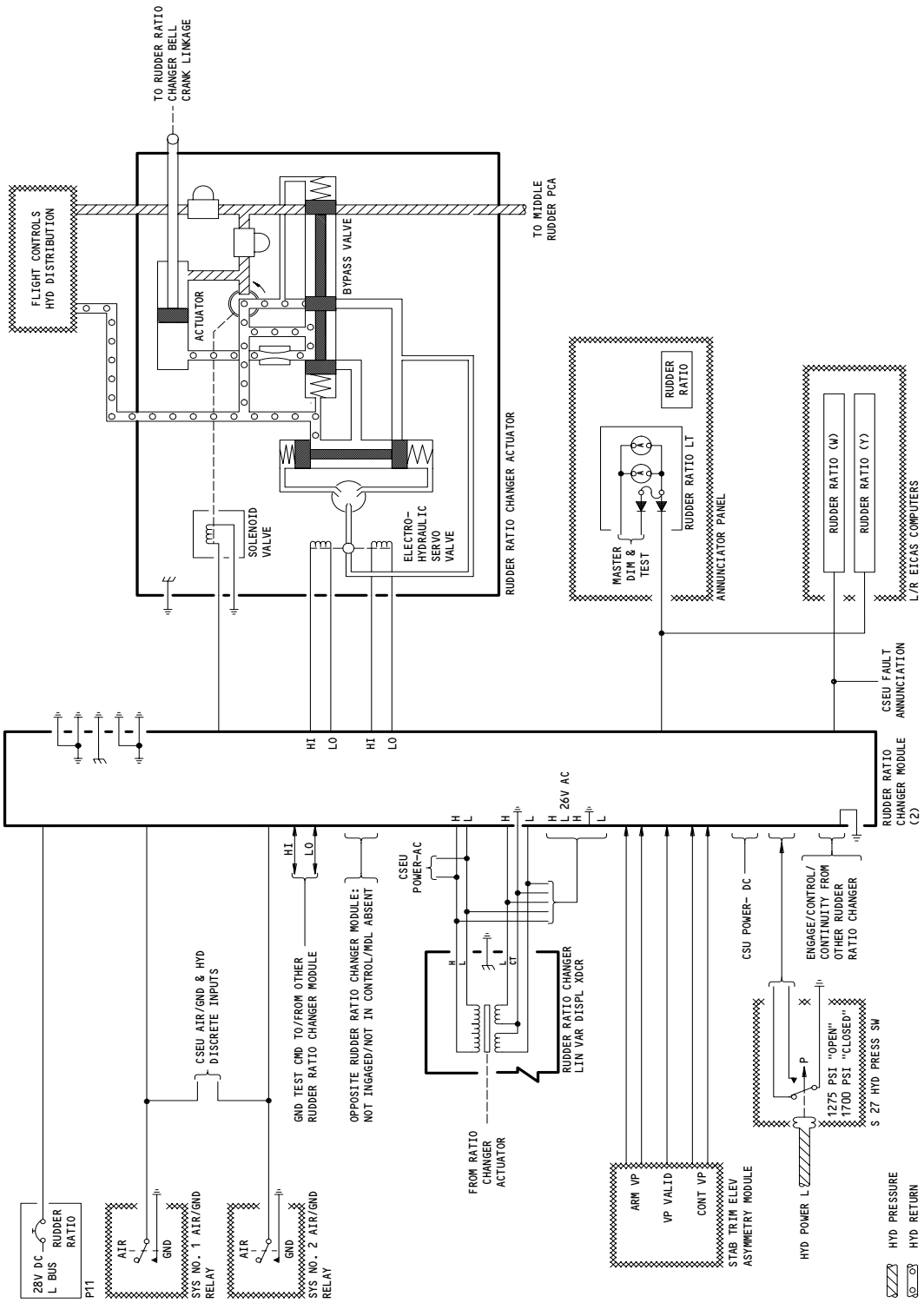
(a) Each RRCM receives two airspeed signals from its SAM. Individual commands to the RRCA are produced on both RRCM dual analog computation paths. The RRCM in control is determined randomly at powerup; one module will be active and the other on standby.

(b) Each airspeed signal is summed with the LVDT and equalizer circuit output. When airspeed changes, an error exists between the LVDT and airspeed signals. The RRCM provides an arming signal to the RRCA solenoid valve and a control signal to the RRCA electrohydraulic servo valve (EHSV). These error signals command the RRCA to drive the ratio changer cranks to a new position. The LVDT is driven by the RRCA through the right ratio changer crank. It provides crank position feedback to the RRCM to eliminate the error signal. The amplified error signals on each RRCM computation path are monitored by current detectors. If a difference between error signals exists, an equalization signal is subtracted from the high signal and added to the low. This equalizes the signals to the EHSV.

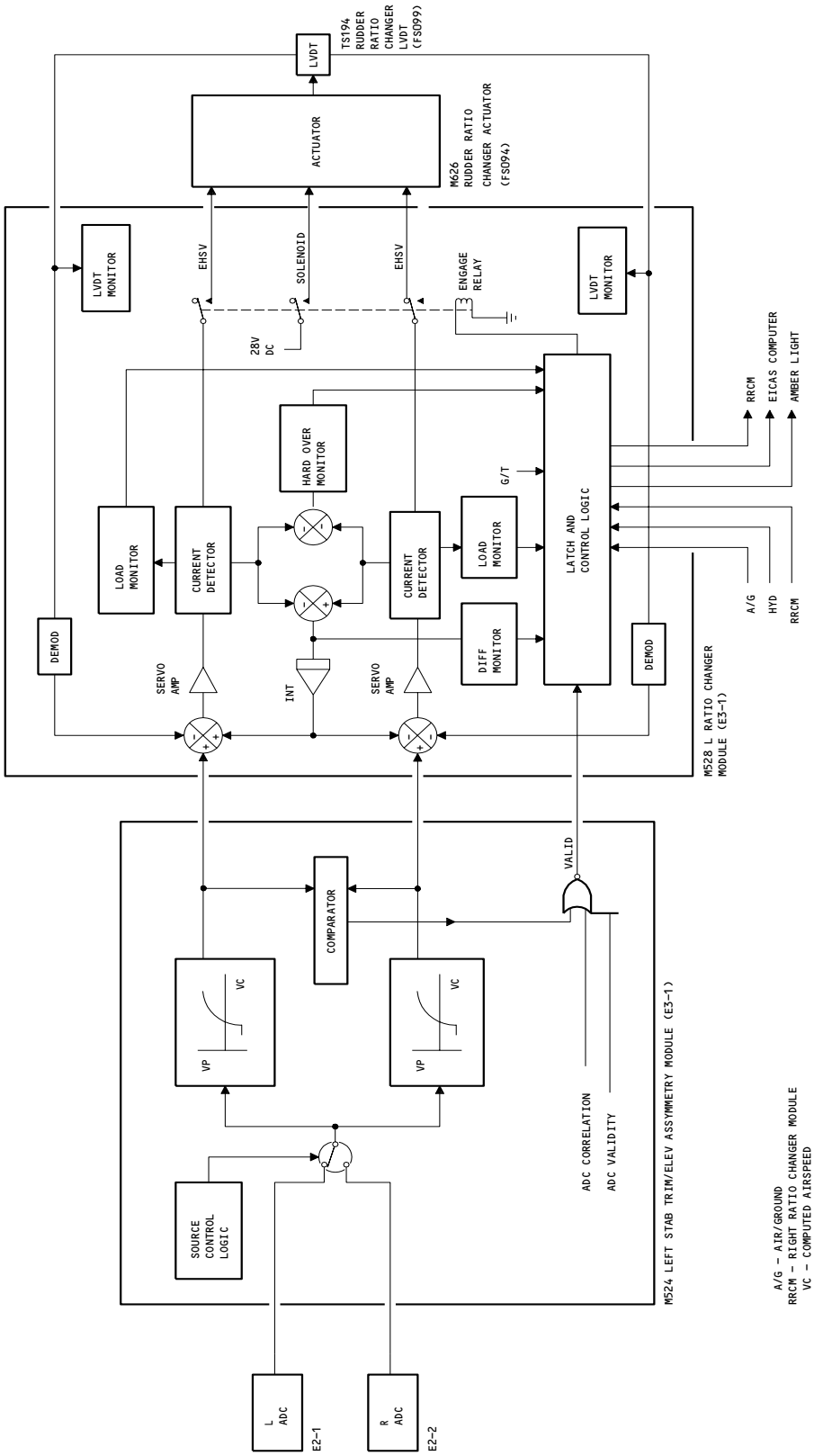
(c) Failure monitoring of RRCM output is performed on the dual analog computation paths. The output monitoring consists of a command difference, command hardover, and an open load monitor. The difference and hardover monitors use current detectors on each signal path. The difference monitor compares the current output commands of the two computation paths for a difference exceeding ± 2.5 milliamp. Signal latch occurs after 0.82-second delay. The hardover monitor sums the output commands of the two signal computation paths for a value greater than ±4.75 milliamp. Signal latch occurs after 2.5-second delay. The open load monitor checks the output voltage in each computation path. Absence of load current is reflected in the output voltage. Signal latch occurs if 7.8 volts is exceeded for 1.6 seconds.

(12) RRCM Latch and Control Logic (Fig. 19)

(a) Module latch and control logic functions are performed by monitoring the following inputs: internal module monitors, validated airspeed signal from SAM (Vp), hydraulic pressure sensing, and air/ground status from air/ground relays.

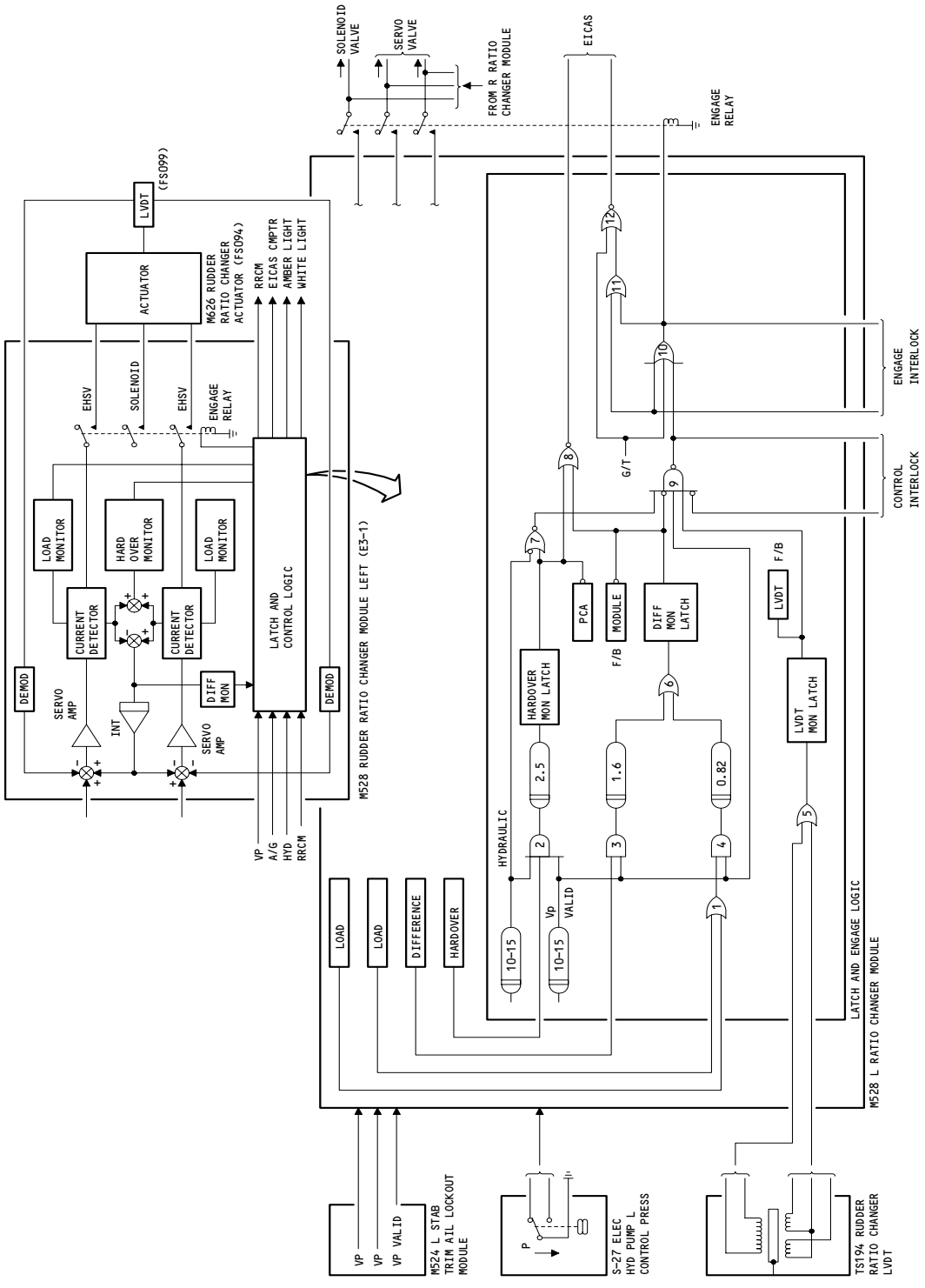


Rudder Ratio Changer Schematic
Figure 17



Ratio Changer Module Signal Generation
Figure 18

S2960



Latch and Control Logic
Figure 19

S2967

(b) Each module processes these inputs and provides suitable control and fault annunciation signals. The module engages/relaxes the engage relay (if in command) and provides/receives control and engage interlock signals between modules. The module also provides input to the EICAS computer and amber RUDDER RATIO light.

(13) Channel Selection and Interlock

(a) The first module to receive a validated airspeed signal from the respective SAM takes control to become the primary channel. This module provides a low logic signal locking the other module in the STANDBY mode. Activation of the engage relay by the module in control provides an engage interlock signal. This signal inhibits the standby module from activating its own engage relay.

(14) Latching Logic - Power up Sequence

(a) During initial power up, the difference and hardover latches are set to low logic (capable of control) for 12.5 seconds. Invalid-to-valid transition of SAM Vp VALID signal includes a 10 to 15 second delay which inhibits the output monitors while system signals are synchronized.

(b) In the power up sequence, SAM Vp valid signal remains invalid and the control line is high logic. The latch monitors are forced low for 12.5 seconds. Engage relays are de-energized and the amber RUDDER RATIO light is on. SAM Vp VALID signal changes from invalid to valid, forcing the hardover and difference monitors to an inhibit nonfailure state. One module takes control, locking the other module to standby, and inhibits energizing of the other engage relay. The amber light goes out and servo and solenoid valve signals connect the actuator through the solenoid valve. Hydraulic power is applied and the RRCA drives to the commanded position. The output command monitor inhibit is released and tripping function enabled.

(15) Latching Logic - Control and Shutdown

(a) Module in command hardover, difference or open-load monitor tripping causes the control line to go to high logic and de-energizes the engage relay. Control is shifted to the standby module and a white RUDDER RATIO message appears on the EICAS maintenance page.

(b) Module on standby hardover, difference or open-load monitor tripping forces the control line to remain in high logic and inhibits passing of control from module in command. A white RUDDER RATIO message is stored on EICAS maintenance page for later display.

(c) Left system hydraulic pressure loss causes both modules to de-energize their engage relays. Hydraulic shutdown of the actuator follows, causing loss of ratio changer function and cycling of ratio changer to low-speed position. The amber RUDDER RATIO light goes on and a RUDDER RATIO alert message (level C) appears on EICAS display.

(d) Loss of SAM Vp VALID signal drives the control line high and de-energizes the engage relay and shifts or inhibits shifting of command between modules depending on which module loses the signal.

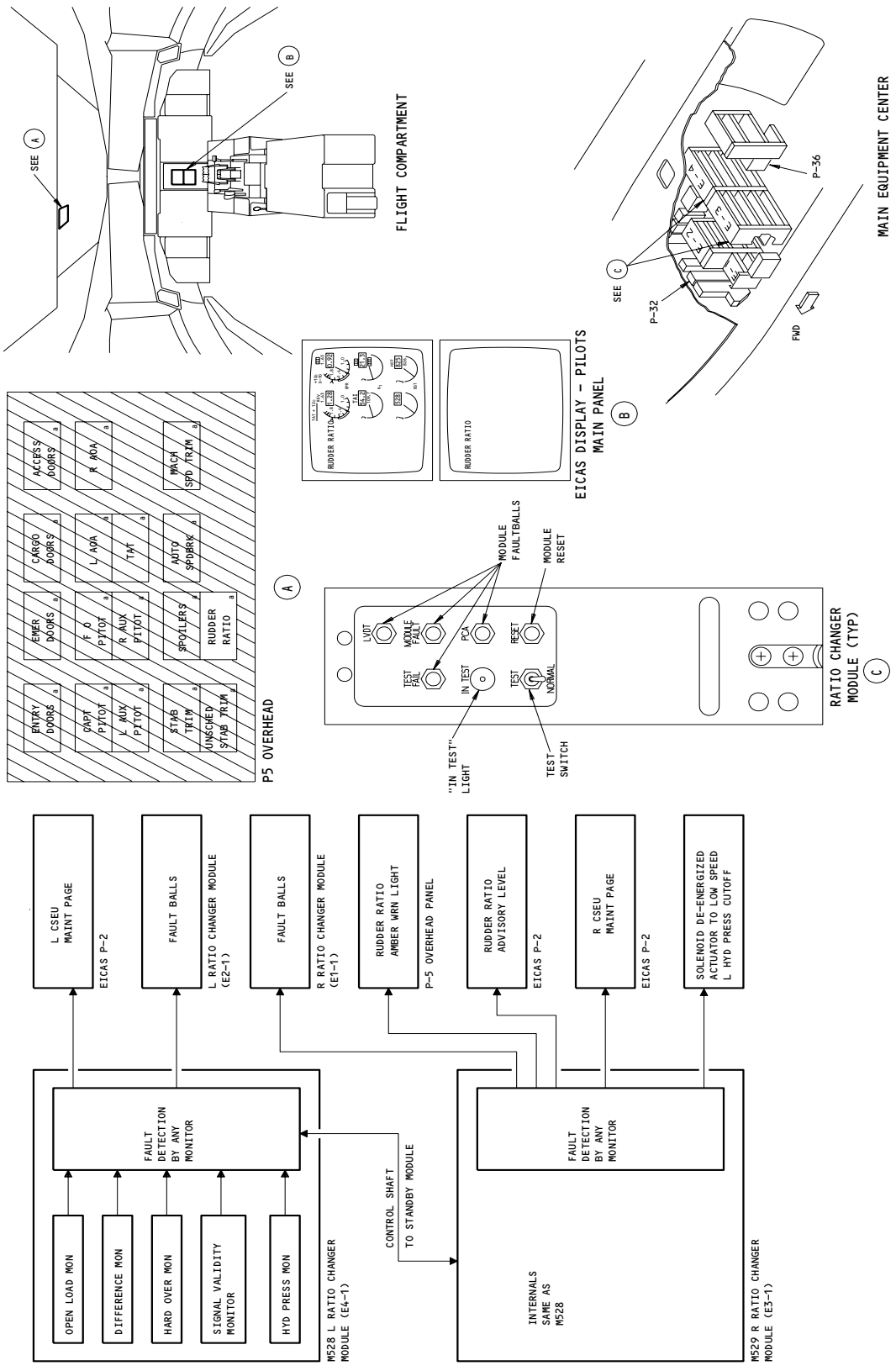
(16) Ground Test Logic

(a) TEST mode selection forces the module selected to energize the engage relay and drives the actuator to high-speed position. The amber RUDDER RATIO light goes on and amber RUDDER RATIO message appears on EICAS. The hardover monitor is inhibited. Inhibit lasts for 12.5 seconds after test switch is returned to NORMAL. Air/ground relays prevent activation of TEST mode while the airplane is flying.

(17) Fault Detection and Annunciation (Fig. 20)

(a) Two types of failures will cause the engage relays to de-energize: a second failure in the electronic systems that affects both RRCMs or a failure in the "single thread" portion of the system. The "single thread" components are the electrohydraulic servo valve, the ratio changer actuator, the ratio changer mechanism, and the LVDT. Removal of one RRCM will activate an interlock which causes the amber RUDDER RATIO light to come on.

(b) Ratio changer modules continuously monitor system status through open load, difference and hardover monitors, and the presence of a Vp VALID signal. Detection of failure in any monitor shifts control to the standby module. This is a single RRCM failure.



Fault Detection and Annunciation
Figure 20

(c) Detection of a single RRCM failure provides a signal input to the EICAS computers. The EICAS computers store a white RUDDER RATIO message for ground access only. A suitable fault ball will set on the RRCM.

(d) Detection of a dual RRCM failure will de-energize the engage relay. The ratio changer actuator solenoid valve closes, allowing the actuator to retract to the low-speed position. Hydraulic pressure to the middle PCA is cut off.

(e) Dual module failure causes an amber RUDDER RATIO alert message (level C) on EICAS. The amber RUDDER RATIO light on overhead panel P5 comes on and suitable fault balls set on the RRCM.

(18) RRCM Maintenance Fault Balls

(a) Each RRCM contains four fault balls and a fault ball reset button. The faultball display is non-volatile and can be reset only at the module.

(b) LVDT fault ball

1) Each channel of the dual channel LVDT is sent to one RRCM. Circuitry continuously monitors the LVDT secondary element common mode sum voltage to 2.5 volts ac. The fault ball will set if voltage is less.

(c) PCA fault ball

1) The PCA fault ball is set by any of three independent logic signals. Latching of the hardover monitor, (dual channel failure or low hydraulic pressure inhibits this fault ball signal), failure of both modules within 2.5 seconds of each other, and latching of the open load monitor.

(d) Module fault ball

1) Fault ball will set if the difference monitor latches and the PCA fault ball dual channel failure signal is not received within 2.5 seconds.

(e) Test Fail fault ball

1) Failure of BITE test or returning the test switch to NORMAL before test is complete will set the fault ball.

(f) Reset function provides a reset signal to a set of latches. The latch provides a ground for a 28 volt dc circuit to reset the fault ball.

(19) Rudder Ratio Changer Actuator (RRCA) (Fig. 17)

(a) The left hydraulic system supplies power to operate the RRCA. The system is controlled by the FLT CONTROL SHUTOFF switch L on the right side panel P61. When the engage relay is activated, the solenoid valve is driven to the powered position and ports left hydraulic pressure to the actuator bypass valve and the electrohydraulic servo valve (EHSV). The hydraulic pressure causes the actuator bypass valve to open a fluid path to the PCA port for left hydraulic power and a fluid path from the EHSV to the piston. The EHSV directs hydraulic fluid to extend or retract the piston when a signal is received from an RRCM. The actuator is mechanically biased to maintain the actuator in the retract position (low airspeed condition) in the event of hydraulic system loss.

(b) As airspeed increases, a signal causes the EHSV to port pressure to extend the actuator. An LVDT on the ratio changer mechanism provides position feedback to the RRCM to stop the piston in the desired position. As airspeed decreases, the EHSV ports pressure from the extend side of the actuator to the return line. Since the actuator always has hydraulic pressure to the retract side, it will move towards the low airspeed position.

(20) Linear Variable Displacement Transmitter (LVDT) (Fig. 15)

(a) The LVDT is driven by the right output crank. As the ratio changer actuator extends, it causes the left output crank to swing inward. The interconnect rod between the cranks causes the right output crank to swing in also. The LVDT piston rod end attached to the right crank is pushed in, so changing the output signal to the RRCMs.

B. Built In Test Equipment (BITE)

(1) BITE can be used to test each of the two RRCMs. Use the procedure that follows to do the test:

(a) Provide electrical power (AMM 24-22-00/201).

WARNING: TO PREVENT INJURY OR DAMAGE, KEEP ALL PERSONNEL AND EQUIPMENT CLEAR OF ALL CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. AILERONS, ELEVATORS, RUDDER, TRAILING EDGE FLAPS, LEADING EDGE SLATS, STABILIZERS, AND SPOILERS ARE FULLY POWERED.

(b) Provide left hydraulic system power (AMM 29-11-00/201).

(c) Open access door 119AL and access panel 324BL (AMM 06-41-00/201 AMM 06-42-00/201).
(d) Place one rudder ratio changer module (RRCM) test switch to TEST. RRCMs are located on equipment shelves E3 and E4.
1) Check that IN TEST light on RRCM remains on for no more than 18 seconds.
2) Check ratio changer actuator fully extends.
3) Check TEST FAIL faultball does not set.
(e) Place RRCM test switch from TEST to NORMAL.
1) Check ratio changer actuator fully retracts.
2) Check that IN TEST light remains on for 15 seconds.
3) Check PCA and TEST FAIL faultballs do not set.
(f) Repeat BITE test for remaining RRCM.
(g) Remove hydraulic power.
(h) Remove electrical power if no longer required.

C. Control
(1) Provide electrical power (AMM 24-22-00/201).

WARNING: TO PREVENT INJURY OR DAMAGE, KEEP PERSONNEL AND EQUIPMENT CLEAR OF ALL CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. AILERONS, ELEVATORS, RUDDER, TRAILING EDGE FLAPS, LEADING EDGE SLATS, AND SPOILERS ARE FULLY POWERED.

(2) Provide left, center, and right hydraulic systems power (AMM 29-11-00/201).

NOTE: Hydraulic power from only one system is required to operate rudder.

(3) Rudder Pedals Control
(a) Push right pedal for right rudder, push left pedal for left rudder.
(b) Remove foot pressure on pedals to return rudder to neutral or trimmed position.
(4) Rudder Trim Control
(a) Rotate trim knob right for right trim, left for left trim.

(b) Rotate trim knob until trim indicator reads zero units to return rudder to neutral.

(5) Remove hydraulic power.

(6) Remove electrical power if no longer needed.

RUDDER AND RUDDER TRIM CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR - RUDDER TRIM, M515	3	1	324AL, RUDDER FEEL, CENTERING, AND TRIM MECHANISM	27-21-06
ACTUATOR (PCA) - RUDDER POWER CONTROL	4	3	324CL, MID VERT FIN	27-21-20
ACTUATOR (RRCA) - RUDDER RATIO CHANGER, M626	4	1	324BL, LWR VERT FIN	27-21-13
ASSEMBLY - AFT QUADRANT	3	1	324AL, RUDDER FEEL, CENTERING, AND TRIM MECHANISM	27-21-06
ASSEMBLY - RUDDER FORWARD QUADRANT AND JACKSHAFT	2	2	113AL, FWD EQUIP COMPT	27-21-05
ASSEMBLY - RUDDER PEDAL	2	2	FLT COMPT AND 113AL, FWD EQUIP COMPT	27-21-02
ASSEMBLY - YAW DAMPER SUMMING LEVER	4	1	324BL, LWR VERT FIN	27-21-17
CABLE - (AMM 27-00-01/201)				
RUDDER CONTROL				
CIRCUIT BREAKER -	1		FLT COMPT, P11	
ELEVATOR LIMIT, C4032		1	11J12	*
FLT CONT ELEC 1L AC, C1538		1	11C6	*
FLT CONT ELEC 1L DC, C1534		1	11C7	*
FLT CONT ELEC 1R AC, C1536		1	11G17	*
FLT CONT ELEC 1R DC, C1531		1	11G18	*
FLT CONT ELEC 2L AC, C1537		1	11C8	*
FLT CONT ELEC 2L DC, C1533		1	11C9	*
FLT CONT ELEC 2R AC, C1535		1	11G27	*
FLT CONT ELEC 2R DC, C1532		1	11G28	*
FLT CONT SHUTOFF TAIL LEFT, C4033		1	11H17	*
PCU MON SENSOR, C4283		1	11J10	*
PCU MON MOD, C4270		1	11J11	*
RUDDER POS, C1005		1	11J16	*
RUD RATIO, C1031		1	11G10 OR 11D18	*
RUD TRIM, C1033		1	11C10	*
RUDDER TRIM POS, C1034		1	11J17	*
STAB TRIM CONT L, C1017		1	11H11 OR 11C5	*
STAB TRIM CONT R, C1018		1	11H20	*
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
CRANK - RUDDER PEDAL ADJUSTMENT	1	2	FLT COMPT AND 113AL, FWD EQUIP COMPT	27-21-03
FILTER - RRCA		1	324BL, RRCA M626	27-21-13
INDICATOR - RUDDER TRIM, N83	1		FLT COMPT, P8, AIL/RUD TRIM CONT PANEL M74	*
LIGHT - RUDDER RATIO, L18	1		FLT COMPT, P5, AUX ANNUN PANEL M10394	*
LINKAGE - (FIM 32-41-00/101)				
BRAKE PEDAL BUS MECHANISM				
LINKAGE - (FIM 32-51-00/101)				
NOSE WHEEL STEERING INTERCONNECT MECHANISM				
LINKAGE - RUDDER TEMPERATURE COMPENSATING	5	1	324AL, LWR VERT FIN	27-21-19
LVDT - RUDDER RATIO CHANGER, TS194	4		324BL, RUDDER RATIO CHANGER MECHANISM	27-21-12
MECHANISM - FEEL, CENTERING AND TRIM	3		324AL, LWR VERT FIN	27-21-06
MECHANISM - RUDDER RATIO CHANGER	4		324BL, LWR VERT FIN	27-21-12
MODULE - (FIM 27-09-00/101)				
LEFT RUDDER RATIO CHANGER (L RRCM), M528				
RIGHT RUDDER RATIO CHANGER (R RRCM), M529				

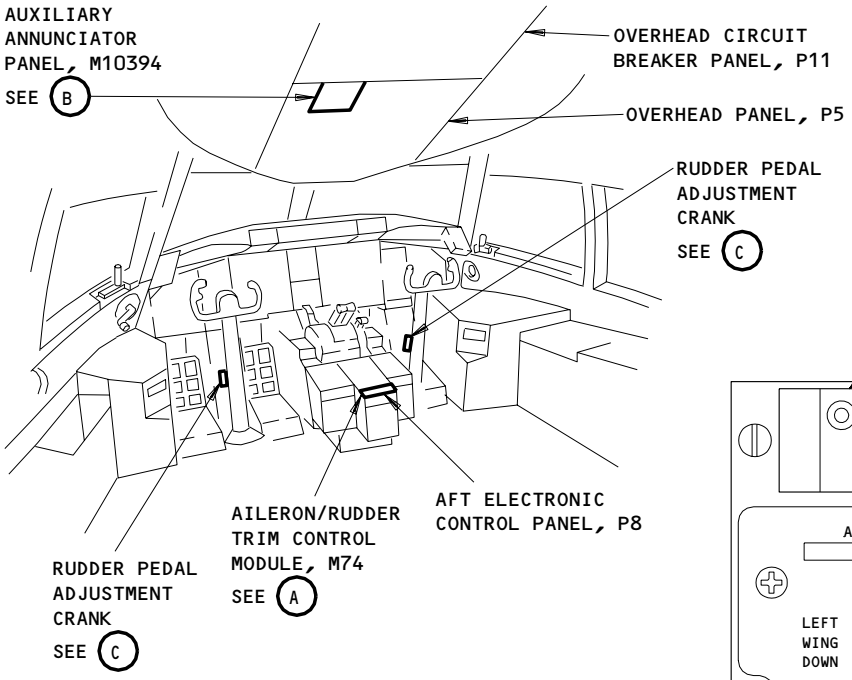
* SEE THE WDM EQUIPMENT LIST

Rudder and Rudder Trim Control System - Component Index
Figure 101 (Sheet 1)

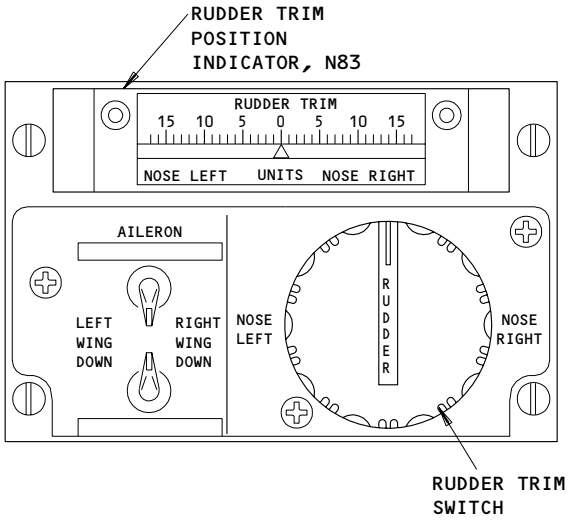
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
MODULES - (27-09-00/101)				
LEFT STAB TRIM/ELEVATOR ASSYMETRY (L SAM), M524				
POWER SUPPLY 1L (PSM 1L), M536				
POWER SUPPLY 1R (PSM 1R), M538				
POWER SUPPLY 2L (PSM 2L), M537				
POWER SUPPLY 2R (PSM 2R), M539				
RIGHT STAB TRIM/ELEVATOR ASSYMETRY (R SAM), M525				
PANEL - (27-11-00/101)				
AILERON/RUDDER TRIM CONTROL, M74				
PANEL - (30-31-00/101)				
AUXILIARY ANNUNCIATOR, M10394				
PIN - RUDDER RATIO CHANGER SHEAR	4	1	324BL, RUDDER RATIO CHANGER MECHANISM	27-21-12
RELAYS - (32-09-00/101)				
AIR/GND SYS 1, K10384				
AIR/GND SYS 2, K10387				
ROD - RUDDER RATIO CHANGER POGO	4	1	324BL, RUDDER RATIO CHANGER MECHANISM	27-21-00
RUDDER -	2	1	VERTICAL STABILIZER TRAILING EDGE, 325	27-21-21
SCREEN - RRCA	4	1	324BL, RRCA M626	27-21-13
SERVOS - (22-13-00/101)				
CENTER AUTOPILOT ROLLOUT GUIDANCE, M278				
LEFT AUTOPILOT ROLLOUT GUIDANCE, M277				
RIGHT AUTOPILOT ROLLOUT GUIDANCE, M279				
SERVOS - (22-21-00/101)				
LEFT YAW DAMPER, M509				
RIGHT YAW DAMPER, M510				
SWITCH - (29-11-00/101)				
LEFT HYDRAULIC PUMP PRESSURE, S27				
SWITCH - RUDDER TRIM	1	1	FLT COMPT, P8, AIL/RUD TRIM CONT PANEL, M74	*
VALVE - RRCA SOLENOID	4	1	324BL, RRCA M626	27-21-13
VALVE (EHSV) - RRCA ELECTROHYDRAULIC SERVO	4	1	324BL, RRCA M626	27-21-13

* SEE THE WDM EQUIPMENT LIST

Rudder and Rudder Trim Control System - Component Index
Figure 101 (Sheet 2)

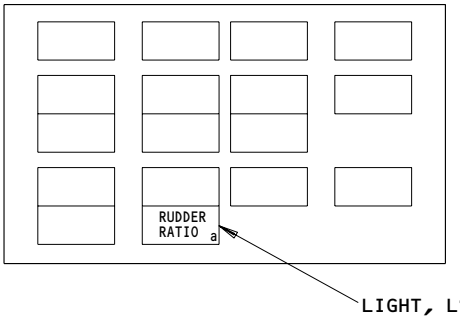


FLIGHT COMPARTMENT



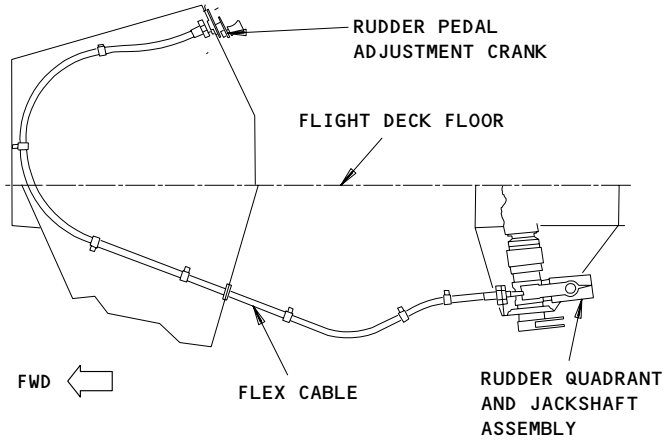
AILERON/RUDDER TRIM CONTROL MODULE, M74

A



AUXILIARY ANNUNCIATOR PANEL, M10394

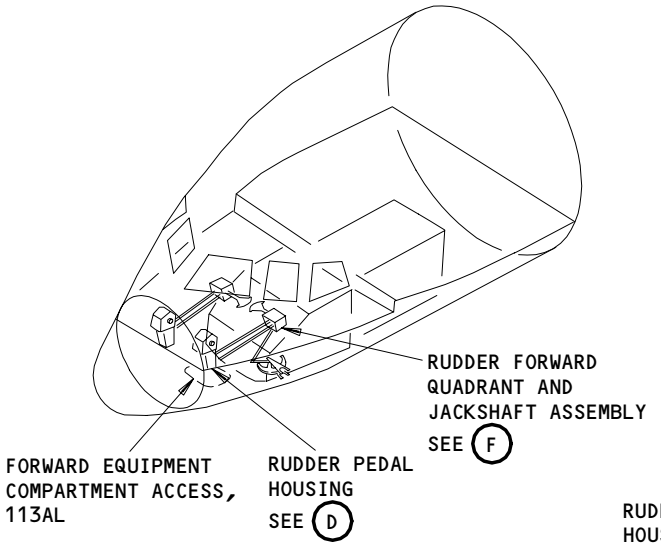
B

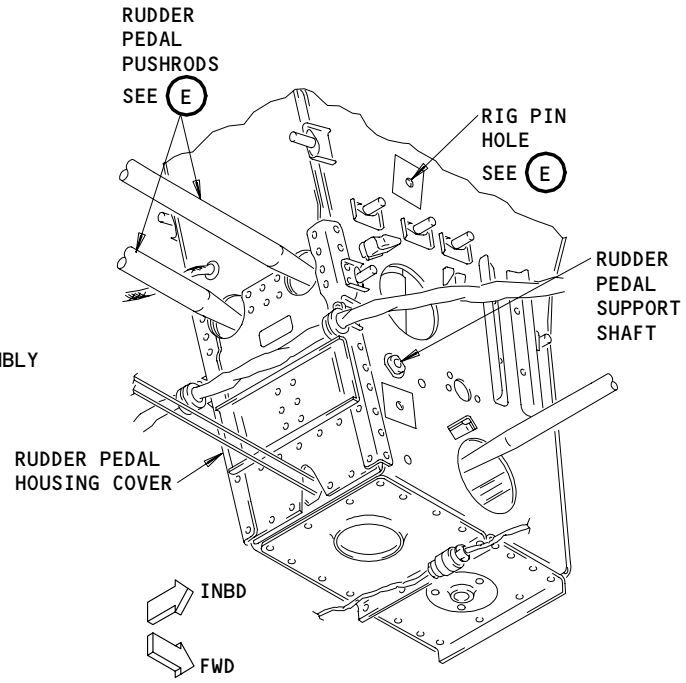


RUDDER PEDAL ADJUSTMENT CRANK

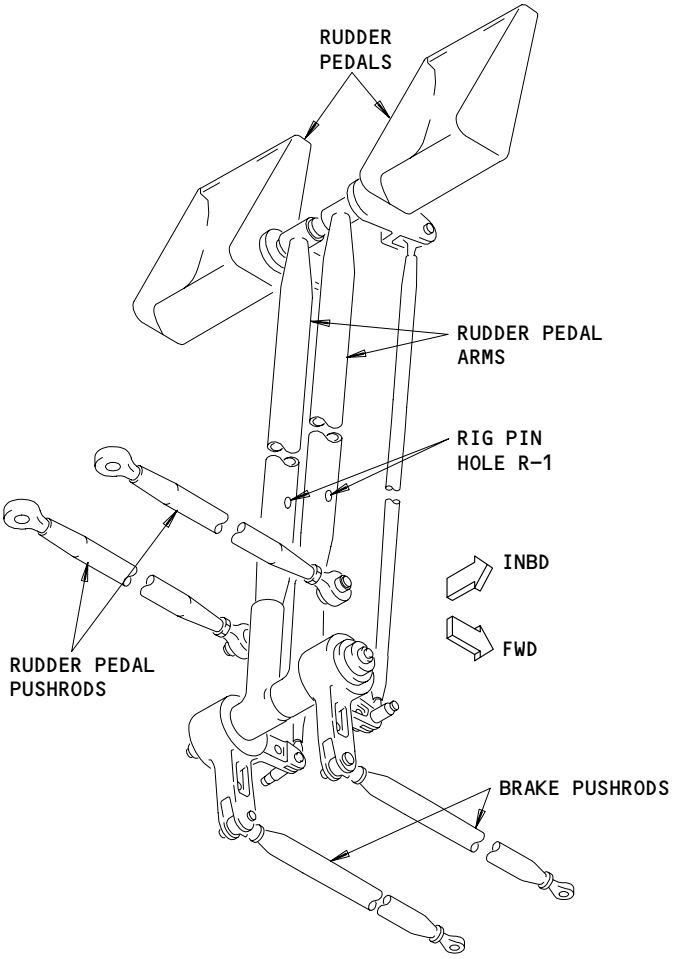
C

Rudder and Rudder Trim Control System – Component Location
Figure 102 (Sheet 1)

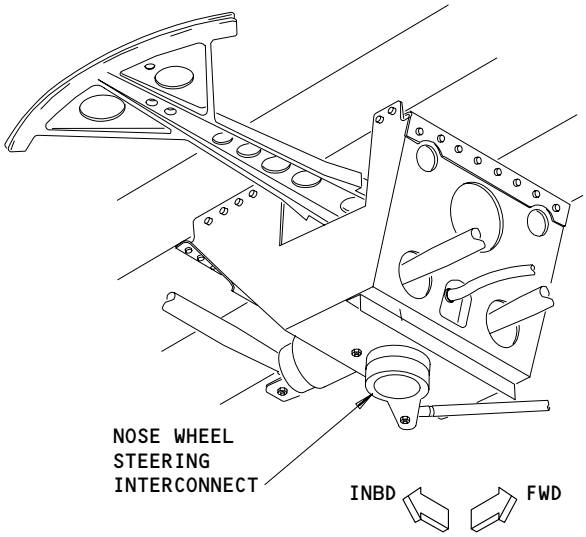




RUDDER PEDAL HOUSING
D

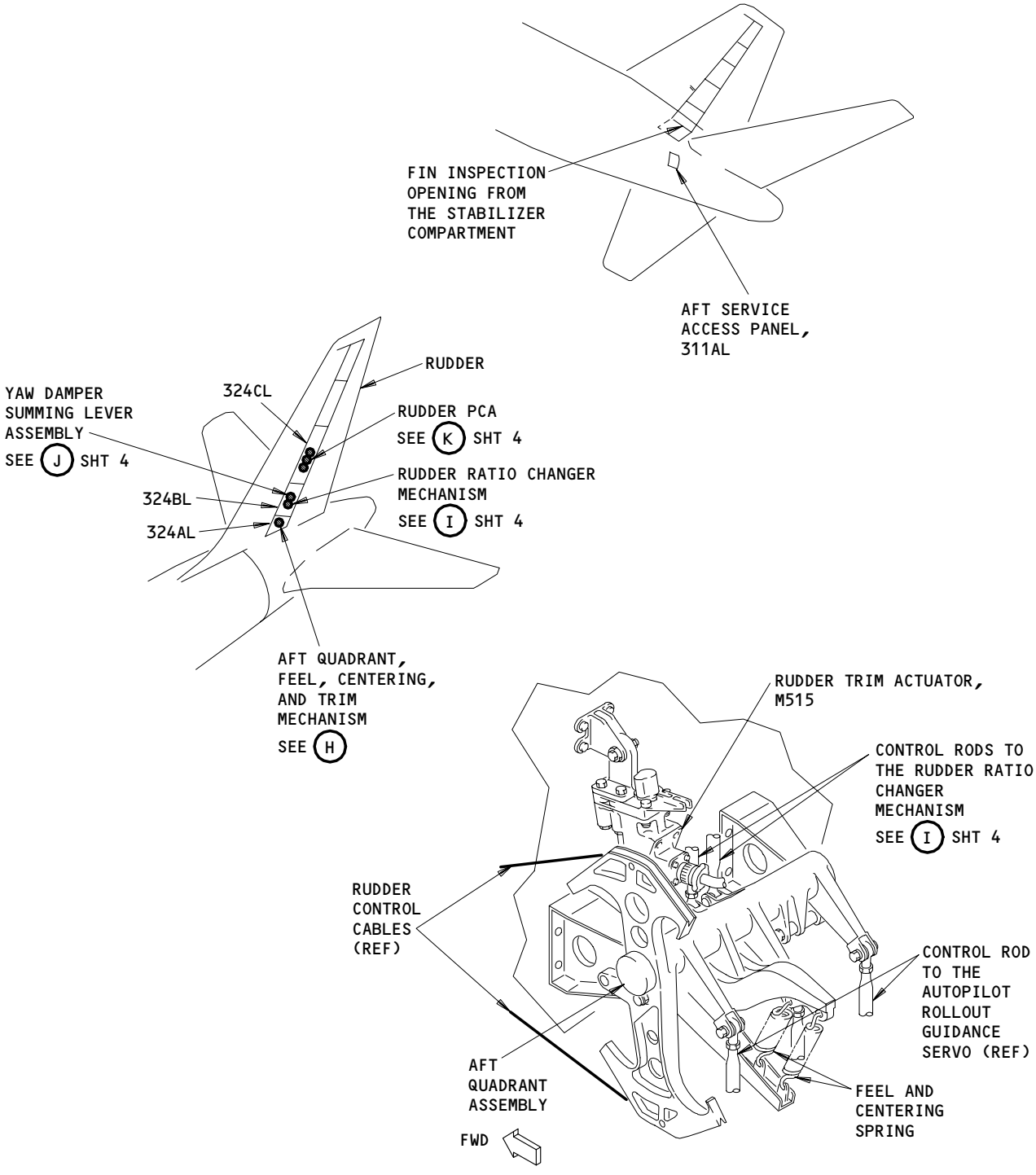


CAPTAIN'S RUDDER PEDALS
E



RUDDER FORWARD QUADRANT AND JACKSHAFT ASSEMBLY
F

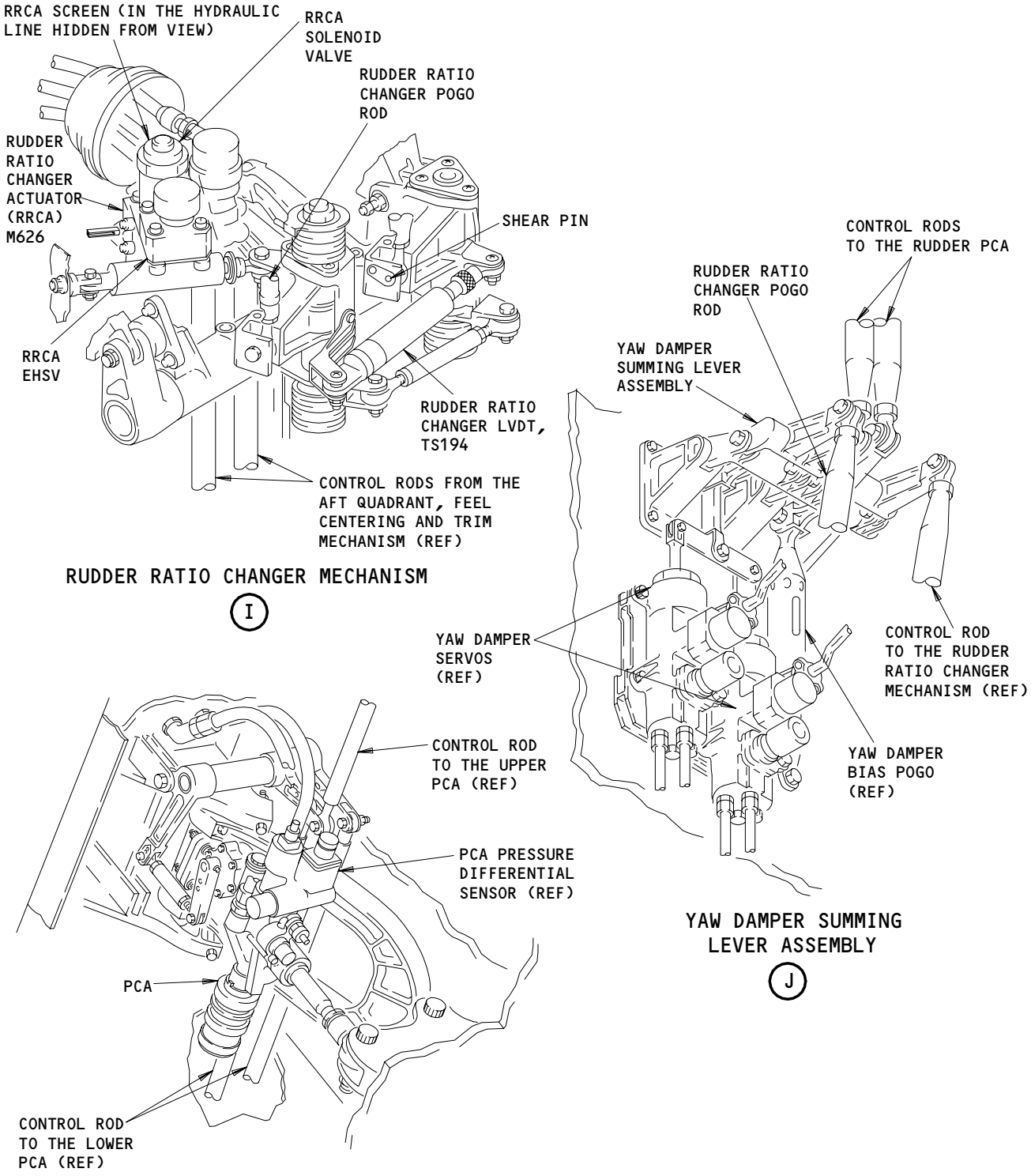
Rudder and Rudder Trim Control System – Component Location
Figure 102 (Sheet 2)



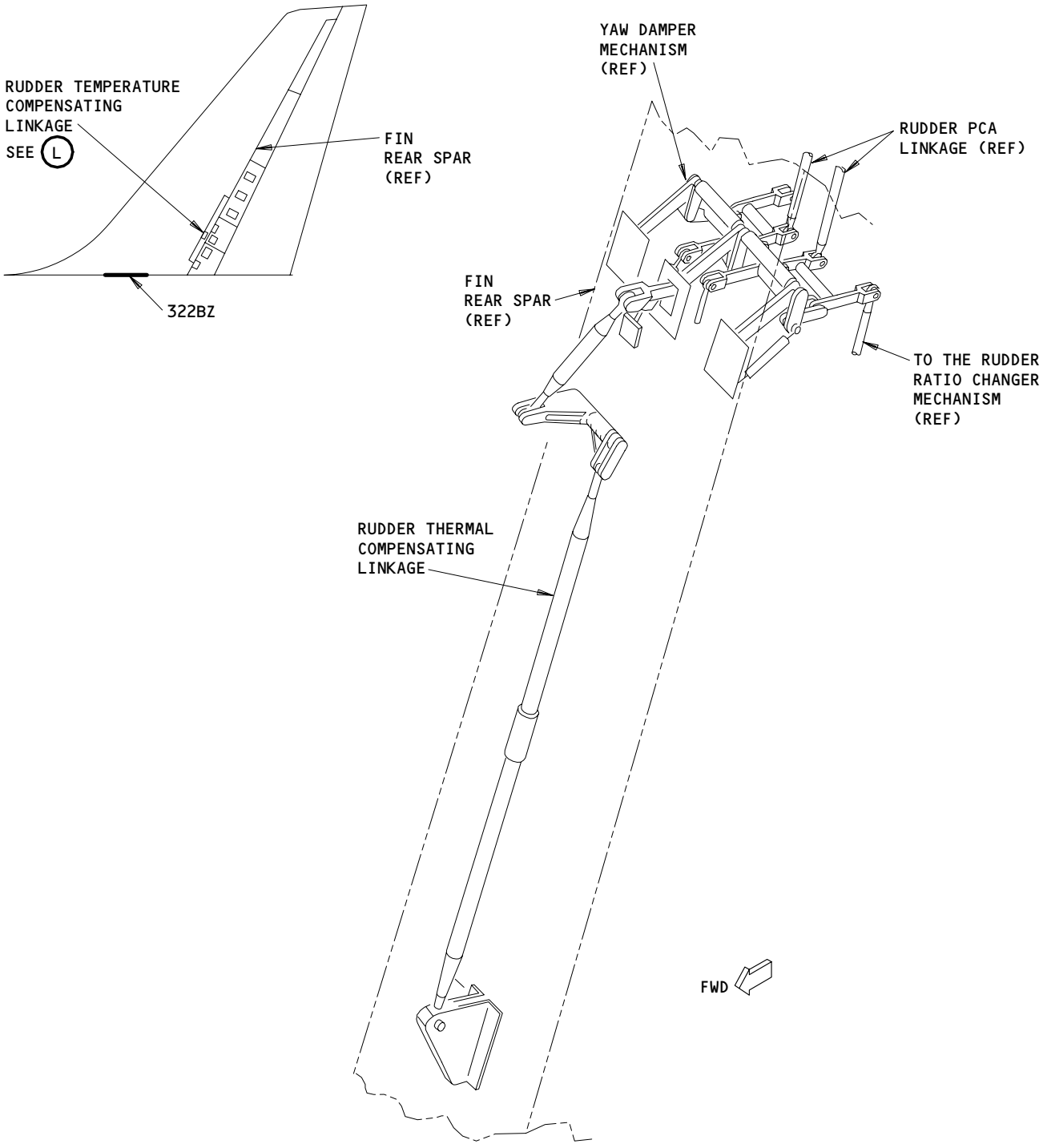
AFT QUADRANT, FEEL, CENTERING, AND TRIM MECHANISM

(H)

Rudder and Rudder Trim Control System – Component Location
Figure 102 (Sheet 3)



Rudder and Rudder Trim Control System - Component Location (Details from Sht 3)
Figure 102 (Sheet 4)



RUDDER TEMPERATURE COMPENSATING LINKAGE

(L)

Rudder and Rudder Trim Control System – Component Location
Figure 102 (Sheet 5)

RUDDER AND RUDDER TRIM CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains the operational test, adjustment, and system test tasks for the rudder and the rudder trim control system. Refer to AMM 27-28-00 for adjustment and test procedures for the rudder position indicating system. Refer to AMM 22-21-00 for adjustment and test procedures for the yaw damper system.

TASK 27-21-00-715-024

2. Operational Test - Rudder and Rudder Trim Control System
   A. References
      (1) AMM 22-13-01/401, Autopilot Rollout Guidance Servo
      (2) AMM 22-21-00/501, Yaw Damper System
      (3) AMM 24-22-00/201, Electrical Power - Control
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          320 Vertical Stabilizer and Rudder

   C. Prepare for the Test

      S 865-025
      (1) Supply electrical power (AMM 24-22-00/201).

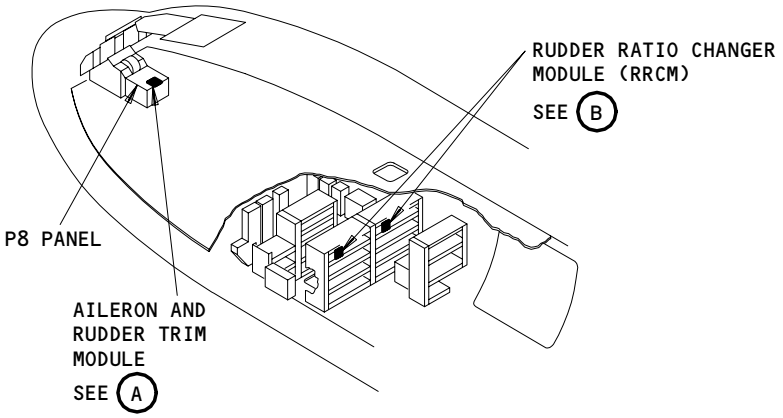
      S 865-001

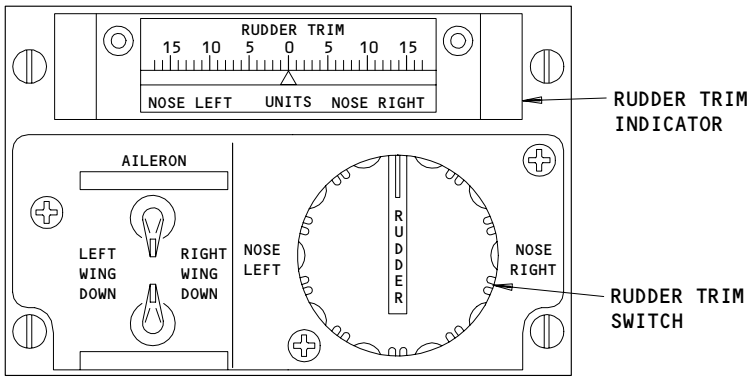
      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (2) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

      S 865-027
      (3) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.
   D. Rudder Pedal Test

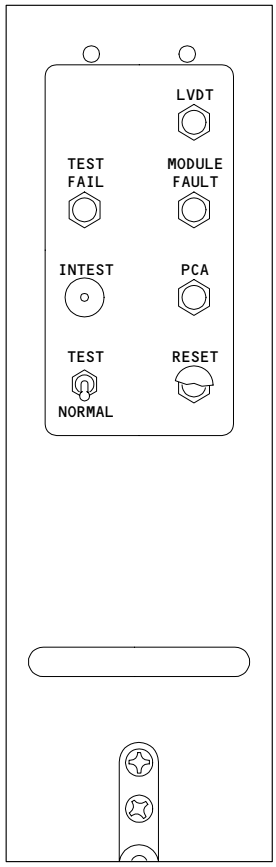
      S 825-028
      (1) Turn the captain's pedal adjustment crank until the captain's rudder pedals are in their full forward position.





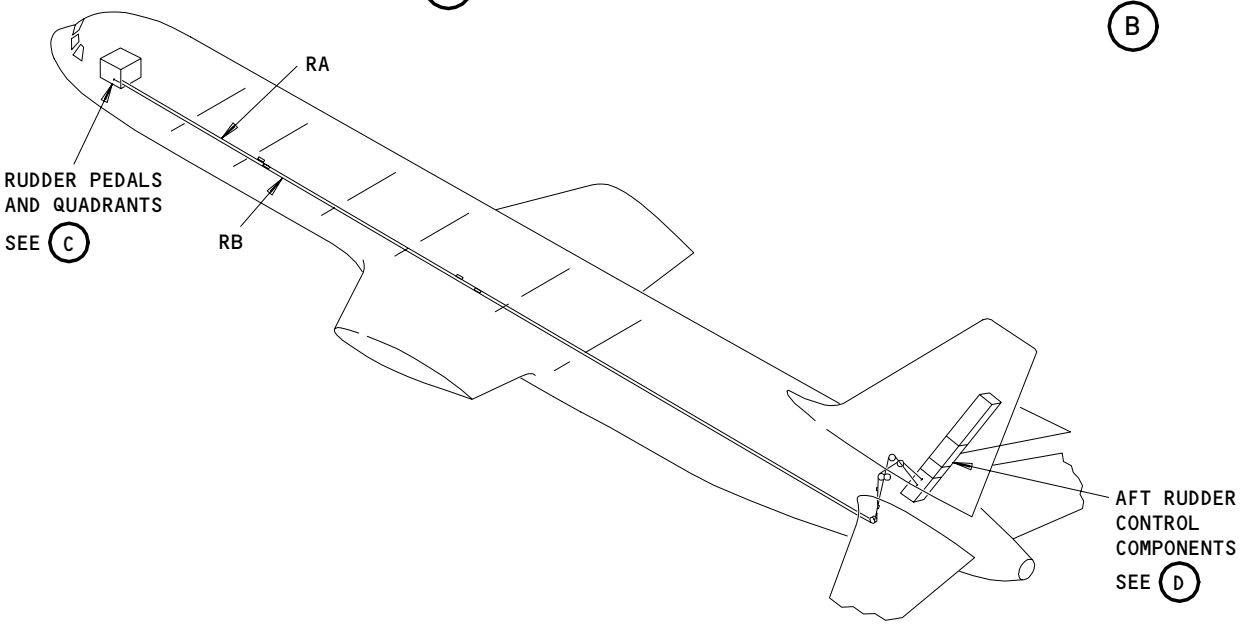
AILERON AND RUDDER TRIM MODULE

A

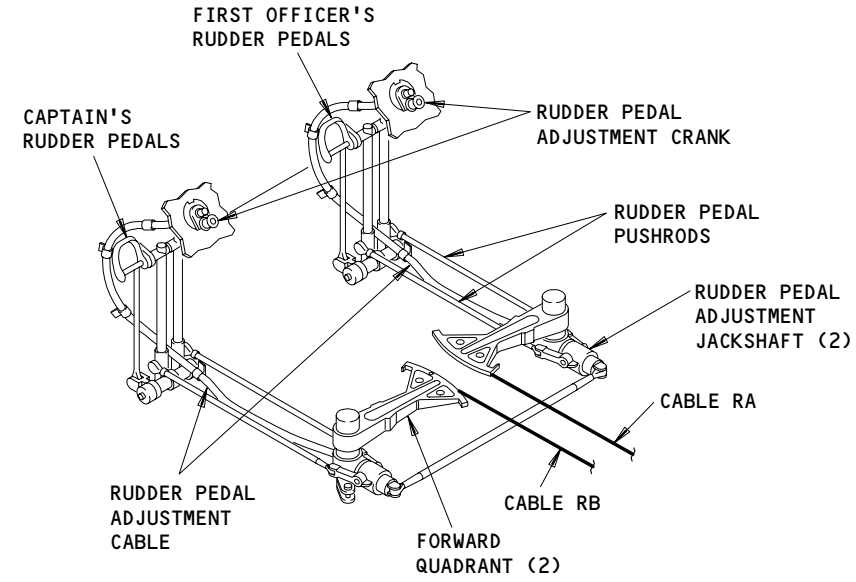


RUDDER RATIO
CHANGER MODULE (RRCM)

B

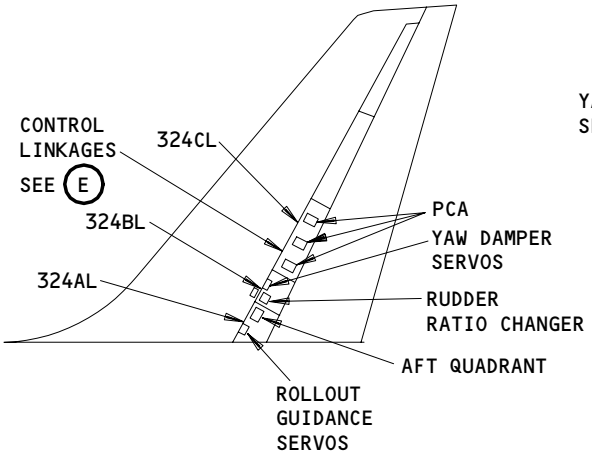


Rudder Control System Components
Figure 501 (Sheet 1)



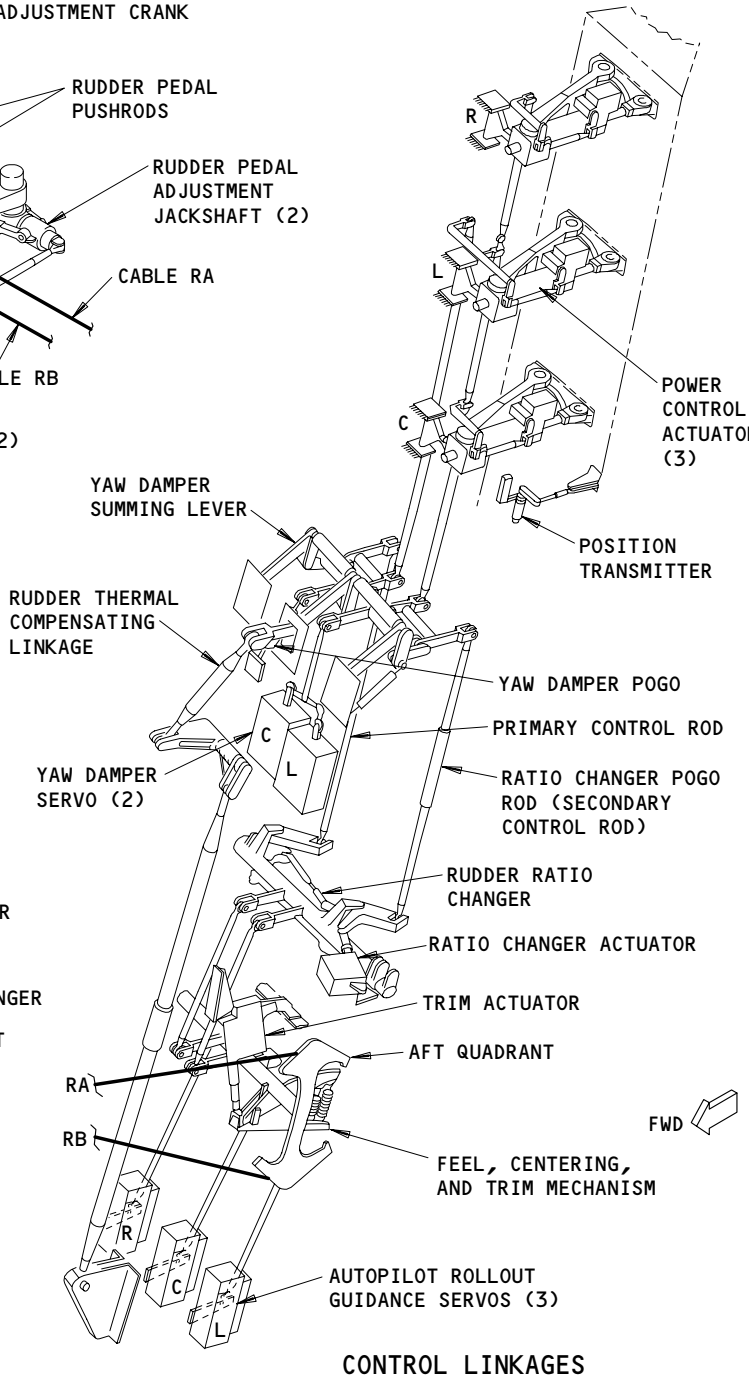
RUDDER PEDALS AND QUADRANTS

C



AFT RUDDER CONTROL COMPONENTS

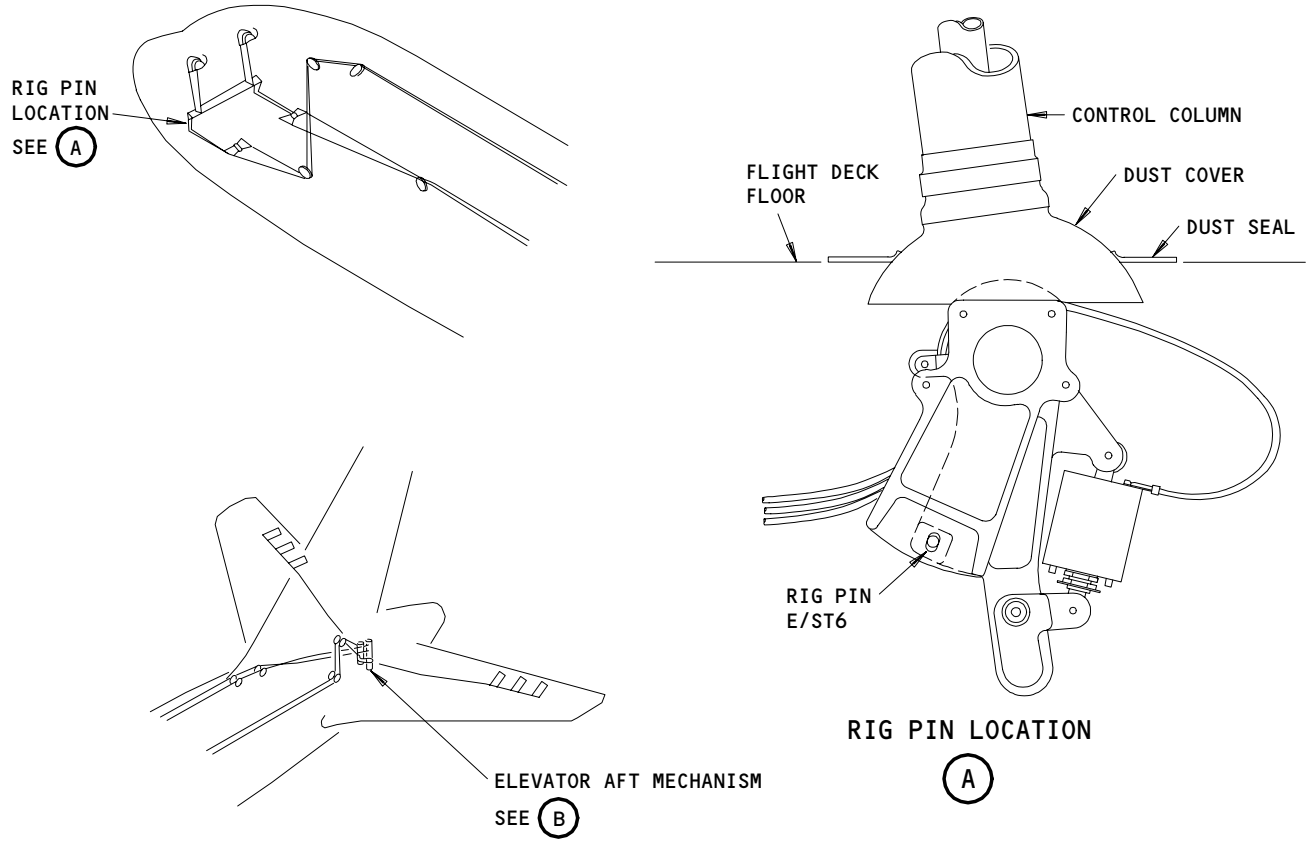
D



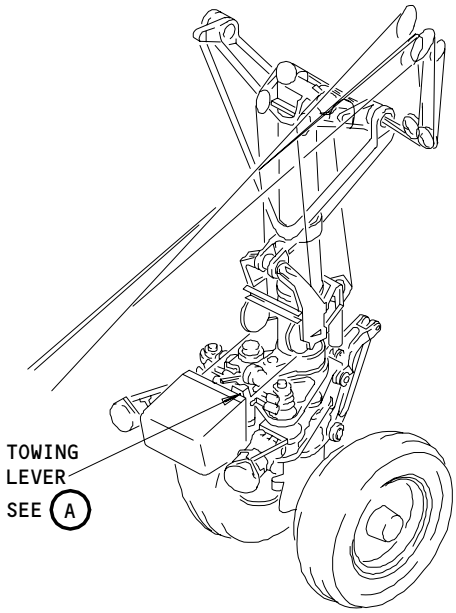
CONTROL LINKAGES

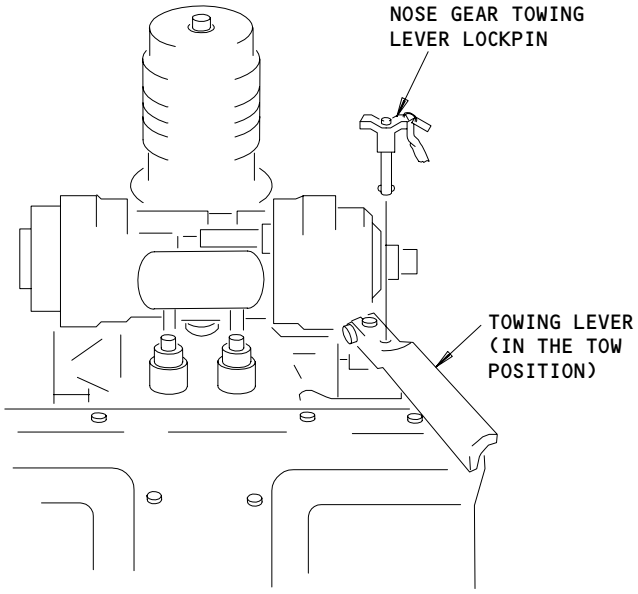
E

Rudder Control System Components
Figure 501 (Sheet 2)



Elevator Control System Isolation
Figure 502

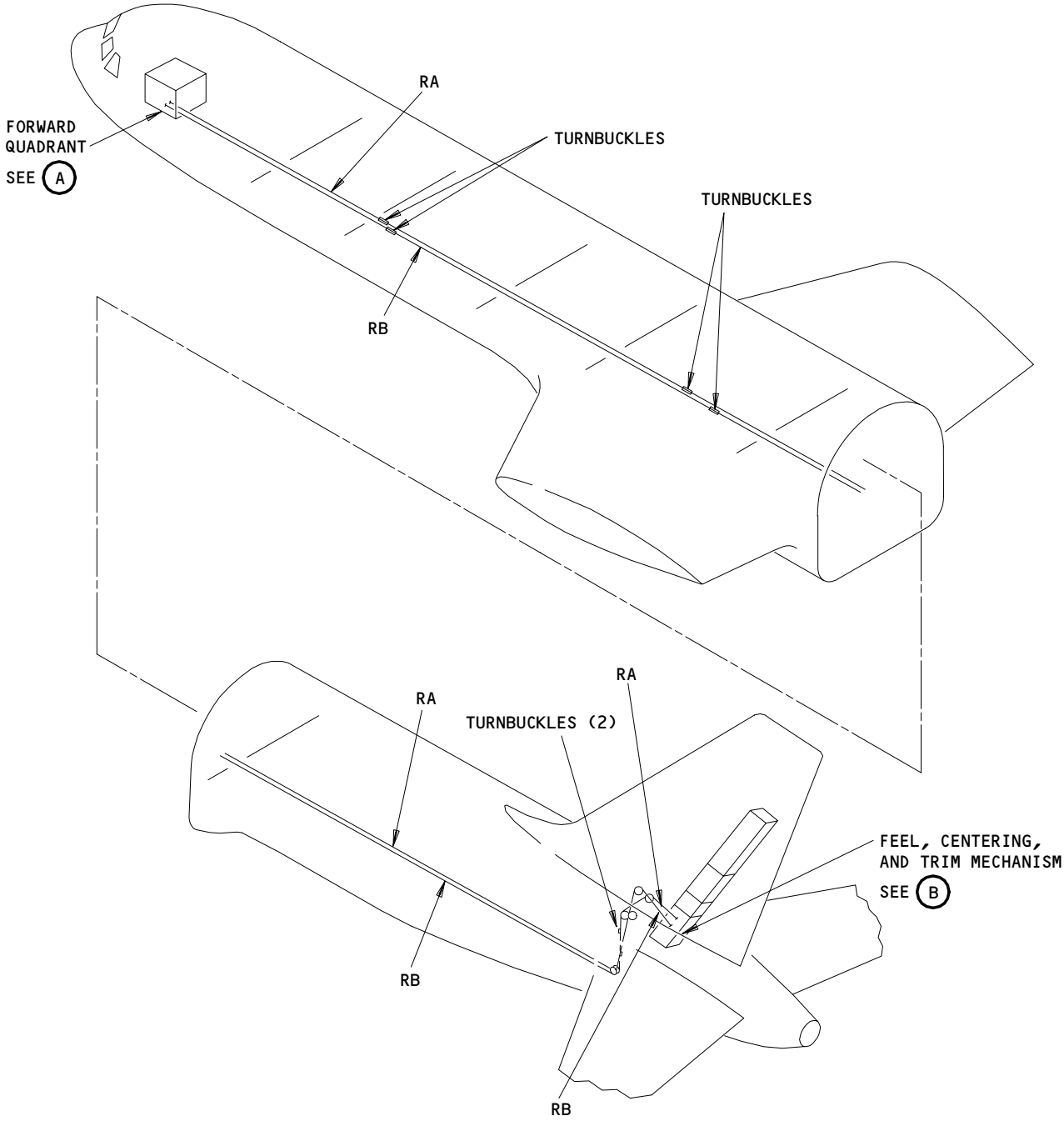




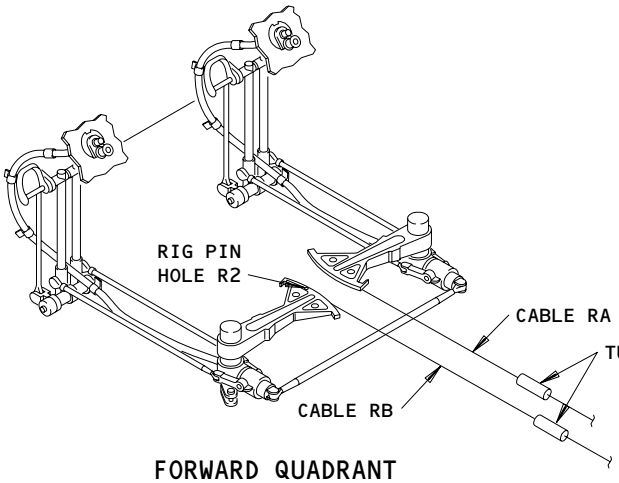
TOWING LEVER

A

Nose Gear Steering Isolation
Figure 503

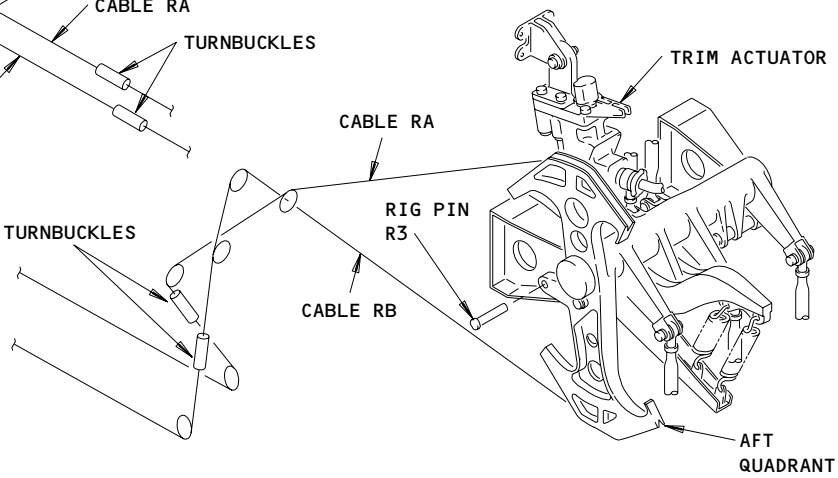


Rudder Control Cables Adjustment
Figure 504 (Sheet 1)



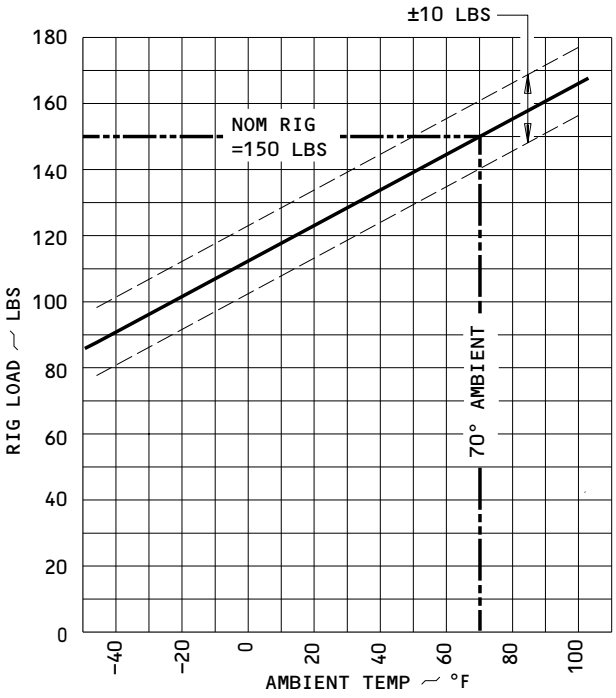
FORWARD QUADRANT

A



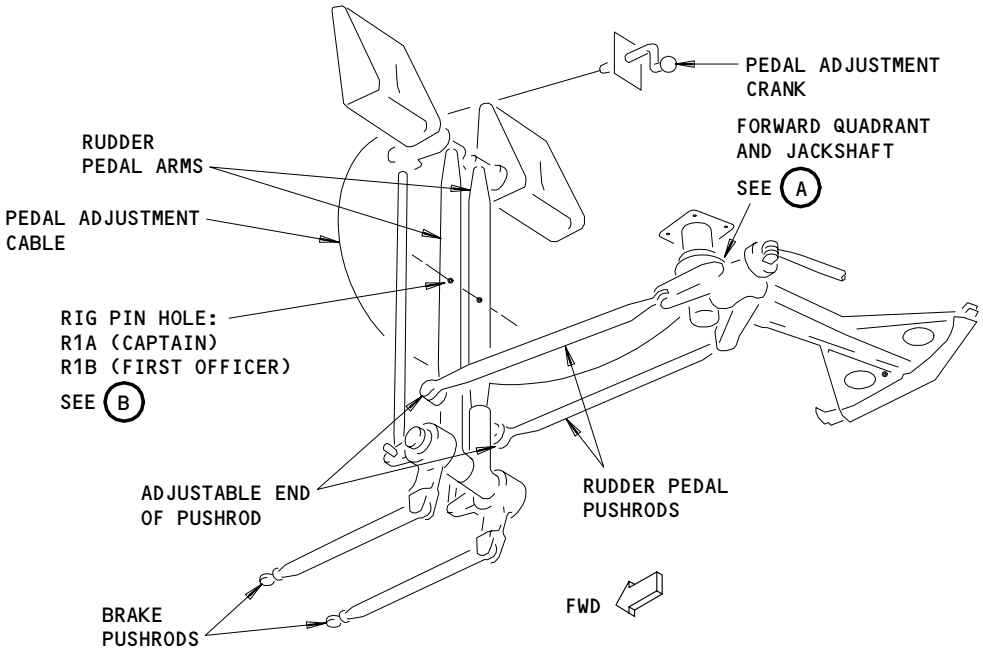
FEEL, CENTERING, AND TRIM MECHANISM

B

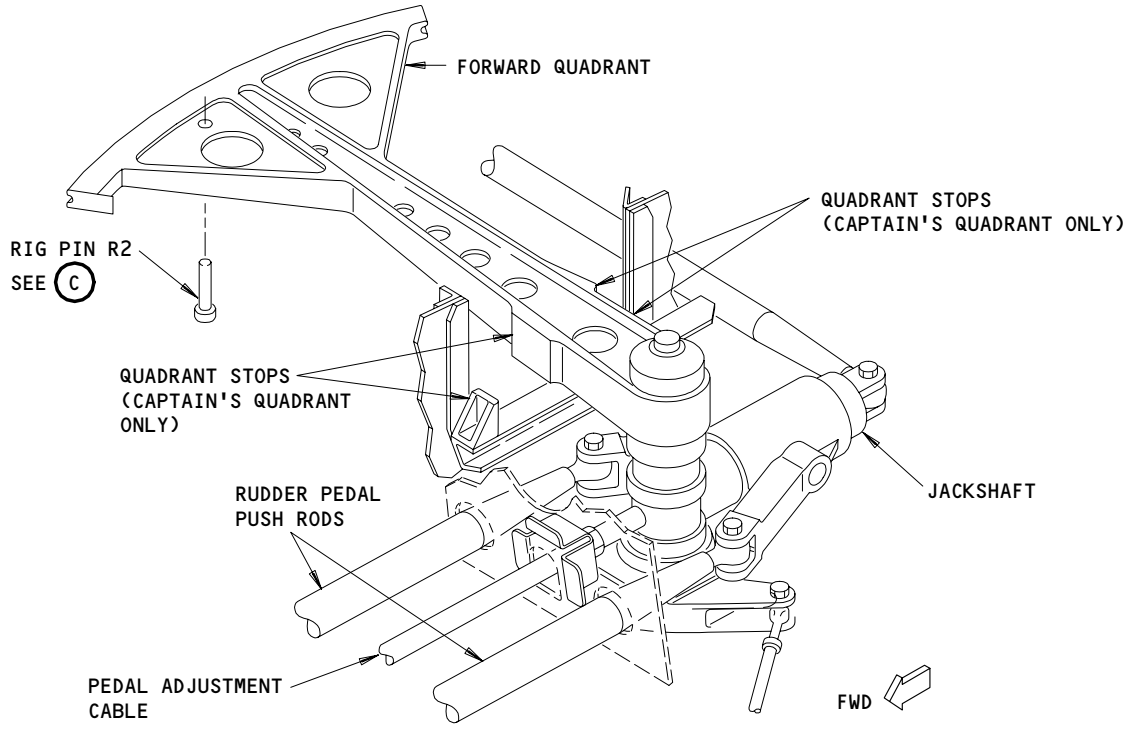


CABLE RIG LOAD VS TEMPERATURE GRAPH

Rudder Control Cables Adjustment
Figure 504 (Sheet 2)



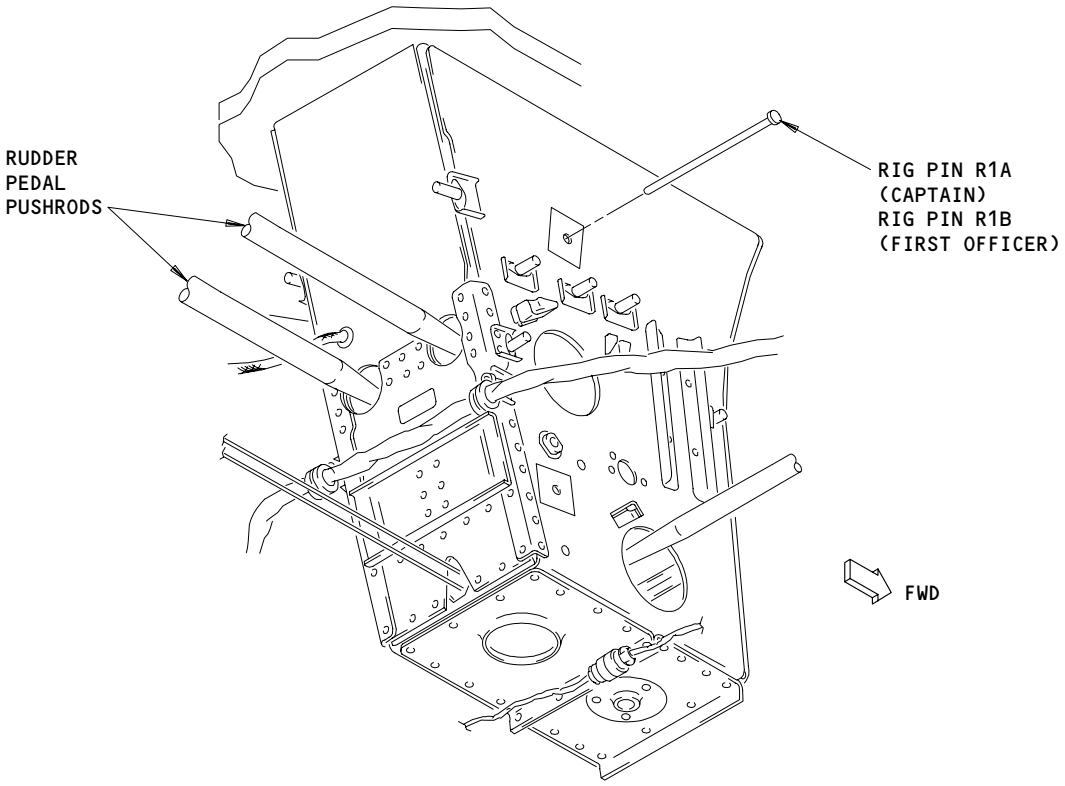
RUDDER PEDAL AND JACKSHAFT ASSEMBLY
(CAPTAIN'S SIDE SHOWN)



FORWARD QUADRANT AND JACKSHAFT

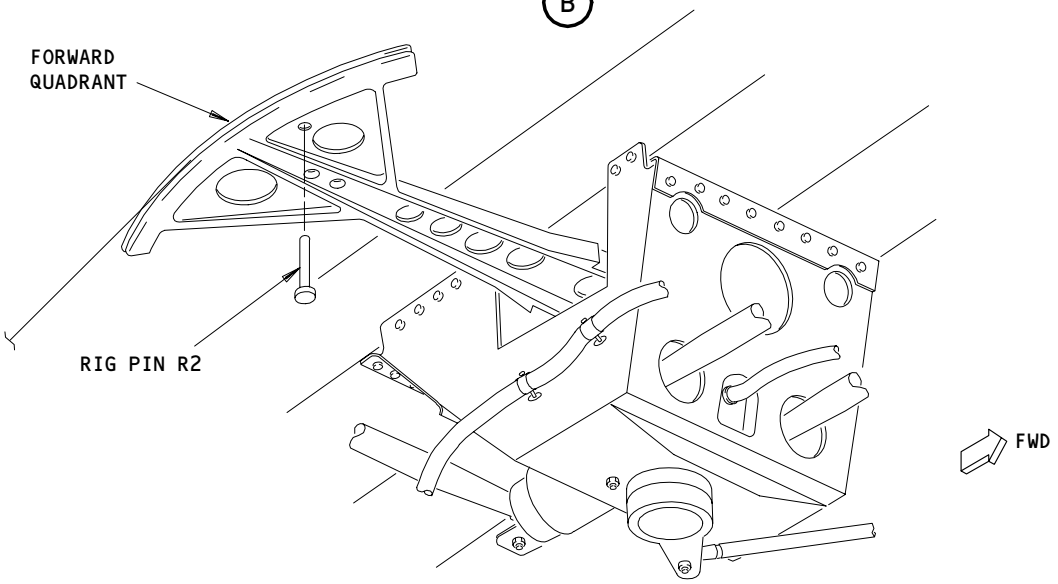
(A)

Rudder Pedals and Jackshaft Adjustment
Figure 505 (Sheet 1)



RUDDER PEDAL HOUSING
(BELOW THE FLIGHT DECK)

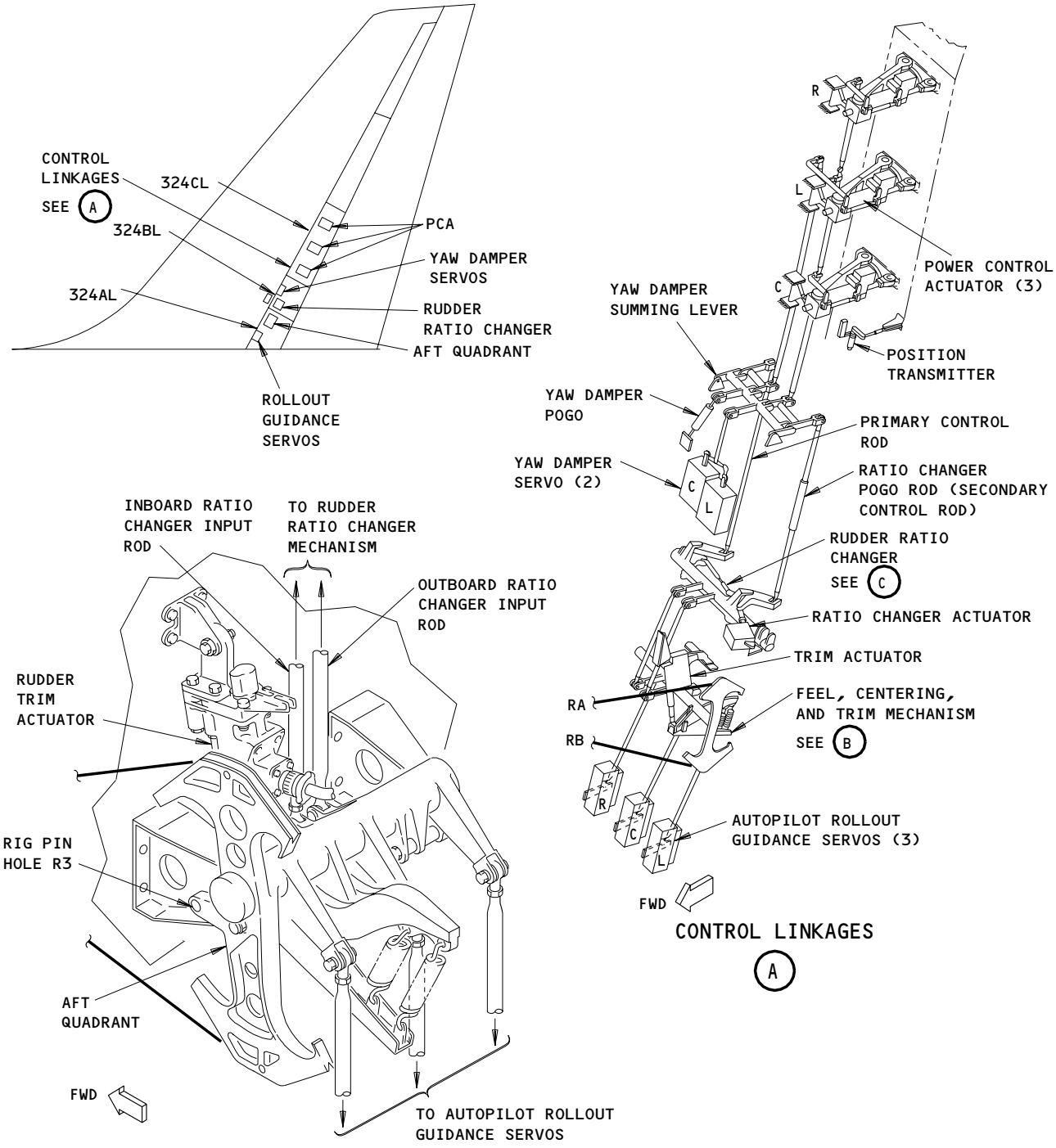
B



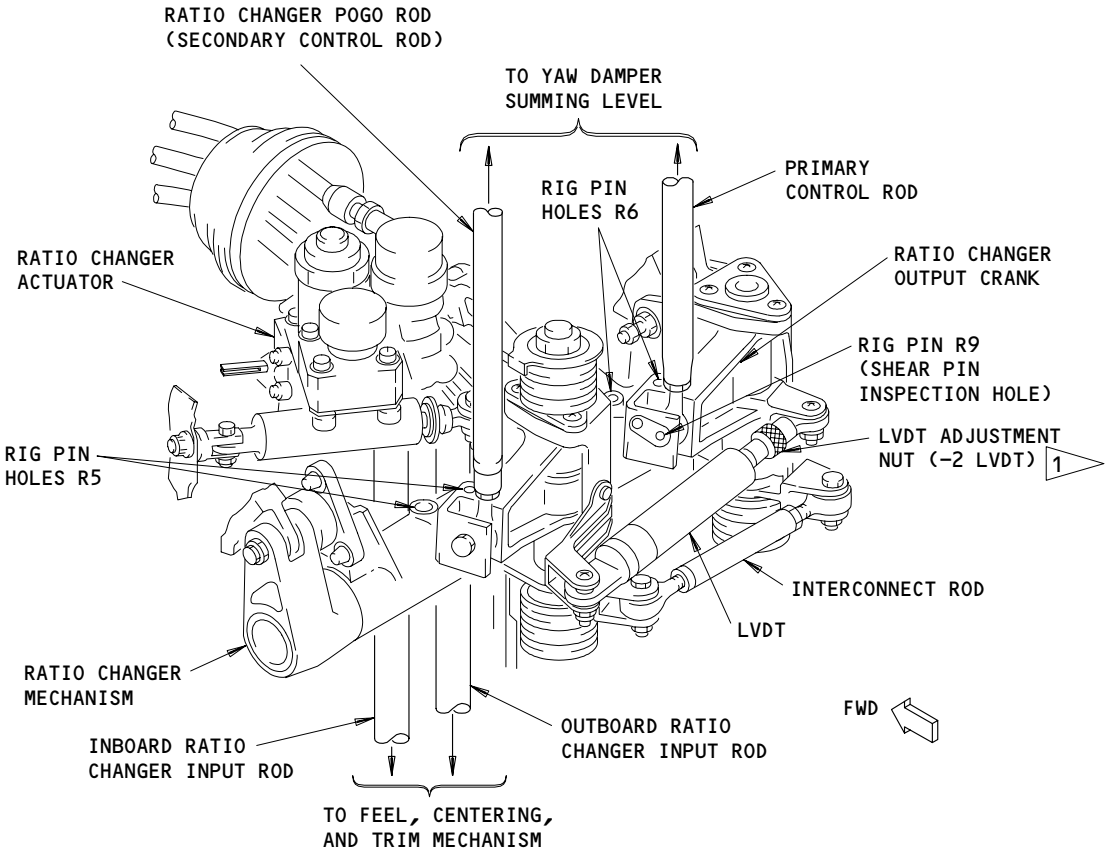
FORWARD QUADRANT AND JACKSHAFT
(BELOW THE FLIGHT DECK)

C

Rudder Pedals and Jackshaft Adjustment
Figure 505 (Sheet 2)



Rudder Ratio Changer and Feel, Centering, and Trim Mechanisms
Figure 506 (Sheet 1)



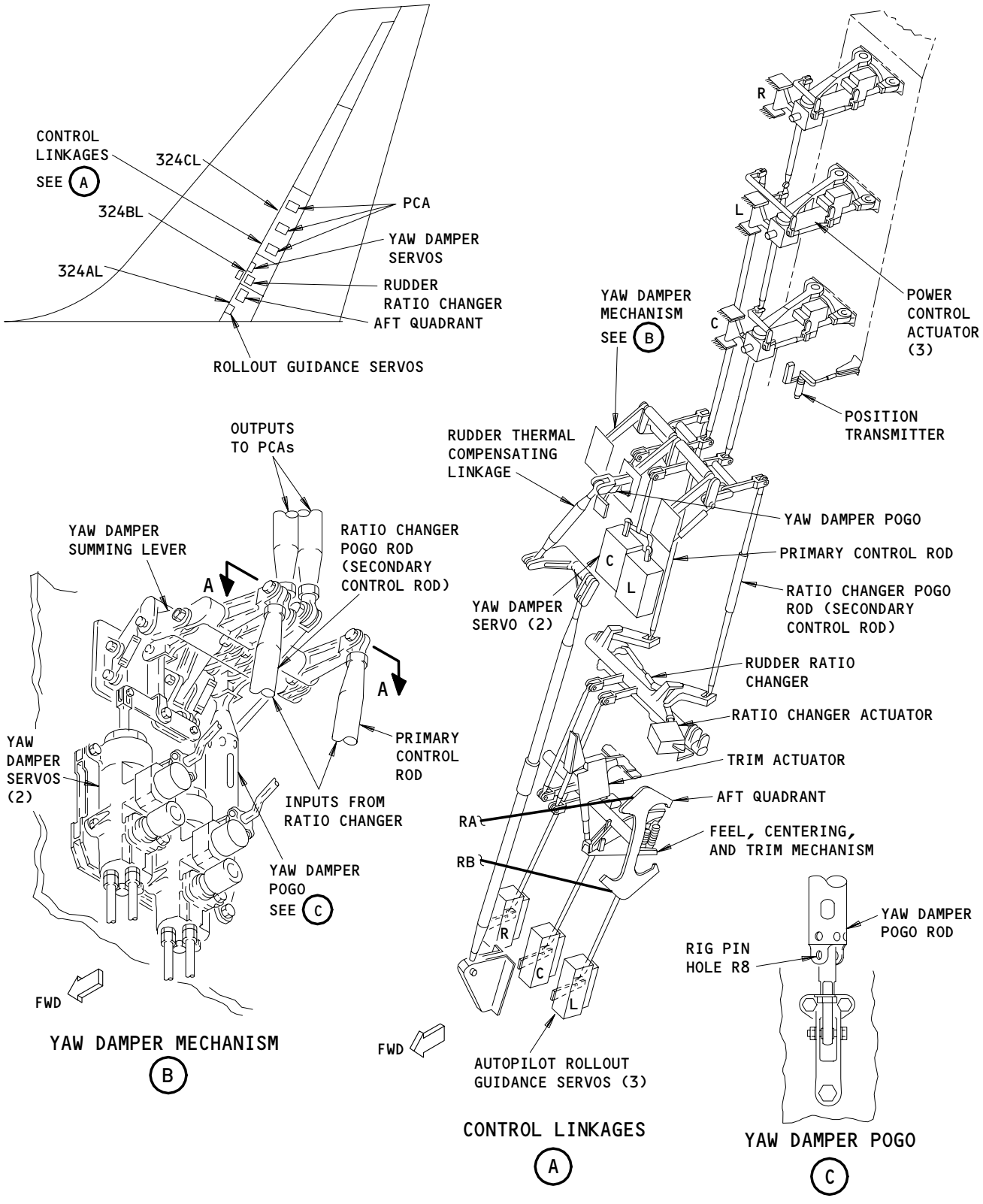
RUDDER RATIO CHANGER MECHANISM

C

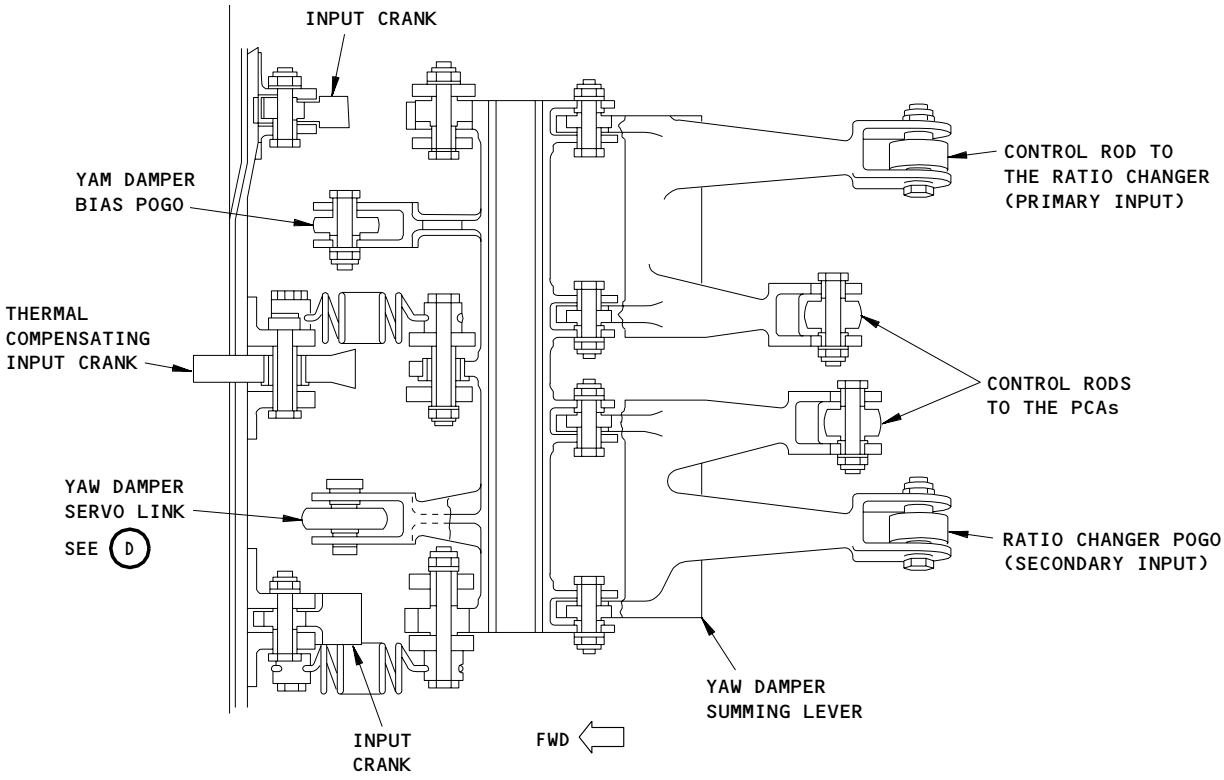
1 TO ADJUST THE LENGTH OF THE -3 LVDT, TURN THE BARREL OF THE LVDT.

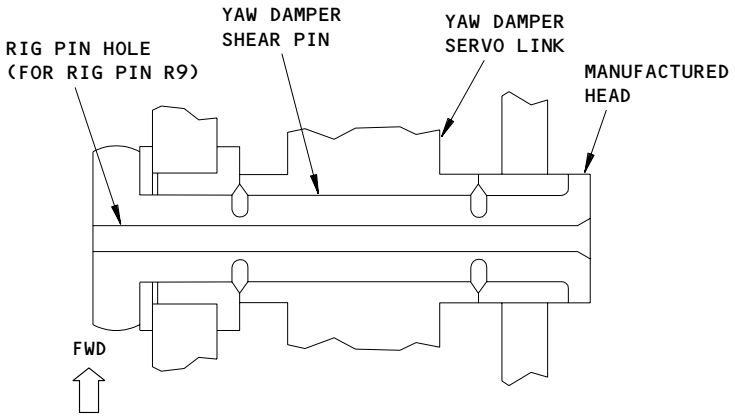
Rudder Ratio Changer and Feel, Centering, and Trim Mechanism
Figure 506 (Sheet 2)

88745

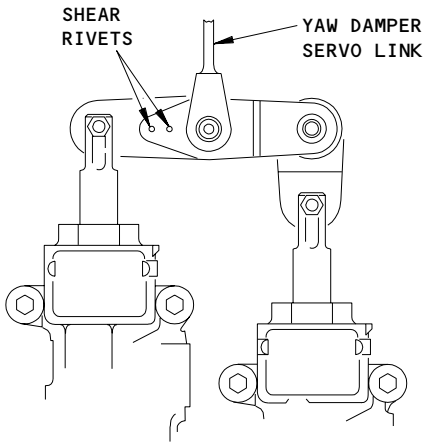


Yaw Damper Mechanism
Figure 507 (Sheet 1)





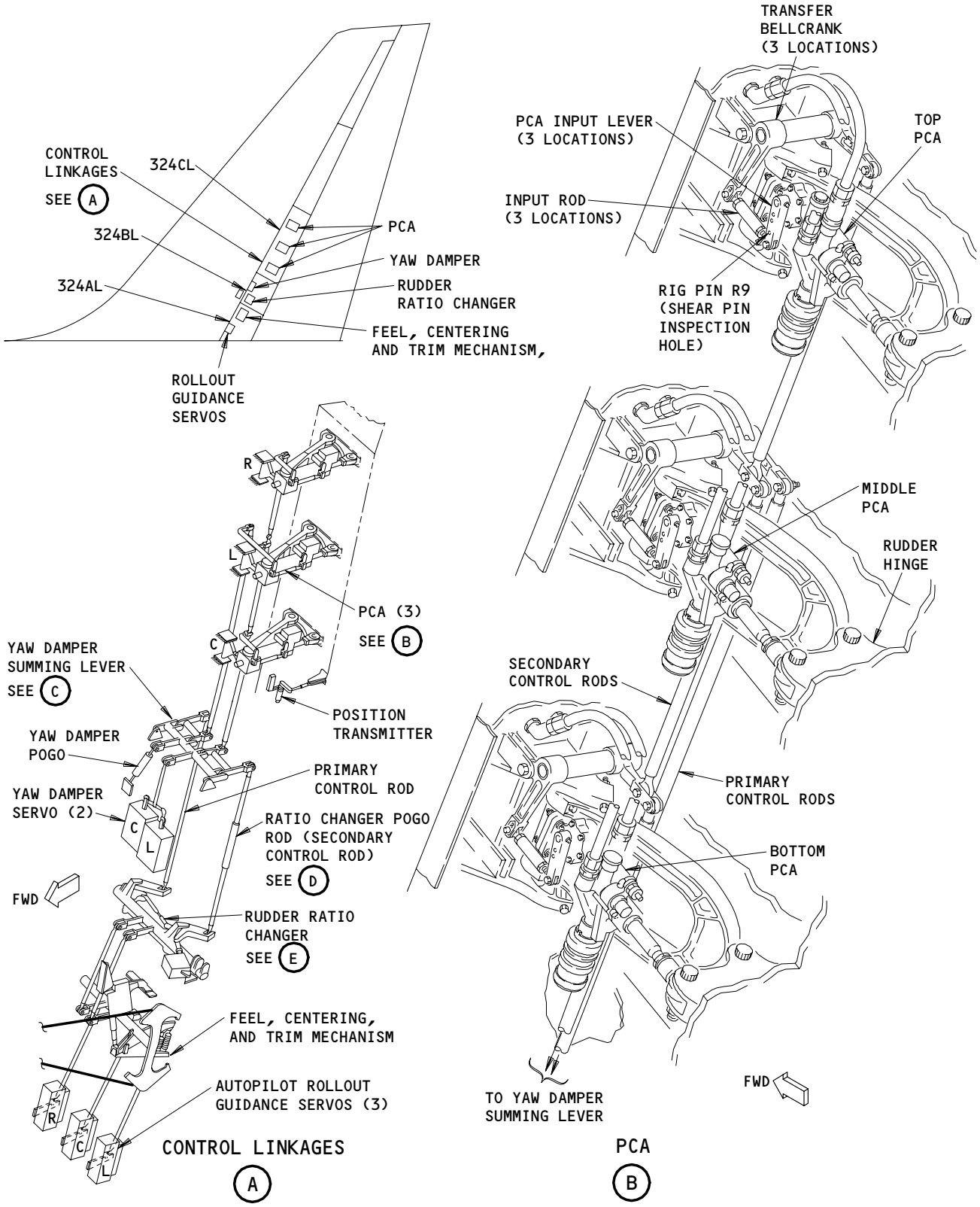
YAW DAMPER SERVO LINK
D 1



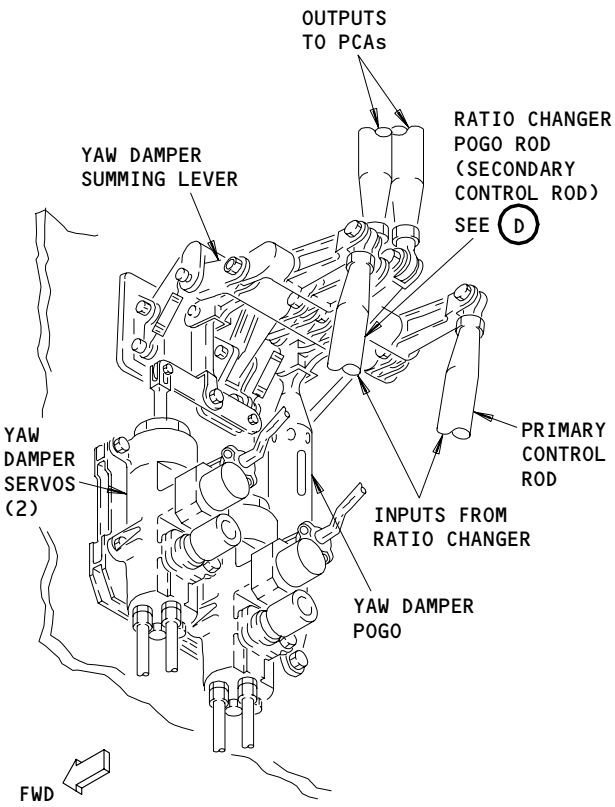
YAW DAMPER SERVO LINK
D 2

1 AIRPLANES WITH SHEAR PINS
2 AIRPLANES WITH SHEAR RIVETS

Yaw Damper Mechanism
Figure 507 (Sheet 2)

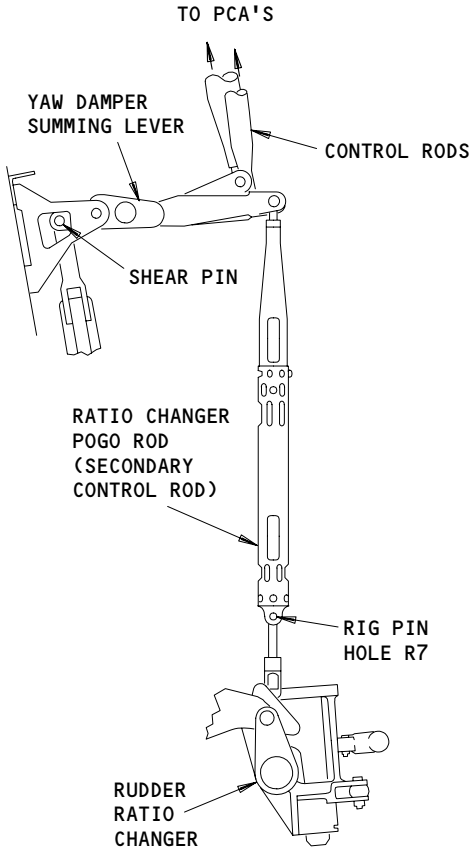


Power Control Actuator (PCA) Adjustment
Figure 508 (Sheet 1)



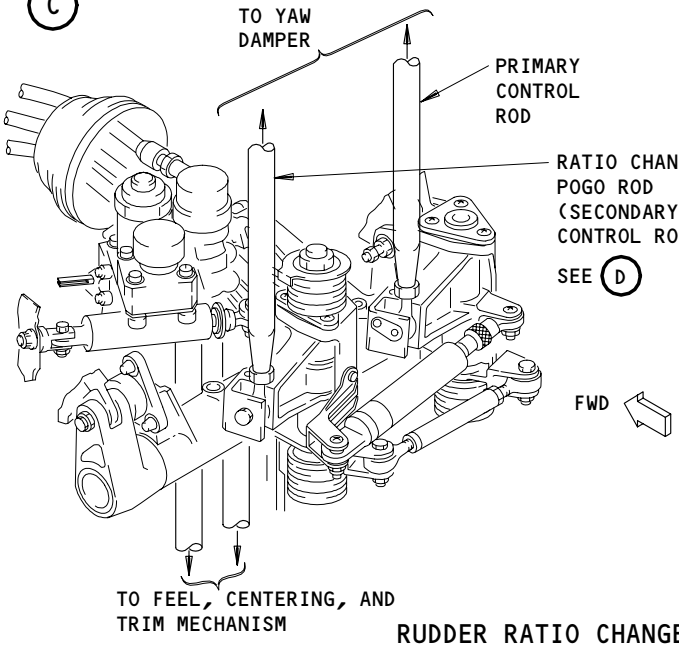
YAW DAMPER SUMMING LEVER

C



RATIO CHANGER
POGO ROD

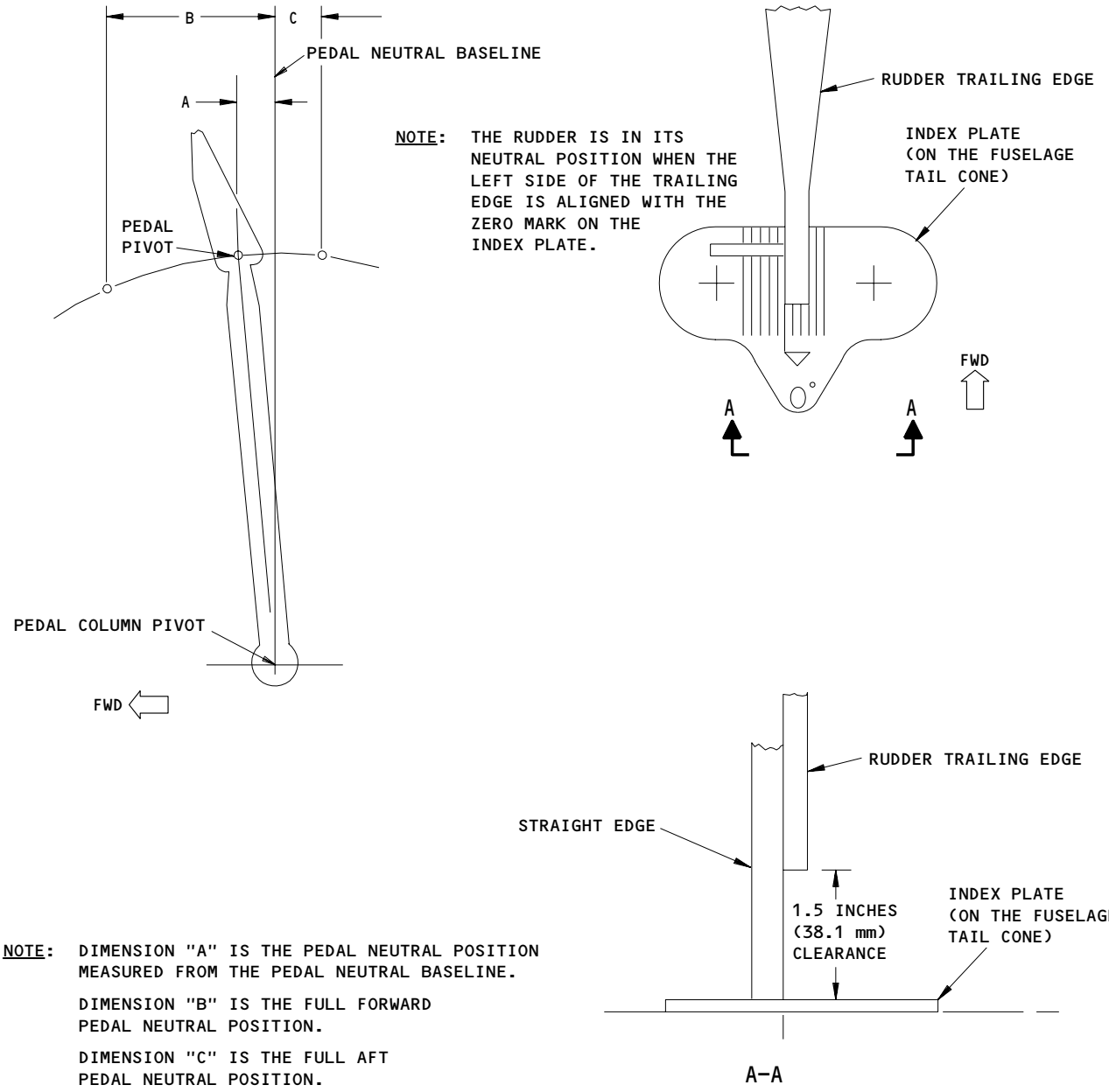
D



RUDDER RATIO CHANGER

E

Power Control Actuator (PCA) Adjustment
Figure 508 (Sheet 2)

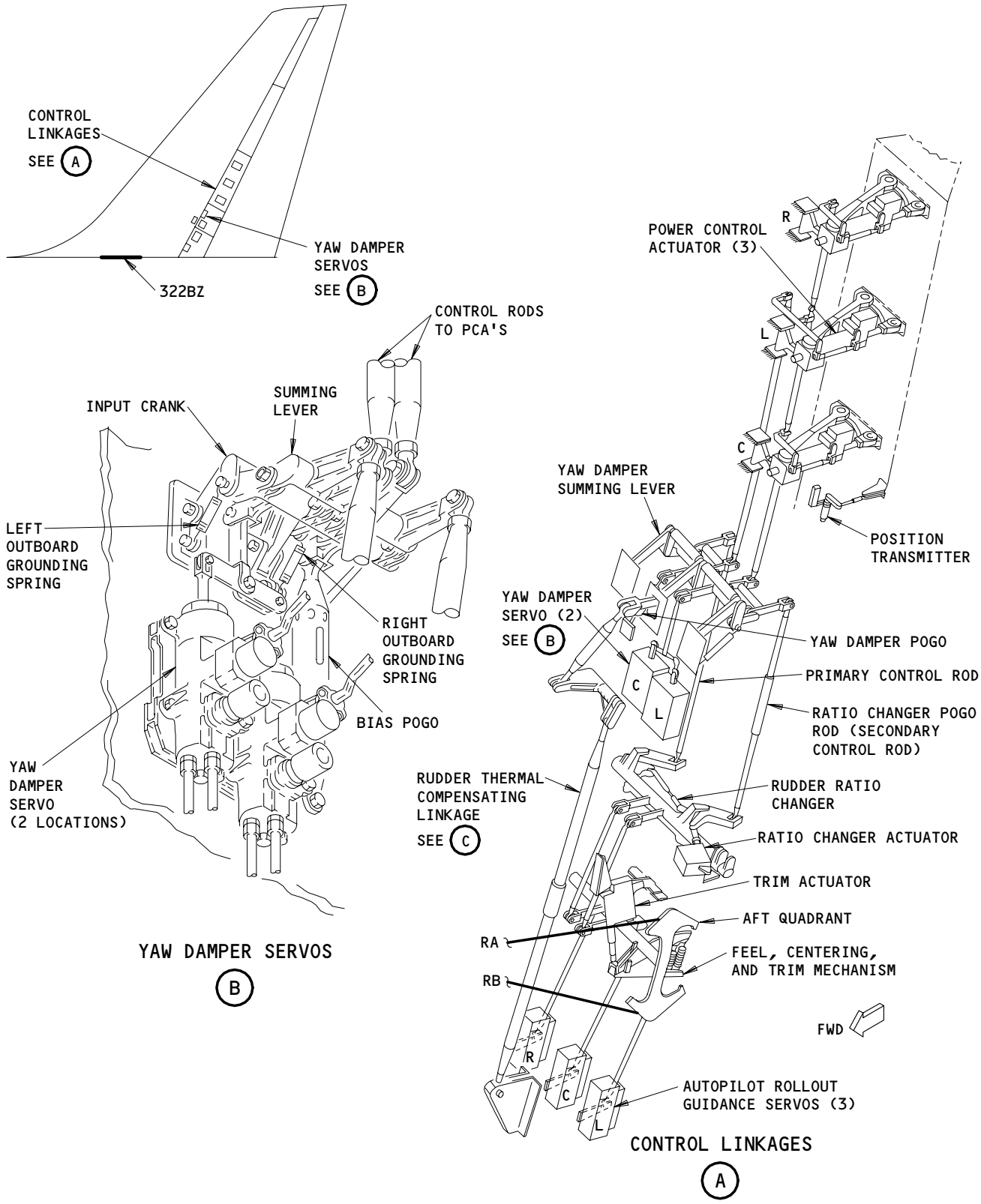


NOTE: DIMENSION "A" IS THE PEDAL NEUTRAL POSITION MEASURED FROM THE PEDAL NEUTRAL BASELINE.

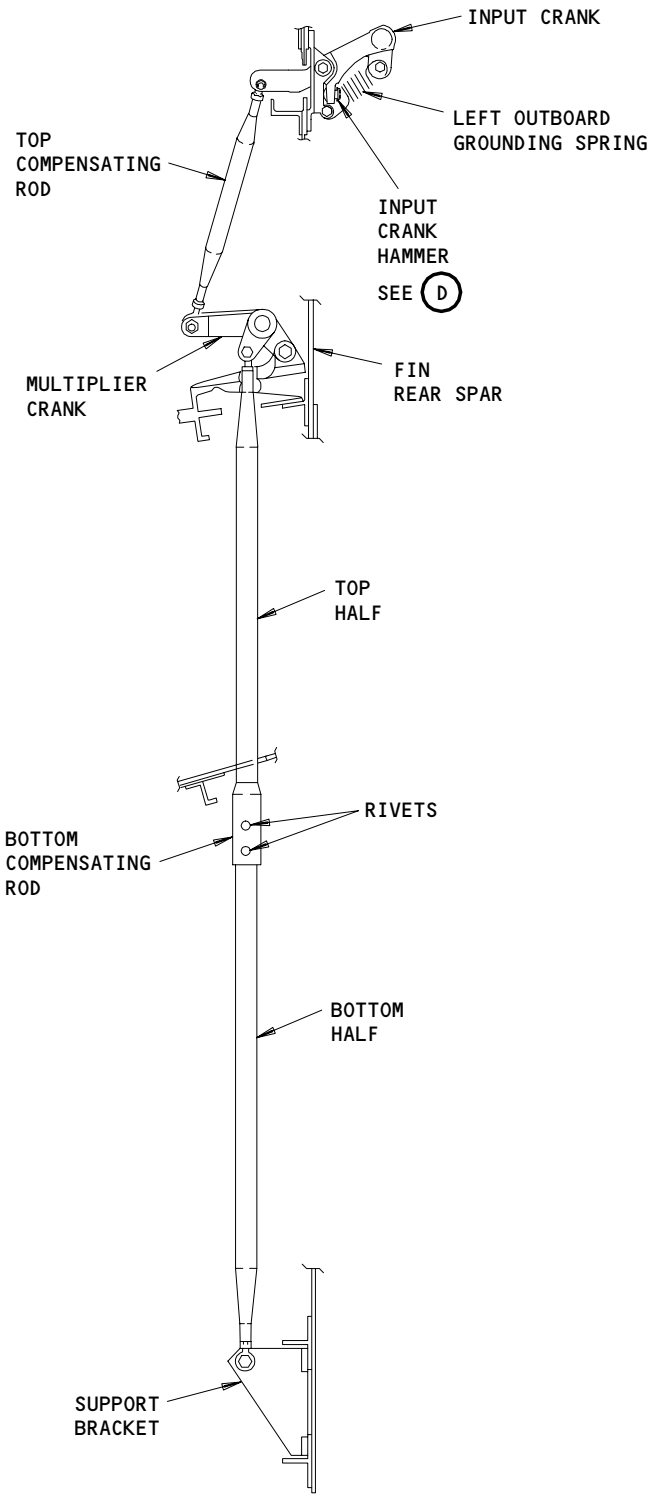
DIMENSION "B" IS THE FULL FORWARD PEDAL NEUTRAL POSITION.

DIMENSION "C" IS THE FULL AFT PEDAL NEUTRAL POSITION.

Rudder and Rudder Trim Control System Test
Figure 509

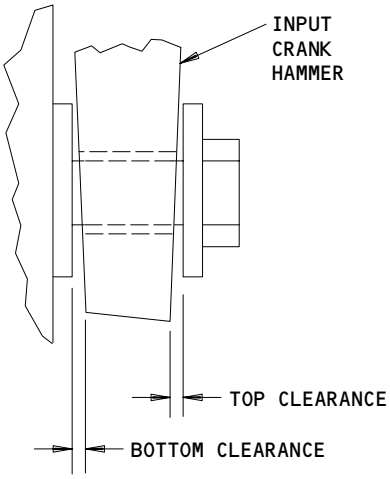


Rudder Thermal Compensating Linkage Adjustment
Figure 510 (Sheet 1)



RUDDER THERMAL COMPENSATING LINKAGE

C



INPUT CRANK HAMMER

D

Rudder Thermal Compensating Linkage Adjustment
Figure 510 (Sheet 2)

S 215-029

WARNING: KEEP ALL PERSONS AND EQUIPMENT AWAY FROM THE NOSE GEAR AND THE RUDDER BEFORE THE RUDDER PEDALS ARE OPERATED. THE RUDDER CAN MOVE QUICKLY AND CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) Apply a light load equally to the two captain's rudder pedals at the same time (approximately 2.5 pounds (11 Newtons) on each pedal) and do these steps:
   (a) Turn the captain's pedal adjustment crank approximately one turn for each second to move the pedals to their full aft position. Do this check:
      1) Make sure the crank and the pedals move smoothly and that the crank does not need too much force.
   (b) Turn the captain's pedal adjustment crank approximately one turn for each second to move the pedals to their full forward position. Do this check:
      1) Make sure the crank and the pedals move smoothly and that the crank does not need too much force.

         NOTE: It is permitted for the pedals to shake lightly during their movement.

   (c) Remove the load from the rudder pedals.

   WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE RUDDER PEDALS ARE OPERATED. THE WHEELS CAN TURN QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

   (d) Operate the rudder pedals through their full travel range and do this check:
      1) Make sure the pedals move smoothly and do not need too much force.
   (e) Release the rudder pedals and do this check:
      1) Make sure the rudder pedals go back to their neutral positions.

S 715-030
(3) Do the rudder pedal test again for the first officer's pedals.

E. Single Hydraulic System - Rudder Control Test

S 865-031
(1) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.

S 865-032

(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
   (a) 11D18 or 11G10, RUD RATIO
   (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (c) 11H18, FLT CONT SHUTOFF TAIL CTR
   (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 215-033

(3) Move the rudder pedals through their full travel range and do this check:
   (a) Make sure the rudder does not move.

S 865-002

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11D18 or 11G10, RUD RATIO
   (b) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 865-034

(5) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch L on the P61 panel to ON. Make sure the correct switch position light is OFF.

S 215-426

(6) Operate the rudder pedals through their full travel range and do these checks:
   (a) Make sure the rudder operates correctly and smoothly in each direction.
   (b) Make sure the rudder position indicator operates correctly and moves to its full scale position in each direction (approximately 30 degrees).

S 865-036

(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(8) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H18, FLT CONT SHUTOFF TAIL CTR

S 865-037

(9) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch C on the P61 panel to ON. Make sure the correct switch position light is OFF.

S 215-038

(10) Move the rudder pedals through their full travel range and do these checks:
(a) Make sure the rudder operates correctly and smoothly in each direction.
(b) Make sure the rudder position indicator operates correctly and moves to its full scale position in each direction (approximately 30 degrees).

S 865-039

(11) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 865-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 865-040

(13) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch R on the P61 panel to ON. Make sure the correct switch position light is OFF.

S 215-041

(14) Move the rudder pedals through their full travel range and do these checks:
   (a) Make sure the rudder operates correctly and smoothly in each direction.
   (b) Make sure the rudder position indicator operates correctly and moves to its full scale position in each direction (approximately 30 degrees).

F. Rudder Trim - Test

S 865-604

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 215-049

(2) Turn the rudder trim switch on the aft electronic control panel, P8, clockwise and then counterclockwise. Hold it there until the rudder movement stops and do these checks:
   (a) Make sure the rudder trim indicator shows at least 15.2 units of trim in the correct direction.
   (b) Make sure the rudder position indicator moves approximately two-thirds of full scale (approximately 22 degrees).

S 215-050

(3) Operate the rudder trim switch until the indicator shows zero units of trim and do this check:
   (a) Make sure the rudder is in its neutral position.

G. Rudder Ratio Changer Modules (RRCMs) - Test

S 865-051
(1) Move the left RRCM test switch on the E3 equipment shelf to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

(a) After 30 seconds, make sure all the RRCM faultballs are black.
1) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

S 215-052
(2) Move the rudder pedals through their full travel range and do this check:
(a) Make sure the rudder position indicator moves approximately one-nineth of full scale (3.3 degrees) at full pedal travel.

S 865-053
(3) Move the left RRCM test switch to NORMAL and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.
1) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

S 865-440
(4) Move the right RRCM test switch on the E4 equipment shelf to TEST and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.
(c) Make sure the rudder position indicator moves approximately one-nineth of full scale (3.3 degrees) at full pedal travel.

S 865-056
(5) Move the right RRCM test switch to NORMAL and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.

H. PCA Monitoring System - Test

S 445-057
(1) Do the activation procedure for the left AC bus (AMM 24-22-00/201).

S 865-058
(2) Push the STATUS switch on the P9 panel to show the STATUS page on the bottom EICAS display.

S 215-059

(3) Move the rudder pedals through their full travel range and do this check:

(a) Make sure the RUDDER PCU message does not come into view on the bottom EICAS display.

S 215-060

(4) Push the STATUS switch on the P9 panel to go out of the STATUS mode. Push the ECS/MSG switch on the P61 panel and do this check:

(a) Make sure a RUD PCU MON message does not come into view on the bottom EICAS display.

S 735-061

(5) Do the yaw damper system test procedure (AMM 22-21-00/501).

I. Put the Airplane Back to Its Usual Condition

S 215-006

CAUTION: IF THE RRCM TEST SWITCH IS NOT MOVED TO "NORMAL", THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. IF THIS LIGHT IS ON, THE AIRPLANE CANNOT BE DISPATCHED.

(1) Make sure the RRCM test switches are in their NORMAL positions.

S 865-062

(2) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-063

(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-21-00-825-064

3. Adjustment - Rudder and Rudder Trim Control System

A. General

(1) SYSTEM ADJUSTMENT SEQUENCE — This task adjusts the rudder control system and its components in the sequence that follows. This sequence is recommended for a complete system adjustment:

ADJUSTMENT	COMPONENT/MECHANISM
F	Control Cables RA and RB
G	Rudder Pedals and Jackshafts
H	Rudder Ratio Changer Actuator (RRCA)
I	Rudder Ratio Changer LVDT
J	Rudder Thermal Compensating Linkage
K	Yaw Damper Pogo
L and M	Rudder Ratio Changer and Power Control Actuators (PCA)
N	Autopilot Rollout Guidance Servos
O	Rudder Position Transmitter
P	Rudder Trim Indicator

(2) OUT OF SEQUENCE ADJUSTMENTS - It is possible to adjust some components in a different sequence. You must do some other adjustments before the component adjustment and some adjustments after it is done. The necessary adjustments are as follows:

ADJUSTMENT	COMPONENT YOU WILL ADJUST OUT-OF-SEQUENCE	ADJUSTMENTS YOU MUST DO BEFORE	ADJUSTMENTS YOU MUST DO AFTER
F	Control Cables RA and RB	NONE	NONE
G	Rudder Pedals and Jackshafts	NONE	NONE
H	Rudder Ratio Changer Actuator	NONE	NONE
I	Rudder Ratio Changer LVDT	NONE	NONE
J	Rudder Thermal Compensating Linkage	NONE	NONE
K	Yaw Damper Pogo	NONE	NONE
L and M	Rudder Ratio Changer and PCAs	G,I *[1]	NONE
N	Autopilot Rollout Guidance Servos	NONE	NONE
O	Rudder Position Transmitter	F,G,I,L	NONE
P	Rudder Trim Indicator	F,G,I,L	NONE

*[1] It is not necessary to do this adjustment if you did not disturb the rudder pedals and jackshafts or the rudder ratio changer LVDT.

B. Equipment

(1) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
- (a) E/ST6 - P/N B20003-21
- (b) E/ST7 - P/N B20003-21
- (c) R1A - P/N B20003-26
- (d) R1B - P/N B20003-26
- (e) R2 - P/N B20003-22
- (f) R3 - P/N B20003-16
- (g) R5 - P/N B20003-17
- (h) R6 - P/N B20003-17
- (i) R7 - P/N B20003-13
- (j) R8 - P/N B20003-13

(k) R9 - P/N B20003-54

(2) Nose Gear Towing Lever Lockpin - A09003-1

(3) Cable Tensiometer, Commercially Available

C. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-42-00/201, Empennage Access Doors and Panels
(3) AMM 20-10-03/401, Control Cables
(4) AMM 20-10-24/201, Rig Pins
(5) AMM 22-13-01/401, Autopilot Rollout Guidance Servo
(6) AMM 24-22-00/201, Electrical Power - Control
(7) AMM 27-21-12/201, Rudder Ratio Changer Mechanism
(8) AMM 27-21-13/201, Ratio Changer Actuator
(9) AMM 27-28-00/501, Rudder Position Indicating System
(10) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

113 Area Forward of the NLG Wheel Well
119 Main Equipment Center
211/212 Control Cabin
324 Vertical Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels

113AL Flight/Landing Gear/Engine Control Components
119BL Main Equipment Center
311AL Control Cables
322BZ Lower Forward Torque Box
324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCAs

E. Prepare for Adjustment

S 865-065

(1) Supply electrical power (AMM 24-22-00/201).

S 865-066

(2) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.

S 865-067

(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11A18, YAW DAMPER LEFT
(b) 11C10, RUD TRIM
(c) 11F34, YAW DAMPER RIGHT
(d) 11H17, FLT CONT SHUTOFF TAIL LEFT
(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(g) 11J17, RUDDER TRIM POS

S 865-068

(4) Move the YAW DMPR switches on the pilot's overhead panel, P5, to INOP. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.

S 015-069

(5) Open these access panels and doors (AMM 06-42-00/201):
  (a) 324AL to get access to the aft quadrant, feel, centering, and trim mechanism and the autopilot rollout guidance servos.
  (b) 324BL to get access to the ratio changer mechanism, the yaw damper summing lever, and the rudder position transmitter.
  (c) 324CL to get access to the bottom, middle, and top power control actuators (PCAs).

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOU WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

  (d) 311AL to get access to rig pin hole E/ST7.
  (e) 322BZ to get access to the rudder thermal compensating linkage.

S 015-070

(6) Open these access doors (AMM 06-41-00/201):
  (a) 113AL to get access to rig pin holes R1A, R1B, and E/ST6.
  (b) 119BL to get access to the left and right rudder ratio changer modules (RRCMs).

S 495-071

(7) Install these rig pins to prevent elevator movement (Fig. 502):
  (a) E/ST6 (for the control column)
  (b) E/ST7 (for the elevator feel unit)

S 495-072

(8) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 503).

F. Rudder Control Cables RA and RB - Adjustment (Fig. 504)

NOTE: See AMM 20-10-03/401 for Control Cables Removal/Installation instructions.

S 825-074

CAUTION: KEEP SOME TENSION IN THE CONTROL CABLES AT ALL TIMES. THIS WILL KEEP THE CONTROL CABLES ON THEIR PULLEYS AND PREVENT INCORRECT CABLE OPERATION. IF THE TENSION IS REMOVED, A FULL INSPECTION OF THE CONTROL CABLE SYSTEM MUST BE DONE.

(1) Adjust the turnbuckles to decrease the tension in cables RA and RB.

NOTE: Use access door 311AL to get access to the turnbuckles.

S 825-075

(2) Turn the rudder trim switch on the aft electronic control panel, P8, until rig pin R3 (for the feel, centering, and trim mechanism) can be easily installed and removed.

S 495-076

(3) Install rig pin R2 (for the left forward quadrant).

S 825-077

(4) Do these steps if new cables were installed:
   (a) Adjust the tension in cables RA and RB at the same time to 300 ±18 pounds (1334 +/- 80 Newtons) and do this check:
      1) Make sure that rig pin R3 (for the feel, centering, and trim mechanism) can be easily installed and removed.
   (b) Adjust the pressure seals at the aft pressure bulkhead if the cables are bent.
   (c) Remove rig pins R2 and R3.
   (d) Move the rudder pedals through their full travel range 25 times and do these checks:
      1) Make sure the aft quadrant moves counterclockwise when the left rudder pedal is pushed.
      2) Make sure the cables are not bent by the fairleads, rubstrips, or grommets that are in the cable system.
      3) Make sure the cables do not touch the flanges of the pulleys or quadrants.
      4) Make sure the pulleys turn freely and do not touch their guards.
   (e) Install rig pins R2 and R3.

S 825-078

(5) Adjust the tension in cables RA and RB to the value shown (Fig. 504) and do this check:
   (a) Make sure that rig pins R2 and R3 can move freely in their holes.

S 095-079

(6) Remove rig pins R2 and R3.

S 225-425

CAUTION: AVOID RUDDER SURFACE TRAVEL TO THE EXTREME FAR LEFT POSITION PRIOR TO OR DURING RUDDER ADJUSTMENT. FULL LEFT TRAVEL OF THE RUDDER BEFORE RIGGING COMPLETION RESULTS IN FULL RETRACTION OF THE PCA'S. THIS MAY CAUSE SURFACE CONTACT BETWEEN THE RUDDER LEADING EDGE AND A PCA.

(7) Move the rudder pedals through their full travel range and do these checks:
  (a) Make sure the cable tension is correct (Fig. 504).
  (b) Make sure the turnbuckles are at least 1.0 inch (25.4 mm) away from the fairleads, grommets, and pulleys at all times.

S 435-081

(8) Install cliplocks on the turnbuckles.

G. Rudder Pedals and Jackshafts - Adjustment (Fig. 505)

S 825-082

(1) Do these steps to set the rudder pedals for adjustment:
  (a) Turn the captain's pedal adjustment crank clockwise until the jackshaft is in its full forward pedal position. Then turn it counterclockwise 3.6 turns and put it in its nearest detent position.
  (b) Do the above step again for the first officer's pedals.

S 015-083

(2) Remove the rudder pedal housing covers (Fig. 505).

S 035-084

(3) Disconnect the rudder pedal pushrods from the captain's and the first officer's rudder pedal arms.

S 495-085

(4) Operate the rudder trim switch if it is necessary and install these rig pins:
  (a) R2 (for the left forward quadrant)
  (b) R3 (for the aft quadrant)

S 825-086

(5) Do these steps to adjust the captain's pedals and jackshaft:
  (a) Install rig pin R1A for the captain's rudder pedal arms or R1B for the first officer's rudder pedal arms (Fig. 505).
  (b) Loosen the jamnuts for the rudder pedal pushrods.
  (c) Adjust the pushrods until the bolts that connect the pushrods to the pedal arms can be easily installed.
  (d) Connect the pushrods to the rudder pedal arms, and tighten the jamnuts.

(e) Remove rig pin R1A or R1B.

S 825-087

(6) Do the above steps on the first officer's side to adjust the first officer's rudder pedals and jackshaft.

S 095-088

(7) Remove rig pins R2 and R3.

S 415-089

(8) Install the rudder pedal housing covers.

S 225-308

(9) Operate the rudder pedals and make sure the forward quadrant touches its stops in each direction.

NOTE: Use sufficient force on the rudder pedals to stretch the control cables. This will let the forward quadrant touch its stops.

H. Rudder Ratio Changer Actuator (RRCA) - Oscillation Check

S 495-400

(1) Install rig pin R3 (for the feel, centering, and trim mechanism).

S 865-401

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply pressure to the left hydraulic system (AMM 29-11-00/201).

S 865-405

(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 865-404

(4) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch L on the P61 panel to ON.

S 865-403

(5) Move the left RRCM test switch on the E3 equipment shelf to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.
(c) Observe the RRCA and Rudder Ratio Changer Output Arms for oscillations. If any oscillations are noted, troubleshoot and correct the oscillation before you complete this procedure.

S 095-614

(6) Remove rig pin R3.

S 865-616

(7) Move the Left RRCM test switch to NORMAL.

S 865-408

(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-409

(9) Move the L FLT CONTROL SHUTOFF switch on the P61 panel to OFF. Install a DO-NOT-OPERATE tag and make sure the switch position light comes ON.

S 865-410

(10) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

I. Rudder Ratio Changer LVDT - Adjustment (Fig. 506)

S 495-090

(1) Turn the rudder trim switch on the aft electronic control panel P8 until rig pin R3 (for the feel, centering, and trim mechanism) can be easily installed.

S 865-009

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply pressure to the left hydraulic system (AMM 29-11-00/201).

S 865-091
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 865-092
(4) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch L on the P61 panel to ON.

S 865-415
(5) Do these steps to extend the rudder ratio changer actuator:
(a) Move the left RRCM test switch on the E3 equipment shelf to TEST.

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.

S 825-397
(6) AIRPLANES WITH THE -2 LVDT;
Loosen the LVDT adjustment nut and adjust the LVDT until rig pins R5 and R6 can be easily installed at the same time.
(a) If rig pin R5 cannot be installed easily, adjust the RRCA support clevis shims (AMM 27-21-12/201).
(b) If rig pin R6 cannot be installed easily with rig pin R5 in place, adjust the interconnect rod.

S 825-398
(7) AIRPLANES WITH THE -3 LVDT;
Turn the barrel of the LVDT to adjust the LVDT until rig pins R5 and R6 can be easily installed at the same time.
(a) If rig pin R5 cannot be installed easily, adjust the RRCA support clevis shims (AMM 27-21-12/201).
(b) If rig pin R6 cannot be installed easily with rig pin R5 in place, adjust the interconnect rod.

S 865-399
(8) Do these steps to make sure the rudder ratio changer actuator is fully extended.
(a) Remove rig pins R5 and R6.
(b) Put the RRCM to the TEST position.
(c) Measure and write down the actuator extension length.
(d) Adjust the LVDT to fully extend the RRCA.

(e) When the RRCA is at full stroke (at its maximuim extension), measure and write down the actuator extension length.
(f) Compare the first actuator extension measurement with the second actuator extension measurement.
1) The greater actuator extension measurement must be 0.02 - 0.04 inches (0.5-1.0 mm) more than the first actuator extension measurement.
2) If it is necessary, Add or remove shims until the greater actuator extension measurement is 0/02 - 0.04 inches (0.5-1.0 mm) more than the small actuator extension measurement.
(g) Do the step (6) or (7) again to adjust the LVDT.

S 435-095
(9) Lock the LVDT with wire.

S 095-096
(10) Remove rig pins R5 and R6.

S 865-097
(11) Move the left RRCM test switch to NORMAL and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.

S 865-098
(12) Move the right RRCM test switch on the E4 equipment shelf to TEST and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.

S 215-099
(13) Make sure that rig pins R5 and R6 can be easily installed at the same time. If they cannot be installed at the same time, replace the LVDT (AMM 27-21-12/201).

S 095-624
(14) Remove rig pins R3, R5, and R6.

S 865-100
(15) Move the right RRCM test switch to NORMAL and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.

S 865-101
(16) Remove the power from the left hydraulic system (AMM 29-11-00/201).

J. Rudder Thermal Compensating Linkage - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

S 825-104
(1) Adjust the top compensating rod until these conditions are satisfactory:
(a) Make sure the top and bottom gaps on the input crank hammer are not more than 0.09 inch (2.3 mm) (Fig. 510).
(b) Make sure the top and bottom gaps of the input crank hammer are the same (use a tolerance of ±0.01 inch (+/- 0.25 mm)).

S 435-105
(2) Tighten the jamnuts and do this check:
(a) Make sure that control rod threads can be seen in at least one-half of the control rod inspection hole.

K. Yaw Damper Pogo - Adjustment (Fig. 507)

S 865-106
(1) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-107
(2) Move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.

S 865-108
(3) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 215-109
(4) AIRPLANES WITH SHEAR PINS;
Make sure that rig pin R9 can be easily installed through the inspection hole in the yaw damper shear pin (Fig. 507).

NOTE: If rig pin R9 can not be installed through the shear pin, you must examine it for damage.

S 215-619
(5) AIRPLANES WITH SHEAR RIVETS;
Make sure that rig pin R9 can be easily installed through the inspection hole that is located below the yaw damper shear rivets (Fig. 507).

NOTE: If rig pin R9 can not be installed through the inspection hole, you must examine the shear rivets for damage.

S 825-110
(6) Make sure that rig pin R8 can be installed in the yaw damper pogo. Do these steps if it can not be installed:
(a) Adjust the yaw damper pogo until rig pin R8 can be installed.
(b) Tighten the jamnuts.

L. Prepare to Adjust the Ratio Changer Mechanism and the Rudder Power Control Actuators (PCAs) (Fig. 506 and 508)

S 215-111
(1) Make sure the FLT CONTROL SHUTOFF switches L, R, and C on the P61 panel are OFF. Make sure the DO-NOT-OPERATE tags are attached.

S 045-112
(2) Do these steps to deactivate the yaw damper servos:
(a) Move the yaw damper switches on the P5 panel to their INOP position.
(b) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11A18, YAW DAMPER LEFT
2) 11F34, YAW DAMPER RIGHT

S 865-113
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C10, RUD TRIM

S 495-114
(4) Operate the rudder trim switch on the P8 panel and install this rig pin:
(a) R3 (for the aft quadrant)

NOTE: Rig pin R3 will stay installed during the adjustment procedure.

S 215-115
(5) Make sure you can install rig pin R9 through the shear pin inspection holes in these components:

NOTE: This examines the shear pins for damage. Replace the shear pin if the rig pin does not go through the inspection hole.

(a) The Rudder PCA input lever (View B, Fig. 508)
(b) AIRPLANES WITH SHEAR PINS;
The Yaw damper linkage (View A-A, Fig. 507)
(c) The ratio changer output crank (View C, Fig. 506).

S 215-620
(6) AIRPLANES WITH SHEAR RIVETS;
Make sure that rig pin R9 can be easily installed through the inspection hole that is located below the yaw damper shear rivets (Fig. 507).

NOTE: If rig pin R9 can not be installed through the inspection hole, you must examine the shear rivets for damage.

S 865-392

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Supply pressure to the left hydraulic system (AMM 29-11-00/201).

S 865-391
(8) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 865-395
(9) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch L on the P61 panel to ON.

S 865-116
(10) Move the left RRCM test switch on the E3 equipment shelf to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come on and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.
1) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

S 865-393
(11) Remove the power from the left hydraulic systems (AMM 29-11-00/201).

S 865-396
(12) Move the FLT CONTROL SHUTOFF L switch on the P61 panel to OFF. Attach a DO-NOT-OPERATE tag and make sure the switch position lights come ON.

S 865-394
(13) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

M. Rudder Ratio Changer Mechanism and Rudder PCAs - Adjustment

S 825-117
(1) Pogo Rod for the Ratio Changer - Adjustment (Fig. 508)
(a) Do these steps if you cannot easily install and remove rig pin R7 in the ratio changer pogo:
1) Loosen the jamnut at the bottom end of the pogo rod.
2) Adjust the length of the pogo rod until you can easily install rig pin R7.
3) Tighten the jamnut.
4) Make sure you can see rod end threads in at least one-half of the inspection hole for the pogo rod.
5) Remove rig pin R7.

S 825-010
(2) Pogo Rod for the Yaw Damper - Adjustment (Fig. 507)
(a) Do these steps if you cannot easily install and remove rig pin R8 in the yaw damper pogo:
1) Loosen the jamnut at the bottom end of the pogo rod.

2) Adjust the length of the pogo rod until you can easily install rig pin R8 in the yaw damper pogo.
3) Tighten the jamnut and lock it with a wire.
4) Make sure you can see rod end threads in at least one-half of the inspection hole for the pogo rod.
5) Remove rig pin R8.

S 225-311

(3) Rudder Ratio Changer Actuator - Check

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Disconnect the input rods for the top and bottom PCA input levers.
(b) Supply pressure to the left hydraulic system only (AMM 29-11-00/201).

NOTE: IF CENTER OR RIGHT HYDRAULIC SYSTEM IS PRESSURIZED, THE RUDDER CAN MOVE.

(c) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
(d) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF L switch on the P61 panel to ON.
(e) Move the left RRCM test switch to NORMAL and do these checks:

NOTE: The ratio changer will move to its low speed position.

1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.

3) Move the input levers for the top and bottom PCA fully clockwise at the same time then release.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(f) Do these steps if the rudder trailing edge is more than 0.20 inch away from its neutral position:
1) Loosen the jamnut on the input rod for the middle PCA.
2) Do these steps to move the rudder to a position that is right of neutral approximately 0.50 inch (12.7 mm):
a) Manually move then hold the input levers for the top and bottom PCAs in their full clockwise positions.

NOTE: This will remove the unwanted hydraulic pressure from the top and bottom PCAs.

Continue to hold the top and bottom PCAs while you adjust the middle PCA to move the rudder in the right direction.

b) Adjust the middle PCA input rod until the rudder is approximately 0.50 inch (12.7 mm) to the right of its neutral position.

NOTE: Each of the two rod end bearings of the input rod has right hand threads. To make the length of the input rod shorter (move the rudder trailing edge to the right), turn the body tube in the rod end of the large diameter thread. To make the length of the input rod longer (move the rudder trailing edge to the left), turn the body tube in the rod end of the small diameter thread.

c) Release the top and bottom input levers.
3) Adjust the input rod for the middle PCA until the rudder trailing edge is no more than 0.20 inch (5.1 mm) away from its neutral position.

NOTE: During the PCA adjustment, always move the rudder from right to left. If the trailing edge is accidentally moved too far left, do the above step again.

Because the rudder is adjusted from right to left, the input levers for the top and bottom PCAs do not have to be moved to release hydraulic pressure.

(g) Put tape on the tail cone index plate and make a mark of the rudder position (use the left side of the rudder trailing edge, this is the low speed position).
(h) Move the left RRCM test switch to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.
3) Make sure you can easily install and remove rig pins R5 and R6 in the ratio changer mechanism.

NOTE: If you cannot install rig pins R5 and R6, do the "Rudder Ratio Changer LVDT - Adjustment" steps (AMM 27-21-00/501).

(i) Move the input levers for the top and bottom PCAs fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(j) Use the tape on the tail cone and make a mark of the rudder position (use the left side of the rudder trailing edge, this is the high speed position).
(k) If this mark is less than 0.05 inch (1.27 mm) away from the first mark, do not do the "Rudder Ratio Changer System - Adjustment" group of steps.
(l) If this mark is more than 0.05 inch (1.27 mm) away from the first mark, do the "Rudder Ratio Changer System - Adjustment" group of steps.

S 825-119
(4) Rudder Ratio Changer System - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

S 745-553

(5) Move the left RRCM test switch to NORMAL and do these checks:
  (a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
    1) After 30 seconds, make sure all the RRCM faultballs are black.
  (b) Move the input levers for the top and bottom PCA fully clockwise at the same time.

    NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

  WARNING: DO NOT DISCONNECT THE TWO INPUT RODS FOR THE RATIO CHANGER AT THE SAME TIME WITH HYDRAULIC POWER ON. THE RUDDER WILL MOVE QUICKLY TO ITS FULL LEFT POSITION AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

  (c) Disconnect the outboard (right) input rod from the ratio changer mechanism (Fig. 506).
  (d) Loosen the jamnuts on the top end of the inboard (left) input rod for the ratio changer.
  (e) Adjust the inboard (left) input rod until the rudder trailing edge is less than 0.05 inch (1.27 mm) away from the second mark (high speed position) on the tape.

    NOTE: Make sure the rudder moves from right to left during the adjustment.

      Move the top and bottom PCA input levers fully clockwise to release hydraulic pressure if it is necessary.

  (f) Tighten the jamnut on the inboard (left) input rod and do these checks:
    1) Make sure you can see control rod threads in at least one-half of the inspection hole for the input rod.
    2) Make sure the rudder position did not change.
  (g) Do these steps to examine the input rod adjustment:
    1) Use some new tape on the tail cone and make a mark of this "low speed" rudder position.

      NOTE: Use the left side of the rudder trailing edge.

2) Move the left RRCM test switch to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
b) After 30 seconds, make sure all the RRCM faultballs are black.

3) Move the input levers for the top and bottom PCAs fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

4) Make a mark on the tape for this "high speed" rudder position (use the left side of the rudder trailing edge).
5) Make sure that the "low speed" mark is no more than 0.05 inch away from the "high speed" mark.
6) If the distance between the marks is more than 0.05 inch (1.27 mm), do the "Rudder Ratio Changer System - Adjustment" group of steps again.

WARNING: DO NOT MOVE THE INPUT LINKAGE WHEN YOU INSTALL THE OUTBOARD (RIGHT) INPUT ROD. IF THE INPUT LINKAGE MOVES, THE RUDDER WILL MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(h) Adjust the outboard (right) input rod until you can easily install the bolt with a light force and do these steps:

NOTE: Do not move the PCA input levers when you do the adjustment. The rudder trailing edge will move, and the rudder datum position will change.

1) Tighten the jamnut for the outboard input rod.
2) Connect the outboard input rod to the ratio changer crank.
3) Make sure you can see control rod threads in at least one-half of the inspection hole for the input rod.

(i) Remove the tape from the tail cone.
(j) Move the left RRCM test switch to NORMAL and do these checks:
1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.

(k) Move the input levers for the top and bottom PCAs fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(l) Put new tape on the tail cone index plate and make a mark of the rudder position (use the left rudder trailing edge).

(m) Move the left RRCM test switch to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

1) Make sure the IN TEST light stays on for a maximum of than 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.

(n) Move the input levers for the top and bottom PCAs fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(o) Make a mark of the rudder position on the tape.

NOTE: Use the left side of the rudder trailing edge.

(p) Do these steps if the distance between the marks is more than 0.05 inch (1.27 mm):

1) Move the left RRCM test switch to NORMAL and do these checks:
   a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
   b) After 30 seconds, make sure all the RRCM faultballs are black.
2) Loosen the jamnuts on the top end of the outboard (right) input rod. Keep a loose fit on the top rod end bolt.
3) Adjust the outboard (right) input rod until the rudder trailing edge is less than 0.05 inch (1.27 mm) away from the "high speed" mark.

   NOTE: Make sure you move the rudder from right to left during the adjustment. Move the top and bottom PCA input levers fully clockwise to release hydraulic pressure if it is necessary.

4) Tighten the input rod jamnuts and do this check:
   a) Make sure you can see input rod threads in at least one-half of the inspection hole for the input rod.

5) Use new tape and make a mark of the rudder position on the tail cone index plate (use the left side of the rudder trailing edge).
6) Move the left RRCM test switch to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
b) After 30 seconds, make sure all the RRCM faultballs are black.
7) Move the input levers for the top and bottom PCAs fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

8) Make a mark of the rudder position on the tape

NOTE: Use the left side of the rudder trailing edge.

9) Make sure the distance between the two marks (low speed and high speed rudder positions) is less than 0.05 inch (1.27 mm).

(q) Do the above step again if the distance is more than 0.05 inch (1.27 mm).
(r) Remove the tape from the tail cone.

S 825-120
(6) Middle PCA - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

(a) Move the left RRCM test switch to NORMAL and do these checks:
1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.
(b) Make sure only the left hydraulic system has power (AMM 29-11-00/201).

(c) Do these steps to adjust input rod for the middle PCA:
1) Hold the input levers for the top and bottom PCAs fully clockwise.

NOTE: This will remove the unwanted hydraulic pressure from the top and bottom PCAs.

2) Adjust the input rod for the middle PCA until the rudder is approximately 0.50 inch (12.7 mm) to the right of its neutral position.
3) Release the top and bottom input levers.
4) Adjust the input rod for the middle PCA until the rudder trailing edge is in its neutral position (use a tolerance of 0.05 inch (1.27 mm)).

NOTE: Make sure you move the rudder from right to left when the adjustment is done.

5) Tighten the jamnuts on the middle PCA input rod and do these checks:
a) Make sure the rudder position does not change.
b) Make sure you can see input rod threads in at least one-half of the inspection hole for the input rod.

(d) Remove the power from the left hydraulic system (AMM 29-11-00/201).
(e) Move the FLT CONTROL SHUTOFF L switch on the P61 panel to OFF. Attach a DO-NOT-OPERATE tag and make sure the switch position light comes ON.
(f) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT

WARNING: DO NOT DISCONNECT THE THREE PCA INPUT RODS AT THE SAME TIME WITH HYDRAULIC POWER ON. THE RUDDER WILL MOVE QUICKLY TO ITS FULL LEFT POSITION AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(g) Make sure the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel are OFF.
(h) Connect the input rod for the bottom PCA to its input lever.
(i) Disconnect the input rod for the middle PCA from its input lever.

S 825-121

(7) Bottom PCA - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

(a) Supply pressure to the center hydraulic system only (AMM 29-11-00/201).
(b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF C switch on the P61 panel to ON.
(d) Move the input levers for the top and middle PCA fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(e) Make sure the rudder trailing edge is no more than 0.05 inch (1.27 mm) away from its neutral position.
(f) Do these steps if the rudder trailing edge is more than 0.05 inch away from its neutral position:
1) Loosen the lock nut on the input rod for the bottom PCA.
2) Do these steps to move the rudder right of neutral approximately 0.50 inch (12.7 mm):
a) Hold the input levers for the top and middle PCAs fully clockwise.

NOTE: This will remove the unwanted hydraulic pressure from the top and middle PCAs.

b) Adjust the input rod for the bottom PCA until the rudder is approximately 0.50 inch (12.7 mm) to the right of its neutral position.
c) Release the input levers for the top and middle PCAs.
3) Adjust the input rod for the bottom PCA until the rudder is in its neutral position.

NOTE: Always move the rudder from right to left during the adjustment.

4) Tighten the jamnut for the input rod and do these checks:
a) Make sure the rudder position does not change.
b) Make sure you can see input rod threads in at least one-half of the inspection hole for the input rod.

(g) Remove the power from the center hydraulic system (AMM 29-11-00/201).
(h) Move the FLT CONTROL SHUTOFF C switch on the P61 panel to OFF. Attach a DO-NOT-OPERATE tag and make sure the switch position light comes on.
(i) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11H18, FLT CONT SHUTOFF TAIL CTR
(j) Make sure the FLT CONTROL SHUTOFF switches L, R, and C on the P61 panel are OFF.

WARNING: DO NOT DISCONNECT THE THREE PCA INPUT RODS AT THE SAME TIME WITH HYDRAULIC POWER ON. THE RUDDER WILL MOVE QUICKLY TO ITS FULL LEFT POSITION AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(k) Connect the input rod for the top PCA to its input lever.
(l) Disconnect the input rod for the bottom PCA from its input lever.

S 825-122
(8) Top PCA - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

(a) Supply pressure to the right hydraulic system (AMM 29-11-00/201).
(b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(c) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF R switch on the P61 panel to ON.
(d) Move the input levers for the middle and bottom PCA fully clockwise at the same time.

NOTE: This is to release unwanted hydraulic pressure and will let the rudder position become stable.

(e) Make sure the rudder trailing edge is no more than 0.05 inch (1.27 mm) away from its neutral position.
(f) Do these steps if the rudder trailing edge is more than 0.05 inch away from its neutral position:
1) Loosen the lock nut on the input rod for the top PCA.

2) Do these steps to move the rudder right of neutral approximately 0.50 inch (12.7 mm):
   a) Hold the input levers for the middle and bottom PCAs fully clockwise.

      NOTE: This will remove the unwanted hydraulic pressure from the middle and bottom PCAs.

   b) Adjust the input rod for the top PCA until the rudder is approximately 0.50 inch (12.7 mm) to the right of its neutral position.
   c) Release the input levers for the middle and bottom PCAs.
3) Adjust the input rod for the top PCA until the rudder is in its neutral position.

   NOTE: Always move the rudder from right to left during the adjustment.

4) Tighten the jamnut for the input rod and do these checks:
   a) Make sure the rudder position does not change.
   b) Make sure you can see input rod threads in at least one-half of the inspection hole for the input rod.

(g) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/0201).

NOTE: All hydraulic power must be removed.

(h) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF switch C on the P61 panel to ON.
(i) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
   1) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(j) Connect the input rod for the middle PCA to its input lever.
(k) Connect the input rod for the bottom PCA to its input lever.

S 825-123

(9) The Three PCA System - Adjustment

NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C). Before adjustments or adjustment checks are made, make sure the temperature has been stable for at least one hour.

(a) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).
(b) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   1) 11H17, FLT CONT SHUTOFF TAIL LEFT
   2) 11H18, FLT CONT SHUTOFF TAIL CTR

3) 11H28, FLT CONT SHUTOFF TAIL RIGHT

(c) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

(d) Make sure the rudder is no more than 0.10 inch (2.54 mm) away from its neutral position.

(e) Do these steps if the rudder is more than 0.10 inch (2.54 mm) away from its neutral position:

1) Move the FLT CONTROL SHUTOFF switches R and C on the P61 panel to OFF. Make sure the switch position lights are ON.
2) Make sure the rudder trailing edge is no more than 0.05 inch away from its neutral position.
3) If the rudder is more than 0.05 inch (1.27 mm) away from the neutral position, do the "Middle PCA - Adjustment" group of steps again (above).
4) Move the FLT CONTROL SHUTOFF L switch on the P61 panel to OFF. Make sure the switch position light is ON.
5) Move the FLT CONTROL SHUTOFF C switch on the P61 panel to ON and do these steps:
   a) Make sure the rudder is no more than 0.05 inch (1.27 mm) away from its neutral position.
   b) If the rudder is more than 0.05 inch (1.27 mm) away from its neutral position, do the "Bottom PCA - Adjustment" group of steps again (above).
6) Move the FLT CONTROL SHUTOFF C switch on the P61 panel to OFF. Make sure the switch position light is ON.
7) Move the FLT CONTROL SHUTOFF R switch on the P61 panel to ON and do these steps:
   a) Make sure the rudder is no more than 0.05 inch (1.27 mm) away from its neutral position.
   b) If the rudder is more than 0.05 inch (1.27 mm) away from its neutral position, do the "Top PCA - Adjustment" group of steps again (above).
8) Move the FLT CONTROL SHUTOFF L and C switches on the P61 panel to ON.

NOTE: All three hydraulic systems are pressurized.

(f) Remove rig pin R3.

(g) Move the rudder pedals through their full travel range 5 times and do these steps:

NOTE: Release the right rudder pedal last on the last cycle.

1) Make sure the rudder is no more than 0.15 inch (3.81 mm) away from the mark on the tail cone index plate (use the left side of the rudder trailing edge). If the rudder position is not correct do the rudder PCA adjustment procedure again.

2) Put tape on the tail cone index plate and make a mark of the rudder position (use the left side of the rudder trailing edge).

NOTE: This mark is the "low speed" position for the rudder ratio changer actuator.

3) Move the left RRCM test switch to TEST.

NOTE: This puts the ratio changer actuator in its "high speed" position.

4) Make a mark of the rudder position and do this step (use the left side of the rudder trailing edge):

NOTE: This mark is the "high speed" position for the ratio changer actuator.

a) If the two marks are more than 0.05 inch (1.27 mm) apart, do the full "Rudder Ratio Changer Mechanism and Rudder PCAs - Adjustment" procedure again.

5) Move the test switches on the left and right RRCMs to NORMAL. Stop for 30 seconds and do this check:

NOTE: This puts the ratio changer actuator in its "low speed" position.

a) Make sure the rudder trailing edge is no more than 0.05 inch away from the "high speed" mark on the tail cone tape.

(h) Move the yaw damper switches on the P5 overhead panel to their ON positions.

(i) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11A18, YAW DAMPER LEFT
2) 11F34, YAW DAMPER RIGHT

N. Autopilot Rollout Guidance Servo - Adjustment

S 825-124

(1) Do the adjustment procedure for the autopilot rollout guidance servos (AMM 22-13-01/401).

O. Rudder Position Transmitter - Adjustment

S 825-125

(1) Do the adjustment procedure for the rudder position transmitter (AMM 27-28-00/501).

P. Rudder Trim Indicator - Adjustment (Fig. 508)

S 865-012

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-126

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11C10, RUD TRIM
   (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (c) 11H18, FLT CONT SHUTOFF TAIL CTR
   (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (e) 11J17, RUDDER TRIM POS

S 865-127

(3) Move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 865-128

(4) Move the test switch on the left RRCM to TEST. Stop for 30 seconds to let the ratio changer actuator extend.

NOTE: This puts the ratio changer actuator in its "high speed" position.

S 215-129

(5) Turn the rudder trim switch until rig pin R3 can be easily installed in the feel, centering, and trim mechanism and do these checks:
   (a) Make sure the rudder is in its neutral position.
   (b) Make sure the pointer for the rudder trim indicator is on the zero line.

S 825-130

(6) Do these steps if the pointer is not on the zero line:
   (a) Turn the four panel fasteners one-quarter turn and remove the aileron and rudder trim module from the P8 panel.

NOTE: Do not remove the electrical connectors.

CAUTION: DO NOT TURN THE RUDDER TRIM SWITCH DURING THE ADJUSTMENT.

(b) Turn the adjustment screw (get access through the hole in the side of the rudder trim indicator) until the pointer is on the zero line.
(c) Tighten the locknut for the adjustment screw.
(d) Install the aileron and rudder trim module.

S 095-131
(7) Remove rig pin R3.

S 825-132
(8) Move the RRCM test switch back to its NORMAL position.

Q. Put the Airplane Back to Its Usual Condition

S 095-309

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 503).

S 095-134
(2) Remove rig pins E/ST6 and E/ST7 from the control column and the elevator feel unit.

S 415-135
(3) Close access panels 324AL, 324BL, and 324CL (AMM 06-42-00/201).

S 415-136
(4) Close access panel 113AL (AMM 06-41-00/201).

S 215-008

CAUTION: IF THE RRCM TEST SWITCH IS NOT MOVED TO "NORMAL", THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. IF THIS LIGHT IS ON, THE AIRPLANE CANNOT BE DISPATCHED.

(5) Make sure the RRCM test switches are in their NORMAL positions.

S 865-137
(6) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-138
(7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-21-00-735-139

4. System Test - Rudder and Rudder Trim Control

A. Equipment

(1) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
  (a) E/ST6 - P/N B20003-21
  (b) E/ST7 - P/N B20003-21
  (c) R1A - P/N B20003-26
  (d) R1B - P/N B20003-26
(2) Lockpin, Nose Gear Towing Lever - A09003-1
(3) Adapter, Force Check, Rudder Pedal - F80212-19
(4) Test Box - Rudder/Elevator PCU Monitor System - B27061-1
(5) Simulator, Yaw Damper Module - B29005

B. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-42-00/201, Empennage Access Doors and Panels
(3) AMM 20-10-24/201, Rig Pins
(4) AMM 24-22-00/201, Electrical Power - Control
(5) AMM 27-09-00/201, Flight Control System Electronics Unit
(6) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(7) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) AMM 32-09-02/201, Air/Ground Relays
(9) AMM 34-11-00/201, Pitot-Static System

C. Access

(1) Location Zones

113	Area Forward of NLG Wheel Well
119	Main Equipment Center
311	Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panels

113AL	Flight/Landing Gear/Engine Control Components
311AL	Control Cables
324CL	Rudder Hinge and PCAs

D. Prepare to Test

S 865-140

(1) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights are ON.

S 865-141

(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
  (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (b) 11H18, FLT CONT SHUTOFF TAIL CTR
  (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 215-142

(3) Make sure these circuit breakers on the P11 panel are closed:
  (a) EICAS (6 locations)

S 865-143
(4) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 015-014

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOU WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(5) Open access door 311AL (AMM 06-42-00/201).

S 015-144
(6) Open access door 113AL (AMM 06-41-00/201).

S 495-145
(7) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 503).

S 495-147
(8) Install these rig pins (Fig. 502):
(a) E/ST6 (for the left control column)
(b) E/ST7 (for the aft elevator quadrant)

S 865-148
(9) Move the YAW DAMPER switches L and R on the yaw damper control panel, P5, to OFF and attach DO-NOT-OPERATE tags.

S 865-149
(10) Move the AUTOPILOT/FLIGHT DIRECTOR switches on the mode control panel, P55, to OFF and attach DO-NOT-OPERATE tags.

E. Rudder Pedals - Test

S 215-150
(1) Move the rudder pedals to their neutral positions and do this check:
(a) Make sure rig pin R1 can be easily installed and removed from the captain's and first officer's rudder pedals.

S 225-151
(2) Turn the captain's and first officer's pedal adjustment crank counterclockwise until the pedals are in their full aft positions. Do these checks:
(a) Make sure all four pedals move aft 4.60 ±0.30 inches (117 +/- 7.6 mm) (from their neutral positions).

(b) Push the captain's left pedal fully forward and do this check:

NOTE: Use sufficient force on the rudder pedals to stretch the control cables. This will let the forward quadrant touch its stops.

1) Make sure the forward quadrant touches its forward stop.
2) Do this step again for the right pedal.

(c) Do the above step again for the first officer's rudder pedals.

S 225-152

(3) Turn the captain's and first officer's pedal adjustment crank clockwise until the pedals are in their full forward positions. Do these steps:

(a) Make sure the pedals move forward 3.29 ±0.30 inches (83.5 +/- 7.6 mm) (from their neutral positions).

(b) Push the captain's left pedal fully forward and do this check:

NOTE: Use sufficient force on the rudder pedals to stretch the control cables. This will let the forward quadrant touch its stops.

1) Make sure the forward quadrant touches its forward stop.
2) Do this step again for the right pedal.

(c) Do the above step again for the first officer's rudder pedals.

S 215-153

(4) Move the rudder pedals through their full travel range four times and do this check:

S 215-565

(5) Make sure the pedals move smoothly and do not need too much force.

F. Rudder Ratio Changer System - Test

S 865-154

(1) Supply electrical power (AMM 24-22-00/201).

S 445-155

(2) Do the activation procedure for the standby bus (AMM 24-22-00).

S 215-156

(3) Make sure the ADC fault ball on the two stabilizer trim/elevator assymmetry modules (SAMs) (located in the main equipment center) are black.

S 865-015

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Supply pressure to the left hydraulic system (AMM 29-11-00/201).

S 865-157

(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 865-158

(6) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF L switch on the P61 panel to ON.

S 215-159

(7) Do these steps to cycle the ratio changer actuator:
(a) Turn the rudder trim switch on the P8 panel until the rudder trim indicator shows approximately 8 units (10 ±1 degrees) of trim.

NOTE: In the trimmed condition, movement of the ratio changer actuator will cause the rudder to move.

(b) Move the test switch for the left rudder ratio changer module (RRCM) to TEST and do these checks:

NOTE: Ignore the flight deck warnings you hear.

1) Make sure the IN TEST light stays on a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.

(c) Make sure the rudder moves in the direction of its neutral position.

NOTE: You can use the rudder position indicator to monitor the rudder position.

(d) Move the left RRCM test switch to NORMAL and do these checks:
1) Make sure the IN TEST light stays on a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.
a) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

3) Make sure the rudder moves away from its neutral position.

S 215-160
(8) Do the above steps again for the right RRCM (use the right RRCM test switch).

S 215-161
(9) Make sure all the faultballs on the left and right RRCMs are black.

S 825-162
(10) Turn the rudder trim switch on the P8 panel until the trim indicator shows zero units of trim.

S 045-163
(11) Stop for 5 seconds.

S 215-164
(12) Do these steps to do a check of the RRCM maintenance indication:
(a) Move the EICAS computer select switch on the P9 panel to R.
(b) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
2) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
3) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
4) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
5) 11D18 or 11G10, RUDDER RATIO
6) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
7) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
8) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
9) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC
(c) Remove the right RRCM (AMM 27-09-00/201).
(d) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
2) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
3) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
4) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
5) 11D18 or 11G10, RUDDER RATIO

(e) Stop for 31 seconds, then push the ECS/MSG switch on the P61 panel and do these checks:
  1) Make sure the white RUDDER RATIO message comes into view on the bottom EICAS display.
  2) Make sure all the faultballs on the left RRCM are black.
  3) Make sure the amber rudder ratio light on the P5 panel is OFF.

(f) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
  1) 11C6, CSEU 1L AC
     or FLT CONT ELEC 1L AC
  2) 11C7, CSEU 1L DC
     or FLT CONT ELEC 1L DC
  3) 11C8, CSEU 2L AC
     or FLT CONT ELEC 2L AC
  4) 11C9, CSEU 2L DC
     or FLT CONT ELEC 2L DC
  5) 11D18 or 11G10, RUDDER RATIO

(g) Install the right RRCM and remove the left RRCM (AMM 27-09-00/201).

(h) Move the EICAS computer select switch on the P9 panel to L.

(i) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  1) 11D18 or 11G10, RUDDER RATIO
  2) 11G17, CSEU 1R AC
     or FLT CONT ELEC 1R AC
  3) 11G18, CSEU 1R DC
     or FLT CONT ELEC 1R DC
  4) 11G27, CSEU 2R AC
     or FLT CONT ELEC 2R AC
  5) 11G28, CSEU 2R DC
     or FLT CONT ELEC 2R DC

(j) Stop for 31 seconds, then push the ECS/MSG switch on the P61 panel and do these checks:
  1) Make sure a white RUDDER RATIO message comes into view on the bottom EICAS display.
  2) Make sure all the faultballs on the right RRCM are black.

(k) Make sure the amber rudder ratio light on the P5 panel is OFF.

(l) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
  1) 11D18 or 11G10, RUDDER RATIO

(m) Install the left RRCM (AMM 27-09-00/201).

(n) Move the EICAS computer select switch on the P9 panel to AUTO.

(o) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  1) 11C6, CSEU 1L AC
     or FLT CONT ELEC 1L AC
  2) 11C7, CSEU 1L DC
     or FLT CONT ELEC 1L DC
  3) 11C8, CSEU 2L AC
     or FLT CONT ELEC 2L AC

4) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
5) 11D18 or 11G10, RUDDER RATIO

(p) Make sure the white RUDDER RATIO message cannot be seen on the bottom EICAS display.

S 215-165

(13) Do these steps to do a check on the power supply interface:

(a) Make sure the amber RUDDER RATIO light on the P5 panel is OFF.

(b) Push the ECS/MSG switch on the P61 panel and do this check:

1) Make sure the RUDDER RATIO, L FLT CONT ELEC, or R FLT CONT ELEC messages can not be seen on the bottom EICAS display.

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(c) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

(d) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
2) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC

(e) Make sure the amber RUDDER RATIO light on the P5 panel is OFF.

(f) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
2) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC

(g) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
2) 11G18, CSEU 1R DC
or FLT CONT ELC 1R DC

(h) Make sure the RUDDER RATIO light on the P5 panel is OFF.

(i) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
2) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC

(j) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

2) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC

(k) Make sure the RUDDER RATIO light on the P5 panel is OFF.

(l) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

2) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC

(m) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

2) 11G28, CSEU 2R DC
or FLT ELEC 2R DC

(n) Make sure the RUDDER RATIO light on the P5 panel is OFF.

(o) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

2) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC

S 215-166

(14) Do these steps to do a check on the hydraulic signal interface:

(a) Push the RESET switch on the left and right RRCMs and do these checks:

1) Make sure all the fault balls on the RRCMs are black.

2) Make sure the amber RUDDER RATIO light on the P5 panel is OFF.

3) Make sure the amber RUDDER RATIO message does not come into view on the top EICAS display.

(b) Open these circuit breakers on the P11 panel and attach a DO-NOT-CLOSE tag:

NOTE: Ignore the warnings you hear.

1) 11CO5 or 11H11, STAB TRIM CONT L

(c) Remove the power from the left hydraulic system (AMM 29-11-00/201) and do these checks:

NOTE: Depress the brake/rudder pedals several times to bleed off unwanted hydraulic pressure.

You will measure the time in the steps that follow.

1) Make sure the RUDDER RATIO light on the P5 panel can be seen in less than 30 seconds (after hydraulic power is removed).
2) Make sure an amber RUDDER RATIO message comes into view on the top EICAS display in less than 30 seconds (after hydraulic power is removed).

(d) Supply pressure to the left hydraulic system (AMM 29-11-00/201). Measure the time it takes to do these checks:
1) Make sure the RUDDER RATIO light on the P5 panel goes OFF in less than 2 seconds.
2) Make sure the amber RUDDER RATIO message is removed from the top EICAS display in less than 2 seconds.

(e) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11C05 or 11H11, STAB TRIM CONT L

(f) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11H20, STAB TRIM CONT RIGHT

(g) Remove the power from the left hydraulic system (AMM 29-11-00/201) and do these checks:

NOTE: Depress the brake/rudder pedals several times to bleed off unwanted hydraulic pressure.

You will measure the time in the steps that follow.

1) Make sure the RUDDER RATIO light on the P5 panel can be seen in less than 30 seconds (after hydraulic power is removed).

2) Make sure an amber RUDDER RATIO message comes into view on the top EICAS display in less than 30 seconds (after hydraulic power is removed).

(h) Supply pressure to the left hydraulic system (AMM 29-11-00/201). Measure the time it takes to do these checks:
1) Make sure the RUDDER RATIO light on the P5 panel goes OFF in less than 2 seconds.
2) Make sure the amber RUDDER RATIO message is removed from the top EICAS display in less than 2 seconds.

(i) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H20, STAB TRIM CONT RIGHT

S 715-167

(15) Left RRCM - Test

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Do the deactivation procedure for flight mode simulation (AMM 32-09-02/201).

(b) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11C30, LANDING GEAR POS SYS 1

(c) Move the test switch on the left RRCM to TEST and do this check:
1) Make sure the amber RUDDER RATIO light on the P5 panel is OFF.

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(d) Do the deactivation procedure for flight mode simulation (AMM 32-09-02/201).

(e) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11S19, AIR/GND SYS 2
(f) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11C30, LANDING GEAR POS SYS 1
(g) Make sure the amber RUDDER RATIO light on the P5 panel is OFF.
(h) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11S19, AIR/GND SYS 2
(i) Make sure the amber RUDDER RATIO light on the P5 panel is ON. Stop for 18 seconds and do this check:
1) Make sure all the faultballs on the left and right RRCMs are black.
a) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).
(j) Move the test switch for the left RCCM to NORMAL. Stop for 18 seconds and do these checks:
1) Make sure the two IN TEST lights on the RRCM stay ON for no more than 18 seconds.
2) Make sure all the RRCM fault balls are black.
a) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

S 715-168
(16) Right RRCM - Test
(a) Move the test switch for the right RRCM to TEST and do these checks:
1) Make sure the IN TEST light stays on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM faultballs are black.
a) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).
(b) Move the test switch on the right RRCM to NORMAL and do these checks:
1) Make sure the two IN TEST lights on the RRCMs stay on for a maximum of 18 seconds.
2) After 30 seconds, make sure all the RRCM fault balls are black.
a) If the faultballs are not black, do the RRCM BITE procedure (FIM 27-09-00/101, Fig. 106B).

G. Rudder Trim - Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour.

S 865-018

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-176

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (b) 11H18, FLT CONT SHUTOFF TAIL CTR
   (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 865-177

(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 215-178

(4) Make sure the RRCM test switches are in their NORMAL positions.

S 215-179

(5) Turn the rudder trim switch until the rudder is in its neutral position and do this check:
   (a) Make sure the rudder trim indicator on the P8 panel shows zero units of rudder trim (use the indicator line width for tolerance).
   (b) Make sure the rudder position indicator is in its center position (use the indicator line width for tolerance).

S 225-180

(6) Turn the rudder trim switch in a clockwise direction until the rudder movement stops. Do these checks:
   (a) Make sure the rudder trailing edge moves to the right 29.78 ±2.65 inches (756 +/- 67 mm) (21.9 ±1.9 degrees).
   (b) Make sure the rudder trim indicator shows at least 15.2 units of nose right trim.

S 225-181
(7) Turn the rudder trim switch in a counterclockwise direction until the rudder movement stops. Do these checks:
(a) Make sure the rudder trailing edge moves to the left 29.78 ±2.65 inches (756 +/- 67 mm) (21.9 ±1.9 degrees).
(b) Make sure the rudder trim indicator shows at least 15.2 units of nose left trim.

S 865-182
(8) Move the rudder trim switch back to its neutral position.

H. Captain's Rudder Pedal Travel - Test

S 825-183
(1) Do these steps to put the rudder pedals in their neutral positions:
(a) Turn the adjustment crank for the captain's rudder pedals clockwise until the pedals are in their full forward positions.
(b) Turn the adjustment crank counterclockwise 3.6 turns and put it in the nearest detent position.

S 215-184
(2) Move the captain's left pedal to its full forward position and do this check:
(a) Make sure the aft quadrant touches its full travel stops.

S 215-185
(3) Move the captain's right pedal to its full forward position and do this check:
(a) Make sure the aft quadrant touches its full travel stops.

I. First Officer's Rudder Pedal Travel - Test

S 735-186
(1) Do the "Captain's Rudder Pedal Travel - Test" group of steps for the first officer's rudder pedals.

J. Captain's Rudder Pedal Forces - Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour.

Use the rudder pedal force tool to do this test.

You must measure the forces with the pedal moving away from the neutral position. If the pedal moves more than the specified distance, you must repeat the test and start with the pedal at neutral position.

S 225-187

(1) Push the captain's left pedal forward (slowly) until the rudder trailing edge has moved 0.10 to 0.15 inch (2.5-3.8 mm) and do this check:
   (a) Make sure the rudder pedal force is between 14.0 and 20.0 pounds.

S 215-188

(2) Release the rudder pedal (slowly) and do this check:
   (a) Make sure the rudder goes back to its neutral position.

S 225-189

(3) Push the captain's left pedal forward (slowly) until the rudder trailing edge has moved 34.6±0.14 inches (879 +/- 3.5 mm) (25.5±.1 degrees) and do this check:
   (a) Make sure the rudder pedal force is 76 ±10.0 pounds (338 +/- 44 Newtons).

S 215-190

(4) Push the captain's left pedal forward until the aft quadrant touches its full travel stop and do these checks:
   (a) Make sure the rudder moves to the left 40.05 - 43.03 inches (1017-1093 mm) (30.6 +1.26/-1.0 degrees).
   (b) Make sure the rudder position indicator moves to its full left position (approximately 30 degrees).
   (c) Make sure the forward quadrant does not touch its stop.

S 215-191

(5) Release the rudder pedals and do these checks:
   (a) Make sure the rudder goes back to its neutral position (use a tolerance of ±0.15 inch (+/- 3.8 mm)).
   (b) Make sure the rudder position indicator moves to its center position (use the line width for tolerance).

S 225-192

(6) Push the captain's right pedal forward (slowly) until the rudder trailing edge has moved 0.10 to 0.15 inch (2.54 to 3.81 mm) and do this check:
   (a) Make sure the rudder pedal force is between 14.0 and 20.0 pounds.

S 215-193

(7) Release the rudder pedal (slowly) and do this check:
   (a) Make sure the rudder goes back to its neutral position.

S 225-194

(8) Push the captain's right pedal forward (slowly) until the rudder trailing edge has moved 34.6±0.14 inches (879 +/- 3.5 mm) (25.5±.1 degrees) and do this check:
   (a) Make sure the rudder pedal force is 76 ±10.0 pounds (338 +/- 44 Newtons).

S 225-195

(9) Push the captain's right pedal forward until the aft quadrant touches its full travel stop and do these checks:
   (a) Make sure the rudder moves to the right 40.05 - 43.03 inches (1017 - 1093 mm) (30.6 +1.26/-1.0 degrees).
   (b) Make sure the rudder position indicator moves to its full left position (approximately 30 degrees).
   (c) Make sure the forward quadrant does not touch its stop.

S 215-196

(10) Release the rudder pedals and do these checks:
   (a) Make sure the rudder goes back to its neutral position (use a tolerance of ±0.15 inch (+/- 3.8 mm)).
   (b) Make sure the rudder position indicator moves to its center position (use the line width for tolerance).

K. First Officer's Rudder Pedal Forces - Test

S 735-197

(1) Do the "Captain's Rudder Pedal Force - Test" group of steps again for the first officer's rudder pedals.

L. Rudder Ratio Changer - Low Speed Retraction Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour.

S 865-019

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-198

(2) Move one of the two RRCM test switches to TEST and do these checks:

NOTE: The amber RUDDER RATIO light on the P5 panel will come ON and stay ON. An amber RUDDER RATIO message will come into view on EICAS when the RRCM test switch is in its TEST position.

(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM faultballs are black.

S 825-199

(3) Turn the rudder trim switch on the P8 panel, if necessary, to install the rig pin R3.

S 975-200

(4) Put tape on the tail cone index plate and make a mark of the rudder position (use the left side of the rudder trailing edge).

S 225-201

(5) Move the RRCM test switch to NORMAL and do these checks:
(a) Make sure the IN TEST light stays on for a maximum of 18 seconds.
(b) Make sure the rudder is no more than 0.05 inch (1.27 mm) away from the mark you made on the tape.
(c) Remove the rig pin R3.

S 215-202

(6) Move the RRCM test switch to TEST and do these checks:
(a) Make sure the IN TEST light stays no for a maximum of 18 seconds.
(b) After 30 seconds, make sure all the RRCM fault balls are black.
(c) Make sure the ratio changer actuator is fully extended.

S 865-203

(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 825-204
(8) Push forward on both (upper portion) of the captain's or first officer's rudder/brake pedals repeatedly to bleed down the hydraulic pressure to less than 50 psi. Stop for 2.5 minutes.

S 215-205
(9) Move the captain's right pedal forward until the aft quadrant touches its full travel stop and do this check:
(a) Make sure the rudder moves right at least 40 inches (1.01 m).

S 215-206
(10) Move the captain's left pedal forward until the aft quadrant touches its full travel stop and do this check:
(a) Make sure the rudder moves left at least 40 inches (1.01 m).

S 865-207
(11) Move the captain's rudder pedals back to their neutral positions.

S 865-413
(12) Supply pressure to the left hydraulic systems (AMM 29-11-00/201).

S 225-412
(13) Move the RRCM test switch to NORMAL.

M. Ratio Changer Authority - Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour and that test switches on RRCM (both boxes) is set to "NORMAL".

S 825-208
(1) Do these steps to put the rudder pedals in their neutral positions:
(a) Turn the adjustment crank for the captain's rudder pedals clockwise until the pedals are in their full forward positions.
(b) Turn the adjustment crank counterclockwise 3.6 turns and put it in the nearest detent position.

S 225-209
(2) Pressurize the pitot-static system to 124 ±1 knots (impact pressure approximately 0.743 inch of mercury (25.2 millibar)) (AMM 34-11-00/201) and do these steps:
(a) Move the captain's left pedal to its full forward position and do this check:
1) Make sure the rudder moves to its left 41.37 ±1.40 inches (1050 +/- 35 mm) (30.6 ±1.0 degrees).
(b) Slowly release the captain's left rudder pedal.

(c) Move the captain's right pedal to its full forward position and do this check:
1) Make sure the rudder moves to its right 41.37 ±1.40 inches (1050 +/- 35 mm)(30.6 ±1 degrees).

S 225-210

(3) Increase the pitot-static pressure to 141 ±1 knots (impact pressure approximately 0.963 inch of mercury (32.6 millibar)) (AMM 34-11-00/201) and do these steps:
(a) Move the captain's left pedal to its full forward position and do this check:
1) Make sure the rudder moves to its left 34.40 ±1.40 inches (874 +/- 35 mm)(25.2 ±1.0 degrees).
(b) Slowly release the captain's left rudder pedal.
(c) Move the captain's right pedal to its full forward position and do this check:
1) Make sure the rudder moves to its right 34.40 ±1.40 inches (873 +/- 35 mm)(25.2 ±1.0 degrees).

S 225-211

(4) Increase the pitot-static pressure to 275 ±1 knots (impact pressure approximately 3.779 inches of mercury (127.97 millibar)) (AMM 34-11-00/201) and do these steps:
(a) Move the captain's left pedal to its full forward position and do this check:
1) Make sure the rudder moves to its left 7.77 ±1.4 inches (197 +/- 35 mm) (5.68 ±1.00 degrees).
2) Slowly release the captain's left rudder pedal.
(b) Move the captain's right pedal to its full forward position and do this check:
1) Make sure the rudder moves to its right 7.77 ±1.4 inches (197 +/- 35 mm) (5.68 ±1.00 degrees).
(c) Slowly release the captain's right rudder pedal.

S 225-212

(5) Increase the pitot-static pressure to 410 ±1 knots (impact pressure approximately 8.849 inches of mercury (299.6 millibar)) (AMM 34-11-00/201) and do these steps:
(a) Move the captain's left pedal to its full forward position and do this check:
1) Make sure the rudder moves to its left 4.79 ±0.96 inches (121.6 +/- 24.3 mm) (3.50 ±0.70 degrees).
2) Slowly release the captain's left rudder pedal.
(b) Move the captain's right pedal to its full forward position and do this check:
1) Make sure the rudder moves to its right 4.79 ±0.96 inches (121.6 +/- 24.0 mm) (3.50 ±0.70 degrees).
2) Slowly release the captain's right rudder pedal.

S 865-213

(6) Reduce the pitot-static pressure to an airspeed of zero knots (AMM 34-11-00/201).

S 865-214

(7) Remove the pitot-static pressure/air speed indication (AMM 34-11-00/201).

S 865-215

(8) Remove the DO-NOT-OPERATE tags and move the YAW DAMPER switches L and R on the P5 panel to ON. Make sure the switch position lights are ON.

N. PCA Bottomed Travel and PCA Monitor - Test

S 865-020

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 045-022

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 825-613

(3) Make sure these circuit breakers on the P11 panel are closed:
- (a) 11A10, AIR DATA CMPTR LEFT
- (b) 11A11, AIR DATA AOA SENSOR LEFT
- (c) 11A12, AIR DATA BARO CORRECT LEFT
- (d) 11C30, LANDING GEAR POS SYS 1
- (e) 11F30, AIR DATA CMPTR RIGHT
- (f) 11F31, AIR DATA AOA SENSOR RIGHT
- (g) 11F32, AIR DATA BARO CORRECT RIGHT
- (h) 11J10, PCU MON SENSOR
- (i) 11J11, PCU MON MOD
- (j) 11S15, AIR/GND SYS 1
- (k) 11S19, AIR/GND SYS 2

(l) 11S23, POS SYS 2

S 445-217

(4) Set the left AC bus to ON (AMM 24-22-00/201).

S 215-218

(5) Make sure the left and right RRCM test switches are in their NORMAL positions.

S 045-021

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
   (a) 11A18, YAW DAMPER LEFT
   (b) 11C6, CSEU 1L AC
       or FLT CONT ELEC 1L AC
   (c) 11C7, CSEU 1L DC
       or FLT CONT ELEC 1L DC
   (d) 11C8, CSEU 2L AC
       or FLT CONT ELEC 2L AC
   (e) 11C9, CSEU 2L DC
       or FLT CONT ELEC 2L DC
   (f) 11F34, YAW DAMPER RIGHT
   (g) 11G17, CSEU 1R AC
       or FLT CONT ELEC 1R AC
   (h) 11G18, CSEU 1R DC
       or FLT CONT ELEC 1R DC
   (i) 11G27, CSEU 2R AC
       or FLT CONT ELEC 2R AC
   (j) 11G28, CSEU 2R DC
       or FLT CONT ELEC 2R DC

S 025-220
(7) Remove the two yaw damper modules (M522, M523) in the main electronics equipment center (AMM 22-21-04/401).

S 425-221
(8) Install the two yaw damper simulator modules.

S 865-222
(9) Move the RUDDER DISPLACEMENT switch to OFF on the two yaw damper module simulators.

S 865-223
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  (a) 11A18, YAW DAMPER LEFT
  (b) 11C6, CSEU 1L AC
      or FLT CONT ELEC 1L AC
  (c) 11C7, CSEU 1L DC
      or FLT CONT ELEC 1L DC
  (d) 11C8, CSEU 2L AC
      or FLT CONE ELEC 2L AC
  (e) 11C9, CSEU 2L DC
      or FLT CONT ELEC 2L DC
  (f) 11F34, YAW DAMPER RIGHT
  (g) 11G17, CSEU 1R AC
      or FLT CONT ELEC 1R AC
  (h) 11G18, CSEU 1R DC
      or FLT CONT ELEC 1R DC
  (i) 11G27, CSEU 2R AC
      or FLT CONT ELEC 2R AC
  (j) 11G28, CSEU 2R DC
      or FLT CONT ELEC 2R DC

S 825-224
(11) Do these steps to erase the EICAS memory:
  (a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.

(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-225

(12) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 225-226

(13) Move the captain's right pedal to its full forward position (slowly) and do these steps:
(a) Move the RUDDER DISPLACEMENT switches to RIGHT on the two yaw damper module simulators and do this check:
1) Make sure the rudder trailing edge moves to the right at least 44.6 inches (1.13 m) (33 degrees).
(b) Move the EICAS computer select switch on the P9 panel to AUTO.
(c) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(d) Move the EICAS computer select switch on the P9 panel to L.
(e) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

(f) Move the EICAS computer select switch on the P9 panel to R.

(g) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

(h) Move the EICAS computer select switch back to AUTO.

S 865-227

(14) Move the captain's right pedal back to its neutral position.

S 865-228

(15) Move the RUDDER DISPLACEMENT switches to OFF on the two yaw damper module simulators and do this step:
(a) Stop for 20 seconds.

S 215-229

(16) Push the ECS/MSG switch on the P61 panel and do this step:
(a) Make sure the white RUDDER PCU message comes into view on the bottom EICAS display.

S 825-230

(17) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-231

(18) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 225-232
(19) Move the captain's left pedal to its full forward position (slowly) and do these steps:
(a) Move the RUDDER DISPLACEMENT switches to LEFT on the two yaw damper module simulators and do this check:
(b) Make sure the rudder trailing edge moves to the left at least 44.6 inches (1.13 m) (33.0 degrees).
(c) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

S 865-233
(20) Move the captain's left pedal back to its neutral position and do this step:
(a) Stop for 20 seconds.

S 825-234
(21) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-235
(22) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 865-236

(23) Move the RUDDER DISPLACEMENT switches to OFF on the two yaw damper module simulators.

S 025-237

(24) Remove the two yaw damper module simulators.

S 425-238

(25) Install the two yaw damper modules (M522 and M523) (AMM 22-21-04/401).

O. PCA Pressure Differential Sensor Isolation Test

S 865-330

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 045-331

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACAT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 215-333

(3) Make sure these circuit breakers on the P11 panel are closed:
  (a) 11A10, AIR DATA CMPTR LEFT
  (b) 11A11, AIR DATA AOA SENSOR LEFT
  (c) 11A12, AIR DATA BARO CORRECT LEFT
  (d) 11C30, LANDING GEAR POS SYS 1
  (e) 11F30, AIR DATA CMPTR RIGHT
  (f) 11F31, AIR DATA AOA SENSOR RIGHT
  (g) 11F32, AIR DATA BARO CORRECT RIGHT
  (h) 11J11, PCU MON MOD
  (i) 11S15, AIR/GND SYS 1
  (j) 11S19, AIR/GND SYS 2
  (k) 11S23, POS SYS 2

S 445-334

(4) Set the left AC bus to ON (AMM 24-22-00/201).

S 215-335

(5) Make sure the left and right RRCM test switches are in their NORMAL positions.

S 045-336

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 865-337

(7) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
  (a) 11A18, YAW DAMPER LEFT

(b) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(c) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
(d) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(e) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
(f) 11F34, YAW DAMPER RIGHT
(g) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(h) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
(i) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(j) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC

S 025-338
(8) Remove the two yaw damper modules (M522, M523) in the main electronics equipment center (AMM 22-21-04/401).

S 425-339
(9) Install the two yaw damper simulator modules.

S 865-340
(10) Move the RUDDER DISPLACEMENT switch to OFF on the two yaw damper module simulators.

S 865-555
(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11A18, YAW DAMPER LEFT
(b) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(c) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
(d) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(e) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
(f) 11F34, YAW DAMPER RIGHT
(g) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(h) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
(i) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(j) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC

S 865-342
(12) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J10, PCU MON SENSOR

S 015-343
(13) Open the access door 324CL (AMM 06-42-00/201).

S 035-389
(14) Disconnect the connectors D4714 and D4712 from the middle and bottom rudder PCAs.

S 435-344
(15) Connect each connector, D4712 and D4714, to the test box.

NOTE: If you do not have a test box, connect a 750 ohm, 10 watt resistor between pin 1 and pin 2 at each PCA electrical connector.

S 865-345
(16) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J10, PCU MON SENSOR

S 825-346
(17) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-347
(18) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 225-348

(19) Move the Captain's right pedal to its full forward position (slowly) and do these steps:
(a) Move the RUDDER DISPLACEMENT switches to RIGHT on the two yaw damper module simulators and do this check:
1) Make sure the rudder trailing edge moves to the right at least 44.6 inches (1.13 m) (33 degrees).
(b) Move the EICAS computer select switch on the P9 panel to AUTO.
(c) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDER PCU message comes into view on the bottom EICAS display.
(d) Move the EICAS computer select switch on the P9 panel to L.
(e) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(f) Move the EICAS computer select switch on the P9 panel to R.
(g) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.

(h) Move the EICAS computer select switch back to AUTO.

S 865-349

(20) Move the Captain's right pedal back to its neutral position.

S 865-350

(21) Move the RUDDER DISPLACEMENT switches to OFF on the two yaw damper module simulators and do this step:
(a) Stop for 20 seconds.

S 215-351

(22) Push the ECS/MSG switch on the P61 panel and do this step:
(a) Make sre the white RUDDER PCU message comes into view on the bottom EICAS display.

S 825-352

(23) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-353

(24) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 865-354

(25) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J10, PCU MON SENSOR

S 035-355
(26) Disconnect the connector D4714 from the test box at the middle PCA.

S 435-356
(27) Connect the connector D4714 to the middle PCA.

S 035-357
(28) Disconnect the connector D4710 from the top PCA.

S 435-358
(29) Connect the connector D4710 to the test box.

S 865-359
(30) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J10, PCU MON SENSOR.

S 825-360
(31) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-362
(32) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 225-361
(33) Move the captain's right pedal to its full forward position (slowly) and do these steps:
(a) Move the RUDDER DISPLACEMENT switches to RIGHT on the two yaw damper module simulators and do this check:
1) Make sure the rudder trailing edge moves to the right at least 44.6 inches (1.13 m) (33 degrees).

(b) Move the EICAS computer select switch on the P9 panel to AUTO.
(c) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
    1) Push the STATUS switch on the P9 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
    2) Push the ECS/MSG switch on the P61 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(d) Move the EICAS computer select switch on the P9 panel to L.
(e) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
    1) Push the STATUS switch on the P9 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
    2) Push the ECS/MSG switch on the P61 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(f) Move the EICAS computer select switch on the P9 panel to R.
(g) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
    1) Push the STATUS switch on the P9 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
    2) Push the ECS/MSG switch on the P61 panel and do this check:
        a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(h) Move the EICAS computer select switch back to AUTO.

S 865-384
(34) Move the captain's right pedal back to its neutral position.

S 865-385
(35) Move the RUDDER DISPLACEMENT switches to OFF on the two yaw damper module simulators and do this step:

S 215-386
(36) Push the ECS/MSG switch on the P61 panel and do this step:
(a) Make sure the white RUDDER PCU message comes into view on the bottom EICAS display.

S 825-387
(37) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-388
(38) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 865-363
(39) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J10, PCU MON SENSOR

S 035-364
(40) Disconnect the connector D4712 from the test box at the bottom PCA.

S 435-365
(41) Connect the connector D4712 to the bottom PCA.

S 035-366
(42) Disconnect the connector D4714 from the middle PCA.

S 435-367
(43) Connect the connector D4714 to the test box.

S 865-368
(44) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J10, PCU MON SENSOR

S 825-369
(45) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-370
(46) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 225-372
(47) Move the captain's right pedal to its full forward position (slowly) and do these steps:
(a) Move the RUDDER DISPLACEMENT switches to RIGHT on the two yaw damper module simulators and do this check:
1) Make sure the rudder trailing edge moves to the right at least 44.6 inches (1.13 m) (33 degrees).
(b) Move the EICAS computer select switch on the P9 panel to AUTO.
(c) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(d) Move the EICAS computer select switch on the P9 panel to L.
(e) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(f) Move the EICAS computer select switch on the P9 panel to R.

(g) Do these steps to make sure a RUDDER PCU message comes into view on the EICAS status and maintenance pages:
1) Push the STATUS switch on the P9 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
2) Push the ECS/MSG switch on the P61 panel and do this check:
a) Make sure a RUDDER PCU message comes into view on the bottom EICAS display.
(h) Move the EICAS computer select switch back to AUTO.

S 865-374
(48) Move the captain's right pedal back to its neutral position.

S 865-373
(49) Move the RUDDER DISPLACEMENT switches to OFF on the two yaw damper module simulators and do this step:
(a) Stop for 20 seconds.

S 215-375
(50) Push the ECS/MSG switch on the P61 panel and do this step:
(a) Make sure the white RUDDER PCU message comes into view on the bottom EICAS display.

S 825-376
(51) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch, then the AUTO EVENT switch on the P61 panel.
(b) Push the erase switch for 3 seconds to erase the EICAS maintenance memory.

S 215-377
(52) Do these steps to make sure no RUDDER PCU messages stay on the EICAS status and maintenance pages:
(a) Push the STATUS switch on the P9 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure no RUDDER PCU message comes into view on the bottom EICAS display.

S 865-378
(53) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J10, PCU MON SENSOR

S 035-379
(54) Disconnect the connectors D4710 and D4714 from the test box at the top and middle PCAs.

S 435-380
(55) Connect the connectors D4710 and D4714 to the top and middle PCAs.

S 865-381
(56) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J10, PCU MON SENSOR

S 025-382
(57) Remove the two yaw damper module simulators.

P. Force Fight at Rudder Neutral - Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour.

S 865-274
(1) Remove the power from the center and right hydraulic systems (AMM 29-11-00/201)

NOTE: Only the left hydraulic system will have power.

S 215-275
(2) Make sure the rudder is in its neutral position (approximately).

S 975-276
(3) Measure the rudder position.

NOTE: This is the rudder neutral datum position.

S 865-277
(4) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-278
(5) Supply pressure to the right hydraulic system (AMM 29-11-00/201).

S 215-279

(6) Make sure the rudder is no more than 0.10 inch (2.54 mm) away from the rudder neutral datum position.

S 865-280

(7) Remove the power from the right hydraulic system (AMM 29-11-00/201).

S 865-281

(8) Supply pressure to the center hydraulic system (AMM 29-11-00/201).

S 215-282

(9) Make sure the rudder is no more than 0.10 inch (2.54 mm) away from the rudder neutral datum position.

Q. Put the Airplane Back to Its Usual Condition

S 865-302

(1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11D18 or 11G10, RUD RATIO

S 865-303

(2) Remove the DO-NOT-OPERATE tags and move the AUTOPILOT/FLIGHT DIRECTOR switches on the P55 panel to ON.

S 215-007

CAUTION: IF THE RRCM TEST SWITCH IS NOT MOVED TO "NORMAL", THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. IF THIS LIGHT IS ON, THE AIRPLANE CANNOT BE DISPATCHED.

(3) Make sure the RRCM test switches are in their NORMAL positions.

S 095-013

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 503).

S 865-304
(5) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 095-305
(6) Remove rig pins.

S 415-306
(7) Close access doors and panels.

S 865-307
(8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

RUDDER PEDALS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains 2 tasks. The first task contains the data that is necessary to remove the rudder pedal assemblies. The second task contains the data that is necessary to install them.

TASK 27-21-02-024-003

2. Remove Rudder Pedal Assembly
   A. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zones
          211 Control Cabin (Left)
          212 Control Cabin (Right)
      (2) Access Panels
          113AL Flight/Landing Gear/Engine Control Components

   D. Prepare for Removal

      S 864-004
      (1) Supply electrical power (Ref 24-22-00).

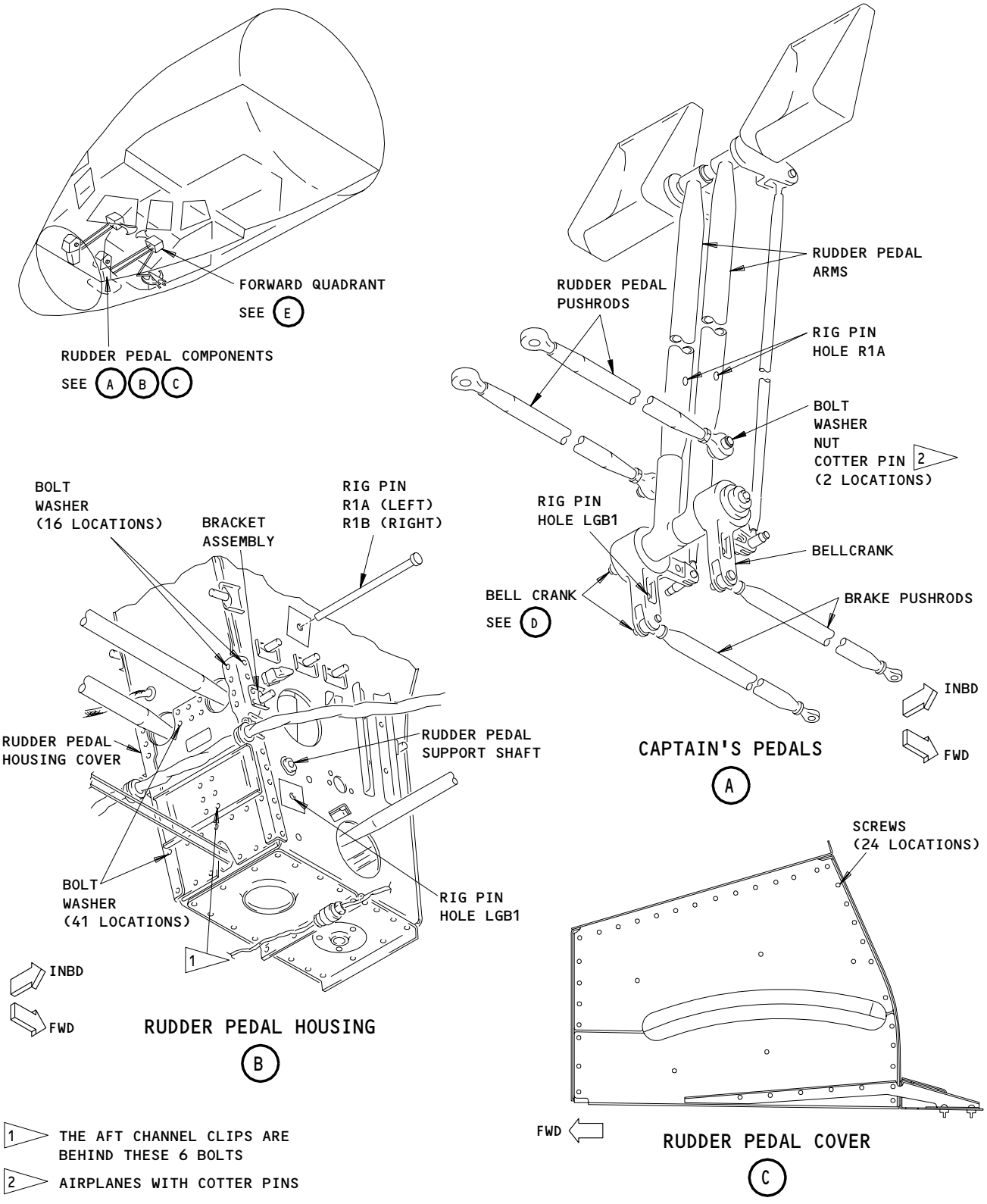
      S 864-005
      (2) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure that the amber switch-position legend lights come ON.

      S 864-006
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

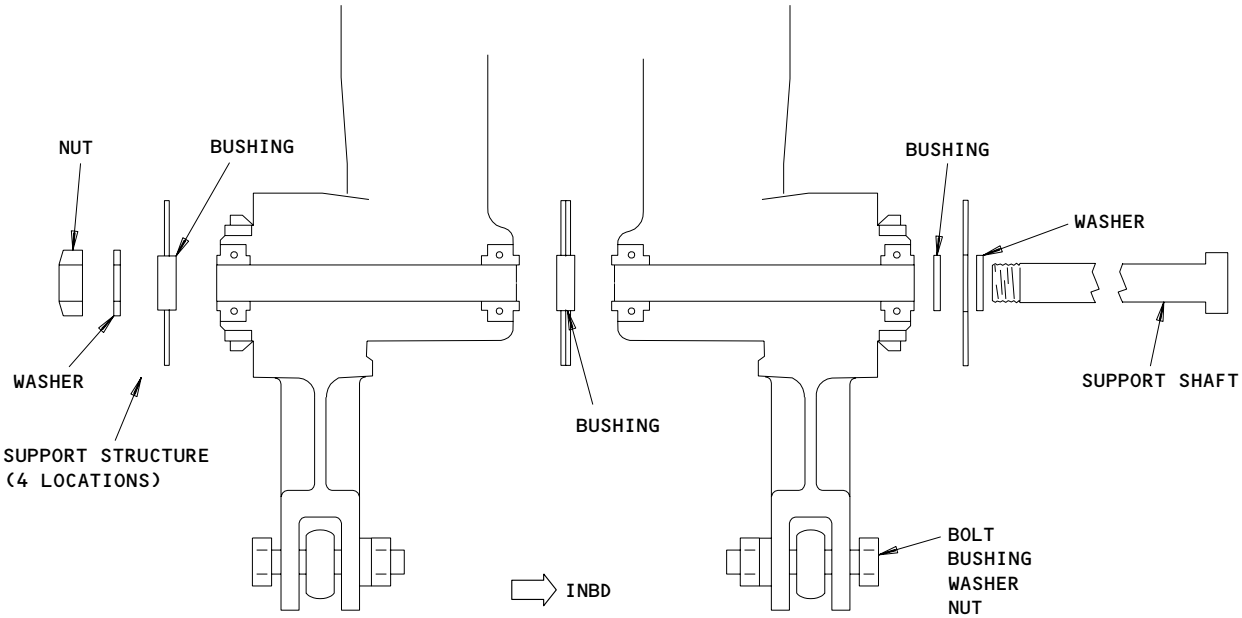
      S 014-007
      (4) Remove the side panels from the rudder pedal cover.

      S 014-008
      (5) Open access panel 113AL for the rudder pedal assembly, the forward quadrant, and the steering interconnect mechanism (Ref 06-41-00).

      S 494-009
      (6) Move the towing lever to the tow position and install the towing lever lockpin in the nose gear (Fig. 402).

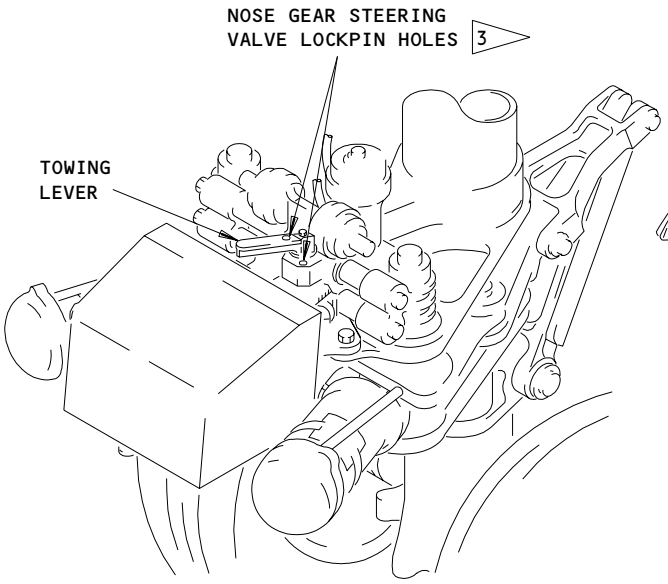


Rudder Pedal Installation
Figure 401 (Sheet 1)

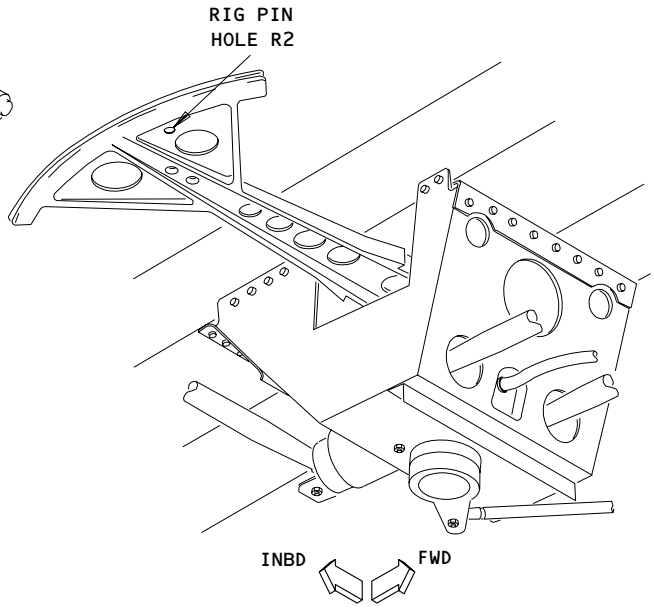


BELL CRANK

(D)



NOSE GEAR STEERING ISOLATION



FORWARD QUADRANT

(E)

3 MOVE TOWING LEVER COUNTERCLOCKWISE,
THEN ALIGN THE HOLES AND INSTALL THE LOCKPIN

Rudder Pedal Installation
Figure 401 (Sheet 2)

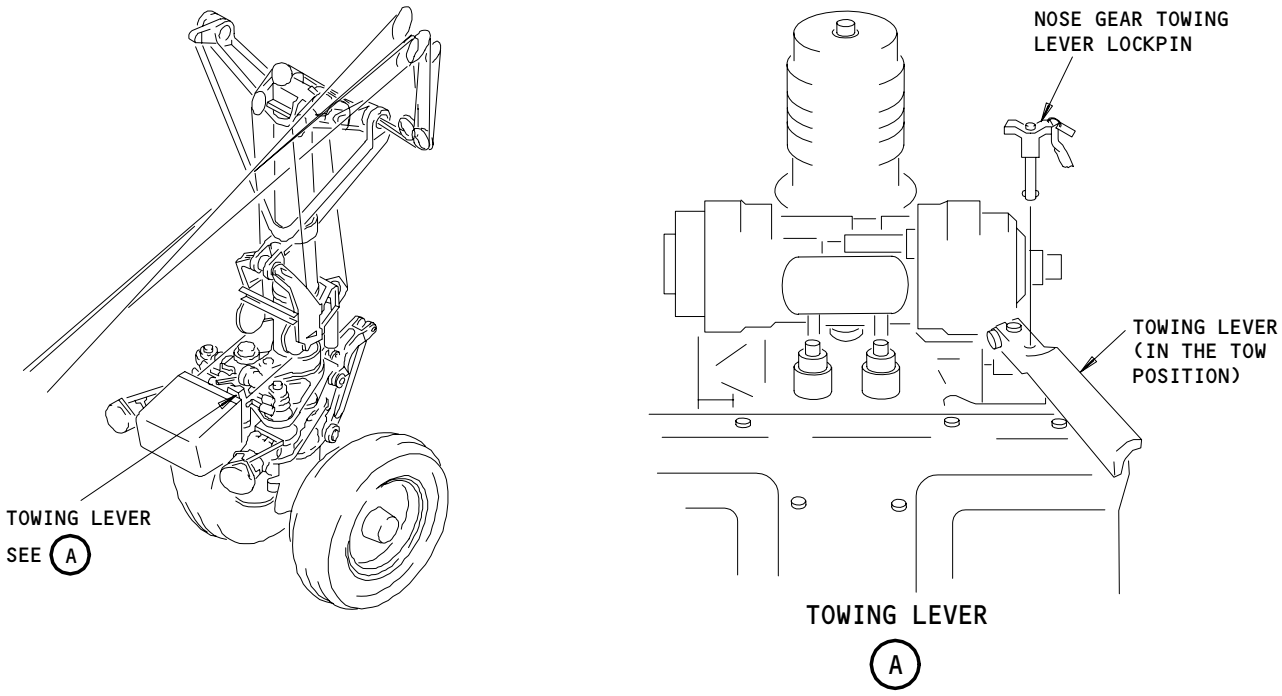
E. Remove Rudder Pedal Assembly (Fig. 401)

S 034-011

(1) Remove these components:
  (a) Remove the rudder pedal housing cover.
  (b) Remove the aft channel clips (3 locations).

S 034-037

(2) Disconnect these components:
  (a) The brake pushrods from the bellcrank.



Nose Gear Steering Isolation
Figure 402

(b) The rudder pedal pushrods from the rudder pedal arms.
(c) Hold the rudder pedal assembly and remove the rudder pedal support shaft.

S 024-012
(3) Turn each pedal 90° and lower the pedal through the flight deck floor. Remove the assembly through the rudder pedal housing.

TASK 27-21-02-424-013

3. Install Rudder Pedal Assembly

A. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) R1A - P/N B20003-26
(b) R1B - P/N B20003-26
(c) R2 - P/N B20003-22
(d) LGB1 - P/N B20003-28

B. Consumable Materials
(1) A00247 Sealant, Chromate Type - BMS 5-95

C. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

D. Access
(1) Location Zones
211 Control Cabin (Left)
212 Control Cabin (Right)

(2) Access Panels
113AL Flight/Landing Gear/Engine Control Components

E. Install Rudder Pedal Assembly (Fig. 401)

S 494-014
(1) Install rig pin R2 (for the left forward quadrant).

S 394-015
(2) Apply sealant to the outer diameter of the bushing.

S 824-016
(3) Put the inboard rudder pedal in the support structure.

S 434-017
(4) Install the washer, the bushing, and the support shaft. Move the support shaft from the inboard support side through the center support.

S 434-018
(5) Install the center support bushing and put the outboard rudder pedal in the support structure.

S 434-019
(6) Push the support shaft through the outboard rudder pedal. Install the bushing, washer and nut. Tighten the nut.

S 824-020
(7) Do these steps to adjust the rudder pedal position:
(a) Turn the pedal adjustment crank clockwise until the jackshaft is in its full forward position.
(b) Turn the pedal adjustment crank 3.6 turns counterclockwise. Put the crank in its nearest detent position.
(c) Install rig pin R1A or R1B into the applicable rudder pedal arms through the rudder pedal housing.

S 824-021
(8) Do these steps to adjust the rudder pedal pushrods:
(a) Loosen the jam nuts on the pushrods.
(b) Turn the pushrods until they can be attached to the pedal arms.
(c) Make sure you can see the rod end threads through the control rod inspection holes after the adjustment is done. Make sure that the threads show in at least one-half of the hole.
(d) Tighten the jam nuts on the rod ends.
(e) Install the bolt, washer, and nut. Tighten the nut.
(f) Torque the nut to 110-150 inch-pounds (12.4-16.9 newton-meters).
(g) AIRPLANES WITH BOLTS AND NUTS THAT REQUIRE COTTER PINS; Install the cotter pin on the nut.

S 094-022
(9) Remove rig pin R1A or R1B from the pedal arms and rig pin R2 from the rudder forward quadrant.

S 434-023
(10) Install the side panels for the rudder pedal cover.

S 824-024
(11) Connect the brake pushrods to the bottom arm of the bellcrank. Make sure that rig pin LGB1 can be easily installed. If it can not be installed, adjust the push rod.

S 094-025
(12) Remove rig pin LGB1.

S 434-026
(13) Install the aft channel clips.

S 434-027
(14) Install the rudder pedal housing cover.

S 224-028

(15) Make sure that the rudder pedals move smoothly through their full travel range.

S 864-001

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(16) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-029

(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-030

(18) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P6l, to ON.

S 864-031

(19) Make sure that these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 824-032

(20) Push the STATUS switch on the display select panel, P9, to show the control surface position indicator on the bottom EICAS display.

S 214-033

(21) Operate the rudder pedals through their full travel range and do the checks that follow:
(a) Make sure that the rudder operates smoothly and correctly when the pedals are moved.
(b) Make sure the rudder position indicator operates correctly and shows full rudder travel in each direction.
(c) Release the rudder pedals. Make sure the rudder goes back to its neutral position.

F. Put the Airplane Back to its Usual Condition

S 094-002

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure that the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 402).

S 414-034

(2) Close access panel 113AL (Ref 06-41-00).

S 864-035

(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-036

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER PEDAL ADJUSTMENT CRANK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains 2 tasks. The first task contains the data that is necessary to remove the captain's (or the first officer's) rudder pedal adjustment crank. The second task contains the data that is necessary to install it.

   TASK 27-21-03-024-006

2. Remove Rudder Pedal Adjustment Crank
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) R1A - P/N B20003-26
          (b) R1B - P/N B20003-26
          (c) R2 - P/N B20003-22
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zones
          211 Control Cabin (Left)
          212 Control Cabin (Right)
          113 Area Forward of NLG Wheel Well (Left)

      (2) Access Panel
          113AL Flight/Landing Gear/Engine Control Components

   D. Prepare for Removal

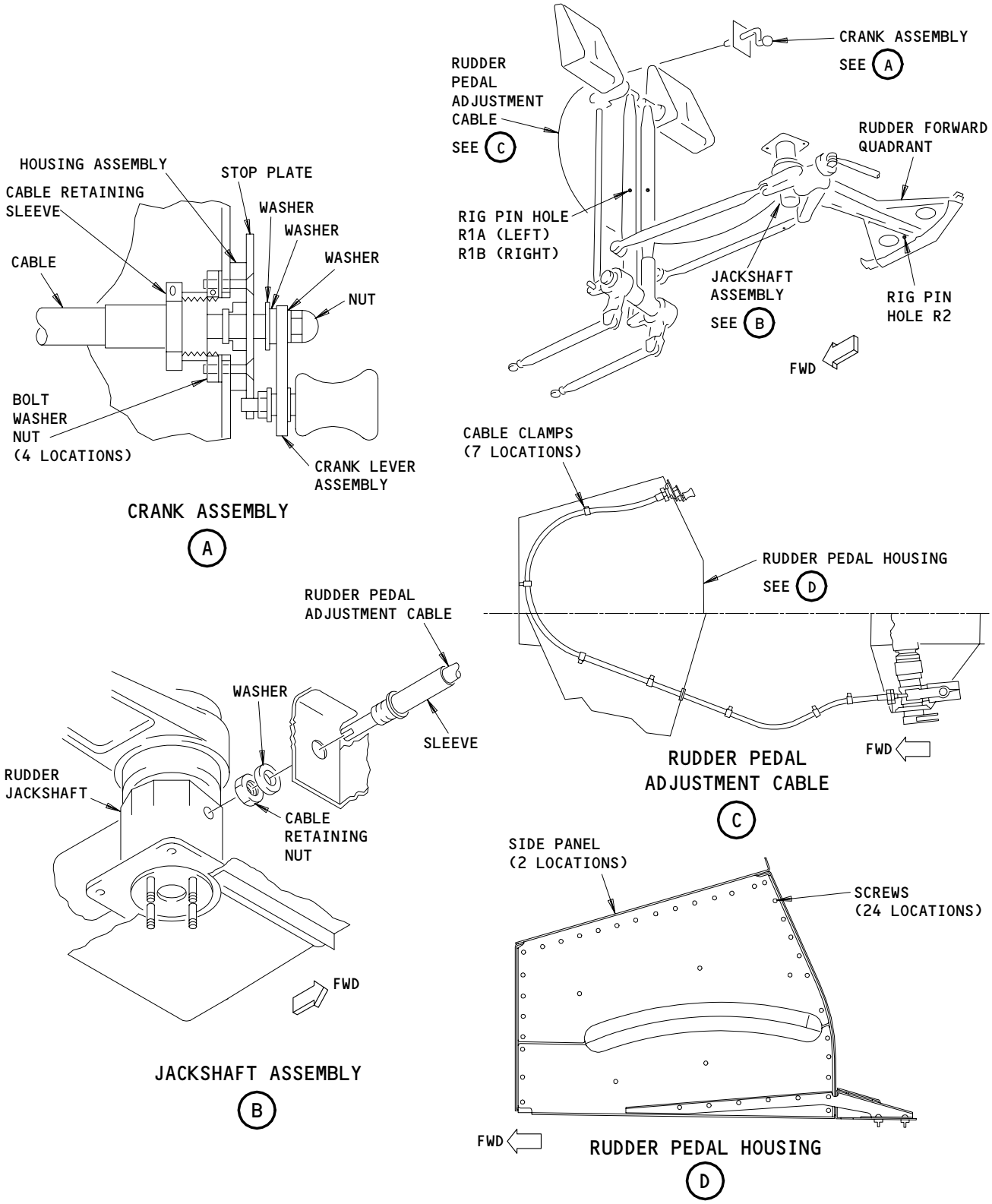
      S 864-007
      (1) Supply electrical power (Ref 24-22-00).

      S 864-027
      (2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

      S 864-008
      (3) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure that the amber switch-position legend lights come ON.

      S 864-009
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

      S 014-010
      (5) Open access door 113AL (Ref 06-41-00).



Rudder Pedal Adjustment Crank Installation
Figure 401

E. Remove Rudder Pedal Adjustment Crank (Fig. 401)

S 494-011

(1) Install these rig pins:
  (a) R1A and R1B (in the applicable rudder pedal arms through the rudder pedal housing).
  (b) R2 (for the forward quadrant)

S 034-001

(2) Do these steps to disconnect the bottom of the cable:
  (a) Loosen the cable retaining nut at the forward quadrant.
  (b) Remove the cable clamps (7 locations) and the grommet.
  (c) Hold the cable retaining nut and washer, then pull the cable from the jackshaft and through the grommet hole.

NOTE: Get access to the cable housing and the crank lever assembly through the rudder pedal covers.

S 034-002

(3) Do these steps to disconnect the top of the cable:
  (a) Remove the nut and washer from the crank lever assembly. Remove the crank lever assembly. Remove the washer.
  (b) Remove the cable retaining sleeve at the crank housing and move it to the center of the cable.
  (c) Pull the cable from the crank housing and remove it.

S 034-013

(4) Remove the four bolts, washers and nuts from the stop plate.

S 034-014

(5) Remove the stop plate and the crank housing.

TASK 27-21-03-424-015

3. Install Rudder Pedal Adjustment Crank

A. Equipment

(1) Alignment Tool and Wrenches, Rudder Pedal Adjustment (from Torque Equipment - Rudder Pedal Adjustment, B27064-1 or -2)
  (a) Alignment Tool - B27064-5 (Supplied with Torque Equipment B27064-1 and -2)
  (b) Flare Nut Wrench - FRH 280 (SNAP-ON TOOLS, Kenosha, Wisconsin)

NOTE: Commercially Available. Supplied with the Torque Equipment B27064-1 only.

(c) Crowfoot Wrench AC34 (Utica Tool Company, Orangeburg, South Carolina)

NOTE: Commercially Available. Supplied with the Torque Equipment B27064-1 only.

B. Consumable Materials
(1) D00633 Grease - BMS-3-33 (Preferred)
(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(3) C00259 Primer - BMS 10-11 - Type 1
(4) C00032 Enamel - BMS 10-60

C. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control

D. Access
(1) Location Zones
211 Control Cabin (Left)
212 Control Cabin (Right)
113 Area Forward of NLG Wheel Well (Left)

(2) Access Panel
113AL Flight/Landing Gear/Engine Control Components

E. Install Rudder Pedal Adjustment Crank (Fig. 401)

S 434-003
(1) Do these steps to connect the cable to the rudder pedal jackshaft:
(a) Put the grommet on the cable.
(b) Push the cable through the grommet hole and the jackshaft support, then put the cable retaining nut and washer on the cable.
(c) Apply a thin layer of grease to the outside diameter of the cable end before it is installed in the jackshaft.
(d) Put the alignment tool through the hole in the bottom of the rudder pedal jackshaft. Hold the jackshaft universal joint and put the cable end into the jackshaft. Turn the cable end until it engages the jackshaft pin.
(e) Hold the cable retaining nut with the crowfoot wrench. Use the flare nut wrench on the sleeve of the rudder pedal adjustment cable and tighten the retaining nut.

NOTE: Make sure the torque that is necessary to turn the nut (before it touches the jackshaft support) is 90-400 pound-inches. When the nut touches the jackshaft support, turn it 1/4 to 1/2 of a turn more to tighten it.

S 434-016
(2) Install the cable clamps (7 locations). Make sure that the cable radius is not less than 5.0 inches (127 mm).

NOTE: A radius of less than 5.0 inches (127 mm) will cause the cable to operate incorrectly.

S 434-017
(3) Install the stop plate and crank housing.

S 434-018
(4) Tighten the four bolts, washers and nuts.

S 434-004
(5) Do these steps to connect the cable to the crank lever assembly:
(a) Push the cable end through the housing and tighten the cable retaining sleeve.
(b) Put the washer on the cable that comes from the stop plate. Install the crank lever assembly, washer, and nut. Tighten the nut.
(c) Install the lockwire. The location of the lockwire nut is optional.

NOTE: To get the best lockwire angle, make sure that the aft cable assembly can turn easily and smoothly.

S 374-019
(6) Apply one layer of primer and 1 layer of enamel to the fasteners and the crank knob pin.

S 094-020
(7) Remove these rig pins:
(a) R1A and R1B (from the rudder pedals).

(b) R2 (from the forward quadrant)

S 214-022

(8) Turn the adjustment cranks full travel in each direction. Make sure that the rudder pedals move in a longitudinal direction.

F. Put the Airplane Back to Its Usual Condition

S 864-023

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-024

(2) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C and R on the right side panel, P61, to ON.

S 414-025

(3) Close access panel 113AL (Ref 06-41-00).

S 864-026

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER JACKSHAFT AND FORWARD QUADRANT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains 2 tasks. The first task contains the data that is necessary to remove the captain's (or first officer's) rudder jackshaft and forward quadrant. The second task contains the data that is necesary to install it.

TASK 27-21-05-024-052

2. Remove Rudder Jackshaft and Forward Quadrant
   A. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 06-42-00/201, Empennage Access Doors and Panels
      (3) 24-22-00/201, Electrical Power - Control
      (4) 27-00-01/201, Flight Control Cables
   C. Access
      (1) Location Zone
          113 Area Forward of NLG Wheel Well (left)

      (2) Access Panels
          113AL Flight/Landing Gear/Engine Control Components
          324AL Body to Fin Seal
          311AL Control Cables, Pulleys, Brackets, Fairleads

   D. Prepare for Removal

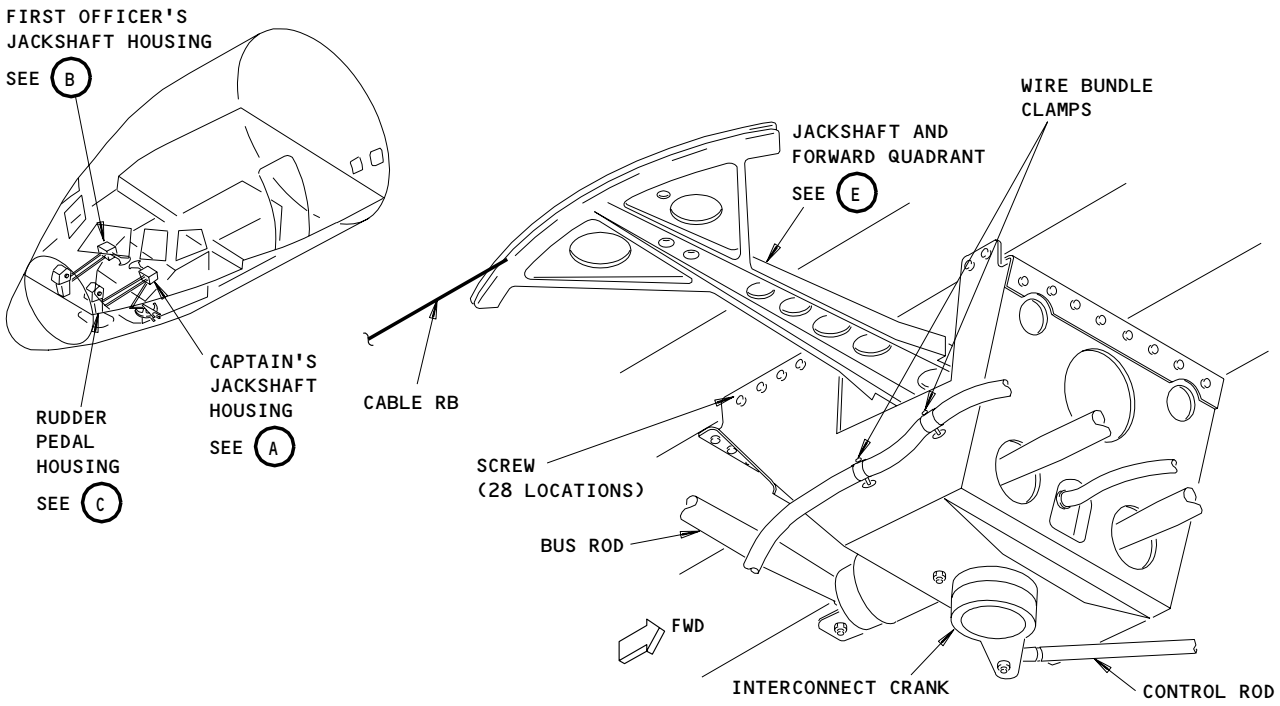
      S 864-008
      (1) Supply electrical power (Ref 24-22-00).

      S 864-009
      (2) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure that the amber switch-position legend lights come ON.

      S 864-010
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

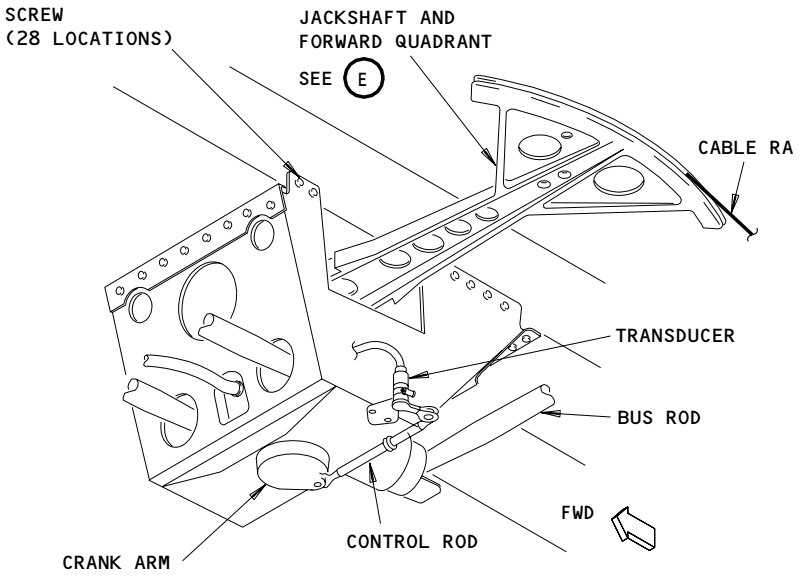
      S 014-011
      (4) Open access door 113AL to get access to the quadrant and jackshaft (AMM 06-41-00/201).

      S 494-012
      (5) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 402).



CAPTAIN'S JACKSHAFT HOUSING

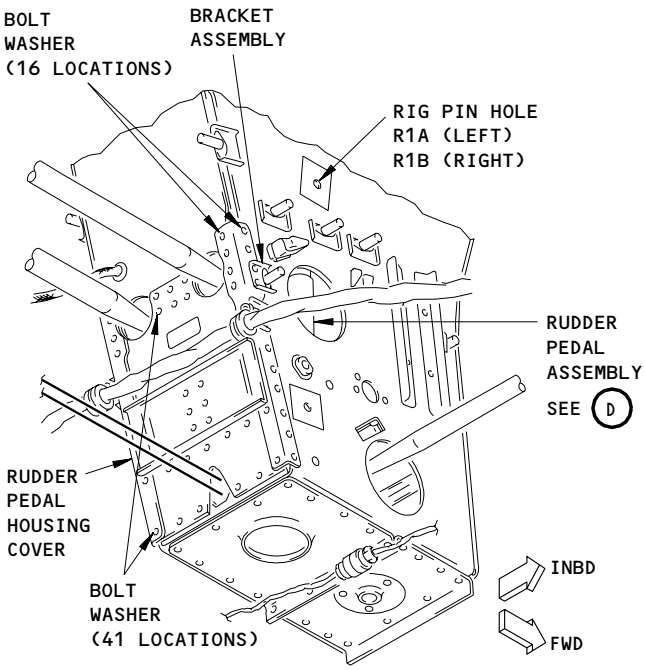
A



FIRST OFFICER'S JACKSHAFT HOUSING

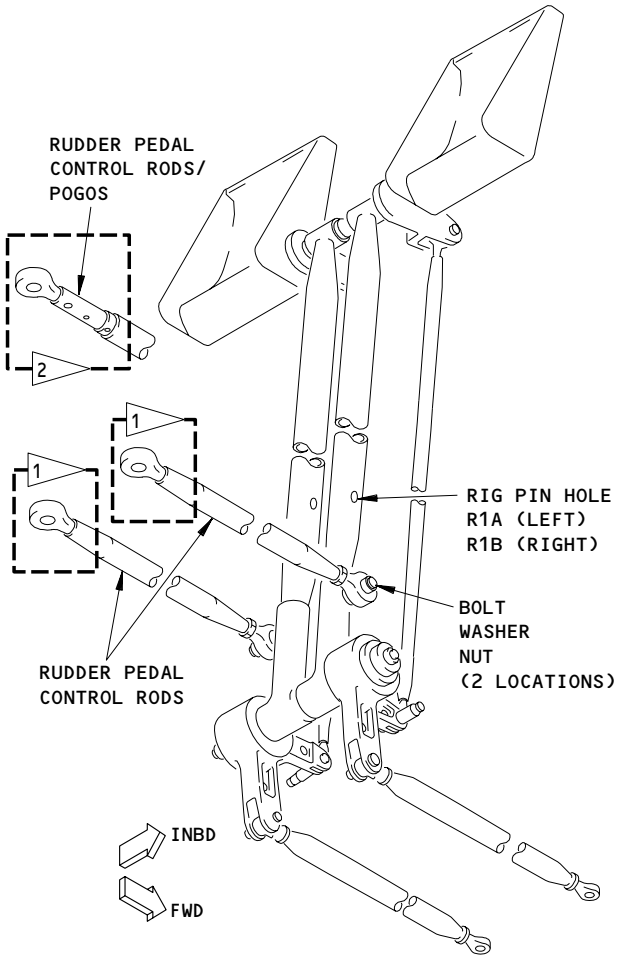
B

Rudder Jackshaft and Forward Quadrant
Figure 401 (Sheet 1)



RUDDER PEDAL HOUSING

C



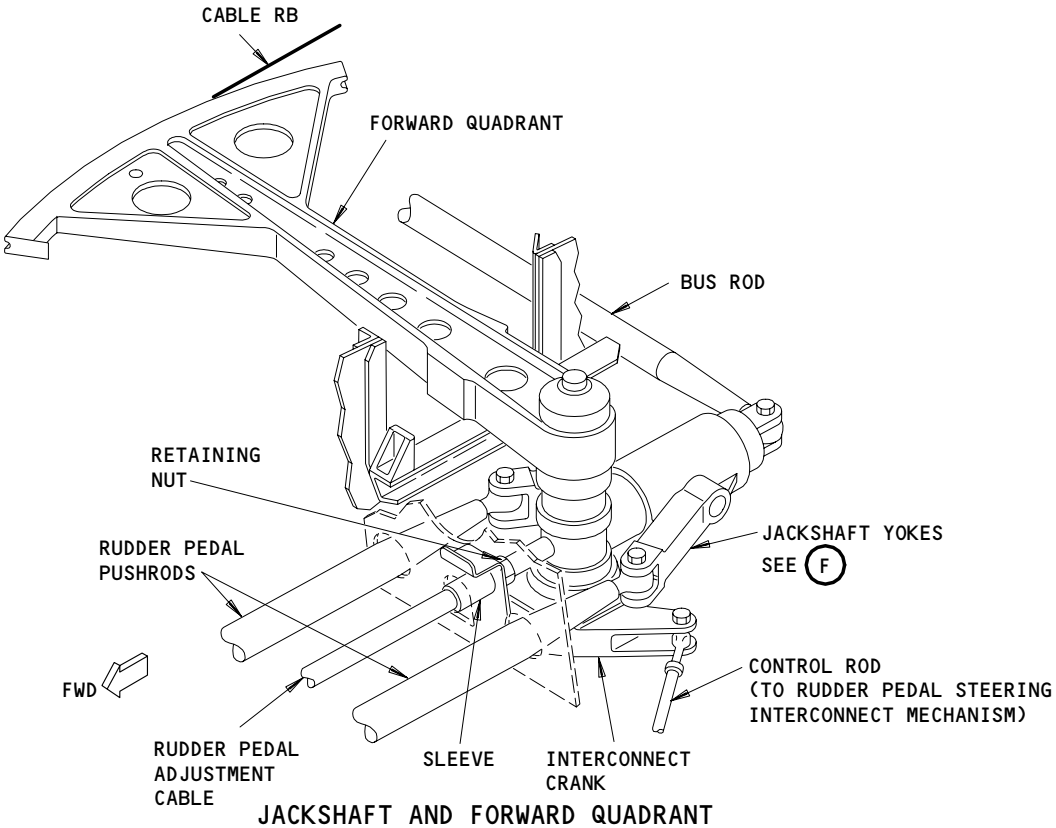
CAPTAIN'S RUDDER ASSEMBLY

D

1 AIRPLANES WITH SOLID CONTROL RODS

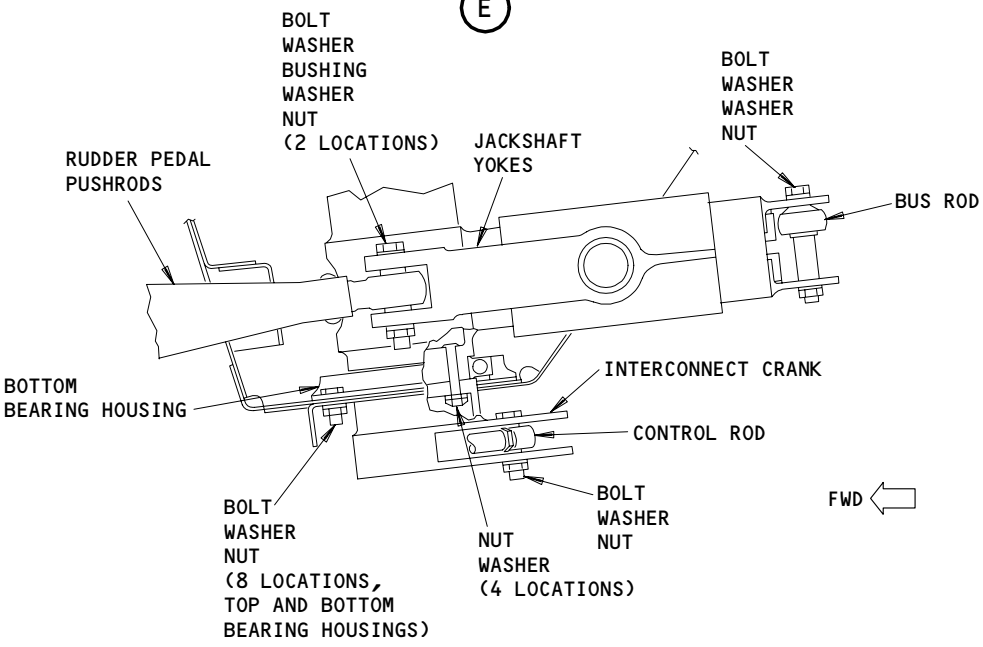
2 AIRPLANES WITH COMPRESSIBLE CONTROL RODS/POGOS

Rudder Jackshaft and Forward Quadrant
Figure 401 (Sheet 2)



JACKSHAFT AND FORWARD QUADRANT

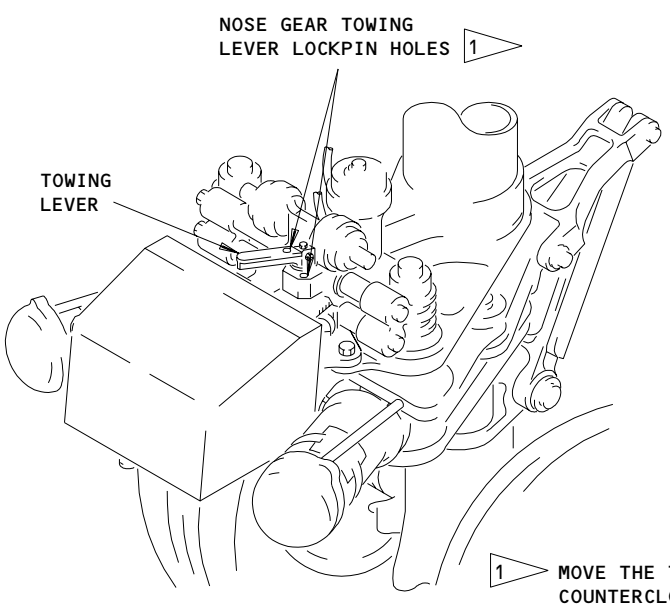
(E)



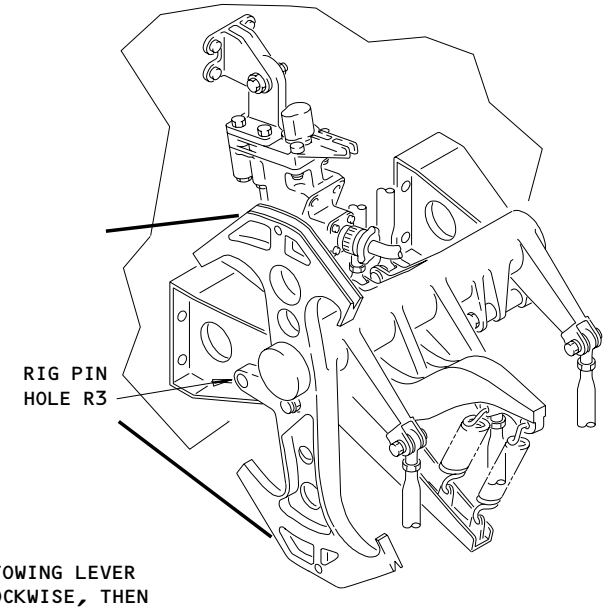
JACKSHAFT YOKES

(F)

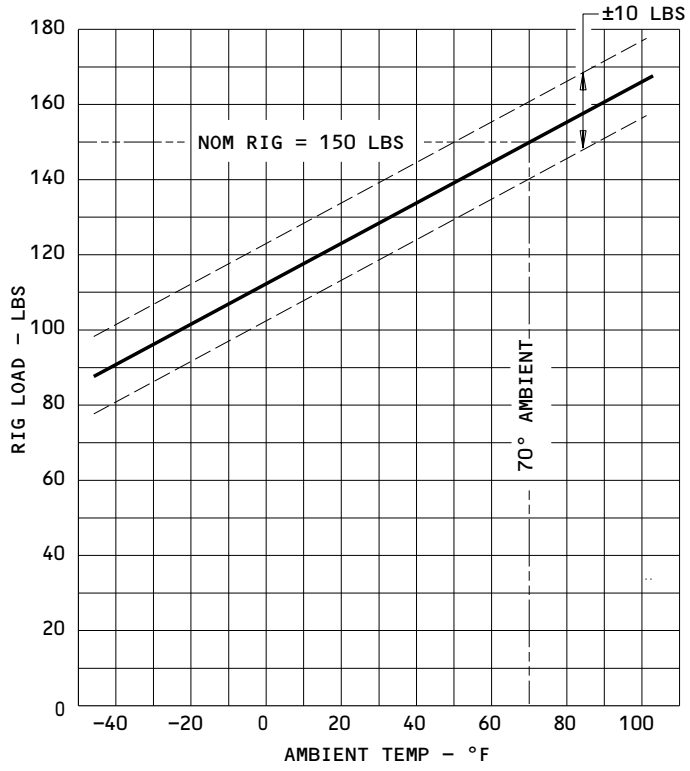
Rudder Jackshaft and Forward Quadrant
Figure 401 (Sheet 3)



NOSE GEAR STEERING COMPONENTS



FEEL, CENTERING AND
TRIM MECHANISM



CABLE RIG LOAD VS TEMPERATURE

Rig Pin Locations and Cable Rig Load vs. Temperature Graph
Figure 402

S 014-014

(6) Open access panel 324AL to get access to the feel, centering, and trim mechanism (AMM 06-42-00/201).

E. Remove Rudder Jackshaft and Forward Quadrant

S 014-001

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(1) Open access door 311AL to get access to the turnbuckles for cables RA and RB (AMM 06-42-00/201).

S 824-015

(2) Equally decrease the tension in cables RA and RB at the turnbuckles that are located aft of the pressure bulkhead (AMM 27-00-01/201).

NOTE: Tension can also be decrease in cables RA and RB at the turnbuckles that are located in the forward cargo instead of aft of the pressure bulkhead (AMM 27-00-01/201).

S 824-078

(3) Equally decrease the tension in aileron cables A1A and A1B at the turnbuckles that are located in the forward cargo compartment to ease in the removal of the Jackshaft Housing (AMM 27-00-01/201).

S 034-002

CAUTION: KEEP SOME TENSION IN THE CONTROL CABLES AT ALL TIMES. IF THE TENSION IS REMOVED, THE CABLES CAN BECOME INCORRECTLY ALIGNED AND OPERATE INCORRECTLY. A FULL INSPECTION OF THE CONTROL CABLE SYSTEM MUST BE DONE IF THE TENSION IS REMOVED.

(4) Disconnect cables RA and RB from the rudder forward quadrants. Keep some tension in the cables and tag them for identification.

S 034-053

(5) Loosen the retaining nut for the pedal adjustment cable. Hold the nut and washer, then remove the cable from the jackshaft and its support structure.

S 034-016

(6) Disconnect the bus rod assembly from the jackshaft.

S 034-017
(7) ON THE CAPTAIN'S JACKSHAFT;
remove the control rod from the interconnect crank.

S 034-072
(8) Disconnect the control rod from the crank arm on the first officer's jackshaft.

S 034-019
(9) Remove the wire bundles and the clamps.

S 034-020
(10) Remove the interconnect crank that is located below the captain's jackshaft. Put the nuts back on the bolts to keep the bolts out of the jackshaft.

S 034-071
(11) Disconnect the control rod from the crank arm on the first officer's jackshaft.

S 034-022
(12) Remove the rudder pedal housing cover that is opposite the jackshaft. Do the steps that follow:
(a) Disconnect the electrical connector from the transducer that is located below the first officer's jackshaft.
(b) Remove the wire bundles.
(c) Remove the bolts from the top front and sides of the cover (16 locations).
(d) Remove the bolts from the face and bottom sides of the cover (41 locations).
(e) Remove the rudder pedal pushrods from the rudder pedal arms.

S 034-023
(13) Hold the jackshaft and remove the jackshaft housing from the flight deck floor. Disengage the jackshaft from the top bearing housing.

S 034-024
(14) Remove the aft panel from the jackshaft housing.

S 034-025
(15) Lift the jackshaft from the bottom bearing housing, then pull the jackshaft and rudder pedal pushrods from the jackshaft housing.

S 034-026

(16) Remove the rudder pedal pushrods from the jackshaft yokes.

S 034-027

(17) Remove the top and bottom bearing housings.

TASK 27-21-05-424-028

3. Install Rudder Jackshaft and Forward Quadrant

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):

(a) R1A - P/N B20003-26

(b) R1B - P/N B20003-26

(c) R2 - P/N B20003-22

(d) R3 - P/N B20003-16

(2) Alignment tool and wrenches, Rudder Pedal Adjustment (from Torque Equipment - Rudder Pedal Adjustment B27064-1 or -2)

(a) Alignment Tool - B27064-5 (part of B27064 -1 and -2)

(b) Flare Nut Wrench - SNAP-ON TOOLS - FRH 280, Snap-On-Tools, Kenosha, Wisconsin

NOTE: Supplied with equipment B27064-1

(c) Crowfoot Wrench - Utica - AC34, Utica Tool Company, Orangeburg, South Carolina

NOTE: Supplied with equipment B27064-1

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References

(1) 06-41-00/201, Fuselage Access Doors and Panels

(2) 06-42-00/201, Empennage Access Doors and Panels

(3) 24-22-00/201, Electrical Power - Control
(4) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

D. Access

(1) Location Zones

113 Area Forward of NLG Wheel Well (Left)
311 Area Aft of Pressure Bulkhead to BS 1725 (Left)

(2) Access Panels

113AL Flight/Landing Gear/Engine Control Components
324AL Body to Fin Seal
311AL Control Cables, Pulleys, Brackets, Fairleads

E. Install Rudder Jackshaft and Forward Quadrant

S 494-029
(1) Install rig pin R1A (Captains), or R1B (First Officers) in the rudder pedal arms of the jackshaft and quadrant that was not removed.

S 434-030
(2) Attach the top bearing housing to to the flight deck floor.

S 434-031
(3) Install the bottom bearing housing in the jackshaft housing.

S 434-032
(4) Connect the end of the rudder pedal pushrods that is not adjustable to the jackshaft yokes.

S 434-033
(5) Install the jackshaft in the bottom bearing of the jackshaft housing.

S 434-034
(6) Install the jackshaft housing aft panel.

S 434-035
(7) Hold the jackshaft and engage the jackshaft in its top bearing. Connect the jackshaft housing to the flight deck floor.

S 434-074
(8) Install the interconnect crank that is located below the captain's jackshaft.

S 434-003

CAUTION: BE CAREFUL NOT TO PUSH THE BOLTS THAT CONNECT THE INTERCONNECT CRANK INTO THE JACKSHAFT BOTTOM.

(9) Connect the control rod (to rudder pedal steering interconnect mechanism) to the crank.

S 434-073

(10) Do these steps to install the first officer's jackshaft:
   (a) Install the crank arm that is located below the first officer's jackshaft.
   (b) Connect the control rod to the crank arm with the bolt, washer, and nut.
   (c) Connect the electrical connector to the transducer.

S 434-038

(11) Connect the bus rod assembly to the jackshaft.

S 434-004

(12) Do these steps to install the pedal adjustment cable:
   (a) Apply a thin layer of grease to the outer diameter of the pedal adjustment cable before it is installed.
   (b) Put the cable retaining nut and washer on the cable.
   (c) Put the alignment tool through the hole in the bottom of the jackshaft. Hold the jackshaft universal joint and put the cable end into the jackshaft. Turn the cable until it engages the jackshaft pin.
   (d) Hold the cable retaining nut with the crowfoot wrench. Use the flare nut wrench on the sleeve of the rudder pedal adjustment cable and tighten the retaining nut.

      NOTE: Make sure that the torque that is necessary to turn the nut (before it touches the jackshaft support) is 90-400 pound-inches. When the nut touches the jackshaft support, turn it 1/4 to 1/2 of a turn more to tighten it.

S 824-005

(13) Do these steps to adjust the control rods for the rudder pedal arms:
   (a) Turn the pedal adjustment knob clockwise until the jackshaft is in its full forward pedal position.

(b) Turn the pedal adjustment knob 3.6 turns counterclockwise. Put the adjustment knob in its nearest detent position.
(c) Install rig pin R2 in the left forward quadrant.
(d) Adjust the control rods for the rudder pedal arms until the bolts can be easily installed. Tighten the jam nuts.
(e) Connect the control rods to the rudder pedal arms.
1) Install the bolt, washer, and nut.
2) Tighten the nut to 110-150 inch-pounds (12.4-16.9 newton-meters).
3) AIRPLANES WITH BOLTS AND NUTS THAT REQUIRE COTTER PINS; install the cotter pin on the nut.

S 494-039
(14) Install rig pin R3 in the feel, centering, and trim mechanism.

S 434-040
(15) Attach cable RA to the first officer's forward quadrant or RB to the captain's forward quadrant.

S 094-041
(16) Remove rig pin R1A or R1B.

S 824-042
(17) Adjust the cable tension to the value shown (Fig. 402).

S 214-043
(18) Make sure that rig pins R2 and R3 can be easily installed and removed.

S 224-044
(19) Move the rudder pedals through one full travel cycle and do a check of the cable tension. If new cables were installed, refer to AMM 27-21-00/501 for the Adjustment/Test procedure.

S 434-045
(20) Install cliplocks on the turnbuckles.

S 864-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(21) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-046

(22) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
  (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (b) 11H18, FLT CONT SHUTOFF TAIL CTR
  (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-047

(23) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C and R on the right side panel, P61, to ON.

S 864-048

(24) Make sure that these circuit breakers on the P11 panel are closed:
  (a) EICAS (6 locations)

S 824-049

(25) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 214-050

(26) Move the rudder pedals full left and right and do the checks that follow:
  (a) Make sure the rudder moves smoothly and correctly through its full travel range.
  (b) Make sure the rudder position indicator operates correctly through its full travel when the pedals are moved.

F. Put the Airplane Back to its Usual Condition

S 094-007

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCK PIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure that the nose gear wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 402).

S 414-051

(2) Close access panels 113AL (AMM 06-41-00/201) and 324AL (AMM 06-42-00/201).

S 864-054

(3) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 864-055

(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

AFT QUADRANT, FEEL, CENTERING AND TRIM MECHANISM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation procedures for the aft rudder control quadrant and its components.

TASK 27-21-06-022-001

2. Aft Quadrant and Components - Removal
   A. General
      (1) This task contains these four procedures:

- Remove the Aft Quadrant Assembly
- Remove the Feel, Centering, and Trim mechanism from the Aft Quadrant Assembly
- Remove the Rudder Trim Actuator
- Remove the Roller Bearing from the Cam Roller Arm Assembly

Because this task contains four procedures, only the applicable group of steps must be done.

To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

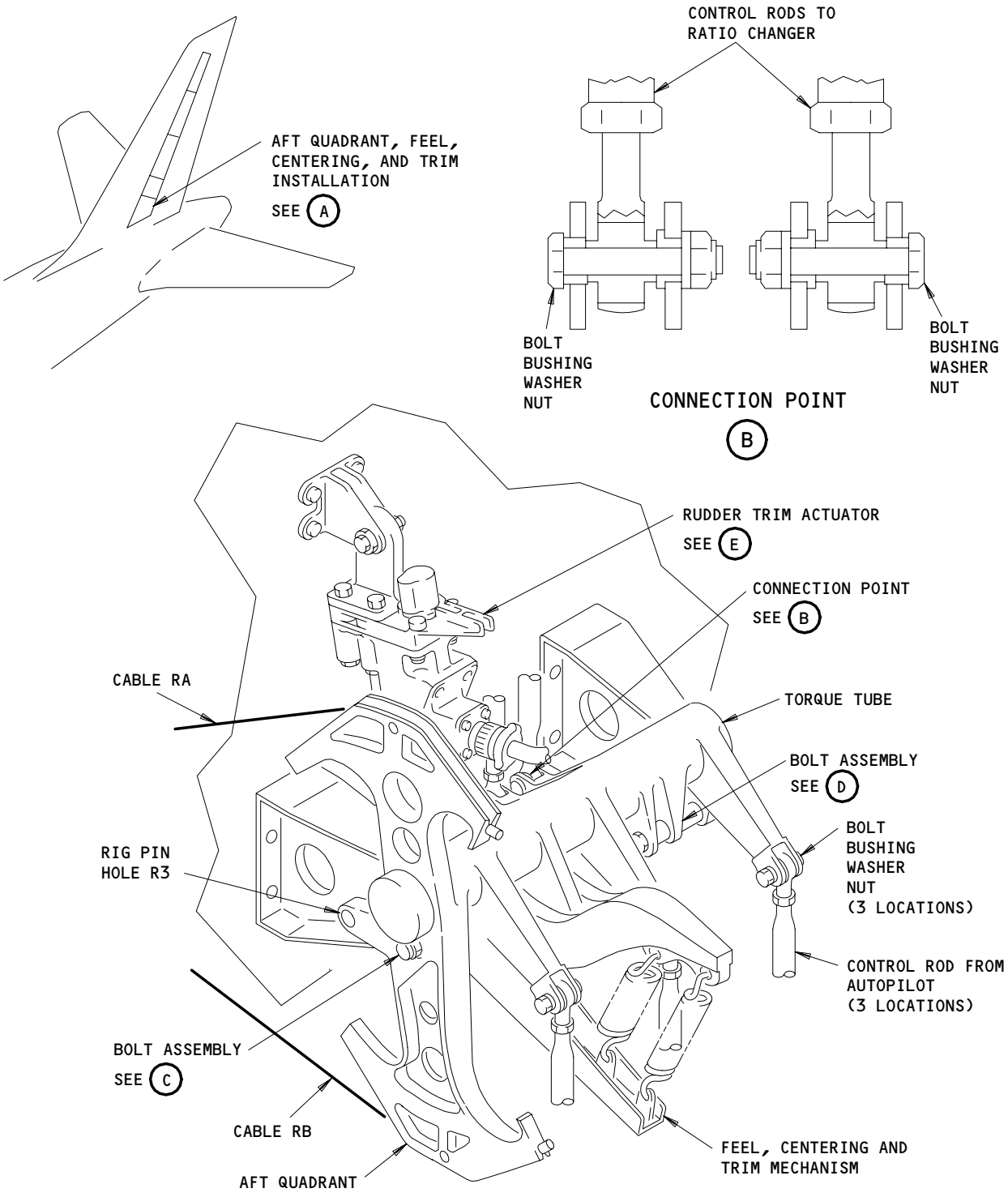
   B. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
   C. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-00-01/201, Flight Control Cables
   D. Access
      (1) Location Zones
          311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          311AL Control Cables
          324AL Body to Fin Seal
          324CL Rudder Hinge and PCAs

   E. Prepare for Removal

S 862-002
      (1) Supply electrical power (Ref 24-22-00).

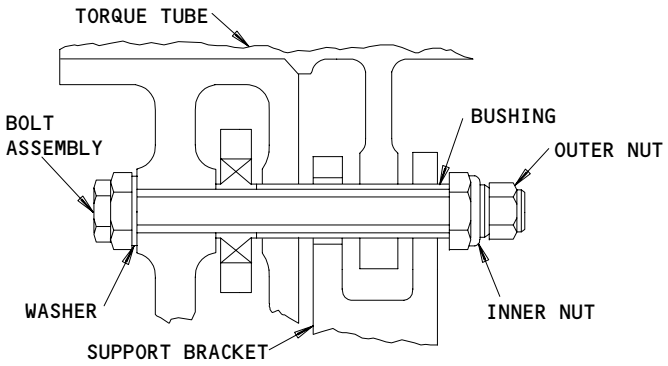
S 862-003
      (2) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.



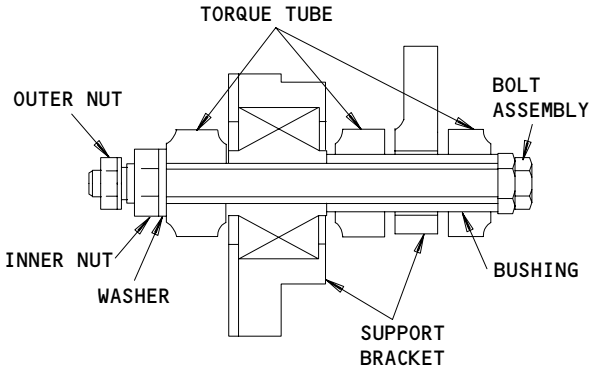
AFT QUADRANT, FEEL, CENTERING, AND TRIM INSTALLATION

A

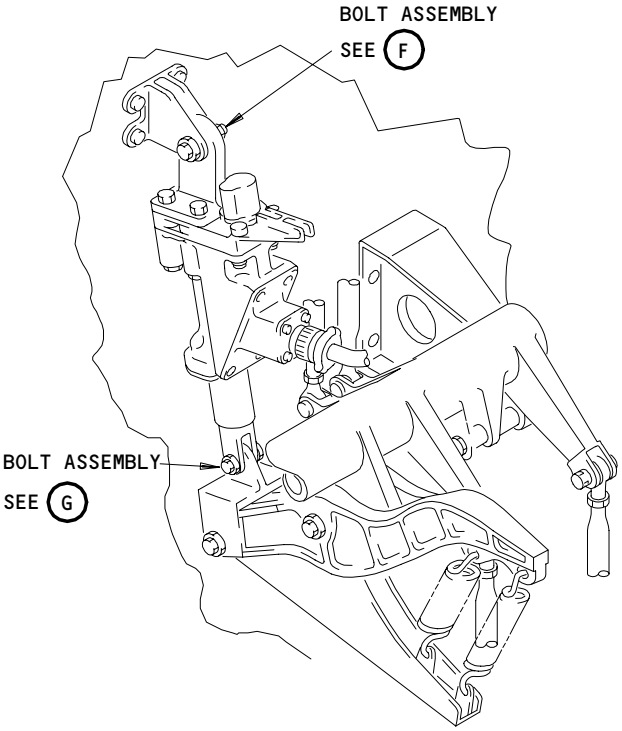
Aft Quadrant Assembly
Figure 201 (Sheet 1)



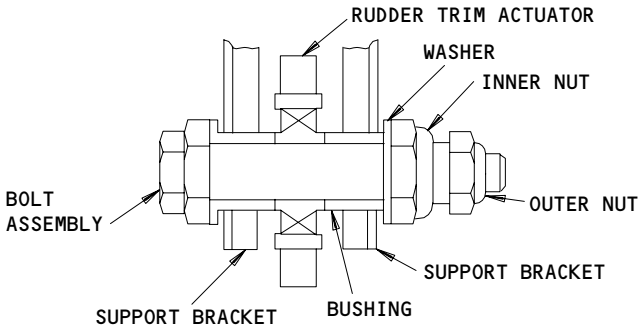
BOLT ASSEMBLY
C



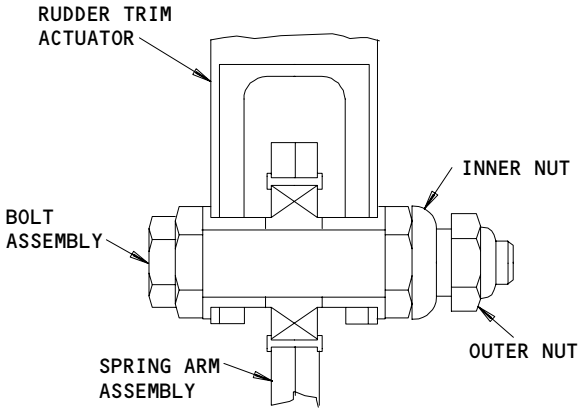
BOLT ASSEMBLY
D



RUDDER TRIM ACTUATOR
E



BOLT ASSEMBLY
F



BOLT ASSEMBLY
G

Aft Quadrant Assembly
Figure 201 (Sheet 2)

S 862-004
(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11C10, RUD TRIM

S 492-005
(4) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 204).

S 012-007
(5) Open access panels 324AL and 324CL (Ref 06-42-00).

F. Remove the Aft Quadrant Assembly (Fig. 201)

S 012-049

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(1) Open access door 311AL to get access to the turnbuckles for cables RA and RB (Ref 06-42-00).

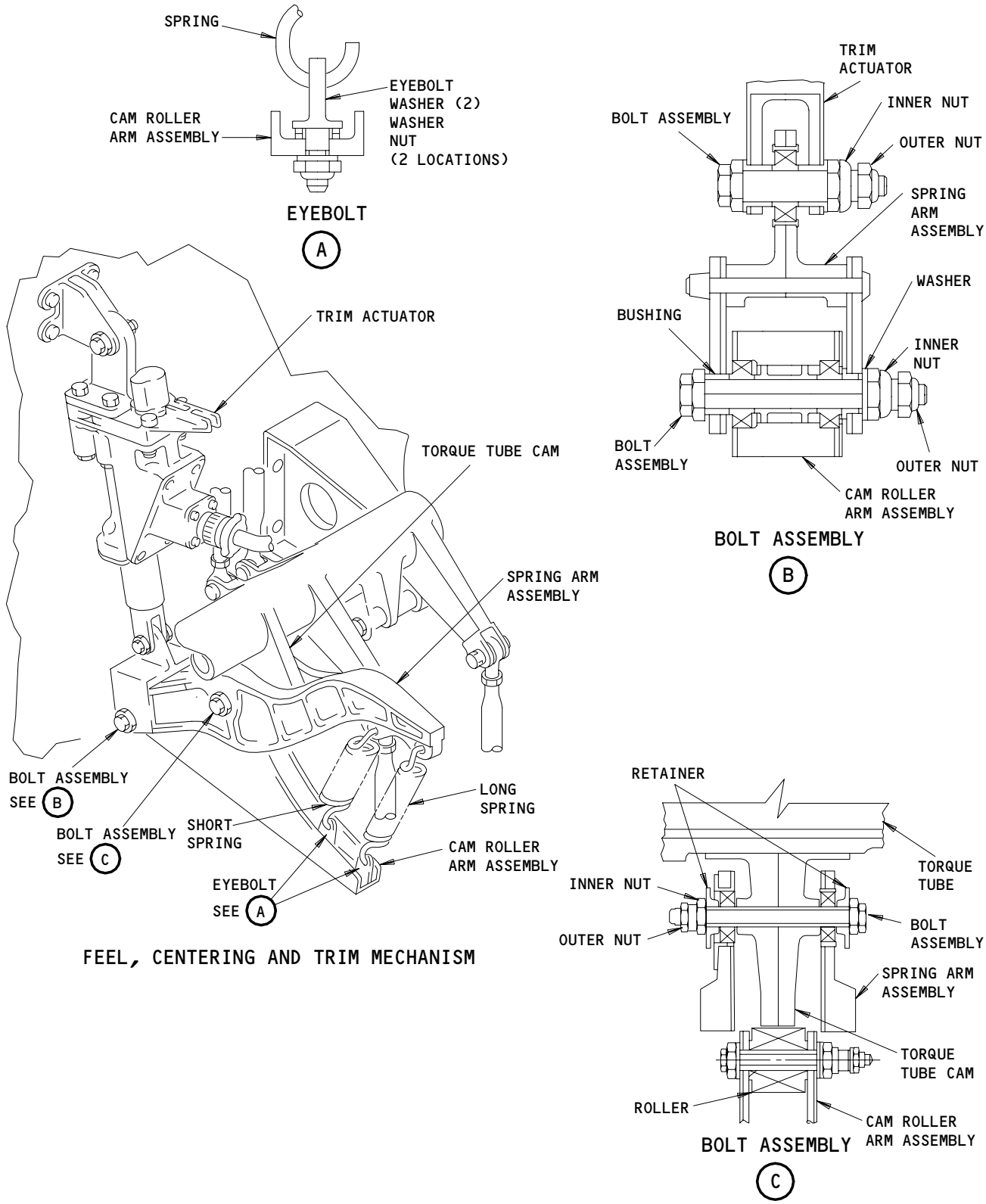
S 032-051
(2) Release the tension from cables RA and RB at their turnbuckles (Ref 27-00-01).

NOTE: These turnbuckles are located in the area aft of the aft pressure bulkhead.

S 032-050

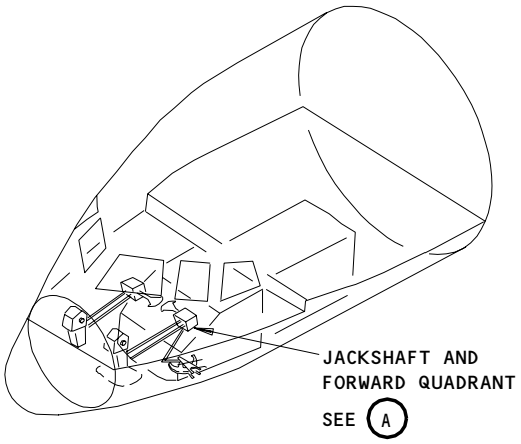
CAUTION: KEEP SOME TENSION IN THE CONTROL CABLES AT ALL TIMES. THIS WILL KEEP THE CABLES ON THEIR PULLEYS AND PREVENT INCORRECT CABLE OPERATION. IF THE TENSION IS REMOVED, A FULL INSPECTION OF THE CONTROL CABLE SYSTEM MUST BE DONE.

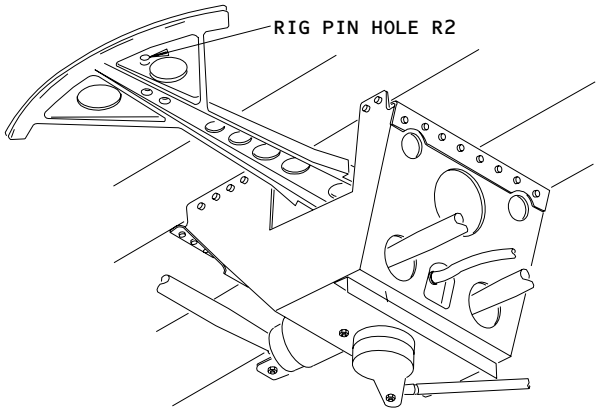
(3) Disconnect these components from the aft quadrant:
(a) Cables RA and RB
(b) The rudder trim actuator
(c) The control rods for the rollout guidance servos (3 locations)
(d) The control rods for the ratio changer (2 locations).



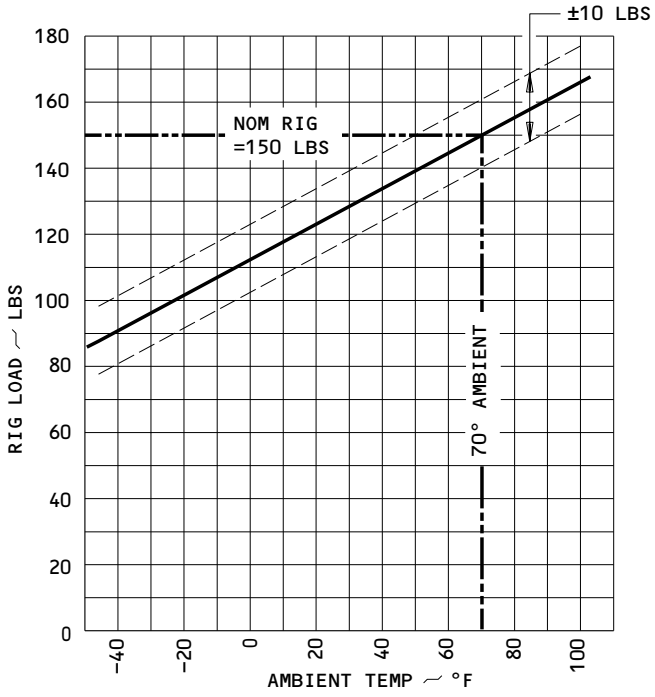
FEEL, CENTERING AND TRIM MECHANISM

Feel, Centering and Trim Mechanism
Figure 202





JACKSHAFT AND FORWARD QUADRANT
(A)



CABLE RIG LOAD VS TEMPERATURE

Rig Pin Locations and Cable Load VS Temperature Graph
Figure 203

S 032-009

(4) Do these steps to disconnect the aft quadrant assembly:
  (a) Remove the outer nuts, washers, and the inner nuts from the two bolt assemblies that connect the quadrant to its brackets.
  (b) Remove the bolt assemblies and their bushings.

S 022-010

(5) Remove the aft quadrant assembly from its brackets.

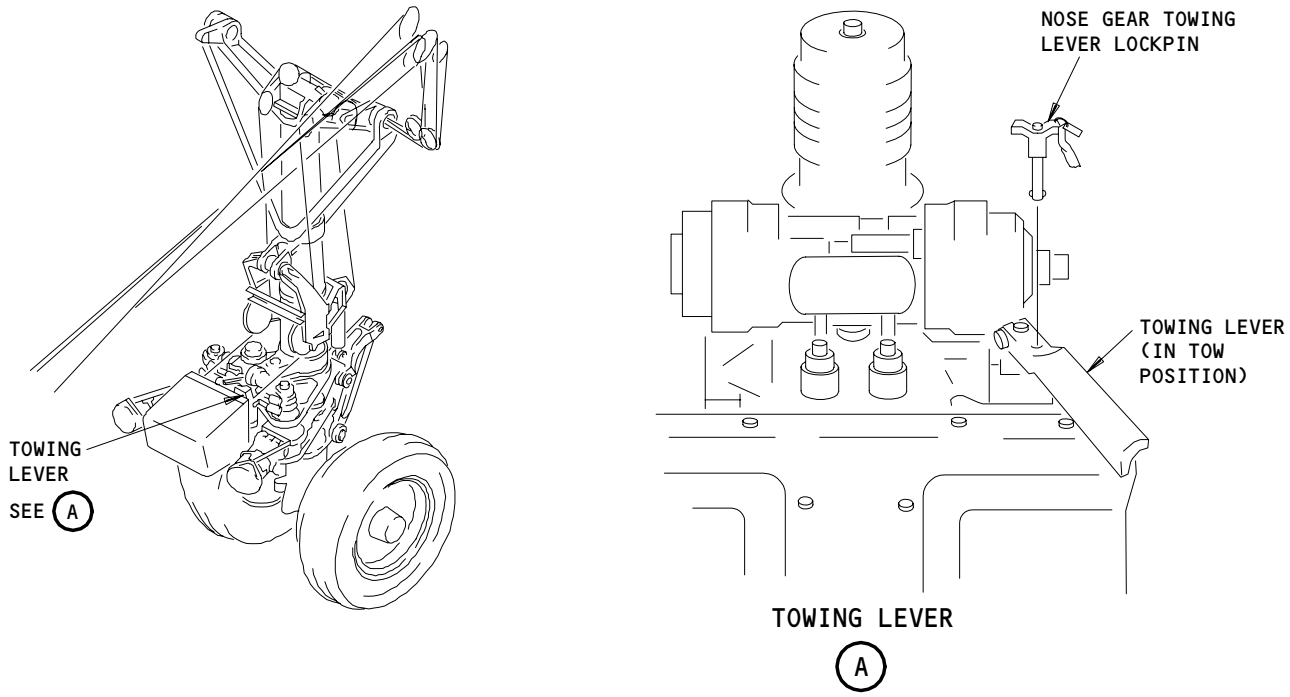
G. Remove the Feel, Centering, and Trim Mechanism From the Aft Quadrant Assembly (Fig. 202)

S 032-011

(1) Loosen the two eyebolt nuts until there is no tension in the springs.

S 032-012

(2) Remove these components:
  (a) The bolt assembly that connects the spring arm assembly to the torque tube cam
  (b) The two feel and centering springs
  (c) The bolt assembly that connects the spring arm assembly to the trim actuator.



Nose Gear Steering Isolation
Figure 204

S 022-013
(3) Remove the feel, centering, and trim mechanism from the aft quadrant assembly.

H. Remove the Rudder Trim Actuator (Fig. 201)

S 032-014
(1) Disconnect the electrical connector from the trim actuator.

S 032-015
(2) Remove these components:
(a) The nuts and washer from the bolt assembly that connects the actuator to the spring arm assembly
(b) The bottom bolt assembly
(c) The nuts and washer from the bolt assembly that connects the actuator to the support bracket
(d) The top bolt assembly.

S 022-016
(3) Remove the trim actuator.

I. Remove the Roller Bearing From the Cam Roller Arm Assembly (Fig. 202)

S 022-057
(1) Remove the nuts and washers that attach the two feel and centering springs to the arm assembly.

S 022-053
(2) Remove the bolt, nuts, and washers that attach the roller bearing to the cam roller arm assembly.

S 022-054
(3) Remove the roller bearing.

TASK 27-21-06-422-017

3. Aft Quadrant and Components - Installation

A. General
(1) This task contains these four procedures:

- Install the Aft Quadrant Assembly
- Install the Feel, Centering, and Trim Mechanism on the Aft Quadrant Assembly
- Install the Rudder Trim Actuator
- Install the Roller Bearing to the Cam Roller Arm Assembly.

Because this task contains four procedures, only the applicable groups of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Feel, Centering, and Trim Mechanism - Test" and the "Put the Airplane Back to Its Usual Condition" groups of steps.

B. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24)
(a) R2 - P/N B20003-22
(b) R3 - P/N B20003-16
(2) Force gage, Commercially Available
(3) Cable Tensiometer, Commercially Available
C. Consumable Materials
(1) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class 3
D. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-21-00/501, Rudder and Rudder Trim Control System
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
E. Access
(1) Location Zones
311 Aft of Pressure Bulkhead to BS 1787.45 (Left)
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
311AL Control Cables
324AL Body to Fin Seal
324CL Rudder Hinge and PCAs

F. Install the Aft Quadrant Assembly (Fig. 201)

S 622-018
(1) Apply the corrosion preventive compound to the bolt assemblies before installation.

S 432-019
(2) Do these steps to install the aft quadrant assembly on its brackets:
(a) Align the aft quadrant assembly with the bracket connection points.
(b) Install the bolt assemblies, bushings, and the washers.
(c) Install the inner nut and tighten it to 50 - 60 pound-inches (5.7-6.7 newton-meters).
(d) Install the outer nut and tighten it to 10 pound-inches (1.1 newton-meters).

NOTE: Do not change the torque value for the inner nut.

S 432-020
(3) Do these steps to connect the rudder trim actuator to the feel, centering, and trim mechanism:
(a) Install the bolt assembly, bushings, and the washers.
(b) Install the inner nut and tighten it to 50 - 60 pound-inches (5.7-6.7 newton-meters).

(c) Install the outer nut and tighten it to 10 pound-inches (1.1 newton-meters).

NOTE: Do not change the torque value for the inner nut.

S 862-021

(4) Remove the DO-NOT-CLOSE tags and close this circuit breaker on the overhead panel, P11:
(a) 11C10, RUD TRIM

S 492-022

(5) Operate the rudder trim switch on the aft electronic control panel, P8, until rig pin R3 (for the aft quadrant assembly) can be easily installed.

S 822-023

(6) Do these steps to adjust the feel and centering springs:
(a) Do these steps to adjust the short feel and centering spring:
1) Install the short spring.
2) Connect the force gage to the top cable guard pin on the aft quadrant.
3) Loosen the eyebolt for the short spring and use the force gage to turn the quadrant in a clockwise direction.
4) Adjust the shim washers below the eyebolt until the tangential load is 2.20 ±0.20 pounds (9.78 +/- 0.9 newtons).

NOTE: Make sure rig pin R3 is held lightly by the rig pin holes when you measure the force.

5) Connect the force gage to the bottom cable guard on the aft quadrant.
6) Use the force gage to turn the quadrant in a counterclockwise direction.
7) Make sure the tangential load is 2.20 ±0.20 pounds (9.78 +/- 0.9 newtons). If adjustment is necessary, make sure the tangential load at the top cable guard pin does not change.

NOTE: Make sure rig pin R3 is held lightly by the rig pin holes when you measure the force.

8) Tighten the eyebolt for the short spring.
(b) Do these steps to adjust the long feel and centering spring:
1) Install the long spring.
2) Connect the force gage to the top cable guard pin on the aft quadrant.
3) Use the force gage to turn the quadrant in a clockwise direction.

4) Adjust the shim washers below the eyebolt for the long spring until the tangential load is 4.35 ±0.45 pounds (19.3 +/- 2.0 newtons).

NOTE: Make sure rig pin R3 is held lightly by the rig pin holes when you measure the force.

5) Connect the force gage to the bottom cable guard pin on the aft quadrant.
6) Use the force gage to turn the aft quadrant in a counterclockwise direction.
7) Make sure the tangential load is 4.35 ±0.45 pounds (19.3 +/- 2.0 newtons). If adjustment is necessary, make sure the tangential load at the top cable gaurd pin does not change.

NOTE: Make sure rig pin R3 is held lightly by the rig pin holes when you measure the force.

(c) Remove rig pin R3.
(d) Connect the force gage to the top cable guard pin and do these steps:
1) Use the force gage to turn the quadrant to its full clockwise position.
2) Make sure the tangential load is 46.40 ±5.0 pounds (206.4 +/- 22.2 newtons).
(e) Connect the force gage to the bottom cable guard and do these steps:
1) Use the force gage to turn the quadrant to its full counterclockwise position.
2) Make sure the tangential load is 46.40 ±5.0 pounds (206.4 +/- 22.2 newtons).

S 432-024
(7) Connect these components:
(a) The control rods from the ratio changer (2 locations)
(b) The control rods from the rollout guidance servos (3 locations).

S 492-025
(8) Install rig pin R2 in the left forward quadrant.

S 822-026
(9) Connect cables RA and RB to the aft quadrant and do these steps:
(a) Operate the rudder trim switch on the P8 panel and install this rig pin:
1) R3 (for the feel, centering, and trim mechanism)
(b) Adjust the cable tension to the value shown (Fig. 203) and do these checks:
1) Make sure that rig pins R2 and R3 can move freely in their holes.

2) Remove rig pins R2 and R3.
3) Operate the rudder pedals through one full travel cycle.
4) Make sure the cable tension is correct (Fig. 203).

(c) Install clip locks on the turnbuckles.

S 822-027

(10) Do the adjustment procedure for the rudder trim indicator (Ref 27-21-00).

S 822-028

(11) Do the adjustment procedure for the autopilot servos (Ref 27-21-00).

G. Install Feel, Centering, and Trim Mechanism to the Aft Quadrant Assembly (Fig. 202)

S 432-044

(1) Do these steps to connect the feel centering, and trim mechanism to the trim actuator:
(a) Align the feel, centering, and trim mechanism with the actuator connection point.
(b) Install the bolt assembly and the bushings.
(c) Install the inner nut and tighten it to 50-60 pound-inches (222-266 newtons).
(d) Install the outer nut and tighten it to 10 pound-inches (1.3 newton-meters).

NOTE: Do not change the torque value for the inner nut.

S 432-029

(2) Do these steps to connect the spring arm assembly to the torque tube cam:
(a) Align the spring arm assembly with the cam plate connection point.
(b) Install the bolt assembly and the retainer through the spring arm assembly and the torque tube cam.
(c) Install the retainer and the inner nut. Tighten it to 50-60 pound-inches.
(d) Install the outer nut and tighten it to 10 pound-inches (1.3 newtons).

NOTE: Do not change the torque value for the inner nut.

S 432-045

(3) Install the two feel and centering springs and tighten the eyebolt nuts.

H. Install the Rudder Trim Actuator (Fig. 201)

S 432-030

(1) Do these steps to connect the trim actuator to its support bracket:
   (a) Align the actuator with the support bracket and the spring arm. Do this check:
      1) Make sure the anti-rotation clevis for the actuator is engaged in the fin structure.
   (b) Install the top bolt assembly, bushings, and the washer.
   (c) Install the inner nut and tighten it to 50-60 pound-inches (5.7-6.7 newton-meters).
   (d) Install the outer nut and tighten it to 10 pound-inches (1.13 newton-meters).

NOTE: Do not change the torque valve for the inner nut.

S 432-052

(2) Do these steps to connect the trim actuator to the spring arm assembly:
   (a) Install the bolt assembly and the bushings.
   (b) Install the inner nut and tighten it to 50-60 pound-inches (5.7-6.7 newton-meters).
   (c) Install the outer nut and tighten it to 10 pound-inches (1.13 newtons).

NOTE: Do not change the torque valve for the inner nut.

S 432-031

(3) Connect the electrical connector to the trim actuator.

I. Install the Roller Bearing to the Cam Roller Arm Assembly (Fig. 202)

S 622-056

(1) Apply the corrosion preventive compound to the bolt before installation.

S 422-055

(2) Do these steps to install the roller bearing:
   (a) Install the roller bearing with the bolt and washers.
   (b) Install the inner nut and tighten it to 60 - 80 pound-inches (6.8-9.0 newton-meters).
   (c) Install the outer nut and tighten it to 15 - 20 pound-inches (1.7-2.2 newton-meters).

NOTE: Do not change the torque value for the inner nut.

S 432-058

(3) Install the two feel and centering springs.

J. Feel, Centering, and Trim Mechanism - Test

S 862-047

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS. SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-032

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (b) 11H18, FLT CONT SHUTOFF TAIL CTR
   (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-033

(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to ON.

S 862-034

(4) Make sure these circuit breakers on the P11 panel are closed:
   (a) EICAS (6 locations)
   (b) 11C10, RUD TRIM

S 862-035

(5) Push the STATUS switch on the pilot's display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 212-036

(6) Move the captain's right rudder pedal to its full forward position and do this check:
   (a) Make sure the rudder trailing edge moves smoothly to its full right position.
   (b) Make sure the rudder position indicator moves to its full right position.

S 212-037

(7) Move the captain's left rudder pedal to its full forward position and do these checks:
   (a) Make sure the rudder trailing edge moves smoothly to its full left position.
   (b) Make sure the rudder position indicator moves to its full left position.

S 212-038
(8) Turn the rudder trim switch on the P8 panel to its full right position and hold it there until the rudder movement stops. Do these checks:
(a) Make sure the rudder trim indicator shows at least 15.2 units of right rudder trim.
(b) Make sure the rudder position indicator moves right to a position that is approximately two-thirds of full scale.

S 212-039
(9) Turn the rudder trim switch on the P8 panel to its full left position and hold it there until the rudder movement stops. Do these checks:
(a) Make sure the rudder trim indicator shows at least 15.2 units of left rudder trim.
(b) Make sure the rudder position indicator moves left to a position that is approximately two-thirds of full scale.

S 212-040
(10) Move the rudder trim switch to zero units of trim and do this check:
(a) Make sure the rudder goes back to its neutral position.

S 212-060
(11) Do the test of the Captain's Rudder Pedal Force (AMM 27-21-00/501).

K. Put the Airplane Back to Its Usual Condition

S 092-048

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 204).

S 862-041
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-042
(3) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-043
(4) Close access panels 324AL and 324CL (Ref 06-42-00).

S 412-046
(5) Close access door 311AL, if necessary (Ref 06-42-00).

RUDDER RATIO CHANGER MECHANISM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains six tasks. The first task contains the data that is necessary to remove the rudder ratio-changer mechanism and its components. The second task supplies the data that is necessary to install the rudder ratio-changer and its components. The third task contains the data that is necessary to remove the ratio-changer LVDT. The fourth task contains the data that is necessary to install the ratio-changer LVDT. The fifth task contains the data necessary to remove the support clevis of the rudder ratio-changer. The sixth taxk contains the data necessary to install the support clevis of the rudder ratio-changer.

TASK 27-21-12-022-011

2. Remove Rudder Ratio-Changer Mechanism and Components
   A. General
      (1) This task contains two procedures, one to remove the rudder ratio-changer mechanism, and one to remove the ratio-changer shear pin. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) R3 - P/N B20003-16
          (b) R4 - P/N B20003-19
      (2) Nose Gear Towing Lever Lockpin - A09003-1
   C. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rigging Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 27-21-13/201, Rudder Ratio Changer Actuator
      (5) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
   D. Access
      (1) Location Zone
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          324AL Body to Fin Seal
          324BL Aft Side of Rear Spar and Rudder Hinge
          324CL Rudder Hinge and PCU's

   E. Prepare for Removal

      S 862-012
      (1) Supply electrical power (Ref 24-22-00).

S 862-013

(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-014

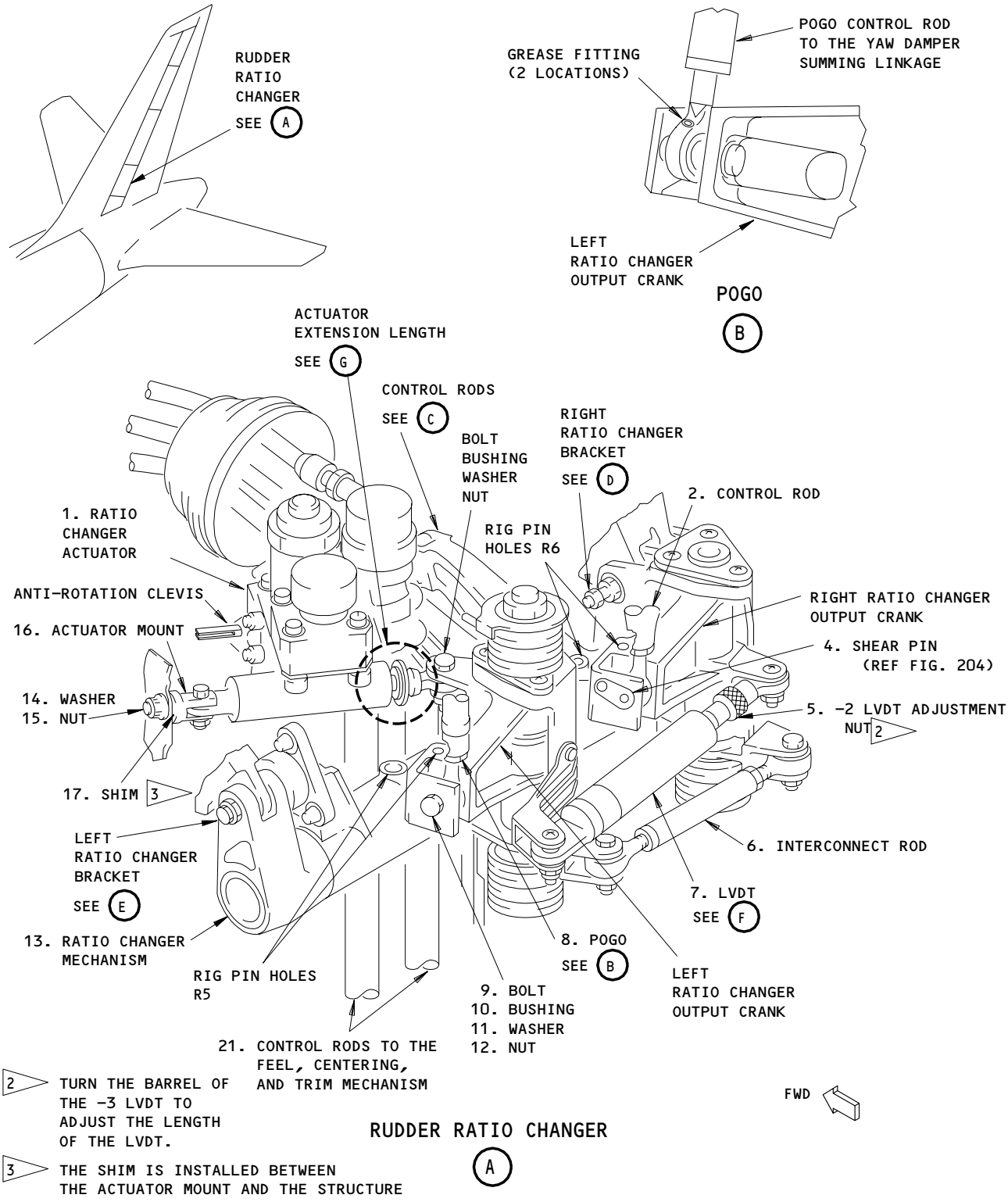
(3) Move the FLT CONTROL SHUTOFF L, C, and R switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure that the amber switch-position legend lights come ON.

S 862-015

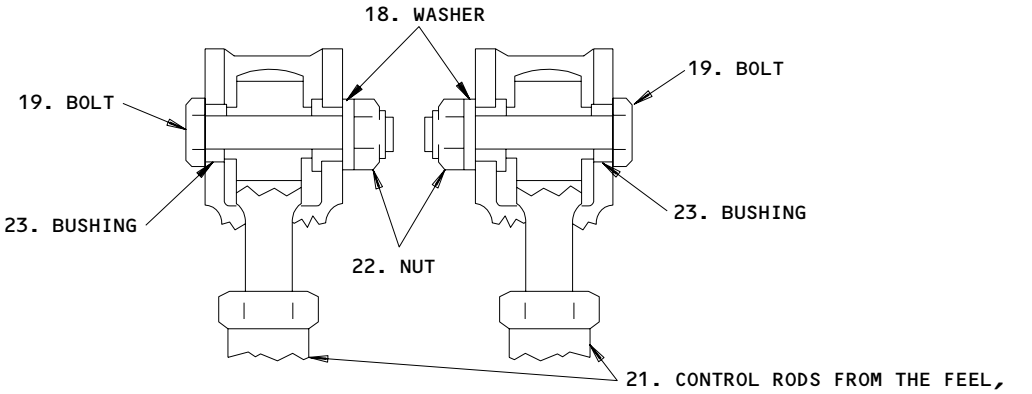
(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11D18 or 11G10, RUD RATIO
   (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (c) 11H18, FLT CONT SHUTOFF TAIL CTR
   (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (e) 11C6, CSEU 1L AC
   or FLT CONT ELEC 1L AC
   (f) 11C7, CSEU 1L DC
   or FLT CONT ELEC 1L DC
   (g) 11C8, CSEU 2L AC
   or FLT CONT ELEC 2L AC
   (h) 11C9, CSEU 2L DC
   or FLT CONT ELEC 2L DC
   (i) 11G17, CSEU 1R AC
   or FLT CONT ELEC 1R AC
   (j) 11G18, CSEU 1R DC
   or FLT CONT ELEC 1R DC
   (k) 11G27, CSEU 2R AC
   or FLT CONT ELEC 2R AC
   (l) 11G28, CSEU 2R DC
   or FLT CONT ELEC 2R DC

S 492-017

(5) Move the towing lever to the tow position and install the towing lever lockpin in the nose gear (Fig. 203).

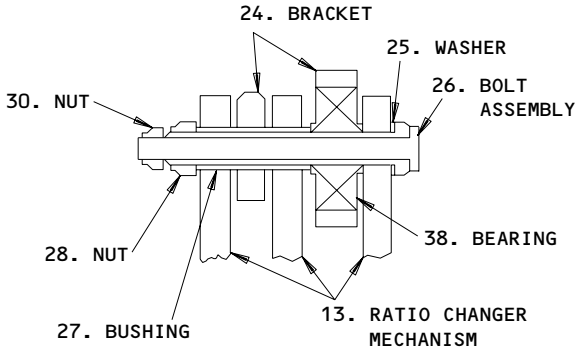


Rudder Ratio Changer
Figure 201 (Sheet 1)



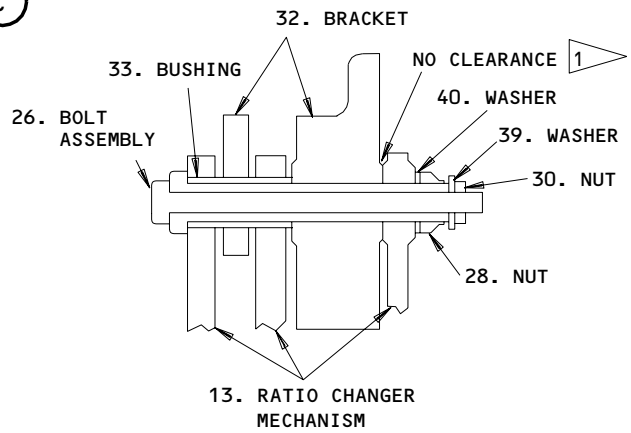
CONTROL RODS

C



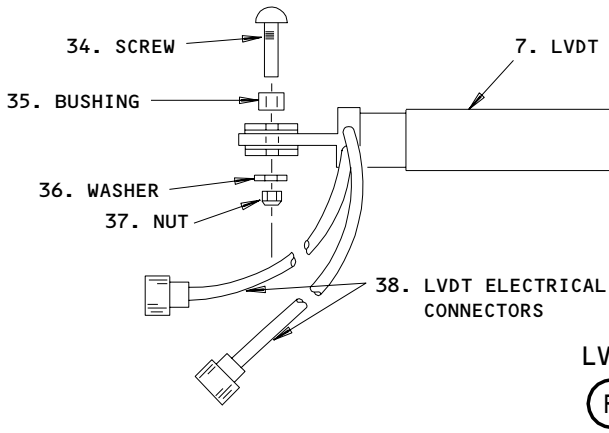
RIGHT RATIO CHANGER BRACKET

D



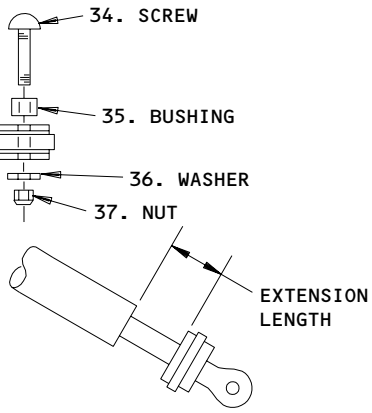
LEFT RATIO CHANGER BRACKET

E



LVDT

F

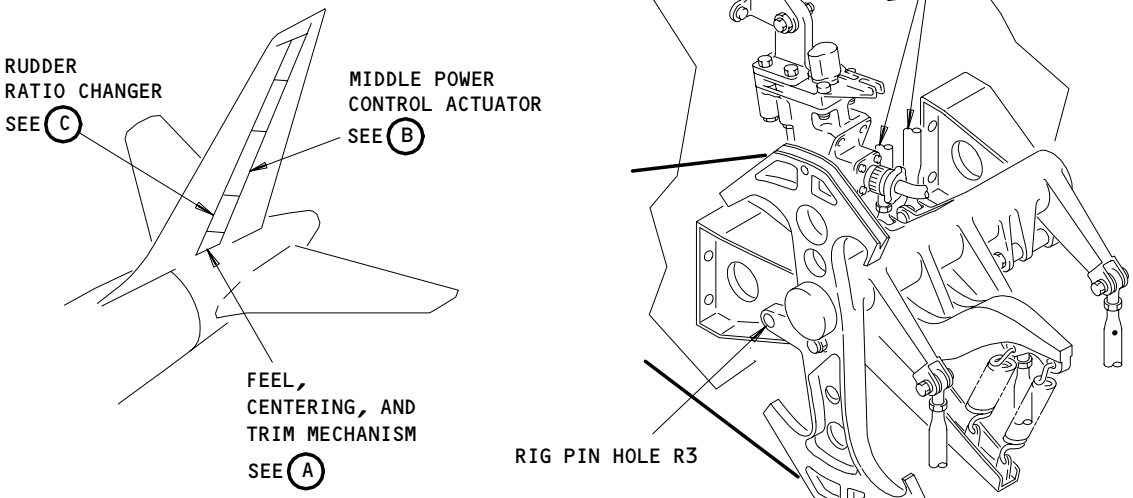


ACTUATOR EXTENSION LENGTH

G

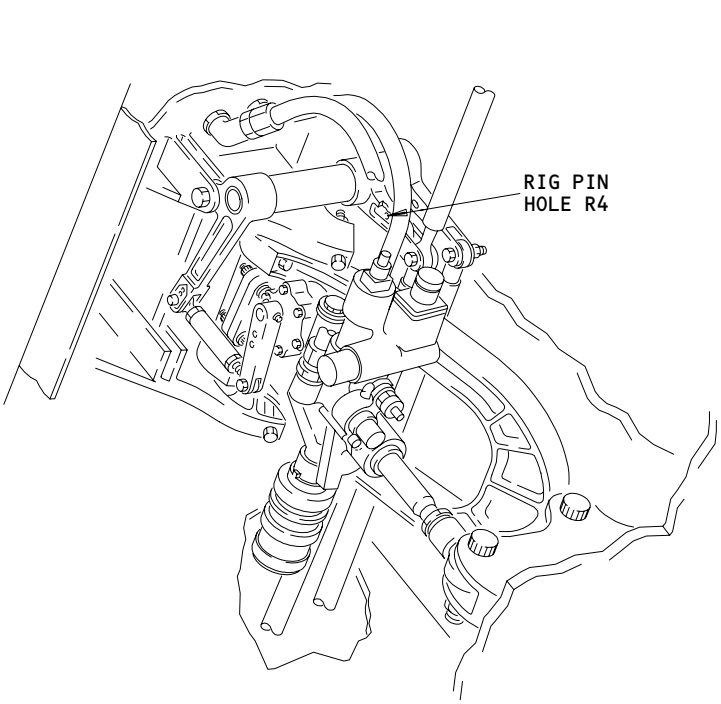
1 NO CLEARANCE. IF THERE IS CLEARANCE, BOND WASHERS TO THE RATIO CHANGER MECHANISM.

Rudder Ratio Changer
Figure 201 (Sheet 2)



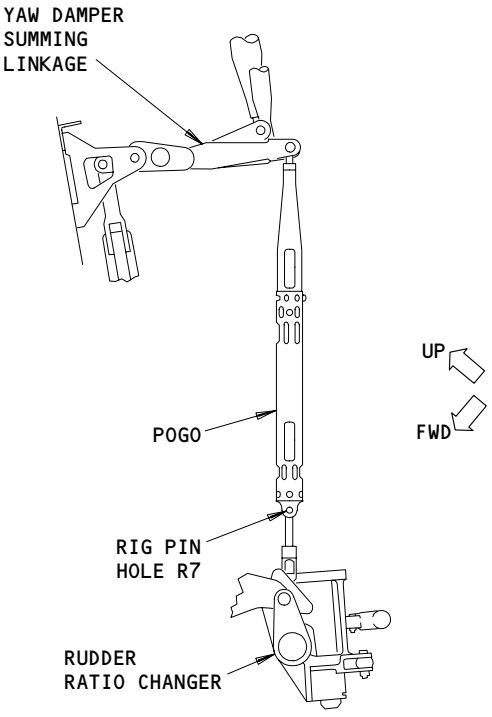
FEEL, CENTERING, AND TRIM MECHANISM

A



MIDDLE POWER CONTROL ACTUATOR

B



RUDDER RATIO CHANGER

C

Rig Pin Locations
Figure 202

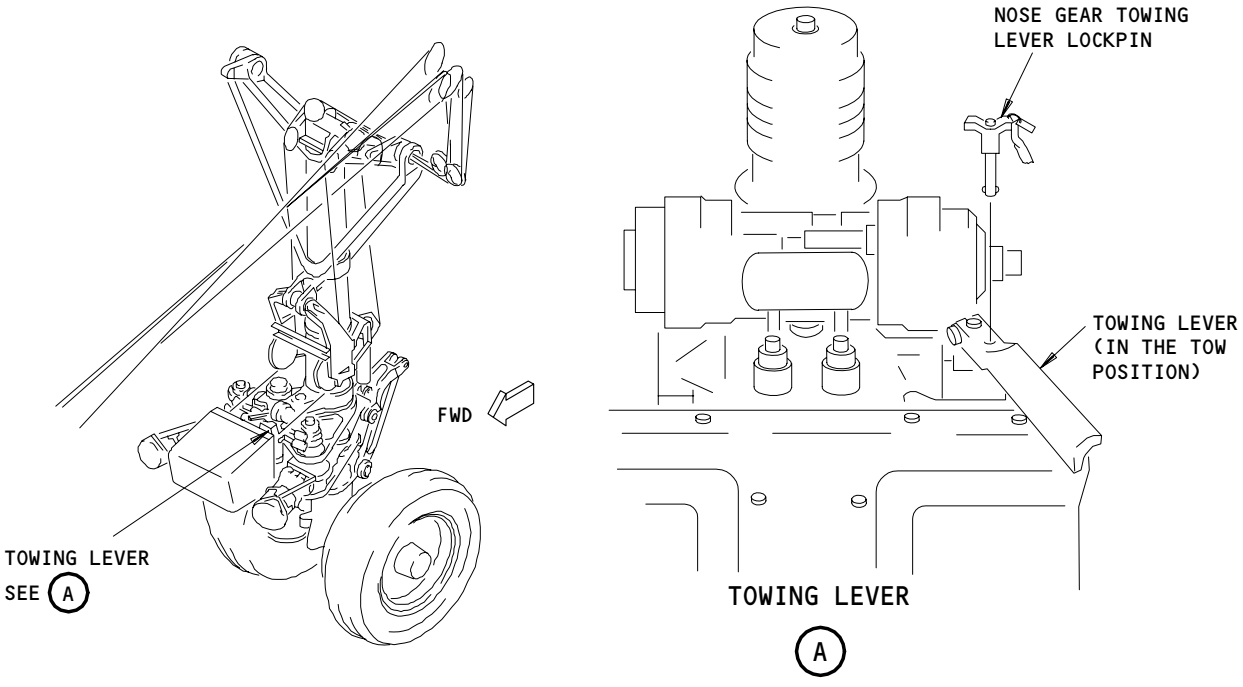
S 012-019

(6) Open access panels 324AL, 324BL, and 324CL (Ref 06-42-00).

F. Remove Rudder Ratio Changer

S 492-020

(1) Install these rig pins:
   (a) R3 (for the feel, centering, and trim mechanism).
   (b) R4 (for the middle power control actuator).



Nose Gear Steering Isolation
Figure 203

S 022-021
(2) Remove the ratio-changer actuator (1) (Ref 27-21-13).

S 032-022
(3) Remove the lockwire from the LVDT electrical connectors (38).

S 032-023
(4) Disconnect the LVDT electrical connectors (38) and tag them for identification.

S 032-024
(5) Remove these components:
  (a) Remove the bolt that connnects the pogo (8) to the summing lever.
  (b) Remove the bolt that connects the control rod (2) to the summing lever.
  (c) Use the removal procedure below to remove the shear pin (4) that connects the control rod (2) to the right ratio-changer output crank.
  (d) Remove the bolt (9) that connects the pogo (8) to the left ratio-changer output crank. Remove the pogo.

S 032-025
(6) Disconnect the control rods that are connected to the feel, centering, and trim mechanism (21) from the ratio-changer mechanism.

S 032-026
(7) Do these steps to disconnect the ratio-changer mechanism (13) from its brackets (24, 32).
  (a) Remove the outer and inner nuts (28, 30) from the left and right brackets (24, 32).
  (b) Remove the bolt assembly (26), bushing (27), and the bearing (38) from the right bracket (24).
  (c) Remove the bolt assembly (26) and the bushing (33) from the left bracket (32).

S 032-027
(8) Remove the ratio-changer actuator mount (16).

NOTE: Keep the shims that were installed.

S 022-028
(9) Remove the ratio-changer mechanism (13).

G. Remove the Shear Pin from the Ratio-Changer Mechanism (Fig. 204)

S 332-029
(1) Use a drill to remove the rivet that holds the shear pin retainer to the right ratio-changer output crank. Be careful not to damage the retainer or the right ratio-changer output crank. Remove the shear pin retainer.

NOTE: Keep the shims that were installed.

S 332-030
(2) Use a drill to remove the shear pin from the retainer side. Be careful not to damage the bushing in the right ratio-changer output crank or the rod end bearing.

NOTE: Use a drill bit larger than 3/16 inch but smaller than 1/4 inch in diameter.

S 022-031
(3) Remove the remaining part of the shear pin from the bearing rod end and bushing in the ratio-changer output crank.

NOTE: Keep the cupped shape washer to use during the shear pin installation.

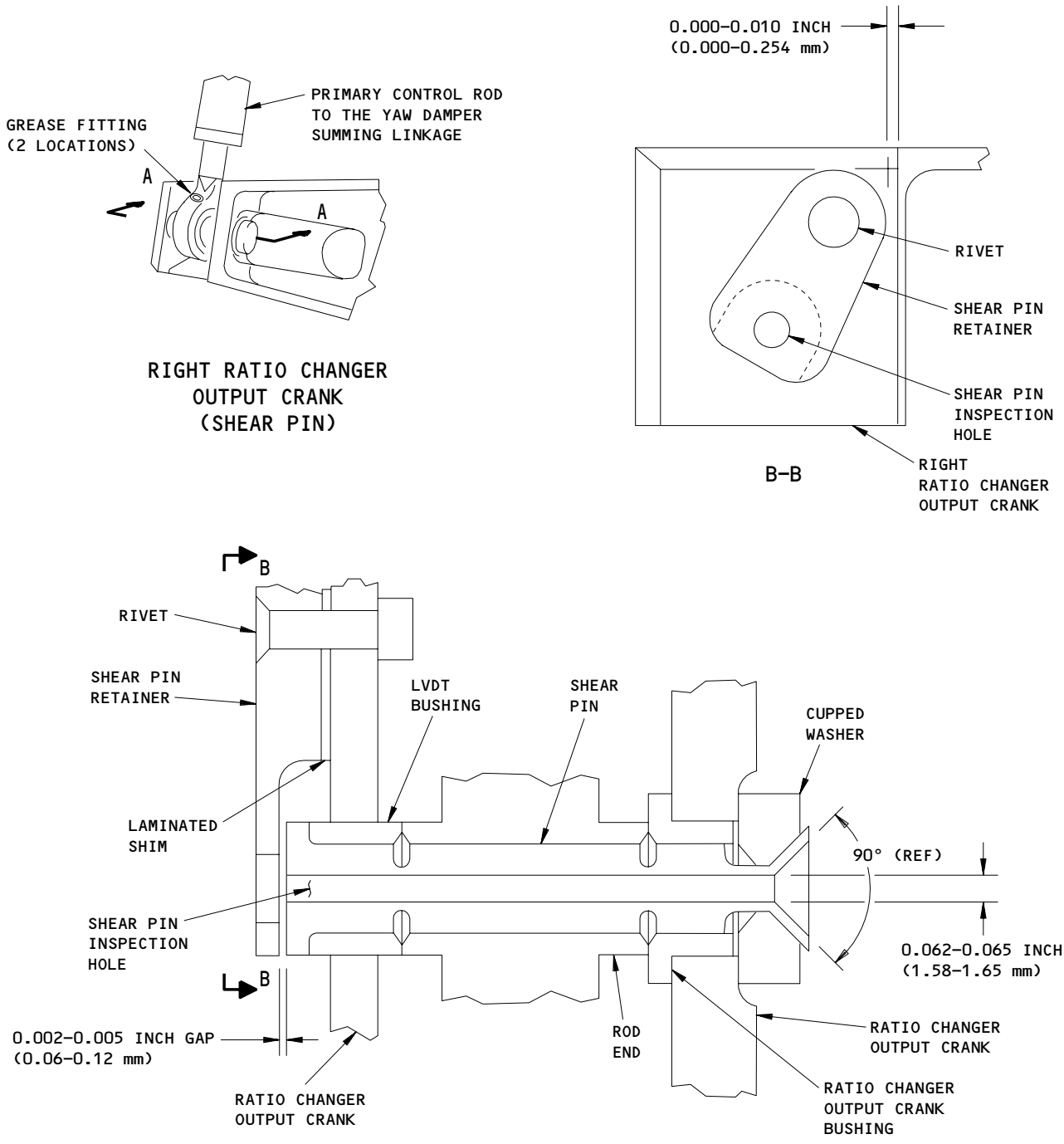
TASK 27-21-12-422-032

3. Install Rudder Ratio-Changer Mechanism

A. General

(1) This task contains two procedures, one to install the rudder ratio-changer mechanism, and one to install the ratio-changer shear pin. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Put the Airplane Back to Its Usual Condition" steps.



Rudder Ratio Changer Shear Pin Repair
Figure 204

(2) You will have to use washers (AN960KD616L) to adjust the clearance between the ratio-changer mechanism and the left ratio-changer bracket.

B. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) R7 - P/N B20003-13
(b) R9 - P/N B20003-54
(2) Handle - Output Arm (optional) - B27045-5
(3) Shear Pin Swaging Tool - B27046-6

C. Consumable Materials
(1) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class III
(2) A00247 Sealant, Chromate Type BMS 5-95
(3) A00181 Adhesive, Epoxy - BMS 5-92, Type I

D. Parts
(1) Refer to the IPC for the part numbers and the effectivities of the items in the tables below:

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	1	Ratio Changer Actuator	27-21-12	01	TBD
	7	Tranduser Assy (LVDT)			270
	13	Ratio Changer Mechanism			215
	17	Shim			85

E. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rigging Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-21-00/501, Rudder and Rudder Trim Control System
(5) 27-21-13/201, Rudder Ratio Changer Actuator

(6) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

F. Access

(1) Location Zone

113 Area Forward of NLG wheel well (Left)
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels

324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCU's

G. Install Rudder Ratio-Changer Mechanism (Fig. 201)

S 392-033

(1) Apply a thin layer of corrosion preventive compound to the ratio-changer bolts and bushings.

S 432-034

(2) Do these steps to connect the rudder ratio-changer mechanism to its brackets:

(a) Align the ratio-changer mechanism (13) with its brackets (24, 32).

(b) Install the bushing (33) and bolt assembly (26) on the left support bracket (32).

(c) Install the bearing (38), bushing (27), washer (25), and bolt assembly (26) on the right support bracket (24).

(d) Install the inner washers (40) and nuts (28). Tighten the nuts to 50-60 pound-inches (5.7-6.7 newton-meters).

(e) Install the outer washers (39) and nuts (30). Tighten the nuts to 10 pound-inches (1.13 newton-meters).

NOTE: Be careful not to turn the inner nuts.

(f) On the left ratio-changer bracket, make sure there is no clearance between the ratio-changer mechanism and the left ratio-changer bracket. If there is clearance, do these steps:

1) Clean the surfaces and apply adhesive to the ratio-changer mechanism.

2) Bond washers (AN960KD616L) to the ratio-changer mechanism until the clearance is removed.
3) Apply pressure to the washer stack, and let the adhesive cure as follows:
   a) 2 hrs at 160°F
   b) 3 hrs at 120°F
   c) 24 hrs at 65°F

S 432-035

(3) Connect these components:
   (a) Connect the control rods (21) from the feel, centering and trim mechanism to the ratio changer.
   (b) Connect the control rod (2) to the right ratio-changer crank. Use a bolt, washer, and nut as an alternative to the shear pin (4).

NOTE: The bolt installation is temporary.

S 432-036

(4) Connect the control rod (2) to the summing lever.

NOTE: Make sure the grease fittings point in the aft direction when the rod end bearings are installed.

S 432-037

(5) Connect the pogo (8) to the left ratio-changer crank.

NOTE: Make sure the grease fittings point in the aft direction when the rod end bearings are installed.

S 432-038

(6) Connect the pogo (8) to the summing lever. Adjust the pogo length until rig pin R7 can be easily installed and removed.

S 432-039

(7) Do these steps to install the actuator mount (16) and shim (17) to the support:

NOTE: If you install new shims, do the task to install the Rudder Ratio Changer Actuator Support Clevis to find the corrrect shim thickness.

(a) Apply sealant to the actuator mount (16), and use the washer (14) and nut (15) to install it. Tighten the nut to 90-125 pound-inches (10.2-14.1 newton-meters).

NOTE: Make sure that the mount fits tightly against the support.

(b) Turn the left and right ratio-changer output cranks from their high speed (cranks in) position to their low speed (cranks out) position. Make sure the output cranks move freely.

(c) Turn the left output crank and install rig pin R5.

NOTE: Because of the spring load, rig pin R5 will fit tightly. You can use the handle - output arm tool, B27045-5, to turn the output crank.

(d) Connect the actuator (1) rod end to the left output crank.
1) Install the bolt, bushing, washer and nut.
2) Align the actuator (1) until the anti-rotation clevis is engaged.

(e) Connect the actuator (1) to the actuator mount (16).
1) Make sure the actuator mount is aligned with the ratio changer actuator (1).
2) Make sure the bolt that connects the ratio-changer actuator (1) to the actuator mount (16) fits freely.
3) If the bolt does not fit correctly, install or remove shims (17) from behind the actuator mount.

(f) Make sure that rig pin R6 can be easily installed. If rig pin R6 cannot be easily installed, adjust the interconnect rod as necessary.
(g) Remove rig pins R5 and R6.

S 432-040
(8) Connect the LVDT electrical connectors (38) to the LVDT (7).

S 432-041
(9) Install the lockwire on the LVDT connectors (38).

S 422-042
(10) Complete the installation of the ratio-changer actuator and do the applicable ajustment/test procedure (Ref 27-21-13).

S 822-043
(11) Adjust the rudder ratio-changer mechanism (Ref 27-21-00).

S 092-002
(12) Remove rig pins R3 and R4.

S 822-044
(13) Move the left and right ratio-changer output cranks to their high speed position and do this check:
(a) Make sure that rig pins R5 and R6 can be easily installed and removed. Adjust the interconnect rod if it is necessary.

S 492-045
(14) Install rig pin R6.

S 712-046
(15) Do these steps to test the primary control rod operation:

NOTE: The nut which holds the control rod is a temporary connection. The shear pin will be installed after you check the operation of the control rod.

(a) Turn the aft quadrant to its full clockwise position and hold it there.
(b) Do a check on the primary control rod for the ratio-changer. Make sure the bearings are free to move and that there is some clearance around the nuts.

(c) Turn the aft quadrant to its full counterclockwise position and hold it there.
(d) Do a check on the primary control rod for the ratio-changer. Make sure the bearings are free to move and that there is some clearance around the nuts.
(e) Release the aft quadrant.
(f) Remove rig pin R6 and let the output cranks go to the low speed position.

S 712-001
(16) Do the above step again to examine primary control rod operation with the output cranks in the low speed position.

S 422-050
(17) Remove the bolt, washer, and nut that temporarily hold the primary control rod to the right ratio-changer output crank. Use the installation procedure below to install the shear pin (4).

S 222-051
(18) Do a test on the rudder ratio-changer mechanism (see below).

H. Install the Shear Pin in the Ratio-Changer Mechanism (Fig. 204)

S 392-052
(1) Apply the corrosion preventive compound to the right ratio-changer output crank, bushings, rod end bearing, and the outside of the shear pin.

S 432-003
(2) Do these steps to install the shear pin:
(a) Install the shear pin through the crank bushings and the rod end from the shear pin retainer side.
(b) Install the cupped shaped washer on the shear pin.
(c) Use the swaging tool and swage the shear pin until it is fully expanded against the cupped washer.

NOTE: Keep the cupped washer against the output crank during the swaging process. The swaging force is between 150-300 pounds (0.667-1.33 KN).

S 822-053
(3) Move the shims and the shear pin retainer into position over the end of the shear pin. Make sure that the clearance between the retainer and the shear pin is as shown (View A-A). Add or remove shims below the retainer to get the correct clearance.

S 392-054
(4) Apply sealant to the shear pin retainer, the ratio-changer output crank, and the outer surface of the rivet.

S 432-055

(5) Do these steps to install the shear pin retainer:
  (a) Make sure that the shear pin retainer is located next to the edge of the right ratio-changer output crank as shown (View B-B).
  (b) Install the blind rivet that holds the retainer to the ratio-changer output crank.

NOTE: Tool air pressure must be approximately 90 psi to install the rivet correctly.

S 322-056

(6) Use a drill to make an inspection hole from the retainer side of the shear pin as shown (View A-A).

S 212-057

(7) Make sure that rig pin R9 moves smoothly through the shear pin inspection hole. Remove rig pin R9.

I. Rudder Ratio-Changer Mechanism Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature 10.0 degrees F (5.5 degrees C) for at least one hour.

S 862-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 862-058

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
  (a) 11D18 or 11G10, RUD RATIO
  (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (c) 11H18, FLT CONT SHUTOFF TAIL CTR
  (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-059

(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 222-060
(4) Make sure that the rudder is not more than 0.15 inch (3.8 mm) away from its neutral position.

S 222-061
(5) Move the test switch on the left or right RRCM on the E3 and E4 shelf in the main equipment center to TEST. Stop for 30 seconds to let the rudder ratio-changer actuator extend. Do the checks that follow:

NOTE: The amber RUDDER RATIO light on the pilot's overhead panel, P5, will come ON and stay ON. An amber RUDDER RATIO message will appear on EICAS when the RRCM test switch is in the TEST position.

(a) Make sure the IN TEST light on each RRCM is ON no more than 18 seconds.
(b) Make sure the RRCM faultballs are black.
(c) Make sure the rudder is no more than 0.10 inch (2.5 mm) away from its neutral position.

S 222-062
(6) Move the RRCM test switch to NORMAL. Stop for 30 seconds to let the ratio-changer actuator retract and do the checks that follow:
(a) Make sure the IN TEST light on each RRCM is ON no more than 18 seconds.
(b) Make sure the RRCM faultballs are black.
(c) Make sure the rudder is no more than 0.15 inch (3.8 mm) away from its neutral position.
(d) Make sure that rig pin R9 can be easily pushed through the shear pin.

S 862-086
(7) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

J. Put the Airplane Back to its Usual Condition

S 212-063
(1) Make sure that all the rig pins are removed.

S 862-064
(2) Remove the DO-NOT-CLOSE tags and close the P11 panel circuit breakers shown in Table 201.

S 092-007

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Make sure that the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 203).

S 212-004

CAUTION: IF THE RRCM TEST SWITCH IS NOT IN ITS "NORMAL" POSITION, THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. THIS WILL PREVENT AIRPLANE DISPATCH.

(4) Make sure that the RRCM test switch is in its NORMAL position.

S 862-067

(5) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-068

(6) Close access panels 324AL, 324BL, and 324CL (Ref 06-42-00).

TASK 27-21-12-022-088

4. Remove the Rudder Ratio-Changer Linear Variable Differential Transducer (LVDT)

A. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

B. Access

(1) Location Zone

324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels

324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCU's

C. Prepare for Removal

S 862-069

(1) Supply electrical power (Ref 24-22-00).

S 862-070

(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-071

(3) Move the FLT CONTROL SHUTOFF L, C, and R switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure that the amber switch-position legend lights come ON.

S 862-072

(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11D18 or 11G10, RUD RATIO
   (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (c) 11H18, FLT CONT SHUTOFF TAIL CTR
   (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (e) 11C6, CSEU 1L AC
   or FLT CONT ELEC 1L AC
   (f) 11C7, CSEU 1L DC
   or FLT CONT ELEC 1L DC
   (g) 11C8, CSEU 2L AC
   or FLT CONT ELEC 2L AC
   (h) 11C9, CSEU 2L DC
   or FLT CONT ELEC 2L DC
   (i) 11G17, CSEU 1R AC
   or FLT CONT ELEC 1R AC
   (j) 11G18, CSEU 1R DC
   or FLT CONT ELEC 1R DC
   (k) 11G27, CSEU 2R AC
   or FLT CONT ELEC 2R AC
   (l) 11G28, CSEU 2R DC
   or FLT CONT ELEC 2R DC

S 862-074

(5) Open access panels 324AL, 324BL, and 324CL (Ref 06-42-00).

D. Remove Rudder Ratio-Changer LVDT (Fig. 201)

S 032-075

(1) Disconnect the electrical connectors (38). Attach a tag for identification.

S 032-076
(2) Disconnect the LVDT (7) from the left support.

S 032-077
(3) Disconnect the LVDT from the right ratio-changer crank.

S 022-078
(4) Remove the LVDT.

TASK 27-21-12-422-079

5. Install the Rudder Ratio-Changer LVDT

A. Consumable Materials
(1) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class III

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-21-00/501, Rudder and Rudder Trim Control System

C. Access
(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCUs

D. Install Rudder Ratio Changer LVDT (Fig. 201)

S 392-080
(1) Apply the corrosion preventive compound to the screws, nuts, and LVDT end bearings.

S 432-008
(2) Do these steps to install the LVDT:
(a) Install the screw (34), bushing (35), washer (36), and nut (37) that connect the LVDT (7) to the right ratio-changer output crank.
(b) Install the screw (34), bushing (35), washer (36), and nut (37) that connect the LVDT (7) to the left ratio-changer output crank.
(c) Connect the electrical connector (38) D717 to the mating LVDT connector.

S 862-081
(3) Remove the DO-NOT-CLOSE tags and close the P11 panel circuit breakers shown in Table 202.

S 822-120
(4) Do the Rudder Ratio Changer Actuator - Oscillation Check (AMM 27-21-00/501).

S 822-082
(5) Adjust the Rudder Ratio Changer LVDT (7) (Ref 27-21-00).

E. Put the Airplane Back to its Usual Condition

S 862-087
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11D18 or 11G10, RUD RATIO
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-083
(2) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 212-009

CAUTION: IF THE RRCM TEST SWITCH IS NOT IN ITS "NORMAL" POSITION, THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. THIS WILL PREVENT AIRPLANE DISPATCH.

(3) Make sure that the RRCM test switch is in its NORMAL position.

S 862-084
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-085
(5) Close access panels 324AL, 324BL, and 324CL (Ref 06-42-00).

TASK 27-21-12-002-093

6. Remove the Support Clevis of the Rudder Ratio Changer

A. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, MIN (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
324AL Body and Fin Seal
324 BL Aft Side of Rear Spar and Rudder Hinge

C. Prepare for the Removal

S 862-089
(1) Supply electrical power (Ref 24-22-00/201).

S 862-090
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 862-091
(3) Move the FLT CONTROL SHUTOFF L, C, and R switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags.
(a) Make sure the amber switch position legend lights come ON.

S 862-092
(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D18 or 11G10, RUD RATIO
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(f) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
(g) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(h) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
(i) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC

(j) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
(k) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(l) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC

S 862-095
(5) Open access panels 324AL, 324BL, and 324CL (Ref 06-42-00).

D. Remove the Support Clevis

S 012-097
(1) Disconnect the Rudder Ratio Changer Actuator
(a) Disconnect the RRCA from the left ratio changer crank.
(b) Disconnect the RRCA from the support clevis.

S 022-098
(2) Remove the Support Fitting, nut, washer and shims.

NOTE: Do not lose or cause damage to the shims. The shim thickness sets the rig length of the RRCA.

TASK 27-21-12-402-099

7. Install the Rudder Ratio Actuator Changer Support Clevis

NOTE: If the shims are damaged or lost during the removal procedure, start the installation with approximately 6 shims.

A. Consumable Materials
(1) A00247 Sealant, Chromate Type BMS 5-95
B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 27-21-00/501, Rudder and Rudder Trim Control System
C. Access
(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
324AL Body and Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge

D. Install the Rudder Ratio Changer Support Clevis

S 422-100
(1) Install the RRCA support fitting, shims, nut and washer.

S 412-101
(2) Connect the RRCA
(a) Connect the RRCA to the support clevis.
(b) Connect the RRCA to the left ratio changer crank.

E. Adjust the RRCA Support Clevis Shims

S 862-102
(1) Supply pressure to the left hydraulic system (Ref 29-11-00/201).

S 862-103
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D18 or 11G10, RUD RATIO
(b) 11C7, CSEU 1L-DC
or FLT CONT ELEC 1L DC
(c) 11C9, CSEU 2L-DC
or FLT CONT ELEC 2L DC
(d) 11G18, CSEU 1R-DC
or FLT CONT ELEC 1R DC
(e) 11G28, CSEU 2R-DC
or FLT CONT ELEC 2R DC

S 492-104
(3) Install the rig pin R3.

S 862-105
(4) Put the RRCM to the TEST position.

S 822-106
(5) Adjust the LVDT until the rig pin R5 can be installed with a loose fit.

S 972-107
(6) Measure and write down the actuator extension length (Fig. 201).

S 822-108
(7) Adjust the LVDT to fully extend the RRCA.

S 972-109
(8) When the RRCA is at full stroke (at its maximum extension), measure and write down the actuator extension length (Fig. 201).

S 972-110
(9) Compare the first actuator extension measurement with the second actuator extension measurement.
(a) The second actuator extension measurement must be 0.02-0.04 inches more than the first actuator extension measurement.
(b) Add or remove shims until the second actuator extension measurement is 0.02-0.04 inches (0.5-1.0 mm) more than the first actuator extension measurement.

NOTE: You must add shims to increase the stroke measurement of the second actuator.

S 012-111
(10) Disconnect the rudder ratio changer actuator.
(a) Disconnect the RRCA from the left ratio changer crank.
(b) Disconnect the RRCA from the support clevis.

S 022-112
(11) Remove the support clevis.
(a) Add corrosion poreventative compound to the shims.

S 422-114
(12) Install the support fitting, shims, nut and washer.

S 412-113
(13) Connect the rudder ratio changer actuator.
(a) Connect the RRCA to the Support Clevis.
(b) Connect the RRCA to the left ratio changer crank.
1) Make sure rig pin R5 can be easily installed.
2) Make sure there is not more than 0.04 inch (1.0 mm) of RRCA stroke beyond the rig position.

S 822-115
(14) Adjust the Rudder Ratio Changer Mechanism (Ref 27-21-00/501).

F. Put the Airplane Back to Its Usual Condition

S 862-118
(1) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL L, R, and C switches on the P61 panel to ON.

S 862-117

CAUTION: IF THE RRCM TEST SWITCH IS NOT IN ITS "NORMAL" POSITION, THE AMBER "RUDDER RATIO" LIGHT WILL COME ON. THIS WILL PREVENT AIRPLANE DISPATCH.

(2) Make sure that the RRCM test switch is in its NORMAL position.

S 412-119
(3) Close the access panels 324AL, 324BL (AMM 06-42-00/201).

RUDDER RATIO CHANGER ACTUATOR (RRCA) - MAINTENANCE PRACTICES

TASK 27-21-13-002-001

1. Remove the Rudder Ratio Changer Actuator (RRCA) or its Parts

A. General

(1) This task contains these procedures:

- Rudder Ratio Changer Actuator (RRCA) - Removal
- RRCA Filter - Removal
- RRCA Screen - Removal
- RRCA Solienoid Valve - Removal
- RRCA Electro-Hydraulic Servo Valve (EHSV) - Removal.

Because this task contains more than one procedure, do only the applicable group of steps.

(2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

B. Equipment

(1) Nose Gear Towing Lever Lockpin - A09003-1

C. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rigging Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-21-00/501, Rudder and Rudder Trim Control System
(5) 27-21-12/201, Rudder Ratio Changer Mechanism
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

211/212 Control Cabin
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels

324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge

E. Prepare for the Removal (Fig. 201)

S 862-002

(1) Supply electrical power (Ref 24-22-00).

S 012-003

(2) Open access panels 324AL and 324BL (Ref 06-42-00).

S 492-004

CAUTION: MAKE SURE TO PUT A COVER ON THE APU INLET. IF HYDRAULIC FLUID GOES INTO THE INLET, IT CAN CAUSE SMOKE AND CONTAMINATION OF THE CABIN AIR SUPPLY.

(3) Install a cover to keep the hydraulic fluid out of the APU inlet and away from the inlet area.

S 862-005

(4) Remove the pressure from the left, right, and center hydraulic systems and reservoirs (Ref 29-11-00).

S 862-006

(5) Move the FLT CONTROL SHUTOFF L, C, and R switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights are ON.

S 862-007

(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D18 or 11G10, RUD RATIO
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 042-008

(7) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 202).

S 042-010

(8) Install rig pin R3 (for the feel, centering, and trim mechanism).

F. Rudder Ratio Changer Actuator (RRCA) - Removal (Fig. 201)

S 032-011

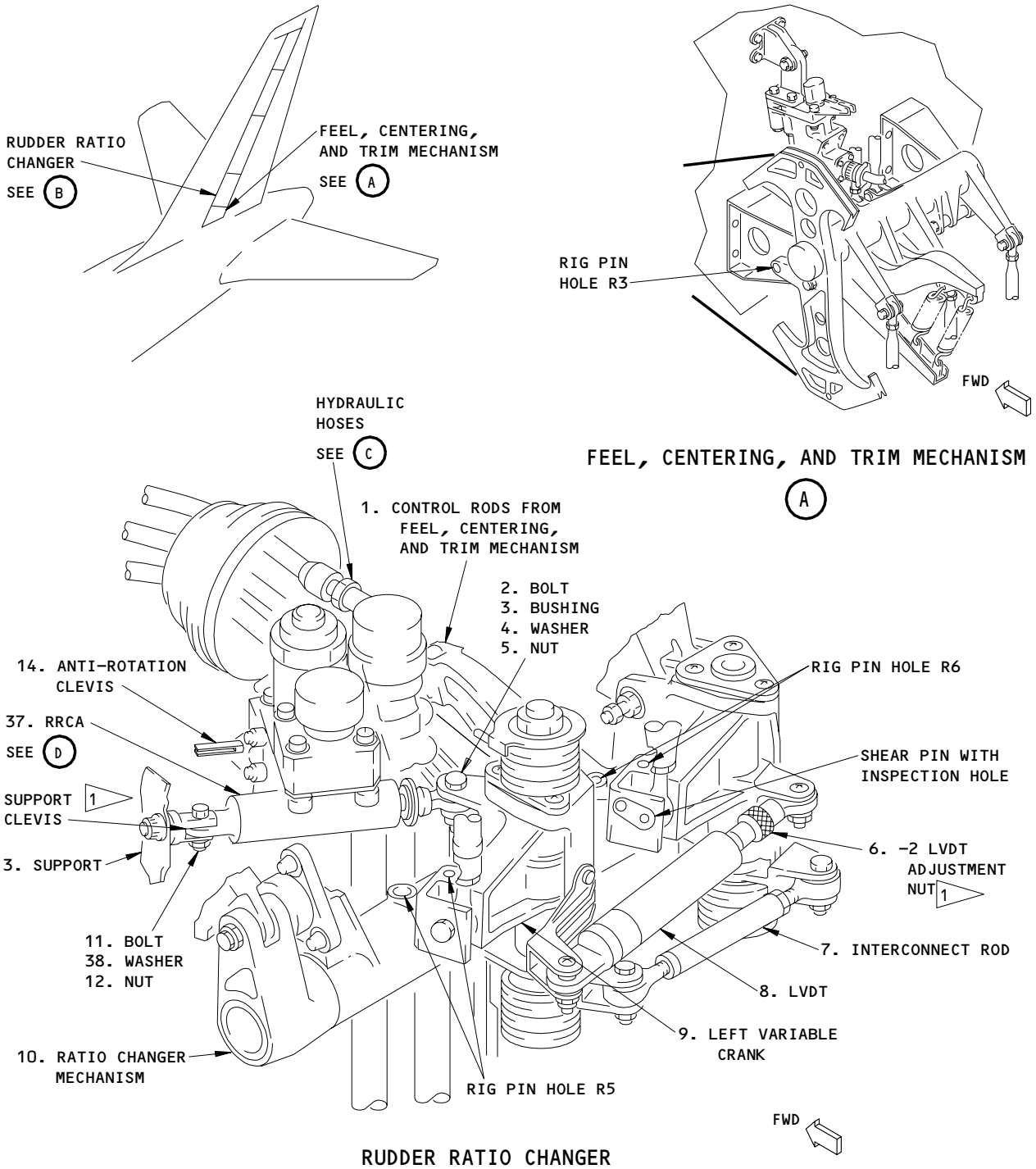
(1) Disconnect the hydraulic hoses (15, 18, 19) from the RRCA (37) and tag them for identification.

S 032-012

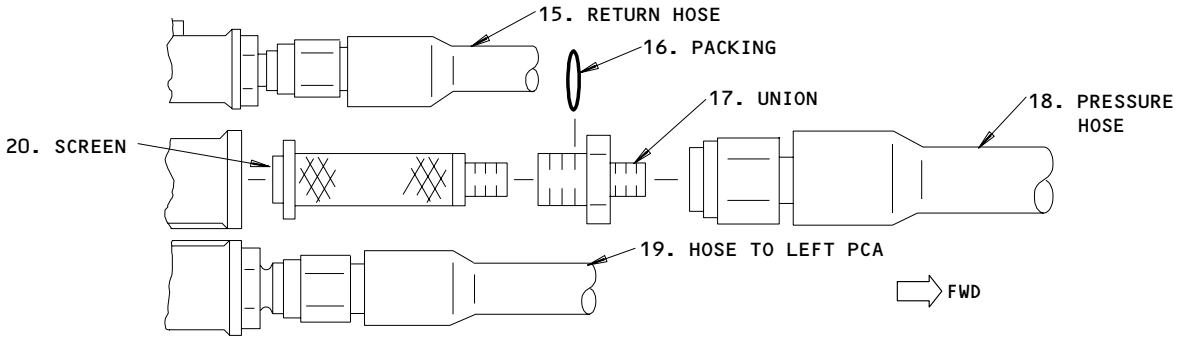
(2) Put caps on the hydraulic hoses and in the ports of the RRCA.

S 032-013

(3) Disconnect these components:
(a) the electrical connectors (26, 33) from the RRCA and tag them for identification
(b) the RRCA (37) from the left ratio changer crank (9)

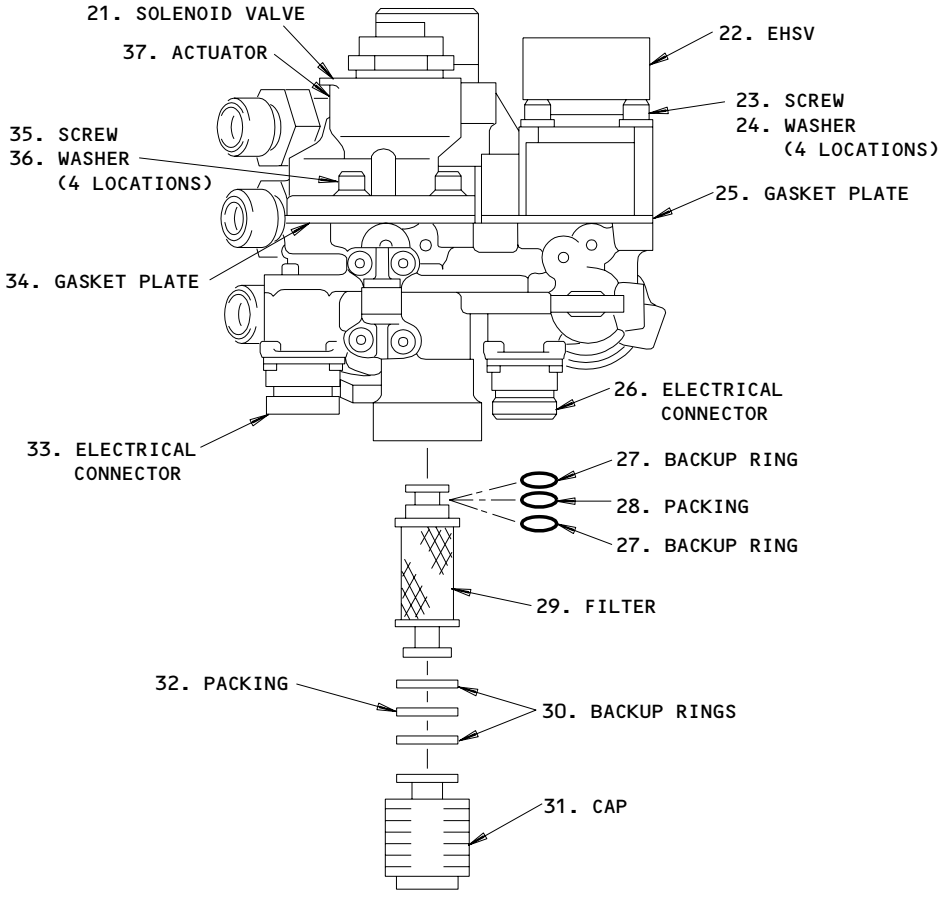


Rudder Ratio Changer Actuator
Figure 201 (Sheet 1)



HYDRAULIC HOSES

C



RUDDER RATIO CHANGER ACTUATOR (RRCA)

D

Rudder Ratio Changer Actuator
Figure 201 (Sheet 2)

(c) the RRCA (37) from the support (13).

NOTE: The rudder ratio changer and the rudder system rigging are very sensitive to the shimming of the rudder tatio changer actuator support clevis. If the RRCA support clevis is removed to make the removal of the RRCM easier, the RRCA support clevis must be installed per AMM 27-21-12/201 (Install the Rudder Ratio Acutator Support Clevis). This can require the adjustment of the RRCA support clevis shims and system rigging.

1) Remove the bolt (11), nut (12) and washer (38) to disconnect the RRCA (37) from the support (13).

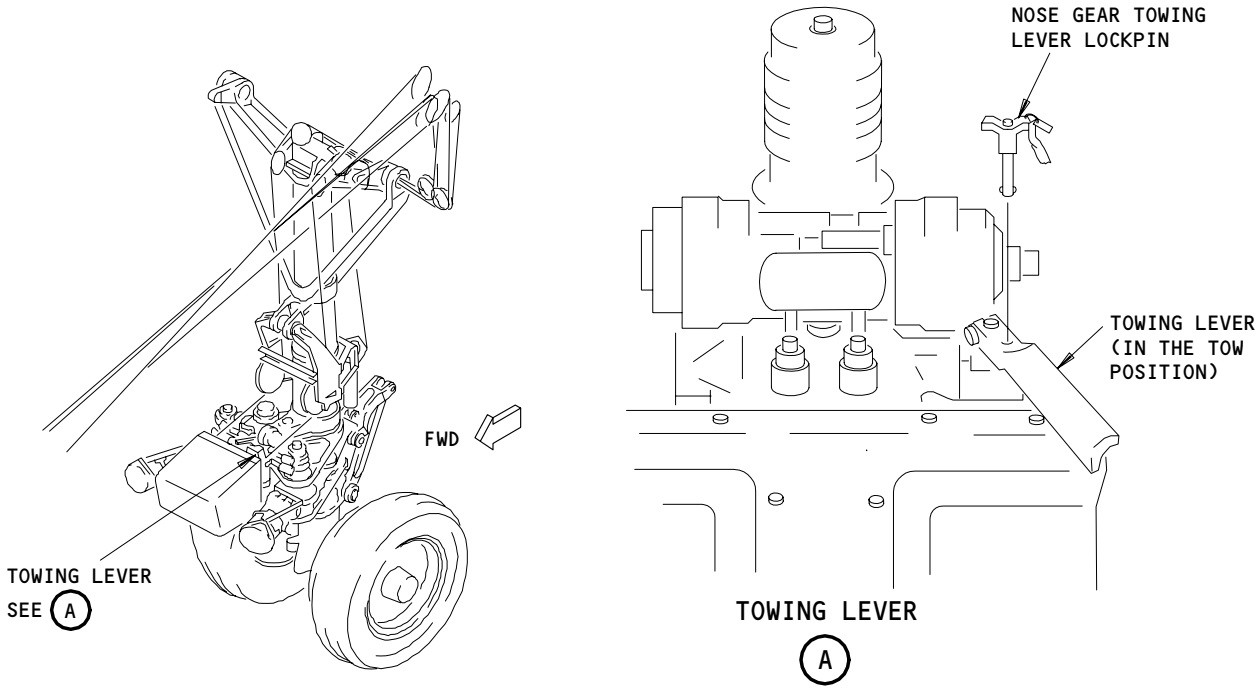
S 022-016

(4) Remove the RRCA (37).

G. RRCA Filter - Removal (Fig. 201)

S 032-086

(1) Remove these components:
(a) the lockwire from the filter cap (31).
(b) the cap (31)
(c) the backup rings (30) and the packing (32) from the cap.



Nose Gear Steering Isolation
Figure 202

S 022-020
(2) Remove the filter (29) from the RRCA and do this step:
(a) Remove the backup rings (27) and the packing (28) from the filter (29).

H. RRCA Screen - Removal (Fig. 201)

S 032-087
(1) Remove these components:
(a) the lockwire from the union (17)
(b) the union (17) from the RRCA
(c) the packing (16) from the union (17).

S 022-025
(2) Remove the screen (20) from the RRCA.

I. RRCA Solenoid Valve - Removal (Fig. 201)

S 032-088
(1) Remove these components:
(a) the lockwire from the screws (35)
(b) the screws (35) and the washers (36).

S 022-028
(2) Remove the solenoid valve (21) and the gasket plate (34).

J. RRCA Electro-Hydraulic Servo Valve (EHSV) - Removal (Fig. 201)

S 032-029
(1) Remove the lockwire from the screws (23).

S 022-030
(2) Remove the screws (23) and the washers (24).

S 022-031
(3) Remove the EHSV (22) and the gasket plate (25) from the RRCA.

TASK 27-21-13-402-032

2. Install the Rudder Ratio Changer Actuator (RRCA) or its Parts

A. General
(1) This task contains these procedures:

- Rudder Ratio Changer Actuator (RRCA) - Installation
- RRCA Filter - Installation
- RRCA Screen - Installation
- RRCA Solienoid Valve - Installation
- RRCA Electro-Hydraulic Servo Valve (EHSV) - Installation.

Because this task contains more than one procedure, do only the applicable group of steps.

(2) To start one of these procedures, do the group of steps that are necessary to install the component. Then, do the "Rudder Ratio Changer Actuator (RRCA) - Test" group of steps. And last, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment
   (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
      (a) R3 - P/N B20003-16
      (b) R5 - P/N B20003-17
      (c) R6 - P/N B20003-17
      (d) R9 - P/N B20003-54

C. Consumable Materials
   (1) D00153 Fluid, Hydraulic - BMS 3-11
   (2) A00247 Sealant - BMS 5-26, Type II, Class A or B
   (3) D00054 Lubricant - MCS 352B

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
	16	Packing (O-ring)	27-21-12	01	440
	20	Screen			441

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	21	Solenoid Valve	27-21-13	01	75
	22	EHSV			55
	25	Gasket Plate			70
	27	Backup Ring			30
	28	Packing			35
	29	Filter			25
	30	Backup Rings			15
	31	Cap			10
	32	Packing			20
	34	Gasket Plate			90
	37	Ratio Changer Actuator			75

E. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rigging Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-21-00/501, Rudder and Rudder Trim Control System
(5) 27-21-12/201, Rudder Ratio Changer Mechanism
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

F. Access
(1) Location Zones
211 Control Cabin (Left)
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge

G. Rudder Ratio Changer Actuator (RRCA) - Installation (Fig. 201)

S 422-033
(1) Do these steps to connect the RRCA (37) to its support (13):
(a) Put the RRCA (37) in its correct position. Make sure the anti-rotation clevis (14) is engaged.
(b) Install and tighten the bolt (11), washer (38), and nut (12).

S 422-034
(2) Do this step to connect the RRCA (37) to the left ratio changer crank (9).
(a) Install and tighten the bolt (2), bushing (3), washer (4), and nut (5).

S 432-089
(3) Connect these components to the RRCA:
(a) the electrical connectors (26, 33)
(b) the hydraulic hoses (15, 18, 19).

S 822-080
(4) Do the Rudder Ratio Changer Actuator - Oscillation Check (AMM 27-21-00/501).

S 422-100
(5) If the RRCA support clevis was removed at the time of RRCA removal, do the RRCA Adjustment (AMM 27-21-00/501).

NOTE: The rudder ratio changer and the rudder system rigging are very sensitive to the shimming of the RRCA support clevis. If the clevis was removed to make the removal of the RRCM easier, the clevis must be installed (AMM 27-21-12/201). This can require the adjustment of the RRCA support clevis shims and system rigging (AMM 27-21-00/501).

S 822-106
(6) If the RRCA support clevis was not removed at the time of the RRCA removal, do the Rudder Ratio Changer System - Test (AMM 27-21-00/501).

H. RRCA Filter - Installation (Fig. 201)

S 642-091
(1) Put hydraulic fluid on all of the seals, packing, and backup rings before installation.

S 032-092
(2) Install these components:
(a) the packing (28) and the backup rings (27) on the filter (29)
(b) the filter (29) in the RRCA
(c) the packing (32) and the backup rings (30) on the cap (31).

S 392-093
(3) Apply the sealant to the cap threads.

S 432-053
(4) Install the cap (31) on the RRCA and torque it to 350 - 375 pound-inches.

S 432-054
(5) Lock the cap (31) with wire.

I. RRCA Screen - Installation (Fig. 201)

S 642-094
(1) Put hydraulic fluid on all of the seals and the packing (16) before installation.

S 432-095
(2) Install these components:
(a) the screen (20) in the RRCA
(b) the packing (16) on the union (17).

S 432-058
(3) Install the union (17) on the RRCA and torque it to 110 - 120 pound-inches.

S 432-059
(4) Lock the union with wire.

J. RRCA Solenoid Valve - Installation (Fig. 201)

S 642-096
(1) Put lubricant on the screws (35) and the washers (36) before installation.

S 422-061
(2) Install the gasket plate (34) and the solenoid valve (21) on the RRCA.

S 422-062
(3) Install the washers (36) and the screws (35) and torque to 27 to 32 pound-inches.

S 432-063
(4) Install a lockwire on the screws.

K. RRCA Electro-Hydraulic Servo Valve (EHSV) - Installation (Fig. 201)

S 432-064
(1) Put lubricant on all of the screws (23) and the washers (24).

S 422-065
(2) Install the gasket plate (25) and the EHSV (22) on the RRCA.

S 422-066
(3) Install the washers (24) and the screws (23) and torque them to 27 - 32 pound-inches (3.6 newton-meters).

S 432-067
(4) Lock the screws with wire.

S 822-079
(5) Do the Rudder Ratio Changer Actuator - Oscillation Check (AMM 27-21-00/501).

S 822-068
(6) Adjust the rudder ratio changer LVDT (Ref 27-21-00).

L. Rudder Ratio Changer Actuator (RRCA) - Test

S 212-097
(1) Make sure rig pin R3 (for the feel, centering, and trim mechanism) is installed.

S 862-069

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply power to the left hydraulic system (Ref 29-11-00).

S 862-070
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11D18 or 11G10, RUD RATIO

(b) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 862-071

(4) Remove the DO-NOT-OPERATE tag and move the FLT CONTROL SHUTOFF L switch on the right side panel, P61, to ON.

S 862-072

(5) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 862-073

(6) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 862-074

(7) Move the test switch on one of the rudder ratio changer modules (RRCM), on the E3 or E4 equipment shelf, to TEST. Do these checks:
(a) Make sure the RRCA extends fully.
(b) Make sure the TEST FAIL fault ball stays black. If the fault ball does not stay black, then adjust and do a test of the ratio changer system (Ref 27-21-00).

NOTE: Permit 30 seconds for full actuator travel.

(c) Observe the RRCA and Rudder Ratio Changer Output Arms for oscillations. If oscillations are noted, troubleshoot and correct the oscillation to complete this procedure.
(d) Make sure that rig pins R5 and R6 can be easily installed and removed at the same time. If you cannot easily install and remove rig pins R5 and R6, do the adjustment procedure for the rudder ratio changer mechanism (AMM 27-21-00/501).

S 862-076

(8) Move the RRCM test switch to NORMAL and do these checks:
(a) Make sure the RRCA retracts fully.

(b) Make sure the TEST FAIL fault ball stays black. If the fault ball does not stay black, then adjust and do a test of the ratio changer system (AMM 27-21-00/501).

NOTE: Permit 30 seconds for full actuator travel.

S 092-077

(9) Remove rig pin R3.

S 722-078

(10) Move the rudder pedals through their full travel range and do these checks:
(a) Make sure the rudder operates correctly and smoothly through its full travel range.
(b) Make sure the rudder position indicator operates correctly and moves to its full scale mark in each direction.

S 792-079

(11) Make sure there are no leaks of hydraulic fluid at the RRCA.

S 712-078

(12) If the RRCA was replaced, do the operational test for the rudder ratio changer modules (Ref 27-21-00).

M. Put the Airplane Back to Its Usual Condition

S 442-080

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 202).

S 412-081

(2) Close access panels 324AL and 324BL (Ref 06-42-00).

S 492-082
(3) Remove the cover from the APU inlet area.

S 862-083

CAUTION: PUT THE RRCM TEST SWITCH TO THE "NORMAL" POSITION. IF THE RRCM TEST SWITCH IS IN THE TEST POSITION THE AMBER "RUDDER RATIO" LIGHT WILL COME ON AND THE AIRPLANE CAN NOT DISPATCH.

(4) Make sure the RRCM test switches are in their NORMAL positions.

S 862-084
(5) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-085
(6) Remove electrical power if it is not necessary (Ref 24-22-00).

YAW DAMPER SUMMING LEVER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the yaw damper summing lever.

TASK 27-21-17-024-005

2. Yaw Damper Summing Lever - Removal
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
          (a) R3 - P/N B20003-16
      (2) Nose Gear Towing Lever
          Lockpin - A09003-1
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zone
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          324AL Body to Fin Seal
          324BL Aft Side of Rear Spar and Rudder Hinge
          324CL Rudder Hinge and PCUs

   D. Prepare for the Removal (Fig. 401)

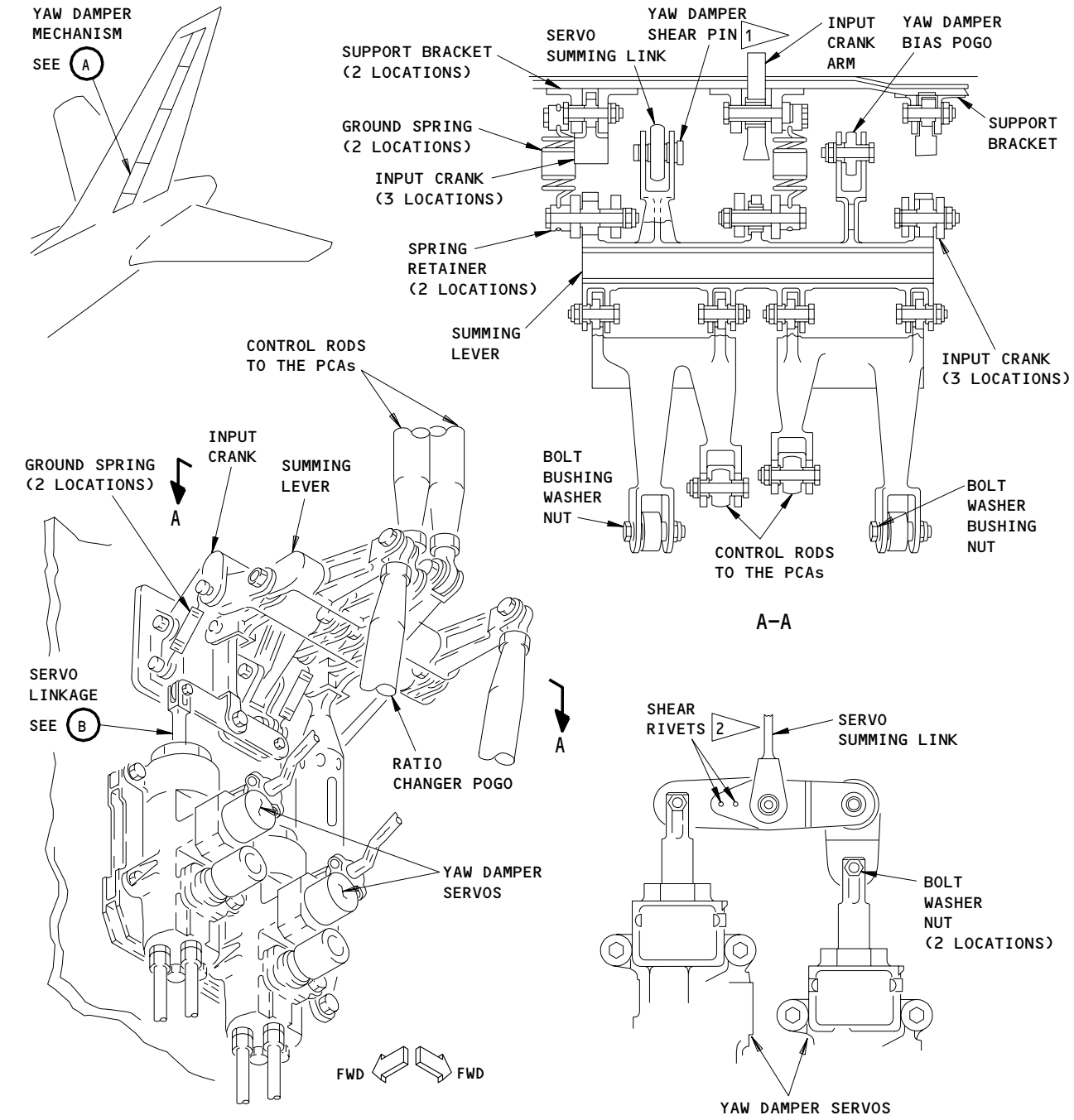
      S 014-011
      (1) Open access panels 324AL, 324BL, and 324CL (Ref 06-42-00/201).

      S 864-006
      (2) Supply electrical power (Ref 24-22-00/201).

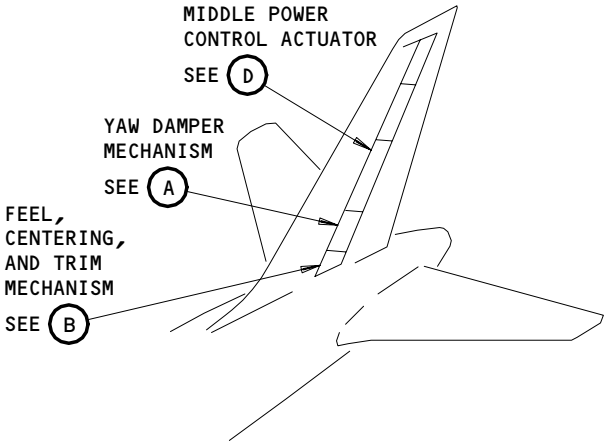
      S 864-030

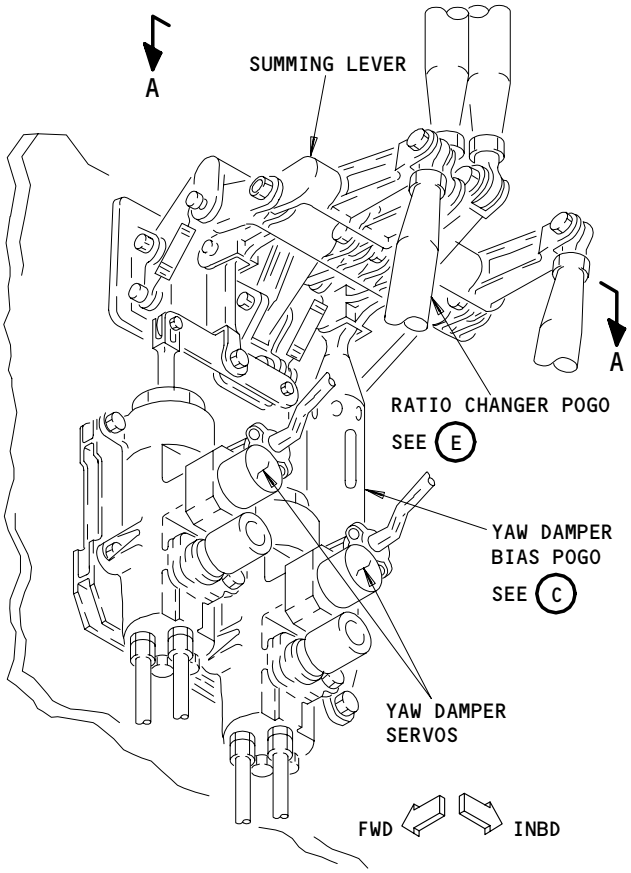
      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

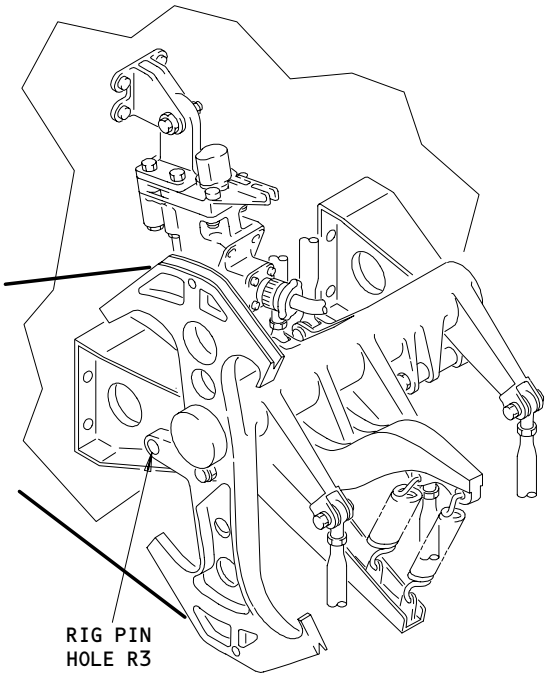


Yaw Damper Summing Lever Installation
Figure 401



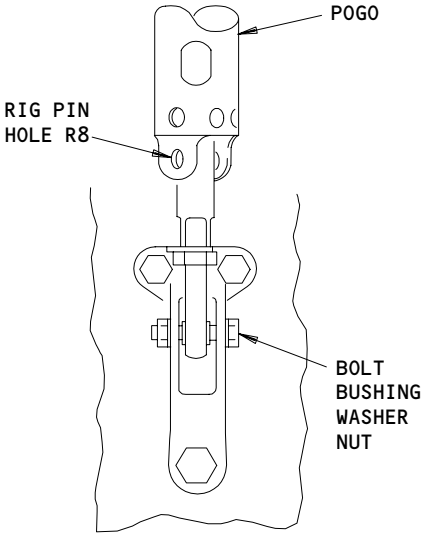


YAW DAMPER MECHANISM
A



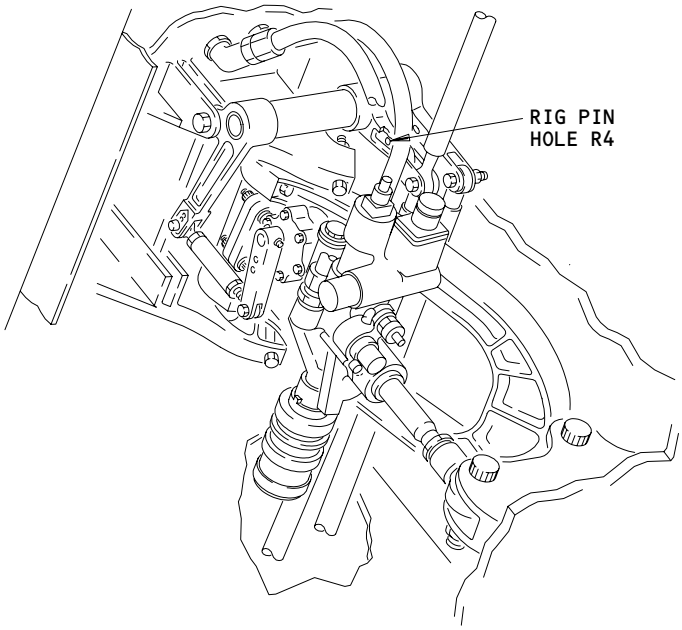
FEEL, CENTERING, AND TRIM MECHANISM
B

Rig Pin Installation
Figure 402 (Sheet 1)



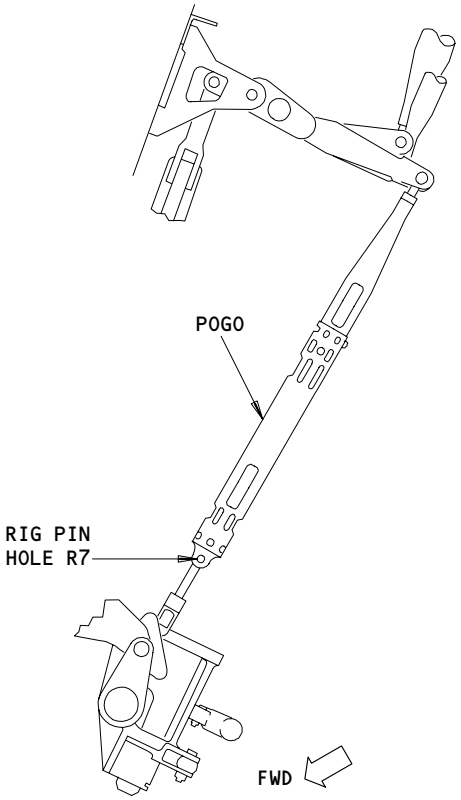
YAW DAMPER BIAS POGO

C



MIDDLE POWER CONTROL ACTUATOR

D



RATIO CHANGER POGO

E

Rig Pin Installation
Figure 402 (Sheet 2)

S 864-032

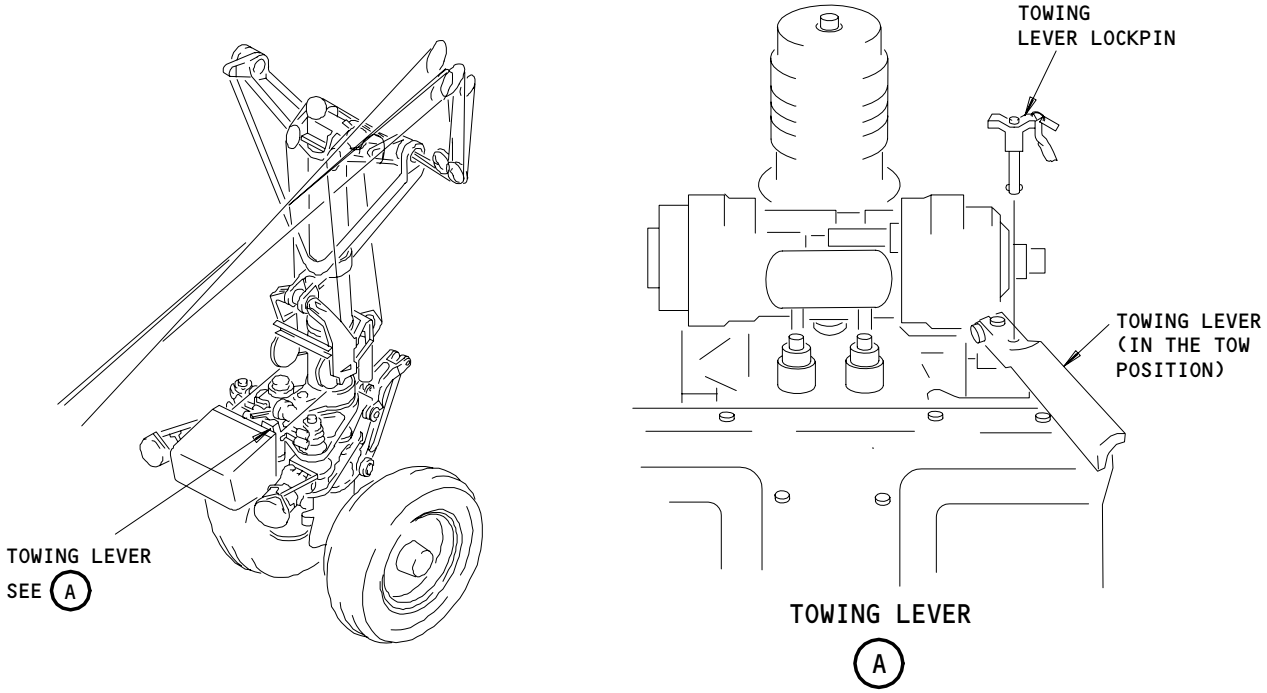
(4) Operate the rudder trim knob on the aft electronic control panel, P8, until the rudder trailing edge aligns with neutral on the tail index plate.

S 494-043

(5) Install rig pin R3 in the feel, centering, and trim mechanism.

S 864-031

(6) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).



Nose Gear Steering Isolation
Figure 403

S 864-007
(7) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 864-008
(8) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-009
(9) Move the towing lever on the metering valve module to the tow position. Install the towing lever lockpin in the nose gear (Fig. 403).

E. Yaw Damper Summing Lever - Removal (Fig. 401)

S 034-012
(1) Disconnect these components from the yaw damper summing lever:
(a) The ratio changer pogo
(b) The control rod that comes from the ratio changer
(c) The control rods that come from the power control actuators (2 locations).

S 034-033
(2) Disconnect these components:
(a) The yaw damper bias pogo from the support bracket
(b) The servo summing link from the yaw damper servos (2 locations).

S 034-036
(3) Do these steps to disconnect the summing lever from the input crank:
(a) Remove the ground springs (2 locations).

(b) Remove the bolts that connect the summing lever to the input crank (3 locations).

S 024-013

(4) Remove the summing lever.

TASK 27-21-17-414-014

3. Yaw Damper Summing Lever - Installation

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24/201):
(a) R7 - P/N B20003-13
(b) R8 - P/N B20003-13
(c) Shear Pin Swaging Tool - B27046-6

B. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-21-00/501, Yaw Damper System
(4) 24-22-00/201, Electrical Power - Control
(5) 27-21-00/501, Rudder and Rudder Trim Control System
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCUs

D. Yaw Damper Summing Lever - Installation (Fig. 402)

S 434-039

(1) Install the bolts, bushings, spring retainers, washers, nuts, and ground springs that connect the summing lever to the input crank.

S 434-040

(2) Connect these components:
(a) The servo summing link to the yaw damper servos (2 locations)

S 434-050

(3) Do these steps to install the shear pin:
(a) Install the shear pin through the crank bushings and the rod end from the shear pin retainer side.
(b) Install the cupped shaped washer on the shear pin.

(c) Use the swaging tool and swage the shear pin until it is fully expanded against the cupped washer.

NOTE: Keep the cupped washer against the output crank during the swaging process. The swaging force is between 150-300 pounds (0.667-1.33 KN).

(d) The yaw damper bias pogo to the support bracket
(e) The control rods for the power control actuators to the summing lever (2 locations)
(f) The control rod from the ratio changer to the summing lever
(g) The ratio changer pogo to the summing lever.

S 824-017

(4) Adjust the ratio changer pogo until you can easily install and remove rig pin R7.

S 824-018

(5) Adjust the yaw damper bias pogo until you can easily install and remove rig pin R8.

S 094-019

(6) Remove rig pin R3 from the feel, centering, and trim mechanism (Fig. 402).

E. Yaw Damper Summing Lever - Test

NOTE: Before you do the test, make sure the airplane is stable at ambient air temperature +/- 10.0 degrees F (+/- 5.5 degrees C) for at least one hour.

S 864-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 864-020

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR

(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-021

(3) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 864-022

(4) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 824-023

(5) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 864-041

(6) Operate the rudder trim knob on the aft electronic control panel, P8, until the rudder trailing edge aligns with the neutral mark on the index plate (use a tolerance of +/- 0.20 inch (5.1 mm)). Do this check:
(a) Make sure you can easily install and remove rig pin R3 in the feel, centering, and trim mechanism.

S 864-044

(7) Put tape on the index plate and make a mark for the position of the rudder trailing edge.

S 214-045

(8) Move one of the rudder ratio changer module (RRCM) test switches to TEST and do these steps:
(a) Stop for 20 seconds, then make a mark for the rudder position on the tape.
(b) Make sure the mark is not more than 0.05 inch (1.3 mm) away from the first mark.

S 214-042

CAUTION: MAKE SURE THE RRCM TEST SWITCH IS IN THE NORMAL POSITION. IF THE TEST SWITCH IS IN THE TEST POSTION, THE AMBER RUDDER RATIO LIGHT WILL COME ON. IF THIS LIGHT IS ON, YOU CANNOT DISPATCH THE AIRPLANE.

(9) Make sure the RRCM TEST switches are in the NORMAL position.

S 824-046
(10) If it is necessary, adjust the rudder trim indicator (Ref 27-21-00/501).

S 214-025
(11) Move the rudder pedals through their full travel range and do these checks:
(a) Make sure the rudder operates correctly and smoothly through its full travel range.
(b) Make sure the rudder position indicator operates correctly.

S 724-026
(12) Do the operational test for the yaw damper system (Ref 22-21-00/501).

F. Put the Airplane Back to Its Usual Condition

S 494-004

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS WILL TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center positions and remove the towing lever lockpin from the nose gear (Fig. 403).

S 414-027
(2) Close access panels 324AL, 324BL, and 324CL (Ref 06-42-00/201).

S 864-028
(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 864-002
(4) Remove electrical power if it is not necessary (Ref 24-22-00/201).

YAW DAMPER SUMMING LEVER - INSPECTION/CHECK

1. General
   A. This procedure contains these tasks:

      - Yaw Damper Shear Pin (or Rivets) - Check
      - Yaw Damper Summing Lever - Inspection

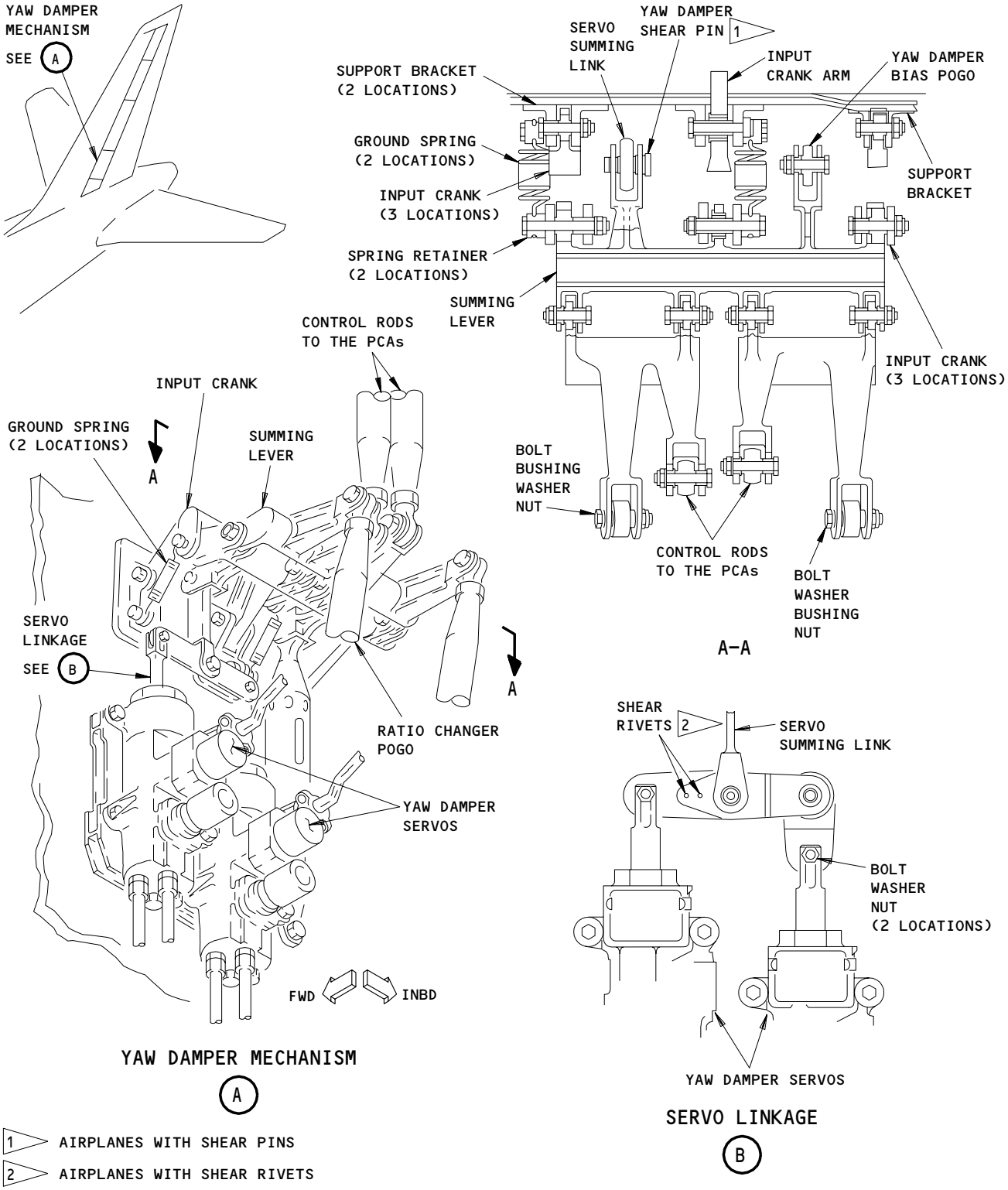
TASK 27-21-17-726-001

2. Yaw Damper Shear Pin (or Rivets) - Check
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Check

      S 866-002
      (1) Supply electrical power (Ref 24-22-00/201).

      S 216-003
      (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) 11A18, YAW DAMPER LEFT
          (b) 11F34, YAW DAMPER RIGHT
          (c) 11C6, CSEU 1L AC
              or FLT CONT ELEC 1L AC
          (d) 11C7, CSEU 1L DC
              or FLT CONT ELEC 1L DC
          (e) 11C8, CSEU 2L AC
              or FLT CONT ELEC 2L AC
          (f) 11C9, CSEU 2L DC
              or FLT CONT ELEC 2L DC



Yaw Damper Summing Lever Inspection
Figure 601

(g) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(h) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
(i) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(j) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC

S 866-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 866-005
(4) Push the STATUS switch on the pilots' display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 866-006
(5) Move the YAW DAMPER test switch on the right side panel, P61, to L and release it.

NOTE: The YAW DAMPER L INOP light will come on. The light will go off approximately 5 seconds after you release the test switch.

S 216-007
(6) Make sure the rudder position indicator on EICAS shows this sequence of rudder movement in less than 10 seconds:
(a) The rudder moves approximately 3 degrees trailing edge right
(b) The rudder moves approximately 3 degrees trailing edge left
(c) The rudder goes back to its neutral position

S 736-008
(7) If the rudder does not move correctly, do the "Yaw Damper Summing Lever - Inspection" task.

D. Put the Airplane Back to Its Usual Condition

S 866-009
(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

S 866-010
(2) Remove electrical power if it is not necessary (Ref 24-22-00/201).

TASK 27-21-17-736-011

3. Yaw Damper Summing Lever - Inspection

A. Equipment
(1) Rig Pins From Set B20003-XX (Ref 20-10-24/201):
(a) R9 - P/N B20003-54

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins

C. Access
(1) Location Zone
324 Vertical Stabilizer, Rear Spar to Trailing Edge

(2) Access Panel
324BL Yaw Damper Summing Linkage

D. Yaw Damper Summing Lever - Inspection

S 016-012
(1) Open access panel 324BL to get access to the yaw damper summing lever (Ref 06-42-00/201).

S 226-013
(2) Examine the clevis that mates with the servo summing link for cracks or other defects.

S 216-023
(3) AIRPLANES WITH SHEAR PIN;
Make sure you can easily install and remove rig pin R9 in the inspection hole that goes thru the yaw damper shear pin.

S 036-015
(4) If you find cracks or cannot install rig pin R9, replace the yaw damper summing lever (Ref 27-21-17/401).

S 226-022

(5) AIRPLANES WITH SHEAR RIVETS;
Make sure you can easily install and remove rig pin R9 in the inspection hole that is located below the yaw damper shear rivets.

S 036-021

(6) If you find cracks or cannot install rig pin R9, replace the shear rivets.

E. Put the Airplane Back to Its Usual Condition

S 416-016

(1) Close the access panel, 324BL (Ref 06-42-00/201).

RUDDER THERMAL COMPENSATING LINKAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the rudder thermal compensating linkage and its components.

      NOTE: Before this procedure is done, make sure the airplane is stable at ambient air temperature 10 degrees F (5.5 degrees C). Before adjustments or adjustment checks are made, maker sure the temperature has been stable for at least one hour.

      (1) You will have to use six rivets for this task (NAS1398D-2).

TASK 27-21-19-024-001

2. Rudder Thermal Compensating Linkage and Its Components - Removal
   A. General
      (1) This task contains these procedures:

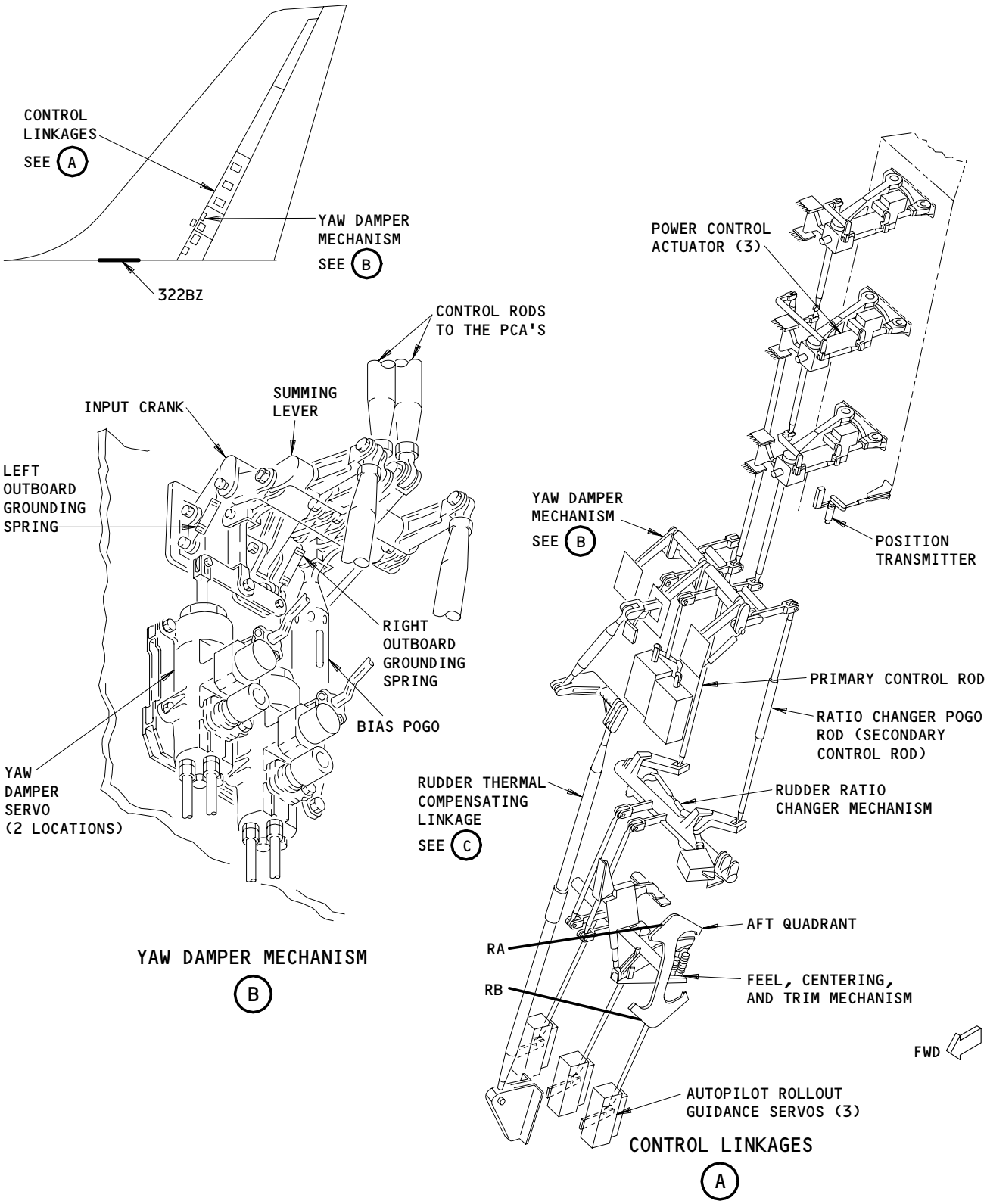
          - Remove the Input Crank Assembly
          - Remove the Top Compensating Rod
          - Remove the Multiplier Crank
          - Remove the Bottom Compensating Rod.

          Because this task contains four procedures, do only the applicable groups of steps.

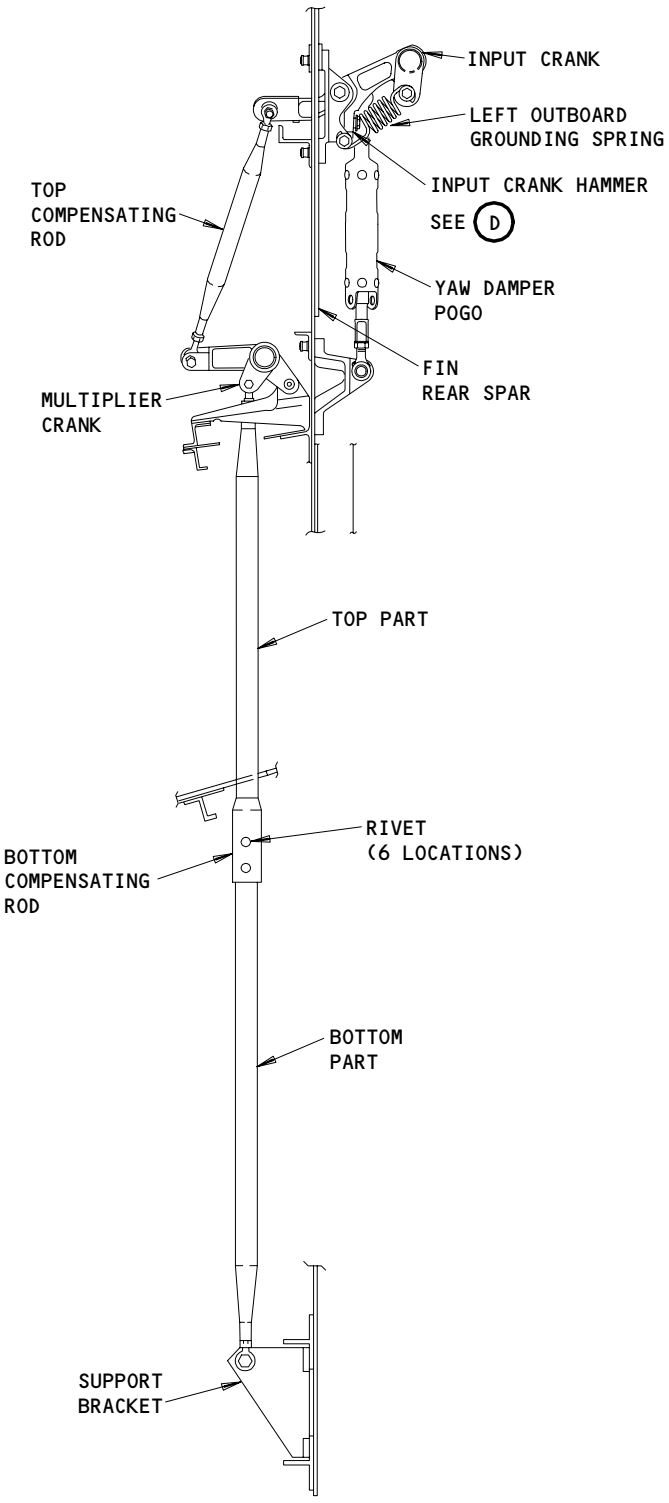
          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
      (2) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) R3 - P/N B20003-16
          (b) R4 - P/N B20003-19
   C. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 27-21-17/401, Yaw Damper Summing Lever
   D. Access
      (1) Location Zone
          342 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          311AL Tailcone Compartment
          322BZ Bottom Forward Torque Box
          324AL Body to Fin Seal
          324BL Aft Side of Rear Spar and Rudder Hinge
          324CL Rudder Hinge and PCAs

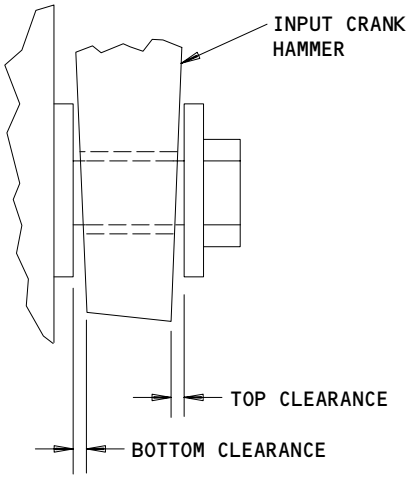


Rudder Thermal Compensating Linkage Installion
Figure 401 (Sheet 1)



RUDDER THERMAL COMPENSATING LINKAGE

C

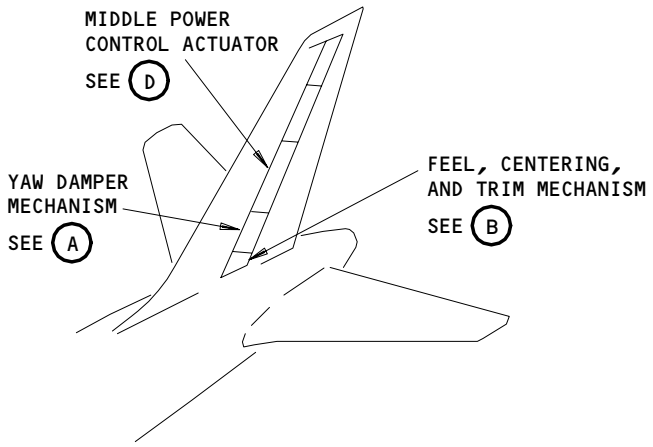


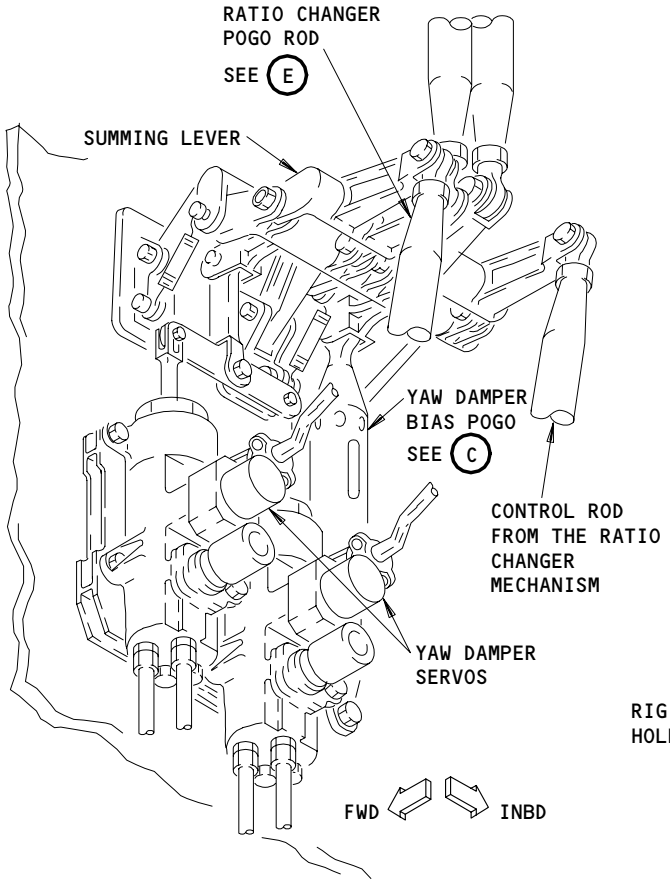
INPUT CRANK HAMMER

D

Rudder Thermal Compensating Linkage Installation
Figure 401 (Sheet 2)

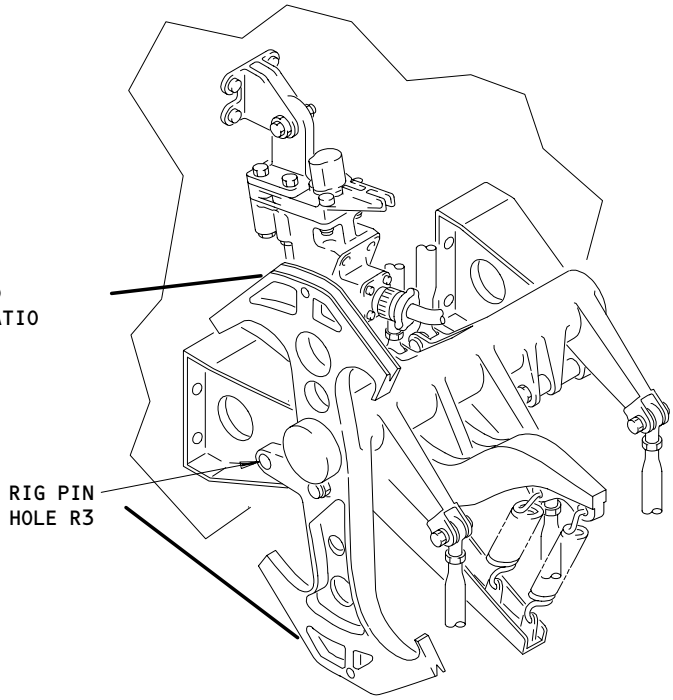
261997





YAW DAMPER MECHANISM

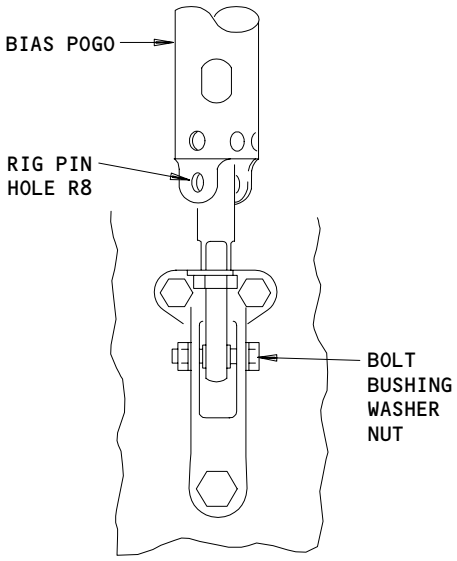
A



FEEL, CENTERING, AND TRIM MECHANISM

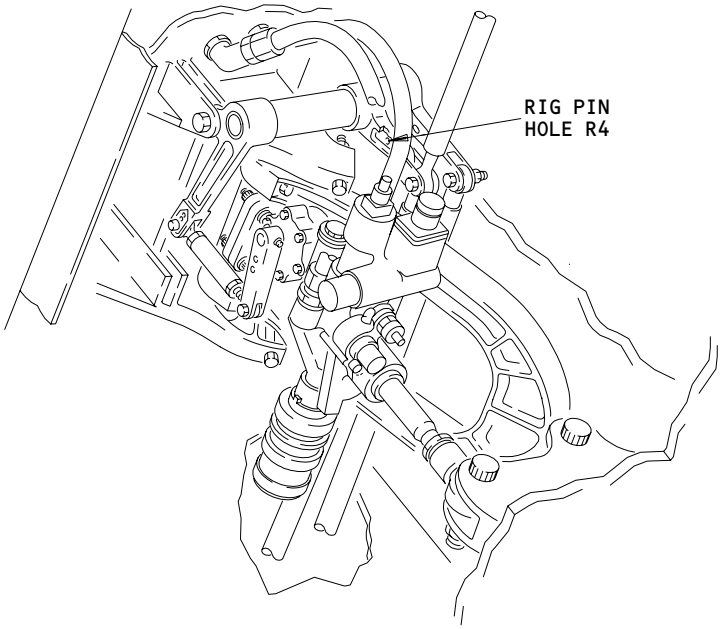
B

Rigging Pin Installation
Figure 402 (Sheet 1)



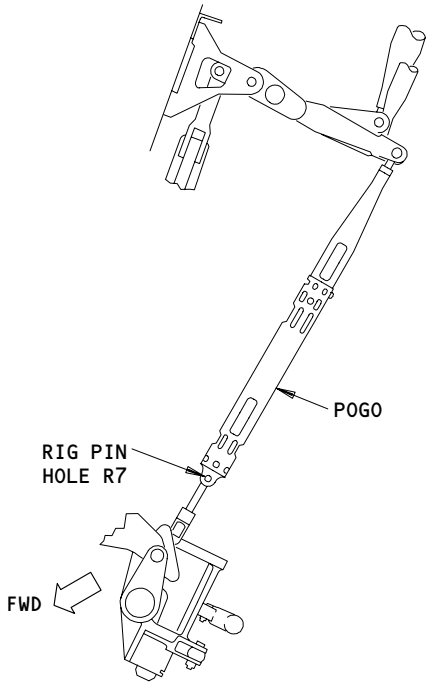
YAW DAMPER BIAS POGO

(C)



MIDDLE POWER CONTROL ACTUATOR

(D)



RATIO CHANGER POGO ROD

(E)

Rigging Pin Installation
Figure 402 (Sheet 2)

E. Prepare for the Removal

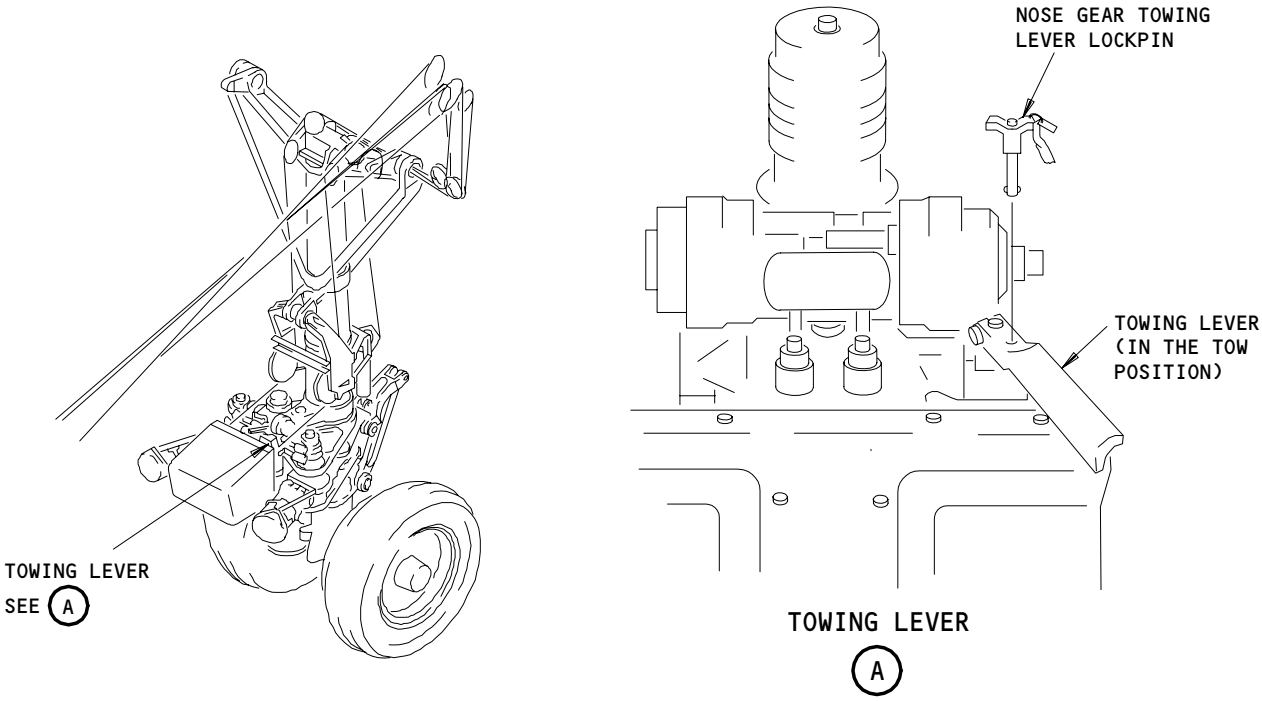
S 864-002
(1) Supply electrical power (Ref 24-22-00).

S 864-003
(2) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 864-004
(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 494-005
(4) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 403).

S 014-007
(5) Open access panels 324AL, 324BL, and 324CL (Ref 06-42-00).



Nose Gear Steering Isolation
Figure 403

S 014-050

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(6) Open access doors 311AL and 322BZ (Ref 06-42-00).

S 494-008

(7) Install these rig pins (Fig. 402):
  (a) R3 (for the rudder feel, centering, and trim mechanism)
  (b) R4 (for the middle power control actuator linkage)

F. Remove the Input Crank Assembly (Fig. 401)

S 024-009

(1) Remove the Yaw Damper Summing Lever (Ref 27-21-17).

S 034-010

(2) Disconnect the input crank from its support brackets (3 locations).

S 024-011

(3) Remove the input crank.

G. Remove the Top Compensating Rod (Fig. 401)

S 034-012

(1) Disconnect the top compensating rod from the input crank.

S 034-013

(2) Disconnect the top compensating rod from the multiplier crank.

S 024-014

(3) Remove the top compensating rod.

H. Remove the Multiplier Crank (Fig. 401)

S 034-015

(1) Disconnect these components:
  (a) The top compensating rod from the multiplier crank
  (b) The bottom compensating rod from the multiplier crank
  (c) The multiplier crank from its support bracket.

S 024-016

(2) Remove the multiplier crank.

I. Remove the Bottom Compensating Rod (Fig. 401)

S 034-017

(1) Disconnect the bottom compensating rod from the multiplier crank.

S 034-018

(2) Disconnect the bottom compensating rod from the support bracket.

S 024-019
(3) Remove the bottom compensating rod.

TASK 27-21-19-424-020

3. Rudder Thermal Compensating Linkage and Its Components - Installation

A. General

(1) This task contains these procedures:

- Install the Input Crank Assembly
- Install the Top Compensating Rod
- Install the Multiplier Crank
- Install the Bottom Compensating Rod.

Because this task contains four procedures, do only the applicable groups of steps.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) R7 - P/N B20003-13
(b) R8 - P/N B20003-13
(2) Power Drill, Commercially Available

C. Consumable Materials

(1) Rivet - NAS1398D-2 (6 are necessary)
(2) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class 3

D. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-21-00/501, Yaw Damper System
(4) 24-22-00/201, Electrical Power - Control
(5) 27-21-00/501, Rudder and Rudder Trim Control System

E. Access

(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels
311AL Tailcone Compartment
322BZ Bottom Forward Torque Box
324AL Body to Fin Seal
324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCAs

F. Install the Input Crank Assembly (Fig. 401)

S 624-021
(1) Apply some of the corrosion preventive compound to the bolts, bushings, washers, and nuts before you install them.

S 434-022
(2) Install the bolts, bushings, washers, and nuts that connect the input crank to its support brackets.

S 434-023
(3) Install the bolts, bushings, spring retainers, washers, nuts, and springs that connect the summing lever to the input crank.

S 434-024
(4) Connect these components:
  (a) The servo summing link to the yaw damper servos
  (b) The control rods from the power control actuators to the summing lever
  (c) The control rod from the right ratio changer crank to the summing lever and do this step:
    1) Tighten the control rod jamnuts.

S 824-025
(5) Adjust the ratio changer pogo rod until rig pin R7 can be easily installed in the pogo (Fig. 402).

S 094-026
(6) Tighten the pogo rod jamnuts and remove rig pin R7.

S 824-027
(7) Adjust the bias pogo until rig pin R8 can be easily installed in the pogo (Fig. 402).

S 094-028
(8) Tighten the pogo rod jamnuts and remove rig pin R8.

S 824-029
(9) Adjust the top compensating rod and do these steps:
  (a) Make sure the top and bottom gaps at the input crank hammer are not more than 0.09 inch (2.3 mm).
  (b) Make sure the top and bottom gaps at the input crank hammer are the same (use a tolerance of ±0.01 inch (+/- 0.25 mm)).
  (c) Tighten the jamnuts for the top compensating rod and lock them with a wire.
  (d) Connect the top compensating rod to the input crank.

S 724-030
(10) Do a test of the Yaw Damper System (Ref 22-21-00).

G. Install the Top Compensating Rod (Fig. 401)

S 624-031
(1) Apply some of the corrosion preventive compound to the bolts, bushings, washers, and nuts before you install them.

S 434-032
(2) Connect the non-adjustable end of the top compensating rod to the multiplier crank.

S 824-033
(3) Adjust the top compensating rod and do these steps:
(a) Make sure the top and bottom gaps at the input crank hammer are not more than 0.09 inch (2.3 mm).
(b) Make sure the top and bottom gaps at the input crank hammer are the same (use a tolerance of ±0.01 inch (+/- 0.25 mm)).
(c) Tighten the jamnuts for the top compensating rod and lock them with a wire.
(d) Connect the top compensating rod to the input crank.

H. Install the Multiplier Crank (Fig. 401)

S 624-034
(1) Apply some of the corrosion preventive compound to the bolts, bushings, washers, and nuts before you install them.

S 434-035
(2) Connect these components:
(a) The multiplier crank to the support bracket
(b) The bottom compensating rod to the multiplier crank.

S 034-036
(3) Disconnect the top compensating rod from the input crank.

S 434-037
(4) Connect the non-adjustable end of the top compensating rod to the multiplier crank.

S 824-038
(5) Adjust the top compensating rod and do these steps:
(a) Make sure the top and bottom gaps at the input crank hammer are not more than 0.09 inch (2.3 mm).
(b) Make sure the top and bottom gaps at the input crank hammer are the same (use a tolerance of ±0.01 inch (+/- 0.25 mm)).
(c) Tighten the jamnuts for the top compensating rod and lock them with a wire.
(d) Connect the top compensating rod to the input crank.

I. Install the Bottom Compensating Rod (Fig. 401)

S 624-039
(1) Apply some of the corrosion preventive compound to the bolts, bushings, washers, and nuts before you install them.

S 034-040
(2) Remove the top compensating rod and do these steps:
(a) Adjust the rod length to 11.84 ±0.02 inches (300.2 +/- 0.5 mm) and tighten the jamnuts.

NOTE: The rod will be used as a tool. Ignore the control rod threads that do not show in the inspection holes.

S 434-041
(3) Install the top compensating rod.

S 434-042
(4) Assemble the top and bottom parts of the bottom compensating rod and do these steps:
(a) Connect the top part of the bottom compensating rod to the multiplier crank.
(b) Connect the bottom part of the bottom compensating rod to the support bracket.

S 434-043
(5) Use the hole locations in the top part of the bottom compensating rod to drill 3/16 inch holes and install the rivets (NAS1398D-2).

NOTE: To get access to all the hole locations, you must remove the bolts and turn the rod. Two rivets must be installed before you turn the compensating rod to make sure the length does not change.

S 434-044
(6) Install the bottom compensating rod and tighten the rod end bolts.

S 824-045
(7) Adjust the rudder thermal compensating linkage (Ref 27-21-00).

J. Put the Airplane Back to Its Usual Condition

S 094-051

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear.

S 094-052

(2) Remove these rig pins:
  (a) R4 (for the middle power control actuator linkage)
  (b) R3 (for the rudder feel, centering and trim mechanism).

S 414-046

(3) Close access panels 324AL, 324BL, and 324CL and access doors 322BZ and 113AL (Ref 06-42-00).

S 864-047

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
  (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (b) 11H18, FLT CONT SHUTOFF TAIL CTR
  (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-048

(5) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 864-049

(6) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER POWER CONTROL ACTUATOR (PCA) AND COMPONENTS - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation procedures for the three rudder PCAs and their reaction links. These procedures are applicable to all of the rudder PCA assemblies.

TASK 27-21-20-022-001

2. Rudder PCA and Reaction Link - Removal
   A. General
      (1) This task contains two procedures, one to remove the rudder PCA and one to remove the rudder reaction link. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
      (2) Rudder PCA Lockout Equipment - B27013-20
   C. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   D. Access
      (1) Location Zone
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panel
          324CL Rudder Hinge and PCAs

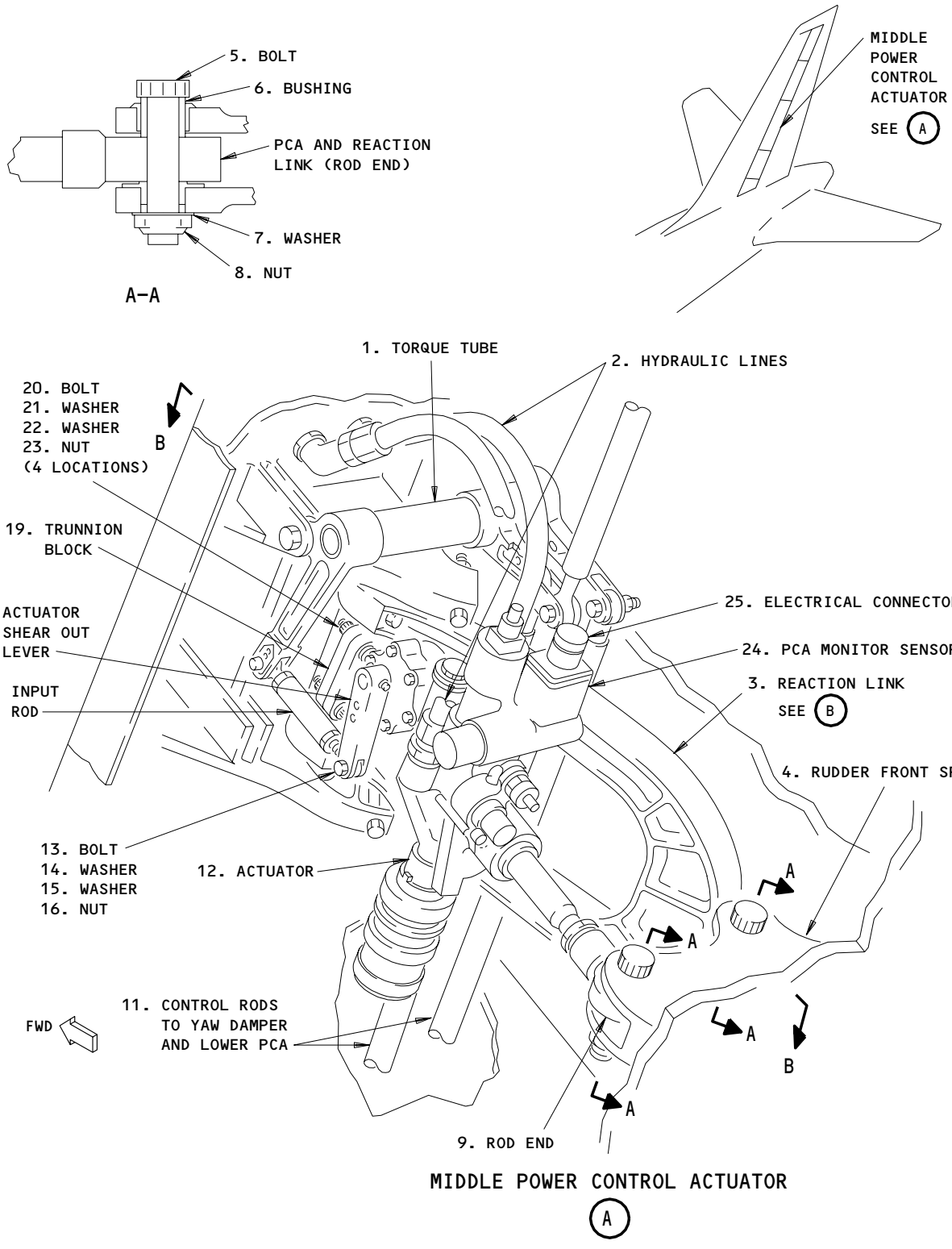
   E. Prepare for Removal

      S 862-002
      (1) Supply electrical power (Ref 24-22-00).

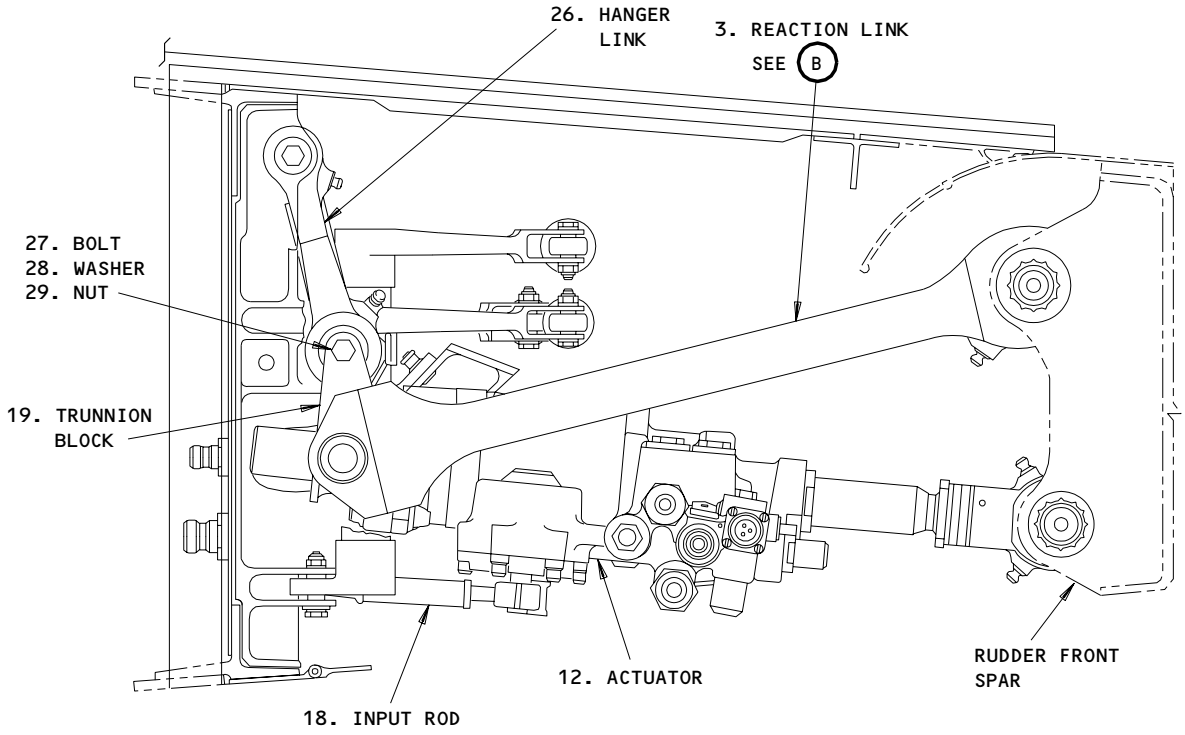
      S 012-003
      (2) Open access panel 324CL (Ref 06-42-00).

          NOTE: Access panel 324CL also removes the trailing edge beam and rear seal.

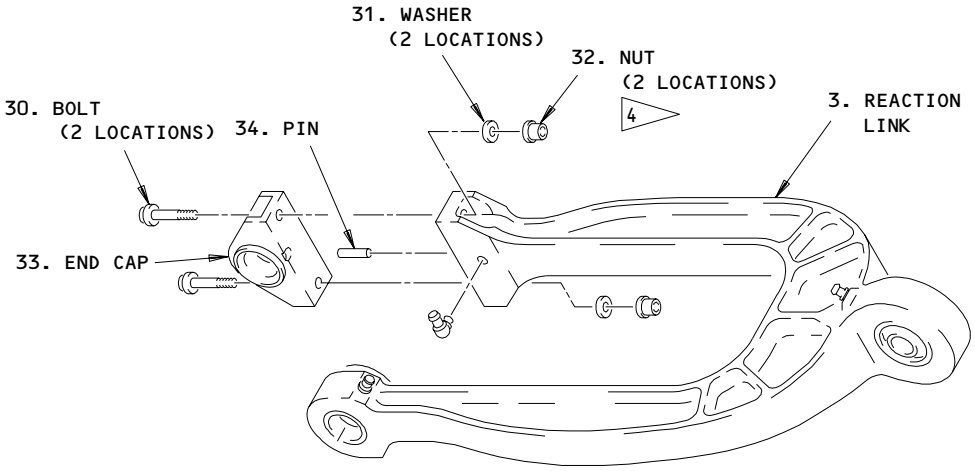
      S 012-004
      (3) Remove the bullnose panel from the left side of the rudder.



Rudder Power Control Actuator and Reaction Link Installation
Figure 201 (Sheet 1)



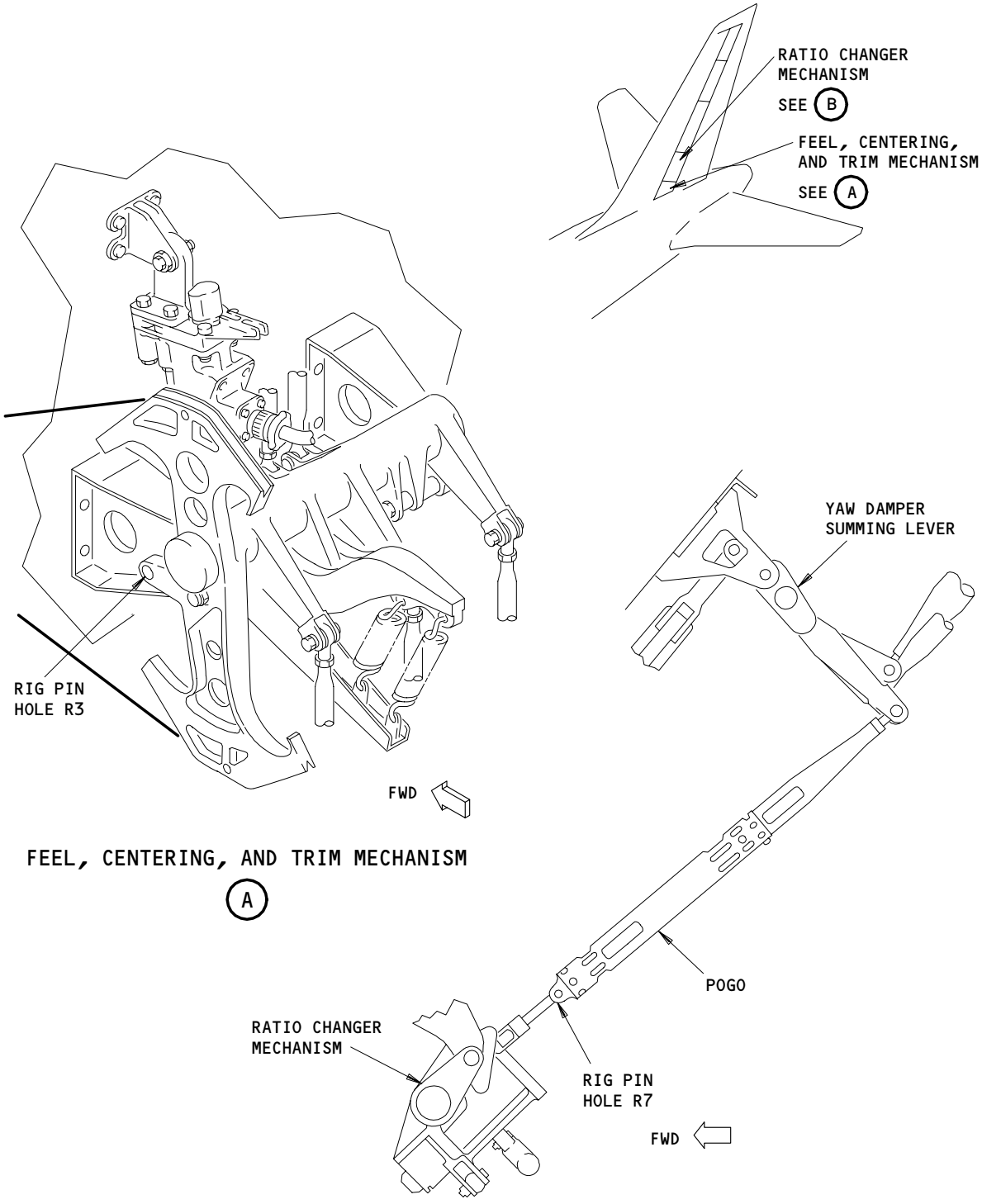
B-B



Reaction Link

B

Rudder Power Control Actuator and Reaction Link Installation
Figure 201 (Sheet 2)



Rudder Rig Pin Installations
Figure 202 (Sheet 1)

S 492-005

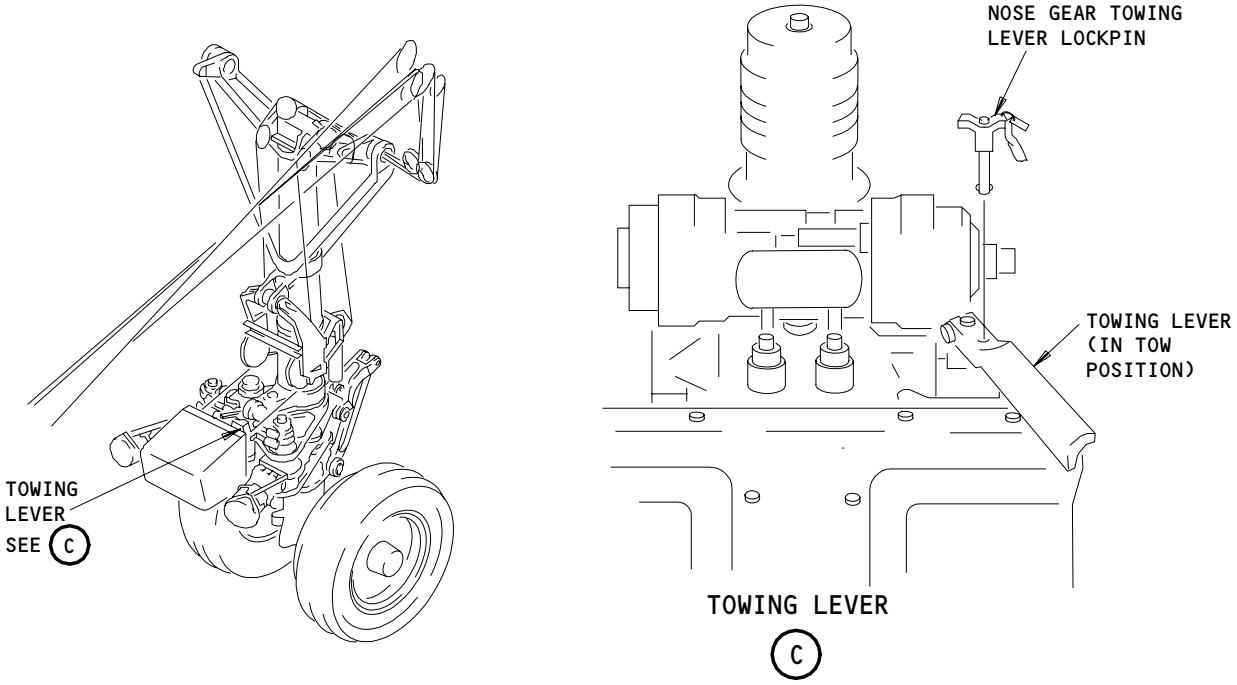
CAUTION: MAKE SURE TO PUT A COVER ON THE APU INLET. IF HYDRAULIC FLUID GOES INTO THE INLET, IT CAN CAUSE SMOKE AND CONTAMINATION OF THE CABIN AIR SUPPLY.

(4) Install a cover to keep the hydraulic fluid out of the APU inlet and away from the inlet area.

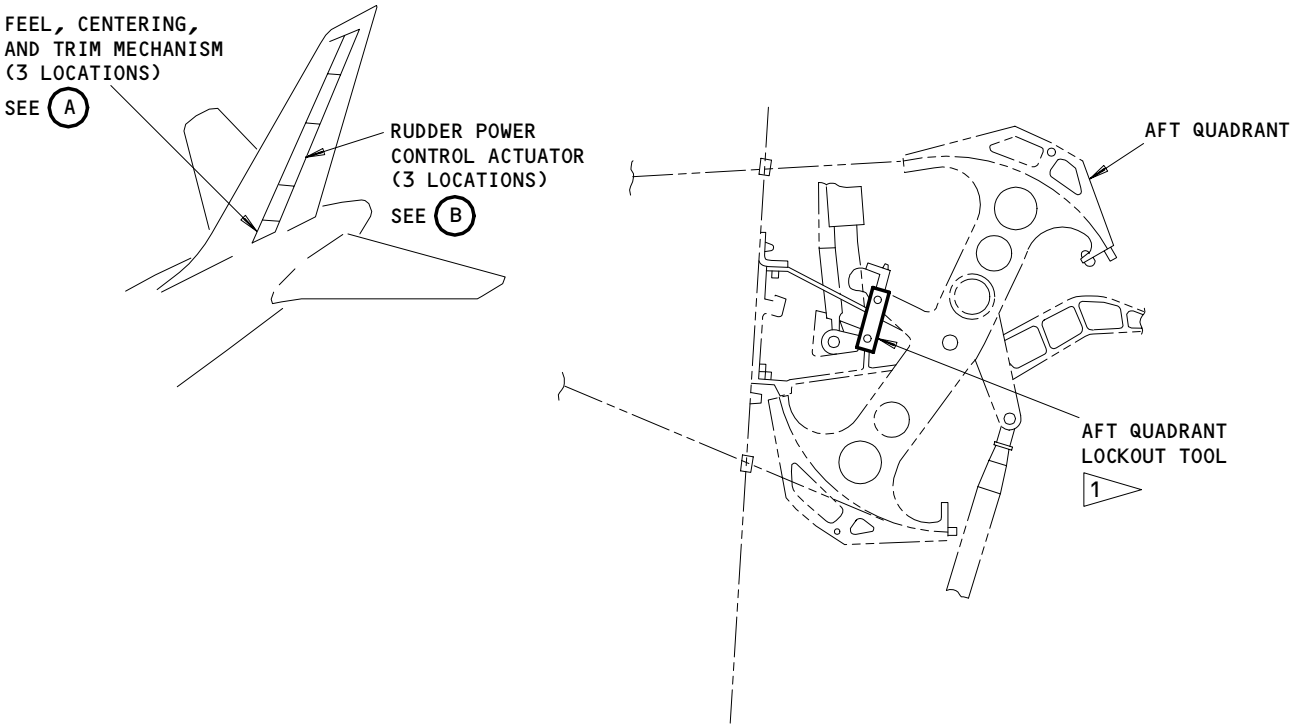
S 862-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

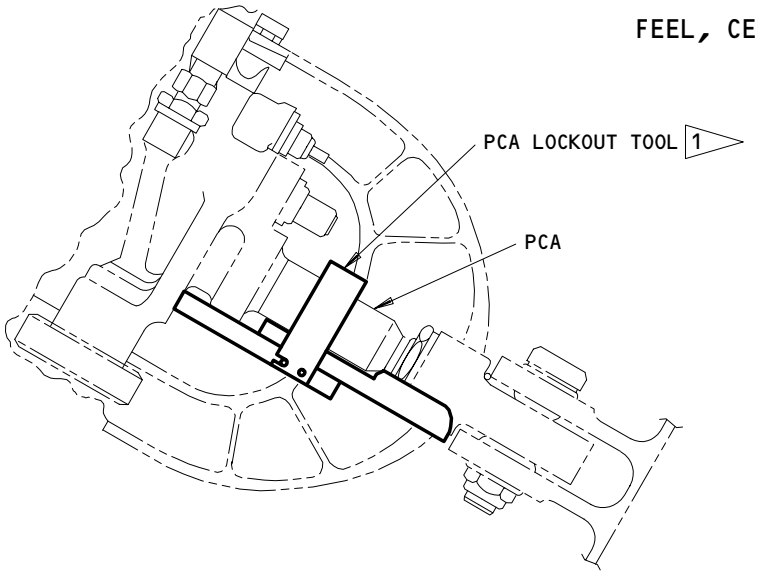


Nose Gear Lever Lockpin Installation
Figure 202 (Sheet 2)



FEEL, CENTERING, AND TRIM MECHANISM

A



RUDDER POWER CONTROL ACTUATOR

B

1 CAUTION: INSTALL THE AFT QUADRANT LOCKOUT TOOL BEFORE THE PCA LOCKOUT TOOL. STRUCTURAL DAMAGE CAN OCCUR IF THE TWO TOOLS ARE NOT USED TOGETHER AND IN THE CORRECT SEQUENCE.

Rudder Power Control Actuator Lockout Equipment Installation
Figure 203

S 862-081

CAUTION: AVOID RUDDER SURFACE TRAVEL TO THE EXTREME FAR LEFT PRIOR TO OR DURING RUDDER ADJUSTMENT. FULL LEFT TRAVEL OF THE RUDDER BEFORE RIGGING COMPLETION RESULTS IN FULL RETRACTION OF THE PCA'S. THIS MAY CAUSE SURFACE CONTACT BETWEEN THE RUDDER LEADING EDGE AND A PCA.

(6) Move the rudder pedals to their full right position and do these steps:

CAUTION: INSTALL THE AFT QUADRANT LOCKOUT TOOL BEFORE THE PCA LOCKOUT TOOL. STRUCTURAL DAMAGE CAN OCCUR IF THE TWO TOOLS ARE NOT USED TOGETHER AND IN THE CORRECT SEQUENCE.

(a) Install the aft quadrant lockout tool (Fig. 203).
(b) Release the rudder pedals.

S 862-008

(7) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 492-009

WARNING: DO NOT INSTALL THE PCA LOCKOUT TOOL WHEN HYDRAULIC PRESSURE IS SUPPLIED. THE RUDDER CAN MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(8) On a PCA where maintenance is not necessary, immediately install the PCA lockout tool (Fig. 203).

S 862-010

(9) Remove the pressure from the hydraulic system that supplies the PCA you will remove (Ref 29-11-00).

NOTE: The right system supplies the top PCA.
The left system supplies the middle PCA.
The center system supplies the bottom PCA.

S 492-011

(10) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 202).

S 862-013
(11) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the amber switch position legend lights come ON.

S 862-014
(12) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J10, PCU MON SENSOR
(e) 11J11, PCU MON MOD

F. Remove the PCA/Shearout Lever Assy (Fig. 201)

S 032-015
(1) Disconnect these components:
(a) The input rod (18) that is connected between the actuator shearout lever (17) and the torque tube (1)

NOTE: Do not remove the shearout lever from the PCA while the PCA is still on the airplane.
The shearout lever is removed from the PCA per Boeing component maintenance manual (CMM).

(b) The electrical connector (25) from the rudder PCA monitor sensor (24)
(c) The hydraulic lines (2) from the actuator (12) and do this step:
1) Seal the hydraulic lines with caps.

S 032-016
(2) Remove these components:
(a) The bolts (5) that connect the actuator (12) and reaction link (3) rod ends to the rudder front spar (4)
(b) The two bolts (20) nearest the access panel that hold the actuator (12) to the trunnion block (19).

S 822-017
(3) Do these steps to compress the actuator:
(a) Make sure the actuator return port does not have a cap installed.
(b) Turn the shearout lever (17) in a counterclockwise direction to remove unwanted hydraulic pressure.
(c) Compress the actuator.

NOTE: It is possible to use 90 pounds (400 newtons) of force when the actuator is compressed.

S 032-018

(4) Do these steps to remove the other two bolts that connect the actuator to the trunnion:

(a) Turn the actuator (12) and the reaction link (3) until you can get access to the bolts (20).

(b) Remove the bolts (20) that hold the actuator to the trunnion block (19).

S 022-019

(5) Remove the actuator (12).

G. Remove the Rudder Reaction Link (Fig. 201).

S 032-020

(1) Disconnect these components:

(a) The input rod (18) that is connected between the actuator shearout lever (17) and the torque tube (1)

NOTE: Do not remove the shearout lever from the PCA.

(b) The electrical connector (25) from the rudder PCA monitor sensor (24)

(c) The hydraulic lines (2) from the actuator (12) and do this step:

1) Seal the hydraulic lines with caps.

S 032-021

(2) Remove the bolts (5) that connect the actuator (12) and reaction link (3) rod ends to the rudder front spar (4).

S 822-022

(3) Do these steps to remove the remaining hydraulic pressure from the PCA:

(a) Make sure the actuator return port does not have a cap installed.

(b) Turn the shearout lever (17) in a counterclockwise direction to remove unwanted hydraulic pressure.

S 032-023

(4) Remove these components:

(a) The bolt (27), washer (28), and nut (29) that connect the hanger link (26) to the trunnion block (19)

(b) The actuator (12), trunnion block (19), and reaction link (3) as an assembly from the airplane.

S 022-024

(5) Do these steps to remove the reaction link (3) from the trunnion block (19):

(a) Remove the bolt (30), washer (31), and nut (32) that connect the reaction link (3) to the end cap (33) (2 locations).

(b) Remove the end cap (33), pin (34), and the reaction link (3) from the trunnion block (19).

TASK 27-21-20-422-025

3. Rudder PCA and Reaction Link - Installation

A. General

(1) This task contains two procedures, one to install the rudder PCA, and one to install the rudder reaction link. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Rudder PCA Adjustment and Test" and the "Put the Airplane Back to Its Usual Condition" groups of steps.

B. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) R3 - P/N B20003-16

C. Consumable Materials

(1) D00015 Grease, Corrosion Preventive - BMS 3-24
(2) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class 3
(3) D00153 Fluid, Hydraulic - BMS 3-11

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	12	Actuator	27-21-20	01	TBD

E. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rigging Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-21-00/501, Rudder and Rudder Trim Control System

(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

F. Access

(1) Location Zone

324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panel

324CL Rudder Hinge and PCAs

G. Install the Rudder PCA/Shearout Lever Assy (Fig. 201)

NOTE: The shearout lever (17) must be installed on the PCA before it is installed on the airplane.
The shearout lever is installed on the PCA per Boeing component maintenance manual (CMM). This CMM installation procedure includes special testing required to verify acceptable assembly hysteresis.

S 622-026

(1) Apply the corrosion preventive compound to the bolts and bushings before they are installed.

S 432-027

(2) Do these steps to connect the actuator to its trunnion:
(a) Align the actuator (12) with the holes in the trunnion block (19).
(b) Install the bolts (20), washers (21), washers (22), and the nuts (23) that connect the actuator to the trunnion. Tighten the nuts to 200 - 250 pound-inches (22.6-28.2 newton-meters).

S 432-028

(3) Do these steps to connect the PCA (12) and reaction link (3) rod ends to the rudder front spar (4):
(a) Turn the actuator (12) and reaction link (3) until they are aligned with the rudder front spar (4).
(b) Install the bolts (5), washers (7), bushings (6), and nuts (8). Do these checks:
1) Make sure the torque that is necessary to turn the nut before it touches the rudder front spar is 90 - 400 pound-inches.
2) Tighten the nut to 1000 - 1400 pound-inches (113-158 newton-meters).

S 432-029

(4) Connect these components:
(a) The input rod between the actuator shearout lever (17) and the torque tube (1)
(b) The electrical connector to the rudder PCA monitor sensor
(c) The hydraulic lines (2) to the actuator (12).

S 642-030
(5) Lubricate the PCA grease fittings after installation.

S 862-031
(6) Move the rudder pedals to their full right position and hold them there.

S 862-032

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Supply hydraulic pressure to the PCA that has the lockout tool installed (Ref 29-11-00).

NOTE: The right system supplies the top PCA. The left system supplies the middle PCA. The center system supplies the bottom PCA.

S 862-033
(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J10, PCU MON SENSOR
(e) 11J11, PCU MON MOD

S 862-077
(9) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to ON.

S 862-035
(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 092-034

WARNING: DO NOT REMOVE THE PCA LOCKOUT TOOL WITH HYDRAULIC POWER ON. THE RUDDER CAN MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(11) Do these steps immediately after hydraulic power is removed:
(a) Remove the PCA lockout tool.
(b) Remove the aft quadrant lockout tool.

H. Install the Reaction Link (Fig. 201)

S 432-036

(1) Do these steps to install the reaction link (3) on the trunnion block (19):
   (a) Install the end cap (33) on the top side (when installed on the airplane) of the trunnion block (19).
   (b) Put the reaction link (3) on the trunnion block (19) and do this step:
      1) Install the pin (34), bolt (30), washer (31), and the nut (32) that connect the reaction link to the end cap. Tighten the nut to 145-165 pound-inches (16.4-18.6 newton-meters).
   (c) Lubricate the PCA and reaction link grease fittings after installation.

S 422-037

(2) Do these steps to install the actuator, reaction link, and trunnion block assembly:
   (a) Align the trunnion block (19), actuator (12), and reaction link (3) assembly with the airplane connection points.
   (b) Install the bolt (27), washer (28), and the nut (29) that connect the hanger link (26) to the trunnion block (19). Tighten the nut to 60 - 95 pound-inches (6.8-10.7 newton-meters).
   (c) Turn the actuator (12) and the reaction link (3) until they are aligned with the rudder front spar (4).
   (d) Install the bolts (5), washers (7), bushings (6), and nuts (8) that connect the actuator and the reaction link to the rudder front spar. Do these checks:
      1) Make sure the torque that is necessary to turn the nut before it touches the spar is 90 - 400 pound-inches (10.2-45.1 newton-meters).
      2) Tighten the nut to 1000 - 1400 pound-inches (113-158 newton-meters).

S 432-038

(3) Connect these components:
   (a) The input rod between the actuator shear out lever (17) and the torque tube (1)
   (b) The electrical connector for the rudder PCA monitor sensor
   (c) The hydraulic lines (2) to the actuator (12).

S 862-039

(4) Move the rudder pedals to their full right position and hold them there.

S 862-075

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply hydraulic pressure to the PCA that has the lockout tool installed (Ref 29-11-00).

NOTE: The right system supplies the top PCA.
The left system supplies the middle PCA.
The center system supplies the bottom PCA.

S 862-040

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J10, PCU MON SENSOR
(e) 11J11, PCU MON MOD

S 862-041

(7) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the P61 panel to ON.

S 862-043

(8) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 092-042

WARNING: DO NOT REMOVE THE PCA LOCKOUT TOOL WITH HYDRAULIC POWER ON. THE RUDDER CAN MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(9) Do these steps immediately after hydraulic power is removed:
(a) Remove the PCA lockout tool.

(b) Remove the aft quadrant lockout tool.

I. Rudder PCA Adjustment and Test

NOTE: This task contains the data that is necessary to adjust one PCA. If you adjust more than one PCA, refer to 27-21-00 for the applicable Adjustment/Test procedure.

Before you do the test, make sure the airplane is stable at ambient air temperature ±10.0 degrees F (±5.5 degrees C) for at least one hour.

S 492-044

(1) Install rig pin R3 (for the feel, centering, and trim mechanism).

S 032-045

WARNING: DO NOT DISCONNECT THE THREE PCA INPUT RODS AT THE SAME TIME WITH HYDRAULIC POWER ON. THE RUDDER WILL MOVE TO ITS FULL LEFT POSITION AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Disconnect the input rod from the PCA you will adjust.

S 862-076

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-046

(4) Remove the power from the hydraulic system that supplies pressure to the PCA you will adjust (Ref 29-11-00) and do these steps:

NOTE: The right system supplies the top PCA.
The left system supplies the middle PCA.
The center system supplies the bottom PCA.

(a) Move the applicable FLT CONTROL SHUTOFF switch (L, C, or R) on the right side panel, P61, to OFF. Attach a DO-NOT-OPERATE tag and make sure the amber switch position legend light comes ON.

(b) Open the applicable circuit breaker below on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
2) 11H18, FLT CONT SHUTOFF TAIL CTR
3) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 972-048
(5) Keep a record of the rudder position.

NOTE: This is the datum position and will be used to adjust the other PCA.

S 862-047
(6) Remove the power from the other two hydraulic systems (Ref 29-11-00) and do these steps:

NOTE: Make sure the power is removed from all three hydraulic systems.

(a) Move the two remaining FLT CONTROL SHUTOFF switches on the P61 panel to OFF. Attach DO-NOT-OPERATE tags and make sure the amber switch position legend lights come ON.
(b) Make sure these circuit breakers on the P11 panel are open and have DO-NOT-CLOSE tags attached:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
2) 11H18, FLT CONT SHUTOFF TAIL CTR
3) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 432-049
(7) Connect the input rod to the PCA you will adjust.

S 032-050
(8) Disconnect the input rods from the other two PCAs.

NOTE: Do not adjust the length of these input rods.

S 862-051

(9) Supply power to the hydraulic system that supplies pressure to the PCA you will adjust (Ref 29-11-00) and do these steps:

NOTE: The right system supplies the top PCA.
The left system supplies the middle PCA.
The center system supplies the bottom PCA.

(a) Remove the DO-NOT-OPERATE tag and move the applicable FLT CONTROL SHUTOFF switch (L, C, or R) on the P61 panel to ON.
(b) Remove the DO-NOT-CLOSE tag and close the applicable circuit breaker below on the P11 panel:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
2) 11H18, FLT CONT SHUTOFF TAIL CTR
3) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 222-078

(10) Measure the rudder position.

S 822-052

(11) Do these steps if the rudder is more than 0.05 inch (1.3 mm) away from the datum position:
(a) Do these steps to move the rudder to the right of its neutral position a small distance:
1) Loosen the jamnuts and adjust the input rod (for the powered PCA) until the rudder position is right of neutral a small distance.
2) Move the input levers for the disconnected PCAs across their neutral positions to remove all unwanted hydraulic pressure.
(b) Adjust the input rod for the powered PCA until the rudder is no more than 0.05 inch (1.3 mm) away from the datum position.

NOTE: Always move the rudder from right to left during this adjustment. Stop for 60 seconds to let the rudder position become stable.

(c) Tighten the control rod jamnuts.
(d) Make sure the rudder is no more than 0.05 inch (1.3 mm) away from the datum position.

S 862-053
(12) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 432-054
(13) Connect the other two PCA input rods.

S 092-055
(14) Remove rig pin R3.

S 412-056
(15) Install the bullnose panel.

S 862-057
(16) Remove the DO-NOT-CLOSE tags and make sure these circuit breakers are closed on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-058
(17) Remove the DO-NOT-OPERATE tags and make sure the FLT CONTROL SHUTOFF switches L, C, and R are ON.

S 862-060

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(18) Supply pressure to the left hydraulic system (Ref 29-11-00).

S 222-084

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(19) Turn the rudder trim switch to put the rudder in its neutral position and do this step:
(a) Keep a record of the rudder position.

NOTE: This is the datum position.

S 862-061
(20) Remove the power from the left hydraulic system (Ref 29-11-00).

S 222-062
(21) Supply pressure to the right hydraulic system (Ref 29-11-00) and do this check:
(a) Make sure the rudder is not more than 0.10 inch (2.5 mm) away from the datum position.

S 862-063
(22) Remove the power from the right hydraulic system (Ref 29-11-00).

S 222-064
(23) Supply pressure to the center hydraulic system (Ref 29-11-00) and do this check:
(a) Make sure the rudder is not more than 0.10 inch (2.5 mm) away from the datum position.

S 862-065
(24) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 212-066
(25) Move the TEST switch on one of the two RRCMs to the TEST position. Stop for 30 seconds and then do these steps:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Turn the rudder trim switch to put the rudder in its neutral position and do this step:

(b) Keep a record of the rudder position.

NOTE: This is the datum position.

S 222-079

(26) Move the TEST switch on the RRCM to NORMAL. Stop for 30 seconds and then do this check:
(a) Make sure the rudder is not more than 0.15 inch (3.8 mm) away from the datum position.

S 862-083

CAUTION: AVOID RUDDER SURFACE TRAVEL TO THE EXTREME FAR LEFT PRIOR TO OR DURING RUDDER ADJUSTMENT. FULL LEFT TRAVEL OF THE RUDDER BEFORE RIGGING COMPLETION RESULTS IN FULL RETRACTION OF THE PCA'S. THIS MAY CAUSE SURFACE CONTACT BETWEEN THE RUDDER LEADING EDGE AND A PCA.

(27) Move the pilots left rudder pedal to its full forward position and do this check:
(a) Make sure the rudder trailing edge moves left 40.05 - 43.03 inches (30.6 +1.26/-1.0 degrees).

S 222-068

(28) Move the pilots right rudder pedal to its full forward position and do this check:
(a) Make sure the rudder trailing edge moves right 40.05 - 43.03 inches (30.6 +1.26/-1.0 degrees).

S 212-069

(29) Move the rudder pedals to their neutral positions and do these checks:
(a) Make sure the RUDDER PCU message is not shown on the EICAS status and maintenance pages.
(b) Make sure there are no leaks at the rudder PCAs.

J. Put the Airplane Back to Its Usual Condition

S 092-070

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCK PIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 202).

S 412-071

(2) Close access panel 324CL (Ref 06-42-00).

S 092-072
(3) Remove the cover from the APU inlet area.

S 862-073
(4) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-074
(5) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is used to remove the rudder and the second task is used to install it.

   TASK 27-21-21-024-039

2. Rudder - Removal
   A. Equipment
      (1) Rudder Sling - B27066-36 (Recommended), B27005-35 (Optional)
      (2) Rig Pin R4 - B20003-19, Part of Set B20003-XX (Ref 20-10-24)
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zone
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          324AL Body to Fin Seal
          324BL Aft Side of Rear Spar and Rudder Hinge
          324CL Rudder Hinge and PCAs
          324DL Aft Side of Rear Spar and Rudder Hinge
          324EL Aft Side of Rear Spar and Rudder Hinge

   D. Prepare for Removal

      S 864-001
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003
      (2) Move the FLT CONTROL SHUTOFF switches L, R, and C on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON.

S 864-004
(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 014-005
(4) Open access panels 324AL, 324BL, 324CL, 324DL, and 324EL (Ref 06-42-00).

NOTE: Rudder access panel 324CL also removes the trailing edge beam and the rear seal.

S 494-006
(5) Install rig pin R4 (for the middle power control actuator).

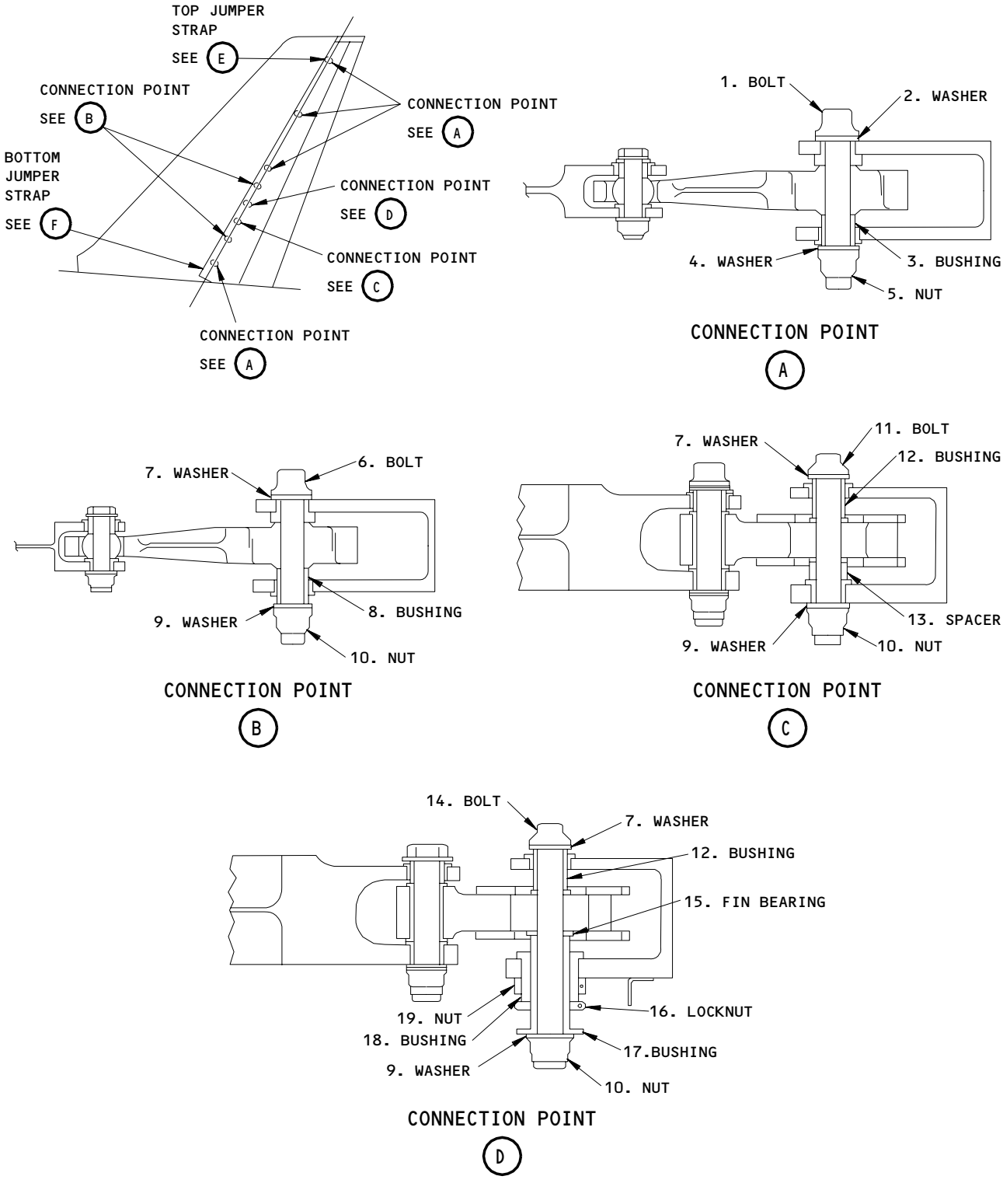
E. Remove the Rudder

S 494-007
(1) Attach the rudder sling to the rudder (25) (Fig. 404).

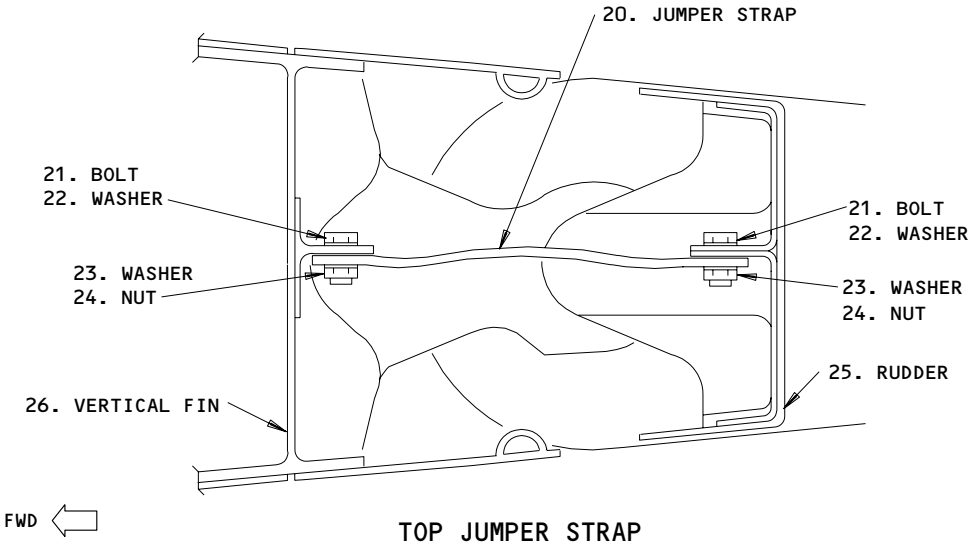
NOTE: Put the sling in its locked position before it is attached.

S 824-008
(2) Lift the rudder until the load is removed from its hinges.

S 034-029
(3) Disconnect these components from the rudder:
(a) The bottom jumper strap (32)
(b) The top jumper strap (20) and remove it from the vertical fin (26)
(c) The three PCAs (10) and their reaction links (9)

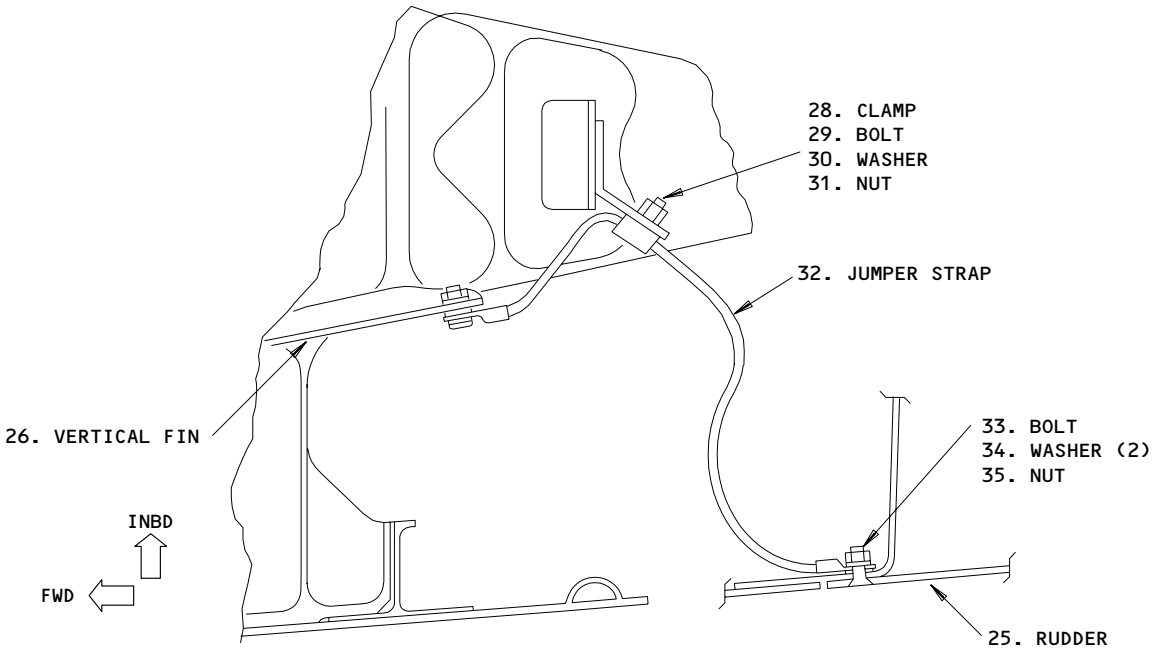


Rudder Installation
Figure 401 (Sheet 1)



TOP JUMPER STRAP

E



BOTTOM JUMPER STRAP

F

Rudder Installation
Figure 401 (Sheet 2)

(d) The control rod (1) for the rudder position transmitter.

S 034-030

(4) Remove these components:
(a) The hinge bolt (14) above the middle power control actuator (PCA) (View D)
(b) The top three and the bottom hinge bolts (1) (View A)
(c) The hinge bolt (11) that is below the middle PCA (View C)
(d) The hinge bolts (6) that are above the top PCA and below the bottom PCA (View B).

S 024-009

(5) Move the rudder (25) aft of the vertical fin (26) and lower it to the ground.

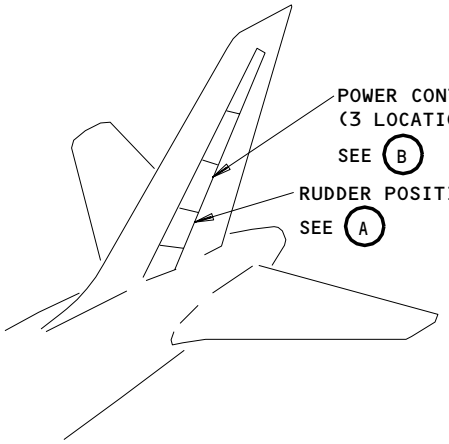
NOTE: Pull the lock rope and use the guide ropes to turn the rudder to its "counterbalance rotation" position (Fig. 404).

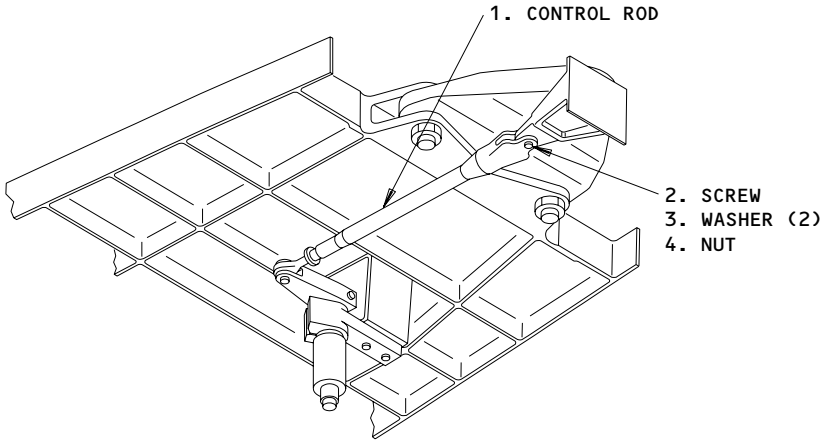
TASK 27-21-21-424-010

3. Rudder - Installation

NOTE: Refer to 27-21-21 for the applicable wear limit data.

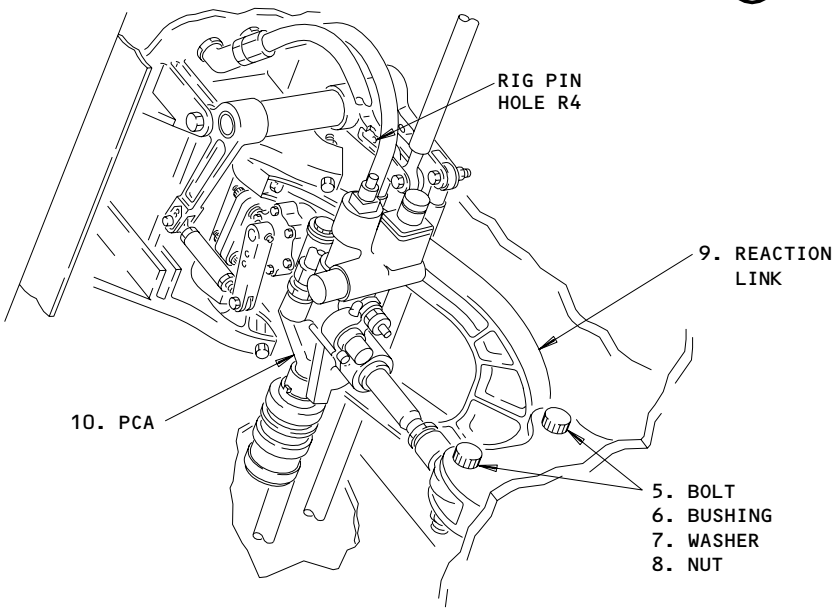
A. Equipment
(1) Rudder Sling - B27066-36 (recommended), B27005-35 (optional)
(2) Nose Gear Towing Lever Lockpin - A09003-1
(3) Bonding Meter - Avtron Model T477W, Avtron Manufacturing Inc., Cleveland, Ohio
B. Consumable Materials
(1) A00247 Sealant, Chromate Type - BMS 5-95
(2) D00015 Grease - Corrosion Preventive - BMS 3-24
(3) C00308 Compound, Corrosion Preventive - MIL-C-11796, Class 3
(4) C00584 Primer - BMS 10-79, Type II
C. Parts





RUDDER POSITION TRANSMITTER

A



POWER CONTROL ACTUATOR (PCA)

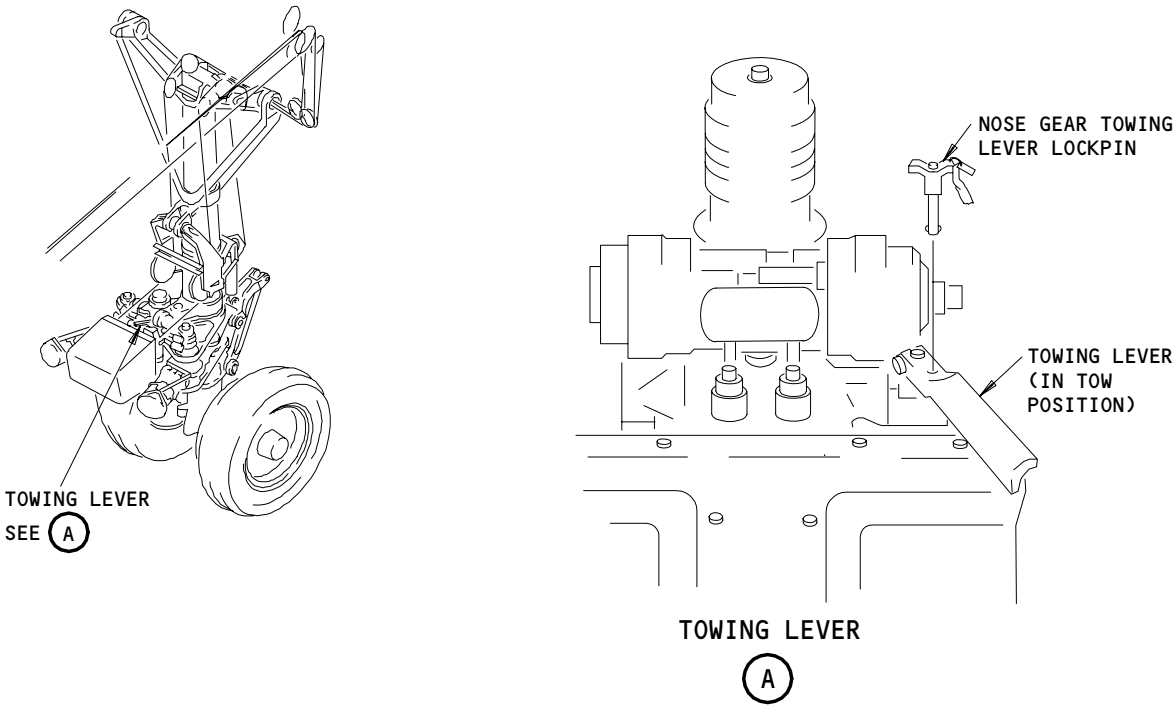
B

Rudder
Figure 402

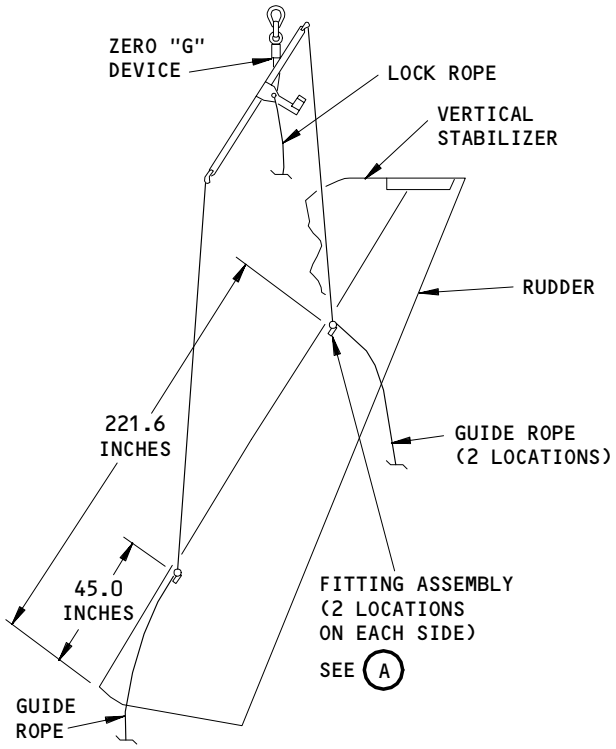
AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	25	Rudder	55-40-51	01	160

D. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-21-00/501, Rudder and Rudder Trim Control System
(4) 27-21-21/601, Rudder
(5) 27-28-00/501, Rudder Position Indicating System
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

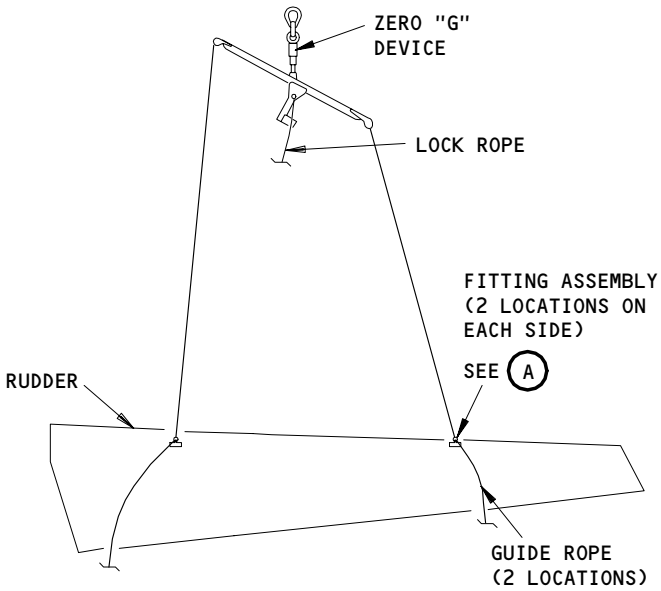
E. Access
(1) Location Zone
324 Vertical Stabilizer - Rear Spar to Trailing Edge



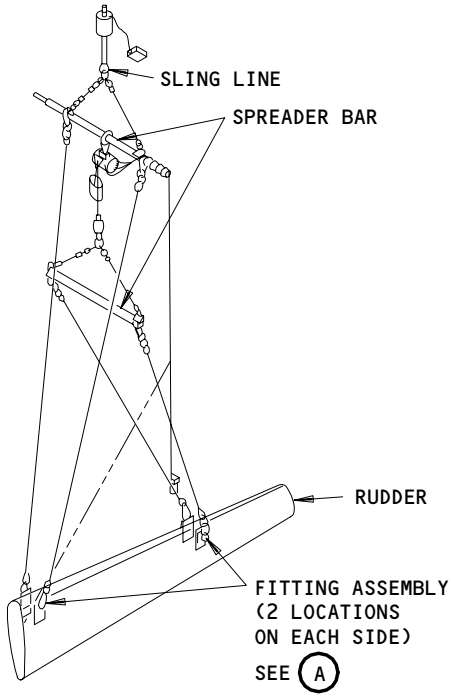
Nose Gear Steering Isolation
Figure 403



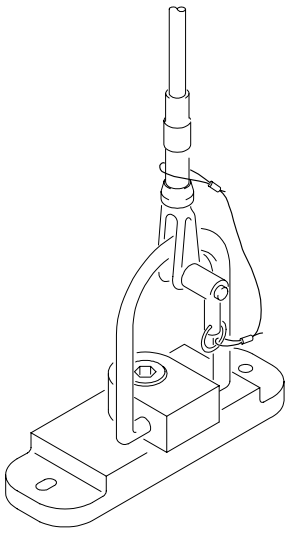
LOCKED POSITION
(RECOMMENDED RUDDER SLING)



COUNTER BALANCE ROTATION POSITION
(RECOMMENDED RUDDER SLING)



COUNTER BALANCE ROTATION POSITION
(OPTIONAL RUDDER SLING)



FITTING ASSEMBLY

A

Rudder Sling
Figure 404

(2) Access Panels

324AL	Body to Fin Seal
324BL	Aft Side of Rear Spar and Rudder Hinge
324CL	Rudder Hinge and PCAs
324DL	Aft Side of Rear Spar and Rudder Hinge
324EL	Aft Side of Rear Spar and Rudder Hinge

F. Install the Rudder

S 644-031

(1) Apply a thin layer of grease on the smooth surfaces of the bolts and the bushings before installation.

S 494-032

(2) Put the sling in its locked position and connect it to the rudder.

S 824-033

(3) Lift the rudder to its correct position.

S 434-011

(4) Do these steps to connect the hinges that are above the top PCA and below the bottom PCA (View B):
(a) Install the washer (7) and the bolt (6).
(b) Install the bushing (8), washer (9), and the nut (10). Tighten the nut to 1000-1200 pound-inches (113-135 newton-meters).

S 434-012

(5) Do these steps to connect the hinge that is below the middle PCA (View D):
(a) Install the bushing (12), washer (7), and the bolt (11).
(b) Install the spacer (13), washer (9), and the nut (10). Tighten the nut to 1000-1200 pound-inches (113-135 newton-meters).

S 434-013

(6) Do these steps to connect the top three and the bottom hinges (View A):
(a) Install the bushing (3), washer (2), and the bolt (1).

(b) Install the washer (4) and the nut (5). Tighten the nut to 440-650 pound-inches (49.7-73.4 newton-meters).

S 434-014

(7) Do these steps to connect the hinge that is above the middle PCA (View C):
(a) Install the bushing (12), washer (7), and the bolt (14).
(b) Install the bushing (17), and tighten it until it lightly touches the fin bearing (15).
(c) Install the locknut (16) and tighten it to 90-120 pound-inches (10.2-13.5 newton-meters) against the bushing (18).
(d) Install the washer (9) and the nut (10). Tighten the nut to 1000-1200 pound-inches (113-135 newton-meters).
(e) Lock the nuts (16, 19) with wire. Make sure they cannot turn in a clockwise direction.
(f) Lock the bushing (18) with wire. Make sure the bushing cannot turn.

S 824-015

(8) Lower the rudder (25) until the load is on its hinges.

S 434-034

(9) Connect these components to the rudder:
(a) Do this step to connect the control rod (1) for the position transmitter:
1) Install the screw (2), washer (3), and the nut (4).
(b) Do these steps to connect the three PCAs (10) and their reaction links (9):
1) Align the rod end bearings for the actuator and the reaction link with the rudder connection points.
2) Apply the corrosion preventive compound to the bolts and bushings before installation.
3) Install the bolts (5), washers (7), bushings (6), and the nuts (8). Tighten the nuts to 1000-1400 pound-inches (113-158 newton-meters).

(c) Do these steps to connect the top jumper strap (20):
1) Install the bolt (21), washers (22, 23), and the nut (24).
2) Install the bolt (21), washers (22, 23), and the nut (24) that connect the jumper strap (20) to the vertical fin (26).

NOTE: Tighten the nut (24) for the vertical fin (26) with the rudder (25) in its neutral position and the jumper strap (20) straight.

3) Use the bonding meter to make sure the maximum bonding resistance is 1.0 ohm.

(d) Do these steps to connect the bottom jumper strap (32):
1) Install the bolt (33), washers (34), and the nut (35).
2) To adjust the strap length, loosen the bolt (29) and move the strap (32) through its clamp (28).
3) Use the bonding meter to make sure the maximum bonding resistance is 1.0 ohm.

S 394-016

(10) Apply sealant to the bolts (21, 33), washers (22, 23, 34), nuts (24, 31, 35), and the ends of the jumper straps (20, 32).

S 374-017

(11) Apply primer to the bolts (29, 33) as necessary.

S 094-040

(12) Remove the rudder sling and install the bolts in the sling connection points.

S 824-035

(13) Do the adjustment procedure for the rudder PCAs (Ref 27-21-00).

S 824-036

(14) Do the adjustment procedure for the rudder position transmitter (Ref 27-28-00).

S 864-041
(15) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 094-022
(16) Remove rig pin R4 from the middle PCA.

S 414-023
(17) Close access panels 324AL, 324BL, 324CL, 324DL, and 324EL (AMM 06-42-00).

S 864-037

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(18) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-018
(19) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-019
(20) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to ON.

S 494-020
(21) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear.

S 864-024

(22) Push the STATUS switch on the pilot's display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 214-025

(23) Move the rudder pedals through their full travel range and do these checks:
  (a) Make sure the rudder operates correctly and moves smoothly through its full travel range.
  (b) Make sure the rudder position indicator operates correctly and moves through its full travel range.

S 864-026

(24) Move the rudder pedals back to their neutral positions.

G. Put the Airplane Back to Its Usual Condition

S 094-038

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose gear wheels are in their center position and remove the towing lever lockpin from the nose gear.

S 864-027

(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-028

(3) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER INSPECTION/CHECK

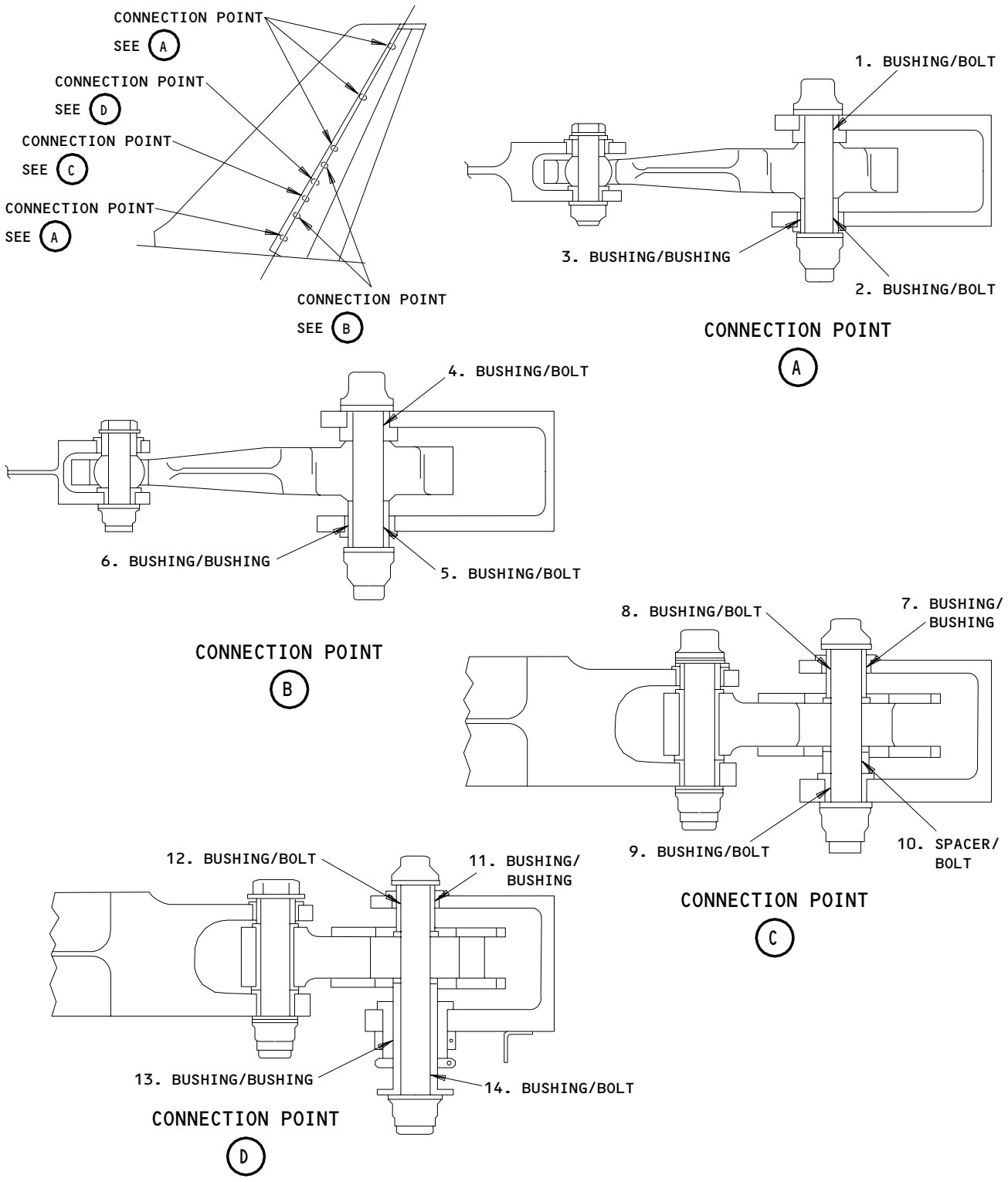
1. General
   A. This procedure only has an illustration and wear limits table which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to Rudder - Removal/Installation for procedures to do these tasks.

TASK 27-21-21-206-001

2. Rudder - Wear Limits
   A. Procedure

S 226-002

(1) Use the supplied data (Fig. 601) to examine the rudder for too much wear.



Rudder Wear Limits
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.5000 (12.700)	0.5007 (12.718)	0.5028 (12.771)	0.0032 (0.081)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4974 (12.634)		X		
2	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5025 (12.764)	0.0030 (0.076)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4975 (12.637)		X		
3	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6890 (17.501)	0.0025 (0.064)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6852 (17.404)		X		
4	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6273 (15.933)	0.0032 (0.081)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6219 (15.796)		X		
5	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6270 (15.926)	0.0030 (0.076)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6220 (15.799)		X		
6	BUSHING	ID	0.8745 (22.212)	0.8753 (22.233)	0.8767 (22.268)	0.0027 (0.069)	X		
	BUSHING	OD	0.8735 (22.187)	0.8740 (22.200)	0.8726 (22.164)		X		
7	BUSHING	ID	0.8745 (22.212)	0.8753 (22.233)	0.8767 (22.268)	0.0027 (0.069)	X		
	BUSHING	OD	0.8735 (22.187)	0.8740 (22.200)	0.8726 (22.164)		X		
8	BUSHING	ID	0.6245 (15.862)	0.6250 (15.875)	0.6270 (15.926)	0.0030 (0.076)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6220 (15.799)		X		
9	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6273 (15.933)	0.0032 (0.081)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6219 (15.796)		X		
10	SPACER	ID	0.6245 (15.862)	0.6250 (15.875)	0.6270 (15.926)	0.0030 (0.076)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6220 (15.799)		X		

Rudder Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
11	BUSHING	ID	0.8745 (22.212)	0.8753 (22.233)	0.8767 (22.268)	0.0027 (0.069)	X		
	BUSHING	OD	0.8735 (22.187)	0.8740 (22.200)	0.8726 (22.164)		X		
12	BUSHING	ID	0.6245 (15.862)	0.6250 (15.875)	0.6270 (15.926)	0.0030 (0.076)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6220 (15.799)		X		
13	BUSHING	ID	0.8745 (22.212)	0.8753 (22.233)	0.8767 (22.268)	0.0027 (0.069)	X		
	BUSHING	OD	0.8735 (22.187)	0.8740 (22.200)	0.8727 (22.167)		X		
14	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6272 (15.931)	0.0032 (0.081)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6220 (15.799)		X		

Rudder Wear Limits
Figure 601 (Sheet 3)

AILERON AND RUDDER TRIM CONTROL MODULE - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation tasks for the trim control module for the ailerons and the rudder. There are tasks to remove and install the rudder trim indicator from the trim module. There is also a procedure to clean the rudder trim knob and its lightplate.

TASK 27-21-23-022-001

2. Aileron and Rudder Trim Control Module - Removal
   A. References
      (1) 24-22-00/201, Electrical Power - Control
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Removal

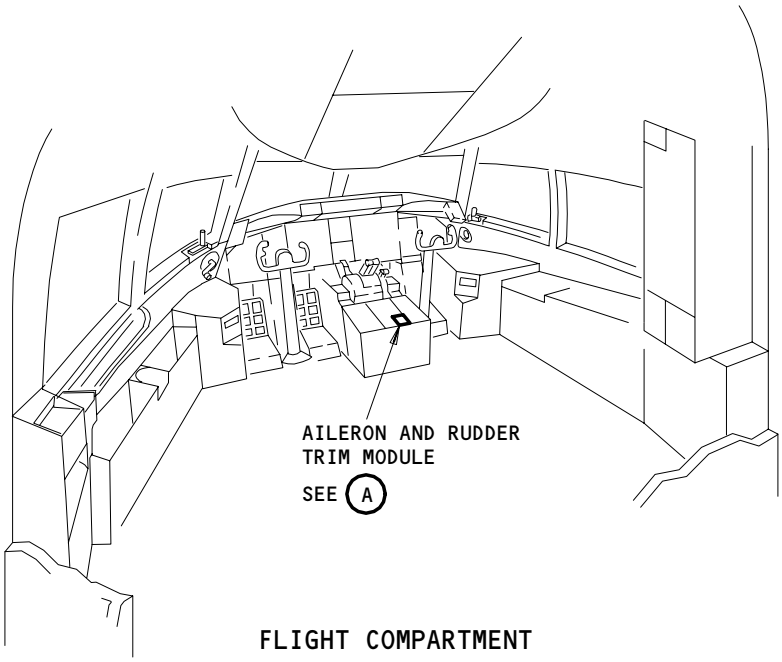
      S 862-002
      (1) Supply electrical power (Ref 24-22-00).

      S 862-003
      (2) Move the FLT CONTROL SHUTOFF switches L, R, and C on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

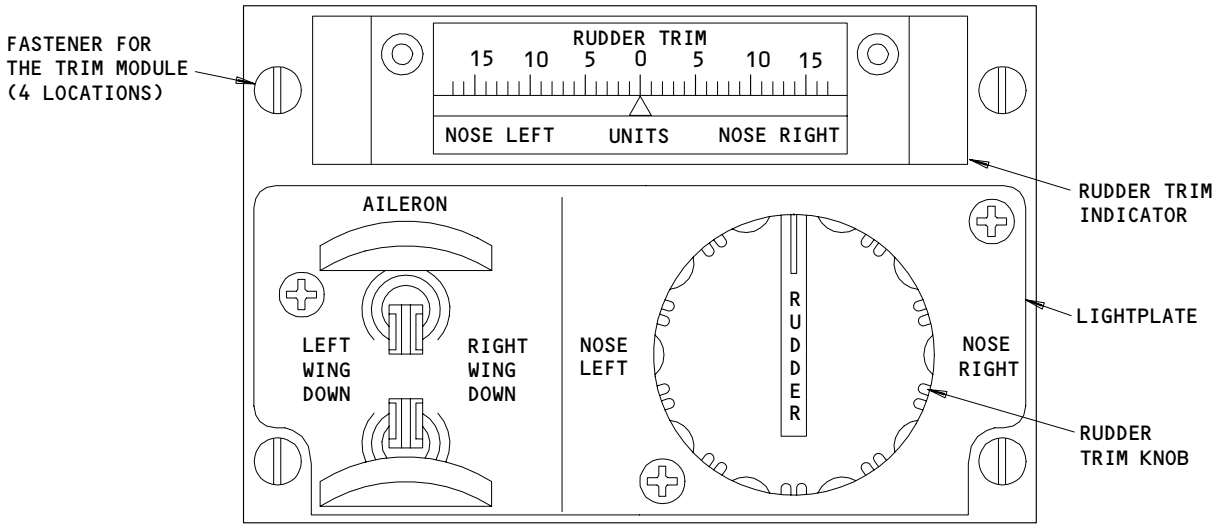
      S 862-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C10, RUD TRIM
          (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (c) 11H18, FLT CONT SHUTOFF TAIL CTR
          (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
          (e) 11J15, AILERON TRIM
          (f) 11J17, RUDDER TRIM POS
   D. Aileron and Rudder Trim Module - Removal (Fig. 201)

      S 032-005
      (1) Turn the four fasteners that connect the trim module to the aft electronic control panel, P8.

      S 022-006
      (2) Lift the trim module from the P8 panel and do these steps:
          (a) Disconnect the two electrical connectors from the trim module.
          (b) Remove the module from the P8 panel.



FLIGHT COMPARTMENT



AILERON AND RUDDER TRIM MODULE

(A)

Aileron and Rudder Trim Module
Figure 201

TASK 27-21-23-422-007

3. Aileron and Rudder Trim Control Module - Installation

A. References

(1) 24-22-00/201, Electrical Power - Control
(2) 27-11-00/501, Aileron and Aileron Trim Control System
(3) 27-21-00/501, Rudder and Rudder Trim Control System
(4) 29-11-00/201, Main (Left, Right, and Center Hydraulic Systems)

B. Access

(1) Location Zones
211/212 Control Cabin

C. Aileron and Rudder Trim Module - Installation (Fig. 201)

S 432-008
(1) Connect the two electrical connectors to the bottom of the trim module.

S 422-009
(2) Put the module in its correct position and do this step:
(a) Turn the four fasteners that connect the trim module to the aft electronic control panel, P8.

S 212-010
(3) Make sure the trim module is tightly held in its correct position.

S 862-011
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J15, AILERON TRIM
(f) 11J17, RUDDER TRIM POS

S 862-012
(5) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 712-013
(6) Do the operational test for the aileron trim control system (Ref 27-11-00).

S 712-014
(7) Do the operational test for the rudder trim control system (Ref 27-21-00).

S 212-015
(8) Make sure the trim switch knob does not touch the lightplate surface during its operation.

D. Put the Airplane Back to Its Usual Condition

S 862-016
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-21-23-002-030

4. Rudder Trim Indicator - Removal

A. References
(1) 24-22-00/201, Electrical Power - Control

B. Access
(1) Location Zones
211/212 Control Cabin

C. Prepare for the Removal

S 862-031
(1) Supply electrical power(Ref 24-22-00).

S 862-032
(2) Move the FLT CONTROL SHUTOFF switches L, R, C on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 862-033
(3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT

(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J17, RUDDER TRIM POS

D. Remove the Rudder Trim Indicator

S 032-034
(1) Turn the two fasteners that attach the cover of the rudder trim indicator to the face of the indicator.

S 032-035
(2) Turn the two fasteners that connect the rudder trim indicator to the trim module in the aft electronic control panel, P8.

S 022-036
(3) Lift the indicator from the trim module and do these steps:
(a) Disconnect the electrical connector from the trim indicator.
(b) Remove the trim indicator from the module.

TASK 27-21-23-402-037

5. Rudder Trim Indicator - Installation

A. References
(1) 24-22-00/201, Electrical Power - Control

B. Access
(1) Location Zones
211/212 Control Cabin

C. Rudder Trim Indicator - Installation

S 432-038
(1) Connect the electrical connector to the bottom of the rudder trim indicator.

S 422-039
(2) Put the rudder trim indicator in it correct position and do these steps:
(a) Turn the two fasteners that connect the rudder trim indicator to the trim module.
(b) Put the cover of the rudder trim indicator in its position and attach it with the two fasteners.

S 862-040
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT CHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J17, RUDDER TRIM POS

S 862-041
(4) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 212-042
(5) Turn the rudder trim switch on the aft electronic control panel, P8, clockwise. Hold it there until the rudder movement stops and do these checks:
(a) Make sure the rudder trim indicator shows at least 15.2 units of trim in the correct direction.
(b) Make sure the rudder positi on indicator moves approximately two-thirds of full scale (approximately 22 degrees).

S 212-043
(6) Turn the rudder trim switch on the aft electronic control panel, P8, counterclockwise. Hold it there until the rudder movement stops and do these checks:
(a) Make sure the rudder trim indicator shows at least 15.2 units of trim in the correct direction.
(b) Make sure the rudder position indicator moves approximately two-thirds of full scale (approximately 22 degrees).

D. Put the Airplane Back to Its Usual Condition

S 862-044
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-21-23-102-017

6. Clean the Rudder Trim Switch

A. Consumable Materials
(1) Detergents:
(a) B00157 Spray White E or Equivalent
(b) B00000 Winsol APC-120-WX

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 25-00-00/701, Equipment/Furnishings
(3) 27-21-00/501, Rudder and Rudder Trim Control System

C. Access
(1) Location Zones
211/212 Control Cabin

D. Prepare to Clean

S 862-018
(1) Supply Electrical Power (Ref 24-22-00).

S 862-019
(2) Move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come on.

S 862-029
(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J15, AILERON TRIM
(f) 11J17, RUDDER TRIM POS

E. Clean the Rudder Trim Switch (Fig. 201)

S 032-020
(1) Loosen the two screws in the rudder trim knob.

S 032-021
(2) Remove the knob from the rudder trim switch.

S 102-022

CAUTION: MAKE SURE THE DETERGENT DOES NOT GO IN THE TRIM SWITCH. THE TRIM SWITCH CAN BECOME DAMAGED IF THE DETERGENT GOES IN THE TRIM SWITCH.

(3) Use a sponge and the detergent to clean the lightplate surface and the bottom surface of the trim knob (AMM 25-00-00/701).

S 432-023

(4) Install the knob on the rudder trim switch and tighten the two knob screws.

S 862-024

(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C10, RUD TRIM
(b) 11H17, FLT CONT SHUTOFF TAIL LEFT
(c) 11H18, FLT CONT SHUTOFF TAIL CTR
(d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) 11J15, AILERON TRIM
(f) 11J17, RUDDER TRIM POS

S 862-028

(6) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the P61 panel to ON.

S 712-025

(7) Do the operational test for the rudder trim system (Ref 27-21-00).

S 212-079

(8) GUI 001-011, 101-115;
Make sure the clearance between the trim switch knob and the lightplate is between a minimum of 0.02 inches (0.5 mm) to a maximum or 0.05 inches (1.3 mm).

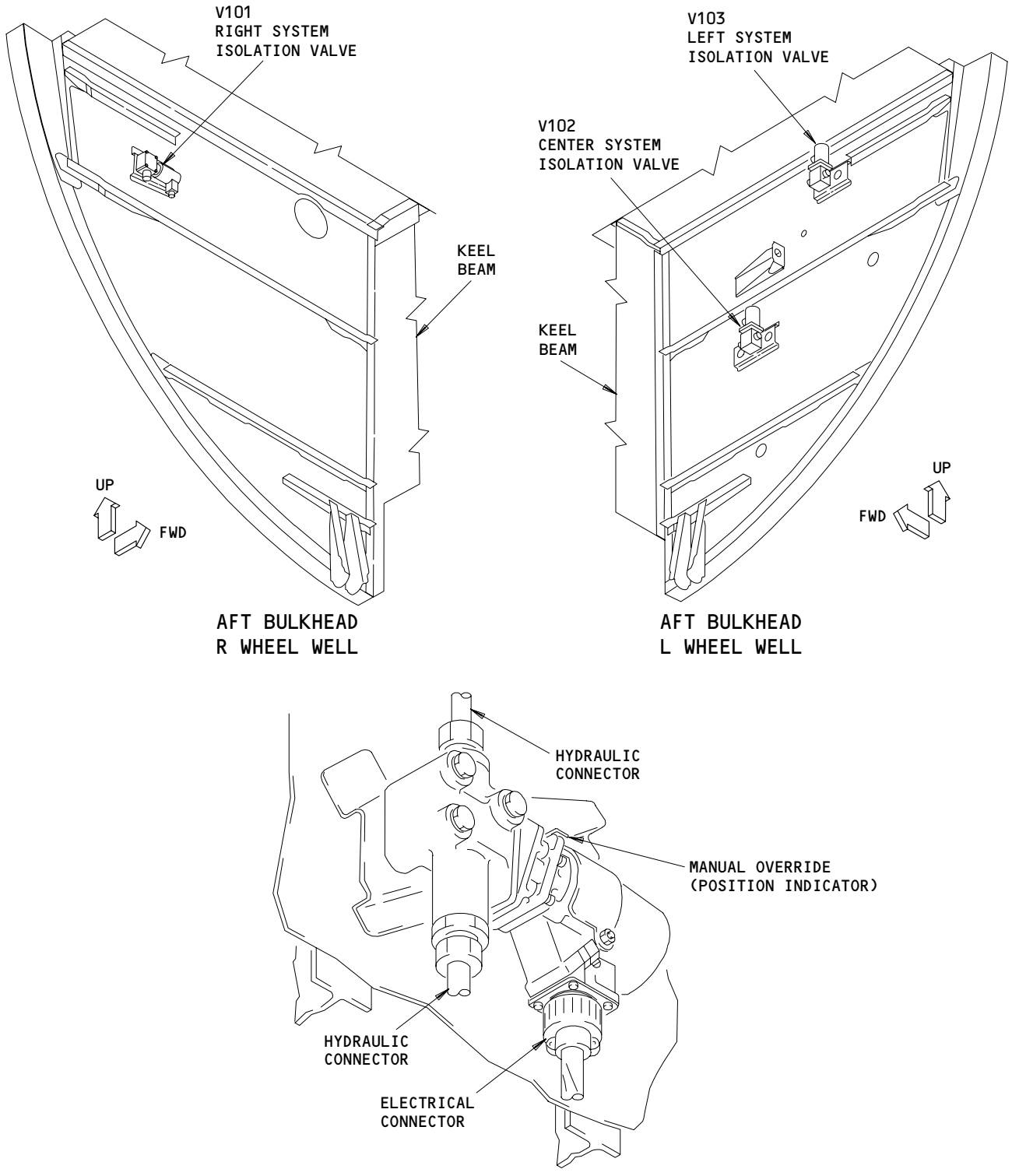
F. Put the Airplane Back to Its Usual Condition

S 862-027

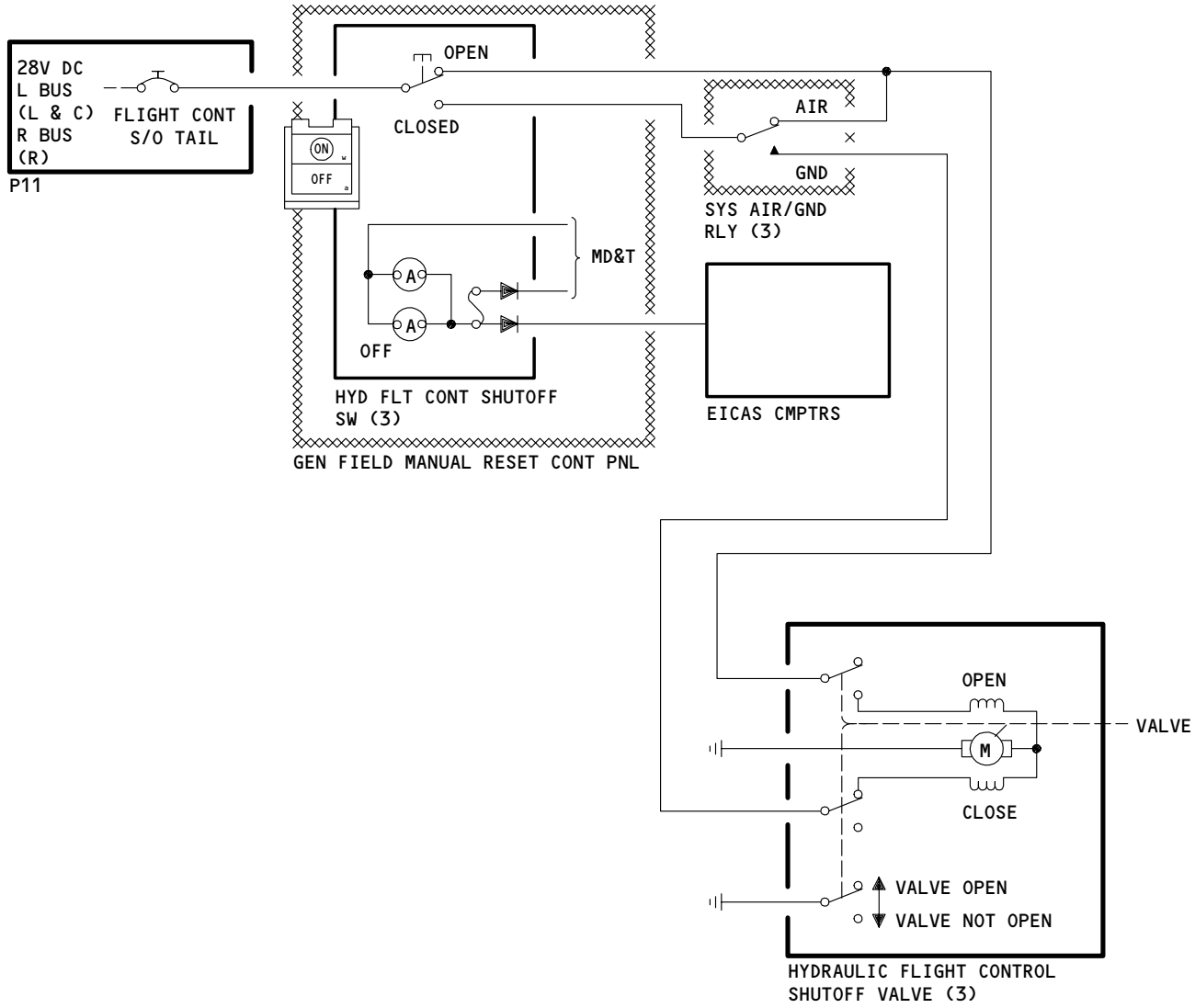
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER AND ELEVATOR HYDRAULIC SYSTEMS - DESCRIPTION AND OPERATION

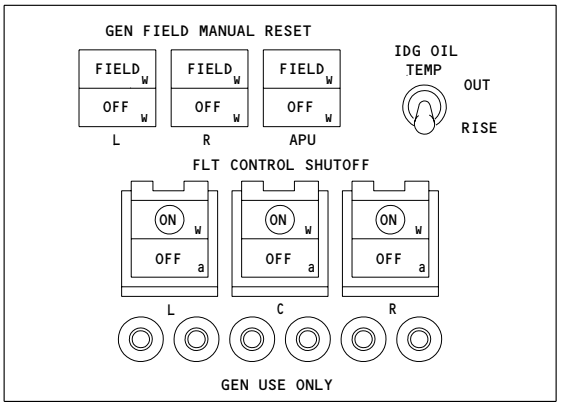
1. General
   A. Rudder and elevator shutoff valves stop the fluid flow in the L, C, and R hydraulic systems. This allows hydraulic line isolation to check for leaks and to perform maintenance on the rudder, stabilizer, and elevators while hydraulic systems are pressurized.
   B. Rudder and elevator center hydraulic system fuses are installed to prevent the complete loss of hydraulic fluid in the event of a hydraulic system rupture downstream of the fuses. Without the fuses, complete loss of airplane control can occur.
2. Component Details
   A. Rudder/Elevator Hydraulic Shutoff Valves (Fig. 1 and 2)
      (1) The valve is a two-position, rotary ball valve, operated by a 28-volt dc motor. There are two ports in the valve body, a pressure port and a cylinder port. The motor shaft rotates about 90 degrees to open or close the valve.
      (2) The left, center, and right system valves power is controlled by the FLT CONT S/O TAIL circuit breakers L, C, and R on overhead circuit breaker panel P11. The L and C systems are powered by bus L; R system is powered by bus R.
      (3) The valves are controlled by the FLT CONTROL SHUTOFF switches L, C, and R on right side panel P61. Each valve has an override handle for manual operation. Markings on the motor case, POS 1 (open) and POS 2 (close) indicate what position the valve and valve override handle are in. Air/ground relays prevent closure of the valves while airplane is in the air.
      (4) The valves are located on the main landing gear wheel well aft bulkheads, R system in the right well, L and C systems in the left well. Valve V101 controls the R (right) system, V102 the C (center) system and V103 the L (left) system.
      (5) An amber light in the FLT CONTROL SHUTOFF switches indicates the valve is closed. The switch legend "OFF" is backlighted by the amber light. An L, C, or R FLT CONT HYD EICAS alert message (level C) indicates which valve is closed.
   B. Rudder/Elevator Power Control Actuator (PCA) Monitor System
      (1) Each rudder and elevator PCA has a two-wire hydraulic pressure differential sensor installed in the relief valve cavity. The relief valve was provided to allow a jammed or disconnected PCA control valve to be overridden by the other PCAs. The sensor sends a signal to the monitor module. The monitor module sends a valid failure signal to the EICAS computer which retains a status and maintenance page message (RUDDER PCU, L or R ELEV PCU) for later display. The monitor sensors are controlled by the PCU MON SENSOR circuit breaker on overhead circuit breaker panel P11. The sensors are powered by 115 volt ac from bus L.

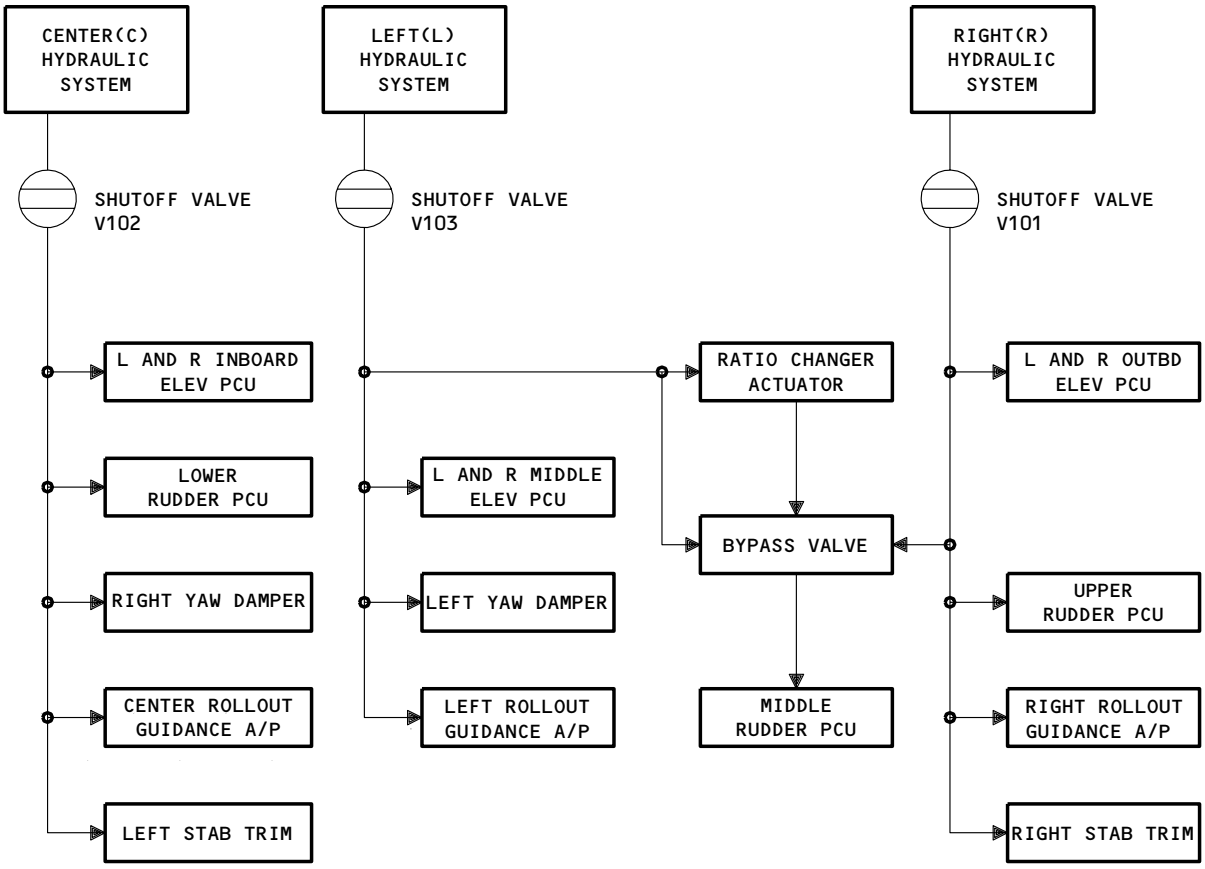


Rudder/Elevator Hydraulic Shutoff Valve
Figure 1



Shutoff Valve Control
Figure 2





Flight Control Systems Affected By Shutoff Valve
Figure 3

(2) The PCA monitor module controls the PCA monitor sensors and is located in the P50 Elec Sys Card File. The module is powered by 28 volts dc from bus L and controlled by PCU MON MOD circuit breaker on panel P11. PCA monitor failure results in a PCU MONITOR EICAS maintenance page message.

C. Rudder and Elevator Center Hydraulic System Fuses

(1) These hydraulic fuses are installed in the center hydraulic system pressure lines upstream of the rudder and elevator actuators. One fuse is installed for the rudder system and two fuses are installed for the elevator system.

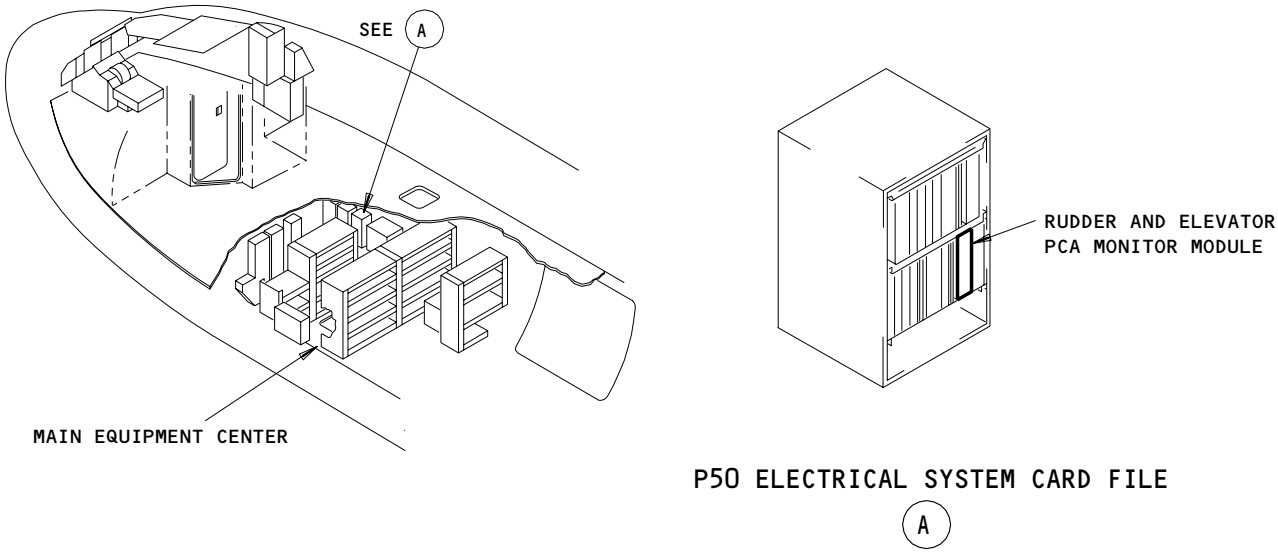
(2) The fuses sense the hydraulic fluid flow rate to the rudder and elevator systems. In the event of hydraulic line rupture downstream, the fuse will close to prevent loss of hydraulic fluid. This will preserve hydraulic pressure in the system upstream of the fuse.

3. Operation

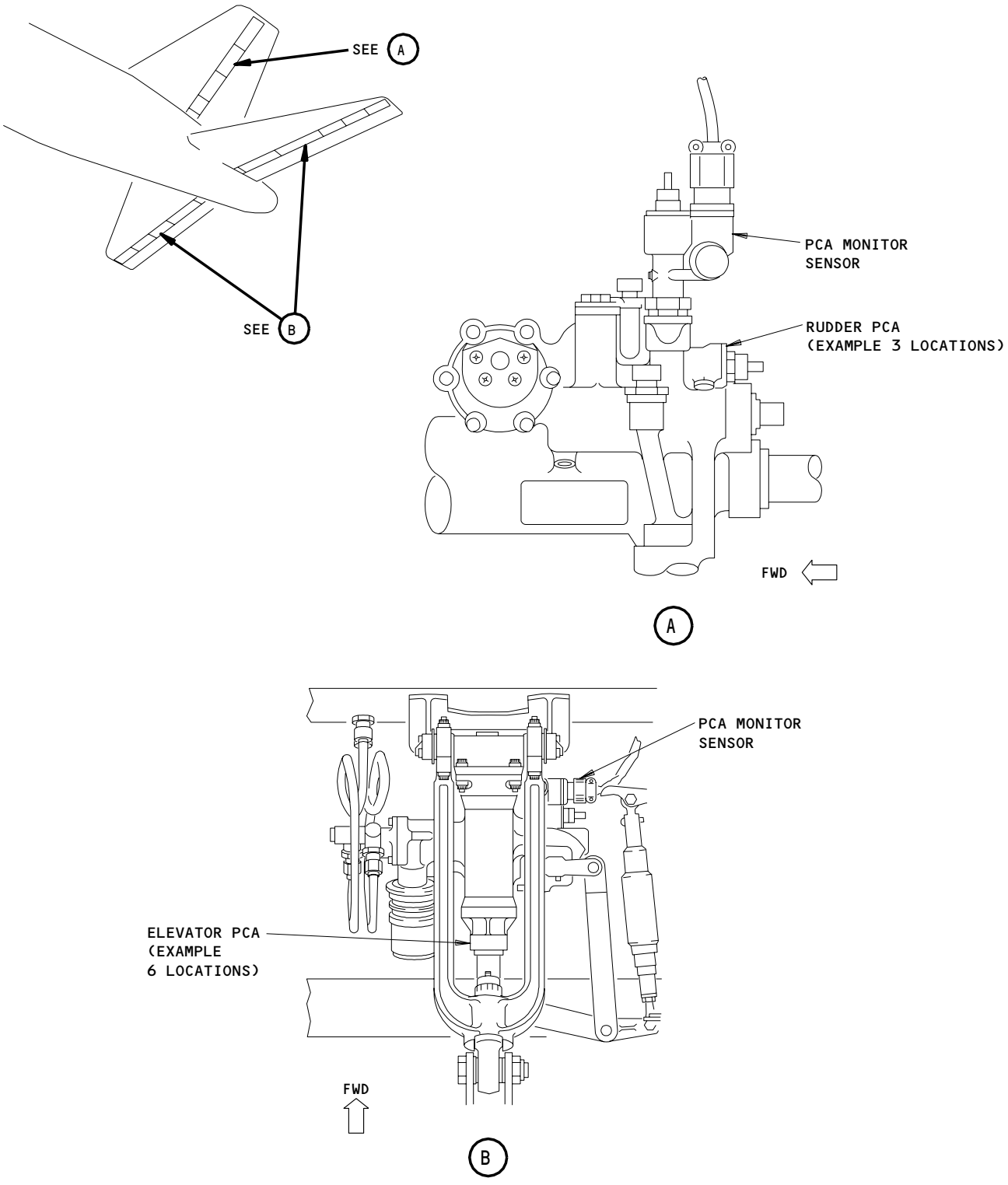
A. Functional Description

(1) Shutoff Valve and Indication Operation

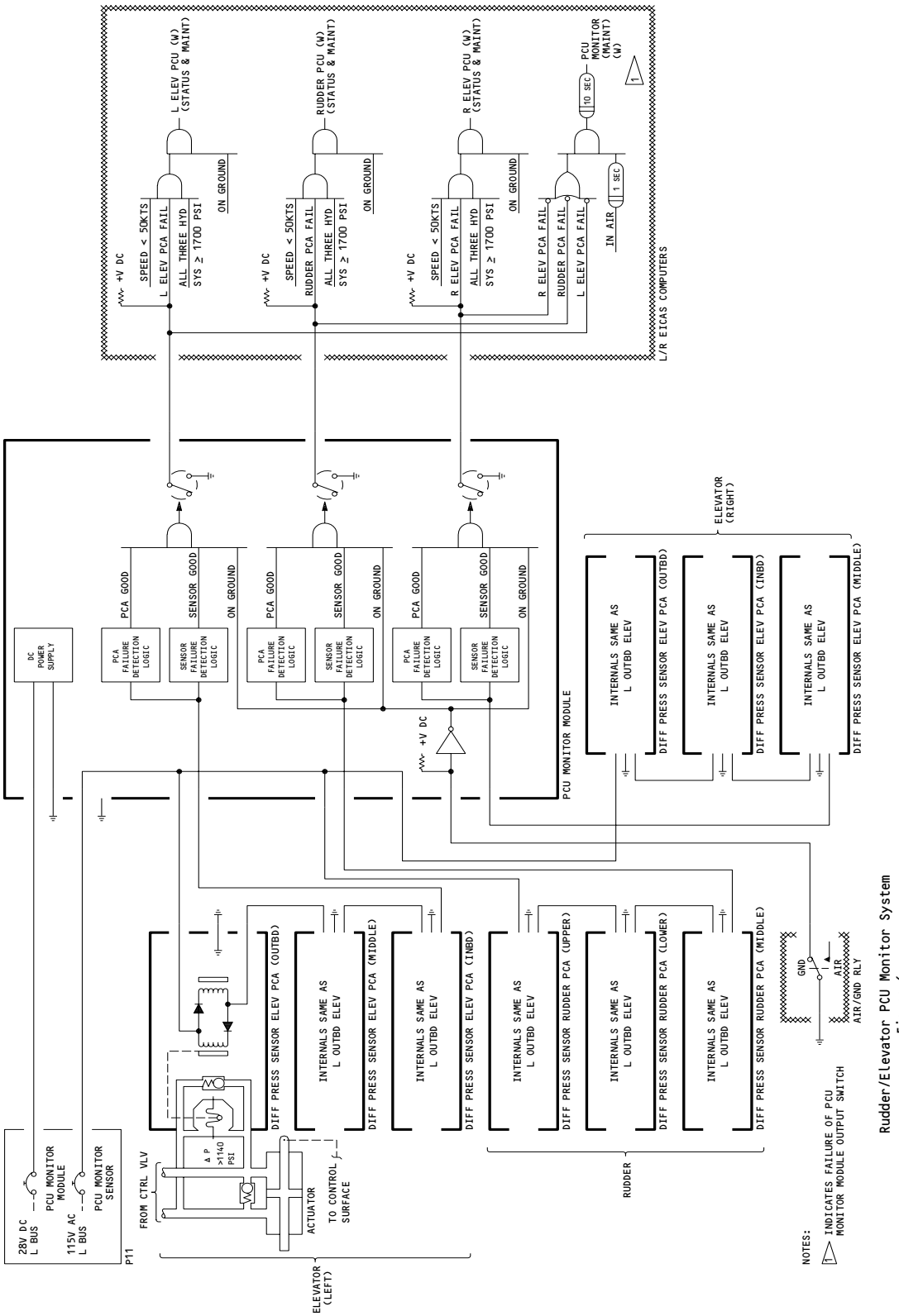
(a) With electrical power provided, FLT CONTROL SHUTOFF switch ON, the amber switch light is not on, and the valve opens. When the switch is placed to OFF, the amber switch light comes on and the valve closes. An L, C, or R FLT CONT HYD EICAS message appears.



Rudder and Elevator PCA Monitor Module Installation
Figure 4

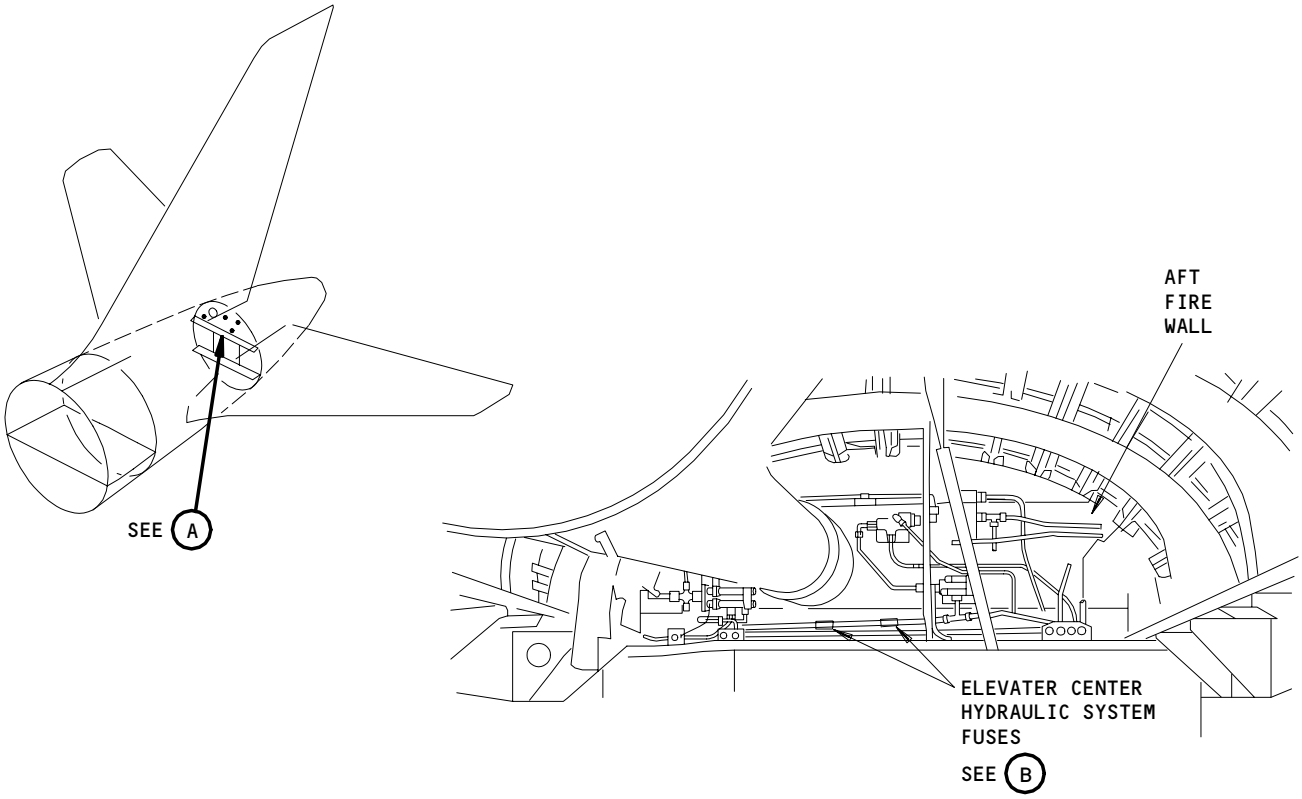


Power Control Actuator Monitor Sensors
Figure 5

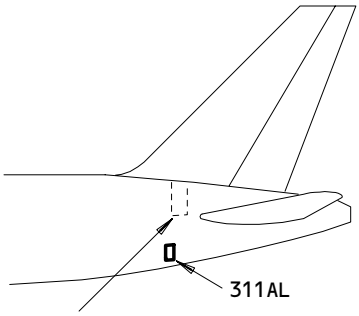


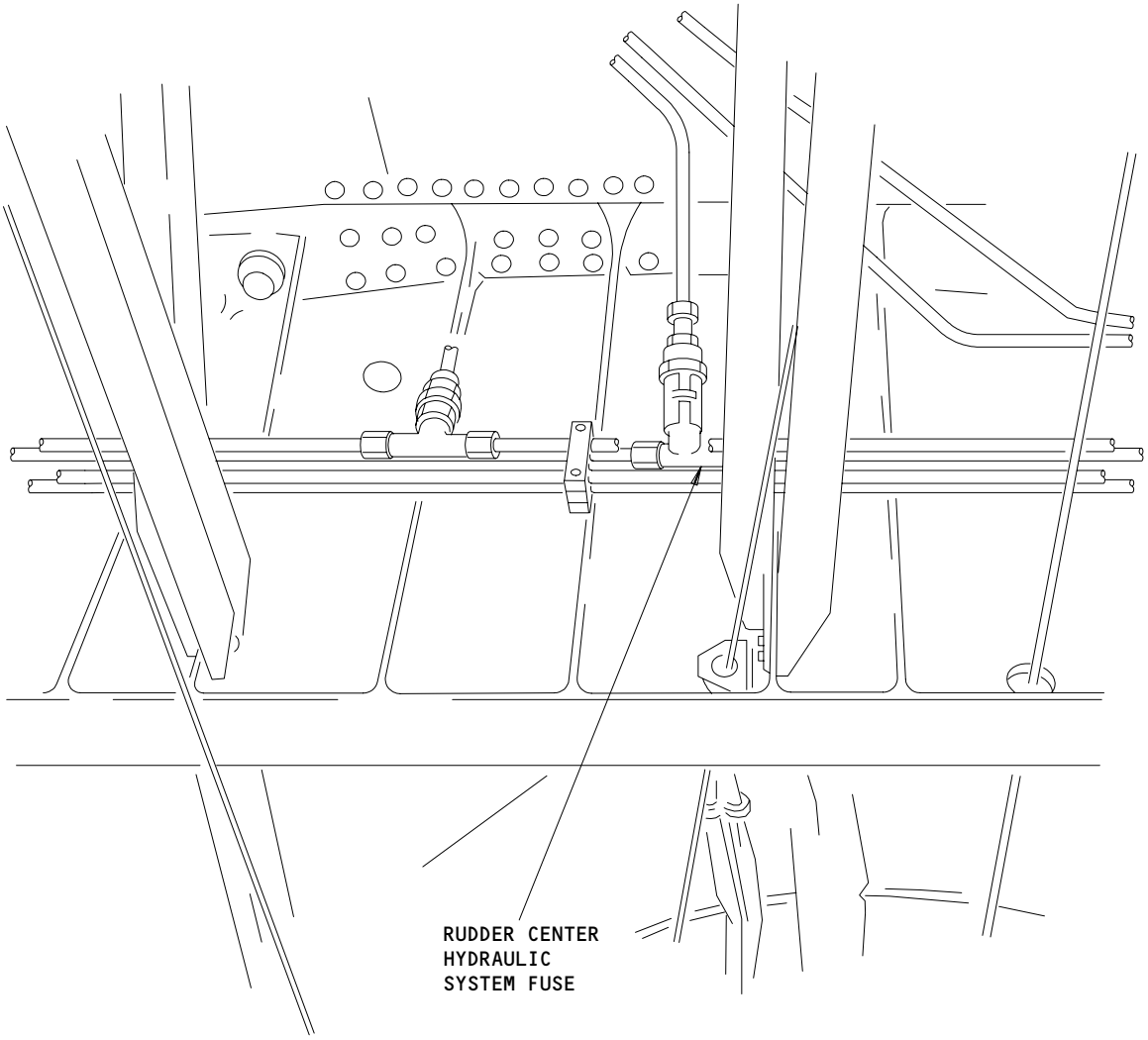
Rudder/Elevator PCU Monitor System
Figure 6

155795



Elevator and Rudder Center Hydraulic System Fuses
Figure 7 (Sheet 1)





C

Elevator and Rudder Center Hydraulic System Fuses
Figure 7 (Sheet 2)

(b) As the valve reaches the open or closed position, internal limit switches open the motor circuit and de-energize the motor.

(c) There are no return lines for the valves; the isolated system has residual pressure of 3000 psig.

(2) Rudder/Elevator Power Control Actuator Monitor System

(a) The PCA monitor senses a hydraulic pressure differential across the PCA cylinder that exceeds 1140-1350 psi. If this occurs, the monitor sends a voltage discrete output to the PCA module. The discrete output continues until the pressure differential decreases below 900 psi.

(b) The PCA monitor module requires that the monitor's discrete output be present for 190-240 milliseconds before sending a failure signal to the EICAS computers. This eliminates false alarms caused by temporary pressure increases. The module detects faults with the following conditions: airplane on the ground with airspeed less than 50 KIAS and all hydraulic systems on. The module also detects open circuit and short to ground failures of sensor and sensor wiring.

(3) Rudder and Elevator Center Hydraulic System Fuses

(a) The rudder and elevator center hydraulic system fuses operate by spring-action. The fuses close when the pressure drop across the fuse increases due to an increased flow from a failed component or line rupture downstream. The fuse automatically resets by its spring-action once the pressure on both sides of the fuse is equal.

(b) These fuses incorporate a time delay to regulate the spring-action closure of fuse. This prevents inadvertent setting of the fuses due to pressure surges that occur when the hydraulic system is first pressurized.

RUDDER AND ELEVATOR HYDRAULIC SYSTEMS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKER	1		FLT COMPT, OVERHEAD PANEL (P11)	
AIR/GND SYS 1, C1182		1	11S15	*
AIR/GND SYS 2, C1170		1	11S19	*
FLT CONT SHUTOFF TAIL CTR, C4035		1	11H18	*
FLT CONT SHUTOFF TAIL LEFT, C4033		1	11H17	*
FLT CONT SHUTOFF TAIL RIGHT, C4034		1	11H28	*
LANDING GEAR POS SYS 1, C1175		1	11C30	*
PCU MON MOD, C4270		1	11J11	*
PCU MON SENSOR, C4283		1	11J10	*
POS SYS 2, C4279		1	11S23	*
COMPUTER - (REF 31-41-00, FIG. 101)				
L EICAS, M10181				
R EICAS, M10182				
FUSE - ELEVATOR CENTER HYDRAULIC SYSTEM	4	2	313AL, AFT FUSELAGE	*
FUSE - RUDDER CENTER HYDRAULIC SYSTEM	5	1	311AL, AFT FUSELAGE	*
MODULE - PCU MONITOR, M10481	1	1	119BL, MAIN EQUIP CTR, P50	27-23-02
PANEL - (REF 24-22-00, FIG. 101)				
GENERATOR FIELD AND HYDRAULIC CONTROL, M10191				
RELAY - (REF 32-09-00, FIG. 101)				
AIR/GND SYS 1, K199				
AIR/GND SYS 1, K10107				
AIR/GND SYS 1, K10388				
AIR/GND SYS 2, K203				
SENSOR - L ELEVATOR CENTER PCA PRESSURE DIFFERENTIAL, TS5208		1	335DB	27-31-05
SENSOR - L ELEVATOR INBOARD PCA PRESSURE DIFFERENTIAL, TS5207		1	335DB	27-31-05
SENSOR - L ELEVATOR OUTBOARD PCA PRESSURE DIFFERENTIAL, TS5206		1	335DB	27-31-05
SENSOR - LOWER RUDDER PCA PRESSURE DIFFERENTIAL, TS5204		1	324CL	27-21-20
SENSOR - MIDDLE RUDDER PCA PRESSURE DIFFERENTIAL, TS5205		1	324CL	27-21-20

* SEE THE WDM EQUIPMENT LIST

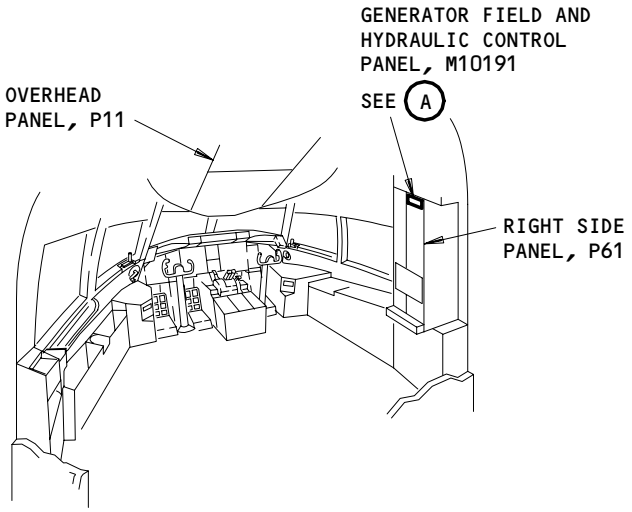
Rudder and Elevator Hydraulic Systems - Component Index
Figure 101 (Sheet 1)

599023

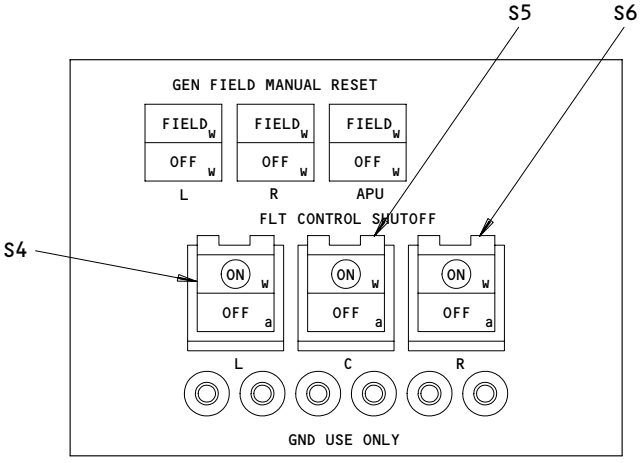
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SENSOR - R ELEVATOR CENTER PCA PRESSURE DIFFERENTIAL, TS5202		1	345DB	27-31-05
SENSOR - R ELEVATOR INBOARD PCA PRESSURE DIFFERENTIAL, TS5201		1	345DB	27-31-05
SENSOR - R ELEVATOR OUTBOARD PCA PRESSURE DIFFERENTIAL, TS5200		1	345DB	27-31-05
SENSOR - UPPER RUDDER PCA PRESSURE DIFFERENTIAL, TS5203		1	324CL	27-21-20
SWITCH - FLT CONTROL SHUTOFF C, S5	1	1	FLT COMPT, RIGHT SIDE PANEL (P61), GEN FIELD & HYD CONT PANEL M10191	*
SWITCH - FLT CONTROL SHUTOFF L, S4	1	1	FLT COMPT, RIGHT SIDE PANEL (P61), GEN FIELD & HYD CONT PANEL M10191	*
SWITCH - FLT CONTROL SHUTOFF R, S6	1	1	FLT COMPT, RIGHT SIDE PANEL (P61), GEN FIELD & HYD CONT PANEL M10191	*
VALVE - C SYSTEM RUDDER/ELEVATOR HYDRAULIC SHUTOFF, V102	2	1	LEFT MAIN GEAR WHEEL WELL, AFT BULKHEAD	27-23-01
VALVE - L SYSTEM RUDDER/ELEVATOR HYDRAULIC SHUTOFF, V103	2	1	LEFT MAIN GEAR WHEEL WELL, AFT BULKHEAD	27-23-01
VALVE - R SYSTEM RUDDER/ELEVATOR HYDRAULIC SHUTOFF, V101	2	1	RIGHT MAIN GEAR WHEEL WELL, AFT BULKHEAD	27-23-01

* SEE THE WDM EQUIPMENT LIST

Rudder and Elevator Hydraulic Systems - Component Index
Figure 101 (Sheet 2)

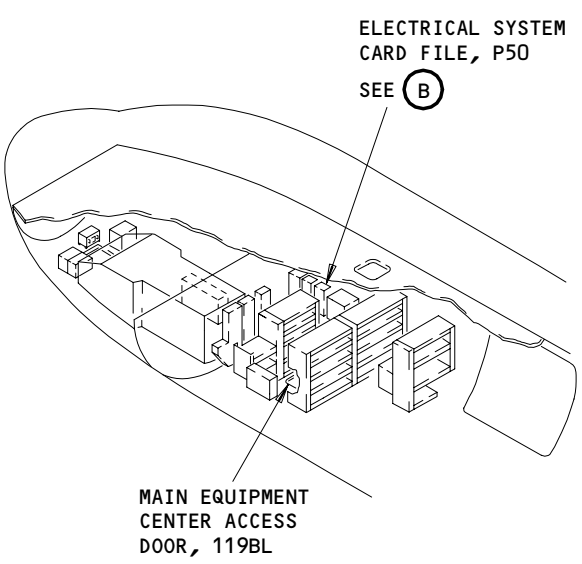


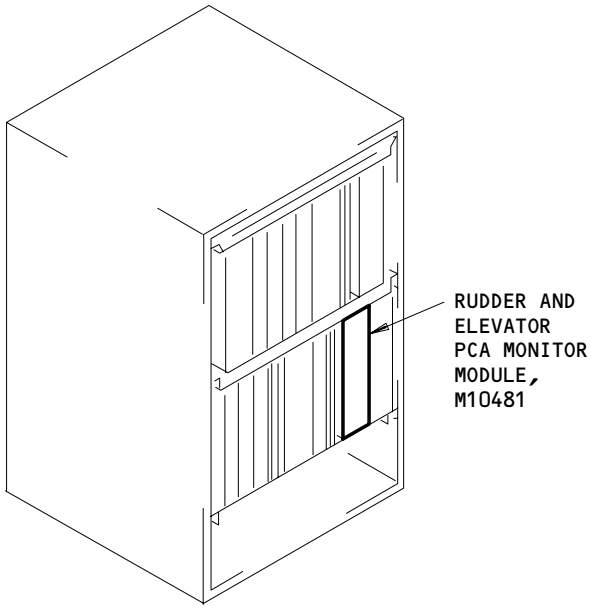
FLIGHT COMPARTMENT



GENERATOR FIELD AND HYDRAULIC
CONTROL PANEL, M10191

A

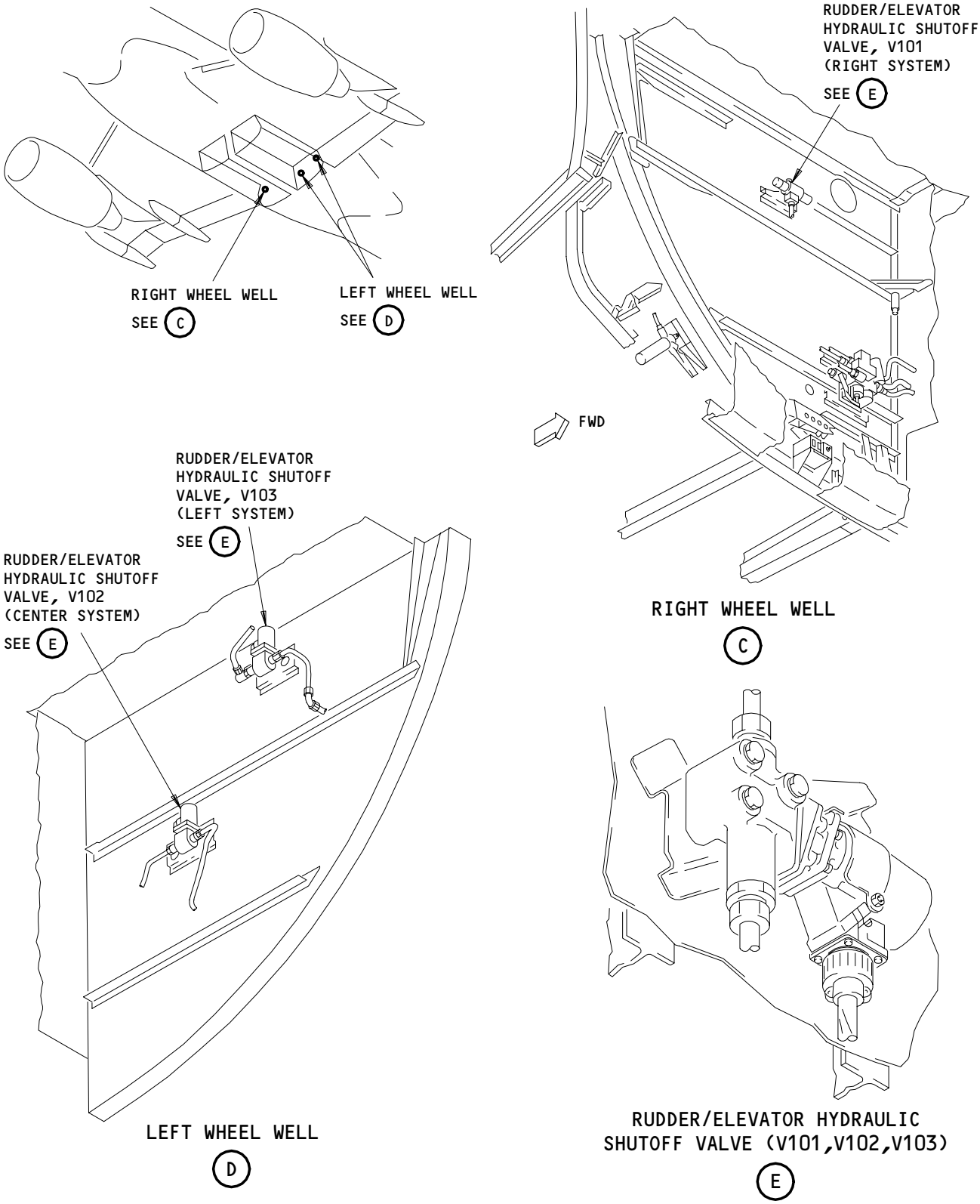




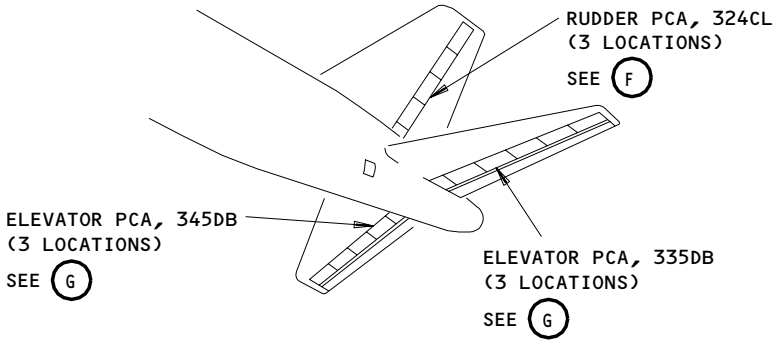
ELECTRIC SYSTEM CARD FILE, P50

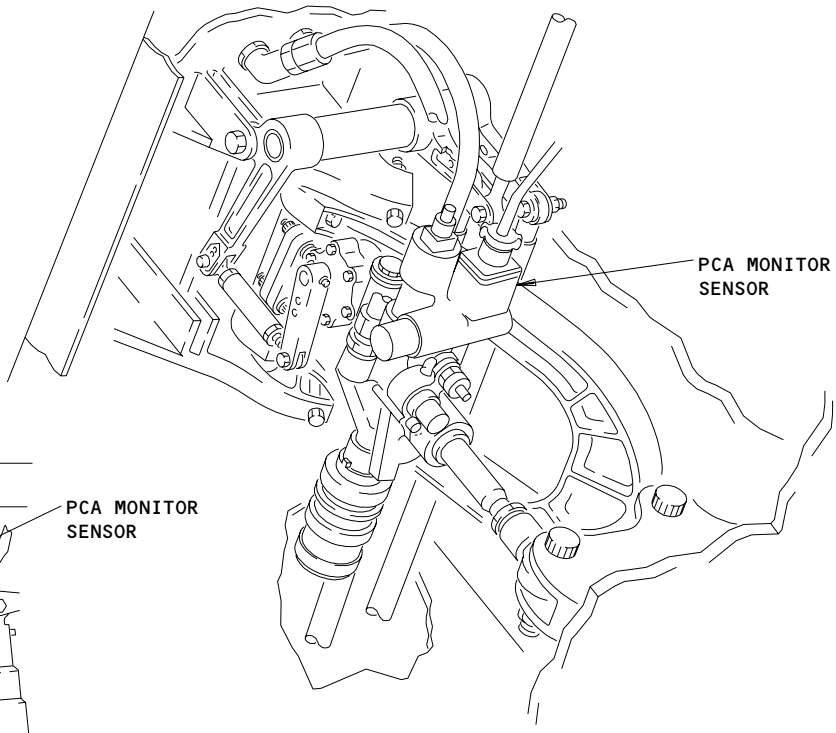
B

Rudder and Elevator Hydraulic Systems - Component Location
Figure 102 (Sheet 1)

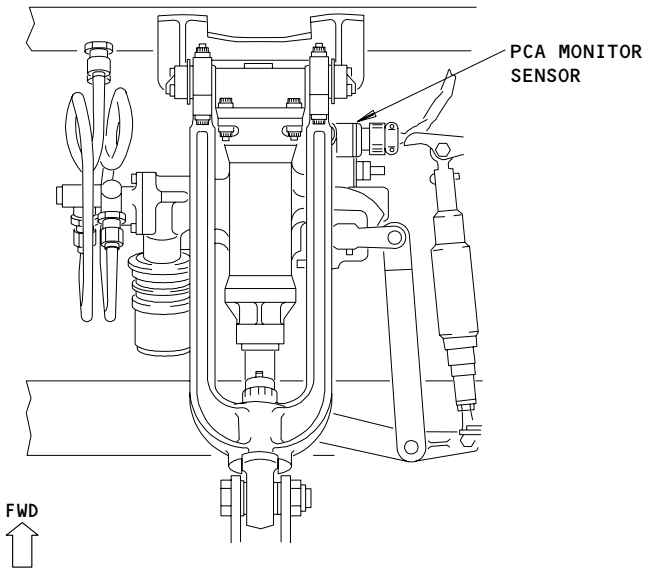


Rudder and Elevator Hydraulic Systems - Component Location
Figure 102 (Sheet 2)



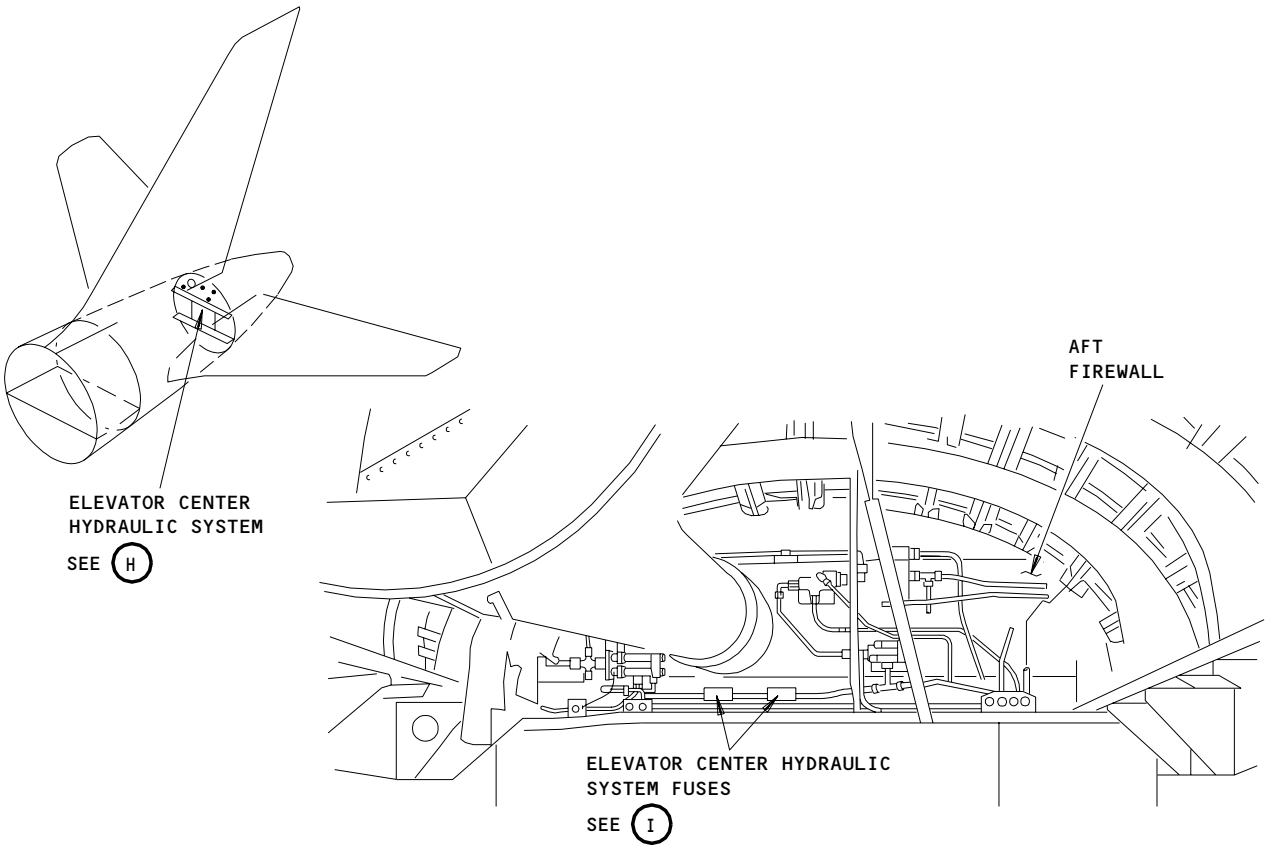


RUDDER PCA
(3 LOCATIONS)
F



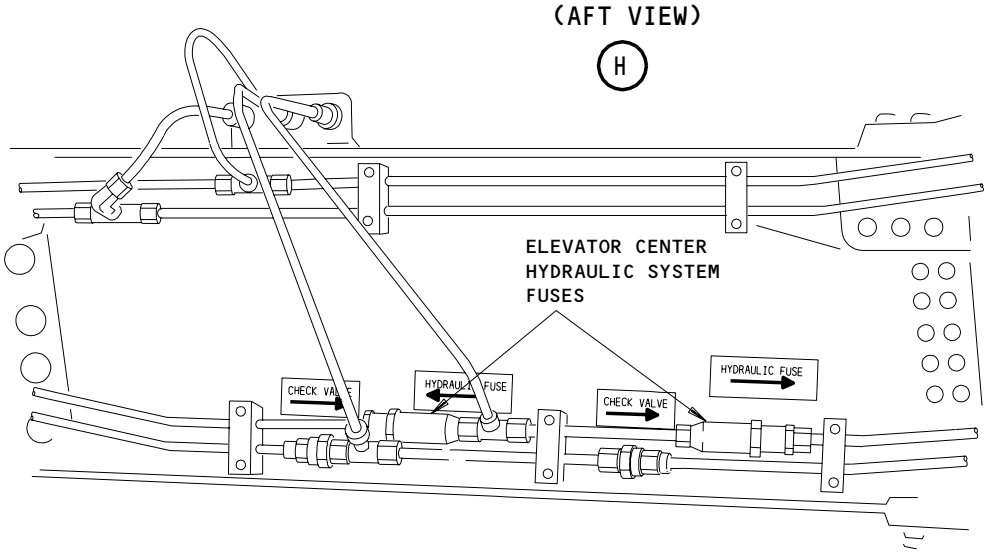
ELEVATOR PCA
(6 LOCATIONS)
G

Rudder and Elevator Hydraulic Systems – Component Location
Figure 102 (Sheet 3)



ELEVATOR CENTER HYDRAULIC SYSTEM
(AFT VIEW)

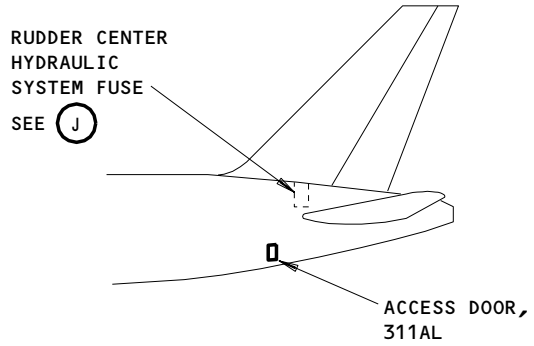
H

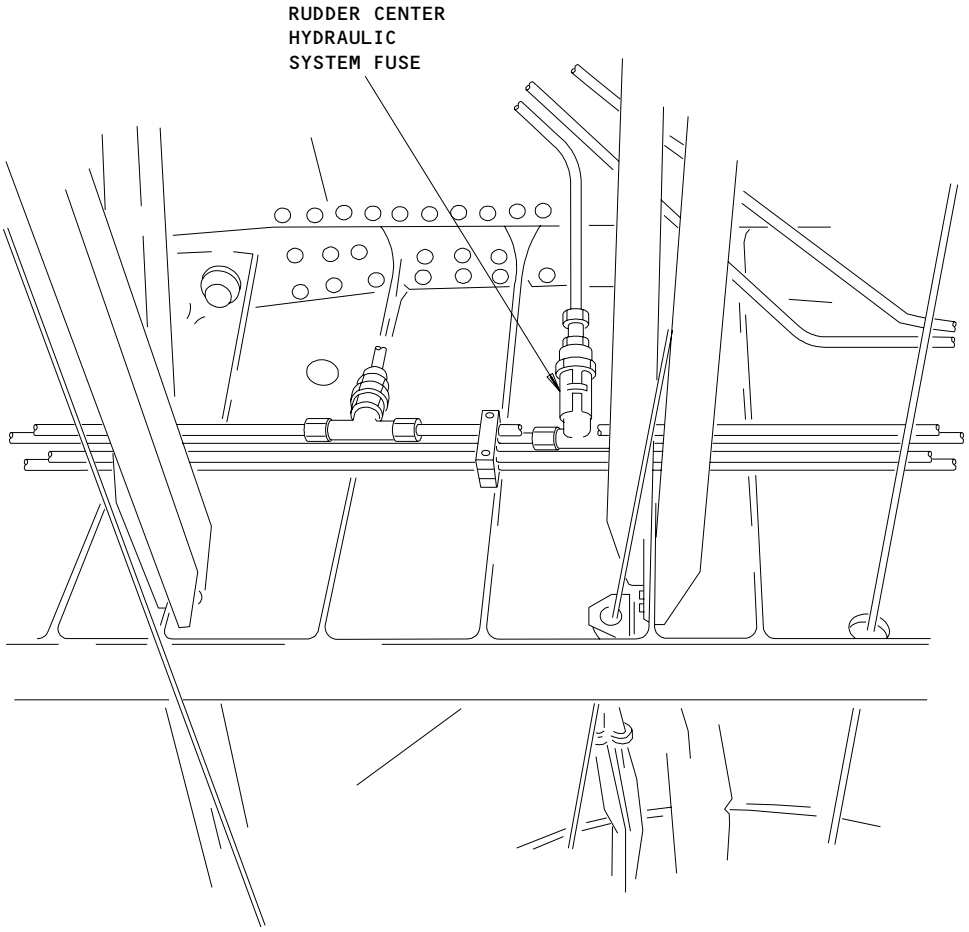


ELEVATOR CENTER HYDRAULIC
SYSTEM FUSES

I

Rudder and Elevator Hydraulic Systems – Component Location
Figure 102 (Sheet 4)





RUDDER CENTER HYDRAULIC SYSTEM FUSE
J

Rudder and Elevator Hydrualic Systems – Component Location
Figure 102 (Sheet 5)

RUDDER AND ELEVATOR HYDRAULIC SYSTEMS - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task is a system test for the rudder/elevator shutoff valves. The second task is a system test for the PCA monitor system.

TASK 27-23-00-735-001

2. Rudder/Elevator Shutoff Valves - System Test
   A. Equipment
      (1) Nose Gear Towing Lever Lockpin - A09003-1
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          730/740 Main Landing Gear and Doors

   D. Prepare for the Test

      S 865-002
      (1) Supply electrical power (Ref 24-22-00).

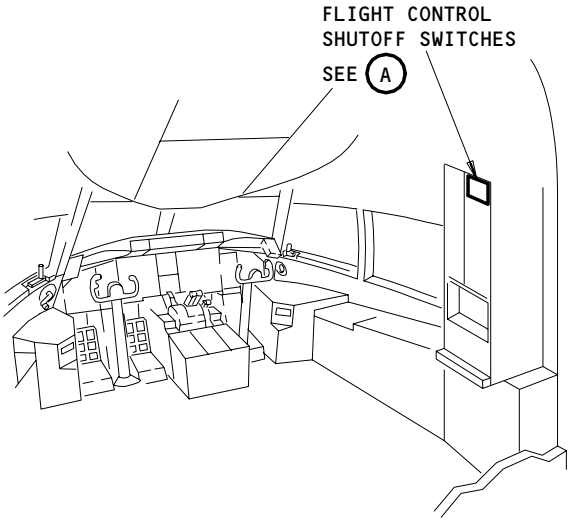
      S 495-003
      (2) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 502).

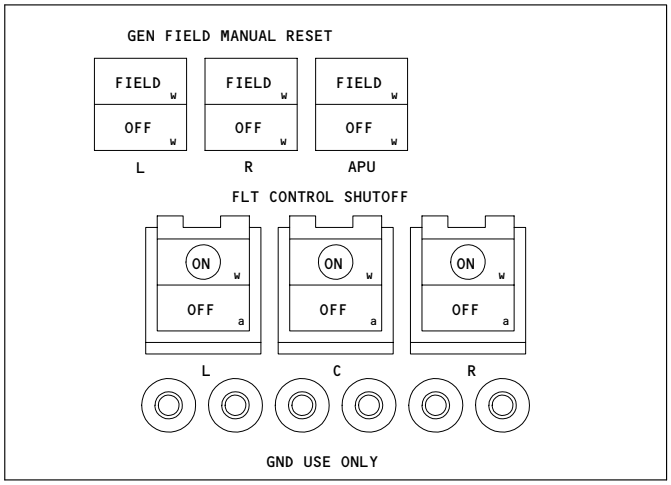
      S 215-043
      (3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 495-005

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

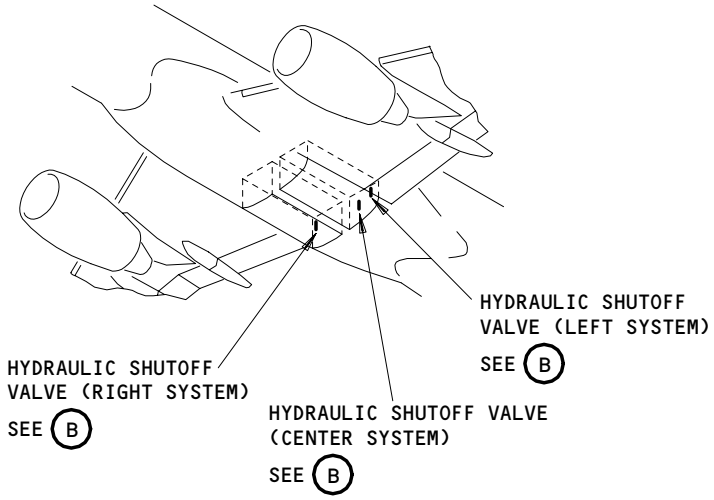
      (4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

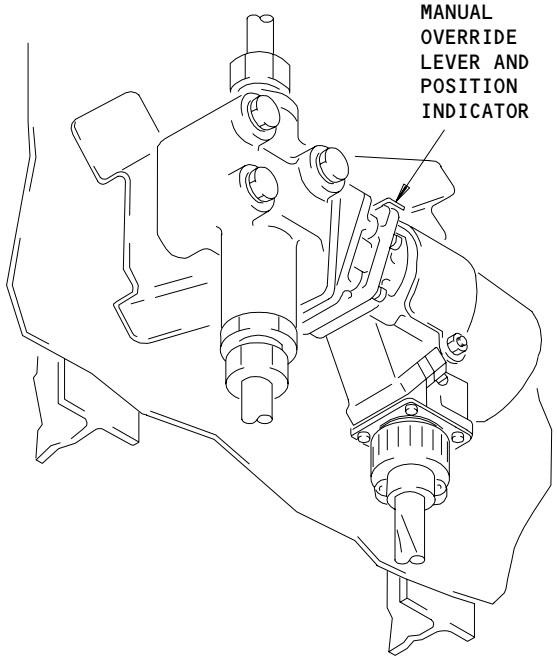




FLIGHT CONTROL SHUTOFF SWITCHES

A





HYDRAULIC SHUTOFF VALVE

B

Rudder and Elevator Shutoff Valve Test
Figure 501

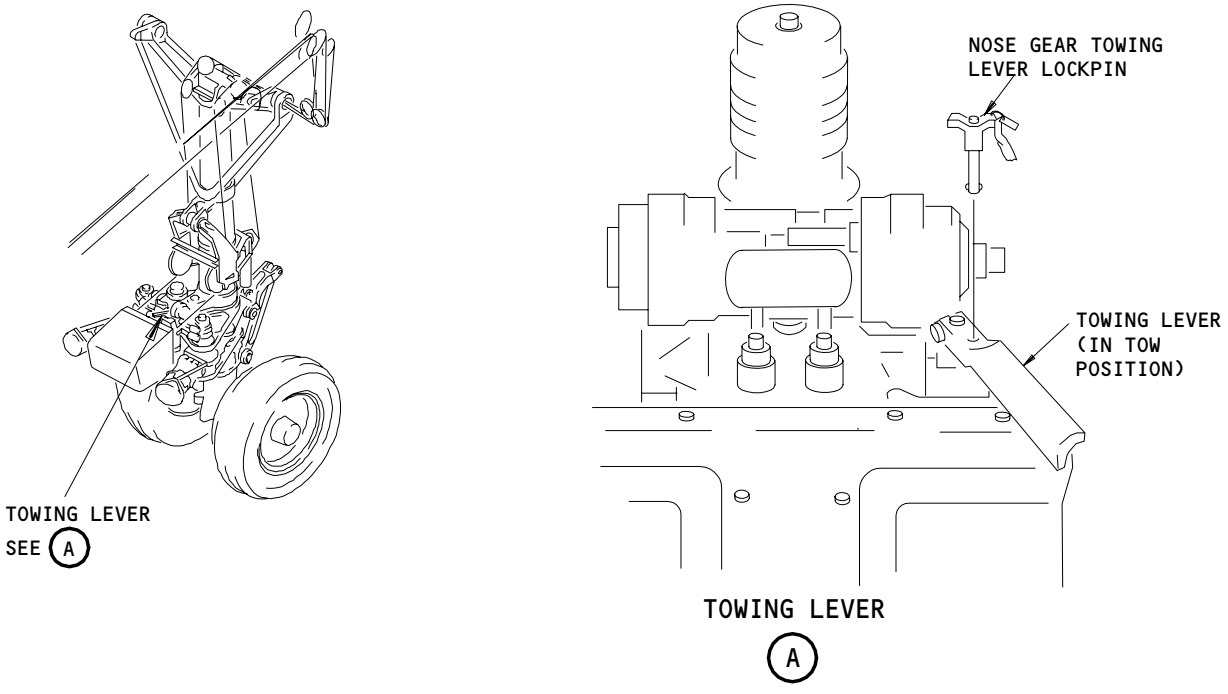
S 865-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

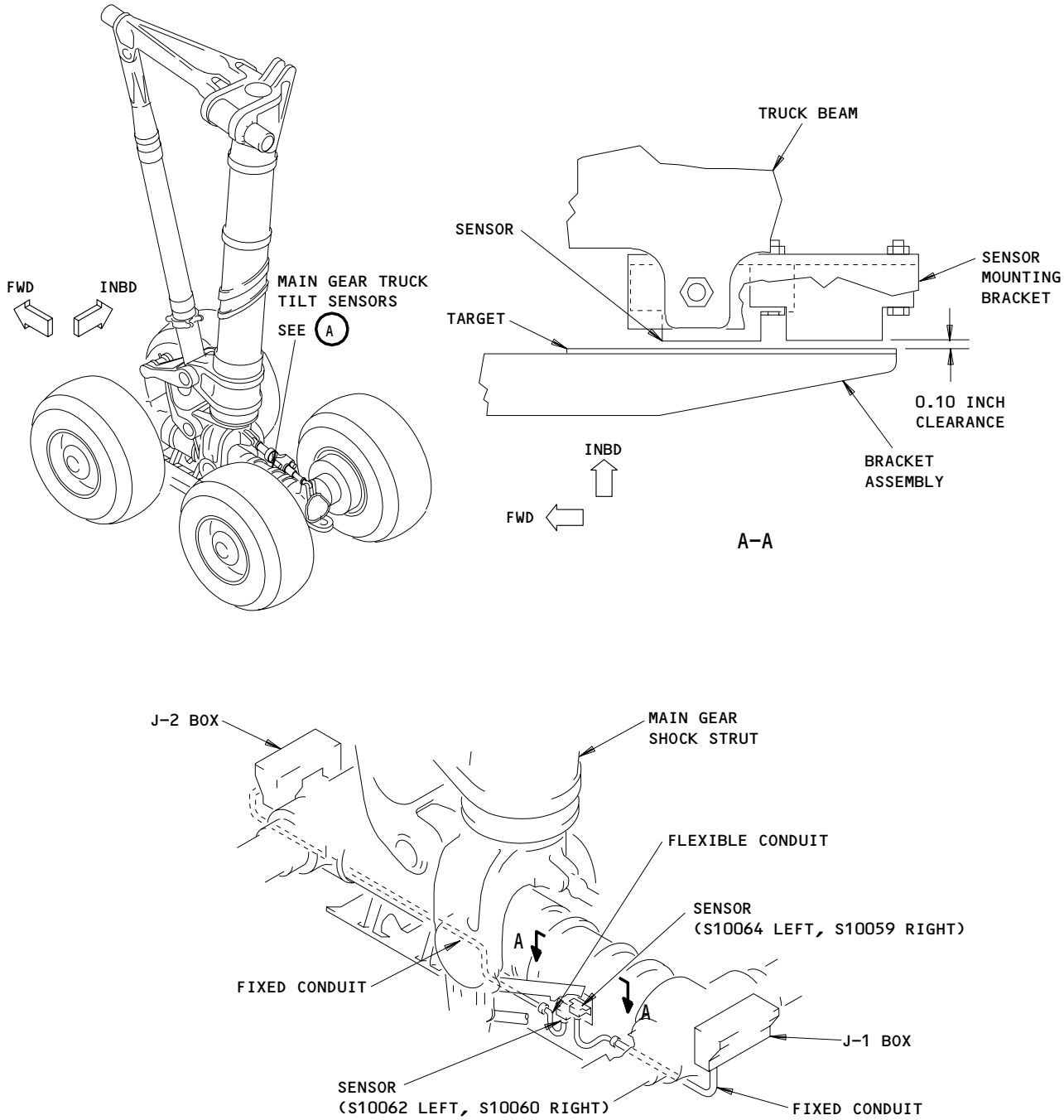
(5) Supply pressure to the applicable hydraulic system (Ref 29-11-00).

NOTE: The shutoff valve for the right hydraulic system is located in the wheel well for the right main gear.

The shutoff valves for the center and left systems are located in the wheel well for the left main gear.



Nose Gear Steering Isolation
Figure 502



MAIN GEAR TRUCK TILT SENSORS
(LEFT GEAR SHOWN, RIGHT GEAR OPPOSITE)
A

Main Gear Truck Tilt Sensor – PCA Monitor Test
Figure 503

S 865-007

(6) Move the FLT CONTROL SHUTOFF switches on the right side panel, P61, for the other two hydraulic systems to OFF. Attach DO-NOT-OPERATE tags and make sure the switch position lights come ON. The EICAS message FLT CONT VAL should appear.

S 865-008

(7) Open two of these circuit breakers (for the other two hydraulic systems) on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
  (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
  (b) 11H18, FLT CONT SHUTOFF TAIL CTR
  (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 215-009

(8) Make sure these circuit breakers on the P11 panel are closed:
  (a) EICAS (6 locations)

E. Rudder/Elevator Shutoff Valves - Test (Fig. 501)

S 865-010

(1) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 215-011

(2) Move the rudder pedals and the control column through their full travel range and do these checks:
  (a) Make sure the rudder operates smoothly through its full travel range.
  (b) Make sure the elevators move smoothly through their full travel range.

S 215-012

(3) Move the FLT CONTROL SHUTOFF switch for the applicable hydraulic system to OFF and do these checks:
  (a) Make sure the valve motor operates smoothly and stops in its closed position.

(b) Make sure the manual override lever and position indicator (located between the valve and the motor) is in its closed position (POS 2).
(c) Make sure the switch position light on the P61 panel is ON.
(d) Make sure the correct FLT CONT VAL message comes into view on EICAS.

S 215-044
(4) Move the rudder pedals and the control column through their full travel range and do these checks:
(a) Make sure the rudder does not move.

NOTE: The remaining hydraulic pressure can cause the rudder to move a small distance.

(b) Make sure the elevators do not move.

NOTE: The remaining hydraulic pressure can cause the elevators to move a small distance.

S 215-013
(5) Move the FLT CONTROL SHUTOFF switch for the applicable hydraulic system to ON and do these checks:
(a) Make sure the valve motor operates smoothly and stops in the open position.
(b) Make sure the manual override lever and position indicator is in its open position (POS 1).
(c) Make sure the switch position light is OFF.

S 865-014
(6) Remove the power from the applicable hydraulic system (Ref 29-11-00).

S 735-015
(7) Do the test procedure again for the other two hydraulic shutoff valves.

F. Put the Airplane Back to Its Usual Condition

S 095-016

WARNING: USE THE PROCEDURE TO AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 095-018

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear.

S 215-019

(3) Make sure these circuit breakers on the P11 panel are closed:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 865-020

(4) Move the FLT CONTROL SHUTOFF switches L, C, and R on the P61 panel to ON.

S 865-021

(5) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-23-00-735-022

3. Rudder and Elevator PCA Monitoring - System Test

A. Equipment
(1) Nose Gear Towing Lever Lockpin - A09003-1

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-61-00/201, Spoiler/Speedbrake Control System
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-09-02/201, Air/Ground Relays

C. Access
(1) Location Zones
211/212 Control Cabin

D. Prepare for the Test

S 865-023
(1) Supply electrical power (Ref 24-22-00).

S 865-049
(2) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 502).

S 865-024

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00).

E. Rudder and Elevator PCA Monitoring System - Test (Fig. 503)

S 865-048
(1) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch on the right side panel, P61, and do this check:
1) Make sure the ECS/MSG format comes into view.
(b) Push the AUTO - EVENT READ switch and do this check:
1) Make sure the AUTO EVENT display comes into view at the bottom of the page.
(c) Push the ERASE switch for 3 seconds.

S 215-047
(2) Examine the PAGE display. If the display shows more messages, do the above step again.

NOTE: Continue the erase procedure until the page display goes blank or shows "PAGE 1".

S 215-026

(3) Push the ECS/MSG switch on the P61 panel and do this check:
  (a) Make sure the PCU MONITOR message does not come into view on the bottom EICAS display.

S 045-027

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 045-028

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF THE PROCEDURE IS NOT DONE CORRECTLY, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Do the Flight Mode Simulation procedure for the No. 1 and No. 2 air/ground systems (Ref 32-09-02).

S 095-029

(6) Remove the deactuator from the SYS 1 RIGHT TRUCK NOT TILTED proximity switch sensor S10060 (Ref 32-09-02).

S 215-030

(7) Stop for 10 seconds, then do this check:
  (a) Make sure the PCU MONITOR message comes into view on the bottom EICAS display.

S 095-031

(8) Remove the remaining deactuators from the sensors (Ref 32-09-02).

NOTE: The No. 1 and 2 air/ground system relays will be in the ground mode.

S 825-032
(9) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the ECS/MSG format comes into view.
(b) Push the AUTO - EVENT READ switch and do this check:
1) Make sure the AUTO EVENT display comes into view at the bottom of the page.
(c) Push the ERASE switch for 3 seconds.

S 215-033
(10) Make sure the PCU MONITOR, L ELEV PCU, R ELEV PCU, and the RUDDER PCU messages do not come into view on the bottom EICAS display.

S 865-051
(11) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J10, PCU MON SENSOR

S 215-034
(12) Push the STATUS switch on the display select panel, P9, and do this check:
(a) Make sure the L ELEV PLU, R ELEV PCU, and RUDDER PCU messages come into view on the bottom EICAS display.

S 865-035
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J10, PCU MON SENSOR

S 825-036
(14) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the ECS/MSG format comes into view.
(b) Push the AUTO - EVENT READ switch and do this check:
1) Make sure the AUTO EVENT display comes into view at the bottom of the page.
(c) Push the ERASE switch for 3 seconds.

S 215-037
(15) Make sure the L ELEV PCU, R ELEV PCU, and RUDDER PCU messages can not be seen on the bottom EICAS display.

S 865-038
(16) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11J11, PCU MON MOD

S 215-045
(17) Make sure the L ELEV PCU, R ELEV PCU, and RUDDER PCU messages come into view on the bottom EICAS display.

S 865-046
(18) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J11, PCU MON MOD

S 825-052
(19) Do these steps to erase the EICAS memory:
(a) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the ECS/MSG format comes into view.
(b) Push the AUTO - EVENT READ switch and do this check:
1) Make sure the AUTO EVENT display comes into view at the bottom of the page.
(c) Push the ERASE switch for 3 seconds.

F. Put the Airplane Back to Its Usual Condition

S 095-039

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 502).

S 865-040
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-041
(3) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER AND ELEVATOR HYDRAULIC SHUTOFF VALVES - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation tasks for the rudder and elevator hydraulic shutoff valves.

TASK 27-23-01-022-003

2. Rudder and Elevator Hydraulic Shutoff Valves - Removal
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zone
          730/740 Main Landing Gear and Doors

   C. Prepare for the Removal

      S 862-004
      (1) Supply electrical power (Ref 24-22-00).

      S 862-005
      (2) Remove the pressure from the hydraulic system that supplies the valve you will remove (Ref 29-11-00).

      S 862-006
      (3) Move the FLT CONTROL SHUTOFF switches L, R, and C on the right side panel, P61, to OFF. Attach DO-NOT OPERATE tags and make sure the switch position lights come on.

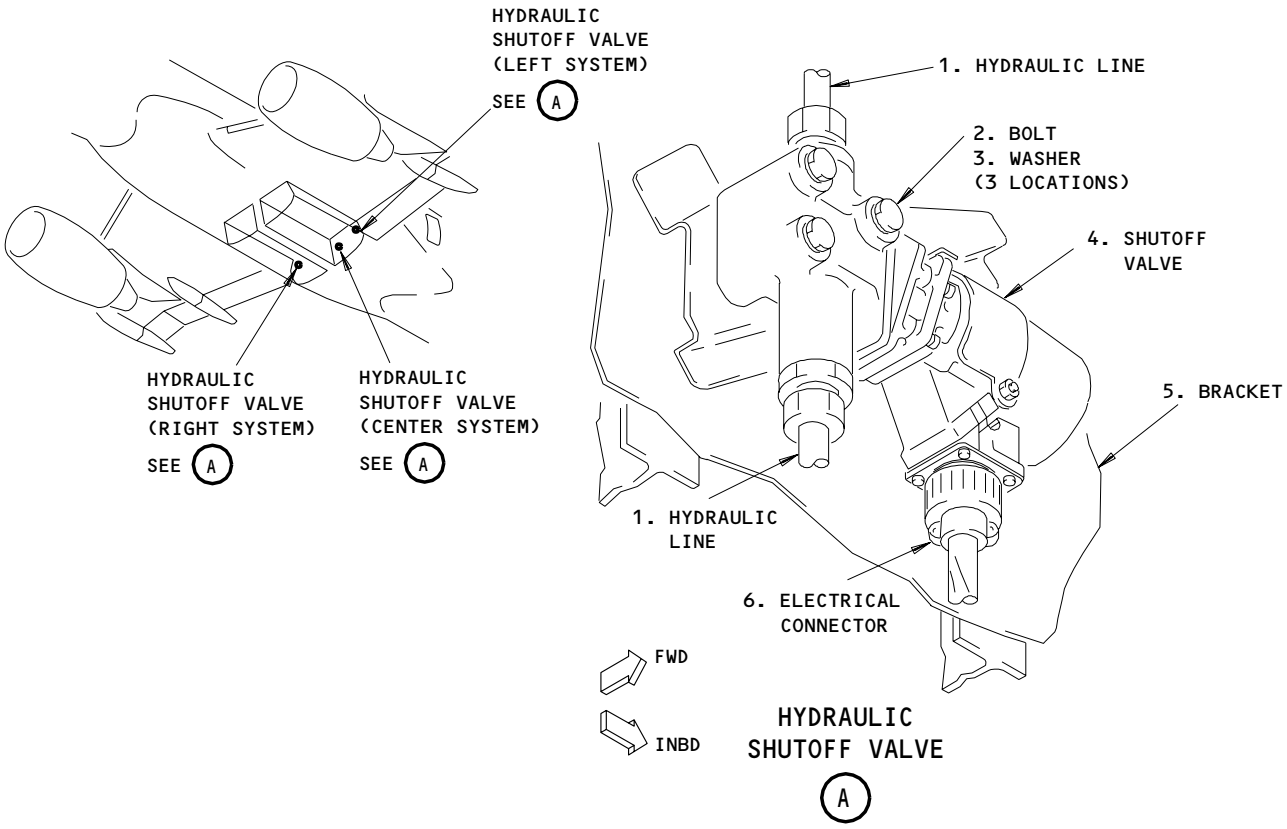
      S 862-007
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

      S 862-008
      (5) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 492-001

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (6) Open the doors for the landing gear and install the door locks (Ref 32-00-15).



Rudder and Elevator Shutoff Valves
Figure 201

D. Remove the Rudder and Elevator Hydraulic Shutoff Valves (Fig. 201)

S 032-009
(1) Disconnect the electrical connector (6) from the shutoff valve (4).

NOTE: The shutoff valve for the right hydraulic system is found in the wheel well for the right main gear.

The shutoff valves for the center and left hydraulic systems are found in the wheel well for the left main gear.

S 032-010
(2) Disconnect the hydraulic lines (1) from the valve and do this step:
(a) Seal the hydraulic lines and the valve ports with a cap.

S 032-011
(3) Remove the bolts (2) that connect the shutoff valve to its bracket (5) (3 locations).

S 022-012
(4) Remove the shutoff valve (4).

TASK 27-23-01-422-013

3. Rudder and Elevator Hydraulic Shutoff Valves - Installation

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
	4	Shutoff Valve		01 02 03	10 10 20

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-23-00/501, Rudder and Elevator Hydraulic Systems
(3) 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zone
730/740 Main Landing Gear and Doors

D. Install the Rudder and Elevator Hydraulic Shutoff Valve (Fig. 201)

S 422-014

(1) Align the shutoff valve (4) with its connection points and do this step:
   (a) Install the bolts (2) and washers (3) that connect it to the bracket.

S 432-015

(2) Connect these components to the shutoff valve:
   (a) The hydraulic lines (1)
   (b) The electrical connector (6).

S 222-016

(3) Make sure the electrical resistance between the valve and the airplane is not more than 0.0025 ohms.

S 862-017

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (b) 11H18, FLT CONT SHUTOFF TAIL CTR
   (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-018

(5) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF L, R, and C switches on the right side panel, P61, to ON.

S 732-019

(6) Do the system test for the hydraulic shutoff valve (Ref 27-23-00).

S 212-020

(7) Do a check of the hydraulic connections for leaks.

E. Put the Airplane Back to Its Usual Condition

S 092-002

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 862-021

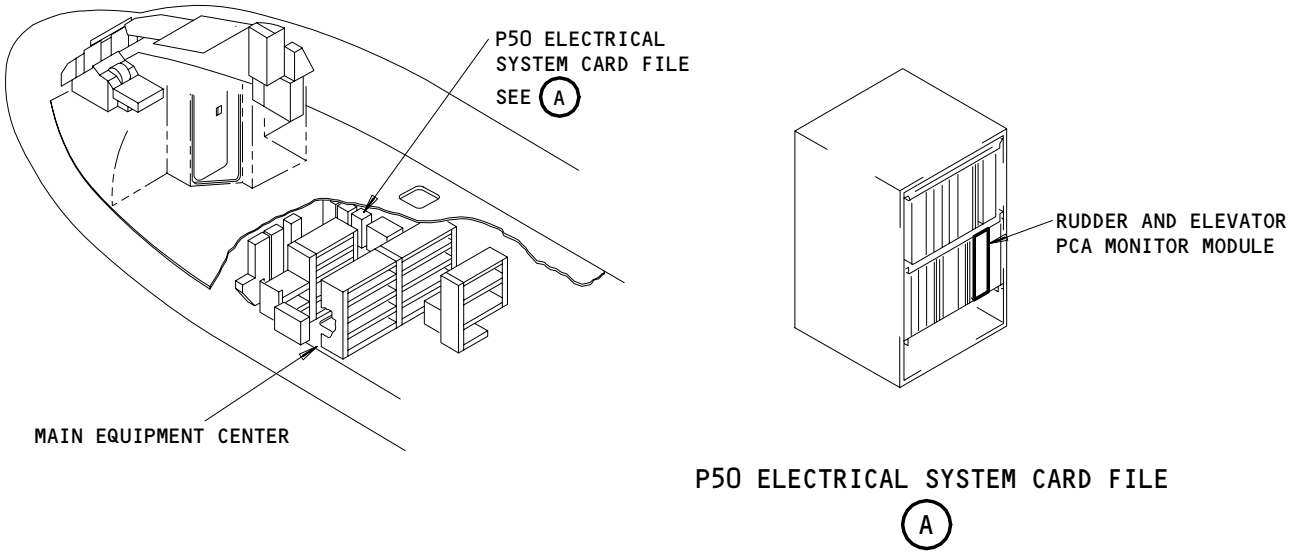
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER AND ELEVATOR PCA MONITOR MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the Rudder/Elevator PCA monitor module.

   TASK 27-23-02-024-005

2. Rudder/Elevator PCA Monitor Module - Removal
   A. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels



Rudder and Elevator PCA Monitor Module Installation
Figure 401

(2) 24-22-00/201, Electrical Power - Control

B. Access

(1) Location Zone

119 Main Equipment Center (Left)

(2) Access Panel

119BL Main Equipment Center

C. Prepare for Removal

S 864-006

(1) Remove electrical power (AMM 24-22-00/201).

S 864-007

(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:

(a) 11J10, PCU MON SENSOR

(b) 11J11, PCU MON MOD

S 014-008

(3) Open access door 119BL (AMM 06-41-00/201).

D. Remove the Rudder/Elevator PCA Monitor Module

S 914-001

CAUTION: DO NOT TOUCH THE PCA MONITOR MODULE BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE PCA MONITOR MODULE.

(1) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 034-010

(2) Open the ELEC SYS CARD FILE access door, P50.

S 024-011
(3) Remove the PCA monitor module.

TASK 27-23-02-424-012

3. Rudder/Elevator PCA Monitor Module - Installation

A. References
(1) 06-41-00/201, Fuselage Access Doors and Panels

B. Access
(1) Location Zone
119 Main Equipment Center (Left)

(2) Access Panel
119BL Main Equipment Center

C. Install the PCA Monitor Module

S 864-002
(1) Make sure these circuit breakers on the overhead panel, P11, are open:
(a) 11J10, PCU MON SENSOR
(b) 11J11, PCU MON MOD

S 914-003

CAUTION: DO NOT TOUCH THE PCA MONITOR MODULE BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE PCA MONITOR MODULE.

(2) Do the procedure for devices that are sensitive to electrostatic discharge (AMM 20-41-01/201).

S 424-013
(3) Install the PCA monitor module.

S 434-014
(4) Close the ELEC SYS CARD FILE access door, P50.

S 734-017
(5) Do the System Test of the Rudder and Elevator PCA Monitoring (AMM 27-23-00/501)

D. Put the Airplane Back to Its Usual Condition

S 414-015
(1) Close access door 119BL (AMM 06-41-00/201).

S 864-004
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11J10, PCU MON SENSOR
(b) 11J11, PCU MON MOD

RUDDER AND ELEVATOR HYDRAULIC FUSE - MAINTENANCE PRACTICES

1. General
   A. This procedure contains four tasks. The first task removes the rudder hydraulic fuse. The second task installs the rudder hydraulic fuse. The third task removes the elevator hydraulic fuse. The fourth task installs the elevator hydraulic fuse.

TASK 27-23-51-022-001

2. Remove the Rudder Hydraulic Fuse
   A. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panels
          311AL Rudder Hydraulic Fuse

   C. Prepare for the Removal

      S 862-002
      (1) Remove the pressure from the center hydraulic system and its reservoir (Ref 29-11-00/201).

      S 012-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (2) Open the access door, 311AL (AMM 06-42-00/201, AMM 52-48-07/401).
   D. Remove the Fuse

      S 032-004
      (1) Remove the clamps from the hydraulic lines to let the lines move during the fuse removal.

      S 022-005
      (2) Remove the fuse from the hydraulic lines and do this step:
          (a) Put a cap on the hydraulic lines.

TASK 27-23-51-402-006

3. Install the Rudder Hydraulic Fuse
   A. Consumable Materials
      (1) D00153 Hydraulic Fluid - BMS 3-11

B. References
(1) 06-42-00/201, Eppennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right and Center)Hydraulic Systems

C. Access
(1) Location Zones
211/212 Control Cabin
312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Rudder Hydraulic Fuse

D. Install the Fuse

S 022-007
(1) Remove the caps from the hydraulic lines.

S 642-008
(2) Apply a thin layer of hydraulic fluid to the fittings before installation.

S 432-009
(3) Make sure the fuse direction is correct and connect the fuse to the hydraulic lines at each end.

S 432-010
(4) Install the clamps for the hydraulic line.

E. Test the Fuse

S 862-011
(1) Supply electrical power (Ref 24-22-00/201).

S 862-012
(2) Make sure these circuit breakers on the overhead panel, P11 are closed:
(a) EICAS (6 locations)
(b) 11K09, LEFT ENG OIL PRESS
(c) 11K35, RIGHT ENG OIL PRESS

S 862-013
(3) Push the STATUS switch on the display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

S 862-014

(4) Make sure these circuit breakers on the overhead panel, P11, are closed:
   (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (b) 11H18, FLT CONT SHUTOFF TAIL CTR
   (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-015

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply pressure to the center hydraulic system (Ref 29-11-00/201).

S 212-016

(6) Make sure the FLT CONTROL SHUTOFF TAIL CENTER switch on the right side panel, P61, is ON.

S 212-018

(7) Operate the rudder pedals through their full travel range ten times and do these checks:
   (a) Make sure the rudder moves through its full travel range.
   (b) Make sure there are no leaks near the hydraulic fuse.
   (c) Make sure the rudder moves correctly with rudder pedal movement.

F. Put the Airplane Back To Its Usual Condition

S 862-019

(1) Put the rudder pedals to their neutral position.

S 862-020

(2) Remove the power from the center hydraulic system (Ref 29-11-00/201).

S 862-021
(3) Remove the electrical power if it is not necessary (Ref 24-22-00/201).

S 412-037
(4) Close the 311AL and any other access door open (AMM 06-42-00/201, AMM 52-48-07/401).

TASK 27-23-51-002-022

4. Elevator Hydraulic Fuses - Removal

A. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems

B. Access
(1) Location Zones

211/212	Control Cabin
312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

311AL	Elevator Hydraulic Fuses
313AL	Elevator Hydraulic Fuses

C. Prepare for the Removal

S 862-023
(1) Remove the pressure from the center hydraulic system and its reservoir (Ref 29-11-00/201).

S 012-024

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the access door, 313AL (AMM 06-42-00/201, AMM 52-48-06/401).

D. Remove the Fuses

S 022-025
(1) Do the steps that follow to remove the fuse:
(a) Remove the clamps from the hydraulic lines to let the lines move during the fuse removal.

(b) Remove the fuses from the hydraulic lines (2 locations).
(c) Put caps on the hydraulic lines.

TASK 27-23-51-402-026

5. Elevator Hydraulic Fuses - Installation

A. Consumable Material
(1) D00153 Hydraulic Fluid - BMS 3-11

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(4) 31-41-00/201, EICAS

C. Access
(1) Location Zones

211/212	Control Cabin
312	Area Aft of Pressure Bulkhead BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

311AL	Elevator Hydraulic Fuses
313AL	Elevator Hydraulic fuses

D. Install the Fuses

S 422-027
(1) Do the steps that follow to install the fuses:
(a) Remove the caps from the hydraulic lines.
(b) Apply a thin layer of hydraulic fluid to the fittings before installation.
(c) Make sure the fuse directions are correct.
(d) Install the fuses to the hydraulic lines (2 locations).
(e) Install the clamps for the hydraulic lines.

E. Test the Elevator Hydraulic Fuse

S 862-028
(1) Suply electrical power (Ref 24-22-00/201).

S 862-029
(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)
(b) 11H18, FLT EONT SHUTOFF TAIL CTR
(c) 11K09, LEFT ENG OIL PRESS
(d) 11K35, RIGHT ENG OIL PRESS

S 862-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the center hydraulic system (Ref 29-11-00/201).

S 712-031

(4) Do these steps to do a test for the hydraulic fuses in the elevator system:
   (a) Make sure the FLT CONTROL SHUTOFF TAIL CENTER switch on the right side panel, P61, is at the ON position.
   (b) Move the control columns through full travel ten times, then let the control columns go to their neutral position.
   (c) Make sure there are no leaks near the hydraulic fuses.
   (d) Make sure the elevators move correctly with the control column movement.

F. Put the Airplane Back to Its Usual Condition

S 862-032

(1) Remove the pressure from the center hydraulic system (Ref 29-11-00/201).

S 862-033

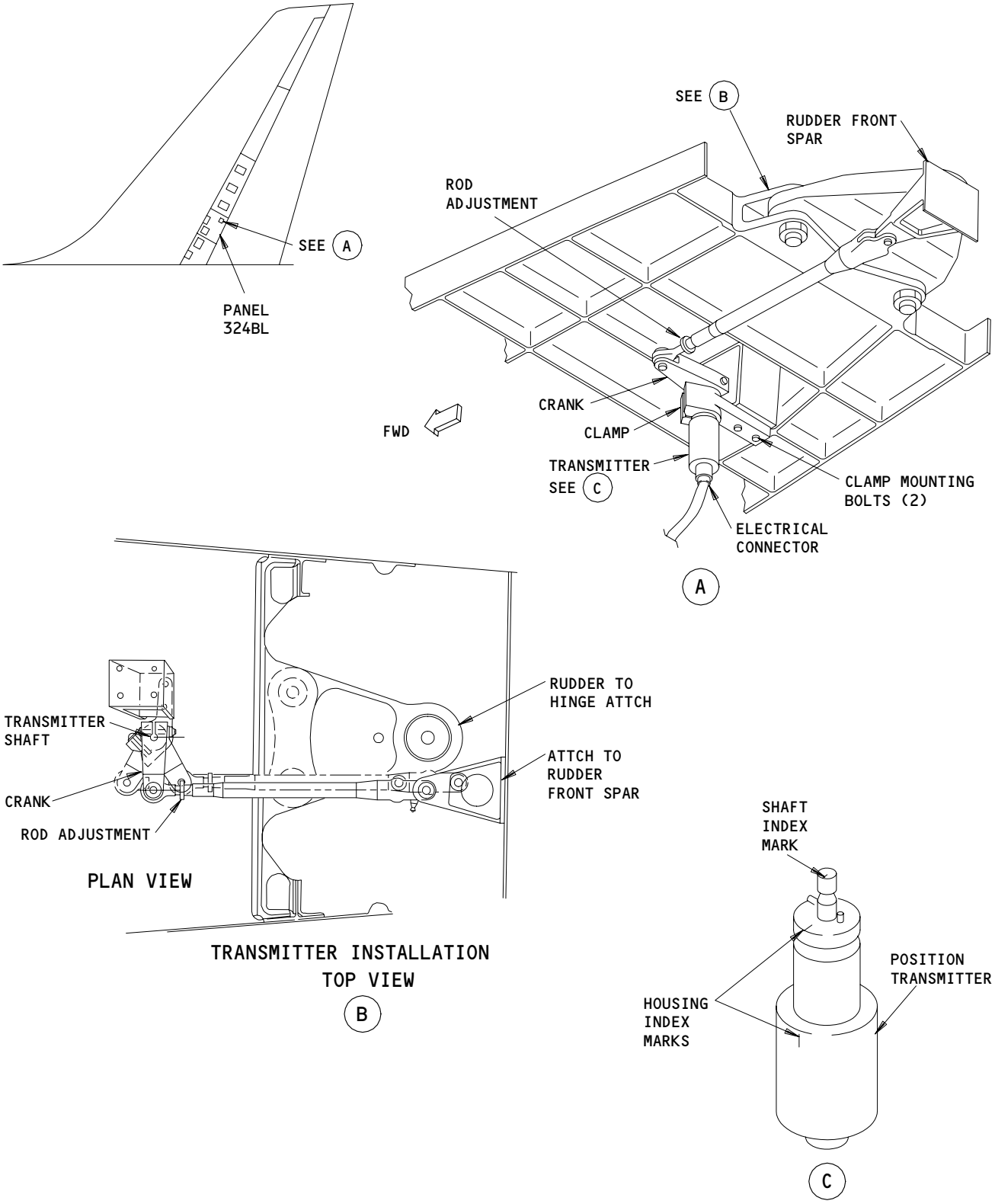
(2) Remove the electrical power if it is not necessary (Ref 24-22-00/201).

S 412-034

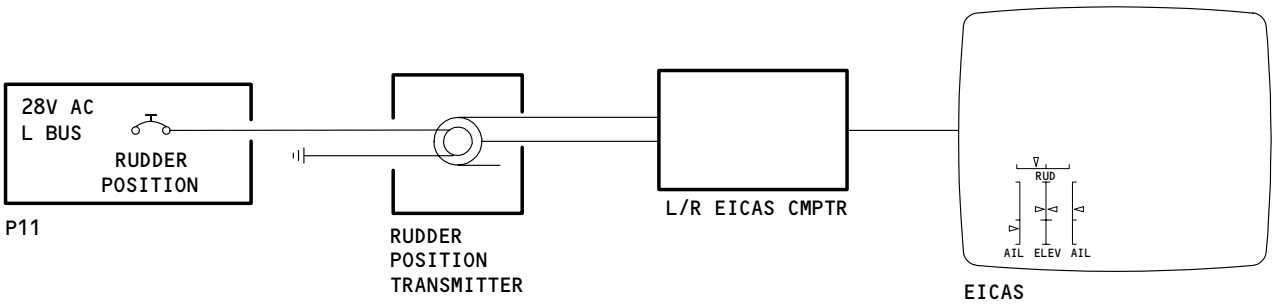
(3) Close the 313AL and any other access door open (AMM 06-42-00/201, AMM 52-48-06/401).

RUDDER POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The rudder position indicating system shows the amount of deflection of the rudder surface. This system does not include the rudder trim indication system.
2. Component Details
   A. Position Transmitter (Fig. 1)
      (1) The rudder position transmitter is mounted below the lower power control actuator. The transmitter's crank is attached to the rudder front spar by an adjustable control rod. The position transmitter is clamped to a bracket mounted to a vertical fin rib. Access to transmitter is through panel 324BL.
      (2) Electrical power to the transmitter is controlled by RUDDER POS circuit breaker on overhead circuit breaker panel P11.
   B. EICAS Position Indicator (Fig. 2)
      (1) The EICAS rudder position indicator appears on the lower EICAS display on the pilot's center instrument panel P2. The indicator is driven by the left or right EICAS computer on equipment shelf E4. The indicator scale in each direction is equal to 34 degrees.
3. Operation
   A. The left power bus supplies 28 volts ac to the rotor in the transmitter, which is inductively coupled to the stator. The rotor is mechanically connected to the airplane control surface and rotates with the surface at the same time. Movement of the rudder changes the rotor position which in turn changes the stator output. This output signal is interpreted by the EICAS computers and displayed on the flight deck. The control surface position is displayed on the left corner of the lower EICAS screen. Press the EICAS status button on panel P9 for display.



Rudder Position Transmitter
Figure 1



Rudder Position Indication
Figure 2

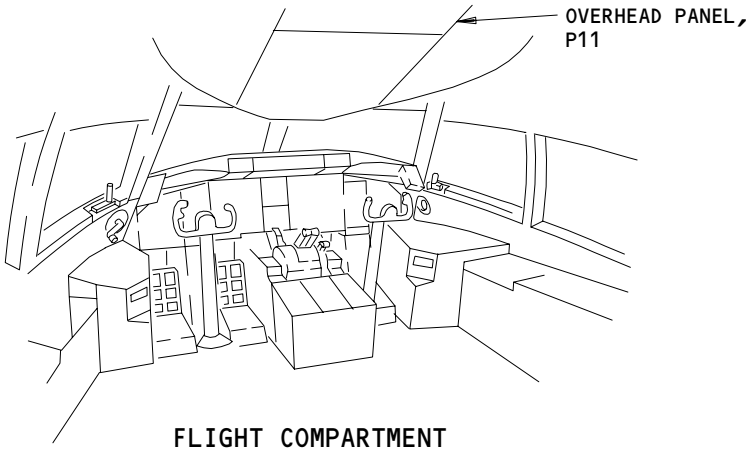
53143

RUDDER POSITION INDICATING SYSTEM

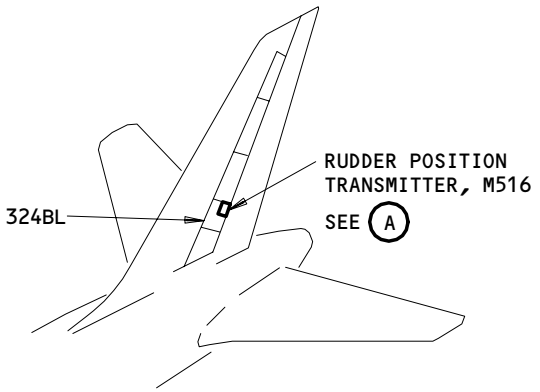
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	--		FLT COMPT, OVERHEAD PANEL, P11	
RUD TRIM, C1033		1	11C10	*
RUDDER POS, C1005		1	11J16	*
RUDDER TRIM POS, C1034		1	11J17	*
COMPUTER - (FIM 31-41-00/101) L EICAS, M10181				
COMPUTER - (FIM 31-41-00/101) R EICAS, M10182				
TRANSMITTER - RUDDER POSITION, M516	--	1	324BL, LWR VERT FIN	27-28-01

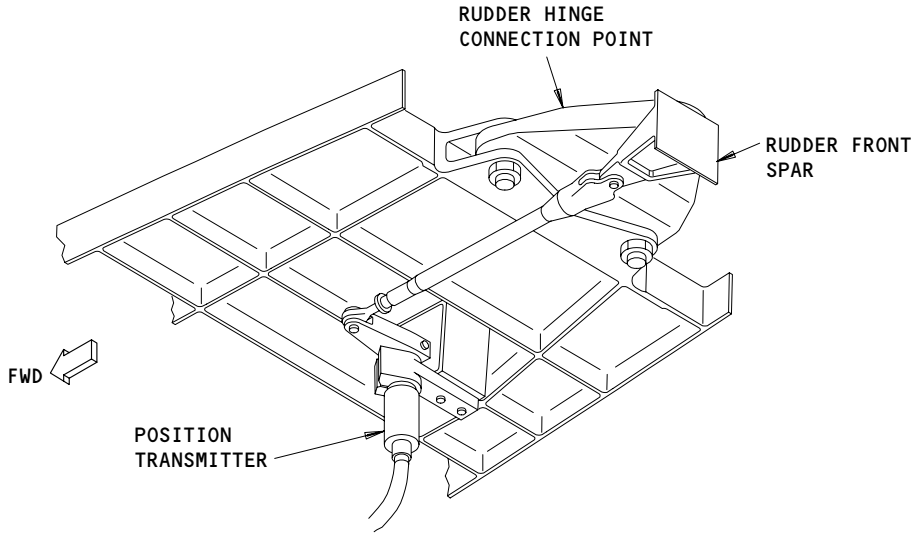
* SEE THE WDM EQUIPMENT LIST

Rudder Position Indicating System - Component Index
Figure 101



FLIGHT COMPARTMENT





RUDDER POSITION TRANSMITTER, M516
(A)

Rudder Position Indicating System - Component Location
Figure 102

RUDDER POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task is an operational test and the second task is a system adjustment for the rudder position indicating system.

TASK 27-28-00-715-001

2. Rudder Position Indicating System - Operational Test
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Test

      S 865-002
      (1) Supply electrical power (Ref 24-22-00).

      S 215-003
      (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) EICAS (6 locations)
          (b) 11J16, RUDDER POS
   D. Rudder Position Indicating System - Test

      S 865-004
      (1) Push the STATUS switch on the pilot's display select panel, P9, to show the rudder position indicator on the bottom EICAS display.

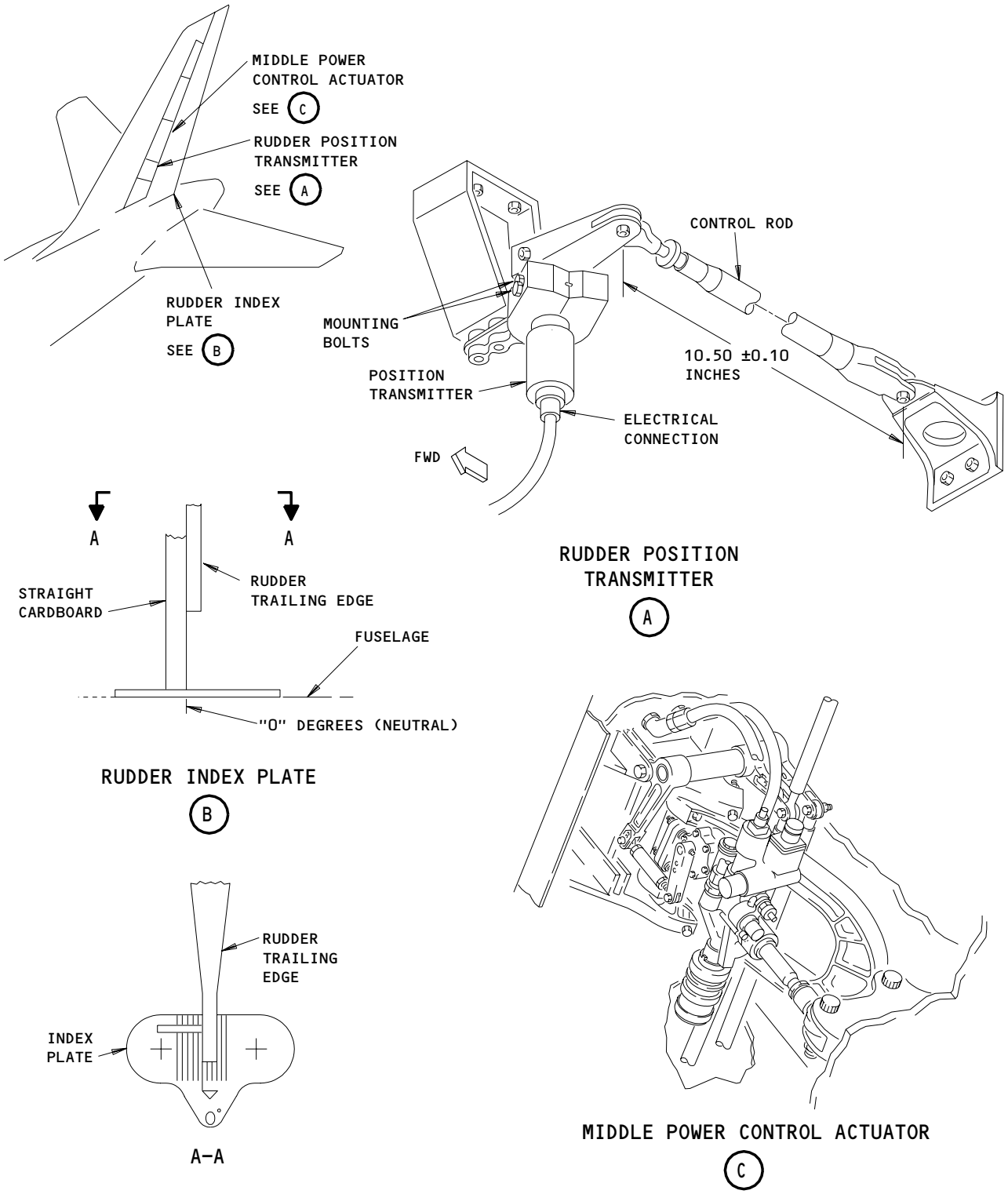
      S 865-005

      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (2) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

      S 825-043
      (3) Turn the rudder trim switch on the aft electronic control panel, P8, until the rudder is in its neutral position. Do this check:
          (a) Make sure the position indicator arrow for the rudder (on EICAS) is on the neutral mark.

              NOTE: Use a tolerance of +/- one-half an arrow width.



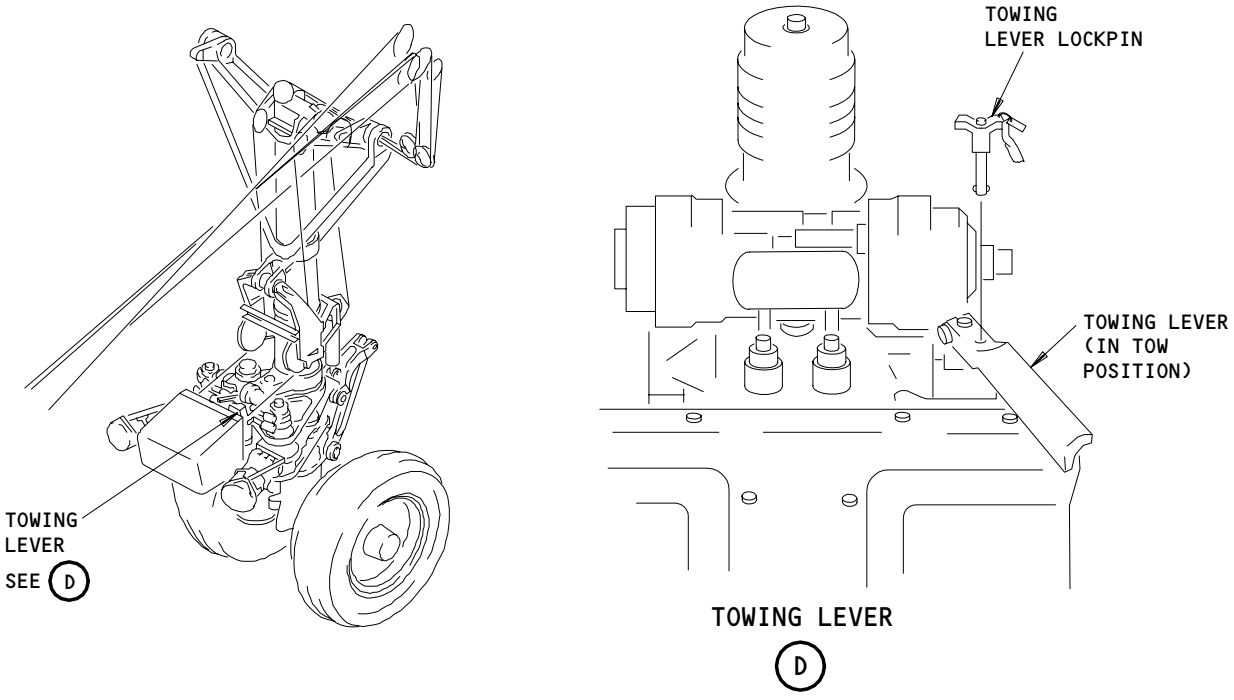
Rudder Position Indicating System Adjustment
Figure 501 (Sheet 1)

S 215-006

WARNING: MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE NOSE GEAR BEFORE THE RUDDER PEDALS ARE OPERATED. THE NOSE WHEELS CAN TURN QUICKLY AND CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Push the left rudder pedal to its full forward position and do this check:
   (a) Make sure the position indicator arrow for the rudder moves to the left full travel mark.

NOTE: At full travel, the indicator arrow can be approximately one-half an arrow width away from the full travel mark.



Rudder Position Indicating System Adjustment
Figure 501 (Sheet 2)

S 215-007
(5) Push the right rudder pedal to its full forward position and do this check:
(a) Make sure the position indicator arrow for the rudder moves to the right full travel mark.

NOTE: At full travel, the indicator arrow can be approximately one-half an arrow width away from the full travel mark.

S 215-008
(6) Operate the rudder pedals until the rudder is in its neutral position and do this check:
(a) Make sure the position indicator arrow for the rudder is on the neutral mark.

NOTE: Use a tolerance of +/- one-half an arrow width.

E. Put the Airplane Back to Its Usual Condition

S 865-009
(1) Remove the power form the left, right, and center hydraulic systems (Ref 29-11-00).

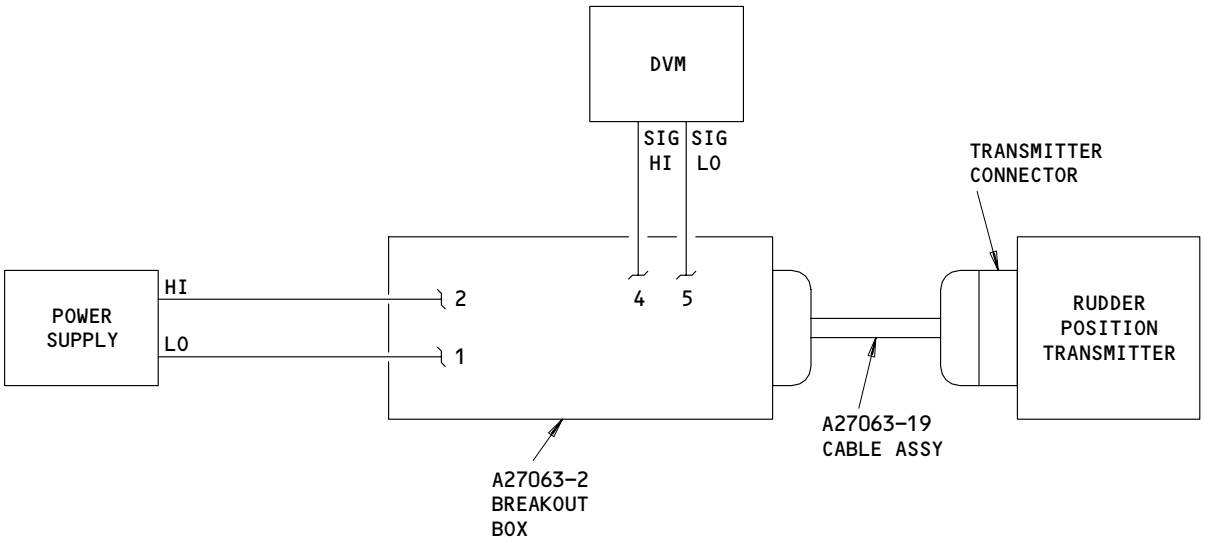
S 865-010
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-28-00-825-011

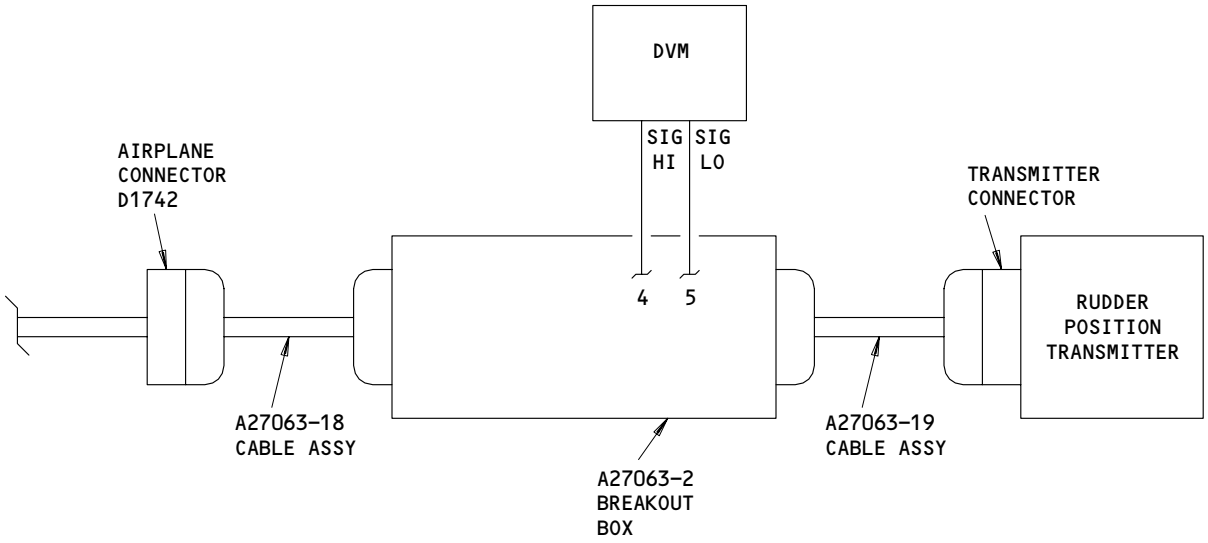
3. Rudder Position Indicating System - Adjustment

A. Equipment
(1) Nose Gear Towing Lever Lockpin - A09003-1
(2) Position Transmitter Tester, Breakout Box, Cables - A27063-91
(3) Digital Voltmeter - John Fluke 8020B, John Fluke Manufacturing Co., Inc., Everett, Washington
(4) Power Supply - Powertron Model 5900 (Adjustment Procedure 1), Industrial Test Equipment Corp., Port Washington, New York

B. Consumable Materials
(1) D00015 Grease, Corrosion Preventive - BMS 3-24



PROCEDURE 1



LEGEND

DVM - DIGITAL VOLTMETER

PROCEDURE 2

NOTE: USE THE DVM TO MONITOR AIRPLANE POWER. THEN, CONNECT IT TO THE BREAKOUT BOX AND DO THE ADJUSTMENT.

Rudder Position Transmitter Adjustment
Figure 502

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
211/212 Control Cabin
324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panel
324BL Aft Side of Rear Spar and Rudder Hinge

E. Prepare for Adjustment

S 865-012
(1) Supply electrical power (Ref 24-22-00).

S 865-013
(2) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11J16, RUDDER POS

S 495-014
(3) Move the towing lever to the tow position and install the towing lever lockpin in the nose gear (Fig. 501).

S 015-016
(4) Open access panel 324BL (Ref 06-42-00).

S 865-019

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 225-017

(6) Operate the rudder trim switch on the aft electronic control panel, P8, until the rudder is in its neutral position. Do this check:

NOTE: Do not operate the rudder trim during the adjustment procedure.

(a) Make sure the rudder trailing edge is not more than 0.05 inch (1.3 mm) away from the zero line on the index plate (Fig. 501).

S 225-045

(7) Make sure the control rod length is 10.50 ±0.03 inches (266.7 +/- 0.7 mm).

S 035-020

(8) Remove the lockwire from the control rod.

F. Rudder Position Transmitter - Adjustment (Procedure 1)

NOTE: Three procedures are supplied to adjust the rudder position transmitter.

Procedure 1 uses a commercially available power supply, a digital voltmeter (DVM), and breakout box equipment.

Procedure 2 uses airplane power and a DVM with the breakout box equipment.

Procedure 3 uses the EICAS computer and communication between the control cabin and the rudder control surface.

S 495-021

(1) Do these steps to connect the breakout box equipment:
(a) Disconnect airplane electrical connector D1742 from the position transmitter.
(b) Connect the breakout box and the cable assembly to the transmitter.

(c) Connect the digital voltmeter (DVM) to the breakout box at pins 4 (SIG HI) and 5 (SIG LO).
(d) Connect the power supply to the breakout box at pins 1 (LO) and 2 (HI) and adjust it to 26 ±0.02 volts ac RMS.

S 825-022
(2) Do these steps to adjust the position transmitter:
(a) Loosen the bolts that hold the position transmitter in its bracket.
(b) Turn the transmitter in its bracket until the output voltage (shown on the DVM) is 0 ±0.080 volts ac RMS.
(c) Tighten the bolts that hold the transmitter and do this check:
1) Make sure the output voltage stays at 0 ±0.080 volts ac RMS.
(d) Adjust the control rod until the output voltage is 0 ±0.050 volts ac RMS and do this check:
1) Make sure the control rod length is 10.50 ±0.10 inches (266.7 +/- 2.5 mm).

NOTE: If it is necessary, turn the transmitter to get the correct voltage and control rod length at the same time.

(e) Lock the control rod with wire and do this check:
1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.

S 095-023
(3) Do these steps to disconnect the breakout box equipment:
(a) Disconnect the power supply, breakout box, and the cable assembly from the transmitter connector.
(b) Connect the airplane connector to the position transmitter.

S 865-024
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J16, RUDDER POS

S 715-025

(5) Do the operational test procedure for the rudder position indicating system.

G. Rudder Position Transmitter - Adjustment (Procedure 2)

S 495-026

(1) Do these steps to connect the breakout box equipment:
   (a) Disconnect airplane electrical connector D1742 from the position transmitter.
   (b) Connect the breakout box and the cable assembly to the transmitter.
   (c) Connect the breakout box and the cable assembly to the airplane connector D1742.
   (d) Connect a digital voltmeter (DVM) to the breakout box at pins 4 (SIG HI) and 5 (SIG LO).

S 865-027

(2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
   (a) 11J16, RUDDER POS

S 825-028

(3) Do these steps to adjust the position transmitter:
   (a) Loosen the bolts that hold the position transmitter in its bracket.
   (b) Turn the transmitter in its bracket until the output voltage (shown on the DVM) is 0 ±0.080 volts ac RMS.
   (c) Tighten the bolts that hold the transmitter and do this check:
      1) Make sure the output voltage stays at 0 ±0.080 volts ac RMS.
   (d) Adjust the control rod until the output voltage is 0 ±0.050 volts ac RMS and do this check:
      1) Make sure the control rod length is 10.50 ±0.10 inches (266.7 +/- 0.7 mm).

         NOTE: If it is necessary, turn the transmitter to get the correct voltage and control rod length at the same time.

   (e) Lock the control rod with wire and do this check:
      1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.

S 865-029

(4) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
   (a) 11J16, RUDDER POS

S 095-030
(5) Do these steps to disconnect the breakout box equipment:
(a) Disconnect the breakout box and the cable assembly from the airplane connector.
(b) Disconnect the breakout box and the cable assembly from the position transmitter.
(c) Connect the airplane connector to the position transmitter.

S 865-032
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J16, RUDDER POS

S 715-031
(7) Do the operational test procedure for the rudder position indicating system.

H. Rudder Position Transmitter - Adjustment (Procedure 3)

S 215-033
(1) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 215-034
(2) Make sure airplane electrical connector D1742 is connected to the position transmitter.

S 865-035
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J16, RUDDER POS

S 865-036
(4) Push the STATUS switch on the pilot's display select panel, P9, to show the rudder position indicator on EICAS.

S 825-037

(5) Adjust the control rod until the position indicator arrow is aligned with the neutral position mark and do this check:

(a) Make sure the control rod length is 10.50 ±0.10 inches (266.7 +/- 2.5 mm).

NOTE: If it is necessary, turn the transmitter to get the correct indication and control rod length at the same time.

S 435-038

(6) Lock the control rod with wire.

S 715-039

(7) Do the operational test procedure for the rudder position indicating system.

I. Put the Airplane Back to Its Usual Condition

S 865-040

(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 415-041

(2) Close access panel 324BL (Ref 06-42-00).

S 095-044

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear (Fig. 501).

S 865-042

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

RUDDER POSITION TRANSMITTER - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation tasks for the rudder position transmitter.

TASK 27-28-01-022-006

2. Rudder Position Transmitter - Removal
   A. Equipment

      (1) Nose Gear Towing Lever Lockpin - A09003-1
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zone
          324 Vertical Stabilizer - Rear Spar to Trailing Edge

      (2) Access Panels
          324BL Aft Side of Rear Spar and Rudder Hinge
          324CL Rudder Hinge and PCAs

   D. Prepare for Removal

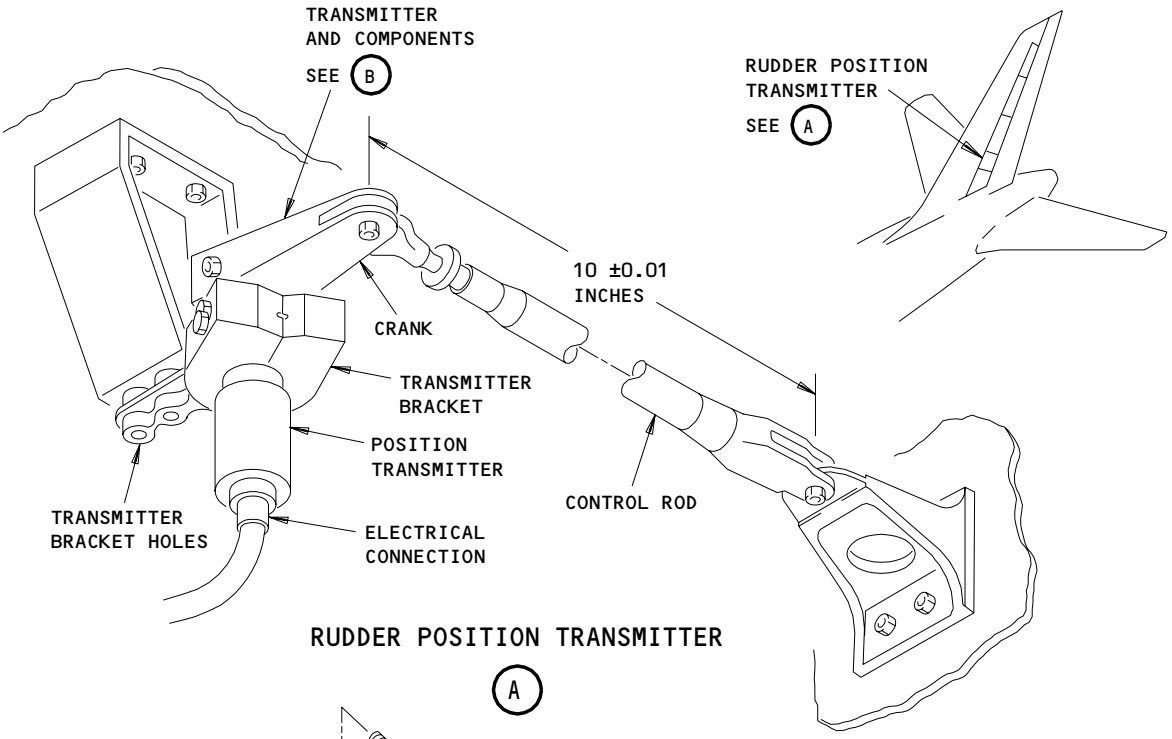
      S 862-001
      (1) Supply electrical power (Ref 24-22-00).

      S 862-002
      (2) Move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to OFF. Attach DO-NOT-OPERATE tags and make sure the amber switch position legend lights come ON.

      S 862-003
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
          (d) 11J16, RUDDER POS

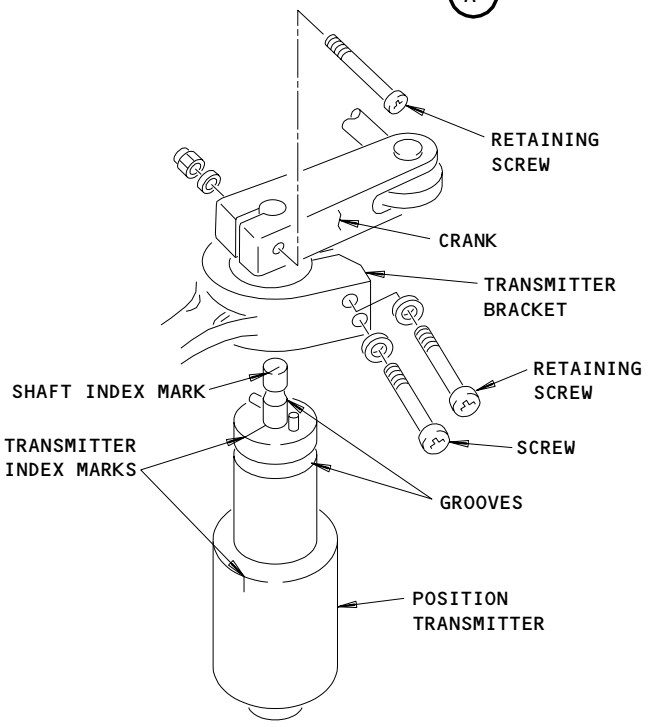
      S 862-017
      (4) Move the towing lever on the metering valve module to the tow position and install the towing lever lockpin in the nose gear (Fig. 202).

      S 012-019
      (5) Open access panels 324BL and 324CL (Ref 06-42-00).



RUDDER POSITION TRANSMITTER

A



TRANSMITTER AND COMPONENTS

B

Rudder Position Transmitter Installation
Figure 201

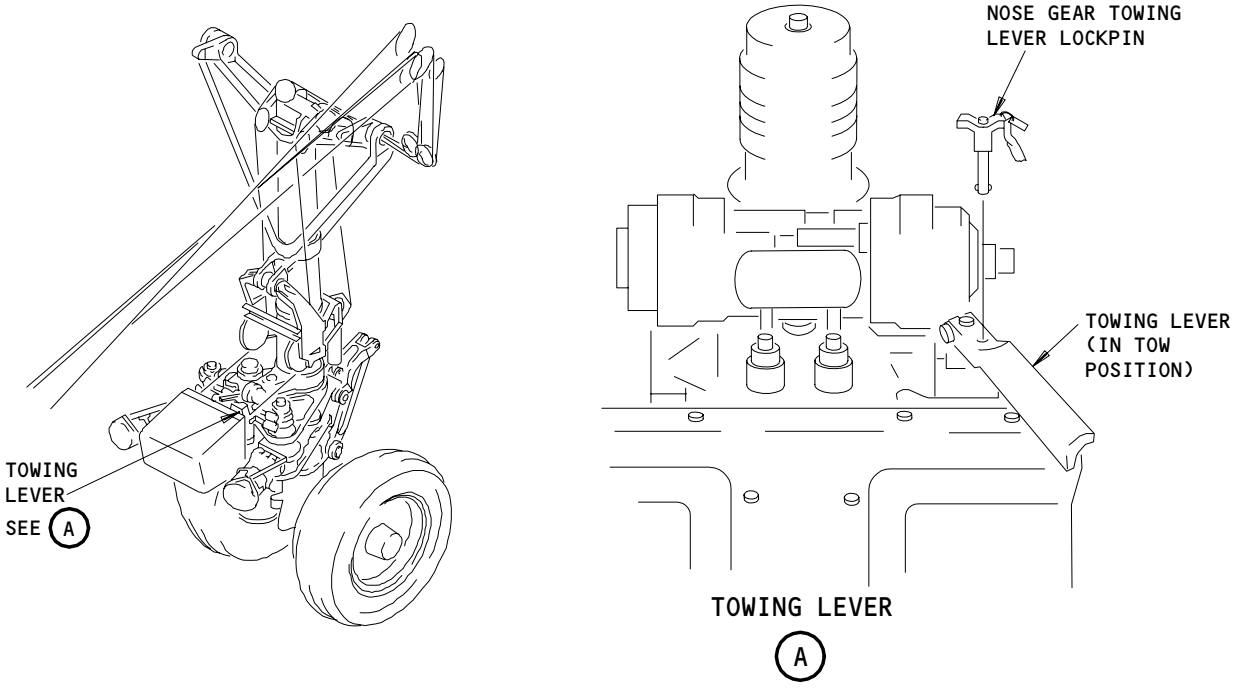
E. Remove the Rudder Position Transmitter (Fig. 201)

S 032-004

(1) Disconnect the electrical connector from the position transmitter.

S 032-007

(2) Remove these components:
   (a) The screws from the transmitter bracket.
   (b) The screw from the crank.



Nose Gear Isolation
Figure 202

(c) The lockwire from the control rod.

S 022-008

(3) Remove the transmitter from the crank and the transmitter bracket.

TASK 27-28-01-422-016

3. Rudder Position Transmitter - Installation

A. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-28-00/501, Rudder Position Indicating System

B. Access

(1) Location Zone

324 Vertical Stabilizer - Rear Spar to Trailing Edge

(2) Access Panels

324BL Aft Side of Rear Spar and Rudder Hinge
324CL Rudder Hinge and PCAs

C. Install the Rudder Position Transmitter (Fig. 201)

S 432-009

(1) Do these steps to install the transmitter in its bracket:
(a) Put the transmitter in its bracket and align the transmitter index marks with the center line of the transmitter bracket holes.
(b) Install the screws that hold the transmitter to the bracket and do this check:
1) Make sure the retaining screw is in the groove on the position transmitter.

S 432-010

(2) Do these steps to install the crank:
(a) Adjust the control rod until the slot in the crank is aligned with the index mark on the transmitter shaft.
(b) Install the crank on the shaft and do this check:
1) Make sure the retaining screw engages the groove on the transmitter shaft.

S 822-005

(3) Adjust the rudder position transmitter (Ref 27-28-00).

D. Put the Airplane Back to Its Usual Condition

S 412-011
(1) Close Access Panels 324BL and 324CL (Ref 06-42-00).

S 092-012

WARNING: STAY AWAY FROM THE NOSE WHEELS WHEN THE LOCKPIN IS REMOVED. THE WHEELS CAN TURN TO THE CENTER POSITION QUICKLY, AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) Make sure the nose wheels are in their center position and remove the towing lever lockpin from the nose gear.

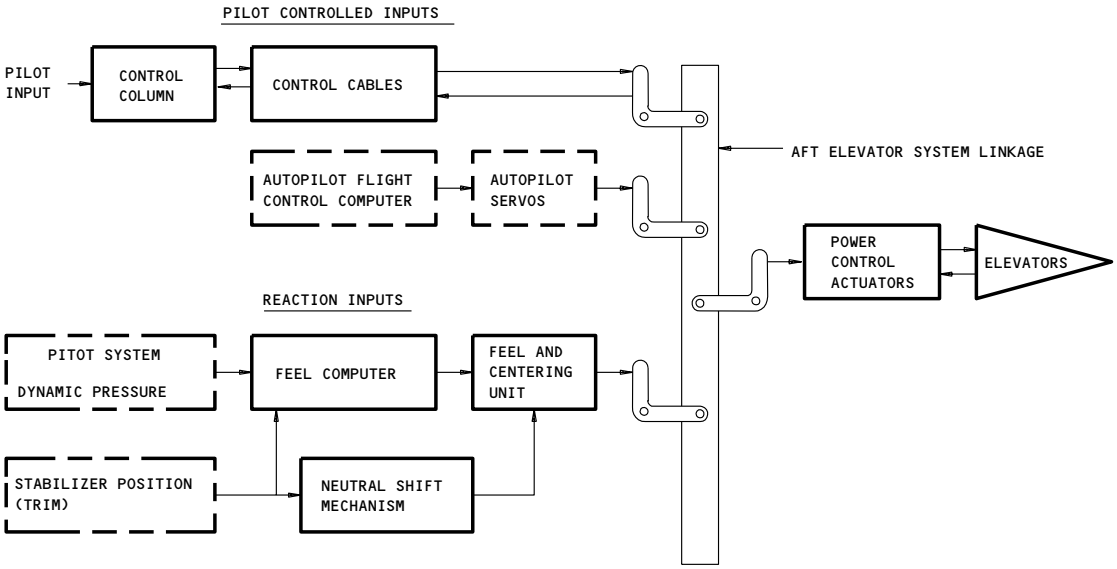
S 862-013
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J16, RUDDER POS

S 862-014
(4) Remove the DO-NOT-OPERATE tags and move the FLT CONTROL SHUTOFF switches L, C, and R on the right side panel, P61, to ON.

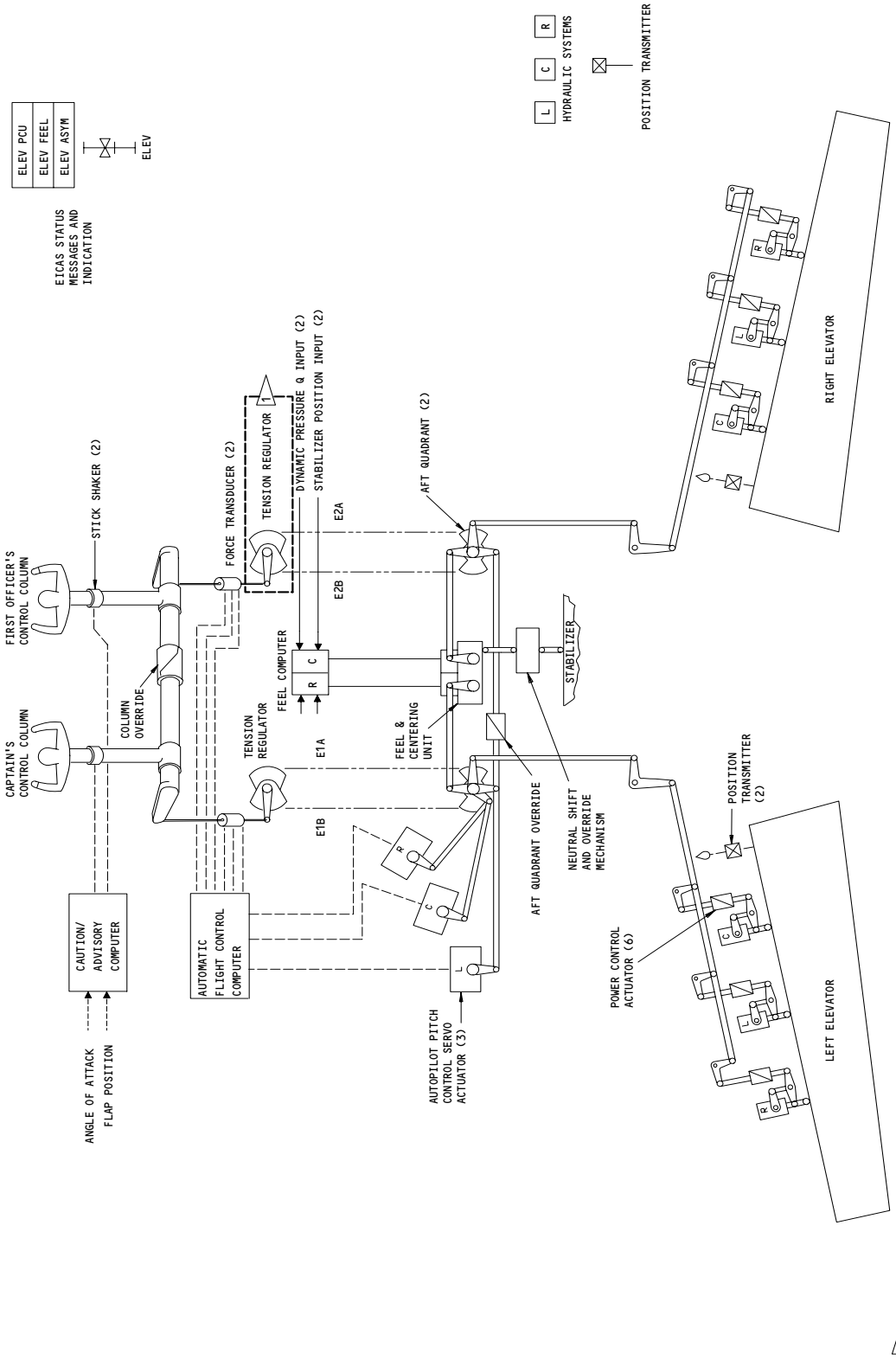
S 862-015
(5) Remove electrical power if it is not necessary (Ref 24-22-00).

ELEVATOR CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1, 2 and 3)
   A. The elevator control system controls airplane pitch attitude by movement of two elevator surfaces which are hinged on the rear spar of the horizontal stabilizer. The elevator is used for primary pitch control. Pitch trim is provided by the horizontal stabilizer.
   B. Primary control of the elevators is through pilot or autopilot inputs. Additional elevator positioning is provided by stabilizer motion which changes the elevator neutral position. The elevator control system is fully powered with no manual reversion capability.
   C. Each elevator surface is positioned by three hydro-mechanical power control actuators (PCAs). Each actuator is powered by an independent hydraulic system. The actuators provide surface restraint for flutter suppression. Control system feel forces are provided by a dual hydro-mechanical feel system.

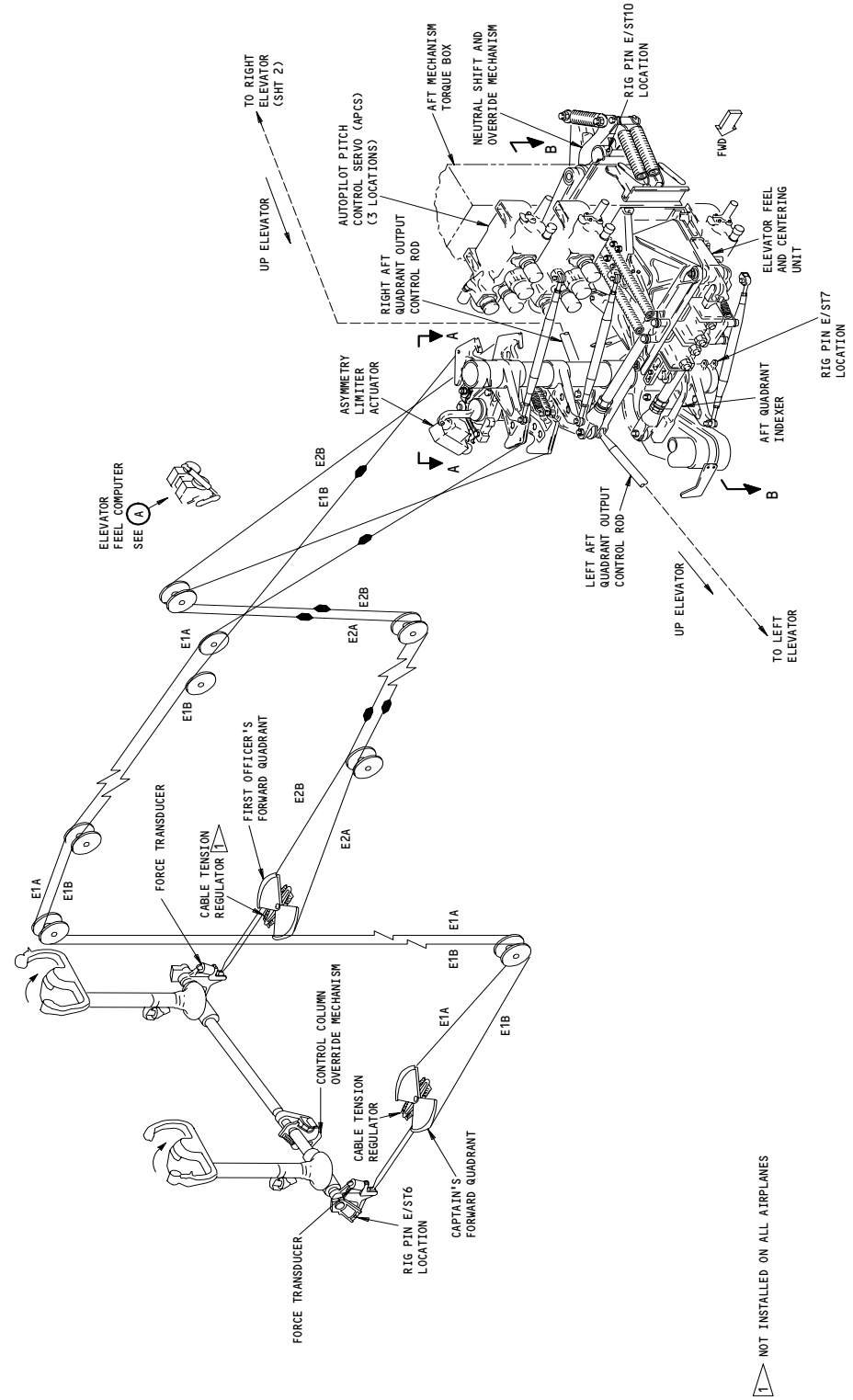


Elevator Control Modes
Figure 1



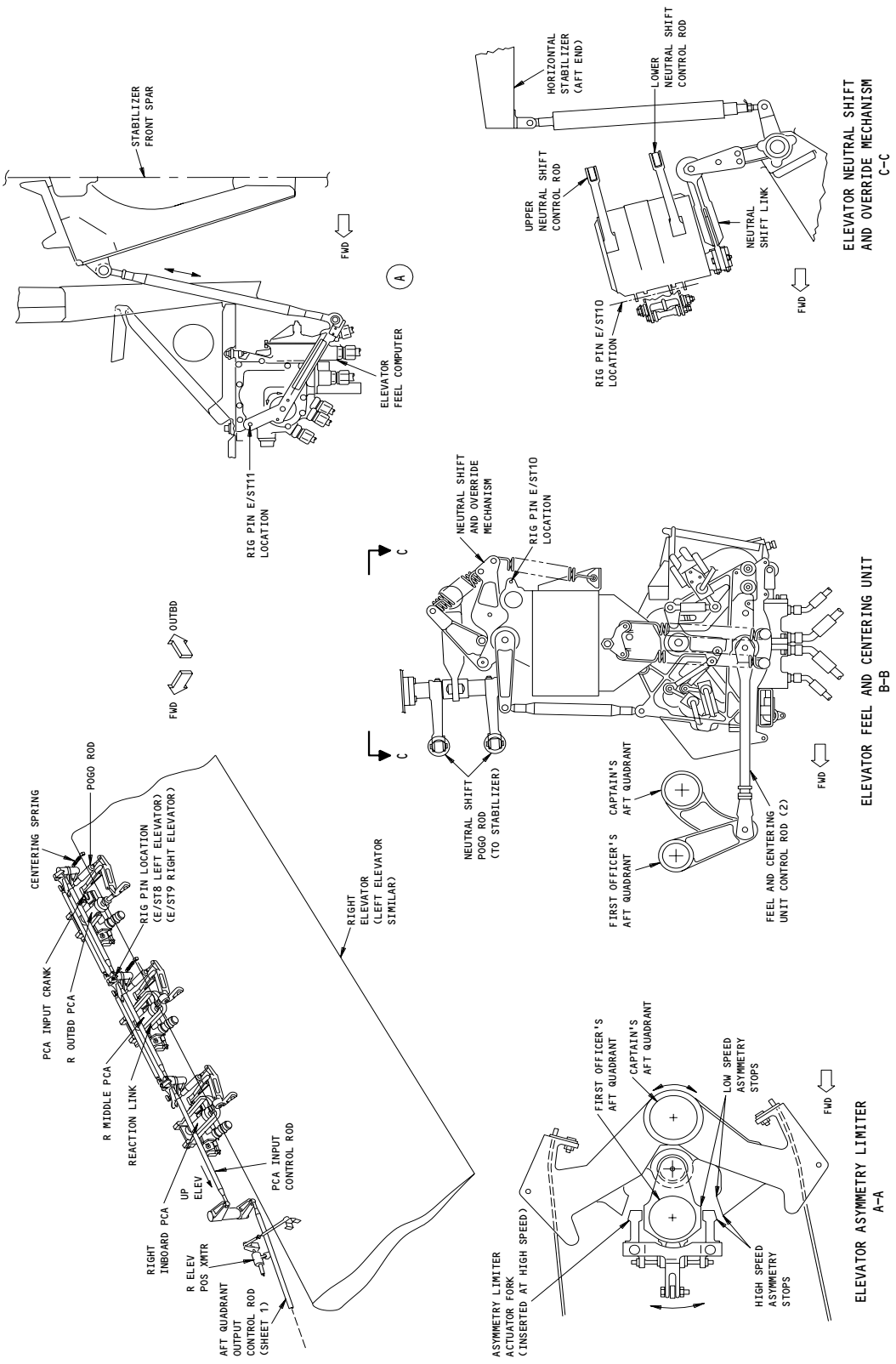
Elevator Control System Operation
Figure 2

987538



Elevator Control System Schematic (Mechanical)
Figure 3 (Sheet 1)

206610



Elevator Control System Schematic (Mechanical)
Figure 3 (Sheet 2)

197289

D. Elevator positioning is achieved by manual inputs from the captain's or first officer's control column. The two columns are mechanically slaved together through a spring-loaded override mechanism. Dual cable systems with tension regulators installed in the forward quadrants are used to transmit pilot inputs to the dual aft quadrants. The aft quadrants are also mechanically slaved together through a spring-loaded override mechanism. The override mechanisms allow separation of the column inputs in the event of a jam in one system. A force of approximately 65 pounds (289 newtons) is required to separate the systems.

E. An elevator asymmetry limiter actuator limits the asymmetric motion between the captain's and first officer's aft quadrants. The amount of asymmetric motion allowed is less at high than at low speeds. This assures that the pilots cannot command enough asymmetric motion to cause excessive loads.

F. An elevator feel and centering unit is connected to both aft quadrants, to provide the desired control column feel and centering characteristics. The feel force is generated by a combination of mechanical and hydraulic devices. The feel and centering unit is positioned by a neutral shift and override mechanism which allows the stabilizer trim to introduce a shift of the neutral position in the airplane nose down direction. An override in the neutral shift mechanism allows the control system to override a jam in the feel and centering mechanism.

G. Three autopilot servos are connected in parallel to the aft quadrant. Autopilot operation causes the entire control system to move, including both control columns.

H. A stick shaker is provided on each control column to warn the pilots of an approaching airplane stall condition. The stick shakers, which are activated by signals from the stall warning system, consist of an electric motor driving an unbalanced mass. Refer to 27-32-00 for stall warning system operation.

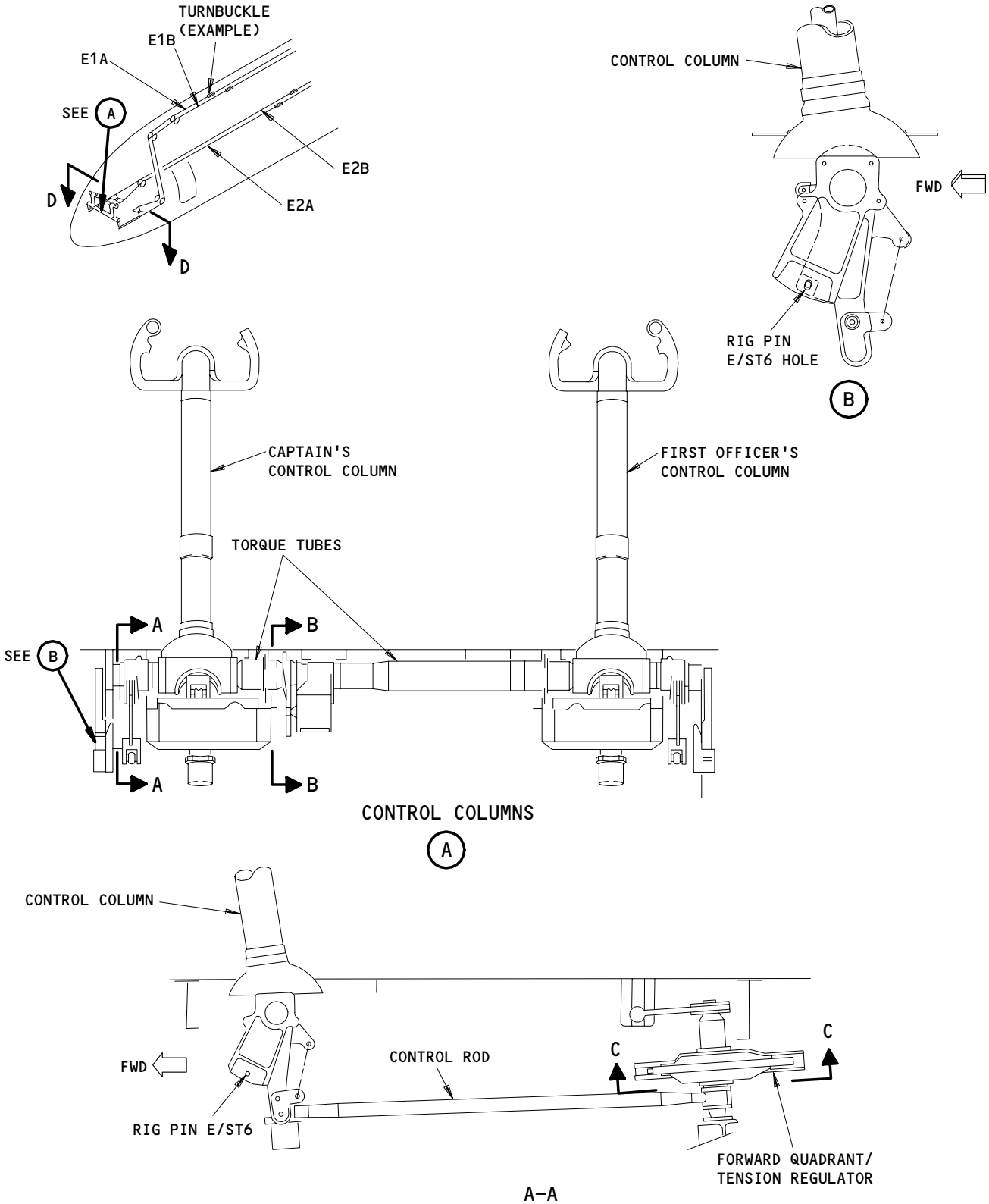
I. Elevator positions are displayed on the lower engine indicating and crew alerting system (EICAS) screen when the STATUS button is pressed. Refer to 27-38-00 for elevator position indicating system.

J. The EICAS provides airplane status, maintenance, caution, and warning messages. These messages appear on the EICAS screens.

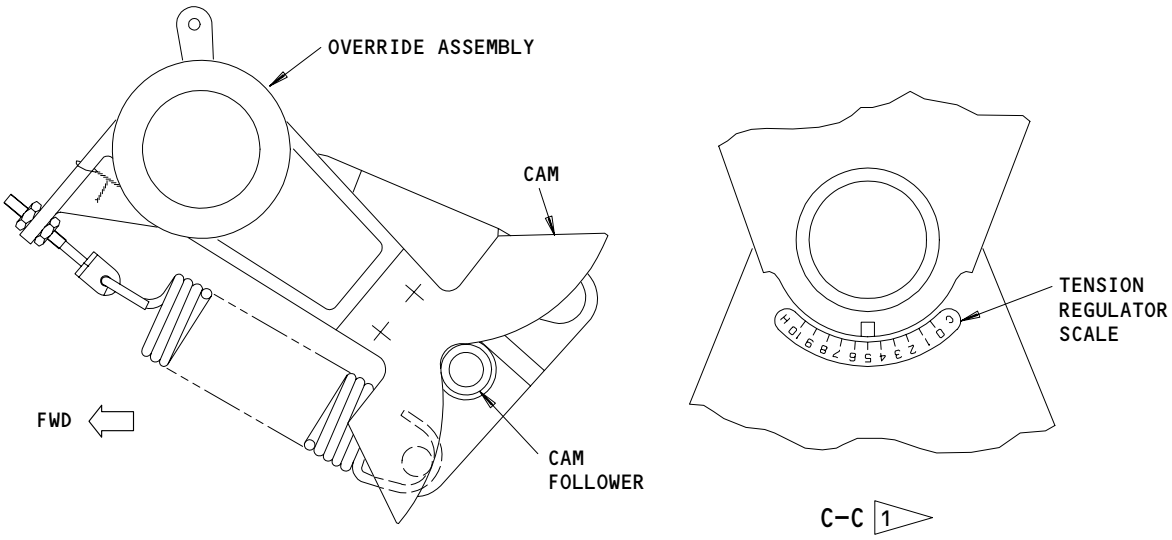
2. Component Details

A. Control Column (Fig. 4)

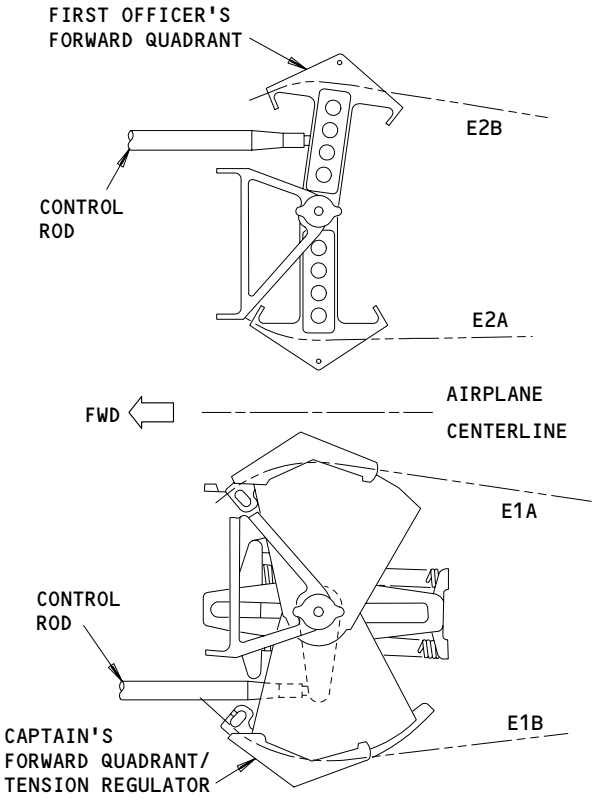
(1) Two control columns are rigidly mounted on concentric torque tubes beneath the cabin floor. The torque tubes are slaved together through a cam override. Crank assemblies on each end of the torque tube transmit motion aft by control rods to forward quadrants/tension regulators. The control columns transmit pilot commands to control the airplane about the pitch axis. Forward and aft motion of the control columns actuates the elevators. Movement of the elevators controls the airplane about the pitch axis. Access to the torque tube and control columns is through the forward compartment access door.



Elevator Forward Compartment Components
Figure 4 (Sheet 1)



CONTROL COLUMN OVERRIDE
B-B



D-D

1 ON CAPTAIN'S FORWARD QUADRANT/TENSION REGULATOR

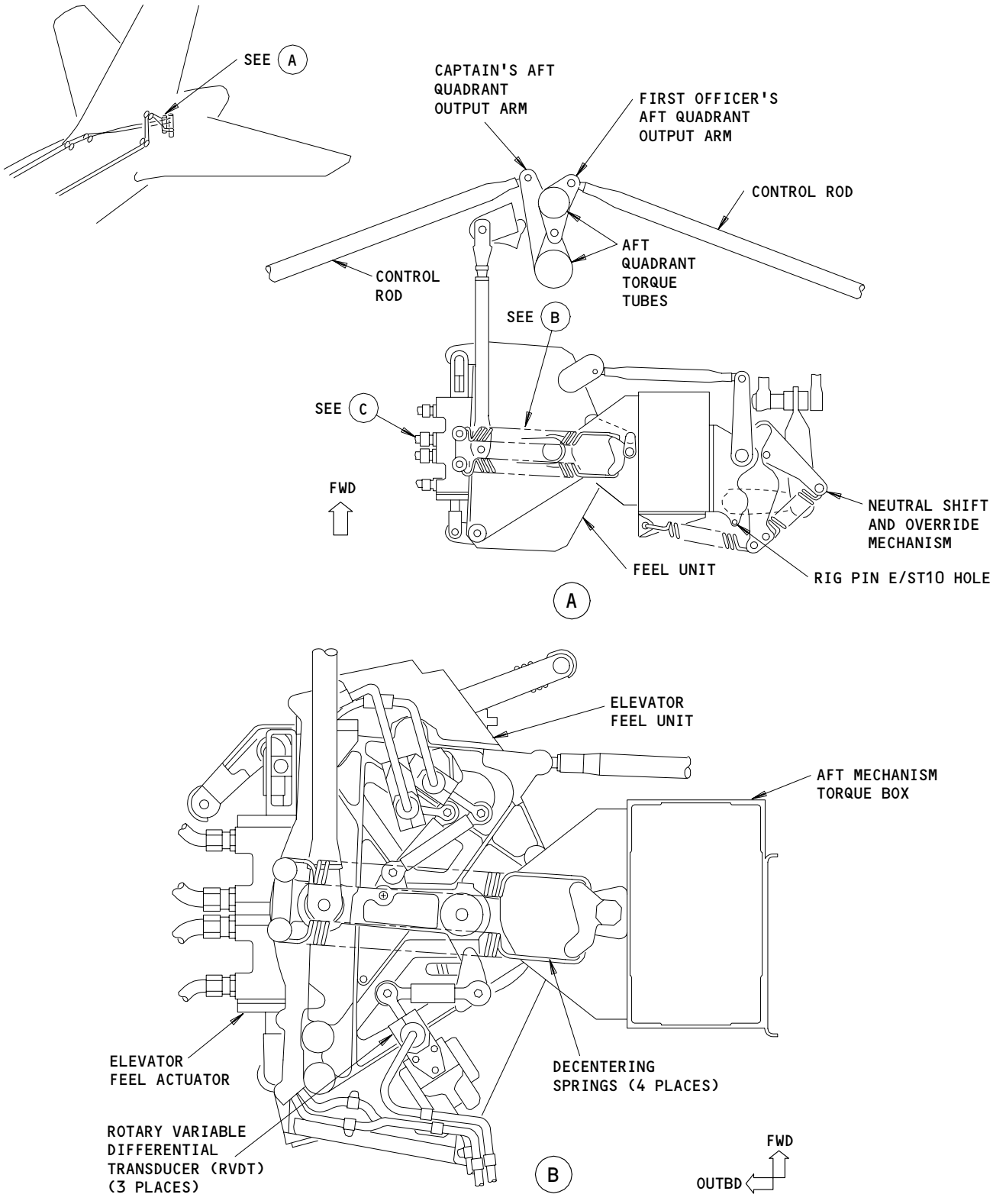
Elevator Forward Compartment Components
Figure 4 (Sheet 2)

B. Forward Quadrant/Tension Regulators
   (1) Two forward quadrants are located beneath the cabin floor just aft of the control column torque tube. A control rod connects each quadrant to a crank assembly installed to the outboard end of each torque tube. The forward quadrants are connected to the aft quadrants by separate pairs of cables.
   (2) A tension regulator is installed in the captain's forward quadrant to maintain correct cable tension during temperature variation and structural deflections. A scale on the bottom of the tension regulator is used to adjust for correct cable tension.

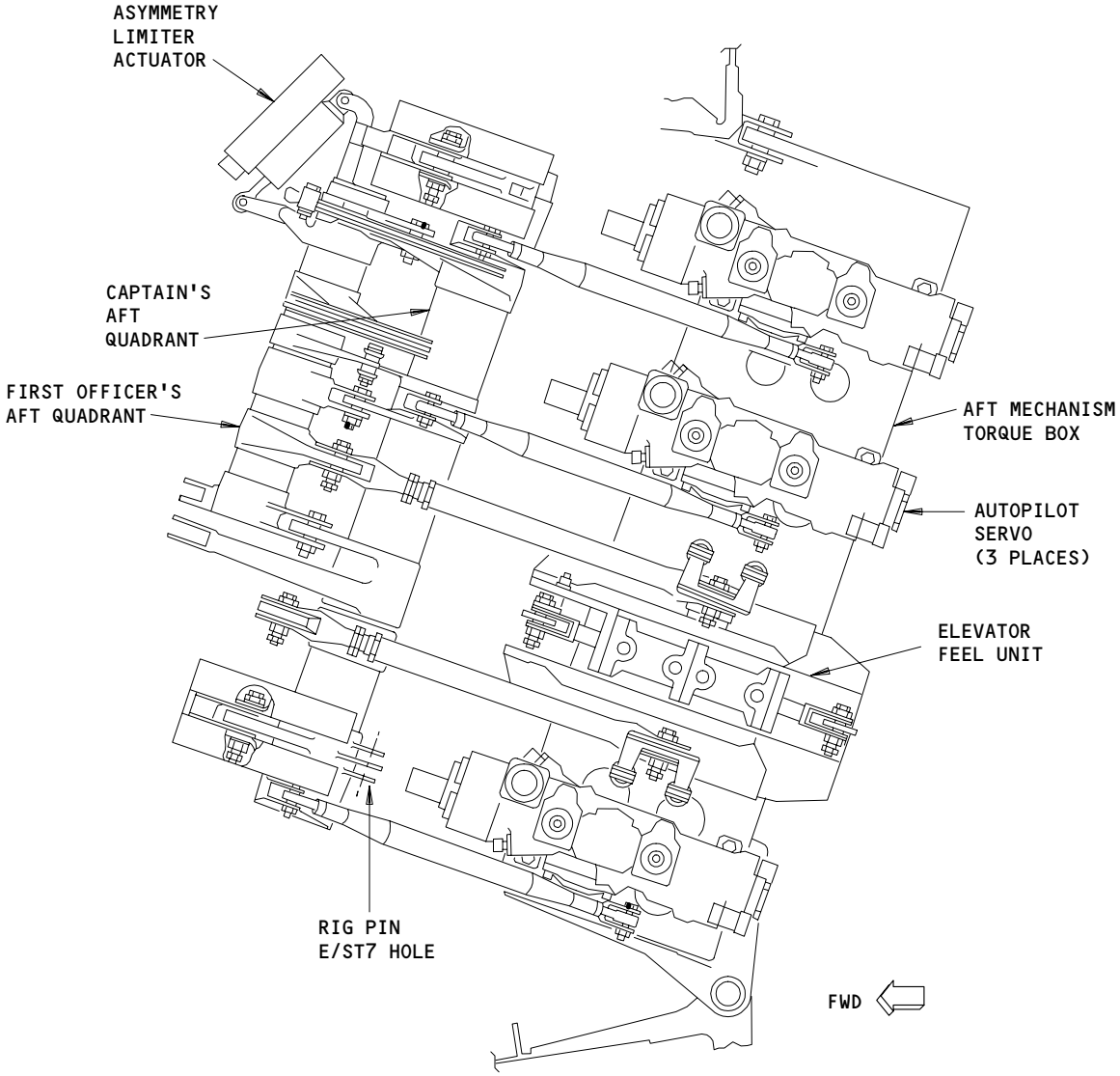
C. Elevator Control Aft Quadrants (Fig. 5)
   (1) Dual aft quadrants are located just aft of the horizontal stabilizer. The aft quadrants receive control cable inputs from the forward quadrants. The aft quadrants transmit feel and centering forces to the cable system and elevator control inputs to the power control actuators. The aft quadrants are equipped with a cam override to allow operation of one elevator should the other jam.

D. Elevator Control Aft Mechanism Torque Box (Fig. 5)
   (1) The aft mechanism torque box is located just behind the aft quadrants. It supports the aft quadrants, feel unit, autopilot servos, and neutral shift mechanism.
   (2) The torque box is attached to airplane structure at six points. Three attach points, with spherical bearings, comprise the primary load path. The other three attach points comprise the secondary load path. A gap between the bolt and structure at the secondary load path attach points prevents airframe deflection from loading the torque box. This gap is not adjustable.

E. Elevator Power Control Actuator (PCA) (Fig. 6)
   (1) Each elevator is positioned by three hydro-mechanical servo actuators. The PCA's are mounted on the horizontal stabilizer rear spar. The PCA's are each powered by a separate hydraulic system. Each PCA consists of a balanced piston, a slide/sleeve four-way servo valve, and mechanical summing linkage. Each PCA includes an overtravel mechanism downstream of the mechanical summing lever. This ensures that full control system inputs can be applied in either direction with the piston in the full opposite direction without transmitting excessive loads to the control linkage. The PCA's receive control inputs from the aft quadrants.

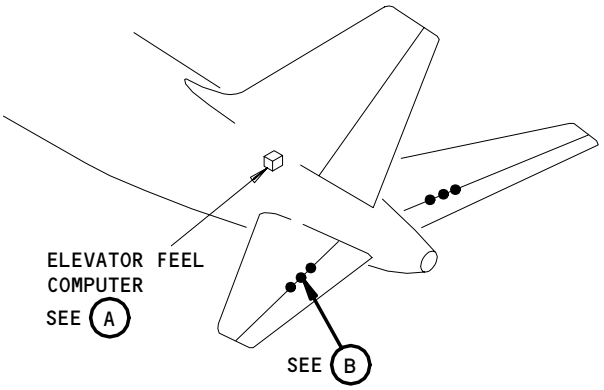


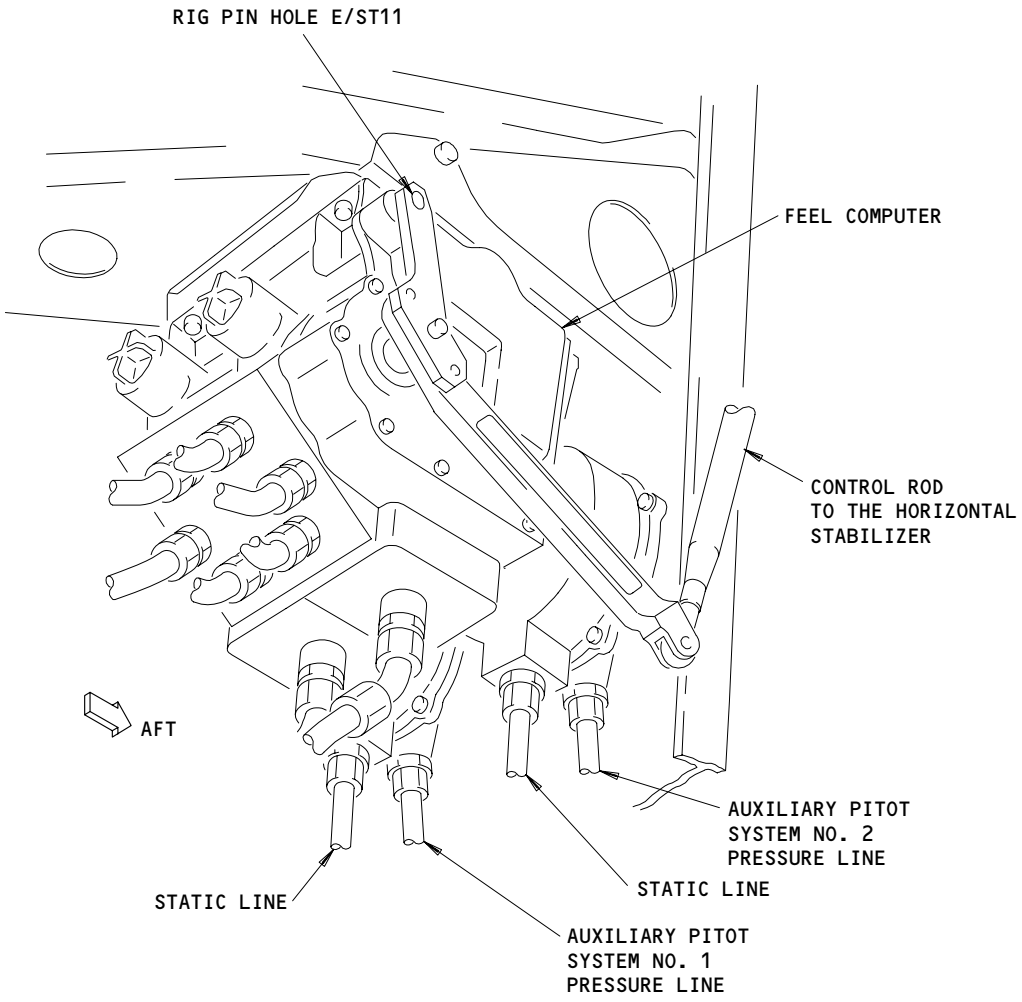
Elevator Aft Mechanism Components
Figure 5 (Sheet 1)



C

Elevator Aft Mechanism Components
Figure 5 (Sheet 2)

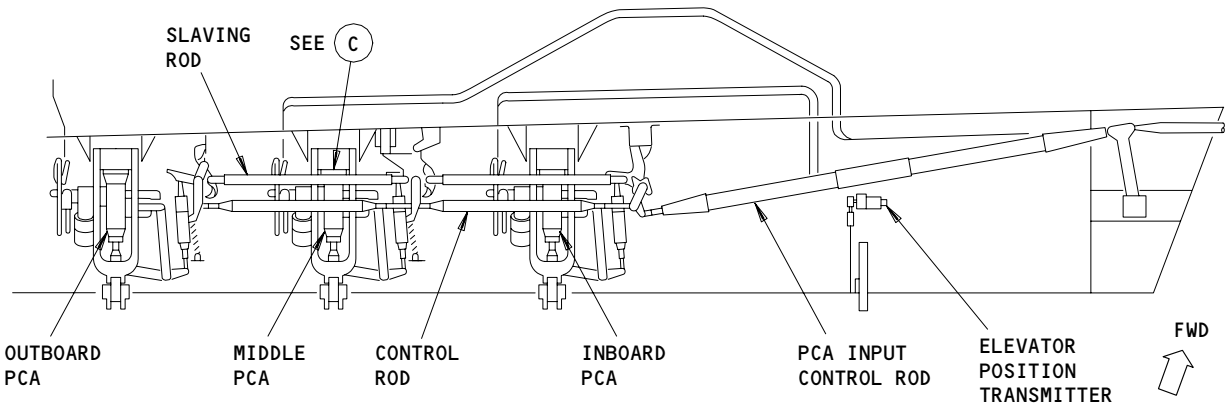




ELEVATOR FEEL COMPUTER

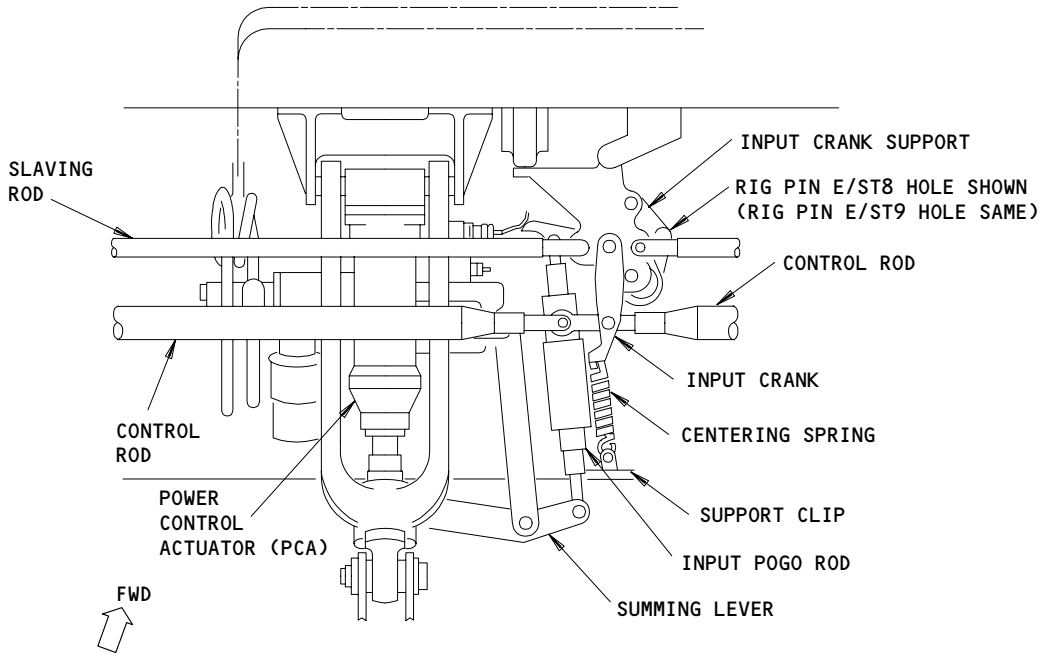
(A)

Elevator Control System Components
Figure 6 (Sheet 1)



LEFT SIDE POWER CONTROL ACTUATORS SHOWN
(RIGHT SIDE SAME)

B



LEFT SIDE MIDDLE PCA SHOWN
(RIGHT SIDE SAME)

C

Elevator Control System Components
Figure 6 (Sheet 2)

F. Elevator (Fig. 6)
   (1) Two elevator control surfaces are hinged on the rear spar of the stabilizer. Each elevator is driven by three power control actuators. The elevators are used primarily for maneuvering with pitch trim provided by the horizontal stabilizer.

G. Elevator Feel Computer (Fig. 6)
   (1) The feel computer is a dual hydro-mechanical unit that generates two independent feel pressures. The pressures are a function of airspeed impact pressure and horizontal stabilizer position. The computer consists of two separate units, one for each hydraulic system (right and center). Each unit is a force balance valve that develops regulated hydraulic feel pressure to balance the forces developed from the pressure differential (total pressure minus static pressure) across a diaphragm. The two feel pressures are monitored by two identical differential pressure sensing mechanisms. When one feel pressure differs significantly from the other feel pressure, an electrical switch generates a fault message to the pilot on the EICAS status page.

H. Elevator Feel Unit and Actuator (Fig. 5)
   (1) The elevator feel unit and actuator are installed on the aft mechanism torque box. The feel unit generates column force by two means: (a) dual mechanical centering springs, and (b) a hydraulic feel actuator. The feel actuator is a dual-tandem, dual-load-path, floating-body actuator. The force output of the actuator is the force determined by the highest of the two feel pressures. The actuator imparts a pull force on the linkage of each output lever through the dual load path link and tie straps. The tie straps are arranged to give a high force gradient around neutral and lower force gradient for large displacements.

I. Neutral Shift and Override Mechanism (Fig. 5)
   (1) The neutral shift and override mechanism is installed on the aft mechanism torque box. The neutral shift mechanism is connected by control rods to the feel unit and stabilizer. The feel unit is reacted to ground on the horizontal stabilizer through an override in the neutral shift mechanism. This allows the stabilizer trim to introduce elevator neutral shift in the airplane nose down direction when the stabilizer is trimmed in the 0.0 to 4.0 unit range. The override in the neutral shift mechanism allows the control system to override the feel unit in the event of a jam in the feel actuator.

J. Asymmetry Limiter Actuator (Fig. 5)

(1) The linear actuator consists of a 28 volt dc reversible motor that drives an acme screw to extend and retract a ram. The motor assembly has a magnetic coil-operated disc brake that engages when the motor is de-energized. Extend and retract limit positions of the ram are controlled by electrical switches located under the switch cover. The asymmetry limiter actuator limits the maximum possible commanded elevator motion by limiting the travel between aft quadrants. The system is operational full time but is used only following a left or right elevator control jam. Asymmetry is limited to 24 degrees of elevator at low speeds and 8 degrees at high speeds. The actuator is installed on the first officer's aft quadrant.

K. Elevator Pressure Reducer and Bypass Valves (Fig. 7)

(1) One elevator pressure reducing valve is connected to each hydraulic system (L, R, C) and to the flight quadrant. The valves reduce hydraulic inlet pressure to a preset specified outlet pressure. A pressure bypass valve is operated by pressure from the right hydraulic system and is connected to the left hydraulic system. If the right system pressure is lost, the bypass valve will bypass the left pressure reducer and provide full left system pressure to the left system PCU.

(2) The pressure reducers and bypass valves are located on the forward side of the APU firewall.

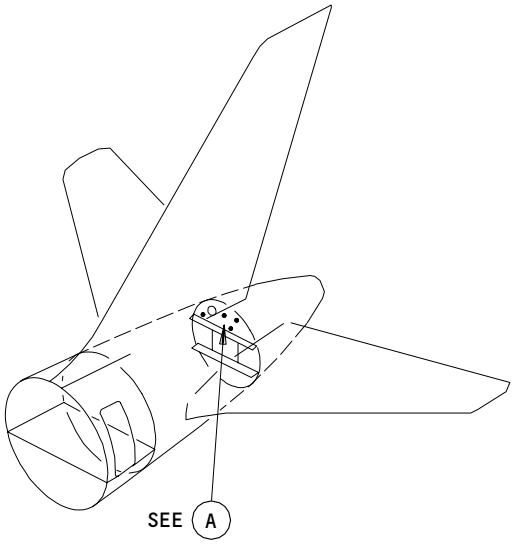
3. Operation

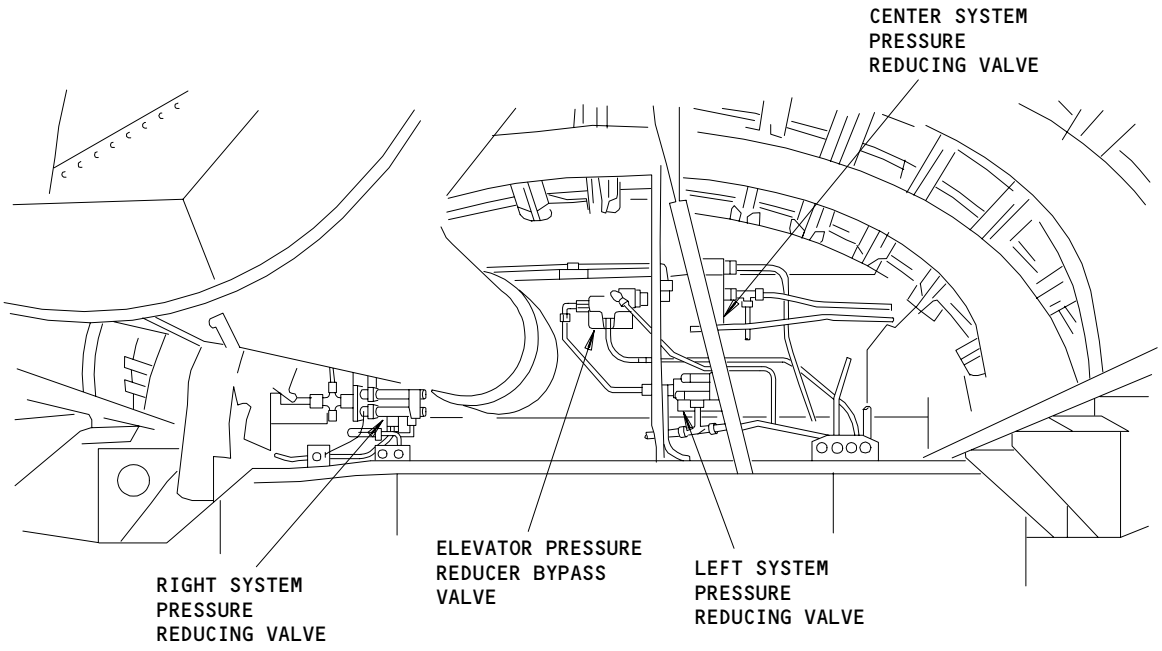
A. Functional Description (Fig. 8)

(1) Airplane hydraulic systems left, right, and center move the elevators in response to manual or electrical control inputs. Manual inputs are applied to either control column and electrical inputs come via the autopilot servos.

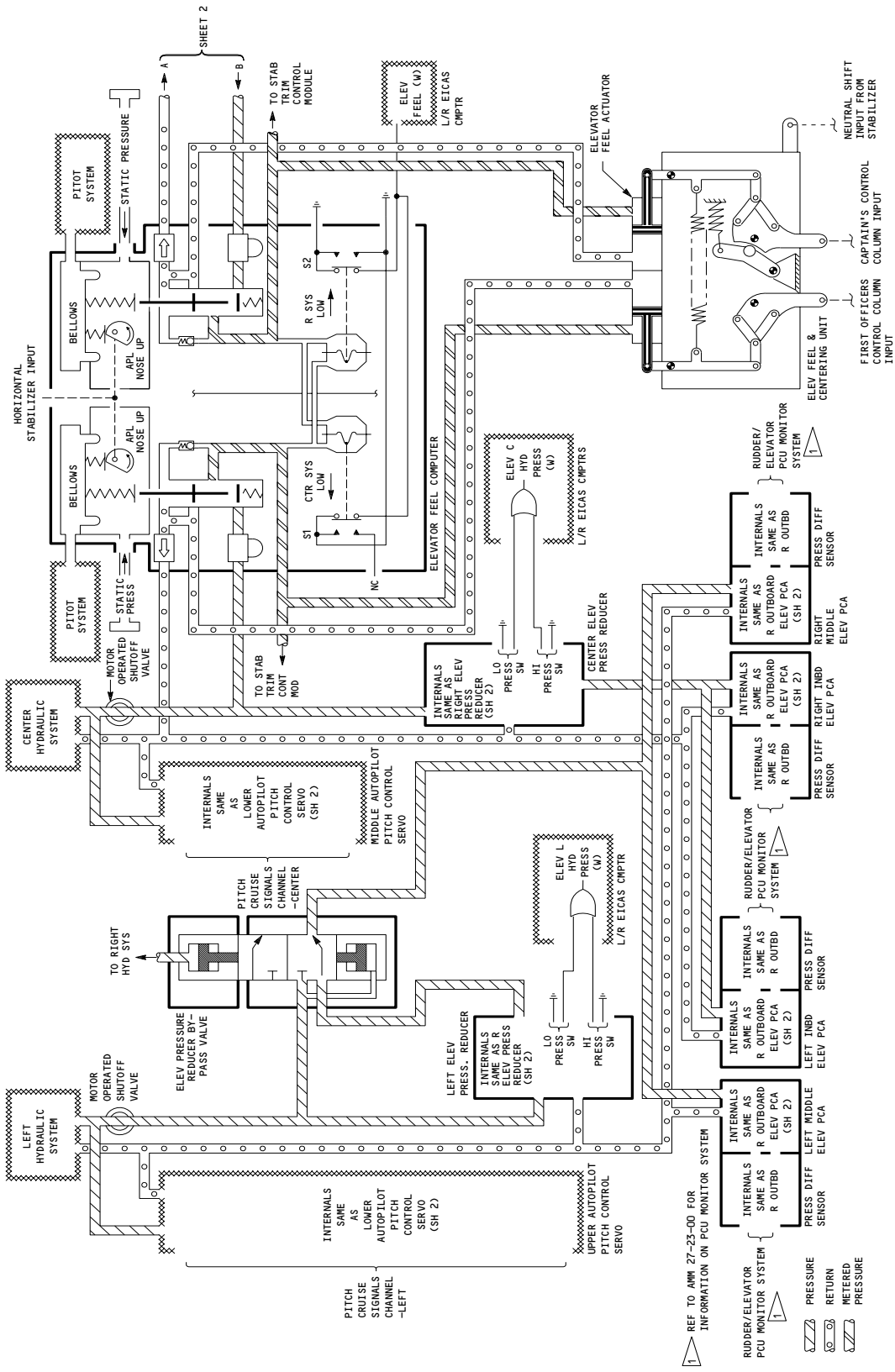
(2) In the manual mode, fore and aft movement of the control columns transmits motion from the forward quadrants to the aft quadrants by means of two sets of cables. As the control columns are displaced farther from neutral, the elevator feel unit imparts an increasing centering force to the control system.

(3) The feel force is controlled by the feel computer. The feel computer independently develops two feel pressures, using the right and center hydraulic systems. The feel unit uses the developed feel pressure to pressurize the two independent pistons of the feel actuator. This provides tension in the kinematic links of the feel unit. A difference in generated feel pressure will result in the feel actuator bottoming out on the piston with the lower pressure. The higher pressure will be used to develop the tension forces.



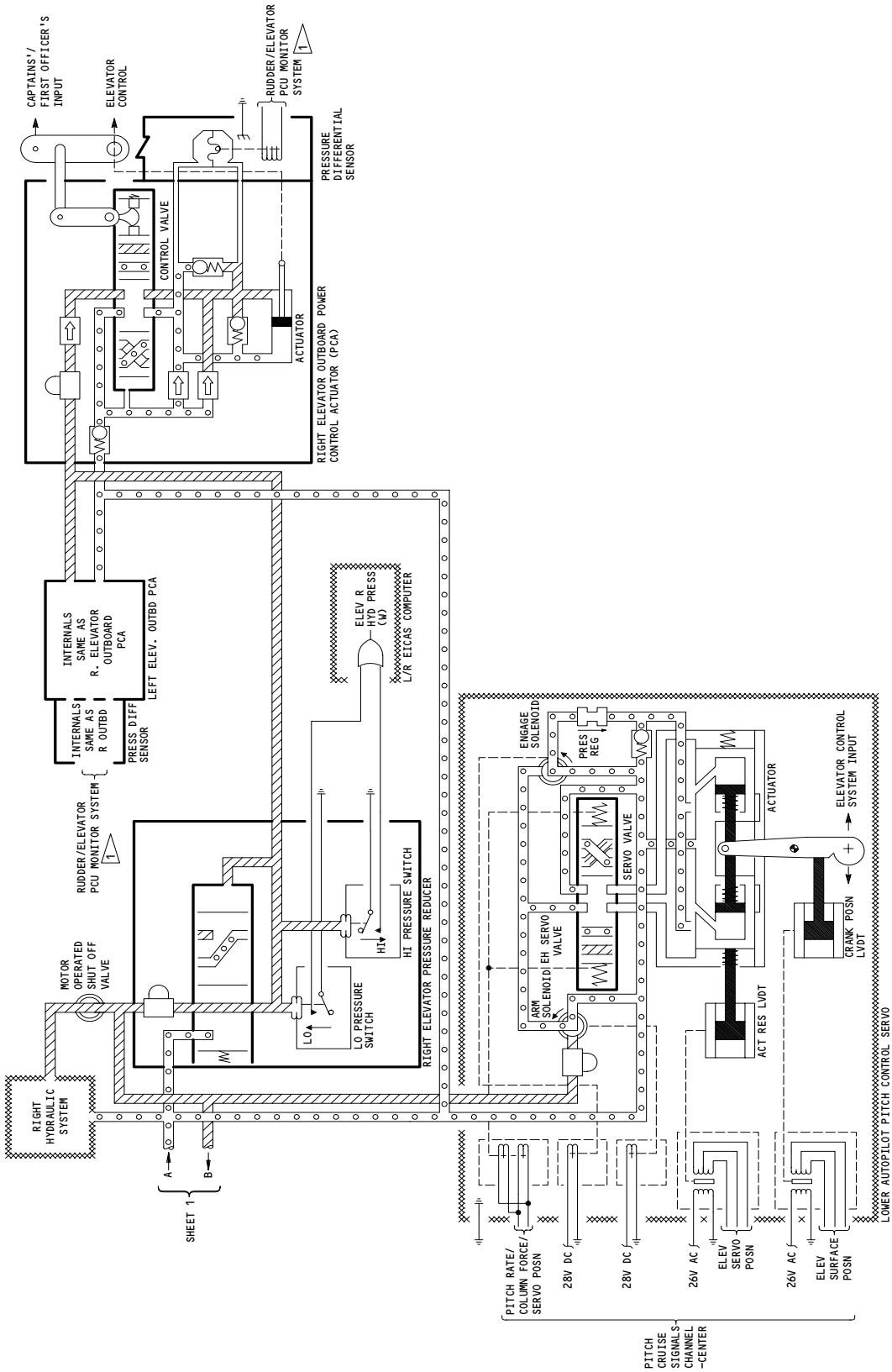


Elevator Pressure Reducer Valves and Bypass Valve
Figure 7

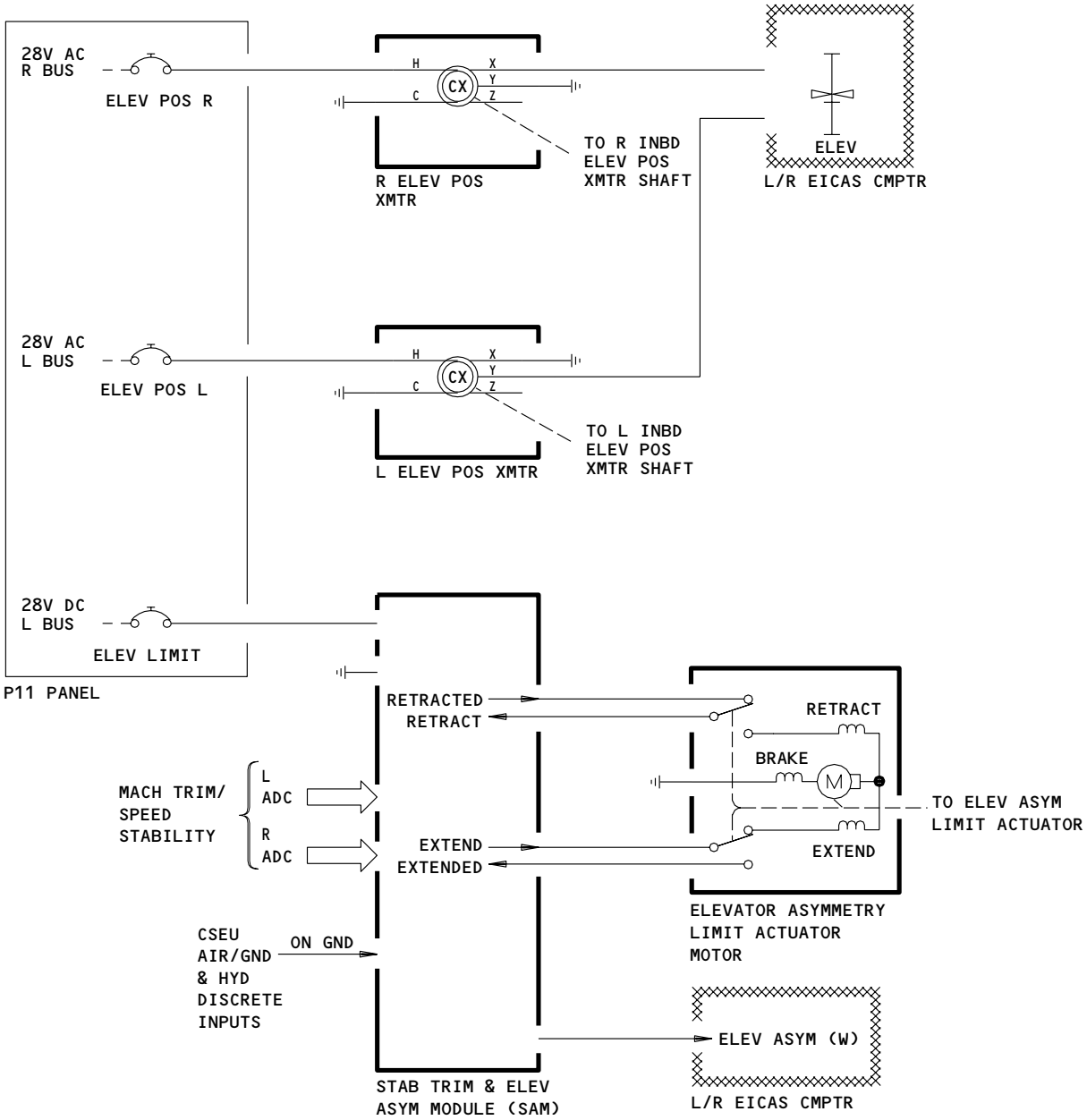


Elevator Control System Schematic (Hydraulic)
Figure 8 (Sheet 1)

168655



Elevator Control System Schematic (Hydraulic)
Figure 8 (Sheet 2)



Elevator Control System Schematic (Electrical)
Figure 8 (Sheet 3)

(4) The kinematic linkages develop the desired force gradient on each of the captain's and first officer's cranks. The forward and aft overrides couple the captain's and first officer's feel unit crank force gradients. This provides the desired column centering and force gradients. A loss of a single hydraulic pressure system will not affect the captain's or first officer's column force gradient. A loss of both hydraulic systems will result in reversion to the force gradient obtained from the full time, normally locked out, mechanical feel system. The feel force is transmitted through the aft quadrants back to the control columns.

(5) The aft quadrants transmit elevator inputs to the power control actuator (PCA) input bellcranks by control rods. The motion to each PCA summing link produces an error signal between the input and output positions. This error signal moves the servovalve, directing high pressure hydraulic fluid to one side of the piston, while venting the opposite side of the piston to return pressure. The resultant force unbalance moves the piston and elevator surface while the feedback summing link positions the servovalve input to reduce flow to the piston. Ultimately, the elevator surface reaches the desired position as the servovalve shuts off hydraulic flow to the piston. Control input stops at the captain's and first officer's aft quadrants limit maximum elevator that can be commanded without bottoming the PCU's.

(6) Elevator asymmetry between captain's and first officer's control system is limited at the aft quadrants by an electrical actuator. The actuator uses an electric motor to position a stop which limits the relative motion between the captain's and first officer's aft quadrants. The motor operates in response to an extend or retract discrete from the stabilizer/elevator asymmetry limiter module (SAM). Switches on the motor output provide signals back to the SAM to indicate if the motor is in the extended or retracted position. The system is operational full time. Asymmetry is limited to 24 degrees at low speeds and 8 degrees at high speeds.

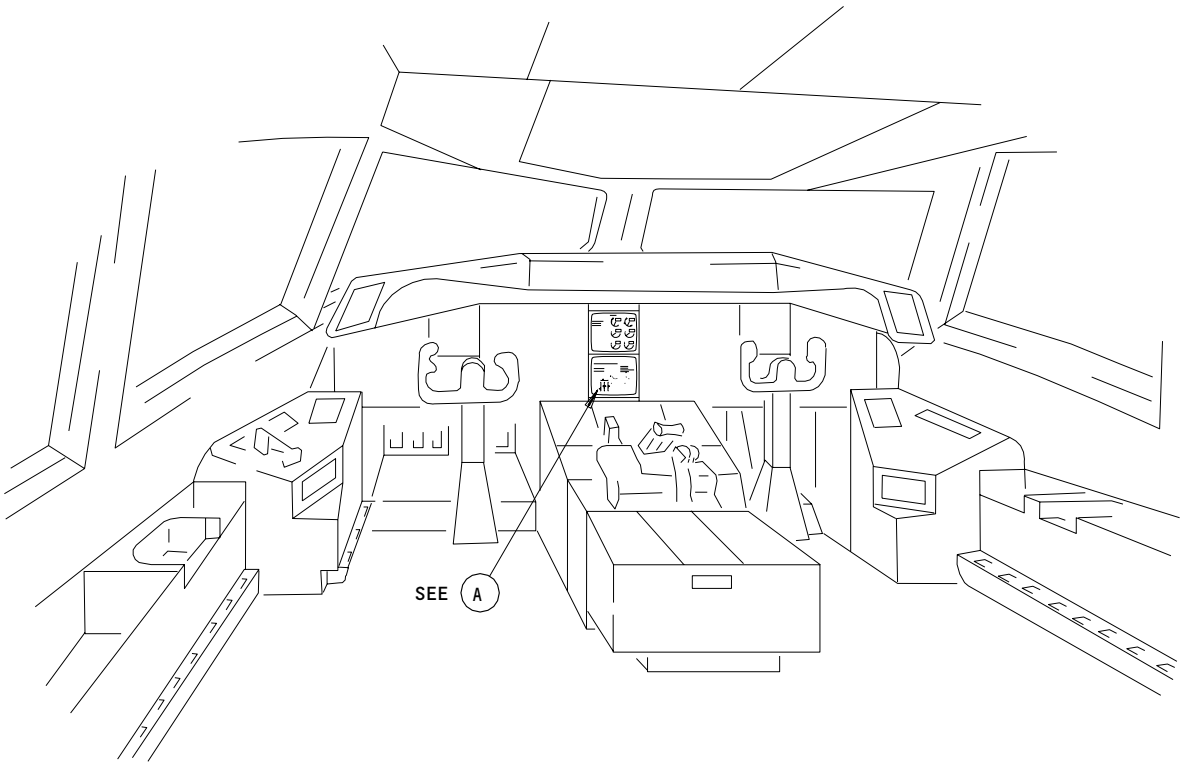
(7) Three identical autopilot servos are provided to drive the elevator control system in parallel with the captain's and first officer's manual system. The servos provide inputs to the control system at the aft quadrants. Each servo is designed to operate either as a single-channel, force-limited servo during climb, cruise, and descent operation or as a three-channel, force-summed system during automatic landings. (See 22-10-00, Autopilot/Flight Director Pitch Channel - Description and Operation).

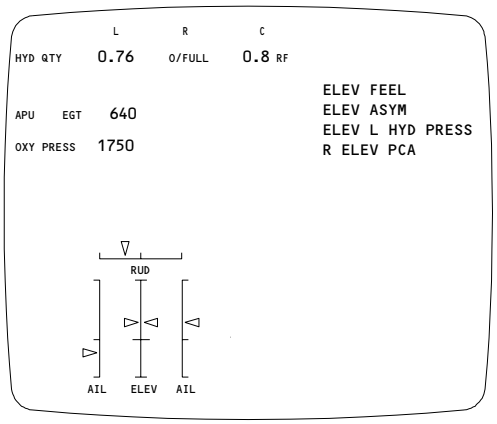
B. Fault Indication (Fig. 9)
   (1) Elevator control system fault monitoring is provided by the SAM and EICAS system. The SAM provides fault monitoring of the elevator/asymmetry limiter actuator. The EICAS system elevator fault monitoring can be obtained by pushing the STATUS button or one of the maintenance buttons on the EICAS MAINT panel.
   (2) A PCU monitor system is installed to monitor hydraulic pressure in the power control actuators (PCAs) to detect and warn of an excessive pressure differential (above 1140-1350 psi) between the PCAs (PCA force-fight). (Ref 27-23-00 for PCU Monitor System Description and Operation.)

C. Control
   (1) Manual Operation
      (a) Provide electrical power (Ref 24-22-00).
      (b) Check that EICAS circuit breakers (6 places) on panel P11 are closed.
      (c) Check that L and R ENG OIL PRESS (11K9, 11K35) circuit breakers on panel P11 are closed.
      (d) Check that R, L, and C FLT CONT S/O TAIL (11H20, 11H17, 11H18) circuit breakers on overhead circuit breaker panel P11 are closed.
      (e) Check that R, L, and C FLT CONT SHUTOFF TAIL valve switches on sidewall panel P61 are in ON position.

      WARNING: AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. CHECK THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT COULD OCCUR.

      (f) Pressurize left, right, and center hydraulic systems (Ref 29-11-00).
      (g) Pull control columns aft to stop and hold. Check that both elevators move up smoothly to their full travel, and that both elevator position indicators travel to approximately full travel tick mark on the EICAS screen.
      (h) Release control columns. Check that elevators, control columns, and position indicators return to neutral positions unassisted.
      (i) Push control columns forward to stop and hold. Check that both elevators move down smoothly to their full travel, and that both elevator position indicators travel to approximately full travel tick mark on the EICAS screen.
      (j) Release control columns. Check that elevators, control columns, and position indicators return to neutral positions unassisted.
      (k) Remove left, right, and center systems hydraulic power (Ref 29-11-00).
      (l) Remove electrical power (Ref 24-22-00).





LOWER EICAS DISPLAY STATUS PAGE

A

Elevator Control and Fault Indication
Figure 9

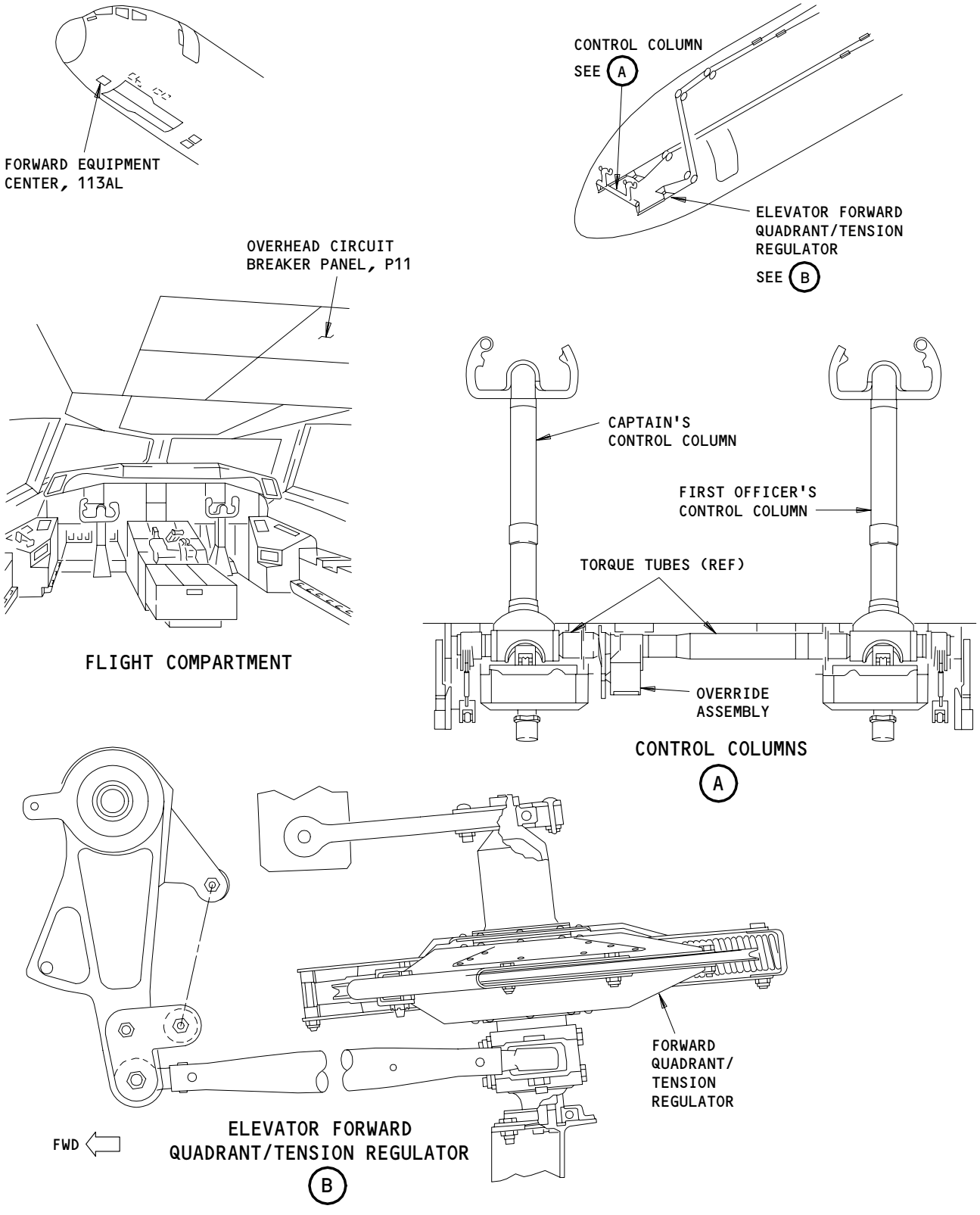
(2) Autopilot Operation
    (a) Refer to 22-12-00, Autopilot/Flight Director Pitch Channel - Description and Operation for elevator control in the auto flight mode.

ELEVATOR CONTROL SYSTEM

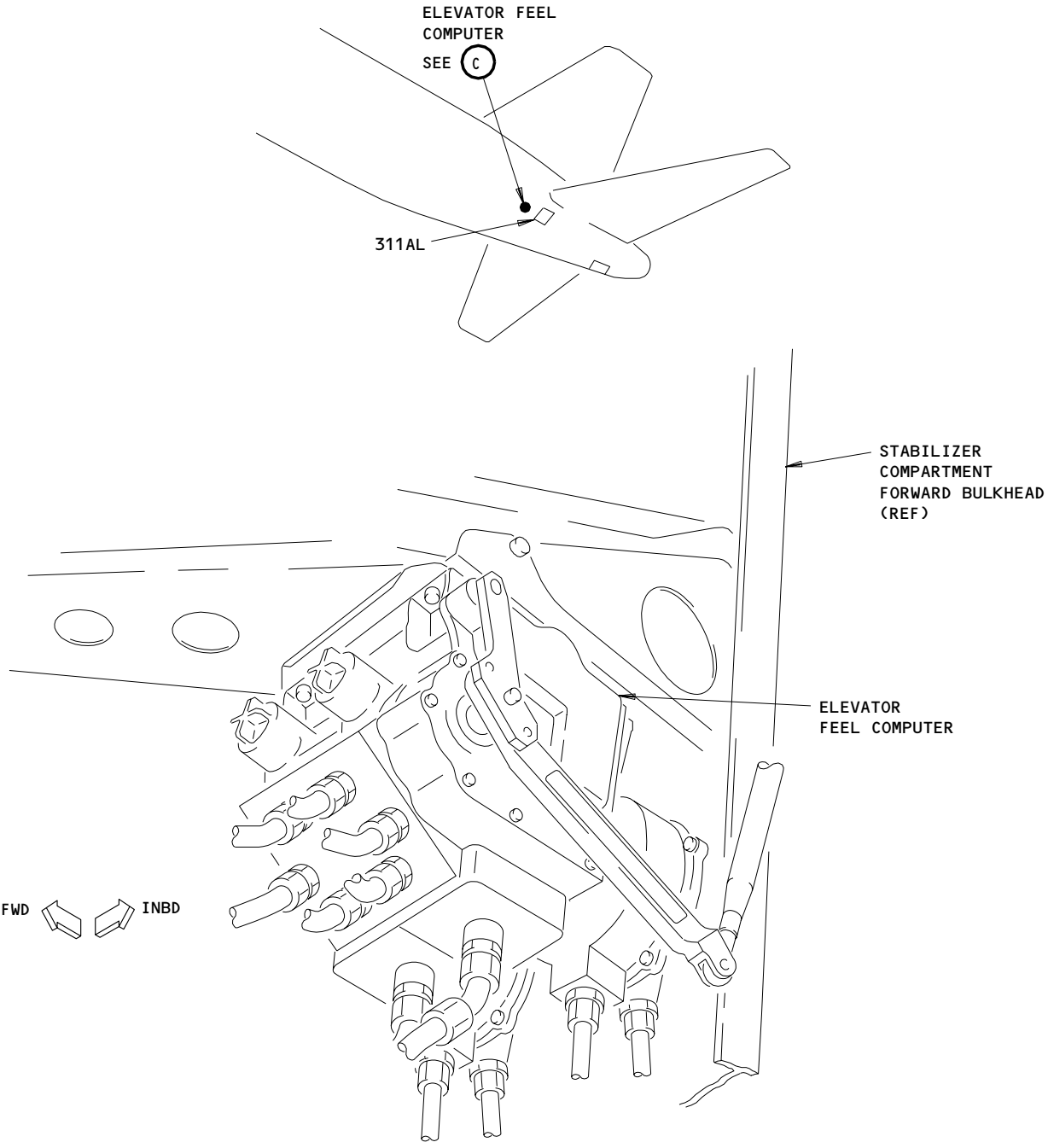
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR – ELEVATOR ASYMMETRY LIMITER, M10048	3	1	313AL, AFT FUSELAGE	27-31-03
ACTUATOR – ELEVATOR FEEL	4	1	313AL, AFT FUSELAGE	27-31-18
ACTUATOR – ELEVATOR POWER CONTROL (PCA)	4	6	335DB (L PCAs),345DB (R PCAs)	27-31-05
CIRCUIT BREAKERS –	1		FLT COMPT, P11	
ELEVATOR LIMIT, C4032		1	11J12	*
ELEVATOR POSITION L, C4101		1	11J13	*
ELEVATOR POSITION R, C4102		1	11J22	*
PCU MON MOD, C4270		1	11J11	*
PCU MON SENSOR, C4283		1	11J10	*
COLUMN – CONTROL	1	2	113AL, FWD EQUIP CTR	27-31-10
COMPUTERS – (31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
COMPUTER – ELEVATOR FEEL	2	1	311AL	27-31-19
ELEVATOR –	4	2	HORIZONTAL STAB REAR SPAR	27-31-01
FEEL AND CENTERING UNIT – ELEVATOR	3	1	311AL, AFT FUSELAGE	27-31-17
MECHANISM – NEUTRAL SHIFT AND OVERRIDE	4	1	313AL, AFT FUSELAGE	27-31-21
MODULES – (27-09-00/101)				
STABILIZER TRIM/ELEV ASYM LIMIT L, M524				
STABILIZER TRIM/ELEV ASYM LIMIT R, M525				
OVERRIDE – CONTROL COLUMN	1	1	113AL, FWD EQUIP CTR	27-31-23
QUADRANT – ELEV AFT	3	2	311AL,313AL, AFT FUSELAGE	27-31-15
QUADRANT – ELEV FWD/TENSION REGULATOR	1		113AL, FWD EQUIP CTR	27-31-12
SERVOS – (22-12-00/101)				
AUTOPILOT PITCH CONTROL C, M272				
AUTOPILOT PITCH CONTROL L, M271				
AUTOPILOT PITCH CONTROL R, M273				
TORQUE BOX – ELEV CONT AFT MECHANISM	3	1	311AL,313AL AFT FUSELAGE	27-31-16
TRANSDUCERS – (22-12-00/101)				
ELEV NEUTRAL SHIFT C, TS5135				
ELEV NEUTRAL SHIFT L, TS5151				
ELEV NEUTRAL SHIFT R, TS5152				
TRANSMITTERS – (27-38-00/101)				
ELEVATOR POS L, M517				
ELEVATOR POS R, M518				
VALVE – PRESSURE REDUCER BYPASS	5	1	311AL, AFT FUSELAGE	27-31-13
VALVE – PRESSURE REDUCING	5	3	311AL, AFT FUSELAGE	27-31-13

* SEE THE WDM EQUIPMENT LIST

Elevator Control System – Component Index
Figure 101

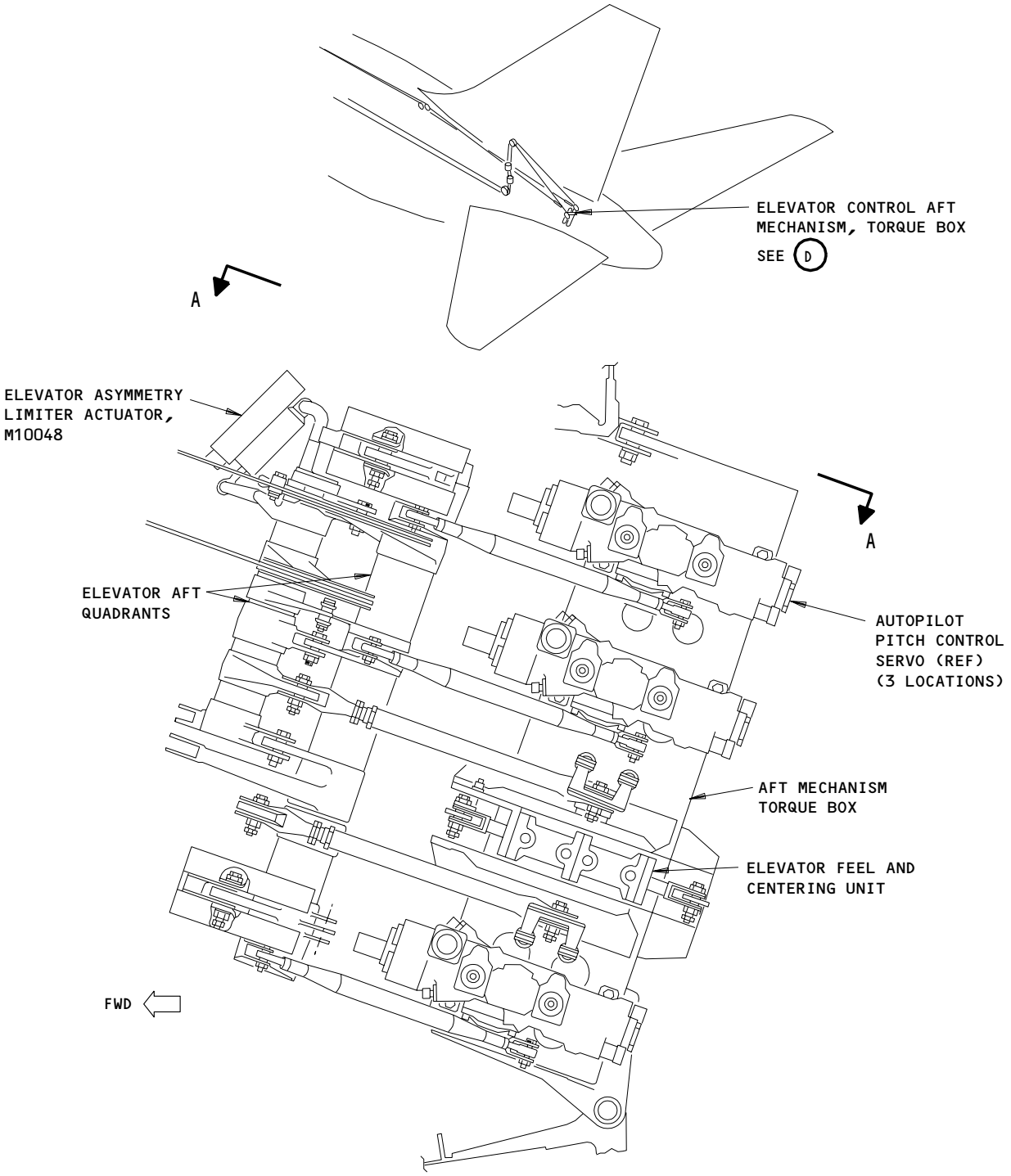


Elevator Control System – Component Location
Figure 102 (Sheet 1)



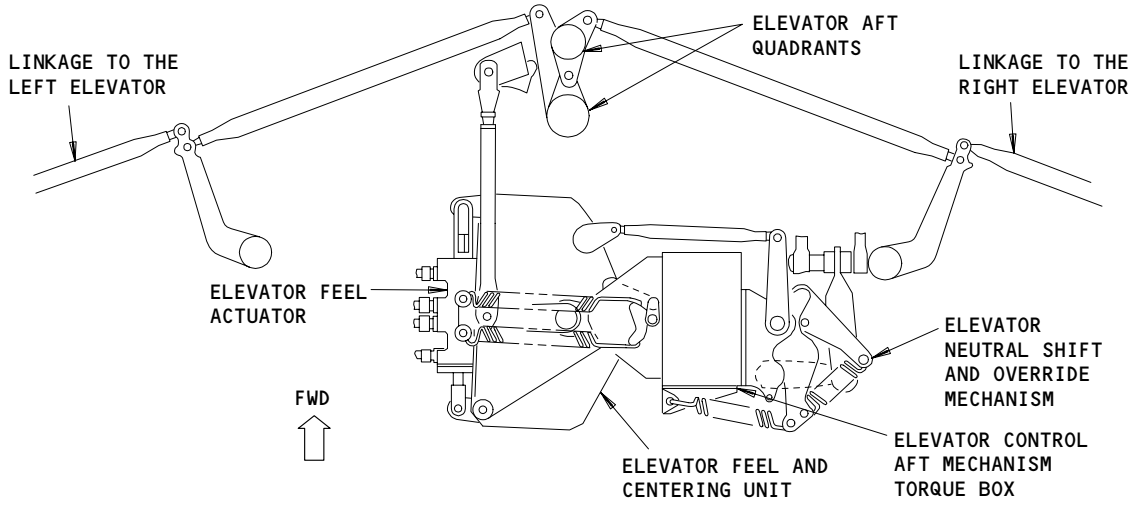
ELEVATOR FEEL COMPUTER
C

Elevator Control System – Component Location
Figure 102 (Sheet 2)



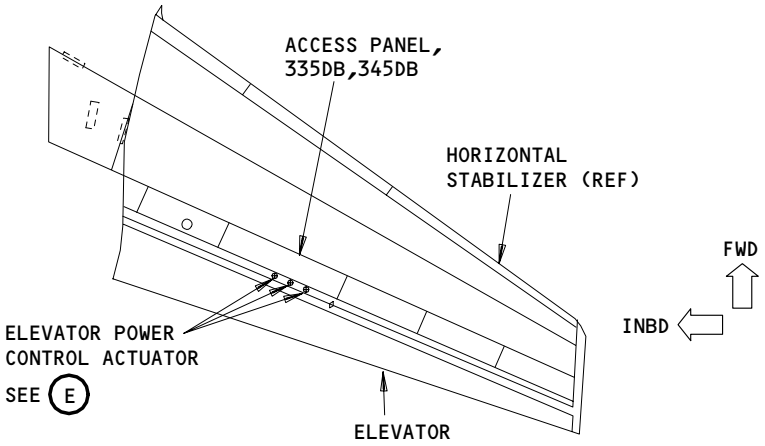
ELEVATOR CONTROL AFT MECHANISM, TORQUE BOX
(D)

Elevator Control System – Component Location
Figure 102 (Sheet 3)

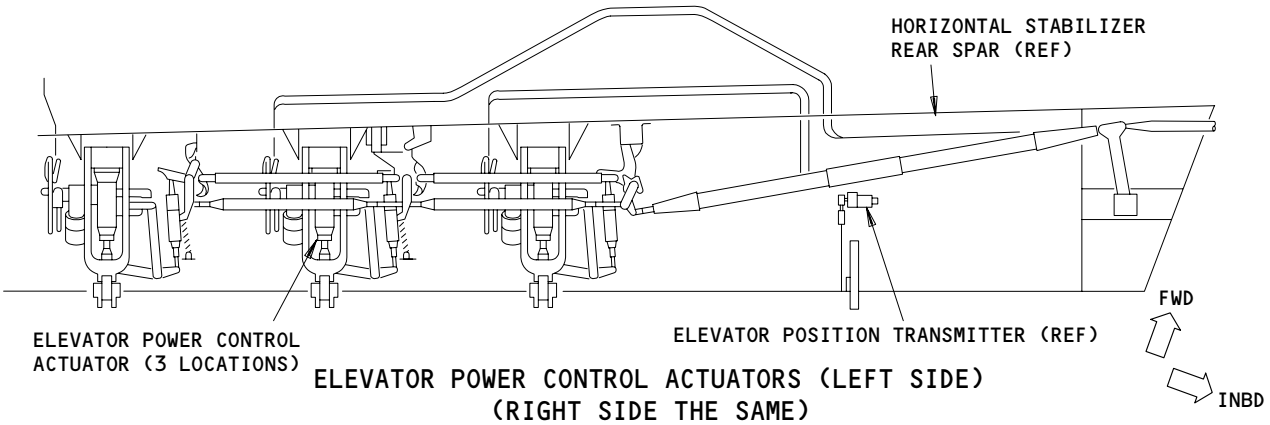


ELEVATOR CONTROL AFT MECHANISM, TORQUE BOX

A-A (FROM SHT 3)



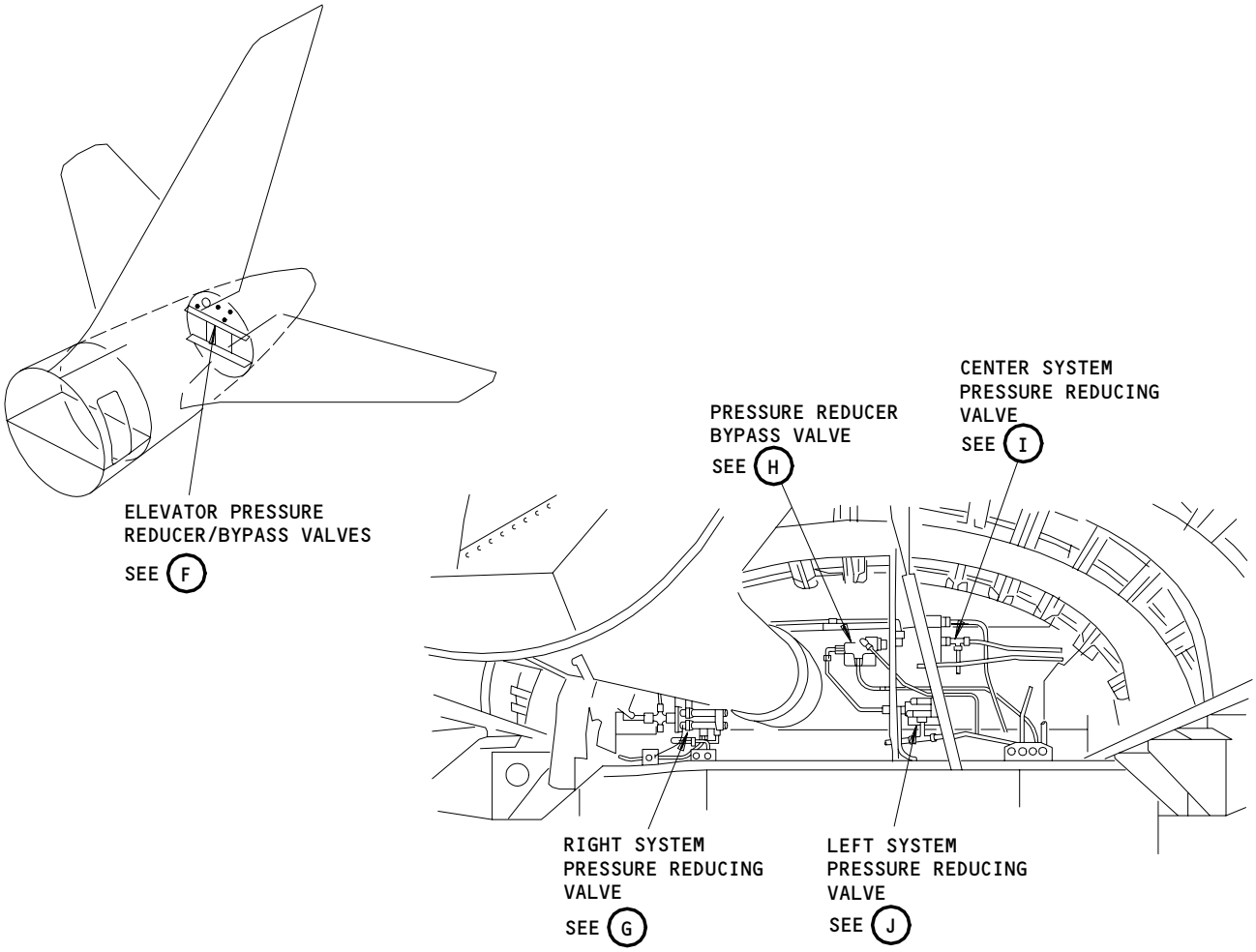
HORIZONTAL STABILIZER AND ELEVATOR (BOTTOM VIEW)



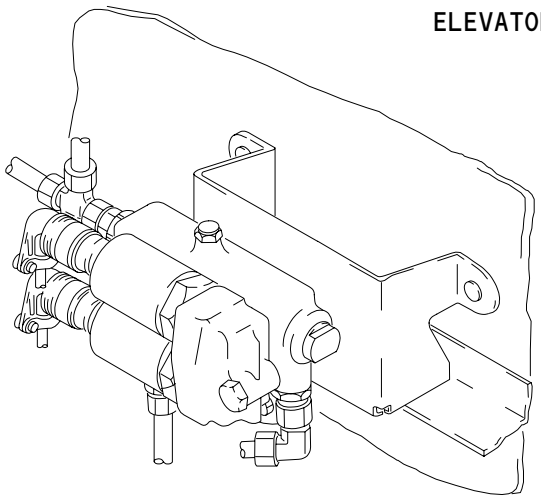
ELEVATOR POWER CONTROL ACTUATORS (LEFT SIDE)
(RIGHT SIDE THE SAME)

(E)

Elevator Control System - Component Location
Figure 102 (Sheet 4)

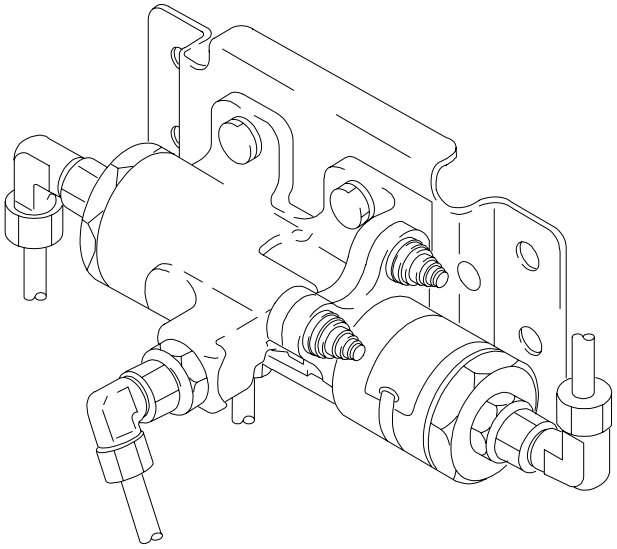


ELEVATOR PRESSURE REDUCER/BYPASS VALVES
F



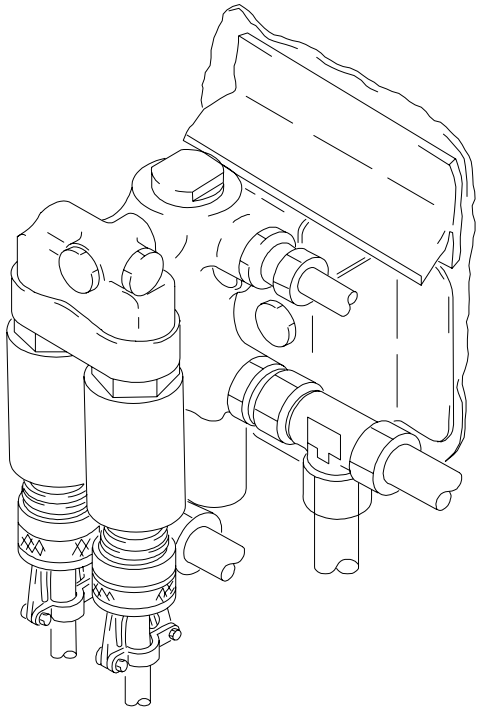
RIGHT SYSTEM PRESSURE REDUCING VALVE
G

Elevator Control System – Component Location
Figure 102 (Sheet 5)



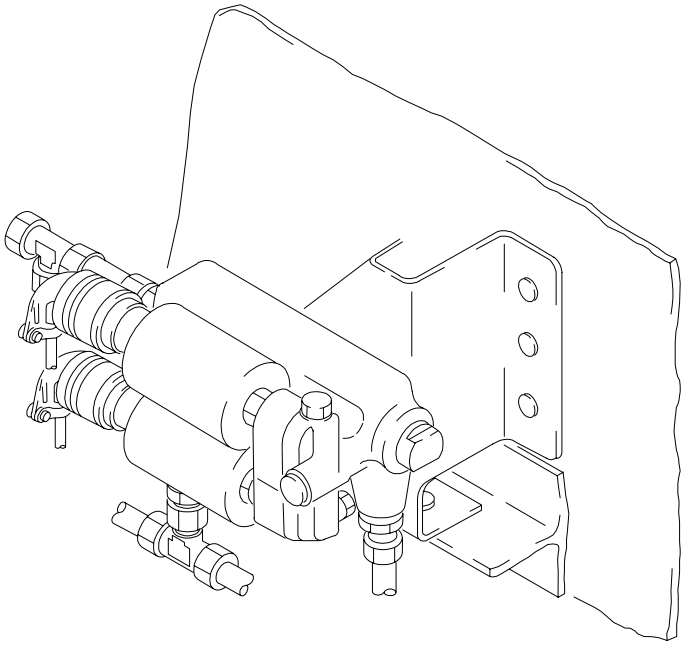
PRESSURE REDUCER BYPASS VALVE

(H)



CENTER SYSTEM PRESSURE REDUCING VALVE

(I)



LEFT SYSTEM PRESSURE REDUCING VALVE

(J)

Elevator Control System - Component Location (Details from Sht 5)
Figure 102 (Sheet 6)

ELEVATOR CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains these tasks for the operational test, adjustment, and system tests for the elevator control system:
      (1) Elevator Control System - Operational Test
      (2) Elevator Control System - Adjustment
      (3) Elevator Control System - System Test
      (4) Elevator Column and Quadrant Override Test
      (5) Elevator Pressure Bypass Valve Test (Procedure 1 and 2)
      (6) Elevator with Each Hydraulic System
   B. The "Elevator Control System - System Test" task contains the instructions to do tasks "Elevator Column and Quadrant Override Test" and "Elevator Pressure Bypass Valve Test (Procedure 1 and 2)" shown above. Thus, if you do all the steps in the "Elevator Control System - System Test" task, it will not be necessary to do tasks "Elevator Column and Quadrant Override Test" and "Elevator Pressure Bypass Valve Test (Procedure 1 and 2)".

      Tasks "Elevator Column and Quadrant Override Test" and "Elevator Pressure Bypass Valve Test (Procedure 1 and 2)" are necessary only for scheduled maintenance.

TASK 27-31-00-715-331

2. Elevator Control System - Operational Test
   A. General
      (1) This task contains the operational test procedure for the elevator control system, which contains these topics:

          - Elevator Control System
          - Elevator System Override

   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin

   D. Prepare for the Operational Test

      S 865-332
      (1) Supply electrical power (AMM 24-22-00/201).

      S 215-333
      (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) EICAS (6 locations)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11H17, FLT CONT SHUTOFF TAIL LEFT

(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(g) 11K9, LEFT ENGINE OIL PRESS
(h) 11K35, RIGHT ENGINE OIL PRESS

S 215-334

(3) Make sure that the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 215-335

(4) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 865-336

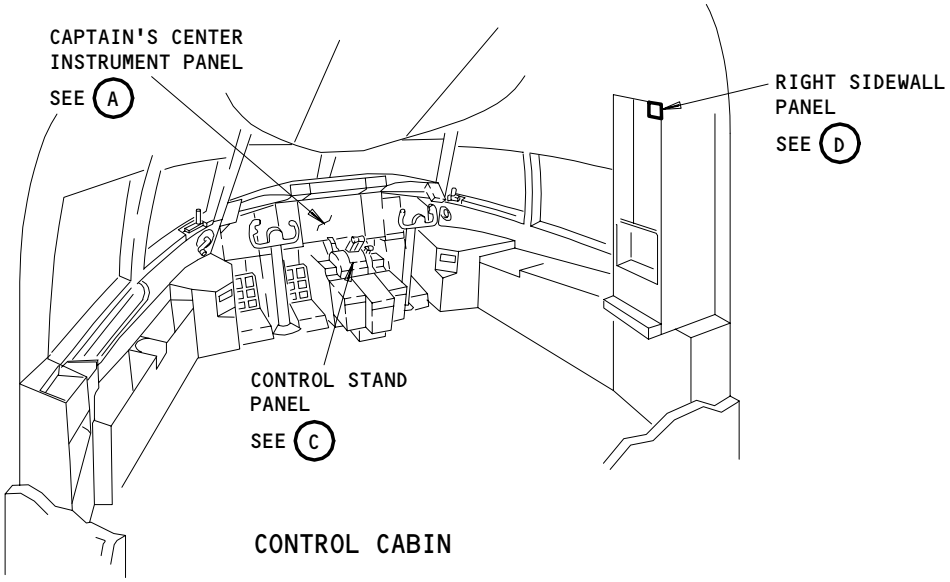
WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).

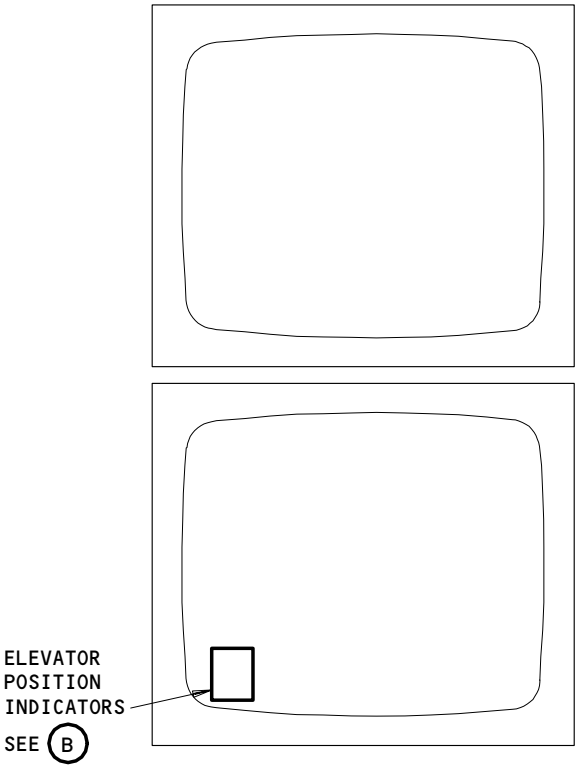
E. Operational Test - Elevator Control System

S 715-001

(1) Do the steps that follow to make sure the elevator control system operates correctly:
(a) Use the alternate stab trim switches to move the horizontal stabilizer to 6 units of trim on the position indicators.
(b) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.
(c) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
2) 11C12, STAB TRIM SHUTOFF LEFT
3) 11C13, STAB TRIM SHUTOFF RIGHT
4) 11H11 or 11C05, STAB TRIM CONT L



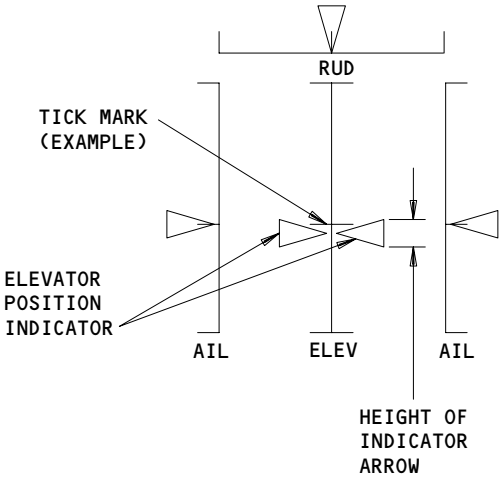
CONTROL CABIN



EICAS SCREEN

CAPTAIN'S CENTER INSTRUMENT PANEL

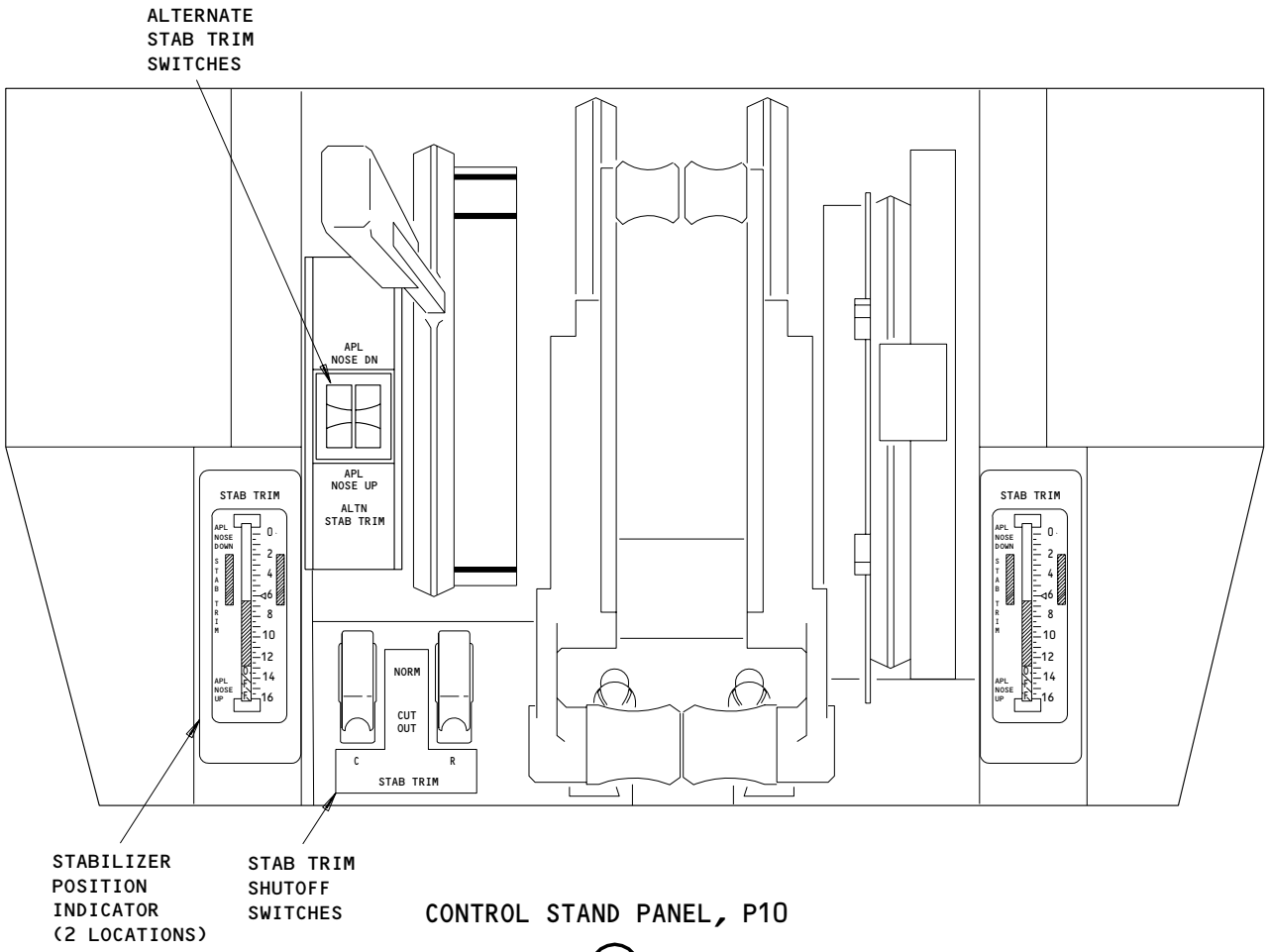
A



ELEVATOR POSITION INDICATORS

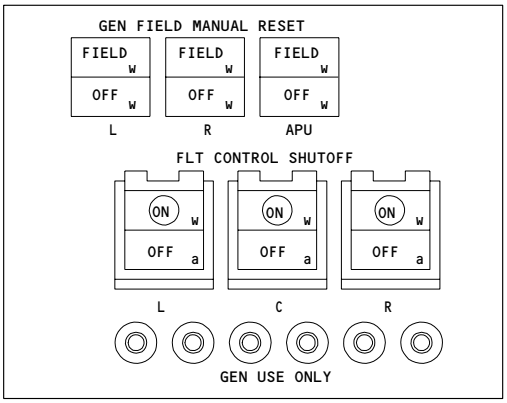
B

Elevator Control System (Control Cabin)
Figure 501 (Sheet 1)



CONTROL STAND PANEL, P10

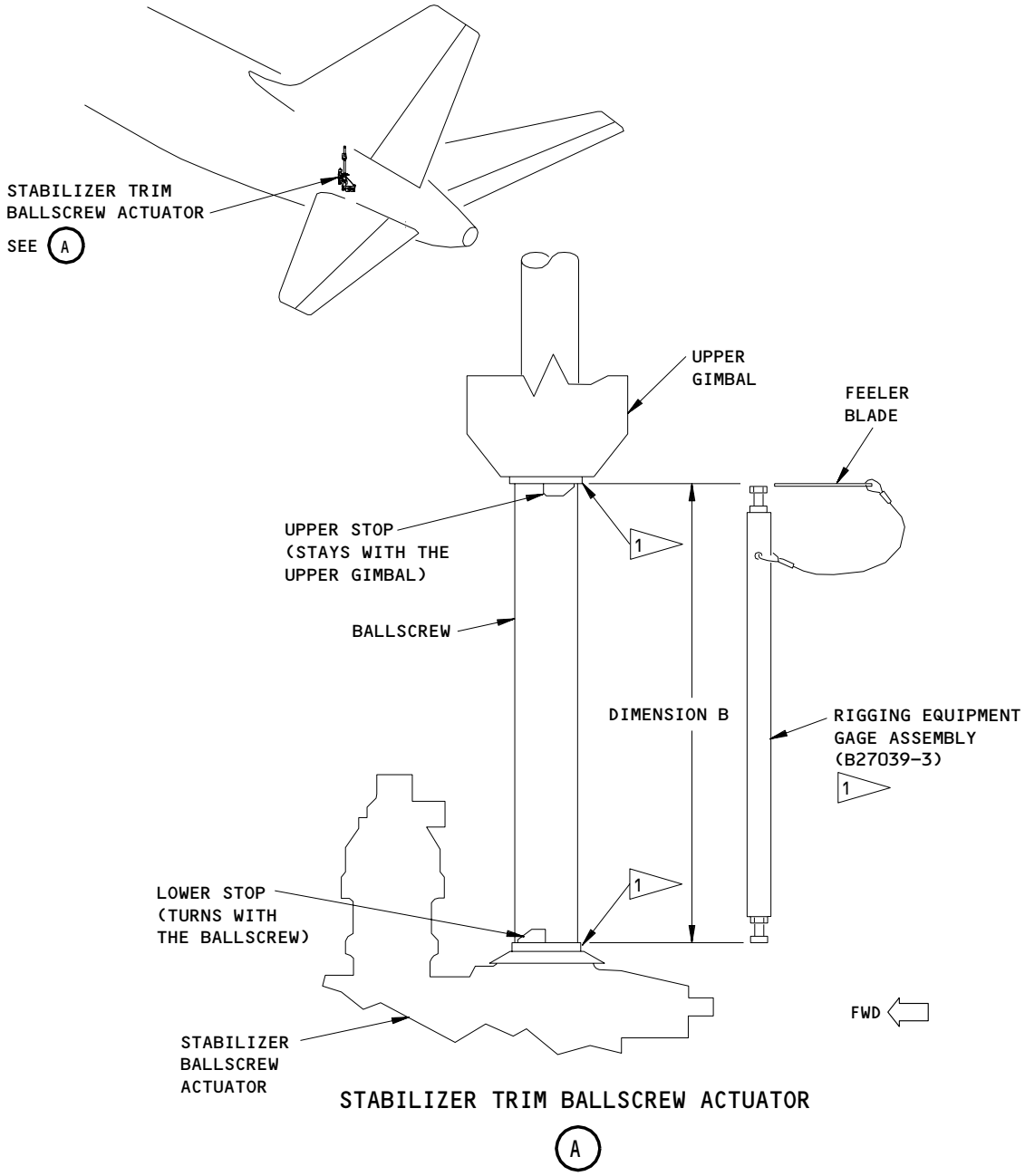
C



RIGHT SIDE PANEL, P61

D

Elevator Control System (Control Cabin)
Figure 501 (Sheet 2)



STABILIZER TRIM BALLSCREW ACTUATOR

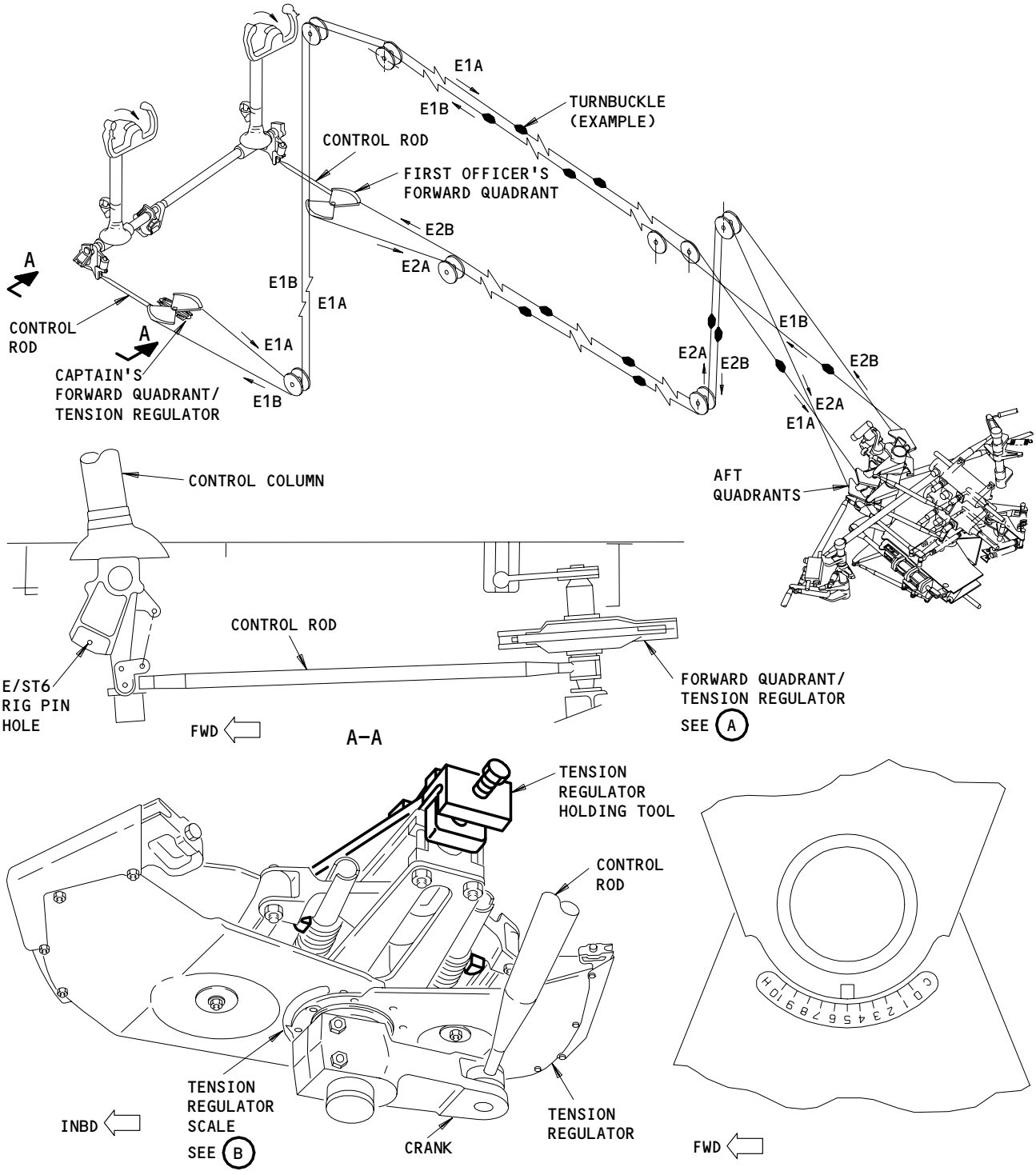
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.30 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SUCH THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 502

Not Used
Figure 503



FORWARD QUADRANT/TENSION REGULATOR
(CAPTAIN'S QUADRANT ONLY)

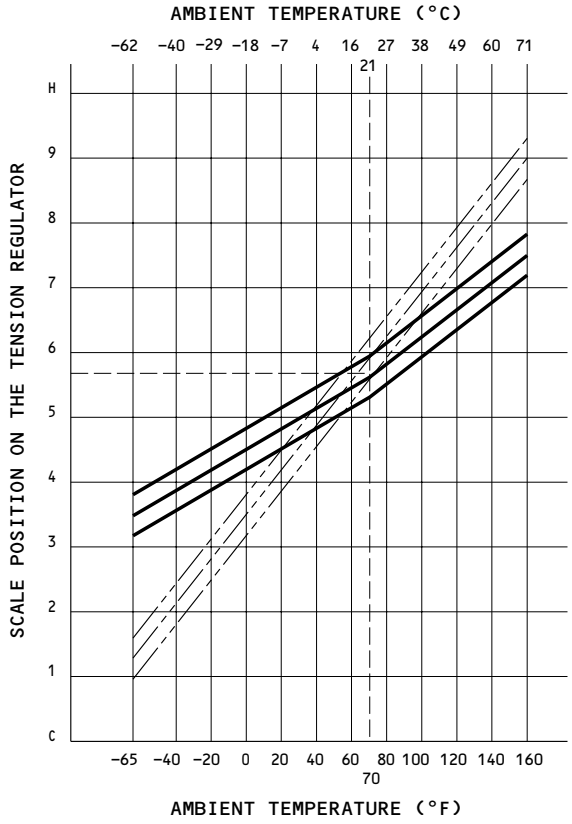
A

TENSION REGULATOR SCALE

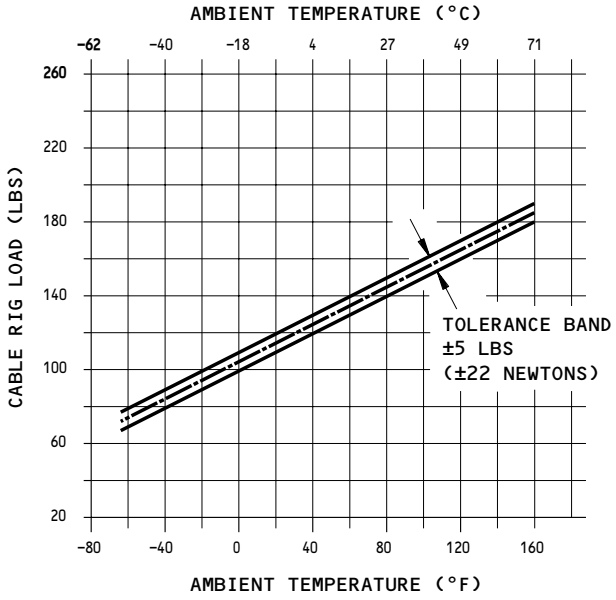
B

Elevator Control Cable Adjustment
Figure 504 (Sheet 1)

290898



TENSION REGULATOR
SCALE SETTING vs TEMPERATURE
(CAPTAIN'S FORWARD QUADRANT)



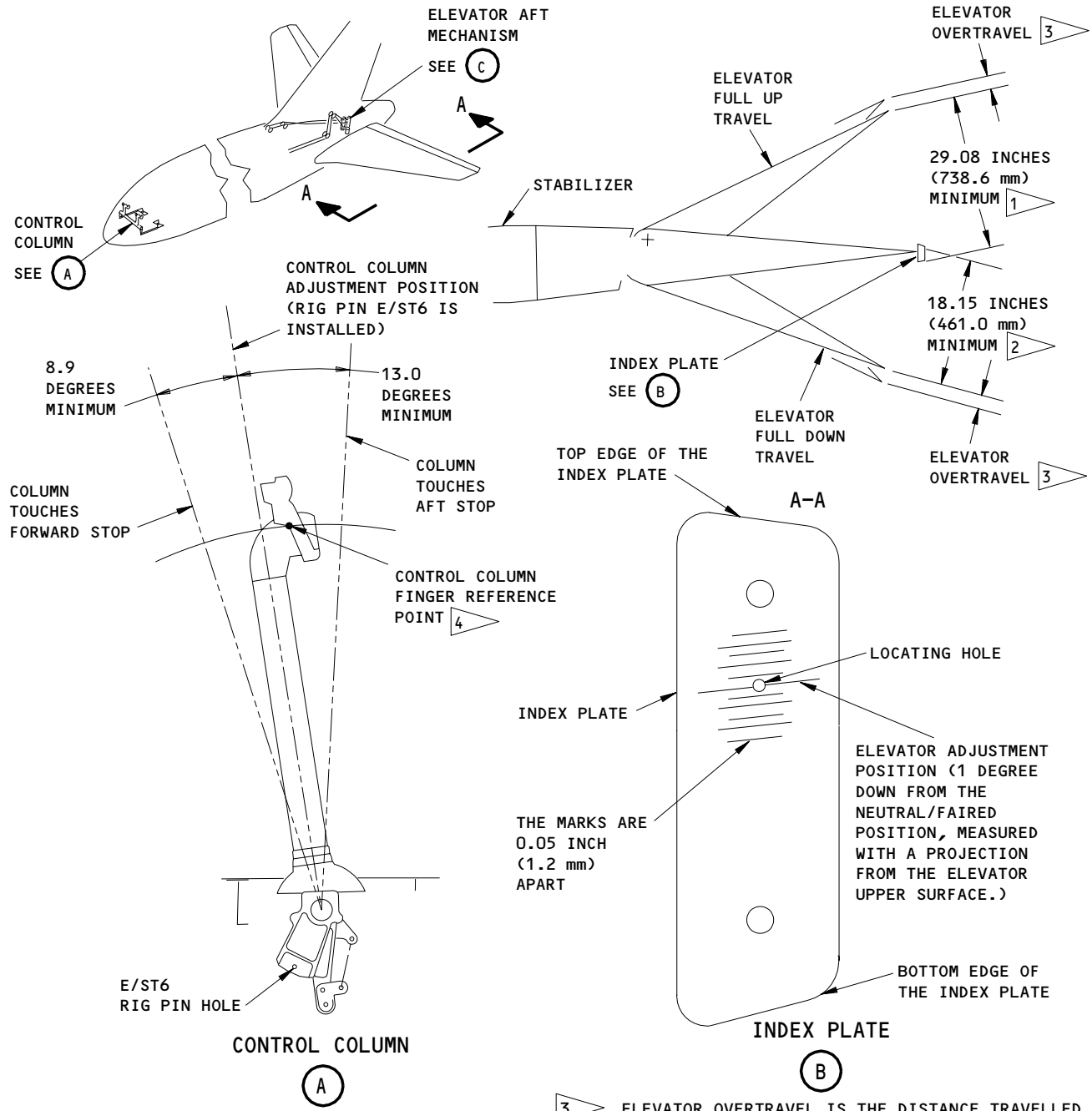
CABLE TENSION vs TEMPERATURE
(FIRST OFFICER'S FORWARD QUADRANT)

THE PRESSURIZED AREA IS AT 70°F (21°C).
THE AREA THAT IS NOT PRESSURIZED IS
AT AMBIENT TEMPERATURE

BOTH THE PRESSURIZED AND NOT PRESSURIZED
AREA ARE AT AMBIENT TEMPERATURE

NOTE: THE TEMPERATURE OF THE AREA THAT IS NOT PRESSURIZED MUST BE LESS THAT ±10°F (±5.5°C) OF THE AMBIENT TEMPERATURE AND MUST BE STABLE FOR ONE HOUR IMMEDIATELY BEFORE ADJUSTMENT.

Elevator Control Cable Adjustment
Figure 504 (Sheet 2)



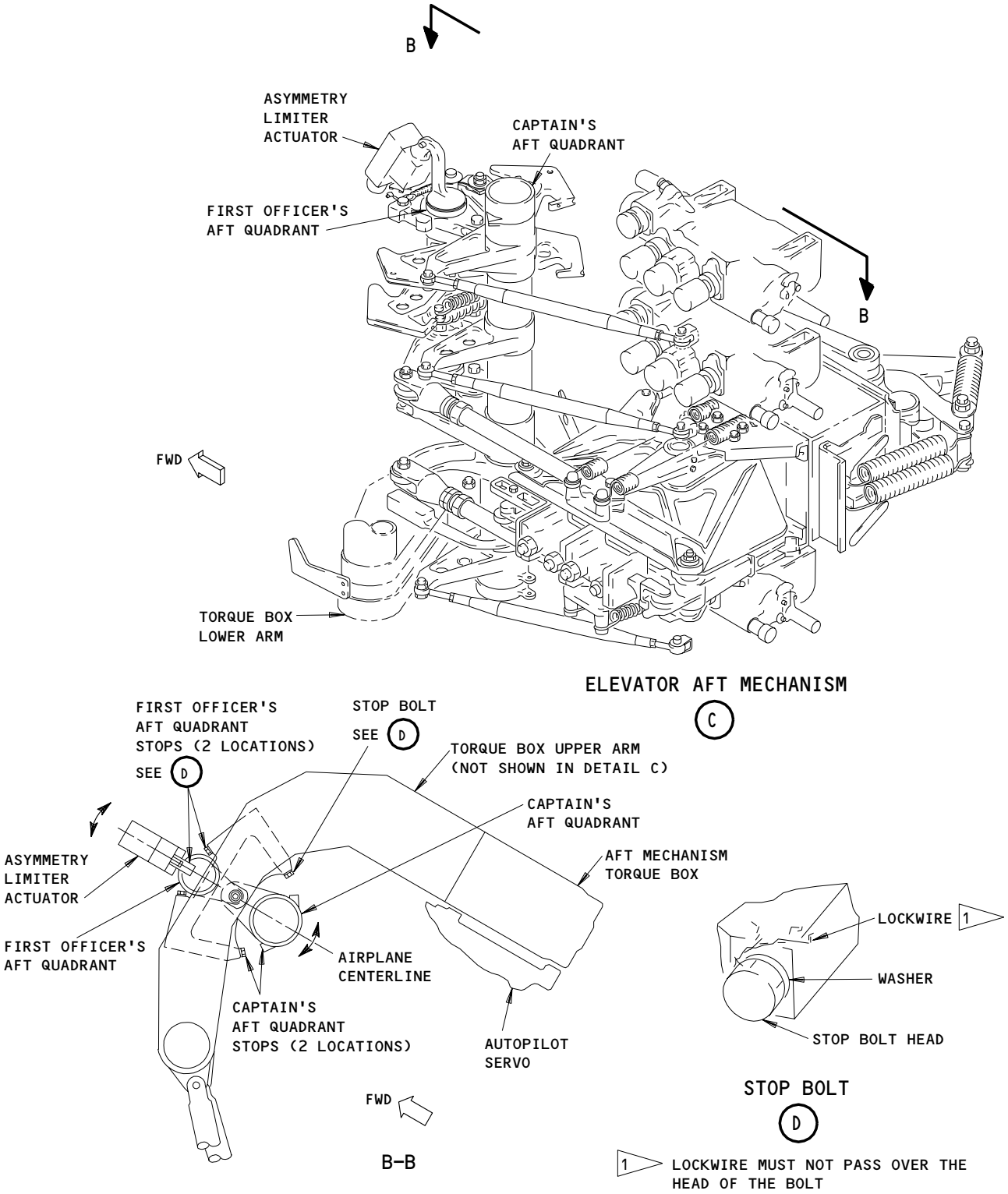
1 ELEVATOR UP TRAVEL IS THE STRAIGHT LINE DISTANCE FROM THE BOTTOM EDGE OF THE INDEX PLATE TO THE INBOARD CORNER OF THE UPPER SURFACE OF THE ELEVATOR TRAILING EDGE

2 ELEVATOR DOWN TRAVEL IS THE STRAIGHT LINE DISTANCE FROM THE TOP EDGE OF THE INDEX PLATE TO THE INBOARD CORNER OF THE UPPER SURFACE OF THE ELEVATOR TRAILING EDGE

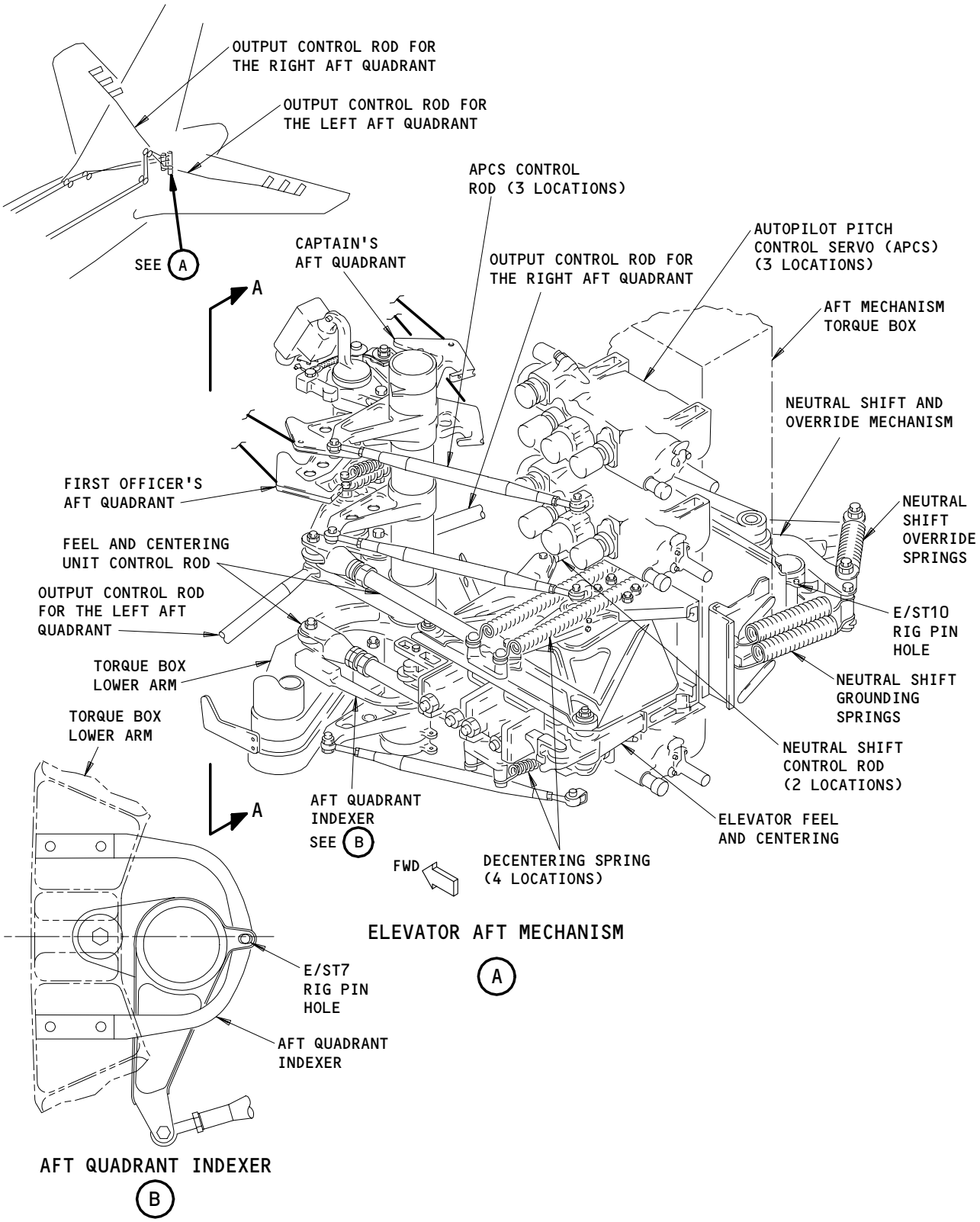
3 ELEVATOR OVERTRAVEL IS THE DISTANCE TRAVELLED WITH POWER SUPPLIED AND THE PCA LINKAGES DISCONNECTED AND THE PCAS ARE MANUALLY MOVED TO BOTTOM. OVERTRAVEL MUST BE A LEAST 0.50 INCH (12.7 mm) LARGER THAN THE MEASURED TRAVEL WITH THE PCAS SUPPLIED WITH POWER.

4 THE FINGER REFERENCE POINT IS 1.0 INCH (25 mm) BELOW THE CENTER OF THE CONTROL WHEEL HUB.

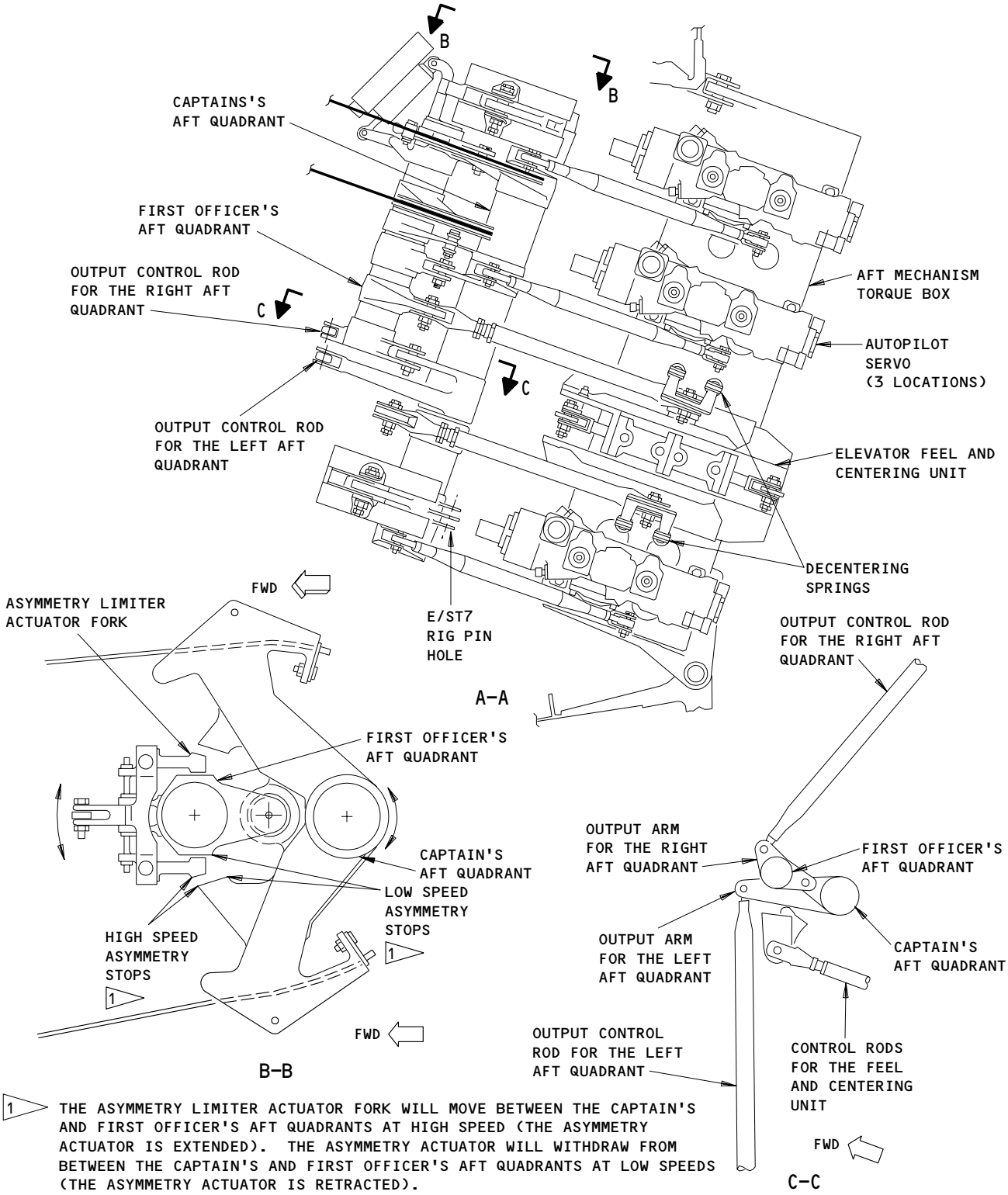
Elevator Control System Travel Measurements
Figure 505 (Sheet 1)



Elevator Control System Travel Measurements
Figure 505 (Sheet 2)

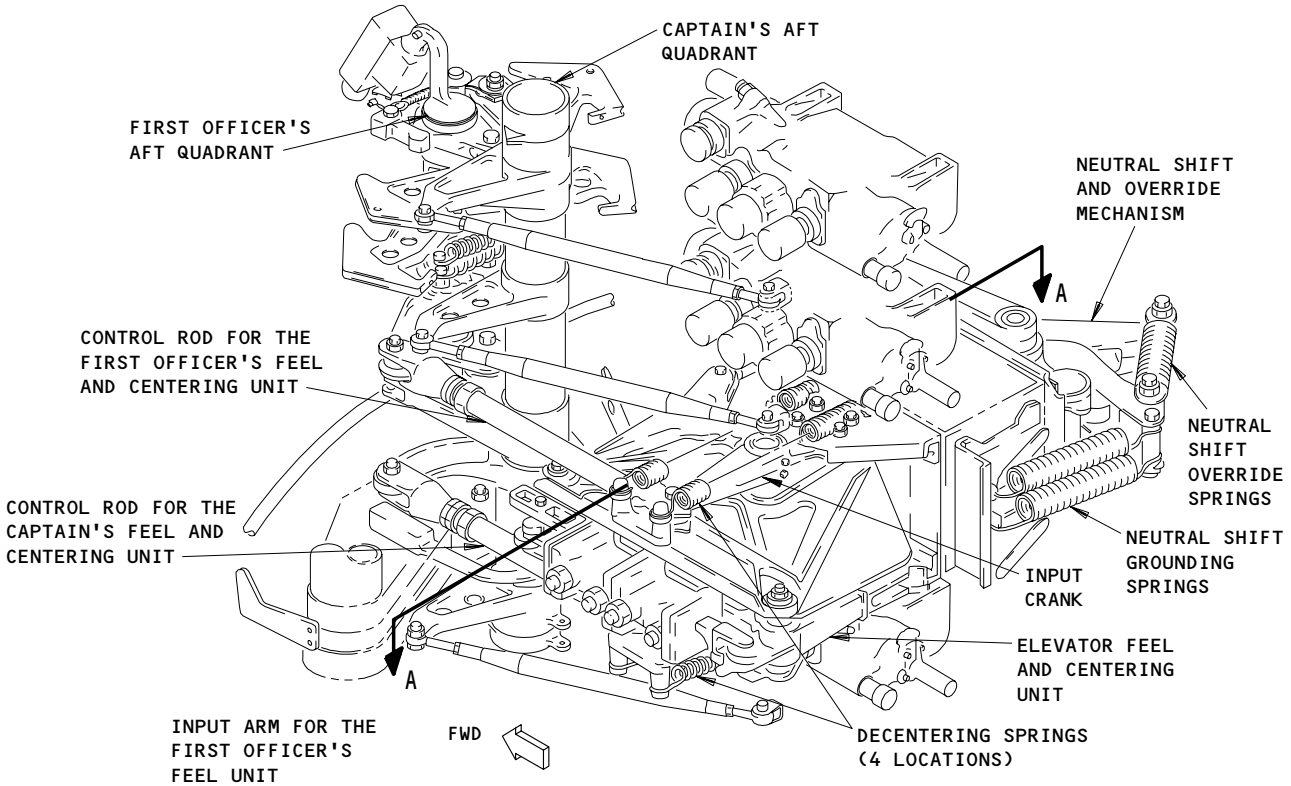


Elevator Control Aft Mechanism
Figure 506 (Sheet 1)

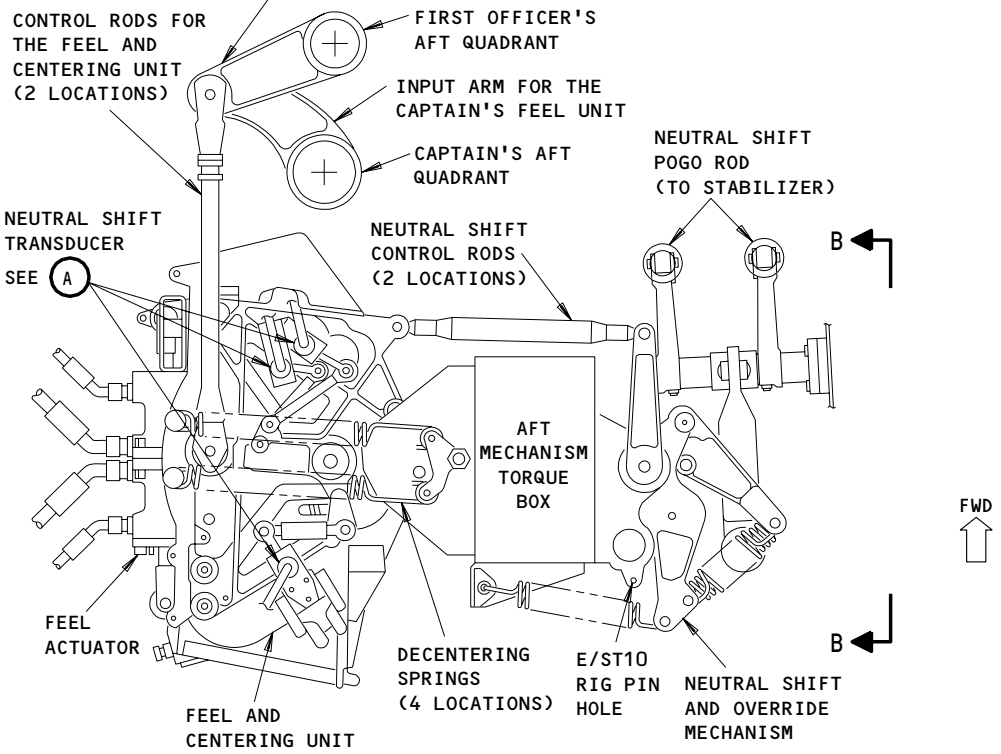


1 THE ASYMMETRY LIMITER ACTUATOR FORK WILL MOVE BETWEEN THE CAPTAIN'S AND FIRST OFFICER'S AFT QUADRANTS AT HIGH SPEED (THE ASYMMETRY ACTUATOR IS EXTENDED). THE ASYMMETRY ACTUATOR WILL WITHDRAW FROM BETWEEN THE CAPTAIN'S AND FIRST OFFICER'S AFT QUADRANTS AT LOW SPEEDS (THE ASYMMETRY ACTUATOR IS RETRACTED).

Elevator Control Aft Mechanism
Figure 506 (Sheet 2)

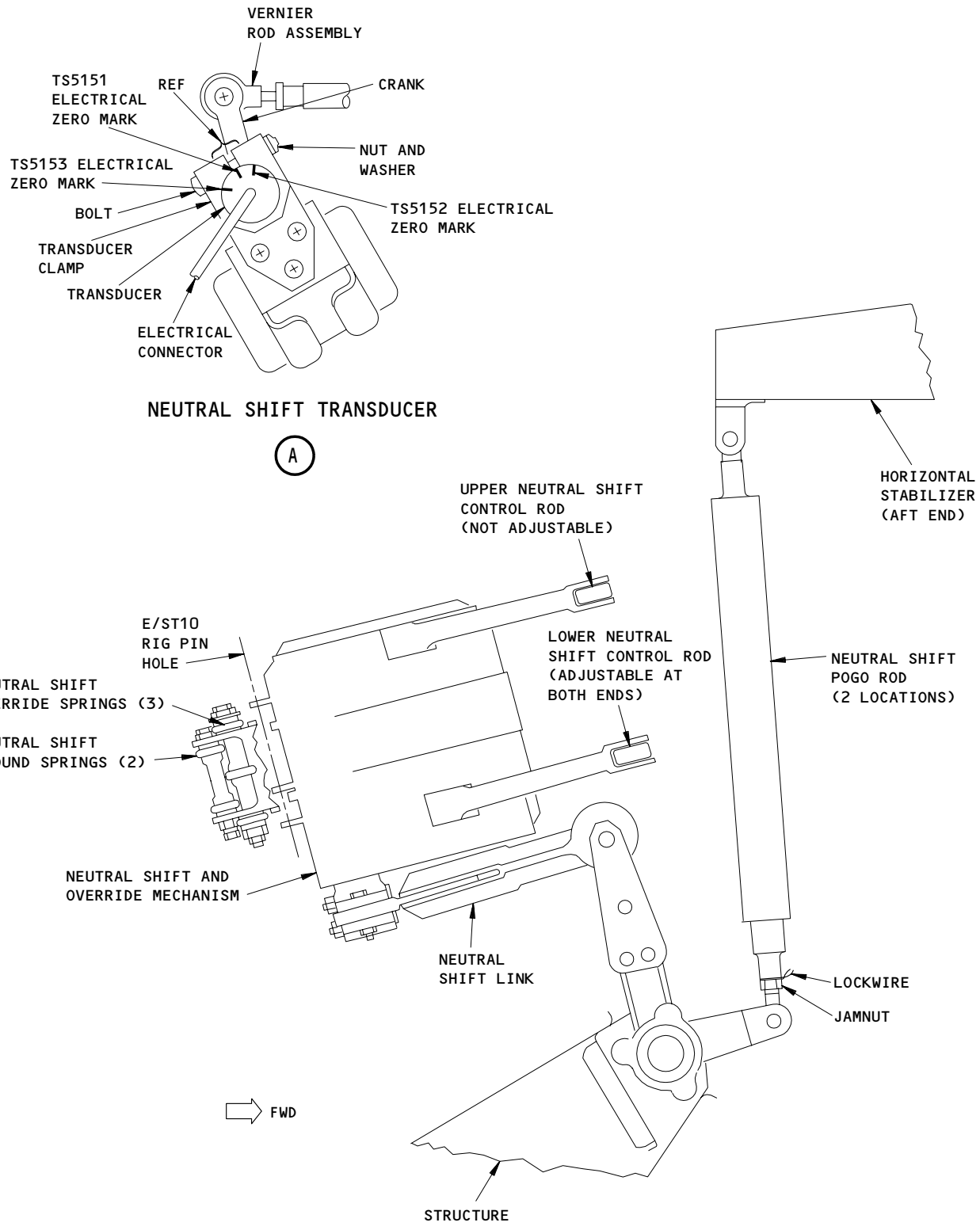


ELEVATOR CONTROL AFT MECHANISM

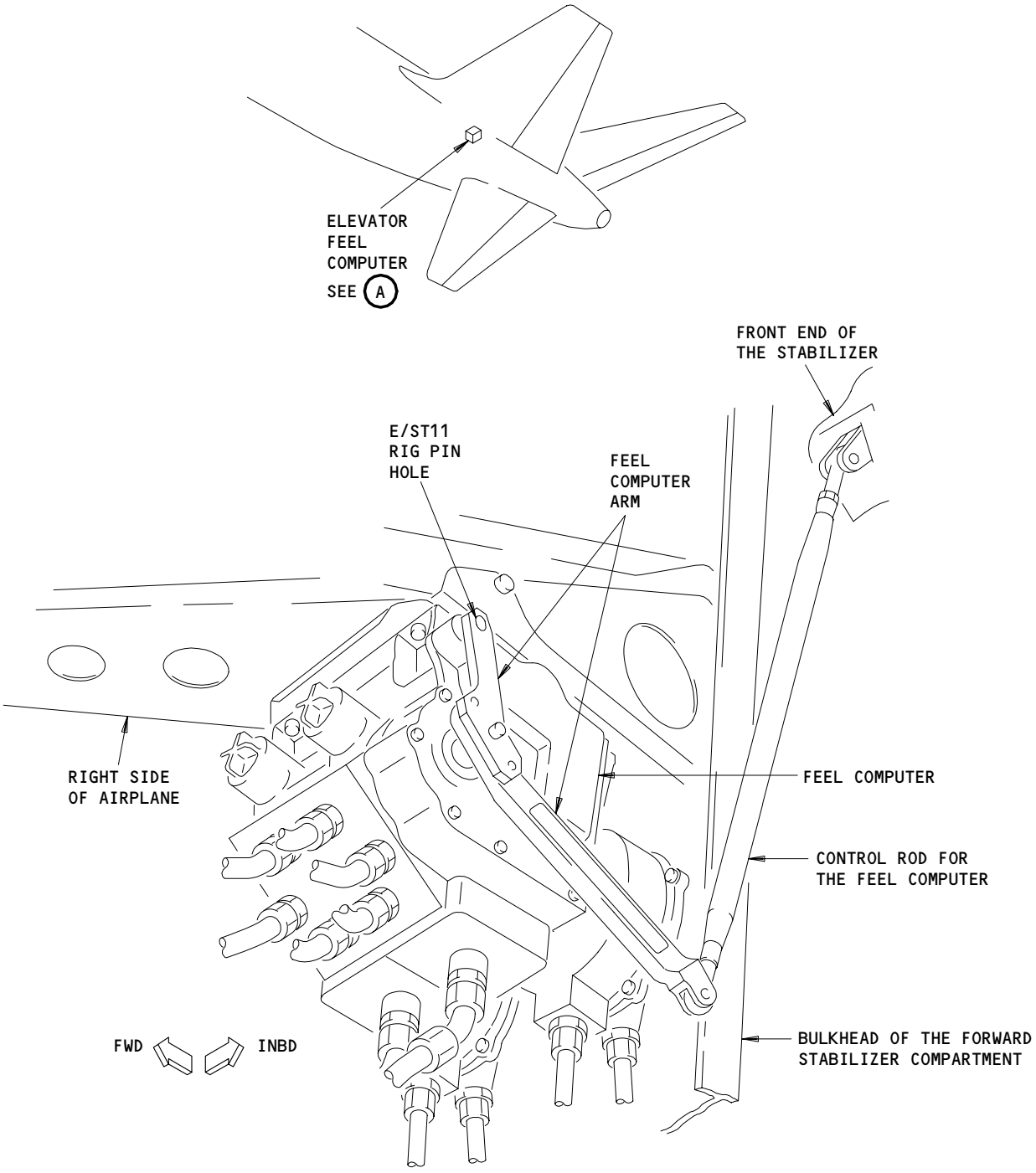


A-A

Feel, Centering, and Neutral Shift Adjustments
Figure 507 (Sheet 1)



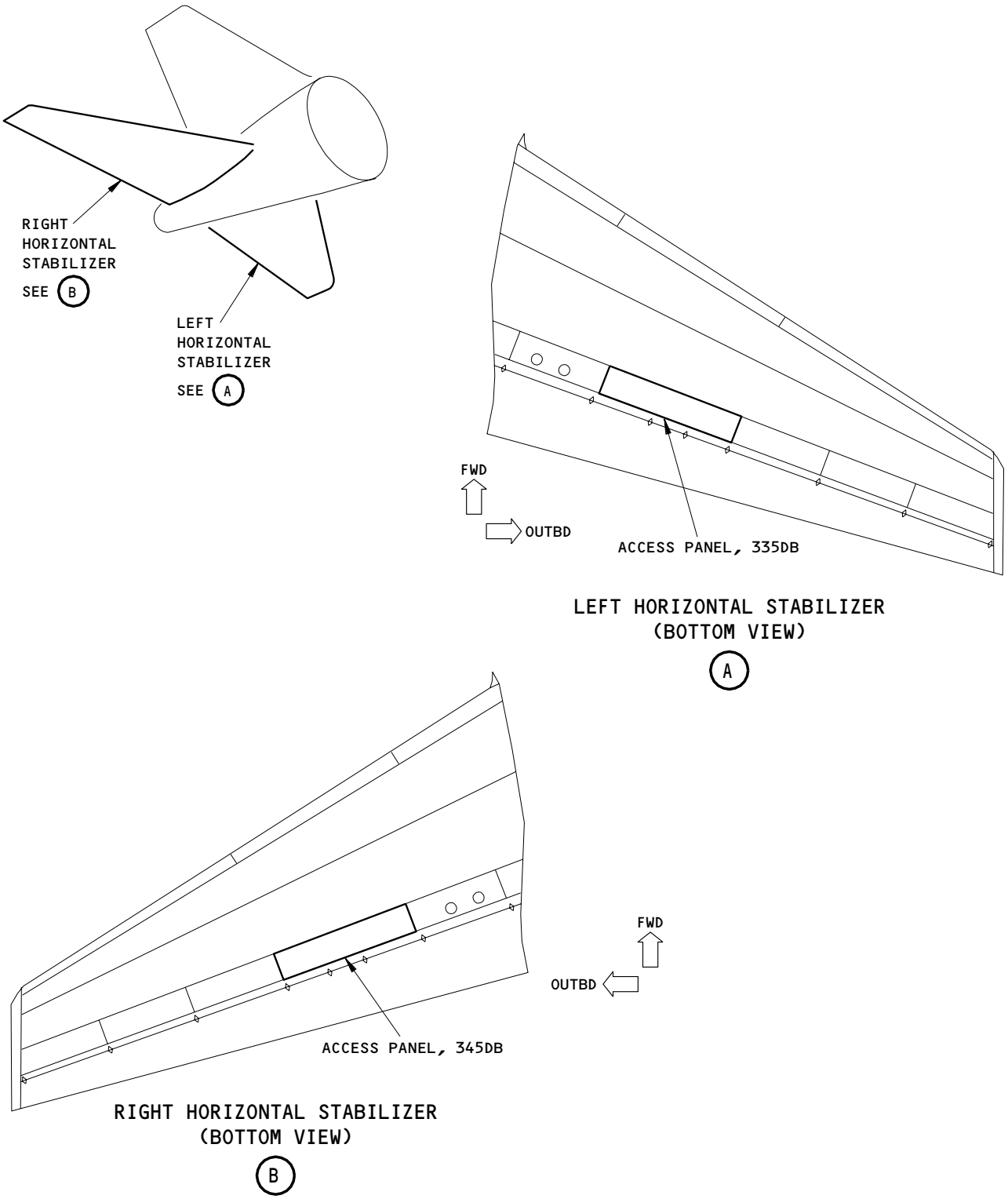
Feel, Centering, and Neutral Shift Adjustment
Figure 507 (Sheet 2)



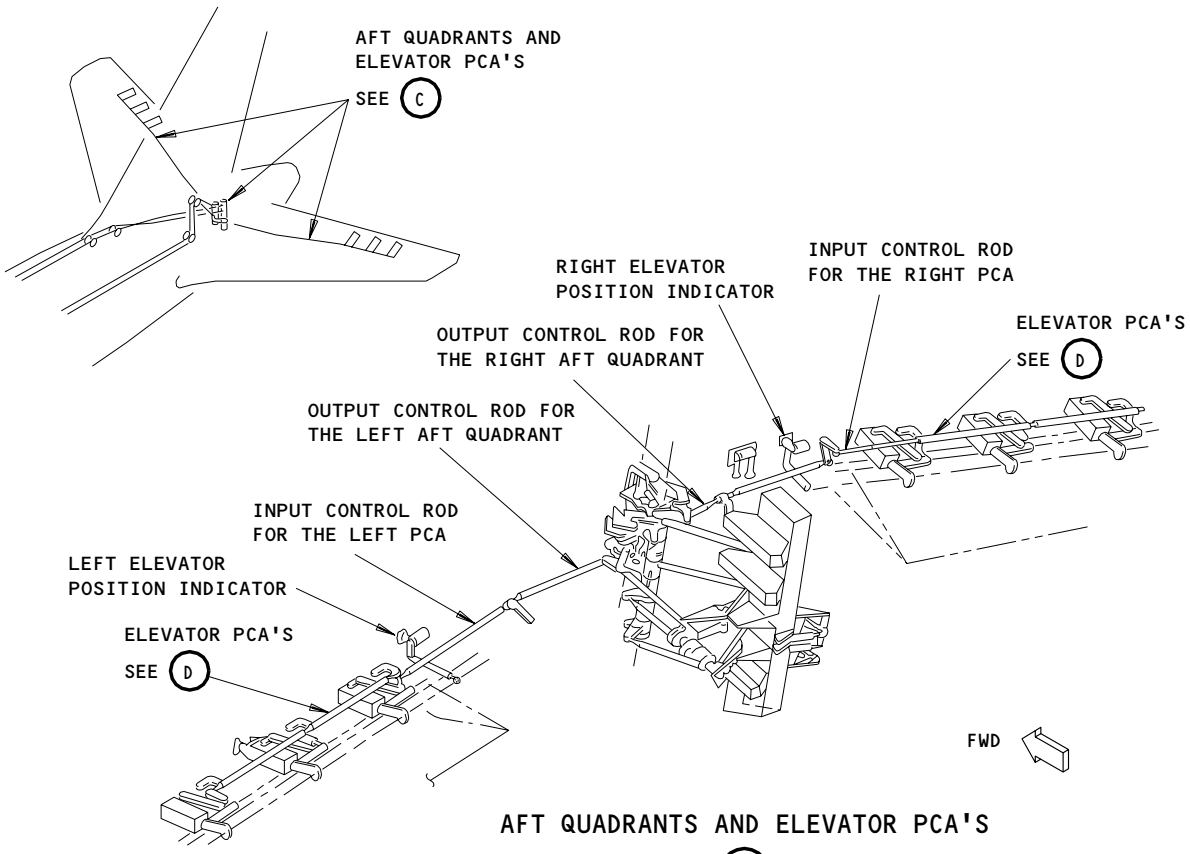
ELEVATOR FEEL COMPUTER

A

Elevator Feel Computer Adjustment
Figure 508

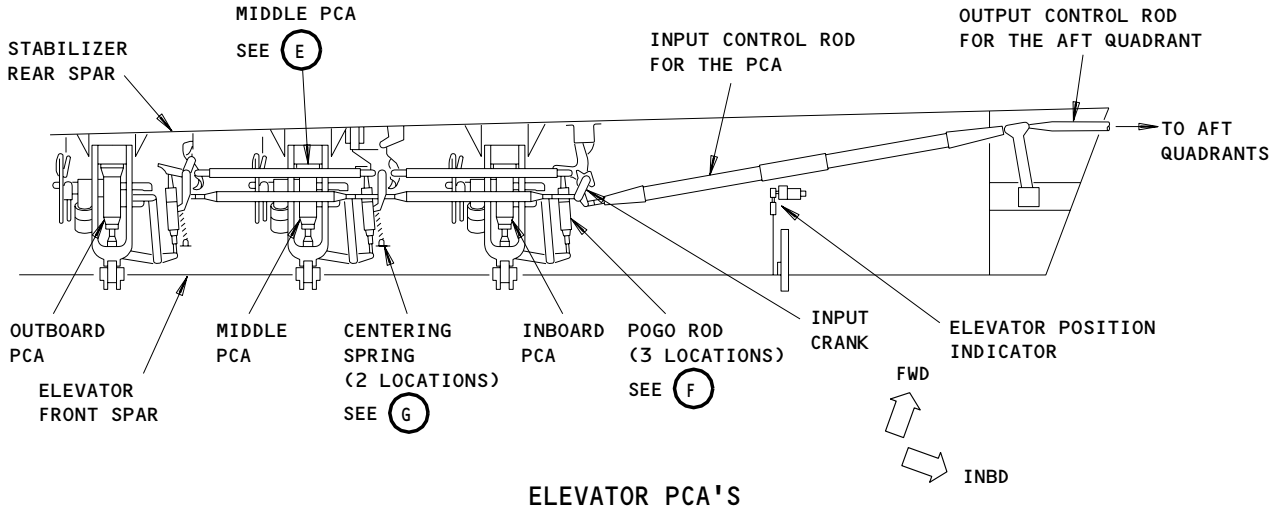


Elevator PCA Adjustment
Figure 509 (Sheet 1)



AFT QUADRANTS AND ELEVATOR PCA'S

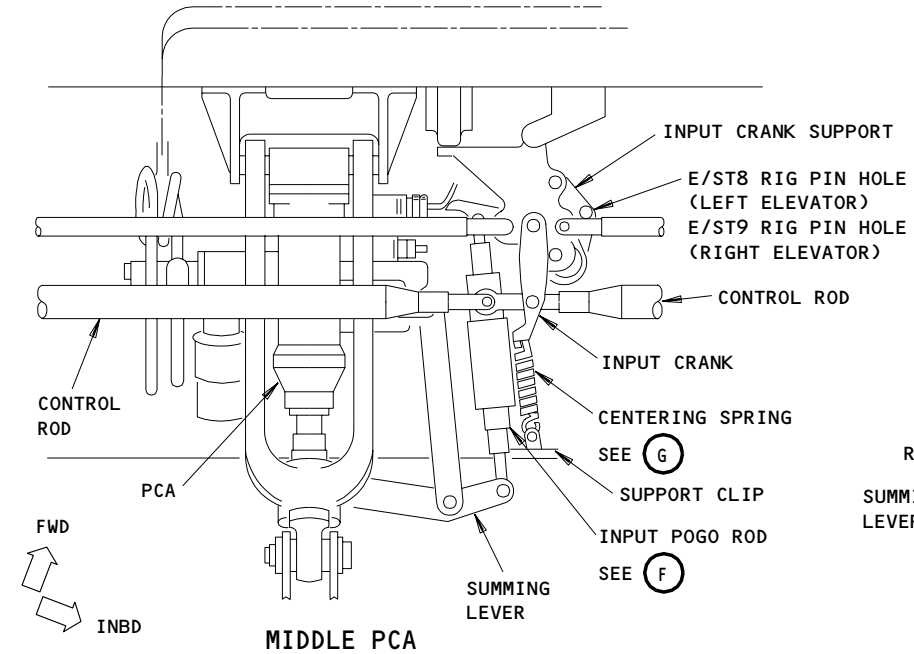
C



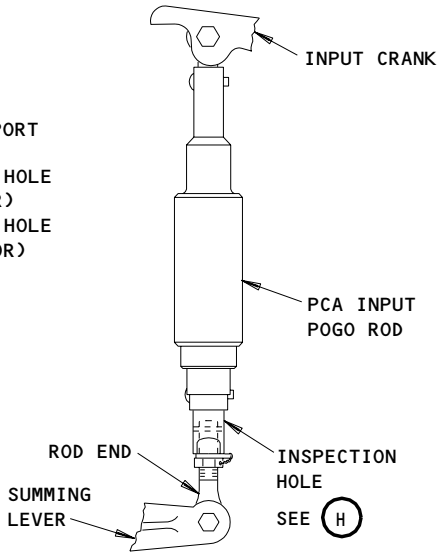
ELEVATOR PCA'S
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

D

Elevator PCA Adjustment
Figure 509 (Sheet 2)

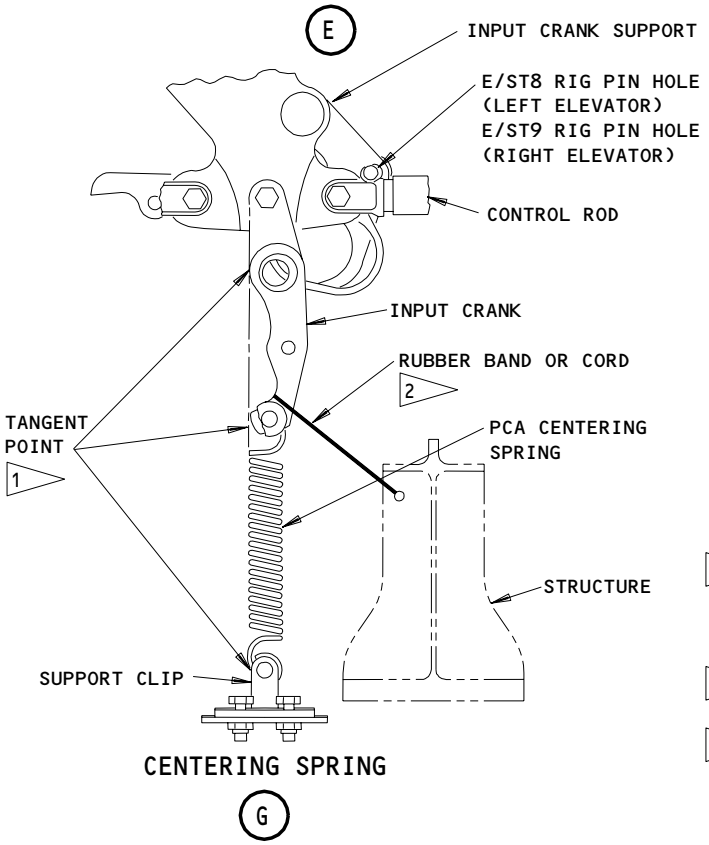


MIDDLE PCA
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)



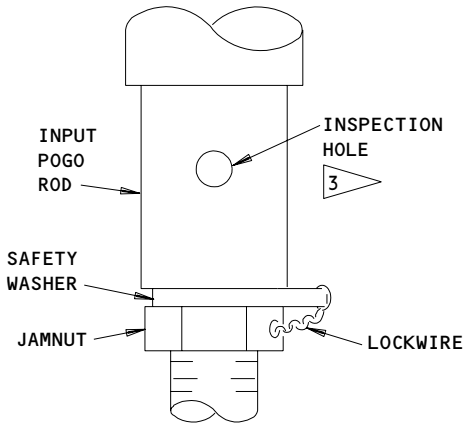
INPUT POGO ROD

F



CENTERING SPRING

G



INSPECTION HOLE

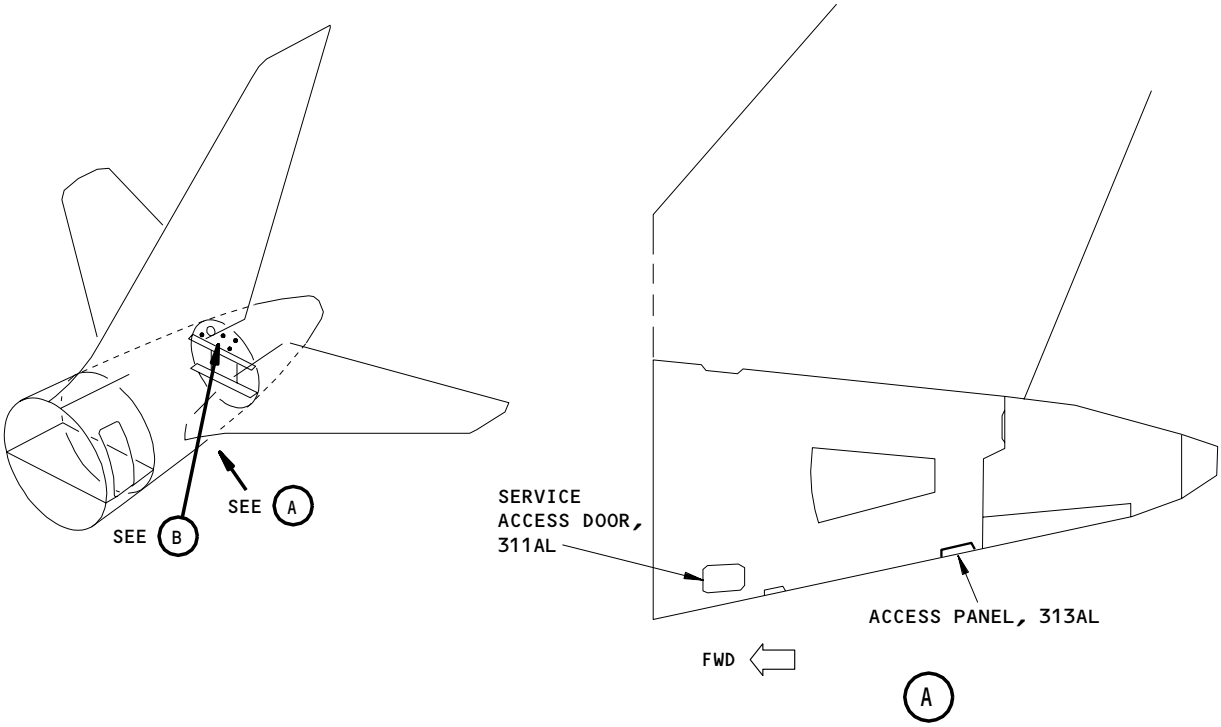
H

1 ALL THREE TANGENT POINTS MUST ALIGN BY BY LESS THAN 0.01 INCH (RIG PIN E/ST8 OR E/ST9 ARE INSTALLED AND BACKLASH IN THE INPUT CRANK REMOVED)

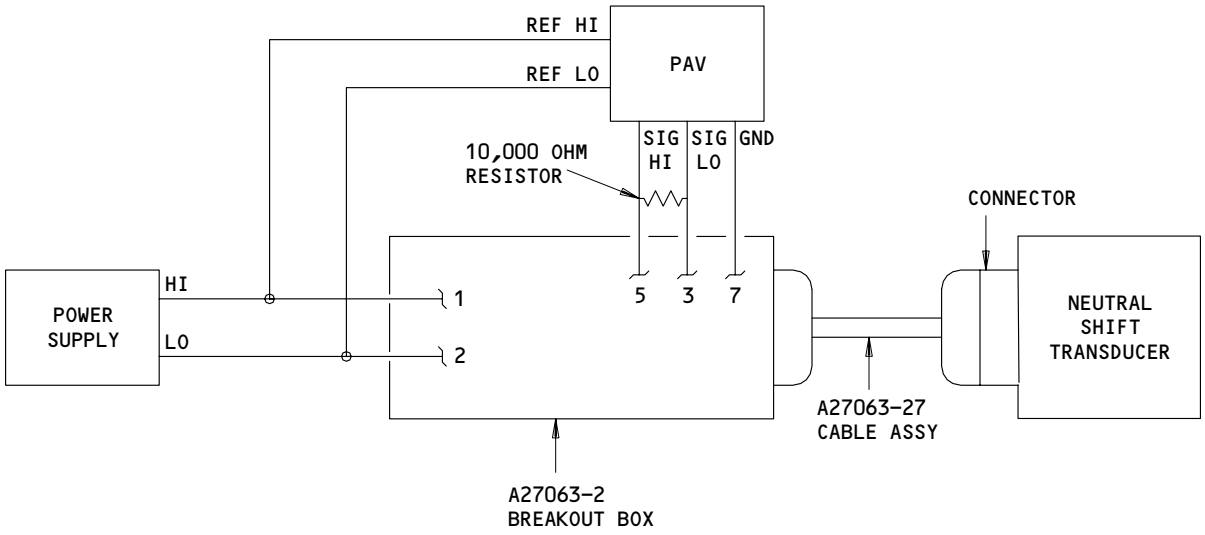
2 TO REMOVE THE INPUT CRANK BACKLASH. REMOVE AFTER THE ADJUSTMENT

3 THE ROD END MUST EXTEND BEYOND THE BOTTOM OF THE INSPECTION HOLE. LOCKWIRE OR A 0.045 INCH DIAMETER ROD MUST NOT PASS THROUGH THE HOLE

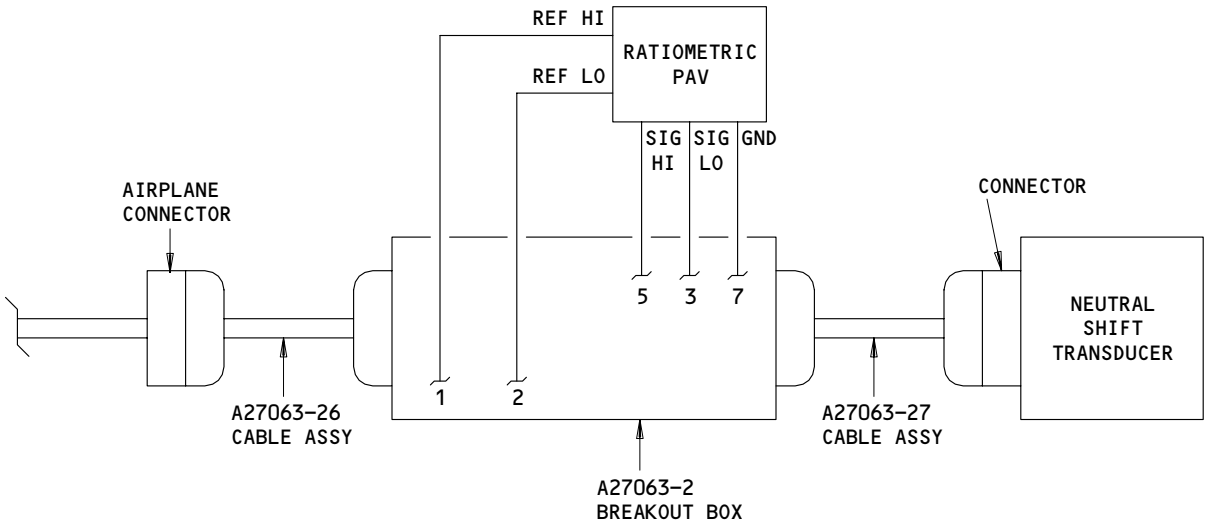
Elevator PCA Adjustment
Figure 509 (Sheet 3)



Elevator Pressure Reducer Valves and Bypass Valve
Figure 509A



METHOD 1



METHOD 2

LEGEND

DVM – DIGITAL VOLTMETER
PAV – DIGITAL PHASE ANGLE VOLTMETER
RATIOMETRIC PAV – RATIOMETRIC DIGITAL PHASE ANGLE VOLTMETER

Equipment Connections For Elevator Neutral Shift Transducer Adjustment
Figure 510 (Sheet 1)

5) 11H20, STAB TRIM CONT R

(d) Put the R, L, and C FLT CONTROL SHUTOFF switches on the P61 panel to the OFF position.

(e) Move the captain's control column through full travel.

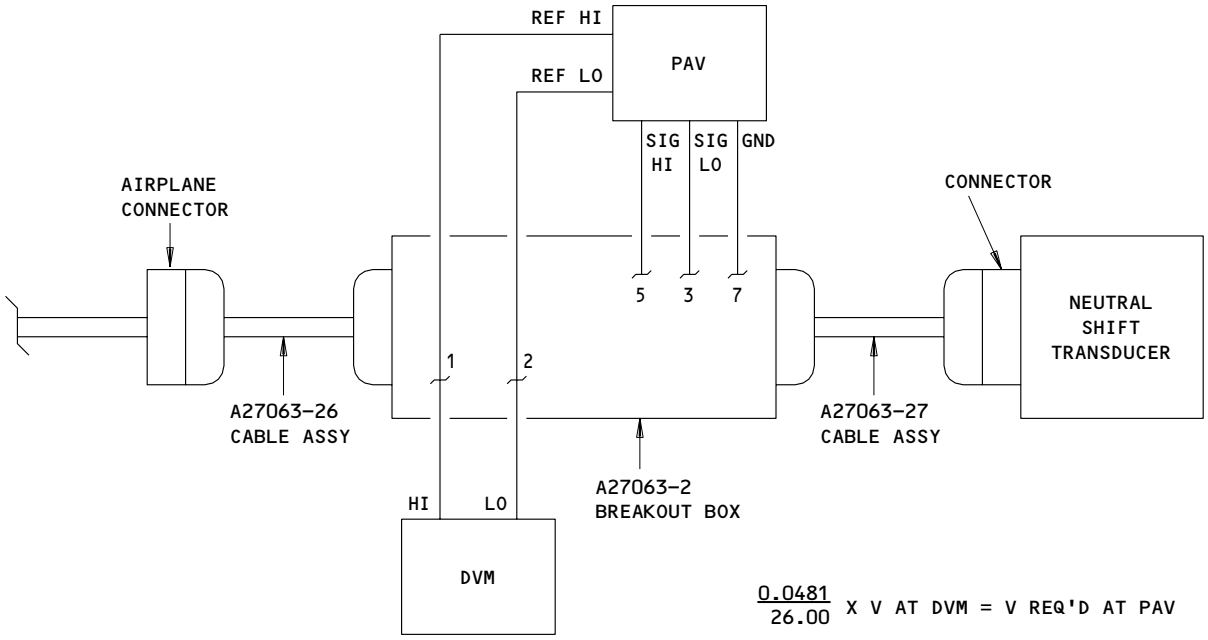
(f) Make sure that the elevators do not move with the control column.

NOTE: When you move the control column, the PCA input linkages will move and let hydraulic fluid flow in the PCAs. This will cause the elevators to hang down because of their weight. However, the elevators should not be hydraulically powered down by the control column. Elevators should not move up at all.

(g) Put the R, L, and C FLT CONTROL SHUTOFF switches on the P61 panel to the ON position.

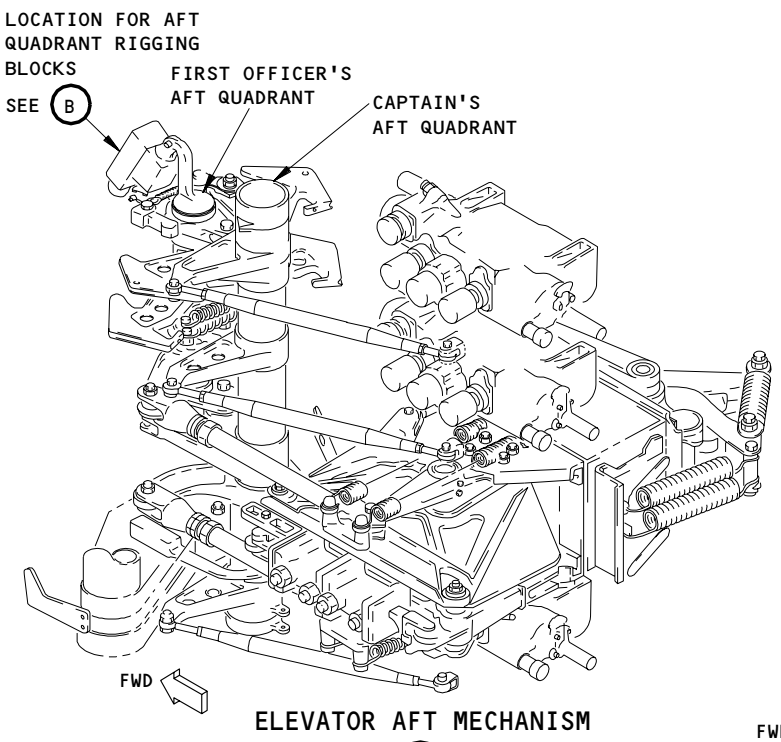
(h) Move the captain's control column full forward and then release.

(i) Make sure that the control column goes to neutral when released.



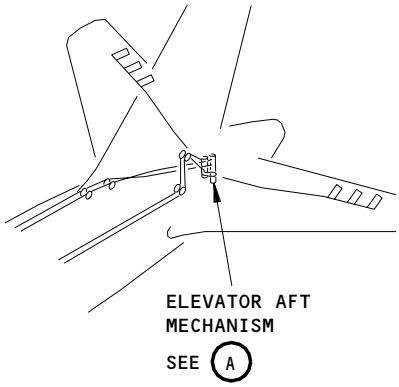
METHOD 3

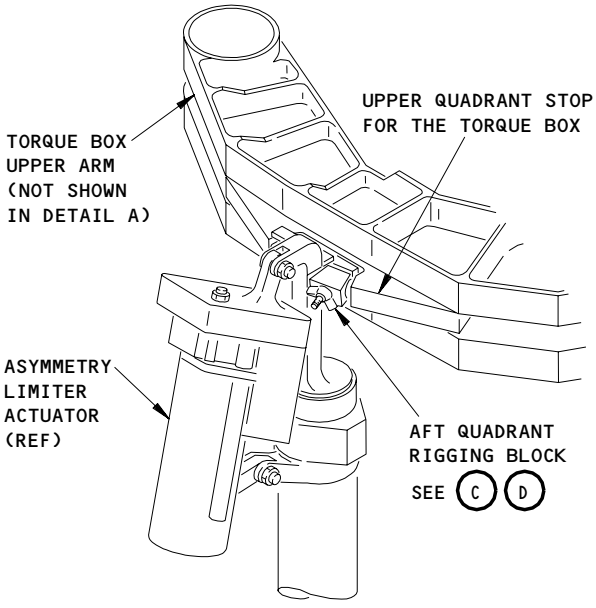
Equipment Connections For Elevator Neutral Shift Transducer Adjustment
Figure 510 (Sheet 2)



ELEVATOR AFT MECHANISM

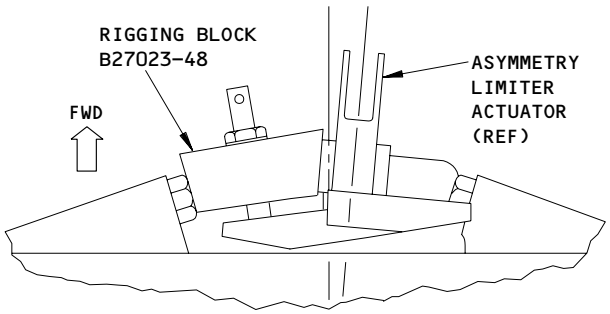
A





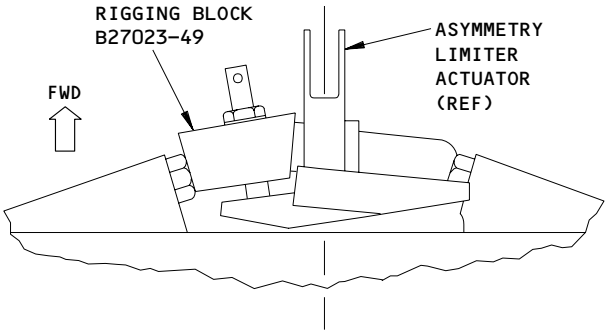
LOCATION FOR AFT QUADRANT RIGGING BLOCKS

B



AFT QUADRANT RIGGING BLOCK
(ELEVATOR IS AT NEUTRAL)

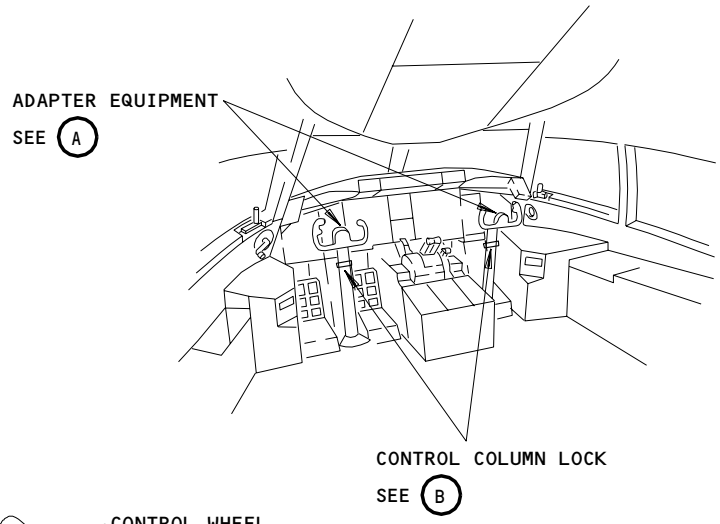
C

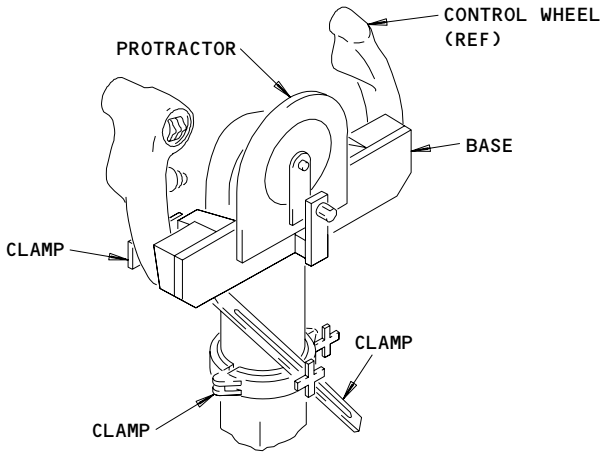


AFT QUADRANT RIGGING BLOCK
(ELEVATOR IS AT 5° UP)

D

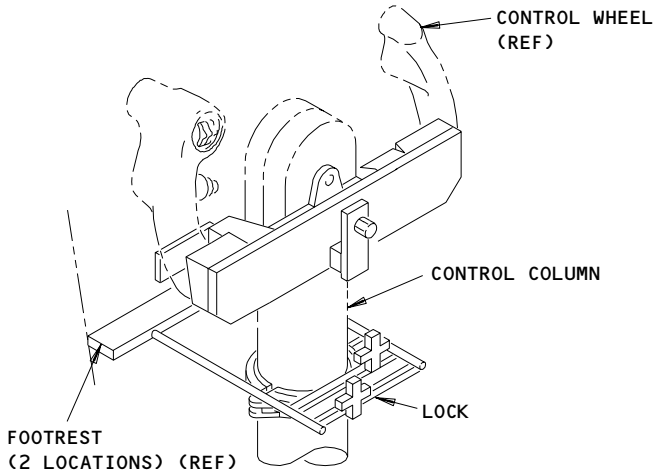
Elevator Aft Quadrant Rigging Blocks
Figure 511





ADAPTER EQUIPMENT

A



CONTROL COLUMN LOCK

B

Control Wheel Adapter Equipment
Figure 512

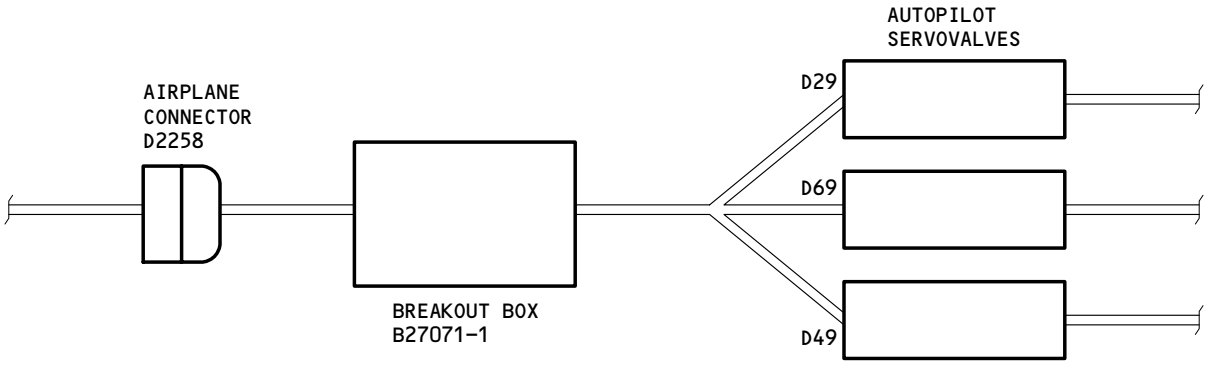
(j) Make sure that the indicators on the EICAS display approximately align with the middle tick marks (Fig. 501).

NOTE: The indicators must be less than one-half the height of an indicator arrow apart.

(k) Move the captain's control column full aft and release.
(l) Make sure that the control column goes to neutral when released.
(m) Make sure that the elevator position indicators on the EICAS display approximately align with the middle tick marks (Fig. 501).

NOTE: The indicators must be less than one-half the height of an indicator arrow from each other.

(n) Move the captain's control column full travel forward, then full travel aft, and return the control column to neutral.
1) Make sure that the control column moves smoothly and freely through full travel.
2) Make sure that the left and right elevator position indicators on the EICAS display move together.
(o) Make sure that the elevator position indicators move smoothly.



Equipment Connections for Elevator Hardover Test
Figure 513

(p) Make sure the indicators are always less than one-half the height of an indicator arrow apart when you move the control column.

(q) Make sure the indicators move down toward the full travel tick mark when the control column is moved full forward.

NOTE: The indicator arrows must go to the full down tick mark on the EICAS display. The indicators must not go more than the full travel tick mark.

(r) Make sure that the indicators move up toward the full travel tick mark on the EICAS display when the control column is moved full aft.

NOTE: The indicator arrows must go to the full up tick mark on the EICAS display. The indicators must not go more than the full travel tick mark.

(s) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
2) 11C12, STAB TRIM SHUTOFF LEFT
3) 11C13, STAB TRIM SHUTOFF RIGHT
4) 11H11 or 11C05, STAB TRIM CONT L
5) 11H20, STAB TRIM CONT R

(t) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the NORM position.

F. Operational Test - Elevator System Override

S 215-022

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-023

(2) Hold the first officer's control column in the neutral position and pull the captain's control column aft.

S 215-024

(3) Make sure that the left elevator moves up.

NOTE: The right elevator will move up a small distance.

S 865-025

(4) Let the captain's control column go to the neutral position.

S 865-026

(5) Hold the captain's control column in the neutral position and push the first officer's control column forward.

S 215-027
(6) Make sure that the right elevator moves down.

NOTE: The left elevator will move down a small distance.

S 865-028
(7) Let the first officer's control column go to the neutral position.

G. Put the Airplane Back To Its Usual Condition

S 865-029
(1) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 865-030
(2) Remove the power from the left, right, and center hydraulic systems if it is not necessary (AMM 29-11-00/201).

TASK 27-31-00-825-031

3. Elevator Control System - Adjustment

A. General

(1) SYSTEM ADJUSTMENT SEQUENCE: The procedure contains steps to adjust the components and mechanisms for the elevator control system. The sequence that follows is recommended for complete system adjustment:
(a) Control Cables: Refer to the "Control Cable Adjustment" paragraph
(b) Feel and Centering Unit Mechanical Linkage: Refer to the "Adjust the Mechanical Linkage on the Feel and Centering Unit" paragraph
(c) Neutral Shift Transducers: Refer to the "Neutral Shift Transducer Adjustment" paragraph
(d) Autopilot Servo Rod: Refer to the "Autopilot Servo Rod Adjustment" paragraph
(e) Feel Computer Control Rod: Refer to the "Feel Computer Control Rod Adjustment" paragraph

(f) PCA Centering Spring: Refer to the "PCA Centering Springs Adjustment" paragraph
(g) PCA Input Control Rod: Refer to the "PCA Input Control Rod Adjustment" paragraph
(h) PCA: Refer to the "Power Control Actuator (PCA) Adjustment" paragraph
(i) Elevator Position Transmitters: Refer to the "Elevator Position Transmitter Adjustment" paragraph
(j) Elevator Aft Quadrant Stops: Refer to the "Elevator Aft Quadrant Stops Adjustment" paragraph

(2) OUT OF SEQUENCE ADJUSTMENTS: A component and mechanism can be adjusted out of the recommended sequence if the conditions below are correct. The necessary components must be adjusted subsequently.
(a) Control Cables
1) Do the "Control Cable Adjustment" paragraph
(b) Feel and Centering Unit Mechanical Linkage
1) Do the "Control Cable Adjustment" paragraph
2) Do the "Adjust the Mechanical Linkage on the Feel and Centering Unit" paragraph
3) Do the "Neutral Shift Transducer Adjustment" paragraph
4) Do the "Autopilot Servo Rod adjustment" paragraph
5) Do the "PCA Input Control Rod Adjustment" paragraph
(c) Neutral Shift Transducers
1) Do the "Adjust the Mechanical Linkage on the Feel and Centering Unit" paragraph
2) Do the "Neutral Shift Transducer Adjustment" paragraph
(d) Autopilot Servo Rod
1) Do the "Control Cable Adjustment" paragraph
2) Do the "Adjust the Mechanical Linkage on the Feel and Centering Unit" paragraph
3) Do the "Neutral Shift Transducer Adjustment" paragraph
4) Do the "Autopilot Servo Rod Adjustment" paragraph
(e) Feel Computer Control Rod
1) Do the "Feel Computer Control Rod Adjustment" paragraph
(f) PCA Centering Spring
1) Do the "PCA Centering Spring Adjustment" paragraph
2) Do the "PCA Input Control Rod Adjustment" paragraph
(g) PCA Input Control Rod
1) Do the "PCA Input Control Rod Adjustment" paragraph
2) Do the "Power Control Actuator (PCA) Adjustment" paragraph
3) Do the "Elevator Position Transmitter Adjustment" paragraph
(h) PCA
1) Do the "PCA Input Control Rod Adjustment" paragraph
2) Do the "Power Control Actuator (PCA) Adjustment" paragraph
3) Do the "Elevator Position Transmitter Adjustment" paragraph
(i) Elevator Position Transmitter
1) Do the "PCA Input Control Rod Adjustment" paragraph
2) Do the "Power Control Actuator (PCA) Adjustment" paragraph
3) Do the "Elevator Position Transmitter Adjustment" paragraph
(j) Elevator Aft Quadrant Stops
1) Do the "PCA Input Control Rod Adjustment" paragraph

2) Do the "Power Control Actuator (PCA) Adjustment" paragraph
3) Do the "Elevator Aft Quadrant Stops Adjustment" paragraph

(3) The elevator control system is adjusted correctly if it operates smoothly through its full travel and if these conditions are correct:

NOTE: Unless specified differently, the conditions that follow must be correct when the stabilizer Dimension B (Fig. 502) is 15.89 ± 0.01 inches (403.6 ± 0.3 mm).

(a) Rig pin E/ST7 (Fig. 506) can be freely put in the aft quadrant indexer with power supplied to the left, right, and center hydraulic systems and the control columns are at neutral.

NOTE: Shake the control columns to make sure that they are at neutral.

1) If rig pin E/ST7 cannot be freely put, make sure that the mechanisms that follow are adjusted correctly:

NOTE: Other components and mechanisms refer to rig pin E/ST7 when they are adjusted. If rig pin E/ST7 cannot be freely put in the aft quadrant indexer, other mechanisms can be incorrectly adjusted.

a) Feel and centering unit mechanical linkage and neutral shift transducers
b) Control cables
c) PCA input control rods
d) Autopilot servo (Ref 22-12-01).

(b) The elevator control cables are adjusted correctly if the conditions that follow can occur at the same time:
1) Rig pin E/ST7 is installed,
2) Rig pin E/ST6 can be freely put in the base of the control column (Fig. 504)
3) The cable tension regulator scale position is correct for the ambient temperature (Fig. 504).

(c) The input rods for the PCA are adjusted correctly if the conditions that follow can occur at the same time:
1) Rig pin E/ST7 is installed
2) Rig pins E/ST8 and E/ST9 (Fig. 509) can be freely put in the middle PCAs.

(d) The PCA centering springs are adjusted correctly if the conditions that follow can occur at the same time:
1) Rig pins E/ST8 and E/ST9 are installed
2) The tangent points of the PCA centering springs are aligned (Fig. 509).

(e) The elevator PCAs are adjusted correctly if the conditions that follow can occur at the same time:
  1) Rig pin E/ST7 is installed
  2) The left, right, and center hydraulic systems are pressurized
  3) The upper surface of the left and right elevator trailing edge is less than 0.15 inch (3.8 mm) from the locating hole on the index plate (Fig. 505).

(f) The elevator position transmitters are adjusted correctly if the conditions that follow can occur at the same time:
  1) The control columns are in the neutral position (shake the control columns to make sure they are in the neutral position)
  2) The left, right, and center hydraulic systems are pressurized
  3) The left and right elevator position indicators approximately align with the middle tick mark on the EICAS display
  4) The elevator position indicators are less than one-half the height of an indicator arrow away from each other.

(g) The elevator position transmitters are adjusted correctly if the conditions that follow can occur at the same time:
  1) Operate the captain's control column through its full fore and aft travel range
  2) The elevator position indicators on the EICAS display follow the movement of the control column
  3) The elevator position indicators are less than one-half the height of an indicator arrow away from each other.

(h) The elevator feel computer is adjusted correctly if rig pin E/ST11 (Fig. 508) can be freely put in the elevator feel computer.

(i) The elevator PCAs are adjusted correctly if the elevators operate as follows:
  1) The left and right elevator trailing edges move up and down together at the same rate,
  2) The elevators are less than 0.15 inch (3.8 mm) away from each other at full elevator travel (Fig. 505),
  3) The elevators stop at the same position when the control column is held at a position between the full travel stops.

(j) The upper control rod for the elevator feel and centering unit is adjusted correctly if the conditions that follow can occur at the same time:
  1) The control columns are at the neutral position
  2) The left, right, and center hydraulic systems are pressurized
  3) The horizontal stabilizer is at 2 units of trim on the stabilizer position indicators (Fig. 501)

4) The left and right elevator trailing edge upper surfaces (Fig. 505) move less than 0.10 inch (2.5 mm) when auxiliary pitot systems No. 1 and 2 are pressurized and not pressurized (AMM 34-11-00/201).

B. Equipment

(1) Adjustment Equipment for the Neutral Shift Transducers (PROCEDURE 1):
   (a) Position Transmitter Tester, Breakout Box, Cables - A27063-91
   (b) Power Supply - Powertron Model 5900
   Industrial Test Equipment Corp.
   Port Washington, New York

(2) Adjustment Equipment for the Neutral Shift Transducers (PROCEDURE 2):
   (a) Position Transmitter Tester, Breakout Box, Cables - A27063-91
   (b) Ratiometeric Digital Phase Angle Voltmeter - North Atlantic Model 225-400R30
   North Atlantic Industries Inc.
   Hauppauge, New York

(3) Adjustment Equipment for the Neutral Shift Transducers (PROCEDURE 3):
   (a) Position Transmitter Tester, Breakout Box, Cables - A27063-91

(4) Adjustment Equipment for the Neutral Shift Transducers (PROCEDURE 4):
   (a) Voltmeter - Phase Synchronous Model 101, 101-AA01
   Electronic Aviation
   Renton, Washington

(5) Gage Assembly - B27039-3 (Part of Elev & Stab Trim Control Systems Rigging Equipment, B27039-13)

NOTE: The gage assembly is used to set stabilizer jackscrew Dimension B in the correct position to adjust the elevator system.

(6) Holding Tool, Elevator Tension Regulator - B27022-4 or B27022-16

NOTE: This tool is used when new control cables are adjusted for the first time.

NOTE: The B27022-4 tool should be used with P/N S251N261-3 regulator and the B27022-16 should be used with P/N S251N261-4 regulator.

(7) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
(a) E/ST6 - P/N B20003-21
(b) E/ST7 - P/N B20003-21
(c) E/ST8 - P/N B20003-21
(d) E/ST9 - P/N B20003-21
(e) E/ST10 - P/N B20003-21
(f) E/ST11 - P/N B20003-21

(8) Spring Removal Tool, Decentering, Elevator Controls - B27060-1
(9) Surface Protractor - Commercially Available
(10) Cable Tensiometer, 0 to 250 pounds (0 to 1,100 newtons) - Commercially Available

C. Consumable Materials
(1) C00308 Compound, Corrosion Preventive MIL-C-11796, Class III
(2) D00002 Compound, Anti Seize - AMS-3080

D. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-42-00/201, Empennage Access Doors and Panels
(3) AMM 22-00-02/201, Autoflight BITE
(4) AMM 22-12-01/401, Autopilot Pitch Control Servo
(5) AMM 24-22-00/201, Electrical Power - Control
(6) AMM 27-38-00/501, Elevator Position Indicating System
(7) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) AMM 34-11-00/201, Pitot Static System

E. Access

(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
335/345	Horizontal Stabilizer Rear Spar to Trailing Edge
710	Nose Landing Gear and Doors
730	Left Main Landing Gear and Landing Gear Doors
740	Right Main Landing Gear and landing Gear Doors

(2) Access Panels

113AL	Forward Compartment
311AL	Forward Stabilizer Compartment
313AL	Aft Stabilizer Compartment
335BB/335DB/345BB/345DB	PCA and Position Transmitter
715/716	Nose Landing Gear Actuator Mechanism and Structure
732/742	Landing Gear Controls Door Controls and Switches

F. Prepare for Elevator System Adjustment

S 015-032

(1) Open the forward compartment access door, 113AL (AMM 06-41-00/201).

S 015-264

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the forward and aft stabilizer compartment access doors, 311AL and 313AL (AMM 06-42-00/201).

S 015-034

(3) Remove the power control actuator and position transmitter access panels, 335BB, 335DB, 345BB, and 345DB (AMM 06-42-00/201).

S 865-035

(4) Supply electrical power (AMM 24-22-00/201).

S 865-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: START ONE HYDRAULIC SYSTEM AT A TIME UNLESS SPECIFIED DIFFERENTLY. HIGH LOADS CAN OCCUR IN THE ELEVATOR, RUDDER, AND STABILIZER STRUCTURES FROM FORCES THAT CAN OCCUR FROM INCORRECTLY ADJUSTED PCAs. DAMAGE TO EQUIPMENT CAN OCCUR.

(5) Pressurize the center hydraulic system (AMM 29-11-00/201).

S 865-037

(6) Move the stabilizer until Dimension B on the stabilizer trim ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-038

(7) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

S 865-039

(8) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 865-040

(9) Put the LEFT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 865-041

(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
- (b) 11C12, STAB TRIM SHUTOFF LEFT
- (c) 11C13, STAB TRIM SHUTOFF RIGHT
- (d) 11H11 or 11C05, STAB TRIM CONT L
- (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
- (f) 11H18, FLT CONT SHUTOFF TAIL CTR
- (g) 11H20, STAB TRIM CONT R
- (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

G. Control Cable Adjustment (Fig. 504)

S 865-042

(1) Do the steps that follow to prepare for control cable adjustment:

(a) Make sure that left, right, and center hydraulic system power is removed (AMM 29-11-00/201).

(b) Disconnect the control rod from the first officer's forward quadrant (Detail A).

NOTE: Loosen and lower the crank at the forward quadrant, as necessary, to disconnect the control rod.

(c) Use a rope to hold the control rod away.

(d) Install rig pins E/ST8 and E/ST9 in the input crank of the middle PCA for the left and right elevator (Detail C, Fig. 509).

NOTE: This will hold the PCA linkages in position while they are disconnected from the aft quadrants.

(e) Disconnect the output control rods for the left and right aft quadrants (View C-C, Fig. 506) from the crank arms on the aft quadrants.

(f) Use a rope to hold the control rod away from the movement of the aft quadrant during the cable adjustment.

(g) Disconnect the captain's and first officer's feel and centering unit control rods from the crank arms on the aft quadrants (Fig. 507).

S 825-043

(2) If new cables are installed, do the steps that follow to adjust them:

NOTE: See AMM 20-10-03/401 for Control Cable Removal/Installation instructions.

(a) Install rig pin E/ST6 in the base of the captain's control column (Fig. 504).

CAUTION: MAKE SURE THE HOLDING TOOL FOR THE TENSION REGULATOR IS INSTALLED CORRECTLY BEFORE YOU ENGAGE OR DISENGAGE THE CABLE TURNBUCKLES. DAMAGE TO EQUIPMENT CAN OCCUR.

NOTE: The B27022-4 tool should be used with the P/N S251N261-3 regulator and the B27022-16 should be used with P/N S251N261-3 regulator.

(b) Install the holding tool for the tension regulator between the crosshead and the hub of the captain's forward quadrant/tension regulator.

(c) Adjust turnbuckles in cables E1A and E1B (captain's side) such that the conditions that follow are correct:
1) The cable tension is 150 pounds (667 newtons)
2) Rig pin E/ST7 can be easily installed in the aft quadrant indexer (Fig. 506). Keep rig pin E/ST7 installed.
(d) Align the pressure seals to remove bends in cables E1A and E1B.
(e) Adjust the turnbuckles in cables E2A and E2B (first officer's side) until you get these conditions to agree:
1) Make sure the cable tension is 280 pounds (1,240 newtons)
2) Make sure you can easily install the fasteners for the control rod in the first officer's forward quadrant (Fig. 504).
(f) Connect the control rod to the first officer's forward quadrant.
(g) Align the pressure seals to remove bends in cables E2A and E2B.
(h) Remove rig pins E/ST6 and E/ST7.
(i) Do a check to make sure these conditions agree:
1) The cables do not touch the pulley or the quadrant flanges for the total cable travel.
2) The cables are in 2 degrees of the plane of the pulley or quadrant.
3) The cables are installed through grommets and seals in the structure.
4) Fairleads, rub strips, and grommets do not move the cables from the adjusted or usual operational position.
5) The pulleys can turn without blockage from the guards.
(j) Operate the cable system through full travel for 25 times.

S 825-044
(3) Do the final cable adjustment with these steps:
(a) Install rig pin E/ST6 in the base of the captain's control column.
(b) Make sure that the control rod on the first officer's forward quadrant is disconnected.
(c) Make sure the holding tool for the tension regulator is not installed on the captain's forward quadrant/tension regulator (Fig. 504).

NOTE: If the tension regulator tool was installed, decrease the tension in cables E1A and E1B to remove the tool.

(d) Adjust the turnbuckles in cables E1A and E1B (captain's side) until you get these conditions to agree:
1) Make sure the captain's forward quadrant/tension regulator scale is at the correct position as shown on the TENSION REGULATOR SCALE SETTING vs TEMPERATURE chart (Fig. 504).
2) Make sure you can easily install rig pin E/ST7 in the aft quadrant indexer with light finger pressure (Fig. 506).

(e) Adjust the turnbuckles in cables E2A and E2B (first officer's side) until you get these conditions to agree:
1) Make sure the tension in cables E2A and E2B are correct as shown in the CABLE TENSION vs TEMPERATURE chart (Fig. 504).
2) Make sure you can easily install the fasteners for the control rod on the first officer's forward quadrant with light finger pressure.
(f) Remove the rope and install the control rod on the first officer's forward quadrant.
(g) Install the locking clips on the turnbuckles.

NOTE: Make sure no more than three threads on any terminal are exposed outside of the turnbuckle body.

(h) Apply corrosion preventive compound to the turnbuckle threads that can be seen.
(i) Make sure you can easily install rig pins E/ST6 and E/ST7 with light finger pressure.
(j) Remove rig pins E/ST6 and E/ST7.
(k) Remove the rope and connect the output control rods for the left and right aft quadrants (View C-C, Fig. 506) to the crank arms on the aft quadrants.
(l) Connect the captain's and first officer's feel and centering unit control rods to the crank arms on the aft quadrants (Fig. 507).
(m) Remove rig pins E/ST8 and E/ST9 in the input crank of the middle PCA for the left and right elevator (Detail C, Fig. 509).
(n) Operate the cable system through full control column travel (make sure that the control column touches the column stops).
(o) Make sure that the conditions that follow are correct:
1) The turnbuckles in cables E1A, E2A, E1B, and E2B do not move nearer than 1.0 inch (25 mm) to the fairleads, grommets or pulleys.
2) The cable tension does not change.

H. Adjust the Mechanical Linkage on the Feel and Centering Unit

S 865-045

(1) Do the steps that follow to prepare for the mechanical linkage adjustment for the feel and centering unit:
(a) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).
(b) Make sure that the CENTER and RIGHT STAB TRIM SHUTOFF valve switches on the P10 panel are at the CUTOUT position.
(c) Make sure these circuit breakers on the P11 panel are open and that DO-NOT-CLOSE tags are attached:
1) 11B19 or 11A19, STAB TRIM ALT (INSTALLED)
2) 11C12, STAB TRIM SHUTOFF LEFT
3) 11C13, STAB TRIM SHUTOFF RIGHT
4) 11H11 or 11C05, STAB TRIM CONT L
5) 11H20, STAB TRIM CONT R

(d) Make sure the power is removed from the left, right, and center hydraulic systems (AMM 29-11-00/201).
(e) Disconnect the output control rods on the left and right aft quadrants from the crank arms on the aft quadrants.
(f) Use rope to hold the control rods away from the movement of the aft quadrants.
(g) Install rig pins E/ST8 and E/ST9 in the input crank for the middle PCA of the left and right elevators.
(h) Remove the four decentering springs from the upper and lower arm of the feel and centering unit (Fig. 506).
(i) Disconnect the control rod on the captain's and first officer's feel and centering units from the aft quadrants.

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.7 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM. APPLICABLE GAUGE SAVER RESTRICTORS OR EQUIVALENT DEVICES MUST BE USED.

(j) Pressurize auxiliary pitot systems No. 1 and 2 to 4.0 psig (28 kPa) (AMM 34-11-00/201).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(k) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 825-046
(2) Do the steps that follow to adjust the pogo rods for the neutral shift mechanism:
(a) Make sure that rig pin E/ST10 can be freely put in the rig pin hole (Fig. 507).
(b) Do the steps that follow if rig pin E/ST10 cannot be freely put in the rig pin hole:

WARNING: DO NOT DISCONNECT THE TWO POGO RODS ON THE NEUTRAL SHIFT MECHANISM AT THE SAME TIME. THE NEUTRAL SHIFT AND OVERRIDE MECHANISM CAN MOVE HARDOVER AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

1) Disconnect the lower end of the inboard pogo rod on the neutral shift mechanism from the neutral shift and override linkage (Fig. 507).

NOTE: If both of the pogo rods must be disconnected, install rig pin E/ST10. This is so the neutral shift and override mechanism will not move hard over.

2) Adjust the outboard pogo rod until rig pin E/ST10 can be put in freely.
3) Tighten the jamnut on the pogo rod and put a lockwire on the jamnut.
4) Adjust the lower end of the inboard pogo rod until the condition that follows is correct:
   a) The attachment bolt for the pogo rod can be freely put through the neutral shift linkage and the pogo rod.
5) Install the attachment bolt, but do not tighten the nut.
6) Tighten the pogo rod jamnut.
7) Make sure that the attachment bolt for the pogo rod can be put in freely.
8) Tighten and put a lockwire on the attachment bolt nut and put lockwire on the pogo rod jamnut.

(c) Remove rig pin E/ST10.

S 825-047

(3) Do the steps that follow to adjust the neutral shift control rod:

NOTE: The upper control rod is not adjustable.
The lower control rod is adjustable on the two ends.

(a) Make sure that there is no freeplay in the rod end bearings on the upper and lower control rods.
(b) If there is freeplay in the rod end bearings, do the steps that follow to adjust the lower control rod:
   1) Loosen the jamnuts.
   2) Make the rod longer until there is no freeplay in the rod end bearings in the upper and lower rods.
   3) Tighten the jamnuts on the rod.

S 825-048

(4) Do these steps to adjust the captain's (lower) feel and centering unit control rod (Fig. 507):
(a) Install rig pin E/ST7 (Fig. 506).

(b) Shake the captain's (lower) feel and centering unit input arm to make sure it is at the neutral position.
(c) Adjust and connect the control rod on the captain's feel and centering unit to the crank arm on the aft quadrant.
(d) Make sure the bolt turns easily and the input arm does not move when you turn the bolt.
(e) Tighten the bolt.
(f) Remove rig pin E/ST7.

S 825-197
(5) Do these steps to adjust the first officer's (upper) feel and centering unit control rod (Fig. 507):
(a) Put the LEFT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the ON position.
(b) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
2) 11C12, STAB TRIM SHUTOFF LEFT
3) 11C13, STAB TRIM SHUTOFF RIGHT
4) 11H11 or 11C05, STAB TRIM CONT L
5) 11H20, STAB TRIM CONT R
(c) Move the stabilizer until Dimension B on the stabilizer ballscrew actuator is 22.24 ± 0.05 inch (564.9 ± 1.2 mm) (2 units of trim on the position indicator)

NOTE: Use tool B27039-17, which is part of B27039-13, to measure this Dimension B.

(d) Connect the breakout box to the neutral shift transducer that is attached to the upper feel unit arm (Refer to the "Neutral Shift Transducer Adjustment" topic for the applicable equipment).
(e) Energize the transducer with 26 VAC, 400 Hz power.
(f) Connect a phase angle voltmeter (PAV) across pins 3 and 5 on the breakout box.
(g) Push the first officer's (upper) feel unit arm approximately 10 degrees clockwise (look from the top view).
(h) Slowly permit the copilot's (upper) feel unit arm to turn back to the neutral position.

NOTE: Do not permit the upper arm to turn too quickly.

(i) Write down the value shown on the voltmeter, and make a note of the sign (positive or negative).
(j) Push the first officer's (upper) feel unit arm approximately 10-degrees counter-clockwise (look from the top view).
(k) Slowly permit the copilot's (upper) feel unit arm to turn back to the neutral position.

NOTE: Do not permit the upper arm to turn too quickly.

(l) Write down the value shown on the voltmeter, and make a note of the sign (positive or negative).
(m) Calculate the average of the two values that you wrote from the voltmeter, and make a record of this average value.
(n) Connect the first officer's (upper) feel unit control rod to the crank arm on the aft quadrant.
(o) Make fine adjustments of the upper feel unit control rod, until you can get the value shown on the voltmeter to agree with the calculated average value, within +/-0.005 volts.
(p) Decrease the pressure in the auxiliary pitot systems No. 1 and No. 2 to 0.0 psig (0.0 kPa) (AMM 34-11-00/201).
(q) Make sure that the transducer output voltage does not change by more than 0.060 volts.
(r) If the transducer voltage changed by more than 0.060 volts, adjust the upper control rod again, and repeat the steps to make sure the control rod is adjusted correctly.

S 865-216

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM. APPLICABLE GAUGE SAVER RESTRICTORS OR EQUIVALENT DEVICES MUST BE USED.

(6) Pressurize the auxiliary pitot systems No. 1 and No. 2 to 4.0 psig (28 kPa) (AMM 34-11-00/201).

S 825-049

(7) Do the adjustment for the neutral shift transducers (Refer to the Neutral Shift Transducer Adjustment paragraph).

I. Neutral Shift Transducer Adjustment (Fig. 507)

NOTE: Five procedures to adjust the neutral shift transducers are given.

PROCEDURE 1 uses the A27063-91 equipment, a power supply, and a digital phase angle voltmeter (PAV).
PROCEDURE 2 uses the A27063-91 equipment, airplane power, a digital voltmeter (DVM), and a ratiometric PAV.
PROCEDURE 3 is the same as PROCEDURE 2 except that the ratiometric PAV is replaced with a PAV and the ratio calculation is done manually.
PROCEDURE 4 uses a phase synchronous voltmeter.
PROCEDURE 5 uses an MCDP Ground Test procedure.

S 865-050

(1) Do these steps to prepare for the neutral shift transducer adjustment:
   (a) Move the stabilizer until Dimension B (Fig. 502) on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.3 mm).
   (b) If removed, install the four decentering springs to the upper and lower arms of the feel and centering unit.
   (c) If disconnected, connect the output control rods for the left and right aft quadrants to the crank arms.
   (d) Make sure that rig pin E/ST8 and E/ST9 is not installed.
   (e) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
      1) 11E17, FLT CONT COMPUTER POWER LEFT
      2) 11E20, FLIGHT CONT CMPTR PWR CENTER
      3) 11E35, FLT CONT CMPTR PWR RIGHT
   (f) Disconnect the electrical connector from the transducer.

S 825-051

(2) Neutral Shift Transducer Adjustment (PROCEDURE 1):

(a) Remove the electrical connector from one of the three neutral shift transducers.

(b) Connect the breakout box and the cable assemblies to the transducer (Fig. 510).

(c) Connect the PAV to the breakout box at pins 3 (SIG LO), 5 (SIG HI), and 7 (GND).

(d) Connect the power supply to the breakout box at pins 2 (LO) and 1 (HI).

(e) Adjust the power supply to 26 ± 0.02 volts ac RMS.

(f) Supply 26 ± 0.02 volts ac RMS from the power supply HI and LO to the PAV at the applicable REF pins.

(g) Loosen the clamping nut on the transducer clamp such that the transducer body can turn.

(h) Turn the body until there is an in-phase absolute output voltage of less than 1.25v ac.

NOTE: The zero mark on the body must be less than 30 degrees from the zero mark on the shaft.

(i) Tighten the clamping nut.

(j) Make sure that the absolute output in-phase voltage is less than 1.25v ac.

(k) Remove the lockwire from the control rod that is attached to the sensor crank.

(l) Turn the adjustment nut on the control rod to get the smallest possible in-phase voltage.

(m) Make sure that the voltage does not have an absolute value larger than 0.040v ac.

(n) Use the breakout box and repeat the same adjustment steps for the other two neutral shift transducers.

(o) Turn the feel unit input crank approximately 5-degrees clockwise.

(p) With the crank held at 5-degrees, measure the in-phase output of each transducer.

(q) Make sure that the voltage is in-phase with the input voltage.
(r) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(s) Turn the feel unit input crank counterclockwise approximately 2-degrees.
(t) With the crank held at 2-degrees, measure the in-phase output of each transducer.
(u) Make sure that the voltage is in-phase with the input voltage.
(v) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(w) Put a lockwire on the control rod.
(x) Disconnect the power supply and the PAV from the breakout box.
(y) Disconnect the breakout box and the cable assembly from the transducer.

S 825-052
(3) Neutral Shift Transducer Adjustment (PROCEDURE 2):
(a) Remove the electrical connector from one of the three neutral shift transducers.
(b) Connect the breakout box and the cable assemblies to the transducer (Fig. 510).
(c) Connect the ratiometric PAV to the breakout box at pins 5 (HI), 3 (LO), and 7 (GND) (Fig. 510).
(d) Connect the breakout box and the cable assembly to the electrical connector.
(e) Connect breakout box pins 2 (LO) and 1 (HI) to the applicable REF pins on the ratiometric PAV.
(f) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11E17, FLT CONT COMPUTER POWER LEFT
2) 11E20, FLIGHT CONT CMPTR PWR CENTER
3) 11E35, FLT CONT CMPTR PWR RIGHT
(g) Loosen the clamping nut on the transducer clamp such that the transducer body can turn.
(h) Turn the body until there is an in-phase absolute output voltage of less than 1.25v ac.

NOTE: The zero mark on the body must be less than 30 degrees from the zero mark on the shaft.

(i) Tighten the clamping nut.
(j) Make sure that the absolute output in-phase voltage is less than 1.25v ac.
(k) Remove the lockwire on the control rod that is attached to the sensor crank.
(l) Turn the adjustment nut on the control rod until the ratiometric PAV shows 0.0481 or less.
(m) Use the breakout box and repeat the same adjustment steps for the other two neutral shift transducers.
(n) Turn the feel unit input crank clockwise approximately 5-degrees.
(o) With the crank held at 5-degrees, measure the in-phase output of each transducer.
(p) Make sure that the voltage is in-phase with the input voltage.
(q) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(r) Turn the feel unit input crank counterclockwise approximately 2-degrees.
(s) With the crank held at 2-degrees, measure the in-phase output of each transducer.
(t) Make sure that the voltage is in-phase with the input voltage.
(u) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(v) Put a lockwire on the control rod.
(w) Make sure that the value shown on the ratiometric PAV is 0.0481 or less.
(x) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
    1) 11E17, FLT CONT COMPUTER POWER LEFT
    2) 11E20, FLIGHT CONT CMPTR PWR CENTER
    3) 11E35, FLT CONT CMPTR PWR RIGHT
(y) Disconnect the breakout box and the cable assembly from the electrical connector.
(z) Disconnect the ratiometric PAV from the breakout box.
(aa) Disconnect the breakout box and the cable assembly from the transducer.

S 825-053

(4) Neutral Shift Transducer Adjustment (PROCEDURE 3):

(a) Remove the electrical connector from one of the three neutral shift transducers.

(b) Connect the breakout box and the cable assemblies to the transducer (Fig. 510).

(c) Connect the PAV to the breakout box at pins 3 (SIG LO), 5 (SIG HI), and 7 (GND) (Fig. 510).

(d) Connect the breakout box and the cable assembly to the electrical connector.

(e) Connect the DVM to the breakout box at pins 2 (LO) and 1 (HI) to monitor airplane power.

(f) Connect pins 1 and 2 on the breakout box to the applicable REF pins on the PAV.

(g) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11E17, FLT CONT COMPUTER POWER LEFT
2) 11E20, FLIGHT CONT CMPTR PWR CENTER
3) 11E35, FLT CONT CMPTR PWR RIGHT

(h) Write down the airplane input voltage shown on the DVM.

(i) Use the formula that follows to calculate the necessary transducer output:

$$\frac{\text{NOMINAL OUTPUT}}{\text{NOMINAL INPUT}} \times \text{Measured input (DVM voltage reading)} = \text{Measured output of transducer (PAV voltage reading)}$$

$$\frac{0.0481}{26.00} \times \text{V at DVM} = \text{V at PAV}$$

where V = voltage shown on monitor

(j) Loosen the clamping nut on the transducer clamp such that the transducer body can turn.
(k) Turn the body until there is an in-phase absolute output voltage of less than 1.25v ac.

NOTE: The zero mark on the body must be less than 30 degrees from the zero mark on the shaft.

(l) Tighten the clamping nut.
(m) Make sure that the absolute output in-phase voltage is less than 1.25v ac.
(n) Remove the lockwire from the control rod that is attached to the sensor crank.
(o) Turn the adjustment nut on the control rod slowly until the PAV shows a value near the value obtained by the formula.
(p) Use the breakout box and repeat the same adjustment steps for the other two neutral shift transducers.
(q) Turn the feel unit input crank clockwise approximately 5-degrees.
(r) With the crank held at 5-degrees, measure the in-phase output of each transducer.
(s) Make sure that the voltage is in-phase with the input voltage.
(t) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(u) Turn the feel unit input crank counterclockwise approximately 2-degrees.
(v) With the crank held at 2-degrees, measure the in-phase output of each transducer.
(w) Make sure that the voltage is in-phase with the input voltage.
(x) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(y) Put a lockwire on the control rod.
(z) Make sure that the PAV shows the necessary output voltage.
(aa) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11E17, FLT CONT COMPUTER POWER LEFT

2) 11E20, FLIGHT CONT CMPTR PWR CENTER
3) 11E35, FLT CONT CMPTR PWR RIGHT

(ab) Disconnect the breakout box and the cable assembly from the electrical connector.
(ac) Disconnect the DVM and the PAV from the breakout box.
(ad) Disconnect the breakout box and the cable assembly from the transducer.

S 825-054

(5) Neutral Shift Transducer Adjustment (PROCEDURE 4):
(a) Prepare the phase synchronous voltmeter for use as written on the tool.
(b) Attach the applicable cable assembly from the voltmeter to the transducer connector.
(c) Loosen the clamping nut on the transducer clamp such that the transducer body can turn.
(d) Turn the body until there is an in-phase absolute output voltage of less than 1.25v ac.

NOTE: The zero mark on the body must be less than 30 degrees from the zero mark on the shaft.

(e) Tighten the clamping nut.
(f) Make sure that the absolute output in-phase voltage is less than 1.25v ac.
(g) Remove the lockwire from the control rod that is attached to the sensor crank.
(h) Turn the adjustment nut on the control rod to get the smallest possible in-phase voltage.
(i) Make sure that the in-phase voltage is not larger than 0.040v ac.
(j) Use the phase synchronous voltmeter and repeat the same adjustment steps for the other two neutral shift transducers.
(k) Turn the feel unit input crank clockwise approximately 5-degrees.
(l) With the crank held at 5-degrees, measure the in-phase output of each transducer.

(m) Make sure that the voltage is in-phase with the input voltage.
(n) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(o) Turn the feel unit input crank counterclockwise approximately 2-degrees.
(p) With the crank held at 2-degrees, measure the in-phase output of each transducer.
(q) Make sure that the voltage is in-phase with the input voltage.
(r) Make sure that the difference in the voltage between two transducers is not more than 0.40v ac.
(s) Put a lockwire on the control rod.
(t) Disconnect the voltmeter and cable from the transducer connector.

S 825-055

(6) Neutral Shift Transducer Adjustment (PROCEDURE 5):

CAUTION: USE PROCEDURE 5 (WHICH USES MCDP GROUND TEST 66) ONLY IF AT LEAST ONE OF THE THREE TRANSDUCERS IS CORRECTLY ADJUSTED WITH PROCEDURE 1, 2, 3, OR 4. MCDP GROUND TEST 66 COMPARES TRANSDUCER OUTPUTS. IF AT LEAST ONE TRANSDUCER IS NOT ADJUSTED WITH PROCEDURE 1, 2, 3, OR 4, INCORRECT ADJUSTMENTS CAN OCCUR.

(a) Do MCDP Ground Test 66 - XDCR OUTPUTS (AMM 22-00-02/201, Autoflight BITE).

S 845-056

(7) Do these steps to put the airplane back to its usual condition:
(a) Connect the electrical connector to the transducer.
(b) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11E17, FLT CONT COMPUTER POWER LEFT
2) 11E20, FLIGHT CONT CMPTR PWR CENTER
3) 11E35, FLT CONT CMPTR PWR RIGHT
(c) Make sure that the rod ends are correctly engaged on the threads.

NOTE: The rod end can be seen through the inspection hole.

(d) Remove the pressure from the right and center hydraulic systems (AMM 29-11-00/201).
(e) Remove the pressure from the auxiliary pitot systems No. 1 and No. 2 (AMM 34-11-00/201).

J. Autopilot Servo Rod Adjustment

S 825-265
(1) Do the adjustment for the autopilot servo rod (AMM 22-12-01/401).

K. Feel Computer Control Rod Adjustment (Fig. 508)

S 865-057
(1) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 715-002
(2) Do the steps that follow to adjust the control rod for the feel computer:
(a) Make sure that rig pin E/ST11 can be freely put in the computer arm.
(b) If rig pin E/ST11 cannot be freely put in, adjust the length of the control rod until the rig pin can be easily installed.
(c) Make sure that the rod end is can be seen through the inspection hole.
(d) Connect the control rod to the computer arm.
(e) Tighten the attachment fasteners.
(f) Remove rig pin E/ST11.

L. PCA Centering Springs Adjustment (Fig. 509)

S 865-058
(1) Make sure that the power from the left, right, and center hydraulic systems is removed (AMM 29-11-00/201).

S 495-217
(2) Install rig pin E/ST7 in the aft quadrant (Fig. 506).

S 035-220
(3) Disconnect the PCA input control rods (outboard end) at the input cranks of the left and right elevators (Fig. 509).

S 495-219
(4) Install rig pins E/ST8 and E/ST9 in the middle PCA in the left and right elevators (Fig. 509).

S 825-247

(5) For the left elevator,
do these steps to adjust the PCA centering springs:
(a) Disconnect the centering springs from the middle and the outboard PCA input cranks.
(b) Use a rubber band or cord to hold the middle PCA input crank to the inboard structure, and make sure you get these conditions to agree (View E, Fig. 509):
1) The rig pin is held tightly in position.
2) All of the freeplay is removed from the input crank.
(c) Use a straight edge to make sure that the 3 tangent points of the middle PCA centering spring and the input crank align (View E, Fig. 509).
(d) If the 3 tangent points do not align correctly, adjust the support clip until they align correctly.
(e) Tighten the attachment bolts for the support clip.
(f) Use a rubber band or cord to hold the outboard PCA input crank to the inboard structure to remove the crank freeplay (View E, Fig. 509).
(g) Use a straight edge to make sure that the 3 tangent points of the outboard PCA centering spring and the input crank align (View E, Fig. 509).
(h) If the 3 tangent points do not align correctly, adjust the support clip until they align correctly.
(i) Tighten the attachment bolts for the support clip.
(j) Remove the rubber band or cord from the middle and outboard PCA input cranks.
(k) Connect the centering springs for the middle and outboard PCA input cranks.

S 825-248

(6) For the right elevator,
do these steps to adjust the PCA centering springs:
(a) Disconnect the centering springs from the middle and the outboard PCA input cranks.

(b) Use a rubber band or cord to hold the middle PCA input crank to the inboard structure, and make sure you get these conditions to agree (View E, Fig. 509):
1) The rig pin is held tightly in position.
2) All of the freeplay is removed from the input crank.
(c) Use a straight edge to make sure that the 3 tangent points of the middle PCA centering spring and the input crank align.
(d) If the 3 tangent points do not align correctly, adjust the support clip until they align correctly.
(e) Tighten the attachment bolts for the support clip.
(f) Use a rubber band or cord to hold the outboard PCA input crank to the structure to remove freeplay (View E, Fig. 509):
(g) Use a straight edge to make sure that the 3 tangent points of the outboard PCA centering spring and the input crank align.
(h) If the 3 tangent points do not align correctly, adjust the support clip until they align correctly.
(i) Tighten the attachment bolts for the support clip.
(j) Remove the rubber band or cord from the middle and outboard PCA input cranks.
(k) Connect the centering springs for the middle and the outboard PCA input cranks.

S 435-249

(7) Connect the PCA input control rods back to the input cranks of the left and right elevators (Fig. 509).

S 825-246

(8) If you can not easily connect the PCA input control rods, adjust the control rods with the instruction given in the PCA Input Control Rod Adjustment paragraph.

S 095-240

(9) Remove rig pins E/ST7, E/ST8 and E/ST9.

M. PCA Input Control Rod Adjustment (Fig. 509)

S 865-059

(1) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm).

S 865-060

(2) Make sure that the power from the left, right, and center hydraulic systems is removed.

S 715-004

(3) Do the steps that follow to adjust the input control rod for the PCA:
   (a) Install rig pin E/ST7 (Fig. 506).
   (b) Make sure that rig pins E/ST8 and E/ST9 can be easily installed (Fig. 509).
   (c) If rig pins E/ST8 and E/ST9 cannot be easily installed, do the steps that follow to adjust the left or right PCA input control rod:
      1) Adjust the length of the PCA input control rod until the conditions that follow are correct:
         a) The attachment bolt for the control rod can be easily installed through the rod and input crank.
         b) Rig pins E/ST7, E/ST8 and E/ST9 can be easily installed.
      2) Install and tighten the attachment bolt for the control rod.
      3) Tighten the control rod jamnut.
   (d) Remove rig pins E/ST7, E/ST8, and E/ST9.

S 825-061

(4) Adjust the PCAs (Refer to the Power Control Actuator Adjustment paragraph).

N. Power Control Actuator (PCA) Adjustment (Fig. 509)

NOTE: The right hydraulic system supplies power to the outboard PCAs. The left hydraulic system supplies power to the middle PCAs. The center hydraulic system supplies power to the inboard PCAs. Only supply power to one hydraulic system at a time during PCA adjustment. The middle PCA is adjusted first and is to be referred to for the outboard and inboard PCA adjustment.

S 865-062

(1) Do the steps that follow to prepare for the PCA adjustment:
   (a) Make sure that the temperatures of the upper and lower surfaces are the same and stay constant.

      NOTE: Temperature differences between the upper and lower surfaces can cause thermal offset at the trailing edge.

(b) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).
(c) Make sure that the power is removed from the left, right and center hydraulic systems.
(d) Install rig pin E/ST7 (Fig. 506).

S 825-063
(2) Do these steps to adjust the input pogo rod for the middle PCA on the left elevator:
(a) Supply hydraulic power to the middle PCA.
1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT
2) Put the L FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

3) Pressurize the left hydraulic system (AMM 29-11-00/201).
(b) Make sure that the trailing edge upper surface on the left elevator aligns, by less than ± 0.05 inch (± 1.3 mm), with the elevator rig position mark on the index plate.
(c) If the trailing edge does not align correctly, adjust the input pogo rod for the middle PCA, as necessary (Fig. 509).

NOTE: Always adjust the input pogo rod so that the elevator moves up, in the direction of the elevator rig position mark on the index plate. If the elevator trailing edge is above the rig position mark, adjust the elevator below the mark. Then, adjust the elevator up until it is aligned correctly.

If the elevator is too far above the index plate and cannot be adjusted down (because of the hydraulic locks in the PCAs without power), pull the input linkages of the PCAs without power aft and hold. Then, adjust the input pogo rod of the PCA with power . The input pogo rods of the PCA without power can be disconnected from the input bellcranks to do the adjustment.

(d) If you adjusted the input pogo rod, make sure the rod end threads are engaged correctly on the pogo rod (Fig. 509).
(e) Tighten the jamnut on the pogo rod, but do not install a lockwire.
(f) Make sure the elevator trailing edge aligns with the rig position mark on the index plate, ± 0.05 inch (± 1.3 mm), after the pogo rod jamnut is tightened.
(g) Make a mark on the index plate at the location of the left elevator trailing edge upper surface.

NOTE: This mark will be used as a datum to adjust the inboard and outboard PCAs.

(h) Remove the hydraulic power from the middle PCA.
1) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).
2) Put the L FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT

S 825-064
(3) Do these steps to adjust the input pogo rod for the outboard PCA on the left elevator:
(a) Supply power to the outboard PCA.
1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H28, FLT CONT SHUTOFF TAIL RIGHT
2) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

3) Pressurize the right hydraulic system (AMM 29-11-00/201).

(b) Make sure the trailing edge upper surface of the left elevator aligns, by less than ± 0.05 inch (± 1.3 mm), with the datum mark from the middle PCA adjustment.
(c) If the surface does not align correctly, adjust input pogo rod for the outboard PCA as necessary.

NOTE: Always adjust the elevator trailing edge up, in the direction of the datum mark, not down.

(d) If you adjusted the input pogo rod, make sure the rod end threads are engaged correctly in the pogo rod (Fig. 509).
(e) Tighten the jamnut on the pogo rod, but do not install a lockwire.
(f) Make sure the elevator trailing edge aligns with the datum mark on the index plate, ± 0.05 inch (± 1.3 mm), after the pogo rod jamnut is tightened.
(g) Remove the power from the outboard PCA.
1) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).
2) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
a) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 825-065
(4) Do these steps to adjust the pogo rod for the inboard PCA on the left elevator:
(a) Supply power to the inboard PCA.
1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H18, FLT CONT SHUTOFF TAIL CTR
2) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

3) Pressurize the center hydraulic system (AMM 29-11-00/201).

(b) Make sure that the trailing edge upper surface of the left elevator aligns, by less than ± 0.05 inch (± 1.3 mm), with the datum mark from the middle PCA adjustment.
(c) If the surface does not align correctly, adjust the input pogo rod for the inboard PCA as necessary.

NOTE: Always adjust the input pogo rod such that the elevator moves up, in the direction of the datum marks, not down.

(d) If you adjusted the input pogo rod, make sure the rod end threads are engaged correctly in the pogo rod (Fig. 509).
(e) Tighten the jamnut on the pogo rod, but do not install a lockwire.
(f) Make sure the elevator trailing edge still aligns with the datum mark on the index plate, ± 0.05 inch (± 1.3 mm), after the pogo rod jamnut is tightened.
(g) Remove the power from the inboard PCA.
1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
2) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
a) 11H18, FLT CONT SHUTOFF TAIL CTR

S 825-241
(5) Adjust the middle, inboard, and outboard PCA input pogo rods for the right elevator with the same procedures and the same sequence that were done for the left elevator.

NOTE: The right elevator is operated by the same hydraulic system, circuit breakers, and switches, as the left elevator. (left middle and right middle, left outboard and right outboard, and left inboard and right inboard).

S 825-067
(6) Do these steps to make sure that the input pogo rods for the elevator PCAs are adjusted correctly:
(a) Supply power to the middle PCAs on the left and right elevators.
1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT

2) Put the L FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

3) Pressurize the left hydraulic system (AMM 29-11-00/201).

(b) Make a mark on the index plates to show the position of the upper surfaces of the left and right elevator trailing edge (Fig. 505).

NOTE: These marks will be used as datum for the outboard and inboard PCA adjustment.

(c) Remove the power from the middle PCAs on the left and right elevators.
1) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).
2) Put the L FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
a) 11H17, FLT CONT SHUTOFF TAIL LEFT

(d) Supply power to the outboard PCAs on the left and right elevators.
1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
a) 11H28, FLT CONT SHUTOFF TAIL RIGHT
2) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.
3) Pressurize the right hydraulic system (AMM 29-11-00/201).

(e) Make sure the trailing edge of the left and right elevator upper surfaces align, by less than ± 0.05 inch (± 1.3 mm), with the datum marks from the previous step.

(f) If the trailing edges do not align correctly, adjust the input pogo rod for the outboard PCA on the left or right elevator as applicable, until they align correctly.

NOTE: Always adjust the input pogo rod so the elevator moves up, in the direction of the datum marks, not down.

(g) If you adjusted the input pogo rod, make sure the rod end threads are engaged correctly in the pogo rod (Fig. 509).
(h) Tighten the jamnut on the pogo rod, but do not install a lockwire.
(i) Make sure that the elevator trailing edge aligns with the rig position mark on the index plate, ± 0.05 inch (± 1.3 mm), after the pogo jamnut is tightened.
(j) Remove the power from the outboard PCAs on the left and right elevators.
    1) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).
    2) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
    3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
        a) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(k) Supply power to the inboard PCAs on the left and right elevators.
    1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
        a) 11H18, FLT CONT SHUTOFF TAIL CTR
    2) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.
    3) Pressurize the center hydraulic system (AMM 29-11-00/201).
(l) Make sure the trailing edge of the left and right elevator upper surfaces align, by less than ± 0.05 inch (± 1.3 mm), with the datum marks from the previous step.
(m) If the trailing edges do not align correctly, adjust the input pogo rod on the inboard PCA for the left or right elevator as applicable, until they align correctly.

NOTE: Always adjust the input pogo rod such that the elevator moves up, in the direction of the datum marks, not down.

(n) If you adjusted the input pogo rod, make sure the rod end threads are engaged correctly in the pogo rod (Fig. 509).
(o) Tighten the jamnut on the pogo rod, but do not install a lockwire.
(p) Make sure the elevator trailing edge still aligns with the rig position mark on the index plate, ± 0.05 inch (± 1.3 mm), after the pogo rod jamnut is tightened.

(q) Remove the power from the inboard PCAs on the left and right elevators.
  1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
  2) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
  3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
    a) 11H18, FLT CONT SHUTOFF TAIL CTR
(r) Make sure there are sufficient thread engagement on all the PCA input pogo rods.

NOTE: Make sure that you cannot put a 0.045 inch (1.14 mm) diameter pin in each inspection hole.

S 095-068
(7) Remove rig pins E/ST7.

S 435-069
(8) Install a lockwire on the jamnuts for all the input pogo rods that you adjusted (Fig. 509).

S 865-070
(9) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-242

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(10) Supply power to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-072
(11) Push the captain's control column full forward until the aft quadrant stops are touched.

S 825-073
(12) Adjust the elevator aft quadrant stops (Refer to the Adjust Elevator Aft Quadrant Stops paragraph), if you get one or more of these conditions to agree:
  (a) The two aft quadrant stops are not touched at the same time
  (b) Elevator travel is less than 18.15 inches (461.0 mm) trailing edge down.

S 865-074
(13) Pull the captain's control column full aft until the aft quadrant stops are touched.

S 825-075
(14) Adjust the elevator aft quadrant stops (Refer to the Adjust Elevator Aft Quadrant Stops paragraph), if you get one or more of these conditions to agree:
(a) The two aft quadrant stops are not touched at the same time
(b) Elevator travel is less than 29.08 inches (738.6 mm) trailing edge up.

S 435-076
(15) Install a lockwire on each stop bolt to the stop assembly.

NOTE: Do not install the lockwire on the top surface of the bolt head.

S 865-077
(16) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

O. Elevator Position Transmitter Adjustment

S 825-266
(1) Do the adjustment for the elevator position transmitter (AMM 27-38-00/501).

P. Elevator Aft Quadrant Stops Adjustment (Fig. 505)

NOTE: Only adjust the aft quadrant stops if the elevators do not have the necessary full travel during the elevator travel limits test (Refer to the Elevator Control System Test), or if the captain's and first officer's control columns do not touch the stop at the same time.

S 425-078
(1) Do the full travel test in the Elevator Travel Limits Test (refer to the Elevator Control System Test) to find which aft quadrant stops need adjustment.

NOTE: The captain's aft quadrant stops are related to the left elevator travel limits. The first officer's aft quadrant stops are related to the right elevator travel limits.

The left and right elevators must have the full up and down travel and overtravel conditions as shown (View A-A, Fig. 505).

S 825-079

(2) To adjust the travel, add or remove washers behind the stop bolt head. Be sure to write down the number of washers behind the stop bolt head before you remove the stop bolt.

NOTE: A change in washer thickness (below the stop bolt head) of 0.016 inch (0.41 mm) will cause a change in elevator travel of approximately 0.29 inch (7.3 mm).

If the difference of the captain's and first officer's control column stops is less than one washer thick, make sure captain's aft quadrant makes contact with the stop first.

Elevator travel will decrease if washers are added. Elevator travel will increase if washers are removed.

S 435-215

CAUTION: MAKE SURE THAT THE LOCKWIRE DOES NOT GO ON TOP OF THE HEAD OF THE STOP BOLT. ELEVATOR TRAVEL CAN DECREASE.

(3) Tighten and put a lockwire on the stop bolt when the adjustment is completed.

S 735-081

(4) Do the Elevator Travel Limits Test in the Elevator Control System Test.

Q. Put the Airplane Back to Its Usual Condition

S 865-082

(1) Make sure that the power from the left, right, and center hydraulic systems is removed (AMM 29-11-00/201).

S 865-083

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)

(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 865-084
(3) Put the L, R, and C FLT CONTROL SHUTOFF switches on the P1 panel to the ON position.

S 865-085
(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the NORM position.

S 415-086
(5) Close the access door for the forward compartment, 113AL (AMM 06-41-00/201).

S 415-087
(6) Close the access doors for the forward and aft stabilizer compartment, 311AL, 313AL (AMM 06-42-00/201).

S 415-088
(7) Install the access panels, 335BB, 335DB, 345BB, and 345DB, for the power control actuator and position transmitter (AMM 06-42-00/201).

S 865-089
(8) Remove electrical power (AMM 24-22-00/201).

TASK 27-31-00-725-090

4. Elevator Control System - System Test

A. General

(1) This task contains the system test procedure for the elevator Control System, which contains these topics:
(a) Control Column Travel

(b) Column Breakout Force
(c) Elevator Column and Quadrant Override
(d) Elevator Travel Limits
(e) Elevator Asymmetry Limits
(f) Elevator Asymmetry Limiting System EICAS Messages
(g) Elevator Feel System EICAS Messages
(h) Elevator Feel System Forces
(i) Neutral Shift
(j) Feel Unit Override
(k) Autopilot Hardover
(l) MCDP Ground Test 08-SERVO ELEV (AMM 22-00-02/201)
(m) Elevator Pressure Reducer
(n) Elevator PCU Monitor System
(o) Elevator Pressure Bypass Valve (Procedure 1 and 2)
(p) Elevator Position Indicating System (AMM 27-38-00/501)

(2) If it is necessary to make sure the complete elevator control system operates correctly, it is necessary to do all the test topics in this task.

B. Equipment

(1) Position Transmitter Tester, Breakout Box, Cables - A27063-91
(2) Power Supply - Powertron Model 5900
Industrial Test Equip Corp.
Port Washington, New York
(3) Force Gage - DPPH-100
Chatillon Inc.
83-30 Kew Garden Rd.
Kew Gardens, New York 11415
(4) Control Wheel Protractor Kit - A27021-29
(5) Control Column Lock Equipment - A27021-69
(6) Control Wheel Adapter Equipment - A27021-97 or -98
(7) Scale (linear measurements for the stabilizer ballscrew) - B27039-13

(8) Rigging Blocks, Elevator Aft Quadrant
(a) B27023-48 (Elevator is at Neutral)
(b) B27023-49 (Elevator at 5 Degrees UP).
(9) Test Box, Rudder/Elevator PCU Monitor System - B27061-1

NOTE: If the test box is not available, you can use three 750-ohm, 10-watt resistors as a replacement to the test box.

(10) Pogo Compression/Extension Tool - B27032-9, (3 Necessary)
(11) Surface Protractor - Commercially Available
(12) Test Box, Elevator Control System Hardover - B27071-34, - Preferred
(13) Tee Fitting - NAS1763J060606 (or equivalent steel or titanium fitting)
(14) Pressure Gage - Capable of 4000 +/- 50 psi (25,600 +/- 350 kPa) (commercially available)

C. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 22-00-02/201, Autoflight BITE
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-31-15/401, Elevator Aft Quadrants
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) FIM 31-41-00/101, EICAS Indicating and Crew Alerting System
(7) AMM 34-11-00/201, Pitot Static System

D. Access
(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
336/346	Elevator
710	Nose Landing Gear and doors
730	Left Main Landing Gear and Landing Gear Doors
740	Right Main Landing Gear and Landing Gear Doors

(2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Aft Stabilizer Compartment

E. Prepare for the Tests

S 865-342
(1) Supply electrical power (AMM 24-22-00/201).

S 215-348
(2) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H17, FLT CONT SHUTOFF TAIL LEFT
(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(g) 11K9, LEFT ENGINE OIL PRESS
(h) 11K35, RIGHT ENGINE OIL PRESS

S 015-350

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(3) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 215-343
(4) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 215-344
(5) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 865-345

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left, right and center hydraulic systems (AMM 29-11-00/201).

S 865-346
(7) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-347
(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-349
(9) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT

(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

F. Control Column Travel Test

S 215-100
(1) Make sure that the left and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 215-101
(2) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 725-005
(3) Do the steps that follow to make sure the control column operates correctly:
(a) Shake the captain's control column forward and aft quickly to make sure the control column is at neutral, then release.
(b) Use a control surface protractor to make a mark of the column's neutral position.
(c) Push the captain's control column forward to the column stop.
(d) Make sure that the angle from the neutral column position to the forward stop is at least 8.90 degrees (Fig. 505).

NOTE: Approximately a 55-pound (245 newton) push is necessary to make sure the column touches the stop.

(e) Pull the captain's control column aft to the column stop.
(f) Make sure that the angle from the neutral column position to the aft stop is at least 13.00 degrees.

NOTE: Approximately a 65-pound (290 newton) pull is necessary to make sure that the column touches the stop.

(g) Let the control column go to the neutral position.
(h) Do the steps that follow to make sure the control column travel with the stabilizer at its limits of travel are correct:
1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
a) 11B19, STAB TRIM ALT (IF INSTALLED)
b) 11C12, STAB TRIM SHUTOFF LEFT
c) 11C13, STAB TRIM SHUTOFF RIGHT
2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the NORM position.
3) Use the alternate stab trim switches to move the horizontal stabilizer in the airplane nose up direction until the stabilizer stops.
4) Turn the captain's control wheel full clockwise and hold.
5) Move the captain's control column to the forward stop, to the aft stop and to the neutral position.
6) Let the control wheel go to its neutral position.

7) Make sure that the control column moves smoothly and freely through full travel.
8) Turn the captain's control wheel full counterclockwise and hold.
9) Move the captain's control column to the forward stop, to the aft stop and to the neutral position.
10) Let the control wheel go to its neutral position.
11) Make sure that the column moves smoothly and freely through full travel.
12) Use the alternate stab trim switches to move the horizontal stabilizer in the airplane nose up direction until the stabilizer stops.
13) Make sure that the control columns move smoothly and freely through full travel.

S 865-196

(4) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-195

(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-102

(6) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19 or 11A19, STAB TRIM ALT (INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT

G. Column Breakout Force Test

S 215-198

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 215-104

(2) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-105

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(3) Pressurize auxiliary pitot systems No. 1 and 2 to between 0.70 and 0.80 psig (4.8 and 5.5 kPa) (171.2 to 182.8 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

S 725-006

(4) Do the steps that follow to make sure the control column breakout force is correct:
   (a) Shake the captain's control column to make sure it is at neutral.
   (b) Make sure the upper surface of the elevator trailing edge aligns with the locating hole on the index plate by less than ± 0.15 inch (± 3.8 mm) (Fig. 505).
   (c) Use the control wheel adapter equipment to attach the force gage to the control column at the finger reference point (Fig. 512).
   (d) Slowly push the control column forward until the elevator trailing edge starts to move.
   (e) Make sure that the force at the point the elevator trailing edge starts to move is 3 to 5 pounds (14 to 22 newtons).
   (f) Let the control column go to the neutral position.
   (g) Use the force gage at the finger reference point to slowly pull the control column aft until the elevator trailing edge starts to move.

(h) Make sure that the force is 5.5 to 7.5 pounds (24 to 33 newtons) when the elevator trailing edge starts to move.
(i) Remove the force gage and adapter equipment.

S 865-106

(5) Remove the pressure from auxiliary pitot systems No. 1 and 2 (AMM 34-11-00/201).

H. Elevator Column and Quadrant Override Test

S 865-107

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 215-339

(2) Make sure that the horizontal stabilizer is at 6 units of trim on the stabilizer position indicator (the dimension B on the stabilizer ballscrew actuator is approximately 15.89 inches (403.6 mm).

S 725-351

(3) Do the steps that follow to make sure the control column and the aft quadrant override operate correctly:
(a) Install the aft quadrant rigging block (Elevator is at Neutral) in the first officer's aft quadrant to hold the quadrant in the neutral position (Fig. 511).

NOTE: Do not use rig pins to hold the quadrant in the neutral position. Rig pins are not applicable blocking tools.

(b) Install a control column lock in the first officer's control column (Fig. 512).
(c) Put a 6-inch (150 mm) strip of adhesive tape vertically on the right elevator index plate (Fig. 505).
(d) Make a mark on the tape that shows the up direction.
(e) Make a mark where the upper surface of the right elevator trailing edge would extend to the tape.
(f) Use the control wheel adapter equipment to attach the force gage to the captain's control column at the finger reference point (Fig. 505).
(g) Slowly pull the control column aft until there is a force of 70 ± 1 pounds (311 ± 4 newtons).
(h) Make a mark on the tape at the right elevator up position.
(i) Let the control column go to the neutral position.

(j) Use the force gage to slowly push the captain's control column forward until there is a force of 70 ± 1 pounds (311 ± 4 newtons).
(k) Make a mark on the tape at the right elevator down position.
(l) Let the control column go to the neutral position.
(m) Make sure that the elevator up and down position marks are less than 0.50 inch (12.7 mm) away from the right elevator reference position mark.
(n) Do the steps that follow if travel in the up or down direction is more than 0.50 inch (12.7 mm):
    1) Make sure that the aft quadrant is held in the neutral position and cannot move.
    2) Make a mark at the elevator trailing edge position on the tape again.
    3) Use the force gage as specified above to make marks at the elevator up and down positions again.
    4) Make sure the elevator up and down position marks are less than 0.50 inch (12.7 mm) away from the right elevator reference position mark.
(o) Measure and make a mark on the tape that is 2.10 inches (53.3 mm) above the upper mark.
(p) Measure and make a mark on the tape that is 2.10 inches (53.3 mm) below the lower mark.
(q) Remove the tape from the right elevator index plate and put it on the left elevator index plate.
(r) Make sure the middle mark on the tape is in line with the upper surface of the left elevator trailing edge.
(s) Use the force gage to slowly pull the captain's control column aft until the left elevator goes above the highest mark on the tape.
(t) Make sure that the control column force is 70 to 90 pounds (311 to 400 newtons).
(u) Let the control column go to the neutral position.
(v) Slowly push the captain's control column forward until the left elevator trailing edge goes below the lowest mark on the tape.
(w) Make sure that the control column force is 70 to 90 pounds (311 to 400 newtons).
(x) Let the control column go to the neutral position.

S 865-340

(4) Put the Airplane Back to its Usual Condition.
    (a) Remove the aft quadrant rigging block from the first officer's aft quadrant.

(b) Remove the control column lock from the first officer's control column.
(c) Remove the force gage and control wheel adapter equipment.
(d) Remove the pressure from the left, right, and center hydraulic systems, if it is not necessary (AMM 29-11-00/201).

I. Elevator Travel Limits Test

S 725-110

(1) Do the steps that follow for the elevator full travel test with the inboard PCA supplied with power:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Pressurize the center hydraulic system (AMM 29-11-00/201).
(b) Make sure that the pressure is removed from the left and right hydraulic systems (AMM 29-11-00/201).
(c) Put the R and L FLT CONTROL SHUTOFF switches on the P61 panel to the OFF position.
(d) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
2) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(e) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA). (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(f) Pressurize auxiliary pitot system No. 2 to between 0.60 to 0.65 psig (4.1 to 4.5 kPa) (159 to 165 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(g) Push the captain's control column forward until it touches the control column stop.
(h) Make sure the captain's aft quadrant touches the captain's aft quadrant stop (Fig. 505).
(i) Hold the control column in this position for 30 seconds.
(j) After 30 seconds, measure and write down the left elevator down travel while you hold the control column.
(k) Make sure that the down travel is at least 18.15 inches (461.0 mm) (View A-A, Fig. 505).

NOTE: If the left elevator does not have the necessary down travel, do the procedure to adjust the captain's aft quadrant stop.

(l) Pull the captain's control column aft until it touches the control column stop.
(m) Make sure the captain's aft quadrant touches the captain's aft quadrant stop.
(n) Hold the control column in this position for 30 seconds.
(o) After 30 seconds, measure and write down the left elevator up travel while you hold the control column.
(p) Make sure that the up travel is at least 29.08 inches (738.6 mm) (View A-A, Fig. 505).

NOTE: If the left elevator does not have the necessary up travel, do the procedure to adjust the captain's aft quadrant stop.

(q) Push the first officer's control column forward until it touches the control column stop.
(r) Make sure the first officer's aft quadrant touches the first officer's aft quadrant stop.
(s) Hold the control column in this position for 30 seconds.
(t) After 30 seconds, measure and write down the right elevator down travel while you hold the control column.
(u) Make sure that the down travel is at least 18.15 inches (461.0 mm) (View A-A, Fig. 505).

NOTE: If the right elevator does not have the necessary down travel, do the procedure to adjust the first officer's aft quadrant stop.

(v) Pull the first officer's control column aft until it touches the control column stop.

(w) Make sure the first officer's aft quadrant touches the first officer's aft quadrant stop.
(x) Hold the control column in this position for 30 seconds.
(y) After 30 seconds, measure and write down the right elevator up travel while you hold the control column.
(z) Make sure that the up travel is at least 29.08 inches (738.6 mm) (View A-A, Fig. 505).

NOTE: If the right elevator does not have the necessary up travel, do the procedure to adjust the first officer's aft quadrant stop.

(aa) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
(ab) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
(ac) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11H18, FLT CONT SHUTOFF TAIL CTR
(ad) Remove the pressure from auxiliary pitot system No. 2 (AMM 34-11-00/201).

S 725-111
(2) Do the steps that follow for the elevator full travel test with the outboard PCA supplied with power:
(a) Remove the DO-NOT-CLOSE tags and close this circuit breaker on the P11 panel:
1) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(b) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the right hydraulic system (AMM 29-11-00/201).
(d) Pressurize auxiliary pitot system No. 1 to between 0.60 to 0.65 psi (4.1 to 4.5 kPa) (159 to 165 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(e) Do the same procedure that was done for the inboard PCA to measure and write down the full up and down elevator travel.

NOTE: The necessary full up and down travel is the same as for the inboard PCA supplied with power.

(f) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).
(g) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.
(h) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
1) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

S 725-112
(3) Do the steps that follow for the elevator full travel test with the middle PCA supplied with power:
(a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) Put the L FLT CONTRL SHUTOFF switch on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the left hydraulic system (AMM 29-11-00/201).
(d) Do the same procedure that was done for the inboard PCA to measure and write down the full up and down elevator travel.

NOTE: The necessary full up and down travel is the same as for the inboard PCA supplied with power.

S 725-113
(4) Do the steps that follow for the uniformity of powered travel between the PCAs test:
(a) Compare the elevator travels that were written down for the full travel test with each PCA powered.

(b) Make sure that the PCAs on the same elevator has the conditions that follow:
  1) The difference between the largest and smallest elevator up travel for the PCAs on the left elevator is less than 1.15 inch (29.2 mm).
  2) The difference between the largest and smallest elevator down travel for the PCAs on the left elevator is less than 1.15 inch (29.2 mm).
  3) The difference between the largest and smallest elevator up travel for the PCAs on the right elevator is less than 1.15 inch (29.2 mm).
  4) The difference between the largest and smallest elevator down travel for the PCAs on the right elevator is less than 1.15 inch (29.2 mm).

(c) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
  1) 11H18, FLT CONT SHUTOFF TAIL CTR
  2) 11H28, FLT CONT SHUTOFF TAIL RIGHT

(d) Put the R and C FLT CONTROL SHUTOFF switches on the P61 panel to the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(e) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

(f) Make sure that the left hydraulic system is pressurized (AMM 29-11-00/201).

(g) Shake the control columns to make sure the control columns are in the neutral position.

NOTE: Do not move control columns from this position until the test is completed.

(h) Make a mark on the index plate at the left and right elevator trailing edge upper surfaces (Fig. 505).
(i) Make sure that the marks are less than ± 0.15 inch (± 3.8 mm) away from the elevator rig position locating holes on the index plates.

NOTE: Identify these marks (with all three hydraulic systems pressurized) for use in subsequent steps.

(j) Remove the pressure from the right and center hydraulic systems (AMM 29-11-00/201).
(k) Make a mark on the index plates at the left and right elevator trailing edge upper surfaces.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(l) Pressurize the center hydraulic system (AMM 29-11-00/201).
(m) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).
(n) Make a mark on the index plate at the left and right elevator trailing edge upper surfaces.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(o) Pressurize the right hydraulic system (AMM 29-11-00/201).
(p) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
(q) Make a mark on the index plates at the left and right elevator trailing edge upper surfaces.

(r) Do the steps that follow to compare the elevator position marks on the index plates:
1) For each elevator, make sure that the position marks for each hydraulic system pressurized are less than ± 0.10 (2.5 mm) apart.
2) Make sure that the position marks for each hydraulic system pressurized is less than ± 0.10 inch (± 2.5 mm) away from the position mark that you made for all three hydraulic systems pressurized.
3) If the elevator position marks do not meet the requirements, do the steps for the Power Control Actuator (PCA) Adjustment.
4) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

S 725-114

(5) Do the steps that follow for the elevator overtravel test:
(a) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).
(b) Remove the four PCA centering springs (Fig. 509) from the left and right elevators.

NOTE: Do not disconnect the centering spring support clips. If the centering spring support clips are removed, the centering springs and PCA input cranks have to be adjusted.

WARNING: MANUALLY HOLD THE AFT QUADRANT OUTPUT CONTROL RODS WHEN THE RODS FROM THE AFT QUADRANTS ARE DISCONNECTED. THE ELEVATOR INPUT LINKAGES ARE SPRING LOADED. IF CONTROL RODS ARE NOT HELD, THEY CAN MOVE HARDOVER AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

1) Manually hold the aft quadrant control rods.
2) Disconnect the output control rods for the left and right aft quadrant from the left and right aft quadrant output arms (Fig. 506).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the left hydraulic system (AMM 29-11-00/201).
(d) Make sure that the right and center hydraulic systems are not pressurized (AMM 29-11-00/201).

CAUTION: USE ONLY LIGHT FINGER PRESSURE AND MOVE THE LINKAGE SLOWLY. THIS WILL PREVENT HIGH END LOADS IN THE ELEVATOR PCA ACTUATORS.

1) Push the left elevator linkage slowly outboard until a PCA touches bottom.

NOTE: A PCA touches bottom when a light force applied to the elevator linkage will not move the elevator any further.

2) Measure and write down the elevator travel (Fig. 505).
3) Pull the left elevator linkage slowly inboard until a PCA touches bottom.
4) Measure and write down the elevator travel (Fig. 505).
5) Do the same steps to measure and write down the right elevator travel until a PCA touches bottom as was done for the left elevator.
6) Do the steps that follow to make sure that left elevator overtravel is correct:
   a) Compare the elevator full travel up with the PCA at bottom against the three elevator full travel up measurements with each PCA supplied with power.
   b) Make sure that the full travel up with PCA at bottom is at least 0.50 inch (12.7 mm) larger than any of the other three full travel up measurements.

NOTE: If the elevator overtravel is not correct, do the procedure to adjust the elevator aft quadrant stops. After the stops are adjusted, do the steps to make sure that the elevator overtravel is correct again.

c) Compare the elevator full travel down with the PCA at bottom against the three elevator full travel down measurements with each PCA supplied with power.
d) Make sure the full travel down with the PCA at bottom is at least 0.05 inch (1.3 mm) larger than the other three full travel down measurements.

NOTE: If the elevator overtravel is not correct, do the procedure to adjust the elevator aft quadrant stops. After the stops are adjusted, do the steps to make sure that the elevator overtravel is correct again.

7) Do the same procedure to make sure the right elevator up and down overtravels are correct as was done for the left elevator.

NOTE: Overtravel must be larger than 0.50 inch (12.7 mm).

If the elevator overtravel is not correct, do the procedure to adjust the elevator aft quadrant stops. After the stops are adjusted, do the steps to make sure that the elevator overtravel is correct again.

8) Connect the left and right output control rods to the aft quadrant output arms.
9) Install the four PCA centering springs (2 on each elevator)

NOTE: Do not loosen the support clips on the centering springs. If you loosen the clips, adjustment will be necessary.

(e) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

J. Elevator Asymmetry Limits Test

S 865-194

(1) Do the steps that follow to prepare for the asymmetry limits test:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).
(b) Make sure that Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).
(c) Shake the captain's control column to make sure that the control column is in the neutral position (Fig. 505).
(d) Install the aft quadrant rigging block (Elevator is at 5 Degrees Up) in the first officer's aft quadrant (Fig. 511).

NOTE: Do not use rig pins to block the aft quadrant.

(e) Measure the distance from the upper surface of the elevator trailing edge to the center of the locating hole in the index plate (Fig. 505).

NOTE: Use the same procedure to measure all elevator distances during the asymmetry limit test.

(f) Make sure that the distance is 5.00 to 5.75 inches (127.0 to 146.1 mm) for the left and right elevators.
(g) Open the access door for the aft stabilizer compartment, 313AL (AMM 06-42-00/201).

S 725-115
(2) Do the steps that follow for the asymmetry limits (actuator retracted) test:
(a) Make sure that the asymmetry limiter actuator is fully retracted.

(b) Pull the captain's control column aft until the elevator stops.
(c) Measure and write down the distance of the left and right elevator from the center of the index plate locating hole.
(d) Calculate the difference (from the measured distances written down before) between the position of the left elevator when the control column is at neutral and when it is pulled aft.
(e) Calculate the difference (from the measured distances written down before) between the right elevator position when the control column is at neutral and when it is pulled aft.
(f) Calculate the difference between the difference for the right elevator and the difference for the left elevator.
(g) Make sure the difference is between 19.90 and 22.50 inches (505.5 and 571.5 mm).
(h) Push the captain's control column forward until the left elevator stops.
(i) Measure and right down the distance of the left and right elevator positions from the center of the locating hole in the index plate.
(j) Add the dimension for the left elevator with the control column forward to the dimension for the control column at neutral.
(k) Subtract the dimension for the right elevator with the control column at neutral from the dimension for the control column forward.
(l) Subtract the above difference from the above sum.
(m) Make sure the difference is between 19.90 and 22.50 inches (505.5 and 571.5 mm).

S 725-116

(3) Do the steps that follow for the asymmetry limits (actuator extended) test:

WARNING: USE PRECAUTIONS TO PREVENT SHORT CIRCUITS AND ELECTRICAL SHOCKS WHEN THE ELECTRICAL SYSTEMS ARE ENERGIZED. INJURY TO PERSONS CAN OCCUR.

(a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11J12, ELEVATOR LIMIT

(b) Remove the electrical connector from the asymmetry limiter actuator.
(c) Connect the breakout box and the cable assembly to the asymmetry limiter actuator connector.
(d) Connect the power supply to the breakout box at pins 1 and 2.
(e) Apply 28v dc across pins 1 and 2 to extend the asymmetry actuator.
(f) Pull the captain's control column aft until the elevator stops.
(g) Measure and write down the distance of the left and right elevator from the center of the locating hole in the index plate.
(h) Subtract the distance of the left elevator when the control column is at neutral from the distance when it is pulled aft.
(i) Subtract the distance of the right elevator when the control column is at neutral from the distance when it is pulled aft.
(j) Subtract the difference for the right elevator from the difference for the left elevator.
(k) Make sure that the calculated value is between 6.05 and 7.80 inches (153.7 and 198.1 mm).
(l) Push the captain's control column forward until the left elevator stops.
(m) Measure and write down the distance of the left and right elevator from the locating hole in the index plate.
(n) Add the dimension for the left elevator with the control column forward to the dimension for the control column at neutral.
(o) Subtract the dimension for the right elevator with the control column at neutral from the dimension for the control column forward.
(p) Subtract the above difference from the above sum.
(q) Make sure the difference is between 6.05 and 7.80 inches (153.7 and 198.1 mm).

S 865-117
(4) Put the airplane back to its usual condition.
(a) Let the captain's control column go to the neutral position.
(b) Disconnect the power supply from Pins 1 and 2 on the breakout box.

(c) Connect the power supply to Pins 1 and 3 on the breakout box.
(d) Apply 28v dc across Pins 1 and 3 to retract the asymmetry actuator.
(e) Disconnect the power supply from the breakout box.
(f) Disconnect the breakout box and the cable assembly from the actuator connector.
(g) Connect the airplane electrical connector to the asymmetry actuator.
(h) Remove the blocking tools from the first officer's aft quadrant.
(i) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11J12, ELEVATOR LIMIT
(j) Close the access door for the aft stabilizer compartment, 313AL (AMM 06-42-00/201).

K. Elevator Asymmetry Limiting System EICAS Messages Test

S 865-118

(1) Do the steps that follow to prepare for the asymmetry limiting system EICAS messages test:
(a) Make sure these circuit breakers on the P11 panel are closed:
1) EICAS (6 locations)
2) 11A10, AIR DATA CMPTR LEFT
3) 11A11, AIR DATA AOA SENSOR LEFT
4) 11A12, AIR DATA BARO CORRECT LEFT
5) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
6) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
7) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
8) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
9) 11F30, AIR DATA CMPTR RIGHT
10) 11F31, AIR DATA AOA SENSOR RIGHT
11) 11F32, AIR DATA BARO CORRECT RIGHT

12) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
13) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
14) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
15) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC
16) 11J12, ELEVATOR LIMIT
17) 11S15, AIR/GND SYS 1
18) 11S19, AIR/GND SYS 2

(b) Push the ECS/MSG select switch on the P61 panel.
(c) Push AUTOREAD, then push ERASE on the P61 panel (FIM 31-41-00/101, Fig. 109).
(d) Put the COMPUTER select switch on the captain's display select panel, P9, to L.
(e) Make sure that the ELEV ASYM message is not shown on the EICAS display.
(f) Put the COMPUTER select switch to R.
(g) Make sure that the ELEV ASYM message is not shown on the EICAS display.
(h) Make sure that these faultballs are clear on the left and right SAM's:
1) ADC
2) L AIL/E ASY ACT
3) AIR/GND
4) SAM
(i) Open the access door for the aft stabilizer compartment, 313AL (AMM 06-42-00/201).

S 725-119

(2) Do the steps that follow for the elevator asymmetry limit crossfeed test:
(a) Open this circuit breaker on the P11 panel:
1) 11A10, AIR DATA CMPTR LEFT
(b) Stop for 2 seconds, then make sure that the ELEV ASYM message is not shown on the EICAS display.
(c) Open this circuit breaker on the P11 panel:
1) 11F30, AIR DATA CMPTR RIGHT
(d) Stop for 35 seconds, then make sure that the ELEV ASYM message is shown on the EICAS display.
(e) Put the COMPUTER select switch on the P9 panel to L.
(f) Erase the EICAS maintenance page (FIM 31-41-00/101, Fig. 109).
(g) Make sure that ELEV ASYM is shown on the EICAS display.
(h) Close this circuit breaker on the P11 panel:
1) 11A10, AIR DATA CMPTR LEFT
(i) Stop for 5 seconds, then erase the EICAS maintenance page (FIM 31-41-00/101, Fig. 109).
(j) Make sure that the ELEV ASYM message is not shown on the EICAS display.

(k) Close this circuit breaker on the P11 panel:
1) 11F30, AIR DATA CMPTR RIGHT

S 725-120
(3) Do the steps that follow for the left SAM elevator asymmetry limit interface test:
(a) Open these circuit breakers on the P11 panel:
1) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
2) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(b) Stop for 2 seconds, then make sure that the ELEV ASYM message is not shown on the EICAS display.
(c) Put the ADC test switch, on the P61 panel, to the test position for one of the ADCs.
(d) Stop for 2 seconds, then make sure that the asymmetry limit actuator extends and then retracts.

NOTE: ADC test switch operation extends the elevator asymmetry actuator for 13 seconds and then retracts it.

(e) Stop for 20 seconds, then push AUTOREAD, and then ERASE on the P61 panel (FIM 31-41-00/101, Fig. 109).
(f) Make sure that the ELEV ASYM message is not shown on the EICAS display.
(g) Close these circuit breakers on the P11 panel:
1) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
2) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 725-121
(4) Do the steps that follow for the right SAM elevator asymmetry limit interface test:

NOTE: Do not do this test for at least 10 seconds after the left SAM interface test.

(a) Open these circuit breakers on the P11 panel:
1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC

2) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

(b) Stop for 2 seconds, then make sure that the ELEV ASYM message is not shown on the EICAS display.

(c) Put the ADC test switch, on the P61 panel, to the test position for one of the ADCs.

(d) Stop for 2 seconds, then make sure that the asymmetry limit actuator extends and then retracts.

NOTE: ADC test switch operation extends the elevator asymmetry actuator for 13 seconds and then retracts it.

(e) Stop for 20 seconds, then push AUTOREAD and then ERASE on the P61 panel (FIM 31-41-00/101, Fig. 109).

(f) Make sure that the ELEV ASYM message is not shown on the EICAS display.

(g) Close these circuit breakers on the P11 panel:

1) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC

2) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

L. Elevator Feel System EICAS Messages Test

S 865-267

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-270

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(2) Pressurize auxiliary pitot systems No. 1 and 2 to between 4.35 to 4.45 psig (29.99 to 30.68 kPa) (410 to 415 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

S 865-124
(3) Put the computer select switch on the EICAS display select panel, P9, to L.

S 215-125
(4) Stop for 10 seconds, then make sure that the ELEV FEEL message does not show on the EICAS display.

S 865-126
(5) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

S 215-127
(6) Stop for 30 seconds, then make sure that the ELEV FEEL message is shown on the EICAS display.

S 865-128
(7) Put the computer select switch on the P9 panel to R.

S 215-130
(8) Stop for 30 seconds, then make sure that the ELEV FEEL message is shown on the EICAS display.

S 865-131
(9) Remove the pressure from auxiliary pitot system No. 2 (AMM 34-11-00/201).

S 865-132
(10) Pressurize auxiliary pitot system No. 1 to between 4.35 to 4.45 psi (29.99 to 30.68 kPa) (410 to 415 knots) (AMM 34-11-00/201).

S 215-133
(11) Stop for 30 seconds, then make sure that the ELEV FEEL message is on the EICAS display.

S 865-134
(12) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

M. Elevator Feel System Forces Test

S 865-330

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 225-136
(2) Make sure that Dimension B on the stabilizer ballscrew actuator is 17.32 ± 0.01 inches (439.9 ± 0.3 mm).

NOTE: Use tool B27039-14, which is part of B27039-13, to measure this Dimension B.

S 485-137
(3) Attach the force gage to the captain's control column at the finger reference point to measure control column forces (Fig. 505).

S 495-138
(4) Put a piece of tape on the side of the airplane adjacent to the elevator trailing edge.

NOTE: Marks for the up and down positions of the elevator will be put on the tape.

S 865-139
(5) Let the elevator go to its center position.

NOTE: Use this for a start point for the travel tests.

S 725-374
(6) Do the steps that follow for the feel forces test with auxiliary pitot systems No. 1 and 2 not pressurized, and all hydraulic systems pressurized:
(a) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

(b) Push the captain's control column forward until the left elevator moves down 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
(c) Make sure that the control column force is 11 to 15 pounds (49 to 67 newtons).
(d) Push the captain's control column forward until the left elevator moves down 6.85 ± 0.05 inches (174.0 ± 1.3 mm).
(e) Make sure that the control column force is 26 to 34 pounds (116 to 151 newtons).
(f) Push the captain's control column forward until the left elevator moves down 16.20 ± 0.05 inches (411.5 ± 1.3 mm).
(g) Make sure that the control column force is 34 to 44 pounds (151 to 196 newtons).
(h) Do the above steps again, except pull the captain's control column aft.
(i) Make sure that the control column forces (when the captain's column is pulled aft) are as follows:
1) 15 to 23 pounds (67 to 102 newtons) for elevator up movement of 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
2) 28 to 35 pounds (125 to 156 newtons) for elevator up movement of 6.85 ± 0.05 inches (174.0 ± 1.3 mm).
3) 35 to 45 pounds (156 to 200 newtons) for elevator up movement of 16.20 ± 0.05 inches (411.5 ± 1.3 mm).

S 725-140
(7) Do the steps that follow for the feel forces test with the two auxiliary pitot systems, and all hydraulic systems pressurized:

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(a) Pressurize auxiliary pitot systems No. 1 and 2 to between 4.35 and 4.45 psig (29.99 and 30.68 kPa) (410 to 415 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(b) Push the captain's control column forward until the left elevator moves down 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
(c) Measure and write down the control column force.
(d) Pull the captain's control column aft until the left elevator moves up 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
(e) Measure and write down the control column force.

(f) Make sure that the sum of the above two forces is 48 to 60 pounds (213 to 267 newtons).
(g) Push the captain's control column forward until the left elevator moves down 6.85 ± 0.05 inches (174.0 ± 1.3 mm).
(h) Measure and write down the control column force.
(i) Pull the captain's control column aft until the left elevator moves up 6.85 ± 0.05 inches (174.0 ± 1.32 mm).
(j) Measure and write down the control column force.
(k) Make sure that the sum of the above two forces is 102 to 124 pounds (454 to 552 newtons).

S 725-141
(8) Do the steps that follow for the feel forces test with one auxiliary pitot system pressurized, and all hydraulic systems pressurized:
(a) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).
(b) Push the captain's control column forward until the left elevator moves down 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
(c) Measure and write down the control column force.
(d) Pull the captain's control column aft until the left elevator moves up 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
(e) Measure and write down the control column force.
(f) Make sure that the sum of the above forces is 48 to 60 pounds (213 to 267 newtons).
(g) Push the captain's control column forward until the left elevator moves down 6.85 ± 0.05 inches (174.0 ± 1.3 mm).
(h) Measure and write down the control column force.
(i) Pull the captain's control column aft until the left elevator moves up 6.85 ± 0.05 inches (174.0 ± 1.3 mm).
(j) Measure and write down the control column force.
(k) Make sure that the sum of the above two forces is 102 to 124 pounds (454 to 552 newtons).
(l) Remove the pressure from auxiliary pitot system No. 2.
(m) Pressurize auxiliary pitot system No. 1 to between 4.35 and 4.45 psig (29.99 to 30.68 kPa) (410 to 415 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(n) Do the above steps again to push and pull the captain's control column.
(o) Make sure that the sums of the forces are as follows:
1) 48 to 60 pounds (213 to 267 newtons) for elevator movement of 2.10 ± 0.05 inches (53.3 ± 1.3 mm).
2) 102 to 125 pounds (454 to 556 newtons) for elevator movement of 6.85 ± 0.05 inches (174.0 ± 1.3 mm).

S 725-143

(9) Do the steps that follow for the feel forces test with only one auxiliary pitot system pressurized, and only two hydraulic systems pressurized:
   (a) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
   (b) Pressurize auxiliary pitot system No. 1 (lower right) to 2.40 to 2.50 psig (16.6 to 17.2 kPa) (311 to 317 knots) (AMM 34-11-00/201).

       NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

   (c) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 20.02 ± 0.02 inches (508.5 ± 0.5 mm).

       NOTE: Use tool B27039-15, which is part of B27039-13, to measure this Dimension B.

   (d) Push the captain's control column forward until the left elevator moves down 1.45 ± 0.05 inches (36.8 ± 1.3 mm).
   (e) Measure and write down the control column force.
   (f) Pull the captain's control column aft until the left elevator moves up 1.45 ± 0.05 inches (36.8 ± 1.3 mm).
   (g) Measure and write down the control column force.
   (h) Make sure that the sum of the above two forces is 67 to 83 pounds (298 to 369 newtons).
   (i) Pressurize the center hydraulic system (AMM 29-11-00/201).
   (j) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).
   (k) Pressurize auxiliary pitot system No. 2 (lower left) to between 2.40 and 2.50 psig (16.56 and 17.24 kPa) (311 to 317 knots) (AMM 34-11-00/201).
   (l) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).
   (m) Push the captain's control column forward until the left elevator moves down 1.45 ± 0.05 inches (36.8 ± 1.3 mm).
   (n) Measure and write down the control column force.
   (o) Pull the captain's control column aft until the left elevator moves up 1.45 ± 0.05 inches (36.8 ± 1.3 mm).
   (p) Measure and write down the control column force.
   (q) Make sure that the sum of the above two forces is 67 to 83 pounds (298 to 369 newtons).

S 865-144

(10) Keep the left and center hydraulic systems pressurized for the neutral shift test.

S 865-145

(11) Keep auxiliary pitot system No. 2 pressurized for the neutral shift test.

N. Neutral Shift Test

S 865-326

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 215-147

(2) Make sure that the left and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-148

(3) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).

S 865-149

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). THIS WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(4) Pressurize auxiliary pitot systems No. 1 and 2 to between 3.45 and 3.55 psig (23.79 and 24.48 kPa) (369 to 374 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(a) Measure and write down the distance from the upper surfaces of the left and right elevator trailing edges to the center of the locating holes in the index plates (Fig. 505).

NOTE: Use this procedure to measure elevator position in the neutral shift test.

S 725-008

(5) Do the steps that follow to make sure that the elevator neutral shift operates correctly:

(a) Make sure that these dimensions are less than 0.15 inch (3.8 mm) above or below the locating hole on the index plate.

(b) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 20.65 ± 0.01 inches (524.5 ± 0.3 mm).

NOTE: Use tool B27039-15, which is part of B27039-13, to measure this Dimension B.

(c) Measure and write down the two of the elevator positions.

(d) Do the steps that follow to calculate a dimension for the two elevators:

1) If the elevator was above the locating hole when dimension B was 15.89 inches (403.6 mm), add its distance to the distance of the elevator when dimension B was 20.65 inches (524.5 mm).

2) If the elevator was below the locating hole when dimension B was 15.89 inches (403.6 mm), subtract its distance from the distance of the elevator when dimension B was 20.65 inches (524.5 mm).

(e) Make sure that the calculated dimension is 4.67 ± 0.23 inches (118.6 ± 5.8 mm).

(f) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 25.09 ±0.01 inches (637.3 ±0.3 mm).

NOTE: Use tool B27039-16, which is part of B27039-13, to measure this Dimension B.

(g) Measure and write down both elevator dimensions.

(h) Do the steps that follow to calculate a dimension for both elevators:

1) If the elevator was above the locating hole when dimension B was 15.89 inches (403.6 mm), add its distance to the distance of the elevator when dimension B was 25.09 inches (637.3 mm).

2) If the elevator was below the locating hole when dimension B was 15.89 inches (403.6 mm), subtract its distance from the distance of the elevator when dimension B was 25.09 inches (637.3 mm).

(i) Make sure that the calculated dimension is 11.10 ± 0.36 inches (281.9 ± 9.1 mm).

S 865-328

(6) Keep auxiliary pitot systems No. 1 and 2 pressurized for the feel unit override test.

S 865-329

(7) Keep the left, right, and center hydraulic systems pressurized for the feel unit override test.

O. Feel Unit Override Test

S 865-327

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPPLIED.

(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-151

(2) Move the horizontal stabilizer Dimension B on the stabilizer ballscrew actuator to 19.07 ± 0.05 inches (484.4 ± 1.3 mm) (4.0 units of trim on the position indicator).

NOTE: Use tool B27039-2, which is part of B27039-13, to measure this Dimension B.

S 495-152

(3) Put a piece of tape on the side of the airplane adjacent to the elevator trailing edge.

NOTE: Marks for the up and down positions of the elevator will be put on the tape.

S 865-153

(4) Let the elevator go to its center position.

NOTE: Use this as a start point to measure travel dimensions.

S 865-269

CAUTION: DO NOT LET THE PRESSURE GO ABOVE 4.75 PSI (32.8 KPA) (426 KNOTS). WILL PREVENT DAMAGE TO THE FEEL COMPUTER. MAKE PRESSURE CHANGES SUCH THAT THE INDICATED RATE OF CLIMB (OR DESCENT) IS LESS THAN 5000 FEET PER MINUTE FOR THE STATIC SYSTEM AND 300 KNOTS PER MINUTE FOR THE PITOT SYSTEM.

(5) Pressurize auxiliary pitot systems No. 1 and 2 to between 4.45 and 4.55 psig (30.68 and 31.37 kPa) (415 to 419 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

S 725-009

(6) Do the steps that follow to make sure that the feel unit override operates correctly:
   (a) Pull the captain's control column until the elevator moves up 18.00 inches (457.2 mm).
   (b) Measure and write down the control column force at the finger reference point (Fig. 505).
   (c) Make sure that the force on the control column is between 100 and 135 pounds (445 and 601 newtons).

NOTE: Pull on the captain's and the first officer's control columns at the same time and add the two applied forces.

   (d) Let the control column go to the neutral position.
   (e) Push the captain's control column forward until the elevators move down 12.00 inches (304.8 mm) (Fig. 505).
   (f) Measure and write down the control column force.
   (g) Make sure that the force is between 60 and 100 pounds (267 and 445 newtons).
   (h) Let the control column go to the neutral position.

S 865-271

(7) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-272

(8) Remove the pressure from auxiliary pitot systems No. 1 and 2 (AMM 34-11-00/201).

P. Autopilot Hardover Test

NOTE: This test uses an elevator hardover test box that will send a signal to the applicable autopilot servo valve to move the elevator.

NOTE: The DIRECTION switch commands the appropriate autopilot servo valve to move the elevator in the nose UP or the nose DOWN direction.

S 865-155

(1) Do the steps that follow to prepare for the autopilot hardover test:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STAILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Make sure that left, right, and center hydraulic system power is supplied (AMM 29-11-00/201).
(b) Make sure that the left, right, and center hydraulic reservoirs are not pressurized (AMM 29-11-00/201).
(c) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 20.02 ± 0.01 inches (508.5 ± 0.3 mm).

NOTE: Use tool B27039-15, which is part of B27039-13, to measure this Dimension B.

(d) Pressurize auxiliary pitot systems No. 1 and 2 to between 2.40 and 2.50 psig (16.55 and 17.24 kPa) (314 to 317 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

(e) Move the captain's control column full travel forward and aft to make sure it moves freely.
(f) Put a piece of tape on the left side of the airplane adjacent to the elevator trailing edge.
(g) Make a mark on the tape that shows the neutral elevator position.
(h) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11E17, L FLT CONT CMPTR PWR
2) 11E18, L FLT CONT CMPT SERVO
3) 11E20, C FLT CONT CMPTR PWR

4) 11E21, C FLT CONT CMPTR SERVO
5) 11E35, R FLT CONT CMPTR PWR
6) 11E36, R FLT CONT CMPTR SERVO

(i) Open access panels 311AL and 313AL.
(j) Disconnect the electrical connectors from the upper, lower, and middle autopilot servo valves.
(k) Make sure that the POWER, EXCITATION, ARM, DIRECTION and ENGAGE switches are OFF.
(l) Connect the elevator hardover test box to the airplane connector D2258 and to the upper, lower, and middle autopilot servo valve connectors one at a time.
(m) Move the POWER, ARM, and EXCITATION switches to ON.

S 725-010

(2) Do the steps that follow to make sure that autopilot hardover operates correctly with auxiliary pitot systems No. 1 and 2 pressurized:

NOTE: Repeat the test steps below for each of the autopilot servos.

(a) Cycle the control column full forward, full aft and then back to neutral.
(b) Shake the control column lightly to center the elevator system.
(c) Move the DIRECTION switch to UP.
1) Wait 5 seconds.
(d) Move the ENGAGE switch to ON.
(e) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(f) Make sure that the distance is between 0.60 and 1.11 inches (15.2 to 28.2 mm).
(g) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(h) Move the DIRECTION switch to OFF.
(i) Cycle the control column full forward and full aft and then back to neutral.
(j) Shake the control column lightly to center the elevator system.

(k) Move the DIRECTION switch to DOWN.
1) Wait 5 seconds.
(l) Move the ENGAGE switch to ON.
(m) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(n) Make sure that the distance is between 0.70 and 1.10 inches (17.8 and 27.9 mm).
(o) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(p) Move the DIRECTION switch to OFF.
(q) Repeat the steps above to test each of the autopilot servos.

S 865-156
(3) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

S 725-011
(4) Do the steps that follow to make sure that autopilot hardover operates correctly with only auxiliary pitot system No. 2 pressurized:

NOTE: Repeat the test steps below for each of the autopilot servos.
(a) Cycle the control column full forward and full aft and then back to neutral.
(b) Shake the control column lightly to center the elevator system.
(c) Move the DIRECTION switch to UP.
1) Wait 5 seconds.
(d) Move the ENGAGE switch to ON.
(e) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(f) Make sure that the distance is between 0.60 and 1.11 inches (15.2 to 28.2 mm).
(g) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(h) Move the DIRECTION switch to OFF.
(i) Cycle the control column full forward and full aft and then back to neutral.
(j) Shake the control column lightly to center the elevator system.
(k) Move the DIRECTION switch to DOWN.
1) Wait 5 seconds.
(l) Move the ENGAGE switch to ON.
(m) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(n) Make sure that the distance is between 0.70 and 1.10 inches (17.8 mm and 27.9 mm).
(o) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(p) Move the DIRECTION switch to OFF.

(q) Repeat the steps above to test each of the autopilot servos.

S 865-157

(5) Remove the pressure from auxiliary pitot system No. 2 (AMM 34-11-00/201).

S 865-389

(6) Pressurize auxiliary pitot systems No. 1 to between 2.40 and 2.50 psig (16.55 and 17.24 kPa) (314 to 317 knots) (AMM 34-11-00/201).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

S 725-012

(7) Do the steps that follow to make sure that autopilot hardover operates correctly with only auxiliary pitot system No. 1 pressurized:

NOTE: Repeat the test steps below for each of the autopilot servos.

(a) Cycle the control column full forward and full aft and then back to neutral.
(b) Shake the control column lightly to center the elevator system.
(c) Move the DIRECTION switch to UP.
1) Wait 5 seconds.
(d) Move the ENGAGE switch to ON.
(e) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(f) Make sure that the distance is between 0.60 and 1.11 inches (15.2 and 28.2 mm).
(g) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(h) Move the DIRECTION switch to OFF.
(i) Cycle the control column full forward and full aft and then back to neutral.
(j) Shake the control column lightly to center the elevator system.

(k) Move the DIRECTION switch to DOWN.
1) Wait 5 seconds.
(l) Move the ENGAGE switch to ON.
(m) Measure the distance that the left elevator trailing edge moved from the neutral position mark on the tape.
(n) Make sure that the distance is between 0.70 and 1.10 inches (17.8 and 27.9 mm).
(o) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(p) Move the DIRECTION switch to OFF.
(q) Repeat the steps above to test each of the autopilot servos.

S 865-159
(8) Remove the pressure from auxiliary pitot system No. 1 (AMM 34-11-00/201).

S 725-013
(9) Do the steps that follow to make sure that autopilot hardover operates correctly with auxiliary pitot systems No. 1 and 2 not pressurized:

NOTE: Repeat the test steps below for each of the autopilot servos.
(a) Move the horizontal stabilizer until dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (Fig. 502).
(b) Cycle the control column full forward and full aft and then back to neutral.
(c) Shake the control column lightly to center the elevator system.
(d) Mark the neutral position on the tape.
(e) Move the DIRECTION switch to UP.
1) Wait 5 seconds.
(f) Move the ENGAGE switch to ON.
(g) Measure the distance that the left trailing edge moved from the neutral position mark on the tape.
(h) Make sure that the distance is between 4.90 and 6.90 inches (124.5 and 175.3 mm).
(i) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(j) Move the DIRECTION switch to OFF.
(k) Cycle the control column full forward and full aft and then back to neutral.
(l) Shake the control column lightly to center the elevator system.
(m) Move the DIRECTION switch to DOWN.
1) Wait 5 seconds.
(n) Move the ENGAGE switch to ON.
(o) Measure the distance that the left trailing edge moved from the neutral position mark on the tape.
(p) Make sure that the distance is between 5.00 and 8.35 inches (127.0 and 212.1 mm).

(q) Move the ENGAGE switch to OFF.
1) Wait 5 seconds.
(r) Move the DIRECTION switch to OFF.
(s) Repeat the steps above to test each of the autopilot servos.

S 825-496
(10) If any of the hardover checks fail, do the following steps:
(a) Remove hydraulic power (AMM 29-11-00/201).
(b) For elevator under deflection, add washers between the clevis assembly and the housing assembly on the elevator feel unit (AMM 27-31-17/201).
(c) For elevator over deflection, remove washers between the clevis assembly and the housing assembly of the elevator feel unit (AMM 27-31-17/201).
(d) After adding or removing washers, perform the steps over again that failed.

S 865-376
(11) Move the POWER, ARM, and EXCITATION switches to OFF.

S 085-161
(12) Disconnect the elevator hardover test box from airplane connector D2258 and from the upper, lower, and middle autopilot servo valve electrical connectors.

S 865-162
(13) Connect the airplane wiring to the upper, lower and middle autopilot servo valve electrical connectors.

S 415-163
(14) Close access panels 311AL and 313AL (AMM 06-42-00/201).

S 865-164
(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11E17, L FLT CONT CMPTR PWR
(b) 11E18, L FLT CONT CMPTR SERVO
(c) 11E20, C FLT CONT CMPTR PWR
(d) 11E21, C FLT CONT CMPTR SERVO
(e) 11E35, R FLT CONT CMPTR PWR
(f) 11E36, R FLT CONT CMPTR SERVO

S 865-388
(16) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 745-387
(17) Do the MCDP Ground Test 08-SERVO ELEV (AMM 22-00-02/201, Autoflight BITE).

Q. Elevator Pressure Reducer Operation Test

S 215-166
(1) Make sure that the L, R, and C FLT CONTROL SHUTOFF valve switches on the P61 panel are at the ON position.

S 865-167
(2) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-168
(3) Do the EICAS status/maintenance message erase procedure (FIM 31-41-00/101, Fig. 109).

S 215-169
(4) Make sure that the ELEV L HYD PRESS message is not shown on the EICAS display.

S 725-014
(5) Do the steps that follow to make sure the elevator pressure reducer operates correctly:
   (a) Put the L FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
   (b) Make sure that the ELEV L HYD PRESS message is shown on the EICAS display, and the ELEV C HYD PRESS message is not shown on the EICAS display.
   (c) Put the C FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
   (d) Make sure that the ELEV C HYD PRESS message is shown on the EICAS display, and the ELEV R HYD PRESS message is not shown on the EICAS display.
   (e) Put the R FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
   (f) Make sure that the ELEV (L, C and R) HYD PRESS messages are shown on the EICAS display.
   (g) Put the L, C, and R FLT CONTROL SHUTOFF valve switches on the P61 panel to the ON position.
   (h) Make sure that the ELEV (L, C, and R) HYD PRESS messages stay on the EICAS display.

S 865-170
(6) Remove the power from the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 215-171
(7) Make sure that the ELEV (L, C, and R) HYD PRESS messages stay on the EICAS display.

S 865-172
(8) Pressurize the left, center, and right hydraulic systems (AMM 29-11-00/201).

S 865-173

(9) Do the EICAS status and maintenance message erase procedure (FIM 31-41-00/101, Fig. 109).

S 215-174

(10) Make sure that the ELEV (L, C, and R) HYD PRESS messages are not shown on the EICAS display.

S 865-175

(11) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

R. Elevator PCU Monitor System Test

S 865-176

(1) Do the steps that follow to prepare for the elevator PCU monitor system test:

(a) Make sure that these circuit breakers on the P11 panel are closed:

1) 11C12, STAB TRIM SHUTOFF LEFT
2) 11C13, STAB TRIM SHUTOFF RIGHT
3) 11H17, FLT CONT SHUTOFF TAIL LEFT
4) 11H18, FLT CONT SHUTOFF TAIL CTR
5) 11H28, FLT CONT SHUTOFF TAIL RIGHT

(b) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel are at the ON position.

(c) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in the NORM position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(d) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).

(e) Supply electrical power (AC and DC) (AMM 24-22-00/201).

(f) Move the horizontal stabilizer to between 5 and 7 units of trim on the stabilizer position indicator.

(g) Make sure that these circuit breakers on the P11 panel are closed:

1) EICAS (6 locations)
2) 11A10, AIR DATA CMPTR LEFT
3) 11A11, AIR DATA AOA SENSOR LEFT
4) 11A12, AIR DATA BARO CORRECT LEFT
5) 11C30, LANDING GEAR POS SYS 1
6) 11F30, AIR DATA CMPTR RIGHT
7) 11F31, AIR DATA AOA SENSOR RIGHT
8) 11F32, AIR DATA BARO CORRECT RIGHT
9) 11J10, PCU MON SENSOR

10) 11J11, PCU MON MOD
11) 11S15, AIR/GND SYS 1
12) 11S19, AIR/GND SYS 2
13) 11S23, POS SYS 2

S 725-177

(2) Do the steps that follow for the PCU monitoring of left outboard PCA test:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FORM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED. THE HYDRAULIC SYSTEMS ARE POWERED FOR THIS TEST.

(a) Disconnect the electrical connectors from the middle and inboard PCAs.
(b) Attach the electrical connectors to the test box.

NOTE: If the test box for the PCU monitoring test is not available, connect a 750-ohm, 10-watt resistor between pin 1 and pin 2 at each PCA electrical connector (at the inboard and middle PCAs).

(c) Erase the EICAS memory (AMM 31-41-00/201).
(d) Make sure that the L ELEV PCU message is not shown on the EICAS display.
(e) Use the pogo rod compression tool to compress the pogo rod on the outboard PCA 0.20 to 0.25 inches (5.1 to 6.4 mm).
(f) Put the computer select switch on the P9 panel to L.
(g) Make sure that the L ELEV PCU message is shown on the EICAS display.
(h) Put the computer select switch on the P9 panel to R.
(i) Make sure that the L ELEV PCU message is shown on the EICAS display.
(j) Put the computer select switch on the P9 panel to AUTO.
(k) Remove the pogo compression tool from the outboard PCA pogo.

S 725-178

(3) Do the steps that follow to do a test for the PCU monitoring of the left middle PCA:
(a) Disconnect the middle PCA connector from the test box (or the resistor).
(b) Attach the middle PCA connector to the PCA.
(c) Disconnect the electrical connector from the outboard PCA.

(d) Attach the electrical connector to the test box.

NOTE: If the test box for the PCU monitoring test is not available, connect a 750-ohm, 10-watt resistor between pin 1 and pin 2 on the outboard PCA electrical connector.

(e) Erase the EICAS memory (AMM 31-41-00/201).
(f) Make sure that the L ELEV PCU message is not shown on the EICAS display.
(g) Use the pogo rod compression tool to compress the pogo rod on the middle PCA 0.20 to 0.25 inches (5.1 to 6.4 mm).
(h) Make sure that the L ELEV PCU message is shown on the EICAS display.
(i) Remove the pogo rod compression tool from the middle PCA pogo rod.
(j) Disconnect the outboard and inboard PCA connectors from the test box (or the resistors).
(k) Attach the outboard and inboard PCA connectors to the PCAs.
(l) Erase the EICAS memory (AMM 31-41-00/201).
(m) Make sure that the L ELEV PCU message is not shown on the EICAS display.
(n) Use the pogo rod compression tool to compress the pogo rod on the middle PCA 0.20 to 0.25 inch (5.1 to 6.4 mm).
(o) Make sure that the L ELEV PCU message is shown on the EICAS display.
(p) Remove the pogo rod compression tool from the middle PCA pogo.

S 725-179

(4) Do the steps that follow for the PCU monitoring of left inboard PCA test:
(a) Disconnect the electrical connectors from the outboard and middle PCAs.
(b) Attach the electrical connectors to the test box.

NOTE: If the test box for the PCU monitoring test is not available, connect a 750-ohm, 10-watt resistor between pin 1 and pin 2 at each PCA electrical connector (at the middle and outboard PCAs).

(c) Erase the EICAS memory (AMM 31-41-00/201).
(d) Make sure that the L ELEV PCU message is not shown on the EICAS display.
(e) Use the pogo rod compression tool to compress the pogo rod on the inboard PCA 0.20 to 0.25 (5.1 to 6.4 mm).
(f) Make sure that the L ELEV PCU message is shown on the EICAS display.
(g) Remove the pogo rod compression tool from the left elevator inboard PCA.
(h) Disconnect the outboard and middle PCA connectors from the test box (or the resistors).

(i) Attach the outboard and middle PCA connectors to the PCAs.
(j) Erase the EICAS memory (AMM 31-41-00/201).
(k) Make sure that the L ELEV PCU message is not shown on the EICAS display.

S 725-180
(5) Do the steps that follow for the PCU monitoring of right elevator PCAs test:
(a) Do the same procedure for the right elevator as you did for the left elevator except as follows:
1) Use the right side PCAs, not the left side PCAs
2) Look for the R ELEV PCU message, not the L ELEV PCU message.

S 865-181
(6) Erase the EICAS memory (AMM 31-41-00/201).

S 215-182
(7) Make sure that the L ELEV PCU message and the R ELEV PCU are not shown on the EICAS display.

S 865-183
(8) Keep the left, right, and center hydraulic systems pressurized for the elevator pressure bypass valve test.

S. Elevator Pressure Bypass Valve Test (Procedure 1)

NOTE: Procedure 1 uses the pogo compression/extension tool. Procedure 2 uses the tee and pressure gage. You can use procedure 1 or procedure 2 to test the elevator pressure bypass valve.

S 865-341

WARNING: MAKE SURE ALL HOLDING TOOLS AND OTHER OBSTRUCTIONS ARE REMOVED FROM THE SYSTEM. KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure that the left, right and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-274

(2) Use the stabilizer position indicator to move the horizontal stabilizer to 6 units of trim.

S 865-275

(3) Use the Captain's control column to do the steps that follow:
  (a) Move the control column fully forward then fully aft, 5 times.
  (b) Release the control column.
  (c) Let the control column return to a centered position.

S 725-277

WARNING: BE CAREFUL WHEN YOU DO THE ELEVATOR PRESSURE BYPASS VALVE TEST. THE HYDRAULIC SYSTEM IS FULLY PRESSURIZED AND THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILZER CAN MOVE QUICKLY. MOVEMENT OF THESE CONTROL SURFACES CAN CAUSE DAMAGE TO EQUIPMENT OR INJURIES TO PERSONS.

(4) Do the steps that follow to make sure the elevator pressure bypass valve operates correctly:
  (a) Put a 2 inch (50 mm) piece of tape on the side of the airplane adjacent to the left elevator trailing edge. Put the tape in the center and vertically along the length of the index plate.
  (b) Make a mark on the tape to show the neutral position of the left elevator.
  (c) Make a mark on the tape 0.5 inch (13 mm) above the neutral position mark.
  (d) Use the elevator pogo tools, B27032-9, to extend the pogos on the left inboard and the left outpoard PCU's to 0.25 +/- 0.01 inch (6.4 +/- 0.3 mm).

    NOTE: Make sure you do not move the elevator input crank when you extend or compress the pogos.

  (e) Make sure the trailing edge of the left elevator moves down.
  (f) Use the elevator pogo tool, B27032-9, to compress the pogo on the left middle PCU 0.25 ± 0.01 inch (6.4 ± 0.3 mm).

    NOTE: The trailing edge of the elevator may move up but it should not move above the neutral position mark.

  (g) If the trailing edge of the elevator moves to or above the neutral position mark, do the steps that follow:
    1) Make sure the elevator PCU pogos are positioned correctly.
    2) If the elevator PCU pogos are correctly positioned, do these steps:
      a) Remove the pogo tools, B27032-9, from the pogos.

b) With one hydraulic system pressurized at a time, move the elevator up and down to make sure each PCU will operate.

NOTE: The left hydraulic system supplies power to the middle PCU.

The right hydraulic system supplies power to the outboard PCU.

The center hydraulic system supplies power to the inboard PCU.

c) Do the Hydraulic System Gross Internal Leakage Check (AMM 29-11-00/601).

3) Do the Elevator Pressure Bypass Valve Test again until the trailing edge of the elevator does not move above the neutral position mark.

(h) Use the tail flight control shutoff valve to remove the pressure from the right hydraulic system.

NOTE: The trailing edge of the elevator will start to move up quickly and then it will move slower at the end of its travel.

(i) Make sure the trailing edge of the elevator is at a minimum of 0.5 inch (13 mm) above the neutral position mark.

(j) Do the steps that follow if the elevator trailing edge is not a minimum of 0.5 inch (13 mm) above the neutral position mark.

1) Make sure the left and center hydraulic systems are pressurized.
2) Make sure the right hydraulic system is not pressurized.
3) Make sure the elevator PCU pogos are correctly positioned.
4) If it is necessary, replace the items that follow in the sequence given.
   a) The pressure reducer bypass valve for the left hydraulic system.
   b) The left elevator PCU relief valve (internal to the PCUs) for the middle PCU.
   c) The left elevator PCU relief valve (internal to the PCUs) for the inboard PCU.

5) Do the Elevator Pressure Bypass Valve Test again until the trailing edge of the elevator is at a minimum of 0.5 inch (13 mm) above the neutral position mark.

S 865-278

(5) Remove the pressure from the left, right and center hydraulic system.

S 485-279

(6) Remove the pogo tools from the PCU pogos.

T. Elevator Pressure Bypass Valve Test (Procedure 2) (Fig. 509A)

NOTE: Procedure 1 uses the pogo compression/extension tool. Procedure 2 uses the tee and pressure gage. You can use procedure 1 or procedure 2 to test the elevator pressure bypass valve.

S 865-285

(1) Make sure pressure is removed from the left, right and center hydraulic systems (AMM 29-11-00/201).

S 495-286

(2) Do the steps that follow to install the tee fitting and the pressure gage in the hydraulic line.

NOTE: When you disconnect the hydraulic lines, use a bucket to catch the hydraulic fluid that spills.

(a) Find the titanium pressure line at the pressure reducer bypass valve.
(b) Find the location where the titanium pressure line joins the flexible line.
(c) Install the pressure gage between the titanium line and the flexible line.

S 865-319

(3) Supply electrical power (AMM 24-22-00/201).

S 865-320

(4) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-287

(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-321

(6) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

S 865-288

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Pressurize the left and right hydraulic systems to 2900 - 3200 psi (20,000 - 22,060 kPa) (AMM 29-11-00/201).

S 865-289

(8) Do these steps to remove the air from the elevator control system.

NOTE: The elevator control cables which are above the stabilizer will move.

(a) Move the elevator to the full airplane nose up position.
(b) Move the elevator to the full airplane nose down position.
(c) Do these steps 10 times.

S 865-290

(9) Make sure that the pressure gage shows less than 2350 psi (16,200 kPa).

S 865-291

(10) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

S 865-292

(11) Make sure that the pressure gage shows between 2900 - 3200 psi (20,000 - 22,060 kPa).

S 865-317

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(12) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 865-294

(13) Make sure that the pressure gage shows less than 2350 psi (16,200 kPa).

NOTE: You can move the elevators to the airplane nose up and nose down position before you check the pressure gage.

S 865-322

(14) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

S 095-295

(15) Remove the tee fitting and the pressure gage from the hydraulic line.
(a) Connect the titanium pressure line to the flexible line.

S 865-324

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. IN:JURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(16) Pressurize the left hydraulic lines (AMM 29-11-00/201).

S 865-298

(17) Do the steps that follow to remove the air from the elevator control system.
(a) Move the elevator to the full airplane nose up position.
(b) Move the elevator to the full airplane nose down position.
(c) Do these steps 10 times.

S 795-297

(18) Make sure there are no leaks at the hydraulic line.

S 865-318

(19) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

U. Elevator Position Indicating System Test

S 715-273

(1) Do the test for the elevator position indicating system (AMM 27-38-00/501).

V. Put the Airplane Back to Its Usual Condition

S 865-188
(1) Remove electrical power (AMM 24-22-00/201).

S 215-189
(2) Make sure the power from the left, right, and center hydraulic systems is removed (AMM 29-11-00/201).

S 865-190
(3) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 215-191
(4) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel are at the ON position.

S 215-192
(5) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in the NORM position.

S 415-193
(6) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

TASK 27-31-00-735-199

5. Elevator Column and Quadrant Override Test

NOTE: This is a scheduled maintenance task.

A. Equipment
(1) Force Gage - DPPH-100
Chatillon Inc.
83-30 Kew Garden Rd.
Kew Gardens, New York 11415

(2) Control Column Lock Equipment - A27021-69
(3) Control Wheel Adapter Equipment -
A27021-97 or -98
(4) Scale (linear measurements for the stabilizer ballscrew) - B27039-13
(5) Rigging Block, Elevator Aft Quadrant:
(a) B27023-48 (Elevator is at Neutral)

B. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-31-15/401, Elevator Aft Quadrants
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Prepare for the Test

S 865-365
(1) Supply electrical power (AMM 24-22-00/201).

S 215-366
(2) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H17, FLT CONT SHUTOFF TAIL LEFT
(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(g) 11K9, LEFT ENGINE OIL PRESS
(h) 11K35, RIGHT ENGINE OIL PRESS

S 015-367

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(3) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 215-368
(4) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 215-369
(5) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 865-370

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-371
(7) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 ± 0.3 mm) (approximately 6 units on the stabilizer position indicator) (Fig. 502).

S 865-372
(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-373
(9) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

D. Elevator Column and Quadrant Override Test

S 215-200
(1) Make sure that the left, right, and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 215-362
(2) Make sure that the horizontal stabilizer is at 6 units of trim on the stabilizer position indicator (the stabilizer B dimension is approximately 15.89 inches (403.6 mm)).

S 725-363
(3) Do the steps that follow to make sure the control column and the aft quadrant override operate correctly:
(a) Install the aft quadrant rigging block (elevator is at neutral) in the first officer's aft quadrant to hold the quadrant in the neutral position (Fig. 511).

NOTE: Do not use rig pins to hold the quadrant in the neutral position. Rig pins are not applicable blocking tools.

(b) Install a control column lock in the first officer's control column (Fig. 512).
(c) Put a 6-inch (150 mm) strip of adhesive tape vertically on the right elevator index plate (Fig. 505).
(d) Make a mark on the tape that shows the up direction.
(e) Make a mark where the upper surface of the right elevator trailing edge would extend to the tape.
(f) Use the control wheel adapter equipment to attach the force gage to the captain's control column at the finger reference point (Fig. 505).

(g) Slowly pull the control column aft until there is a force of 70 ± 1 pounds (311 ± 4 newtons).
(h) Make a mark on the tape at the right elevator up position.
(i) Let the control column go to the neutral position.
(j) Use the force gage to slowly push the captain's control column forward until there is a force of 70 ± 1 pounds (311 ± 4 newtons).
(k) Make a mark on the tape at the right elevator down position.
(l) Let the control column go to the neutral position.
(m) Make sure that the elevator up and down position marks are less than 0.50 inch (12.7 mm) away from the right elevator reference position mark.
(n) Do the steps that follow if travel in the up or down direction is more than 0.50 inch (12.7 mm):
1) Make sure that the aft quadrant is held in the neutral position and cannot move.
2) Make a mark at the elevator trailing edge position on the tape again.
3) Use the force gage as specified above to make marks at the elevator up and down positions again.
4) Make sure the elevator up and down position marks are less than 0.50 inch (12.7 mm) away from the right elevator reference position mark.
(o) Measure and make a mark on the tape that is 2.10 inch (53.3 mm) above the upper mark.
(p) Measure and make a mark on the tape that is 2.10 inch (53.3 mm) below the lower mark.
(q) Remove the tape from the right elevator index plate and put it on the left elevator index plate.
(r) Make sure the middle mark on the tape is in line with the upper surface of the left elevator trailing edge.
(s) Use the force gage to slowly pull the captain's control column aft until the left elevator goes above the highest mark on the tape.
(t) Make sure that the control column force is 70 to 90 pounds (311-400 newtons).
(u) Let the control column go to the neutral position.
(v) Slowly push the captain's control column forward until the left elevator trailing edge goes below the lowest mark on the tape.
(w) Make sure that the control column force is 70 to 90 pounds (311-400 newtons).
(x) Let the control column go to the neutral position.

E. Put the Airplane Back to Its Usual Condition

S 025-426

(1) Remove the aft quadrant rigging block from the first officer's aft quadrant.

S 025-427
(2) Remove the control column lock from the first officer's control column.

S 025-428
(3) Remove the force gage and control wheel adapter equipment.

S 865-364
(4) Remove the power from the left, right, and center hydraulic systems if it is not necessary (AMM 29-11-00/201).

S 215-202
(5) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11C13, STAB TRIM SHUTOFF RIGHT
(e) 11H11 or 11C05, STAB TRIM CONT L
(f) 11H20, STAB TRIM CONT R

S 215-203
(6) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel are at the ON position.

S 215-204
(7) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in the NORM position.

S 415-205
(8) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

TASK 27-31-00-735-201
6. Elevator Pressure Bypass Valve Test (Fig 502, Fig 509)

NOTE: This is a scheduled maintenance task.

There are two procedures supplied to test the elevator pressure bypass valve. You can use Procedure 1 or Procedure 2.

Procedure 1 uses the pogo compression/extension tool.

Procedure 2 uses a pressure gage teed to the hydraulic line.

A. Equipment
(1) Gage Assembly (linear measurements for the stabilizer ballscrew) - B27039-3
(2) Pogo Compression/Extension Tool - B27032-9 (3 necessary)
(3) Tee Fitting - NAS1763J0606 (or equivalent steel or titanium fitting)

(4) Pressure Gage - Capable of 4000 +/- 50 psi (27,600 +/- 250 kPa) (commercially available)

B. References

(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Prepare for the Test (Procedure 1 - Pogo Tool Method)

S 865-353

(1) Supply electrical power (AMM 24-22-00/201).

S 215-354

(2) Make sure that these circuit breakers on the overhead panel, P11, are closed:

(a) EICAS (6 locations)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H17, FLT CONT SHUTOFF TAIL LEFT
(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(g) 11K9, LEFT ENGINE OIL PRESS
(h) 11K35, RIGHT ENGINE OIL PRESS

S 215-356

(3) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 215-357

(4) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 865-358

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-359

(6) Make sure the horizontal stabilizer is at 6 units of trim by setting the "B" dimension at the stabilizer jackscrew to 15.89 +/- 0.01 inches (403.6 +/- 0.3 mm) (Fig 502).

S 865-360

(7) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-361

(8) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
   (a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H20, STAB TRIM CONT R

D. Elevator Pressure Bypass Valve Test (Procedure 1 - Pogo Tool Method)

S 865-352

WARNING: MAKE SURE ALL HOLDING TOOLS AND OTHER OBSTRUCTIONS ARE REMOVED FROM THE SYSTEM. KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure that the left, right and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 865-185

(2) Make sure the horizontal stabilizer is at 6 units of trim by setting the "B" dimension at the stabilizer jackscrew to 15.89 +/-0.01 inches (403.6 +/- 0.3 mm) (Fig 502).

S 865-280

(3) Use the Captain's control column to do the steps that follow:
   (a) Move the control column fully forward then fully aft, 5 times.

(b) Release the control column.
(c) Let the control column return to a centered position.

S 725-283

WARNING: BE CAREFUL WHEN YOU DO THE ELEVATOR PRESSURE BYPASS VALVE TEST. THE HYDRAULIC SYSTEM IS FULLY PRESSURIZED AND THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER CAN MOVE QUICKLY. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THESE CONTROL SURFACES MOVE.

(4) Do the steps that follow to make sure the elevator pressure bypass valve operates correctly:
(a) Put a 2 inch (50 mm) piece of tape on the side of the airplane adjacent to the left elevator trailing edge. Put the tape in the center and vertically along the length of the index plate.
(b) Make a mark on the tape to show the neutral position of the left elevator.
(c) Make a mark on the tape 0.5 inch (13 mm) above the neutral position mark.
(d) Use the elevator pogo tools, B27032-9, to extend the pogos on the left inboard and the left outboard PCU's to 0.25 +/- 0.01 inch (6.4 +/- 0.3 mm).

NOTE: Make sure you do not move the elevator input crank when you extend or compress the pogos.

(e) Make sure the trailing edge of the left elevator moves down.
(f) Use the elevator pogo tool, B27032-9, to compress the pogo on the left middle PCU 0.25 ± 0.01 inch (6.4 ± 0.3 mm).

NOTE: The trailing edge of the elevator may move up but it should not move above the neutral position mark.

(g) If the trailing edge of the elevator moves to or above the neutral position mark, do the steps that follow:
1) Make sure the elevator PCU pogos are positioned correctly.

2) If the elevator PCU pogos are correctly positioned, do these steps:
   a) Remove the pogo tools, B27032-9, from the pogos.
   b) With one hydraulic system pressurized at a time, move the elevator up and down to make sure each PCU will operate.

      NOTE: The left hydraulic system supplies power to the middle PCU.

      The right hydraulic system supplies power to the outboard PCU.

      The center hydraulic system supplies power to the inboard PCU.

   c) Do the Hydraulic System Gross Internal Leakage Check (AMM 29-11-00/601).
3) Do the Elevator Pressure Bypass Valve Test again until the trailing edge of the elevator does not move above the neutral position mark.

(h) Use the tail flight control shutoff valve to remove the pressure from the right hydraulic system.

NOTE: The trailing edge of the elevator will start to move up quickly and then it will move slower at the end of its travel.

(i) Make sure the trailing edge of the elevator is at a minimum of 0.5 inch (13 mm) above the neutral position mark.
(j) Do the steps that follow if the elevator trailing edge is not a minimum of 0.5 inch (13 mm) above the neutral position mark.
   1) Make sure the left and center hydraulic systems are pressurized.
   2) Make sure the right hydraulic system is not pressurized.
   3) Make sure the elevator PCU pogos are correctly positioned.
   4) If it is necessary, replace the items that follow in the sequence given.
      a) The pressure reducer bypass valve for the left hydraulic system.

b) The left elevator PCU relief valve (internal to the PCUs) for the middle PCU.
c) The left elevator PCU relief valve (internal to the PCUs) for the inboard PCU.

5) Do the Elevator Pressure Bypass Valve Test again until the trailing edge of the elevator is at a minimum of 0.5 inch (13 mm) above the neutral position mark.

E. Put the Airplane Back to Its Usual Condition (Procedure 1)

S 865-187
(1) Remove the power from the left, right, and center hydraulic systems if it is not necessary (AMM 29-11-00/201).

S 485-284
(2) Remove the pogo tools from the PCU pogos.

S 215-206
(3) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 215-207
(4) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel are at the ON position.

S 215-208
(5) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in the NORM position.

S 415-209
(6) Close the left and right access panels for the elevator PCAs, 335DB and 345DB (AMM 06-42-00/201).

F. Prepare for the Test (Procedure 2 - Tee and Pressure Gage Method)

S 865-299
(1) Make sure pressure is removed from the left, right and center hydraulic systems (AMM 29-11-00/201).

S 015-435

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

G. Elevator Pressure Bypass Valve Test (Procedure 2)

S 495-307

(1) Do the steps that follow to install the tee fitting and the pressure gage in the hydraulic line.

NOTE: When you disconnect the hydraulic lines, use a bucket to catch the hydraulic fluid that spills.

(a) Find the titanium pressure line at the pressure reducer bypass valve.
(b) Find the location where the titanium pressure line joins the flexible line.
(c) Install the pressure gage between the titanium line and the flexible line.

S 865-300

(2) Supply electrical power (AMM 24-22-00/201).

S 865-308

(3) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-309

(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 865-301

(5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

S 865-310

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left and right hydraulic systems to 2900 - 3200 psi (20,000 - 22,060 kPa) (AMM 29-11-00/201).

S 865-302

(7) Do these steps to remove the air from the elevator control system.

NOTE: The elevator control cables which are above the stabilizer will move.

(a) Move the elevator to the full airplane nose up position.
(b) Move the elevator to the full airplane nose down position.
(c) Do these steps 10 times.

S 865-311

(8) Make sure that the pressure gage shows less than 2350 psi (16,200 kPa).

S 865-312

(9) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

S 865-303

(10) Make sure that the pressure gage shows between 2900 - 3200 psi (20,000 - 22,060 kPa).

S 865-304

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(11) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 865-305

(12) Make sure that the pressure gage shows less than 2350 psi (16,200 kPa).

NOTE: You can move the elevators to the airplane nose up and nose down positions before you check the pressure gage.

S 865-498
(13) Remove pressure from the left and right hydraulic systems (AMM 29-11-00/201).

H. Put the Airplane Back to Its Usual Condition (Procedure 2)

S 095-313
(1) Remove the tee and the pressure gage from the hydraulic line.
(a) Connect the titanium pressure line to the flexible line.

S 865-325

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-316
(3) Do the steps that follow to remove the air from the elevator control system.
(a) Move the elevator to the full airplane nose up position.
(b) Move the elevator to the full airplane nose down position.
(c) Do these steps 10 times.

S 795-315
(4) Make sure there are no leaks at the hydraulic line.

S 865-306
(5) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

S 415-430
(6) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

TASK 27-31-00-735-250

7. Single Hydraulic Source - Test

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Prepare for the Test

S 865-251

(1) Supply electrical power (AMM 24-22-00/201).

S 865-252

(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
   (a) EICAS (6 locations)
   (b) 11K9, LEFT ENGINE OIL PRESS
   (c) 11K35, RIGHT ENGINE OIL PRESS

C. Do the Test For Single Hydraulic Source

S 215-253

(1) Make sure the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61 are at the ON position.

S 865-254

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).
   (a) Operate the control columns through full travel then put them to the neutral position.
      1) Make sure the elevators move correctly to the control column movement.
   (b) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-255

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the center hydraulic system (AMM 29-11-00/201).
   (a) Operate the control columns through full travel then put them to the neutral position.
      1) Make sure the elevators move correctly to the control column movement.
   (b) Remove the power from the center hydraulic system (AMM 29-11-00/201).

S 865-256

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right hydraulic system (AMM 29-11-00/201).
   (a) Operate the control columns through full travel then put them to the neutral position.
      1) Make sure the elevators move correctly to the control column movement.
   (b) Remove the power from the right hydraulic system (AMM 29-11-00/201).

ELEVATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains tasks to remove and install the left and right elevators.

TASK 27-31-01-024-001

2. Remove the Elevator
   A. Equipment
      (1) Elevator Sling Assembly - B27021-1
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 27-02-00/601, Flight Controls Surfaces
      (3) 27-31-05/601, Elevator Power Control Actuator
   C. Access
      (1) Location Zones

330	Left Horizontal Stabilizer and Elevator
340	Right Horizontal Stabilizer and Elevator

      (2) Access Panels

335AB/335BB/335DB/ 335EB/335FB/335GB	Left Horizontal Stabilizer - Rear Spar to Trailing Edge
345AB/345BB/345DB/ 345EB/345FB/345GB	Right Horizontal Stabilizer - Rear Spar to Trailing Edge

   D. Prepare for Removal

      S 864-005
      (1) Make sure that the elevator surface freeplay is in permitted limits (Ref 27-02-00).

      S 224-025
      (2) If freeplay is more than the limit, examine the elevator PCA and reaction link rod end bearings for unusual wear (Ref 27-31-05).

      S 864-006
      (3) Put the STAB TRIM SHUTOFF RIGHT and CENTER switches on the control stand panel, P10, to the CUTOUT position.

S 864-007

(4) Put the FLT CONTROL SHUTOFF R, L, and C switches on the sidewall panel, P61, to the OFF position.

S 864-008

(5) Open these circuit breakers on overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (i) 11J13, ELEVATOR POS LEFT
   (j) 11J21 or 11J22, ELEV POS RIGHT

S 014-027

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE AREA BELOW THE ELEVATORS. OBJECTS CAN FALL AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Remove the access panels that follow (Ref 06-42-00):
   (a) 335AB, 335BB, 335DB, 335EB, 335FB, and 335GB for left elevator.
   (b) 345AB, 345BB, 345DB, 345EB, 345FB, and 345GB for right elevator.

S 494-002

(7) Do these steps to install the sling to the elevator (Fig. 401):
   (a) Remove the plug bolts from the elevator upper skin panel and save the plug bolts.
   (b) Install the forward inboard and outboard hoist ring assemblies.
   (c) Install the aft clamp assembly.
   (d) Attach the elevator sling shackle to the hoist equipment.
   (e) Apply sufficient lift to the elevator sling such that the elevator hinge bolts can be removed.

E. Remove the Elevator (Fig. 402)

S 034-003

(1) Remove the elevator connecting parts as follows:
   (a) Remove the nut, washers and bolt (5, 4 and 2) that connects the inboard bonding jumper (3) to the elevator upper skin panel (Fig. 401).

(b) Remove the nut, washer and bolt (10, 9 and 8) that connects the outboard bonding jumper to the elevator spar (Fig. 401).
(c) Remove the bolt (11) and washer (12) that connects the elevator position transmitter control rod to the elevator (Fig. 401).

NOTE: Do not change the control rod adjustment. Turn the control rod away from elevator.

CAUTION: HOLD THE ELEVATOR AT ALL TIMES IN THIS PROCEDURE. WITH THE POWER CONTROL ACTUATORS (PCA'S) DISCONNECTED, THE ELEVATOR WILL MOVE DOWN AND CAUSE STRUCTURAL DAMAGE.

(d) Remove the three sets of nuts, washers, bolts and bushing (15, 12, 14, 11 and 13) that connects the PCA to the elevator.
(e) Remove the three sets of nuts, washers, bolts and bushings (15, 12, 14, 11 and 13) that connects the PCA reaction links to the elevator.
(f) Remove nut, washer, bolt, bushing (23, 22, 25 and 21).
(g) Cut the lockwire on the locknut (27) and remove the locknut (27) and bushing (26).

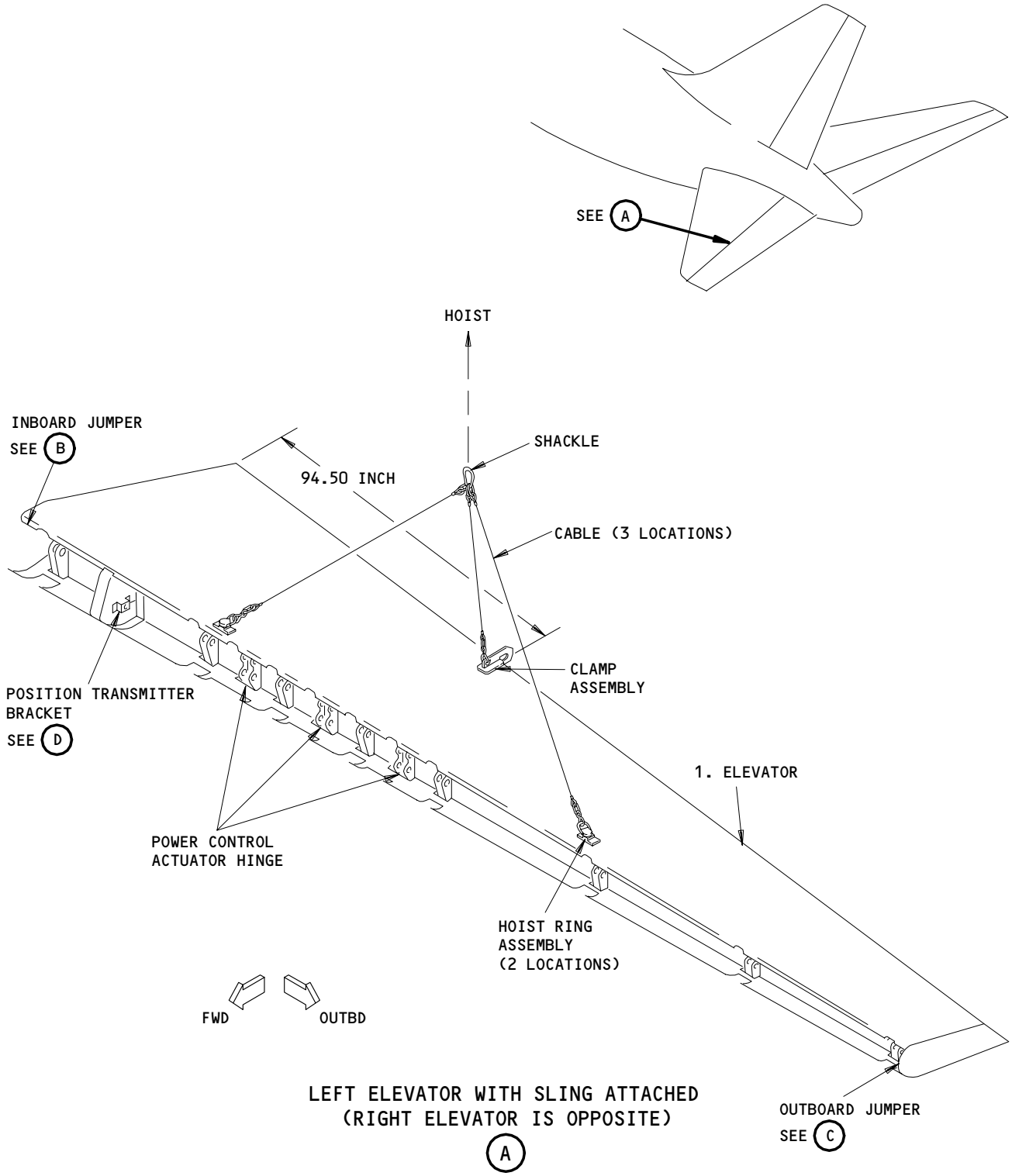
NOTE: Do not cut the lockwire on the hinge lug locknut. The hinge lug bushing and locknut must not be changed.

(h) Remove the fasteners that follow:
1) Nut, washers, bolt and bushing (1, 2, 4, 5 and 3).
2) Nut, washers, bolt and bushing (6, 7, 9, 10 and 8).
3) Nut, washers, bolt and bushing (28, 29, 31, 32 and 30).
4) Nut, washers, bolt and bushing (33, 34, 36, 37 and 35).
5) Nut, washers, bolt and bushing (38, 39, 41, 42 and 40).

WARNING: MAKE SURE THAT THE SLING IS INSTALLED PROPERLY AND THE HOIST OPERATES PROPERLY BEFORE YOU DISCONNECT THE LAST HINGE FASTENERS ON THE ELEVATORS. KEEP PERSONS AND EQUIPMENT AWAY FROM THE AREA BELOW THE ELEVATORS. OBJECTS CAN FALL AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

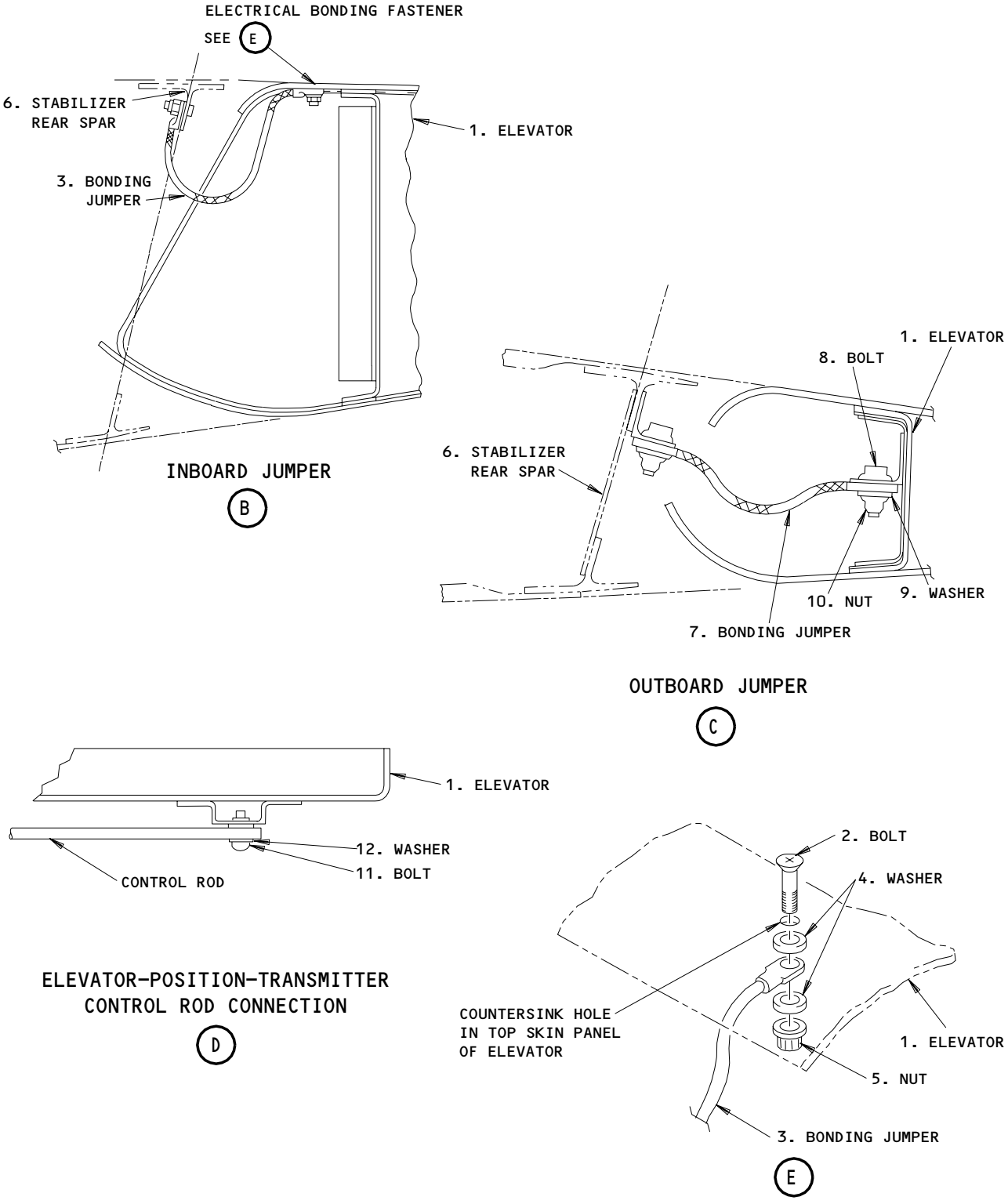
(i) Remove nut, washers, bolt and bushing (16, 17, 19, 20 and 18).

NOTE: The above step fully disconnects the elevator from the airplane.

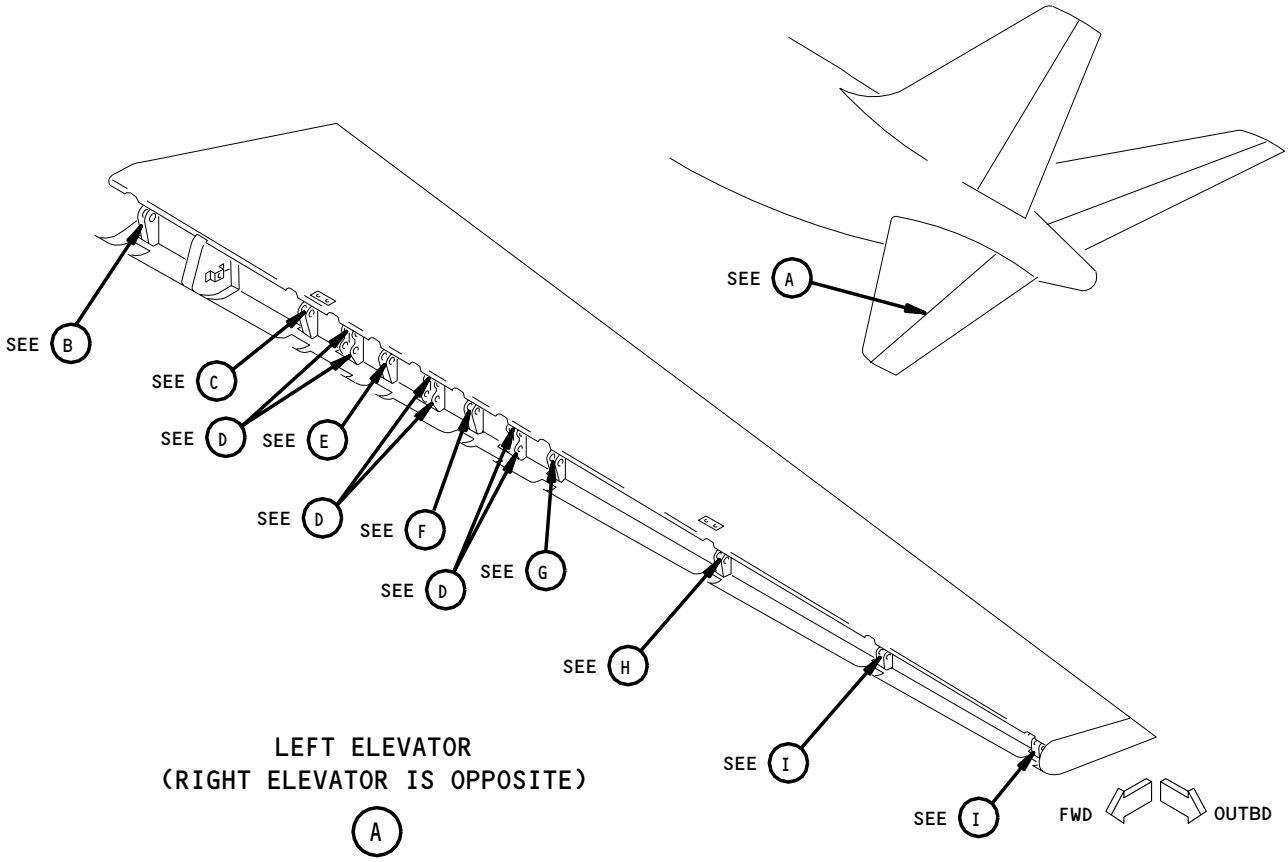


LEFT ELEVATOR WITH SLING ATTACHED
(RIGHT ELEVATOR IS OPPOSITE)
A

Elevator Installation
Figure 401 (Sheet 1)

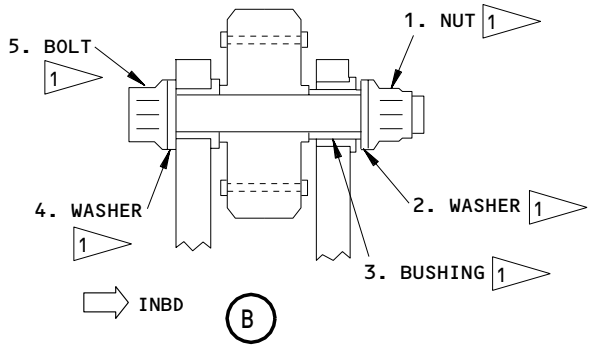


Elevator Installation
Figure 401 (Sheet 2)

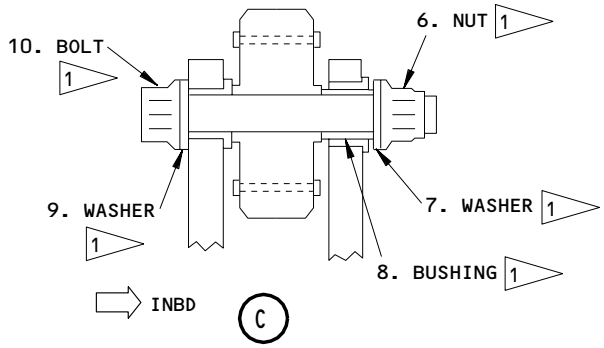


LEFT ELEVATOR
(RIGHT ELEVATOR IS OPPOSITE)

A



B



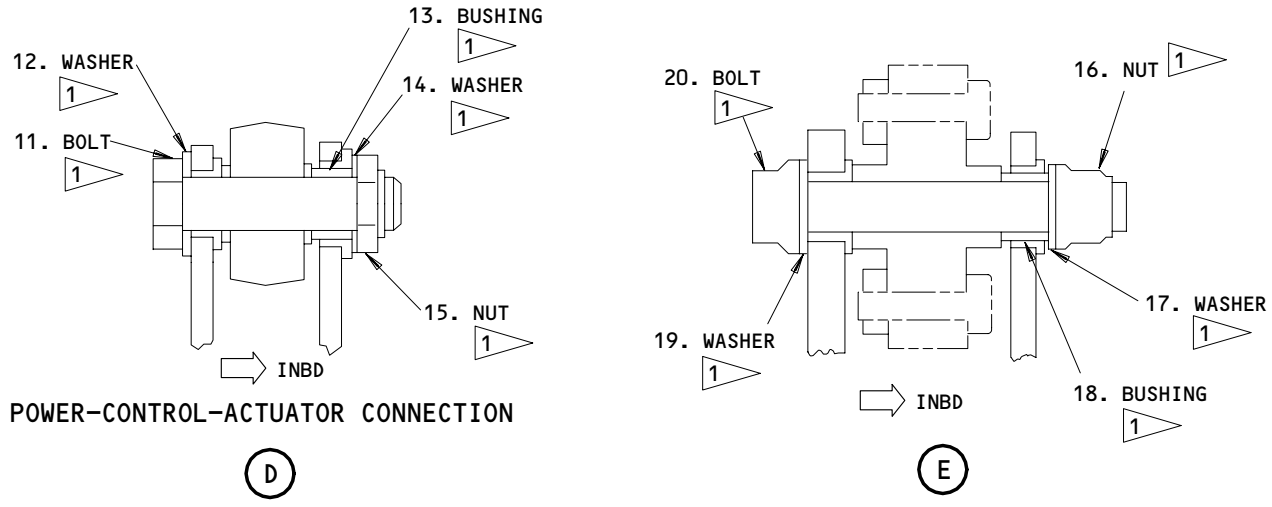
C

1 INSTALL BOLTS, BUSHINGS, FLOATING, BEARINGS, WASHERS, AND NUTS WITH BMS 3-33 GREASE AND REMOVE ANY UNWANTED GREASE
BMS 3-33 (RECOMMENDED)
BMS 3-24 (OPTIONAL)

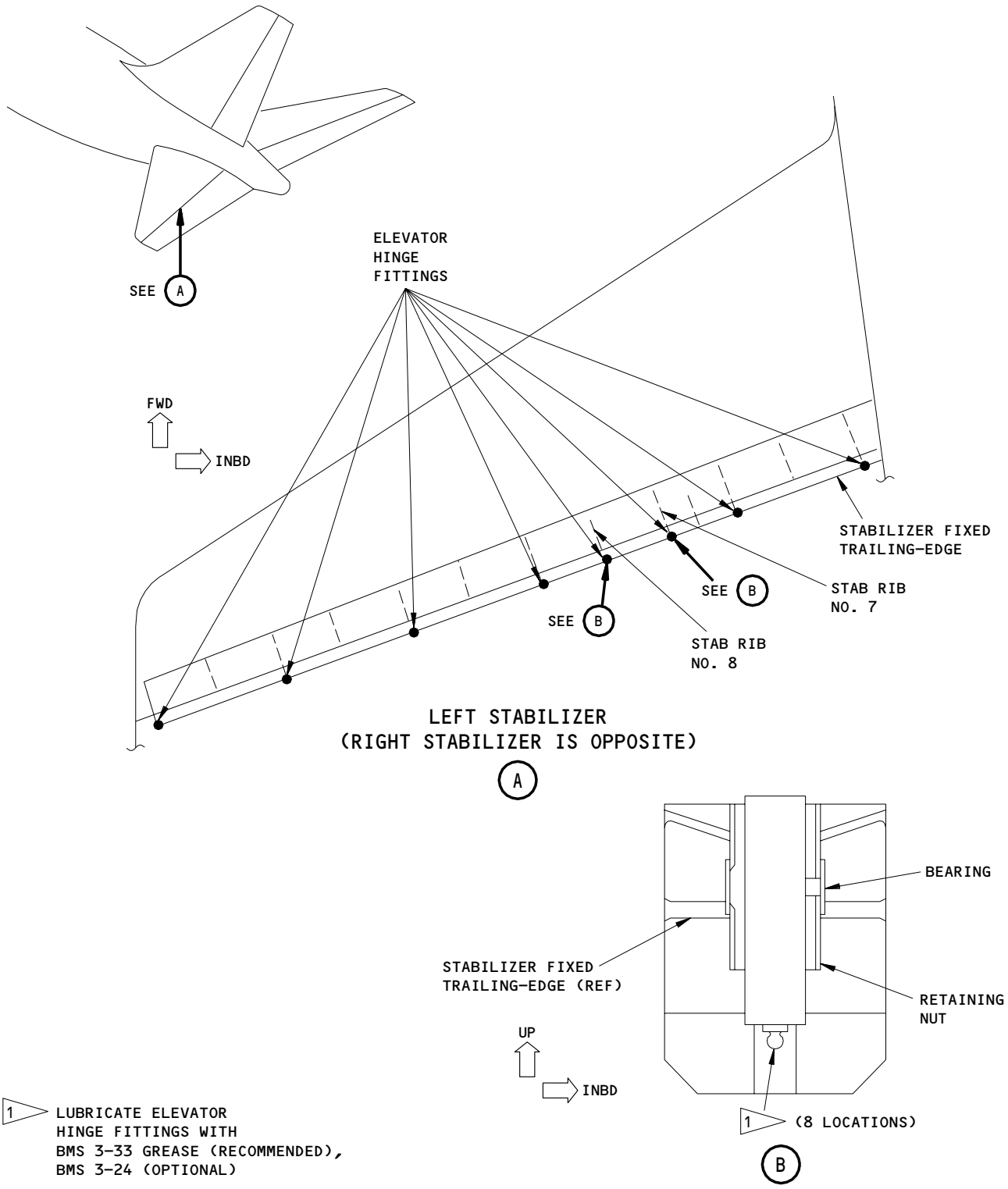
2 TIGHTEN AFTER THE LOCKNUT (27) IS TIGHT AGAINST THE HINGE LUG BUSHING

3 DOUBLETWIST THE LOCKWIRE TO ATTACH ON THE OUTBOARD SIDE OF THE HINGE FITTING

Elevator Hinge Connections
Figure 402 (Sheet 1)



Elevator Hinge Connections
Figure 402 (Sheet 2)



Elevator Hinge Fittings
Figure 403

S 024-010

(2) Carefully move the elevator straight back and remove it.

TASK 27-31-01-424-028

3. Install the Elevator (Fig. 401, 402)

NOTE: Wear Limits for the elevator hinge components are in 27-31-01.

A. Equipment
   (1) Elevator Sling Assembly - B27021-1
   (2) Socket set, Horizontal Stabilizer Fixed Trailing Edge - B27069
   (3) Milliohmeter - commercially available

B. Consumable Materials
   (1) D00633 Grease - BMS 3-33 (Preferred)
   (2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
   (3) D00015 Grease- BMS 3-24 (Alternate)
   (4) A00247 Sealant - Chromate Type BMS 5-95
   (5) C00259 Primer - BMS 10-11, Type I
   (6) C00584 Primer - BMS 10-79, TYPE II
   (7) C00767 Anti-Static/Conductive Coating - BMS 10-21, Type III
   (8) C00304 Teflon Filled Coating - BMS 10-86, Type I or II Gray

C. Parts
   (1) Refer to IPC for part numbers and effectivities of items in this table:

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Elevator	55-20-51	01	165,170

D. References
   (1) 06-42-00/201, Empennage Access Doors and Panels
   (2) 12-21-04/301, Elevator Control System Servicing (Lubrication)

(3) AMM 20-10-21/401, Bonding Jumpers and Ground Leads
(4) 20-30-03/201, Finishing Materials
(5) 24-22-00/201, Electrical Power - Control
(6) 27-02-00/601, Flight Controls Surfaces
(7) 27-31-00/501, Elevator Control System
(8) 27-31-01/601, Elevator
(9) 27-31-05/601, Elevator Power Control Actuator
(10) 27-38-00/501, Elevator Position Indicating System
(11) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(12) 51-21-10/701, Decorative Exterior Finishes
(13) 51-24-02/701, Conductive Coating for Exterior Fiberglass and Kevlar

E. Access

(1) Location Zones

330	Left Horizontal Stabilizer and Elevator
340	Right Horizontal Stabilizer and Elevator

(2) Access Panels

335AB/335BB/335DB/ 335EB/335FB/335GB	Left Horizontal Stabilizer Rear Spar to Trailing Edge
345AB/345BB/345DB/ 345EB/345FB/345GB	Right Horizontal Stabilizer Rear Spar to Trailing Edge

F. Prepare for Installation

S 864-011
(1) Make sure the seals at the stabilizer trailing edge are in good condition.

S 024-026
(2) If the seals at the stabilizer trailing edge are damaged, replace the damaged seals.

S 864-012
(3) Make sure that the bearing retaining nuts in the elevator hinge fittings at stabilizer ribs No. 7 and No. 8 are tightened to 440-650 lb-in (49.7-73.4 newton-meters).

NOTE: IF it is necessary to tighten the bearing retaining nuts, use the B27069 tool.

S 434-013

(4) Hand fit all bushings and bolts before installation.

NOTE: This can require removal of burrs that are inside the bushings and smoothing out sharp edges.

S 644-014

(5) Fully lubricate the elevator hinge bearings (8 locations) and the rod ends of the elevator PCA and reaction links (6 locations) with grease.

NOTE: Turn the parts to make sure they are fully lubricated and clean off unwanted grease.

S 644-015

(6) Apply a layer of grease to all hinge bolts (5, 10, 11, 20, 25, 32, 37, 42), the inner surface of bushings (3, 8, 13, 18, 26, 30, 35, 40) and the inner surface of all stabilizer hinge bearings.

G. Install the Elevator

S 434-016

(1) Loosely install bushing (26) and locknut (27) to the elevator hinge lug.

NOTE: The end of the bushing will not be farther than the face of the hinge lug bushing. Bushing (26) will be adjusted and locked in position by locknut (27) afterwards.

S 494-017

CAUTION: MAKE SURE THE ELEVATOR IS HELD UNTIL THE PCA'S ARE CONNECTED. DO NOT DAMAGE THE ELEVATOR SKIN. SEVERE DAMAGE TO THE ELEVATOR CAN RESULT

(2) Do these steps to install the sling to the elevator (Fig. 401):

(a) Install the sling to the elevator.

(b) On a replacement elevator, remove the plug bolts from the elevator upper skin panel.
(c) Install the forward inboard and outboard hoist ring assemblies.
(d) Install the aft clamp assembly.
(e) Attach the elevator sling shackle to the hoist equipment.
(f) Lift the elevator to the level of the attach points on the horizontal stabilizer.

S 864-029

(3) Move the elevator to the stabilizer trailing edge such that the elevator lugs fit with the stabilizer hinges.

S 434-004

(4) Install the elevator connecting parts as follows:
(a) Install bolt (20), washers (17, 19), bushing (18), and tighten nut (16) to 440-650 lb-in (49.7-73.4 newton-meters).
(b) Install bolt (5), washers (2, 4), bushing (3), and tighten nut (1) to 150-250 lb-in (16.9-28.2 newton-meters).
(c) Install bolt (10), washers (7, 9), bushing (8), and tighten nut (6) to 150-250 lb-in (17.0-28.2 newton-meters).
(d) Install bolt (32), washers (29, 31), bushing (30), and tighten nut (28) to 150-250 lb-in (17.0-28.2 newton-meters).
(e) Install bolt (37), washers (34, 36), bushing (35), and tighten nut (33) to 150-250 lb-in (17.0-28.2 newton-meters).
(f) Install bolts (42), washers (39, 41), bushings (40), and tighten nuts (38) to 150-250 lb-in (2 locations) (17.0-28.2 newton-meters).
(g) Install bolt (25) as follows:
1) Turn bushing (26) in the hinge lug bushing until it touches the horizontal stabilizer hinge fitting bearing with finger-tight force.
2) Tighten locknut (27) against the hinge lug bushing to 90-120 lb-in (10.2-13.5 newton-meters).
3) Doubletwist lockwire bushing (26) and locknut (27) to attach on the outboard side of the elevator hinge fitting.

NOTE: Lockwire must prevent clockwise and counterclockwise movements.

4) Install bolt (25), washers (22 and 24), bushing (21), and nut (23), and tighten nut (23) to 440-650 lb-in (49.7-73.4 newton-meters).

(h) Install three sets of bolts (11), washers (12, 14), bushings (13), and nuts (15) in the PCA's reaction link hinges.

NOTE: To tighten nut (15) make sure that the nut run-on torque before clamp-up is 90-400 lb-in (10.2-45.1 newton-meters), then tighten to 1300-2000 lb-in (147-224 newton-meters).

(i) Install three sets of bolts (11), washers (12, 14), bushings (13), and nuts (15) in the PCA hinges.

NOTE: To tighten nut (15) make sure that the nut run-on torque before clamp-up is 90-400 lb-in (10.2-45.1 newton-meters), then tighten to 1300-2000 lb-in (147-225 newton-meters).

(j) Do these steps to install the inboard bonding jumper (3):

NOTE: Bolt (2) is an electrical bonding fastener to the elevator upper skin panel.

1) Prepare, clean and apply BMS 10-21 Type I to the countersink hole in the elevator upper skin panel (Ref 51-24-02).
2) Install bolt, washers, jumper and nut (2, 4, 3, and 5) dry.
3) Finish the head of bolt (2) as follows:
   a) Apply one coat BMS 10-79, Type II primer (Ref 51-21-10).
   b) Apply BMS 10-86, Type I or II, gray (Ref 51-21-10).
4) Finish nut (5) and jumper (3) end as follows:
   a) Apply one coat of BMS 10-11, Type I primer after the bonding jumper is installed (Ref 51-21-10).
   b) Seal with BMS 5-95.

(k) Do these steps to install the outboard bonding jumper (7):
1) Install bolt, jumper, washer and nut (8, 7, 9 and 10).
2) Finish bolt (8), nut (10) and jumper (7) end as follows:
   a) Apply one coat of BMS 10-11, Type I primer after the bonding jumper is installed (Ref 51-21-10).
   b) Seal with BMS 5-95.

(l) Use a milliohmeter to do an electrical resistance test at the inboard and outboard jumper locations as follows:
1) Measure electrical resistance between the upper skin panel of the elevator and the stabilizer rear spar for the above locations.

2) Make sure the electrical resistance is not above 1.0 ohm at each location.

(m) Install bolt (11) and washer (12) to connect the elevator position transmitter control rod to the elevator front spar as follows:
1) Do not change the length of the control rod when you install it.
2) If the length of the rod was changed, refer to 27-38-00 for adjustment procedure.

(n) Disconnect the hoist and sling from the elevator.

(o) Install the plug bolts on the elevator upper skin panel.

S 864-018

(5) Remove DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19 or 11A19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J13, ELEVATOR POS LEFT
(j) 11J21 or 11J22, ELEV POS RIGHT

S 864-019

(6) Put the STAB TRIM SHUTOFF RIGHT and CENTER switches on control stand panel, P10, to the NORM position.

S 864-020

(7) Put the FLT CONTROL SHUTOFF R, L and C switches on the sidewall panel, P61, to ON.

S 724-021

(8) Do the elevator travel limits test (Ref 27-31-00).

NOTE: First, slowly move the elevator up and down. Make sure there is no interference and movement is smooth and continuous.

S 724-022
(9) Do the elevator position indicating system test (Ref 27-38-00).

H. Put the Airplane Back to Its Usual Condition

S 864-023
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

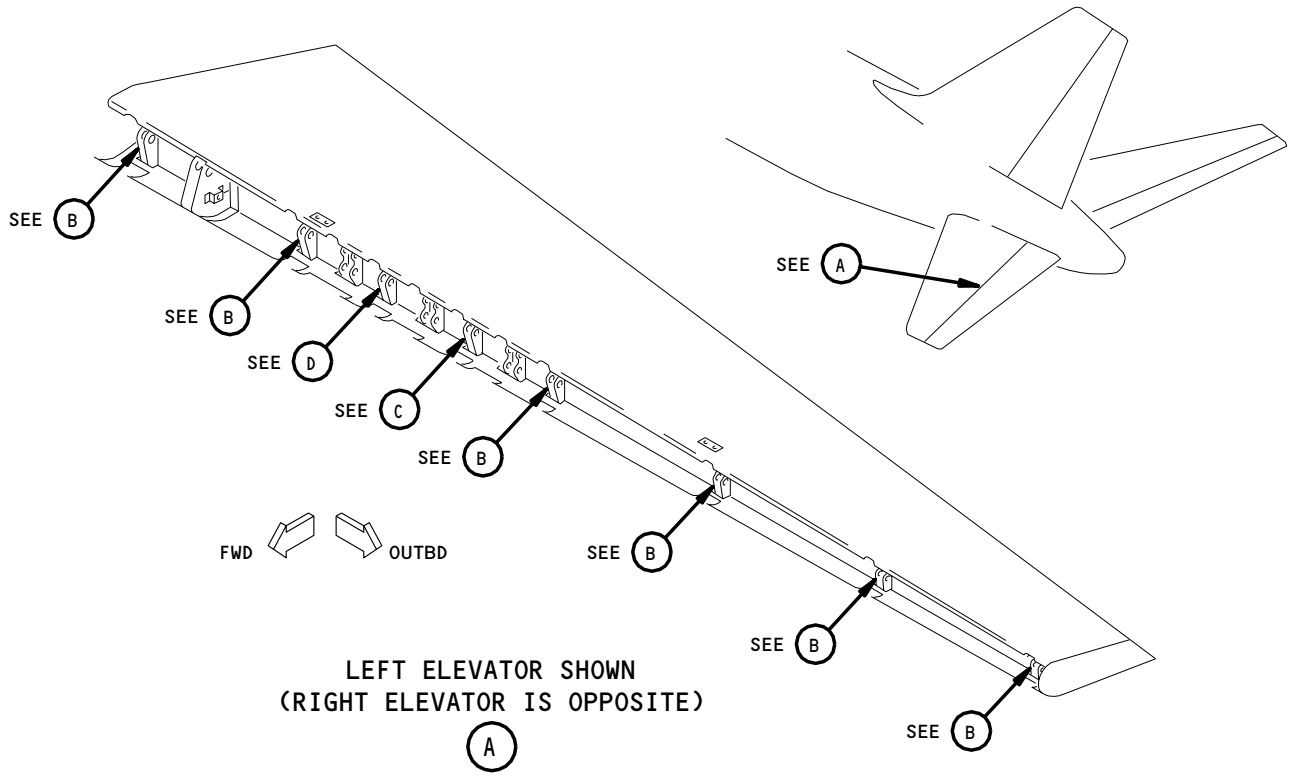
S 414-024
(2) Install the access panels that were removed (Ref 06-42-00).

ELEVATOR - INSPECTION/CHECK

1. General
   A. This section contains illustrations and a wear limit chart. Refer to Elevator Removal/Installation for the procedures to access a component and to remove/install a component for wear inspection.

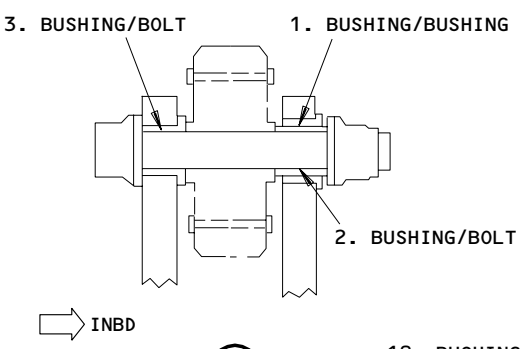
   TASK 27-31-01-226-001

2. Elevator Hinge Wear Limits (Fig. 601)
   A. Access
      (1) Location Zones
          330/340 Horizontal Stabilizer and Elevator

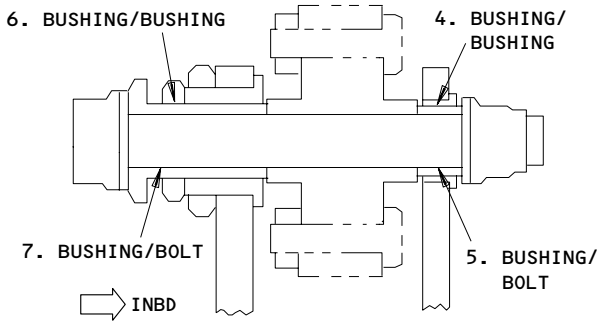


LEFT ELEVATOR SHOWN
(RIGHT ELEVATOR IS OPPOSITE)

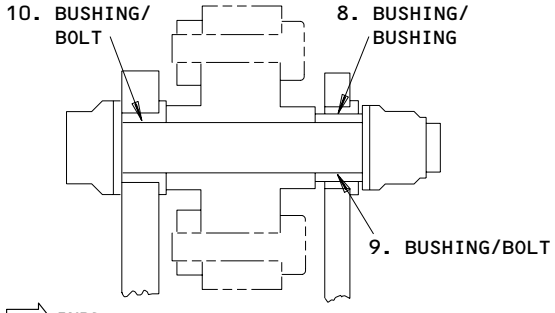
A



B



C



D

Elevator Hinge Wear Limits
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.5620 (14.275)	0.5627 (14.293)	0.5640 (14.326)	0.0025 (0.064)	X		
	BUSHING	OD	0.5610 (14.249)	0.5615 (14.262)	0.5602 (14.229)		X		
2	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3755 (9.538)	0.0030 (0.076)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3725 (9.462)		X		
3	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3776 (9.591)	0.0031 (0.079)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3725 (9.462)		X		
4	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6890 (17.501)	0.0025 (0.064)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6852 (17.404)		X		
5	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5025 (12.764)	0.0030 (0.076)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4975 (12.637)		X		
6	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6890 (17.501)	0.0025 (0.064)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6852 (17.404)		X		
7	BUSHING	ID	0.5000 (12.700)	0.5007 (12.718)	0.5027 (12.769)	0.0032 (0.081)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4975 (12.637)		X		
8	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6890 (17.501)	0.0025 (0.064)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6852 (17.404)		X		
9	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5025 (12.764)	0.0030 (0.076)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4975 (12.637)		X		
10	BUSHING	ID	0.5000 (12.700)	0.5007 (12.718)	0.5027 (12.769)	0.0032 (0.081)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4975 (12.637)		X		

Elevator Hinge Wear Limits
Figure 601 (Sheet 2)

ELEVATOR INDEX PLATE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the elevator index plates.
   B. The steps to remove and install the left index plate are the same as the steps for the right index plate.
   C. It is important to mark the exact location of the initial index plate before removal. If you can not find the location of the initial index plate, it will be necessary to use special tooling (5MIT18ON0001) to make sure the index plate is installed in the correct location.

TASK 27-31-02-024-001

2. Remove the Index Plate
   A. Equipment
      (1) Gage Assembly - B27039-3, Part of the Elevator/Stabilizer Trim Control Systems Rigging Equipment, B27039-13
   B. References
      (1) AMM 06-42-00/201, Empennage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
315/316	Auxiliary Power Unit Compartment

      (2) Access Panels

311AL	Forward Stabilizer Compartment
315AL	Auxiliary Power Unit
316AR	Auxiliary Power Unit

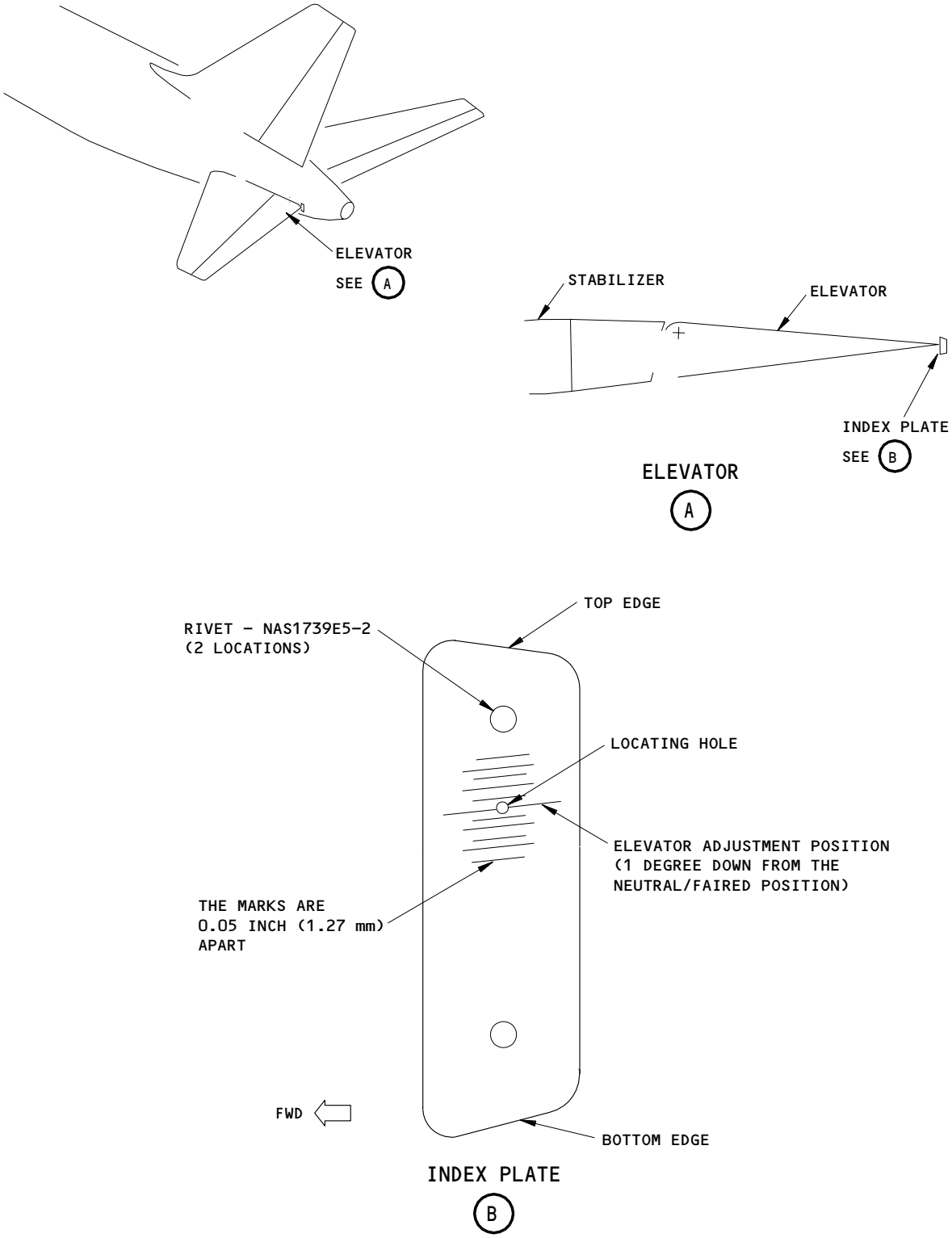
   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

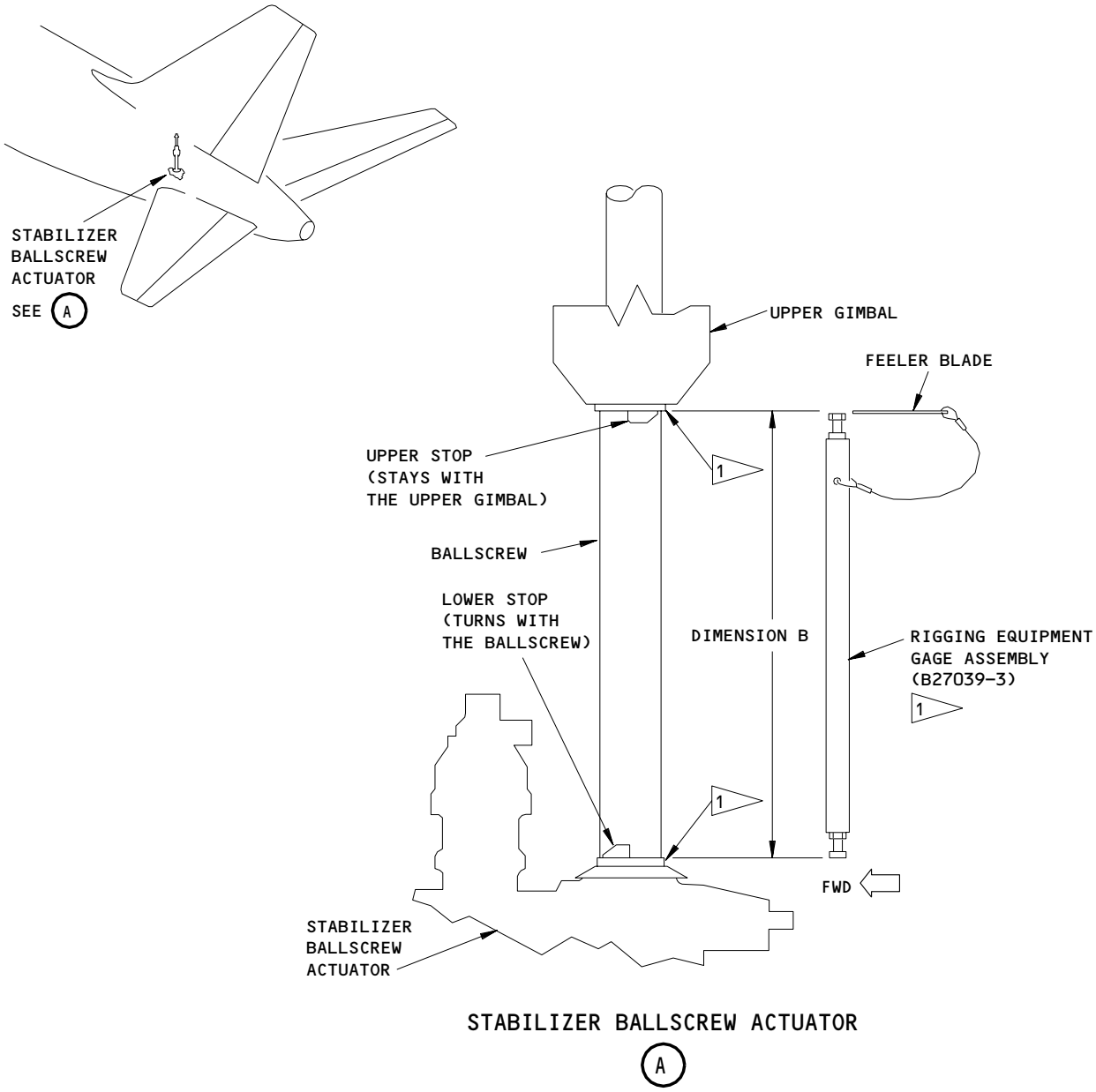
      S 864-003

      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (2) Pressurize the right and center hydraulic systems (AMM 29-11-00/201)



Elevator Index Plate Installation
Figure 401



STABILIZER BALLSCREW ACTUATOR

A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 402

S 014-004

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(3) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 864-005

(4) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.3 centimeters) (6 units of trim) (Fig. 402).

S 864-006

(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-007

(6) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-008

(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-009
(8) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 014-010
(9) Open the access doors for the auxiliary power unit, 315AL and 316AR, for access to the index plate rivets (AMM 06-42-00/201).

E. Remove the Index Plate (Fig. 401)

S 984-011
(1) Push the control columns full forward and turn the elevator trailing edge down and away from the index plate.

S 934-035
(2) Mark the position of the index plate onto the airplane fuselage.

NOTE: The new index plate will need to be installed in the same position as the old plate.

S 034-012
(3) Remove the rivets that connect the index plate to the airplane fuselage.

NOTE: Use caution while removing the fasteners because the tail cone is made of an aluminum metal bond honeycomb. Damage to the panel may result in repairs per SRM 51-70-10.

S 024-013
(4) Remove the index plate.

TASK 27-31-02-424-014

3. Install the Index Plate

A. General
(1) You will have to use two rivets (NAS1739E5-2) in this task.

B. Consumable Materials
(1) A00247 Sealant, Chromate Type - BMS 5-95

C. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45
315/316 Auxiliary Power Unit Compartment

(2) Access Panels

311AL	Forward Stabilizer Compartment
315AL	Auxiliary Power Unit
316AR	Auxiliary Power Unit

E. Install the Index Plate (Fig. 401)

S 864-037

(1) Align the new index plate with the marks made on the fuselage.
   (a) Make sure the rivot holes in the fuselage align with the holes in the index plate.

   NOTE: If the rivot holes in the fuselage do not align with the holes in the index plate, new holes must be drilled in the index plate using the old plate as a guide.

S 624-020

(2) Apply a layer of sealant between the index plate and the airplane fuselage.

S 424-021

(3) Hold the index plate in its correct position and use NAS1739E5-2 rivets to install the index plate to the airplane fuselage.

S 864-016

(4) Do the steps that follow to use the middle PCA to move the elevator to its neutral position:

   WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

   (a) Pressurize the left hydraulic system (AMM 29-11-00/201).
   (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
      1) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (c) Put the L FLT CONTROL SHUTOFF switch on the right side panel, P61, to the ON position.
   (d) Move the control column forward and aft 4 to 5 times quickly.

      NOTE: Move the control column less than 1 inch (25 mm) from the neutral position.

   (e) Let the control column go to the neutral position.

S 824-017

(5) Put a straight edge on the top surface of the elevator trailing edge against the airplane fuselage.

S 824-018
(6) Make sure the locating hole on the index plate aligns, by less than +/- 0.05 inch (+/- 1.3 mm), with the lower side of the straight edge.

F. Put the Airplane Back to Its Usual Condition

S 864-022
(1) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 864-023
(2) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 864-024
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H18, FLT CONT SHUTOFF TAIL CTR
(f) 11H20, STAB TRIM CONT R
(g) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-025
(4) Put the R and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 864-026
(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 414-027
(6) Close the access doors for the auxiliary power unit, 315AL and 316AR (AMM 06-42-00/201).

S 414-028

(7) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

ASYMMETRY LIMITER ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the asymmetry limiter actuator for the elevator control system.
   B. The asymmetry limiter actuator must be in the retracted position when you remove and install it.

TASK 27-31-03-024-001

2. Remove the Asymmetry Limiter Actuator
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST6 - P/N B20003-21
          (b) E/ST7 - P/N B20003-21
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 06-42-00/201, Empennage Access Doors and Panels
      (3) 20-10-24/201, Rig Pins
      (4) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zones

113/114	Area Forward of NLG Wheel Well
211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

      (2) Access Panels

113AL	Forward Equipment Bay
311AL	Forward Stabilizer Compartment
313AL	Elevator Aft Quadrants

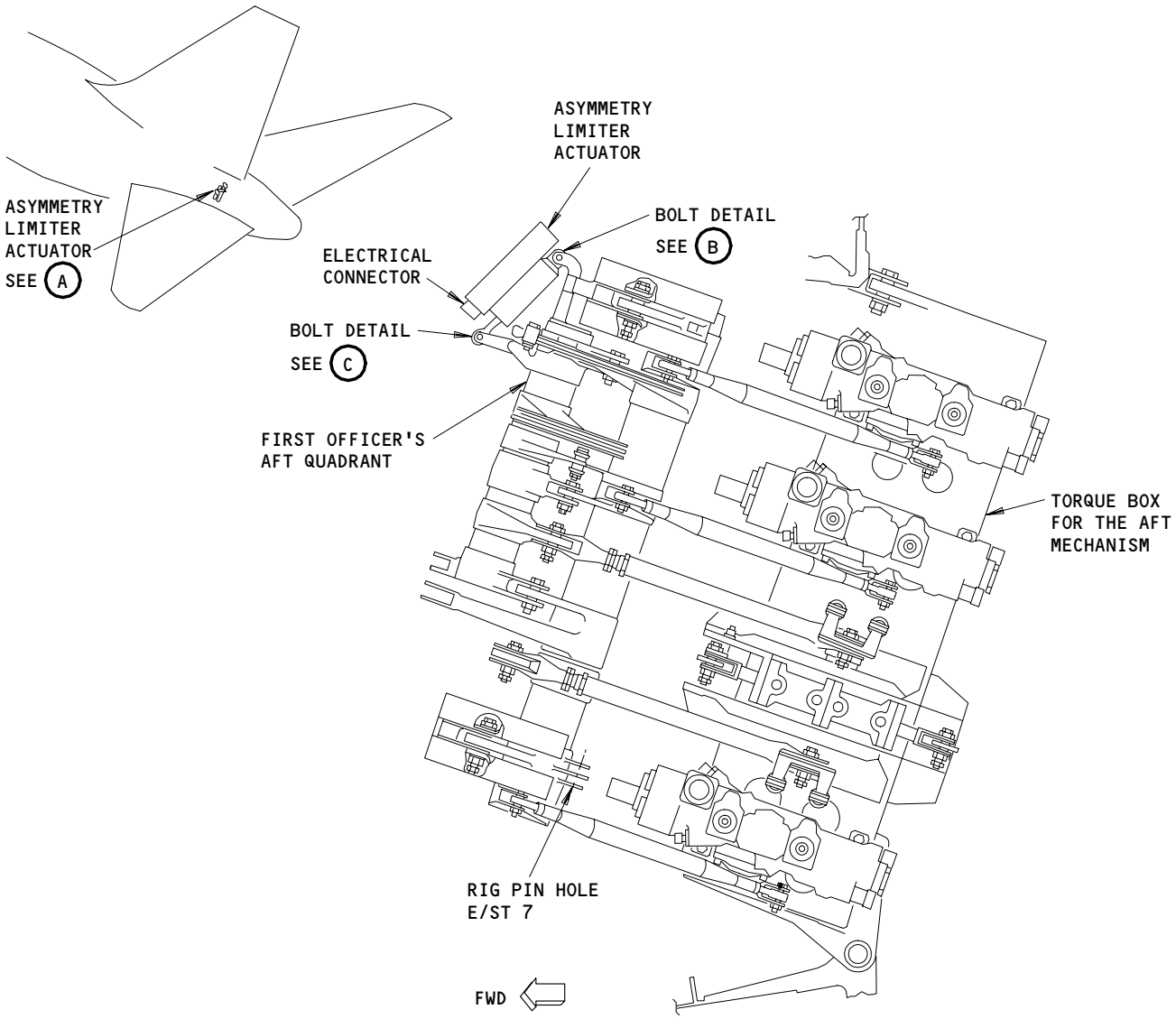
   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

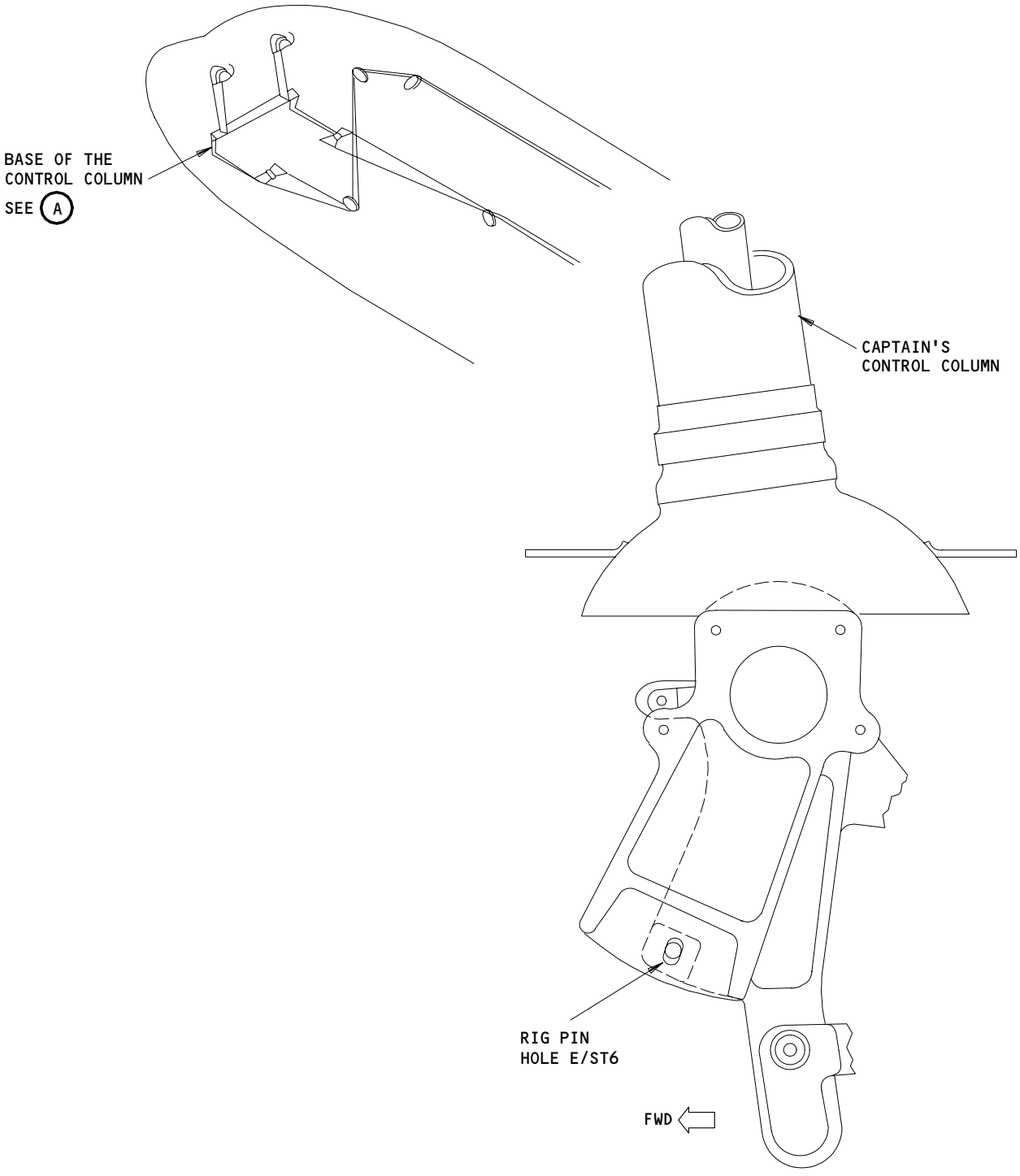
      S 214-003
      (2) Make sure that the control columns are in their neutral position.

      S 864-004
      (3) Put the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 864-005
      (4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.



Asymmetry Limiter Actuator Installation
Figure 401



Control Column Rig Pin Location
Figure 402

S 864-006
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 014-007
(6) Open the access door for the forward equipment bay, 113AL (Ref 06-41-00).

S 014-008

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(7) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 014-009
(8) Open the access door for the elevator aft quadrants, 313AL (Ref 06-42-00).

S 494-010
(9) Install rig pins E/ST7 (Fig. 401).

S 494-011
(10) Install rig pin E/ST6 (Fig. 402).

E. Remove the Asymmetry Limiter Actuator (Fig. 401)

S 214-012
(1) Make sure the asymmetry limiter actuator is in the fully retracted position.

S 034-013
(2) Disconnect the electrical connector.

S 034-014
(3) Remove the bolts, washers, and nuts that attach the asymmetry limiter actuator to the first officer's aft quadrant.

S 024-015
(4) Remove the asymmetry limiter actuator.

TASK 27-31-03-424-016

3. Install the Asymmetry Limiter Actuator

A. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 06-42-00/201, Empennage Access Doors and Panels
(3) 24-22-00/201, Electrical Power - Control

B. Access
(1) Location Zones

113/114	Area Forward of NLG Wheel Well
211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

113AL	Forward Equipment Bay
311AL	Forward Stabilizer Compartment
313AL	Elevator Aft Quadrants

C. Install the Asymmetry Limiter Actuator (Fig. 401)

S 214-017
(1) Make sure the new asymmetry limiter actuator is in the fully retracted position.

S 424-018
(2) Hold the asymmetry limiter actuator in its correct position on the first officer's aft quadrant.

S 424-019
(3) Install the bolts, washers, and nuts to attach the asymmetry limiter actuator to the first officer's aft quadrant.

S 434-020
(4) Connect the electrical connector.

S 094-021
(5) Remove rig pins E/ST6 and E/ST7.

D. Test for the Asymmetry Limiter Actuator

S 864-023
(1) Push the ECS MSG switch on the EICAS MAINT panel on the right side panel, P61.

S 864-024
(2) Push the AUTOREAD and then the ERASE buttons to erase the EICAS memory.

S 714-025
(3) Put the COMPUTER switch on the EICAS DISPLAY select panel to the L position.
(a) Make sure the EICAS message, ELEV ASYM, message does not show on the bottom display.

S 714-026
(4) Put the COMPUTER switch on the EICAS DISPLAY select panel to the R position.
(a) Make sure the EICAS message, ELEV ASYM, does not show on the bottom display.

S 864-027
(5) Open these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) Make sure the EICAS message, ELEV ASYM, message does not show on the bottom display.

NOTE: Do not do this step until 2 seconds after you open the above circuit breakers.

S 714-028
(6) Hold the ADC test switch on the right side panel, P61, for a minimum of 2 seconds and do the checks that follow:

NOTE: The ADC test switch extends the asymmetry limiter actuator for 13 seconds and then retracts it.

(a) Make sure the EICAS message, ELEV ASYM, shows on the bottom display.

(b) Make sure the asymmetry limiter actuator extends and then retracts.

NOTE: You must observe the asymmetry limit actuator during the first 13 seconds after you operate the ADC test switch.

S 864-029

(7) Do not start the subsequent steps for a minimum of 20 seconds.

S 864-030

(8) Push the AUTOREAD and then ERASE buttons to erase the EICAS memory.
(a) Make sure the EICAS message, ELEV ASYM, does not show on the bottom display.

S 864-031

(9) Close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

S 864-058

(10) Close these circuit breakers on the overhead panel, P11, and remove the DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

E. Put the Airplane Back to Its Usual Condition

S 864-032

(1) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-033

(2) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-034

(3) Close the access door for the elevator aft quadrants, 313AL (Ref 06-42-00).

S 414-035

(4) Close the access door for the forward equipment bay, 113AL (Ref 06-41-00).

ELEVATOR POWER CONTROL ACTUATOR (PCA)/REACTION LINK/IDLER LINK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the tasks to remove and install the following elevator actuation components:
      (1) the Power Control Actuator (PCA)
      (2) the Reaction Link
      (3) the Idler Link.

   TASK 27-31-05-024-001

2. Remove the Power Control Actuator (PCA)
   A. Equipment
      (1) Lock Assemblies from the Elevator PCA Lockout Equipment, B27009-12:
         (a) Lock Assembly, PCA, B27009-2

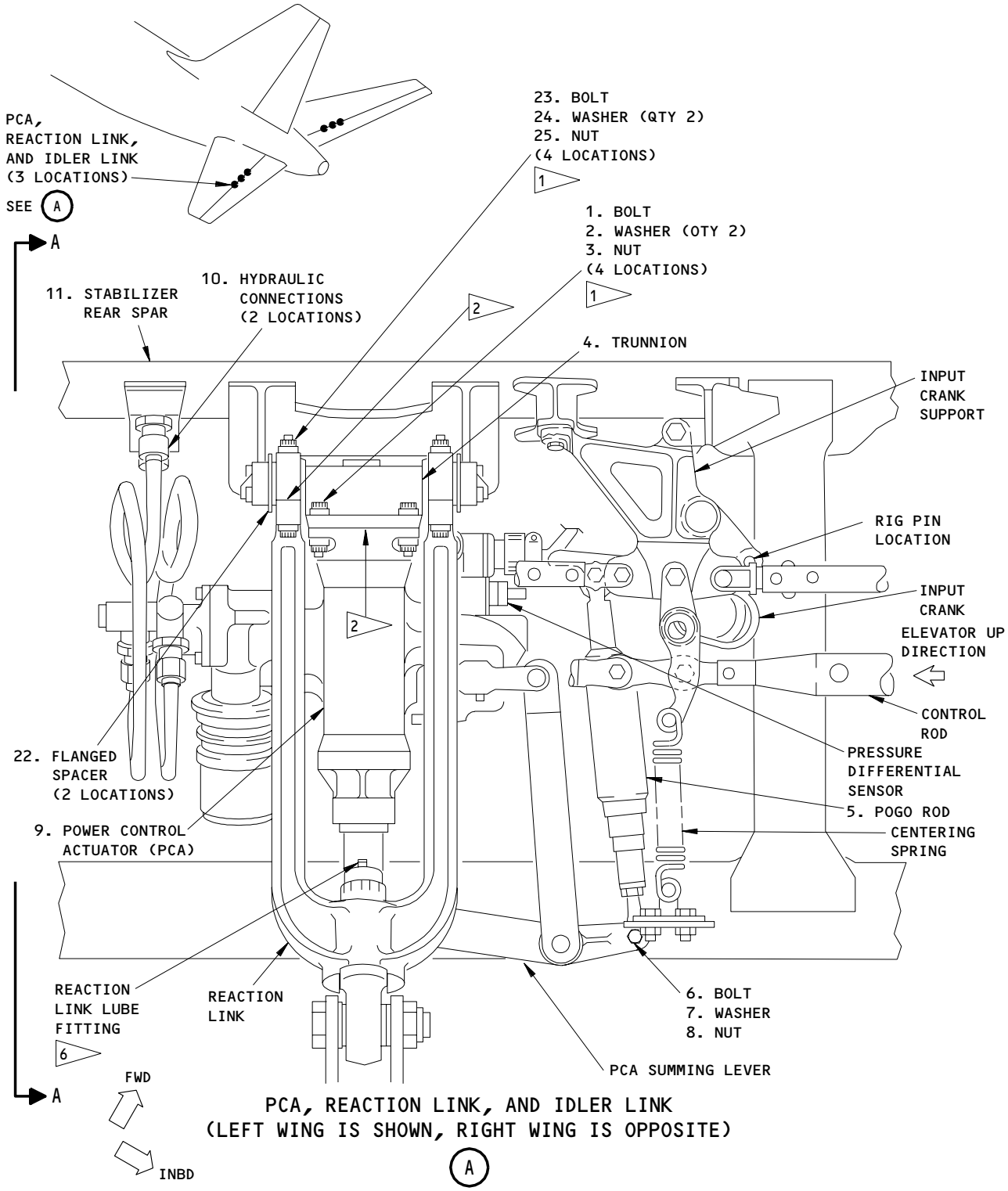
            NOTE: The PCA lock assembly is installed on the PCA. It contains a shear-out device that prevents damage caused by accidental operation during maintenance.

         (b) Lock Assembly, PCA Input Linkage, B27009-3

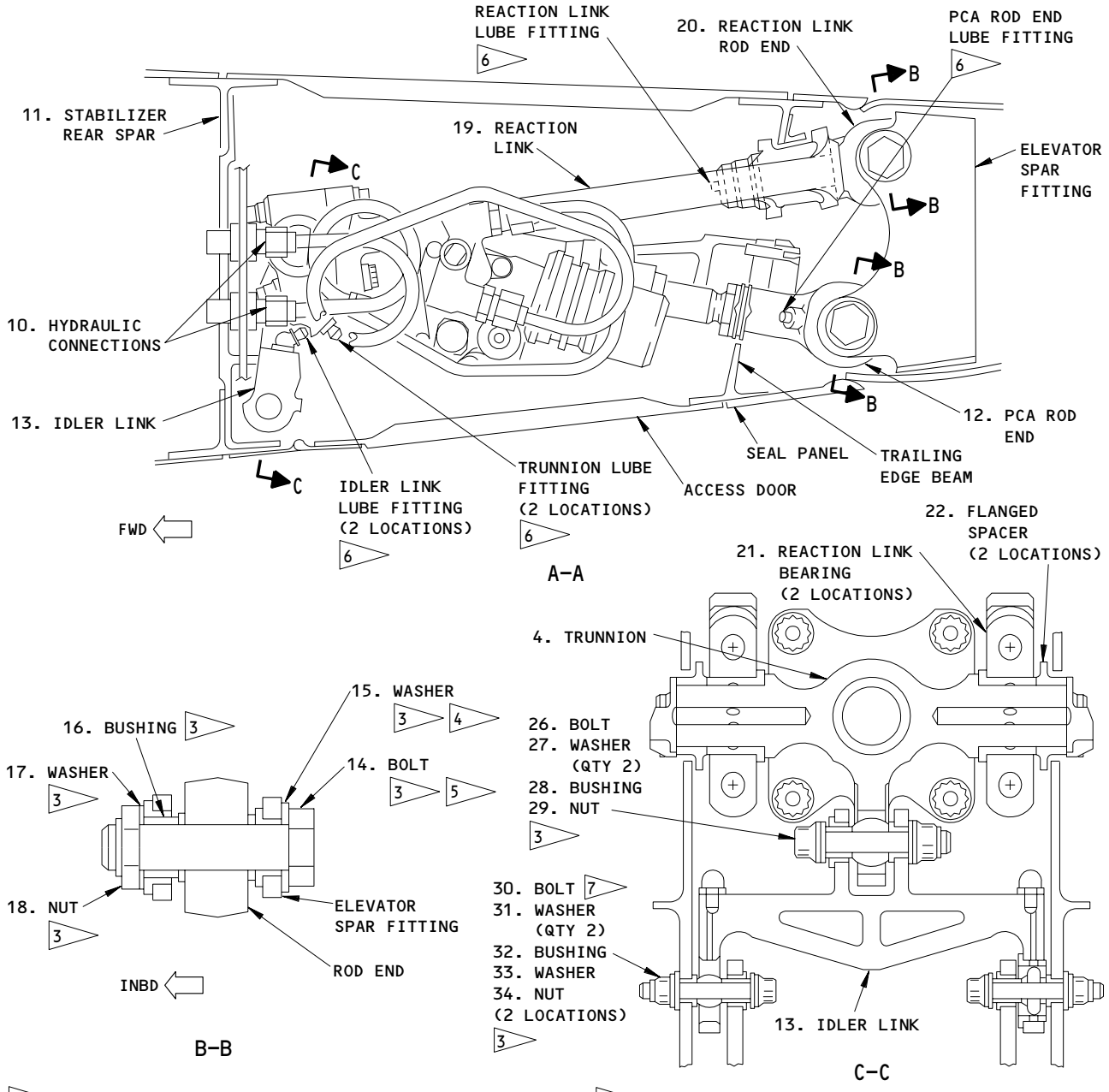
            NOTE: The lock assembly for the PCA input linkage holds the elevator linkage in the up position during maintenance. It is installed on the center PCA linkage.

   B. References
      (1) AMM 06-42-00/201, Empennage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-02-00/601, Flight Controls Surfaces
      (4) AMM 27-31-05/601, Elevator Power Control Actuator
      (5) AMM 27-61-00/201, Spoiler/Speedbrake Control System
      (6) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
         211/212 Control Cabin
         335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

      (2) Access Panels
         335DB/345DB Left/Right Elevator, PCUs and Control Linkage

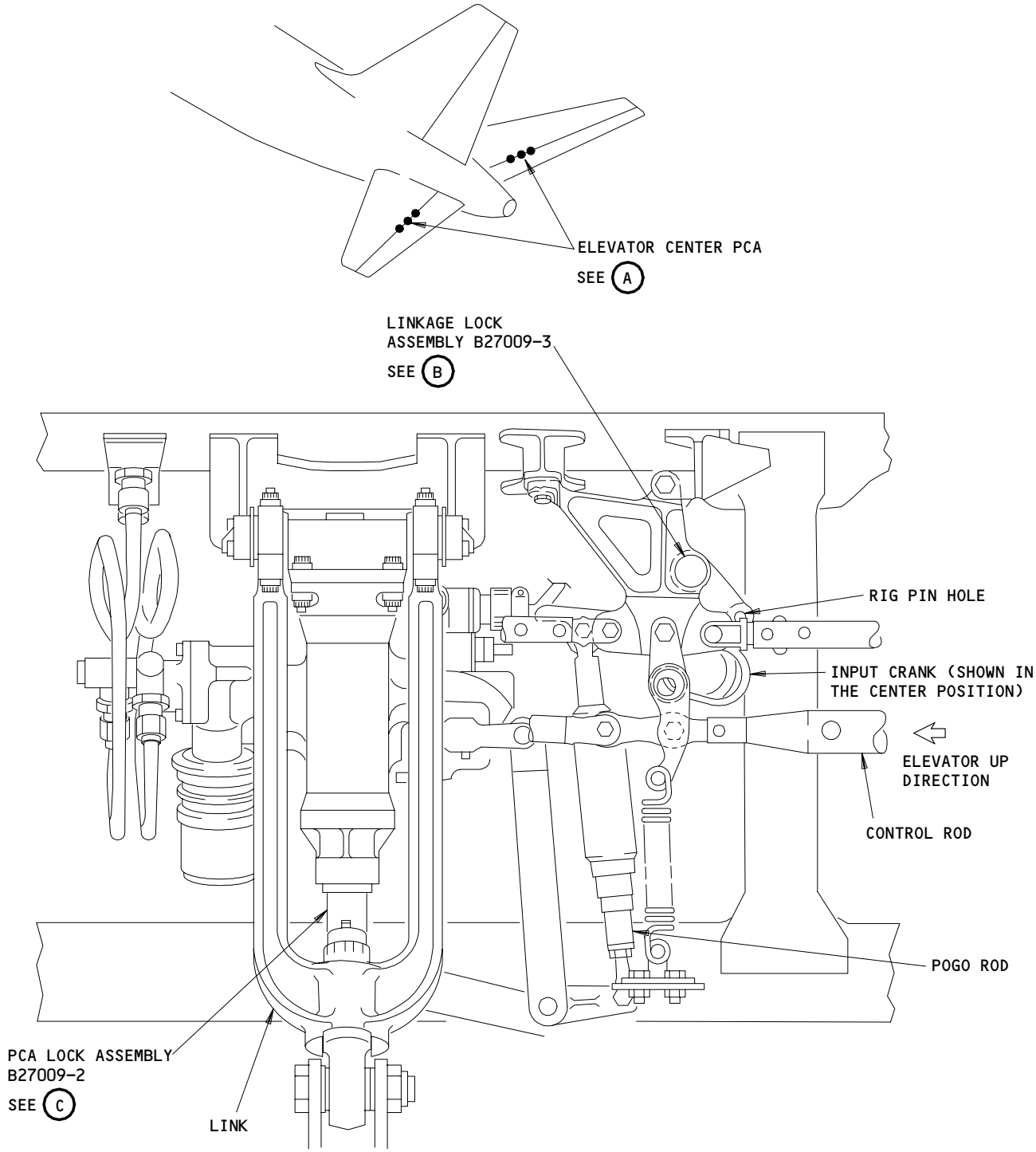


Elevator Power Control Actuator (PCA),
Reaction Link, and Idler Link Installation
Figure 401 (Sheet 1)



1. APPLY A LAYER OF SEALANT TO THE BOLT THREADS AND THREAD END OF THE SHANK AND INSTALL BOLTS, WASHERS, AND NUTS. CLEAN ANY UNWANTED SEALANT
2. APPLY A LAYER OF SEALANT TO THE MATING SURFACE BEFORE INSTALLATION
3. INSTALL THE BOLTS, BUSHINGS, WASHERS, AND NUTS WITH BMS 3-33 GREASE. CLEAN ANY UNWANTED GREASE. BMS 3-33 (RECOMMENDED), BMS 3-24 (OPTIONAL).
4. INSTALL THE WASHER WITH THE CHAMFER POINTED TO THE HEAD OF THE BOLT
5. INSTALL THE BOLT WITH THE HEAD OUTBOARD
6. FULLY LUBRICATE WITH BMS 3-33 GREASE. TURN THE PARTS TO MAKE SURE THAT THERE IS SUFFICIENT LUBRICATION. CLEAN ANY UNWANTED GREASE. BMS 3-33 (RECOMMENDED), BMS 3-24 (OPTIONAL)
7. INSTALL THE BOLTS WITH THE HEADS FACING EACH OTHER.

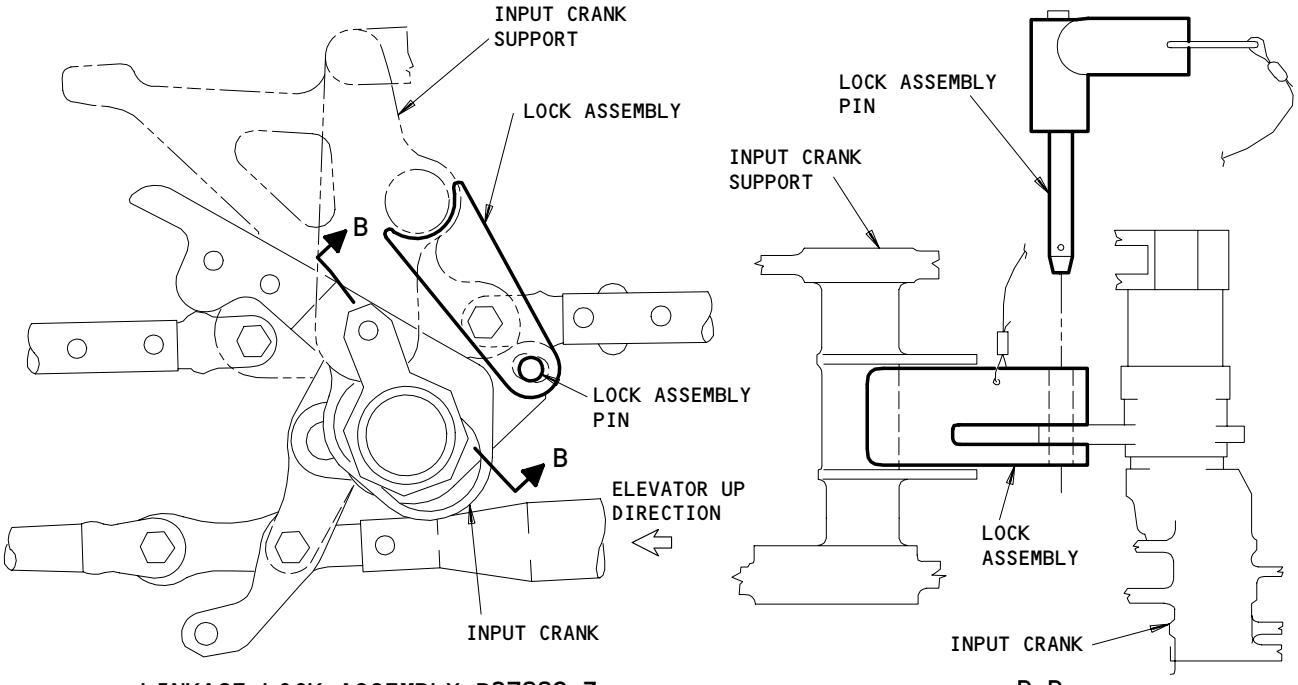
Elevator Power Control Actuator (PCA), Reaction Link, and Idler Link Installation
Figure 401 (Sheet 2)



ELEVATOR CENTER PCA
LEFT WING SHOWN (RIGHT WING OPPOSITE)

(A)

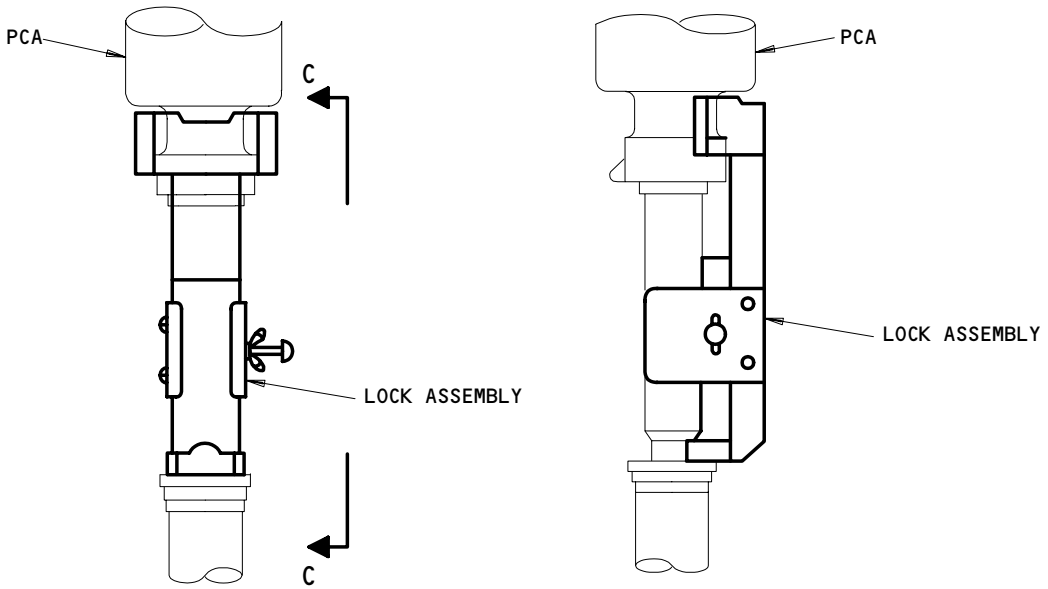
Elevator PCA Lockout Equipment Installation
Figure 402 (Sheet 1)



LINKAGE LOCK ASSEMBLY B27009-3
(PCA LINKAGE IN UP POSITION)

B 1

B–B



PCA LOCK ASSEMBLY B27009-2
(PCA EXTENDED)

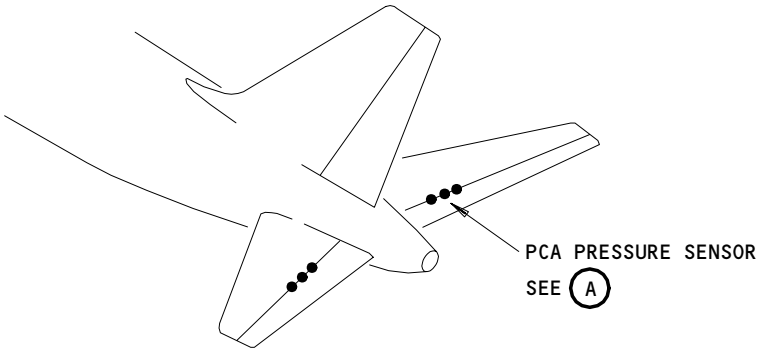
C 1

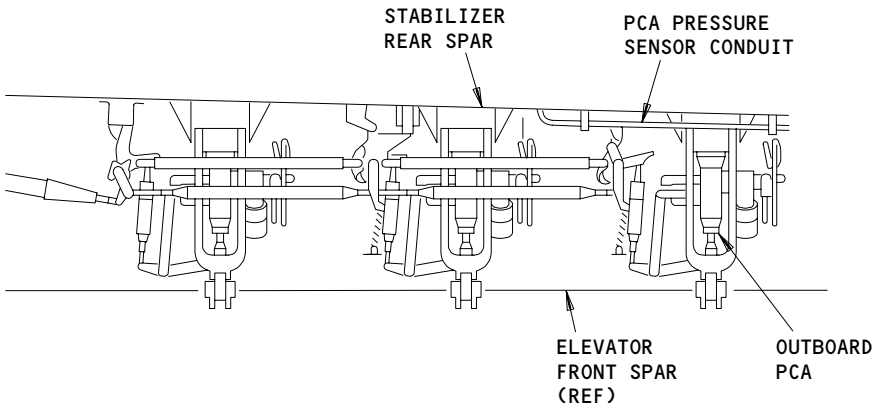
C–C

1 INSTALL LOCK ASSEMBLY B27009-3 BEFORE B27009-2

Elevator PCA Lockout Equipment Installation
Figure 402 (Sheet 2)

206841





PCA PRESSURE SENSOR
A

PCA Pressure Sensor Conduit
Figure 403

D. Prepare for the Removal

S 224-003
(1) Supply electrical power (AMM 24-22-00/201).

S 864-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 864-005
(3) Move the stabilizer to 6 units of trim.

S 864-006
(4) Remove the pressure from the right, center and left hydraulic systems and reservoirs (AMM 29-11-00/201).

NOTE: The right hydraulic system supplies the power to the outboard PCAs. The left hydraulic system supplies the power to the middle PCAs. The center hydraulic system supplies the power to the inboard PCAs.

S 864-009
(5) Pull both control columns to full aft and hold them in this position with ropes.

S 494-008
(6) Attach a DO-NOT-OPERATE tag to each control column.

S 864-010

(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-011

(8) Move the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-012

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF RIGHT
   (c) 11C13, STAB TRIM SHUTOFF LEFT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
   (i) 11J10, PCU MON SENSOR
   (j) 11J11, PCU MON MOD

S 014-014

(10) Open the access panel, 335DB (left elevator PCAs) or 345DB (right elevator PCAs) (AMM 06-42-00/201).

S 024-013

(11) Remove the seal panel and the trailing edge beam aft of the access panel (Fig. 401, Section A-A).

S 494-015

WARNING: INSTALL THE TWO ELEVATOR LOCK ASSEMBLIES (PCA AND PCA LINKAGE LOCK ASSEMBLIES) BEFORE YOU DO WORK ON THE PCA OR PCA LINKAGES. INSTALL THE PCA LINKAGE LOCK ASSEMBLY BEFORE YOU INSTALL THE PCA LOCK ASSEMBLY. MAKE SURE THE ELEVATOR CONTROL COLUMN IS HELD TO THE FULL AFT POSITION WHILE YOU INSTALL THE LOCK ASSEMBLIES. ACCIDENTAL MOVEMENT OF THE PCA CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(12) Manually turn the elevator up and install the elevator PCA lockout equipment with the steps that follow (Fig. 402):

   NOTE: A force of approximately 60 pounds (267 newtons) on the elevator trailing edge is necessary to lift the elevator.

   (a) Install the PCA linkage lock assembly on the elevator center PCA linkage (Detail B).

(b) Install PCA lock assembly (Detail C).

S 044-016

WARNING: REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. THE SPOILERS CAN ACCIDENTALLY MOVE WHEN YOU REMOVE ELECTRICAL POWER. THIS CAN CAUSE INJURY TO PERSONS.

(13) Remove electrical power (AMM 24-22-00/201).

E. Elevator PCA Removal (Fig. 401)

S 034-021

(1) Disconnect the electrical connector from the PCA.

S 034-022

(2) Remove the bolt (6), washer (7), and nut (8) and disconnect the pogo rod (5) from the PCA summing lever.

NOTE: Do not change the adjustment of the pogo rod when you disconnect it from the summing lever.

S 034-023

(3) Disconnect the hydraulic pressure and return lines (10) from the PCA (9).

S 494-024

(4) Install plugs to the hydraulic lines and caps to the PCA ports.

S 104-025

(5) Clean the PCA and hydraulic lines and remove any leakage of hydraulic fluid.

S 034-026

(6) Hold the PCA (9) and remove the bolt (14), washers (15, 17), bushing (16), and nut (18) that connect the PCA rod end (12) to the elevator spar fitting.

S 034-027

(7) Remove the bolts (1), washers (2), and nuts (3) which connect the PCA (9) to the trunnion (4).

S 024-028

(8) Remove the PCA from the airplane.

TASK 27-31-05-424-067

3. Install the Power Control Actuator (PCA)

A. Consumable Materials

(1) A00247 Sealant - Chromate Type - BMS 5-95
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) D00015 Grease - BMS 3-24 (Alternate)

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	Power Control Actuator	27-31-05	01	905

C. References

(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-31-00/501, Elevator Control System
(4) AMM 27-31-05/601, Elevator Power Control Actuator

D. Access

(1) Location Zones

211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

E. Elevator PCA Installation (Fig. 401)

S 644-029
(1) Lubricate the trunnion (4) and the idler link (13) with grease through the grease fittings (Section A-A).

NOTE: Turn the parts to make sure that there is sufficient lubrication, and remove any unwanted grease from the parts.

S 224-030
(2) Do a check for the permitted wear on the PCA attach points (AMM 27-31-05/601).

S 104-031
(3) Clean the mating surfaces between the PCA (9) and the trunnion (4), and remove all of the remaining sealant.

S 624-032
(4) Apply a layer of sealant to the faying surface of the PCA (9) and put the PCA against the faying surface of the trunnion (4).

S 434-033
(5) Install the bolts (1), washers (2), and nuts (3) to the PCA with wet sealant.

S 434-034
(6) Tighten the nuts (3) to 90-125 pound-inches (10.2-14.1 newton-meters)

NOTE: Make sure the trunnion and the flanged spacer can turn freely.

S 644-035
(7) Fully lubricate the PCA rod end (12) with grease through the grease fittings (Section A-A).

S 434-036
(8) Put the PCA rod end (12) into the elevator spar fitting and install with a bolt (14), washers (15, 17), bushing (16), and nut (18) with grease.

S 434-037
(9) Make sure that the run-on torque for the nut (18) is 90-400 pound-inches (10.2-45.2 newton-meters), then tighten the nut to 1300-2000 pound-inches (147-226 newton-meters).

S 094-038
(10) Remove the plugs from the hydraulic lines (10) and the caps from the PCA ports (9).

S 434-039
(11) Connect the hydraulic lines (10) to the PCA (9).

S 434-040
(12) Align the pogo rod (5) to the PCA summing lever and install the bolt (6), washer (7), and nut (8).

NOTE: It is necessary to adjust the elevator PCA pogo rod if the adjustment for the pogo rod was changed while it was disconnected (AMM 27-31-00/501).

S 434-041
(13) Connect the electrical connector to the PCA (9).

S 094-042
(14) Remove the elevator PCA lockout equipment (Fig. 402).

S 094-044
(15) Remove the DO-NOT-OPERATE tags from the control columns.

S 864-043
(16) Release the control columns and put them back to the center position.

S 864-092
(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF RIGHT
(c) 11C13, STAB TRIM SHUTOFF LEFT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-090
(18) Move the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-091
(19) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 644-048
(20) Fully lubricate the link bearing with grease before you adjust the PCA.

S 724-068
(21) If you only replace one elevator PCA, then do these steps:
(a) Pressurize the hydraulic system to one of the the PCAs that was not replaced (AMM 29-11-00/201).

NOTE: The center hydraulic system supplies pressure to the inboard PCA. The left hydraulic system supplies pressure to the middle PCA. The right hydraulic system supplies pressure to the outboard PCA.

(b) Keep a record of the exact position of the elevator trailing edge at the index plate.
(c) Remove hydraulic power from the PCA that was not replaced (AMM 29-11-00/201).
(d) Supply hydraulic power to the other PCA that was not replaced (AMM 29-11-00/201).
(e) Keep a record of the exact position of the elevator trailing edge at the index plate.
(f) Remove hydraulic power from the PCA (AMM 29-11-00/201).
(g) Supply hydraulic power to the replaced elevator PCA (AMM 29-11-00/201).
(h) Keep a record of the exact position of the elevator trailing edge at the index plate.
(i) Make sure that this position is +/- 0.05 inch (+/- 1.3 mm) from the first two positions.
(j) If this position is not +/-0.05 inch (+/- 1.3 mm) from the first two positions, then do these steps:
    1) Cut the lockwire of the input pogo rod of the replaced PCA.
    2) Adjust the input pogo rod to move the elevator to +/- 0.05 inch (+/- 1.3 mm) of the first two positions.

        NOTE: When you rig the PCA pogo rods, you must adjust the surface upward toward the index plate and not downward. Therefore, the linkage of the unpowered PCAs should be pushed forward to eliminate possibility of a hydraulic lock.

        If you adjust the surface too far above the index plate, it is necessary to pull the linkage of the unpowered PCAs aft to relieve a hydraulic lock. This will move the surface down below the index plate so you can re-rig the surface.

    3) Do a check of the input pogo rod end for correct thread engagement. Make sure that a 0.045 inch (1.14 mm) diameter pin can not be installed in the inspection hole.
    4) Tighten the input pogo rod check nut. Do not lockwire.
        a) Make sure that the elevator does not move when you tighten the input pogo rod check nut.
    5) Lockwire the check nut on the input pogo rod end.
(k) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 824-049
(22) If more than one PCA is replaced:
(a) Adjust the Power Control Actuators (AMM 27-31-00/501).
(b) Do the first four steps of the Elevator Travel Limits Test found in the Elevator Control System - System Test (AMM 27-31-00/501).

F. Put the Airplane Back to Its Usual Condition

S 424-052
(1) Install the trailing edge beam and the seal panel.

S 414-053
(2) Install the PCA access panels 335DB or 345DB, as necessary (AMM 06-42-00/201).

S 864-054
(3) Remove electrical power (AMM 24-22-00/201).

TASK 27-31-05-024-055

4. Remove the Elevator Reaction Link

A. Equipment

(1) Lock Assemblies from the Elevator PCA Lockout Equipment, B27009-12:

(a) Lock Assembly, PCA, B27009-2

NOTE: The PCA lock assembly is installed on the PCA. It contains a shear-out device that can help prevent any damage caused by accidental operation during maintenance.

(b) Lock Assembly, PCA Input Linkage, B27009-3

NOTE: The input linkage lock assembly holds the linkage in the elevator at the up position during maintenance. It is installed on the center PCA linkage.

B. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-02-00/601, Flight Controls Surfaces
(4) AMM 27-31-05/601, Elevator Power Control Actuator
(5) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(6) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems

C. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

D. Prepare for the Removal

S 844-020
(1) Prepare for removal with the instructions given in the "Prepare for Removal" paragraph.

E. Reaction Link Removal (Fig. 401)

S 024-056
(1) Do these two steps only if you remove the right outboard PCA reaction link:
(a) Remove the screws (one on each end) that connect the pressure sensor conduit to the stabilizer rear spar (Fig. 403).
(b) Remove the pressure sensor conduit.

S 034-057
(2) Disconnect the electrical connector from the PCA (Fig. 401).

S 034-058
(3) Remove the bolt (6) and disconnect the pogo rod (5) from the PCA summing lever.

NOTE: Do not change the adjustment of the pogo rod while it is disconnected. It is necessary to adjust the elevator system if you change the adjustment on the pogo rod.

S 034-060
(4) Disconnect the hydraulic pressure and return lines (10) from the PCA (9).

S 494-059
(5) Install plugs on the hydraulic lines and caps on the PCA ports.

S 104-061
(6) Clean the PCA and hydraulic lines and remove all leakage of hydraulic fluid.

S 034-062
(7) Hold the PCA (9) and remove the bolt (14), washers (15, 17), bushing (16), and nut (18), which connect the PCA rod end (12) to the elevator spar fitting.

S 034-063
(8) Hold the reaction link (19) and remove the bolt (14), washers (15, 17), bushing (16), and nut (18) which connect the reaction link rod end to the elevator spar fitting.

S 034-064
(9) Hold the reaction link and the PCA, and remove the bolt (26), washers (27), bushing (28), and nut (29) which connect the trunnion (4) to the idler link (13).

S 034-065
(10) Remove the bolts (23), washers (24), and nuts (25) which connect the reaction link (19) to its bearings (21).

S 024-066
(11) Remove the reaction link (19) from the trunnion (4).

S 024-067
(12) Disconnect the bolts (1), washers (2), and nuts (3) and remove the PCA (9) from the trunnion (4).

TASK 27-31-05-424-068

5. Install the Elevator Reaction Link

A. Consumable Materials

(1) A00247 Sealant, Chromate Type - BMS 5-95
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00015 Grease - BMS 3-24 (Alternate)
(4) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	19	Reaction Link	27-31-05	01	887

C. References

(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-31-00/501, Elevator Control System
(4) AMM 27-31-05/601, Elevator Power Control Actuator

D. Access

(1) Location Zones

211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels

335DB/345DB Left/Right Elevator, PCU's and Control Linkage

E. Reaction Link Installation (Fig. 401)

S 224-069

(1) Do a check on the permitted wear for the reaction link (19) (AMM 27-31-05/601).

S 644-070
(2) Lubricate the trunnion (4), idler link (13), reaction link rod end (20), and PCA rod end (12) through the grease fittings with grease.

NOTE: Turn the parts to make sure that there is sufficient lubrication, and clean all unwanted grease from the parts.

S 104-071
(3) Remove all the used sealant and clean the faying surfaces between the reaction link (19) and its bearings (21).

S 104-072
(4) Remove all the used sealant and clean the mating surfaces between the PCA (9) and the trunnion (4).

S 624-073
(5) Apply a layer of sealant to the mating surface of the PCA (9), and put the PCA against the faying surface of the trunnion (4).

S 434-074
(6) Install the bolts (1), washers (2), and nuts (3) on the PCA with wet sealant.

S 434-075
(7) Tighten the nuts to 90-125 pound-inches (10.2-14.1 newton-meters).

S 644-076
(8) Apply a layer of sealant to the mating surface of the reaction link bearing (21), the assembled reaction link (19) and its bearings (21), and the trunnion (4).

S 434-077
(9) Install the bolts (23), washers (24), and nuts (25) to the reaction link with wet sealant.

S 434-078
(10) Tighten the nuts to 90-125 pound-inches (10.2-14.1 newton-meters).

NOTE: Make sure the trunnion (4) and the flanged spacers (21) can turn freely.

S 434-079
(11) Move the trunnion (4) into the idler link (13) and install the bolt (26), washers (27), bushing (28), and nut (29) with grease.

S 434-080
(12) Move the reaction link rod end (20) and the PCA rod end (12) to the elevator spar fitting and install the bolts (14), washers (15, 17), bushings (16) and nuts (18) with grease.

S 434-081
(13) Make sure the run-on torque for the nut is 90-400 pound-inches (10.2-14.1 newton-meters), then tighten the nut to 1300-2000 pound-inches (147-225 newton-meters).

S 094-082
(14) Remove the plugs from the hydraulic lines (10) and the caps from the PCA ports (9).

S 434-083
(15) Align the pogo rod (5) with the PCA summing lever and install the bolt (6), washer (7), and nut (8).

NOTE: It is necessary to adjust the elevator system if the adjustment of the pogo rod was changed while disconnected (AMM 27-31-00/501).

S 434-084
(16) Connect the electrical connector to the PCA (9).

S 424-085
(17) Connect the pressure sensor conduit to the stabilizer rear spar only if you are to install the right outboard PCA reaction link (Fig. 403).

S 094-086
(18) Remove the elevator PCA lockout equipment (Fig. 402).

S 094-087
(19) Remove the DO-NOT-OPERATE tags from the control columns.

S 864-044
(20) Release the control columns and put them back to the center position.

S 864-093
(21) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF RIGHT
(c) 11C13, STAB TRIM SHUTOFF LEFT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-094
(22) Move the RIGHT and LEFT STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-095
(23) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 824-048
(24) Adjust the power control actuator (AMM 27-31-00/501).

S 724-049
(25) Do a test on the elevator travel limits (AMM 27-31-00/501).

S 724-096
(26) Do a test on the Elevator PCU Monitor System (AMM 27-31-00/501).

F. Put the Airplane Back to Its Usual Condition

S 424-017
(1) Install the trailing edge beam and the seal panel.

S 414-097
(2) Install the PCA access panels, 335DB or 345DB, as necessary (AMM 06-42-00/201).

S 864-019
(3) Remove electrical power (AMM 24-22-00/201).

TASK 27-31-05-024-099

6. Remove the Elevator Idler Link

A. Equipment

(1) Lock Assemblies from the Elevator PCA Lockout Equipment, B27009-12:

(a) Lock Assembly, PCA, B27009-2

NOTE: The PCA lock assembly is installed on the PCA. It contains a shear-out device that can help prevent any damage caused by accidental operation during maintenance.

(b) Lock Assembly, PCA Input Linkage, B27009-3

NOTE: The input linkage lock assembly holds the linkage in the elevator at the up position during maintenance. It is installed on the center PCA linkage.

B. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-02-00/601, Flight Controls Surfaces
(4) AMM 27-31-05/601, Elevator Power Control Actuator
(5) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(6) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems

C. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

D. Prepare for the Removal

S 844-100
(1) Prepare for removal with the instructions given in the "Prepare for Removal" paragraph.

E. Idler Link Removal (Fig. 401)

S 024-101
(1) Do these two steps only if you remove the right outboard PCA idler link:
(a) Remove the screws (one on each end) that connect the pressure sensor conduit to the stabilizer rear spar (Fig. 403).
(b) Remove the pressure sensor conduit.

S 034-109
(2) Hold the PCA and remove the bolt (26), washers (27), bushing (28), and nut (29) which connect the PCA (9) to the idler link (13).

S 034-110
(3) Remove the bolts (30), washers (31), bushings (32), washers (33), and nuts (34) which connect the idler link (13) to the stabilizer rear spar (11).

S 024-111
(4) Remove the idler link (13) from the aircraft.

TASK 27-31-05-424-117

7. Install the Elevator Idler Link

A. Consumable Materials
(1) A00247 Sealant, Chromate Type - BMS 5-95
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00015 Grease - BMS 3-24 (Alternate)
(4) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	13	Idler Link	27-31-05	01	805

C. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-31-00/501, Elevator Control System
(4) AMM 27-31-05/601, Elevator Power Control Actuator

D. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Left/Right Elevator, PCU's and Control Linkage

E. Idler Link Installation (Fig. 401)

S 224-118
(1) Do a check on the permitted wear for the idler link (13) (AMM 27-31-05/601).

S 644-119
(2) Lubricate the idler link (13), bolt (26), washers (27), bushing (28), nut (29), bolts (30), washers (31), bushings (32), washers (33), and nuts (34) with grease.

NOTE: Turn the parts to make sure that there is sufficient lubrication, and clean all unwanted grease from the parts.

S 644-159
(3) Lubricate the idler link grease fittings on the idler link bearings with grease.

S 434-123
(4) Install the bolts (30), washers (31), bushings (32), washers (33), and nuts (34) on the idler link.

S 434-124
(5) Tighten the nuts to the proper torque.

S 434-126
(6) Align the mating holes of the PCA (9) and the idler link (13) and install the bolts (26), washers (27), bushings (28), and nuts (29) to the assembly.

S 434-127
(7) Tighten the nuts to the proper torque.

S 434-158
(8) Connect the pressure sensor conduit to the stabilizer rear spar only if you are to install the right outboard PCA idler link (Fig. 403).

S 094-146
(9) Remove the elevator PCA lockout equipment (Fig. 402).

S 094-147
(10) Remove the DO-NOT-OPERATE tags from the control columns.

S 864-148
(11) Release the control columns and put them back to the center position.

S 864-149
(12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF RIGHT
(c) 11C13, STAB TRIM SHUTOFF LEFT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-150
(13) Move the RIGHT and LEFT STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-151
(14) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 724-153
(15) Do a test on the elevator travel limits (AMM 27-31-00/501).

S 724-154
(16) Do a test on the Elevator PCU Monitor System (AMM 27-31-00/501).

F. Put the Airplane Back to Its Usual Condition

S 424-155
(1) Install the trailing edge beam and the seal panel.

S 414-156
(2) Install the PCA access panels, 335DB or 345DB, as necessary (AMM 06-42-00/201).

S 864-157
(3) Remove electrical power (AMM 24-22-00/201).

ELEVATOR POWER CONTROL ACTUATOR/REACTION LINK - INSPECTION/CHECK

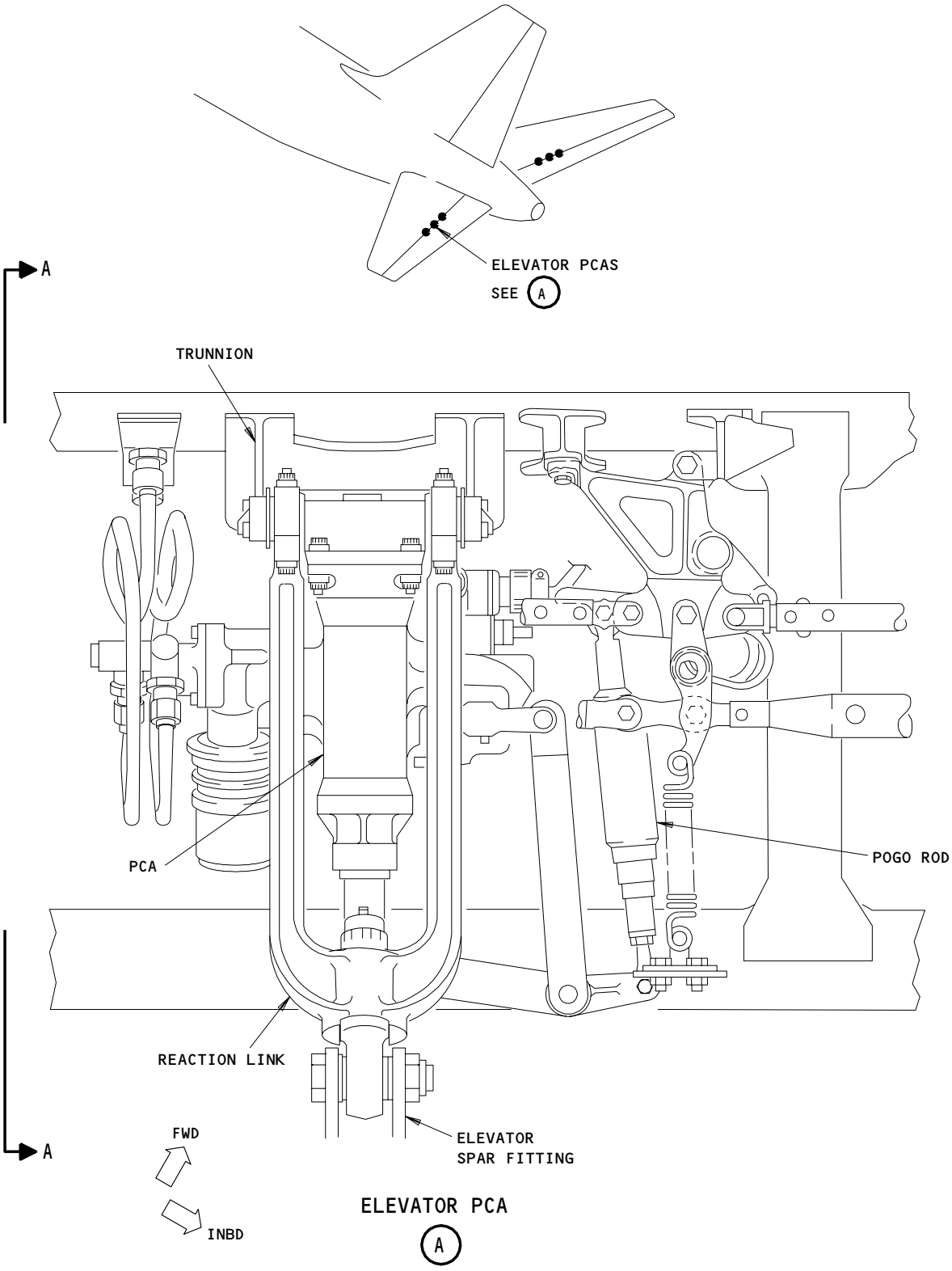
1. General
   A. This section contains illustrations and wear limit charts for the elevator PCA connections to the fittings on the elevator spar and for the PCA input linkage assemblies. Refer to Elevator PCA Removal/Installation for the procedures to access a component and to remove/install a component for wear inspection.

TASK 27-31-05-226-001

2. PCA/Elevator Wear Limits (Fig. 601)
   A. Access
      (1) Location Zones
          330/340 Horizontal Stabilizer and Elevator

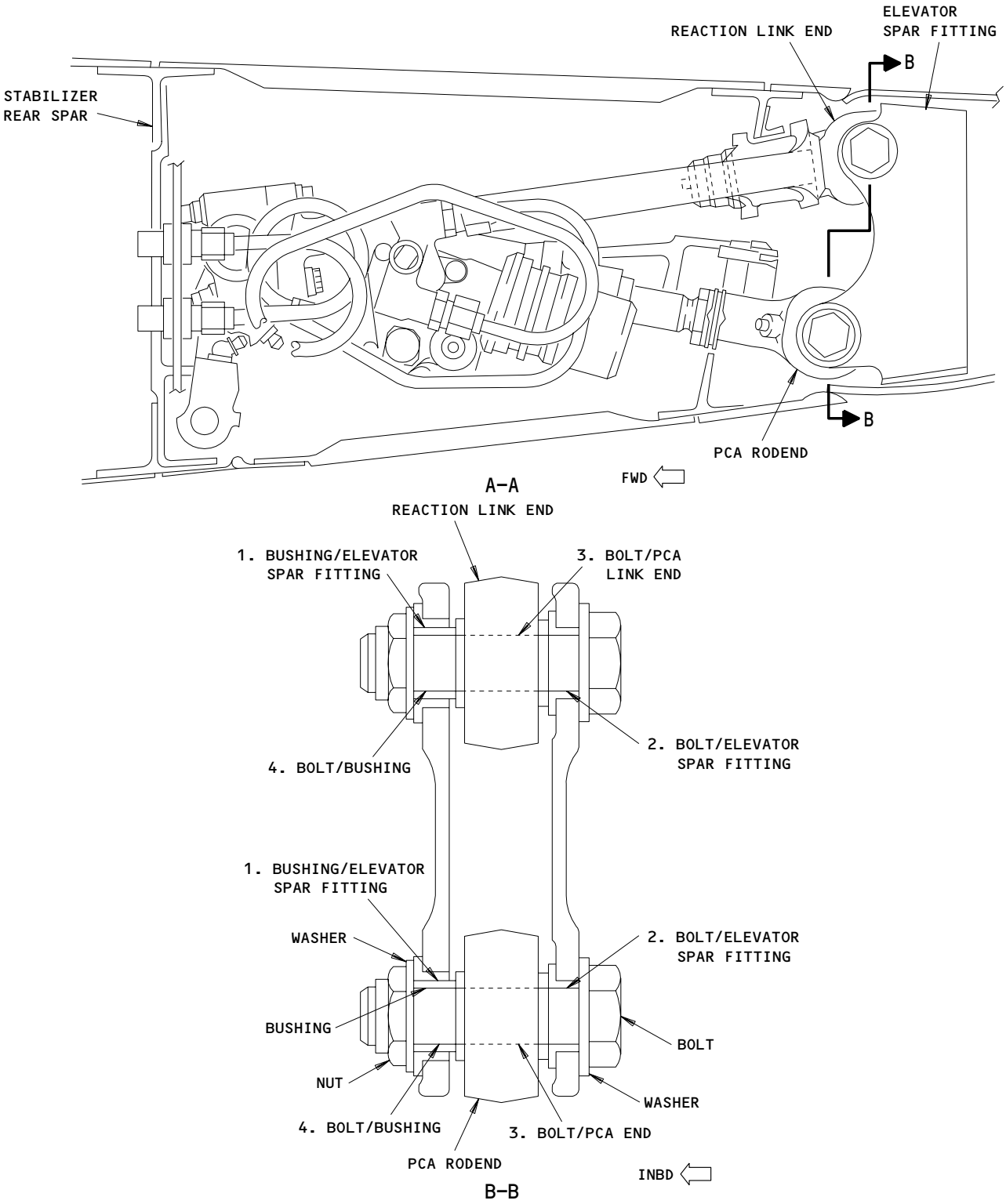
TASK 27-31-05-226-002

3. PCA Input Linkage Wear Limits (Fig. 602)
   A. Access
      (1) Location Zones
          330/340 Horizontal Stabilizer and Elevator



ELEVATOR PCA
(A)

PCA/Elevator Wear Limits
Figure 601 (Sheet 1)

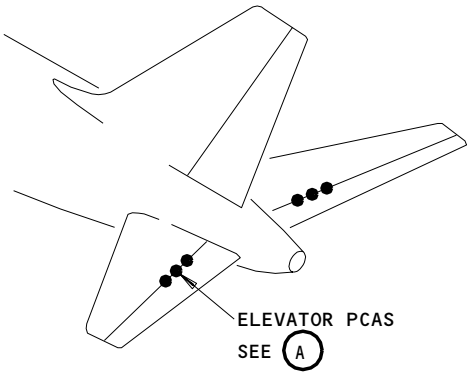


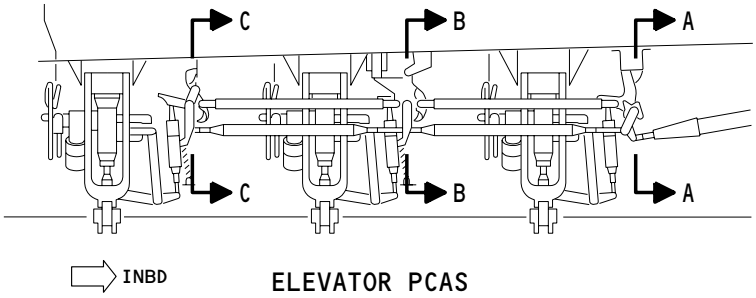
PCA/Elevator Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	ELEV SPAR FTG	ID	1.0620 (26.975)	1.0628 (26.995)	1	0.0030 (0.076)		X	1
	BUSHING	OD	1.0613 (26.957)	1.0618 (26.970)	1.0606 (26.939)		X		
2	ELEV SPAR FTG	ID	0.7495 (19.037)	0.7503 (19.058)	1	0.0036 (0.091)		X	1
	BOLT	OD	0.7485 (19.012)	0.7490 (19.025)	0.7476 (18.989)		X		
3	PCA END	ID	0.7495 (19.037)	0.7500 (19.050)	0.7508 (19.070)	0.0030 (0.076)	X		
	BOLT	OD	0.7485 (19.012)	0.7490 (19.025)	0.7478 (18.994)		X		
4	BUSHING	ID	0.7492 (19.030)	0.7497 (19.042)	0.7503 (19.058)	0.0024 (0.061)	X		
	BOLT	OD	0.7485 (19.012)	0.7490 (19.025)	0.7479 (18.997)		X		

1 THIS PART CAN BE REPAIRED.

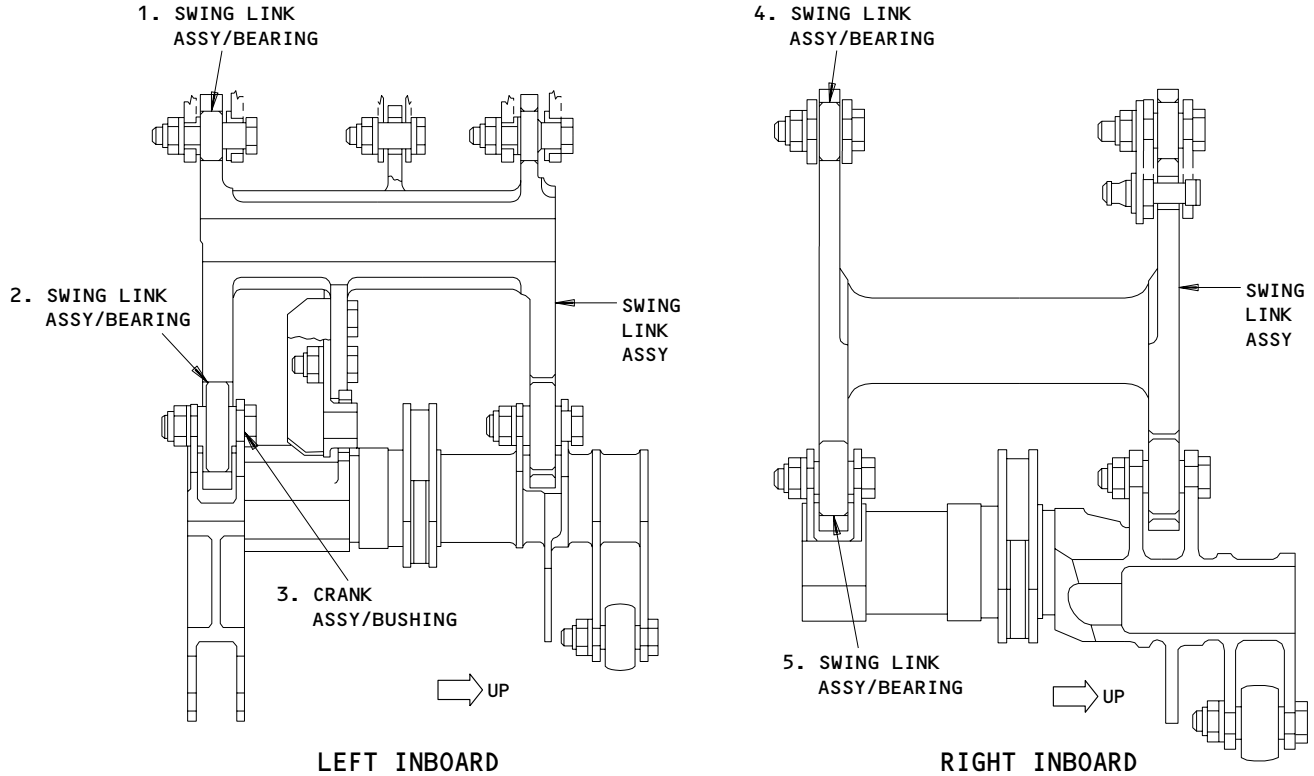
PCA/Elevator Wear Limits
Figure 601 (Sheet 3)





ELEVATOR PCAS
LEFT SIDE SHOWN
(RIGHT SIDE IS OPPOSITE)

A

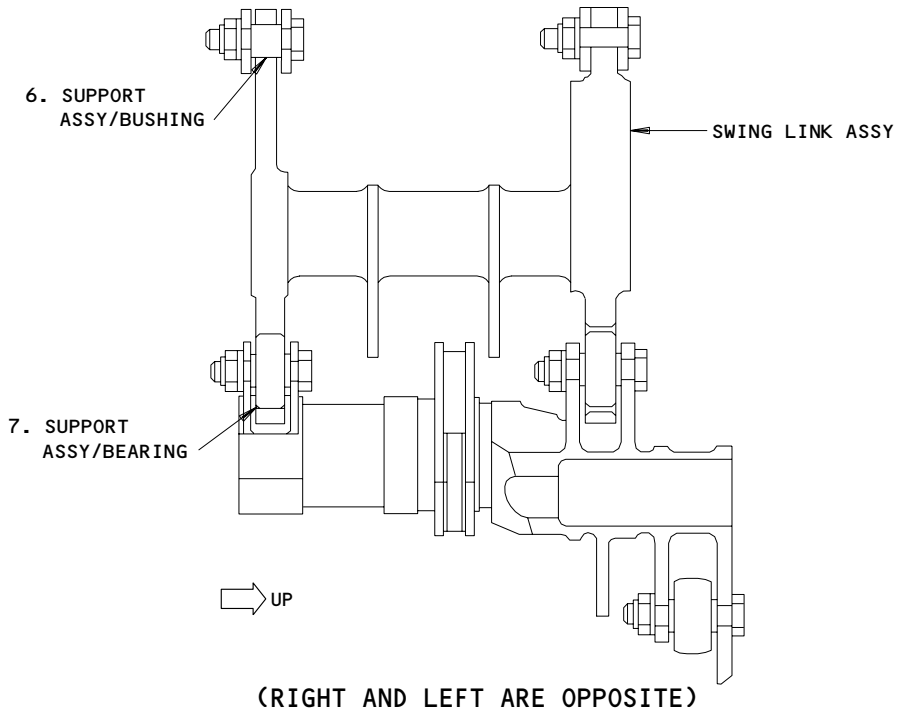


LEFT INBOARD

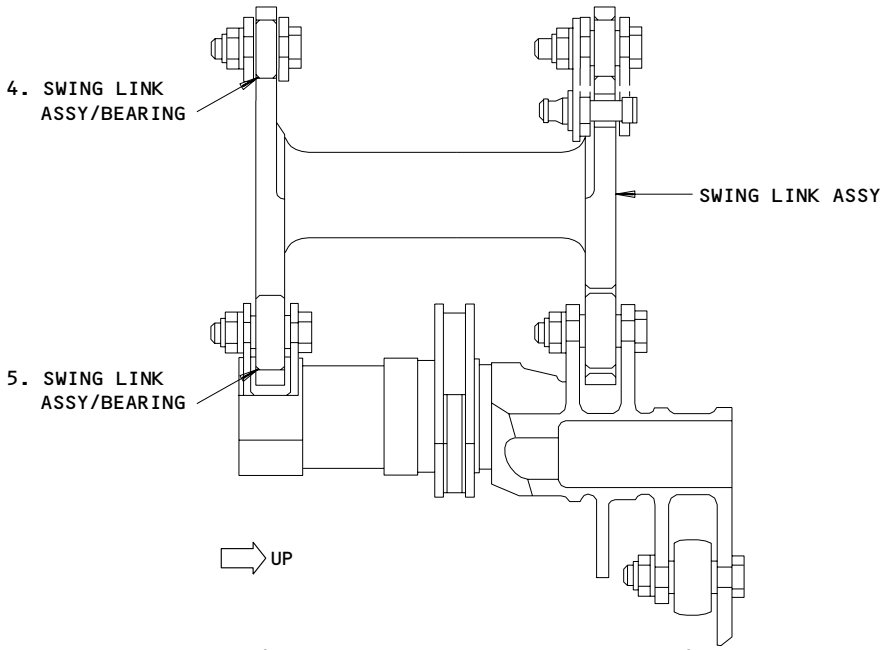
RIGHT INBOARD

A-A

PCA Input Linkages Wear Limits
Figure 602 (Sheet 1)



(RIGHT AND LEFT ARE OPPOSITE)
B-B



(RIGHT AND LEFT ARE OPPOSITE)
C-C

PCA Input Linkages Wear Limits
Figure 602 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	SWING LINK ASSY	ID	0.6875 (17.463)	0.6880 (17.475)	0.6893 (17.508)	0.0018 (0.046)	X		
	BEARING	OD	0.6871 (17.452)	0.6875 (17.463)	0.6857 (17.417)		X		
2	SWING LINK ASSY	ID	1.2500 (31.750)	1.2505 (31.763)	1.2518 (31.796)	0.0018 (0.046)	X		
	BEARING	OD	1.2496 (31.740)	1.2500 (31.750)	1.2482 (31.704)		X		
3	CRANK ASSY	ID	0.4370 (11.100)	0.4375 (11.113)	0.4390 (11.151)	0.0020 (0.051)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4350 (11.049)		X		
4	SWING LINK ASSY	ID	0.6875 (17.463)	0.6880 (17.475)	0.6893 (17.508)	0.0018 (0.046)	X		
	BEARING	OD	0.6871 (17.452)	0.6875 (17.463)	0.6857 (17.417)		X		
5	SWING LINK ASSY	ID	0.9014 (22.896)	0.9019 (22.908)	0.9032 (22.941)	0.0018 (0.046)	X		
	BEARING	OD	0.9010 (22.885)	0.9014 (22.896)	0.8996 (22.850)		X		
6	SUPPORT ASSY	ID	0.3745 (9.512)	0.3750 (9.525)	0.3765 (9.563)	0.0020 (0.051)	X		
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3725 (9.462)		X		
7	SUPPORT ASSY	ID	0.9014 (22.896)	0.9019 (22.908)	0.9032 (22.941)	0.0018 (0.046)	X		
	BEARING	OD	0.9010 (22.885)	0.9014 (22.896)	0.8996 (22.850)		X		

PCA Input Linkages Wear Limits
Figure 602 (Sheet 3)

ELEVATOR POWER CONTROL ACTUATOR (PCA) INPUT LINKAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the input linkages on the power control actuators (PCAs) for the elevator control system.

   TASK 27-31-06-024-001

2. Remove the PCA Input Linkage
   A. Equipment
      (1) Lock Assembly, PCA-B27009-2, from Elevator PCA Lockout Equipment B27009-12
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-61-00/201, Spoiler/Speedbrake Control System
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

      (2) Access Panels
          335DB/345DB Elevator PCAs

   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003

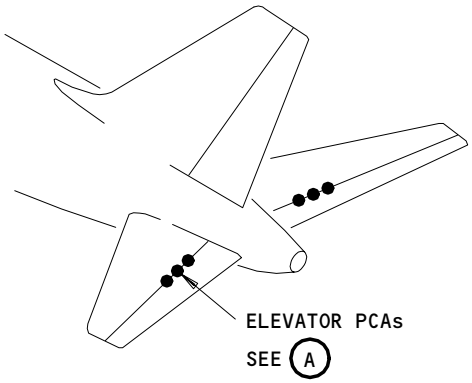
      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

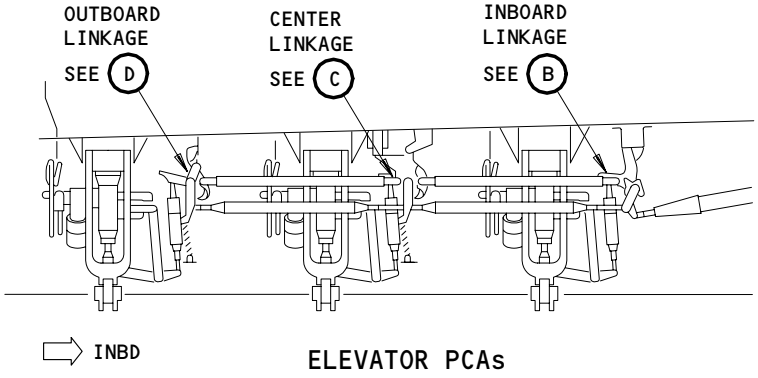
      (2) Pressurize the right and center hydraulic systems (Ref 29-11-00).

      S 864-004
      (3) Move the stabilizer to the neutral position (6 units of trim).

      S 864-005
      (4) Remove the pressure from the left, right, and center hydraulic systems (Ref 29-11-00).

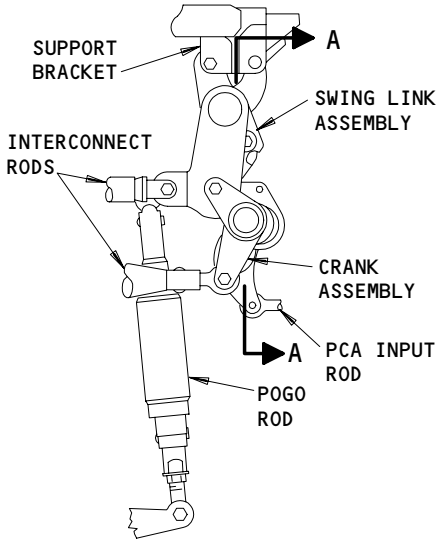
      S 864-006
      (5) Pull the control column full aft and use a rope to hold it in this position.





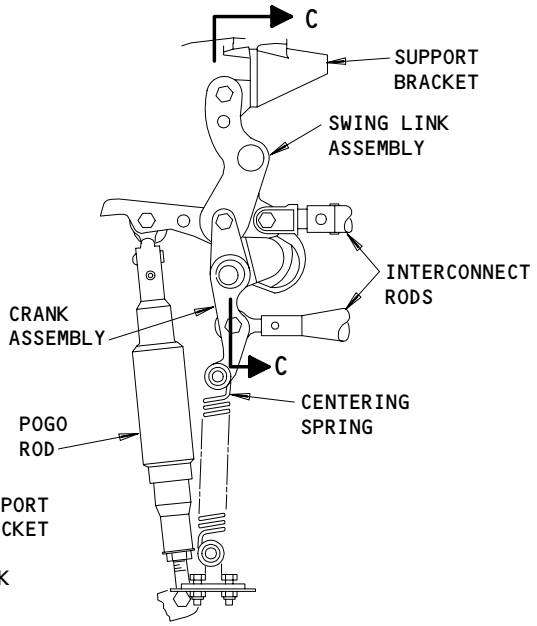
ELEVATOR PCAs
(LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT)

A



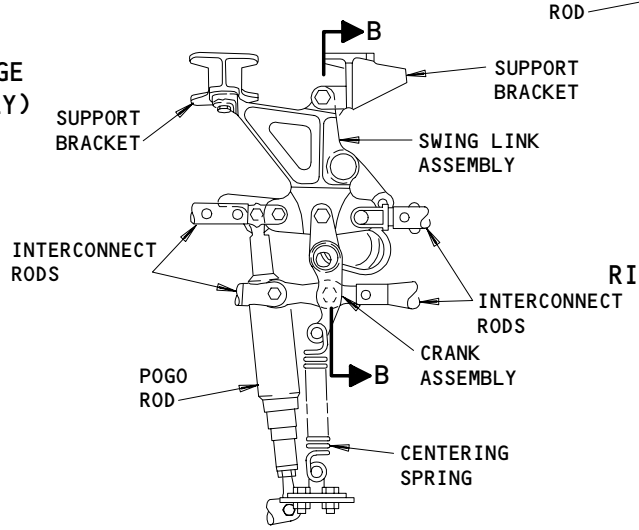
INBOARD LINKAGE
(LEFT SIDE ONLY)

B



OUTBOARD LINKAGE
(LEFT SIDE IS SHOWN,
RIGHT INBOARD AND OUTBOARD
ARE EQUIVALENT)

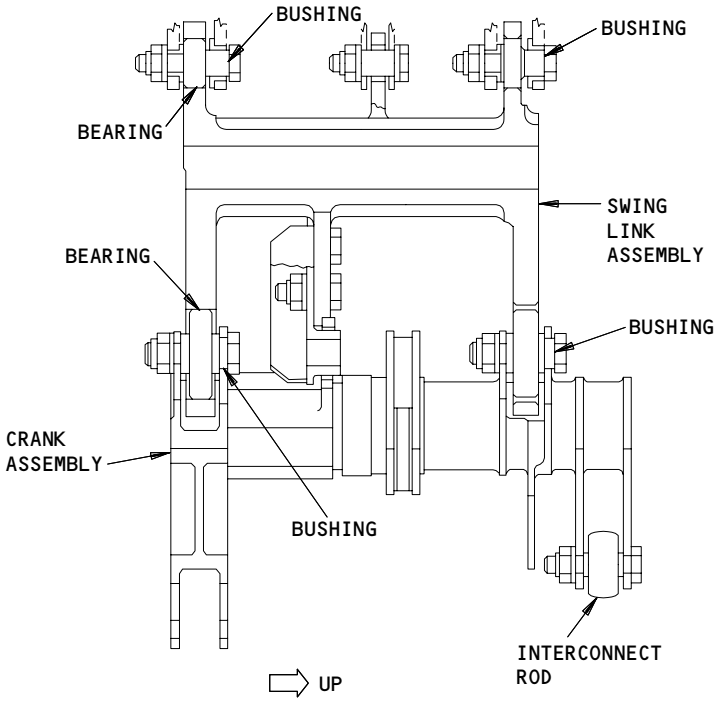
D



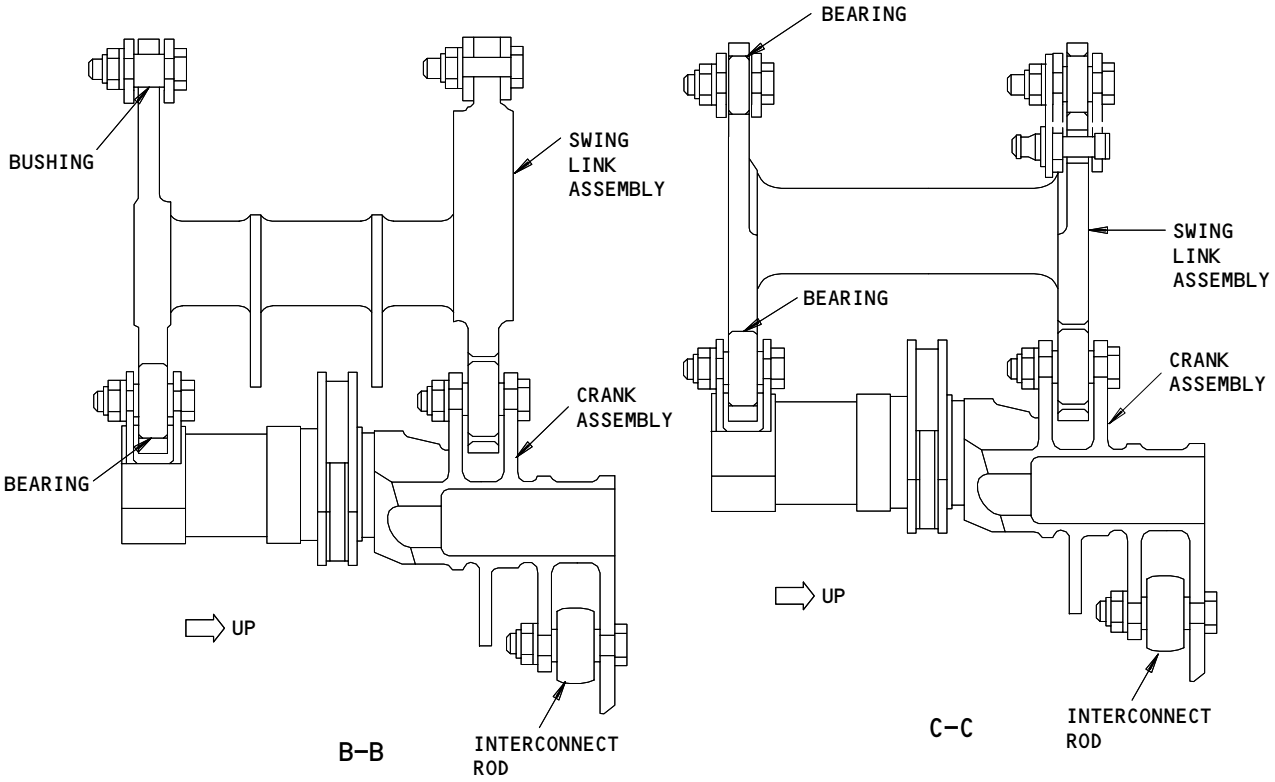
CENTER LINKAGE
(LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT)

C

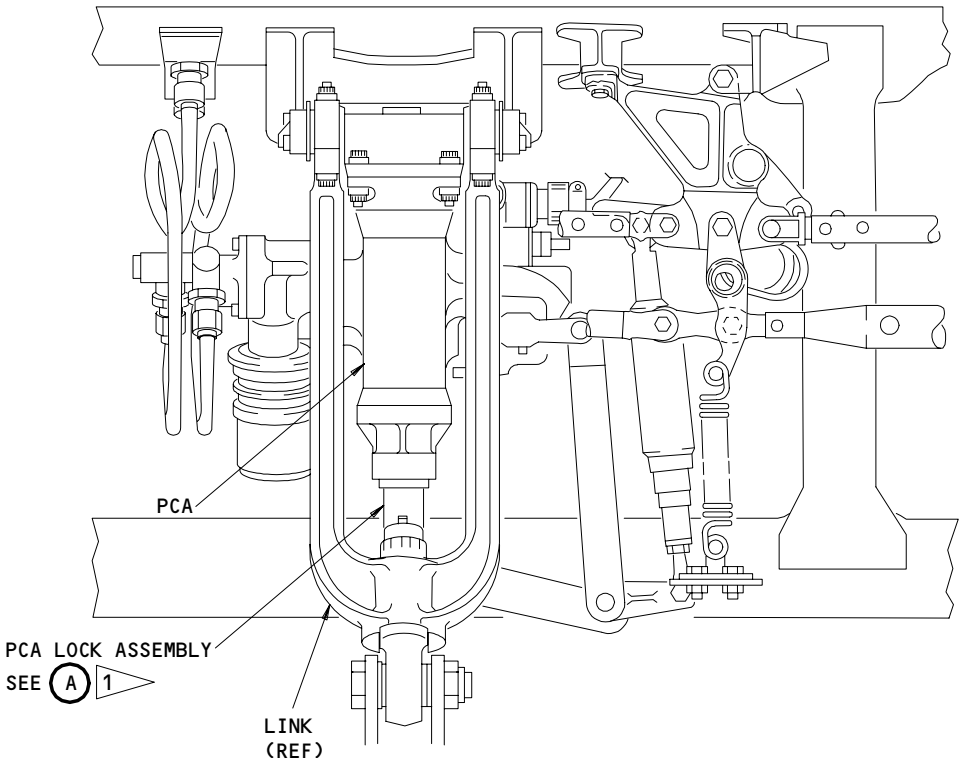
PCA Input Linkage Installation
Figure 401 (Sheet 1)

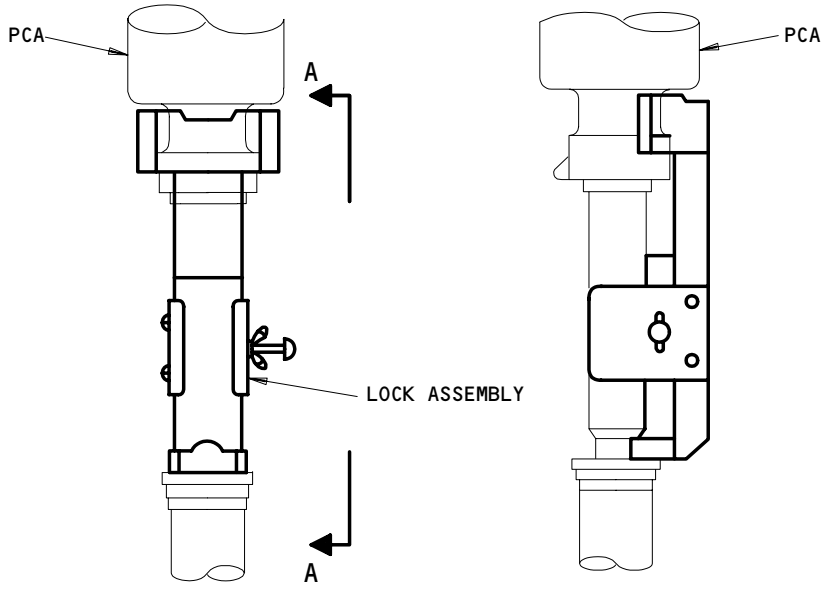


A–A



PCA Input Linkage Installation
Figure 401 (Sheet 2)





PCA LOCK ASSEMBLY
(PCA EXTENDED)
A

1 THE PCA LOCK ASSEMBLY CAN BE INSTALLED ON THE INBOARD, CENTER, OR OUTBOARD PCA

PCA Lock Assembly
Figure 402

S 494-007
(6) Attach DO-NOT-OPERATE tags on the control columns.

S 864-008
(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-009
(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOFF position.

S 864-010
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF RIGHT
(c) 11C13, STAB TRIM SHUTOFF LEFT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 014-011
(10) Open the access panel for the elevator PCAs, 335DB (left elevator PCAs) or 345DB (right elevator PCAs) (Ref 06-42-00).

S 034-012
(11) Remove the seal panel and the trailing edge beam that is aft of the access panel that you removed.

S 494-013

WARNING: INSTALL THE PCA LOCK ASSEMBLY BEFORE YOU REMOVE OR INSTALL THE PCA INPUT LINKAGE. MAKE SURE THE CONTROL COLUMNS ARE IN THE FULL AFT POSITION WITH DO-NOT-OPERATE TAGS ATTACHED TO THEM BEFORE YOU INSTALL THE PCA LOCK ASSEMBLY. INJURY TO PERSONS OR DAMAGE TO THE ELEVATOR CAN OCCUR.

(12) Manually lift the elevator trailing edge up and install the PCA lock assembly (Fig. 402).

NOTE: A force of approximately 60 pounds (266 newtons) on the elevator trailing edge is necessary to lift the elevator. The PCA lock assembly can be installed on the inboard, center, or outboard PCA.

S 044-014

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 864-015

(14) Remove electrical power (Ref 24-22-00).

E. Remove the PCA Input Linkage (Fig. 401)

NOTE: The steps that follow apply to the outboard, center, and inboard PCA linkages unless specified differently.

S 034-016

(1) On the center and outboard PCA linkages only, disconnect the centering spring from the crank assembly (View C and D).

S 034-017

(2) Disconnect the two ends of the pogo rod and remove the pogo rod.

NOTE: Do not change the adjustment of the pogo rod while it is disconnected. If you do, you will have to adjust the elevator system.

S 034-018

(3) Disconnect the interconnect rods from the crank assembly.

S 034-019

(4) On the inboard PCA linkage only, disconnect the PCA input rod from the crank assembly (View B).

S 034-020
(5) Remove the fasteners, bearings, and bushings that connect the crank assembly to the swing link assembly (View A-A, B-B, and C-C).

S 024-021
(6) Remove the crank assembly.

S 034-022
(7) Remove the fasteners, bearings, and bushings that connect the swing link assembly to the support brackets (View A-A, B-B, and C-C).

S 024-023
(8) Remove the swing link assembly.

TASK 27-31-06-424-024

3. Install the PCA Input Linkage

A. Consumable Materials
(1) D00633 Grease, Corrosion Preventive - BMS 3-33 (recommended)
(2) D00015 Grease, Corrosion Preventive - BMS 3-24 (optional)

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 27-31-00/501, Elevator Control System
(3) 27-61-00/201, Spoiler Speedbrake Control System

C. Access
(1) Location Zones
211/212 Control Cabin
335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels
335DB/345DB Elevator PCAs

D. Install the PCA Input Linkage (Fig. 401)

NOTE: Apply a layer of grease on all of the bolts, nuts, bearings and bushings before you install them.

S 424-025
(1) Install the fasteners, bearings and bushings to connect the swing link assembly to the support brackets (View A-A, B-B, and C-C).

S 424-026
(2) Install the fasteners, bearings and bushings to connect the crank assembly to the swing link assembly (View A-A, B-B, and C-C).

S 434-027
(3) Connect the interconnect rods to the crank assembly.

S 434-028
(4) On the inboard PCA linkage only, connect the PCA input rod to the crank assembly (View B).

S 434-029
(5) Connect the two ends of the pogo rod.

NOTE: If you changed the adjustment of the pogo rod while it was disconnected, do the elevator PCA adjustment (Ref 27-31-00).

S 434-030
(6) On the center and outboard PCA linkages only, connect the centering spring to the crank assembly (View C and D).

S 094-031
(7) Remove the PCA lock assembly (Fig. 402).

S 094-032
(8) Remove the rope and DO-NOT-OPERATE tags from the control columns and let the control columns go to the neutral position.

S 864-033
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(i) 11J10, PCU MON SENSOR
(j) 11J11, PCU MON MOD

S 864-034
(10) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-035
(11) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 824-036
(12) Do the adjustment for the elevator PCAs (Ref 27-31-00).

S 714-037
(13) Do the test for the elevator travel limits (Ref 27-31-00).

E. Put the Airplane Back to Its Usual Condition

S 444-038
(1) Do the activation procedure for the spoilers if it is necessary (Ref 27-61-00).

S 434-039
(2) Install the trailing edge beam and seal panel.

S 414-040
(3) Install the access panel for the elevator PCAs, 335DB (left elevator PCAs) or 345DB (right elevator PCAs) (Ref 06-42-00).

CONTROL COLUMN - REMOVAL/INSTALLATION

1. General
   A. The removal/installation procedures for the captain's and first officer's control columns are the same.

TASK 27-31-10-024-001

2. Remove the Control Column
   A. Equipment
      (1) Extraction/Insertion Tool - M15570-20
          Deutsch Company, Electronic Components Division
          700 S. Hathaway, Municipal Airport
          Banning, CA 92220
      (2) Rig Pin E/ST6 -P/N B20003-21, part of Set B20003-XX (Ref 20-10-24)
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) SWPM 20-61-16, Standard Wiring Practices Manual
   C. Access
      (1) Location Zones

113	Area Forward of NLG Wheel Well (Left)
211/212	Control Cabin

      (2) Access Panel

113AL	Forward Compartment Access Door

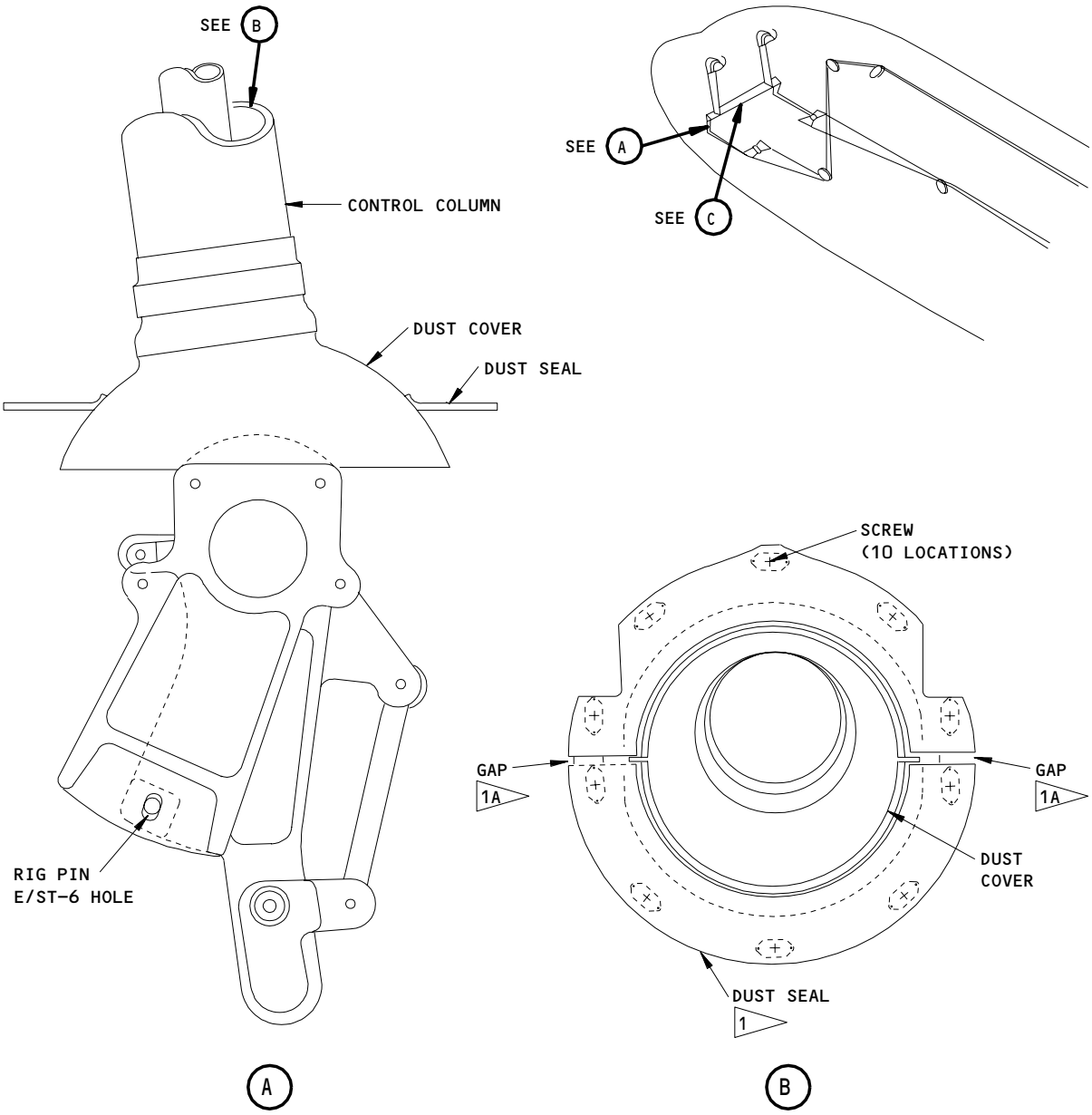
   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 214-004
      (2) Make sure that the control column is at neutral.

      S 864-005
      (3) Put the R, L, and C FLT CONTROL SHUTOFF switches on the sidewall panel, P61, to OFF.

      S 864-006
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C11, STICK SHAKER LEFT
          (b) 11E17, FLT CONT COMPUTER POWER LEFT
          (c) 11E20, FLIGHT CONT CMPTR PWR CENTER
          (d) 11E35, FLT CONT CMPTR PWR RIGHT
          (e) 11H11 or 11C05, STAB TRIM CONT L

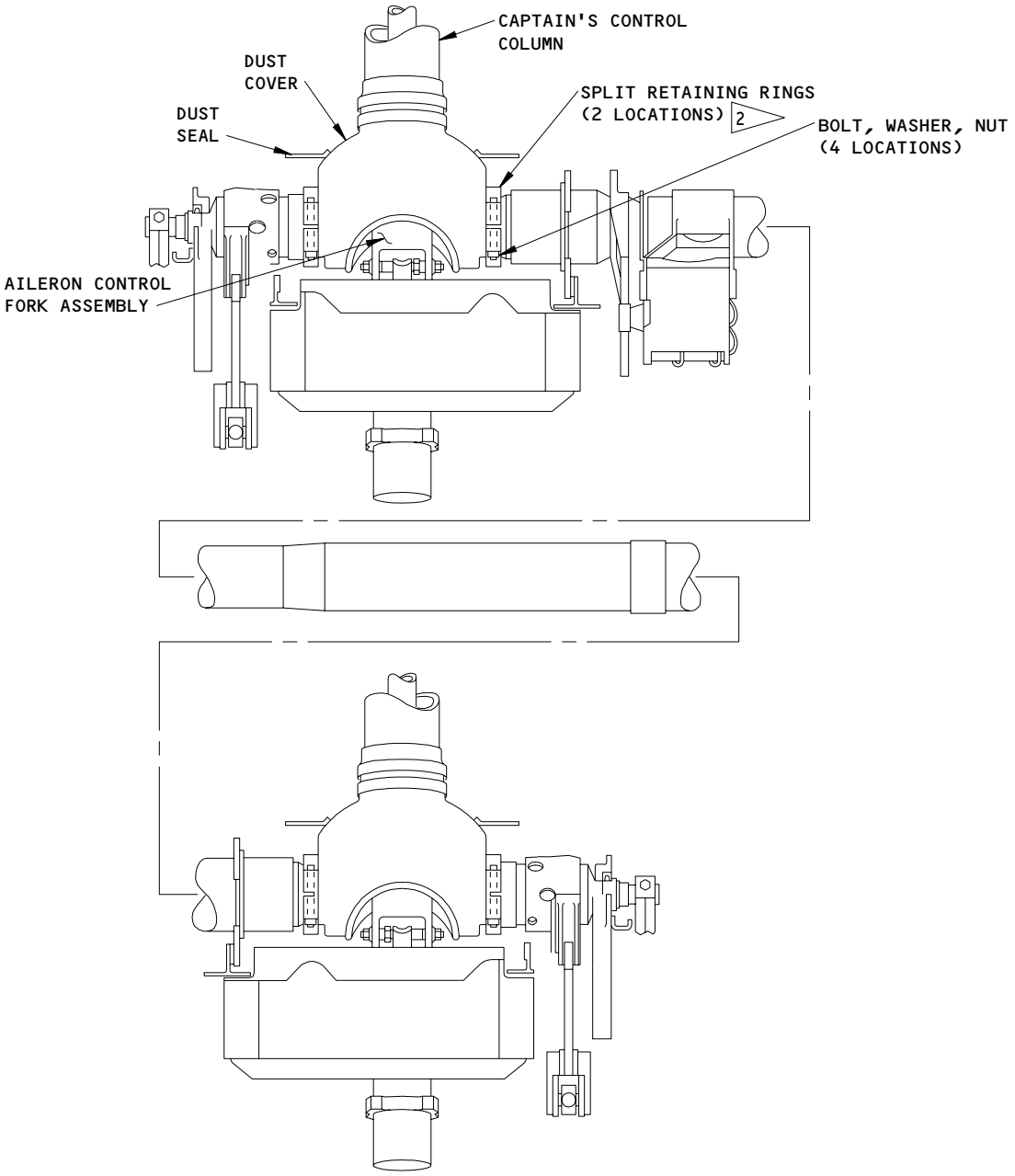


1 WITH A FEELER GAGE THAT IS 0.015 INCH (0.38 mm) THICK AND 0.50 INCH (1.27 mm) WIDE, MAKE SURE THAT THESE CONDITIONS ARE CORRECT:
- THE FEELER GAGE CAN BE PUT BETWEEN THE FELT SEAL AND THE DUST COVER ON THE COLUMN BASE.
- THE FEELER GAGE CAN MOVE FREELY AROUND THE CIRCUMFERENCE OF THE DUST SEAL.

MAKE SURE THAT LIGHT FROM BELOW THE SEAL CANNOT BE SEEN FROM ABOVE.

1A FILL THE GAP BETWEEN THE DUST SEAL HALVES FLUSH WITH SEALANT.

Control Column Installation
Figure 401 (Sheet 1)



2 MAKE SURE THAT THE GAPS BETWEEN THE RING HALVES ARE EQUAL ON BOTH SIDES OF THE CLAMP ±0.03 INCH. MAKE SURE THAT THE GAPS ARE HORIZONTAL WHEN THE COLUMNS ARE IN THE NEUTRAL POSITION.

Control Column Installation
Figure 401 (Sheet 2)

(f) 11H17, FLT CONT SHUTOFF TAIL LEFT
(g) 11H18, FLT CONT SHUTOFF TAIL CENTER
(h) 11H20, STAB TRIM CONT RIGHT
(i) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(j) 11J20 or 11J21, STICK SHAKER RIGHT

S 864-007
(5) Before you remove the captain's control column, open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) INTERPHONE circuit-breakers:
1) 11C25
2) 11G29

S 864-008
(6) Before you remove the first officer's control column, open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) INTERPHONE circuit-breakers:
1) 11C26
2) 11G30

S 014-009
(7) Open the forward compartment access door, 113AL (Ref 06-41-00).

E. Remove the Control Column (Fig. 401)

S 494-010
(1) Install rig pin E/ST6.

S 034-011
(2) Disconnect the wiring leads at the terminal block.

NOTE: Identify the wires with labels for the subsequent installation.

S 034-040
(3) Use one of these two procedures to disconnect the wire for the control column shaker:
(a) Procedure A,
disconnect the connector from the control column shaker, and disassemble the connector socket to remove the two wires.

NOTE: Follow the standards in the Boeing Standard Wiring Practices Manual (SWPM 20-61-16) to disassemble the socket.

(b) Procedure B,
1) Remove the wire ties and trace the column shaker wires to the wire splices, in the area forward of the NLG wheel well.
2) Cut the wire at the two ends of the existing wire splice, and remove the wire splice.

NOTE: You can cut the column shaker wire near the control column if it is easier. It is not necessary to remove the existing splice, but it is recommended.

S 034-012
(4) Remove the screws that hold the dust cover.

S 034-013
(5) Remove the dust cover.

S 864-014
(6) Hold the control column.

S 034-015
(7) Remove the bolts on the retaining rings that are on each side of the control column.

S 034-016
(8) Remove the retaining rings.

S 034-017
(9) Disengage the control column from the torque tube.

S 024-018
(10) Remove the control column.

TASK 27-31-10-424-019

3. Install the Control Column (Fig. 401)

A. Equipment
(1) Extraction/Insertion Tool - M15570-20
Deutsch Company, Electronic Components Division
700 S. Hathaway, Municipal Airport
Banning, CA 92220
(2) Rig Pin E/ST6 -P/N B20003-21, part of Set B20003-XX (Ref 20-10-24)

B. Consumable Materials
(1) C00259 Sealant - BMS 5-95, Type I

C. Parts
(1) Splice, General Purpose Nylon Preinsulated - NAS 1388-1 (2 Necessary for Each Control Column)

NOTE: This splice is necessary only for Procedure B of the Column Shaker Wire Connection.

D. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-11-03/401, Autopilot Disengage Switches
(4) 23-51-03/401, Control Wheel Push-To-Talk (PTT) Switch
(5) 24-22-00/201, Electrical Power - Control
(6) 27-32-05/401, Control Column Shaker
(7) 27-41-01/401, Stabilizer Trim Control Wheel Switch
(8) SWPM 20-30-12
(9) SWPM 20-61-16

E. Access
(1) Location Zones

113	Area Forward of NLG Wheel Well (Left)
211/212	Control Cabin

(2) Access Panel

113AL	Forward Compartment Access Door

F. Install the Control Column

S 434-020
(1) Engage the plate assembly for the control column in the aileron control fork assembly.

S 434-021
(2) Set the control column on the torque tube.

NOTE: On airplanes with index marks on the control column and torque tube, make sure that the index marks align before you engage the control column to the torque tube.

S 424-022
(3) Do these steps to attach the control column to the torque tube:
(a) Put the retaining rings on each side of the control column.
(b) Install the bolts on the retaining rings.
(c) Tighten the forward nuts and the aft nuts as follows:
1) Tighten each of the forward nuts 10 lb-in (1.1 Nm).
2) Tighten each of the aft nuts 10 lb-in (1.1 Nm).

3) Continue to tighten the nuts by 10 lb-in (1.1 Nm) increments as specified above until the torque on each nut is 50-70 lb-in (5.7-7.9 Nm) and the retaining ring gaps are correct.

S 434-023

(4) Do these steps to install the dust cover:
   (a) Adjust the dust cover to fit tightly into the dust seals after the column is installed.
   (b) Make sure the seal is installed correctly (Fig. 401).
   (c) Clean the gap between the dust seal halves.
   (d) Fill the gap between the dust seal halves flush with sealant.

NOTE: Do not let the sealant touch the dust cover.

S 434-024

(5) Connect the wiring leads to the terminal block.

S 434-041

(6) If you used Procedure A to disconnect the wires for the control column shaker, do these steps to connect the wires:
   (a) Route the column shaker wires from the bottom of the control column tube, through the grommet, to the column shaker connector.
   (b) Engage the two wires to the connector socket, and assemble the socket for the control column shaker.

NOTE: Follow the standards in the Standard Boeing Wiring Practices Manual (SWPM 20-61-16) to assemble the socket.

   (c) Connect the socket to the control column shaker.

S 434-042

(7) If you used Procedure B to disconnect the wires for the control column shaker, do these steps to connect the wires:
   (a) Install two new splices to connect the column shaker wires, at the location where each wire was cut.

NOTE: Follow the standards in the Boeing Standard Wiring Practices Manual (SWPM 20-30-12) to install the splices.

   (b) Tie the column shaker wires to the wire bundle with wire ties if it is necessary.

NOTE: If removed, install a new wire tie at each wire tie location along the wire bundle.

S 094-025
(8) Remove rig pin E/ST6.

G. Control Column Test

S 864-026
(1) Move the control column forward and aft and then rotate the control wheel through full travel.
(a) Make sure the control column and control wheel move freely.

S 864-027
(2) Supply electrical power (Ref 24-22-00).

S 864-028
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11C11, STICK SHAKER LEFT
(b) 11E17, FLT CONT COMPUTER POWER LEFT
(c) 11E20, FLIGHT CONT CMPTR PWR CENTER
(d) 11E35, FLT CONT CMPTR PWR RIGHT
(e) 11H11 or 11C05, STAB TRIM CONT L
(f) 11H17, FLT CONT SHUTOFF TAIL LEFT
(g) 11H18, FLT CONT SHUTOFF TAIL CENTER
(h) 11H20, STAB TRIM CONT RIGHT
(i) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(j) 11H20 or 11J21, STICK SHAKER RIGHT

S 864-029
(4) To test the captain's control column,
remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) INTERPHONE circuit-breakers:
1) 11C25
2) 11G29

S 864-030
(5) To test the first officer's control column,
remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) INTERPHONE circuit-breakers:
1) 11C26

2) 11G30

S 864-031
(6) Put the L, R, and C FLT CONTROL SHUTOFF switches on the sidewall panel, P61, to ON.

S 714-032
(7) Make sure that the stabilizer trim control wheel switches operate correctly (Ref 27-41-01/401).

S 714-033
(8) Make sure that the autopilot button operates correctly (Ref 22-11-03/401).

S 714-034
(9) Make sure that the control wheel Push-To-Talk (PTT) switch operates correctly (Ref 23-51-03/401).

S 714-043
(10) Do a test on the control column shaker, and make sure it operates correctly (Ref 27-32-05/401).

H. Put the Airplane Back to Its Usual Condition

S 864-035
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

S 214-036
(2) Make sure that rig pin E/ST6 is removed.

S 414-038
(3) Close the forward compartment access door, 113AL (Ref 06-41-00).

CONTROL COLUMN - INSPECTION/CHECK

1. General
   A. This section contains a check for backlash in the control columns.

TASK 27-31-10-716-015

2. Control Column Backlash Check
   A. Equipment
      (1) Rig Pin E/ST6 - P/N B20003-21, part of Set B20003-XX (Ref 20-10-24)
      (2) Wood Block
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zone
          211/212 Control Cabin

   D. Prepare for the Control Column Backlash Check

      S 866-001
      (1) Supply electrical power (Ref 24-22-00).

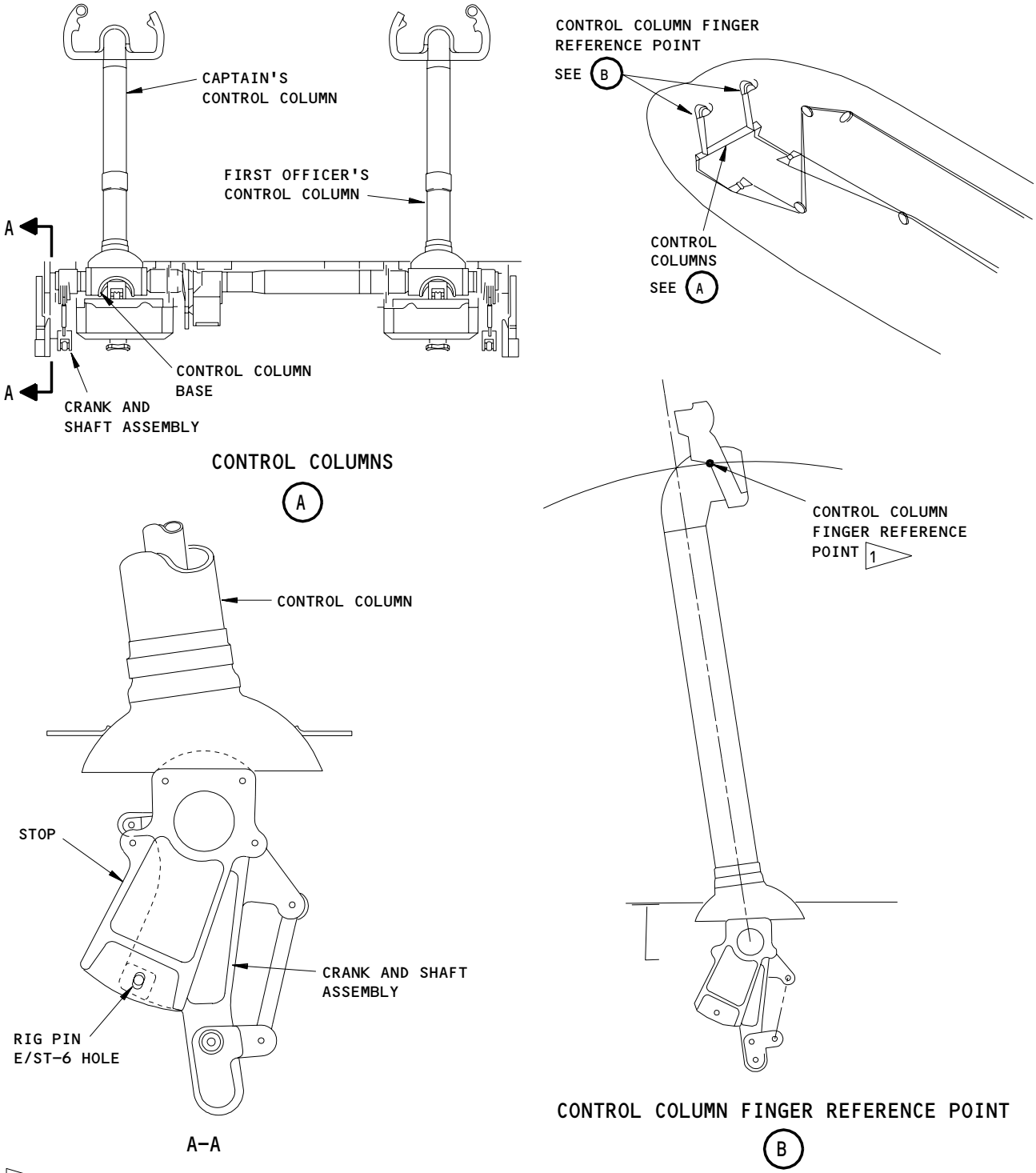
      S 866-002
      (2) Make sure that the control column is at neutral.

      S 866-003
      (3) Remove the pressure from the left, right, and center hydraulic systems (Ref 29-11-00).

      S 866-004
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C12, STAB TRIM SHUTOFF LEFT
          (b) 11C13, STAB TRIM SHUTOFF RIGHT
          (c) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (d) 11H18, FLT CONT SHUTOFF TAIL CENTER
          (e) 11H28, FLT CONT SHUTOFF TAIL RIGHT

      S 016-005
      (5) Open the forward compartment access door, 113AL (Ref 06-41-00).
   E. Control Column Backlash Check (Fig. 601)

      S 496-006
      (1) Install rig pin E/ST6.



Control Column Inspection/Check
Figure 601

S 496-007
(2) Insert a wood block between the crank and shaft assembly and the stop.

NOTE: The wood block will hold the control column crank and the shaft assembly in one position.

S 866-008
(3) Push forward on the control column at the finger reference point with approximately a one pound force.

S 216-009
(4) Make sure that the control column base and the crank and shaft assembly do not move in relation to each other.

F. Put the Airplane Back to Its Usual Condition

S 096-010
(1) Remove the wood block from between the crank and shaft assembly and the stop.

S 096-011
(2) Remove rig pin E/ST6.

S 866-012
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT
(c) 11H17, FLT CONT SHUTOFF TAIL LEFT
(d) 11H18, FLT CONT SHUTOFF TAIL CENTER
(e) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 866-013
(4) Remove electrical power (Ref 24-22-00).

S 416-014
(5) Close the forward compartment access door, 113AL (Ref 06-41-00).

CONTROL COLUMN TORQUE TUBE BEARING - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the torque tube bearings from the control column. The second task installs the torque tube bearings on the control column. The removal and installation procedure is the same for the Captain's and the First Officer's bearings.

TASK 27-31-11-004-001

2. Remove the Control Column Torque Tube Bearings
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-31-10/401, Control Column - Removal/Installation

   B. Access
      (1) Location Zones
          113/114 Area Forward of NLG Wheel Well
          211/212 Control Cabin

      (2) Access Panels
          113AL Forward Compartment Access Door

   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003
      (2) Make sure the control columns are at neutral.

      S 864-004
      (3) Put the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 864-006
      (4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-007
      (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags.
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT

(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11CO5 OR 11H11, STAB TRIM CONTROL L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H2O, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 014-008
(6) Open the forward compartment access door, 113AL (AMM 06-41-00/201).

D. Remove the Captain's and the First Officer's Torque Tube Bearings

S 014-009
(1) Disconnect the applicable control column from the torque tube (AMM 27-31-10/401).

NOTE: It is not necessary to completely remove the control columns. It is sufficient to lift the control column above the floor after you disengage it from the torque tube.

S 014-010
(2) Remove the crank for the stabilizer cutoff switch assembly.

S 014-011
(3) Disconnect the elevator control rod from the crank and shaft assembly.

S 014-012
(4) Remove the bracket, stop, and the crank and shaft assembly from the torque tube.

S 034-013
(5) Remove the crank and shaft assembly from the stop.

S 034-014
(6) On the Captain's side, remove the bracket from the stop.

S 024-015
(7) Remove the bearing from the stop.

TASK 27-31-11-404-016

3. Install the Control Coloumn Torque Tube Bearings

A. Consumable Materials
(1) DO0633 Grease, Corrosion Preventive - BMS 3-33 (Recommended)
(2) DO0013 Grease - MIL-PRF-23827 (Alternative)

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels

(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-31-10/401, Control Column - Removal/Installation
(4) AMM 27-41-01/401, Stabilizer Trim Control Wheel Switch

C. Access
(1) Location Zones
113/114 Area Forward of NLG Wheel Well
211/212 Control Cabin

(2) Access Panels
113AL Forward Compartment Access Door

D. Install the Captain's and the First Officer's Torque Tube Bearings

S 644-017
(1) Apply a layer of grease to the bearing.

S 424-018
(2) Install the bearing in the stop.

S 434-019
(3) For the Captain's side, attach the stop to the bracket.

S 434-020
(4) Install the crank and shaft assembly in the bearing.

NOTE: Be careful that the weight of the crank and shaft assembly does not cause damage to the bearing.

S 434-021
(5) Install the nut on the crank and shaft assembly.
(a) If you use the self-locking nut, do these steps:
1) Turn the self-locking nut to get the torque measure and write down this quantity.

NOTE: The torque measure must be between 50 and 150 lb-in (5.7-17.0 newton meters).

2) Add 200-300 lb-in (22.6-33.9 newton meters) to the torque measure to get the required torque value.

NOTE: The required torque value will be between 250 and 450 lb-in (28.3 and 50.9 newton meters).

3) Torque the self-locking nut to the required torque value.

(b) If you use the lock washer and nut, do these steps:
1) Attach the lock washer and the nut.
2) Torque the nut to 200-300 lb-in (22.6-33.9 newton meters).
3) Bend one tang of the washer to put it in one slot of the nut.

S 414-022
(6) Install the bracket, stop, and the crank and shaft assembly to the torque tube.

S 414-023
(7) Install the applicable control column to the torque tube (AMM 27-31-10/401).

S 864-024
(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11C05 or 11H11, STAB TRIM CONTROL L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-025
(9) Put the L, R, and C FLT CONTROL SHUTOFF switches on the sidewall panel, P61, to ON.

S 714-026
(10) Make sure the stabilizer trim control wheel switches operate correctly (AMM 27-41-01/401).

E. Put the Airplane Back to Its Usual Condition

S 864-027
(1) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 414-028
(2) Close the forward compartment access door, 113AL (AMM 06-41-00/201).

ELEVATOR FORWARD QUADRANT/TENSION REGULATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the forward quadrant/tension regulator for the elevator control system.

TASK 27-31-12-024-001

2. Remove the Quadrant/Tension Regulator
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST6 - P/N B20003-21
          (b) E/ST7 - P/N B20003-21
      (2) Cable Tension Relief Holder, Elevator Tension Regulator - B27063-1
      (3) Relief Holder Tool B27063-1 should be used with Regulator P/N S251N261-3.
      (4) Relief Holder Tool B27063-10 should be used with Regulator P/N S251N261-4.
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 06-42-00/201, Empennage Access Doors and Panels
      (3) 20-10-24/201, Rig Pins
   C. Access
      (1) Location Zones

113/114	Area Forward of NLG Wheel Well
211/212	Control Cabin
313/314	Stabilizer Center Section Compartment

      (2) Access Panels

113AL	Forward Equipment Bay
313AL	Elevator Aft Quadrants

   D. Prepare for the Removal

      S 864-002
      (1) Put the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 864-003
      (2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)

(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 214-005
(4) Make sure the control columns are in the neutral position.

S 014-006
(5) Open the access door for the forward equipment bay, 113AL (Ref 06-41-00).

S 014-007

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(6) Open the access door for the elevator aft quadrants, 313AL (Ref 06-42-00).

S 494-008
(7) Install rig pin E/ST6 in the base of the control column (Fig. 402).

S 494-009
(8) Install rig pin E/ST7 in the aft quadrant indexer (Fig. 401).

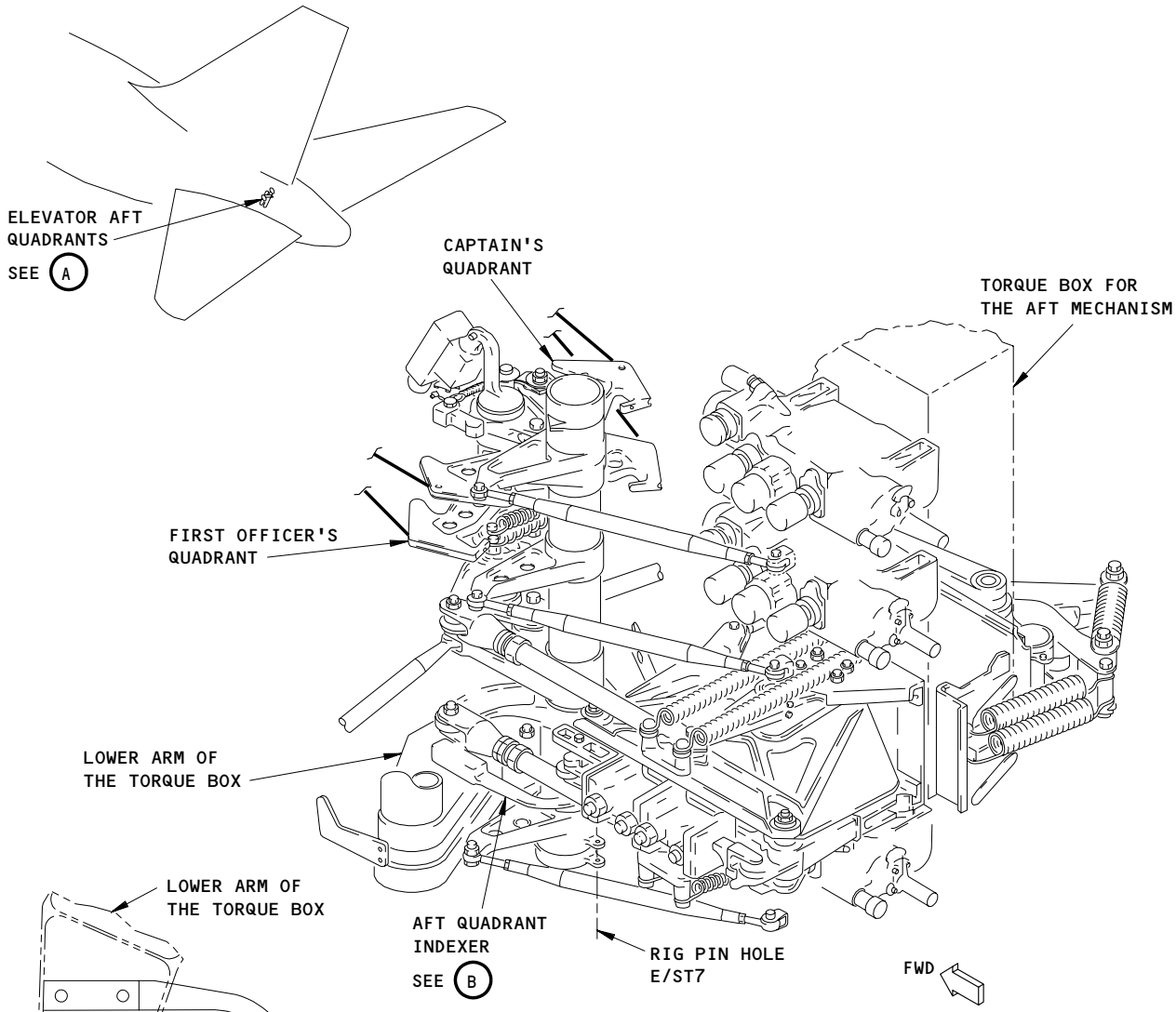
E. Remove the Quadrant/Tension Regulator (Fig. 402)

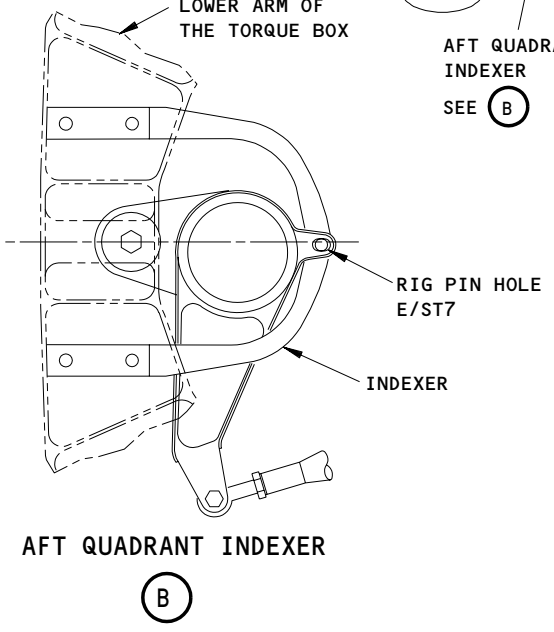
NOTE: A tension regulator is installed on the captain's forward quadrant only.

S 494-037
(1) QUADRANTS WITH A TENSION REGULATOR;
install the cable tension relief holder tool in the forward end of the tension regulator.

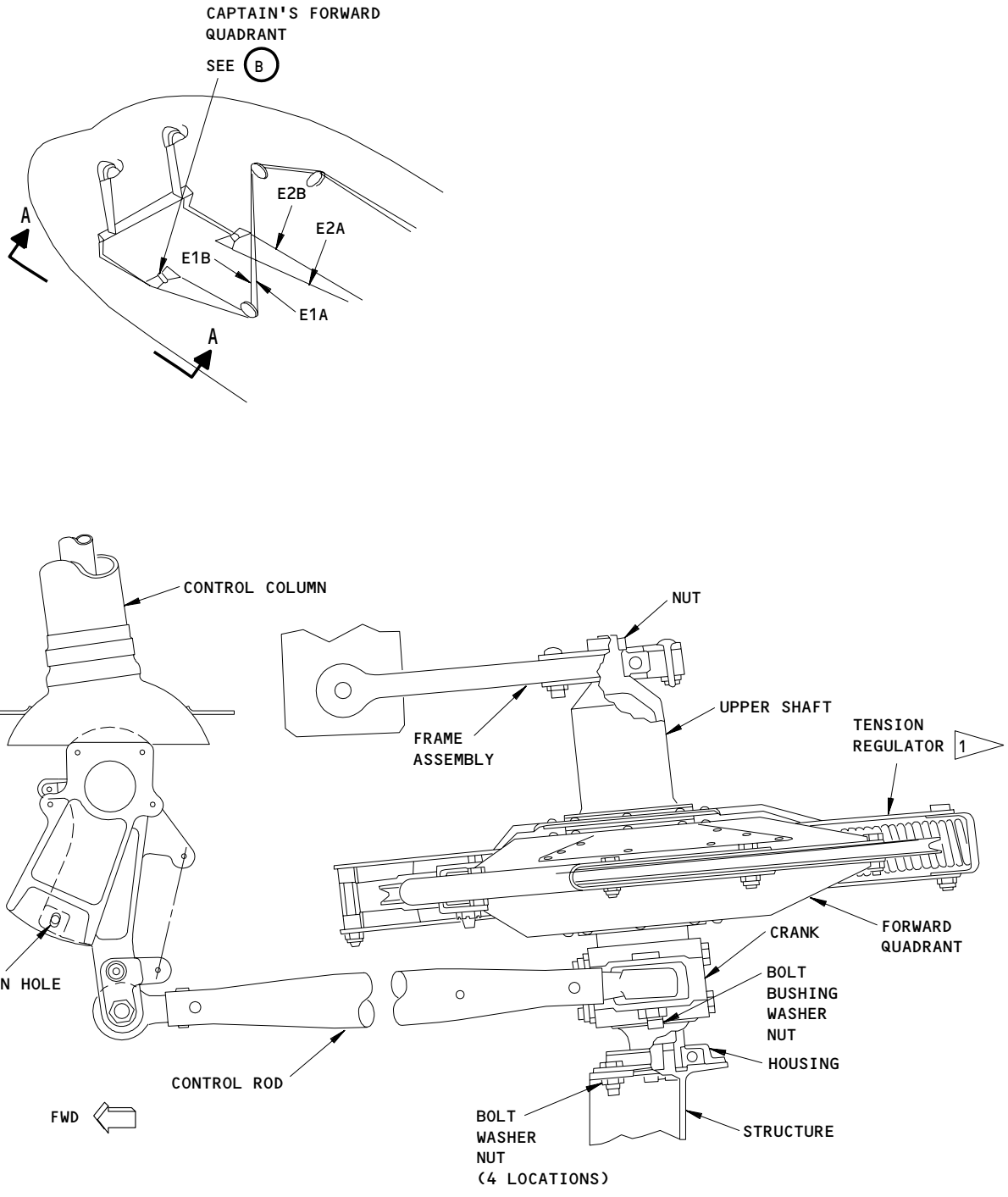
NOTE: The B27063-1 tool should be used with P/N S251N261-3 Regulator and the B27063-10 should be used with P/N S251N261-4 Regulator.

NOTE: When you remove the tension in the body cables equally, the tension regulator springs will extend and push the crosshead forward. The cable tension relief holder tool will prevent the release of the crosshead when you loosen the body cables.





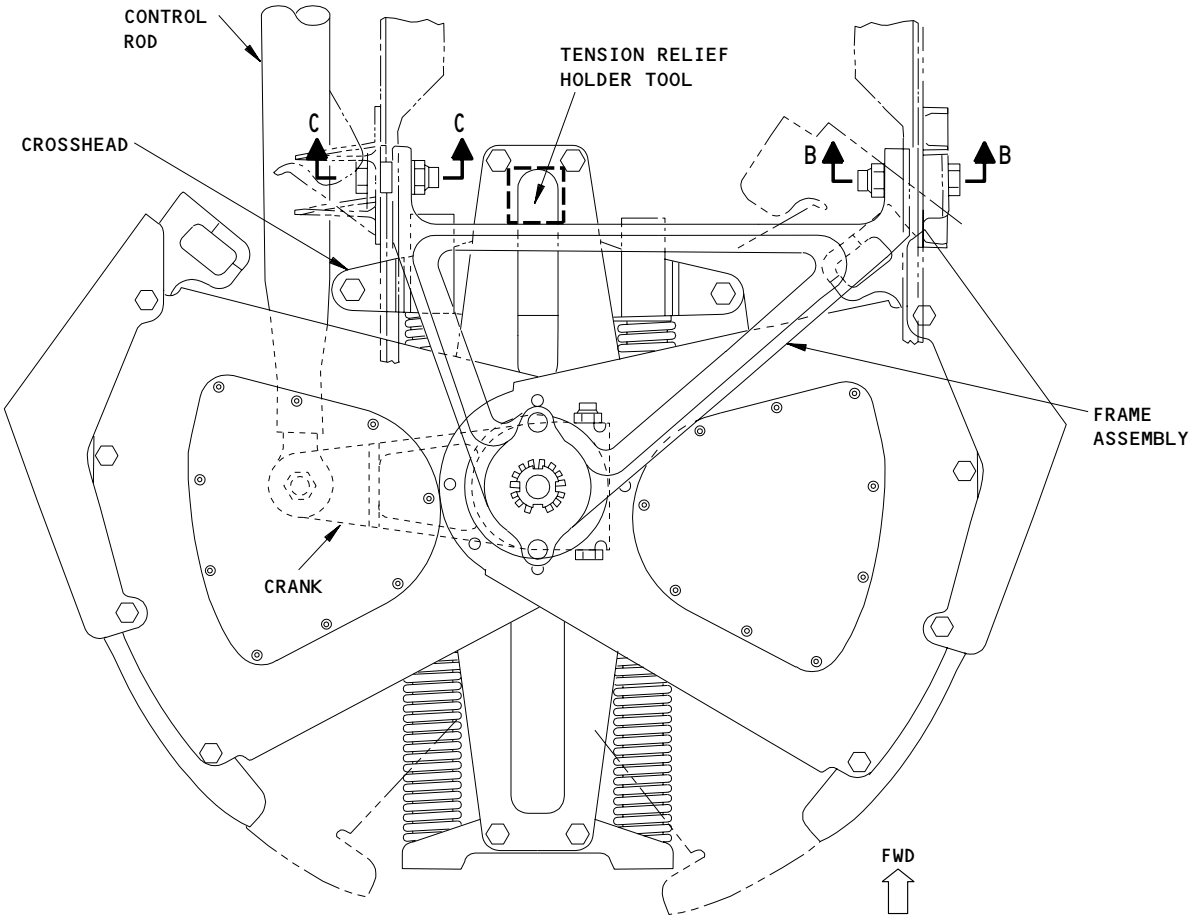
Rig Pin E/ST7 Installation
Figure 401



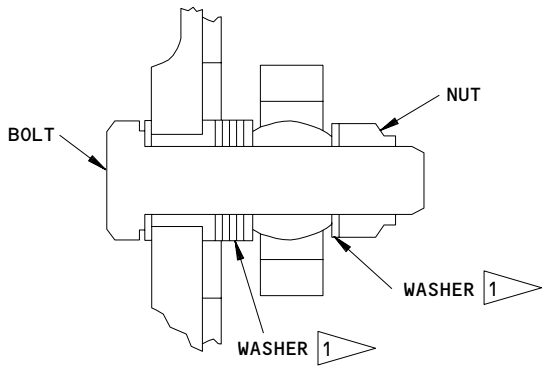
A-A

1 A TENSION REGULATOR IS NOT INSTALLED IN THE FIRST OFFICER'S FORWARD QUADRANT

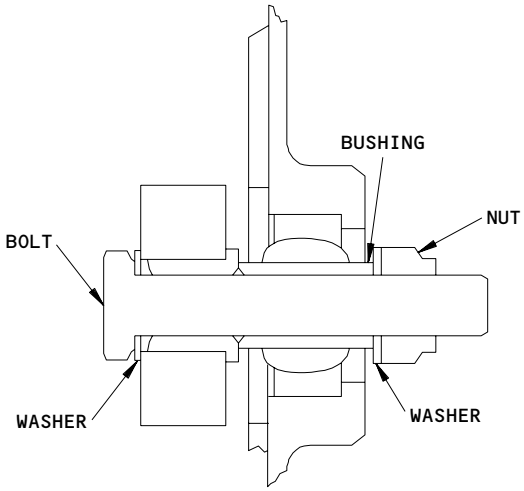
Forward Quadrant/Tension Regulator Installation
Figure 402 (Sheet 1)



FORWARD QUADRANT (EXAMPLE)



C–C



B–B

1 THE SHIMS THAT YOU REMOVED MUST BE INSTALLED IN THEIR INITIAL POSITIONS WHEN YOU INSTALL THE NEW QUADRANT/ TENSION REGULATOR

Forward Quadrant/Tension Regulator Installation
Figure 402 (Sheet 2)

S 034-012
(2) Loosen the body cables at the aft turnbuckles equally by small increments and release the tension equally in the cables.

NOTE: Keep the disconnected cables tight to keep them on the pulleys correctly and properly aligned. If you let the cables go loose, then you must do a full inspection of the cables.

S 034-013
(3) Disconnect the cables from the quadrant/tension regulator (Fig. 402).

S 494-014
(4) Attach tags to the cables to identify them for subsequent installation.

S 034-015
(5) Disconnect the control rod from the quadrant/regulator crank (View A-A).

NOTE: You can lower the crank to disconnect the control rod , if it is necessary. If you must lower the crank, loosen the bolts that hold the crank to the splined shaft on the quadrant/tension regulator (Detail B).

S 034-016
(6) Remove the two bolts, nuts, and washers that hold the frame assembly to the airplane structure.

NOTE: The washers on the outboard bolt are installed as shims. During subsequent installation, you must put the washers in the same positions that you removed them from (Fig. 402).

S 034-017
(7) Remove the four bolts that hold the bottom of the housing for the quadrant/tension regulator to the airplane structure.

S 034-018
(8) Remove the quadrant/tension regulator and the frame assembly together.

S 034-019

(9) Remove the nut and washer that holds the frame assembly to the upper shaft of the quadrant/tension regulator.

NOTE: Be careful when you remove and install the nut on the upper shaft; the shaft is made of alumninum.

The frame assembly that you removed will be installed with a new quadrant/tension regulator in the location that it was removed from.

S 024-020

(10) Remove the quadrant/tension regulator.

TASK 27-31-12-424-021

3. Install the Quadrant/Tension Regulator

A. References

(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 06-42-00/201, Empennage Access Doors and Panels
(3) 27-31-00/501, Elevator Control System.

B. Access

(1) Location Zones

113/114	Area Forward of NLG Wheel Well
211/212	Control Cabin
313/314	Stabilizer Center Section Compartment

(2) Access Panels

113AL	Forward Equipment Bay
313AL	Elevator Aft Quadrants

C. Install the Quadrant/Tension Regulator (Fig. 402)

NOTE: A tension regulator is installed on the captain's forward quadrant only.

S 424-022

(1) Do the steps that follow to attach the frame assembly to the new quadrant/tension regulator:
(a) Carefully install the nut and washer in the upper shaft to attach the frame assembly to the new quadrant/tension regulator.

S 434-023

(2) Install the bolts, nuts, and washers to attach the frame assembly to the airplane structure (Fig. 402).

S 434-024
(3) Install the four bolts that hold the bottom of the housing for the quadrant/tension regulator to the airplane structure.

S 434-025
(4) Connect these body cables to the quadrant/tension regulator.
(a) Cables E1A and E1B on the captain's side.
(b) Cables E2A and E2B on the first officer's side.

S 094-026
(5) Remove the identification tags from the cables.

S 434-027
(6) Tighten the turnbuckles equally by small increments to the nominal cable load.

S 094-029
(7) QUADRANTS WITH TENSION REGULATORS;
remove the cable tension relief holder tool from the forward end of the quadrant/tension regulator.

NOTE: On new assemblies from vendors, there is a wood spacer installed, not a cable tension relief holder tool. Remove the wood spacer.

S 824-030
(8) Lightly hit the cables to remove friction from the cable system.

S 824-031
(9) Do the adjustment for the elevator body cables (Ref 27-31-00).

S 714-032
(10) Do the operational test for the elevator control system (Ref 27-31-00).

D. Put the Airplane Back to Its Usual Condition

S 864-033
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 214-034
(2) Make sure the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 414-035
(3) Close the access door for the forward equipment bay, 113AL (Ref 06-41-00).

S 414-036
(4) Close the access door for the elevator aft quadrants, 313AL (Ref 06-42-00).

ELEVATOR PRESSURE REDUCER/BYPASS VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the pressure reducer valves and the bypass valve for the pressure reducer valves that are in the elevator control system.
   B. The steps to remove and install the left, right, and center pressure reducer valves are equivalent.
   C. The pressure reducer valves and bypass valve are on the forward side of the APU firewall. The bypass valve is connected by hydraulic lines to the right and left pressure reducer valves.

TASK 27-31-13-024-031

2. Remove the Pressure Reducer Valve and the Bypass Valve
   A. General
      (1) This task contains two procedures, one to remove the pressure reducer valve, and one to remove the bypass valve. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

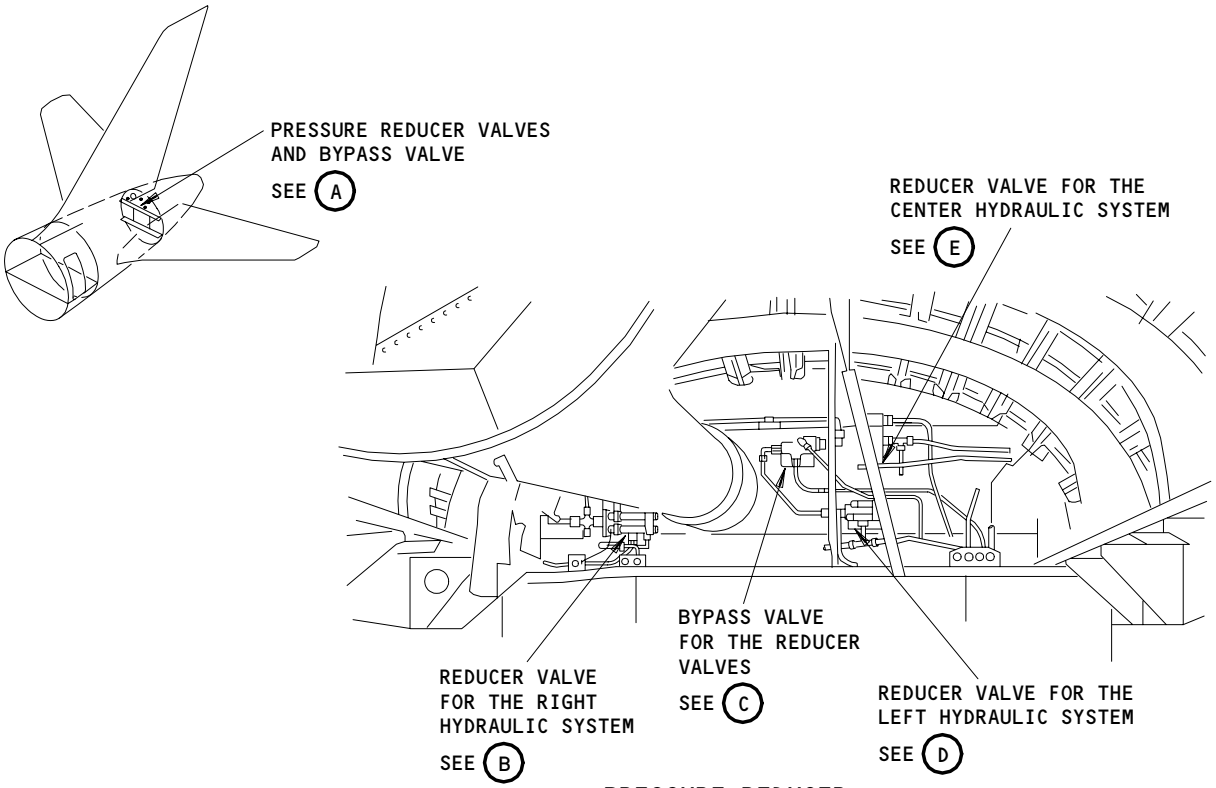
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Pressure Reducer Valves and Bypass Valve

   D. Prepare for the Removal

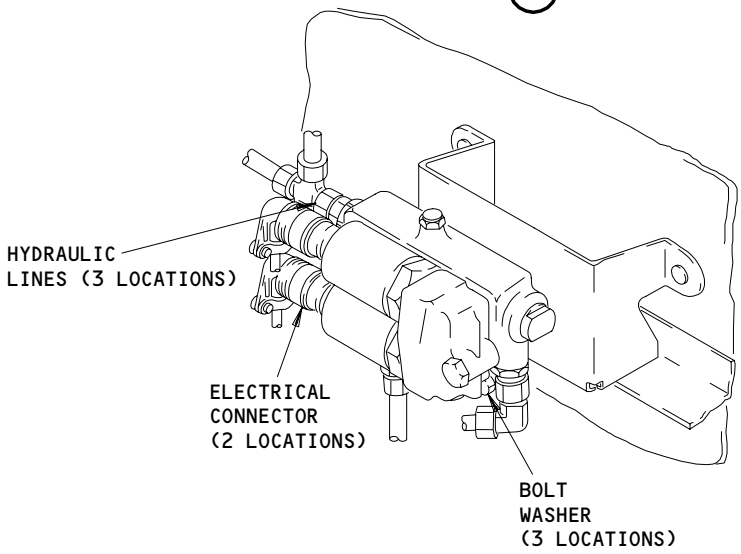
      S 864-001
      (1) Supply electrical power (Ref 24-22-00/201).

      S 864-002
      (2) Do the step that follows to remove the left or right pressure reducer valve or the bypass valve:
          (a) Remove the pressure from the right and left hydraulic systems and reservoirs (Ref 29-11-00/201).



PRESSURE REDUCER
VALVE AND BYPASS VALVE

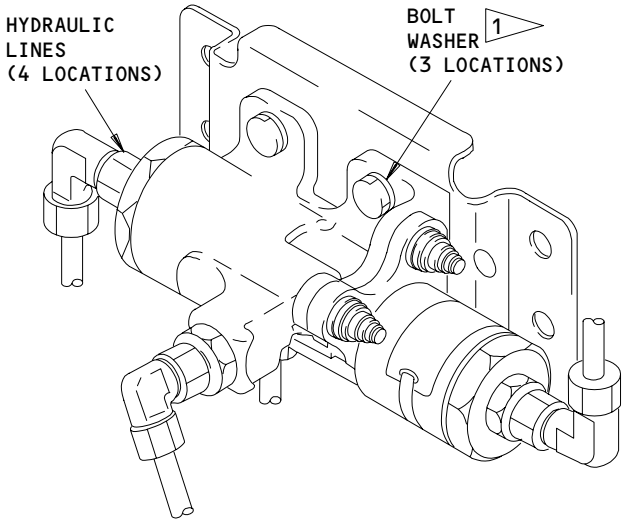
A



REDUCER VALVE FOR THE RIGHT HYDRAULIC SYSTEM

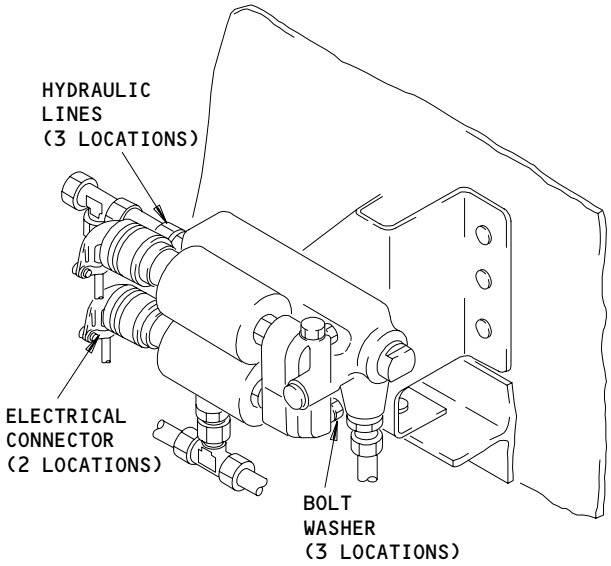
B

Pressure Reducer Valves and Bypass Valve
Figure 401 (Sheet 1)



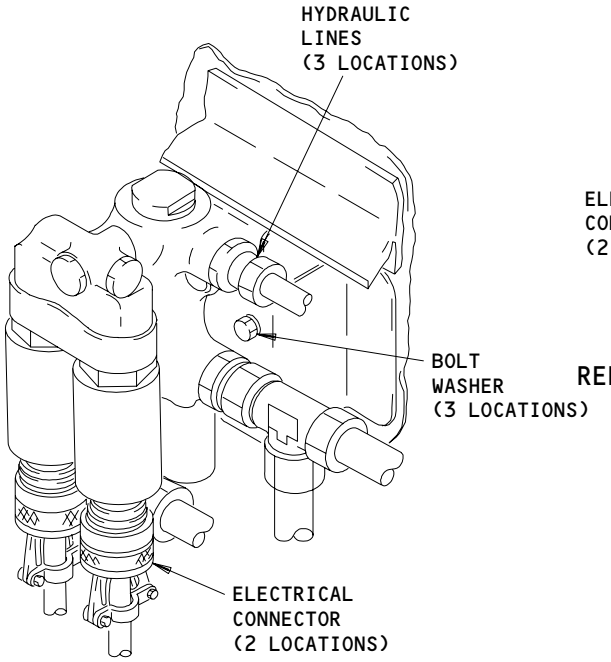
BYPASS VALVE FOR THE REDUCER VALVES

C



REDUCER VALVE FOR THE LEFT HYDRAULIC SYSTEM

D

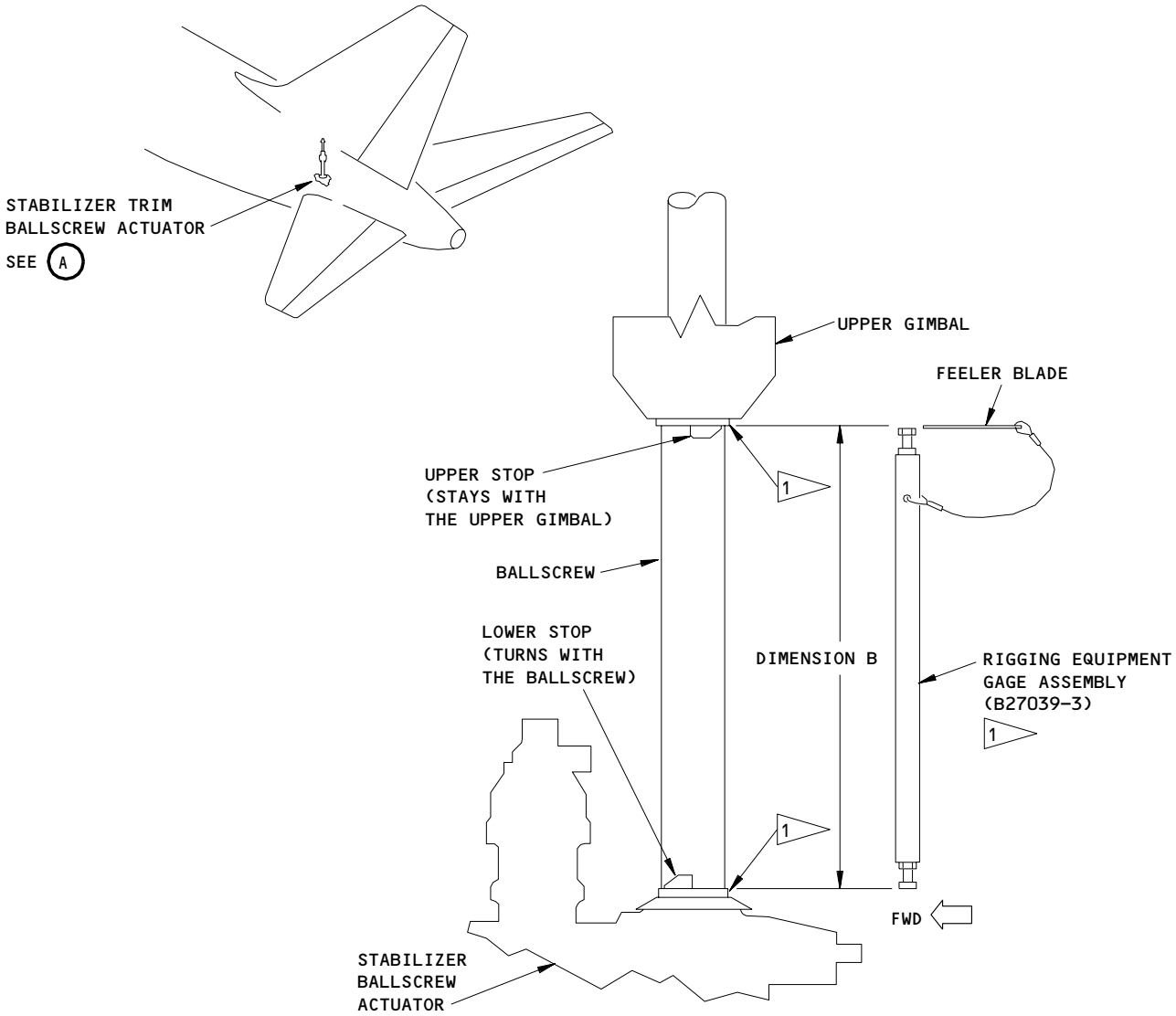


REDUCER VALVE FOR THE CENTER HYDRAULIC SYSTEM

E

1 INSTALL THE WASHER WITH THE COUNTERSINK SIDE NEXT TO THE BOLT HEAD

Pressure Reducer Valves and Bypass Valve
Figure 401 (Sheet 2)



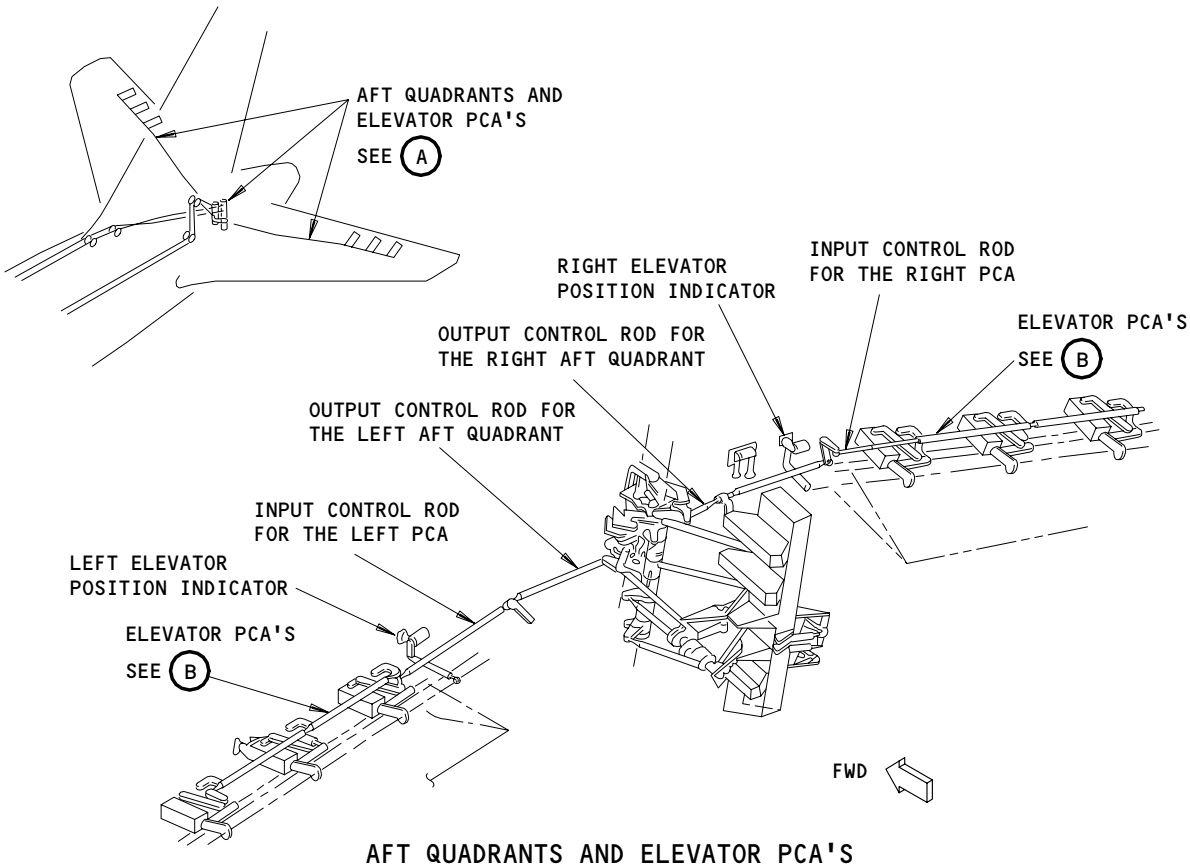
STABILIZER TRIM BALLSCREW ACTUATOR

A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

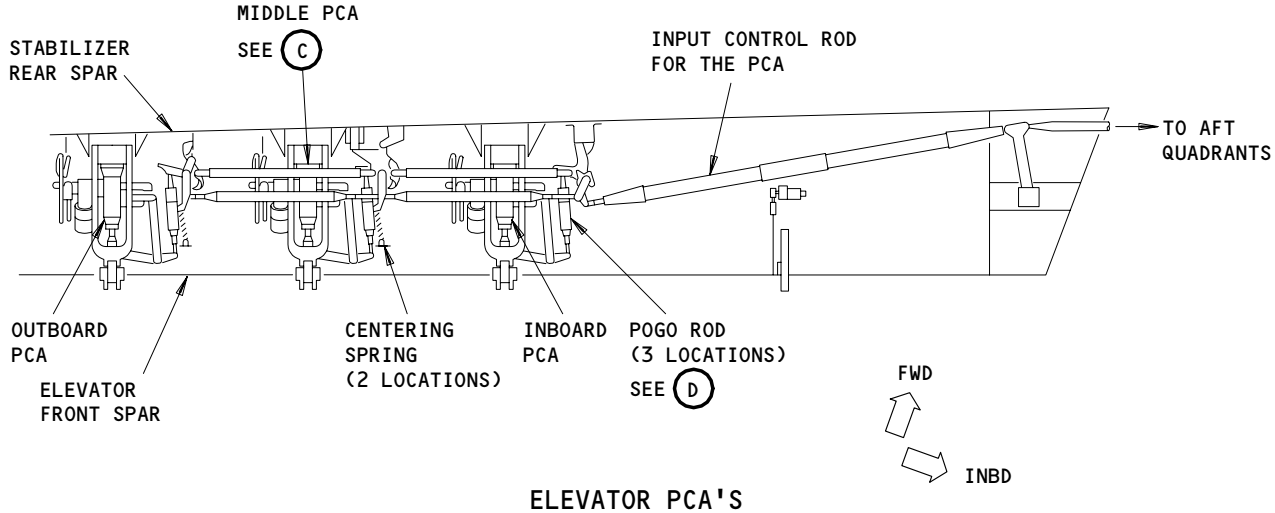
1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 402



AFT QUADRANTS AND ELEVATOR PCA'S

A

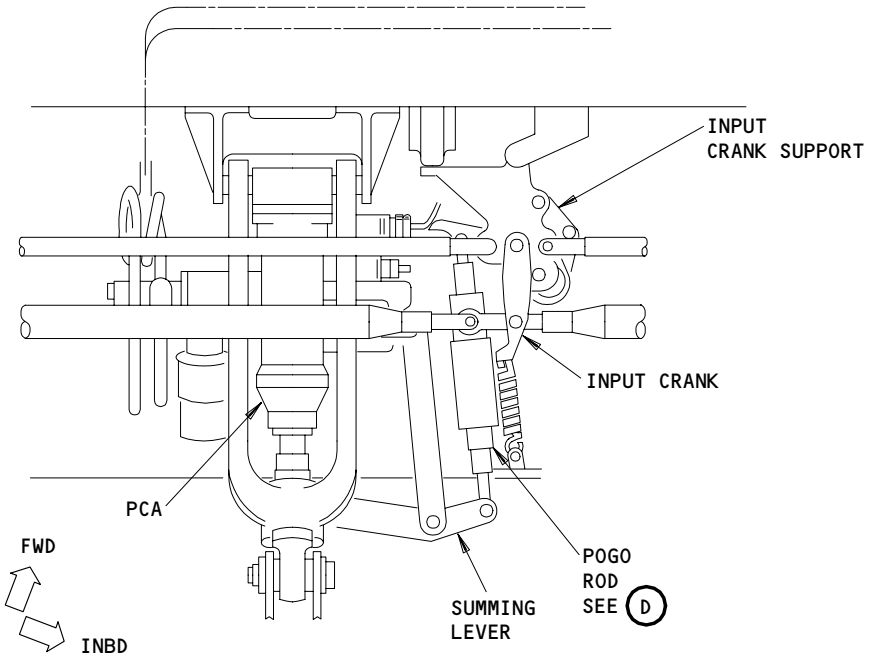


ELEVATOR PCA'S
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

B

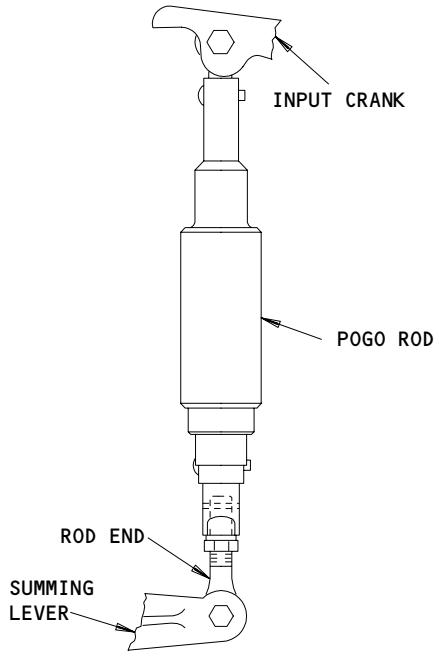
Elevator PCA Adjustment
Figure 403 (Sheet 1)

964287



MIDDLE PCA
(LEFT SIDE SHOWN, RIGHT SIDE OPPOSITE)

C



POGO ROD

D

Elevator PCA Adjustment
Figure 403 (Sheet 2)

S 864-003
(3) Do the step that follows to remove the center pressure reducer valve:
(a) Remove the pressure from the center hydraulic system and reservoir (Ref 29-11-00/201).

S 864-004
(4) Put the R, L, and C FLT CONTROL SHUTOFF valve switches on the right side panel, P61, to the OFF position.

S 864-005
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 014-006

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(6) Open the access door for the pressure reducer valves and the bypass valve, 311AL (Ref 06-42-00/201).

S 864-007
(7) Remove electrical power if it is not necessary (Ref 24-22-00/201).

E. Remove the Pressure Reducer Valve (Fig. 401)

S 034-008
(1) Disconnect the electrical connectors (2 locations) from the pressure reducer valve.

S 034-009
(2) Disconnect the hydraulic lines (3 locations) from the pressure reducer valve.

NOTE: Use a bucket to catch the fluid from the hydraulic lines and the pressure reducer.

S 034-010
(3) Put plugs in the lines and caps on the ports.

S 034-011
(4) Remove the bolts and washers (3 locations) that attach the pressure reducer valve to the support bracket.

S 024-012
(5) Remove the pressure reducer valve.

F. Remove the Bypass Valve (Fig. 401)

S 034-013
(1) Disconnect the hydraulic lines from the bypass valve (4 locations).

NOTE: Use a bucket to catch the fluid from the hydraulic lines and the bypass valve.

S 034-014
(2) Put plugs in the lines and caps on the ports.

S 034-015
(3) Remove the bolts and washers (3 locations) that attach the bypass valve to the support bracket.

S 024-016
(4) Remove the bypass valve.

TASK 27-31-13-424-017

3. Install the Pressure Reducer Valve and the Bypass Valve

A. General

(1) This task contains two procedures, one to install the pressure reducer valve and one to install the bypass valve. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the components. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) Pogo Compression/Extension Tool - B27032-9
(2 Necessary)

(2) Scale - B27039-13

NOTE: This will be used to do linear measurements for the stabilizer ballscrew.

C. Consumable Materials
(1) D00153 Hydraulic Fluid - BMS 3-11

D. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 12-12-01/301, Hydraulic Systems
(3) 24-22-00/201, Electrical Power - Control
(4) 27-31-00/501, Elevator Control System
(5) 31-41-00/201, EICAS Indicating and Crew Alerting System

E. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Pressure Reducer Valves and Bypass Valve

F. Install the Pressure Reducer Valve (Fig. 401)

S 424-018
(1) Install the bolts and washers (3 locations) that attach the pressure reducer valve to the support bracket.

S 434-019
(2) Remove the plugs from the lines and the caps from the ports (3 locations).

S 434-020
(3) Connect the hydraulic lines to the pressure reducer valve.

S 434-021
(4) Connect the electrical connectors to the pressure reducer valve (2 locations).

S 714-022
(5) Do a test on the pressure reducer installation with these steps:
(a) Make sure that the L, R, and C FLT CONTROL SHUTOFF valve switches on the P61 panel are at the ON position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(b) Pressurize the left, right, and center hydraulic systems (Ref 29-11-00/201).

(c) Do the EICAS status/maintenance message erase procedure (Ref 31-41-00/201).
(d) Make sure that the ELEV L HYD PRESS message is not shown on the EICAS display.
(e) Put the L FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
(f) Make sure that the ELEV L HYD PRESS message is shown on the EICAS display, and the ELEV C HYD PRESS message is not shown on the EICAS display.
(g) Put the C FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
(h) Make sure that the ELEV C HYD PRESS message is shown on the EICAS display, and the ELEV R HYD PRESS message is not shown on the EICAS display.
(i) Put the R FLT CONTROL SHUTOFF valve switch on the P61 panel to the OFF position.
(j) Make sure that the ELEV (L, C and R) HYD PRESS messages are shown on the EICAS display.
(k) Put the L, C, and R FLT CONTROL SHUTOFF valve switches on the P61 panel to the ON position.
(l) Make sure that the ELEV (L, C, and R) HYD PRESS messages stay on the EICAS display.
(m) Remove the power from the left, center, and right hydraulic systems (Ref 29-11-00/201).
(n) Make sure that the ELEV (L, C, and R) HYD PRESS messages stay on the EICAS display.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(o) Pressurize the left, center, and right hydraulic systems (Ref 29-11-00/201).
(p) Do the EICAS status and maintenance message erase procedure (Ref 31-41-00/201)
(q) Make sure that the ELEV (L, C, and R) HYD PRESS messages are not shown on the EICAS display.
(r) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00/201).

G. Install the Bypass Valve (Fig. 401)

S 424-023
(1) Install the bolts and washers (3 locations) that attach the bypass valve to the support bracket.

S 434-024
(2) Remove the plugs from the hydraulic lines and the caps from the bypass valve ports (4 locations).

S 434-032
(3) Connect the hydraulic lines to the bypass valve.

S 714-025
(4) Do a test on the bypass valve installation with these steps:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Pressurize the left, right, and center hydraulic systems (Ref 29-11-00/201).
(b) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 402).
(c) Move the captain's column forward and aft, then let it go to the neutral position.
(d) Put a piece of tape on the side of the airplane adjacent to the left elevator trailing edge.
(e) Make a mark at the neutral position of the left elevator on the tape.

NOTE: Elevator travel, for this test, is the straight line distance from the neutral position to the new inboard trailing edge position. You must make a mark and measure the elevator movement in the time specified in the steps.

(f) Use the tail flight control shutoff valves to remove the power from the left and right hydraulic systems.

WARNING: DO NOT EXTEND THE POGO MORE THAN 0.25 INCH (6.3 mm). MAKE SURE THAT THE TOOL IS CLEAR OF ALL OF THE LINKAGES, THE ELEVATOR AND THE HORIZONTAL STABILIZER. INJURY TO PERSONS CAN OCCUR.

(g) Use pogo tools to extend the pogos at the left middle and left outboard PCAs by 0.20 to 0.25 inch (5.1-6.3 mm) (Fig. 403).

NOTE: Do not move the control column again until the test on the byass valve is completed.

(h) Use the tail flight control shutoff valve to supply power to the left hydraulic system.
(i) After 28 to 32 seconds, make sure the left elevator moves down 2.5 to 3.5 inches (64-88 mm).

NOTE: If the bypass valve does not pass the test, do these checks:

- Make sure the pogos are extended at least 0.20 inches (5 mm).
- Make sure the elevator PCU is in rig.

- make sure the control column was not moved after the test was started.

(j) Use the tail flight control shutoff valve to remove the power from the left hydraulic system.
(k) Remove the pogo tools from the left middle and left outboard PCA pogos.
(l) Open the tail flight control shutoff valves to supply power to the left and right hydraulic systems.
(m) Make sure that the elevator goes to the neutral position mark by less than ± 0.10 inch (+/- 2.5 mm).
(n) Use the tail flight control shutoff valves to remove power from the left and center hydraulic systems.
(o) Use pogo tools to extend the pogos at the left middle and left inboard PCAs by 0.20 to 0.25 inch (5.1-6.3 mm).
(p) Open the tail flight shutoff valve to supply power to the left hydraulic system.
(q) Make a mark on the tape at the elevator position three seconds after you open the tail flight shutoff valve.
(r) After 28 to 32 seconds, make sure the elevator travels less than 1.0 inch (25.4 mm).
(s) Use the tail flight control shutoff valve to remove power from the left hydraulic system.
(t) Remove the pogo tools from the left middle and left inboard PCAs.

(u) Use the tail flight control shutoff valves to supply power to the left and center hydraulic systems.
(v) Remove the pressure from the left, right, and center hydraulic systems (Ref 29-11-00/201).

H. Put the Airplane Back to Its Usual Condition

S 864-026
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-027
(2) Put the R, L, and C FLT CONTROL SHUTOFF valve switches on the right side panel, P61, to the ON position.

S 614-028
(3) Fill the applicable hydraulic reservoir if necessary (Ref 12-12-01/301).

S 414-029
(4) Close the access door for the pressure reducer valves and bypass valve (Ref 06-42-00/201).

S 864-030
(5) Remove electrical power if it is not necessary (Ref 24-22-00/201).

ELEVATOR AFT QUADRANTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the aft quadrants in the elevator control system.

   TASK 27-31-15-024-001

2. Remove the Aft Quadrants
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST6 - P/N B20003-21
          (b) E/ST8 - P/N B20003-21
          (c) E/ST9 - P/N B20003-21
      (2) Gage Assembly - B27039-3, Part of Elevator and Stabilizer Rigging Equipment, B27039-13
      (3) Removal Tool, Decentering Springs, Elevator - B27060-1
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 27-31-03/401, Asymmetry Limiter Actuator
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones

          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45
          313/314 Stabilizer Center Section Compartment

      (2) Access Panels

          311AL Forward Stabilizer Compartment
          313AL Elevator Aft Quadrants

   D. Prepare for the Removal

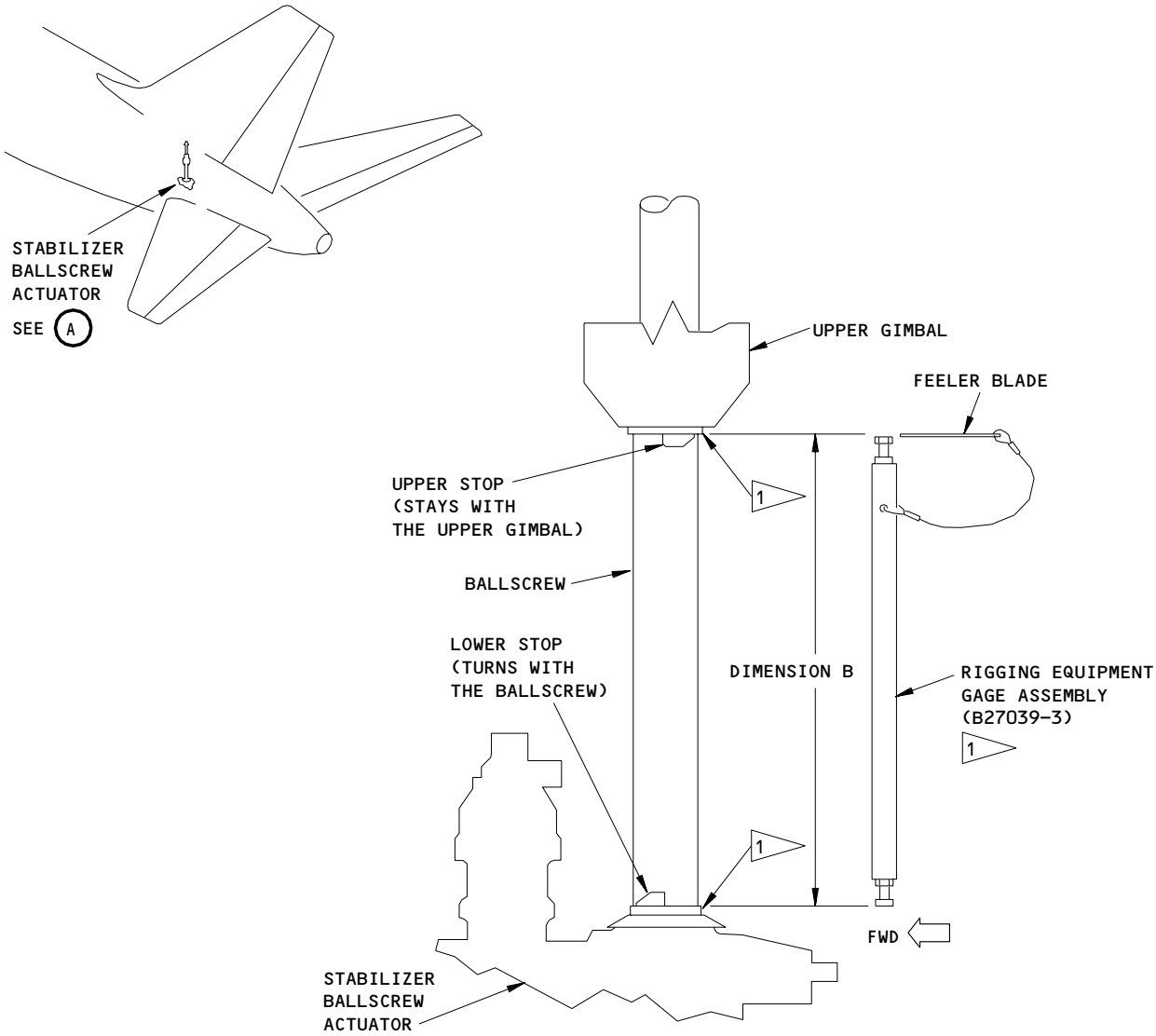
      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 014-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (2) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

      S 014-004
      (3) Open the access door for the aft quadrants, 313AL (Ref 06-42-00).



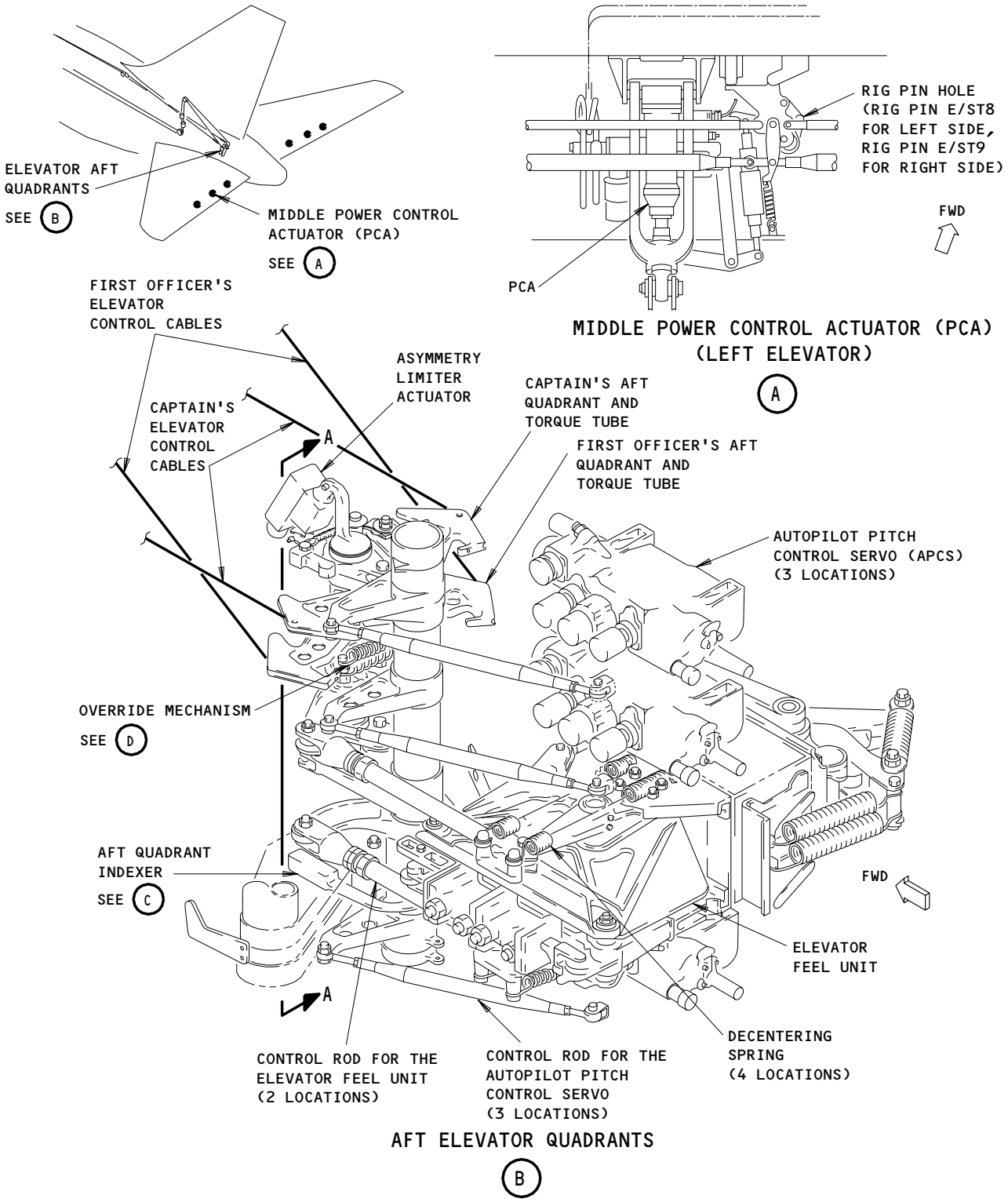
STABILIZER BALLSCREW ACTUATOR

A

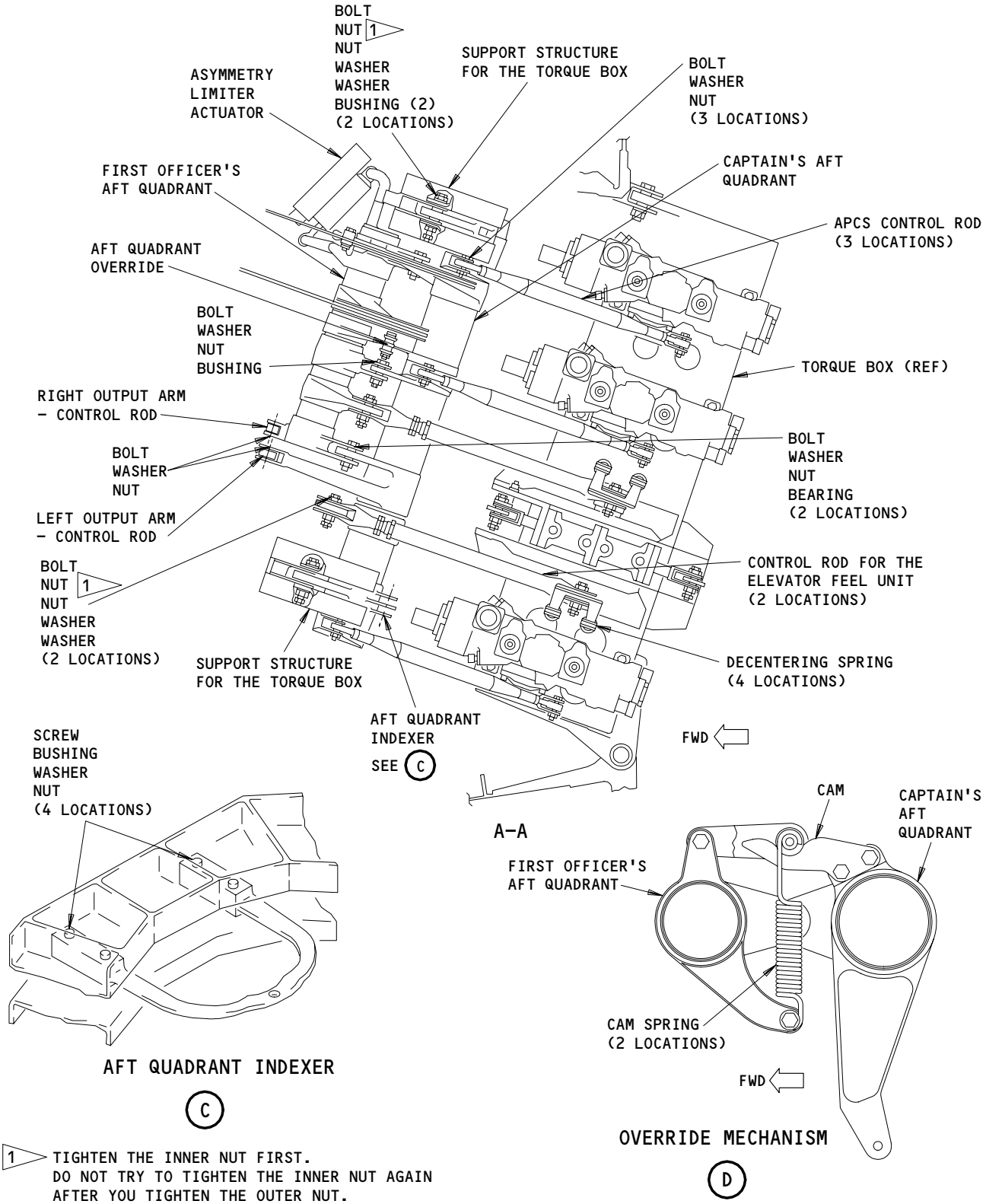
1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 401



Elevator Aft Quadrant Installation
Figure 402 (Sheet 1)



Elevator Aft Quadrant Installation
Figure 402 (Sheet 2)

S 864-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right hydraulic system (Ref 29-11-00).

S 864-006

(5) Move the horizontal stabilizer until Dimension B on the stabilizer actuator ballscrew is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 401).

S 864-007

(6) Remove the pressure from the right hydraulic system (Ref 29-11-00).

S 214-008

(7) Make sure the pressure is removed from the left and center hydraulic systems (Ref 29-11-00).

S 864-009

(8) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-010

(9) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-011

(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM CONT ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

E. Remove the Aft Quadrants (Fig. 402)

S 494-012

(1) Install rig pin E/ST6 in the base of the captain's control column.

S 494-013
(2) Install the rig pins E/ST8 and E/ST9 in the left and right elevator's middle PCAs.

S 494-014
(3) Attach tags to identify the captain's and the first officer's elevator control cables.

S 034-015
(4) Disconnect the captain's and the first officer's elevator control cables.

NOTE: All three turnbuckles must loosened to make allowances for the cable tension regulator.

S 034-016
(5) Disconnect the left and right output control rods from the output arms on the aft quadrant.

NOTE: Do not change the adjustment of the output control rods.

S 034-017
(6) Remove the asymmetry limiter actuator (Ref 27-31-03).

S 034-018
(7) Use the spring removal tool to remove the decentering springs on the elevator feel unit.

NOTE: There are 4 springs. The force of the installed spring is 100 pounds (445 newtons).

S 034-019
(8) Disconnect the two control rods for the elevator feel unit from the torque tube levers on the aft quadrant.

S 034-020
(9) Disconnect the three servo control rods for the autopilot pitch control from the torque tube levers on the aft quadrant.

S 034-021
(10) Remove the two cam springs from the override mechanism on the aft quadrant.

S 034-022
(11) Remove the three fasteners that hold the first officer's aft quadrant and torque tube to the captain's aft quadrant and torque tube.

S 024-023
(12) Remove the first officer's aft quadrant and torque tube.

S 034-024
(13) Remove the indexer bracket on the aft quadrant.

S 034-025
(14) Remove the two fasteners that hold the captain's aft quadrant and torque tube to the support structure of the torque box.

S 024-026
(15) Remove the captain's aft quadrant and torque tube.

TASK 27-31-15-424-027

3. Install the Aft Quadrant

A. Equipment
(1) Removal Tool, Decentering Springs, Elevator - B27060-1

B. Consumable Materials
(1) D00633 Grease, Corrosion Preventive - BMS 3-33 (recommended)
(2) D00015 Grease, Corrosion Preventive - BMS 3-24 (optional)

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-31-00/501, Elevator Control System
(4) 27-31-03/401, Asymmetry Limiter Actuator

D. Access
(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Elevator Aft Quadrants

E. Install the Elevator Aft Quadrants (Fig. 402)

NOTE: You must apply a layer of corrosion preventive grease on all fasteners, bushings, and bearings that will be installed at movable joints.

S 434-028
(1) Install the two fasteners that attach the captain's aft quadrant and torque tube to the support structure of the torque box and tighten the nuts as follows:
(a) Tighten the inner nut to 50-60 pound-inches (5.6-6.7 newton-meters).

(b) Tighten the outer nut to 10 pound-inches (1.1 Nm).

NOTE: Do not try to tighten the inner nut again.

S 434-029
(2) Install the indexer bracket on the aft quadrant.

S 434-030
(3) Install the three fasteners to attach the first officer's aft quadrant and torque tube to the captain's aft quadrant and torque tube.

S 434-031
(4) Install the two cam springs on the override mechanism.

S 434-032
(5) Install the asymmetry limiter actuator (Ref 27-31-03).

S 094-033
(6) Remove the identification tags and connect the captain's and the first officer's elevator control cables to the aft quadrants.

S 434-034
(7) Connect the left and right output control rods to the output arms on the aft quadrant.

S 434-035
(8) Connect the two control rods for the elevator feel unit to the aft quadrant flanges.

S 434-036
(9) Use the spring removal tool to install the four decentering springs on the elevator feel unit.

S 434-037
(10) Connect the three control rods for the autopilot pitch control servo (APCS) to the aft quadrant flanges.

S 094-038
(11) Remove rig pins E/ST6, E/ST8 and E/ST9.

S 824-039
(12) Do the adjustment for the elevator control system (Ref 27-31-00).

S 714-040
(13) Do the operational test for the elevator control system (Ref 27-31-00).

F. Put the Airplane Back to Its Usual Condition

S 864-041
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM CONT ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 214-042
(2) Make sure the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 214-043
(3) Make sure the L, R and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

S 864-044
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-045
(5) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-046
(6) Close the access door for the aft quadrants, 313AL (Ref 06-42-00).

ELEVATOR CONTROL AFT MECHANISM TORQUE BOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the torque box for the aft mechanism of the elevator control system.

TASK 27-31-16-024-001

2. Remove the Torque Box
   A. Equipment
      (1) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-13
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 22-12-01/401, Autopilot Pitch Control Servo
      (3) 24-22-00/201, Electrical Power - Control
      (4) 27-00-01/201, Flight Control Cables
      (5) 27-31-15/401, Elevator Aft Quadrants
      (6) 27-31-17/201, Elevator Feel Unit
      (7) 27-31-21/401, Neutral Shift and Override Mechanism
      (8) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45
          313/314 Stabilizer Center Section Compartment

      (2) Access Panels
          311AL Forward Stabilizer Compartment
          313AL Elevator Aft Quadrants

   D. Prepare for the Removal (Fig. 401)

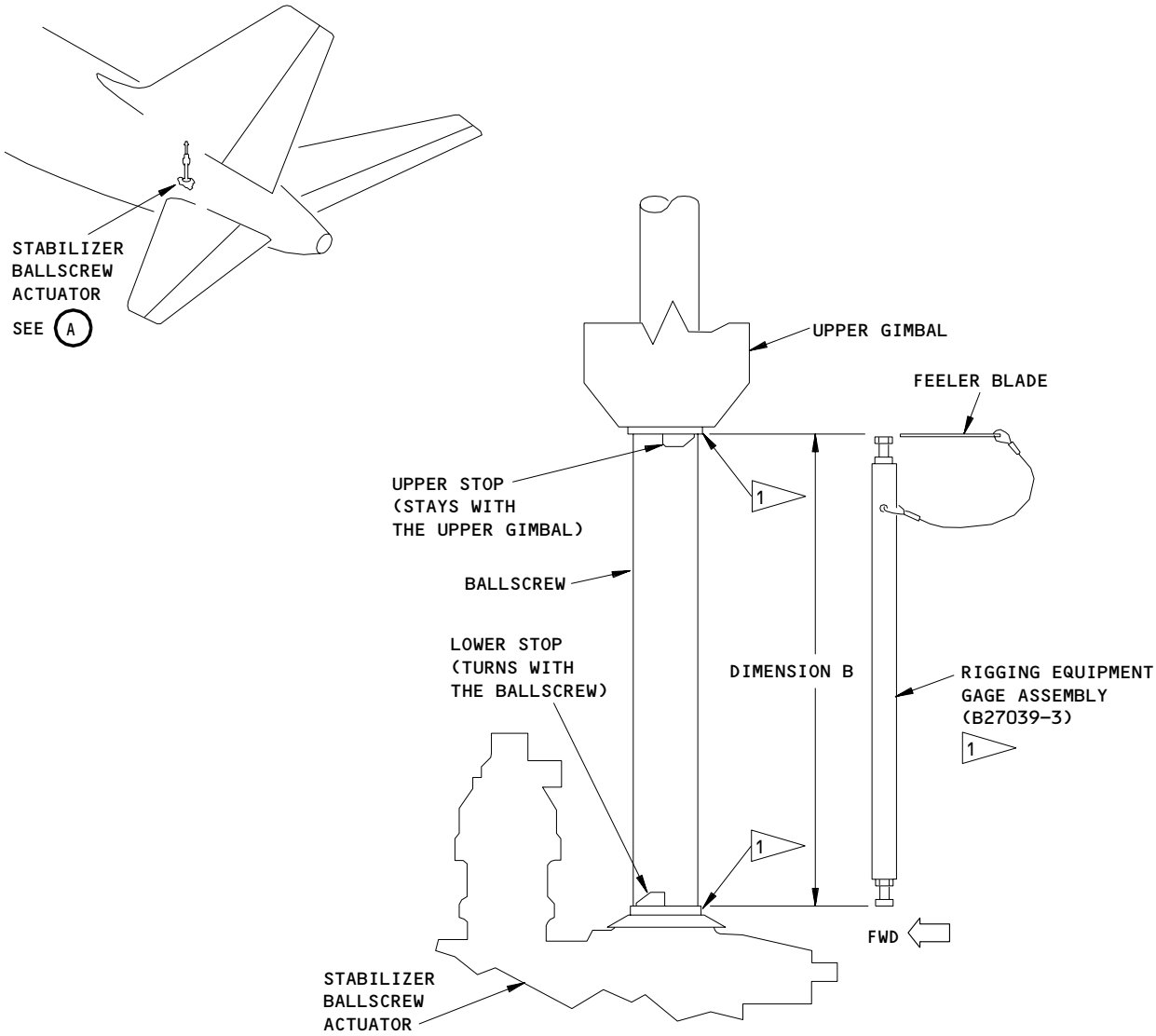
      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 014-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (2) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

      S 014-004
      (3) Open the access door for the aft quadrants, 313AL, and remove the auxiliary access panel (Ref 06-42-00).

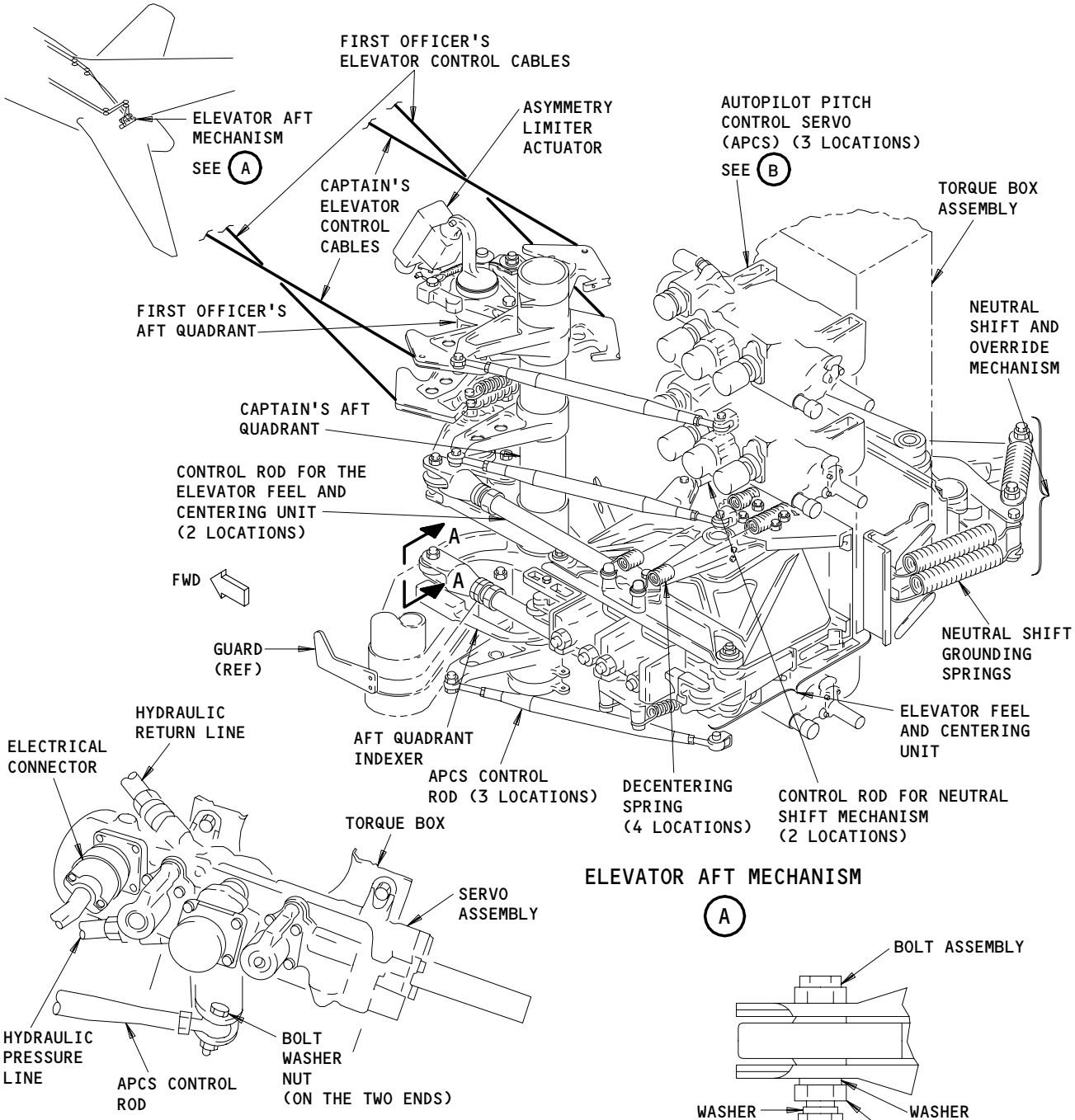


STABILIZER BALLSCREW ACTUATOR
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 401

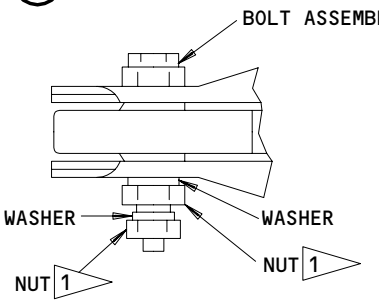


ELEVATOR AFT MECHANISM

A

AUTOPILOT PITCH CONTROL SERVO (EXAMPLE)

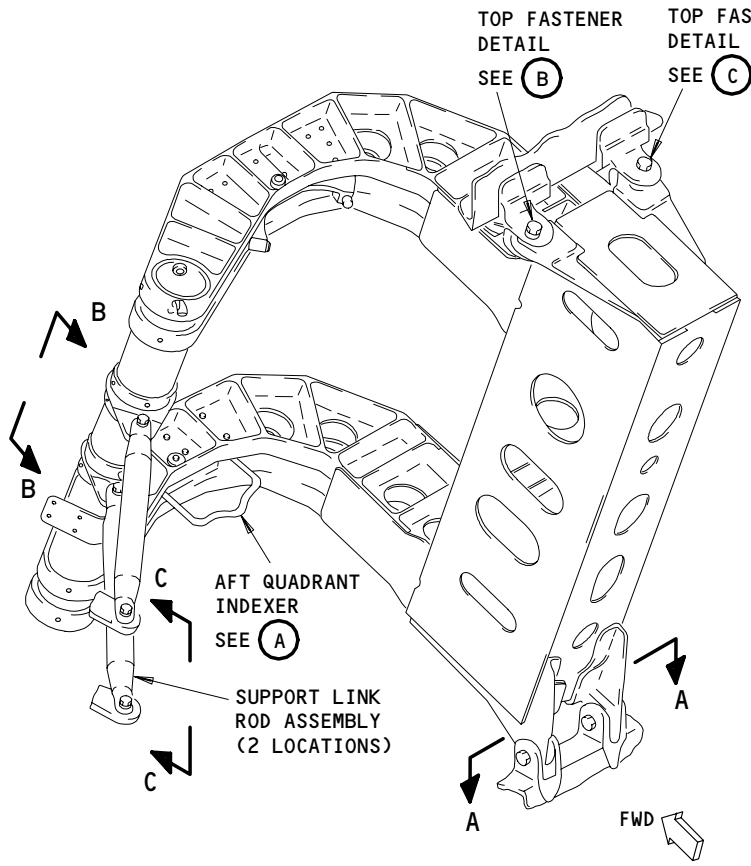
B



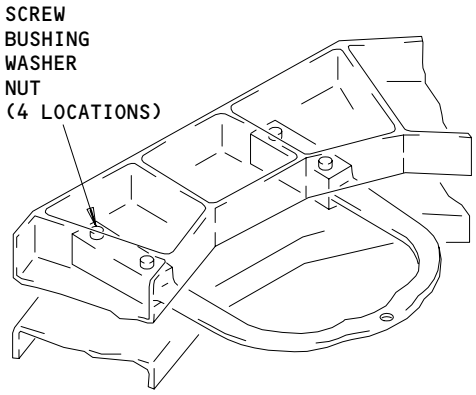
(4 LOCATIONS)
A-A

1 TIGHTEN THE INNER NUT FIRST. DO NOT TRY TO TIGHTEN THE INNER NUT AGAIN AFTER YOU TIGHTEN THE OUTER NUT.

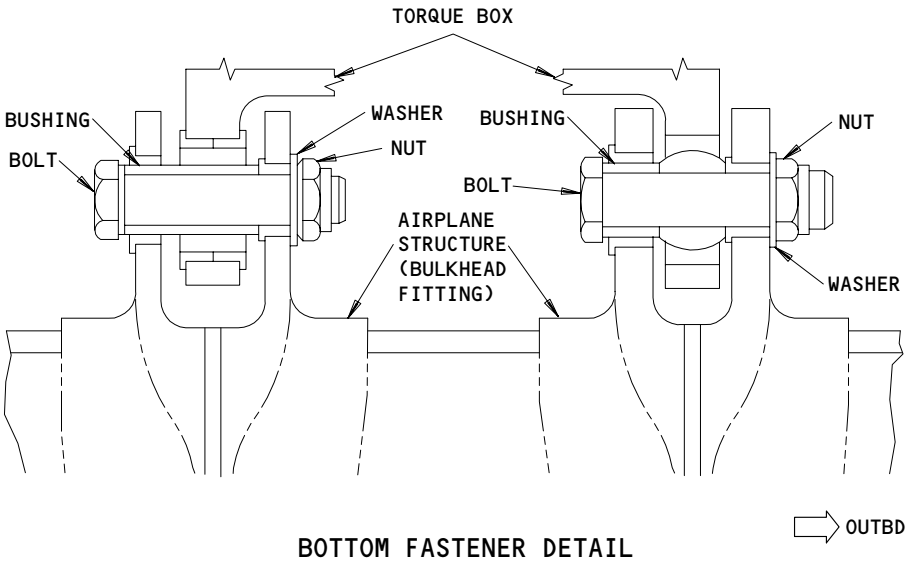
Elevator Aft Mechanism
Figure 402



TORQUE BOX ASSEMBLY

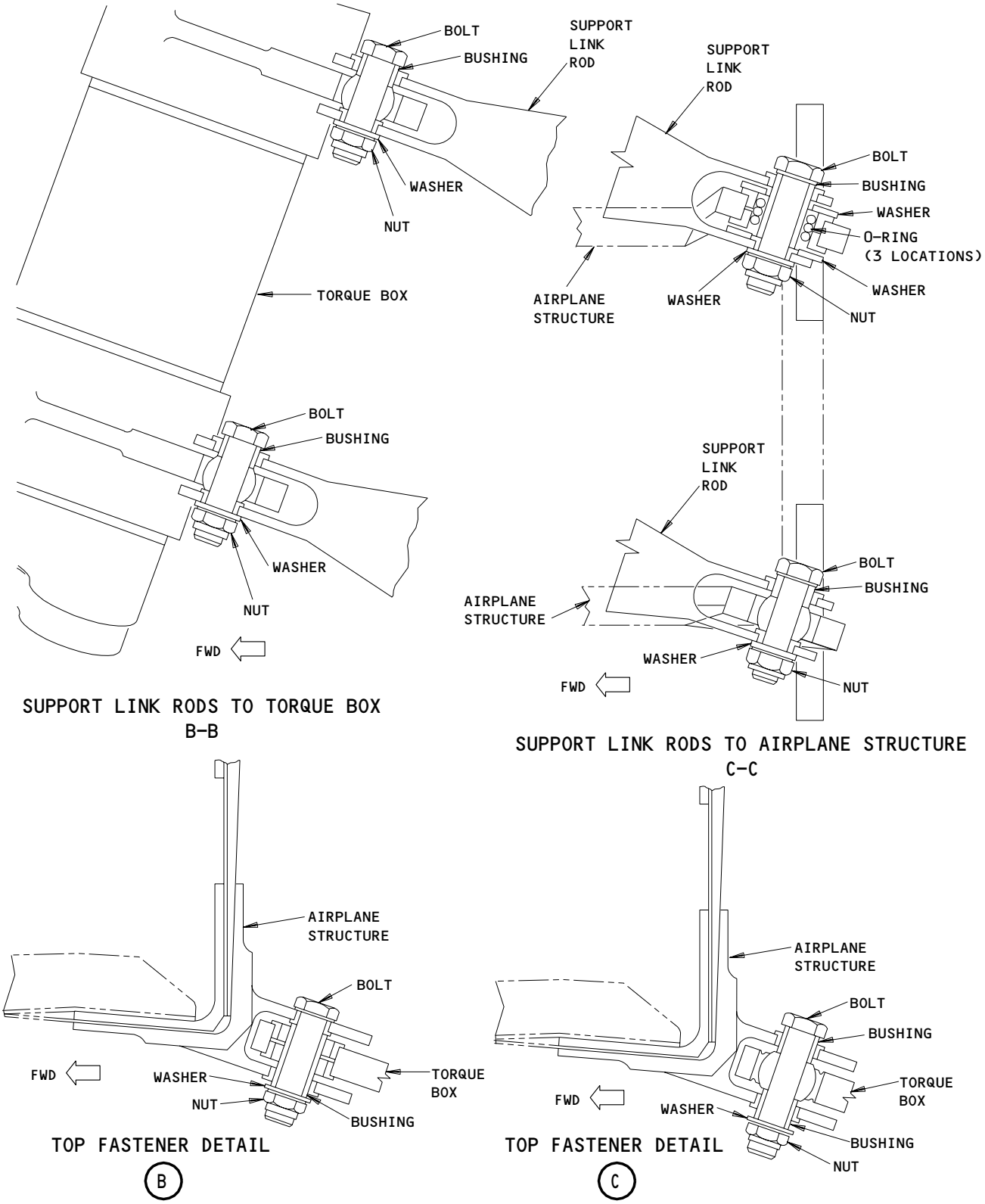


AFT QUADRANT INDEXER
A



BOTTOM FASTENER DETAIL
A-A

Torque Box for the Elevator Aft Mechanism
Figure 403 (Sheet 1)



SUPPORT LINK RODS TO TORQUE BOX
B-B

SUPPORT LINK RODS TO AIRPLANE STRUCTURE
C-C

TOP FASTENER DETAIL
B

TOP FASTENER DETAIL
C

Elevator Control Aft Mechanism Torque Box
Figure 403 (Sheet 2)

S 864-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right hydraulic system (Ref 29-11-00).

S 864-006

(5) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (40.36 ± 0.025 centimeters) (6 units of trim) (Fig. 401).

S 864-007

(6) Remove the pressure from the right hydraulic system (Ref 29-11-00).

S 864-008

(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-009

(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-010

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

E. Remove the Torque Box

S 494-011

(1) Attach identification tags on the captain's and the first officer's elevator control cables (Ref 27-00-01) (Fig. 402).

S 034-012

(2) Disconnect the captain's and the first officer's elevator control cables from the aft quadrants (Ref 27-00-01).

S 034-013
(3) Disconnect the decentering springs from the elevator feel unit.

NOTE: The force of the installed spring is 100 pounds (445 newtons).

S 034-014
(4) Remove the two connecting rods that are between the elevator feel unit and the aft quadrant flanges.

S 034-015
(5) Remove the two connecting rods that are between the elevator feel unit and the neutral shift mechanism.

S 034-016
(6) Remove the three connecting rods that are between the autopilot pitch control servos (APCS) and the aft quadrant flanges.

S 034-017
(7) Remove the APCS from the torque box assembly (3 locations) (Ref 22-12-01).

S 034-018
(8) Disconnect the APCS hydraulic lines for access to remove the torque box, if it is necessary.

S 034-019
(9) Remove the neutral shift and override mechanism (Ref 27-31-21).

S 034-020
(10) Remove the elevator feel unit (Ref 27-31-17)

S 034-021
(11) Remove the two grounding springs on the aft side of the neutral shift and override mechanism.

NOTE: The force of each installed spring is 125 pounds (556 newtons).

S 034-022
(12) Remove the first officer's aft quadrant (Ref 27-31-15)

S 034-023
(13) Remove the aft quadrant indexer (Fig. 403).

S 034-024
(14) Remove the captain's aft quadrant (Ref 27-31-15).

S 034-025
(15) Disconnect the grounding strap from the torque box.

S 034-026
(16) Hold the torque box while you remove the fasteners on the torque box.

S 034-027
(17) Remove the two support link rod assemblies.

S 034-028
(18) Remove the two top and the two bottom fasteners.

S 024-029
(19) Turn the torque box assembly counterclockwise 180° about a vertical axis.

S 024-030
(20) Lower the torque box through the access door, 313AL (Ref 06-42-00).

TASK 27-31-16-424-062

3. Install the Torque Box

A. Consumable Materials
(1) C00308 Corrosion Preventive Compound, MIL-C-11796

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 22-12-01/401, Autopilot Pitch Control Servo
(3) 24-22-00/201, Electrical Power - Control
(4) 27-00-01/201, Flight Control Cables
(5) 27-31-00/501, Elevator Control System
(6) 27-31-15/401, Elevator Aft Quadrants
(7) 27-31-17/201, Elevator Feel Unit
(8) 27-31-21/401, Neutral Shift and Override Mechanism

C. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45
313/314 Stabilizer Center Section Compartment

(2) Access Panels
311AL Forward Stabilizer Compartment
313AL Elevator Aft Quadrants

D. Install the Torque Box

S 214-031
(1) Make sure the new torque box is turned counterclockwise 180° about a vertical axis from its fully installed position.

S 424-032
(2) Lift the new torque box through the access door, 313AL (Ref 06-42-00).

S 424-033
(3) When the torque box is in the correct vertical position adjacent to the bulkhead, do the step that follows:
(a) Turn the torque box clockwise 180° about a vertical axis and align it with the four bulkhead fastener locations.

S 624-034
(4) Apply a layer of corrosion preventive compound to the two top and the two bottom fasteners.

S 434-035
(5) Install the two bottom and the two top fasteners (Fig. 403).

S 624-037
(6) Apply a layer of corrosion preventive compound to the fasteners for the support link rod assemblies.

S 434-036

CAUTION: MAKE SURE THE O-RINGS ARE INSTALLED IN THE TOP SUPPORT LINK ROD ASSEMBLY. O-RINGS WILL HELP PREVENT CORROSION AND NOT LET THE BOLTS RUB AGAINST THE AIRPLANE STRUCTURE. DAMAGE TO THE AIRPLANE CAN OCCUR IF THE O-RINGS ARE NOT INSTALLED.

(7) Install the two support link rod assemblies.

S 434-038
(8) Install the captain's aft quadrant (Ref 27-31-15).

S 434-039
(9) Install the aft quadrant indexer.

S 434-040
(10) Install the first officer's aft quadrant (Ref 27-31-15) (Fig. 402).

S 434-041
(11) Install the neutral shift and override mechanism (Ref 27-31-21).

S 434-042
(12) Install the elevator feel unit (Ref 27-31-17).

S 434-043
(13) Install the APCS hydraulic lines, if you removed them for access.

S 434-044
(14) Install the APCS on the torque box assembly (3 locations) (Ref 22-12-01).

S 434-045
(15) Install the connecting rods between the APCS and the torque tube cranks on the captain's aft quadrant (3 locations).

S 434-046
(16) Install the two control rods between the neutral shift and override mechanism and the elevator feel unit.

S 434-047
(17) Install the two connecting rods between the elevator feel unit and the aft quadrant flanges and tighten the nuts as follows:
(a) Tighten the inner nut to 50-60 pound-inches (5.6-6.7 Nm).

(b) Tighten the outer nut to 10 pound-inches (1.1 newtons).

NOTE: Do not try to tighten the inner nut after you tighten the outer nut.

S 094-048
(18) Remove the identification tags and install the captain's and the first officer's elevator control cables to the aft quadrants (Ref 27-00-01).

S 824-049
(19) Do the adjustment for the elevator control cables (Ref 27-31-00).

S 864-050
(20) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-051
(21) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-052
(22) Put the L, R and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 824-053
(23) Do the adjustment for the neutral shift and override mechanism (Ref 27-31-21).

S 824-054
(24) Do the adjustment for the elevator feel unit (Ref 27-31-17).

S 714-055
(25) Do the test for the elevator feel system (Ref 27-31-00).

S 714-056
(26) Do the test for the neutral shift and override mechanism (Ref 27-31-00).

S 824-057
(27) Do the adjustment for the autopilot pitch control servo mechanism (Ref 22-12-01).

S 714-058
(28) Do the test for the autopilot pitch control servo mechanism (Ref 22-12-01).

E. Put the Airplane Back to Its Usual Condition

S 864-059
(1) Remove electrical power, if it is not necessary (Ref 24-22-00).

S 414-060
(2) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-061
(3) Close the access panel for the aft quadrants, 313AL (Ref 06-42-00).

ELEVATOR FEEL UNIT - MAINTENANCE PRACTICE

1. General
   A. This procedure contains steps to remove and install the feel unit for the elevator control system and remove and install of the feel unit roller bearing.

   TASK 27-31-17-022-001

2. Remove the Feel Unit
   A. Equipment
      (1) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-13
      (2) Removal/Installation Tool, Elevator Control Decentering Springs - B27060-1
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

      (2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Elevator Feel Unit

   D. Prepare for the Removal

      S 862-002
      (1) Supply electrical power (Ref 24-22-00).

      S 012-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (2) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 862-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 862-005

(4) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.3 mm) (Fig. 201).

S 862-006

(5) Remove the pressure from the right and center hydraulic systems (Ref 29-11-00).

S 862-007

(6) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 862-008

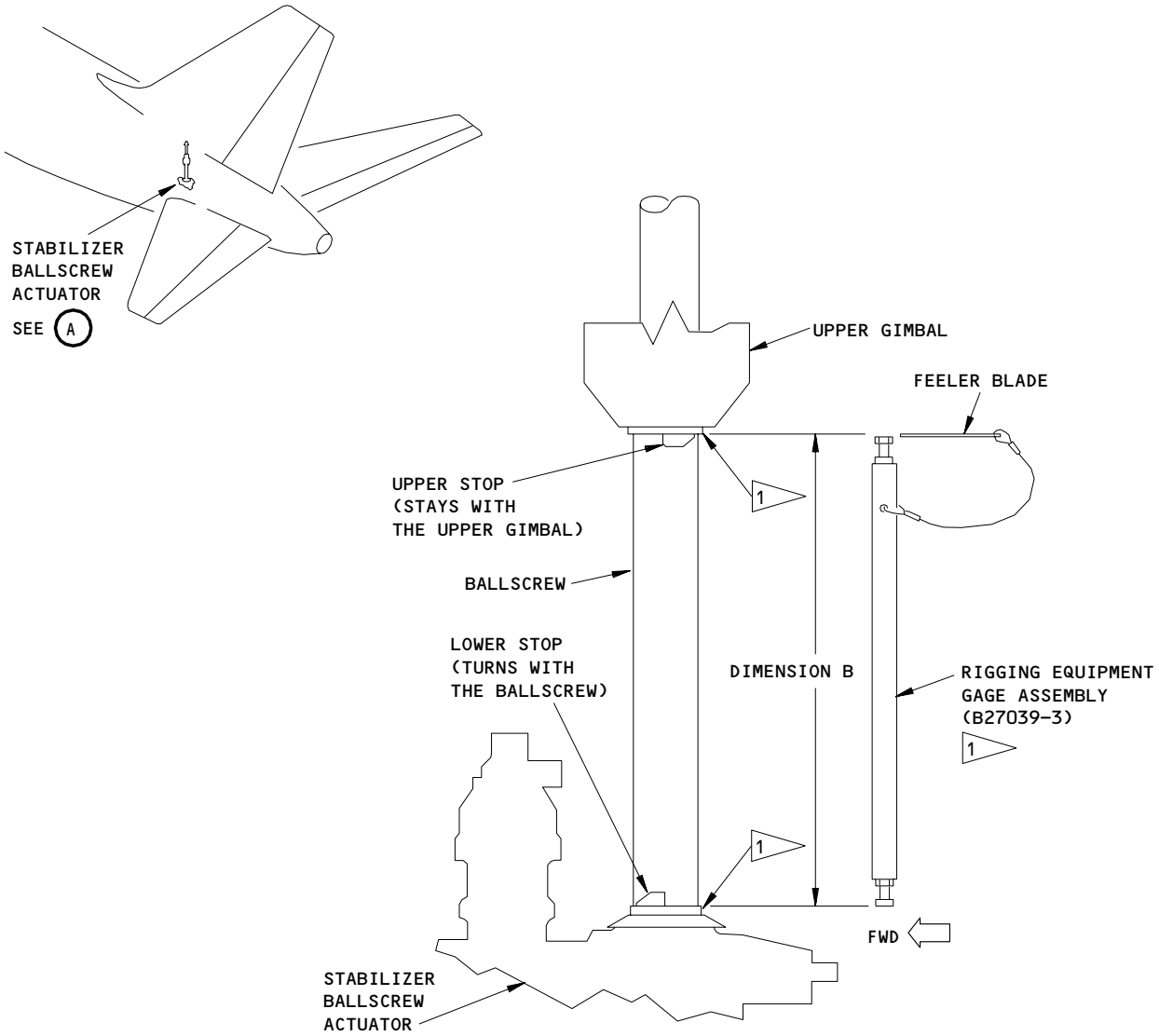
(7) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 862-009

(8) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 012-010

(9) Open the access door for the feel unit, 313AL (Ref 06-42-00).



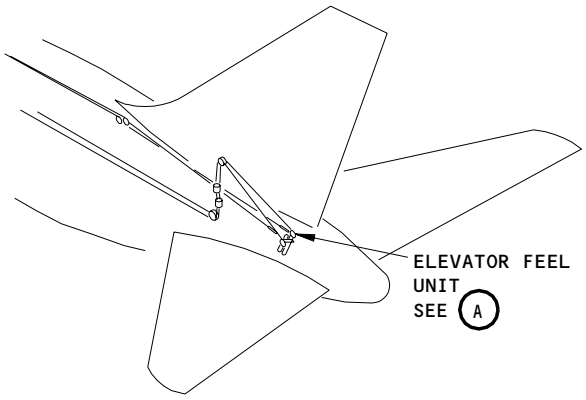
STABILIZER BALLSCREW ACTUATOR

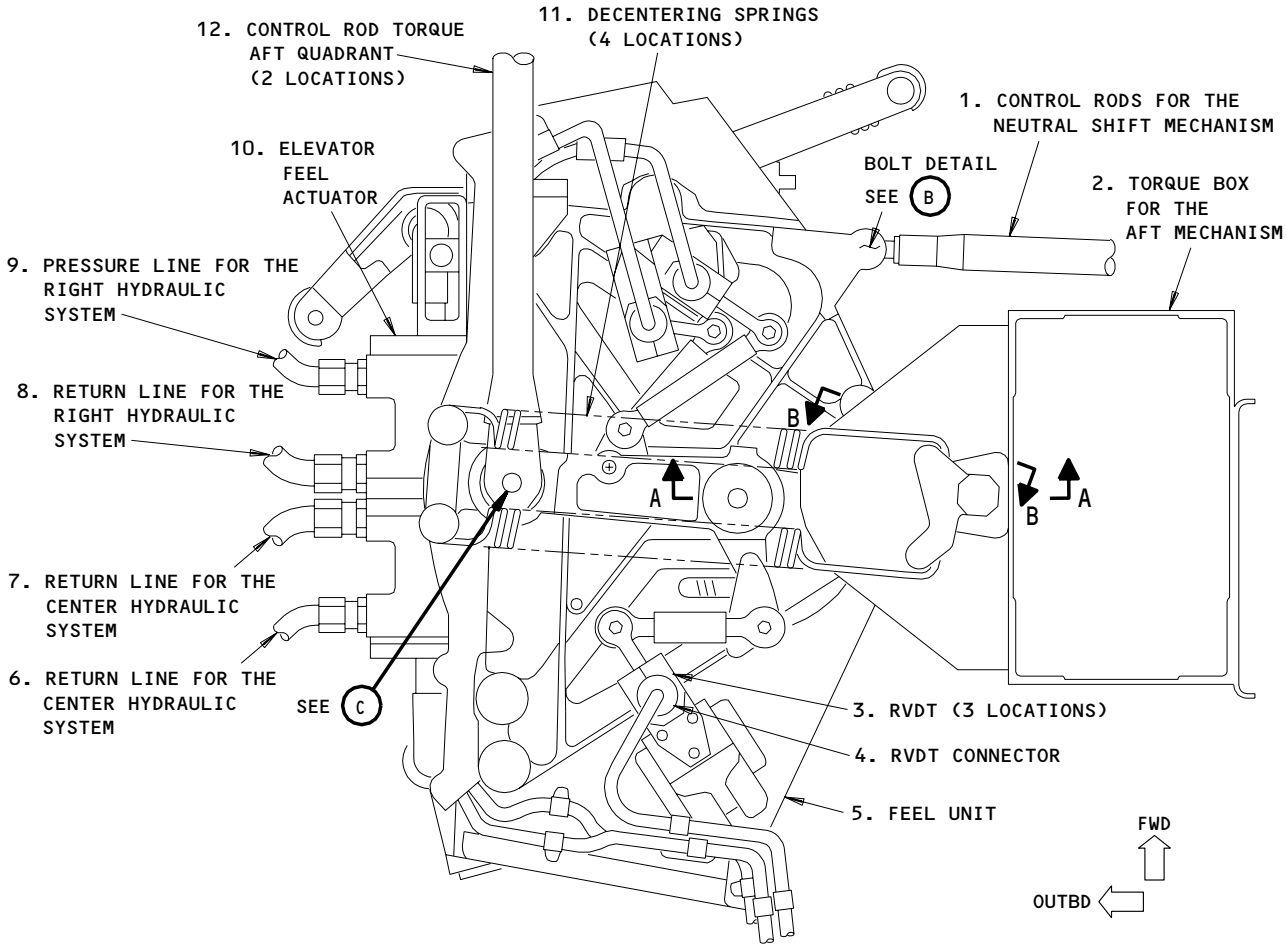
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

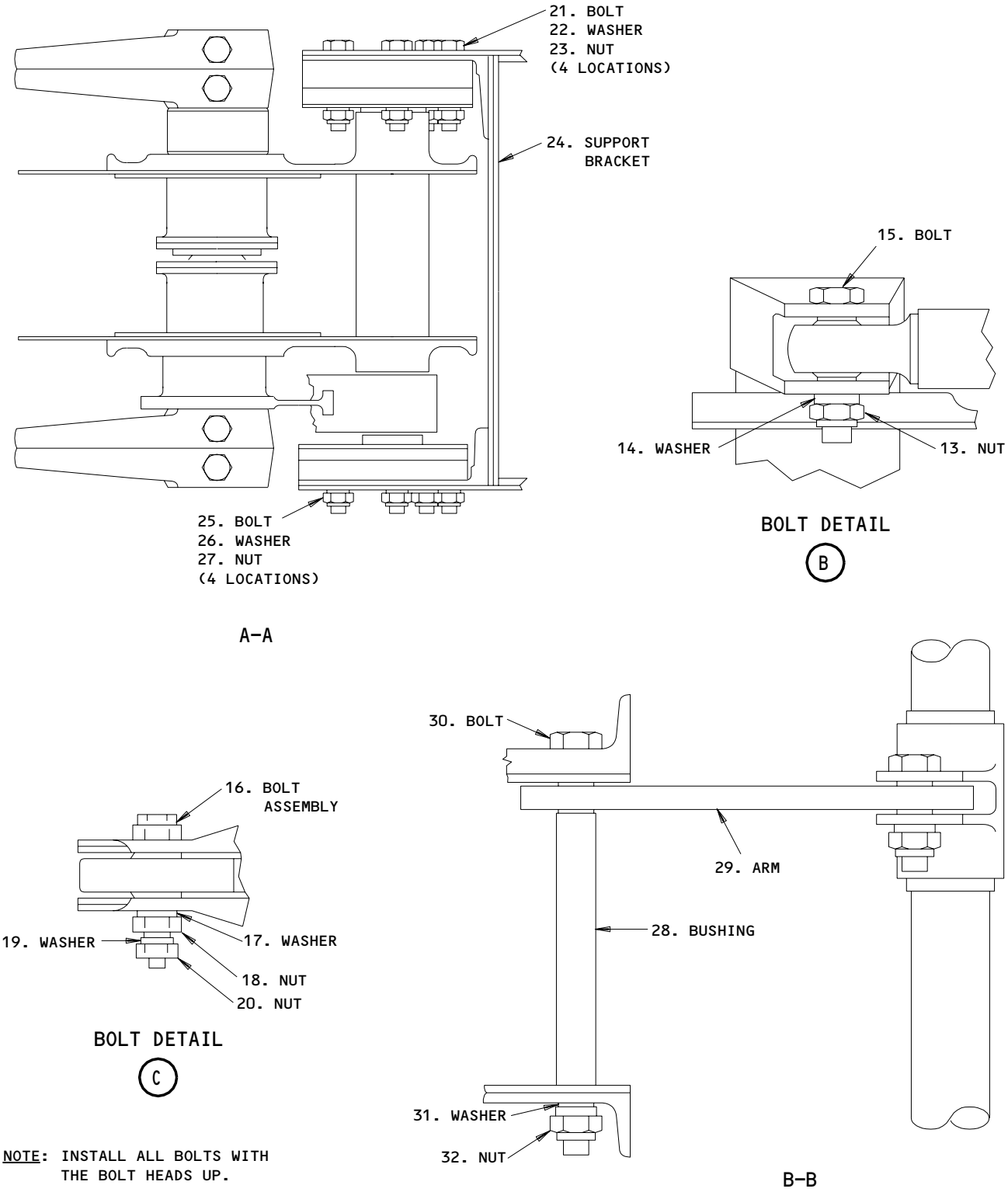
Measurement of Stabilizer Dimension B
Figure 201





ELEVATOR FEEL UNIT
A

Elevator Feel Unit Installation
Figure 202 (Sheet 1)



NOTE: INSTALL ALL BOLTS WITH THE BOLT HEADS UP.

Elevator Feel Unit Installation
Figure 202 (Sheet 2)

E. Remove the Feel Unit (Fig. 202)

NOTE: The elevator control system will move quickly to the APL NOSE DN position when you disconnect the control rods and the hydraulic lines from the feel unit.

S 032-011
(1) Disconnect the electrical connectors from the RVDTs (3 locations).

S 032-012

WARNING: USE THE SPRING REMOVAL TOOL TO REMOVE THE DECENTERING SPRINGS. EACH SPRING HAS A LOAD OF 100 POUNDS (444 NEWTONS). IF YOU LET A SPRING RETRACT FREELY, DAMAGE TO EQUIPMENT OR INJURY TO A PERSON CAN OCCUR.

(2) Use the spring removal/installation tool to remove the decentering springs (11) (Fig. 204).

S 032-013
(3) Disconnect the control rods on the aft quadrant (12) from the feel unit (5) (2 locations).

S 862-014
(4) Disconnect the control rods on the neutral shift mechanism (1) from the feel unit (5) (2 locations).

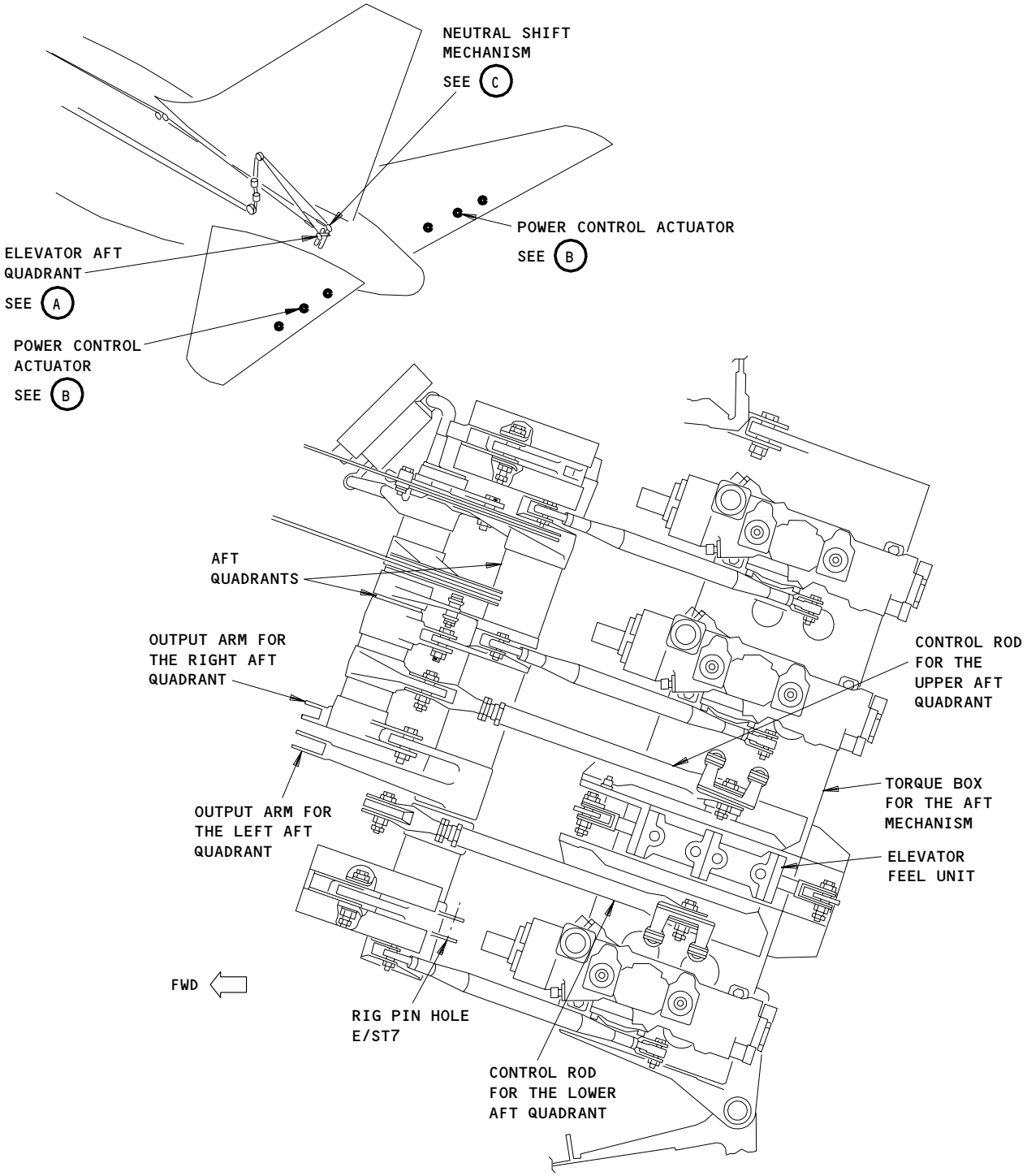
S 032-015
(5) Disconnect the hydraulic lines (6, 7, 8, 9) from the feel actuator (10) (AMM 20-10-09/401).

S 032-016
(6) Put plugs in the hydraulic lines and caps on the ports.

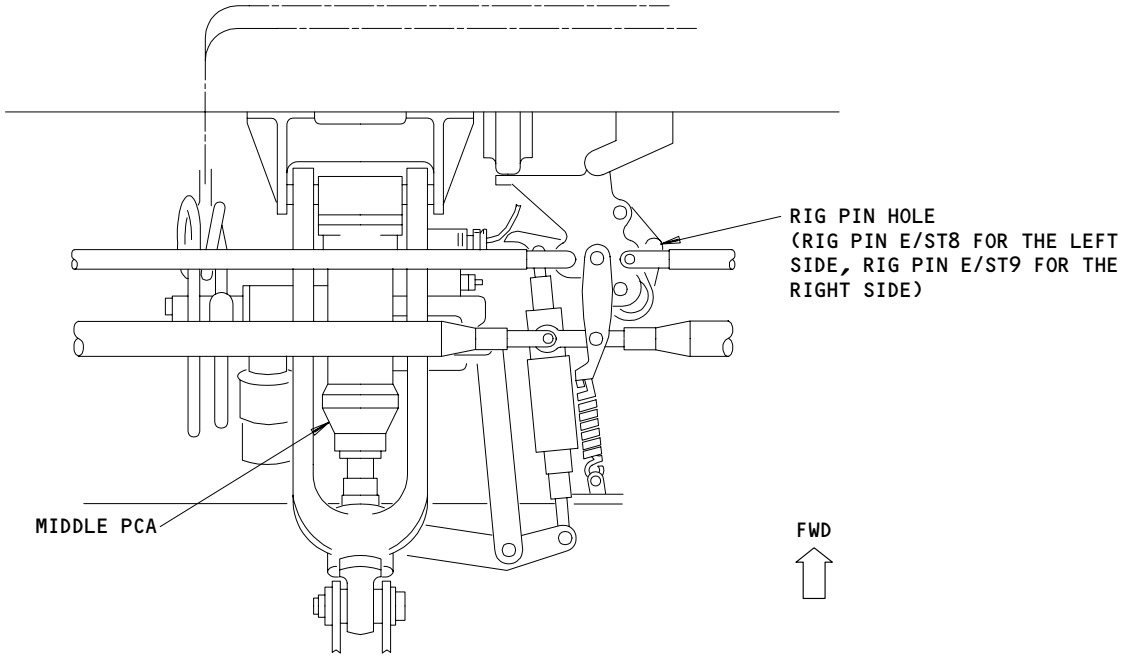
S 032-017
(7) Disconnect the arm assembly (29) from the feel unit (5).

S 032-018
(8) Hold the feel unit (5) and remove the bolts (21, 25) that attach the feel unit to the support bracket (24).

S 022-019
(9) Remove the feel unit (5).

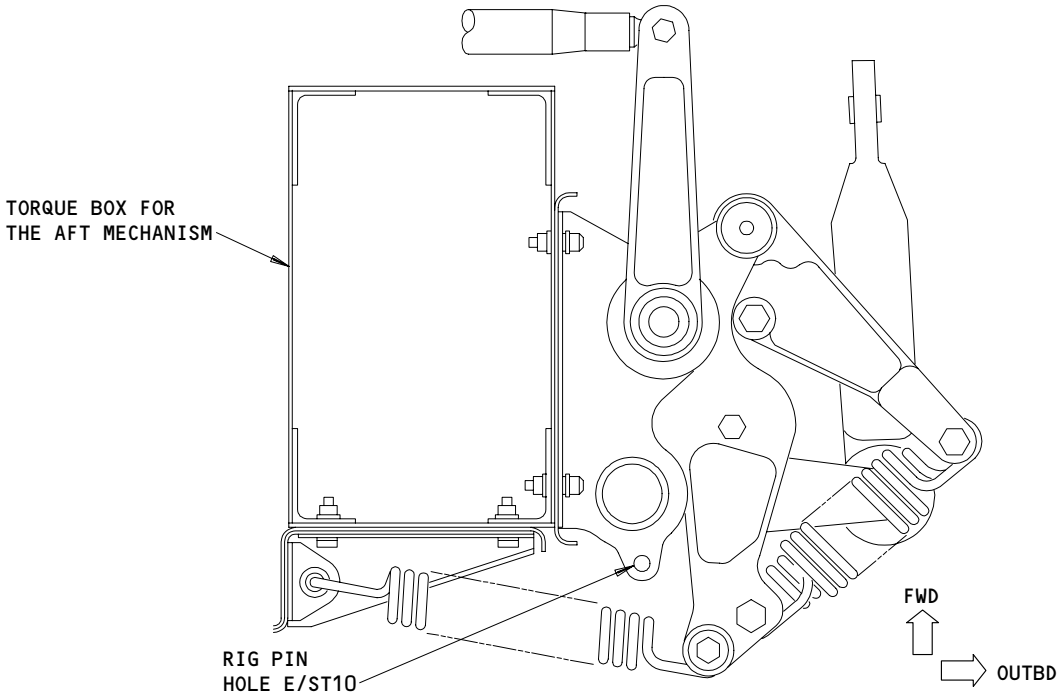


Elevator Feel Unit Adjustment
Figure 203 (Sheet 1)



POWER CONTROL ACTUATOR (PCA)

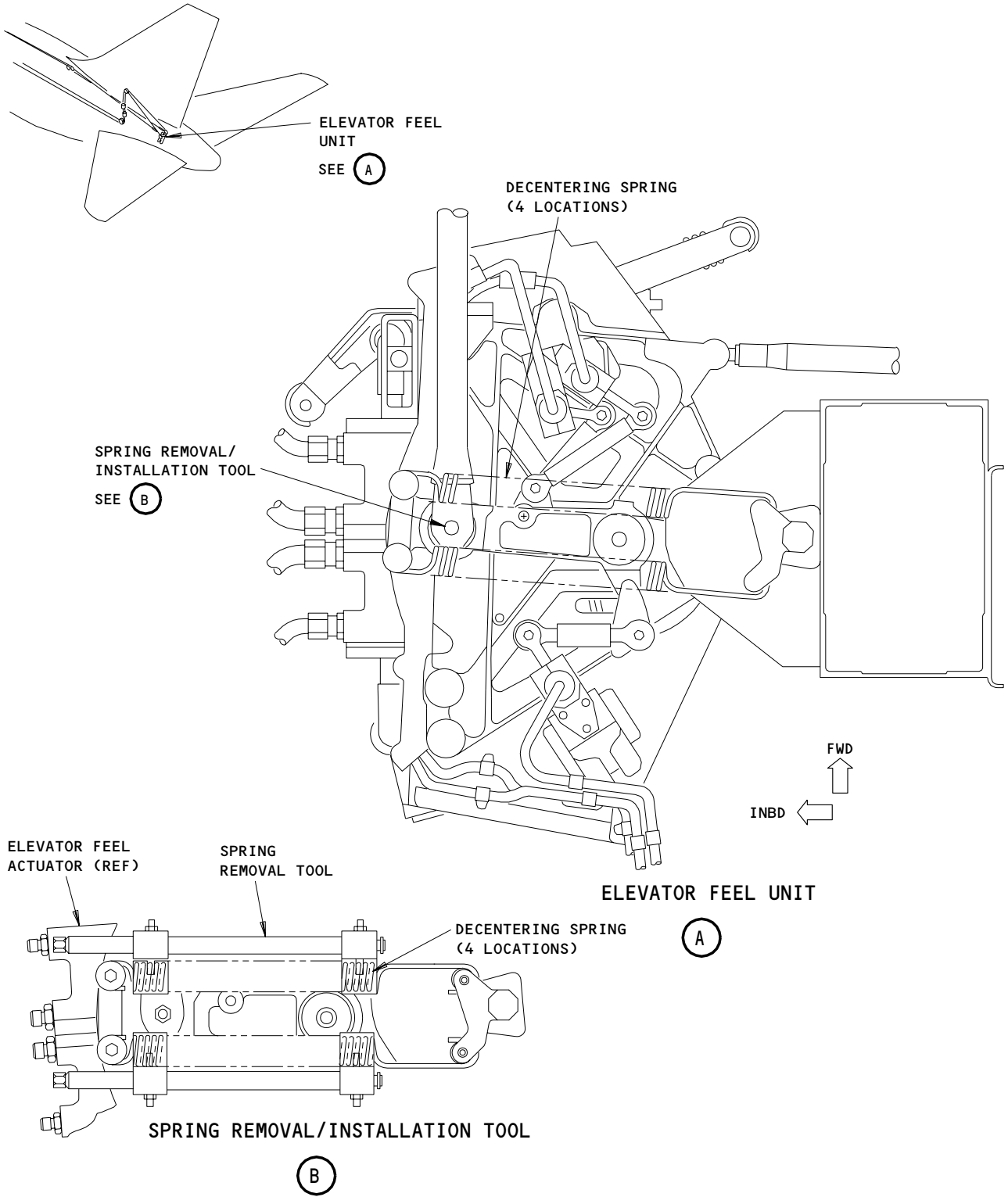
B



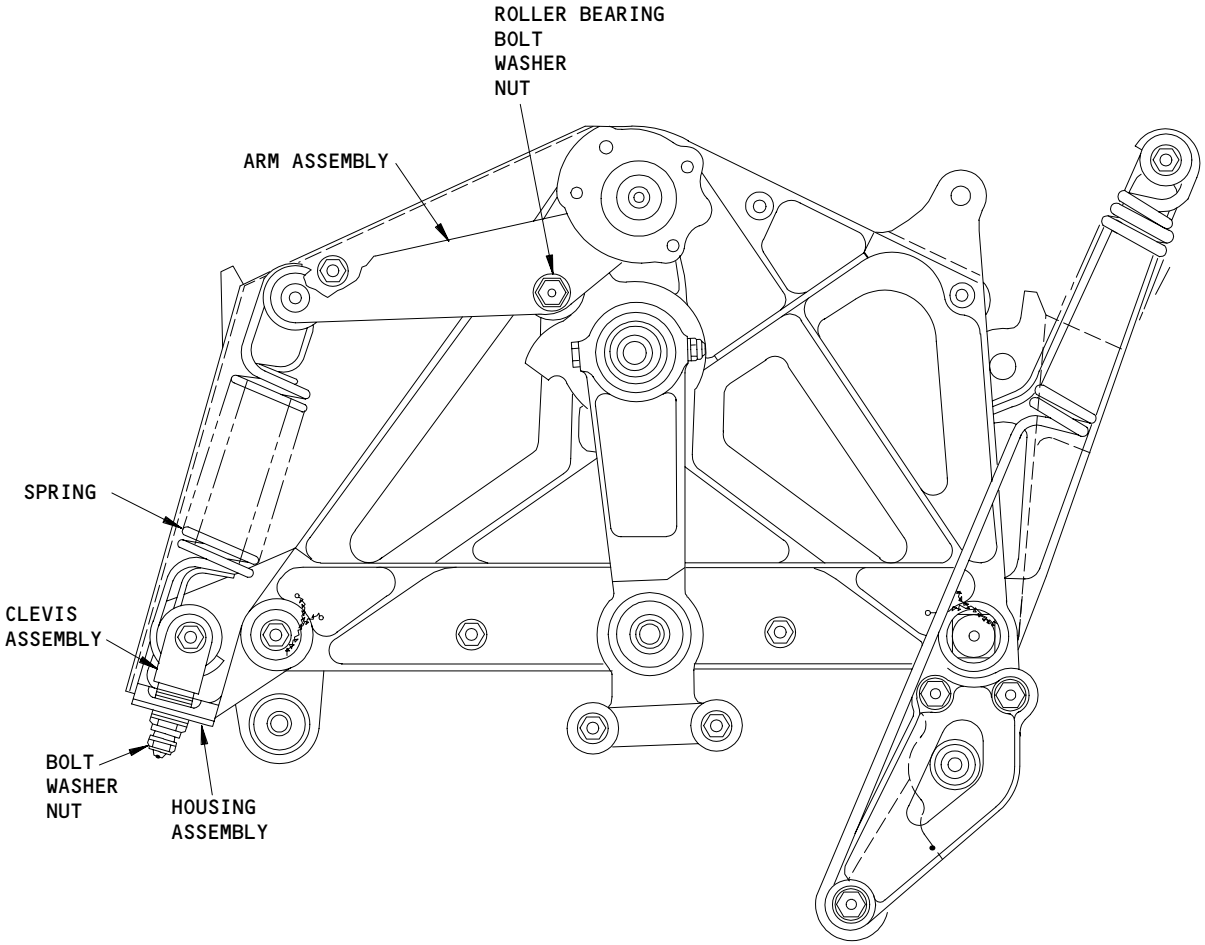
NEUTRAL SHIFT MECHANISM

C

Elevator Feel Unit Adjustment
Figure 203 (Sheet 2)



Spring Removal/Installation Tool for the Decentering Springs
Figure 204



ELEVATOR FEEL UNIT

Elevator Feel Unit Roller Bearing Installation
Figure 205

TASK 27-31-17-422-020

3. Install the Feel Unit

A. Equipment

(1) Removal/Installation Tool, Elevator Control Decentering Springs - B27060-1

B. Consumable Materials

(1) D00153 Fluid - Hydraulic BMS 3-11

C. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
202	5	Feel and Centering Unit	27-31-53	01	750

D. References

(1) 06-42-00/201, Empennage Access Doors and Panels

(2) 24-22-00/201, Electrical Power - Control

(3) 27-31-00/501, Elevator Control System

E. Access

(1) Location Zones

211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45
313/314 Stabilizer Center Section Compartment

(2) Access Panels

311AL Forward Stabilizer Compartment
313AL Elevator Feel Unit

F. Install the Feel Unit (Fig. 202)

S 432-021

(1) Install the bolts (21, 25), washers (22, 26) and nuts (23, 27) that attach the feel unit (5) to the support bracket (24).

S 432-022
(2) Install the bolt (30), washer (31), and nut (32) to connect the arm assembly (29) to the feel unit (5).

S 432-023
(3) Remove the plugs from the hydraulic lines and the caps from the ports.

S 432-024
(4) Connect the hydraulic lines (6, 7, 8, 9) to the feel actuator (10) (AMM 20-10-09/401).

S 822-030
(5) Do the adjustment for the mechanical linkages for the feel and centering unit (AMM 27-31-00/501).

NOTE: You must do the adjustments for the neutral shift transducers (AMM 22-12-04/401), autopilot servo rods (AMM 22-12-01/401), and PCA input control rods after you adjust the mechanical linkages for the feel and centering unit (AMM 27-31-00/501).

S 432-025
(6) Install the nuts (13), washers (14), and bolts (15) to connect the control rods on the neutral shift mechanism (1) to the feel unit (5) (2 locations).

NOTE: If the adjustable rod is not in the tolerance limits, you must do the adjustment for the adjustable rod (Ref 27-31-00).

S 432-026
(7) Install the bolts (16), washers (17, 19) and nuts (18, 20) to connect the control rods on the aft quadrant (12) to the feel unit (5) (2 locations).
(a) Tighten the nuts as follows:
1) Tighten the nut (18) to 50 - 60 pound-inches (5.7 - 6.7 Newton-meters).

2) Tighten the nut (20) to 10 pound-inches (1.1 Newton-meter).

S 432-027

CAUTION: DO NOT REPLACE THE DECENTERING SPRINGS ONE AT A TIME. ALL FOUR OF THE DECENTERING SPRINGS MUST BE CLOSE TOLERANCE SPRINGS (± 2 PERCENT). DAMAGE TO THE AIRPLANE CAN OCCUR IF THEY ARE NOT CLOSE TOLERANCE SPRINGS.

(8) Use the spring removal/installation tool to install the decentering springs (if not already connected), (11) on the feel unit (5) (Fig. 204).

S 212-028

(9) Make sure the springs are installed correctly.

S 432-029

(10) Connect the electrical connectors to the RVDTs (3 locations).

S 712-031

(11) Do the test for the elevator feel system forces (AMM 27-31-00/501).

S 732-066

(12) Do the Control Column Breakout Test in the Elevator Control System - System Test (AMM 27-31-00/501).

S 732-067

(13) Do the Autopilot Hardover Test in the Elevator Control System - System Test (AMM 27-31-00/501).

S 732-068

(14) Do the MCDP Ground Test 68 - Elevator Servo Limit (FIM 22-00-04/101).

G. Put the Airplane Back to Its Usual Condition

S 862-032

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11B19, STAB TRIM ALT
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT

(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 862-033
(2) Remove electrical power, if it is not necessary (Ref 24-22-00).

S 412-034
(3) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 412-035
(4) Close the access door for the elevator feel unit, 313AL (Ref 06-42-00).

TASK 27-31-17-022-036

4. Remove the Feel Unit Roller Bearing

A. Equipment
(1) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-8
(2) Test Box, Elevator Control System Hardover - B27071-34, Preferred

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

(2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Elevator Feel Unit

D. Prepare for the Removal

S 012-037

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(1) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 862-038

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 862-039

(3) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 201).

S 862-040

(4) Remove the pressure from the right, left, and center hydraulic systems (Ref 29-11-00).

S 862-041

(5) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 862-042

(6) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 862-043

(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 012-044

(8) Open the access door for the feel unit, 313AL (Ref 06-42-00).

E. Remove the Feel Unit Roller Bearing (Fig. 205)

S 022-045

(1) Disconnect the clevis assembly from the housing assembly to relax the spring.

S 022-046
(2) Keep a record of the number and thickness of the washers, and save the washers.

NOTE: The same washers and dimensions must be used to install the clevis assembly.

S 022-047
(3) Remove the springs and clevises.

S 022-048
(4) Disconnect the control rods for the neutral shift mechanism from the feel unit (2 locations).

S 022-049
(5) Remove the two springs from the bracket assembly.

S 022-050
(6) Remove the bracket assembly.

S 022-051
(7) Carefully rotate and hold the feel unit until you can get access to the roller bearing.

NOTE: Remove the feel unit as required for access to the roller bearing (AMM 27-31-17/201).

S 022-052
(8) Remove the roller bearing from the arm assembly.

TASK 27-31-17-402-053

5. Install the Feel Unit Roller Bearing

A. Consumable Materials
(1) D00153 Fluid - Hydraulic BMS 3-11

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) FIM 22-00-04/101, Autoflight BITE MCDP Ground Tests - Support
(3) 27-31-00/501, Elevator Control System

C. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45
313/314 Stabilizer Center Section Compartment

(2) Access Panels
311AL Forward Stabilizer Compartment
313AL Elevator Feel Unit

D. Install the Feel Unit Roller Bearing

S 422-054
(1) Install the bolt, washer, and nuts that attach the roller bearing to the arm assembly.
(a) Tighten the nuts as follow:
1) Tighten the inner nut to 85 - 100 pound-inches (9.6-11.3 newton-meters).
2) Tighten the outer nut to 30 - 35 pound-inches (3.4-4.0 newton-meters).
NOTE: Do not change the torque value for the inner nut.

S 422-079
(2) Install the feel unit (AMM 27-31-17/201).

S 422-055
(3) Install the bracket assembly.

S 422-056
(4) Install the two springs to the bracket assembly.

S 422-057
(5) Install the nuts, washers and bolts to connect the control rods on the neutral shift mechanism to the feel unit.

NOTE: If the adjustment rod is not in tolerance limits, you must do the adjustment for the adjustable rods (AMM 27-31-00/501).

S 422-058
(6) Install the bolts, washers, and nuts to connect the springs and clevis to the housing assembly.
(a) Tighten the nuts as follows:
1) Tighten the inner nut to 85 - 100 pound-inches (9.6-11.3 Nm).
2) Tighten the outer nut to 30 - 35 pound-inches (3.38-3.95 Newton-meters).

NOTE: Do not change the torque value for the inner nut.

S 862-059
(7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR

(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 732-060
(8) Do the Control Column Breakout Test in the Elevator Control System - System Test (AMM 27-31-00/501).

S 732-061
(9) Do these steps to check for elevator feel system forces:
(a) Move the captain's control column full forward.
(b) Move the captain's control column full aft.
(c) Move the captain's control column back to the neutral position.
(d) Verify that the control columns move smoothly and without binding through the entire travel range.

S 732-070
(10) Do the Autopilot Hardover Test in the Elevator Control System - System Test (AMM 27-31-00/501).

NOTE: When accomplishing the Autopilot Hardover Test for the purpose of post-installation checking of the feel unit roller bearing, it is only necessary to perform that portion of the hardover test with pitot systems number 1 and 2 not pressurized.

S 732-063
(11) Do the MCDP Ground Test 68 - Elevator Servo Limit (FIM 22-00-04/101, Fig. 111).

S 412-064
(12) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

ELEVATOR FEEL ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the elevator feel actuator.

TASK 27-31-18-024-001

2. Remove the Feel Actuator
   A. Equipment
      (1) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-13
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          313/314 Stabilizer Center Section Compartment

      (2) Access Panels
          313AL Elevator Feel Actuator

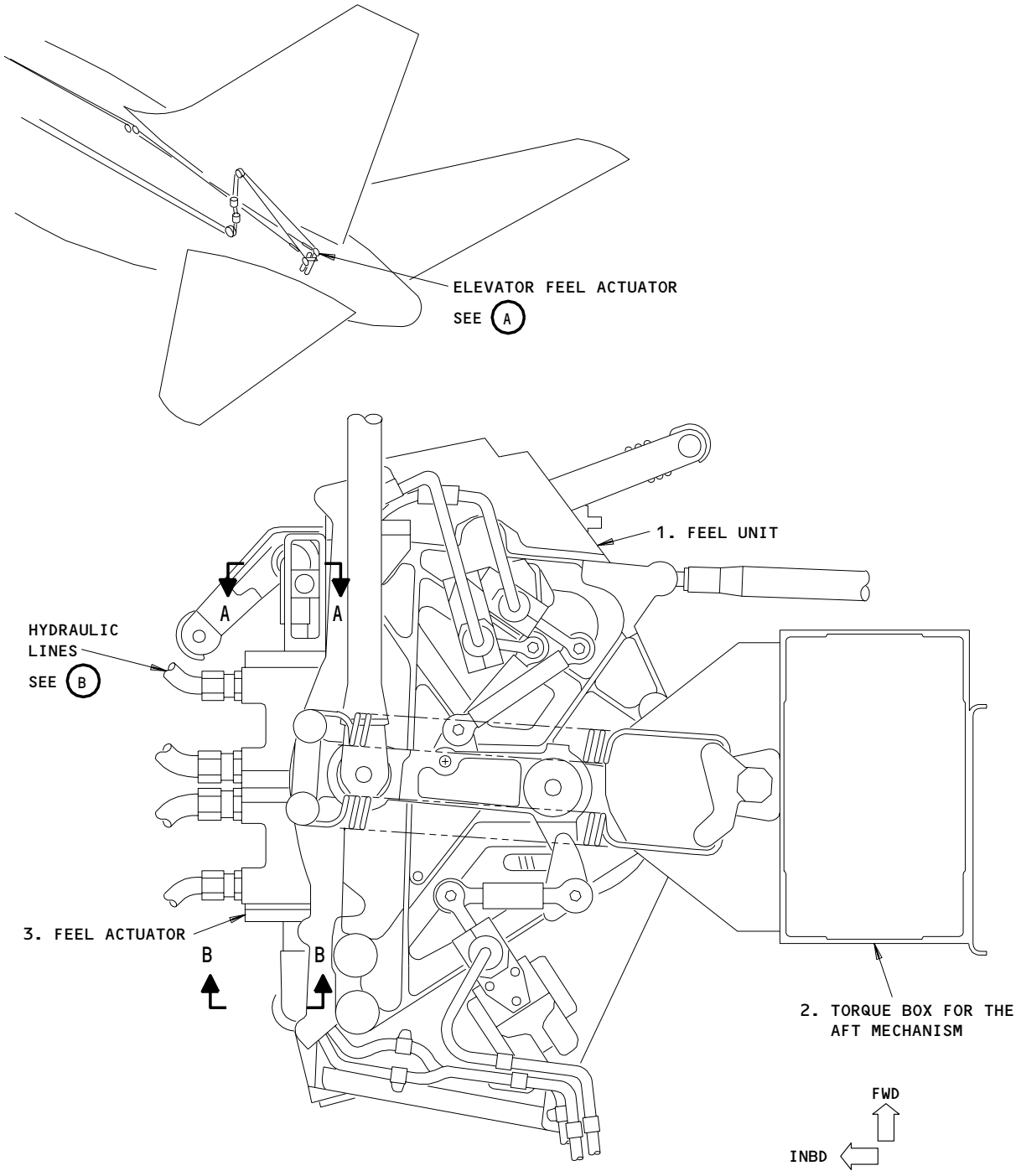
   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003
      (2) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 864-004
      (3) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

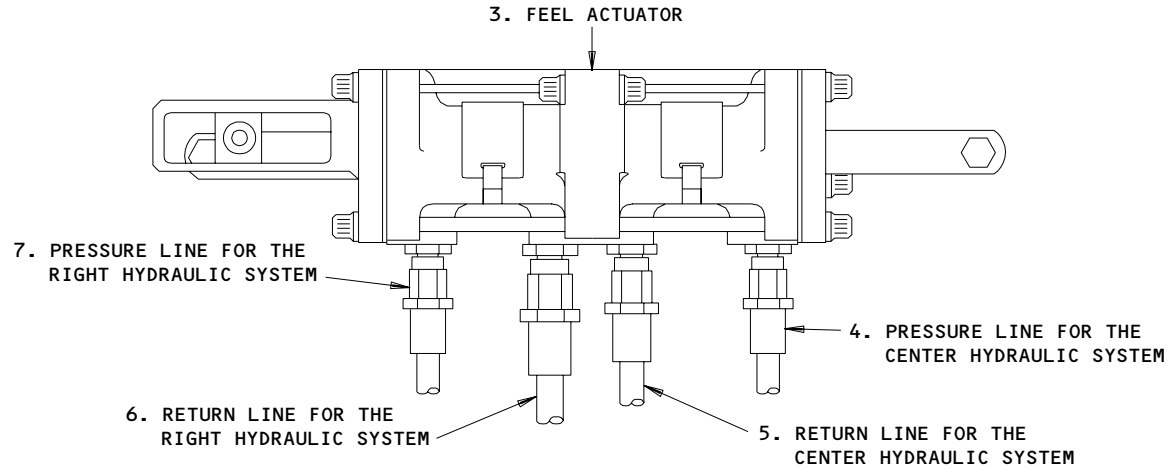
      S 864-005
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11C05 or 11H11, STAB TRIM CONT L
          (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (f) 11H18, FLT CONT SHUTOFF TAIL CTR
          (g) 11H20, STAB TRIM CONT R
          (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT



ELEVATOR FEEL ACTUATOR

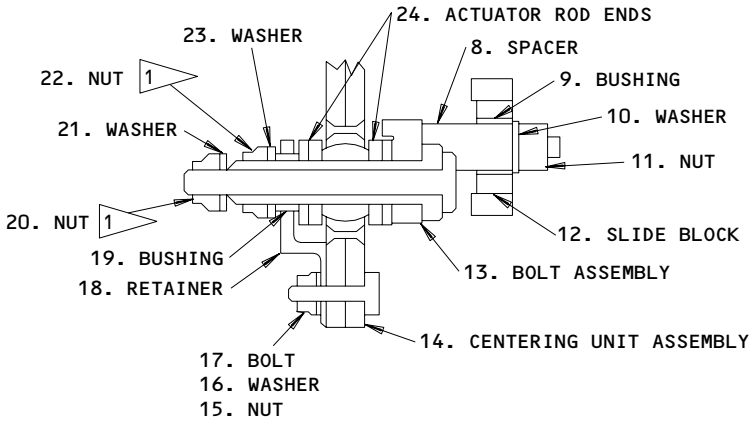
A

Elevator Feel Actuator Installation
Figure 401 (Sheet 1)

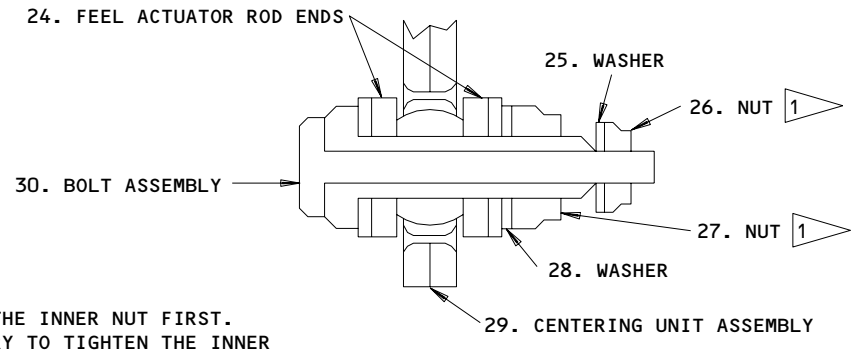


HYDRAULIC LINES

B



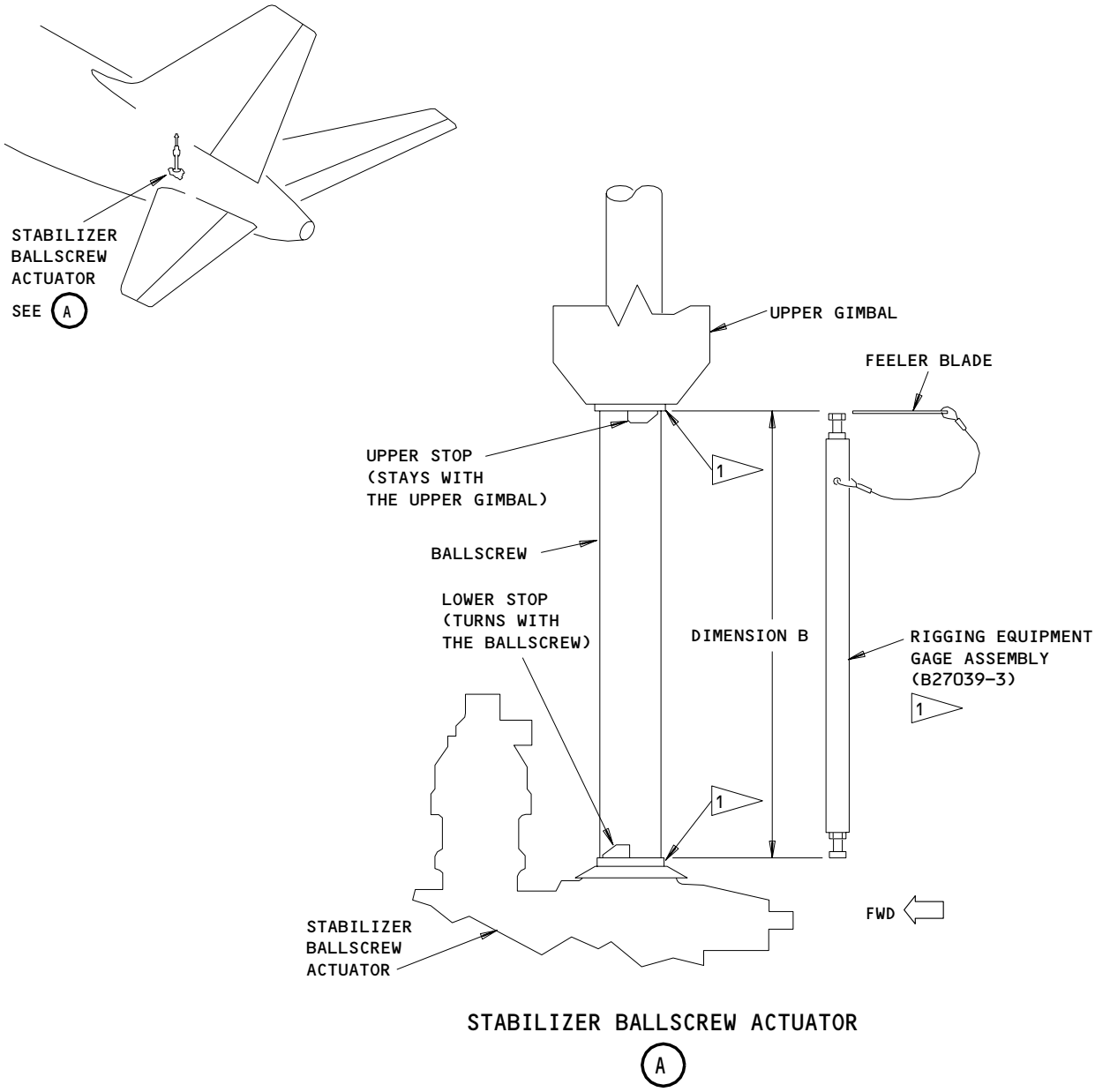
A-A



1 TIGHTEN THE INNER NUT FIRST. DO NOT TRY TO TIGHTEN THE INNER NUT AGAIN AFTER YOU TIGHTEN THE OUTER NUT.

B-B

Elevator Feel Actuator Installation
Figure 401 (Sheet 2)



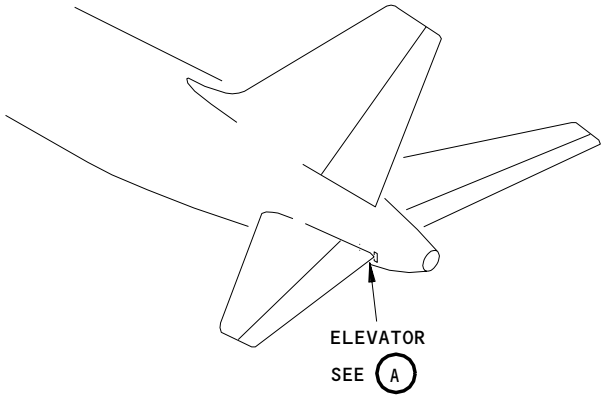
STABILIZER BALLSCREW ACTUATOR

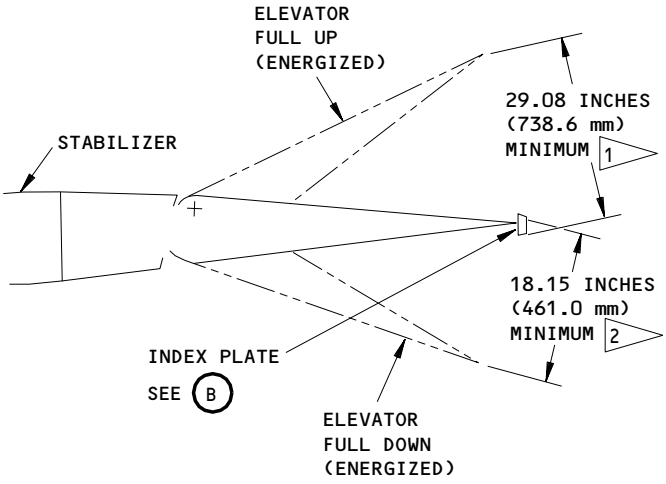
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES, DO THE STEPS THAT FOLLOW:

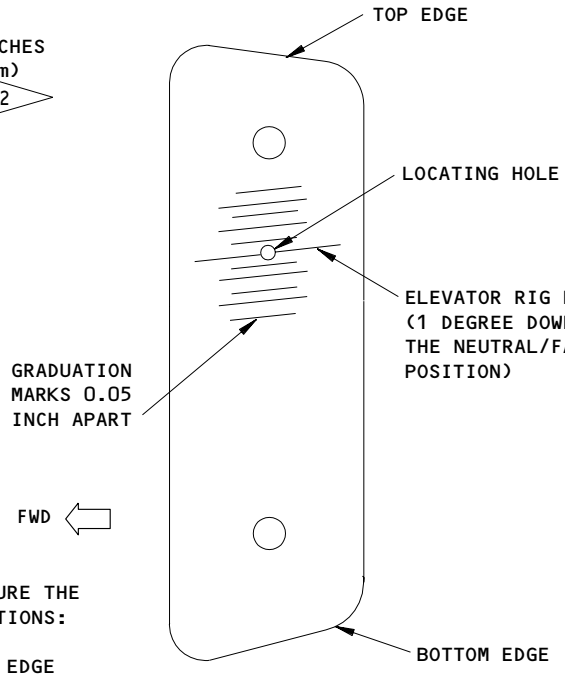
1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 402





ELEVATOR
A



INDEX PLATE
B

1 TO FIND THE ELEVATOR UP TRAVEL DISTANCE, MEASURE THE STRAIGHT-LINE DISTANCE BETWEEN THESE TWO LOCATIONS:
1. THE BOTTOM EDGE OF THE INDEX PLATE
2. THE TOP SURFACE OF THE ELEVATOR TRAILING EDGE AT THE INBOARD CORNER.

2 TO FIND THE ELEVATOR DOWN TRAVEL DISTANCE, MEASURE THE STRAIGHT-LINE DISTANCE BETWEEN THESE TWO LOCATIONS:
1. THE TOP EDGE OF THE INDEX PLATE
2. THE TOP SURFACE OF THE ELEVATOR TRAILING EDGE AT THE INBOARD CORNER.

Elevator Position Measurements
Figure 403

S 014-006

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(5) Open the access door for the feel actuator, 313AL (Ref 06-42-00).

E. Remove the Feel Actuator (Fig. 401)

S 034-007

(1) Disconnect the hydraulic lines (4, 5, 6, 7) from the feel actuator (3).

S 034-008

(2) Put plugs in the hydraulic lines and caps on the ports.

S 034-009

(3) Hold the feel actuator (3) and remove the bolts (13, 17, 30) that connect the feel actuator (3) to the feel unit (1).

S 024-010

(4) Remove the feel actuator (3).

TASK 27-31-18-424-011

3. Install the Feel Actuator

A. Equipment

(1) Scale (to Measure Elevator Travel Linear Distances) - Commercially Available

(2) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-8

(3) Force gage - DPPH-100, Chatillon Inc - 83-30 Kew Garden Rd., Kew Gardens, New York 11415

B. Consumable Materials

(1) D00153 Fluid - Hydraulic BMS 3-11

C. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	3	Actuator Assy (Feel)	27-31-18	01	120

D. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 34-11-00/201, Pitot-Static System

E. Access
(1) Location Zones
211/212 Control Cabin
313/314 Stabilizer Center Section Compartment

(2) Access Panels
313AL Elevator Feel Actuator

F. Install the Feel Actuator (Fig. 401)

S 434-012
(1) Install the bolts (13, 17, 30) to connect the feel actuator (3) to the feel unit (1) and tighten the nuts as follows:
(a) Tighten the nut (11) to 100-125 pound-inches (11.3-14.1 Nm).
(b) Tighten the nut (20) to 30-35 pound-inches (3.39-3.95 Nm).
(c) Tighten the nut (22) to 85-100 pound-inches (9.6-11.3 Nm).
(d) Tighten the nut (26) to 30-35 pound-inches (3.39-3.95 Nm).
(e) Tighten the nut (27) to 85-100 pound-inches (9.6-11.3 Nm).

S 434-013
(2) Remove the plugs from the hydraulic lines and the caps from the ports.

S 434-014
(3) Connect the hydraulic lines (4, 5, 6, 7) to the feel actuator (3).

NOTE: Apply a layer of hydraulic fluid to the hydraulic fittings before you install the lines.

G. Feel Actuator Test

S 864-015

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-016
(2) Move the stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 402).

S 224-017
(3) Push the captain's control column to the forward stop and do the checks that follow:
(a) Make sure the contacts on the aft quadrant stops.
(b) Make sure the left elevator is not less than 18.15 inches (461 mm) away from the top edge of the index plate (Fig. 403).

NOTE: To find the elevator down travel distance, measure the straight-line distance between these two locations:
- The top edge of the index plate
- The top surface of the elevator trailing edge at the inboard corner.

S 224-018

(4) Pull the captain's control column to the aft stop and do the checks that follow:
   (a) Make sure the contacts on the aft quadrant stops.
   (b) Make sure the left elevator position is not less than 29.08 inches away from the bottom edge of the index plate (Fig. 403).

NOTE: To find the elevator up travel distance, measure the straight-line distance between these two locations:
- The bottom edge of the index plate
- The top surface of the elevator trailing edge at the inboard corner.

S 284-019

(5) Push the captain's control column forward slowly until the elevators start to move and do the check that follows:
   (a) Make sure the control column force at this position is 3.0-5.0 pounds.

S 864-020

(6) Let the control column go to the neutral position.

S 284-021

(7) Pull the captain's control column aft slowly until the elevators start to move and do the check that follows:
   (a) Make sure the control column force at this position is 5.5-7.5 pounds.

S 864-022

(8) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 20.02 ± 0.01 inches (508.5 +/- 0.25 mmm).

NOTE: Use tool B27039-15, which is part of B27039-13, to measure this Dimension B.

S 864-023

(9) Remove the pressure from the center hydraulic system (Ref 29-11-00).

S 224-024
(10) Do the check that follows for the control column forces with the right pitot tube pressurized:
(a) Pressurize the lower right pitot tube to 2.40-2.50 psi (311-317 knots) (Ref 34-11-00).
(b) Push the captain's control column forward until the left elevator moves down 1.45 ± 0.05 inches (36.8 +/- 1.2 mm).
(c) Measure and write down the control column force.
(d) Let the control column go to the neutral position.
(e) Pull the captain's control column aft until the left elevator moves up 1.45 ± 0.05 inches (36.8 +/- 1.2 mm).
(f) Measure and write down the control column force.
(g) Let the control column go to the neutral position.
(h) Make sure the sum of the two above control column forces is 75 ± 8 pounds (333 +/- 45 newtons).

S 864-025
(11) Remove the pressure from the right hydraulic system (Ref 29-11-00).

S 864-026
(12) Remove the pressure from the lower right pitot tube (Ref 34-11-00).

S 864-027
(13) Pressurize the center hydraulic system (Ref 29-11-00).

S 224-028
(14) Do the check that follows for the control column forces with the left pitot tube pressurized:
(a) Pressurize the lower left pitot tube to 2.40-2.50 psi (311-317 knots) (Ref 34-11-00).
(b) Push the captain's control column forward until the left elevator moves down 1.45 ± 0.05 inches (36.8 +/- 1.2 mm).
(c) Measure and write down the control column forces.
(d) Let the control column go to the neutral position.
(e) Pull the captain's column aft until the left elevator moves up 1.45 ± 0.05 inches (36.8 +/- 1.2 mm).
(f) Measure and write down the control column force.
(g) Let the control column go to the neutral position.
(h) Make sure the sum of the two above control column forces is 75 ± 8 pounds (333 +/- 35 newtons).

S 864-029
(15) Remove the pressure from the lower left pitot tube (Ref 34-11-00).

S 864-030
(16) Remove the pressure from the left, right and center hydraulic systems (Ref 29-11-00).

H. Put the Airplane Back to Its Usual Condition

S 864-031
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H20, STAB TRIM CONT R
(h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-032
(2) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 864-033
(3) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-034
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-035
(5) Close the access door for the feel actuator (Ref 06-42-00).

ELEVATOR FEEL COMPUTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the elevator feel computer.

TASK 27-31-19-024-001

2. Remove the Feel Computer
   A. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 34-11-00/501, Pitot Static System
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panels
          311AL Forward Stabilizer Compartment

   C. Prepare for the Removal

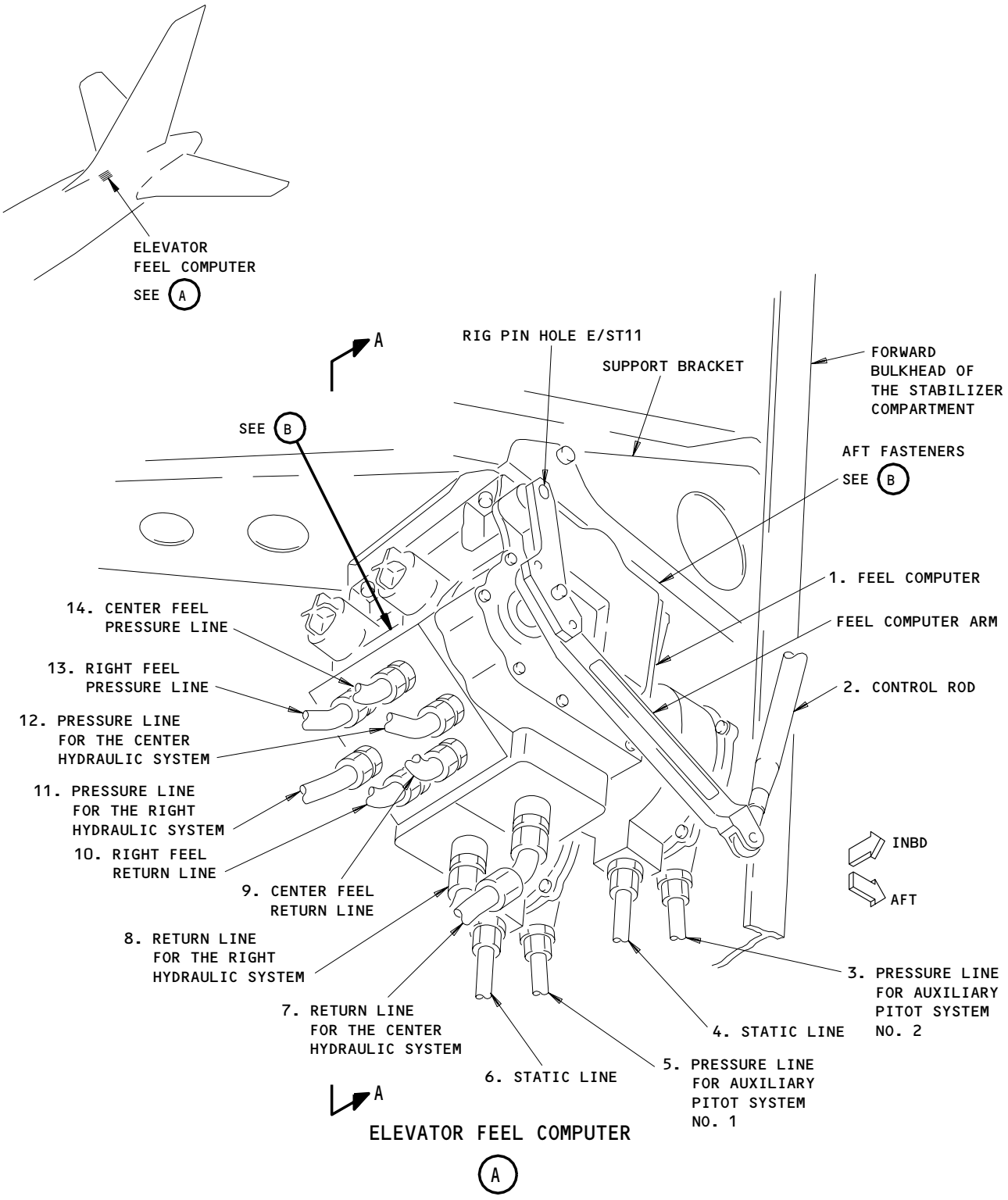
      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003
      (2) Put the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11H11 or 11C05, STAB TRIM CONT L
          (c) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (d) 11H18, FLT CONT SHUTOFF TAIL CTR
          (e) 11H20, STAB TRIM CONT R
          (f) 11H28, FLT CONT SHUTOFF TAIL RIGHT

      S 214-005
      (4) Make sure the pressure in the right and center hydraulic systems is removed (AMM 29-11-00/201).

      S 864-006
      (5) Remove the pressure from the right and center hydraulic reservoirs (AMM 29-11-00/201).



Elevator Feel Computer Installation
Figure 401 (Sheet 1)

22093

S 864-007
(6) Remove the pressure from auxiliary pitot systems No. 1 and 2 (AMM 34-11-00/501).

S 014-008

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(7) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

D. Remove the Feel Computer (Fig. 401)

S 034-009
(1) Disconnect the electrical connector (19) from the feel computer (1).

S 034-010
(2) Do the steps that follow to disconnect the pitot-static, feel pressure and hydraulic lines from the feel computer (1):

NOTE: Make sure you do not get hydraulic fluid in the pitot and static lines.

(a) Attach tags on the pitot-static and hydraulic lines and on the feel computer ports for identification during the subsequent installation.
(b) Disconnect the pitot-static, feel pressure, and hydraulic lines from the feel computer (1).
(c) Put plugs in the lines and caps on the ports.

S 034-011
(3) Remove the nut (17), washer (16), and bolt (15) that connects the control rod (2) to the feel computer arm.

S 034-012
(4) Hold the feel computer (1).

S 034-013
(5) Remove the nuts (20, 27), washers (21, 22, 25, 26) and bolts (23, 24) that attach the feel computer (1) to the airplane structure.

S 024-014
(6) Remove the feel computer (1).

TASK 27-31-19-424-015

3. Install the Feel Computer

A. Equipment

(1) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-13

(2) Rig Pin E/ST11 - P/N B20003-21, Part of Set B20003-XX (Ref 20-10-24)

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Computer Assy (Elevator Feel)	27-31-19	01	50

C. Access

(1) Location Zones

211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panels

311AL Forward Stabilizer Compartment

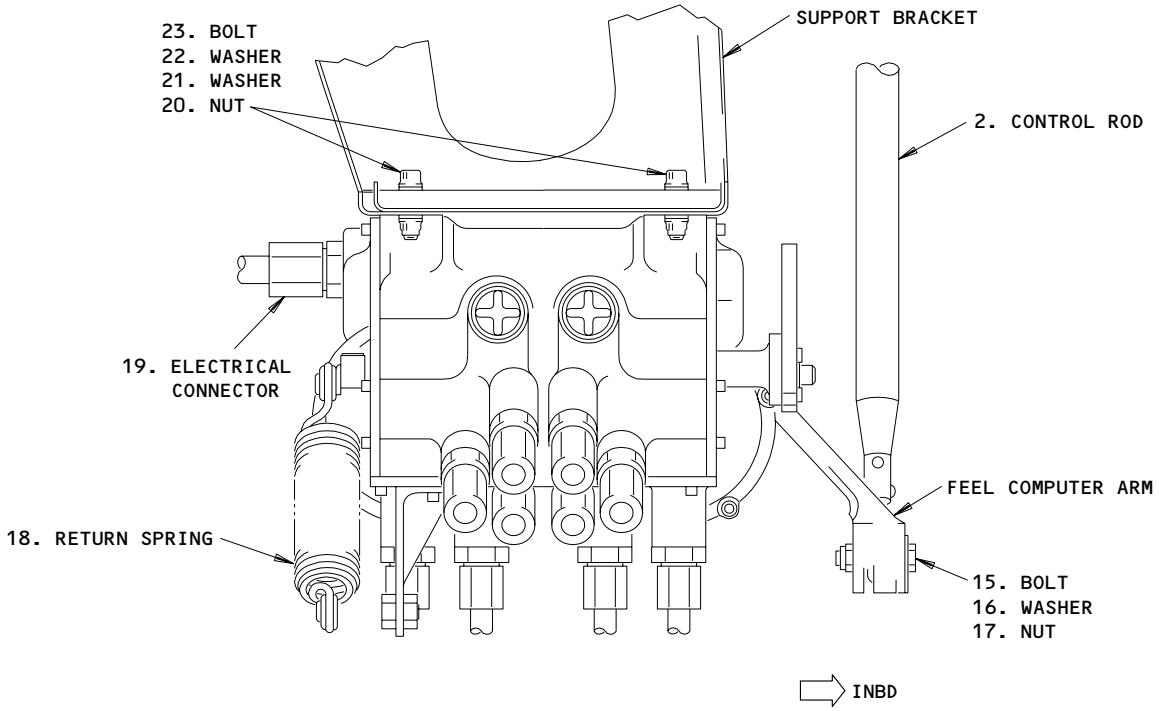
D. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 22-00-02/201, Autoflight BITE
(4) 24-22-00/201, Electrical Power - Control
(5) 27-31-00/501, Elevator Control System
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(7) 34-11-00/501, Pitot Static System

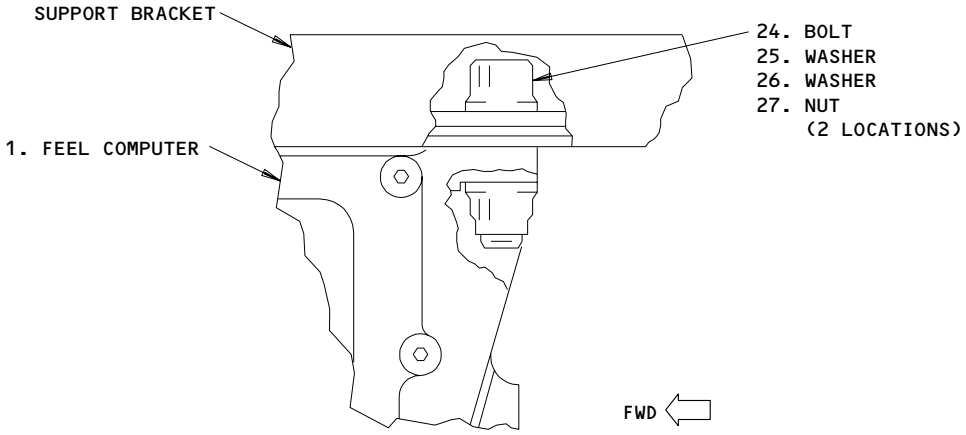
E. Install the Feel Computer (Fig. 401)

S 434-016

(1) Install the bolts (23, 24) washers (21, 22, 25, 26) and nuts (20, 27) to attach the feel computer (1) to the airplane structure.



A-A



AFT FASTENERS

B

Elevator Feel Computer Installation
Figure 401 (Sheet 2)

S 434-017
(2) Remove the plugs from the pitot-static, feel pressure, and hydraulic lines and the caps from the feel computer ports.

S 434-018
(3) Connect the lines to the feel computer (1).

S 434-019
(4) Install the bolt (15), washer (16), and nut (7) to connect the control rod (2) to the feel computer arm.

S 434-020
(5) Connect the electrical connector (19) to the feel computer (1).

F. Adjustment for the Elevator Feel Computer (Fig. 401)

S 864-028
(1) Supply electrical power (AMM 24-22-00/201).

S 864-029
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11H18, FLT CONT SHUTOFF TAIL CTR

S 864-046
(3) Put the C FLT CONTROL SHUTOFF switch on the right side panel, P61, to the ON position.

S 864-030

CAUTION: START ONE HYDRAULIC SYSTEM AT A TIME UNLESS SPECIFIED DIFFERENTLY. HIGH LOADS CAN OCCUR IN THE ELEVATOR, RUDDER, AND STABILIZER STRUCTURES FROM FORCES THAT CAN OCCUR FROM INCORRECTLY ADJUSTED PCAs. DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Pressurize the right and center hydraulic systems (AMM 29-11-00/201)

S 214-031
(5) Make sure there are no leaks at the hydraulic line connections on the feel computer (AMM 29-11-00/201).

S 864-032
(6) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 402).

S 864-033
(7) Remove the pressure from the right and center hydraulic systems (AMM 29-11-00/501).

S 864-034
(8) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to the OFF position.

S 864-035
(9) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11H18, FLT CONT SHUTOFF TAIL CTR

S 034-036
(10) Disconnect the control rod (2) from the feel computer (1).

S 494-037
(11) Install rig pin E/ST11.

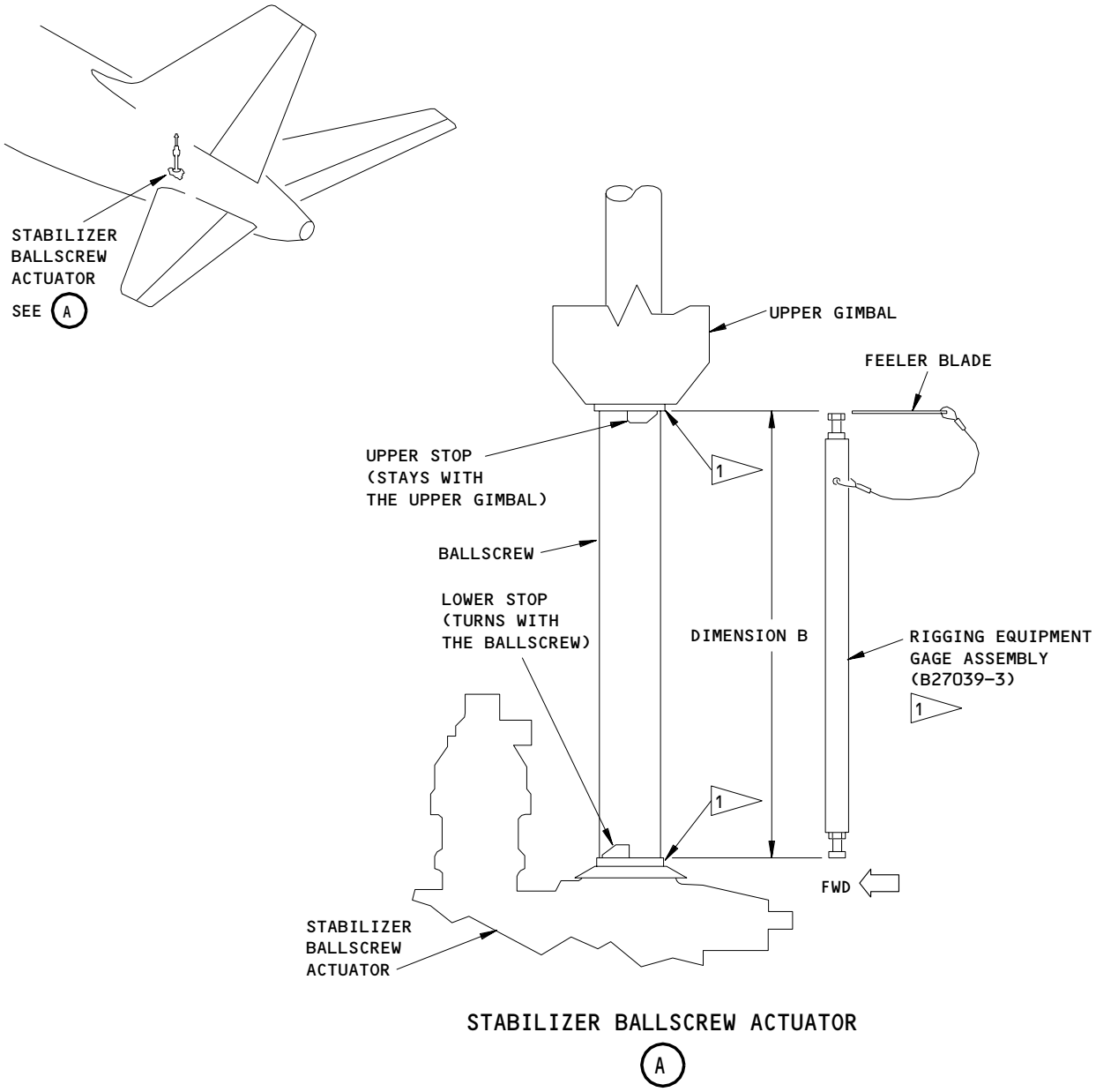
S 834-038
(12) Adjust the length of the control rod until the conditions that follow are correct:
(a) The bolt can be freely installed through the clevis of the feel computer arm and the rod end.
(b) Rig pin E/ST11 can be removed with finger pressure only.

S 434-039
(13) Install the bolt (15), washer (16), and nut (17).

S 214-040
(14) Make sure the rod end threads are engaged correctly.

NOTE: You can see the rod end through the inspection hole.

S 094-041
(15) Remove rig pin E/ST11.



STABILIZER BALLSCREW ACTUATOR

A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 402

G. Test for the Elevator Feel System and Autopilot Authority

S 714-042
(1) Do the test that follows for pitot-static leaks:
(a) Do the test for the auxiliary pitot systems No. 1 and 2 line connections to the feel computer (AMM 34-11-00/501).
(b) Do a visual check to make sure the static line connections on the feel computer are installed correctly.

S 714-043
(2) Do the the EICAS message test for the elevator feel system (AMM 27-31-00/501).

S 714-044
(3) Do the test for the forces in the elevator feel system (AMM 27-31-00/501).

S 714-045
(4) Do the MCDP ground test 08-SERVO ELEV (AMM 22-00-02/201).

H. Put the Airplane Back to Its Usual Condition

S 864-023
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11H11 or 11C05, STAB TRIM CONT L
(c) 11H17, FLT CONT SHUTOFF TAIL LEFT
(d) 11H18, FLT CONT SHUTOFF TAIL CTR
(e) 11H20, STAB TRIM CONT R
(f) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-024
(2) Put the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel to the ON position.

S 864-025
(3) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 864-026
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-027
(5) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

ELEVATOR NEUTRAL SHIFT AND OVERRIDE MECHANISM - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the neutral shift and override mechanism.

TASK 27-31-21-024-001

2. Remove the Neutral Shift and Override Mechanism
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST7 - P/N B20003-21
          (b) E/ST10 - P/N B20003-21
      (2) Gage Assembly - B27039-3, Part of the Elevator and Stabilizer Rigging Equipment, B27039-13
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
313/314	Stabilizer Center Section Compartment

      (2) Access Panels

311AL	Forward Stabilizer Compartment
313AL	Elevator Neutral Shift and Override Mechanism

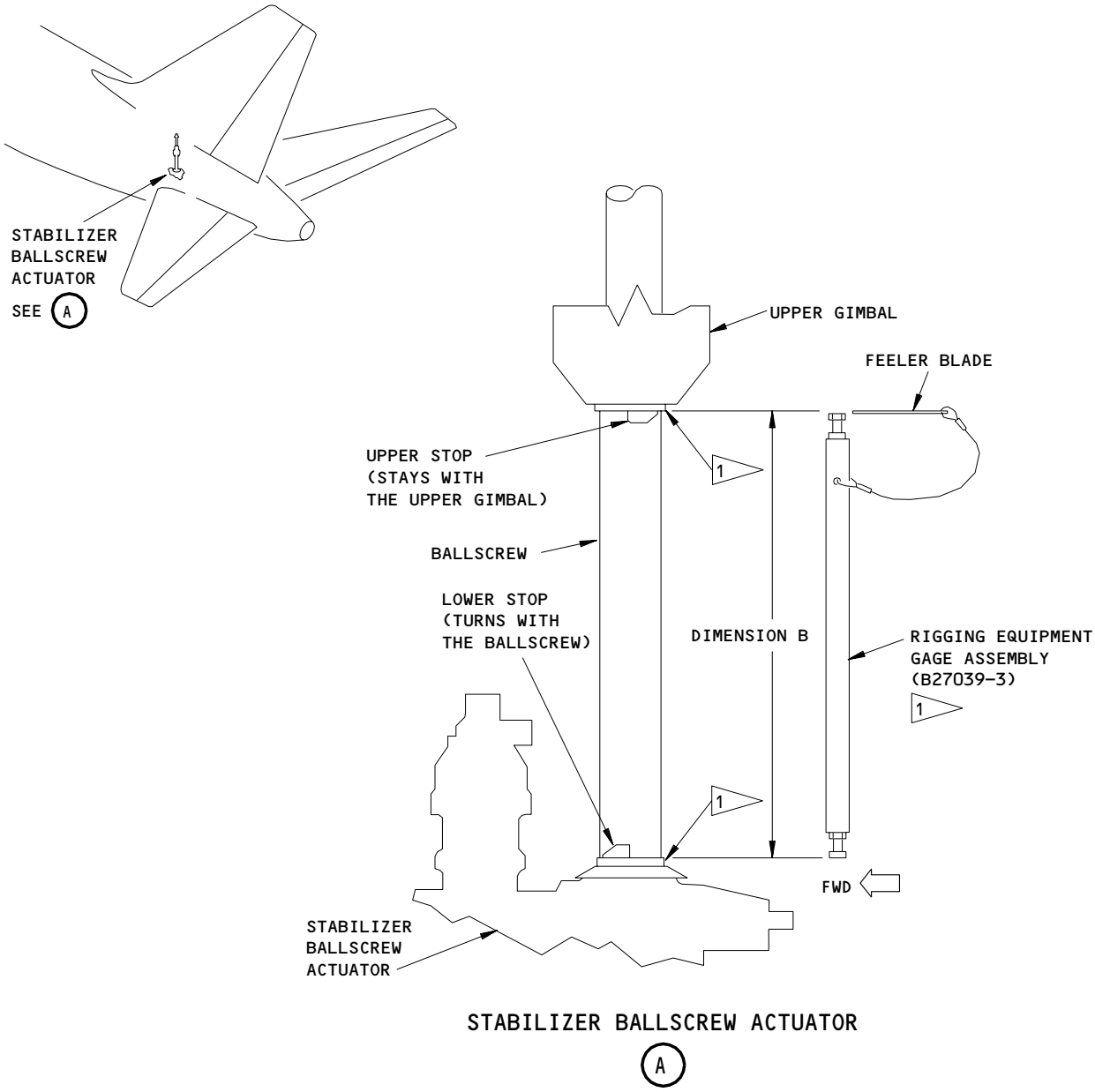
   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 014-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (2) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).



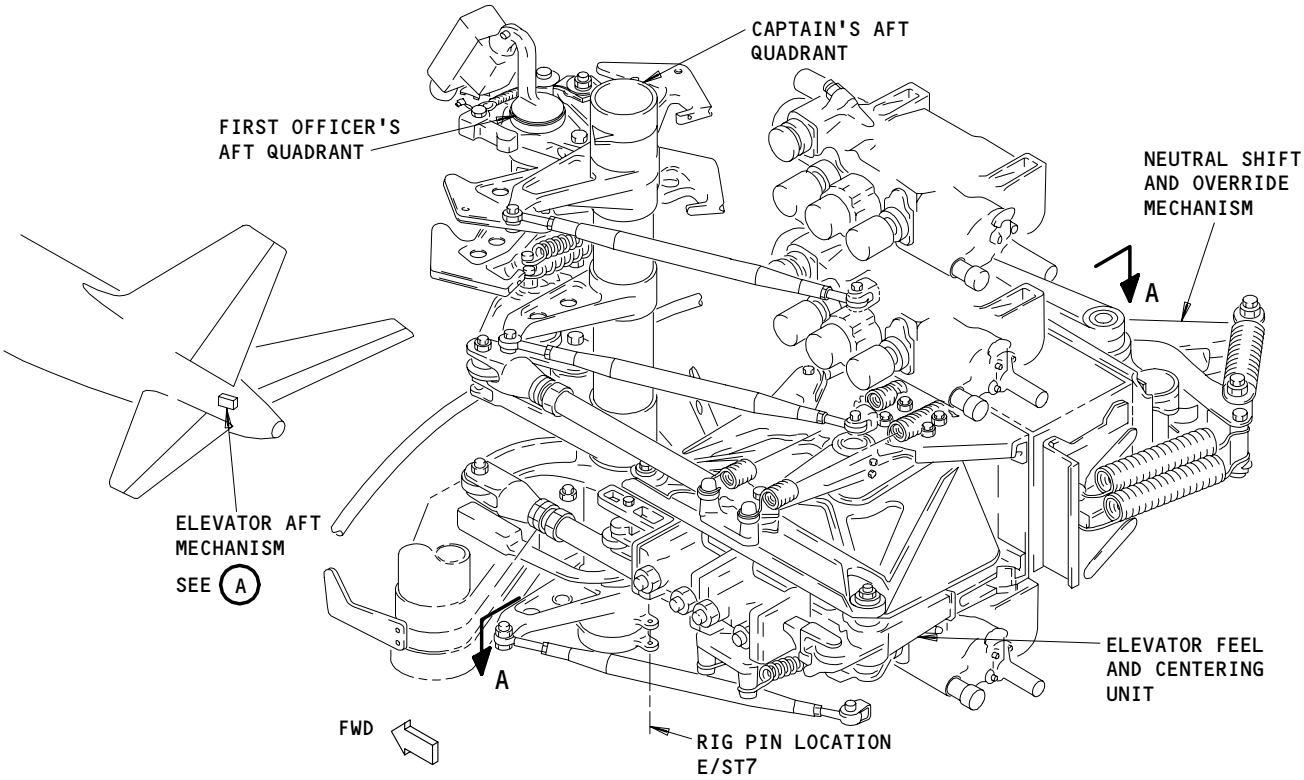
STABILIZER BALLSCREW ACTUATOR

A

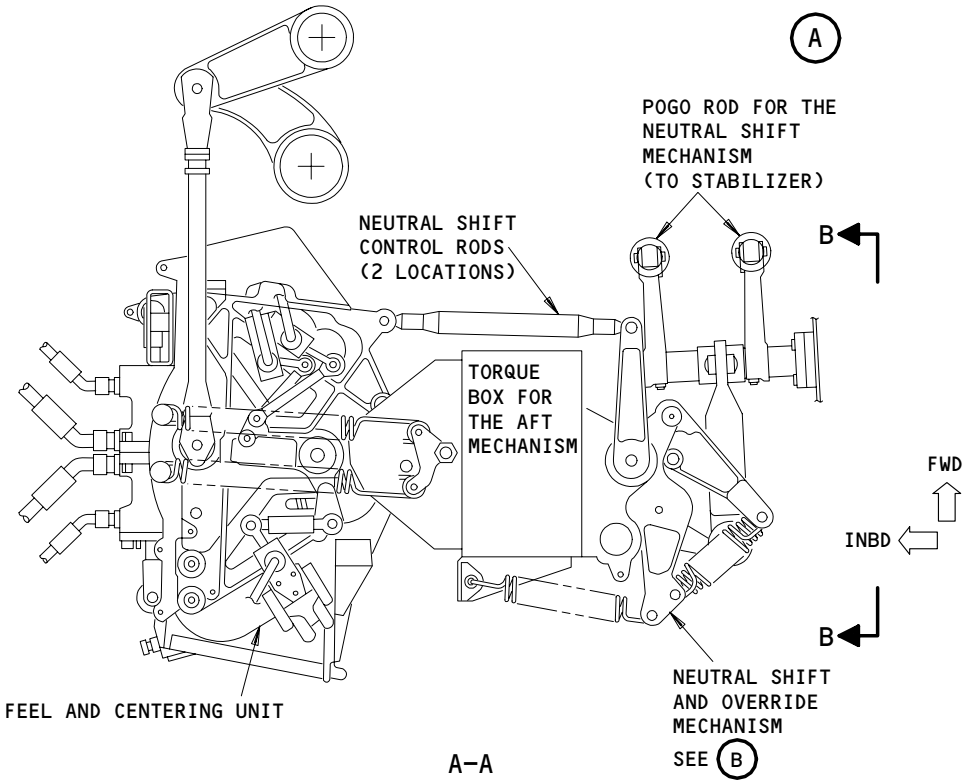
1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES (403.60 ±0.25 mm), DO THE STEPS THAT FOLLOW:

1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 401

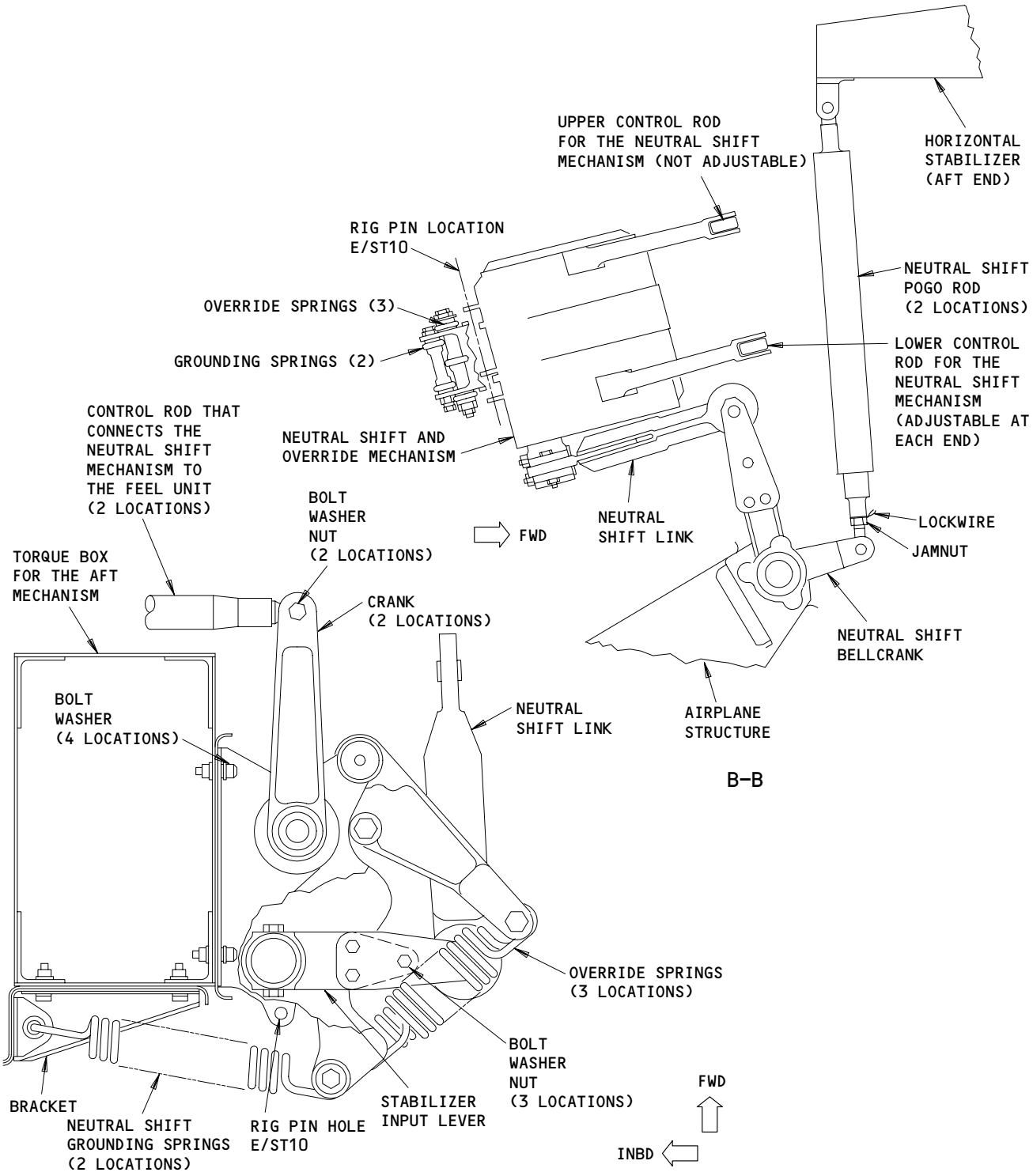


ELEVATOR AFT MECHANISM
A



A–A

Elevator Neutral Shift and Override Mechanism Installation
Figure 402 (Sheet 1)



NEUTRAL SHIFT AND OVERRIDE MECHANISM

B

Elevator Neutral Shift and Override Mechanism Installation
Figure 402 (Sheet 2)

S 864-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 014-005

(4) Open the access door for the neutral shift and override mechanism, 313AL (Ref 06-42-00).

S 864-006

(5) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm) (Fig. 401).

S 864-007

(6) Remove the pressure from the right and center hydraulic systems (Ref 29-11-00).

S 864-008

(7) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-009

(8) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-010

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H17, FLT CONT SHUTOFF TAIL LEFT
   (f) 11H18, FLT CONT SHUTOFF TAIL CTR
   (g) 11H20, STAB TRIM CONT R
   (h) 11H28, FLT CONT SHUTOFF TAIL RIGHT

E. Remove the Neutral Shift and Override Mechanism (Fig. 402)

S 494-011

(1) Install rig pin E/ST7 in the aft quadrants.

S 494-012
(2) Install rig pin E/ST10 in the neutral shift housing.

S 034-013
(3) Disconnect the two control rods that connect the neutral shift mechanism to the feel and centering unit.

NOTE: Do not change the adjustment of the control rods.

S 034-014
(4) Remove the three fasteners that connect the neutral shift link to the neutral shift mechanism at the stabilizer input lever.

S 034-015
(5) Remove the two grounding springs that connect the neutral shift mechanism to the torque box bracket on the elevator aft mechanism.

NOTE: Each spring has a force of 150 pounds (667 newtons).

S 034-016
(6) Remove the four fasteners that attach the neutral shift mechanism to the torque box of the elevator aft mechanism.

S 024-017
(7) Remove the neutral shift and override mechanism.

TASK 27-31-21-424-018

3. Install the Neutral Shift and Override Mechanism

A. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-31-00/501, Elevator Control System

B. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45
313/314 Stabilizer Center Section Compartment

(2) Access Panels
311AL Forward Stabilizer Compartment
313AL Elevator Neutral Shift and Override Mechanism

C. Install the Neutral Shift and Override Mechanism (Fig. 402)

S 434-019
(1) Install the four fasteners to attach the neutral shift mechanism to the torque box for the elevator aft mechanism.

S 434-020
(2) Install the two grounding springs between the neutral shift mechanism and the torque box for the elevator aft mechanism.

S 434-021
(3) Install the three fasteners to connect the neutral shift link to the neutral shift mechanism at the stabilizer input lever.

S 434-022
(4) Install the two control rods that connect the neutral shift mechanism to the feel and centering unit.

S 094-023
(5) Remove rig pins E/ST7 and E/ST10.

S 864-024
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H17, FLT CONT SHUTOFF TAIL LEFT
(f) 11H18, FLT CONT SHUTOFF TAIL CTR
(g) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(h) 11H20, STAB TRIM CONT R

S 864-025
(7) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-026
(8) Put the L, R and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 714-027
(9) Do the test for the neutral shift and override mechanism (Ref 27-31-00).

S 824-028
(10) Do the adjustment for the mechanical linkages on the feel and centering unit, if it is necessary (Ref 27-31-00).

D. Put the Airplane Back to Its Usual Condition

S 864-029
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-030

(2) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-031

(3) Close the access door for the neutral shift and override mechanism, 313AL (Ref 06-42-00).

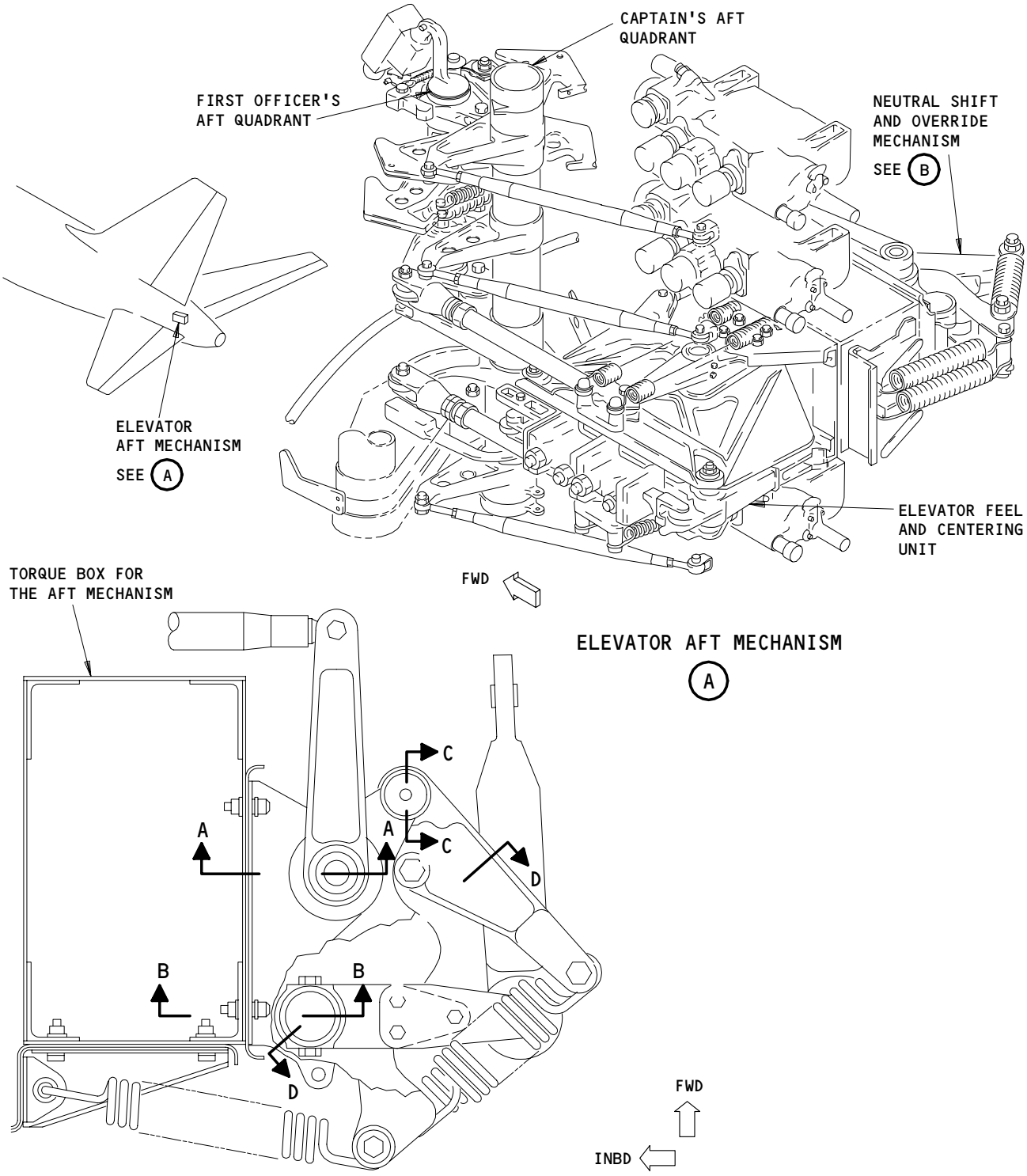
ELEVATOR NEUTRAL SHIFT AND OVERRIDE MECHANISM - INSPECTION/CHECK

1. General
   A. This procedure only has illustrations and a wear limit table which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to Elevator Neutral Shift and Override Mechanism - Removal/Installation for procedures to do these tasks.

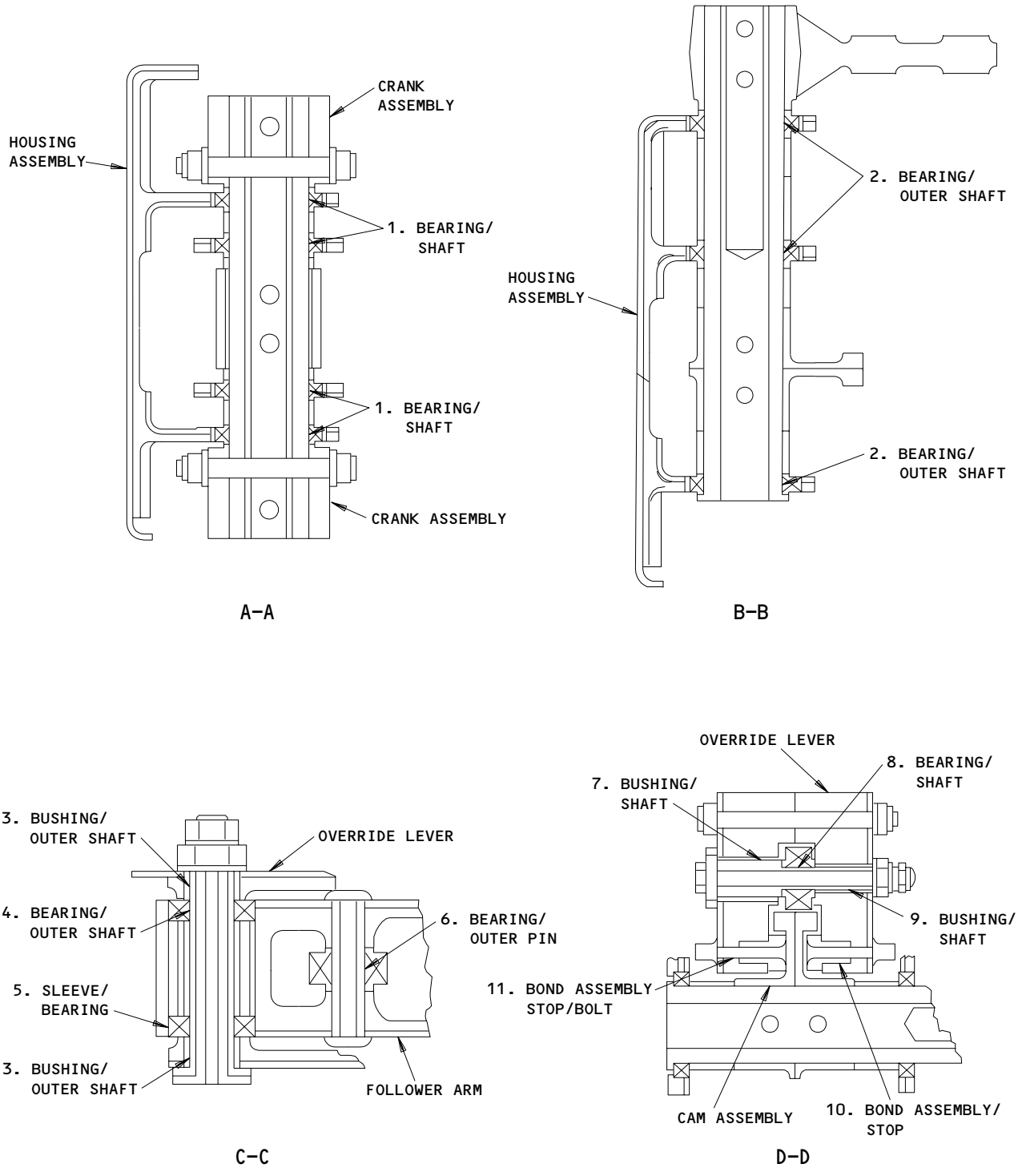
TASK 27-31-21-226-001

2. Wear Limits for the Elevator Neutral Shift and Override Mechanism (Fig. 601)
   A. Access
      (1) Location Zones
          313/314 Stabilizer Center Section Compartment

      (2) Access Panel
          313AL Neutral Shift and Override Mechanism



Wear Limits for the Elevator Neutral Shift and Override Mechanism
Figure 601 (Sheet 1)



Wear Limits for the Elevator Neutral Shift and Override Mechanism
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		PERM-ITTED WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
1	BEARING	ID	1.3120	1.3125	1.3136	0.0016	X		
	SHAFT	OD	1.3117	1.3120	1.3104		X		
2	BEARING	ID	1.3120	1.3125	TBF	TBF	X		
	OUTER SHAFT	OD	1.3116	1.3120	TBF		X		
3	BUSHING	ID	0.6245	0.6248	TBF	TBF	X		
	OUTER SHAFT	OD	0.6243	0.6246	TBF		X		
4	BEARING	ID	0.6245	0.6250	0.6260	0.0014	X		
	OUTER SHAFT	OD	0.6243	0.6246	0.6231		X		
5	SLEEVE	ID	1.0620	1.0625	1.0635	0.0010	X		
	BEARING	OD	1.0620	1.0625	1.0610		X		
6	BEARING	ID	0.3743	0.3750	0.3754	0.0002	X		
	OUTER PIN	OD	0.3749	0.3752	0.3741		X		
7	BUSHING	ID	0.6250	0.6255	TBF	TBF	X		
	SHAFT	OD	0.6245	0.6250	TBF		X		
8	BEARING	ID	0.3743	0.3750	0.3767	0.0024	X		
	SHAFT	OD	0.3738	0.3743	0.3719		X		
9	BUSHING	ID	0.3743	0.3748	TBF	TBF	X		
	SHAFT	OD	0.3738	0.3743	TBF		X		
10	BOND ASSY	ID	0.3755	0.3765	TBF	TBF	X		
	STOP	OD	0.3745	0.3750	TBF		X		
11	BOND ASSY, STOP	ID	0.1900	0.1910	TBF	TBF	X		
	BOLT	OD	0.1880	0.1895	TBF		X		

Wear Limits for the Elevator Neutral Shift and Override Mechanism
Figure 601 (Sheet 3)

CONTROL COLUMN OVERRIDE ASSEMBLY - ADJUSTMENT/TEST

1. General
   A. This procedure contains steps to adjust the override assembly for the control column.

TASK 27-31-23-825-001

2. Adjust the Override Assembly
   A. Equipment
      (1) Force Gage - DPPH-100
          Chatillon Inc.
          83-30 Kew Garden Rd.
          Kew Gardens, New York 11415
      (2) Control Wheel Adapter Equipment (Optional) -
          A27021-97 or -98
   B. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-31-00/501, Elevator Control System
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          113/114 Area Forward of NLG Wheel Well

      (2) Access Panel
          113AL Forward Equipment Bay

   D. Prepare for the Adjustment

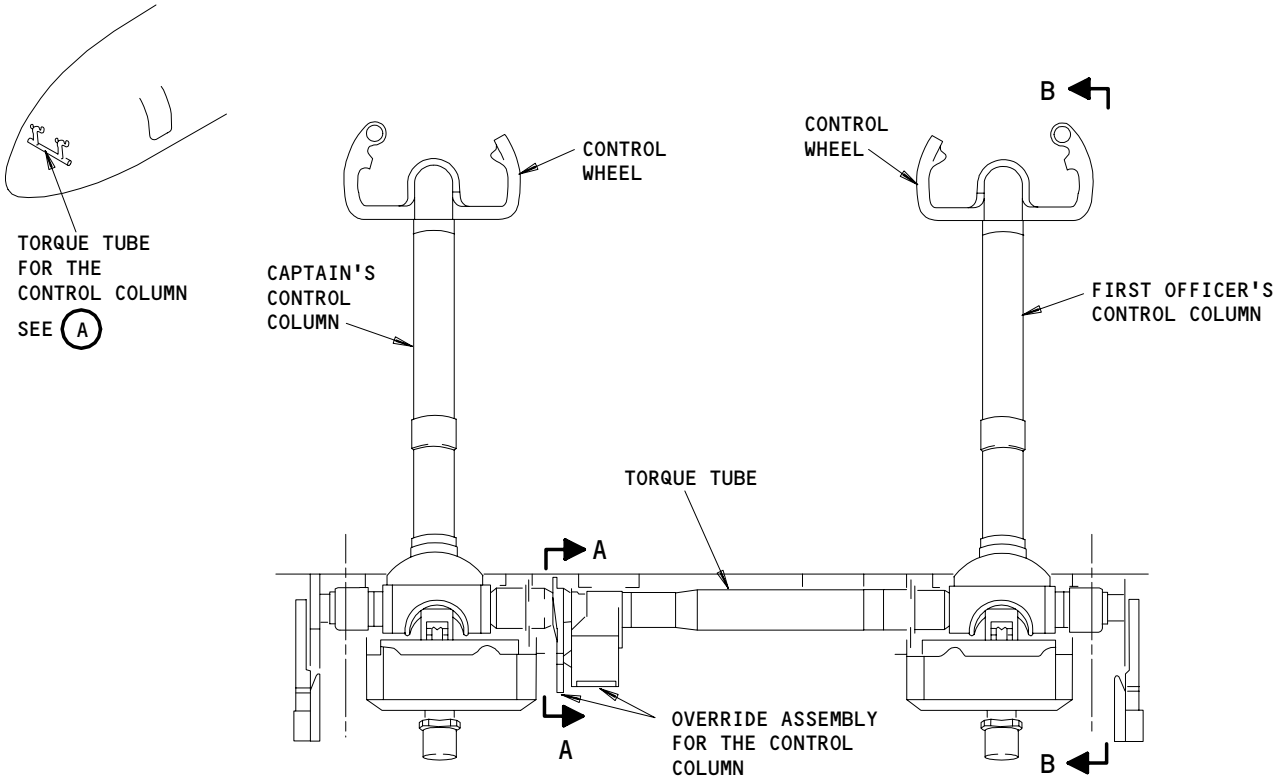
      S 865-002
      (1) Supply electrical power (Ref 24-22-00).

      S 865-003
      (2) Put the R, L and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

      S 865-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (b) 11H18, FLT CONT SHUTOFF TAIL CTR
          (c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

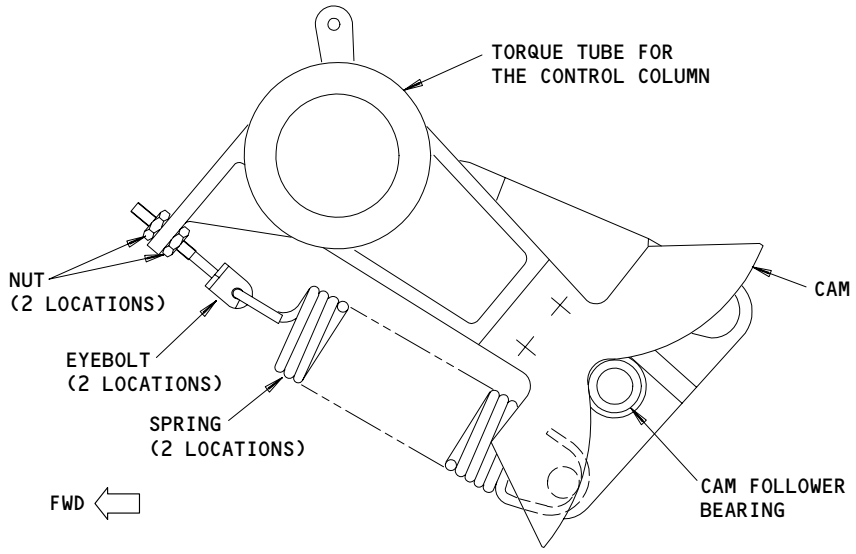
      S 015-005
      (4) Open the access door for the forward equipment bay, 113AL (Ref 06-41-00).

      S 035-006
      (5) Do these steps to disconnect the aft end of the first officer's control rod from the elevator forward quadrant:
          (a) Loosen the bolts that hold the crank to the shaft on the elevator forward quadrant.



TORQUE TUBE FOR THE CONTROL COLUMNS

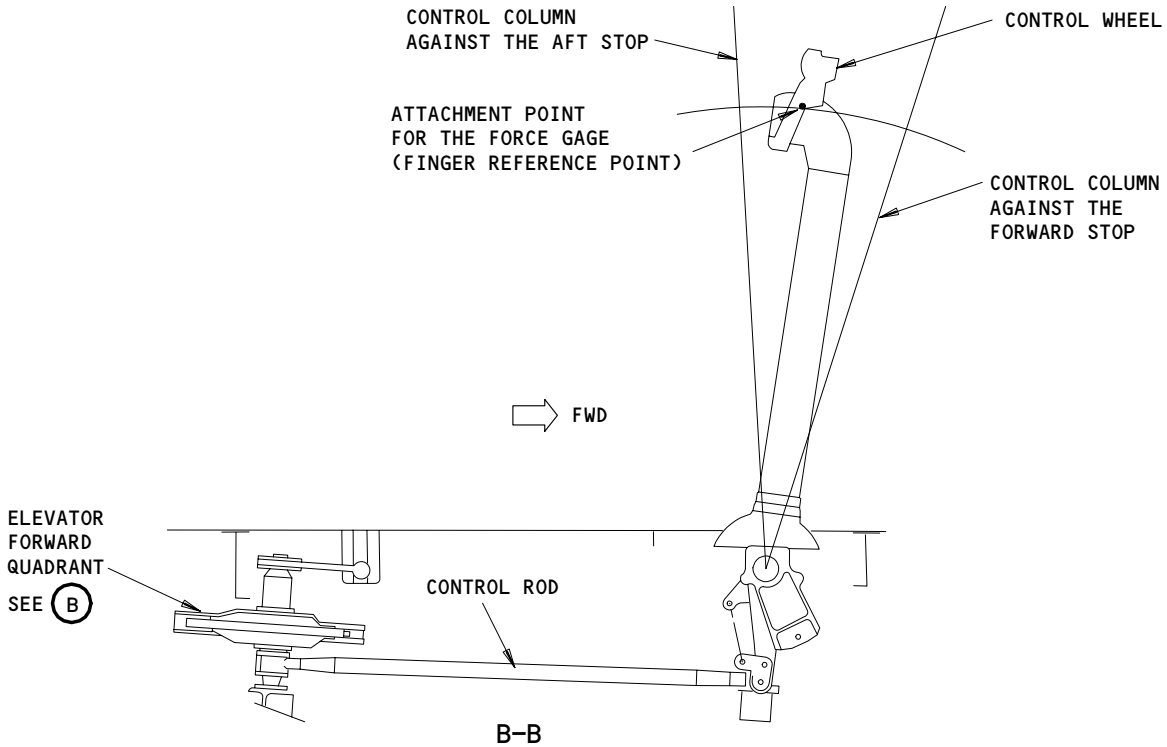
A



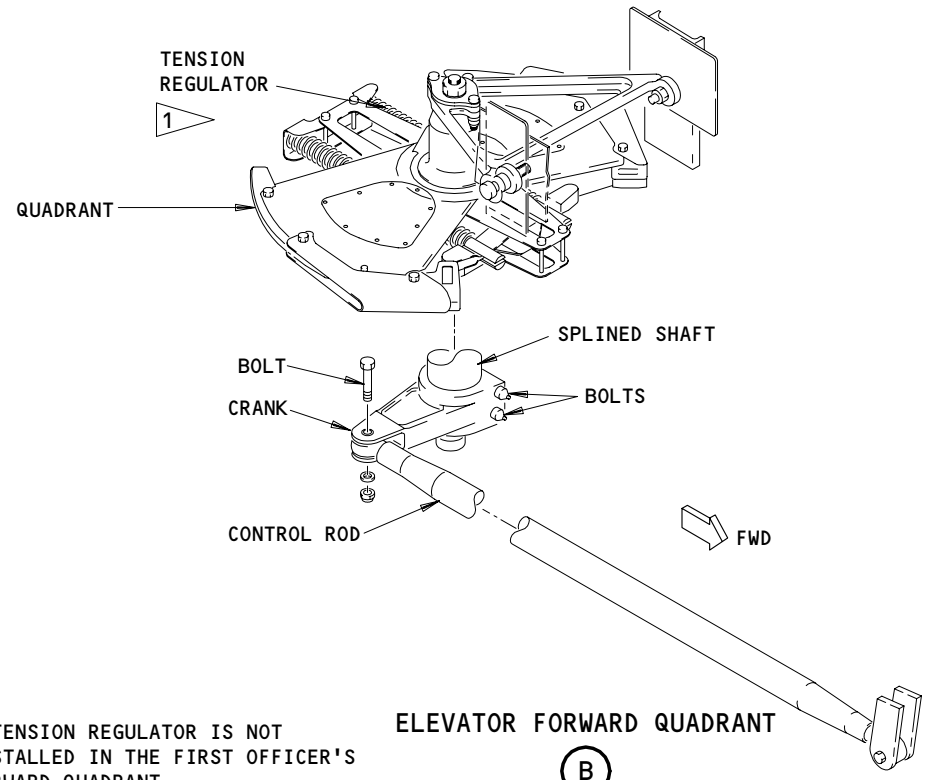
OVERRIDE ASSEMBLY

A-A

Control Column Override Assembly Adjustment
Figure 501 (Sheet 1)



B–B



1 A TENSION REGULATOR IS NOT INSTALLED IN THE FIRST OFFICER'S FORWARD QUADRANT.

ELEVATOR FORWARD QUADRANT
B

Control Column Override Assembly Adjustment
Figure 501 (Sheet 2)

(b) Lower the crank to permit access to the bolt that connects the control rod to the crank.
(c) Disconnect the control rod from the crank.

NOTE: Move the control rod to make sure that it will not get caught when you move the control column.

S 495-007
(6) Install the adapter equipment (if it is available) for the control wheel to the first officer's control wheel.

S 485-008
(7) Install the force gage to one of these locations:
(a) On the adapter equipment (if it is installed) for the control wheel on the first officer's control wheel
(b) At the finger reference point on the control wheel.

E. Adjust the Override Assembly (Fig. 501)

S 865-009
(1) Push the captain's and the first officer's control columns forward and do the steps that follow:
(a) Hold the captain's control column forward (against the forward stop).
(b) Pull the first officer's control column aft with the force gage until the control column starts to move.
(c) Make sure the breakout force is 33.5-37.5 pounds (149-166 newtons).

NOTE: The cam follower bearing breaks out of detent at the cam on the override assembly.

(d) Let the control columns go to the neutral position.

S 865-010
(2) Pull the captain's and the first officer's control columns aft and do the steps that follow:
(a) Hold the captain's control column aft (against the aft stop).
(b) Pull the first officer's control column forward with the force gage until the control column starts to move.
(c) Make sure the breakout force is 32.0-36.0 pounds (143-160 newtons).
(d) Let the control columns go to the neutral position.

S 825-011
(3) If the control columns do not have the above breakout forces, do the steps that follow to correct the breakout forces:

NOTE: These steps adjust the spring eyebolts.

(a) Adjust the locknut.

NOTE: One-half of a turn of the the locknut changes the control column breakout force approximately 0.45 pound (2 newtons).

(b) Make sure the difference in spring lengths is less than 0.04 inch.

(c) Use the double twist method to put a lockwire on the locknuts.

F. Put the Airplane Back to Its Usual Condition

S 085-012
(1) Remove the force gage.

S 095-013
(2) Remove the adapter equipment (if installed) for the control wheel.

S 435-014
(3) Do the steps that follow to connect the aft end of the first officer's control rod to the elevator forward quadrant:

(a) Install the bolt that holds the control rod to the crank and make sure the conditions that follow are correct:
1) You can install the bolt freely and easily.
2) You installed the bolt with the bolt head up.

(b) Lift the crank to its initial position and tighten the bolts on the shaft of the elevator forward quadrant.

(c) Do the adjustment for the elevator cables, if it is necessary (Ref 27-31-00).

S 415-015
(4) Close the access door for the forward equipment bay, 113AL (Ref 06-41-00).

S 865-016
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT

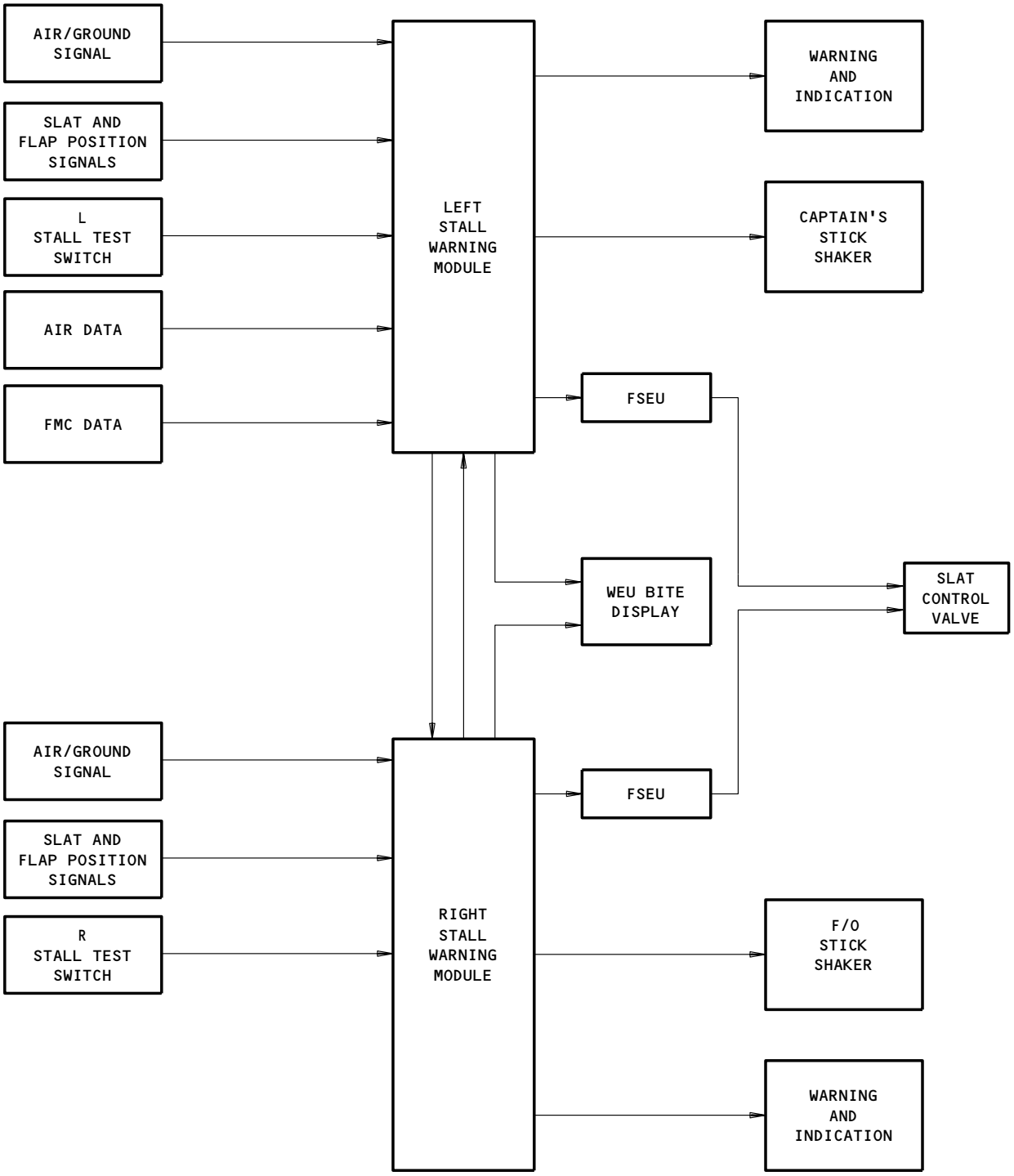
S 865-017
(6) Put the R, L and C FLT CONTROL SHUTOFF switches on the P61 panel to the ON position.

S 865-018

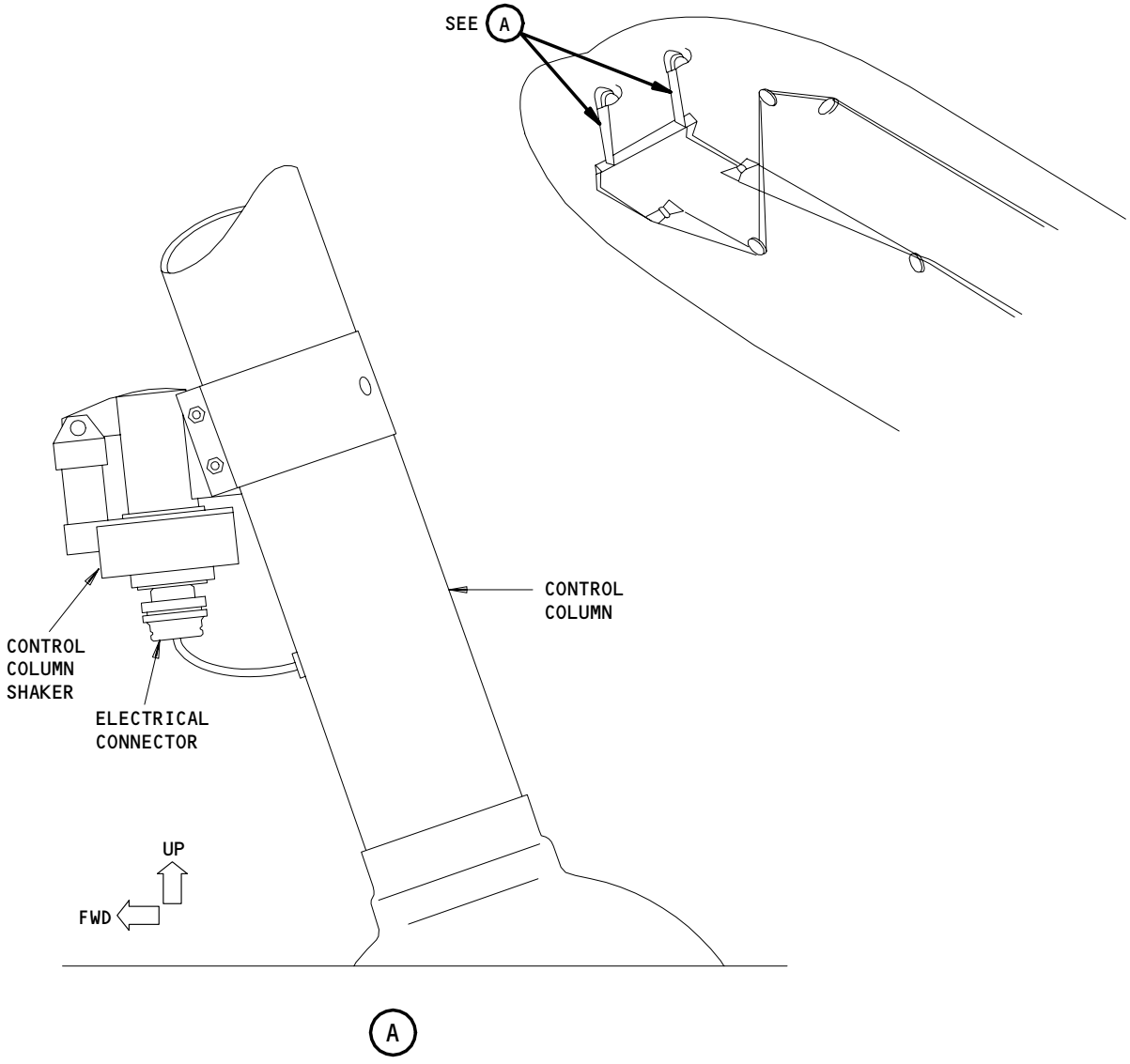
(7) Remove electrical power if it is not necessary (Ref 24-22-00).

STALL WARNING SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The stall warning system provides warning and protection from impending stalls, indication and guidance in windshear conditions, and detection and display of system faults.
   B. In impending stall conditions, the system performs the following functions:
      (1) Shakes both of the control columns to alert the flight crew.
   C. In windshear conditions, the system performs the following functions:
      (1) Signals data to the Ground Proximity Warning Computer (GPWC) to provide the flight crew with visual and aural warnings (Ref 34-46-00).
      (2) Controls the maximum pitch limit value which is signaled to the Electronic Flight Instrument System (EFIS). The maximum pitch limit value is displayed on the Electronic Attitude Director Indicator (EADI) to guide the flight crew (Ref 34-22-00).
   D. The system detects faults as follows:
      (1) The system initiates a self-test following each power up. A WARN ELEX message is displayed on EICAS whenever a fault is detected.
      (2) The BITE detects and displays internal faults and interface faults as alphanumeric codes on the Warning Electronic Unit (WEU) BITE Module.
   E. The stall warning system monitors data inputs from the following systems to perform its functions (Fig. 1):
      (1) Airplane Mach, true air speed, computed airspeed, and indicated angle of attack from Air Data Computers (ADC) (Ref 34-12-00).
      (2) LE slat position from Flap/Slat Electronic Units (FSEU) (Ref 27-51-00).
      (3) TE flap position from Flap/Slat Electronic Units (FSEU) (Ref 27-51-00).
      (4) Airplane pitch angle and pitch rate from Inertial Reference System (IRS) (AMM 34-22-00).
      (5) Power from the WEU power supply modules (AMM 31-51-00).
      (6) Air/Ground Mode from Air/ground relay system (Ref 32-09-00).
   F. The stall warning system includes the following components:
      (1) Left and right stick shakers
      (2) Left and right Stall Warning Computers (SWC's)
      (3) Left and right STALL test switches
      (4) WEU BITE module
2. Component Details
   A. Stick Shakers (Fig. 2)
      (1) The left and right stick shakers are 28v dc motor-driven vibrating devices attached to the forward side of each control column.
      (2) Each stick shaker is activated by its SWC to shake the control column to warn the flight crew of an impending stall. The left stick shaker is controlled by the left SWC and the right stick shaker by the right SWC.



Stall Warning System Introduction
Figure 1



Control Column Shaker
Figure 2

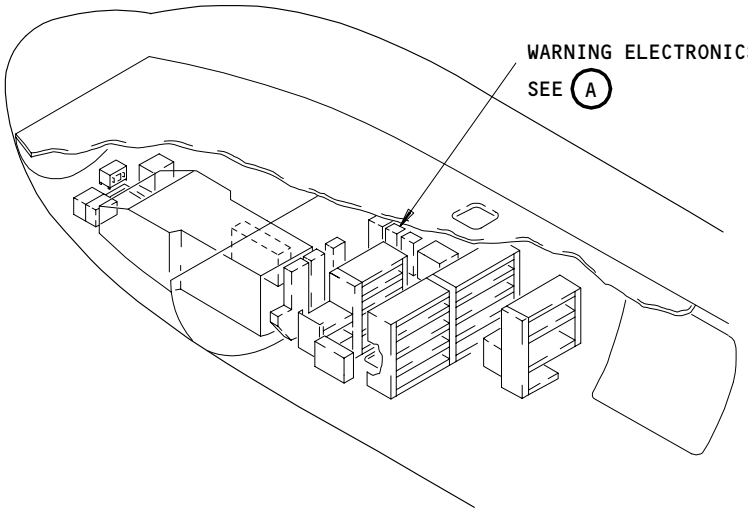
(3) The stick shakers are activated on the ground for test purposes using the STALL L/R test switches.
(4) The stick shakers are located in the flight compartment.

B. Stall Warning Computer (SWC) (Fig. 3)
(1) The two Stall Warning Computers are located in the Warning Electronics Unit (WEU) P51.
(2) Each SWC is powered by the Warning Electronic Unit power supply modules. Each SWC monitors inputs from the ADC, FSEU, IRS, and air/ground relays.
(3) When an impending stall conditions is detected, the stall warning computers activate the stick shakers and extend the slats if the flaps are in the takeoff position. The SWC's provide inputs to the GPWC and EFIS to provide the flight crew with visual and aural warnings and guidance in windshear conditions.
(4) The SWC's continuously monitor for internal and interface faults. When a fault is detected, an EICAS message WARN ELEX status will be displayed to alert the flight crew, and an alphanumeric code will be displayed on the WEU BITE module.
(5) Access to the Stall Warning Computers is through main equipment center access door.

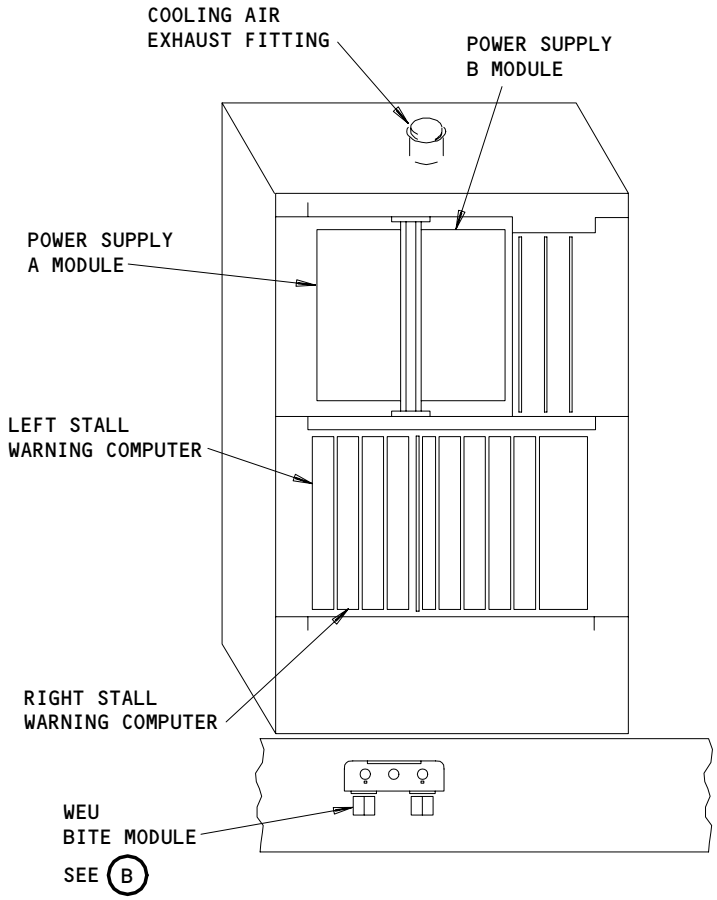
C. STALL Test Switches (Fig. 2)
(1) The STALL L and R test switches are located on sidewall panel P61 in flight compartment. They are used to test the stall warning computer systems on the ground.
(2) The STALL L test switch activates the left stick shaker. The STALL R switch activates the right shaker. When activated, either stall warning test switch will also test the auto slat function if the flaps and slats are in the takeoff position.

D. WEU BITE Module (Fig. 4)
(1) The WEU BITE module is located below the WEU P51 panel. It consists of a printed circuit board with faultballs for WEU power supplies A and B, a power reset switch, and two pairs of hex indicators to display stall warning computers configuration and fault codes.
(2) The module displays alphanumeric codes for SWC's internal and interface faults, airplane configuration, airplane options, and software version.

3. Operation
A. Functional Description (Fig. 4)
(1) The stall warning system is active in the air, and can be activated on ground by using the STALL test switches.

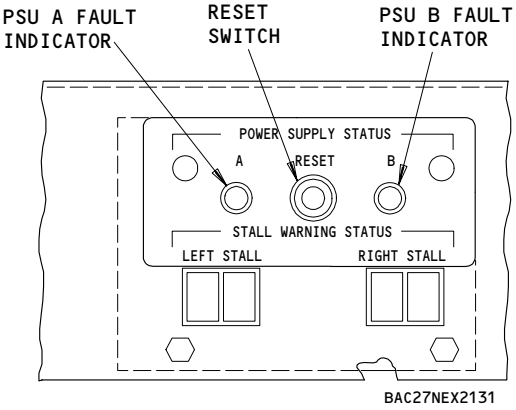


MAIN EQUIP CTR



WARNING ELECTRONICS UNIT P51

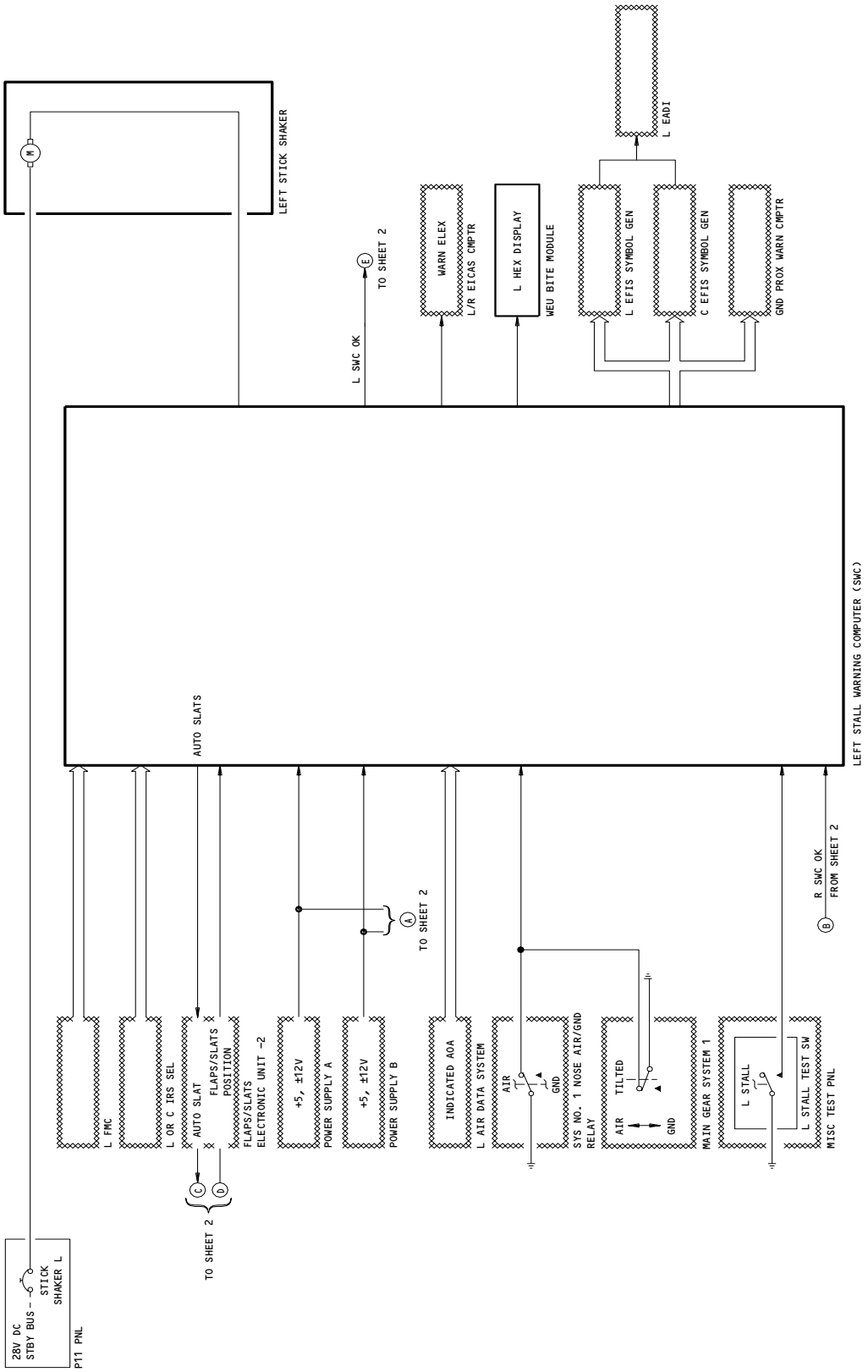
A



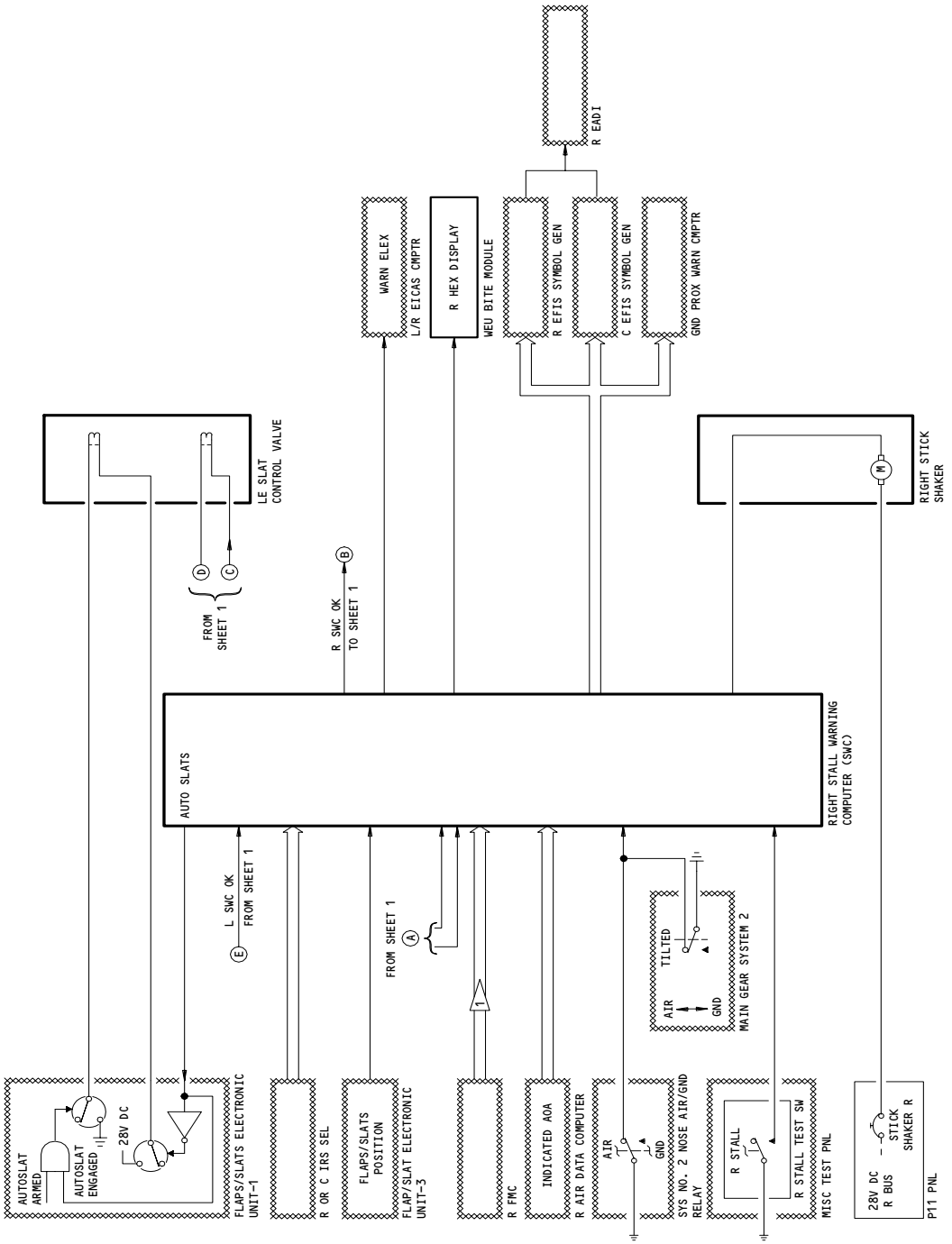
WEU BITE MODULE

B

Component Location
Figure 3



Stall Warning System Schematic
Figure 4 (Sheet 1)



Stall Warning System Schematic
Figure 4 (Sheet 2)

(2) In the air, the SWC's monitor and compute data inputs from the interfacing systems and provide functional output signals to the stick shakers and windshear detection and guidance systems.
(3) The SWC's will activate the stick shakers in the air when the airplane computed angle of attack exceeds the computed trip angle of attack of impending stall.
(4) The two stick shakers operate independently of each other. The left stick shaker is controlled by the left SWC. The right stick shaker is controlled by the right SWC.
(5) The SWC's compute a pitch limit value based on the difference between the computed trip angle of attack of impending stall and the airplane computed angle of attack. This value is transmitted to the EFIS, which displays the proper Pitch Limit Indicator (PLI) on the EADI to guide the pilots (Ref 34-22-00).
(6) The SWC's also transmit the flap position to the GPWC to set the windshear sensitivity level (Ref 34-46-00).
(7) On the ground, the SWC's can be set to a test mode. They monitor and detect internal and interface faults and display them on BITE and EICAS.

B. BITE

(1) Following power up, each SWC initiates a self-test for internal and interface faults. If a fault is detected, a WARN ELEX status message will be displayed on EICAS, and the appropriate alphanumeric fault code will be displayed on the WEU BITE module. The WARN ELEX message also indicates power supply modules failure (Ref 31-51-00). If no faults are detected after power-up, no EICAS message will appear, and the WEU BITE module will display the system configuration and option code.
(2) The BITE test is operable on the ground only. The test is initiated by operating the STALL L or R test switches. The BITE checks operation of the stick shakers, cross channel faults, and interface faults.
    (a) The WARN ELEX message will display continuously on EICAS during a BITE test. After the BITE test, the EICAS message will not be displayed if the stall warning system normal.
    (b) If the SWC detects a fault, the BITE will display the highest priority fault code. Lower priority fault codes will be displayed in order of priority as higher priority faults are corrected. This process will continue until all faults are cleared, then the BITE will display the airplane configuration and option code.
    (c) If the system is normal, the stick shaker will operate during the BITE test. and the slats will extend to the fully extended position of the flaps and slats are in the takeoff position.
    (d) During a BITE test, the two pairs of hex indicators will illuminate until the test switch is released. After release of test switch, the numeric value of the software version will display for approximately 1 second, followed by either the fault code or the configuration/option code.

(e) The software version code uses only the numeric digit values between 01-09 and 80-99. This code represents only the software version configuration, and is independent from either the airplane configuration or the option selected.

(f) For example, the configuration code (most significant digit) could be 4 or 5, and the option code (least significant digit) could show 3, 2 or F.

(3) Faults are identified by codes and categorized into internal and interface faults.

(4) Internal faults are coded A0 thru C5, with code A0 having highest display priority. Table 1 lists internal faults in priority order and their most probable causes.

TABLE 1

INTERNAL FAULT CODE *[1]	PROBABLE CAUSE
A0	More than one board failure on SWC
A1	Slats retracted input circuit on SWC
A2	Slats partially extended input circuit on SWC
A3	Slats fully extended input circuit on SWC
A8	Spare Input input circuit on SWC
A9	Test input circuit on SWC
B0	Air/ground input circuit on SWC
B1	Gear down input circuit on SWC
B2	Opposite channel fail input circuit on SWC
B6	ARINC 429 input circuit on SWC
C0	Analog to digital converter output circuit on SWC
C1	Stick shaker output circuit on SWC
C3	Auto slat enable output circuit on SWC
C4	EICAS status message output circuit on SWC
C5	Channel OK output circuit on SWC

*[1] Missing codes are not used.

(5) Interface faults have a lower display priority than internal faults and will be displayed only after all internal faults are corrected. Interface fault codes range from D0 thru D9 plus code FX , with code D0 having the highest display priority. Table 2 lists interface faults in priority order, and their most probable causes.

TABLE 2	
INTERFACE FAULT CODE *[1]	PROBABLE CAUSE
D0	Stick shaker inoperative due to invalid voltage at stick shaker interface
D1	Air data computer invalid
D2	Flap position invalid due to flap voltage out of tolerance
D4	Multiple slat position inputs to SWC
D5	Loss of slat position input
D6	IRS or ADIRU data word invalid
D8	Air/ground, AOA conflict
D7	Flight Management Computer Data Invalid
D9	Opposite channel fail
FX	Invalid configuration code

*[1] Missing codes are not used.

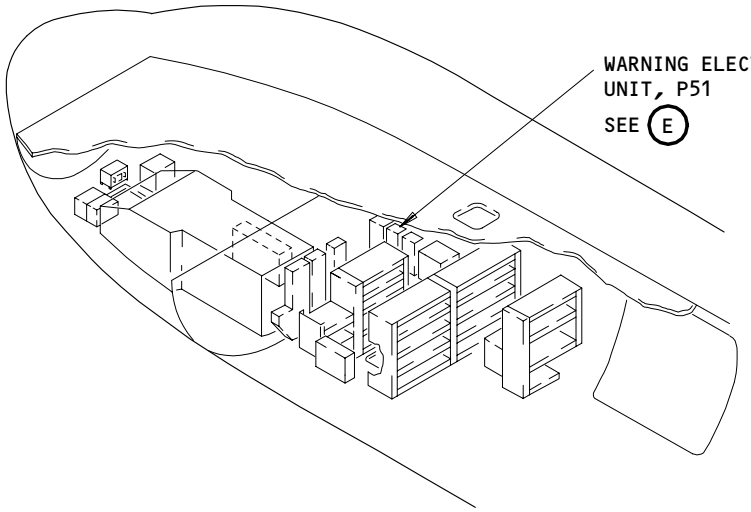
STALL WARNING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER –	1		FLT COMPT, P11	
LEFT STICK SHAKER, C1039		1	11C11	*
RIGHT STICK SHAKER, C4209		1	11J21	*
COMPUTER – (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
COMPUTER – (FIM 34-12-00/101)				
L AIR DATA, M100				
R AIR DATA, M101				
COMPUTER – (FIM 34-61-00/101)				
FLIGHT MANAGEMENT-LEFT, M134 } 1				
FLIGHT MANAGEMENT-RIGHT, M135 } 1				
COMPUTER – LEFT STALL WARNING, M615	2	1	119BL, MAIN EQUIP CTR, P51	27-32-01
COMPUTER – RIGHT STALL WARNING, M938	2	1	119BL, MAIN EQUIP CTR, P51	27-32-01
GENERATOR – (FIM 34-22-00/101)				
CENTER EFIS SYMBOL, M149				
LEFT EFIS SYMBOL, M148				
RIGHT EFIS SYMBOL, M150				
MODULE – (FIM 31-51-00/101)				
POWER SUPPLY A, M616				
POWER SUPPLY B, M621				
MODULE – WEU BITE, M1411	2	1	119BL, MAIN EQUIP CTR, P51	27-32-02
PANEL – (FIM 30-32-00/101)				
MISC TEST, M10398				
RELAY – (FIM 31-01-36/101)				
MAIN GEAR SYS 1, K149				
SYSTEM 1 AIR/GROUND, K135				
RELAY – (FIM 31-01-37/101)				
MAIN GEAR SYS 1, K207				
SYSTEM 2 AIR/GROUND, K215				
SHAKER – LEFT STICK, M240	1	1	FLT COMPT	27-32-05
SHAKER – RIGHT STICK, M952	1	1	FLT COMPT	27-32-05
SWITCH – L STALL TEST (S1)	1	1	FLT COMPT, P61, MISC TEST PNL, M10398	*
SWITCH – R STALL TEST (S2)	1	1	FLT COMPT, P61, MISC TEST PNL, M10398	*
UNIT – (FIM 27-51-00/101)				
FLAP/SLAT ELECTRONIC 1, M10331				
FLAP/SLAT ELECTRONIC 2, M10332				
FLAP/SLAT ELECTRONIC 3, M10333				
UNIT – (FIM 34-21-00/101)				
CENTER INERTIAL REFERENCE, M160				
LEFT INERTIAL REFERENCE, M159				
RIGHT INERTIAL REFERENCE, M161				

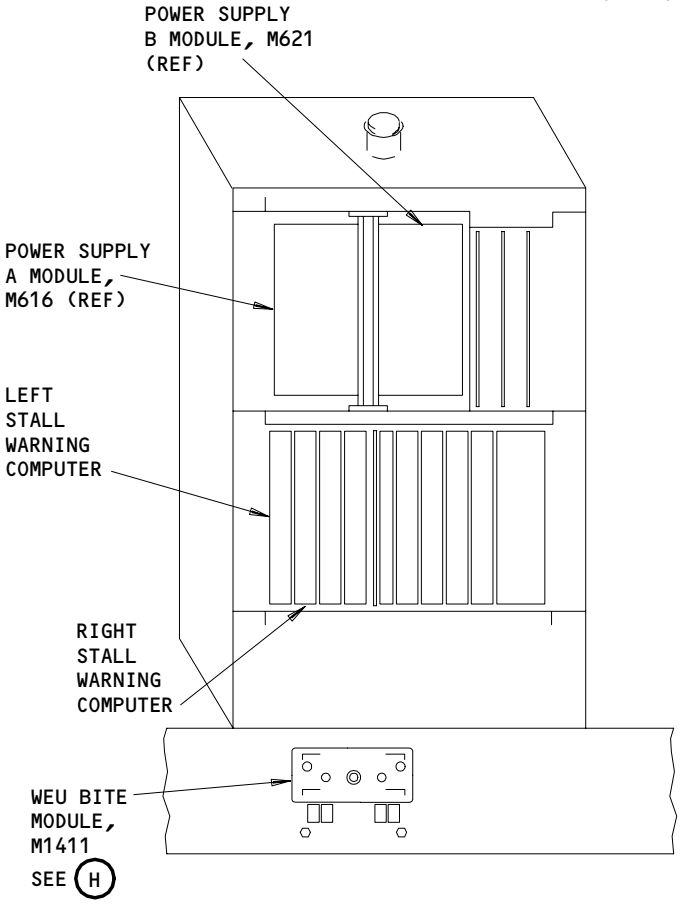
* SEE THE WDM EQUIPMENT LIST

1 AIRPLANES WITH SPEED TAPE

Stall Warning System – Component Index
Figure 101

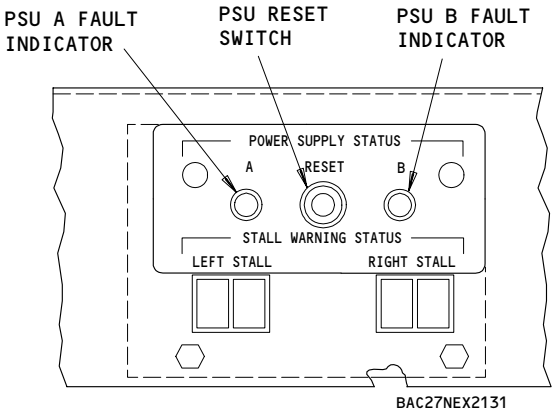


MAIN EQUIP CTR



WARNING ELECTRONICS UNIT, P51

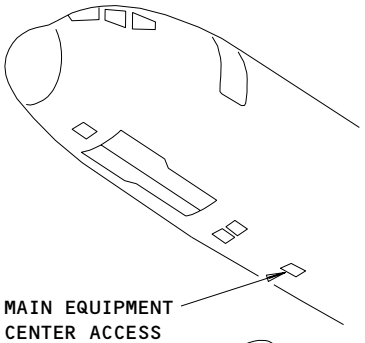
(E)

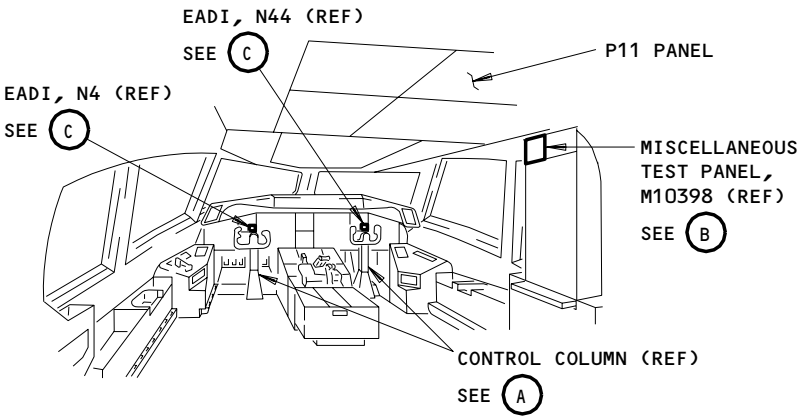


WEU BITE MODULE, M1411

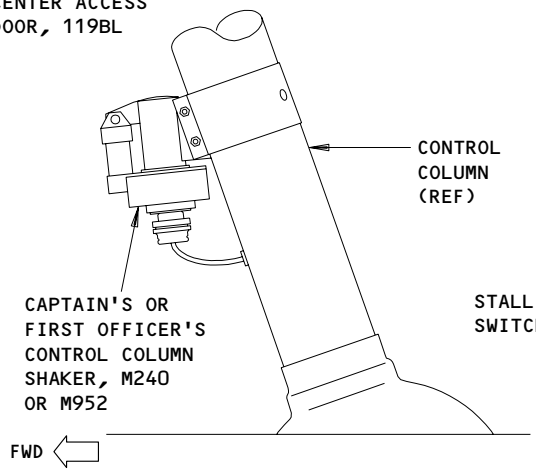
(H)

Component Location
Figure 102 (Sheet 1)



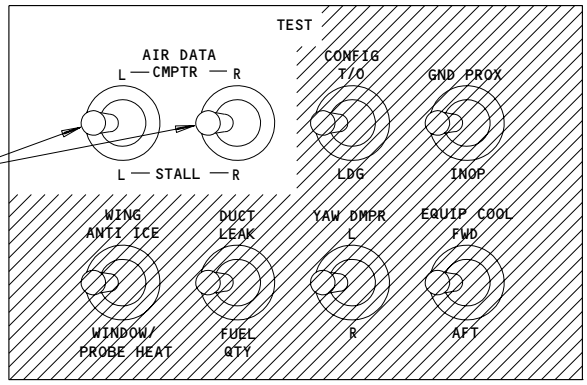


FLIGHT COMPARTMENT



CONTROL COLUMN (REF)

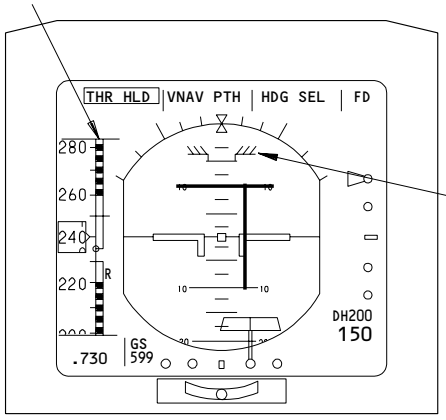
A



STALL TEST
SWITCH, S1,S2

MISCELLANEOUS TEST PANEL, M10398 (REF)

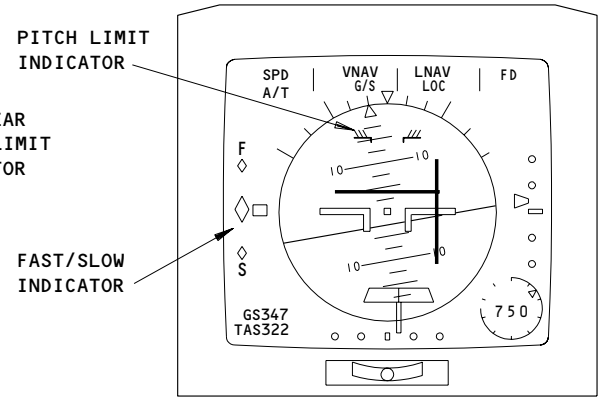
B



WINDSHEAR
PITCH LIMIT
INDICATOR

LEFT (RIGHT) ELEX ATTITUDE DIRECTION
INDICATOR (EADI), N4 (N44) (REF)

C 1



LEFT (RIGHT) ELEX ATTITUDE DIRECTION
INDICATOR (EADI), N4 (N44) (REF)

C 2

1 AIRPLANES WITH SPEED TAPE

2 AIRPLANES WITH FAST/SLOW INDICATOR

Stall Warning System – Component Location
Figure 102 (Sheet 2)

STALL WARNING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure gives the operational test and the system test of the stall warning system. There are no adjustments for the stall warning system.

TASK 27-32-00-715-001

2. Operational Test - Stall Warning System (Fig. 501, 502)
   A. General
      (1) The operational test for the left and right stall warning computers (SWC's) is the same. This test is written for the left SWC. When you do the test of the right SWC, replace the instructions for the left system with those for the right system. These are given in parentheses.
         (a) Make sure you do the tests for both the left and the right systems if these procedures are being done for scheduled maintenance checks.
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-51-00/201, Trailing Edge Flap System
      (3) AMM 27-81-00/201, Leading Edge Slat System
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
      (5) AMM 31-41-00/201, Engine Indication and Crew Alerting System
      (6) AMM 34-21-00/501, Inertial Reference System
      (7) AMM 34-22-00/501, Flight Instrument System
      (8) AIRPLANES WITH SPEED TAPE (FIG. 502);
          AMM 34-61-00/501, Flight Management Computer System
      (9) AMM 71-11-04/201, Fan Cowl Panels
      (10) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

119	Main Equipment Center (RH Side)
211/212	Control Cabin
500/600	Left Wing/Right Wing

      (2) Access Panel

119BL	Main Equipment Center

   D. Prepare for the Test

      S 865-004
      (1) Supply electrical power (AMM 24-22-00/201).

S 865-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the left hydraulic system and reservoir (AMM 29-11-00/201).

S 045-198

WARNING: DO THE THRUST REVERSERS DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 285-006

(4) Make sure the trailing edge flaps and the leading edge slats are fully retracted, and that the flap lever is in the zero (FLAPS UP) detent (AMM 27-51-00/201 and AMM 27-81-00/201).

S 285-007

(5) Make sure these systems are operational:
(a) EFIS (AMM 34-22-00/501).
(b) EICAS (AMM 31-41-00/201).

S 285-008

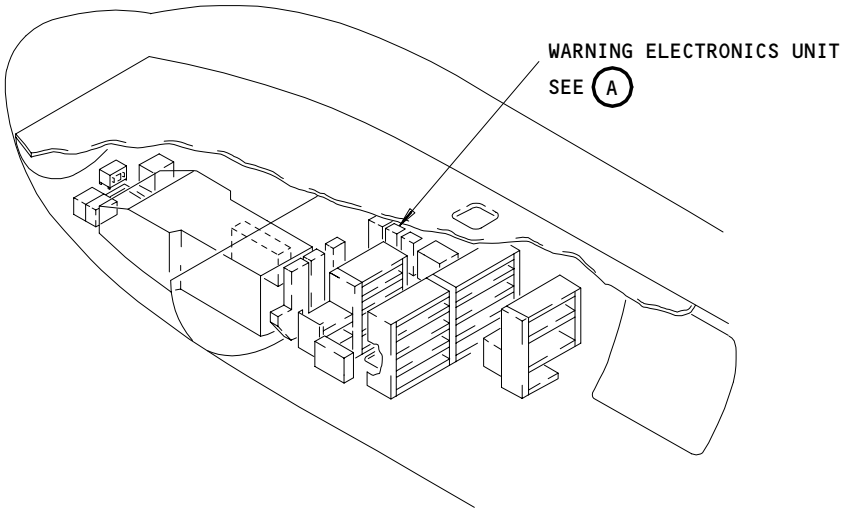
(6) Make sure these switches are in the correct positions:
(a) Make sure the IRS and EFI switches on the instrument source select panel P1 (P3) are in the usual position (ALTN legend not displayed).
(b) Put the L, R, and C IRS mode select switches on the inertial reference mode panel P5 in the NAV position (Ref 34-21-00/501).

E. Stall Warning System Operational Test (Fig. 501, 502)

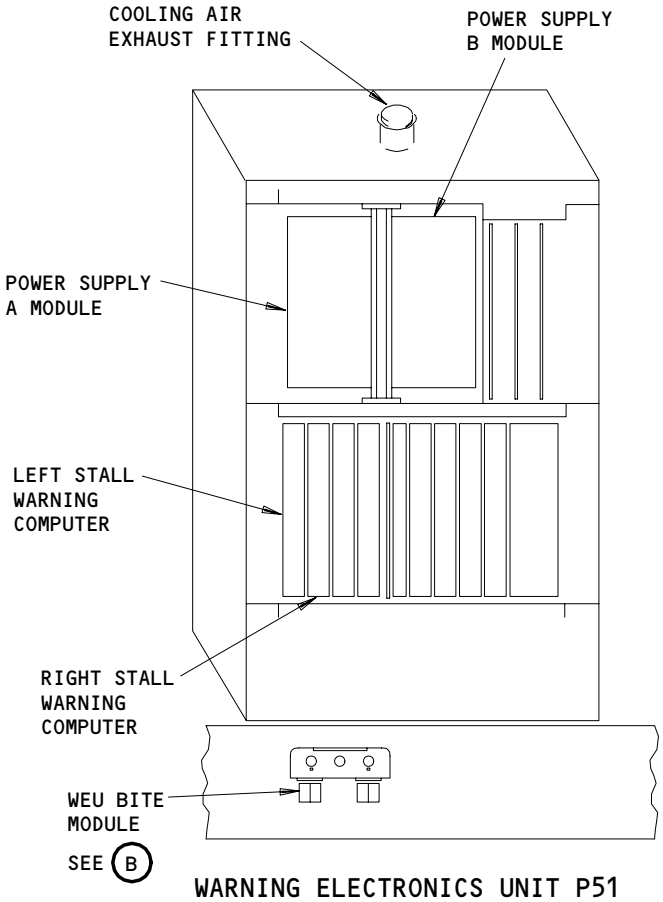
NOTE: Make sure you do the tests for both the left and the right systems if these procedures are being done for scheduled maintenance checks.

S 015-215

(1) Open the EE bay access panel 119BL to see the WEU BITE.

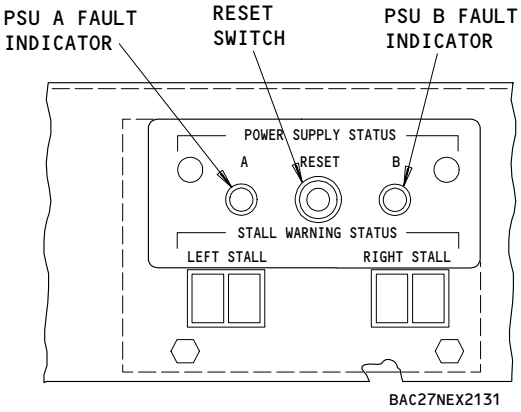


MAIN EQUIP CTR



WARNING ELECTRONICS UNIT P51

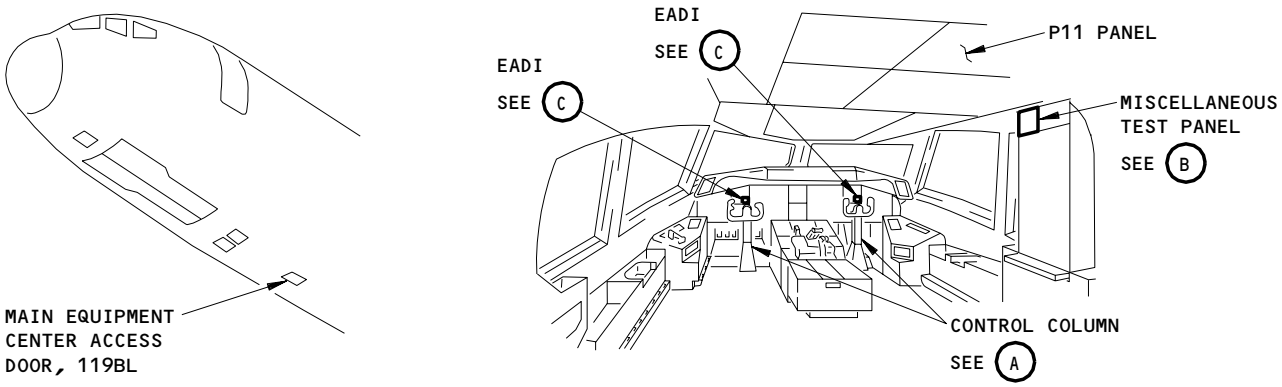
(A)



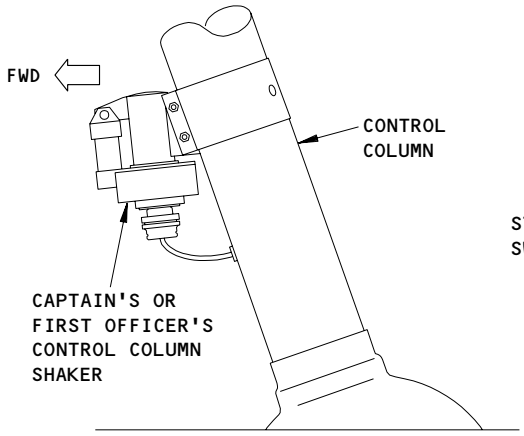
WEU BITE MODULE

(B)

Component Location
Figure 501

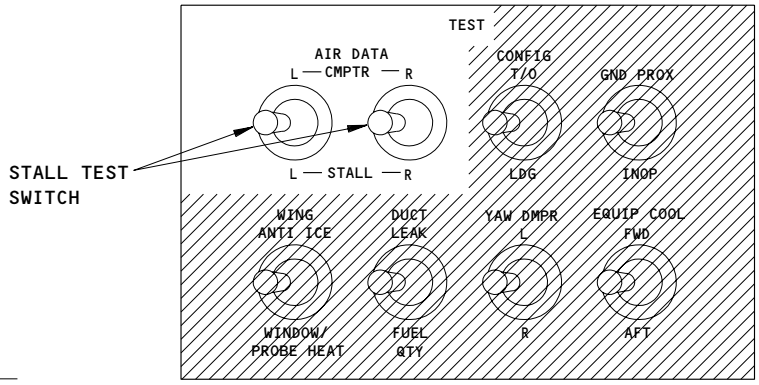


FLIGHT COMPARTMENT



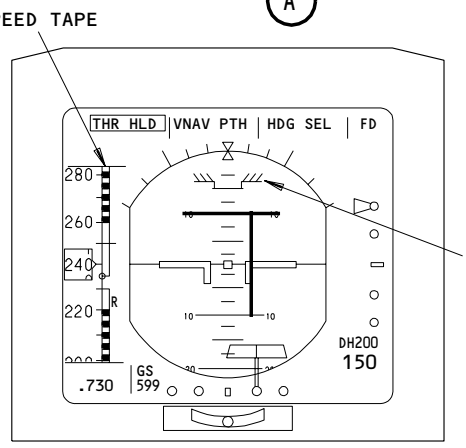
CONTROL COLUMN

A



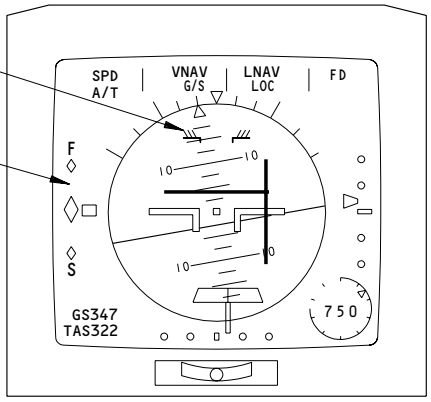
MISCELLANEOUS TEST PANEL

B



LEFT (RIGHT) ELEX ATTITUDE DIRECTION INDICATOR (EADI)

C 1



LEFT (RIGHT) ELEX ATTITUDE DIRECTION INDICATOR (EADI)

C 2

1 AIRPLANES WITH SPEED TAPE

2 AIRPLANES WITH FAST/SLOW INDICATOR

Stall Warning System – Adjustment
Figure 502

S 215-090

CAUTION: MAKE SURE THE MOVEMENT OF THE SLATS DOES NOT HIT OR CATCH THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Make sure the movement of the leading edge slats does not catch or hit these panels (AMM 71-11-04/201):
  (a) The access doors for the left and right engine struts.
  (b) The inboard fan cowling on the left and right engines.
  (c) The thrust reverser cowling on the left and right engines.

S 745-200

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. OPERATION OF STALL WARNING TEST SWITCHES CAN CAUSE THE SLATS TO MOVE TO THEIR FULLY EXTENDED POSITION. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Hold down the L STALL (R STALL) TEST switch on the right side panel, P61.

S 285-010

(4) Make sure you find these conditions:
  (a) The L (R) stick shaker and both columns shake.
  (b) The Windshear Pitch Limit indicator (PLI) shows on the L (R) EADI.
  (c) On the WEU BITE Module (P51), all segments on the LEFT (RIGHT) stall hex display come on, and the code D9 shows on the opposite RIGHT (LEFT) stall hex display.
  (d) The EICAS status message WARN ELEX shows.

S 985-011

(5) Release the L STALL (R STALL) TEST switch.

S 285-012

(6) Make sure you find these conditions:
  (a) The L (R) stick shaker and both columns stop.
  (b) The EICAS message WARN ELEX does not show.
  (c) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
  The LEFT (RIGHT) STALL hex display on the WEU BITE Module (P51) shows the code 4F.
  (d) AIRPLANES WITH SPEED TAPE (FIG. 502);
  The LEFT (RIGHT) STALL hex display on the WEU BITE Module (P51) shows the code 43.

S 865-171
(7) Put the flap lever in the 25-unit detent

S 865-172
(8) Hold down the L STALL (R STALL) TEST switch.

S 215-173
(9) Make sure the L (R) stick shaker and both columns shake.

S 865-174
(10) Release the L STALL (R STALL) TEST switch.

S 215-175
(11) Make sure that the L (R) stick shaker and both columns stop.

S 715-196
(12) Do the previous test steps for the right (or left) system if it is necessary.

F. Do a Test of the Auto Slats

NOTE: Make sure you do the tests for both the left and the right systems if these procedures are being done for scheduled maintenance checks.

S 215-091

CAUTION: MAKE SURE THE MOVEMENT OF THE SLATS DOES NOT HIT OR CATCH THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(1) Make sure the movement of the leading edge slats does not catch or hit these panels:
  (a) The access doors for the left and right engine struts.
  (b) The inboard fan cowling on the left and right engines.
  (c) The thrust reverser cowling on the left and right engines.

S 865-092

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. OPERATION OF STALL WARNING TEST SWITCHES WILL CAUSE THE SLATS TO MOVE TO THEIR FULLY EXTENDED POSITION. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the left hydraulic system and reservoir (AMM 29-11-00/201), if it is not already done.
   (a) If a ground cart is not available, do these steps:
      1) Pressurize the left and right ACMP's (AMM 29-11-00/201).
      2) Set the PTU manual switch on the right side panel, P61, to the ON position.
   (b) Put the flap lever in the 1-unit position.
   (c) Make sure the leading edge slats move to the intermediate position.

S 745-194

(3) Hold down the STALL L (STALL R) test switch.
   (a) Make sure the leading edge slats move to the fully extended position.

      NOTE: The left (right) stick shaker will shake the columns.

      NOTE: A slight hesitation of the slat motion may be noticed. This hesitation is due to the toggling of the Autoslat discrete when the stall warning test switch is held down. This hesitation is normal.

S 745-193

(4) Release the STALL L (STALL R) test switch.
   (a) Make sure the leading edge slats move to the intermediate position.

      NOTE: The left (right) stick shaker and columns will stop.

S 715-195
(5) Do the previous test steps for the right system if it is necessary.

S 745-197
(6) Hold down the STALL L and the STALL R test switches.
(a) Make sure the leading edge slats move to the fully extended position.

NOTE: The left and right stick shakers will shake the columns.

S 745-192
(7) Release the STALL L and the STALL R test switches.
(a) Make sure the leading edge slats move to the intermediate position.

NOTE: The left and right stick shakers and columns will stop.

S 865-099
(8) Put the flap lever in the zero (FLAPS UP) detent.
(a) Make sure the leading edge slats move to the fully retracted position.

G. Put the Airplane Back to Its Usual Condition If the System Test is Not Required

S 865-013
(1) Remove pressure from the left hydraulic system (AMM 29-11-00/201).

S 865-251
(2) If a ground power cart was not used, do these steps:
(a) Remove pressure from the left and right ACMP's (AMM 29-11-00/201).
(b) Set the PTU manual switch on the right side panel, P61 to the OFF position.

S 985-014
(3) Put the left, center, and right IRS MODE SELECT switches in the OFF position.

S 865-015
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 445-199
(5) Do the activation procedure for the thrust reversers (AMM 78-31-00/201).

TASK 27-32-00-735-016

3. System Test - Stall Warning System (Fig. 501, 502)
   A. General
      (1) The function of this test is to make sure that the Stall Warning System is serviceable. The tests for the left and right systems are almost the same. In part of the procedure, the test of the left and right systems are in the same steps. In the remaining parts of the procedure the test of the left and right system are in different steps.
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
      (3) AMM 31-41-00/201, Engine Indication and Crew Alerting System
      (4) AMM 32-09-02/201, Air/Ground Relays
      (5) AMM 71-11-04/201, Fan Cowl Panels
      (6) WDM 34-46-12
   C. Equipment
      (1) Data Bus Analyzer 429EB (preferred)
          JcAIR Instrumentation
          400 Industrial Parkway
          Industrial Airport, KS 66031
      (2) Data Bus Analyzer 429-2 (optional)
          Interface Technology
          150 E. Arrow Highway
          San Dimas, CA 91773
      (3) Proximity Sensor Actuator/Deactuator Set - A27092-84 (2 Rectangular sensor deactuators and 1 rectangular sensor actuators required)
   D. Access
      (1) Location Zones

119	Main Equipment Center (RH Side)
211/212	Control Cabin
500/600	Left Wing/Right Wing

   E. Prepare for the Test

      S 715-017
      (1) Do the operational test for the stall warning system.

      NOTE: This test is the first task in this procedure.

   F. Do a Test of the System Power Supplies

      S 865-018
      (1) Open this circuit breaker on the P11 panel:
          (a) 11J33, WARN ELEX A

S 285-019
(2) Make sure the EICAS message WARN ELEX shows.

S 845-105

WARNING: MAKE SURE THE ENGINE FAN COWLS ARE CLOSED BEFORE OPERATION OF STALL WARNING TEST SWITCHES. OPERATION OF STALL WARNING TEST SWITCHES CAN CAUSE THE SLATS TO MOVE TO THEIR FULLY EXTENDED POSITION. MOVEMENT OF THE SLATS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT TO OCCUR.

(3) Make sure the left and right fan cowls are closed (Ref 71-11-04/201).

S 985-020
(4) Hold down the LEFT and RIGHT STALL TEST switches on the P61 panel.

S 285-021
(5) Make sure you find these conditions:
(a) The L and R stick shakers shake the columns.
(b) The Windshear PLI shows on the L and R EADI's.
(c) The EICAS message WARN ELEX shows.
(d) All segments of LEFT STALL and RIGHT STALL hex displays come on, on the WEU BITE module (P51).

S 865-022
(6) Close the circuit breaker below on the P11 panel:
(a) 11J33, WARN ELEX A

S 865-023
(7) Open this circuit breaker on the P11 panel:
(a) 11B18, WARN ELEX B

S 285-024
(8) Make sure the stick shakers still shake the columns.

S 985-026
(9) Release the R STALL TEST switch.

S 285-025
(10) Make sure you find these conditions:
(a) The R stick shaker stops.
(b) The Windshear PLI does not show on the R EADI.
(c) All segments of the LEFT STALL hex display on the WEU BITE Module (P51) stay on, and the RIGHT STALL hex display shows the code D9.

S 985-025
(11) Release the L STALL TEST switch.

S 285-027
(12) Make sure you find these conditions:
(a) The L stick shaker stops.
(b) The Windshear PLI does not show on the L EADI.
(c) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
The LEFT STALL and RIGHT STALL hex displays on the WEU BITE Module show the code 4F.
(d) AIRPLANES WITH SPEED TAPE (FIG. 502);
The LEFT STALL and RIGHT STALL hex displays on the WEU BITE Module show the code 43.

S 865-117
(13) Close this circuit breaker on the P11 panel:
(a) 11B18, WARN ELEX B

S 285-179
(14) Make sure the EICAS message WARN ELEX does not show.

G. Do a Test of the Stall Warning System Interface

S 285-026
(1) Make sure the Captain's and First Officer's IRS Source Select switches are in the usual position (ALTN legend is not displayed).

S 985-027
(2) Put the L, C, and R IRS Mode Select switches in the OFF position.

S 285-028
(3) Make sure the LEFT and RIGHT STALL hex displays on the WEU BITE Module (P51) show the code D6.

S 985-029
(4) Put the Left and Right IRS Mode Select switches in the NAV position, and wait until the Left and Right IRS ALIGN lights are OFF.

S 285-153
(5) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
Make sure the LEFT and RIGHT STALL hex displays on the WEU BITE Module (P51) show the code 4F.

NOTE: It can be up to 10 seconds before the code is shown.

S 285-154
(6) AIRPLANES WITH SPEED TAPE (FIG. 502);
Make sure the LEFT and RIGHT STALL hex displays on the WEU BITE Module (P51) show the code 43.

NOTE: It can be up to 10 seconds before the code is shown.

S 985-033
(7) Put the Captain's IRS Source Select switch in the ALTN position.

S 285-032
(8) Make sure the LEFT STALL hex display on the WEU BITE Module (P51) shows the code D6.

S 985-036
(9) Put the CENTER IRS Mode Select switch in the NAV position, and wait until the CENTER IRS ALIGN light is OFF.

S 285-155
(10) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
Make sure the LEFT STALL hex display on the WEU BITE Module (P51) shows the code 4F.

NOTE: It can be up to 10 seconds before the code is shown.

S 285-156
(11) AIRPLANES WITH SPEED TAPE (FIG. 502);
Make sure the LEFT STALL hex display on the WEU BITE Module (P51) shows the code 43.

NOTE: It can be up to 10 seconds before the code is shown.

S 985-041
(12) Put the Captain's IRS Source Select switch in the usual position (ALTN legend is not displayed).

S 985-150
(13) Put the CENTER IRS Mode Select switch in the OFF position.

S 985-138
(14) Put the First Officer's IRS Source Select switch in the ALTN position.

S 285-139
(15) Make sure the RIGHT STALL hex display on the WEU BITE Module (P51) shows the code D6.

S 985-140
(16) Put the CENTER IRS Mode Select switch in the NAV position, and wait until the CENTER IRS ALIGN light is OFF.

S 285-157
(17) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
Make sure the RIGHT STALL hex display on the WEU BITE Module (P51) shows the code 4F.

NOTE: It can be up to 10 seconds before the code is shown.

S 285-158
(18) AIRPLANES WITH SPEED TAPE (FIG. 502);
Make sure the RIGHT STALL hex display on the WEU BITE Module (P51) shows the code 43.

NOTE: It can be up to 10 seconds before the code is shown.

S 985-149
(19) Put the First Officer's IRS Source Select switch in the usual position (ALTN legend is not displayed).

S 865-042
(20) For the Left Stall Warning System, open these circuit breakers on the P11 panel:
(a) 11A10, AIR DATA CMPTR LEFT
(b) 11C11, STICK SHAKER LEFT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(d) AIRPLANES WITH SPEED TAPE (FIG. 502);
11E9, FMCS CMPTR LEFT

S 285-049
(21) Make sure the left hex display on the WEU BITE Module (P51) shows code D0, or cycles between the codes D0 and D1.

S 865-048
(22) Close this P11 panel circuit breaker:
(a) 11C11, STICK SHAKER LEFT

S 285-047
(23) Make sure the LEFT STALL hex display on the WEU BITE Module shows the code D1.

S 865-046
(24) Close this circuit breaker on the P11 panel:
(a) 11A10, AIR DATA CMPTR LEFT

S 285-045
(25) Make sure the LEFT STALL hex display on the WEU BITE Module shows the code D2.

S 865-044
(26) Close this circuit breaker on the P11 panel:
(a) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR

S 285-159
(27) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
Make sure the LEFT STALL hex display on the WEU BITE Module shows the code 4F.

S 285-160
(28) AIRPLANES WITH SPEED TAPE (FIG. 502);
Make sure the LEFT STALL hex display on the WEU BITE Module shows the code 43.

S 485-056
(29) Attach probe A of the ARNIC 429 Data Bus Analyzer to Burndy block Z104, TB205 on the E2-3 shelf, and attach probe B to Burndy block Z103, TB205 on the E2-3 shelf (WDM 34-46-12).

S 985-057
(30) Set the analyzer to decode label 270.

S 285-058
(31) Make sure that BIT 15 = 0 (GND MODE).

S 045-135

WARNING: PREPARE THE SAFETY-SENSITIVE SYSTEMS FOR THE AIR MODE BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. IN THE AIR MODE, MANY OF THE AIRPLANE SYSTEMS CAN OPERATE AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(32) Prepare the safety-sensitive systems for air mode simulation (Ref 32-09-02/201).

S 865-060
(33) Open this circuit breaker on the P11 panel:
(a) 11C30, LANDING GEAR POS AIR/GND SYS 1

S 285-061
(34) Make sure that BIT 15 = 1, then close the circuit breaker.

S 285-062
(35) Make sure that BIT 15 = 0 (GND MODE).

S 865-063
(36) Open this circuit breaker on the P11 panel:
(a) 11S15, LANDING GEAR AIR/GND SYS 1

S 285-064
(37) Make sure that BIT 15 = 1, then close the circuit breaker.

S 285-065
(38) Make sure that BIT 15 = 0 (GND MODE).

S 865-066
(39) Open this circuit breaker on the P11 panel:
(a) 11J33, WARN ELEX A

S 285-067
(40) Make sure that BIT 11 = 0.

S 865-068
(41) Close the circuit breaker opened in the step above. Make sure that label 270, BIT 11 = 0, and then changes to 1.

NOTE: Monitor label 270, BIT 11 when the circuit breaker is closed. The zero (0) is shown for less than 1 second.

S 985-119
(42) Set the analyzer to decode label 271.

S 285-152

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE LEADING EDGE SLATS AND THE TRAILING EDGE FLAPS. YOU WILL MOVE THE LEADING EDGE SLATS AND THE TRAILING EDGE FLAPS IN THE TEST THAT FOLLOWS. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(43) Move the flaps to each position given in Table 501, and make sure that BITS 14 thru 20 of label 271 are as shown.

TABLE 501								
	LABEL 271, BIT NUMBER							
FLAP LEVER POSITION	20	19	18	17	16	15	14	NOTES *[1]
FLAPS UP	1	0	0	0	0	0	0	LE SLATS RETRACTED
FLAPS 1 UNIT DETENT	0	1	0	0	0	0	0	LE SLATS PARTIALLY EXTENDED
FLAPS 25 UNIT DETENT	0	0	1	0	0	0	0	LE SLATS FULLY EXTENDED
FLAPS UP	1	0	0	0	0	0	0	LE SLATS RETRACTED

*[1] BITS must be monitored when the TE Flaps and LE Slats are not in motion.

S 865-070
(44) Open this circuit breaker on the P11 panel:
(a) 11B18, WARN ELEX B

S 285-071
(45) Make sure that BIT 29 = 0.

S 865-072
(46) Close the circuit breaker opened in the step above. Make sure that label 271, BIT 29 = 0, and then changes to 1.

NOTE: Monitor label 271, BIT 29 when the circuit breaker is closed. The zero (0) is shown for less than 1 second.

S 715-163
(47) AIRPLANES WITH SPEED TAPE (FIG. 402);
Do the steps that follow:
(a) Open this circuit breaker on the P11 panel:
1) 11E9, FMCS CMPTR LEFT
(b) Make sure the LEFT STALL hex display on the WEU BITE module (P51) shows the code D7.
(c) Close this circuit breaker on the P11 panel:
1) 11E9, FMCS CMPTR LEFT

S 085-074
(48) Disconnnect the ARINC 429 data bus analyzer.

S 865-075
(49) For the right Stall Warning System, open these circuit breakers on the P11 panel:
(a) AIRPLANES WITH SPEED TAPE (FIG. 502);
11E30, FMCS CMPTR RIGHT
(b) 11F30, AIR DATA CMPTR RIGHT
(c) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(d) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(e) 11J21, STICK SHAKER RIGHT

S 285-078
(50) Make sure the RIGHT STALL hex display on WEU BITE Module (P51) shows the code D0 or alternating D0/D1.

S 865-079
(51) Close this circuit breaker on the P11 panel:
(a) 11J21, STICK SHAKER RIGHT

S 285-080
(52) Make sure the RIGHT STALL hex display on the WEU BITE Module shows the code D1.

S 865-083
(53) Close this circuit breaker on the P11 panel:
(a) 11F30, AIR DATA CMPTR RIGHT

S 285-084
(54) Make sure the RIGHT STALL hex display on the WEU BITE Module shows the code D2.

S 865-085
(55) Close these circuit breakers on the P11 panel:
(a) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(b) 11G21, FLAP SLAT ELEC UNIT 3 POWER

S 285-161
(56) AIRPLANES WITH FAST/SLOW INDICATOR (FIG. 502);
Make sure the RIGHT STALL hex display on the WEU BITE Module shows the code 4F:

S 285-162
(57) AIRPLANES WITH SPEED TAPE (FIG. 502);
Make sure the RIGHT STALL hex display on the WEU BITE Module shows the code 43.

S 485-092
(58) Attach probe A of the ARINC 429 Data Bus Analyzer to Burndy block Z106, TB205 on the E2-3 shelf, and attach probe B to Burndy block Z105, TB205 on the E2-3 shelf (WDM 34-46-12).

S 985-093
(59) Set the analyzer to decode label 270.

S 285-094
(60) Make sure that BIT 15 = 0 (GND MODE).

S 985-177
(61) Install a deactuator on these proximity sensors (Ref 32-09-02/201):
(a) S10059, System 2 - Right Truck Not Tilted Sensor Switch
(b) S10064, System 2 - Left Truck Not Tilted Sensor Switch

S 285-096
(62) Make sure that BIT 15 = 1 (AIR/GND = Air Mode):

S 985-178
(63) Remove the deactuators from the proximity sensors.

S 285-098
(64) Make sure that BIT 15 = 0.

S 985-099
(65) Install an actuator on this proximity sensor (Ref 32-09-02/201):
(a) S10068, System 2 - Nose Gear Not Compressed Prox Sensor Switch

S 285-137
(66) Make sure that BIT 15 = 1:

S 985-100
(67) Remove the actuator from the proximity sensor.

S 285-101
(68) Make sure that BIT 15 = 0.

S 865-103
(69) Open this circuit breaker on the P11 panel:
(a) 4J33 or 11J33, WARN ELEX A

S 285-104
(70) Make sure that BIT 11 = 0.

S 865-105
(71) Close the circuit breaker opened in the step above. Make sure that label 270, BIT 11 = 0 then changes to 1.

NOTE: Monitor label 270, BIT 11 when the circuit breaker is closed. The zero (0) is shown for less than 1 second.

S 985-106
(72) Set the analyzer to decode label 271.

S 985-107

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE LEADING EDGE SLATS AND THE TRAILING EDGE FLAPS. YOU WILL MOVE THE LEADING EDGE SLATS AND THE TRAILING EDGE FLAPS IN THE TEST THAT FOLLOWS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(73) Move the flaps to each position given in Table 501, and make sure that BITS 14 thru 20 of label 271 are as shown.

S 865-108
(74) Open this circuit breaker on the P11 panel:
(a) 11B18, WARN ELEX B

S 285-109
(75) Make sure that Label 271, BIT 29 = 0.

S 865-110
(76) Close the circuit breaker opened in the step above. Make sure that label 271, BIT 29 = 0 then changes to 1.

NOTE: Monitor label 271, BIT 29 when the circuit breaker is closed. The zero (0) is shown for less than 1 second.

S 715-167
(77) AIRPLANES WITH SPEED TAPE (FIG. 402);
Do the steps that follow:
(a) Open this circuit breaker on the P11 panel:
1) 11E30, FMCS CMPTR RIGHT
(b) Make sure the RIGHT STALL hex display on the WEU BITE module (P51) shows the code D7.
(c) Close this circuit breaker on the P11 panel:
1) 11E30, FMCS CMPTR RIGHT

S 085-111
(78) Disconnnect the ARINC 429 data bus analyzer.

H. Put the Airplane Back to Its Usual Condition

S 445-134
(1) Put the safety-sensitive systems back to their initial conditions (Ref 32-09-02/201).

S 865-113
(2) Close these circuit breakers on the overhead panel P11:
(a) AIRPLANES WITH SPEED TAPE (FIG. 502);
11E9, FMCS CMPTR LEFT
11E30, FMCS CMPTR RIGHT

S 865-114

(3) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 985-115

(4) Put the left, center, and right IRS MODE SELECT switches in the OFF position.

S 865-116

(5) Remove electrical power if it is not necessary (Ref 24-22-00/201).

STALL WARNING MODULE - REMOVAL/INSTALLATION

1. General
   A. The left and right stall warning modules are in the warning electronics unit (WEU) on the P51 panel. The removal/installation procedures for the left and right stall warning modules are the same.

TASK 27-32-01-024-001

2. Remove the Stall Warning Module (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-32-00/501, Stall Warning System
   B. Access
      (1) Location Zones
          119/120 Main Equipment Center
          211/212 Control Cabin

      (2) Access Panel
          119BL Main Equipment Center

   C. Prepare for Removal

      S 864-015

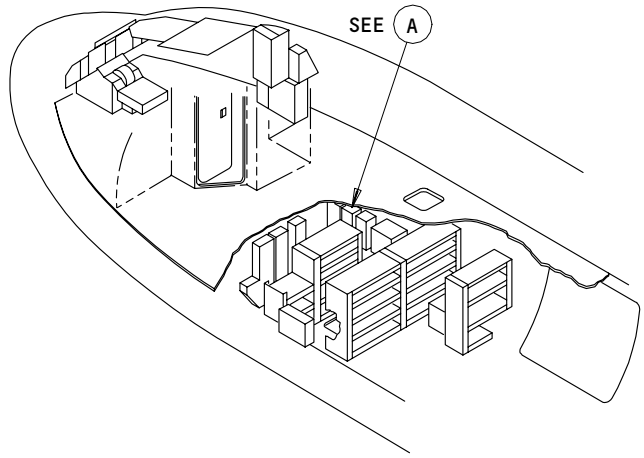
      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILER PANELS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

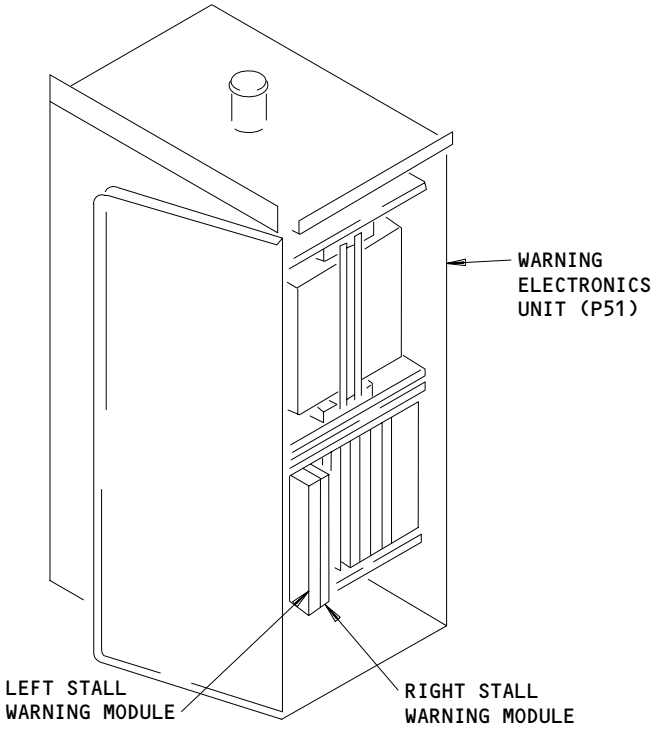
      (1) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoiler panels.

      S 864-002
      (2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
          (a) 11B18, WARN ELEX B
          (b) 11J33, WARN ELEX A

      S 014-003
      (3) Open the main equipment center access door, 119BL (AMM 06-41-00/201).

      S 014-004
      (4) Open the WEU access door.
   D. Remove the stall warning module.





Stall Warning Module Installation
Figure 401

S 864-017

CAUTION: DO NOT TOUCH THE STALL WARNING MODULE BEFORE YOU DO THE PROCEDURE FOR ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (AMM 20-41-01/201). ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE STALL WARNING MODULE.

(1) Do the procedure for electrostatic discharge sensitive devices (AMM 20-41-01/201).

S 024-016

(2) Remove the Stall Warning Module (AMM 20-10-01/401).

TASK 27-32-01-424-005

3. Install the Stall Warning Module (Fig. 401)

A. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-32-00/501, Stall Warning System

B. Access

(1) Location Zones

119/120 Main Equipment Center
211/212 Control Cabin

(2) Access Panel

119BL Main Equipment Center

C. Prepare to Install the Stall Warning Computer

S 864-006

(1) Make sure that these breakers on the P11 panel are open and DO-NOT-CLOSE tags are attached:
(a) 11B18, WARN ELEX B
(b) 11J33, WARN ELEX A

D. Install the Stall Warning Module

S 864-018

CAUTION: DO NOT TOUCH THE STALL WARNING MODULE BEFORE YOU DO THE PROCEDURE FOR ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (AMM 20-41-01/201). ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE STALL WARNING MODULE.

(1) Do the procedure for electrostatic discharge sensitive devices (AMM 20-41-01/201).

S 414-007

(2) Close the WEU access door.

E. Put the Airplane Back to Its Usual Condition

S 864-008
(1) Supply electrical power (AMM 24-22-00/201).

S 864-009
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11J33, WARN ELEX A

S 714-012
(3) Do the Stall Warning Computer Operational Test (AMM 27-32-00/501).

S 414-013
(4) Close the access door 119BL (AMM 06-41-00/201).

S 864-014
(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

WARNING ELECTRONIC UNIT (WEU) BITE MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. These tasks remove and install the WEU BITE modules.

TASK 27-32-02-024-001

2. Remove WEU BITE Module (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
      (3) AMM 24-22-00/201, Electrical Power - Control
      (4) AMM 27-32-00/501, Stall Warning System
   B. Access
      (1) Location Zones
          119 Main Equipment Center (Left)
          211/212 Control Cabin

      (2) Access Panel
          119BL Main Equipment Center

   C. Prepare for Removal

      S 014-002
      (1) Open the main equipment center access door, 119BL (AMM 06-41-00/201).

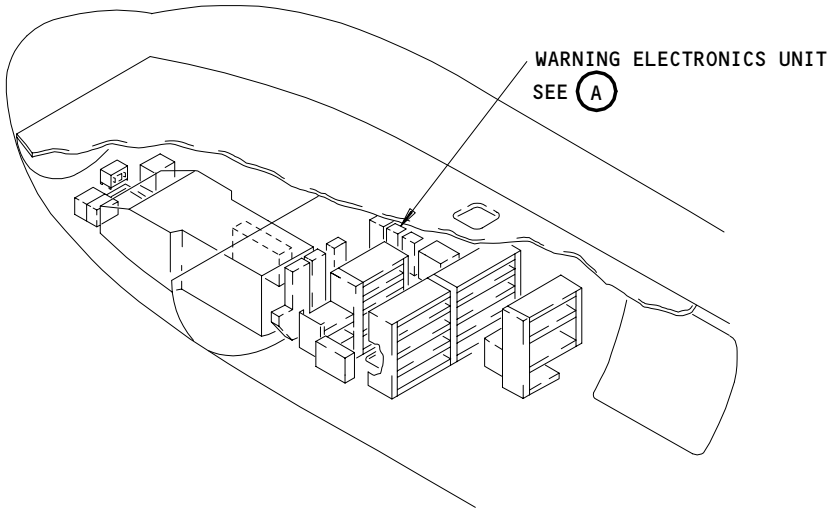
      S 864-003
      (2) Remove electrical power (AMM 24-22-00/201).

      S 864-004
      (3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B18, WARN ELEX B
          (b) 11J33, WARN ELEX A

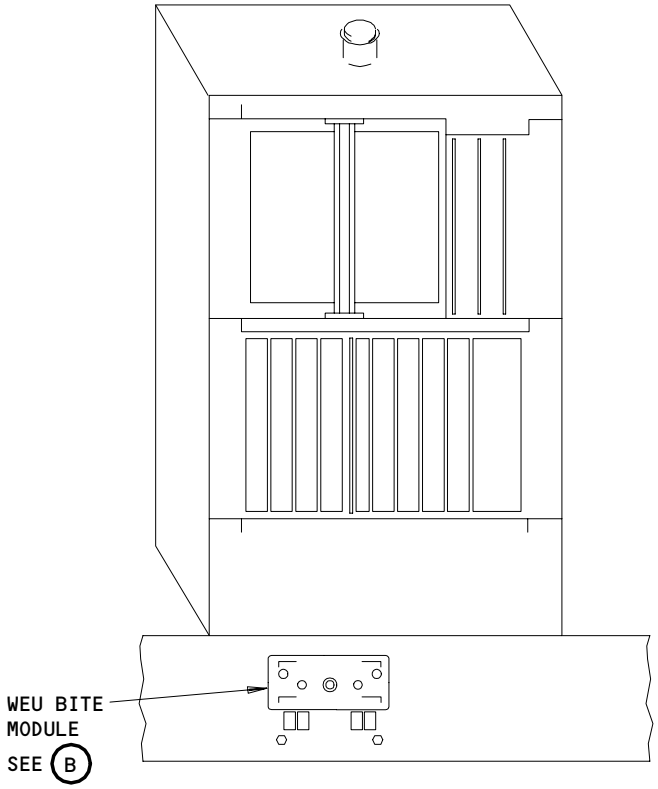
      S 864-019

      CAUTION: DO NOT TOUCH THE STALL WARNING MODULE BEFORE YOU DO THE PROCEDURE FOR ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (AMM 20-41-01/201). ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE STALL WARNING MODULE.

      (4) Do the procedure for electrostatic discharge sensitive devices (AMM 20-41-01/201).

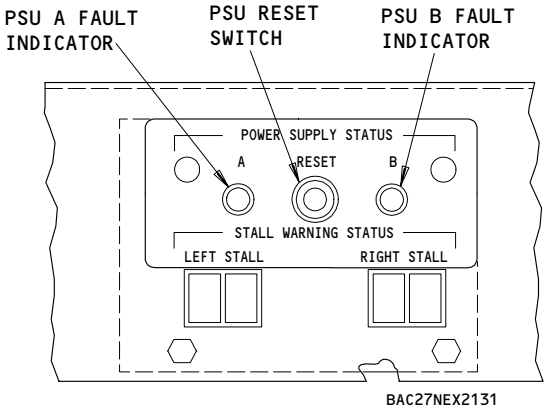


MAIN EQUIP CTR



WARNING ELECTRONICS UNIT P51

A



WEU BITE MODULE

B

Component Location
Figure 401

S 024-015
(5) Remove the Stall Warning Module (AMM 20-10-01/401).

S 014-005
(6) Open the WEU access door.

S 024-006
(7) Remove the four fasteners that hold the module bracket to the support structure.

S 034-007
(8) Disconnect the module from the wire bundle connector. Remove the module.

TASK 27-32-02-424-008

3. Install WEU BITE Module (Fig. 401)

A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 20-41-01/201, Electrostatic Discharge Sensitive Devices
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-32-00/501, Stall Warning System

B. Access
(1) Location Zones
119 Main Equipment Center (Left)
211/212 Control Cabin

(2) Access Panel
119BL Main Equipment Center

C. Procedure

S 844-016

CAUTION: DO NOT TOUCH THE STALL WARNING MODULE BEFORE YOU DO THE PROCEDURE FOR ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (AMM 20-41-01/201). ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE STALL WARNING MODULE.

(1) Do the procedure for electrostatic discharge sensitive devices (AMM 20-41-01/201).

S 424-017
(2) Install the Stall Warning Module (AMM 20-10-01/401).

S 434-009
(3) Connect the module to the wire bundle connector, and secure the jackscrew.

S 414-010
(4) Install the four fasteners that hold the module to the support structure.

D. Put the airplane back to its initial condition.

S 414-011
(1) Close the WEU access door.

S 864-012
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11J33, WARN ELEX A

S 864-014
(3) Close the main equipment center access door, 119BL (AMM 06-41-00/201).

S 714-018
(4) Do the operational test of the Stall Warning System (AMM 27-32-00/501).

CONTROL COLUMN SHAKER - REMOVAL/INSTALLATION

1. General
   A. The removal/installation procedures for the captain's and first officer's control column shakers are the same.

TASK 27-32-05-024-001

2. Remove Control Column Shaker (Fig. 401)
   A. Equipment
      (1) Torque wrench - commercially available (For torque ranges, Ref Fig. 401).
   B. Consumable Materials
      (1) C00032, Enamel - Exterior Decorative System BMS 10-60 Type I (AMM 20-30-03/201)
   C. References
      (1) 24-22-00/201, Electrical Power - Control
   D. Access
      (1) Location Zones
          211/212 Control Cabin

   E. Prepare for Removal

      S 844-025

      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILER PANELS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoiler panels.

      S 864-007

      (2) Remove electrical power (Ref 24-22-00).

      S 864-008

      (3) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C11, LEFT STICK SHAKER

(b) 11J21, RIGHT STICK SHAKER

S 844-009
(4) Move the control columns to the aft position.

S 844-003
(5) Hold the control column in position with rope and attach a DO-NOT-MOVE tag.

F. Remove Shaker

S 034-010
(1) Disconnect the electrical connector from the control column shaker.

S 034-011
(2) Remove the bolts that connect the column shaker to the strap assembly.

S 024-012
(3) Remove the control column shaker.

TASK 27-32-05-424-013

3. Install Control Column Shaker (Fig. 401)

A. Procedure

S 424-014
(1) Put the shaker unit in position with the strap assembly.

S 434-026
(2) Install the bolts that connect the shaker to the strap assembly.

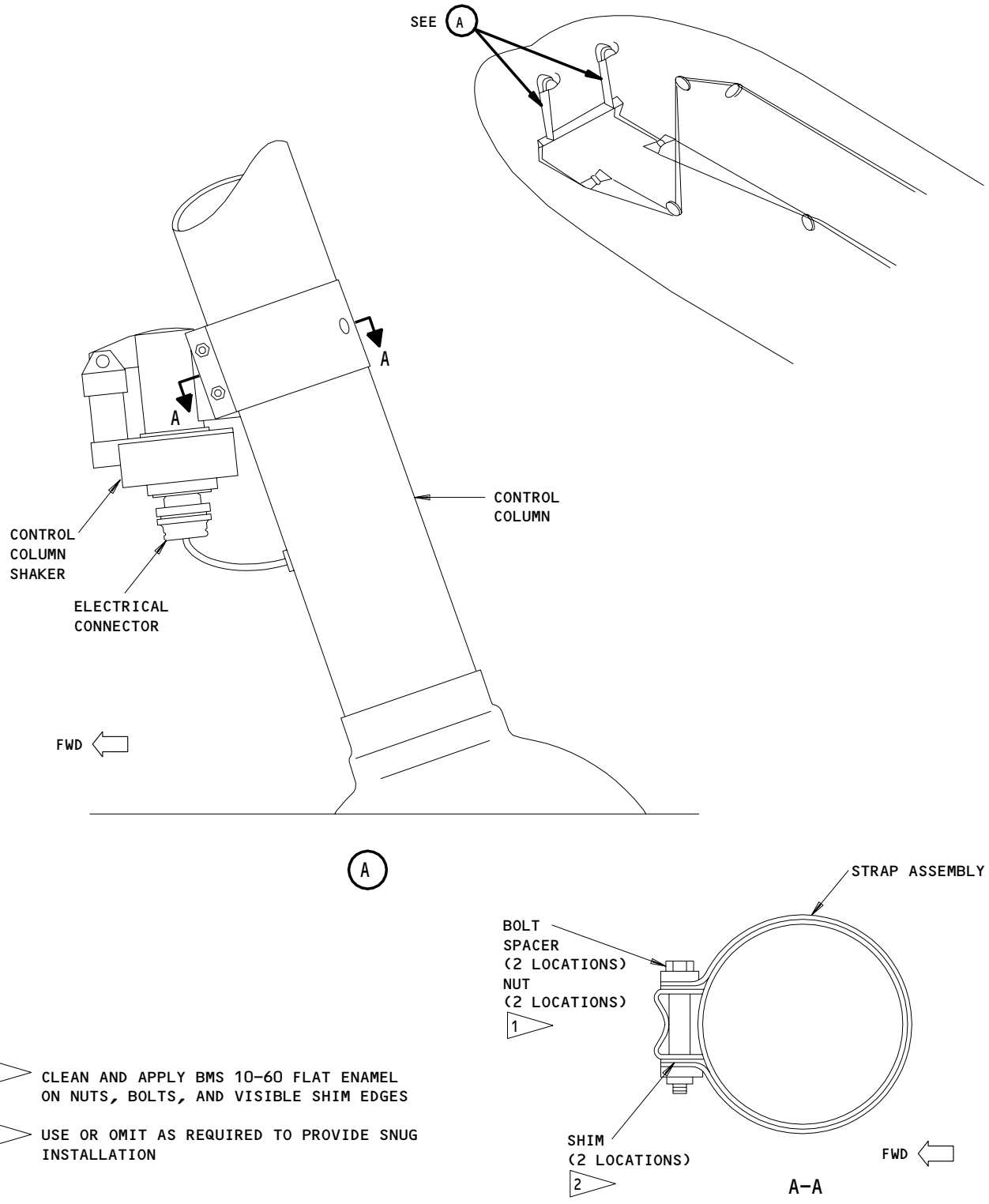
NOTE: Use or omit shim as to provide installation.

S 864-004
(3) Set torque wrench to 20-25 pound-inches (2.3-2.8 newton-meters).

S 434-005
(4) Tighten bolts to 20-25 pound-inches (2.3-2.8 newton-meters)

S 374-015
(5) Put enamel on the scratches and marks where necessary.

S 864-016
(6) Connect the electrical connector to the control column shaker.



Elevator Control Column Shaker Installation
Figure 401

S 844-017
(7) Remove the DO-NOT-MOVE tag from the control column and release the column.

TASK 27-32-05-714-006

4. Test Control Column Shaker

A. Procedure

S 864-018
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C11, LEFT STICK SHAKER
(b) 11J21, RIGHT STICK SHAKER

S 864-019
(2) Supply electrical power (Ref 24-22-00).

S 984-020
(3) Push and hold the applicable STALL test switch on the sidewall panel, P61.

S 284-021
(4) Make sure that the column shakers operate.

S 984-022
(5) Release the STALL test switch.

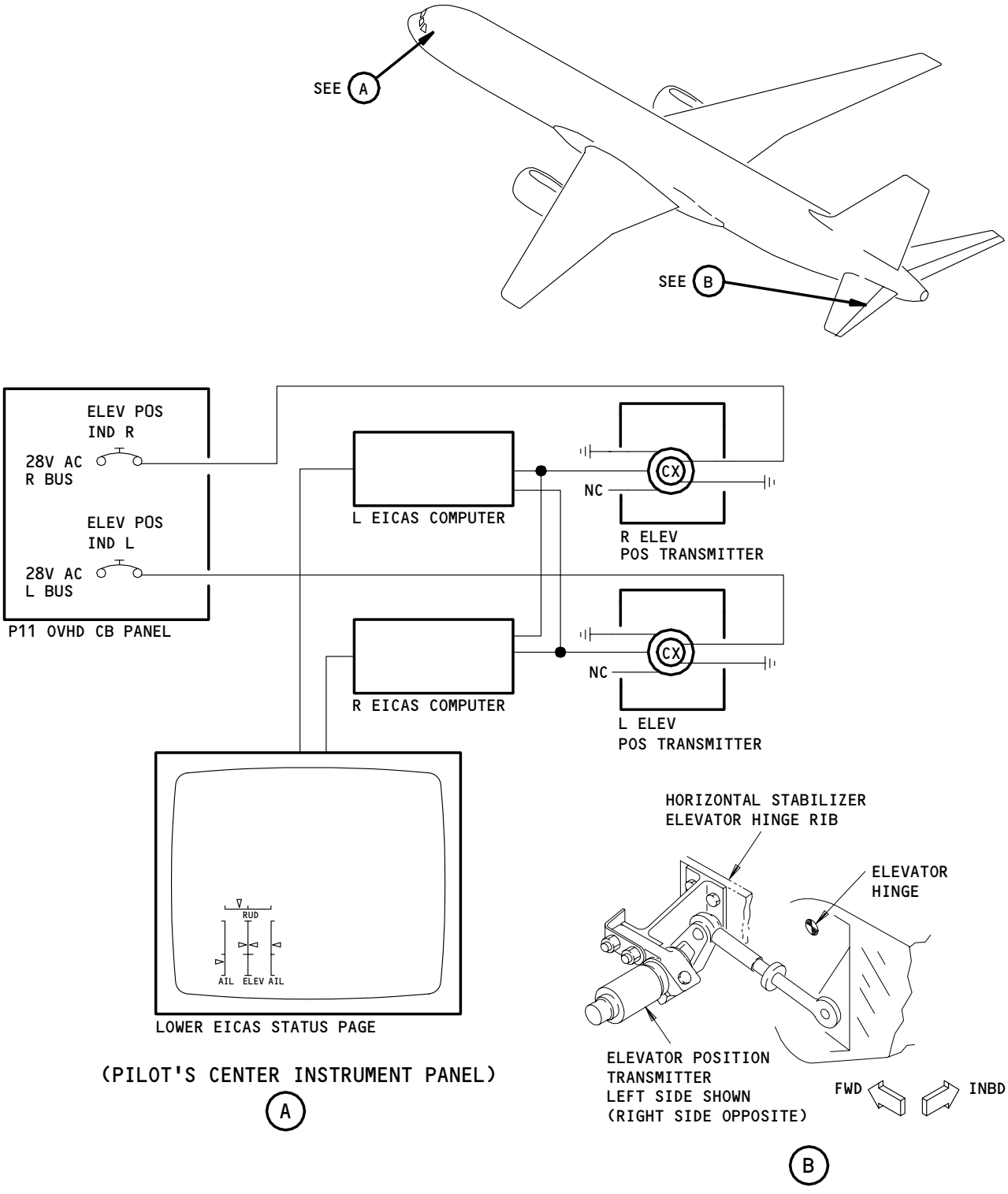
S 284-023
(6) Make sure that the column shakers stop.

B. Put the airplane back to its original condition.

S 864-024
(1) Remove electrical power if it is not necessary (Ref 24-22-00).

ELEVATOR POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. Elevator position indication is provided by a surface position indicator on the EICAS screen. Elevator position transmitters send left and right elevator position data to the left and right EICAS computers. The EICAS computers process the signals and display the elevator position on the surfaces position indicator. The indicator appears on the lower EICAS screen when the STATUS button is pressed.
2. Component Details (Fig. 1)
   A. Elevator Position Transmitter
      (1) The elevator position transmitter is a synchro transmitter. The transmitter consists of a stator, rotor, housing assembly, and a shaft assembly. The elevator position transmitter rotor is connected by a crank arm and pushrod to the elevator. Each transmitter is connected to the stabilizer rear spar near the fuselage. The transmitters send position data to the left and right EICAS computers.
3. Operation (Fig. 1)
   A. Functional Description
      (1) The elevator position indicating system is powered by a 28v, 400 Hz AC Bus. The 400 Hz output from the aircraft power supply is received by the synchro rotor input, and is inductively coupled to the stator of the transmitter. The rotor is mechanically connected to the aircraft control surface, so that the rotor turns simultaneously with the control surface. When the rotor changes position, the output from the stator also changes. The output from the transmitters is sent to the left and right EICAS computers. The surfaces position indicator appears on the EICAS screen when the STATUS button is pushed, showing elevator position. The indicator will disappear when the STATUS button is pushed a second time.



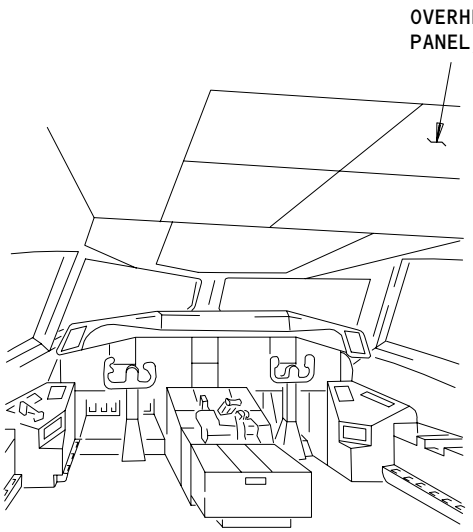
Elevator Position Indicating Systems
Figure 1

ELEVATOR POSITION INDICATING SYSTEM

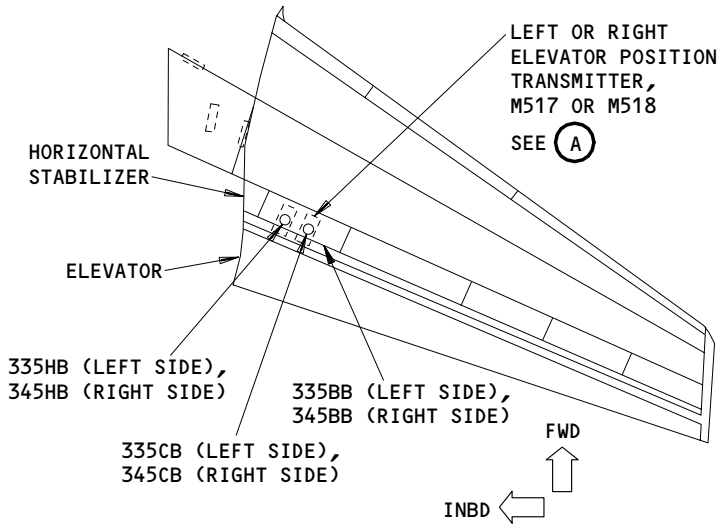
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	--		FLIGHT COMPARTMENT, P11 PANEL	
ELEVATOR POS L, C4101		1	11J13	*
ELEVATOR POS R, C4102		1	11J22	*
COMPUTER - (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
TRANSMITTER - ELEVATOR POSITION LEFT, M517	--	1	335CB,335HB,335BB, STABILIZER	27-38-02
TRANSMITTER - ELEVATOR POSITION RIGHT, M518	--	1	345CB,345HB,345BB, STABILIZER	27-38-02

* SEE THE WDM EQUIPMENT LIST

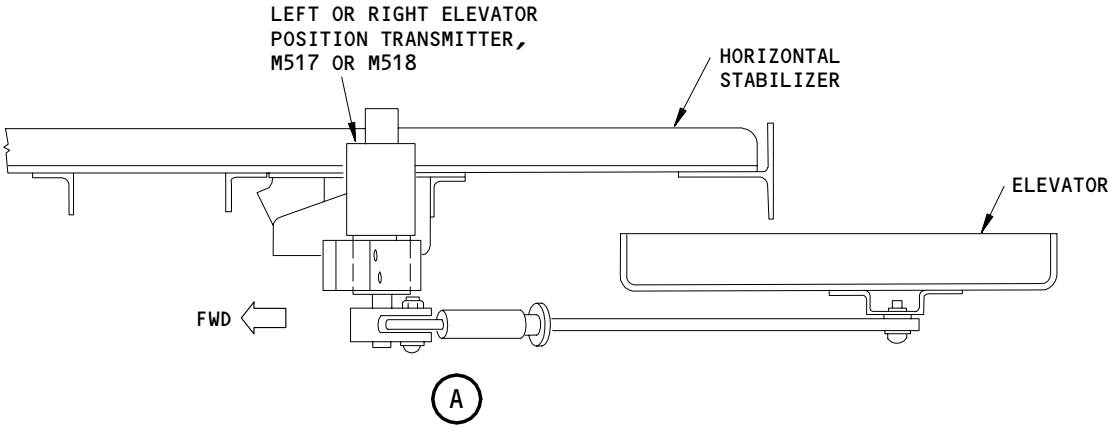
Elevator Position Indicating System - Component Index
Figure 101



FLIGHT COMPARTMENT



HORIZONTAL STABILIZER AND ELEVATOR
(BOTTOM VIEW)



Elevator Position Indicating System - Component Location
Figure 102

ELEVATOR POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains the operational test and the adjustment procedure for the position indicating system for the elevator.

TASK 27-38-00-715-002

2. Operational Test - Elevator Position Indicating System
   A. General
      (1) The operational test of the position indicating system for the elevator does not use ground support equipment. The test lets you monitor the operation of the system and makes sure that it operates smoothly through full travel.
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin

   D. Position Indicating System Operational Test for the Elevator (Fig. 501)

      S 865-003
      (1) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) EICAS (6 locations)
          (b) 11H17, FLT CONT SHUTOFF TAIL LEFT
          (c) 11H18, FLT CONT SHUTOFF TAIL CTR
          (d) 11H28, FLT CONT SHUTOFF TAIL RIGHT
          (e) 11J13, ELEVATOR POS LEFT
          (f) 11J21 or 11J22, ELEV POS RIGHT
          (g) 11K9, LEFT ENGINE OIL PRESS
          (h) 11K35, RIGHT ENGINE OIL PRESS

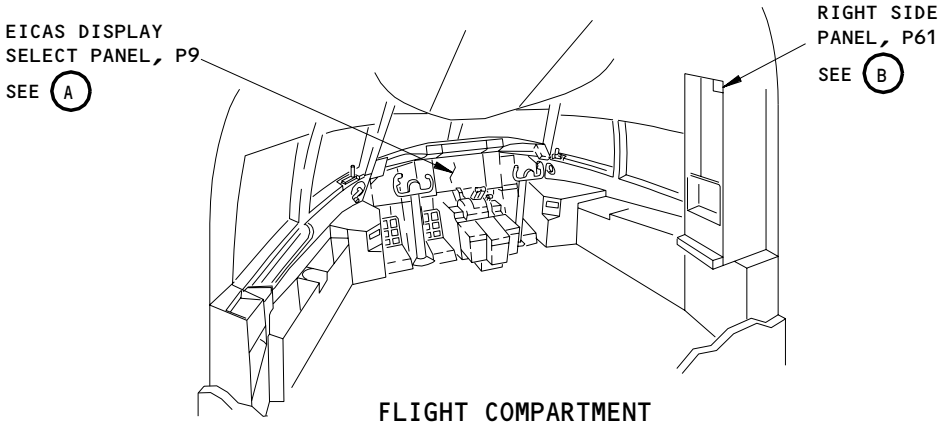
      S 865-004
      (2) Supply electrical power (Ref 24-22-00).

      S 865-005
      (3) Make sure that the R, L, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are at the ON position.

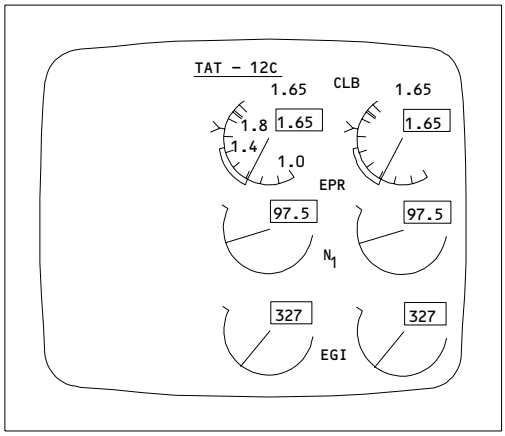
      S 865-006

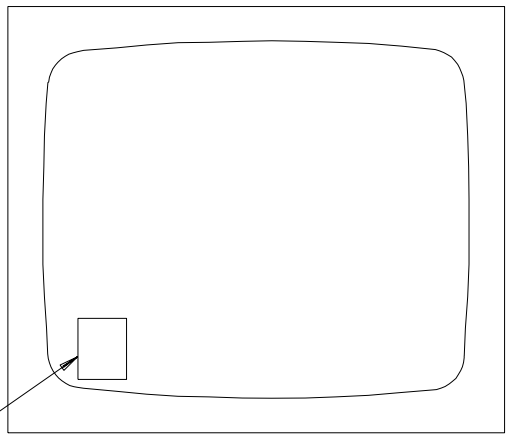
      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (4) Pressurize the left, right, and center hydraulic systems (Ref 29-11-00).



FLIGHT COMPARTMENT



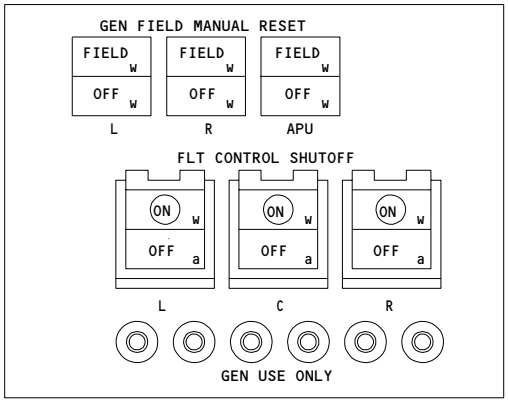


ELEVATOR
POSITION
INDICATORS
SEE C

EICAS SCREEN

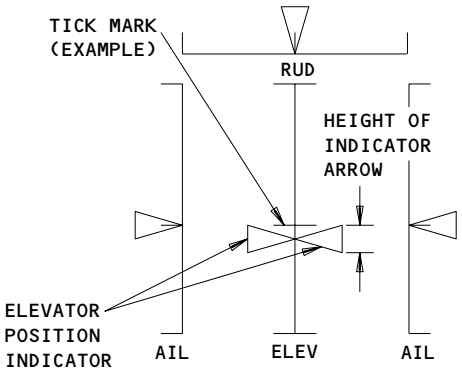
EICAS DISPLAY SELECT PANEL, P9

A



RIGHT SIDE PANEL, P61

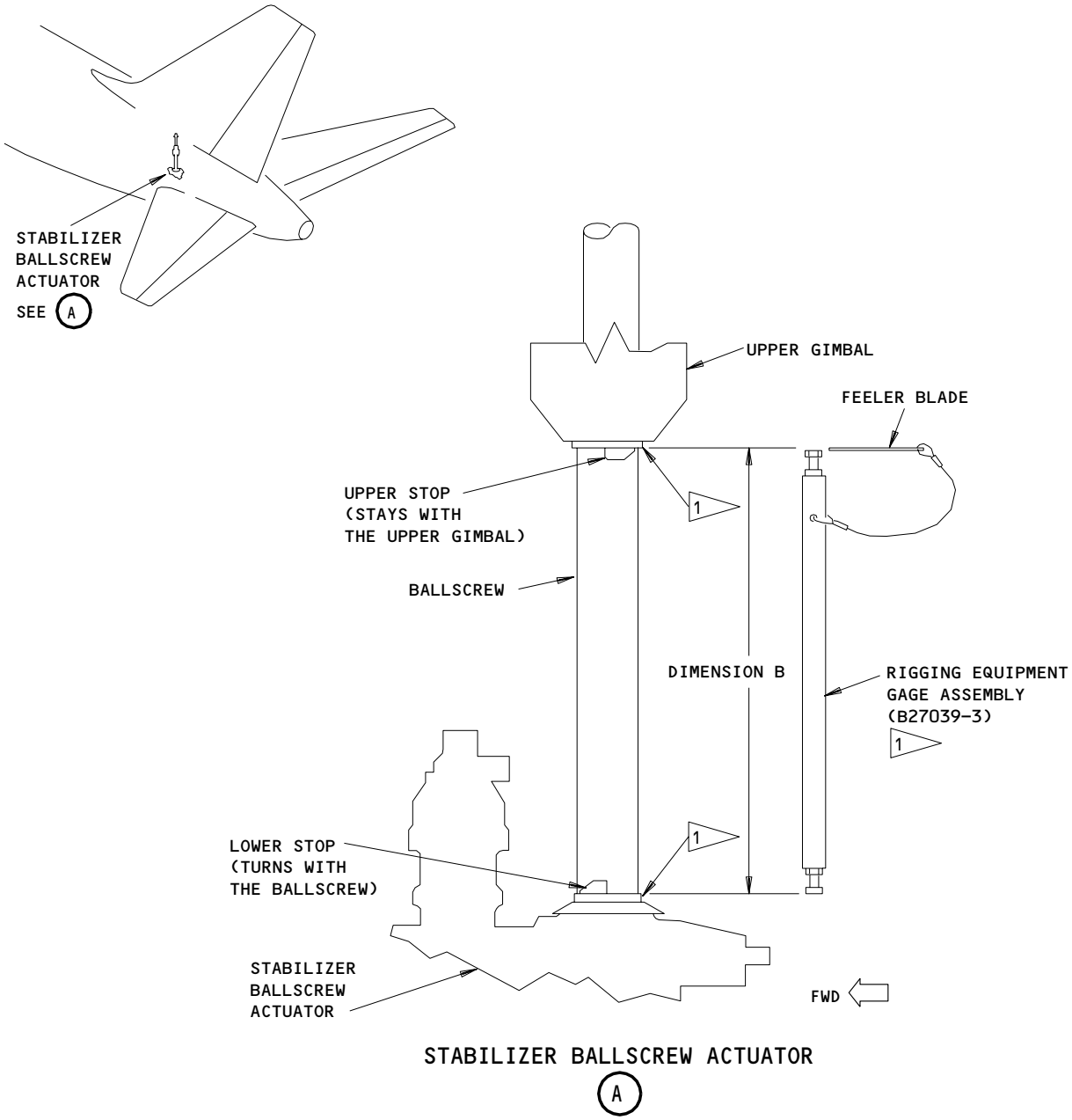
B



ELEVATOR POSITION INDICATORS

C

Elevator Position Indicating System Components
Figure 501

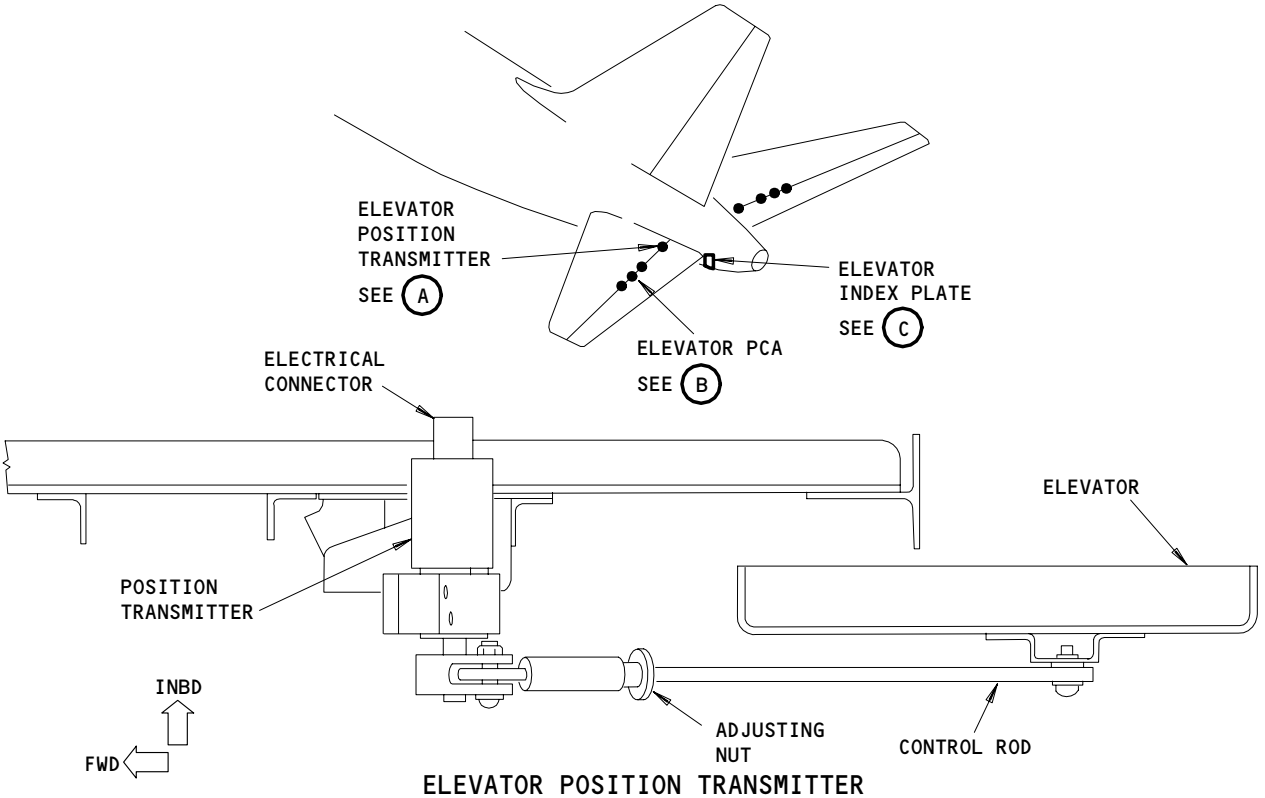


STABILIZER BALLSCREW ACTUATOR
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES, DO THE STEPS THAT FOLLOW:

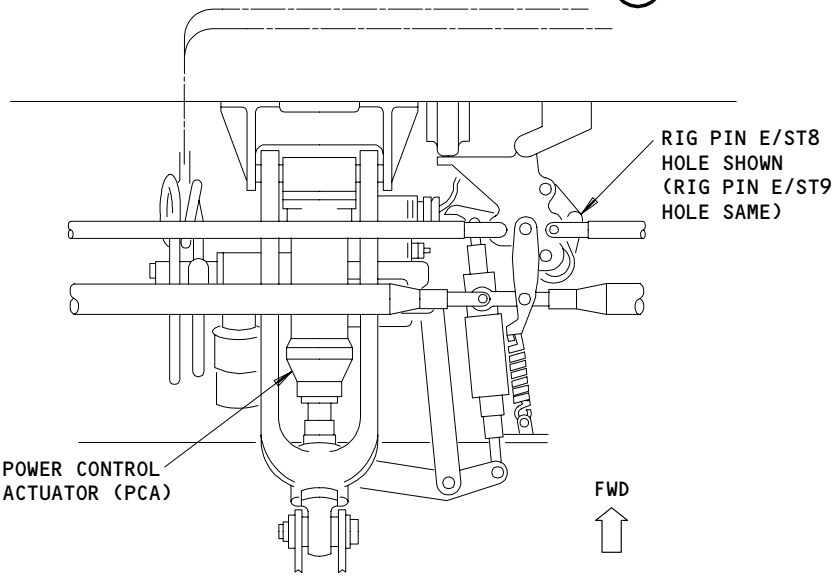
1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 502



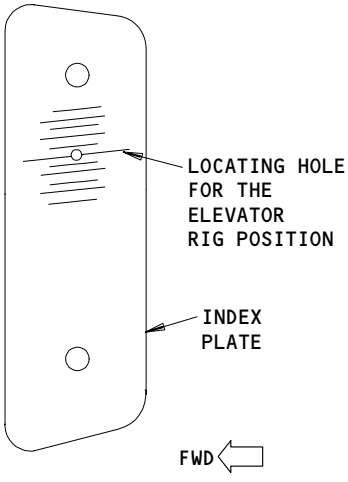
ELEVATOR POSITION TRANSMITTER

A



MIDDLE PCA
(LEFT SIDE SHOWN, RIGHT SIDE IS OPPOSITE)

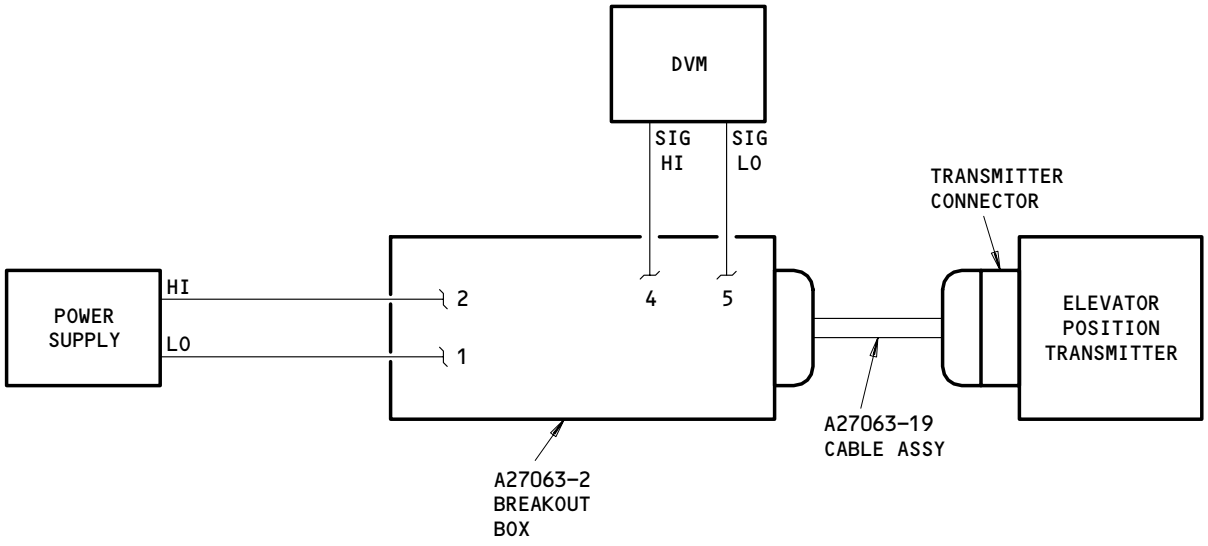
B



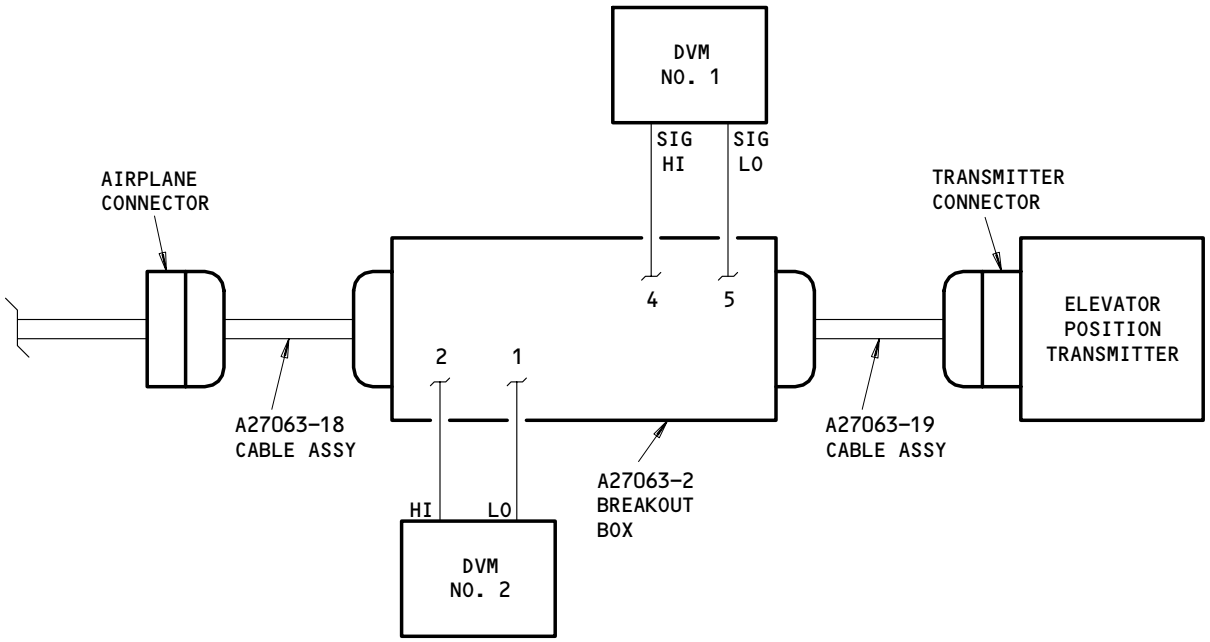
ELEVATOR INDEX PLATE

C

Elevator Position Indicating System Adjustment
Figure 503



PROCEDURE 1



LEGEND

DVM - DIGITAL VOLTMETER

PROCEDURE 2

NOTE: IF ONLY ONE DVM IS AVAILABLE, FIRST CONNECT THE DVM AT THE POSITION SHOWN FOR DVM NO. 2 THEN CONNECT THE DVM TO THE POSITION SHOWN FOR DVM NO. 1

Elevator Position Transmitter Adjustment
Figure 504

S 715-001

(5) Do the steps that follow to make sure the elevator position indicators operate correctly:

(a) Make sure the stabilizer is at 6 units of trim (neutral position) on the stabilizer position indicators, on the control stand panel, P10.

NOTE: use a tolerance of +/- one-half and arrow width.

(b) Make sure that the elevator position indicators on the EICAS display are as follows:
1) Align approximately with the middle EICAS tick mark.
2) Less than one-half the height of an indicator arrow away from each other.

(c) Push the captain's control column to the forward stop.

(d) Make sure that the elevator position indicators on the EICAS display move down together to the full travel tick mark.

NOTE: Make sure that the elevator position indicators on the EICAS display are as follows:

1) Align approximately with the middle EICAS tick mark.
2) Less than one-half the height of an indicator arrow away from each other.

(e) Pull the captain's control column to the aft stop.

(f) Make sure that the elevator position indicators on the EICAS display move up together to the full travel tick mark.

NOTE: Make sure that the elevator position indicators on the EICAS display are as follows:

1) Align approximately with the middle EICAS tick mark.
2) Less than one-half the height of an indicator arrow away from each other.

(g) Let the captain's control column go to the neutral position.

NOTE: Make sure that the elevator position indicators on the EICAS display are as follows:

1) Align approximately with the middle EICAS tick mark.
2) Less than one-half the height of an indicator arrow away from each other.

S 865-007

(6) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-008

(7) Remove electrical power (Ref 24-22-00).

TASK 27-38-00-825-009

3. Adjustment - Elevator Position Indicating System

A. General

(1) This procedure contains steps to adjust the position indicating system for the elevator. When adjusted correctly, the system will operate smoothly through its travel range. With the horizontal stabilizer at its rigged position, the elevator position transmitter is adjusted correctly if the elevator position indicators follow the movement of the elevators correctly.

B. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) E/ST8 - B20003-21
(b) E/ST9 - B20003-21

(2) Position Transmitter Tester, Breakout Box, Cables - A27063-91

(3) Gage Assembly - B27039-3 (part of Elevator and Stabilizer Rigging Equipment, B27039-13)

(4) Digital Voltmeter (DVM) - John Fluke 8020B (adjustment PROCEDURE 1 or 2) John Fluke Manufacturing Co., Inc., Everett, Washington

NOTE: Two DVM's are necessary if PROCEDURE 2 (airplane power procedure) is used.

(5) Power Supply - Powertron Model 5900 (adjustment PROCEDURE 1) Industrial Test Equipment Corp., Port Washington, New York

C. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control

(4) 27-38-02/401, Elevator Position Transmitter
(5) 27-41-00/501, Horizontal Stabilizer Trim Control System
(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

211/212	Control Cabin
335/345	Horizontal Stabilizer Rear Spar to Trailing Edge

(2) Access Panels

335CB/345CB	Position Transmitter (Left/Right)
335DB/345DB	Middle Elevator PCA (Left/Right)

E. Prepare for the Adjustment Procedure

S 865-010
(1) Supply electrical power (Ref 24-22-00).

S 215-011
(2) Make sure that the control columns are at the neutral position.

S 495-012
(3) Use a rope to hold the control columns at the neutral position and attach a DO-NOT-OPERATE tag.

NOTE: If you move the control columns, with the elevators not supplied with power, the elevators will move down because of their weight.

S 225-013
(4) Make sure the upper surfaces of the left and right elevator trailing edge are less than 0.15 inch (3.8 mm) away from the locating hole on the index plates (Fig. 503).

NOTE: Adjustment of the PCAs and input rods for the PCAs can be necessary before you adjust the elevator position transmitters (Ref 27-31-00).

S 865-014
(5) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 215-015
(6) Make sure that the power is removed from the left, right, and center hydraulic systems.

S 015-016
(7) Remove the access panels for the middle PCAs, 335DB and 345DB (Ref 06-42-00).

S 015-017
(8) Remove the access panels for the position transmitter , 335CB and 345CB (Ref 06-42-00).

F. Elevator Position Transmitters Adjustment (Fig. 503).

NOTE: Three procedures to adjust the elevator position transmitters are given:
PROCEDURE 1 uses a commercially available power supply, digital voltmeter (DVM), and breakout box equipment.
PROCEDURE 2 uses airplane power, two DVM's, and breakout box equipment.
PROCEDURE 3 uses the EICAS computer and a person in the control cabin and a person at the elevator.

The steps that follow are used for the left and right position transmitters. Adjust only one position transmitter at a time.

S 495-018
(1) Install rig pins E/ST8 and E/ST9 in the middle PCA bellcranks.

S 865-019
(2) Put the L, R, and C FLT CONTROL SHUTOFF switches on the P61 panel to the ON position.

S 865-020

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-021
(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11J21 or 11J22, ELEV POS RIGHT

S 225-022
(5) Make sure the length of the transmitter control rod, between the centers of the attachment fasteners, is 9.30 ± 0.02 inches (236.2 +/- 0.5 mm).

S 825-023
(6) If the length is not the necessary dimension, do the steps that follow to adjust the control rod:
(a) Disconnect the transmitter control rod from the elevator.

(b) Turn the control rod one-half turn at a time until the rod has the necessary dimension.
(c) Connect the control rod to the elevator.

S 825-024
(7) Do the steps that follow to adjust the position transmitters (PROCEDURE 1):

NOTE: PROCEDURE 1 uses a commercially available power supply, digital voltmeter (DVM) and breakout box.

(a) Disconnect the airplane electrical connector from the position transmitter.
(b) Connect the breakout box and the cable assembly to the position transmitter where the airplane electrical connector was disconnected (Fig. 504).
(c) Connect the digital voltmeter (DVM) to the breakout box at pins 4 (SIG HI) and 5 (SIG LO).
(d) Adjust the power supply voltmeter to 26 ± 0.02 volts ac RMS.
(e) Connect the power supply to the breakout box at pins 1 (LO) and 2 (HI).
(f) Turn the adjusting nut to adjust the control rod length until the output voltage (between pins 4 and 5 on the breakout box) is 0.21 ± 0.05 volts ac RMS (shown on the DVM).

NOTE: The voltage will decrease as you make the control rod shorter.

(g) Make sure the rod center-to-center dimension is between 9.08 and 9.47 inches (230.6-240.5 mm).

NOTE: The transmitter body can be turned in its bracket for the necessary thread and voltage conditions. If you turn the transmitter, tighten the screws and apply sealant (Ref 27-38-02).

(h) Put lockwire on the adjusting nut on the control rod.
(i) Make sure that the output voltage shown on the DVM is 0.21 ± 0.05 volt ac RMS.
(j) Disconnect the power supply and the DVM from the breakout box.
(k) Disconnect the breakout box and cable assembly from the position transmitter connector.
(l) Connect the airplane electrical connector to the position transmitter connector.

S 825-025

(8) Do the steps that follow to adjust the position transmitters (PROCEDURE 2):

NOTE: PROCEDURE 2 uses airplane power, two digital voltmeters (DVM's), and a breakout box.

(a) Disconnect the airplane electrical connector from the position transmitter.
(b) Connect the breakout box and cable assembly to the position transmitter where the airplane electrical connector was disconnected (Fig. 504).
(c) Connect the digital voltmeter (DVM) No. 1 to the breakout box at pins 4 (SIG HI) and 5 (SIG LO).
(d) Connect the cable assembly between the airplane electrical connector and the breakout box.
(e) Connect DVM No. 2 to the breakout box at pins 1 (LO) and 2 (HI) to monitor airplane power.
(f) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11J13, ELEVATOR POS LEFT (to adjust the left transmitter)
2) 11J21 or 11J22, ELEV POS RIGHT (to adjust the right transmitter)
(g) Make sure that the airplane input voltage is between 24 and 30 volts ac RMS (shown on DVM No. 2).
(h) Turn the adjusting nut to adjust the control rod length until the output voltage (between pins 4 and 5 on the breakout box) is 0.21 ± 0.05 volts ac RMS (shown on DVM No. 1).

NOTE: The voltage will decrease as you make the control rod shorter.

(i) Make sure the rod center-to-center dimension is between 9.08 and 9.47 inches (230.6-240.5 mm).

NOTE: The transmitter body can be turned in its bracket for the necessary thread and voltage conditions. If you turn the transmitter, tighten the screws and apply sealant (Ref 27-38-02).

(j) Put lockwire on the control rod adjusting nut.
(k) Make sure that the output voltage shown on DVM No. 1 is 0.21 ± 0.05 volt ac RMS.
(l) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11J13, ELEVATOR POS LEFT

2) 11J21 or 11J22, ELEV POS RIGHT

(m) Disconnect the breakout box and the cable assembly from the airplane electrical connector.

(n) Disconnect the DVMs from the breakout box.

(o) Disconnect the breakout box and the cable assembly from the position transmitter connector.

(p) Connect the airplane electrical connector to the position transmitter connector.

S 825-026

(9) Do the steps that follow to adjust the position transmitters (PROCEDURE 3):

NOTE: PROCEDURE 3 uses the EICAS computer and a person in the control cabin and a person at the elevator.

(a) Install equipment for the person in the control cabin to speak with the person by the position transmitter.

(b) Make sure these circuit breakers on the P11 panel are closed:

1) EICAS (6 locations)
2) 11J13, ELEVATOR POS LEFT
3) 11J21 or 11J22, ELEV POS RIGHT
4) 11K9, LEFT ENGINE OIL PRESS
5) 11K35, RIGHT ENGINE OIL PRESS

(c) Push the STATUS button on the EICAS display select panel, P9, to show the elevator position indicator on the EICAS display.

(d) Turn the adjusting nut to adjust the control rod length until the left (right) elevator position indicator arrow is as follows (Fig. 501):

1) Aligned with the middle EICAS tick mark.

(e) Make sure the rod center-to-center dimension is between 9.08 and 9.47 inches (230.6-240.5 mm).

NOTE: The transmitter body can be turned in its bracket for the necessary thread and voltage conditions. If you turn the transmitter, tighten the screws and apply sealant (Ref 27-38-02).

(f) Put lockwire on the adjustment nut on the control rod.

(g) Make sure that the position indicator arrow did not moved.

S 865-027

(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-028

(11) Remove electrical power (Ref 24-22-00).

S 095-029

(12) Remove rig pins E/ST8 and E/ST9.

S 095-030
(13) Remove the rope and the DO-NOT-OPERATE tag from the control columns.

S 415-031
(14) Install the access panels for the middle PCAs, 335DB and 345DB (Ref 06-42-00).

S 415-032
(15) Install the access panels for the position transmitters, 335CB and 345CB (Ref 06-42-00).

S 705-033
(16) Do the test for the position indicating system for the elevator (same as the Elevator Position Transmitter Operational Test).

ELEVATOR POSITION TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the position transmitters for the elevator control system.

TASK 27-38-02-024-001

2. Remove the Position Transmitters
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST8 - B20003-21
          (b) E/ST9 - B20003-21
      (2) Gage Assembly - B27039-3 (Part of the Elevator and Stabilizer Rigging Equipment, B27039-13)
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 27-61-00/201, Spoiler/Speedbrake Control System
      (5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45
          335/345 Horizontal Stabilizer, Rear Spar to Trailing Edge

      (2) Access Panels
          311AL Forward Stabilizer Compartment
          335BB/335DB Position Transmitter (Left)
          345BB/345DB Position Transmitter (Right)

   D. Prepare for the Removal

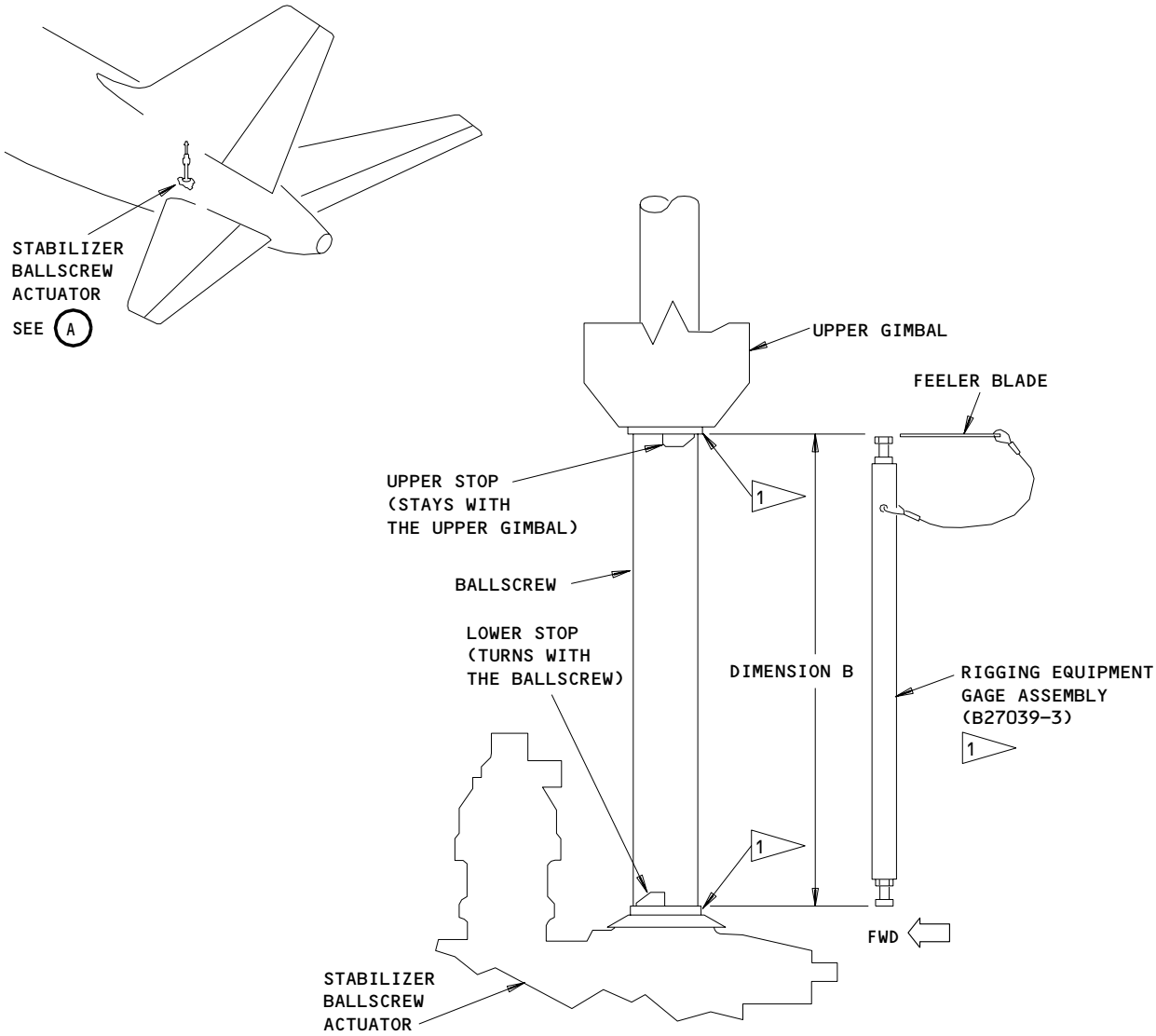
      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003

      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (2) Pressurize the right and center hydraulic systems (Ref 29-11-00).

      S 864-004
      (3) Move the horizontal stabilizer until Dimension B on the stabilizer ballscrew actuator is 15.89 ± 0.01 inches (40.36 +/- 0.025 centimters) (6 units of trim on the position indicator) (Fig. 401).

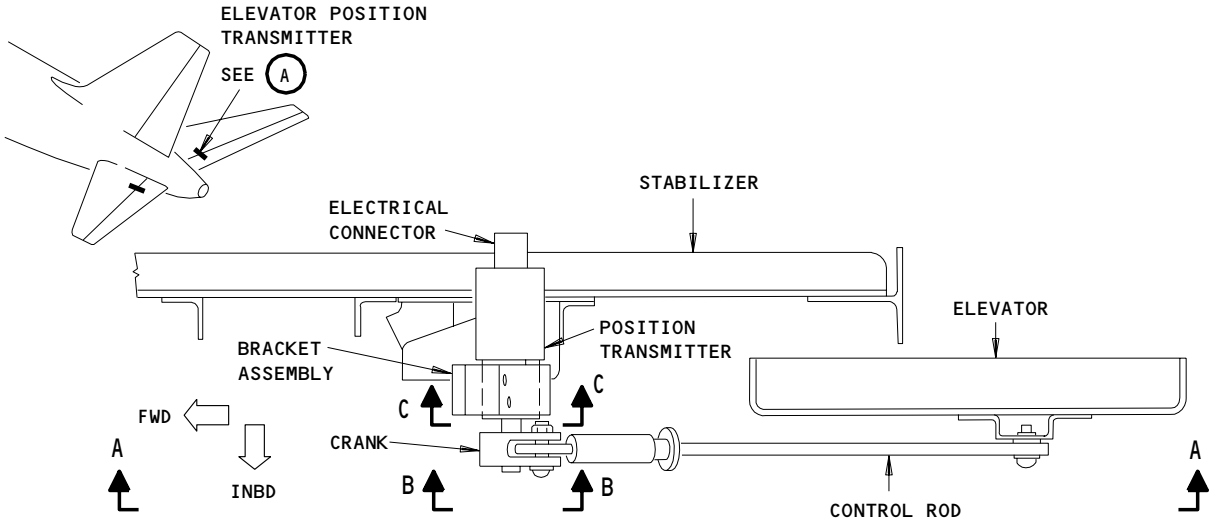


STABILIZER BALLSCREW ACTUATOR
A

1 TO USE THE GAGE ASSEMBLY TO SET DIMENSION B TO 15.89 ±0.01 INCHES, DO THE STEPS THAT FOLLOW:

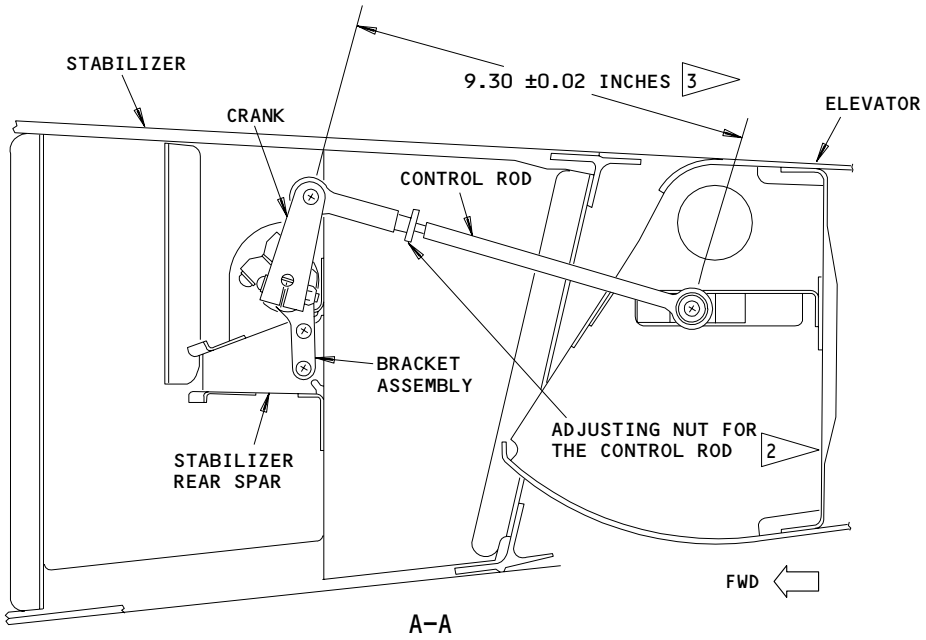
1. PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SO THAT THE BOLT HEADS ARE ON THE SHOULDERS OF THE UPPER AND LOWER STOPS
2. MAKE SURE THAT THE FEELER BLADE CAN BE PUT BETWEEN THE BOLT HEAD OF THE GAGE ASSEMBLY AND ON THE SHOULDER OF THE UPPER STOP (THIS WILL PREVENT PRELOADING)

Measurement of Stabilizer Dimension B
Figure 401



ELEVATOR POSITION TRANSMITTER

A



A–A

1 PREPARE THE MATING SURFACES WITH AN ABRASIVE PAD, THEN APPLY A LAYER OF ALODINE. APPLY SEALANT TO THE EDGES OF THE MATING SURFACES, THE SURFACE EDGES, AND THE ENDS OF THE FASTENERS.

2 A MAXIMUM OF 12 THREADS ARE PERMITTED TO BE SEEN ON THE ADJUSTING NUT.

3 SET THE CONTROL ROD TO THIS INITAL LENGTH WHILE THE ELEVATOR AND STABILIZER ARE IN THEIR ADJUSTMENT POSITIONS.

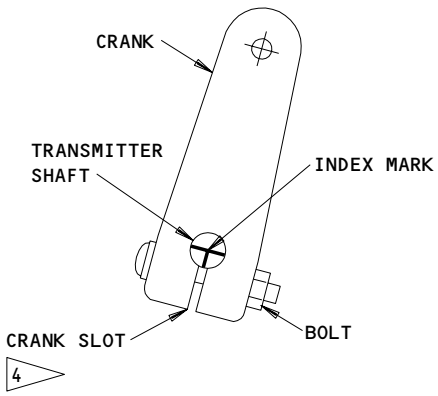
4 THE CRANK SLOT MUST ALIGN WITH THE INDEX MARK ON THE TRANSMITTER SHAFT BY LESS THAN ±2°.

Elevator Position Transmitter Installation
Figure 402 (Sheet 1)

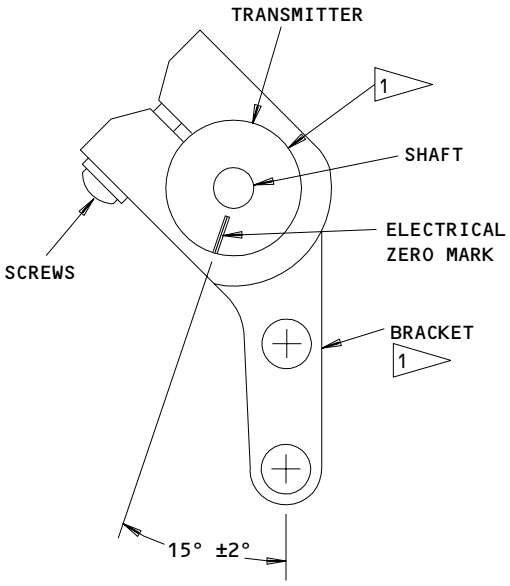
S 864-005
(4) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 864-006
(5) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the OFF position.

S 864-007
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J13, ELEVATOR POS LEFT

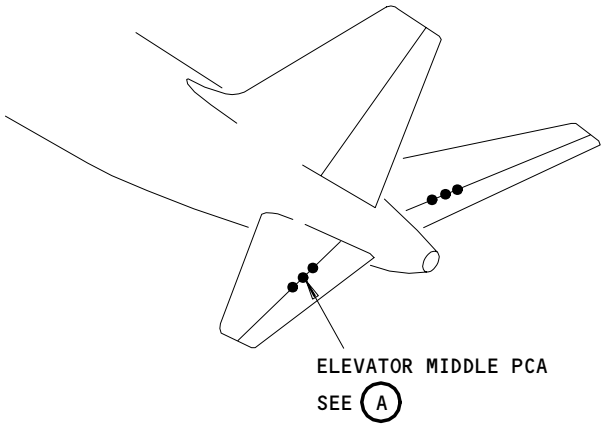


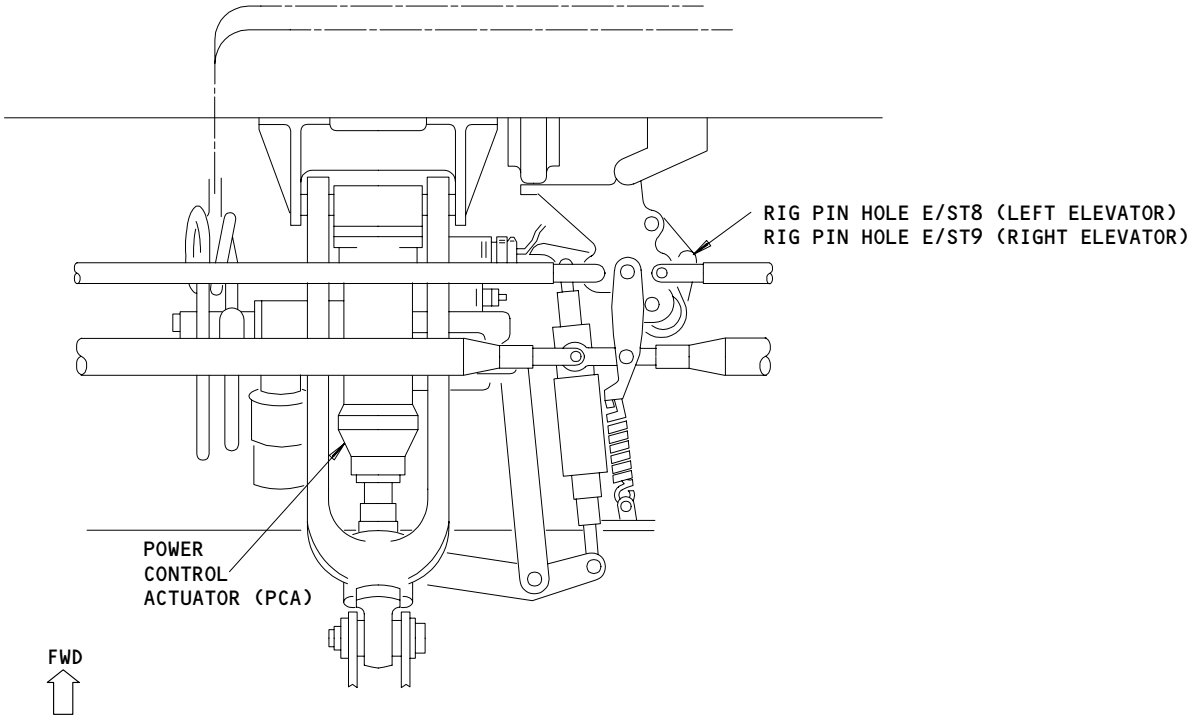
B-B



C-C

Elevator Position Transmitter Installation
Figure 402 (Sheet 2)





ELEVATOR MIDDLE PCA
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

A

Adjustment for the Elevator Power Control Actuator (PCA)
Figure 403

(e) 11J21 or 11J22, ELEV POS RIGHT

S 014-008

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(7) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 014-009

(8) Remove these access panels to the position transmitter and the PCA bellcranks (Ref 06-42-00):
(a) 335BB and 335DB for the left elevator
(b) 345BB and 345DB for the right elevator.

S 494-010

(9) Install rig pins E/ST8 and E/ST9 (Fig. 403).

S 044-011

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 864-012

(11) Remove electrical power (Ref 24-22-00).

E. Remove the Position Transmitter (Fig. 402)

S 034-013

(1) Disconnect the electrical connector from the position transmitter.

S 034-014

(2) Disconnect the control rod from the elevator.

S 034-015

(3) Remove the bolts that hold the bracket assembly to the stabilizer.

S 034-016

(4) Remove the bracket assembly, position transmitter, crank, and control rod.

S 034-017

(5) Disassemble the bracket assembly, position transmitter, crank, and control rod.

TASK 27-38-02-424-018

3. Install the Position Transmitter

A. Consumable Materials

(1) A00247 Sealant, Chromate Type BMS - 5-95
(2) B00105 Abrasive - Scotch Brite No. 7447
(3) C00064 Alodine - 1200 or 1200S

B. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-38-00/501, Elevator Position Indicating System
(4) 27-61-00/201, Spoiler/Speedbrake Control System
(5) 51-21-04/701, Alodine

C. Access

(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45
335/345	Horizontal Stabilizer, Rear Spar to Trailing Edge

(2) Access Panels

311AL	Forward Stabilizer Compartment
335BB/335DB	Position Transmitter (Left)
345BB/345DB	Position Transmitter (Right)

D. Install the Position Transmitter (Fig. 402)

S 124-019

(1) Prepare the mating surfaces between the position transmitter and the bracket with an abrasive pad, and do the step that follows:
(a) Apply a layer of alodine (Ref 51-21-04) to the mating surfaces.

S 424-020

(2) Install the position transmitter in the bracket assembly.

S 824-021

(3) Turn the position transmitter in the bracket assembly to align the electrical zero mark on the position transmitter, and do the steps that follow (Section D-D):
(a) Tighten the screws on the position transmitter to 25-32 pound-inches.
(b) Make sure the position transmitter is aligned correctly and cannot turn in the bracket.
(c) Apply sealant to the edges of the mating surfaces and to the edge of the fasteners.

S 824-022

(4) Align the slot in the crank with the index mark on the position transmitter shaft, and do the steps that follow (Section C-C):
(a) Put the crank on the position transmitter shaft such that the fastener is in the groove.

(b) Install the bolt in the crank and tighten the bolt to 25-32 pound-inches.

S 124-023

(5) Prepare the mating surfaces between the bracket assembly and the stabilizer with an abrasive pad and do the step that follows:
(a) Apply a layer of alodine to the mating surfaces (Ref 51-21-04).

S 424-024

(6) Attach the bracket assembly to the stabilizer and do the step that follows:
(a) Apply sealant to the mating edges and the ends of the fasteners.

S 434-025

(7) Connect the electrical connector to the position transmitter.

S 824-026

(8) Adjust the length of the control rod to 9.30 ± 0.02 inches (236 +/- 0.5 mm).

NOTE: Make sure that you do not see more than 12 threads at the adjusting nut.

S 434-027

(9) Connect the control rod between the crank and the elevator.

S 824-028

(10) Do the adjustment for the position transmitter (Ref 27-38-00).

S 714-029

(11) Do the test for the position indicating system for the elevator (Ref 27-38-00)

E. Put the Airplane Back to Its Usual Condition

S 864-030

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H17, FLT CONT SHUTOFF TAIL LEFT
(b) 11H18, FLT CONT SHUTOFF TAIL CTR
(c) 11H28, FLT CONT SHUTOFF TAIL RIGHT
(d) 11J13, ELEVATOR POS LEFT

(e) 11J21 or 11J22, ELEV POS RIGHT

S 864-031

(2) Put the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, to the ON position.

S 444-032

(3) Do the activation procedure for the spoiler/speedbrake, if it is necessary (Ref 27-61-00).

S 864-033

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-034

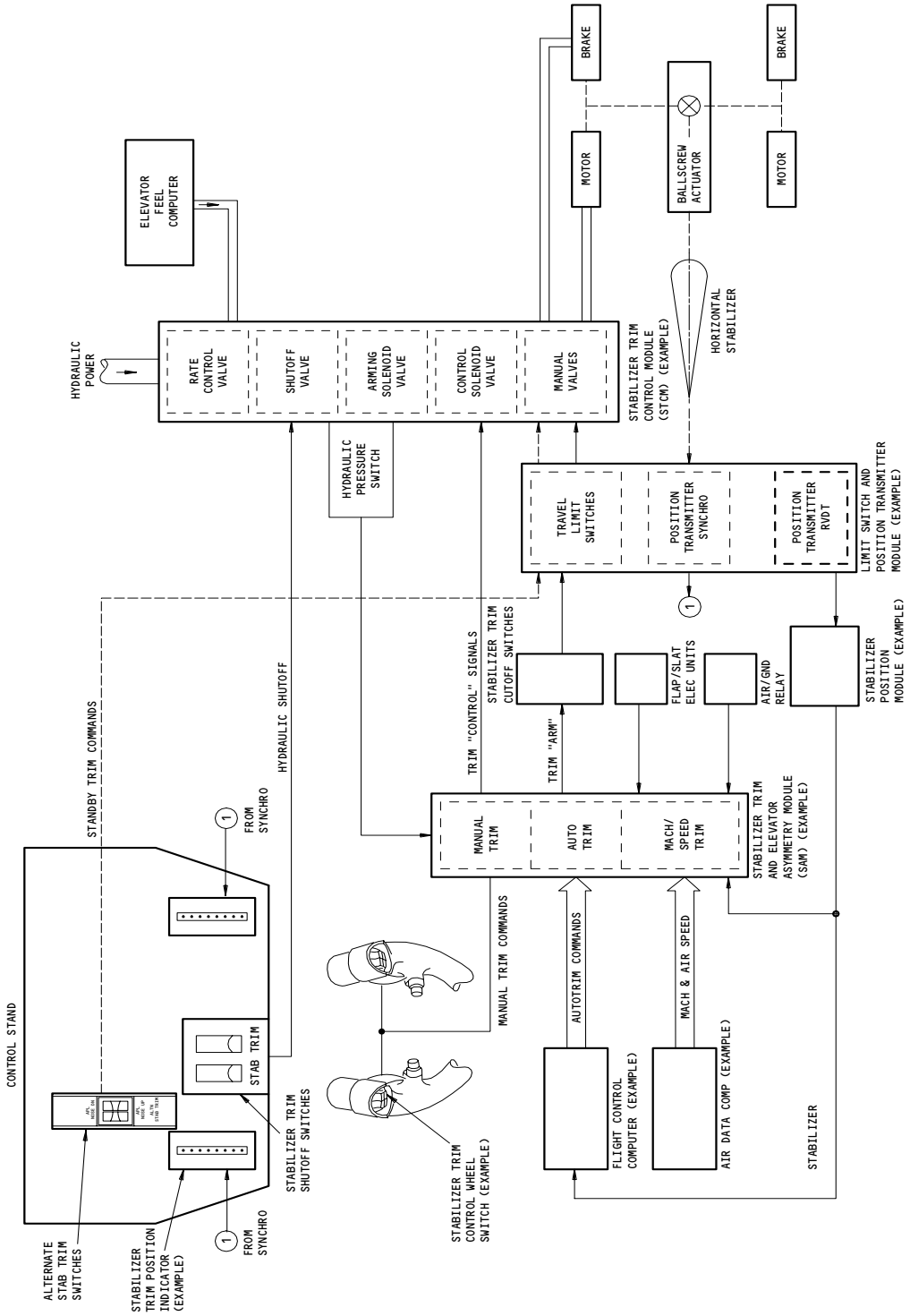
(5) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

S 414-035

(6) Install these access panels for the position transmitter and PCA bellcranks (Ref 06-42-00):
(a) 335BB and 335DB for the left elevator
(b) 345BB and 345DB for the right elevator.

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The overall function of the stabilizer trim system is to maintain the airplane in a trimmed condition and to provide automatic mach and speed stability. The system consists of: (1) several alternative sources of trim command signals; (2) two independent actuation devices which position the stabilizer in response to source commands; and (3) an electronic module which selects a particular trim signal source and also energizes one or the other actuation device.
   B. There are four sources of electric trim command signals. They are: 1) the flight control computer (FCC), 2) the mach/speed trim function in the stabilizer asymmetry module (SAM), 3) the manual-electric trim switches on the control wheels, and 4) the alternate-electric trim switches on the control stand. There is no mechanical control mode for the STCMs.
   C. The description and operation for the stabilizer asymmetry module (SAM) is contained in this section. The removal and installation procedure for the module is contained in MM 27-09-00/201. The selection of the active trim source is done by logic circuits in the SAMs.
   D. The SAMs accept input signals from the FCC, the mach/speed trim function in the SAM, and the control wheel switches. The output signals from the SAM are sent to two STCMs.
   E. There are two independent channels of trim command and actuation. Each channel consists of a SAM, an STCM, and a hydraulic motor and brake on the stabilizer ballscrew actuator. The two channels are known as trim channel left and trim channel right. When an FCC or mach/speed function is the active trim source, only one trim channel is activated, providing half-rate trim. When the electric trim switches are energized, both trim channels are activated simultaneously, and the stabilizer is driven at full-rate trim. The trim rate varies with airplane speed and horizontal stabilizer position as determined by hydraulic pressure output from the elevator feel computer (Fig. 7). The variable hydraulic pressure output from the elevator feel computer is fed to each STCM. In each STCM a rate control valve regulates actual hydraulic pressure available to drive the horizontal stabilizer.



Stabilizer Trim Control System
Figure 1

810377

F. Travel limiting devices control the range of stabilizer movement in all operating modes. In the electrical control modes, limit switches within the stabilizer trim limit switch and position transmitter modules (LSTMs) prevent stabilizer travel beyond that required by the normal flight envelope (Ref 27-48-00).

G. Stabilizer position data is generated by three stabilizer trim limit switch and position transmitter modules (LSTM's). The modules are driven by mechanical cables attached to the stabilizer. The modules transmit position data to the SAM's, the FCC's, and a pair of position indicators on the flight deck (Ref 27-48-00).

H. System redundancy and protective devices prevent stabilizer uncommanded motion. Each of the trim channels requires separate electrical ARM and CONTROL signals to send hydraulic fluid to the motors. Hydraulic power to each control module can be removed by a shutoff switch that is on the control stand panel. The switch controls a motor-operated shutoff valve in the STCM. Cutoff switches operated by the control column motion in opposition to stabilizer motion will interrupt primary electrical trim commands. Failure detection/annunciation is provided for stabilizer trim motion without a valid trim command and for failures resulting in half rate trim operation.

2. Component Details

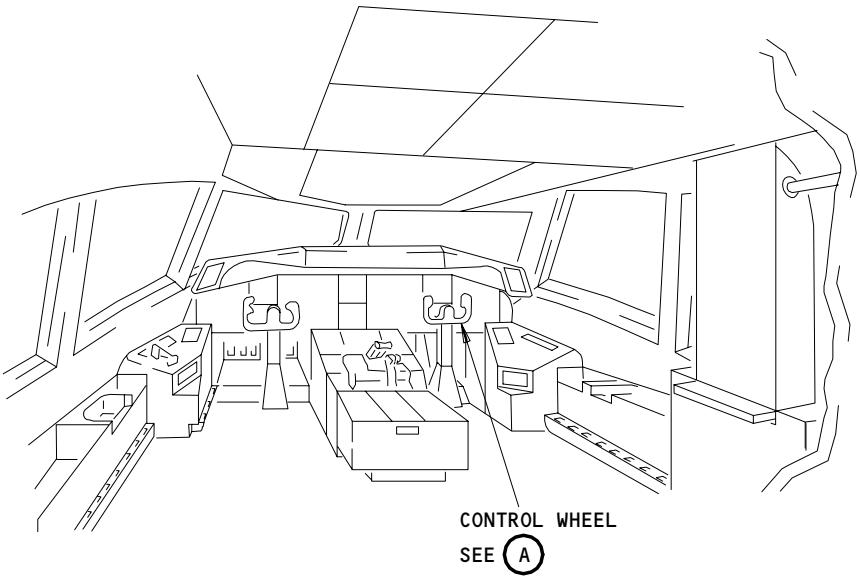
A. Stabilizer Trim Control Wheel Switches (Fig. 2)

(1) Two sets of dual switches, located in the captain's and first officer's control wheels, actuate the stabilizer trim system in the manual-electric control mode. The two switches in each set are mounted side-by-side on the control wheel such that both can be actuated simultaneously with one thumb. Each switch set consists of two single pole, three position, center off switches. The stabilizer trim control wheel switches enable the captain or first officer to input manual trim commands to both SAM's. Actuating both switches in airplane nose up direction inputs simultaneous airplane nose up (stab LE down) arm and control commands. Airplane nose down actuation inputs airplane nose down (stab LE up) arm and control commands.

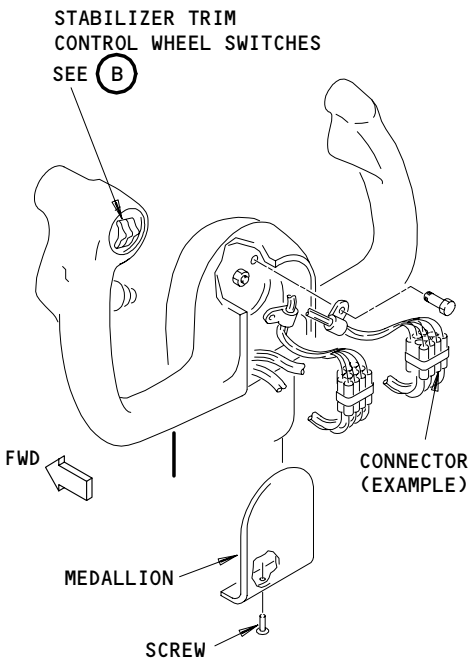
B. Alternate Stab Trim Switches (Fig. 3)

(1) Dual switches, on the control stand panel, operate the stabilizer trim system in the alternate-electric control mode. The switches are mounted side-by-side on the control stand such that both can be operated at the same time. The left segment operates the "control" hydraulic valves on the STCMs and the right segment operates the "arm" hydraulic valve on the STCMs. Movement of the alternate stab trim switches in the opposite direction of the control wheel switches stops the movement of the horizontal stabilizer.

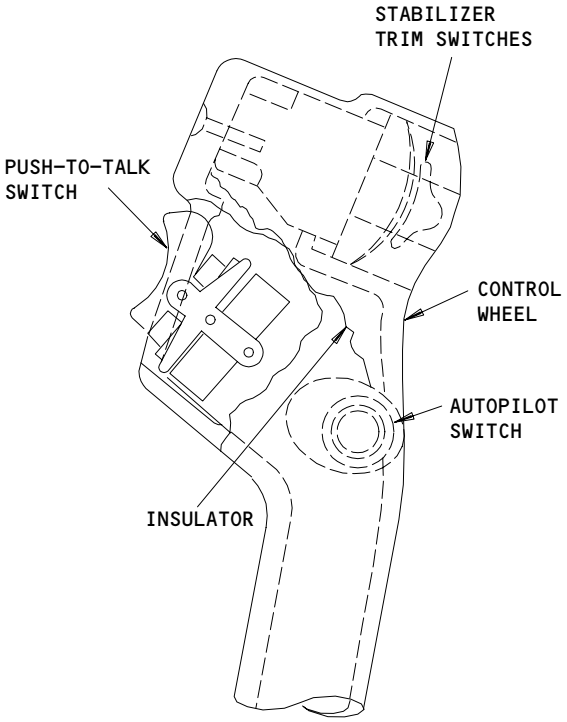
(2) The "arm" segment of the alternate stab trim switches is connected to a standby trim switch. When the alternate stab trim switches are moved, the standby trim switch sends an electrical signal to the SAM. This signal adjusts the mach/speed trim function to agree with the stabilizer position that is commanded by the alternate stab trim switches. The standby trim switch also prevents an incorrect indication of unscheduled stabilizer trim movement.



FLIGHT COMPARTMENT

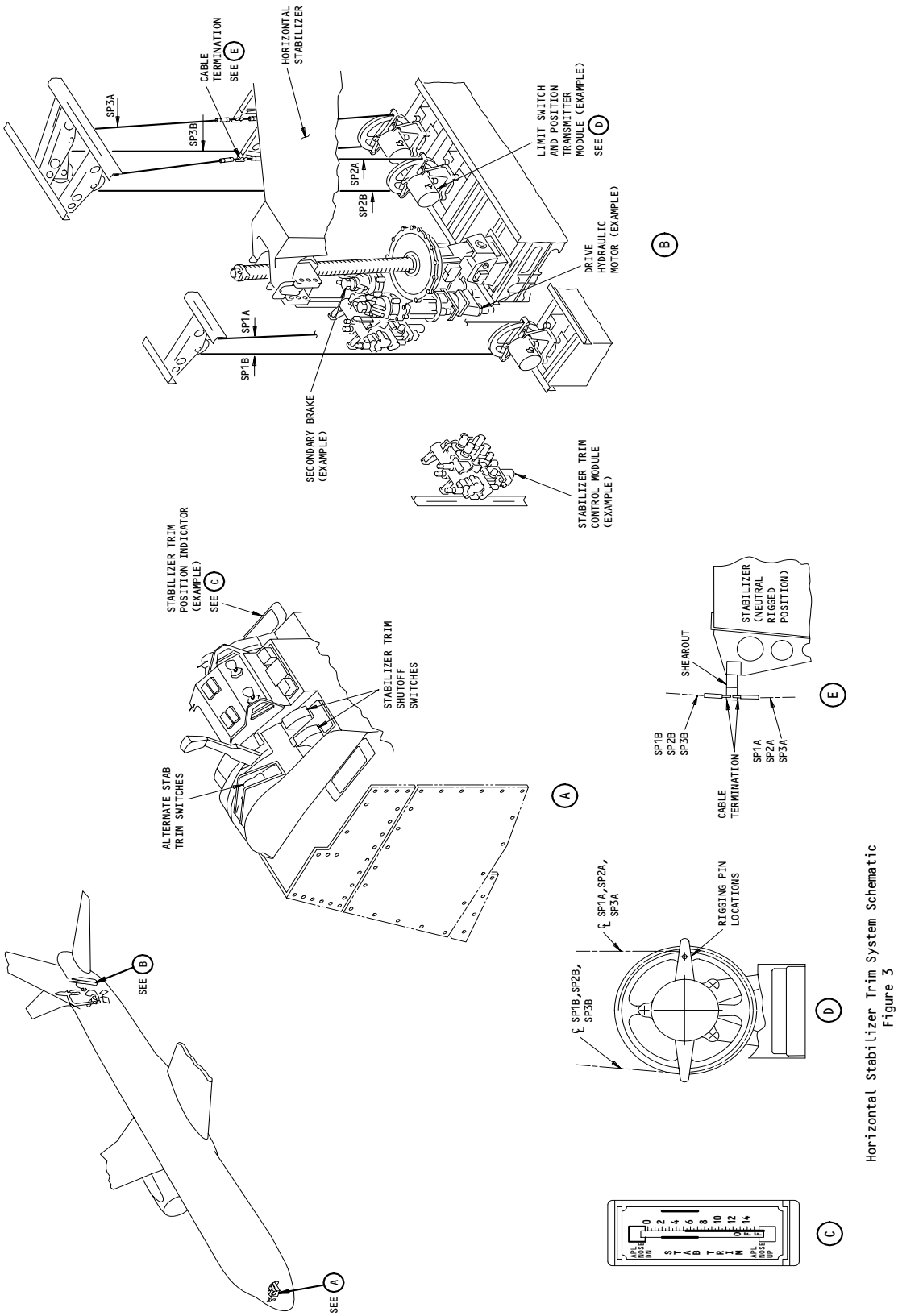


CONTROL WHEEL
A



STABILIZER TRIM
CONTROL WHEEL SWITCHES
B

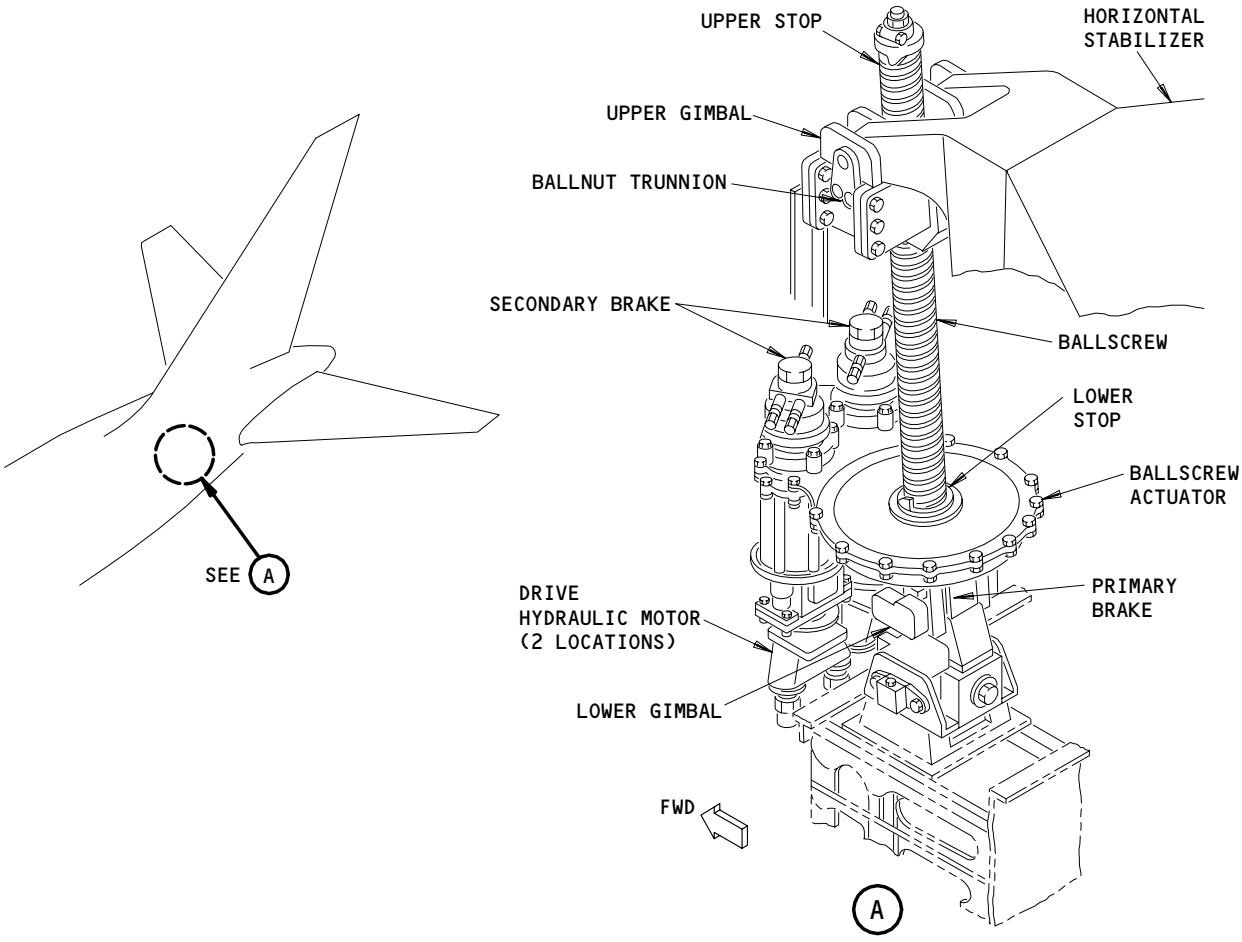
Stabilizer Trim Control Wheel Switches
Figure 2



Horizontal Stabilizer Trim System Schematic
Figure 3

C. Stabilizer Trim Control Module (STCM)
   (1) The stabilizer trim system uses two identical hydraulic control modules. They provide direction and rate control to the stabilizer trim ballscrew actuator. Each module consists of an arming valve, control valve, four dual-wound solenoid-operated valves, rate controller, motor-operated shutoff valve, manual brake bypass valve, and a secondary brake pressure switch used in fault monitoring within the SAM. The simultaneous operation of both STCM's will produce twice the trim rate of just one STCM. The modules are installed just forward of the stabilizer in Section 48.
   (2) A manual brake bypass valve is located in each module and will release the hydraulic pressure on the secondary brake when depressed. This action applies the brake. The valve is designed to return to its neutral position when the external force is removed.

D. Stabilizer Trim Ballscrew Actuator (Fig. 4)
   (1) The ballscrew actuator consists of two sets of drive hydraulic motor/secondary brake combinations which singly or simultaneously drive the ballscrew actuator. The ballscrew actuator consists of a differential gearbox, jackscrew and ballnut assembly, and a primary brake.
   (2) Each STCM controls a drive hydraulic motor and a secondary brake. The STCM ports fluid to the brake and its associated drive motor. The brake is mounted in-line with the motor and acts upon the motor output shaft. When hydraulic pressure reaches the brake-release pressure level, the spring-loaded brake disc disengages and permits motor operation. The brake is sized to hold the maximum output torque of the drive motor.
   (3) The differential gearbox drives a jackscrew and ballnut assembly. The two motors sum their outputs through the differential. This permits full torque capability with one or both motors driving. When only one side of the differential is driven (one motor operation) the opposite side is held stationary. This results in one-half the trim rate. Full trim rate is accomplished with both motors operating. The gearbox utilizes dual load path design to assure that the braking function of either the hydraulic motor or brake is retained after any single failure.
   (4) The jackscrew is dual load path by virtue of a safety rod inside the jackscrew housing which will hold it intact in the event of screw fracture. The inner rod is torsionally constrained to the primary brake at the base and to the jackscrew at the top. The ballnut consists of four ball circuits all of which are loaded. If one fails, only 25 percent of the load carrying capability of the ballnut will be lost. In addition to the ballnut, there is an acme nut which will ride in the ball races on the jackscrew if all ballnut circuits fail.



Stabilizer Trim Ballscrew Actuator Compartment Component
Figure 4

(5) The primary brake consists of a disc of friction material and a ratchet plate on both sides of the jackscrew flange. The ratchet plates and their associated pawls permit ratcheting when the jackscrew is driven in a direction to bring the airplane into trim, and resist stabilizer loads backdriving actuator in the APL out of trim direction.

(6) The ballscrew actuator is located in the empennage. The actuator is held in place by two gimbal pin attachments. The upper gimbal pin attaches the ballnut to the stabilizer. The lower gimbal pin connects the actuator to bulkhead structure below the stabilizer.

(7) In the alternate-electric-stabilizer trim mode, there are mechanical stops on the upper and lower gimbals to limit ballscrew movement. The stabilizer leading edge up limit is approximately +3.85 degrees or 24.86 - 25.46 inches (631.4-646.6 mm) of the dimension B on ballscrew actuator or 0.20 +/- 0.25 units of trim on position indicator. The stabilizer leading edge down limit is approximately -11.36 degrees or 0.80 - 1.40 inches (20-35 mm) of the dimension B or 15.30 +/- 0.25 units of trim.

(8) For all stabilizer trim modes, the stabilizer trim limits are same as the alternate trim mode, except when you trim the stabilizer leading edge up with the flaps in the fully retracted position. In this case, the dimension B is 20.43 - 21.03 inches (519-534 mm) or approximately 3 units of trim.

E. Stabilizer Trim Drive Hydraulic Motor

(1) Two identical hydraulic motors power the stabilizer trim drive. The motors are constant-displacement, bent-axis, piston-type units. The direction of motor rotation is controlled by fluid through the unit. By reversing fluid flow, the direction of motor rotation can be reversed. The motors may be operated continuously, intermittently, or stalled without damage at rated pressures and in a system having proper overload relief. There are no controls or instruments on the hydraulic motor. Operation is controlled entirely by the STCM's.

F. Stabilizer Trim Secondary Brake

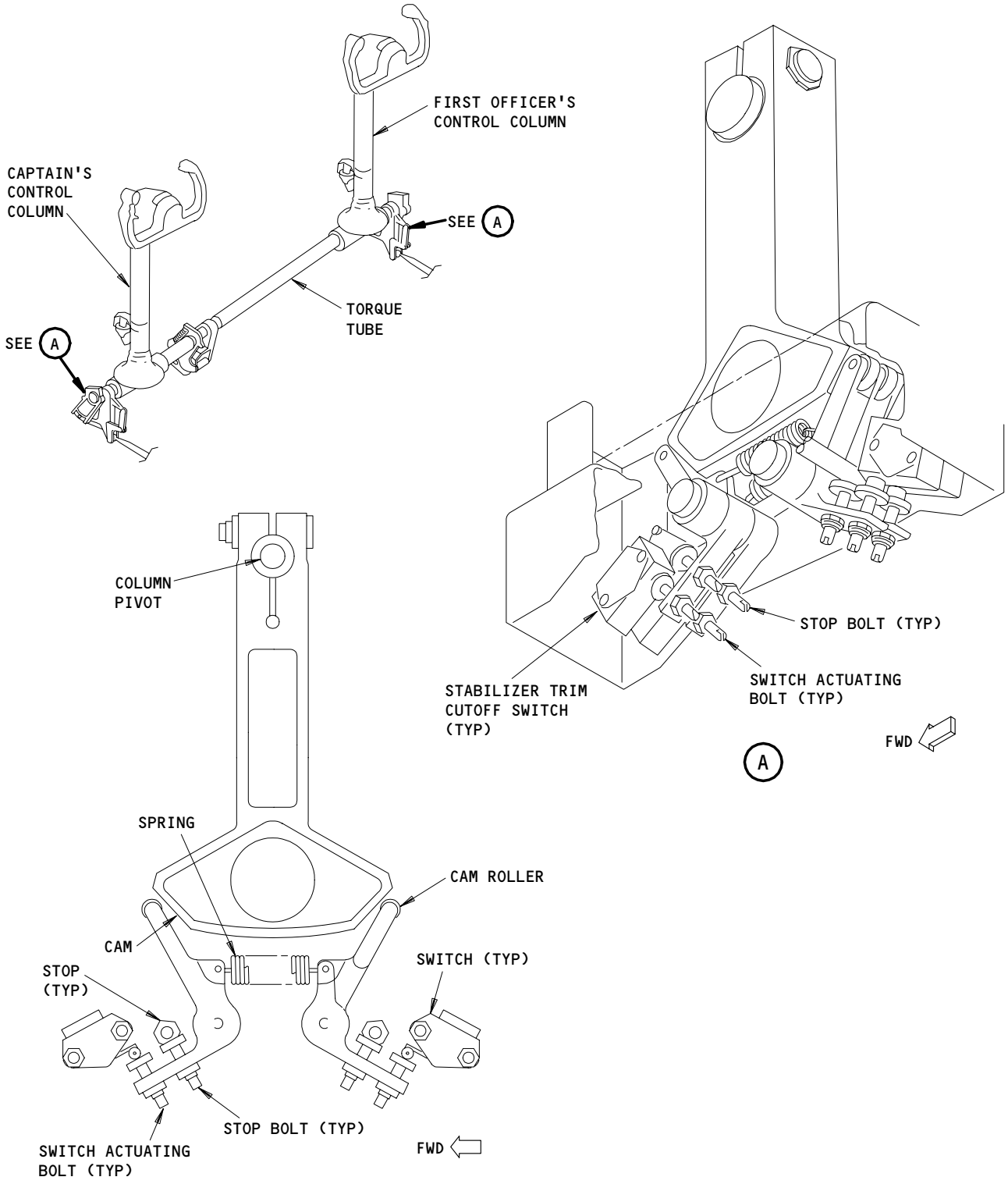
(1) The secondary brake is a completely enclosed sealed unit. The brake consists of a housing, shaft subassembly, brake disc pack, pressure plate and piston, and three concentric brake pressure springs. The brake is normally engaged, under which condition the brake springs are compressing the stator and rotor discs together. On introducing hydraulic pressure into the brake pressure port, the piston is forced back, compressing the pressure springs and pulling the pressure plate away from the disc pack. The brake release springs cause a separation of each layer of rotor and stator discs as the pressure plate is retracted by the piston. On removal of the axial force of the brake pressure springs, the rotor discs and shaft are free to rotate.

G. Stabilizer Trim Limit Switch and Position Transmitter Modules (LSTM's)
   (1) The stabilizer trim control system uses three LSTM's (Ref 27-48-00). The LSTM's are connected by cables to the leading edge of the stabilizer torque box. Each LSTM contains two position transmitters (one synchro and one rotary variable differential transducer (RVDT)), five travel limit switches, and a greenband switch. The synchro transmitter sends position data to the control stand stabilizer position indicators. The RVDT sends position data to the stabilizer position module (SPM). The travel limit switches in the LSTMs limit the electrical trim range. The center LSTM greenband switch provides signals to the warning electronics unit (WEU) for takeoff warning.

H. Stabilizer Trim Cut-off Switches (Fig. 5)
   (1) The column operated stabilizer trim cutoff system interrupts electrical trim commands when the control columns are moved in opposition to stabilizer motion. There are four pairs of switches located on the structure beneath the control columns and actuated by cams attached to the control columns. Four switches are operated by control column movement in the elevator-up direction, and four by movement in the elevator-down direction.
   (2) The cutoff switches interrupt stabilizer trim motion in opposite direction to elevator commands if the control columns are displaced a few degrees forward or a few degrees aft of neutral in a direction opposed to the stabilizer trim. Four switches control the left SAM operation and the other four control the right SAM. The switches are wired such that if the columns are operated asymmetrically, as would occur after an abnormal system condition, both trim modules will remain operative in both directions. This allows full rate trim capability after a jam. The STAB TRIM control levers have control authority over the stabilizer trim cutoff switches.

I. Stabilizer Trim Shutoff Switches
   (1) Two guarded stabilizer trim shutoff switches allow system hydraulic pressure to be removed from the STCM's. The switches control motor-operated shutoff valves in the STCM's. The right system shutoff switch controls the right STCM. The center system shutoff switch controls the left STCM. The switches are mounted on the control stand.

J. Stabilizer/Elevator Asymmetry Limiter Module (SAM)
   (1) The SAM is part of the integrated package of flight control electronics, the control system electronics unit (CSEU). Each of the two (left and right) CSEU's contains a SAM. The SAM's provide electric stabilizer trim control and associated failure monitoring. Each of the two SAM's provides:
      (a) Stabilizer trim mode priority logic for manual electric trim, autopilot trim, and mach/speed trim
      (b) Stabilizer trim engage/disengage and auto transfer logic
      (c) Unscheduled trim fault detection
      (d) Manual-electric trim monitoring
      (e) Fault messages for the caution and warning system as well as for maintenance



OPERATIONAL SCHEMATIC

Control Column Stabilizer Trim Cutoff Switches
Figure 5

(f) Mach/speed trim function
(g) Rudder ratio changer command computation
(h) Elevator asymmetry limiter control

(2) Fault balls on the SAM's display line replaceable unit (LRU) status. A manual RESET button on the SAM clears intermittent failures.

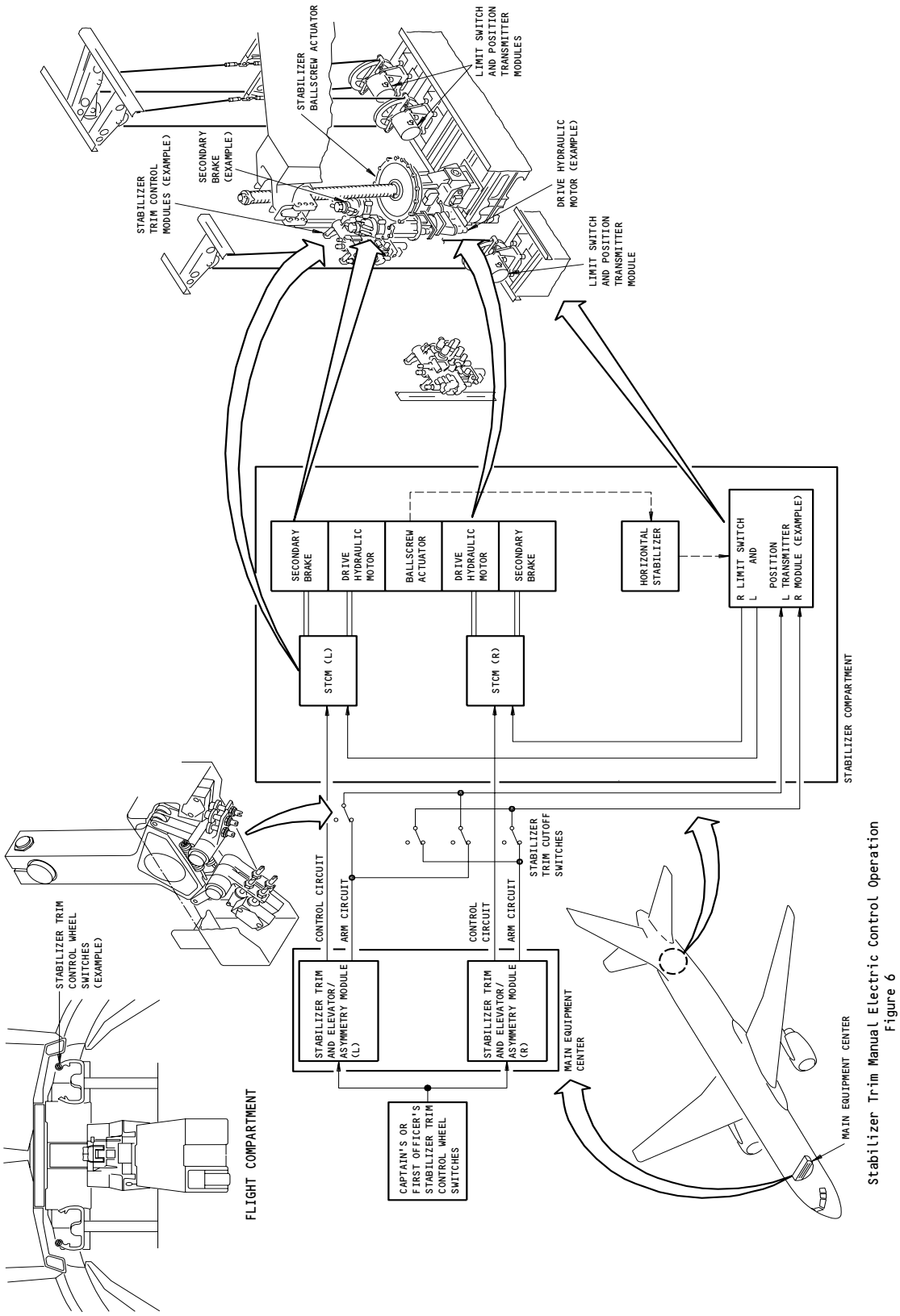
3. Operation

A. Functional Description (Fig. 3, 6 and 7)

(1) There are four modes that can be used to operate the stabilizer. They are 1) manual-electric, 2) automatic stabilizer trim, 3) mach/speed, and 4) alternate-electric operation. The automatic stabilizer trim mode is described in MM 22-22-00. The mach/speed mode is described in MM 22-24-00. The stabilizer is hydraulically driven in all modes. The right and center hydraulic systems supply power to the right and left STCMs respectively.

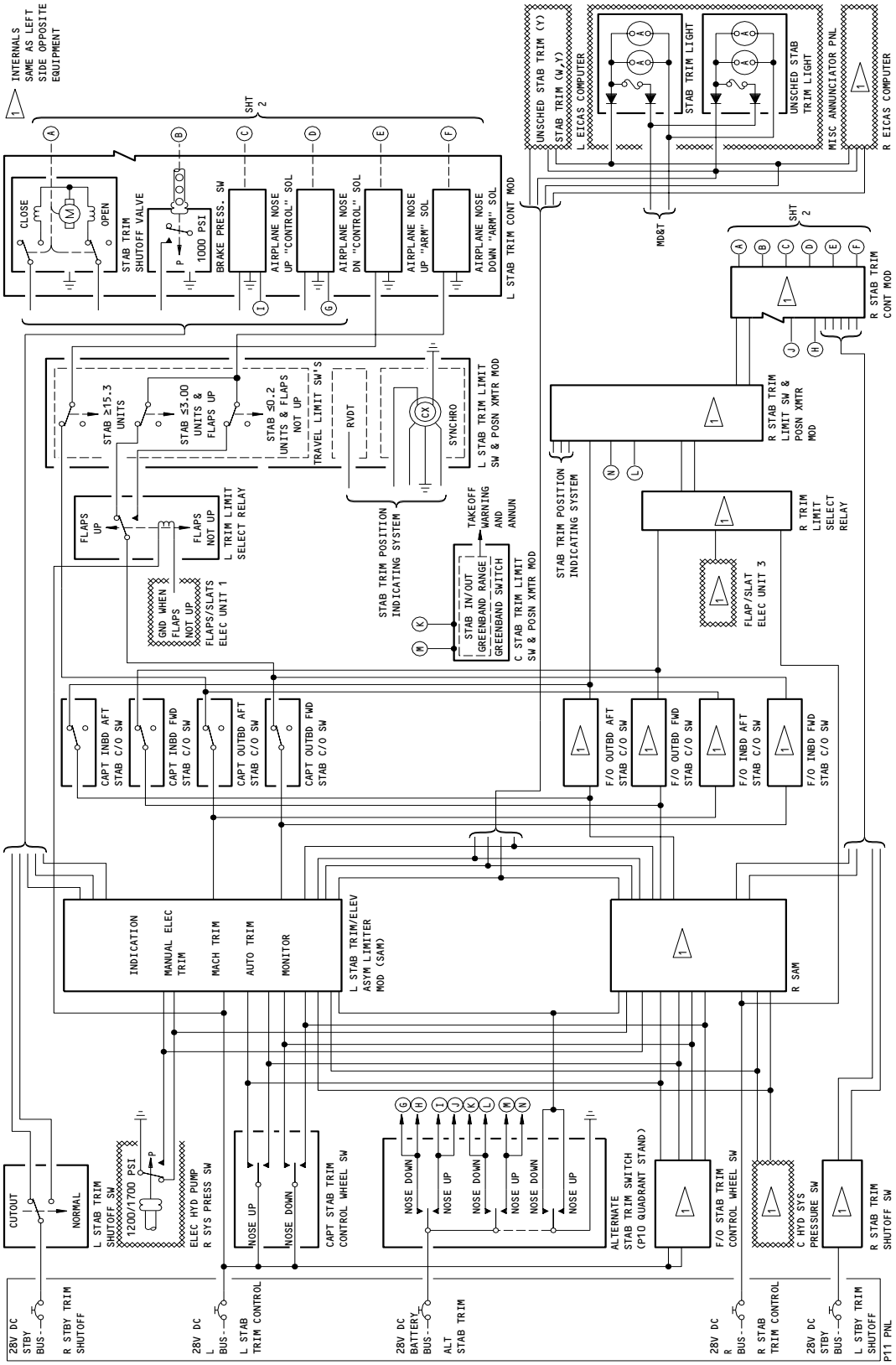
(2) The stabilizer trim system requires application of hydraulic power from the right and center systems to achieve normal trim rate. Normal trim rate varies from 0.5 degree/second to 0.2 degree/second. Trim rate with only one system operating is from 0.25 degree/second to 0.1 degree/second. A rate control valve in the STCM controls the flow rate to and from the arming and control valves as a function of airspeed and horizontal stabilizer positon. Between high and low trim rates, the rate varies linearly as a function of elevator feel pressure.

(3) In the manual-electric mode, stabilizer operation is controlled by dual stabilizer trim control wheel switches on the captain's and first officer's control wheels. The switches, when activated, send ARM and CONTROL signals to the left and right SAM's. Dual auto/manual transfer relays and autotrim priority relays in each SAM transmit the signals to ARM and CONTROL solenoid valves in the left and right STCM's. Operation of both valves on each module results in release of secondary brake and application of hydraulic power to the respective motors. The output of the drive hydraulic motors is summed by the differential gearbox and converted to stabilizer motion by the ballscrew actuator. Stabilizer motion continues until the stabilizer trim control wheel switches are released or the electric trim limits are reached. Both switches must be moved in same direction for stabilizer operation.



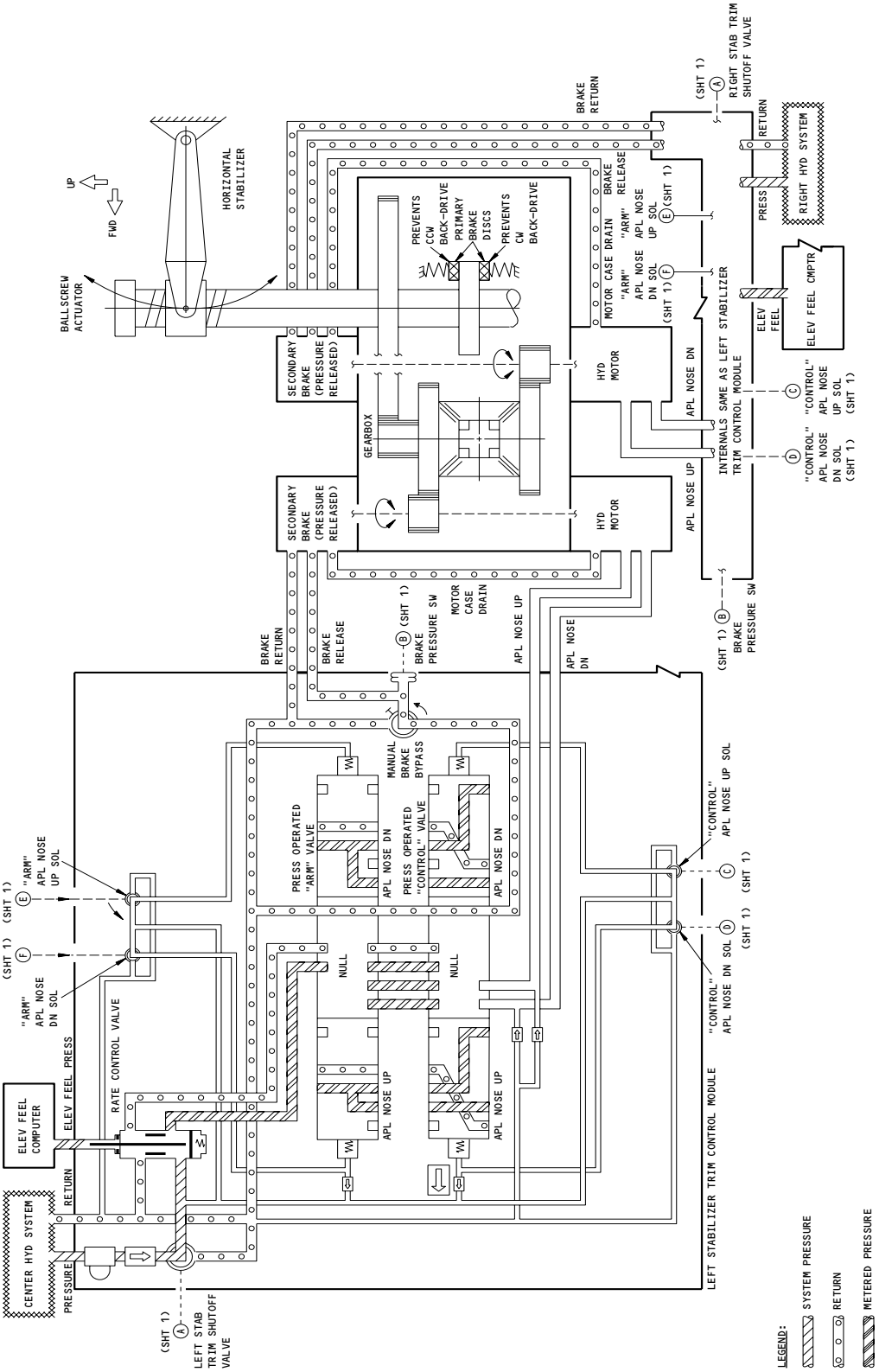
Stabilizer Trim Manual Electric Control Operation
Figure 6

810609



Horizontal Stabilizer Trim System Schematic
Figure 7 (Sheet 1)

W220B5



Horizontal Stabilizer Trim System Schematic
Figure 7 (Sheet 2)

W22086

(4) In the alternate-electric mode, the stabilizer operation is controlled by dual switches on the control stand. The switches send electrical signals to the left and right STCMs. The dual inputs to the two STCMs release the secondary brakes and power the hydraulic motors. The output of the hydraulic motors is summed by the differential gearbox and converted to stabilizer motion by the ballscrew actuator. Stabilizer motion continues until the switches are released or until the electrical travel limits are reached. Both switches must be moved in the same direction for stabilizer operation.

(5) The priority for the electric control modes is as follows:

(a) Alternate stab trim switches switches or control wheel switches except when in the autoland mode (3 FCCs and autoland switches selected)

(b) Automatic stabilizer trim

(c) Mach/speed trim

1) The mach/speed trim mode is selected as a default mode when neither the automatic nor manual-electric trim is engaged.

B. Fault Indication (Fig. 8)

(1) Stabilizer trim control system faults are monitored by the SAM. When a fault is detected the SAM enables corresponding fault balls , EICAS messages , and light indicators.

(2) Stabilizer trim system fault indications include:

(a) STCM faultball

(b) COL LEVER SW faultball

(c) MAN LEVER SW faultball

(d) STAB TRIM message on EICAS and light indicator

(e) UNSCD STAB TRIM message on EICAS and light indicator

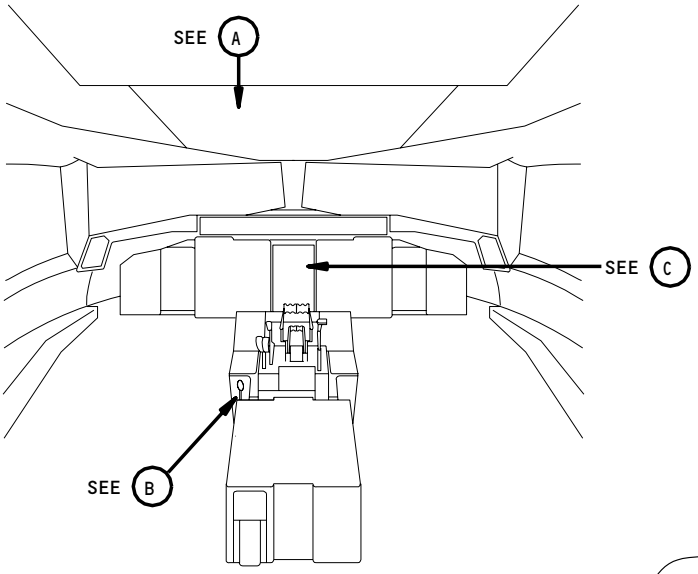
(3) The conditions to enable above fault indications are covered in Flight Control System Electronics Unit (CSEU) 27-09-00.

(4) Refer to Automatic Stabilizer Trim System (AMM 22-22-00), and Mach Trim/Speed Stability System (AMM 22-24-00) for other fault indications.

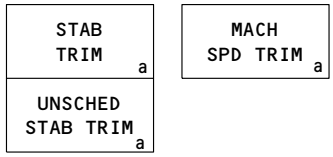
C. Control

(1) General

(a) This section provides instructions for stabilizer trim control in the manual-electric and manual-mechanical modes.

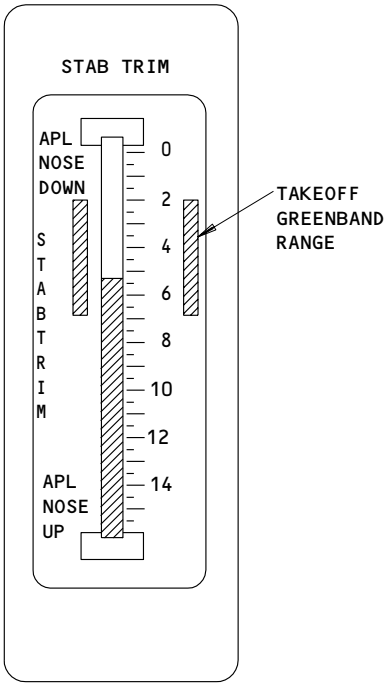


FLIGHT COMPARTMENT



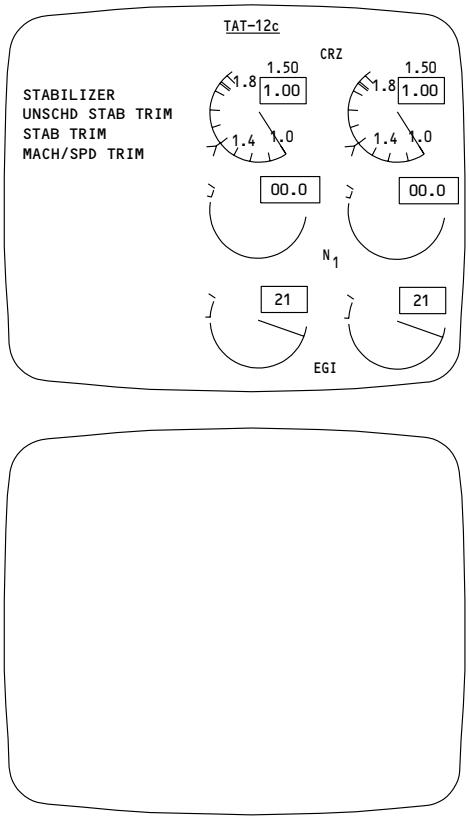
PILOT'S OVERHEAD PANEL P5

A



STABILIZER TRIM POSITION INDICATOR (TYP)

B



PILOT'S CENTER INSTRUMENT PANEL P2

C

Stabilizer Trim Fault Indications
Figure 8

(b) For information concerning control in the automatic mode, refer to AMM 22-22-00, Stabilizer Trim System-Description and Operation

(c) For information concerning control in the Mach/Speed mode, refer to AMM 22-24-00, Mach Trim/Speed Stability System - Description and Operation.

(2) Prepare For Operation

(a) Provide electrical power (AMM 24-22-00/201).

(b) Check that the following circuit breakers on panel P11 are closed:

1) 11B19, STAB TRIM ALT
2) 11C12, STAB TRIM SHUTOFF LEFT
3) 11C13, STAB TRIM SHUTOFF RIGHT
4) 11F19, STAB POS MOD CENTER
5) 11G15, STAB POS MOD LEFT
6) 11G24, STAB POS MOD RIGHT
7) 11H10, STAB TRIM POS IND L
or STAB TRIM LEFT POS IND
8) 11H11 or 11C05, STAB TRIM LEFT CONT
9) 11H19, STAB TRIM POS IND RIGHT
10) 11H20, STAB TRIM CONT RIGHT

(c) Check that RIGHT and CENTER STAB TRIM SHUTOFF switches on panel P10 are in NORM position.

WARNING: AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. CHECK THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT COULD OCCUR.

(d) Pressurize right and center hydraulic systems (AMM 29-11-00/201).

(3) Manual - Electric Operation

(a) Move stabilizer in AIRPLANE NOSE DOWN (stabilizer leading edge up) direction by moving up either the captain's or first officer's stabilizer trim control wheel switches.

(b) Move stabilizer in AIRPLANE NOSE UP (stabilizer leading edge down) direction by moving down either the captain's or first officer's stabilizer trim control wheel switches.

(4) Alternate - Electric Operation

(a) Move the alternate stab trim switches forward to move the stabilizer in the AIRPLANE NOSE DOWN direction (stabilizer leading edge up).

(b) Move the alternate stab trim switches aft to move the stabilizer in the AIRPLANE NOSE UP direction (stabilizer leading edge down).

(5) Restore Airplane to Normal

(a) Remove right and center systems hydraulic power (AMM 29-11-00/201).

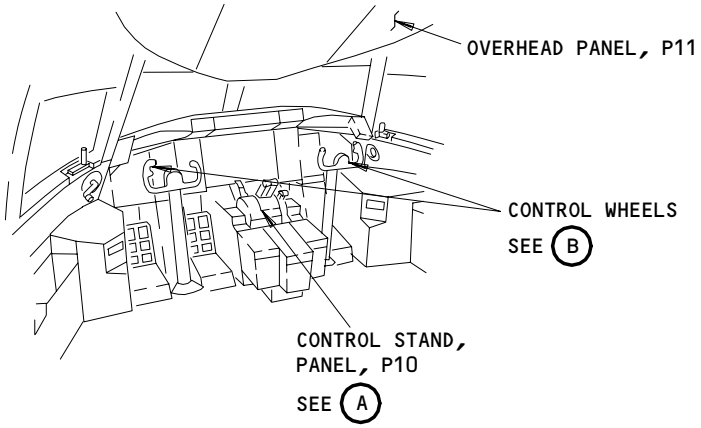
(b) Remove electrical power (AMM 24-22-00/201).

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM

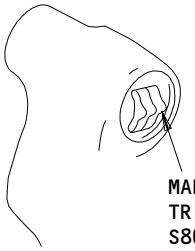
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR – STAB TRIM BALLSCREW	3	1	311AL, AFT FUSELAGE	27-41-10
BRAKE – STAB TRIM SECONDARY	3	4	311AL, AFT FUSELAGE	27-41-13
CIRCUIT BREAKER –			FLIGHT COMPARTMENT, P11 PANEL	
STAB TRIM CONT L, C1017		1	11H11 OR 11C5	*
STAB TRIM CONT R, C1018		1	11H20	*
STAB TRIM POS IND L, C1002		1	11H10	*
STAB TRIM POS IND R, C1009		1	11H19	*
STAB TRIM SHUTOFF L, C1528		1	11C12	*
STAB TRIM SHUTOFF R, C1529		1	11C13	*
COMPUTER – (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				
GIMBAL – STAB TRIM	3	2	311AL, AFT FUSELAGE	27-41-14
INDICATOR – (FIM 27-48-00/101)				
STAB TRIM POSITION, N68,N69				
MODULE – (FIM 27-09-00/101)				
STABILIZER TRIM/ELEV ASYM LIMIT L, M524				
STABILIZER TRIM/ELEV ASYM LIMIT R, M525				
MODULE – STAB TRIM CONTROL LEFT, M10897	3	1	311AL, AFT FUSELAGE	27-41-05
MODULE – STAB TRIM CONTROL RIGHT, M10898	3	1	311AL, AFT FUSELAGE	27-41-05
MODULE – (FIM 27-48-00/101)				
STAB TRIM LIMIT SWITCH AND POSITION TRANSMITTER, M10899,M10896,M10895				
MOTOR – STAB TRIM, HYDRAULIC	3	2	311AL, AFT FUSELAGE	27-41-11
PANEL – (FIM 30-31-00/101)				
LIGHT – STAB TRIM, L13				
LIGHT – UNSCHED STAB TRIM, L17				
PANEL – (FIM 76-11-00/101)				
FUEL CONTROL, M73				
RELAY – TRIM LIMIT SELECT LEFT, K574		1	119BL, MAIN EQUIPMENT CENTER, E3-1 SHELF	*
RELAY – TRIM LIMIT SELECT RIGHT, K575		1	119BL, MAIN EQUIPMENT CENTER, E4-1 SHELF	*
SWITCH – ALTERNATE STAB TRIM, S10580	1	1	FLIGHT COMPARTMENT, P10 PANEL	27-41-03
SWITCH – MANUAL STAB TRIM, S80,S81	1	2	FLIGHT COMPARTMENT, CONTROL WHEELS	27-41-01
SWITCH – STAB TRIM BRAKE PRESSURE, YB4S1, YB5S1	3	2	311AL, AFT FUSELAGE, STABILIZER TRIM CONTROL MODULES, M211,M212	*
SWITCH – STAB TRIM CUTOFF, S334,S335,S337, S338,S10234,S10235,S10236,S10237	2	8	113AL, FORWARD EQUIPMENT CENTER, CONTROL COLUMNS BASE	
SWITCH – STAB TRIM SHUTOFF CENTER, S5	1	1	FLIGHT COMPARTMENT, P10 PANEL, FUEL CONTROL PANEL M73	*
SWITCH – STAB TRIM SHUTOFF RIGHT, S6	1	1	FLIGHT COMPARTMENT, P10 PANEL, FUEL CONTROL PANEL M73	*
SWITCH – (FIM 29-31-00/101)				
HYD SYST C – ACMP PRESS, S10002				
HYD SYST R – ACMP PRESS, S32				
UNIT – (FIM 27-51-00/101)				
FLAP/SLAT ELECTRONIC, M10331,M10333				

* SEE THE WDM EQUIPMENT LIST

Horizontal Stabilizer Trim Control System – Component Index
Figure 101

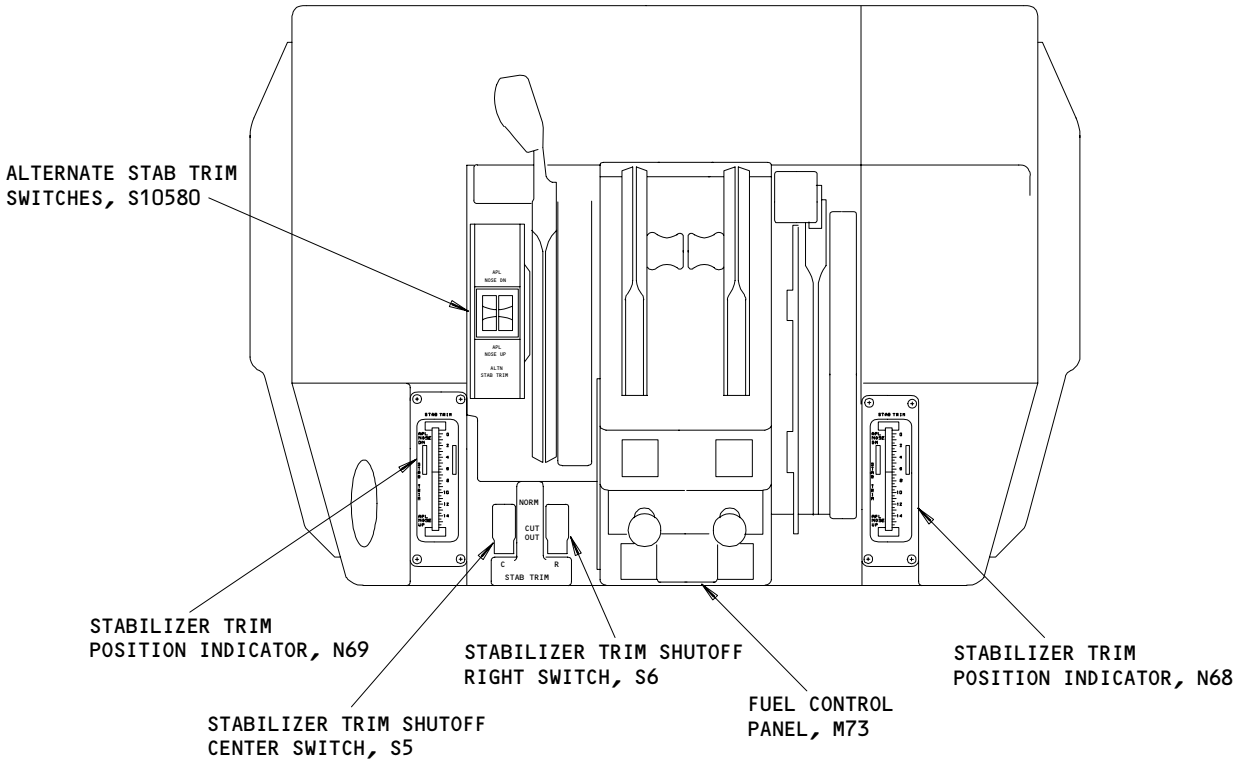


FLIGHT COMPARTMENT



CONTROL WHEEL
(EXAMPLE)

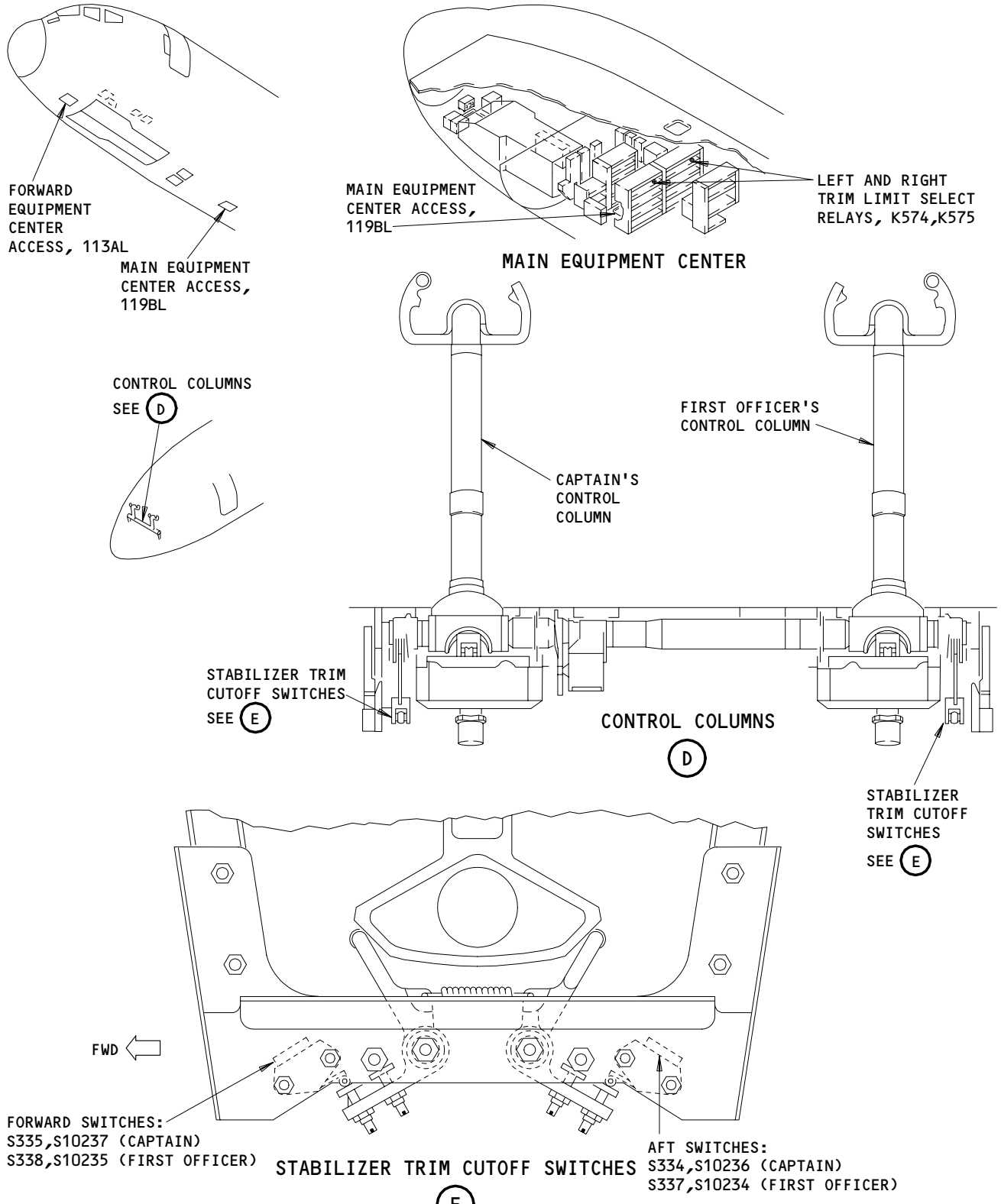
B



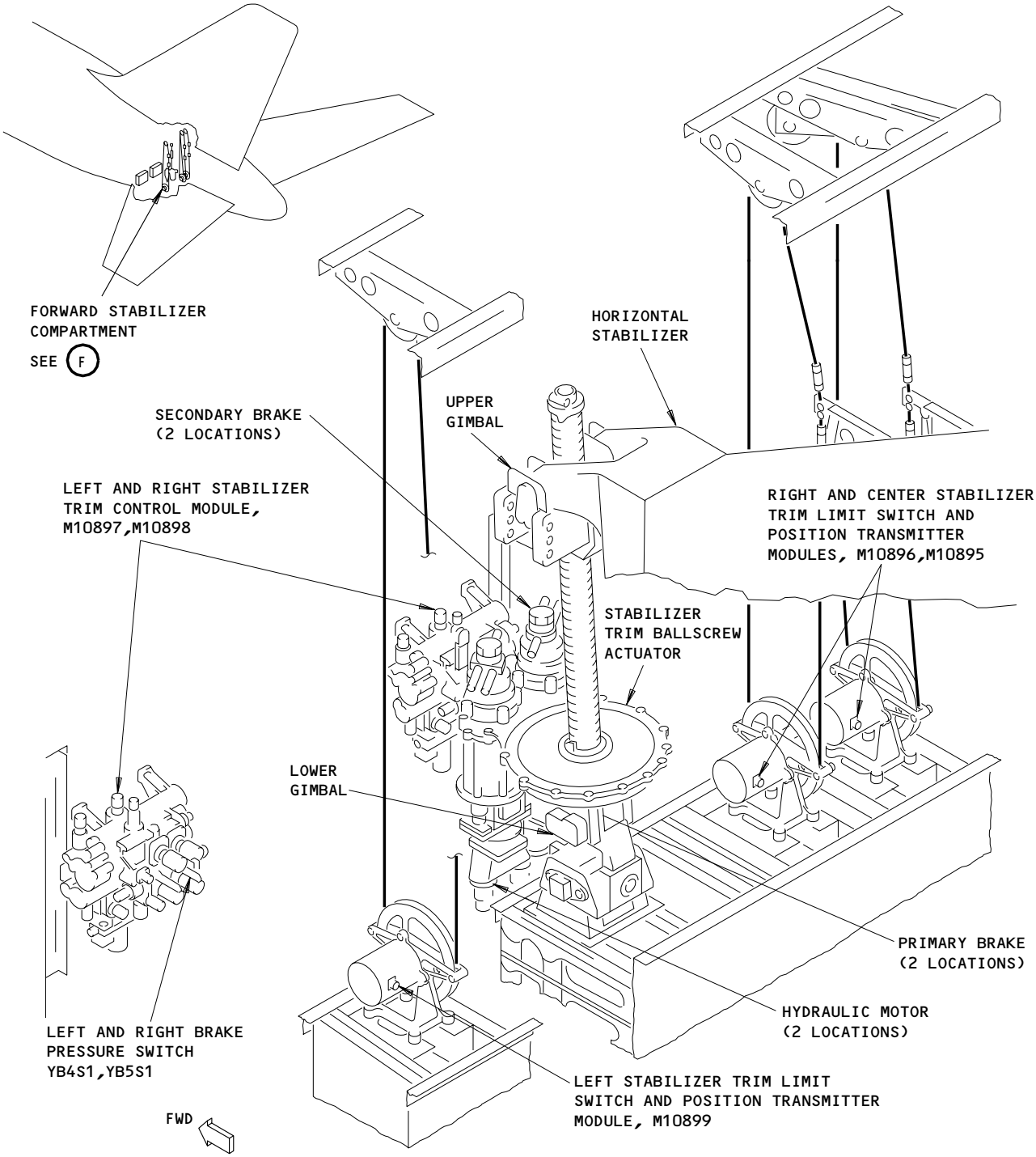
CONTROL STAND PANEL, P10

A

Horizontal Stabilizer Trim Control System – Component Location
Figure 102 (Sheet 1)



Horizontal Stabilizer Trim Control System – Component Location
Figure 102 (Sheet 2)



FORWARD STABILIZER COMPARTMENT
(F)

Horizontal Stabilizer Trim Control System – Component Location
Figure 102 (Sheet 3)

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains these tasks for the operational tests, adjustment, and system tests for the stabilizer trim-control system:

      (1) Horizontal Stabilizer Trim Control System - Operational Test
      (2) Horizontal Stabilizer Trim Control System - Adjustment
      (3) Horizontal Stabilizer Trim Control System - System Test
      (4) Stabilizer Trim Secondary Brake Test
      (5) Stabilizer Trim Shutoff Switches Test
      (6) Stabilizer Trim Override Capability with Split Control Column Commands Test
      (7) Electrical Travel Limits and Stabilizer Trim Cutoff Switch Test

      The Operational Test task (1) contains the instructions to do tasks (4), (5), and (6) shown above. Thus, if you do all the steps in the Operational Test task (1), it will not be necessary to do tasks (4), (5), and (6).

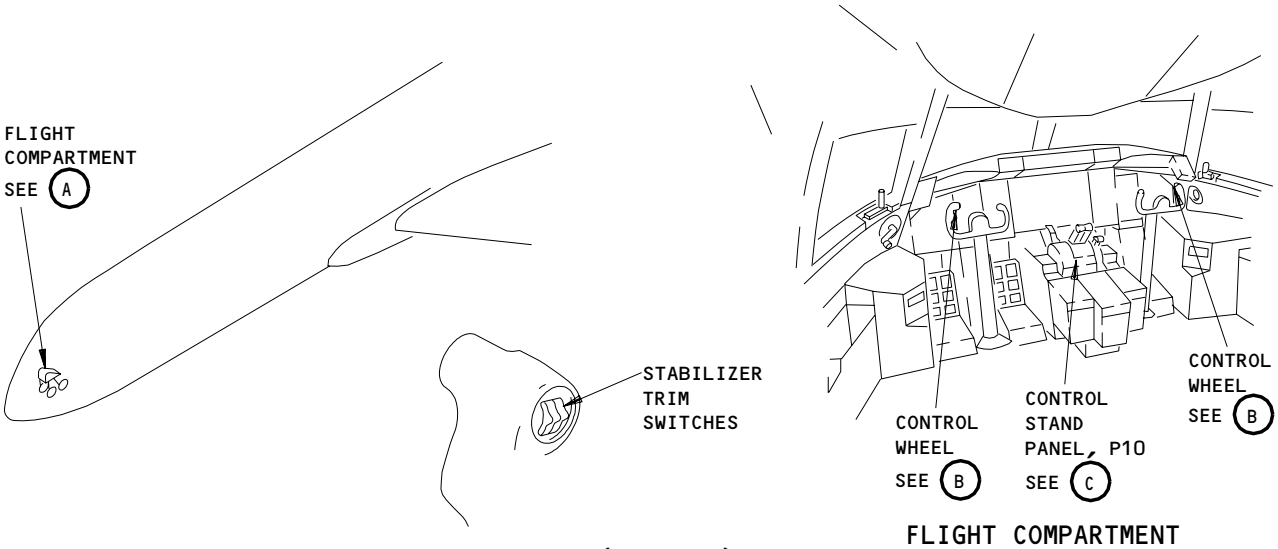
   C. The System Test task (3) contains the instructions to do task (7) shown above. Thus, if you do all the steps in the System Test task (3), it will not be necessary to do task (7).

   D. Tasks (4), (5), (6), and (7) are necessary only for scheduled maintenance.

TASK 27-41-00-715-001

2. Horizontal Stabilizer Trim Control System - Operational Test
   A. General
      (1) The operational test of the stabilizer-trim control system is done without the use of ground support equipment. The test lets you monitor stabilizer-trim control system operation and makes sure the stabilizer has smooth and free mechanical movement.
      (2) The Operational Test for the Stabilizer Trim Control System contains these topics:

         - Stabilizer Trim Electrical Operation
         - Alternate-Electrical Operation
         - Alternate-Electric Operation and Travel Limits
         - Alternate-Electric Trim Authority
         - Stabilizer Trim Secondary Brake
         - Stabilizer Trim Shutoff Switches
         - Electrical Travel Limits
         - Stabilizer Trim Cutoff Switches
         - Stabilizer Trim Override Capability with Split Control Column Commands

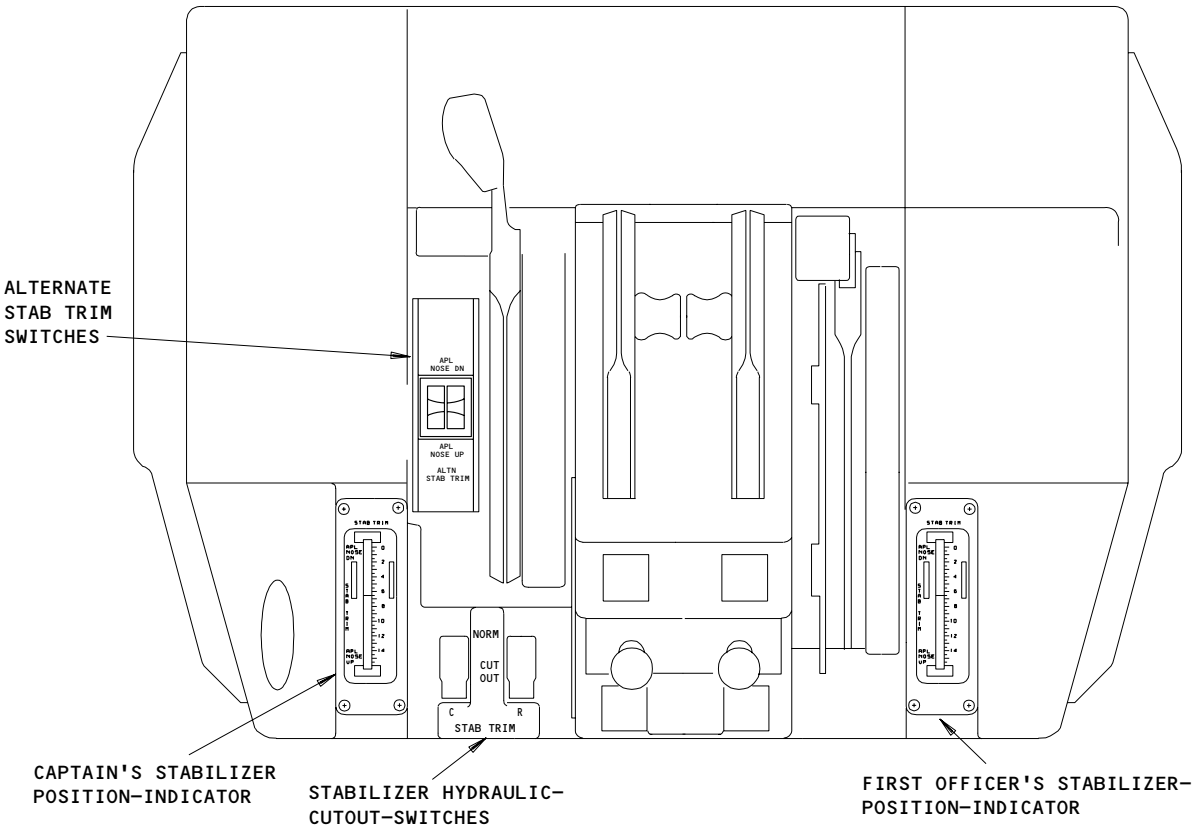


CONTROL WHEEL (EXAMPLE)

B

FLIGHT COMPARTMENT

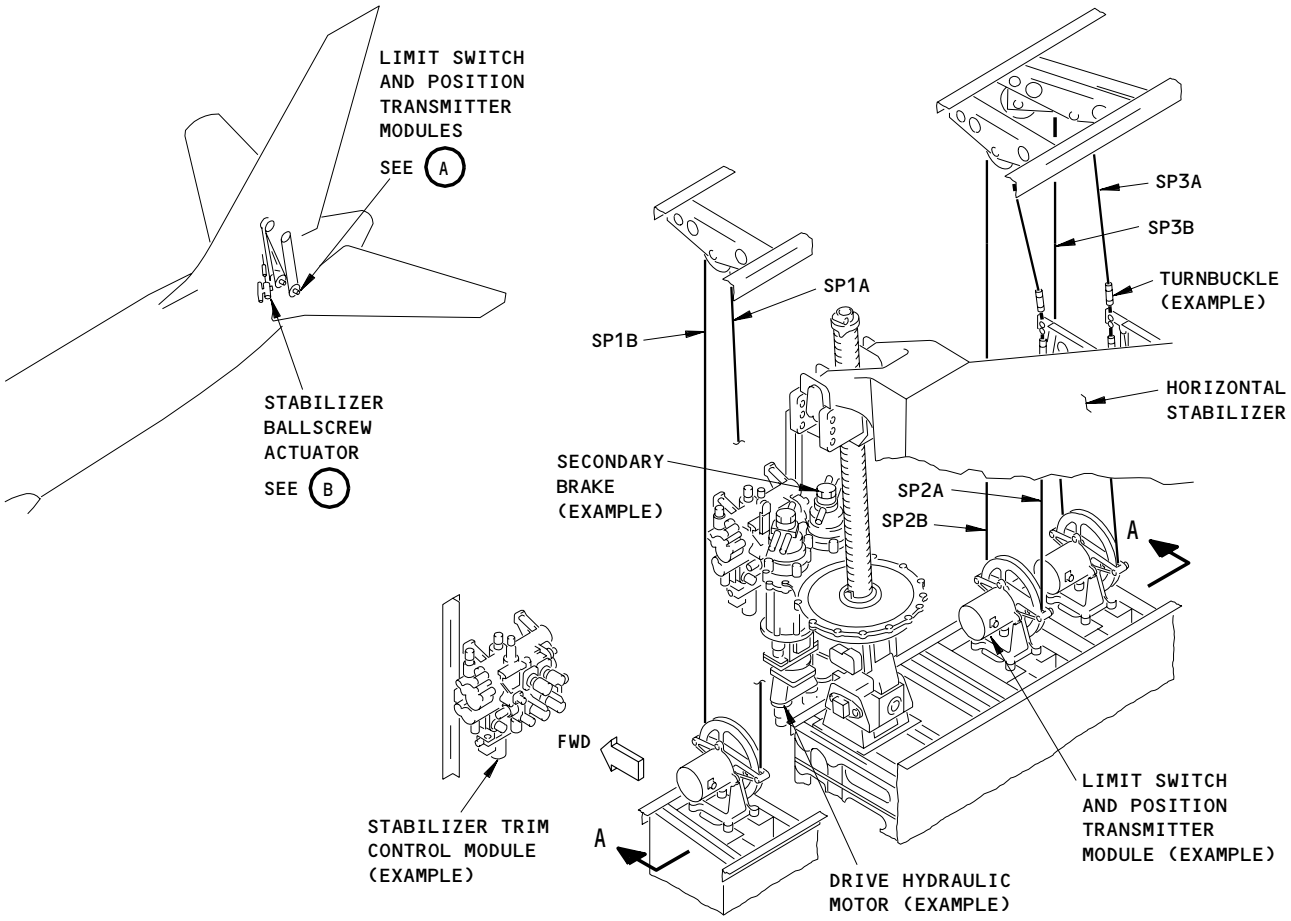
A



CONTROL STAND PANEL, P10

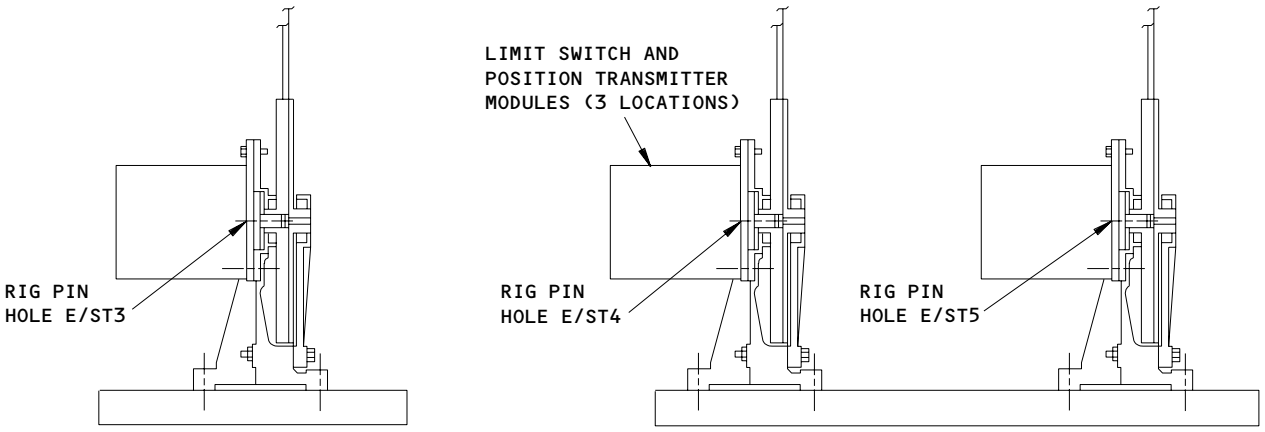
C

Horizontal Stabilizer Trim Control
Figure 501



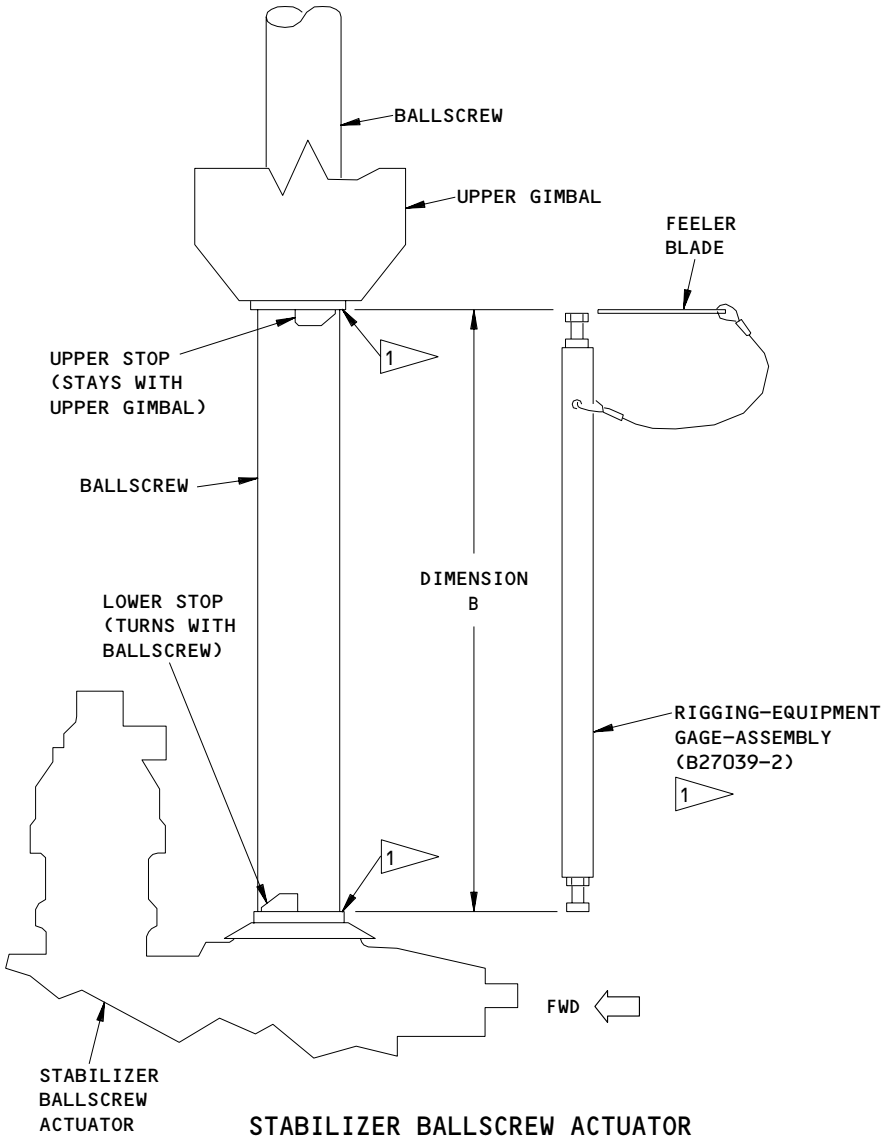
LIMIT SWITCH AND POSITION TRANSMITTER MODULES

A



(VIEW IN THE FORWARD DIRECTION)
A-A

Horizontal Stabilizer Trim Control System Adjustments
Figure 502 (Sheet 1)



STABILIZER BALLSCREW ACTUATOR

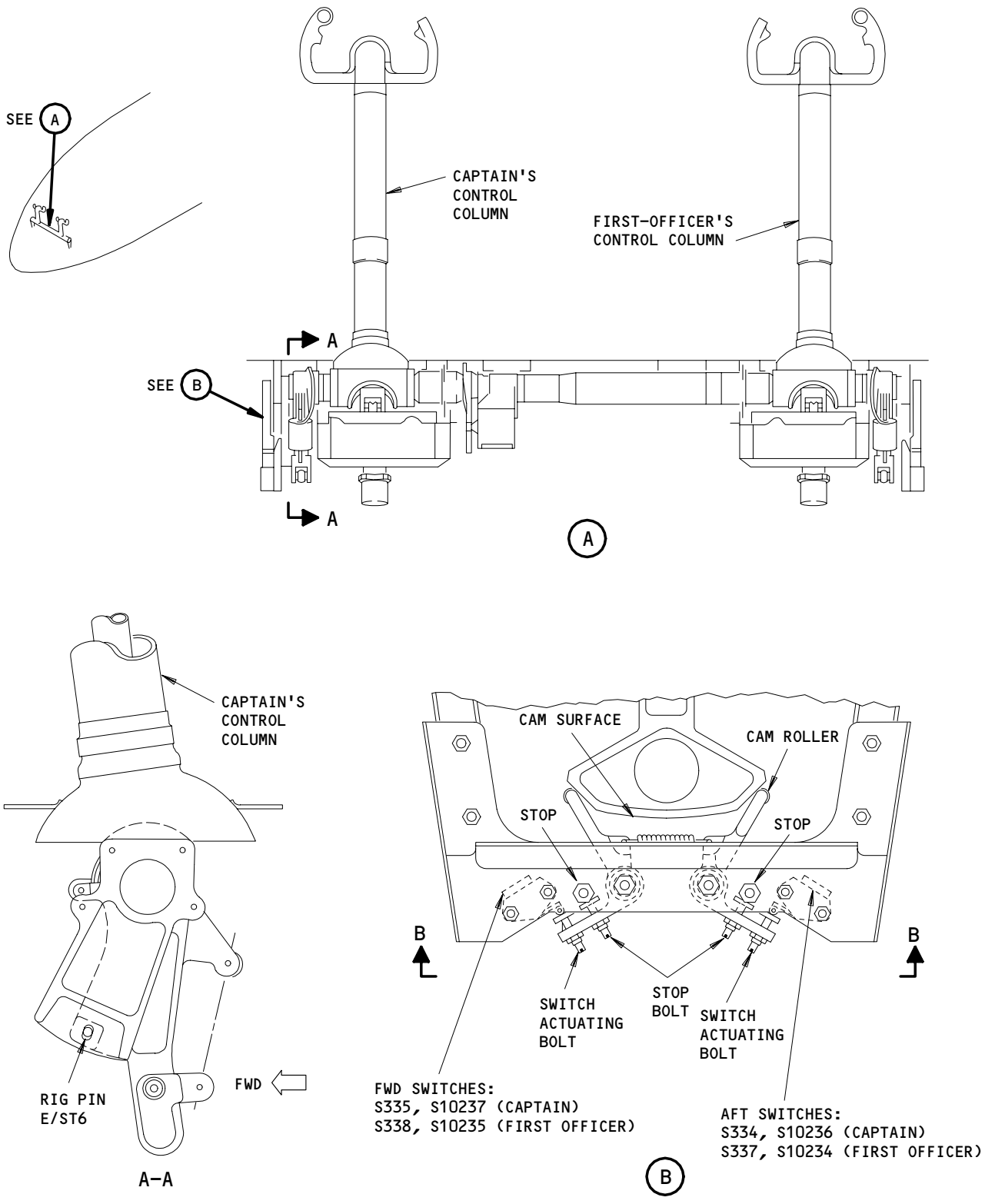
B

1 GAGE ASSEMBLY CAN BE USED TO ACCURATELY SET STABILIZER DIMENSION B TO 19.07 ±0.01 INCHES (484.38 ±0.25 mm).

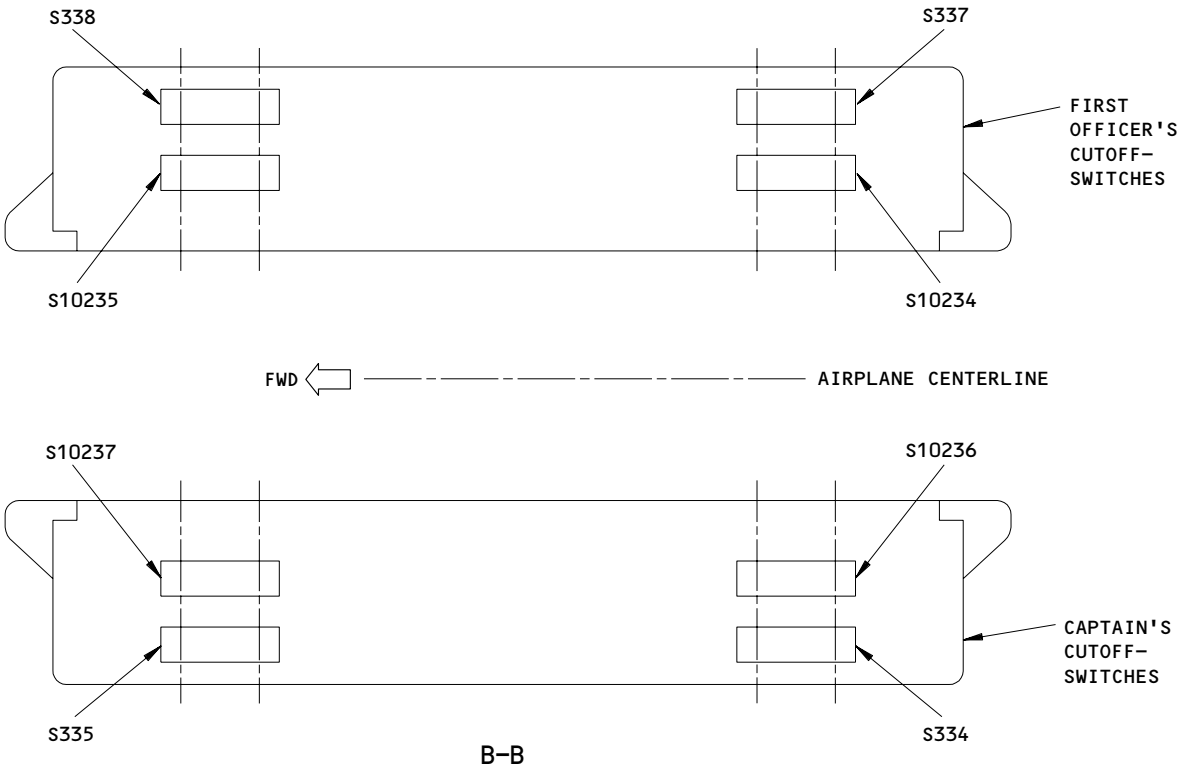
TO USE, PUT THE GAGE-ASSEMBLY AGAINST THE BALLSCREW SUCH THAT THE LOWER BOLT HEAD IS ON THE SHOULDER OF THE LOWER STOP. MAKE SURE THAT THE FEELER BLADE CANNOT BE PUT BETWEEN THE GAGE-ASSEMBLY UPPER BOLT HEAD AND THE SHOULDER OF THE UPPER STOP. MAKE SURE THE SHOULDER OF THE UPPER STOP DOES NOT TOUCH THE UPPER BOLT HEAD.

Horizontal Stabilizer Trim Control System Adjustment
Figure 502 (Sheet 2)

Not Used
Figure 503



Stabilizer-Trim Cutoff Switches
Figure 504 (Sheet 1)



CONTROL COLUMN POSITION	FORWARD SWITCHES (S335, S338, S10235, S10237)	AFT SWITCHES (S334, S337, S10234, S10236)
RIG POSITION (RIG PIN E/ST6 INSTALLED)	CONTINUITY	CONTINUITY
3.5-4.0 DEGREES FWD OF RIG POSITION	CONTINUITY	NO CONTINUITY
2.2-2.7 DEGREES AFT OF RIG POSITION	NO CONTINUITY	CONTINUITY

SWITCH CONTINUITY REQUIREMENTS
TABLE 1

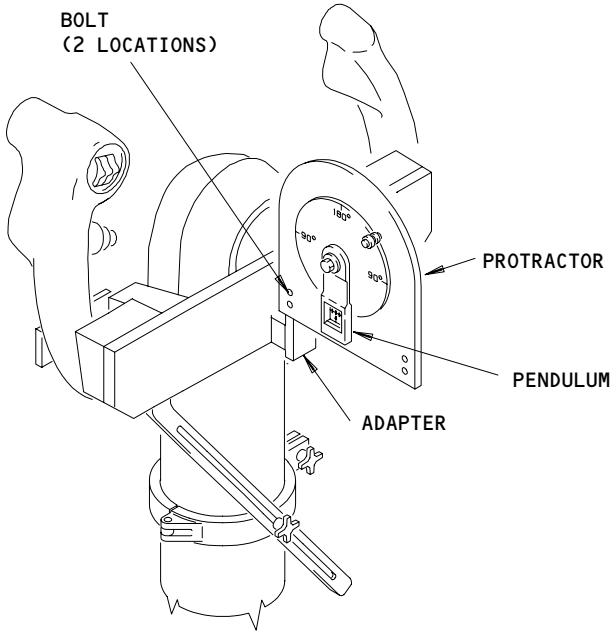
Stabilizer-Trim Cutoff Switches
Figure 504 (Sheet 2)

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zones
211/212 Control Cabin

D. Stabilizer Trim Electrical Operation Test

S 865-002
(1) Supply electrical power (Ref 24-22-00).



CONTROL WHEEL
(EXAMPLE)

Protractor Installation - Fore and Aft Control Measurement
Figure 505

S 865-003
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 865-004
(3) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are ON.

S 865-005
(4) Put the CENTER STAB TRIM SHUTOFF switch on control stand panel, P10, to CUTOUT.

S 865-006
(5) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at NORM.

S 865-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Supply pressure to the right and center hydraulic systems (Ref 29-11-00).

S 865-008
(7) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-009
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.
(a) Make sure that the stabilizer movement stops in one second.

S 865-010
(9) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that the stabilizer movement starts in one second.

S 865-011
(10) Release the captain's stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer movement stops.

S 865-012
(11) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-013
(12) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that the stabilizer movement stops within one second.

S 865-014
(13) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that the stabilizer movement starts in one second.

S 865-016
(14) Release the first officer's stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer movement stops.

S 865-017
(15) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-018
(16) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-019
(17) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-020
(18) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that the stabilizer movement stops in one second.

S 865-021
(19) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that the stabilizer movement starts in one second.

S 865-022
(20) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer movement stops.

S 865-023
(21) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-024
(22) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that the stabilizer movement stops in one second.

S 865-025
(23) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that the stabilizer movement starts in one second.

S 865-026
(24) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer movement stops.

S 865-027
(25) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-028
(26) On the captain's control wheel, move each stabilizer-trim control-wheel-switch up while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-029
(27) On the captain's control wheel, move each stabilizer-trim control-wheel-switch down while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-030
(28) On the captain's control wheel, move the stabilizer-trim control-wheel-switches in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure that the stabilizer does not move.

S 865-031
(29) Change the direction of the two stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer does not move.

S 865-032
(30) On the first officer's control wheel, move each stabilizer-trim control-wheel-switch up while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-033
(31) On the first officer's control wheel, move each stabilizer-trim control-wheel-switch down while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-034
(32) On the first officer's control wheel, move the stabilizer-trim control-wheel-switches in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure that the stabilizer does not move.

S 865-035
(33) Change the direction of the stabilizer-trim control-wheel-switches.
(a) Make sure that the stabilizer does not move.

E. Alternate-Electrical Operation Test

S 865-525
(1) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 215-526
(2) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at the NORM position.

S 215-527
(3) Make sure this circuit breaker on the P11 panel is closed:
(a) 11A19, ALT STAB TRIM

S 865-528
(4) Move the alternate stab trim switches forward (airplane nose down).
(a) Make sure the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-529
(5) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-530
(6) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 865-531
(7) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-532
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-533
(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-534
(10) Move the alternate stab trim switches aft (airplane nose up).
(a) Make sure the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-535
(11) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-536
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 865-537
(13) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-538
(14) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-539
(15) Move each segment of the alternate stab trim switch forward while the other segment stays at neutral.
(a) Make sure the stabilizer does not move.

S 865-540
(16) Move each segment of the alternate stab trim switch aft while the other segment stays at neutral.
(a) Make sure the stabilizer does not move.

S 865-541
(17) Move each segment of the alternate stab trim switch in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure the stabilizer does not move.

S 865-706
(18) Move each switch segment to the opposite position.
(a) Make sure that the stabilizer does not move.

F. Alternate-Electric Operation and Travel Limits Test

S 215-542
(1) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel are at the NORM position.

S 215-543
(2) Make sure that the right and center hydraulic systems are pressurized (Ref 29-11-00).

S 865-544
(3) Move the alternate stab trim switches forward.
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-642
(4) Release the alternate stab trim switches.
(a) Make sure that the stabilizer movement stops.

S 865-545
(5) Move the alternate stab trim switches forward and hold until the stabilizer stops.

S 865-546
(6) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to the CUTOUT position.

S 215-547
(7) Make sure that the upper stops of the stabilizer ballscrew actuator have not hit each other.

S 225-548
(8) Make sure that both stabilizer trim position indicators show 0.20 ± 0.25 units of trim.

S 865-549
(9) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to the NORM position.

S 865-550
(10) Move the alternate stab trim switches aft.
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-551
(11) Release the alternate stab trim switches.
(a) Make sure that the stabilizer movement stops.

S 865-552
(12) Move the alternate stab trim switches aft and hold until the stabilizer stops.

S 865-553
(13) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to the CUTOUT position.

S 215-554
(14) Make sure that the lower stop surfaces on the stabilizer ballscrew actuator have not hit each other.

S 225-555
(15) Make sure that both stabilizer trim positions indicators show 15.30 ± 0.25 units of trim.

G. Alternate-Electric Trim Authority Test

S 865-556
(1) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-557
(2) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-558
(3) Move the stabilizer to approximately six units of trim with the captain's stabilizer-trim control-wheel-switches.

S 865-559
(4) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-560
(5) Move the alternate stab trim switches aft while the stabilizer moves (airplane nose up).
(a) Make sure that the stabilizer stops in one second.

S 865-561
(6) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-562
(7) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-563
(8) Move the alternate stab trim switches forward while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-564
(9) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-565
(10) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-566
(11) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-567
(12) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-568
(13) Move the alternate stab trim switches aft while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-569
(14) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-570
(15) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-571
(16) Move the alternate stab trim switches forward while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-572
(17) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

H. Stabilizer Trim Secondary Brake Test (Fig. 502)

S 215-067
(1) Make sure that electrical power is supplied (AMM 24-22-00/201).

S 215-710
(2) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at NORM.

S 215-711
(3) Make sure that the CENTER STAB TRIM SHUTOFF switch on the P10 panel is at CUTOUT.

S 865-712
(4) Move the stabilizer at least four units of trim away from one end of the travel range (full airplane NOSE UP or full airplane NOSE DN). Use the captain's or first officer's stabilizer-trim control-wheel-switches to move the stabilizer to this position.

S 865-713
(5) Push and hold the BRAKE BYPASS valve button on the right stabilizer-trim control module.

NOTE: The button is on the bottom of the unit.

The force necessary to push the button should be less than 25 pounds (111 newtons). You should push the button smoothly. If the force necessary to push the button is more than 25 pounds (111 newtons), remove the hydraulic power, push the button more than once, then supply the hydraulic power.

S 865-714
(6) Move the stabilizer-trim control-wheel-switches in the airplane nose up direction (stabilizer leading edge down).

S 865-887
(7) Hold the switches in this position for approximately 10 seconds.
(a) Make sure that there is no stabilizer movement.

S 865-885
(8) Release the stabilizer-trim control-wheel-switches, then release the BRAKE BYPASS valve button.

S 865-715
(9) Move the stabilizer-trim control-wheel-switches up and then down to make sure the stabilizer operates correctly.

S 865-716
(10) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-717
(11) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-718
(12) Push and hold the BRAKE BYPASS valve button on the left stabilizer trim control module.

S 865-719
(13) Move the stabilizer-trim control-wheel-switches in the airplane nose down direction (stabilizer leading edge up).

S 865-888
(14) Hold the switch in this position for approximately 10 seconds.
(a) Make sure that there is no stabilizer movement.

S 865-720
(15) Release the stabilizer-trim control-wheel-switches and the BRAKE BYPASS valve button.

S 865-C44
(16) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-721
(17) Move the stabilizer-trim control-wheel-switches up and then down to make sure the stabilizer operates correctly.

I. Stabilizer Trim Shutoff Switches Test

S 215-083
(1) Make sure that electrical power is supplied (Ref 24-22-00/201).

S 865-084
(2) Make sure the right and center hydraulic systems are pressurized (AMM 29-11-00/201).

S 215-886
(3) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-747
(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to CUTOUT.

S 715-668
(5) Do the steps that follow to make sure the stabilizer operates correctly for the RIGHT and CENTER STAB TRIM SHUTOFF switches at the CUTOUT position:
(a) Move the alternate stab trim switches full forward and full aft slowly.
1) Make sure that the stabilizer does not move.
(b) Let the alternate stab trim switches go to the neutral position.

S 865-748
(6) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 715-669

(7) Do the steps that follow to make sure the stabilizer moves correctly for the RIGHT STAB TRIM SHUTOFF switch at the NORM position and the CENTER STAB TRIM SHUTOFF switch at the CUTOUT position:
   (a) Move the alternate stab trim switches full forward and hold.
      1) Make sure that the stabilizer leading edge moves up.
   (b) Let the alternate stab trim switches go to the neutral position.

S 865-749

(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-750

(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 715-670

(10) Do the steps that follow to make sure the stabilizer operates correctly for the RIGHT STAB TRIM SHUTOFF switch at the CUTOUT position and the CENTER STAB TRIM SHUTOFF switch at the NORM position:
   (a) Move the alternate stab trim switches full aft and hold.
      1) Make sure that the stabilizer leading edge moves down.
   (b) Let the alternate stab trim switches go back to the neutral position.

S 865-751

(11) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

TASK 27-41-00-735-B52

3. Electrical Travel Limits and Stabilizer Trim Cutoff Switch Tests

NOTE: This is a scheduled maintenance task.

A. Equipment
   (1) Control Wheel Adapter Equipment - A27021-97 or -98
   (2) Control Wheel Protractor Kit - A27021-29
   (3) Push/Pull Gage, 0 to 15 lb. range - Commercially Available
   (4) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)
   (5) Elastic Cord - Commercially Available

B. References
   (1) 06-42-00/201, Empennage Access Doors and Panels
   (2) 24-22-00/201, Electrical Power-Control
   (3) 27-51-00/201, Trailing Edge Flap System
   (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   (5) 34-11-00/201, Pitot-Static System

C. Prepare for the Tests

S 865-B53
(1) Supply electrical power (Ref 24-22-00/201).

S 865-B54
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 015-B55

WARNING: STAY OFF SERVICE ACCESS DOORS 311AL AND 313AL. THE WEIGHT OF A PERSON CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. A PERSON CAN BE INJURED IF THEY FALL THROUGH THE OPEN DOOR.

(3) Open the access door, 311AL, to the forward stabilizer-compartment (Ref 06-42-00/201).

S 865-B56

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right and center hydraulic systems (Ref 29-11-00/201).

D. Electrical Travel Limits - Functional Test

NOTE: The stabilizer may not be in electrical control range if it does not move when the stabilizer-trim control-wheel-switches are moved in one direction. Move the stabilizer-trim control-wheel-switches in the other direction to move the stabilizer into electrical control range, then continue with test.

S 215-C03
(1) Make sure that the trailing edge flaps and the leading edge slats are in the fully retracted position.

S 215-C04
(2) Make sure that the flap lever is in the zero detent (FLAPS UP).

S 865-C05

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 865-C06
(4) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-C07
(5) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

S 865-C08
(6) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C09
(7) Make sure that dimension B on the stabilizer jackscrew is 20.43 to 21.03 inches (519.0-534.1 mm) (Fig. 502).

S 865-C10
(8) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C11
(9) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves.

S 865-C12
(10) Let the stabilizer move until it stops.

S 865-C13
(11) Release the stabilizer-trim control-wheel-switches.

S 865-C14
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C15
(13) Make sure that dimension B on the stabilizer jackscrew is 0.80 to 1.40 inches (20-35 mm).

S 215-C16
(14) Extend the trailing edge flaps to the 15 unit position (Ref 27-51-00/201).

S 865-C17
(15) Do the deactivation procedure for the trailing edge flap system (Ref 27-51-00/201).

S 865-C18
(16) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C19
(17) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves.

S 865-C20
(18) Let the stabilizer move until it stops then release the stabilizer-trim control-wheel-switches.

S 865-C21
(19) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C22
(20) Make sure that dimension B on the stabilizer jackscrew is 24.86 to 25.46 inches (631.4-646.6 mm) (Fig. 502).

S 865-C23
(21) Put the RIGHT STAB TRIM SHUTOFF switch on P10 to NORM.

S 865-C24
(22) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-C25
(23) Let the stabilizer move until it stops.

S 865-C26
(24) Release the stabilizer-trim control-wheel-switches.

S 865-C27
(25) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C28
(26) Make sure that dimension B on the stabilizer jackscrew is 0.80 to 1.40 inches.

S 865-C29
(27) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C30
(28) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves.

S 865-C31
(29) Let the stabilizer move until it stops.

S 865-C32
(30) Release the stabilizer-trim control-wheel-switches.

S 865-C33
(31) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C34
(32) Make sure that dimension B on the stabilizer jackscrew is 24.86 to 25.46 inches (631.4-646.6 mm).

S 865-C35
(33) Move the flaps to the fully retracted position (Ref 27-51-00/201).

S 865-C36
(34) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C37
(35) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-C38
(36) Let the stabilizer move until it reaches 6.0 units of trim, as shown on the control stand stabilizer-position-indicators.

S 865-C39
(37) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-C40
(38) Let the stabilizer move until it stops.

S 865-C41
(39) Release the stabilizer-trim control-wheel-switches.

S 865-C42
(40) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-C43
(41) Make sure that dimension B on the stabilizer jackscrew is 20.43 to 21.03 inches (519-534 mm).

E. Electrical Travel Limits - Operational Test

S 865-664

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 215-113

(2) Make sure the trailing edge flaps and leading edge slats are fully retracted, and the flap lever is in the zero detent (FLAPS UP).

S 865-114

(3) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

NOTE: If the stabilizer does not move when you initially move the switches up, move the switches down until the stabilizer is at 4 to 6 units of trim, then move the switches up.

(a) Make sure that the stabilizer position indicators on the control stand show 2.75 to 3.25 units of trim.

S 865-116

(4) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold the switches down until the stabilizer stops.

(a) Make sure that the stabilizer position indicators show 15.0 to 15.6 units of trim.

S 865-120

(5) Extend the trailing edge flaps to the 15-unit position (Ref 27-51-00).

S 865-121

(6) Do the trailing edge flap system deactivation procedure (Ref 27-51-00).

S 865-707

(7) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

(a) Make sure that the stabilizer position indicators show 0.0 to 0.5 units of trim.

S 865-469
(8) Do the trailing edge flap system activation procedure (Ref 27-51-00).

S 865-125
(9) Move the flaps to the fully retracted position (Ref 27-51-00/201).

F. Stabilizer Trim Cutoff Switches Test

S 865-126
(1) Make sure the right and center hydraulic systems are pressurized (Ref 29-11-00/201).

S 865-127
(2) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-128
(3) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

S 865-130
(4) Move the captain's or first officer's stabilizer-trim control-wheel-switches down (airplane nose up).

S 865-131
(5) While the switches are held down, slowly push the elevator control column fully forward.
(a) Make sure that the stabilizer stops before it gets to the leading edge down travel limit.

S 865-133
(6) While the switches are held down, let the control column move to neutral and let the stabilizer move until it stops.

S 865-134
(7) Release the stabilizer-trim control-wheel-switches.

S 865-135
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-136
(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-137
(10) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

S 865-139
(11) Move the captain's or first officer's stabilizer-trim control-wheel-switches down (airplane nose up).

S 865-140
(12) While the switches are held down, slowly push the elevator control column fully forward.
(a) Make sure that the stabilizer stops before it gets to the leading edge down travel limit.

S 865-142
(13) While the switches are held down, let the control column move to neutral and let the stabilizer move until it stops.

S 865-143
(14) Release the stabilizer-trim control-wheel-switches.

G. Stabilizer Trim Override Capability with Split Control Column Commands Test

S 865-144
(1) Make sure the right and center hydraulic systems are pressurized (Ref 29-11-00/201).

S 865-145
(2) Make sure that electrical power is supplied (Ref 24-22-00).

S 865-760
(3) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-761
(4) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C45
(5) Push the captain's control column full forward and hold in position. At the same time, pull the first officer's control column full aft and hold in position.

S 865-C46
(6) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-C47
(7) Release the stabilizer-trim control-wheel-switches.

S 865-C48
(8) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-C49
(9) Release the stabilizer-trim control-wheel-switches.

S 865-C50
(10) Push the first officer's control column full forward and hold in position. At the same time, pull the captain's control column full aft and hold in position.

S 865-C51
(11) Move the captain's or first officer's stabilizer-trim control-wheel switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-C52
(12) Release the stabilizer-trim control-wheel-switches.

S 865-C53
(13) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-C54
(14) Release the stabilizer-trim control-wheel-switches.

S 865-C55
(15) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-C56
(16) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-C57
(17) Push the captain's control column full forward and hold in position. At the same time, pull the first officer's control column full aft and hold in position.

S 865-C58
(18) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-C59
(19) Release the stabilizer-trim control-wheel-switches.

S 865-C60
(20) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-C61
(21) Release the stabilizer-trim control-wheel-switches.

S 865-C62
(22) Push the first officer's control column full forward and hold in position. At the same time, pull the captain's control column full aft and hold in position.

S 865-C63
(23) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-C64
(24) Release the stabilizer-trim control-wheel-switches.

S 865-C65
(25) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-C66
(26) Release the stabilizer-trim control-wheel-switches.

S 865-781
(27) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

H. Put the Airplane Back to its Usual Condition

S 865-174
(1) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to NORM.

S 045-B18
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 865-176
(3) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 865-177
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

TASK 27-41-00-825-467

4. Horizontal Stabilizer Trim Control System - Adjustment

A. General
(1) For the correct horizontal stabilizer adjustment position, move the alternate stab trim switches until Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm) (Fig. 502).

(2) This procedure contains instructions to adjust the stabilizer trim control system. Adjustment of the system is done in the specified procedures. Each procedure must be completed before subsequent procedures are started.
(3) The adjustment for the Horizontal Stabilizer Trim Control includes these topics:

- Limit Switch and Position Transmitter Module
- Stabilizer Trim Cutoff Switches

(4) When correctly adjusted, the stabilizer-trim control system operates smoothly through its full travel range and the components are in the conditions that follow:
(a) Limit Switch and Position Transmitter Module and Travel Limit Mechanism
1) The limit switch and position transmitter modules are correctly adjusted if:
a) AIRPLANES WITH ALTERNATE STAB TRIM SWITCHES ON THE CONTROL STAND;
Tensions in cables SP are 50 ± 5 lbs (222 +/- 22 newtons).
b) AIRPLANES WITH STAB TRIM LEVERS ON THE CONTROL STAND;
Tensions in cables SL and SP are 50 ± 5 lbs (222 +/- 22 newtons).
c) Rig pins E/ST3, E/ST4, and E/ST5 can be put in freely when Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.07 inches (484.4 +/- 1.7 mm).
(b) Stabilizer Trim Cutoff Switches
1) The stabilizer-trim cutoff switches are correctly adjusted if:
a) With rig pin E/ST6 installed, stabilizer-trim cutoff switch continuity is as shown in Table 1 , Fig. 504.

B. Equipment
(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) E/ST1 - P/N B20003-21

(b) E/ST2 - P/N B20003-21
(c) E/ST3 - P/N B20003-21
(d) E/ST4 - P/N B20003-21
(e) E/ST5 - P/N B20003-21
(f) E/ST6 - P/N B20003-21

(2) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)

C. Consumable Materials

(1) C00308 Compound - Corrosion Preventive
MIL-C-11796

D. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

E. Access

(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.5

(2) Access Panel

311AL	Forward Stabilizer Compartment Access Door

F. Prepare for the Adjustment

S 865-470

(1) Supply electrical power (Ref 24-22-00).

S 865-523

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (Ref 29-11-00/201).

S 865-472

(3) Move the stabilizer such that dimension B on the stabilizer jackscrew is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm).

S 865-473
(4) Remove the pressure from the right and center hydraulic systems (Ref 29-11-00/201).

S 865-474
(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to CUTOUT.

S 865-475
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 015-524

WARNING: STAY OFF SERVICE ACCESS DOORS 311AL AND 313AL. THE WEIGHT OF A PERSON CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. A PERSON CAN BE INJURED IF THEY FALL THROUGH THE OPEN DOOR.

(7) Open access door 311AL (Ref 06-42-00)

G. Adjust the Limit Switch and Position Transmitter Module (Fig. 502)

S 225-582
(1) Make sure that the stabilizer is set such that Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm).

S 825-583
(2) Adjust the tension in cables SP to 50 ± 5 lbs (222 +/- 22 newtons) such that rig pins E/ST3, E/ST4, and E/ST5 can be put in freely.

S 095-584
(3) Remove rig pins E/ST3, E/ST4, and E/ST5.

S 865-585
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19, STAB TRIM ALT

(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-586
(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to the NORM position.

S 865-587
(6) Move the alternate stab trim switches forward until the stabilizer stops.
(a) Make sure that the stabilizer-trim ballscrew-actuator upper-stop surfaces have not hit each other.
(b) Make sure that Dimension B on the stabilizer-trim ballscrew-actuator is 24.86 to 25.46 inches (631.4-646.6 mm).

S 865-588
(7) Move the alternate stab trim switches aft until the stabilizer stops.
(a) Make sure that the stabilizer-trim ballscrew-actuator surfaces have not hit each other.
(b) Make sure that Dimension B on the stabilizer-trim ballscrew-actuator is 0.80 to 1.40 inches (20-35 mm).

H. Adjust Stabilizer-Trim Cutoff Switches (Fig. 504)

S 865-507
(1) Move the stabilizer such that dimension B on the stabilizer jackscrew is 15.89 ± 0.01 inches (403.6 +/- 0.25 mm).

S 865-508
(2) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 865-511
(3) Put the captain's control column in the center position.

S 865-512
(4) Install rig pin E/ST6 (Fig. 504).

S 765-513
(5) Make sure that all eight cutoff switches have continuity (Table 1, Fig. 504).

S 825-514
(6) If a switch does not have continuity, do the steps that follow to adjust the switch:
  (a) Adjust the stop bolt to move the switch actuating bolt in the direction of the switch until the switch has continuity.
  (b) Tighten the jamnut (Do not adjust the switch actuating bolt).
  (c) Remove rig pin E/ST6.

S 865-515
(7) Hold the captain's control column 2.2 to 2.7 degrees aft of the center position.

S 765-516
(8) Make sure that all four forward switches do not have continuity (Table 1, Fig. 504).

S 825-517
(9) If a forward switch has continuity, do the steps that follow to adjust the switch:
  (a) Make sure that the stop bolt for that switch does not touch the stop.
  (b) Adjust the switch actuating bolt away from the switch until the switch does not have continuity.
  (c) Tighten the jamnut.

S 865-518
(10) Hold the captain's control column 3.5 to 4.0 degrees forward of the center position.

S 765-519
(11) Make sure that all four aft switches do not have continuity (Table 1, Fig. 504).

S 825-520

(12) If an aft switch has continuity, do the steps that follow to adjust the switch:

(a) Make sure that the stop bolt for that switch does not touch the stop.

(b) Adjust the switch actuating bolt away from the switch until the switch does not have continuity.

(c) Tighten the jamnuts.

(d) Do the above checks and adjustments until the switches have the necessary continuity (Table 1, Fig. 504).

I. Put the Airplane Back to its Usual Condition

S 865-521

(1) Remove electrical power (Ref 24-22-00).

S 415-522

(2) Close the forward stabilizer compartment access door 311AL.

TASK 27-41-00-735-468

5. Horizontal Stabilizer Trim Control System - System Test

A. General

(1) This task contains the instruction for a full System Test of the Horizontal Stabilizer Trim Control System, which contains these topics:

- Stabilizer Trim Electrical Operation
- Alternate-Electrical Operation
- Electrical Travel Limits
- Alternate-Electric Travel Limits
- Stabilizer Trim Cutoff Switch
- Alternate-Electric Trim Authority
- Stabilizer Trim Rate
- Secondary Brake Reaction Torque

(2) To make sure the horizontal stabilizer trim control system operates correctly, it is necessary to complete all the test procedures in this task.

B. Equipment
(1) Control Wheel Adapter Equipment - A27021-97 or -98
(2) Control Wheel Protractor Kit - A27021-29
(3) Push/Pull Gage, 0 to 15 lb. range - Commercially Available
(4) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)
(5) Elastic Cord - Commercially Available

C. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power-Control
(3) 27-51-00/201, Trailing Edge Flap System
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 34-11-00/201, Pitot-Static System

D. Access
(1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panels

113AL	Forward Compartment Access Door
311AL	Forward Stabilizer Compartment Access Door

E. Prepare for the Tests

S 865-722
(1) Supply electrical power (Ref 24-22-00).

S 865-723
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC

(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 015-890

WARNING: STAY OFF SERVICE ACCESS DOORS 311AL AND 313AL. THE WEIGHT OF A PERSON CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. A PERSON CAN BE INJURED IF THEY FALL THROUGH THE OPEN DOOR.

(3) Open the forward stabilizer-compartment access door 311AL (Ref 06-42-00).

S 865-891

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right and center hydraulic systems (Ref 29-11-00).

F. Stabilizer-Trim Electrical Operation Test (Fig. 501)

NOTE: The stabilizer may not be in electrical control range if it does not move when the stabilizer-trim control-wheel-switches are moved in one direction. Move the stabilizer-trim control-wheel-switches in the other direction to move the stabilizer into electrical control range, then continue with test.

S 865-183

(1) Put the CENTER STAB TRIM SHUTOFF switch on the control stand panel, P10, to CUTOUT.

S 215-184

(2) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at NORM.

S 865-185
(3) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-186
(4) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer is moving.
(a) Make sure that stabilizer motion stops in one second.

S 865-187
(5) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that stabilizer motion starts in one second.

S 865-188
(6) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that stabilizer motion stops.

S 865-189
(7) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-190
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that stabilizer movement stops in one second.

S 865-191
(9) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that stabilizer movement starts in one second.

S 865-192
(10) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that stabilizer movement stops.

S 865-193
(11) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-194
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-195
(13) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-196
(14) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that stabilizer movement stops in one second.

S 865-197
(15) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that stabilizer movement starts in one second.

S 865-198
(16) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that stabilizer movement stops.

S 865-199
(17) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-200
(18) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure that stabilizer movement stops in one second.

S 865-201
(19) Place the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.
(a) Make sure that stabilizer movement starts in one second.

S 865-202
(20) Release the stabilizer-trim control-wheel-switches.
(a) Make sure that stabilizer movement stops.

S 865-203
(21) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-204
(22) Move each stabilizer-trim control-wheel-switch up on the captain's control wheel (airplane nose down) while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-205
(23) Move each stabilizer-trim control-wheel-switch down on the captain's control wheel (airplane nose up) while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-206
(24) Move the stabilizer-trim control-wheel-switches on the captain's control wheel in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure that the stabilizer does not move.

S 865-207
(25) Move each stabilizer-trim control-wheel-switch to the opposite position.
(a) Make sure that the stabilizer does not move.

S 865-208
(26) Move each stabilizer-trim control-wheel-switch on the first officer's control wheel up (airplane nose down) while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-209
(27) Move each stabilizer-trim control-wheel-switch on the first officer's control wheel down (airplane nose up) while the other switch stays at neutral.
(a) Make sure that the stabilizer does not move.

S 865-210
(28) Move the stabilizer-trim control-wheel-switches on the first officer's control wheel in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure that the stabilizer does not move.

S 865-211
(29) Move the stabilizer-trim control-wheel-switches to the opposite position.
(a) Make sure that the stabilizer does not move.

G. Alternate-Electrical Operation Test

S 865-589
(1) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 215-590
(2) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at the NORM position.

S 215-591
(3) Make sure this circuit breaker on the P11 panel is closed:
(a) 11B19, STAB TRIM ALT

S 865-592
(4) Move the alternate stab trim switches forward (airplane nose down).
(a) Make sure the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-593
(5) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-594
(6) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 865-595
(7) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-596
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-597
(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-598
(10) Move the alternate stab trim switches aft (airplane nose up).
(a) Make sure the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-599
(11) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-600
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 865-601
(13) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-602
(14) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-603
(15) Move each segment of the alternate stab trim switch forward while the other segment stays at neutral.
(a) Make sure the stabilizer does not move.

S 865-604
(16) Move each segment of the alternate stab trim switch aft while the other segment stays at neutral.
(a) Make sure the stabilizer does not move.

S 865-605
(17) Move each segment of the alternate stab trim switch in opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure the stabilizer does not move.

S 865-606
(18) Move each switch segment to the opposite position.
(a) Move sure that the stabilizer does not move.

H. Test Electrical Travel Limits

NOTE: The stabilizer may not be in electrical control range if it does not move when the stabilizer-trim control-wheel-switches are moved in one direction. Move the stabilizer-trim control-wheel-switches in the other direction to move the stabilizer into electrical control range, then continue with test.

S 215-724
(1) Make sure that the trailing edge flaps and the leading edge slats are in the fully retracted position.

S 215-892
(2) Make sure that the flap lever is in the zero detent (FLAPS UP).

S 865-214
(3) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 865-725
(4) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-726
(5) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

S 865-727
(6) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-728
(7) Make sure that dimension B on the stabilizer jackscrew is 20.43 to 21.03 inches (519-534 mm) (Fig. 502).

S 865-729
(8) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-730
(9) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves.

S 865-731
(10) Let the stabilizer move until it stops.

S 865-732
(11) Release the stabilizer-trim control-wheel-switches.

S 865-733
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-734
(13) Make sure that dimension B on the stabilizer jackscrew is 0.80 to 1.40 inches (20-35 mm).

S 215-735
(14) Extend the trailing edge flaps to the 15 unit position (Ref 27-51-00).

S 865-736
(15) Do the deactivation procedure for the trailing edge flap system (Ref 27-51-00).

S 865-737
(16) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-738
(17) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves.

S 865-739
(18) Let the stabilizer move until it stops, then release the stabilizer-trim control-wheel-switches.

S 865-740
(19) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-741
(20) Make sure that dimension B on the stabilizer jackscrew is 24.86 to 25.46 inches (Fig. 502) (631.4-646.6 mm).

S 865-782
(21) Put the RIGHT STAB TRIM SHUTOFF switch on P10 to NORM.

S 865-783
(22) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-784
(23) Let the stabilizer move until it stops.

S 865-789
(24) Release the stabilizer-trim control-wheel-switches.

S 865-785
(25) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-786
(26) Make sure that dimension B on the stabilizer jackscrew is 0.80 to 1.40 inches (20-35 mm).

S 865-787
(27) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-788
(28) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves.

S 865-790
(29) Let the stabilizer move until it stops.

S 865-791
(30) Release the stabilizer-trim control-wheel-switches.

S 865-792
(31) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-793
(32) Make sure that dimension B on the stabilizer jackscrew is 24.86 to 25.46 inches (631.4-646.6 mm).

S 865-794
(33) Move the flaps to the fully retracted position (Ref 27-51-00).

S 865-795
(34) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-796
(35) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-797
(36) Let the stabilizer move until it reaches 6.0 units of trim, as shown on the control stand stabilizer-position-indicators.

S 865-798
(37) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-799
(38) Let the stabilizer move until it stops.

S 865-800
(39) Release the stabilizer-trim control-wheel-switches.

S 865-801
(40) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 215-802
(41) Make sure that dimension B on the stabilizer jackscrew is 20.43 to 21.03 inches (519-534 mm).

I. Alternate-Electric Travel Limits

S 865-607
(1) Pressurize the center hydraulic system (Ref 29-11-00).

S 865-608
(2) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-609
(3) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-610
(4) Move the alternate stab trim switches forward (airplane nose down) and hold the switches forward until the stabilizer stops.

S 865-611
(5) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 225-612
(6) Make sure that Dimension B on the stabilizer ballscrew is 24.86 to 25.46 inches (631.4-646.6 mm) (Fig. 502).

S 865-613
(7) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-614
(8) Move the alternate stab trim switches aft (airplane nose up) and hold the switches aft until the stabilizer stops.

S 865-615
(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 225-616
(10) Make sure that Dimension B on the stabilizer ballscrew is 0.80 to 1.40 inches (20-35 mm).

S 865-617
(11) Put the RIGHT STAB TRIM SHUTOFF switch to the NORM position.

S 865-618
(12) Move the alternate stab trim switches forward (airplane nose down) and hold the switches forward until the stabilizer stops.

S 865-619
(13) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 225-620
(14) Make sure that Dimension B on the stabilizer ballscrew is 24.86 to 25.46 inches (631.4-646.6 mm) (Fig. 502).

S 865-621
(15) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-622
(16) Move the alternate stab trim switches aft (airplane nose up) and hold the switches aft until the stabilizer stops.

S 865-623
(17) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 225-624
(18) Make sure that Dimension B on the stabilizer ballscrew is 0.80 to 1.40 inches (20-35 mm).

J. Stabilizer Trim Cutoff Switch Test (Fig. 503)

NOTE: The stabilizer may not be in electrical control range if it does not move when the stabilizer-trim control-wheel-switches are moved in one direction. Move the stabilizer-trim control-wheel-switches in the other direction to move the stabilizer into electrical control range, then continue with test.

S 865-803
(1) Move the flaps to the fully retracted position (Ref 27-51-00).

S 865-804
(2) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-805
(3) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 495-671
(4) Install the adapter equipment with the protractor kit to the captain's control wheel (Fig. 504).

S 865-806
(5) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold until the stabilizer stops.

S 865-807
(6) Do the steps that follow to prevent the operation of the first officer's stabilizer-trim cutoff switches:
(a) Open the forward compartment access door, 113AL (Ref 06-41-00).
(b) Install an elastic cord (or other applicable device) around the lower ends of each set of opposite switch actuating arms.
(c) Add sufficient tension to make a space between the switch-actuating-arms and the switch levers. The switch-actuating-arm cam rollers should be away from the control column cam-surface.

S 865-808
(7) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-809
(8) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-810
(9) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-811
(10) Release the stabilizer-trim control-wheel-switches.

S 865-812
(11) Let the control column go to the neutral position.

S 865-813
(12) Put the CENTER STAB TRIM SHUTOFF switch to CUTOUT.

S 865-814
(13) Put the RIGHT STAB TRIM SHUTOFF switch to NORM.

S 865-815
(14) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-816
(15) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-817
(16) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-818
(17) Let the control column go to the neutral position.

S 865-819
(18) Hold the stabilizer-trim control-wheel-switches down (airplane nose up) until the stabilizer stops.

S 865-820
(19) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-821
(20) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-822
(21) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-823
(22) Release the stabilizer-trim control-wheel-switches.

S 865-824
(23) Let the control column go to the neutral position.

S 865-825
(24) Put the RIGHT STAB TRIM SHUTOFF switch to CUTOUT.

S 865-826
(25) Put the CENTER STAB TRIM SHUTOFF switch to NORM.

S 865-827
(26) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-828
(27) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-829
(28) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-830
(29) Let the control column go to the neutral position.

S 865-831
(30) Hold the stabilizer-trim control-wheel-switches up (airplane nose down) until the stabilizer stops.

S 865-832
(31) Release the stabilizer-trim control-wheel-switches.

S 095-833
(32) Remove the elastic cord from around the lower ends of first officer's switch actuating arms. This will allow the first officer's stabilizer-trim cutoff switches to operate.

S 865-893
(33) Do the steps that follow to prevent the operation of the captain's stabilizer-trim cutoff switches:
(a) Open the forward compartment access door, 113AL (Ref 06-41-00).
(b) Install an elastic cord (or other applicable device) around the lower ends of each set of opposite switch actuating arms.
(c) Add sufficient tension to make a space between the switch-actuating-arms and the switch levers. The switch-actuating-arm cam rollers should be away from the control column cam-surface.

S 865-834
(34) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-835
(35) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-836
(36) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-837
(37) Release the stabilizer-trim control-wheel-switches.

S 865-838
(38) Let the control column go to the neutral position.

S 865-839
(39) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-840
(40) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-841
(41) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-842
(42) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-843
(43) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-844
(44) Let the control column go to the neutral position.

S 865-845
(45) Hold the stabilizer-trim control-wheel-switches down (airplane nose up) until the stabilizer stops.

S 865-846
(46) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-847
(47) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-848
(48) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-849
(49) Release the stabilizer-trim control-wheel-switches.

S 865-850
(50) Let the control column go to the neutral position.

S 865-851
(51) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-852
(52) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-853
(53) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-854
(54) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-855
(55) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-856
(56) Let the control column go to the neutral position.

S 865-857
(57) Hold the stabilizer-trim control-wheel-switches up (airplane nose down) until the stabilizer stops.

S 865-858
(58) Release the stabilizer-trim control-wheel-switches.

S 095-894
(59) Remove the elastic cord from around the lower ends of the captain's switch actuating arms. This will allow the captain's stabilizer-trim cutoff switches to operate.

S 095-674
(60) Remove the adapter equipment and protractor kit from the captain's control wheel (Fig. 505).

S 865-859
(61) Pull the first officer's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-860
(62) At the same time, push the captain's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-861
(63) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-862
(64) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-863
(65) Release the stabilizer-trim control-wheel-switches.

S 865-883
(66) Let the control columns go to the neutral position.

S 865-864
(67) Push the first officer's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-865
(68) At the same time, pull the captain's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-866
(69) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-867
(70) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-868
(71) Release the stabilizer-trim control-wheel-switches.

S 865-869
(72) Let the control columns go to the neutral position.

S 865-870
(73) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-871
(74) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-872
(75) Pull the first officer's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-873
(76) At the same time, push the captain's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-874
(77) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-875
(78) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-876
(79) Release the stabilizer-trim control-wheel-switches.

S 865-884
(80) Let the control columns go to the neutral position.

S 865-877
(81) Push the first officer's control column 3 to 4 inches (7.6-10.1 centimeters) forward and hold in position.

S 865-878
(82) At the same time, pull the captain's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-879
(83) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-880
(84) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-881
(85) Release the stabilizer-trim control-wheel-switches.

S 865-882
(86) Let the control columns go to the neutral position.

K. Alternate-Electric Trim Authority Test

S 865-625
(1) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-626
(2) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-627
(3) Move the stabilizer to approximately six units of trim with the captain's stabilizer-trim control-wheel-switches.

S 865-628
(4) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-629
(5) Move the alternate stab trim switches aft while the stabilizer moves (airplane nose up).
(a) Make sure that the stabilizer stops in one second.

S 865-630
(6) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-631
(7) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-632
(8) Move the alternate stab trim switches forward while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-633
(9) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-634
(10) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 865-635
(11) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-636
(12) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-637
(13) Move the alternate stab trim switches aft while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-638
(14) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

S 865-639
(15) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure that the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-640
(16) Move the alternate stab trim switches forward while the stabilizer moves.
(a) Make sure that the stabilizer stops in one second.

S 865-641
(17) Let the stabilizer-trim control-wheel-switches and the alternate stab trim switches go back to the neutral position.

L. Stabilizer Trim Rate Test (Fig. 501)

S 215-414
(1) Make sure that the trailing edge flaps and leading edge slats are in the fully retracted position (Ref 27-51-00).

S 215-415
(2) Make sure that the flap lever is in the zero (FLAPS UP) detent (Ref 27-51-00).

S 865-416
(3) Pressurize the right and center hydraulic systems (Ref 24-11-00).

S 865-417
(4) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-418
(5) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-419

(6) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold until the stabilizer stops.

S 865-420

(7) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and do the check that follows:
   (a) Measure the time necessary for the stabilizer to go to the airplane nose up electrical-trim-stop (stabilizer leading edge down).
      1) Make sure that the time is less than 54 seconds.

S 865-421

(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-422

(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-423

(10) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and do the check that follows:
   (a) Measure the time necessary for the stabilizer to go to the airplane nose down electrical-trim-stop (stabilizer leading edge up).
      1) Make sure that the time is less than 54 seconds.

S 865-424

CAUTION: HOLD THE AIR SUPPLY PRESSURE TO THE AIRPLANE TO AN ABSOLUTE LIMIT OF 4.75 PSI (426 KNOTS). PRESSURE IS TO BE CHANGED AT A RATE OF NOT MORE THAN 2 PSI/MIN. THIS WILL PREVENT DAMAGE TO EQUIPMENT AND INJURY TO PERSONS.

(11) Pressurize the auxiliary pitot lines (lower left and lower right) to 4.23 ± 0.10 psi (405 ± 5 knots) (Ref 34-11-00).

NOTE: Use airspeed values only when the static pressure on the airspeed indicator is open to ambient pressure.

S 865-425
(12) Extend the trailing edge flaps to the 15-unit detent (Ref 27-51-00).

S 865-426
(13) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold until the stabilizer stops.

S 225-427
(14) Measure and write down dimension B of the stabilizer jackscrew.

S 865-428
(15) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold for 25 seconds.

S 225-429
(16) Measure and write down dimension B of the stabilizer jackscrew.

S 225-430
(17) Calculate the difference of the above two written measurements.
(a) Make sure that the difference is between 3.84 and 5.00 inches (97.5-127.0 mm).

S 865-430
(18) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold until the stabilizer stops.

S 225-431
(19) Measure and write down dimension B of the stabilizer jackscrew.

S 865-432
(20) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold for 29 seconds.

S 225-433
(21) Measure and write down dimension B of the stabilizer jackscrew.

S 225-434
(22) Calculate the difference in the above two measurements.
(a) Make sure that the difference is between 9.41 and 11.99 inches (239.0-304.5 mm).

S 865-435
(23) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-436
(24) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-437
(25) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold until the stabilizer stops.

S 865-B16
(26) Measure and write down dimension B of the stabilizer jackscrew.

S 865-438
(27) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold for 25 seconds.

S 225-439
(28) Measure and write down dimension B of the stabilizer jackscrew.

S 225-440
(29) Calculate the difference in the above two measurements.
(a) Make sure that the difference is between 3.84 and 5.00 inches (97.5-127.0 mm).

S 865-441
(30) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold until the stabilizer stops.

S 225-442
(31) Measure and write down dimension B of the stabilizer jackscrew.

S 865-443
(32) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold for 29 seconds.

S 225-444
(33) Measure and write down dimension B of the stabilizer jackscrew.

S 225-445
(34) Calculate the difference in the above two measurements.
(a) Make sure that the difference is between 9.41 and 11.99 inches (239.0-304.5 mm).

S 865-446
(35) Remove the pressure from the pitot lines (Ref 34-11-00).

S 865-447
(36) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

M. Secondary Brake Reaction Torque Test (Fig. 502)

S 865-448
(1) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 865-449
(2) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-450
(3) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-451
(4) Use the captain's or first officer's stabilizer-trim control-wheel-switches to move the stabilizer at least 4 units of trim from the ends of the travel range.

S 865-452
(5) Press and hold the BRAKE BYPASS valve button on the right stabilizer trim control module.

NOTE: The button is on the bottom of the unit.

S 865-453
(6) Move the stabilizer-trim control-wheel-switches full travel in the airplane nose up direction (stabilizer leading edge down) and hold for approximately 10 seconds.
(a) Make sure the stabilizer does not move.

S 865-454
(7) Release the stabilizer-trim control-wheel-switches and then release the BRAKE BYPASS valve button.

S 865-455
(8) Move the stabilizer-trim control-wheel-switches full travel in one direction and then in the other direction.
(a) Make sure the stabilizer-trim control-wheel-switches operate correctly.

S 865-456
(9) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-457
(10) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-458
(11) Press and hold the BRAKE BYPASS valve button on the left control module.

S 865-459
(12) Move the stabilizer-trim control-wheel-switches full travel in the airplane nose down direction (stabilizer leading edge up) and hold for approximately 10 seconds.
(a) Make sure the stabilizer does not move.

S 865-460
(13) Release the stabilizer-trim control-wheel-switches and release the BRAKE BYPASS valve button.

S 865-461
(14) Move the stabilizer-trim control-wheel-switches full travel in one direction and then in the other direction.
(a) Make sure the stabilizer-trim control-wheel-switches operate correctly.

N. Put the Airplane Back to Its Usual Condition

S 865-742
(1) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 865-743
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 865-744
(3) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to NORM.

S 865-745
(4) Remove electrical power (AMM 24-22-00/201).

S 415-746
(5) Close the forward stabilizer compartment access door, 311AL (AMM 06-42-00/201).

TASK 27-41-00-715-643

6. Stabilizer Trim Secondary Brake Test

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 24-22-00/201, Electrical Power - Control

(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Stabilizer Trim Secondary Brake Test (Fig. 502)

S 865-067

(1) Supply electrical power (AMM 24-22-00/201).

S 865-649

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 215-904

(3) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at NORM.

S 215-905

(4) Make sure that the CENTER STAB TRIM SHUTOFF switch on the P10 panel is at CUTOUT.

S 865-906

(5) Move the stabilizer at least four units of trim away from one end of the travel range. Use the captain's or first officer's stabilizer-trim control-wheel-switches to move the stabilizer to this position.

S 865-907

(6) Push and hold the BRAKE BYPASS valve button on the right stabilizer-trim control module.

NOTE: The button is on the bottom of the unit.

The force necessary to push the button should be less than 25 pounds (111 newtons). You should push the button smoothly. If the force necessary to push the button is more than 25 pounds (111 newtons), remove the hydraulic power, push the button more than once, then supply the hydraulic power.

S 865-908

(7) Move the stabilizer-trim control-wheel-switches in the airplane nose up direction (stabilizer leading edge down).

S 865-909

(8) Hold the switches in this position for approximately 10 seconds.
(a) Make sure that there is no stabilizer movement.

S 865-910
(9) Release the stabilizer-trim control-wheel-switches, then release the BRAKE BYPASS valve button.

S 865-911
(10) Move the stabilizer-trim control-wheel-switches up and then down to make sure the stabilizer operates correctly.

S 865-912
(11) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-913
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-914
(13) Push and hold the BRAKE BYPASS valve button on the left stabilizer trim control module.

S 865-915
(14) Move the stabilizer-trim control-wheel-switches in the airplane nose down direction (stabilizer leading edge up).

S 865-916
(15) Hold the switch in this position for approximately 10 seconds.
(a) Make sure that there is no stabilizer movement.

S 865-917
(16) Release the stabilizer-trim control-wheel-switches and the BRAKE BYPASS valve button.

S 865-650
(17) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-918
(18) Move the stabilizer-trim control-wheel-switches up and then down to make sure the stabilizer operates correctly.

S 865-651
(19) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 865-652
(20) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-41-00-715-644
7. Stabilizer Trim Shutoff Switches Test

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
B. Stabilizer Trim Shutoff Switches Test

S 865-083
(1) Supply electrical power (AMM 24-22-00/201).

S 865-653

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 215-919
(3) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-920
(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to CUTOUT.

S 715-665

(5) Do the steps that follow to make sure the stabilizer operates correctly for the RIGHT and CENTER STAB TRIM SHUTOFF switches at the CUTOUT position:
   (a) Move the alternate stab trim switches full forward and full aft slowly.
      1) Make sure that the stabilizer does not move.
   (b) Let the alternate stab trim switches go to the neutral position.

S 865-924

(6) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 715-666

(7) Do the steps that follow to make sure the stabilizer moves correctly for the RIGHT STAB TRIM SHUTOFF switch at the NORM position and the CENTER STAB TRIM SHUTOFF switch at the CUTOUT position:
   (a) Move the alternate stab trim switches full forward and hold.
      1) Make sure that the stabilizer leading edge moves up.
   (b) Let the alternate stab trim switches go to the neutral position.

S 865-928

(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-929

(9) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 715-667

(10) Do the steps that follow to make sure the stabilizer operates correctly for the RIGHT STAB TRIM SHUTOFF switch at the CUTOUT position and the CENTER STAB TRIM SHUTOFF switch at the NORM position:
   (a) Move the alternate stab trim switches full aft and hold.
      1) Make sure that the stabilizer leading edge moves down.
   (b) Let the alternate stab trim switches go back to the neutral position.

S 865-933

(11) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-654

(12) Remove the power from the center and right hydraulic systems (Ref 29-11-00/201).

S 865-655

(13) Remove electrical power (Ref 24-22-00/201).

TASK 27-41-00-715-647

8. Stabilizer Trim Override Capability with Split Control Column Commands Test

NOTE: This is a scheduled maintenance task.

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Stabilizer Trim Override Capability with Split Control Column Commands Test

S 865-660

(1) Supply electrical power (Ref 24-22-00/201).

S 865-659

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (Ref 29-11-00/201).

S 865-943

(3) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-944

(4) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-946
(5) Push the captain's control column full forward and hold in position. At the same time, pull the first officer's control column full aft and hold in position.

S 865-947
(6) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-949
(7) Release the stabilizer-trim control-wheel-switches.

S 865-951
(8) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-953
(9) Release the stabilizer-trim control-wheel-switches.

S 865-B25
(10) Push the first officer's control column full forward and hold in position. At the same time, pull the captain's control column full aft and hold in position.

S 865-B26
(11) Move the captain's or first officer's stabilizer-trim control-wheel switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-B27
(12) Release the stabilizer-trim control-wheel-switches.

S 865-B28
(13) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-B29
(14) Release the stabilizer-trim control-wheel-switches.

S 865-B30
(15) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-B31
(16) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-B20
(17) Push the captain's control column full forward and hold in position. At the same time, pull the first officer's control column full aft and hold in position.

S 865-B21
(18) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-B22
(19) Release the stabilizer-trim control-wheel-switches.

S 865-B23
(20) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-B24
(21) Release the stabilizer-trim control-wheel-switches.

S 865-B37
(22) Push the first officer's control column full forward and hold in position. At the same time, pull the captain's control column full aft and hold in position.

S 865-B38
(23) Move the captain's or first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure that the stabilizer leading edge moves up.

S 865-B32
(24) Release the stabilizer-trim control-wheel-switches.

S 865-B33
(25) With the control columns still split, move the captain's or first officer's stabilizer-trim control-wheel switches down (airplane nose up).
(a) Make sure that the stabilizer leading edge moves down.

S 865-B34
(26) Release the stabilizer-trim control-wheel-switches.

S 865-964
(27) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-661
(28) Remove the power from the center and right hydraulic systems (Ref 29-11-00/201).

S 865-662
(29) Remove electrical power if it is not necessary (Ref 24-22-00/201).

TASK 27-41-00-735-648

9. Electrical Travel Limits and Stabilizer Trim Cutoff Switch Tests

NOTE: This is a scheduled maintenance task.

A. Equipment
(1) Control Wheel Adapter Equipment - A27021-97 or -98
(2) Control Wheel Protractor Kit - A27021-29
(3) Push/Pull Gage, 0 to 15 lb. range - Commercially Available
(4) Elastic Cord - Commercially Available

B. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power-Control
(3) 27-51-00/201, Trailing Edge Flap System
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 34-11-00/201, Pitot-Static System

C. Prepare for the Tests

S 865-A94
(1) Supply electrical power (Ref 24-22-00/201).

S 865-A95
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC

(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 015-A96

WARNING: STAY OFF SERVICE ACCESS DOORS 311AL AND 313AL. THE WEIGHT OF A PERSON CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. A PERSON CAN BE INJURED IF THEY FALL THROUGH THE OPEN DOOR.

(3) Open the access door, 311AL, to the forward stabilizer-compartment (Ref 06-42-00/201).

S 865-A97

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the right and center hydraulic systems (Ref 29-11-00/201).

D. Electrical Travel Limits - Operational Test

S 865-B43

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 215-B44

(2) Make sure the trailing edge flaps and leading edge slats are fully retracted, and the flap lever is in the zero detent (FLAPS UP).

S 865-B45

(3) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.

NOTE: If the stabilizer does not move when you initially move the switches up, move the switches down until the stabilizer is at 4 to 6 units of trim, then move the switches up.

(a) Make sure that the stabilizer position indicators on the control stand show 2.75 to 3.25 units of trim.

S 865-B46

(4) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up) and hold the switches down until the stabilizer stops.
   (a) Make sure that the stabilizer position indicators show 15.0 to 15.6 units of trim.

S 865-B47

(5) Extend the trailing edge flaps to the 15-unit position (Ref 27-51-00).

S 865-B48

(6) Do the trailing edge flap system deactivation procedure (Ref 27-51-00).

S 865-B49

(7) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold the switches up until the stabilizer stops.
   (a) Make sure that the stabilizer position indicators show 0.0 to 0.5 units of trim.

S 865-B50

(8) Do the trailing edge flap system activation procedure (Ref 27-51-00).

S 865-B51

(9) Move the flaps to the fully retracted position (AMM 27-51-00/201).

E. Stabilizer Trim Cutoff Switch Test (Fig 504)

NOTE: The stabilizer may not be in electrical control range if it does not move when the stabilizer-trim control-wheel-switches are moved in one direction. Move the stabilizer-trim control-wheel-switches in the other direction to move the stabilizer into electrical control range, then continue with test.

S 865-970

(1) Make sure that the flaps are in the fully retracted position (AMM 27-51-00/201).

S 865-971
(2) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-972
(3) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 495-675
(4) Install the adapter equipment with the protractor kit to the captain's control wheel (Fig. 504).

S 865-973
(5) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down) and hold until the stabilizer stops.

S 865-974
(6) Do the steps that follow to prevent the operation of the first officer's stabilizer-trim cutoff switches:
   (a) Open the forward compartment access door, 113AL (Ref 06-41-00/201).
   (b) Install an elastic cord (or other applicable device) around the lower ends of each set of opposite switch actuating arms.
   (c) Add sufficient tension to make a space between the switch-actuating-arms and the switch levers.

      NOTE: The switch-actuating-arm cam rollers should be away from the control column cam-surface.

S 865-975
(7) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
   (a) Make sure the stabilizer moves.

S 865-976
(8) While the switches are held down, slowly push the control column forward until the stabilizer stops.

   NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-977
(9) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-978
(10) Release the stabilizer-trim control-wheel-switches.

S 865-979
(11) Let the control column go to the neutral position.

S 865-980
(12) Put the CENTER STAB TRIM SHUTOFF switch to CUTOUT.

S 865-981
(13) Put the RIGHT STAB TRIM SHUTOFF switch to NORM.

S 865-982
(14) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-983
(15) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-984
(16) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-985
(17) Let the control column go to the neutral position.

S 865-986
(18) Hold the stabilizer-trim control-wheel-switches down (airplane nose up) until the stabilizer stops.

S 865-987
(19) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-988
(20) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-989
(21) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-990
(22) Release the stabilizer-trim control-wheel-switches.

S 865-991
(23) Let the control column go to the neutral position.

S 865-992
(24) Put the RIGHT STAB TRIM SHUTOFF switch to CUTOUT.

S 865-993
(25) Put the CENTER STAB TRIM SHUTOFF switch to NORM.

S 865-994
(26) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-995
(27) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-996
(28) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-997
(29) Let the control column go to the neutral position.

S 865-998
(30) Hold the stabilizer-trim control-wheel-switches up (airplane nose down) until the stabilizer stops.

S 865-999
(31) Release the stabilizer-trim control-wheel-switches.

S 095-A00
(32) Remove the elastic cord from around the lower ends of first officer's switch actuating arms. This will allow the first officer's stabilizer-trim cutoff switches to operate.

S 865-A01
(33) Do the steps that follow to prevent the operation of the captain's stabilizer-trim cutoff switches:
(a) Open the forward compartment access door, 113AL (Ref 06-41-00/201).
(b) Install an elastic cord (or other applicable device) around the lower ends of each set of opposite switch actuating arms.
(c) Add sufficient tension to make a space between the switch-actuating-arms and the switch levers.

NOTE: The switch-actuating-arm cam rollers should be away from the control column cam-surface.

S 865-A02
(34) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A03
(35) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-A04
(36) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-A05
(37) Release the stabilizer-trim control-wheel-switches.

S 865-A06
(38) Let the control column go to the neutral position.

S 865-A07
(39) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-A08
(40) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-A09
(41) Move the first officer's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A10
(42) While the switches are held down, slowly push the control column forward until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-A11
(43) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 3.5 to 4.0 degrees.

S 865-A12
(44) Let the control column go to the neutral position.

S 865-A13
(45) Hold the stabilizer-trim control-wheel-switches down (airplane nose up) until the stabilizer stops.

S 865-A14
(46) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A15
(47) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-A16
(48) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-A17
(49) Release the stabilizer-trim control-wheel-switches.

S 865-A18
(50) Let the control column go to the neutral position.

S 865-A19
(51) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-A20
(52) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-A21
(53) Move the first officer's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A22
(54) While the switches are held up, slowly pull the control column aft until the stabilizer stops.

NOTE: Do this step while the stabilizer indicated position is between 5.0 and 15.5 units of trim.

S 225-A23
(55) Measure the angle of travel of the control column from the neutral position to the point where the stabilizer stops. The angle of travel should be 2.2 to 2.7 degrees.

S 865-A24
(56) Let the control column go to the neutral position.

S 865-A25
(57) Hold the stabilizer-trim control-wheel-switches up (airplane nose down) until the stabilizer stops.

S 865-A26
(58) Release the stabilizer-trim control-wheel-switches.

S 095-A27
(59) Remove the elastic cord from around the lower ends of the captain's switch actuating arms. This will allow the captain's stabilizer-trim cutoff switches to operate.

S 095-678
(60) Remove the adapter equipment and protractor kit from the captain's control wheel (Fig. 505).

S 865-A28
(61) Pull the first officer's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-A29
(62) At the same time, push the captain's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-A30
(63) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A31
(64) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A32
(65) Release the stabilizer-trim control-wheel-switches.

S 865-A33
(66) Let the control columns go to the neutral position.

S 865-A34
(67) Push the first officer's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-A35
(68) At the same time, pull the captain's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-A36
(69) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A37
(70) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A38
(71) Release the stabilizer-trim control-wheel-switches.

S 865-A39
(72) Let the control columns go to the neutral position.

S 865-A40
(73) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT.

S 865-A41
(74) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to NORM.

S 865-A42
(75) Pull the first officer's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-A43
(76) At the same time, push the captain's control column 3 to 4 inches (76-101 mm) forward and hold in position.

S 865-A44
(77) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A45
(78) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A46
(79) Release the stabilizer-trim control-wheel-switches.

S 865-A47
(80) Let the control columns go to the neutral position.

S 865-A48
(81) Push the first officer's control column 3 to 4 inches forward and hold in position (67-101 mm).

S 865-A49
(82) At the same time, pull the captain's control column 3 to 4 inches (76-101 mm) aft and hold in position.

S 865-A50
(83) Move the captain's stabilizer-trim control-wheel-switches down (airplane nose up).
(a) Make sure the stabilizer moves.

S 865-A51
(84) Move the captain's stabilizer-trim control-wheel-switches up (airplane nose down).
(a) Make sure the stabilizer moves.

S 865-A52
(85) Release the stabilizer-trim control-wheel-switches.

S 865-A53
(86) Let the control columns go to the neutral position.

F. Put the Airplane Back to Its Usual Condition

S 865-965
(1) Remove the power from the right and center hydraulic systems (Ref 29-11-00/201).

S 865-966
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(c) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(d) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC

S 865-967
(3) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to NORM.

S 865-968
(4) Remove electrical power (Ref 24-22-00/201).

S 415-969
(5) Close the forward stabilizer compartment access door, 311AL (Ref 06-42-00/201).

TASK 27-41-00-715-679

10. Horizontal Stabilizer Alternate Electric Trim System - Operational Check

A. General
(1) The operational check of the stabilizer alternate electric trim system is done without the use of ground support equipment. The test lets you monitor stabilizer alternate electric trim operation and makes sure the stabilizer has smooth and free movement.

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zones
211/212 Control Cabin

D. Alternate-Electrical Operation Test

S 865-681
(1) Supply electrical power (Ref 24-22-00/201).

S 865-683

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (Ref 29-11-00/201).

S 865-705
(3) Make sure that the L, R, and C FLT CONTROL SHUTOFF switches on the right side panel, P61, are ON.

S 865-684
(4) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 215-685
(5) Make sure that the RIGHT STAB TRIM SHUTOFF switch on the P10 panel is at the NORM position.

S 215-686
(6) Make sure this circuit breaker on the P11 panel is closed:
(a) 11B19, ALT STAB TRIM

S 715-687
(7) Move the alternate stab trim switches forward (airplane nose down).
(a) Make sure the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

S 865-688
(8) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to CUTOUT while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-689
(9) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 715-690
(10) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-691
(11) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position.

S 865-692
(12) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 715-693
(13) Move the alternate stab trim switches aft (airplane nose up).
(a) Make sure the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 865-694
(14) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the CUTOUT position while the stabilizer moves.
(a) Make sure the stabilizer stops in one second.

S 865-695
(15) Put the CENTER STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.
(a) Make sure the stabilizer starts to move in one second.

S 715-696
(16) Release the alternate stab trim switches.
(a) Make sure the stabilizer stops.

S 865-697
(17) Put the RIGHT STAB TRIM SHUTOFF switch on the P10 panel to the NORM position.

S 715-698
(18) Move one of the two alternate stab trim switches forward while you keep the other switch in the neutral position.
(a) Make sure the stabilizer does not move.

S 715-699
(19) Move one of the two alternate stab trim switches aft while you keep the other switch in the neutral position.
(a) Make sure the stabilizer does not move.

S 715-700
(20) Move the two alternate stab trim switches in the opposite directions (one airplane nose up and the other airplane nose down).
(a) Make sure the stabilizer does not move.

S 715-701
(21) Move the two alternate stab trim switches to the opposite position. (one airplane nose down and the other airplane nose up).
(a) Make sure that the stabilizer does not move.

E. Put the Airplane Back to its Usual Condition

S 865-702
(1) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to NORM.

S 865-703
(2) Remove electrical power if it is not necessary (Ref 24-22-00/201).

S 865-704
(3) Remove the power from the right and center hydraulic systems (Ref 29-11-00/201).

STABILIZER TRIM CONTROL WHEEL SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the control wheel switches for stabilizer trim operation. The steps to remove and install the captain's and first officer's control wheel switches are the same.
   B. The control wheel switch is attached to an electrical cable that goes through the control wheel handles. If a control wheel switch is defective, the switch and cable must be replaced as an assembly. This procedure removes and installs the switch and cable as an assembly.

TASK 27-41-01-024-001

2. Remove the Control Wheel Switch
   A. Equipment
      (1) Extraction/Insertion Tool - M15570-20
          (Deutsch Company, Electronics Company Division,
          700 S. Hathaway, Municipal Airport
          Banning, CA 92220)
   B. References
      (1) 24-22-00/201, Electrical Power - Control
   C. Access
      (1) Location Zones
          211/212 Control Cabin

   D. Prepare for the Removal

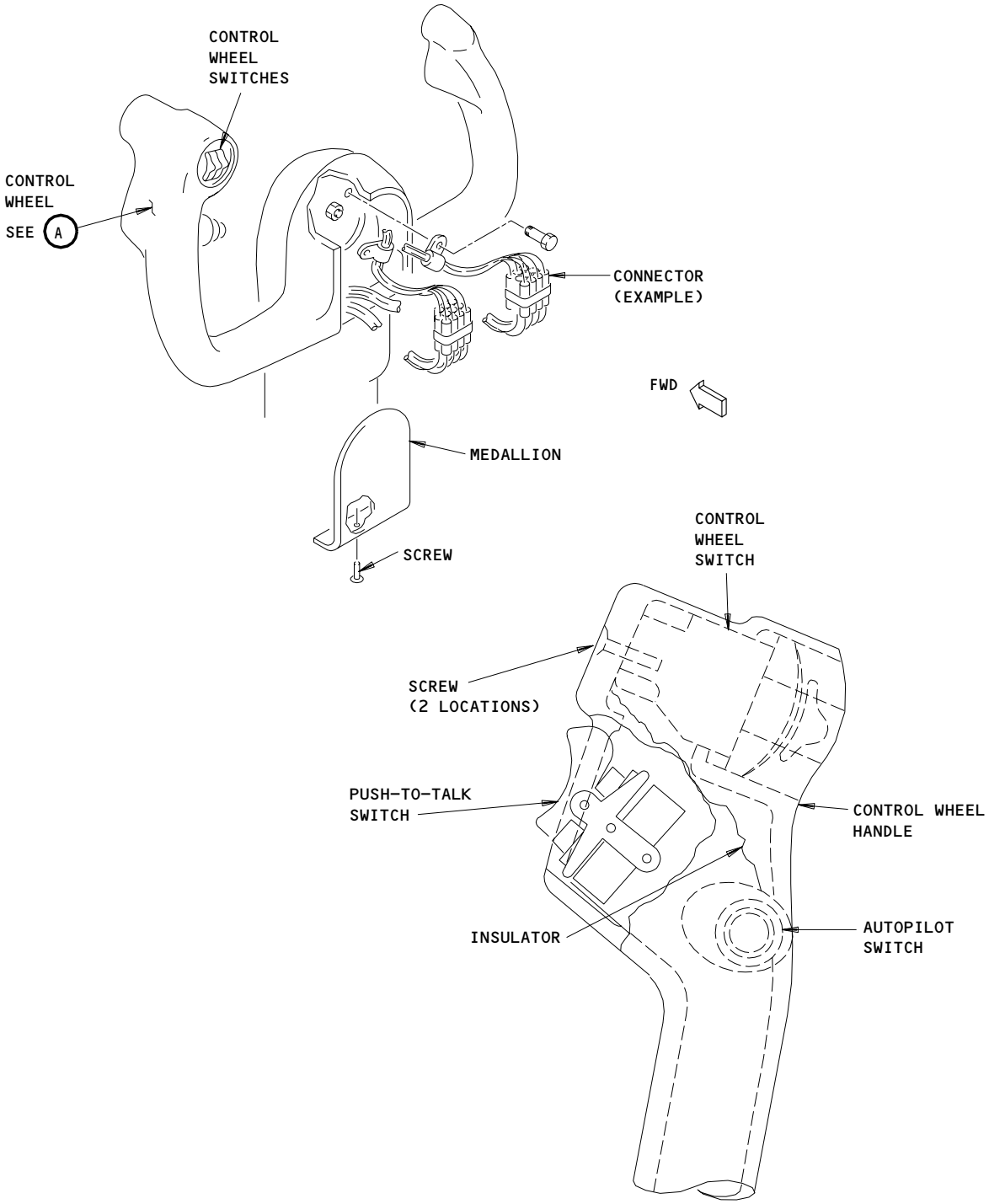
      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003
      (2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11C12, STAB TRIM SHUTOFF LEFT
          (b) 11C13, STAB TRIM SHUTOFF RIGHT
          (c) 11H11 or 11C5, STAB TRIM CONT L
          (d) 11H20, STAB TRIM CONT RIGHT
   E. Remove the Control Wheel Switch (Fig. 401)

      S 034-005
      (1) Remove the medallion.

      S 034-006
      (2) Remove the connectors from the control wheel hub.



Control Wheel Switch Installation
Figure 401

S 034-031
(3) Disconnect the wires for the control wheel switch from the connectors in the control wheel hub.

S 034-007
(4) Remove the screws that hold the control wheel switch to the control wheel handle.

S 494-008
(5) Attach a wire guide to the end of the cable for the control wheel switch.

S 034-009
(6) Pull the cable through the switch hole in the control wheel handle.

S 034-010
(7) Disconnect the cable and let the wire guide stay in the control wheel handle.

TASK 27-41-01-424-011

3. Install the Control Wheel Switch

A. Equipment
(1) Extraction/Insertion Tool - M15570-20
(Deutsch Company, Electronics Company Division,
700 S. Hathaway, Municipal Airport
Banning, CA 92220)

B. Consumable Materials
(1) G00961 Talcum Powder - Commercially Available

C. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
211/212 Control Cabin

E. Install the Control Wheel Switch (Fig. 401)

S 644-012
(1) Apply talcum powder to the cable for the control wheel switch.

S 434-013
(2) Attach the cable for the control wheel switch to the wire guide.

S 434-014
(3) Pull the cable through the switch hole in the control wheel handle.

S 094-015
(4) Disconnect the cable from the wire guide.

S 434-016
(5) Put the insulator between the cable for the control wheel switch and the interphone switch wires.

S 434-017
(6) Pull the cable through the control wheel until the control wheel switch and the guard assembly are set correctly.

S 434-018

CAUTION: DO NOT TIGHTEN THE SCREWS TOO MUCH. DAMAGE TO THE SWITCH HOUSING CAN OCCUR.

(7) Install the screws that attach the control wheel switch to the control wheel handle.
(a) Tighten the screws to 4 ± 0.5 pound-inches (0.45 +/- 0.05 newtons).

S 434-019
(8) Attach the wires for the control wheel switch to the connectors in the control wheel hub.

F. Control Wheel Switch Test

S 864-020
(1) Turn the control wheel through five cycles of full travel.

S 214-021
(2) Make sure the cables for the control wheel switches are not pulled when you turn the control wheel.

S 864-022
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT
(c) 11H11 or 11C5, STAB TRIM CONT L
(d) 11H20, STAB TRIM CONT RIGHT

S 864-023
(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-024

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 864-025
(6) Move the control wheel switch to the APL NOSE UP and APL NOSE DN positions.

S 214-026
(7) Make sure the stabilizer moves as follows:
(a) The stabilizer leading edge moves down when the control wheel switch is in the APL NOSE UP position.
(b) The stabilizer leading edge moves up when the control wheel switch is in the APL NOSE DN position.

G. Put the Airplane Back to Its Usual Condition

S 434-027
(1) Put the connectors in the control wheel hub.

S 434-028
(2) Install the medallion.

S 864-029
(3) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 864-030
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

ALTERNATE STABILIZER TRIM SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the alternate stabilizer trim switches.

TASK 27-41-03-024-001

2. Remove the Alternate Stabilizer Trim Switch
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Removal

      S 864-002
      (1) Remove the pressure from the right and center hydraulic systems (Ref 29-11-00).

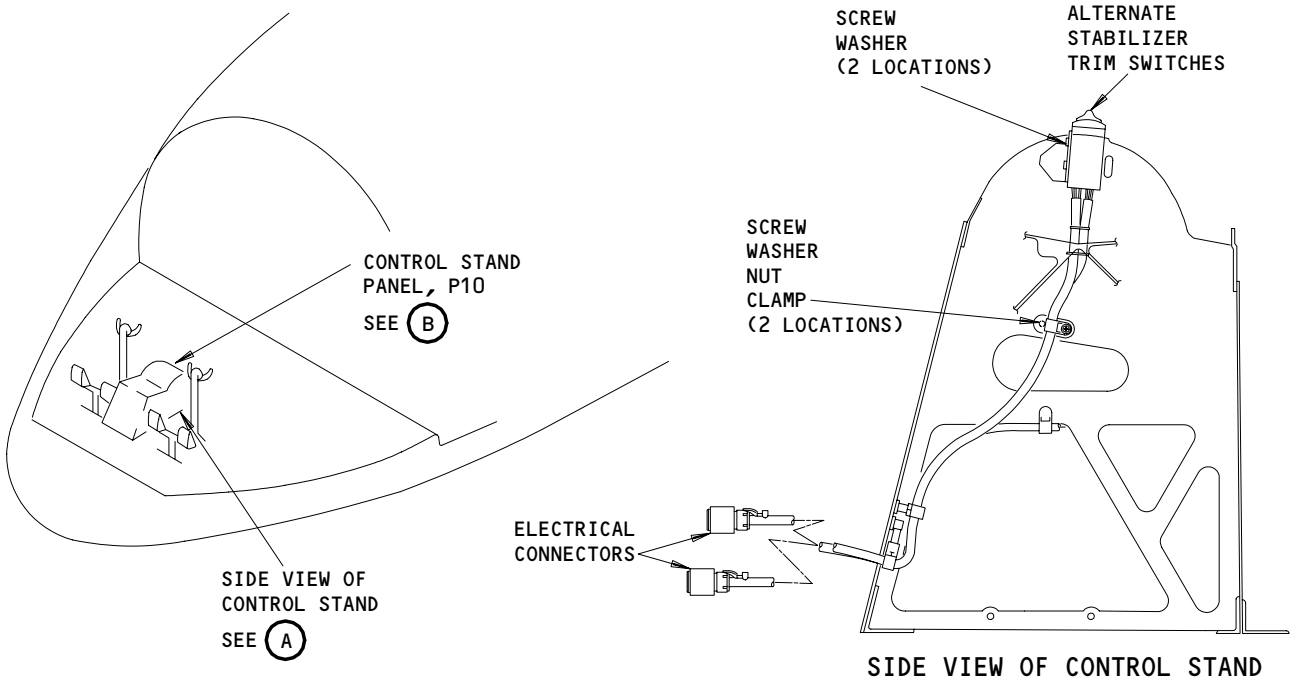
      S 864-003
      (2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOFF position.

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11H11 or 11C05, STAB TRIM CONT LEFT
          (e) 11H20, STAB TRIM CONT RIGHT
   D. Remove the Alternate Stabilizer Trim Switch

      S 014-005
      (1) Remove the left seal assembly for access to the speed brake lever and the alternate stabilizer trim switch.

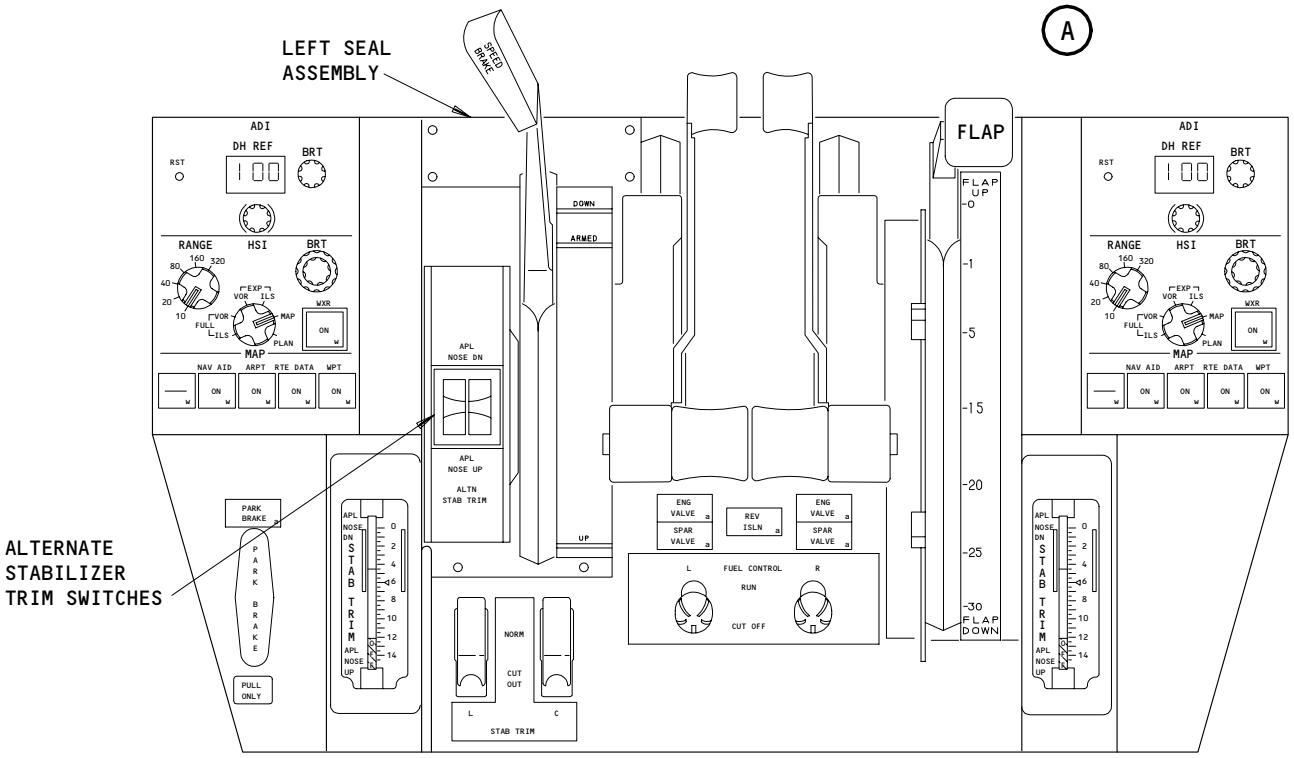
      S 014-006
      (2) Remove the access panel on the left side of the control stand.

      S 034-007
      (3) Remove the screws that hold the clamps to the control stand.



SIDE VIEW OF CONTROL STAND
(ACCESS PANEL REMOVED)

A



CONTROL STAND PANEL, P10

B

Alternate Stabilizer Trim Switch - Installation
Figure 401

S 034-008
(4) Disconnect the electrical connectors for the alternate stabilizer trim switch.

NOTE: The electrical connectors for the alternate stab trim switches are under the control cabin floor by the speed brake LVDT connectors.

S 034-009
(5) Remove the screws that hold the alternate stabilizer trim switch to the control stand.

S 024-010
(6) Remove the alternate stabilizer trim switch.

TASK 27-41-03-424-011

3. Install the Alternate Stabilizer Trim Switch

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
211/212 Control Cabin

C. Install the Alternate Stabilizer Trim Switch

S 424-012
(1) Install the alternate stabilizer trim switch on the control stand with the screw and the washer (2 locations).

S 434-013
(2) Connect the electrical connector for the alternate stabilizer trim switch.

NOTE: The electrical connectors for the alternate stab trim switches are under the control cabin floor by the speed brake LVDT connectors.

S 434-014
(3) Connect the clamp (2 locations) to the control stand panel, P10, with the screw, nut, and washer.

S 414-015
(4) Install the access panel for the left side of the control stand.

S 414-016
(5) Install the left seal assembly.

D. Alternate Stabilizer Trim Switch Test

S 864-017
(1) Supply electrical power (Ref 24-22-00).

S 864-018

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply power to the right and center hydraulic systems (Ref 29-11-00).

S 864-019
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT LEFT
(e) 11H20, STAB TRIM CONT RIGHT

S 864-020
(4) Put the RIGHT STAB TRIM SHUTOFF valve switch on the P10 panel to the NORM position.

S 864-027
(5) Put the CENTER STAB TRIM SHUTOFF valve switch on the P10 panel to the CUTOUT position.

S 864-028
(6) Move the stabilizer to 8 units of trim.

S 864-029
(7) Use the alternate trim switches to move the stabilizer airplane nose up for 5 seconds.
  (a) Make sure the stabilizre moves in the airplane nose up direction (stabilizer leading edge down).
  (b) Make sure that the UNSCHED STAB TRIM EICAS message is not shown on the EICAS display panel, P2.

S 864-030
(8) Use the alternate trim switches to move the stabilizer airplane nose down for 5 seconds.
  (a) Make sure the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).
  (b) Make sure that the UNSCHED STAB TRIM EICAS message is not shown on the EICAS display panel, P2.

S 864-031
(9) Put the RIGHT STAB TRIM SHUTOFF valve switch on the P10 panel to the CUTOUT position.

S 864-034
(10) Put the CENTER STAB TRIM SHUTOFF valve switch on the P10 panel to the NORM position.

S 864-033
(11) Use the alternate trim switches to move the stabilizer airplane nose up.
  (a) Make sure the stabilizer moves in the airplane nose up direction (stabilizer leading edge down).

S 864-032
(12) Use the alternate trim switches to move the stabilizer airplane nose down.
  (a) Make sure the stabilizer moves in the airplane nose down direction (stabilizer leading edge up).

E. Put the Airplane Back to Its Usual Condition

S 864-023
(1) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 864-024
(2) Remove electrical power if it is not necessary (Ref 24-22-00).

STABILIZER TRIM CONTROL MODULE - MAINTENANCE PRACTICES

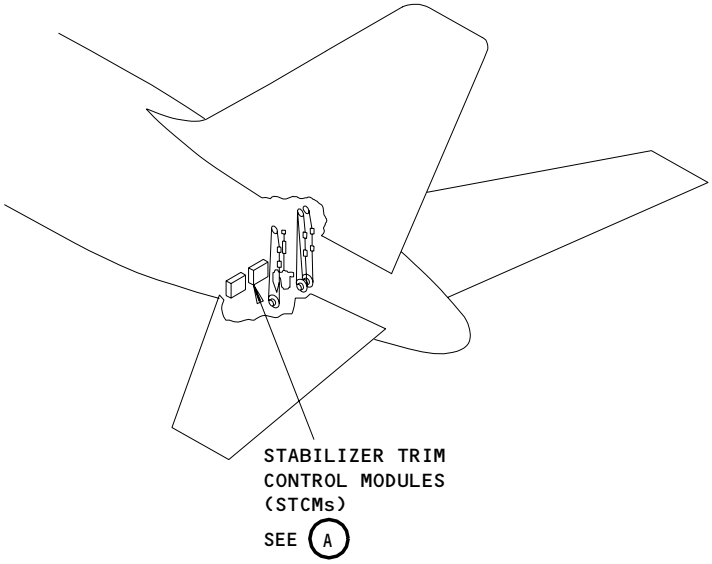
1. General
   A. This procedure contains steps to remove and install the stabilizer trim control modules (STCMs) and the solenoid valves on the STCMs.
   B. The procedures to remove and install the right and left STCMs are the same.
   C. The procedures to remove and install each of the solenoid valves on the right and left STCMs are the same.

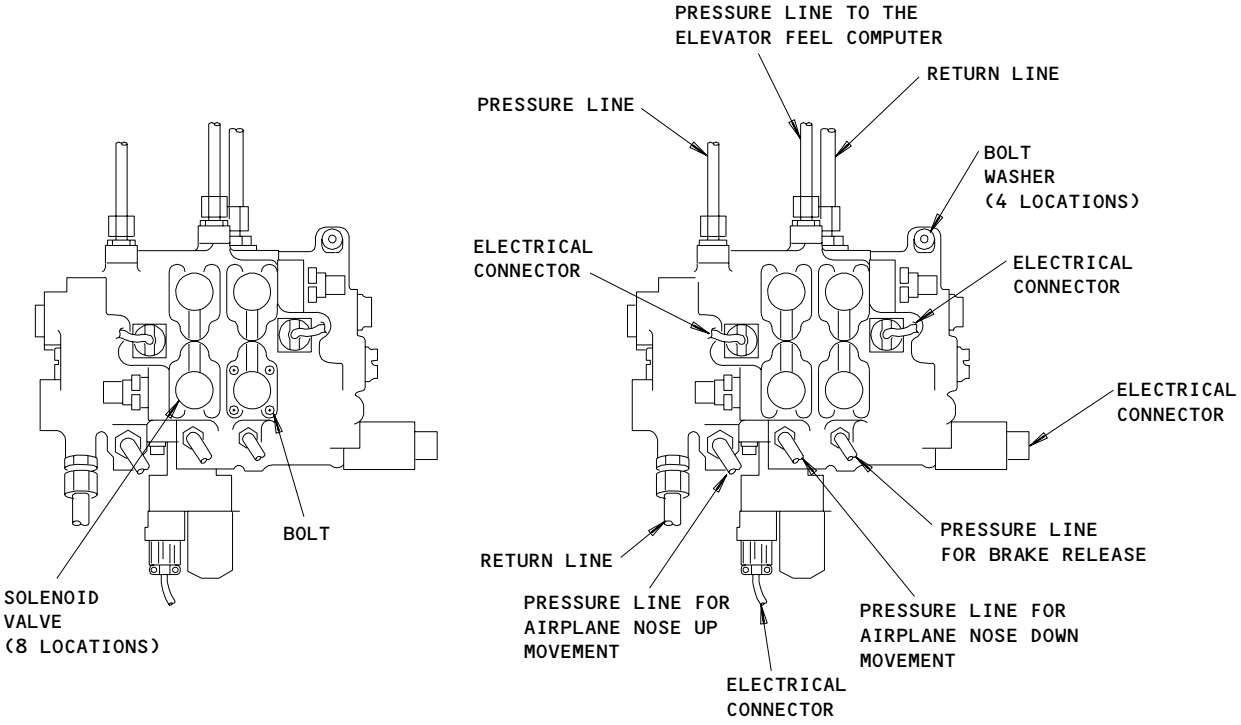
TASK 27-41-05-022-001

2. Remove the Stabilizer Trim Control Modules (STCMs) and the Solenoid Valves
   A. General
      (1) This task contains two procedures, one to remove the STCM, and one to remove the solenoid valves on the STCM. Because this task contains two procedures, do only the applicable group of steps.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) Gage Assembly - B27039-2 (Part of the Elevator and Stabilizer Rigging Equipment, B27039-13)
      (2) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) E/ST1 - P/N B20003-21
          (b) E/ST2 - P/N B20003-21
   C. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   D. Access
      (1) Location Zones

211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1787.45





STABILIZER TRIM CONTROL MODULES (STCMs)

(A)

NOTE: THE RIGHT HYDRAULIC SYSTEM SUPPLIES PRESSURE TO THE RIGHT STCM, THE CENTER HYDRAULIC SYSTEM SUPPLIES PRESSURE TO THE LEFT STCM.

Stabilizer Trim Control Module Installation
Figure 201

(2) Access Panel
311AL Forward Stabilizer Compartment

E. Prepare for the Removal

S 862-002
(1) Supply power to the right and center hydraulic systems (Ref 29-11-00).

S 862-003
(2) Move the stabilizer until Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm) (Fig. 202).

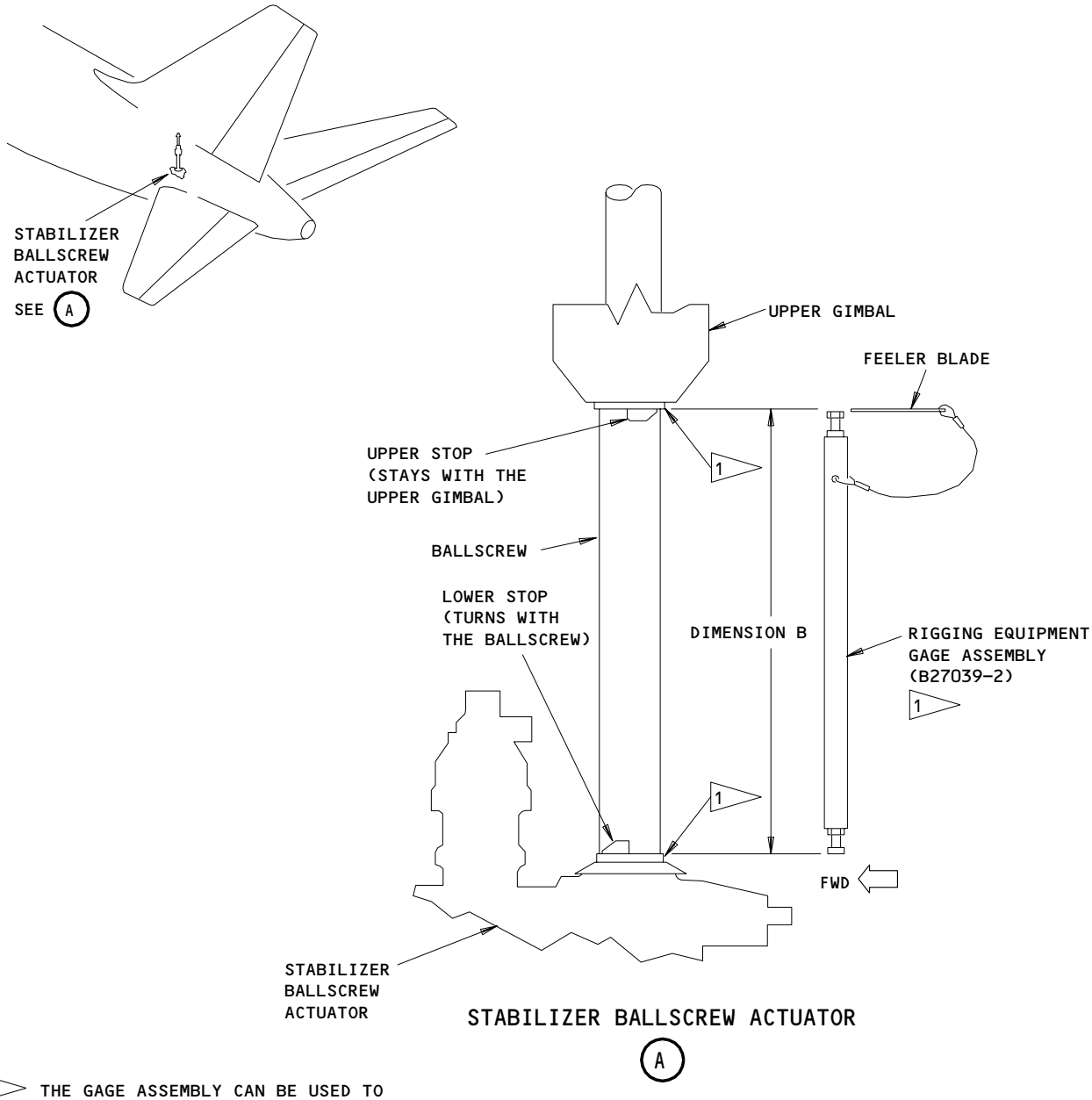
S 862-004
(3) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 862-005
(4) Put the RIGHT and CENTER STAB TRIM CUTOUT switches on the control stand panel, P10, to the CUTOUT position.

S 862-006
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT
(c) 11H11 or 11C05, STAB TRIM CONT L
(d) 11H20, STAB TRIM CONT R

S 862-062
(6) Do the steps that follow to put the stabilizer control system in the correct configuration to remove the component:
(a) Operate the alternate stab trim switches to the APL NOSE UP and APL NOSE DOWN position 4 to 5 times.

NOTE: This will remove the remaining pressure in the STCM.



STABILIZER BALLSCREW ACTUATOR

A

1 THE GAGE ASSEMBLY CAN BE USED TO ACCURATELY SET THE STABILIZER DIMENSION B TO 19.07 ±0.01 INCHES.

TO USE, PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SUCH THAT THE LOWER BOLTHEAD IS ON THE SHOULDER OF THE LOWER STOP. MAKE SURE THAT THE FEELER BLADE CANNOT BE PUT BETWEEN THE GAGE ASSEMBLY UPPER BOLTHEAD AND THE SHOULDER OF THE UPPER STOP. MAKE SURE THE SHOULDER OF THE UPPER STOP DOES NOT TOUCH THE UPPER BOLTHEAD.

Measurement of Stabilizer Dimension B
Figure 202

(b) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11B19, ALT STAB TRIM
(c) Put a DO-NOT-OPERATE tag on the alternate stab trim switches.

S 012-010

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(7) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

F. Remove the STCM (Fig. 201)

S 032-015
(1) Disconnect the electrical connectors.

S 032-016
(2) Disconnect the hydraulic lines.

S 032-017
(3) Put plugs in the hydraulic lines and caps on the ports.

S 032-018
(4) Hold the STCM and remove the bolts and washers that attach the it to the airplane structure.

S 022-019
(5) Remove the STCM.

G. Remove the Solenoid Valve (Fig. 201)

S 032-020
(1) Remove the bolts and washers that attach the solenoid valve to the STCM.

S 022-021
(2) Remove the solenoid valve and the gasket plate from the STCM.

S 032-022
(3) Remove and discard the gasket plate and the o-ring from the solenoid valve.

TASK 27-41-05-422-023

3. Install the Stabilizer Trim Control Modules (STCMs) and the Solenoid Valves

A. General

(1) This task contains two installation procedures, one to install the STCMs, and one to install the solenoid valves on the STCM. Because this task contains two procedures, do only the applicable group of steps.

To start one of these procedures, do the group of steps that is necessary to install the components. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Consumable Materials

(1) D00293 Skydrol Assembly Lube - MCS 352B
(2) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

C. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel

311AL Forward Stabilizer Compartment

E. Install the STCM (Fig. 201)

S 432-024
(1) Put the STCM in its correct position and install the bolts and washers to attach it to the airplane structure.

S 432-025
(2) Remove the plugs from the hydraulic lines and the caps from the ports.

S 432-026
(3) Connect the hydraulic lines to the STCM.

S 432-027
(4) Connect the electrical connectors.

S 712-033
(5) Do the test for the STCM that follows in this task.

F. Install the Solenoid Valve (Fig. 201)

S 432-034
(1) Install a new o-ring on the solenoid valve.

S 642-035
(2) Lightly apply a layer of assembly lubricant or hydraulic fluid to all surfaces of a new gasket plate.

S 432-036
(3) Put the gasket plate its correct position on the STCM.

S 422-037
(4) Put the solenoid valve in its correct position on the STCM.

S 422-038
(5) Install the bolts and washers to attach the solenoid valve to the STCM and tighten the bolts as follows:
(a) Tighten the bolts to 30-35 pound-inches (3.39-3.95 Nm).

G. Test for the STCM

S 862-046
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 862-047
(2) Put the RIGHT and CENTER STAB TRIM CUTOUT switches on the control stand panel, P10, to the NORM position.

S 862-048

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 712-063

(4) Do the tests that follow:
  (a) Alternate-Electrical Operation Test (AMM 27-41-00/501).
  (b) Alternate-Electric Trim Authority Test (AMM 27-41-00/501).
  (c) Stabilizer Trim Shutoff Switches Test (AMM 27-41-00/501).
  (d) Stabilizer Trim Secondary Brake Test (AMM 27-41-00/501).

H. Put the Airplane Back to Its Usual Condition

S 862-052

(1) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 862-053

(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 412-054

(3) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

STABILIZER TRIM CONTROL MODULE BRAKE PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the brake pressure switch on the stabilizer trim control modules (STCMs). The steps to remove and install the brake pressure switch are the same for the left and right STCMs.

      NOTE: The right hydraulic system supplies pressure to the right STCM, the center hydraulic system supplies pressure to the left STCM.

TASK 27-41-07-024-001

2. Remove the Brake Pressure Switch
   A. Equipment
      (1) Gage Assembly - B27039-2 (Part of the Elevator and Stabilizer Rigging Equipment, B27039-13)
   B. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-41-00/501, Horizontal Stabilizer Trim Control System
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

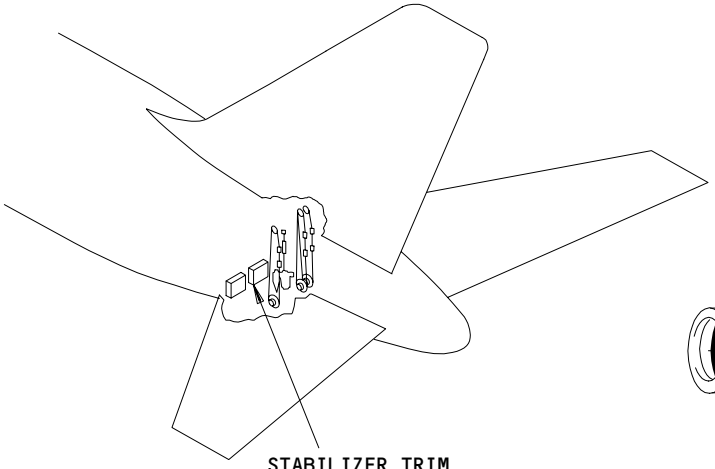
   D. Prepare for the Removal

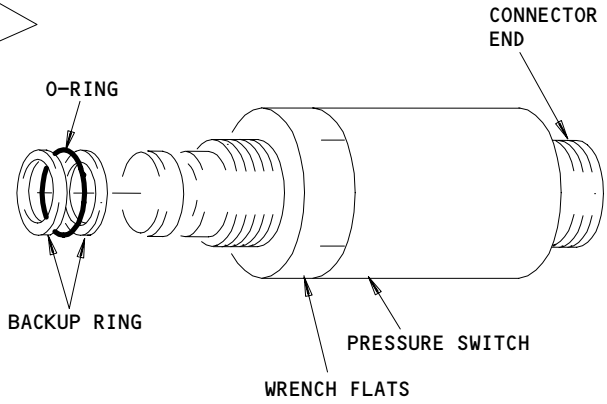
      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003

      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

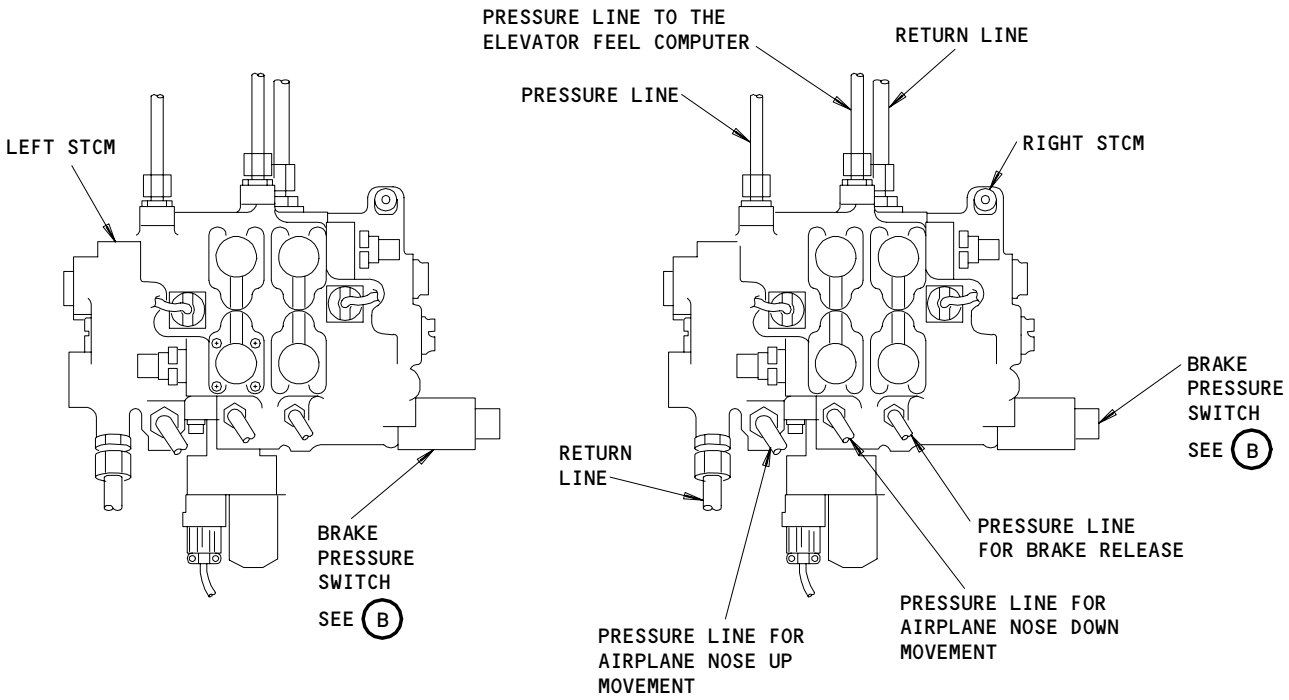
      (2) Supply power to the right hydraulic system (AMM 29-11-00/201).





BRAKE PRESSURE SWITCH

(B)



STABILIZER TRIM CONTROL MODULES

(A)

Brake Pressure Switch Installation
Figure 401

S 864-038
(3) Use the alternate stab trim switches to move the stabilizer until Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.01 inches (Fig. 402).

S 864-007
(4) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

S 214-008
(5) Make sure the pressure is removed from the center hydraulic system (AMM 29-11-00/201).

S 864-009
(6) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-010
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 944-039
(8) Attach DO-NOT-OPERATE tags to the alternate stab trim switches and the control wheel switches.

S 014-014

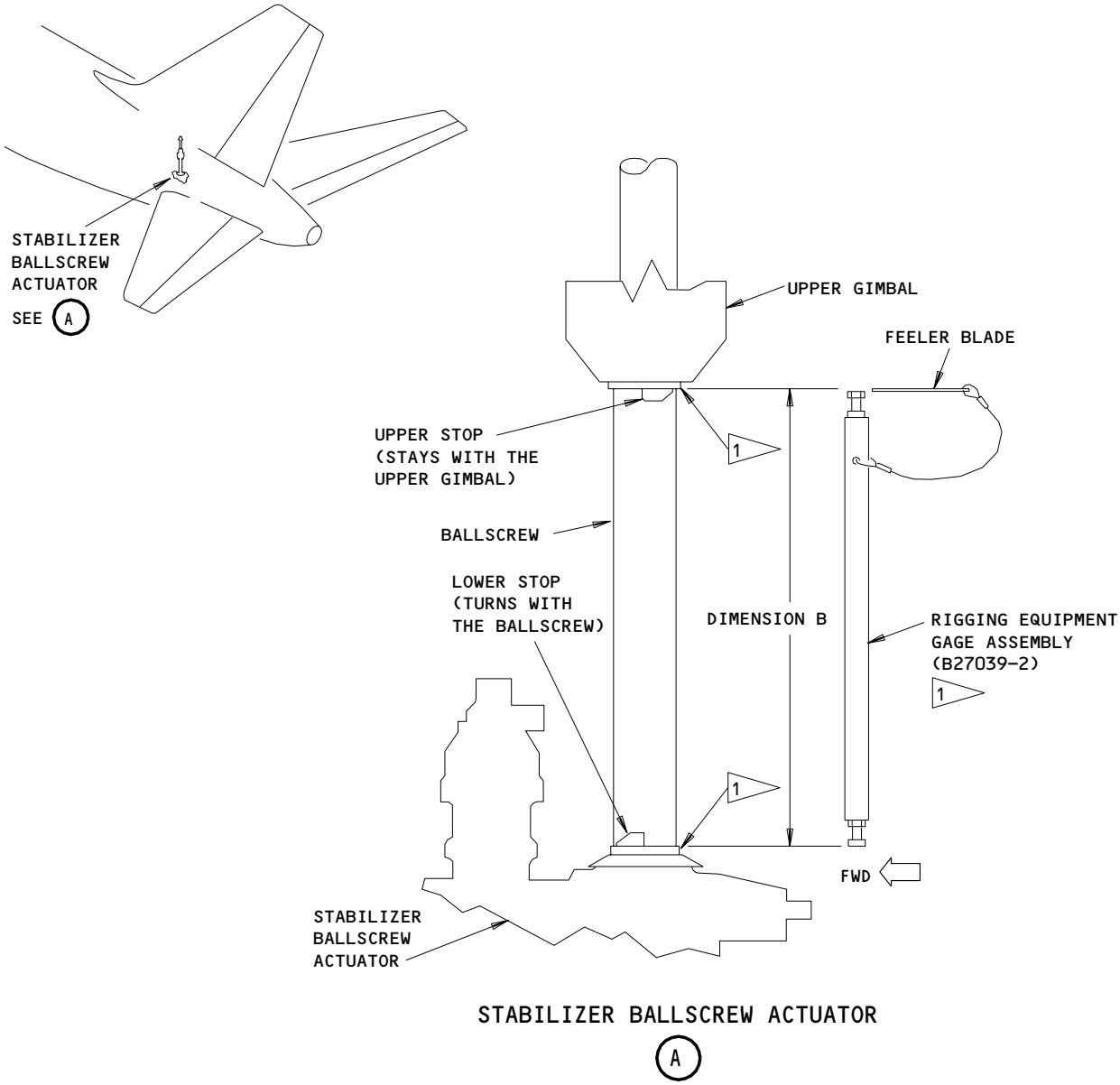
WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(9) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

E. Remove the Brake Pressure Switch (Fig. 401)

S 034-017
(1) Disconnect the electrical connector from the brake pressure switch.

S 024-018
(2) Remove the brake pressure switch from the STCM.



STABILIZER BALLSCREW ACTUATOR
A

1 THE GAGE ASSEMBLY CAN BE USED TO ACCURATELY SET THE STABILIZER DIMENSION B TO 19.07 ±0.01 INCHES.

TO USE, PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SUCH THAT THE LOWER BOLTHEAD IS ON THE SHOULDER OF THE LOWER STOP. MAKE SURE THAT THE FEELER BLADE CANNOT BE PUT BETWEEN THE GAGE ASSEMBLY UPPER BOLTHEAD AND THE SHOULDER OF THE UPPER STOP. MAKE SURE THE SHOULDER OF THE UPPER STOP DOES NOT TOUCH THE UPPER BOLTHEAD.

Measurement of Stabilizer Dimension B
Figure 402

S 034-019
(3) Discard the o-ring and the two backup rings.

S 034-020
(4) Put a cap on the open port on the STCM.

TASK 27-41-07-424-021

3. Install the Brake Pressure Switch

A. References
(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-09-00/201, Flight Control System Electronics Unit (CSEU) - Maintenance Practices
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Forward Stabilizer Compartment

C. Install the Brake Pressure Switch (Fig. 401)

S 434-022
(1) Install a new o-ring and two backup rings on the brake pressure switch.

S 434-023
(2) Remove the cap from the port on the STCM.

S 424-024
(3) Install the brake pressure switch and tighten it at the wrench flats as follows:
(a) Tighten the brake pressure switch at the wrench flats 300 to 350 pound-inches (33.9-39.5 Nm).

S 434-025
(4) Connect the electrical connector to the brake pressure switch.

S 864-028
(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-029
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT

(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 944-040
(7) Remove the DO-NOT-OPERATE tags from the alternate stab trim switches and from the control wheel switches.

S 714-033
(8) Do the Test of the Stabilizer Trim/Elevator Asymmetry Limit Module (SAM) (FIM 27-09-00).
(a) Make sure the STCM fault balls do not set during the left and right SAM tests.

NOTE: Do all of the steps as if you replaced the left and right SAMs.

(b) Make sure there are no hydraulic leaks at the brake pressure switch.

D. Put the Airplane Back to Its Usual Condition

S 214-034
(1) Make sure the power is removed from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 864-035
(2) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 414-036
(3) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00).

STABILIZER TRIM BALLSCREW ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the stabilizer ballscrew actuator.

TASK 27-41-10-024-001

2. Remove the Stabilizer Ballscrew Actuator
   A. Equipment
      (1) Removal/Installation Equipment - Horizontal Stabilizer Jackscrew - B27011-79
   B. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          311/312 Area Aft of the Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

   D. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

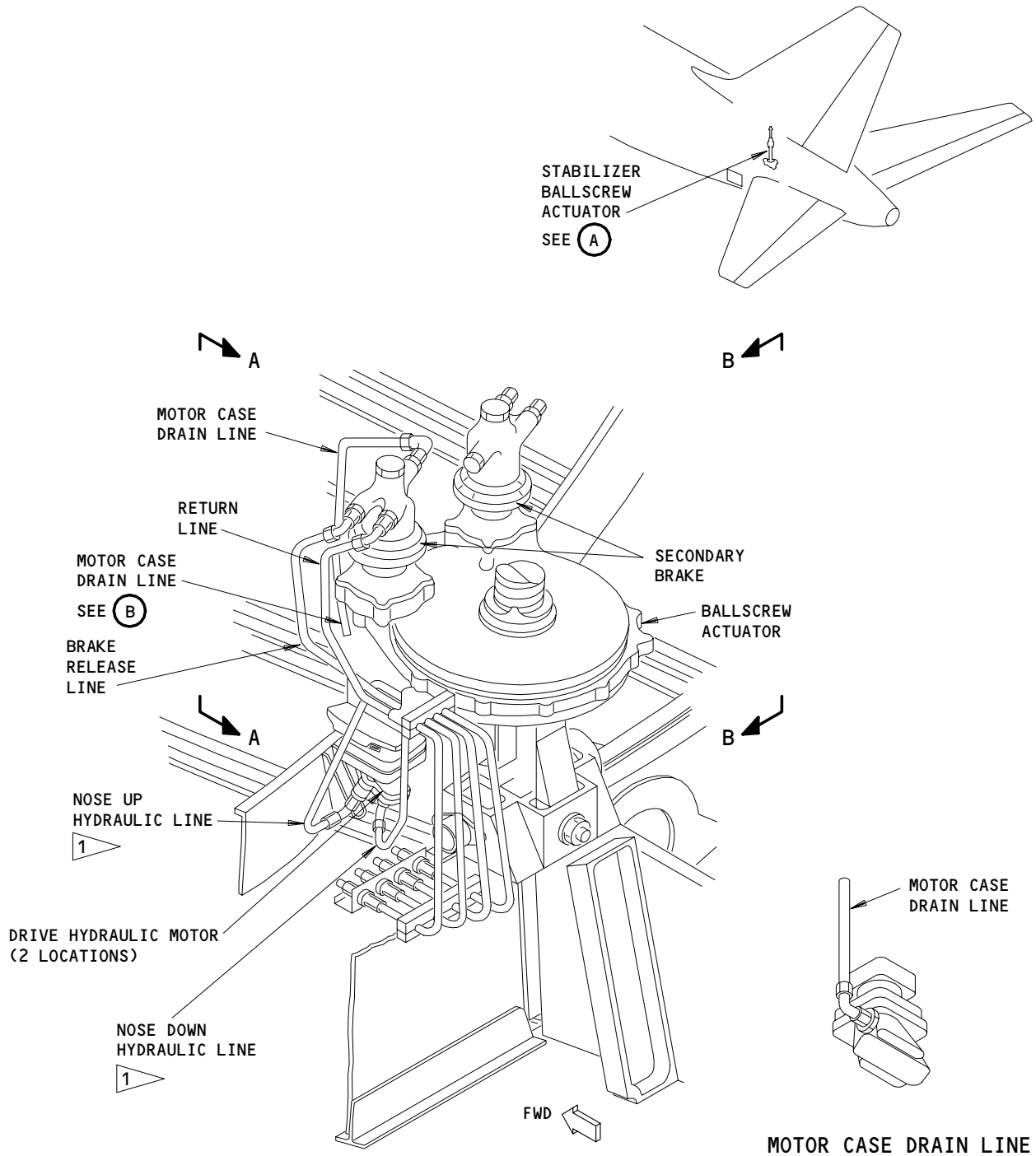
      S 864-003

      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      (2) Supply power to the right and center hydraulic systems (AMM 29-11-00/201).

      S 864-004
      (3) Move the stabilizer to 4 units of trim, as shown on the stabilizer position indicators that are on the control stand panel, P10.

          NOTE: The stabilizer ballscrew actuator can be removed at all positions (if the stabilizer cannot be moved to the recommended position). But, if the actuator is not in the recommended position, the telescopic supports can hit the actuator.



STABILIZER BALLSCREW ACTUATOR

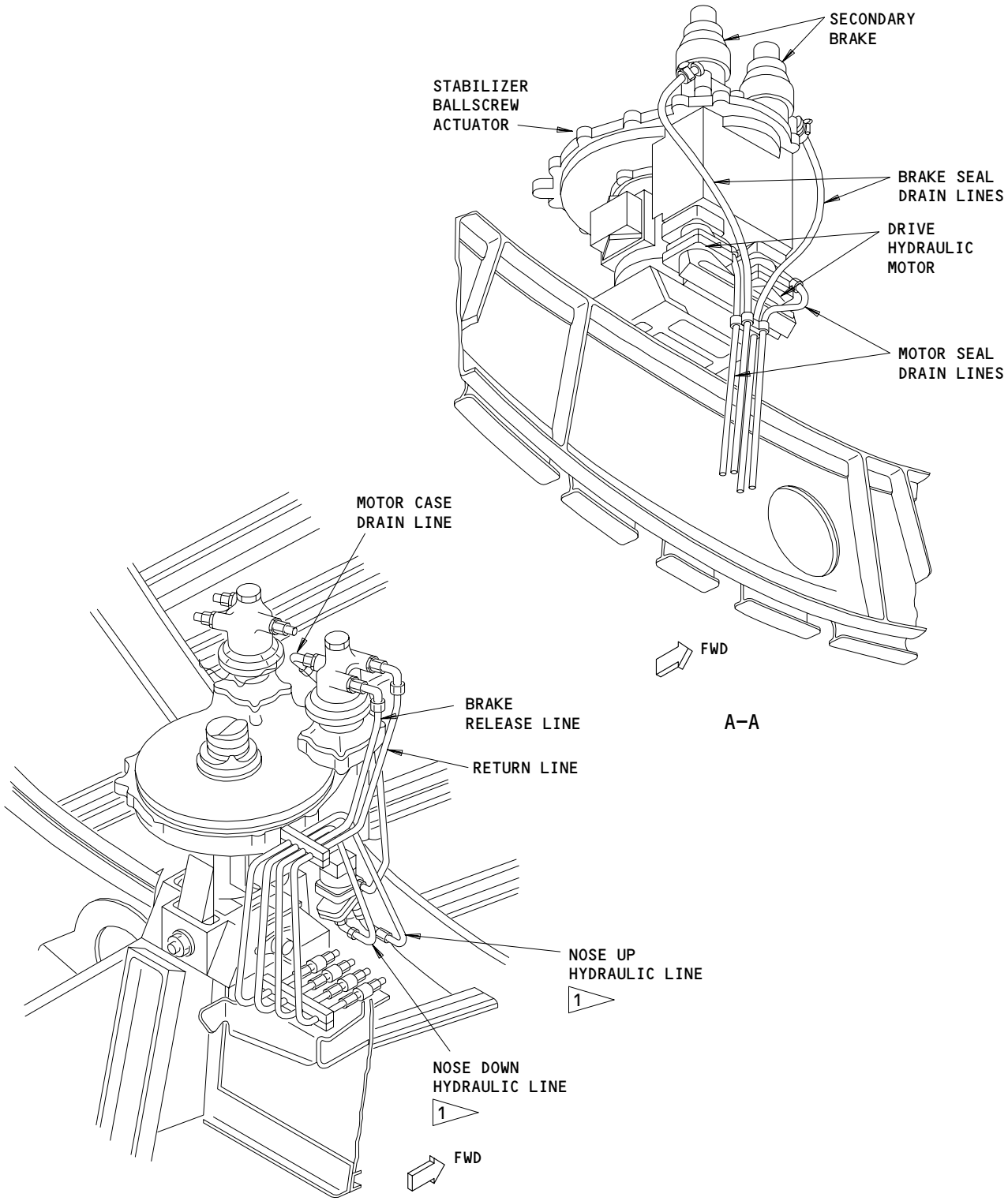
(A)

MOTOR CASE DRAIN LINE

(B)

1 CENTER HYDRAULIC SYSTEM SUPPLIES POWER TO THE LEFT SIDE
RIGHT HYDRAULIC SYSTEM SUPPLIES POWER TO THE RIGHT SIDE

Stabilizer Trim Ballscrew Actuator Hydraulic Connections
Figure 401 (Sheet 1)



Stabilizer Trim Ballscrew Actuator Hydraulic Connections
Figure 401 (Sheet 2)

S 864-005
(4) Remove the pressure from the right and center hydraulic systems and reservoirs (AMM 29-11-00/201).

S 864-006
(5) Put the C and R STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 864-007
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF L
(c) 11C13, STAB TRIM SHUTOFF R
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 014-008

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

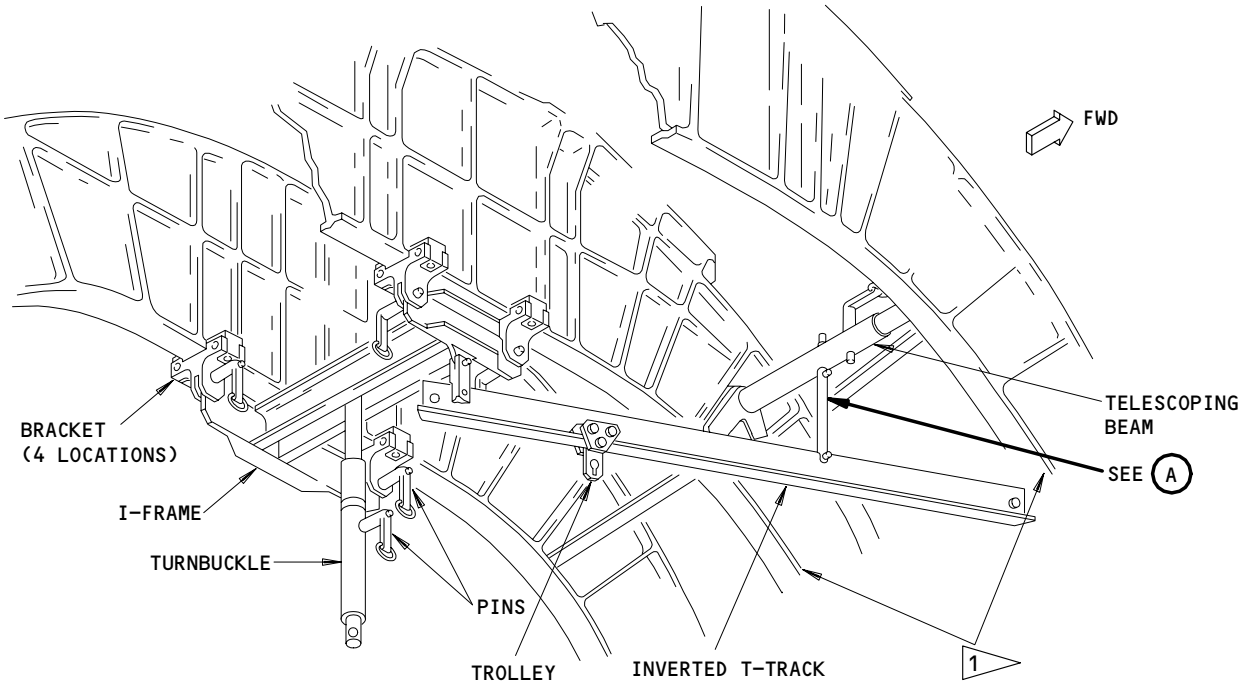
(7) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 034-009
(8) Disconnect the eight hydraulic lines that connect to the actuator brakes and motors at the lower gimbal (there are four on each side of the actuator) (Fig. 401).

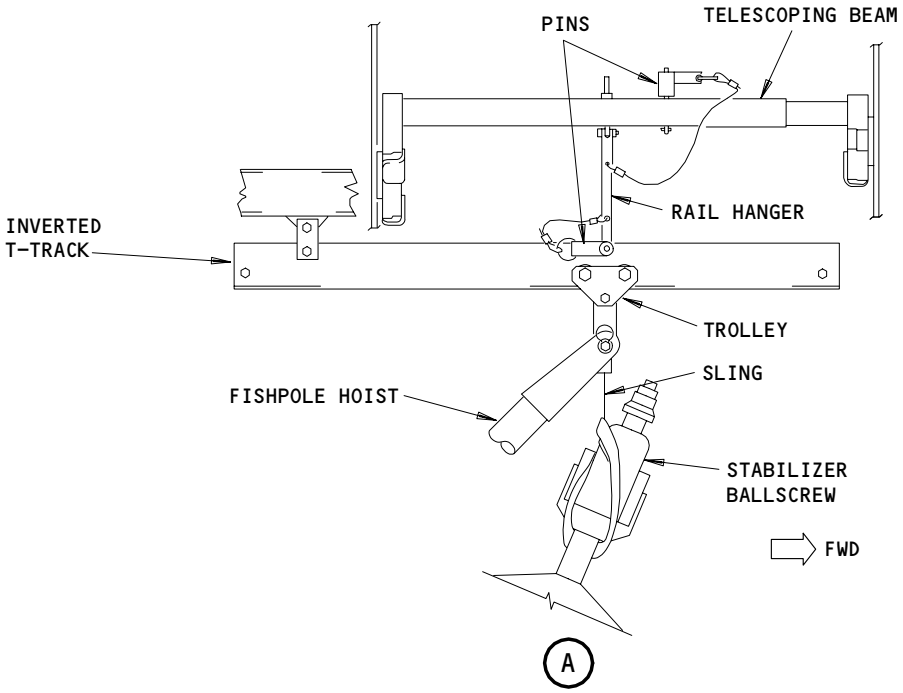
S 034-010
(9) Disconnect the four hydraulic drain seal lines from the actuator brakes and motors.

S 034-011
(10) Disconnect the hydraulic lines from the actuator unions and clamps and turn them away from the actuator.

S 034-012
(11) Install plugs and caps on all of the disconnected hydraulic lines and ports.

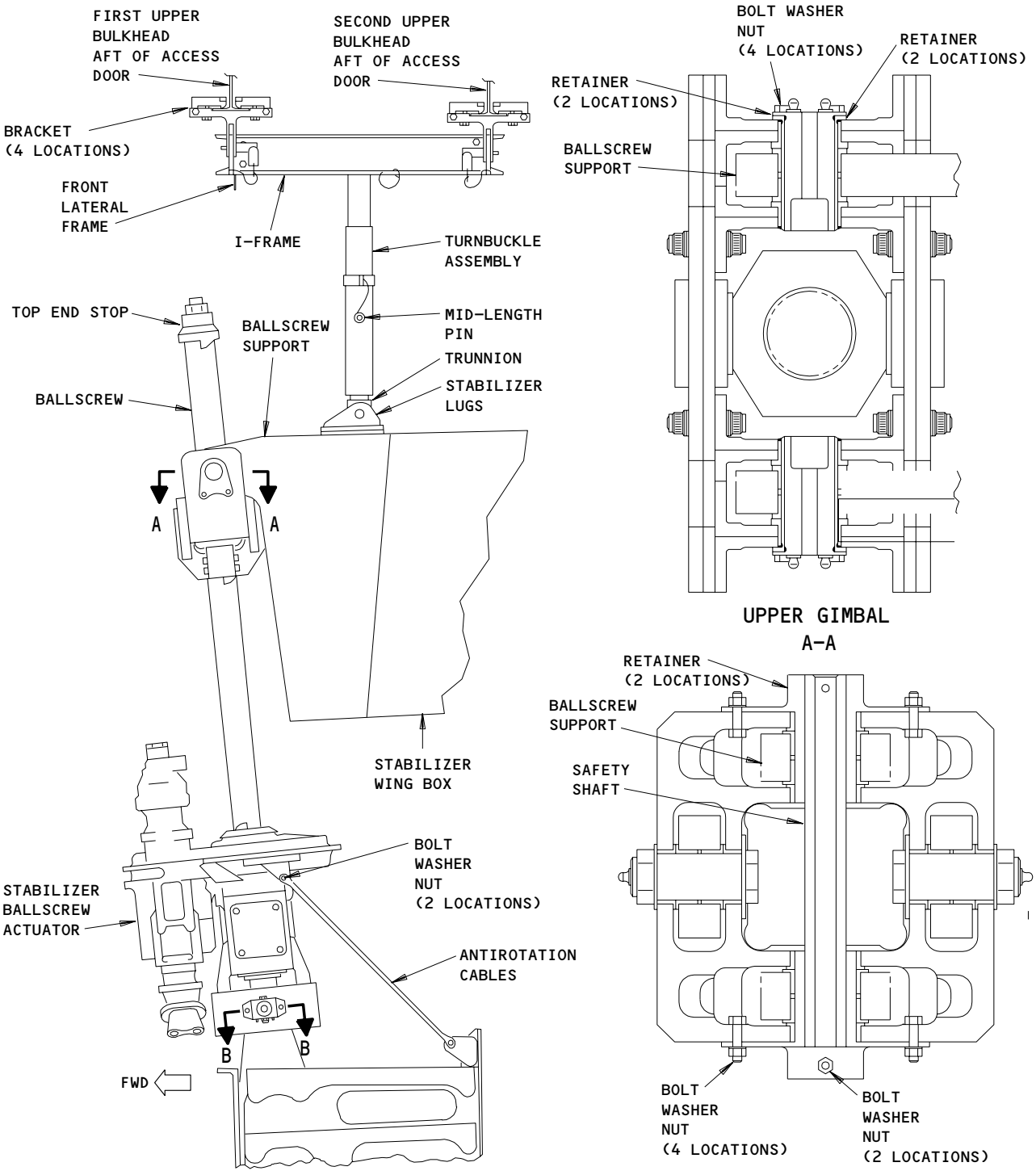


STABILIZER BALLSCREW ACTUATOR REMOVAL EQUIPMENT
(VIEW WHEN YOU LOOK UP, AFT AND LEFT OUTBOARD)

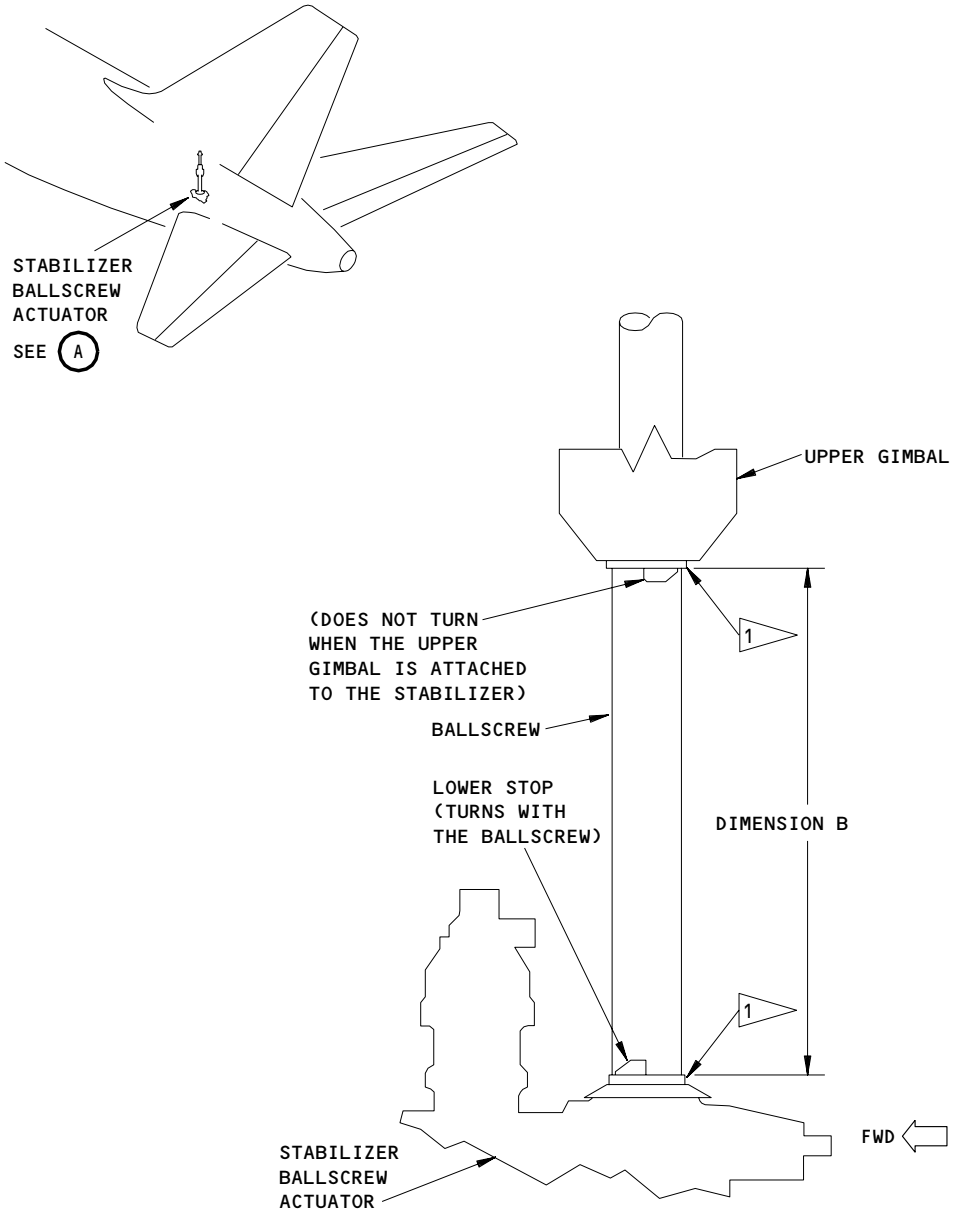


1 ACCESS DOOR 311AL IS BETWEEN THESE TWO FRAMES.

Stabilizer Trim Ballscrew Actuator Installation
Figure 402 (Sheet 1)



Stabilizer Trim Ballscrew Actuator Installation
Figure 402 (Sheet 2)



STABILIZER BALLSCREW ACTUATOR

A

1 USE A STRAIGHT EDGE TO SET THE STABILIZER DIMENSION B TO 19.07 ±0.50 INCHES (484.4 ±12.7 mm). THIS IS NOT A CRITICAL (RIGGING) MEASUREMENT AND IS USED TO GET THE UPPER GIMBAL CLOSE TO THE POSITION NEEDED FOR RE-INSTALLATION.

Measurement of Stabilizer Dimension B
Figure 403

S 494-013

(12) Do the steps that follow to install the removal equipment for the stabilizer ballscrew (Fig. 402):

(a) Do the steps that follow to lock the stabilizer:

1) Install the four bracket assemblies to the first two upper bulkheads aft of the access door, 311AL.

NOTE: Refer to Fig. 402 for the bracket position on the bulkheads in relation to the airplane centerline.

2) Use the four pins that are supplied to install the I-frame to the brackets.

3) Use the pin that is supplied to install the turnbuckle assembly to the I-frame.

4) Use the bolts and pins that are supplied to install the trunnion assembly to the stabilizer lugs.

NOTE: The stabilizer lugs are on the top of the stabilizer wing box.

5) Install the lateral frame assembly to the front of the I-frame.

6) Turn the turnbuckle assembly until it can be attached to the trunnion with the pin that is supplied.

7) If you turn the turnbuckle assembly and it is too short to connect to the trunnion, do the steps that follow:

a) Remove the mid-length pin.

b) Extend the turnbuckle until it can be connected to the trunnion.

c) Install the mid-length pin.

d) Adjust the turnbuckle and attach it to the trunnion.

e) Make sure that the turnbuckle is installed vertically at the centerline of the airplane.

(b) Do the steps that follow to install the sling:

1) Remove the mid-length safety pin.

2) Install the spring-loaded telescoping beam assembly between the bulkheads on each side of the access door, 311AL.

NOTE: Refer to Fig. 402 for the beam position in relation to the airplane centerline.

3) Install the mid-length safety pin.

4) Install the inverted T-track and trolley between the lateral front frame of the I-beam and the rail hanger of the telescoping beam. Use the two pins that are supplied to install the T-track.

NOTE: This will let you move the stabilizer ballscrew actuator forward and left outboard to a position above the access door.

5) Attach the fishpole hoist to the trolley.
6) Move the trolley to a position above the stabilizer ballscrew actuator.
7) Install the sling around the upper gimbal of the stabilizer ballscrew actuator.

E. Remove the Stabilizer Ballscrew Actuator (Fig. 402)

S 824-014

WARNING: ONLY APPROVED PERSONS MUST OPERATE THE LEVER CHAIN HOISTS. DO NOT USE FORCE TO MOVE THE CONTROL LEVER OR KNOB INTO THE NEUTRAL OR THE FREE CHAIN POSITION. THIS CAN CAUSE A CHAIN HOIST WITH A LIGHT LOAD TO RELEASE ITS LOAD. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Adjust the hoist until it holds the weight of the stabilizer ballscrew actuator.

NOTE: A hoist with too much tension will cause the gimbal pins to get caught.

S 034-015
(2) Remove the two bolts that attach the anti-rotation cables to the actuator housing.

S 034-016
(3) Do the steps that follow to disconnect the upper gimbal:
(a) Loosen the bolts for the upper and lower gimbal pins.
(b) Remove the four bolts that hold the left and right upper gimbal retainers.

CAUTION: DO NOT USE METAL TOOLS TO REMOVE THE RETAINERS. DO NOT USE TOO MUCH FORCE TO REMOVE THE GIMBAL. DAMAGE TO THE UPPER GIMBAL AND THE RETAINER FLANGES CAN OCCUR.

(c) Remove the left and right upper gimbal retainers (4 locations).

NOTE: Use hardwood wedges between the retainer flanges and the gimbal to start the removal of the retainers.

S 034-017

(4) Do the steps that follow to disconnect the lower gimbal:
  (a) Remove the two bolts that hold the safety shaft.
  (b) Remove the four bolts that hold the left and right retainers to the lower gimbal.

CAUTION: DO NOT USE METAL TOOLS TO REMOVE THE RETAINERS. DAMAGE TO THE UPPER GIMBAL AND THE RETAINER FLANGES CAN OCCUR.

  (c) Use a hardwood dowel to remove the retainers and the safety shaft from the lower gimbal.

S 024-018

(5) Turn the actuator forward to make sure the upper gimbal will not touch the supports for the stabilizer ballscrew. Move the trolley if it is necessary.

S 024-019

(6) Lift the stabilizer ballscrew actuator away from the lower gimbal attachment lugs.

S 024-020

(7) Move the actuator to a position above the access door, 311AL, and lower it through the door.

TASK 27-41-10-424-021

3. Install the Stabilizer Ballscrew Actuator

A. Equipment
  (1) Removal/Installation Equipment - Horizontal Stabilizer Jackscrew - B27011-79

B. Consumable Materials
  (1) D00633 Grease, Corrosion Preventive - BMS 3-33 (Recommended)
  (2) D00013 Grease - MIL-PRF-23827 (Alternative)
  (3) D00153 Fluid - Hydraulic BMS 3-11

C. References
  (1) AMM 06-42-00/201, Empennage Access Panels and Doors
  (2) AMM 12-21-05/301, Horizontal Stabilizer Trim Control System
  (3) AMM 24-22-00/201, Electrical Power - Control
  (4) AMM 27-41-00/501, Horizontal Stabilizer Trim Control System
  (5) AMM 27-41-14/601, Stabilizer Trim Upper and Lower Gimbal
  (6) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
311/312 Area Aft of the Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Forward Stabilizer Compartment

E. Prepare for the Installation (Fig. 402)

S 224-022
(1) Make sure that the stabilizer ballscrew actuator and the attachment locations are in the permitted wear limits (AMM 27-41-14/601).

S 224-023
(2) Turn the upper gimbal and ballnut until the Dimension B on the stabilizer ballscrew actuator is 19.07 ± 0.50 inches (484.4 +/- 12.7 mm) (Fig. 403).

S 034-024
(3) Do the steps that follow to remove the upper gimbal retainers:
(a) Remove the nuts and bolts from the left and right retainers.
(b) Remove the left and right retainers.

S 034-025
(4) Do the steps that follow to remove the safety shaft and retainers from the lower gimbal:
(a) Remove the nuts and bolts from the safety shaft.
(b) Remove the safety shaft.
(c) Remove the nuts and bolts from the left and right retainers.
(d) Remove the left and right retainers.

S 494-026
(5) Attach the lift bracket to the stabilizer ballscrew.

S 424-027
(6) Use the fishpole hoist to lift the stabilizer ballscrew actuator through the access door, 311AL.

S 424-028
(7) Move the lower gimbal to its correct position on the stabilizer attachment lugs.

F. Install the Stabilizer Ballscrew Actuator (Fig. 402)

S 424-029
(1) Do the steps that follow to attach the lower gimbal:
(a) Lightly apply grease to these surfaces:
1) Bearing surfaces of the lower gimbal attachment lugs
2) Outer and inner surfaces of the retainers
3) outer surface of safety shaft.
(b) Align the lower gimbal with the attachment lugs and install the left and right retainers with the grease fittings down.
(c) Install the bolts, washers, and nuts that hold the retainers to the lower gimbal.

NOTE: Install the bolts such that the washers and nuts are on the outer part of the lower gimbal.

(d) Install the safety shaft and align the holes at each end of the shaft with the retainer holes.
(e) Install the bolts, nuts, and washers that hold the safety shaft.

NOTE: Install the bolts such that the washers and nuts are on the lower side of the retainer.

S 424-030
(2) Do the steps that follow to attach the upper gimbal:
(a) Lightly apply grease to the bearing surfaces of the ballscrew support and the outer surfaces of the retainers.
(b) Adjust the turnbuckle assembly as necessary until the stabilizer ballscrew actuator will engage with the ballscrew support.
(c) Turn the actuator aft to engage it with the ballscrew support.
(d) Align the upper gimbal with the ballscrew support and install the left and right retainers.
(e) Align the bolt holes on the retainers with the holes on the upper gimbal.
(f) Install the bolts, washers, and nuts on the retainers and upper gimbal.

S 434-031
(3) Connect the anti-rotation cables with a bolt, washer, and nut (2 locations).

S 434-032
(4) Remove the plugs and caps from the hydraulic lines and ports.

S 434-034

(5) Connect the hydraulic lines and the drain tubes to the stabilizer ballscrew actuator. Use clamps to hold the hydraulic lines and drain tubes to the supports on the actuator.

NOTE: Before you connect these hydraulic lines, make sure that the drive motor housing is full of hydraulic fluid.

S 094-035

(6) Remove the removal equipment for the stabilizer ballscrew.

S 214-036

(7) Do a visual check to make sure that you installed the stabilizer ballscrew actuator correctly.

S 644-037

(8) Lubricate the stabilizer ballscrew actuator (AMM 12-21-05/301).

G. Stabilizer Ballscrew Actuator Test

S 864-038

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF L
   (c) 11C13, STAB TRIM SHUTOFF R
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H20, STAB TRIM CONT R

S 864-039

(2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-040

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply power to the right or center hydraulic systems (AMM 29-11-00/201).

NOTE: The right hydraulic system only supplies power to the ballscrew actuator's right side secondary brake and drive hydraulic motor. The center hydraulic system only supplies power to the ballscrew actuator's left side secondary brake and drive hydraulic motor. If the right and center hydraulic systems are pressurized at the same time, you cannot find failures.

S 864-041

(4) Push and hold the BRAKE BYPASS valve button on the applicable stabilizer trim control module.

NOTE: The button is on the bottom of the unit.

The force necessary to push the button should be less than 25 pounds (111 newtons). You should push the button smoothly. If the force necessary to push the button is more than 25 pounds (111 newtons), remove the hydraulic power, push the button more than once, then supply the hydraulic power.

S 864-042

(5) Move the control wheel switches and hold for 10 seconds.
(a) Make sure that the stabilizer does not move.

S 864-044

(6) Release the control wheel switches and then release the BRAKE BYPASS valve button.

S 864-045

(7) Use the control wheel switches to move the stabilizer through its full travel range.

(a) Make sure the stabilizer moves smoothly and freely through its full travel.

NOTE: The stabilizer can move to two different full-travel positions, depending on the flap setting. To move the stabilizer to its furthest possible point of travel, you will need to set the flaps to the 15-unit position.

(b) Make sure that the anti-rotation cables stay loose through the full stabilizer travel.

(c) Make sure there are no leaks or damage in the hydraulic line connections.

S 714-054

(8) Do the Alternate-Electric Operation and Travel Limits Test (AMM 27-41-00/501).

H. Put the Airplane Back to Its Usual Condition

S 414-047

(1) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 864-048

(2) Remove the power from the hydraulic systems (AMM 29-11-00/201).

S 864-049

(3) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

STABILIZER TRIM BALLSCREW FREEPLAY

1. General
   A. This procedure contains steps to do the following inspections:
      - Stabilizer Ballscrew to Ballnut Freeplay Inspection
      - Stabilizer Ballscrew Assembly Detailed Visual Inspection.

   TASK 27-41-10-226-052

2. Check for Stabilizer Ballscrew to Ballnut Freeplay

   NOTE: This is a scheduled maintenance task.

   A. Equipment
      (1) Checking equipment - B27034-1 -
          (B27034-6 load assembly included)
      (2) Load Tool Installation Hardware -
          B27011-3, -4, -62, -71, -77
      (3) Dial Indicator with Magnetic Base -
          (Commercially Available)
   B. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 12-21-05/301, Stabilizer Trim Control System - Lubrication
   C. Access
      (1) Location Zones
          311/312 Area Aft of the Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

   D. Prepare for the Inspection/Check

      S 646-054
      (1) Lubricate the stabilizer ballscrew (AMM 12-21-05/301).

      S 866-053
      (2) Supply electrical power (AMM 24-22-00/201).

S 866-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply power to the right and center hydraulic systems (AMM 29-11-00/201).

S 866-004

(4) Move the stabilizer to approximately 4 units of trim, as shown on the stabilizer position indicators that are on the control stand panel, P10.

S 866-005

(5) Remove the pressure from the right and center hydraulic system (AMM 29-11-00/201).

S 866-006

(6) Put the C and R STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

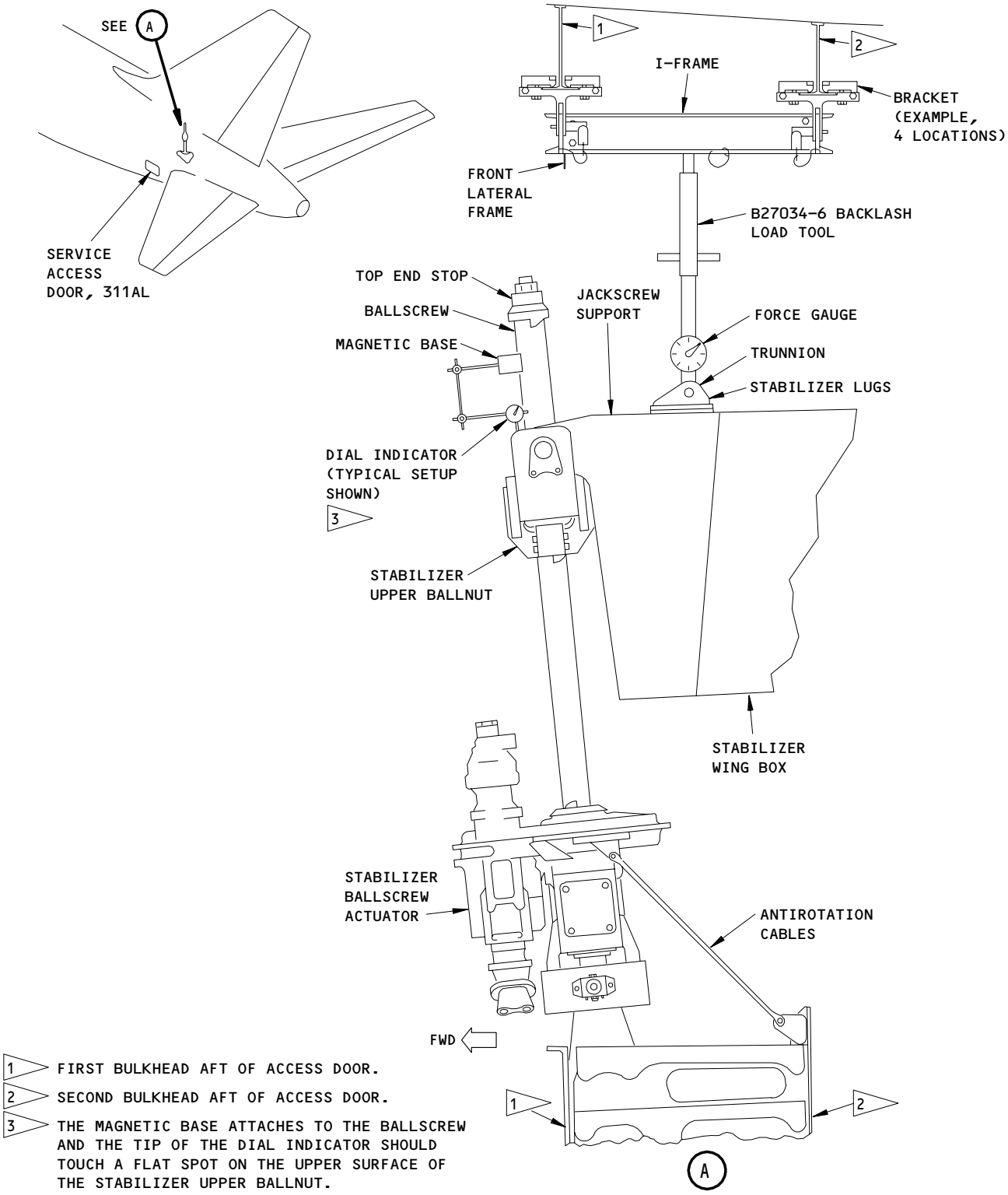
S 866-007

(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF L
(c) 11C13, STAB TRIM SHUTOFF R
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 016-008

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(8) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).



1 FIRST BULKHEAD AFT OF ACCESS DOOR.

2 SECOND BULKHEAD AFT OF ACCESS DOOR.

3 THE MAGNETIC BASE ATTACHES TO THE BALLSCREW AND THE TIP OF THE DIAL INDICATOR SHOULD TOUCH A FLAT SPOT ON THE UPPER SURFACE OF THE STABILIZER UPPER BALLNUT.

Stabilizer Ballnut Freeplay Inspection
Figure 601

S 496-013

(9) Do the steps that follow to install the load tool, B27034-6, between the horizontal stabilizer and the upper fuselage structure (Fig. 601):
   (a) Install the four bracket assemblies, B27011-3, -4, and -77 to the bulkheads above the horizontal stabilizer actuator (Fig. 601).
   (b) Use the four pins to install the I-frame, B27011-62, to the four bracket assemblies that were just installed.
   (c) Use the bolts and pins supplied to install the trunnion assembly, B27011-71, to the stabilizer lug.
   (d) Install the load tool, B27034-6, to the I-frame and trunnion using the pins.

S 866-055

(10) Do the steps that follow to install the dial indicator on the ballscrew actuator:
   (a) Install the magnetic base for the dial indicator on the ballscrew above the upper ballnut.
   (b) Install the dial indicator to the magnetic base so that the tip of the dial indicator touches the flat spot on the top of the ballnut.

      NOTE: The dial indicator is installed to measure the downward movement of the ballnut relative to the ballscrew.

E. Stabilizer Ballnut Freeplay Procedure (Fig. 601)

S 826-014

CAUTION: DO NOT APPLY MORE THAN THE SPECIFIED LOADS TO THE STABILIZER WHILE USING THE LOAD TOOL, B27034-6. DO NOT APPLY POWER TO THE STABILIZER TRIM ACTUATOR WITH THE LOAD TOOL INSTALLED. IF YOU DO, DAMAGE TO THE EQUIPMENT OR AIRCRAFT CAN OCCUR.

(1) Zero the dial indicator.

NOTE: At 4 units of trim, the aft stabilizer center of gravity loads the ballscrew in the upward direction, putting the ballscrew in tension.

S 866-056

(2) Use the load tool, B27034-6, to slowly apply an upward force of 350 pounds to the ballscrew as read on the force guage.

NOTE: To apply the upward force to the ballscrew, the stabilizer tool must be turned in the direction that shortens the tool length. This will apply an upward force on the ballnut and move the leading edge of the stabilizer up.

S 826-061

(3) Zero the dial indicator.

S 826-057

(4) Use the load tool, B27034-6, to slowly release the upward force applied in the previous step and continue adjusting the load tool to apply a downward force of 1000 pounds (4450 newtons).

NOTE: To apply a downward force on the stabilizer, the tool must be turned in a direction that lengthens the tool. This will apply a downward force on the ballnut.

(a) Make a note of the quantity shown on the dial indicator. This is the stabilizer ballscrew to ballnut freeplay.

S 846-059

(5) Use the load tool, B27034-6, to slowly release the downward force that was applied.

S 826-062

(6) If the ballscrew to ballnut freeplay is less than 0.004 inch (0.10 mm), then the measurement may be in error. Do the following to verify that the measurement was not made in error:

NOTE: If the measured freeplay is 0.000 inch (0.00 millimeter), then the freeplay measurement is probably in error. A small amount (0.004 to 0.007 inch (0.10 to 0.18 millimeter)) of freeplay is expected in new stabilizer ballscrews.

(a) Check that the stabilizer was loaded in the correct direction for each of the previous steps.
(b) Make sure the dial indicator is functioning properly.

(c) If the above two checks are complete and the freeplay check was run correctly, the stabilizer ballscrew to ballnut freeplay check is within the limits and no further checks are necessary. You can ignore the next two steps and put the airplane back to its usual condition.

S 826-063

(7) If the ballscrew to ballnut freeplay is greater than or equal to 0.004 inch (0.10 mm), and less than 0.016 inch (0.41 mm), the ballscrew to ballnut freeplay is in the acceptable limits.

S 826-064

(8) If the ballscrew to ballnut freeplay is greater than or equal to 0.016 inch (0.41 mm), the stab trim actuator wear is greater than the maximum in-service wear limits. Do the following:
(a) Remove and Replace the Stabilizer Trim Actuator (AMM 27-41-10/401).

F. Put the Airplane Back to Its Usual Condition

S 486-065

(1) Remove the load tool, B27034-6, from the horizontal stabilizer and the upper fuselage (Fig. 601).

S 486-066

(2) Remove the load tool installation brackets from the attach points on the bulkheads.

S 486-067

(3) Remove the dial indicator and the magnetic base from the ballnut and ballscrew.

S 416-049

(4) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

S 866-050

(5) Set the C STAB TRIM SHUTOFF switch and R STAB TRIM SHUTOFF switch to the NORM position.

S 866-051

(6) Remove the DO-NOT-CLOSE tags and close the following circuit breakers:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF L
(c) 11C13, STAB TRIM SHUTOFF R
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

TASK 27-41-10-226-069

3. Stabilizer Ballscrew Assembly Detailed Visual Inspection

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 12-21-05/301, Stabilizer Trim Control System - Lubrication

B. Access
(1) Location Zones
311/312 Area Aft of the Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Forward Stabilizer Compartment

C. Prepare for the Detailed Visual Inspection

S 866-071
(1) Supply electrical power (AMM 24-22-00/201).

S 866-072

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply power to the right and center hydraulic systems (AMM 29-11-00/201).

S 866-073
(3) Move the stabilizer to approximately 4 units of trim, as shown on the stabilizer position indicators that are on the control stand panel, P10.

S 866-074
(4) Remove the pressure from the right and center hydraulic system (AMM 29-11-00/201).

S 866-075
(5) Put the C and R STAB TRIM SHUTOFF valve switches on the P10 panel to the CUTOUT position.

S 866-076

(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF L
(c) 11C13, STAB TRIM SHUTOFF R
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 016-077

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(7) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

D. Stabilizer Ballscrew Assembly Detailed Visual Inspection (Fig. 602)

S 216-099

(1) Inspect the ballscrew and ballnut for signs of corrosion.

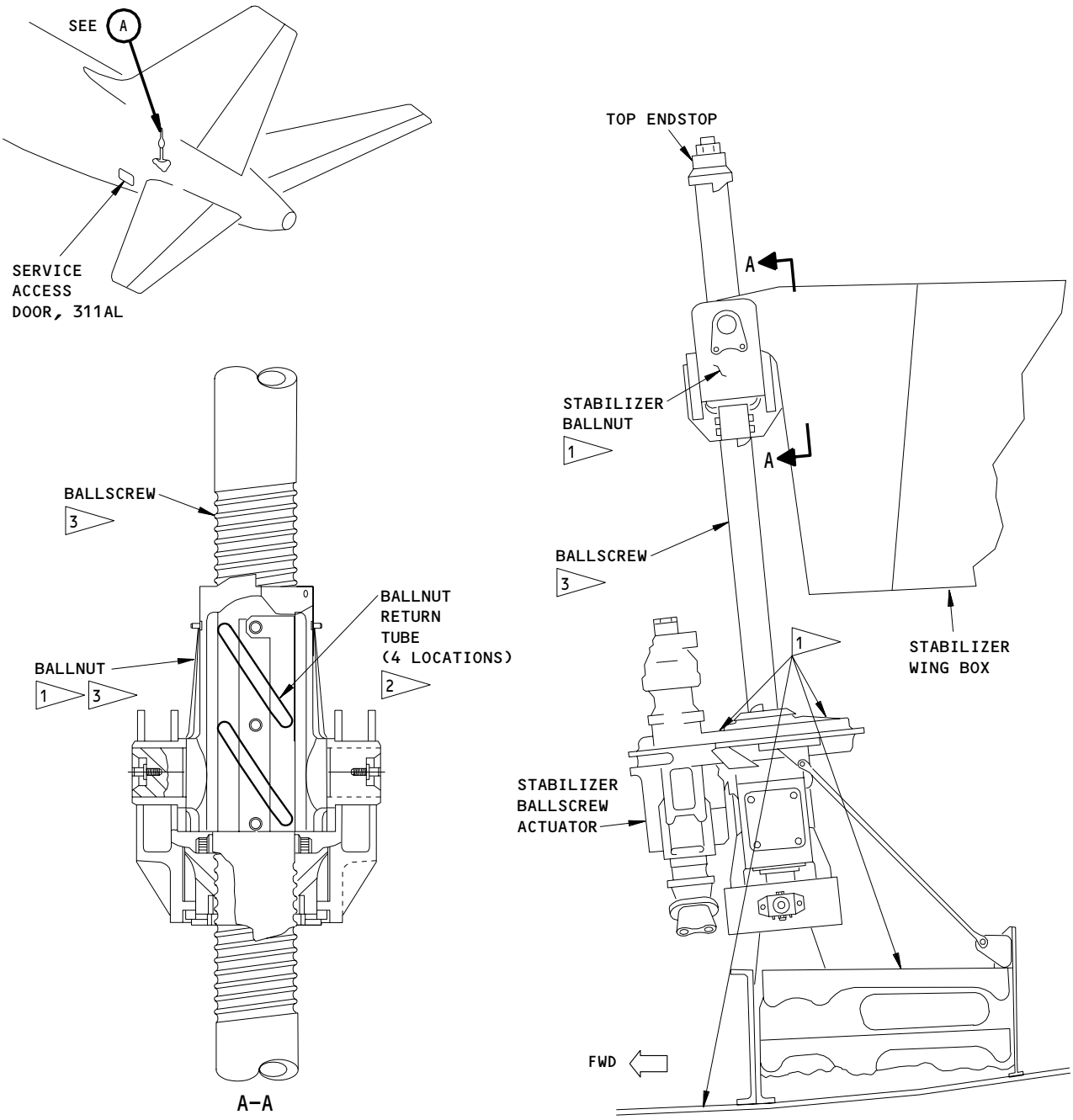
NOTE: Metallic debris in the grease may indicate degradation of the balls in the ballnut.

(a) Look for metallic dust particles on or around the ballscrew and ballnut.
(b) Examine the grease on the ballscrew for metal debris.
(c) If you find any metal debris or corrosion, replace the stabilizer ballscrew actuator assembly (AMM 27-41-10/401).

S 646-070

(2) Clean the ballscrew by wiping any old grease and dirt from the ballscrew threads.

NOTE: Use a clean, dry, non-abrasive cloth.



1 INSPECT THESE AREAS FOR 0.2188 INCH (5.558 mm) DIAMETER BALL BEARINGS FROM THE BALLNUT RETURN TUBES.

2 INSPECT THE BALLNUT RETURN TUBES FOR CORROSION AND LIFTING AWAY FROM THE BALLNUT.

3 INSPECT THE BALLSCREW AND BALLNUT FOR EXCESSIVE CORROSION OR WEAR, DAMAGE, AND CRACKING.

Stabilizer Assembly Detailed Visual Inspection
Figure 602

W20636

S 216-101
(3) Inspect the ballnut and four ballnut return tubes for the following:

NOTE: The ballnut return tubes are difficult to view from below. Make sure to view the return tubes from above the ballnut assembly.

(a) Visually inspect the ballnut return tubes to see if they have lifted from the ballnut or are damaged in a way that would restrict free movement of the ball bearings.
1) If any of the return tubes have lifted from the ballnut, or are dented or damaged, replace the stabilizer ballscrew actuator assembly (AMM 27-41-10/401).

(b) Check the exterior of the ballnut, stabilizer actuator, and the area below and around the actuator for ball bearings.

NOTE: The ball bearings used inside the ballnut are 0.2188 inch (5.558 millimeter) diameter.

1) If any ball bearings are found, replace the stabilizer ballscrew actuator assembly (AMM 27-41-10/401).

S 216-102
(4) Examine the ballscrew for the following problems:

(a) Inspect the ballscrew threads for for cross-threading, distortion, or stripping.
(b) Check for metal debris, pitting, gouging, corrosion, spalling or brinelling in the ballscrew thread.
(c) Check for obvious differences in thread shape between thread grooves in the lower, middle and upper portions of the ballscrew.
(d) Check the ballscrew for damage or cracking.

S 866-095
(5) Move the ballscrew to another location other than the 4 units of trim that it was just at.

S 216-104
(6) Repeat the steps above to examine the newly exposed threads of the ballscrew.

S 216-105
(7) If you find any problems listed above, replace the stabilizer ballscrew actuator assembly (AMM 27-41-10/401).

S 646-096
(8) Unless you will immediately perform the check for the stabilizer ballscrew to ballnut freeplay (AMM 27-41-10/601), lubricate the stabilizer ballscrew and ballnut (AMM 12-21-05/301).

E. Put the Airplane Back to Its Usual Condition

S 866-092

(1) Set the C STAB TRIM SHUTOFF switch and R STAB TRIM SHUTOFF switch to the NORM position.

S 866-093

(2) Remove the DO-NOT-CLOSE tags and close the following circuit breakers:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF L
   (c) 11C13, STAB TRIM SHUTOFF R
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H20, STAB TRIM CONT R

STABILIZER TRIM DRIVE HYDRAULIC MOTOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the hydraulic motor on the stabilizer ballscrew actuator.

TASK 27-41-11-024-001

2. Remove the Hydraulic Motor
   A. References
      (1) AMM 06-42-00/201, Empennage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

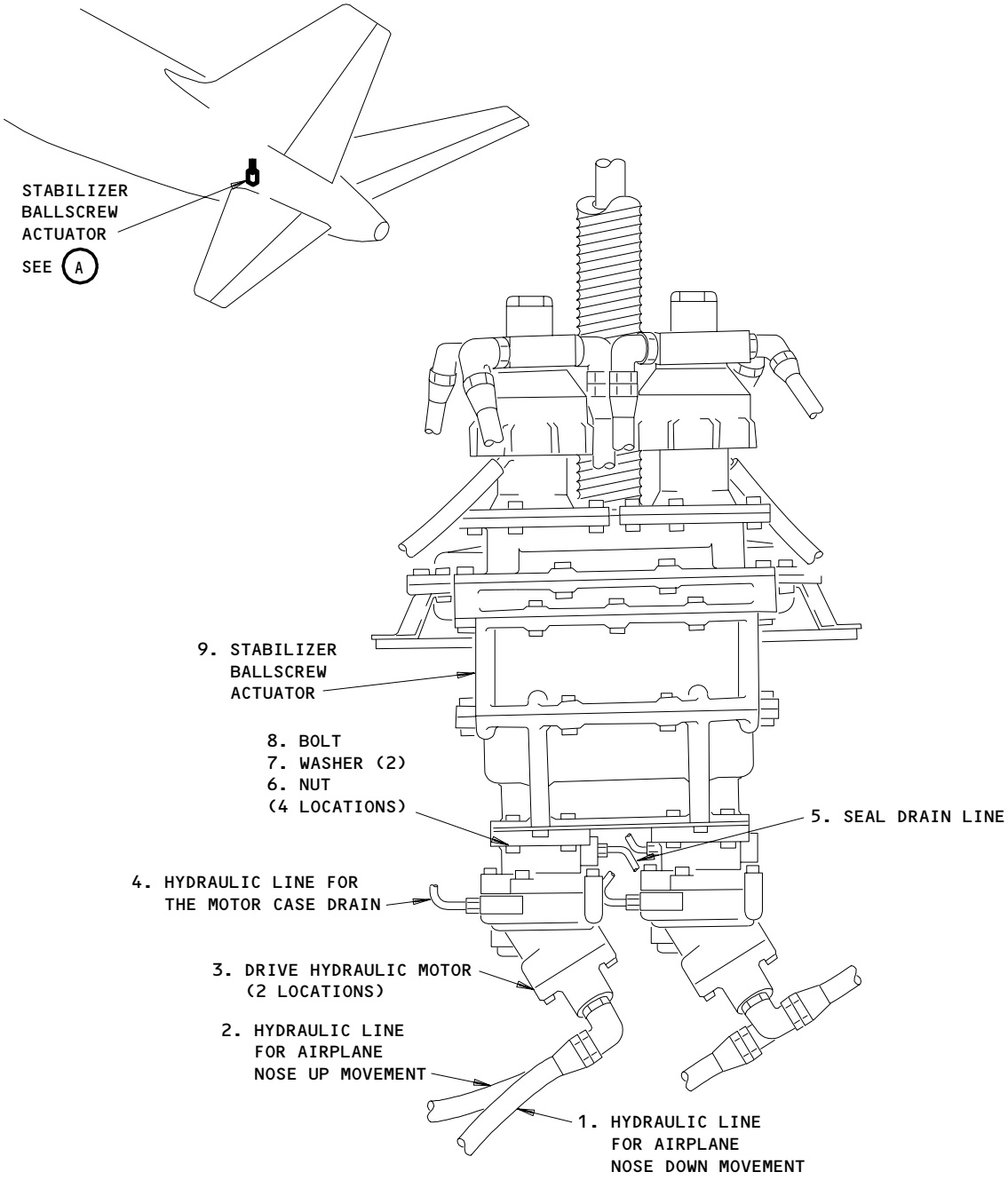
   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003
      (2) Remove the pressure from the right and center hydraulic systems and reservoirs (AMM 29-11-00/201).

      S 864-004
      (3) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-005
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11H11 or 11C05, STAB TRIM CONT L
          (e) 11H20, STAB TRIM CONT R



STABILIZER BALLSCREW ACTUATOR
(FRONT VIEW)
(COMPONENTS FOR THE RIGHT DRIVE HYDRAULIC MOTOR ARE IDENTIFIED,
COMPONENTS FOR THE LEFT MOTOR ARE EQUIVALENT)

(A)

Drive Hydraulic Motor Installation
Figure 401

S 014-006

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(5) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

D. Remove the Drive Hydraulic Motor (Fig. 401)

S 034-007

(1) Disconnect the hydraulic lines and the drain lines from the hydraulic motor (3).

S 034-009

(2) Put plugs in the lines and caps on the ports.

S 034-010

(3) Hold the hydraulic motor (3) and remove the bolts (8) that attach it to the stabilizer ballscrew actuator.

S 024-011

(4) Remove the hydraulic motor (3).

TASK 27-41-11-424-012

3. Install the Hydraulic Motor

A. Consumable Materials

(1) D00153 Fluid - Hydraulic BMS 3-11
(2) C00259 Primer BMS 10-11 Type 1
(3) D00633 Grease, Corrosion Preventive - BMS 3-33 (Recommended)
(4) D00013 Grease - MIL-PRF-23827 (Alternative)

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Motor Assy (Hydraulic)	27-41-10	01	45

C. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel
311AL Forward Stabilizer Compartment

E. Install the Hydraulic Motor (Fig. 401)

S 624-013
(1) Clean and apply a large quantity of grease to the part of the splined shaft (located on the gearbox) that you can see.

S 964-014
(2) Replace the O-ring if there is deterioration.

S 164-015
(3) Clean the mating surfaces of the hydraulic motor and the gearbox.

S 434-016
(4) Put the hydraulic motor on the stabilizer ballscrew actuator and install bolts (8), washers (7), and nuts (6) with wet primer.

S 434-017
(5) Remove the plugs from the hydraulic lines and the caps from the ports.

S 214-019
(6) Make sure the hydraulic motor housing is full with hydraulic fluid.

S 434-020
(7) Connect the hydraulic lines to the hydraulic motor.

S 624-021

(8) Apply a small quantity of grease to the metal surfaces that you can see around the hydraulic motor (3) and the differential housing.

F. Hydraulic Motor Test

S 864-022

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11B19, STAB TRIM ALT (IF INSTALLED)
   (b) 11C12, STAB TRIM SHUTOFF LEFT
   (c) 11C13, STAB TRIM SHUTOFF RIGHT
   (d) 11H11 or 11C05, STAB TRIM CONT L
   (e) 11H20, STAB TRIM CONT R

S 864-023

(2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on control stand panel, P10, to the NORM position.

S 864-024

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply power to the applicable hydraulic system that follows (AMM 29-11-00/201):

NOTE: Operate only one hydraulic motor at a time. You cannot find failures if you pressurize the left and right motors at the same time.

   (a) The right hydraulic system for the right motor
   (b) The center hydraulic system for the left motor.

S 714-032

(4) Use the alternate stab trim switches to move the stabilizer to the APL NOSE UP and APL NOSE DOWN travel limits and do the check that follows:

(a) Make sure the stabilizer moves smoothly and freely through its full travel.

S 214-028

(5) Make sure there are no leaks or structural damage at the hydraulic motors and hydraulic lines.

G. Put the Airplane Back to Its Usual Condition

S 864-029

(1) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 864-030

(2) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 414-031

(3) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

STABILIZER TRIM SECONDARY BRAKE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the secondary brakes on the stabilizer ballscrew actuator.
   B. The procedures to remove and install the left and right secondary brakes are the same.

TASK 27-41-13-024-001

2. Remove the Secondary Brake
   A. References
      (1) 06-42-00/201, Empennage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

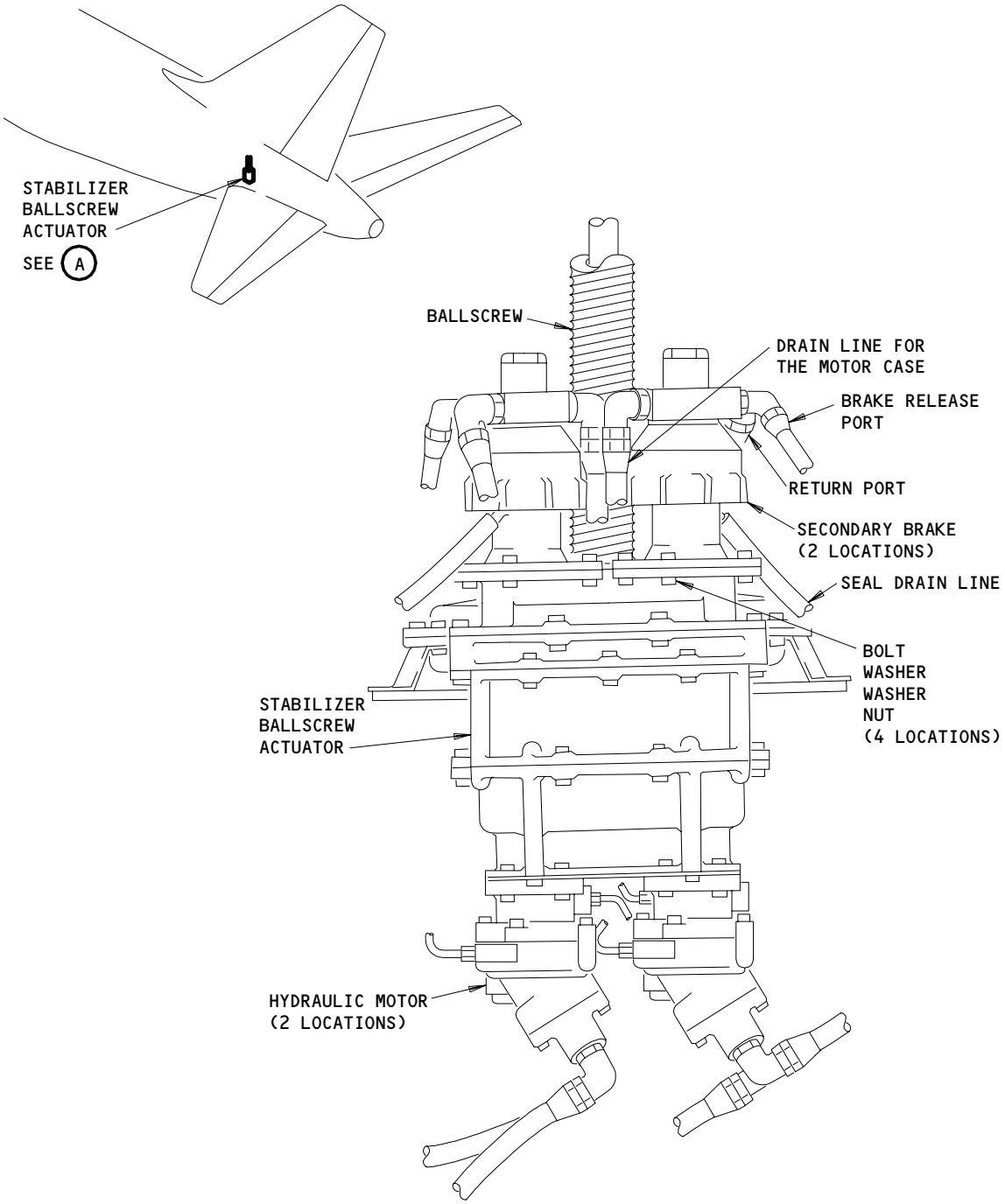
   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

      S 864-003
      (2) Remove the pressure from the right and center hydraulic systems (Ref 29-11-00).

      S 864-004
      (3) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-005
      (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11H11 or 11C05, STAB TRIM CONT L
          (e) 11H20, STAB TRIM CONT R



STABILIZER BALLSCREW ACTUATOR
(FRONT VIEW)
(COMPONENTS FOR THE LEFT SECONDARY BRAKE ARE IDENTIFIED,
COMPONENTS FOR THE RIGHT BRAKE ARE EQUIVALENT)

A

Secondary Brake Installation
Figure 401

S 014-006

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(5) Open the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

D. Remove the Secondary Brake (Fig. 401)

S 034-007

(1) Disconnect the hydraulic lines and the drain lines from the secondary brake.

S 034-008

(2) Put plugs in the hydraulic lines and caps on the ports.

S 034-009

(3) Remove the bolts that hold the secondary brake to the stabilizer ballscrew actuator.

S 024-010

(4) Disengage the secondary brake from the brake differential shaft.

S 024-011

(5) Remove the secondary brake.

TASK 27-41-13-424-012

3. Install the Secondary Brake

A. Consumable Materials

(1) D00153 Fluid - Hydraulic BMS 3-11
(2) C00259 Primer BMS 10-11 Type 1

B. References

(1) 06-42-00/201, Empennage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

(1) Location Zones

211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel

311AL Forward Stabilizer Compartment

D. Install the Secondary Brake (Fig. 401)

S 204-038
(1) Inspect the o-ring on the brake differential shaft and replace the O-ring if it necessary.

S 624-013
(2) Clean and apply a large quantity of grease to the part of the brake differential shaft that you can see.

S 164-014
(3) Make sure the mating surfaces of the brake mounting flange and the stabilizer ballscrew actuator are clean.

S 424-015
(4) Do the steps that follow to put the secondary brake in its correct position:
   (a) Engage the splines on the internal brake shaft with the splines on the brake differential shaft.
   (b) Align the brake mounting flange with the studs until the hydraulic ports are in the correct positions.
   (c) Lower the secondary brake to the correct position.

S 434-016
(5) Install the bolts to attach the secondary brake to the stabilizer ballscrew actuator.

NOTE: Tighten the bolts equally.

S 434-017
(6) Remove the plugs from the hydraulic lines and the caps from the ports.

S 434-019
(7) Connect the hydraulic lines to the secondary brake.

S 624-020
(8) Apply primer to the metal surfaces around the brake mounting flange that you can see.

S 714-021

(9) Do the Test for the Secondary Brake.

E. Secondary Brake Test

S 494-022

(1) Make sure the person in the control cabin can speak to the person in the forward stabilizer compartment.

S 864-023

(2) Supply electrical power (Ref 24-22-00).

S 864-024

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 864-025

(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-026

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply power to the applicable hydraulic system that follows (Ref 29-11-00):

NOTE: Operate only one secondary brake at a time. You cannot find failures if you pressurize the left and right secondary brakes at the same time.

(a) The right hydraulic system for the right secondary brake
(b) The center hydraulic system for the left secondary brake.

S 864-027
(6) Move the stabilizer to 8 units of trim as shown on the stabilizer position indicators.

S 864-028
(7) Push and hold the BRAKE BYPASS valve button on the applicable stabilizer trim control module.

NOTE: The button is on the bottom of the unit.

The force necessary to push the button should be less than 25 pounds (111 newtons). You should push the button smoothly. If the force necessary to push the button is more than 25 pounds (111 newtons), remove the hydraulic power, push the button more than once, then supply the hydraulic power.

S 864-029
(8) Move the control wheel switches full travel in the same direction and hold for 10 seconds and do the check that follows:
(a) Make sure the stabilizer does not move.

S 864-030
(9) Release the control wheel switches, then release the BRAKE BYPASS valve button.

S 864-031
(10) Move the control wheel switches through full travel and do the check that follows:
(a) Make sure the stabilizer operates correctly.

S 214-032
(11) Make sure there is no leakage at the hydraulic connections on the secondary brake.

F. Put the Airplane Back to Its Usual Condition

S 864-033
(1) Move the stabilizer to its neutral position.

S 864-034
(2) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 864-035
(3) Remove electrical power if it is not necessary (Ref 24-22-00).

S 414-036
(4) Close the access door for the forward stabilizer compartment, 311AL (Ref 06-42-00).

STABILIZER TRIM UPPER AND LOWER GIMBAL - INSPECTION/CHECK

1. General
   A. This procedure contains steps to inspect the stabilizer trim upper and lower gimbals. There is a task which contains the wear limit data for the stabilizer trim upper and lower gimbal wear limits.

TASK 27-41-14-216-001

2. Inspect the Stabilizer Trim Upper and Lower Gimbals
   A. Equipment
      (1) Borescope - Commercially Available
      (2) Inspection Mirrors - Commercially Available
      (3) Horizontal Stabilizer Jackscrew Adjustable Beam Assembly - B27011-79
   B. Consumable Materials
      (1) D00633 Grease, Corrosion Preventive - BMS 3-33 (Recommended)
      (2) D00013 Grease - MIL-PRF-23827 (Alternative)
   C. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 12-21-05/301, Horizontal Stabilizer Control System
      (3) AMM 27-41-00/501, Horizontal Stabilizer Trim Control System
      (4) AMM 29-11-00/201, Main (Left, Right, Center) Hydraulic Systems
   D. Access
      (1) Location Zones
          311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)

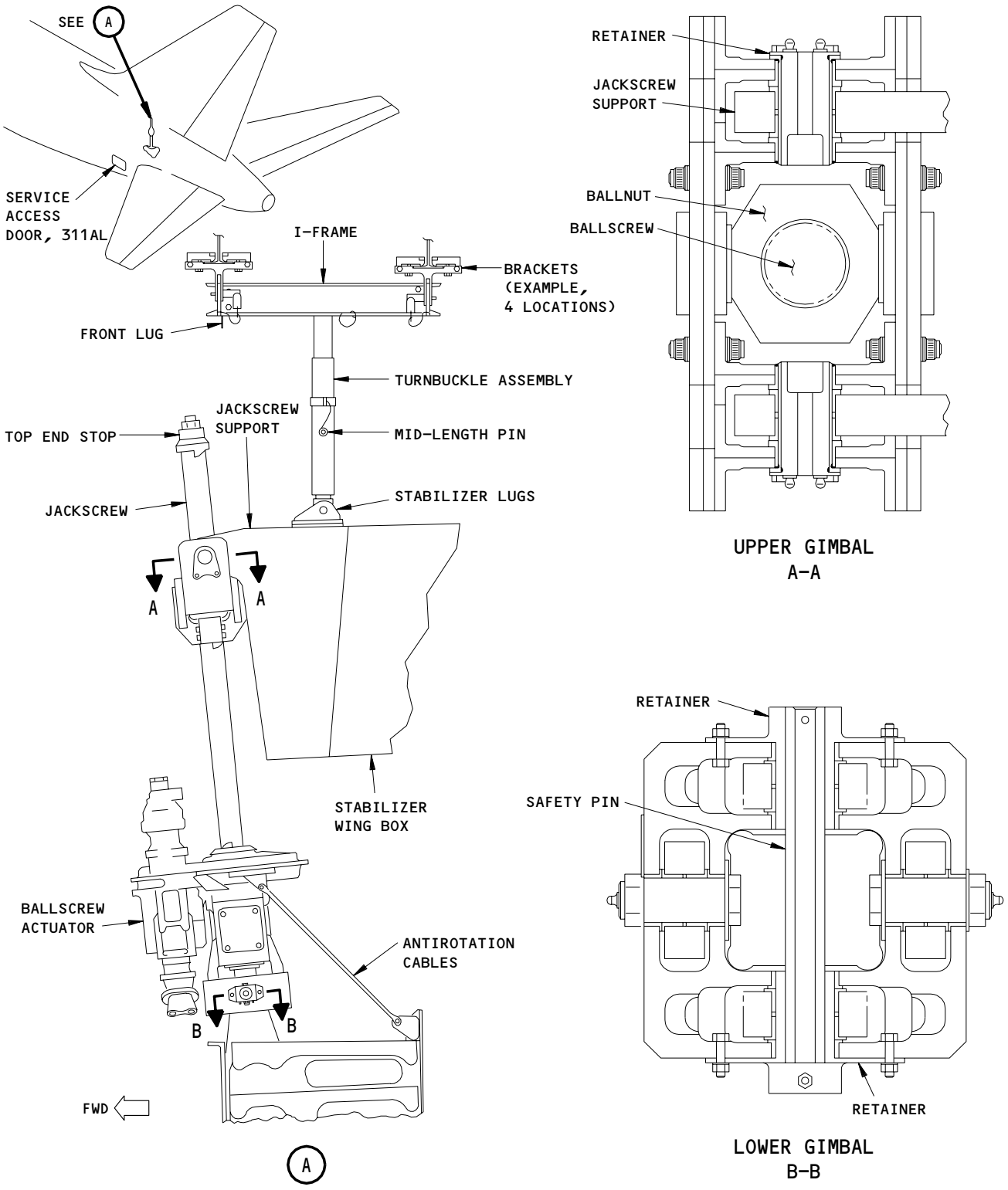
      (2) Access Panels
          311AL Horizontal Stabilizer Access Door

   E. Prepare for Inspection/Check

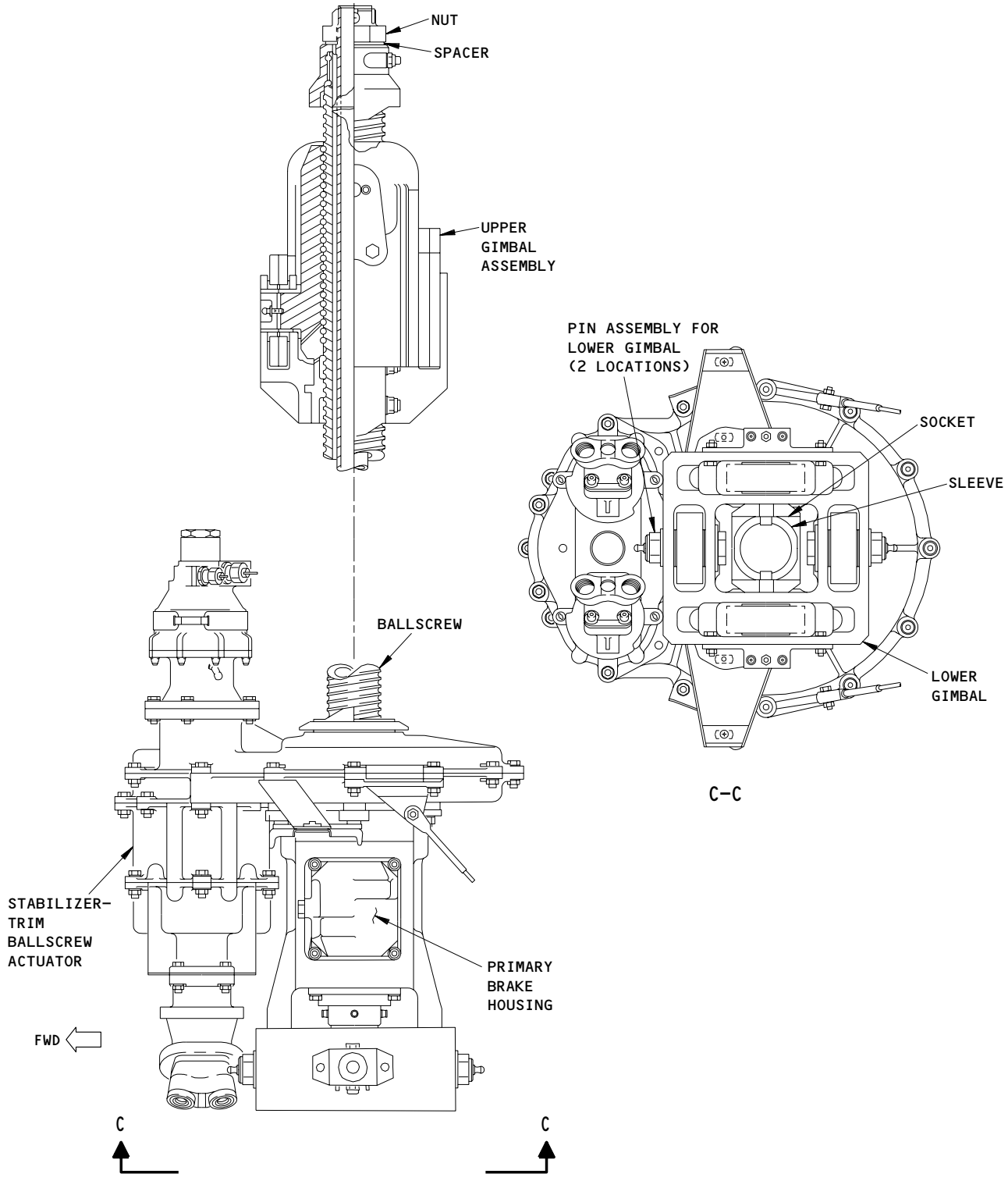
      S 866-004
      (1) Remove the pressure from the right and center hydraulic systems (AMM 29-11-00/201).

      S 866-005
      (2) Place R and C STAB TRIM SHUTOFF valve switches on control stand panel, P10, to CUTOUT.

      S 866-006
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT



Stabilizer Trim Upper and Lower Gimbal Inspection
Figure 601 (Sheet 1)



Stabilizer Trim Upper and Lower Gimbal Inspection
Figure 601 (Sheet 2)

(d) 11H11 or 11C05, STAB TRIM CONT L
(e) 11H20, STAB TRIM CONT R

S 016-014

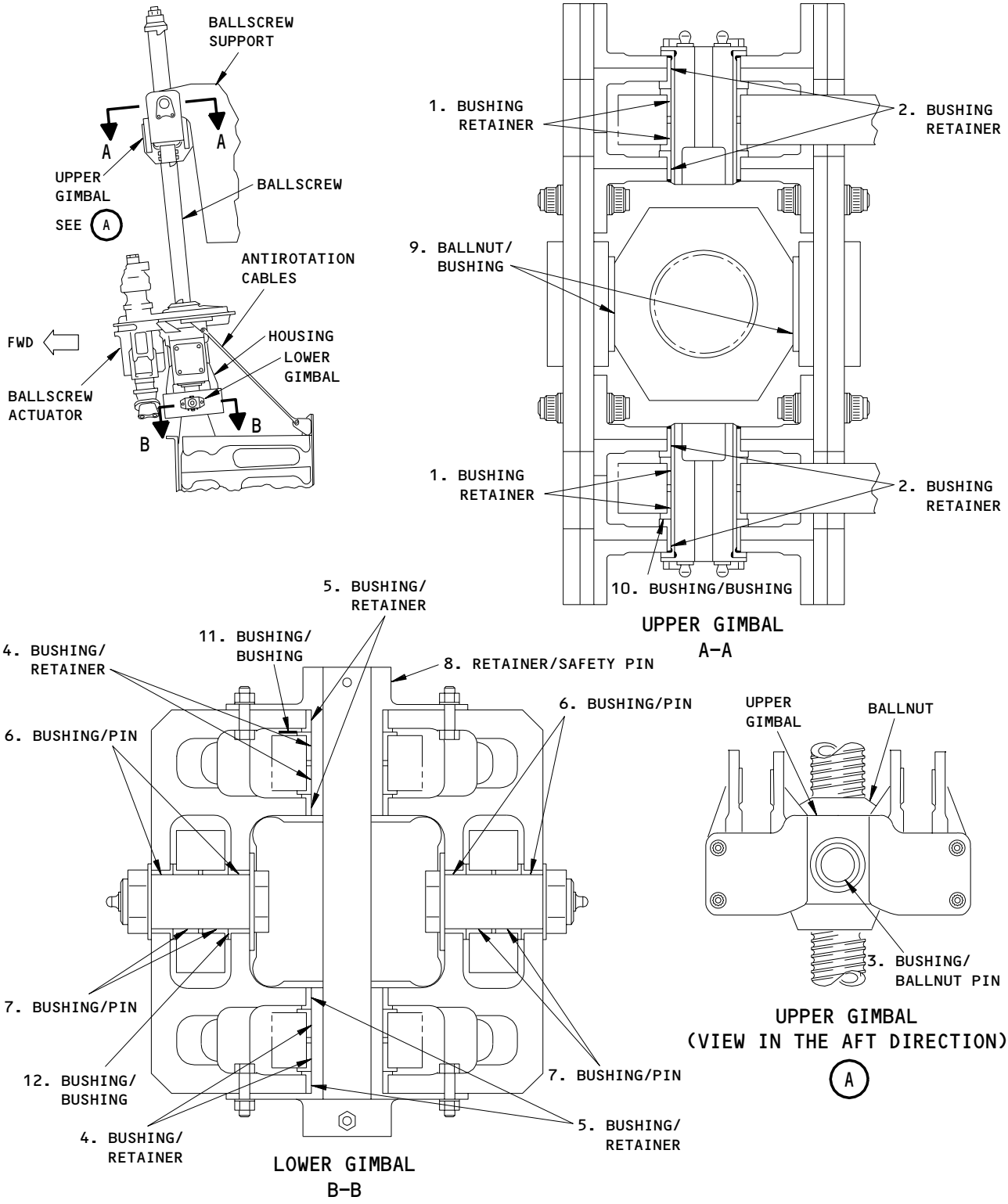
WARNING: STAY OFF SERVICE ACCESS-DOOR 311AL AND CONTROLS BAY ACCESS-DOOR, 313AL. THE WEIGHT OF A PERSON CAN CAUSE THE SPRING LOADED LATCHES TO RELEASE. A PERSON CAN BE INJURED IF HE FALLS THROUGH THE DOOR.

(4) Open horizontal-stabilizer access door, 311AL (AMM 06-42-00/201).

S 496-008
(5) Install the adjustable beam assembly for the horizontal stabilizer jackscrew (Fig. 603).
(a) Lock the horizontal stabilizer as follows:
1) Install four bracket assemblies to the first two upper bulkheads aft of access door 311AL.

NOTE: Refer to Fig. 603 for the bracket position on the bulkheads as related to the centerline of the airplane.

2) Use the four pins that are supplied to install the I frame to the bracket.
3) Use the pin that is supplied to install the turnbuckle assembly to the I frame.
4) Use the bolts and pins that are supplied to install the trunnion assembly to the stabilizer lugs that are on top of the stabilizer wing box.
5) Install the lateral frame assembly to the front of the I frame.
6) Turn the turnbuckle assembly until it can be attached to the trunnion.
7) If you turn the turnbuckle and it is not a sufficient length to be attached to the trunnion, do the steps that follow:
a) Remove the mid-length pin.
b) Extend the turnbuckle until it can be attached to the trunnion.
c) Install the mid-length pin.
d) Adjust the turnbuckle.
8) Attach the turnbuckle to the trunnion.
9) Make sure the turnbuckle is installed vertically along the centerline of the airplane.



Stabilizer Trim Upper and Lower Gimbal Wear Limits
Figure 602 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	1.3120 (33.325)	1.3130 (33.350)	1.3160 (33.426)	0.0050 (0.127)			
	RETAINER	OD	1.3100 (33.274)	1.3110 (33.299)	1.3092 (33.254)			X	1
2	BUSHING	ID	1.3130 (33.350)	1.3140 (33.376)	1.3157 (33.419)	0.0070 (0.178)	X		
	RETAINER	OD	1.3100 (33.274)	1.3110 (33.299)	1.3087 (33.241)			X	1
3	BUSHING	ID	1.5602 (39.629)	1.5607 (39.642)	1.5622 (39.680)	0.0060 (0.152)	X		
	BALLNUT PIN	OD	1.5577 (39.566)	1.5592 (39.604)	1.5562 (39.527)		X		
4	BUSHING	ID	1.4995 (38.087)	1.5005 (38.113)	1.5040 (38.202)	0.0130 (0.330)	X		
	RETAINER	OD	1.4940 (37.948)	1.4945 (37.960)	1.4910 (37.871)			X	1
5	BUSHING	ID	1.4995 (38.087)	1.5005 (38.113)	1.5010 (38.125)	0.0075 (0.191)	X		
	RETAINER	OD	1.4940 (37.948)	1.4945 (37.960)	1.4935 (37.935)			X	1
6	BUSHING	ID	1.1250 (28.575)	1.1265 (28.613)	1.1270 (28.626)	0.0040 (0.102)	X		
	PIN	OD	1.1235 (28.537)	1.1240 (28.550)	1.1230 (28.524)			X	1
7	BUSHING	ID	1.1250 (28.575)	1.1265 (28.613)	1.1280 (28.651)	0.0060 (0.152)	X		
	PIN	OD	1.1235 (28.537)	1.1240 (28.550)	1.1220 (28.499)			X	1
8	RETAINER	ID	1.0000 (25.400)	1.0030 (25.476)	1.0030 (25.476)	0.0070 (0.178)	X		
	SAFETY PIN	OD	0.9960 (25.298)	0.9980 (25.349)	0.9960 (25.298)		X		

STRAIGHT BUSHING (I.D./O.D) WEAR LIMITS FOR RADIAL FREEPLAY
TABLE A

1 THIS PART CAN BE REPAIRED.

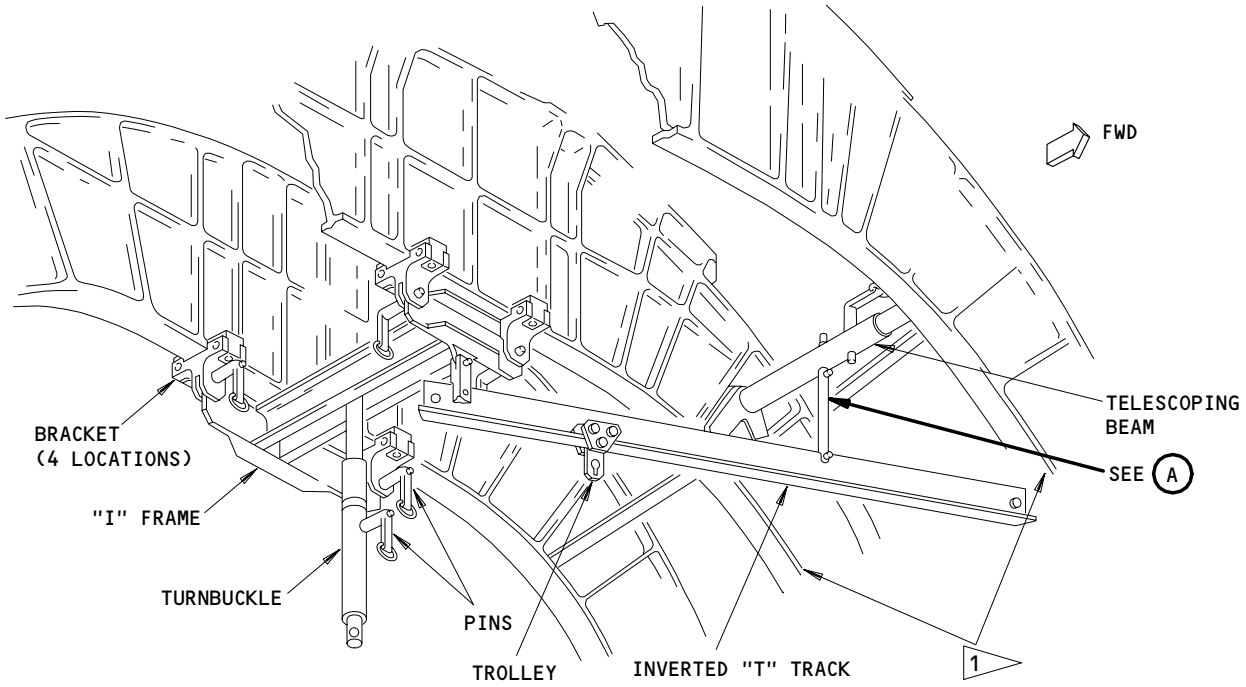
Stabilizer Trim Upper and Lower Gimbal Wear Limits
Figure 602 (Sheet 2)

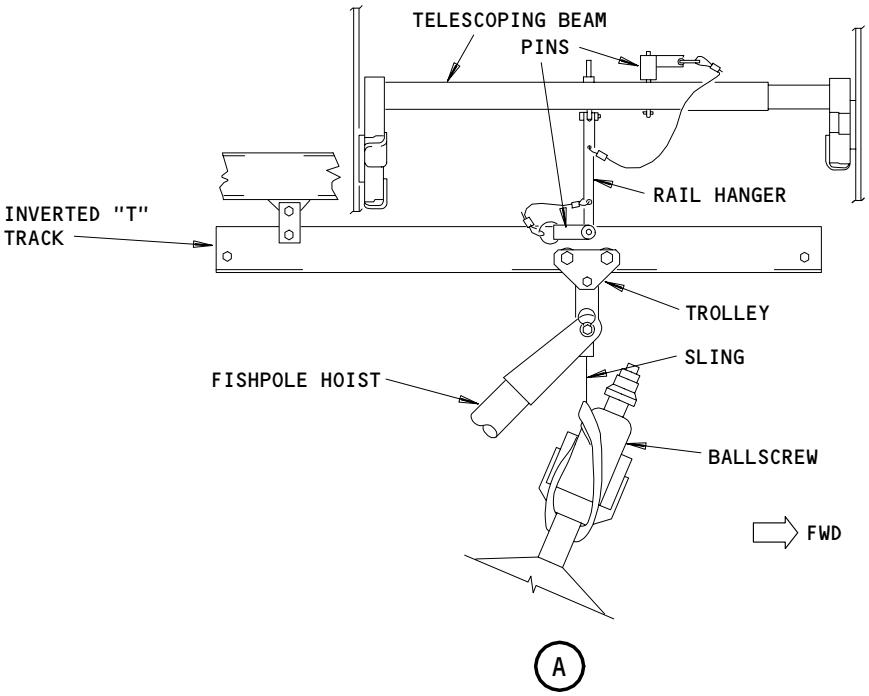
INDEX	PART NAME	DESIGN LIMIT DIMENSIONS				WEAR LIMIT DIMENSIONS		REPAIR INSTR
		CLEARANCE		BUSHING FLANGE		CLEARANCE (REF)	BUSHING FLANGE	
		MIN INCHES (mm)	MAX INCHES (mm)	MIN INCHES (mm)	MAX INCHES (mm)	MAX INCHES (mm)	MIN INCHES (mm)	
9	BALLNUT/BUSHING	0.032 (0.813)	0.062 (1.575)	0.064 (1.626)	0.069 (1.753)	0.100 (2.540)	0.045 (1.143) 2	REPLACE WORN BUSHING 2
10	BUSHING/BUSHING	0.041 (1.041)	0.081 (2.057)	0.131 (3.327)	0.136 (3.454)	0.120 (3.048)	0.100 (2.540) 2	REPLACE WORN BUSHING 2
11	BUSHING/BUSHING	0.010 (0.254)	0.059 (1.499)	0.055 (1.397)	0.060 (1.524)	0.099 (2.515)	0.045 (1.143) 2	REPLACE WORN BUSHING 2
12	BUSHING/BUSHING	0.022 (0.559)	0.057 (1.448)	0.055 (1.397)	0.060 (1.524)	0.072 (1.829)	0.045 (1.143) 2	REPLACE WORN BUSHING 2

FLANGED BUSHING WEAR LIMITS FOR AXIAL FREEPLAY
TABLE B

2 REPLACE THE WORN BUSHING WHEN THE BUSHING FLANGE IS AT ITS MINIMUM WEAR LIMIT.

Stabilizer Trim Upper and Lower Gimbal Wear Limits
Figure 602 (Sheet 3)





1 ACCESS DOOR 311AL IS BETWEEN THESE TWO FRAMES.

Stabilizer Jackscrew Adjustable Beam Assembly
Figure 603

(b) Install the sling as follows:
1) To install the spring-loaded beam assembly, do the steps that follow:
a) Remove the mid-length safety pin.
b) Install the spring-loaded beam assembly between the bulkheads on each side of access door 311AL.

NOTE: Refer to Fig. 603 for the beam position as related to the centerline of the airplane.

c) Install the mid-length safety pin.
2) Install the inverted T track and trolley between the lateral front frame of the I frame and the beam rail hanger.

NOTE: This allows the ballscrew actuator to be moved forward and left outboard from the airplane centerline to a position over the access door.

a) Use the two pins that are supplied to install the inverted T track and trolley.
3) Attach the fishpole hoist to the trolley.
4) Move the trolley over the actuator.
5) Attach the sling as a choker around the jackscrew upper gimbal.

F. Inspect the Stabilizer Trim Upper and Lower Gimbal (Fig. 601)

S 496-009
(1) Attach a support to the actuator before you remove gimbal pins.

S 216-002
(2) Inspect the stabilizer trim upper gimbal.
(a) Remove the upper gimbals from the stabilizer and jackscrew attach points.
(b) Examine the upper gimbal carefully for cracks.
(c) Examine the jackscrew and ballnut for cracks and more than usual wear.
(d) Install the upper gimbals in the stabilizer-to-jackscrew attach points.

S 216-003
(3) Inspect the stabilizer trim lower gimbal.
(a) Remove the safety pin from the lower gimbal-to-structure joint and the pin assemblies from lower gimbal-to-housing joint.
(b) Remove the lower gimbal sleeve.
(c) Remove the nut and spacer from the upper end of the jackscrew safety rod.
(d) Remove the safety rod and socket through the bottom of actuator.
(e) Use a borescope to examine the entire ballscrew inner diameter.
(f) Remove the socket from the safety rod.

(g) Examine for wear between the safety rod, the socket, and the sleeve.
(h) Carefully inspect the lower gimbal assembly and the primary brake housing for cracks.
(i) Clean and examine all disassembled parts.
(j) Apply a light coat of grease on all unpainted faying surfaces.
(k) Assemble and install all disassembled parts.
(l) Fill the space between the socket, the sleeve, and the safety rod flange with grease.
(m) Connect the actuator lower gimbal to the structure.

S 096-010
(4) Remove the adjustable beam assembly for the horizontal stabilizer jackscrew (Fig. 603).

S 646-011
(5) Lubricate all the grease fittings on the stabilizer-trim ballscrew actuator (AMM 12-21-05/301).

S 736-012
(6) Do the stabilizer trim control system test (AMM 27-41-00/501).

S 416-013
(7) Close access door 311AL.

TASK 27-41-14-226-015

3. Stabilizer Trim Upper and Lower Gimbal Wear Limits (Fig. 602)

A. Access

(1) Location Zones

311 Area Aft of Pressure Bulkhead to BS 1787.45 (Left)

(2) Access Panel

311AL Horizontal Stabilizer Access Door

B. Procedure

S 226-016
(1) Use the supplied data (Fig. 602) to examine the stabilizer trim upper and lower gimbals for too much wear.

HORIZONTAL STABILIZER ALIGNMENT TABS - REMOVAL/INSTALLATION

1. General
   A. This section contains the procedure to install alignment tabs for the stabilizer neutral position, and the manual control upper and lower limit positions.

TASK 27-41-17-424-001

2. Install the Stabilizer Alignment Tabs
   A. References
      (1) AMM 20-10-15/401, Stencil Markings
      (2) AMM 27-41-00/501, Horizontal Stabilizer Trim Control System
   B. Access
      (1) Location Zones

211/212	Area Aft of Pressure Bulkhead to BS 1725
332	Horizontal Stabilizer Leading Edge (Left)

   C. Install the Alignment Tabs

S 214-002

(1) Find the alignment tab on the stabilizer leading edge. It is on the center of the inboard leading edge of the left stabilizer (Fig. 401).

S 424-009

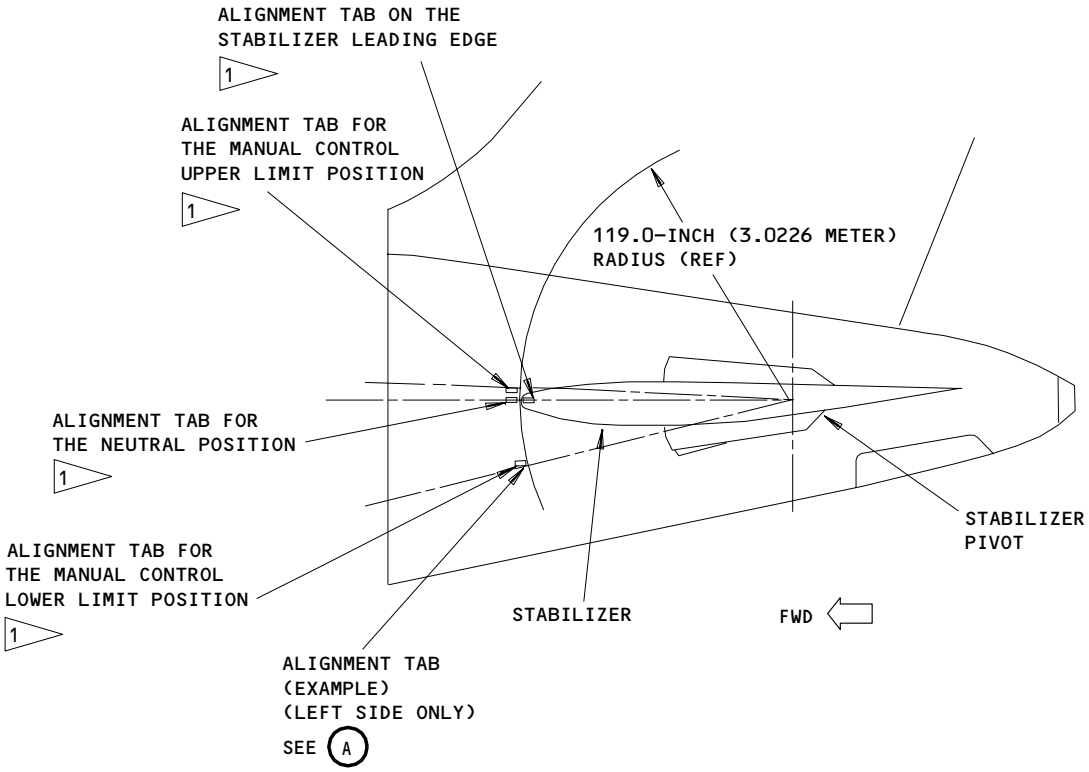
(2) If an alignment tab is not installed on the stabilizer, install an alignment tab by stencil (AMM 20-10-15/401).

S 864-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES BEFORE THE STABILIZER IS MOVED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Move the stabilizer such that Dimension B on the stabilizer ballscrew actuator is correct for installation of the alignment tabs (Fig. 401 and 402).

NOTE: For the procedures to move the stabilizer and to measure Dimension B, refer to AMM 27-41-00/501.



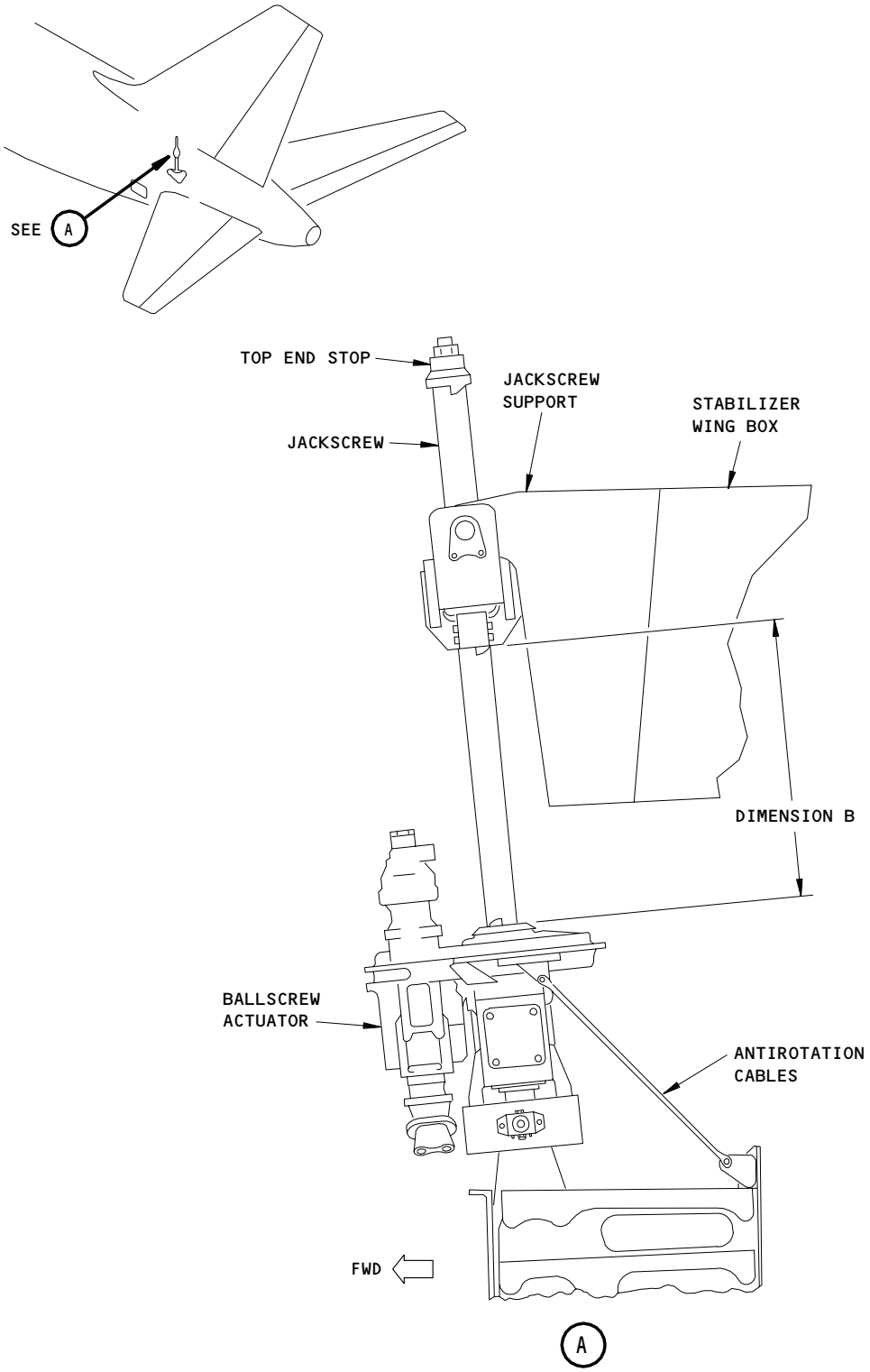
ALIGNMENT TAB
4.00 X 1.00 INCH
(101.6 X 25.4 mm)
BLACK PAINTED STENCIL
OR
2.1 X 0.6 INCH
(53.34 X 15.24 mm)
CLAD 2024-0 ALUMINUM)

A

1 USE THE TABLE BELOW TO SET DIMENSION B ON THE STABILIZER BALLSCREW ACTUATOR BEFORE YOU INSTALL THE ALIGNMENT TABS. THE ALIGNMENT TAB FOR EACH DIMENSION B MUST ALIGN WITH THE ALIGNMENT TAB ON THE INBOARD LEADING EDGE OF THE STABILIZER.

ALIGNMENT TAB	DIMENSION B ON BALLSCREW ACTUATOR (FIG. 402) INCHES (mm)
NEUTRAL	19.07 ±0.25 (484.4 ±6.3)
MANUAL CONTROL UPPER LIMIT	25.40 ±0.25 (645.2 ±6.3)
MANUAL CONTROL LOWER LIMIT	0.87 ±0.25 (22.0 ±6.3)

Stabilizer Trim Alignment Tabs Installation
Figure 401



Stabilizer Ballscrew Actuator - Stabilizer Trim Alignment Tabs Installation
Figure 402

K46449

S 934-005

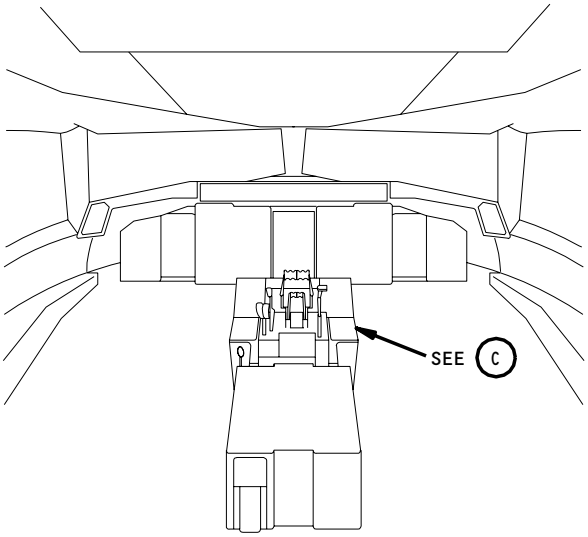
(4) Put the alignment tab on the side of the airplane such that the conditions that follow are correct:
   (a) The alignment tab is one inch in front of the stabilizer leading edge.
   (b) The alignment tab aligns with the alignment tab on the stabilizer leading edge for the applicable Dimension B.

S 424-008

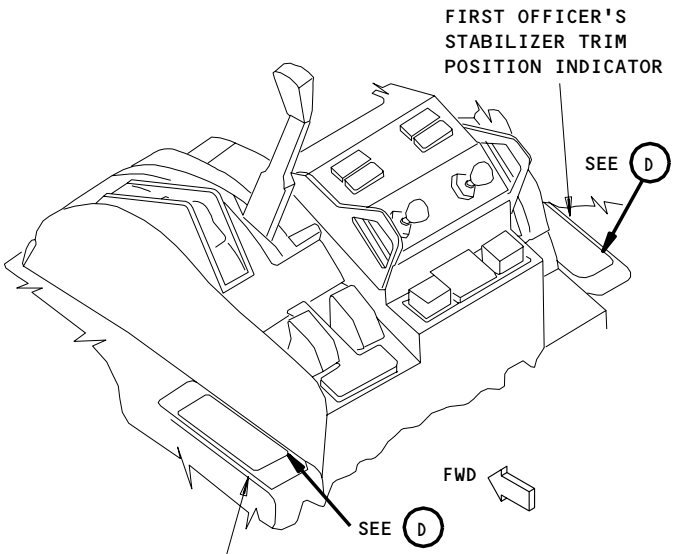
(5) Install the alignment tabs (AMM 20-10-15/401).

STABILIZER TRIM POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

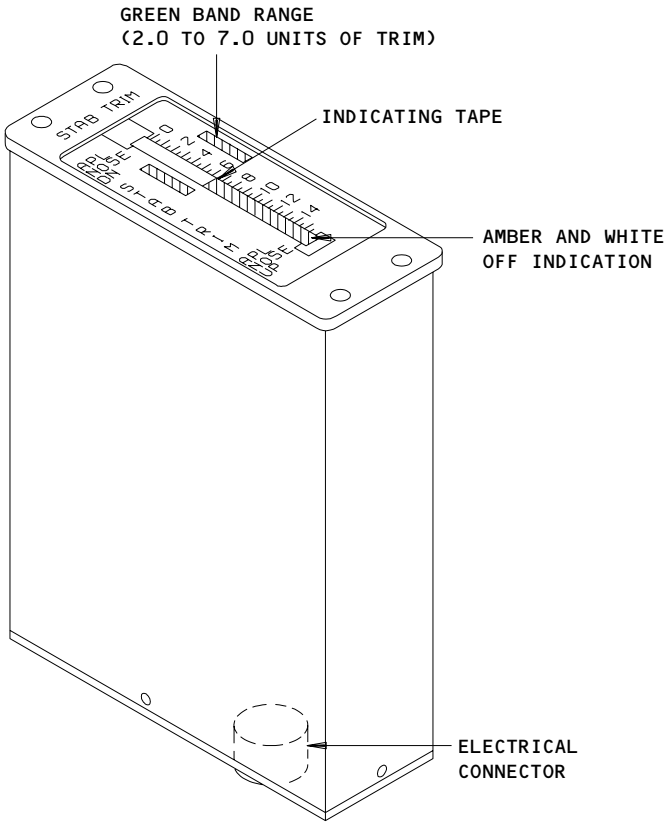
1. General
   A. Stabilizer trim position is provided by two independent indicators. The indicators are located on the left and right sides of the control stand. They are equipped with greenband range denoting safe takeoff stabilizer trim setting.
   B. Stabilizer trim position is sensed by three stabilizer trim limit switch and position transmitter modules (LSTM's). The LSTM's are driven by cables attached to the stabilizer. The left and right LSTM's transmit position data to the stabilizer position indicators.
   C. The LSTM's also provide:
      (1) Electrical travel limits to Horizontal Stabilizer Control System (Ref 27-41-00).
      (2) Data for takeoff configuration warning and annunciation.
      (3) Stabilizer position data to Stabilizer Position Modules (SPM's).
   D. The SPM's provide stabilizer position data to:
      (1) Autopilot Flight Director System (AFDS) (AMM 22-12-00).
      (2) Stabilizer Trim/Elevator Asymmetry Limiter Modules (SAM's) (AMM 27-41-00).
2. Component Details
   A. Stabilizer Position Indicators (Fig. 1)
      (1) Stabilizer trim position is displayed by two indicators on the control stand. The indicators show stabilizer position from 0 to 15.5 units of trim. The indicators receive their inputs from synchro transmitters in the LSTM's. A greenband on the face of each indicator shows the range of stabilizer settings for safe takeoff. The greenband range is from 2.0 to 7.0 units of trim. If a power failure occurs, the indicators will show an OFF flag at the bottom of the indicator. If a signal loss occurs, the indicator's tape will disappear out of view.
   B. Stabilizer Trim Limit Switch and Position Transmitter Module (LSTM) (Fig. 2)
      (1) The stabilizer control system uses three interchangeable LSTM's, each connected via a cable system to the leading edge of the stabilizer torque box. The LSTM's are mounted just forward of and below the stabilizer in Section 48. Each LSTM contains two position transmitters (one synchro and one rotary variable differential transducer (RVDT)), three travel limit switches, and a greenband switch.
      (2) The two stabilizer position indicators are electrically driven by the synchro transmitters in the left and right LSTM's. The center LSTM signals the Takeoff configuration warning card module.
      (3) The RVDT's in the three LSTM's signal stabilizer trim position to corresponding SPM's.



FLIGHT COMPARTMENT



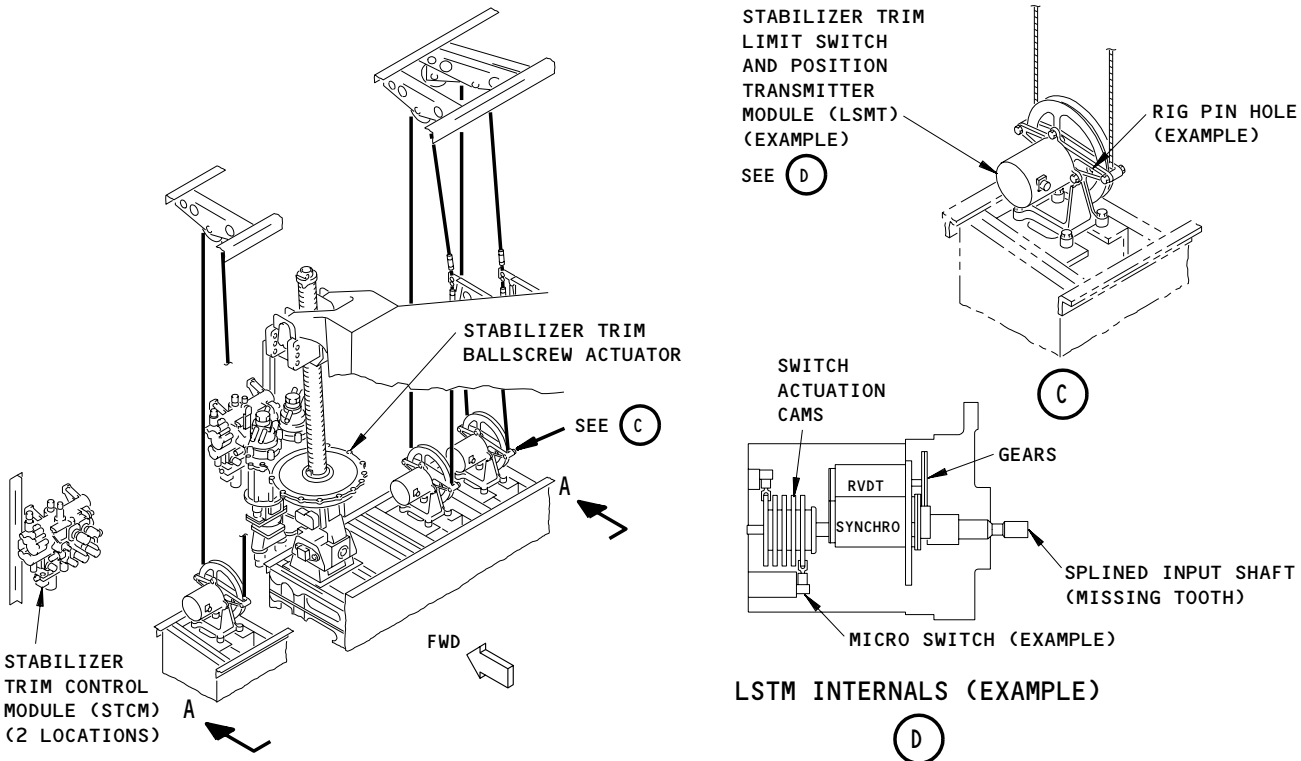
C



STABILIZER TRIM POSITION INDICATOR

D

Stabilizer Trim Position Indicator
Figure 1



LSTM INTERNALS (EXAMPLE)

D

L

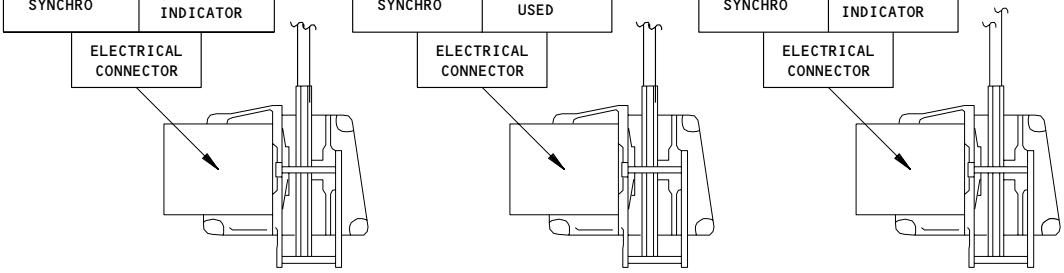
COMPONENT	FUNCTION
SWITCH 1	UP LIMIT FLAPS RETRACTED
SWITCH 2	UP LIMIT FLAPS NOT RETRACTED
SWITCH 3	DOWN LIMIT
SWITCH 4	GREEN BAND
SWITCH 5	UP LIMIT STANDBY TRIM
SWITCH 6	DOWN LIMIT STANDBY TRIM
RVDT	SPM (L)
SYNCHRO	CAPTAIN'S INDICATOR

C

COMPONENT	FUNCTION
SWITCH 1	UP LIMIT FLAPS RETRACTED
SWITCH 2	UP LIMIT FLAPS NOT RETRACTED
SWITCH 3	DOWN LIMIT
SWITCH 4	GREEN BAND
SWITCH 5	UP LIMIT STANDBY TRIM
SWITCH 6	DOWN LIMIT STANDBY TRIM
RVDT	SPM (C)
SYNCHRO	NOT USED

R

COMPONENT	FUNCTION
SWITCH 1	UP LIMIT FLAPS RETRACTED
SWITCH 2	UP LIMIT FLAPS NOT RETRACTED
SWITCH 3	DOWN LIMIT
SWITCH 4	GREEN BAND
SWITCH 5	UP LIMIT STANDBY TRIM
SWITCH 6	DOWN LIMIT STANDBY TRIM
RVDT	SPM (R)
SYNCHRO	F/O'S INDICATOR



LSTM FUNCTIONS

A-A

Stabilizer Trim Limit Switch and Position Transmitter Modules
Figure 2

(4) The travel limit switches are only functional on the left and right LSTM's. They interrupt the trim signal from the SAM's to the Stabilizer Trim Control Modules (STCM's) at the stabilizer up and down travel limits (AMM 27-41-00).

(5) The up and down travel limit switches for normal operation are only functional on the left and right LSTM's. The up and down limit switches for standby trim are only functional on the left and right LSTM. They interrupt the trim signal from the SAM's to the Stabilizer Trim Control Modules (STCM's) at the stabilizer up and down travel limits (AMM 27-41-00).

(6) The greenband switch is only functional on the center LSTM. The switch signals the takeoff configuration card to issue a takeoff configuration warning and annunciation if the stabilizer trim position is outside of the greenband range and the airplane is in a takeoff configuration.

C. Stabilizer Position Modules (SPM's)(Fig. 3)

(1) Each of the SPM's recieve a stabilizer trim position input signal from the corresponding LSTM.

(2) The left and right SPM's signal stabilizer trim position to the SAM's.

(3) All SPM's signal stabilizer trim position to the AFDS.

(4) The SPM's are located in the electrical system card file P50.

3. Operation

A. Functional Description (Fig. 4)

(1) The stabilizer trim position indicating system provides position information to the flight crew as well as other systems.

(2) Stabilizer trim position is sensed by three LSTM's, each driven by a mechanical cable system.

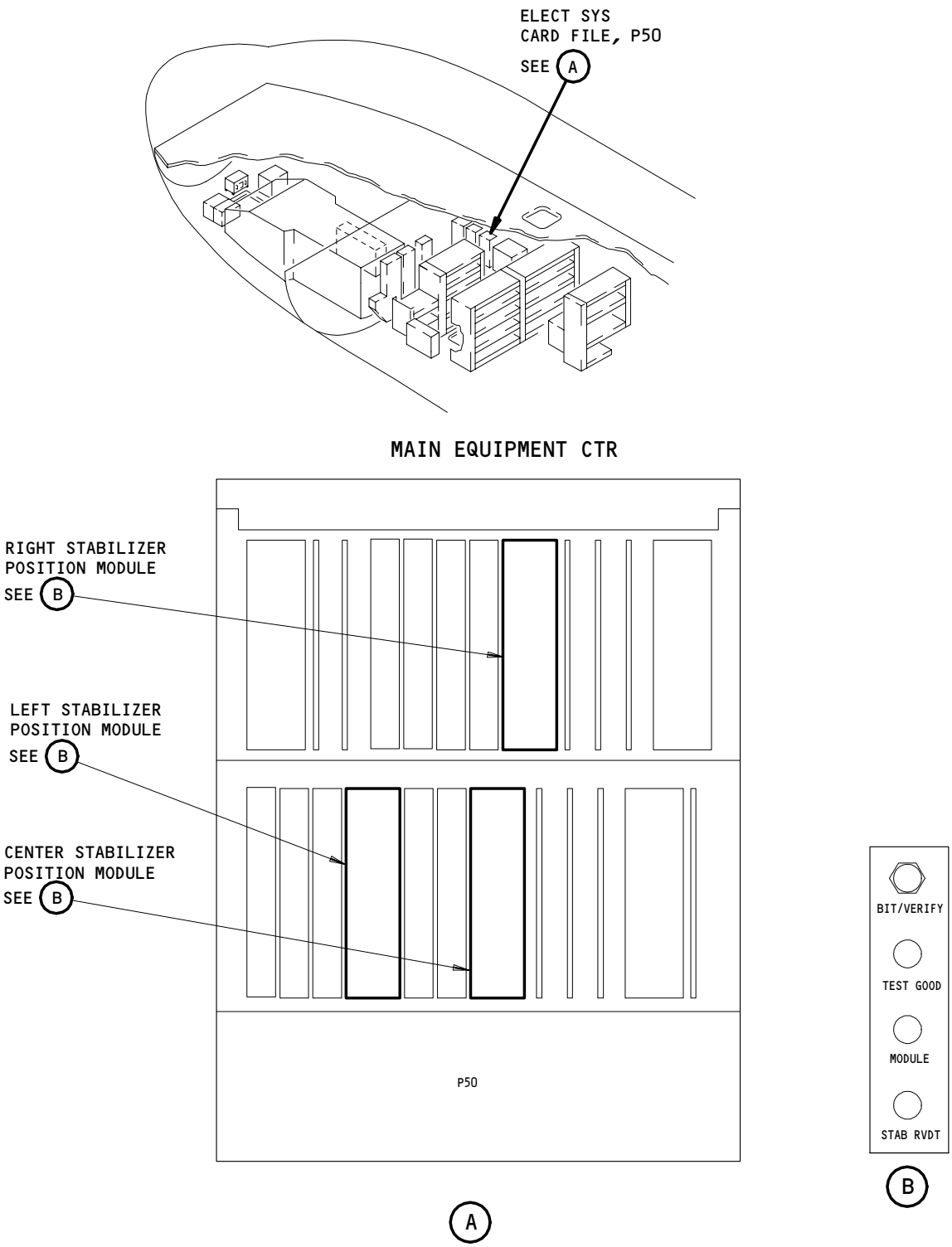
(3) Stabilizer trim position is displayed by indicators on the control stand. When the stabilizer trim setting is outside of the takeoff greenband, the takeoff aural warning circuit is armed. If the indicator loses power, an "OFF" flag will appear at the bottom of the indicator. If there is a loss of the synchro signal to the indicator, the indicating tape will disappear from view.

(4) Each SPM contains a BITE with troubleshooting lights. A single green light indicates that SPM components are operative . Two amber lights indicate inoperative components.

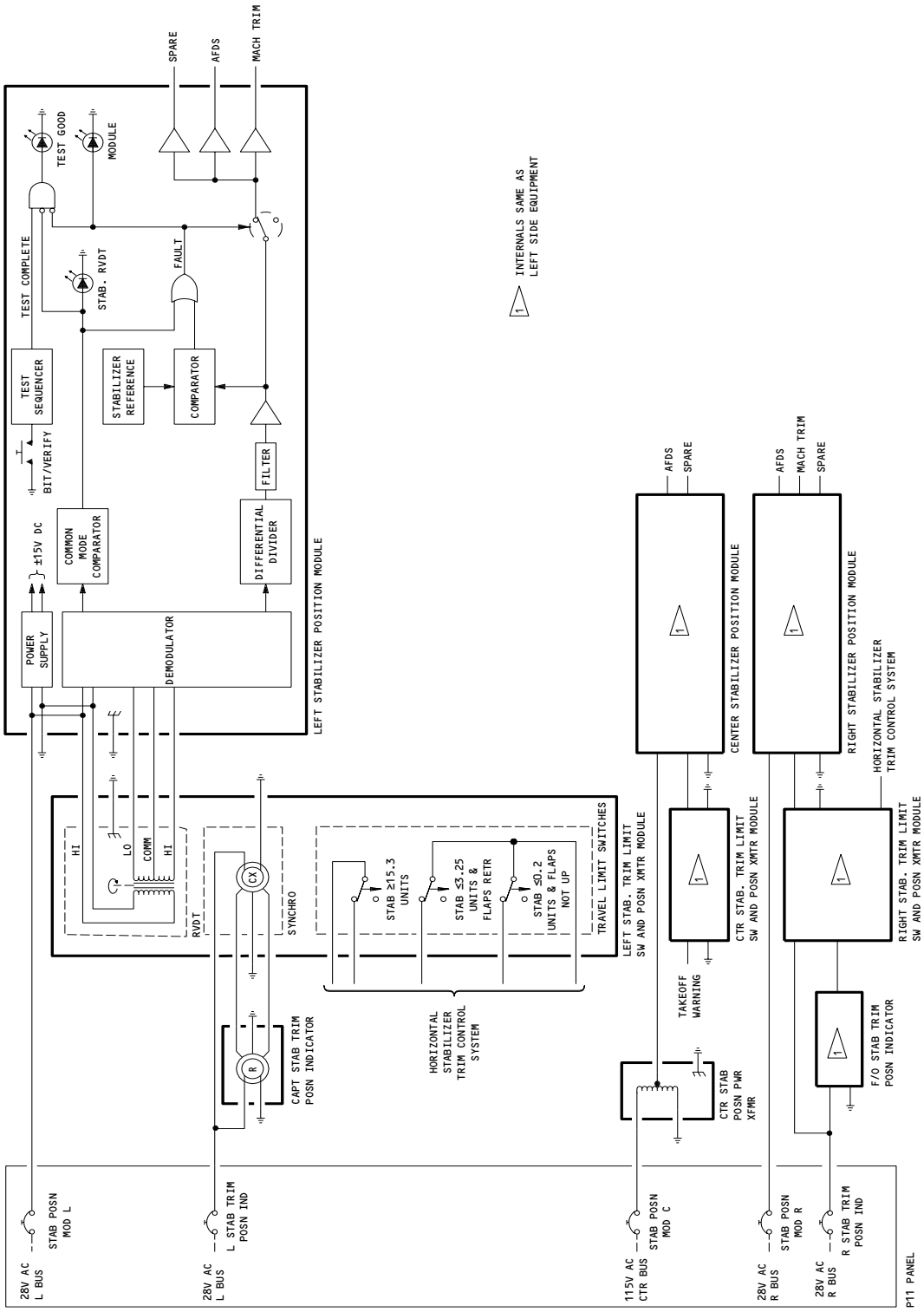
B. Control

(1) The system is on whenever the following overhead panel P11 circuit breakers are closed:

(a) 11F19, STAB POS MOD C
(b) 11G15, STAB POS MOD L
(c) 11G24, STAB POS MOD R
(d) 11H10, STAB TRIM POS IND L
(e) 11H19, STAB TRIM POS IND R



Stabilizer Position Module
Figure 3



Stabilizer Position Indicating System Schematic
Figure 4

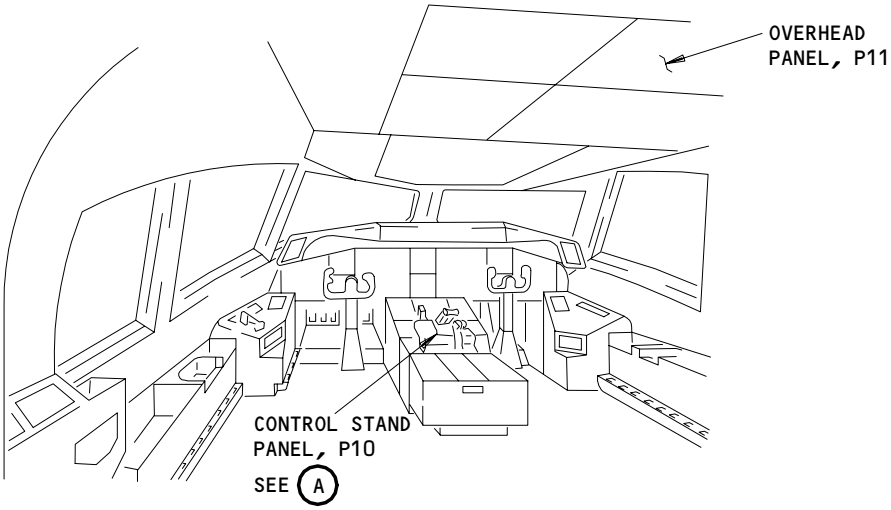
98585

STABILIZER TRIM POSITION INDICATING SYSTEM

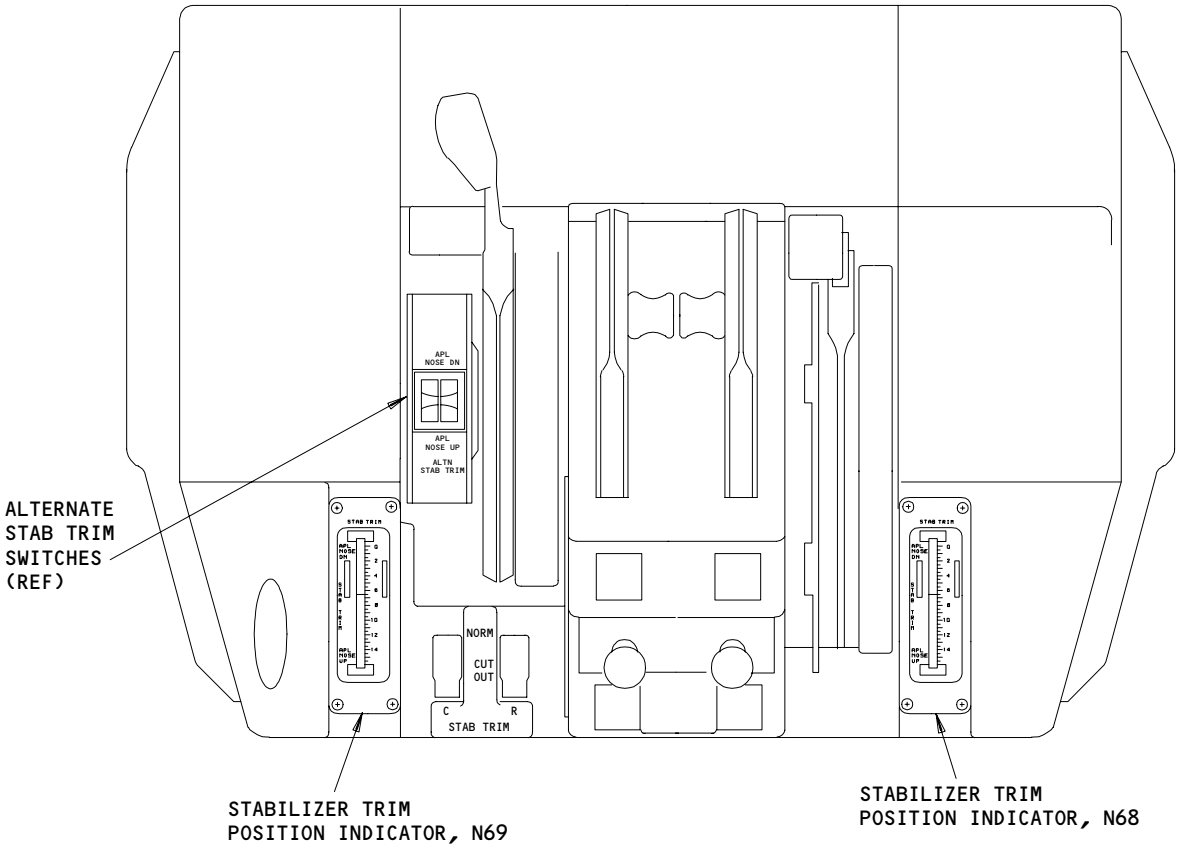
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS –	2		FLT COMPT, P11	
STAB POS MOD C, C1525		1	11F19	*
STAB POS MOD L, C1523		1	11G15	*
STAB POS MOD R, C1526		1	11G24	*
STAB TRIM POS IND L, C1002		1	11H10	*
STAB TRIM POS IND R, C1009		1	11H19	*
INDICATOR – STAB TRIM POS L, N69	2	1	FLT COMPT, CONT STAND, P10	27-48-06
INDICATOR – STAB TRIM POS R, N68	2	1	FLT COMPT, CONT STAND, P10	27-48-06
MODULE – STAB TRIM LIMIT SW & POS XMTR C, M10895	3	1	311AL, AFT FUSELAGE	27-48-01
MODULE – STAB TRIM LIMIT SW & POS XMTR L, M10899	3	1	311AL, AFT FUSELAGE	27-48-01
MODULE – STAB TRIM LIMIT SW & POS XMTR R, M10896	3	1	311AL, AFT FUSELAGE	27-48-01
MODULE STABILIZER POSITION C, M10409	4	1	119BL, MAIN EQUIP CTR, P50	27-48-03
MODULE STABILIZER POSITION L, M10408	4	1	119BL, MAIN EQUIP CTR, P50	27-48-03
MODULE STABILIZER POSITION R, M10410	4	1	119BL, MAIN EQUIP CTR, P50	27-48-03
TRANSFORMER – (REF 31-01-36-1, FIG. 101) CTR STAB POS PWR, T10031				

* SEE THE WDM EQUIPMENT LIST

Stabilizer Trim Position Indicating System – Component Index
Figure 101



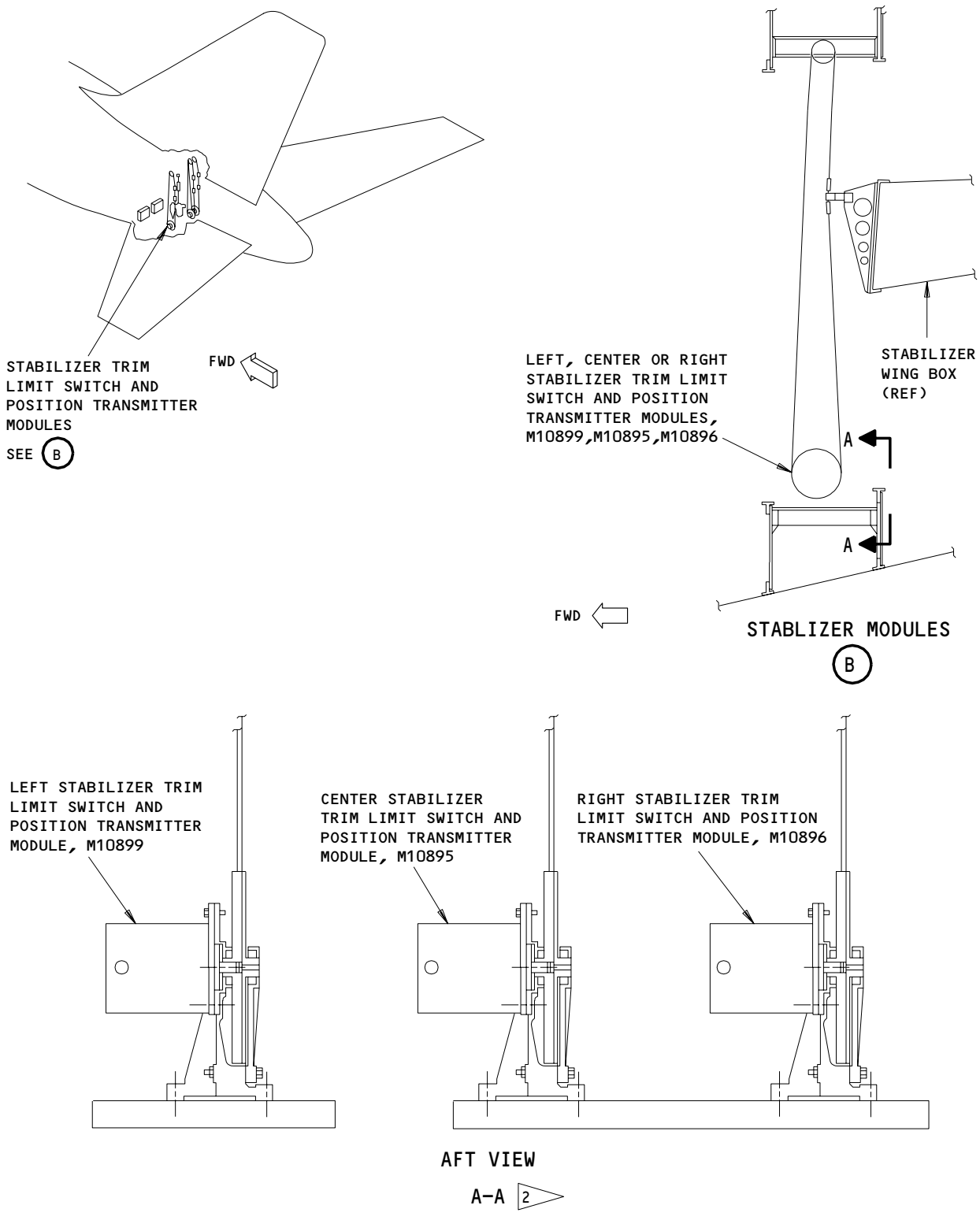
FLIGHT COMPARTMENT



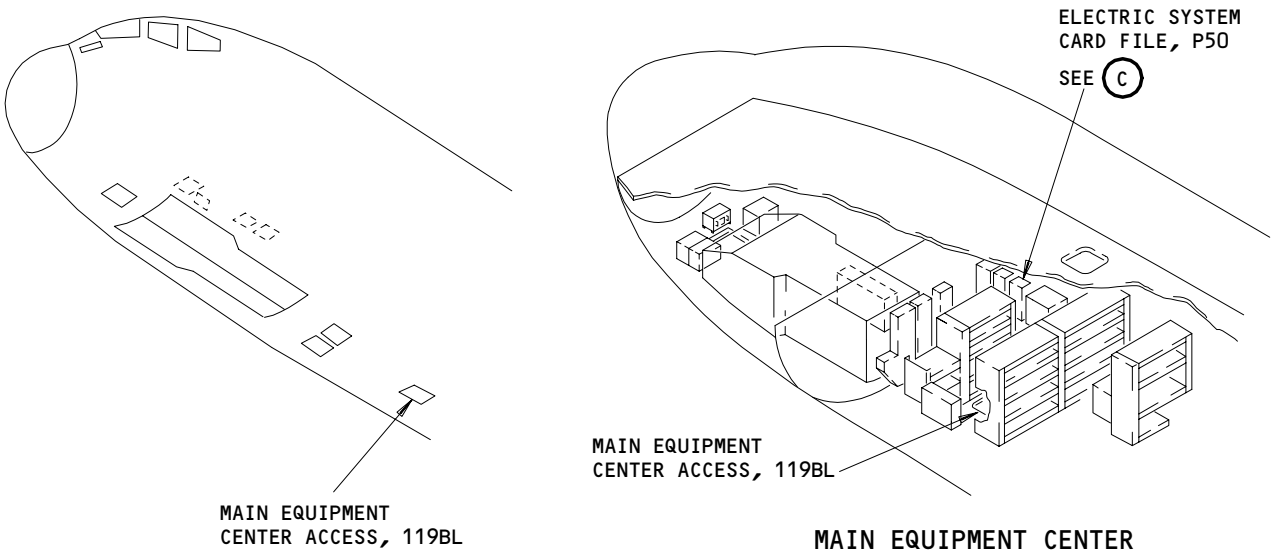
CONTROL STAND PANEL, P10

(A)

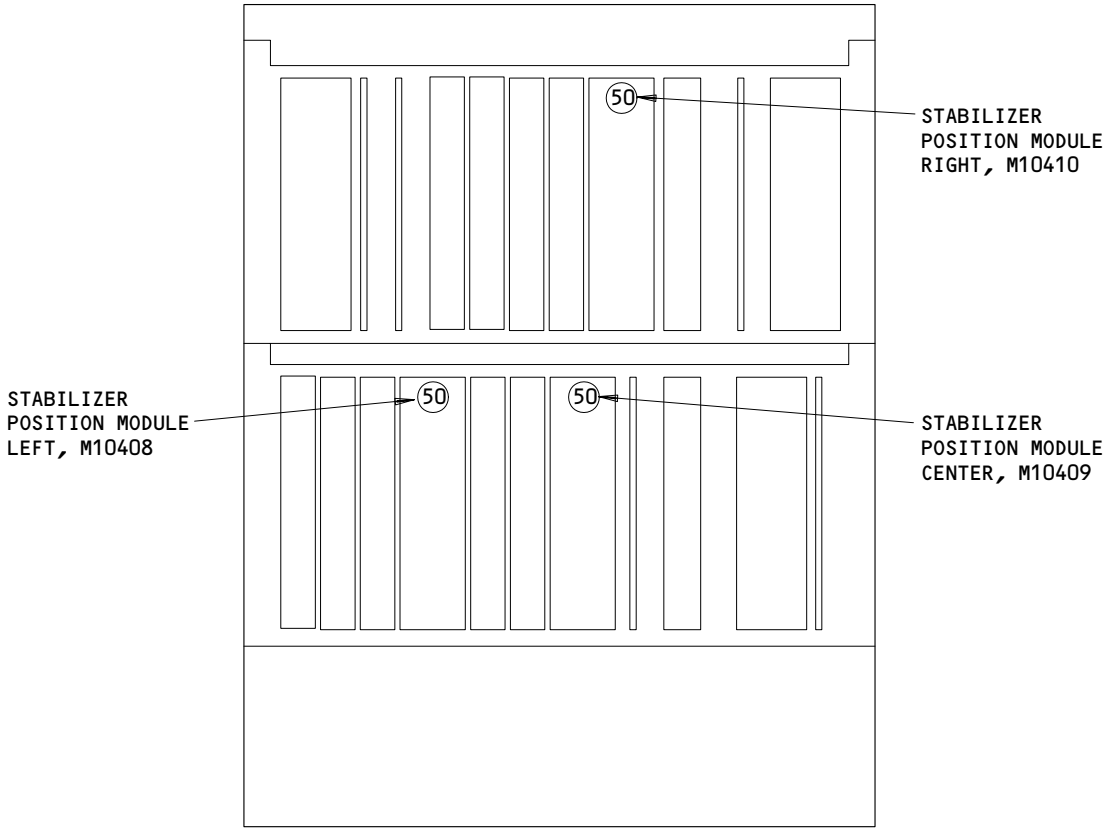
Horizontal Stabilizer Trim Control System – Component Location
Figure 102 (Sheet 1)



Horizontal Stabilizer Trim Control System – Component Location
Figure 102 (Sheet 2)



MAIN EQUIPMENT CENTER



ELECTRIC SYSTEM CARD FILE, P50

(C)

Horizontal Stabilizer Trim Control System - Component Location
Figure 102 (Sheet 3)

STABILIZER TRIM POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains these tasks for the operational tests, adjustment, and system test for the stabilizer trim position indicating system:

      - Stabilizer Trim Position Indicating System - Operational Test
      - Stabilizer Takeoff Warning - Operational Test
      - Stabilizer Trim Position Indicating System - Adjustment
      - Stabilizer Trim Positoin Indicating System - System Test

TASK 27-48-00-715-001

2. Stabilizer Trim Position Indicating System - Operational Test
   A. General
      (1) No ground support equipment is necessary to do the operational test for the stabilizer trim position indicating system. This test lets maintenance people monitor the elevator control system to make sure that it operates smoothly through its full travel range.
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, Center) Hydraulic Systems
   C. Access
      (1) Location Zone
          211/212 Control Cabin

   D. Stabilizer Trim Position Indicating System Test (Fig. 501)

      S 865-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 865-003
      (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT

(d) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(e) 11H19, STAB TRIM POS IND RIGHT

S 215-004
(3) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are in the NORM position.

S 865-005

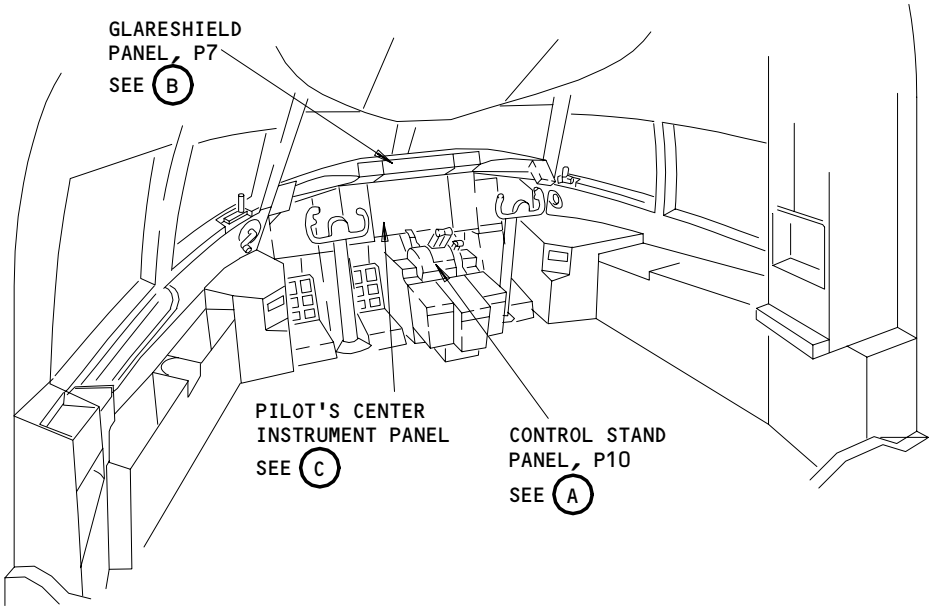
WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

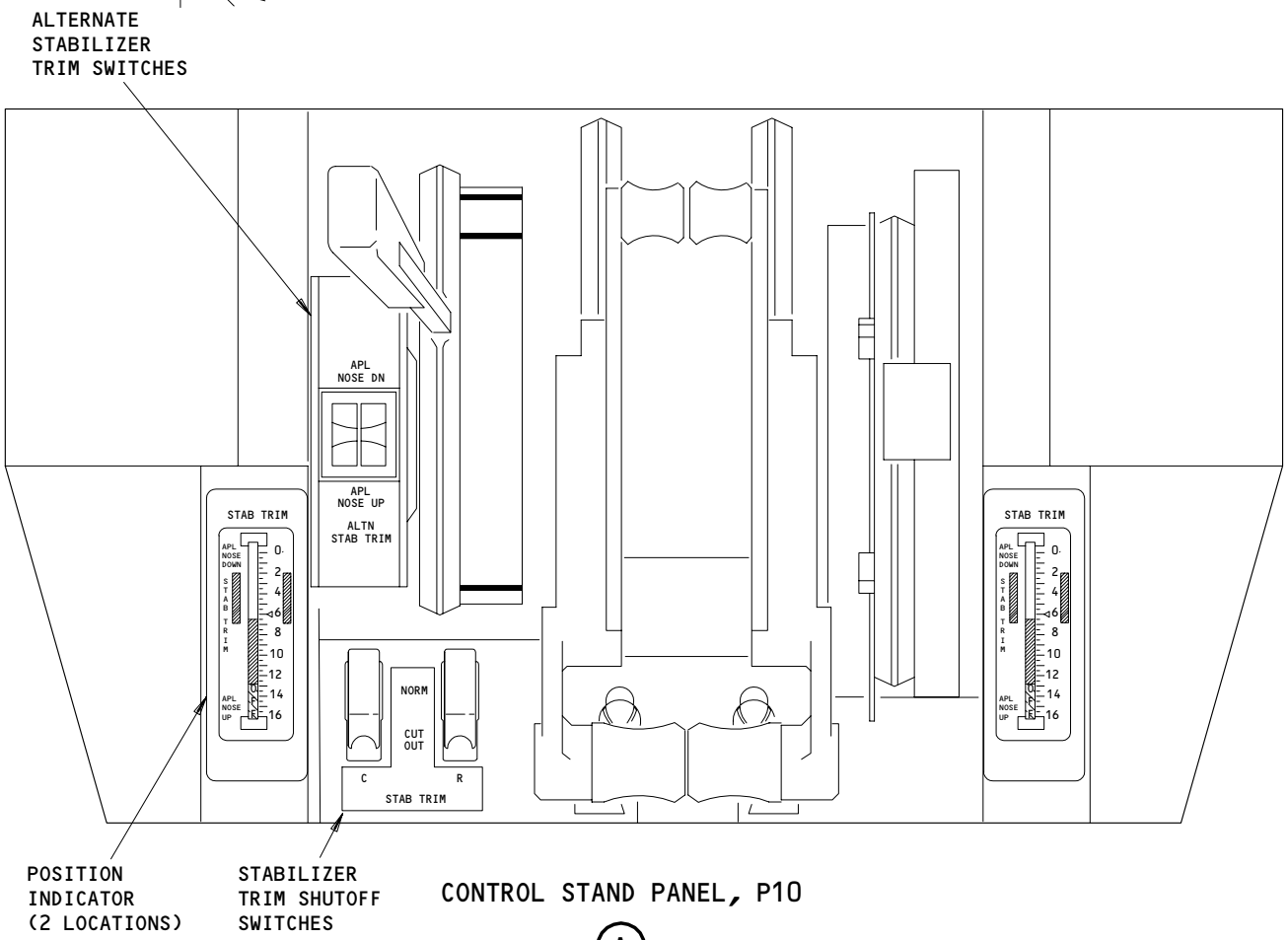
(4) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 215-006
(5) Make sure the stabilizer is in the neutral position (4 units of trim).

S 215-147
(6) Make sure the alternate stab trim switches are in the neutral position.

S 715-148
(7) Do the steps that follow to make sure the position indicating system shows stabilizer movement correctly:
(a) Move the alternate stab trim switches forward and hold.
1) Make sure the position indicators correctly follow the movement of the stabilizer until it stops (0.20 ±0.25 units of trim).
(b) Release the alternate stab trim switches.
1) Make sure the alternate stab trim switches go to the neutral position when you release them.
(c) Move the alternate stab trim switches aft and hold.
1) Make sure the position indicators correctly follow the movement of the stabilizer until it stops (15.3 ±.25 units of trim).
(d) Release the alternate stab trim switches.
1) Make sure the alternate stab trim switches go to the neutral position when you release them.

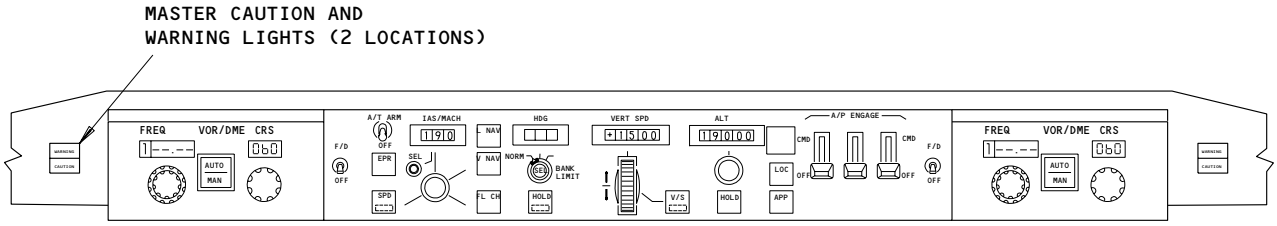




CONTROL STAND PANEL, P10

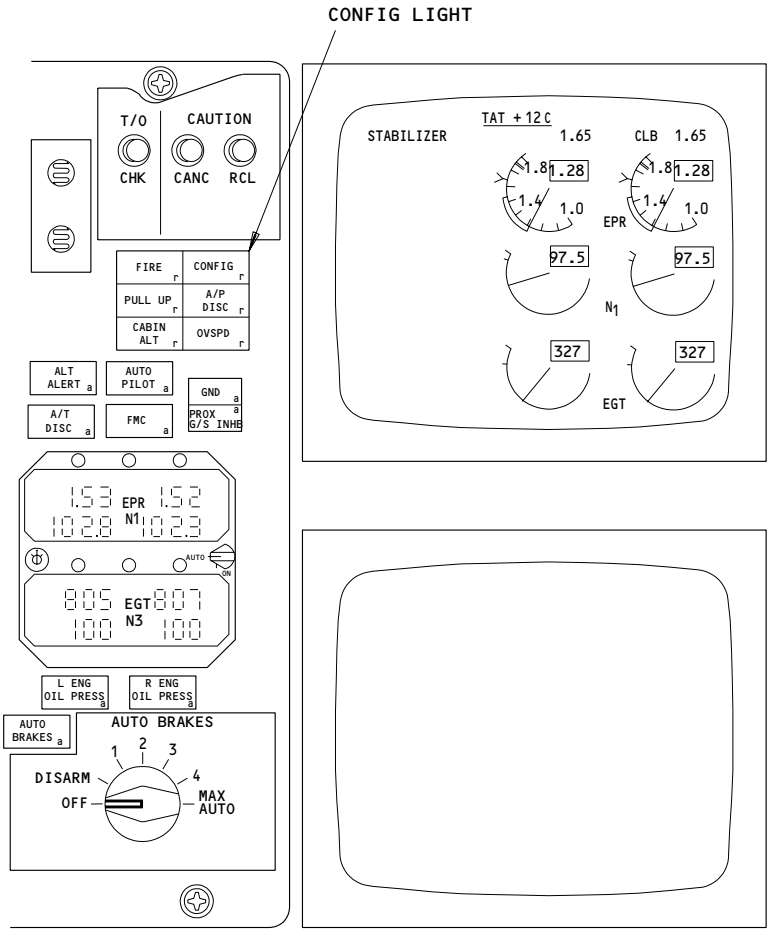
A

Horizontal Stabilizer Trim Control System
Figure 501 (Sheet 1)



GLARESHIELD PANEL (P7)

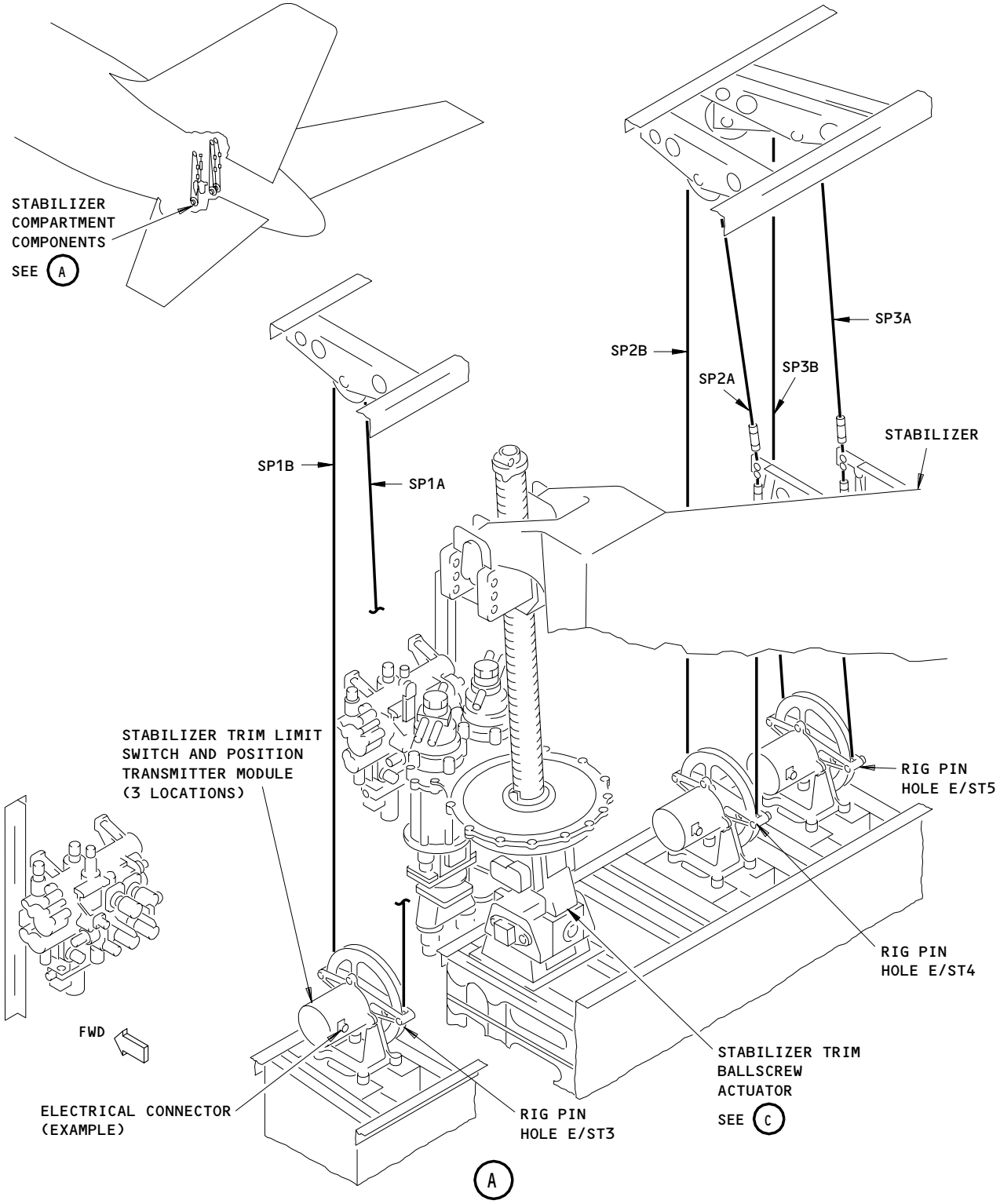
B



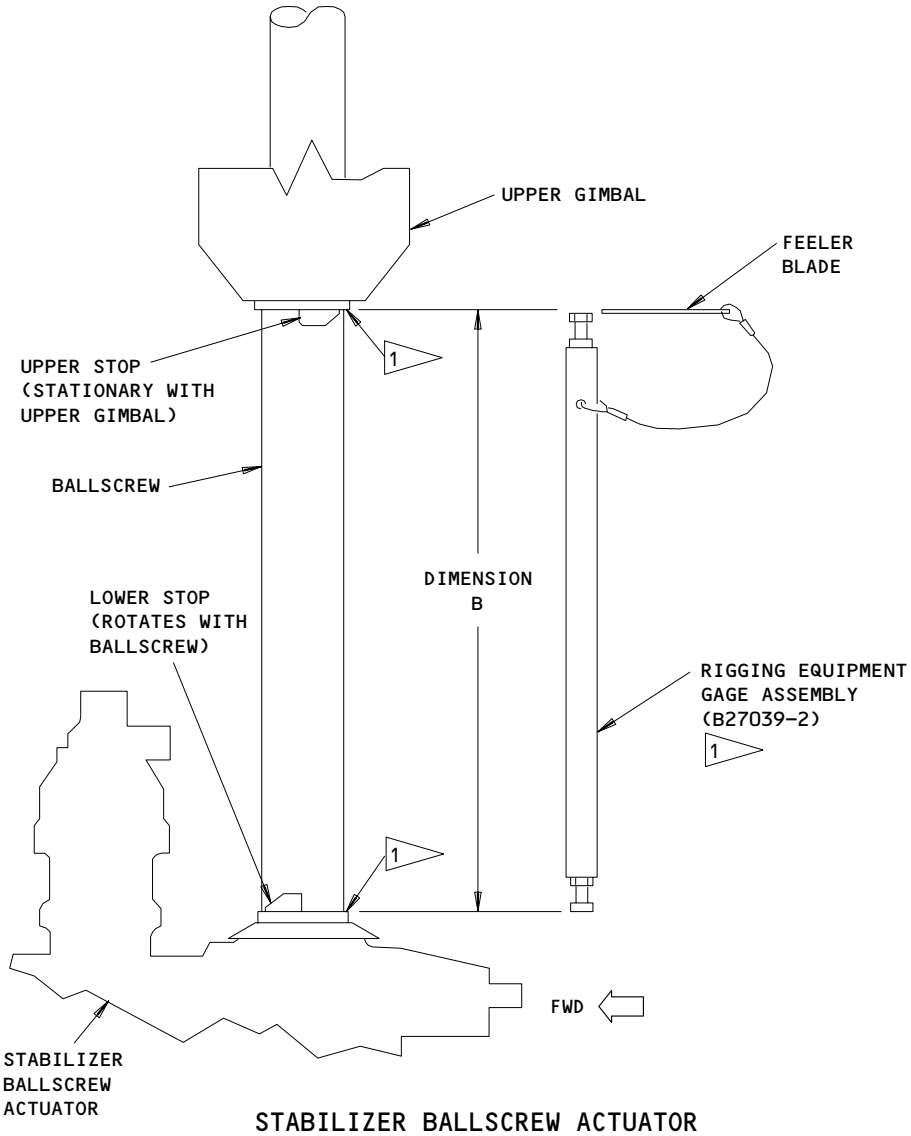
PILOT'S CENTER INSTRUMENT PANEL

C

Horizontal Stabilizer Trim Control System
Figure 501 (Sheet 2)



Stabilizer Compartment Components
Figure 502 (Sheet 1)



STABILIZER BALLSCREW ACTUATOR

C

1 THE GAGE ASSEMBLY CAN BE USED TO ACCURATELY SET THE STABILIZER DIMENSION B TO 19.07 ±0.01 INCHES.

TO USE, PUT THE GAGE ASSEMBLY AGAINST THE BALLSCREW SUCH THAT THE LOWER BOLTHEAD IS ON THE SHOULDER OF THE LOWER STOP. MAKE SURE THAT THE FEELER BLADE CANNOT BE PUT BETWEEN THE GAGE ASSEMBLY UPPER BOLTHEAD AND THE SHOULDER OF THE UPPER STOP. MAKE SURE THE SHOULDER OF THE UPPER STOP DOES NOT TOUCH THE UPPER BOLTHEAD.

Stabilizer Compartment Components
Figure 502 (Sheet 2)

S 865-015
(8) Open these circuit breakers on the P11 panel:
(a) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(b) 11H19, STAB TRIM POS IND RIGHT

S 215-016
(9) Make sure that an OFF indication is shown at the bottom of the stabilizer trim position indicator.

S 865-017
(10) Close these circuit breakers on the P11 panel:
(a) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(b) 11H19, STAB TRIM POS IND RIGHT

S 215-114
(11) Make sure that the indicating tape is in view on the stabilizer trim position indicators.

S 865-019
(12) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-48-00-715-143

3. Stabilizer Takeoff Warning System - Operational Test

A. General
(1) No ground support equipment is necessary to do the operational test for the stabilizer takeoff warning system.

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, Center) Hydraulic Systems

C. Access
(1) Location Zone
211/212 Control Cabin

D. Stabilizer Takeoff Warning Test (Fig. 501)

S 865-020
(1) Supply electrical power (AMM 24-22-00/201).

S 215-021
(2) Make sure these circuit breakers on the P11 panel are closed:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT

S 215-022
(3) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in NORM.

S 865-023

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SUREFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left, right and center hydraulic systems (AMM 29-11-00/201).

S 865-024
(5) Move the flap lever to the 20-unit detent.

S 865-025
(6) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicators (greenband range).

S 865-161
(7) Move the speedbrake lever to its down-and-locked detent position.

S 435-162
(8) Install landing gear wheel chocks if not installed already.

S 865-026
(9) Release the parking brake.

S 865-027
(10) Push and hold the takeoff warning test switch on the right sidewall panel, P61, for the full test.

S 215-028
(11) Make sure that the following indications do not come on:

NOTE: Some nuisance messages can show on the EICAS display. These messages are not important for this test.

(a) Red CONFIG light on the pilot's center instrument panel, P2
(b) Captain's and first officer's master warning lights on the glareshield panel, P7
(c) EICAS red warning message (STABILIZER)
(d) Aural warning siren.

S 865-029
(12) Move the stabilizer trim control wheel switches up until the stabilizer is just out of the greenband range.

S 215-030
(13) Make sure that the following indications come on:
(a) Red CONFIG light on the P2 panel
(b) Captain's and first officer's master warning lights on the P7 panel
(c) EICAS red warning message (STABILIZER)
(d) Aural warning siren.

S 865-031
(14) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicator (greenband range).

S 215-032
(15) Make sure that all of the warnings stop as soon as the stabilizer moves into the greenband range.

S 865-033
(16) Move the stabilizer trim control wheel switches down until the horizontal stabilizer is just out of the greenband range.

S 215-034
(17) Make sure that the following indications come on:
(a) Red CONFIG light on the P2 panel

(b) Captain's and first officer's master warning lights on the P7 panel
(c) EICAS red warning message (STABILIZER)
(d) Aural warning siren.

S 865-035
(18) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicator (greenband range).

S 215-036
(19) Make sure that all of the warnings stop as soon as the horizontal stabilizer moves into the greenband range.

S 865-037
(20) Release the takeoff warning test switch on the P61 panel.

S 865-142
(21) Set the parking brake.

S 865-038
(22) Remove the power from the left, right and center hydraulic systems (AMM 29-11-00/201).

S 865-039
(23) Remove electrical power (AMM 24-22-00/201).

TASK 27-48-00-825-040

4. Stabilizer Trim Position Indicating System - Adjustment

A. General

(1) This procedure contains steps to adjust the stabilizer trim position indicating system. When correctly adjusted, the system operates smoothly through its travel range and agrees with the conditions that follow:
(a) Limit Switch and Position Transmitter Module and Travel Limit Mechanism
1) The limit switch and position transmitter modules are adjusted correctly if:
a) The tensions in cables SL and SP are 50 ± 5 lbs (222 +/- 22 newtons).
b) Rig pins E/ST3, E/ST4, and E/ST5 can be put in freely when Dimension B on the stabilizer ballscrew actuator is 19.07 ±0.01 inches (484.4 +/- 0.25 mm).

B. Equipment

(1) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)
(2) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
(a) E/ST1 - P/N B20003-21
(b) E/ST3 - P/N B20003-21
(c) E/ST4 - P/N B20003-21

(d) E/ST5 - P/N B20003-21

C. Consumable Materials
(1) C00308 Compound - Corrosion Preventive MIL-C-11796

D. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 20-10-24/201, Rig Pins
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 29-11-00/201, Main (Left, Right, Center) Hydraulic Systems

E. Access
(1) Location Zone
311 Area Aft of the Pressure Bulkhead to BS 1787.45 (Left)

(2) Access Panel
311AL Forward Stabilizer Compartment Access Door

F. Prepare for Adjustment

S 865-041
(1) Supply electrical power (AMM 24-22-00/201).

S 865-042

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 865-043
(3) Move the horizontal stabilizer such that Dimension B on the stabilizer trim ballscrew actuator is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm).

S 865-044
(4) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

S 865-045
(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to CUTOUT.

S 865-046
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H11 or 11C05, STAB TRIM CONT L

(e) 11H20, STAB TRIM CONT R

S 415-047

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(7) Open the forward stabilizer compartment access door, 311AL (Ref 06-42-00).

G. Adjust the Limit Switch and Position Transmitter Module (Fig. 502).

S 215-125

(1) Make sure the stabilizer is set such that Dimension B on the stabilizer ballscrew actuator is 19.07 ±0.01 inches (484.4 +/- 0.3 mm).

S 825-156

(2) Adjust the tension in cables SP to 50 ±5 lbs (222 +/- 22 newtons) such that rig pins E/ST3, E/ST4, and E/ST5 can be put in freely.

S 095-127

(3) Remove rig pins E/ST3, E/ST4, and E/ST5.

S 865-128

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B19, STAB TRIM ALT
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-129

(5) Put the RIGHT and CENTER STAB TRIM SHUTOFF switches on the P10 panel to the NORM position.

S 865-130

(6) Move the alternate stab trim switches forward until the stabilizer stops.
(a) Make sure that the stabilizer ballscrew actuator upper stop surfaces do not hit each other.
(b) Make sure Dimension B on the stabilizer ballscrew actuator is 24.86 to 25.46 inches (631.4-646.6 mm).

S 865-131

(7) Move the alternate stab trim switches aft until the stabilizer stops.
(a) Make sure the stabilizer ballscrew actuator surfaces do not hit each other.
(b) Make sure Dimension B on the stabilizer ballscrew actuator is 0.80 to 1.40 inches (20-35 mm).

H. Put the Airplane Back to Its Usual Condition

S 865-069
(1) Remove the power from the right hydraulic system (Ref 29-11-00).

S 865-150
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel.
(a) 11H11 or 11C05, STAB TRIM CONT L
(b) 11H20, STAB TRIM CONT R

S 865-072
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-073
(4) Close the forward stabilizer compartment access door, 311AL (AMM 06-42-00/201).

TASK 27-48-00-735-074

5. Stabilizer Trim Position Indicating System - System Test

A. General
(1) This test makes sure that the stabilizer trim position indicating system operates correctly.

B. Equipment
(1) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)
(2) Rig Pins from Set B20003-XX (AMM 20-10-24/201):
(a) E/ST1 - P/N B20003-21
(b) E/ST3 - P/N B20003-21
(c) E/ST4 - P/N B20003-21
(d) E/ST5 - P/N B20003-21
(3) Gage Assembly - B27039-2 (Part of Elevator and Stabilizer Rigging Equipment, B27039-13)

C. References
(1) AMM 06-42-00/201, Empennage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

D. Access
(1) Location Zone
311 Area Aft of the Pressure Bulkhead to BS 1787.45 (Left)

(2) Access Panel
311AL Forward Stabilizer Compartment Access Door

E. Prepare for Test

S 865-075
(1) Supply electrical power (AMM 24-22-00/201).

S 015-115

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ACCESS DOOR FOR THE CONTROLS BAY, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the forward stabilizer compartment access door, 311AL (AMM 06-42-00/201).

S 865-077
(3) Make sure that these circuit breakers on the overhead panel, P11, are closed:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(e) 11H19, STAB TRIM POS IND RIGHT

S 215-078
(4) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are in NORM.

S 865-079

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 865-080

(6) Move the horizontal stabilizer such that Dimension B on the stabilizer trim ballscrew actuator is 19.07 ± 0.01 inches (484.4 +/- 0.25 mm) (neutral position).

S 215-151

(7) Make sure the alternate stab trim switches are in the neutral position.

S 215-082

(8) Make sure that the stabilizer trim position indicators show that the stabilizer is at neutral (4 units of trim).

F. Stabilizer Trim Position Indicating System Test (Fig. 501)

S 715-153

(1) You must use the "B" dimension when it is specified in the procedures. You cannot use the Units of Trim value in place of the "B" dimension.

UNITS OF TRIM	"B" DIMENSION (INCHES)
0.0	25.40
0.5	24.61
1.0	23.82
1.5	23.03
2.0	22.24
2.5	21.45
3.0	20.66
3.5	19.86
4.0	19.07
4.5	18.28

UNITS OF TRIM	"B" DIMENSION (INCHES)
5.0	17.48
5.5	16.69
6.0	15.90
6.5	15.10
7.0	14.31
7.5	13.51
8.0	12.72
8.5	11.93
9.0	11.13
9.5 10.0	10.34 9.55
10.5	8.75
11.0	7.96
11.5	7.17
12.0	6.38
12.5	5.59
13.0	4.80
13.5	4.01
14.0	3.22
14.5	2.44
15.0	1.66
15.5	0.87

S 735-144
(2) Do the steps that follow to make sure the position indicating system shows stabilizer movement correctly:
(a) Move the alternate stab trim switches forward and hold.
1) Make sure the stabilizer trim position indicators correctly follow the movement of the stabilizer until it stops.
2) Make sure the position indicators show 0.20 ±0.25 units of trim.
(b) Release the alternate stab trim switches.
1) Make sure the alternate stab trim switches go to the neutral position when you release them.
(c) Move the alternate stab trim switches aft and hold.
1) Make sure the stabilizer trim position indicators correctly follow the movement of the stabilizer until it stops.
2) Make sure the position indicators show 15.3 ±.25 units of trim.
(d) Release the alternate stab trim switches.
1) Make sure the alternate stab trim switches go to the neutral position when you release them.

S 865-087
(3) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 865-088
(4) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to CUTOUT.

S 865-089
(5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 715-146
(6) Do the steps that follow to make sure the position indicating system does not show stabilizer movement with the RIGHT and CENTER STAB TRIM SHUTOFF valve switches at the CUTOUT position:
(a) Slowly move the alternate stab trim switches through full travel and release.
1) Make sure there is no stabilizer movement.

2) Make sure the stabilizer trim position indicators show no stabilizer movement.
3) Make sure the alternate stab trim switches go to the neutral position when you release them.

S 865-091
(7) Open these circuit breakers on the P11 panel:
(a) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(b) 11H19, STAB TRIM POS IND RIGHT

S 215-092
(8) Make sure that an OFF indication is shown on the bottom of the stabilizer trim position indicator.

S 865-093
(9) Close these circuit breakers on the P11 panel:
(a) 11H10, STAB TRIM POS IND LEFT
or STAB TRIM LEFT POS IND
(b) 11H19, STAB TRIM POS IND RIGHT

S 215-116
(10) Make sure that the indicating tape is in view on the stabilizer trim position indicators.

S 865-094
(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C12, STAB TRIM SHUTOFF LEFT
(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-095
(12) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel to NORM.

G. Stabilizer Takeoff Warning Test (Fig. 501)

S 865-096
(1) Make sure that these circuit breakers on the P11 panel are closed:
(a) 11C12, STAB TRIM SHUTOFF LEFT

(b) 11C13, STAB TRIM SHUTOFF RIGHT

S 865-097

(2) Make sure that the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the P10 panel are in NORM.

S 865-098

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right and center hydraulic systems (AMM 29-11-00/201).

S 865-099

(4) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicators.

S 865-100

(5) Push and hold the takeoff warning test switch on the right sidewall panel, P61, for the full test.

S 215-101

(6) Make sure that the indications that follow do not come on:
(a) Red CONFIG light on the pilot's center instrument panel, P2
(b) Captain's and first officer's master warning lights on the glareshield panel, P7
(c) EICAS red warning message (STABILIZER)
(d) Aural warning siren.

S 865-102

(7) Move the stabilizer trim control wheel switches up until the stabilizer is just out of the greenband range.

S 215-103
(8) Make sure that the indications that follow come on:
  (a) Red CONFIG light on the P2 panel
  (b) Captain's and first officer's master warning lights on the P7 panel
  (c) EICAS red warning message (STABILIZER)
  (d) Aural warning siren.

S 865-104
(9) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicator (greenband range).

S 215-105
(10) Make sure that all of the warnings stop as soon as the stabilizer moves into the greenband range.

S 865-106
(11) Move the stabilizer trim control wheel switches down until the stabilizer is just out of the greenband range.

S 215-107
(12) Make sure that the indications that follow come on:
  (a) Red CONFIG light on the P2 panel
  (b) Captain's and first officer's master warning lights on the P7 panel
  (c) EICAS red warning message (STABILIZER)
  (d) Aural warning siren.

S 865-108
(13) Move the horizontal stabilizer such that it is between 2.0 and 7.0 units of trim on the stabilizer trim position indicator (greenband range).

S 215-109
(14) Make sure that all of the warnings stop as soon as the stabilizer moves into the greenband range.

S 865-110
(15) Release the takeoff warning test switch on the P61 panel.

S 865-111
(16) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 865-112
(17) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-113
(18) Close the forward stabilizer compartment access door, 311AL (AMM 06-42-00/201).

STABILIZER TRIM LIMIT SWITCH AND POSITION TRANSMITTER MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the limit switch and position transmitter modules (LSTMs). The steps to remove and install the left, center, and right LSTMs are the same. The test for each LSTM is different.

TASK 27-48-01-024-001

2. Remove the Limit Switch and Position Transmitter Module (LSTM)
   A. References
      (1) 06-42-00/201, Empennage Access Doors and Panels.
      (2) 24-22-00/201, Electrical Power - Control
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          311/312 Area Aft of Pressure Bulkhead to BS 1787.45

      (2) Access Panel
          311AL Forward Stabilizer Compartment

   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003
      (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11F19, STAB POS MOD CENTER
          (e) 11G15, STAB POS MOD LEFT
          (f) 11G24, STAB POS MOD RIGHT

(g) 11H10, STAB TRIM POS IND L
or STAB TRIM LEFT POS IND
(h) 11H11 or 11C05, STAB TRIM CONT L
(i) 11H19, STAB TRIM POS IND RIGHT
(j) 11H20, STAB TRIM CONT R

S 864-004
(3) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

S 864-005
(4) Remove the power from the right and center hydraulic systems (AMM 29-11-00/201).

S 014-006

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(5) Open the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

D. Remove the LSTM (Fig. 401)

S 034-007
(1) Disconnect the electrical connector.

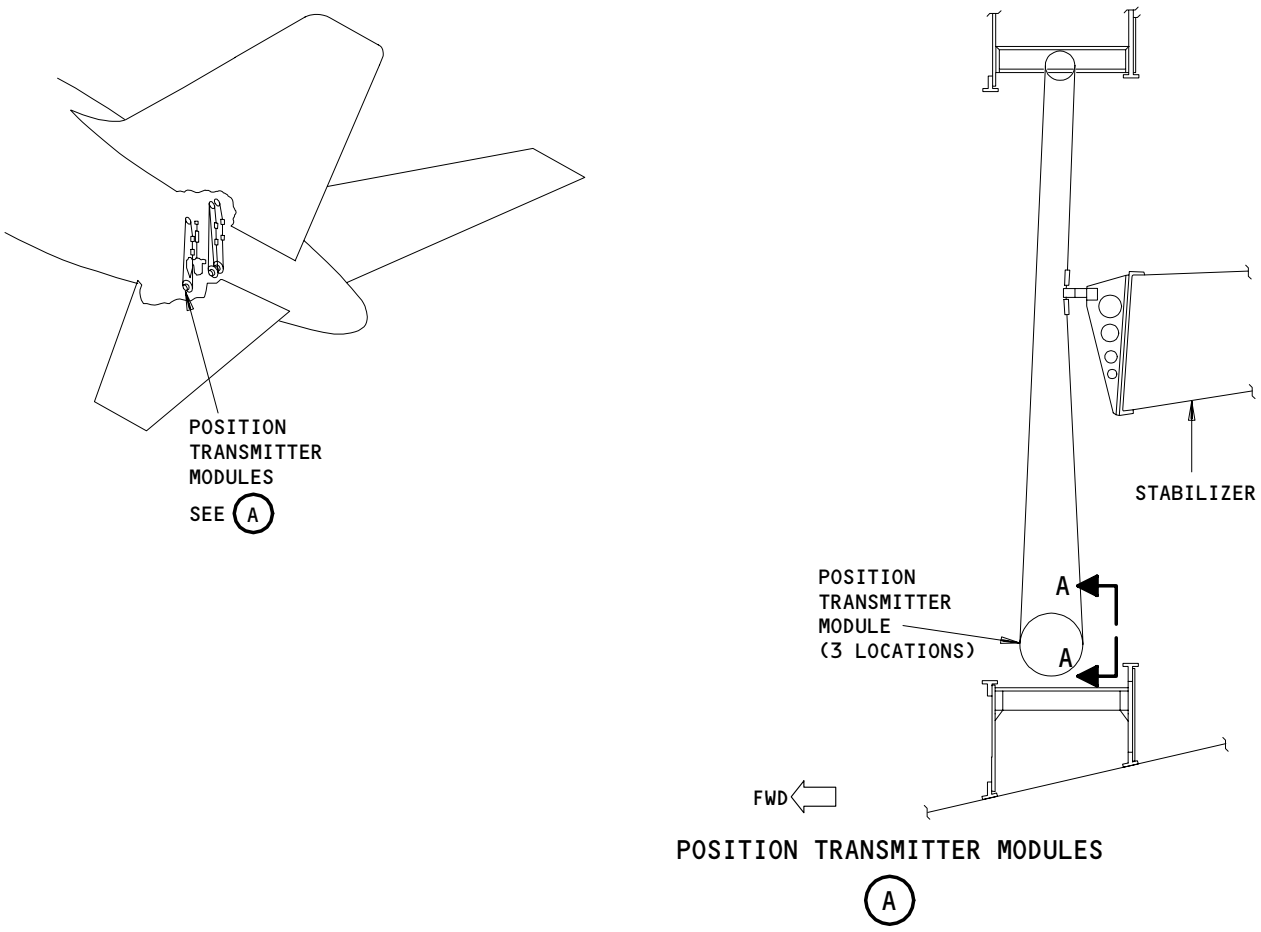
S 034-008
(2) Remove the bolts from the mounting flange on the LSTM.

S 024-009
(3) Carefully disengage the LSTM input shaft from the drive assembly.

S 024-010
(4) Remove the LSTM.

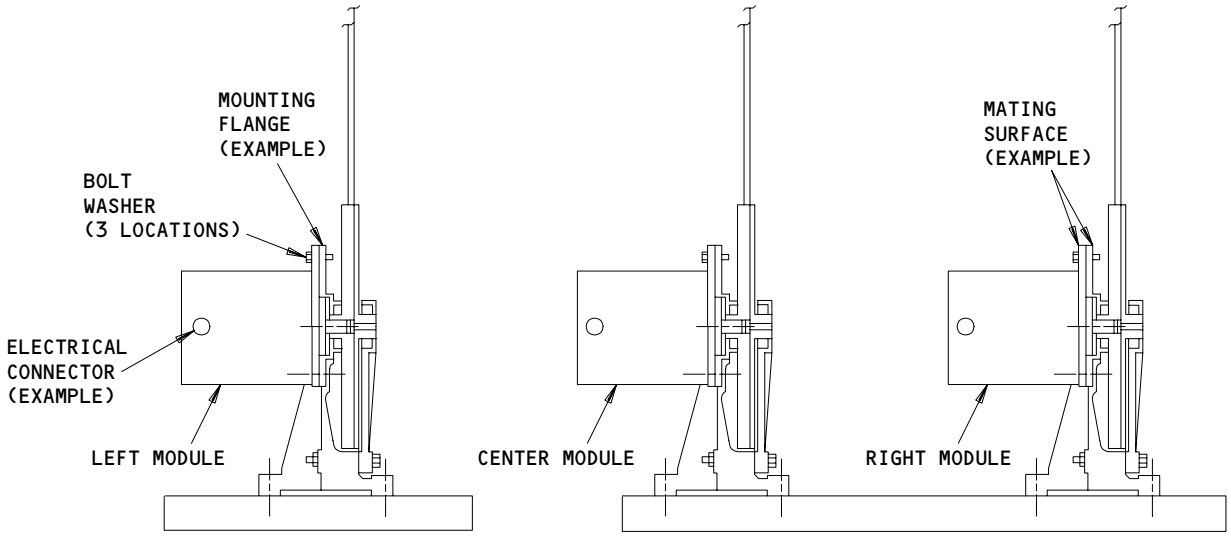
TASK 27-48-01-424-011

3. Install the Limit Switch and Position Transmitter Module (LSTM)
A. Consumable Materials
(1) C00271 Conversion Coating - Iridite 14-2
B. References
(1) 06-42-00/201, Empennage Access Doors and Panels.
(2) 20-10-21/601, Electrical Bonding
(3) 20-10-22/701, Metal Surfaces Cleaning/Painting
(4) 20-30-03/201, Finishing Materials
(5) 24-22-00/201, Electrical Power - Control
(6) 27-41-00/501, Horizontal Stabilizer Trim Control System



POSITION TRANSMITTER MODULES

A



AFT VIEW
A-A

Limit Switch and Position Transmitter Module Installation
Figure 401

(7) 27-48-00/501, Stabilizer Trim Position Indicating System

C. Access

(1) Location Zones

211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1787.45

(2) Access Panel

311AL Forward Stabilizer Compartment

D. Install the LSTM (Fig. 401)

S 124-012

(1) Clean the mating surfaces with abrasives (AMM 20-10-22/701).

S 624-013

(2) Apply a layer of Iridite 14-2 to the bare aluminum surfaces (AMM 20-30-03/201).

S 424-014

(3) Carefully engage the LSTM input shaft to the drive assembly.

NOTE: Make sure the tooth that is gone aligns with the splines on the mating part.

S 434-015

(4) Turn the LSTM to align the mounting holes in the mounting flange with the holes in the drive assembly bracket.

S 434-016

(5) Install the bolts to attach the LSTM to the mounting flange.

S 284-017

(6) Make sure the maximum electrical resistance is 0.0025 ohms (AMM 20-10-21/601).

S 624-018

(7) Apply Iridite 14-2 to bare mating surfaces that you can see.

S 434-019

(8) Connect the electrical connector.

S 864-020

(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:

(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LEFT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11F19, STAB POS MOD CENTER
(e) 11G15, STAB POS MOD LEFT
(f) 11G24, STAB POS MOD RIGHT

(g) 11H10, STAB TRIM POS IND L
or STAB TRIM LEFT POS IND
(h) 11H19, STAB TRIM POS IND RIGHT

S 864-021
(10) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 824-022
(11) If you changed the rig adjustment of the control cables, do the adjustment for the limit switch and position transmitter modules (AMM 27-41-00/501).

S 714-023
(12) If you replaced the middle LSTM,
do the Stabilizer Takeoff Warning Test (AMM 27-48-00/501).

S 714-024
(13) If you replaced the left or right LSTM,
do the tests that follow:

NOTE: Use only the center hydraulic system to do a test for the left module. Use only the right hydraulic system to do a test for the right module.

(a) Do the stabilizer position module (SPM) BITE procedure (AMM 27-48-00/501).
(b) Do the Electrical Travel Limits Test for the stabilizer system (AMM 27-41-00/501).
(c) Do the Stabilizer Trim Position Indicating System Test (AMM 27-48-00/501).

E. Put the Airplane Back to Its Usual Condition

S 864-025
(1) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 414-026
(2) Close the access door for the forward stabilizer compartment, 311AL (AMM 06-42-00/201).

STABILIZER POSITION MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the stabilizer position modules (SPMs). The steps to remove and install the three SPMs are the same.
   B. There are three SPMs are located in the electrical systems card file panel, P50. They are electrostatic sensitive devices.

TASK 27-48-03-024-001

2. Remove the Stabilizer Position Module (SPM)
   A. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 20-10-01/401, E/E Rack Mounted Components
      (3) 20-41-01/201, Electrostatic Discharge Sensitive Devices
      (4) 24-22-00/201, Electrical Power - Control
      (5) 27-61-00/201, Spoiler/Speedbrake Control System
   B. Access
      (1) Location Zones
          119/120 Main Equipment Center
          211/212 Control Cabin

      (2) Access Panel
          119BL Main Equipment Center

   C. Remove the SPM (Fig. 401)

      S 044-002

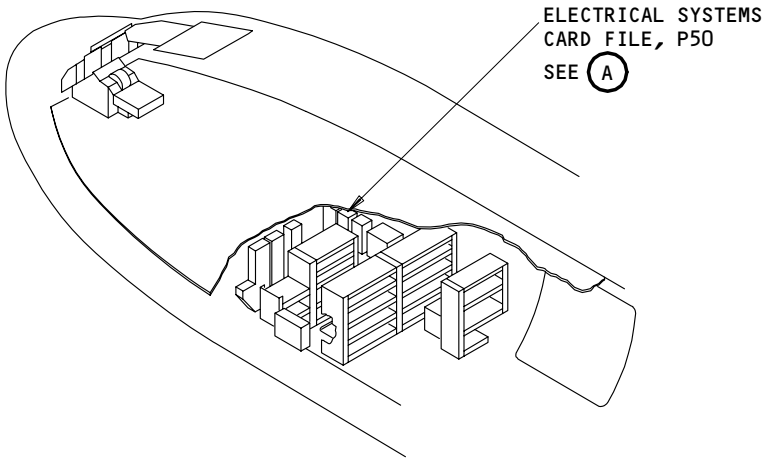
      WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

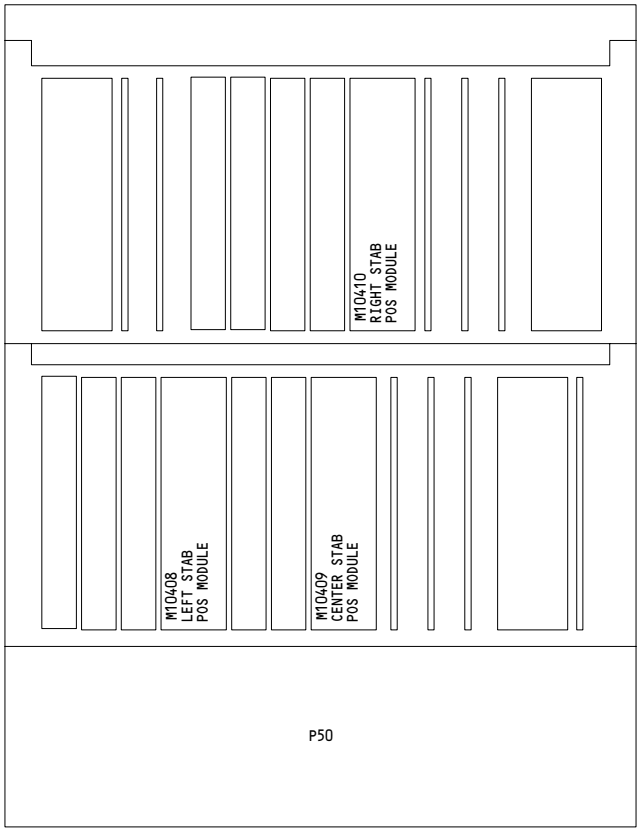
      S 864-003
      (2) Remove electrical power (Ref 24-22-00).

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11F19, STAB POS MOD CENTER
          (b) 11G15, STAB POS MOD LEFT
          (c) 11G24, STAB POS MOD RIGHT

      S 014-005
      (4) Open the access door for the main equipment center, 119BL (Ref 06-41-00).



MAIN EQUIPMENT CENTER



ELECTRICAL SYSTEMS CARD FILE, P50

(A)

Stabilizer Position Module Installation
Figure 401

S 914-006

CAUTION: DO NOT TOUCH THE CARD FILE FOR THE ELECTRICAL SYSTEMS BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE CARD FILE.

(5) Do the procedure for devices that are sensitive to electrostatic discharge (Ref 20-41-01).

S 014-007

(6) Open the door for the electrical systems card file, P50.

S 024-008

(7) Remove the SPM (Ref 20-10-01).

TASK 27-48-03-424-009

3. Install the Stabilizer Position Module (SPM)

A. References

(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 20-10-01/401, E/E Rack Mounted Components
(3) 20-41-01/201, Electrostatic Discharge Sensitive Devices
(4) 22-00-02/201, Maintenance Monitor
(5) 24-22-00/201, Electrical Power - Control
(6) 27-61-00/201, Spoiler/Speedbrake Control System
(7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access

(1) Location Zones

119/120 Main Equipment Center
211/212 Control Cabin

(2) Access Panel

119BL Main Equipment Center

C. Install the SPM (Fig. 401)

S 864-010

(1) Make sure these circuit breakers on the overhead panel, P11, are open:
   (a) 11F19, STAB POS MOD CENTER
   (b) 11G15, STAB POS MOD LEFT
   (c) 11G24, STAB POS MOD RIGHT

S 914-011

CAUTION: DO NOT TOUCH THE CARD FILE FOR THE ELECTRICAL SYSTEMS BEFORE YOU DO THE PROCEDURE FOR DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE. ELECTROSTATIC DISCHARGE CAN CAUSE DAMAGE TO THE CARD FILE.

(2) Do the procedure for devices that are sensitive to electrostatic discharge (Ref 20-41-01).

S 424-012

(3) Install the SPM (Ref 20-10-01).

S 414-013

(4) Close the door for the electrical systems card file, P50.

S 864-014

(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11F19, STAB POS MOD CENTER
   (b) 11G15, STAB POS MOD LEFT
   (c) 11G24, STAB POS MOD RIGHT

D. SPM Test

S 864-015

(1) Supply electrical power (Ref 24-22-00).

S 214-016
(2) Make sure these circuit breakers on the P11 panel are closed:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C5 or 11H11, STAB TRIM CONT L
(c) 11C6, CSEU 1L AC
or FLT CONT ELEC 1L AC
(d) 11C7, CSEU 1L DC
or FLT CONT ELEC 1L DC
(e) 11C8, CSEU 2L AC
or FLT CONT ELEC 2L AC
(f) 11C9, CSEU 2L DC
or FLT CONT ELEC 2L DC
(g) 11C12, STAB TRIM CONT LEFT
(h) 11C13, STAB TRIM CONT RIGHT
(i) 11F19, STAB POS MOD CENTER
(j) 11G15, STAB POS MOD LEFT
(k) 11G17, CSEU 1R AC
or FLT CONT ELEC 1R AC
(l) 11G18, CSEU 1R DC
or FLT CONT ELEC 1R DC
(m) 11G24, STAB TRIM MOD RIGHT
(n) 11G27, CSEU 2R AC
or FLT CONT ELEC 2R AC
(o) 11G28, CSEU 2R DC
or FLT CONT ELEC 2R DC
(p) 11H10, STAB TRIM LEFT POS IND
or STAB TRIM POS IND LEFT
(q) 11H19, STAB TRIM POS IND RIGHT
(r) 11H20, STAB TRIM CONT RIGHT

S 214-017
(3) Make sure the SPM fault balls are not set on the left stabilizer/elevator asymmetry limiter module (SAM) (E3-1 shelf).

S 214-027
(4) Make sure the SPM fault balls are not set on the right SAM (E4-1 shelf).

S 864-018

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left, right and center hydraulic systems (Ref 29-11-00).

S 214-019

(6) Make sure the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, are at the NORM position.

S 864-020

(7) Move the stabilizer to 6 units of trim as shown on the stabilizer position indicators.

S 714-021

(8) Do the MCDP Ground Test 66 - XDCR outputs to get the 66 STAB - DEG/LCR message (Ref 22-00-02).

S 214-022

(9) Make sure the left, center, and right (L,C,R) channels show -2 ± 2 degrees.

E. Put the Airplane Back to Its Usual Condition

S 444-023

(1) Do the activation procedure for the spoilers if you did the deactivation procedure (Ref 27-61-00).

S 864-024

(2) Remove electrical power if it is not necessary (Ref 24-22-00).

S 864-025

(3) Remove the power from the right, left and center hydraulic systems (Ref 29-11-00).

S 414-026

(4) Close the access door for the main equipment center, 119BL (Ref 06-41-00).

STABILIZER TRIM POSITION INDICATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the position indicators for the stabilizer. The steps to remove and install the captain's and first officer's position indicators are the same.

TASK 27-48-06-024-001

2. Remove the Position Indicator
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Removal

      S 864-002
      (1) Supply electrical power (Ref 24-22-00).

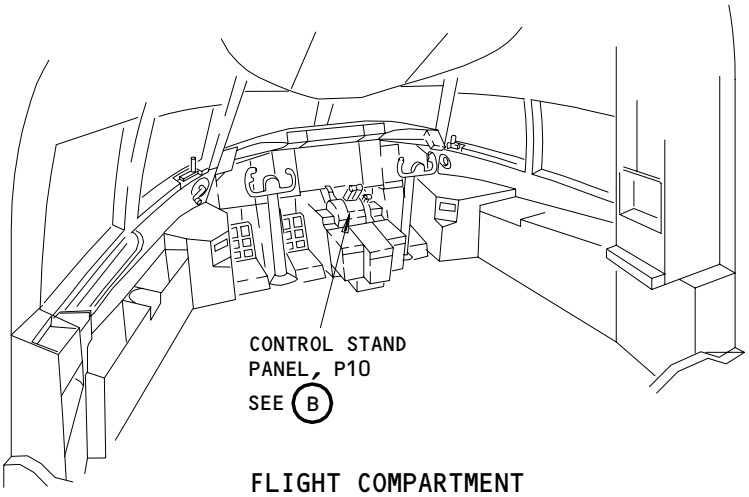
      S 864-003
      (2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the CUTOUT position.

      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B19, STAB TRIM ALT (IF INSTALLED)
          (b) 11C12, STAB TRIM SHUTOFF LEFT
          (c) 11C13, STAB TRIM SHUTOFF RIGHT
          (d) 11H10, STAB TRIM LEFT POS IND
              or STAB TRIM POS IND L
          (e) 11H11 or 11C05, STAB TRIM CONT L
          (f) 11H19, STAB TRIM POS IND RIGHT
          (g) 11H20, STAB TRIM CONT R
   D. Remove the Position Indicator (Fig. 401)

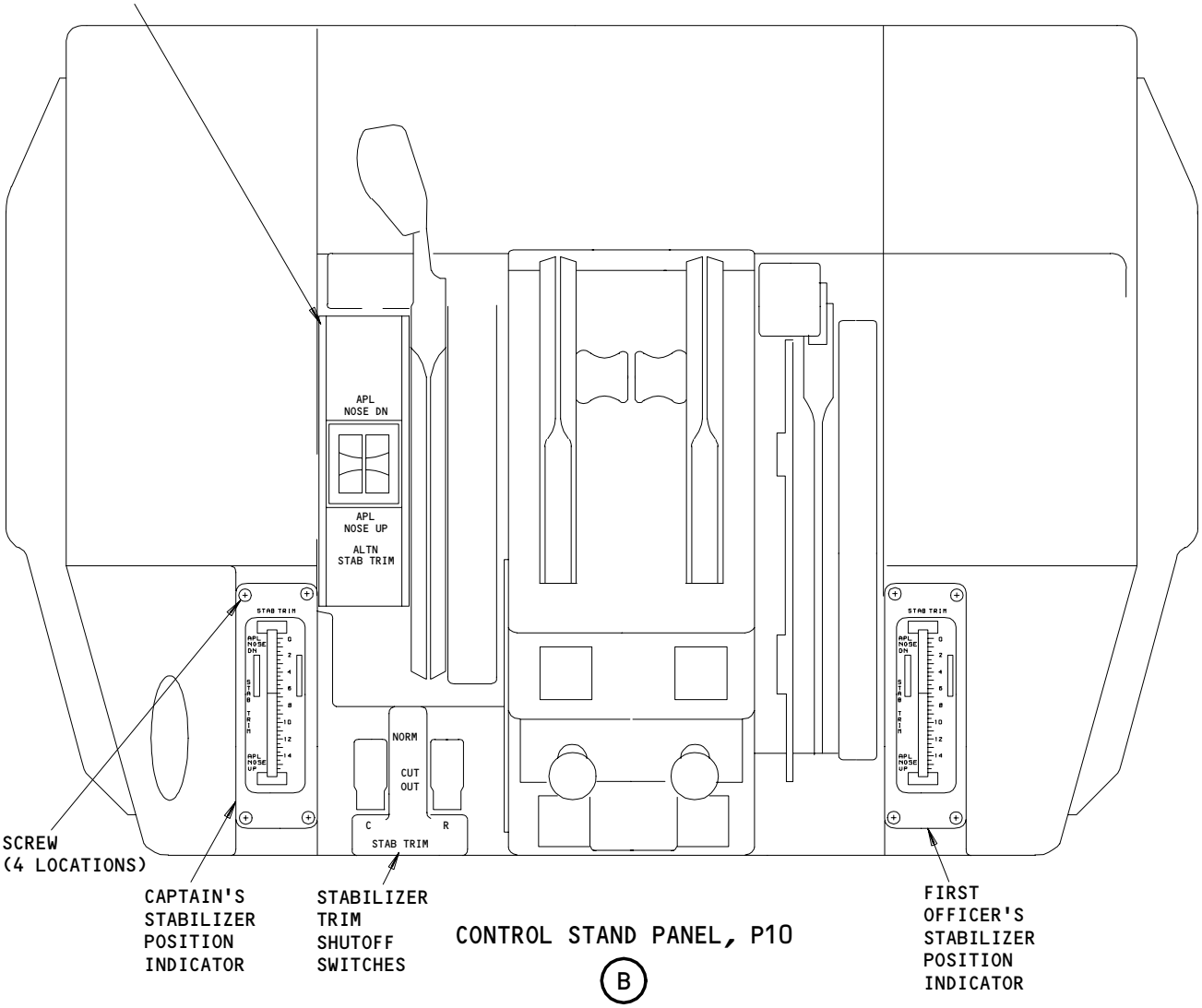
      S 014-005
      (1) Remove the access panel from the side of the control stand.

      NOTE: To remove the captain's position indicator, remove the left side panel. To remove the first officer's position indicator, remove the right side panel.

      S 034-006
      (2) Disconnect the electrical connector from the position indicator.



FLIGHT COMPARTMENT



CONTROL STAND PANEL, P10

(B)

Stabilizer Position Indicator Installation
Figure 401

S 034-007
(3) Remove the screws that hold the position indicator to the control stand.

S 024-008
(4) Remove the position indicator from the control stand.

TASK 27-48-06-424-009

3. Install the Position Indicator

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
211/212 Control Cabin

C. Install the Position Indicator (Fig. 401)

S 424-010
(1) Set the position indicator in the control stand.

S 434-011
(2) Connect the electrical connector to the position indicator.

S 434-012
(3) Install the screws to attach the position indicator to the control stand.

S 414-013
(4) Install the access panel on the side of the control stand.

D. Position Indicator Test

S 864-014
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B19, STAB TRIM ALT (IF INSTALLED)
(b) 11C12, STAB TRIM SHUTOFF LIGHT
(c) 11C13, STAB TRIM SHUTOFF RIGHT
(d) 11H10, STAB TRIM LEFT POS IND
or STAB TRIM POS IND L
(e) 11H11 or 11C05, STAB TRIM CONT L
(f) 11H19, STAB TRIM POS IND RIGHT
(g) 11H20, STAB TRIM CONT R

S 864-015
(2) Put the RIGHT and CENTER STAB TRIM SHUTOFF valve switches on the control stand panel, P10, to the NORM position.

S 864-016

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right and center hydraulic systems (Ref 29-11-00).

S 864-026

(4) Use the alternate stabilizer trim switches to move the stabilizer to the APL NOSE DN and APL NOSE UP travel limits.

S 214-021

(5) Make sure the position indicators follow the stabilizer movement correctly through its full travel range.

S 864-022

(6) Move the stabilizer to its neutral position.

S 214-023

(7) Make sure the position indicators show 4 units of trim (neutral position).

E. Put the Airplane Back to Its Usual Condition

S 864-024

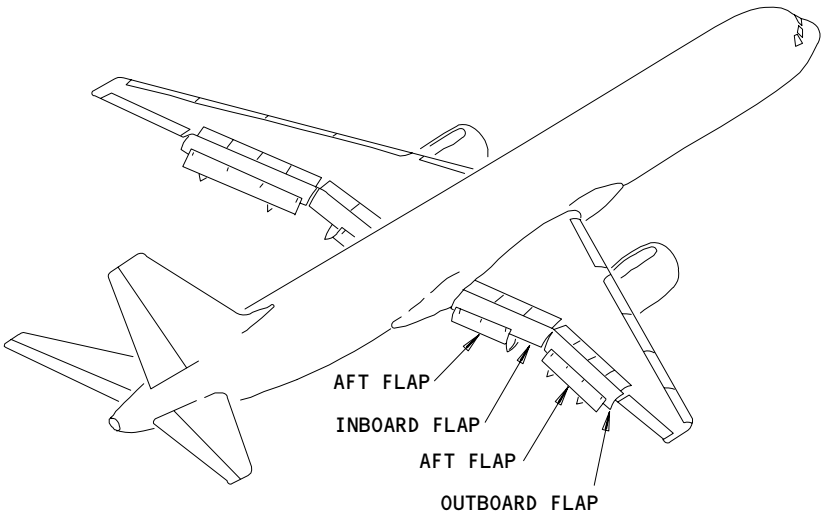
(1) Remove the power from the right and center hydraulic systems (Ref 29-11-00).

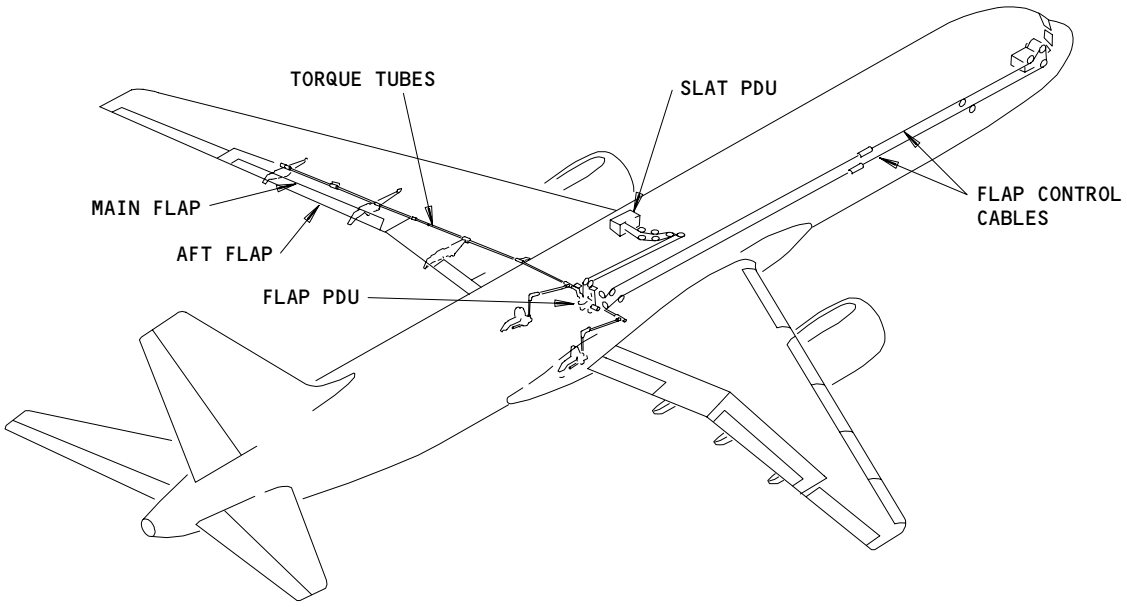
S 864-025

(2) Remove electrical power if it is not necessary (Ref 24-22-00).

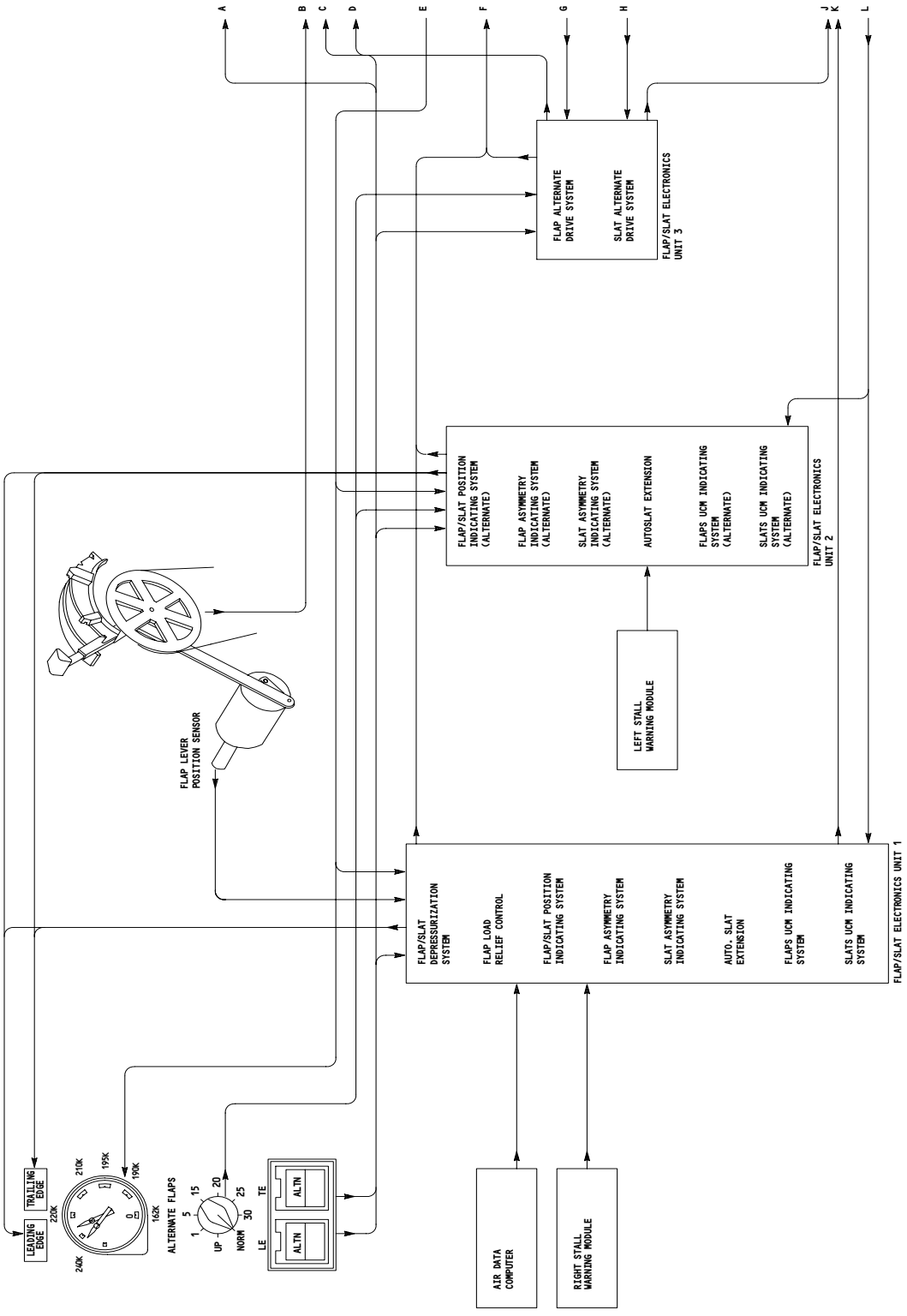
TRAILING EDGE FLAP SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. Introduction (Fig. 1, Fig. 2)
      (1) The trailing edge flaps provide extra aircraft lift during takeoff and landing. When extended the flaps operate in conjunction with leading edge slats to effectively increase camber and area of the wings.
      (2) Increased wing camber and area decreases stall speeds and allows the aircraft to be maneuvered at lower airspeeds. Lower aircraft stall speeds allow lower takeoff and landing speeds. This reduces ground roll, increases wheel and brake life, increases climb-out performance, and creates safer operating conditions.
      (3) There are two flaps on each wing, an inboard flap and an outboard flap. Each flap consists of a main flap and an aft flap. The flaps are faired with the wing for cruise conditions and are extended aft and downward at takeoff and landing.
      (4) During normal operation, the flaps are powered by the left hydraulic system. Normal flap operation is controlled by the flap control lever mounted on the pilot's control stand.
      (5) During alternate operation the flaps are electrically powered. Control of the flaps is provided by a guarded alternate drive arming switch and a rotary alternate flaps/slats position selector switch located on the center panel.
      (6) A flap position indicating system is provided to show flap position during extension and retraction. A combined flaps and slats dial indicator is located on the center instrument panel.
   B. General Description
      (1) Trailing Edge Flap Primary Control (Fig. 3)
         (a) The flaps are normally controlled with the flap control lever on the center aisle stand. Movement of the flap control lever rotates a cable drum attached to the flap control cables. The flap control cables are connected to the input drum on the flap power drive unit (PDU) and cause rotation of the input drum.
         (b) The input drum is connected to a cam which rotates with the drum. This cam is linked to the control valve and positions the control valve spool. The control valve will pass hydraulic fluid to the retract or extend port of the PDU hydraulic motor depending upon flap control lever input.
         (c) As the flaps move towards the commanded setting a feedback mechanism repositions the control valve spool to a neutral position, stopping the hydraulic motor.
      (2) Trailing Edge Flap Alternate Control (Fig. 4)
         (a) Back up operation of the flap system is done electrically.

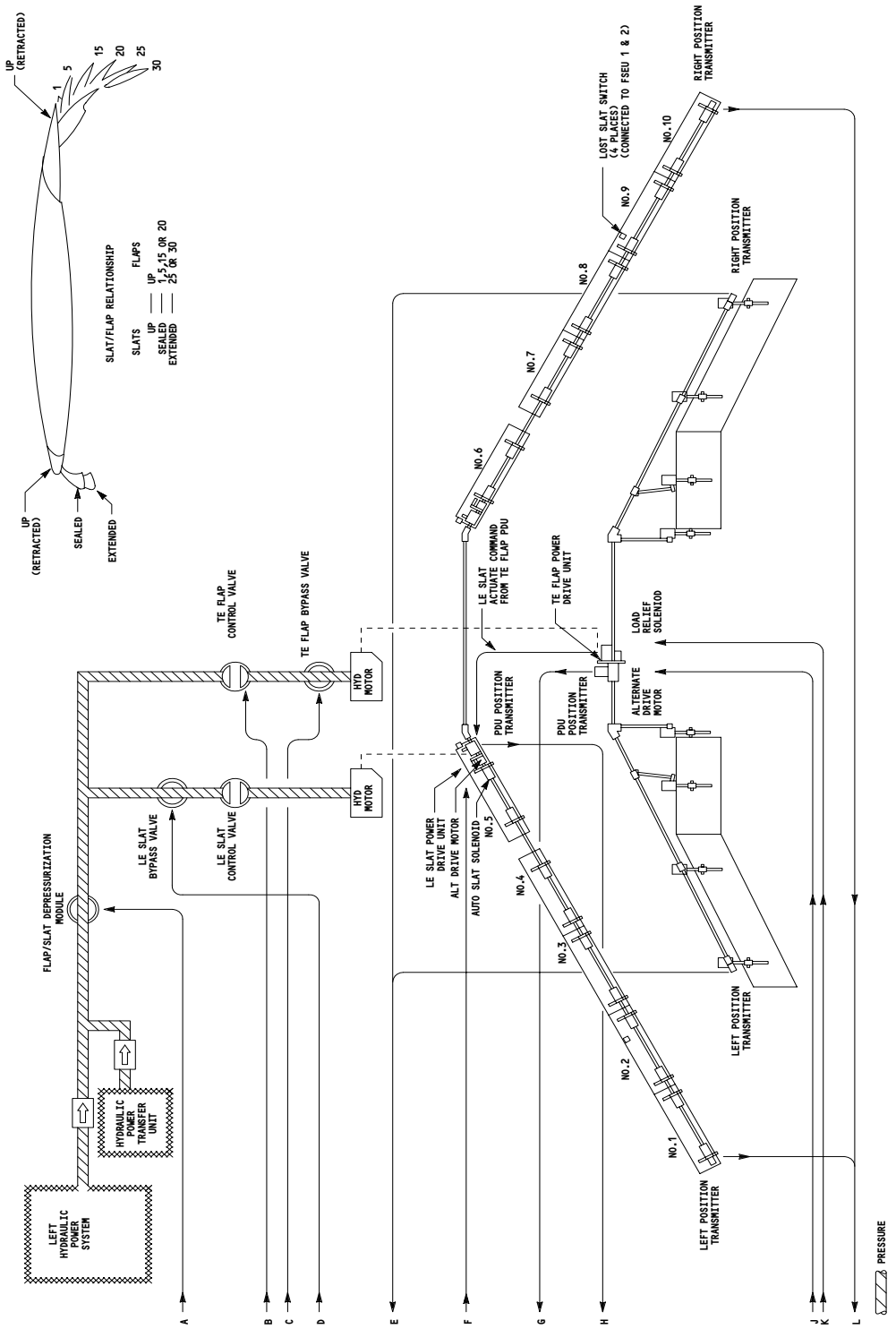




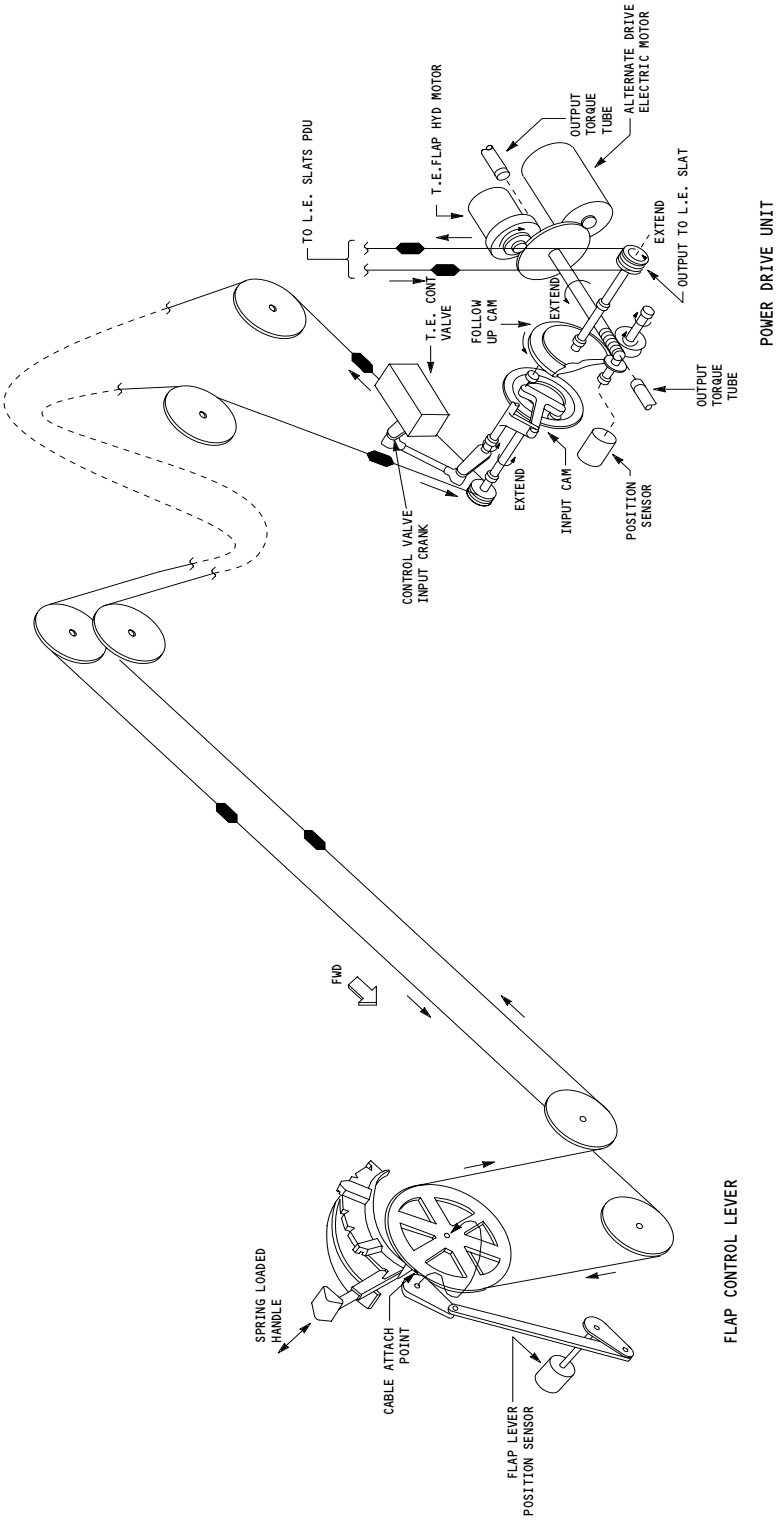
Trailing Edge Flaps
Figure 1



High Lift System Block Diagram
Figure 2 (Sheet 1)

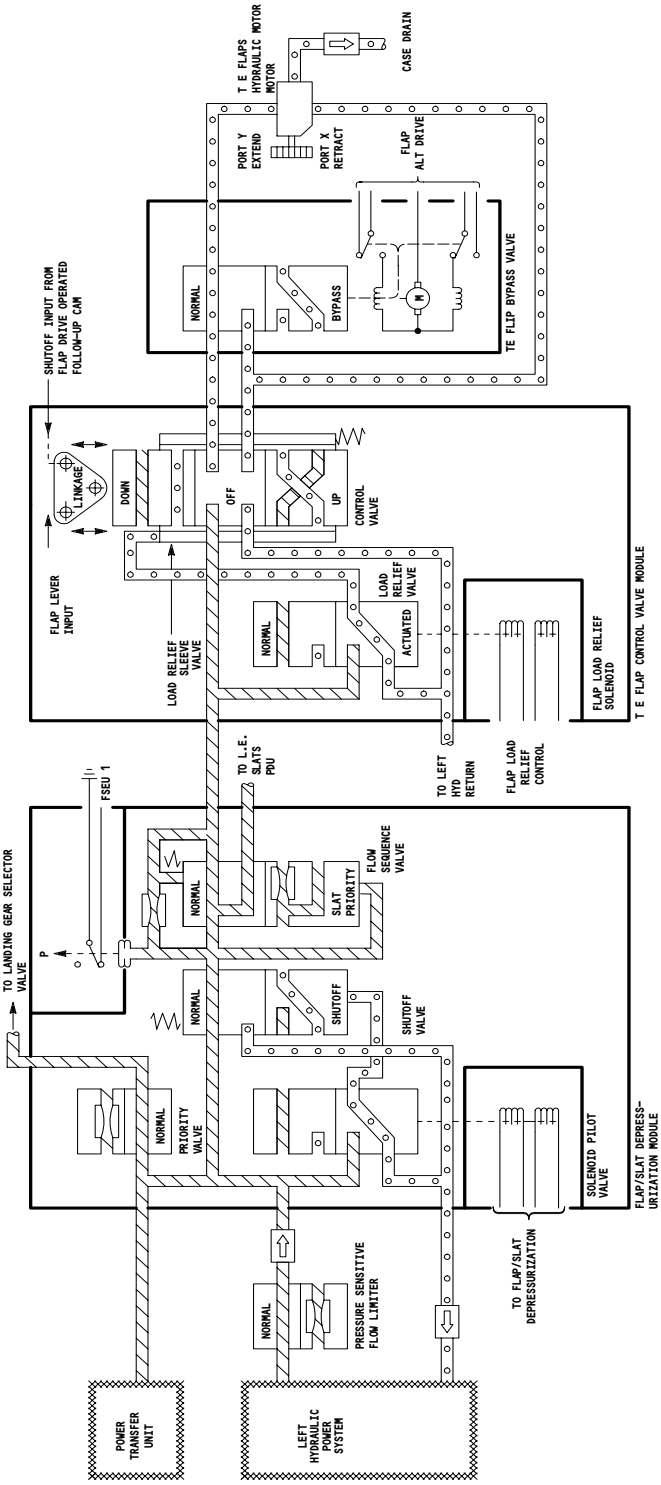


High Lift System Block Diagram
Figure 2 (Sheet 2)

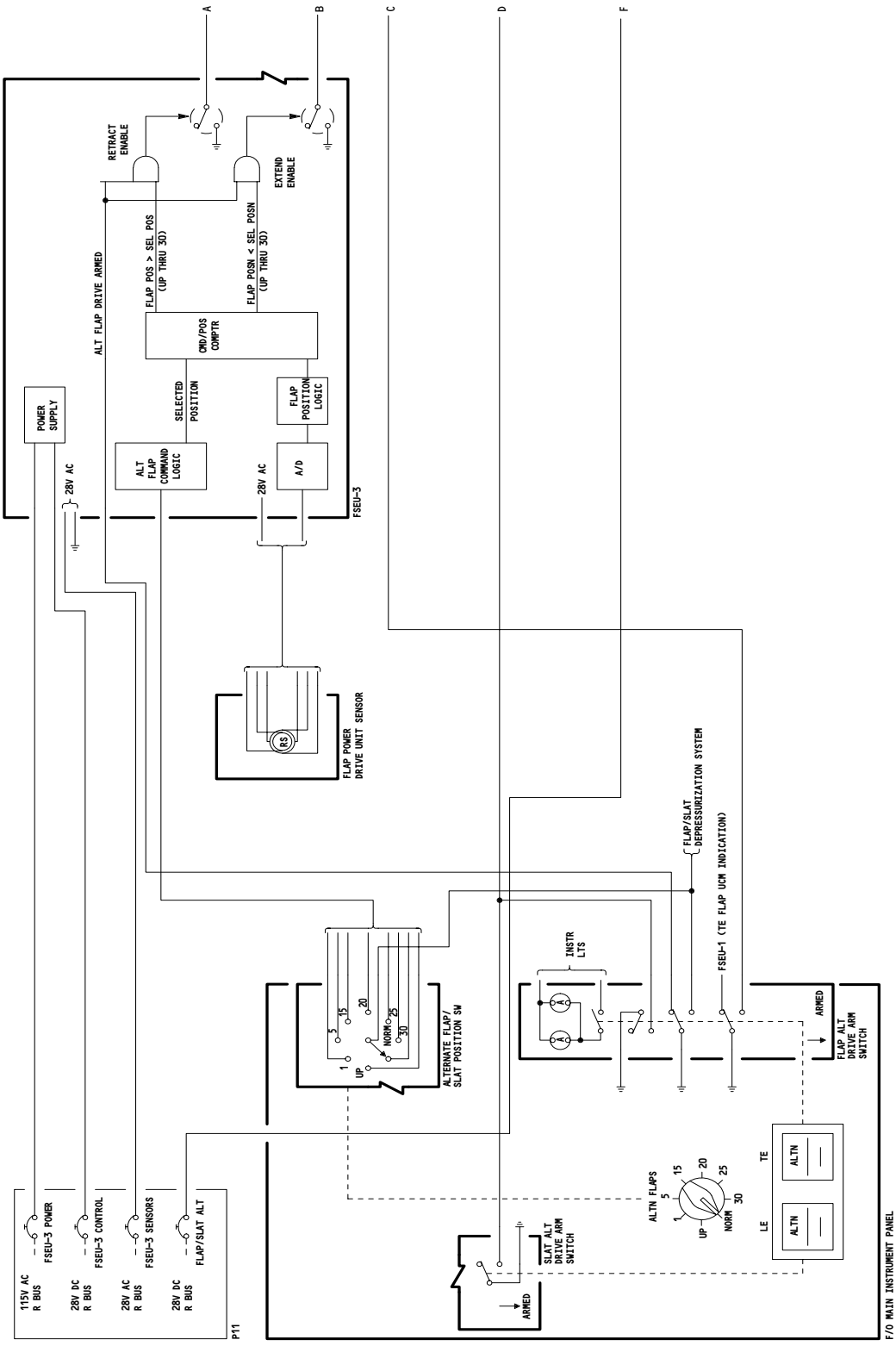


NOT ARROWS INDICATE FLAPS DOWN INPUT DIRECTION

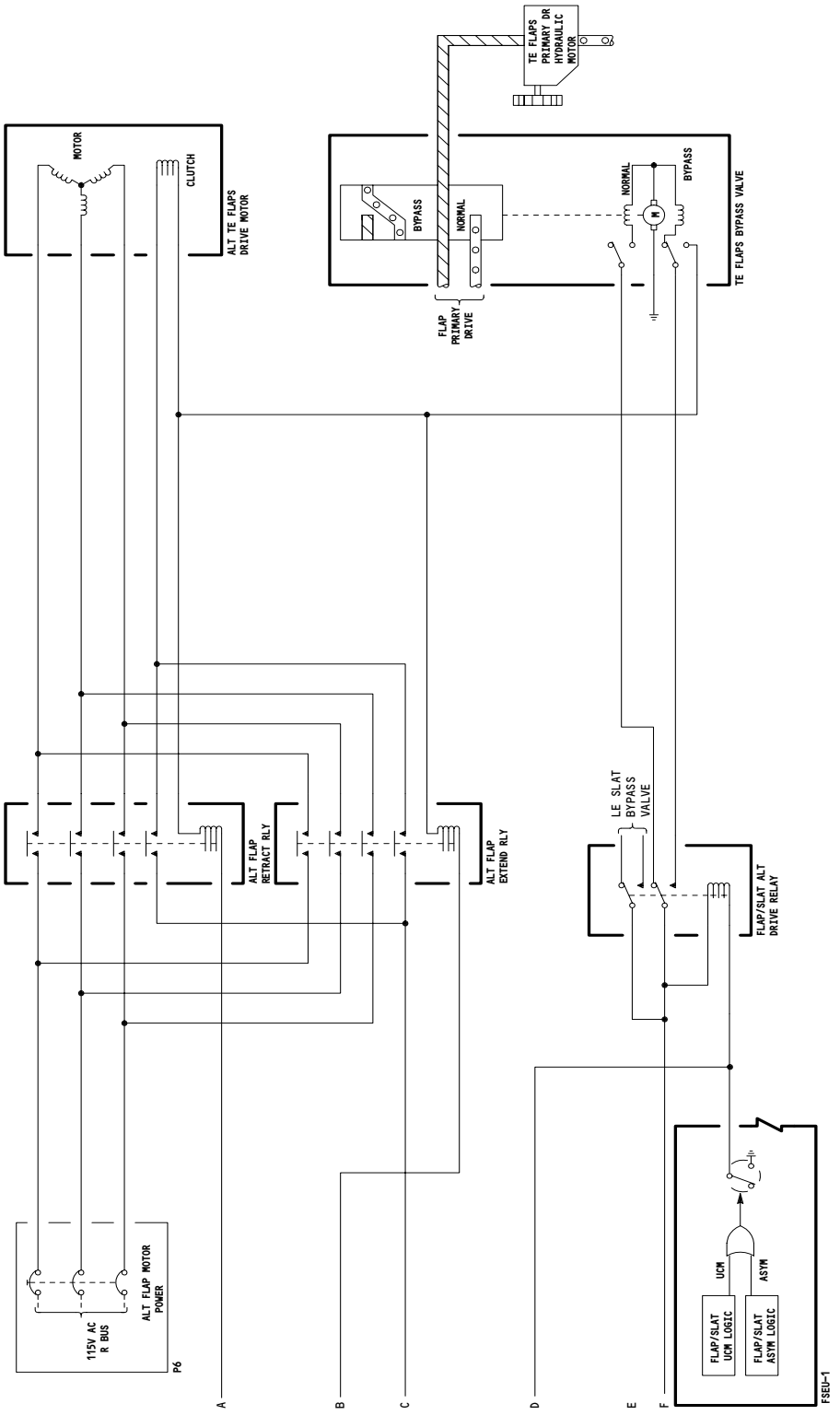
Trailing Edge Flaps Primary Drive Schematic
Figure 3 (Sheet 1)



Trailing Edge Flaps Primary Drive Schematic
Figure 3 (Sheet 2)



Trailing Edge Flap Alternate Drive System Schematic
Figure 4 (Sheet 1)



Trailing Edge Flap Alternate Drive System Schematic
Figure 4 (Sheet 2)

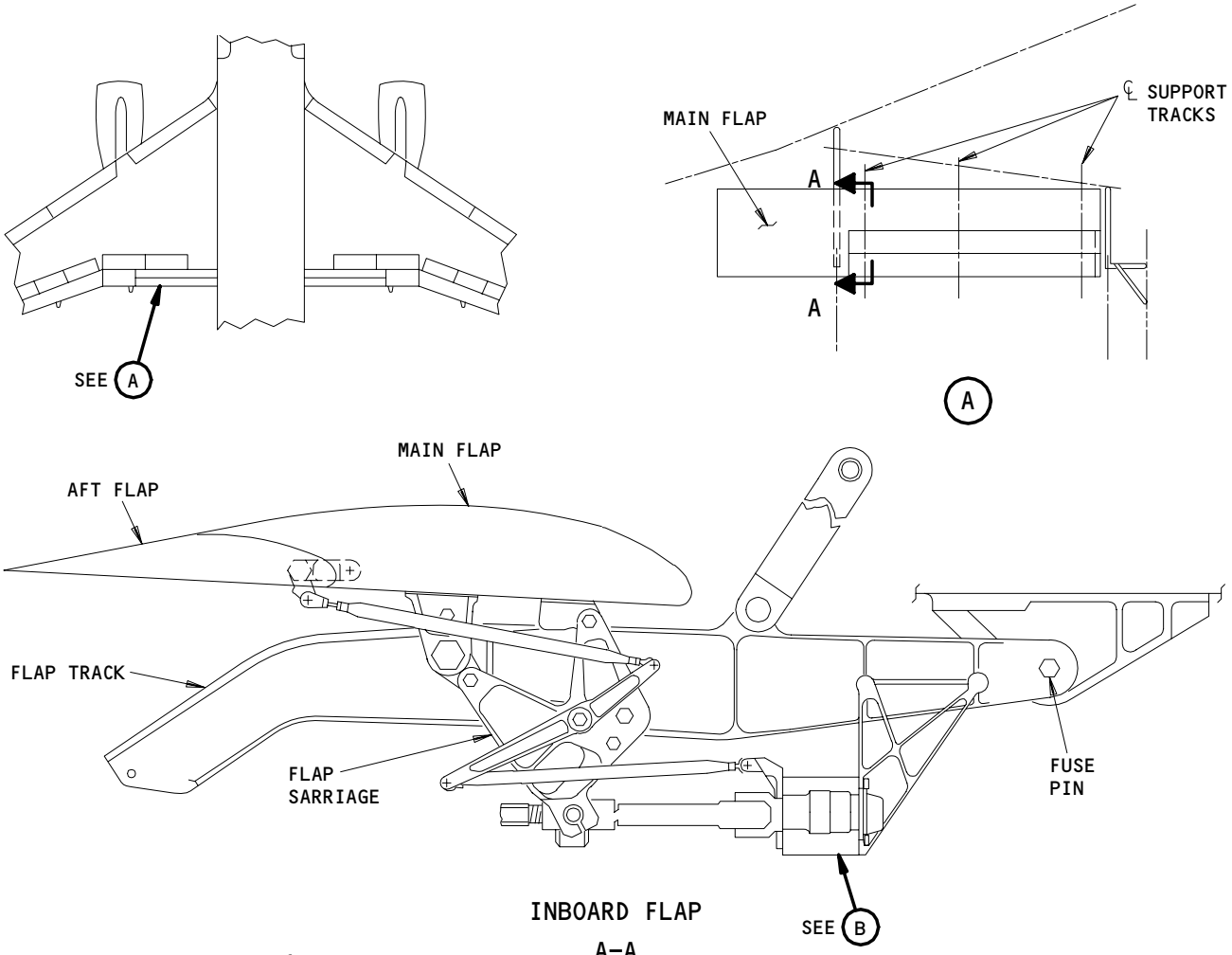
(b) The flap system is controlled electrically by a rotary position switch and the trailing edge arming switch.
(c) The arming switch moves both flap and slat bypass valves to the bypass position and closes the flap/slat depressurization valve to remove hydraulic pressure from the high lift hydraulic system.
(d) The rotary selector switch commands a closed loop electrical system that selects the same seven flap positions as the hydraulic control system. Rotary selector switch position is monitored by FSEU-2 and FSEU-3. FSEU-3 generates signals to close extend or retract relays which power the PDU electric motor and engergize the electric motor clutch.
(e) A position transmitter on the PDU sends flap position data to FSEU-3. The FSEU uses this data to control alternate motor operation. When the flaps reach the commanded position the drive relays are opened, the clutch is released, and the alternate drive motor stops.

(3) Primary Power
(a) The left hydraulic system provides primary power to the flap drive system.
(b) In the event of a left engine failure, the flaps and slats, as well as the landing gear, are powered by the power transfer unit (PTU). The PTU consists of a hydraulic motor which drives a hydraulic pump. The PTU motor is powered by the right hydraulic system and the PTU pump provides left hydraulic system pressure.

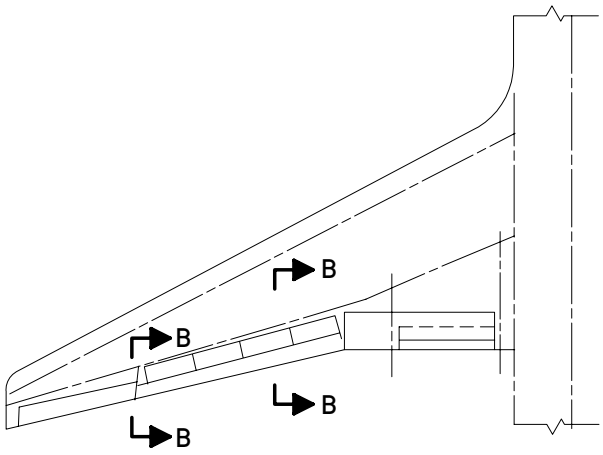
(4) Alternate Power
(a) The flaps are driven by an electric motor in the alternate control mode. The electric motor runs on 3-phase, 400 Hz, 115-volt AC current provided by the right AC bus.

(5) Flap Drive System (Fig. 5).
(a) The flaps are positioned by two ballscrew actuators attached to each flap. The ballscrews are driven through a system of transmissions and gearboxes which attach to the torque tube system. The torque tubes extend out into each wing and are powered by the flap power drive unit (PDU).
(b) Each flap rides on two flap tracks which determine the angle that the flap makes with the wing and which transfer the lifting forces of the flaps to the wing structure.
(c) The aft flaps ride on tracks within the flap structure and are driven to the extended position by bellcranks and connecting rods.
(d) The outboard flap track for the inboard flap is attached to the forward support fitting of the wing by a fuse pin. Both the inboard and outboard flap tracks for the outboard flap are attached to the wing by fuse bolts. These fuse pins and bolts shear under extreme load to prevent major damage to the wing structure.

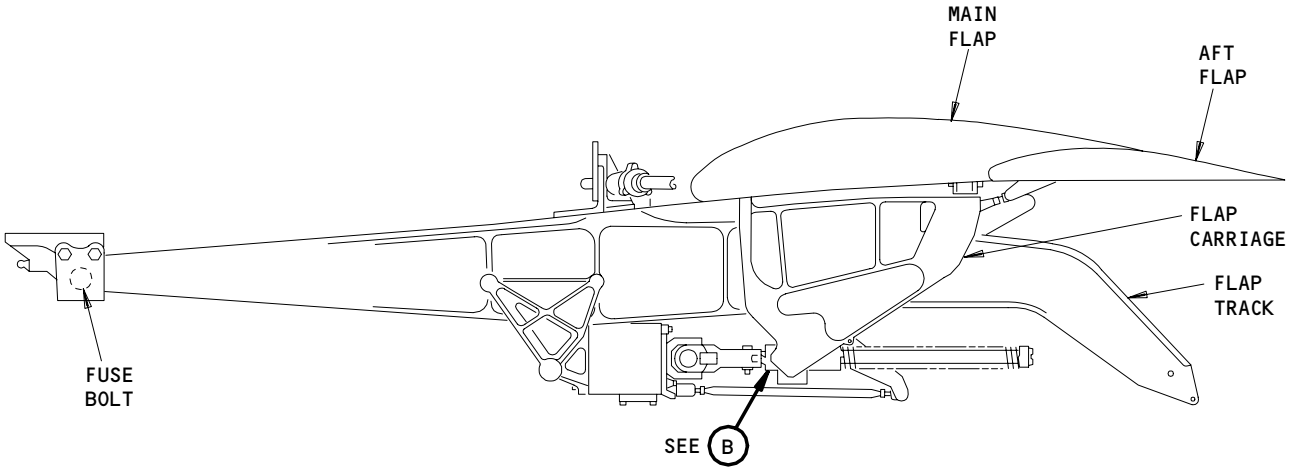
(6) Flap Load Relief (Fig. 6)



Flap Drive System
Figure 5 (Sheet 1)



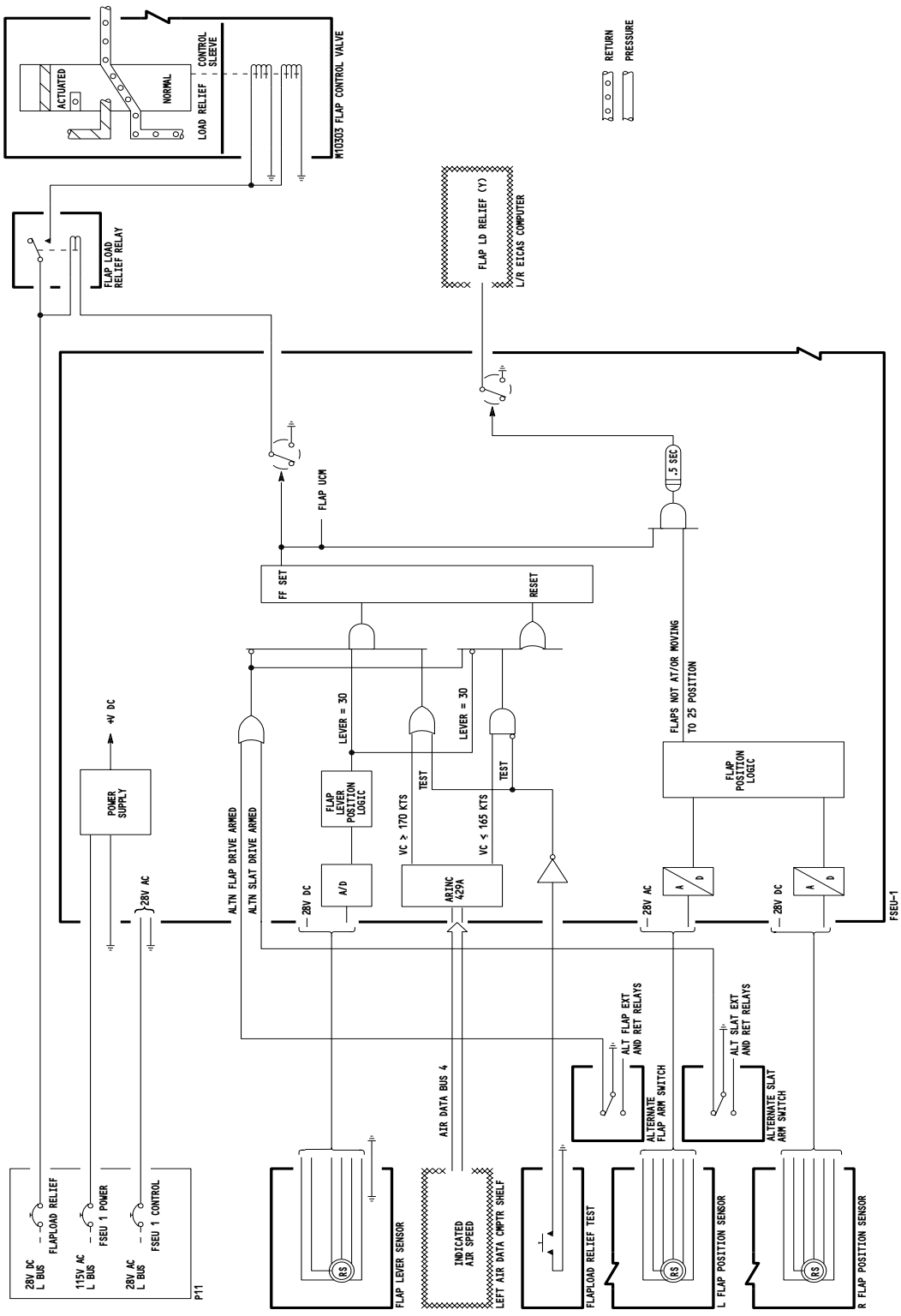
LEFT WING
PLAN VIEW



OUTBOARD FLAP

B–B

Flap Drive system
Figure 5 (Sheet 2)



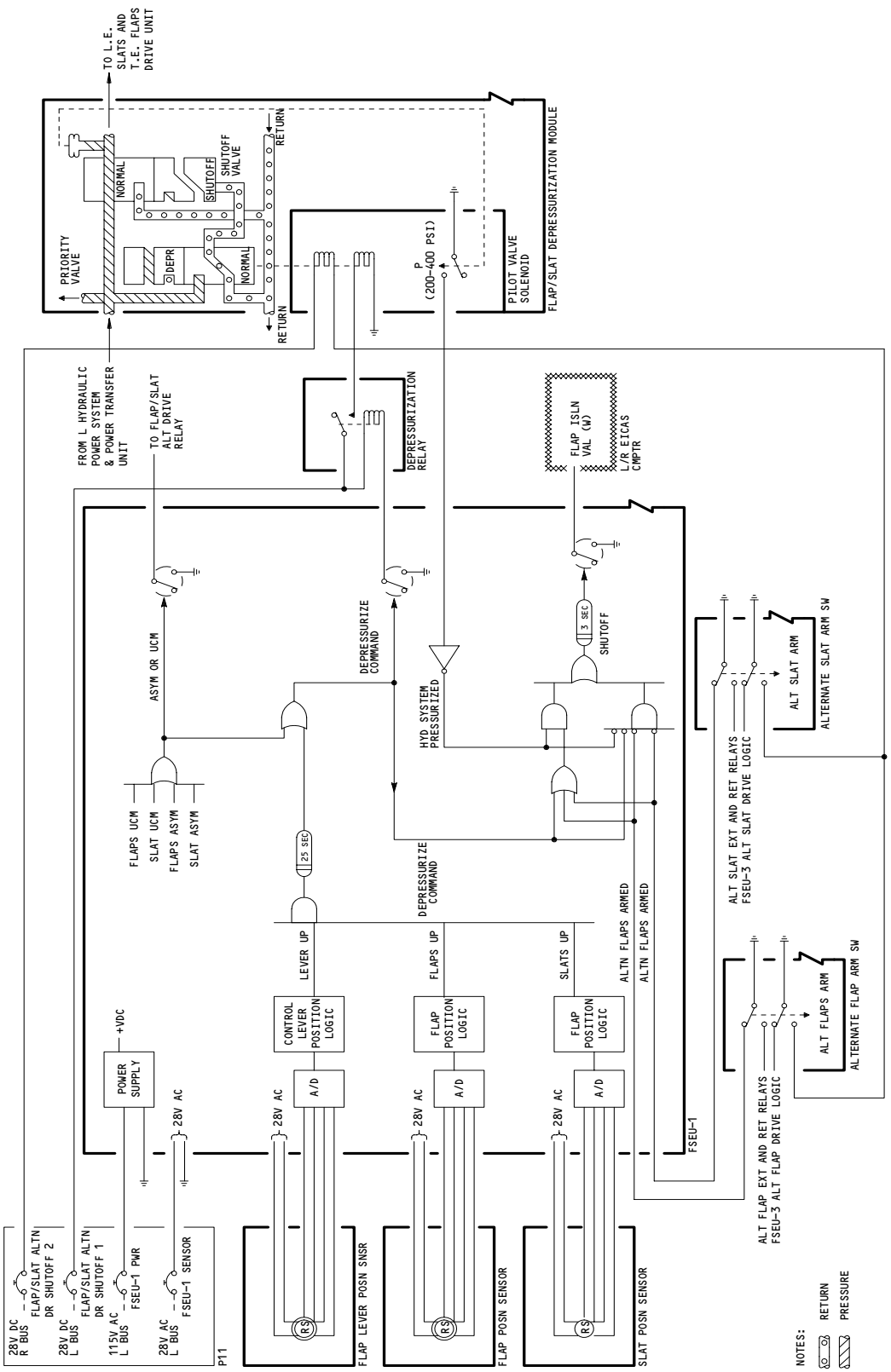
Flap Load Relief System Schematic
Figure 6

53068

(a) The flap load relief system provides automatic retraction of the flaps from the 30-unit position to the 25-unit position to protect the flaps from excessive airloads.
(b) The flap load relief system operates only when the flap lever is positioned in the 30-unit detent. FSEU-1 recieves airspeed data from the digital air data computer. If this speed exceeds 170 knots the FSEU sends a signal to the flap load relief solenoid on the flap control valve. The solenoid moves the control valve sleeve allowing hydraulic fluid to pass to the hydraulic motor and drive the flaps to the 25-unit position.
(c) The flaps will return to the 30-unit position when airspeed is reduced to 165 knots.
(d) The flap control lever will not change position during load relief.
(e) The flap load relief system is inoperative when the alternate drive system is armed.

(7) Depressurization (Fig. 7)
(a) The flap/slat depressurization module shuts off hydraulic power to the flaps and slats when the flaps have been retracted for 25 seconds or when the alternate drive systems are armed. Asymmetry or uncommanded motion causes hydraulic shutdown of the flap/slat systems as described in 27-58-00, Trailing Edge Flap System Position Indicating System - Description and Operation.
(b) When depressurization occurs for asymmetry or uncommanded motion failures, the flaps remain in the position where failure occurs.
(c) Depressurization of the flap/slat system is commanded by signals from FSEU-1.

(8) Uncommanded Motion (Fig. 16).
(a) Flap uncommanded motion is defined as the failure of the flaps to be in, or driving toward the commanded position.
(b) In the normal mode, FSEU-1 monitors uncommanded motion by comparing the output from the flap control lever resolver with resolvers at the outboard ends of the torque tubes. If the flap lever is out of any detent for more than 25 seconds, or if the flaps are stationary and out of the commanded position, or if the flaps are moving away from the commanded position, a failure condition exists.



Flap/Slat Depressurization System Schematic
Figure 7

(c) In the event of an uncommanded motion failure the EICAS display panel will show a TE FLAP DISAGREE message and the amber TRAILING EDGE light comes on. The FSEU commands hydraulic shutdown of the flap/slat systems as described in 27-58-00, Trailing Edge Flap System Position Indicating System - Description and Operation.

(d) In the alternate control mode, FSEU-2 compares the rotary switch position with resolvers at the outboard ends of the torque tubes. Any uncommanded motion results in failure annunication messages only, as the slow system travel rates allow the system to be shut down in time to avoid a dangerous flight configuration.

(9) Asymmetry (Fig. 17)

(a) A difference of 4% in right flap travel compared to left flap travel is considered an asymmetry condition.

(b) FSEU-1 detects flap asymmetry by comparing resolver output from each wing.

(c) In normal control mode an asymmetry condition causes the FSEU to command hydrualic shutdown of the flap/slat systems as described in 27-58-00, Trailing Edge Flap System Position Indicating System - Description and Operation. The amber TRAILING EDGE light comes on and the EICAS display screen will show a TE FLAP ASYM message.

(d) In alternate mode FSEU-2 detects an asymmetry condition resulting in the TE FLAP ASYM message on the EICAS display and illumination of the amber TRAILING EDGE lights.

2. Component Details

A. Flap Control Lever (Fig. 8)

(1) The flap control lever, located on the center aisle stand, controls operation of the flaps and slats during normal operation.

(2) The lever assembly consists of a spring-loaded telescoping handle and a cable drum.

(3) The control stand has detents at the 0-, 1-, 5-, 15-, 20-, 25-, and 30-unit positions. The flap lever is spring-loaded to lock into each detent. Lifting the lever releases the handle to allow rotation.

(4) If the flap lever is not in any detent or not properly seated in a detent for 25 seconds, a condition exists that results in FSEU commands to depressurize the flap/slat hydraulic systems and to move both flap and slat bypass valves to the bypass condition. The amber TRAILING EDGE light comes on and the EICAS display screen will show a TE FLAP DISAGREE message.

(5) Gates are provided at detents 1 and 20 to prevent inadvertent movement past these positions.

(6) Flap control lever position is electrically monitored by a resolver attached to the flap lever by linkages.

B. Alternate Control Panel

(1) The flap/slat systems are controlled electrically by a rotary position switch and the leading and trailing edge arming switches. The arming switches operate the hydraulic motor by-pass valves and depressurize the high lift system hydraulics.

(2) The rotary switch energizes the electric motor clutches and commands a closed loop electrical system that selects the same seven flap positions as the hydraulic control system (except that slats are fully extended for the 20-unit position selection) . Slats are commanded to the fully extended position for the 20-, 25-, and 30-unit positions, and to the intermediate position for the 1-, 5-, and 15-unit positions. Flaps extend to the same positions as under normal hydraulic control.

C. Flap Control Cables

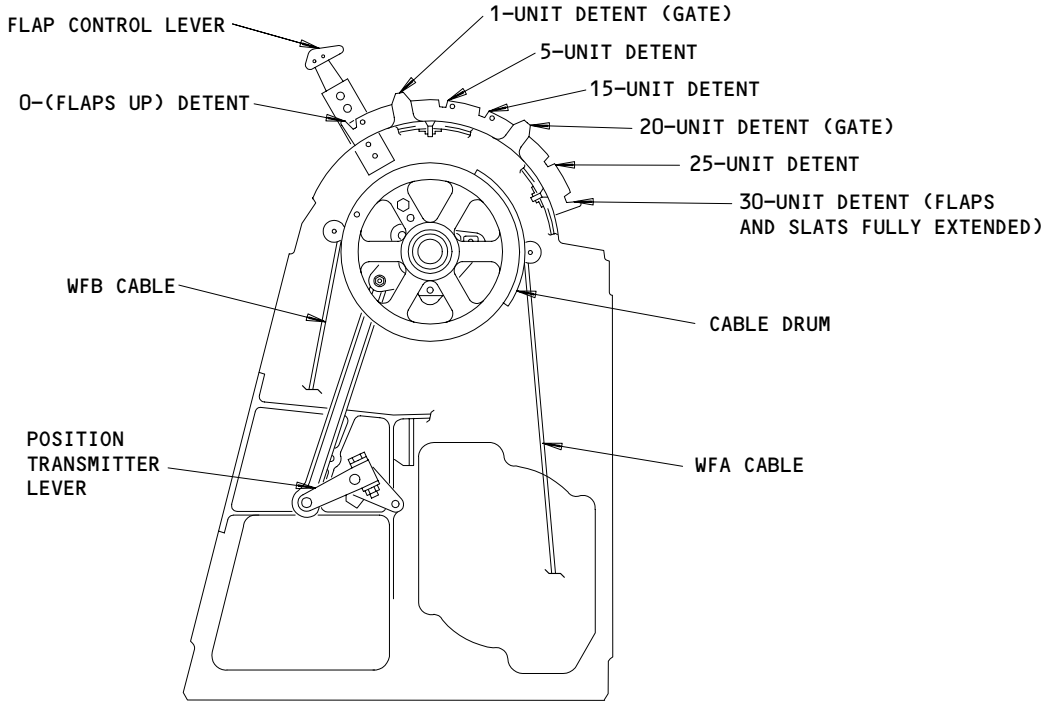
(1) Two control cables, WFA and WFB, are attached to the cable drum on the flap control lever. Control movements of the flap control lever are transferred to the flap drive system by these cables. Cable WFA is the flap retract cable and cable WFB is the flap extend cable.

(2) The control cables run from the cable drum under the cabin floor and back to the PDU at the forward end of the left main wheel well.

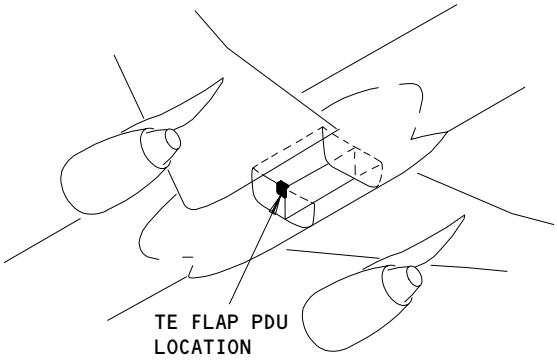
(3) The control cables are attached to the flap PDU input drum.

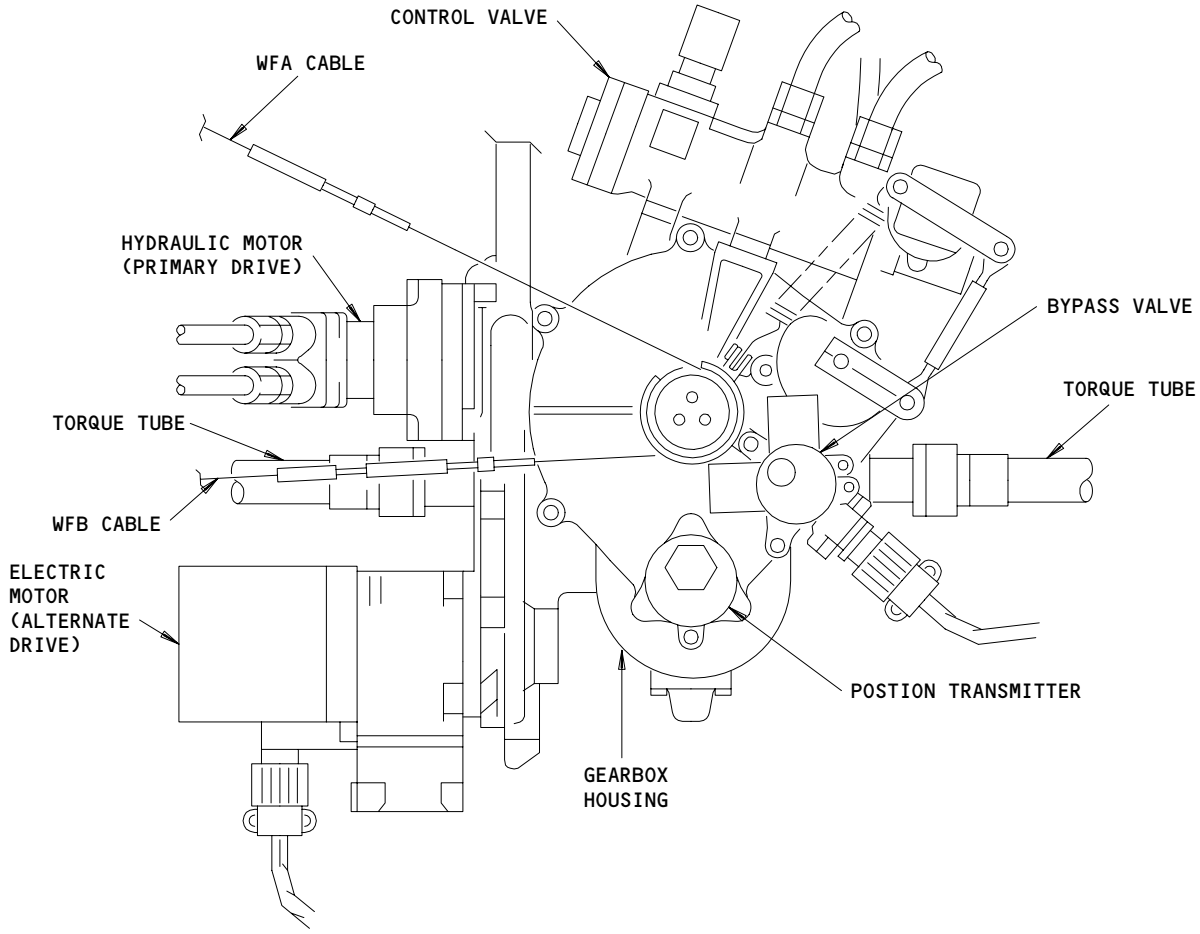
D. Flap Power Drive Unit (PDU) (Fig. 9)

(1) The flap power drive unit is the source of mechanical power for the flap drive system.



Flap Control Lever
Figure 8





Flap Power Drive Unit (PDU)
Figure 9

(2) The flap PDU is a gearbox housing. Mounted on the housing is a hydraulic motor, alternate electric motor, hydraulic bypass valve, control valve assembly, mechanical controls and a rotary position transmitter.
(3) The hydraulic and electric motors drive the common gear train which drives the torque tubes.
(4) The hydraulic motor powers the flap drive system during normal operation. The motor is a constant displacement, bent axis, piston type motor, designed for reversible operation at a supply system pressure of 3000 psi. The hydraulic motor has a rated speed of 3760 RPM which drives the PDU gear train to yield a torque tube output of 857 RPM.
(5) The alternate electric motor is mounted on the PDU housing and provides power to the flaps if hydraulic power is not available. The electric motor is a 400-Hz, 3-phase, 115 VAC motor with a cable clutch and a planetary gear set final drive.
    (a) The motor is controlled by FSEU-3 and relays for extension or retraction. The rotary position selector switch commands motor actuation through the FSEU.
    (b) A solenoid engages the cable clutch when AC power is supplied to the motor.
    (c) A torque limiter in the motor housing protects the motor in the event of a drive system jam.
    (d) The alternate electric motor has a rated speed of 275 RPM which gives a PDU output speed of 164 RPM.
    (e) Maximum duty cycle for the electric motor is 4 minutes (3 minutes off) to avoid overheating.
(6) The hydraulic control valve directs hydraulic fluid to the retract or extend ports of the hydraulic motor to power the flap drive system.
    (a) The control valve is a mechanically operated slide valve containing a solenoid valve to override normal slide position.
    (b) Position of the valve slide is determined by rotation of an input crank. The input crank is driven by a linkage system which positions the crank according to location of cams in the PDU.
    (c) The valve slide directs hydraulic fluid to the hydraulic motor until the input crank moves the slide to a position where hydraulic fluid is cut off.
    (d) The solenoid on the control valve moves a sleeve which surrounds the valve slide. When the solenoid is powered by FSEU-1 due to a flap load relief condition the solenoid moves the sleeve and opens up the ports to the hydraulic motor.
(7) Position of the flap control valve input crank is controlled by cams in the PDU.
    (a) Movement of the flap control lever causes rotation of the input drum of the flap PDU. Connected to this drum is the input cam. A cam follower is moved when the input cam rotates. This cam follower is linked to the input crank of the control valve and determines valve position.

(b) A followup cam is driven by the gearbox in the PDU. When the flaps are driven the gearbox rotates the followup cam which moves a cam follower. This cam follower is linked to the input crank on the control valve. As the flaps approach their commanded position the followup cam moves the linkages to return the control valve slide to its null position, shutting off hydraulic power to the motor.

(c) A drum attached to the followup cam drives the cables which control slat PDU operation. Unless the flap PDU gear train has been driven there is no movement of the followup cam and the slats will not move.

(8) The bypass valve removes hydraulic power from the PDU during alternate flap operation or during protective flap drive system shutdown.

(a) The bypass valve is a 3-port, 2-position, motor-operated rotary valve. It has a manual override lever to allow hydraulic bypass during maintenance operations.

(b) When in the bypass position the bypass valve connects the extend and retract ports of the hydraulic motor, preventing the hydraulic motor from jamming the flap drive system.

(9) The resolver on the PDU transmits information on the angular position of the PDU gear train to FSEU-3. The FSEU uses this position information to control the alternate electric motor.

(10) The PDU must be rigged to ensure that the PDU will move the flaps to the commanded position.

(a) A rig pin inserted in the flap PDU input cam is used to adjust the cables between the flap lever and the PDU.

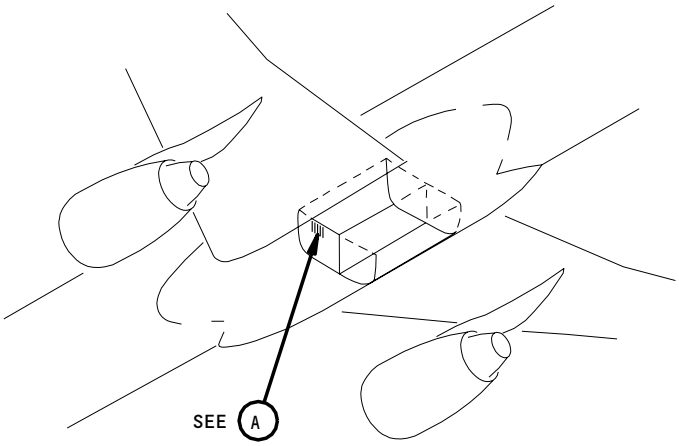
(b) Correct alignment of the followup cam is found by lining up a mark on the PDU with a mark on the output drum.

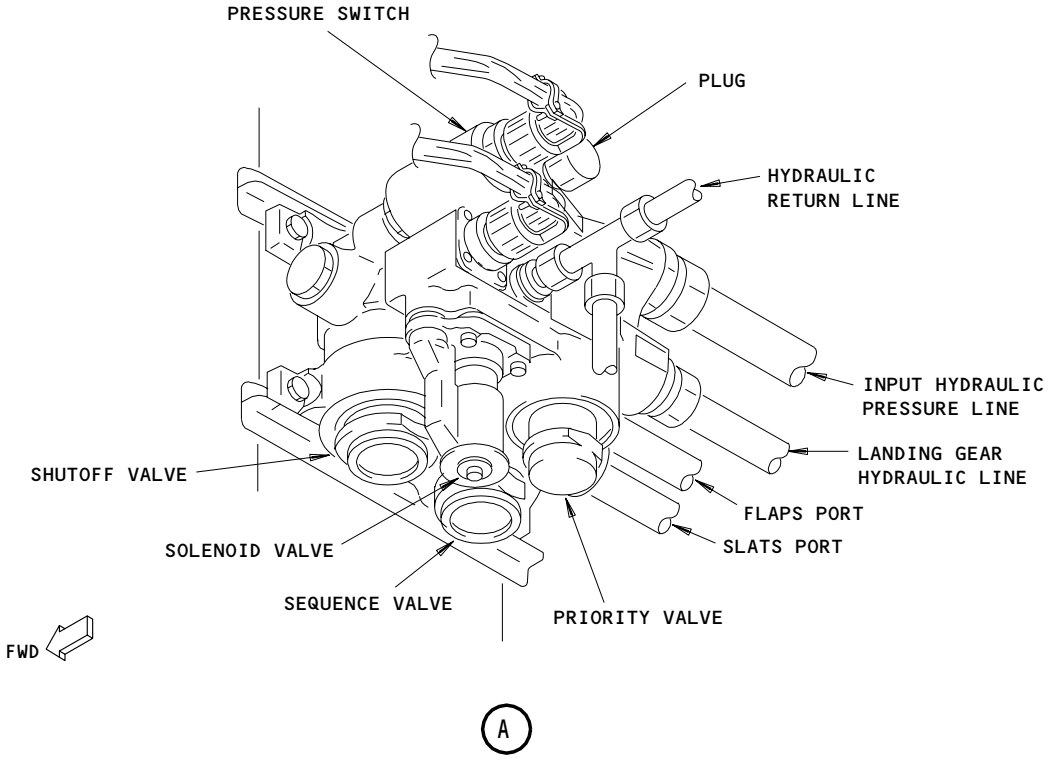
(c) Hydraulic null for the control valve is approximated by lining up a mark on the input crank with a mark on the valve body. The hydraulic null is adjusted to the followup cam by pressurizing the hydraulic system, allowing the system to stop at hydraulic null and adjusting the linkage to the control valve input crank so that the followup cam is aligned at the same time the control valve is hydraulically nulled.

E. Flap/Slat Depressurization Module (Fig. 10)

(1) The flap/slat depressurization module is installed in the left main gear wheel well directly forward of the flap PDU. The hydraulic flow to the flap and slat hydraulic motors passes through the depressurization module.

(2) The primary function of the depressurization module is to remove hydraulic power from the flap and slat drive systems during cruise or in the event of drive system failures. Depressurization at cruise reduces valve erosion and minimizes the possibility of uncommanded flap/slat motion. In the event of a flap asymmetry condition or uncommanded motion problem, the flap/slat systems are shut down hydraulically as described in 27-58-00, Trailing Edge Flap System Position Indicating - Description and Operation.





Flap/Slat Depressurization Module
Figure 10

(3) The depressurization module contains a solenoid pilot valve, a shutoff valve, a landing gear priority valve, a flap/slat sequencing valve and a pressure switch.

(4) Solenoid Pilot Valve and Shutoff Valve

(a) The shutoff valve closes off hydraulic pressure to the flap/slat systems. The shutoff valve is actuated to the shutoff position by hydraulic pressure ported to the valve by the solenoid pilot valve.

(b) The shutoff valve is normally spring-loaded open. When FSEU-1 commands depressurization the solenoid pilot valve opens, letting hydraulic pressure close the shutoff valve.

(c) In the event of an electrical failure the shutoff valve remains open so that hydraulic control of the flaps and slats is available.

(d) The solenoid pilot valve has two coils. FSEU-1 powers one coil to open the valve when the airplane is in cruise configuration or a failure exists in the flap/slat drive systems. The other coil is powered when either the flap or slat alternate drive system is armed.

(5) The pressure switch provides information to the airplane maintenance system. If the hydraulic pressure remains high during a depressurized state, or low during a pressurized state, a FLAP ISLN VAL message is sent to the EICAS computer.

(6) The landing gear priority valve gives flap and slat operation priority over landing gear operation. If pressure in the left hydraulic system drops below 1800 psi the priority valve closes, leaving a 3-gallon per minute orifice for the landing gear.

(7) The flap/slat sequencing valve serves to reduce total flow to the flaps and slats when both systems are operating at the same time. The valve normally serves as a flow limiter to the flap system. When slat motion is commanded, flow to the flap system is reduced to allow adequate flow to the slat system. Total flow to the flaps and slats is limited to assure adequate flow to other hydraulic systems.

F. Flap Torque Tubes (Fig. 11)

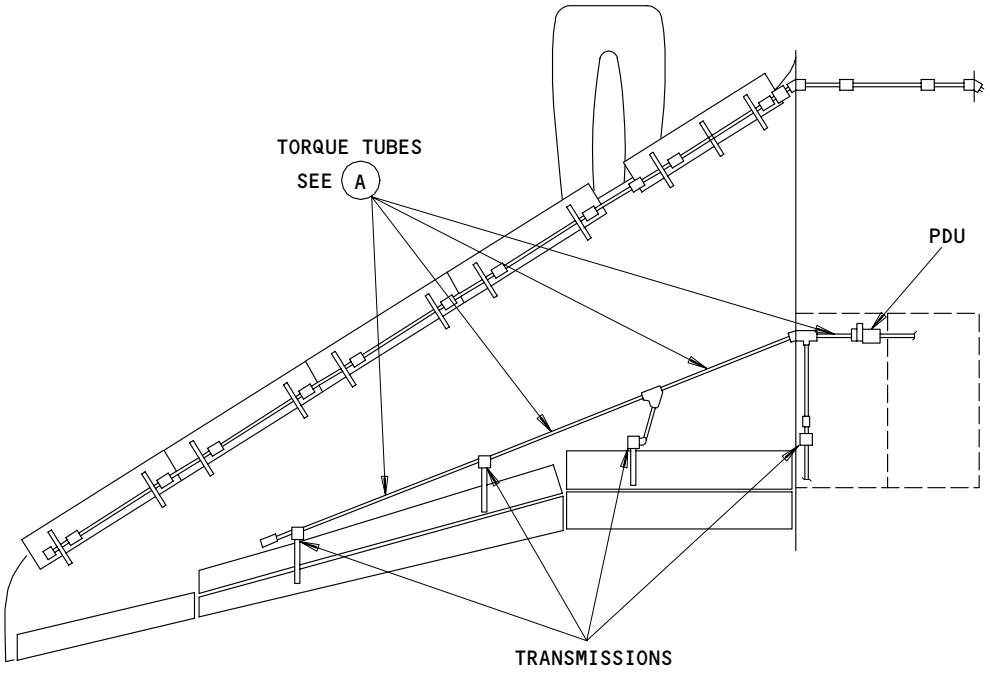
(1) Output from the PDU is transmitted by a single torque tube system. The torque tubes are aluminum tubes connected with steel sleeve and spline couplings. Safety straps are installed to prevent damage to surrounding airplane systems in the event of a torque tube failure.

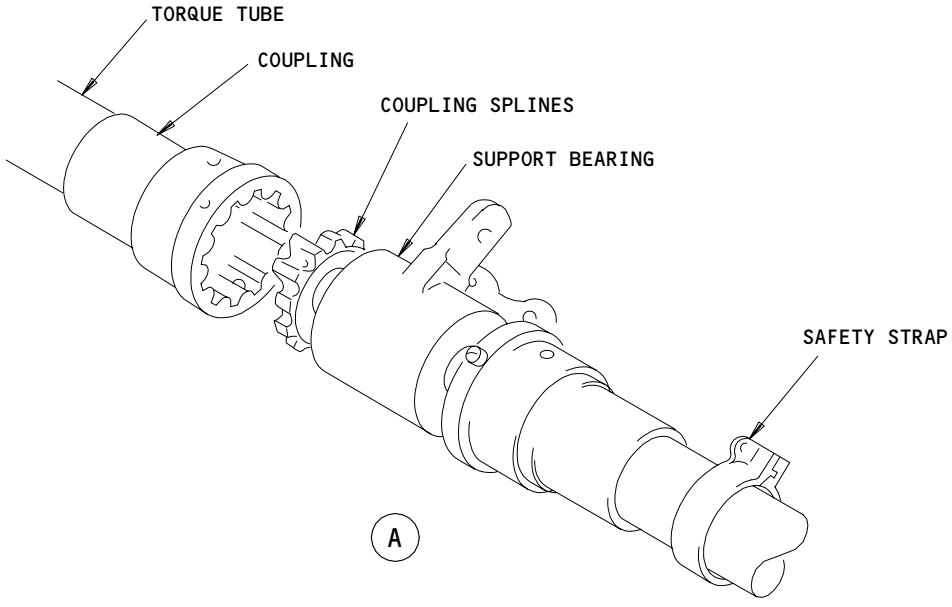
(2) Torque tubes attach to each other through intermediate support bearings. Torque tubes attach to gearboxes to change direction and to transmit power to flap actuation transmissions.

(3) A lubrication point is provided at each spline coupling and support bearing.

G. Flap Transmissions

(1) Each trailing edge flap is driven by two transmission assemblies. Each transmission contains a 15-to-1 gear reduction, a no-back brake assembly and a torque limiter. The torque limiter is a ball ramp, disk brake device with a torque trip indicator. If the TE flap does not move freely, the torque brake stops the movement of the torque tubes. This protects the system from damage due to jamming. The trip indicator must be manually reset if it activates.





TORQUE TUBE DETAILS

Trailing Edge Flap Torque Tubes
Figure 11

(2) The no-back brake assembly consists of a brake disk that is pushed against a brake plate by flap airloads transferred through the drive system. The flaps are kept from retracting by rachet pawls which keep the brake plate from turning in the retract direction. During flap extension the pawls rachet freely and the brake plate rotates with the brake disk. During flap retraction the brake plate is locked in place and the brake disk rubs against it. This causes a large friction torque which the drive system must overcome.

(3) Output from the flap transmissions drive ballscrew actuators which convert rotary motion to linear motion. The ballscrews are attached to the transmissions through universal joints which allow the ballscrews to change angle as the flaps are extended. Ballnuts on the ballscrews are attached through gimbals to flap carriages to drive the flaps.

H. Flap Carriages (Fig. 12)

(1) Each main flap is attached to two carriage roller assemblies which ride on flap tracks. The carriages are steel forgings to which roller bearings are attached. The rollers support the flap on the flap track and transfer the lift generated by the flaps to the wing structure. The carriage is moved along the flap track by the ballnut. Flap angle is determined by the shape of the flap tracks and the position of the carriage along the track.

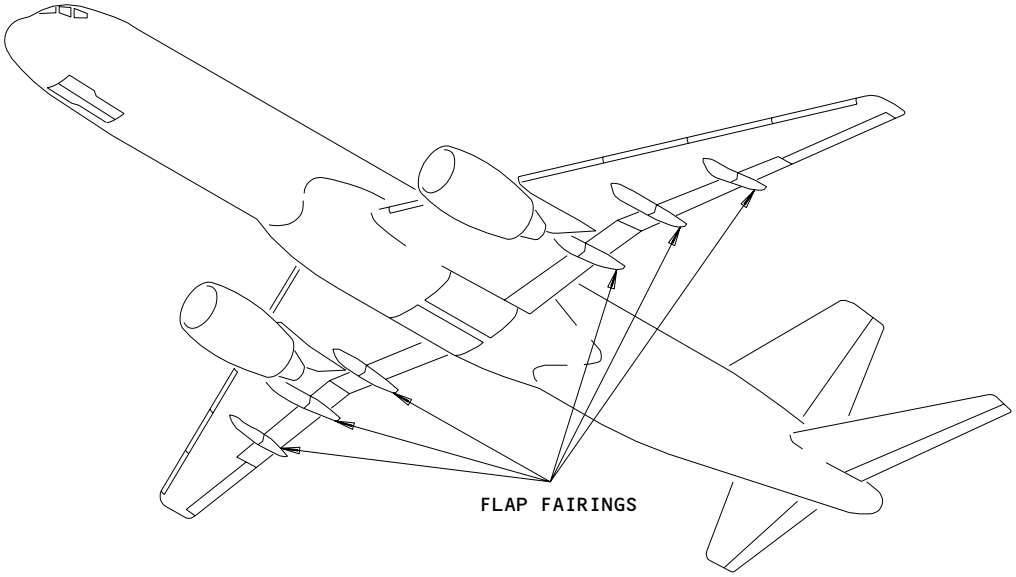
I. Aft Flaps

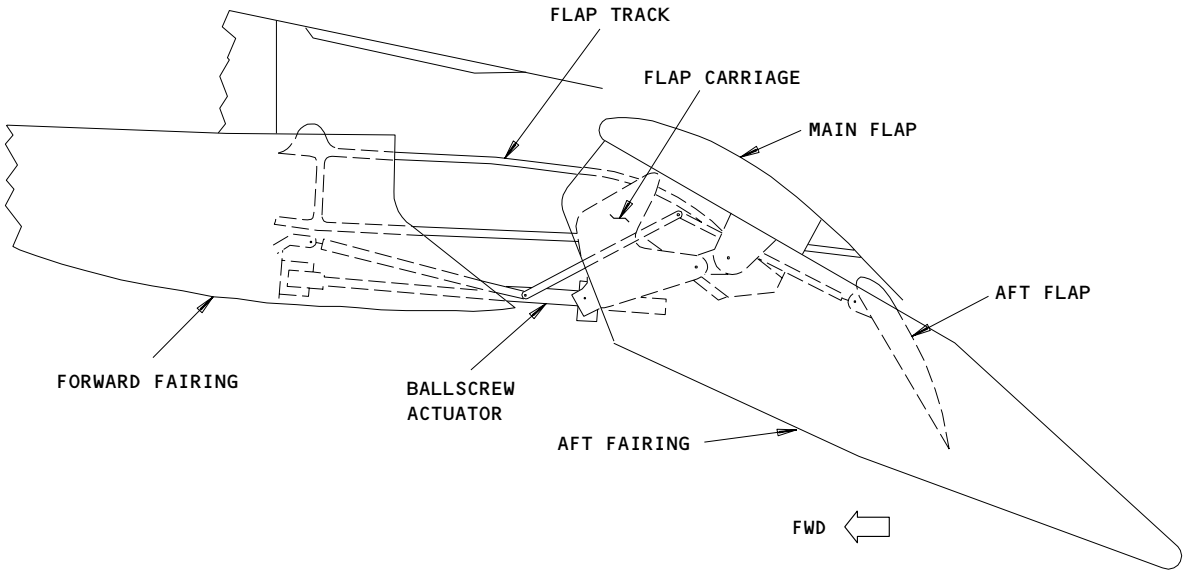
(1) The aft flaps ride on tracks in the main flap and are actuated by bellcranks attached to the wings and pivoting at attachments on the main flaps. Both outboard flap bellcranks on each wing pivot on bearings on the flap carriages. On each inboard flap the outboard bellcrank pivots at the flap carriage while the inboard bellcrank is mounted to a special support fitting. The angle of the aft flap relative to the main flap is determined by programming tracks in the main flap.

J. Fairings (Fig. 12)

(1) The flap tracks and the flap drive mechanisms are mounted below the wing surface so they are housed in aerodynamic fairings.

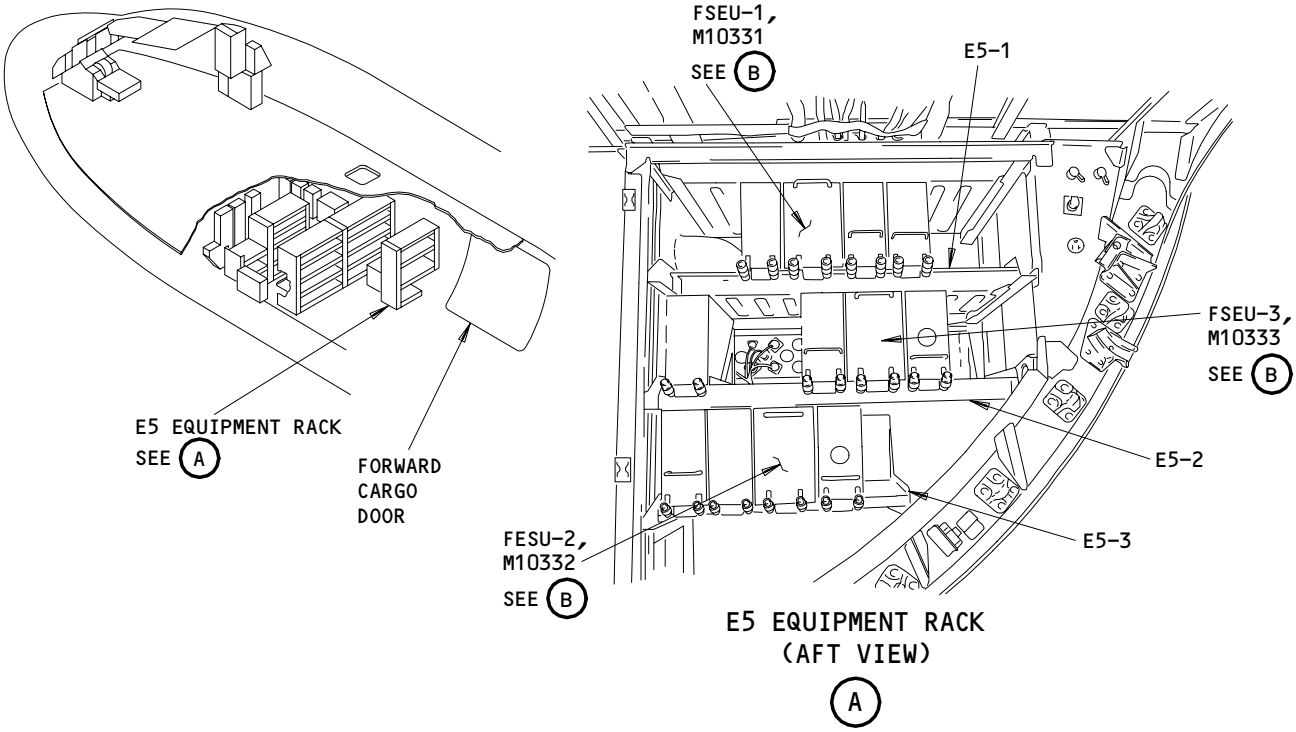
K. Flap/Slat Electronic Unit (FSEU) (Fig. 13, Fig. 14)





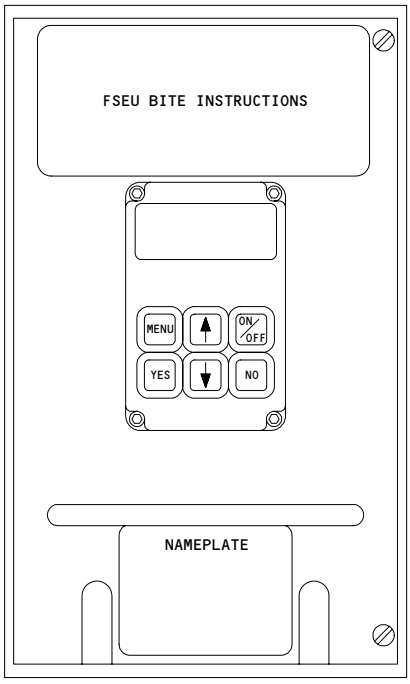
INBOARD FLAP DEPLOYMENT

Flap System Components
Figure 12



E5 EQUIPMENT RACK
(AFT VIEW)

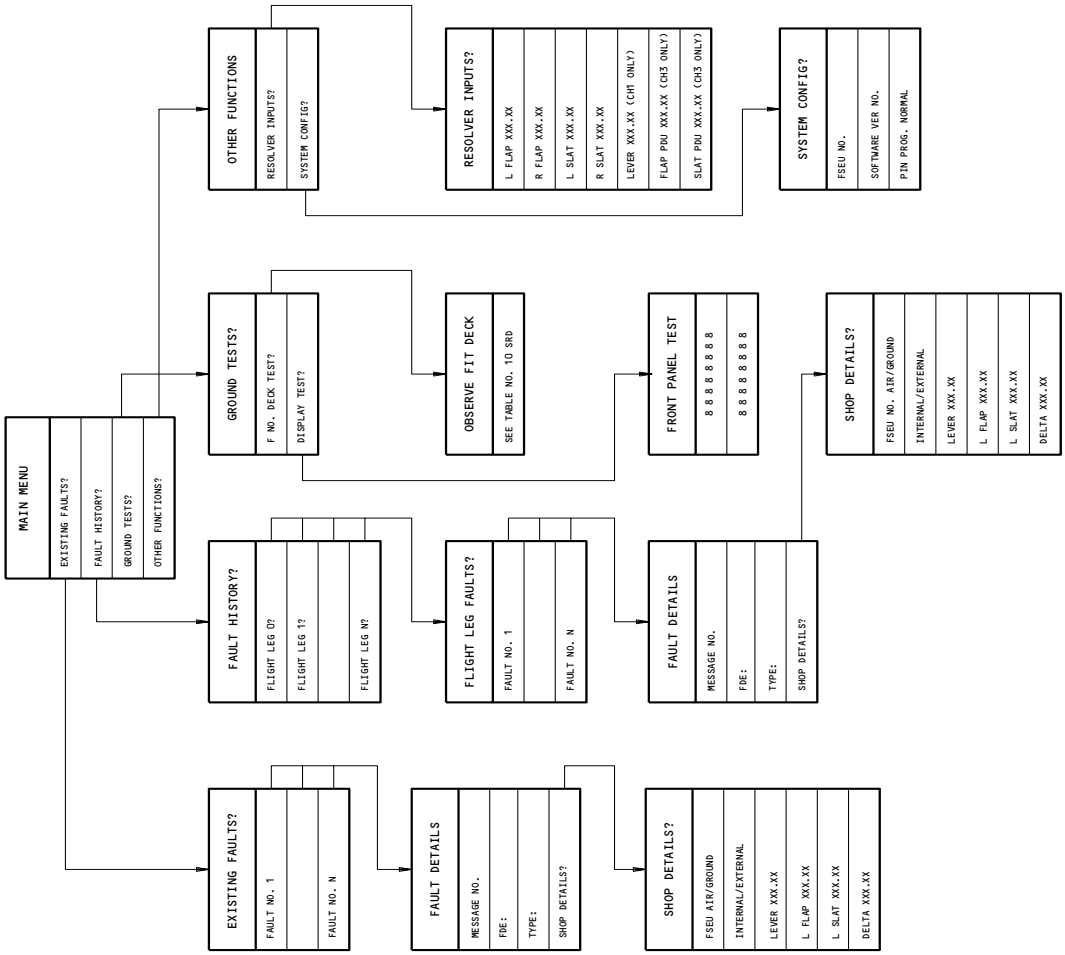
A

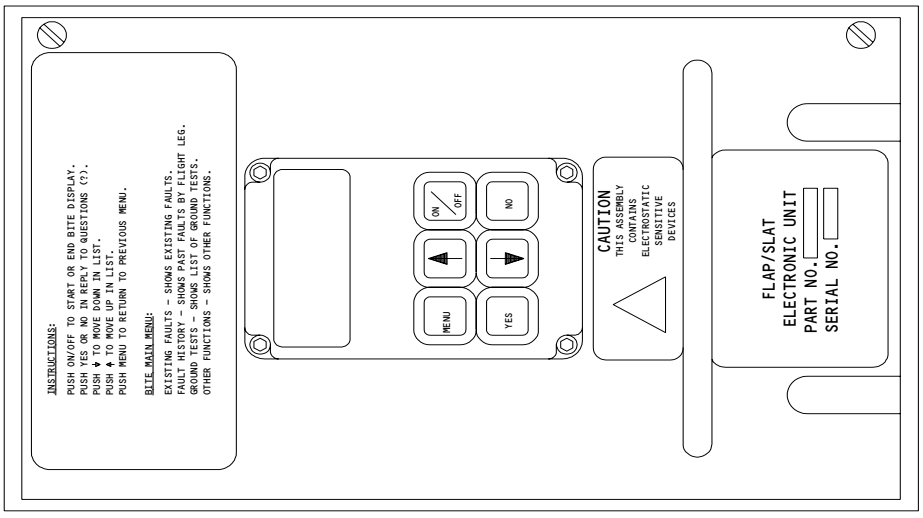


FSEU (EXAMPLE)

B

Flap/Slat Electronic Unit
Figure 13





Flap/Slat Electronics Unit Block Diagram
Figure 14

815913

(1) Monitoring and control of the flap and slat drive systems is done electrically by the flap/slat electronics unit.
(2) The FSEU consists of 3 interchangable modules; FSEU-1, FSEU-2 and FSEU-3. The 3 modules are physically and functionally identical but they perform different functions based upon where they are installed in the equipment rack.
(3) Each FSEU module has a microprocessor programmed to perform all FSEU functions. When the module is installed in one of three locations in the equipment rack the wiring from the electrical connectors enables only a specific channel, defining the module's function.
(4) FSEU-1 performs all primary flap and slat drive system protection, indication and automatic operation. Specifically, FSEU-1 provides:
    (a) Uncommanded motion detection and protection of the flaps during hydraulic operation.
    (b) Asymmetry detection and protection during hydraulic operation.
    (c) Flap load relief functions.
    (d) Autoslat controls.
    (e) Flaps up depressurization.
    (f) Slat position indication signals.
    (g) Signals to other aircraft systems.
(5) FSEU-2 performs alternate flap and slat drive protection and annunciation. Specific functions are:
    (a) Uncommanded motion detection under alternate control.
    (b) Asymmetry detection under alternate control.
    (c) Autoslat control.
    (d) Position indication.
    (e) Signals to other aircraft systems.
(6) FSEU-3 performs alternate flap and slat drive control. Specific functions are:
    (a) Alternate electric drive motor control.
    (b) Signals to other aircraft systems.
(7) Built in Test Equipment (BITE)
    (a) The FSEU BITE system electrically tests the FSEU and interfacing electronic components. BITE software is designed to isolate faults in the electronic system down to the line replaceable unit level.
    (b) The BITE test is activated by pressing a switch on the front of each FSEU box. The BITE test is self terminating and the results of the test are shown on the FSEU front panel.
    (c) Activation of BITE test causes TRAILING EDGE and LEADING EDGE lights to illuminate and EICAS messages to print on EICAS display successively per following table as a check of the availability of the lights and the EICAS messages.

TABLE FOR FSEU BITE CHECK OF T.E. AND L.E. LIGHTS AND EICAS MESSAGES	
FSEU	OUTPUT
NO. 1	TE LIGHT
	LE LIGHT
	TE FLAP DISAGREE
	TE FLAP ASYM
	LE SLAT DISAGREE
	LE SLAT ASYM
	FLAP LOAD RELIEF
	FLAP/SLAT ELEC
NO. 2	TE LIGHT
	LE LIGHT *[1]
	TE FLAP DISAGREE
	TE FLAP ASYM
	LE SLAT DISAGREE
	LE SLAT ASYM
	FLAP/SLAT ELEC
NO. 3	FLAP/SLAT ELEC

*[1] LE slat alternate drive arming switch (P3) must be armed.

(d) The BITE test is used only during aircraft maintenance.

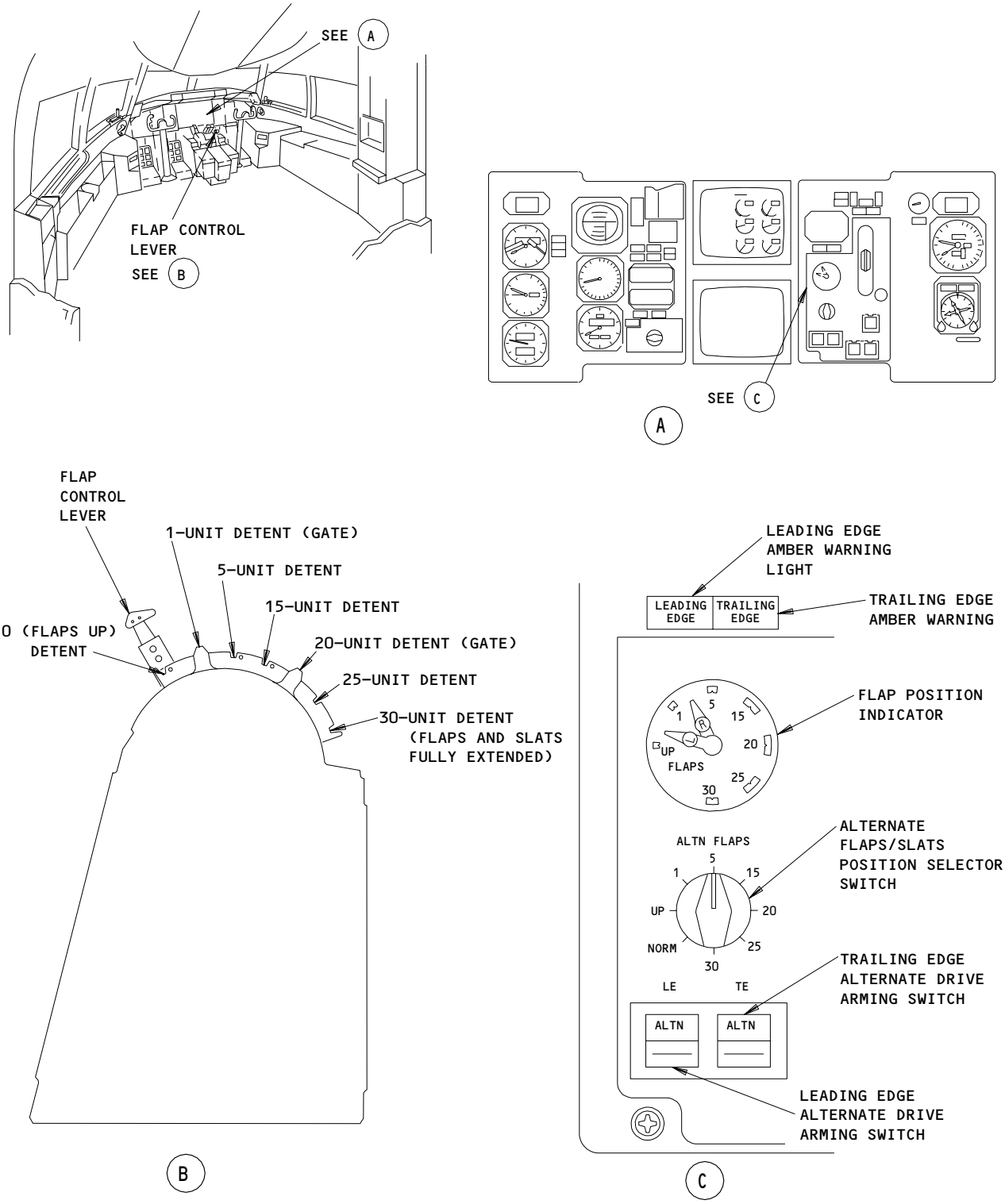
L. Resolvers

(1) Flap position information used by the FSEU is provided by resolvers.

(2) There are 6 resolvers in the flap system: two at the outboard end of each outboard torque tube, one on the flap power drive unit and one connected to the flap control lever.

M. Synchros
(1) Flap position indicator needles in the cockpit are driven by synchros.
(2) There are two flap system synchros, one on each of the outboard ends of the flap torque tubes.
N. Flight Deck Interface
(1) The controls and indicators for the high lift system are located in the cockpit. The flap control lever is located on the control stand between the pilot and co-pilot. The flap needles, EICAS display screen, amber FLAPS light, alternate drive arming switches and alternate flaps/slats position selector switch are located on the pilot's main panel, forward of the control column.
O. Position Indicators
(1) Flap position is indicated in the cockpit by the flap/slat position indicator. The indicator has two needles which indicate position of the left and right flaps.
(2) The position indicator needles indicate slat position between the UP position and the 1-unit position. When flap extension is commanded and the flaps and slats start extending, the flap indicator needles move to a position between the UP and 1-unit marks. After the slats reach the sealed position the flap indicator needles follow flap movement. During retraction the indicator needles follow flap movement until the flaps reach the 1-unit position. After the flaps reach the 1-unit position the indicator needles move to a position between the UP mark and the 1-unit mark. When the flaps and slats reach the fully retracted position the needles will suddenly move to the flaps UP mark.

3. Operation (Fig. 15)
A. Functional Description
(1) Primary Function
(a) Position of the flaps during hydraulic operation is contolled by the flap control lever on the pilot's control stand. Movement of the flap control lever positions a cable system which extends back to the flap PDU.
(b) The flap cables rotate the input cam in the flap PDU, displacing the cam follower. The cam follower is linked to the hydraulic control valve and opens the control valve to supply hydraulic power to the PDU hydraulic motor.
(c) Hydraulic flow causes rotation of the hydraulic motor which drives the PDU gearbox. The gearbox drives the output shafts and attached torque tubes.
(d) As the PDU gearbox operates, it drives a feedback mechanism connected to the follow-up cam. Movement of the followup cam closes the hydraulic control valve, stopping the PDU.
(2) Alternate Function
(a) During alternate flap operation flap position is controlled by the alternate flap/slat position selector switch.



Trailing Edge Flap Controls
Figure 15

(b) The flap system is placed in alternate control by pressing the trailing edge alternate drive arming switch.
(c) After arming the alternate drive system, flap position is selected by rotating the alternate flap/slat position selector switch.
(d) Signals from the position selector switch are sent to the FSEU which operates relays to run the alternate drive motor on the PDU.

(3) Flap Drive System Function
(a) Torque tubes attach to the output shafts of the PDU. The torque tubes extend out into each wing through gearboxes and support bearings.
(b) Rotation of torque tubes is transferred through gearboxes into two transmissions mounted below the flap tracks for each flap.
(c) Each transmission drives a ballscrew actuator through a universal assembly. The ballscrew actuator changes the rotational motion of the transmissions into translational movement of the flap carriages and attached flaps.
(d) The flaps move rearward and downward on the flap tracks. As the flaps move the aft flap linkages are driven by their bellcranks to extend the aft flaps behind the main flaps.

B. Control
(1) Normal Flap Operation (Hydraulic)
(a) Flap position is normally controlled by the flap control lever on the pilot's control stand.

Table I
Flap Positions

Control Lever	UP	1	5	15	20 *[1]	25	30 *[2]
Flap Angle	0°	1°	5°	11°	20°	25°	34°
% Travel	0°	10.32	51.85	70.46	80.41	88.13	100

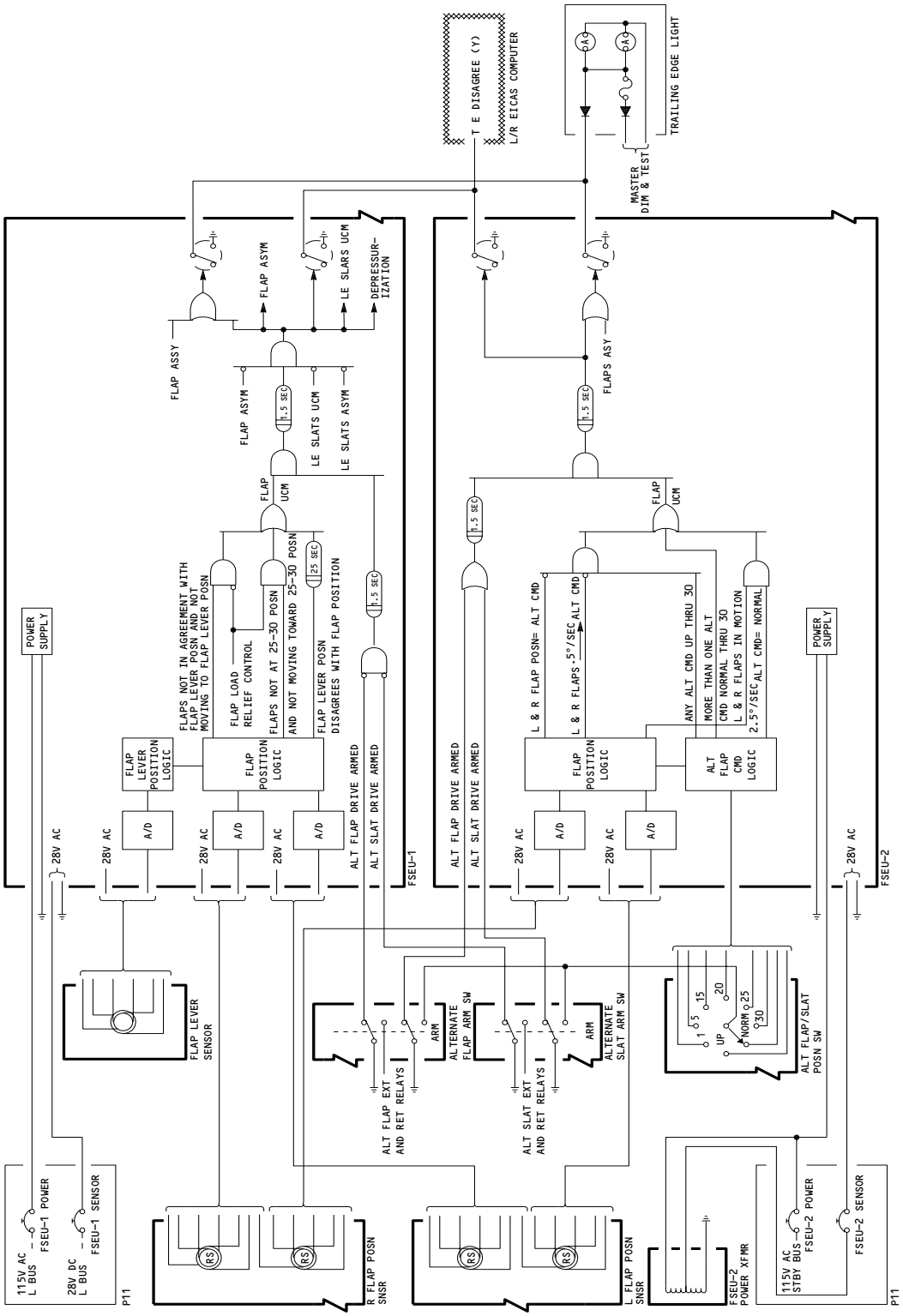
*[1] Maximum takeoff extension
*[2] Landing position

WARNING: KEEP PERSONNEL AND EQUIPMENT CLEAR OF FLAPS AND SLATS DURING FLAP OPERATION. WHEN OPERATING THE FLAPS THE SLATS WILL ALSO BE MOVING. FLAP AND SLAT MOTION CAN CAUSE INJURY OR DAMAGE.

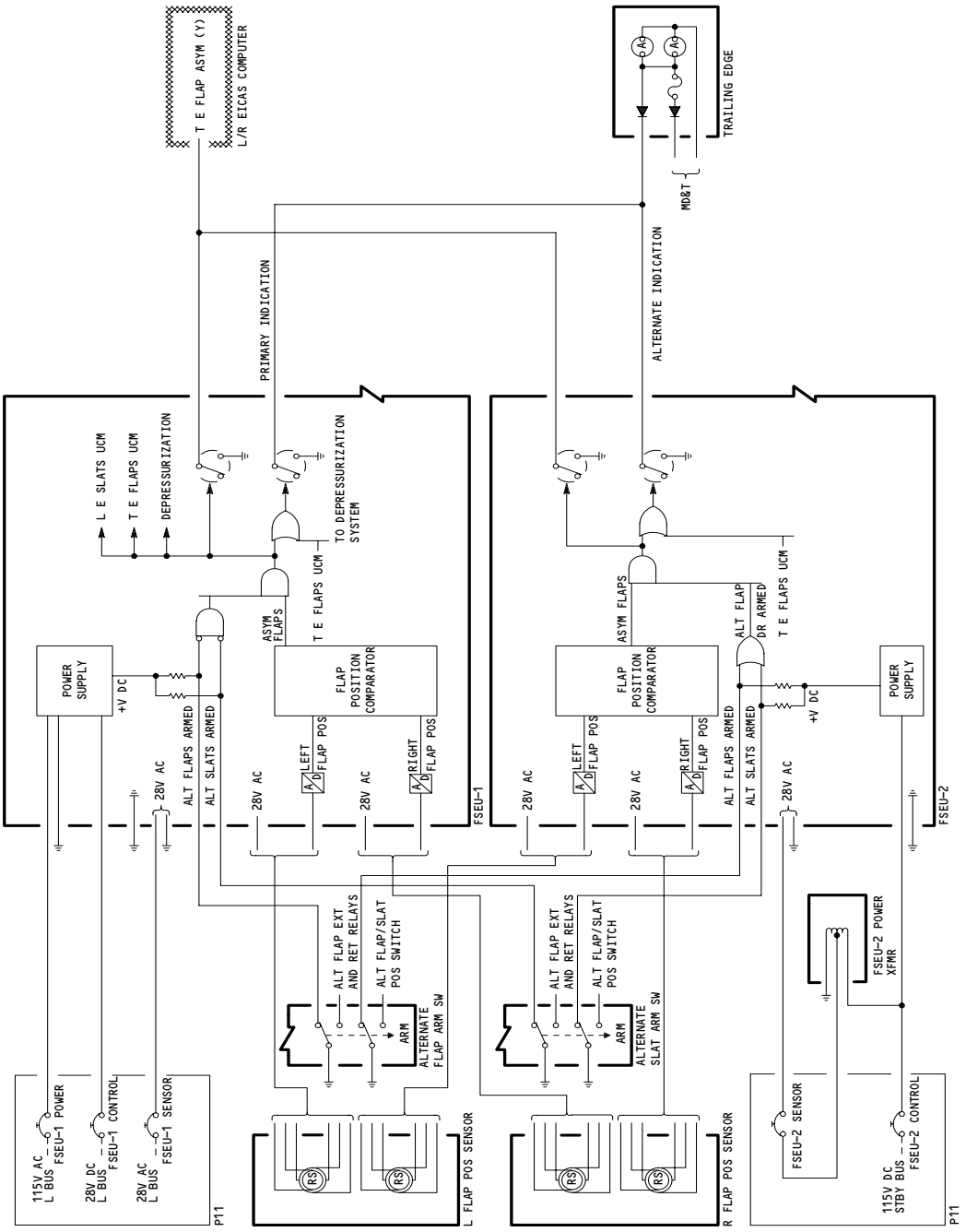
(b) Pressurize left hydraulic system (Ref 29-11-00).
(c) Provide electrical power (Ref 24-22-00).
(d) Move flap control lever to required detent. Allow time for flaps and slats to reach commanded positions.
(e) Monitor flap motion by watching flap position indicator needles.

(f) Retract flaps and slats by moving the flap control lever to the zero (FLAPS UP) detent.
(g) Remove hydraulic power if no longer required.

(2) Alternate Flap Operation (Electrical)
(a) Flap operation by means of alternate (electrical) power allows flap movement independent of slat movement if desired. Arming of both flap and slat alternate drive arming switches allows control of both flaps and slats by use of the alternate flap/slat position selector switch. Arming just the flap alternate drive arming switch allows movement of the flaps alone.
(b) Provide electrical power (Ref 24-22-00).
(c) Press the trailing edge flap alternate drive arming switch on P3 panel to arm alternate flap drive system. (Both segments of switch should light.)
(d) Rotate alternate flap/slat position selector switch to required position. Allow time for flaps to reach the commanded position.
1) Monitor flap motion by watching flap position indicator needles.
2) The amber LEADING EDGE warning light should come on and the EICAS screen should show a LE SLAT DISAGREE message.
(e) Retract flaps by rotating the alternate flap/slat position selector switch to the UP position. Allow time for flaps to reach the fully retracted position.
(f) Rotate the alternate flap/slat position selector switch to the NORM detent.
(g) Press the trailing edge flap alternate drive arming switch to disarm alternate drive system (lights in both segments of switch should go out).



TE Flap UCM Indication Schematic
Figure 16



Flap Asymmetry Indication Schematic
Figure 17

THIS PAGE INTENTIONALLY LEFT BLANK

TRAILING EDGE FLAP SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
BALLSCREW - INBOARD FLAP	6	4	MAIN GEAR WHEEL WELLS AND WING	27-51-11
BALLSCREW - OUTBOARD FLAP	7	4	WING	27-51-21
CARRIAGE - INBOARD FLAP	6	4	MAIN GEAR WHEEL WELLS AND WING	27-51-05
CARRIAGE - OUTBOARD FLAP	7	4	WING	27-51-16
CIRCUIT BREAKERS	1		FLT COMPT, P6,P11	
ALTN FLAP PWR, C323			6D23	*
FLAP LOAD RELIEF, C1022			11J18	*
FLAP POS IND L, C1008			11H12	*
FLAP POS IND R, C1522			11H13	*
FLAP/SLAT ALTN DRIVE SHUTOFF ARM, C4212			11H23	*
FLAP/SLAT SHUTOFF 1, C4110			11C18	*
FLAP/SLAT ALTN DR SHUTOFF 2, C4271			11H24	*
FLAP/SLAT ELEC UNIT 1 CONT, C1539			11G13	*
FLAP/SLAT ELEC UNIT 2 CONT, C1541			11C15	*
FLAP/SLAT ELEC UNIT 3 CONT, C1540			11G22	*
FLAP/SLAT ELEC UNIT 1 PWR, C1025			11G12	*
FLAP/SLAT ELEC UNIT 2 PWR, C1521			11C14	*
FLAP/SLAT ELEC UNIT 3 PWR, C4210			11G21	*
FLAP/SLAT ELEC UNIT 1 SENSOR, C1037			11G14	*
FLAP/SLAT ELEC UNIT 2 SENSOR, C1524			11C16	*
FLAP/SLAT ELEC UNIT 3 SENSOR, C1038			11G23	*
COMPUTER - (REF 31-41-00, FIG. 101)				
EICAS L, M10181				
EICAS R, M10182				
FAIRINGS - INBOARD FLAP TRACK	1	2	WING	27-51-30
FAIRINGS - OUTBOARD FLAP TRACK	1	4	WING	27-51-31
FLAP - INBOARD TE	1	2	WING TRAILING EDGE	27-51-02
FLAP - INBOARD TE FLAP AFT	1	2	INBOARD FLAP TRAILING EDGE	27-51-12
FLAP - OUTBOARD TE	1	2	WING TRAILING EDGE	27-51-14
FLAP - OUTBOARD TE FLAP AFT	1	2	OUTBOARD FLAP TRAILING EDGE	27-51-22
GEARBOX - INBOARD ANGLE, INBOARD FLAP	5	2	MAIN GEAR WHEEL WELLS	27-51-09
GEARBOX - OUTBOARD ANGLE, INBOARD FLAP	6	2	WING	27-51-10
GEARBOX - INBOARD TEE, INBOARD FLAP	5	2	MAIN GEAR WHEEL WELLS	27-51-07
GEARBOX - OUTBOARD TEE, INBOARD FLAP	5	2	551BB,651BB	27-51-08
GEARBOX - TEE, OUTBOARD FLAP	5	4	WING	27-51-18
INDICATOR - FLAP/SLAT POSITION, N15	2	1	FLT COMPT, P3	*
LEVER - FLAP CONTROL	2	1	FLT COMPT, P10	27-51-32
LIGHT - TRAILING EDGE, L434	2	1	FLT COMPT, P3	*
MODULE - FLAP PDU CONTROL VALVE	4	1	LEFT MAIN GEAR WHEEL WELL, TE FLAP PDU	27-51-28
MODULE - FLAP/SLAT DEPRESSURIZATION, V10060	3	1	FORWARD BULKHEAD LEFT MAIN GEAR WHEEL WELL	27-51-29
MOTOR - ALTERNATE TE FLAPS DRIVE, M547	4	1	MAIN GEAR WHEEL WELL, TE FLAP PDU	*
MOTOR - HYDRAULIC	4	1	MAIN GEAR WHEEL WELL, TE FLAP PDU	*

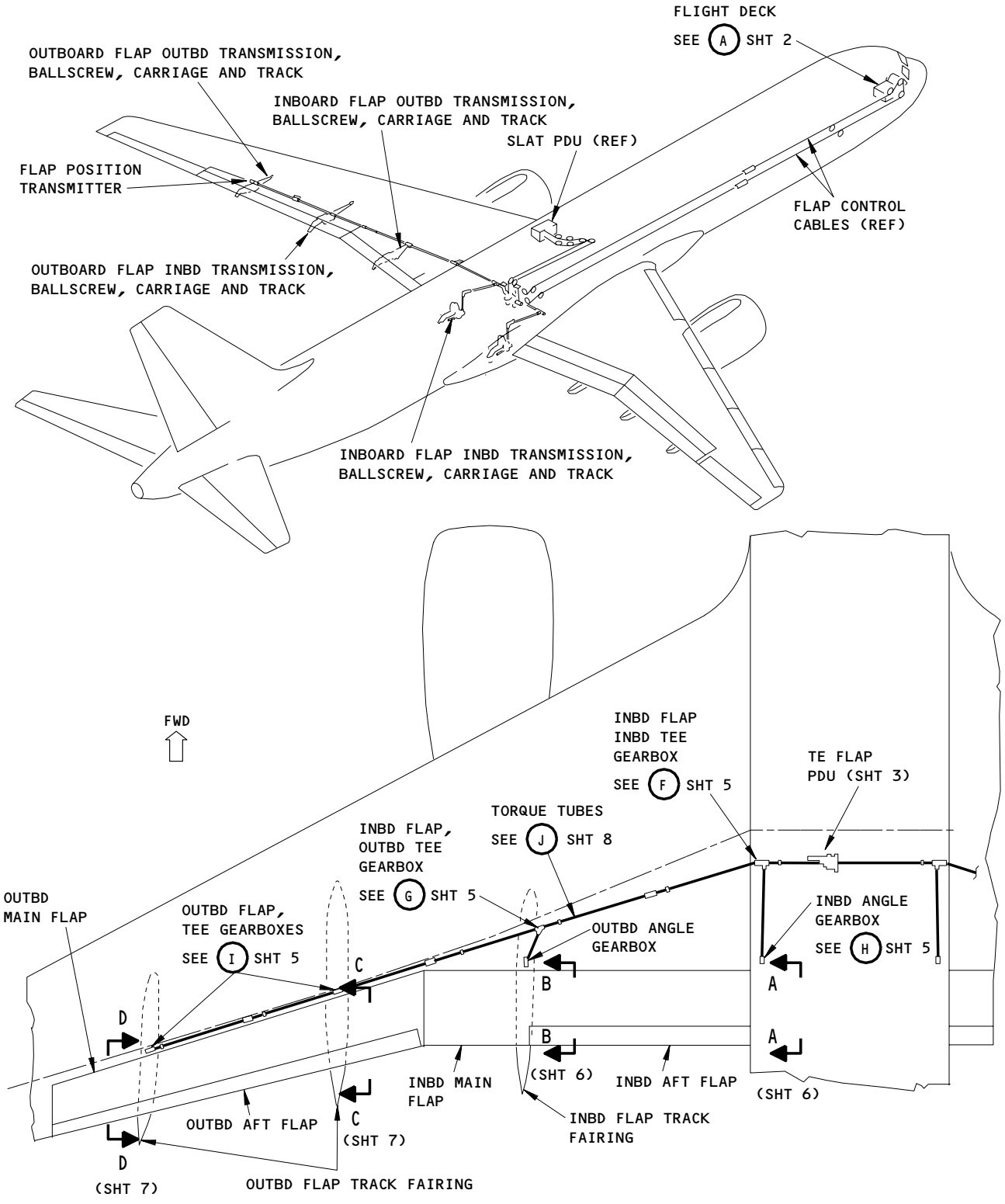
* SEE THE WDM EQUIPMENT LIST

Trailing Edge Flap System - Component Index
Figure 101 (Sheet 1)

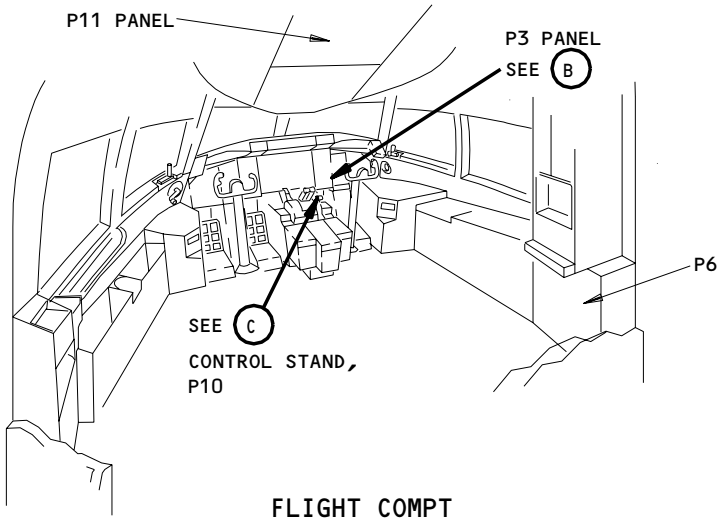
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
RELAY - (REF 31-01-33, FIG. 101) ALT FLAP EXTEND, K359 ALT FLAP RETRACT, K360 FLAP/SLAT ALT DRIVE ARM, K10095 DEPRESSURIZATION, K10104				
RELAY - (REF 31-01-36, FIG. 101) LE/TE TRANSFER, K10244 FLAP LOAD RELIEF, K10245				
SOLENOID - FLAP LOAD RELIEF	4	1	LEFT MAIN GEAR WHEEL WELL, FLAP PDU CONTROL VALVE MODULE	27-51-28
SWITCH - ALTERNATE FLAPS/SLATS POSITION SELECTOR, S10256	2	1	FLT COMPT, P3	*
SWITCH - FLAP/SLAT DEPRESSURIZATION PRESSURE, S1	3	1	LEFT MAIN GEAR WHEEL WELL	27-51-29
SWITCH - (REF 27-81-00, FIG. 101) LE SLAT ALTERNATE ARM, S10255				
SWITCH - TRAILING EDGE ALTERNATE DRIVE ARMING, S10254	2	1	FLT COMPT, P3	*
TRACK - INBOARD FLAP	6	4	MAIN GEAR WHEEL WELL AND WING	27-51-03
TRACK - OUTBOARD FLAP	7	4	WING	27-51-15
TRANSFORMER - (REF 31-01-70, FIG. 101) FSEU-2 POWER, T153				
TRANSMISSIONS - INBOARD FLAP	6	4	MAIN GEAR WHEEL WELL AND WING	27-51-06
TRANSMISSIONS - OUTBOARD FLAP	7	4	WING	27-51-17
TRANSMITTER - FLAP LEVER POSITION, TS5046	2	1	FLIGHT COMPT, P10	27-51-33
TRANSMITTER - PDU POSITION, TS5050	4	1	LEFT MAIN GEAR WHEEL WELL TE FLAP PDU	27-51-27
TRANSMITTERS - L FLAP POSITION, TS5049	5	1	OUTBD END FLAP DRIVE L WING	27-58-03
R FLAP POSITION, TS5051	5	1	OUTBD END FLAP DRIVE R WING	27-58-03
TRANSMITTER - (REF 27-81-00, FIG. 101) SLAT PDU POSITION, TS5048				
TRANSMITTERS - (REF 27-81-00, FIG. 101) L SLAT POSITION, TS5083 R SLAT POSITION, TS5047				
TUBE - TE FLAP TORQUE	8		FORWARD BULKHEAD MAIN GEAR WHEEL WELLS, WING REAR SPARS	27-51-25
UNIT - FLAP/SLAT ELECTRONIC, M10331,M10332, M10333	8	3	821, FWD CARGO COMPT, E5	27-51-01
UNIT - TE FLAP POWER DRIVE	3	1	FORWARD BULKHEAD LEFT MAIN GEAR WHEEL WELL	27-51-26
VALVE - TE FLAP BYPASS, V105	4	1	LEFT MAIN GEAR WHEEL WELL	27-51-27
VALVE - FLAP/SLAT DEPRESSURIZATION PRIOIRITY	3	1	LEFT MAIN GEAR WHEEL WELL	27-51-29
VALVE - FLAP/SLAT DEPRESSURIZATION SEQUENCE	3	1	LEFT MAIN GEAR WHEEL WELL	27-51-29
VALVE - FLAP/SLAT DEPRESSURIZATION SHUTOFF	3	1	LEFT MAIN GEAR WHEEL WELL	27-51-29
VALVE - FLAP/SLAT DEPRESSURIZATION SOLENOID, V1	3	1	LEFT MAIN GEAR WHEEL WELL	27-51-29

* SEE WM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 2)

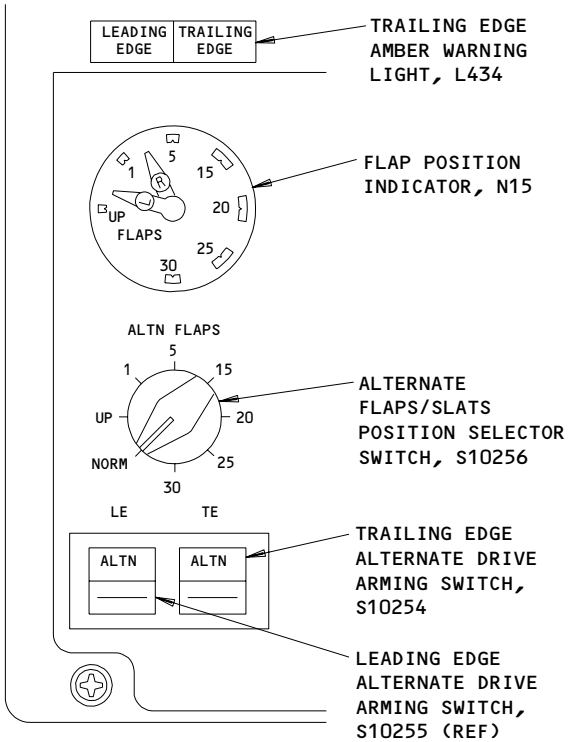


Trailing Edge Flap System – Component Location
Figure 102 (Sheet 1)



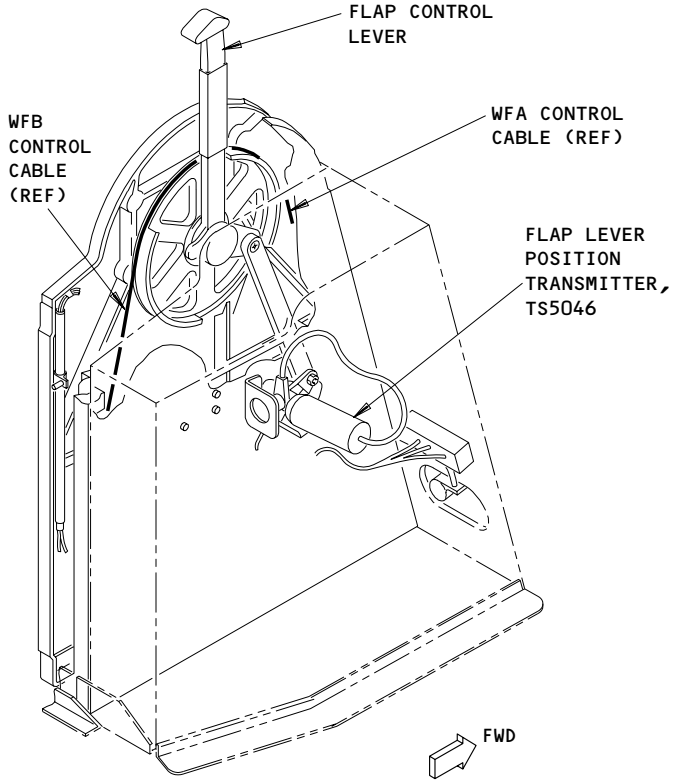
FLIGHT COMPT

A



P3 PANEL

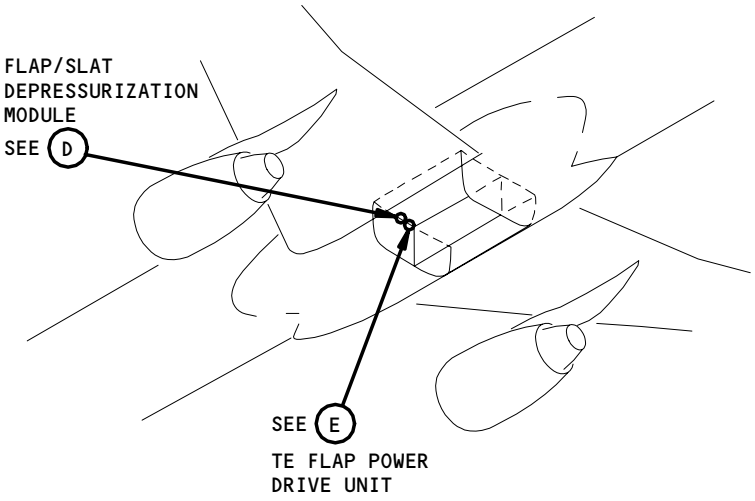
B

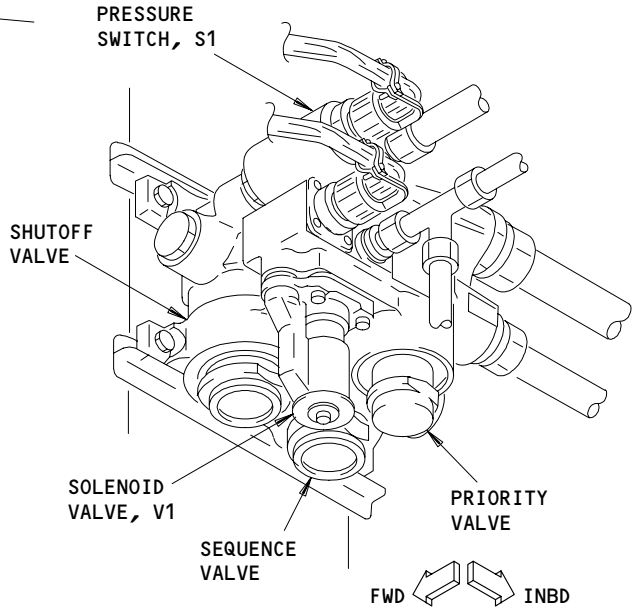


CONTROL STAND, P10

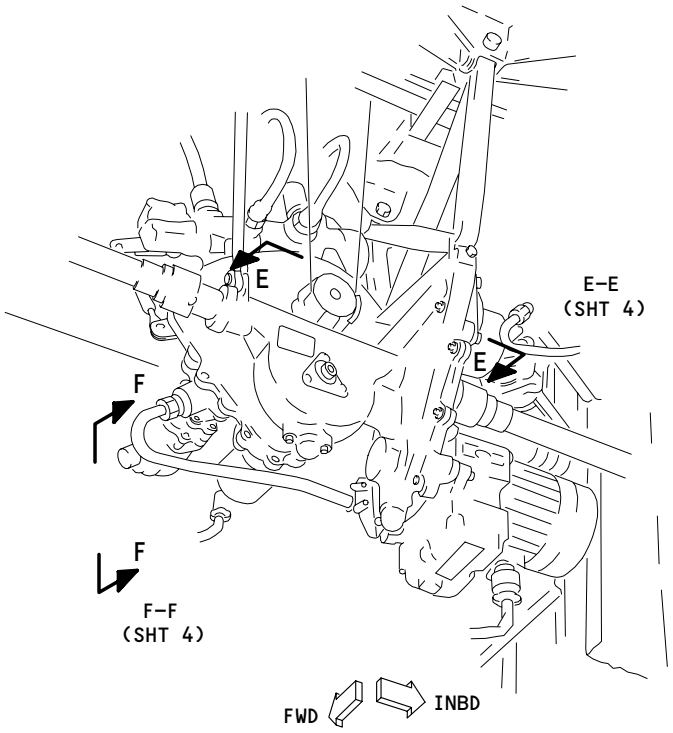
C

Component Location
Figure 102 (Sheet 2)



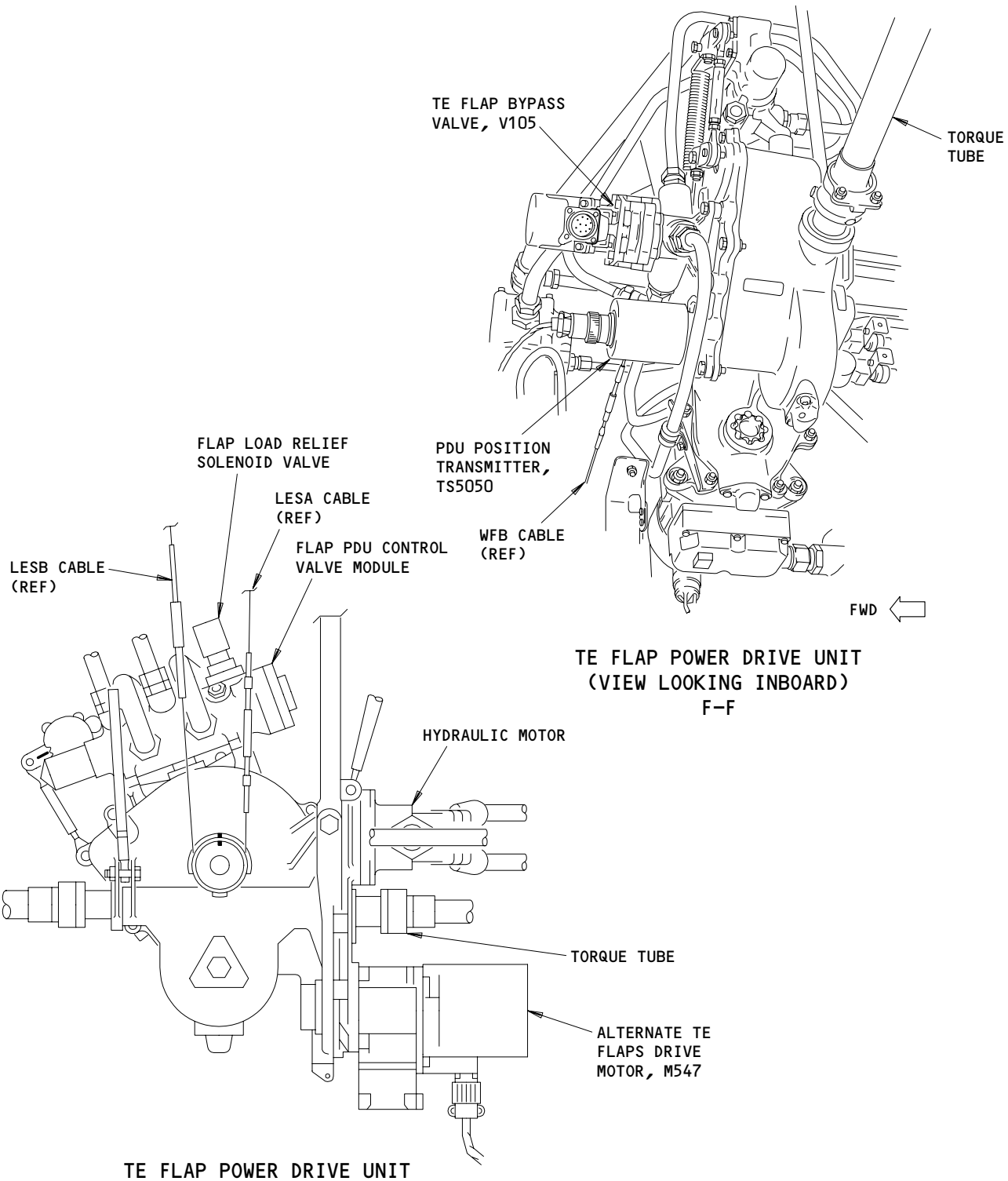


FLAP/SLAT DEPRESSURIZATION
MODULE, V10060
(D)



TE FLAP POWER DRIVE UNIT
(E)

Component Location
Figure 102 (Sheet 3)



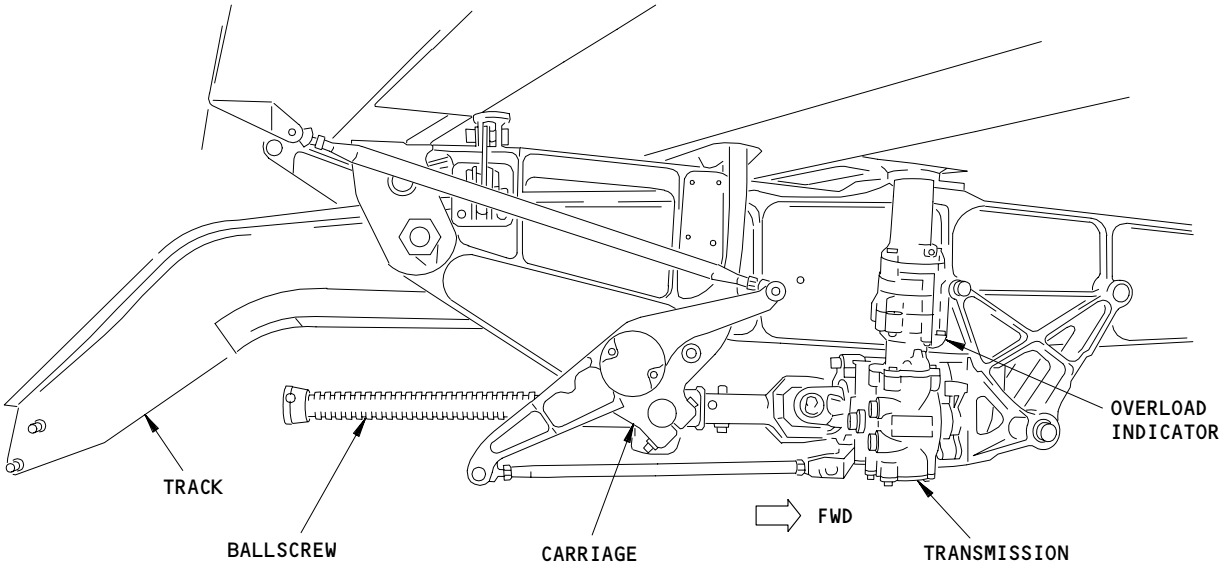
TE FLAP POWER DRIVE UNIT
(VIEW LOOKING INBOARD)
F-F

TE FLAP POWER DRIVE UNIT
(VIEW LOOKING FORWARD)
E-E

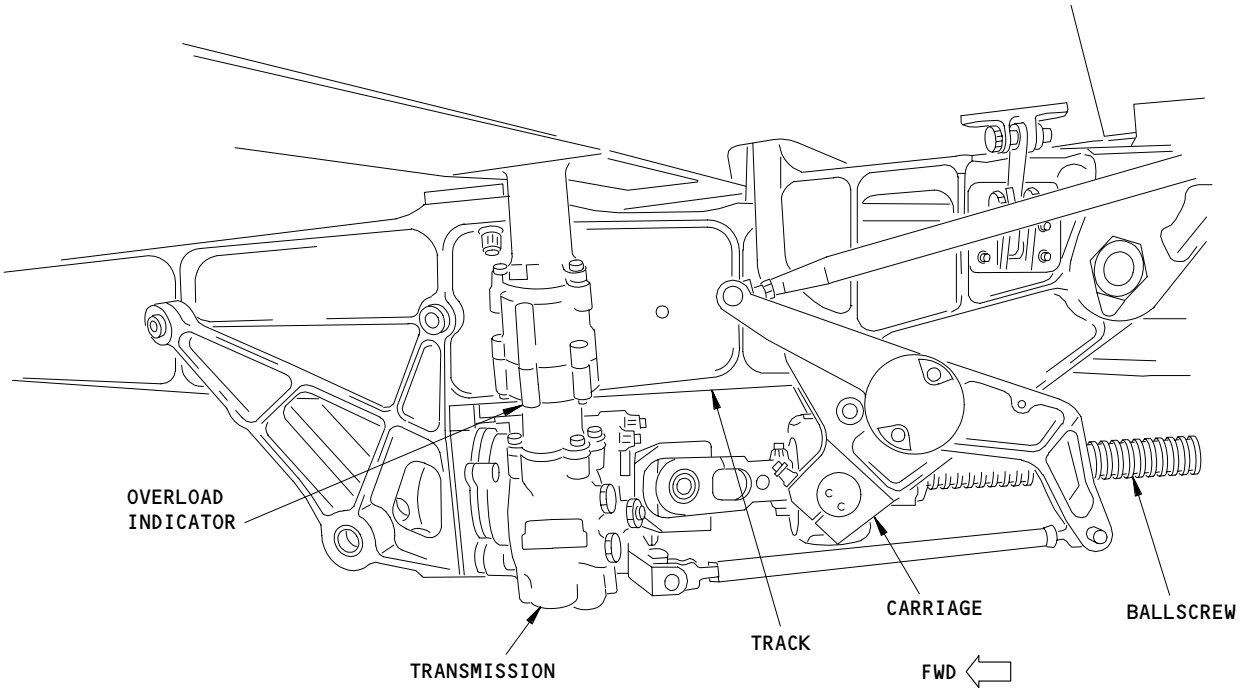
Component Location
Figure 102 (Sheet 4)

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

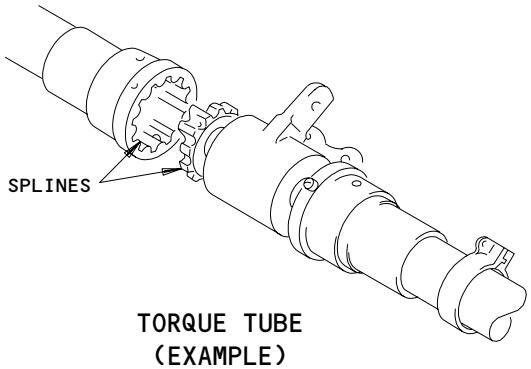


OUTBOARD FLAP, INBOARD DRIVE
(LOOKING OUTBOARD)
C–C



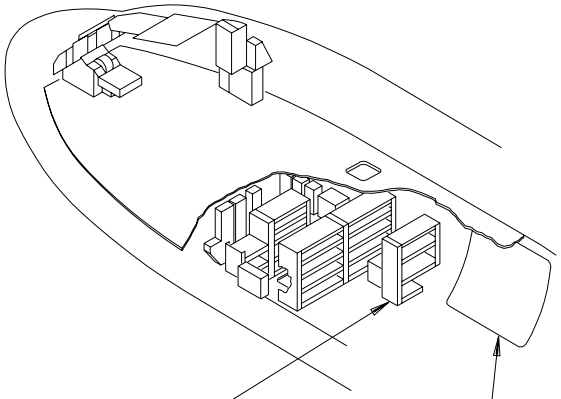
OUTBOARD FLAP, OUTBOARD DRIVE
(LOOKING OUTBOARD)
D–D

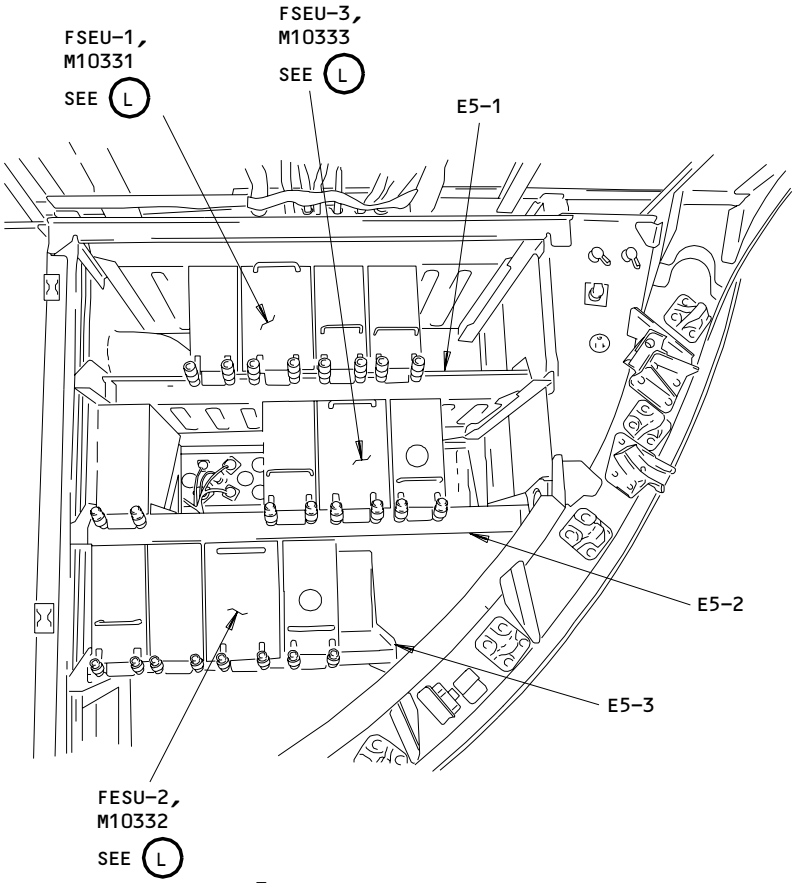
Trailing Edge Flap System – Component Location
Figure 102 (Sheet 7)



TORQUE TUBE
(EXAMPLE)

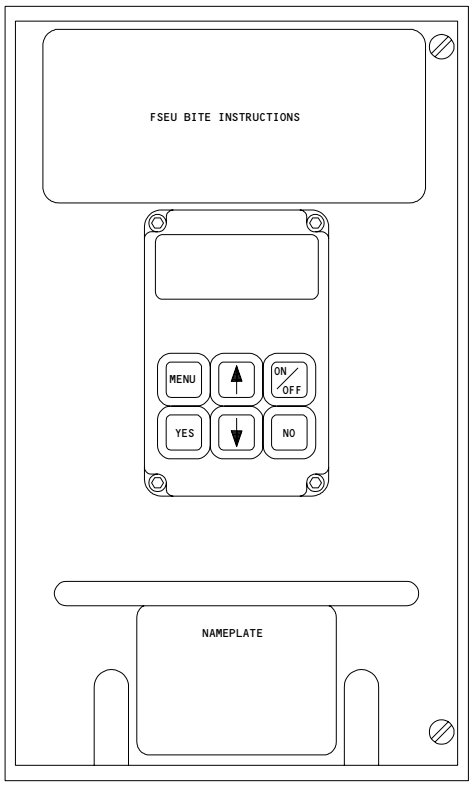
J FROM SHT 1





E5 EQUIPMENT RACK
(AFT VIEW)

K



FSEU
(EXAMPLE)

L

Component Location
Figure 102 (Sheet 8)

TRAILING EDGE FLAP SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains two tasks. The first task deactivates the flap drive system to prevent flap movement when you work near the flap system. The second task operates the flap system with normal hydraulic power or alternate electric power.

   TASK 27-51-00-042-001

2. Deactivation of the Flap Drive System
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (3) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-29:
      (4) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Lock
      (4) 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
511/611	Leading Edge to Front Spar
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

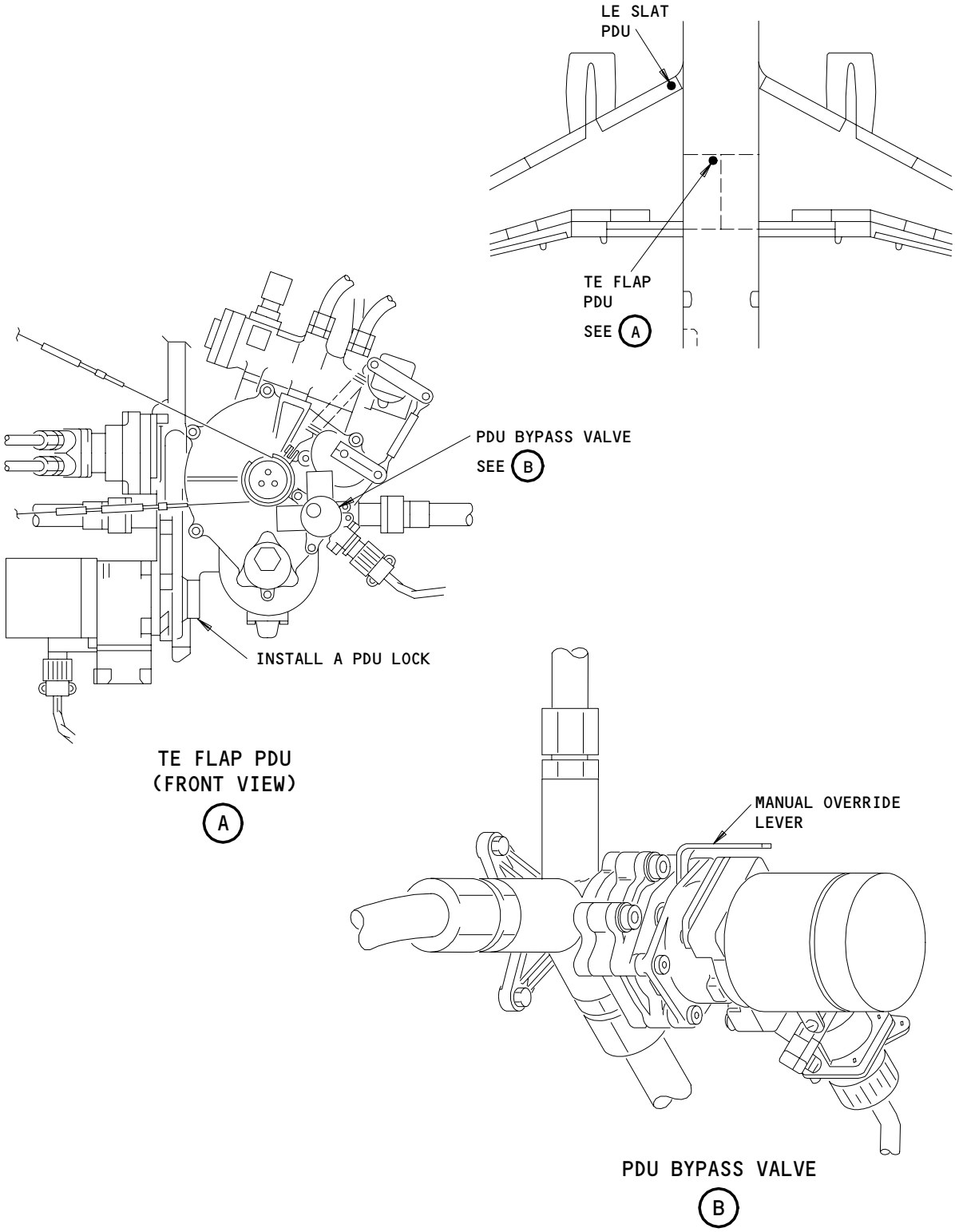
   D. Deactivation of the Flap Drive System

      S 212-010
      (1) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 012-011

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

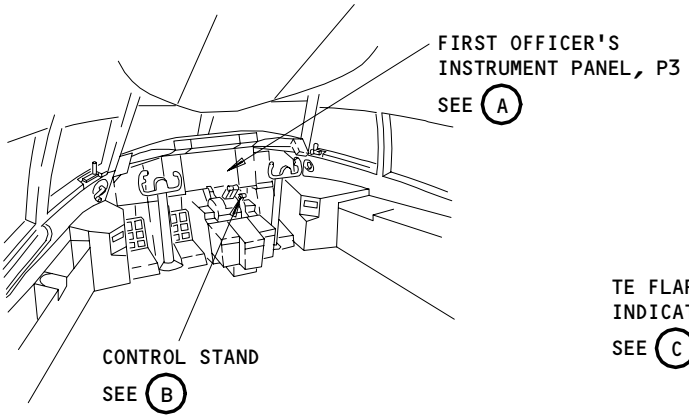
      (2) Open the doors for the landing gear and install the door locks (Ref 32-00-15).



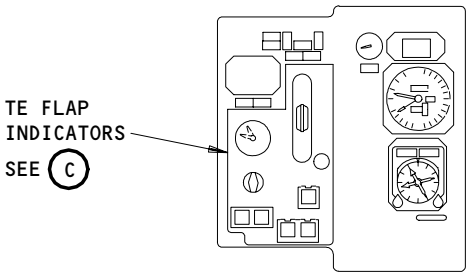
TE FLAP PDU
(FRONT VIEW)
A

PDU BYPASS VALVE
B

Maintenance Practices for the TE Flap
Figure 201

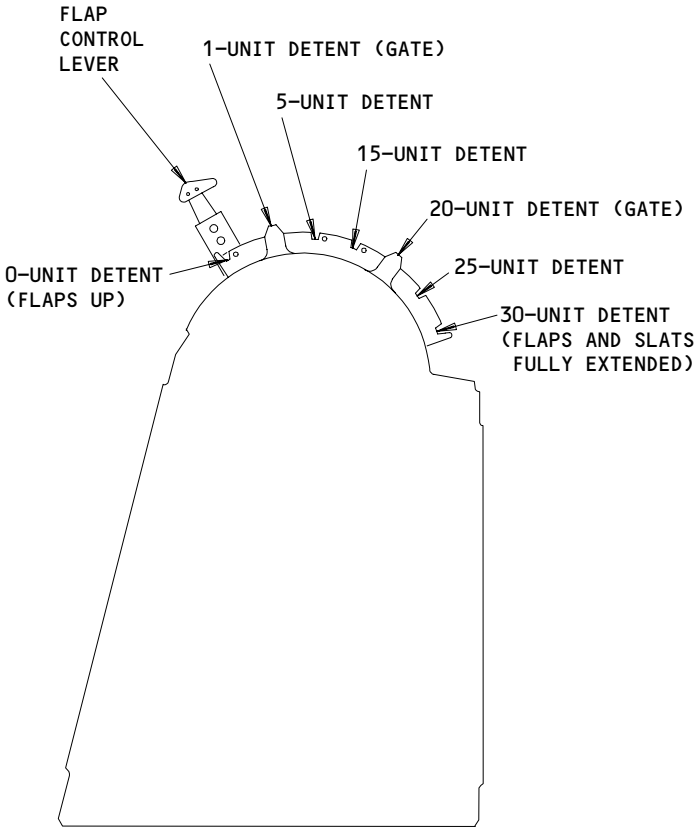


FLIGHT COMPARTMENT



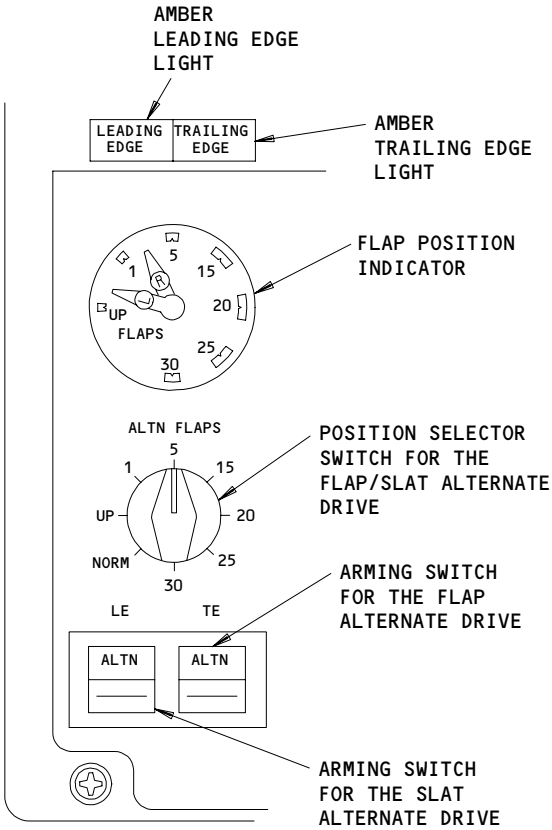
FIRST OFFICER'S INSTRUMENT PANEL, P3

A



CONTROL STAND

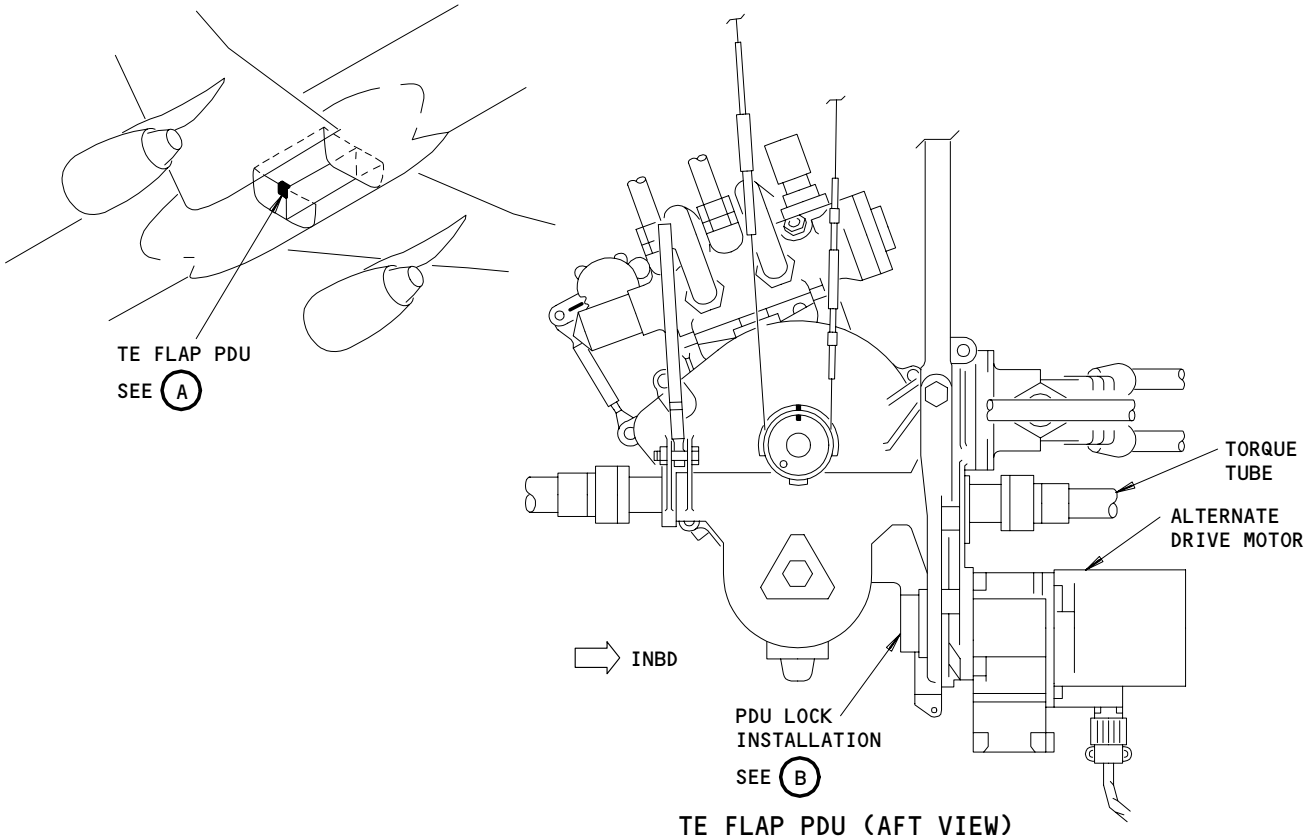
B



TE FLAP INDICATORS

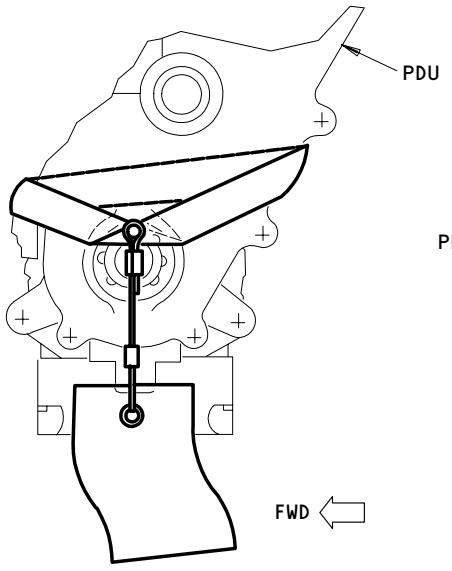
C

Controls for the Trailing Edge Flap
Figure 202



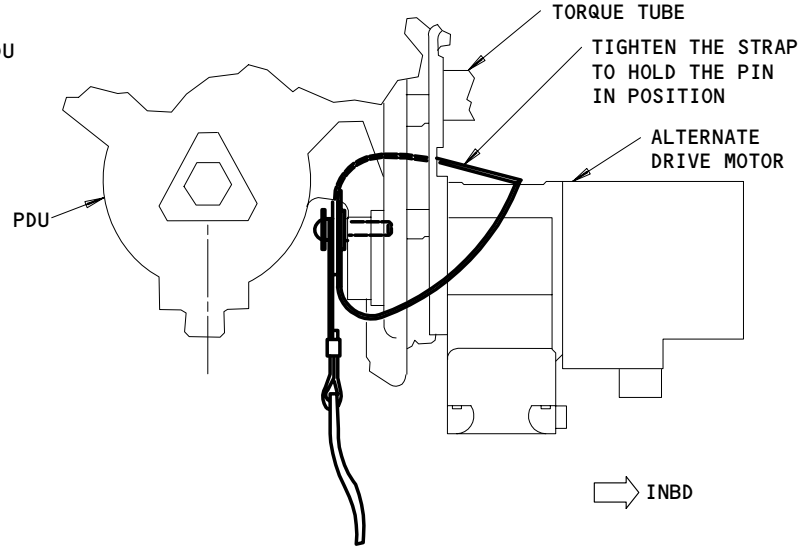
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 203

S 212-012
(3) If the alternate system for the trailing edge (TE) flaps is armed, make sure the position selector switch for the flap/slat alternate drive, on the first officers main instrument panel, P3, and the TE flap position are the same.

S 212-013
(4) If the alternate system for the TE flaps is not armed, make sure the position of the flap control lever and the position of the TE flaps are the same.

S 862-014
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J18, FLAP LOAD RELIEF
(d) 11J33, WARN ELEX A

S 862-015
(6) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-016
(7) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-017
(8) If the power from the left hydraulic system is not necessary, remove the power from the left hydraulic system (Ref 29-11-00).

S 862-018
(9) If the power from the left hydraulic system is necessary, to give power to other systems, move the manual override lever on the PDU bypass valve to the No. 1 (bypass) position.

S 492-032
(10) Safety the manual override lever in this position.

S 492-019
(11) Install a PDU lock in the TE flap PDU (Fig. 203).

E. Put the Airplane Back to Its Usual Condition

S 212-020
(1) If the alternate system for the TE flaps is armed, make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, and the position of the TE flaps are the same.

S 212-021
(2) If the alternate system for the TE flaps is not armed, make sure the position of the flap control lever and the position of the TE flaps are the same.

S 862-022
(3) If the manual override lever on the PDU bypass valve is in the No. 1 (bypass) position, put the manual override lever to the No. 2 position.

S 092-023
(4) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-024
(5) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J18, FLAP LOAD RELIEF
(d) 11J33, WARN ELEX A

S 862-025
(6) Remove the circuit breaker lock and close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-026
(7) Remove the circuit breaker locks, and close these circuit breakers on the P6 panel:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-027
(8) Retract the flaps with normal hydraulic or alternate electric power in the Operation of the TE Flap System.

S 412-028

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 862-029

(10) Remove the power from the left hydraulic system if it is not necessary (Ref 29-11-00).

S 862-030

(11) Remove the electrical power if it is not necessary (Ref 24-22-00).

TASK 27-51-00-862-004

3. Operation of the TE Flap System

A. General

(1) During normal hydraulic operation, the TE flaps and LE slats move by the operation of the flap control lever.

During alternate electric operation, the TE flaps can move independently of the LE slats. If you arm the flap and slat alternate drives, you can control the TE flaps and the LE slats with the position selector switch for the flap/slat alternate drive. If you arm only the flap alternate drive, you can control only the movement of the TE flaps.

TABLE 201
Trailing Edge Flap System Data

Flap detent position	UP	1	5	15	20*[1]	25	30*[2]
Flap Angle	0°	1°	5°	11°	20°	25°	34°
% Travel	0°	10.32	51.85	70.46	80.41	88.13	100
Ballnut Travel (inches) *[3]	0	1.67	8.39	11.40	13.01	14.26	16.18

*[1] TAKEOFF POSITION
*[2] LANDING POSITION
*[3] NO. 4 INBOARD FLAP, INBOARD BALLSCREW

B. Equipment
(1) TE Flap PDU Lock - B27008-1
C. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
D. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
511/611	Leading Edge to Front Spar
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Normal Hydraulic Operation of the TE Flap System

S 212-005
(1) Make sure the PDU lock is removed from the TE flap PDU (Fig. 203).

S 862-006
(2) Do these steps to extend the TE flaps:
(a) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.
(b) Supply electrical power (Ref 24-22-00).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRUALIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRUALIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(c) Pressurize the left hydraulic system (Ref 29-11-00).
(d) Move the flap control lever to the necessary detent and let the flaps and slats move to the correct positions.
(e) If you do work near the flap or slat systems, deactivate the flap drive system.
(f) Remove the power from the left hydraulic system if it is not necessary (Ref 29-11-00).
(g) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 862-007
(3) Do these steps to retract the TE flaps:
(a) Make sure the position of the TE flaps and LE slats and the position of the flap control lever are the same.

(b) Supply electrical power (Ref 24-22-00).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(c) Pressurize the left hydraulic system (Ref 29-11-00).
(d) Put the flap control lever in the zero (FLAPS UP) detent and make sure the TE flaps and LE slats move to the fully retracted position.
(e) Remove the electrical power if it is not necessary (Ref 24-22-00).
(f) Remove the power from the left hydraulic system if it is not necessary (Ref 29-11-00).

F. Alternate Electric Operation of the TE Flaps

S 092-033
(1) Make sure the PDU lock is removed from the TE flap PDU (Fig. 203).

S 862-008
(2) Do these steps to extend the TE flaps:

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(a) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.
(b) Make sure the position selector switch for the flap/slat alternate drive, on the first officers main instrument panel, P3, is in the NORM detent.
(c) Supply electrical power (Ref 24-22-00).
(d) To extend the TE flaps independently of the slats, push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on).
(e) To extend the TE flaps and LE slats, push the arming switches for the flap and slat alternate drives on the P3 panel (switch lights will come on).

(f) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the necessary detent and let the flaps move to the correct position.
1) Look at the L and R needles on the flap position indicator, on the P3 panel, to monitor the flap movement.
2) If only the flap drive system is armed, the amber LEADING EDGE light, on the P3 panel, will come on and the EICAS screen will show a LE SLAT DISAGREE message.

(g) Remove the electric power if it is not necessary (Ref 24-22-00).

(h) If you do work near the flap control surfaces, deactivate the flap drive system.

S 862-009

(3) Do these steps to retract the TE flaps:

(a) Make sure the position of the TE flaps and the position of the position selector switch for the flap/slat alternate drive, on the P3 panel, are the same.

(b) Supply electrical power (Ref 24-22-00).

(c) Turn the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent and let the flaps move to the fully retracted position.

(d) Turn the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.

(e) If only the flap drive system is armed, push the arming switch for the flap alternate drive, on the P3 panel, to disarm the flap alternate drive (switch light will go off).

(f) If the TE flap and LE slat drive systems are armed, push the arming switches for the flap and slat alternate drives on the P3 panel (switch lights will go off).

(g) Remove the electrical power if it is not necessary (Ref 24-22-00).

TRAILING EDGE FLAP SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains five tasks. The first task is an operational test of the trailing edge (TE) flap system. The second task is an adjustment of the control system for the TE flaps. This adjustment covers components from the flap control lever to the power drive unit (PDU) for the TE flaps. The third task is a system test to make sure the TE flap system is correctly adjusted. The fourth and fifth tasks are included in the third task. Thus, if you do the third task, it is not necessary to do tasks four and five.

   B. Make sure the inboard and outboard flaps on the trailing edge are installed and adjusted (AMM 27-51-02 and 27-51-14).

TASK 27-51-00-715-001

2. Operational Test of the TE Flap System
   A. General
      (1) Make sure the flap-position indicator system is correctly adjusted (AMM 27-58-00/501).
   B. References
      (1) AMM 20-10-03/401, Control Cables - Removal/Installation
      (2) AMM 24-22-00/201, Electrical Power-Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones

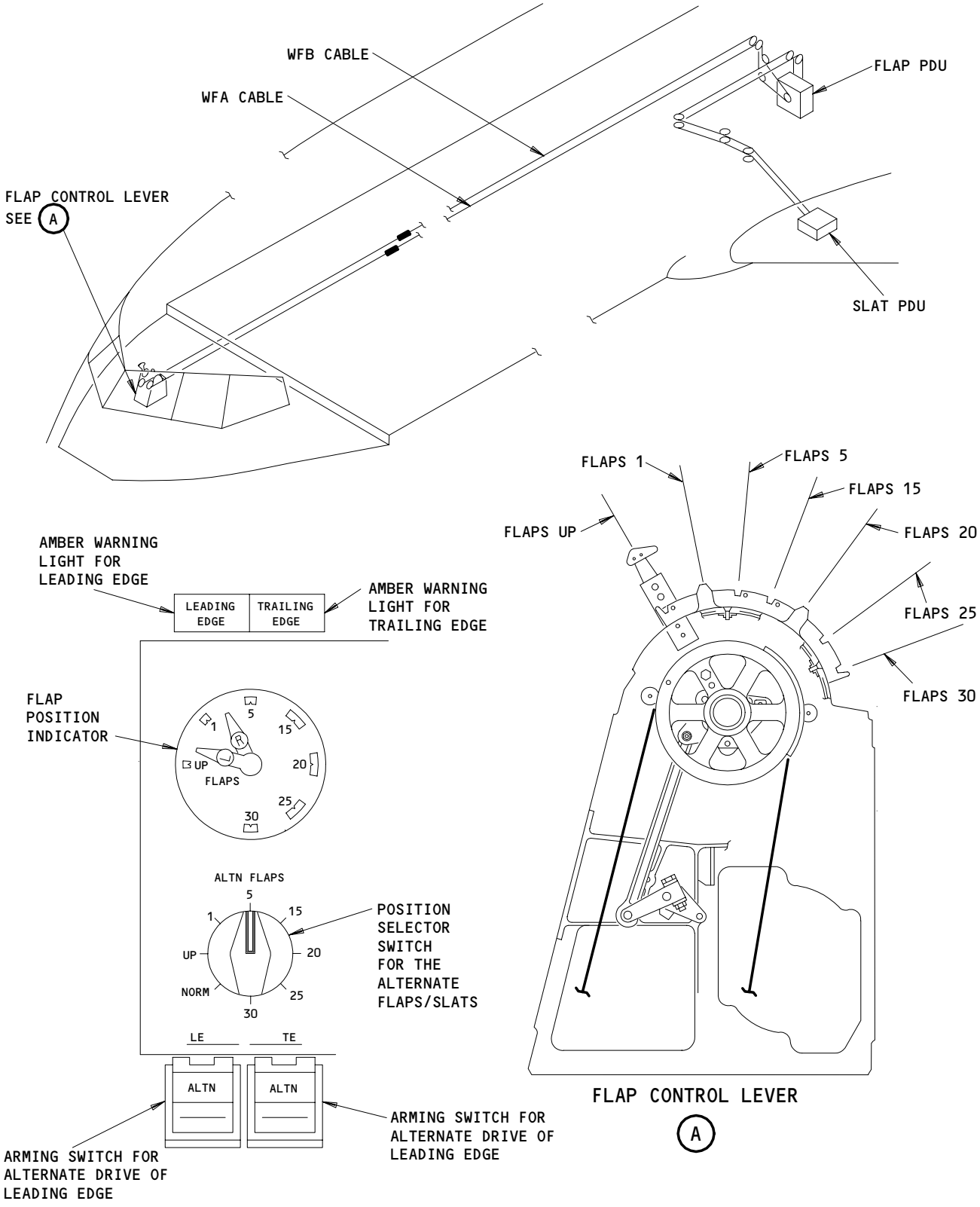
119	Main Equipement Center
211/212	Control Cabin

   D. Prepare for the Test

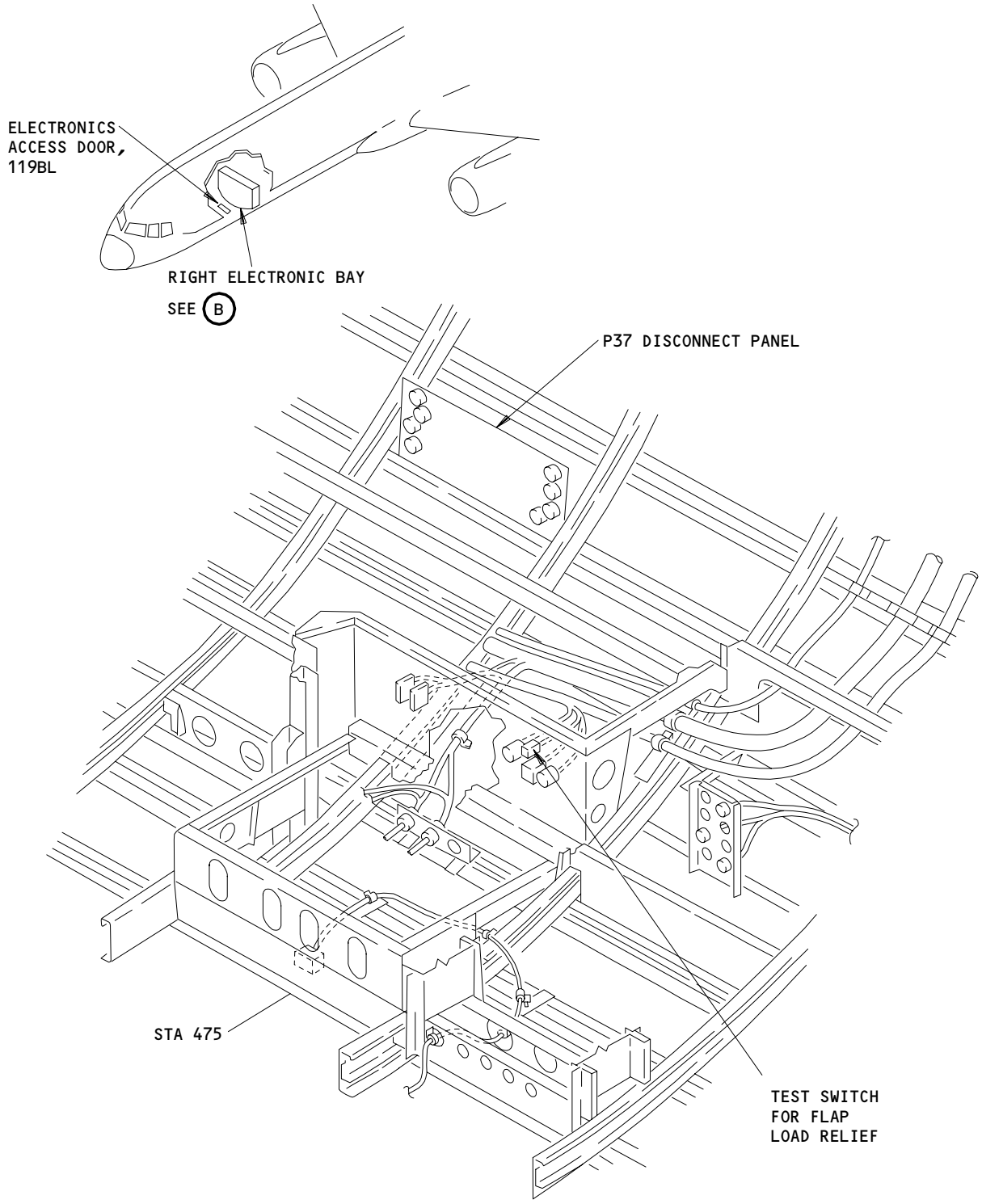
      S 865-189
      (1) Make sure the flaps and slats are in the fully retracted position with the flap control lever in the zero (FLAPS UP) detent.

      S 215-238
      (2) Make sure the position selector switch for the alternate flaps/slats on the first-officer's main instrument panel, P3, is in NORM position.

      S 865-190
      (3) Supply electrical power (AMM 24-22-00/201).



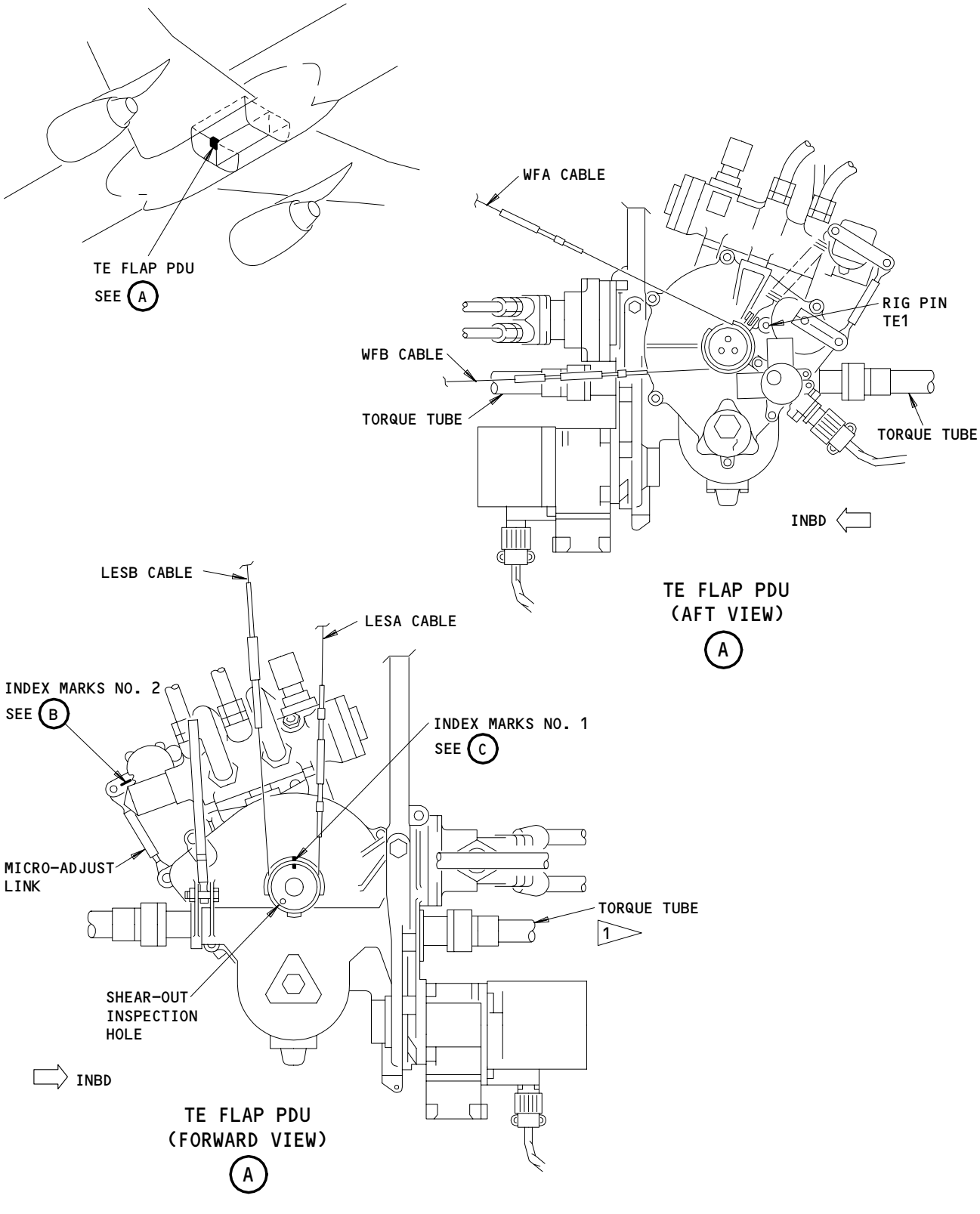
Trailing Edge Flap Controls
Figure 501 (Sheet 1)



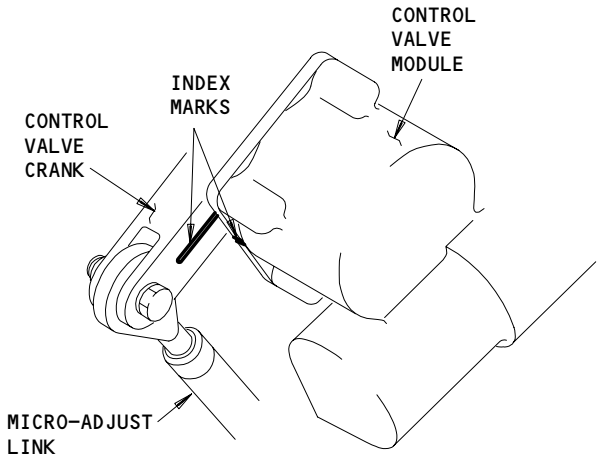
RIGHT ELECTRONICS BAY

(B)

Trailing Edge Flap Controls
Figure 501 (Sheet 2)

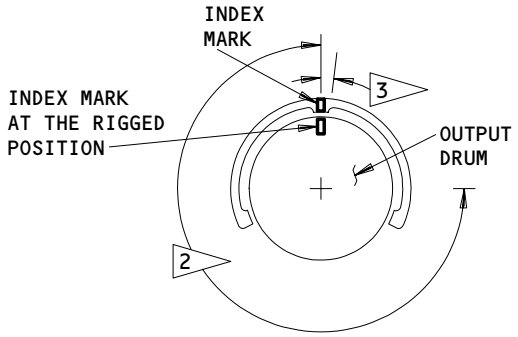


TE Flap PDU
Figure 502 (Sheet 1)



INDEX MARKS NO. 2

B



INDEX MARKS NO. 1

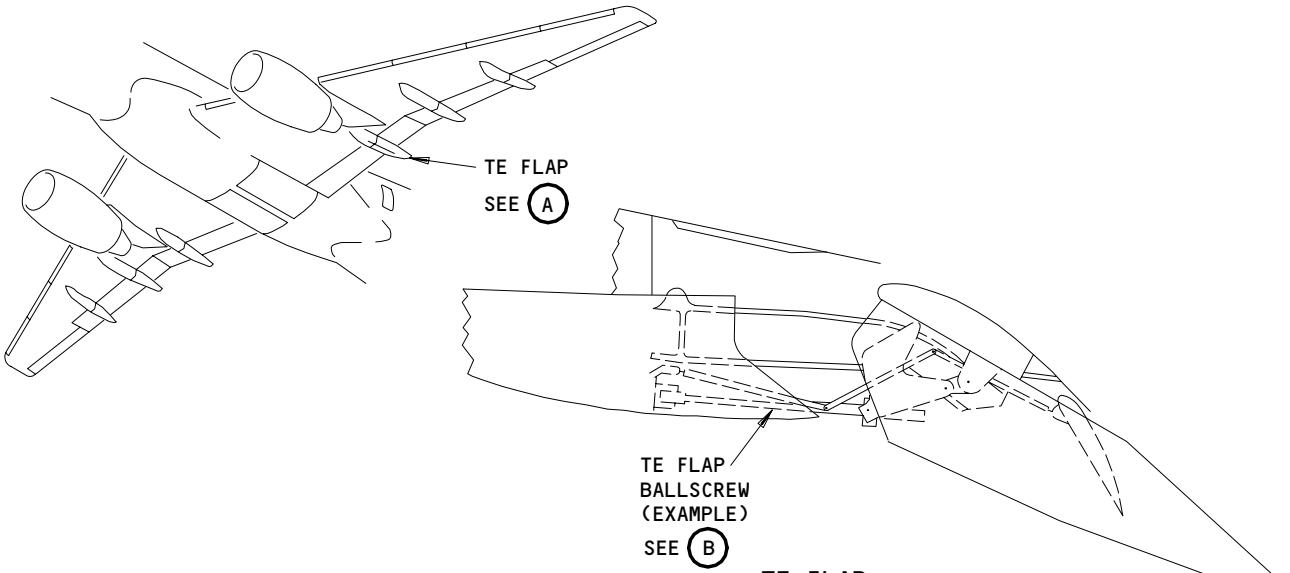
C

1 PUT A MARK ON THE TORQUE TUBE AND THE PDU OUTPUT SHAFT AT THE SAME POSITIONS TO MAKE SURE THEY ARE ALIGNED CORRECTLY WHEN CONNECTED AGAIN.

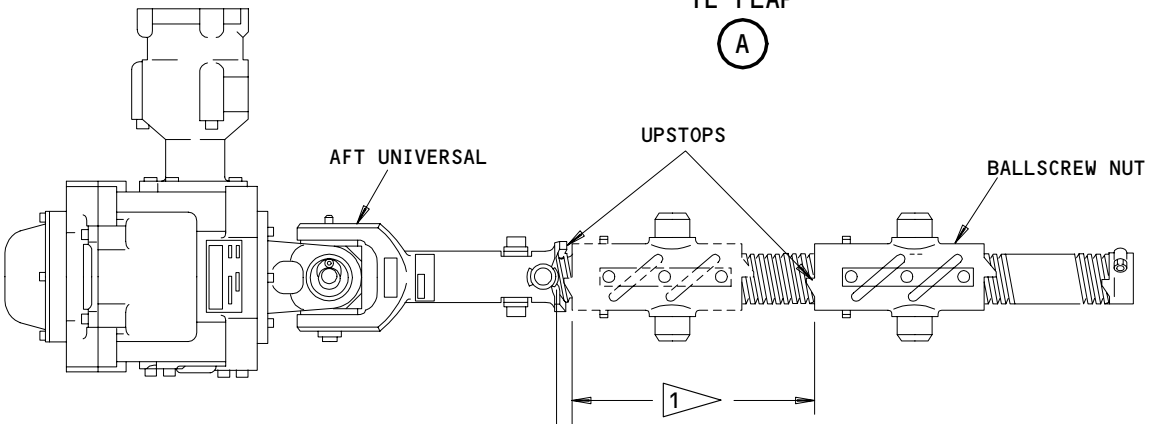
2 IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, TURN THE PDU OUTPUT SHAFT BY HAND SO THAT THE OUTPUT DRUM TURNS CLOCKWISE TO ALIGN THE INDEX MARKS

3 IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, TURN THE PDU OUTPUT SHAFT BY HAND SO THAT THE OUTPUT DRUM TURNS COUNTER CLOCKWISE TO ALIGN THE INDEX MARKS

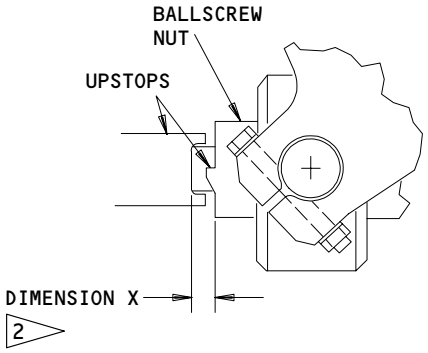
TE Flap PDU
Figure 502 (Sheet 2)



TE FLAP
A



TE FLAP BALLSCREW
B

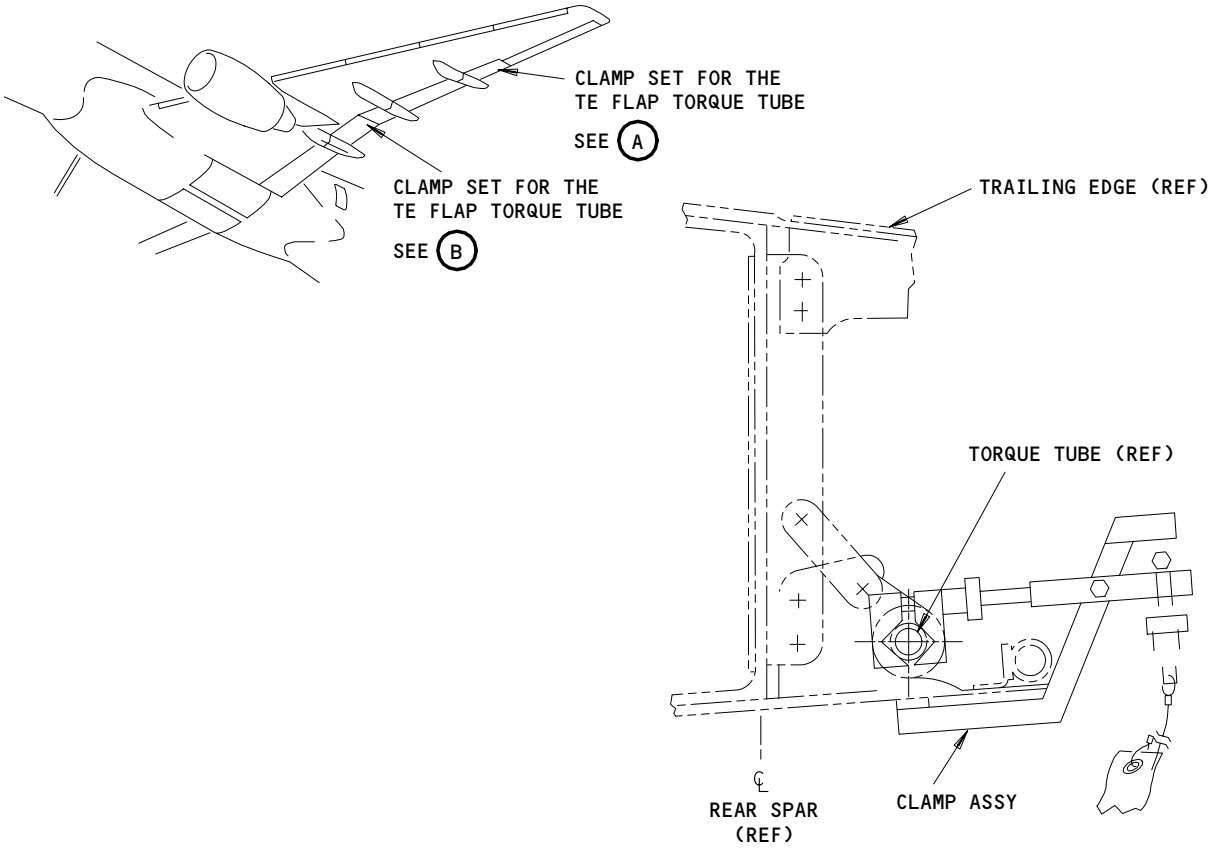


DEMENSION X
C

1 TO MEASURE THE TOTAL BALLSCREW NUT TRAVEL, REFER TO THE ADJUSTMENT/TEST PROCEDURE

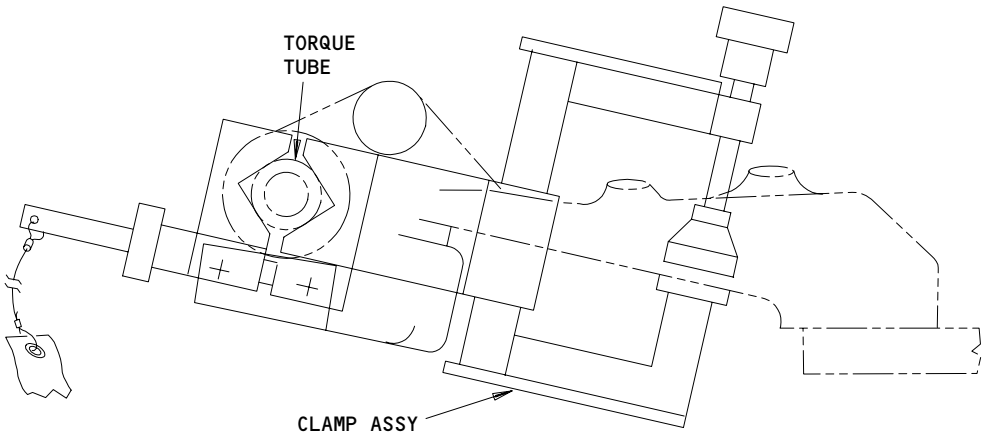
2 TO MEASURE THE BALLSCREW NUT TRAVEL, MEASURE THE DIMENSION X FIRST WITH THE FLAPS FULLY RETRACTED

TE Flap Ballscrew
Figure 503



CLAMP SET FOR THE TE FLAP TORQUE TUBE

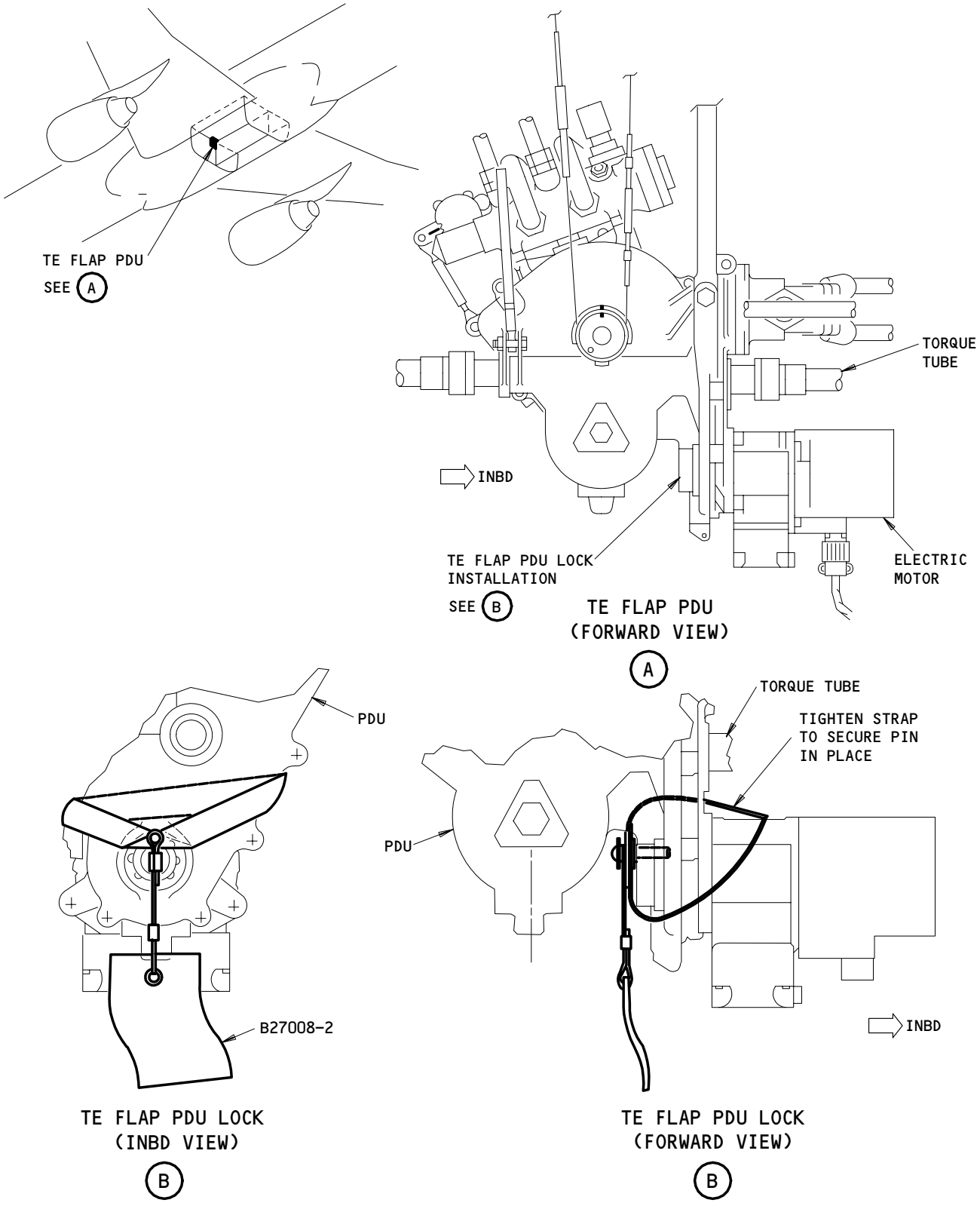
A



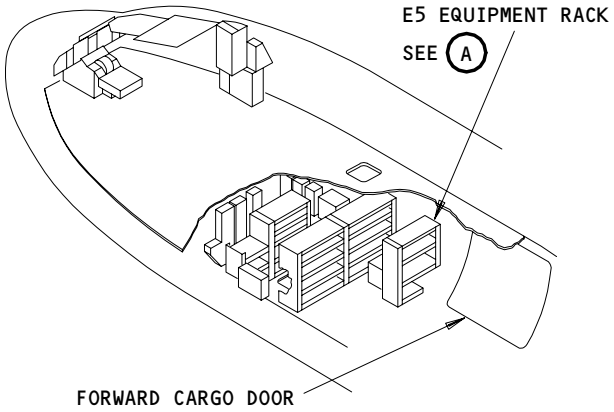
CLAMP SET FOR THE TE FLAP TORQUE TUBE

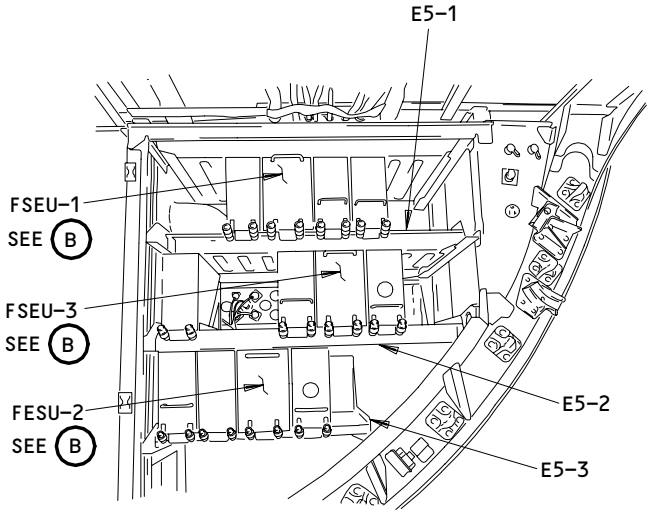
B

TE Flap Torque Tube Clamp Set
Figure 504

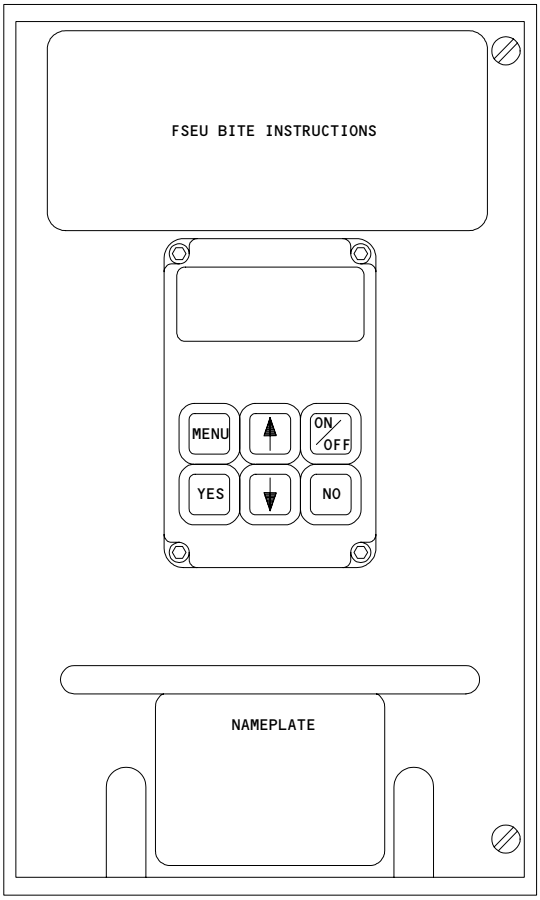


TE Flap PDU Lock
Figure 505



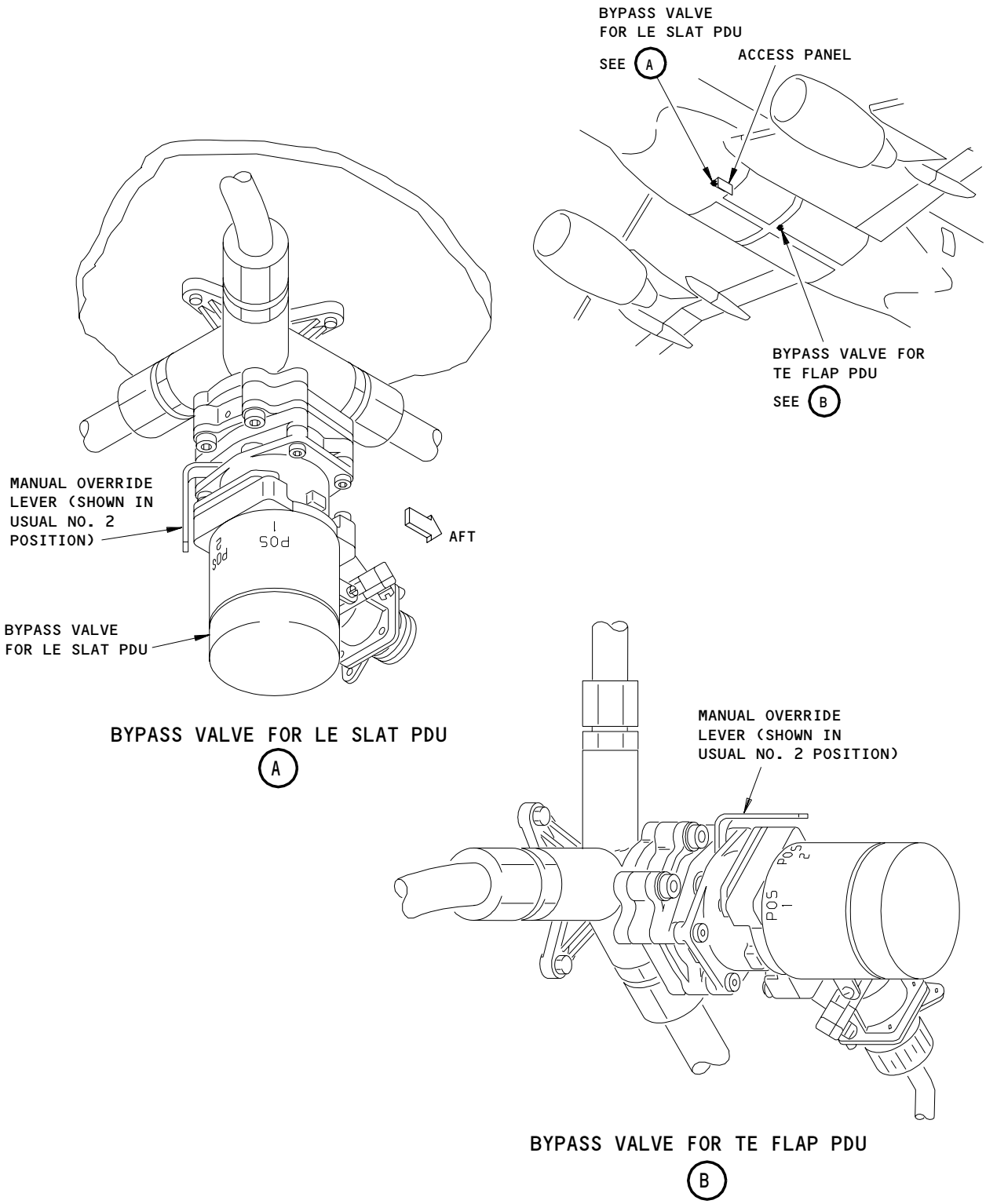


E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU)
Figure 506



TE Flap and LE Slat PDU Bypass Valves
Figure 507

S 215-239

(4) Make sure the arming switches for the alternate drive of the TE flaps and LE slats on the P3 panel are not in the armed position (switch lights will go off).

NOTE: You will need to put these arming switches in the armed position for the LEADING EDGE light to come on when you do the FSEU-2 BITE test in the steps below.

S 865-170

(5) Make sure these circuit breakers on the overhead panel, P11, are closed.
(a) EICAS (6 locations)

S 865-191

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

E. Flap/Slat Electronic Unit (FSEU) - Test (Fig. 506)

S 715-160

(1) Do the FSEU test that follows:
(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(b) Push the YES switch on the FSEU.
(c) Make sure the NO FAULTS message shows on the display.
(d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(e) Push the NO switch two times to show the GROUND TESTS? message on the display.
(f) Push the YES switch to show the FLT DECK TEST? message on the display.
(g) Push the NO switch to show the DISPLAY TEST? message on the display.
(h) Push the YES switch.
(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the NO switch two times to show the GROUND TESTS? message on the display.
(l) Push the YES switch to show the FLT DECK TEST? message on the display.

(m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

FSEU-1

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP LOAD RELIEF	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[2]	EICAS STATUS PAGE

FSEU-2

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT *[1]	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	EICAS STATUS PAGE
FLAP/SLAT ELEC *[2]	UPPER EICAS SCREEN

FSEU-3

INDICATION	LOCATION
FLAP/SLAT ELEC *[2]	EICAS STATUS PAGE

*[1] The LEADING EDGE light will come on only if the LE slat alternate drive is armed (the switch light will be on) while the FSEU-2 BITE test is run.

*[2] The EICAS status page must be on for message to show.

F. TE Flap System for Primary Hydraulic Operation - Test

NOTE: Make sure the TRAILING EDGE light on the P3 does not come on and that no TE flap messages come on the EICAS display on 2.

S 715-149

(1) Do the hydraulic operation test that follows:

CAUTION: CLOSE THE ENGINE FAN DUCT COWLING BEFORE THE LE SLATS ARE OPERATED. IF THIS COWLING IS OPENED THE SLATS CAN RUN INTO THE COWLING WHICH CAN CAUSE DAMAGE TO THE SLATS OR COWLING.

(a) Put the flap control lever in the 1-unit detent.

(b) As the flaps and slats start to extend, make sure the L and R needles on the flap position indicator, on the first officer's main instrument panel, P3, move very quickly to a position between the UP and the 1-unit position.

(c) When the flaps stop at the 1-unit position, make sure the L and R needles on the flap position indicator move very quickly to the 1-unit position.

(d) Put the flap control lever in the 5, 15, 20, 25 and 30-unit detents and do a check at each detent position as follows:

1) Make sure the flaps stop at the correct position for the flap control lever.

2) Make sure the flaps are in the correct position for the indicator needles.

3) Make sure both indicator needles show the same flap position as the flaps.

(e) Push the test switch for the flap load relief with the flaps in the 30-unit position.

(f) Make sure flaps retract to the 25-unit position.

(g) Release the test switch.

(h) Make sure the flaps extend to the 30-unit position.

(i) Put the flap control lever in the zero (FLAPS UP) detent. Make sure the flaps and slats retract fully.

G. Flap/Slat Alternate-(Electric) Drive System - Test

NOTE: Make sure the TRAILING EDGE and LEADING EDGE lights on the P3 panel do not come on and that no TE flap or LE slat messages come on the EICAS display. If either the TE flap or LE slat EICAS message is displayed, find the part number of FSEU-2 and -3 in the forward cargo compartment. Then do the FSEU BITE procedure on FSEU-2 and -3 (FIM 27-51-00/101, Fig. 104A or 104B).

S 865-192

(1) Make sure the TE flap system is as follows:

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 FLAP CYCLES), DO NOT OPERATE THE MOTOR FOR 3 MINUTES. YOU CAN CAUSE DAMAGE TO THE MOTOR IF YOU LET IT RUN CONTINUOUSLY FOR MORE THAN 12 MINUTES.

(a) Make sure the flap control lever, flaps, and slats are in the UP position.

(b) Depressurize the left hydraulic system (AMM 29-11-00/201).
(c) Make sure the position selector switch for the flap/slat alternate drive is in the NORM position.
(d) Push the LE ALTN (slat alternate drive arming) switch on P3 panel and make sure the switch light comes on.

S 715-193
(2) Do the Flap/Slat Alternate Drive System test as follows:
(a) Push the TE ALTN (flap alternate-drive arming) switch on the P3 panel and make sure the switch light comes on.
(b) Turn the alternate flaps/slats position selector switch to the 1-unit position.
(c) Make sure the L and R needles on the flap position indicator move very quickly to the 1/2 position when the flaps start to extend.
(d) Make sure the L and R needles on the flap position indicator move very quickly to the 1 position when the flaps extend to the 1-unit position.
(e) Turn the position-selector switch to the 5 and 15 unit positions.

NOTE: Let the flaps extend and stop at each position before you move the position selector switch to the next position.

(f) Make sure flaps move to the same position as the position indicator needles.
(g) Turn the alternate flaps/slats position selector switch to the 20-unit position.
(h) Make sure the flaps and slats move to the correct position.
(i) Turn the alternate flaps/slats position selector switch to the 15-unit position.
(j) Make sure the flaps and slats move to the correct position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(k) Pressurize the left hydraulic system (AMM 29-11-00/201).
(l) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives.
(m) Make sure the flaps and slats move to the fully UP position.
(n) Turn the alternate flaps/slats position selector switch to the NORM position.

TASK 27-51-00-825-007

3. Adjustment of the TE Flap System

A. General

(1) The flap system is correctly adjusted when the conditions that follow are correct:

(a) With the flaps in the fully retracted position:

1) The angle between the up stops, on the ballscrew U-joints for the flap drive system, and the ballnuts is between 45° and 135°.

2) All the ballnut up stops are less than 20° of each other.

(b) With the flap control lever in the 1-unit detent:

1) The cable tension is in the tolerance limits given in the temperature tension chart (Table 1)

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

2) The rig pin TE1 can easily be put into the power drive unit (PDU) for the TE flaps.

(c) With the flap control lever in the zero (FLAPS UP) detent and the left hydraulic system pressurized:

1) The index mark on the output cam of the PDU is aligned with the index mark on the PDU case (Index marks #1).

B. Equipment

(1) TE Flap Torque Tube Clamps from Set B27055-1
(a) Outboard TE Flap Torque Tube Clamp - B27055-2
(b) Inboard TE Flap Torque Tube Clamp - B27055-3
(2) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) LE1 - B20003-3
(b) TE1 - B20003-53

C. References

(1) AMM 20-10-03/401, Control Cables - Removal/Installation
(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-51-02/501, Inboard Trailing Edge Flap
(5) 27-51-14/501, Outboard Trailing Edge Flap
(6) 27-51-27/201, Trailing Edge Flap Power Drive Unit Components
(7) 27-58-03/401, Flap Position Transmitter
(8) 27-81-00/201, Leading Edge Slat System.
(9) 27-81-00/501, Leading Edge Slat System
(10) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(11) 32-00-15/201, Landing Gear Door Locks
(12) 32-00-20/201, Landing Gear Downlocks

D. Access

(1) Location Zones

143	Left MLG Wheel Well
197/198	Wing to Body - Aft Lower Half (Left/Right)
211/212	Control Cabin - Section 41 (Left/Right)
567/667	Outboard Aft Flap (Left/Right)

(2) Access Panel

193BL	RAM Air Inlet Actuator Door

E. Prepare for Adjustment

S 495-008

(1) Make sure the downlocks for the nose and main landing gear are installed (AMM 32-00-20/201).

S 495-009

WARNING: REFER TO AMM 32-00-15 FOR THE MAIN-GEAR DOOR-LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS MAY CAUSE INJURY OR DAMAGE IF THE LOCKS ARE NOT CORRECTLY INSTALLED.

(2) Open the main gear doors and install the door locks (Ref 32-00-15).

S 215-013

(3) Make sure the TE flaps and the LE slats are in the fully retracted position.

S 215-012

(4) Make sure the flap control lever is in the zero (FLAPS up) detent.

S 865-011

(5) Remove left hydraulic system power (AMM 29-11-00/201).

S 865-010

(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C17, FLAP SLAT SHUTOFF 1
(d) 11D31, HYDRAULICS PTU CONT
(e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(g) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(h) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(i) 11J33, WARN ELEX A

S 865-014

(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

F. Adjust the TE Flap System

S 035-015

(1) Disconnect the torque tubes at the output shafts of the power drive unit (PDU) for the TE flaps.

S 495-016

(2) Attach clamps to the torque tubes to keep the flap position (Fig. 504).

S 825-017

(3) Adjust the PDU Input Cam and Control Cables as follows:

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

(a) Disconnect the WFA and WFB cables at the turnbuckles.
(b) Put the flap control lever in the 1-unit detent.
(c) Turn the input drum of the PDU to the 1-unit flap position.
(d) Put rig pin TE1 into the PDU input cam to make sure the input drum is in the correct position (Fig. 502).
(e) Connect the WFA and WFB cables at the turnbuckles.
(f) If new cables are installed, and the cables were not pulled before installation, do the steps that follow:
    1) Pull the cables with a force that is two times the force shown in Table 1.
    2) Cycle the system to the maximum travel limits 20 times.
(g) Tighten the cables and refer to Table 1 for the correct tension.

TABLE 1	
FLAP CABLE TENSION LOADS	
TEMP °F ±5°F	WFA, WFB TENSION IN POUNDS
110	118
90	109
80	104
70	100
60	96
50	92
40	88
30	84
10	75
-10	67
-30	59
-40	53

NOTE: The cable tension values are not valid when the temperature differences are more than 5°F between two points along the cable length. The airplane ambient temperature should be stable for one hour prior to the adjustment.

(h) Make sure rig pin TE1 can easily be put into the PDU input cam.
(i) Remove rig pin TE1.
(j) Put the flap control lever in the zero (flaps up) detent.

S 825-018
(4) Adjust the Follow-up Cam to the Hydraulic Control Valve.
(a) Make sure the shearout on the output drum of the PDU is correct as follows:
1) Put a straight 0.032 inch (0.81 mm) diameter wire into the drum inspection hole on the output drum (Fig. 502).
2) Make sure the wire can be pushed in 1.00 inch (25.4 mm).

CAUTION: DO NOT TURN THE OUTPUT SHAFTS WITH POWER TOOLS. POWER TOOLS CAN DAMAGE INTERNAL MECHANISMS WHEN USED TO TURN THE OUTPUT SHAFTS.

(b) Manually turn the output shafts to align the index mark on the output pulley with the index mark on the PDU (index marks #1).

NOTE: To align index marks #1, turn the PDU output shaft so that the index mark on the output drum moves in the direction shown (Fig. 502).

(c) Adjust the micro adjust link to align the index mark on the input crank of the PDU control valve with the index mark on the control valve body (index marks #2) (Fig. 502).

G. Adjustment of the TE Flap System - Check

S 015-019

(1) Open access door 193BL (AMM 06-41-00/201).

S 865-020

(2) Put the manual override lever on the bypass valve of the PDU for the leading edge to the POS 1 (bypass) position (AMM 27-81-00/201).

S 865-021

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize left hydraulic system (AMM 29-11-00/201).

S 825-022

(4) Adjust the micro adjust link until the index marks #1 are aligned.

NOTE: Ignore the index marks #2.

S 435-023

(5) Tighten the jamnuts on the micro adjust link and make sure that the index marks #1 stay aligned.

S 825-024

(6) Make sure the shearout on the output drum of the PDU is correct as follows:
(a) Put a straight 0.032 inch (0.81 mm) diameter wire into the drum inspection hole on the output drum (Fig. 502).
(b) Make sure the wire can be pushed in 1.00 inch (25.4 mm).

S 865-025

(7) Remove left hydraulic system power (AMM 29-11-00/201).

S 865-026

(8) Put the override lever to the POS 2 (normal) position.

S 415-027

(9) Close access door 193BL (AMM 06-41-00/201).

S 825-028

(10) Adjust the inboard TE flaps and the outboard TE flaps if necessary (AMM 27-51-02 and 27-51-14).

S 435-029
(11) Connect the torque tubes and remove the clamps.

S 215-030
(12) Make sure the TE flaps are in the adjusted retracted position.

S 825-031
(13) Adjust the left flap position transmitters for the left and right wings (AMM 27-58-01/501).

S 825-032
(14) Adjust the PDU for the TE flap (AMM 27-51-27/201).

S 825-033
(15) Make sure rig pin LE1 can easily be put in the rig pin hole of the LE-slat PDU input-cam in the input cam of the PDU for the leading edge slat.
(a) If the rign pin LE1 cannot easily be put in the rig pin hole, adjust the LE-slat PDU (Ref 27-81-00).

H. Put the Airplane Back to Its Usual Condition

S 865-034
(1) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C17, FLAP SLAT SHUTOFF 1
(d) 11D31, HYDRAULICS PTU CONT
(e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(g) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(h) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(i) 11J33, WARN ELEX A

S 865-035
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

TASK 27-51-00-735-036

4. TE Flap System - System Test

A. General
(1) The TE flap system must be adjusted correctly before the tests that follow are done.
(2) An EXISTING FAULT is a failure that occurred in the last flight leg. Faults that occurred before the last flight leg can be found in the respective flight leg in the FAULT HISTORY part of the FSEU BITE menu.

B. Equipment
(1) TE Flap PDU Lock - B27008-1
(2) Force Gage (0-25 pounds)
(3) TE Flap Torque Tube Clamps from Set B27055-1
(a) Outboard TE Flap Torque Tube Clamp - B27055-2
(b) Inboard TE Flap Torque Tube Clamp - B27055-3

C. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-81-00/201, Leading Edge Slat System.
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones

119	Main Equipment Center
143	Left MLG Wheel Well
197/198	Wing to Body - Aft Lower Half (Left/Right)
211/212	Control Cabin - Section 41 (Left/Right)
567/667	Outboard Aft Flap (Left/Right)

(2) Access Panel

193BL	RAM Air Inlet Actuator Door

E. Prepare for the Test

S 865-171
(1) Supply electrical power (AMM 24-22-00/201).

S 865-172
(2) Put the EICAS computer switch on the EICAS DISPLAY select-panel, P9, to L.

S 865-173
(3) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 015-174
(4) Open access panel 193BL (AMM 06-41-00/201).

S 215-175
(5) Make sure the flaps and slats are in the fully retracted position with the flap control lever in the zero (FLAPS UP) detent.

S 865-176

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

F. Operation Force of the Flap Control Lever - Test

S 735-043

(1) Do the test as follows:
   (a) Measure the force necessary to move the flap control lever smoothly from the zero (FLAPS UP) detent to the 30-unit detent in five seconds.
   (b) Make sure the force does not exceed nine pounds.
   (c) Move the flap control lever to the 1-unit detent.
   (d) Let the flaps and slats stop at the 1-unit position.
   (e) Move the flap control lever to zero (FLAPS UP) detent.
   (f) Make sure the force necessary to move the flap control lever is less than six and one-half pounds.

G. FSEU BITE - Test

S 215-156

(1) Make sure the EICAS computer switch on the P9 panel, is in the L position.

S 745-157

(2) Do the BITE test on the FSEU-1 in the main equipment center as follows:
   (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (b) Push the YES switch on the FSEU.
   (c) Make sure the NO FAULTS message shows on the display.
   (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (f) Push the YES switch to show the FLT DECK TEST? message on the display.
   (g) Push the NO switch to show the DISPLAY TEST? message on the display.
   (h) Push the YES switch.
   (i) Make sure all LED's on the face panel of the FSEU come on.
   (j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
   (k) Push the NO switch two times to show the GROUND TESTS? message on the display.

(l) Push the YES switch to show the FLT DECK TEST? message on the display.

(m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

1) Make sure indications that follow show momentarily in the given sequence:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP LOAD RELIEF	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] The EICAS status page must be on for the message to show.

S 745-158

(3) Do the BITE test on the FSEU-2 in the main equipment center as follows:

(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.

(b) Push the YES switch on the FSEU.

(c) Make sure the NO FAULTS message shows on the display.

(d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.

(e) Push the NO switch two times to show the GROUND TESTS? message on the display.

(f) Push the YES switch to show the FLT DECK TEST? message on the display.

(g) Push the NO switch to show the DISPLAY TEST? message on the display.

(h) Push the YES switch.

(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the NO switch two times to show the GROUND TESTS? message on the display.
(l) Push the YES switch to show the FLT DECK TEST? message on the display.
(m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:
1) Push the arming switch for the alternate drive of the LE slat to arm the alternate drive (switch light on).
2) Make sure the indications that follow show momentarily in the given sequence:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] The EICAS status page must be on for the message to show.

(n) Push the arming switch to disarm the slat alternate drive (switch light will go off).

S 745-159
(4) Do the BITE test on the FSEU-3 in the main equipment center as follows:
(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(b) Push the YES switch on the FSEU.
(c) Make sure the NO FAULTS message shows on the display.
(d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(e) Push the NO switch two times to show the GROUND TESTS? message on the display.
(f) Push the YES switch to show the FLT DECK TEST? message on the display.

(g) Push the NO switch to show the DISPLAY TEST? message on the display.
(h) Push the YES switch.
(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the NO switch two times to show the GROUND TESTS? message on the display.
(l) Push the YES switch to show the FLT DECK TEST? message on the display.
(m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:
(n) Make sure the EICAS message, FLAP/SLAT ELEC, does not show on the lower display.

NOTE: The EICAS status page must be on for the message to show.

H. Hydraulic Operation - Test

NOTE: Make sure you use a hydraulic source that operates at a pressure of 3000 psi and supplies a flow rate of 22 gallons/minute. If you use a hydraulic source that does not operate to these specifications, the time it takes for the flaps and slats to move to the correct position will be more than the permitted time limit.

S 735-046
(1) Do the test steps that follow for the usual hydraulic operation:
(a) Make sure the flap control lever is in the zero (FLAPS UP) detent and the flaps and slats are in the fully retracted position.
(b) Make sure the position selector switch for the alternate flaps/slats on the P3 panel is in the NORM position.

(c) Make sure the L and R indicator needles for the flap position are in the tolerance band for the UP-unit position.
(d) Do the BITE test on the FSEU-1 in the main equipment center.
(e) Make sure the BITE test shows no faults.
(f) Move the flap control lever to 1-unit detent.
(g) Let the flaps move to the 1-unit position and the slats move to the intermediate position.
(h) Make sure the flaps reach the 1-unit position in 5 to 7 seconds after the flap control lever is moved.
(i) Make sure the L and R indicator needles for the flap position are in the tolerance band for the 1-unit position.
(j) Do the BITE test on the FSEU-1.
(k) Make sure the BITE test shows no faults.
(l) Move the flap control lever to the 5, 15, 20, 25, and 30-unit detents, and then to the 25, 20, 15, 5, and 1-unit detents.
(m) Let the flaps stop at each detent position and do a check as follows:
    1) Make sure the L and R flap indicator needles for the flap position are in the tolerance band for the unit position set on the flap control lever.
    2) Do the BITE test on the FSEU-1 and make sure the BITE test shows no fault.
(n) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats move to the fully retracted position.
(o) Make sure the L and R indicator needles for the flap position are in the tolerance band for the UP-unit position.
(p) Move the flap control lever to the 30-unit detent.
(q) Make sure the flaps and slats are at the fully extended position in less than 52 seconds after the flap control lever is moved.
(r) Move the flap control lever to the zero (FLAPS UP) detent.
(s) Make sure the flaps and slats are at the fully retracted position in less than 52 seconds after the flap control lever is moved.
(t) Make sure the L and R indicator needles for the flap position are in the tolerance band for the UP-unit position.

(u) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11C14, FLAP SLAT ELEC UNIT 2 POWER
2) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
3) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 735-047

(2) Do the steps that follow to do a check of the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL:
(a) Make sure the EICAS message, FLAP/SLAT ELEC shows on the status and ECS/MSG display.
(b) Push the arming switch of the alternate drive for the flaps on P3 to arm the flap alternate drive (switch light on).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Move the flap control lever to 1-unit detent, and let the flaps and slats stop at the correct position.
(d) Make sure the EICAS message, FLAP ISLN VAL shows on the ECS/MSG and status display after 3 seconds.
(e) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(f) Erase the EICAS message FLAP ISLN VAL from the ECS/MSG display and make sure the EICAS message FLAP ISLN VAL is off the status display.
(g) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the flaps and slats do not move.
(h) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-162

(3) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
  (a) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
  (b) Make sure the EICAS message, FLAP ISLN VAL shows on the ECS/MSG and status display after 3 seconds.
  (c) Make sure the flaps and slats do not move.
  (d) Push the arming switch for the alternate drive of the slats on the P3 panel to arm the slat alternate drive (switch light will come on).
  (e) Push the arming switch for alternate drive of the flaps to disarm the flap alternate drive (switch light off).
  (f) Make sure the flaps and slats do not move.
  (g) Open this circuit breaker on the P11 panel and attach the DO-NOT-CLOSE tag:
    1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 735-048

(4) Do a check of the bypass valves on the TE flap and LE slat PDU.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

  (a) Move the manual override lever on the bypass valve for the TE flap PDU to the usual position (POS 2) (Fig. 507), and let the flaps retract.
  (b) Make sure the slats do not move.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

  (c) Move the manual override lever on the bypass valve for the LE slat PDU (left wing-body fairing forward of the wing) to the usual position (POS 2) (Fig. 507), and let the slats retract.

(d) Move the manual override lever on the bypass valve LE slat PDU to the bypass position (POS 1).
(e) Move the flap control lever to the 1-unit detent.
(f) Make sure the LE slats do not move.
(g) Move the flap lever to the 5-unit detent.
(h) Make sure that the TE flaps go to the 5-unit position in 12-14 seconds after the flap control lever is moved.
(i) Move the flap control lever to the 1-unit detent.
(j) Make sure the TE flaps go to the 1-unit position in 12-14 seconds after the flap control lever is moved.
(k) Move the flap control lever to 30-unit detent, and let the flaps fully extended.
(l) Move the manual override lever on the bypass valve for the TE flap PDU to the bypass position (POS 1).

WARNING: DO NOT MOVE THE MANUAL OVERRIDE LEVER ON THE BYPASS VALVE OF THE FLAP PDU. MOVEMENT OF THE MANUAL OVERRIDE LEVER WILL CAUSE THE FLAPS TO MOVE AND POSSIBLE INJURY TO PERSONS.

(m) Make sure no trip indicators on the flap transmissions are released.

NOTE: If a trip indicator is above the adjacent surface the trip indicator was released. If there is no history of a TE FLAPS DISAGREE message on EICAS, then you do not need to remove or replace the flap transmission. Manually reset the trip indicator by pushing the pin in until the end stays aligned with the housing. Cycle the flaps to make sure that the indicator does not get tripped again.

(n) Move the manual override lever on the bypass valve for the TE flap PDU to the usual position (POS 2).
(o) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps fully retract.
(p) Move the manual override lever on the bypass valve for the LE slat PDU to the usual position (POS 2).
(q) Push arming switch for the alternate drive of LE slat to disarm the slat alternate drive (switch light off).
(r) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
1) 11C14, FLAP SLAT ELEC UNIT 2 POWER

2) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
3) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

(s) Erase the EICAS message, FLAP ISLN VAL from the ECS/MSG display.
(t) Make sure the EICAS message, FLAP ISLN VAL, does not show on the status display.
(u) Make sure the TRAILING EDGE and LEADING EDGE lights are off.
(v) Make sure the EICAS message, FLAT/SLAT ELEC does not show on the status display and ECS/MSG display.

I. Asymmetry Detection Response - Test

S 735-049

(1) Do the steps that follow:
(a) Move the flap control lever to the 15-unit detent.
(b) Let the flaps stop at 15-unit position and the slats stop at the intermediate position.
(c) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).
(d) Install the lock for the flap PDU (Fig. 505).
(e) Make a mark of the position of the torque tube coupling on the inboard side of flap PDU.
(f) At the inboard transmission on the left wing inboard flap, measure the distance between the face of the upstop and the face of the ballnut (Dimension X, Fig. 503).
(g) Disconnect the torque tube coupling from the inboard side of the TE flap PDU. Attach a clamp to the torque tubes in the right wing (Fig. 504).
(h) Remove the lock for the TE flap PDU.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(i) Pressurize the left hydraulic system (AMM 29-11-00/201).

(j) Move the flap control lever to the 20-unit detent.
(k) Make sure the TE flaps start to move and then stop.
(l) Make sure the position indicator needle for the L flap moves to a position between the 15-unit and 20-unit positions.
(m) Make sure the position indicator needle for the R flap does not move from the 15-unit position.
(n) Make sure the TRAILING EDGE light on the P3 panel comes on.
(o) Make sure the EICAS message, TE FLAP ASYM, shows on the display unit.
(p) Measure the up stop to screw nut dimension and make sure the screw nut has moved less than 1.13 inch (28.7 mm).
(q) Make sure the manual override levers on the bypass valve for the LE slat and TE flap PDUs are in the bypass position (POS 1).
(r) Remove the lock for the TE flap PDU.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(s) Pressurize the left hydraulic system (AMM 29-11-00/201).
(t) Move the flap control lever to the 15-unit detent.
(u) Make sure the flaps and slats do not move.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE TE FLAPS. WHEN THE FSEU POWER IS REMOVED, THE LEFT FLAPS WILL RETRACT AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(v) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
1) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(w) Make sure the indications that follow occur:
1) Make sure the left flaps retract to the 15-unit position.

2) Make sure the TRAILING EDGE light goes out.
3) Make sure the TE FLAP ASYM message goes out on EICAS display unit.
4) Make sure the position indicator needle for the L flap is in the tolerance band for the 15-unit position.

(x) Connect the torque tube coupling at the flap PDU and make sure the marks on the torque tube align.
(y) Remove the clamp from the torque tubes in the right wing.
(z) At inboard flaps inboard transmissions, make sure the angle between the upstops and the ballnuts is less than 10° (left wing versus right wing).
(aa) Remove the lock for the TE flap PDU.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(ab) Pressurize the left hydraulic system (AMM 29-11-00/201).
(ac) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel.
1) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(ad) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats fully retract.
(ae) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP ISLN VAL, do not show on the status display.
(af) Make sure the EICAS messages FLAP/SLAT ELEC, FLAP ISLN VAL, or FLAP/SLAT BITE, do not show on the ECS/MSG display.

J. TE Flap Electrical Circuits - Test (FLAP/SLAT BITE message, flap position indication, and FSEU-2 to the alternate flaps/slats position selector switch).

S 865-050
(1) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR

(d) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(e) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(f) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR

S 215-051
(2) Do a check of EICAS message, FLAP/SLAT BITE:
(a) Put the computer switch on the EICAS DISPLAY select panel P9, in L.
(b) Make sure the EICAS message, FLAP/SLAT BITE, shows on the ECS/MSG display
(c) Put the computer switch on the EICAS DISPLAY select panel P9, in R.
(d) Make sure the EICAS message stays.
(e) Put the computer switch in L.

S 865-052
(3) Move the flap control lever to the 1-unit detent.

S 215-055
(4) Make sure the position indicator needles are in the tolerance band for the 1-unit position.

S 215-054
(5) Make sure the flaps move to the 1-unit position and slats move to the intermediate position.

S 865-053
(6) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(d) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(e) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(f) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR

S 035-056
(7) Erase the EICAS message, FLAP/SLAT BITE, from the EICAS ECS/MSG display.

S 865-057
(8) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11G22, FLAP SLAT ELEC UNIT 3 CONT

S 215-058
(9) Make sure the EICAS message, FLAP/SLAT BITE, shows on the ECS/MSG display.

S 865-059
(10) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G22, FLAP SLAT ELEC UNIT 3 CONT

S 035-060
(11) Erase the EICAS message FLAP/SLAT BITE from EICAS ECS/MSG display.

S 865-061
(12) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats fully retract.

S 865-062
(13) Open this circuit breaker on the P11 panel and do the subsequent step in less than 15 seconds:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 215-063
(14) Move the flap control lever to the 1-unit detent and do the checks that follow:
(a) Make sure the position indicator needles for the L and R flap position do not go to an intermediate position between the UP-unit and 1-unit positions as the flaps start to extend.
(b) Make sure the position indicator needles for the L and R position are in the tolerance band for the 1-unit position when flaps reach 1-unit position and the slats reach intermediate position.

S 865-064
(15) Remove the DO-NOT-CLOSE tag, and close this circuit breaker on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 865-065
(16) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11H12, FLAP POS IND LEFT

S 215-066
(17) Move the flap control lever to the zero (FLAPS UP) detent, let the flaps and slats fully retract, and do the checks that follow:
(a) Make sure the position indicator needle for the L flap position does not move.
(b) Make sure the position indicator needle for the R flap position moves to the UP-unit position.

S 865-067
(18) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H12, FLAP POS IND LEFT

S 215-068
(19) Make sure the position indicator needle for the L flap moves to the UP-unit position.

S 865-069
(20) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11H13, FLAP POS IND RIGHT

S 215-070
(21) Move the flap control lever to the 1-unit detent, let the flaps move to the 1-unit position and the slats move to the intermediate position, and do the checks that follow:
(a) Make sure the position indicator needle for the R flap does not move to the 1-unit position..
(b) Make sure the position indicator needle for L flap moves to the 1-unit position.

S 865-164
(22) Remove the DO-NOT-CLOSE tag and close this circuit breaker on P11 panel:
(a) 11H13, FLAP POS IND RIGHT

S 215-071
(23) Move the flap control lever to the zero (FLAPS UP) detent, let the flaps and slats fully retract, and do the checks that follow:
(a) Make sure the position indicator needles for L and R flap are in the tolerance band for the UP-unit position.

S 865-165
(24) Push the arming switches for the alternate drive of the TE flap and LE slat to arm the flap and slat alternate drives (switch lights will come on).

S 865-072
(25) Put the position selector switch for the alternate flaps/slats in the UP-unit detent.

S 865-073

(26) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6D23, ALTN FLAP PWR

S 215-074

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 FLAP CYCLES) DO NOT OPERATE THE MOTOR FOR 3 MINUTES. IF YOU LET THE MOTOR RUN FOR TOO MUCH TIME IT CAN CAUSE DAMAGE TO EQUIPMENT.

(27) Put the position selector switch for the alternate flaps/slats in the 1, 5, 15, 20, 25, and 30-unit detents. Wait for at least 5 seconds in each detent and make sure the steps that follow occur:
(a) Make sure the TE flaps do not move for each detent.
(b) When the position selector switch is moved to the 1-unit detent, make sure the LE slats go to the intermediate position.
(c) When the position selector switch is moved to the 20-unit detent, make sure the LE slats go to the fully extended position.
(d) Make sure the TRAILING EDGE light is on and that the EICAS message, TE FLAP DISAGREE, shows on the EICAS display unit.

S 865-075

(28) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6D23, ALTN FLAP PWR

S 215-076

(29) Put the position selector switch for the alternate flap/slat in the 1-unit detent, and do the checks that follow:
(a) Make sure the TE flaps move to the 1-unit position and slats move to the intermediate position.
(b) Make sure TRAILING EDGE light is off and the EICAS message, TE FLAP DISAGREE is not shown on the display unit.

S 865-077
(30) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6D23, ALTN FLAP PWR

S 215-078
(31) Put the position selector switch in the UP-unit detent, and do the check that follows:
(a) Make sure the TE flaps and LE slats do not move.
(b) Make sure the TRAILING EDGE light is on and the EICAS message TE FLAP DISAGREE shows on the display.

S 865-166
(32) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6D23, ALTN FLAP PWR

S 215-079
(33) Quickly move the position selector switch to the 1-unit detent and back to the UP-unit detent and make sure that the TE flaps and LE slats move to the UP position.

S 865-080
(34) Put the position selector switch for the alternate flaps/slats in the NORM position.

S 865-081
(35) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-082
(36) Move the flap control lever to the 5-unit detent, and make sure the TE flaps and LE slats do not move.

S 215-083
(37) Make sure the EICAS message, FLAP ISLN VAL, comes on the ECS/MSG and status display after 3 seconds.

S 215-084

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE TE FLAPS. IN THE STEP THAT FOLLOWS, THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(38) Move manual override lever on the bypass valve of the TE flap PDU to the usual position (POS 2), and make sure steps that follow occur:
(a) Make sure the TE flaps move to the 5-unit position.

(b) Make sure the TRAILING EDGE light and EICAS message TE FLAP DISAGREE on the EICAS display unit are on momentarily and then go off.

S 865-085

(39) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-086

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE LE SLATS. IN THE STEP THAT FOLLOWS, THE SLATS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(40) Push the arming switches for the alternate drive of the TE flap and LE slat to disarm the flap and slat alternate drives (switch lights will go off), and make sure the LE slats move to the intermediate position.

S 865-087

(41) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats fully retract.

S 035-088

(42) Erase the EICAS message FLAP ISLN VAL from the ECS/MSG display.

S 215-089

(43) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL, are not shown on the status display.

S 215-090

(44) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP/SLAT BITE, are not shown on the ECS/MSG display.

S 215-091

(45) Make sure the TRAILING EDGE light is off and the EICAS message, TE FLAP DISAGREE, is off the display.

K. Alternate Electric Operation - Test

S 865-092

(1) Push the arming switches for the alternate drives of the TE flaps and LE slats to arm the flap and slat alternate drives (switch lights will come on).

S 865-093

(2) Open this circuit breaker P6 panel and attach DO-NOT-CLOSE tag:
(a) 6D23, ALTN FLAP PWR

S 215-221

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 FLAP CYCLES) DO NOT OPERATE THE MOTOR FOR 3 MINUTES. IF YOU LET THE MOTOR RUN FOR TOO MUCH TIME IT CAN CAUSE DAMAGE TO EQUIPMENT.

(3) Put the position selector switch for the alternate flaps/slats to the 1-unit detent, and do the checks that follow:
(a) Make sure the TE flaps do not move.
(b) Make sure the LE slats move to the intermediate position.
(c) Make sure the TRAILING EDGE light is on.

S 865-220

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE TE FLAPS. IN THE STEP THAT FOLLOWS, THE FLAPS WILL EXTEND AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Remove the DO-NOT-CLOSE tag and close the P6 panel circuit breaker that follows, and make sure the TE flaps move to the 1-unit position:
(a) 6D23, ALTN FLAP PWR

S 215-096
(5) Put the position selector switch to the UP-unit detent and do the check that follows:
(a) Make sure the TE flaps and LE slats move to the UP position.

S 215-097
(6) Put the position selector switch to the 1-unit detent and do the checks that follow:
(a) Make sure the flaps move to the 1-unit position and LE slats move to the intermediate position.
(b) Make sure the TRAILING EDGE light is off.
(c) Make sure the EICAS message, TE FLAP DISAGREE, is off the display.

S 865-098
(7) Open this circuit breaker on the P6 panel and attach DO-NOT-CLOSE tag:
(a) 6D20, ALTN SLAT PWR

S 215-099
(8) Put the position selector switch to the UP-unit detent and do the checks that follow:
(a) The TE flaps move to the UP position.
(b) The LE slats do not move.
(c) The LEADING EDGE Light is on.
(d) The EICAS message, LE SLAT DISAGREE, shows on the display.

S 215-100
(9) Remove the DO-NOT-CLOSE tag and close this circuit breaker P6 panel and make sure the LE slats do not move:
(a) 6D20, ALTN SLAT PWR

S 215-101

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE LE SLATS. IN THE STEP THAT FOLLOWS, THE SLATS WILL RETRACT AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Push the arming switches for the TE flap and LE slat alternate drive to disarm the flap and slat alternate drives (switch lights will go off), and make sure the LE slats retract to the UP position.

S 215-102
(11) Make sure the LEADING EDGE light is off and the EICAS message, LE SLAT DISAGREE, does not show on the display.

S 865-152
(12) Push the arming switches for the TE flap and LE slat alternate drive to arm the flap and slat alternate drives (switch lights will come on).

S 215-103
(13) Put the position selector switch for the alternate flaps/slats to the 1-unit detent and do the checks that follow:
(a) Make sure the flaps move to the 1-unit position.
(b) Make sure the LE slats move to the intermediate position.

S 215-104
(14) Put the position selector switch for the alternate flaps/slats to the UP-unit detent and do the checks that follow:
(a) Make sure the TE flaps and LE slats move to the UP position.
(b) Make sure the position indicator needles for the R and L flaps are in the tolerance band of the UP position.

S 865-105
(15) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(b) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR

S 215-106
(16) Make sure the EICAS message, FLAP/SLAT ELEC, shows on the status and ECS/MSG display.

S 215-107
(17) Put the position selector switch for the alternate flaps/slats in the 1-unit detent, and do the checks that follow:
(a) As the TE flaps start to move, make sure the position indicator needles jump for the L and R flap move quickly to a position between the UP-unit and 1-unit positions.

(b) When the TE flaps go to the 1-unit position and the LE slats go to the intermediate position, make sure the position indicator needles move quickly to the tolerance band of the 1-unit position.
(c) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(d) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(e) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR

S 215-110
(18) Make sure the EICAS message, FLAP/SLAT ELEC message, stays on the ECS/MSG and status display.

S 215-112
(19) Put the position selector switch in the UP-unit detent, and make sure the steps that follow occur:
(a) Make sure the TE flaps move to the UP position before the LE slats retract.
(b) As the TE flaps go to the UP position, make sure the position indicator needles move smoothly to the tolerance band of the UP position.
(c) Make sure the LE slats then move to the UP position.

S 865-113
(20) Remove the DO-NOT-CLOSE tags and close the circuit breakers on the P11 panel:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(d) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(e) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR

S 035-114
(21) Erase the EICAS message, FLAP/SLAT BITE, from the ECS/MSG display.

S 215-115
(22) Make sure the EICAS message, FLAP/SLAT ELEC, is not shown on the status and ECS/MSG display.

S 215-116
(23) Put the position selector switch for the alternate flaps slats in the 1-unit detent and do the check that follows:
(a) Make sure the TE flaps move to the 1-unit position and the slats move to the intermediate position in less than 60 seconds of position selector switch movement.

S 215-117
(24) Put the position selector switch for the alternate flaps/slats in the 5-unit detent, and do the checks that follow:
(a) Make sure the position indicator needles for the L and R flap are in the tolerance band for the 5-unit position when the TE flaps stop at the 5-unit position.

(b) Make sure the flaps go to the 5-unit position in less than 80 seconds from the movement of the position selector switch.

S 215-153

(25) Put the position selector switch for the alternate flaps/slats in the 15-unit detent and do the check that follows:
(a) Make sure the position indicator needles are in the tolerance band for the 15-unit position, when the TE flaps stop at the 15-unit detent.

S 215-118

(26) Put the position selector switch for the alternate flaps/slats in the 20-unit detent.
(a) Make sure the flaps go to the 20-unit position.
(b) Make sure the TE slats move to the fully extended position.
(c) Make sure the position indicator needles are in the tolerance band for the 20-unit position.

S 215-119

(27) Put the position selector switch for the alternate flaps/slats in the 25-unit detent and make sure the position indicator needles are in the tolerance band for the 25-unit position when TE flaps stop at the 25-unit position.

S 215-120

(28) Put the position selector switch for the alternate flaps/slats in the 30-unit detent and make sure the position indicator needles are in the tolerance band for the 30-unit position when TE flaps stop at the 30-unit position.

S 215-121

(29) Put the position selector switch for the alternate flaps/slats in the 25-unit detent, and make sure the position indicator needles are in the tolerance band for the 25-unit position when TE flaps stop at the 25-unit position.

S 215-122

(30) Put the position selector switch for the alternate flaps/slats in the 20-unit detent, and make sure the position indicator needles are in the tolerance band for the 20-unit position tolerance band when TE flaps stop at the 20-unit position.

S 215-123

(31) Put the position selector switch for the alternate flaps/slats in the 15-unit detent, and make sure the position indicator needles are in the tolerance band for the 15-unit position when TE flaps stop at the 15-unit position and the LE slats move to the intermediate position.

S 215-124
(32) Put the position selector switch for the alternate flaps/slats in the 5-unit detent, and make sure the position indicator needles are in the tolerance band for the 5-unit position when TE flaps stop at the 5-unit position.

S 215-125
(33) Put the position selector switch for the alternate flaps/slats in the 1-unit detent, and make sure the position indicator needles are in 1-unit position tolerance band for the 1-unit position when TE flaps stop at the 1-unit position.

S 215-126
(34) Put the position selector switch in the UP-unit detent, and do the checks that follow:
(a) Make sure the TE flaps move to the UP position before retraction of the slats.
(b) Make sure the position indicator needles are between the 1-unit and UP-unit positions when the TE flaps stop at the UP position.
(c) Make sure the LE slats then move to the UP position.
(d) Make sure the position indicator needles are in the tolerance band for the UP-unit position, when the LE slats are in the UP position.

S 865-127
(35) Put the position selector switch for the alternate flaps/slats in the NORM position.

S 865-128
(36) Push the arming switches for the alternate drives of the TE flap and LE slat to disarm the flap and slat alternate drives (switch lights will go off).

S 215-129
(37) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP ISLN VAL, do not show on the status display.

S 215-130
(38) Make sure the EICAS messages, FLAP/SLAT ELEC, FLAP ISLN VAL, or FLAP/SLAT BITE, do not show on the ECS/MSG display.

L. TE-Flap Load Relief System - Test

S 865-177
(1) Move the flap control lever to the 30-unit detent, and let the TE flaps and LE slats fully extend.

S 865-178
(2) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11J18, FLAP LOAD RELIEF

S 865-179
(3) Push and hold the LOAD RELIEF-test switch.

NOTE: The LOAD RELIEF-test switch is near the E/E bay access panel.

S 215-180
(4) Make sure the EICAS message, FLAP LD RELIEF, does show on the display unit and the TRAILING EDGE light is on.

S 865-181
(5) Release the LOAD RELIEF-test switch.

S 215-182
(6) Make sure the EICAS message, FLAP LD RELIEF, does not show on the display unit and the TRAILING EDGE light is off.

S 865-183
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J18, FLAP LOAD RELIEF

S 215-184
(8) Push and hold the LOAD RELIEF-test switch and do the checks that follow:
(a) Make sure the TE flaps move to the 25-unit position.

(b) Make sure the position indicator needles are in the tolerance band for the 25-unit position.

S 215-185

(9) Release the LOAD RELIEF-test switch and do the checks that follow:
(a) Make sure the TE flaps go to the 30-unit position.
(b) Make sure the position indicator needles are in the tolerance band for the 30-unit position.

S 215-186

(10) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP ISLN VAL, do not show on the status display.

S 215-187

(11) Make sure the messages, FLAP/SLAT ELEC, FLAP ISLN VAL, or a FLAP/SLAT BITE, do not show on the ECS/MSG display.

S 865-188

(12) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats fully retract.

M. Put the Airplane Back to Its Usual Condition

S 865-146

WARNING: REFER TO AMM 32-00-15 FOR THE MAIN GEAR DOOR LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS MAY CAUSE INJURY OR DAMAGE IF THE LOCKS ARE NOT CORRECTLY INSTALLED.

(1) Remove all hydraulic power (AMM 29-11-00/201).

S 865-169

(2) Remove electrical power (AMM 24-22-00/201).

S 415-145

(3) Close the access doors and install the access panels.

TASK 27-51-00-715-167

5. Operational Test of the Flap/Slat Alternate Drive System

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 24-22-00/201, Electrical Power-Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
119 Main Equipment Center
211/212 Control Cabin

C. Prepare for the Test

S 865-215
(1) Make sure the six EICAS circuit breakers on the overhead panel, P11, are closed.

S 865-216
(2) Make sure the flaps and slats are in the fully retracted position with the flap control lever in the zero (FLAPS UP) detent.

S 865-217
(3) Supply electrical power (AMM 24-22-00/201).

S 865-218

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

D. Flap/Slat Alternate-(Electric) Drive System - Test (Fig. 501)

NOTE: Make sure the TRAILING EDGE and LEADING EDGE lights on the P3 panel do not come on and that no TE flap or LE slat messages come on the EICAS display. If either the TE flap or LE slat EICAS message is displayed, find the part number of FSEU-2 and -3 in the forward cargo compartment. Then do the FSEU BITE procedure on FSEU-2 and -3 (FIM 27-51-00/101, Fig. 104A or 104B).

S 865-213
(1) Make sure the TE flap system is as follows:

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(a) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.
(b) Make sure the position selector switch for the flap/slat alternate drive is in the NORM detent.
(c) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will come on).

S 715-214

(2) Do the Flap/Slat Alternate Drive System test as follows:
(a) Push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on).
(b) Turn the position selector switch, for the flap/slat alternate drive, to the 1-unit position.
(c) Make sure the L and R needles, on the flap position indicator, move very quickly to the 1/2 position when the flaps start to extend.
(d) Make sure the L and R needles, on the flap position indicator, move very quickly to the 1 position when the flaps extend to the 1-unit position.
(e) Turn the position selector switch to the 5 and 15 unit positions.

NOTE: Let the flaps extend and stop at each position before you move the position selector switch to the next detent.

(f) Make sure the flaps move to the same position as the L and R needles on the flap position indicator.
(g) Turn the position selector switch, for the flap/slat alternate drive, to the 20-unit position.
(h) Make sure the flaps and slats move to the correct position.
(i) Turn the alternate flaps/slats position selector switch to the 15-unit position.
(j) Make sure the flaps and slats move to the correct position.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE FLAPS AND SLATS. THE FLAPS AND SLATS WILL RETRACT WHEN THE ALTERNATE DRIVE IS DISARMED. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE FLAPS AND SLATS RETRACT.

(k) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives.
(l) Make sure the flaps and slats move to the fully UP position.
(m) Turn the position selector switch to the NORM detent.
(n) Remove the power from the left hydraulic system (AMM 29-11-00/201).
(o) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-00-735-161

6. TE Flap Load Relief - System Test

NOTE: This is a scheduled maintenance task.

A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks

B. Access
(1) Location Zones

119	Main Equipment Center
211/212	Control Cabin - Section 41 (Left/Right)

(2) Access Panel

119BL	E/E Access Door

C. Prepare for the Test

S 865-207
(1) Supply electrical power (AMM 24-22-00/201).

S 865-208
(2) Put the EICAS computer switch on the EICAS DISPLAY select-panel, P9, to L.

S 865-209
(3) Make sure the six EICAS circuit breakers on the overhead panel, P11, are closed.

S 215-211
(4) Make sure the flaps and slats are in the fully retracted position with the flap control lever in the zero (FLAPS UP) detent.

S 865-212

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

D. TE-Flap Load Relief System - Test

S 865-194
(1) Move the flap control lever to the 30-unit detent, and let the TE flaps and LE slats fully extend.

S 865-195
(2) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11J18, FLAP LOAD RELIEF

S 865-196
(3) Push and hold the FLA TEST switch (Fig. 501).

NOTE: The FLA TEST switch is near the E/E bay access panel.

S 215-197
(4) Make sure the EICAS message, FLAP LD RELIEF, does show on the display unit and the TRAILING EDGE light is on.

S 865-198
(5) Release the FLA TEST switch.

S 215-199
(6) Make sure the EICAS message, FLAP LD RELIEF, does not show on the display unit and the TRAILING EDGE light is off.

S 865-200
(7) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11J18, FLAP LOAD RELIEF

S 215-201
(8) Push and hold the FLA TEST switch and do the checks that follow:
(a) Make sure the TE flaps move to the 25-unit position.

(b) Make sure the L and R needles, on the flap position indicator, are in the tolerance band for the 25-unit position.

S 215-202

(9) Release the FLA TEST switch and do the checks that follow:
(a) Make sure the TE flaps go to the 30-unit position.
(b) Make sure the position indicator needles are in the tolerance band for the 30-unit position.

S 215-203

(10) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP ISLN VAL, do not show on the status display.

S 215-204

(11) Make sure the messages, FLAP/SLAT ELEC, FLAP ISLN VAL, or a FLAP/SLAT BITE, do not show on the ECS/MSG display.

S 865-205

(12) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats fully retract.

E. Put the Airplane Back to Its Usual Condition

S 865-143

(1) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-206

(2) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP DRIVE SYSTEM - INSPECTION/CHECK

1. General
   A. There are four tasks in this procedure:
      (1) A check of the axial shaft movement in the angle tee gearbox for the inboard trailing edge (TE) flap.
      (2) A check of the axial shaft movement in the outboard tee gearbox for the inboard trailing edge (TE) flap.
      (3) A check of the axial shaft movement in the outboard angle gearbox for the inboard trailing edge (TE) flap.
      (4) A check of the wear in the U-joints of the driveshafts for the inboard trailing edge (TE) flap drive system.

   TASK 27-51-00-026-001
2. Inboard TE Flap Angle Tee Gearbox Inspection (Fig. 601)
   A. Equipment
      (1) Dial Test Indicator - (clamp type with adjustable stem adaptor) (commercially available)
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-51-07/401, Inboard TE Flap Drive Inboard Tee Gearbox
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Down Locks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Procedure

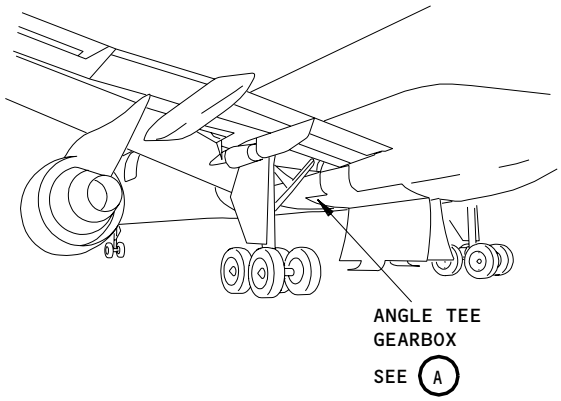
      S 216-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

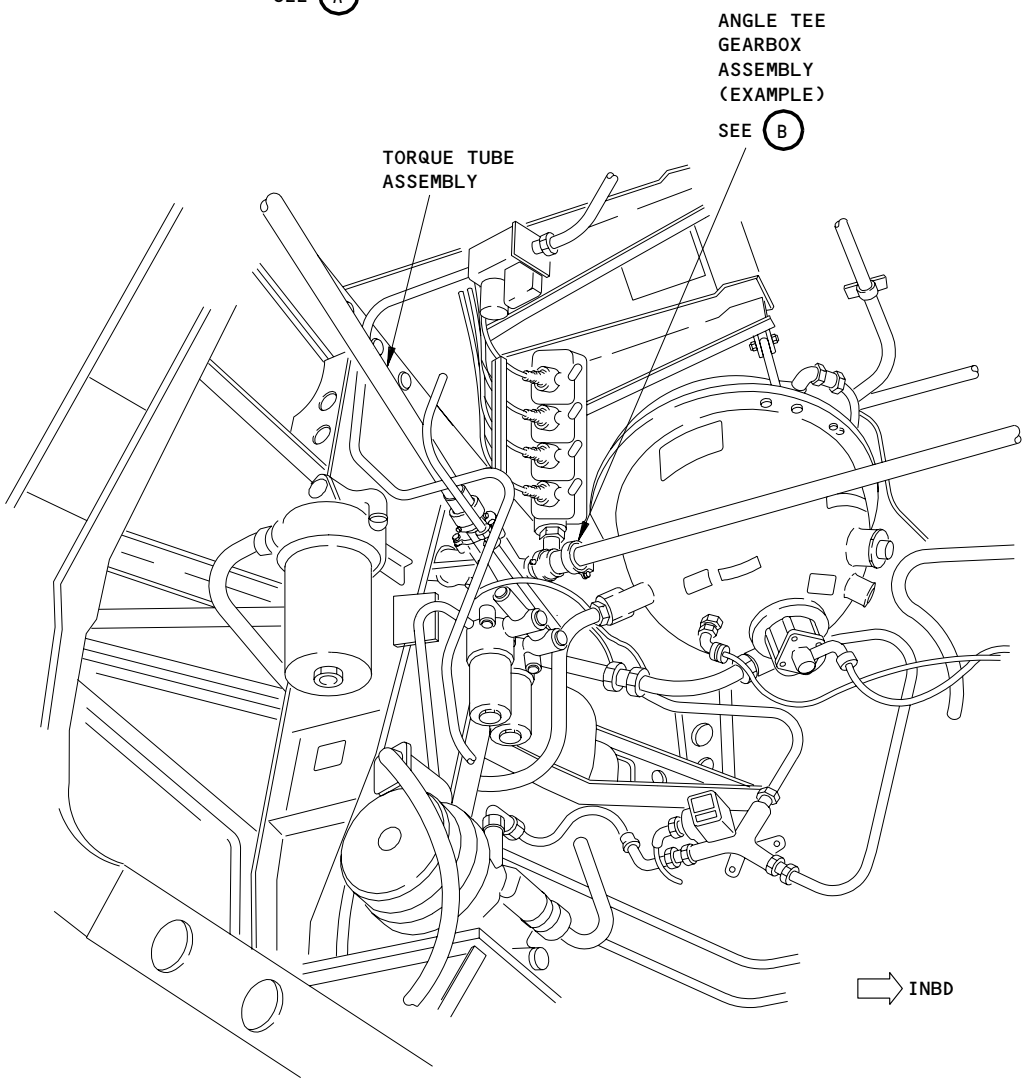
      S 866-066
      (2) Supply electrical power (AMM 24-22-00/201).

      S 016-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

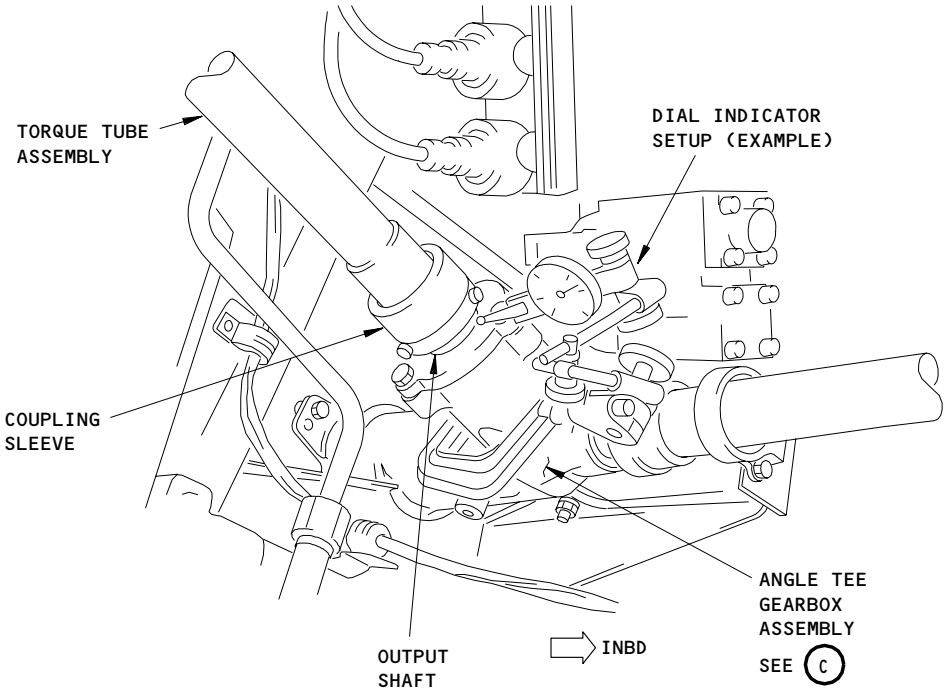




ANGLE TEE GEARBOX

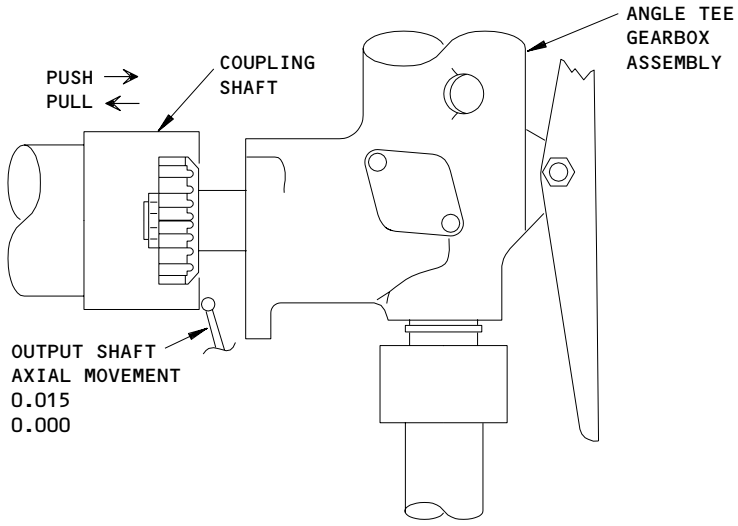
A

Angle Tee Gearbox Inspection
Figure 601 (Sheet 1)



ANGLE TEE GEARBOX ASSEMBLY NO. 4
(ANGLE TEE GEARBOX ASSEMBLY NO. 5 IS OPPOSITE)

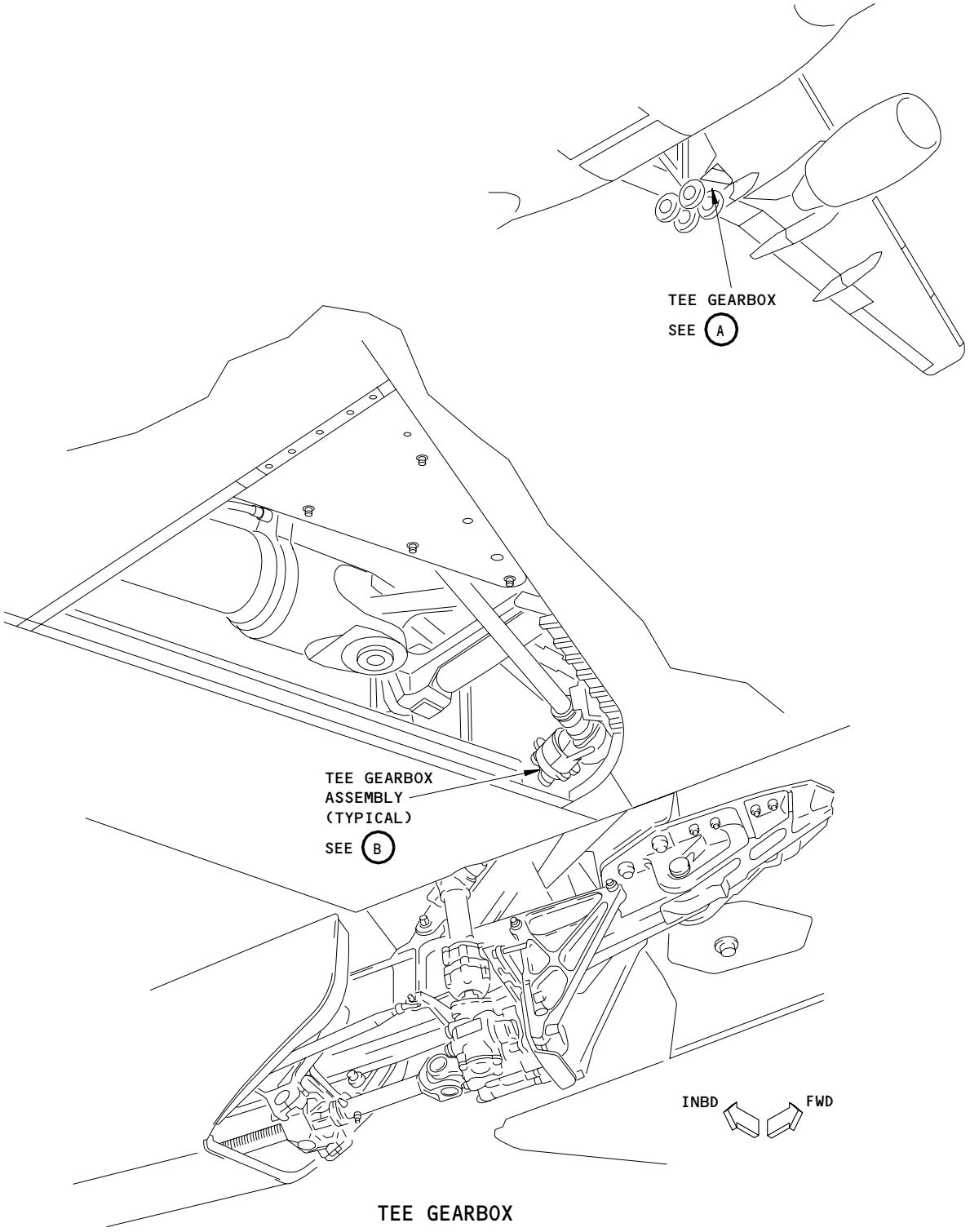
B



ANGLE TEE GEARBOX ASSEMBLY

C

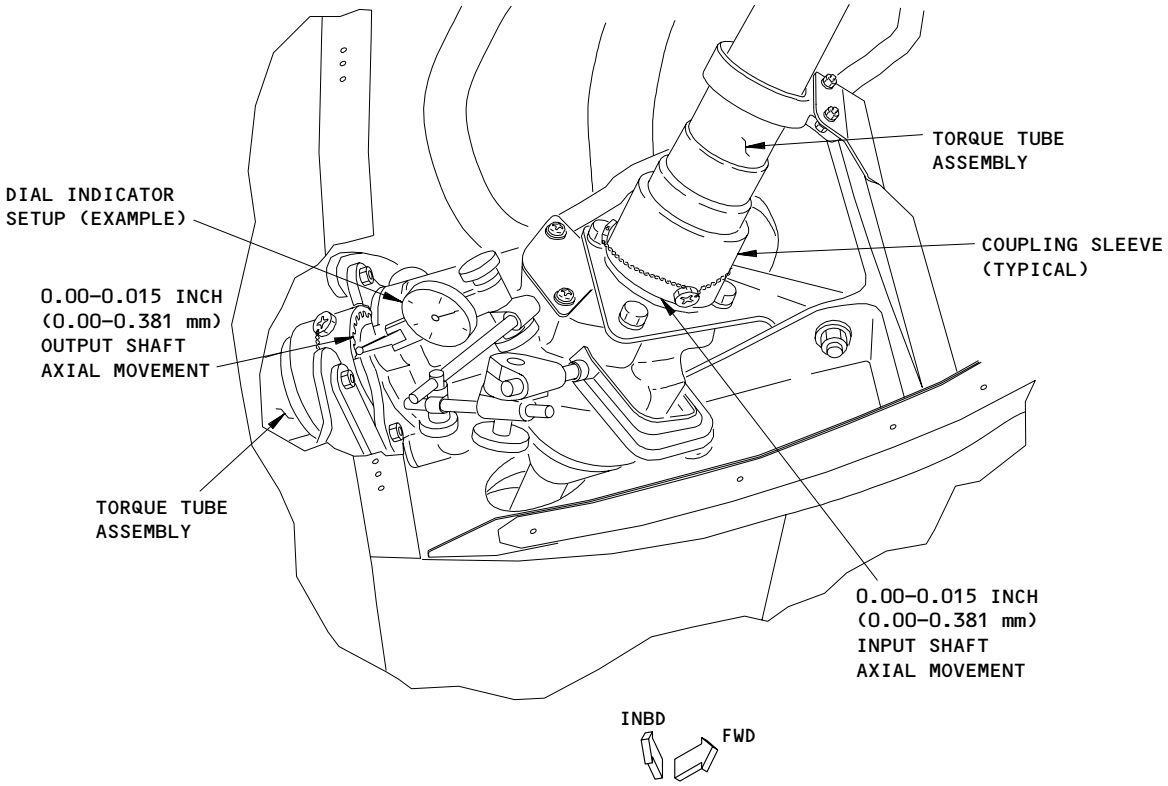
Angle Tee Gearbox Inspection
Figure 601 (Sheet 2)



TEE GEARBOX

A

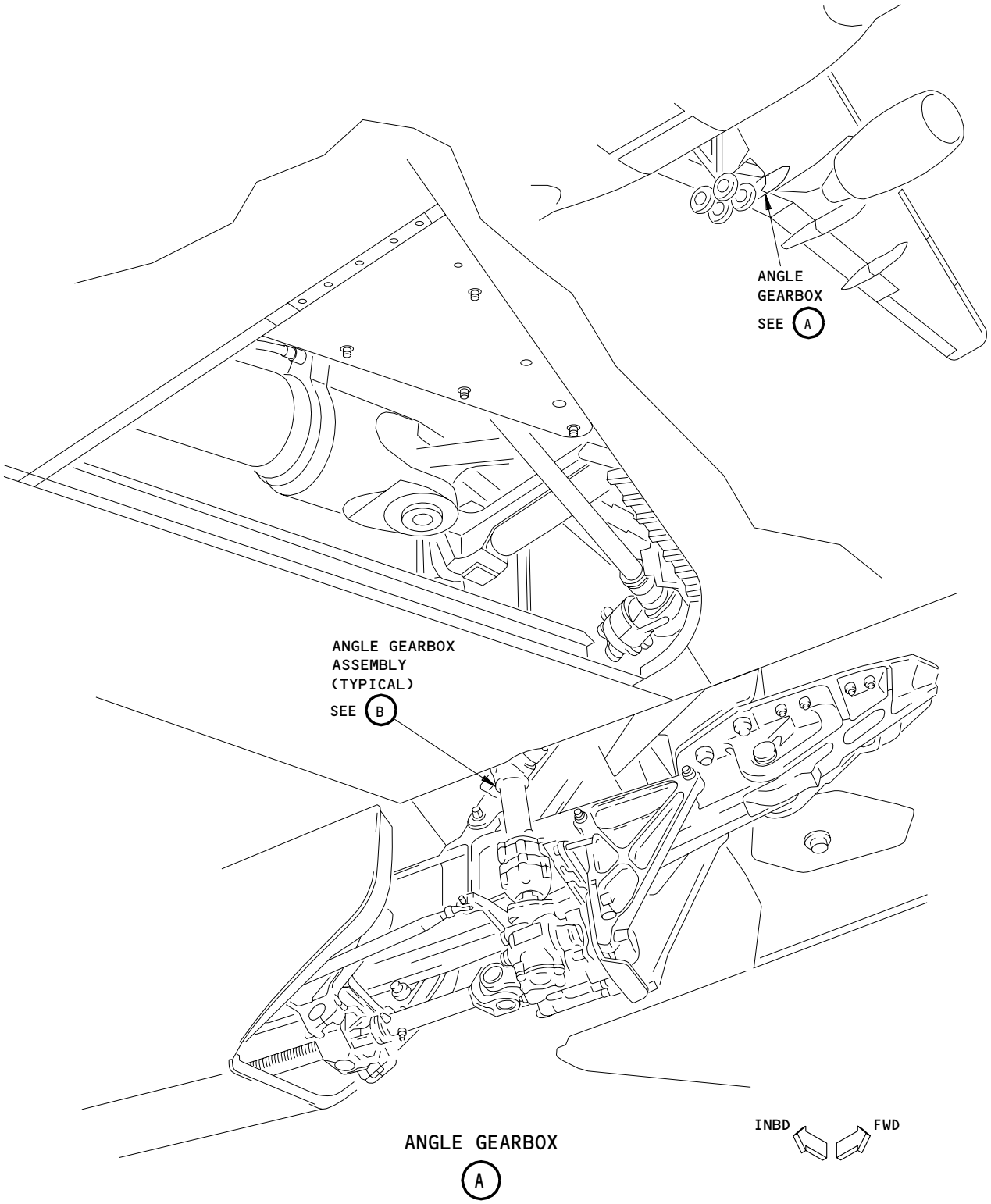
Tee Gearbox Inspection
Figure 602 (Sheet 1)



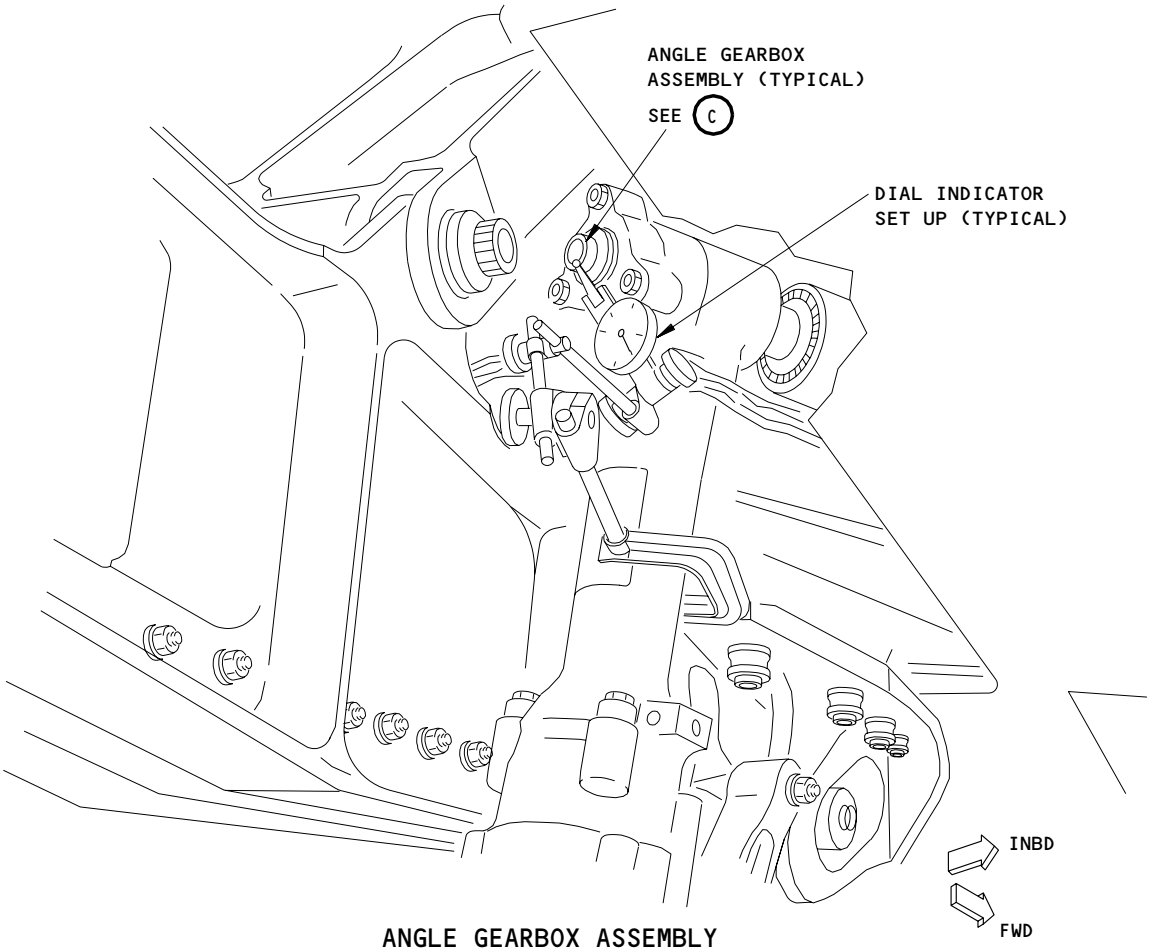
TEE GEARBOX ASSEMBLY NO. 3
(TEE GEARBOX ASSEMBLY NO. 6 IS OPPOSITE)

B

Tee Gearbox Inspection
Figure 602 (Sheet 2)

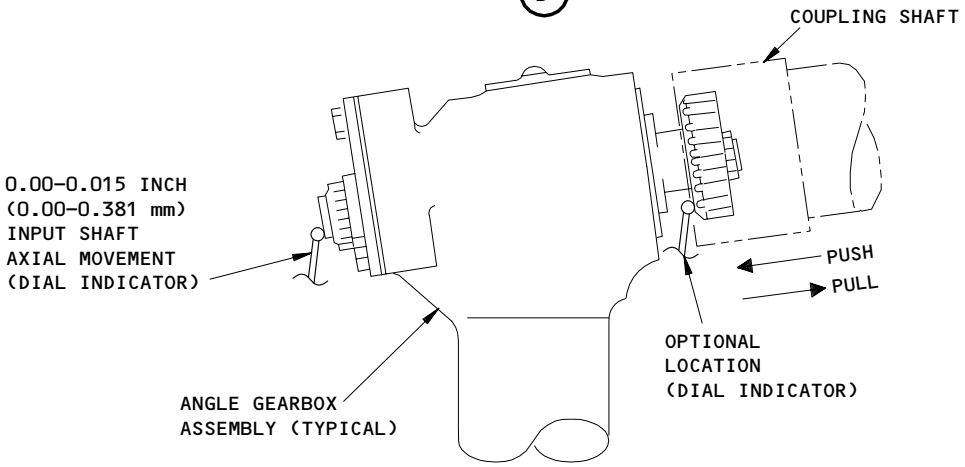


Angle Gearbox Inspection
Figure 603 (Sheet 1)



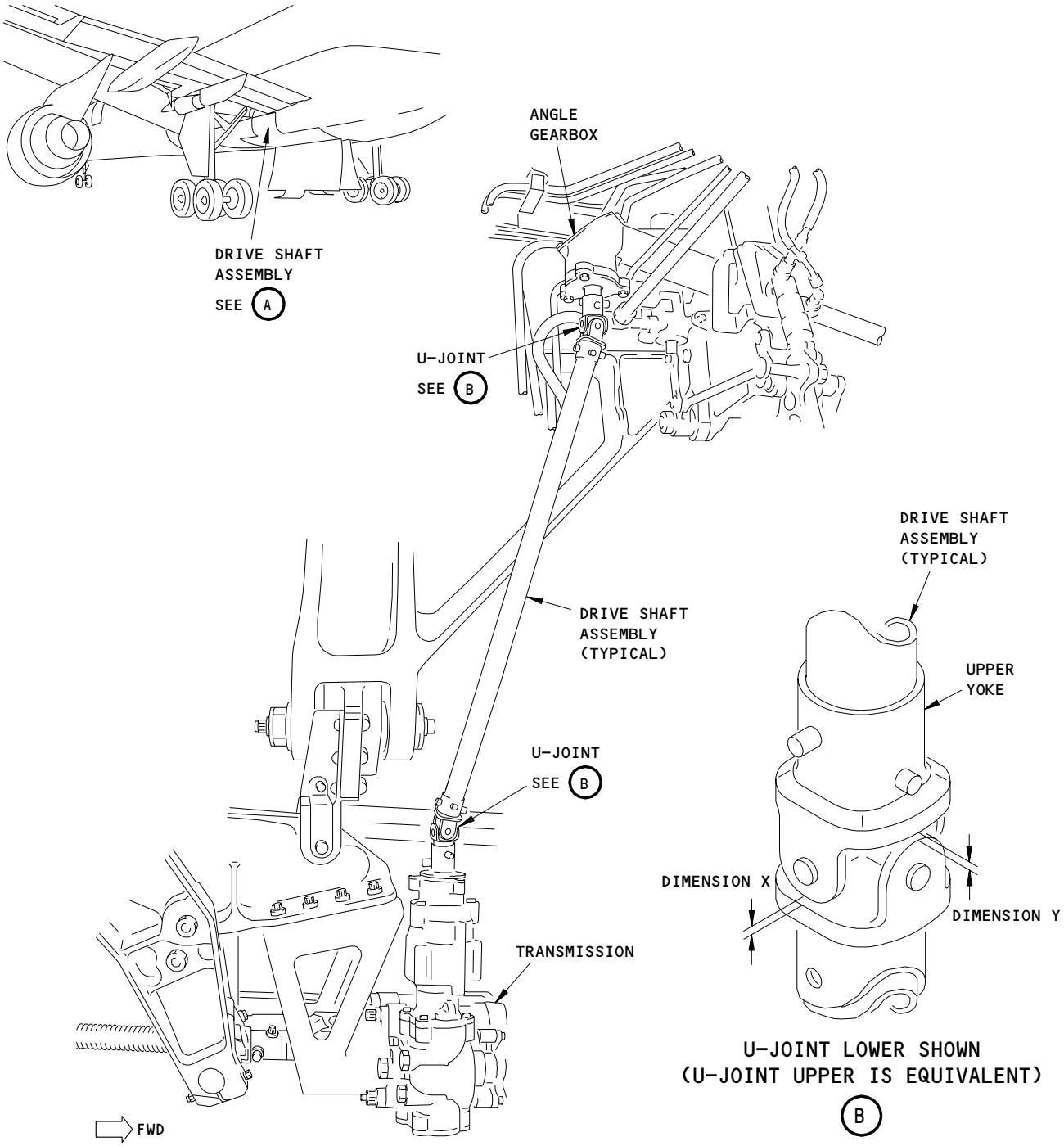
ANGLE GEARBOX ASSEMBLY

B



C

Angle Gearbox Inspection
Figure 603 (Sheet 2)



DRIVE SHAFT ASSEMBLY NO. 4
(DRIVE SHAFT ASSEMBLY NO. 5 IS OPPOSITE)

A

U-JOINT LOWER SHOWN
(U-JOINT UPPER IS EQUIVALENT)

B

Drive Shaft U-Joint Inspection
Figure 604

S 866-075

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-076

(5) Move the flap control lever to the 30-unit detent and make sure that the TE flaps move to the fully extended position.

S 866-077

(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 486-078

(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 486-004

(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 866-005

(9) Open these circuit breakers on overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-006

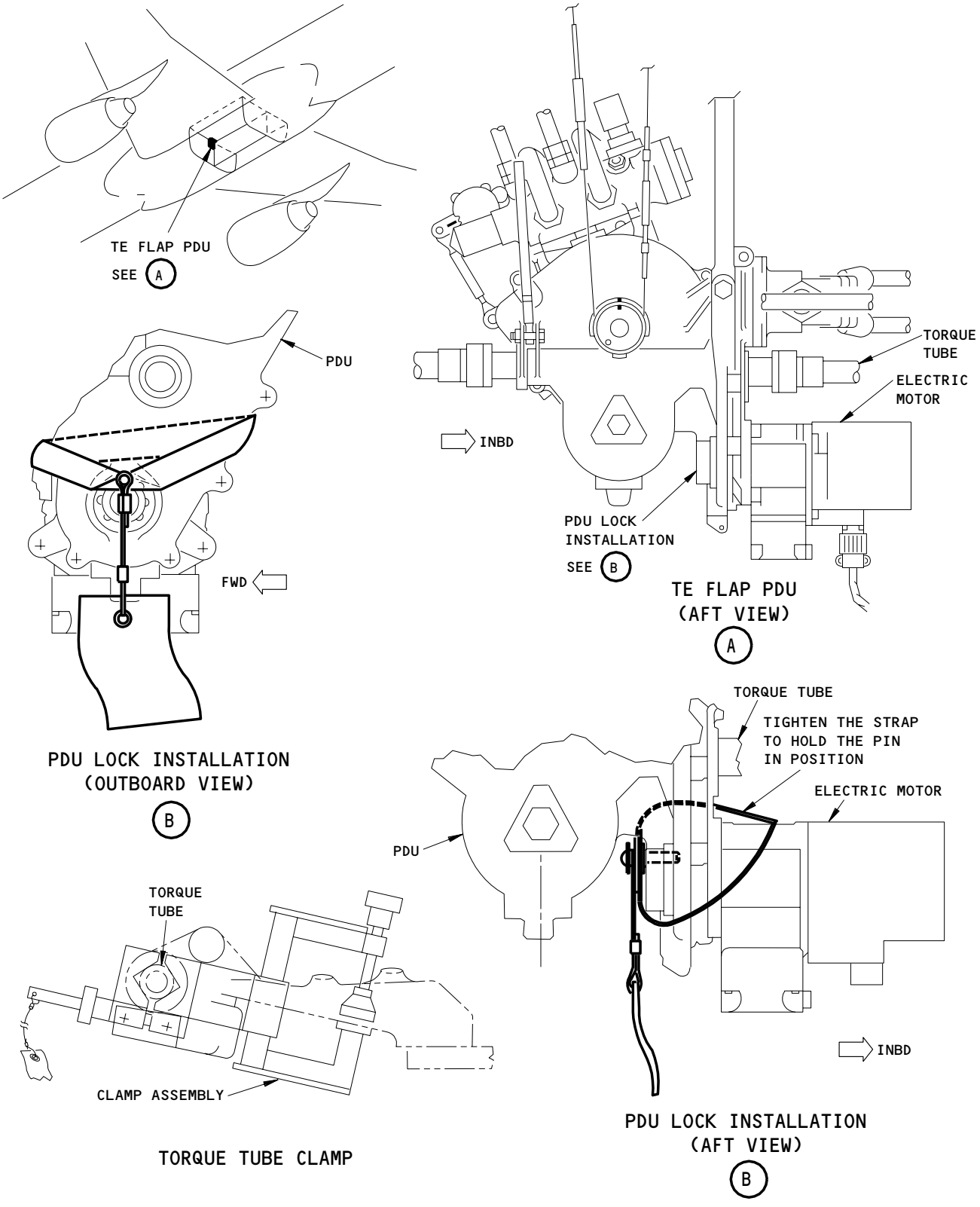
(10) Open these circuit breakers on main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 226-007

(11) Measure the total axial shaft movement of the angle tee gearbox:
(a) Clamp the dial indicator or equivalent to the gearbox assembly.

NOTE: Movement of the gearbox assembly can cause an incorrect measurement if the indicator is clamped to any other nearby structures.

(b) Push the coupling sleeve and output shaft in (10-30 pounds) pounds)(45-130 newtons) by hand. Set the indicator to zero.



PDU Lock for the TE Flap PDU
Figure 605

(c) Pull the coupling sleeve and output shaft out (10-30 pounds) pounds)(45-130 newtons) by hand.
(d) Make a record of the total axial movement.
(e) If the total axial movement is more than 0.015 inches (0.38 mm), then replace the gearbox assembly (AMM 27-51-07/401).

S 866-008

(12) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-009

(13) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 086-010

(14) Remove the DO-NOT-OPERATE tag from the flap control lever.

E. Put the Airplane Back to Its Usual Condition

S 416-011

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 866-012

(2) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-00-026-013

3. Inboard TE Flap Outboard Tee Gearbox Inspection (Fig. 602)

A. Equipment
(1) Dial Indicator - (clamp type with adjustable stem adaptor)

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-51-08/401, Inboard TE Flap Drive Outboard Tee Gearbox
(4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Down Locks

C. Access

(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panel

551BB	Access Panel
651BB	Access Panel

D. Procedure

S 216-014

(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 866-068

(2) Supply electrical power (AMM 24-22-00/201).

S 016-015

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-079

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-080

(5) Move the flap control lever to the 30-unit detent and make sure that the TE flaps move to the fully extended position.

S 866-081

(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 486-082

(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 486-016

(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 866-017
(9) Open these circuit breakers on overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-018
(10) Open these circuit breakers on main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 016-019
(11) Remove the landing gear retract actuator access panel 551BB left or 651BB right (AMM 06-44-00/201).

S 226-020
(12) Measure the total axial shaft movement of the outboard tee gearbox:
(a) Clamp the dial indicator or equivalent to the gearbox assembly.

NOTE: Movement of the gearbox assembly can cause an incorrect measurement if the indicator is clamped to any other nearby structures.

(b) Push the coupling sleeve and output shaft in (10-30 pounds) (45-130 newtons) by hand. Set the indicator to zero.
(c) Pull the coupling sleeve and output shaft out (10-30 pounds) (45-130 newtons) by hand.
(d) Make a record of the total axial movement.
(e) Push the coupling sleeve and input shaft in (10-30 pounds) (45-130 newtons) by hand. Set the indicator to zero.
(f) Pull the coupling sleeve and input shaft out (10-30 pounds) (45-130 newtons) by hand.
(g) Make a record of the total axial movement.
(h) If the total axial movement at one of the two measurement locations is more than 0.015 inches (0.38 mm), then replace the gearbox assembly (AMM 27-51-08/401).

E. Put the Airplane Back to Its Usual Condition

S 416-021
(1) Install the landing gear retract actuator access panel 551BB left or 651BB right (AMM 06-44-00/201).

S 866-022
(2) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-023
(3) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 086-024
(4) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 416-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 866-026
(6) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-00-026-027

4. Inboard TE Flap Outbd Angle Gearbox Inspection (Fig. 603)
A. Equipment
(1) Dial Test Indicator - (clamp type with adjustable stem adaptor) (commercially available)
B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-51-10/401, Inboard TE Flap Drive Outbd Angle Gearbox
(3) AMM 27-51-30/201, Inboard TE Flap Track Fairing
(4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Down Locks
C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Procedure

S 216-028
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 866-067
(2) Supply electrical power (AMM 24-22-00/201).

S 016-029

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-031
(5) Move the flap control lever to the 30-unit detent and make sure that the TE flaps move to the fully extended position.

S 866-032
(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 486-033
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 866-034
(8) Open these circuit breakers on overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-035
(9) Open these circuit breakers on main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

S 016-036
(10) Remove the forward flap track fairing (AMM 27-51-30/201).

S 226-037
(11) Measure the total axial shaft movement of the angle gearbox:
(a) Clamp the dial indicator or equivalent to the gearbox assembly.

NOTE: Movement of the gearbox assembly can cause an incorrect measurement if the indicator is clamped to any other nearby structures.

(b) Push the coupling sleeve and input shaft in (10-30 pounds) (45-130 newtons) by hand. Set the indicator to zero.
(c) Pull the coupling sleeve and input shaft out (10-30 pounds) (45-130 newtons) by hand.
(d) Make a record of the total axial movement.
(e) If the total axial movement is more than 0.015 inches (0.38 mm), then replace the gearbox assembly (AMM 27-51-10/401).

E. Put the Airplane Back to Its Usual Condition

S 866-038
(1) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-039
(2) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 416-040
(3) Install the forward flap track fairing (AMM 27-51-30/201).

S 086-041
(4) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 866-042

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-043

(6) Move the flap control lever to the zero (FLAPS UP) detent.

S 416-044

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 866-045

(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 866-046

(9) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-00-026-047

5. TE Flap Drive Shaft Inspection (Fig. 604)

A. Equipment

(1) Calipers, Dial

B. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-51-34/401, Trailing Edge Flap Driveshaft
(3) AMM 32-00-15/201, Landing Gear Door Locks
(4) AMM 32-00-20/201, Landing Gear Down Locks

C. Access

(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Prepare for the Inspection

S 216-048

(1) Make sure that the TE flaps and LE slats are in the fully retracted position, and that the flap control lever is in the zero (FLAPS UP) detent.

S 216-049

(2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 866-050

(3) Supply electrical power (AMM 24-22-00/201).

S 496-051

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-083

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-084

(6) Move the flap control lever to the 30-unit detent and make sure that the TE flaps move to the fully extended position.

S 866-085

(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 486-086

(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 496-052
(9) Install a DO-NOT-OPERATE tag on the flap control lever.

S 866-053
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-054
(11) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 496-055
(12) Install the PDU lock on the TE flap PDU (Fig. 605).

S 496-056
(13) Use a clamp on the adjacent torque tubes to prevent all movement (Fig. 605).

E. Inspect the Drive Shaft U-joints (Fig. 604)

S 226-057
(1) Do these steps to inspect the drive shaft U-joints:
(a) The following steps must be completed for each U-joint (4 places).

NOTE: Some drive shaft assemblies have a sealed protective boot installed over each U-joint. No inspection is necessary if the boot is installed and is not damaged.

(b) Use a caliper or equivalent. At dimension X, pull the upper yoke and lower yoke apart (10-30 pounds)(45-130 newtons) by hand.
1) Measure and record this distance as "A".
(c) Use a caliper or equivalent. At dimension X, push the upper yoke and lower yoke together (10-30 pounds)(45-130 newtons) by hand.
1) Measure and record this distance as "B".
(d) If distance "B" subtracted from distance "A" is more than 0.020 inch, replace the U-joint and drive shaft assembly (AMM 27-51-34/401).

(e) Use a caliper or equivalent. At dimension Y, pull the upper yoke and lower yoke apart (10-30 pounds)(45-130 newtons) by hand.
1) Measure and record this distance as "C".
(f) Use a caliper or equivalent. At dimension Y, push the upper yoke and lower yoke together (10-30 pounds)(45-130 newtons) by hand.
1) Measure and record this distance as "D".
(g) If distance "D" subtracted from distance "C" is more than 0.020 inch, replace the U-joint and drive shaft assembly (AMM 27-51-34/401).

F. Put the Airplane Back to Its Usual Condition

S 096-058
(1) Remove the clamp from the adjacent torque tube (Fig. 605).

S 096-059
(2) Remove the PDU lock from the TE flap PDU (Fig. 605).

S 866-060
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-061
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 866-062
(5) Supply electrical power (AMM 24-22-00/201).

S 096-063
(6) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 416-064

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 866-065

(8) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

FLAP/SLAT ELECTRONIC UNIT - MAINTENANCE PRACTICES

1. General
   A. This procedure contains three tasks. The first task is the removal of the FLAP/SLAT ELECTRONICS UNIT (FSEU). The second task is the installation of the FSEU. The third task tests the FSEU.

   TASK 27-51-01-022-006

2. Remove Flap/Slat Electronic Unit (Fig. 201)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack Mounted Components
      (3) AMM 24-22-00/201, Electrical Power - Control
      (4) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
   B. Access
      (1) Location Zone

119	Main Equipment Center
211/212	Control Cabin - Section 41
821	Forward Cargo Door

   C. Prepare for Removal

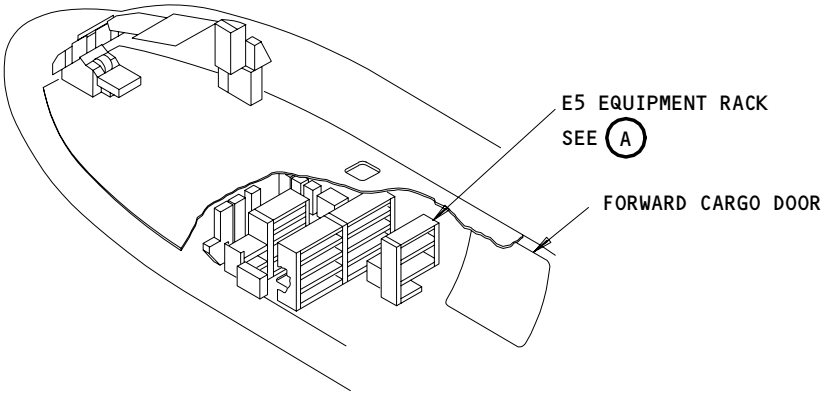
      S 862-095

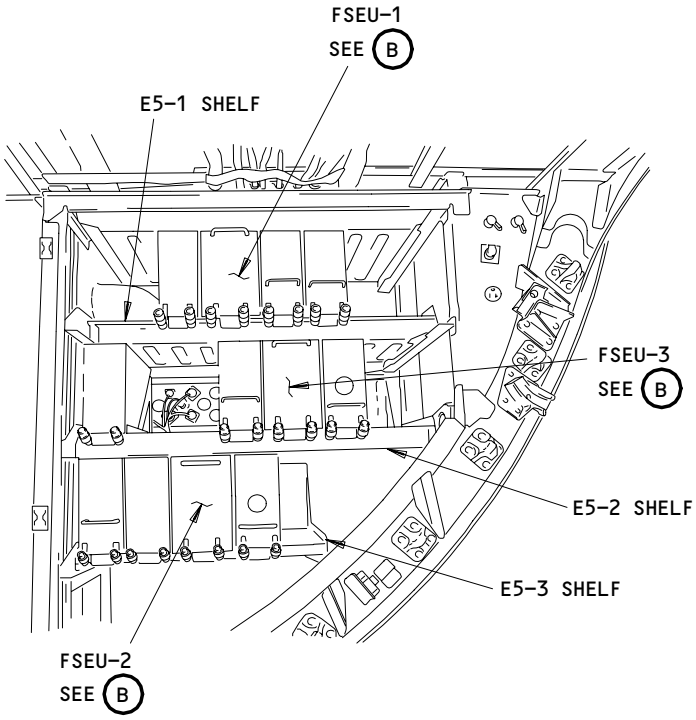
      WARNING: KEEP PERSONNEL AND EQUIPMENT CLEAR OF THE FLIGHT CONTROL SURFACES, THE THRUST REVERSERS, AND THE LANDING GEAR. THESE COMPONENTS CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

      (1) Open the forward (No. 1) cargo door, 821 (AMM 06-41-00 201).

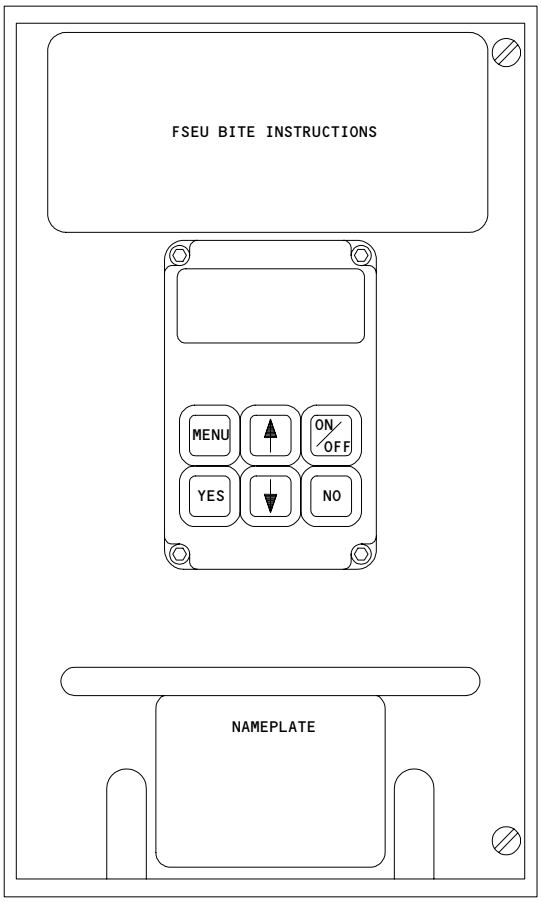
      S 862-007
      (2) Remove electrical power (AMM 24-22-00/201).

      S 862-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
         (a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
         (b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
         (c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
         (d) 11G12, FLAP SLAT ELEC UNIT 1 POWER
         (e) 11G13, FLAP SLAT ELEC UNIT 1 CONT
         (f) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
         (g) 11G21, FLAP SLAT ELEC UNIT 3 POWER
         (h) 11G22, FLAP SLAT ELEC UNIT 3 CONT
         (i) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR





E5 EQUIPMENT RACK
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 201

S 022-010
(4) Remove the front hold-down extractors and pull the FSEU from the rack (AMM 20-10-01/401).

TASK 27-51-01-422-011

3. Install Flap/Slat Electronic Unit (Fig. 201)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack-Mounted Component
   B. Access
      (1) Location Zone

119	Main Equipment Center
211/212	Control Cabin - Section 41
821	Forward Cargo Door

   C. Install the FSEU

S 422-012
(1) Install the FSEU in rack with hold down extractors (AMM 20-10-01/401).

NOTE: You do not need to test each FSEU. Do the test that follows on the FSEU that you installed.

S 862-013
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(d) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(e) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(f) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(g) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(h) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(i) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR

S 862-088
(3) Close the forward (No. 1) cargo door, 821 (AMM 06-41-00/201).

TASK 27-51-01-722-005

4. Test the FSEU
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

(3) AMM 34-21-00/501, Inertial Reference System

B. Access

(1) Location Zones

119 Main Equipment Center
211/212 Control Cabin - Section 41 (Left)/(Right)

C. Prepare for Test

S 862-016

(1) Supply electrical power (AMM 24-22-00/201).

S 862-017

(2) Make sure the trailing edge flaps (TE flaps) and leading edge slats (LE slats) are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 862-018

(3) Make sure the arming switches for the alternate drive of the TE flaps and LE slats on the first-officer's main-instrument panel, P3, are not in the armed position (switch lights off).

S 862-019

(4) Make sure the position selector switch for the alternate flaps/slats on the P3 is in the NORM position.

S 862-020

(5) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 862-089

(6) Make sure the IRU is in operation (AMM 34-21-00/501).

S 862-021

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE FAN DUCT COWLING IS CLOSED. AN OPEN COWLING MAY HIT THE LE SLAT AS THE LE SLAT EXTEND AND CAUSE DAMAGE TO EQUIPMENT.

(7) Pressurize the left hydraulic system (AMM 29-11-00/201) by use of one of the methods that follow:
(a) Hydraulic Service Cart
(b) Right ACMP augmenting left ACMP through PTU
(c) Engine Driven Pump (EDP)

D. Test the FSEU-1

S 862-022
(1) Move the flap control lever to the 20-unit detent, and let the flaps extend to the 20-unit position and the slats extend to the intermediate position.

S 722-023
(2) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.
(a) Stop the procedure for 25 seconds, so that depressurization occurs.

S 862-024
(3) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 722-025
(4) Make sure this EICAS message, FLAP ISLN VAL, shows on the bottom EICAS for both maintenance and status page displays.

S 862-026
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 742-082
(6) Erase the EICAS message, FLAP ISLN VAL, from the ECS/MSG display.

S 722-049
(7) Make sure the EICAS message, FLAP ISLN VAL, does not show on the status display.

S 742-085
(8) Do a check for Past and Present faults as follows:
(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.

(b) Push the YES switch on the FSEU.
(c) Make sure the NO FAULTS message shows on the display.
(d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(e) Push the NO switch two times to show the GROUND TESTS? message on the display.
(f) Push the YES switch to show the FLT DECK TEST? message on the display.
(g) Push the NO switch to show the DISPLAY TEST? message on the display.
(h) Push the YES switch.
(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the arming switch for the alternate drive of the LE SLAT to arm the slat alternate drive (switch light on).
(l) Push the NO switch two times to show the GROUND TESTS? message on the display.
(m) Push the YES switch to show the FLT DECK TEST? message on the display.
(n) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP LOAD RELIEF	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] THE EICAS STATUS PAGE MUST BE ON FOR A MESSAGE TO COME ON

(o) Push the arming switch for the alternate drive of the LE SLAT to disarm the slat alternate drive (switch light off).

S 722-003

(9) Make sure the stall warning system lets the LE slats operate as follows:

(a) Move the flap control lever to the 1-unit detent, and let the flaps extend to the 1-unit position and the slats to the intermediate position.

(b) Make sure the L and R position indicator needles move quickly to a position between the UP-unit and 1-unit position.

(c) Make sure the L and R position indicator needles remain at this position for a short time.

(d) Make sure the L and R position indicator needle move quickly to the 1-unit position.

(e) Operate and hold the test switch for the RIGHT stall warning on the side panel P61.

1) Make sure the slats move to the fully extended posiiton.

2) Make sure the first-officer's stick-shacker operates.

(f) Release the test switch.

1) Make sure the slats retract to the intermediate position.

2) Make sure the first-officer's stick-shaker stops.

(g) Operate and hold the test switch for the LEFT stall warning.

1) Make sure the slats move to the fully extended position.

2) Make sure the captain's stick-shaker operates.

(h) Release the test switch.

1) Make sure the slats retract to the intermediate position.

2) Make sure the captain's stick-shaker stops.

(i) Move the flap control lever to the 30-unit detent, and let the flaps and slats extend fully.

(j) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

(k) Make sure the EICAS message, FLAP/SLAT ELEC, does not show on the status display.

(l) Make sure the EICAS message FLAP/SLAT ELEC or FLAP/SLAT BITE, does not show on the ECS/MSG display.

E. Test the FSEU-2

S 722-053

(1) Do a check for Past and Present Faults as follows:

S 742-054

(2) Do a check for Past and Present faults as follows:
   (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (b) Push the YES switch on the FSEU.
   (c) Make sure the NO FAULTS message shows on the display.
   (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (f) Push the YES switch to show the FLT DECK TEST? message on the display.
   (g) Push the NO switch to show the DISPLAY TEST? message on the display.
   (h) Push the YES switch.
   (i) Make sure all LED's on the face panel of the FSEU come on.
   (j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
   (k) Push the arming switch, on the P3 panel, for the flap and slat alternate drives to arm the flap and slat alternate drives (switch light will come on).
   (l) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (m) Push the YES switch to show the FLT DECK TEST? message on the display.
   (n) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] THE EICAS STATUS PAGE MUST BE ON FOR MESSAGE TO COME ON

S 862-032

(3) Push the arming switch for the alternate drive of the LE SLAT to disarm the slat alternate drive (switch light off).

S 862-063

(4) Make sure the flap control lever is in the zero (FLAPS UP) detent and the flaps and slats are fully retracted.

S 722-064

(5) Push the arming switches for the alternate drive of the TE flap and LE slat to arm the flap and slat alternate drives (switch lights on).

S 722-065

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 FLAP CYCLES), DO NOT OPERATE THE MOTOR FOR 3 MINUTES. YOU CAN CAUSE DAMAGE TO THE MOTOR IF YOU LET IT RUN CONTINUOUSLY FOR MORE THAN 12 MINUTES.

(6) Put the position selector switch for the alternate flaps/slats in the 1-unit detent, and let the flaps move to the 1-unit position and the slats to move to the intermediate position.
   (a) Make sure the position indicator needles for the L and R flap move quickly to between UP-unit and 1-unit positions.
   (b) Make sure the needles then move quickly to the 1-unit detent.

S 862-066

(7) Put the position selector switch for the alternate flaps/slats in the 20-unit detent, and let the flaps move to the 20-unit position and the slats extend fully.

S 862-067

(8) Move the flap control lever to the 20-unit detent.

S 862-068

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Push the arming switches for the alternate drive of the TE flap and LE slat to disarm the flap and slat alternate drives (switch lights off).

S 722-069

(10) Move the flap control lever to the 1-unit detent, and let the flaps move to the 1-unit position.

S 722-070

(11) Operate and hold the test switch for the LEFT stall warning on the side panel P61.
(a) Make sure the slats move to the fully extended position.
(b) Make sure the captain's stick shaker operates.

S 722-071

(12) Release the test switch.
(a) Make sure the slats retract to the intermediate position.
(b) Make sure the captain's stick shaker stops.

S 722-072

(13) Operate and hold the test switch for the RIGHT stall warning.
(a) Make sure the slats move to the fully extended position.
(b) Make sure the first officer's stick shaker actuates.

S 722-073

(14) Release the test switch.

S 722-074
(15) Make sure the slats retract to the intermediate position.

S 722-075
(16) Make sure the first officer's stick shaker stops.

S 722-076
(17) Make sure the EICAS message, FLAP/SLAT ELEC, does not show on the status display.

S 722-077
(18) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP/SLAT BITE does not show on the ECS/MSG display.

S 862-078
(19) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

S 862-093
(20) Put the position selector switch for the alternate flaps/slats in the NORM position.

F. Test the FSEU-3

S 742-056
(1) Do a check for Past and Present faults as follows:
  (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
  (b) Push the YES switch on the FSEU.
  (c) Make sure the NO FAULTS message shows on the display.
  (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
  (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
  (f) Push the YES switch to show the FLT DECK TEST? message on the display.

(g) Push the NO switch to show the DISPLAY TEST? message on the display.
(h) Push the YES switch.
(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the arming switch, on the P3 panel, for the flap and slat alternate drives to arm the flap and slat alternate drives (switch light will come on).
(l) Push the NO switch two times to show the GROUND TESTS? message on the display.
(m) Push the YES switch to show the FLT DECK TEST? message on the display.
(n) Push the YES switch on the face panel of the FSEU and make sure the EICAS message that follows shows momentarily on the status display:
1) FLAP/SLAT ELEC

S 862-036

(2) Make sure the flap control lever is in the zero (FLAPS UP) detent and the flaps and slats are fully retracted.

S 722-052

(3) Push the arming switches for the alternate drive of the TE flap and LE slat to arm the flap and slat alternate drives (switch lights on).

S 722-057

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 FLAP CYCLES), DO NOT OPERATE THE MOTOR FOR 3 MINUTES. YOU CAN CAUSE DAMAGE TO THE MOTOR IF YOU LET IT RUN CONTINUOUSLY FOR MORE THAN 12 MINUTES.

(4) Put the position selector switch for the alternate flaps/slats in the 1-unit detent, and let the flaps move to the 1-unit position and the slats to move to the intermediate position.
(a) Make sure the position indicator needles for the L and R flap move quickly to between UP-unit and 1-unit positions.

(b) Make sure the needles then move quickly to the 1-unit detent.

S 862-038

(5) Put the position selector switch for the alternate flaps/slats in the 20-unit detent, and let the flaps move to the 20-unit position and the slats extend fully.

S 862-039

(6) Move the flap control lever to the 20-unit detent.

S 862-058

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Push the arming switches for the alternate drive of the TE flap and LE slat to disarm the flap and slat alternate drives (switch lights off).

S 722-041

(8) Move the flap control lever to the 1-unit detent, and let the flaps move to the 1-unit position.

S 722-042

(9) Operate and hold the test switch for the LEFT stall warning on the side panel P61.
(a) Make sure the slats move to the fully extended position.
(b) Make sure the captain's stick shaker operates.

S 722-043

(10) Release the test switch.
(a) Make sure the slats retract to the intermediate position.
(b) Make sure the captain's stick shaker stops.

S 722-044
(11) Operate and hold the test switch for the RIGHT stall warning.
(a) Make sure the slats move to the fully extended position.
(b) Make sure the first officer's stick shaker actuates.

S 722-045
(12) Release the test switch.

S 722-059
(13) Make sure the slats retract to the intermediate position.

S 722-060
(14) Make sure the first officer's stick shaker stops.

S 722-046
(15) Make sure the EICAS message, FLAP/SLAT ELEC, does not show on the status display.

S 722-047
(16) Make sure the EICAS messages, FLAP/SLAT ELEC or FLAP/SLAT BITE does not show on the ECS/MSG display.

S 862-048
(17) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

S 862-052
(18) Put the position selector switch for the alternate flaps/slats in the NORM position.

S 862-061
(19) Remove electrical power (AMM 24-22-00/201).

S 862-062
(20) Remove the pressure from the hydraulic system (AMM 29-11-00/201).

INBOARD TRAILING EDGE FLAP - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the inboard trailing edge (TE) flap. The second task installs the inboard TE flap. These tasks are done with the aft flap installed on the main flap and with the flap carriages and the aft flap linkages installed.

TASK 27-51-02-024-001

2. Remove the Inboard TE Flap
   A. Equipment
      (1) Inboard and Outboard TE Flap Sling - B27026-60
      (2) Inboard and Outboard TE Flap Sling - B27078-1 (Optional)
      (3) Transmission Ball Screw Harness - B27074-1
      (4) TE Flap PDU Lock - B27008-1
      (5) Rig Pins from Set B20003-XX (Ref 20-10-24):
         (a) TE2 - P/N B20003-53
         (b) TE3 - P/N B20003-4
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 20-10-24/201, Rig Pins
      (3) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
      (4) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairings
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
      (8) AMM 32-12-10/401, Main Landing Gear Trunnion Fairing Door
      (9) AMM 57-51-10/401, Main Landing Gear Trunnion Fairing
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
555/655	Inboard Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panels

197EL	Flap Track
197FL	Flap Track
195GL	Wing/Body Structure
197JL	Wing/Body Structure
198ER	Flap Track
198FR	Flap Track
198GR	Wing/Body Structure
198JR	Wing/Body Structure

D. Prepare for the Removal

S 214-002

(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-003

(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-004

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 014-006

(5) Remove the trunnion fairing door for the main landing gear (AMM 32-12-10/401).

S 014-007

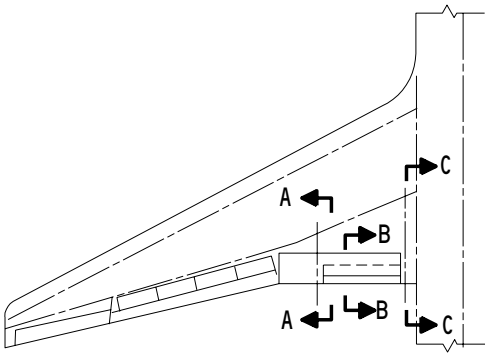
(6) Remove the trunnion fairing for the landing gear (AMM 57-51-10/401).

S 014-008

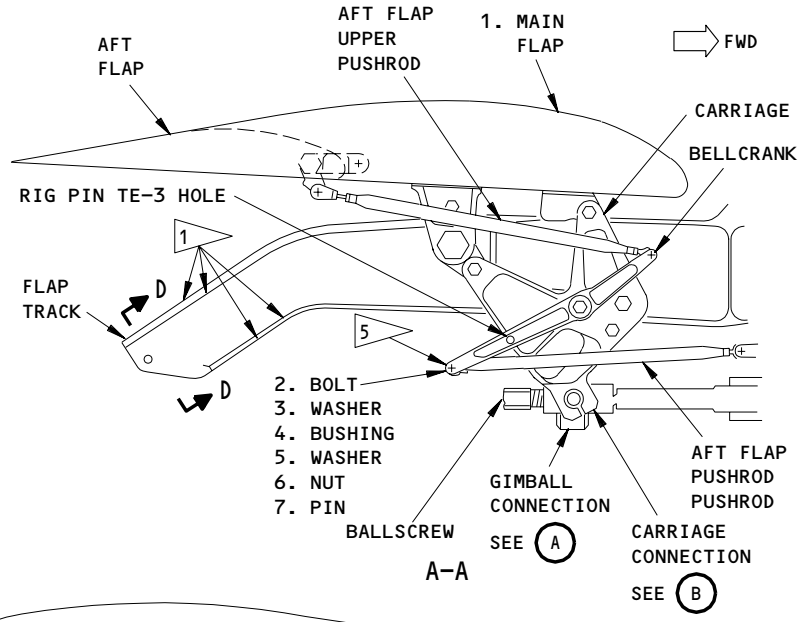
(7) Remove the flap track fairing from the inboard flap (AMM 27-51-30/201).

S 224-010

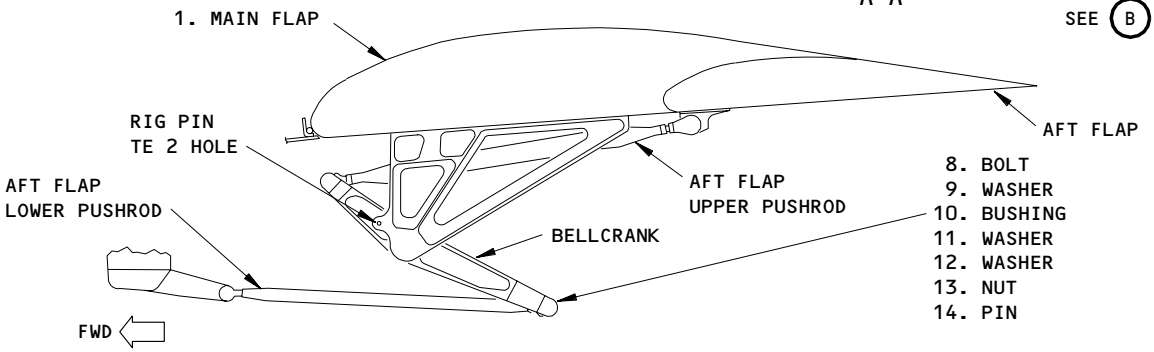
(8) Measure and make a record of the dimension X at the ballscrew nut and the universal joint of each inboard flap transmission (View A, Fig. 401).



LEFT WING PLAN VIEW

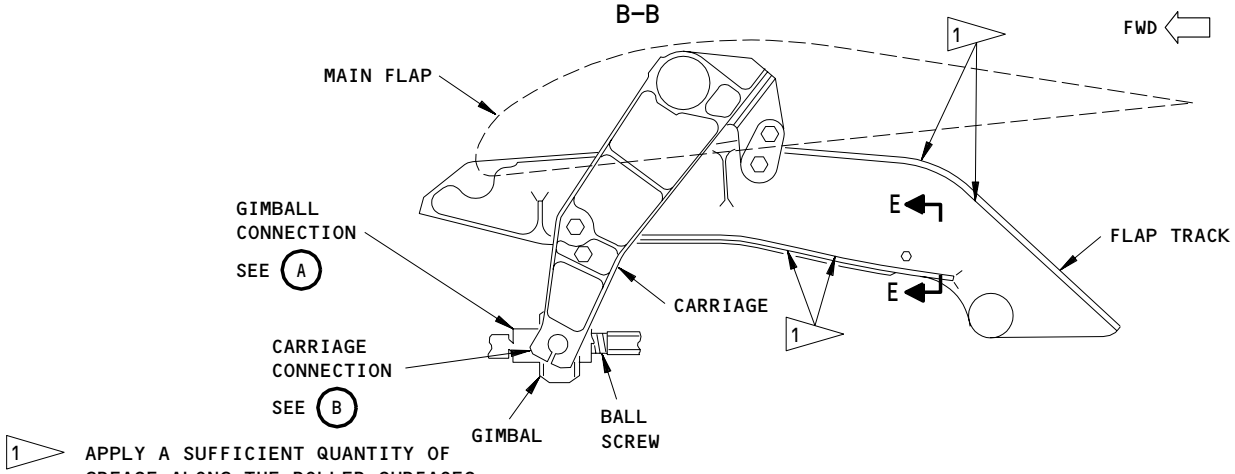


A-A



INBOARD AFT FLAP LINKAGE
(LEFT WING SHOWN, RIGHT WING OPPOSITE)

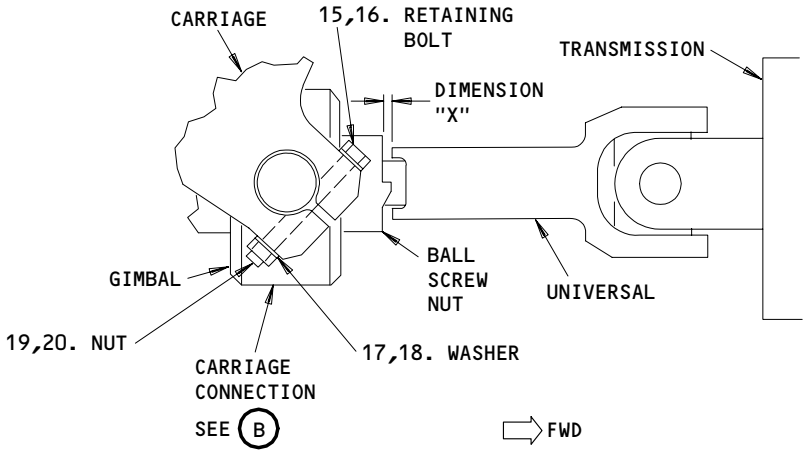
B-B



FLAP INBOARD TRACK
(LEFT WING SHOWN, RIGHT WING OPPOSITE)

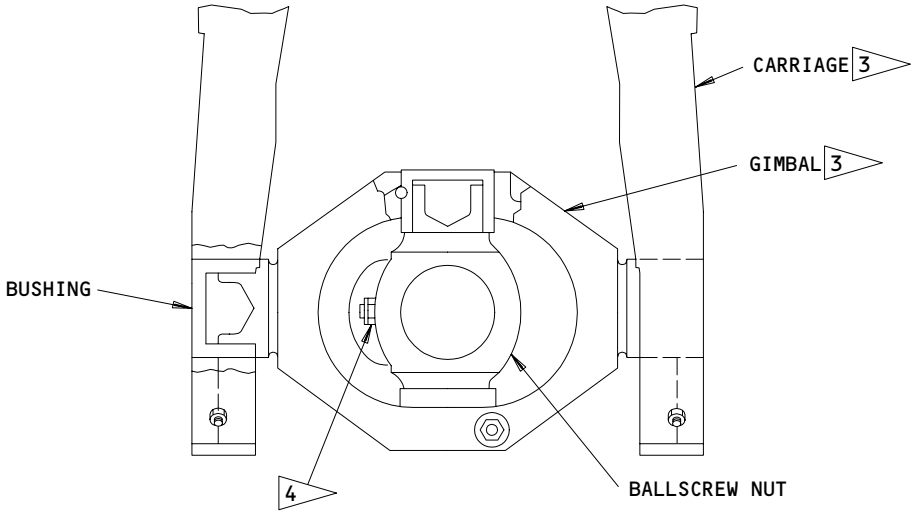
C-C

Inboard Trailing Edge Flap
Figure 401 (Sheet 1)



GIMBAL CONNECTION

A



CARRIAGE CONNECTION

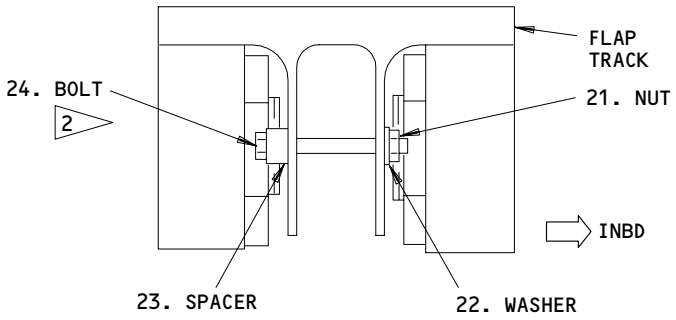
B

2 DRY PRIME THE HOLE AND INSTALL A BOLT WITH CORROSION PREVENTIVE COMPOUND

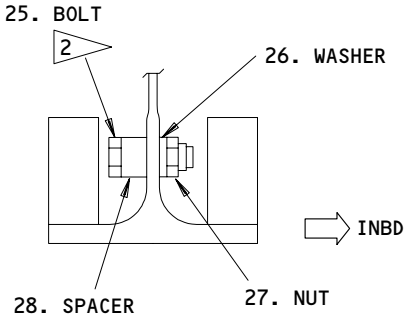
3 PUT THE GIMBAL SHAFT THROUGH THE CLEARANCE GROOVES ON THE CARRIAGE UNTIL THE SHAFT IS ALIGNED WITH THE BUSHING HOLES ON THE CARRIAGE. INSTALL THE BUSHINGS FROM THE TWO SIDES AND MAKE SURE THE BUSHING GROOVES ALIGN WITH THE CARRIAGE BOLT HOLES. INSTALL THE RETAINING BOLT

4 APPLY GREASE TO THE BALLSCREW NUT THROUGH THE LUBE FITTING

Inboard Trailing Edge Flap
Figure 401 (Sheet 2)

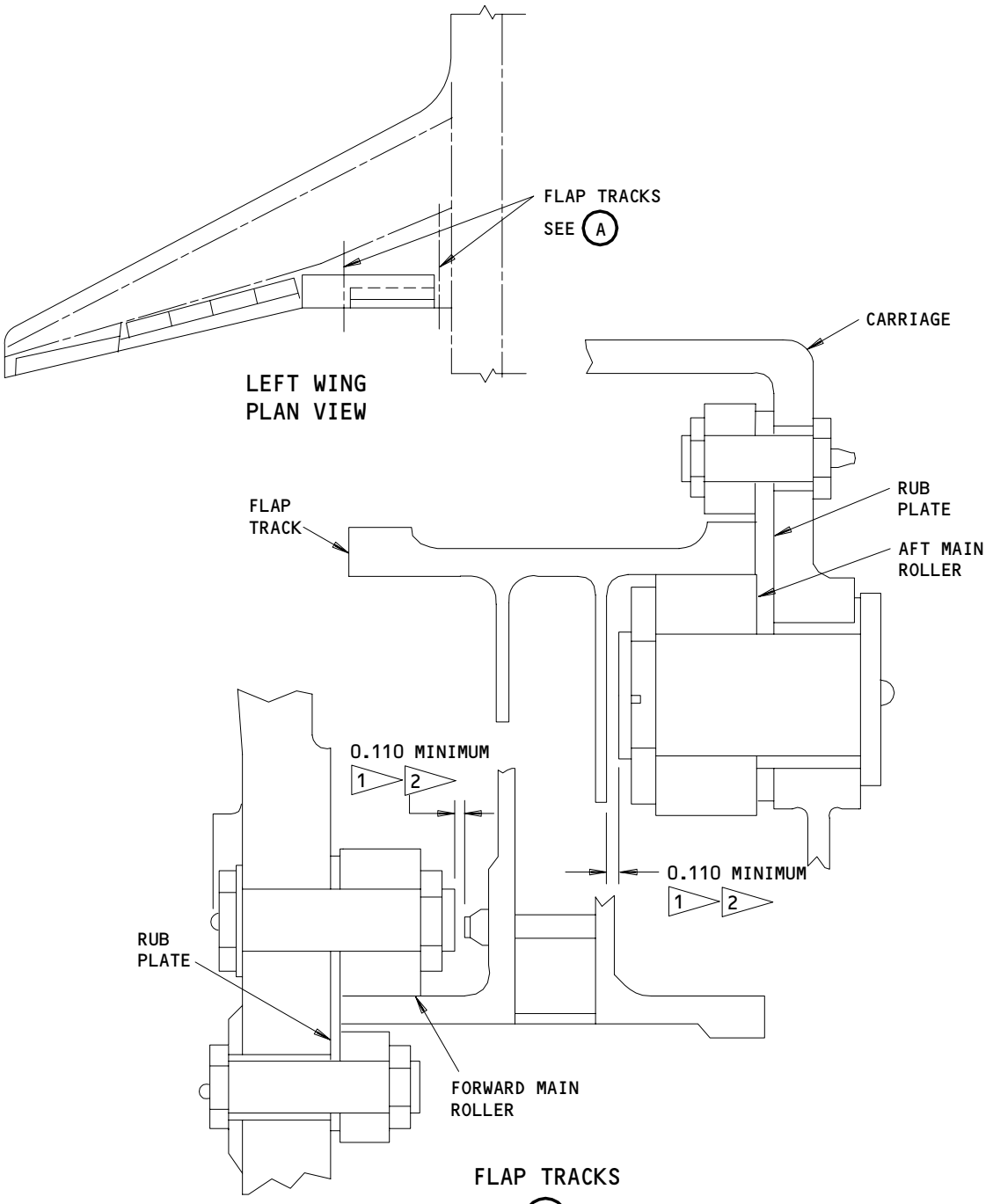


CARRIAGE STOP FOR THE OUTBOARD FLAP TRACK
D–D



CARRIAGE STOP FOR THE INBOARD FLAP TRACK
E–E

Inboard Trailing Edge Flap
Figure 401 (Sheet 3)



1 MAKE SURE YOU HAVE THE CORRECT CLEARANCE BETWEEN THE CARRIAGE ROLLER BOLTS AND THE FLAP TRACK THROUGH THE FULL CARRIAGE TRAVEL. AT THE SAME TIME, THE EDGE OF THE TRACK MUST TOUCH THE RUB PLATE (3 LOCATIONS) ON THE SIDE YOU EXAMINE

2 MINIMUM CLEARANCES SPECIFIED ARE FOR CARRIAGES WITH NO WEAR ON RUB PLATES. FOR CARRIAGES WITH WORN PLATES THESE CLEARANCES CAN BE REDUCED BY AN AMOUNT EQUIVALENT TO THE WEAR GROOVE DEPTH

Clearance Check Inboard Trailing Edge Flap
Figure 402

S 014-009
(9) Remove the aft fairing from the inboard track of the outboard flap (AMM 27-51-31/201).

S 224-011
(10) Measure and make a record of the dimension X at the ballscrew nut and the aft universal joint of the inboard transmission of the outboard flap (View A, Fig. 407).

S 864-012
(11) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-013
(12) Install a PDU lock on the TE flap PDU (Fig. 404).

S 034-014
(13) Disconnect the torque tube between the TE flap PDU and the inboard tee gearbox (for the inboard flap), at the tee gearbox.

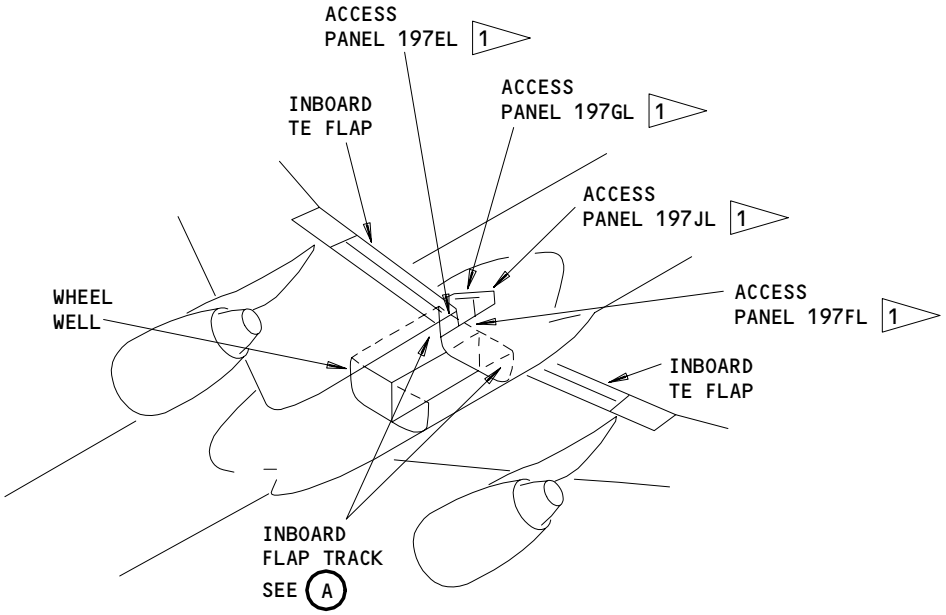
S 864-015
(14) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

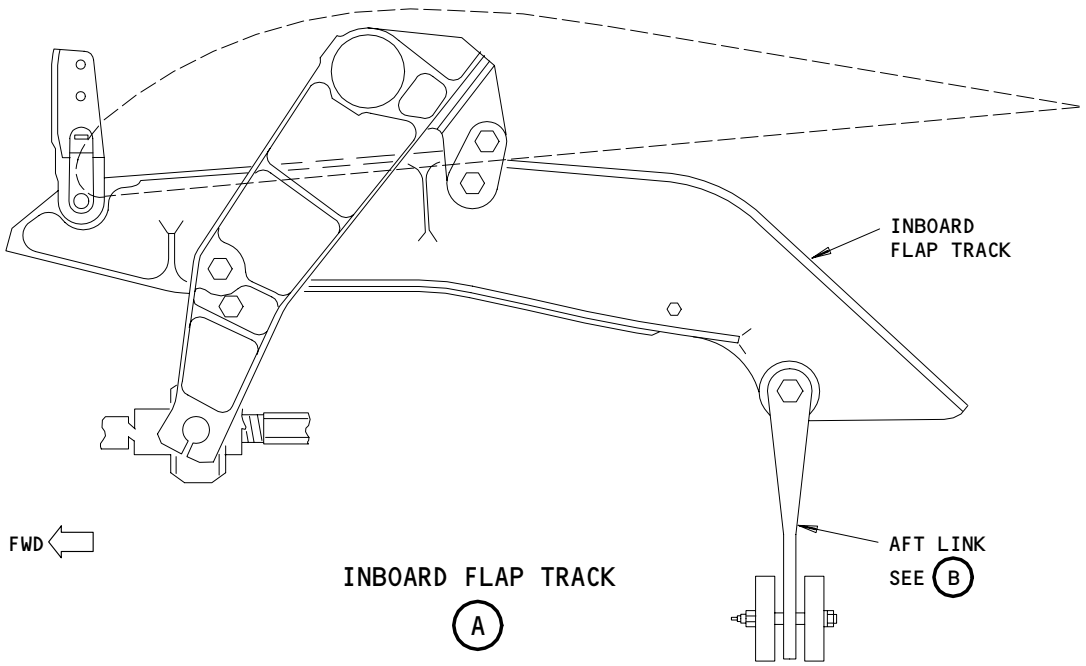
S 864-016
(15) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-017
(16) If you remove the left inboard TE flap, remove access panels 197FL, 197EL, 195GL, and 197JL (AMM 06-44-00/201).

S 014-018
(17) If you remove the right inboard TE flap, remove access panels 198FR, 198ER, 198GR, and 198JR (AMM 06-44-00/201).

S 494-019
(18) Install rig pins TE2 and TE3 (Views A-A and B-B, Fig. 401) to prevent movement of the aft flap.



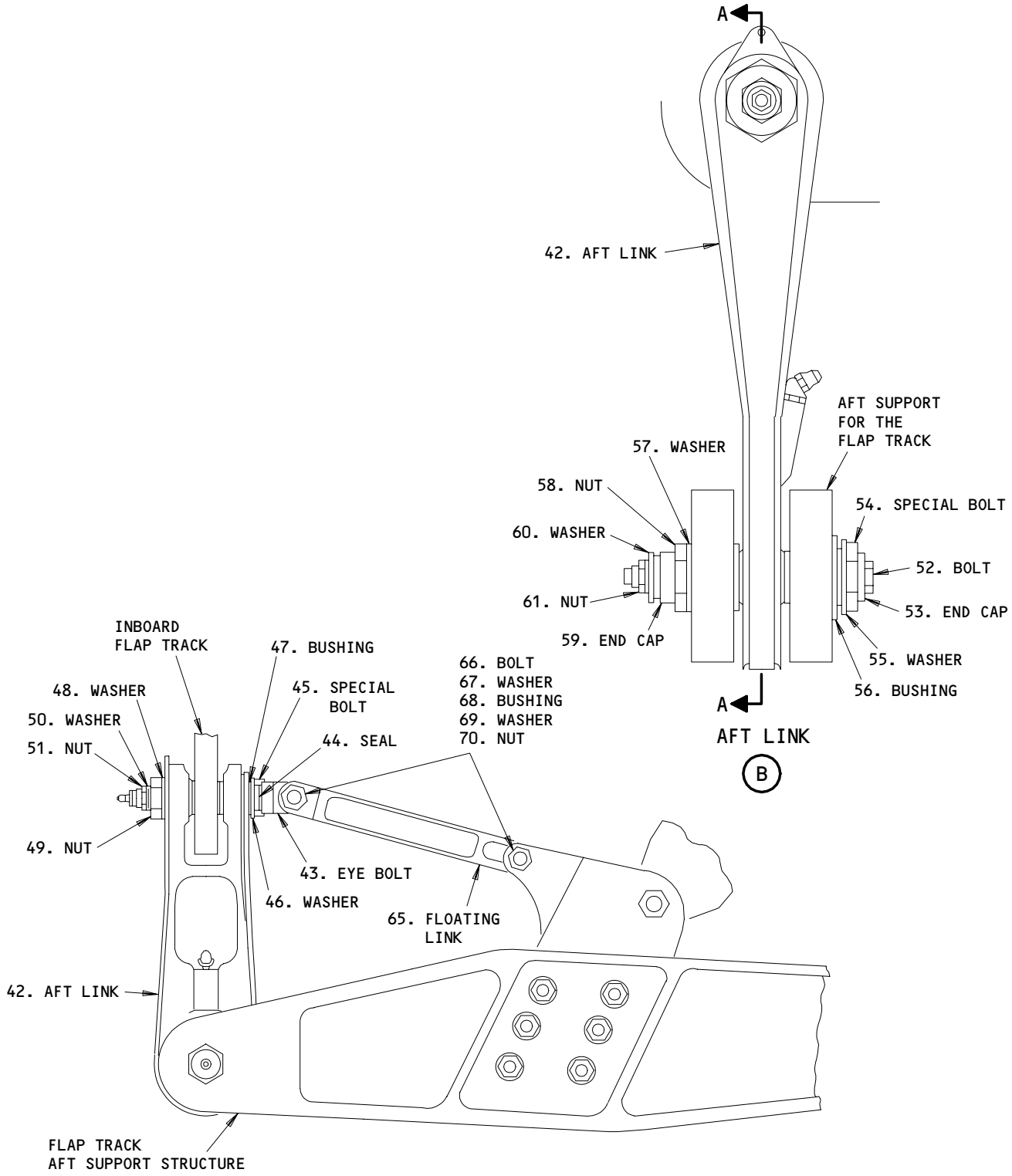


INBOARD FLAP TRACK

A

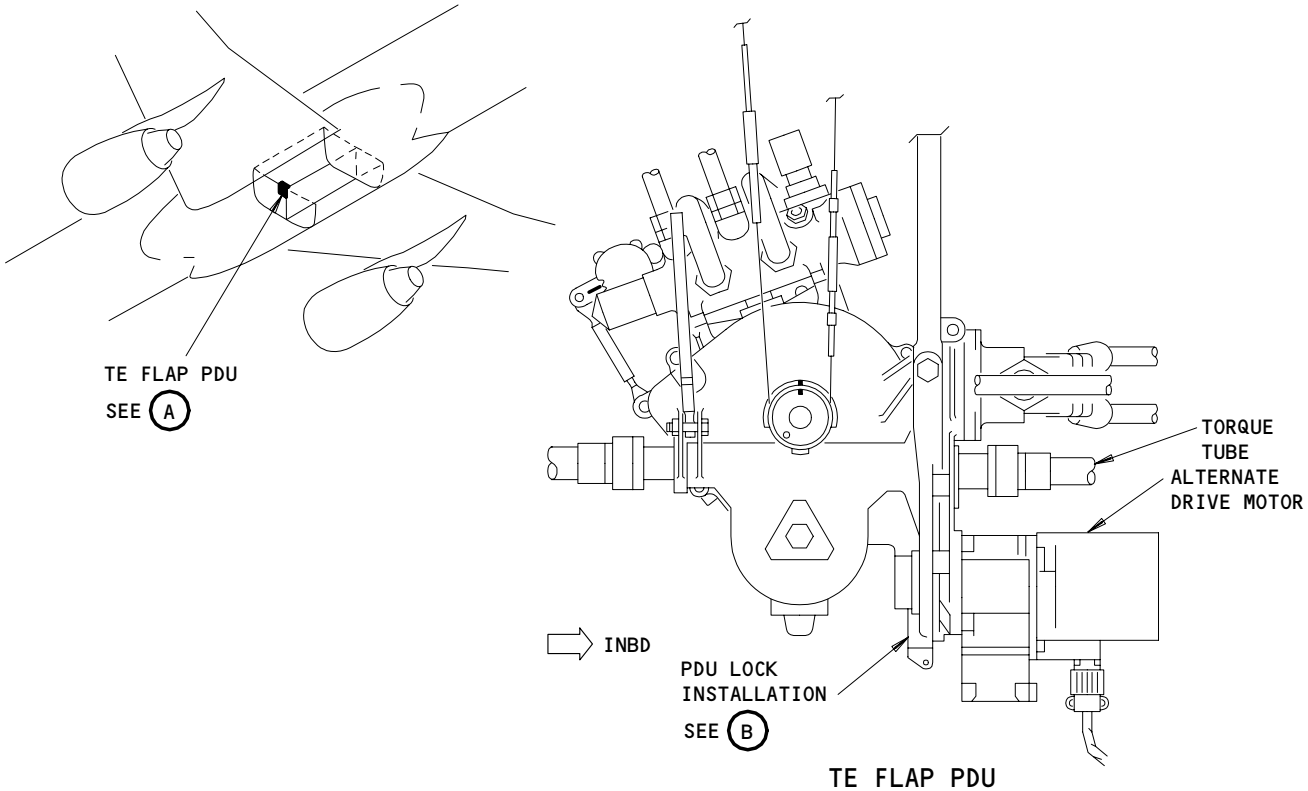
1 LEFT ACCESS PANEL SHOWN, RIGHT ACCESS PANELS; 198FR, 198GR, 198ER, AND 198JR OPPOSITE

Support Strut and Floating Link for the Inboard Flap Track
Figure 403 (Sheet 1)

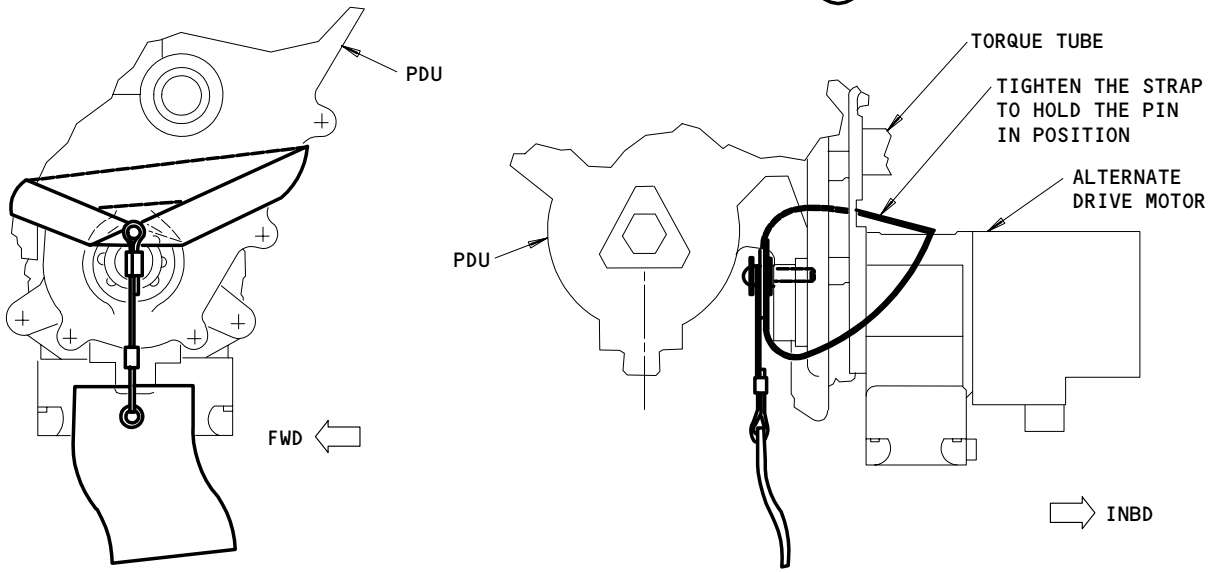


AFT LINK AND FLOATING LINK
A-A

Aft Link and Floating Link for the Inboard Flap Track
Figure 403 (Sheet 2)



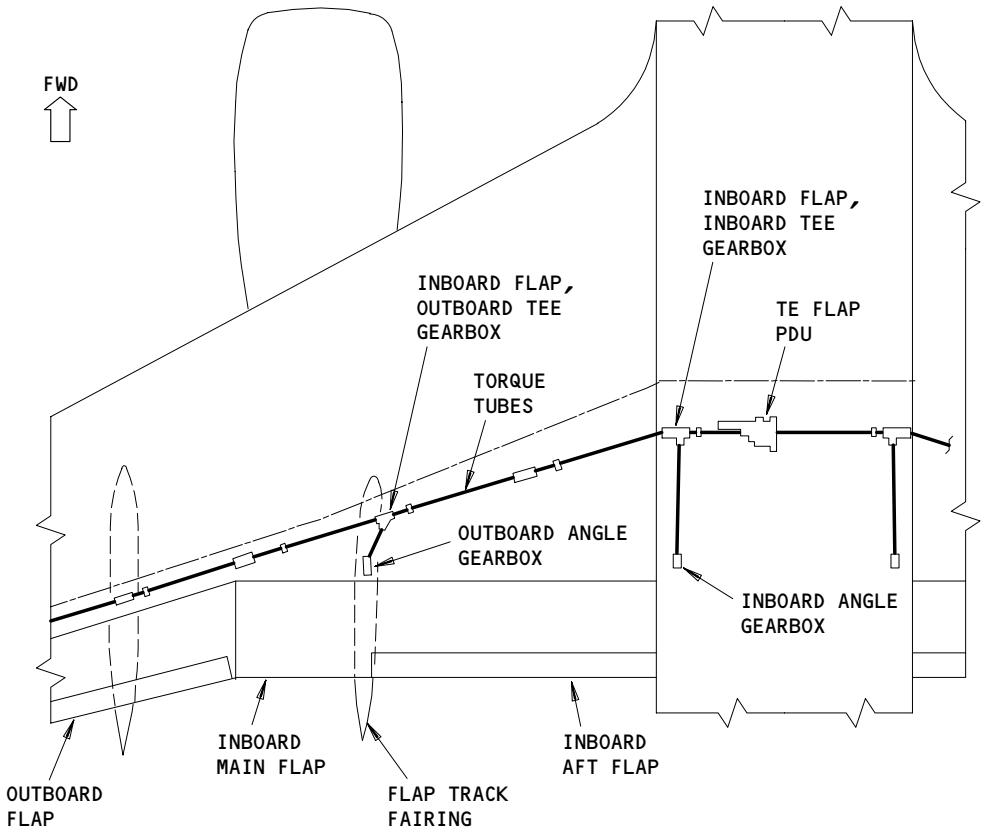
TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B

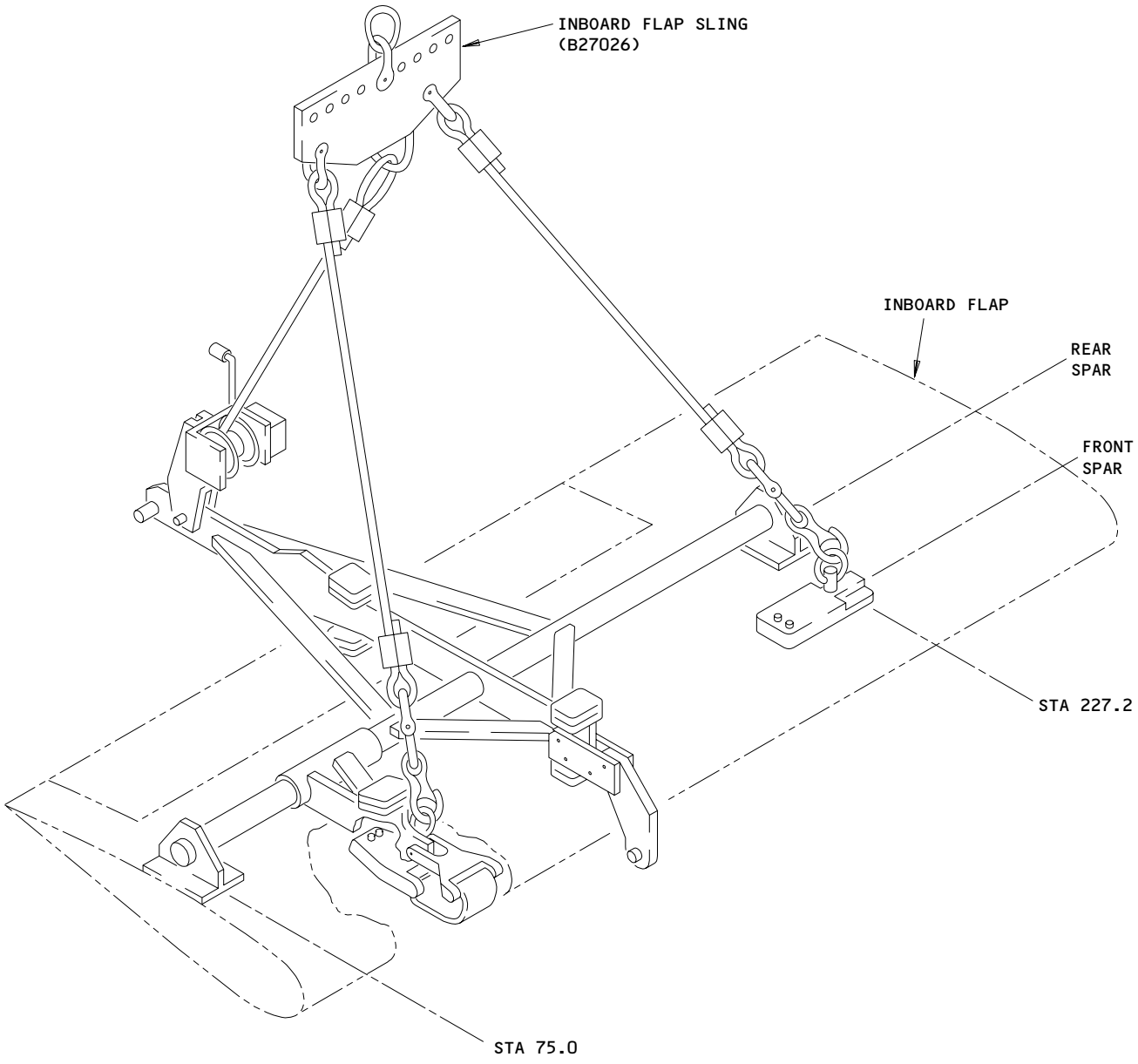
PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 404

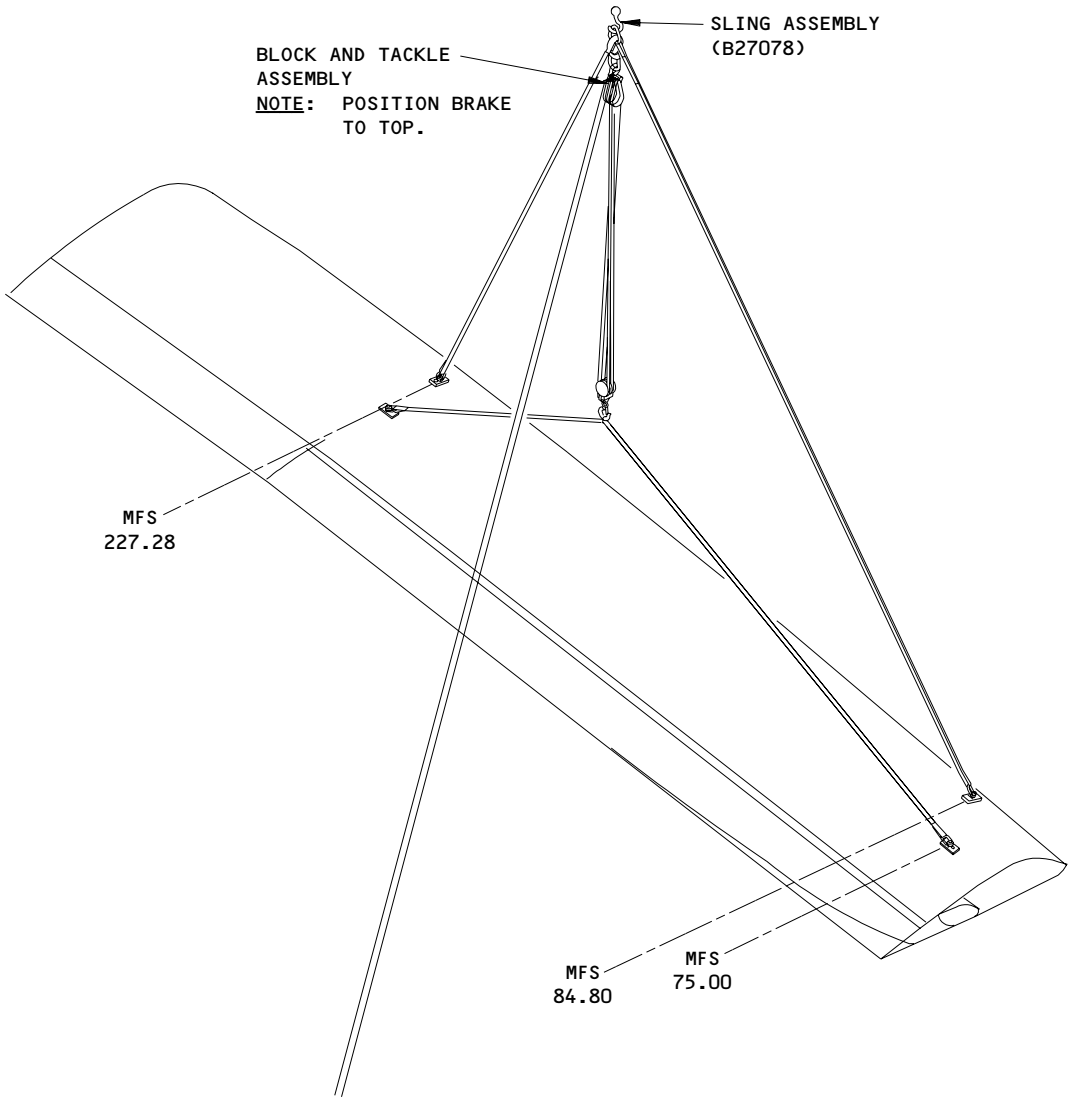


TE FLAP TORQUE TUBE
(LEFT WING SHOWN, RIGHT WING OPPOSITE)

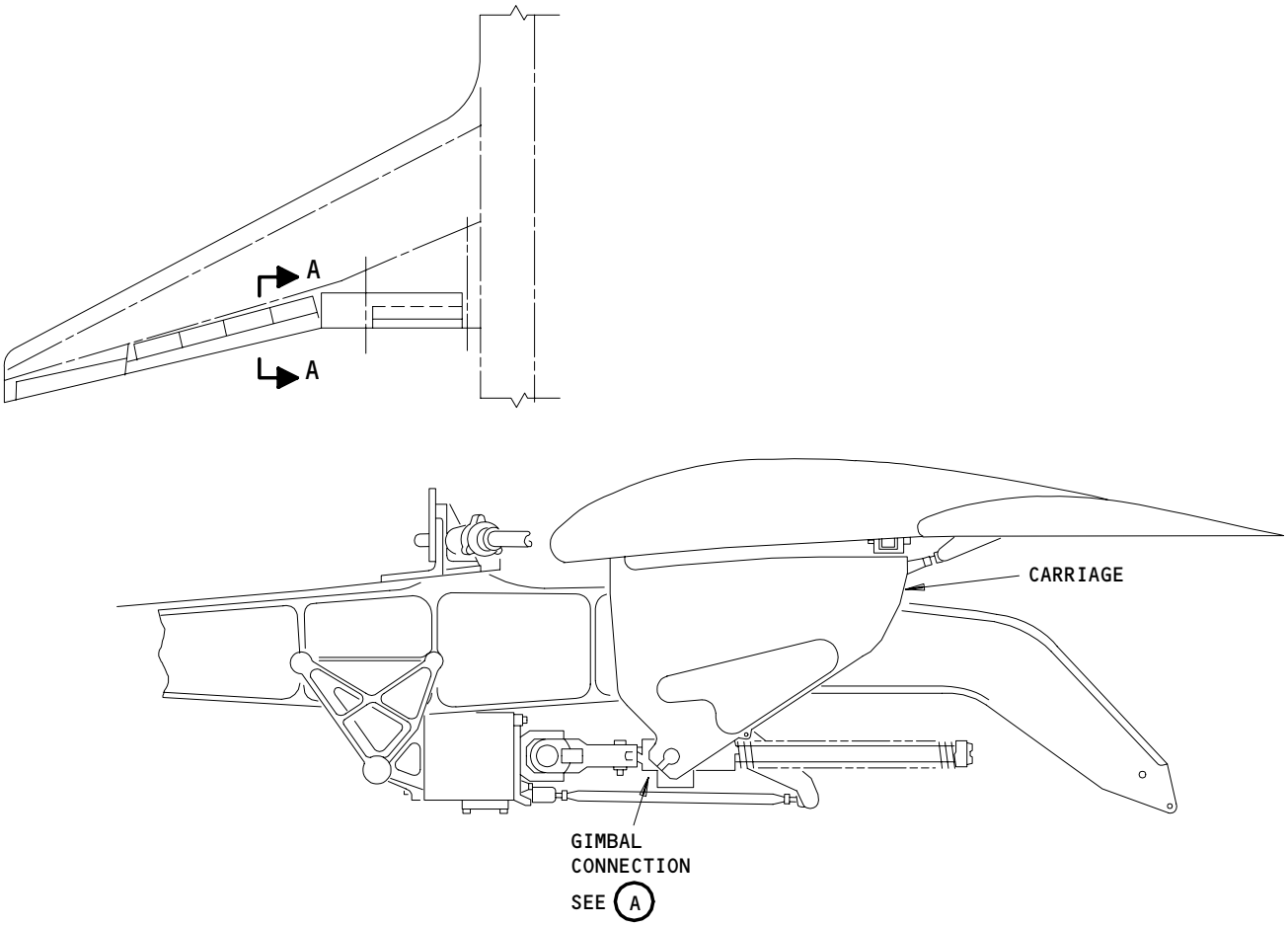
Inboard TE Flap Drive
Figure 405



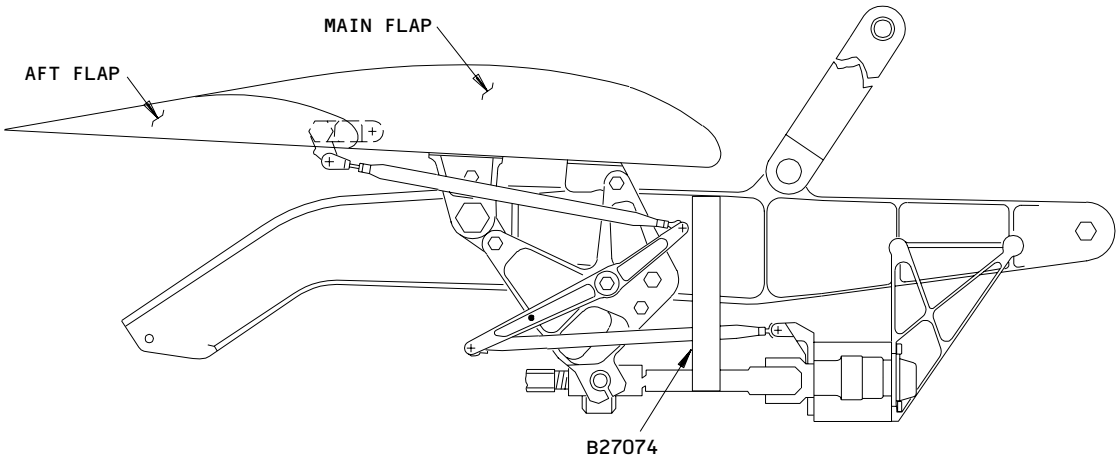
Trailing Edge Flaps Sling
Figure 406 (Sheet 1)



Trailing Edge Flaps Sling
Figure 406 (Sheet 2)



Dimension X Measurement for the Transmission Ball Screw
Figure 407



BALLSCREW HARNESS ASSEMBLY

Harness Assembly for the Transmission Ballscrew
Figure 408

E. Remove the Inboard TE Flap (Fig. 401)

S 024-020

(1) Do these steps to remove the TE flap:

(a) Disconnect the lower pushrods for the aft flap at the carriage bellcrank (remove fasteners 2 thru 7, and 8 thru 14).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE DISCONNECTED LOWER PUSHRODS FOR THE AFT FLAP WHEN YOU EXTEND THE TE FLAPS. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE FLAPS MOVE.

(b) Turn the torque tube for the flap drive manually (or with an air motor) to extend the flaps until the carriages are approximately 3 inches (76.2 mm) from the carriage stops.

(c) Disconnect the torque tube between the inboard angle gearbox and the inboard tee gearbox (for the inboard flap), at the tee gearbox.

(d) Disconnect the torque tube between the outboard tee gearbox (for the inboard flap) and the outboard angle gearbox, at the angle gearbox.

(e) Attach the inboard TE flap sling to the flap (Fig. 406).

WARNING: MAKE SURE THAT THE ANGLE BETWEEN THE CENTERLINES OF THE TRANSMISSION AND THE BALLSCREW IS NOT TOO LARGE. THIS IS TO PREVENT DAMAGE TO THE TRANSMISSION UNIVERSAL JOINT.

(f) Use a harness to hold each transmission ballscrew (Fig. 408).

NOTE: A manual turn of the torque tubes will be necessary to disconnect the carriages from the ballscrew gimbals.

(g) Disconnect the carriages from the ballscrew gimbals.

(h) Remove the carriage stops.

(i) Remove the fasteners (66 thru 70) from each end of the floating link (65), and remove the floating link.

(j) Remove the fasteners (44 thru 51) and the eye bolt (43) to disconnect the flap track from the aft link (42).

(k) Remove the fasteners that connect the aft link to the aft support for the flap track (52 thru 61), and remove the aft link (42).

(l) Turn the flap in the aft direction and lift it off the flap tracks.

(m) When the flap is free of the flap tracks, lower the inboard flap track carefully until it touches the adjacent structure.

NOTE: All of the inboard track supports other than the forward support were removed. Thus, the track will turn about the forward connection.

(n) Lower the flap to the ground and disconnect it from the sling.

TASK 27-51-02-424-021

3. Install the Inboard TE Flap

A. Equipment

(1) Inboard and outboard TE Flap Sling - B27026-60
(2) Inboard and Outboard TE Flap Sling - B27078-1 (Optional)
(3) TE Flap PDU Lock - B27008-1
(4) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) TE2 - P/N B20003-53
(b) TE3 - P/N B20003-4

B. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) D00015 Grease - BMS 3-24 (Alternate)
(5) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

C. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Flap Assy (Left Side)	27-51-02	02	220,221 222
				10C	850,860
	1	Flap Assy (Right Side)	27-51-02	02A	310,315 320
				10A	780,785

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
403	42	Aft Link	57-52-51	05	265
	43	Eye Bolt			180
	44	Seal			175
	45	Special Bolt			165
	46	Washer			160
	47	Bushing			170
	48	Washer			155
	49	Nut			150
	50	Washer			145
	51	Nut			140
	52	Bolt			215
	53	End Cap			230
	54	Special Bolt			250
	55	Washer			245
	56	Bushing			255
	57	Washer			240
	58	Nut			235
	59	End Cap			230
	60	Washer			220
	61	Nut			225
	65	Floating Link			135
	66	Bolt			130
	67	Washer			125
	68	Bushing			120
	69	Washer			115
	70	Nut			110

D. References
(1) AMM 20-10-24/201, Rig Pins
(2) AMM 27-51-02/501, Inboard Trailing Edge Flap
(3) AMM 27-51-05/401, Inboard Trailing Edge Flap Carriage
(4) AMM 27-51-12/401, Inboard Trailing Edge Aft Flap
(5) AMM 27-51-12/501, Inboard Trailing Edge Aft Flap
(6) AMM 27-51-13/401, Inboard Trailing Edge Aft Flap Linkage

E. Access
(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
555/655	Inboard Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panels

197EL	Flap Track
197FL	Flap Track
195GL	Wing/Body Structure
197JL	Wing/Body Structure
198ER	Flap Track
198FR	Flap Track
198GR	Wing/Body Structure
198JR	Wing/Body Structure

F. Install the Inboard TE Flap (Fig. 401)

S 214-022

(1) Make sure the flap/slat primary (hydraulic) and alternate (electric) drives are off and the flap control lever is in the zero (FLAPS UP) detent.

NOTE: The inboard and outboard flaps on the wing where the inboard flap is removed will be in the extended position. The flaps on that wing were extended manually for the inboard TE flap removal.

S 214-030

(2) Make sure the flap carriages are installed on the inboard main flap (AMM 27-51-05/401).

S 214-031

(3) Make sure the aft flap linkages are installed (AMM 27-51-13/401).

S 214-032

(4) Make sure the aft flap is installed and adjusted (AMM 27-51-12/501).

S 494-033

(5) Install rig pins TE2 and TE3 (Views A-A and B-B) to prevent movement of the aft flap of the inboard flap.

S 644-024

(6) Apply grease along the roller surfaces of the flap tracks.

S 424-025

(7) Do these steps to install the TE flap:
   (a) Install the sling for the inboard TE flap on the flap (Fig. 406).
   (b) If the airplane is equipped with slot seal doors (instead of brush seals) make sure these doors (in the wing-body fairing) open and close correctly as the flap moves.
   (c) Use a manual support to hold the inboard flap track, then lift the flap into position.
   (d) Put the carriages together on the flap tracks and roll the flap forward.

(e) Connect the inboard flap carriages to the ballscrew gimbals with fasteners (15 thru 20).

NOTE: A manual turn of the torque tubes connected to the transmission angle gearboxes can align the carriages with the gimbals.

(f) Tighten the nuts (19 and 20) to 65-75 pound-inches (7.35-8.47 newton-meters) more than the run-on torque.
(g) Move manually the inboard TE flap forward on the tracks, and examine the track for the correct clearances (Fig. 402).
(h) Connect the aft link (42) to the aft support structure of the flap track with fasteners (52 thru 61).
(i) Tighten the nut (58) to 500-700 pound-inches (56.5-79.0 newton-meters).
(j) Connect the flap track to the aft link (42) with fasteners (44 thru 51) and an eye bolt (43).
(k) Tighten the nut (49) to 400-600 pound-inches (45.2-67.7 Nm).
(l) Install the floating link (65) with fasteners (66 thru 70).
(m) Install the carriage stops.
(n) Tighten the nut with your fingers on the carriage stop for the outboard flap track and install a cotter pin.
(o) Remove the sling from the flap.
(p) To retract the outboard TE flap, turn the torque tube at the inboard tee gearbox of the inboard flap manually, or with an air motor.
(q) Turn the torque tube until you get the dimension X at the inboard transmission that you measured and recorded before (View A, Fig. 407).

NOTE: If the measured and recorded dimension X is not available, retract the flap until the upstops on the ballscrew nut and the universal are 90 degrees away from each other. This is a nominal position.

(r) To retract the inboard TE flap, turn the torque tubes at the angle gearboxes of the inboard and outboard transmission manually, or with an air motor.
(s) Turn the torque tube until you get the dimension X at each transmission that you measured and recorded before (View A, Fig. 401).

NOTE: If the measured and recorded dimension X is not available, retract the flap until the upstops on the ballscrew nut and the universal at each transmission are 90 degrees away from each other. This is a nominal position.

(t) Remove the harnesses that were installed to prevent damage to the transmission ball screws during the flap removal.

S 824-029

(8) Adjust and do a test of the flap installation (AMM 27-51-02/501).

NOTE: Steps to do the items that follow are included in the adjustment/test procedure:

- Connect the lower pushrods to the aft flap
- Install the aft fairing for the outboard flap track
- Install the trunnion fairing for the main landing gear
- Install the trunnion fairing door for the main landing gear
- Put the airplane back to its usual condition.

INBOARD TRAILING EDGE FLAP - ADJUSTMENT/TEST

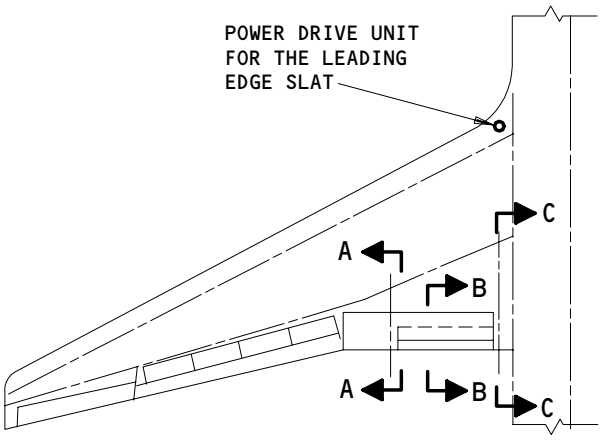
1. General
   A. This procedure contains the adjustment and test of the inboard trailing edge (TE) flap. The adjustment and test is done while the aft flap is attached to the main flap, with the flap carriages and aft flap linkages installed.

   B. The rigging dimensions in this procedure represent rigging the flaps with the wings in the unloaded condition (without engines or fuel weight on the wings). That is the configuration that most closely resembles the in-flight deflection of the wing.
   C. For a in-service airplane the flaps are usually rigged with the engines installed, on jacks or gears, and with fuel weight on the wings. Regardless of this difference, the rigging dimensions given in this procedure are still the target dimensions for the rigging of the airplane in any configuration.

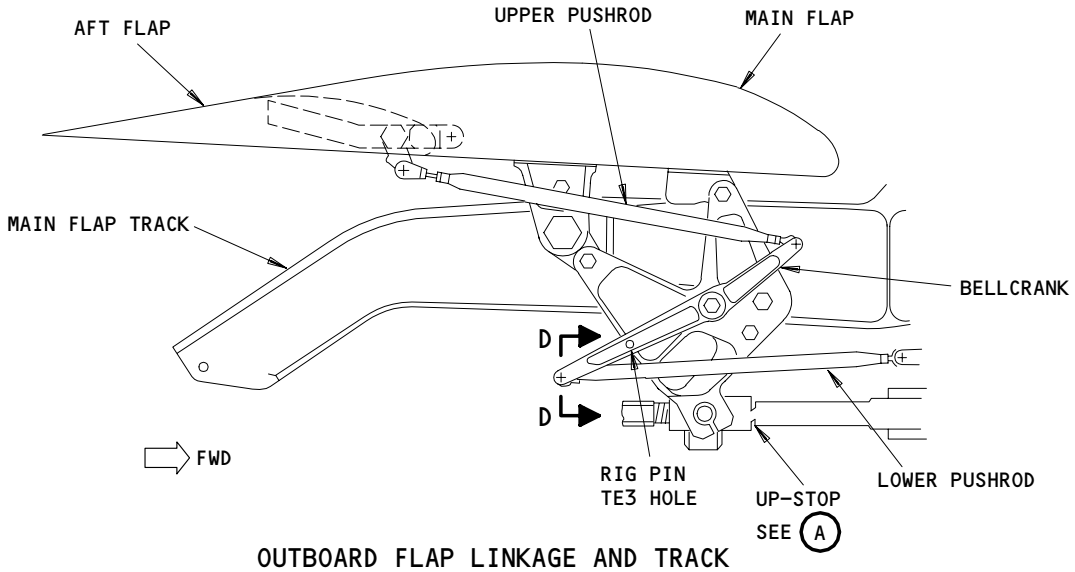
      NOTE: If the best rigging dimension you can obtain is not within the limit, refer to the tables in this procedure to find the limits for a particular airplane configuration.

TASK 27-51-02-825-001

2. Adjustment for the Inboard Trailing Edge Flap
   A. Equipment
      (1) Rigging Bars (from TE Flap Rigging Bar Set, B27030-125):
          (a) Inboard Flap Rigging Bar - B27030-126
          (b) Inboard Flap Rigging Bar - B27030-129
      (2) Door Locks, MLG - (Ref 32-00-15)
      (3) Rig Pins from Set B20003-XX (Ref 20-10-24)
          (a) TE2 - P/N B20003-4
          (b) TE3 - P/N B20003-4
      (4) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (5) Inboard Flap Torque Tube Clamp - B27055-3 (Part of Flap Torque Clamp Set, B27055-1)
   B. Consumable Materials
      (1) A00247 Sealant - BMS 5-95
      (2) C00259 Primer - BMS 10-11, Type 1
      (3) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

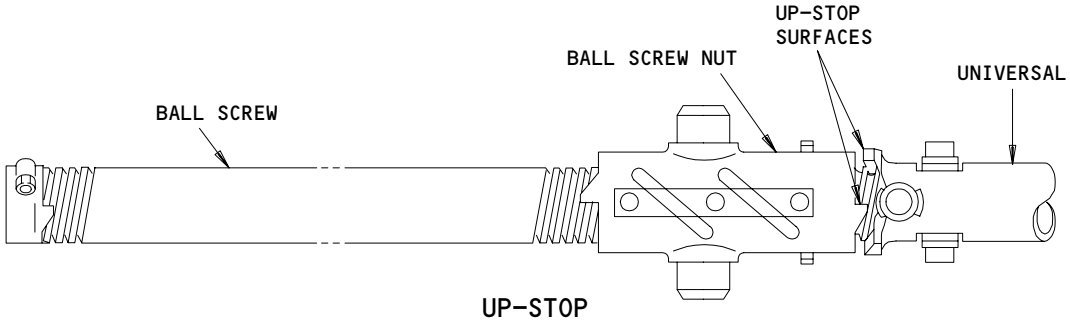


LEFT WING
PLAN VIEW



OUTBOARD FLAP LINKAGE AND TRACK
FOR MAIN AND AFT FLAP,
LEFT INBOARD FLAP
(RIGHT OPPOSITE)

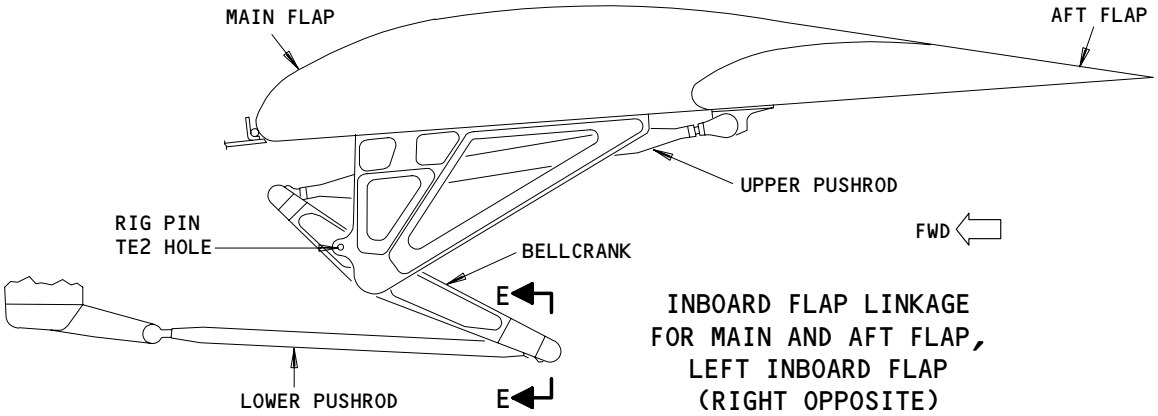
A-A



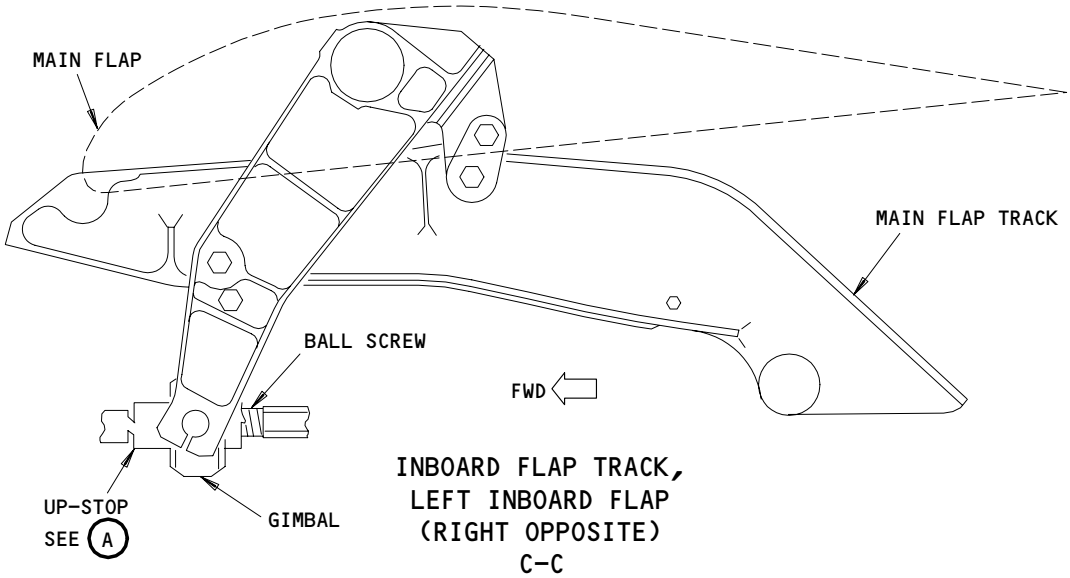
UP-STOP

A

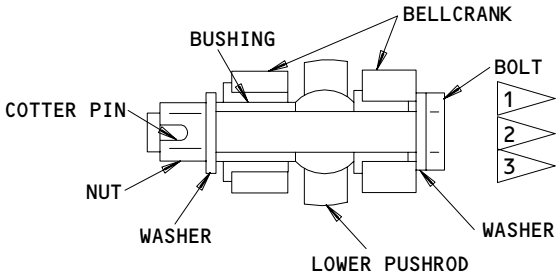
Inboard TE Flap Adjustment
Figure 501 (Sheet 1)



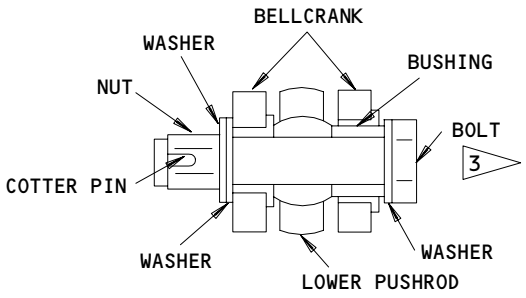
INBOARD FLAP LINKAGE
FOR MAIN AND AFT FLAP,
LEFT INBOARD FLAP
(RIGHT OPPOSITE)
B–B



INBOARD FLAP TRACK,
LEFT INBOARD FLAP
(RIGHT OPPOSITE)
C–C



ATTACHMENT FOR THE LOWER PUSHROD
D–D



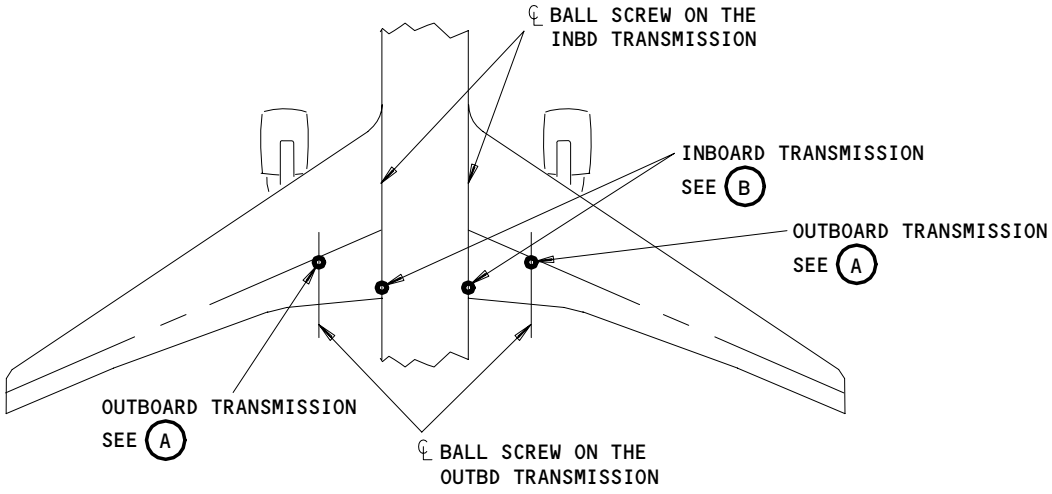
ATTACHMENT FOR THE LOWER PUSHROD
E–E

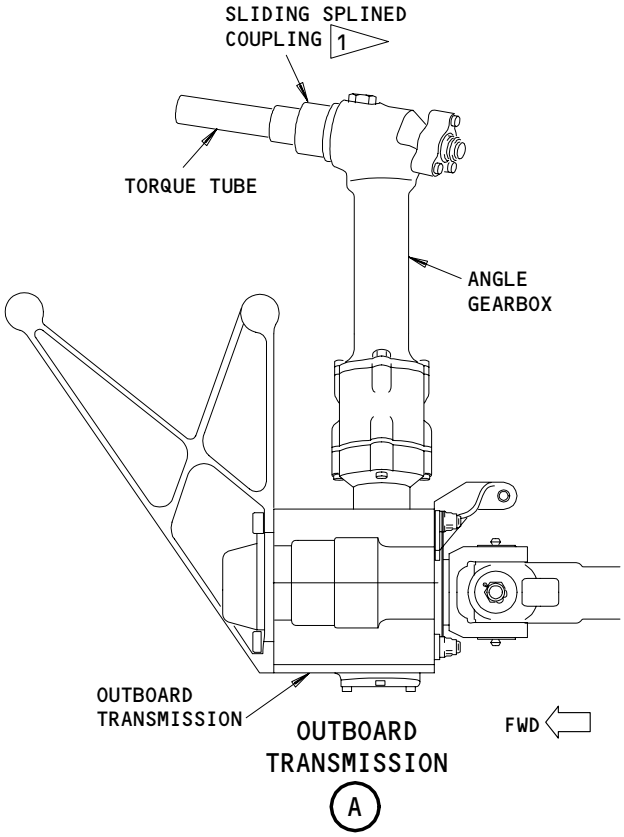
1 INSTALL THE BOLT HEAD FACING INBD TO ENSURE CLEARANCE WITH THE FAIRING

2 LUBRICATE THE BEARING WITH GREASE THROUGH THE LUBRICATION FITTING AFTER INSTALLATION

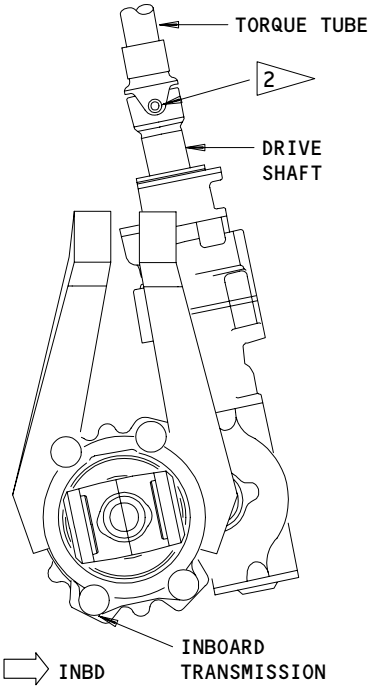
3 APPLY GREASE TO THE BOLT AND THE OUTER AND INNER DIAMETER OF THE BUSHING. REMOVE ALL GREASE COMPLETELY FROM THE BOLT THREADS.

Inboard TE Flap Adjustment
Figure 501 (Sheet 2)





OUTBOARD TRANSMISSION
(A)

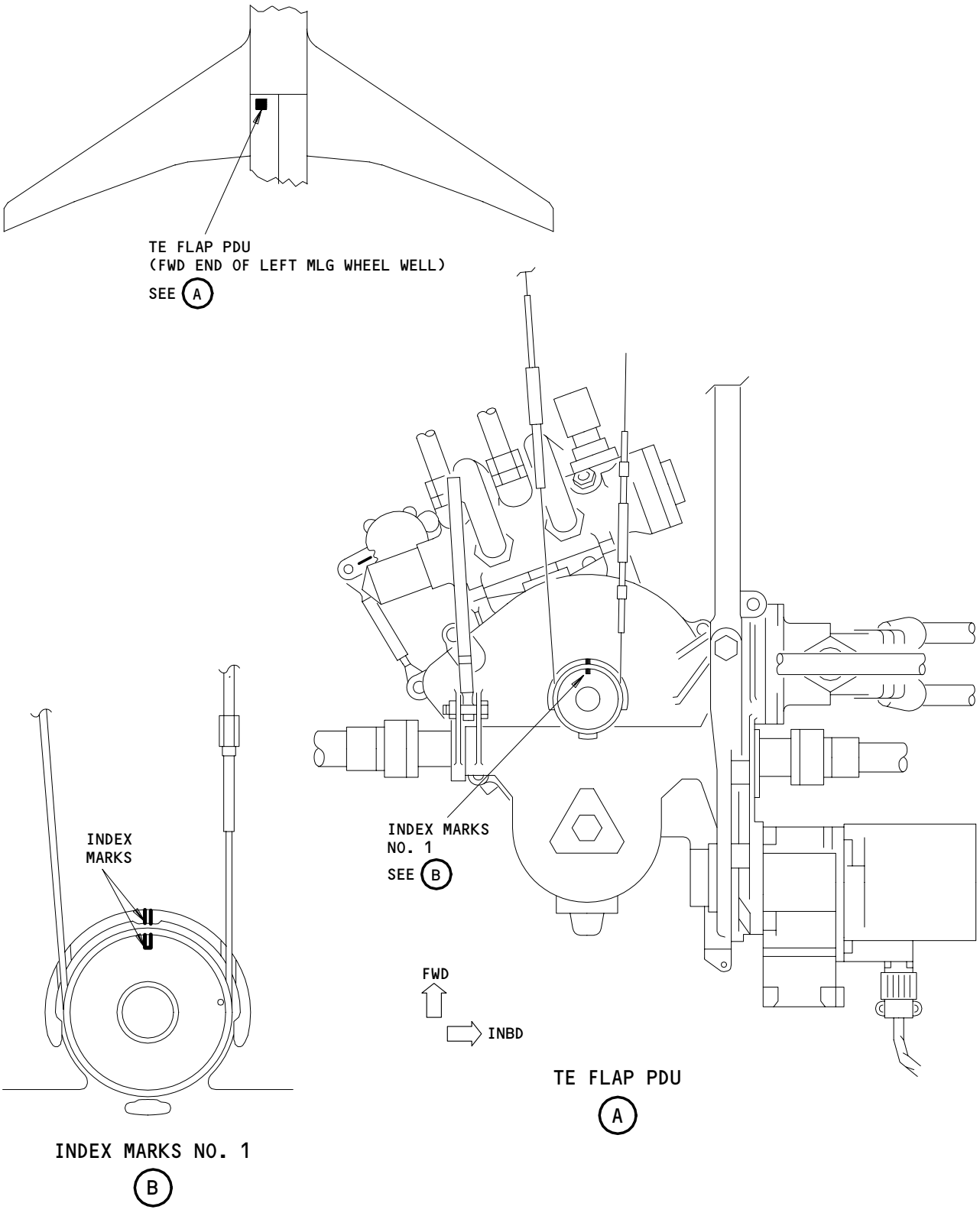


INBOARD TRANSMISSION (REAR VIEW)
(B)

1 BEFORE INSTALLATION APPLY GREASE TO THE INTERNAL AND EXTERNAL SURFACES OF MATING SPLINES. INSTALL THREE SCREWS TO FIX THE COUPLING TO THE MATING PART AND LOCKWIRE THE SCREWS TOGETHER. AFTER INSTALLATION FILL THE COUPLING CAVITY WITH GREASE THROUGH THE LUBRICATION HOLE

2 APPLY GREASE

Inboard TE Flap Transmissions
Figure 502



Power Drive Unit (PDU) for the TE Flap
Figure 503

(4) D00633 Grease - BMS 3-33 (Preferred)
(5) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 27-01-00/501, Flight Control Lateral Trim Correction
(3) 27-51-00/501, Trailing Edge Flap System
(4) 27-51-06/401, Inboard Trailing Edge Flap Transmissions
(5) 27-51-10/401, Inboard Trailing Edge Flap Outboard Angle Gearbox
(6) 27-51-12/501, Inboard Trailing Edge Aft Flap
(7) 27-51-14/501, Outboard Trailing Edge Flap
(8) 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
(9) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(10) 32-00-15/201, Landing Gear Door Lock
(11) 32-00-20/201, Landing Gear Downlock
(12) 32-12-10/401, Main Landing Gear Trunnion Fairing Door
(13) 57-51-10/401, Main Landing Gear Trunnion Fairing

D. Access
(1) Location Zones

143/144	MLG Wheel Well (Left/Right)
211/212	Control Cabin
500/600	Left Wing/Right Wing
730/740	Main Landing Gear and Door (Left/Right)

E. Prepare for Adjustment

S 215-010
(1) Make sure that the trailing edge (TE) flaps and the leading edge (LE) slats are in the fully retracted position.

S 865-048
(2) Make sure the flap control lever is in the zero (FLAPS UP) detent, and install a DO-NOT-OPERATE tag on the flap control lever.

S 215-011
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 495-012

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 865-013
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-008

(6) Install the PDU lock in the TE flap power drive unit (PDU) (Fig. 506).

S 865-014

(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (d) 11J18, FLAP LOAD RELIEF
   (e) 11J33, WARN ELEX A

S 865-015

(8) Open these circuit breakers on the power distribution panel, P6, and install DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 015-016

(9) Remove the access panels for the TE flaps and open access doors as necessary (Ref 06-44-00).

F. Inboard TE Flap Adjustment

S 215-017

(1) Make sure that the TE flaps agree with the conditions that follow before you adjust the inboard TE flaps:
   (a) The outboard flaps are correctly adjusted with the outboard rigging bars (Ref 27-51-14).

      NOTE: If you cannot get the outboard flaps to agree with the rigging adjustment (Ref 27-51-14), make sure that the lateral trim correction for the outboard flaps is below the limit (Ref 27-01-00). You must make allowance for rigging by lateral trim correction to get level flight for the airplane.

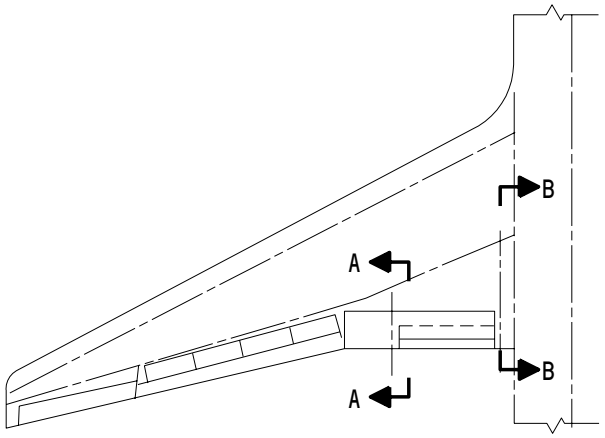
   (b) The left and right hand side of the outboard flaps are correctly sychronized to each other (Ref 27-51-14).
   (c) The inboard flap that you will not adjust must agree with the angular dimension (Fig. 504) and the vertical mismatch between the inboard and outboard flaps (Fig. 505).

S 025-018

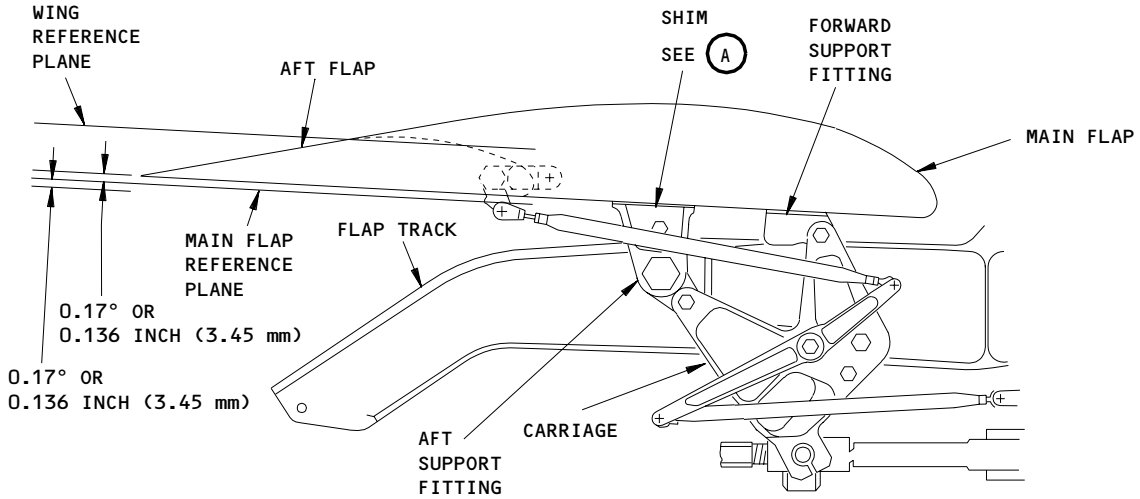
(2) Remove the aft fairing for the inboard flap track (Ref 27-51-30).

S 025-019

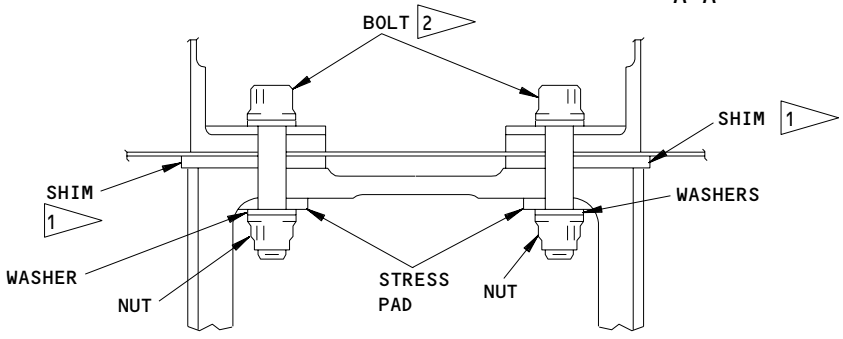
(3) Remove the trunnion fairing door for the main landing gear (MLG) (Ref 32-12-10).



LEFT WING
(PLAN VIEW)



OUTBOARD FLAP LINKAGE AND TRACK
LEFT INBOARD FLAP
(RIGHT OPPOSITE)
A-A

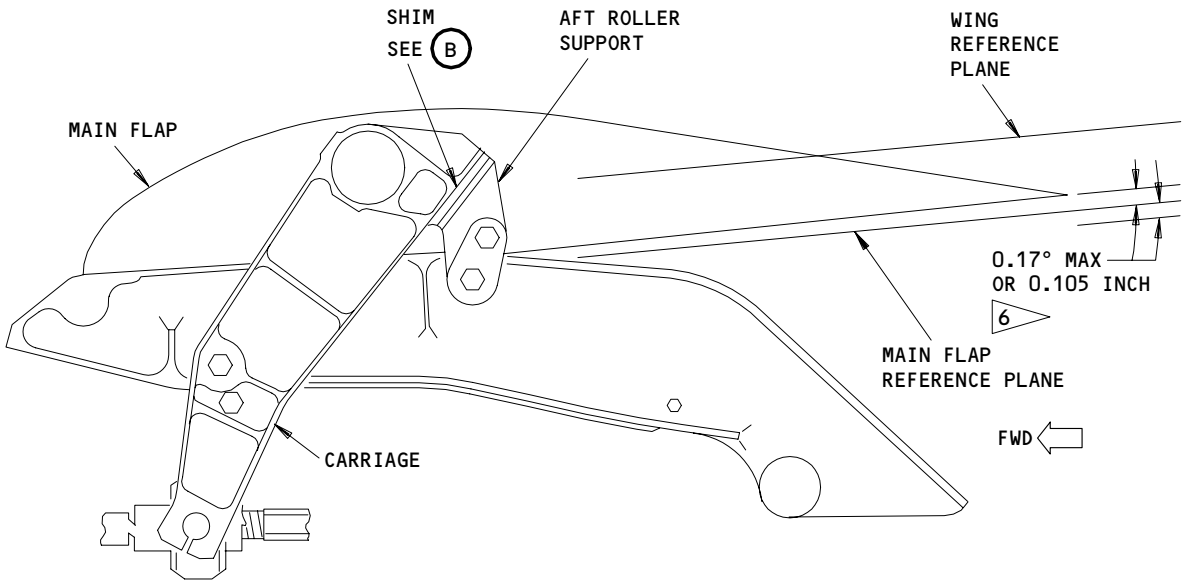


SHIM, OUTBOARD LINKAGE
A

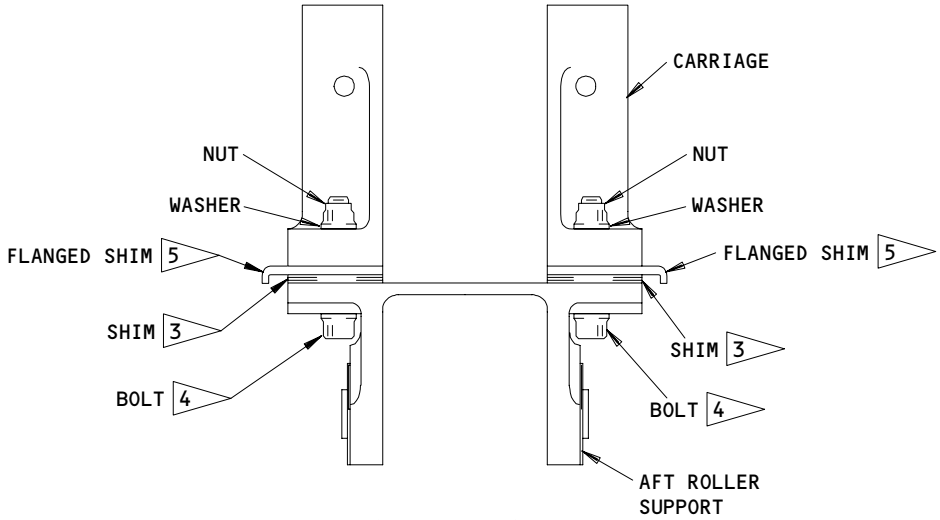
1 MAXIMUM SHIM THICKNESS 0.40 INCH (10.1 mm)

2 DRY THE PRIME HOLE AND INSTALL THE BOLT WITH CORROSION PREVENTIVE COMPOUND

Vertical Adjustment for the Inboard TE Flap
Figure 504 (Sheet 1)



INBOARD FLAP TRACK, LEFT INBOARD FLAP
(RIGHT OPPOSITE)
B-B



SHIM, INBOARD
B

3 MAXIMUM SHIM THICKNESS-0.40 INCH. INSTALL THE SHIM WITH TWO COATS OF PRIMER AND FAYING SURFACE SEAL

4 APPLY SEALANT TO THE BOLT AFTER SHIM CHANGE

5 INSTALL SHIMS ONLY BETWEEN AFT THE ROLLER SUPPORT AND THE FLANGED SHIM. FLANGED SHIM IS INSTALLED ON THE CARRIAGE AND IS NOT REMOVABLE.

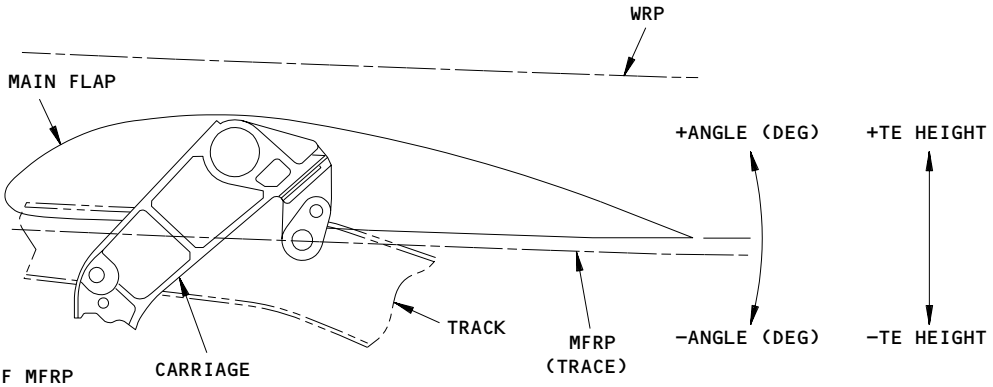
6 SEE TABLE 1.

Vertical Adjustment for the Inboard TE Flap
Figure 504 (Sheet 2)

98396

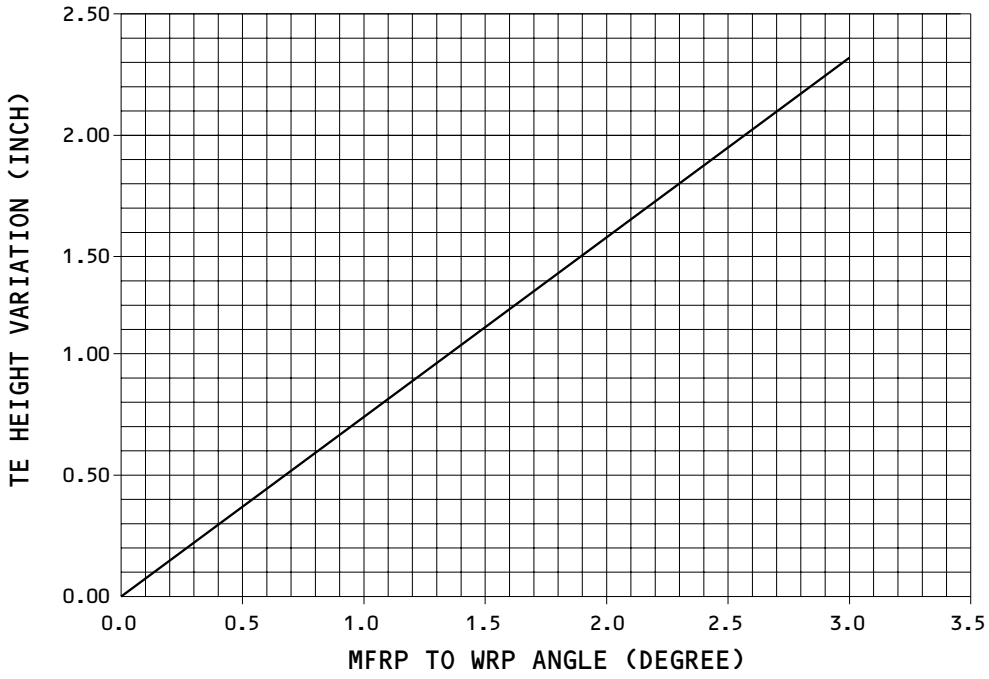
CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	−0.27°	0.44°	−1.72°
ON GEAR + ENGINES	0.19°	2.66°	−2.92°
ON GEAR + ENGINES + 3000 LBS FUEL	−0.12°	0.40°	−0.53°

INBOARD FLAP WING REFERENCE PLANE
TABLE 1



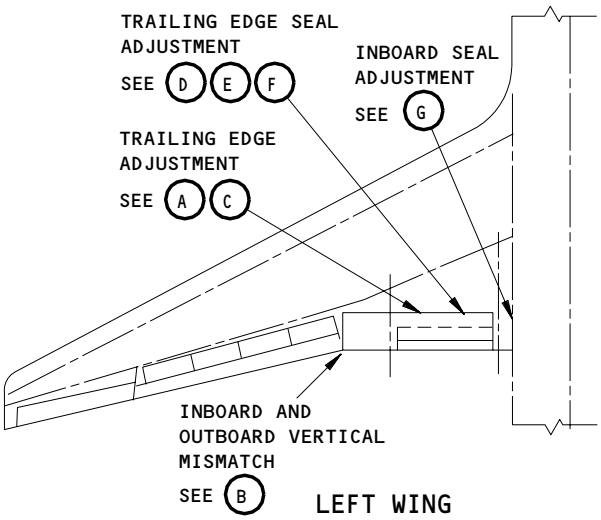
NOTE: WRP AND TRACE OF MFRP ARE NOMINALLY PARALLEL.

WING REFERENCE PLANE (WRP) TO INBOARD FLAP
MAIN FLAP REFERENCE PLANE (MFRP)

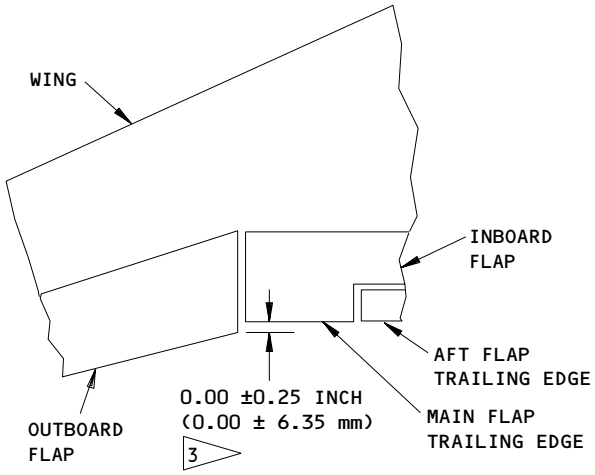


INBOARD FLAP ANGLE TO TE HEIGHT CONVERSION

Vertical Adjustment for the Inboard TE Flap
Figure 504 (Sheet 3)

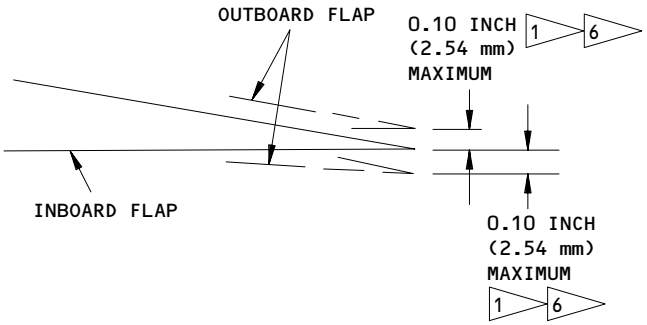


LEFT WING
(PLAN VIEW)



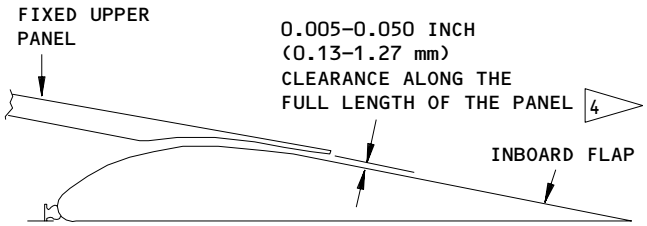
TRAILING EDGE ADJUSTMENT

A



INBOARD AND OUTBOARD VERTICAL MISMATCH

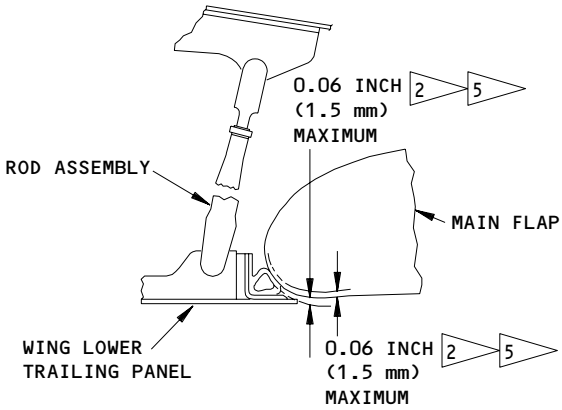
B



TRAILING EDGE ADJUSTMENT

C

1. ADJUST WITH SHIMS AT THE AFT END OF THE FLAP CARRIAGES
2. AT THE OUTBOARD END, THE MAXIMUM CLEARANCE IS 0.30 INCH (7.6 mm). THE MAXIMUM CLEARANCE DECREASES CONTINUOUSLY FOR 30 INCHES (762 mm) IN THE INBOARD DIRECTION TO THE 0.06 INCH (1.5 mm) CLEARANCE.
3. SEE TABLE 4.
4. SEE TABLE 6.
5. SEE TABLE 1 AND 2.
6. MISMATCH UP TO 0.30 INCH (7.6 mm) IS PERMITTED. SEE TABLE 5.

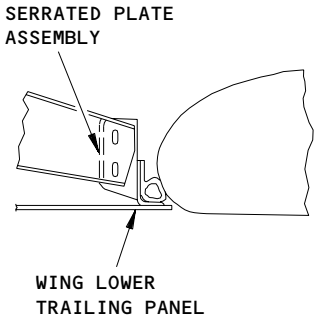


TRAILING EDGE SEAL ADJUSTMENT

D

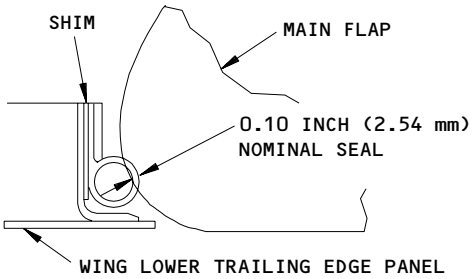
Fit and Fair Requirement for the Inboard TE Flap
Figure 505 (Sheet 1)

207337



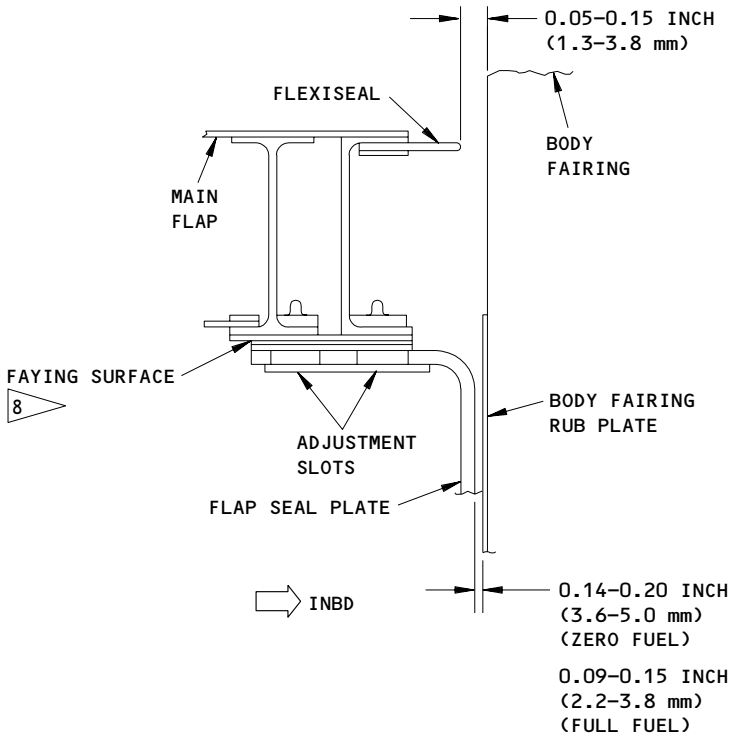
TRAILING EDGE SEAL ADJUSTMENT

E



TRAILING EDGE SEAL ADJUSTMENT

F



INBOARD SEAL ADJUSTMENT

G

8 APPLY SEALANT

Fit and Fair Requirement for the Inboard TE Flap
Figure 505 (Sheet 2)

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.26 (-6.604)	-0.16 (-4.064)	-0.40 (-10.160)
ON GEAR + ENGINES	-0.16 (-4.064)	0.08 (2.032)	-0.30 (-7.620)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.25 (-6.350)	-0.08 (-2.032)	-0.44 (-11.176)

NOTE: NEGATIVE DIMENSION INDICATES THE FLAP IS ABOVE THE PANEL.

MAXIMUM MISFAIR BETWEEN THE LOWER FIXED PANEL AND LOWER SURFACE OF INBOARD FLAP OVER LAST 30 INCHES (762 mm) OF THE OUTBOARD END. MEASUREMENT TAKEN AT THE OUTBOARD END OF THE INBOARD FLAP
TABLE 1

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.10 (-2.540)	0.08 (2.032)	-0.25 (-6.350)
ON GEAR + ENGINES	-0.01 (-0.254)	0.10 (2.540)	-0.10 (-2.540)
ON GEAR + ENGINES + 3000 LBS FUEL	0.04 (1.016)	0.18 (4.572)	-0.16 (-4.064)

NOTE: NEGATIVE DIMENSION INDICATES THE FLAP IS ABOVE THE PANEL.

MISFAIR BETWEEN THE LOWER FIXED PANEL AND LOWER SURFACE OF INBOARD FLAP MEASUREMENT DOES NOT APPLY OVER THE OUTBOARD 30 INCHES (762 mm) OF THE INBOARD FLAP
TABLE 2

TABLE 3 NOT USED

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.12 (-3.048)	0.50 (12.700)	-0.35 (-8.890)
ON GEAR + ENGINES	-0.14 (-3.556)	0.12 (3.048)	-0.25 (-6.350)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.11 (-2.794)	0.20 (5.080)	-0.27 (-6.858)

NOTE: A NEGATIVE DIMENSION INDICATES THE INBOARD FLAP IS AFT OF THE OUTBOARD FLAP.

FORWARD/AFT MISFAIR BETWEEN INBOARD/OUTBOARD MAIN FLAPS AT TRAILING EDGE
TABLE 4

Fit and Fair Requirement for the Inboard TE Flap
Figure 505 (Sheet 3)

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	0.20 (5.080)	0.30 (7.620)	0.06 (1.524)
ON GEAR + ENGINES	0.09 (2.286)	0.20 (5.080)	-0.06 (-1.524)
ON GEAR + ENGINES + 3000 LBS FUEL	0.11 (2.794)	0.26 (6.604)	-0.11 (-2.794)

NOTE: A NEGATIVE DIMENSION INDICATES THE INBOARD FLAP TE IS BELOW THE OUTBOARD FLAP TE.

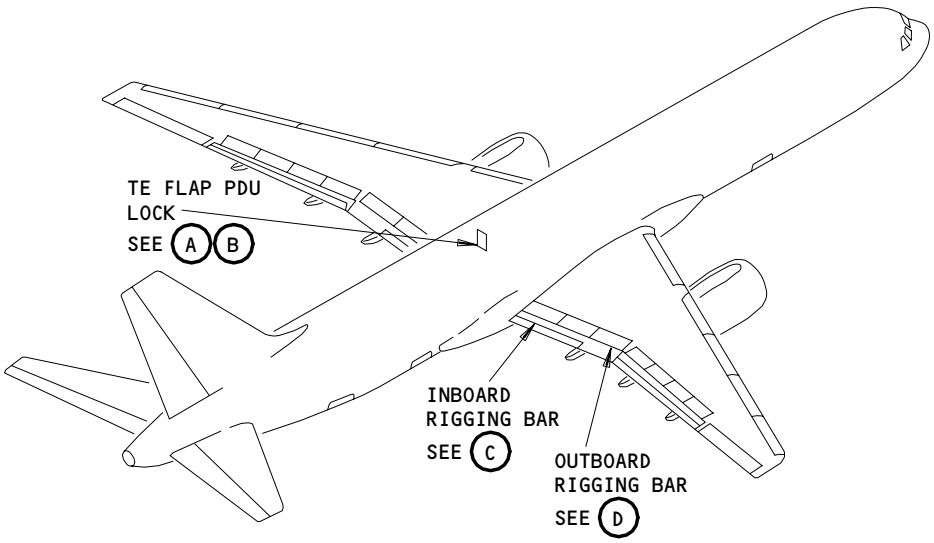
VERTICAL MISFAIR BETWEEN INBOARD/OUTBOARD FLAPS AT TRAILING EDGE
TABLE 5

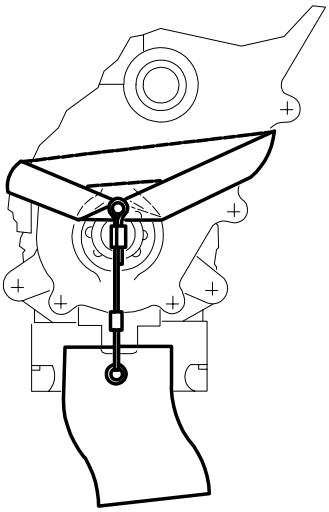
CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM* INCHES (mm)
ON JACKS + ENGINES	0.01 (0.254)	0.11 (2.794)	0.00 (0.000)
ON GEAR + ENGINES	0.05 (1.270)	0.32 (8.128)	0.00 (0.000)
ON GEAR + ENGINES + 3000 LBS FUEL	0.18 (4.572)	0.40 (10.160)	0.04 (1.016)

*THIS IS THE DIMENSION AS IT WAS MEASURED. IF RIGGING IN THIS CONFIGURATION, THE PANEL SHOULD ALWAYS BE RIGGED TO PROVIDE A MINIMUM GAP OF 0.005 INCH (0.127 mm) ALONG PANEL LENGTH.

GAP BETWEEN THE INBOARD UPPER FIXED PANEL AND UPPER SURFACE OF INBOARD FLAP
TABLE 6

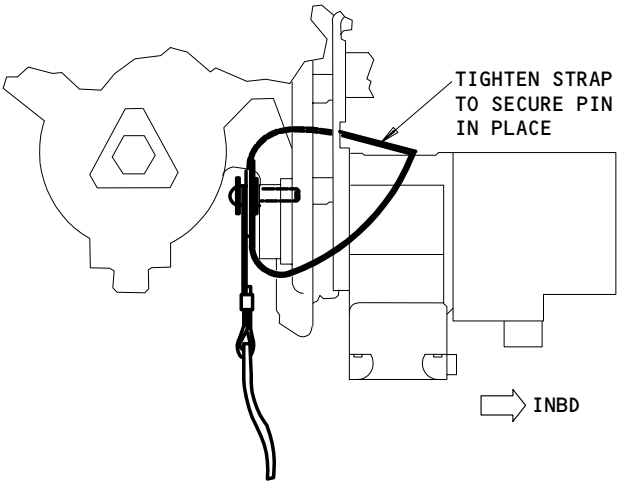
Fit and Fair Requirement for the Inboard TE Flap
Figure 505 (Sheet 4)





TE FLAP PDU LOCK

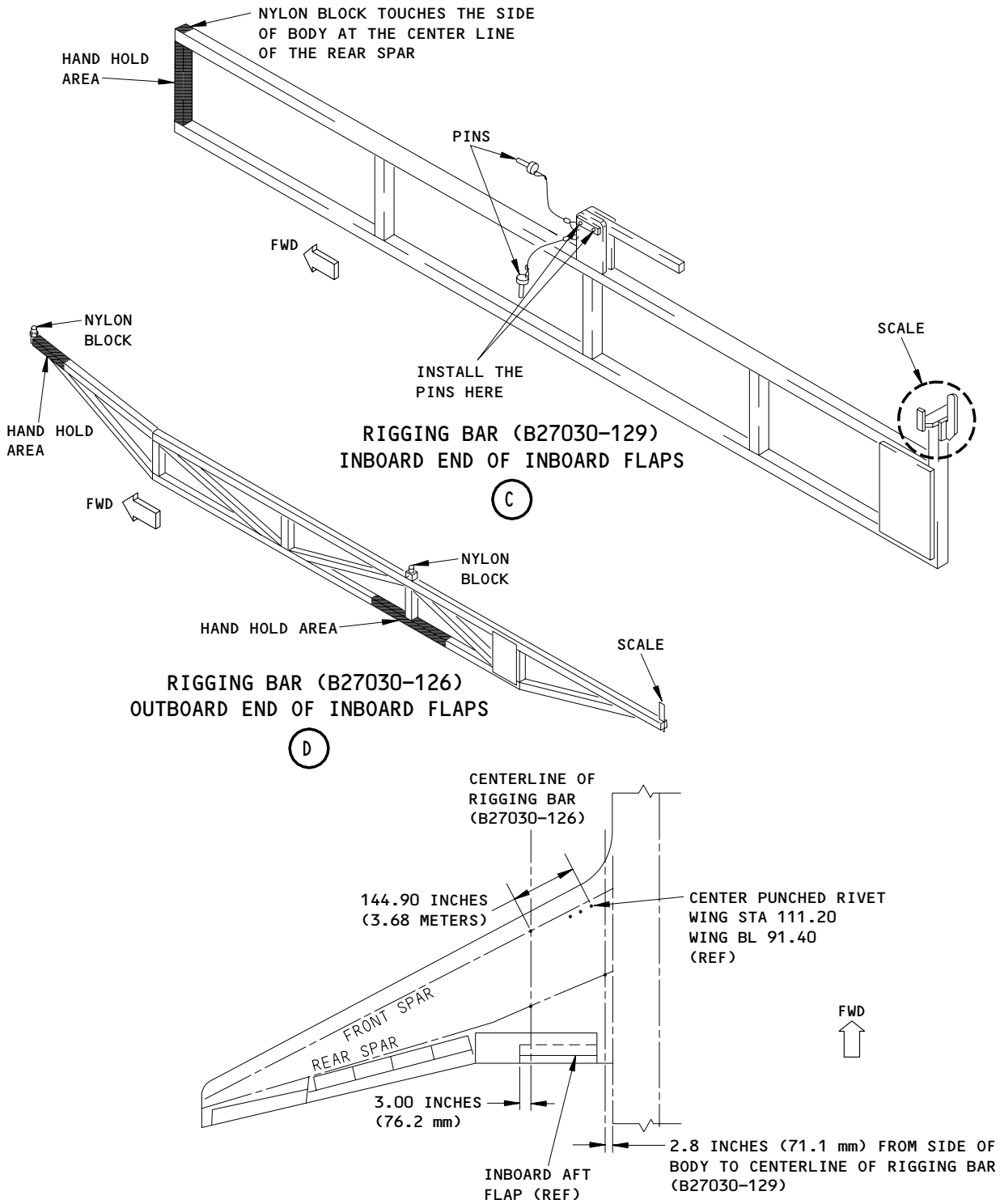
A



TE FLAP PDU LOCK

B

Tools for the Inboard TE Flaps
Figure 506 (Sheet 1)



POSITION OF RIGGING BARS FOR THE INBOARD TE FLAPS
(PLAN VIEW, LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

Tools for the Inboard TE Flaps
Figure 506 (Sheet 2)

S 025-002
(4) Remove the MLG trunnion fairing (Ref 57-51-10).

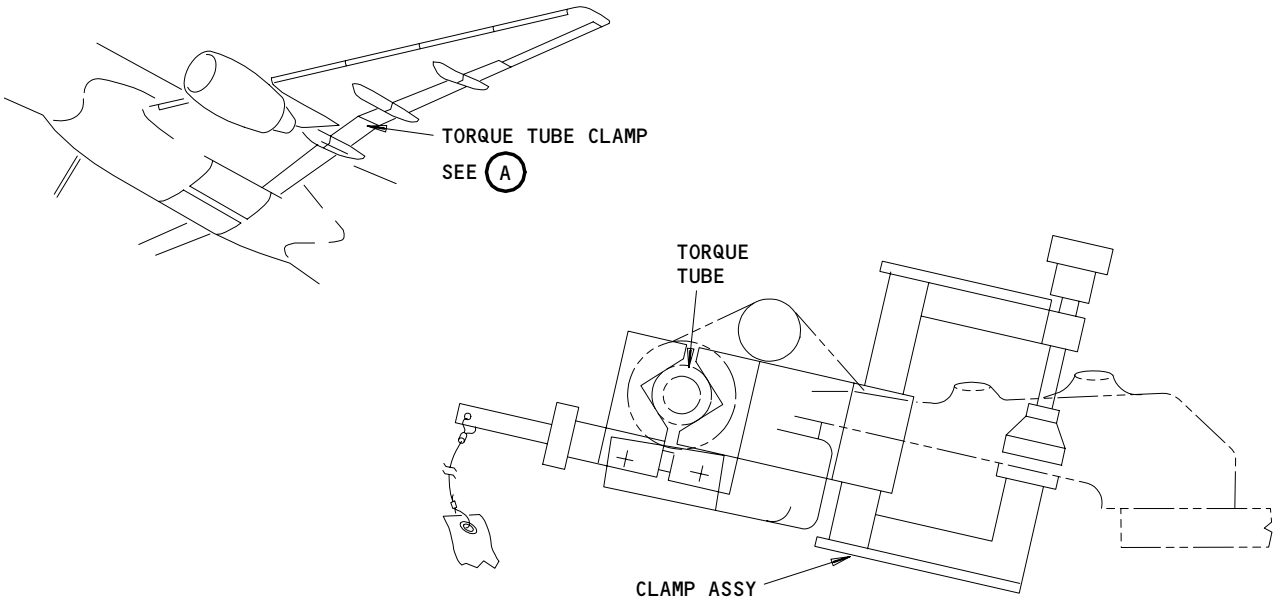
S 215-020
(5) Do a check to make sure that the aft flap is adjusted to the main flap (Ref 27-51-12).

S 035-021
(6) Disconnect the lower pushrods of the aft flap from the bellcrank (Fig. 501).

S 035-022
(7) Disconnect the torque tubes at the angle gearbox for the outboard transmission (Ref 27-51-10) and at the drive shaft for the inboard transmission (Ref 27-51-06) (Fig. 502).

NOTE: Do not rotate the torque tubes. You can cause the flap drive to go out of adjustment if you rotate the torque tubes.

S 495-003
(8) Install the torque tube clamp on the torque tube (Fig. 507).



Flap Torque Tube Clamp
Figure 507

S 865-023
(9) Rotate the input shaft to each transmission until the up-stop on the universal touches the up-stop on the ball screw nut (Fig. 501).

S 865-024
(10) Rotate the input shaft in the opposite direction (approximately 4 turns) to get a clearance of 90 ± 10 degrees between the up-stop surfaces of the ball screw nut and the universal. This is the rigging position for the TE flaps.

S 095-025
(11) Remove the clamp from the torque tube (Fig. 507).

S 435-054

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(12) Connect the torque tubes to the outboard and inboard transmissions, then safety wire the fasteners together (Fig. 502).

NOTE: Do not rotate the torque tube.

S 425-049
(13) You can operate the flaps manually to make fair adjustments, and to install the aft fairings (Ref 27-51-30).

S 495-026
(14) Install the rig pins TE2 and TE3 (Fig. 501).

S 215-027
(15) Make sure that the two No. 1 index marks are aligned on the TE flap PDU (Fig. 503).

S 215-004
(16) Make sure that the inboard flap and the transmissions are positioned as specified in the steps before.

S 865-028
(17) Apply an upload to the inboard flap so that the support tracks (3 locations) for the inboard aft flap touch the main rollers. Also make sure that the main flap tracks (2 locations) touch the main carriage rollers.

NOTE: All the fit and fair conditions must agree when you apply an upload to the inboard flap.

S 225-029

(18) Use the inboard flap rigging bars and do a check on the inboard flap vertical mismatch with the steps that follow (Fig. 504):

(a) Use the rigging bar for the outboard end of the inboard flap by the instructions that follow (Fig. 506):

NOTE: Two persons will be necessary to hold the rigging bar in position.

1) Hold the rigging bar against the lower surface of the wing at the location shown.

NOTE: Hold the rigging bar only at the HAND HOLD areas.

2) The two nylon blocks must touch the lower surface of the wing at a point along the center line of the front spar and the rear spar.
3) The scale at the end of the rigging bar must lightly touch the trailing edge of the aft flap.
4) Use the lower surface of the aft flap to read the position on the scale.

(b) Install the rigging bar for the inboard end of the inboard flap by the instructions that follow (Fig. 506):

NOTE: One person is necessary to hold the rigging bar in position.

1) Hang the rigging bar on the main landing gear beam below the wing and install the pins at the locations shown.
2) Hold the rigging bar only at the HAND HOLD area.
3) The scale at the end of the rigging bar must lightly touch the inboard trailing edge of the main flap.
4) The nylon block on the forward end of the rigging bar must touch the side of the airplane body at the centerline of the rear spar.
5) Use the lower surface of the aft flap to read the position on the scale.

(c) Read the scale to make sure that the flap trailing edge is in the limits (Views A-A and B-B, Fig. 504).

(d) Do these steps to adjust the angle of the inboard flap if you cannot get the above condition to agree (Fig. 504):
1) Loosen the bolts attached to the aft roller support and the carriage at the inboard flap track.
2) Add or remove shims as necessary to get the correct angular dimensions.

NOTE: A 0.05 inch (1.27 mm) change in shim thickness will give an approximate angle change of 0.13 degree.

3) Tighten the bolts for the aft roller support after you corrected the flap position.

S 225-052

(19) Do a check on the inboard flap fit and fair with the steps that follow (Fig. 505):

(a) Make sure the trailing edge of the inboard flap agrees with the trailing edge of the outboard flap to ±0.10 inch (2.54 mm) in the vertical direction. If fuel is added to the airplane, or the engines are installed, the mismatch can be as much as 0.30 inch (7.62 mm).

1) Adjust the inboard flap as necessary to get this condition.

(b) Make sure that the clearance between the fixed upper panel for the inboard flap agrees with the upper surface of the inboard flap.

1) Adjust the rod assemblies on the fixed upper panel as necessary to get the surfaces to agree.

2) Install the lockwire on the jam nuts as necessary.

(c) Make sure that the surface alignment of the lower TE panel agrees with the lower surface of the main flap.

1) Adjust the rod assembly and the serrated plates as necessary to get the trailing edge surfaces to agree.

(d) Make sure that the leading edge of the main flap touches the seal on the lower TE panel along the entire length of the flap.

1) Add or remove shims as necessary to make the correct seal deflection.

(e) Make sure that the seal on the inboard end of the main flap is within the specified tolerances from the body fairing.

1) Loosen the adjustment screws to adjust the seal as necessary.

S 215-030

(20) Make sure that rig pins TE2 and TE3 are installed (Fig. 501) and that the inboard flap is in the correct rigging position.

S 435-005

(21) Adjust the length of the lower pushrods for the aft flap and connect it to the bellcranks (Fig. 501).

(a) Tighten the nut to attach the lower pushrod for the outboard linkage to 130-170 inch-pounds (14.7-19.2 newton-meters).

(b) Tighten the nut to attach the lower pushrod for the inboard linkage to 370-450 inch-pounds (41.8-50.8 Nm).

S 095-031

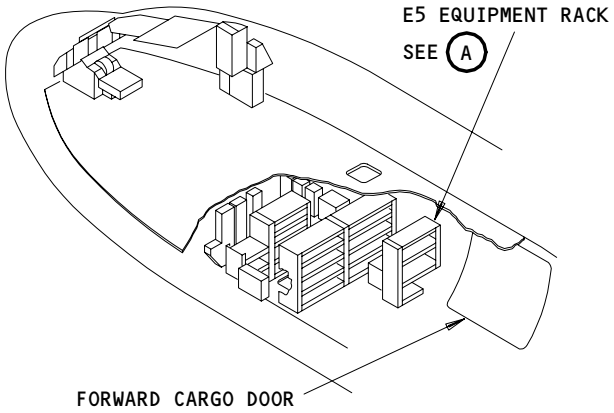
(22) Remove rig pins TE2 and TE3.

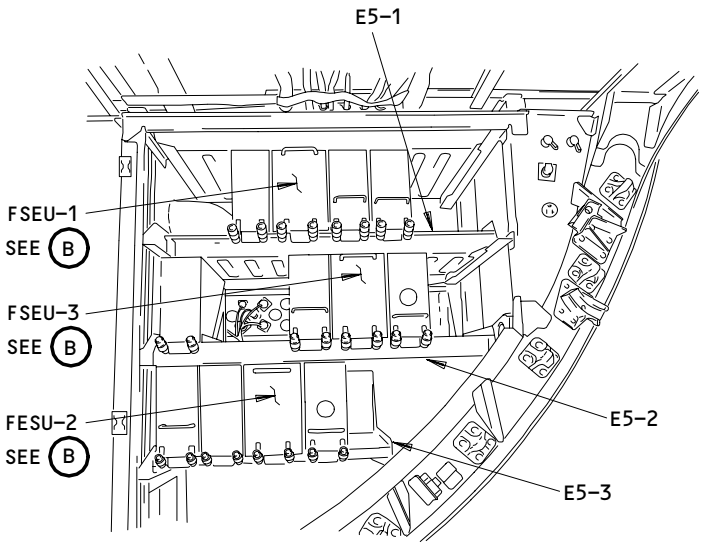
S 425-032

(23) Install the aft fairing for the flap track (Ref 27-51-30).

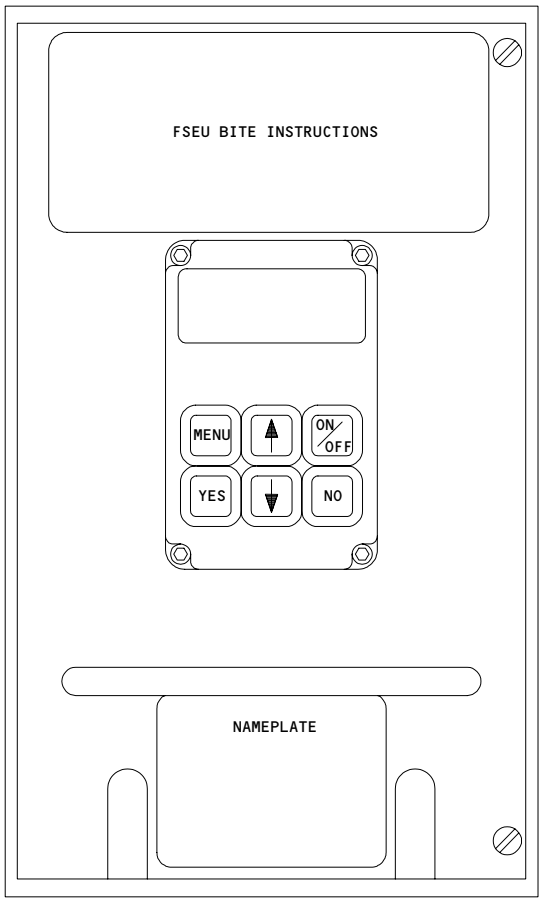
S 425-033

(24) Install the trunnion fairing door for the MLG (Ref 32-12-10).





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 508

816524

S 425-006
(25) Install the MLG trunnion fairing (Ref 57-51-10).

S 725-034
(26) Do a test on the inboard TE flap.

TASK 27-51-02-705-035

3. Inboard Trailing Edge Flap Test

A. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-51-00/501, Trailing Edge Flap System
(4) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(5) 32-00-15/201, Landing Gear Door Lock

B. Access
(1) Location Zones

120	Main Equipment Center (Right)
143	Left MLG Wheel Well
211/212	Control Cabin
500/600	Left Wing/Right Wing
730/740	Main Landing Gear and Door (Left/Right)

C. Prepare for the Test

S 215-036
(1) Do a check on the trailing edge (TE) flaps and the leading edge (LE) slats to see that they are in the fully retracted position.

S 215-007
(2) Make sure that the flap control lever is in the zero (FLAPS UP) detent, and remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-037
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11.
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 865-038
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 865-039
(5) Rotate the dimmer control knob for the first officer's panel, located on the pilots glare shield, P7, to full clockwise.

S 215-040
(6) Make sure that the arming switch for the flap and slat alternate drive on the first officer's main instrument panel, P3, are not armed (switch lights off).

S 215-041
(7) Make sure that the position selector switch for the flaps/slats alternate drive on P3 is in the NORM position.

S 215-042
(8) Make sure the six EICAS circuit breakers on the P11 panel are closed.

S 095-030
(9) Remove the PDU lock from the TE flap PDU.

S 865-043
(10) Supply electrical power (Ref 24-22-00).

S 865-046

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(11) Pressurize the left hydraulic system (Ref 29-11-00).

D. Inboard TE Flap Test

NOTE: If you adjusted the flap drive system between the flap control lever and the flap PDU before you adjust the inboard flaps, you must then follow 27-51-00 to test the inboard flap.

S 215-045
(1) Move the flap control lever from zero (FLAPS UP) detent to 30-unit detent, and from 30-unit detent to zero (FLAPS UP) detent. Stop at each detent to permit the TE flaps and LE slats to move to the position on the flap control lever and do the checks that follow:
(a) Make sure that the TRAILING EDGE and LEADING EDGE lights on the P3 panel are off.
(b) Make sure that no messages are shown on the EICAS display.
(c) If the airplane is equipped with spring-loaded, hinged, and slot seal doors in the wing-body fairing (instead of brush seals), make sure that the slot seal doors can open and close correctly as the flap moves.

S 725-047

(2) If you adjusted the position transmitters (one in the left wing, one in the right wing, and one on the PDU) with the flap adjustment, or with flap component removal/installation, then do the test that follows:

(a) Move the flap control lever to the 20-unit detent, and permit the flaps to move to the 20-unit position, and the slats to move to the intermediate position.

(b) Make sure that the position indicator needles show the L and R flaps move to the 20-unit positions.

(c) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on when you do the test.

(d) Press the arming switches for the TE flap and LE slat alternate drive to arm the flap and slat alternate drives (switch lights will come on).

(e) Move the position selector switch for the flaps/slats alternate drive to the 25-unit detent.

1) Make sure that the flaps move to the 25-unit position, and that the slats move to the fully extended position.

2) Make sure that the position indicator needles show the L and R flaps move to the 25-unit position.

(f) Move the position selector switch for the flaps/slats alternate drive to the UP-detent.

1) Make sure that the TE flaps and LE slats move to the fully retracted position.

(g) Move the flap lever control to the zero (FLAPS UP) detent.

(h) Move the position selector switch for the flaps/slats alternate drive to the NORM position.

(i) Press the arming switches for the TE flap and LE slat alternate drive to disarm the flap and slat alternate drives (switch lights will go off).

E. Put the Airplane Back to Its Usual Condition

S 095-047

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-049

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-050

(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-051

(4) Install the access panels and close the access doors (AMM 06-44-00/201)

INBOARD TRAILING EDGE FLAPS - INSPECTION/CHECK

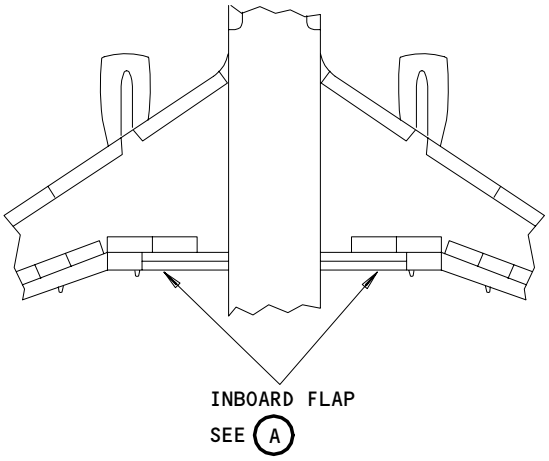
1. General
   A. This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacment of components that you will examine for wear. Refer to the Inboard Trailing Edge Aft Flap - Removal/Installation to remove or replace these components.

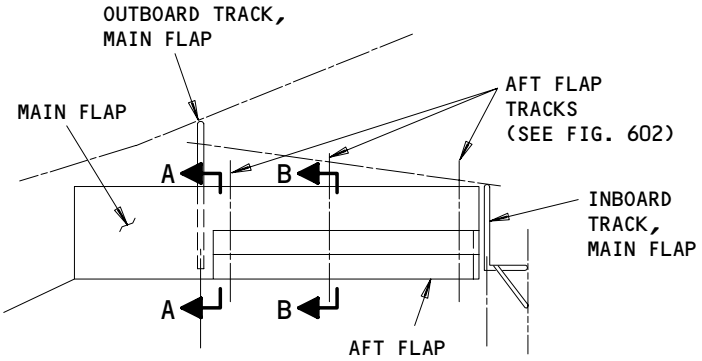
TASK 27-51-02-226-001

2. Wear Limits for Inboard Flap Linkage (Fig. 601)
   A. General
      (1) This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacment of components that you will examine for wear. Refer to the Inboard Trailing Edge Aft Flap - Removal/Installation to remove or replace these components.

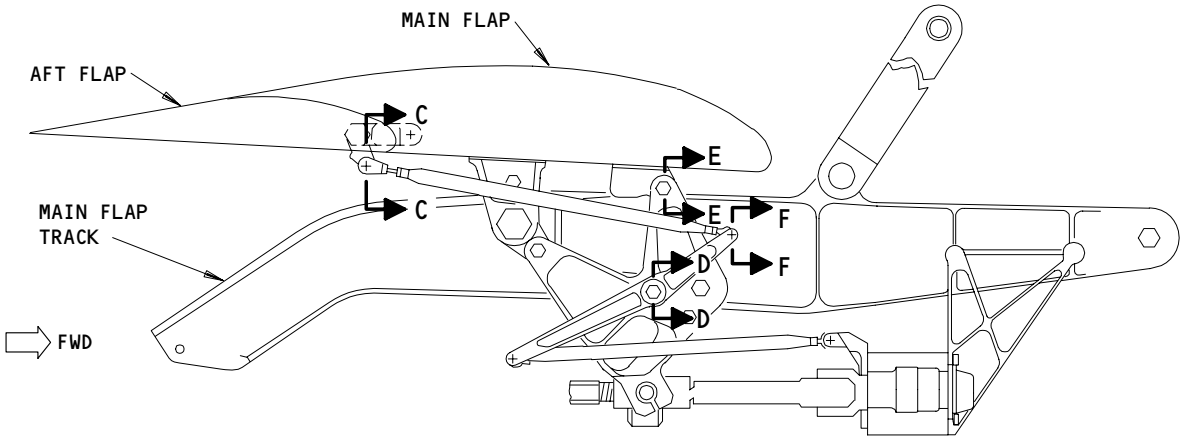
TASK 27-51-02-226-002

3. Wear Limits for the Aft Flap Tracks of the Inboard Flap (Fig. 602)
   A. General
      (1) This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacment of components that you will examine for wear. Refer to the Inboard Trailing Edge Aft Flap - Removal/Installation to remove or replace these components.

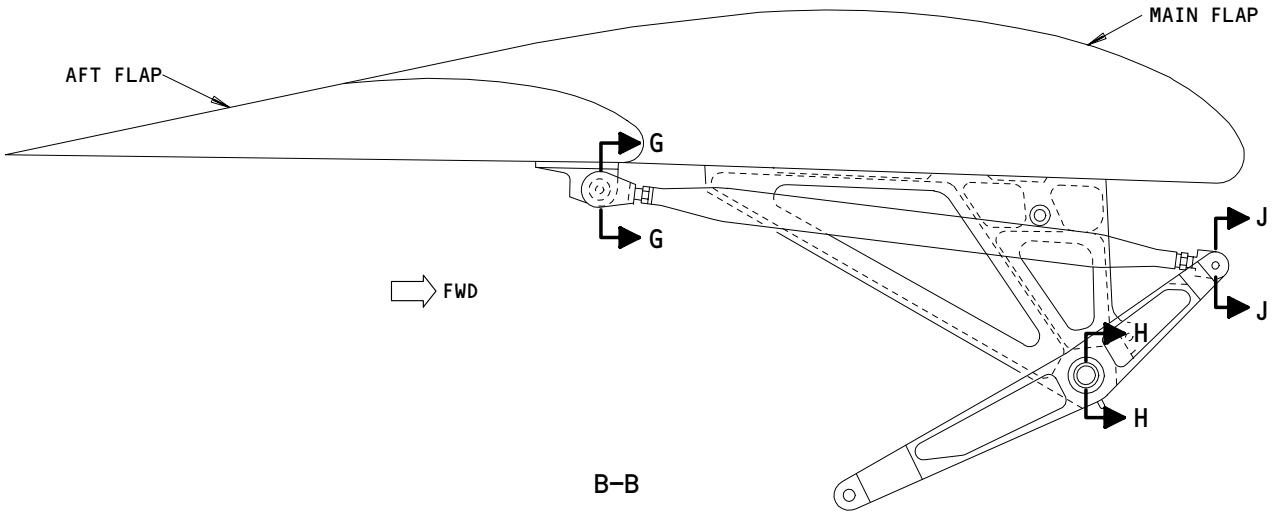




LEFT INBOARD FLAPS
(RIGHT FLAPS OPPOSITE)
(A)

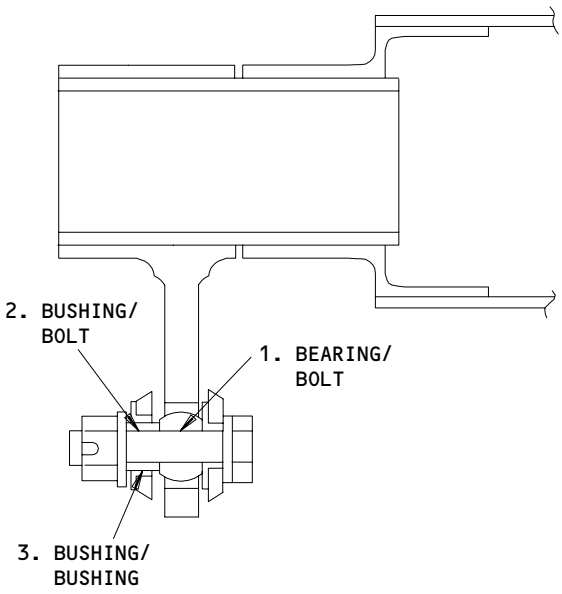


A–A

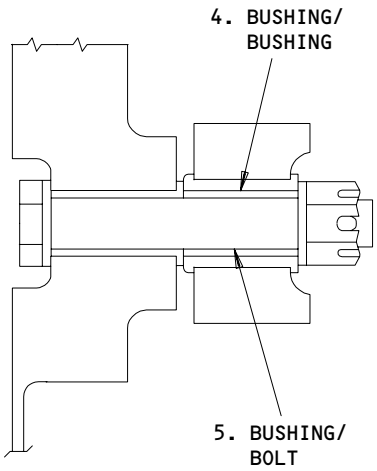


B–B

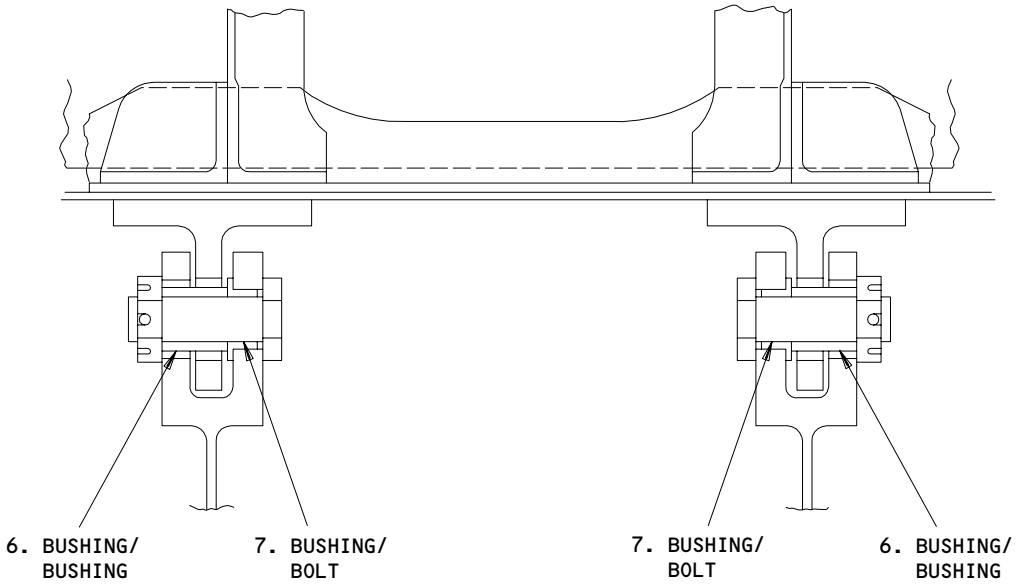
Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 1)



C–C

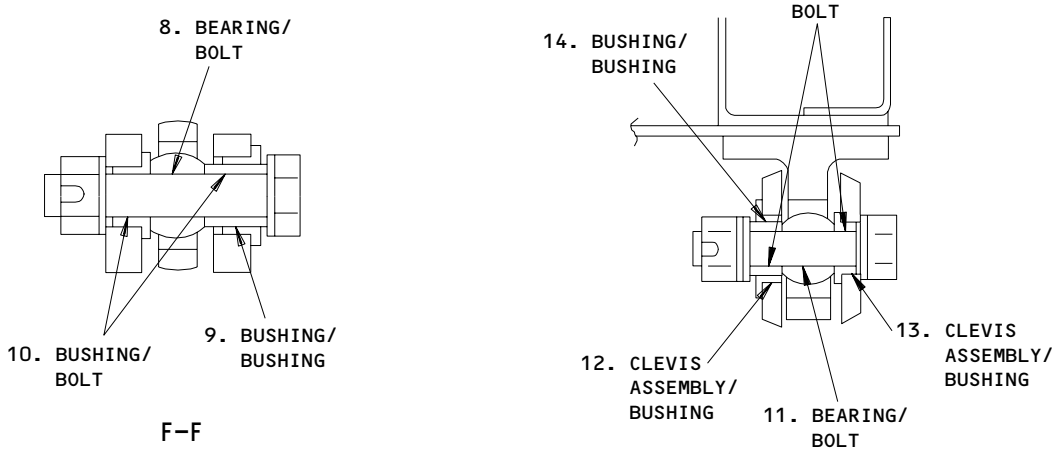


D–D



E–E

Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 2)



1 AIRPLANES WITH SINGLE BEAM SUPPORT
2 AIRPLANES WITH DUAL BEAM SUPPORT

Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 3)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BEARING	ID	0.3125 (7.938)	0.3129 (7.948)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3079 (7.821)		X		
2	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		
3	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		
4	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6915 (17.564)	0.0050 (0.127)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		
5	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5045 (12.814)	0.0050 (0.127)	X		
	BOLT	OD	0.4990 (12.675)	0.4995 (12.687)	0.4955 (12.586)		X		
6	BUSHING	ID	0.8745 (22.212)	0.8753 (22.233)	0.8790 (22.327)	0.0050 (0.127)	X		
	BUSHING	OD	0.8735 (22.187)	0.8740 (22.200)	0.8703 (22.106)		X		
7	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6290 (15.977)	0.0050 (0.127)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6202 (15.753)		X		
8	BEARING	ID	0.3125 (7.938)	0.3125 (7.938)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3075 (7.811)		X		
9	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4430 (11.252)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		

Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 4)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
10	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		X		
11	BEARING	ID	0.3750 (9.525)	0.3754 (9.535)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3740 (9.500)	0.3745 (9.512)	0.3704 (9.408)		X		
12	CLEVIS ASSY	ID	0.6875 (17.463)	0.6882 (17.480)	--	--		X	3
	BUSHING	OD	0.6887 (17.493)	0.6893 (17.508)	--		4		
13	CLEVIS ASSY	ID	0.5000 (12.700)	0.5006 (12.715)	--	--		X	3
	BUSHING	OD	0.5010 (12.725)	0.5016 (12.741)	--		4		
14	BUSHING	ID	0.5620 (14.275)	0.5627 (14.293)	0.5665 (14.389)	0.0050 (0.127)	X		
	BUSHING	OD	0.5610 (14.249)	0.5615 (14.262)	0.5577 (14.166)		X		
15	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3740 (9.500)	0.3745 (9.512)	0.3705 (9.411)		X		
16	LEVER ASSY	ID	1.2500 (31.750)	1.2508 (31.770)	--	--		X	3
	BUSHING	OD	1.2516 (31.791)	1.2524 (31.811)	--		X		
17	BUSHING	ID	1.0310 (26.187)	1.0510 (26.695)	--	--	X		
	BUSHING	OD	1.0605 (26.937)	1.0615 (26.962)	--		X		
18	BUSHING	ID	0.7495 (19.037)	0.7500 (19.050)	0.7540 (19.152)	0.0050 (0.127)	X		
	BOLT	OD	0.7485 (19.012)	0.7490 (19.025)	0.7450 (18.923)		X		

3 YOU CAN REPAIR A PART THAT IS WORN. REFER TO THE COMPONENT MAINTENANCE MANUAL FOR REPAIR INSTRUCTIONS

4 REPLACE WITH A LARGER BUSHING

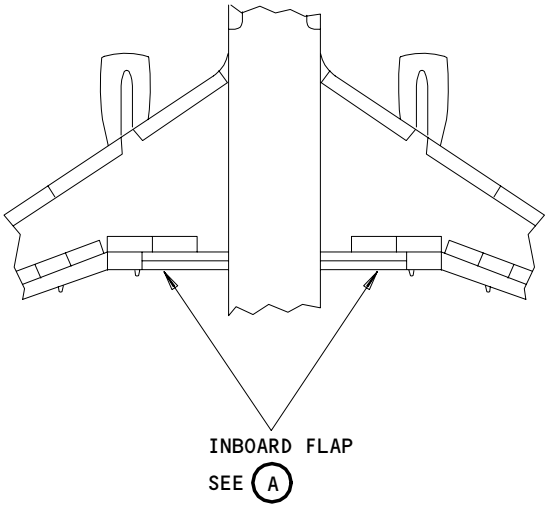
Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 5)

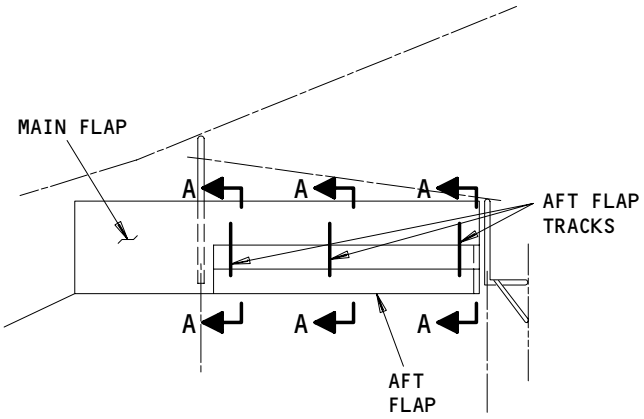
INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
19	BEAM ASSY	ID	0.8763 (22.258)	0.8770 (22.276)	--	--		X	3
	BUSHING	OD	0.8763 (22.258)	0.8770 (22.276)	--		X		
20	BUSHING	ID	0.7340 (18.644)	0.7390 (18.771)	--	--	X		
	BOLT	OD	0.7485 (19.012)	0.7490 (19.025)	--		X		
21	BEARING	ID	0.3750 (9.525)	0.3750 (9.525)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3700 (9.398)		X		
22	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3705 (9.411)		X		
23	LEVER ASSY	ID	0.6875 (17.463)	0.6882 (17.480)	--	--		X	3
	BUSHING	OD	0.6887 (17.493)	0.6893 (17.508)	--		X		
24	BUSHING	ID	0.5470 (13.894)	0.5530 (14.046)	--	--	X		
	BUSHING	OD	0.5610 (14.249)	0.5615 (14.262)	--		X		
25	LEVER ASSY	ID	0.5000 (12.700)	0.5006 (12.715)	--	0.0050 (0.127)		X	3
	BUSHING	OD	0.5010 (12.725)	0.5016 (12.741)	--		X		
26	LEVER ASSY	ID	0.8125 (20.638)	0.8132 (20.655)	--	--		X	3
	BUSHING	OD	0.8139 (20.673)	0.8144 (20.686)	--		X		
27	BUSHING	ID	0.6870 (17.450)	0.6882 (17.480)	0.6915 (17.564)	0.0050 (0.127)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		

Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 6)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
28	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5045 (12.814)	0.0050 (0.127)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4965 (12.611)		X		
29	BEAM ASSY	ID	0.6250 (15.875)	0.6256 (15.890)	--	--		X	3
	BUSHING	OD	0.6261 (15.903)	0.6266 (15.916)	--		X		
30	BUSHING	ID	0.5000 (12.700)	0.5007 (12.718)	0.5045 (12.814)	0.0050 (0.127)	X		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4955 (12.586)		X		
31	BEAM ASSY	ID	0.8125 (20.638)	0.8132 (20.655)	--	--		X	3
	BUSHING	OD	0.8139 (20.673)	0.8144 (20.686)	--		X		
32	BUSHING	ID	0.6870 (17.450)	0.6882 (17.480)	0.6915 (17.564)	0.0050 (0.127)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		

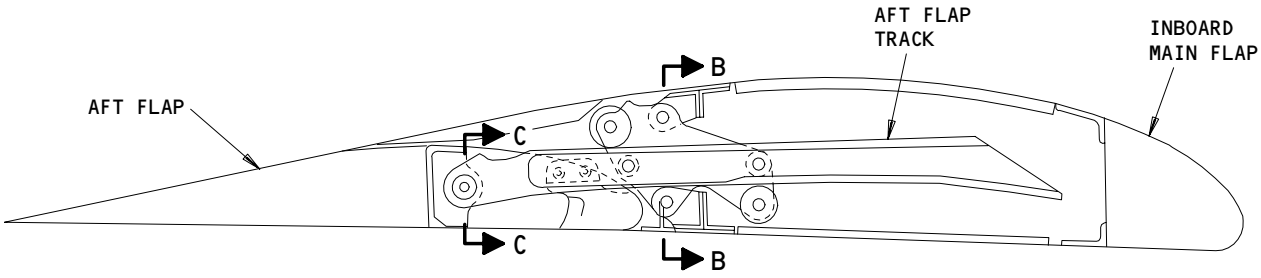
Wear Limits for the Inboard Flap Linkage
Figure 601 (Sheet 7)





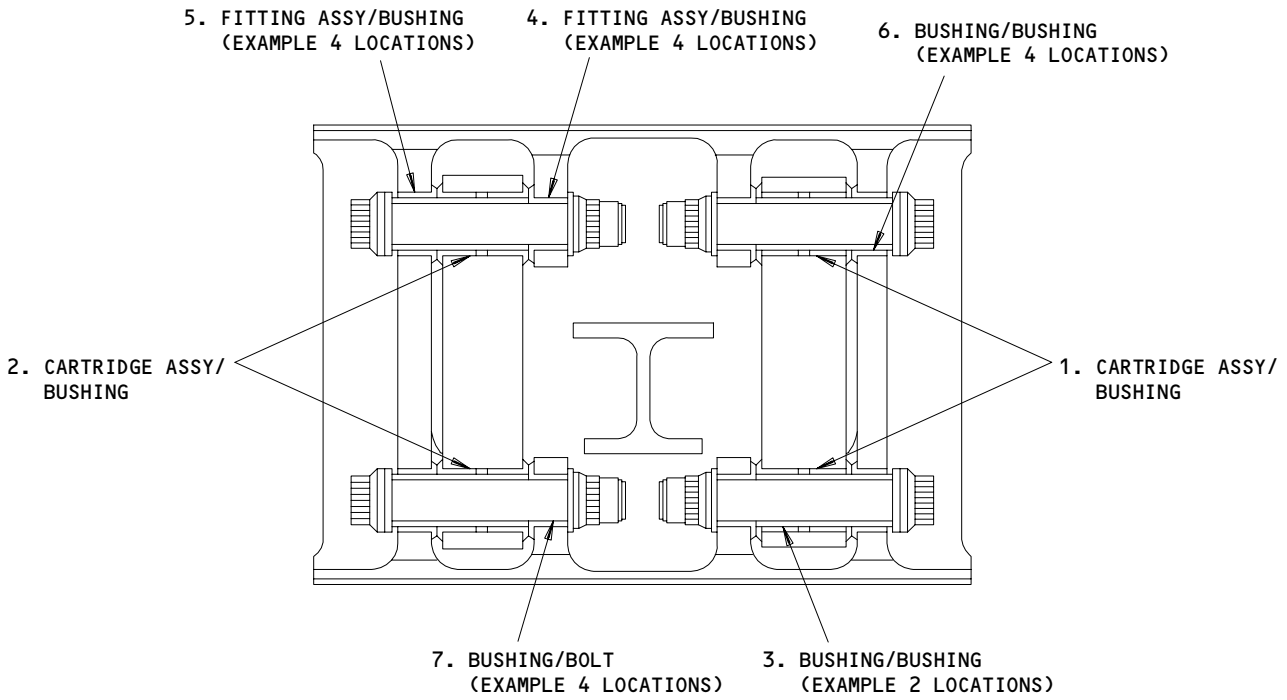
LEFT INBOARD FLAPS
(RIGHT FLAPS OPPOSITE)

(A)

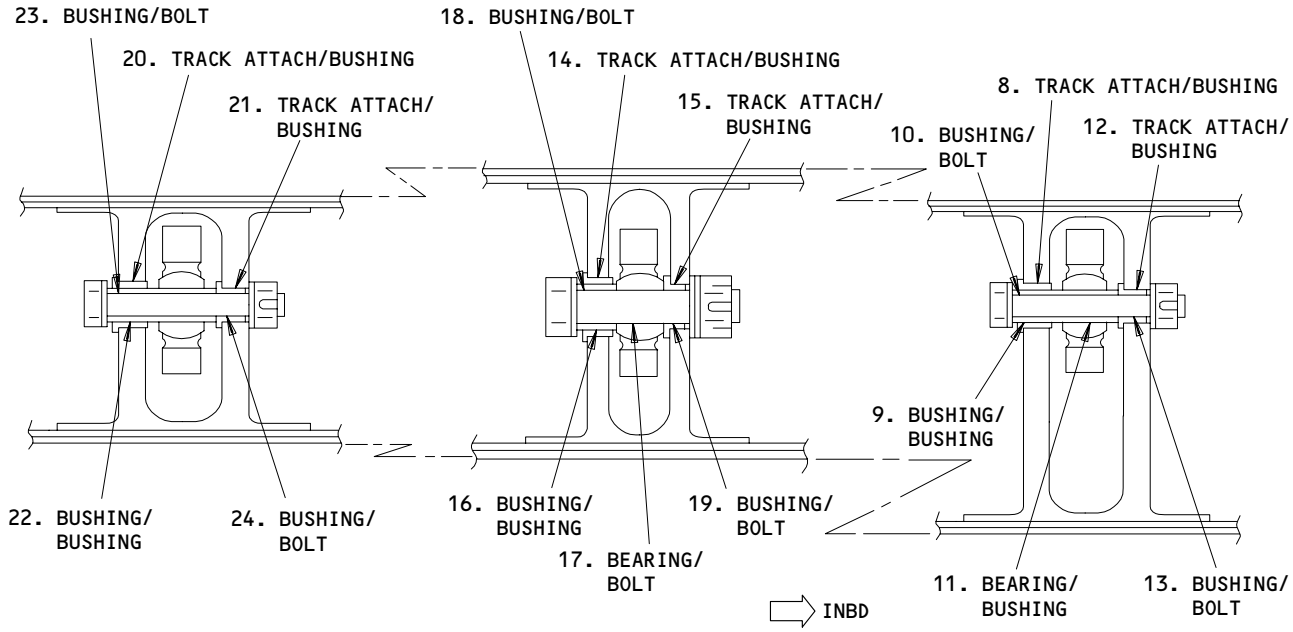


A–A

Wear Limits for the Aft Flap Tracks of the Inboard Flap
Figure 602 (Sheet 1)



B–B



C–C

Wear Limits for the Aft Flap Tracks of the Inboard Flap
Figure 602 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	CARTRIDGE ASSY	ID	0.8750 (22.225)	0.8757 (22.243)	--	--		X	1
	BUSHING	OD	0.8757 (22.243)	0.8767 (22.268)	--		X		
2	CARTRIDGE ASSY	ID	0.8125 (20.638)	0.8132 (20.655)	--	--		X	1
	BUSHING	OD	0.8137 (20.668)	0.8144 (20.686)	--		X		
3	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6915 (17.564)	0.0050 (0.127)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		
4	FITTING ASSY	ID	0.6250 (15.875)	0.6256 (15.890)	--	--		X	1
	BUSHING	OD	0.6261 (15.903)	0.6267 (15.918)	--		X		
5	FITTING ASSY	ID	0.8125 (20.638)	0.8132 (20.655)	--	--		X	1
	BUSHING	OD	0.8137 (20.668)	0.8144 (20.686)	--		2		
6	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6915 (17.564)	0.0050 (0.127)	X		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		
7	BUSHING	ID	0.5000 (12.700)	0.5007 (12.718)	0.5045 (12.814)	0.0050 (0.127)	X		
	BOLT	OD	0.4990 (12.675)	0.4995 (12.687)	0.4957 (12.591)		X		
8	TRACK ATTACH	ID	0.5625 (14.288)	0.5631 (14.303)	--	--		X	1
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		X		
9	BUSHING	ID	0.4375 (11.113)	0.4381 (11.128)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4331 (11.001)		X		
10	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		

1 REAM THE FITTING HOLE TO REMOVE ANY CORROSION. DO NOT MAKE THE HOLE 0.06 INCH (1.5 mm) LARGER THAN THE MAXIMUM DIAMETER

2 REPLACE WITH A LARGER BUSHING

Wear Limits for the Aft Flap Tracks of the Inboard Flap
Figure 602 (Sheet 3)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
11	BEARING	ID	0.4375 (11.113)	0.4379 (11.123)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4329 (10.996)		X		
12	TRACK ATTACH	ID	0.4375 (11.113)	0.4381 (11.128)	--	--		X	1
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	--		X		
13	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		
14	TRACK ATTACH	ID	0.7500 (19.050)	0.7507 (19.068)	--	--		X	1
	BUSHING	OD	0.7512 (19.080)	0.7519 (19.098)	--		X		
15	TRACK ATTACH	ID	0.5625 (14.288)	0.5631 (14.303)	--	--		X	1
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		X		
16	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6290 (15.977)	0.0050 (0.127)	X		
	BUSHING	OD	0.6235 (15.837)	0.6240 (15.850)	0.6202 (15.753)		X		
17	BEARING	ID	0.4375 (11.113)	0.4379 (11.123)	0.4420 (11.227)	0.0050 (0.127)	X		
	BOLT	OD	0.4365 (11.087)	0.4370 (11.100)	0.4329 (10.996)		X		
18	BUSHING	ID	0.4375 (11.113)	0.4380 (11.125)	0.4420 (11.227)	0.0050 (0.127)	X		
	BOLT	OD	0.4365 (11.087)	0.4370 (11.100)	0.4330 (10.998)		X		

Wear Limits for the Aft Flap Tracks of the Inboard Flap
Figure 602 (Sheet 4)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
19	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BOLT	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		
20	TRACK ATTACH	ID	0.5625 (14.288)	0.5631 (14.303)	--	--		X	1
	BUSHING	OD	0.5625 (14.288)	0.5631 (14.303)	--		2		
21	TRACK ATTACH	ID	0.4375 (11.113)	0.4381 (11.128)	--	--		X	1
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	--		2		
22	BUSHING	ID	0.4375 (11.113)	0.4381 (11.128)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4331 (11.001)		X		
23	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		
24	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		

Wear Limits for the Aft Flap Tracks of the Inboard Flap
Figure 602 (Sheet 5)

INBOARD TRAILING EDGE FLAP TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains steps to remove and install the inboard and outboard flap tracks of the inboard trailing edge (TE) flaps.

TASK 27-51-03-024-001

2. Remove the Inboard and Outboard Flap Tracks of the Inboard TE Flaps
   A. General
      (1) This task contains two procedures, one to remove the inboard flap track of the inboard TE flap and one to remove the outboard flap track of the inboard TE flap. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Flap Track Hoist Adapter - B27075-20
      (3) Transmission Jack - Blackhawk Model 67554 or Hein-Werner Model 74
   C. References
      (1) AMM 27-51-02/401, Inboard Trailing Edge Flap
      (2) AMM 27-51-06/401, Inboard TE Flap Transmission
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
   D. Prepare for the Removal

          S 214-002
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the ZERO (FLAPS UP) detent.

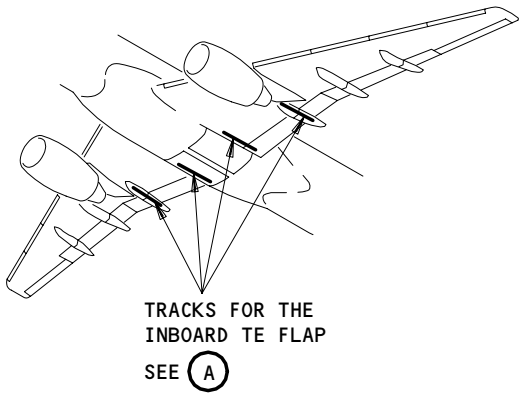
          S 494-003
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

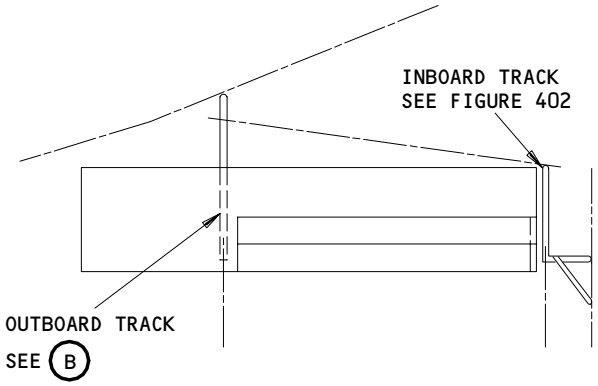
          S 214-004
      (3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

          S 014-005

      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

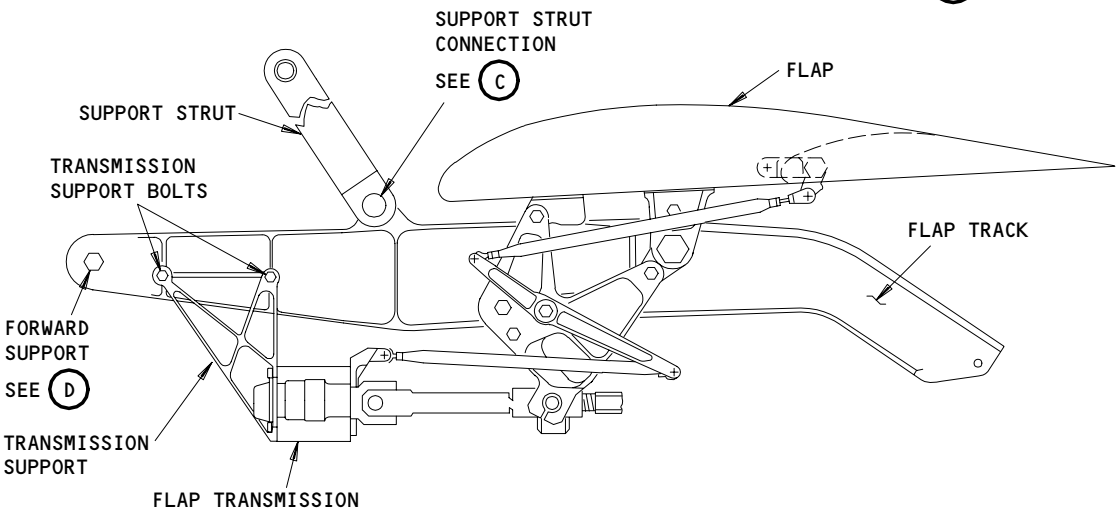
      (4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).





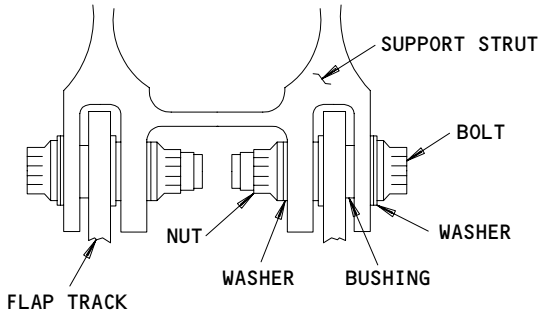
TRACKS FOR THE INBOARD TE FLAP

A



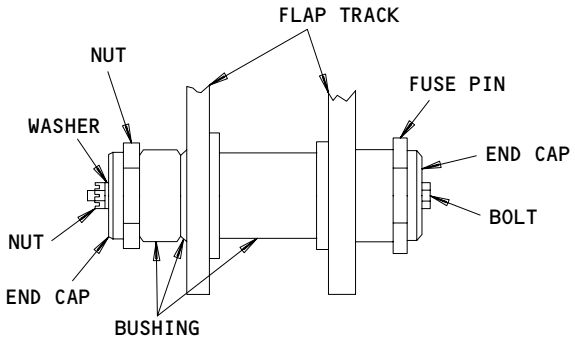
OUTBOARD TRACK

B



SUPPORT STRUT CONNECTION

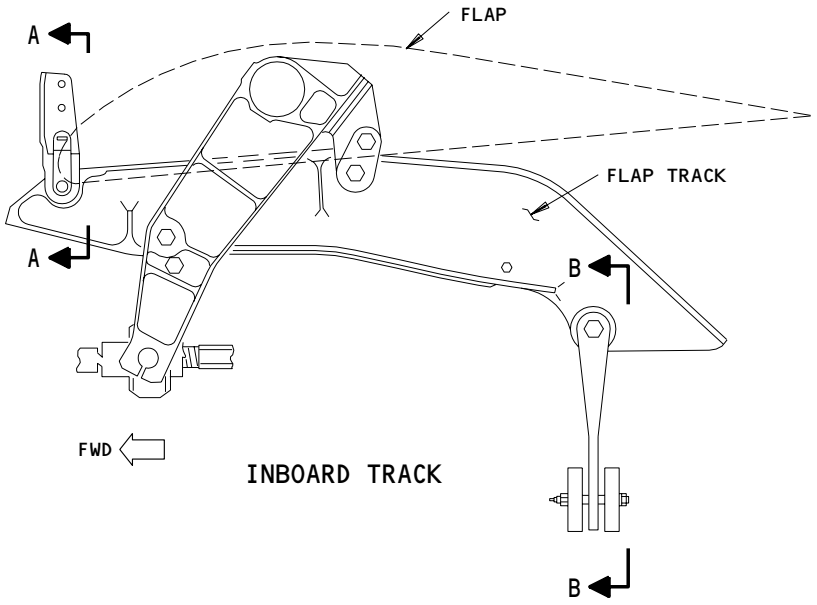
C



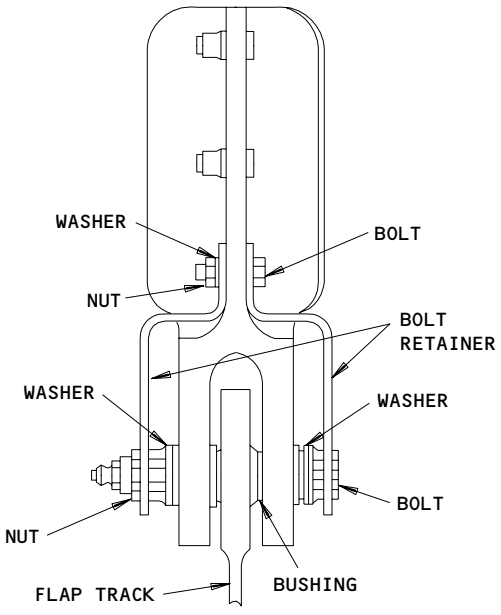
FORWARD SUPPORT

D

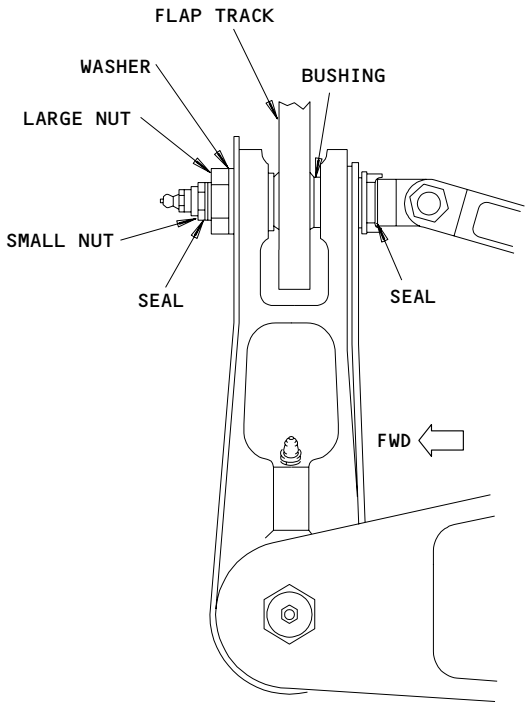
Outboard Track for the Inboard TE Flaps
Figure 401



INBOARD TRACK

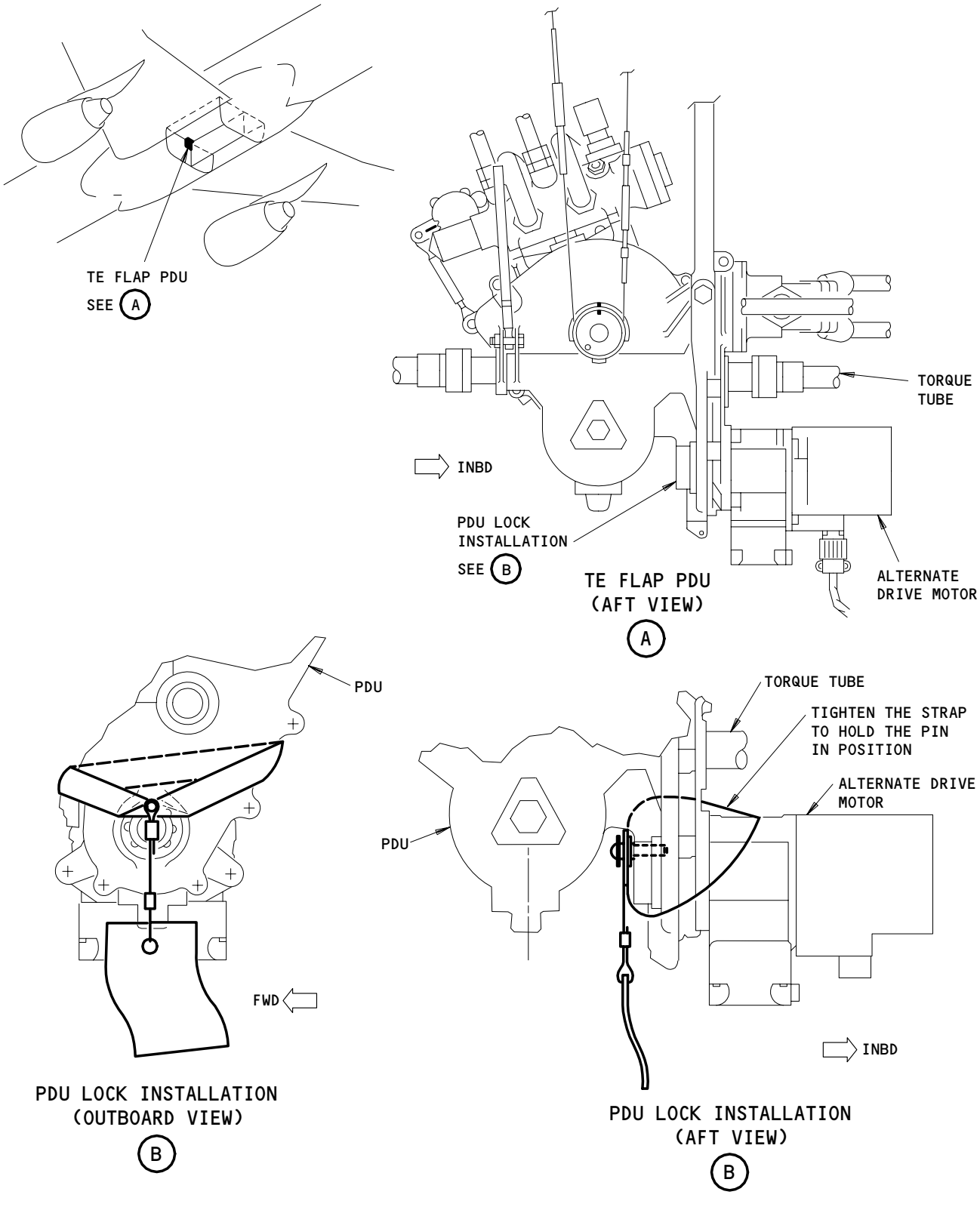


FORWARD SUPPORT
A-A

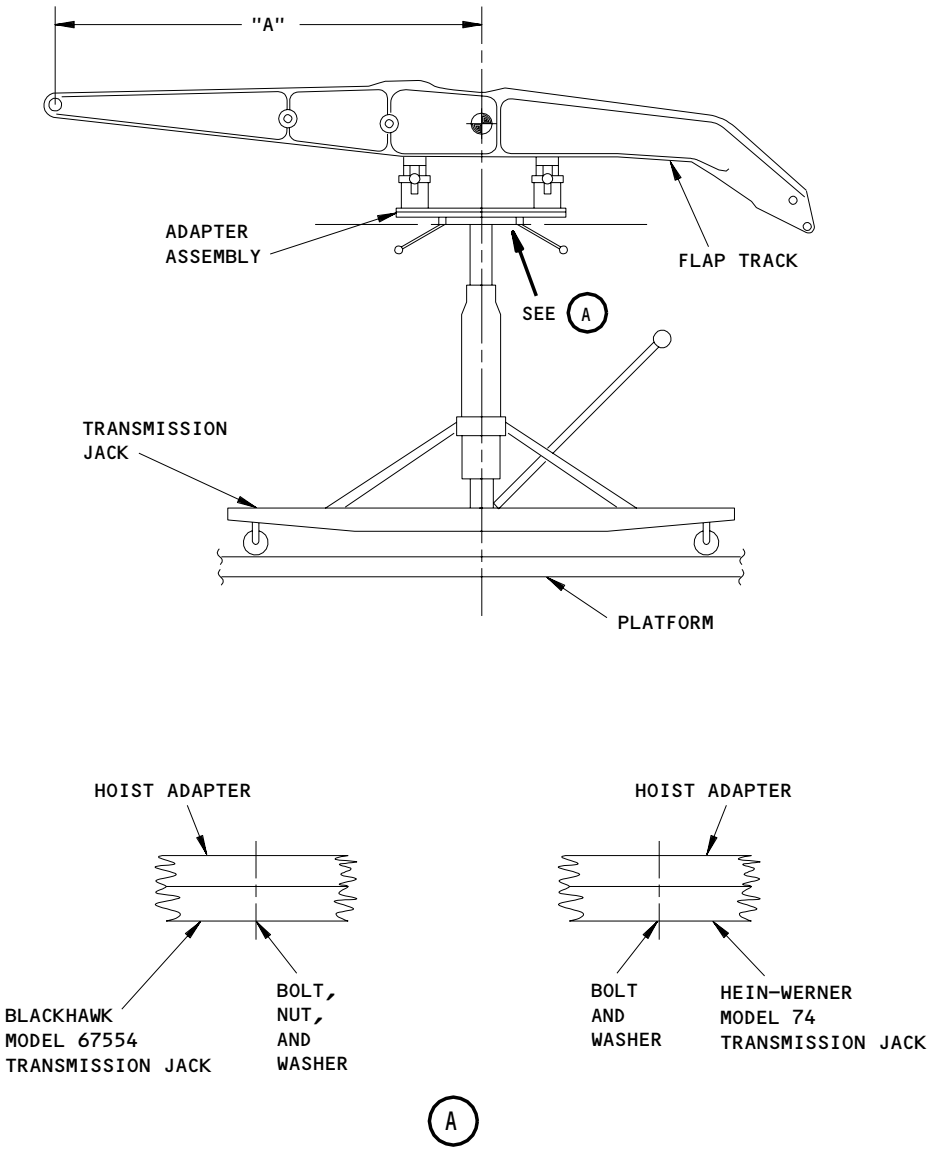


AFT SUPPORT
B-B

Inboard Track for the Inboard TE Flaps
Figure 402



PDU Lock for the TE Flap PDU
Figure 403



FLAP TRACK	"A" INCHES (mm)
OUTBD FLAP – INBD TRACK OUTBD FLAP – OUTBD TRACK	11.6 (294.6) 30.8 (782.3)

Support Transmission Jack for Flap Traks
Figure 404

S 864-006
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-007
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-008
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-009
(8) Install a PDU lock on the TE flap PDU (Fig. 403).

S 024-011
(9) Remove the inboard TE flap (AMM 27-51-02/401).

S 024-012
(10) Remove the transmission for the inboard TE flap (AMM 27-51-06/401).

E. Remove the Inboard Track for the Inboard Flap (Fig. 402)

NOTE: The Inboard Track weighs approximately 70 pounds (31.75 Kg).

S 494-013
(1) Install a transmission jack and hoist adapter per Fig. 404 to hold the weight of the flap track.

S 024-014
(2) Do these steps to remove the inboard track:
(a) Remove the bolt retainer at the forward support.
(b) Remove the bolt at the forward support.
(c) Remove the small nut and the seal at the aft support.
(d) Remove the large nut and the bolt at the aft support.

WARNING: BE CAREFUL WHEN YOU MOVE THE INBOARD TRACK. BECAUSE THE INBOARD TRACK WEIGHS 70 POUNDS (31.75 Kg), INJURY CAN OCCUR.

(e) Lower the track from the airplane.

F. Remove the Outboard Track for the Inboard Flap (Fig. 401)

NOTE: The Outboard Track weighs approximately 290 pounds (131.5 Kg).

S 034-015

(1) Remove the 2 bolts that attach the transmission support to the flap track.

S 494-016

(2) Install a transmission jack and hoist adapter per Fig. 404 to hold the weight of the flap track.

S 034-017

(3) Remove the 2 bolts that attach the support strut to the flap track.

S 034-018

(4) Do these steps to remove the fuse pin from the forward support:
(a) Remove the bolt in the center of the connection point
(b) Remove the end caps
(c) Remove the nut and the fuse pin.

S 024-019

WARNING: BE CAREFUL WHEN YOU MOVE THE OUTBOARD TRACK. BECAUSE THE OUTBOARD TRACK WEIGHS 290 POUNDS (131.5 Kg), INJURY CAN OCCUR.

(5) Lower the track from the airplane.

TASK 27-51-03-424-020

3. Install the Inboard and Outboard Tracks for the Inboard Flap

A. General

(1) This task contains two procedures, one to install the inboard track for the inboard TE flap and one to install the outboard track for the inboard TE flap. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the components. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) TE Flap PDU Lock - B27008-1
(2) Transmission Jack - Blackhawk Model 67554 or Hein-Werner Model 74

C. Consumable Materials

(1) D00633 Grease - BMS3-33 (Recommended)

(2) D00015 Grease - BMS3-24 (Optional)
(3) C00259 Primer - BMS 10-11, Type 1
(4) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

D. References
(1) AMM 27-51-02/401, Inboard Trailing Edge Flap
(2) AMM 27-51-02/501, Inboard Trailing Edge Flap
(3) AMM 27-51-06/401, Inboard TE Flap Transmission

E. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Install the Inboard Track for the Inboard Flap (Fig. 402)

NOTE: The inboard track weighs approximately 70 pounds (31.75 Kg).

S 484-034
(1) Use a transmission jack and hoist adapter to hold the weight of the flap track (Fig. 404).

S 644-021

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(2) Apply grease to the outer diameters of the large bolts and the inner diameters of the bushings.

S 424-022
(3) Do these steps to install the inboard track at the aft support:

WARNING: BE CAREFUL WHEN YOU MOVE THE INBOARD TRACK. BECAUSE THE INBOARD TRACK WEIGHS 70 POUNDS (31.75 Kg), INJURY CAN OCCUR.

(a) Put the track in its position and install the bolt and the large nut at the aft support (View B-B).
(b) Install the seal and the small nut.
(c) Tighten the large nut to 400-600 pound-inches (45.2-67.7 Nm).
(d) Tighten the small nut to 30-40 pound-inches (3.4-4.5 Nm).

S 424-023
(4) Do these steps to install the inboard track at the forward support:
(a) Install the bolt at the forward support (View A-A).
(b) Tighten the nut to 375-450 pound-inches (42.4-50.8 Nm).

(c) Apply primer to the bolt hole for the bolt retainer connection and let dry.
(d) Apply corrosion preventive compound to the bolt that holds the bolt retainer in its position.
(e) Install the bolt retainer.

S 644-024
(5) Lubricate the aft support at the grease fitting.

S 424-025
(6) Install the transmission for the inboard TE flap (AMM 27-51-06/401).

S 424-026
(7) Install the inboard TE flap (AMM 27-51-02/401).

S 704-027
(8) Adjust and do a test on the inboard TE flap installation (AMM 27-51-02/501).

NOTE: Do the steps in 27-51-02/501 to adjust and to do a test on the installation of the inboard TE flap. Steps to put the airplane back to its usual condition are also included in this procedure.

G. Install the Outboard Track of the Inboard Flap (Fig. 401)

NOTE: The outboard track weighs approximately 290 pounds (131.5 Kg).

S 484-035
(1) Use a transmission jack and hoist adapter to hold the weight of the flap track (Fig. 404).

S 644-028

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(2) Apply grease to the outer diameters of the pin and bolts and the inner diameters of the bushings.

S 424-029
(3) Do these steps to install the outboard track:

WARNING: BE CAREFUL WHEN YOU MOVE THE OUTBOARD TRACK. BECAUSE THE OUTBOARD TRACK WEIGHS 290 POUNDS (131.5 Kg), INJURY CAN OCCUR.

(a) Put the flap track in its position at the connection points (View B) .

(b) Install the fuse pin and the bushings at the forward support.
(c) Attach a nut and tighten to 1250-1550 pound-inches (141-175 Nm).
(d) Install the end caps and the central bolt.
(e) Install the 2 bolts that attach the support strut to the flap track.
(f) Lubricate the assembly at the grease fittings.
(g) Attach the transmission support with the 2 bolts.

NOTE: If it is necessary, install shim 113N3107-5 to make the clearance not more than 0.003 inch (0.076 mm) before you tighten the bolts.

S 424-048
(4) Install the transmission for the inboard TE flap (AMM 27-51-06/401).

S 424-032
(5) Install the inboard TE flap (AMM 27-51-02/401).

S 704-033
(6) Adjust and do a test of the inboard TE flap installation (AMM 27-51-02/501).

NOTE: Do the steps in 27-51-02/501 to adjust and to do a test on the installation of the inboard TE flap. Steps to put the airplane back to its usual condition are also included in this procedure.

INBOARD TRAILING EDGE FLAP CARRIAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure gives information for the removal and installation of the Inboard Trailing Edge (TE) Flap Carriages. You must remove the inboard TE flap before you do this procedure.

TASK 27-51-05-024-029

2. Remove the Carriages for the Inboard Trailing Edge (TE) Flap (Fig. 401)
   A. Equipment
      (1) Installation/Removal Equipment, TE Flap Torque Tubes - B57001-23
   B. References
      (1) 27-51-02/401, Inboard Trailing Edge Flap
      (2) 27-51-13/401, Inboard TE Flap Aft Flap Linkage
   C. Access
      (1) Location Zones
          556/656 Inboard Aft Flap
   D. Prepare for Removal

      S 014-020
      (1) Remove the inboard trailing edge flap from the airplane (Ref 27-51-02).
   E. Remove the Outboard Carriage

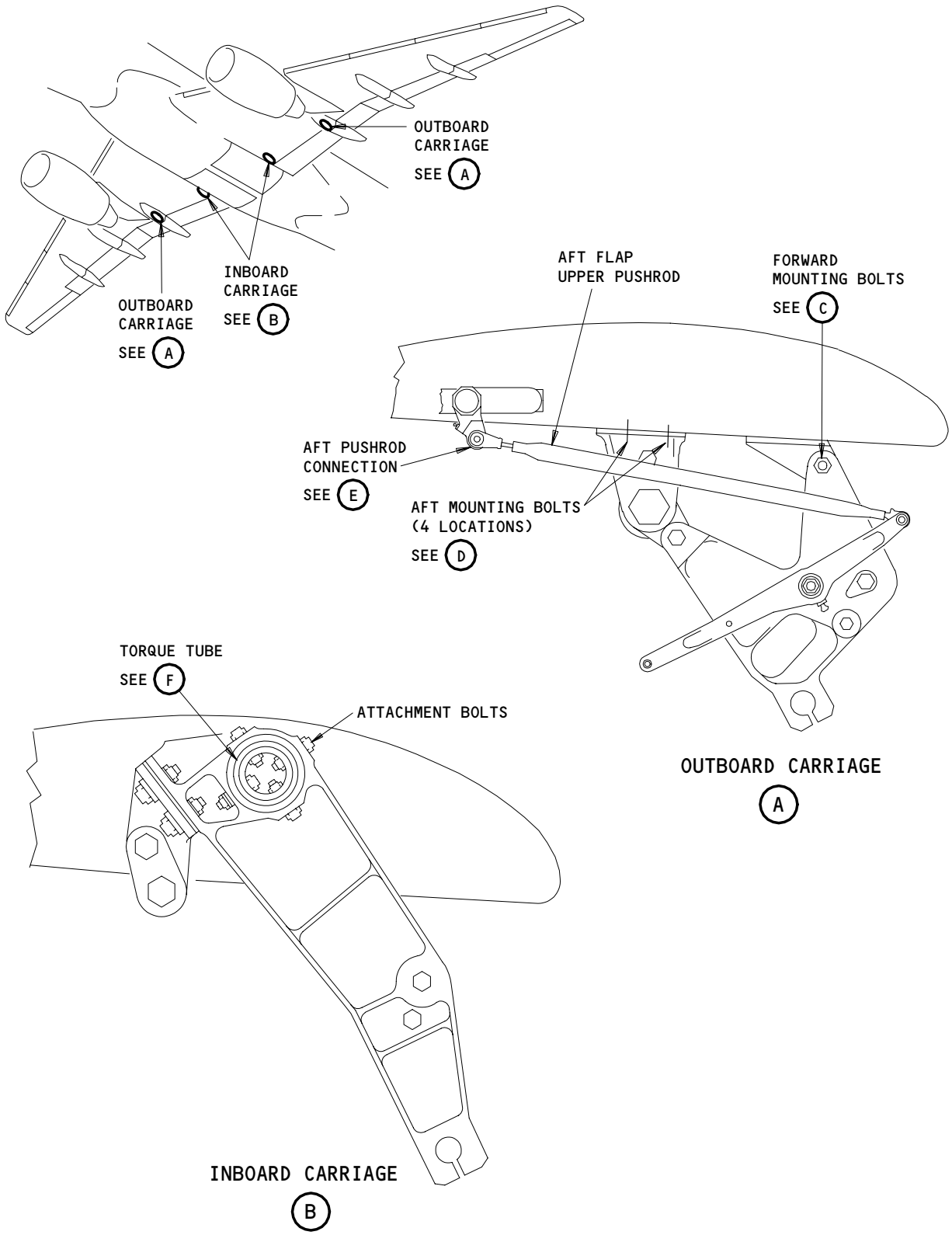
      S 034-001
      (1) Disconnect the upper pushrod at the aft end.

      S 024-002
      (2) If the carriage is replaced, remove the aft flap linkage (Ref 27-51-13).

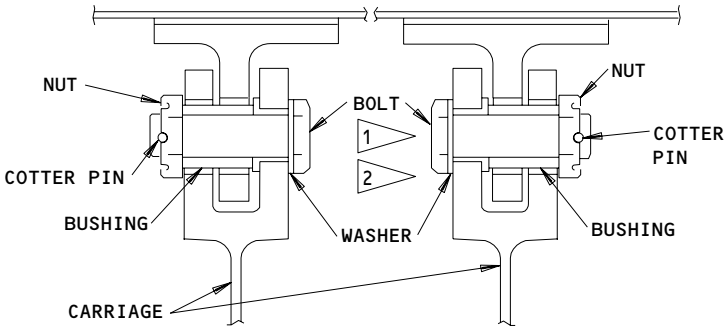
      S 034-003
      (3) Remove the six bolts which attach the carriage to the flap.
          (a) Keep the shims at the aft mount.
   F. Remove the Inboard Carriage (Fig. 401)

      S 034-014
      (1) Remove the four bolts at the inboard end of the torque tube.

      S 024-015
      (2) Do the steps to remove the failsafe tube:
          (a) Remove the four bolts and spacers.

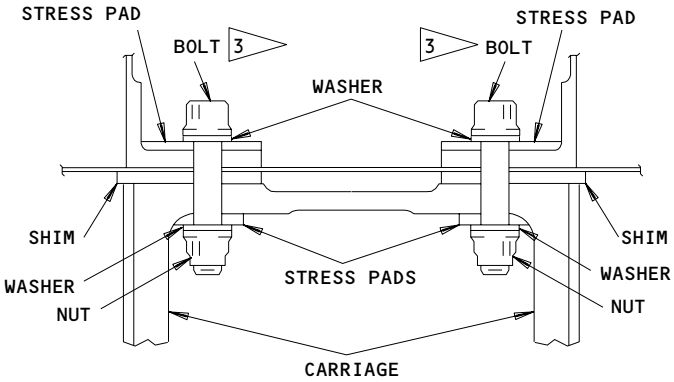


Inboard Flap Carriages
Figure 401 (Sheet 1)



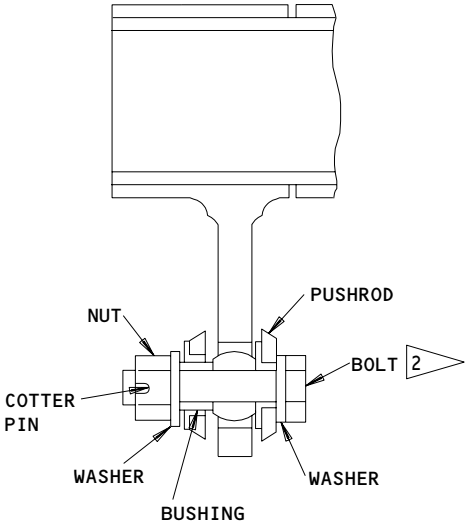
FORWARD MOUNTING BOLTS

C



AFT MOUNTING BOLTS

D



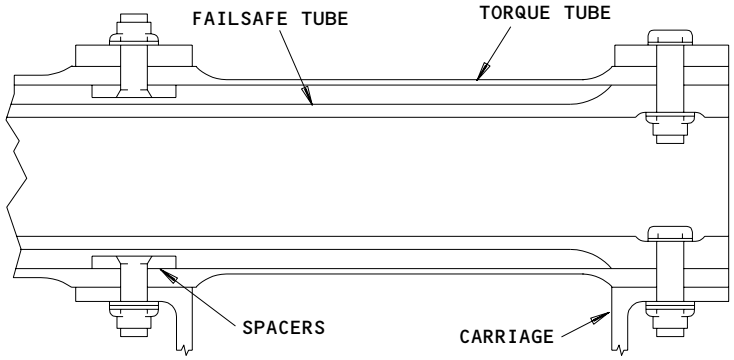
AFT PUSHROD CONNECTION

E

1 CAUTION: THE BOLT HEADS MUST BE TOWARD INSIDE OF CARRIAGE.

2 APPLY GREASE TO THE BOLT OD AND BUSHING ID, REMOVE ALL GREASE FROM THE THREADS

3 APPLY PRIMER TO THE HOLE; WHEN DRY INSTALL THE BOLT WITH CORROSION PREVENTIVE COMPOUND



TORQUE TUBE

INBD

F

Inboard Flap Carrriages
Figure 401 (Sheet 2)

(b) Use the torque tube installation/removal equipment to move the carriage to the inboard direction, and off the torque tube.

TASK 27-51-05-424-026

3. Install the Carriages for the Inboard TE Flap (Fig. 401)

A. Equipment

(1) Installation/Removal Equipment, TE Flap Torque Tubes - B57001-23

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Recommended)
(2) D00015 Grease - BMS 3-24 (Alternate)
(3) A00247 Sealant - BMS 5-95
(4) C00308 Corrosion preventive compound - MIL-C-11796, Class 3
(5) C00259 Primer - BMS 10-11, Type 1

C. References

(1) 27-51-02/401, Inboard Trailing Edge
(2) 27-51-13/401, Inboard TE Flap Aft Linkage

D. Access

(1) Location Zones
556/656 Inboard Aft Flap

E. Install the Outboard Carriage

S 374-004
(1) Apply primer to the areas where the old primer has been removed. Let the primer dry.

S 624-005
(2) Apply corrosion preventive compound to the aft mounting bolts.

S 424-006
(3) Install the shims over the aft mounting holes.

S 424-007
(4) Install the carriage.

S 424-008
(5) Install the stress pads and the four aft mounting bolts at the aft mount.
(a) Use your finger to tighten the bolts.

S 644-027
(6) Apply grease to the outer diameter of the forward mounting bolts and the inner diameter of the bushings.

S 164-023
(7) Remove all grease from the bolt threads.

S 434-009
(8) Install the bushings in the forward mounting holes.

S 434-010
(9) Install the forward mounting bolts.

S 414-021
(10) Tighten the forward mounting bolts to 480-650 lb-in (54.3-73.4 Nm).

S 414-022
(11) Install the cotter pins.

S 434-030

CAUTION: BOLTHEADS MUST POINT TO THE INSIDE OF THE CARRIAGE TO PERMIT CLEARANCE WHEN THE FLAPS MOVE. THIS WILL PREVENT DAMAGE TO THE FLAPS.

(12) Tighten the four aft mounting bolts.

S 424-012
(13) Attach the aft flap pushrod.

S 434-024
(14) If the carriage was replaced, install the aft flap leakage (Ref 27-51-13).

S 214-013
(15) Examine and adjust the carriage installation after the flap is installed on the airplane (Ref 27-51-02).
(a) Use the torque tube installation/removal equipment to remove the four bolts and spacers.

S 024-025
(16) Slide the carriage inboard, off the torque tube.

F. Install the Inboard Carriage

S 424-016
(1) Slide the carriage onto the torque tube.

S 434-017
(2) Put the spacers inside the torque tube and attach the carriage to the tube at the outboard side of the carriage.

S 434-018
(3) Install the failsafe tube.

S 434-028
(4) Use the torque tube installation/removal equipment to attach the failsafe tube to the carriage and the torque tube with four bolts.
(a) Install the bolts with wet sealant.

S 214-019
(5) Examine and adjust the carriage installation after the flap is installed on the airplane (Ref 27-51-02).

INBOARD TRAILING EDGE FLAP TRANSMISSIONS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the inboard and outboard transmissions for the trailing edge (TE) flap. The second task installs the inboard and outboard transmissions.

TASK 27-51-06-024-001

2. Remove the Inboard and Outboard Transmissions for the TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) TE Flap Torque Tube Clamps from Set - B27055-1:
         (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
         (b) Inboard Flap Torque Tube Clamp - P/N B27055-3
   B. References
      (1) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
      (2) AMM 27-58-01/501, Trailing Edge Flap System and Leading Edge
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Lock
      (5) AMM 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

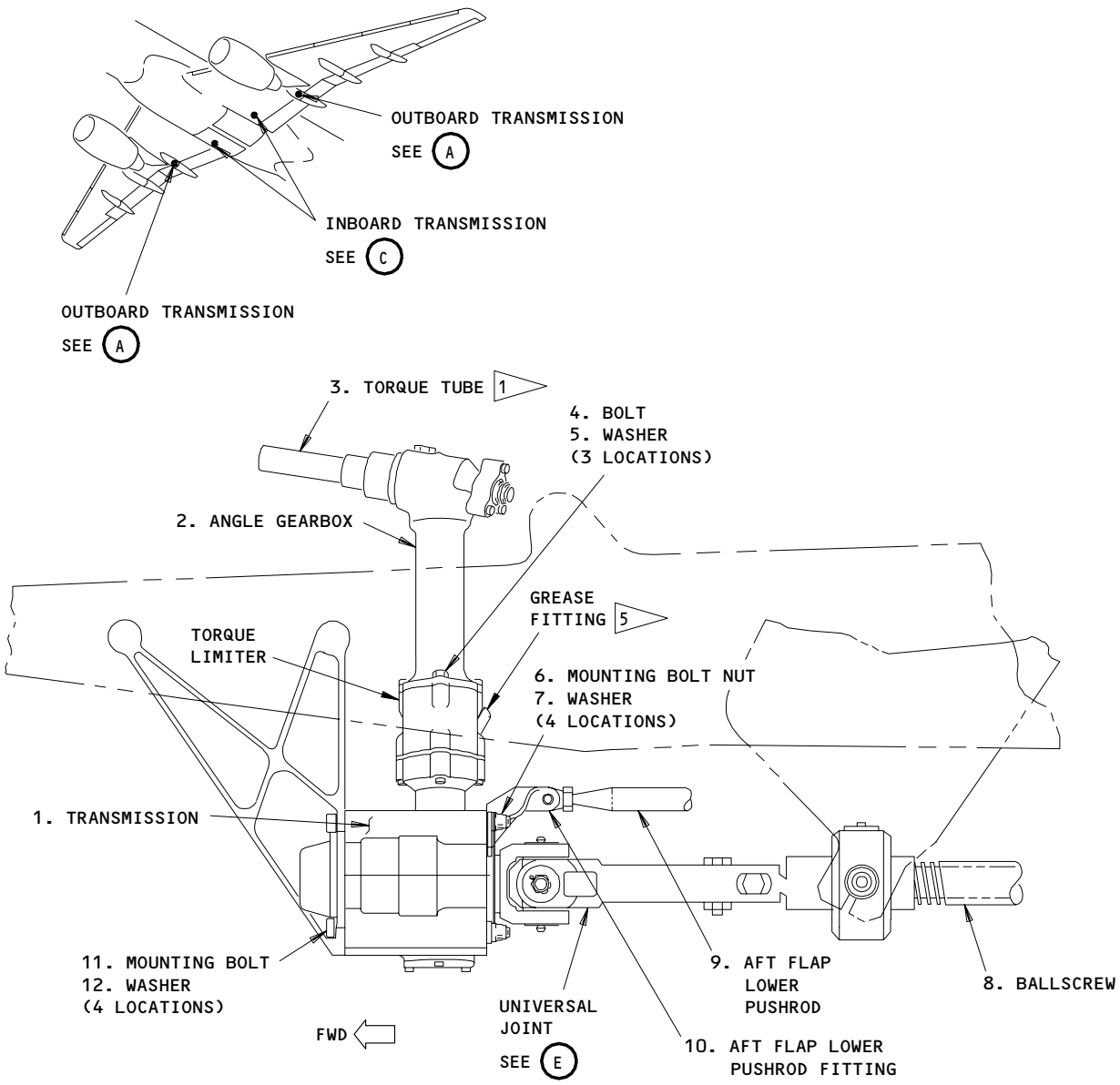
      S 214-002
      (1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

      S 214-003
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-004

      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

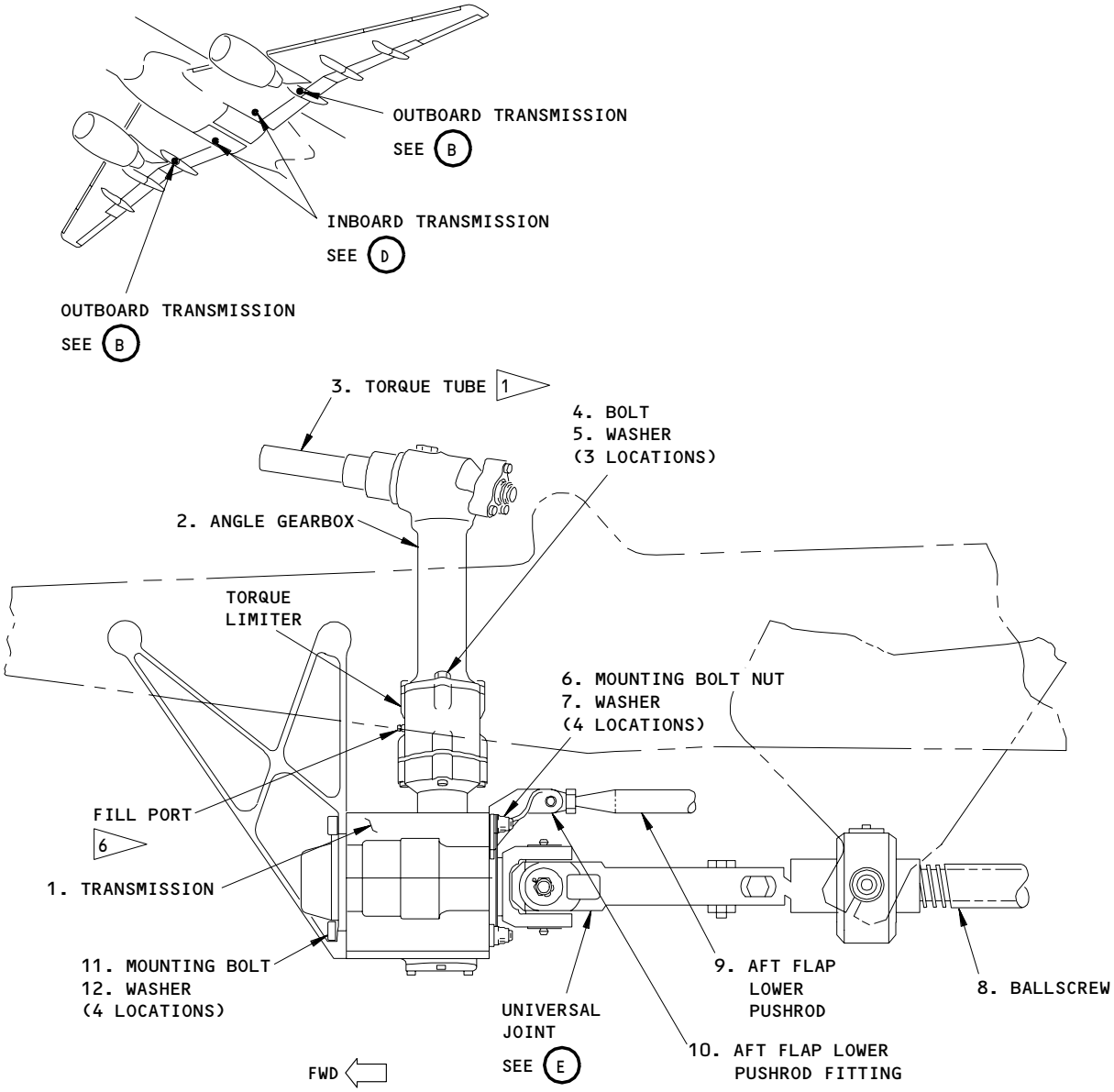


OUTBOARD TRANSMISSION
A

1 CLAMP THE TORQUE TUBES TO PREVENT ALL MOVEMENT. IF THE TORQUE TUBE TURNS IT WILL BE NECESSARY TO RIG THE FLAPS AGAIN AND CAN CAUSE DAMAGE TO THE FLAP SYSTEM

Inboard Flap Transmissions
Figure 401 (Sheet 1)

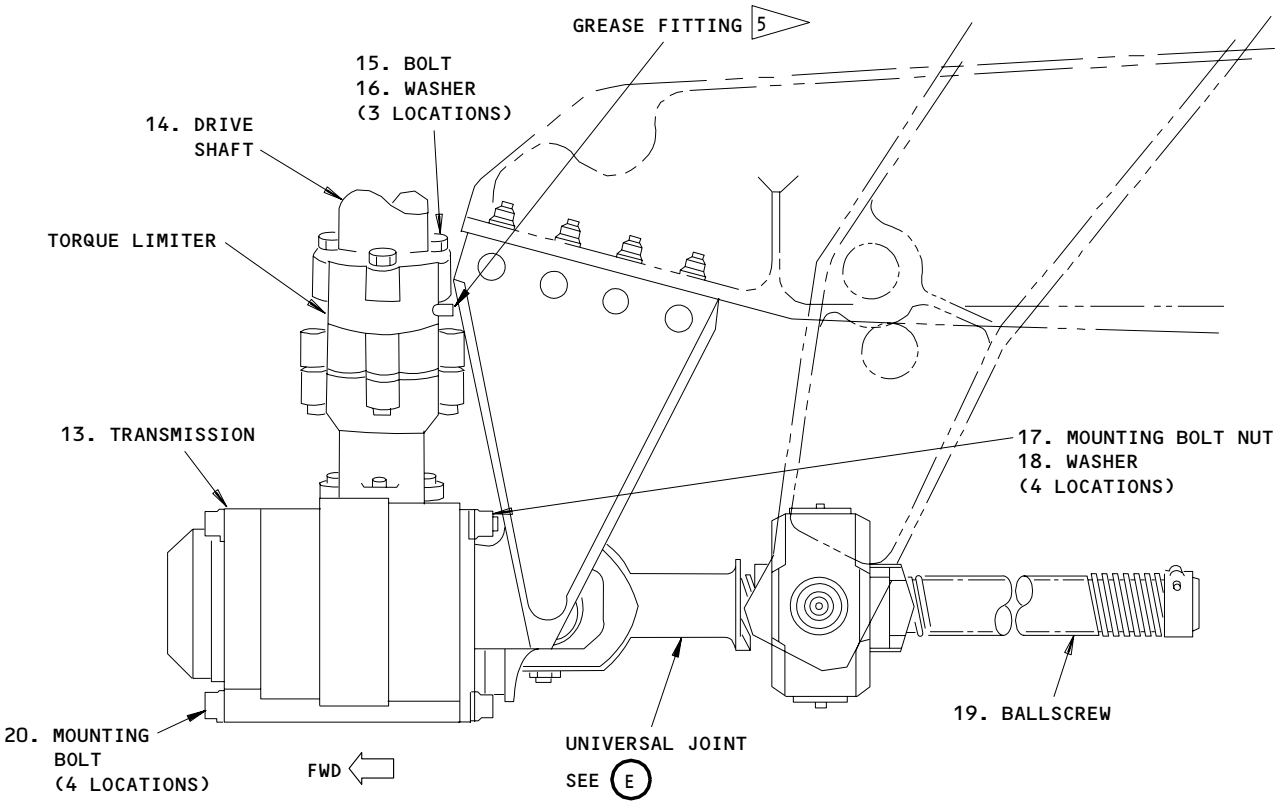
H31168



OUTBOARD TRANSMISSION
B

1 CLAMP THE TORQUE TUBES TO PREVENT ALL MOVEMENT. IF THE TORQUE TUBE TURNS IT WILL BE NECESSARY TO RIG THE FLAPS AGAIN AND CAN CAUSE DAMAGE TO THE FLAP SYSTEM

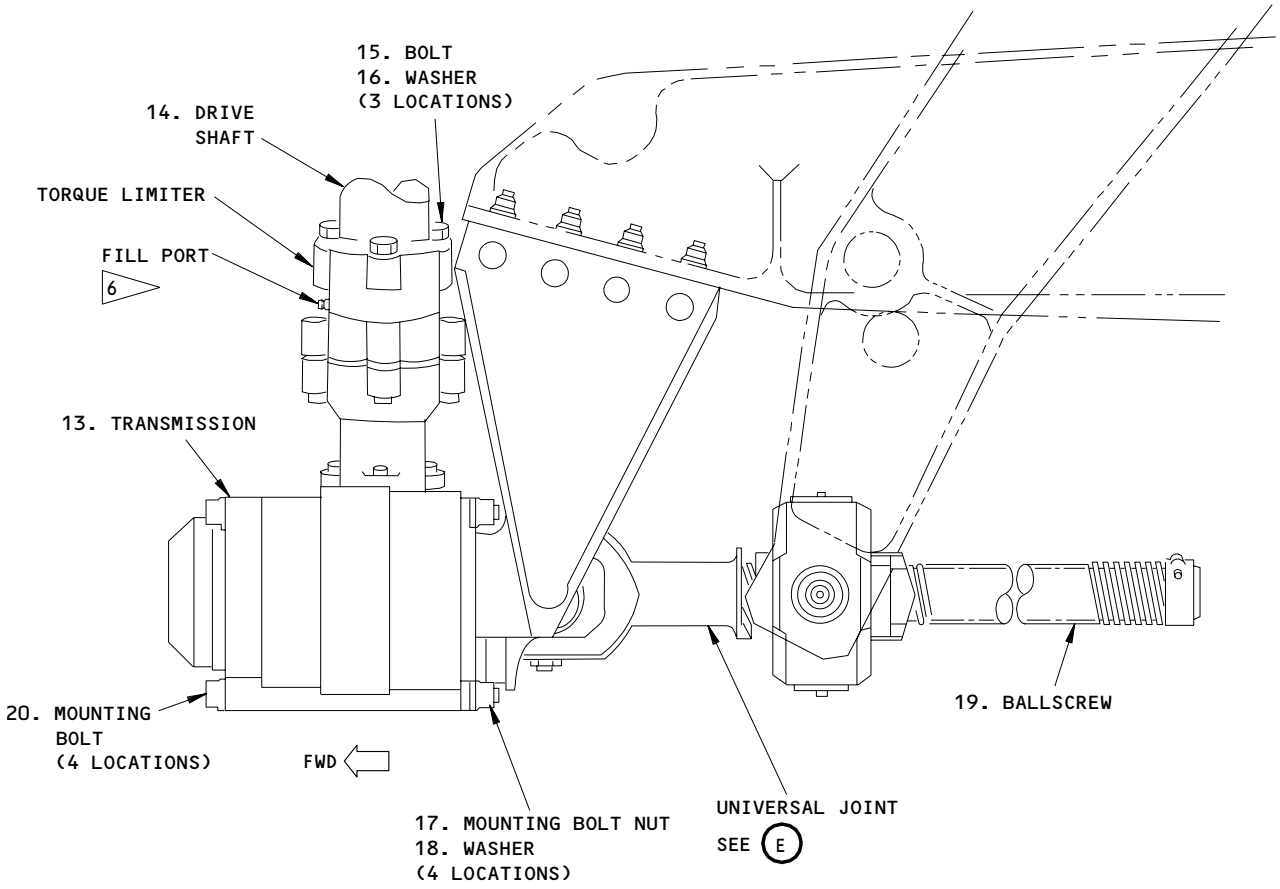
Inboard Flap Transmissions
Figure 401 (Sheet 2)



INBOARD TRANSMISSION
C

Inboard Flap Transmissions
Figure 401 (Sheet 3)

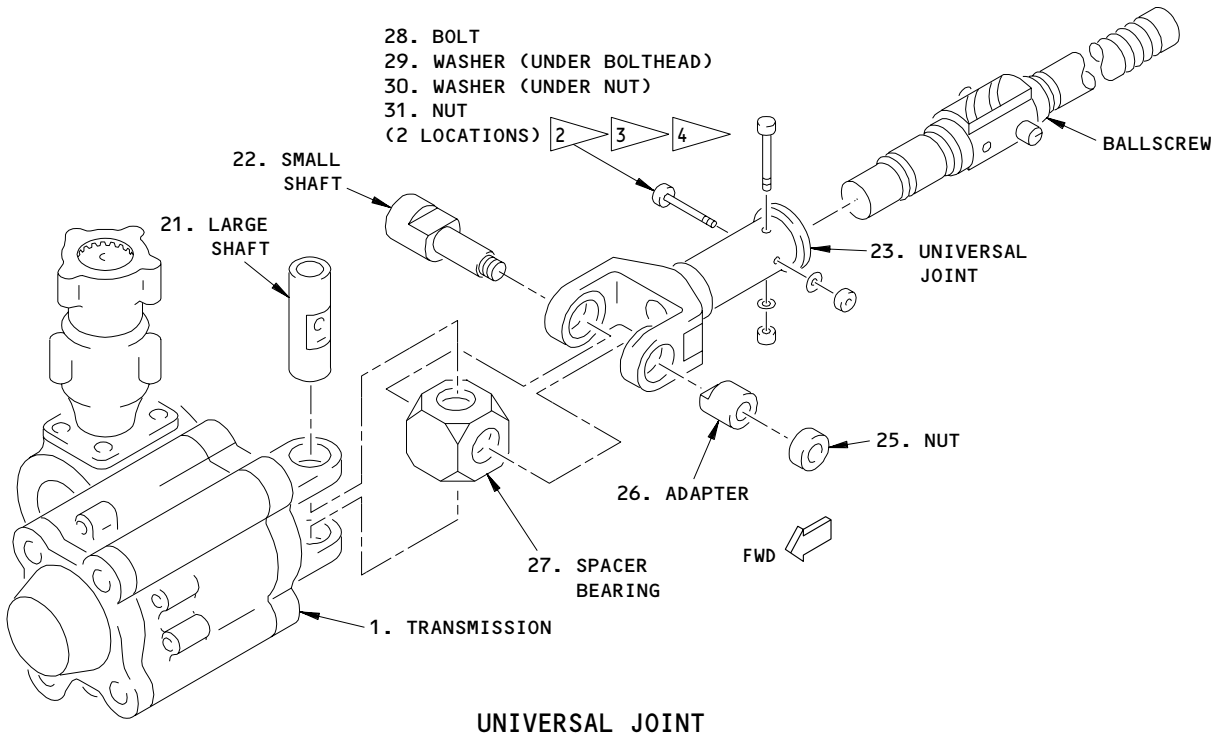
H30509



INBOARD TRANSMISSION
D

Inboard Flap Transmissions
Figure 401 (Sheet 4)

H30579



UNIVERSAL JOINT

E

2 INSTALL THE WASHERS WITH THE COUNTERSUNK SIDE ADJACENT TO THE BOLT HEAD. APPLY BMS 5-95 (251N4010-7 THRU -10 AND 251N4011-15 THRU -18) OR BMS 3-27 (MASTINOX 6856K) (251N4010-15 AND ON, AND 251N4011-23 AND ON) TO THE MATING SURFACES OF THE BOLTS, THE AFT UNIVERSAL JOINT, AND THE BALLSCREW

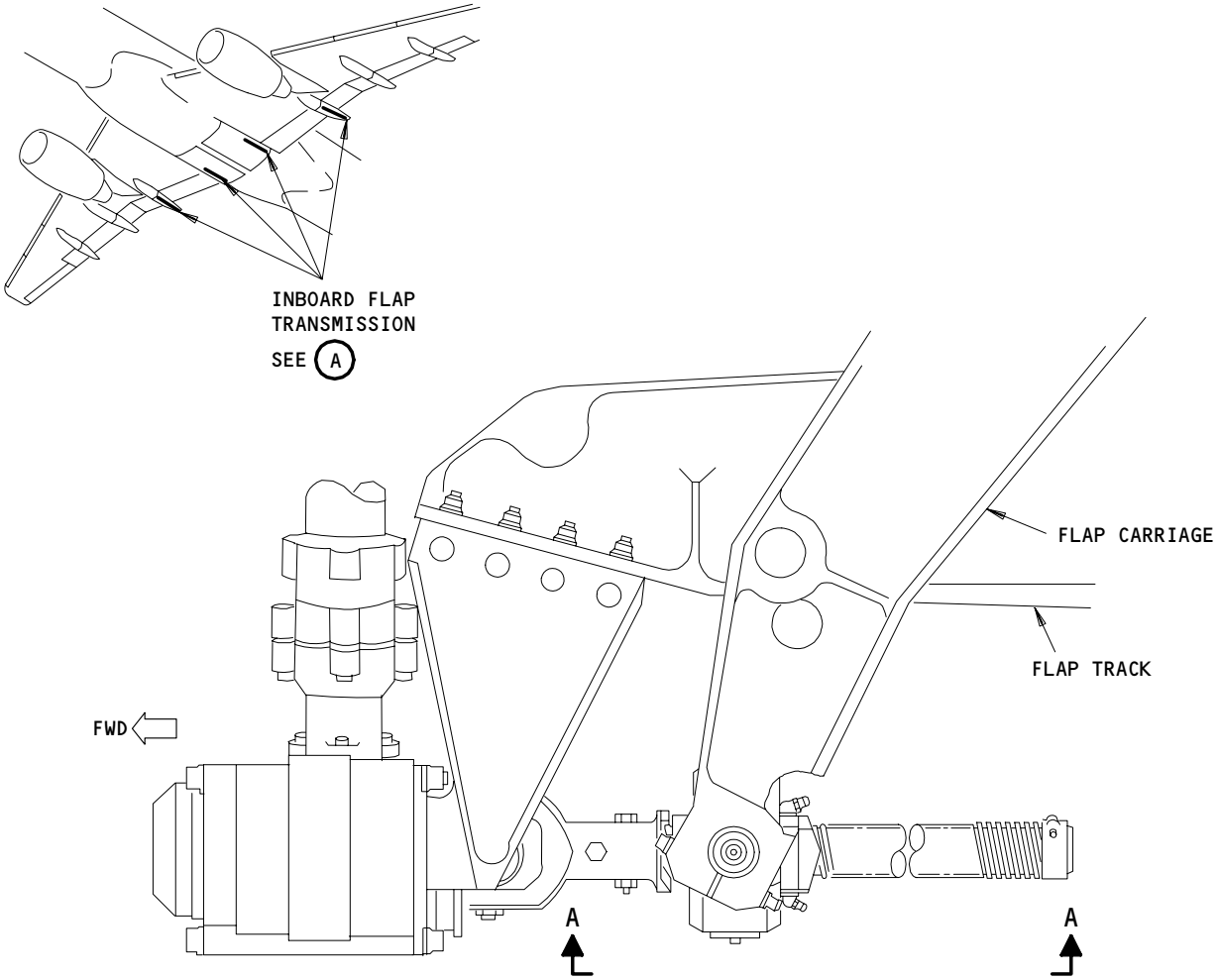
3 WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES. IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSON.

4 CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES WHICH WILL BE LUBRICATED AND FROM SURFACES THAT MOVE. YOU CAN CAUSE FAILURE OF MOVING PARTS IF YOU APPLY MASTINOX TO SURFACES THAT MOVE.

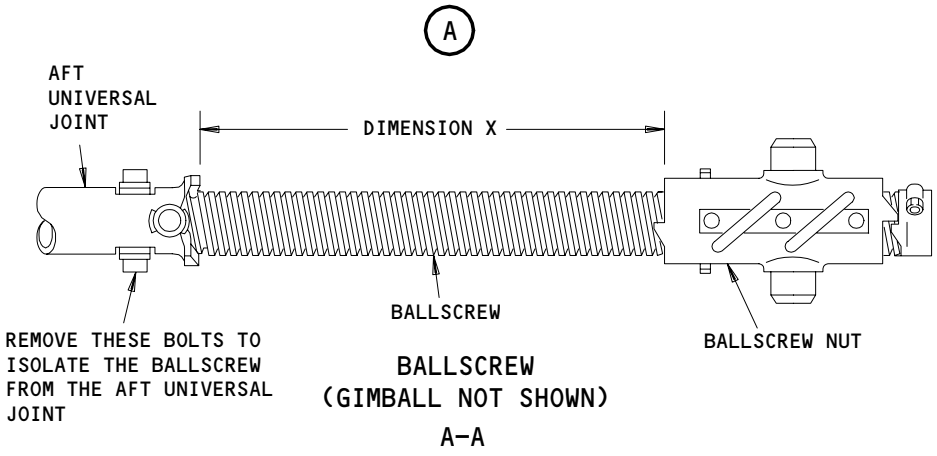
5 FILL WITH GREASE AFTER THE INSTALLATION PROCEDURE UNTIL GREASE FLOWS FROM THE LOWER VENT HOLES

6 FILL WITH BMS 3-32 TYPE II UNTIL THE OIL FLOWS OUT FROM THE FILL PORT

Inboard Flap Transmissions
Figure 401 (Sheet 5)

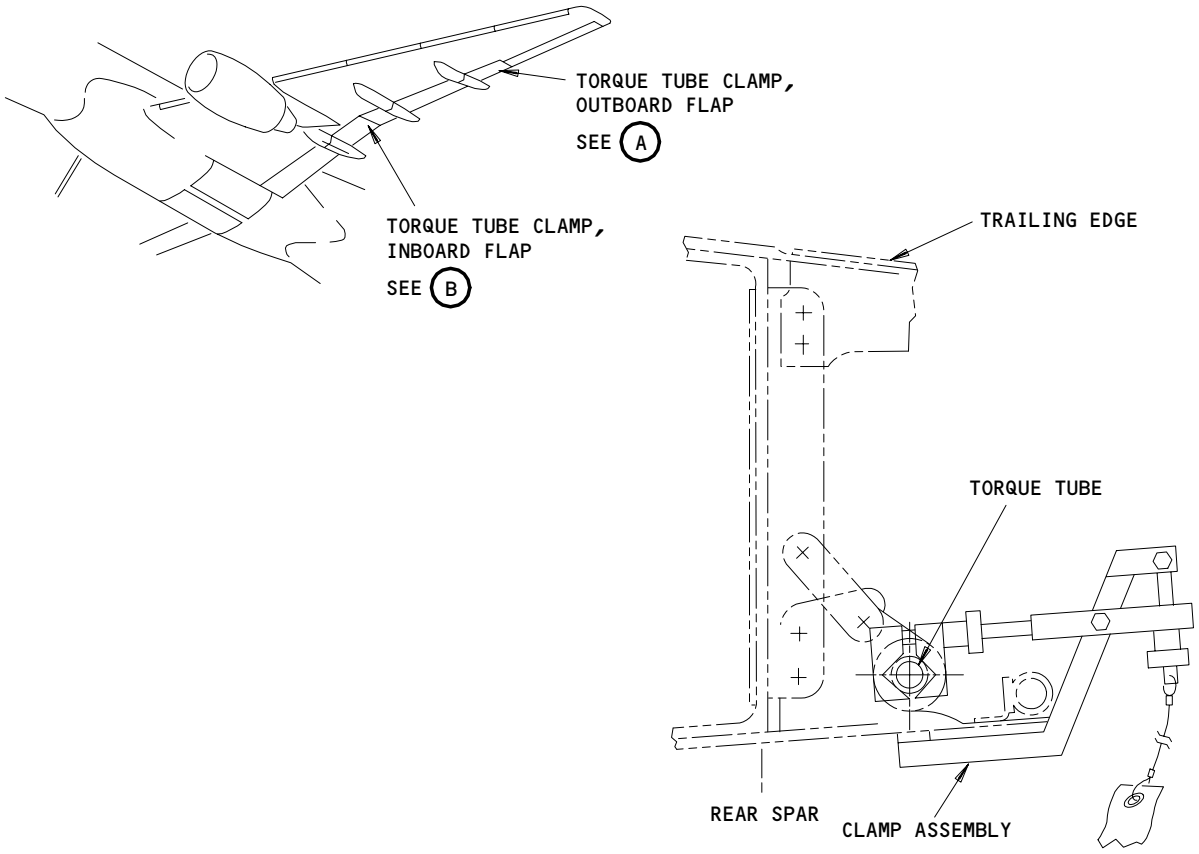


INBOARD FLAP TRANSMISSION
INBOARD - INBOARD SHOWN (2 LOCATIONS)
(OUTBOARD - INBOARD OPPOSITE 2 LOCATIONS)

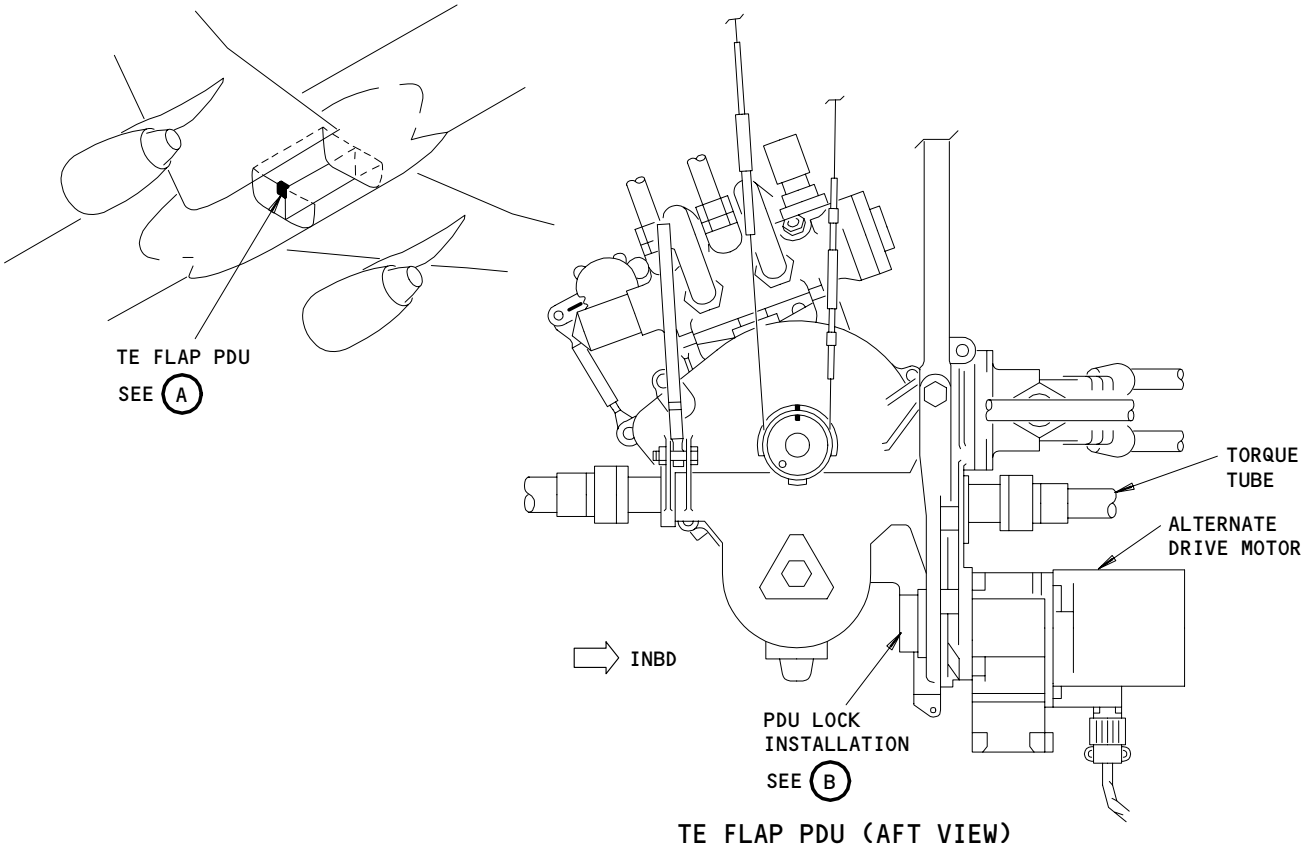


BALLSCREW
(GIMBALL NOT SHOWN)
A-A

Inboard Flap Transmission
Figure 402

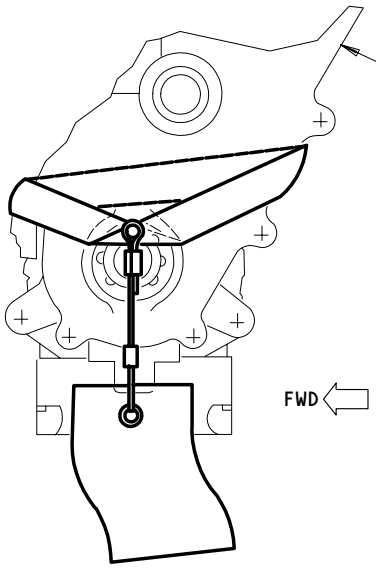


Torque Tube Clamp
Figure 403



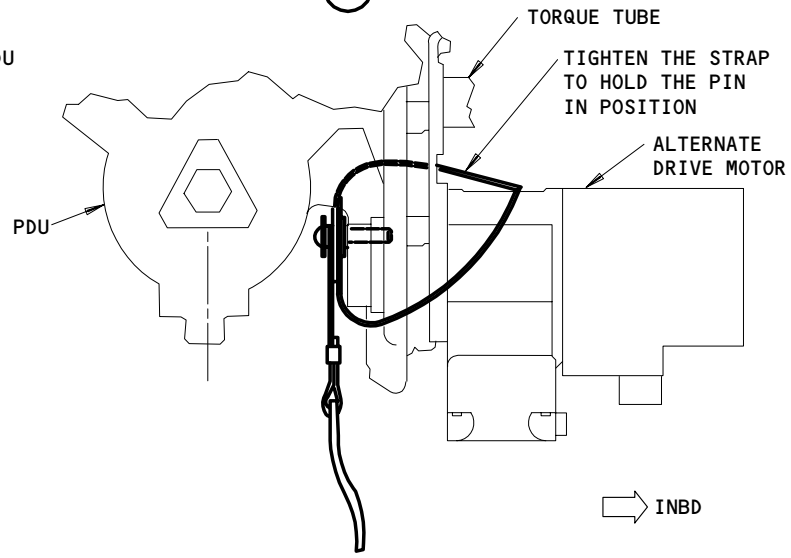
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B

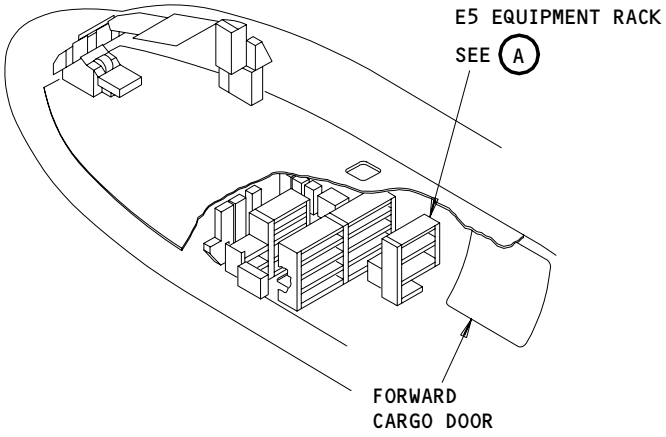


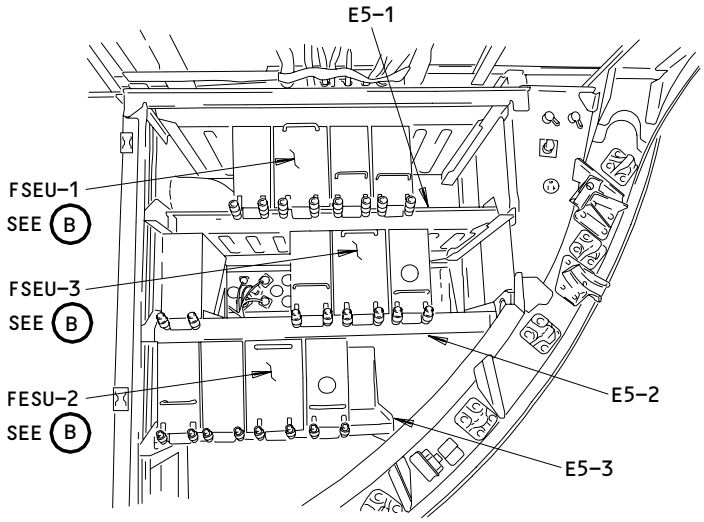
PDU LOCK INSTALLATION
(AFT VIEW)

B

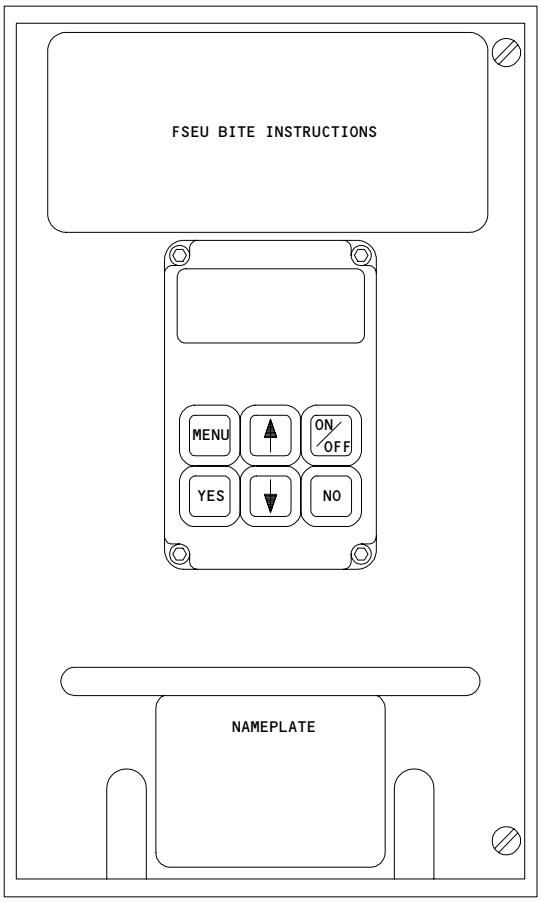
PDU Lock for the TE Flap PDU
Figure 404

216858





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 405

S 864-005
(4) Supply electrical power (AMM 24-22-00/201).

S 864-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-040
(6) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.

S 494-008
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-009
(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-010
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-011
(10) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-012
(11) Install a PDU lock on the TE flap PDU (Fig. 404).

S 014-013
(12) To get access to the inboard transmission, use the wheel well for the main landing gear.

S 014-014
(13) To get access to the outboard transmission, remove the forward fairing for the flap track (AMM 27-51-30/201).

S 494-015

(14) Use a clamp on the adjacent torque tubes (Fig. 403) on each side of the gearbox to prevent a turn and hold the weight of the angle gearbox.

S 934-041

(15) Make index marks on the torque tubes and the adjacent structure or components to show if the torque tubes turn during the transmission removal.

NOTE: You can apply a piece of tape to the lowest point around the torque tube to help you find the index marks later.

S 494-017

(16) Use a support on the flap to keep the weight off the ballscrew and to prevent all flap movement.

E. Remove the Transmissions (Fig. 401)

S 224-018

(1) Measure and make a record of the dimension X (View A-A, Fig. 402).

S 974-042

(2) Make a record of the flap resolver readings for the left and right flaps at the FSEU.
   (a) For -40 FSEUs (in FSEU-1 or FSEU-2):
      1) Push the ON/OFF switch on the face panel of the FSEU to show the "EXISTING FAULTS?" message.
      2) Push the "NO" switch 3 times until the "OTHER FUNCTIONS ?" message is displayed.
      3) Push the "YES" button to display the "RESOLVER INPUTS?" message. Use the down arrow to display resolver angles.
   (b) For other FSEUs, use an Angle Position Indicator, a HILDA tester (in -32 and -37 FSEUs only), or equivalent Syncro/Resolver Angle Indicator to display the resolver readings (AMM 27-58-01/501).

S 024-019

(3) Do these steps to remove the outboard transmission of the inboard flap:
   (a) Disconnect the ballscrew (8) from the universal joint (23)
   (b) Move the ballscrew (8) away from the universal joint (23) until you can disassemble the universal joint (23).
   (c) Remove the nut (25) at the universal joint and remove the small shaft (22).
   (d) Disconnect the universal joint (23) from the transmission (1).
   (e) Remove the 3 bolts (4) that attach the angle gearbox (2) to the transmission (1).
   (f) Use a support to hold the transmission (1).

(g) Remove four mounting bolts (11).
1) When you remove the four mounting bolts, disconnect the lower pushrod fitting (10) for the aft flap from the outboard transmission (1).
(h) Disengage the gearbox splines as you lower the transmission from the airplane.

S 024-020
(4) Do these steps to remove the inboard transmission of the inboard flap :
(a) Disconnect the ballscrew (19) from the universal joint (23)
(b) Move the ballscrew (19) away from the universal joint (23) until you can disassemble the universal joint (23).
(c) Remove the nut (25) at the universal joint and remove the small shaft (22).
(d) Disconnect the universal joint (23) from the transmission (13).
(e) Remove the 3 bolts (15) that attach the drive shaft (14) to the inboard transmission (13).
(f) Use a support to hold the transmission (13).
(g) Remove the four mounting bolts (20).
(h) Disengage the transmission (13) from the drive shaft and lower the transmission from the airplane.

TASK 27-51-06-424-021

3. Install Inboard and Outboard Transmissions for the TE Flap

A. Consumable Materials
(1) D00013 Grease - MIL-G-23827 (Alternate)
(2) D00633 Grease - BMS 3-33 (Recommended)
(3) D00015 Grease - BMS3-24 (Alternate)
(4) C00913 Corrosion Inhibiting Compound - BMS 3-27
(5) C00259 Primer - BMS 10-11, Type 1
(6) A00247 Sealant - BMS 5-95, Class B or C
(7) D00590 Fluid, Flap drive system - Brayco 795 (Recommended)

B. Parts
(1) OUTBOARD TRANSMISSION;
Refer to the table that follows:

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Transmission	27-51-06	01	155,165 190

(2) INBOARD TRANSMISSION;
Refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	13	Transmission	27-51-06	02	155,165 190

C. References
(1) AMM 12-21-09/301, Trailing Edge Flap System
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
(4) AMM 27-58-01/501, TE Flap System and LE Slat System Position Transmitter - Adjustment Test
(5) AMM 27-58-03/401, Flap Position Transmitter
(6) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(7) AMM 32-00-15/201, Landing Gear Door Lock

D. Access
(1) Location Zones
143/144 MLG Wheel Well
211/212 Control Cabin
572/672 Inboard Flap Outboard Fairing
710 Nose Landing Gear and Doors
730/740 Main Landing Gear and Doors

E. Install the Transmissions (Fig. 401)

S 224-022
(1) Examine the index marks that were applied to the torque tubes before the transmission was removed to see if the torque tubes (3) have turned.

S 824-023

(2) Align the index marks if it is necessary.

S 424-024

(3) Do these steps to install the outboard transmission of the inboard flap :

(a) Turn the input splines on the transmission (1) until the universal joint (23) and the input splines can be attached without a turn of the input shafts.

(b) Apply grease to the external splines at the bottom of the mating gearbox.

(c) Lift the transmission (1) into its position and engage the angle gearbox splines.

(d) Attach the transmission (1) to the angle gearbox (2).

(e) Attach the transmission (1) with four mounting bolts (11).

1) When you install the four mounting bolts, install the fitting (10) to which the lower pushrod for the aft flap is attached.

(f) Apply sealant to the mating surfaces of the torque limiter of the flap transmission.

(g) Attach the universal joint (23) to the transmission (1).

1) Attach the nut (25) with the grease, BMS 3-24.

NOTE: The self-locking part of the nut must have a run-on torque of 30 - 100 pound-inches (3.4-11.3 Nm), with no axial load on the nut and the thread fully engaged. The bolt thread must extend beyond the locking part of the nut.

(h) Tighten the nut to 440 - 650 pound-inches (49.8-73.4 Nm).

(i) Turn the ballscrew (8) to prepare the ballscrew for its connection to the universal joint (23).

(j) Connect the ballscrew (8) to the universal joint (23) (View C) and at the same time keep the dimension X (Fig. 402) you made a record of before.

(k) Lubricate the universal joint (23) with grease at the zerk fittings.

(l) TORQUE LIMITERS WITH A GREASE FITTING;
Fill the torque limiter with grease.
(m) TORQUE LIMITERS WITH AN OIL FILL PORT;
Fill the torque limiter with oil.

NOTE: Use Brayco 795 as the preferred alternative to BMS 3-32, Type II to lubricate the torque limiters.

S 424-025
(4) Do these steps to install the inboard transmission of the inboard flap :
(a) Turn the input splines on the transmission (13) until the universal joint (23) and the input splines can be attached without a turn of the input shafts.
(b) Apply grease to the external splines at the bottom of the mating gearbox.
(c) Lift the transmission (13) into its position and engage the drive shaft splines.
(d) Attach the transmission (13) to the drive shaft (14).
(e) Attach the transmission (13) with four mounting bolts (20).
(f) Apply sealant to the mating surfaces of the torque limiter.
(g) Attach the universal joint (23) to the transmission (13).
1) Attach the nut (25) with the grease, BMS 3-24.

NOTE: The self-locking part of the nut must have a run-on torque of 30 - 100 pound-inches (3.4-11.3 Nm), with no axial load on the nut and the thread fully engaged. The bolt thread must extend beyond the locking part of the nut.

(h) Tighten the nut to 440 - 650 pound-inches (49.8-73.4 Nm).
(i) Turn the ballscrew (19) to prepare the ballscrew for its connection to the universal joint (23).
(j) Connect the ballscrew (19) to the universal joint (23) (View C) and at the same time keep the dimension X (Fig. 402) you made a record of before.
(k) Lubricate the universal joint (23) with grease at the zerk fittings.
(l) Fill the torque limiter with grease through the grease fitting.

S 094-026
(5) Remove the torque tube clamps.

S 094-027
(6) Remove the flap supports.

S 614-028
(7) Do the servicing steps for the transmission (AMM 12-13-06/301).

S 094-029
(8) Remove PDU lock from the TE flap PDU (Fig. 404).

S 824-030
(9) Adjust the flap position transmitter in the wing where the transmission was removed and installed (AMM 27-58-03/401).

NOTE: If the flap position transmitter readings were recorded when the transmission was removed, then adjust the flap position transmitters to that recorded reading within plus or minus 0.5 degrees.

S 864-031
(10) Supply electrical power (AMM 24-22-00/201).

F. Operational Test for the Position Transmitter Installation

S 864-032
(1) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-033
(2) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 714-034
(3) Do these steps to do a test of the transmission installation:
(a) Turn the dimmer control knob on the first officer's panel for the lightshield panel, P7, fully clockwise.
(b) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).
(c) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.
(d) Make sure the six EICAS circuit breakers on the P11 panel are closed.
(e) Make sure the position of the TE flaps and LE slats are the same as the position of the flap control lever.
(f) Remove the DO-NOT-OPERATE tag from the flap control lever.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(g) Remove the PDU lock from the TE flap PDU (Fig. 404).
(h) Pressurize the left hydraulic system (AMM 29-11-00/201).
(i) Move the flap control lever to the zero (FLAPS UP) detent, and permit the flaps and slats to retract fully.
(j) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
1) Stop in each detent to let the TE flaps and the LE slats move to the correct position.
2) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data show on the display.

S 714-035
(4) Do the test of the position transmitter for the TE flap (AMM 27-58-01/501).

G. Put the Airplane Back to Its Usual Condition

S 414-036
(1) Install the fairings for the flap track (AMM 27-51-30/201).

S 414-037

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-038
(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-039
(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP DRIVE INBOARD TEE GEARBOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the inboard tee gearbox for the inboard trailing edge (TE) flap. The second task installs the inboard tee gearbox.

   TASK 27-51-07-024-024

2. Remove the Inboard Tee Gearbox for the Inboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Flap Torque Tube Clamp part of Set - B27055-1:
          (a) Inboard Flap Torque Tube Clamp - B27055-3
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Down Locks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-001
      (1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap lever is in the zero (FLAPS UP) detent.

      S 494-025
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

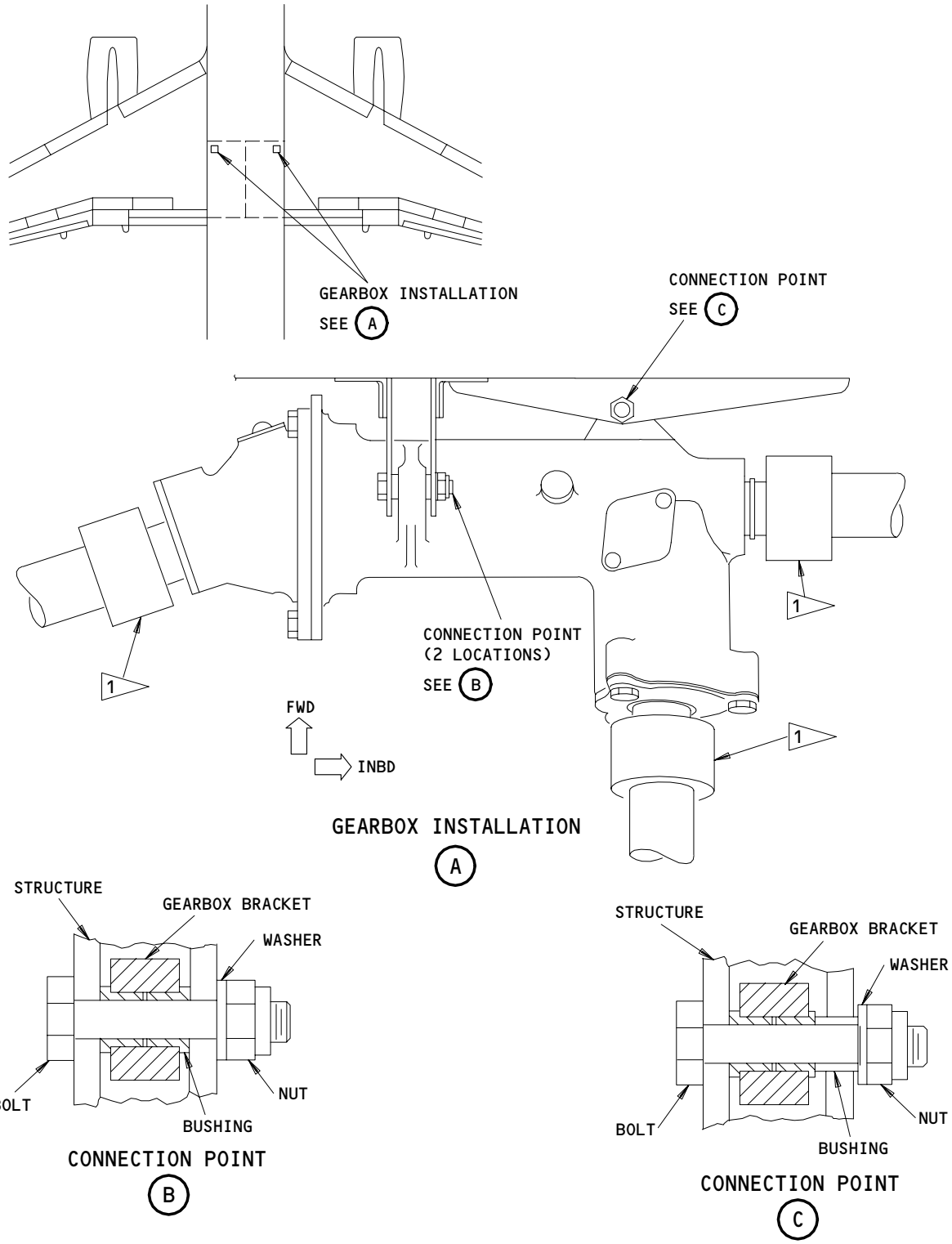
      S 214-002
      (3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

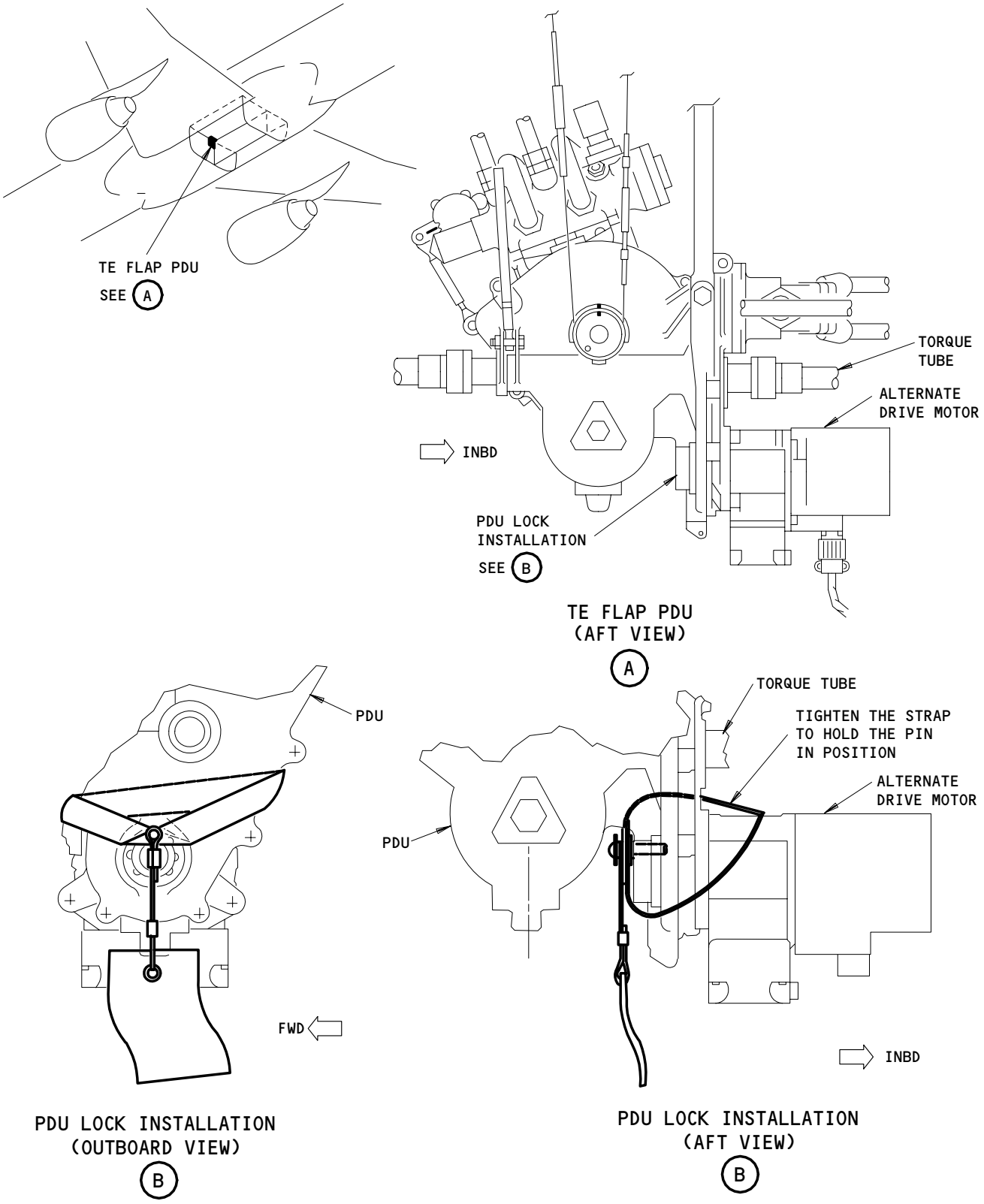
      (4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-004
      (5) Open these circuit breakers on overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B18, WARN ELEX B



1 INSTALL CLAMPS ON THE TORQUE TUBES TO HOLD WEIGHT AND TO PREVENT MOVEMENT. IF THE TORQUE TUBE TURNS IT WILL BE NECESSARY TO RIG THE FLAP DRIVE SYSTEM AGAIN.

Inboard Tee Gearbox of the Inboard TE Flap
Figure 401



PDU Lock for the TE Flap PDU
Figure 402

(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-005
(6) Open these circuit breakers on main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

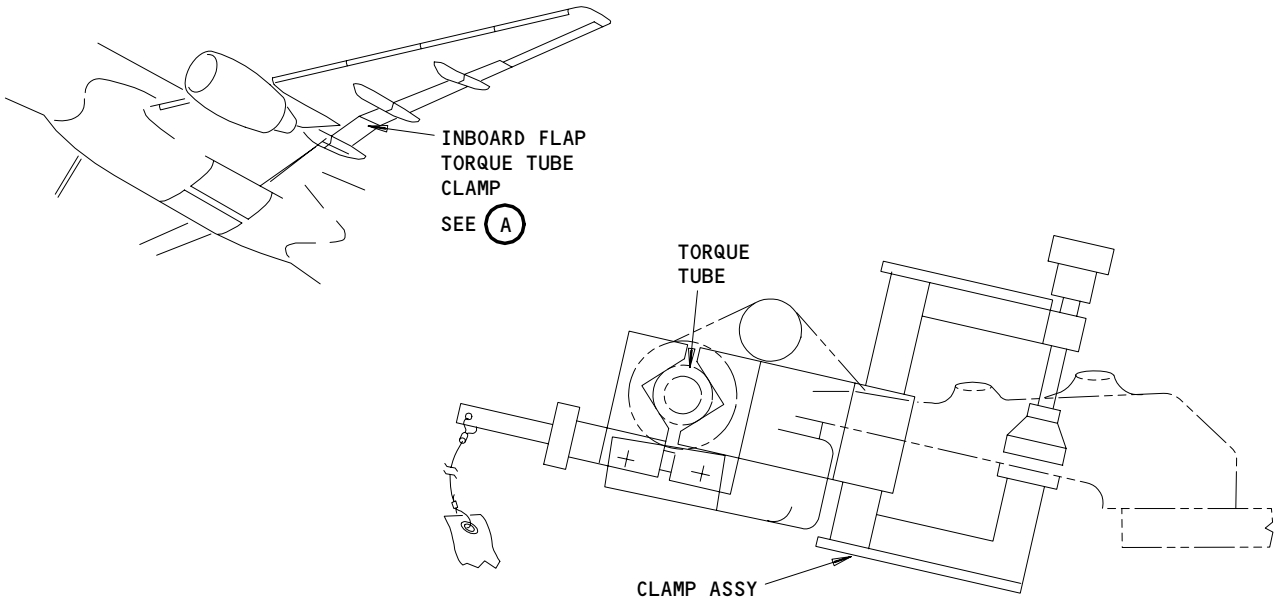
S 864-006
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-007
(8) Install a PDU lock in the TE flap PDU (Fig. 402).

E. Remove the Tee Gearbox

S 494-008
(1) Install clamps on the torque tubes to prevent movement (Fig. 403).

NOTE: Do not turn the torque tube while you install the clamp. A movement of the torque tube will make it necessary to adjust the flap drive system again.



Flap Torque Tube Clamp
Figure 403

S 034-009
(2) Disconnect the torque tubes at the three couplings.

S 034-010
(3) Remove the three bolts at the connection points (Fig. 401).

S 024-026
(4) Remove the tee gearbox from the assembly.

TASK 27-51-07-424-027

3. Install the Inboard Tee Gearbox for the Inboard TE Flap

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) C00308 Compound - Corrosion Preventive MIL-C-11796 Class 3

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) 32-00-15/201, Landing Gear Door Locks
(4) 32-00-20/201, Landing Gear Down Locks

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Tee Gearbox

S 214-011
(1) Make sure that the flap drive systems are off.

S 644-012
(2) Apply corrosion preventive compound to the bolts.

S 434-028
(3) Put the tee gearbox in the correct position and install the bolts at the connection points (Fig. 401).

S 434-013
(4) Do these steps to connect the torque tubes:
(a) Apply a light film of grease to the torque tube and the tee gearbox splines.
(b) Attach each torque tube to the tee gearbox at the three locations.
(c) On each torque tube, install three screws in the coupling and lock with a wire.
(d) Move the torque tube to one end until the coupling touches the mating structure.

(e) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).
(f) Move the torque tube to the opposite end until the coupling touches the mating structure.
(g) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).
(h) Move and adjust the torque tube to its middle position.

E. Operational Test for the Tee Gearbox Installation

S 094-014
(1) Remove the clamps from the torque tubes.

S 094-015
(2) Remove the PDU lock from the TE flap PDU.

S 864-016
(3) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-017
(4) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-018

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-020

(6) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-019

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(7) Move the flaps between the fully retracted and the fully extended positions and make sure the flaps move to the correct positions.

F. Put the Airplane Back to Its Usual Condition

S 414-021

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-022

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-023

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP DRIVE OUTBOARD TEE GEARBOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the outboard tee gearbox for the inboard trailing edge (TE) flap. The second task installs the outboard tee gearbox.

   TASK 27-51-08-024-001

2. Remove the Outboard Tee Gearbox for the Inboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) TE Flap Torque Tube Clamp part of TE Flap Torque Tube Clamp Set - B27055-1:
         (a) Inboard TE Flap Torque Tube Clamp - P/N B27055-3
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

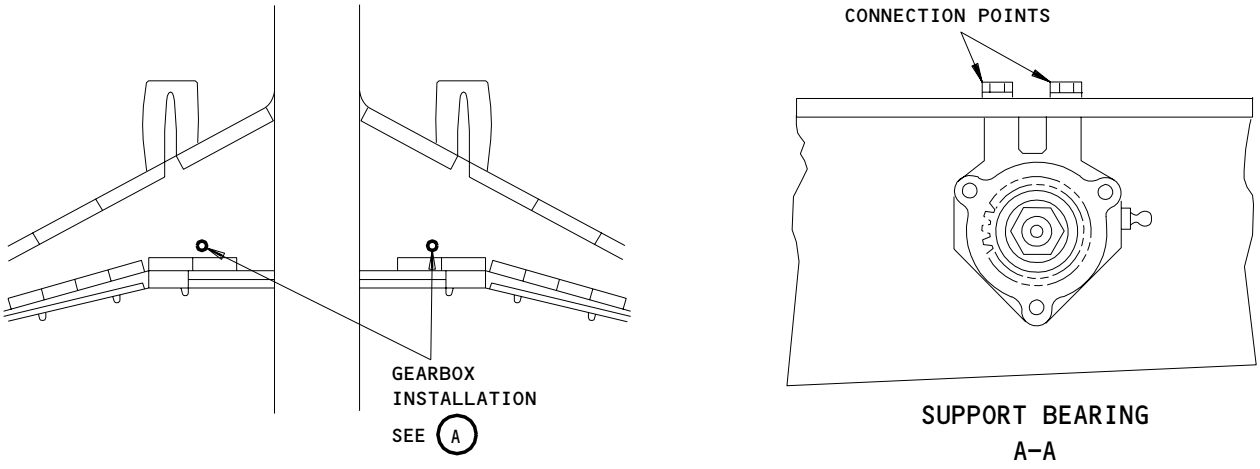
143	MLG Wheel Well (Left)
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-006
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

      S 494-002
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

      S 214-007
      (3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

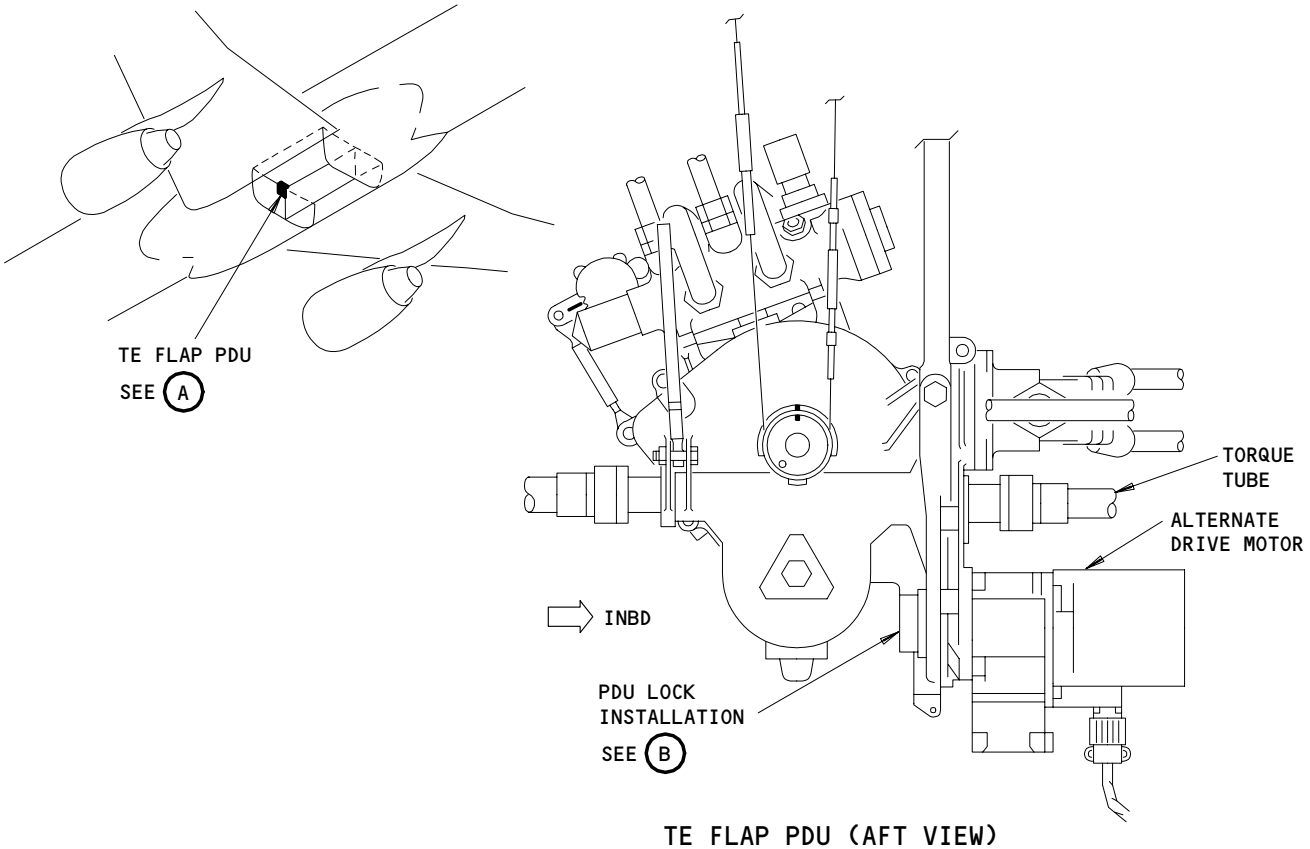


1 INSTALL CLAMPS ON THE TORQUE TUBES TO HOLD WEIGHT AND TO PREVENT MOVEMENT. AN ACCIDENTAL TURN WILL MAKE IT NECESSARY TO RIG THE FLAP DRIVE SYSTEM AGAIN.

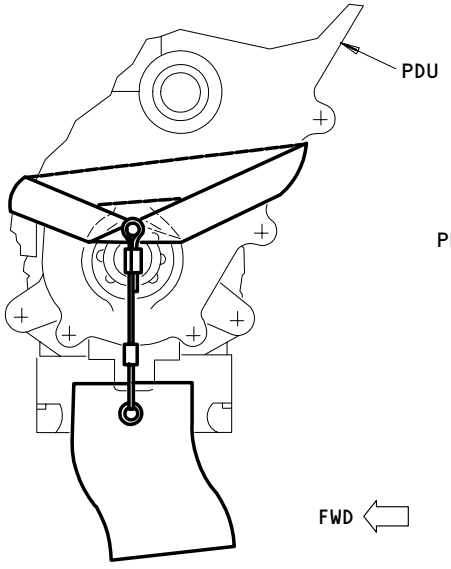
2 FILL THE COUPLING CAVITY WITH GREASE THROUGH EACH OF THE THREE FLUSH LUBRICATION HOLES

3 BMS 3-33 RECOMMENDED
BMS 3-24 OPTIONAL
MIL-G-21164 OPTIONAL
MIL-PRF-23827 OPTIONAL

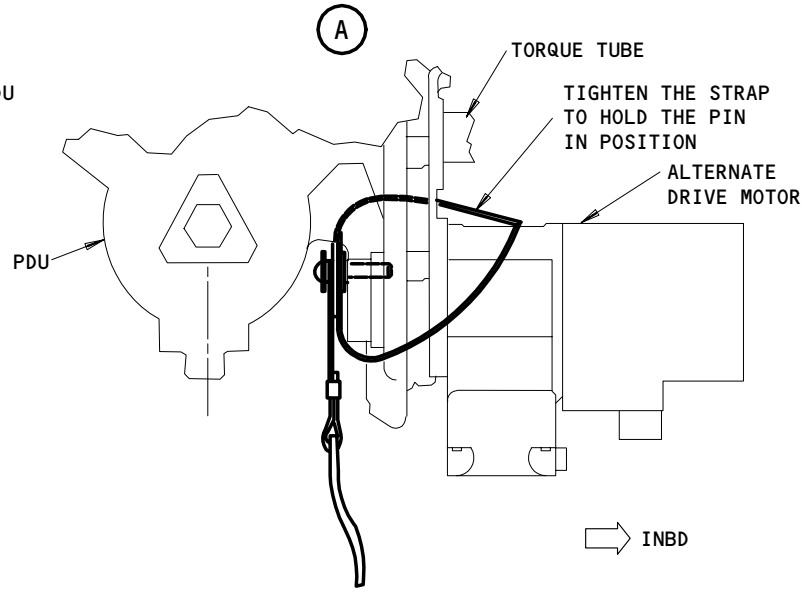
Outboard Tee Gearbox of the Inboard Flap
Figure 401



TE FLAP PDU (AFT VIEW)



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

229548

S 864-033

(4) Supply the electrical power (AMM 24-22-00/201).

S 014-008

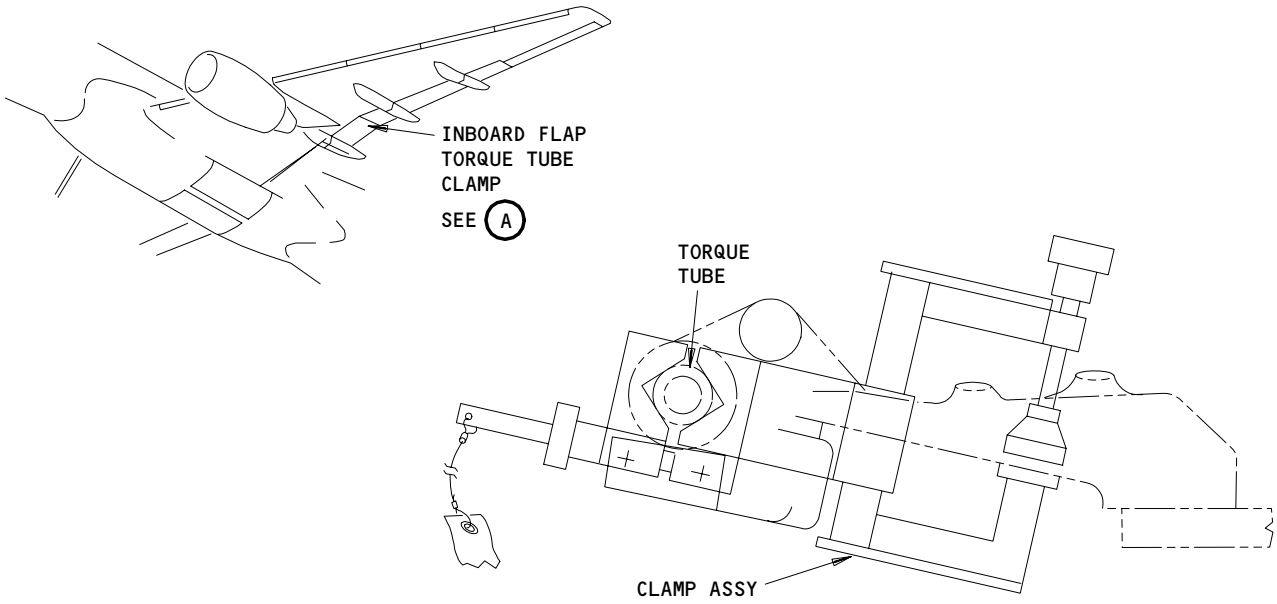
WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).



Flap Torque Tube Clamp
Figure 403

S 214-009
(7) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.

S 864-010
(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-011
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-012
(10) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-013
(11) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Tee Gearbox (Fig. 401)

S 494-014
(1) Install clamps on the torque tubes to hold weight and to prevent movement (Fig. 403).

NOTE: Do not turn the torque tube while you install the clamp. A movement of the torque tube will make it necessary to adjust the flap drive system again.

S 034-003
(2) Remove the bolts that attach the inboard and the aft torque tubes to the tee gearbox.

S 024-015
(3) Remove the inboard and the aft torque tubes.

S 024-016
(4) Do these steps to remove the outboard torque tube:
(a) Disconnect the coupling outboard of the support bearing.
(b) Remove the bolts from the support bearing.
(c) Move the torque tube out of the splines in the gearbox.

S 034-017
(5) Remove four bolts and remove the gearbox from the airplane.

TASK 27-51-08-424-004

3. Install the Outboard Tee Gearbox for the Inboard TE Flap

A. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(3) D00015 Grease - BMS 3-24 (Alternate)
(4) D00014 Grease - MIL-G-21164 (Alternate)

B. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks

C. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Tee Gearbox (Fig. 401)

S 214-018

(1) Make sure that the flap drive system is off.

S 214-031

(2) Make sure the sealant plug is installed in the inner diameter of the output shaft.

S 424-019

(3) Put the tee gearbox in the correct position and install four bolts.

S 424-020

(4) Do these steps to connect the torque tubes:
   (a) Apply a layer of grease to the coupling splines of the torque tube and the tee gearbox.
   (b) Attach the inboard and aft torque tubes.
   (c) Engage the splines of the outboard torque tube into the gearbox.
   (d) Install the support bearing with two bolts.
   (e) Install the coupling screws and lock with a wire.
   (f) Move the torque tube to one end until the coupling touches the mating surface.
   (g) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).
   (h) Move the torque tube to the opposite end until the coupling touches the mating surface.
   (i) Fill the coupling reservoirs with grease through lubrication holes (3 locations).

(j) Move and adjust the torque tube to its middle position.

S 094-021

(5) Remove the clamps from the torque tubes.

S 094-022

(6) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 864-023

(7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-024

(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-025

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERSON, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-005

(10) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 214-026

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(11) Move the flaps between the fully extended and the fully retracted positions and at the same time make sure these conditions occur:
(a) the TE flaps move to the correct positions

(b) the flap drive system moves freely
(c) the torque tubes do not rub on the adjacent parts.

E. Put the Airplane Back to Its Usual Condition

S 414-027

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-028

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-029

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP DRIVE INBOARD ANGLE GEARBOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the inboard angle gearbox for the inboard Trailing Edge (TE) flap. The second task installs the inboard angle gearbox.

   TASK 27-51-09-024-005

2. Remove the Inboard Angle Gearbox
   A. Equipment
      (1) TE Flap PDU lock - B27008-1

      (2) Inboard Flap Torque Tube Clamp - B27055-3 (part of the Flap Torque Tube Clamp Set, B27055-1)
   B. References
      (1) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (2) 32-00-15/201, Landing Gear Door Locks
      (3) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-001
      (1) Make sure that the TE flaps and the (LE) slats are in the fully retracted position, and that the flap control lever is in the zero (FLAPS UP) detent.

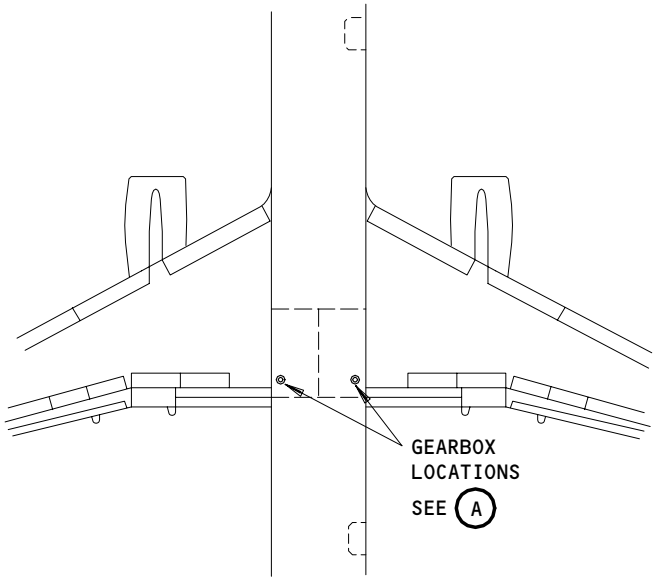
      S 494-029
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

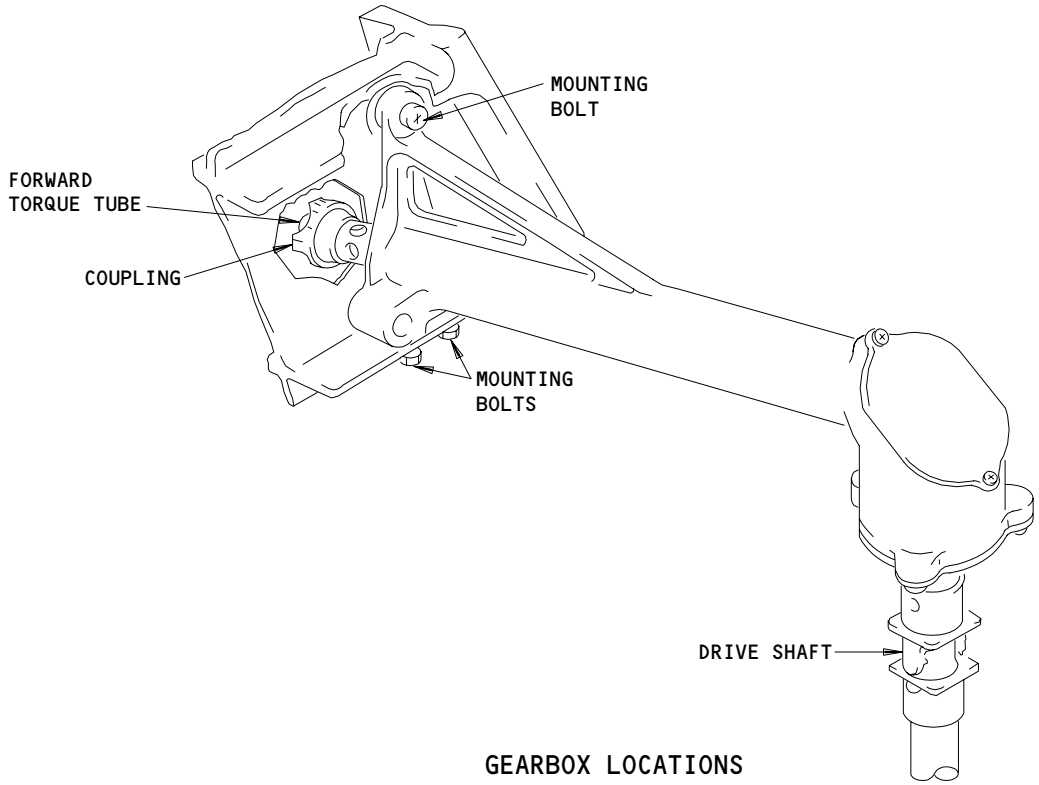
      S 214-002
      (3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 414-003

      WARNING: USE THE PROCEDURE IN 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

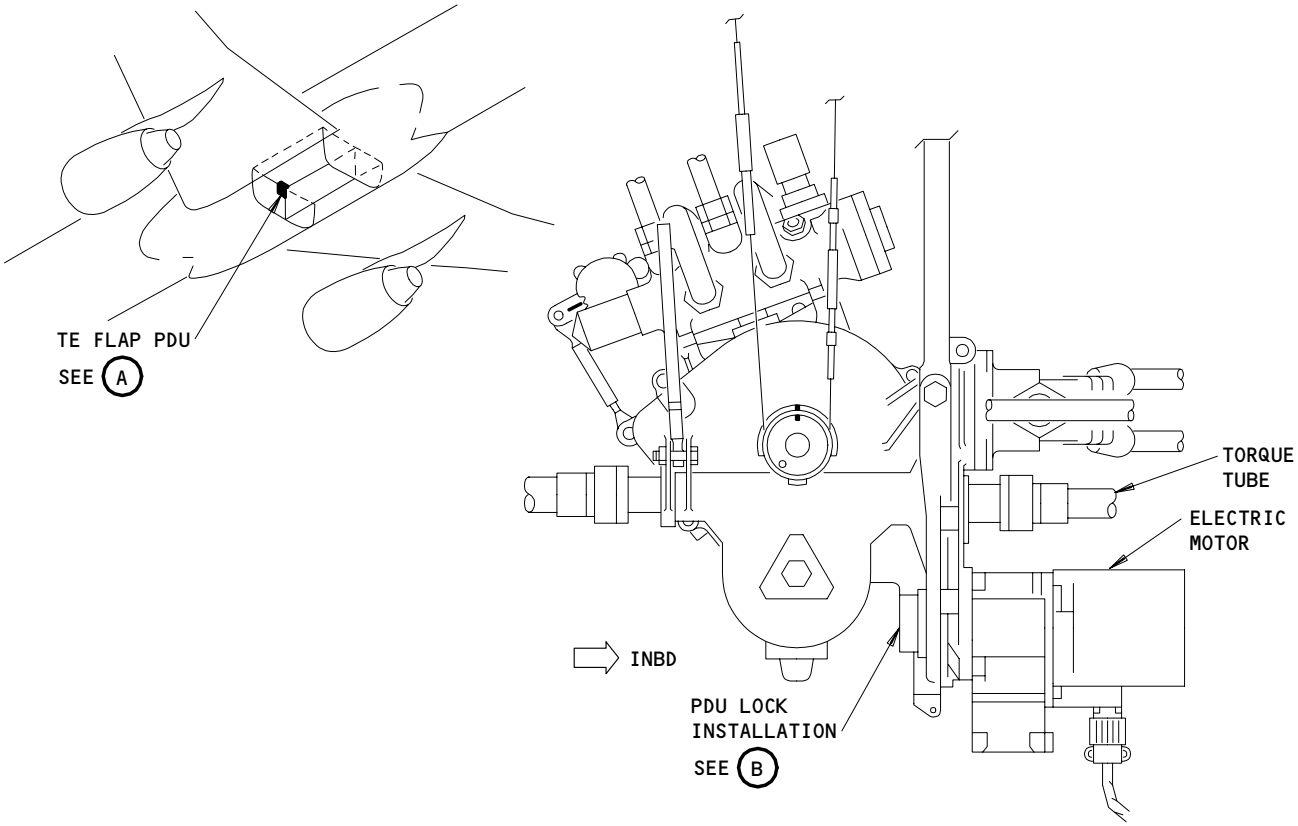




GEARBOX LOCATIONS

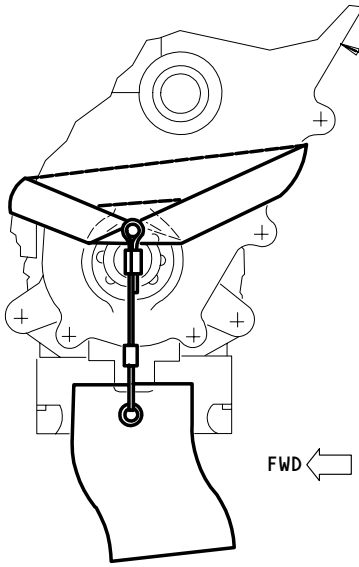
A

Inboard Angle Gearbox Inboard TE Flaps
Figure 401



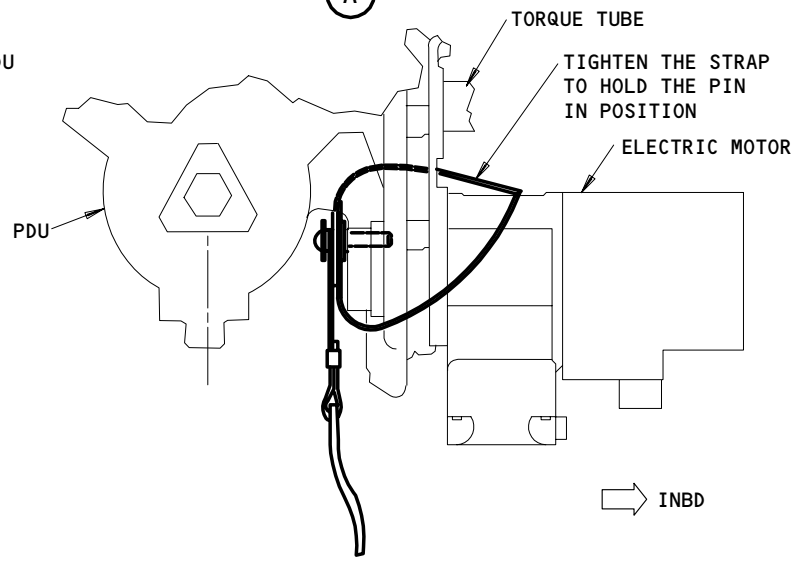
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 402

229549

S 864-004
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

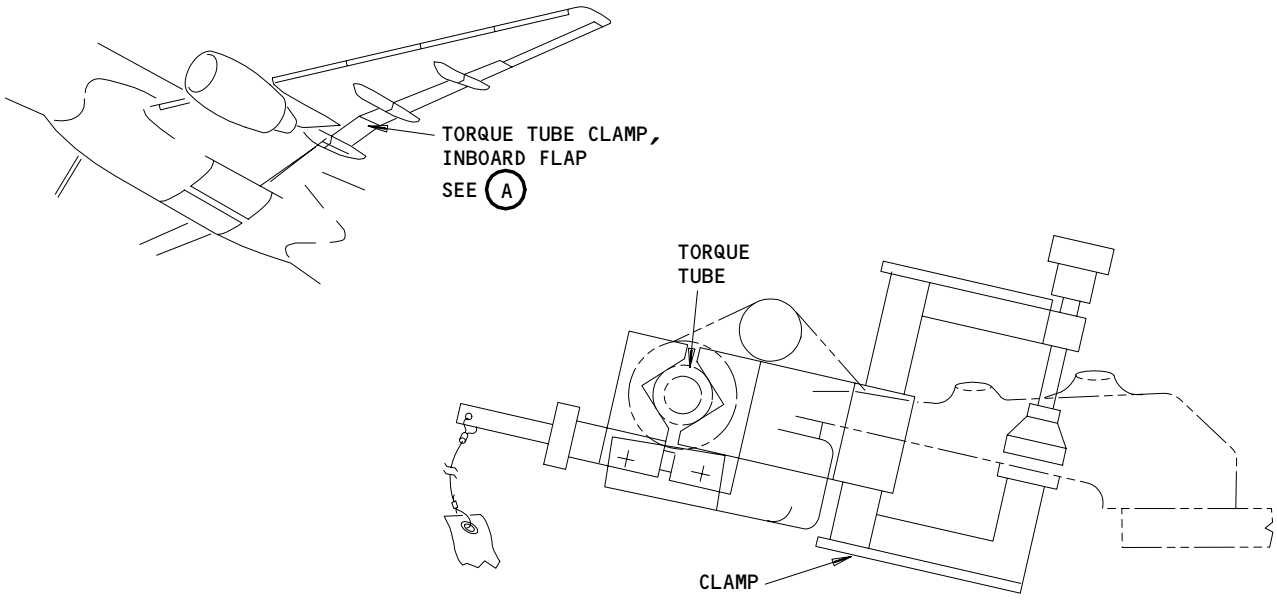
S 864-005
(6) Open these circuit breakers on the main power distribution panel, P6, and install DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-006
(7) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-007
(8) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Angle Gearbox (Fig. 401)

S 034-008
(1) Disconnect the forward torque tube at the coupling.



Torque Tube Clamp
Figure 403

S 494-009
(2) Use a clamp on the torque tube to prevent all movement (Fig. 403).

S 034-010
(3) Remove the three mounting bolts.

S 024-011
(4) Lift the gearbox off of the splines of the drive shaft.

S 494-012
(5) Use a clamp on the drive shaft to prevent all movement.

TASK 27-51-09-424-013

3. Install the Inboard Angle Gearbox

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) C00308 Compound - Corrosion Preventive, Petroleum Hot Application, MIL-C-11796 Class 3

B. References
(1) 24-22-00/201, Electrical Power Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Angle Gearbox (Fig. 401)

S 214-014
(1) Make sure that the flap and slat drive systems are off.

S 644-015
(2) Lubricate the torque tube and the drive shaft splines.

S 624-016
(3) Apply the corrosion preventive compound to the bolt holes.

S 424-017
(4) Do these steps to install the angle gearbox:
(a) Lower the angle gearbox on the drive shaft and engage the splines.
(b) Attach the angle gearbox to the airplane with the mounting bolts.
(c) Attach the forward torque tube to the coupling.
(d) Install the coupling screws.
(e) Safety the screws together with wire.

S 644-018
(5) Do these steps to lubricate the assembly:
(a) Move the torque tube in the inboard direction until it touches the coupling.
(b) Fill the inboard coupling reservoir with grease through lubrication holes.
(c) Move the torque tube in the outboard direction until it touches the coupling.
(d) Fill the outboard coupling reservoir with grease through lubrication holes.

S 094-019
(6) Remove the clamps from the torque tubes and the drive shaft (Fig. 403).

S 094-020
(7) Remove the PDU lock from the TE flap PDU (Fig. 402).

E. Operational Test for the Angle Gearbox Installation

S 864-021
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B

(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-022

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-023

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the left hydraulic system (Ref 29-11-00).

S 494-024

(4) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 214-004

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(5) Move the flaps between the fully retracted and the fully extended positions.
(a) Make sure that the gearbox operates correctly.
(b) Make sure that the flaps move to the correct positions.

F. Put the Airplane Back to Its Usual Condition

S 494-026

WARNING: USE THE PROCEDURE IN 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 864-027

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-028

(3) Remove electrical power if it is not necessary (Ref 24-22-00).

INBOARD TRAILING EDGE FLAP DRIVE OUTBOARD ANGLE GEARBOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the outboard angle gearbox from the inboard trailing edge (TE) flap. The second task installs the outboard angle gearbox.

   TASK 27-51-10-024-028

2. Remove the Outboard Angle Gearbox from the Inboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) TE Flap Torque Tube Clamp Set - B27055-1
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks.
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
550/650	Wing Trailing Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-001
      (1) Make sure the TE flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

      S 214-002
      (2) Make sure the downlocks are installed on the nose and main landing gears (AMM 32-00-20/201).

      S 864-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-004
      (4) Supply electrical power (AMM 24-22-00/201).

S 864-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 214-006

(6) Move the flap control lever to the 30-unit detent and make sure that the TE flaps move to the fully extended position.

S 494-029

(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-007

(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-008

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-009

(10) Open these circuit breakers on the main power distribution panel, P6, and install DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-010

(11) Install a PDU lock on the TE flap PDU (Fig. 403).

E. Remove the Angle Gearbox

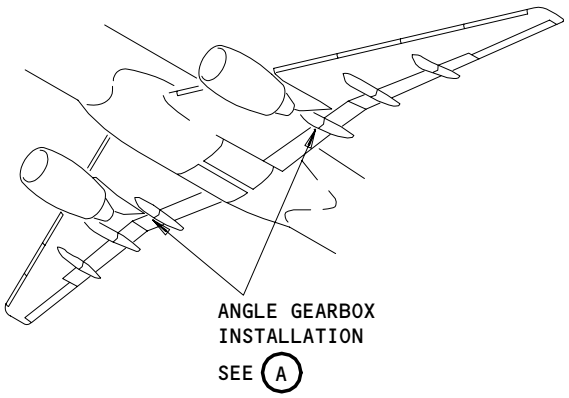
S 014-011

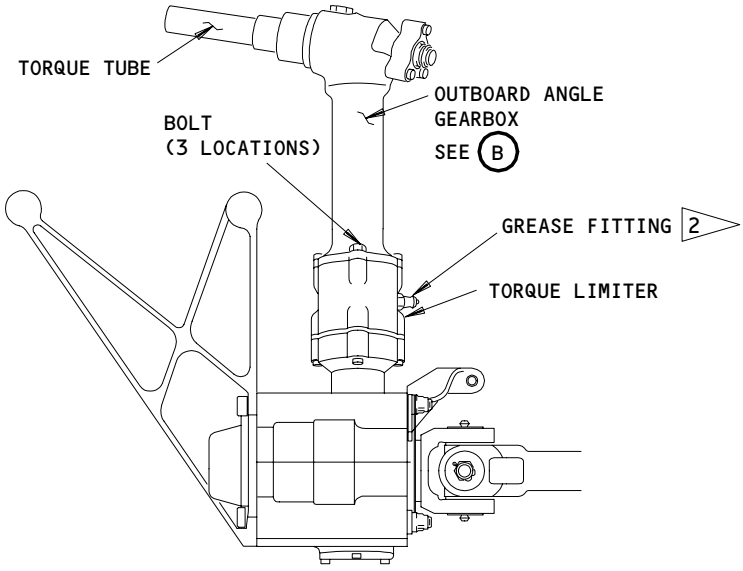
(1) Remove the forward fairing of the flap track (AMM 27-51-30/201).

S 494-012

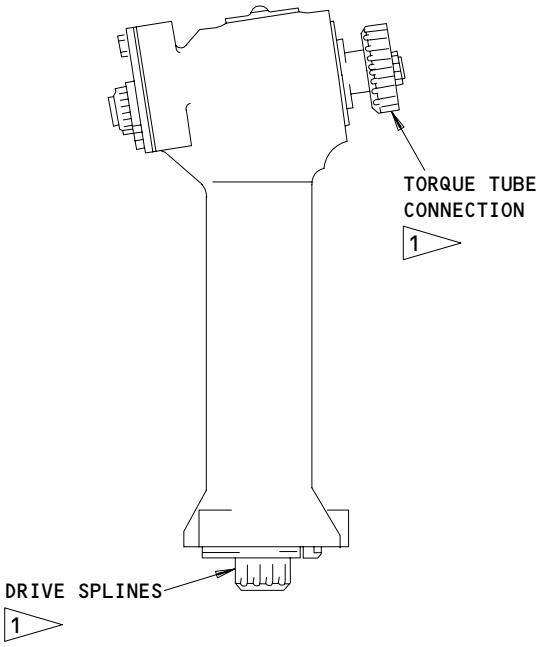
(2) Install clamps on the torque tube and the ballscrew to hold weight and to prevent movement (Fig. 402).

NOTE: Do not turn the torque tube while you install the clamp. A movement of the torque tube will make it necessary to adjust the flap drive system again.





ANGLE GEARBOX INSTALLATION
(A)

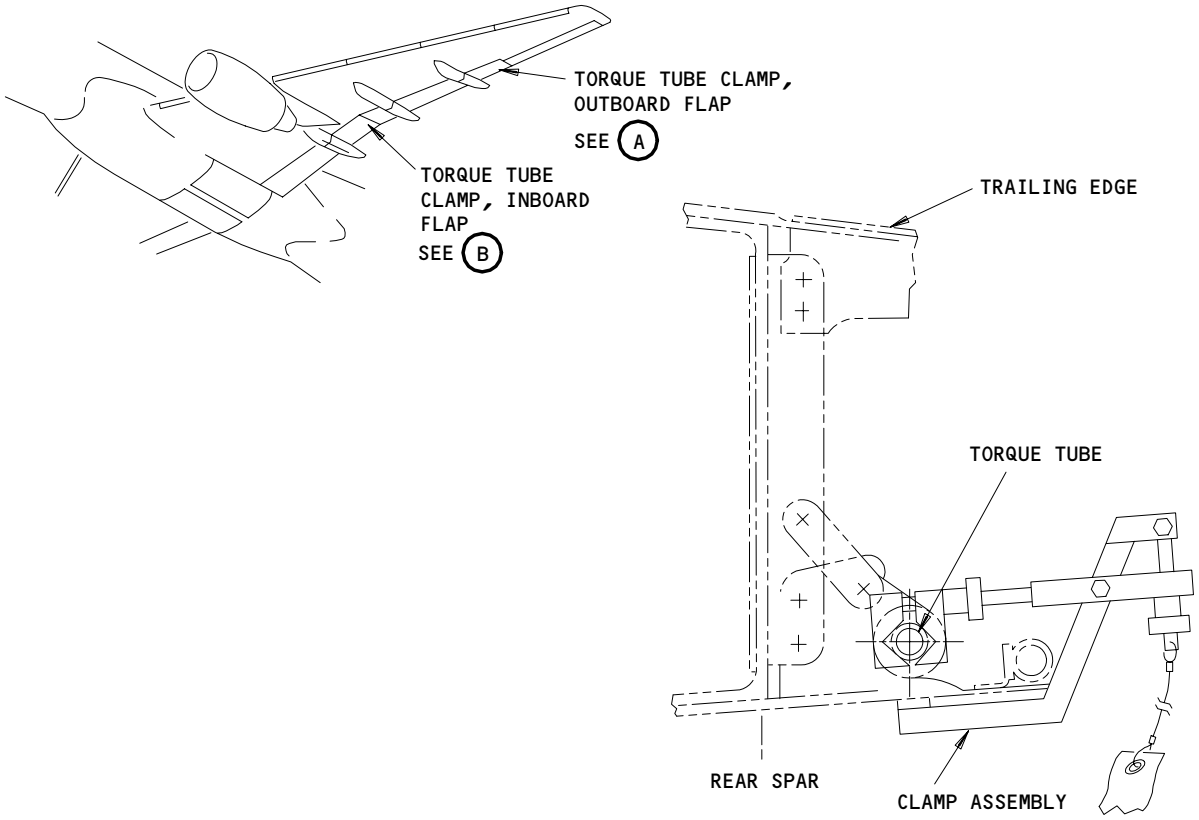


OUTBOARD ANGLE GEARBOX
(B)

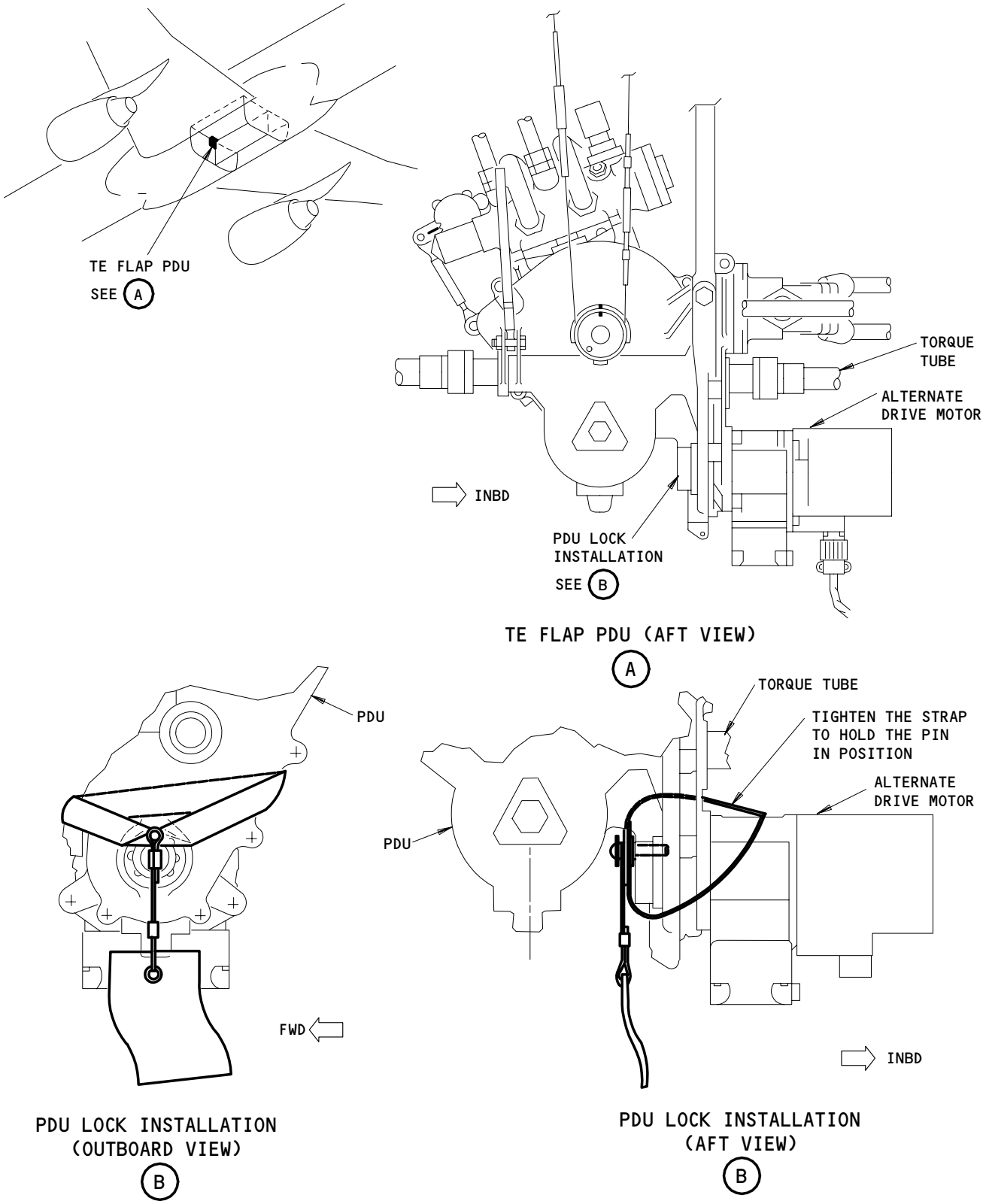
1 APPLY A THIN LAYER OF GREASE BEFORE THE INSTALLATION.

2 FILL WITH GREASE AFTER INSTALLATION, UNTIL GREASE FLOWS FROM THE LOWER VENT HOLES.

Outboard Angle Gearbox of the Inboard TE Flaps
Figure 401



Torque Tube Clamp
Figure 402



PDU Lock for the TE Flap PDU
Figure 403

S 034-013
(3) Disconnect the torque tube at the coupling connection.

S 034-014
(4) Remove the three bolts that attach the angle gearbox to the flap transmission (View A, Fig. 401).

S 024-030
(5) Lift the angle gearbox straight up to disengage the splines and remove it from the flap transmission.

TASK 27-51-10-424-031

3. Install the Outboard Angle Gearbox for the Inboard TE Flap

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) D00467 Fluid - Landing gear shock strut, BMS3-32, Type II
(5) D00590 Fluid - Flap drive system, Brayco 795
(6) A00247 Sealant - BMS 5-95 Class B or C

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairings
(3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
550/650	Wing Trailing Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Angle Gearbox

S 214-015
(1) Make sure that the flap drive systems are off.

S 214-036
(2) Make sure the sealant plug is installed in the inner diameter of the input shaft.

S 644-016
(3) Apply grease to the drive splines at the flap transmission connection and at the torque tube connection (View B, Fig. 401).

S 424-032
(4) Do these steps to install the angle gearbox:
(a) Lower the angle gearbox on the flap transmission and engage the drive splines.
(b) Attach the angle gearbox to the flap transmission with three bolts (View A).
(c) Connect the torque tube.
(d) Install the coupling screws and lock with a wire.
(e) Move the torque tube to one end until the coupling touches the mating structure.
(f) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).
(g) AIRPLANES WITH A GREASE FITTING;
Fill the torque limiter with grease through the grease fitting until grease flows from the lower vent holes.
(h) AIRPLANES WITH AN OIL FILL PORT;
fill the torque limiter with oil.

NOTE: Use Brayco 795 as the preferred alternative to BMS 3-32, Type II to lubricate the torque limiters.

(i) Apply sealant to the seams of the torque limiter housing.
(j) Move the torque tube to the opposite end until the coupling touches the mating structure.
(k) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).
(l) Move and adjust the torque tube to its middle position.

S 094-018
(5) Remove the clamps from the torque tube and the ballscrew.

S 094-019
(6) Remove the PDU lock from the TE flap PDU (Fig. 403).

S 864-020
(7) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-021
(8) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

E. Operational Test for the Angle Gearbox Installation

S 214-022
(1) Make sure the position on the flap control lever agrees with the position of the TE flaps.

S 094-033
(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-023

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-034

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(4) Move the flap control lever to the zero (FLAPS UP) detent.
(a) Permit the TE flaps to move to the fully retracted position.

S 864-035
(5) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent, and from the 30-unit detent back to the zero detent.
(a) Stop at each detent to permit the TE flaps and the LE slats to move to the correct position.
(b) At each detent, make sure the TRAILING EDGE and LEADING EDGE lights on the P3 panel are off and there are no messages on the EICAS display.
(c) Make sure the angle gearboxes operate correctly during each flap cycle.

F. Put the Airplane Back to Its Usual Condition

S 414-024
(1) Install the forward fairing for the flap track (AMM 27-51-30/201).

S 414-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-026

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-027

(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP BALLSCREW - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the ballscrew for the Inboard Trailing Edge (TE) Flap. The second task installs the ballscrew.

   TASK 27-51-11-024-001

2. Remove the Ballscrew for the Inboard TE Flap
   A. Equipment
      (1) Inboard TE Flap Lock Components from the Inboard TE Flap Lock Equipment - B27016-37:
         (a) Inboard Track Support Assembly - B27016-2 (Left Wing)
         (b) Inboard Track Support Assembly - B27016-3 (Right Wing)
         (c) Inboard Track Stop Assembly - B27016-38
         (d) Outboard Track Stop Assembly - B27016-39
      (2) TE Flap PDU Lock - B27008-1
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-51-30/201, Inboard TE Flap Track Fairings
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-002
      (1) Make sure the TE flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-004
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-007
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

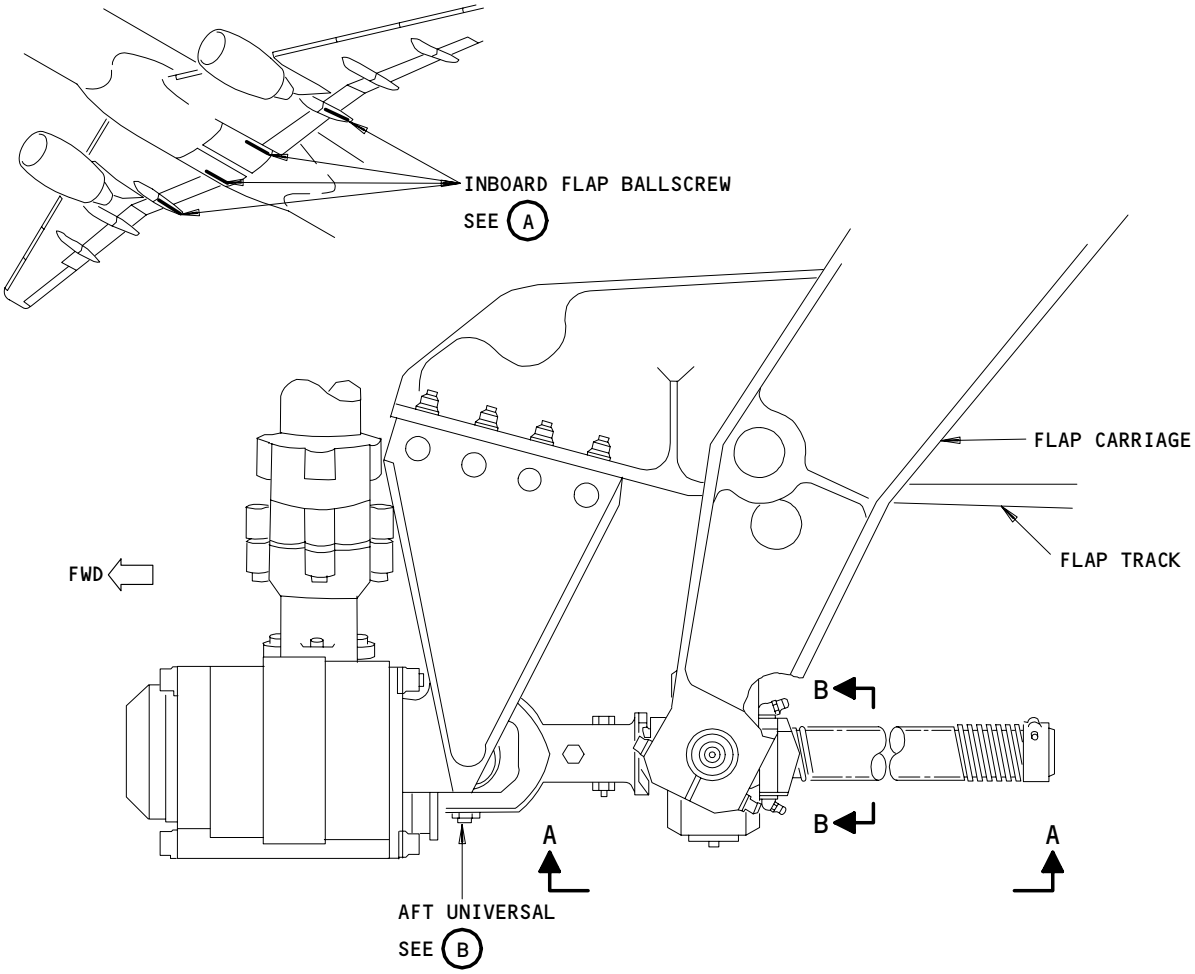
S 864-009
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-010
(8) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Ballscrew (Fig. 401)

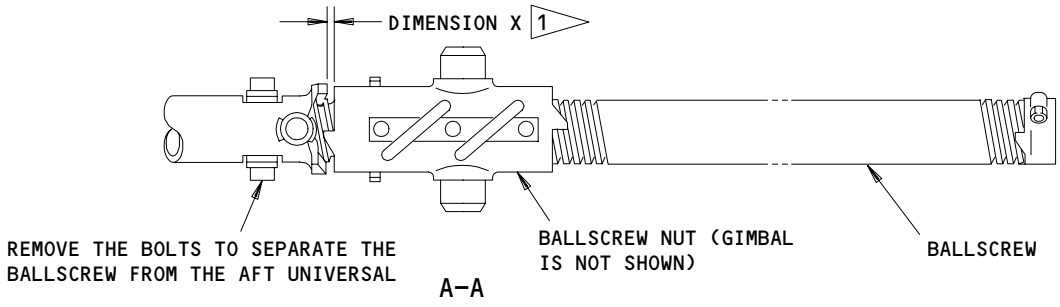
S 014-011
(1) To get access to the outboard transmission and ballscrew, remove the inboard fairing for the flap track (AMM 27-51-30/201).

S 494-012
(2) Install the lock equipment for the inboard TE flap to hold the TE flaps in the retracted position as follows (Fig. 403):
(a) Hold the inboard flap carriage in its position with the support assembly (-2 or -3) and the inboard stop assembly (-4).
(b) Hold the outboard flap carriage in its position with the outboard stop assembly (-5) and the strap and fish pole hoist.



INBOARD FLAP BALLSCREW
INBOARD TRANSMISSION SHOWN
(OUTBOARD TRANSMISSION OPPOSITE)

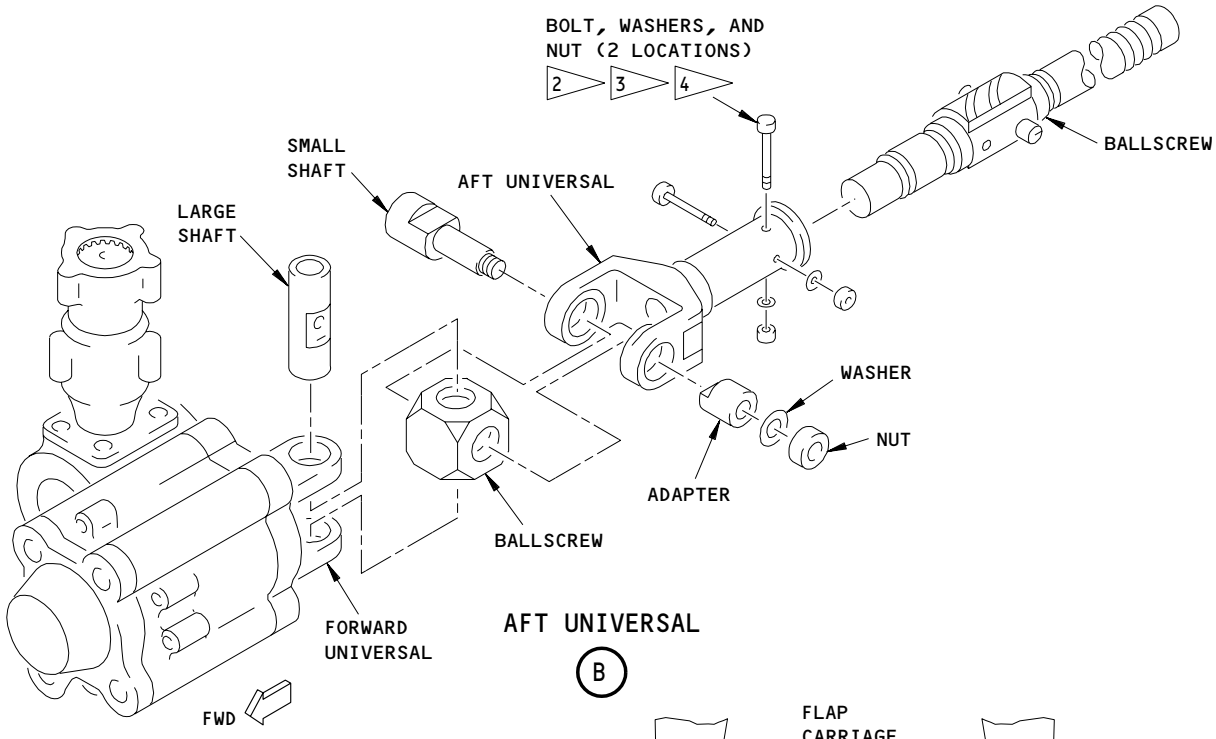
A



A–A

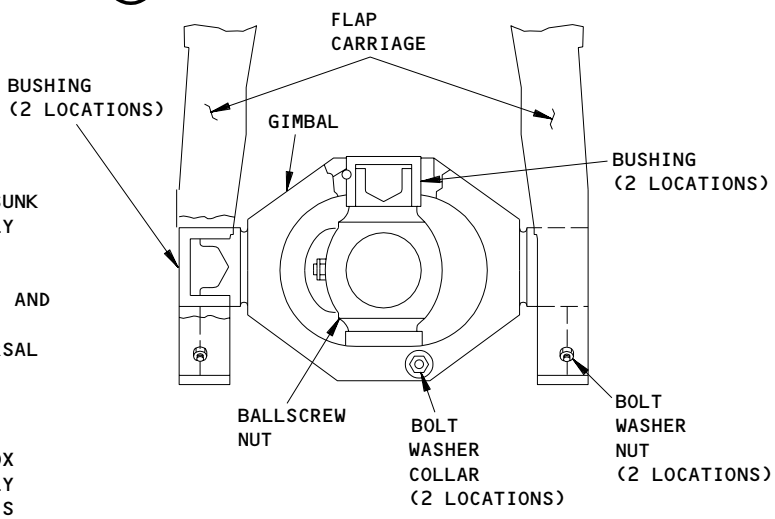
1 MEASURE DIMENSION X BEFORE YOU REMOVE THE BALLSCREW TO HELP IN THE INSTALLATION PROCEDURE.

Ballscrew Installation for the Inboard TE Flaps
Figure 401 (Sheet 1)



AFT UNIVERSAL

B



BALLSCREW NUT AND GIMBAL

B-B

2 INSTALL THE WASHERS WITH THE COUNTERSUNK SIDE ADJACENT TO THE BOLT HEAD. APPLY BMS 5-95 (251N4010-7 THRU -10 AND 251N4011-15 THRU -18) OR BMS 3-27 (MASTINOX 6856K) (251N4010-15 AND ON, AND 251N4011-23 AND ON) TO THE MATING SURFACES OF THE BOLTS, THE AFT UNIVERSAL JOINT, AND THE BALLSCREW

3 WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES. IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSON.

4 CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES WHICH WILL BE LUBRICATED AND FROM SURFACES THAT MOVE. YOU CAN CAUSE FAILURE OF MOVING PARTS IF YOU APPLY MASTINOX TO SURFACES THAT MOVE.

Ballscrew Installation for the Inboard TE Flaps
Figure 401 (Sheet 2)

S 224-013
(3) Measure the dimension X between the left universal and the ballscrew nut (View A-A).

S 974-014
(4) Keep a record of the dimension X.

S 034-015
(5) Remove the nut on the aft universal and lightly hit the small shaft to isolate the universal parts (View B).

S 034-016
(6) Remove the bolts and the bushings that attach the gimbal to the flap carriage (View B-B).

S 024-017
(7) Move the gimbal shafts through the grooves on the carriage, and remove the ballscrew and the gimbal.

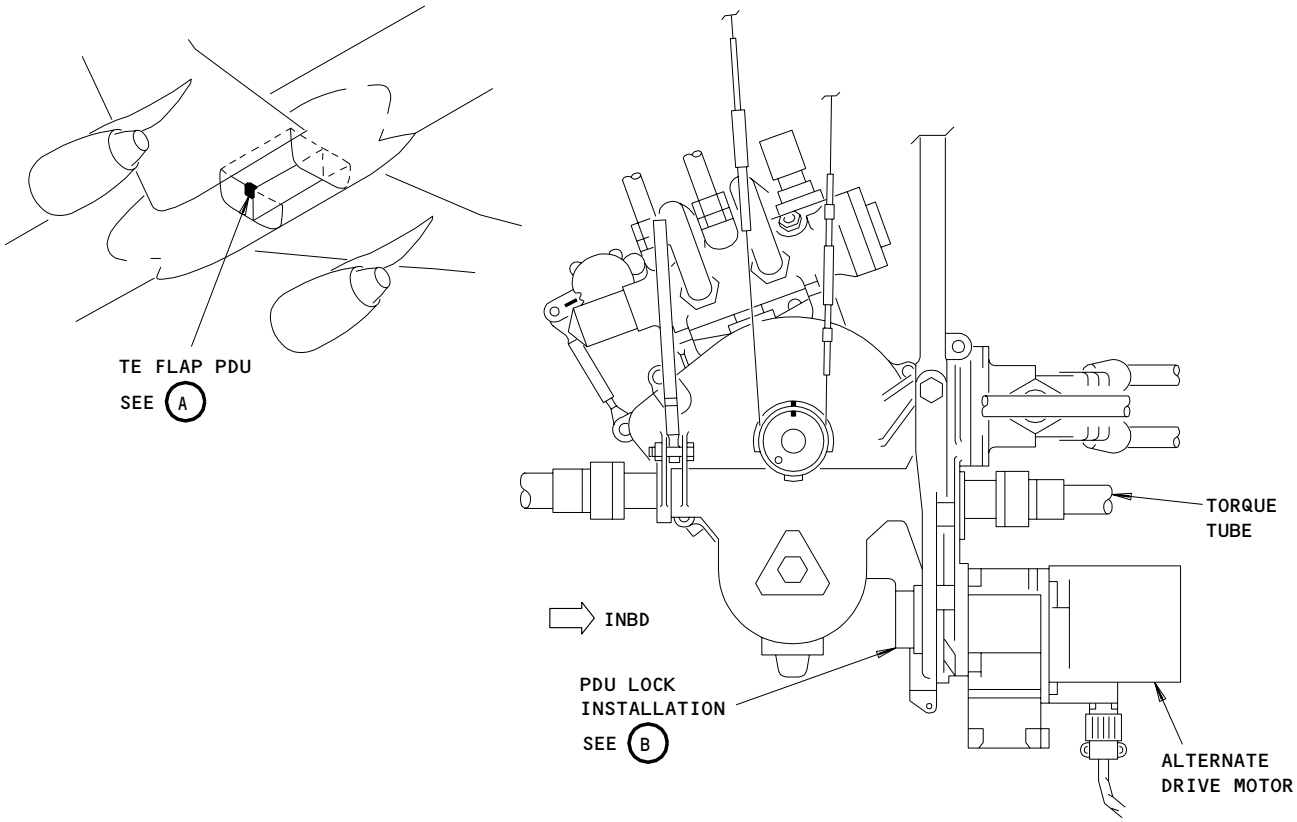
S 034-018
(8) Remove the bolts and the bushings that attach the gimbal to the ballscrew nut (View B-B).

S 024-019
(9) Turn the ballscrew nut 90 degrees until the ballscrew nut and the gimbal shafts align and remove the gimbal from the ballscrew.

NOTE: If it is necessary, isolate the aft universal from the ballscrew as shown in View B.

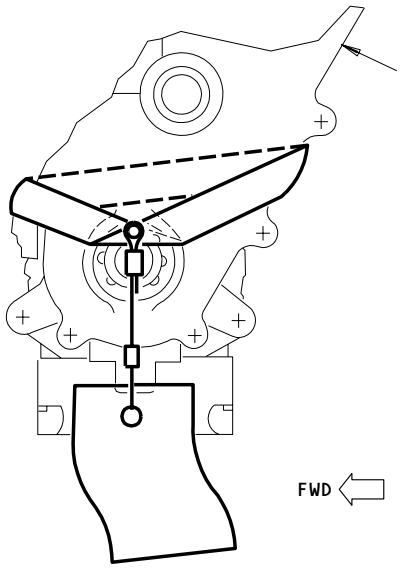
TASK 27-51-11-424-020

3. Install the Ballscrew for the Inboard TE Flap (Fig. 401)
   A. Consumable Materials
      (1) C00259 Primer - BMS 10-11, Type 1



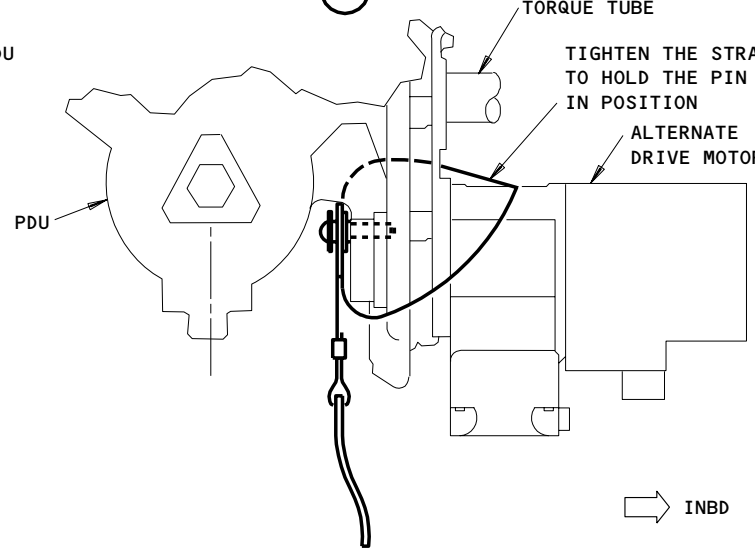
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

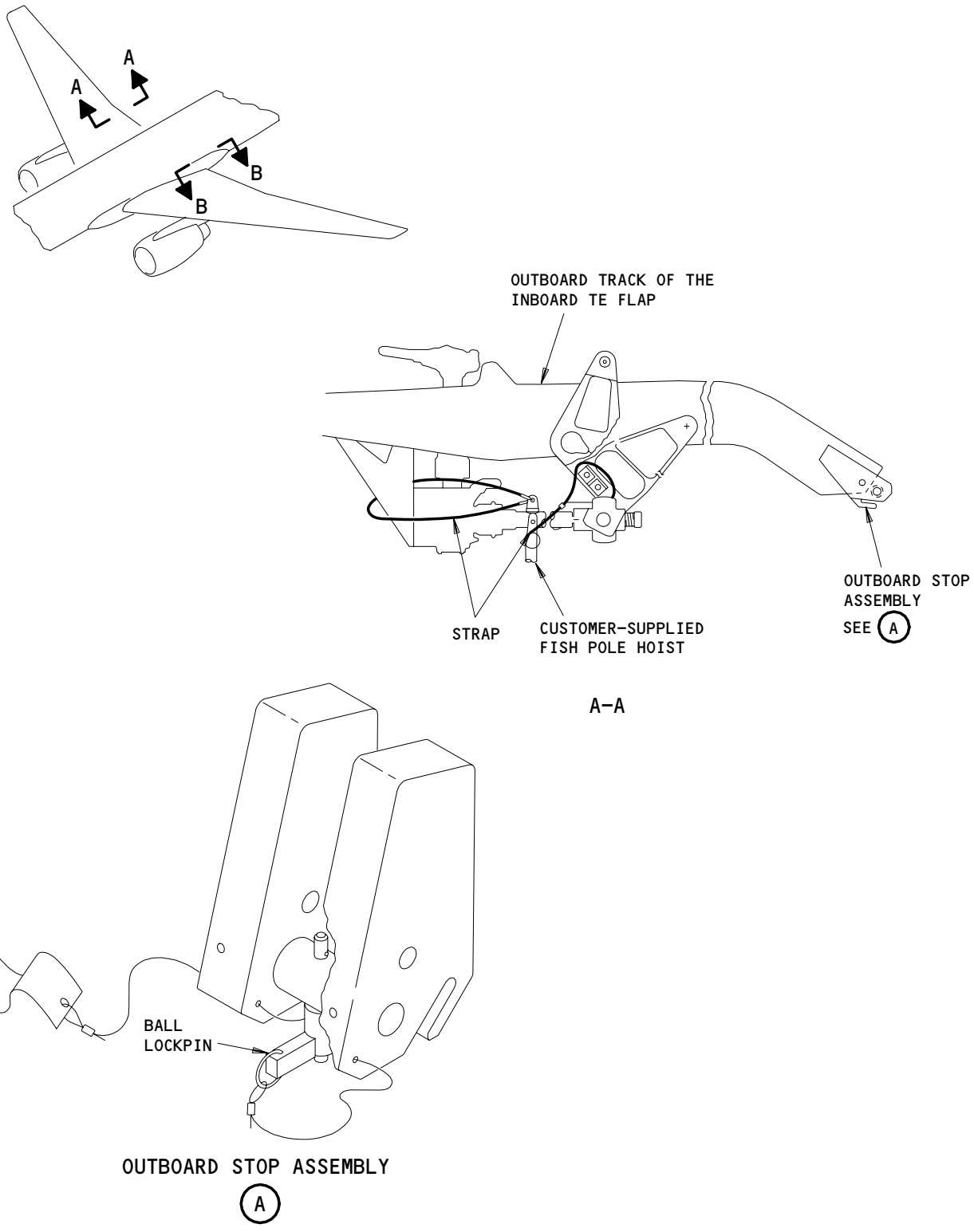
B



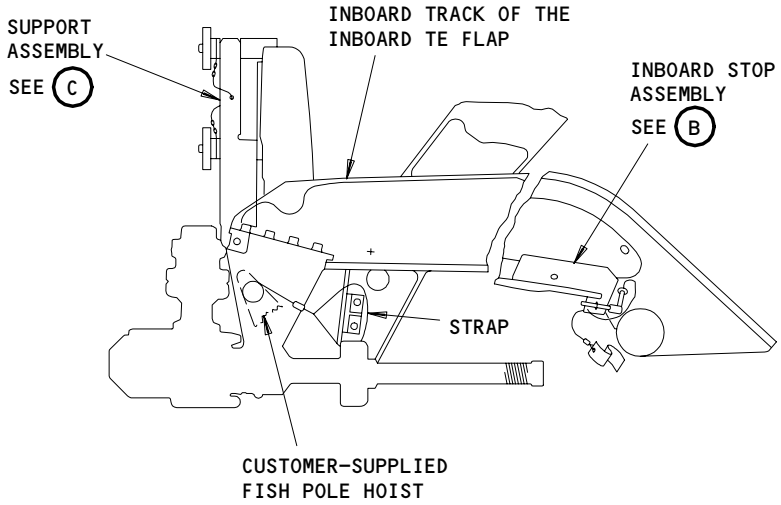
PDU LOCK INSTALLATION
(AFT VIEW)

B

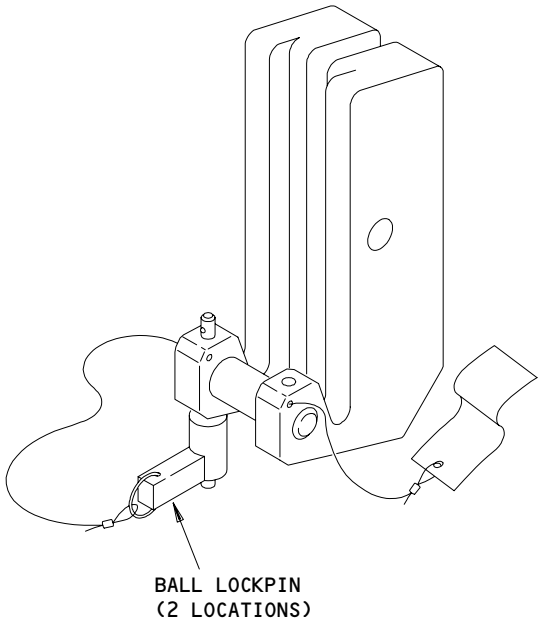
PDU Lock for the TE Flap PDU
Figure 402



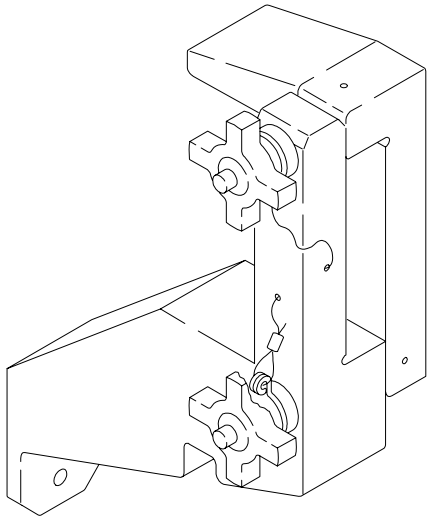
Lock Equipment for the Inboard Flap
Figure 403 (Sheet 1)



B-B



INBOARD STOP ASSEMBLY
B



SUPPORT ASSEMBLY (EXAMPLE)
C

Lock Equipment for the Inboard Flap
Figure 403 (Sheet 2)

(2) A00247 Sealant - BMS 5-95, Class B or C
(3) C00913 Corrosion Inhibiting Compound - BMS 3-27 (Preferred)
(4) C50056 Compound - Non-drying Corrosion Inhibiting Resin Mix, BMS 3-38 (Alternate)
(5) G50136 Paste - Corrosion Inhibiting, Non-drying BMS 3-38 (Alternate)
(6) G50237 Compound - Corrosion Inhibiting Non-drying Cor-Ban 27L, BMS 3-38 (Alternate)
(7) D00633 Grease - BMS 3-33 (Preferred)
(8) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(9) D00015 Grease - BMS 3-24 (Alternate)

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-51-30/201, Inboard TE Flap Track Fairings
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Ballscrew

S 434-021
(1) If it is necessary, connect the aft universal to the ballscrew as shown in View B.

S 644-042

CAUTION: USE A HANDPUMP TO LUBRICATE THE BALLSCREW. PRESSURE PUMPS CAN CAUSE DAMAGE TO THE SEALS AND CAUSE A FAILURE.

(2) Lubricate the ballscrew nut through the fittings.
(a) Move the ballscrew nut along the full length of the ballscrew to lubricate the ballscrew.

S 214-022
(3) Make sure that the TE flap drive systems are off.

S 424-023
(4) Do these steps to install the gimbal on the ballscrew nut (View B-B):
(a) Move the gimbal along the ballscrew nut with the shafts of the two parts aligned.

(b) Turn the ballscrew nut, 90 degrees, to align the shafts with the bushing holes.
(c) Install the bushings on each side of the gimbal with the grooves in the bushings aligned with the bolt holes on the gimbal.
(d) Install the bolts that attach the gimbal to the ballscrew nut.

S 424-024
(5) Do these steps to install the gimbal to the flap carriage (View B-B):
(a) Put the gimbal shafts through the clearance groove on the flap carriage to make sure the gimbal shafts and the bushing holes align.
(b) Install the bushings on each side of the flap carriage with the grooves in the bushings aligned with the bolt holes on the flap carriage.

S 434-025
(6) Install the bolts that attach the gimbal to the flap carriage.

S 824-026
(7) Turn the ballscrew nut until you get the dimension X that you measured in the removal (View A-A).

S 424-027
(8) Do these steps to install the aft universal to the flap transmission (View B-B).
(a) Put the spacer bearing in the forward universal.
(b) Install the large shaft through the forward universal and the spacer bearing.
(c) Put the aft universal in its corrrect position and make sure the holes in the spacer bearing align with the holes in the aft universal.
(d) Install the small shaft with a washer.
1) Attach the nut with the grease, BMS 3-24.

NOTE: The self-locking part of the nut must have a run-on torque of 30 - 100 pound-inches (3.4-11.2 Nm), with no axial load on the nut and the thread fully engaged. The bolt thread must extend beyond the locking part of the nut. Replace the nut if the minimum run-on torque is not met.

(e) Torque the nut to 440-650 pound-inches (49.8-73.4 Nm).

S 644-028
(9) Lubricate the universal joint at the grease fittings.

E. Operational Test for the Ballscrew Installation

S 094-029
(1) Remove the TE flap supports (Fig. 403).

S 094-030
(2) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 864-031
(3) Supply electrical power (AMM 24-22-00/201).

S 864-032
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-033
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 214-034
(6) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 094-035
(7) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(8) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-037

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(9) Move the flaps, between the fully retracted and the fully extended positions.
  (a) Make sure that the ballscrew components operate correctly.
  (b) Make sure that the flaps move to the correct positions.

F. Put the Airplane Back to Its Usual Condition

S 414-038

(1) Install the inboard fairings for the flap track (AMM 27-51-30/201).

S 414-039

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-040

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-041

(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP BALLSCREW - INSPECTION/CHECK

1. General
   A. There are three tasks in this procedure:
      (1) A check of the backlash in the ballscrew for the inboard trailing edge flaps.
      (2) A check of the ball return tubes on the ballscrew nuts for the inboard trailing edge flaps.
      (3) A check of the wear on the ballscrew gimbal:
         (a) The wear on the bushings that attach the gimbal to the carriage.
         (b) The wear on the journals of the gimbal.
         (c) The wear on the bushings that attach the ballnut to the gimbal.
         (d) The wear on the journals of the ballnut.

TASK 27-51-11-226-001

2. Inboard Trailing Edge Flap Ballscrew Backlash Check (Fig. 601)
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Measuring Assembly - Flap Screw Backlash - C27030-3
      (3) Backlash Tool - C27030-34 (Optional)

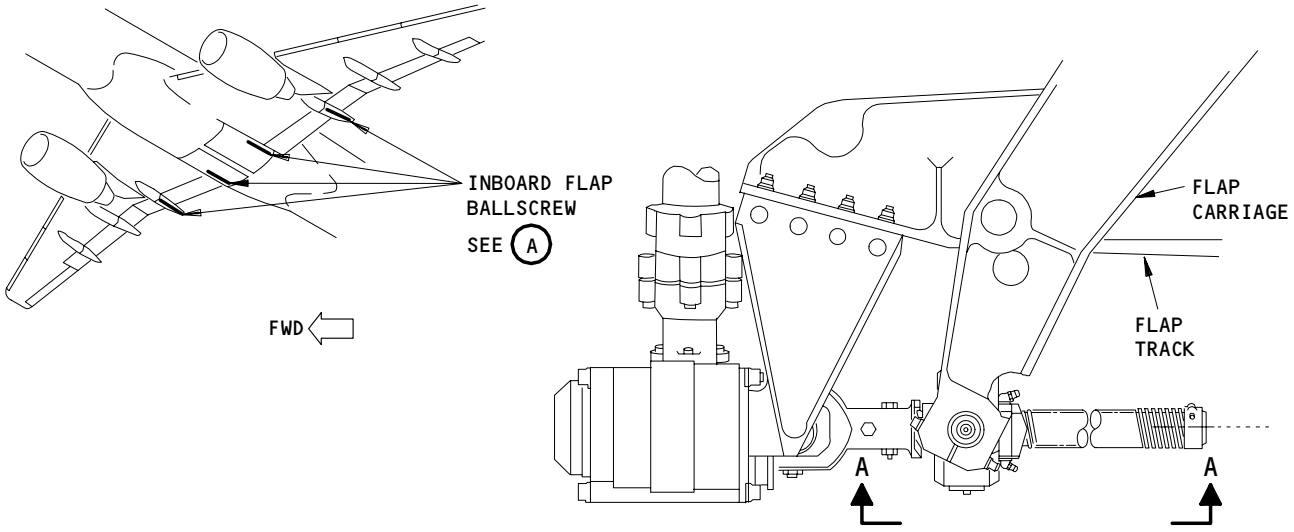
      NOTE: The C27030-3 is included in the C27030-33 Tool Kit

   B. References
      (1) AMM 24-22-00/201, Electrical Power
      (2) AMM 27-51-11/401, Inboard Trailing Edge Flap Ballscrew
      (3) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
      (4) AMM 29-11-00/201, Hydraulic System
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

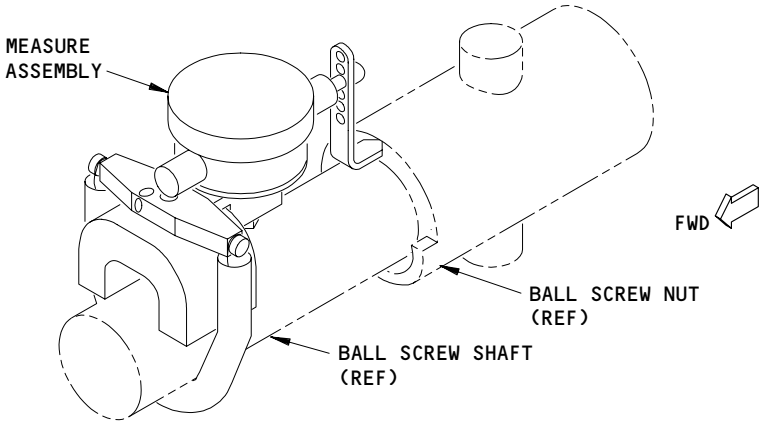
   D. Prepare for the Backlash Check

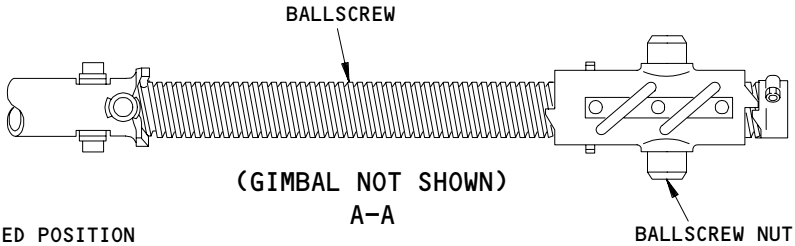
      S 216-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).



INBOARD FLAP BALLSCREW
INBOARD TRANSMISSION SHOWN
(OUTBOARD TRANSMISSION OPPOSITE)

(A)





(GIMBAL NOT SHOWN)
A-A

1 NUT SHOWN IN EXTENDED POSITION

Ballscrew for the Inboard TE Flaps
Figure 601

S 866-004

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-005

(3) Supply electrical power (AMM 24-22-00/201).

S 866-006

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-007

(5) Move the flap control lever to the 30-unit position to extend the flaps.

NOTE: If you use the optional C27030-34 Backlash Tool, extend the flaps to 20-unit position.

S 866-008

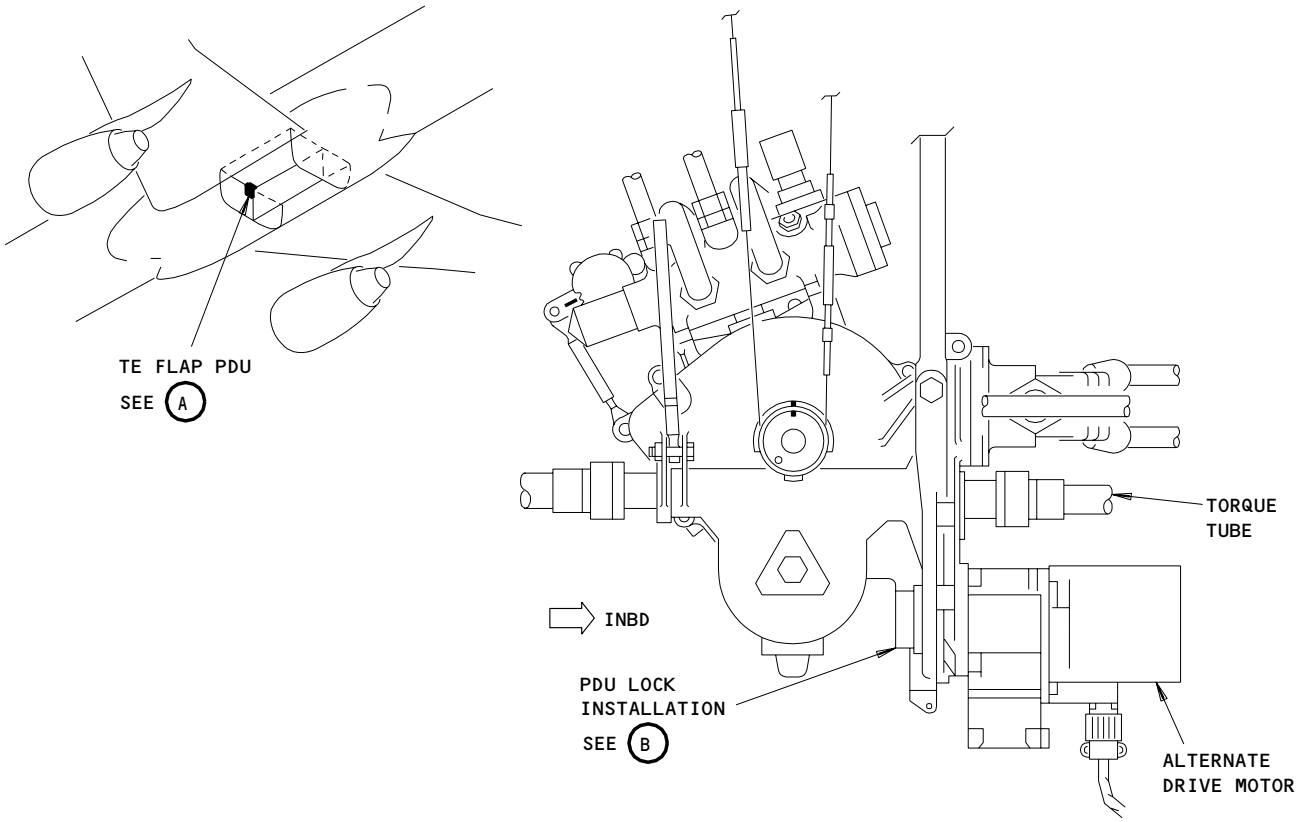
(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-009

(7) Open these circuit breakers and attach DO-NOT-CLOSE tags:
   (a) P6 Main Power Distribution Panel
      1) 6D20, ALTN SLAT PWR
      2) 6D23, ALTN FLAP PWR
   (b) P11 Overhead Panel
      1) 11B18, WARN ELEX B
      2) 11D31, HYDRAULICS PTU CONT
      3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
      4) 11J18, FLAP LOAD RELIEF
      5) 11J33, WARN ELEX A

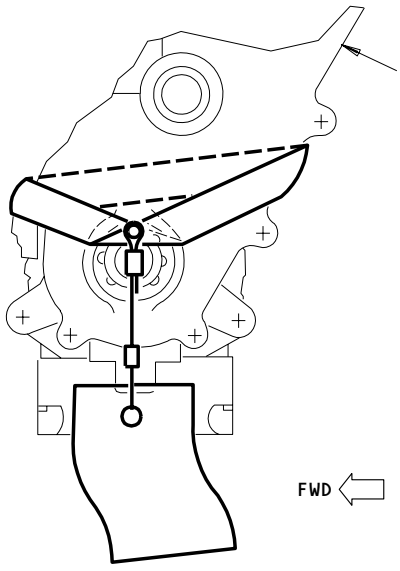
S 496-010

(8) Install a PDU lock on the TE flap PDU (Fig. 602).



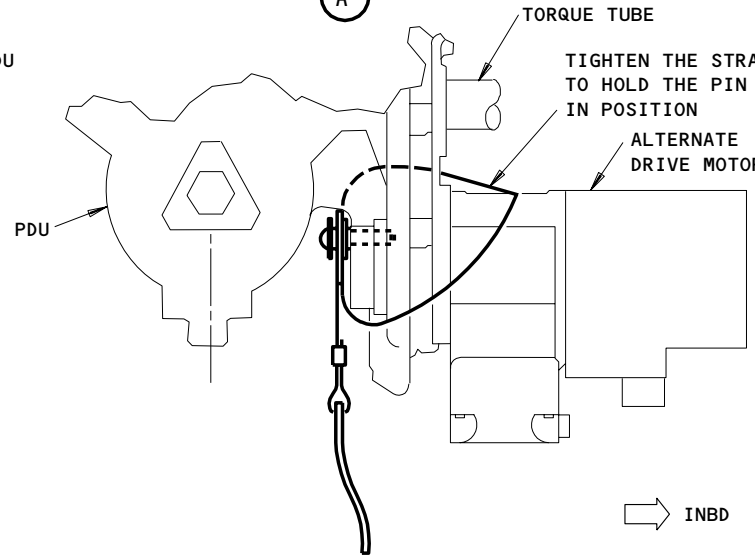
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 602

E. Inboard Flap Ballscrew Backlash Check

S 226-011

(1) Measure the backlash of the outboard ballscrew for the inboard flap (Fig. 601):

NOTE: You will use the dial indicator on the measuring assembly to measure the relative movement between the ballscrew and the ballnut.

(a) Install the measuring assmebly on the number 3 or 6 ballscrew, forward of the applicable ballnut.
1) Set the dial indicator to zero.
(b) Lift to remove backlash (free play) first. Then apply a lifting force of 50 pounds (222 newtons) to the flap fairing in the direction of the aft flap chord line.
(c) Make sure the maximum dial indicator reading is less than 0.0140 inch (0.355 mm).
(d) If the backlash value is not in the limit, install a new ballscrew (AMM 27-51-11/401).
(e) Remove the measuring assembly from the ballscrew.

S 226-012

(2) Measure the backlash of the inboard ballscrew for the inboard flap, without the optional backlash tool (C27030-34):

NOTE: You will use the dial indicator on the measuring assembly to measure the relative movement between the ballscrew and the ballnut.

(a) Install the measuring assembly on the number 4 or 5 ballscrew, forward of the ballnut.
1) Set the dial indicator to zero.

CAUTION: DO NOT APPLY THE FORCE PERPENDICULAR TO THE AFT FLAP CHORD LINE. YOU CAN CAUSE DAMAGE TO THE FLAP STRUCTURE.

(b) Lift to remove backlash (free play) first. Then apply a lifting force of 50 pounds (222 newtons) to the inboard trailing edge of the aft flap in the direction of the aft flap chord line.
(c) Make sure the maximum dial indicator reading is less than 0.0140 inch (0.355 mm).
(d) If the backlash value is not in the limit, install a new ballscrew (AMM 27-51-11/401).
(e) Remove the measuring assembly from the ballscrew.

S 226-020

(3) Measure the backlash of the inboard ballscrew for the inboard flap, with the optional backlash tool (C27030-34). Do the steps that follow to install the lever and clamp tool on the ballscrew:

NOTE: You will use the dial indicator on the measuring assembly to measure the relative movement between the ballscrew and the ballnut.

The lever and clamp tool is part of the C27030-33 tool kit and is a one piece tool. There is an adjustment screw which connect the clamp and the lever together. This screw can be loosened to adjust the two tools so the load noses fit correctly on the ballscrew. The kit tool box has a placard that shows how the tool is mounted.

(a) With a rag, clean the oil and the dirt from the surface of the ballscrew where the clamp of the lever and clamp tool will be attached.

(b) Attach the lever and clamp tool on the ballscrew, aft of the ballnut.

1) Move the lever and clamp along the ballscrew until the load noses of the tool touch the aft end of the ball nut.

NOTE: Make sure the load noses of the tool are set so that the handles of the tool are approximately in line with the ball nut trunnions.

2) Tighten the clamp to 200-300 pound inches (22.6-33.8 Nm).

NOTE: Make sure the handles of the lever assembly are in the relaxed position.

S 486-021

(4) Install the measuring assembly on the number 4 or 5 ballscrew, forward of the ball nut.

(a) Set the dial indicator to zero.

S 496-022

(5) Move the handles of the lever tool together until the movement on the dial indicator stops.

(a) Make sure the lever and clamp tool do not move along the length of the ballscrew when you move the handles together.

1) If the lever and clamp tool move, do the steps again to install the lever and clamp tool.

NOTE: It can be necessary to use a higher torque value if the tool moves but do not use a torque greater than 300 pounds inches (33.8 Nm).

2) Write down the value which is shown on the dial indicator.

NOTE: The value shown on the dial indicator is the value for the backlash of the ballscrew.

3) Do these steps a total of five times to make sure the dial indicator movement is repeatable and consistent.

4) Make sure the maximum dial indicator reading is less than 0.0140 inch (0.355 mm).

(b) If the backlash value is not in the limit, install a new ballscrew (AMM 27-51-11/401).

1) Remove the measuring assembly from the ballscrew.

2) Remove the lever tool assembly.

F. Put the Airplane Back to Its Usual Condition

S 096-013

(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-014

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P6 Main Power Distribution Panel

1) 6D20, ALTN SLAT PWR

2) 6D23, ALTN FLAP PWR

(b) P11 Overhead Panel

1) 11B18, WARN ELEX B

2) 11D31, HYDRAULIC PTU CONT

3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

4) 11J18, FLAP LOAD RELIEF

5) 11J33, WARN ELEX A

S 866-015

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-016

(4) Move the flap control lever to the UP position to retract the flaps.

S 866-017

(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-018

(6) Remove electrical power (AMM 24-22-00/201).

TASK 27-51-11-226-024

3. Inboard Trailing Edge Flap Ballscrew Nut Return Tube Check (Fig. 603)

A. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00015 Grease - BMS 3-24 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

B. Equipment

(1) Flush gun (grease gun)
(2) TE Flap PDU Lock - B27008-1

C. References

(1) AMM 24-22-00/201, Electrical Power
(2) AMM 27-51-11/401, Inboard Trailing Edge Flap Ballscrew
(3) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
(4) AMM 29-11-00/201, Hydraulic System
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

D. Access

(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

E. Prepare for the Return Tube Check

S 216-025

(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 866-026

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-027

(3) Supply electrical power (AMM 24-22-00/201).

S 866-028

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-029

(5) Move the flap control lever to the 30-unit position to extend the flaps.

S 866-030

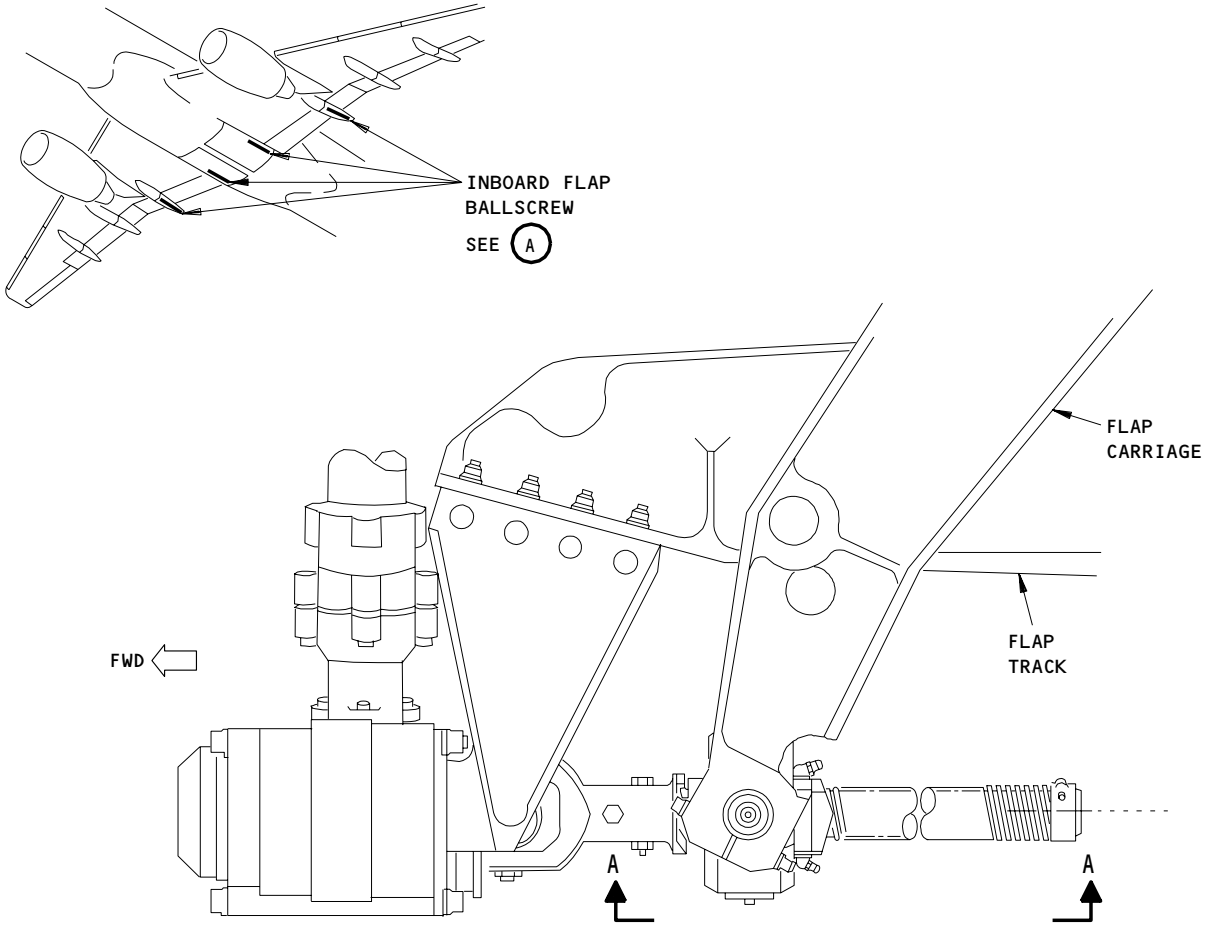
(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-031

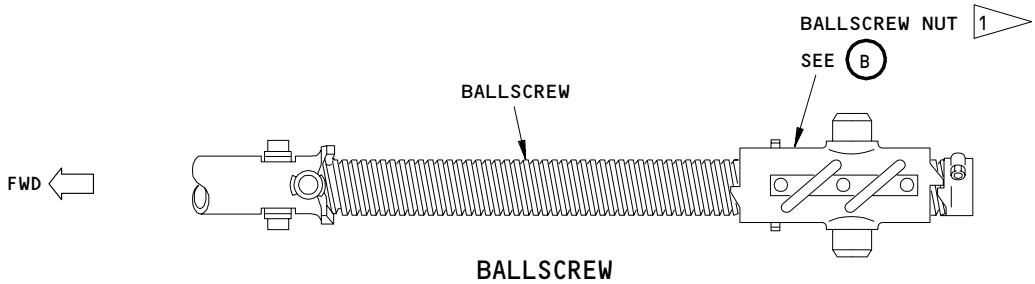
(7) Open these circuit breakers and attach DO-NOT-CLOSE tags:
   (a) P6 Main Power Distribution Panel
      1) 6D20, ALTN SLAT PWR
      2) 6D23, ALTN FLAP PWR
   (b) P11 Overhead Panel
      1) 11B18, WARN ELEX B
      2) 11D31, HYDRAULICS PTU CONT
      3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
      4) 11J18, FLAP LOAD RELIEF
      5) 11J33, WARN ELEX A

S 496-032

(8) Install a PDU lock on the TE flap PDU (Fig. 602).



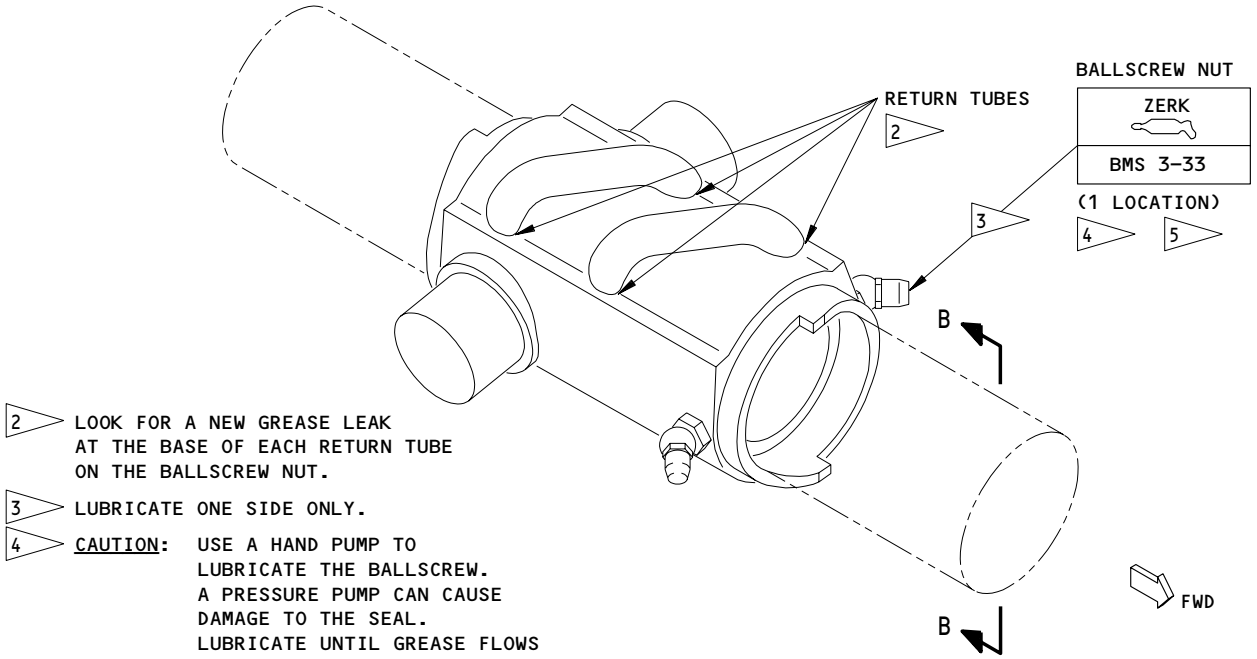
INBOARD FLAP BALLSCREW
INBOARD TRANSMISSION SHOWN
(OUTBOARD TRANSMISSION OPPOSITE)
A



BALLSCREW
(GIMBAL NOT SHOWN)
A-A

1 NUT SHOWN IN EXTENDED POSITION

Ballscrew Nut Inspection
Figure 603 (Sheet 1)



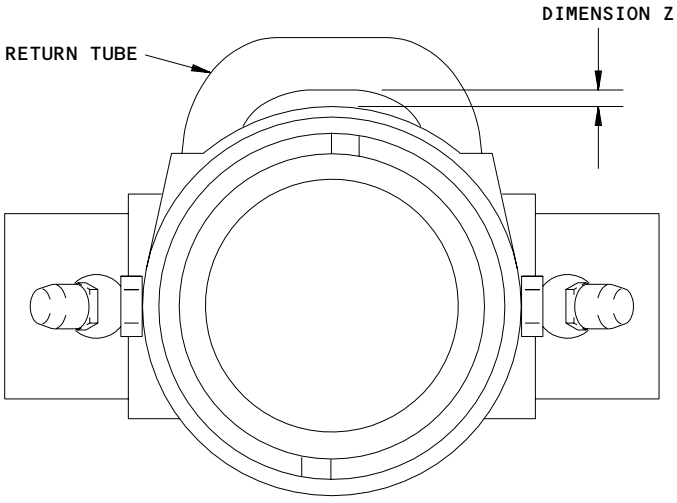
2 LOOK FOR A NEW GREASE LEAK AT THE BASE OF EACH RETURN TUBE ON THE BALLSCREW NUT.

3 LUBRICATE ONE SIDE ONLY.

4 CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. A PRESSURE PUMP CAN CAUSE DAMAGE TO THE SEAL. LUBRICATE UNTIL GREASE FLOWS OUT FROM THE BLEED HOLE.

5 BMS 3-33 RECOMMENDED
BMS 3-24 OPTIONAL
MIL-PRF-23827 ALTERNATIVE

BALLSCREW NUT
1 POINT
B



BALLSCREW NUT
B-B

Ballscrew Nut Inspection
Figure 603 (Sheet 2)

F. Inboard Flap Ballscrew Nut Return Tube Check (Fig. 603).

S 226-048

CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. A PRESSURE PUMP CAN CAUSE DAMAGE TO THE SEAL.

(1) Lubricate the ballnuts on the ballscrews of the inboard flap.

NOTE: You will add grease to the ballnut until grease flows out of the bleed hole.

(a) Look for a new grease leak at the base of each return tube on the ballscrew nut.
(b) If there is a new grease leak at the base of any of the return tubes, measure dimension Z on the ballscrew nut (Fig. 603).

NOTE: Dimension Z is the distance between the return tubes and the body of the ballscrew nut.

(c) If dimension Z is more than 0.060 inch (1.52 mm), then replace the ballscrew (AMM 27-51-11/401).

G. Put the Airplane Back to Its Usual Condition

S 096-038
(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-039
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULIC PTU CONT

3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 866-040

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-041

(4) Move the flap control lever to the UP position to retract the flaps.

S 866-042

(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-043

(6) Remove electrical power (AMM 24-22-00/201).

TASK 27-51-11-226-049

4. Inboard Trailing Edge Flap Ballscrew Inspection (Fig. 604)

A. Equipment
(1) Micrometer - 0 to 2 inch
(2) Vernier Caliper

B. References
(1) AMM 24-22-00/201, Electrical System
(2) AMM 27-51-11/401, Inboard Trailing Edge Flap Ballscrew
(3) AMM 29-11-00/201, Hydraulic System
(4) AMM 32-00-15/201, Landing Gear Door Ground Operations
(5) AMM 32-00-20/201, Landing Gear Downlocks

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

S 216-061

(1) Make sure the TE flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 496-062

(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 216-063
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-064

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-065
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-066
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 866-067
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 496-068
(8) Install a PDU lock on the TE flap PDU (Fig. 602).

E. Prepare for the Ballscrew Inspection

S 866-050
(1) Remove the applicable ballscrew (AMM 27-51-11/401).
(a) Remove the gimbal from the ballscrew that you removed.

S 226-051
(2) Do a check of the wear surfaces of the parts with a micrometer or vernier caliper as applicable (Fig. 604).
(a) Compare the dimensions measured with the permitted dimensions shown in Fig. 604.
(b) Repair or replace the parts that are not in the tolerance specified in Fig. 604.

S 866-052
(3) Reconnect the gimbal to the ballscrew.

S 866-053
(4) Reinstall the applicable ballscrew on the flap transmission (AMM 27-51-11/401).

F. Put the Airplane Back to Its Usual Condition

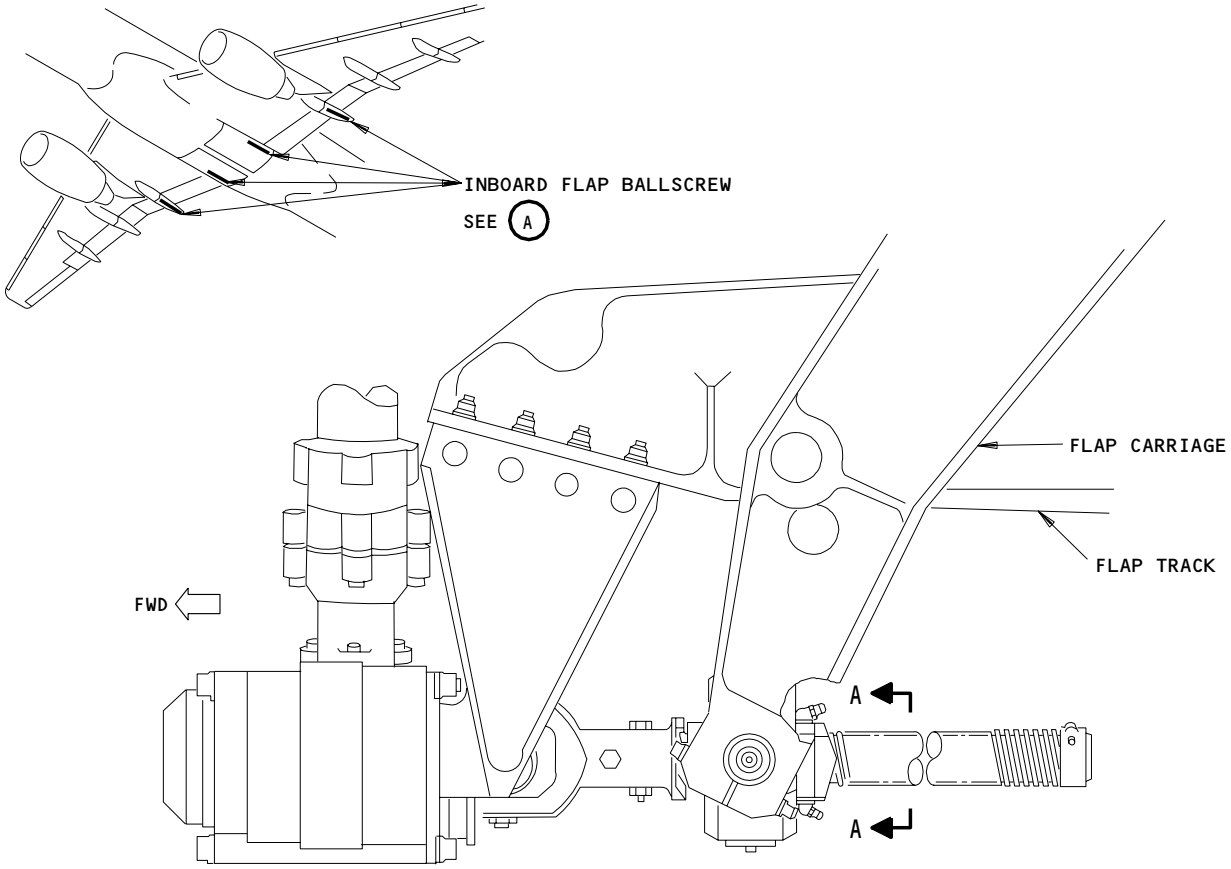
S 096-054
(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-055
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULIC PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 866-056

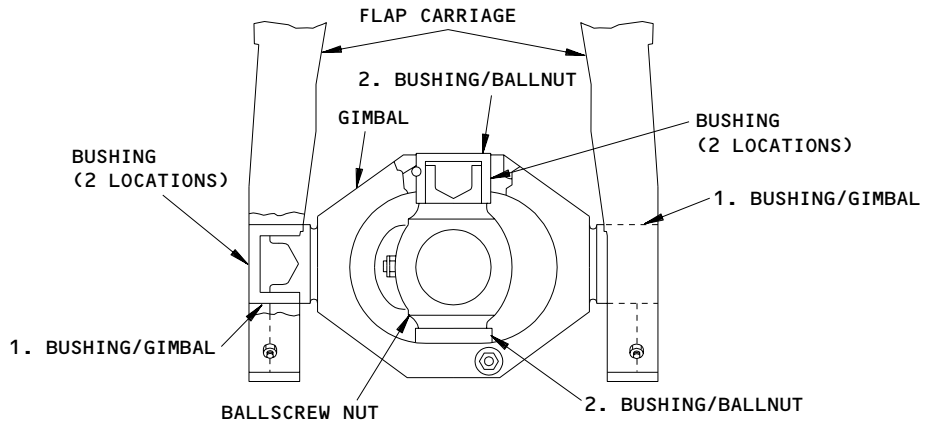
WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).



INBOARD FLAP BALLSCREW
(INBOARD TRANSMISSION IS SHOWN, OUTBOARD TRANSMISSION IS OPPOSITE)

(A)



BALLSCREW NUT AND GIMBAL
A-A

Flap Ballscrew Wear Limits
Figure 604 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	1.1255 (28.5877)	1.1275 (28.6385)	1.1355 (28.8417)	0.0120 (0.3048)	1		
	GIMBAL	OD	1.1240 (28.5496)	1.1250 (28.5750)	1.1235 (28.5369)			X	2
2	BUSHING	ID	1.1255 (28.5877)	1.1275 (28.6385)	1.1355 (28.8417)	0.0115 (0.2921)	1		
	BALLNUT	OD	1.1240 (28.5496)	1.1250 (28.5750)	1.1240 (28.5496)			X	2

1 REPLACE BUSHING WHEN ID IS MORE THEN 1.1355 INCH (28.8417 mm) MEASURED ACROSS ANY DIAMETER.
2 THIS PART CAN BE REPAIRED.

Flap Ballscrew Wear Limits
Figure 604 (Sheet 2)

S 866-057
(4) Move the flap control lever to the UP position to retract the flaps.

S 866-058
(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-059
(6) Remove electrical power (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP-AFT FLAP - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the aft flap for the inboard trailing edge (TE) flap. The second task installs the aft flap.

TASK 27-51-12-024-001

2. Remove the Aft Flap for the Inboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Sling Equipment - Inboard/Outboard Aft Flap - B27025-42
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-02/601, Inboard TE Flap
      (3) 27-51-12/501, Inboard TE Flap Aft Flap
      (4) 27-51-30/201, Inboard TE Flap Track Fairings
      (5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) 32-00-15/201, Landing Gear Door Locks
      (7) 32-00-20/201, Landing Gear Downlocks
      (8) 57-51-10/401, Main Gear Trunnion Fairing
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
556/656	Inboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-009
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

      S 214-010
      (2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 014-011

      WARNING: USE THE PROCEDURE IN AMM 32-00-15-205 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 214-012
(4) Make sure the position selector switch for the flap/slat alternate drive on the first officer's instrument panel, P3, is in the NORM detent.

S 494-002
(5) Install a DO-NOT-OPERATE tag on the position selector switch.

S 014-013
(6) Remove the aft fairing for the inboard TE flap track (Ref 27-51-30).

S 014-014
(7) Remove the aft piece of the trunnion fairing for the main gear (Ref 57-51-10).

S 864-015
(8) Supply electrical power (Ref 24-22-00).

S 864-016

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

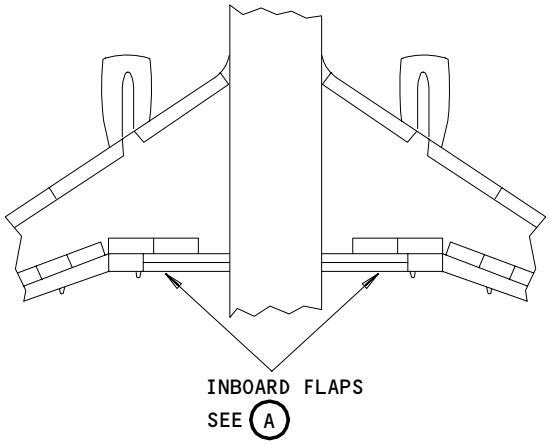
(9) Pressurize the left hydraulic system (Ref 29-11-00).

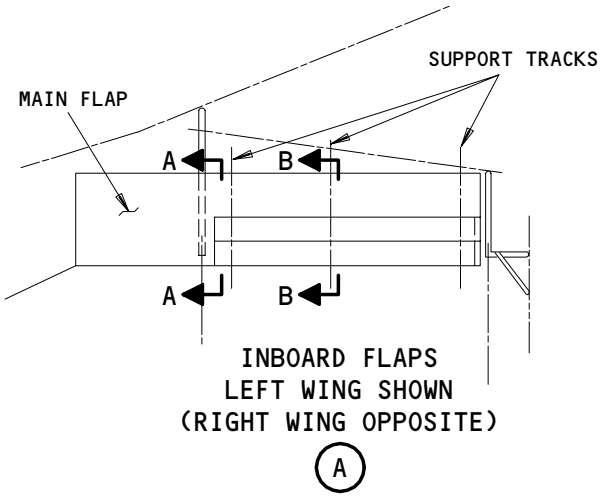
S 864-017
(10) Move the flap control lever to the 30-unit detent and let the flaps and slats extend fully.

S 494-003
(11) Install a DO-NOT-OPERATE tag on the flap control lever.

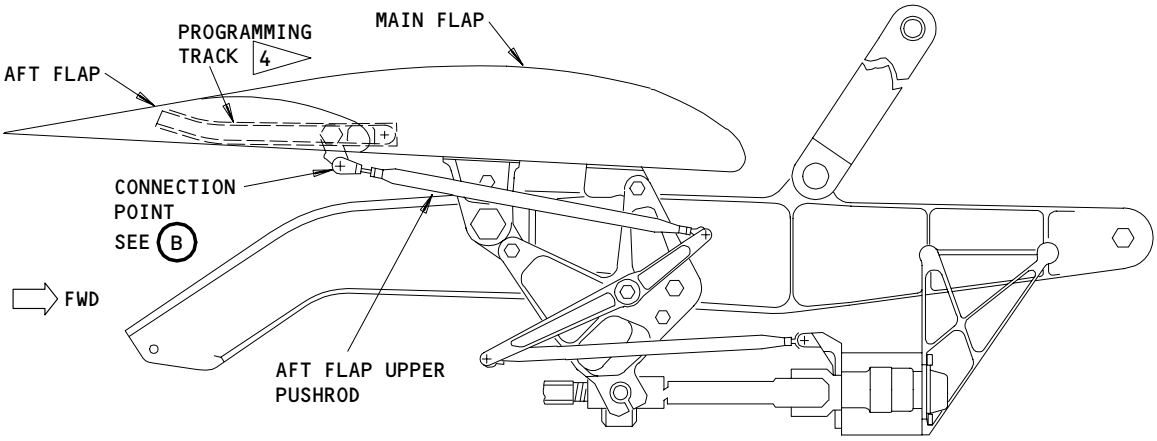
S 864-018
(12) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-019
(13) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

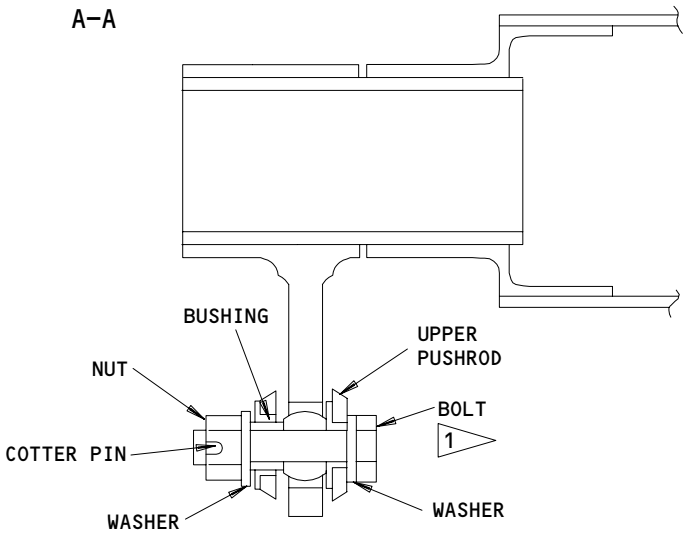




INBOARD FLAPS
LEFT WING SHOWN
(RIGHT WING OPPOSITE)
A

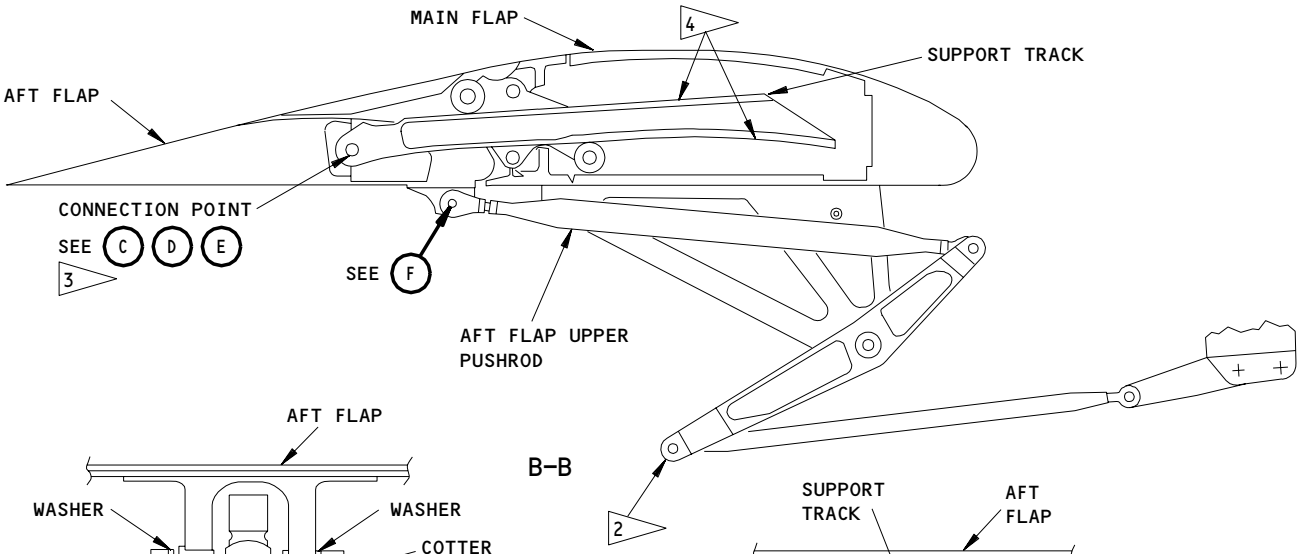


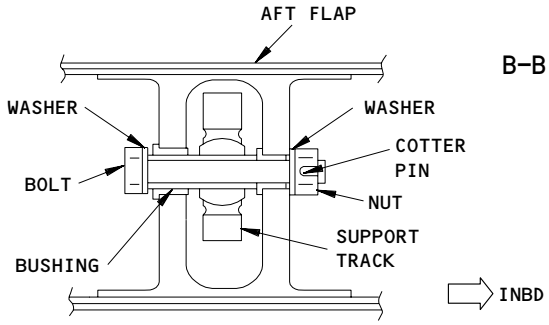
A–A



CONNECTION POINT
B

Inboard Aft Flaps
Figure 401 (Sheet 1)

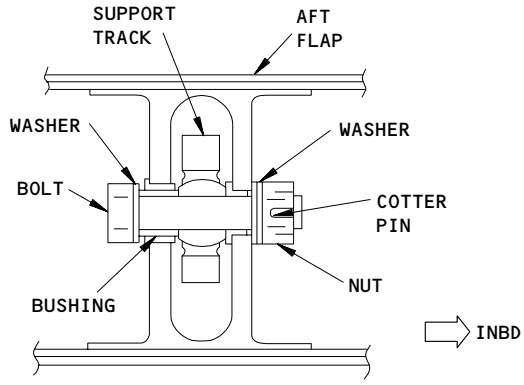




B-B

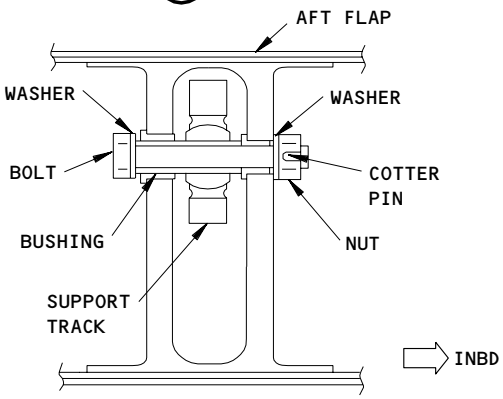
CONNECTION POINT (OUTBOARD TRACK)

C



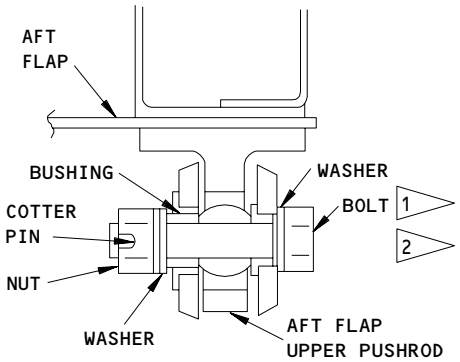
CONNECTION POINT (CENTER TRACK)

D



CONNECTION POINT (INBOARD TRACK)

E

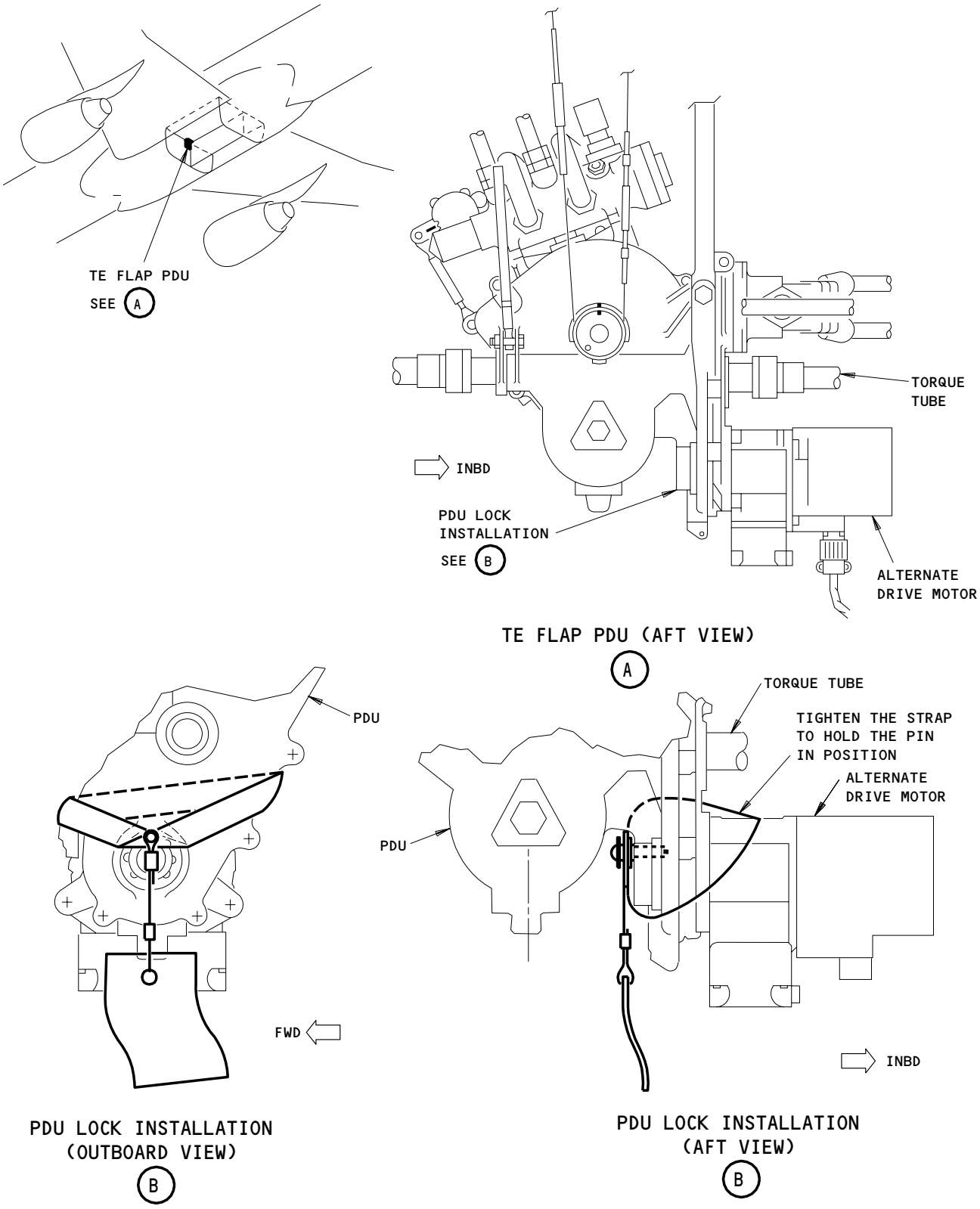


CONNECTION POINT (UPPER PUSHROD)

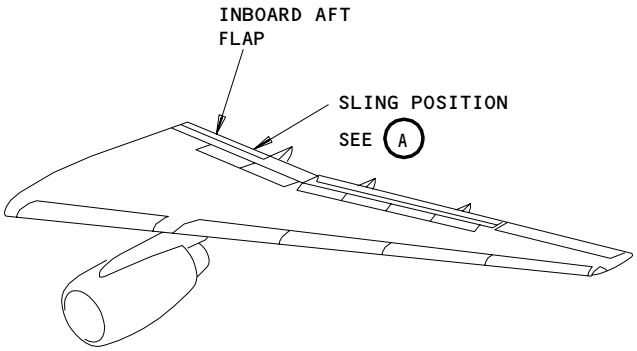
F

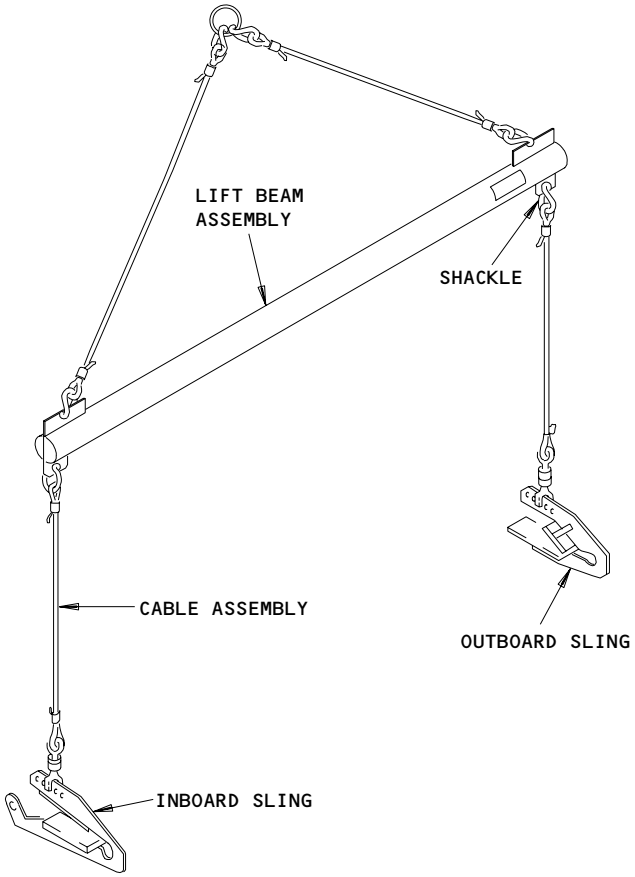
1. INSTALL THE BOLT WITH GREASE ON THE BOLT OUTER DIAMETER AND THE BUSHING INNER DIAMETER. REMOVE ALL GREASE FROM THE BOLT THREADS.
2. THE BOLT HEAD MUST FACE INBOARD TO PREVENT INTERFERENCE WITH THE FAIRING.
3. REMOVE THE SUPPORT TRACKS IF YOU REPLACE THE AFT FLAP.
4. APPLY A SUFFICIENT QUANTITY OF GREASE ALONG THE ROLLER SURFACES.

Inboard Aft Flaps
Figure 401 (Sheet 2)



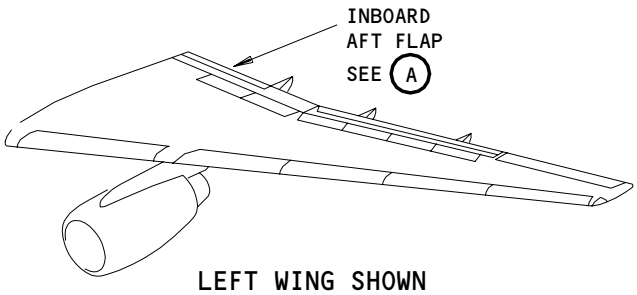
PDU Lock for the TE Flap PDU
Figure 402



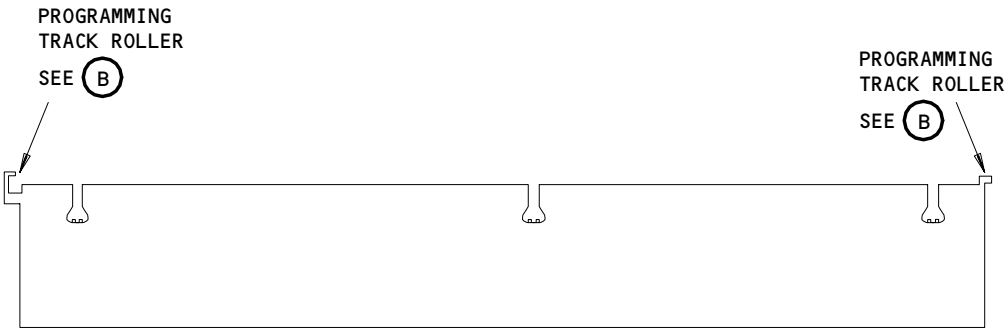


SLING POSITION
A

Sling Equipment for the TE Aft Flap
Figure 403

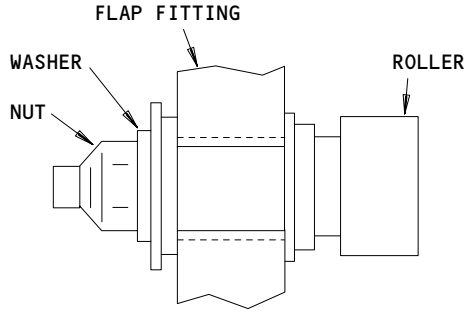


LEFT WING SHOWN
(RIGHT WING OPPOSITE)



INBOARD AFT FLAP
A

INBD



PROGRAMMING TRACK ROLLER
B

Programming Track Roller for the TE Aft Flap
Figure 404

S 864-020

(14) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-004

(15) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Aft Flap (Fig. 401)

NOTE: The aft TE Flap weighs approximately 60 pounds (27.2 Kg).

S 494-021

(1) Install the sling for the aft flap to hold the weight of the aft flap as follows (Fig. 403):
(a) Put the sling hold assemblies on the aft flap at two positions.
(b) Connect the aft flap to the sling with two strap assemblies.

S 024-005

(2) Do these steps to remove the aft flap:
(a) Disconnect the upper push rods from the aft flap.

WARNING: USE A SUPPORT FOR THE SUPPORT TRACKS OF THE AFT FLAP WHEN YOU REMOVE THE AFT FLAP. THE TRACKS WILL FALL FREELY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Disconnect the aft flap from the three support tracks in the main flap (View B-B).
(c) Push the support tracks back into the main flap and use a support to hold them in their position.
(d) Remove the roller for the outboard programming track from the aft flap (Fig. 404).
(e) Move one end of the aft flap forward and the other end aft to disengage the roller for the inboard programming track from the main flap.
(f) Remove the aft flap from the main flap.

TASK 27-51-12-424-006

3. Install the Aft Flap for the Inboard TE Flap

A. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1
(2) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3
(3) D00633 Grease - BMS 3-33 (recommended)
(4) D00015 Grease - BMS 3-24 (alternate)

B. Equipment

(1) Sling Equipment - Inboard/Outboard Aft Flap - B27025-42

C. References

(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-02/601, Inboard TE Flap
(3) 27-51-12/501, Inboard TE Flap Aft Flap
(4) 27-51-30/201, Inboard TE Flap Track Fairings
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
556/656	Inboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Aft Flap (Fig. 401)

NOTE: The wear limits for these components are given in 27-51-02.

S 214-023

(1) Make sure that the support tracks are held in the fully retracted position in the main flap (View B-B).

S 644-024

(2) Apply grease along the roller surfaces of the support track.

S 494-025

(3) Install the aft flap sling.

S 024-053

CAUTION: DO NOT REPLACE AN AFT FLAP THAT HAS THE SINGLE-BEAM BELLCRANK SUPPORT FITTING LINKAGE WITH A FLAP THAT HAS DUAL-BEAM BELLCRANK SUPPORT FITTING LINKAGE. SEE BOEING DWG 113N2053. THE CENTERLINES OF THE SUPPORT FITTINGS WILL NOT BE ALIGNED, AND DAMAGE CAN OCCUR.

(4) If you install a new aft flap, remove the roller of the outboard programming track from the aft flap (Fig. 404).

S 644-027

(5) Apply grease along the roller surfaces of the programming track in the main flap.

S 424-028

(6) Lift the aft flap into the correct position and engage the roller of the inboard programming track into the programming track on the main flap.

S 424-029

(7) Install the roller of the outboard programming track on the aft flap and in the programming track on the main flap.

NOTE: It may be necessary to move one end of the aft flap forward and the other end aft to engage the rollers into the programming tracks.

S 424-030

(8) Do these steps to connect the three support tracks to the aft flap (View B-B):
(a) Manually extend the support tracks from the main flap.

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(b) Apply grease to the outer diameters of the bolts and the inner diameters of the bushings.
(c) Install the bushings, bolts, washers and nuts at the connection points for the inboard and outboard tracks.
(d) Tighten the nuts to 130-170 pound-inches (14.7-19.2 Nm).
(e) Install the bushing, bolt, washer and nut at the connection point for the center track.
(f) Tighten the nut to 370-450 pound-inches (41.8-50.8 Nm).

(g) Install the cotter pins at all three locations.

S 424-031

(9) Do these steps to connect the upper pushrods to the aft flap:

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(a) Apply grease to the outer diameters of the bolts and the inner diameters of the bushings.

CAUTION: MAKE SURE THE HEAD OF THE BOLT POINTS IN THE INBOARD DIRECTION TO GIVE CLEARANCE WITH THE FAIRING. IF THE BOLT IS INCORRECTLY INSTALLED IT WILL CAUSE DAMAGE TO THE AIRPLANE.

(b) Install the bushing, bolt, washer and nut at the outboard connection point between the upper pushrod and the aft flap (View A-A).
(c) Tighten the nut to 130-170 pound-inches (14.7-19.2 Nm).
(d) Install the bushing, bolt, washer and nut at the middle connection point between the upper pushrod and the aft flap (View B-B).
(e) Tighten the nut to 220-280 pound-inches (24.9-31.6 Nm).
(f) Install the cotter pins.

S 094-032

(10) Remove the sling assemblies from the aft flap (Fig. 403).

S 094-007

(11) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 214-033

(12) Make sure that electrical power is supplied (Ref 24-22-00).

S 864-034

(13) Turn the dimmer control knob for the first officer's panel on the lightshield panel, P7, fully clockwise.

S 214-035

(14) Make sure that the power is removed from the left hydraulic system (Ref 29-11-00).

S 214-036

(15) Make sure that the position selector switch for the flap/slat alternate drive on the first officer's instrument panel, P3, is in the NORM detent.

S 214-008
(16) Make sure a DO-NOT-OPERATE tag is on the position selector switch.

S 864-037
(17) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11H23, FLAP/SLAT ALT DR SHUTOFF ARM

S 864-038
(18) Push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on).

S 864-039
(19) Open this circuit breaker on the P11 panel, and attach a DO-NOT-CLOSE tag:
(a) 11H23, FLAP/SLAT ALT DR SHUTOFF ARM

S 984-040
(20) Manually turn the flap torque tubes to retract the flaps fully until you get a 90 ±10 degrees clearance between the ballscrew nut up-stop and the universal up-stop at the inboard transmission of the inboard flap.

S 864-041
(21) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALT DR SHUTOFF ARM

S 864-042
(22) Push the arming switch for the flap alternate drive, on the P3 panel, to disarm the flap alternate drive (switch light will go off).

S 864-043
(23) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11H23, FLAP/SLAT ALT DR SHUTOFF ARM

S 094-044
(24) Remove the DO-NOT-OPERATE tag from the position selector switch for the flap/slat alternate drive, on the P3 panel, but keep the switch in the NORM detent.

S 864-045
(25) Remove the DO-NOT-OPERATE tag from the flap control lever and move the flap control lever to the zero (FLAPS UP) detent.

S 864-047

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERSONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(26) Pressurize the left hydraulic system (Ref 29-11-00), and let the slats retract fully.

S 864-048

(27) Remove the power from the left hydraulic system (Ref 29-11-00).

S 714-049

(28) Adjust and do a test on the aft flap installation (27-51-12).

NOTE: Do the steps to install the fairings and to put the airplane back to its usual condition in the adjustment/test procedure.

S 424-051

(29) If you install the same removed aft flap, rigging of the flap is not necessary when these occur:
(a) Upper push rod adjustment, is not changed.
(b) Lower push rod adjustment, is not changed.
(c) The programming track eccentric is not changed.
(d) The bellcrank for the lower and/or upper pushrod is not repaired, modified, adjusted or replaced.
(e) The flap drive transmissions and drive ballscrew nuts are not removed or replaced.
(f) The flap drive system (changing of drive ballscrew nut relationship) is not re-rigged.

INBOARD TRAILING EDGE FLAP-AFT FLAP - ADJUSTMENT/TEST

1. General
   A. This procedure contains the adjustment and the test for the inboard trailing edge (TE) aft flap.
   B. The rigging dimensions in this procedure represent rigging the flaps with the wings in the unloaded condition (without engines or fuel weight on the wings). That is the configuration that most closely resembles the in-flight deflection of the wing.
   C. For a in-service airplane the flaps are usually rigged with the engines installed, on jacks or gears, and with fuel weight on the wings. Regardless of this difference, the rigging dimensions given in this procedure are still the target dimensions for the rigging of the airplane in any configuration.

      NOTE: If the best rigging dimension you can obtain is not within the limit, refer to the tables in this procedure to find the limits for a particular airplane configuration.

TASK 27-51-12-825-001

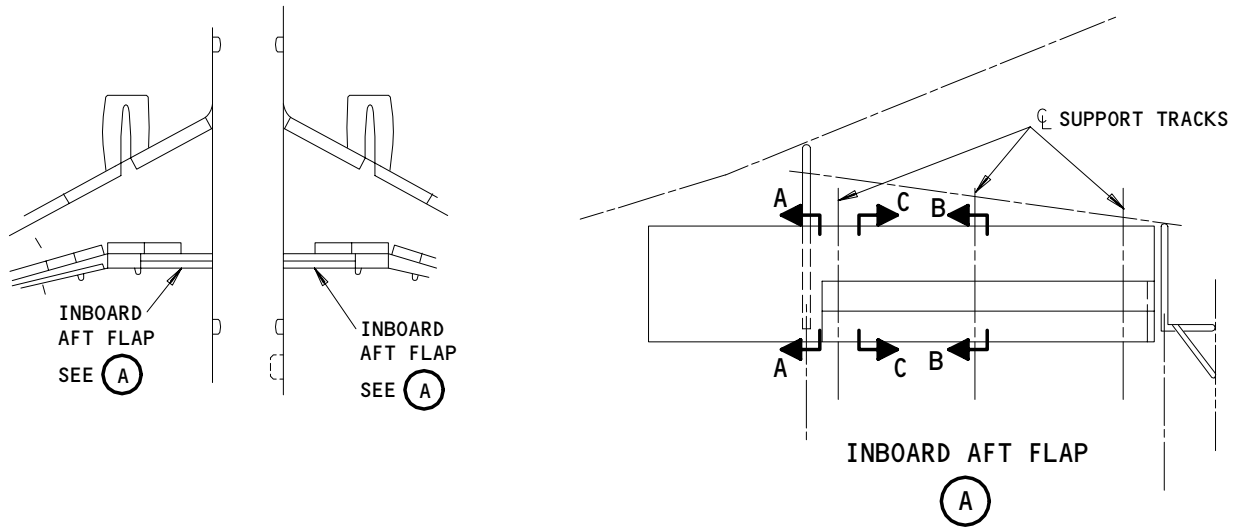
2. Inboard Aft Flap Adjustment
   A. Equipment
      (1) Rig Pins from Set B20003-XX:
          (a) TE2 - P/N B20003-4
          (b) TE3 - P/N B20003-4
      (2) TE Flap PDU Lock - B27008-1
   B. References
      (1) 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Lock
      (4) 32-00-20/201, Landing Gear Downlock
      (5) 57-51-10/401, Main Landing Gear Trunnion Fairing
   C. Access
      (1) Location Zones

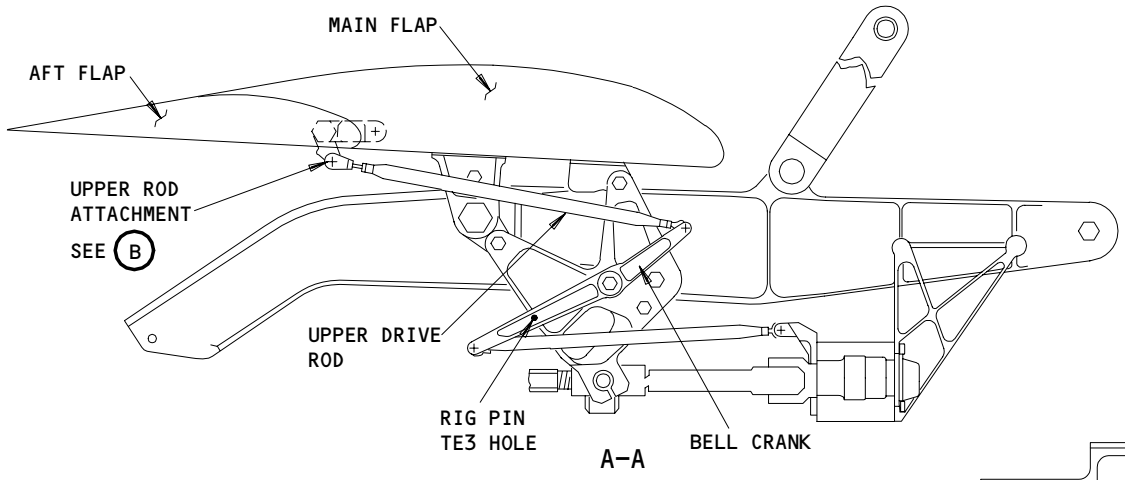
143	Left MLG Wheel Well
211/212	Control Cabin
555/655	Inboard Flap (Left/Rignt)
556/656	Inboard Aft Flap (Left/Right)
730/740	Main Landing Gear and Doors (Left/Right)

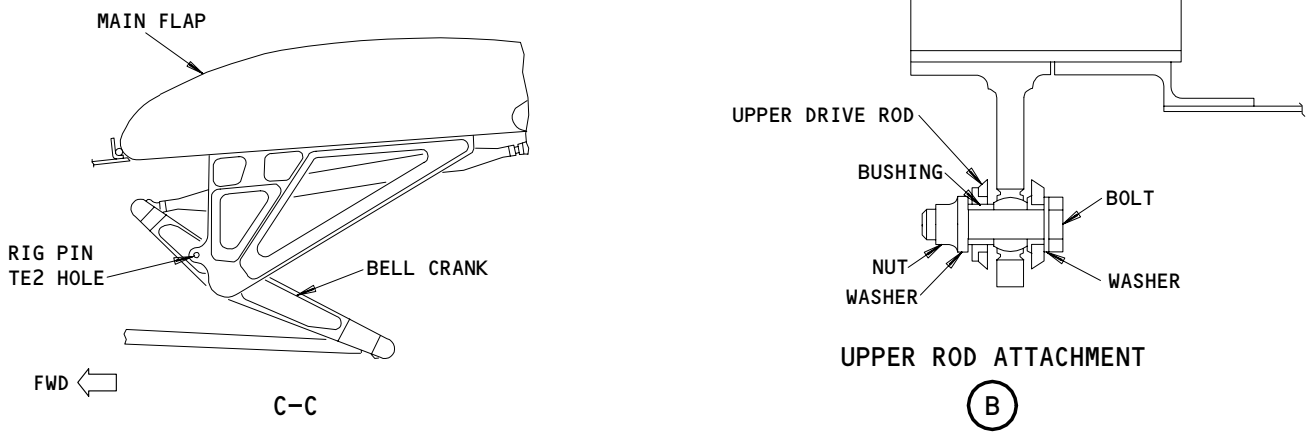
   D. Prepare for Adjustment

      S 215-002
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and that the flap control lever is in the zero detent.

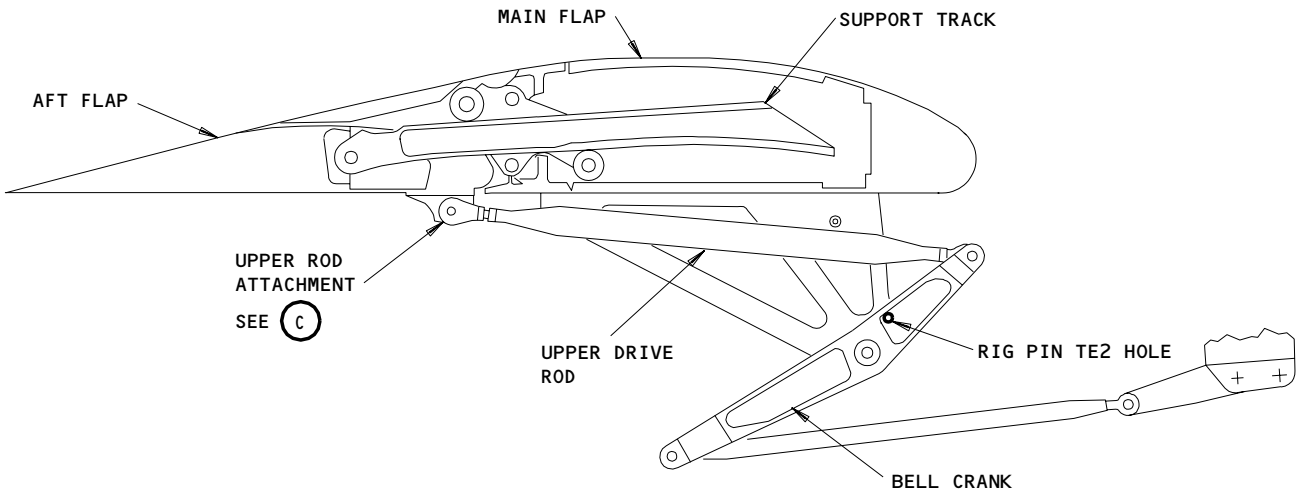
      S 495-003
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.



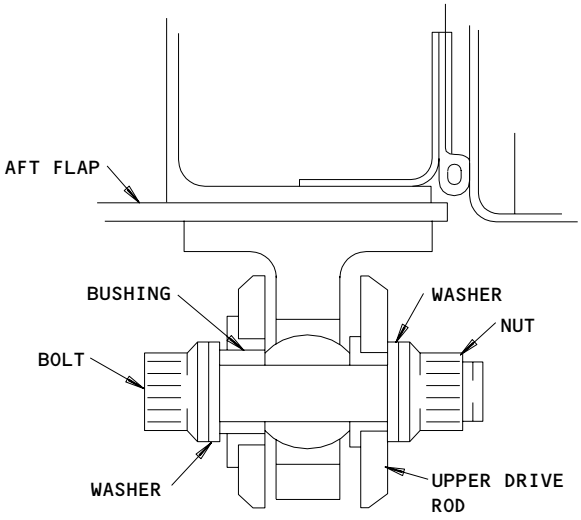




Upper Drive Rod Adjustment of the Inboard Aft Flap
Figure 501 (Sheet 1)



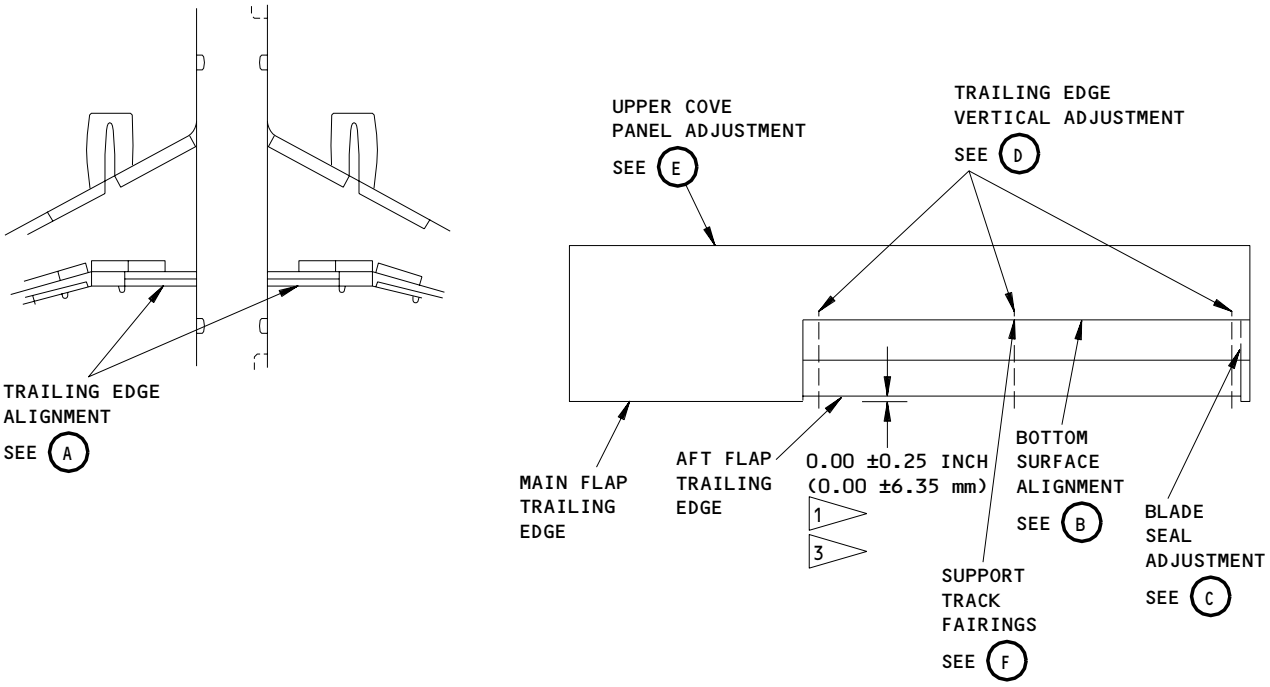
B–B



UPPER ROD ATTACHMENT

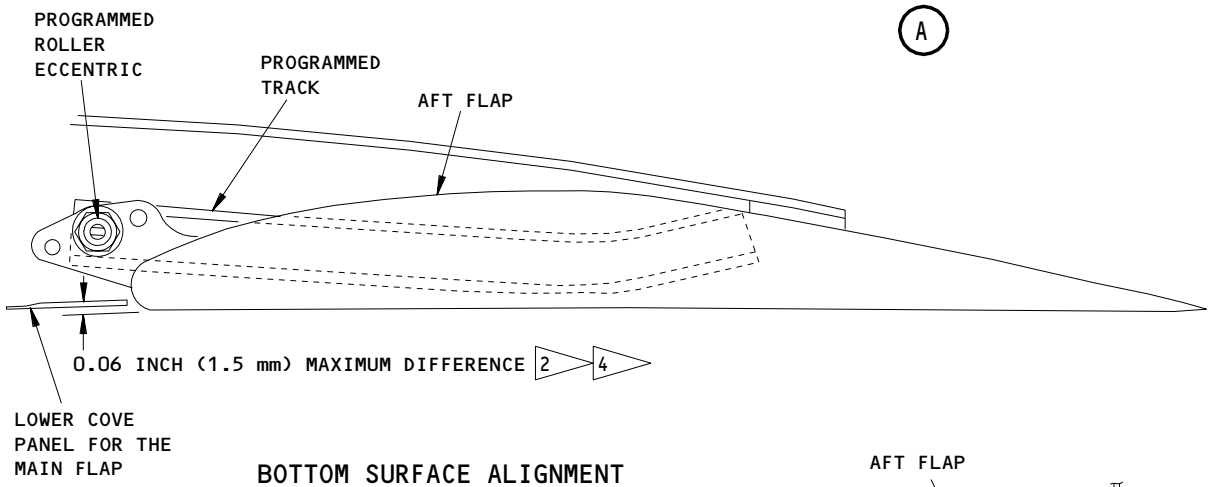
C

Upper Drive Rod Adjustment of the Inboard Aft Flap
Figure 501 (Sheet 2)



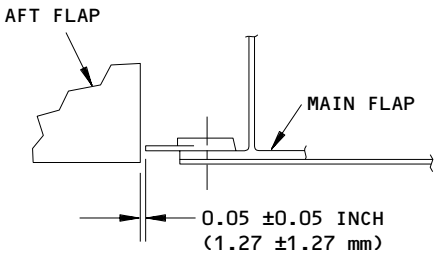
TRAILING EDGE ALIGNMENT
(LEFT WING IS SHOWN, RIGHT WING IS OPPOSITE)

A



BOTTOM SURFACE ALIGNMENT

B



BLADE SEAL ADJUSTMENT

C

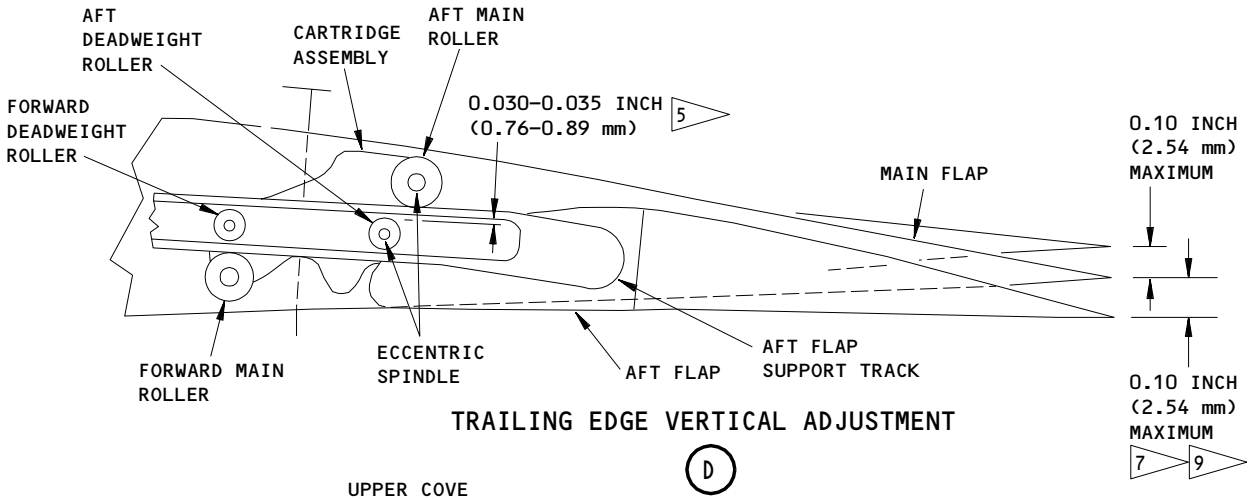
1 ADJUST THE LENGTH OF THE UPPER DRIVE RODS TO GET THE DIMENSION SHOWN

2 TURN THE PROGRAMMED ROLLER ECCENTRICS TO ADJUST

3 SEE TABLE 1.

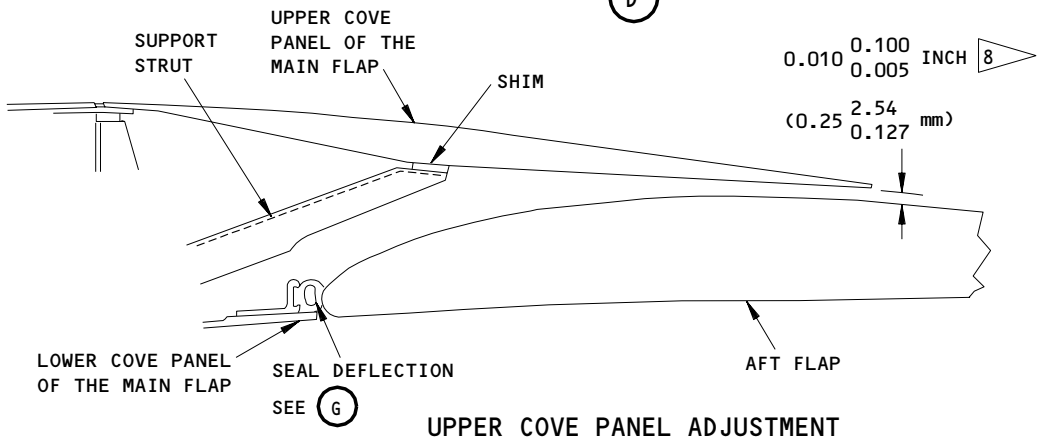
4 SEE TABLE 2.

Alignment and Fit for the Inboard Aft Flap
Figure 502 (Sheet 1)



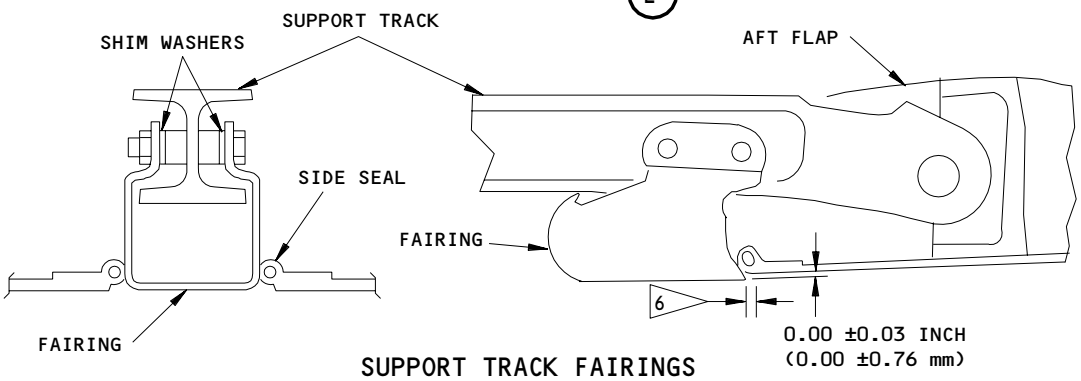
TRAILING EDGE VERTICAL ADJUSTMENT

D



UPPER COVE PANEL ADJUSTMENT

E



SUPPORT TRACK FAIRINGS

F

5 WITH AFT FLAP EXTENDED, ADJUST THE DEADWEIGHT ROLLERS TO CLEAR THE SUPPORT TRACKS BY 0.030 TO 0.035 INCH (0.76 TO 0.89 mm)

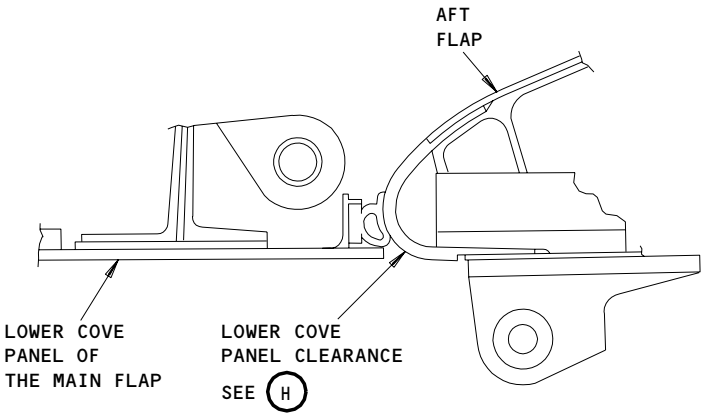
6 THE CORRECT GAP BETWEEN THE AFT EDGE OF THE FAIRING AND THE FLAP CUTOUT IS 0.02–0.10 INCH (0.5–2.5 mm) AT ALL LOCATION

7 MAXIMUM MISMATCH WITH THE AFT FLAP HELD IN THE UP DIRECTION

8 SEE TABLE 3.

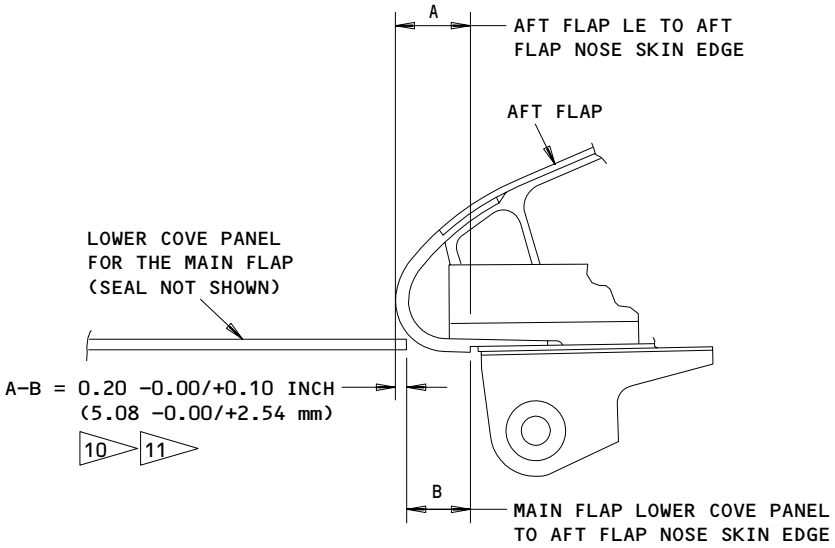
9 SEE TABLE 4.

Alignment and Fit for the Inboard Aft Flap
Figure 502 (Sheet 2)



SEAL DEFLECTION

G



LOWER COVE PANEL CLEARANCE

H

10 THE DIMENSION APPLIES TO THE FULL SPAN. DIMENSION A AND B ARE MEASURED FROM THE SAME AFT FLAP LOCATION ALONG THE SPAN

11 0.13 –0.00/+0.12 INCH (3.30 –0.00/+3.04 mm) FOR SEAL WITH SPONGE RUBBER INSERT.

Alignment and Fit for the Inboard Aft Flap
Figure 502 (Sheet 3)

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.07 (-1.778)	0.10 (2.540)	-0.42 (-10.668)
ON GEAR + ENGINES	-0.07 (-1.778)	0.25 (6.350)	-0.45 (-11.430)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.02 (-0.508)	0.33 (8.382)	-0.29 (-7.366)

NOTE: NEGATIVE DIMENSION INDICATES THE MAIN FLAP IS AFT OF THE AFT FLAP.

FORWARD/AFT MISFAIR BETWEEN THE AFT FLAP TRAILING EDGE AND THE MAIN FLAP TRAILING EDGE
TABLE 1 12

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.03 (-0.762)	0.18 (4.572	-0.13 (-3.302)
ON GEAR + ENGINES	-0.04 (-1.016)	0.06 (1.524)	-0.16 (-4.064)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.04 (-1.016)	0.07 (1.778)	-0.25 (-6.350)

NOTE: NEGATIVE MEASUREMENT INDICATES MAIN FLAP IS BELOW AFT FLAP.

VERTICAL MISMATCH BETWEEN THE AFT FLAP LOWER SURFACE AND THE MAIN FLAP LOWER SURFACE
TABLE 2 12

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	0.08 (2.032)	0.20 (5.080)	0.01 (0.254)
ON GEAR + ENGINES	0.08 (2.032)	0.22 (5.588)	0.01 (0.254)
ON GEAR + ENGINES + 3000 LBS FUEL	0.08 (2.032)	0.26 (6.604)	0.01 (0.254)

NOTE: THE AFT FLAP SHOULD ALWAYS BE RIGGED TO PROVIDE A MINIMUM GAP OF 0.005 INCH (0.127 mm) ALONG THE AFT FLAP LENGTH.

GAP BETWEEN THE AFT FLAP UPPER SURFACE AND THE MAIN FLAP UPPER SURFACE
TABLE 3 12

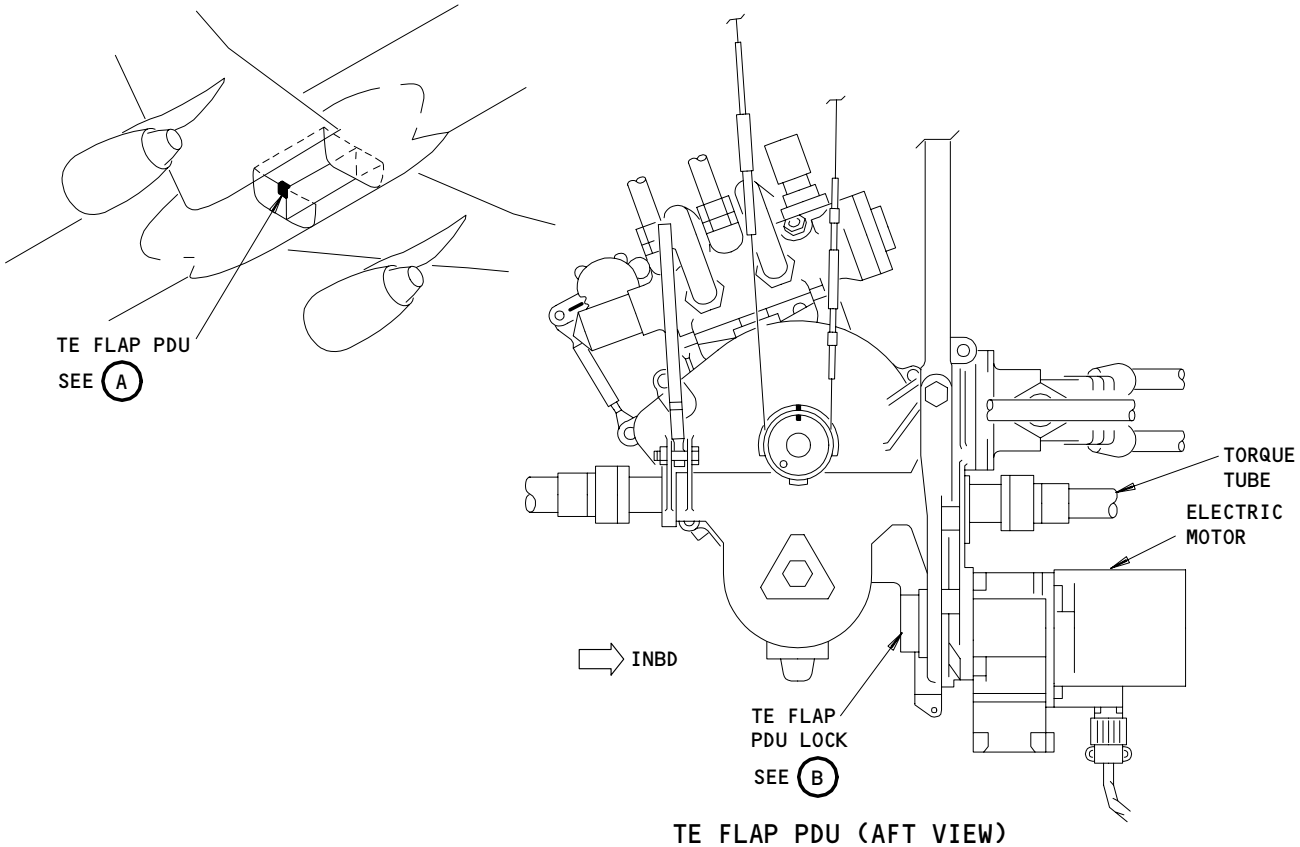
CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.14 (-3.556)	0.25 (6.350)	-0.36 (-9.144)
ON GEAR + ENGINES	-0.21 (-5.334)	-0.02 (-0.508)	-0.40 (-10.160)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.19 (-4.826)	0.00 (0.000)	-0.45 (-11.430)

NOTE: NEGATIVE MEASUREMENT INDICATES AFT FLAP TE IS BELOW MAIN FLAP TE.

VERTICAL MISMATCH BETWEEN THE TRAILING EDGE OF THE AFT FLAP AND THE TRAILING EDGE OF THE MAIN FLAP
TABLE 4 12

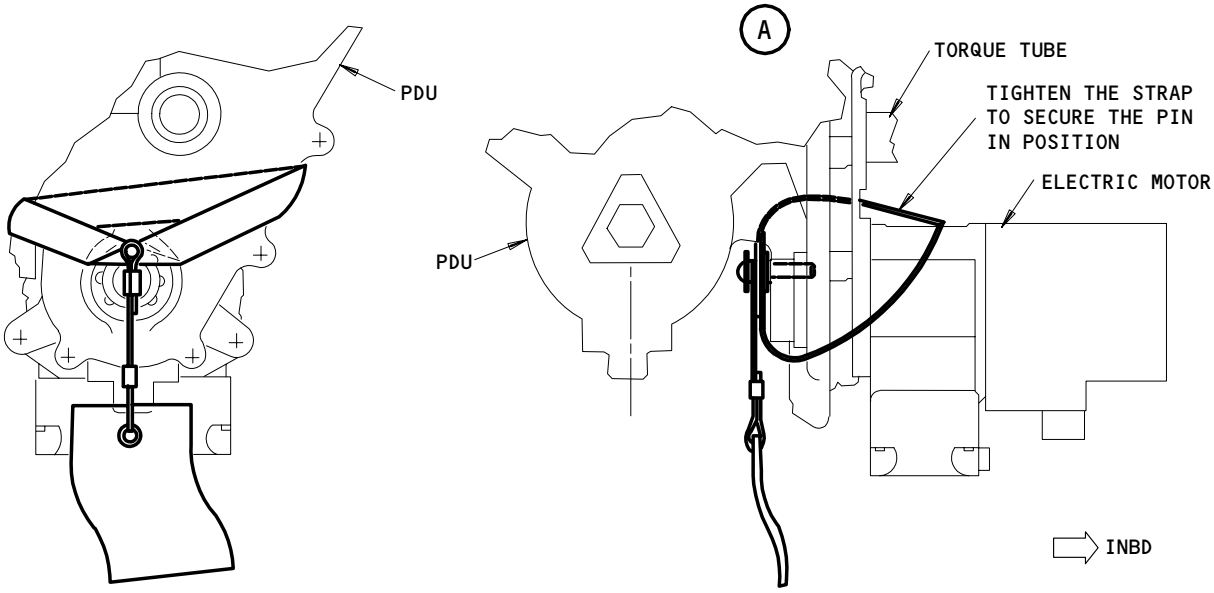
12 THE DIMENSIONS IN THE TABLES ARE FOR REFERENCE ONLY. THE DIMENSIONS GIVEN DO NOT SUPERSEDE THOSE GIVEN AS RIGGING DIMENSIONS. THEY ONLY SHOW A RANGE OF MEASUREMENTS THAT YOU WILL SEE ON A SATISFACTORY RIGGED AIRPLANES.

Alignment and Fit for the Inboard Aft Flap
Figure 502 (Sheet 4)



TE FLAP PDU (AFT VIEW)

A



TE FLAP PDU LOCK
(OUTBOARD VIEW)

B

TE FLAP PDU LOCK
(AFT VIEW)

B

TE Flap PDU Lock
Figure 503

S 215-004
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 495-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 865-006
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 865-007
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 865-008
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 495-009
(8) Install the PDU lock on the TE flap power drive unit (PDU) (Fig./503).

S 025-010
(9) Remove the aft fairing for the inboard flap track (Ref 27-51-30).

S 025-011
(10) Remove the aft section of the Main Landing Gear (MLG) trunnion fairing (Ref 57-51-10).

E. Inboard Aft Flap Adjustment

S 495-012
(1) Install the rig pins TE2 and TE3 in the bellcrank on the inboard and outboard aft flap linkage (Fig. 501).

S 035-013
(2) Remove the lockwire from the nut on the upper drive rod attachment (Fig. 501).

S 825-037
(3) Adjust the length of the upper drive rods and align the inboard aft flap with the steps that follow (Fig. 502):
  (a) Align the trailing edge between the main flap and the aft flap (Detail A).
  (b) Follow these steps to adjust the leading edge of the aft flap to correctly compress the seal on the lower cove panel (Detail G):
    1) Remove the rig pins TE2 and TE3 and extend the aft flaps.
    2) Measure the dimension A (Detail H).
    3) Retract the flaps and install the rig pins TE2 and TE3.
    4) Measure the dimension B, and make sure that dimension A minus dimension B agrees with the dimension shown (Detail H).

S 095-014
(4) Remove the rig pins TE2 and TE3.

S 215-015
(5) Make sure the aft flap can operate (from the adjusted position) through a minimum of 0.18 inch (4.6 mm) in the forward direction, before it touches the aft support cartridge assemblies (Fig. 502, Detail D).

S 825-016
(6) If necessary, adjust the drive rods to get this and other conditions in the steps before to agree.

S 825-017
(7) Adjust the blade seal on the main flap to align with the aft flap (Fig. 502, Detail C).

S 095-040
(8) Install the rig pins TE2 and TE3 in the bellcrank.

S 825-018
(9) Hold the trailing edge of the aft flap in the up direction so that the support tracks touch the main rollers, and do these adjustments on the aft flap (Fig. 502):
  (a) Make sure the lower surface of the aft flap aligns with the lower surface of the lower cove panel (Detail B).
  (b) If necessary, turn the programmed roller eccentric at the forward end of the programmed track to adjust the aft flap.
  (c) Turn the eccentric spindle at the aft deadweight roller and the aft main roller on the cartridge assembly to align the trailing edge of the aft flap to the trailing edge of the main flap (Detail D).
  (d) Do a check on the bottom surface alignment and adjust the aft flap until you get the conditions on the steps before to agree.

(e) Adjust the clearance between the upper cove panel and the upper surface of the aft flap (Detail E).

NOTE: Add or remove shims between the upper cove panel and the support strut to make the adjustments.

(f) Hold the weight of the aft flap to prevent sudden movement.
(g) Disconnect the upper drive rods from the aft flap.

NOTE: Do not change the adjusted length of upper drive rod.

(h) Remove the rig pins TE2 and TE3 and manually extend the aft flap.
(i) Make sure that the aft flap is fully extended.
(j) Adjust the aft deadweight rollers until you get the correct clearance between the rollers and the upper-inside flange of the aft flap support track (Detail D).
(k) Push the aft flap forward into the retracted position.
(l) Install the rig pins TE2 and TE3 in the bellcrank.
(m) Connect the upper drive rods to the aft flap (Fig. 501).
(n) Install a lockwire to the nut to safety the drive rod attachment.
(o) Remove the rig pins TE2 and TE3.

S 425-019
(10) If removed, install the support track fairing (Fig. 502).

S 825-038
(11) Install or remove shim washers on the attachment bolts to adjust the center position of the support track fairing.

S 825-021
(12) Move the support track fairings to align with the lower surface of the aft flap (Fig. 502, Detail F).

S 435-039
(13) Tighten the attachment bolts.

S 715-020
(14) Do a test on the aft flap.

TASK 27-51-12-715-022

3. Operational Test for the Aft Flap

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Lock
(5) 57-51-10/401, Main Landing Gear Trunnion Fairing

B. Access

(1) Location Zones

143	Left MLG Wheel Well
211/212	Control Cabin
555/655	Inboard Flap (Left/Rignt)
556/656	Inboard Aft Flap (Left/Right)
730/740	Main Landing Gear and Doors (Left/Right)

C. Prepare for the Test

S 095-023

(1) Remove the PDU lock from the trailing edge (TE) flap power drive unit (PDU).

S 865-025

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (d) 11J18, FLAP LOAD RELIEF
   (e) 11J33, WARN ELEX A

S 865-026

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 865-027

(4) Supply electrical power (Ref 24-22-00).

S 095-024

(5) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-028

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (Ref 29-11-00).

S 215-029

CAUTION: MONITOR THE MOVEMENT OF THE FLAPS WHEN YOU OPERATE THE FLAPS. LOOK AT THE COMPONENTS WHILE THEY MOVE TO SEE IF THEY ARE INCORRECTLY INSTALLED. INCORRECTLY INSTALLED COMPONENT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Move the TE flaps with the flap control lever to one full cycle, from the fully retracted position to the fully extended position.

S 215-030

(8) Do the checks that follow to make sure the aft flap is installed correctly, while the flaps move:
   (a) Make sure the aft flaps move to the correct position.
   (b) Make sure that the components do not rub and are free to move.
   (c) Make sure that the seal stay aligned before and after the flap movement.

S 865-031

(9) Move the TE flaps to the fully retracted position with the flap control lever.

D. Put the Airplane Back to Its Usual Condition

S 425-032

(1) Install the aft section of the MLG trunnion fairing (Ref 57-51-10).

S 425-033

(2) Install the aft fairing to the inboard flap track (Ref 27-51-30).

S 095-034

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 865-035

(4) Remove the power from the center hydraulic system (Ref 29-11-00).

S 865-036

(5) Remove electrical power if it is not necessary (Ref 24-22-00).

INBOARD TRAILING EDGE FLAP AFT FLAP LINKAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the aft flap linkage for the inboard trailing edge (TE) flap. The second task installs the aft flap linkage.

   TASK 27-51-13-024-001

2. Remove the Aft Flap Linkage for the Inboard TE Flap
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) TE2 - P/N B20003-4
          (b) TE3 - P/N B20003-4
      (2) TE Flap PDU Lock - B27008-1
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-30/201, Inboard TE Flap Track Fairing
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlock
      (6) 57-51-10/401, Main Landing Gear Trunnion Fairing
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
556/656	Inboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-009
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the ZERO (FLAPS UP) detent.

      S 494-002
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

      S 214-010
      (3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 014-011

      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-012
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-013
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-014
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-015
(8) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Aft Flap Linkage (Fig. 401)

S 014-016
(1) To get access to the outboard linkage, remove the aft flap fairing (Ref 27-51-30).

S 014-017
(2) To get access to the inboard linkage, remove the trunnion fairing for the aft main gear (Ref 57-51-10).

S 494-018
(3) Use a support to hold the aft flap in its position to prevent movement.

S 034-019
(4) Remove the bolts at each end of the upper and lower pushrods.

S 024-003
(5) Remove the pushrods.

S 034-020
(6) Remove the bolt at the bellcrank pivots.

S 024-004
(7) Remove the bellcranks.

TASK 27-51-13-424-005

3. Install the Aft Flap Linkage for the Inboard TE Flap

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):

(a) TE2 - P/N B20003-4

(b) TE3 - P/N B20003-4

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00015 Grease - BMS 3-24 (Alternate)

(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References

(1) 24-22-00/201, Electrical Power - Control

(2) 27-51-30/201, Inboard TE Flap Track Fairing

(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(4) 32-00-15/201, Landing Gear Door Locks

(5) 57-51-10/401, Main Landing Gear Trunnion Fairing

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
556/656	Inboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Aft Flap Linkage (Fig. 401)

S 644-021

(1) Apply a layer of grease to the outer diameter of the bolts and the inner diameter of the bushings.

(a) Remove all grease from the bolt threads before you install the nut.

S 424-006

(2) Do these steps to install the aft flap linkages at the outboard location (View A-A):

(a) Put the bellcrank in the correct position and attach it to the carriage.

(b) Tighten the nut to 480-790 pound-inches (54.3-89.2 Nm).

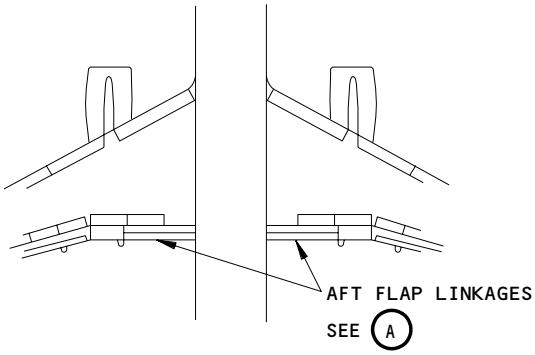
(c) Install rig pins TE2 and TE3 in the inboard and outboard bellcranks.

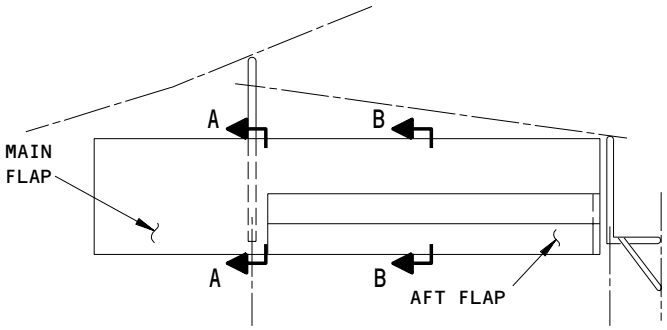
(d) Attach the upper and lower pushrods to the assembly.

(e) Adjust the upper pushrod to align the trailing edge of the aft flap and the trailing edge of the main flap as shown.

(f) Tighten the nuts to 130-170 pound-inches (14.7-19.2 Nm).

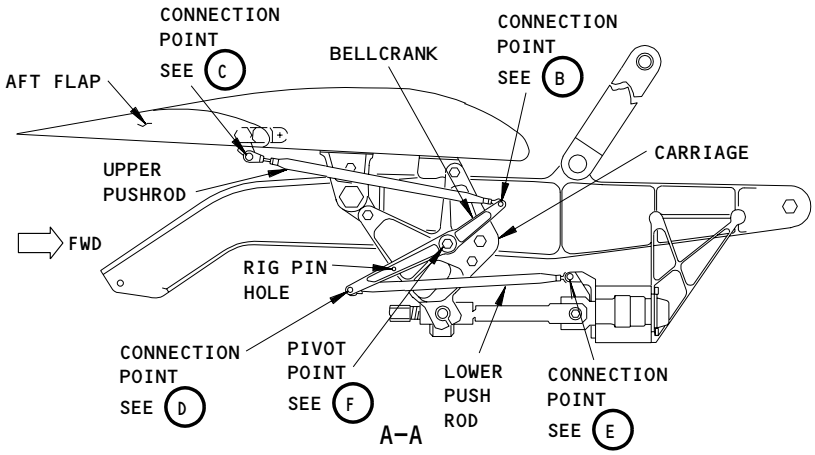
(g) Safety the nuts at each end of the pushrods with a wire.

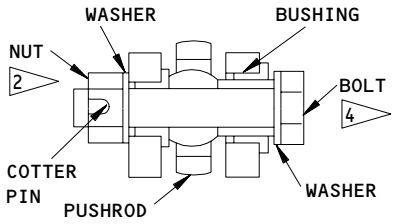




AFT FLAP LINKAGES

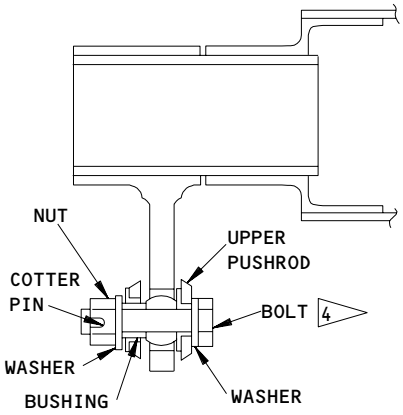
A





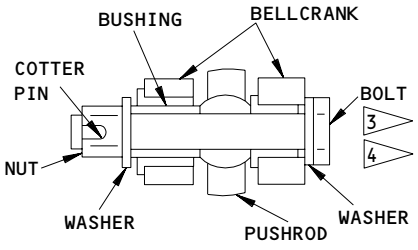
CONNECTION POINT

B



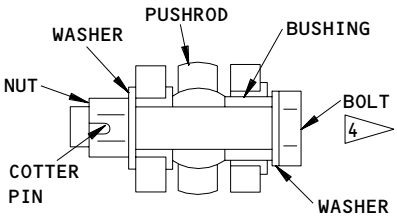
CONNECTION POINT

C



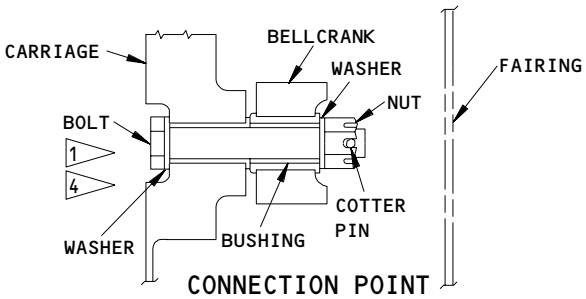
CONNECTION POINT

D



CONNECTION POINT

E



CONNECTION POINT

F

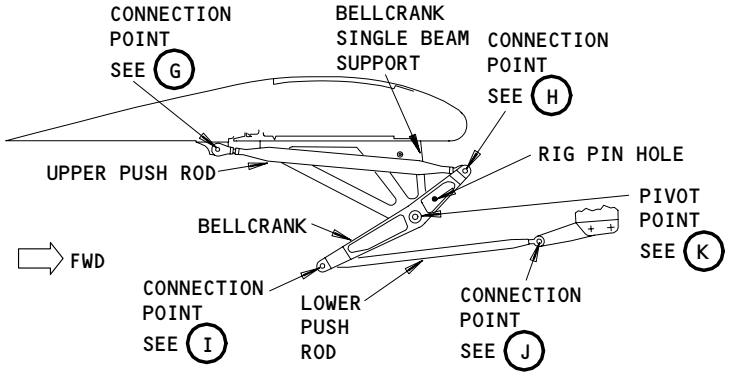
1 THE BOLT HEAD MUST SET IN THE COUNTERBORE.

2 INSTALL THE NUT AND MAKE SURE IT FACES THE CARRIAGE SIDE PLATE. THIS WILL GIVE CLEARANCE DURING DEPLOYMENT OF THE AFT FLAP.

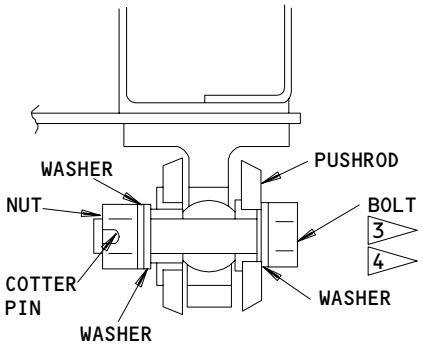
3 THE BOLT HEAD MUST FACE INBOARD TO MAKE SURE YOU HAVE SUFFICIENT FAIRING CLEARANCE.

4 APPLY GREASE TO THE BOLT AND BUSHING SURFACES. REMOVE ALL GREASE COMPLETELY FROM THE BOLT THREADS.

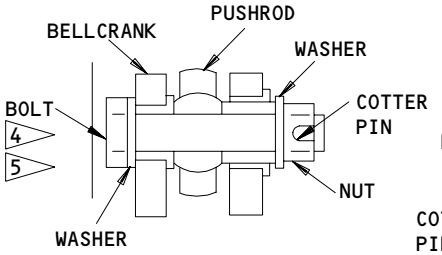
Linkages for the Inboard Aft Flap
Figure 401 (Sheet 1)



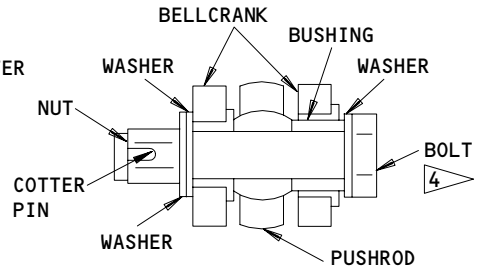
B-B



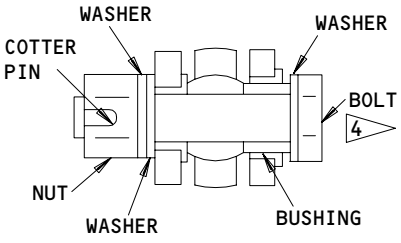
CONNECTION POINT
G



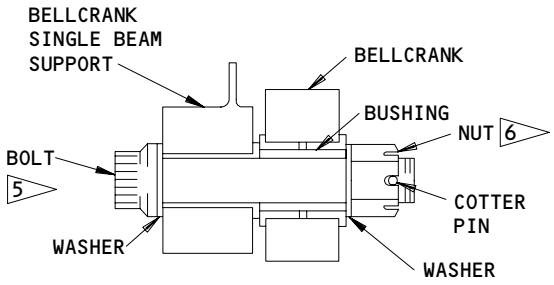
CONNECTION POINT
H



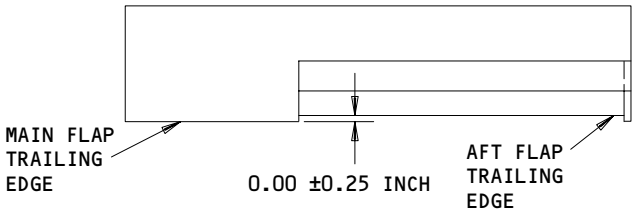
CONNECTION POINT
I



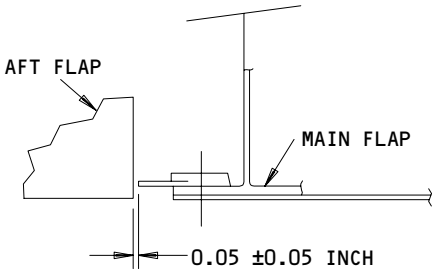
CONNECTION POINT
J



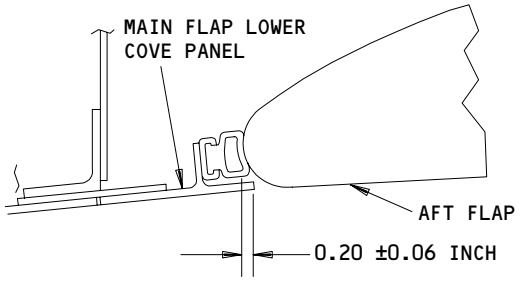
PIVOT POINT
K



ALIGN THE TRAILING EDGE



BLADE SEAL ADJUSTMENT

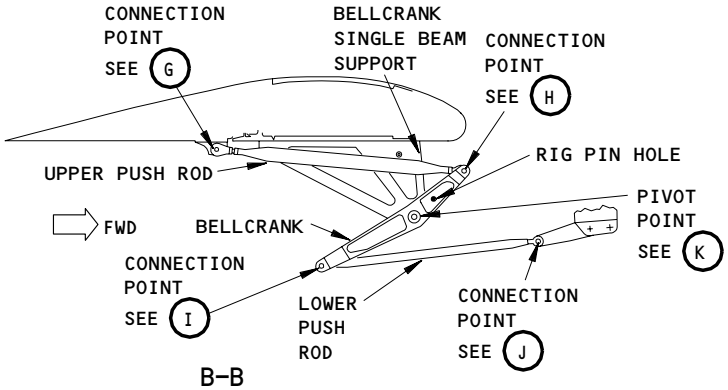


ALIGN THE LEADING EDGE

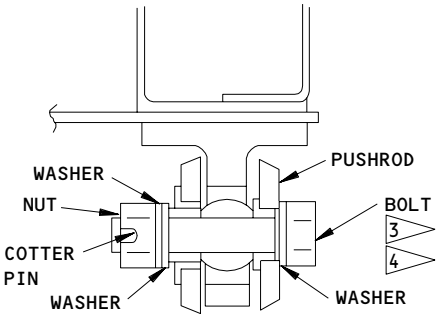
5 THE BOLT HEAD MUST FACE THE BELLCRANK SUPPORT BEAM.

6 PERMITTED LATERAL MOVEMENTS OF THE BELLCRANK IS UP TO 0.040 INCHES.

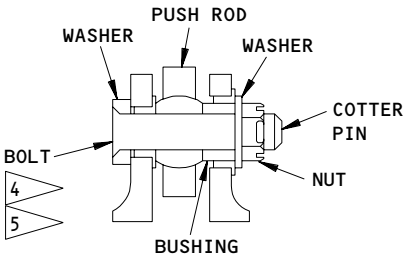
Linkages for the Inboard Aft Flap
Figure 401 (Sheet 2)



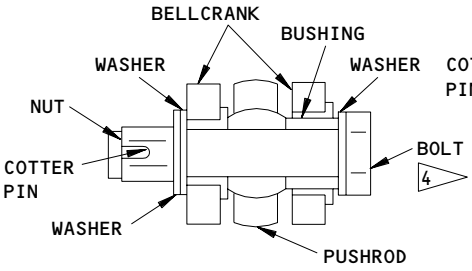
B–B



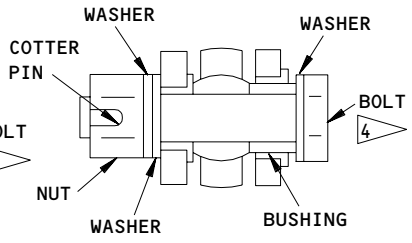
CONNECTION POINT
G



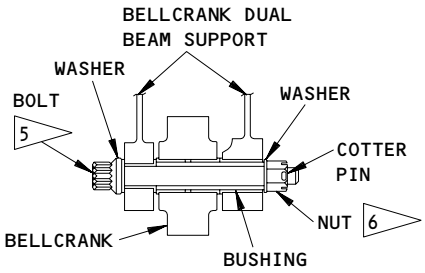
CONNECTION POINT
H



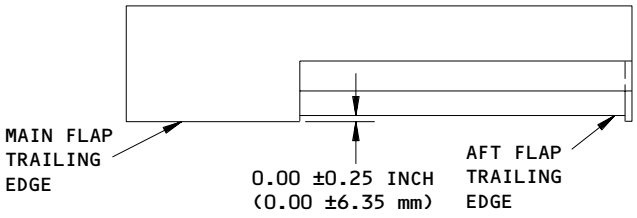
CONNECTION POINT
I



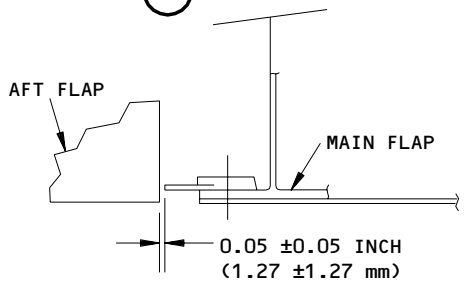
CONNECTION POINT
J



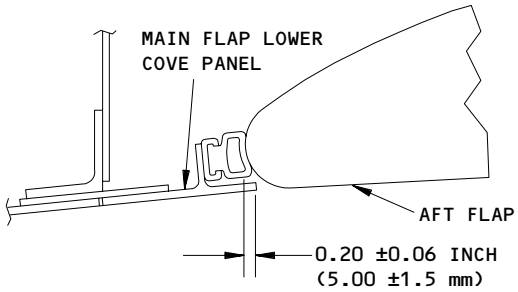
PIVOT POINT
K



ALIGN THE TRAILING EDGE



BLADE SEAL ADJUSTMENT

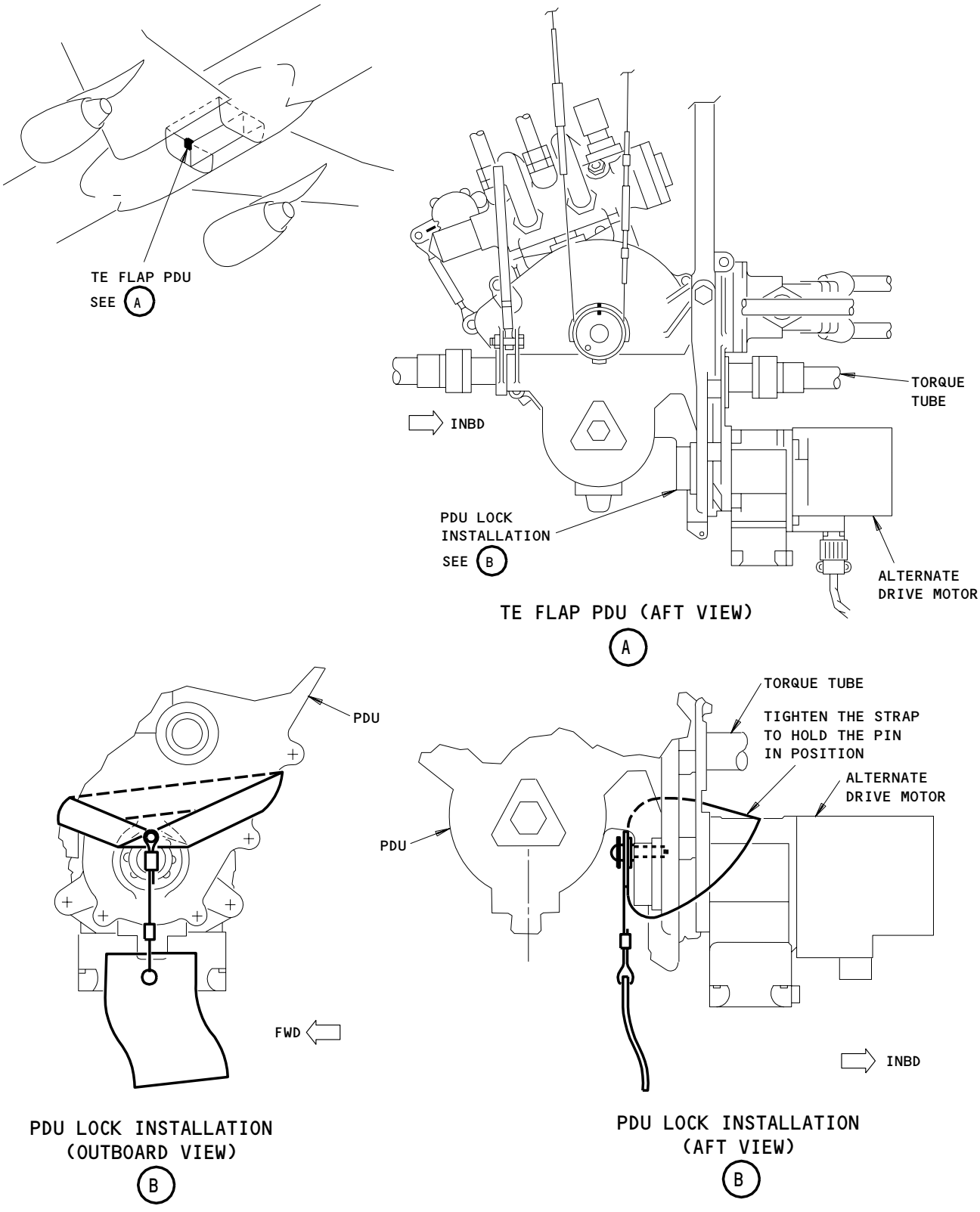


ALIGN THE LEADING EDGE

5 THE BOLT HEAD MUST FACE THE BELLCRANK SUPPORT BEAM.

6 PERMITTED LATERAL MOVEMENTS OF THE BELLCRANK IS UP TO 0.040 INCH (1.0 mm).

Linkages for the Inboard Aft Flap
Figure 401 (Sheet 3)



PDU Lock for the TE Flap PDU
Figure 402

S 424-007
(3) Do these steps to install the aft flap linkages at the inboard location (View B-B):
(a) Put the bellcrank in the correct position and attach it to the carriage.
(b) AIRPLANES THAT HAVE A SINGLE BEAM SUPPORT;
Tighten the nut to 500-1300 pound-inches (56.5-146.8 Nm)
(c) AIRPLANES THAT HAVE A DUAL BEAM SUPPORT;
Tighten the nut to 480-790 pound-inches (54.3-89.2 Nm)
(d) Attach the upper and lower pushrods to the assembly.
(e) Adjust the upper pushrod to align the aft flap TE and the aft flap TE as shown.
(f) Tighten the nuts on the upper pushrod to 220-280 pound-inches (24.9-31.6 Nm).
(g) Tighten the nuts on the lower pushrod to 370-450 pound-inches (24.9-31.6 Nm).
(h) Safety the nuts at each end of the pushrods with a wire.

S 824-022
(4) Adjust the blade seal to correct the gap shown.

S 644-023
(5) Apply grease to each pivot at all grease fittings.

S 094-024
(6) Remove the rig pins TE2 and TE3.

F. Operational Test for the Linkage Installation

S 094-025
(1) Remove the PDU lock on the TE flap PDU (Fig. 402).

S 864-026
(2) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-027
(3) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-028
(4) Supply electrical power (Ref 24-22-00).

S 094-029

(5) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (Ref 29-11-00).

S 214-031

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(7) Move the flaps between the fully retracted and the fully extended positions.

S 214-032

(8) Make sure that the aft flap linkages are correctly installed as follows:
   (a) Make sure that the aft flap moves to the correct positions.
   (b) Make sure the linkages move freely and do not rub on adjacent parts.

S 864-033

(9) Move the flaps back to the fully retracted position.

G. Put the Airplane Back to Its Usual Condition

S 414-034

(1) Install the trunnion fairing for the aft main gear (AMM 57-51-10/401).

S 414-008

(2) Install the aft flap fairing (AMM 27-51-30/201).

S 414-035

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-036

(4) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-037

(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

OUTBOARD TRAILING EDGE FLAP - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the outboard trailing edge (TE) flap. The second task installs the outboard TE flap. These tasks are done with the flap carriage and the aft flap linkages installed.

TASK 27-51-14-024-001

2. Remove the Outboard TE Flap
   A. Equipment
      (1) Outboard Flap Sling and Winch from Inboard and Outboard Flaps Sling - B27026-60:
          (a) Outboard TE Flap Sling Assembly - B27026-2
          (b) Winch Assembly - B27026-4
      (2) Inboard and Outboard TE Flap Sling - B27078-1 (Optional)
      (3) TE Flap PDU Lock - B27008-1

   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 27-51-31/201, Outboard Trailing Edge Flap Track Fairings
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlock

   C. Access
      (1) Location Zones

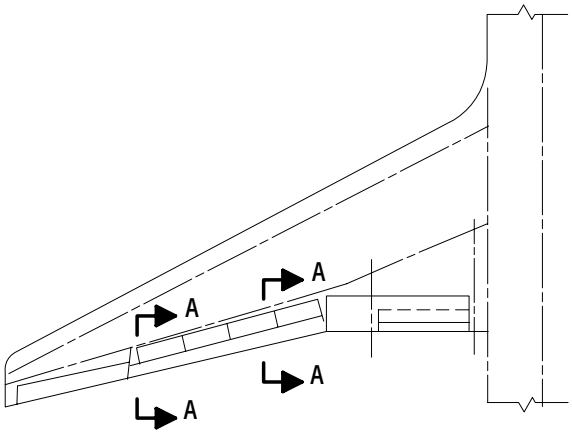
143	MLG Wheel Well (Left)
211/212	Control Cabin
566/666	Outboard Forward Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

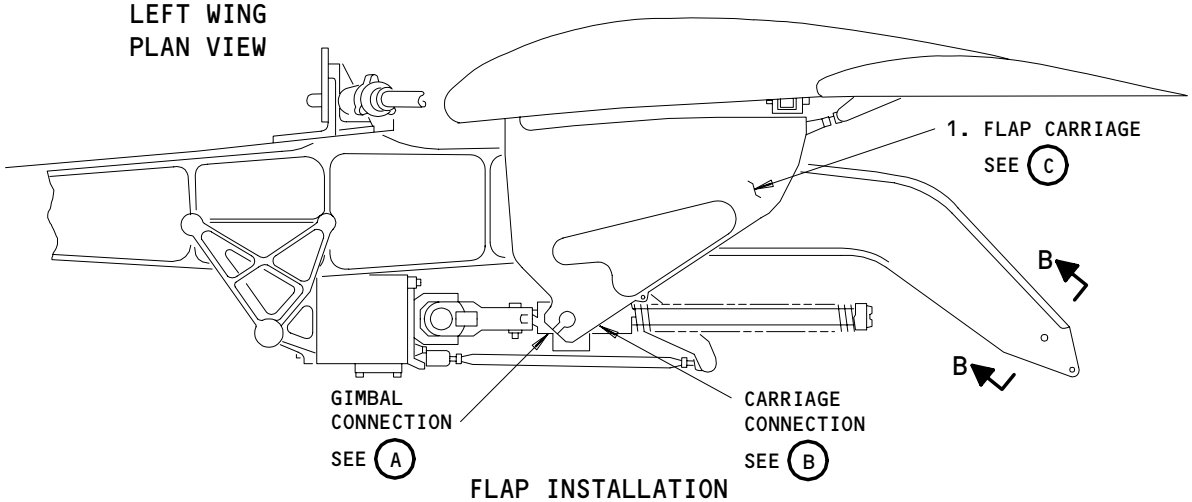
      S 214-002
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and that the flap control lever is in the zero (FLAP UP) detent.

      S 494-003
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

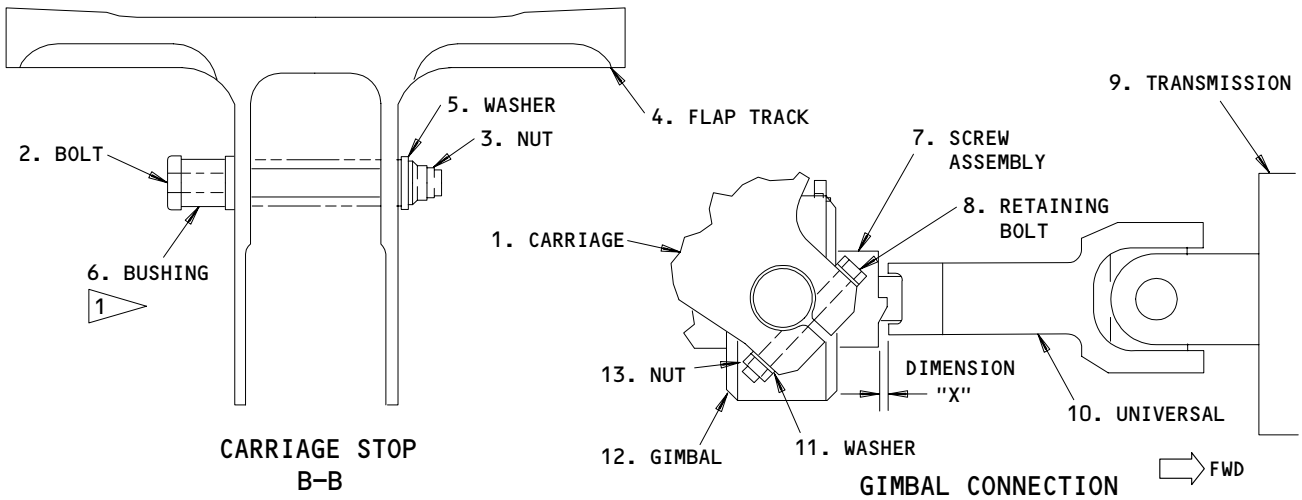
      S 214-004
      (3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).



LEFT WING
PLAN VIEW



FLAP INSTALLATION
(LEFT WING SHOWN, RIGHT WING OPPOSITE)
A–A

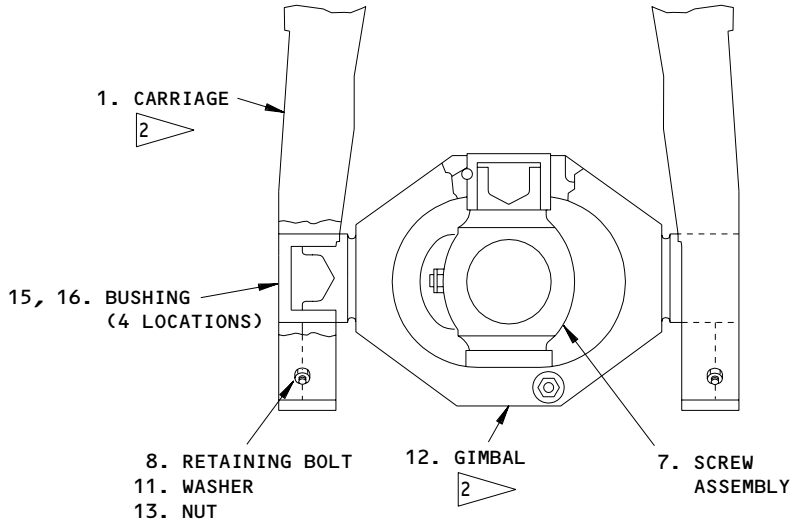


CARRIAGE STOP
B–B

GIMBAL CONNECTION
A

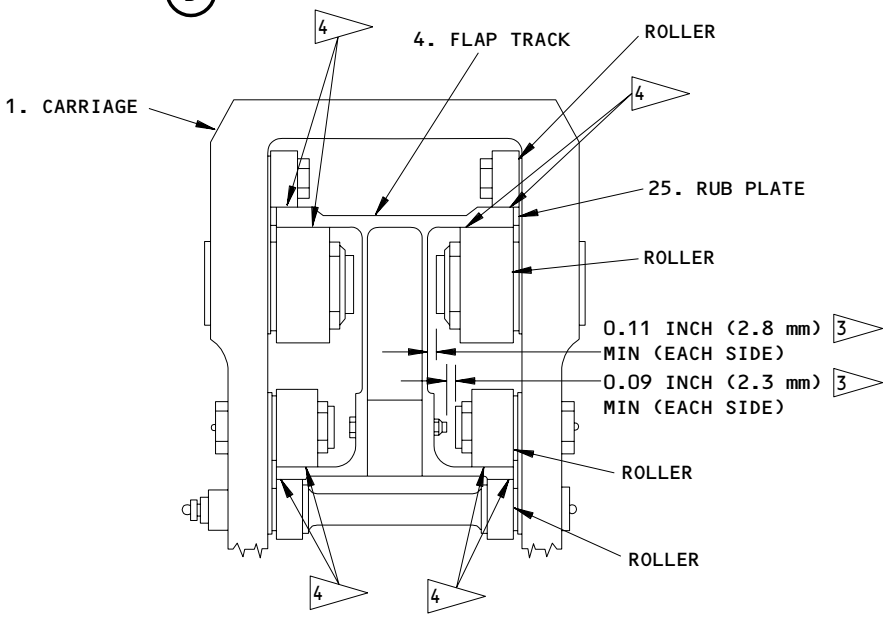
1 INSTALL A BUSHING BETWEEN THE BOLT HEAD AND THE FLANGE OF THE TRACK

Outboard Trailing Edge Flap
Figure 401 (Sheet 1)



CARRIAGE CONNECTION

B



FLAP CARRIAGE

C

2 PUT THE GIMBAL SHAFT THROUGH THE CLEARANCE GROOVES ON THE CARRIAGE UNTIL THE SHAFT IS ALIGNED WITH THE BUSHING HOLES ON THE CARRIAGE. INSTALL THE BUSHINGS FROM THE TWO SIDES AND MAKE SURE THE BUSHING GROOVES ALIGN WITH THE CARRIAGE BOLT HOLES. INSTALL THE RETAINING BOLT

3 MAKE SURE YOU HAVE THE CORRECT CLEARANCE BETWEEN THE CARRIAGE ROLLER BOLTS AND THE FLAP TRACK THROUGH THE FULL CARRIAGE TRAVEL. AT THE SAME TIME, THE EDGE OF THE TRACK MUST TOUCH THE RUB PLATE (3 LOCATIONS) ON THE SIDE THAT YOU EXAMINE

4 APPLY BMS 3-33 (RECOMMENDED) OR BMS 3-24 (ALTERNATE) GREASE ALONG THE ROLLER SURFACES OF THE FLAP TRACKS BEFORE YOU INSTALL THE FLAP

Outboard Trailing Edge Flap
Figure 401 (Sheet 2)

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the landing gear doors and install the door locks (Ref 32-00-15).

S 864-006

(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-007

(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-008

(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 484-029

(8) Install a PDU lock on the TE flap PDU (Fig. 402).

S 014-009

(9) Remove the access panels for the trailing edge and open the necessary access doors (Ref 06-44-00).

S 014-010

(10) Remove the fairings for the outboard TE flap track (Ref 27-51-31).

E. Remove the Outboard TE Flap (Fig. 401)

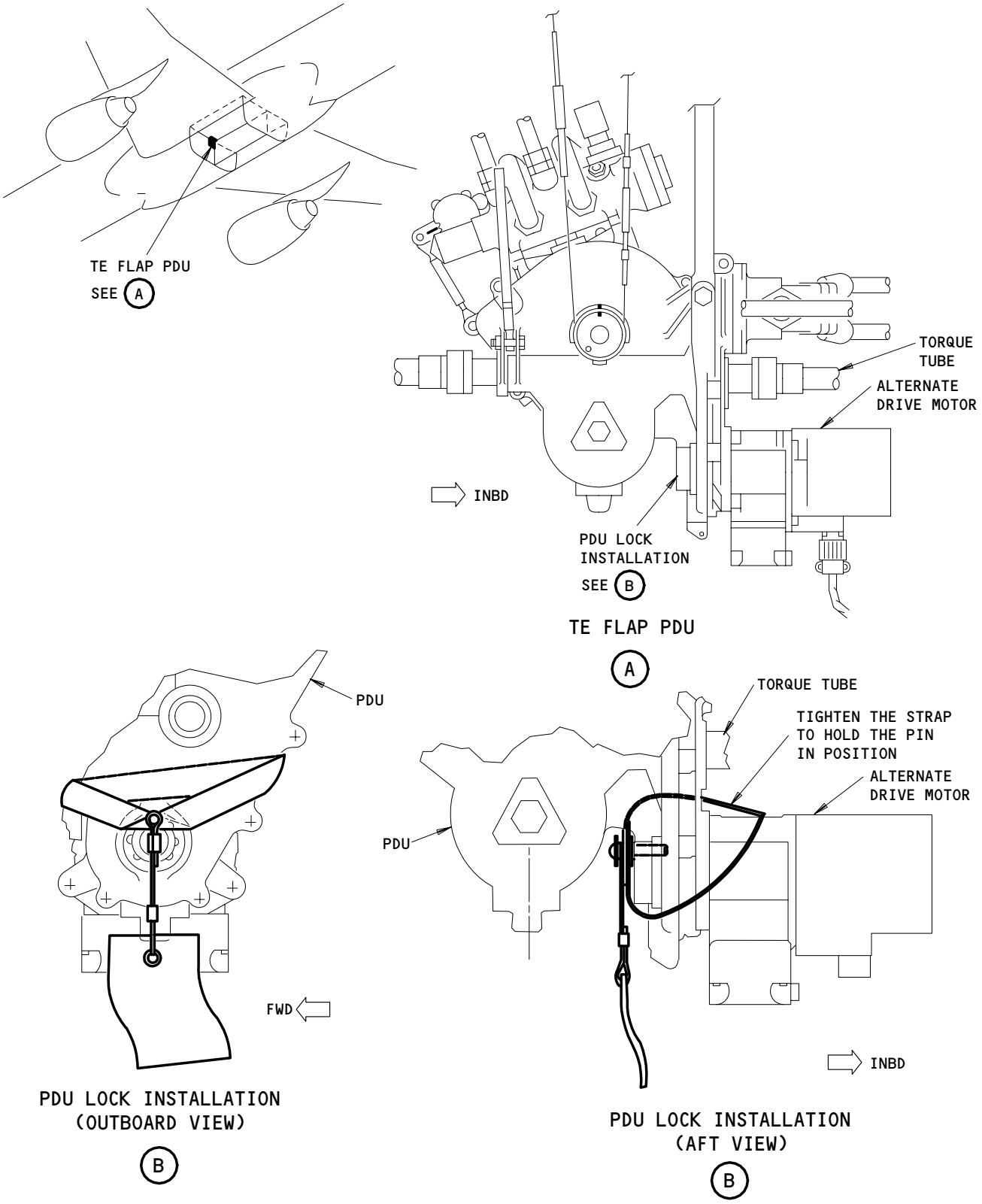
NOTE: The outboard TE flap weighs approximately 490 pounds (222 Kg).

S 224-011

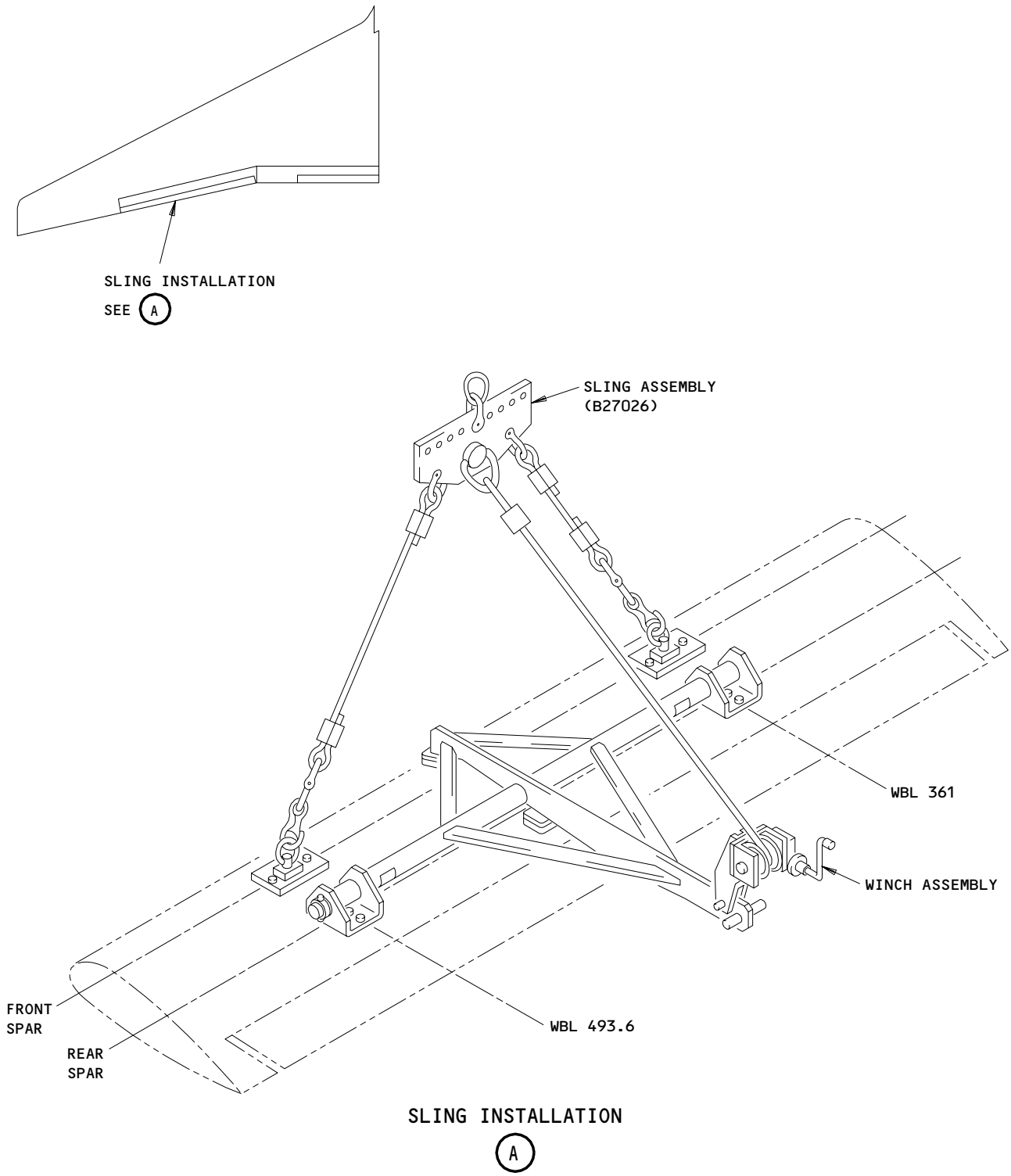
(1) Measure and make a record of the dimension X at each ballscrew nut (View A) to make the adjustment easier when you install the flap.

S 494-012

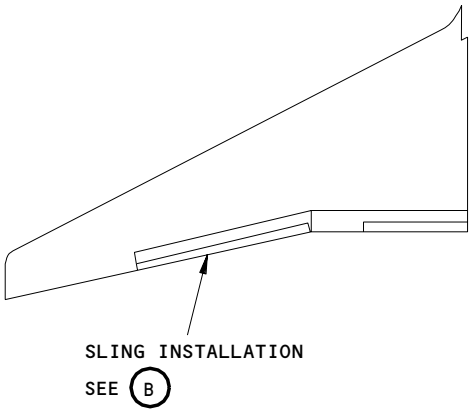
(2) Attach the sling to the flap (Fig. 403).

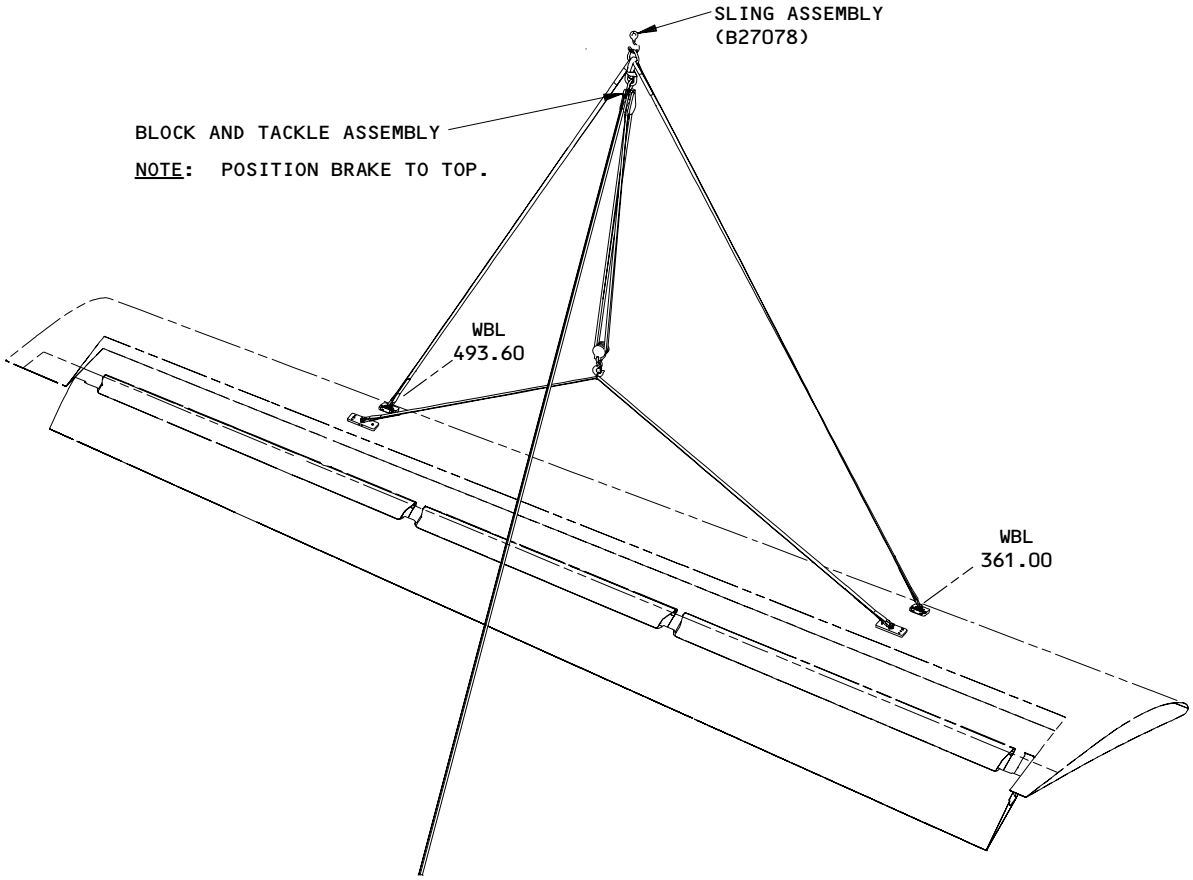


PDU Lock for the TE Flap PDU
Figure 402



Trailing Edge Flaps Sling
Figure 403 (Sheet 1)





SLING INSTALLATION
(B)

Trailing Edge Flaps Sling
Figure 403 (Sheet 2)

S 024-013

(3) Do these steps to remove the outboard TE flap:

(a) Disconnect the lower pushrods for the aft flap at the forward end.

CAUTION: MAKE SURE THAT THE ANGLE BETWEEN THE CENTERLINES OF THE TRANSMISSION AND THE BALLSCREW IS NOT TOO LARGE. THIS IS TO PREVENT DAMAGE TO THE TRANSMISSION UNIVERSAL JOINT.

(b) Use a support to hold each transmission ballscrew (7).

(c) Disconnect the carriages (1) from the ballscrew gimbals (12).

(d) Remove the carriage stops (2), (3), (5), and (6) (View B-B).

(e) Move the flap in the aft direction and off the flap tracks (4).

NOTE: Move the aft flap to the extended position as you move the flap aft. This will give a clearance between the carriage structure and the pushrods or the leading edge of the aft flap.

(f) Lift the flap to the ground and disconnect it from the sling.

TASK 27-51-14-424-014

3. Install the Outboard TE Flap (Fig. 401)

A. Equipment

(1) Outboard Flap Sling and Winch from Inboard and Outboard Flaps Sling - B27026-60:

(2) Outboard TE Flap Sling Assembly - B27026-2

(3) Winch Assembly - B27026-4

(4) Inboard and Outboard TE Flap Sling - B27078-1 (Optional)

(5) TE Flap PDU Lock - B27008-1

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

(3) D00015 Grease - BMS 3-24 (Alternate)

C. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401		Left O/B Flap	27-51-14	01	65,66

D. References
(1) 27-51-14/501, Outboard Trailing Edge Flap
(2) 27-51-16/401, Outboard Trailing Edge Flap Carriage
(3) 27-51-22/401, Outboard Trailing Edge Aft Flap
(4) 27-51-22/501, Outboard Trailing Edge Aft Flap
(5) 27-51-23/401, Outboard Trailing Edge - Aft Flap Linkage Linkages

E. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
566/666	Outboard Forward Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Install the Outboard TE Flap (Fig. 401)

S 214-015
(1) Make sure the flaps and the slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 214-016
(2) Make sure these components are installed on the outboard TE flap:
(a) The carriages for the Outboard TE Flap (Ref 27-51-16)
(b) The aft flap for the Outboard TE Flap (Ref 27-51-22)
(c) The aft flap linkages for the Outboard TE Flap (Ref 27-51-23).

S 824-017
(3) Make sure that the aft flap of the outboard TE flap is adjusted (Ref 27-51-22).

S 014-018
(4) Remove the forward attach access panels for the inboard and outboard carriage at the leading edge of the main flap.

S 494-019
(5) Install the sling on the flap.

S 644-022
(6) Apply grease along the roller surfaces of the flap track.

S 424-020
(7) Do these steps to install the outboard TE flap:
(a) Lift the flap into its position, start the carriages together on the flap tracks (4) and move the flap forward.

NOTE: During the installation, do not let the aft flap be in the retracted position in relation to the main flap until you retract the main flap. This will give a clearance between the carriage structure and the pushrods or the leading edge of the aft flap.

(b) Install the carriage stops (2), (3), (5), (6) on the flap track (4) (View B-B).
(c) Make sure you have the correct clearances between the flap carriage (1) and the flap track (4).
(d) Set each ballscrew nut (7) to the dimension X measured (View A), during the removal of the flap.

CAUTION: ON AIRPLANES WITH LUBE-FITTING UPPER GIMBAL BUSHINGS, MAKE SURE THE LUBRICATION FITTING POINTS IN THE FORWARD DIRECTION WHEN YOU INSTALL THE BEARING CAP/LUBE FITTING THAT COMES OUT OF THE SURFACE OF THE GIMBAL. THIS WILL HELP PREVENT DAMAGE TO THE BALLSCREW.

(e) Remove the transmission ballscrew supports, one at a time, and move the flap to align the carriages (1) with the ballscrew gimbals (12).
(f) Connect the carriages (1) to the gimbals (12).

S 644-027

CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. A PRESSURE PUMPS CAN BLOW OUT A SEAL AND CAUSE DAMAGE TO THE EQUIPMENT.

(8) Apply grease to the ballscrew lubrication fittings.

S 094-023

(9) Remove the sling from the flap.

S 084-030

(10) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 414-024

(11) Install the forward attach access panels of the inboard and outboard carriage at the leading edge of the main flap.

S 824-026

(12) Adjust and do a test on the outboard TE flap installation (Ref 27-51-14/501).

NOTE: Steps to do the items that follow are included in the adjustment/test procedure:

- Connect the lower pushrods to the aft flap
- Install the fairings for the outboard TE flap track
- Put the airplane back to its usual condition.

OUTBOARD TRAILING EDGE FLAP - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task is to adjust the trailing edge (TE) main flap with the aft flap attached to the main flap, and with the flap carriages and aft flap linkages installed. The second task is a test of the outboard TE flap, and is done after the flap adjustment is made.
   B. The rigging dimensions in this procedure represent rigging the flaps with the wings in the unloaded condition (without engines or fuel weight on the wings). That is the configuration that most closely resembles the in-flight deflection of the wing.
   C. For a in-service airplane the flaps are usually rigged with the engines installed, on jacks or gears, and with fuel weight on the wings. Regardless of this difference, the rigging dimensions given in this procedure are still the target dimensions for the rigging of the airplane in any configuration.

      NOTE: If the best rigging dimension you can obtain is not within the limit, refer to the tables in this procedure to find the limits for a particular airplane configuration.

TASK 27-51-14-825-001

2. Adjust the Outboard TE Flap

   A. Equipment
      (1) Rigging Bars from Rig Bar Set - B27030-125:
         (a) Rigging Bar - P/N B27030-127
         (b) Rigging Bar - P/N B27030-128
      (2) Door Lock, MLG (Ref 32-00-15)
      (3) Rig Pins from Set B20003-XX (Ref 20-10-24):
         (a) TE4 - P/N B20003-4
         (b) TE5 - P/N B20003-4
      (4) TE Flap PDU Lock - B27008-1
      (5) TE Flap Torque Tube Clamp Set - B27055-1:
         (a) TE Flap Torque Tube Clamp Assy - B27055-2
   B. Consumable Materials
      (1) A00247 Sealant - BMS 5-95

(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References
(1) AMM 06-44-00/201, Wing Access /Doors and Panels
(2) AMM 27-51-00/501, Trailing Edge Flap System
(3) AMM 27-51-18/401, Outboard Trailing Edge Flap Tee Gearbox
(4) AMM 27-51-22/501, Outboard Trailing Edge Aft Flap
(5) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairings
(6) AMM 27-58-03/401, Flap Position Transmitter
(7) AMM 27-61-00/501, Spoiler/Speedbrake Control System
(8) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(9) AMM 32-00-15/201, Landing Gear Door Locks.
(10) AMM 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zones
143 Main Landing Gear Wheel Well (Left)
211/212 Control Cabin
560 Wing Trailing Edge, Outboard (Left)
660 Wing Trailing Edge, Outboard (Right)
730 Main Landing Gear and Doors (Left)
740 Main Landing Gear and Doors (Right)

E. Prepare for Adjustment

S 215-002
(1) Make sure that the trailing edge (TE) flaps and the leading edge (LE) slats are in the fully retracted position.

S 495-003
(2) Make sure that the flap control lever is in the zero (flaps up) detent, and install a DO-NOT-OPERATE tag on the flap control lever.

S 215-004
(3) Make sure that the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

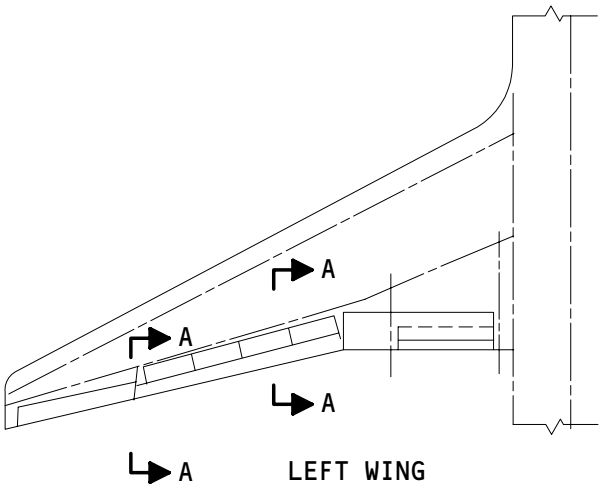
S 495-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

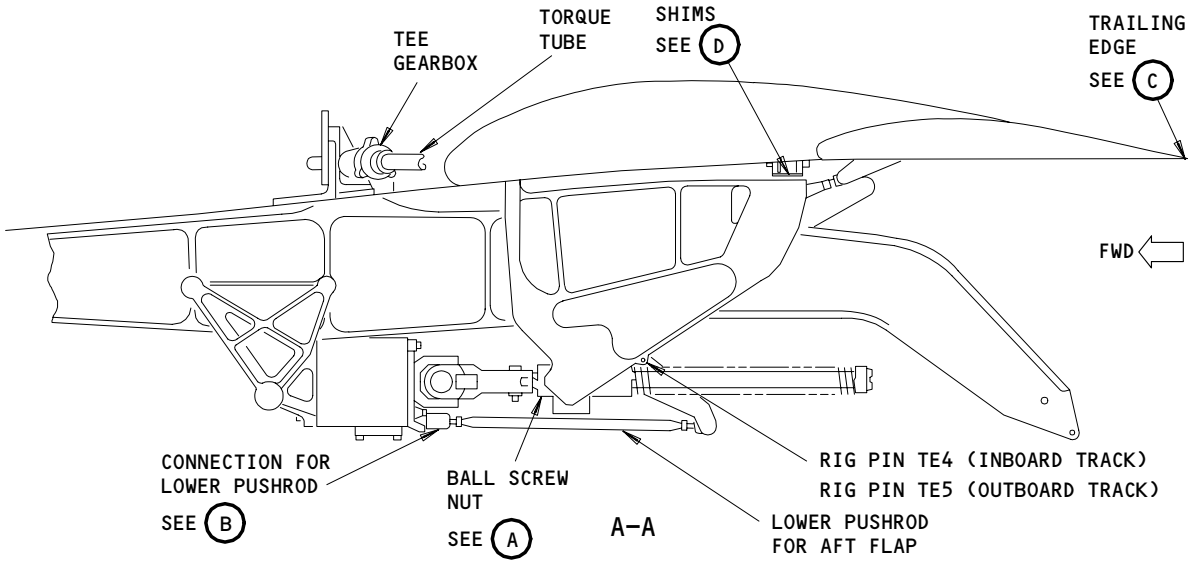
(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

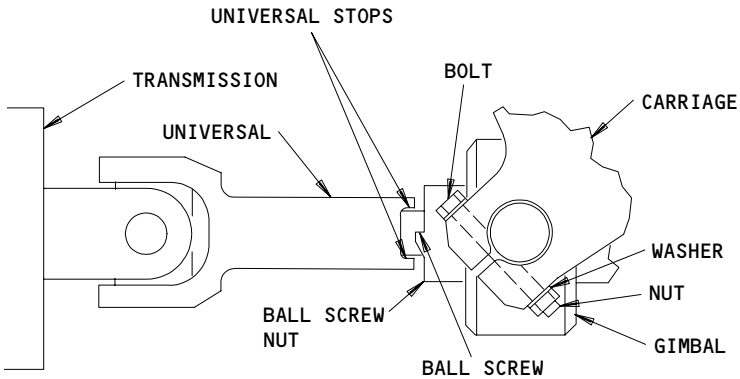
S 865-006
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-007
(6) Install a PDU lock on the TE flap PDU (Fig. 504).



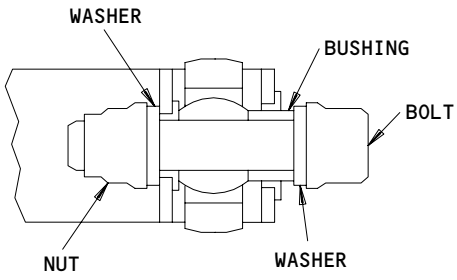
LEFT WING
PLAN VIEW





BALL SCREW NUT

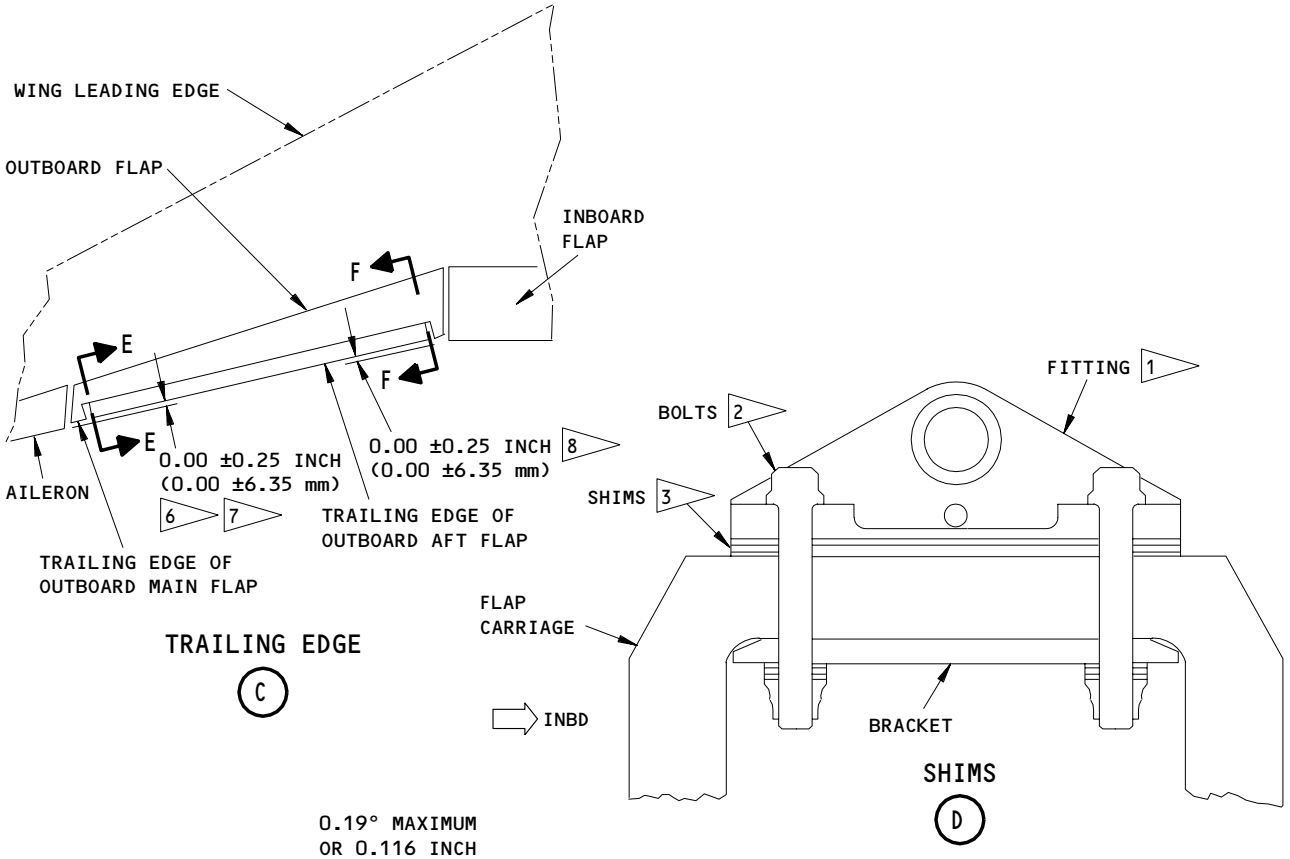
A



CONNECTION FOR LOWER PUSHROD

B

Adjustment for the Outboard TE Flap, Aft TE Flap and the Aileron TE
Figure 501 (Sheet 1)

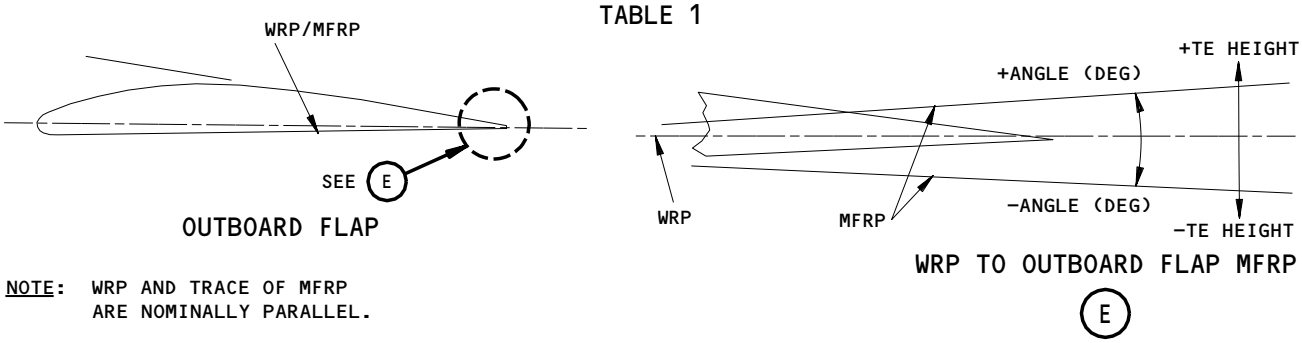


1. INSTALL THE FITTING WITH FAYING SURFACE SEALANT BMS 5-95
2. SEAL BOLTS AFTER INSTALLATION WITH BMS 5-95 SEALANT
3. MAXIMUM SHIM THICKNESS TO BE NOT MORE THAN 0.35 INCH (8.9 mm)
4. ADJUST WITH SHIMS AT THE AFT END OF THE FLAP CARRIAGES
5. SEE TABLE 1.
6. THE OUTBOARD FLAP TRAILING EDGES AT THE ENDS, MATCH TO THE AFT FLAP TRAILING EDGE.
7. THE OUTBOARD FLAP TRAILING EDGE MATCHES TO THE AILERON TRAILING EDGE. SEE TABLES 2 AND 3.
8. THE OUTBOARD FLAP TRAILING EDGE MATCHES TO THE INBOARD FLAP TRAILING EDGE.

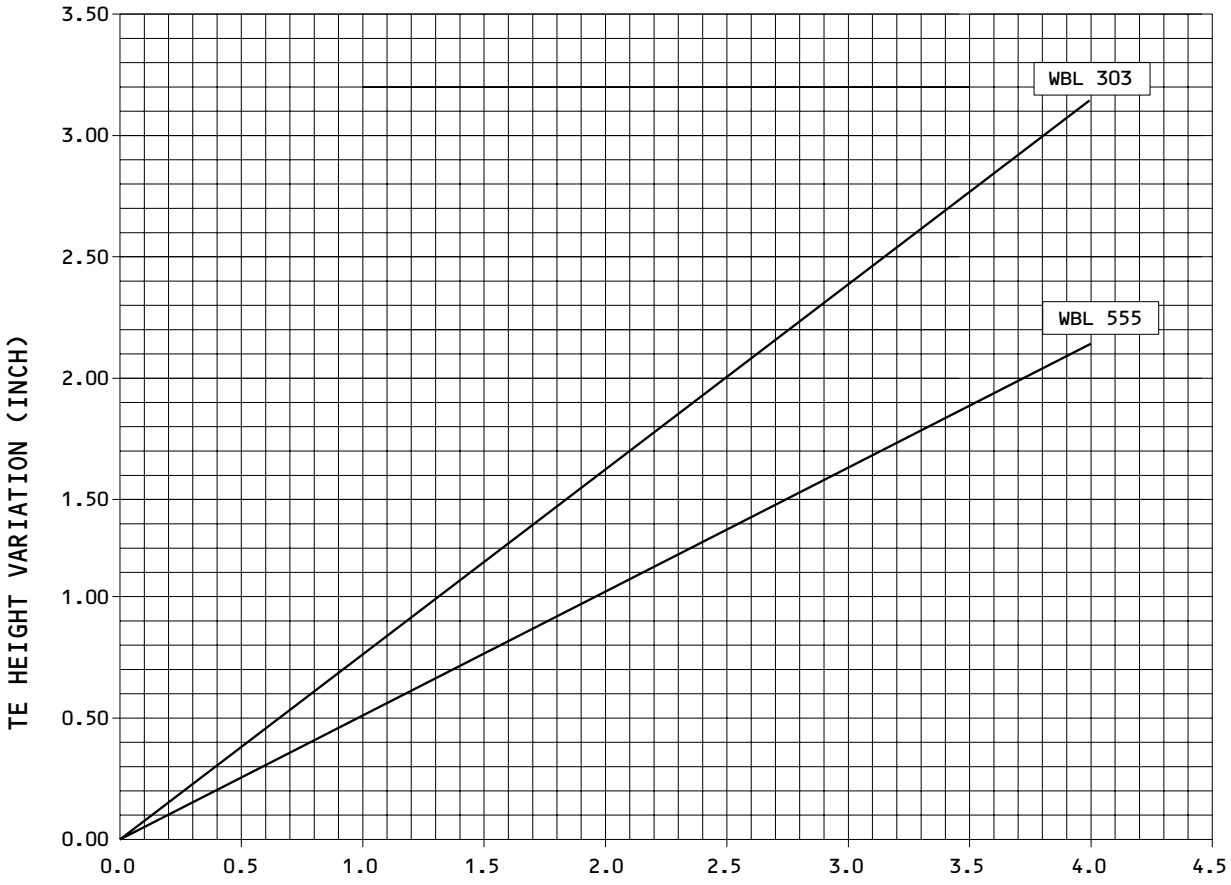
Adjustment for the Outboard TE Flap, Aft TE Flap and the Aileron TE
Figure 501 (Sheet 2)

CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	−0.26°	0.75°	−1.55°
ON GEAR + ENGINES	0.46°	3.53°	−2.47°
ON GEAR + ENGINES + 3000 LBS FUEL	0.18°	1.30°	−0.36°

OUTBOARD FLAP WING REFERENCE PLANE
TABLE 1



NOTE: WRP AND TRACE OF MFRP ARE NOMINALLY PARALLEL.



OUTBOARD FLAP ANGLE TO TE HEIGHT CONVERSION

Adjustment for the Outboard TE Flap, Aft TE Flap and the Aileron TE
Figure 501 (Sheet 3)

CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	0.06°	0.15°	-0.03°
ON GEAR + ENGINES	0.06°	0.14°	-0.02°
ON GEAR + ENGINES + 3000 LBS FUEL	0.03°	0.10°	-0.06°

NOTE: A NEGATIVE DIMENSION INDICATES THAT THE AILERON IS AFT OF THE MAIN FLAP AT TE.

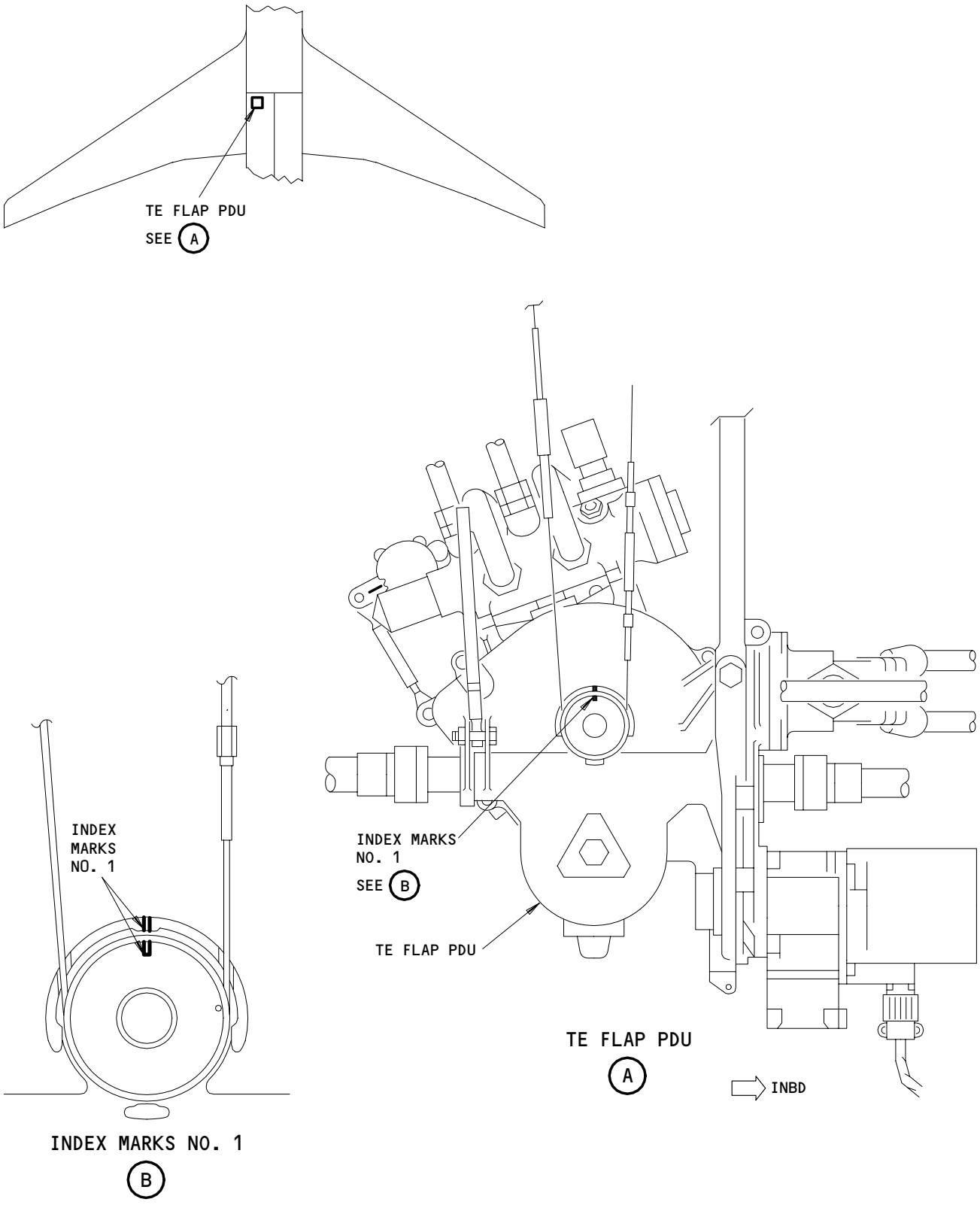
FORWARD/AFT MISFAIR BETWEEN OUTBOARD FLAPS AND AILERONS AT TRAILING EDGE
TABLE 2

CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	-0.07°	0.27°	-0.34°
ON GEAR + ENGINES	0.05°	0.30°	-0.30°
ON GEAR + ENGINES + 3000 LBS FUEL	0.06°	0.08°	-0.25°

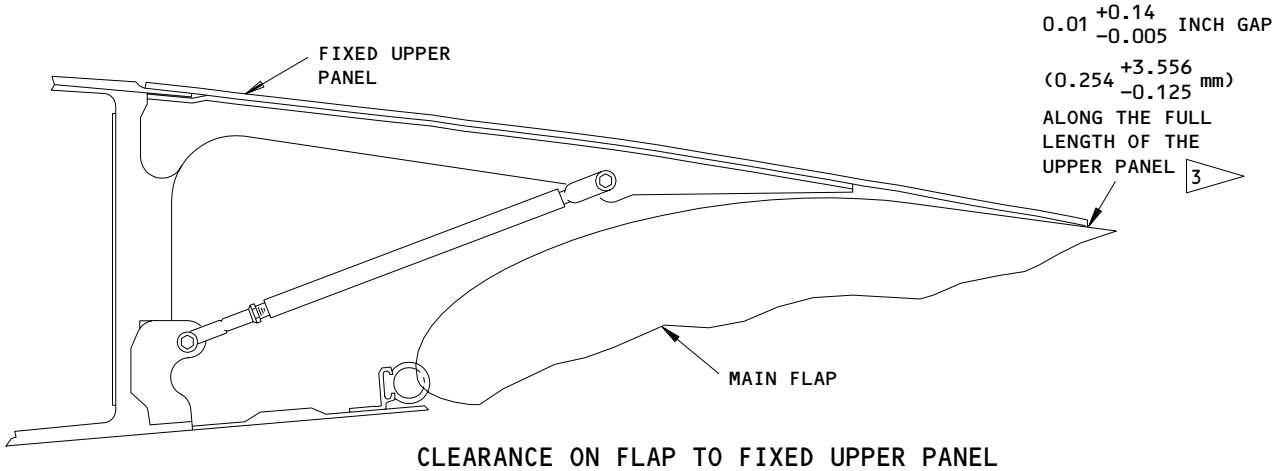
NOTE: A NEGATIVE DIMENSION INDICATES THAT THE FLAP TE IS BELOW THE AILERON TE.

VERTICAL MISFAIR BETWEEN OUTBOARD FLAPS AND AILERONS AT TRAILING EDGE
TABLE 3

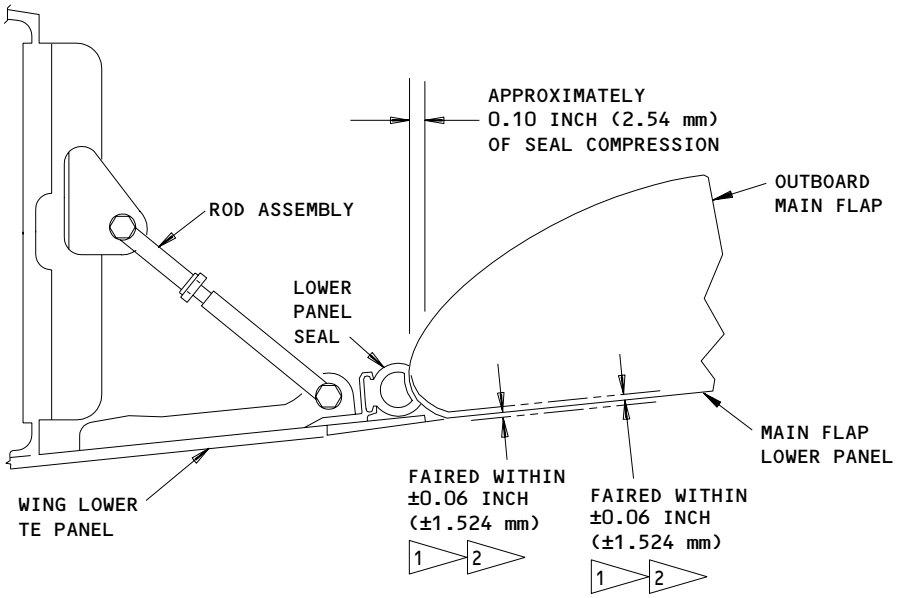
Adjustment for the Outboard TE Flap, Aft TE Flap and the Aileron TE
Figure 501 (Sheet 4)



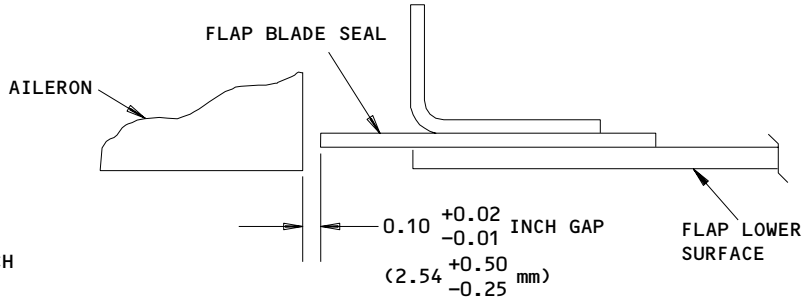
Flaps-Up Adjustment for the TE Flap PDU
Figure 502



CLEARANCE ON FLAP TO FIXED UPPER PANEL



CLEARANCES ON FLAP TO LOWER TE PANEL



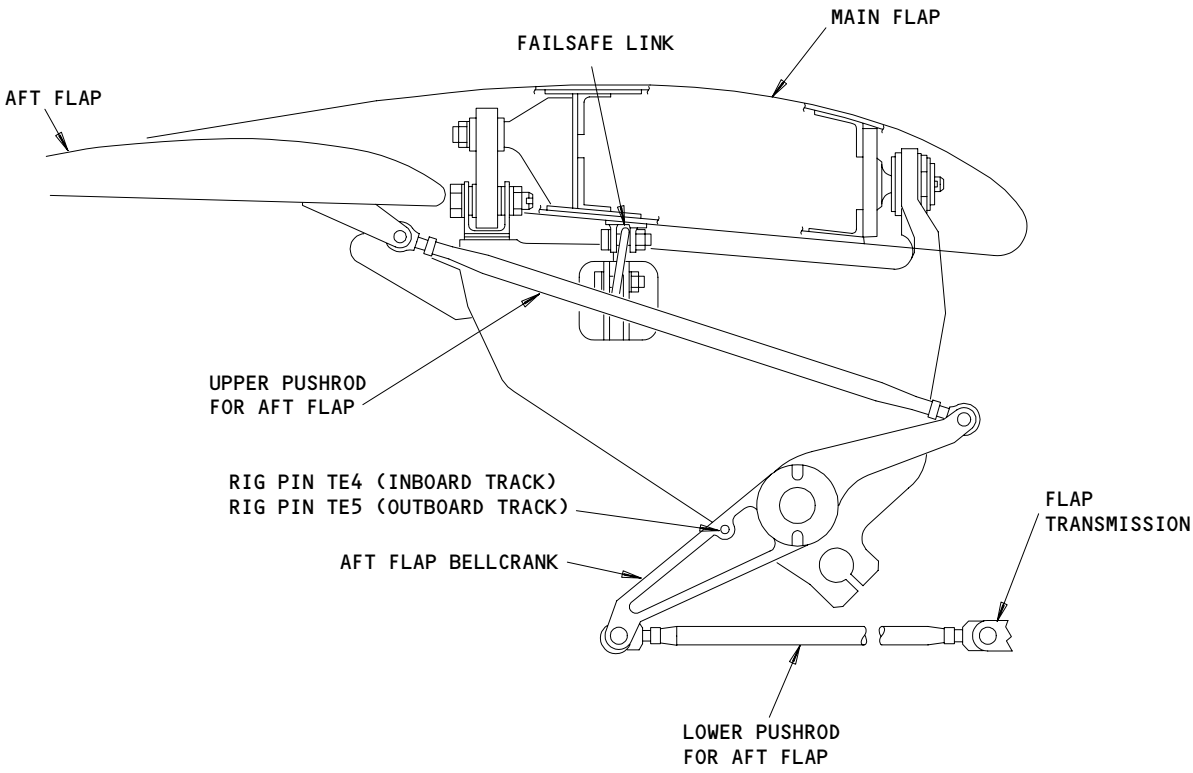
CLEARANCE ON FLAP BLADE SEAL TO AILERON

1 AT THE INBOARD END, THE MAXIMUM CLEARANCE IS 0.20 INCH (5.08 mm). THE MAXIMUM CLEARANCE DECREASES CONTINUOUSLY FOR 12 INCHES IN THE OUTBOARD DIRECTION TO THE 0.06 INCH (1.52 mm) CLEARANCE.

2 SEE TABLES 1 AND 2.

3 SEE TABLE 3.

Adjustments for the Outboard TE Flap and the Wing Fixed Upper Panel
Figure 503 (Sheet 1)



Adjustments for the Outboard TE Flap and the Wing Fixed Upper Panel
Figure 503 (Sheet 2)

CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	0.00	0.09	-0.09
ON GEAR + ENGINES	0.00	0.08	-0.08
ON GEAR + ENGINES + 3000 LBS FUEL	0.00	0.08	-0.12

NOTE: NEGATIVE DIMENSION INDICATES THE FLAP IS ABOVE THE PANEL.

MISFAIR BETWEEN THE LOWER FIXED PANEL AND LOWER SURFACE OF OUTBOARD FLAP. MEASUREMENT DOES NOT APPLY OVER THE INBOARD 12 INCHES OF THE OUTBOARD FLAP.
TABLE 1

CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM
ON JACKS + ENGINES	0.02	0.11	-0.08
ON GEAR + ENGINES	0.02	0.10	-0.08
ON GEAR + ENGINES + 3000 LBS FUEL	0.02	0.18	-0.13

NOTE: NEGATIVE DIMENSION INDICATES THE FLAP IS ABOVE THE PANEL.

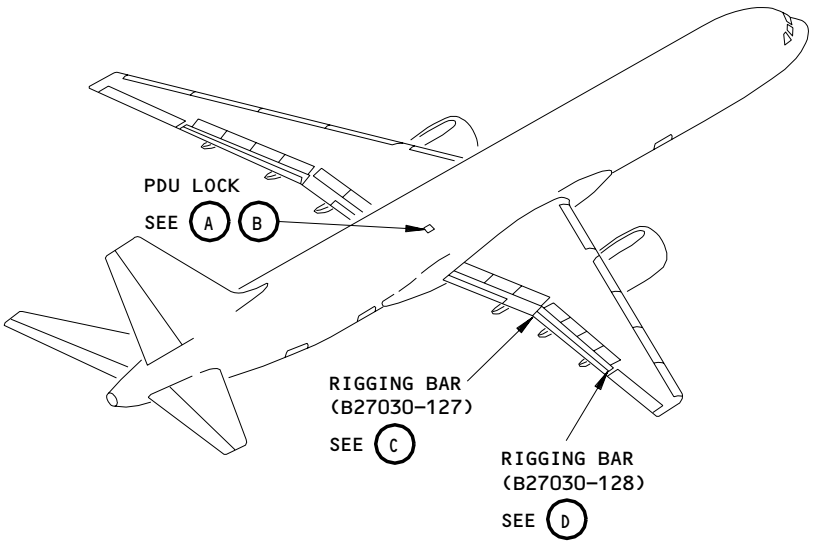
MAXIMUM MISFAIR BETWEEN THE LOWER FIXED PANEL AND LOWER SURFACE OF OUTBOARD FLAP OVER INBOARD 12 INCHES OF OUTBOARD FLAP. MEASURED AT INBOARD END OF FLAP
TABLE 2

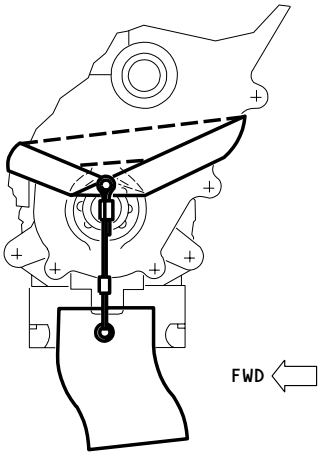
CONFIGURATION	AVERAGE	MAXIMUM	MINIMUM*
ON JACKS + ENGINES	0.08	0.45	0.00
ON GEAR + ENGINES	0.07	0.18	0.00
ON GEAR + ENGINES + 3000 LBS FUEL	0.04	0.18	0.00

*THIS IS THE DIMENSION AS IT WAS MEASURED. IF RIGGING IN THIS CONFIGURATION, THE PANEL SHOULD ALWAYS BE RIGGED TO PROVIDE A MINIMUM GAP OF 0.005 INCH ALONG PANEL LENGTH.

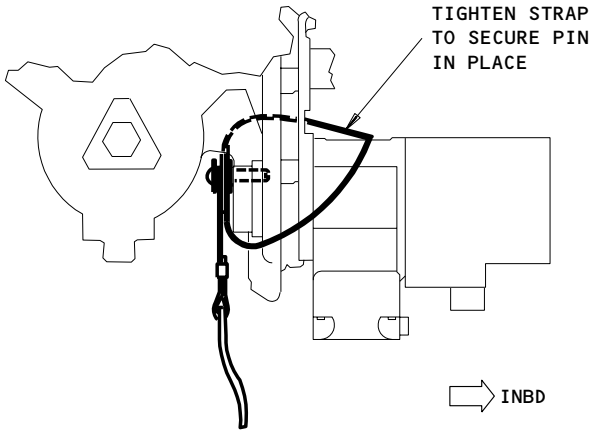
GAP BETWEEN THE UPPER FIXED PANEL AND UPPER SURFACE OF OUTBOARD FLAP
TABLE 3

Adjustment for the Outboard TE Flap and the Wing Fixed Upper Panel
Figure 503 (Sheet 3)



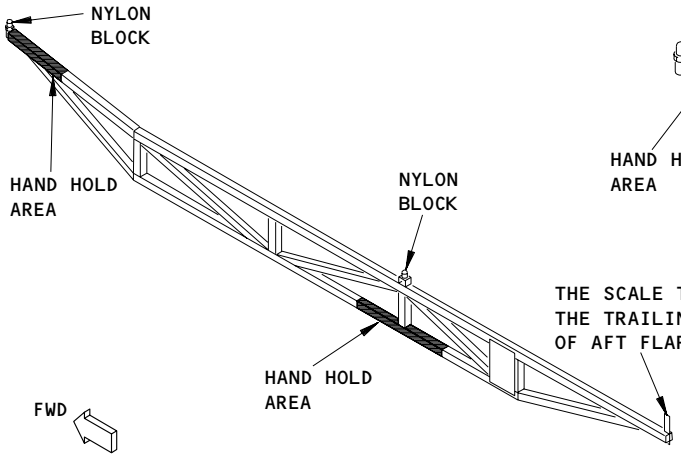


PDU LOCK
(OUTBOARD VIEW)
A



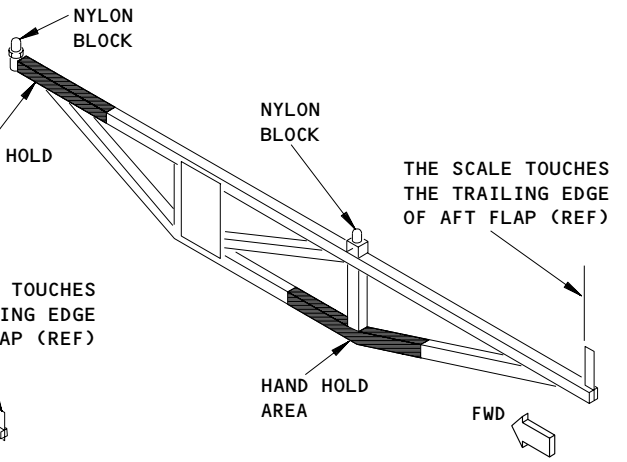
PDU LOCK
(AFT VIEW)
B

Outboard TE Flap Tools
Figure 504 (Sheet 1)



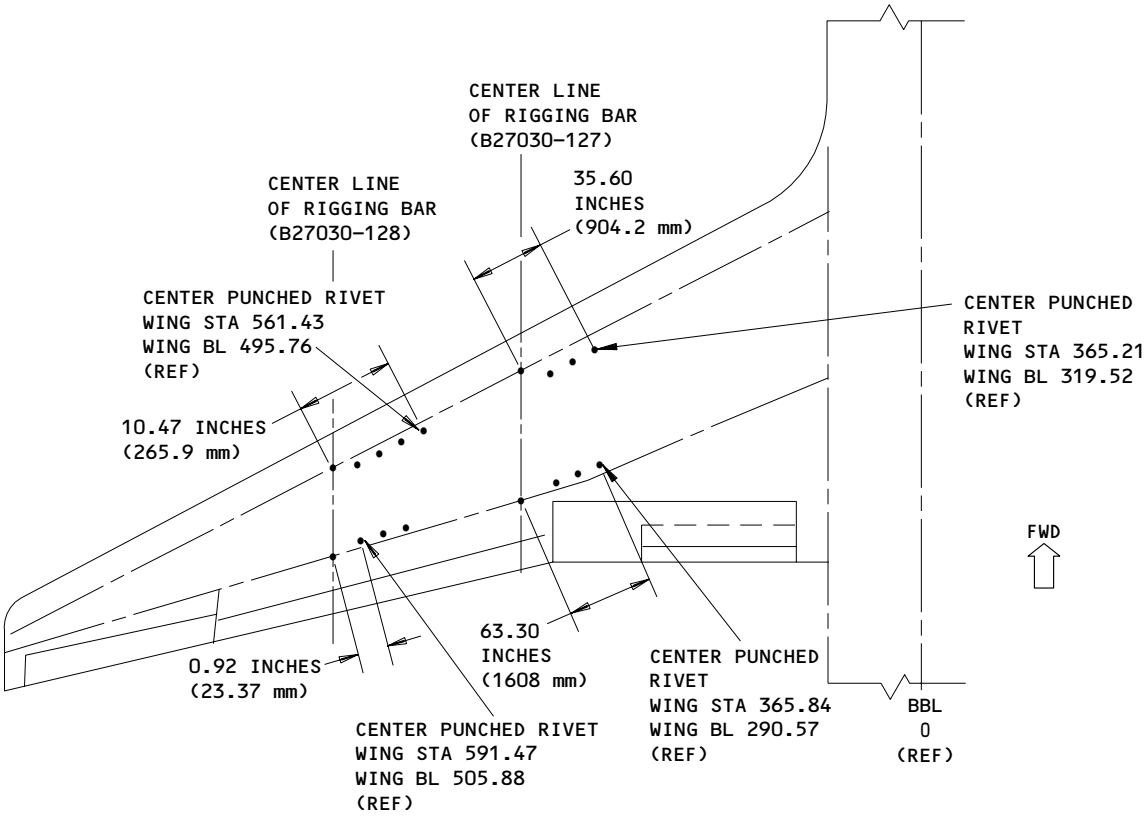
RIGGING BAR (B27030-127)
INBOARD END OF OUTBOARD FLAP

C



RIGGING BAR (B27030-128)
OUTBOARD END OF OUTBOARD FLAP

D



POSITION OF RIGGING BARS FOR THE OUTBOARD TE FLAPS
(PLAN VIEW, LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

Outboard TE Flap Tools
Figure 504 (Sheet 2)

S 865-008

(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (d) 11J18, FLAP LOAD RELIEF
   (e) 11J33, WARN ELEX A

S 865-009

(8) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

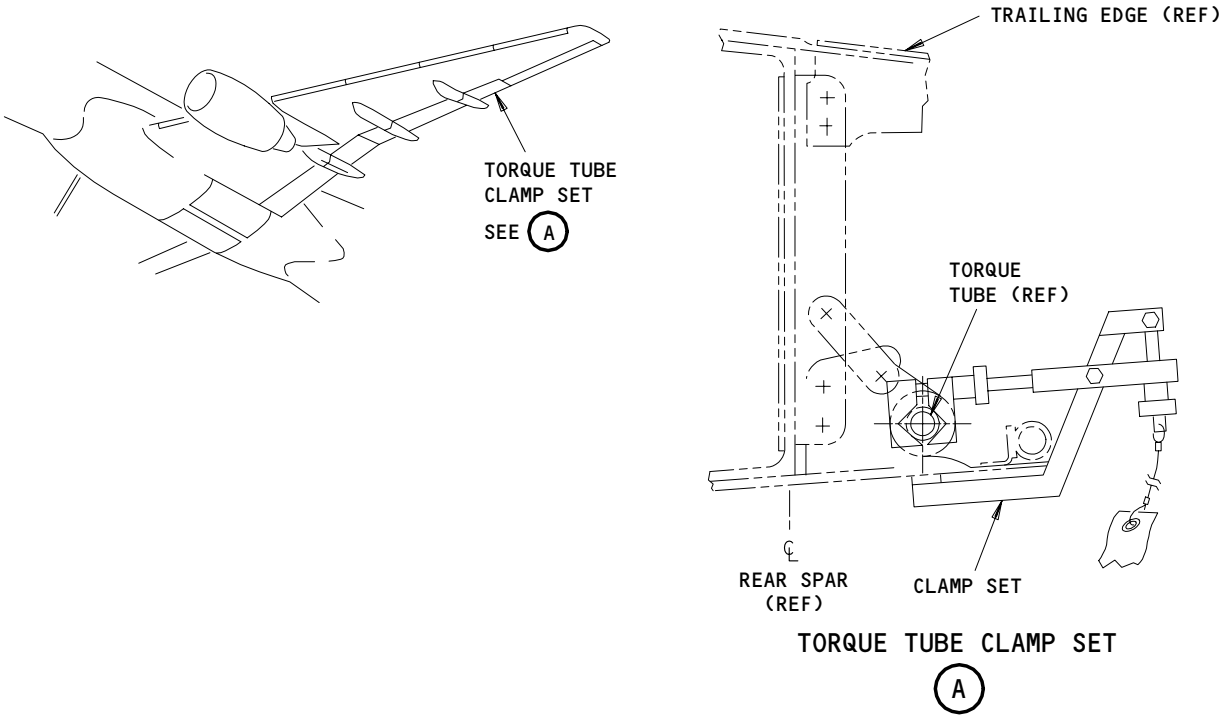
S 015-010

(9) Remove the access panels for the trailing edge, and open access doors as necessary (AMM 06-44-00/201).

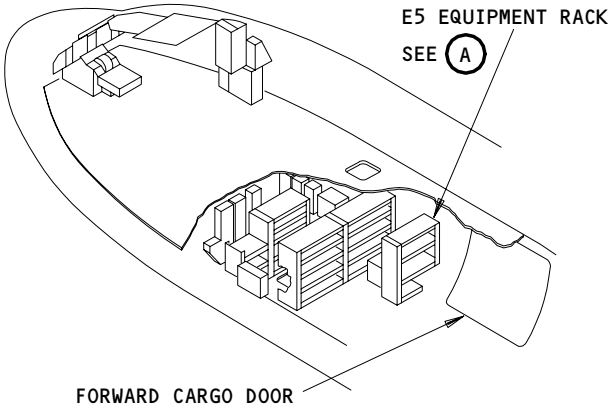
F. Adjust the Outboard TE Flap

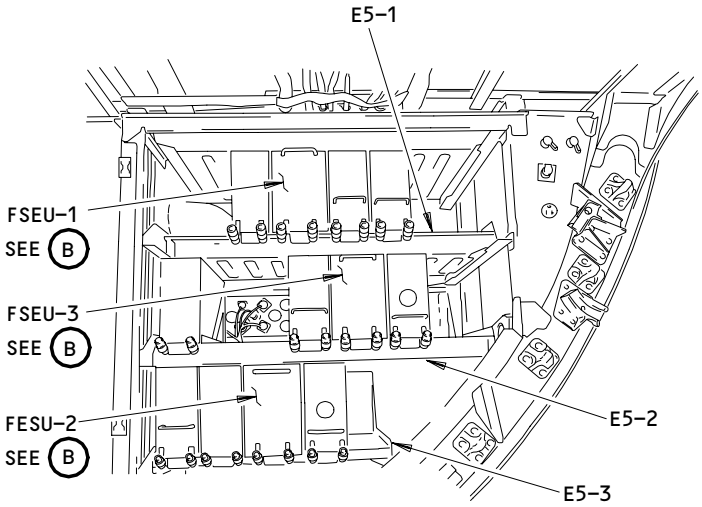
S 025-011

(1) Remove the aft fairings for the flap track (AMM 27-51-31/201).

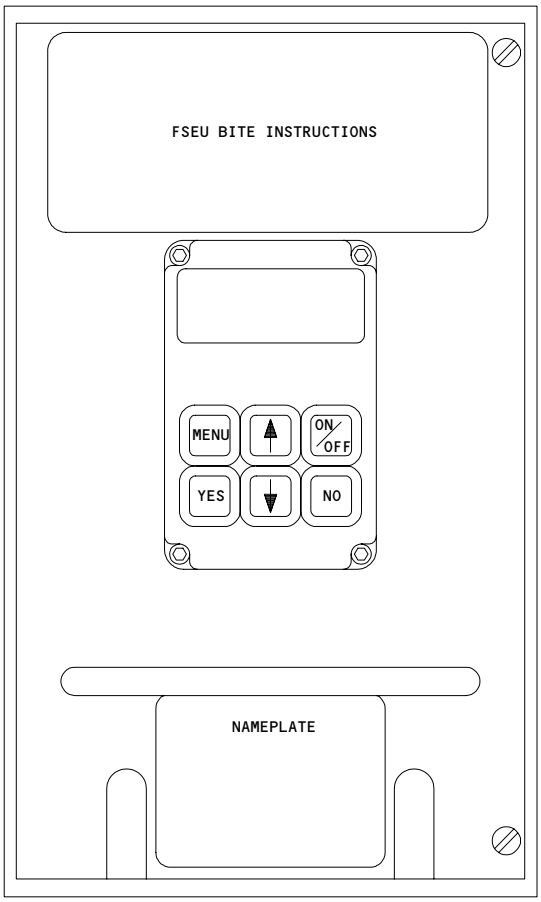


Torque Tube Clamp Set
Figure 505





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 506

S 215-012
(2) Make sure that the aft flap is adjusted to the main flap (AMM 27-51-22/501).

S 035-013
(3) Disconnect the lower push rod for the aft flap from the flap transmission (Fig. 503).

S 035-014
(4) Disconnect the torque tube from the inboard side of the outboard tee gearbox, and from the inboard side of the inboard tee gearbox (AMM 27-51-18/401).

NOTE: Do not turn the torque tubes. The flap drive will be out of alignment if you turn the torque tubes while it is disconnected from the inboard tee gearbox (AMM 27-51-18/401).

S 495-015
(5) Install a torque tube clamp (Fig. 505) to the disconnected torque tube at the inboard side of the inboard tee gearbox.

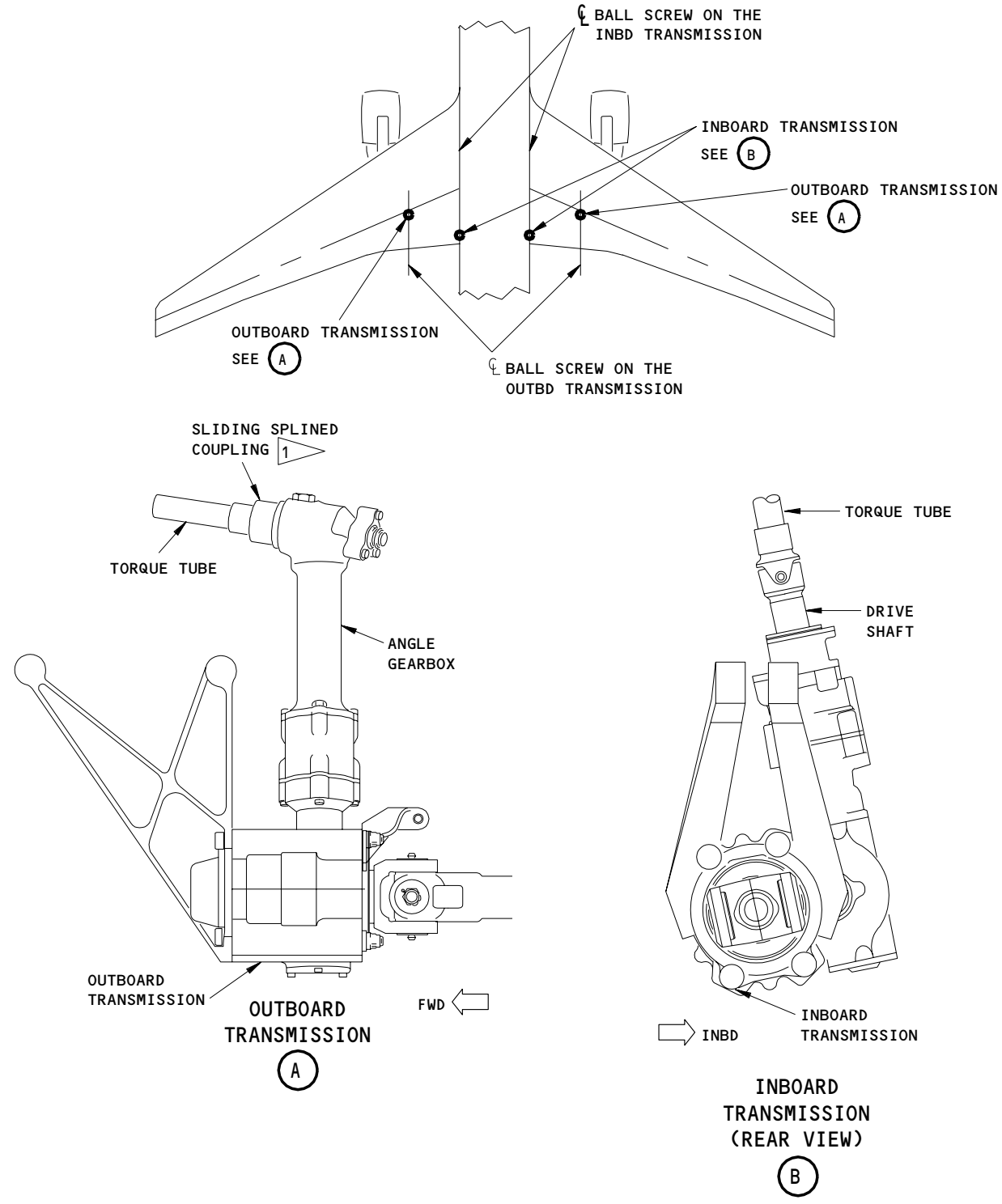
NOTE: This will hold the torque tube in position.

S 865-016
(6) Turn each input shaft to the angle gearbox until the universal stop for the transmission touches the ball screw nut stop.

S 865-017
(7) Turn each input shaft in the opposite direction until you get a 90 (+/- 10) degrees clearance (approximately 3.75 turns) between the universal stop and the ball screw nut stop.

NOTE: This will get you the correct position for adjustment on the outboard flap.

S 095-018
(8) Remove the clamp from the torque tube.



Inboard/Outboard TE Flap Transmissions
Figure 507

S 435-071

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(9) Connect the torque tubes at the inboard and outboard tee gearboxes, then safety wire the fasteners together (FIG. 507).

NOTE: Do not turn the torque tubes.

S 215-021

(10) Do the checks that follow after you connect the torque tube:
(a) Make sure that the No.1 index marks on the TE flap PDU are aligned (Fig. 502).
(b) Make sure that the outboard flap and transmissions are in the same position as before.

S 865-022

(11) Apply an up load to the outboard flap such that the aft flap support tracks (four locations) touch the main rollers, and the main flap tracks (two locations) touch the main carriage rollers.

NOTE: The outboard flap must agree with all the fit and fair dimensions when the flap is in this position (Fig. 503).

S 495-023

(12) Install the TE4 and TE5 rig pins (Fig. 501).

S 215-024

(13) Make sure that the trailing edge of the outboard flap is aligned with the trailing edge of the aileron (Detail C, Fig. 501).

NOTE: You can manually move the flap to make fair adjustments if necessary.

S 835-025

(14) If the trailing edge positions do not agree with the tolerances, adjust the shims at the aft end of the flap carriages.

S 835-062

(15) Use the outboard rigging bars to find the necessary adjustment with the steps that follow (Fig. 504):

(a) Hold the rigging bars against the lower surface of the wing at the location shown.

NOTE: Hold the rigging bars at the HAND HOLD area. Two persons will be necessary to hold each rigging bar into position.

(b) The nylon blocks on the rigging bars must touch the lower surface of the wing directly under the front spar and the rear spar.

(c) The scale at the end of each rigging bar must lightly touch the trailing edge of the flap.

(d) Use the lower surface of the flap to read the position on each scale.

(e) Read the scale to make sure that the flap trailing edge is in the limits (Views E-E and F-F, Fig. 501).

(f) Make sure that the left flap trailing edge makes the same angle with the left wing reference plane as the right flap trailing edge makes with the right wing reference plane within 0.14 degree. Use the outboard rigging bars to do this check.

S 225-026

(16) Make sure that there is a 0.01 (+0.14/-0.005) inch clearance between the trailing edge of the fixed upper panel and the flap upper surface (Fig. 503).

(a) Adjust the rod assemblies attached to the upper panels to get this condition to agree.

S 225-027
(17) Make sure that the surface of the lower TE panel is aligned with the lower surface of the main flap by +/- 0.06 inch (+/- 1.524 mm) or less (Fig. 503).

NOTE: At the inboard end of the outboard flap, the maximum allowance for mismatch is 0.00 (+0.06/-0.20) inch (+1.5/-5.0 mm). This mismatch is permitted over the next 12 inches (305 mm) in the outboard direction.

(a) Adjust the rod assemblies attached to the lower panels to get this condition to agree.

S 215-028
(18) Make sure that the flap leading edge touches the lower panel seals along the full length of the flap (Fig. 503).

S 225-029
(19) Do a check to see that there is a 0.10 inch (2.54 mm) gap between the aileron and the flap blade seal (Fig. 503).

S 225-070
(20) Do a check of the spoiler to flap clearance (AMM 27-61-00/501).

S 865-067
(21) Make sure that the rig pins TE4 and TE5 are installed in the aft flap bellcranks (Fig. 503).

S 435-030
(22) Attach the lower pushrods to the transmissions. Adjust the length of the pushrods as necessary.

S 095-031
(23) Remove the TE4 and TE5 rig pins.

S 215-032
(24) Operate the flaps through one complete cycle and do the checks that follow (Fig. 503):

NOTE: You can operate the flaps manually to do these checks.

(a) Make sure that the failsafe links are free to move through full travel.
(b) Make sure that the upper and lower pushrods are free to move through full travel.

S 425-033
(25) Install the aft fairing for the flap tracks (AMM 27-51-31/201).

S 215-034
(26) Do a check to see that the TE flaps and LE slats are in the fully retracted position.

S 215-035
(27) Make sure that the flap control lever is in the zero (FLAPS UP) detent, and remove the DO-NOT-OPERATE tag.

S 095-037
(28) Remove the PDU lock from the TE flap PDU.

S 865-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(29) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-038
(30) Move the flap control lever to the 20-unit detent, and make sure that the TE flaps and LE slats extend to the intermediate position.

S 495-039
(31) Install a DO-NOT-OPERATE tag on the flap control lever.

S 865-040
(32) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-041
(33) Install the PDU lock in the TE flap PDU.

S 905-042
(34) Remove, adjust, and install the flap position transmitter at the outboard end of the torque tube drive if necessary (AMM 27-58-03/401).

S 095-043
(35) Remove the PDU lock from the TE flap PDU.

S 865-044

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(36) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 095-045
(37) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-046
(38) Move the flap control lever to the zero (FLAPS UP) detent, and make sure that the TE flaps and the LE slats move to the fully retacted position.

S 495-047
(39) Install a DO-NOT-OPERATE tags on the flap control lever.

S 715-048
(40) Do a test on the outboard TE flap.

TASK 27-51-14-715-049

3. The Outboard Trailing Edge Flap Test

NOTE: You can do the test that follows only if the flap drive between the flap control lever and the TE flap PDU was not adjusted (AMM 27-51-00/501). You must do the test on 27-51-00 as an alternative to this test if you adjust the flap drive before you adjust the outboard flaps.

A. References
(1) AMM 06-44-00/201, Wing Access /Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-51-00/501, Trailing Edge Flap System
(4) AMM 27-58-01/501, TE Flap System and LE Slat System Position Transmitter - Adjustment Test
(5) AMM 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(6) AMM 32-00-15/201, Landing Gear Door Locks.

B. Access

(1) Location Zones

120 Main Equipment Center (Right)
143 Main Landing Gear Wheel Well (Left)
211/212 Control Cabin
560 Wing Trailing Edge, Outboard (Left)
660 Wing Trailing Edge, Outboard (Right)
730 Main Landing Gear and Doors (Left)
740 Main Landing Gear and Doors (Right)

C. Prepare for Test.

S 215-050
(1) Make sure that the trailing edge (TE) flaps and the leading edge (LE) slats are in the fully retracted position.

S 095-051
(2) Make sure the flap control lever is in the zero detent, and remove the DO-NOT-OPERATE tag from the flap contol lever.

S 865-052
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) On the overhead equipment panel P11:
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A
(b) On the main power distribution panel P6:
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR

S 865-053
(4) Supply electrical power (AMM 24-22-00/201).

S 865-054
(5) Turn the dimmer control knob for the first officer's panel on the lightshield panel, P7, to a full clockwise.

S 215-055
(6) Make sure that the arming switches for the flap and slat alternate drive on the first officer's main instrument panel, P3, are not in the armed position (switch lights off).

S 215-056
(7) Make sure that the position selector switch for the flap and slat alternate drive is in the NORM position.

S 215-057
(8) Make sure that the six EICAS circuit breakers on the P11 panel are closed.

S 095-058
(9) Remove the PDU lock from the TE flap PDU.

S 865-059

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(10) Pressurize the left hydraulic system (AMM 29-11-00/201).

D. The Outboard TE Flap Test

S 865-060
(1) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent, and from the 30-unit detent back to the zero detent. Stop at each detent to permit the TE flaps and LE slats to move to the position on the flap control lever. Do a check at each detent for the conditions that follows:
(a) Make sure that the TRAILING EDGE and the LEADING EDGE lights on the P3 panel are off.
(b) Make sure that there are no messages on the EICAS display.

S 715-061
(2) Do the test of the position transmitter for the TE flap (AMM 27-58-01/501).

E. Put the Airplane Back to its Usual Condition

S 095-062

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-068
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-064
(3) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 415-065
(4) Install the access panels and close the access doors (AMM 06-44-00/201).

OUTBOARD TRAILING EDGE FLAP TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the track for the outboard trailing edge (TE) flap. The second task installs the track.

   TASK 27-51-15-024-001

2. Remove the Track for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Flap Track Hoist Adapter - B27075-20
      (3) Transmission Jack - Blackhawk Model 67554 or Hein-Werner Model 74
   B. References
      (1) AMM 27-51-14/401, Outboard Trailing Edge Flap
      (2) AMM 27-51-17/401, Outboard Trailing Edge Flap Transmission
      (3) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairings
      (4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

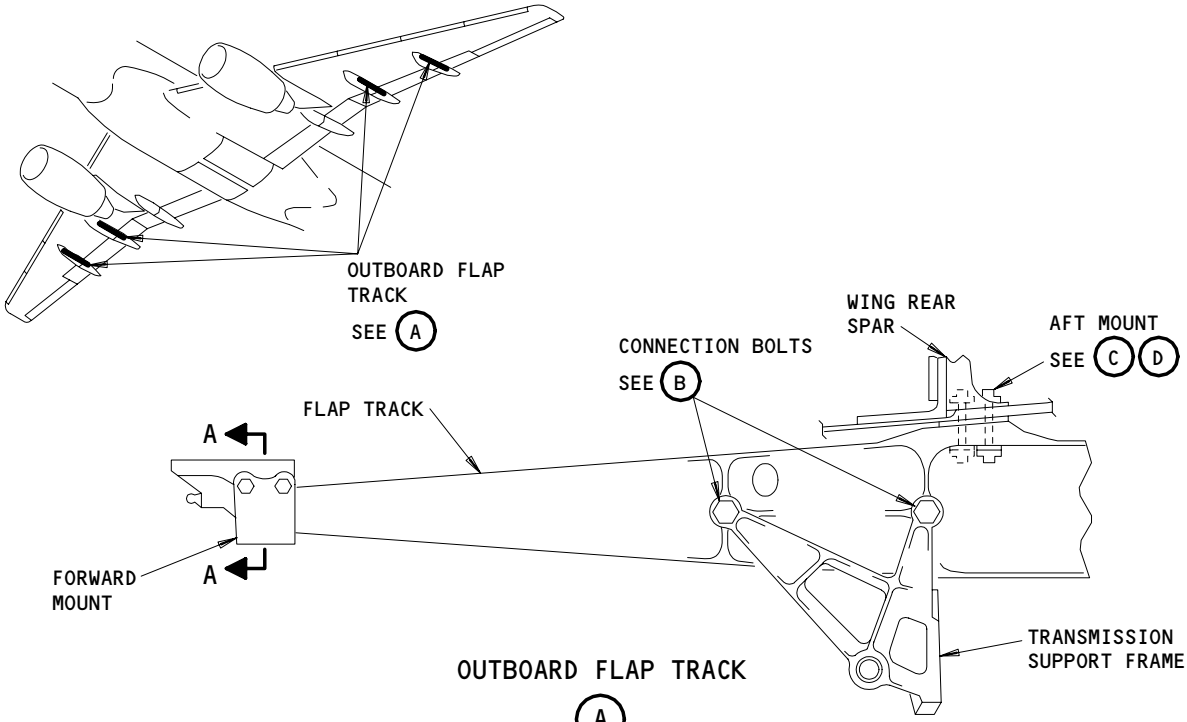
143	MLG Wheel Well
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-011
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

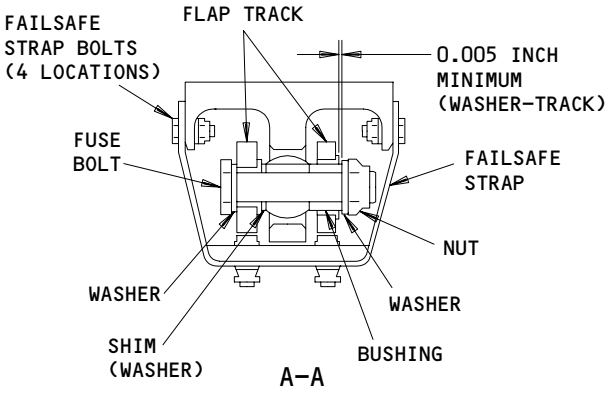
      S 494-002
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

      S 214-012
      (3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

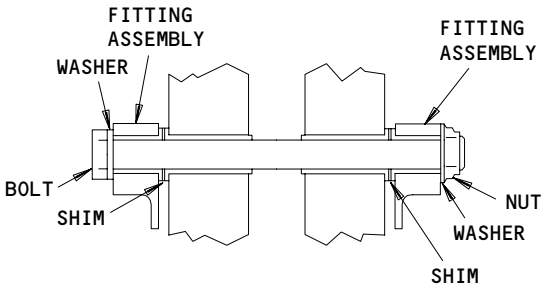


OUTBOARD FLAP TRACK

A

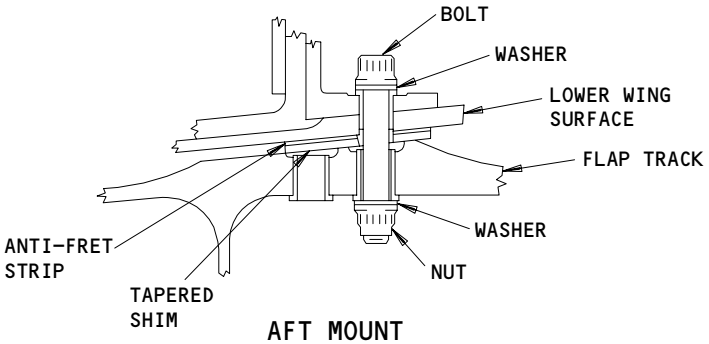


A-A



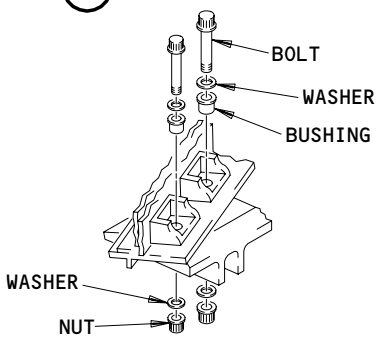
CONNECTION BOLTS

B



AFT MOUNT

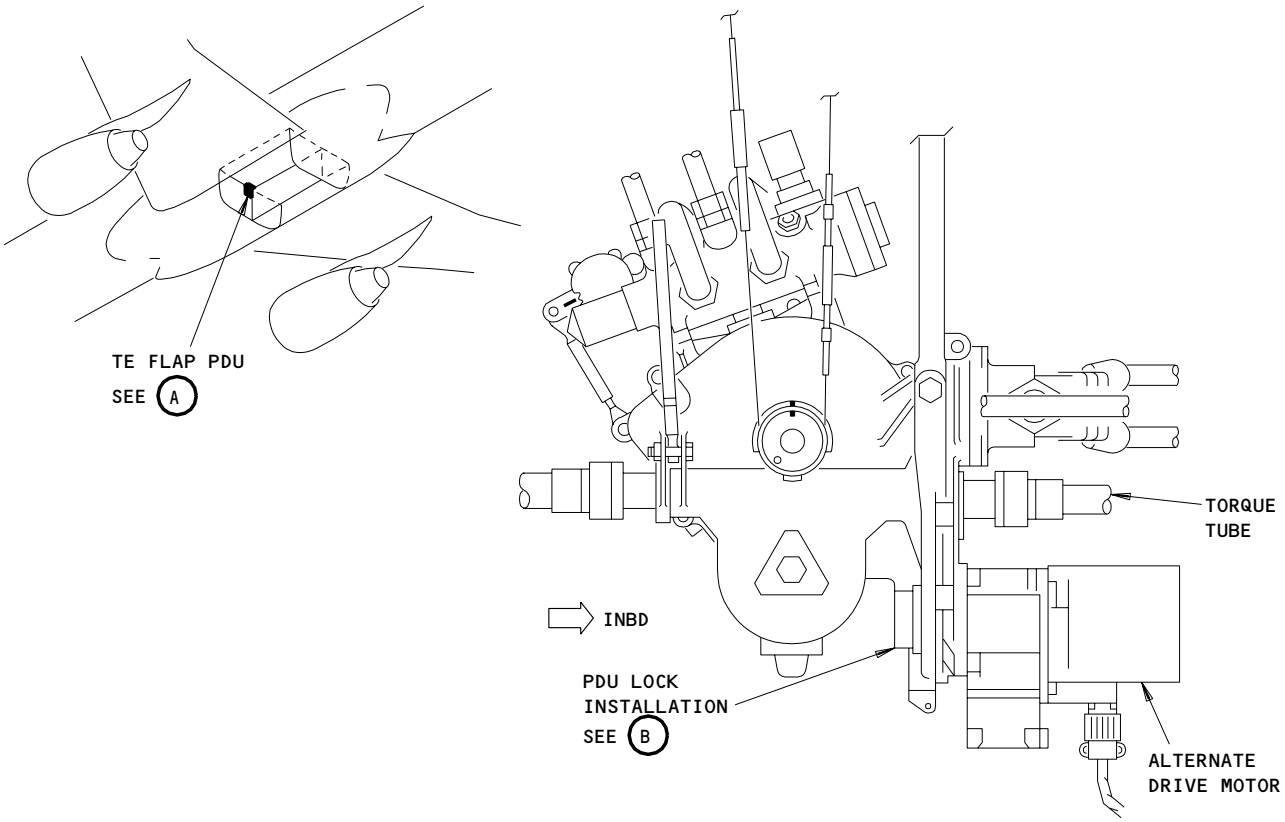
C



AFT MOUNT

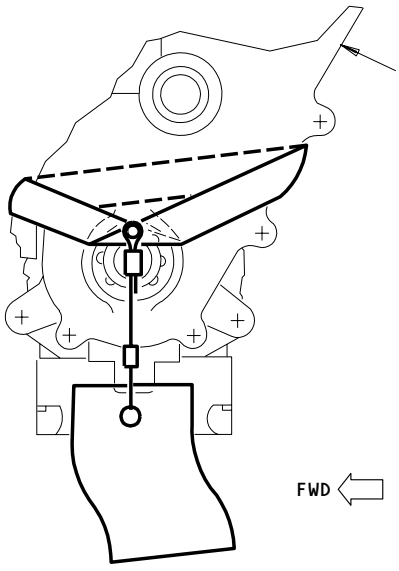
D

Outboard Flap Tracks
Figure 401



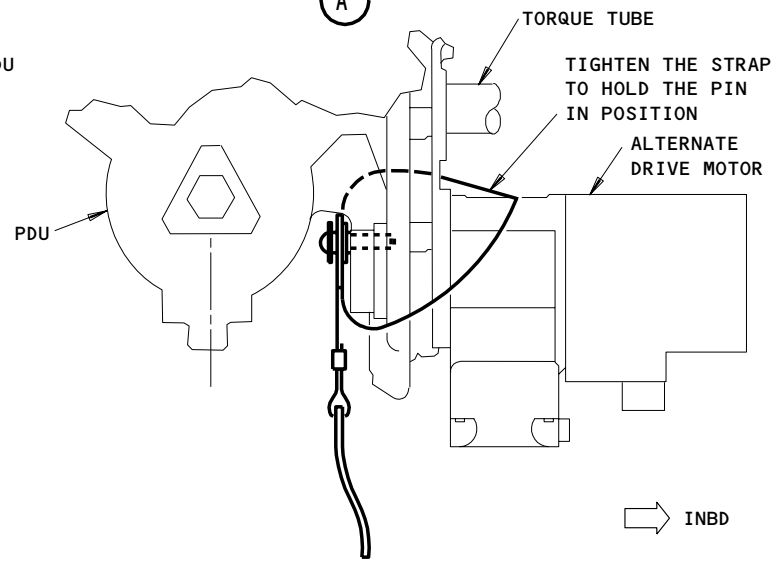
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

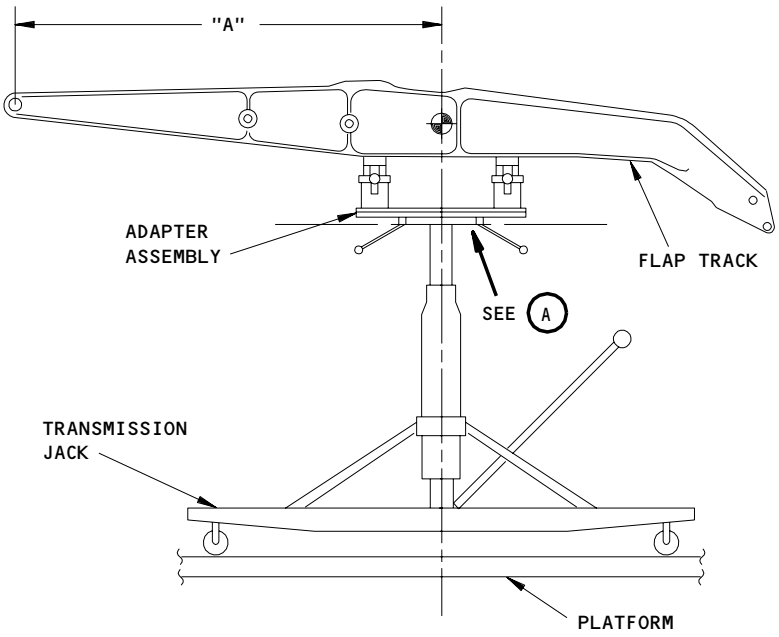
B

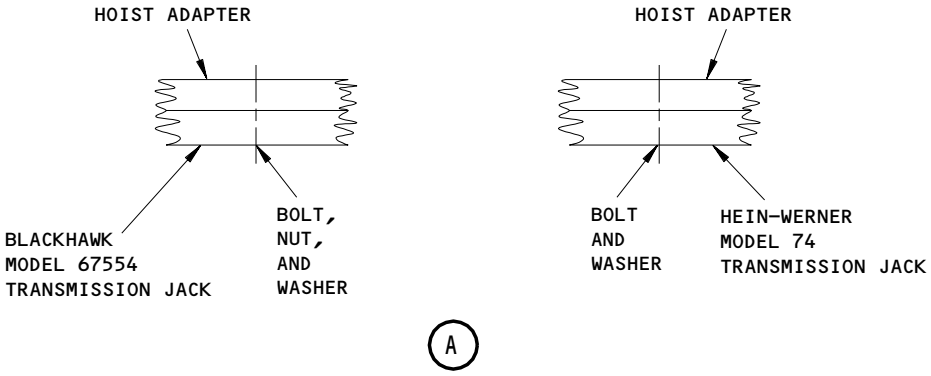


PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 402





FLAP TRACK	"A" INCHES (mm)
OUTBD FLAP - INBD TRACK	48.0 (1219)
OUTBD FLAP - OUTBD TRACK	36.0 (914)

Support Transmission Jack for Flap Traks
Figure 403

S 014-013

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-014

(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-015

(6) Open these circuit breakers on the panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-016

(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-017

(8) Install a PDU lock on the TE flap PDU (Fig. 402).

S 014-018

(9) Remove the fairing for the outboard TE flap track (AMM 27-51-31/201).

S 014-019

(10) Remove the outboard TE flap (AMM 27-51-14/401).

S 014-020

(11) Remove the transmission for the outboard TE flap (AMM 27-51-17/401).

NOTE: Remove the ballscrew and the gimbal first to make the transmission removal procedure easier.

E. Remove the Flap Track (Fig. 401)

NOTE: The outboard TE Flap Track weighs approximately 220 pounds (99.8 Kg).

S 024-031

(1) Do these steps to remove the inboard or outboard flap track:
  (a) Install transmission jack and hoist adapter per Fig. 403.
  (b) Remove the two bolts that connect the transmission support frame to the flap track.
  (c) Remove the two bolts at the aft mount.
  (d) Remove the failsafe strap assembly at the forward mount.
  (e) Remove the fuse bolt at the forward mount (View A-A).
  (f) If you will install a different flap track, remove the tapered shim to use for the installation.

NOTE: The tapered shim is at the aft mount location.

TASK 27-51-15-424-003

3. Install the Track for the Outboard TE Flap

A. Equipment
  (1) Transmission Jack - Blackhawk Model 67554 or Hein-Werner Model 74

B. Consumable Materials
  (1) A00247 Sealant - BMS 5-95 Type I, Class B or C
  (2) A00028 Adhesive - BMS 5-92 Type I or III
  (3) D00015 Grease - BMS 3-24 (Optional)
  (4) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

C. References
  (1) AMM 24-22-00/201, Electrical Power - Control
  (2) AMM 27-51-14/401, Outboard Trailing Edge Flap
  (3) AMM 27-51-14/501, Outboard Trailing Edge Flap
  (4) AMM 27-51-15/601, Outboard Trailing Edge Flap Track Wear Limits
  (5) AMM 27-51-17/401, Outboard Trailing Edge Flap Transmission
  (6) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairings
  (7) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
  (8) AMM 32-00-15/201, Landing Gear Door Locks

D. Access
  (1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Flap Track (Fig. 401)

NOTE: The wear limits for these components are given in 27-51-15/601.

S 484-033

(1) Use a transmission jack and hoist adapter to hold the weight of the flap track (Fig. 403).

NOTE: The outboard TE flap track weighs approximately 220 pounds (99.8 Kg).

S 434-021

(2) If you install a new track, bond a tapered shim to the top of the track with a faying surface sealant (View C).

NOTE: Use the tapered shim that you removed from the other flap track. If you cannot use the shim, make a new shim. Make the shim thickness the same as the shim that you removed. The bonded decal on the wing rear spar, adjacent to the flap track, shows the necessary shim thickness.

S 644-022

(3) Apply grease along the roller surfaces of the flap track.

S 434-023

(4) If you replace the anti-fret strip, bond the new strip with adhesive to the lower wing surface that is primed (View C).
   (a) Use a clamp to hold a pressure of 100 ±25 psi during the cure.
   (b) Alternatively, do these steps to apply pressure:
      1) Make a pressure plate from 0.50-inch minimum thickness aluminum alloy plate.
      2) Drill two holes in the pressure plate to align with the holes in the wing structure.
      3) Use two 7/16-inch diameter bolts to attach the pressure plate.
      4) Tighten the nuts 360-420 pound-inches (40.7-47.4 Nm).

         NOTE: Tighten the nuts before the end of the sealant work life.

      5) Let the sealant cure.
      6) Remove the pressure plate.

S 424-004

(5) Do these steps to install the inboard or outboard track at the forward mount:

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(a) Apply grease to the outer diameter of the fuse bolts and the inner diameters of the mating parts.
(b) Put the track in the correct position to install the fuse bolt.
(c) Install the fuse bolt at the forward mount.
(d) Make sure the distance between the washer and the flap track is a minimum of 0.005 inch (0.127 mm) (View A-A).
1) Install a washer between the bearing and the bushing, if it is necessary.
(e) Tighten the nut to 400-450 pound-inches (45.2-50.8 Nm).
(f) Apply the sealant (BMS 5-95) to the failsafe strap bolts and install the failsafe strap assembly immediately.

S 424-005

(6) Do these steps to install the inboard track of the outboard flap at the aft mount:
(a) Apply the corrosion preventive compound (MIL-C-11796, Class 3) to the outer diameter of the bolts.
(b) Install the two bolts that connect the flap track to the wing rear spar.
(c) Tighten the inboard nut of the inboard track to 870-1300 pound-inches.
(d) Tighten the outboard nut of the inboard track to 240-360 pound-inches.

S 424-006

(7) Do these steps to install the outboard track of the outboard flap at the aft mount:
(a) Apply the corrosion preventive compound (MIL-C-11796, Class 3) to the outer diameter of the bolts.
(b) Install the two bolts that connect the flap track to the wing rear spar.
(c) Tighten the inboard nut of the outboard track to 1300-1800 pound-inches.
(d) Tighten the outboard nut of the outboard track to 480-600 pound-inches.

S 424-007

(8) Do these steps to connect the transmission support frame to the inboard or outboard flap track:

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(a) Apply grease to the outer diameter of the bolts and the inner diameters of the mating parts.
(b) Install two bolts to connect the transmission support frame to the flap track.
(c) Install shim(s) to make the clearance not more than 0.003 inch (0.076 mm) before you tighten the bolts.
(d) Tighten the two bolts.

S 414-008
(9) Install the transmission for the outboard TE flap (AMM 27-51-17/401).

S 414-009
(10) Install the outboard TE flap (AMM 27-51-14/401).

S 714-024
(11) Adjust and do a test on the flap track installation (AMM 27-51-14/501).

F. Put the Airplane Back to Its Usual Condition

S 094-010
(1) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 414-025
(2) Install the fairings for the flap track (AMM 27-51-31/201).

S 864-029
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead circuit breaker panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUT OFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-030
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 094-032

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 864-027

(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-028

(7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

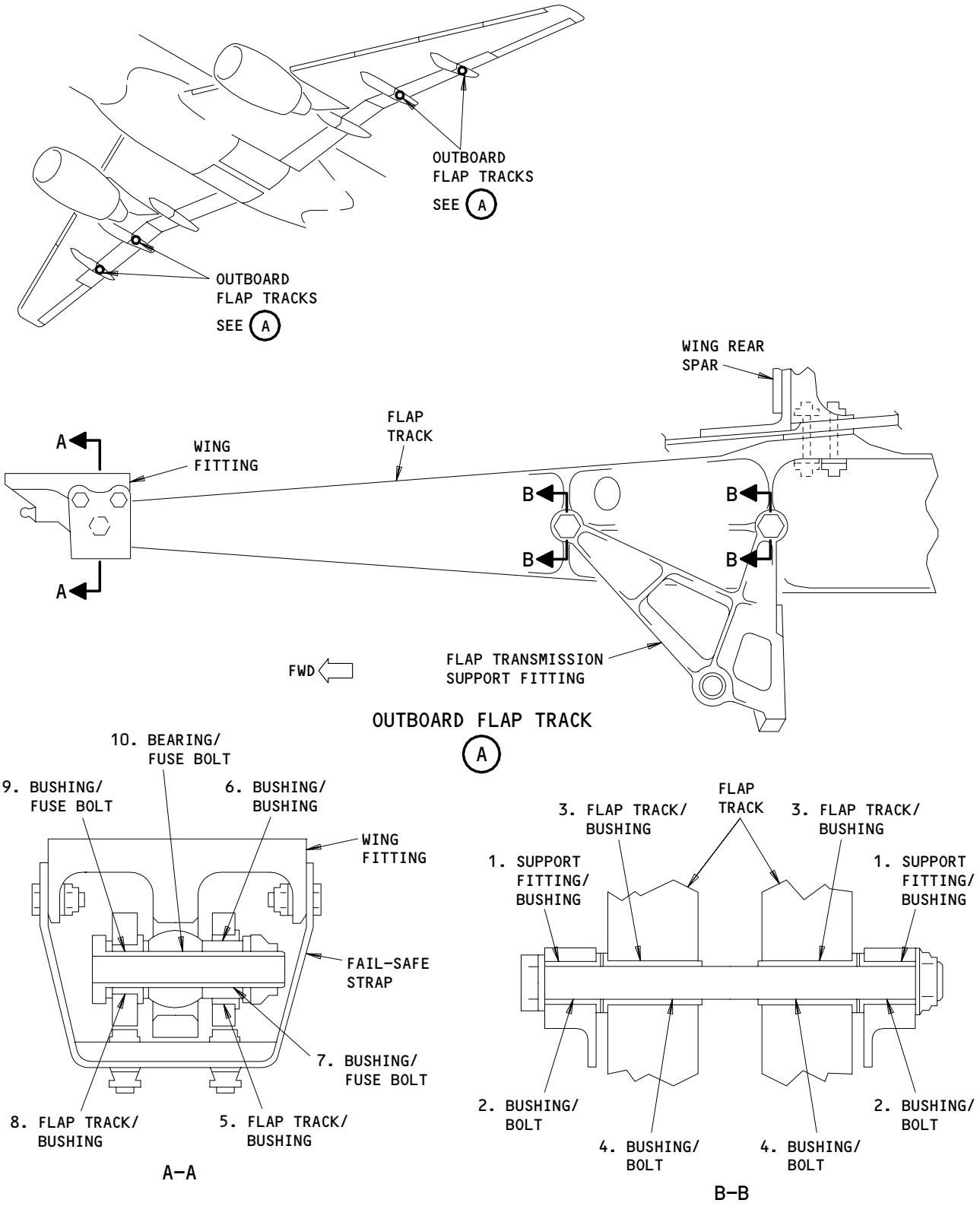
OUTBOARD TE FLAP TRACK - INSPECTION/CHECK

TASK 27-51-15-206-001

1. Wear Limits for the Outboard TE Flap Tracks (Fig. 601)

   A. General

      (1) This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacement of the components that you will examine for wear. Refer to the Outboard Trailing Edge Flap Track - Removal/Installation to remove or replace these components.



Wear Limits for the Outboard TE Flap Track
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	SUPPORT FITTING	ID	0.7500 (19.050)	0.7507 (19.068)	--	--		X	1
	BUSHING	OD	0.7512 (19.080)	0.7519 (19.098)	--		X		
2	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6290 (15.977)	0.0050 (0.127)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6202 (15.753)		X		
3	FLAP TRACK	ID	0.7500 (19.050)	0.7507 (19.068)	--	--		X	1
	BUSHING	OD	0.7512 (19.080)	0.7519 (19.098)	--		X		
4	BUSHING	ID	0.6242 (15.855)	0.6252 (15.880)	0.6290 (15.977)	0.0050 (0.127)	X		
	BOLT	OD	0.6230 (15.824)	0.6240 (15.850)	0.6202 (15.753)		X		
5	FLAP TRACK	ID	1.1875 (30.163)	1.1882 (30.180)	--	0.0050 (0.127)		X	1
	BUSHING	OD	1.1890 (30.201)	1.1898 (30.221)	--		X		
6	BUSHING	ID	0.9995 (25.387)	1.0003 (25.408)	1.0040 (25.502)	--	X		
	BUSHING	OD	0.9985 (25.362)	0.9990 (25.375)	0.9953 (25.281)		X		
7	BUSHING	ID	0.6870 (17.450)	0.6875 (17.463)	--	0.0015 (0.038)	X		
	FUSE BOLT	OD	0.6860 (17.424)	0.6865 (17.437)	--		X		
8	FLAP TRACK	ID	0.8175 (20.765)	0.8132 (20.655)	--	--		X	1
	BUSHING	OD	0.8139 (20.673)	0.8144 (20.686)	--		X		
9	BUSHING	ID	0.6870 (17.450)	0.6877 (17.468)	0.6915 (17.564)	0.0050 (0.127)	X		
	FUSE BOLT	OD	0.6860 (17.424)	0.6865 (17.437)	0.6827 (17.341)		X		
10	BEARING	ID	0.6875 (17.463)	0.6879 (17.473)	--	0.0019 (0.048)	X		
	FUSE BOLT	OD	0.6860 (17.424)	0.6865 (17.437)	--		X		

1 YOU CAN REPAIR A PART THAT IS WORN. REFER TO THE COMPONENT MAINTENANCE MANUAL FOR REPAIR INSTRUCTIONS

Wear Limits for the Outboard TE Flap
Figure 601 (Sheet 2)

OUTBOARD TRAILING EDGE FLAP CARRIAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the flap carriage for the outboard Trailing Edge (TE) flaps. The second task installs the flap carriage.

TASK 27-51-16-024-008

2. Remove the Flap Carriage for the Outboard TE Flap
   A. General
      (1) This procedure is applicable to the inboard and outboard carriages on the outboard TE flap.
   B. References
      (1) 27-51-14/401, Outboard Trailing Edge Flap
   C. Access
      (1) Location Zones
          567/667 Outboard Aft Flap

   D. Remove the Flap Carriage

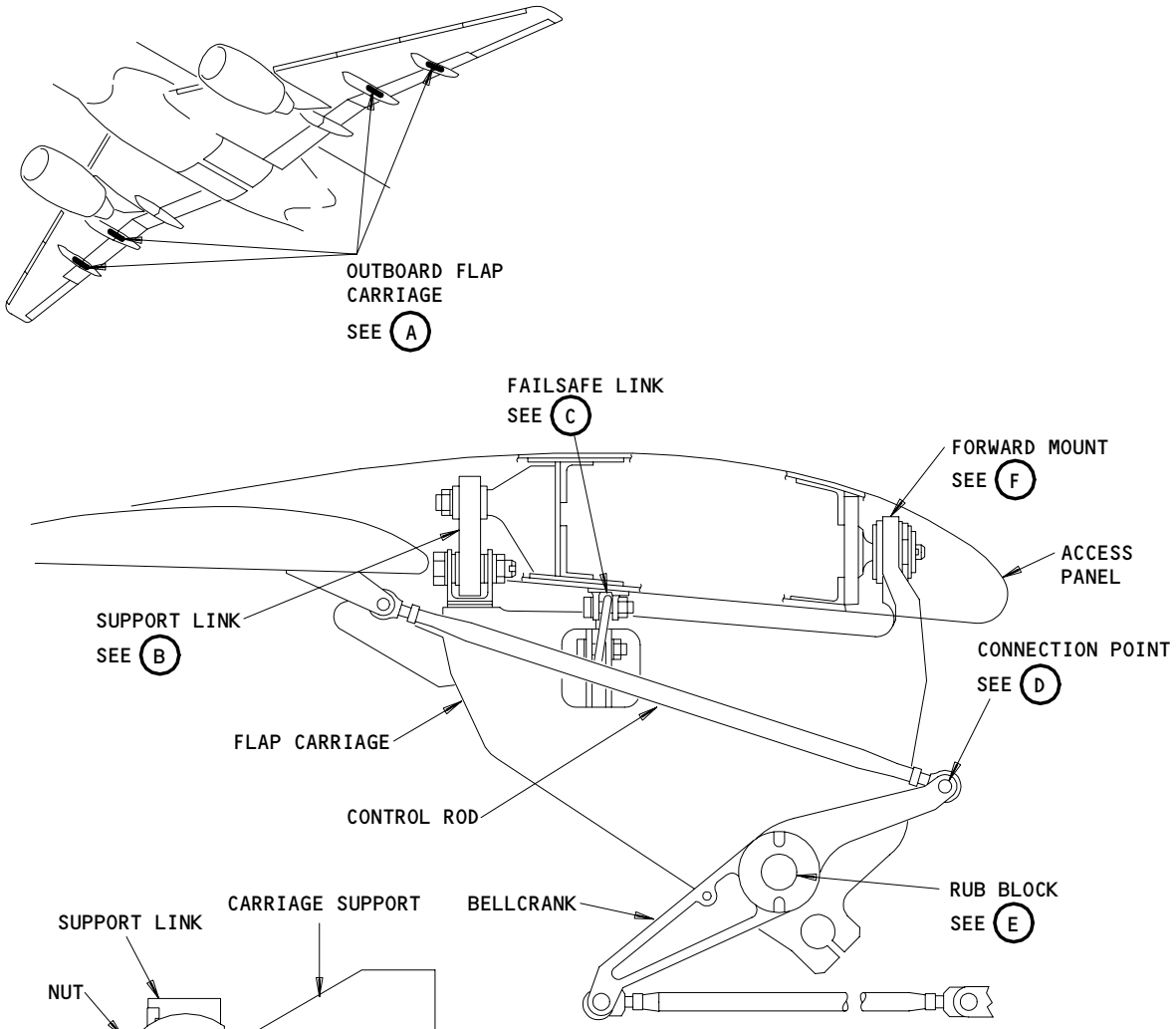
      S 024-009
      (1) Remove the outboard TE flap (Ref 27-51-14).

      S 034-010
      (2) Disconnect the upper control rod from the bellcrank.

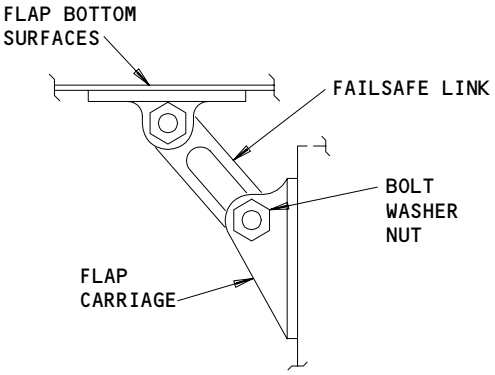
      S 034-001
      (3) Remove these components:
          (a) The two screws that hold the rub block to the bellcrank
          (b) The bellcrank pivot bolt and the bellcrank
          (c) The failsafe link.

      S 014-011
      (4) Open the access panels found at the leading edge of the main flap.

      S 034-002
      (5) Remove these components:
          (a) The support link

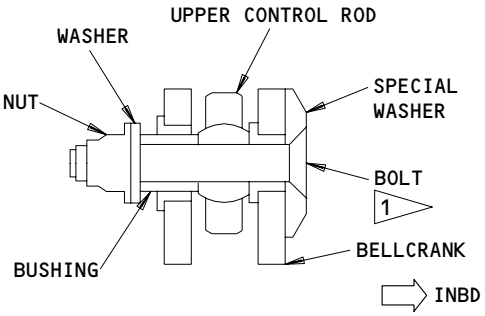


Outboard Flap Carriages
Figure 401 (Sheet 1)



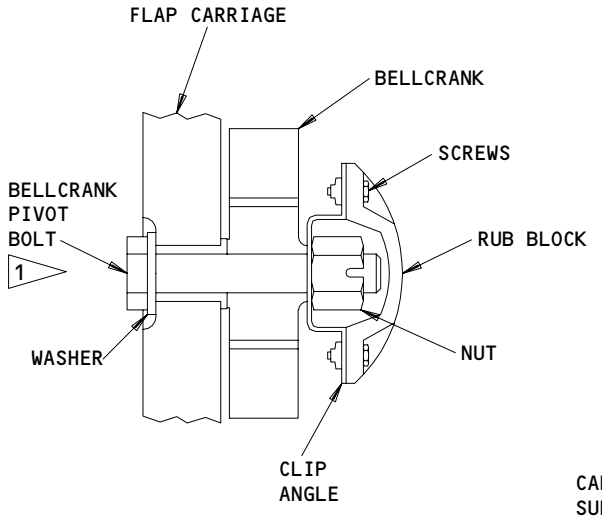
FAILSAFE LINK

C



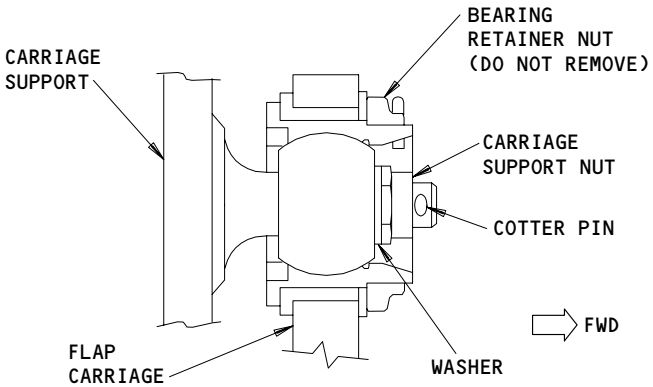
CONNECTION POINT

D



RUB BLOCK

E



FORWARD MOUNT

F

1 APPLY GREASE TO THE BOLT AND BUSHING SURFACES. DO NOT LUBRICATE THE BOLT THREADS

Outboard Flap Carriages
Figure 401 (Sheet 2)

23894

(b) The forward carriage support nut.

S 024-003

(6) Remove the carriage from the airplane.

NOTE: Do not remove the bearing retainer nut.

TASK 27-51-16-424-012

3. Install the Flap Carriage for the Outboard TE Flap

A. General

(1) This procedure is applicable to the inboard and outboard carriages on the outboard TE flaps.

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References

(1) 27-51-14/401, Outboard Trailing Edge Flap

D. Access

(1) Location Zones

567/667 Outboard Aft Flap

E. Install the Flap Carriage

S 424-004

(1) Do these steps to install the flap carriages:

(a) Put the flap carriage in its correct position.

(b) Install the carriage support nut on the forward mount.

(c) Do these steps to install the support link:

1) Install the nut on the top connection point of the support link.

2) Install the bolt and nut on the bottom connection point of the support link.

3) Tighten the nut to 1300-1800 pound-inches (146.9-203.3 Nm).

(d) Do these steps to install the failsafe link:

1) Install the bolt, the washer, and the nut on the top connection point of the failsafe link.

2) Install the bolt, the washer, and the nut on the bottom connection point of the failsafe link.

3) Tighten the nut to 270-300 pound-inches (30.5-33.8 Nm).

S 644-013
(2) Lubricate the support link after you install it.

S 414-014
(3) Close the access panels that you removed.

S 434-005
(4) Install the pivot bolt to connect the bellcrank and the clip angle to the flap carriage.
(a) Tighten the nut to 1000-1200 pound-inches (113-135.5 Nm).

S 434-006
(5) Install the two screws that connect the rub block to the clip angle.

S 434-007
(6) Connect the upper control rod to the bellcrank.
(a) Tighten the nut to 65-80 pound-inches (7.4-9.0 Nm).

S 424-015
(7) Install the outboard TE flap (Ref 27-51-14).

NOTE: You will adjust and do a test on the carriage during the installation procedure for the Outboard TE Flap (Ref 27-51-14).

OUTBOARD TRAILING EDGE FLAP TRANSMISSION - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the transmissions for the outboard trailing edge (TE) flap. The second task installs the transmissions.

TASK 27-51-17-024-001

2. Remove the Transmissions for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) TE Flap Torque Tube Clamp from Set - B27055-1:
          (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
   B. References
      (1) AMM 27-51-31/201, Outboard TE Flap Track Fairings
      (2) AMM 27-58-01/501, Trailing Edge Flap System and Leading Edge
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

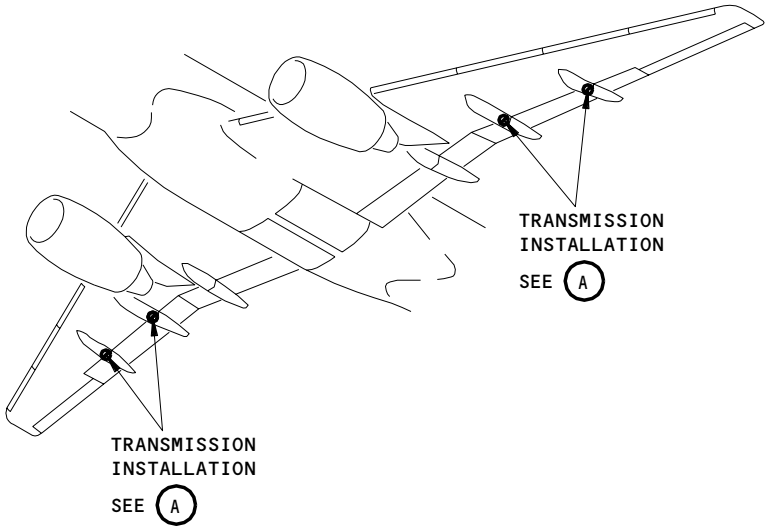
      S 214-002
      (1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

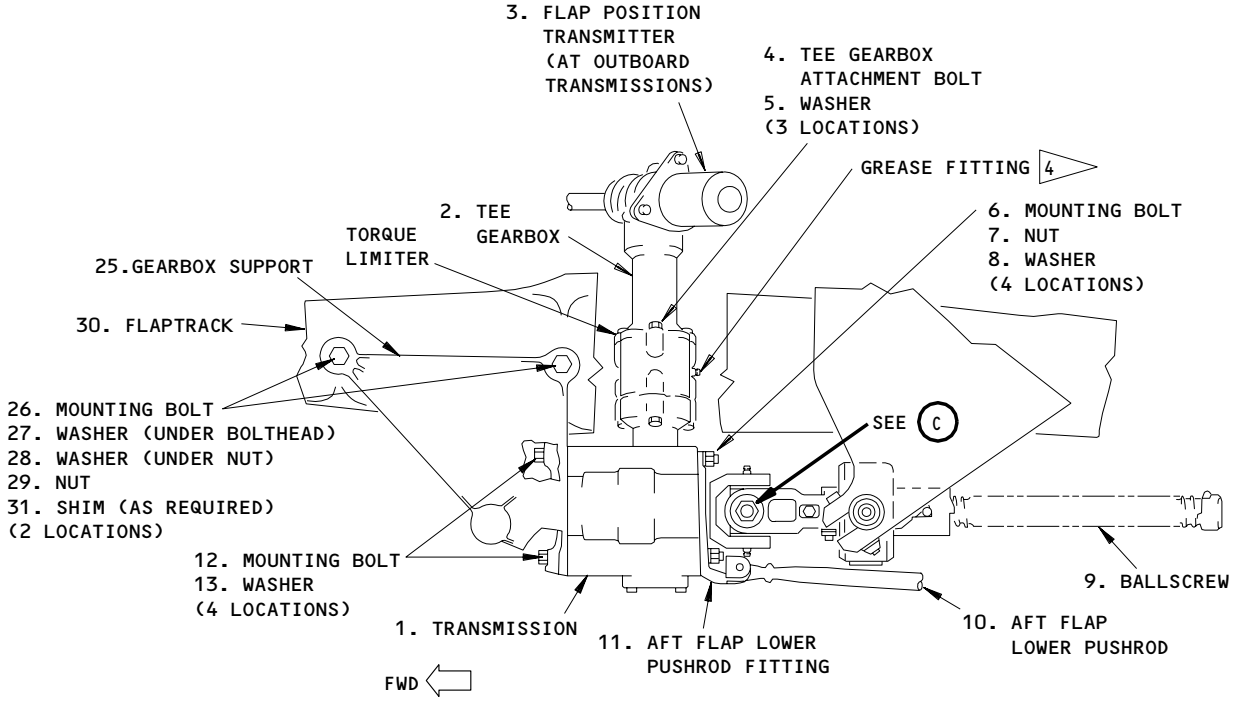
      S 214-003
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-004

      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).





TRANSMISSION INSTALLATION
(OUTBOARD IS SHOWN, INBOARD IS OPPOSITE)

A

Flap Transmissions for the Outboard Flaps
Figure 401 (Sheet 1)

S 864-005

(4) Supply electrical power (AMM 24-22-00/201).

S 864-006

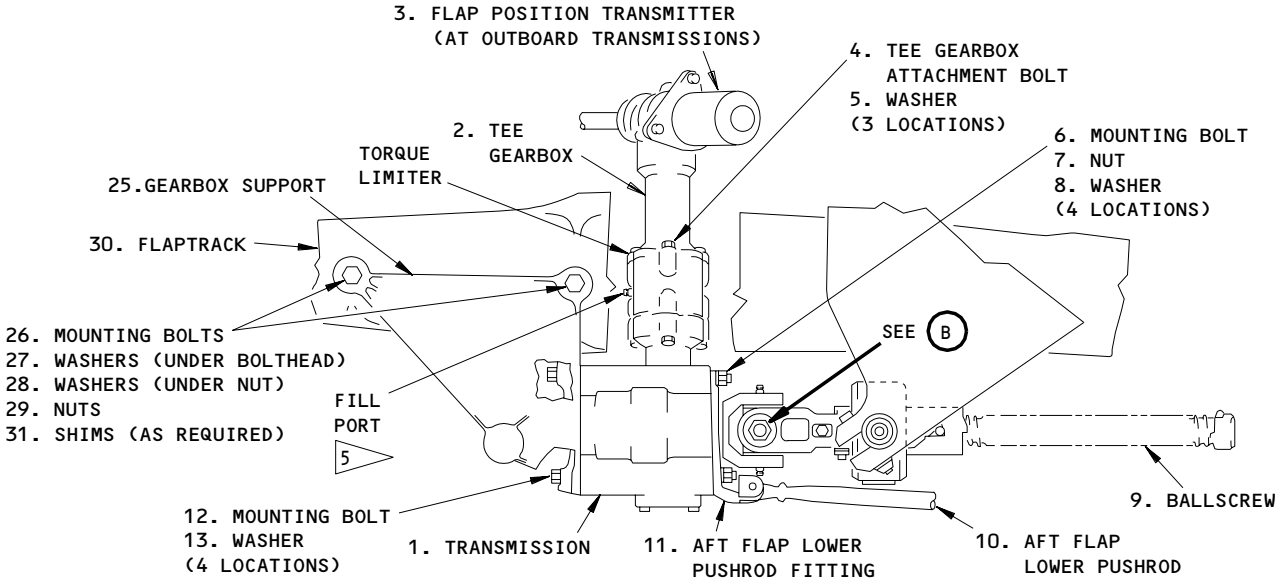
WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-010

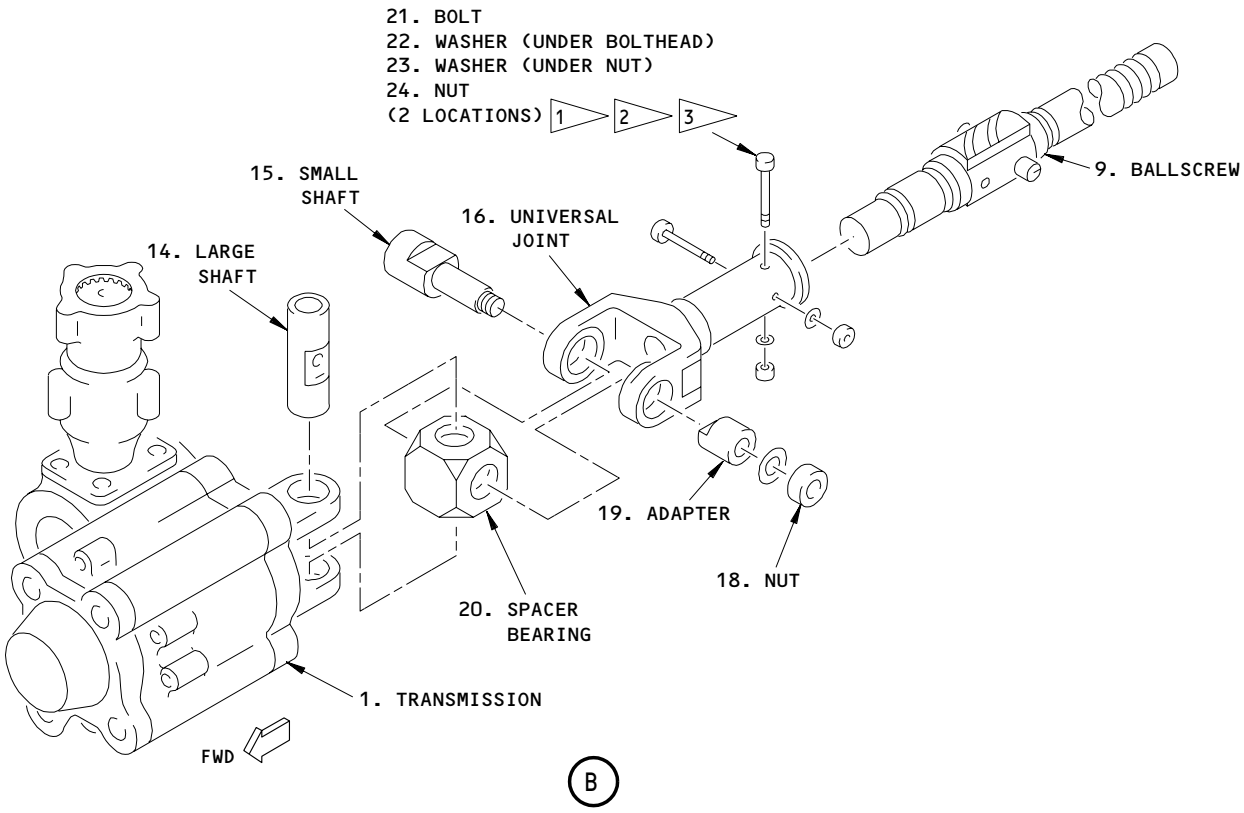
(6) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.



TRANSMISSION INSTALLATION
(OUTBOARD IS SHOWN, INBOARD IS OPPOSITE)

A

Flap Transmissions for the Outboard Flaps
Figure 401 (Sheet 2)



1 INSTALL THE WASHERS WITH THE COUNTERSUNK SIDE ADJACENT TO THE BOLT HEAD. APPLY BMS 5-95 (251N4008-15 THRU -18 AND 251N4009-15 THRU -18) OR BMS 3-27 (MASTINOX 6856K) (251N4008-25 AND ON, AND 251N4009-23 AND ON) TO THE MATING SURFACES OF THE BOLTS, THE AFT UNIVERSAL JOINT, AND THE BALLSCREW

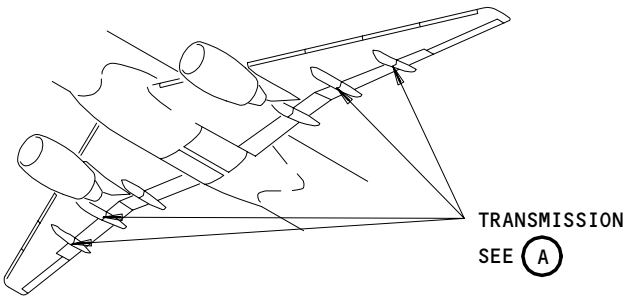
2 WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES. IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSON.

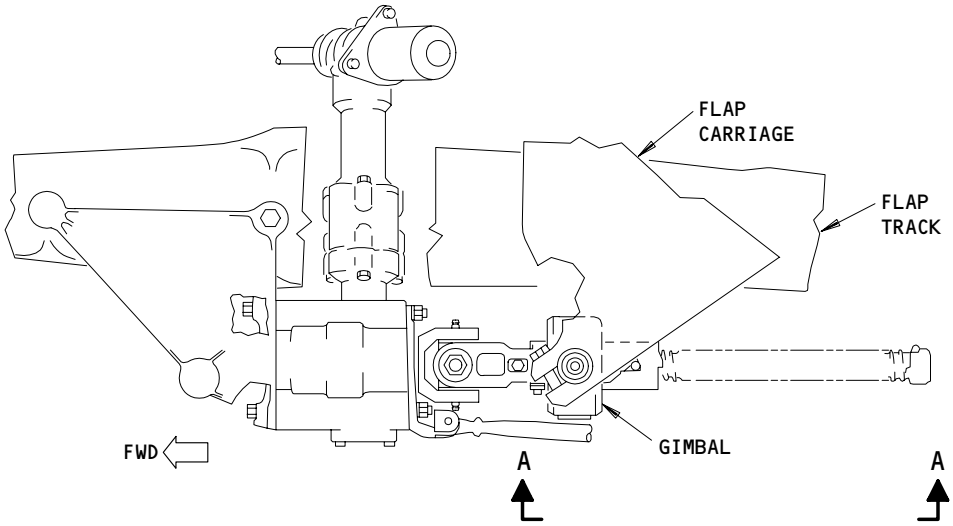
3 CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES WHICH WILL BE LUBRICATED AND FROM SURFACES THAT MOVE. YOU CAN CAUSE FAILURE OF MOVING PARTS IF YOU APPLY MASTINOX TO SURFACES THAT MOVE.

4 FILL THE EMPTY SPACE WITH GREASE AFTER THE INSTALLATION PROCEDURE, UNTIL GREASE FLOWS FROM THE LOWER VENT HOLES

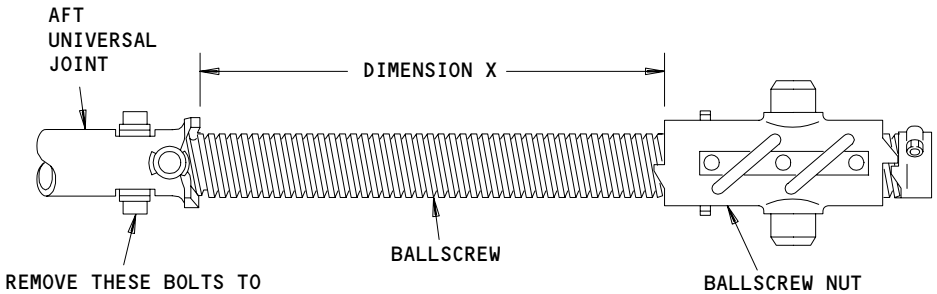
5 FILL WITH BMS 3-32 TYPE II UNTIL THE OIL FLOWS OUT FROM THE FILL PORT

Flap Transmissions for the Outboard Flaps
Figure 401 (Sheet 3)



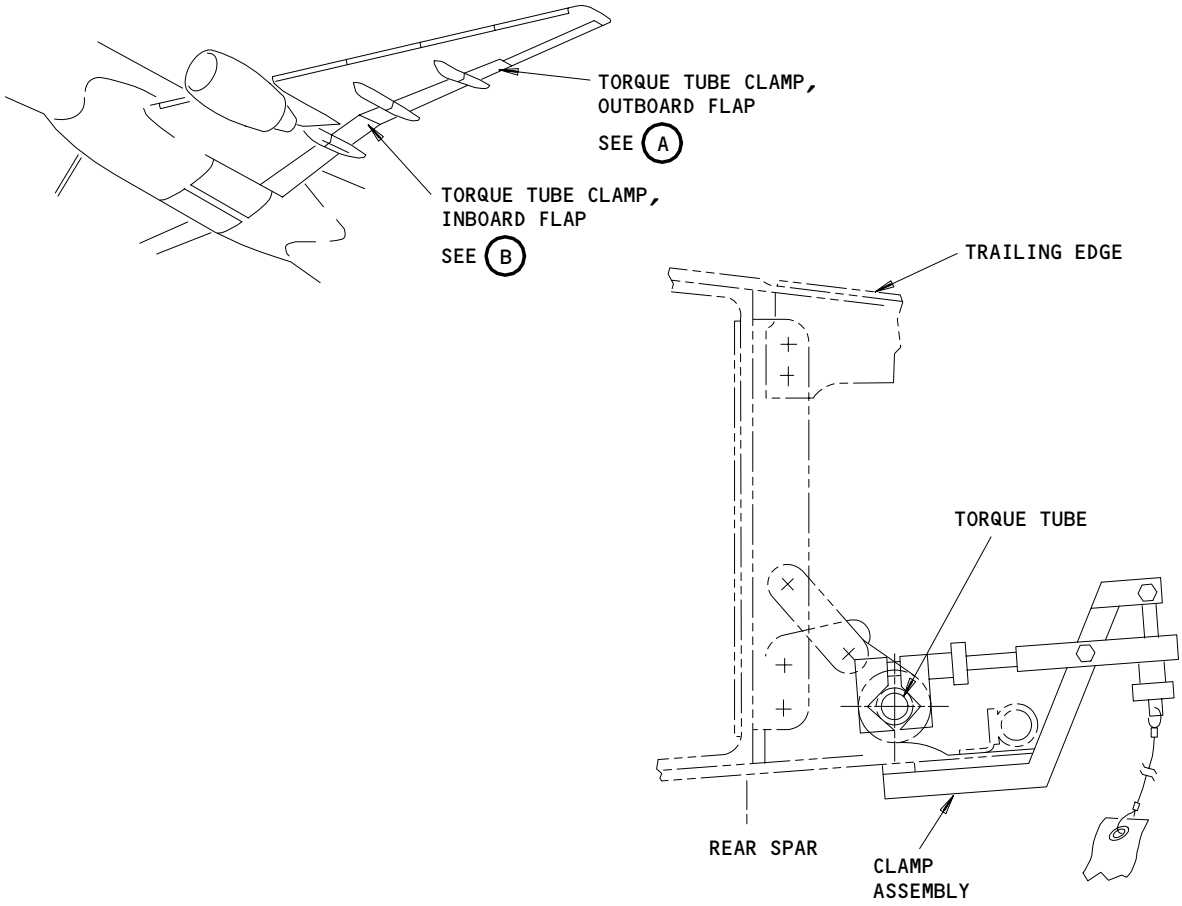


TRANSMISSION
(EXAMPLE 4 LOCATIONS)
(A)



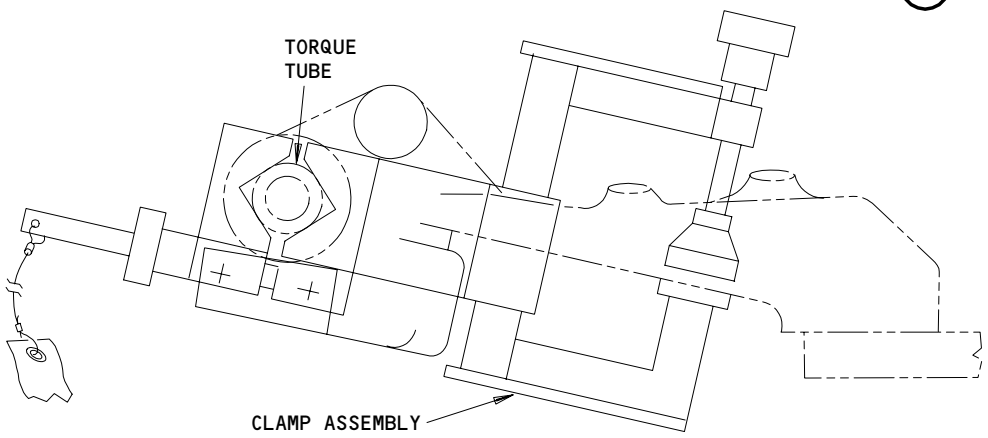
BALLSCREW
(GIMBAL NOT SHOWN)
A-A

Ballscrew X Dimension
Figure 402



TORQUE TUBE CLAMP, OUTBOARD FLAP

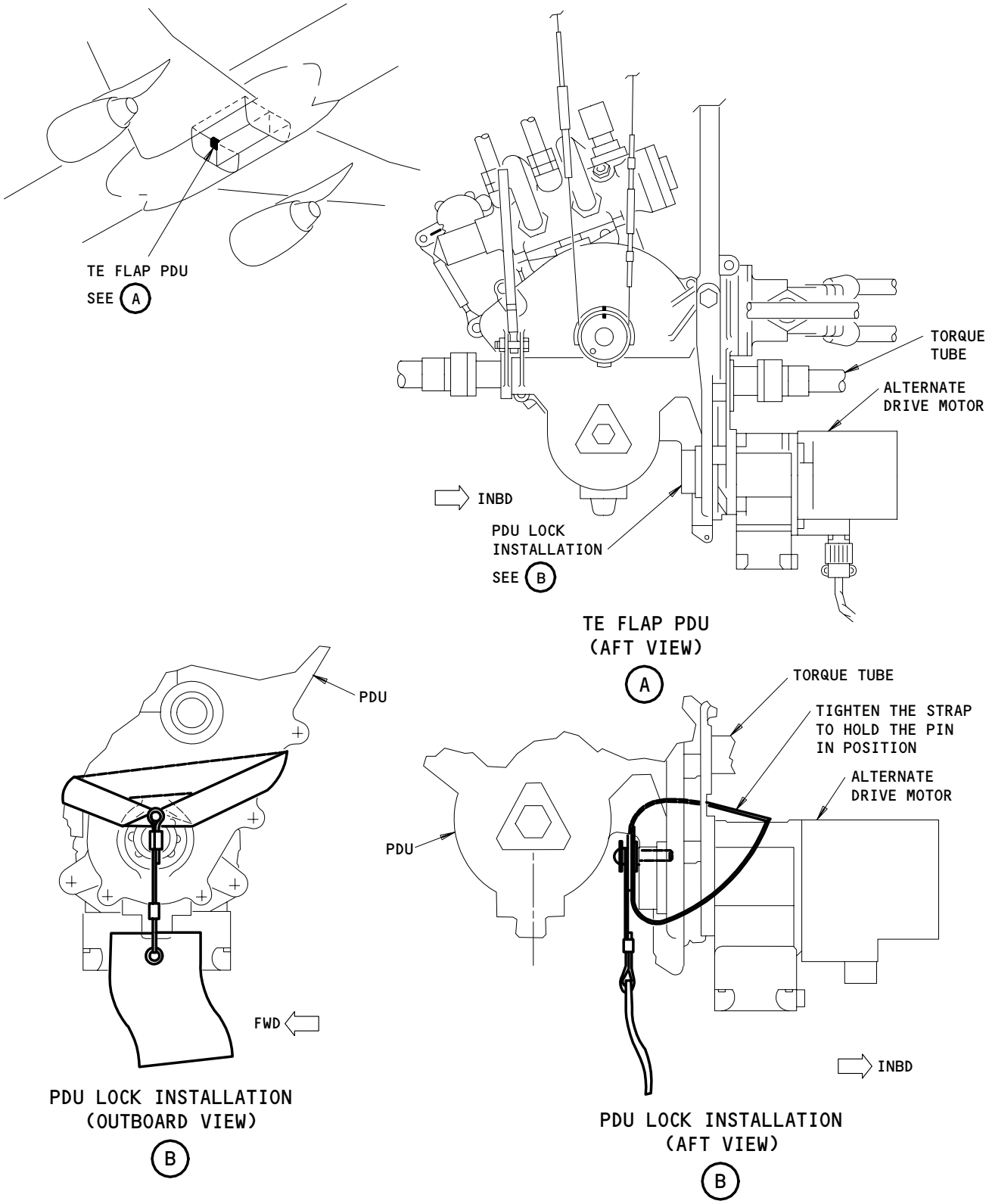
A



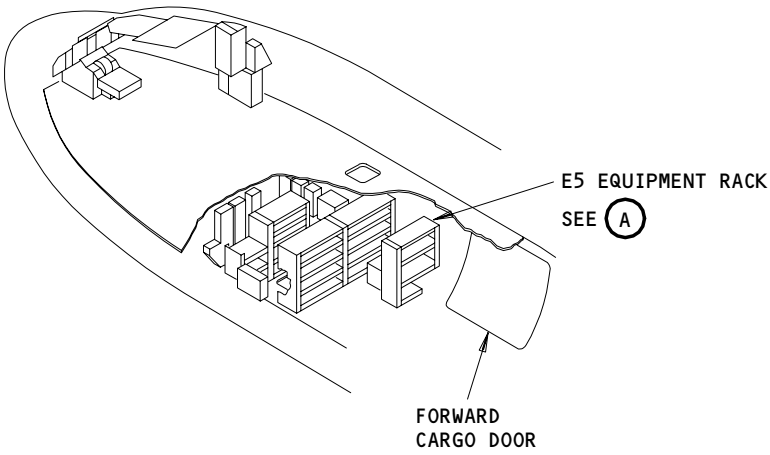
TORQUE TUBE CLAMP, INBOARD FLAP

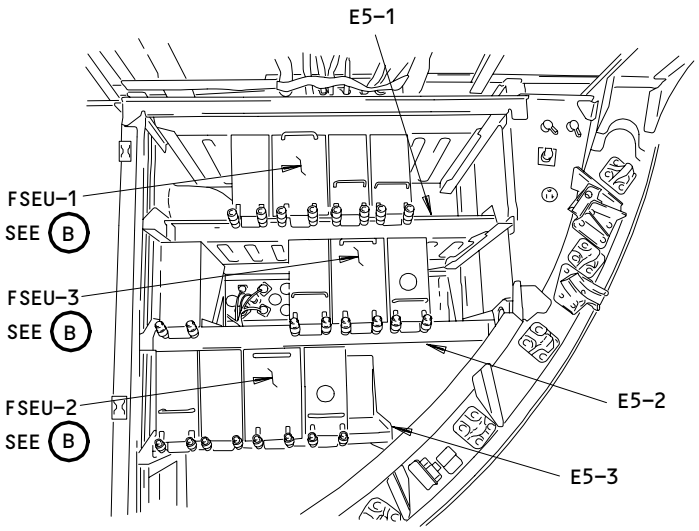
B

Torque Tube Clamp
Figure 403

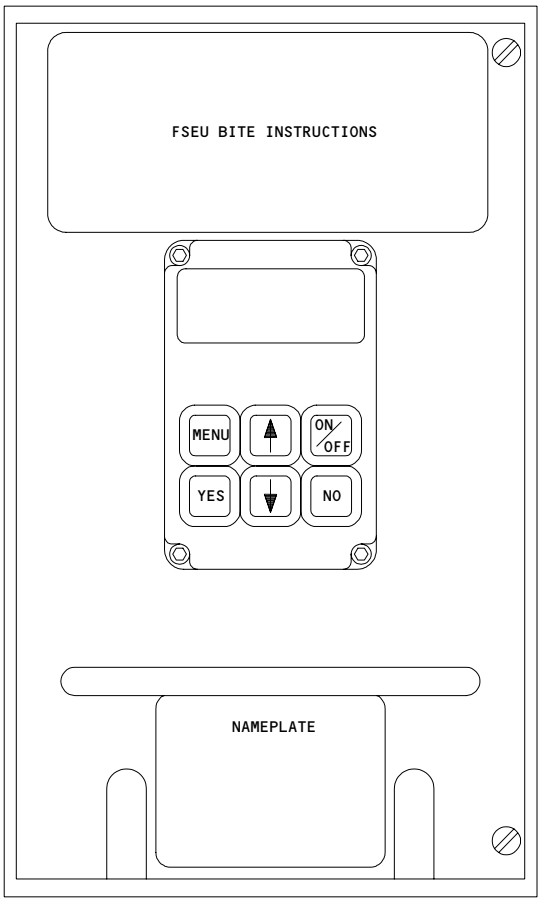


PDU Lock for the TE Flap PDU
Figure 404





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 405

S 494-008
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 974-037
(8) Make a record of the flap resolver readings for the left and right flaps on the FSEU.
    (a) For -40 FSEUs (in FSEU-1 or FSEU-2):
        1) Push the ON/OFF switch on the face panel of the FSEU to show the "EXISTING FAULTS?" message.
        2) Push the "NO" switch 3 times until the "OTHER FUNCTIONS ?" message is displayed.
        3) Push the "YES" button to display the "RESOLVER INPUTS?" message. Use the down arrow to display resolver angles.
    (b) For other FSEUs, use an Angle Position Indicator, a HILDA tester (in -32 and -37 FSEUs only), or equivalent Syncro/Resolver Angle Indicator to display the resolver readings (AMM 27-58-01/501).

S 864-009
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-011
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
    (a) 11B18, WARN ELEX B
    (b) 11D31, HYDRAULICS PTU CONT
    (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
    (d) 11J18, FLAP LOAD RELIEF
    (e) 11J33, WARN ELEX A

S 864-012
(11) Open these circuit breakers on the main power distribution panel,P6, and install DO-NOT-CLOSE tags:
    (a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

S 494-013

(12) Install a PDU lock on the TE flap PDU (Fig. 404).

S 014-015

(13) Remove the forward fairing and the aft fairing for the flap track (AMM 27-51-31/201).

S 494-016

(14) Use a clamp to hold the torque tubes and prevent all movement (Fig. 403).

S 494-017

(15) Use a support to hold the flap and keep weight off the ballscrew and to prevent all flap movement.

E. Remove the Transmissions (Fig. 401)

S 224-018

(1) Measure and make a record of the dimension X (Fig. 402).

S 024-019

(2) Do these steps to remove the transmissions:
   (a) Disconnect the ballscrew (9) from the universal joint (16) (View B).
   (b) Move the ballscrew (9) away from the universal joint (16) until you can disassemble the universal joint (16).
   (c) Remove the nut (18) at the universal joint (16) and remove the small shaft (15).
   (d) Disconnect the universal joint (16) from the transmission (1).
   (e) Remove the 3 bolts (4) and washers (5) that attach the tee gearbox (2) to the assembly.
   (f) Use a support to hold the transmission (1) with the gearbox support (25) attached.
   (g) Remove the two mounting bolts (26), nuts (29) and washers (27) (28), that attach the gearbox support (25) to the flap track (30).
   (h) Disconnect the lower pushrod fitting (11) for the aft flap from the transmission (1).
   (i) Disengage the gearbox splines as you lower the transmission from the airplane.

(j) On the bench, remove the four mounting bolts (12) and washers (13) that attach the transmission assembly (1) to the gearbox support (25).

TASK 27-51-17-424-020

3. Install the Transmissions for the Outboard TE Flap

A. Consumable Materials

(1) D00013 Grease - MIL-G-23827 (Alternate)
(2) D00633 Grease - BMS 3-33 (Recommended)
(3) D00015 Grease - BMS3-24 (Alternate)
(4) C00913 Corrosion Inhibiting Compound - BMS 3-27 (Preferred)
(5) C50056 Compound - Non-drying Corrosion Inhibiting Resin Mix, BMS 3-38 (Alternate)
(6) G50136 Paste - Corrosion Inhibiting Non-drying, BMS 3-38 (Alternate)
(7) G50237 Compound - Corrosion Inhibiting, Non-drying Cor-Ban 27L, BMS 3-38 (Alternate)
(8) C00259 Primer - BMS 10-11, Type 1
(9) A00247 Sealant - BMS 5-95 Class B or C
(10) D00590 Fluid, Flap drive system - Brayco 795 (Recommended)
(11) D00467 Fluid, Landing gear shock strut - BMS3-32, Type II (Optional)

B. Parts

(1) OUTBOARD TRANSMISSION;
Refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Transmission	27-51-17	01	150,151 152,160 161,199

(2) INBOARD TRANSMISSION;
Refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Transmission	27-51-17	02	125,131 132,133 200,220 225

C. References
(1) AMM 12-21-09/301, Trailing Edge Flap System
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-51-31/201, Outboard TE Flap Track Fairings
(4) AMM 27-58-03/401, Flap Position Transmitter
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Transmissions (Fig. 401)

S 214-021
(1) Make sure that the torque tube did not turn.

S 644-022
(2) Apply grease to the external splines of the mating gearbox (2).
(a) Turn the input splines on the transmission (1) until the universal joint (16) and the input splines can be attached without a turn to the input shafts.
(b) Attach the transmission (1) to the gearbox spport (25) with the four mounting bolts (12) and washers (13).
(c) Lift the transmission (1) into its position, and engage the tee gearbox splines.
(d) Attach the transmission to the tee gearbox (3) with three bolts (4) and washers (5).
(e) Attach the gearbox support (25) and transmission (1) to the flap track (30) with shims (31) as required, two mounting bolts (26), nuts (29), and washers (27), (28) (outboard transmission) or (22), (23) (inboard transmission).

(f) Install the shim(s) equally on each side to make the clearance not more than 0.003 inch (0.076 mm) before you tighten the bolts.
(g) When you install the lower bolts, install a fitting (11) to which the lower pushrod (10) for the aft flap is attached.
(h) Apply primer to the mating surfaces of the universal joint (16) and the nut (18).
(i) Attach the universal joint (16) to the transmission (1).
(j) Attach the nut (18) with grease.

NOTE: The self-locking part of the nut must have a run-on torque of 30 - 100 pound-inches (3.4-11.3 Nm), with no axial load on the nut and the thread fully engaged. The bolt thread must extend beyond the locking part of the nut.

1) Tighten the nut (18) to 440-650 pound-inches (49.8-73.4 Nm).

(k) Turn the ballscrew (9) to prepare the ballscrew (9) for its connection to the universal joint (16).
(l) Connect the ballscrew (9) to the universal joint (16) (View B) and at the same time keep the dimension X (Fig. 402) the same as that you made a record of before.
(m) Lubricate the universal joint (16) with grease at the fittings.
(n) TORQUE LIMITERS WITH A GREASE FITTING;
Fill the torque limiter with grease.
(o) TORQUE LIMITERS WITH AN OIL FILL PORT;
Fill the torque limiter with oil.

NOTE: Use Brayco 795 as the preferred alternative to BMS 3-32, Type II to lubricate the torque limiters.

(p) Apply corrosion inhibiting compound to the mating surfaces of the transmission (1) and tee gearbox (3).
(q) Remove the torque tube clamp (Fig. 403).

(r) Remove the flap supports.

S 614-025

(3) Do the servicing steps for the transmission (AMM 12-13-06/301).

S 094-026

(4) Remove the PDU lock from the TE flap PDU (Fig. 404).

S 824-038

(5) Adjust the flap position transmitter in the wing where the transmission was removed and installed (AMM 27-58-03/401).

NOTE: If the flap position transmitter readings were recorded when the transmission was removed, then adjust the flap position transmitters to that recorded reading within plus or minus 0.5 degrees.

F. Do a Test on the Transmission Installation

S 864-028

(1) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-029

(2) Remove the DO-NOT-OPERATE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-030

(3) Supply electrical power (AMM 24-22-00/201).

S 714-031

(4) Do these steps to do a test on the transmission installation:

(a) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

(b) Make sure the position selector switch for the flap/slat alternate drive selector switch, on the P3 panel, is in the NORM detent.

(c) Make sure that the six EICAS circuit breakers, on the P11 panel, are closed.

(d) Make sure that the TE flaps and the LE slats are in the same position as the flap control lever.

(e) Remove the DO-NOT-OPERATE tag from the flap control lever.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IR BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(f) Pressurize the left hydraulic system (AMM 29-11-00/201).

(g) Move the flap control lever to the zero (FLAPS UP) detent, and permit the flaps and slats to retract fully.

(h) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.

1) Stop in each detent to let the TE flaps and the LE slats move to the correct position.

2) Make sure at each detent the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS messages show on the display.

S 714-032

(5) Do the test of the position transmitter for the TE flap (AMM 27-58-01/501).

G. Put the Airplane Back to Its Usual Condition

S 414-033

(1) Install the fairing for the flap track (AMM 27-51-31/201).

S 414-034

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-035

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-036

(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

OUTBOARD TRAILING EDGE FLAP TEE GEARBOX - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the tee gearbox for the outboard trailing edge (TE) flap. The second task installs the tee gearbox.

TASK 27-51-18-024-001

2. Remove the Tee Gearbox for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU lock - B27008-1
      (2) Outboard Flap Torque Tube Clamp - B27055-2 (Part of Flap Torque Tube Clamp Set, B27055-1)
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-31/201, Outboard TE Flap Track Fairing
      (3) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Down Locks
   C. Access
      (1) Location Zones
          143 MLG Wheel Well (Left)
          211/212 Control Cabin
          573 Outboard Flap Inboard Fairing (Left)
          574 Outboard Flap Outboard Fairing (Left)
          673 Outboard Flap Inboard Fairing (Right)
          674 Outboard Flap Outboard Fairing (Right)
          730 Main Landing Gear (MLG) and Doors (Left)
          740 Main Landing Gear (MLG) and Doors (Right)

   D. Prepare for Removal

      S 214-002
      (1) Make sure that the TE flaps and LE slats are in the fully retracted position, and that the flap lever is in the zero (FLAPS UP) detent.

      S 214-003
      (2) Make sure that the downlocks are installed on the nose and main landing gears (Ref 32-00-20).

      S 494-004

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Open the landing gear doors and install the door locks (Ref 32-00-15).

S 864-005
(4) Supply electrical power (Ref 24-22-00).

S 864-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-007
(6) Move the flap control lever to the 30-unit detent, and make sure that the TE flaps move to the fully extended position.

S 494-008
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-009
(8) Remove power from the left hydraulic system (Ref 29-11-00).

S 864-010
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

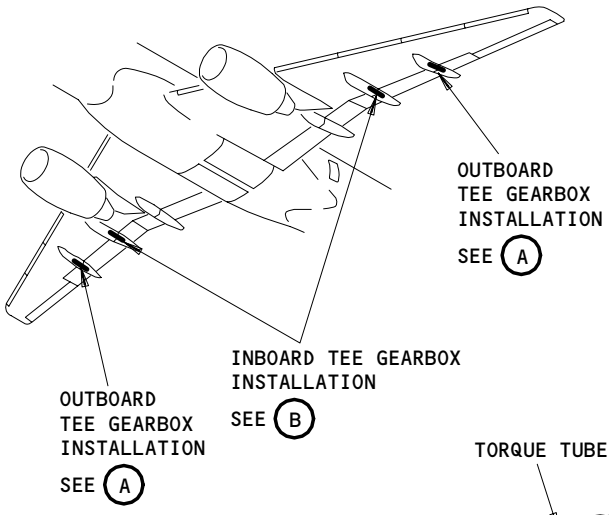
S 864-011
(10) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-012
(11) Install a PDU lock on the TE flap PDU (Fig. 402).

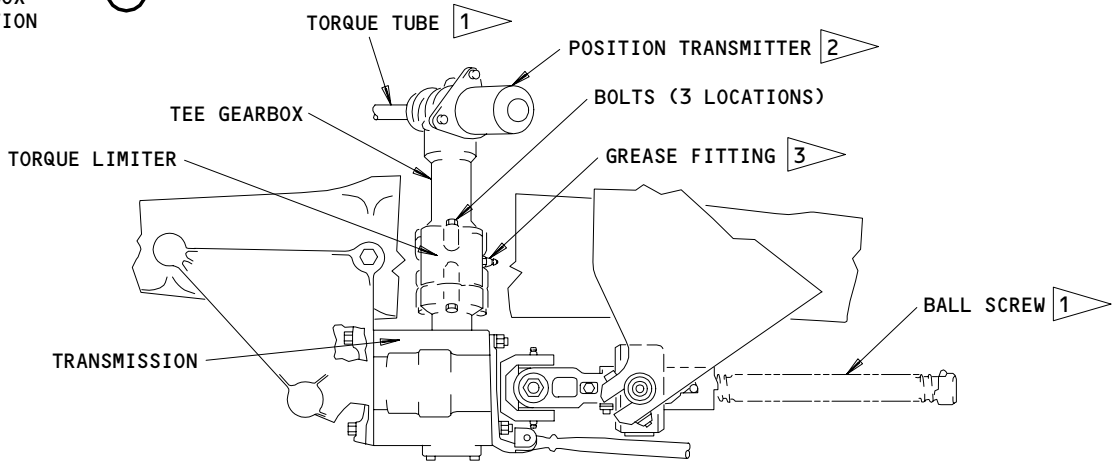
E. Remove the Tee Gearbox (Fig. 401)

S 024-013
(1) Remove the aft fairing on the TE flap track (Ref 27-51-31).

S 494-014
(2) Install clamps on the torque tubes to prevent movement. Do not turn the torque tube while you install the clamp.

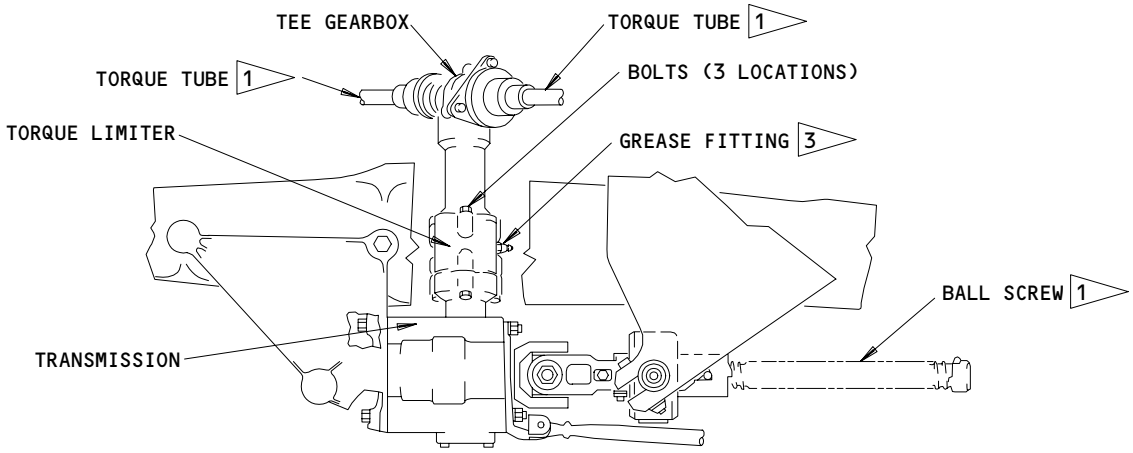


1. ATTACH CLAMPS TO PREVENT MOVEMENT OF THE TORQUE TUBES AND BALL SCREW. DO NOT TURN THE TORQUE TUBE WHILE IT IS DISCONNECTED. IT WILL BE NECESSARY TO ADJUST THE FLAP DRIVE IF YOU TURN THE TORQUE TUBE OR BALL SCREW
2. IT WILL BE NECESSARY TO ADJUST THE POSITION TRANSMITTER IF YOU REMOVE THE OUTBOARD TEE GEARBOX WITH THE POSITION TRANSMITTER ATTACHED
3. FILL WITH GREASE AFTER INSTALLATION, UNTIL GREASE FLOWS FROM THE LOWER VENT HOLES



OUTBOARD TEE GEARBOX INSTALLATION

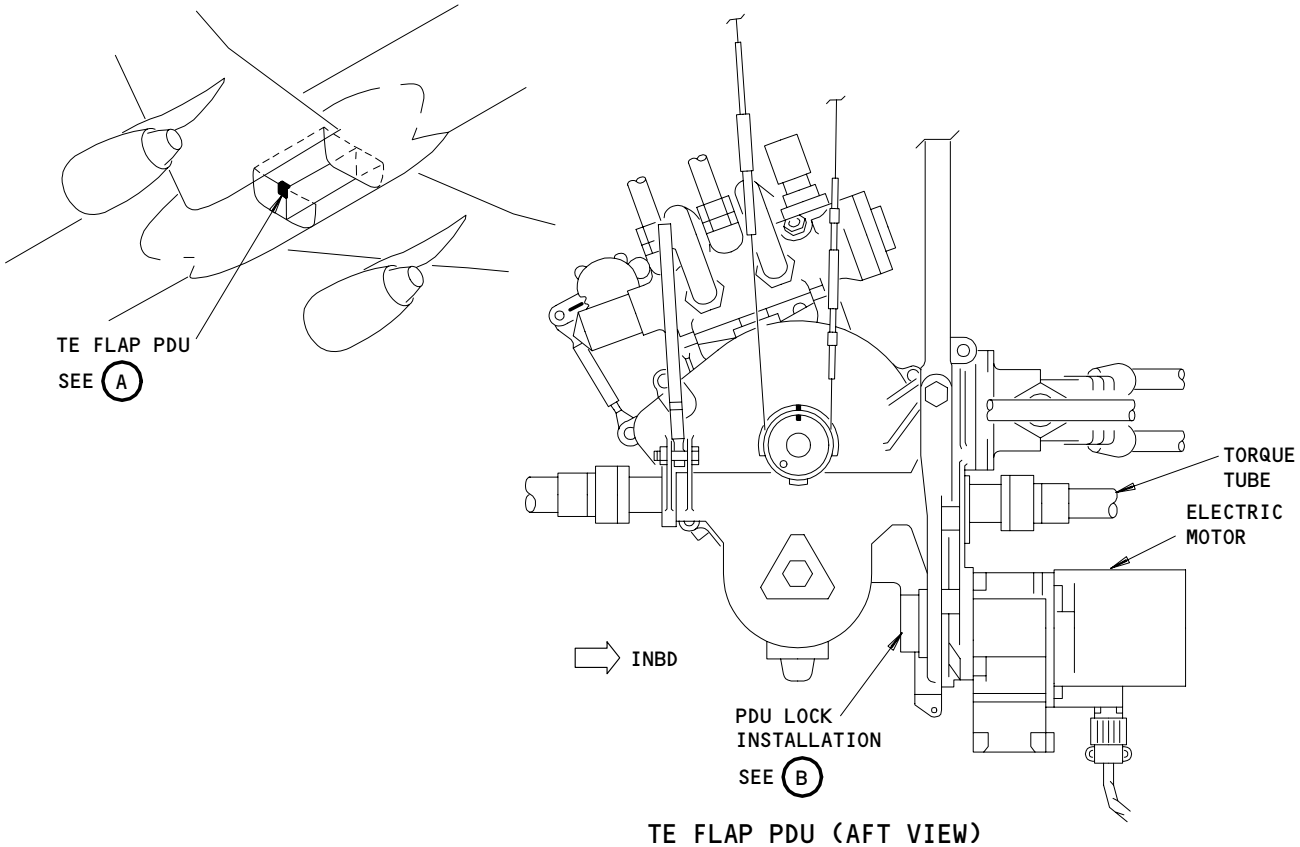
A



INBOARD TEE GEARBOX INSTALLATION

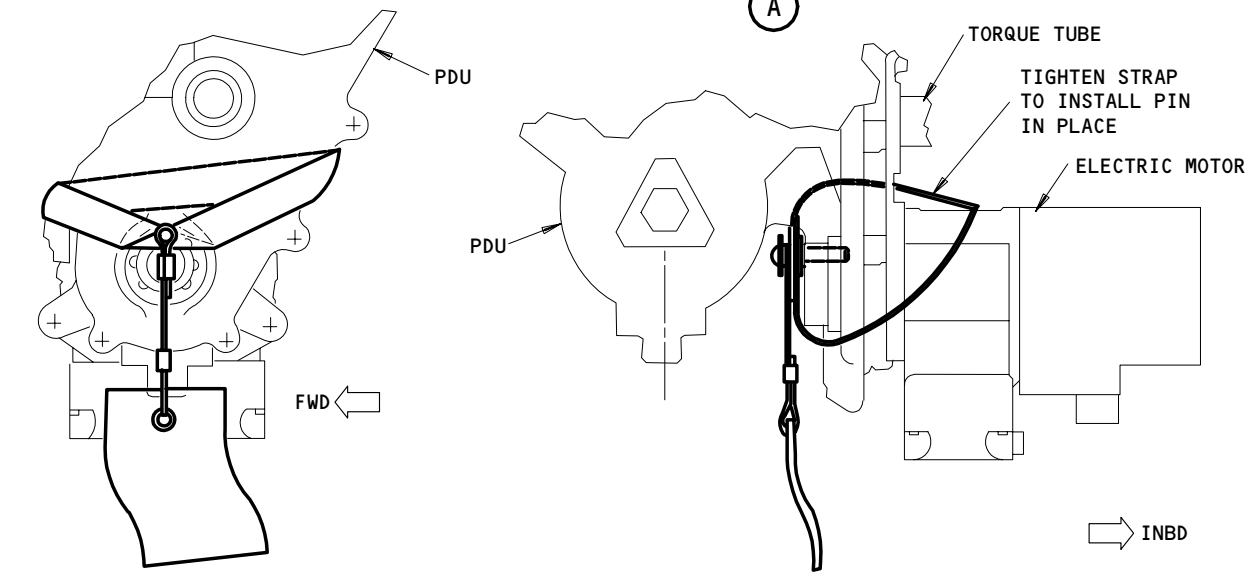
B

Tee Gearbox for the Outboard Flaps
Figure 401



TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION

B

PDU LOCK INSTALLATION (AFT VIEW)

B

TE Flap PDU Lock
Figure 402

S 494-015
(3) Install a clamp on the ballscrew to prevent movement. Do not permit the ballscrew to turn.

S 034-016
(4) Disconnect the torque tubes at the couplings.

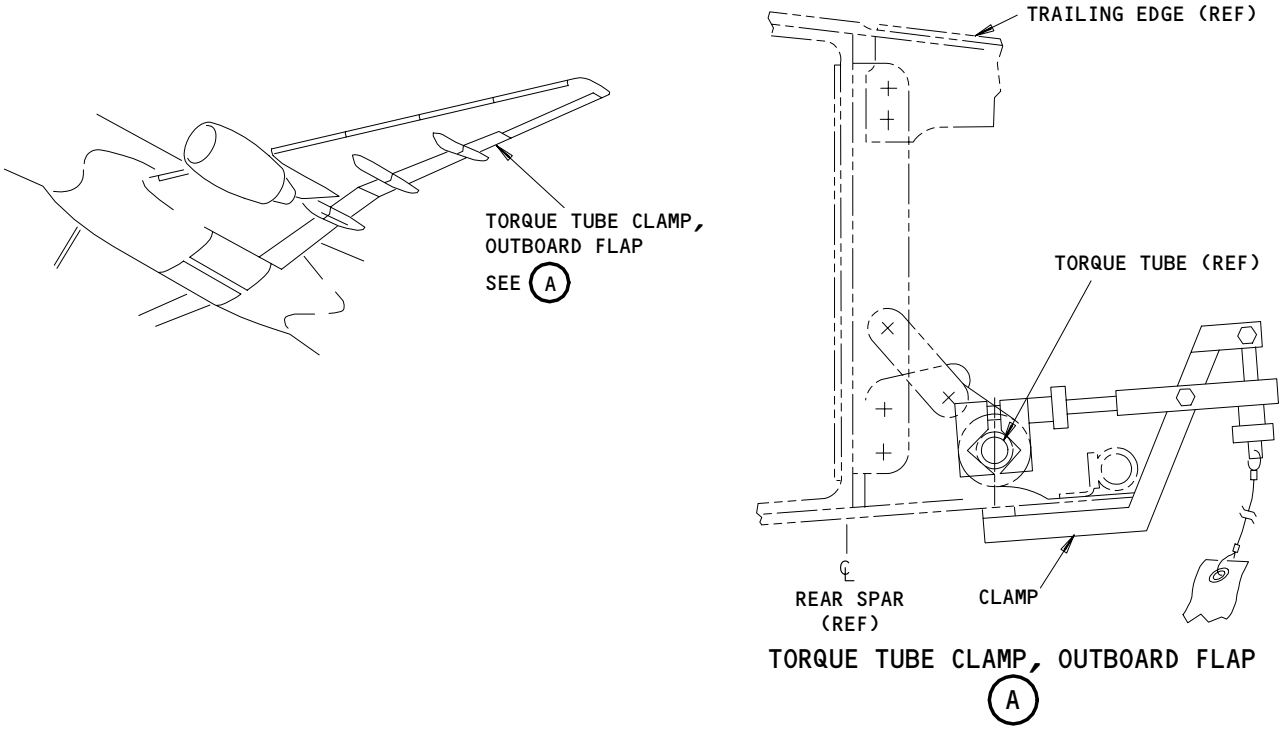
S 034-017
(5) Remove the three bolts that attach the tee gearbox to the transmission.

S 024-018
(6) Lift the tee gearbox to disengage and remove it from the transmission.

TASK 27-51-18-424-019

3. Install the Tee Gearbox for the Outboard TE Flap

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)



Torque Tube Clamp
Figure 403

(3) D00467 Fluid - Landing gear shock strut, BMS3-32, Type II
(4) D00590 Fluid - Flap drive system, Brayco 795
(5) A00247 Sealant - BMS 5-95 Class B or C

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-31/201, Outboard TE Flap Track Fairing
(3) AMM 27-58-01/501, TE Flap System and LE Slat System Position Transmitter - Adjustment Test
(4) 27-58-03/401, Flap Position Transmitter
(5) 29-11-00/201, Pressurize/Depressurize Main Hydraulic System
(6) 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones
120 Main Equipment Center (Right)
143 MLG Wheel Well (Left)
211/212 Control Cabin
573 Outboard Flap Inboard Fairing (Left)
574 Outboard Flap Outboard Fairing (Left)
673 Outboard Flap Inboard Fairing (Right)
674 Outboard Flap Outboard Fairing (Right)
730 Main Landing Gear (MLG) and Doors (Left)
740 Main Landing Gear (MLG) and Doors (Right)

D. Install the Tee Gearbox (Fig. 401)

S 214-020
(1) Make sure that the flap drive system is off.

S 644-021
(2) Apply grease to the drive splines at the transmission connection and at the torque tube connection.

S 434-023
(3) Lower the tee gearbox on the transmission and engage the splines.

S 434-024
(4) Attach the tee gearbox to the transmission with three bolts.

S 434-025
(5) Connect the torque tubes.

S 434-026
(6) Install the coupling screws and lockwire.

S 434-027
(7) Slide the torque tube to one end until the coupling touches the tee gearbox.

S 644-028
(8) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).

S 644-029
(9) AIRPLANES WITH A GREASE FITTING;
fill the torque limiter with grease through the grease fitting.

S 644-061
(10) AIRPLANES WITH AN OIL FILL PORT;
fill the torque limiter with oil.

NOTE: Use Brayco 795 as the preferred alternative to BMS 3-32, Type II to lubricate the torque limiters.

S 394-031
(11) Apply sealant to the base of the torque limiter housing, at the connection between the tee gearbox and the transmission.

S 434-032
(12) Move the torque tube on the opposite end of the tee gearbox until the coupling touches the tee gearbox.

S 644-033
(13) Fill the coupling reservoirs with grease through the lubrication holes (3 locations).

S 824-034
(14) Move and adjust the torque tube to its center position.

S 094-035
(15) Remove the clamps on the torque tube.

S 094-036
(16) Remove the clamp on the ballscrew.

S 864-037
(17) Supply electrical power (Ref 24-22-00).

S 024-038
(18) Do the steps that follow only if you are to install the outboard tee gearbox (with the position transmitter attached):
(a) Make sure that the position on the flap control lever agrees with the position of the TE flaps and LE slats.
(b) Remove the PDU lock on the TE flap PDU.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the left hydraulic system (Ref 29-11-00).

(d) Move the flap control lever to the 1-unit detent, and permit the TE flaps to move to the 1-degree position, and the LE slats to move to the intermediate position.
(e) Move the flap control lever to the 20-unit detent, and permit the TE flaps to move to the 20-degree position.
(f) Install a DO-NOT-OPERATE tag on the flap control lever.
(g) Remove the power from the left hydraulic system (Ref 29-11-00).
(h) Install the PDU lock on the TE flap PDU (Fig. 402).
(i) Remove, Adjust, or install the flap position transmitter per 27-58-03 (Fig. 401).

S 714-039
(19) Do a test on the tee gearbox installation.

E. Operational Test for the Tee Gearbox Installation

S 864-040
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel,P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-041
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 214-042
(3) Make sure that the position on the flap control lever agrees with the position of the TE flaps.

S 094-043
(4) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-044
(5) Rotate the dimmer control knob for the first officer's panel on the lightshield panel, P7, to full clockwise.

S 214-045
(6) Make sure that the arming switches for the flap and slat alternate drive on the first officer's main instrument panel, P3, are not in the armed position (switch lights off).

S 214-046
(7) Make sure that the position selector switch on the P3 panel for the alternate flap/slat drive is in the NORM position.

S 214-047
(8) Make sure that the six EICAS circuit breakers on the P11 panel are closed.

S 094-048
(9) Remove the PDU lock on the TE flap PDU.

S 864-058

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(10) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-059

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS TO PREVENT DAMAGE ON COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(11) Move the flap control lever to the zero (FLAP UP) detent.
  (a) Permit the TE flaps to move to the fully retracted position.

S 864-052
(12) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent, and from the 30-unit detent back to the zero detent.
  (a) Stop at each detent to permit the TE flaps and LE slats to move to the position on the flap control lever.
  (b) At each detent, make sure that the TRAILING EDGE and the LEADING EDGE lights on the P3 panel are off, and that there are no messages on the EICAS display.

(c) Do a check to see that the inboard and outboard tee gearboxes operate correctly during each flap cycle.

S 714-053

(13) Do the test of the position transmitter for the TE flap (AMM 27-58-01/501).

F. Put the Airplane Back to its Usual Condition.

S 424-054

(1) Install the aft fairing for the flap track (Ref 27-51-31).

S 094-055

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-056

(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-057

(4) Remove electrical power if it is not necessary (Ref 24-22-00).

OUTBOARD TRAILING EDGE FLAP BALLSCREW - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the ballscrew for the outboard trailing edge (TE) flap. The second task installs the ballscrew.

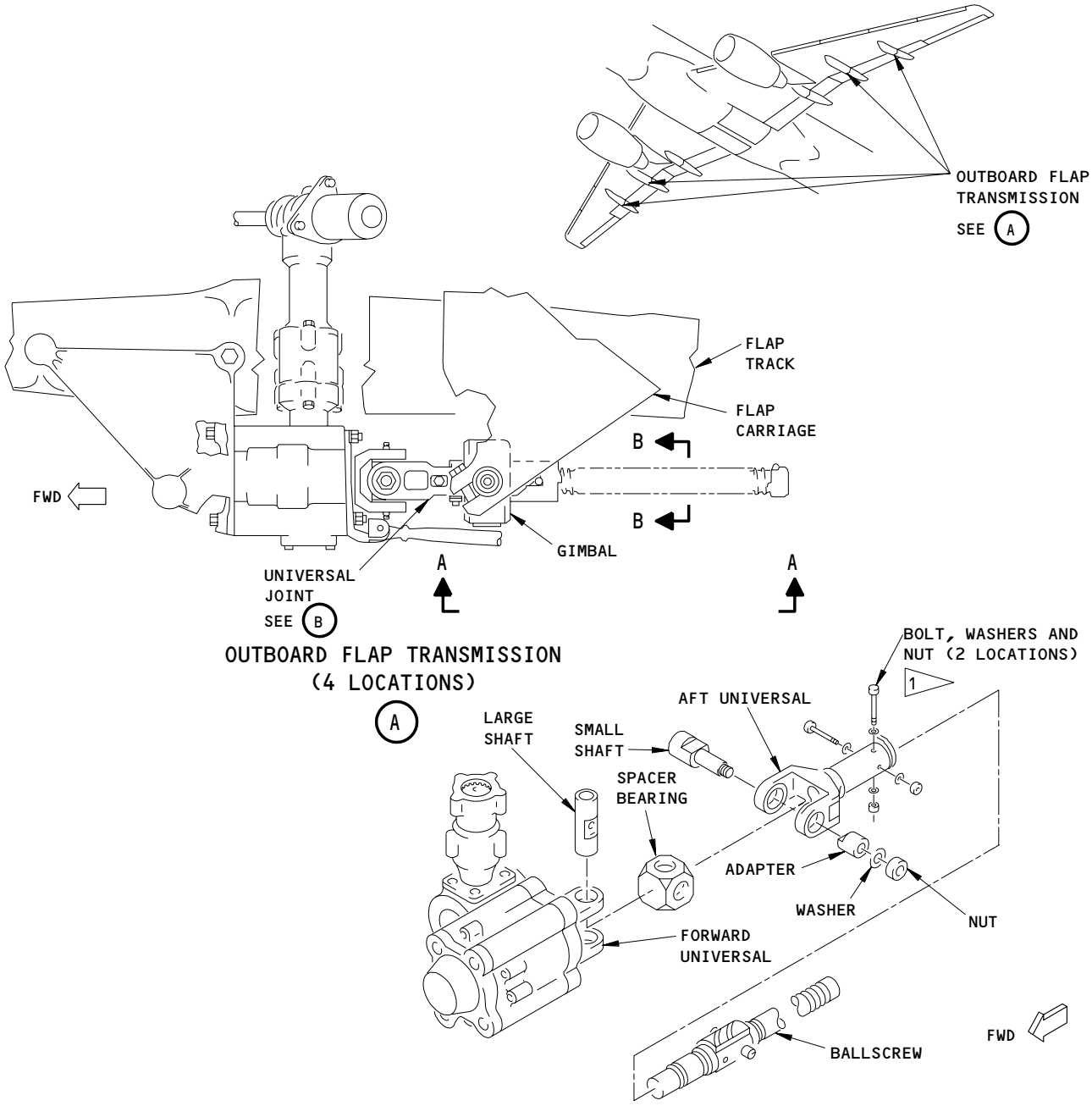
   TASK 27-51-21-024-001

2. Remove the Ballscrew for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Lock Equipment, Outbd TE Flap part of Lock Equipment Set - B27014-20:
         (a) Lifting Pin Assembly - B27014-2
         (b) Hoist Support Assembly - B27014-3
         (c) Outbd Stop Assy - B27014-23
         (d) Inbd Stop Assy - B27014-24
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 27-51-31/201, Outboard TE Flap Track Fairings
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

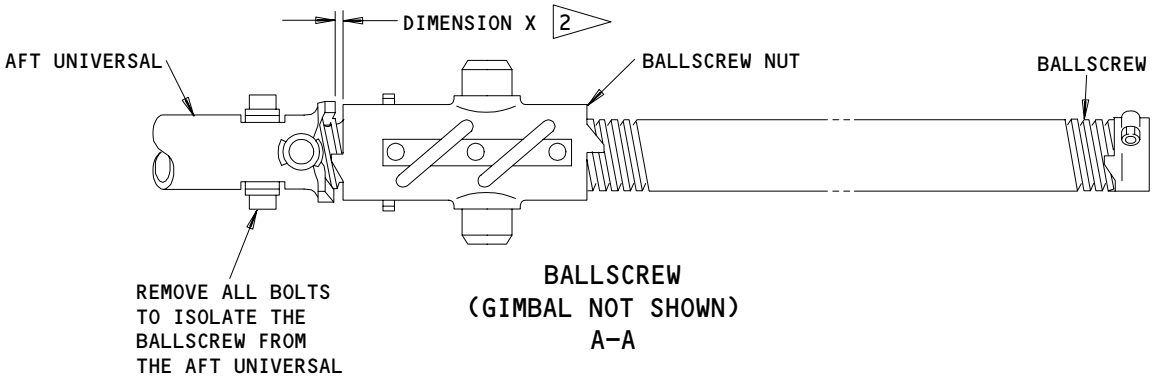
   D. Prepare for the Removal

      S 214-008
      (1) Make sure the TE flaps and LE slats are in the fully retracted positions, and the flap control lever is in the zero (FLAPS UP) detent.

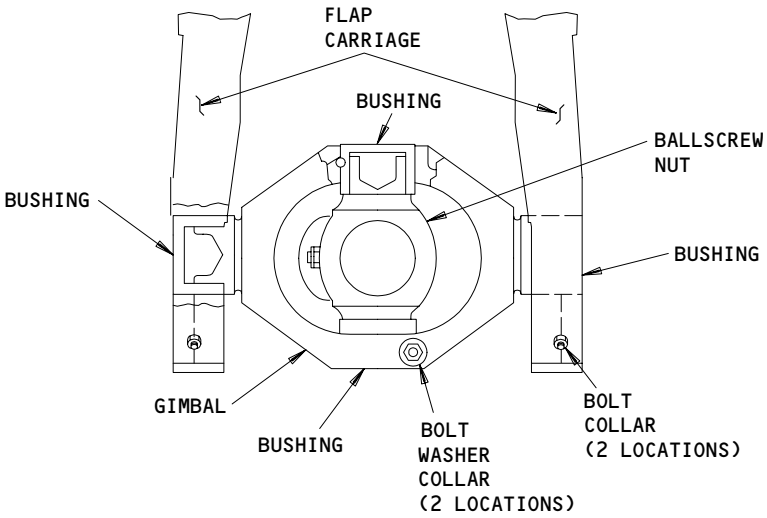


1 INSTALL THE WASHERS WITH THE COUNTERSUNK SIDE ADJACENT TO THE BOLT HEAD. APPLY BMS 5-95 (251N4008-15 THRU -18 AND 251N4009-15 THRU -18) OR BMS 3-27 (MASTINOX 6856K) (251N4008-25 AND ON, AND 251N4009-23 AND ON) TO THE MATING SURFACES OF ALL BOLTS, THE AFT UNIVERSAL, AND THE BALLSCREW

Ballscrew Installation for the Outboard TE Flap
Figure 401 (Sheet 1)



BALLSCREW
(GIMBAL NOT SHOWN)
A–A

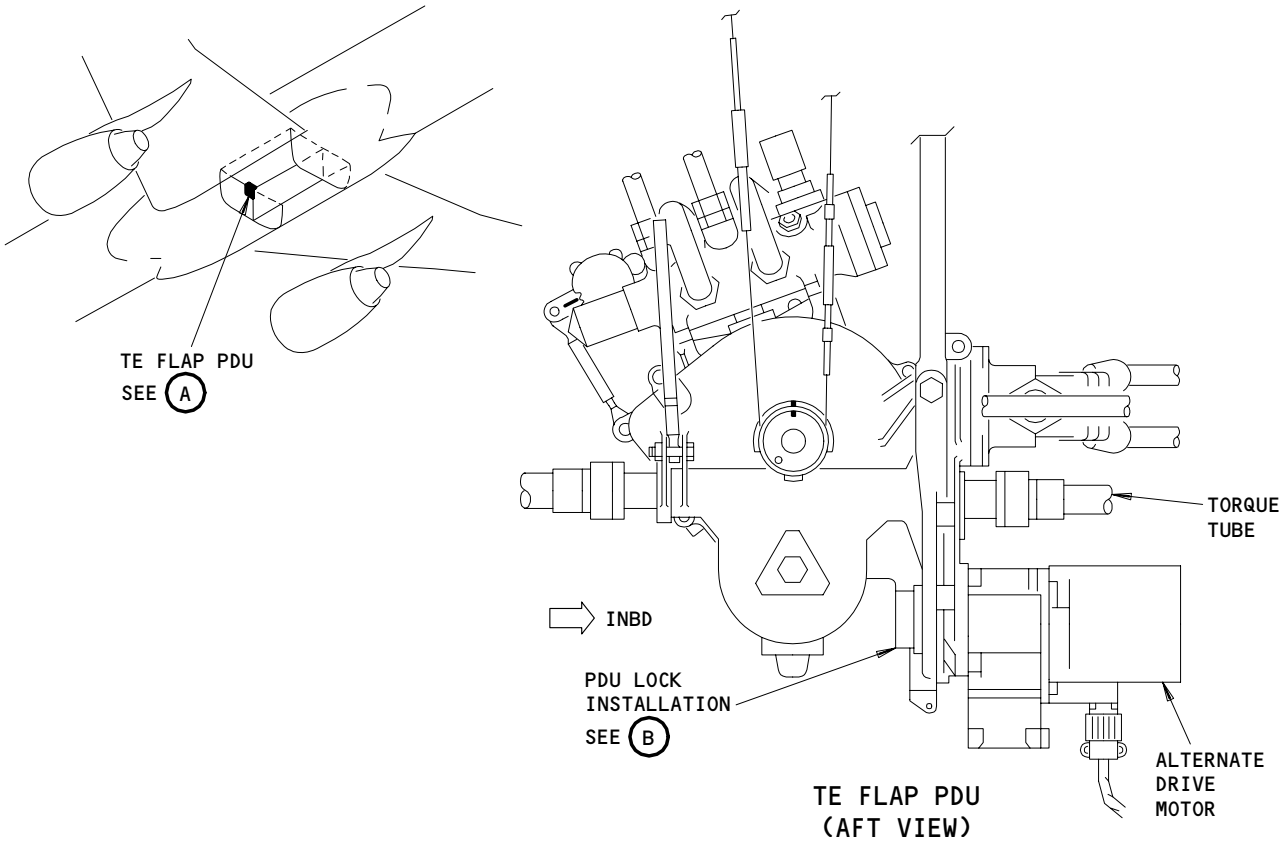


BALLSCREW NUT AND GIMBAL
B–B

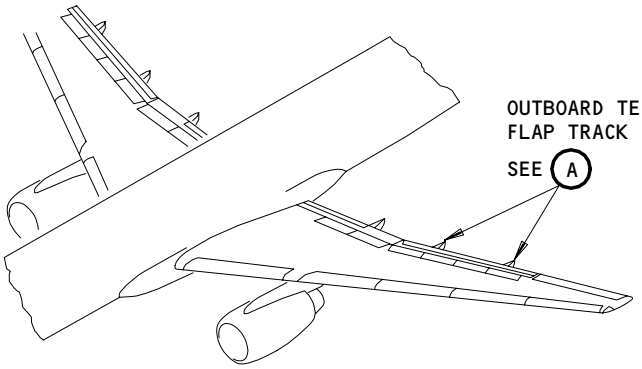
2 MEASURE THE DIMENSION X BEFORE YOU REMOVE THE BALLSCREW TO HELP IN THE INSTALLATION PROCEDURE

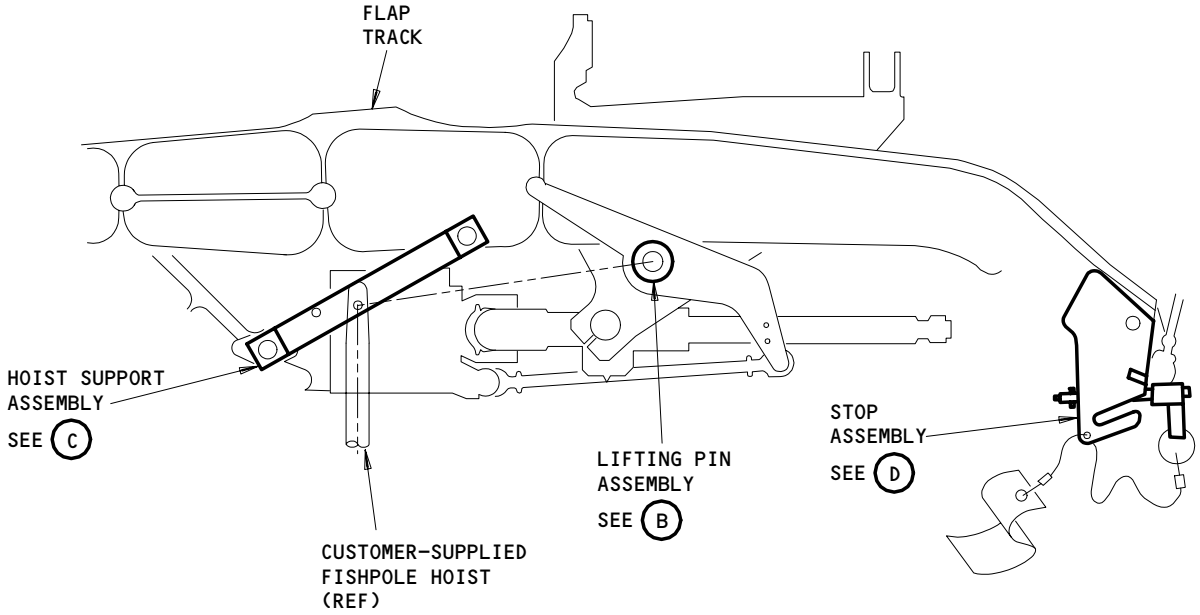
Ballscrew Installation for the Outboard TE Flap
Figure 401 (Sheet 2)

141866



PDU Lock for the TE Flap PDU
Figure 402

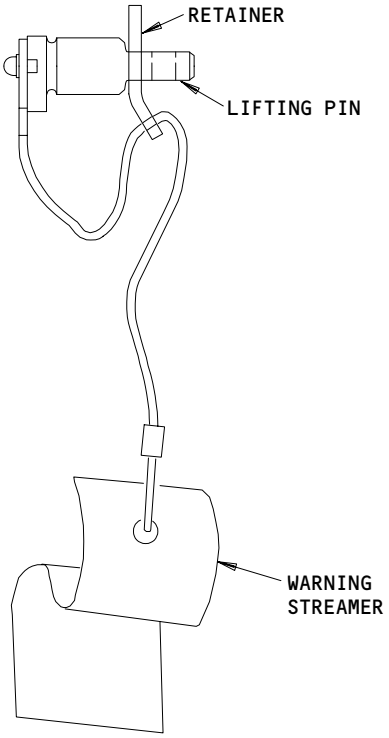




OUTBOARD TE FLAP TRACK

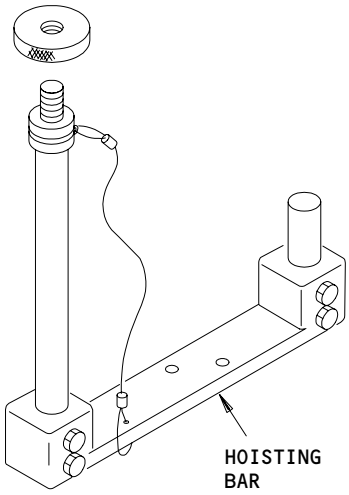
A

Lock Equipment for the Outboard TE Flap
Figure 403 (Sheet 1)



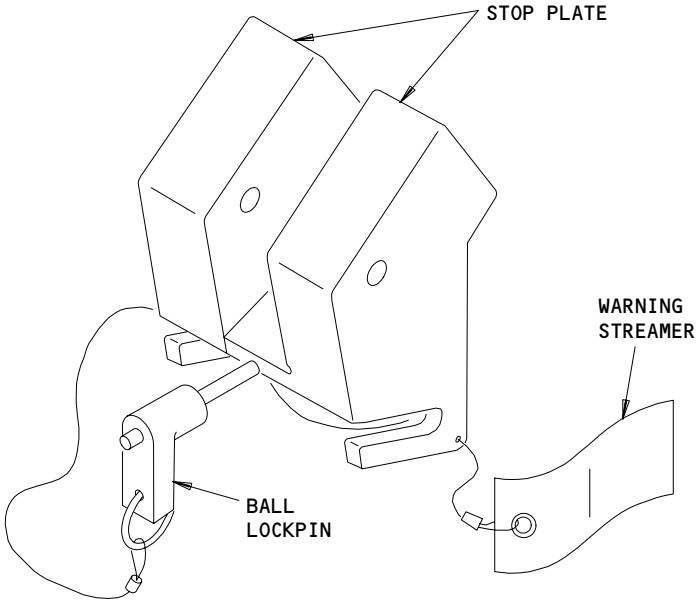
LIFTING PIN ASSEMBLY

(B)



HOIST SUPPORT ASSEMBLY

(C)



STOP ASSEMBLY

(D)

Lock Equipment for the Outboard TE Flap
Figure 403 (Sheet 2)

S 494-002
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-009
(3) Make sure that the downlocks are installed on the nose and main landing gears (AMM 32-00-20).

S 014-010

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the landing gear doors and install the door locks (AMM 32-00-15).

S 864-011
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-012
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-013
(7) Remove the power from the left hydraulic system (AMM 29-11-00).

S 864-014
(8) Remove electrical power (AMM 24-22-00).

S 494-015
(9) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Ballscrew (Fig. 401)

S 014-016
(1) Remove the aft fairing for the outboard flap track (AMM 27-51-31).

S 494-017
(2) Install the lock equipment for the outboard TE flap to hold the flap in the retracted position (Fig. 403).

S 224-018
(3) Measure the dimension X between the aft universal and the ballscrew nut (View A-A).
(a) Keep a record of the dimension X.

S 024-019
(4) Remove the nut on the aft universal and lightly hit the small shaft to disassemble the universal parts (View B).

S 034-020
(5) Remove the bolts and the bushings that attach the gimbal to the flap carriage (View B-B).

S 024-021
(6) Move the gimbal shafts through the grooves on the carriage, and remove the ballscrew and the gimbal.

S 034-022
(7) Remove the bolts and the bushings that attach the gimbal to the ballscrew nut.

S 024-023
(8) Turn the ballscrew nut, 90 degrees, to align the ballscrew nut and the gimbal shafts, and remove the gimbal.

NOTE: If it is necessary, remove the aft universal from the ballscrew (View B).

TASK 27-51-21-424-004

3. Install the Ballscrew for the Outboard TE Flap

A. Equipment

(1) Lock Equipment, Outbd TE Flap part of Lock Equipment Set - B27014-20:
(a) Lifting Pin Assembly - B27014-2
(b) Hoist Support Assembly - B27014-3
(c) Outbd Stop Assy - B27014-23
(d) Inbd Stop Assy - B27014-24

B. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1
(2) C00913 Corrosion Inhibiting Compound - BMS 3-27 (Preferred)
(3) C50056 Compound - Non-drying Corrosion Inhibiting Resin Mix, BMS 3-38 (Alternate)
(4) G50136 Paste - Corrosion Inhibiting Non-drying, BMS 3-38 (Alternate)
(5) G50237 Compound - Corrosion Inhibiting Non-drying Cor-Ban 27L, BMS 3-38 (Alternate)
(6) A00247 Sealant - BMS 5-95, Class B or C
(7) D00633 Grease - BMS 3-33 (Preferred)
(8) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(9) D00015 Grease - BMS 3-24 (Alternate)

C. References

(1) AMM 24-22-00/201, Electrical Power-Control
(2) AMM 27-51-31/201, Outboard TE Flap Track Fairings
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Ballscrew (Fig. 401)

S 424-024

(1) If it is necessary, connect the aft universal to the ballscrew (View B).

S 644-005

CAUTION: USE A HANDPUMP TO LUBRICATE THE BALLSCREW. PRESSURE PUMPS CAN CAUSE DAMAGE TO THE SEALS AND CAUSE A FAILURE.

(2) Lubricate the ballscrew nut through the lube fittings.
  (a) Move the ballscrew nut along the full length of the ballscrew to lubricate the ballscrew.

S 214-025
(3) Make sure that the flap drive system is off.

S 424-026
(4) Do these steps to install the gimbal on the ballscrew nut:
  (a) Move the gimbal over ballscrew nut until the shafts of the parts align.
  (b) Turn the ballscrew nut, 90 degrees, to align the shafts with the bushing holes.
  (c) Install the bushings on each side of the gimbal with the grooves in the bushings aligned with the bolt holes on the gimbal (View B-B).
  (d) Install the bolts that attach the gimbal to the ballscrew nut.

S 824-027
(5) Turn the ballscrew nut until the dimension X is the same as the dimension measured in the Removal Procedure (View A-A).

S 434-028
(6) Put the spacer bearing and the large shaft into the forward universal (View B).

S 424-029
(7) Put the aft universal on the forward universal while you hold the ballscrew.

S 424-030
(8) Do these steps to install the gimbal to the flap carriage:
  (a) Put the gimbal shafts through the clearance grooves on the flap carriage and make sure the gimbal shafts and the bushing holes align.
  (b) Install the bushings on each side of the flap carriage and make sure the grooves in the bushings align with the bolt holes on the flap carriage.
  (c) Install the bolts that attach the gimbal to the flap carriage.

S 424-031
(9) Do these steps to install the aft universal to the flap transmission (View B):
  (a) Make sure the lock equipment for the TE flap is installed to hold the flap in the retracted position.

(b) Install the small shaft with the adapter and the washer.
1) Attach the nut with grease.

NOTE: The self-locking part of the nut must have a run-on torque of 30 - 100 pound-inches (3.4-11.2 Nm), with no axial load on the nut and the thread fully engaged. The bolt thread must extend beyond the locking part of the nut. Replace the nut if the minimum run-on torque is not met.

(c) Tighten the nut to 440-650 pound-inches (49.8-73.4 Nm).

S 644-032

CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. PRESSURE PUMPS CAN CAUSE DAMAGE TO THE SEALS AND CAUSE A FAILURE.

(10) Lubricate the universal at the lube fittings.

F. Operational Test for the Ballscrew Installation

S 094-034
(1) Remove the lock equipment from the outboard TE flap.

S 094-035
(2) Remove the PDU lock from the TE flap PDU.

S 864-036
(3) Supply electrical power (AMM 24-22-00).

S 864-037
(4) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-038
(5) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 214-039
(6) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 094-006
(7) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-040

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(8) Pressurize the left hydraulic system (AMM 29-11-00).

S 864-041

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS TO MAKE SURE THE COMPONENTS MOVE FREELY. THIS WILL PREVENT DAMAGE ON THE COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(9) Move the flaps between the fully retracted and the fully extended positions.
(a) Make sure the ballscrew moves freely and does not rub against adjacent parts.
(b) Make sure the flaps move to the correct positions.

G. Put the Airplane Back to its Usual Condition

S 414-042
(1) Install the aft fairing for the flap track (AMM 27-51-31).

S 414-043

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the locks from the landing gear doors and close the doors (AMM 32-00-15).

S 864-044
(3) Remove the power from the left hydraulic system (AMM 29-11-00).

S 864-045

(4) Remove electrical power if is not necessary (AMM 24-22-00).

OUTBOARD TRAILING EDGE FLAP BALLSCREW - INSPECTION/CHECK

1. General
   A. There are three tasks in this procedure:
      (1) A check of the backlash in the ballscrew for the outboard trailing edge flaps.
      (2) A check of the ball return tubes on the ballscrew nuts for the outboard trailing edge flaps.
      (3) A check of the wear on the ballscrew gimbal:
         (a) The wear on the bushings that attach the gimbal to the carriage.
         (b) The wear on the journals of the gimbal.
         (c) The wear on the bushings tht attach the ballnut to the gimbal.
         (d) The wear on the journals of the ballnut.

TASK 27-51-21-226-001

2. Outboard Trailing Edge Flap Ballscrew Backlash Check (Fig. 601)
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Measuring Assembly - Flap Screw Backlash C27030-3

         NOTE: The C27030-3 is included in the C27030-33 Tool Kit

   B. References
      (1) 24-22-00/201, Electrical Power
      (2) 27-51-31/201, Outboard Trailing Edge Flap Track Fairing
      (3) 29-11-00/201, Hydraulic System
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

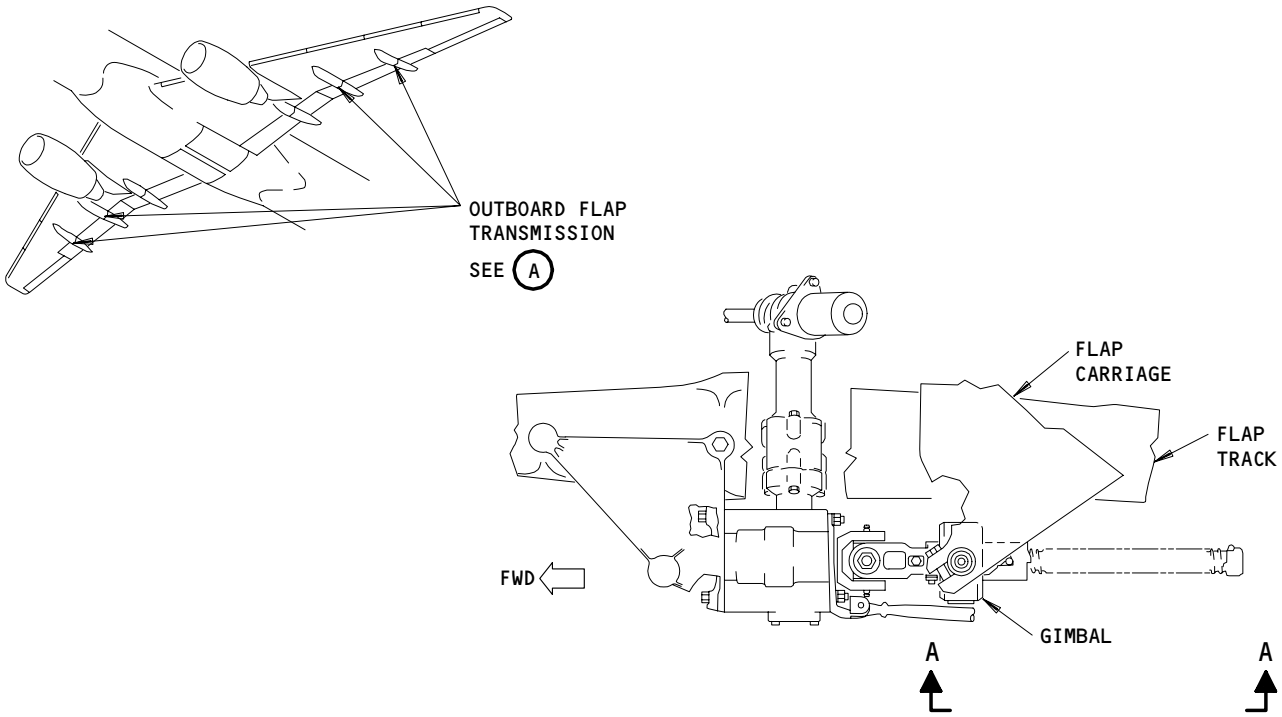
   D. Prepare for the Backlash Check

         S 216-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

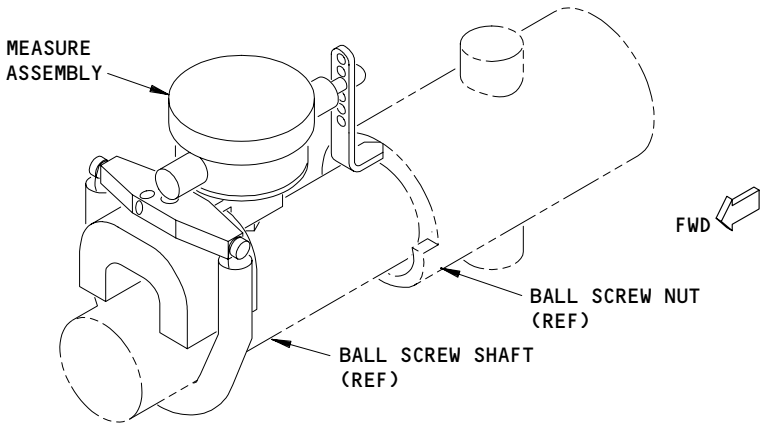
         S 866-003

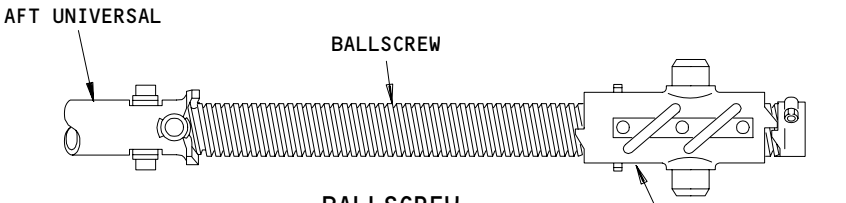
         WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).



OUTBOARD FLAP TRANSMISSION
(4 LOCATIONS)
A





BALLSCREW
(GIMBAL NOT SHOWN)
A-A

1 NUT SHOWN IN EXTENDED POSITION

Ballscrew for the Outboard TE Flap
Figure 601

S 866-004
(3) Supply electrical power (AMM 24-22-00/201).

S 866-005

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 866-006
(5) Move the flap control lever to the 30-unit position to extend the flaps.

S 866-007
(6) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 866-008
(7) Open these circuit breakers and attach DO-NOT-CLOSE tags:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

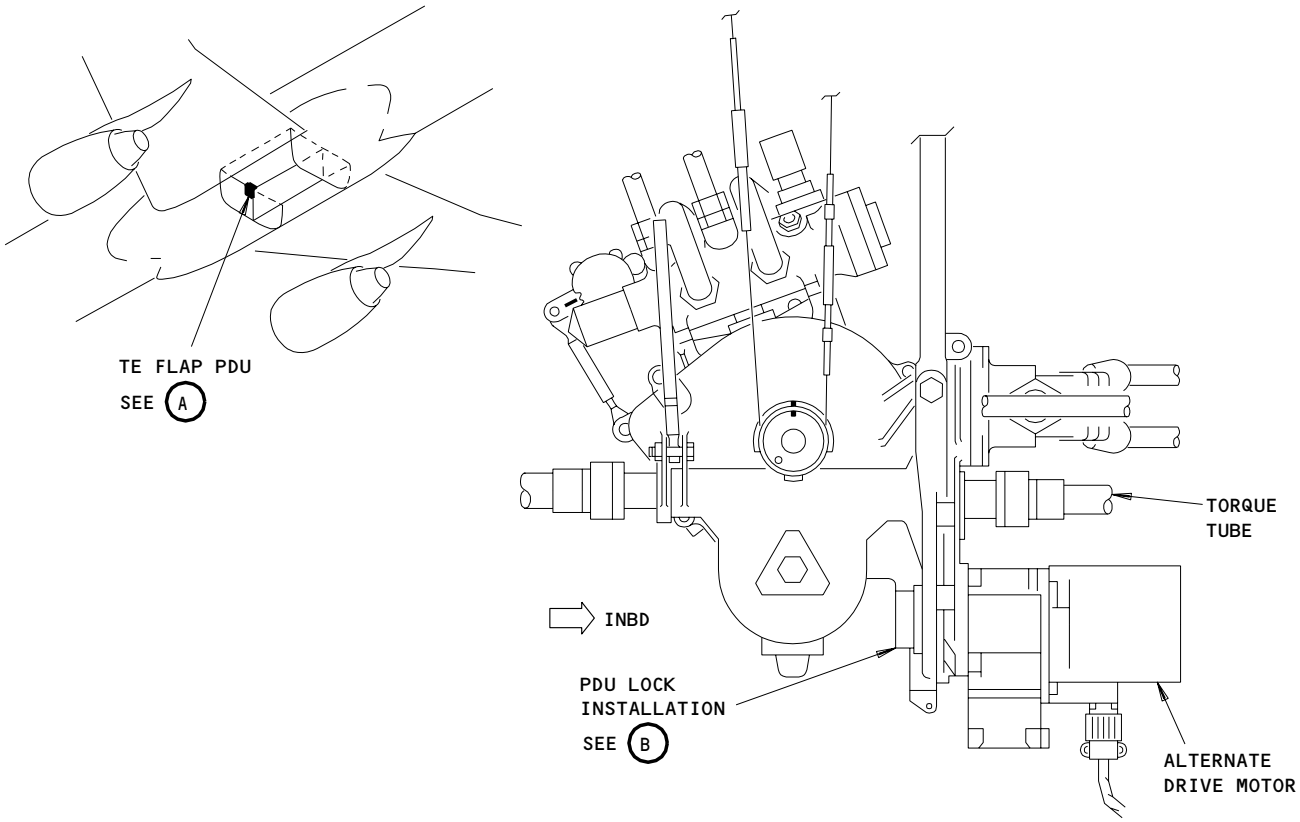
S 496-009
(8) Install a PDU lock on the TE flap PDU (Fig. 602).

E. Outboard Flap Ballscrew Backlash Check

S 226-010
(1) Measure the backlash of the ballscrews for the outboard flap (Fig. 601):

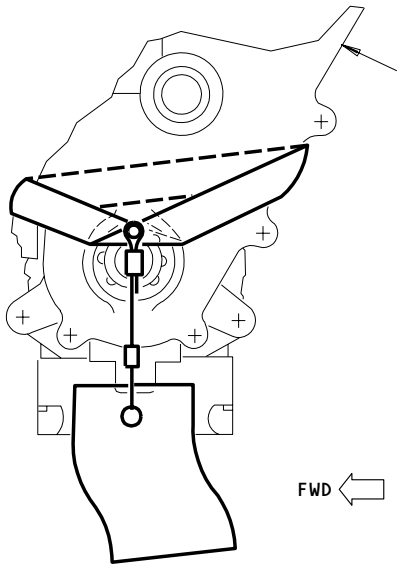
NOTE: You will use the dial indicator on the measuring assembly to measure the relative movement between the ballscrew and the ballnut.

(a) Install the measuring assembly on the applicable ballscrew, forward of the ballnut.
1) Set the dial indicator to zero.



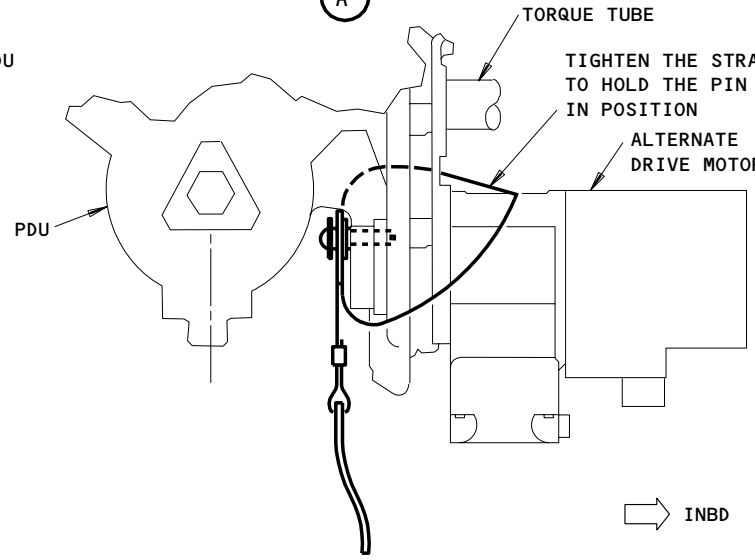
TE FLAP PDU (AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 602

(b) Lift to remove backlash (free play) first. Then apply a lifting force of 50 pounds (222 newtons) to the flap fairing in the direction of the aft flap chord line.
(c) Make sure the maximum dial indicator reading is less than 0.0210 inch (0.533 mm).
(d) If the backlash value is not in the limit, install a new ballscrew (AMM 27-51-21/401).
(e) Remove the measuring assembly from the ballscrew.

F. Put the Airplane BAck to Its Usual Condition

S 096-011
(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-012
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 866-013

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 866-014
(4) Move the flap control lever to the UP position to retract the flaps.

S 866-015
(5) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 866-016
(6) Remove electrical power (Ref 24-22-00/201).

TASK 27-51-21-226-018

3. Outboard Trailing Edge Flap Ballscrew Nut Return Tube Check (Fig. 603)
A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00015 Grease - BMS 3-24 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

B. Equipment
(1) Flush gun (grease gun)
(2) TE Flap PDU Lock - B27008-1

C. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 27-51-21/401, Outboard Trailing Edge Flap Ballscrew
(3) AMM 27-51-31/201, Outboard Trailing Edge Flap Track Fairing
(4) AMM 29-11-00/201, Hydraulic System
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

E. Prepare for the Return Tube Check

S 216-019
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 866-020

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-021
(3) Supply electrical power (AMM 24-22-00/201).

S 866-022

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-023

(5) Move the flap control lever to the 30-unit position to extend the flaps.

S 866-024

(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-025

(7) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  (a) P6 Main Power Distribution Panel
    1) 6D20, ALTN SLAT PWR
    2) 6D23, ALTN FLAP PWR
  (b) P11 Overhead Panel
    1) 11B18, WARN ELEX B
    2) 11D31, HYDRAULICS PTU CONT
    3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
    4) 11J18, FLAP LOAD RELIEF
    5) 11J33, WARN ELEX A

S 496-026

(8) Install a PDU lock on the TE flap PDU (Fig. 602).

F. Outboard Flap Ballscrew Nut Return Tube Check (Fig. 603).

S 226-038

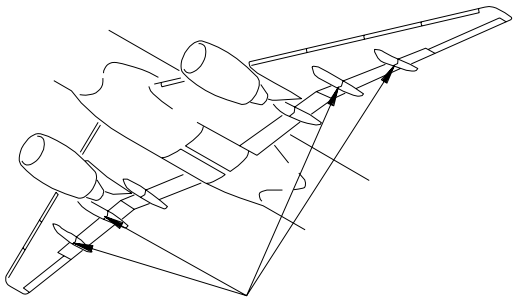
CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. A PRESSURE PUMP CAN CAUSE DAMAGE TO THE SEAL.

(1) Lubricate the ballnuts on the ballscrews of the outboard flap.

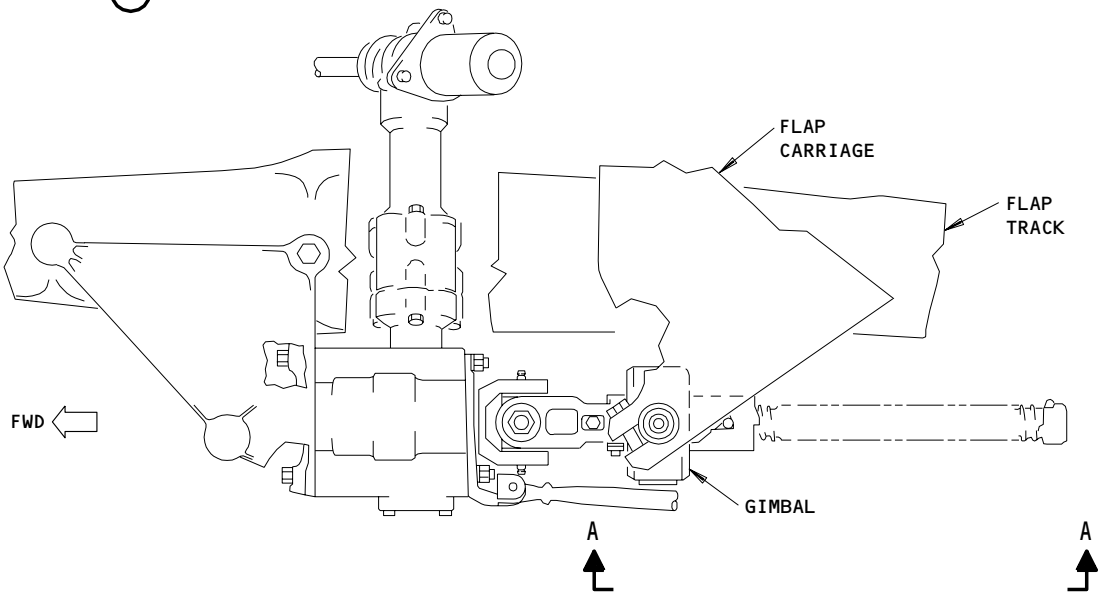
NOTE: You will add grease to the ballnut until grease flows out of the bleed hole.

  (a) Look for a new grease leak at the base of each return tube on the ballscrew nut.
  (b) If there is a new grease leak at the base of any of the return tubes, measure dimension Z on the ballscrew nut (Fig. 603).

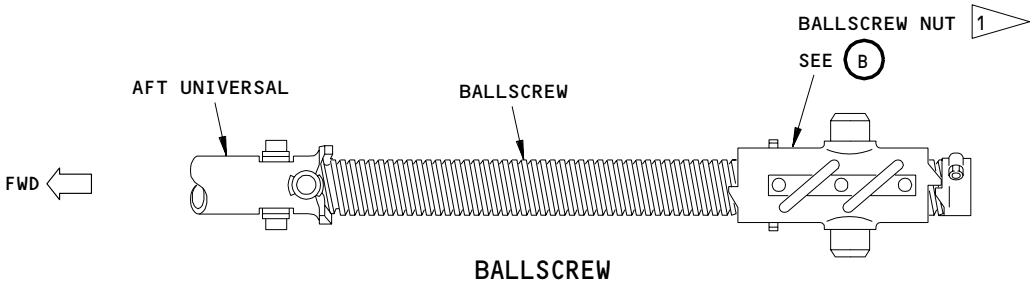
NOTE: Dimension Z is the distance between the return tubes and the body of the ballscrew nut.



OUTBOARD FLAP
BALLSCREW
SEE (A)



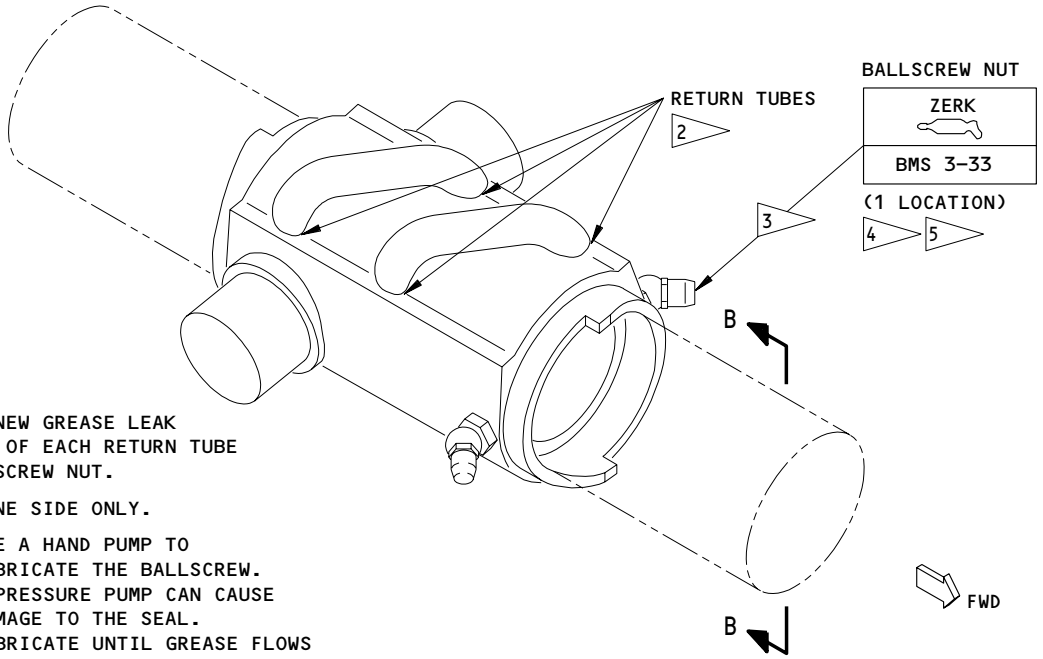
OUTBOARD FLAP BALLSCREW
(4 LOCATIONS)
(A)



BALLSCREW
(GIMBAL NOT SHOWN)
A-A

1 NUT SHOWN IN EXTENDED POSITION

Ballscrew Nut Inspection
Figure 603 (Sheet 1)



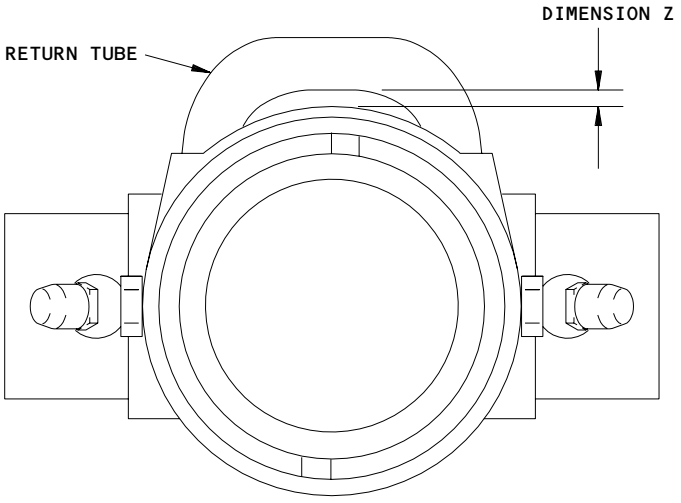
2 LOOK FOR A NEW GREASE LEAK AT THE BASE OF EACH RETURN TUBE ON THE BALLSCREW NUT.

3 LUBRICATE ONE SIDE ONLY.

4 CAUTION: USE A HAND PUMP TO LUBRICATE THE BALLSCREW. A PRESSURE PUMP CAN CAUSE DAMAGE TO THE SEAL. LUBRICATE UNTIL GREASE FLOWS OUT FROM THE BLEED HOLE.

5 BMS 3-33 RECOMMENDED
BMS 3-24 OPTIONAL
MIL-PRF-23827 ALTERNATIVE

BALLSCREW NUT
1 POINT
B



BALLSCREW NUT
B-B

Ballscrew Nut Inspection
Figure 603 (Sheet 2)

(c) If dimension Z is more than 0.060 inch (1.5 mm), then replace the ballscrew (AMM 27-51-21/401).

G. Put the Airplane Back to Its Usual Condition

S 096-028

(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-029

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULIC PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 866-030

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-031

(4) Move the flap control lever to the UP position to retract the flaps.

S 866-032

(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-033
(6) Remove electrical power (AMM 24-22-00/201).

TASK 27-51-21-226-039

4. Outboard Trailing Edge Flap Ballscrew Inspection (Fig. 604)

A. Equipment
(1) Micrometer - 0 to 2 inch
(2) Vernier Caliper

B. References
(1) AMM 24-22-00/201, Electrical System
(2) AMM 27-51-21/401, Outboard Trailing Edge Flap Ballscrew
(3) AMM 29-11-00/201, Hydraulic System
(4) AMM 32-00-15/201, Landing Gear Door Ground Operations
(5) AMM 32-00-20/201, Landing Gear Downlocks

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

S 216-059
(1) Make sure the TE flaps and LE slats are in the fully retracted positions, and the flap control lever is in the zero (FLAPS UP) detent.

S 496-060
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 216-061
(3) Make sure that the downlocks are installed on the nose and main landing gears (AMM 32-00-20).

S 016-062

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the landing gear doors and install the door locks (AMM 32-00-15).

S 866-063
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT

(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 866-064
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 866-065
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 866-066
(8) Remove electrical power (AMM 24-22-00/201).

S 496-067
(9) Install a PDU lock on the TE flap PDU (Fig. 602).

E. Prepare for the Ballscrew Inspection

S 866-055
(1) Remove the applicable ballscrew (AMM 27-51-21/401).
(a) Remove the gimbal from the ballscrew that you removed.

S 226-056
(2) Do a check of the wear surfaces of the parts with a micrometer or vernier caliper as applicable (Fig. 604).
(a) Compare the dimensions measured with the permitted dimensions shown in Fig. 604.
(b) Repair or replace the parts that are not in the tolerance specified in Fig. 604.

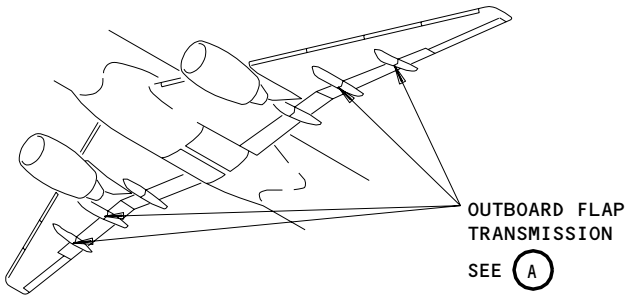
S 866-045
(3) Reconnect the gimbal to the ballscrew.

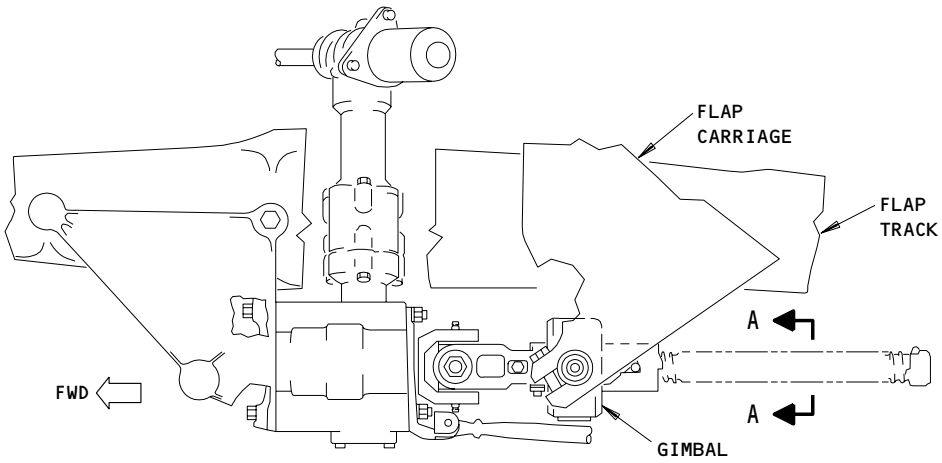
S 866-046
(4) Reinstall the applicable ballscrew on the flap transmission (AMM 27-51-21/401).

F. Put the Airplane Back to Its Usual Condition

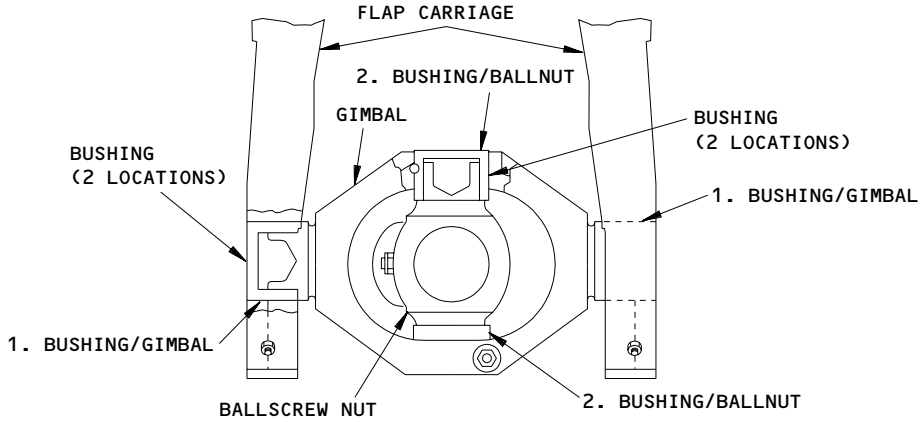
S 096-049
(1) Remove the PDU lock from the TE flap PDU (Fig. 602).

S 866-050
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULIC PTU CONT





OUTBOARD FLAP TRANSMISSION
(4 LOCATIONS)
(A)



BALLSCREW NUT AND GIMBAL
A-A

Flap Ballscrew Wear Limits
Figure 604 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	1.1255 (28.5877)	1.1275 (28.6385)	1.1355 (28.8417)	0.0120 (0.3048)	1		
	GIMBAL	OD	1.1240 (28.5496)	1.1250 (28.5750)	1.1235 (28.5369)			X	2
2	BUSHING	ID	1.1255 (28.5877)	1.1275 (28.6385)	1.1355 (28.8417)	0.0115 (0.2921)	1		
	BALLNUT	OD	1.1240 (28.5496)	1.1250 (28.5750)	1.1240 (28.5496)			X	2

1 REPLACE BUSHING WHEN ID IS MORE THEN 1.1355 INCH (28.8417 mm) MEASURED ACROSS ANY DIAMETER.

2 THIS PART CAN BE REPAIRED.

Flap Ballscrew Wear Limits
Figure 604 (Sheet 2)

L99586

3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 866-051

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 866-052
(4) Move the flap control lever to the UP position to retract the flaps.

S 866-053
(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 866-054
(6) Remove electrical power (AMM 24-22-00/201).

OUTBOARD TE FLAP AFT FLAP - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the aft flap from the outboard trailing edge (TE) flap. The second task installs the aft flap.

TASK 27-51-22-024-026

2. Remove the Aft Flap From the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU lock - B27008-1
      (2) Sling Equipment - Inboard/Outboard Aft Flap - B27025-42

   B. References
      (1) 27-51-31/201, Outboard TE Flap Track Fairings
      (2) 27-51-22/501, Outboard TE Flap Aft Flap
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
567/667	Outboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 214-001
      (1) Make sure that the TE flaps and LE slats are in the fully extended position, and that the flap control lever is in the 30-unit (FLAPS DOWN) detent.

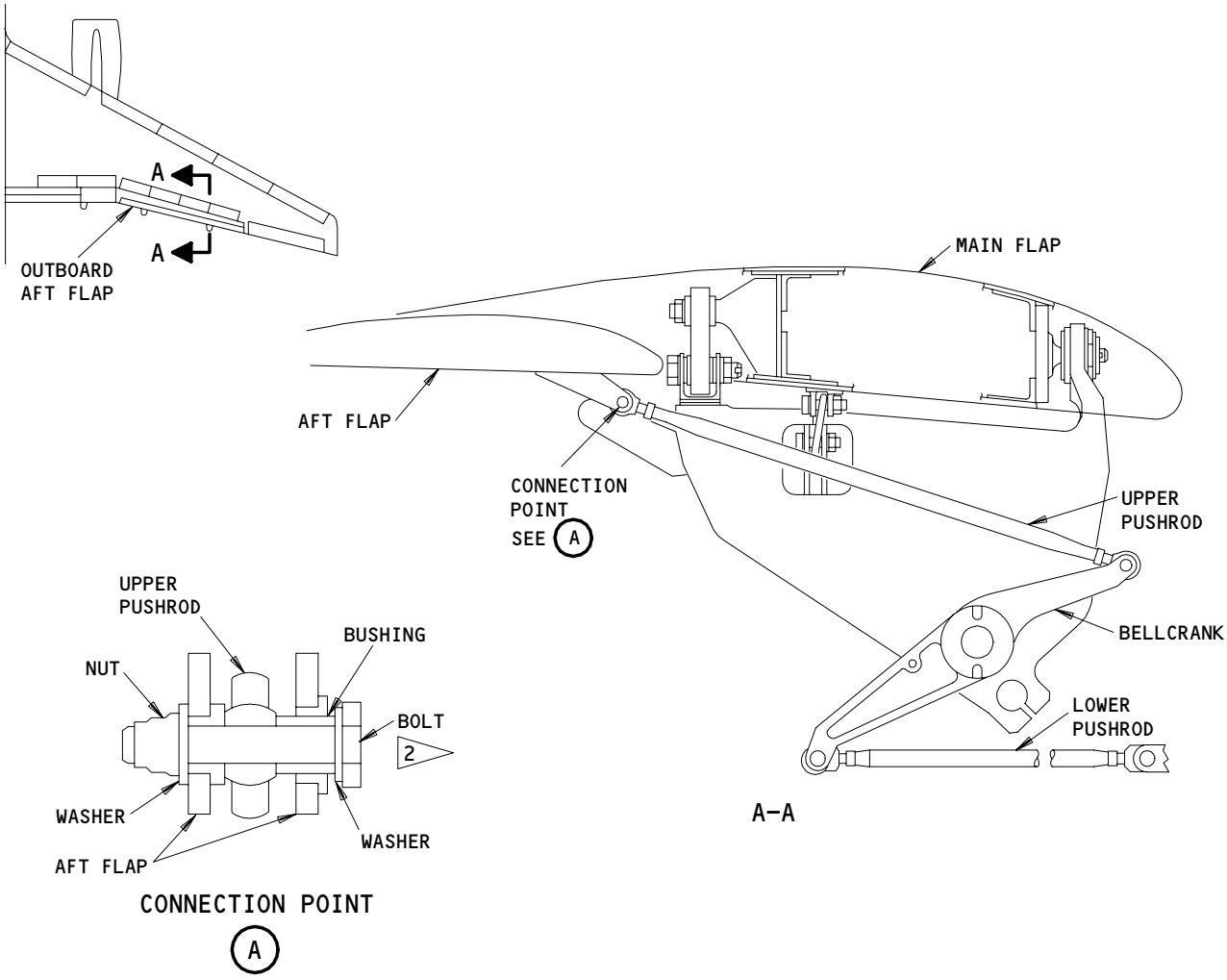
      S 494-027
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

      S 214-002
      (3) Make sure that the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 014-003

      WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY. THE MOVEMENT OF THE DOORS CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

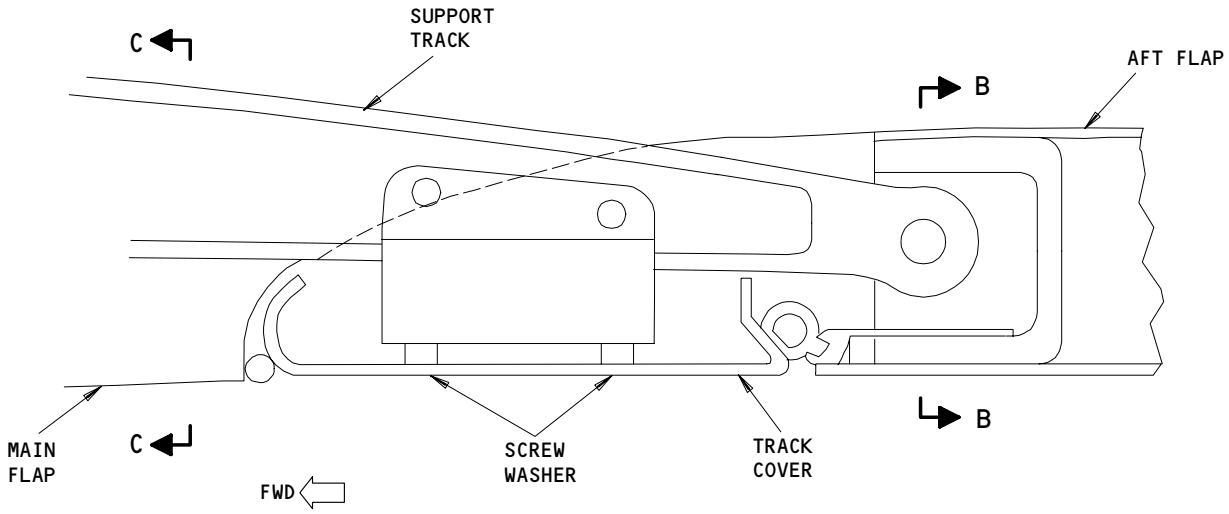
      (4) Open the landing gear doors and install the door locks (AMM 32-00-15/201).



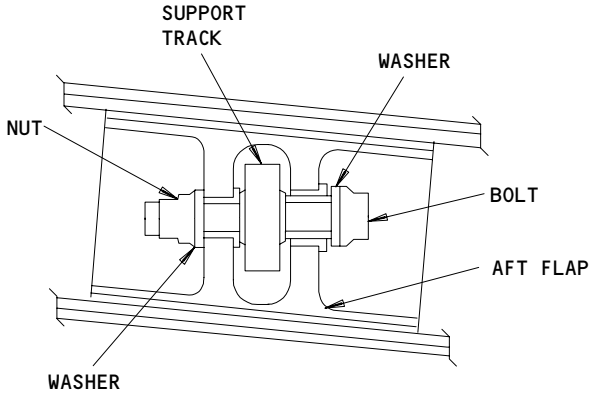
1 APPLY A SUFFICIENT QUANTITY OF GREASE ALONG THE ROLLER SURFACES OF THE PROGRAMMING TRACK

2 THE BOLT HEAD MUST FACE INBOARD TO GIVE CLEARANCE WITH THE FAIRING

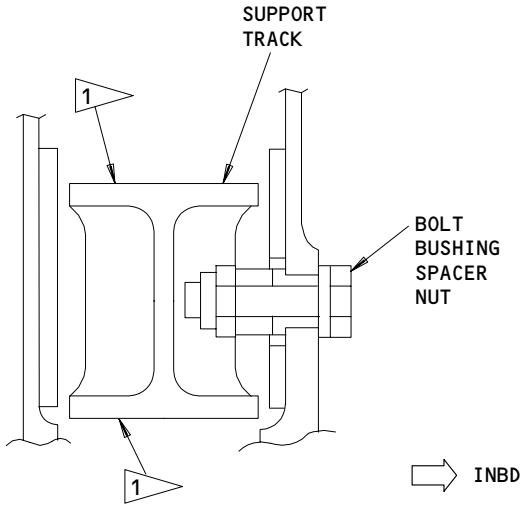
Installation of the Outboard Aft Flaps
Figure 401 (Sheet 1)



SUPPORT TRACK TO AFT FLAP CONNECTION

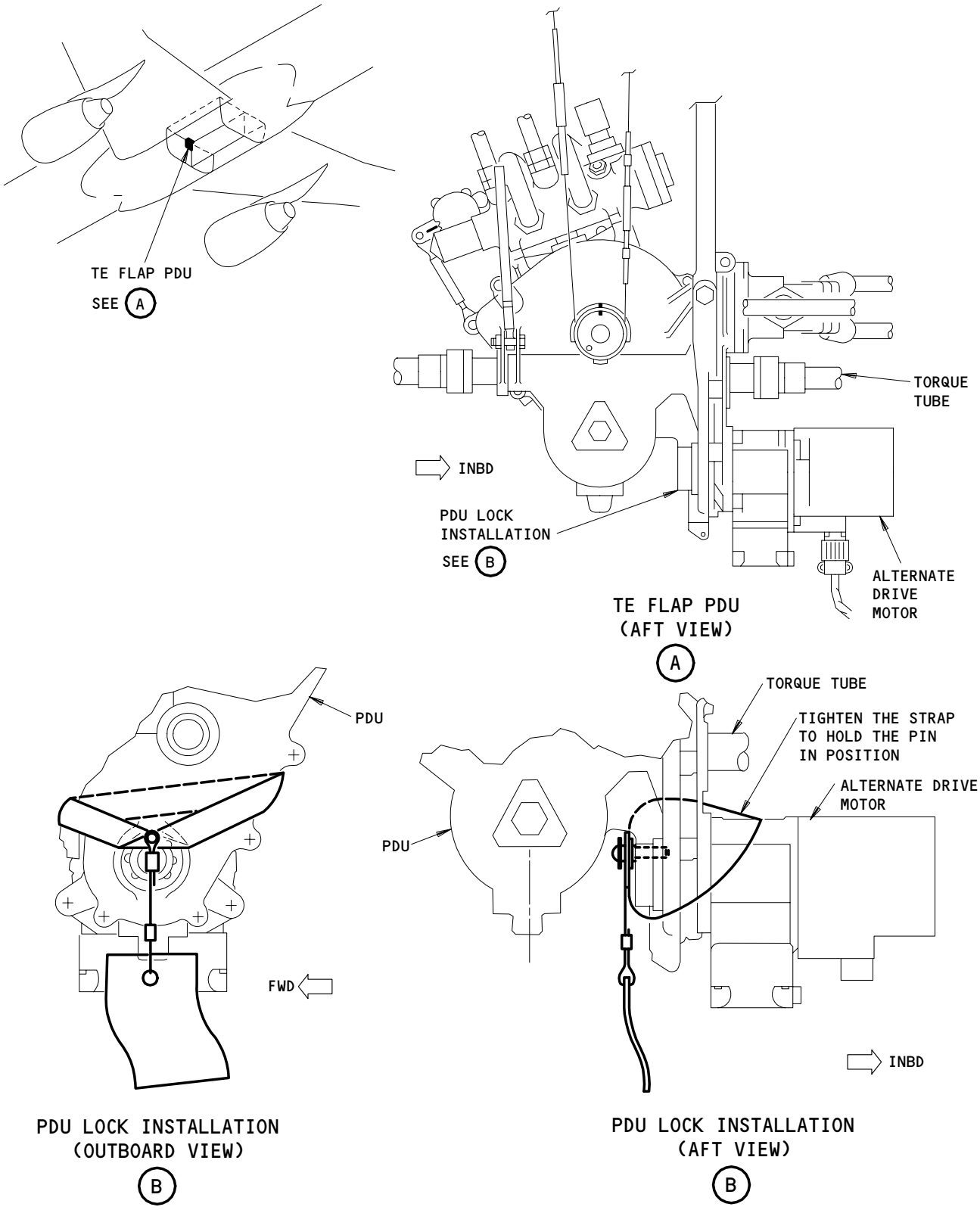


SUPPORT TRACK CONNECTION
B-B

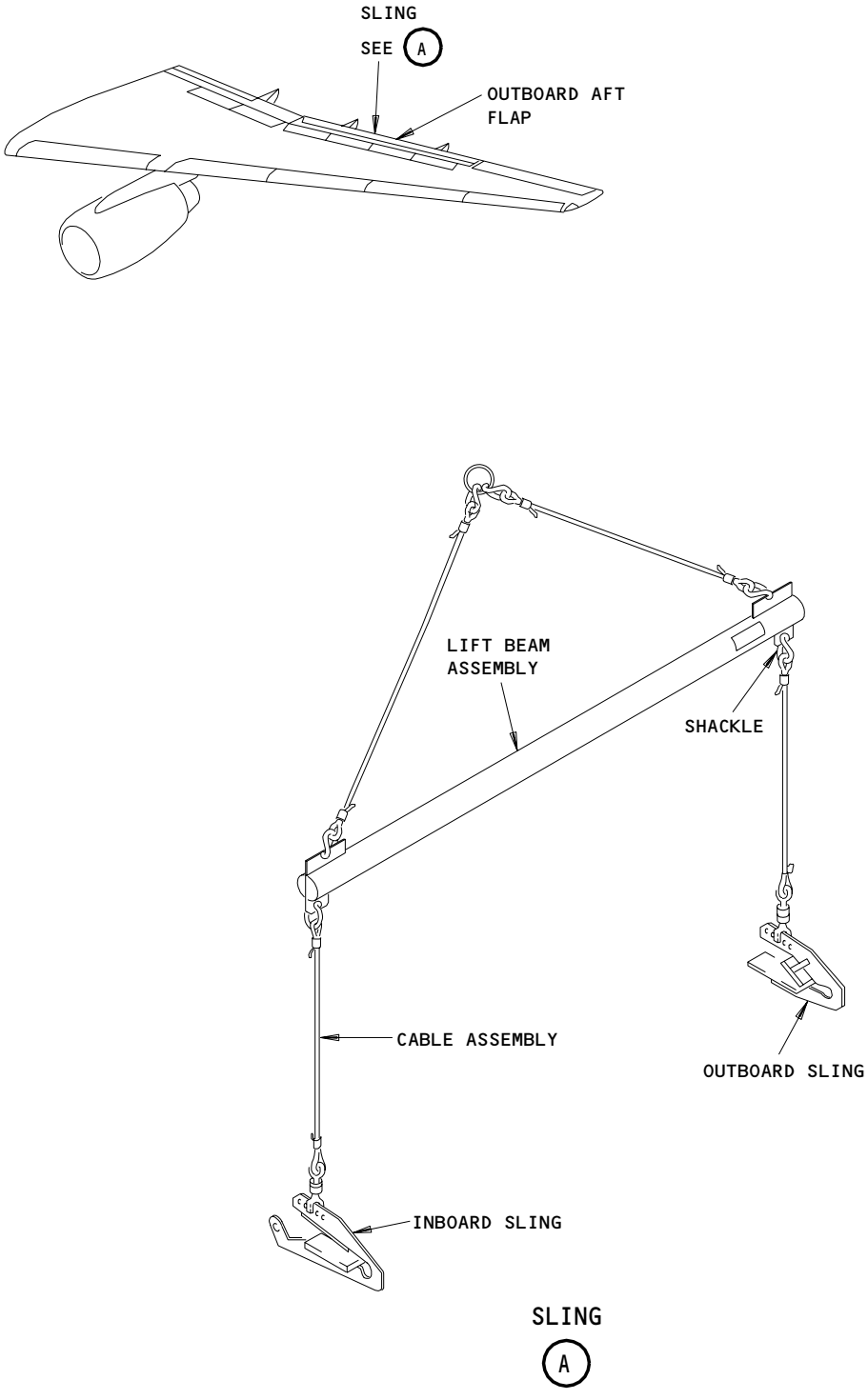


AFT TRACK STOP
C-C

Installation of the Outboard Aft Flaps
Figure 401 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 402



Sling Equipment for the Aft Flap
Figure 403

S 864-004
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-005
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-006
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-007
(8) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Outboard Aft Flap

NOTE: The aft flap weighs approximately 70 pounds (31.75 Kg).

S 014-008
(1) Remove the aft fairings for the TE flap track (Ref 27-51-31).

S 494-009
(2) Do these steps to install the aft flap sling as a support to hold the aft flap (Fig. 403).
(a) Put the sling hold assemblies on the aft flap at two locations.

NOTE: One hold assembly is installed approximately 55.9 inches from the inboard end of the outboard flap assemblies. The other hold asssembly is installed approximately 189.5 inches from the inboard end. This permits the installation of a safety pin at the connection of the upper pushrod to the aft flap. The safety pin holds the aft flap in the sling hold assemblies.

(b) Disconnect the two upper pushrods from the aft flap and immediately install the safety pins.

S 034-010
(3) Remove the blade seals near the programming tracks of the aft flap at the aft flap ends.

S 014-012
(4) Remove the track cover from the support track.

S 864-013
(5) Move the aft flap, a sufficient distance, in the aft direction to access the aft track stops.

S 034-014
(6) Remove the aft track stops from the two middle track supports.

S 024-011

WARNING: USE A SUPPORT FOR THE SUPPORT TRACKS OF THE AFT FLAP WHEN YOU REMOVE THE AFT FLAP. THE TRACKS WILL FALL FREELY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Move the aft flap in the aft direction and remove it from the airplane.

S 024-015
(8) If you replace the aft flap, you must remove the support tracks from the aft flap.

TASK 27-51-22-424-028

3. Install the Aft Flap to the Outboard TE Flap

A. Equipment
(1) Sling Equipment - Inboard/Outboard Aft Flap - B27025-42

B. Consumable Materials
(1) A00247 Sealant - BMS 5-95, Class A
(2) D00015 Grease - BMS 3-24 (Alternate)
(3) D00633 Grease - BMS 3-33 (Recommended)

C. References
(1) 27-51-22/501, Outboard TE Flap Aft Flap
(2) 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
567/667	Outboard Aft Flap
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Outboard Aft Flap (Fig. 401)

S 424-016
(1) If you install a new aft flap, you must install the flap tracks on the aft flap.

S 644-018
(2) Apply grease along the roller surfaces of the support tracks on the aft flap.

S 214-019
(3) Make sure that the roller bearing eccentrics at the ends of the aft flap are in the neutral position.

S 644-020
(4) Apply grease along the roller surfaces of the programming tracks on the main flap.

S 494-021
(5) Install the aft flap sling and the safety pins.

S 424-022
(6) Do these steps to install the aft flap:
  (a) Lift the aft flap into the correct position and engage the rollers with the programing tracks and the track with the support rollers.
  (b) Move the flap tracks, a sufficient distance, in the forward direction to install the track stops.
  (c) Apply sealant to the bolts that connect the track stops to the support ribs.
  (d) Install the flap track stops on the two middle support ribs.
  (e) Move the aft flap and the tracks to the fully retracted position.

  WARNING: INSTALL THE ATTACH BOLTS TO THE UPPER PUSHROD IMMEDIATELY AFTER YOU REMOVE THE SAFETY PINS THAT HOLD THE AFT FLAP TO THE SLING HOLD ASSEMBLIES. THE AFT FLAP CAN FALL FREELY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

  (f) Remove the safety pins on the hold assemblies and immediately attach the upper push rods to the aft flap:

    CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

    1) Apply grease to the outer diameter of the bolt and the inner diameter of the bushing.

CAUTION: MAKE SURE THE BOLT HEAD POINTS TO THE INBOARD DIRECTION TO GIVE CLEARANCE WITH THE FLAP TRACK FAIRING. IF THE BOLT IS INCORRECTLY INSTALLED, IT CAN CAUSE THE MOVEMENT OF THE FAIRING TO BE BLOCKED AND CAUSE DAMAGE TO THE AIRPLANE.

2) Install the bolt that attaches the upper pushrod to the aft flap.
3) Tighten the nut to 65-80 pound-inches (7.4-9.0 Nm).

(g) Remove the sling hold assemblies from the aft flap.

S 414-023

(7) Install the track cover to the support track (Fig. 401).

S 094-024

(8) Remove the PDU lock from the TE flap PDU.

S 714-025

(9) Adjust and do a test on the aft flap installation (AMM 27-51-22/501).

NOTE: Do the steps to install the flap track fairings and to put the airplane back to its usual condition in the adjustment/test procedure.

S 424-030

(10) If you install the same removed aft flap, rigging of the flap is not necessary when these occur:
(a) Upper push rod adjustment, is not changed.
(b) Lower push rod adjustment, is not changed.
(c) The programming track eccentric is not changed.
(d) The bellcrank for the lower and/or upper pushrod is not repaired, modified, adjusted or replaced.
(e) The flap drive transmissions and drive ballscrew nuts are not removed or replaced.
(f) The flap drive system (changing of drive ballscrew nut relationship) is not re-rigged.

OUTBOARD TE FLAP AFT FLAP - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task adjusts the aft flap for the outboard trailing edge (TE) flap. The second task is a test of the aft flap and is done after the flap adjustment is made.
   B. The rigging dimensions in this procedure represent rigging the flaps with the wings in the unloaded condition (without engines or fuel weight on the wings). That is the configuration that most closely resembles the in-flight deflection of the wing.
   C. For a in-service airplane the flaps are usually rigged with the engines installed, on jacks or gears, and with fuel weight on the wings. Regardless of this difference, the rigging dimensions given in this procedure are still the target dimensions for the rigging of the airplane in any configuration.

      NOTE: If the best rigging dimension you can obtain is not within the limit, refer to the tables in this procedure to find the limits for a particular airplane configuration.

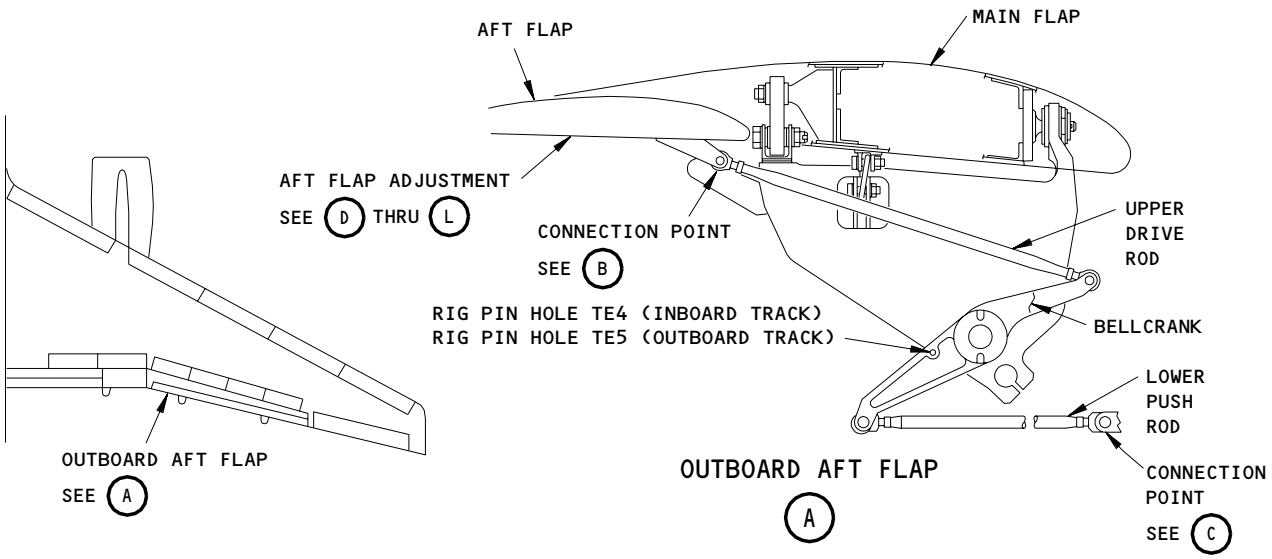
TASK 27-51-22-825-001

2. Adjust the Aft Flap for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) TE4 - P/N B20003-4
          (b) TE5 - P/N B20003-4
   B. References
      (1) 20-10-24/201, Rig Pins
      (2) 27-51-31/201, Outboard TE Flap Track Fairings
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

211/212	Control Cabin
567/667	Outboard Aft Flap
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

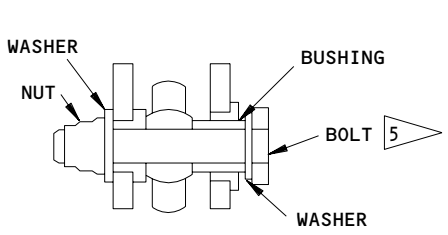
   D. Prepare for the Adjustment

      S 215-002
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.



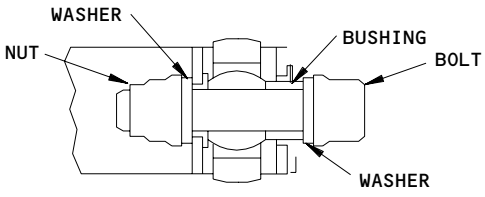
OUTBOARD AFT FLAP

A



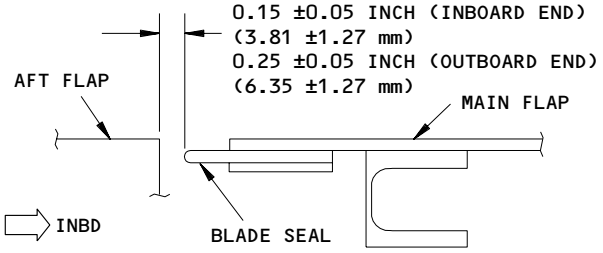
CONNECTION POINT

B



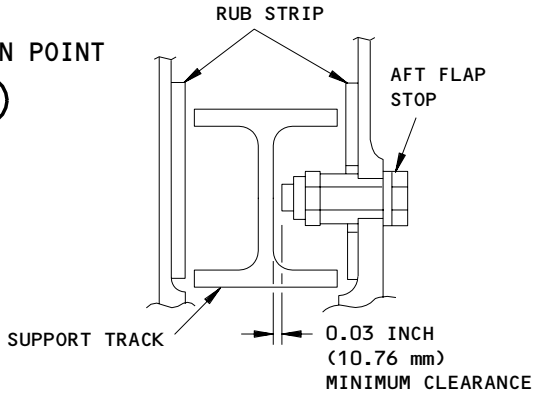
CONNECTION POINT

C



AFT FLAP ADJUSTMENT
(BLADE SEALS)

D

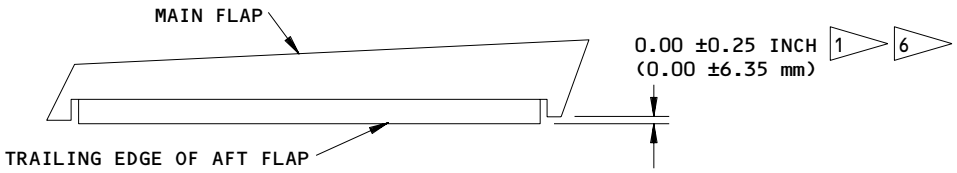


AFT FLAP ADJUSTMENT
(AFT FLAP STOP CLEARANCE)

E

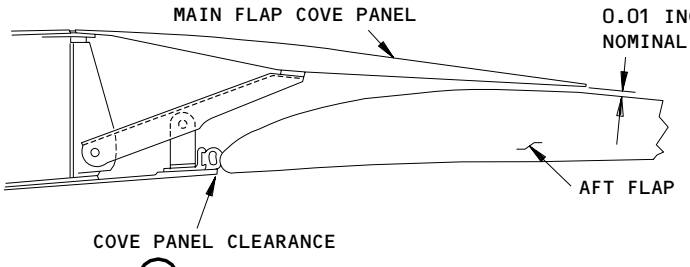
1. TO ADJUST THE AFT FLAP, CHANGE THE LENGTH OF THE UPPER PUSH ROD.
2. THE CLEARANCE MUST BE BETWEEN 0.005 AND 0.100 INCH (0.13 AND 2.54 mm).
3. TO ADJUST THE AFT FLAP, TURN THE ECCENTRICS ON THE ROLLERS ON EACH END OF THE AFT FLAP.
4. ADJUST THE SIDE SEALS TO GET A SEAL COMPRESSION OF 0.12 ±0.05 INCH (3.0 ±1.27 mm) AT THE INBOARD CENTER TRACK AND 0.25 ±0.10 INCH (6.35 ±2.5 mm) AT THE OTHER TRACKS.
5. INSTALL EACH BOLT WITH THE HEAD POINTED INBOARD TO GIVE CLEARANCE WITH THE FLAPTRACK FAIRING

Outboard Aft Flaps Adjustment
Figure 501 (Sheet 1)



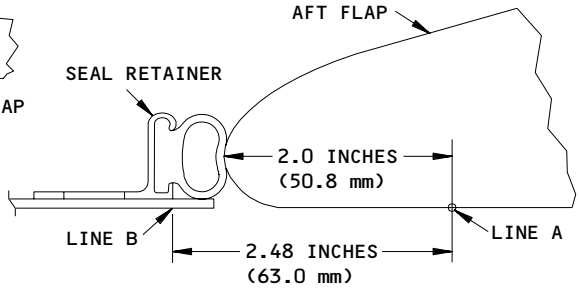
AFT FLAP ADJUSTMENT
(TRAILING EDGE ALIGNMENT)

F



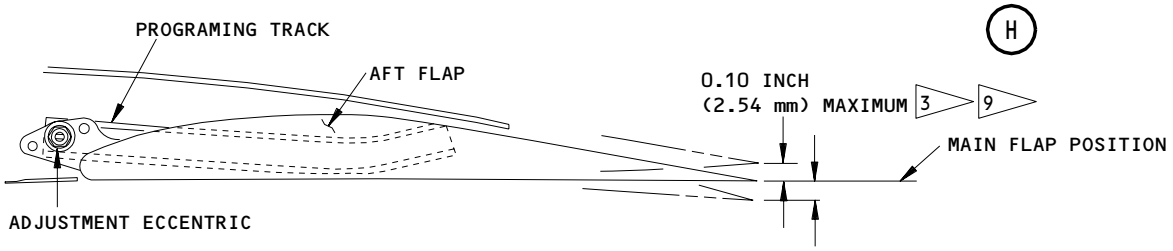
AFT FLAP ADJUSTMENT
(AFT FLAP CLEARANCES)

G



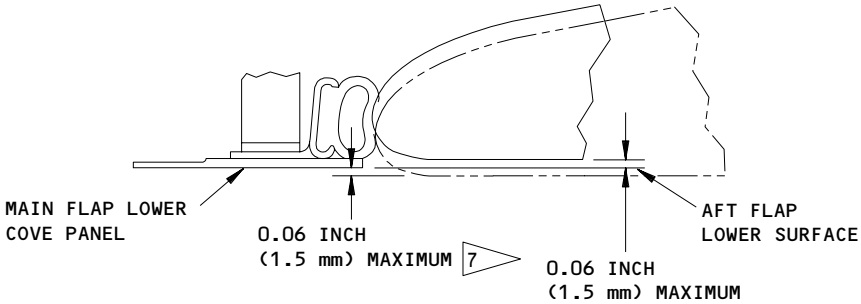
AFT FLAP ADJUSTMENT
(SEAL RETAINER ADJUSTMENT)

H



AFT FLAP ADJUSTMENT
(VERTICAL ADJUSTMENT)

I



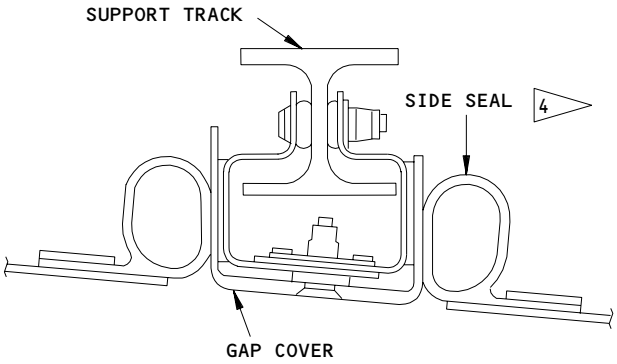
AFT FLAP ADJUSTMENT
(BOTTOM SURFACE ALIGNMENT)

J

6 SEE TABLE 1.
7 SEE TABLE 2.
8 SEE TABLE 3.
9 SEE TABLE 4.

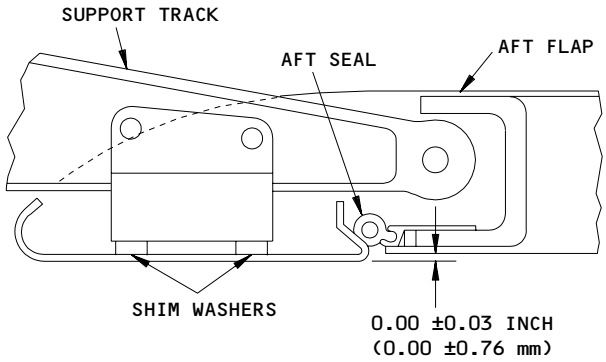
Outboard Aft Flaps Adjustment
Figure 501 (Sheet 2)

23911



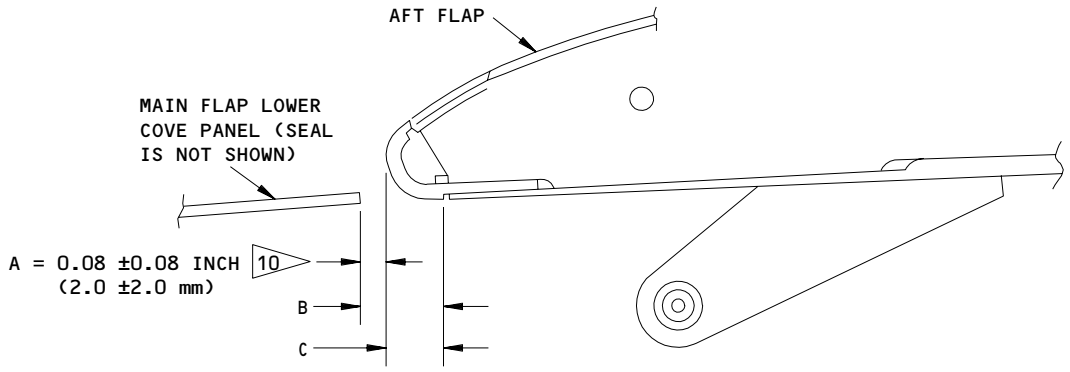
AFT FLAP ADJUSTMENT
(GAP COVER SEALS)

K



AFT FLAP ADJUSTMENT
(GAP COVER ADJUSTMENT)

L



COVE PANEL CLEARANCE

M

10 THE CLEARANCE APPLIES TO THE FULL LENGTH OF THE AFT FLAP.

Outboard Aft Flaps Adjustment
Figure 501 (Sheet 3)

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.02 (-0.508)	0.20 (5.080)	-0.20 (-5.080)
ON GEAR + ENGINES	-0.01 (-0.254)	0.15 (3.810)	-0.20 (-5.080)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.03 (-0.762)	0.06 (1.524)	-0.15 (-3.810)

NOTE: NEGATIVE DIMENSION INDICATES THE MAIN FLAP IS AFT OF THE AFT FLAP.

FORWARD/AFT MISFAIR BETWEEN THE AFT FLAP TRAILING EDGE AND THE MAIN FLAP TRAILING EDGE
TABLE 1

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.02 (0.508)	0.08 (2.032)	-0.12 (-3.048)
ON GEAR + ENGINES	-0.02 (0.508)	0.08 (2.032)	-0.12 (-3.048)
ON GEAR + ENGINES + 3000 LBS FUEL	0.01 (0.254)	0.11 (2.794)	-0.12 (-3.048)

NOTE: NEGATIVE MEASUREMENT INDICATES MAIN FLAP IS BELOW AFT FLAP.

VERTICAL MISMATCH BETWEEN THE AFT FLAP LOWER SURFACE AND THE MAIN FLAP LOWER SURFACE
TABLE 2

CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	0.07 (1.778)	0.19 (4.826)	0.02 (0.508)
ON GEAR + ENGINES	0.07 (1.778)	0.16 (4.064)	0.02 (0.508)
ON GEAR + ENGINES + 3000 LBS FUEL	0.05 (1.270)	0.19 (4.826)	0.01 (0.254)

NOTE: THE PANEL SHOULD ALWAYS BE RIGGED TO PROVIDE A MINIMUM GAP OF 0.005 INCH (0.127 mm) ALONG PANEL LENGTH.

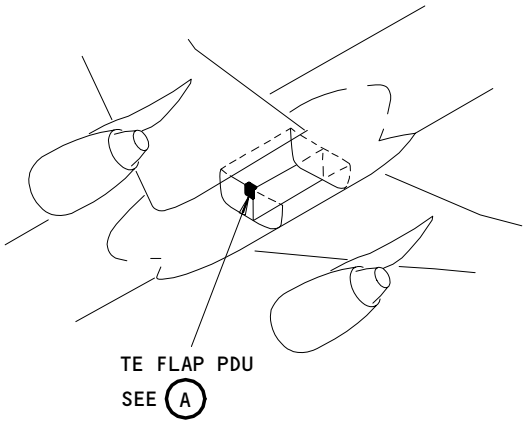
GAP BETWEEN THE AFT FLAP UPPER SURFACE AND THE MAIN FLAP UPPER SURFACE
TABLE 3

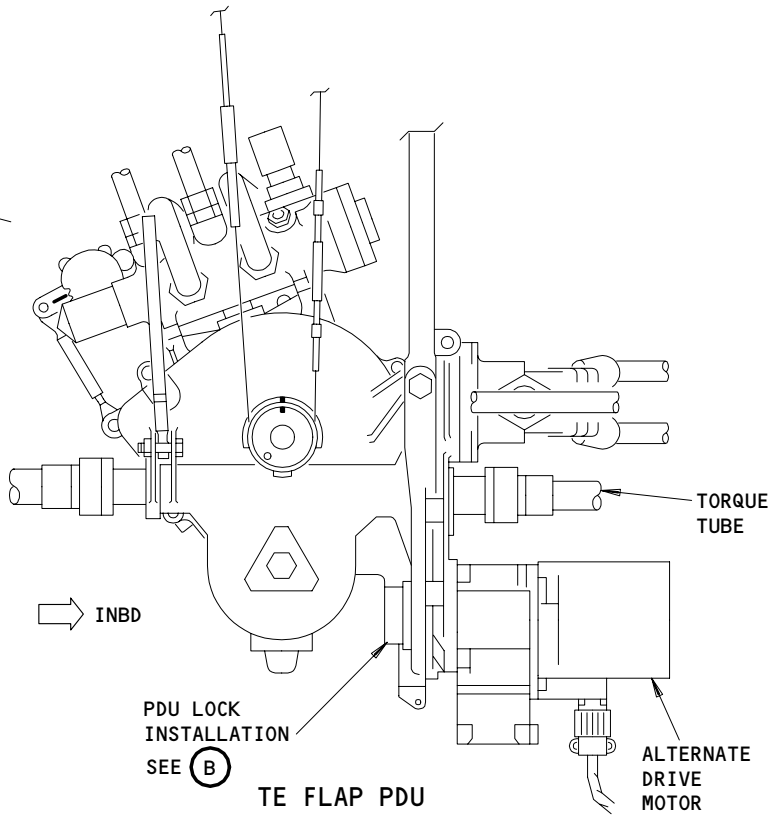
CONFIGURATION	AVERAGE INCHES (mm)	MAXIMUM INCHES (mm)	MINIMUM INCHES (mm)
ON JACKS + ENGINES	-0.01 (-0.254)	0.10 (2.540)	-0.13 (-3.302)
ON GEAR + ENGINES	0.01 (0.254)	0.16 (4.064)	-0.11 (-2.794)
ON GEAR + ENGINES + 3000 LBS FUEL	-0.04 (-1.016)	0.10 (2.540)	-0.15 (-3.810)

NOTE: NEGATIVE MEASUREMENT INDICATES AFT FLAP TE IS BELOW MAIN FLAP TE.

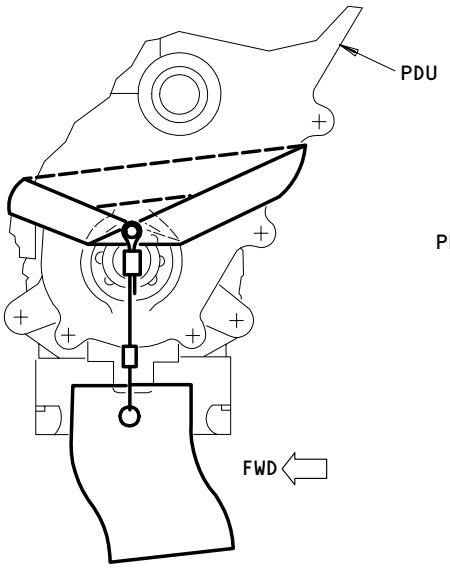
VERTICAL MISMATCH BETWEEN THE TRAILING EDGE OF THE AFT FLAP AND THE TRAILING EDGE OF THE MAIN FLAP
TABLE 4

Outboard Aft Flap
Figure 501 (Sheet 4)

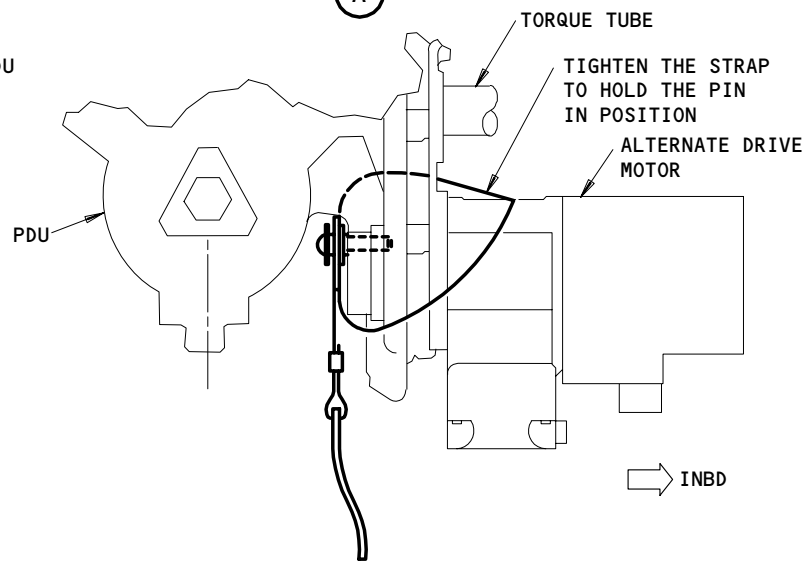




TE FLAP PDU
(AFT VIEW)
(A)



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
(B)



PDU LOCK INSTALLATION
(AFT VIEW)
(B)

PDU Lock for the TE Flap PDU
Figure 502

S 495-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 215-004
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 015-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 865-006
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 865-007
(6) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 865-008
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 495-009
(8) Install a PDU lock in the TE flap PDU (Fig. 502).

S 015-010
(9) Remove the fairings for the aft flap tracks (Ref 27-51-31).

E. Adjust the Aft Flap (Fig. 501)

S 825-011
(1) Do these steps to adjust the blade seals:
(a) Adjust the inboard blade seal to get a clearance of 0.15 inch (3.81 mm) between the blade seal and the aft flap.
(b) Adjust the outboard blade seal to get a clearance of 0.25 inch (6.35 mm) between the blade seal and the aft flap.

S 035-012
(2) Disconnect the two lower pushrods at the transmission fittings.

S 865-013
(3) Manually move the aft flap through its full range of travel to make sure the components do not bind or rub on adjacent parts.

S 825-014
(4) Push each center support track in the inboard direction to touch the rub strip on the support rib.

S 225-015
(5) Make sure the clearance between the aft flap stops and the middle of the support track is 0.03 inch minimum (0.76 mm) (through the full range of the aft flap travel).

S 835-016
(6) Install rig pins TE4 and TE5 in the bellcranks for the aft flap drive.

S 435-017
(7) If you install the aft flap, connect the upper pushrods.

S 825-018
(8) Do these steps to adjust the length of the upper pushrods to align the aft flap:
   (a) Make sure the trailing edge of the aft flap is aligned to +/- 0.25 inch (+/- 6.35 mm).
   (b) Make sure the clearance between the aft flap and the lower cove panel for the main flap (Dimension A) is between 0.00 and 0.16 inch.
   (c) Do these steps to examine the Dimension A:

      NOTE: Make sure you read the Dimensions A, B, and C at the same locations along the span of the aft flap.

      1) Remove rig pins TE4 and TE5 and manually extend the aft flap.
      2) Measure the Dimension C.
      3) Push the aft flap in the forward direction to the retracted position and install rig pins TE4 and TE5.
      4) Measure the Dimension B.
      5) Use the equation that follows to find dimension A:

         Dimension B - Dimension C = Dimension A

   (d) Remove rig pins TE4 and TE5.
      1) Make sure the aft flap can move in the forward direction a minimum of 0.12 inch (3.0 mm) at the inboard track before it touches the support ribs.
      2) Make sure the aft flap can move in the forward direction a minimum of 0.10 inch (2.54 mm) at the outboard track before it touches the support ribs.

(e) If it is necessary, adjust the pushrods to make sure the adjustment requirements are made.
(f) Safety the nuts at the ends of the pushrods with a wire.

S 835-019
(9) Install rig pins TE4 and TE5.

S 825-020
(10) Push the trailing edge of the aft flap up until the support tracks touch the rollers.

S 825-021
(11) Turn the eccentrics at the end of the flap to adjust the position of the trailing edge of the aft flap.
(a) The trailing edge of the aft flap must align with the trailing edge of the main flap to no more than 0.10 inch (2.5 mm) over the full span of the aft flap.

S 225-022
(12) Make sure the clearance between the aft flap and the upper cove panel for the main flap is between 0.005 and 0.100 inch (0.127-2.54 mm).

S 225-023
(13) Make sure the surface of the lower cove panel of the main flap aligns with the lower surface of the aft flap to no more than 0.06 inch.

S 935-024
(14) Make a line on the lower surface of the aft flap 2.0 inches (50.8 mm) in the aft direction from the leading edge (Line A).

S 935-025
(15) Make a line 2.48 inches (63 mm) forward of line A on the lower cove panel of the main flap (Line B).

S 865-026
(16) Remove rig pins TE4 and TE5 and move the aft flap away from the seal.

S 825-027
(17) Adjust the seal retainer until the aft edge of the seal retainer is along Line B.

S 825-028
(18) Adjust the seals at the support ribs for the aft flap track to align with the main seals.

S 865-029
(19) Move the aft flap in the forward direction and install the rig pins.

S 215-030
(20) Make sure the aft flap touches the seals along the full length of the aft flap.

S 825-031
(21) Adjust the gap covers for the aft flap (with shims) to make sure the lower surface of the gap covers aligns with the lower surface of the aft flap (+/- 0.03 inch (+/- 0.76 mm)).

S 825-032
(22) Adjust the aft seals to touch the gap covers.

S 825-033
(23) Adjust the side seals to get a seal compression of 0.12 ± 0.05 inch (3.04 +/- 1.2 mm) at the inboard center track and 0.25 ± 0.10 inch (6.35 +/- 2.5 mm) at the other tracks.

S 435-034
(24) With rig pins TE4 and TE5 installed and the TE flaps in the up position, attach the lower pushrods to the transmission fittings.

S 095-035
(25) Remove rig pins TE4 and TE5 from the bellcranks.

S 705-036
(26) Do a test on the aft flap in the Test of the Aft Flap Installation.

TASK 27-51-22-705-037

3. Test of the Aft Flap Installation

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-31/201, Outboard TE Flap Track Fairings
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Locks

B. Access
(1) Location Zones

211/212	Control Cabin
567/667	Outboard Aft Flap
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

C. Test of the Aft Flap Installation

S 095-038
(1) Remove the PDU lock from the TE flap PDU (Fig. 502).

S 215-039

(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 095-040

(3) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-041

(4) Remove DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (d) 11J18, FLAP LOAD RELIEF
   (e) 11J33, WARN ELEX A

S 865-042

(5) Remove DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 865-043

(6) Supply electrical power (Ref 24-22-00).

S 865-044

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

S 215-045

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(8) Move the TE flaps from the fully retracted to the fully extended positions, and stop in each detent to make sure you correctly installed the aft flap:
(a) Make sure the aft flap moves to the correct positions.
(b) Make sure the linkages do not bind or rub on other parts.

S 865-052

(9) Move the flap control lever to the zero (FLAPS UP) detent and let the TE flaps move to the fully retracted position.

S 215-046

(10) Make sure all of the seals keep their adjusted positions when the TE flaps retract.

D. Put the Airplane Back to Its Usual Condition

S 415-048

(1) Install the fairings for the aft flap tracks (Ref 27-51-31).

S 415-049

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks for the landing gear and close the doors (Ref 32-00-15).

S 865-050

(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 865-051

(4) Remove the electrical power if it is not necessary (Ref 24-22-00).

OUTBOARD TRAILING EDGE FLAP AFT FLAP LINKAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the linkage for the aft flap of the outbord trailing edge (TE) flap. The second task installs the linkage.

TASK 27-51-23-024-001

2. Remove the Aft Flap Linkage for the Outboard TE Flap
   A. Equipment
      (1) TE Flap PDU Lock- B27008-1
   B. References
      (1) 20-10-24/201, Rig Pins
      (2) 27-51-31/201, Outboard TE Flap Track Fairing
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 214-002
(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

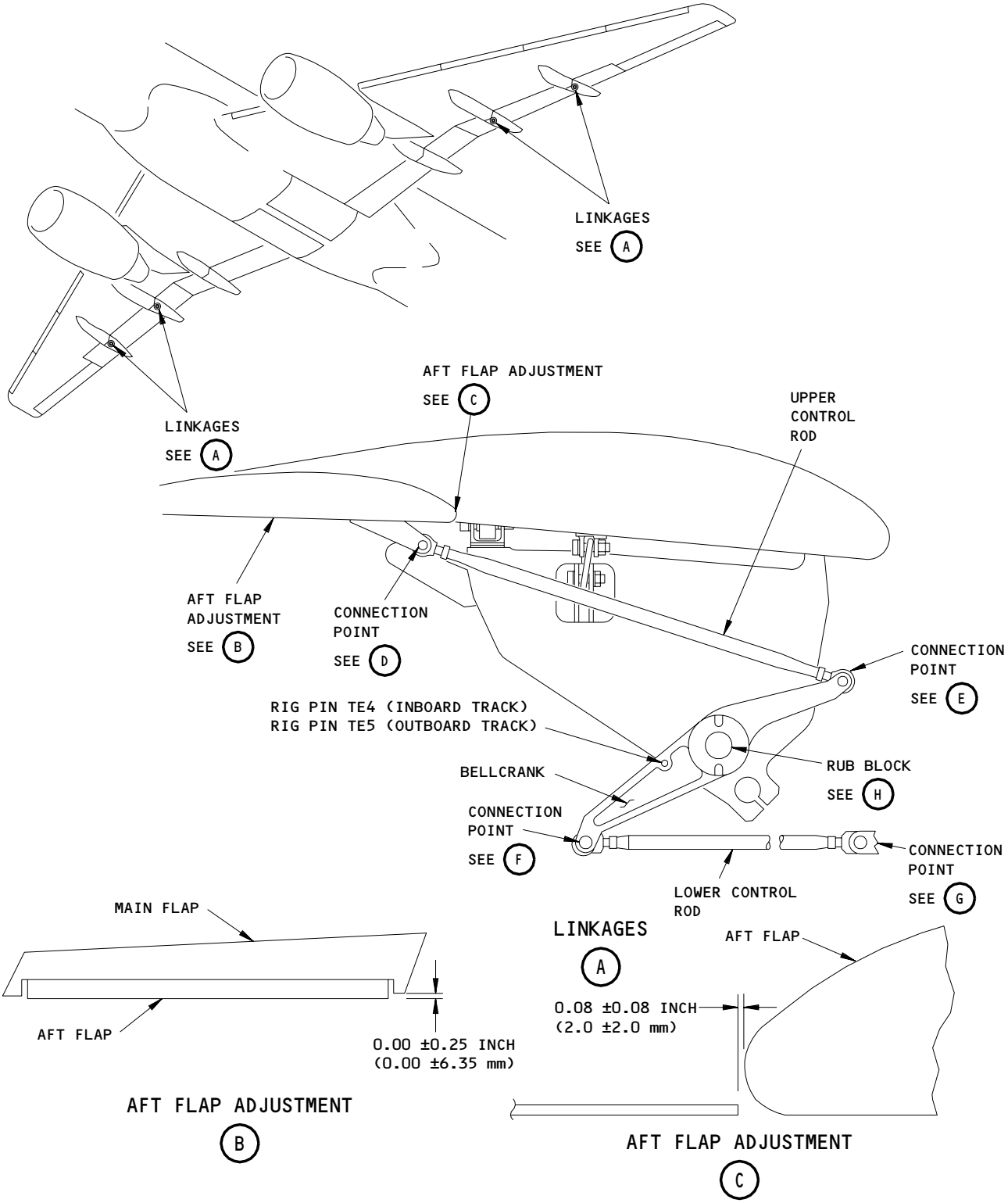
S 214-004
(3) Make sure that the downlocks are installed on the nose and main gears (AMM 32-00-20/201).

S 014-005

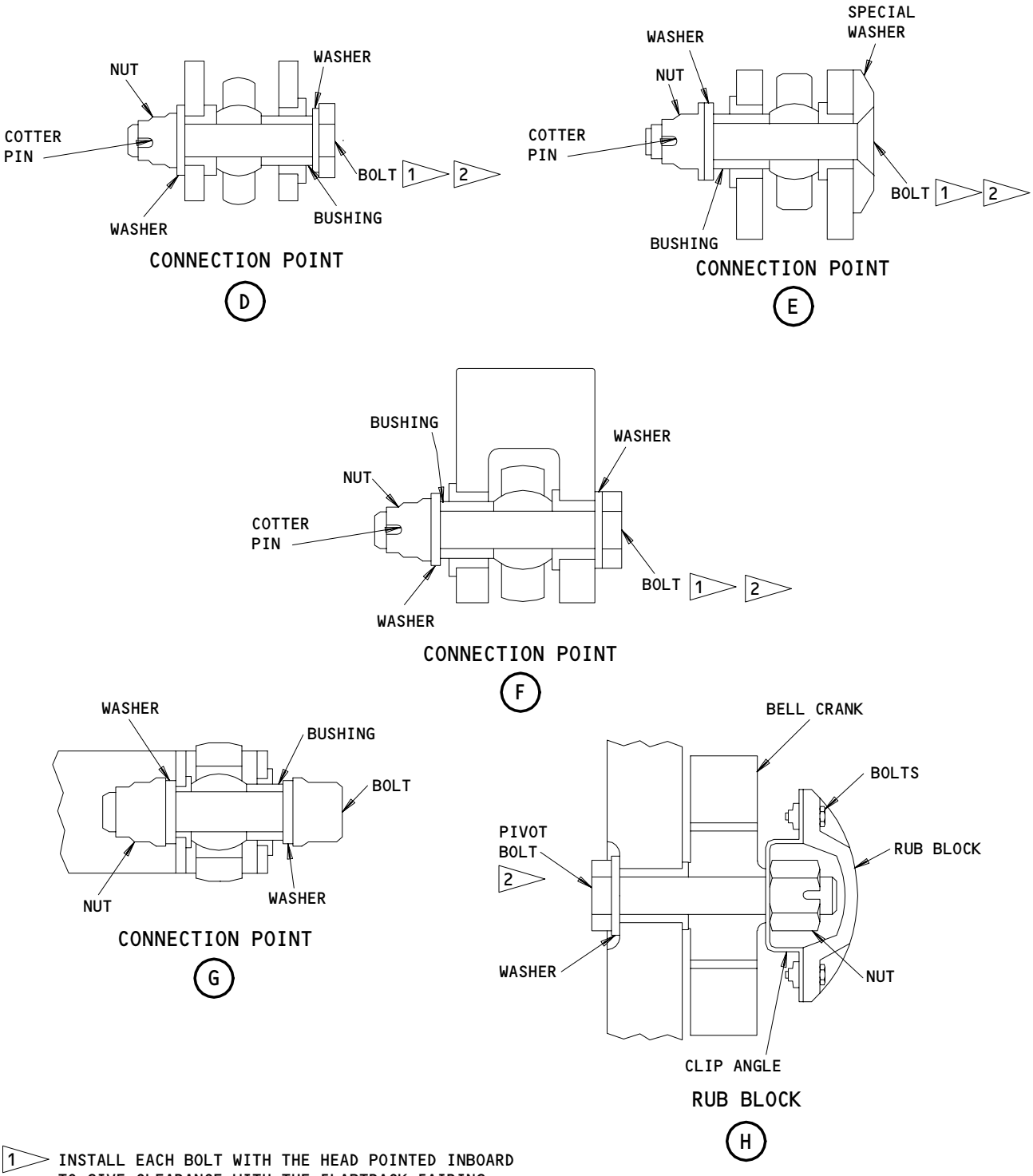
WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006
(5) Remove the power from the left hydraulic system (Ref 29-11-00).



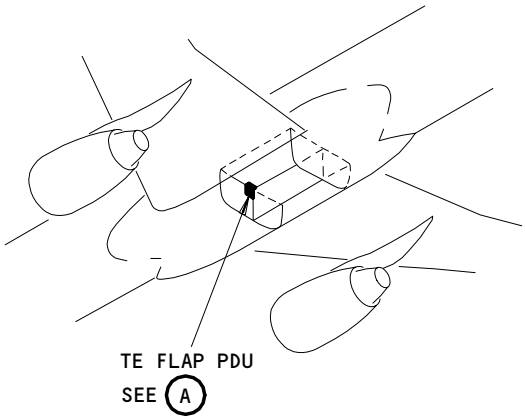
Aft Flap Linkages of the Outboard Flap
Figure 401 (Sheet 1)

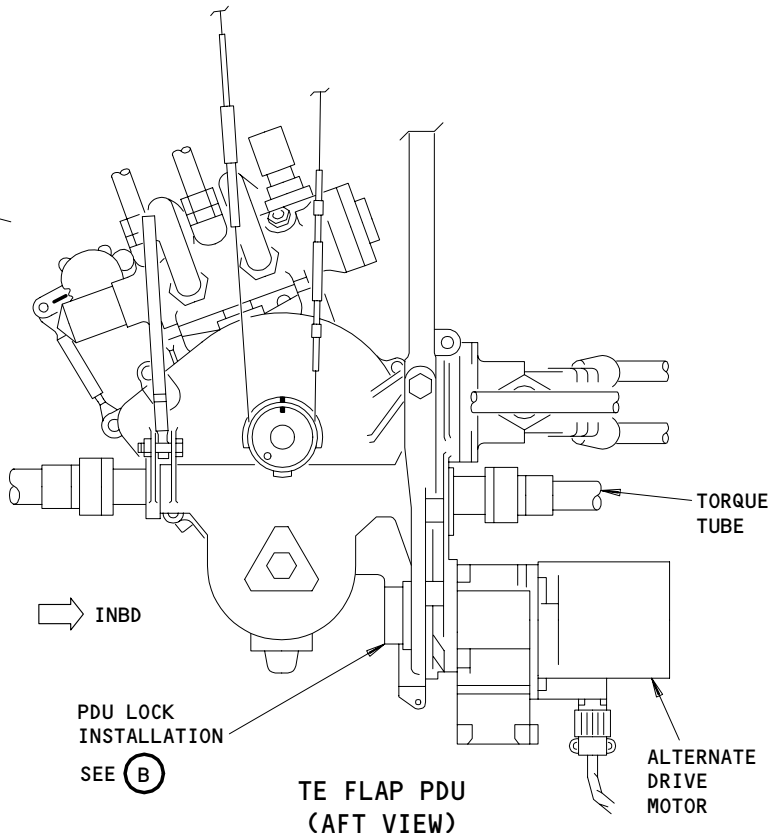


1 INSTALL EACH BOLT WITH THE HEAD POINTED INBOARD TO GIVE CLEARANCE WITH THE FLAPTRACK FAIRING

2 APPLY GREASE TO THE BOLT AND THE BUSHING SURFACES. REMOVE ALL THE GREASE COMPLETELY FROM THE BOLT THREADS

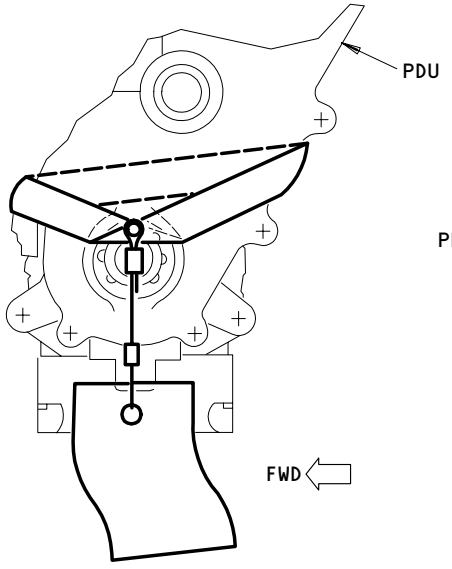
Aft Flap Linkages of the Outboard Flap
Figure 401 (Sheet 2)





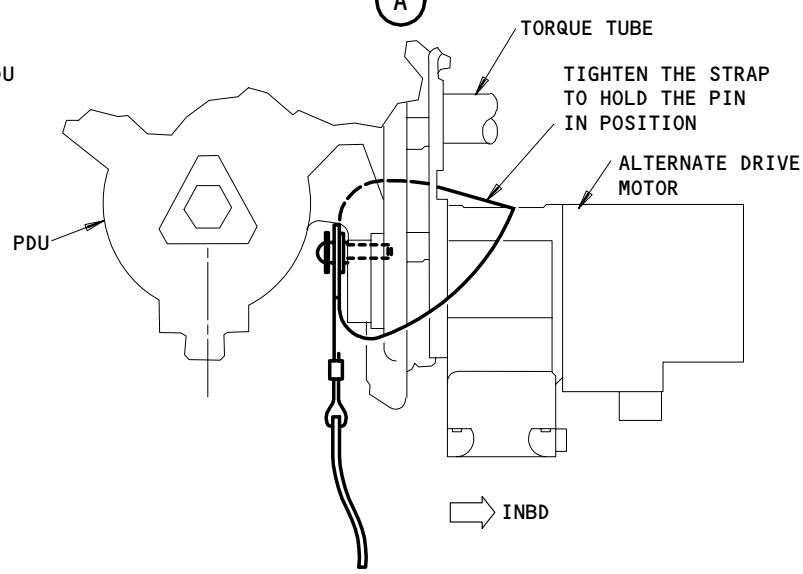
TE FLAP PDU
(AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 402

S 864-007
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-008
(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-009
(8) Install a PDU lock on the TE flap PDU (Fig. 402).

E. Remove the Aft Flap Linkage

S 014-010
(1) Remove the aft part of the TE flap fairing (AMM 27-51-31/201).

S 494-011
(2) Use a support to hold the aft flap in its position and prevent movement.

S 034-012
(3) Remove the bolts at each end of the upper and lower pushrods.

S 024-013
(4) Remove the pushrods.

S 034-014
(5) Remove the two bolts that attach the rub block to the bellcrank.

S 024-015
(6) Remove the rub block.

S 034-016
(7) Remove the nut and the bolt at the bellcrank pivot location.

S 024-017

(8) Remove the bellcrank.

TASK 27-51-23-424-018

3. Install the Aft Flap Linkage for the Outboard TE Flap

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):

(a) TE4 - P/N B20003-4

(b) TE5 - P/N B20003-4

B. Consumable Materials

(1) D00015 Grease - BMS 3-24 (Alternate)

(2) D00633 Grease - BMS 3-33 (Recommended)

C. References

(1) 20-10-24/201, Rig Pins

(2) 24-22-00/201, Electrical Power - Control

(3) 27-51-23/601, Outboard TE Flap Aft Flap

(4) 27-51-31/201, Outboard TE Flap Track Fairing

(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(6) 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
573/673	Outboard Flap Inboard Fairing
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Aft Flap Linkage

NOTE: The wear limits for these components are given in AMM 27-51-23/601.

S 424-019

(1) Do these steps to install the bellcrank and the rub block (Fig. 401):

(a) Put the bellcrank in the correct position.

(b) Attach the clip angle and the bellcrank to the flap carriage with a bolt.
(c) Tighten the nut to 1000-1200 pound-inches (113-135 Nm).
(d) Attach the rub-block to the clip angle with two bolts.

S 424-020
(2) Do these steps to install the upper and lower pushrods (Fig. 401):
(a) Install the rig pins TE4 and TE5 in the inboard and the outboard bellcranks.
(b) Attach the upper pushrod at each end with a bolt.
(c) Tighten the nut to 65-80 pound-inches (7.4-9.0 Nm).
(d) Adjust the length of the upper pushrod to give these conditions:
1) The correct clearance between the main flap and the aft flap (View B)
2) The correct clearance between the lower cover panel of the main flap and the leading edge of the aft flap (View C)
(e) Remove the rig pins TE4 and TE5.
(f) Move the aft flap in the forward direction and do this check:
1) Make sure the aft flap can move a minimum of 0.12 inch (3.0 mm) at the inboard track and 0.10 inch (2.5 mm) at the outboard track before it touches the support ribs.
(g) Lock the nuts at each end of the pushrod with a wire.
(h) Install the rig pins TE4 and TE5.
(i) Attach the lower pushrod at each end with a bolt.
(j) Tighten the nut to 220-280 pound-inches (24.9-31.6 Nm).
(k) Lock the nuts at each end of the pushrod with a wire.
(l) Remove the rig pins TE4 and TE5.

F. Operational Test for the Linkage Installation

S 094-021
(1) Remove the PDU lock from the TE flap PDU.

S 864-022
(2) Remove DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B

(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-023
(3) Remove DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-024
(4) Supply electrical power (Ref 24-22-00).

S 094-025
(5) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-026

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-027

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS TO MAKE SURE THE COMPONENTS MOVE FREELY. THIS WILL PREVENT DAMAGE ON THE COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(7) Move the flaps between the fully retracted and the fully extended positions.

S 214-028
(8) Make sure the aft flap linkages are correctly installed:
(a) Make sure the aft flap moves to the correct positions.
(b) Make sure the linkages move freely and do not rub on the adjacent parts.

S 864-029
(9) To complete the test, put the flaps in the fully retracted position.

G. Put the Airplane Back to Its Usual Condition

S 414-030
(1) Install the TE flap fairings (AMM 27-51-31/201).

S 414-031

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOORS LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-032

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-033

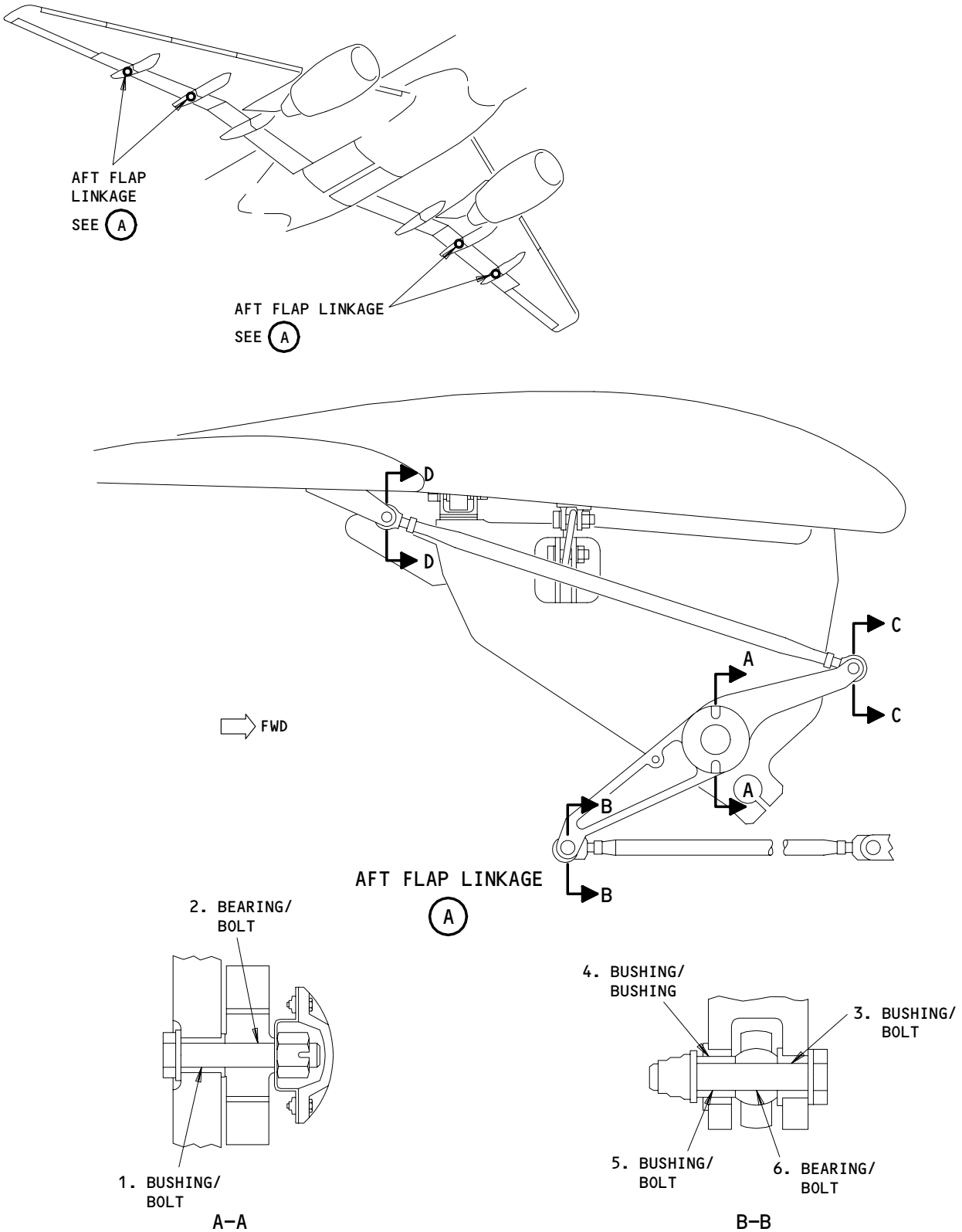
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

OUTBOARD TRAILING EDGE FLAP AFT FLAP LINKAGES - INSPECTION/CHECK

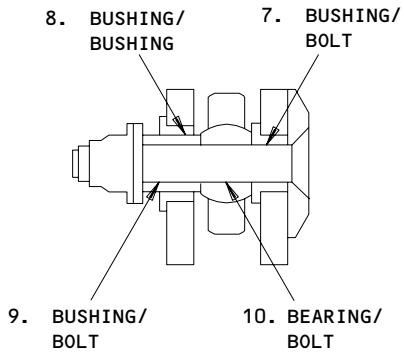
1. General
   A. This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacement of components that you will examine for wear. Refer to the Aft Flap Linkage, Outboard Flap - Inspection/Check to remove or replace these components.

   TASK 27-51-23-226-001

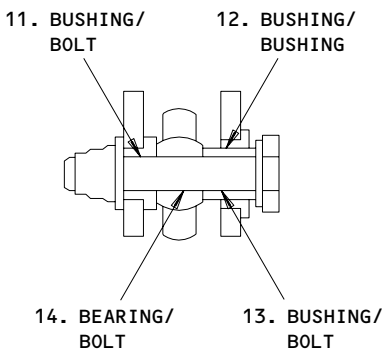
2. Wear Limits for the Aft Flap Linkages, Outboard Flaps (Fig. 601)
   A. General
      (1) This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacement of components that you will examine for wear. Refer to the Aft Flap Linkage, Outboard Flap - Inspection/Check to remove or replace these components.



Wear Limits for the Aft Flap Linkages, Outboard Flaps
Figure 601 (Sheet 1)



C–C



D–D

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.6245 (15.862)	0.6252 (15.880)	0.6290 (15.977)	0.0050 (0.127)	X		
	BOLT	OD	0.6235 (15.837)	0.6240 (15.850)	0.6202 (15.753)		X		
2	BEARING	ID	0.6625 (16.826)	0.6250 (15.875)	0.6290 (15.977)	0.0050 (0.127)	X		
	BOLT	OD	0.6235 (15.837)	0.6240 (15.850)	0.6200 (15.748)		X		
3	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3706 (9.413)		X		
4	BUSHING	ID	0.5620 (14.275)	0.5627 (14.293)	0.5665 (14.389)	0.0050 (0.127)	X		
	BUSHING	OD	0.5610 (14.249)	0.5615 (14.262)	0.5577 (14.166)		X		
5	BUSHING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3705 (9.411)		X		
6	BEARING	ID	0.3750 (9.525)	0.3755 (9.538)	0.3795 (9.639)	0.0050 (0.127)	X		
	BOLT	OD	0.3735 (9.487)	0.3745 (9.512)	0.3705 (9.411)		X		

Wear Limits for the Aft Flap Linkage, Outboard Flaps
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
7	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		
8	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3795 (9.639)	0.0050 (0.127)	X		
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3706 (9.413)		X		
9	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		
10	BEARING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		
11	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		
12	BUSHING	ID	0.3750 (9.525)	0.3756 (9.540)	0.3795 (9.639)	0.0050 (0.127)	X		
	BUSHING	OD	0.3740 (9.500)	0.3745 (9.512)	0.3706 (9.413)		X		
13	BUSHING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		
14	BEARING	ID	0.2500 (6.350)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)	X		
	BOLT	OD	0.2490 (6.325)	0.2495 (6.337)	0.2455 (6.236)		X		

Wear Limits for the Aft Flap Linkage, Outboard Flaps
Figure 601 (Sheet 3)

LEFT HYDRAULIC SYSTEM PRESSURE SENSITIVE FLOW LIMITER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains three tasks. The first task removes the flow limiter for the left hydraulic system. The second task installs the flow limiter. The third task tests the flow limiter.

TASK 27-51-24-024-001

2. Remove the Pressure-Sensitive Flow Limiter for the Left Hydaulic System
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   C. Prepare for the Removal

      S 214-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-004
      (3) Remove the pressure from the left hydraulic system and the hydraulic reservoirs (AMM 29-11-00/201).
   D. Remove the Flow Limiter (Fig. 401)

      S 024-005
      (1) Do these steps to remove the flow limiter:
         (a) Disconnect the hydraulic lines.

(b) Install caps on the hydraulic lines and plugs in the flow limiter ports.

NOTE: The flow limiter is found on the keel beam (inboard bulkhead) of the left wheel well for the landing gear (immediately above and forward of the hydraulic motor-driven generator).

(c) Remove the bolts that attach the flow limiter to the bracket (3 locations).
(d) Remove the flow limiter.

TASK 27-51-24-424-006

3. Install the Pressure-Sensitive Flow Limiter for the Left Hydraulic System

A. Access

(1) Location Zones

143 MLG Wheel Well (Left)

B. Install the Flow Limiter (Fig. 401)

S 424-007

(1) Do these steps to install the flow limiter:
(a) Align the flow limiter with the attach points.
(b) Install the bolts and washers.
(c) Connect the hydraulic lines to the flow limiter.

S 114-035

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(2) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 714-008

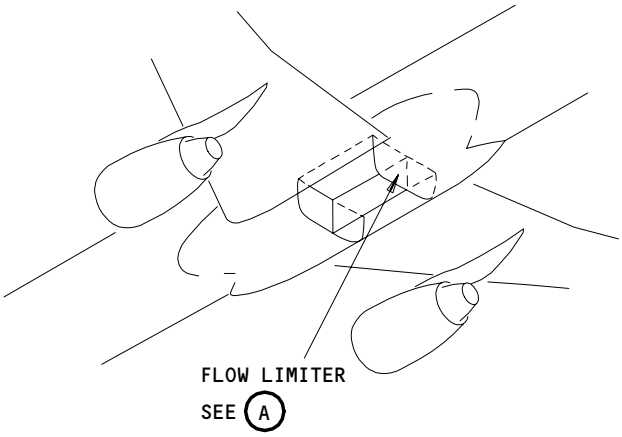
(3) Do a test on the flow limiter installation in the Operational Test for the Flow Limiter.

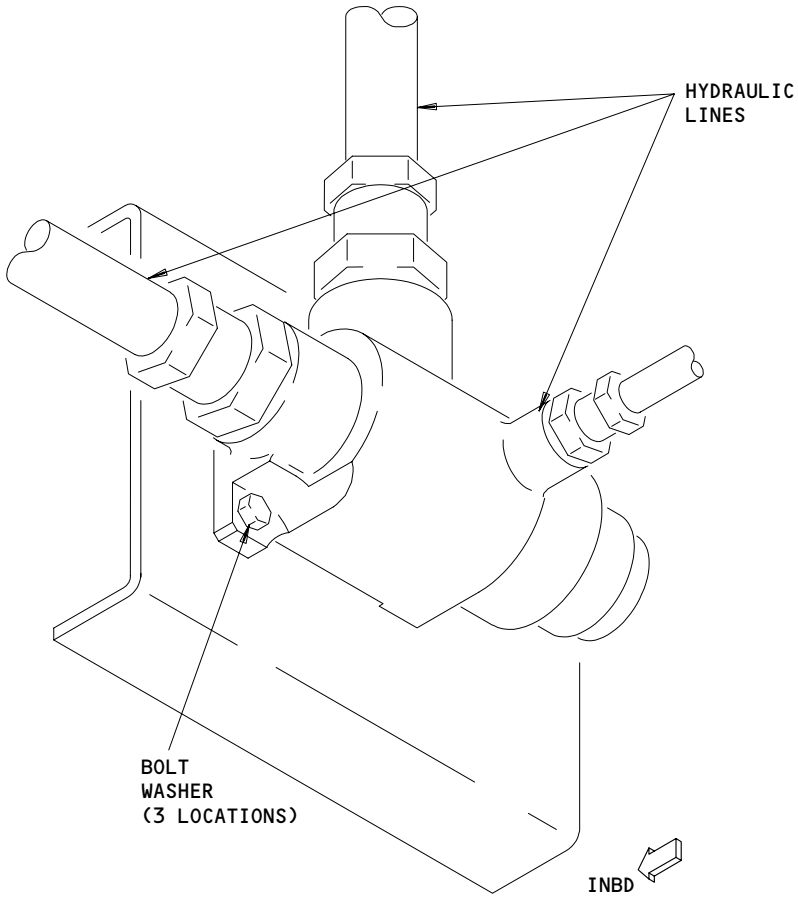
TASK 27-51-24-714-028

4. Operational Test for the Flow Limiter for the Left Hydraulic System

A. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks





FLOW LIMITER

(A)

Flow Limiter Installation
Figure 401

(5) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

(1) Location Zones

143	MLG Wheel Well (Left)
193	Wing to Body Fairings
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panel

193BL	Leading Edge Slat PDU

C. Test of the Flow Limiter

S 214-031

(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 864-018

(2) Supply electrical power (AMM 24-22-00/201).

S 214-019

(3) Make sure that all airplane controls are in the neutral position.

S 214-020

(4) Make sure the TE flaps are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.

S 864-034

(5) Close these circuit breakers:

(a) On the power distribution panel P6:

1) 6C8, HYD GEN 28VDC SENSE
2) 6C3, HYD GEN CONT

(b) On the overhead panel P11:

1) 11K17, HYDRAULICS SYSTEM PRESS-L
2) 11K26, HYDRAULICS SYSTEM PRESS-R
3) 11K20, HYDRAULICS QTY L
4) 11K21, HYDRAULICS QTY R
5) 11D31, HYDRAULIC PTU CONT
6) 11R6, AC BUS SENSE L
7) 11R29, AC BUS SENSE R

(c) On the P71-00 panel:

1) HMG INST XFR BUS
2) HMG L XFR BUS
3) HMG R XFR BUS
4) HMG BAT CHGR
5) HYD GEN AC VOLT SENSE

(d) Fill the HMG accumulator with dry nitrogen to a specified pressure as shown on the placard.

NOTE: On airplanes with Vickers 10 KVA HMG, the placard is on the central hydraulics bay door which is adjacent to the accumulator charging point.

On airplanes with Abex 5 KVA HMG, the placard is on the aft keel beam of the left wheel well.

(e) Make sure all the hydraulic system pressures are zero psig.
(f) Make sure the EICAS Maintenance Page HYD QTY shows 0.75 or more for the left and right system reservoirs.
(g) Pressurize the right hydraulic system with the right engine-driven pump or a hydraulic ground cart (AMM 29-11-00/201).
(h) Move the PTU manual control switch S1 which is on the P5 Pilot's overhead panel (or S7 on the P61 right side panel as applicable) to the ON position.
1) Make sure that the PTU operates.
2) Make sure the EICAS Maintenance Page shows 2600 psig or more for the left hydraulic system.
(i) Move the GRD PROX/HYD GEN switch on the miscellaneous test panel M10398 to the HYD GEN position and hold it in its position.
1) Make sure that the EICAS Maintenance Message HYD GEN DC-V shows between 24 and 32 volts.
2) Make sure that the EICAS Maintenance Message HYD GEN AC-V shows between 113 and 123 volts.
3) Make sure that the EICAS Maintenance Message HYD GEN FREQ shows between 395 and 405 Hz.
(j) Move the flap control lever on the flight deck control stand to the 5 degree position.
1) Make sure that the left system hydraulic pressure stays between 2300 and 2825 psig during the movement of the flaps and slats.
2) Make sure that the HMG does not stop before the flaps are extended to the 5 degree position.
(k) Move the flap control lever to the zero (flap up) position.
1) Make sure that the left system hydraulic pressure stays between 2300 and 2825 psig during the movement of the flap.
2) Make sure the HMG does not stop before the flaps and slats are in the fully retracted position.
(l) Release the GRD PROX/HYD GEN switch.
(m) Move the PTU manual control switch S1 on the P5 panel or S7 on the P61 panel (as applicable) to the OFF position.

S 214-021
(6) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 214-022
(7) Make sure the control switch for the L YAW DAMPER on the overhead panel, P5, is in the INOP position.

S 214-023
(8) Make sure the control lever for the landing gear on the pilot's main instrument panel, P1, is in the OFF position.

S 864-024
(9) Push the EXT PWR switch on the overhead panel, P5, to supply 115 VAC 3-phase ground power.

S 864-025
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11C17, FLAP SLAT SHUTOFF 1
(b) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 014-026
(11) Open the access panel, 193BL (AMM 06-41-00/201).

S 864-027
(12) Move the manual override lever for the bypass valve of the LE slat system to position 1 (BYPASS).

S 714-010
(13) If you use a hydraulic cart to pressurize the left hydraulic system, do these steps to do a test on the flow limiter installation:

WARNING: KEEP PERSONS AND EUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRUALIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRUALIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(a) Pressurize the left hydraulic system (use the hydraulic service cart) (AMM 29-11-00/201).
(b) Operate the hydraulic service cart to 3000 psig with full flow capacity.

S 014-032

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(14) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
  (a) Move the flap control lever to the 30-unit detent.
    1) Make sure the flaps move to the fully extended position in less than 35 seconds.
  (b) Move the flap control lever to the zero (FLAPS UP) detent.
    1) Let the flaps move to the fully retracted position.
  (c) Decrease the hydraulic pressure to 1500 ± 100 psig.
    1) Operate the hydraulic service cart at full flow capacity.
  (d) Move the flap control lever to the 30-unit detent.
    1) Make sure the flaps move to the fully extended position in more than 70 seconds.
  (e) Move the flap control lever to the zero (FLAPS UP) detent.
    1) Let the flaps move to the fully retracted position.
  (f) Make sure there are no leaks at the hydraulic connections to the flow limiter.
  (g) Put the hydraulic pressure back to 3000 psig.

S 714-029

(15) If you use engine driven pump to pressurize the left hydraulic system, do these steps to do a test on the flow limiter installation:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS / ELEVATORS / RUDDER / FLAPS / SLATS / SPOILERS / AND STABILIZER ARE FULLY POWERED SURFACED. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THAT ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(a) With the left engine operating at ground idle, pressurize the left hydraulic system to 3000 psi (use the left engine-driven pump and the left electric motor-driven pump).

NOTE: The left wing fuel tanks must contain a minimum of 600 gallons of fuel.

S 484-033

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(16) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
  (a) Move the flap control lever to the 30-unit detent.
    1) Make sure the flaps move to the fully extended position in less than 35 seconds.
  (b) Move the flap control lever to the zero (flaps up) detent.
    1) Let the flaps move to the fully retracted position.
  (c) Open the 11D31, HYDRAULIC PTU CONT circuit breaker on the overhead panel, P11.
  (d) Set the L ENG HYD PUMP switch to OFF.

    NOTE: Only the electric motor-driven pump should supply pressure to the left hydraulic system.

  (e) Move the manual override lever for the bypass valve of the LE slat system to position 2 (normal).
  (f) Move the flap control lever to the 1-unit detent.
    1) Make sure the left hydraulic system pressure decreases and stays between 1550 and 2100 psi during flap and slat extension.
  (g) Move the flap control lever to the zero (flaps up) detent.
    1) Let the flaps move to the fully retracted position.
  (h) Make sure there are no leaks at the hydraulic connects to the flow limiter.

D. Put the Airplane Back to Its Usual Condition

S 414-011

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 864-012
(2) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 864-013
(3) Move the manual override lever for the bypass valve of the LE slat system to position 2 (NORMAL).

S 414-014
(4) Close the access panel 193BL (AMM 06-41-00/201).

S 864-015
(5) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11C17, FLAP SLAT SHUTOFF 1
(b) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-016
(6) Push the EXT PWR switch on the overhead panel, P5, to remove the ground power.

S 864-017
(7) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TRAILING EDGE FLAP TORQUE TUBES - MAINTENANCE PRACTICES

1. General
   A. This procedure contains five tasks. The first task removes the torque tubes for the trailing edge (TE) flap. The second task installs the torque tubes. The third task gives instructions for the approved repairs of the torque tubes. The fourth task is an inspection procedure for the torque tube couplings at the Number 3, 4, 5 and 6 angle gearboxes. The fifth task is a removal and installation of the torque tube support bearings.

TASK 27-51-25-022-001

2. Remove the Torque Tubes for the TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Flap Torque Tube Clamps from Set B27055-1:
         (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
         (b) Inboard Flap Torque Tube Clamp - P/N B27055-3
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Down Locks
      (6) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

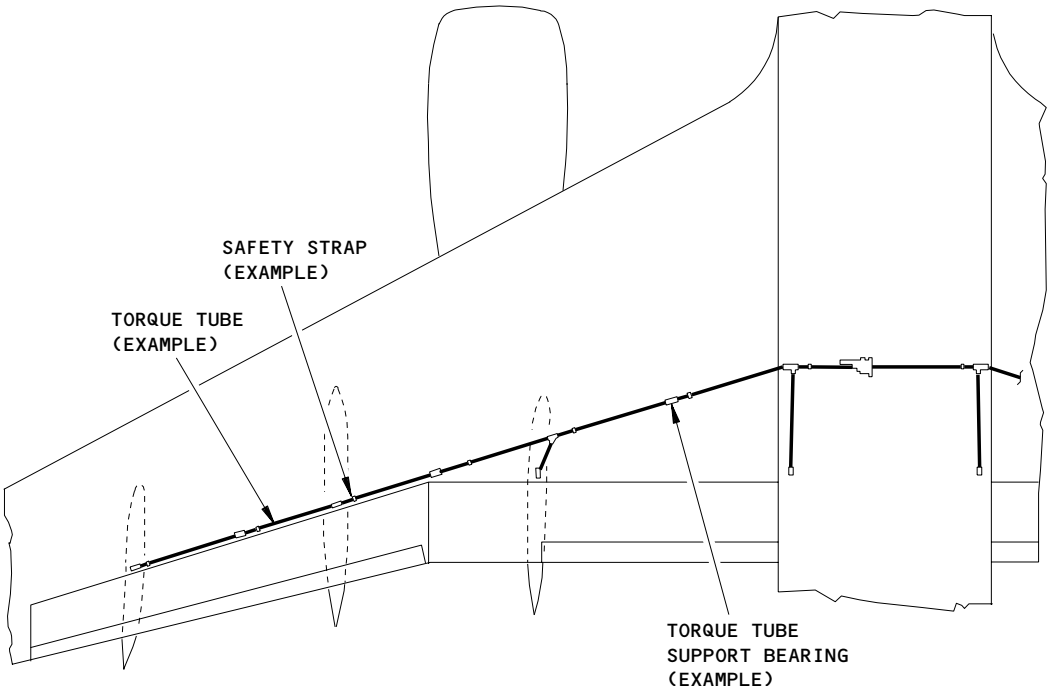
143/144	MLG Wheel Well
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
560/660	Wing Trailing Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

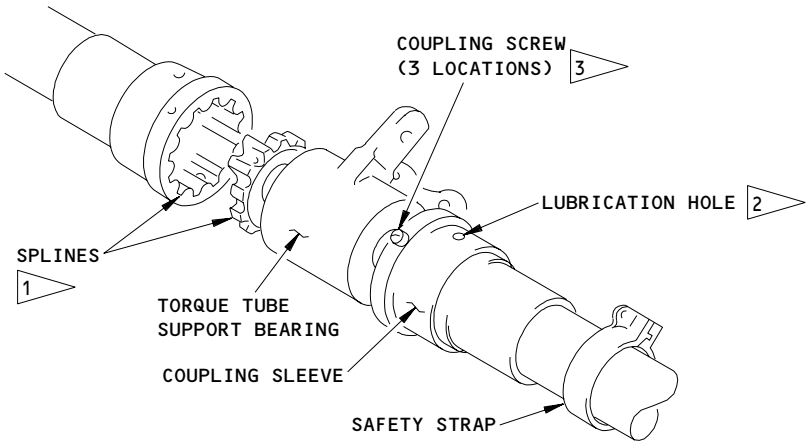
S 042-032

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



TE FLAP TORQUE TUBES



TORQUE TUBE INSTALLATION (EXAMPLE)

1 APPLY GREASE TO THE INTERNAL AND EXTERNAL SPLINES BEFORE YOU ASSEMBLE THE TORQUE TUBES.

2 FILL THE COUPLING WITH GREASE AFTER YOU ASSEMBLE THE TORQUE TUBES.

3 LOCK THE COUPLING SCREWS TOGETHER WITH WIRE AFTER YOU INSTALL THE SCREWS.

Torque Tubes for the TE Flap Drive
Figure 201

S 212-002
(2) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 212-003
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-005
(5) Supply electrical power (AMM 24-22-00/201).

S 862-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-007
(7) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.

S 492-008
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 862-009
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-010
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 862-011
(11) Open these circuit breakers on the main power distribution panel, P6, and install DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 492-012
(12) Install a PDU lock in the TE flap PDU (Fig. 203).

S 012-013
(13) Remove the necessary access panels (Ref 06-44-00).

S 492-014
(14) Use a clamp on the adjacent torque tubes to make sure they can not turn (Fig. 204).

E. Remove the Torque Tubes (Fig. 201)

S 022-015
(1) Do these steps to remove the torque tubes:
(a) Disconnect the safety straps from the structure.
(b) Remove the wire that locks the three screws in their position at each torque tube coupling.
1) Remove the three screws at each torque tube coupling.
(c) Move the sleeve off the splines of the torque tube coupling.
(d) Remove the torque tube.

S 212-026
(2) Examine the torque tube for repair in the Approved Repairs (for the Torque Tubes of the TE Flap System) paragraph.

TASK 27-51-25-422-016

3. Install the Torque Tubes for the TE Flap

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

(5) A00679 Sealant - Corrosion Preventive Chromated, BMS 5-95, Type I or II, Class B

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-30-03, Boeing Standard Overhaul Practices Manual (SOPM)
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-58-01/501, Flap Position Transmitter
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
560/660	Wing Trailing Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Torque Tubes (Fig. 201)

S 392-109
(1) If you replace a -14 or -19 for a new -20 torque tube assembly, do these steps before the installation:
(a) Clean the grease from the inner diameter of the output shaft of both of the gear box assemblies, at the places where the torque tube ends are installed (SOPM 20-30-03)
(b) Put sealant to the inner diameter of the output shafts to make sealant plugs (minimum plug length is 0.50 inch (12.7 mm))
(c) Keep the outer surfaces of the gearbox output shafts and adjacent areas free of sealant.
(d) Make sure that there are no cracks on the outer surface of the sealant plugs
(e) Make sure that the plugs (when dry) are smooth (+0.00 to -0.100 inch) to the surface of the outer diameter of the output shafts

S 422-017
(2) Do these steps to install the torque tubes:
(a) Put the safety straps into the correct position on the torque tube and attach the safety straps to the structure.
(b) Apply grease to the splines of the torque tube coupling.
(c) Put the torque tube in its position.
(d) Move the sleeves of the torque tube coupling on the splines at each end.

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON THE COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(e) Install the screws and safety them with a lockwire.

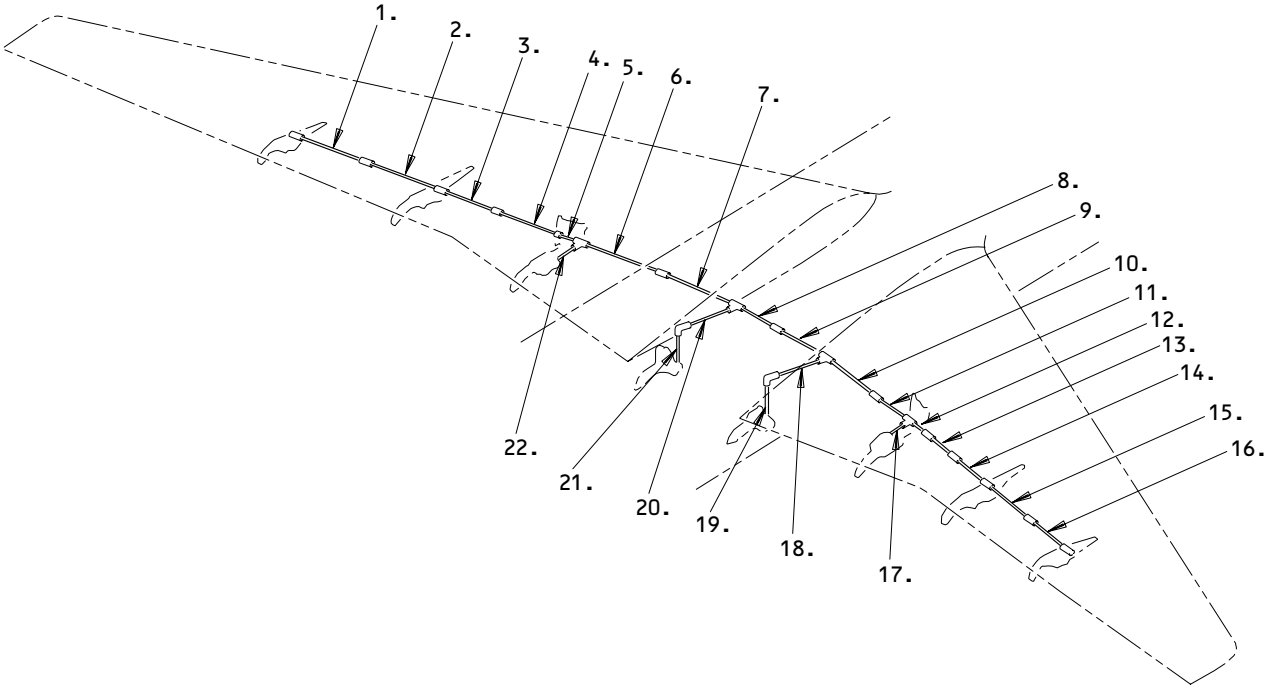
(f) Move the torque tube to one end until it touches the torque tube coupling.
(g) Fill the reservoirs of the torque tube coupling with grease through the lubrication holes (3 locations).
(h) Move the torque tube to the opposite end until it touches the torque tube coupling.
(i) Fill the reservoirs of the torque tube coupling with grease through the lubrication holes (3 locations).
(j) Move the torque tube to the middle position.
(k) Remove the clamps from the adjacent torque tubes.
(l) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 822-018
(3) Adjust the flap position transmitter in the wing where the torque tube was removed and installed (AMM 27-58-01/501).

S 712-106
(4) Do a test on the torque tube installation in the Operational Test for the Torque Tube Installation.

E. Operational Test for the Torque Tube Installation

S 862-034
(1) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B

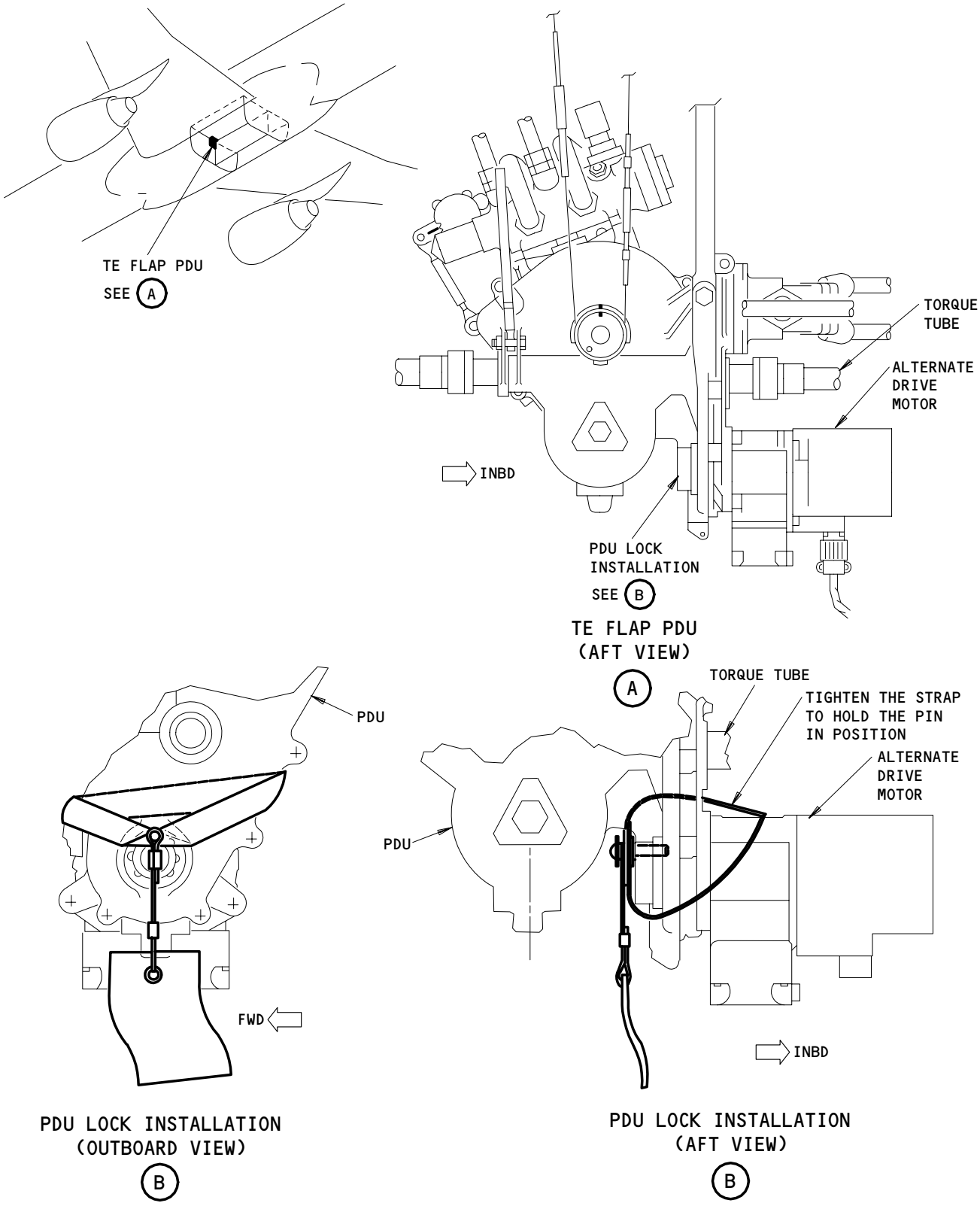


Repair Limits for the Torque Tubes of the TE Flap Drive
Figure 202 (Sheet 1)

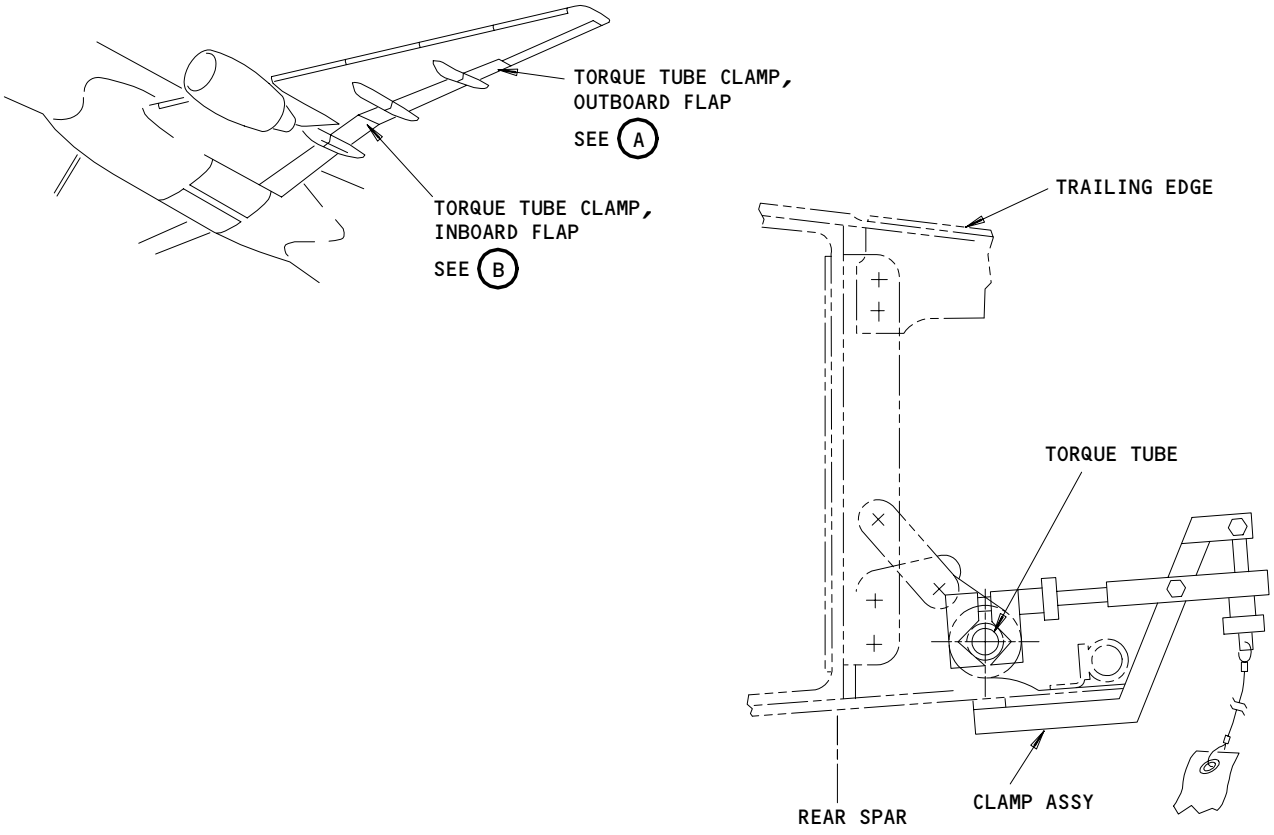
TORQUE TUBE INDEX NO.	MAXIMUM PERMITTED REWORK DEPTH (INCHES) 1	
	DEFECT WIDTH LESS THAN 3 INCHES	DEFECT WIDTH 3 INCHES OR MORE
1.	0.010	0.010
2.	0.010	0.010
3.	0.019	0.014
4.	0.019	0.014
5.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
6.	0.005	0.002
7.	0.005	0.002
8.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
9.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
10.	0.005	0.002
11.	0.005	0.002
12.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
13.	0.019	0.014
14.	0.019	0.014
15.	0.010	0.010
16.	0.010	0.010
17.	0.005	NO REPAIR PERMITTED
18.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
19.	0.015	0.015
20.	NO REPAIR PERMITTED	NO REPAIR PERMITTED
21.	0.015	0.015
22.	0.005	0.005

1 REPAIR LIMITS ARE THE TOTAL OF THE WORK YOU DO NOW AND THE WORK YOU DID BEFORE

Repair Limits for the Torque Tubes of the TE Flap Drive
Figure 202 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 203



Torque Tube Clamp
Figure 204

(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 862-035
(2) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-036
(3) Supply electrical power (AMM 24-22-00/201).

S 212-037
(4) Make sure the arming switches for the flap and slat alternate drives, on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 212-038
(5) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 212-039
(6) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 212-040
(7) Make sure the position of the flap control lever and the flap and slat position is the same.

S 092-041
(8) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 092-042
(9) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-043

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(10) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-044

(11) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

S 862-045

(12) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
   (a) Stop in each detent to let the TE flaps and LE slats move to the correct position.
   (b) Make sure at each detent the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS messages show on the display.

S 712-020

(13) Do these steps to do a test on the position transmitters:
   (a) Move the flap control lever to the 20-unit detent, and let the flaps move to the 20-unit position and the slats move to the intermediate position.
      1) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 20-unit position.

(b) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on when you do the test.

(c) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

(d) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 25-unit detent.
1) Make sure the flaps move to the 25-unit position and the slats move to the fully extended position.
2) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.

(e) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP-detent and make sure the flaps and slats move to the UP position.

(f) Move the flap control lever to the zero (FLAPS UP) detent.

(g) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.

(h) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

F. Put the Airplane Back to Its Usual Condition

S 412-027

(1) Install the access panels that you removed (AMM 06-44-00/201).

S 412-028

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 862-029
(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-030
(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 442-031
(5) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

TASK 27-51-25-302-025

4. Approved Repairs for the Torque Tubes of the TE Flap System

A. General
(1) This procedure gives instructions to repair torque tubes that are worn on the outer diameter.

B. Consumable Materials
(1) C00064 Alodine 1200S
(2) C00259 Primer - BMS 10-11, Type 1
(3) C00033 Gloss Enamel - BMS 10-60, Type 2, Boeing Color 707 Grey

C. References
(1) AMM 51-21-04/701, Alodine Coating
(2) AMM 51-21-10/701, Decorative Exterior Finishes

D. Repair the Torque Tubes

S 212-033
(1) Find out if you can repair the torque tube:
(a) You must replace the torque tube if you have one of these conditions:
1) You did repair on the full diameter of the worn area before.
2) The worn area is adjacent to the end fitting fasteners.
3) The depth of the area that you did repair on before is more than the repair limit.
(b) You can repair the torque tube if the repair depth, which includes the repair done before, is not more than the repair limits (Fig. 202).

S 322-108
(2) Do these steps to repair the torque tubes:
(a) Make the worn area smooth.
(b) Examine the repair depth.
1) If the repair depth is not more than the repair limits, the torque tube is structurally satisfactory.
(c) Do a penetrant inspection of the worn area.
(d) Apply Alodine to the worn area (AMM 51-21-04/701).
(e) Apply one layer of primer to the worn area (AMM 51-21-10/701).
(f) Apply one layer of grey gloss enamel to the worn area (AMM 51-21-10/701).

TASK 27-51-25-202-082

5. GUI 001, 002, 115 PRE-SB 27-99 AND PRE-SB 27A0125;
GUI 003-011 PRE-SB 27A0125;
Torque Tube Coupling Inspection at No. 3, 4, 5 and 6 Angle Gearboxes (Fig. 205)

A. General
(1) You can use this procedure to do the necessary inspection of the torque tube couplings between the tee gearbox and the angle gearbox for the number 3, 4, 5 and 6 transmissions. This is a scheduled maintenance task.

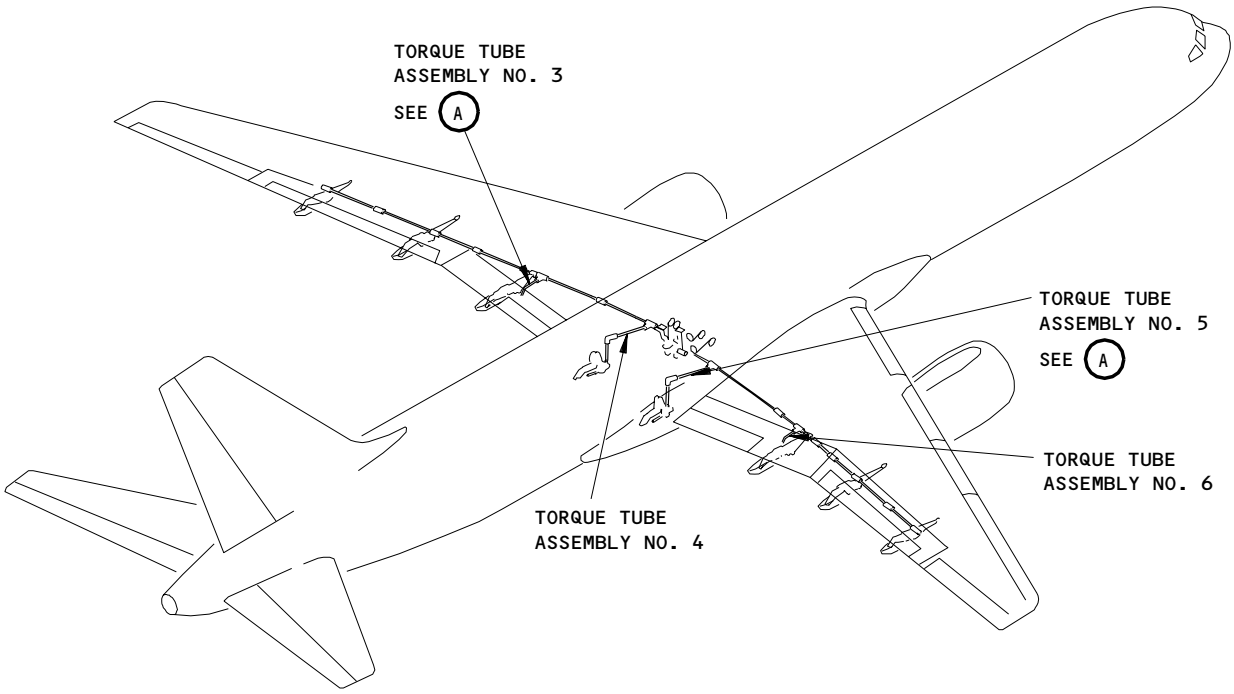
B. Equipment
(1) TE Flap PDU Lock - B27008-1
(2) Flap Torque Tube Clamps from Set B27055-1:
(a) Outboard Flap Torque Tube Clamp - P/N B27055-2
(b) Inboard Flap Torque Tube Clamp - P/N B27055-3
(3) Pins, diameter 0.1198 - 0.1202 (3.042-3.053 mm), length 1.00 inch (25.4 mm), specification ANSI/AGMA 2002-B88 Section 6, quantity 2.

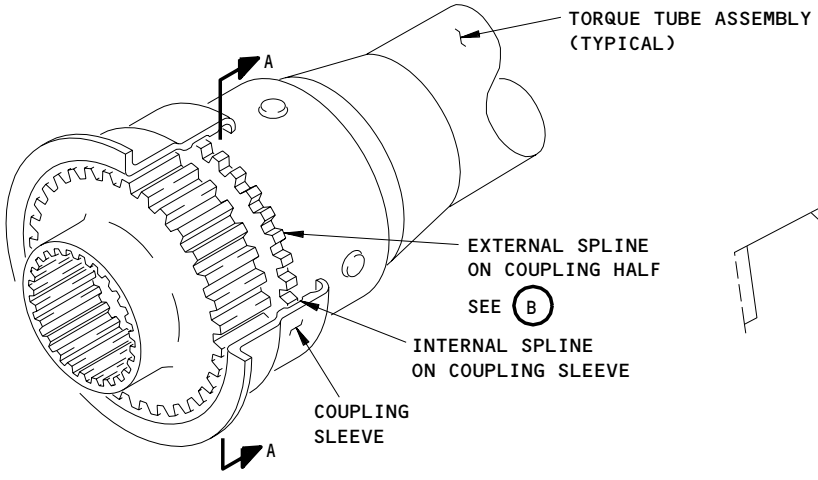
C. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

D. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 27-51-30/201, Inboard Trailing Edge Flap Track Fairing
(3) AMM 29-11-00/201, Hydraulic System
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Down Locks

E. Access
(1) Location Zones

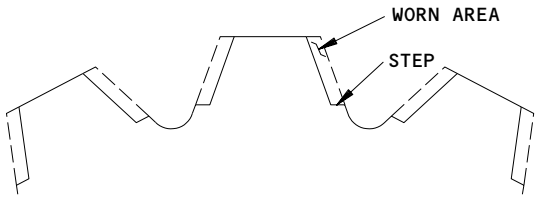
143/144	MLG Wheel Well
211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
730/740	Main Landing Gear and Doors





TORQUE TUBE COUPLING (TYPICAL)
(2 LOCATIONS EACH ASSEMBLY)

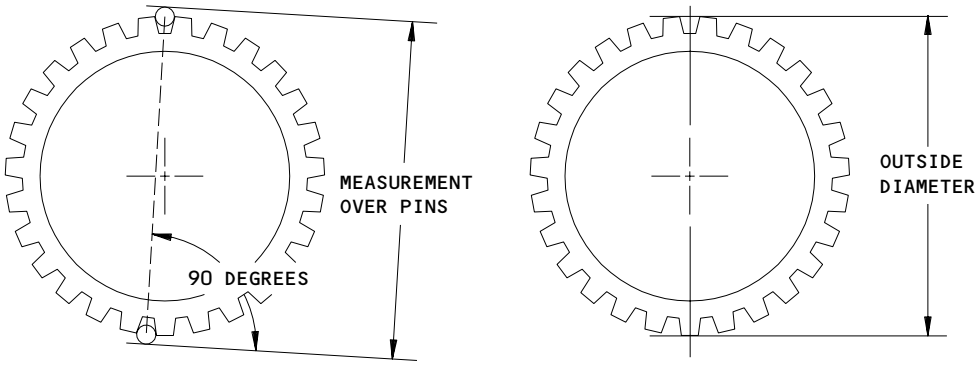
A



VISUAL SPLINE INSPECTION

B

Torque Tube Coupling Inspection
Figure 205 (Sheet 1)



SPLINE MEASUREMENT
A-A

MEASUREMENT OVER PINS (MOP)	OUTSIDE DIAMETER (OD)	ACTION
More Than 1.8605	-	Inspect again at subsequent 3000 Cycles
1.8533-1.8605	-	Inspect again at 1500 Cycles 1
1.8337-1.8532	-	Inspect again at 300 Cycles 1
Less Than 1.8337	More Than 1.739	Replace at 35 Cycles 1
Less Than 1.8337	Less Than or Equal to 1.739	Replace Now

1 As an option you can replace the torque tube assembly.

TABLE 1

Torque Tube Coupling Inspection
Figure 205 (Sheet 2)

F. Prepare for the Torque Tube Inspection

S 862-088
(1) Supply electrical power (AMM 24-22-00/201).

S 492-089
(2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 492-090

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-091

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-092
(5) Move the flap control lever to the 30-unit detent to extend the flaps.

S 862-093
(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 862-094
(7) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  (a) P6 Main Power Distribution Panel
    1) 6D20, ALTN SLAT PWR
    2) 6D23, ALTN FLAP PWR
  (b) P11 Overhead Panel
    1) 11B18, WARN ELEX B
    2) 11D31, HYDRAULICS PTU CONT
    3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
    4) 11J18, FLAP LOAD RELIEF
    5) 11J33, WARN ELEX A

S 492-095
(8) Install the PDU lock on the TE flap PDU (Fig. 203).

S 492-184

(9) Use a clamp on the adjacent torque tubes to make sure they can not turn (Fig. 204).

G. Number 3, 4, 5 and 6 Transmission Torque Tube Inspection

NOTE: You can use these steps as applicable on any torque tube coupling inspection.

S 032-096

(1) Disconnect the torque tube couplings from the gearboxes:
   (a) Remove the three screws that attach the spline coupling to the coupling sleeve.

S 212-097

(2) Inspect the torque tube couplings:
   (a) Move the coupling sleeves off the spline couplings.
   (b) Clean the grease off the internal and external splines.
   (c) Make sure the couplings do not have worn areas.

      NOTE: Worn areas will show on the splines as a step that is visable. It is not unusual for the spline surfaces to have polished areas.

   (d) If a wear step condition is found, measure the diameter of the torque tube splines over the measurement pins (Fig. 205).
   (e) Make a record of the diameter of the torque tube splines over the pins (Fig. 205).
      1) Take the measurement at three locations an equal distance apart.
      2) Make a record of all three measurements.
   (f) With the pins removed, measure and make a record of the diameter over the external coupling splines (Fig. 205), at three locations an equal distance apart.
      1) Make a record of all three measurements.
   (g) Compare the measurements you made a record of for M.O.P. and O.D. to the values in the table for replacement and more inspection requirements (Fig. 205).

S 432-098

(3) Connect the torque tube couplings to the gearboxes:
   (a) Fill the splines with grease.
   (b) Move the coupling sleeves on the spline couplings.
   (c) Install the three screws to attach the spline coupling to the coupling sleeve.

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON THE COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(d) Install the lockwire on the screws.

H. Put the Airplane Back to Its Usual Condition

S 092-099

(1) Remove the PDU lock from the TE flap PDU (Fig. 203).
(a) Remove the clamps from the adjacent torque tubes.

S 092-100

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks and close the doors for the landing gear (AMM 32-00-15/201).

S 862-101

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P6 Main Power Distribution Panel
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR
(b) P11 Overhead Panel
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
4) 11J18, FLAP LOAD RELIEF
5) 11J33, WARN ELEX A

S 862-102

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-103

(5) Move the flap control lever to the UP detent to retract the flaps.

S 862-104

(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 862-105

(7) Remove the electrical power (AMM 24-22-00/201).

TASK 27-51-25-022-155

6. Remove the Torque Tube Support Bearing for the TE Flaps

A. Equipment
(1) TE Flap PDU Lock - B27008-1

(2) Flap Torque Tube Clamps from Set B27055-1:
  (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
  (b) Inboard Flap Torque Tube Clamp - P/N B27055-3

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Down Locks
(6) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
560/660	Wing Trailing Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

S 042-140

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 212-141
(2) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 212-142
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-143

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-144
(5) Supply electrical power (AMM 24-22-00/201).

S 862-145

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-146
(7) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.

S 492-147
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 862-148
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-149
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 862-150
(11) Open these circuit breakers on the main power distribution panel, P6, and install DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 492-151
(12) Install a PDU lock in the TE flap PDU (Fig. 203).

S 012-152
(13) Remove the necessary access panels (AMM 06-44-00/201).

S 492-153
(14) Use a clamp on the adjacent torque tubes to make sure they can not turn (Fig. 204).

E. Remove the Torque Tube Support Bearing (Fig. 201)

S 022-154
(1) Do these steps to remove the torque tube support bearing:
(a) Disconnect the safety straps from the structure.
(b) Remove the wire that locks the three screws in their position at the torque tube support bearing.
1) Remove the three screws at the torque tube coupling.
(c) Move the sleeve off the splines of the torque tube coupling.
(d) Remove the nuts, washers and bolts that attach the support bearing to the brackets.
(e) Remove the support bearing.

TASK 27-51-25-422-158

7. Install the Torque Tube Support Bearing

A. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) A00247 Sealant - Corrosion Preventive Chromated, BMS 5-95, Type I or II, Class B

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-30-03, Boeing Standard Overhaul Practices Manual (SOPM)
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-58-01/501, Flap Position Transmitter
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
550/650	Wing Trailing Edge - Inboard
560/660	Wing Trailing Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Torque Tubes Support Bearing (Fig. 201)

S 422-160
(1) Do these steps to install the torque tube support bearing:
(a) Put the support bearing in its position on the brackets.

(b) For the support bearing at WS 214, put the sealant in the holes.
(c) Install the bolts, washers and nuts.

S 422-181
(2) Do these steps to install the torque tubes:
(a) Put the safety straps into the correct position on the torque tube and attach the safety straps to the structure.
(b) Apply grease to the splines of the torque tube support bearing.
(c) Put the torque tube in its position.
(d) Move the sleeves of the torque tube support bearing on the splines at each end.

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON THE COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(e) Install the screws and safety them with a lockwire.
(f) Move the torque tube to one end until it touches the torque tube coupling.
(g) Fill the reservoirs of the torque tube coupling with grease through the lubrication holes (3 locations).
(h) Move the torque tube to the opposite end until it touches the torque tube coupling.
(i) Fill the reservoirs of the torque tube coupling with grease through the lubrication holes (3 locations).
(j) Move the torque tube to the middle position.
(k) Remove the clamps from the adjacent torque tubes.
(l) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 822-161
(3) Adjust the flap position transmitter in the wing where the torque tube support bearing was removed and installed (AMM 27-58-01/501).

S 712-162
(4) Do a test on the torque tube support bearing installation in the Operational Test for the Torque Tube Installation.

TRAILING EDGE FLAP POWER DRIVE UNIT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the power drive unit (PDU) from the trailing edge (TE) flap. The second task installs the PDU for the TE flap.

   TASK 27-51-26-034-001

2. Remove the PDU for the TE Flap
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) LE1 - P/N B20003-3
      (2) TE Flap Torque Tube Clamps from Set - B27055-1:
          (a) Inboard Flap Torque Tube Clamp - P/N B27055-3 (2 Necessary)
      (3) TE Flap PDU Sling - B27067-2
      (4) Fishpole Hoist - PF51, P.F. Industries, 9320 15th Ave. So., Seattle, WA 98108
   B. References
      (1) 06-44-00/201, Wing Access doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 27-51-25/201, TE Flap Torque Tubes
      (4) 27-51-27/201, TE Flap PDU Components
      (5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) 32-00-15/201, Landing Gear Door Locks
      (7) 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

      (2) Access Panels

511CB	Leading Edge Slat PDU

   D. Prepare for the Removal

      S 214-002
      (1) Make sure the TE flaps and the leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

      S 214-003
      (2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 864-005

(4) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (d) 11G13, FLAP/SLAT ELEC UNIT 1 CONT
   (e) 11G22, FLAP SLAT ELEC UNIT 3 CONT
   (f) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
   (g) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (h) 11J18, FLAP LOAD RELIEF
   (i) 11J33, WARN ELEX A

S 864-006

(5) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 864-007

(6) Remove the power from the left hydraulic system (Ref 29-11-00).

S 014-008

(7) Get access to the LE slat PDU at the inboard leading edge of the left wing through access panel, 511CB (AMM 06-44-00/201).

S 494-009

(8) Remove the cover plate and put rig pin LE1 in the input cam of the LE slat PDU (Fig. 402).

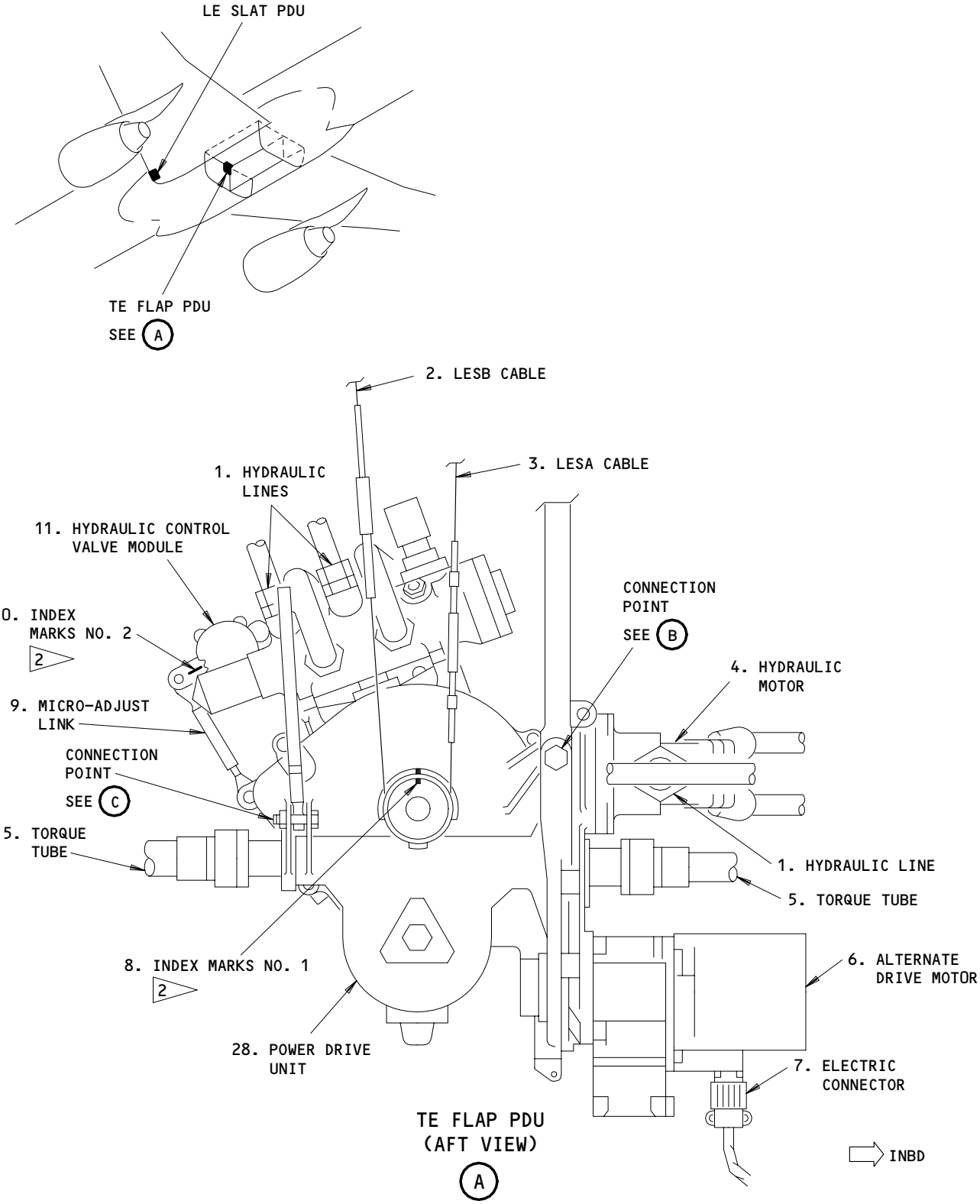
E. Remove the PDU (Fig. 401)

S 494-010

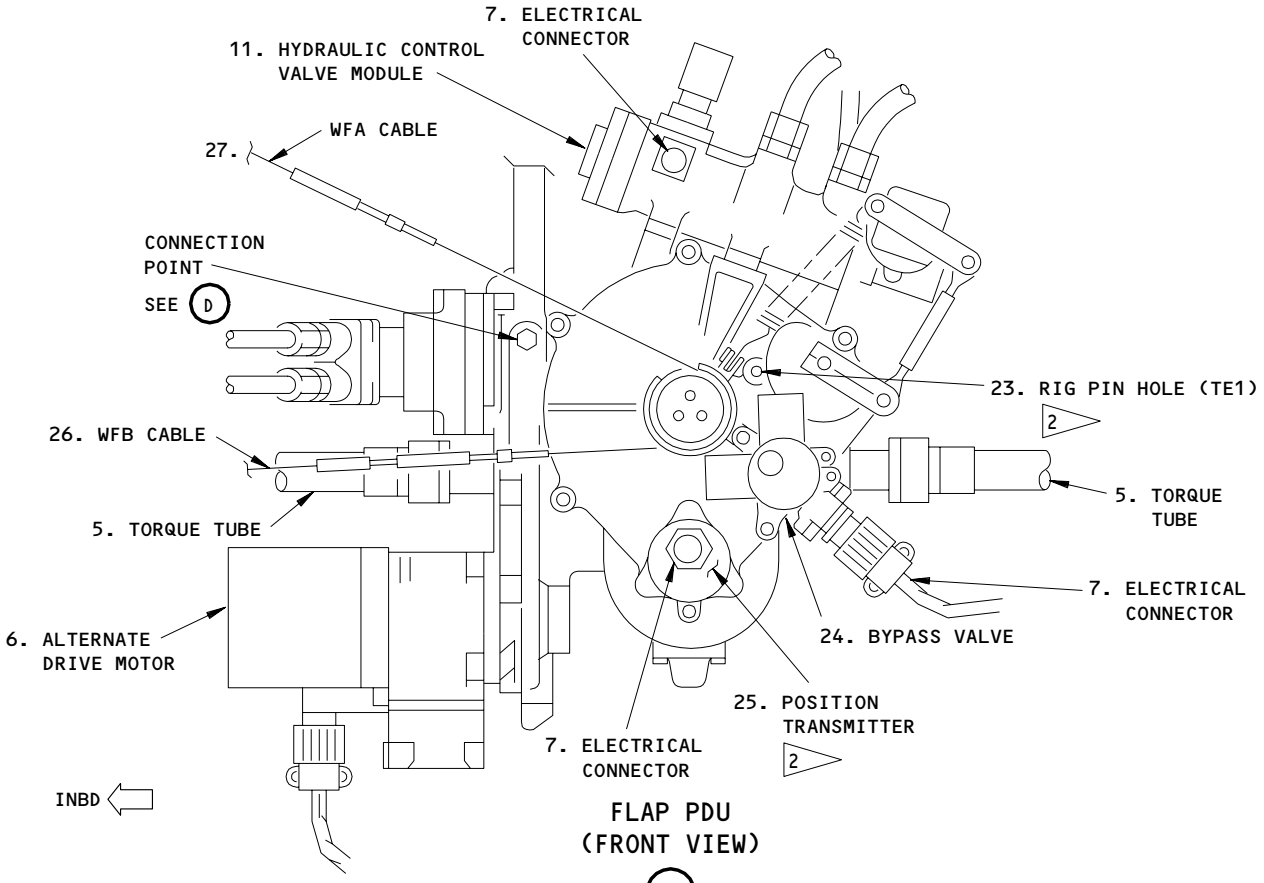
(1) Install cable clamps on the control cables (LESA (3), LESB (2), WFA (27) and WFB (26)) at the left and right wheel well ceilings before you disconnect the turnbuckles.

S 034-011

(2) Do these steps to remove the PDU:
   (a) Disconnect the control cables (LESA, LESB, WFA and WFB) at the turnbuckles.
   (b) Disconnect the electrical connectors (7), at four locations.



TE Flap PDU
Figure 401 (Sheet 1)



MOUNTING BOLTS FOR THE TE FLAP PDU

1 APPLY CORROSION PREVENTIVE COMPOUND TO THE BOLT THREADS BEFORE YOU ASSEMBLE THE PARTS

2 SEE FIG. 402

TE Flap PDU
Figure 401 (Sheet 2)

(c) Disconnect the hydraulic lines (1), at 3 locations.
1) Seal the hydraulic lines with a cap.
2) Seal the PDU ports with a plug.
(d) Use a clamp to hold the torque tube drive (above the left gear strut in the wheel well) for the left wing (Fig. 406).
(e) To remove the outboard (left) torque tube (5), disconnect the couplings at each end of the tube (Ref 27-51-25).

NOTE: Do not turn the input shaft to the tee gearbox or the adjacent torque tubes.

(f) Use a clamp to hold the torque tube drive (above the right gear strut in the wheel well) for the right wing (Fig. 406).
(g) Disconnect the inboard (right) torque tube (5) at the coupling (Ref 27-51-25).
(h) Install the PDU sling on the TE flap PDU (Fig. 404).
(i) Remove the three mounting bolts (16, 19, 22), Fig. 401
(j) Remove the TE flap PDU (28).
(k) Remove the PDU sling from the TE flap PDU.
(l) Remove the three bolts that attach the PDU position transmitter (25) to the PDU and remove the position transmitter (Ref 27-51-27).

TASK 27-51-26-434-012

3. Install the PDU for the TE Flap

A. General

(1) This task contains steps to install the TE Flap PDU. To install the TE Flap PDU, make sure the hydraulic motor, the alternate drive motor, the bypass valve, and the control valve module are installed on the TE Flap PDU.

If you have to install one of these components on the PDU, do the test on the installation of that component after you install the PDU. Also, do the test on the installation of the position transmitter for the TE flap PDU. Then do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):
(a) TE1 - P/N B20003-53
(2) TE Flap PDU Lock - B27008-1
(3) TE Flap PDU Sling - B27067-2
(4) Fishpole Hoist - PF51, P.F. Industries, 9320 15th Ave. So., Seattle, WA 98108

C. Consumable Materials

(1) C00174 Corrosion Preventive Compound - MIL-C-16173, Class 2
(2) D00054 Skydrol Assembly Lube - MCS 352B
(3) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

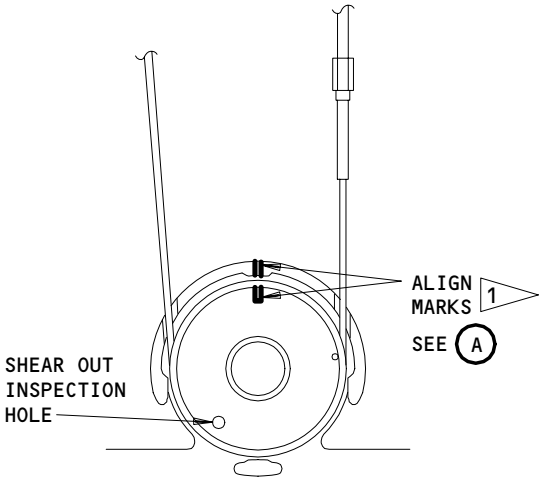
(4) D00633 Grease - BMS 3-33 (Preferred)
(5) D00014 Grease MIL-G-21164 (Alternate)
(6) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

D. Parts

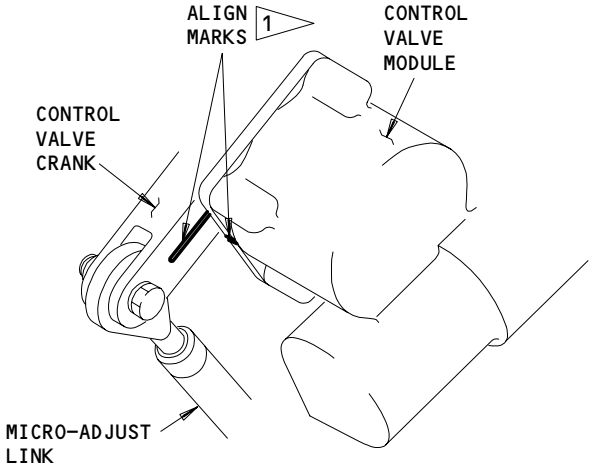
AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Hydraulic Motor	27-51-26	01	128
	6	Alternate Electrical Motor		01	150
	11	Control Valve Assy		02	350
	24	Bypass Valve		01	166
	25	Position Transmitter	27-51-25	03	285
	28	Power Drive Unit	27-51-26	01	295

E. References
(1) 06-44-00/201, Wing Access doors and Panels
(2) 12-12-01/301, Hydraulic Systems
(3) 20-10-24/201, Rig Pins
(4) 24-22-00/201, Electrical Power - Control
(5) 25-50-01/401, Cargo Compartment Ceiling Lining
(6) 27-51-00/501, Trailing Edge Flap System
(7) 27-51-25/201, TE Flap Torque Tubes
(8) 27-51-27/201, TE Flap PDU Components
(9) 27-51-28/201, TE Flap PDU Control Valve Module and Components
(10) 27-58-03/401, Flap Position Transmitter
(11) 27-81-00/201, Leading Edge Slat System
(12) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(13) 32-00-15/201, Landing Gear Door Locks

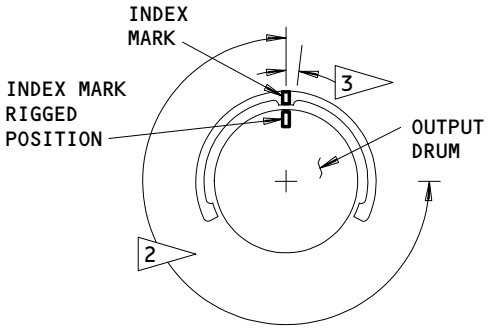
F. Access
(1) Location Zones
119/120 Main Equipment Center
143 MLG Wheel Well
211/212 Control Cabin
710 Nose Landing Gear and Doors
730/740 Main Landing Gear and Doors



INDEX MARKS NO. 1



INDEX MARKS NO. 2



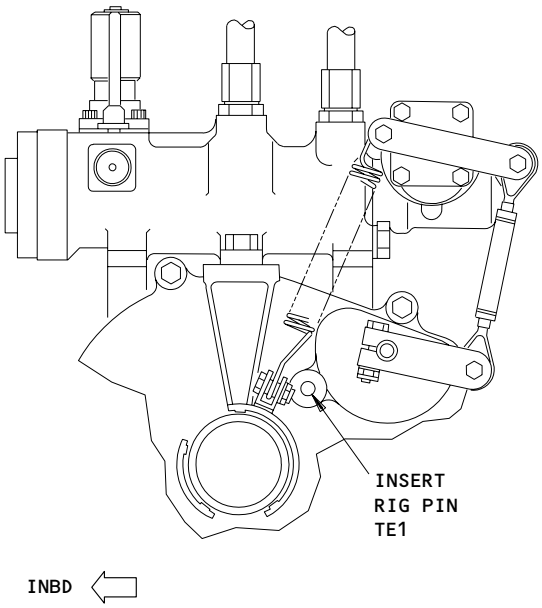
ALIGN MARKS
A

1 ADJUST THE COMPONENTS AS SPECIFIED IN THE PDU INSTALLATION PROCEDURE

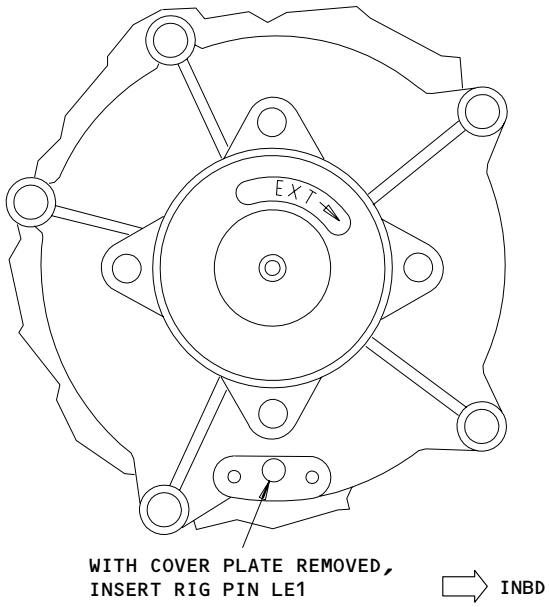
2 IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, MANUALLY TURN THE PDU OUTPUT SHAFT UNTIL THE DRUM TURNS CLOCKWISE TO ALIGN THE INDEX MARKS

3 IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, MANUALLY TURN THE PDU OUTPUT SHAFT UNTIL THE OUTPUT DRUM TURNS COUNTER CLOCKWISE TO ALIGN THE INDEX MARKS

TE Flap PDU Adjustment
Figure 402 (Sheet 1)



TE1 RIG PIN LOCATION
TE FLAP PDU
(FRONT VIEW)



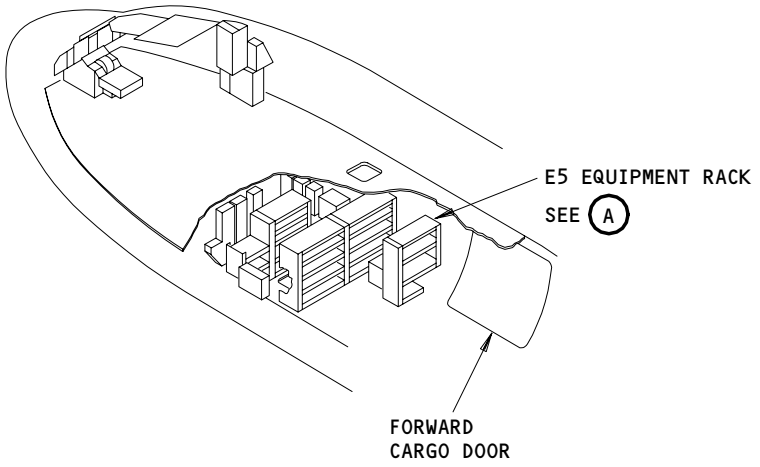
LE1 RIG PIN LOCATION
LE SLAT PDU
(AFT VIEW)

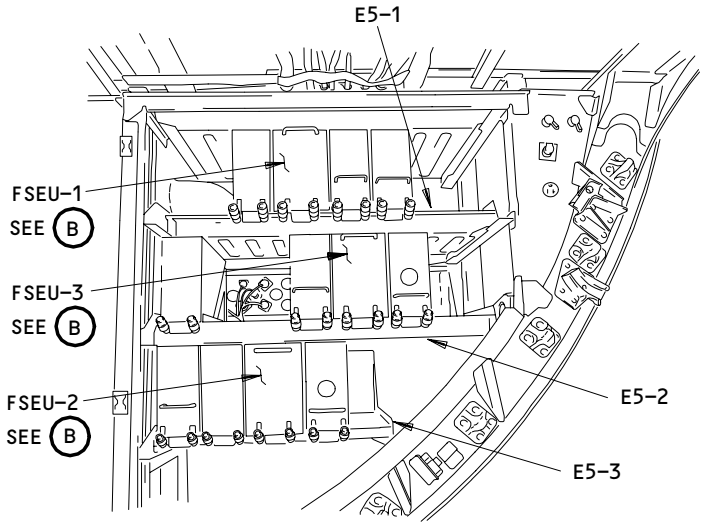
RIG LOADS FOR THE FLAP AND SLAT CABLES	
TEMP °F (°C) ±5°F (±3°C)	WFA, WFB, LESA, LESB ±10 LBS (±4.5 Kgs)
110 (43)	118 (53)
90 (32)	109 (49)
80 (26)	104 (47)
70 (21)	100 (45)
60 (15)	96 (43)
50 (10)	92 (41)
40 (4.4)	88 (39)
30 (-1.1)	84 (38)
10 (-12)	75 (34)
-10 (-23)	67 (30)
-30 (-34)	59 (26)
-40 (-40)	53 (24)

TABLE I

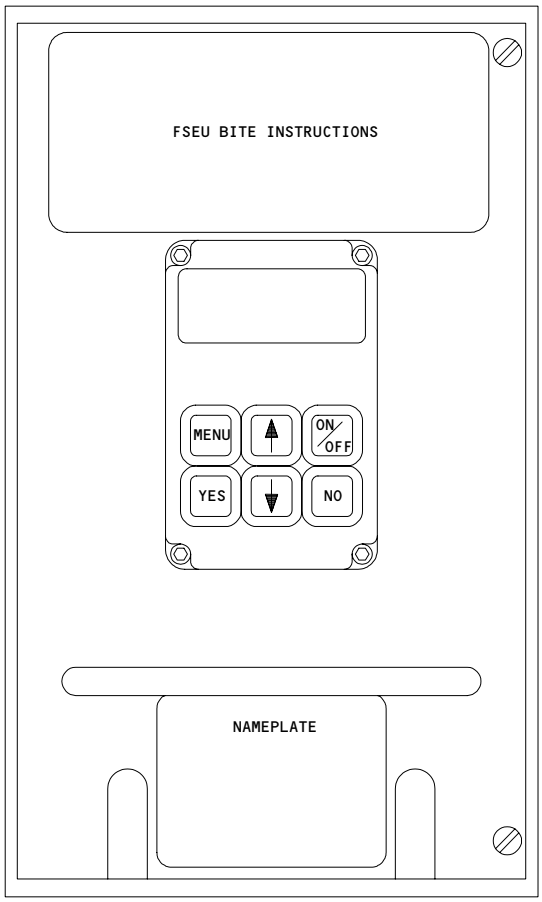
NOTE: CABLE TENSION VALUES WILL NOT BE CORRECT WHEN TEMPERATURE DIFFERENCES ALONG THE CABLE RUN EXCEED 5°F (3°C). AIRCRAFT/AMBIENT TEMPERATURES MUST BE STABLE FOR ONE HOUR BEFORE YOU RIG THE PDU.

TE Flap PDU Adjustment
Figure 402 (Sheet 2)



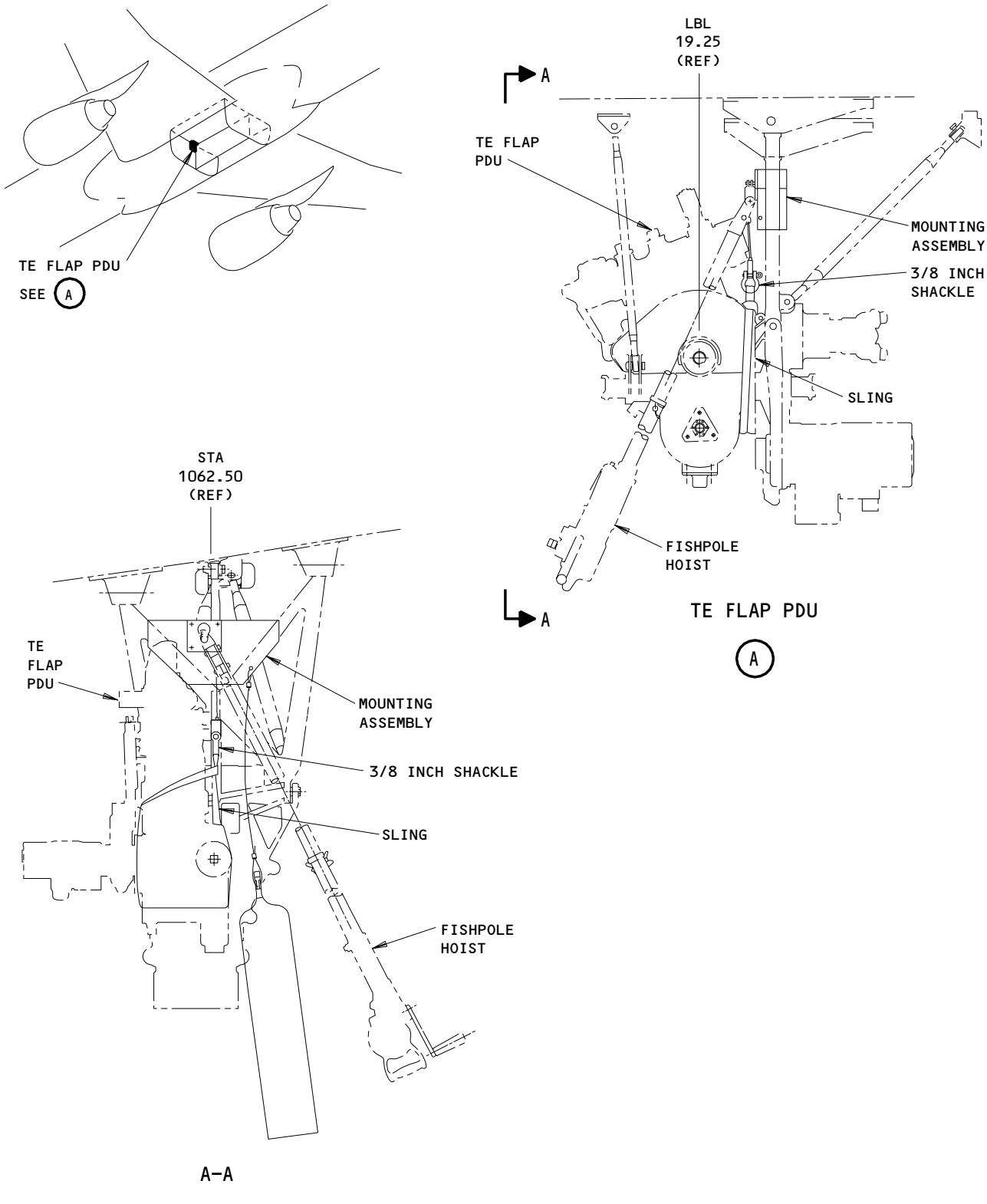


E5 EQUIPMENT RACK
(AFT VIEW)
A

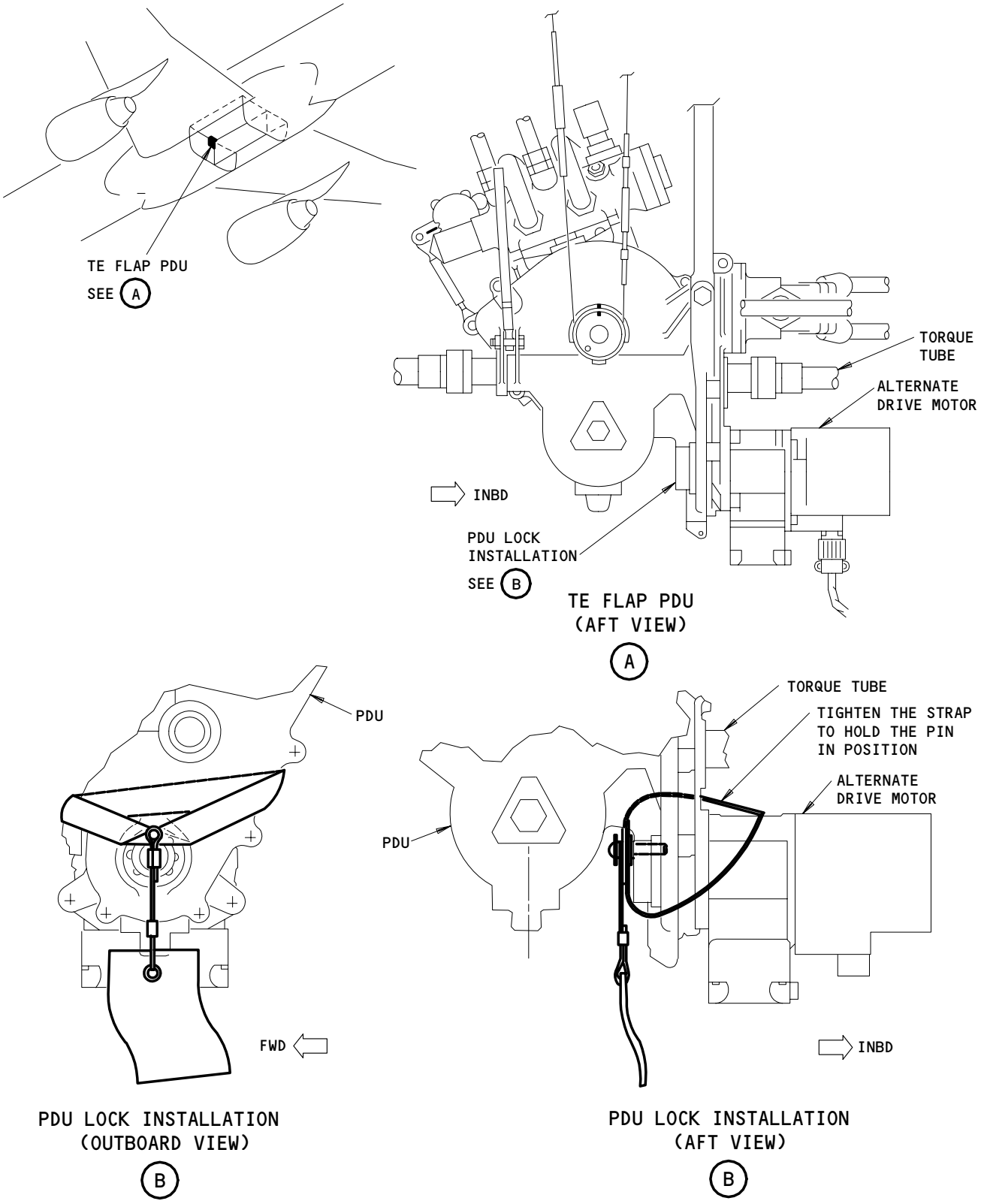


FSEU
(EXAMPLE)
B

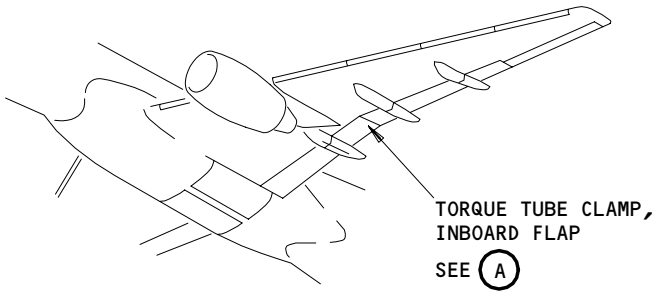
Flap/Slat Electronic Units (FSEU's)
Figure 403

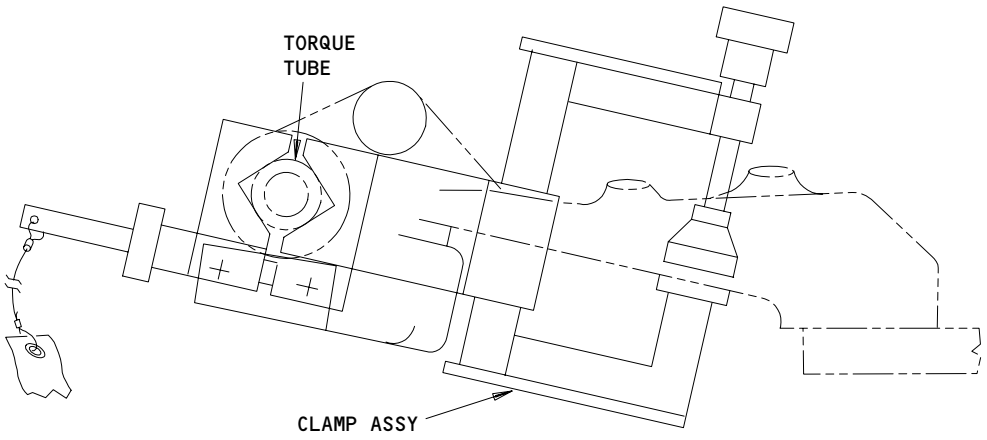


Sling for the TE Flap PDU
Figure 404



PDU Lock for the TE Flap PDU
Figure 405





TORQUE TUBE CLAMP
INBOARD FLAP
A

Torque Tube Clamp
Figure 406

(2) Access Panels
511CB Leading Edge Slat PDU

G. Install the PDU (Fig. 401)

S 214-013
(1) Make sure these components are installed on the TE flap PDU before you install the PDU:
(a) The hydraulic motor (4) (Ref 27-51-27)
(b) The alternate drive motor (6) (Ref 27-51-27)
(c) The bypass valve (24) (Ref 27-51-27)
(d) The control valve module (11) (Ref 27-51-28).

S 214-014
(2) Make sure the flap/slats drive systems are off as shown in the Prepare for the Removal paragraph.

S 494-015
(3) Install the PDU sling on the TE flap PDU (Fig. 404).

S 434-016
(4) Do these steps to install the TE flap PDU (Fig. 401):
(a) Apply a thin layer of corrosion preventive compound on the internal and external threads before you install the PDU.
(b) Install bushings (15), (18), (20), at the PDU (28) connection points.
(c) Lift the PDU (28) into its position and attach it to the supports at three connection points.
(d) Align the holes and install the bolts (16), (19), (22), washers (12), (17), radius filler (13), and nuts (14), (21), and tighten.
(e) Remove the sling from the TE flap PDU.
(f) Remove the plugs and caps from the hydraulic lines (1) and ports.
(g) Apply Skydrol assembly lube or hydraulic fluid to the packing O-rings and fittings.

(h) Connect the hydraulic lines (1) to the PDU (28).
(i) Install the electrical connectors (7) for the control valve module (11), the alternate drive motor (6), and the bypass valve (24).

S 864-030
(5) Put the flap control lever in the 1-unit detent.

S 864-031
(6) Turn the flap input drum for the PDU (to the flap position 1), to permit installation of the rig pin TE1 (Fig. 401-402).

S 494-032
(7) Put rig pin TE1 (23) in the PDU input cam (Fig. 401-402).

S 434-033
(8) Connect and rig the WFA (27) and WFB (26) cables (Fig. 401) as shown in Table 1 (Fig. 402).

NOTE: If it is not easy to connect the control cables WFA (27) and WFB (26), get access to the forward cargo compartment. You can find the control cables WFA and WFB near the center of the forward cargo door, 60 inches (1.52 meters) inboard from the door top. Remove the ceiling panels for access (AMM 25-50-01/401).

S 214-034
(9) Make sure the rig pin TE1 (23) can easily be removed and installed in the input cam of the PDU and remove the rig pin.

S 094-035
(10) Remove the cable clamps from the control cables WFA (27) and WFB (26).

S 864-036
(11) Put the flap control lever in the zero (FLAPS UP) detent.

S 204-037
(12) Put a straight 0.032- inch diameter wire into the drum inspection hole to see if there is any damage to the output drum.

NOTE: There is no damage to the output drum if you can easily push the wire in 1.00 inch (25.4 mm).

S 864-038

CAUTION: DO NOT TURN THE PDU BACK WITH POWER. IN OTHER WORDS, DO NOT BACKDRIVE THE PDU WITH POWER. THIS CAN CAUSE DAMAGE TO THE INTERNAL MECHANISMS.

(13) Turn the PDU back manually until the index marks No.1 (8) align (Fig. 402).

NOTE: To align the index marks No.1, turn the PDU output shaft until the index mark on the output drum moves in the direction shown (View A).

S 824-039

(14) Adjust the micro-adjust link (9) to align the control valve crank with the index marks No.2 (10).

S 014-048

(15) Open the access panel 511CB (AMM 06-44-00/201).

S 864-040

(16) Put the manual override lever for the bypass valve (24) on the LE slat PDU to the POS 1 (bypass) position (Ref 27-81-00/201).

S 864-041

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(17) Pressurize the left hydraulic system (Ref 29-11-00).

S 824-042
(18) Adjust the micro-adjust link (9) until the index marks No.1 (8) align (ignore index marks No.2).

S 434-105
(19) Tighten the jamnuts on the micro-adjust link and make sure the index marks No.1 align.

S 204-043
(20) Put a straight 0.032-inch diameter wire into the drum inspection hole to see if there is any damage to the output drum.

NOTE: There is no damage to the output drum if you can easily push the wire in 1.00 inch (25.4 mm).

S 864-044
(21) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-045
(22) Install a PDU lock on the TE flap PDU (Fig. 405).

S 864-046
(23) Put the manual override lever for the bypass valve (24) of the LE slat PDU in the POS 2 (normal) position.

S 434-049
(24) Connect and adjust the LESA (3) and LESB (2) cables as shown in Table 1 (Fig. 402).

S 214-050
(25) Remove the rig pin LE1 from the input cam of the LE slat PDU.

S 414-047
(26) Install the access panel, 511CB (AMM 06-44-00/201).

S 094-051
(27) Remove the cable clamps from the control cables LESA (3) and LESB (2).

S 434-052
(28) Do these steps to connect the PDU to the torque tubes (5) (Ref 27-51-25):
(a) Apply grease to the internal and external surfaces of the splines of the torque tube couplings.
(b) Connect the torque tubes to the PDU and to the tee-gearbox.
(c) Install the coupling screws and safety them to each other with wire.
(d) Remove the clamps from the torque tubes (Fig. 406).

(e) Fill the coupling reservoirs with grease.

S 094-054
(29) Remove the PDU lock from the TE flap PDU (Fig. 405).

S 864-055

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(30) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-056
(31) Move the flap control lever to the 20-unit detent and let the flaps move to the 20-degree position and the slats move to the intermediate position.

S 864-057
(32) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-058
(33) Install a PDU lock on the TE flap PDU (Fig. 405).

S 904-061
(34) Remove, install, and adjust the position transmitter (25) for the TE flap PDU (Ref 27-51-27).

S 094-062
(35) Remove the PDU lock from the TE flap PDU (Fig. 405).

S 864-063

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(36) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-064

(37) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats move to the fully retracted position.

S 864-065

(38) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(d) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(e) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(f) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(g) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(h) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(i) 11J18, FLAP LOAD RELIEF
(j) 11J33, WARN ELEX A

S 864-066

(39) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

S 864-067

(40) Turn the dimmer control knob for the first officer's panel on the light shield panel, P7, fully clockwise.

S 214-068

(41) Make sure the position selector switch for the flap/slat alternate drive, on the first officer's instrument panel, P3, is in the NORM detent.

S 214-069

(42) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not armed (switch lights off).

S 214-070

(43) Make sure the six EICAS circuit breakers are closed on the P11 panel.

S 864-071

(44) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
(a) Stop in each detent to let the TE flaps and the LE slats move to the correct position.
(b) Make sure at each detent the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 714-072

(45) Do the Test for the Operation Force of the Flap Control Lever (Ref 27-51-00).

H. Operational Test for the Alternate Drive Motor:

S 864-073

(1) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

S 864-074

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(2) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent.
(a) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the UP position.

(b) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 864-075

(3) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 30-unit detent.
   (a) Make sure the slats extend fully in less than 85 seconds.
   (b) Make sure the flaps extend fully in less than 210 seconds.
   (c) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 30-unit position.
   (d) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 864-076

(4) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent.
   (a) Make sure the flaps and slats retract to the UP position.
   (b) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 864-077

(5) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.

S 864-078

(6) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

I. Operational Test for the Hydraulic Motor

S 864-079

(1) Move the flap control lever to the 1-unit detent, and let the flaps move to the 1-unit position and the slats move to the intermediate position.
   (a) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 864-080

(2) Move the flap control lever to the 5-unit detent and let the flaps move to the 5-unit position.
   (a) Make sure the flaps move to the 5-unit position in less than 12-14 seconds from the time you started to move the flap control lever.
   (b) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 864-081

(3) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats move to the fully retracted position.
   (a) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

J. Operational Test for the Bypass Valve

S 864-082

(1) Open these circuit breakers on the P11 panel and install DO-NOT-CLOSE tags:
   (a) 11C17, FLAP SLAT SHUTOFF 1
   (b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 864-083

(2) Move the flap control lever to the 5-unit detent, and let the flaps start to move to the 5-unit position and the slats start to move to the intermediate position.

S 864-084

(3) Push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on), and make sure the flaps and slats stop their movement.

S 864-085

(4) Push the arming switch for the flap alternate drive, on the P3 panel, to disarm the flap alternate drive (switch light will go off).
   (a) Make sure the flaps move to the 5-unit position and the slats move to the intermediate position.

S 864-086

(5) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

S 864-087

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

K. Operational Test for the Control Valve Module

S 864-088

(1) Move the flap control lever to the 30-unit detent, and let the flaps and slats extend fully.

S 864-089

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 214-091

(3) Make sure the overload indicators for the flap transmission did not come on.

NOTE: An overload indicator that is on will show above the adjacent surface.

S 864-093

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(4) Pressurize the left hydraulic system (Ref 29-11-00).

S 704-094

(5) Push and hold the test switch for the flap LOAD RELIEF.

NOTE: You can find the test switch immediately through the access door for the E/E bay.

(a) Make sure the flaps retract to the 25-unit position and the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.

S 704-095

(6) Release the test switch for the flap LOAD RELIEF.

(a) Make sure the flaps extend to the 30-unit position and the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 30-unit position.

S 864-096

(7) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

L. Operational Test for the Position Transmitter for the TE flap PDU

S 864-097

(1) Move the flap control lever to the 20-unit detent, and let the flaps move to the 20-unit position and the slats move to the intermediate position.

(a) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 20-unit position.

(b) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on when you do the test.

S 864-099

(2) Push the arming switches for the flap and slat alternate drives , on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

S 864-100

(3) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 25-unit detent.
   (a) Make sure the flaps move to the 25-unit position and the slats move to the fully extended position.
   (b) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.

S 864-101

(4) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent, and make sure the flaps and slats move to the UP position.

S 864-102

(5) Move the flap control lever to the zero (FLAPS UP) detent.

S 864-103

(6) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.

S 864-104

(7) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

M. Put the Airplane Back to Its Usual Condition

S 414-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 864-026

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-027
(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 414-028
(4) Install the access panels that you removed (Ref 06-44-00).

S 614-029
(5) Do the servicing steps to the reservoir for the left hydraulic system (Ref 12-12-01).

TRAILING EDGE FLAP POWER DRIVE UNIT COMPONENTS - MAINTENANCE PRACTICES

1. General
   A. This procedure contains steps to remove and install these power drive unit (PDU) components for the trailing edge (TE) flap: the hydraulic motor, the alternate drive motor, the bypass valve, and the position transmitter.
   B. Refer to AMM 27-51-28/201 for the removal and installation procedures for the control valve module.

TASK 27-51-27-022-001

2. Remove the PDU Components (Fig. 201)
   A. General
      (1) This task contains four procedures, one to remove the hydraulic motor, one to remove the alternate drive motor, one to remove the bypass valve, and one to remove the position transmitter. Because this task contains four procedures, only the applicable group of steps must be done.

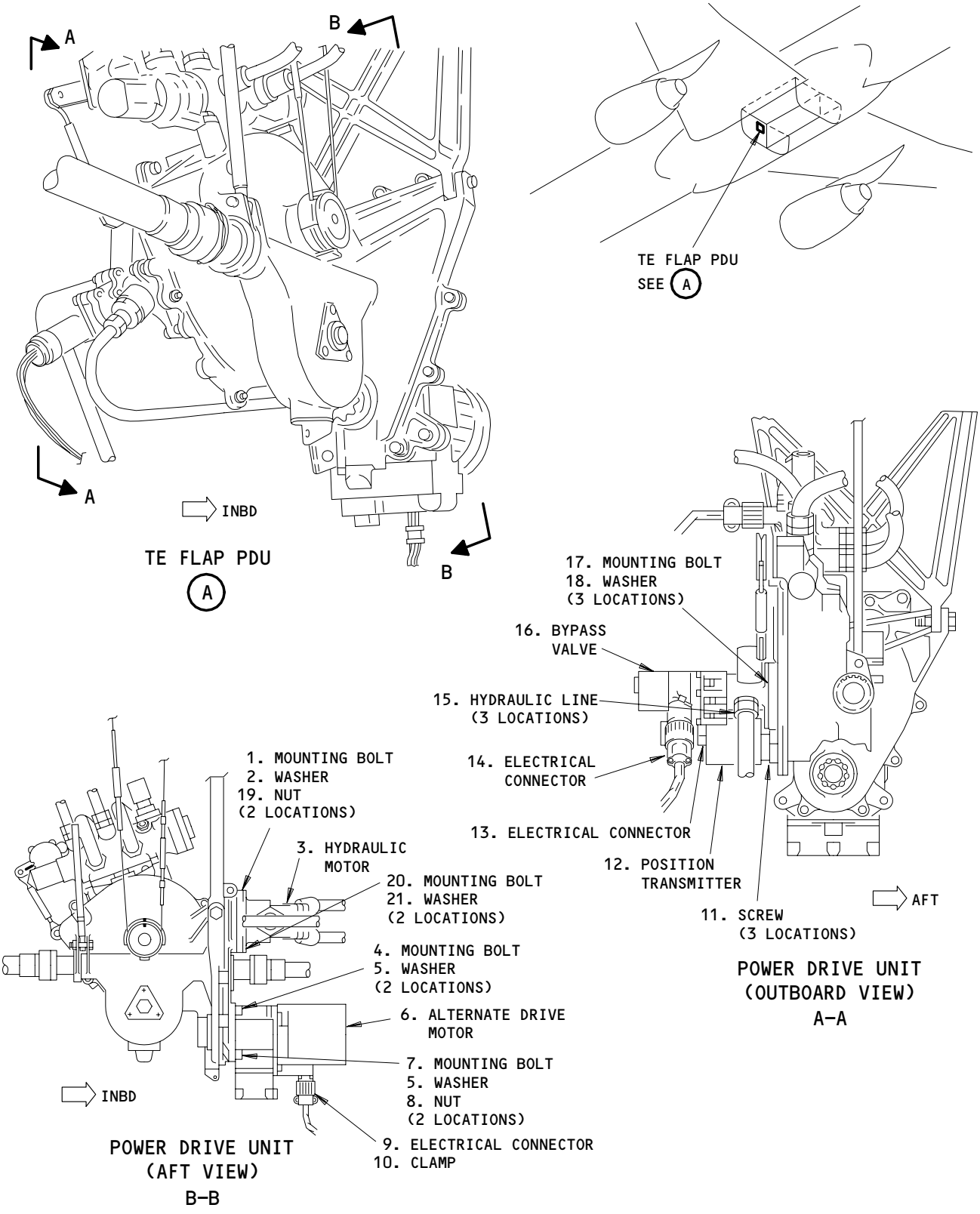
          To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) TE Flap PDU Lock - B27008-1
   C. References
      (1) AMM 27-51-28/201, TE Flap PDU Control Valve Module and Components
      (2) AMM 32-00-15/201, Landing Gear Door Locks
      (3) AMM 32-00-20/201, Landing Gear Downlock
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   D. Access
      (1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   E. Prepare for the Removal

          S 212-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).



PDU Components for the TE Flaps
Figure 201

S 012-003

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-004

(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11G21, FLAP SLAT ELEC UNIT 3 POWER
   (d) 11G22, FLAP SLAT ELEC UNIT 3 CONT
   (e) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
   (f) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (g) 11J18, FLAP LOAD RELIEF
   (h) 11J33, WARN ELEX A

S 862-005

(4) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 862-006

(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 492-007

(6) Install a PDU lock on the TE flap PDU (Fig. 203).

F. Remove the Hydraulic Motor

S 032-024

(1) Disconnect the inlet, outlet and the case drain fittings.
   (a) Seal the fittings with a plug.
   (b) Seal the hydraulic motor ports with a cap.

S 032-025

(2) Remove four bolts (1, 20), four washers (2, 21), and two nuts (19) that attach the hydraulic motor (3) to the PDU.

S 022-026

(3) Remove the hydraulic motor.

G. Remove the Alternate Drive Motor

S 032-027
(1) Disconnect the electrical connector (9) and the clamp (10).

S 032-028
(2) Remove the four mounting bolts (4, 7), four washers (5), and two nuts (8) that connect the alternate drive motor to the PDU.

S 022-029
(3) Remove the alternate drive motor.

S 492-030
(4) Use a cover on the alternate drive motor (6) and the PDU mounting surfaces.

H. Remove the Bypass Valve

S 032-031
(1) Remove the electrical connector (14).

S 032-032
(2) Disconnect the three hydraulic lines (15).
(a) Seal the hydraulic lines with a cap.
(b) Seal the ports on the bypass valve with a plug.

S 032-033
(3) Remove the three mounting bolts (17) and washers (18) that connect the bypass valve (16) to the PDU.

S 022-034
(4) Remove the bypass valve (16).

I. Remove the Position Transmitter

S 092-035
(1) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-037
(3) Move the flap control lever to the 20-unit detent and let the flaps move to the 20-unit position.

S 862-038
(4) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-039
(5) Install a PDU lock on the TE flap PDU (Fig. 203).

S 032-040
(6) Remove the electrical connector (13).

S 032-041
(7) Remove the three screws (11) that connect the position transmitter (12) to the PDU.

S 022-042

CAUTION: BE CAREFUL WHEN YOU REMOVE THE POSITION TRANSMITTER. THE INPUT SHAFT FOR THE PDU CAN EASILY BE BENT.

(8) Remove the position transmitter (12).

TASK 27-51-27-422-012

3. Install the PDU Components (Fig. 201)

A. General

(1) This task contains four procedures, one to install the hydraulic motor, one to install the alternate drive motor, one to install the bypass valve, and one to install the position transmitter. Because this task contains four procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the components. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) TE Flap PDU Lock - B27008-1

C. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease MIL-G-21164 (Alternate)
(3) D00013 Grease- MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) D00054 Skydrol Assembly Lube - MCS 352B
(5) D00153 Hydraulic Fluid - Fire Resistant - BMS 3-11

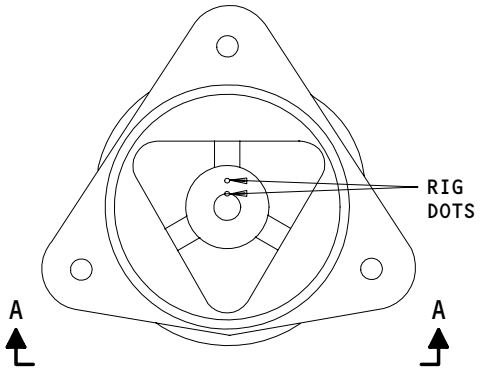
D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	3	Hydraulic Motor	27-51-26	01	128
	6	Alternate Electric Motor		01	150
	12	Transmitter	27-51-25	03	285
	16	Valve	27-51-26	01	166

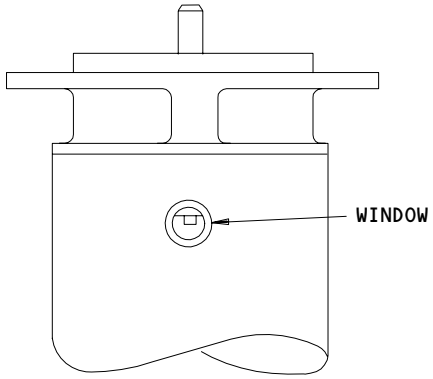
E. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-58-01/501, TE Flap and LE Slat Systems Position Transmitters
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks

F. Access
(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

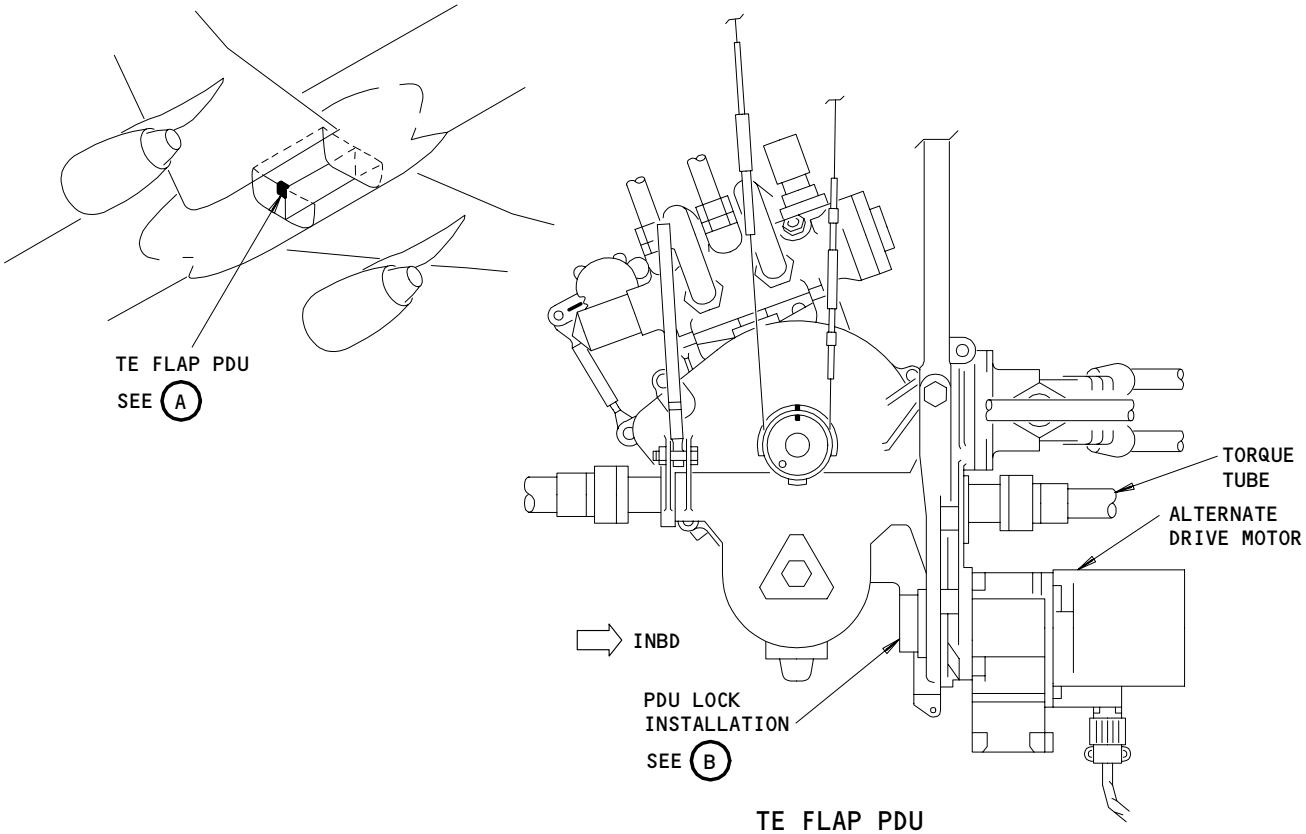


RIG THE POSITION TRANSMITTER



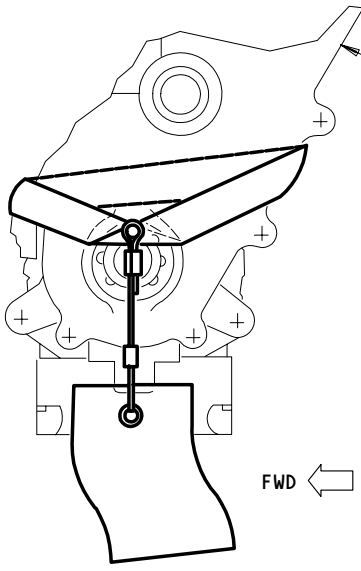
A-A

PDU Transmitter for the TE Flaps
Figure 202



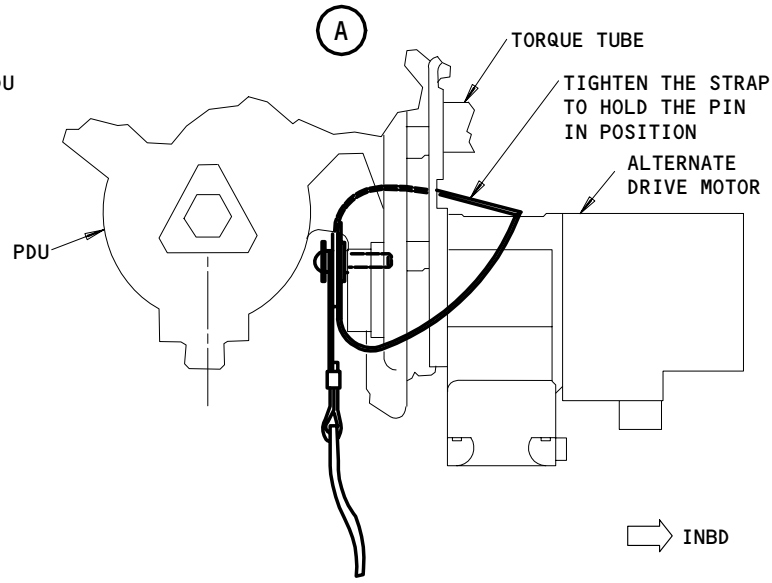
TE FLAP PDU
(AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 203

G. Install the Hydraulic Motor

S 642-043
(1) Apply a thin layer of grease to the drive spline of the hydraulic motor (3).

S 422-044
(2) Put the hydraulic motor (3) in its position on the PDU and attach it with the four bolts (1, 20), four washers (2, 21), and two nuts (19).

S 092-045
(3) Remove the caps and plugs from the adjacent hydraulic connections.

S 642-046
(4) Lubricate the fittings and packing O-rings with Skydrol assembly lube or hydraulic fluid.

S 432-047
(5) Connect the hydraulic lines to the inlet and outlet ports.

S 602-048
(6) If not done, fill the hydraulic motor housing (3) with hydraulic fluid, (maximum capacity 1 cu. in.), and connect the case drain line.

S 712-049
(7) Do a test on the hydraulic motor installation in the Operational Test for the Components of the TE Flap PDU.

H. Install the Alternate Drive Motor

S 092-050
(1) Remove the covers from the alternate drive motor (6) and the PDU mounting surfaces.

S 642-051
(2) Lubricate the splines of the alternate drive motor with grease.

S 432-052
(3) Attach the alternate drive motor (6) to the PDU with four mounting bolts (4,7), four washers (5), and two nuts (8).

S 432-053
(4) Connect the electrical connector (9) and the clamp (10).

S 712-054
(5) Do a test on the installation of the alternate drive motor in the Operational Test for the Components of the TE Flap PDU.

I. Install the Bypass Valve

S 422-055
(1) Put the bypass valve (16) in its position and attach it to the PDU with three mounting bolts (17) and washers (18).

S 092-056
(2) Remove the plugs from the bypass valve ports and the caps from the hydraulic lines.

S 642-057
(3) Lubricate the fittings and packing O-rings with Skydrol assembly lube or hydraulic fluid.

S 432-058
(4) Connect the three hydraulic lines (15).

S 432-059
(5) Install the electrical plug and safety it to the valve connector (14) with a wire.

S 712-060
(6) Do a test on the bypass valve installation in the Operational Test for the Components of the TE Flap PDU.

J. Install the Position Transmitter

NOTE: To adjust the position transmitter, you must extend the flaps to the 20-unit position (by hydraulic power) from a position between the fully retracted and the 20-unit positions.

S 092-061
(1) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-062

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-064
(3) Move the flap control lever to the 20-unit detent and let the flaps move to the 20-unit position.

S 862-065
(4) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-066
(5) Install a PDU lock on the TE flap PDU (Fig. 203).

S 092-067

WARNING: WHEN YOU REMOVE THE SHIPPING RIG TOOL FROM THE POSITION TRANSMITTER, LIFT THE SHIPPING RIG TOOL IN A STRAIGHT LINE OFF THE POSITION TRANSMITTER SHAFT. DO NOT PULL THE SHIPPING RIG TOOL OFF THE POSITION TRANSMITTER ARM WITH FORCE. THIS WILL CAUSE THE SHAFT OF THE POSITION TRANSMITTER TO BEND.

(6) Remove the rig tool, if it is installed.

S 822-069
(7) Turn the input shaft on the transmitter, if it is necessary, to put the rigging mark in in the center of the window (Fig. 202).

NOTE: Do not turn the input shaft more than five turns to see the mark.

S 822-070
(8) Align the mark on the input shaft with the mark on the housing.

S 422-068

CAUTION: BE CAREFUL WHEN YOU INSTALL THE POSITION TRANSMITTER. THE INPUT SHAFT FOR THE PDU CAN EASILY BE BENT.

(9) Without a turn to the shaft, install the transmitter with the rigging window pointed down (View A-A).

NOTE: No drive system movement is permitted during the transmitter adjustment.

S 862-071
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(d) 11G22, FLAP SLAT ELEC UNIT 3 CONT

(e) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(f) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(g) 11J18, FLAP LOAD RELIEF
(h) 11J33, WARN ELEX A

S 712-072
(11) Adjust and do a test on the position transmitter for the TE flap PDU (AMM 27-58-01/501).

K. Operational Component Test for the Components of the TE Flap PDU

NOTE: Refer to AMM 27-58-01/501 to do a test on the position transmitter installation.

This topic contains the operational tests for the TE Flap PDU components: the hydraulic motor, the alternate drive motor, and the bypass valve. Because this topic contains three operational tests, only the applicable group of steps must be done.

To start one of these operational tests, do the group of steps that is necessary to prepare for the test. Then, do the applicable group of steps to do a test on the installation of the component.

S 702-017
(1) Do these steps to prepare for the operational test:
(a) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.
(b) Remove the DO-NOT-OPERATE tag from the flap control lever.
(c) Remove the PDU lock from the TE flap PDU (Fig. 203).
(d) Supply electrical power (AMM 24-22-00/201).
(e) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).
(f) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.
(g) Make sure the six EICAS circuit breakers on the P11 panel are closed.
(h) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11G21, FLAP SLAT ELEC UNIT 3 POWER
4) 11G22, FLAP SLAT ELEC UNIT 3 CONT
5) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
6) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
7) 11J18, FLAP LOAD RELIEF
8) 11J33, WARN ELEX A

(i) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
1) 6D20, ALTN SLAT PWR
2) 6D23, ALTN FLAP PWR

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(j) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 712-018
(2) Do these steps to do a test on the hydraulic motor installation:
(a) Move the flap control lever to the 1-unit detent, and let the flaps move to the 1-unit position and the slats move to the intermediate position.
1) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.
(b) Move the flap control lever to the 5-unit detent, and let the flaps move to the 5-unit position.
1) Make sure the flaps move to the 5-unit position in less than 12-14 seconds from the time you moved the flap control lever.
2) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.
(c) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats move to the fully retracted position.
1) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.

S 712-019
(3) Do these steps to do a test on the alternate drive motor installation:
(a) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).
(b) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent and do these checks:
1) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the UP-unit position.
2) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(c) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 30-unit position and do these checks:
  1) Make sure the slats extend fully in less than 85 seconds.
  2) Make sure the flaps extend fully in less than 210 seconds.
  3) Make sure the L and R needles on the flap position indicator are in the tolerance band of the 30-unit position.
  4) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.

(d) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent and do these checks:
  1) Make sure the flaps and slats retract to the UP position.
  2) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.

(e) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.

(f) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

S 712-020

(4) Do these steps to do a test on the bypass valve installation:

(a) Open these circuit breakers on the P11 panel, and install DO-NOT-CLOSE tags:
  1) 11C17, FLAP SLAT SHUTOFF 1
  2) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

(b) Move the flap control lever to the 5-unit detent, and let the flaps start to move to the 5-unit position and the slats start to move to the intermediate position.
  1) Push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on), and make sure the flaps and slats stop their movement.

(c) Push the arming switch for the flap alternate drive, on the P3 panel, to disarm the flap alternate drive (switch light will go off).
  1) Make sure the flaps move to the 5-unit position and the slats move to the intermediate position.

(d) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

(e) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
  1) 11C17, FLAP SLAT SHUTOFF 1
  2) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

(f) Make sure there are no leaks at the hydraulic connections of the TE flap PDU.

L. Put the Airplane Back to Its Usual Condition

S 412-021

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-022

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-023

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

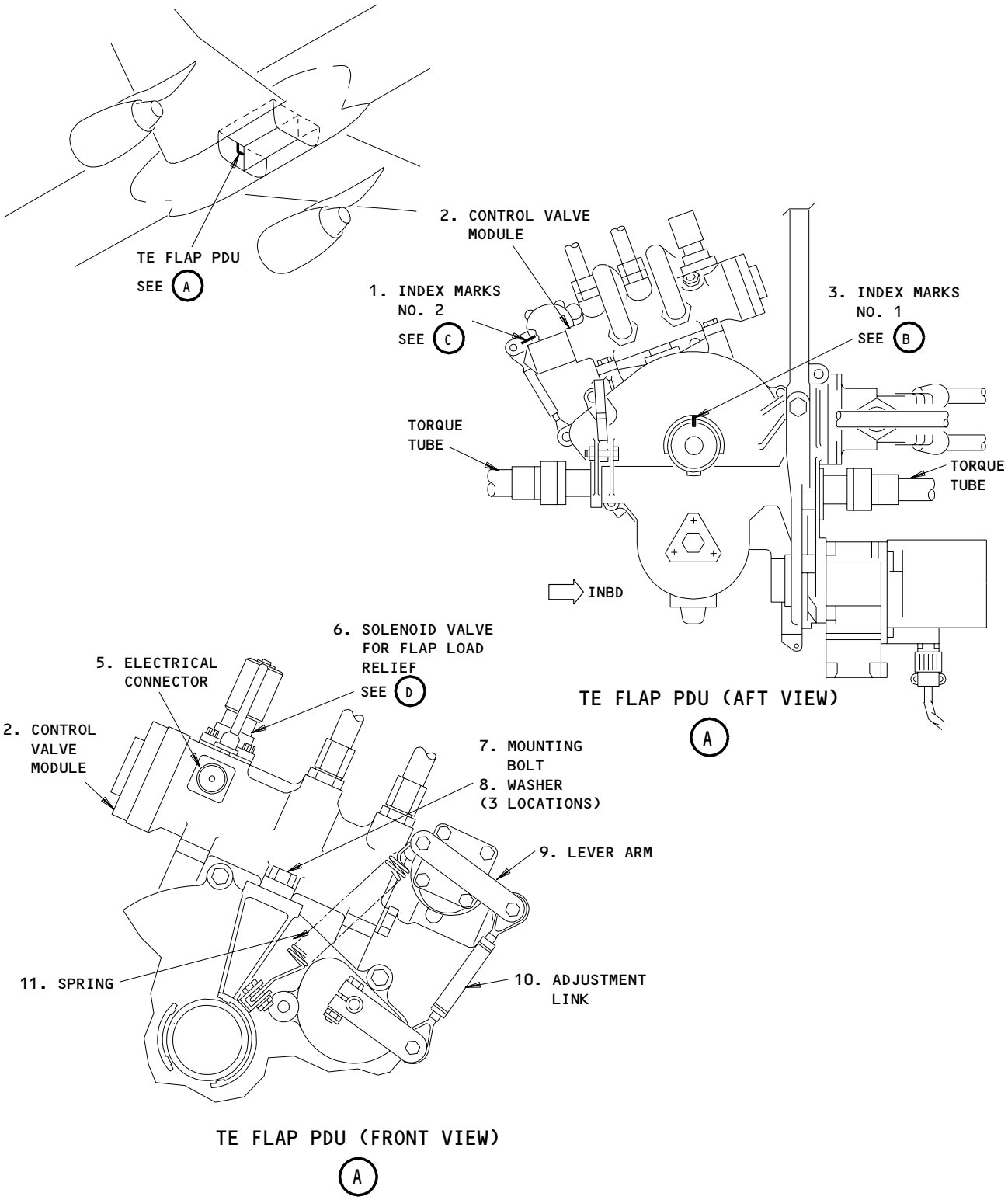
TRAILING EDGE FLAP POWER DRIVE UNIT CONTROL VALVE MODULE AND COMPONENTS - MAINTENANCE PRACTICES

1. General
   A. This procedure has these tasks:
      (1) A removal of the trailing edge flap PDU control valve module
      (2) An installation of the trailing edge flap PDU control valve module
      (3) A removal of the trailing edge flap load relief solenoid valve
      (4) An installation of the trailing edge flap load relief solenoid valve
      (5) A removal of the trailing edge flap load relief solenoid valve coil
      (6) An installation of the trailing edge flap load relief solenoid valve coil
      (7) A test of the components of the Control Valve Module

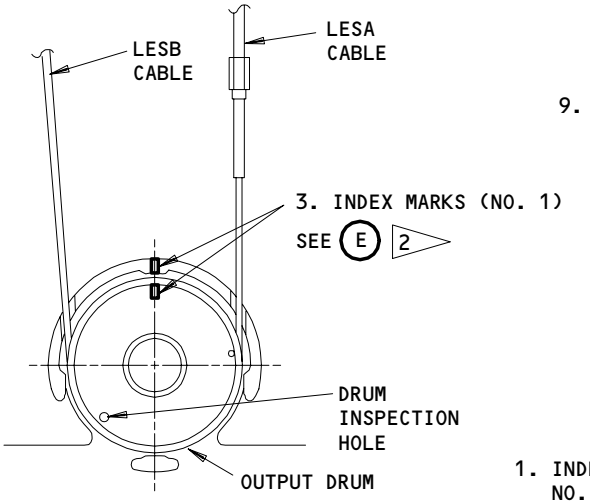
   TASK 27-51-28-022-001

2. Control Valve Module Removal (Fig. 201)
   A. General
      (1) This task includes the removal of the control valve module as a unit. The module is located on the top of the trailing edge flap PDU.
   B. Equipment
      (1) Rig Pin from Set - B20003-XX
          (AMM 20-10-24/201).
          (a) Rig Pin LE1 - B20003-3
      (2) TE Flap PDU Lock - B27008-1
      (3) TE Flap Torque Tube Clamps from Set - B27055-1:
          (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
          (b) Inboard Flap Torque Tube Clamp - P/N B27055-3
   C. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 20-10-03/401, Control Cables - Removal/Installation
      (3) AMM 20-10-24/201, Rig Pins
      (4) AMM 24-22-00/201, Electrical Power - Control
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlock
   D. Access
      (1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

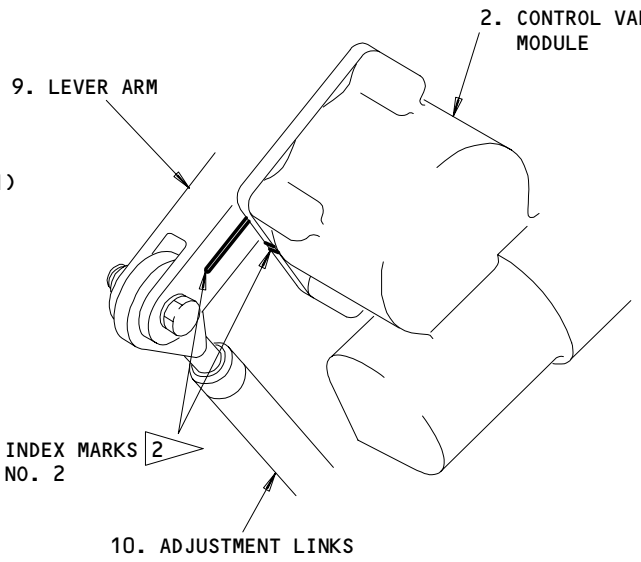


Control Valve Module for the TE Flap PDU
Figure 201 (Sheet 1)



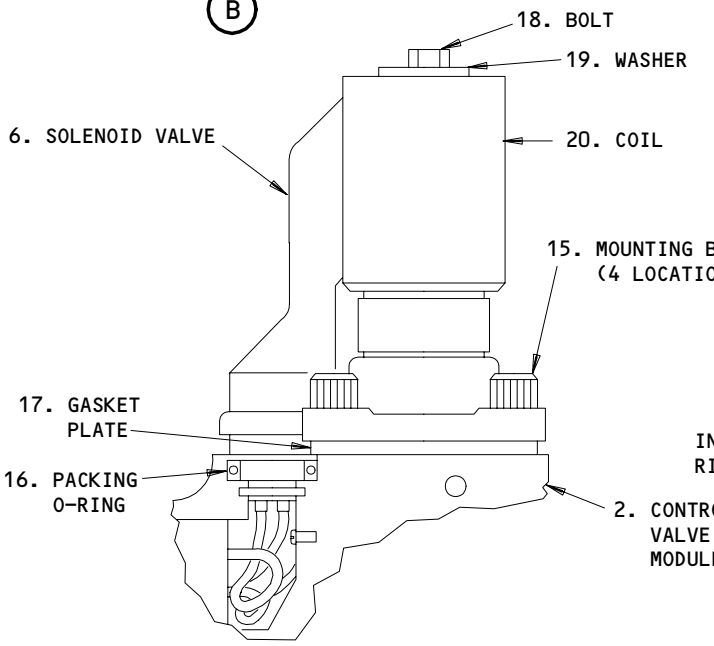
INDEX MARK NO. 1

(B)



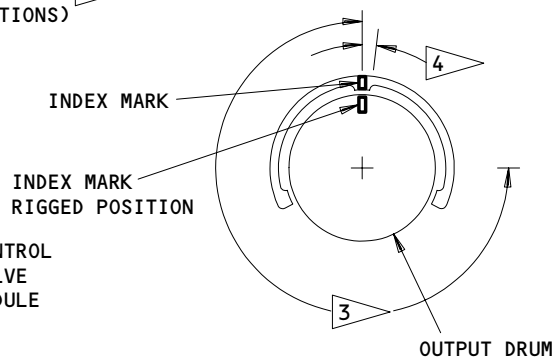
INDEX MARK NO. 2

(C)



SOLENOID VALVE FOR FLAP LOAD RELIEF

(D)



INDEX MARKS (NO.1)

(E)

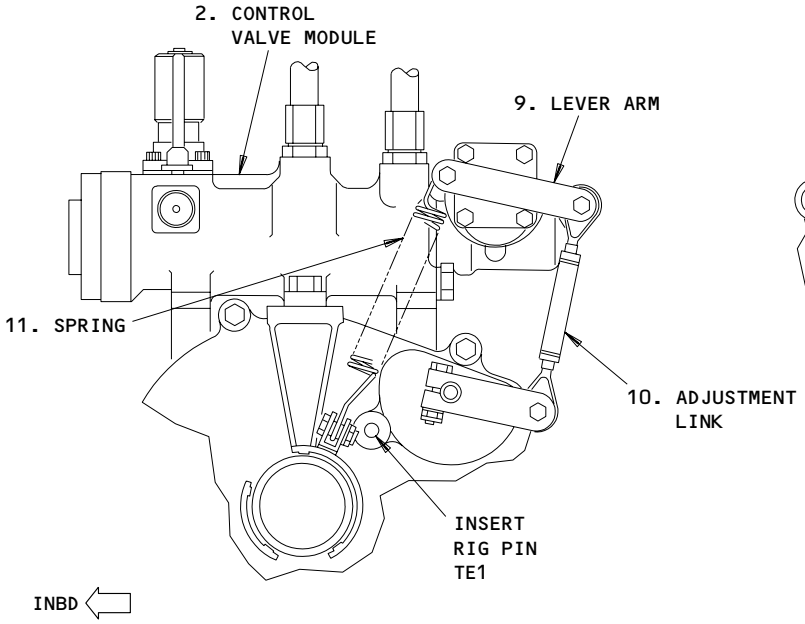
1. LOCK THE BOLTS TO EACH OTHER WITH WIRE (DOUBLE TWIST) IN PAIRS.

2. ADJUST THE COMPONENTS AS SPECIFIED IN THE PDU INSTALLATION PROCEDURE

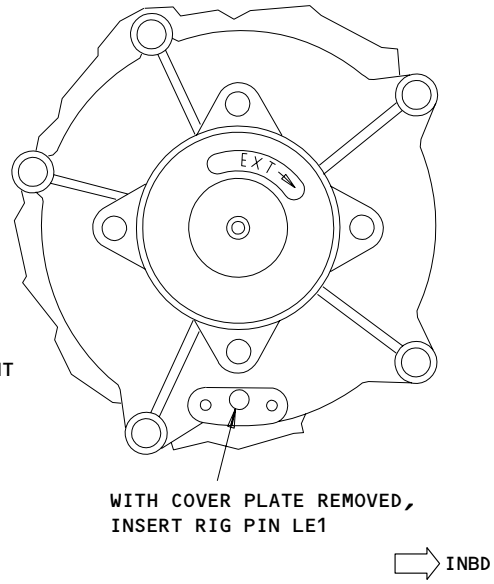
3. IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, MANUALLY TURN THE PDU OUTPUT SHAFT UNTIL THE OUTPUT DRUM TURNS CLOCKWISE TO ALIGN THE INDEX MARKS

4. IF THE INDEX MARK ON THE OUTPUT DRUM IS IN THIS AREA, MANUALLY TURN THE PDU OUTPUT SHAFT UNTIL THE OUTPUT DRUM TURNS COUNTER CLOCKWISE TO ALIGN THE INDEX MARKS

Control Valve Module for the TE Flap PDU
Figure 201 (Sheet 2)



TE1 RIG PIN LOCATION
TE FLAP PDU
(FRONT VIEW)



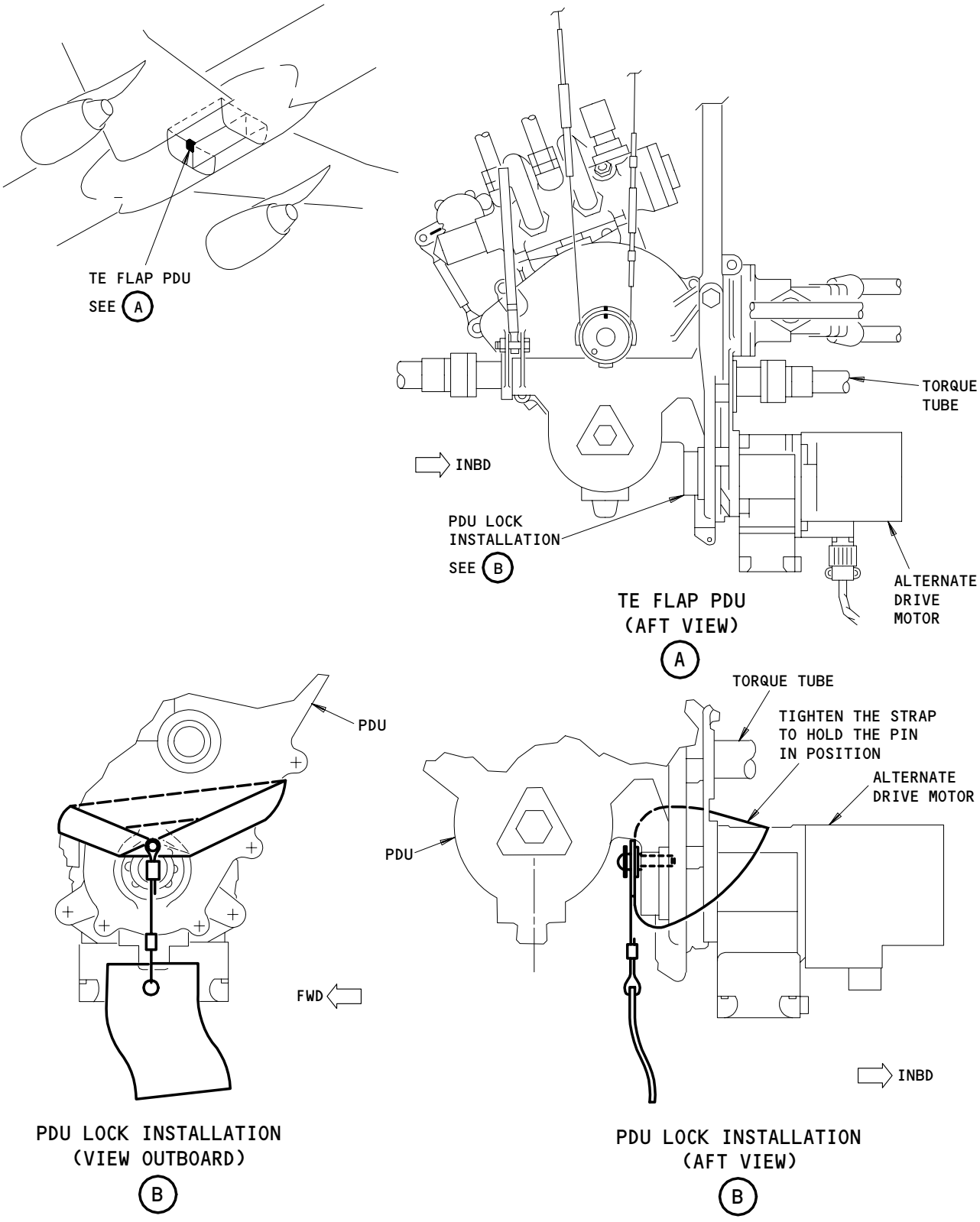
LE1 RIG PIN LOCATION
LE SLAT PDU
(AFT VIEW)

RIG LOADS FOR THE FLAP AND SLAT CABLES	
TEMP °F (°C) ±5°F (±3°C)	WFA, WFB, LESA, LESB ±10 LBS (±4.5 Kgs)
110 (43)	118 (53)
90 (32)	109 (49)
80 (26)	104 (47)
70 (21)	100 (45)
60 (15)	96 (43)
50 (10)	92 (41)
40 (4.4)	88 (39)
30 (-1.1)	84 (38)
10 (-12)	75 (34)
-10 (-23)	67 (30)
-30 (-34)	59 (26)
-40 (-40)	53 (24)

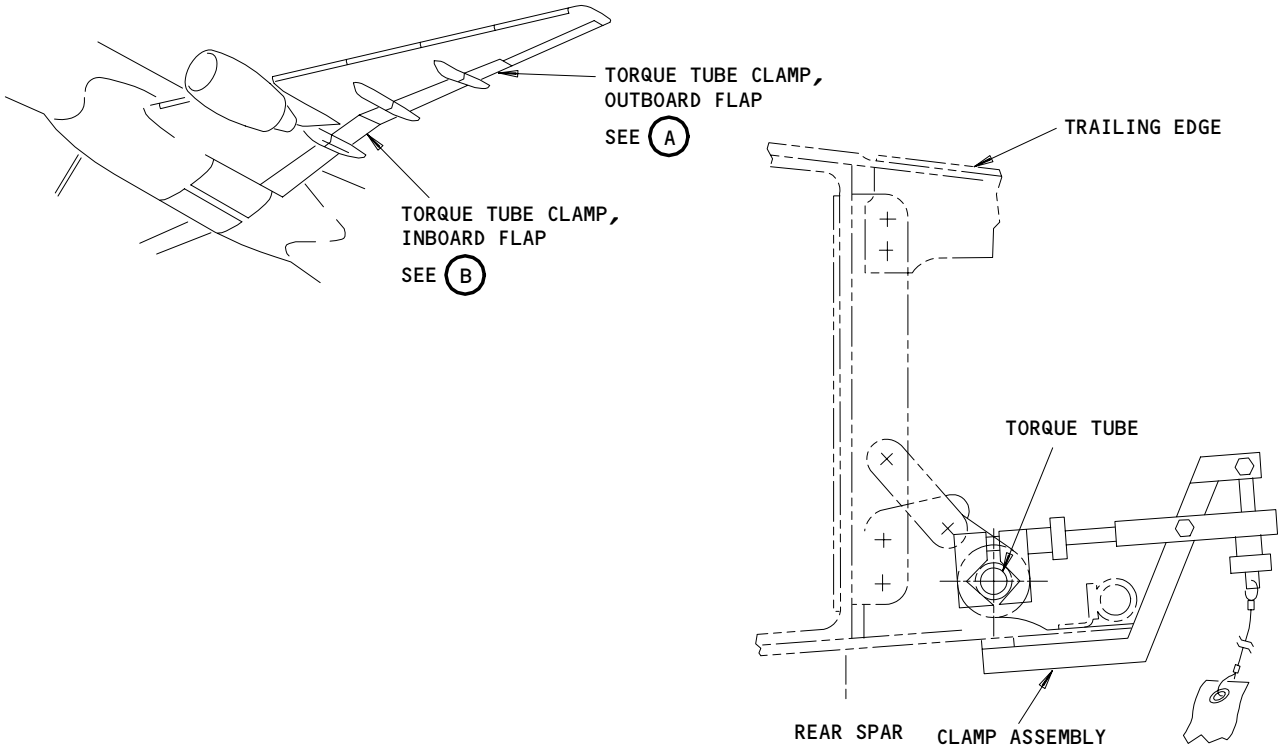
TABLE I

NOTE: CABLE TENSION VALUES WILL NOT BE CORRECT WHEN TEMPERATURE DIFFERENCES ALONG THE CABLE RUN EXCEED 5°F (3°C). AIRCRAFT/AMBIENT TEMPERATURES MUST BE STABLE FOR ONE HOUR BEFORE YOU RIG THE PDU.

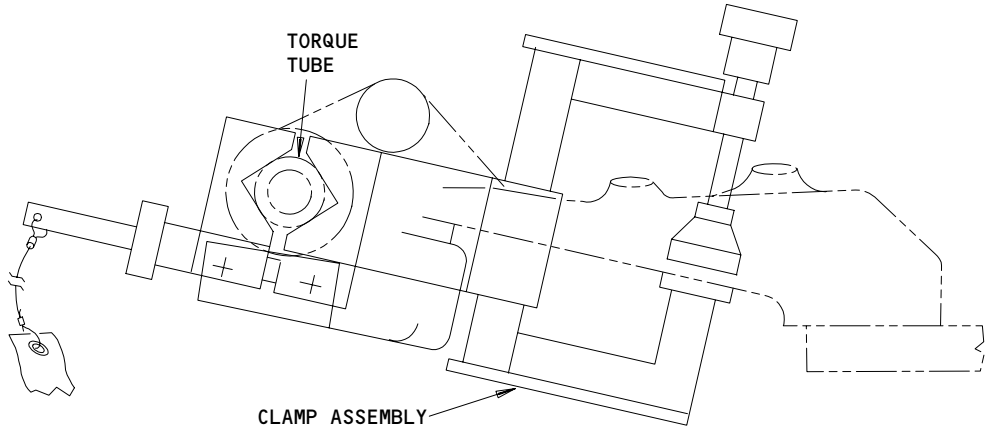
TE Flap PDU
Figure 202



PDU Lock for the TE Flap PDU
Figure 203

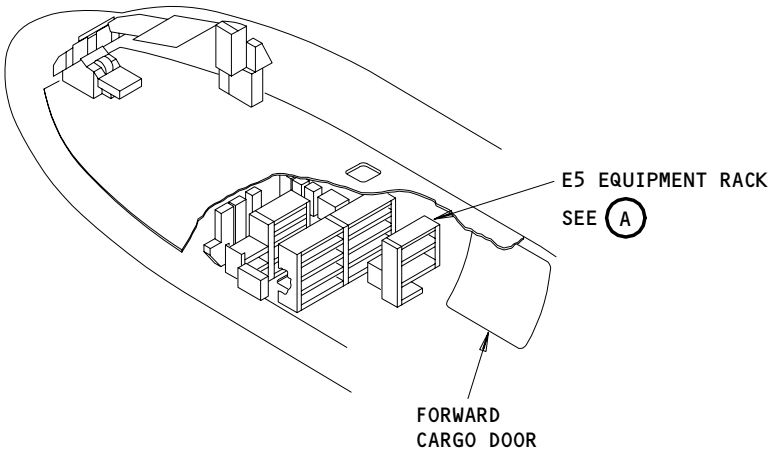


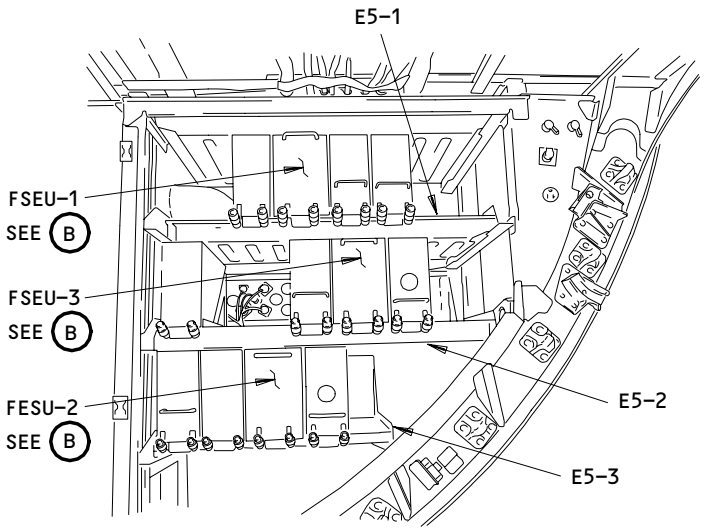
TORQUE TUBE CLAMP,
OUTBOARD FLAP
A



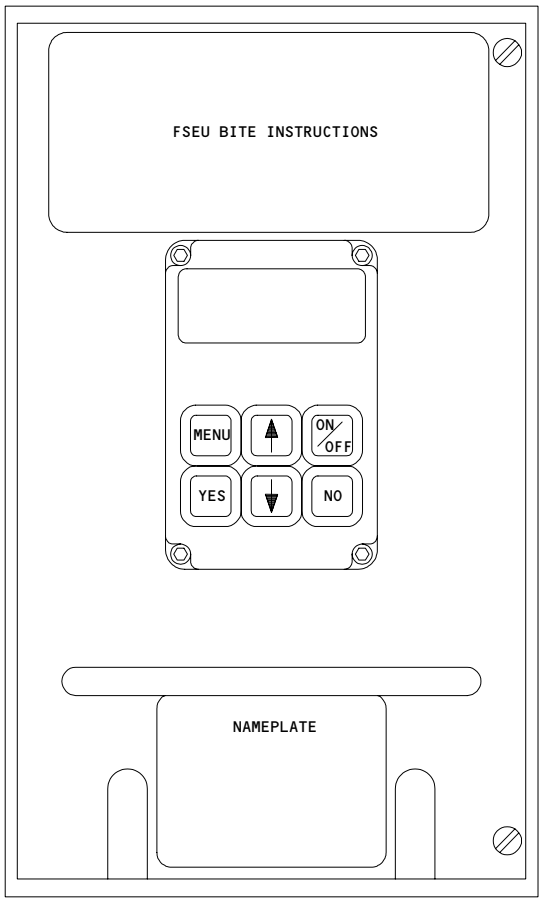
TORQUE TUBE CLAMP,
INBOARD FLAP
B

Torque Tube Clamp
Figure 204





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 205

(2) Access panels
193BL Leading Edge Slat PDU

E. Prepare for the Removal

S 212-002
(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 492-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-004
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-006
(5) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C17, FLAP SLAT SHUTOFF 1
(d) 11D31, HYDRAULICS PTU CONT
(e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(g) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(h) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(i) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(j) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(k) 11J18, FLAP LOAD RELIEF
(l) 11J33, WARN ELEX A

S 862-007
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-008
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 012-009
(8) Get access to the LE slat PDU at the inboard leading edge of the left wing through access panel, 193BL (AMM 06-44-00/201).

S 492-010
(9) Remove the cover plate and put rig pin LE1 in the input cam of the LE slat PDU (Fig. 202).

F. Control Valve Module Removal

S 022-011
(1) Do these steps to remove the control valve module from the PDU:
(a) Install a clamp on the torque tubes adjacent to the PDU to prevent a turn (Fig. 204).
(b) Disconnect the torque tubes at the TE flap PDU.
(c) Disconnect the LESA and LESB cables from the flap PDU at the turnbuckles (AMM 20-10-03/401).
(d) Use a clamp on the cables to make sure they do not fall off the pulleys.
(e) Disconnect the electrical connector (5).
(f) Disconnect the four hydraulic lines from the control valve module (2).
1) Seal the hydraulic lines with a cap.
2) Seal the PDU ports with a plug.
(g) Disconnect the spring (11) from the lever arm (9).
(h) Disconnect the adjustment link (10) from the lever arm (9).
(i) Remove the three mounting bolts (7) and washers (8) that hold the control valve module to the PDU.
(j) Remove the control valve module (2).
(k) If you install a new control valve module (2), remove the lever arm (9) from the control valve module you removed to install it on the new control valve module.

NOTE: Monitor the position of the open space on the spline to help you when you install the control valve module.

TASK 27-51-28-422-152

3. Control Valve Module Installation (Fig. 201)

A. General
(1) This task includes the installation of the control valve module as a unit. The control valve module is located on the top of the trailing edge flap PDU.

B. Equipment
(1) Rig Pin from Set - B20003-XX
(AMM 20-10-24/201):
(a) Rig Pin LE1 - B20003-3
(2) T.E. Flap PDU Lock - B27008-1
(3) TE Flap Torque Tube Clamps from Set - B27055-1:
(a) Outboard Flap Torque Tube Clamp -
P/N B27055-2

(b) Inboard Flap Torque Tube Clamp - P/N B27055-3

C. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) D00054 Skydrol Assembly Lube - MCS 352B
(5) D00153 Hydraulic Fluid - Fire Resistant - BMS 3-11

D. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	2	Control Valve Module	27-51-26	01	350
	6	Flap Load Relief Solenoid Valve			355
	16	Packing (O-ring)			375,495
	17	Gasket Plate			365,490

E. References
(1) AMM 20-10-03/401, Control Cables - Removal/Installation
(2) AMM 20-10-24/201, Rig Pins
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 27-51-27/201, Trailing Edge Flap Power Drive Unit Components
(5) AMM 27-81-00/201, Leading Edge Slat System
(6) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(7) AMM 32-00-15/201, Landing Gear Door Locks

F. Access
(1) Location Zones
119/120 Main Equipment Center
143 MLG Wheel Well (Left)
211/212 Control Cabin
710 Nose Landing Gear and Doors
730/740 Main Landing Gear and Doors

(2) Access Panels
193BL Leading Edge Slat PDU

G. Control Valve Module Installation

S 862-153

(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-154

(2) Make sure the flap/slat alternate drives are off.

S 422-155

(3) Do these steps to install the control valve module:
  (a) If it is necessary, install the lever arm (9).
  (b) Put the open space on the spline in the position that you monitored during the removal procedure.
  (c) Install the control valve module (2) with three mounting bolts (7) and washers (8).
  (d) Connect the adjustment link (10) to the lever arm (9).
  (e) Connect the spring (11) to the lever arm (9).
  (f) Remove the plugs and caps from the hydraulic lines and ports.
  (g) Lubricate the packing O-rings and the fittings with hydraulic fluid or Skydrol assembly lube.
  (h) Connect the hydraulic lines to the control valve module (2).
  (i) Connect the electrical connector (5) to the control valve module (2).

S 202-156

(4) Put a straight 0.032-inch (0.813 mm) diameter wire into the drum inspection hole to see if there is damage to the output drum.

NOTE: There is no damage to the output drum if you can easily push the wire in 1.00 inch (25.4 mm).

S 862-157

CAUTION: DO NOT TURN THE PDU BACK WITH POWER. IN OTHER WORDS, DO NOT BACKDRIVE THE PDU WITH POWER. THIS CAN CAUSE DAMAGE TO THE INTERNAL MECHANISMS.

(5) Turn the PDU back manually until the index marks (No. 1) align.

NOTE: To align the index marks (No. 1), turn the PDU output drum until the index mark on output drum moves in the direction shown (View E).

S 822-158

(6) Adjust the adjustment link (10) to align the lever arm (9) with the index marks No. 2.

S 012-159
(7) Remove the access panel, 193BL (AMM 06-44-00/201).

S 862-160
(8) Put the manual override lever for the bypass valve of the LE slat PDU to the POS 1 (bypass) position (AMM 27-81-00/201).

S 862-161

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 822-162
(10) Adjust the adjustment link (10) until the index marks (No. 1) align.

NOTE: You can ignore the No. 2 index marks.

S 432-163
(11) Tighten the jamnuts on the adjustment link (10) and examine the index marks (No. 1) again.

S 202-164
(12) Put a straight 0.032-inch diameter wire into the drum inspection hole (View B) to see if there is damage to the output drum.

NOTE: There is no damage to the output drum is you can easily push the wire in 1.00 inch (25.4 mm).

S 862-165
(13) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-166
(14) Install a PDU lock on the TE flap PDU (Fig. 203).

S 862-167
(15) Put the manual override lever for the bypass valve of the LE slat PDU to the POS 2 (normal) position (AMM 27-81-00/201).

S 412-168
(16) Install the access panel, 193BL (AMM 06-44-00/201).

S 432-169
(17) Connect and adjust the LESA and LESB cables as shown in Table 1, Fig. 202.

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

S 202-170
(18) Make sure that rig pin LE1 can be easily installed in the LE slat PDU.

S 432-171
(19) Do these steps to connect the torque tubes to the TE flap PDU:
(a) Apply grease to the internal and external surfaces of the splines of the torque tube coupling.
(b) Connect the torque tubes to the PDU.
(c) Install the coupling screws and safety them with wire.
(d) Remove the clamps from the torque tubes (Fig. 204).
(e) Fill the spline couplings with grease through three grease fittings on each spline.

S 092-172
(20) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-173

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(21) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-174
(22) Move the flap control lever to the 20-unit detent and let the flaps move to the 20-unit position and the slats move to the intermediate position.

S 862-175
(23) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-176
(24) Install a PDU lock on the TE flap PDU (Fig. 203).

S 822-177
(25) Adjust the position transmitter for the TE flap PDU (AMM 27-51-27/201).

S 092-178
(26) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-179

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(27) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-180
(28) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats move to the fully retracted position.

S 862-181
(29) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 712-182
(30) Do a test on the installation of the control valve module in the Control Valve Module Component Test.

H. Put the Airplane Back to Its Usual Condition

S 412-219

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-220
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-221
(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-28-022-070

4. Flap Load Relief Solenoid Valve Removal (Fig. 201)

A. General

(1) This task includes the removal of the flap load relief solenoid valve. The valve is located on the top of the trailing edge flap PDU control valve module.

B. Equipment

(1) TE Flap PDU Lock - B27008-1
(2) TE Flap Torque Tube Clamps from Set - B27055-1:
(a) Outboard Flap Torque Tube Clamp - P/N B27055-2
(b) Inboard Flap Torque Tube Clamp - P/N B27055-3

C. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks
(4) AMM 32-00-20/201, Landing Gear Downlock

D. Access

(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Removal

S 212-071
(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 492-072
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-073

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-074

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-075

(5) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
   (c) 11C17, FLAP SLAT SHUTOFF 1
   (d) 11D31, HYDRAULICS PTU CONT
   (e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
   (g) 11G22, FLAP SLAT ELEC UNIT 3 CONT
   (h) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
   (i) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (j) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
   (k) 11J18, FLAP LOAD RELIEF
   (l) 11J33, WARN ELEX A

S 862-076

(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 862-077

(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

F. Flap Load Relief Solenoid Valve Removal

S 022-024

(1) Do these steps to remove the solenoid valve (6):
   (a) Remove the wire that locks the four mounting bolts (15).
   (b) Remove the four mounting bolts (15).
   (c) Pull the solenoid valve (6) away from the control valve module (2).
   (d) Remove the solenoid valve (6).

TASK 27-51-28-422-183

5. Flap Load Relief Solenoid Valve Installation (Fig. 201)

A. General

(1) This task includes the installation of the flap load relief solenoid valve. The valve is located on the top of the trailing edge flap PDU control valve module.

B. Equipment

(1) T.E. Flap PDU Lock - B27008-1
(2) TE Flap Torque Tube Clamps from Set - B27055-1:
   (a) Outboard Flap Torque Tube Clamp - P/N B27055-2
   (b) Inboard Flap Torque Tube Clamp - P/N B27055-3

C. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Control Valve Module	27-51-26	01	350
	6	Flap Load Relief Solenoid Valve			355
	16	Packing (O-ring)			375,495
	17	Gasket Plate			365,490

D. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks

E. Access
(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Flap Load Relief Solenoid Valve Installation

S 862-184
(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-185
(2) Make sure the flap/slat alternate drives are off.

S 422-186
(3) Do these steps to install the solenoid valve:
(a) Lubricate the packing O-ring (16) with hydraulic fluid.
(b) Apply hydraulic fluid to each side of a new gasket (17).
(c) Install the solenoid valve (6).

S 712-217
(4) Do the test on the solenoid valve installation in the Control Valve Module Component Test.

G. Put the Airplane Back to Its Usual Condition

S 412-222

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-223
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-224
(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-28-022-090

6. Flap Load Relief Solenoid Valve Coil Removal (Fig. 201)

A. General

(1) This task includes the removal of the flap load relief solenoid valve coil. The valve is located on the top of the trailing edge flap PDU control valve module.

B. Equipment

(1) TE Flap PDU Lock - B27008-1

(2) TE Flap Torque Tube Clamps from Set - B27055-1:

(a) Outboard Flap Torque Tube Clamp - P/N B27055-2

(b) Inboard Flap Torque Tube Clamp - P/N B27055-3

C. References

(1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(2) AMM 32-00-15/201, Landing Gear Door Locks

(3) AMM 32-00-20/201, Landing Gear Downlock

D. Access

(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Removal

S 212-080

(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 492-081

(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-082

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-083

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-084

(5) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
   (a) 11B18, WARN ELEX B
   (b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
   (c) 11C17, FLAP SLAT SHUTOFF 1
   (d) 11D31, HYDRAULICS PTU CONT
   (e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
   (g) 11G22, FLAP SLAT ELEC UNIT 3 CONT
   (h) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
   (i) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (j) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
   (k) 11J18, FLAP LOAD RELIEF
   (l) 11J33, WARN ELEX A

S 862-085

(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

S 862-086
(7) Remove the power from the left hydraulic system (AMM 29-11-00/201).

F. Flap Load Relief Solenoid Valve Coil Removal

S 022-025
(1) Do these steps to remove the solenoid coil (20):
(a) Remove the wire that locks the bolt (18) in its position.
(b) Remove the seal from the solenoid coil (20).
(c) Remove the bolt (18) and the washer (19).
(d) Remove the solenoid coil (20).

TASK 27-51-28-422-091

7. Flap Load Relief Solenoid Valve Coil Installation (Fig. 201)

A. General
(1) This task includes the installation of the flap load relief solenoid valve coil. The valve is located on the top of the trailing edge flap PDU control valve module.

B. Equipment
(1) T.E. Flap PDU Lock - B27008-1
(2) TE Flap Torque Tube Clamps from Set - B27055-1:
(a) Outboard Flap Torque Tube Clamp - P/N B27055-2
(b) Inboard Flap Torque Tube Clamp - P/N B27055-3

C. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	2	Control Valve Module	27-51-26	01	350
	6	Flap Load Relief Solenoid Valve			355
	16	Packing (O-ring)			375,495
	17	Gasket Plate			365,490

D. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks

E. Access
(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Flap Load Relief Solenoid Valve Coil Installation

S 862-092
(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-093
(2) Make sure the flap/slat alternate drives are off.

S 862-030
(3) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-031
(4) Make sure the flap/slat alternate drives are off.

S 422-020
(5) Do these steps to install the solenoid coil (20):
(a) Put the solenoid coil (20) in its correct position.
(b) Attach the solenoid coil (20) to the solenoid valve (6) with a bolt (18) and a washer (19).
(c) Install the seal on the solenoid coil (20).
(d) Tighten the bolt and safety the bolt with a wire.

S 712-021

(6) Do the test on the installation of the solenoid coil in the Control Valve Module Component Test.

G. Put the Airplane Back to Its Usual Condition

S 412-225

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-226

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-227

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-28-722-218

8. Control Valve Module Component Test

A. General

(1) This task includes the test of the components of the Control Valve Module Installation.

B. Access

(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

C. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks

D. Prepare for the Test

S 212-034

(1) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 092-035

(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 862-036

(3) Supply electrical power (AMM 24-22-00/201).

S 862-037

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(4) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-038

(5) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
   (a) 11B18, WARN ELEX B
   (b) 11C17, FLAP SLAT SHUTOFF 1
   (c) 11D31, HYDRAULICS PTU CONT
   (d) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (e) 11G21, FLAP SLAT ELEC UNIT 3 POWER
   (f) 11G22, FLAP SLAT ELEC UNIT 3 CONT
   (g) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
   (h) 11H14, FLAP SLAT SHUTOFF 1
   (i) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (j) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
   (k) 11J18, FLAP LOAD RELIEF
   (l) 11J33, WARN ELEX A

S 862-039

(6) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
   (a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

S 212-040

(7) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 212-041

(8) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 212-042

(9) Make sure the six EICAS circuit breakers are closed on the P11 panel.

E. Control Valve Module Component Test

S 712-013

(1) Do these steps to do a test on the control valve module installation:

NOTE: If the control valve module was removed and installed, do the position transmitter test and the control valve module test. If the solenoid coil or the solenoid valve was removed and installed, do the test for the control valve module.

(a) Do a test on the Position Transmitter for the TE flap PDU

1) Move the flap control lever to the 20-unit detent, and let the flaps move to the 20-unit position and the slats move to the intermediate position.

a) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 20-unit position.

(b) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on when you do the test.

1) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

2) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 25-unit detent.
   a) Make sure the flaps move to the 25-unit position and the slats move to the fully extended position.
   b) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.
3) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent.
   a) Make sure the flaps and the slats move to the UP position.
4) Move the flap control lever to the zero (FLAPS UP) detent.
5) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.
6) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

(c) Do a test on the Control Valve Module
1) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
   a) Stop in each detent and make sure the flaps and slats move to the correct position.
   b) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and no EICAS data shows on the display.
2) Move the flap control lever to the 30-unit detent, and let the flaps and slats extend fully.
3) Remove the power from the left hydraulic system (AMM 29-11-00/201).
4) Install a PDU lock on the TE flap PDU (Fig. 203).
5) Make sure no overload indicators for the flap transmission came on.

NOTE: An overload indicator that is on will show above the adjacent surface.

6) Remove the PDU lock from the TE flap PDU (Fig. 203).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

7) Pressurize the left hydraulic system (AMM 29-11-00/201).
8) Push and hold the FLA TEST switch.

NOTE: You can find the test switch immediately through the access door for the E/E bay.

a) Make sure the flaps retract to the 25-unit position.
b) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.

9) Release the FLA TEST switch.
a) Make sure the flaps extend to the 30-unit position.
b) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 30-unit position.

10) Move the flap control lever to the 5-unit detent, and let the flaps move to the 5-unit position and the slats to the intermediate position.
11) Move the flap control lever to the 1-unit detent, and let the flaps move to the 1-unit position.
a) Make sure the flaps move to the 1-unit position in less than 12-14 seconds from the time you moved the flap control lever.

12) Move the flap control lever to the 5-unit detent, and let the flaps move to the 5-unit position.
a) Make sure the flaps move to the 5-unit position in less than 12-14 seconds from the time you moved the flap control lever.
13) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

F. Put the Airplane Back to Its Usual Condition

S 412-015

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-016
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-017
(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

FLAP/SLAT DEPRESSURIZATION MODULE AND COMPONENTS - MAINTENANCE PRACTICES

1. General

A. This procedure contains these five tasks:

- the first task removes the flap/slat depressurization module, the priority valve, the sequence valve, the solenoid valve, and the pressure switch.

- the second task installs the flap/slat depressurization module, the priority valve, the sequence valve, the solenoid valve, the pressure switch, and the shutoff valve.

- the third task is an operational test for the flap/slat depressurization module.

- the fourth task is an operational test for the flap/slat depressurization module with primary control.

- the fifth task is an operational test of the priority valve.

The fourth and fifth tasks are included in the third task. Thus, if you do the third task, it is not necessary to do tasks four and five.

TASK 27-51-29-022-001

2. Remove the Flap/Slat Depressurization Module and Components

A. General

(1) This task contains removal procedures for these six components:
- the depressurization module
- the priority valve
- the sequence valve
- the solenoid valve
- the pressure switch
- and the shutoff valve.

Because this task contains six procedures, only the applicable group of steps must be done.

To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

B. References

(1) AMM 07-11-01/201, Jacking Airplane
(2) AMM 12-12-01/301, Hydraulic Systems
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

(7) AMM 51-21-04/701, Alodine Coating

C. Access

(1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

S 212-002

(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-003

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install door locks (AMM 32-00-15/201).

S 862-004

(3) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 862-005

(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:

(a) 11C17, FLAP SLAT SHUTOFF 1
(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(c) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(d) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(e) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

E. Remove the Depressurization Module (Fig. 201)

S 032-006

(1) Remove the electrical connectors (16) and (17).

S 032-007

(2) Disconnect the hydraulic lines from the depressurization module (6 locations).

(a) Install a plug in the hydraulic lines.
(b) Install a cap in the ports on the depressurization module.

S 032-008

(3) Remove the four mounting bolts (2) and washers (3) and remove the depressurization module (1).

F. Remove the Priority Valve (Fig. 201)

S 032-009
(1) Remove the wire that locks the priority valve (9) in its position.

S 022-010
(2) Remove the seal for the priority valve (9).

S 022-011
(3) Turn the priority valve (9) and remove it from the airplane.

G. Remove the Sequence Valve (Fig. 201)

S 032-012
(1) Remove the wire that locks the sequence valve in its position.

S 022-013
(2) Remove the seal for the sequence valve.

S 022-014
(3) Turn the sequence valve (11) and remove it from the depressurization module (1).

H. Remove the Solenoid Valve (Fig. 201)

S 032-015
(1) Remove the wire that locks the solenoid valve (13) in its position.

S 032-016
(2) Remove the four mounting bolts (7).

S 022-017
(3) Pull the solenoid valve (13) and the gasket plate (8) from the depressurization module (1).

I. Remove the Pressure Switch (Fig. 201)

S 032-018
(1) Disconnect the electrical connector (16).

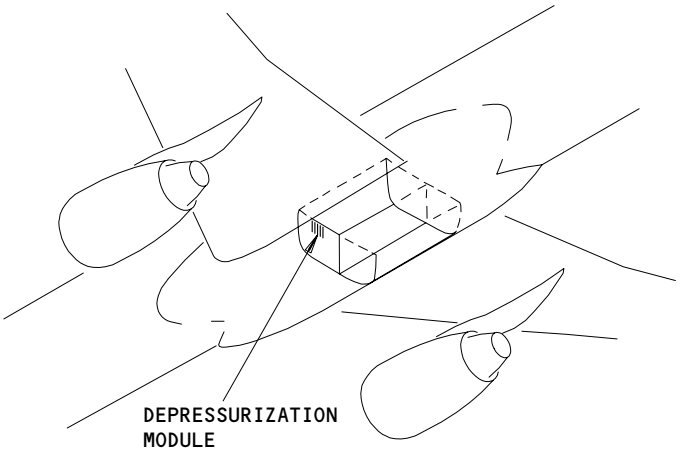
S 032-020
(2) Remove the wire that locks the pressure switch (4) in its position.

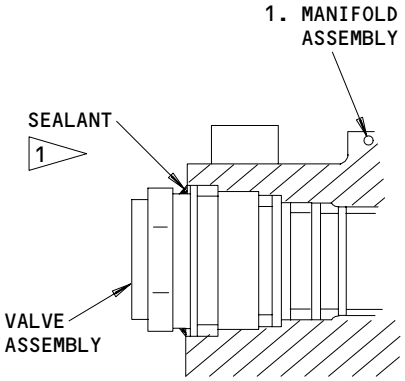
S 022-021
(3) Turn the pressure switch (4) and remove it from the depressurization module (1).

S 032-022
(4) Remove the gasket from the pressure switch (4).

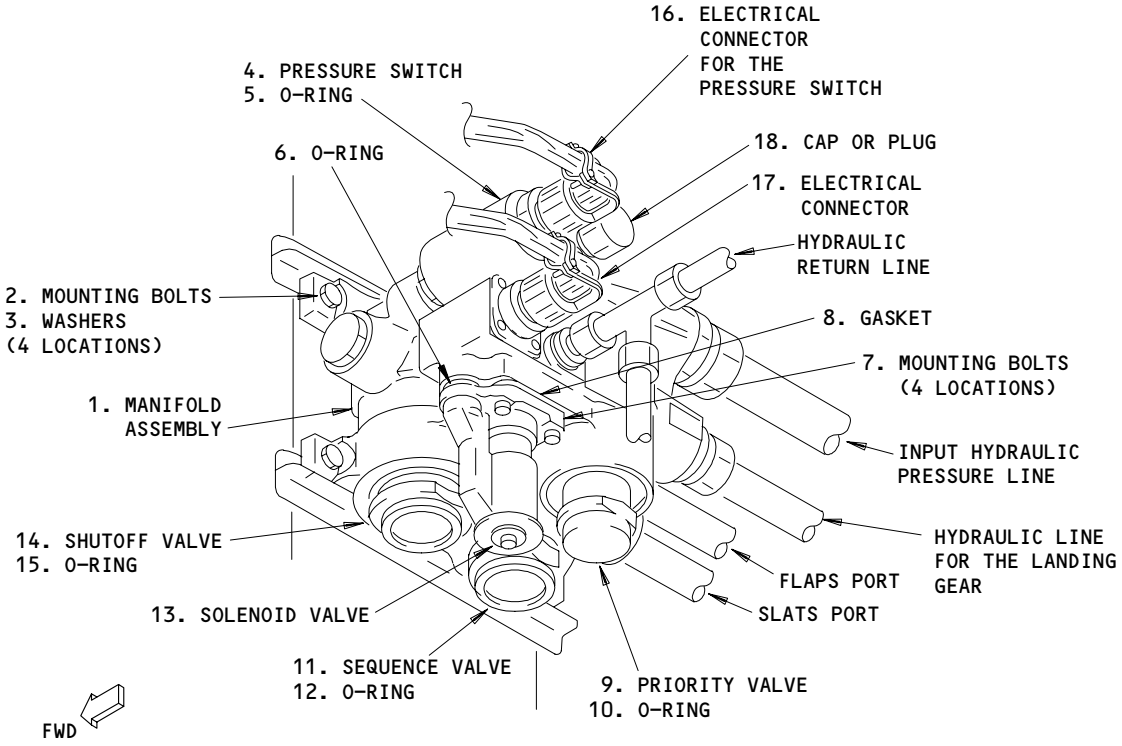
J. Remove the Shutoff Valve (Fig. 201)

S 032-023
(1) Remove the wire that locks the shutoff valve (14) in its position.





VALVE INSTALLATION
(EXAMPLE)



DEPRESSURIZATION MODULE
A

1 APPLY RTV-162 SEALANT TO FILL THE CLEARANCE BETWEEN THE VALVE ASSEMBLIES AND THE MANIFOLD

Depressurization Module
Figure 201

S 022-024

(2) Remove the seal from the shutoff valve (14).

S 022-025

(3) Turn the shutoff valve (14) and remove it from the depressurization module.

TASK 27-51-29-422-026

3. Install the Flap/Slat Depressurization Module and Components

A. General

(1) This task contains installation procedures for these six components:

- the depressurization module
- the priority valve
- the sequence valve
- the solenoid valve
- the pressure switch
- and the shutoff valve.

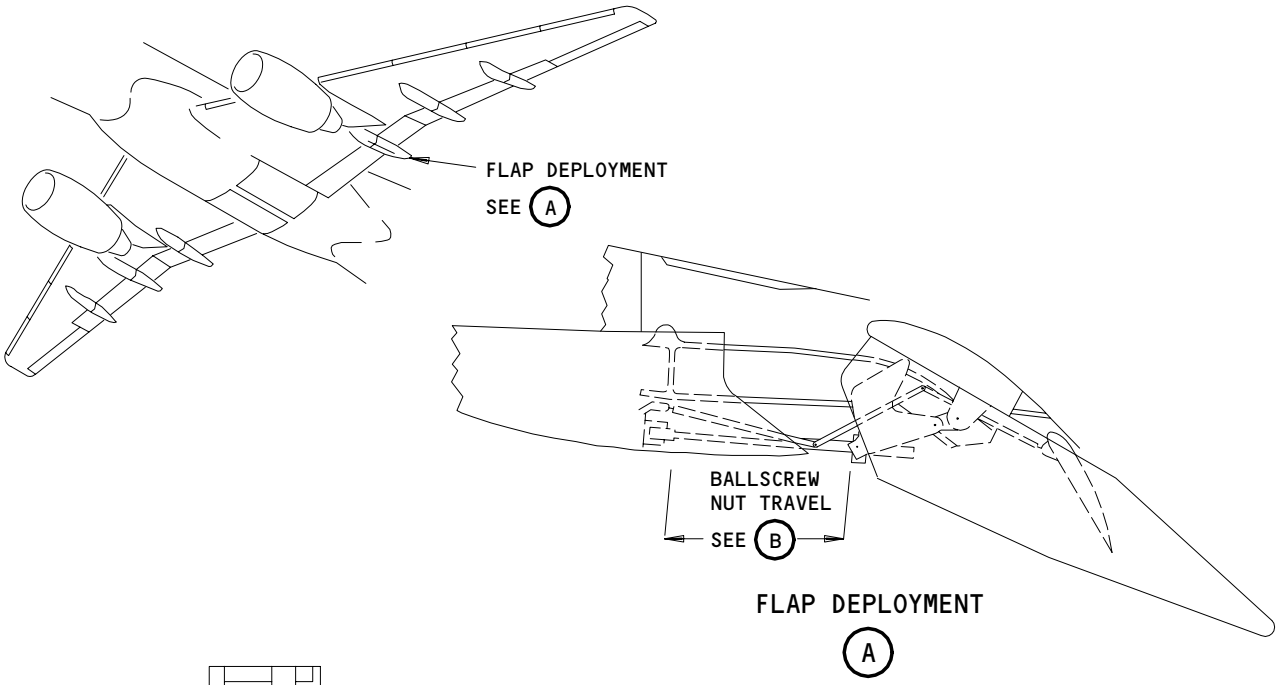
Because this task contains six procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the group of steps that is necessary to do a test on the installation of that component.

B. Equipment

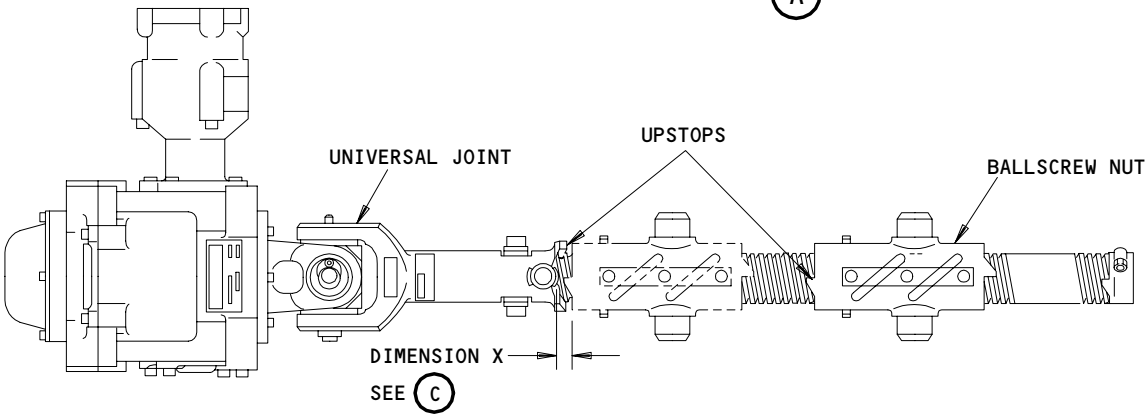
(1) Bonding Meter - Microhm Bridge, Type W Bonding Meter, Avtron Model T477W, Avtron Manufacturing Inc., Cleveland Ohio, or equivalent.

(2) Rotary Stainless Steel Brush - Commercially Available



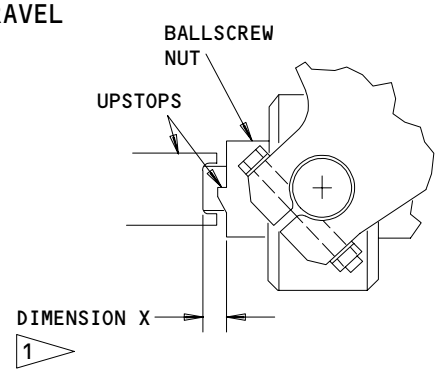
FLAP DEPLOYMENT

A



BALLSCREW NUT TRAVEL

B

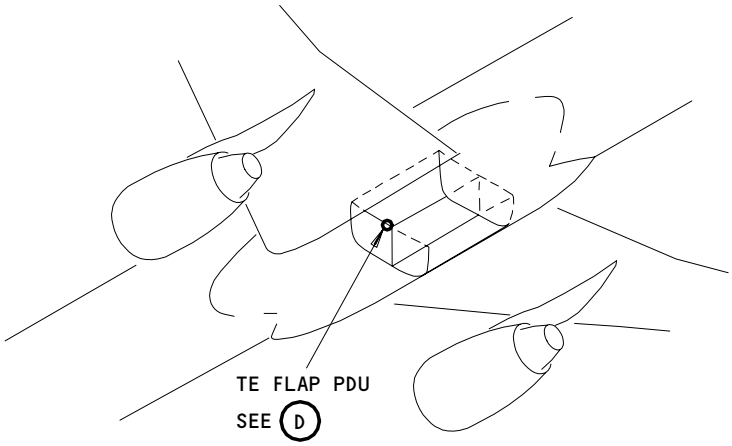


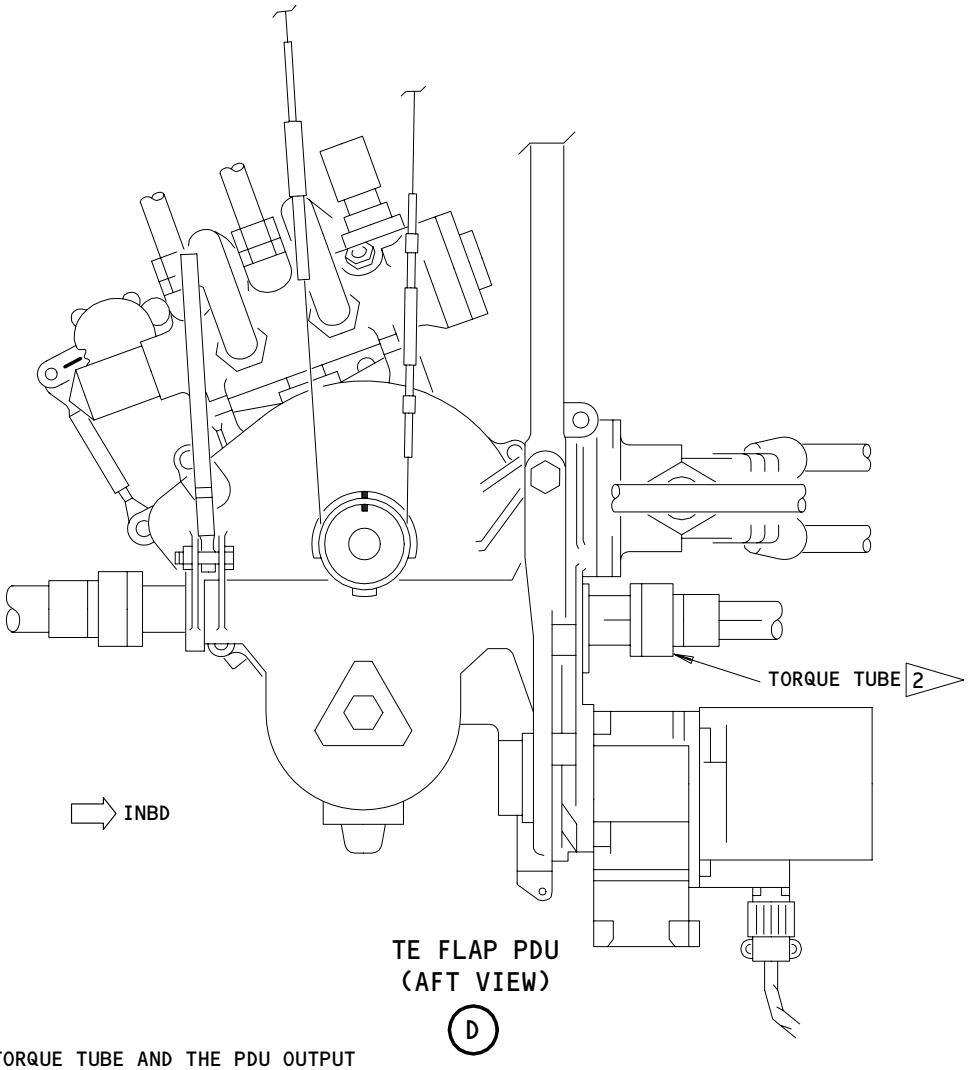
DIMENSION X

C

1 MEASURE THE DIMENSION X TO USE AS A START POINT FOR WHEN YOU MEASURE THE BALLSCREW NUT TRAVEL

Ballscrew Nut for the TE Flap
Figure 202 (Sheet 1)

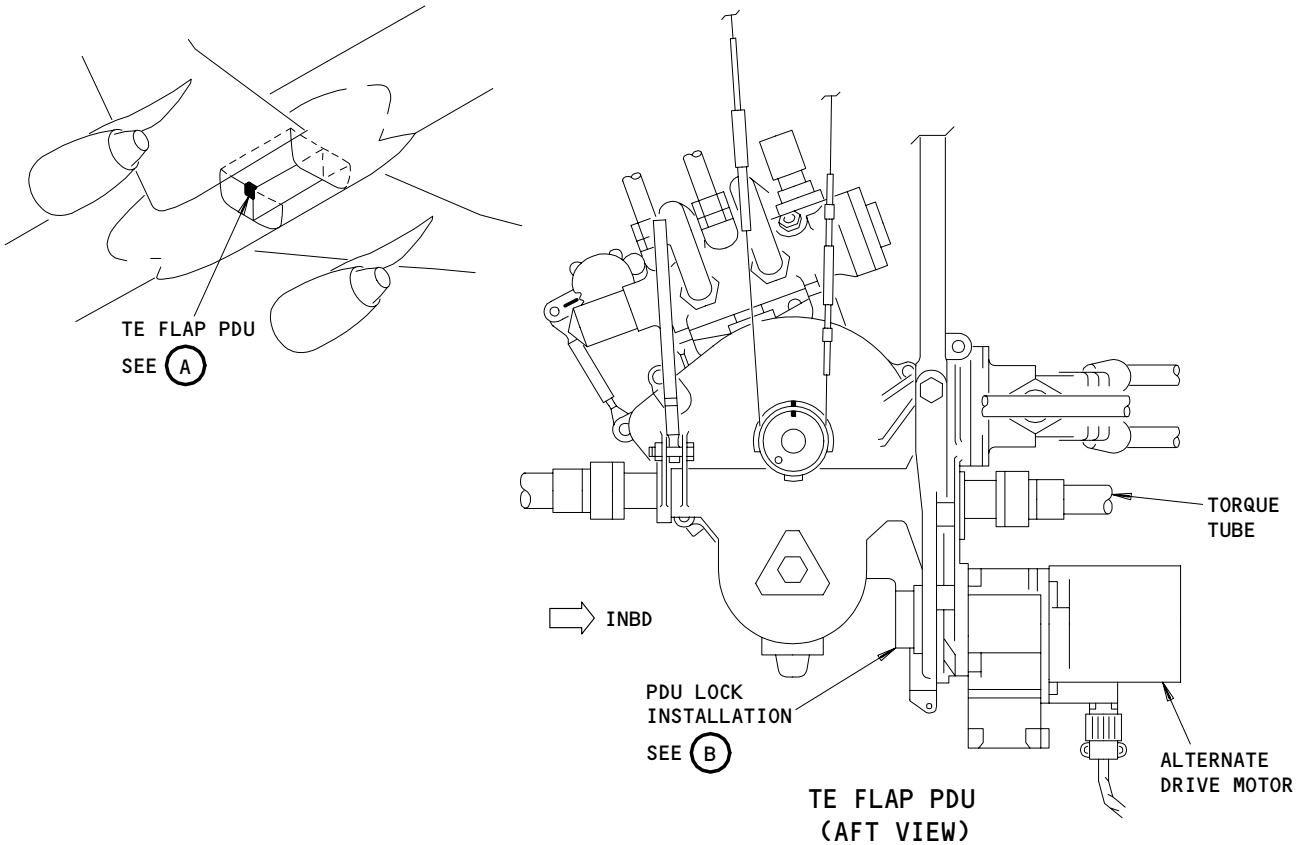




2 MAKE A MARK ON THE TORQUE TUBE AND THE PDU OUTPUT SHAFT POSITIONS TO MAKE SURE YOU CAN ALIGN THEM WHEN YOU ASSEMBLE

Ballscrew Nut for the TE Flap
Figure 202 (Sheet 2)

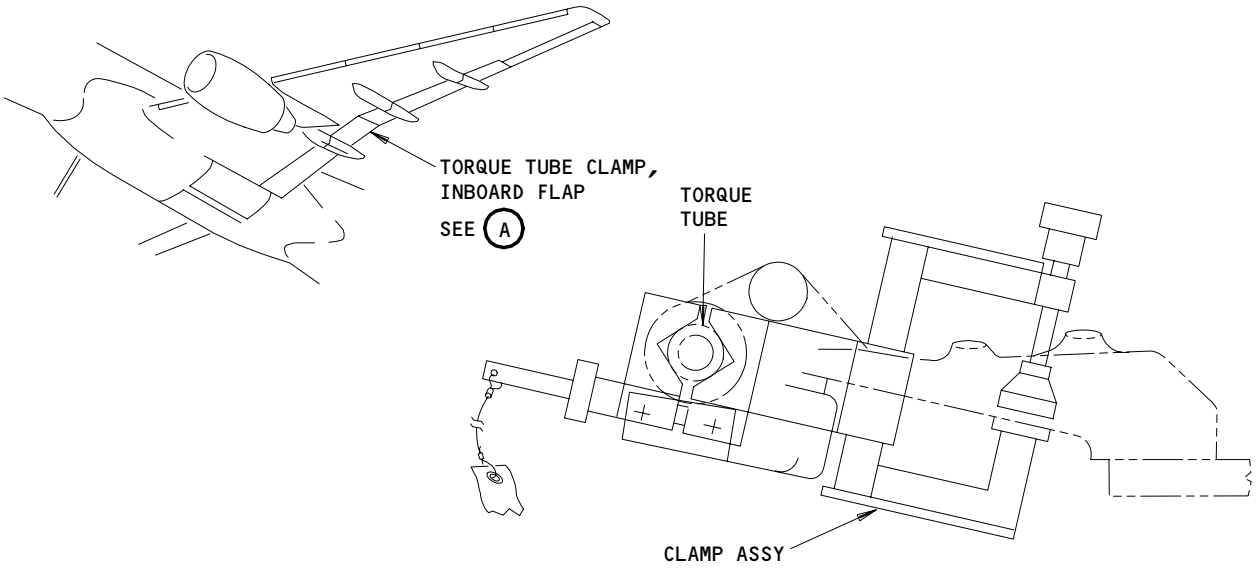
117664



PDU Lock for the TE Flap PDU
Figure 203

C. Parts

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	1	Flap and Slat Depressurization Module Assy	27-51-29	01	60
	4	Pressure Switch			95
	5	Packing (O-ring)			100
	6	Packing (O-ring)			120
	8	Gasket			115
	9	Priority Valve			135
	10	Packing (O-ring)			137
	11	Sequence Valve			130
	12	Packing (O-ring)			132
	13	Solenoid Valve			105
	14	Shutoff Valve			125
	15	Packing (O-ring)			127



Torque Tube Clamp
Figure 204

229594

D. Consumable Materials
   (1) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3
   (2) D00054 Skydrol Assembly Lube - MCS 352B
   (3) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11
   (4) D00004 Antiseize Compound - MIL-T-5544
   (5) A00734 Sealant - RTV 162
   (6) A00557 Sealant - Dow Corning FS3452
   (7) B00316 Solvent - Aliphatic Naphtha, TT-NN-95, Type I

E. References
   (1) AMM 07-11-01/201, Jacking Airplane
   (2) AMM 12-12-01/301, Hydraulic Systems
   (3) AMM 24-22-00/201, Electrical Power - Control
   (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   (5) AMM 32-00-15/201, Landing Gear Door Locks
   (6) AMM 32-00-20/201, Landing Gear Downlocks
   (7) AMM 51-21-04/701, Alodine Coating

F. Access
   (1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

G. Install the Depressurization Module (Fig. 201)

   S 102-027
   (1) At the two lower mounting bolt locations, clean the faying surfaces on the structure and the depressurization module with a rotary stainless steel brush.

   S 602-028
   (2) Apply solvent to the clean area.

   S 622-029
   (3) Apply a layer of alodine to the prepared area (AMM 51-21-04/701).

S 622-030
(4) Apply corrosion preventive compound to the mounting bolt threads.

S 422-031
(5) Put the depressurization module in its correct position and install the four mounting bolts (2) with washers (3).
(a) Tighten the bolts to 65-80 pound-inches (7.4-9.0 Nm).

S 702-032
(6) Make sure that the maximum resistance across the electrical bonds at the two lower mounting bolt locations is 0.0025 ohm.

S 622-033
(7) Fillet seal around the bonded surfaces with Dow Corning FS3452 sealant.

S 092-034
(8) Remove the plugs from the hydraulic lines and the caps from the ports on the depressurization module.

S 642-035
(9) Apply Skydrol assembly lube or hydraulic fluid to the packing O-rings and fittings.

S 432-036
(10) Connect the hydraulic lines to the depressurization module.

S 432-037
(11) Install the electrical connectors (16) and (17).

S 712-038
(12) To do a test on the depressurization module installation, do the steps in the Operational Test for the Flap/Slat Depressurization Module.

H. Install the Priority Valve (Fig. 201)

S 622-039
(1) Apply antisieze compound to the threads of the priority valve (9).

S 642-040
(2) Lubricate the packing O-rings (10) with assembly lube or hydraulic fluid.

S 422-041
(3) Install the priority valve (9) into the depressurization module (1).
(a) Tighten the priority valve to 90-100 pound-feet (122-135 Nm).

S 432-042
(4) Safety the priority valve (9) to the depressurization module (1) with a wire.

S 622-043
(5) Apply sealant (RTV 162) to fill the clearance between the priority valve and the manifold.

S 712-044
(6) To do a test on the priority valve installation, do the steps in the Operational Test of the Priority Valve of the Flap/Slat Depressurization Module.

I. Install the Sequence Valve (Fig. 201)

S 622-045
(1) Apply antisieze compound to the threads of the sequence valve (11).

S 642-046
(2) Lubricate the packing O-rings (12) with assembly lube or hydraulic fluid.

S 422-047
(3) Install the sequence valve (11) into the depressurization module (1).
(a) Tighten the sequence valve to 140-150 pound-feet (190-203 Nm).

S 432-048
(4) Safety the sequence valve (11) to the depressurization module (1) with a wire.

S 622-049
(5) Apply sealant (RTV 162) to fill the clearance between the sequence valve (9) and the depressurization module (1).

S 712-050
(6) To do a test on the sequence valve installation, do the steps in the Operational Test for Primary Control.

J. Install the Solenoid Valve (Fig. 201)

S 642-051
(1) Lubricate the packing O-ring (6) with assembly lube or hydraulic fluid.

S 422-052
(2) Put the new gasket plate (8) and solenoid valve (13) on the manifold assembly (1), and install four mounting bolts (7).
(a) Tighten the bolts to 60-70 pound-inches (6.8-7.9 Nm).

S 432-053
(3) Safety the mounting bolts (7) with a wire.

S 712-054
(4) To do a test on the solenoid valve installation, do the test procedure for primary control of the Operational Test of the Flap/Slat Depressurization Module. Make sure that there is no leakage of hydraulic fluid at the hydraulic components on the depressurization module.

K. Install the Pressure Switch (Fig. 201)

S 432-055
(1) Install a gasket on the pressure switch (4).

S 642-056
(2) Lubricate the packing O-ring (5) with assembly lube or hydraulic fluid.

S 422-057
(3) Install the pressure switch (4) into the depressurization module (1).
(a) Tighten the pressure switch to 155-165 pound-inches (17.5-18.6 Nm).

S 432-058
(4) Safety the pressure switch (4) to the depressurization module (1) with a wire.

S 432-059
(5) Install the electrical connector (16).

S 712-060
(6) To do a test on the pressure switch installation, do the steps in the Operational Test for the Uncommanded Motion and the Operational Test for Cruise Mode.

L. Install the Shutoff Valve (Fig. 201)

NOTE: Make sure the shutoff valve you install has an "AB" on the serial number.

S 622-061
(1) Apply antisieze compound to the threads of the shutoff valve (14).

S 642-062
(2) Lubricate the packing O-rings (15) with assembly lube or hydraulic fluid.

S 422-063
(3) Install the shutoff valve (14) into the depressurization module (1).
(a) Tighten the shutoff valve to 160-170 pound-feet (18.1-19.2 Nm).

S 432-064

(4) Safety the shutoff valve (14) to the depressurization module (1) with a wire.

S 622-065

(5) Apply sealant (RTV 162) to fill the clearance between the shutoff valve (14) and the depressurization module (1).

S 712-066

(6) To do a test on the shutoff valve installation, do the steps in the Operational Test for Primary Control and the Operational Test for Uncommanded Motion.

TASK 27-51-29-712-067

4. Operational Test for the Flap/Slat Depressurization Module

A. General

(1) This task contains test procedures for these five conditions:

- for primary control
  (test for the sequence valve)
- for uncommanded motion
  (test for the solenoid and shutoff valves)
- for cruise mode
  (test for solenoid and shutoff valves and pressure switch)
- for asymmetry
  (test for the solenoid and shutoff valves)
- and a test on the priority valve.

Because this task contains five procedures, do only the steps that are necessary to do a test on the component that you installed.

To start one of these procedures, do the "Prepare for the Test" group of steps. Then, do the group of steps that is necessary to do a test on the component's installation. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment
(1) TE Flap PDU Lock - B27008-1
(2) Torque Tube Clamp from Set - B27055-1:
(a) Inboard Flap Torque Tube Clamp - P/N B27055-3
(3) Equipment for the test operation of the priority valve:
(a) Hydraulic Hose - 20 feet long with a 3/4 inch fitting to connect to the MS33514-12 fitting on the flap/slat depressurization module and a fitting to connect to a pressure gage
(b) Pressure Gage, 3500 psi with snubber - Commercially Available

NOTE: The optional pressure gage listed below may be used for the priority valve test as an alternative to the hydraulic hose and to the pressure gage listed above.

(c) Clamp-On Pressure Gage - Model PMS1000-1, The Device Company, 22418 94th Ave S., Kent, WA 98031 (206) 852-2111

C. References
(1) AMM 12-12-01/301, Hydraulic Systems
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Test

S 862-268
(1) Supply electrical power (AMM 24-22-00/201).

S 862-205

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Use one of these procedures to pressurize the left hydraulic system and make sure you have a sufficient system pressure for the correct operation (AMM 29-11-00/201):
   (a) A hydraulic service cart
   (b) The left ACMP with the aid of the right ACMP and the PTU
   (c) The engine driven pump (EDP)

S 862-267

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) EICAS (6 locations)
   (b) 11C17, FLAP SLAT SHUTOFF 1
   (c) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (d) 11G13, FLAP SLAT ELEC UNIT 1 CONT
   (e) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
   (f) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 212-264

(4) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not in the armed position (switch lights will be off).

S 212-265

(5) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 212-269

(6) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in zero (FLAPS UP) detent.

F. Operational Test for Primary Control
(test for the sequence valve)

NOTE: This test contains steps to do a test on the sequence valve. Unless noted differently, make sure the TRAILING EDGE and LEADING EDGE lights, on the first officer's instrument panel, P3, do not come on and that no messages show on the EICAS display.

S 862-260

(1) Put the flap control lever in 30-unit detent and do these checks:
   (a) Make sure the flaps and slats move to the fully extended position in no more than 52 seconds.
   (b) Make sure the slats move to the fully extended position before the flaps are fully extended.

S 862-261

(2) Put the flap control lever in zero (FLAPS UP) detent.

S 212-206

(3) Make sure the TE flaps and LE slats move to the fully retracted position.

G. Operational Test for Uncommanded Motion
(test for the solenoid and shutoff valves)

S 862-077

(1) Move the flap control lever to the 1-unit detent and do these checks:
   (a) Make sure the flaps move to the 1-unit position in no more than 5-7 seconds from when the flaps first started to move.
   (b) Make sure the slats move to the intermediate position.

S 862-078

(2) Open this circuit breaker on the P11 panel:
   (a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-079

(3) Push the arming switch for the flap alternate drive to arm the flap alternate drive (switch light will come on).

S 862-080

(4) Move the flap control lever to the zero (FLAPS UP) detent and make sure the flaps and slats do not move.

S 862-081

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE FLAPS AND SLATS WHEN THEY MOVE. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE FLAPS OR SLATS MOVE.

(5) Push the arming switch for the flap alternate drive to disarm the flap alternate drive (switch light will go off).

S 212-082
(6) Make sure the flaps and slats move to the fully retracted position.

S 862-083
(7) Move the flap control lever out of the zero (FLAPS UP) detent and in the direction of the 1-unit detent, but stop the movement when you can feel the force step.
(a) Make sure the flaps and slats do not move.
(b) Make sure the TRAILING EDGE light comes on and the TE FLAP DISAGREE message shows on the EICAS display after 25 seconds, but before 30 seconds from when you felt the force step.

S 862-085
(8) Move the flap control lever to the zero (FLAPS UP) detent.

S 862-086
(9) Push the arming switch for the flap alternate drive, on the P3 panel, to arm the flap alternate drive (switch light will come on).

S 212-087
(10) Make sure the TRAILING EDGE light goes off and the TE FLAP DISAGREE message on the EICAS display is off.

H. Operational Test for Cruise Mode
(test for the solenoid and shutoff valves and pressure switch)

S 862-088
(1) Push the arming switch for the flap alternate drive to disarm the flap alternate drive (switch light will go off).

S 862-089
(2) Close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-090
(3) Stop for 25 seconds, before you continue, until the system pressure decreases.

S 862-091
(4) Open these circuit breakers on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 212-092
(5) Make sure the FLAP ISLN VAL message shows on the EICAS ECS/MSG display.

S 212-093
(6) Make sure the FLAP ISLN VAL message shows on the EICAS status display.

S 862-094
(7) Close these circuit breakers on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 862-095
(8) Erase the FLAP ISLN VAL message from the EICAS ECS/MSG display.

S 212-096
(9) Make sure the FLAP ISLN VAL message on the EICAS status display is off.

I. Operational Test for Asymmetry
(test for the solenoid and shutoff valves)

S 862-097
(1) Move the flap control lever to the 15-unit detent and let the flaps move to the 15-unit position and the slats move to the intermediate position.

S 862-098
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-099
(3) Install a PDU lock in TE flap PDU (Fig. 203).

S 932-100
(4) Make a mark on the position of torque tube coupling on the inboard side of the flap PDU (Detail D, Fig. 202).

S 222-101
(5) At the inboard transmission on the left wing inboard flap, measure the distance between the face of the upstop and the face of the ballscrew nut (Dimension X, Detail B, Fig. 202).

S 492-103
(6) Install a clamp on the torque tube in the right wing (Fig.204).

S 032-102
(7) Disconnect the torque tube coupling from the inboard side of the flap PDU.

S 092-104
(8) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-105

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRUALIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-106
(10) Move the flap control lever to the 20-unit detent and do these checks:
  (a) Make sure the flaps start to move and then stop.
  (b) Make sure the L needle on the flap position indicator, on the P3 panel, moves to a position between the 15-unit and 20-unit positions.
  (c) Make sure the R needle on the flap position indicator, on the P3 panel, does not move from the 15-unit position.
  (d) Make sure the TRAILING EDGE light, on the P3 panel, comes on.
  (e) Make sure a TE FLAP ASYM message shows on the EICAS display..

S 862-107
(11) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-108
(12) Install a PDU lock in TE flap PDU (Fig. 203).

S 222-109
(13) Measure the distance between the upstop and the ballscrew nut and make sure the ballscrew nut moved no more than 1.13 inch (28.7 mm).

S 212-110
(14) Make sure the manual override levers on the bypass valves, for the LE slat system (located in the left wing-body fairing, forward of the wing) and the TE flap system, are in the bypass position (POS 1).

S 092-111
(15) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-112

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERSONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(16) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-113
(17) Move the flap control lever to the 15-unit detent and make sure the flaps and slats do not move.

S 862-114

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES. THE LEFT FLAP WILL RETRACT WHEN FSEU POWER IS REMOVED AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(18) Open these circuit breakers on the main power distribution panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 212-115
(19) Make sure the left flaps retract to the 15-unit position.

S 212-116
(20) Make sure the TRAILING EDGE light, on the P3 panel, goes off.

S 212-117
(21) Make sure the TE FLAP ASYM message on the EICAS display goes off.

S 212-118
(22) Make sure the L needle on the flap position indicator, on the P3 panel, is in the tolerance band of the 15-unit position.

S 862-119
(23) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 492-120
(24) Install a PDU lock in the TE flap PDU (Fig. 203).

S 432-121
(25) Connect the torque tube coupling at the flap PDU and make sure you align the marks on the torque tube.

S 092-122
(26) Remove the clamp from the torque tube in the right wing.

S 222-123
(27) At the inboard flaps inboard transmissions, make sure the angle between the upstops and the ballnuts is no more than 10° (the left wing compared to the right wing).

S 092-124
(28) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-125

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(29) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 862-126
(30) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 862-127
(31) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats retract fully.

S 212-128
(32) Make sure a FLAP/SLAT ELEC or FLAP ISLN VAL message does not show on the EICAS status display.

S 212-129
(33) Make sure a FLAP/SLAT ELEC, FLAP ISLN VAL, or FLAP/SLAT BITE message does not show on the EICAS ECS/MSG display.

S 212-130
(34) Make sure the depressurization module has no hydraulic leaks.

J. Operational Test for the Priority Valve

NOTE: You can use the Clamp-On pressure gage as an alternative to the hydraulic hose in this test. If you do, then skip the steps given below that apply to the use of the hydraulic hose.

S 212-182
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 862-183
(2) Supply electrical power (AMM 24-22-00/201).

S 862-184
(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 012-208

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Move the MAIN GEAR DOOR CLOSE switch, on the main wheel well electrical service panel, P72, to the DOOR OPEN position to open the main landing gear doors and install door locks (AMM 32-00-15/201).

S 862-185
(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 032-186
(6) Remove the cap (18) from the port on the depressurization module (Fig. 201).

S 492-187
(7) Attach a 20 foot long hydraulic hose, with a pressure gage, to the depressurization module port.

NOTE: If you use the Clamp-On pressure gage (alternative to the hydraulic hose), install the Clamp-On pressure gage on the input hydraulic pressure line of the flap/slat depressurization module (Fig. 201).

S 492-188

WARNING: MAKE SURE THE HYDRAULIC HOSE WILL NOT BE HIT BY THE LANDING GEAR DOORS WHEN THEY CLOSE. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE HYDRAULIC HOSE IS DAMAGED BY THE LANDING GEAR DOORS.

(8) Put the hydraulic hose through the door opening for the landing gear strut, and put the gage in a location where it can be safely read when the landing gear doors open and close.

S 612-189

(9) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

S 862-190

(10) Pressurize the left hydraulic system reservoir (AMM 29-11-00/201).

S 032-191

WARNING: BE CAREFUL TO CONTROL THE HYDRAULIC LEAKAGE THAT WILL OCCUR WHEN AIR IS BLED FROM THE 20 FOOT LONG HYDRAULIC HOSE. HYDRAULIC FLUID CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Loosen the fitting in the 20 foot long hydraulic hose, at the pressure gage, to bleed air from the hose.

S 432-207

(12) Tighten the fitting when hydraulic fluid comes out of the fitting without air.

S 412-192

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-210

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(14) Pressurize the left hydraulic system with the left ACMP only (AMM 29-11-00/201).

S 862-193

(15) Move the MAIN GEAR DOOR CLOSE switch, on the P72 panel, to the DOOR CLOSE position to close the main landing gear doors.

S 702-194

(16) Do these steps to do a test on the priority valve:

WARNING: MAKE SURE THE DOWNLOCKS ARE INSTALLED ON THE NOSE AND MAIN LANDING GEAR AND MAKE SURE THE LANDING GEAR DOORS WILL NOT OPEN INTO PERSONS AND EQUIPMENT WHEN THE LANDING GEAR LEVER IS MOVED. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE LANDING GEAR DOORS ARE MOVED.

(a) Push the override switch for the landing gear lever lock, on the P3 panel, and move the landing gear lever to the UP position to open the landing gear doors.
(b) Move the landing gear lever to the DN position to close the landing gear doors.
(c) Open and close the landing gear doors two more times to bleed air from the hydraulic system.
    1) Make sure you complete the cycle with the landing gear doors closed.
(d) Move the landing gear lever to the UP position to open the landing gear doors.

(e) Make sure the hydraulic pressure indication, on the gage attached to the depressurization module port, is between 1500 and 2500 psi when the doors open.

NOTE: If you installed the Clamp-On pressure gage (alternative to the hydraulic hose), make sure the hydraulic pressure indication on this gage (connected to the input hydraulic pressure line of the flap/slat depressurization module), is in the same pressure range as given above this note.

S 862-195

(17) Move the landing gear lever to the DN position.

S 862-196

(18) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-197

(19) Move the MAIN GEAR DOOR CLOSE switch, on the P72 panel, to the DOOR OPEN position to agree with the position of the landing gear doors.

S 012-198

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(20) Install door locks on the nose and main landing gear (AMM 32-00-15/201).

S 862-199

(21) Remove the pressure from the left hydraulic system reservoir (AMM 29-11-00/201).

S 092-200

(22) Remove the hydraulic hose and gage from the port in the depressurization module, and install the cap on the port.

NOTE: If you have the Clamp-On pressure gage (alternative to the hydraulic hose), remove this gage from the input hydraulic pressure line of the flap/slat depressurization module.

S 612-201

(23) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

S 862-211

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(24) Pressurize the left hydraulic system and reservoir (AMM 29-11-00/201).

S 412-202

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(25) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 862-203

(26) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-204

(27) Remove the electrical power (AMM 24-22-00/201).

K. Put the Airplane Back to Its Usual Condition

S 862-262

(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 862-263

(2) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 612-171

(3) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

TASK 27-51-29-712-172

5. Operational Test for the Flap/Slat Depressurization Module with Primary Control

NOTE: This is a scheduled maintenance task.

NOTE: This test contains steps to do a test on the sequence valve. Unless noted differently, make sure the TRAILING EDGE and LEADING EDGE lights, on the first officer's instrument panel, P3, do not come on and that no messages show on the EICAS display.

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
211/212 Control Cabin

C. Prepare for the Test

S 862-249
(1) Supply electrical power (AMM 24-22-00/201).

S 862-250

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Use one of these procedures to pressurize the left hydraulic system and make sure you have a sufficient system pressure for the correct operation (AMM 29-11-00/201):
(a) A hydraulic service cart
(b) The left ACMP with the aid of the right ACMP and the PTU
(c) The engine driven pump (EDP)

S 862-251
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) EICAS (6 locations)
(b) 11C17, FLAP SLAT SHUTOFF 1
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(d) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(e) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(f) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 212-252
(4) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not in the armed position (switch lights will be off).

S 212-253
(5) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 212-254
(6) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in zero (FLAPS UP) detent.

D. Operational Test for Primary Control

S 862-255
(1) Put the flap control lever in 30-unit detent and do these checks:
(a) Make sure the flaps and slats move to the fully extended position in no more than 52 seconds.
(b) Make sure the slats move to the fully extended position before the flaps are fully extended.

S 862-256
(2) Put the flap control lever in zero (FLAPS UP) detent.

S 212-257
(3) Make sure the TE flaps and LE slats move to the fully retracted position.

E. Put the Airplane Back to Its Usual Condition

S 862-259
(1) Make sure the power is removed from the left and right hydraulic systems (AMM 29-11-00/201).

S 862-258
(2) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-51-29-712-173

6. Operational Test for the Priority Valve

NOTE: This is a scheduled maintenance task.

A. Equipment
(1) Hydraulic Hose - 20 feet long with a 3/4 inch fitting to connect to the MS33514-12 fitting on the flap/slat depressurization module and a fitting to connect to a pressure gage
(2) Pressure Gage, 4000 psi with snubber - Commercially Available

B. References
(1) AMM 12-12-01/301, Hydraulic Systems
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks

C. Access
(1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Operational Test for the Priority Valve

S 212-222
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 862-223
(2) Supply electrical power (AMM 24-22-00/201).

S 862-224
(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 012-225

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Move the MAIN GEAR DOOR CLOSE switch, on the main wheel well electrical service panel, P72, to the DOOR OPEN position to open the main landing gear doors and install door locks (AMM 32-00-15/201).

S 862-226
(5) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 032-227
(6) Remove the cap (18) from the port on the depressurization module (Fig. 201).

S 492-228
(7) Attach a 20 foot long hydraulic hose, with a pressure gage, to the depressurization module port.

S 492-229

WARNING: MAKE SURE THE HYDRAULIC HOSE WILL NOT BE HIT BY THE LANDING GEAR DOORS WHEN THEY CLOSE. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR IF THE HYDRAULIC HOSE IS DAMAGED BY THE LANDING GEAR DOORS.

(8) Put the hydraulic hose through the door opening for the landing gear strut, and put the gage in a location where it can be safely read when the landing gear doors open and close.

S 612-230

(9) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

S 862-231

(10) Pressurize the left hydraulic system reservoir (AMM 29-11-00/201).

S 032-232

WARNING: BE CAREFUL TO CONTROL THE HYDRAULIC LEAKAGE THAT WILL OCCUR WHEN AIR IS BLED FROM THE 20 FOOT LONG HYDRAULIC HOSE. HYDRAULIC FLUID CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Loosen the fitting in the 20 foot long hydraulic hose, at the pressure gage, to bleed air from the hose.

S 432-233

(12) Tighten the fitting when hydraulic fluid comes out of the fitting without air.

S 412-234

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Remove the door locks for the landing gear and close the doors (AMM 32-00-15/201).

S 862-235

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(14) Pressurize the left hydraulic system with the left ACMP only (AMM 29-11-00/201).

S 862-236

(15) Move the MAIN GEAR DOOR CLOSE switch, on the P72 panel, to the DOOR CLOSE position to close the main landing gear doors.

S 702-237

(16) Do these steps to do a test on the priority valve:

WARNING: MAKE SURE THE DOWNLOCKS ARE INSTALLED ON THE NOSE AND MAIN LANDING GEAR AND MAKE SURE THE LANDING GEAR DOORS WILL NOT OPEN INTO PERSONS AND EQUIPMENT WHEN THE LANDING GEAR LEVER IS MOVED. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE LANDING GEAR DOORS ARE MOVED.

(a) Push the override switch for the landing gear lever lock, on the P3 panel, and move the landing gear lever to the UP position to open the landing gear doors.
(b) Move the landing gear lever to the DN position to close the landing gear doors.
(c) Open and close the landing gear doors two more times to bleed air from the hydraulic system.
    1) Make sure you complete the cycle with the landing gear doors closed.
(d) Move the landing gear lever to the UP position to open the landing gear doors.
(e) Make sure the hydraulic pressure indication, on the gage attached to the depressurization module port, is between 1500 and 2500 psi when the doors open.

S 862-238

(17) Move the landing gear lever to the DN position.

S 862-239

(18) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-240
(19) Move the MAIN GEAR DOOR CLOSE switch, on the P72 panel, to the DOOR OPEN position to agree with the position of the landing gear doors.

S 012-241

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(20) Install door locks on the nose and main landing gear (AMM 32-00-15/201).

S 862-242
(21) Remove the pressure from the left hydraulic system reservoir (AMM 29-11-00/201).

S 092-243
(22) Remove the hydraulic hose and gage from the port in the depressurization module, and install the cap on the port.

S 612-244
(23) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

S 862-245

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(24) Pressurize the left hydraulic system and reservoir (AMM 29-11-00/201).

S 412-246

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(25) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 862-247
(26) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-248
(27) Remove the electrical power (AMM 24-22-00/201).

INBOARD TRAILING EDGE FLAP TRACK FAIRING - MAINTENANCE PRACTICES

1. General
   A. This procedure contains two tasks, one to remove and one to install the fairings for the inboard trailing edge (TE) flap track.

TASK 27-51-30-022-001

2. Remove the Fairings for the Inboard TE Flap Track
   A. General
      (1) This task contains two procedures, one to remove the aft fairing from the inboard TE flap track, and one to remove the forward fairing. Because this task contains two procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) TE Flap PDU Lock - B27008-1
   C. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlock
   D. Access
      (1) Location Zones

211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

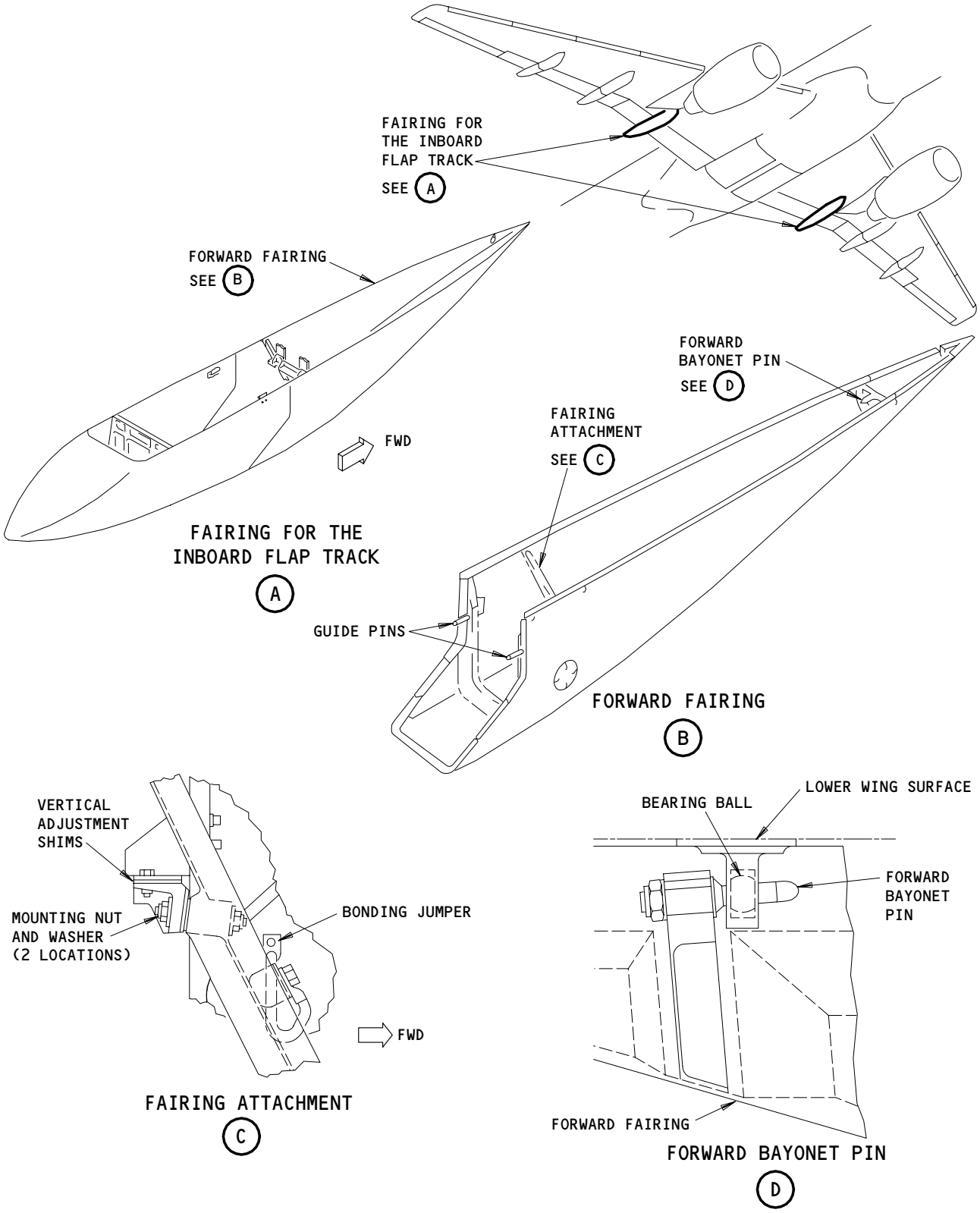
   E. Prepare for the Removal

      S 862-173

      WARNING: MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE LE AND THE TE FLAPS AND FLAP DRIVE MECHANISMS BEFORE YOU MOVE THE FLAP CONTROL LEVER. WITH HYDRAULIC POWER REMOVED, THE FLAPS WILL MOVE AUTOMATICALLY BY ELECTRICAL POWER WHEN YOU MOVE THE FLAP CONTROL LEVER. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

      (1) Move the flap control lever to the 5 units detent to extend the flaps.

          S 492-003
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.



Forward Fairing for the Inboard Flap Track
Figure 201

S 212-004
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 012-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 862-006
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 862-007
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 492-009
(8) Install a PDU lock in the TE flap PDU (Fig. 204).

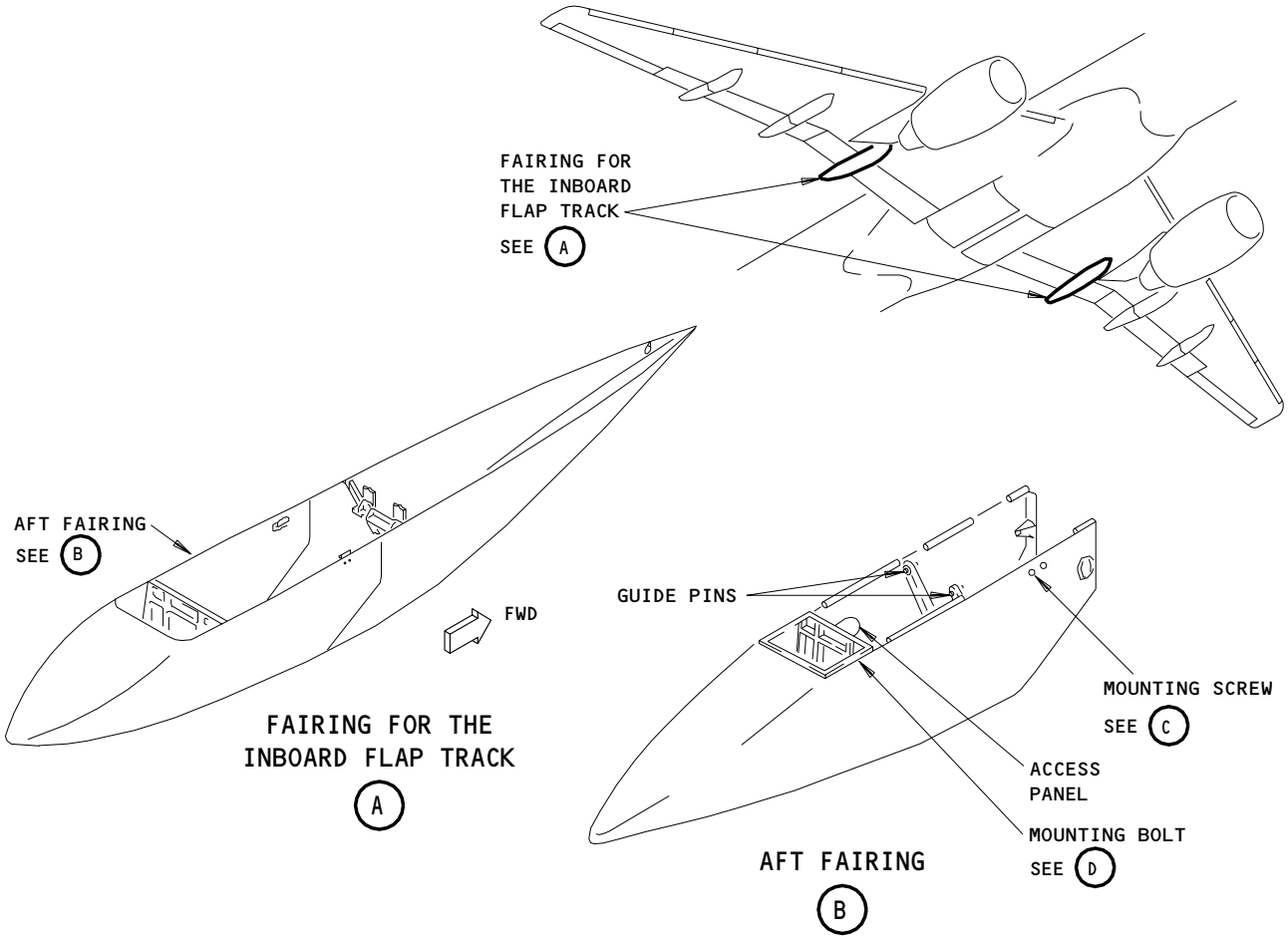
F. Remove the Aft Fairing (Fig. 202)

S 492-010
(1) Use a support to hold the weight of the aft fairing.

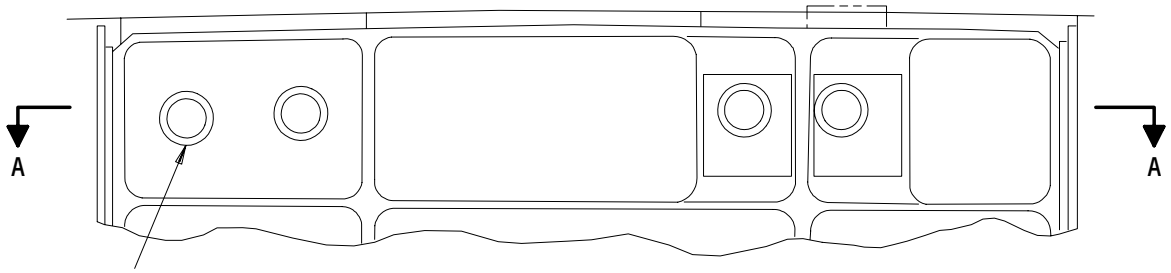
S 032-011
(2) Remove the four screws that hold the aft fairing to the flap.

S 012-012
(3) Remove the access panel for the aft fairing (Ref 06-44-00/201).

S 432-100
(4) Remove the mounting bolts, washers, and nuts and the bonding strap that hold the fairing to the flap.

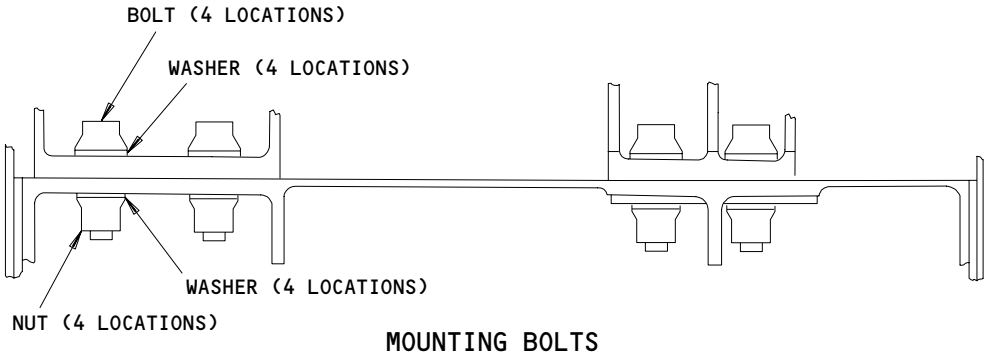


Aft Fairing for the Inboard Flap Track
Figure 202 (Sheet 1)



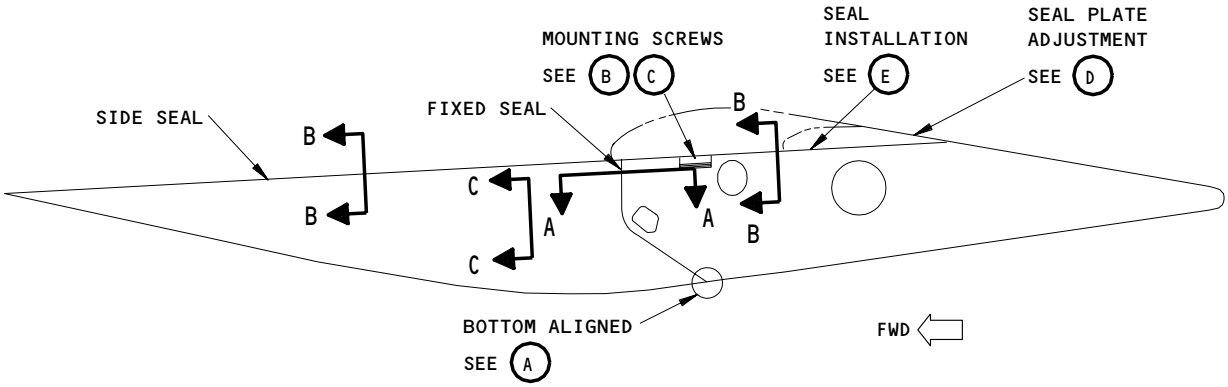
MOUNTING BOLTS

D

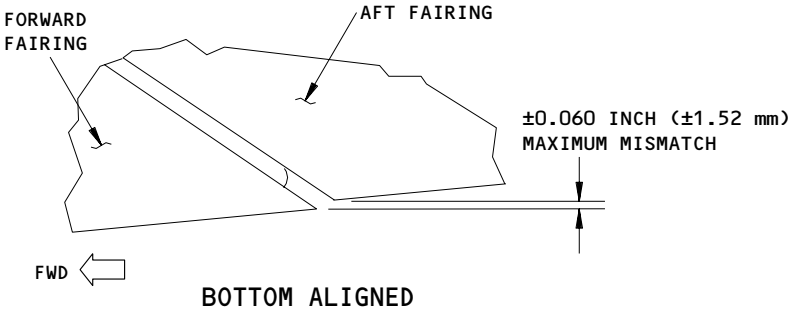


MOUNTING BOLTS
A–A

Aft Fairing for the Inboard Flap Track
Figure 202 (Sheet 2)

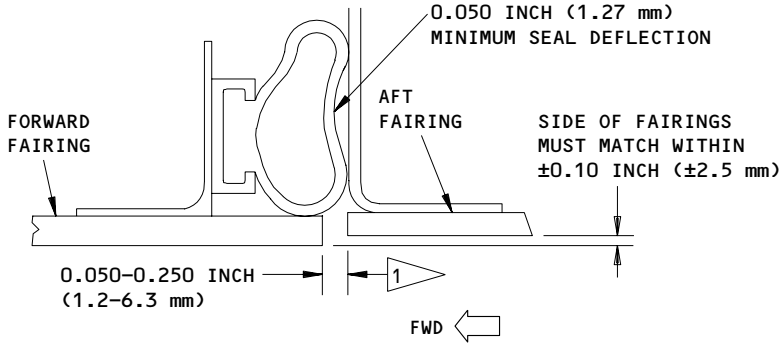


INBOARD FLAP TRACK FAIRING

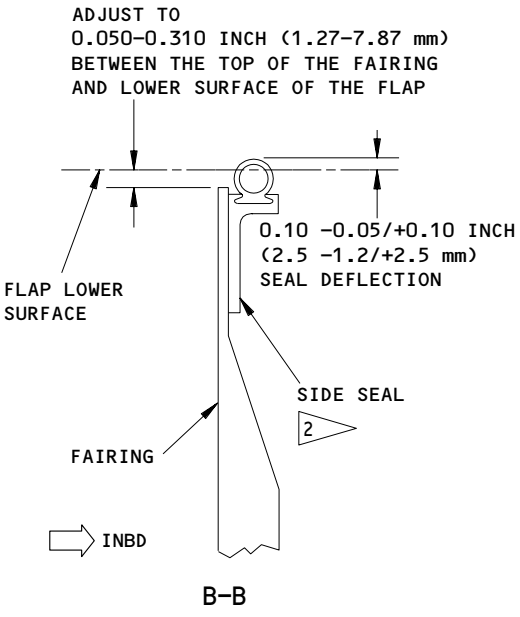


BOTTOM ALIGNED

A



A–A

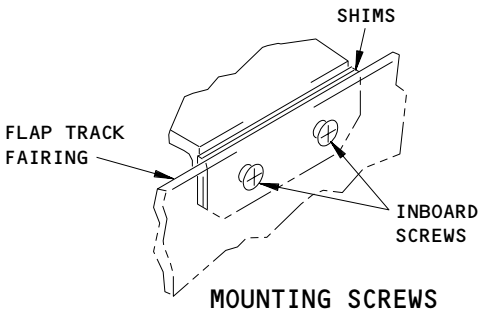


B–B

1 IF THE CLEARANCE IS AT THE SAME DISTANCE APART AT EVERY POINT OVER ITS FULL LENGTH, IT MUST NOT BE MORE THAN 0.15 INCH (3.8 mm).

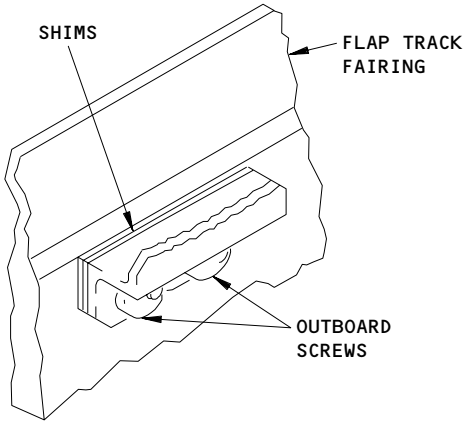
2 THE SIDE SEAL IS ALMOST THE SAME FOR THE FORWARD AND AFT FAIRINGS

Inboard Fairing Adjustments
Figure 203 (Sheet 1)



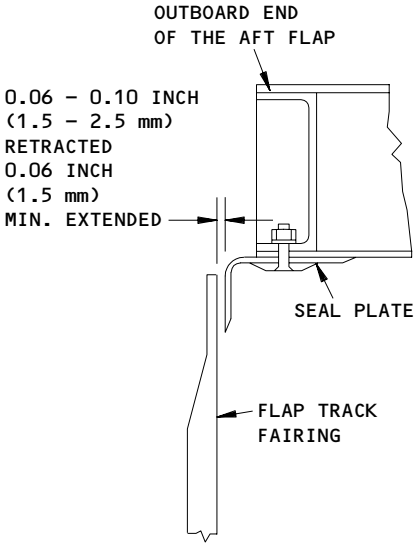
MOUNTING SCREWS

B



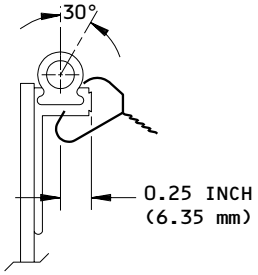
MOUNTING SCREWS

C



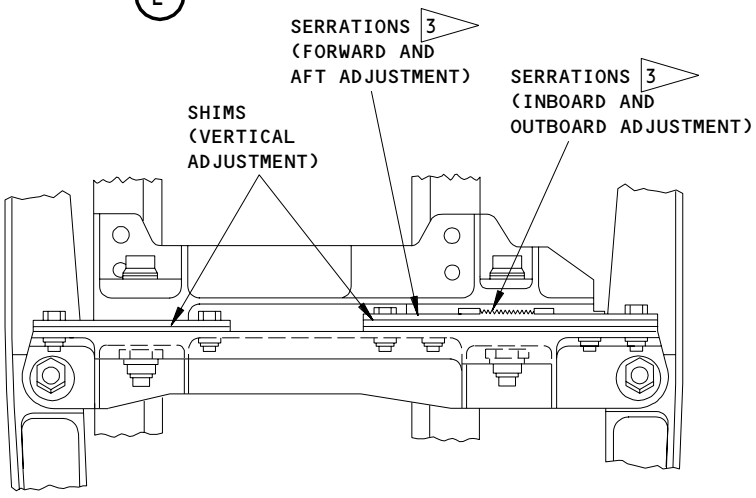
SEAL PLATE ADJUSTMENT

D



SEAL INSTALLATION

E

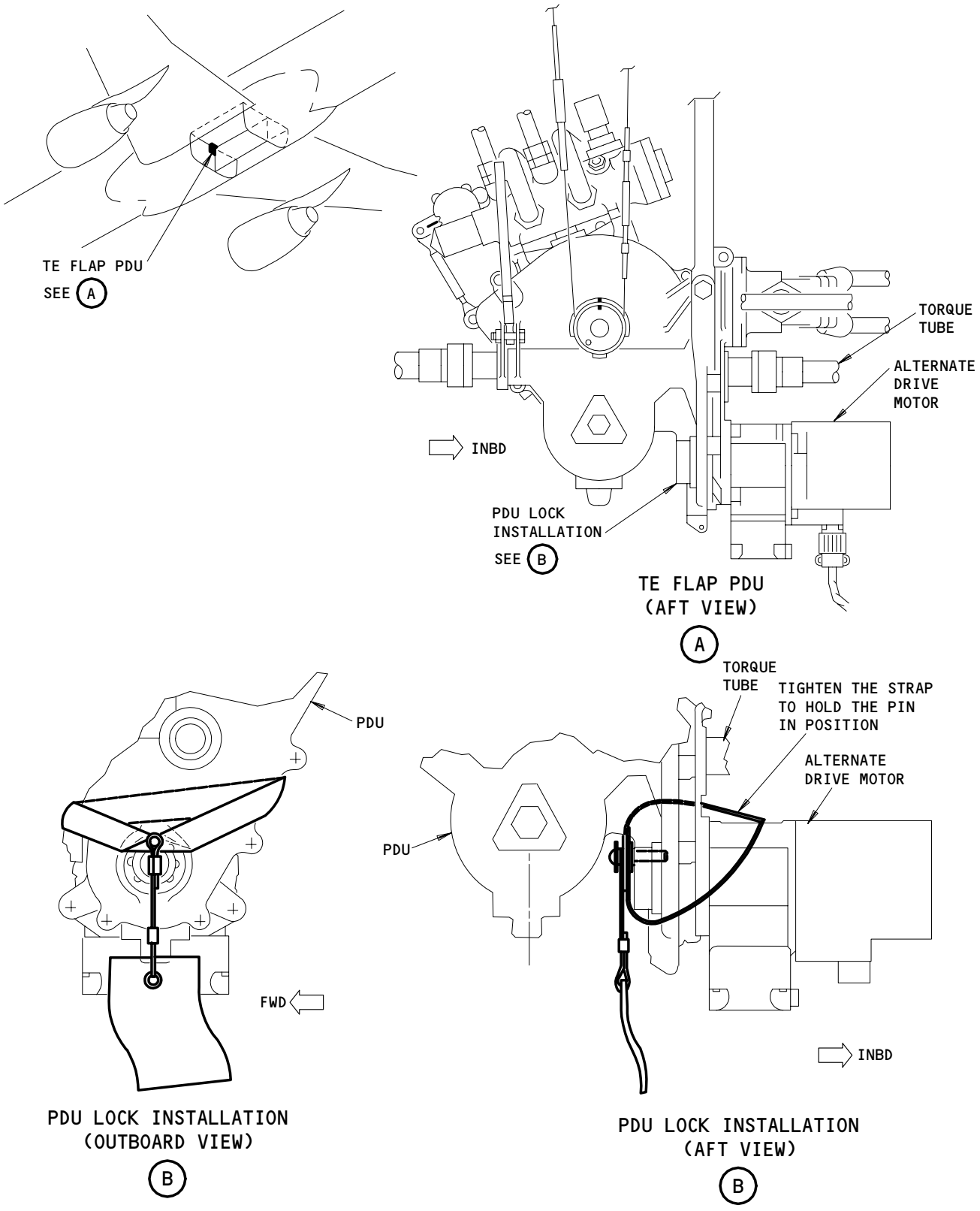


FORWARD FAIRING SUPPORT BRACKET
C–C

3 ONE SERRATION HAS THE SAME VALUE AS A 0.035 INCH (0.89 mm) MOVEMENT

4 INSTALL LOCKWIRE 1.0 ±0.50 INCH (25.489 ±12.7 mm) FROM END OF RETAINER IF SEAL IS REPLACED

Inboard Fairing Adjustments
Figure 203 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 204

S 032-013
(5) Pull the aft fairing in the aft direction to disengage the guide pin.

G. Remove the Forward Fairing (Fig. 201)

S 012-034
(1) Remove the access panel from the bottom of the forward fairing (Ref 06-44-00/201).

S 492-035
(2) Use a support to hold the weight of the forward fairing.

S 032-036
(3) Remove the mounting nuts and washers at the fairing attachment (2 locations).

S 032-037
(4) Move the forward fairing in the forward direction to disengage the guide pin and the forward bayonet pin.

S 032-038
(5) Disconnect the bonding jumper at the fairing support bracket.

TASK 27-51-30-422-039

3. Install the Fairing for the Inboard TE Flap Tracks

A. General
(1) This task contains two procedures, one to install the aft fairing for the inboard TE flap track, and one to install the forward fairing. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to install the components. Then, do the group of steps that is necessary to do a test on the installation of the component.

B. Consumable Materials
(1) D00013 Grease - MIL-G-23827
(2) A00027 Adhesive - BAC 5010 Type 50
(3) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3
(4) C00259 Primer - BMS 10-11, Type 1
(5) A00247 Sealant - BMS 5-95

C. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 20-10-21/401, Electrical Bonding

D. Access
(1) Location Zone
572/672 Inboard Flap Outboard Fairing

E. Install the Aft Fairing (Fig. 202)

S 432-017
(1) If you install a new aft fairing, bond the retention plate to the aft fairing.

S 622-018
(2) Apply primer to the areas around the mounting holes where there is no primer or the remaining primer has scratches.

S 622-019
(3) Apply corrosion preventive compound to the bolts and to the mounting hole areas.

S 422-020
(4) Put the aft fairing in its position, and engage the guide pins.

S 822-022
(5) Make sure the guide pins align with the slots as shown in the Adjustment/Test of the Fairings for the Inboard TE Flap Tracks.

S 622-026
(6) Apply corrosion preventive compound to the bolts (4 locations) that hold the bonding strap in its position and install the bonding strap immediately (with 4 washers and 4 nuts) (Ref 20-10-21).

S 412-027
(7) Install the access panel for the aft fairing (Ref 06-44-00/201).

S 622-028
(8) Apply primer to the screws (4 locations) that hold the aft fairing in its position and attach the aft fairing to the flap.

S 212-030
(9) Make sure there is a clearance between the top of the aft fairing and the surface of the flap (Fig. 203).

S 622-031
(10) Seal the areas, without bulb seals, with BMS 5-95 sealant.

S 822-032
(11) Adjust the aft fairing installation if it is necessary as shown in the Ajustment/Test of the Fairings for the Inboard TE Flap Track.

S 712-033
(12) Do a test on the aft fairing installation as shown in the Adjustment/Test for the Fairings for the Inboard TE Flap Track.

F. Install the Forward Fairing (Fig. 201)

S 622-040
(1) Apply primer to the areas around the mounting holes where there is no primer or the remaining primer has scratches.

S 622-041
(2) Apply corrosion preventative compound to the bolts and to the mounting hole areas.

S 642-042
(3) Apply a thin layer of grease (MIL-G-23827) to the forward bayonet pin.

S 602-043
(4) Do the steps to prepare the bonding surface (Ref 20-10-21).

S 642-044
(5) If you install the same forward fairing that you removed and you know that no adjustments are necessary, apply sealant in and around the bearing ball to prevent movement of the bearing ball.

S 422-045
(6) Install the forward fairing while the sealant is still wet.

S 432-046
(7) Put the forward fairing in its correct position and install the bonding jumpers (Ref 20-10-21).

S 212-047
(8) Make sure the resistance across the bond is no more than 0.01 ohm.

S 432-048
(9) Engage the guide pins and the forward bayonet pin.

S 822-049
(10) Make sure the guide pins align with the slots on the aft fairing as shown in the Adjustment/Test of the Fairing for the Inboard TE Flap Track.

S 432-050
(11) Apply corrosion preventive compound to the 2 washers and nuts and install them immediately.

S 432-051
(12) Tighten the nuts to 150-200 pound-inches (17.0-22.5 Nm).

S 822-052
(13) Adjust the forward fairing installation if it is necessary as shown in the Adjustment/Test of the Fairing for the Inboard Flap Track.

S 412-053
(14) Install the access panel on the bottom of the forward fairing (Ref 06-44-00).

S 702-054
(15) Do a test on the forward fairing installation as shown in the Adjustment/Test of the Fairing for the Inboard TE Flap Track.

TASK 27-51-30-702-055

4. Adjustment/Test of the Fairing for the Inboard TE Flap Track

A. General

(1) This task contains two procedures, one to adjust the fairings for the inboard TE flap track, and one to do a test on the fairing installation. Because this task contains two procedures, only the applicable group of steps must be done.

To start one of these procedures, do the group of steps that is necessary to adjust and to do a test on the fairings for the inboard TE flap tracks. Then do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Consumable Materials

(1) A00247 Sealant - BMS 5-95

C. References

(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zones

211/212	Control Cabin
572/672	Inboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Adjustment of the Forward and Aft Fairings (Fig. 203)

S 212-056
(1) Make sure the guide pins on the forward fairing align with the slots in the guide fittings on the aft fairing in a horizontal direction.
(a) Adjust the forward fairing, if it is necessary, by serrations.

S 212-057
(2) Make sure the mismatch between the forward and aft fairing at the lowest point is +/- 0.06 inch (+/- 1.5 mm) maximum (Fig. 203).
(a) If it is necessary, adjust the forward fairing by serrations.

S 212-058
(3) Make sure the clearance between the forward and aft fairing is 0.050-0.250 inch (1.27-6.35 mm) (Fig. 203).
(a) If it is necessary, adjust the forward fairing by serrations.

S 212-059
(4) Make sure the mismatch between the side of the forward and the aft fairing is no more than 0.050 inch (1.27 mm) (Fig. 203).
(a) If it is necessary, adjust the forward fairing, by serrations.

S 212-060
(5) Make sure the clearance between the top of the aft fairing and the lower surface of the flap is 0.050-0.310 inch (1.3-7.8 mm).
(a) If it is necessary, adjust the forward fairing by serrations.

S 212-061
(6) Make sure the side seal deflection for the forward and aft fairings is 0.10 +0.10/-0.05 inch (2.54 +2.54/-1.27 mm) .
(a) If it is necessary, adjust the forward fairing by serrations.

S 212-062
(7) Make sure the deflection of the lower seal between the forward and aft fairings is at least 0.050 inch (1.27 mm).
(a) If it is necessary, adjust the forward fairing by serrations.

S 212-063
(8) Make sure the seal plate clearance is 0.06-0.10 inch (1.5-2.5 mm) with the flap retracted or 0.06 inch (1.5 mm) minimum with the flap extended.
(a) If it is necessary, adjust the forward fairing by serrations.

F. Operational Test of the Fairing Installation

S 092-064
(1) Remove the PDU lock from the TE flap PDU (Fig. 204).

S 212-065
(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 092-066
(3) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 862-067
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-068
(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 862-069
(6) Supply electrical power (Ref 24-22-00).

S 862-070

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

S 212-071

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(8) Move the flaps between the fully retracted and the fully extended positions and make sure the fairings were correctly installed:
(a) Make sure the forward and aft fairings do not rub against the other parts.
(b) Make sure the seals move back to the adjusted positions when the flaps are retracted.

S 022-072
(9) Remove the forward fairing.

S 622-073
(10) Apply sealant (BMS 5-95) in and around the bearing ball to prevent movement of the bearing ball.

S 422-074
(11) Install the forward fairing while the sealant is still wet.

S 862-075

(12) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats move to the retracted position.

G. Put the Airplane Back to Its Usual Condition

S 412-076

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 862-077

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 862-078

(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 412-079

(4) Make sure you install all of the access panels that you removed (Ref 06-44-00).

OUTBOARD TRAILING EDGE FLAP TRACK FAIRINGS - MAINTENANCE PRACTICES

1. General
   A. This procedure contains two tasks, one to remove and one to install the fairings for the outboard trailing edge (TE) flap tracks.

TASK 27-51-31-022-001

2. Remove the Fairings for the Outboard TE Flap Tracks
   A. General
      (1) This task contains two procedures, one to remove the aft fairing for the outboard TE flap tracks, and one to remove the forward fairing. Because this task contains two procedures, only the applicable group of steps must be done.

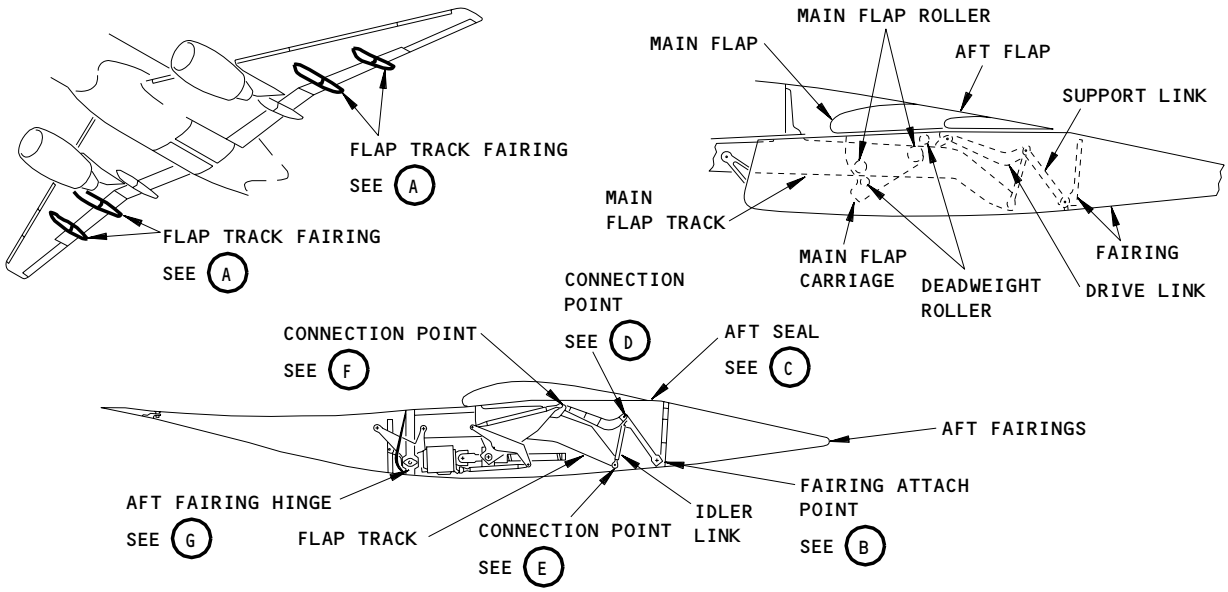
          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) TE Flap PDU Lock - B27008-1
   C. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlock
   D. Access
      (1) Location Zones

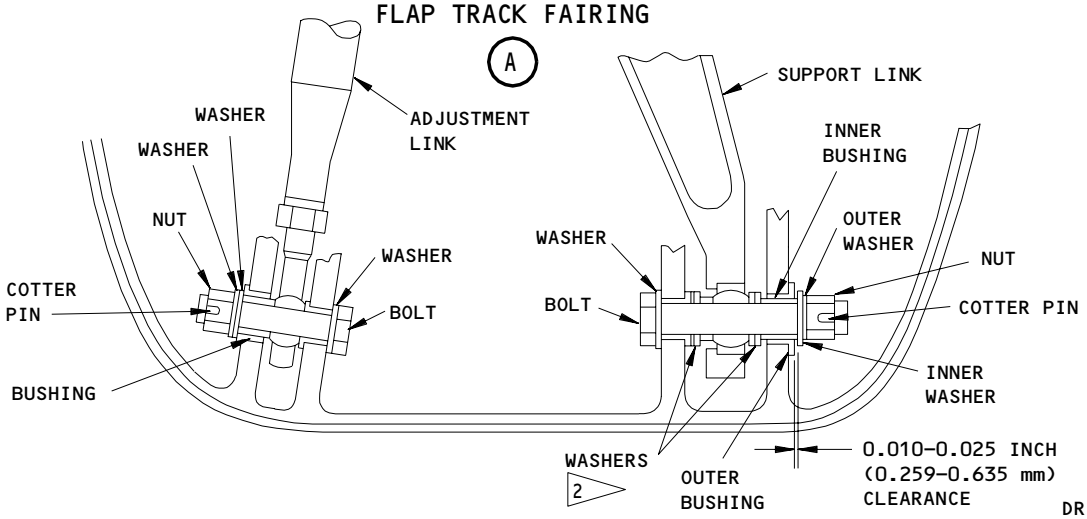
211/212	Control Cabin
573/574	Outboard Flap Inboard Fairing
673/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   E. Prepare for the Removal

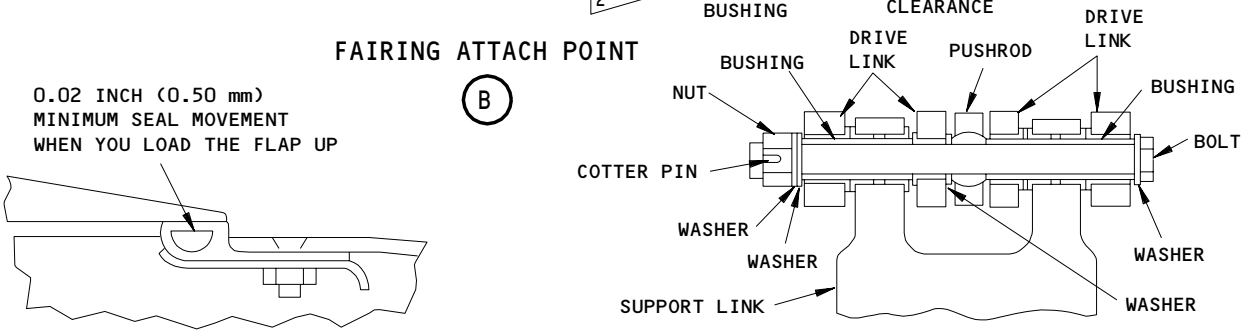
          S 212-002
      (1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position and the flap control lever is in zero (FLAPS UP) detent.



FLAP TRACK FAIRING
A



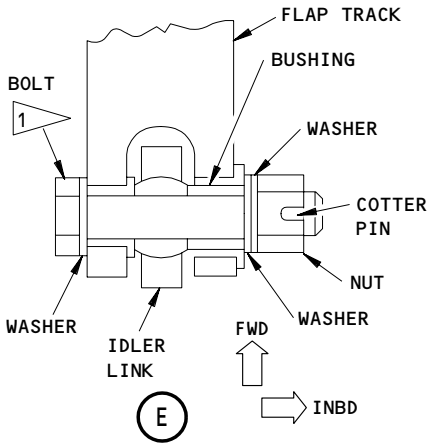
FAIRING ATTACH POINT
B



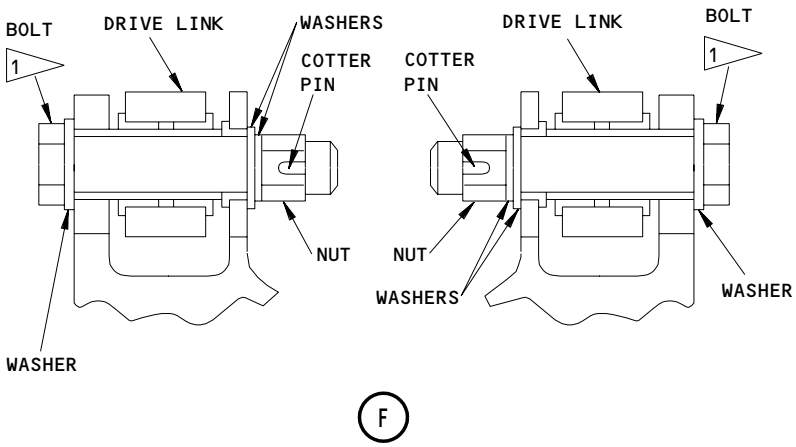
AFT SEAL
C

CONNECTION POINT
D

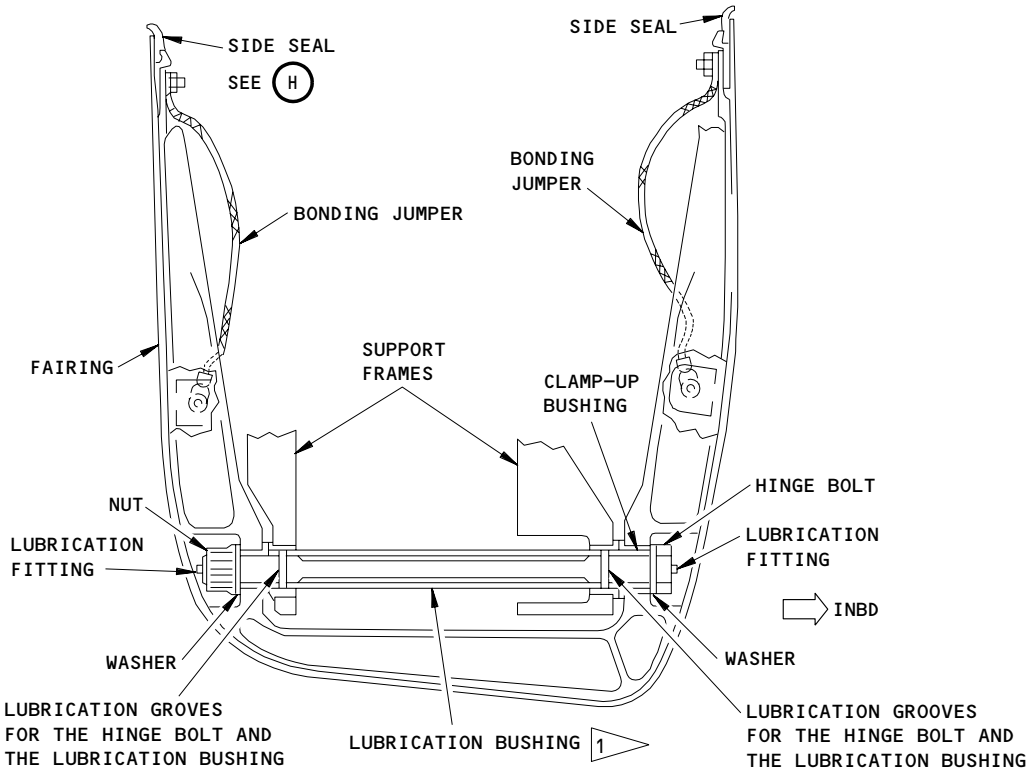
Aft Fairing
Figure 201 (Sheet 1)



E



F



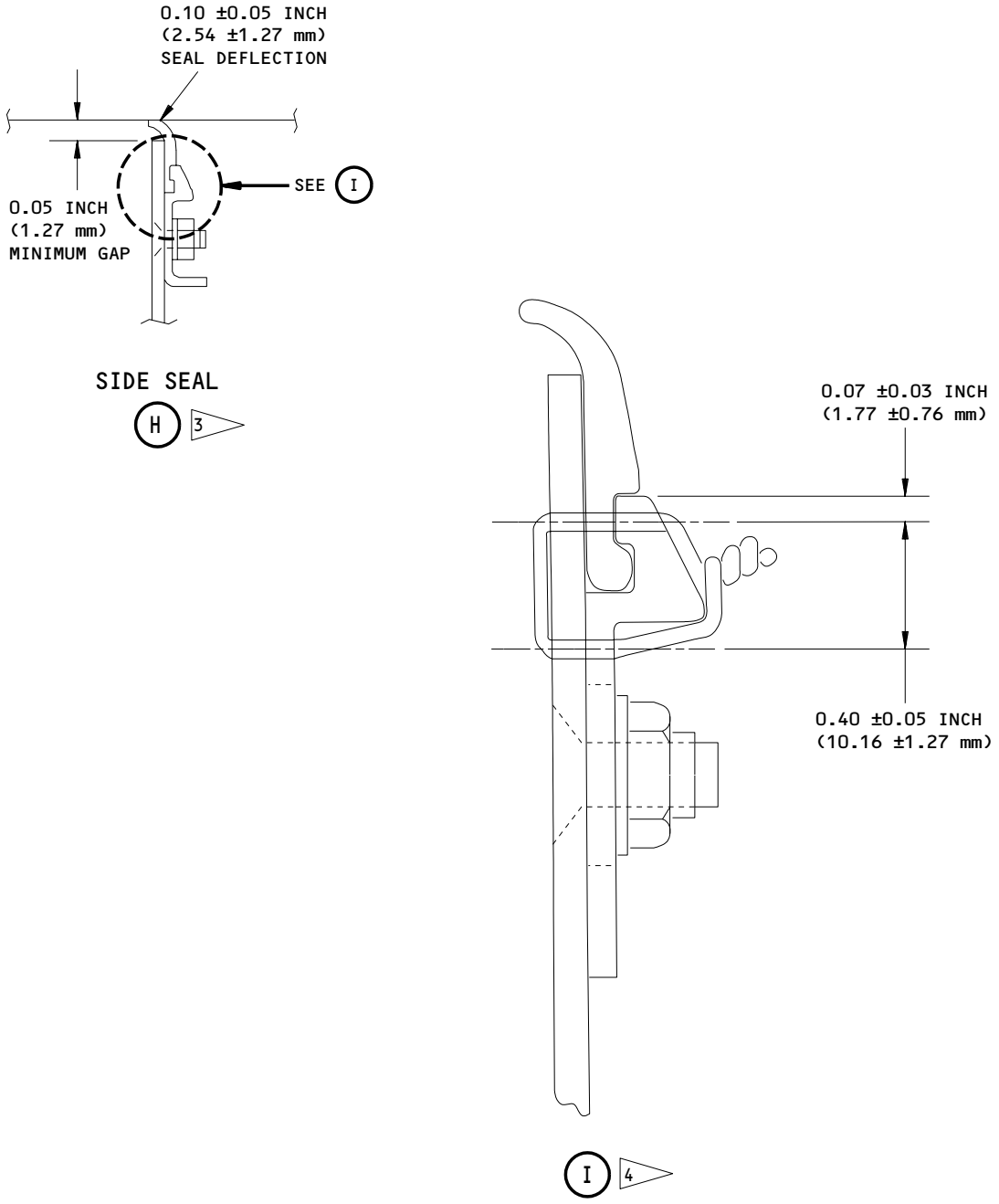
AFT FAIRING HINGE

G

1 APPLY GREASE TO THE OUTER SURFACES OF THE BOLT AND THE BUSHING. FULLY REMOVE ALL GREASE FROM THE THREADS BEFORE YOU INSTALL THE BOLT

2 USE WASHERS AS NECESSARY FOR THE ADJUSTMENT

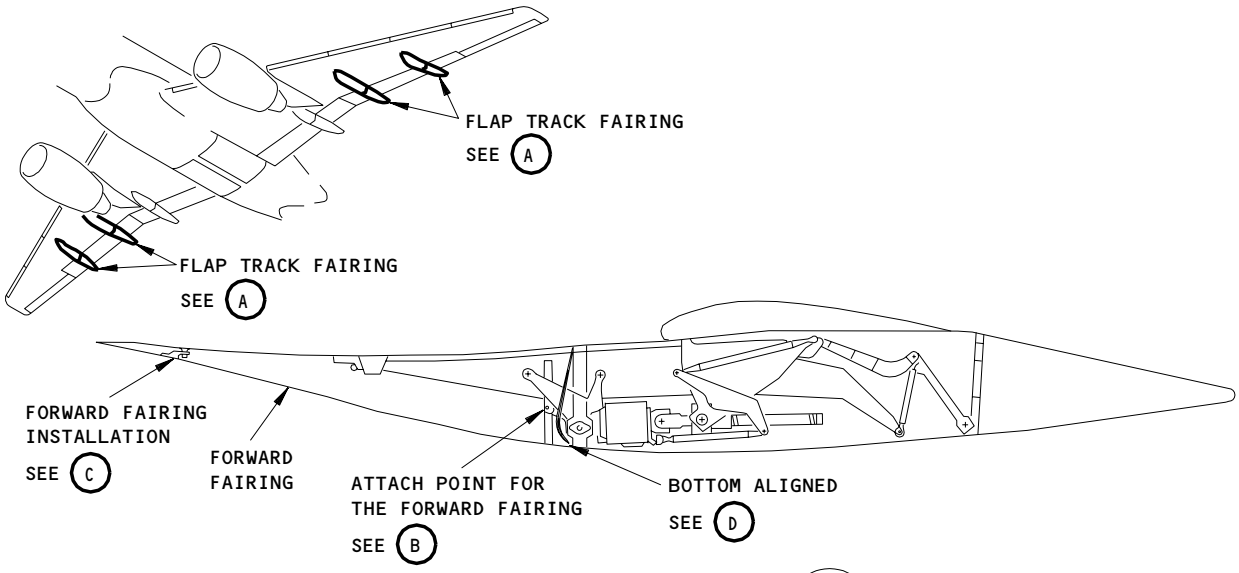
Aft Fairing
Figure 201 (Sheet 2)



3 APPLY ADHESIVE (BAC5010, TYPE 60) TO BOND THE SEAL TO THE RETAINER. APPLY 1.0–1.5 INCH (25–38 mm) BEADS AT FIVE ALMOST EQUAL SPACES. CLEAN EXCESS ADHESIVE FROM FAIRING SIDE OF SEAL AND RETAINER.

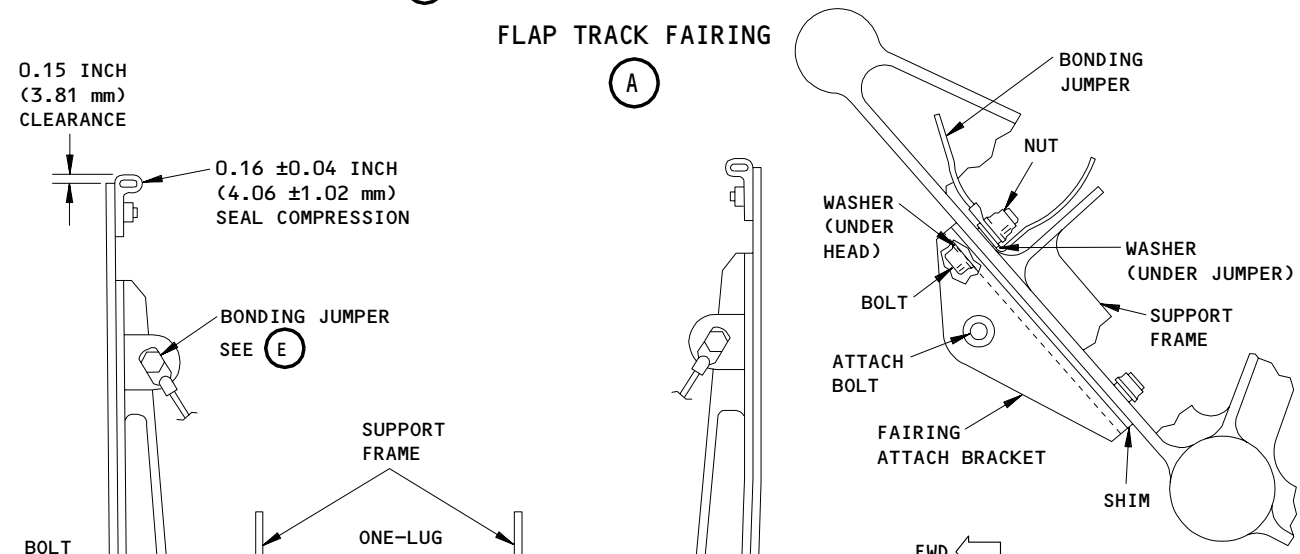
4 LOCATE TWO HOLES 0.047 ±0.010 INCH (1.19 ±0.254 mm) 0.50 ±0.10 INCH (12.7 ±2.54 mm) FROM BOTH ENDS OF RETAINER. FILL HOLES WITH BMS5–95 AFTER 0.032 INCH (0.81 mm) SAFETY WIRE IS INSTALLED.

Aft Fairing
Figure 201 (Sheet 3)



FLAP TRACK FAIRING

A

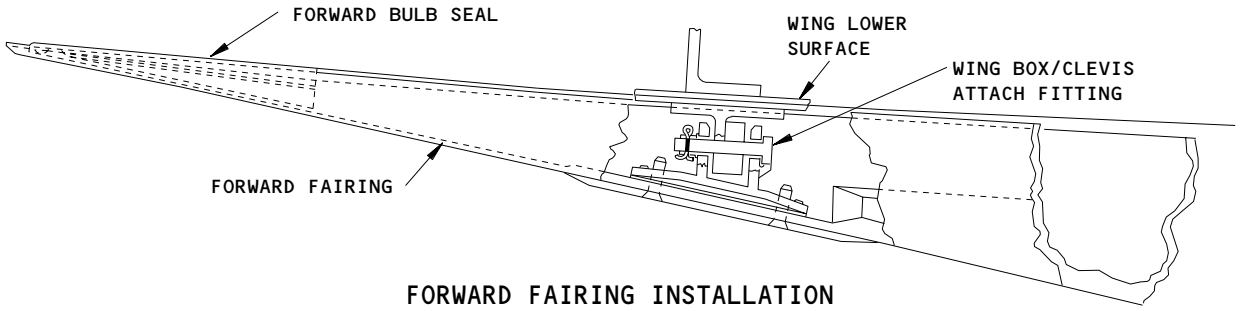


A-A

ATTACH POINT FOR THE FORWARD FAIRING

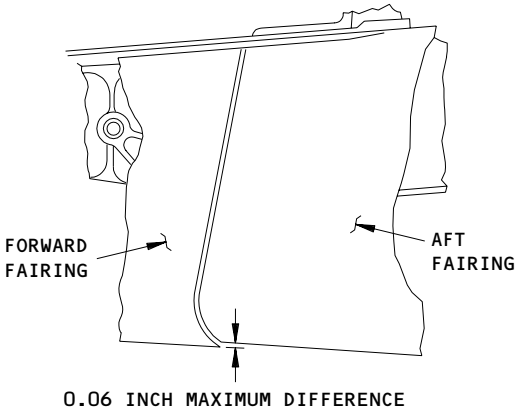
B

Forward Fairing
Figure 202 (Sheet 1)



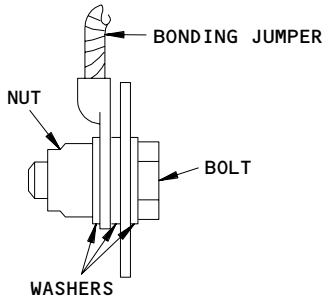
FORWARD FAIRING INSTALLATION

C



BOTTOM ALIGNED

D



BONDING JUMPER 2

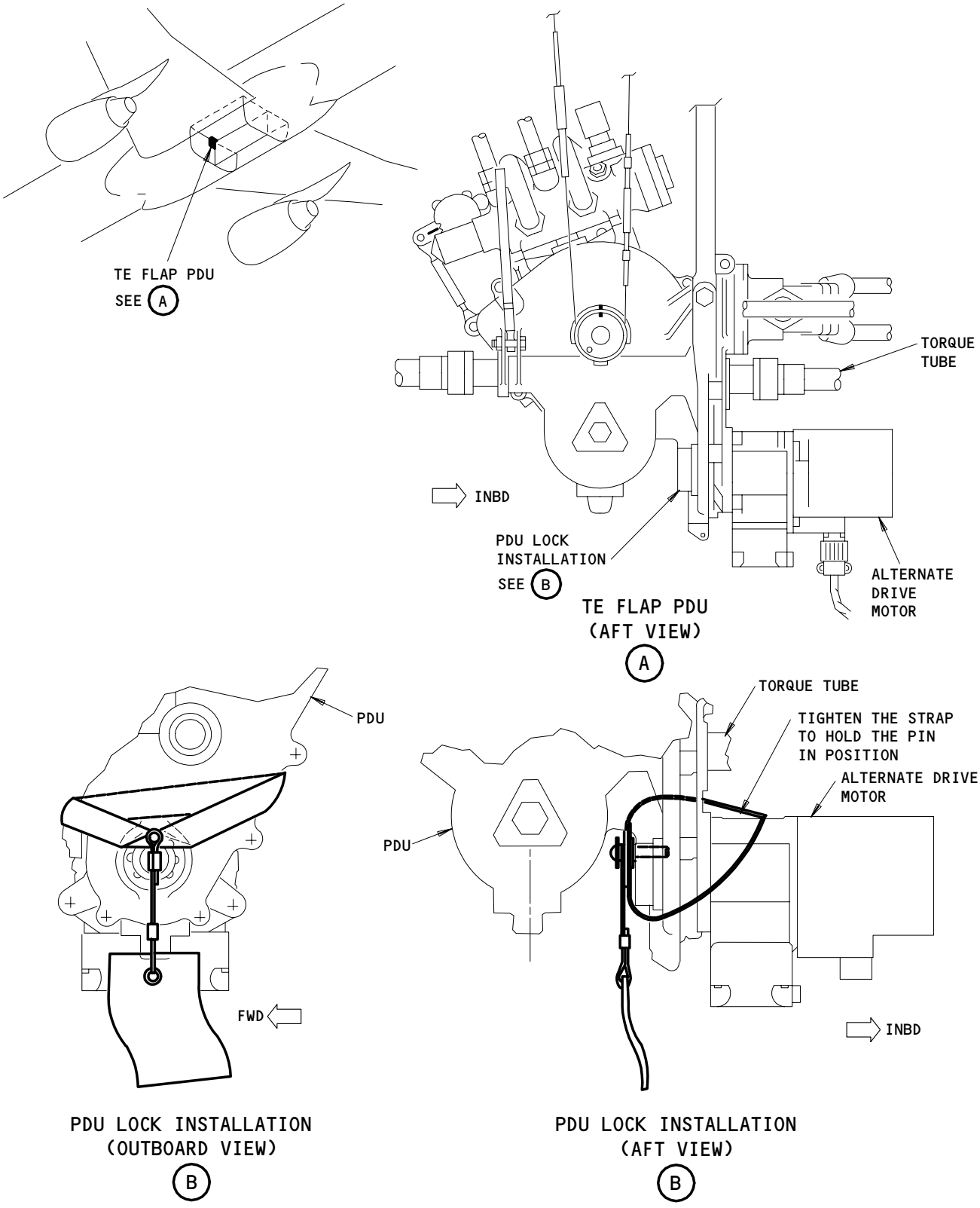
E

1 APPLY GREASE TO THE OUTER SURFACES OF THE BOLT AND THE BUSHING. FULLY REMOVE ALL GREASE FROM THE THREADS BEFORE YOU INSTALL THE BOLT.

2 THE TOTAL RESISTANCE ACROSS THE BOND MUST NOT BE MORE THAN 0.001 OHM t

3 USE SHIM WASHERS AS NECESSARY FOR ADJUSTMENT

Forward Fairing
Figure 202 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 203

816388

S 492-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-004
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-006
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-007
(6) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 492-009
(8) Install a PDU lock in the TE flap PDU (Fig. 203).

F. Remove the Aft Fairing (Fig. 201)

S 012-010
(1) Remove the access panels for the aft fairing (AMM 06-44-00/201).

S 492-011
(2) Use a support to remove the weight of the aft fairing from the attachment bolts.

S 022-012
(3) Do these steps to remove the aft fairing:
(a) Remove the bolt that attaches the adjustment link to the aft fairing.

(b) Remove the bolt that attaches the support link to the aft fairing.
(c) Remove the two bonding jumpers.
(d) Remove the cover plates at the aft fairing hinge.
(e) Remove the nut and move the hinge bolt from the aft fairing.
(f) Remove the clamp-up bushing and the lubrication bushing with the hinge bolt and the nut.

G. Remove the Forward Fairing (Fig. 202)

S 492-026
(1) Use a support to hold the weight of the forward fairing.

S 432-027
(2) Remove the two mounting bolts.

S 432-030
(3) Remove the clevis pin from the forward attach fitting.

S 432-031
(4) Disconnect the two bonding jumpers from the forward fairing and remove the fairing.

TASK 27-51-31-422-068

3. Install the Fairings for the Outboard TE Flap Tracks

A. Equipment
(1) Bonding Meter-Microhm Bridge, Type 2 Bonding Meter Avtron - Model T477W or equivalent
Avtron Manufacturing, Inc.
Cleveland, Ohio

B. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Recommended)
(2) D00013 Grease - MIL-PRF-23827 (Alternate)
(3) D00015 Grease - BMS 3-24 (Alternate)
(4) C00259 Primer - BMS 10-11, Type 1

C. References
(1) AMM 20-10-21/401, Electrical Bonding
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access
(1) Location Zones

211/212	Control Cabin
573/574	Outboard Flap Inboard Fairing
673/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Aft Fairing (Fig. 201)

S 212-013
(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-014
(2) Make sure the alternate drive systems are not armed.

S 622-015
(3) Apply primer to the areas around the mounting holes where there is no primer or the primer is scratched and let it dry.

S 422-016
(4) Lift the aft fairing into its position.

S 432-017

CAUTION: MAKE SURE YOU INSTALL THE HINGE BOLT AND LUBRICATION BUSHING CORRECTLY. THE HINGE MUST BE LUBRICATED THROUGH THE GROOVES IN THE HINGE BOLT AND LUBRICATION BUSHING. IF THE HINGE BOLT AND LUBRICATION BUSHING ARE NOT INSTALLED CORRECTLY, THE AFT FAIRING HINGE WILL NOT BE LUBRICATED SUFFICIENTLY AND CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Do these steps to install the hinge bolt:
   (a) Apply grease to the outer diameter of the hinge bolt and the inner diameter of the lubrication bushing.

   CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

   (b) Install the hinge bolt, the lubrication bushing, and the clamp-up bushing with washers and a nut.

      NOTE: Make sure the hinge bolt and the lubrication bushing are installed pointed toward each other. This will make sure the hinge will be adequately lubricated through the grooves in the hinge bolt and the lubrication bushing.

   (c) Tighten the hinge bolt to 1000-1200 pound-inches (113-135 newtons).

S 642-018
(6) Lubricate the hinge with grease through the lubrication fittings at each end of the hinge bolt.

S 432-019
(7) Install the hinge cover plates.

S 432-020
(8) Install the bonding jumpers (AMM 20-10-21/401).

S 422-021
(9) Install the support link.

S 212-022
(10) Make sure the clearance between the outer bushing and the inner washer is between 0.025 and 0.010 inches (0.26-0.62 mm).

S 422-023

CAUTION: MAKE SURE THE TAB ON THE LOCKING DEVICE IS IN THE ROD END PLANE (FORWARD OR AFT DIRECTION) ON THE SUPPORT LINK. THIS WILL PREVENT A GOUGE ON THE CLEVIS.

(11) Turn the end of the adjustment link to align it with the mounting hole in the aft fairing and do these steps:
(a) Install the adjustment link with a bolt and washers.
(b) Tighten the nut to 220-280 pound-inches (24.9-31.6 Nm).
(c) Install a cotter pin through the bolt and nut.
(d) Safety the nuts at each end of the adjustment link with a wire.

S 092-024
(12) Remove the support from the aft fairing.

S 822-025
(13) Do the adjustment steps for the aft fairing in the Adjustment/Test of the Forward and Aft Fairings.
(a) Do the steps to adjust and to do a test on the aft fairing installation in the Adjustment/Test of the Forward and Aft Fairings.

F. Install the Forward Fairing (Fig. 202)

S 212-032
(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 212-033
(2) Make sure the alternate drive systems are not armed.

S 622-034
(3) Apply primer to the areas around the mounting holes where there is no primer or the remaining primer has scratches and let it dry.

S 422-070
(4) Put the forward fairing in its correct position and connect the bonding jumper (AMM 20-10-21/401).

S 642-039

CAUTION: MAKE SURE YOU FULLY REMOVE ALL GREASE FROM THE BOLT THREADS. GREASE IN THE THREADS CAN CAUSE THE BOLT TO COME LOOSE AND CAUSE DAMAGE TO THE AIRPLANE.

(5) Apply grease to the mounting bolts.

S 432-041
(6) Install the clevis pin into the forward attach fitting.

S 432-042
(7) Install the bolts, wet with primer, to hold the fairing in its position.

S 432-043

CAUTION: DO NOT PUSH TOO HARD ON THE BOLTS BEFORE THE THREADS ENGAGE IN THE ONE-LUG NUTPLATES. BOLT THREADS AND NUTPLATES CAN BE DAMAGED IF YOU INCORRECTLY ENGAGE THE THREADS.

(8) Engage the bolts loosely with one-lug nutplates but, do not tighten bolts.

NOTE: If you install the same fairing that you removed and the fairing was correctly adjusted before you removed it, tighten the bolts to 100-140 pound-inches (11.3-15.8 Nm). No subsequent adjustment is necessary.

S 822-044
(9) Do these steps to adjust the forward fairing:
(a) Do a test on the forward fairing installation as shown in the Adjustment/Test of the Forward and Aft Fairings.

TASK 27-51-31-822-045

4. Adjustment/Test of the Forward and Aft Fairings

A. Consumable Materials

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones

211/212	Control Cabin
573/574	Outboard Flap Inboard Fairing
673/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Adjust the Forward and Aft Fairings

S 822-046
(1) Do these steps to adjust the aft fairing (Fig. 201):

CAUTION: MAKE SURE THE TAB ON THE LOCKING DEVICE IS IN THE ROD END PLANE (FORWARD OR AFT DIRECTION) ON THE SUPPORT LINK. THIS WILL PREVENT A GOUGE ON THE CLEVIS.

(a) Make sure the deadweight rollers for the main flap are on the main flap tracks and do this step:
1) Adjust the length of the idler link to get a 0.05 inch (1.27 mm) minimum clearance between the top edge of the fairing (not the seal) and the lower surface of the flaps.

(b) Put the TE flap in the UP position until the support tracks for the aft flap touch the flight rollers and the flight rollers for the main flap touch the main flap track and do these checks:
1) Make sure there is a 0.05 inch (1.27 mm) minimum clearance between the top edge of the fairing and the bottom surface of the flap.
2) Make sure the aft seal continuously touches the lower surface of the aft flap along the trailing edge.

CAUTION: MAKE SURE THE TAB ON THE LOCKING DEVICE IS IN THE ROD END PLANE (FORWARD OR AFT DIRECTION) ON THE SUPPORT LINK. THIS WILL PREVENT A GOUGE ON THE CLEVIS.

3) If it is necessary, adjust the idler link to make sure you have all of the above requirements.

NOTE: Make sure the clearance between the top of the fairing and the lower flap surface (with the deadweight rollers set on the flap tracks) is the same as before.

(c) Adjust the side seals to get a seal deflection of between 0.05 and 0.15 inch (1.27-3.81 mm).

(d) Safety the nuts at each end of the idler link with a wire.

S 822-047

(2) Do these steps to adjust the forward fairing (Fig. 202):
(a) If the lower surface of the forward fairing touches the aft fairing, install shims below the forward attach bracket (Detail A-A).
(b) Do these steps to adjust the forward end of the fairing:
(c) Make sure the forward seal continuously touches the wing.

S 222-048

(3) Make sure the outer surface of the forward fairing is aligned with the outer surface of the aft fairing to 0.06 around the outer edge of the fairing.
(a) To adjust the fairings in the vertical direction, add or subtract shims at the outboard attach bolt of the forward fairing.

(b) To adjust the fairings in the horizontal direction, use shims at the attach bracket for the forward fairing.

S 822-049

(4) Adjust the bulb seal for the forward fairing to make sure the seal compression is 0.16 +/- 0.04 inches (4.06 +/- 1.0 mm).

S 432-050

(5) Tighten the bolts in the one-lug nutplates to 100-140 pound-inches (11.3-15.8 Nm).

E. Operational Test for the Forward and Aft Fairings

S 212-051

(1) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 092-052

(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 092-053

(3) Remove the PDU lock from the TE flap PDU (Fig. 203).

S 862-054

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-055

(5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 862-056

(6) Supply electrical power (AMM 24-22-00/201).

S 862-057

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 212-058

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE TO COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(8) Move the flaps between the fully retracted and the fully extended positions and do these checks:
   (a) Make sure the fairings do not rub against other parts.
   (b) Make sure the seals move back to the adjusted positions when the flaps are fully retracted.

S 862-063

(9) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats move to the fully retracted position.

F. Put the Airplane Back to Its Usual Condition

S 412-064

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 862-065

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 862-066

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 412-067

(4) Install the access panels for the forward and aft fairings (AMM 06-44-00/201).

FLAP CONTROL LEVER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the flap control lever for the trailing edge (TE) flap and leading edge (LE) slat systems. The second task installs the flap control lever.

   TASK 27-51-32-024-001

2. Remove the Flap Control Lever
   A. Equipment
      (1) Rig Pin part of Set - B20003-XX (Ref 20-10-24):
          (a) Rig Pin TE1 - P/N B20003-53
      (2) TE Flap PDU Lock - B27008-1
      (3) Cable Clamps - Commercially Available
   B. References
      (1) AMM 20-10-03/401, Control Cables - Removal/Installation
      (2) 20-10-24/201, Rig Pins
      (3) 24-22-00/201, Electrical Power - Control
      (4) 25-50-01/401, Cargo Compartment - Ceiling Lining Panels (FWD, AFT).
      (5) 27-48-06/401, Stabilizer Trim Position Indicator
      (6) 27-61-00/201, Spoiler/Speedbrake Control System
      (7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (8) 32-00-15/201, Landing Gear Door Locks
      (9) 32-00-20/201, Landing Gear Downlock
      (10) 34-22-02/201, EFIS Control Panel.
   C. Prepare for the Removal

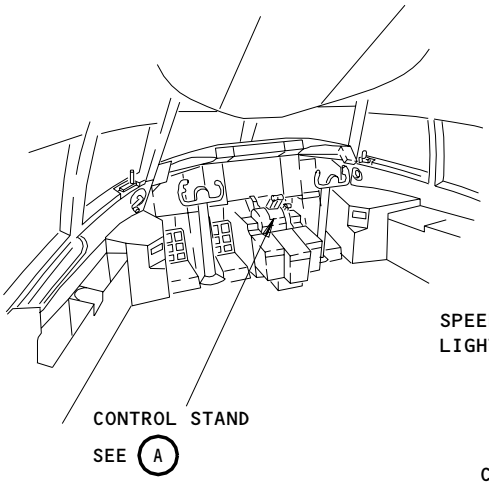
      S 214-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 014-003

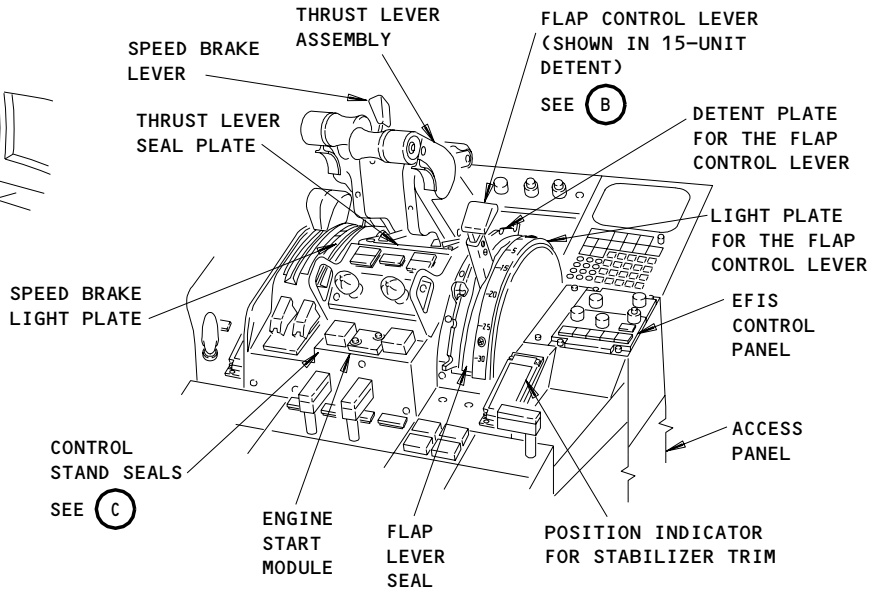
      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-004
      (3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

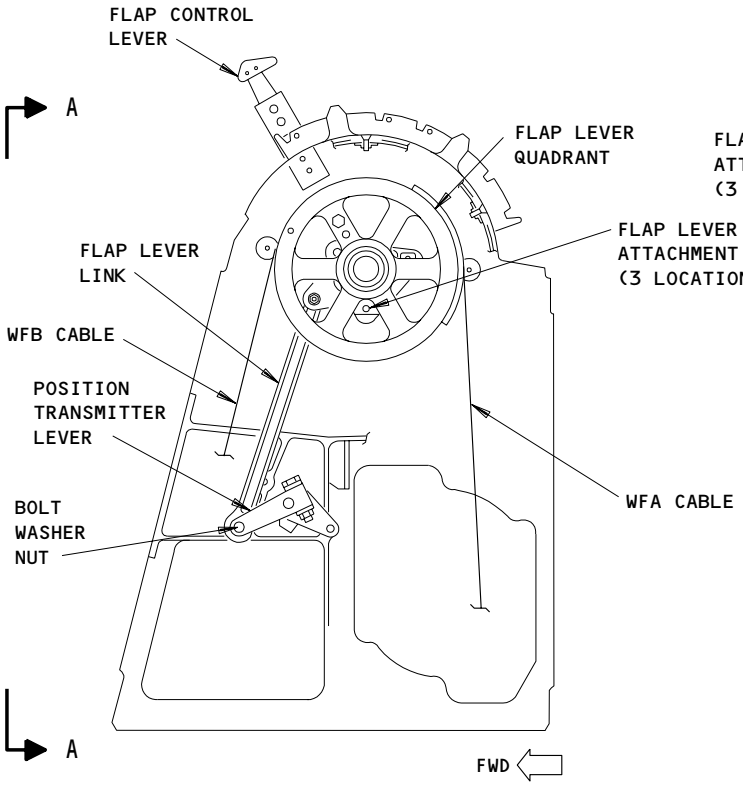


FLIGHT COMPARTMENT



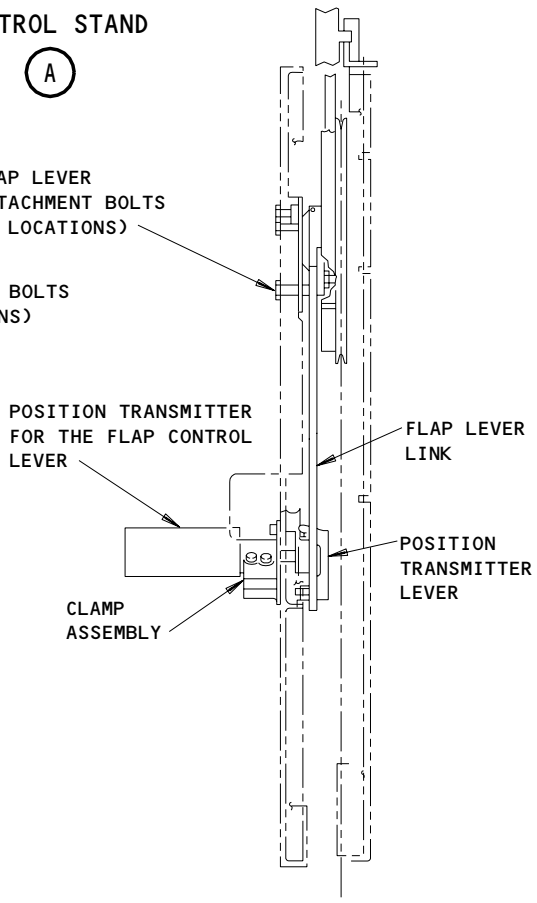
CONTROL STAND

A



FLAP CONTROL LEVER

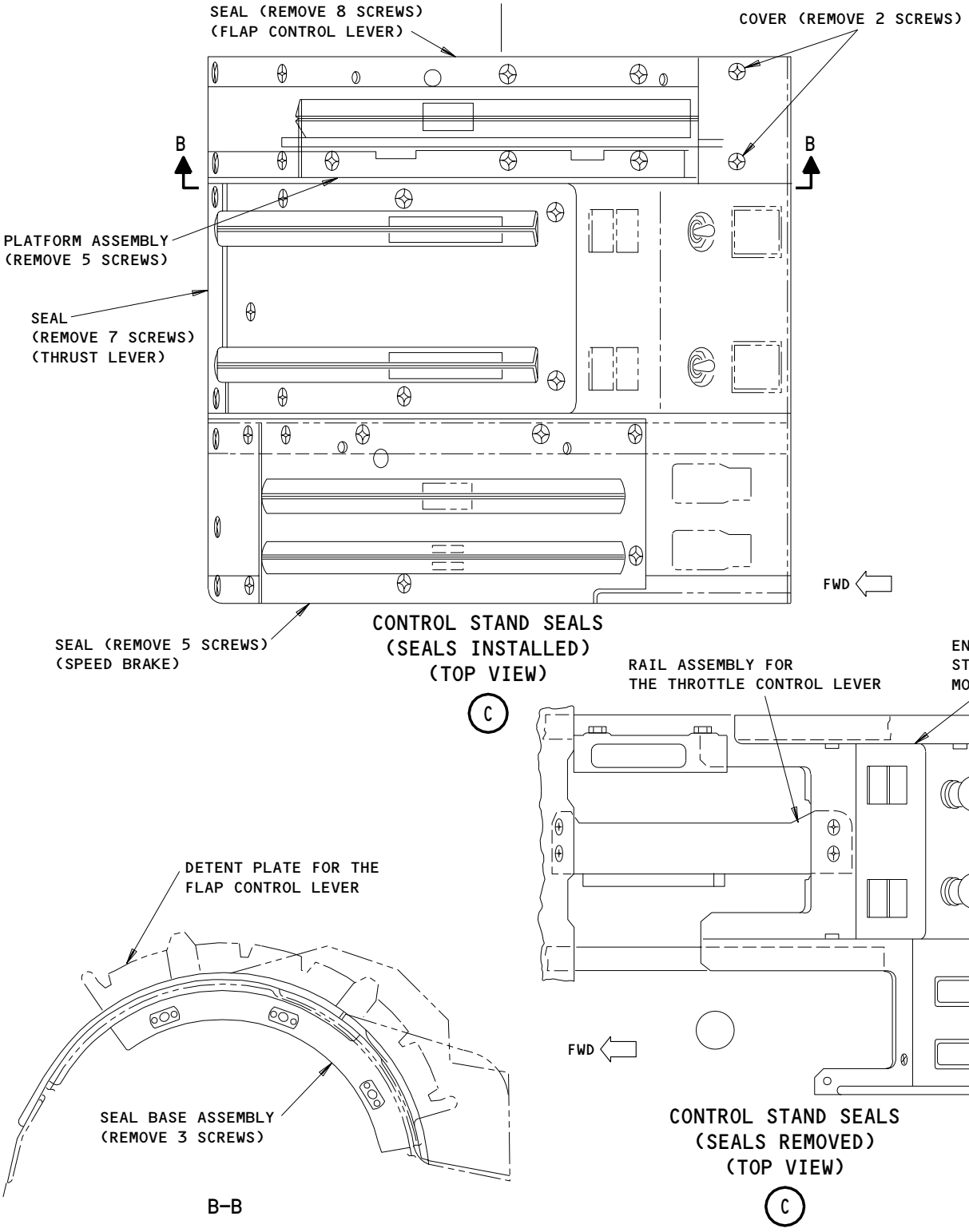
B



A-A

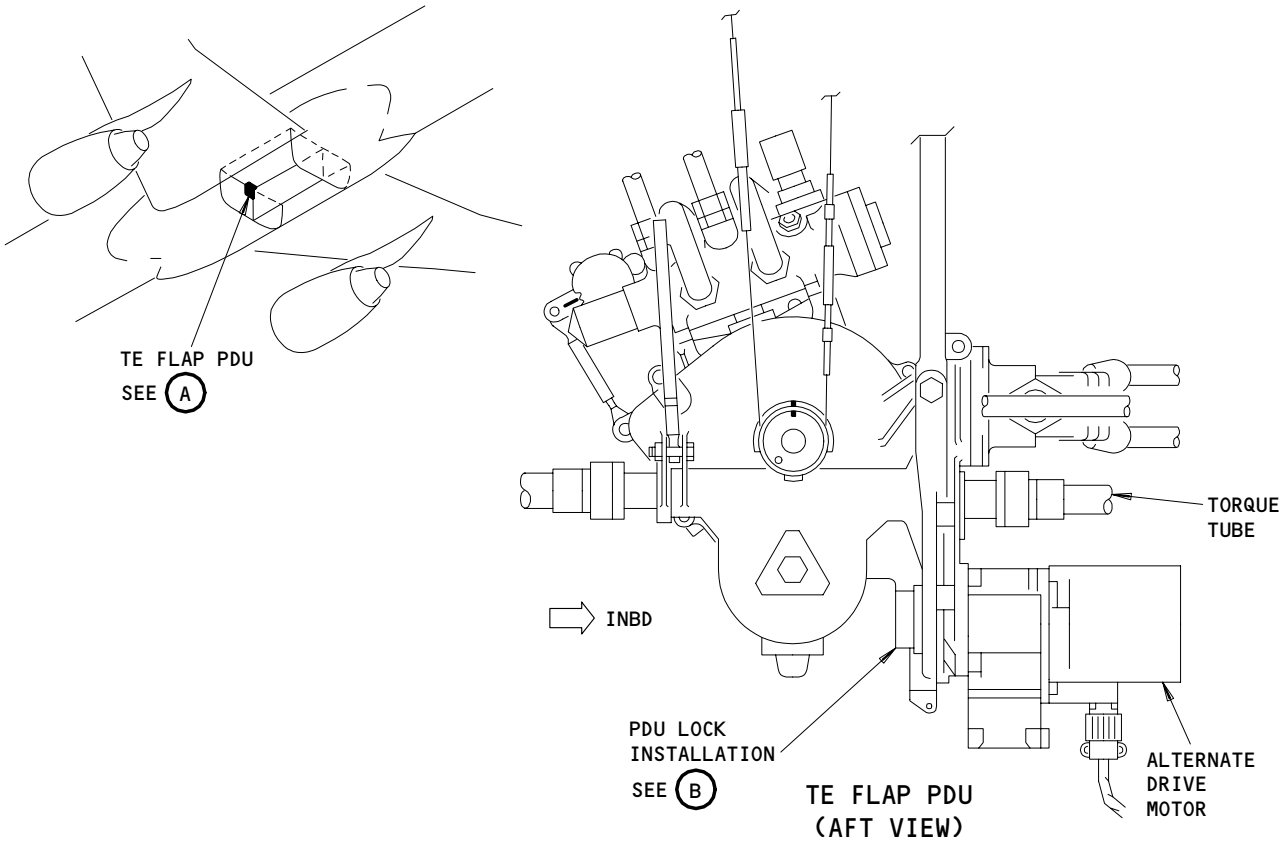
Flap Control Lever
Figure 401 (Sheet 1)

78845

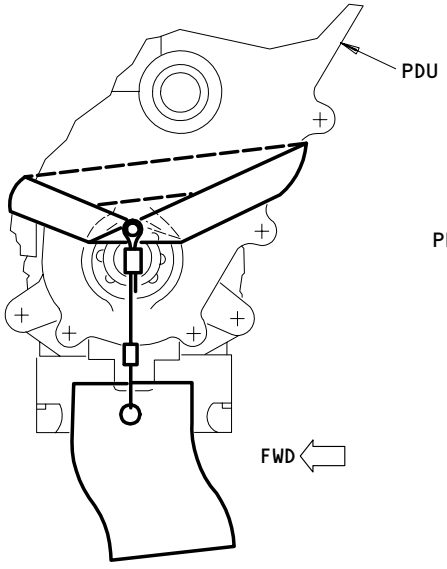


Flap Control Lever
Figure 401 (Sheet 2)

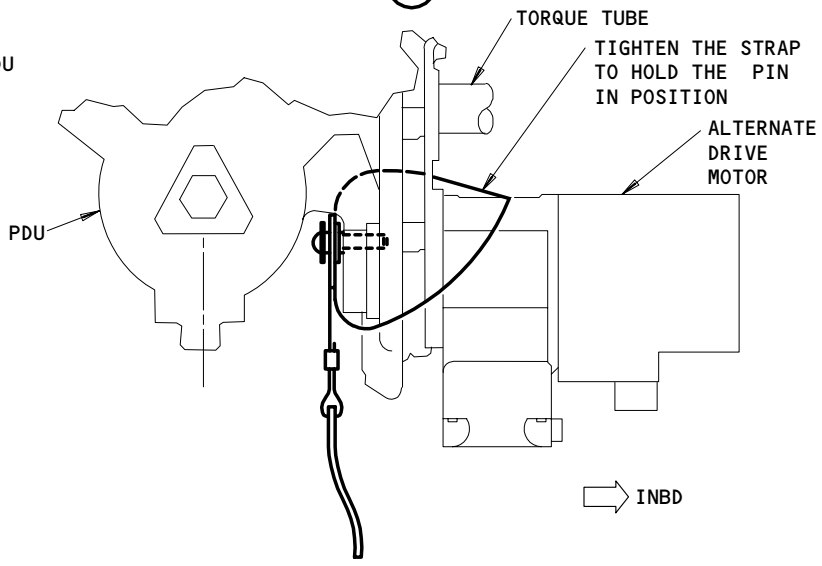
78667



TE FLAP PDU
(AFT VIEW)
A

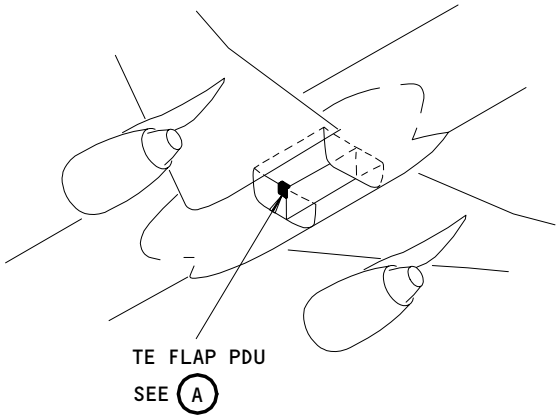


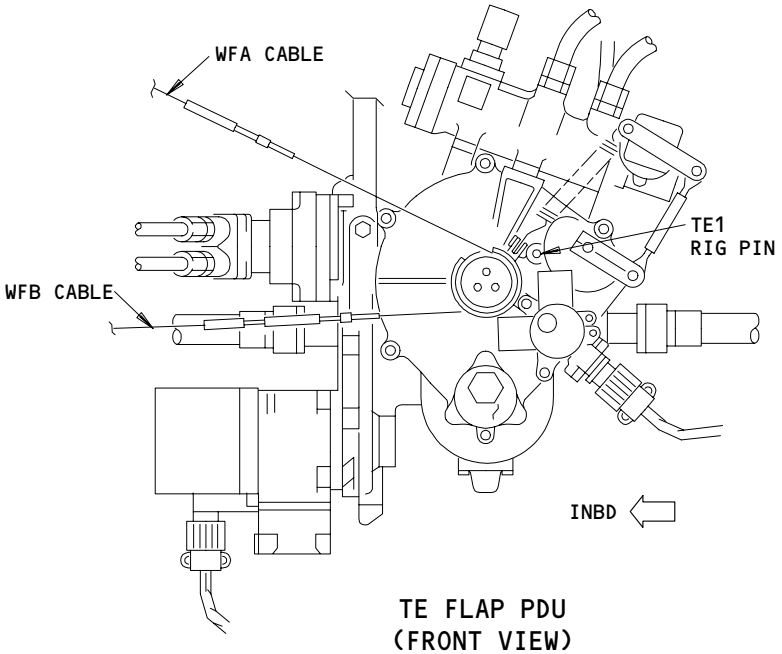
PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

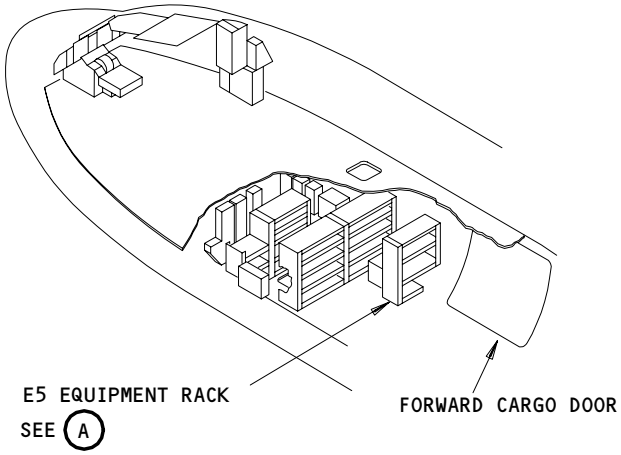
PDU Lock for the TE Flap PDU
Figure 402

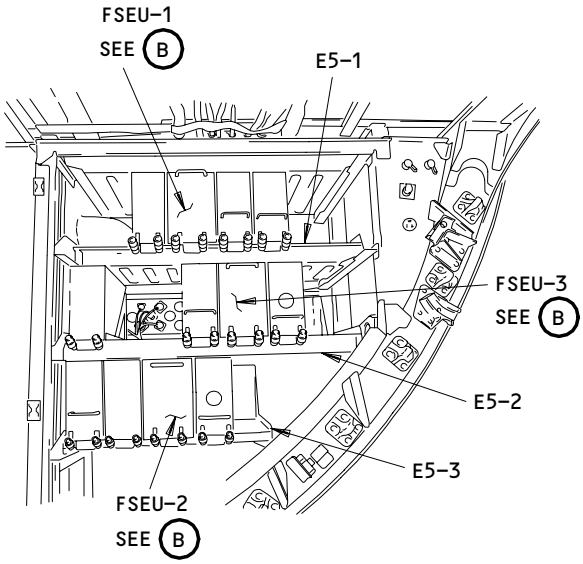




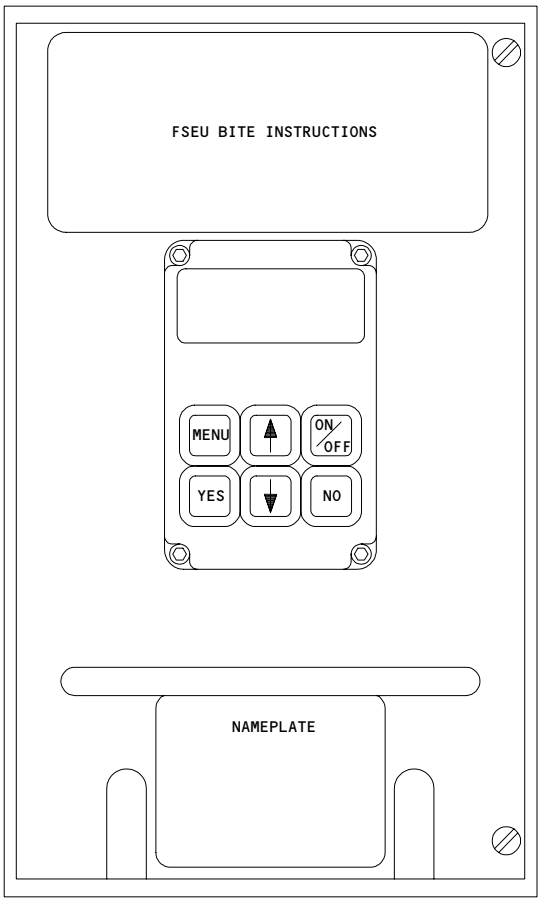
TE FLAP PDU
(FRONT VIEW)
(A)

TE Flap PDU
Figure 403





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 404

S 044-005

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS OR MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Do the deactivation procedure for the spoilers (Ref 27-61-00) or move all persons and equipment away from the spoilers.

S 864-006

(5) Remove the electrical power (Ref 24-22-00).

S 864-008

(6) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-009

(7) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-010

(8) Get access to the forward cargo compartment and remove all necessary ceiling panels to get access to the turnbuckles for the WFA and WFB control cables (AMM 25-50-01/401).

NOTE: The control cable turnbuckles are found at approximately the center of the forward cargo door (approximately 60 inches (1.54 meters) inboard from the top of the door).

S 864-011

(9) Put the flap control lever in the 1-unit detent.

S 494-012

(10) Install rig pin TE1 into the input cam of the TE flap PDU (Fig. 403).

S 494-013

(11) Install a PDU lock in the TE flap power drive unit (PDU) (Fig. 402).

D. Remove the Flap Control Lever (Fig. 401)

S 024-014

(1) Do these steps to remove the flap control lever:

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

(a) Disconnect the WFA and WFB control cables at the turnbuckles.
(b) Use a clamp on the aft cables to keep a light tension and to make sure the cables stay on the pulleys.
(c) Remove the access panel on the lower right side of the control stand to get access to the lightplate wires.
(d) Remove the EFIS control panel on the right side of the control stand (View A) (Ref 34-22-02).
(e) Remove the position indicator for the stabilizer trim system on the right side of the control stand (Ref 27-48-06).
(f) Cut the ties that hold the loose wires for the lightplates for the flap control lever and the speedbrake lever.
(g) Remove the two screws to remove the cover that is located aft of the detent plate for the flap control lever (View C).
(h) Remove the two screws that attach the lightplate for the flap control lever (View A).
1) Pull the lightplate up from the control stand.
(i) Remove the two screws that attach the speedbrake lightplate.
1) Pull the lightplate up from the control stand.
(j) Remove the seal assemblies at four locations (View C).
(k) Remove the two screws that attach the aft end of the rail assembly for the thrust control lever (View C).
(l) Remove the seven screws to remove the engine start module.
1) Pull it out of the control stand and move it away from the assembly to permit you to remove the detent plate and the seal base assembly.
(m) Remove the detent plate and the seal base assembly (View B-B).
(n) Remove the two cotter pins that attach the cable to the flap lever quadrant.
(o) Remove the cable from the flap lever quadrant and safety the cable to make sure you keep the tension.
(p) Remove the bolt (cross-recess) that attaches the flap lever link to the position transmitter lever (View B).
(q) Remove the three mounting bolts.
(r) Remove the assembly of the flap control lever from the control stand.

TASK 27-51-32-424-015

3. Install the Flap Control Lever

NOTE: The wear limits for the these components are given in 27-51-32.

A. References
(1) AMM 20-10-03/401, Control Cables - Removal/Installation

(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 25-50-01/401, Cargo Compartment - Ceiling Lining Panels (FWD, AFT).
(5) 27-48-06/401, Stabilizer Trim Position Indicator
(6) 27-61-00/201, Spoiler/Speedbrake Control System
(7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) 32-00-15/201, Landing Gear Door Locks
(9) 32-00-20/201, Landing Gear Downlock
(10) 34-22-02/201, EFIS Control Panel.

B. Install the Flap Control Lever (Fig. 401)

S 424-016

(1) Do these steps to install the flap control lever:

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

(a) Put the assembly of the flap control lever in the control stand.
1) Attach the flap control lever to the adjacent structure with the three bolts and washers.
(b) Connect the flap lever link to the position transmitter lever.
(c) Put the control cable on the flap lever quadrant and put the spherical swage fitting in the detent of the quadrant.
1) Attach the spherical swage fitting with two cotter pins.
(d) Install the detent plate and seal base assembly.
(e) Put the flap control lever in the 1-unit detent.
(f) Connect the WFA and WFB cables at the turnbuckles.
1) Tighten the cables to the value in Table 401.
(g) Make sure that rig pin TE1 can be easily installed in the PDU (Fig. 403).
(h) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent back to the zero (FLAPS UP) detent.
(i) Again, move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent back to the zero (FLAPS UP) detent.
(j) Move the flap control lever to the 1-unit detent.
(k) Make sure that rig pin TE1 can be easily installed in the PDU.
(l) Move the flap control lever to the zero (FLAPS UP) detent.
(m) Install the turnbuckle clip locks.

TABLE 401	
FLAP CABLE TENSION LOADS	
TEMP °F ±5°F	WFA, WFB (POUNDS)
110	118
90	109
80	104
70	100
60	96
50	92
40	88
30	84
10	75
-10	67
-30	59
-40	53

NOTE: Cable tension values will not be correct when the temperature differences along the cable are more than 5 degrees F. Let the difference between the airplane temperature and the air temperature that is near the airplane become stable one hour before you adjust the flap cables.

S 414-028

(2) Install the ceiling panels in the cargo compartment (AMM 25-50-01/401).

S 424-029

(3) Install the engine start module with the seven screws.

S 434-030

(4) Use two screws to attach the aft end of the rail assembly for the thrust control lever.

S 434-031

(5) Install the four seal assemblies.

S 434-032

(6) Install the speedbrake lightplate with the two screws.

S 414-033

(7) Install the cover aft of the detent plate for the flap control lever.

S 434-034
(8) Pull the loose wires of the lightplates for the flap control lever and the speedbrake lever into the control stand.
(a) Install ties on the wires for the lightplates.

S 424-035
(9) Install the position indicator for the stabilizer trim system on the right side of the control stand (Ref 27-48-06).

S 414-036
(10) Install the EFIS Control Panel on the right side of the control stand (Ref 34-22-02).

S 414-037
(11) Install the access panel on the lower right side of the control stand.

S 864-038
(12) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-039
(13) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 714-017
(14) Do a test on the installation of the flap control lever.

C. Operational Test for the Installation of the Flap Control Lever

S 094-018
(1) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 214-019
(2) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 864-020
(3) Supply electrical power (Ref 24-22-00).

S 864-021

WARNING: CLEAR PERSONNEL AND EQUIPMENT FROM ALL CONTROL SURFACES BE WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Pressurize the left hydraulic system (Ref 29-11-00).

S 714-022

(5) Do these steps to do a test on the installation of the flap control lever:

(a) Move the flap control lever to the 30-unit detent.

1) Make sure the force necessary to move the flaps is not more than 9 pounds (40 newtons).

2) Make sure the TE flaps and the LE slats move to the fully extended position.

(b) Move the flap control lever to the 1-unit detent.

1) Make sure the TE flaps and LE slats move to the 1-unit position.

(c) Move the flap control lever to the zero (FLAPS UP) detent.

1) Make sure the force necessary to move the flaps is not more than 6.5 pounds (28.9 newtons).

2) Make sure the TE flaps and LE slats move to the fully retracted position.

(d) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.

1) Stop in each detent to let the TE flaps and LE slats move to the correct position.

2) Make sure, at each detent, the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS messages show on the display.

(e) Push and release the BIT TEST switch (Fig. 404) on the FSEU-1 in the main equipment center, and make sure there are no indications of a failure or defect.

NOTE: A green test-complete light shows the end of the test. Ignore the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

(f) Move the flap control lever to the 15-unit detent, and let the flaps move to the 15-unit position and the slats move to the intermediate position.

(g) Push and release the BIT TEST switch on the FSEU-1, and make sure there are no indications of a failure or defect.

NOTE: A green test-complete light shows the end of the test. Ignore the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

(h) Move the flap control lever to the 30-unit detent, and let the flaps and slats extend fully.

(i) Push and release the BIT TEST switch on the FSEU-1, and make sure there are no indications of a failure or defect.

NOTE: A green test-complete light shows the end of the test. Ignore the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

(j) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

D. Put the Airplane Back to Its Usual Condition

S 414-023

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 864-024

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-025

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

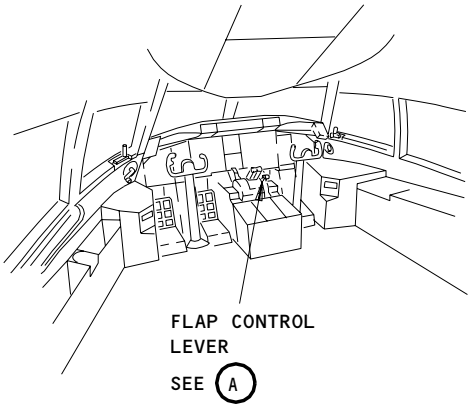
FLAP CONTROL LEVER - INSPECTION/CHECK

1. General
   A. This procedure only has an illustration and a wear limit table which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to the Flap Control Lever - Removal/Installation for procedures to do these tasks.

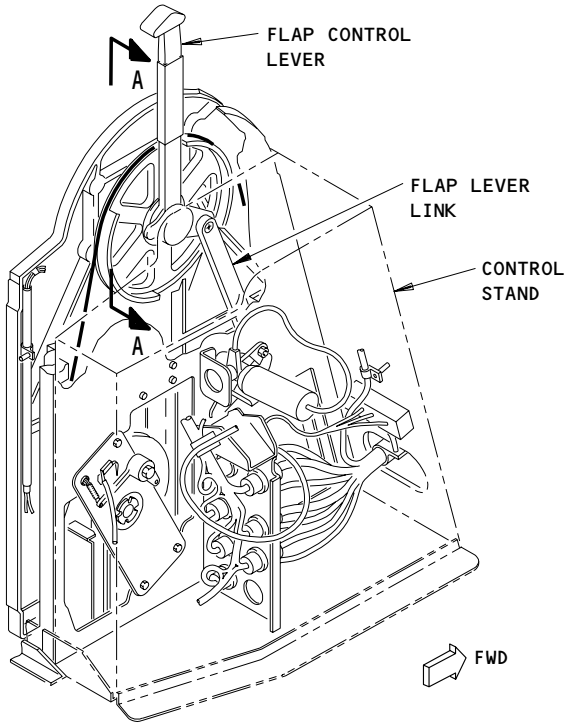
   TASK 27-51-32-206-001

2. Wear Limits for the Flap Control Lever
   A. Procedure

      S 226-002
      (1) Use the supplied data (Fig. 601) to examine the flap control lever for too much wear.

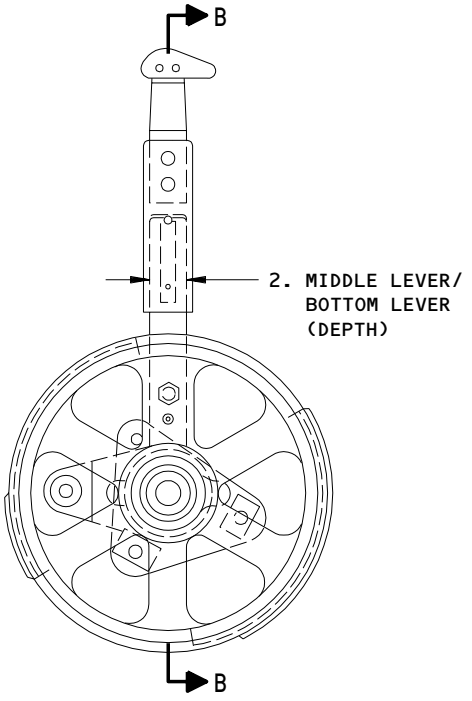


FLIGHT COMPARTMENT

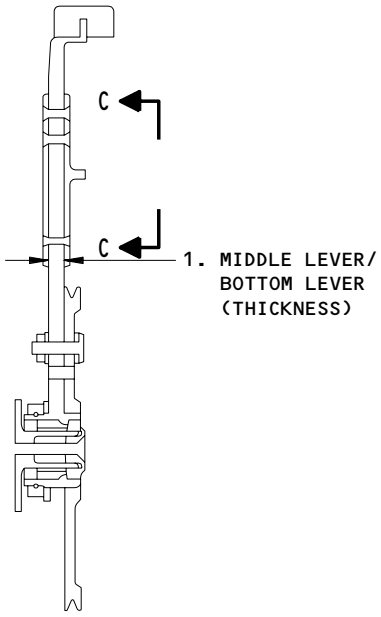


FLAP CONTROL LEVER

(A)

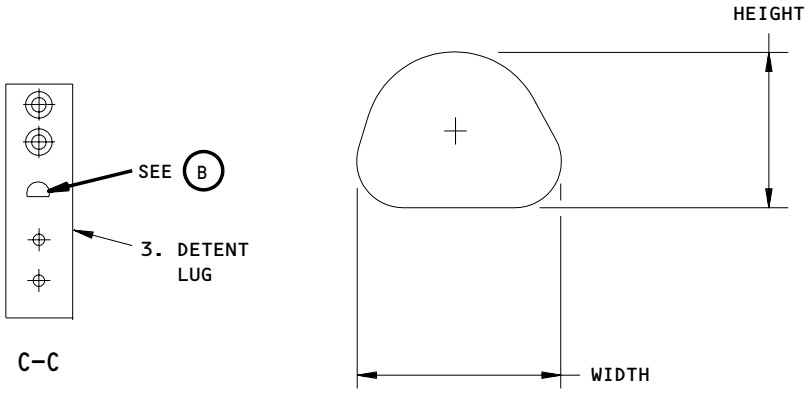


A–A



B–B

Wear Limits for the Flap Control Lever
Figure 601 (Sheet 1)



DETENT LUG
B

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	MID LEVER	2	0.314 (7.976)	0.318 (8.078)	0.327 (8.305)	0.015 (0.381)		X	1
	LOWER LEVER	2	0.308 (7.823)	0.312 (7.924)	0.299 (7.594)			X	1
2	MID LEVER	3	0.722 (18.33)	0.726 (18.44)	0.735 (18.67)	0.015 (0.381)		X	1
	LOWER LEVER	3	0.716 (18.19)	0.720 (18.28)	0.707 (17.96)			X	1
3	DETENT LUG	4	0.160 (4.064)	0.170 (4.318)	0.130 (3.302)	0.030 (0.762)	6	X	1
	DETENT LUG	5	0.225 (5.715)	0.235 (5.969)	0.195 (4.953)		7	X	1

1. THIS PART CAN BE REPAIRED.
2. LEVER THICKNESS
3. LEVER DEPTH
4. LUG HEIGHT
5. LUG WIDTH
6. 0.109 INCH (2.769 mm), REPLACE WITHIN 1000 CYCLES. 0.095 INCH (2.413 mm), REPLACE NOW.
7. 0.156 INCH (3.962 mm), REPLACE WITHIN 1000 CYCLES. 0.138 INCH (3.505 mm), REPLACE NOW.

Wear Limits for the Flap Control Lever
Figure 601 (Sheet 2)

FLAP CONTROL LEVER POSITION TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the position transmitter for the flap control lever. The second task installs the position transmitter.

TASK 27-51-33-024-001

2. Remove the Position Transmitter for the Flap Control Lever
   A. References
      (1) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (2) 32-00-20/201, Landing Gear Downlocks
      (3) 34-22-02/201, EFIS Control Panel
   B. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

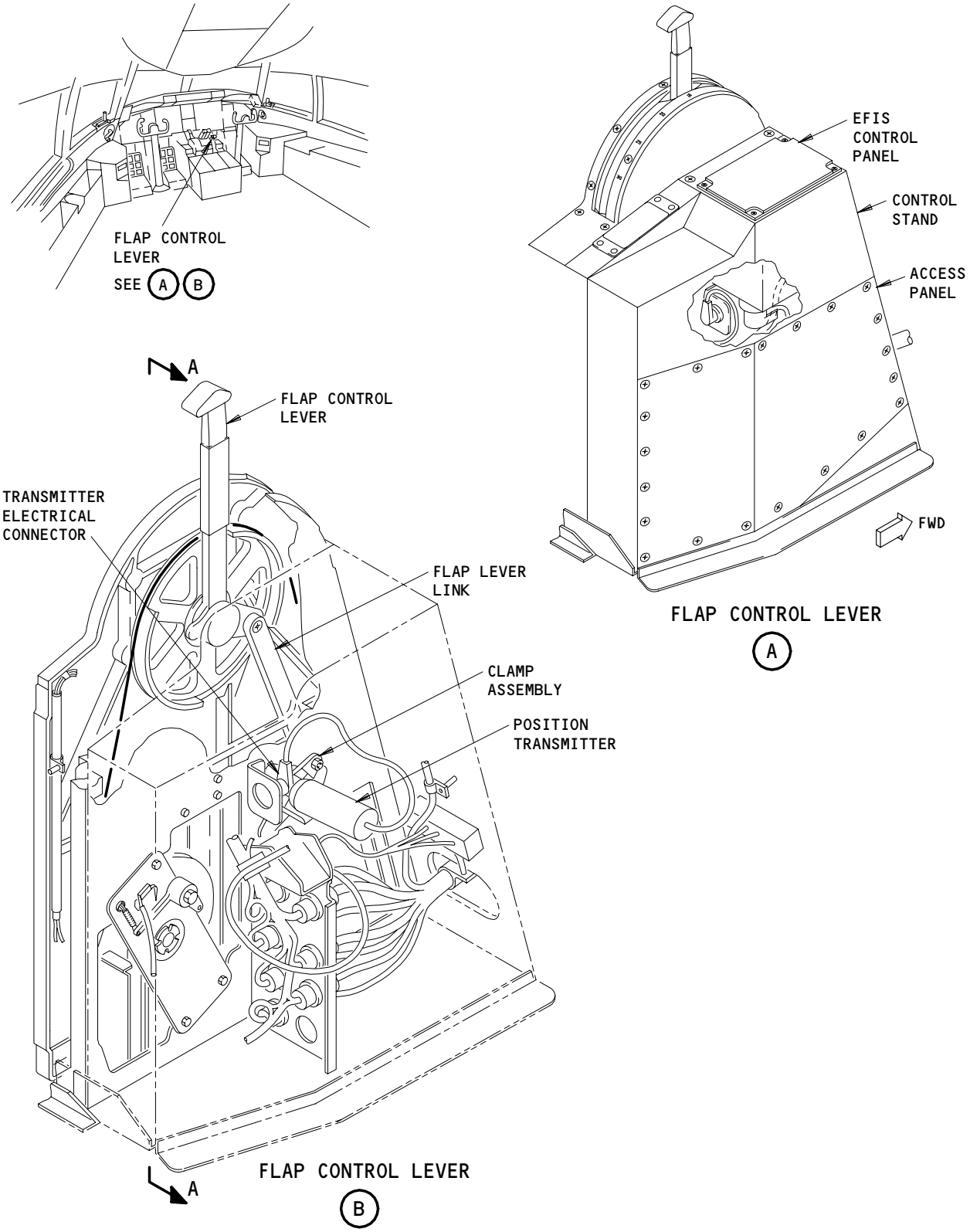
   C. Prepare for the Removal

S 214-002
      (1) Make sure the trailing edge (TE) flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

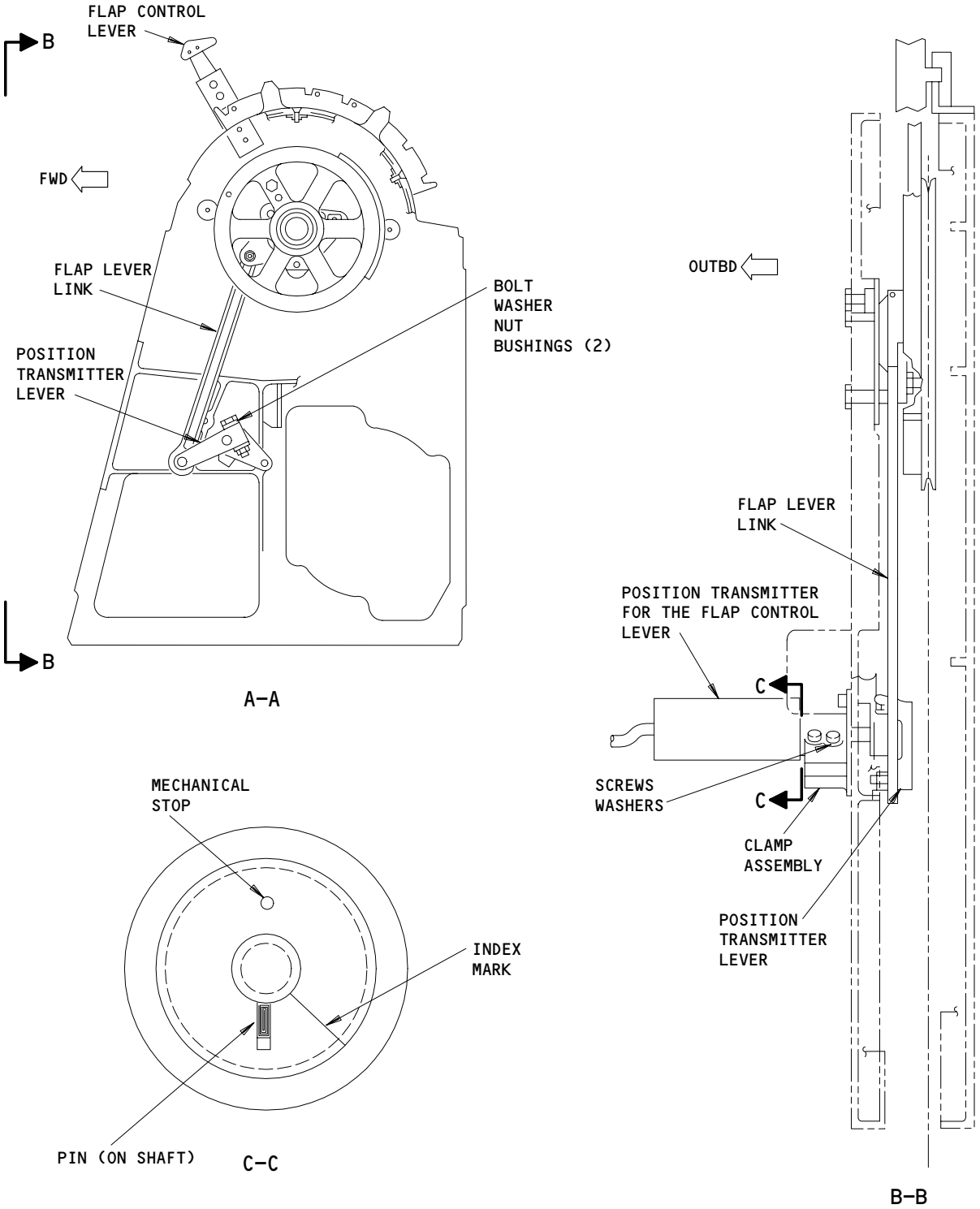
S 494-019
      (2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
         (a) 11B18, WARN ELEX B
         (b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
         (c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
         (d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
         (e) 11D31, HYDRAULICS PTU CONT
         (f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
         (g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
         (h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
         (i) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
         (j) 11J18, FLAP LOAD RELIEF
         (k) 11J33, WARN ELEX A

S 864-005
      (4) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
         (a) 6D20, ALTN SLAT PWR
         (b) 6D23, ALTN FLAP PWR



Position Transmitter for the Flap Control Lever
Figure 401 (Sheet 1)



Position Transmitter for the Flap Control Lever
Figure 401 (Sheet 2)

S 214-006
(5) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 864-007
(6) Remove the power from the left hydraulic system (Ref 29-11-00).

D. Remove the Position Transmitter (Fig. 401)

S 014-020
(1) Remove the EFIS control panel (Ref 34-22-02).

S 014-021
(2) Remove the lightplate and seals for the flap control lever.

S 014-022
(3) Remove the access panel on the lower right side of the control stand.

S 024-009
(4) Do these steps to remove the position transmitter:
(a) Disconnect the transmitter electrical connector.
(b) Remove the bolt to disconnect the position transmitter shaft from the position transmitter lever.

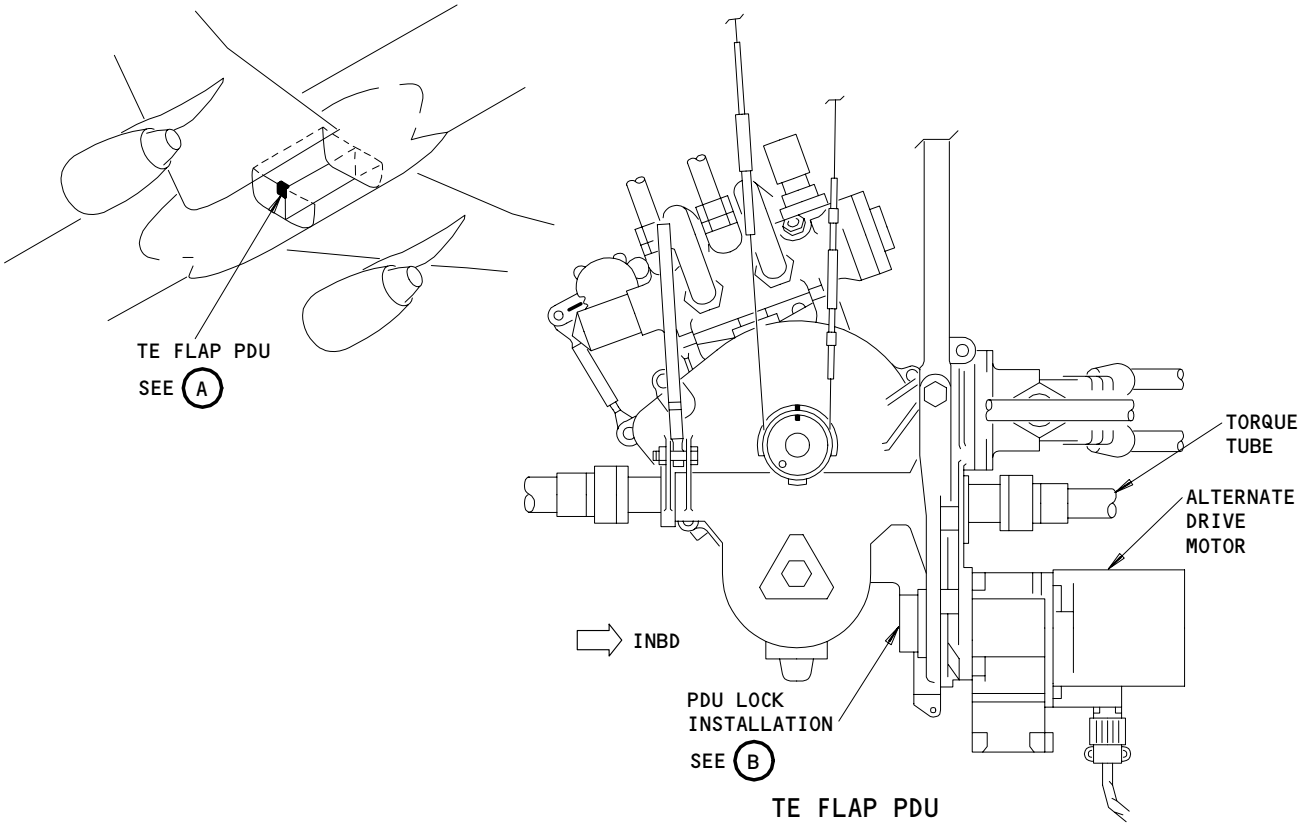
CAUTION: BE CAREFUL WHEN YOU REMOVE THE POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BE BENT.

(c) Remove the two clamp-up bushings from the position transmitter lever.
(d) Remove the two clamping screws that hold the position transmitter in its location.
(e) Remove the position transmitter from the control stand.

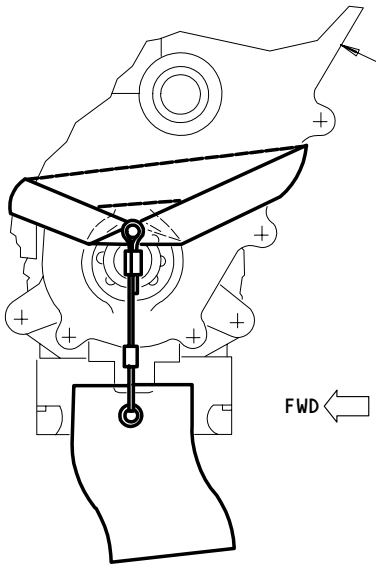
TASK 27-51-33-424-010

3. Install the Position Transmitter for the Flap Control Lever

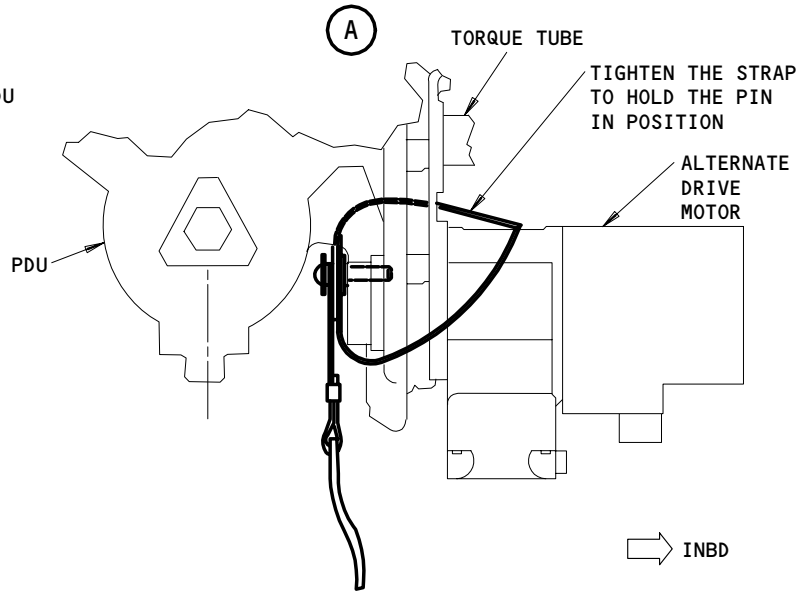
A. References
(1) 24-22-00/201, Electrical Power - Control



TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

(2) 27-58-01/501, TE Flap System and LE Slat System Position Transmitters
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Locks
(5) 34-22-02/201, EFIS Control Panel

B. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

C. Install the Position Transmitter (Fig. 401)

S 424-011

(1) Do these steps to install the position transmitter:

CAUTION: BE CAREFUL WHEN YOU INSTALL THE POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BE BENT.

(a) Align the pin on the position transmitter shaft with the index mark on the position transmitter case ± 2 degrees.
(b) Make sure the flap control lever is in the zero (FLAPS UP) detent.
(c) Put the position transmitter into the clamp assembly until the shaft extends through the control stand structure and engages with the position transmitter lever.

NOTE: Do not move the adjustment of the pin on the position transmitter shaft when you engage the position transmitter lever or install the clamp-up bushings.

(d) Install two screws and washers.
(e) Install the two clamp-up bushings in the position transmitter lever.
1) Install a bolt, washer, and a nut.
(f) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
1) 11B18, WARN ELEX B
2) 11C14, FLAP SLAT ELEC UNIT 2 POWER
3) 11C15, FLAP SLAT ELEC UNIT 2 CONT
4) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
5) 11D31, HYDRAULICS PTU CONT
6) 11G12, FLAP SLAT ELEC UNIT 1 POWER
7) 11G13, FLAP SLAT ELEC UNIT 1 CONT
8) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
9) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
10) 11J18, FLAP LOAD RELIEF
11) 11J33, WARN ELEX A

S 094-023
(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 714-016
(3) Adjust and do a test on the position transmitter for the flap control lever (Ref 27-58-01).

D. Put the Airplane Back to Its Usual Condition

S 414-017

WARNING: USE THE PROCEDURE IN 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 414-018
(2) Install the EFIS control panel (Ref 34-22-02).

S 414-024
(3) Install the lightplate and seals for the flap control lever.

S 414-025
(4) Install the access panel on the lower right side of the control stand.

S 864-013
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-014
(6) Remove the electrical power if it is not necessary (Ref 24-22-00).

TRAILING EDGE FLAP DRIVESHAFT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the drive shaft for the trailing edge (TE) flap. The second task installs the drive shaft.

   TASK 27-51-34-024-001

2. Remove the Drive Shaft for the TE Flap
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Flap Torque Tube Clamp from Set B27055-1:
          (a) Inboard Flap Torque Tube Clamp - B27055-3
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-51-00/501, Trailing Edge Flap System
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) 32-00-15/201, Landing Gear Door Locks
      (6) 32-00-20/201, Landing Gear Down Locks
   C. Access
      (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

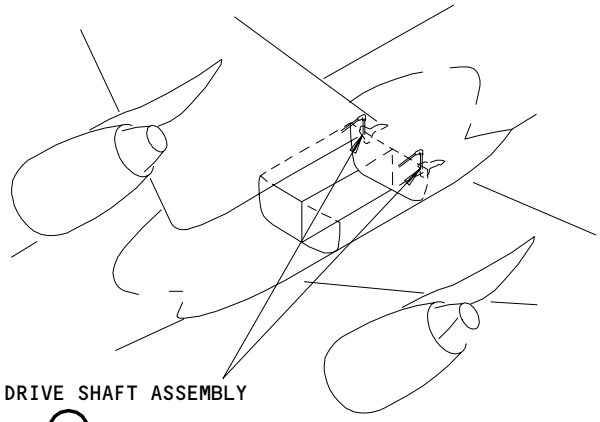
      S 214-007
      (1) Make sure that the TE flaps and LE slats are in the fully retracted position, and that the flap control lever is in the zero (FLAPS UP) detent.

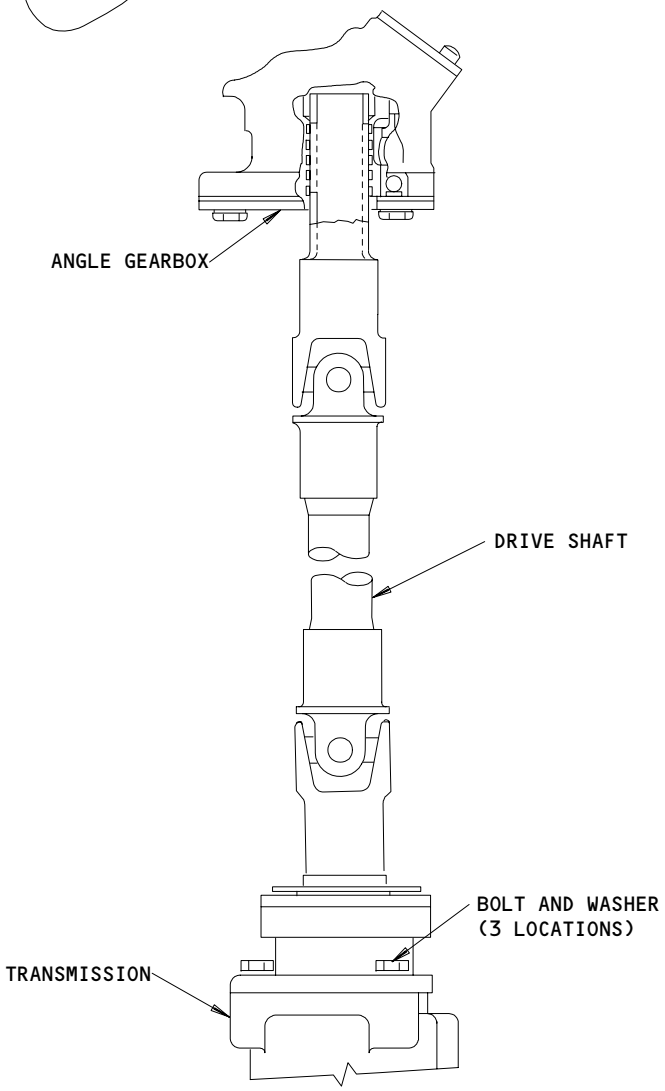
      S 214-008
      (2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

      S 494-009

      WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

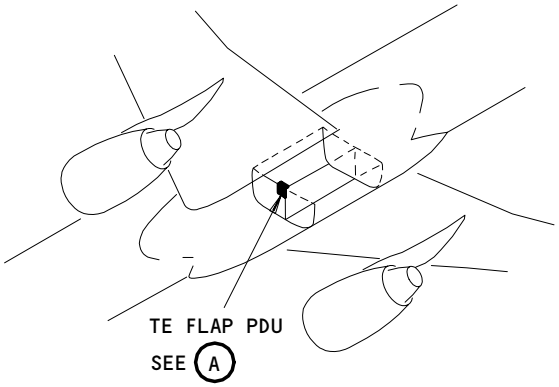
      (3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

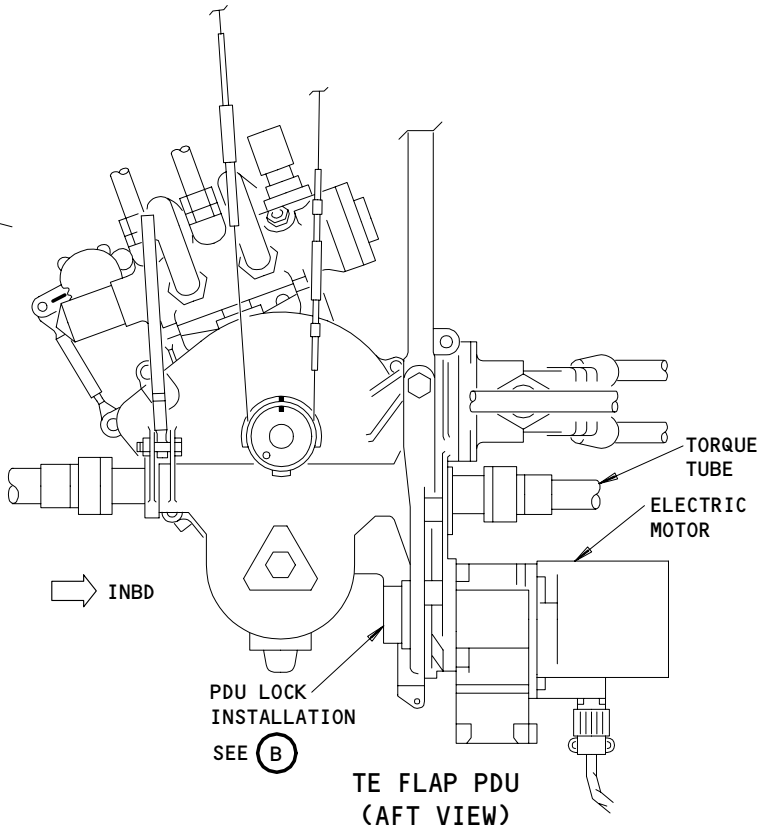




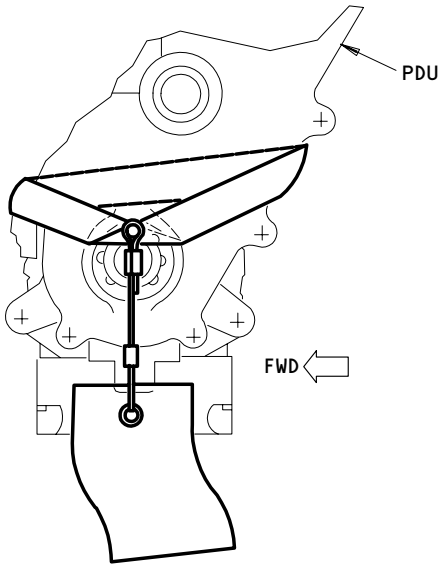
DRIVE SHAFT ASSEMBLY
(A)

Drive Shaft Assembly for the TE Flap
Figure 401

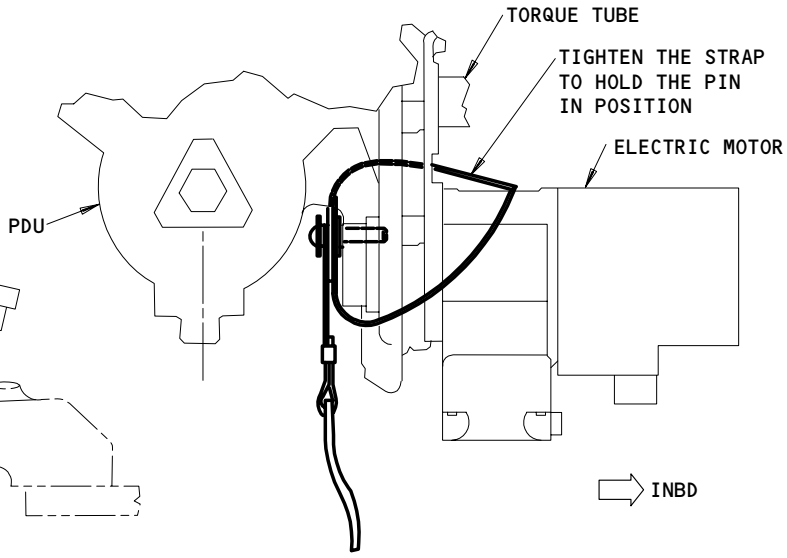




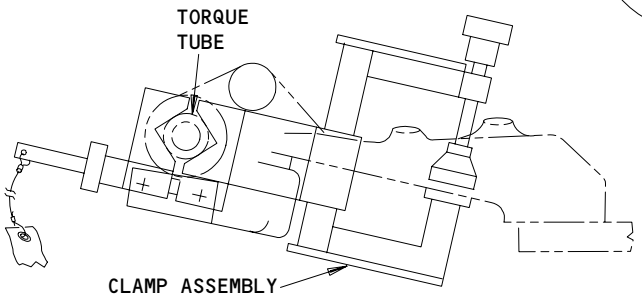
TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B



TORQUE TUBE CLAMP

PDU Lock for the TE Flap PDU
Figure 402

S 864-010
(4) Supply electrical power (Ref 24-22-00).

S 864-011

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-012
(6) Move the flap control lever to the 30-unit detent, and make sure that the TE flaps move to the fully extended position.

S 494-002
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-013
(8) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-014
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-015
(10) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 494-016
(11) Install the PDU lock on the TE flap PDU (Fig. 402).

S 494-017
(12) Use a clamp on the adjacent torque tubes to prevent all movement (Fig. 402).

E. Remove the Drive Shaft (Fig. 401)

S 024-003

(1) Do these steps to remove the drive shaft:
   (a) Remove the bolt and washer (3 locations) that attach the drive shaft to the transmission.
   (b) Move the drive shaft in the direction of the angle gearbox.
   (c) Turn the drive shaft away from the transmission.
   (d) Pull the drive shaft out of the angle gearbox.

TASK 27-51-34-424-018

3. Install the Drive Shaft for the TE Flap (Fig. 401)

A. Consumable Materials
   (1) D00633 Grease - BMS 3-33 (Preferred)
   (2) D00014 Grease - MIL-G-21164 (Alternate)
   (3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
   (4) C00528 Corrosion Preventive Compound - MIL-C-11796, Class 3

B. References
   (1) 24-22-00/201, Electrical Power - Control
   (2) 27-51-00/501, Trailing Edge Flap System
   (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   (4) 32-00-15/201, Landing Gear Door Locks

C. Access
   (1) Location Zones

143/144	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Drive Shaft

S 424-004

(1) Do these steps to install the drive shaft:
   (a) Apply grease to the splines on each end of the drive shaft.
   (b) Install the end of the drive shaft into the angle gearbox.
   (c) Move the drive shaft so the other end of the drive shaft can be installed into the transmission.
   (d) Install the drive shaft into the transmission.
   (e) Install three bolts and washers to attach the drive shaft to the transmission.

(f) Do the lubrication procedure for the drive shaft universal joints (AMM 12-21-09/301).

S 094-005

(2) Remove the clamp from the adjacent torque tube (Fig. 402).

E. Operational Test for the Drive Shaft Installation

S 094-006

(1) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 864-019

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J18, FLAP LOAD RELIEF
(e) 11J33, WARN ELEX A

S 864-020

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-021

(4) Supply electrical power (Ref 24-22-00).

S 094-022

(5) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-026

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(6) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-027

CAUTION: MONITOR THE MOVEMENT OF THE TE FLAPS DURING THE FLAP OPERATION TO MAKE SURE THE COMPONENTS OPERATE CORRECTLY. THIS IS TO HELP PREVENT DAMAGE ON COMPONENTS THAT ARE INCORRECTLY INSTALLED.

(7) Move the flaps between the fully retracted and the fully extended positions.
(a) Make sure that the drive shaft components operate correctly.
(b) Make sure that the flaps move to the correct positions.

F. Put the Airplane Back to Its Usual Condition

S 864-023

(1) Move the flap control lever to the zero (FLAPS UP) detent and permit the flaps and slats to retract fully.

S 414-028

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-024

(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-025

(4) Remove the electrical power if it is not necessary (Ref 24-22-00).

TRAILING EDGE FLAP POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General (Figure 1)
   A. The trailing edge flap position indicating system provides flap position and flap system failure information to the flight deck.
   B. Flap surface and flap lever position sensing is performed with resolvers for both alternate and normal flap control separate. Sensors are used for each mode.
   C. Position data is used by the Flap Slat Electronics Unit (FSEU) for asymmetry detection, uncommanded motion detection, fault annunciation, position indication, control protection, and flap/slat position information to other systems.
   D. Position indication is identical for both normal or alternate control modes. Flap position is indicated by a synchro-driven dial indicator.
   E. A TRAILING EDGE amber light will illuminate to indicate flap system faults. A concurrent Engine Indicating and Crew Alerting System (EICAS) message will show the nature of the fault.
2. Component Details
   A. Flap/Slat Position Indicator (Fig. 2)
      (1) The primary source of flap position information is the flap/slat position indicator located on the First Officer's main instrument panel (P3).
      (2) The position indicator uses two needles (one for each wing) to indicate flap position between the UP-unit and 30-unit positions.
      (3) The position indicator needles are driven directly from the flap synchros except between flap positions UP and 1.
         (a) During extension, if either the flaps or slats have left the retracted position and the flaps are not past the 1-unit position both needles will simultaneously move to a position half way between UP and 1. The needles will jump to 1 when the slats reach the sealed position and the flaps reach the 1-unit position.
         (b) When the flaps move beyond the 1-unit position, flap position will be provided directly to the needles by the synchros at the ends of the flap drive torque tubes.

(c) During retraction, both needles will move from the 1-unit indication to the 1/2-unit indication if the flaps or slats retract from the 1-unit position.

(d) When both flaps and slats are retracted, both needles will jump from the 1/2-unit indication to the UP indication.

B. Trailing Edge Light

(1) The amber TRAILING EDGE light illuminates whenever an uncommanded motion or asymmetry condition is detected.

(2) If the condition is corrected the light will stay on until the alternate drive system is armed, then unarmed for uncommanded motion, or the power to FSEU-1 is interrupted for an asymmetry condition.

C. Flap/Slat Electronic Unit (FSEU)

(1) The FSEU processes information from the high lift system and provides indications and data for display and warning when crew alerting or warning is required.

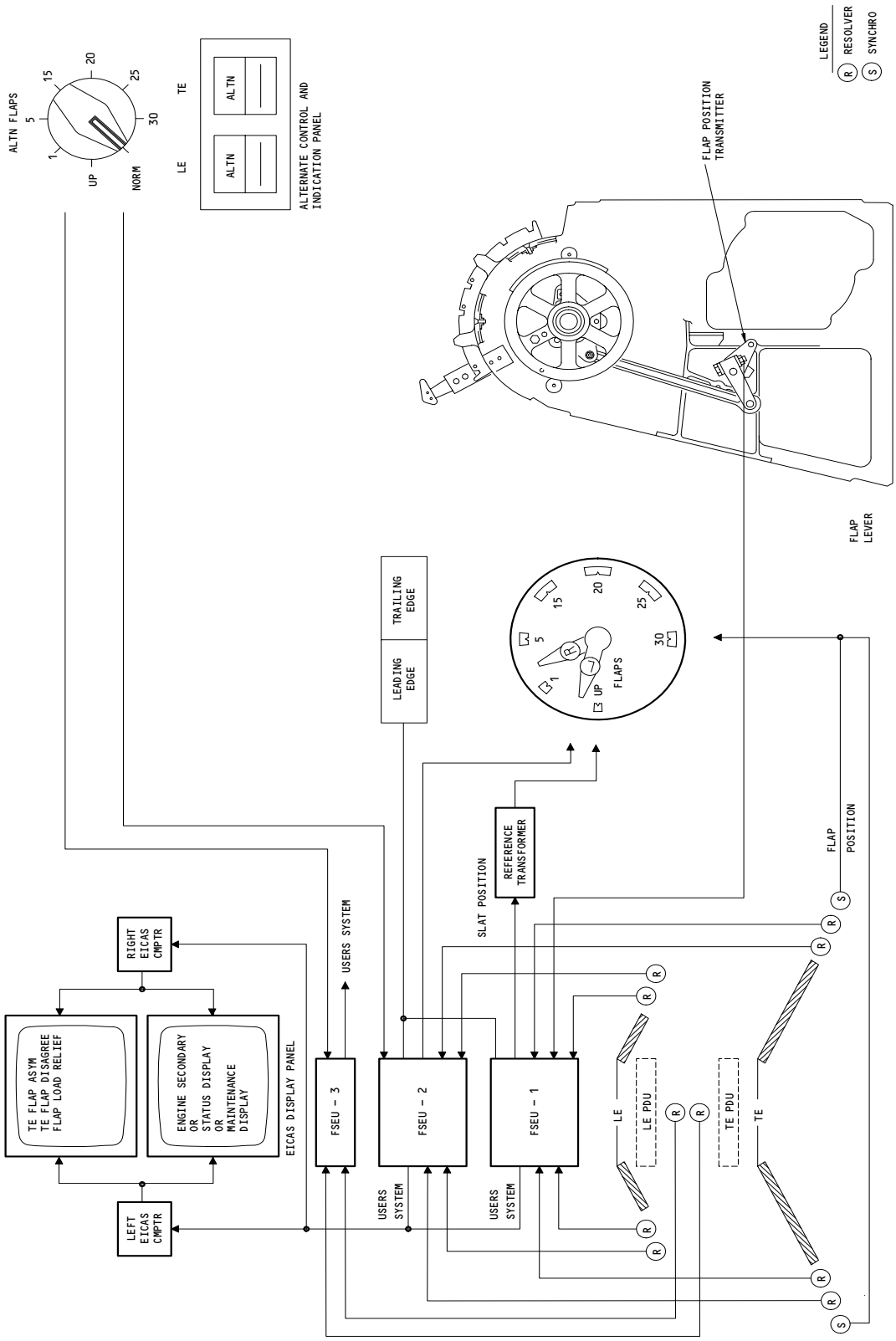
(2) The FSEU monitors the output of the flap system resolvers to obtain flap system position information. Position data is used by the FSEU for asymmetry detection, uncommanded motion detection, fault annunciation, position indication, control in the alternate mode, protection in the normal mode, and flap/slat position information to other systems.

(3) The FSEU has a built-in test equipment system which performs a self test of the FSEU and interfacing hardware.

(4) The FSEU consists of three physically and functionally isolated identical units.

(a) FSEU 1 performs all primary flap/slat drive protection, fault annunciation, and automatic control operations. Specifically, FSEU 1 provides:

1) Uncommanded motion detection/protection of the flaps under normal control.
2) Asymmetry detection/protection of the flaps under normal control.
3) Trailing edge flap load relief.
4) Autoslat control.
5) Flaps up depressurization.
6) Logic for flap needles halfway between UP and 1.
7) Fault annunciation from EICAS and TRAILING EDGE light.



TE Flap Position Indication System Block Diagram
Figure 1

40660

8) Signals to other components.

(b) FSEU 2 performs alternate flap/slat drive protection and annunciation. Specific functions are:
1) Uncommanded motion detection under alternate control.
2) Asymmetry detection under alternate control.
3) Autoslat control.
4) Logic for flap needles halfway between UP and 1.
5) Fault annunciation from EICAS and TRAILING EDGE light.
6) Signals to other components.

(c) FSEU 3 performs alternate flap/slat drive control. Specific functions are:
1) Alternate electric drive motor control.
2) Signals to other users.

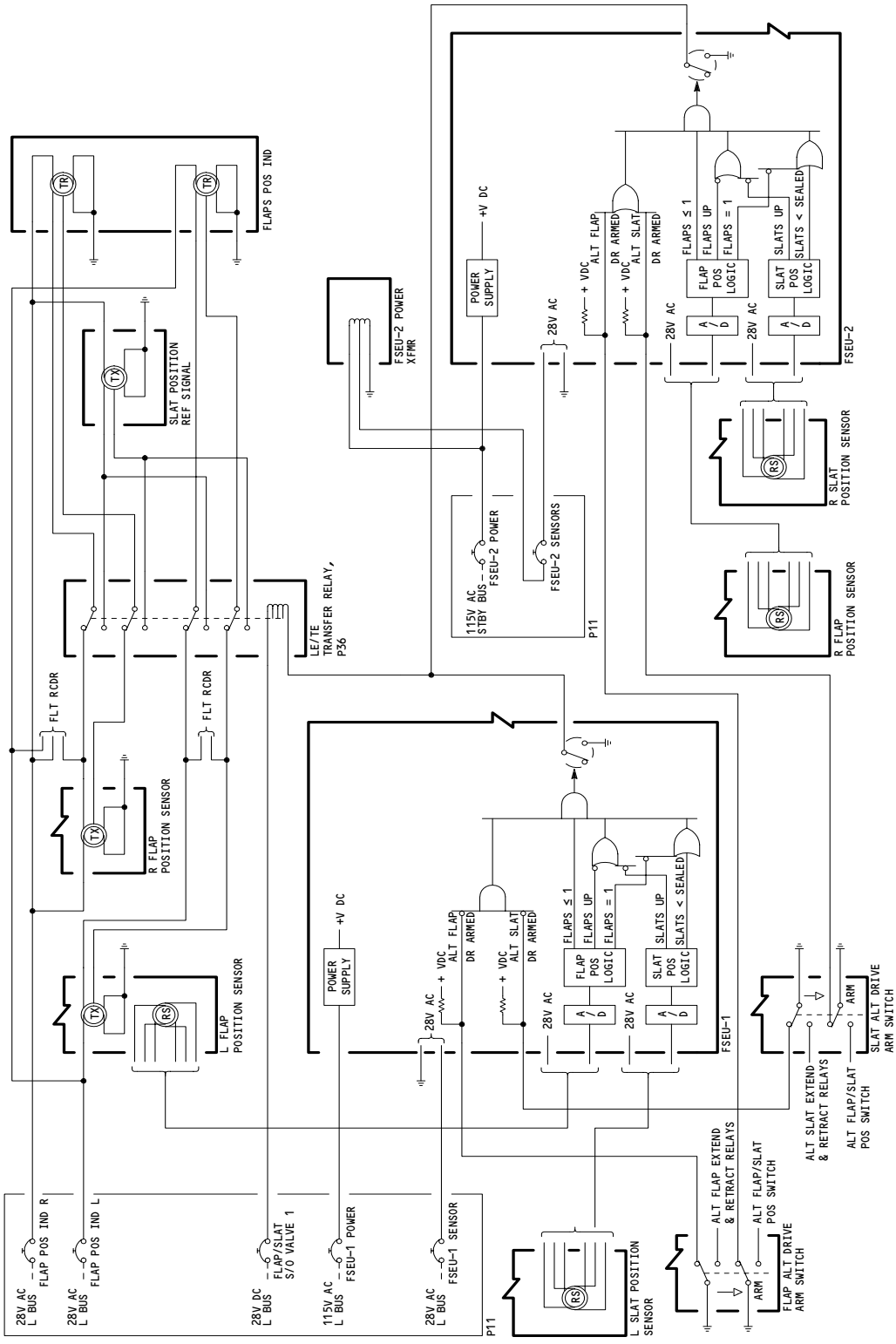
(d) Each FSEU contains all software necessary to perform any of three channel functions. All three FSEU's are interchangeable. The software for a specific channel is enabled when an FSEU is installed in that channel's location in the electronics bay.

D. Engine Indicating and Crew Alerting System (EICAS)

(1) Failures of the flap system are displayed on the EICAS screen.

(2) Message levels are according to following table:

Level A: Warning	Red message and light, master warning light and aural. An operational or aircraft system condition which requires immediate corrective or compensatory action by the crew.
Level B: Caution	Amber message and light, master caution light and aural. An operational or aircraft system condition which requires immediate crew awareness and future compensatory action.
Level C: Advisory	Amber message and light. An operational or aircraft system condition which requires crew awareness and possibly future compensatory action.
Level S: Status	White message on Status page, MEL related items requiring crew awareness prior to dispatch only.
Level M: Maintenance	White message on ECS/MSG page, maintenance only.



Flap/Slat Position Indicating System Schematic
Figure 2

(3) EICAS supplies following specific TE flap messages:
(a) Level A: FLAPS
(b) Level B: TE FLAP DISAGREE and TE FLAP ASYM
(c) Level C: FLAP LD RELIEF
(d) Level S:
1) FLAP/SLAT ELEC
2) FLAP ISLN VAL
(e) Level M: FLAP/SLAT ELEC, FLAP ISLN VAL, and FLAP/SLAT BITE

E. Resolvers
(1) Position information used by the FSEU is provided by resolvers.
(2) The resolvers compare the phase shift of a rotary transformer with respect to a reference signal. The resolver output is in degrees of rotation. The analog resolver output is converted to digital form which the FSEU can use.
(3) There are six resolvers in the flap position indication system:
(a) Two at the end of the right torque tube system: RFR1 and RFR2.
(b) Two at the end of the left torque tube system: RFL1 and RFL2.
(c) One on the flap power drive unit: RFP3.
(d) One in the pilot's control stand linked to the flap control lever: RFH1.

F. Synchros
(1) There are two flap position synchros in the flap position indicating system. They are located at the end of the torque tube in each wing.
(2) The synchro in the left wing provides input to the "L" position needle and the synchro in the right wing provides "R" needle input.
(3) Flap position indication is provided directly from the flap synchros except between up and 1 positions. Between up and 1 a fixed output synchro provides input to the position indicator needles.

3. Operation

A. Uncommanded Motion (UCM)
(1) UCM is defined as the failure of the flaps to be in or driving toward the position commanded by the flap lever or the alternate flap slat position selector switch.
(2) Normal Drive UCM
(a) In the event of a UCM condition, the following will occur:
1) The EICAS display will show a TE FLAP DISAGREE message and the TRAILING EDGE light will be on.

2) The flap PDU and the slat PDU bypass valves will go to BYPASS and the shutoff valve in the flap/slat depressurization module will close.
3) The exception to the previous two steps is as follows:
a) The TE flap disagree message and the TRAILING EDGE light will not come on and hydraulic shutdown will not occur when the flap lever is moved from 20-unit detent or less to 30-unit detent with airplane speed above safe 30-unit detent air speed. The flaps will drive to 25-unit position, due to flap load relief requirement. This will enable the flaps and slats to operate normally on hydrualic power when airplane speed goes below safe 30-unit detent air speed.

(3) Alternate Drive UCM
(a) Any UCM condition results in TE FLAP DISAGREE message and TRAILING EDGE light illumination only, as the slow system travel rates allow the system to be shut down in time to avoid a dangerous flight condition.

B. Asymmetry
(1) Flap asymmetry is defined as the condition where the position of the left flaps versus the right flaps differs by more than 4% of total flap travel.
(2) In normal (hydraulic) control asymmetry is detected by comparing the output of flap position resolvers RFR1 and RFL1.
(a) A difference in flap position of more than 4% of system travel results in a TE FLAP ASYM message on the EICAS display screen and lighting of the TRAILING EDGE amber warning light.
(b) Under an asymmetry condition the flap/slat hydraulic system is shutdown. The flap/slat depressurization module depressurizes the system and both the flap and slat bypass valves move to the bypass position.
(3) When the flaps are in alternate (electric) control, asymmetry is detected by comparing the output of flap position resolvers RFR2 and RFL2.
(a) An asymmetry condition results in a TE FLAP ASYM message on the EICAS display screen and amber TRAILING EDGE warning light.
(b) The drive system still operates in the alternate mode after an asymmetry failure.

(4) After an asymmetry condition has been corrected, removing and reapplying power to FSEU-1 (normal mode) and FSEU-2 (alternate mode) will clear the asymmetry indications.

C. Flap Load Alleviation

(1) In the event of flap load alleviation actuation there will be no messages on the flight deck. The flap position indicator needles will follow flap position.

(2) If the flap load alleviation system fails to retract the flaps when commanded, a FLAP LOAD RELIEF message will appear on the EICAS display screen and the amber TRAILING EDGE warning light will come on.

(3) If the flaps fail to extend after requirement for flap load alleviation no longer exists, a TE FLAP DISAGREE message will appear on the EICAS display and the amber TRAILING EDGE warning light will come on.

D. Takeoff Configuration

(1) If the slats and flaps are not in the takeoff position when takeoff thrust is selected on either engine, warnings will be sent to the flight deck requiring immediate pilot action.

(a) There will be an aural warning

(b) The red CONFIG warning light will illuminate.

(c) The two master warning lights on each side of the P-7 panel will illuminate.

(d) A red FLAPS message will appear on the EICAS screen.

TRAILING EDGE FLAP POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains steps to do a test on the position indicating system for the trailing edge (TE) flap. To adjust the flap position transmitters for the left and right wing, do the steps in the Removal/Installation of the Flap Position Transmitters (Ref 27-58-03). To adjust the TE flap PDU transmitter, do the steps in the Maintenance Practices for the Trailing Edge Flap Power Drive Unit Components (Ref 27-51-27).

TASK 27-58-00-705-001

2. Test of the Position Indicating System for the TE Flaps
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-27/201, Trailing Edge Flap Power Drive Unit Components
      (3) 27-58-03/401, Flap Position Transmitters
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Test of the Position Indicating System

      S 215-002
      (1) Make sure the flaps are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

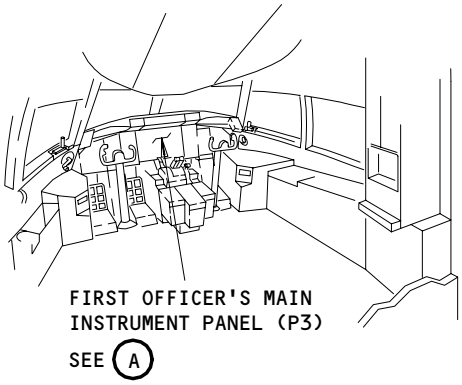
      S 865-003
      (2) Supply electrical power (Ref 24-22-00).

      S 865-004

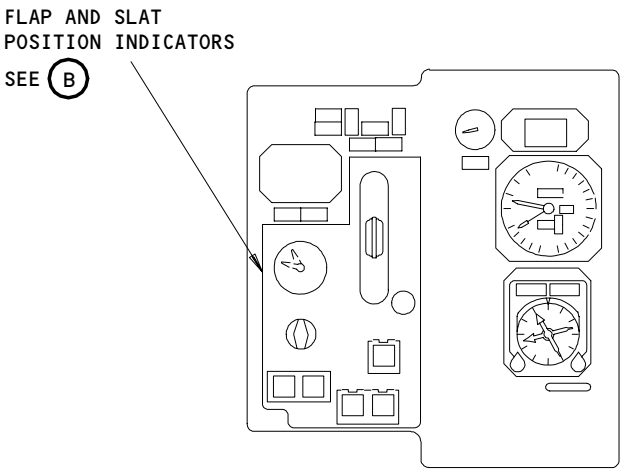
      WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

      CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

      (3) Pressurize the left hydraulic system (Ref 29-11-00).

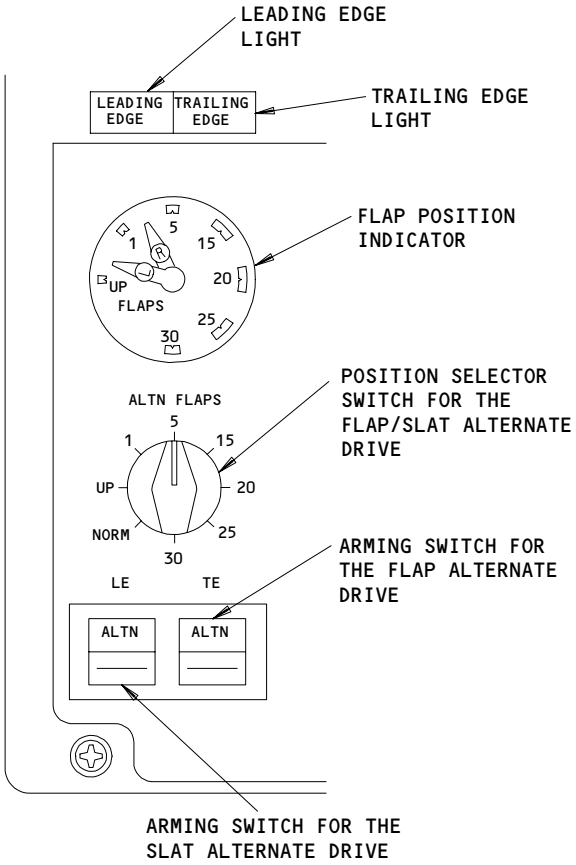


FLIGHT COMPARTMENT



FIRST OFFICER'S MAIN INSTRUMENT PANEL (P3)

A



FLAP AND SLAT POSITION INDICATORS

B

Flap Position Indication
Figure 501

S 865-005

(4) Move the flap control lever to the 1-unit detent and do these checks:

(a) As the flaps and slats start to extend, make sure the L and R needles on the flap position indicator, on the first officer's main instrument panel, P3, move very quickly to a position between the UP and the 1 position.

(b) When the flaps stop at the 1-unit position, make sure the L and R needles on the flap position indicator move very quickly to the 1-unit position.

NOTE: A fault in relay K10244 could cause the flap position needles to move smoothly between the flaps up and the 1-unit position.

S 865-006

(5) Move the flap control lever to the 5, 15, 20, 25, and 30-unit detents and let the flaps move to each position before you move the flap control to the next detent.

(a) Make sure the position of the L and R needles on the flap position indicator are the same as the position of the TE flaps.

S 865-007

(6) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps move to the fully retracted position.

S 215-008

(7) Make sure the position selector switch for the flap/slat alternate drive is in the NORM detent.

S 865-009

(8) Push the arming switch for the flap alternate drive to arm the flap alternate drive (switch light will come on).

S 865-010

(9) Turn the position selector switch for the flap/slat alternate drive to the 1-unit detent and do these checks:

(a) Make sure the L and R needles on the flap position indicator move very quickly to the 1/2 position when the flaps start to extend.

(b) Make sure the L and R needles on the flap position indicator stay in the 1/2 position when the flaps stop at the 1-unit position.

(c) Make sure the LEADING EDGE light, on the P3 panel, comes on and the LE SLAT DISAGREE message shows on the EICAS display.

S 865-011
(10) Turn the position selector switch for the flap/slat alternate drive to the 5-unit detent and do this check:
(a) Make sure the L and R needles move away from the 1-unit position and follow the flap movement to the 5-unit position.

S 865-012
(11) Turn the position selector switch for the flap/slat alternate drive to the UP position and let the flaps move to the fully retracted position.

S 865-013
(12) Turn the position selector switch for the flap/slat alternate drive to the NORM detent.

S 865-014
(13) Push the arming switch for the flap alternate drive to disarm the flap alternate drive (switch light will go off).
(a) Make sure the LEADING EDGE light is off and the LE SLAT DISAGREE message does not show on the EICAS display.

S 865-015
(14) Remove the power from the left hydraulic system (Ref 29-11-00).

S 865-016
(15) Remove the electrical power if it is not necessary (Ref 24-22-00).

TRAILING EDGE FLAP SYSTEM AND LEADING EDGE SLAT SYSTEM POSITION TRANSMITTER - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task adjusts the position transmitter. The second task gives steps to do a test on the position transmitter installation.

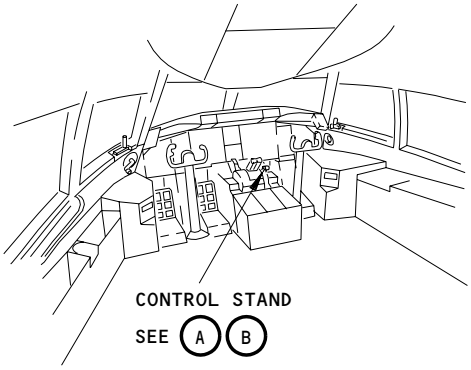
   TASK 27-58-01-825-002

2. Adjust the Position Transmitters for the TE Flaps and LE Slats
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-28:
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (3) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-58-03/401, Flap Position Transmitter
      (4) AMM 27-88-01/401, Leading Edge Slat Position Transmitter
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
      (8) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

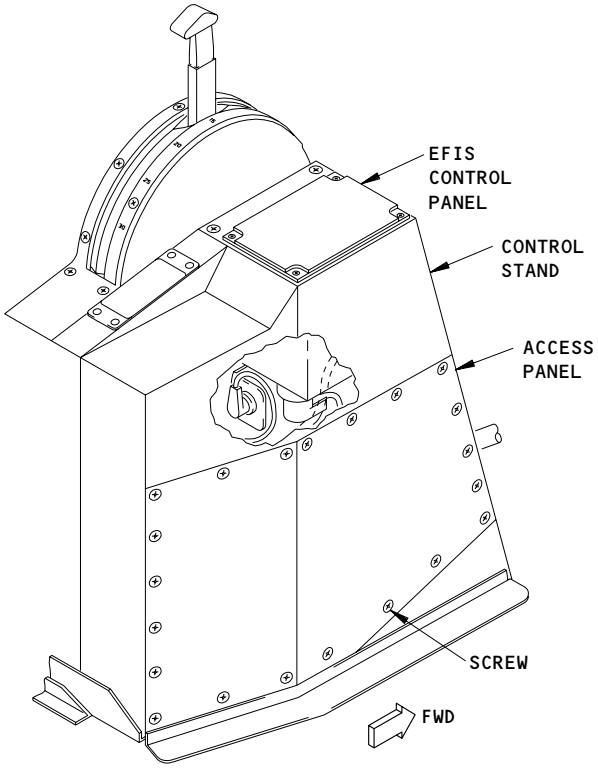
143	MLG Wheel Well
211/212	Control Cabin
511	Leading Edge to Front Spar
525	Slat No. 1
625	Slat No. 10
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Adjustment

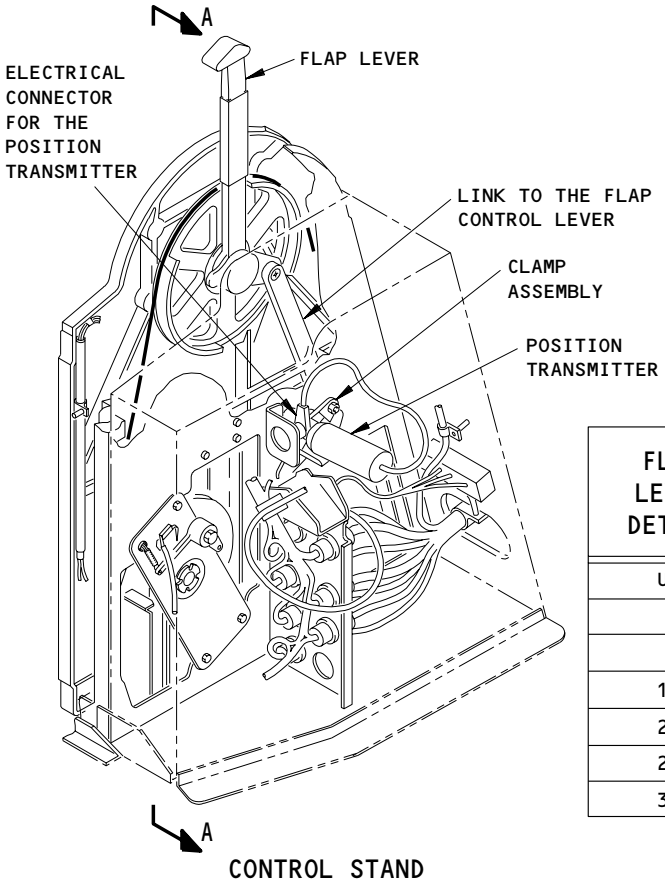
      S 215-006
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).



FLIGHT COMPARTMENT



CONTROL STAND
A



CONTROL STAND
B

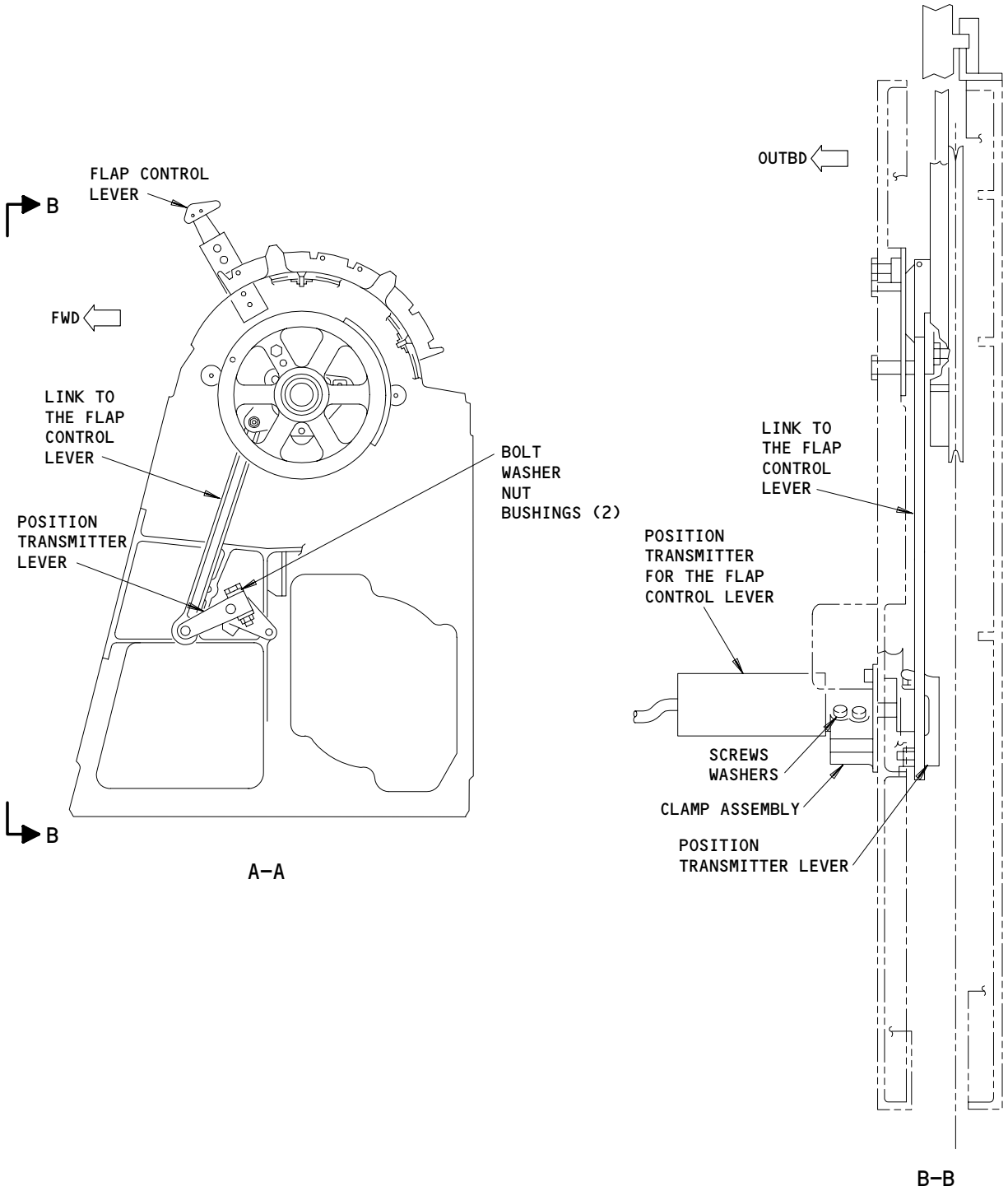
FLAP LEVER DETENT	ANGLE (DEGREES) ACCURACY REQUIREMENTS 1	
	FSEU -14,-17	FSEU -32,-37,-40
UP	131.00 ±1.75	131.00 ±3.00
1	149.80 ±1.75 2	149.80 ±3.00 2
5	165.70 ±1.75	165.70 ±3.00
15	181.50 ±1.75	181.50 ±1.75
20	197.30 ±1.75	197.30 ±3.00
25	213.10 ±1.75	213.10 ±3.00
30	229.00 ±1.75	229.00 ±3.00

LEVER TRANSMITTER
TABLE A

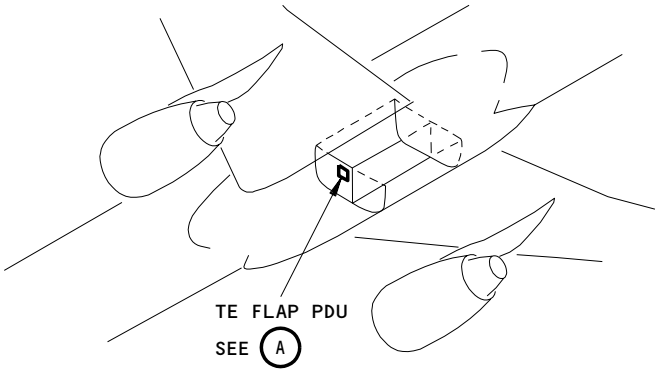
1 TRANSMITTERS ADJUSTED OUTSIDE OF THE ACCURACY REQUIREMENTS WILL BE INDICATED BY A "FLAP/SLAT ELEC" MESSAGE ON EICAS. TRANSMITTERS ADJUSTED OVER THE +/-5.0 DEGREES FROM NOMINAL WILL BE INDICATED BY EITHER A "TRAILING EDGE DISAGREE" OR A "LEADING EDGE DISAGREE" MESSAGE.

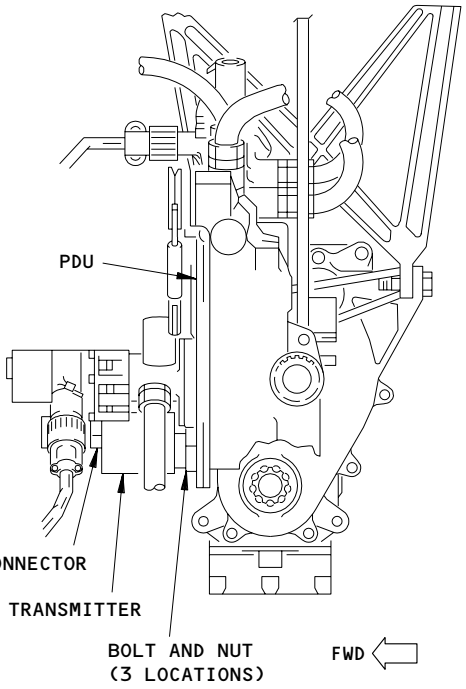
2 THE RIGGING TOLERANCE AT FLAPS 1 IS +/-1.00 DEGREES. THE TRANSMITTERS MAY NOT STAY WITHIN THE RIGGING TOLERANCE AFTER MOVING THE SYSTEM.

Position Transmitter for the Flap Control Lever
Figure 501 (Sheet 1)



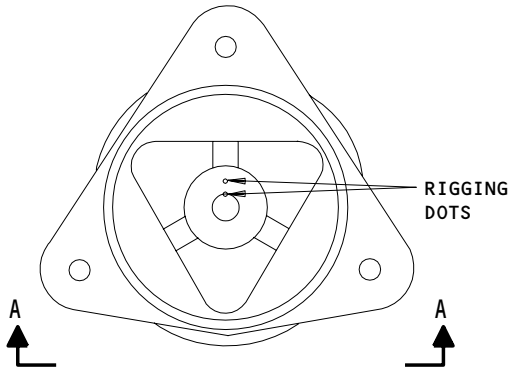
Position Transmitter for the Flap Control Lever
Figure 501 (Sheet 2)





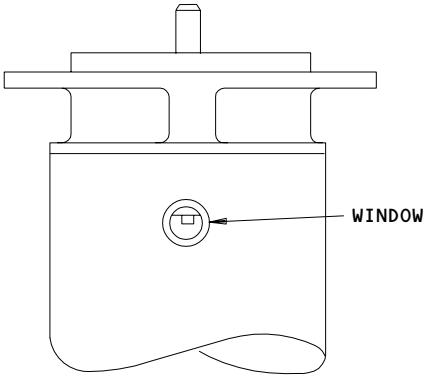
TO FLAP PDU (OUTBOARD VIEW)

A



POSITION TRANSMITTER

B



A-A

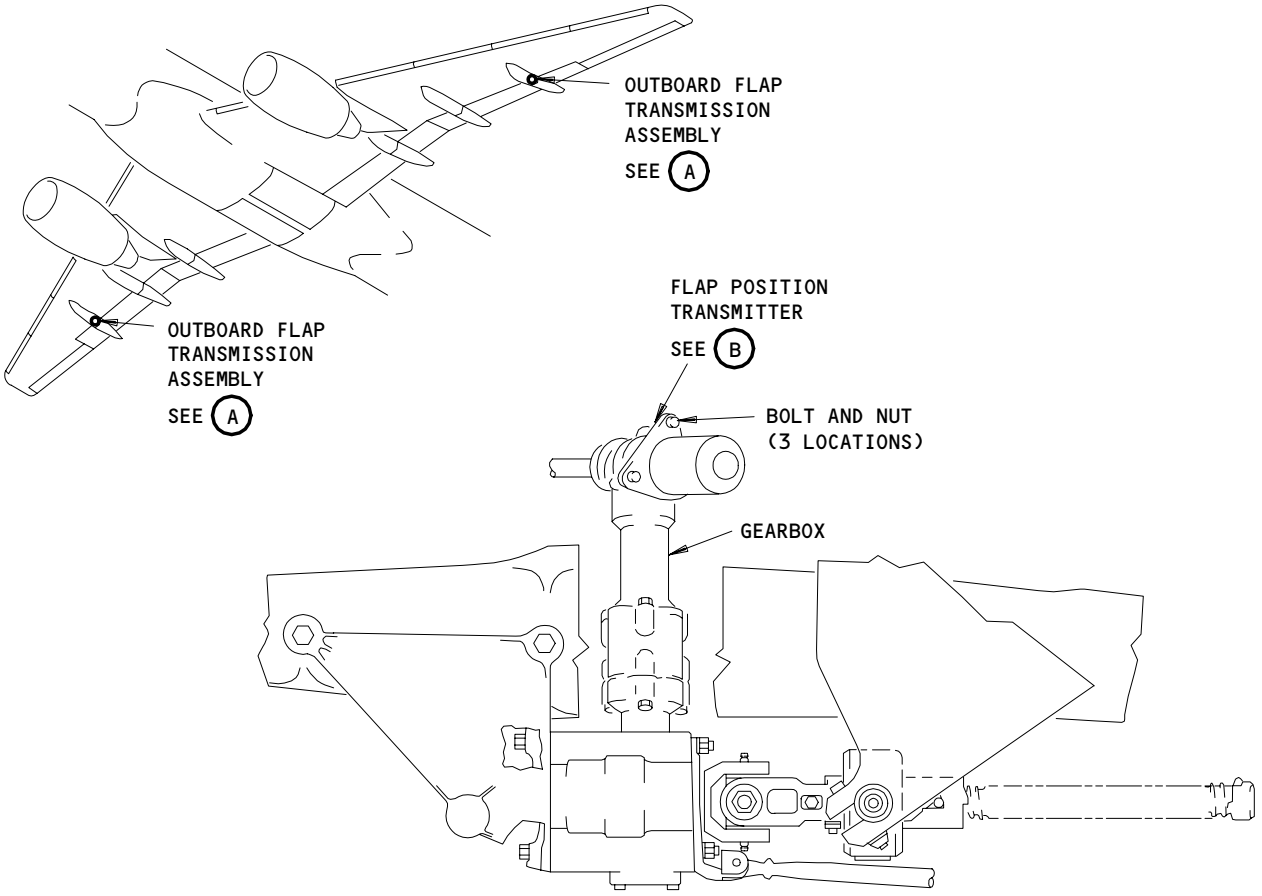
FLAP LEVER DETENT	ANGLE (DEGREES) ACCURACY REQUIREMENTS 1	
	FSEU -14,-17	FSEU -32,-37,-40
UP	6.59 ±2.5	6.59 ±2.5
1	41.05 ±2.5	41.05 ±2.5
5	179.71 ±2.5	179.71 ±2.5
15	241.85 ±2.5	241.85 ±2.5
20	275.07 ±2.5 2	275.07 ±2.5 2
25	300.85 ±2.5	300.85 ±2.5
30	340.48 ±2.5	340.48 ±2.5

FLAP PDU AND FLAP POSITION TRANSMITTERS
TABLE A

1 TRANSMITTERS ADJUSTED OUTSIDE OF THE ACCURACY REQUIREMENTS WILL BE INDICATED BY A "FLAP/SLAT ELEC" MESSAGE ON EICAS. TRANSMITTERS ADJUSTED OVER THE +/-5.0 DEGREES FROM NOMINAL WILL BE INDICATED BY EITHER A "TRAILING EDGE DISAGREE" OR A "LEADING EDGE DISAGREE" MESSAGE.

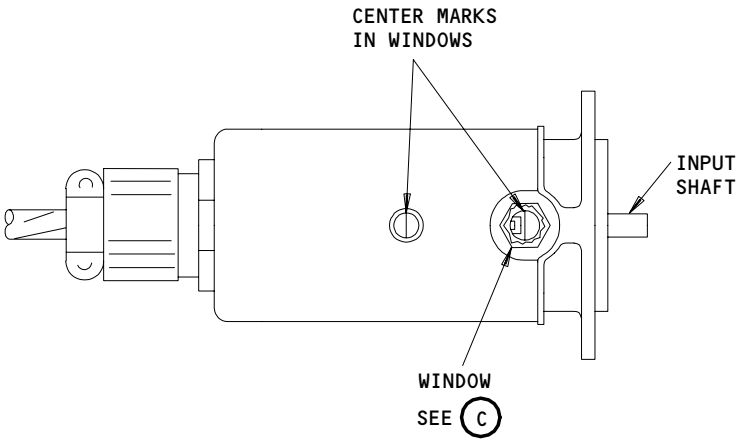
2 THE RIGGING TOLERANCE AT FLAPS 20 IS +/-0.25 DEGREES. THE TRANSMITTERS MAY NOT STAY WITHIN THE RIGGING TOLERANCE AFTER MOVING THE SYSTEM.

Position Transmitter for the TE Flap PDU
Figure 502



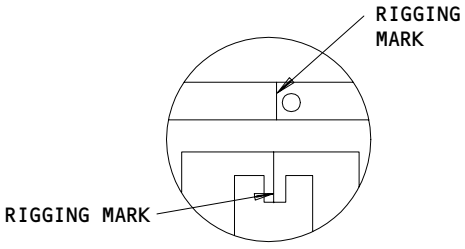
OUTBOARD FLAP TRANSMISSION ASSEMBLY

A



FLAP POSITION TRANSMITTER

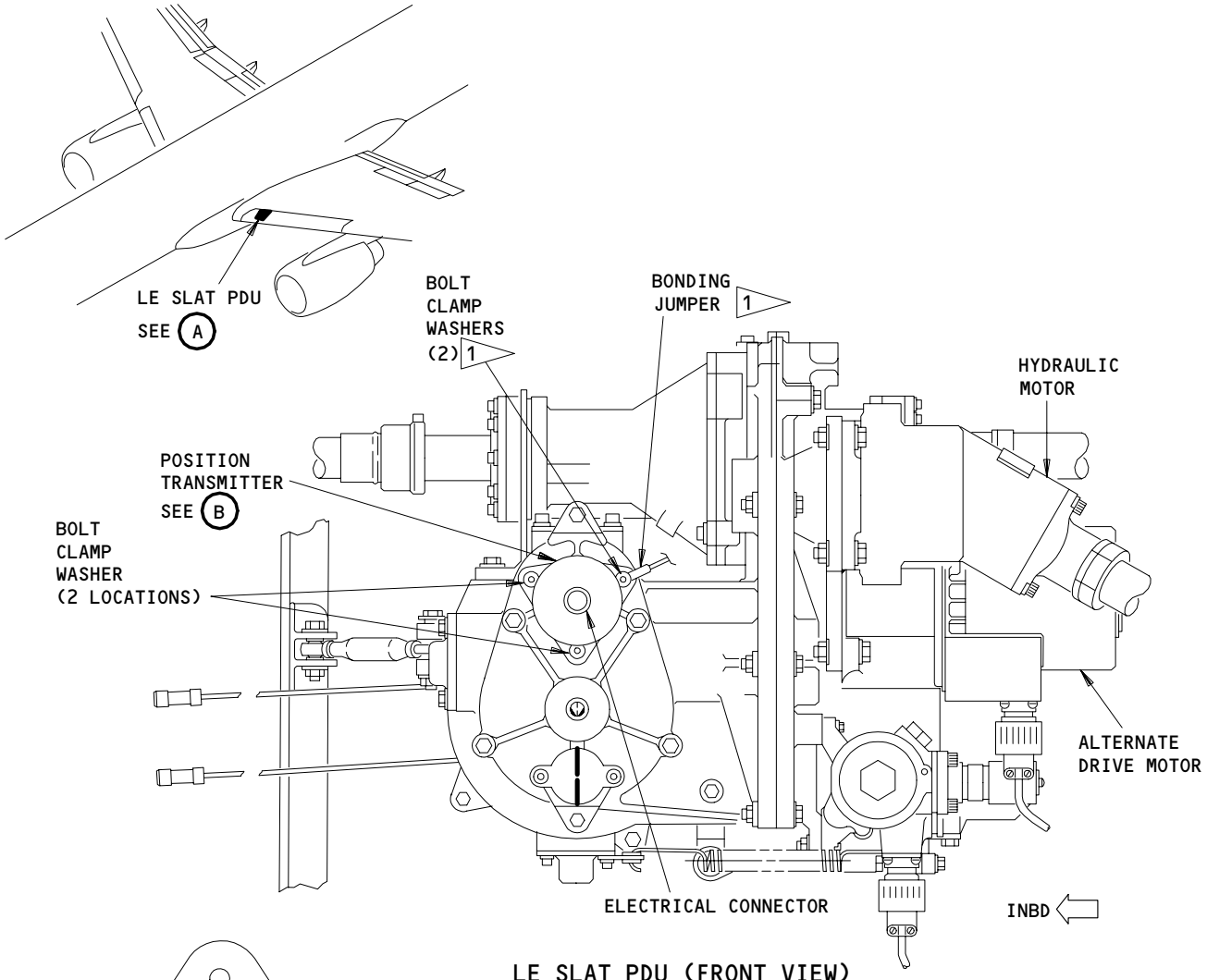
B



WINDOW

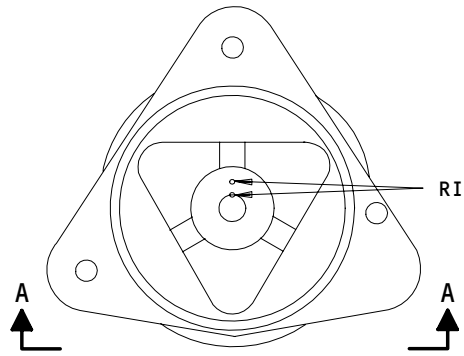
C

Position Transmitters for the TE Flap
Figure 503



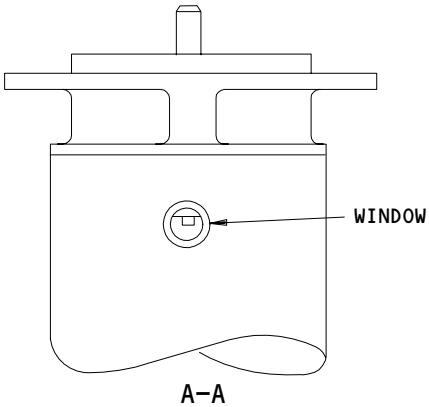
LE SLAT PDU (FRONT VIEW)

A



POSITION TRANSMITTER

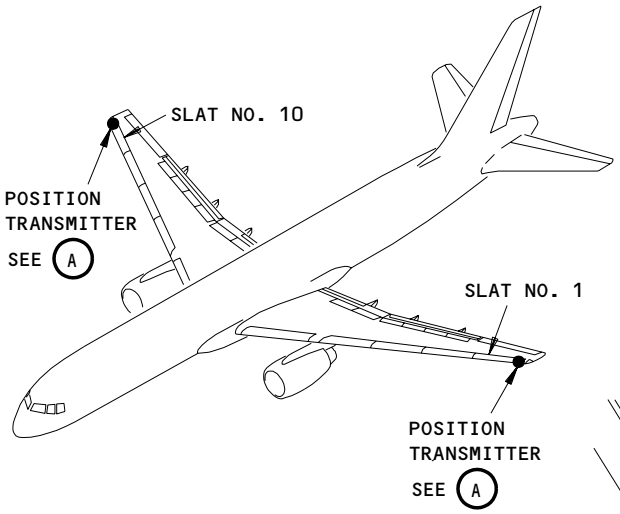
B

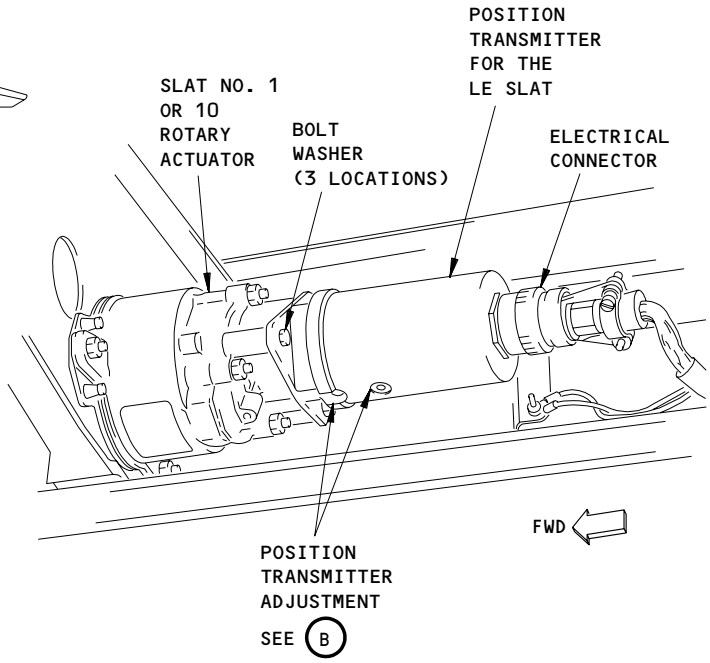


A-A

1 CLEAN THE BONDING SURFACES WITH A ROTARY STAINLESS STEEL BRUSH. INSTALL ONE WASHER UNDER THE HEAD OF THE BOLT AND ONE WASHER UNDER THE BONDING JUMPER. THE TOTAL RESISTANCE MUST NOT BE MORE THAN 0.001 OHM.

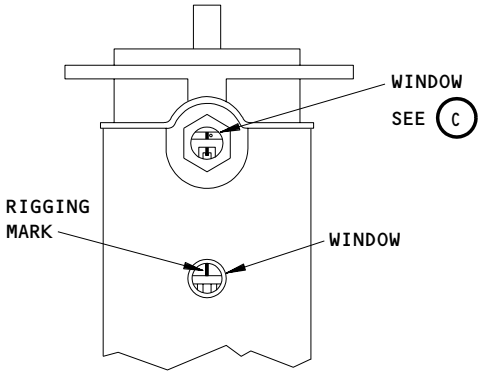
Position Transmitter for the LE Slat PDU
Figure 504





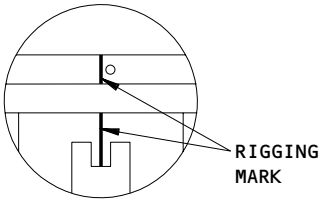
POSITION TRANSMITTER

A



POSITION TRANSMITTER ADJUSTMENT

B



WINDOW

C

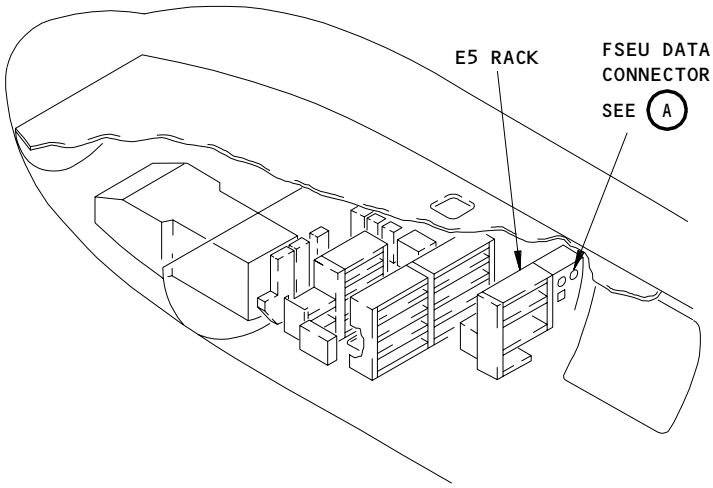
FLAP LEVER DETENT	ANGLE (DEGREES) ACCURACY REQUIREMENTS 1	
	FSEU -14,-17	FSEU -32,-37,-40
UP	8.85 ±2.5 2	8.85 ±2.5 2
1		
5	264.54 ±2.5	264.54 ±2.5
15	264.54 ±2.5	264.54 ±2.5
20		
25	350.61 ±2.5	350.61 ±2.5
30	350.61 ±2.5	350.61 ±2.5

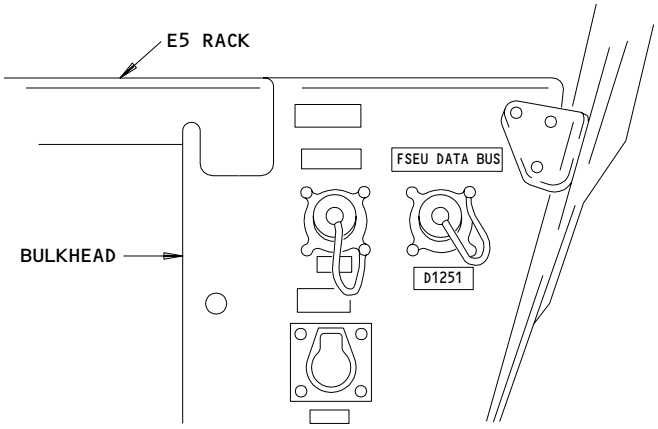
SLAT PDU AND SLAT POSITION TRANSMITTERS
TABLE A

1 TRANSMITTERS ADJUSTED OUTSIDE OF THE ACCURACY REQUIREMENTS WILL BE INDICATED BY A "FLAP/SLAT ELEC" MESSAGE ON EICAS. TRANSMITTERS ADJUSTED OVER THE +/-5.0 DEGREES FROM NOMINAL WILL BE INDICATED BY EITHER A "TRAILING EDGE DISAGREE" OR A "LEADING EDGE DISAGREE" MESSAGE.

2 THE RIGGING TOLERANCE AT FLAPS UP IS +/-0.25 DEGREES. THE TRANSMITTERS MAY NOT STAY WITHIN THE RIGGING TOLERANCE AFTER MOVING THE SYSTEM.

Position Transmitter for the LE Slat
Figure 505





FSEU DATA BUS CONNECTOR (D1251)

A

SOURCE/DESTINATION INDEX

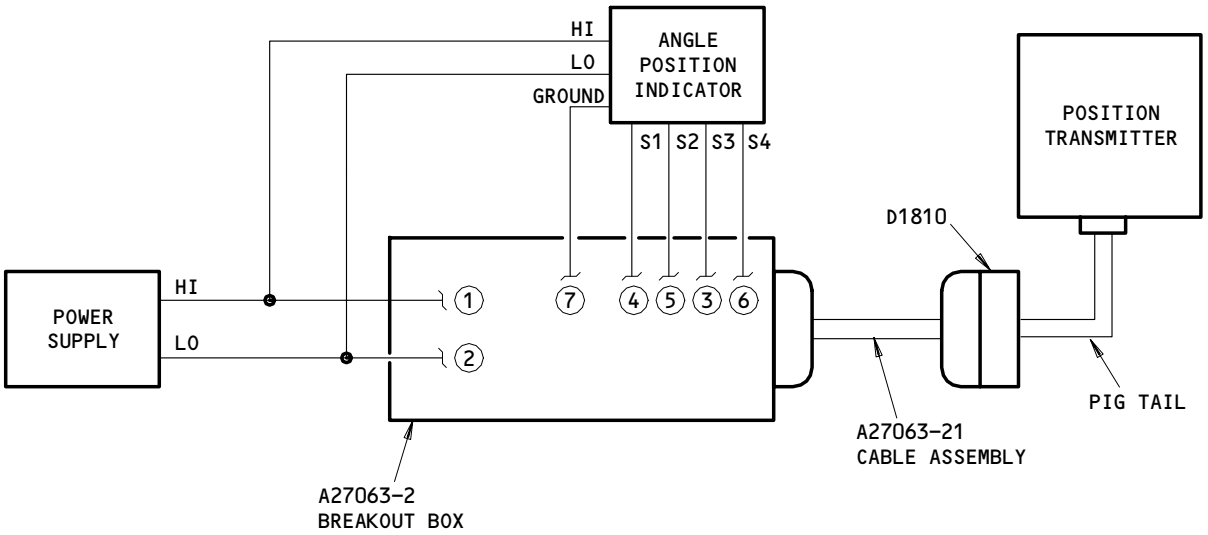
CHANNEL	1	2	3
SDI	0,1	1,0	1,1

LABEL

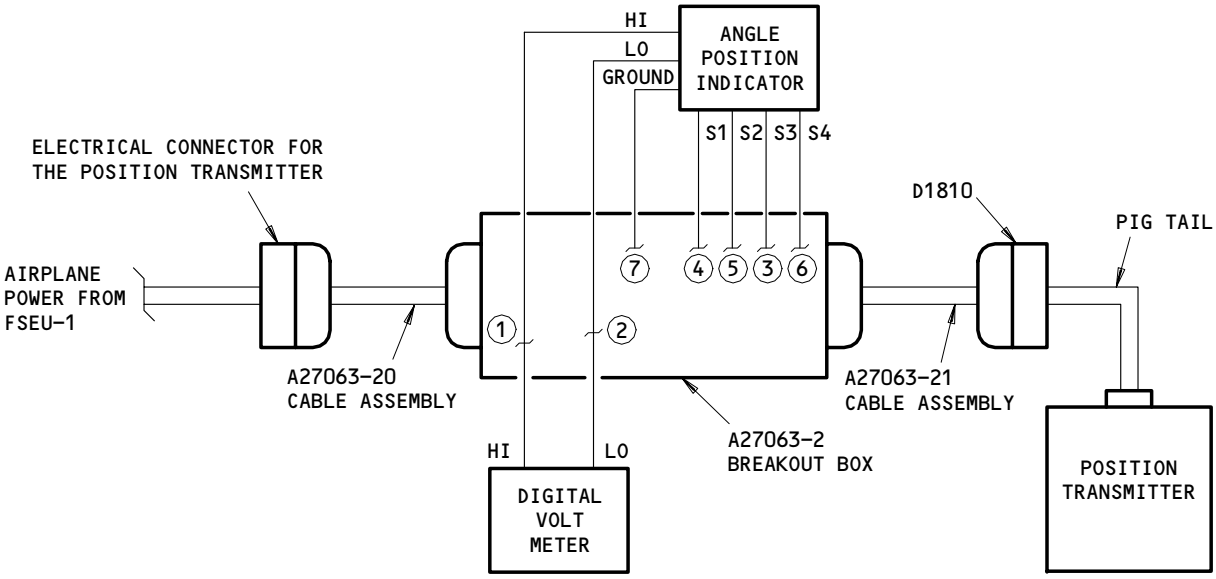
RESOLVER	LEFT FLAP/ FLAP PDU	RIGHT FLAP	LEFT SLAT/ SLAT PDU	RIGHT SLAT	FLAP LEVER
LABEL	103	104	105	106	107

TABLE A

ARINC 429 Data Bus Analyzer
Figure 506

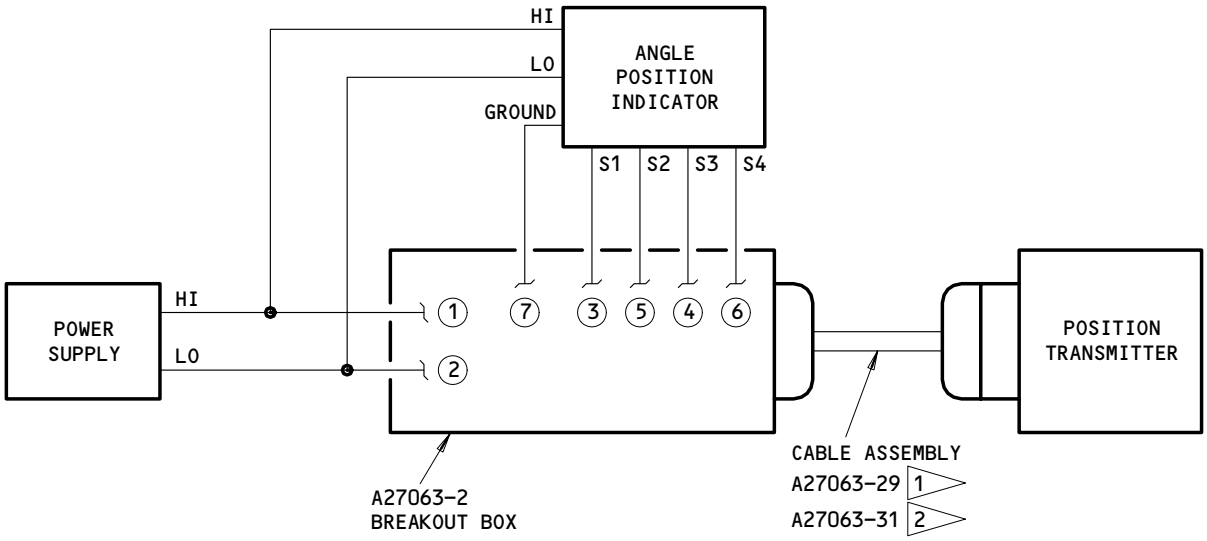


PROCEDURE 1

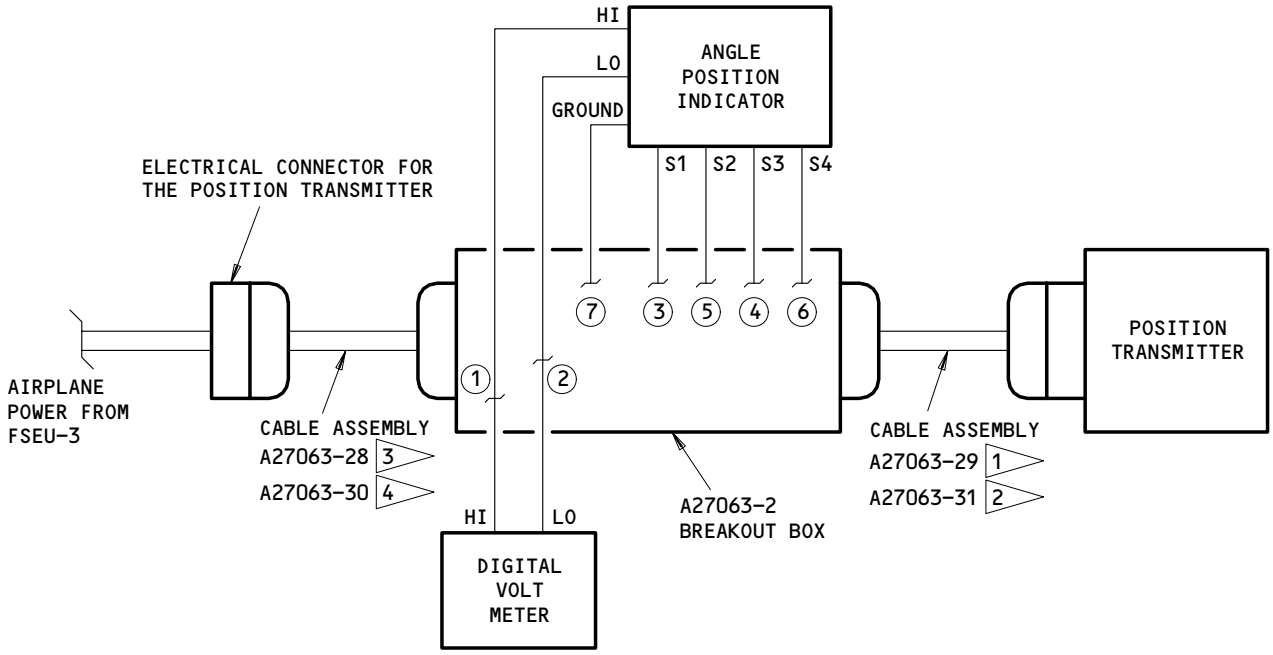


PROCEDURE 2

Adjustment of the Position Transmitter for the Flap Control Lever
Figure 507



PROCEDURE 1



PROCEDURE 2

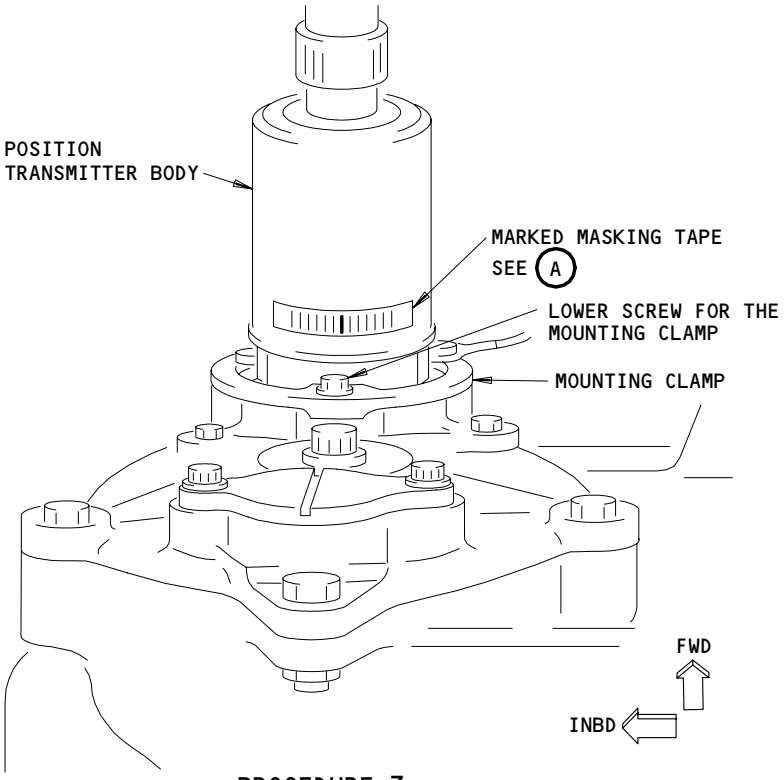
1 POSITION TRANSMITTER FOR THE TE FLAP PDU

2 POSITION TRANSMITTER FOR THE LE SLAT PDU

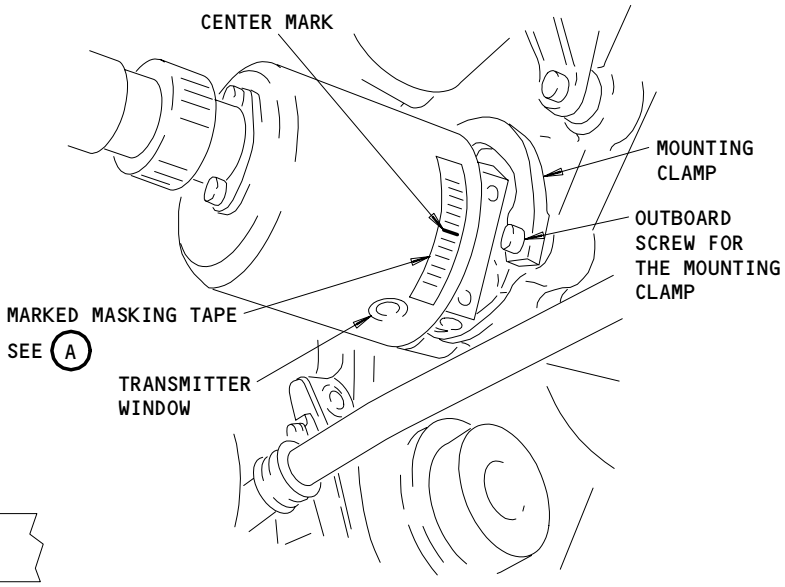
3 POSITION TRANSMITTER FOR THE TE FLAP PDU

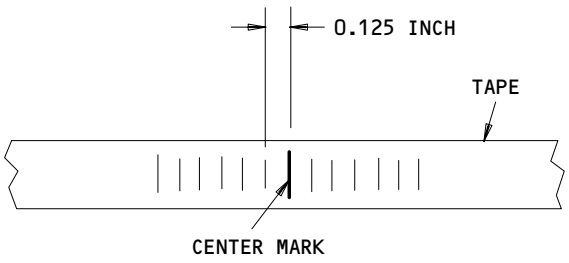
4 POSITION TRANSMITTER FOR THE LE SLAT PDU

Adjustment of the Position Transmitter for the TE Flap and LE Slat PDU's
Figure 508 (Sheet 1)



PROCEDURE 3
(LE SLAT PDU)

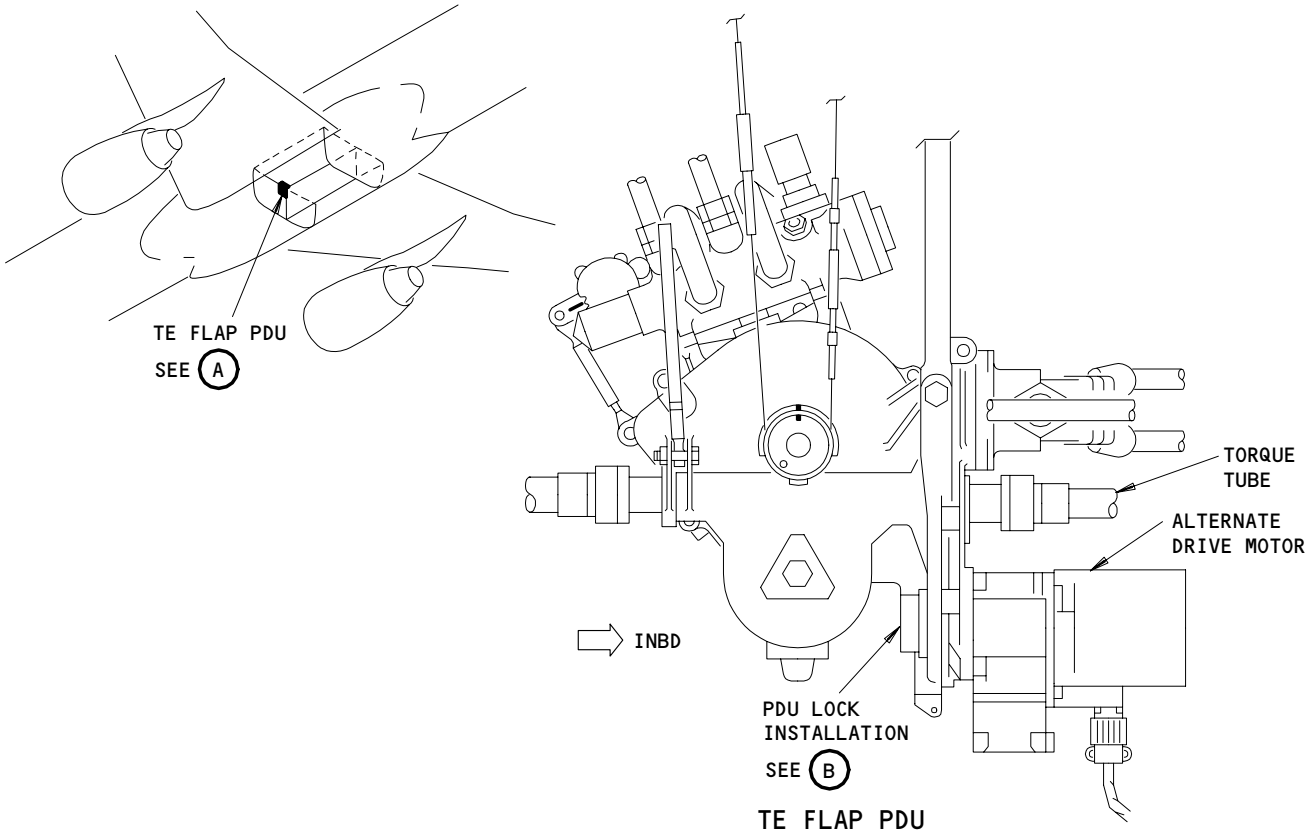




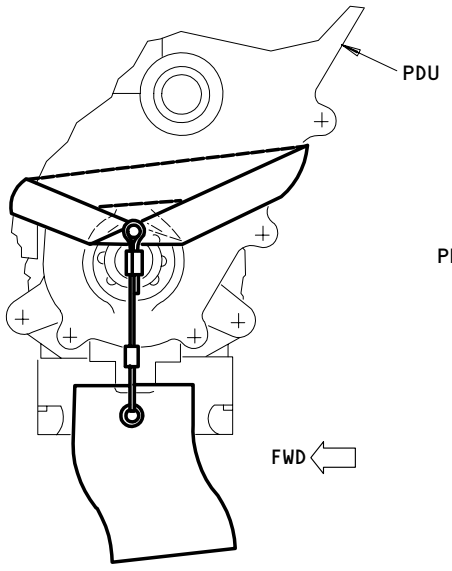
MARKED MASKING TAPE
(A)

PROCEDURE 3
(TE FLAP PDU)

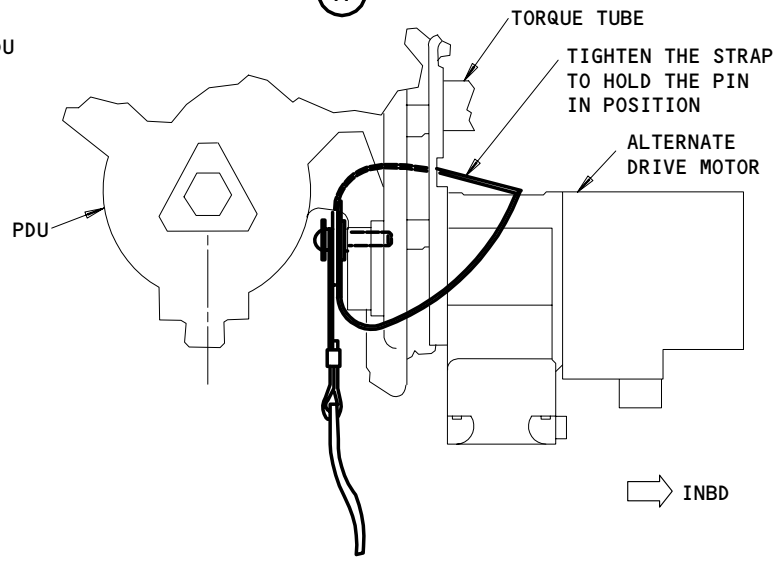
Adjustment of the Position Transmitter for the TE Flap and LE Slat PDU's
Figure 508 (Sheet 2)



TE FLAP PDU
(AFT VIEW)
A

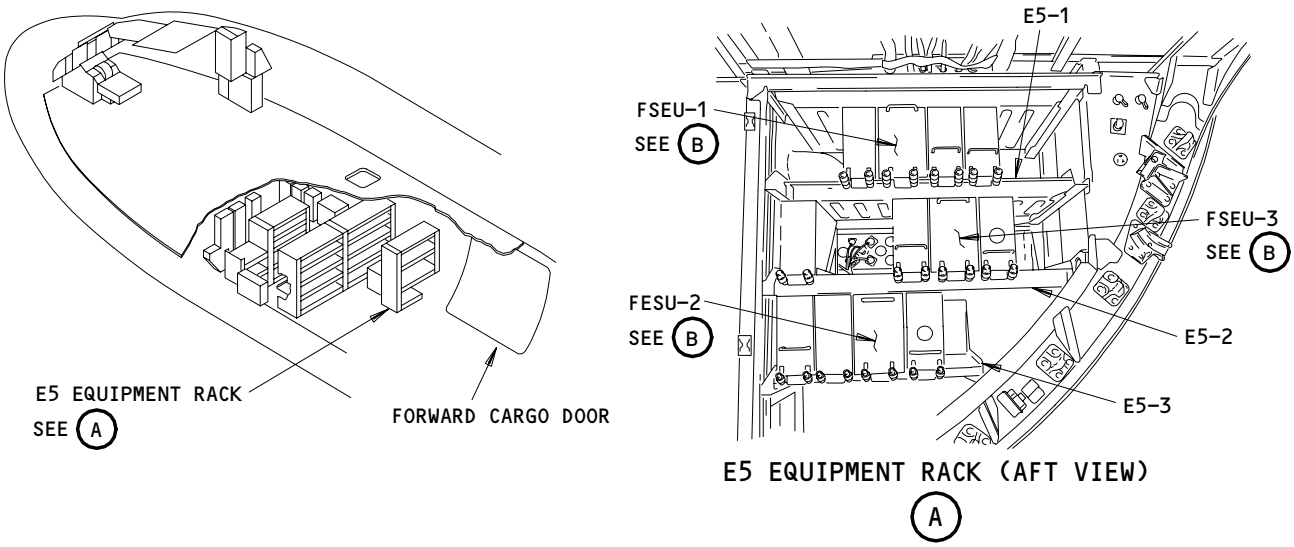


PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B

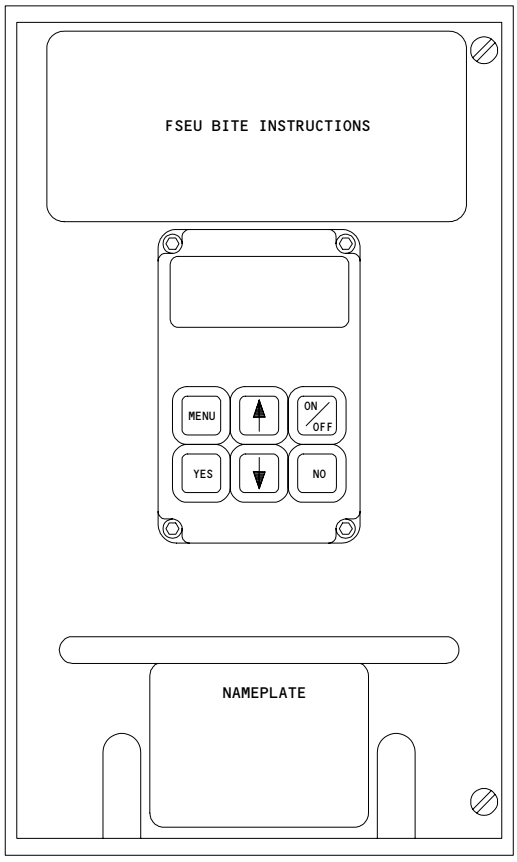


PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 509



E5 EQUIPMENT RACK (AFT VIEW)
A



FSEU (EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 510

S 015-007

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 045-008

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 865-009
(4) Supply electrical power (AMM 24-22-00/201).

S 865-010

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-011
(6) Move the flap control lever to the zero (FLAPS UP) detent and make sure the trailing edge (TE) flaps and leading edge (LE) slats move to the fully retracted position.

S 495-012
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 495-013
(8) If you adjust a position transmitter for the flap control lever, LE slats, or LE slat PDU,
do this step:
(a) Keep the TE flaps and LE slats in the fully retracted position and make sure a DO-NOT-OPERATE tag is installed on the flap control lever.

S 865-014
(9) If you adjust a position transmitter for the TE flaps or TE flap PDU,
do these steps:
(a) Remove the DO-NOT-OPERATE tag from the flap control lever.
(b) Move the flap control lever to the 20-unit detent, and let the TE flaps move to the 20-unit position and the LE slats move to the intermediate position.
(c) Install a DO-NOT-OPERATE tag on the flap control lever.

S 865-015
(10) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-016
(11) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 495-017
(12) Install a PDU lock in the TE flap PDU (Fig. 509).

S 015-018
(13) Remove the access panels for the wing trailing edge or wing leading edge (AMM 06-44-00/201).

S 865-019
(14) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(d) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(e) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(f) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(g) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(h) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(i) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(j) 11H12, FLAP POS IND LEFT
(k) 11H13, FLAP POS IND RIGHT

S 215-020
(15) Make sure the TE flaps and LE slats are in the necessary position for the adjustment procedure.

S 865-022
(16) Supply electrical power (AMM 24-22-00/201).

S 215-025
(17) Do these steps to get the resolver angles for the position transmitters:
(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(b) Push the NO switch three times to show the OTHER FUNCTIONS? message on the display.
(c) Push the YES switch two times to show the resolver inputs for the position transmitters.

NOTE: Push the down arrow to see the resolver angles for all the position transmitters.

E. Adjust the Position Transmitter for the Flap Control Lever (Fig. 501)

S 015-027
(1) Remove the access panel for the lower right side of the control stand.

S 215-028
(2) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 825-029
(3) Loosen the screws that hold the position transmitter in its position and turn the position transmitter to get an electrical angle value of 131.00 ±1.00 degrees.
(a) Adjust it to the nominal value.

S 435-030
(4) Tighten the screws that hold the position transmitter in its position, and make sure the angle value stays at 131.00 ±1.00 degrees.

S 215-031
(5) Make sure the angle values for each detent of the flap control lever are as shown (Table A, Fig. 501).

NOTE: If the angle values are not in the correct range, the position transmitter can be adjusted to the high or low side of the nominal value with the flap control lever in the zero (FLAPS UP) detent.

S 865-032
(6) Move the flap control lever to the zero (FLAPS UP) detent.

S 495-033
(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 085-034
(8) If it is not necessary to adjust other position transmitters, disconnect the electrical test equipment from connector D1251.
(a) Install a cap on connector D1251 to prevent damage to the connector.

S 715-035
(9) Do the steps to do a test on the position transmitter for the flap control lever.

NOTE: If you adjust two or more position transmitters, do the test procedure after you complete the adjustment of all the position transmitters.

F. Adjust the Position Transmitter for the TE Flap PDU (Fig. 502)

NOTE: To adjust the position transmitter, make sure the TE flaps were last extended hydraulically to the position the same as the flap control lever in the 20-unit detent from a position on the up side of the 20-unit detent. Do not move the TE flap system during the position transmitter adjustment.

S 825-036
(1) Loosen the screws that hold the position transmitter in its position, and turn the position transmitter to get an electrical angle value of 275.07 ±0.25 degrees.
(a) Adjust it to the nominal value.

S 435-037
(2) Tighten the screws that hold the position transmitter in its position and make sure the angle value stays at 275.07 ±0.25 degrees.

S 225-215
(3) Make sure the angle values for each detent of the flap control lever are as shown (Table A, Fig. 502).

NOTE: If the angle values are not in the correct range, the position transmitter can be adjusted to the high or low side of the nominal value with the flap control lever in the zero (FLAPS UP) detent.

S 085-038
(4) If it is not necessary to adjust other position transmitters, disconnect the electrical test equipment from connector D1251.

S 495-039
(5) Install a cap on connector D1251 to prevent the connector from damage.

S 715-040
(6) Do the steps to do a test on the position transmitter for the TE Flap PDU.

NOTE: If you adjust two or more position transmitters, do the test procedure after you complete the adjustment of all position transmitters.

G. Adjust the Position Transmitter for the TE Flap (Fig. 503)

S 215-041
(1) Make sure the TE flaps are in the 20-unit position and the LE slats are in the intermediate position with the flap control lever in the 20-unit detent.

S 025-042
(2) Do these steps to remove the position transmitter (AMM 27-58-03/401):
(a) Disconnect the electrical connector for the position transmitter.
(b) Remove the three bolts that attach the position transmitter to the gearbox.

NOTE: Do not turn the input shaft of the position transmitter.

S 645-043
(3) Apply grease to the splines on the position transmitter shaft.

S 825-044
(4) Turn the input shaft of the position transmitter to get an electrical angle value of 275.07 ±0.25 degrees.
(a) Adjust it to the nominal value.

S 425-045
(5) Install the position transmitter without a turn to the input shaft.

NOTE: Do not change the position of the input shaft by more than one half tooth.

S 435-046
(6) Tighten the bolts that hold the position transmitter in its position.

S 215-047
(7) Make sure the electrical angle value is 275.07 ±0.25 degrees.

S 225-216
(8) Make sure the angle values for each detent of the flap control lever are as shown (Table A, Fig. 502).

NOTE: If the angle values are not in the correct range, the position transmitter can be adjusted to the high or low side of the nominal value with the flap control lever in the zero (FLAPS UP) detent.

S 085-048
(9) If it is not necessary to adjust other position transmitters, disconnect the electrical test equipment from connector D1251.

S 495-049
(10) Install a cap on connector D1251 to prevent the connector from damage.

S 715-050
(11) Do the steps to do a test on the position transmitter for the TE Flap.

NOTE: If you adjust two or more position transmitters, do the test procedure after you complete the adjustment of all the position transmitters.

H. Adjust the Position Transmitter for the LE Slat PDU (Fig. 504)

S 215-219
(1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 825-051
(2) Loosen the screws that hold the position transmitter in its position, and turn the position transmitter to get an electrical angle value of 8.850 ±0.250 degrees.
(a) Adjust it to the nominal value.

S 435-052
(3) Tighten the screws that hold the position transmitter in its position, and make sure the electrical angle readout stays at 8.850 ±0.250 degrees.

S 225-217
(4) Make sure the angle values for each detent of the flap control lever are as shown (Table A, Fig. 505).

NOTE: If the angle values are not in the correct range, the position transmitter can be adjusted to the high or low side of the nominal value with the flap control lever in the zero (FLAPS UP) detent.

S 085-053
(5) If it is not necessary to adjust other position transmitters, disconnect the electrical test equipment from connector D1251.

S 495-054
(6) Install a cap on connector D1251 to prevent the connector from damage.

S 715-055
(7) Do the steps to do a test on the position transmitter for the LE Slat PDU.

NOTE: If you adjust two or more position transmitters, do the test procedure after you complete the adjustment of all position transmitters.

I. Adjust the Position Transmitter for the LE Slat (Fig. 505)

S 215-056
(1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 025-057
(2) Do these steps to remove the position transmitter (AMM 27-88-01/401):
(a) Disconnect the electrical connector for the position transmitter.
(b) Remove the bolts and remove the position transmitter.

NOTE: Do not turn the input shaft of the position transmitter.

S 645-058
(3) Apply grease to the splines on the position transmitter shaft.

S 825-059
(4) Turn the input shaft of the position transmitter to get an electrical angle value of 8.850 ±0.250 degrees.
(a) Adjust it to the nominal value.

S 425-060
(5) Install the position transmitter without a turn to the input shaft .

NOTE: Do not change the position of the input shaft by more than one half tooth.

S 435-061
(6) Tighten the bolts that hold the position transmitter in its position.

S 215-062
(7) Make sure the electrical angle value is 8.850 ±0.250 degrees.

S 225-218
(8) Make sure the angle values for each detent of the flap control lever are as shown (Table A, Fig. 505).

NOTE: If the angle values are not in the correct range, the position transmitter can be adjusted to the high or low side of the nominal value with the flap control lever in the zero (FLAPS UP) detent.

S 085-063
(9) If it is not necessary to adjust other position transmitters, disconnect the electrical test equipment from connector D1251.

S 495-064
(10) Install a cap on connector D1251 to prevent the connector from damage.

S 715-065

(11) Do the steps to do a test on the position transmitter for the LE Slat.

NOTE: If you adjust two or more position transmitters, do the test procedure after you complete the adjustment of all the position transmitters.

TASK 27-58-01-715-112

3. Test of the Position Transmitter Installation

A. General

(1) This task gives instructions to do a test on the position transmitter installation for these components:

- the Flap Control Lever
- the TE Flap PDU
- the TE Flap
- the LE Slat PDU
- the LE Slat.

To start one of these procedures, do the steps "Prepare for the Test" and then do the steps to do a test on the position transmitter that you adjusted. Then, do the steps to "Put the Airplane Back to Its Usual Condition".

B. Equipment

(1) TE Flap PDU Lock - B27008-1

C. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
511	Leading Edge to Front Spar
525	Slat No. 1
625	Slat No. 10
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Test

S 095-113

(1) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-114
(2) Remove the circuit breaker lock, and close this circuit breaker on the overhead panel, P11:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-115
(3) Remove the circuit breaker locks and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 865-116
(4) Supply electrical power (AMM 24-22-00/201).

S 215-117
(5) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 215-118
(6) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not armed (switch lights will be off).

S 215-119
(7) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 095-120
(8) Remove the PDU lock from the TE flap PDU (Fig. 509).

S 865-121

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Make sure the TE flap and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

F. Test of the Position Transmitter for the Flap Control Lever

S 865-122

(1) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent back to the zero (FLAPS UP) detent as follows:
   (a) Stop in each detent to let the TE flaps and LE slats move to the correct positions.
   (b) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 745-123

(2) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on when you do the test.

S 865-126

(3) Move the flap control lever to the 15-unit detent, and let the TE flaps move to the 15-unit position and the LE slats move to the intermediate position.

S 745-127

(4) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-130

(5) Move the flap control lever to the 30-unit detent and let the TE flaps and LE slats move to the fully extended position.

S 745-131

(6) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-134
(7) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats move to the fully retracted position.

S 745-135
(8) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

G. Test of the Position Transmitter for the TE Flap PDU

S 865-138
(1) Move the flap control lever to the 20-unit detent, and let the TE flaps move to the 20-unit position and the LE slats move to the intermediate position.
(a) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 20-unit position.

S 745-139
(2) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-142
(3) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will go on).

S 865-143
(4) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the 25-unit detent.
(a) Make sure the TE flaps move to the 25-unit position and the LE slats move to the fully extended position.
(b) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 25-unit position.

S 865-144
(5) Move the position selector switch for the flap/slat alternate drive, to the UP-detent, and make sure the TE flaps and LE slats move to the UP position.

S 865-145
(6) Move the flap control lever to the zero (FLAPS UP) detent.

S 865-146
(7) Move the position selector switch for the flap/slat alternate drive to the NORM detent.

S 865-147
(8) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

H. Test of the Position Transmitter for the TE Flap

S 095-148
(1) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-149
(2) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats move to the fully retracted position.

S 865-150
(3) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent as follows:
(a) Stop in each detent to let the TE flaps and LE slats move to the correct position.
(b) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 865-151
(4) Move the flap control lever to the 20-unit detent, and let the TE flaps move to the 20-unit position and the LE slats move to the intermediate position.
(a) Make sure the L and R needles on the flap position indicator are in the tolerance band of the 20-unit position.

S 745-152
(5) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-155
(6) Push the arming switches for the flap and slat alternate drives to arm the flap and slat alternate drives (switch lights will go on).

S 865-156
(7) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the 25-unit detent and do these checks:
(a) Make sure the TE flaps move to the 25-unit position.
(b) Make sure the LE slats move to the fully extended position.
(c) Make sure the L and R needles on the flap position indicator, are in the tolerance band of the 25-unit position.

S 865-157
(8) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent, and make sure the flaps and slats move to the UP position.

S 865-158
(9) Move the flap control lever to the zero (FLAPS UP) detent.

S 865-159
(10) Move the position selector switch for the flap/slat alternate drive to the NORM detent.

S 865-160
(11) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

I. Test of the Position Transmitter for the LE Slat PDU

S 745-161

(1) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-164

(2) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.

S 865-165

(3) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 865-166

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(4) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended positon.

S 865-167

(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-168
(6) Install a PDU lock in the TE flap PDU (Fig. 509).

S 865-169
(7) Release the test switch for the LEFT stall warning, and make sure the slats stay in the fully extended position.

S 865-170
(8) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will come on).

S 215-171
(9) Make sure, at all rotary actuators on all slats, the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure you can turn the torque tube, found immediately outboard of the LE slat PDU, in the extend direction (in the clockwise direction if you look inboard at the LE slat PDU from the left wing).

S 095-172
(10) Remove the PDU lock from the TE flap PDU (Fig. 509).

S 865-173

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(11) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-174
(12) Push the arming switch for the slat alternate drive, on the P3 panel, to disarm the slat alternate drive (switch light will go off).
(a) Make sure the LE slats move to the intermediate position.

S 865-175
(13) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 865-176
(14) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

S 865-177
(15) Move the position selector switch for the flap/slat alternate drive to the UP detent, and make sure the flaps and slats move to the fully retracted position.

S 865-178
(16) Move the flap control lever to the zero (FLAPS UP) detent.

S 865-179
(17) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.

S 865-180
(18) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

S 215-181
(19) Make sure there are no leaks at the hydraulic connections to the LE slat PDU.

J. Test of the Position Transmitter for the LE Slat

S 215-182
(1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 095-183
(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-184
(3) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent back to the zero (FLAPS UP) detent as follows:
(a) Stop in each detent to let the TE flaps and LE slats move to the correct position.
(b) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 745-185
(4) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center, and make sure there are no faults.

NOTE: The NO FAULTS message will show on the FSEU display if there are no faults when you push the YES switch to the EXISTING FAULTS? message.

S 865-188
(5) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.

S 865-189
(6) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 865-190
(7) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended position.

S 865-191
(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-192
(9) Install a PDU lock in the TE flap PDU (Fig. 509).

S 865-193
(10) Release the test switch for the LEFT stall warning, and make sure the LE slats stay in the fully extended position.

S 865-194
(11) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will come on).

S 215-195
(12) Make sure, at all rotary actuators on all slats, the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure you can turn the torque tube, found immediately outboard of the LE slat PDU, in the extend direction (in the clockwise direction if you look inboard at the LE slat PDU from the left wing).

S 095-196
(13) Remove the PDU lock from the TE flap PDU (Fig. 509).

S 865-197

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(14) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-198
(15) Push the arming switch for the slat alternate drive, on the P3 panel, to disarm the slat alternate drive (switch light will go off).
(a) Make sure the LE slats move to the intermediate position.

S 865-199
(16) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 865-200
(17) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will go on).

S 865-201
(18) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent.
(a) Make sure the TE flaps and LE slats move to the UP position.

S 865-202
(19) Move the flap control lever to the zero (FLAPS UP) detent.

S 865-203
(20) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.

S 865-204
(21) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

K. Put the Airplane Back to Its Usual Condition

S 415-205

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-206
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-207
(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 415-208
(4) Install the access panels and close the access doors (AMM 06-44-00/201).

S 445-210

(5) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

FLAP POSITION INDICATOR (N15) REMOVAL/INSTALLATION

1. General
   A. The Flap Position Indicator (N15) is installed on the P3-1 panel. This procedure contains the following tests:
      (1) Flap Position Indicator - Removal
      (2) Flap Position Indicator - Installation
      (3) Flap Position Indicator - Test

   TASK 27-58-02-004-001

2. Flap Position Indicator - Removal
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
   B. Access
      (1) Location Zones

          211/212 Flight Compartment

   C. Prepare for Removal

      S 864-021

      CAUTION: YOU CAN MAKE AN INCORRECT CONNECTION WITH THIS COMPONENT. CLEARLY IDENTIFY CONNECTIONS WHEN YOU DISCONNECT AND WHEN YOU CONNECT AGAIN.

      (1) Open the following circuit breakers on the P11 overhead panel and attach DO NOT CLOSE tags:
          (a) 11H12, FLAP POS IND L
          (b) 11H13, FLAP POS IND R
          (c) 11H14, FLAP/SLAT S/O VALVE 1
   D. Flap Position Indicator - Removal Procedure

      S 024-003
      (1) Release the screw adjacent to the indicator.

      S 024-004
      (2) Pull the indicator forward out of the panel.

      S 024-005
      (3) Disconnect the electrical connector (D2960) from the rear of the indicator.

TASK 27-58-02-404-015

3. Flap Position Indicator - Installation

A. References

(1) AMM 24-22-00/201, Electrical Power - Control

B. Access

(1) Location Zones

211/212 Flight Compartment

C. Flap Position Indicator - Installation Procedure

S 864-022

CAUTION: YOU CAN MAKE AN INCORRECT CONNECTION WITH THIS COMPONENT. CLEARLY IDENTIFY CONNECTIONS WHEN YOU DISCONNECT AND WHEN YOU CONNECT AGAIN.

(1) Ensure the following circuit breakers on the P11 overhead panel are open:
(a) 11H12, FLAP POS IND L
(b) 11H13, FLAP POS IND R
(c) 11H14, FLAP/SLAT S/O VALVE 1

S 424-007

(2) Connect the electrical connector (D2960) to the Flap Position Indicator.

S 964-019

(3) Install the indicator into the panel (P3-1) with the screw.

S 864-009

(4) Remove the DO NOT CLOSE tags and close the following circuit breakers on the P11 panel:
(a) 11H12, FLAP POS IND L
(b) 11H13, FLAP POS IND R
(c) 11H14, FLAP/SLAT S/O VALVE 1

TASK 27-58-02-704-010

4. Flap Position Indicator - Test

A. Procedure

S 864-011

(1) Supply electrical power (AMM 24-22-00/201).

S 724-020
(2) Do the following tests:
(a) Test of the Position Indicating System for the TE Flaps (AMM 27-58-00/501).
(b) Test of the Position Indicating System for the LE Slat (AMM 27-88-00/501).

S 844-013
(3) Put the Airplane Back to its Usual Condition.

S 864-014
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

FLAP POSITION TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the position transmitter for the trailing edge (TE) flaps. The second task installs the position transmitter.

TASK 27-58-03-024-001

2. Remove the Position Transmitter for the TE Flaps
   A. Equipment
      (1) TE Flap PDU Lock, - B27008-1
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlock
   C. Access
      (1) Location Zones

211/212	Control Cabin
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 214-002

(1) Make sure the TE flaps and leading edge (LE) slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-003

(2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 864-005

(4) Supply electrical power (Ref 24-22-00).

S 864-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-007

(6) Move the flap control lever to the 20-unit detent and let the TE flaps move to the 20-unit position.

S 494-008

(7) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-009

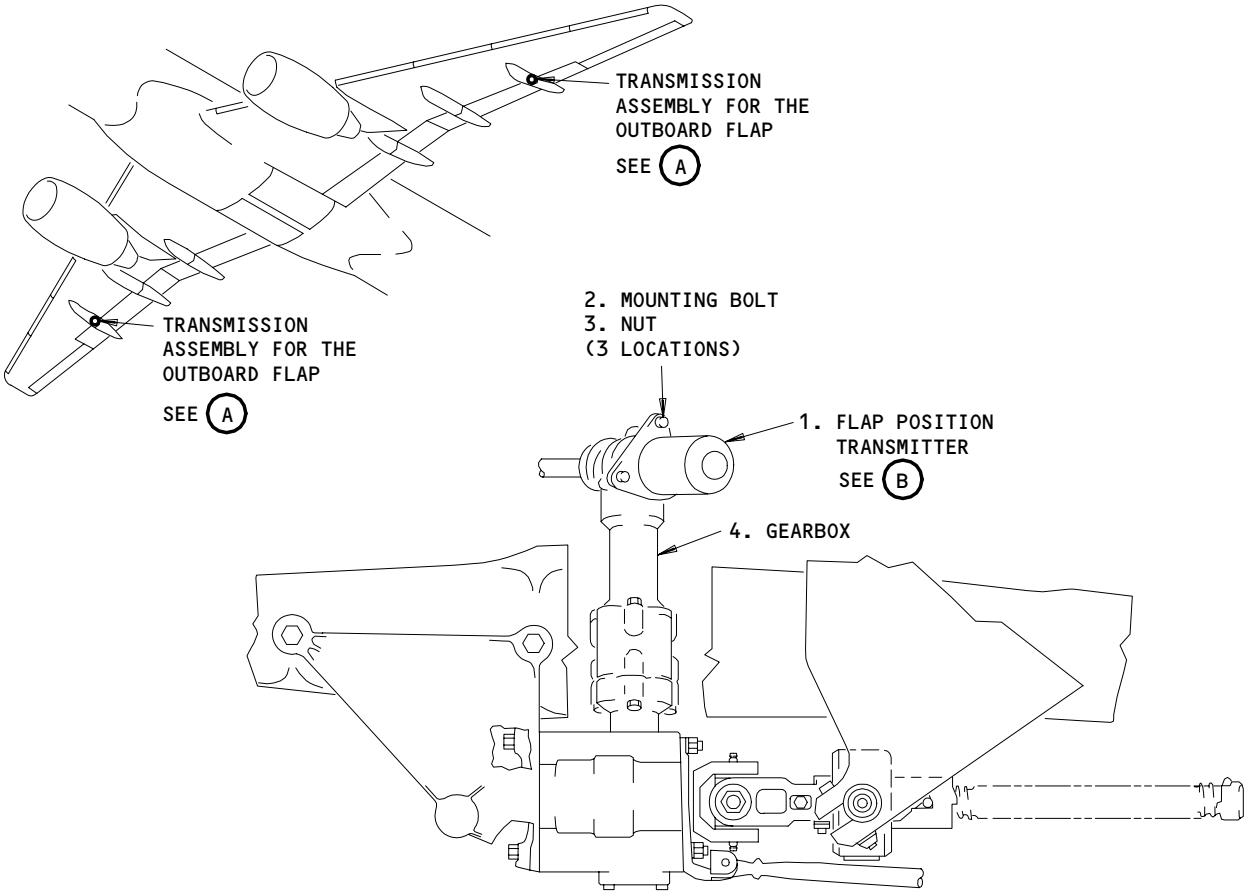
(8) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-010

(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-OPERATE tags:
   (a) 11B18, WARN ELEX B
   (b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
   (c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
   (d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
   (e) 11D31, HYDRAULICS PTU CONT
   (f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
   (g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
   (h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
   (i) 11H12, FLAP POS IND LEFT
   (j) 11H13, FLAP POS IND RIGHT
   (k) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (l) 11J18, FLAP LOAD RELIEF
   (m) 11J33, WARN ELEX A

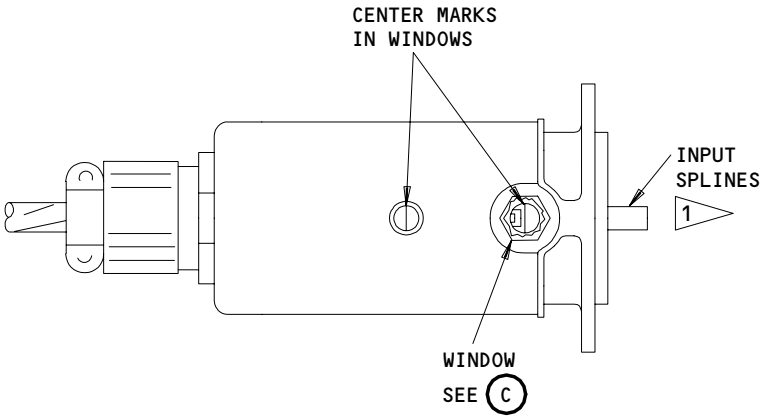
S 864-011

(10) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR



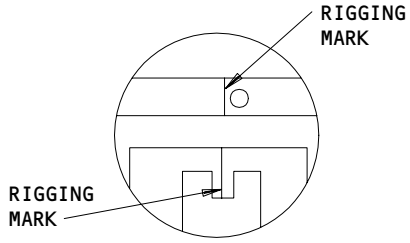
TRANSMISSION ASSEMBLY FOR THE OUTBOARD FLAP

A



POSITION TRANSMITTER

B

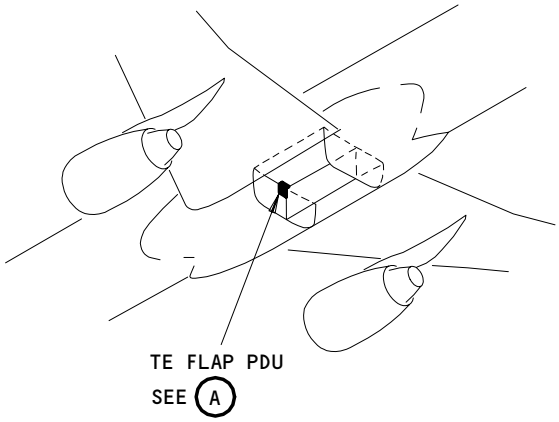


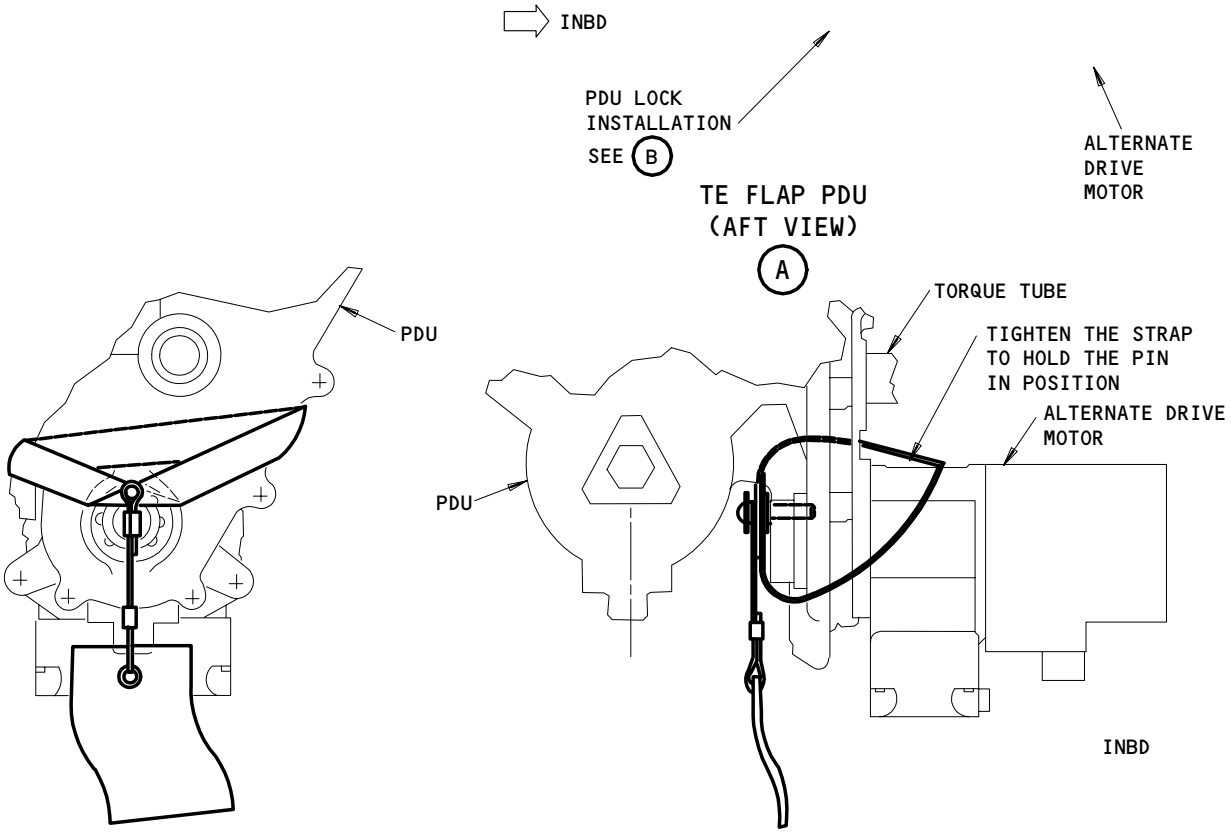
WINDOW

C

1 LUBRICATE THE SPLINES WITH GREASE BEFORE YOU ASSEMBLE

Flap Position Transmitters
Figure 401





PDU Lock for the TE Flap PDU
Figure 402

S 494-012

(11) Install a PDU lock in the TE flap PDU (Fig. 402).

E. Remove the Position Transmitter (Fig. 401)

S 034-013

(1) Disconnect the electrical connector.

S 024-014

CAUTION: BE CAREFUL WHEN YOU REMOVE THE FLAP POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BEND WHEN YOU REMOVE THE POSITION TRANSMITTER.

(2) Remove the three bolts (2) and nuts (3) that attach the position transmitter (1) to the tee gearbox.

TASK 27-58-03-424-015

3. Install the Flap Position Transmitter (Fig. 401)

NOTE: To adjust the position transmitter, make sure the flaps last were extended to the position that matches the flap control lever in the 20-unit detent with hydraulic power from a position on the up side of the 20-unit detent.

You will install the flap position transmitter during the adjustment procedure of the flap position transmitter.

A. Equipment
(1) TE Flap PDU Lock - B27008-1

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Flap Position Transmitter	27-51-25	03 03A 03B	260,265 228,230 265,270

C. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

D. References

(1) 27-58-01/501, TE Flap System and LE Slat System Position Transmitter

E. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
574/674	Outboard Flap Outboard Fairing
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Install the Position Transmitter

S 214-016

(1) Make sure the flap control lever is in the 20-unit detent and the flaps are in the 20-unit position.

S 094-018

CAUTION: BE CAREFUL WHEN YOU REMOVE THE SHIPPING RIG TOOL FROM THE POSITION TRANSMITTER, LIFT THE SHIPPING RIG TOOL IN A STRAIGHT LINE OFF OF THE POSITION TRANSMITTER SHAFT. DO NOT USE FORCE TO PULL THE SHIPPING RIG TOOL OFF OF THE ARM, THE POSITION TRANSMITTER SHAFT CAN EASILY BEND.

(2) If it is installed, remove the shipping rig tool that holds the input shaft of the position transmitter input shaft in its position.

S 864-020

(3) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:

(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11D31, HYDRAULICS PTU CONT
(f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(g) FLAP SLAT ELEC UNIT 1 CONT (11G13)
(h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(i) 11H12, FLAP POS IND LEFT
(j) 11H13, FLAP POS IND RIGHT
(k) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(l) 11J18, FLAP LOAD RELIEF
(m) 11J33, WARN ELEX A

S 424-019

CAUTION: BE CAREFUL WHEN YOU INSTALL THE FLAP POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BEND WHEN YOU INSTALL THE POSITION TRANSMITTER.

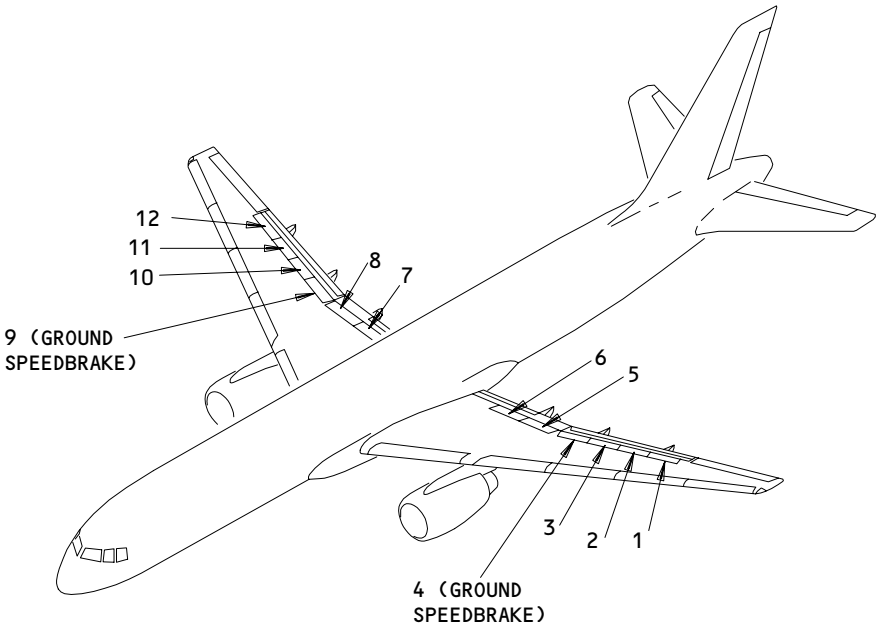
(4) Install, adjust, and do a test on the installation of the flap position transmitter (Ref 27-58-01).

NOTE: Do not move the flaps or slats during the position transmitter adjustment.

Do the steps to put the airplane back to its usual condition in the adjustment/test procedure.

SPOILERS AND DRAG DEVICES - DESCRIPTION AND OPERATION

1. General (Fig. 1)
   A. The twelve spoiler control surfaces are numbered 1 thru 12, consecutively, for reference. Spoiler surfaces 1 thru 6 are on the left wing, numbered from outboard to inboard. Spoiler surfaces 7 thru 12 are on the right wing, numbered from inboard to outboard. Spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11 and 12 are used to assist aileron lateral control. These panels also respond to speedbrake lever commands in flight. Spoiler surfaces 4 and 9 are ground speedbrakes only. All twelve surfaces respond to speedbrake lever commands through the auto-speedbrake system. Refer to 27-61-00, Description and Operation, for information about the in-flight spoiler/speedbrake system. Refer to 27-62-00, Description and Operation, for information about the auto-speedbrake system.

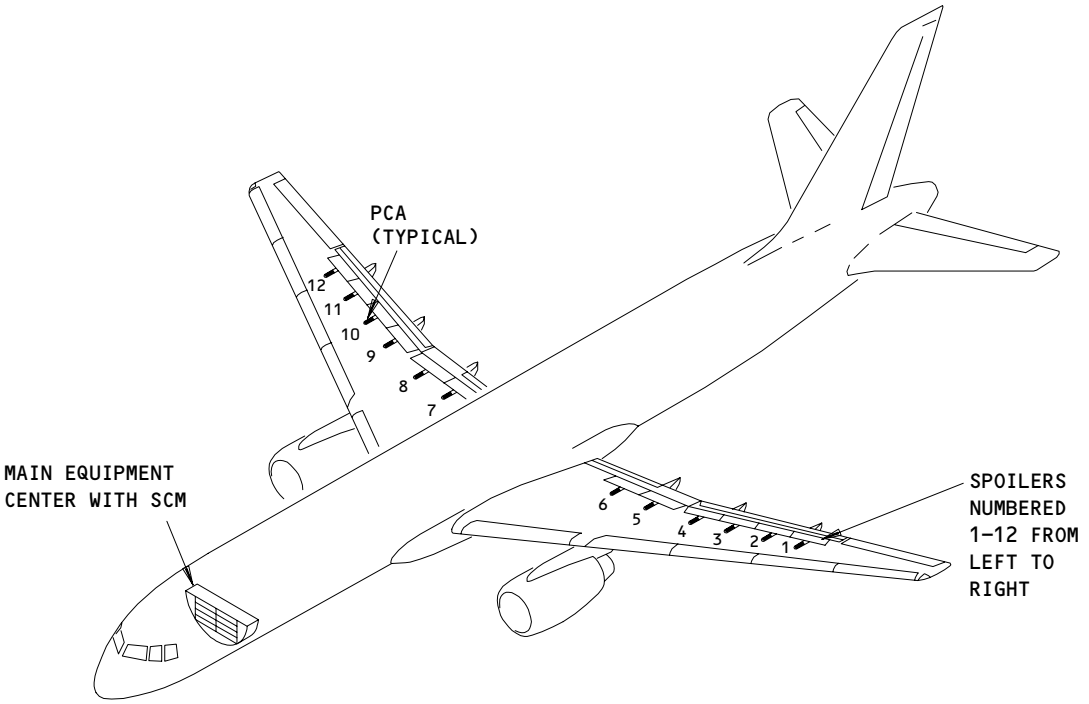


Spoilers and Drag Devices
Figure 1

52956

SPOILER/SPEEDBRAKE CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The spoiler/speedbrake system uses the same flight control surfaces to perform two functions (Fig. 1). The system deploys the flight spoilers to assist the ailerons in lateral control of the airplane (Ref 27-11-00, Description and Operation). The system also operates the same surfaces as speedbrakes to increase drag and reduce lift in flight.
   B. The spoiler/speedbrake system is electrically controlled and hydraulically powered. Rotary variable differential transducers (RVDTs) translate aileron control wheel inputs into electrical signals. The spoiler control modules (SCMs) receive these signals and command the power control actuators (PCAs) to raise spoilers. Placing the speedbrake lever in the UP position will deploy all flight speedbrakes.
   C. Flight deck indicators display failures in the spoiler/speedbrake system (Fig. 2). The amber SPOILERS light on the pilot's overhead panel, P5, indicates a second failure in the spoiler system. An amber SPOILERS message will also appear on the upper EICAS screen. First spoiler system failures are stored in EICAS memory and can be recalled on the ground.



Spoiler/Speedbrakes
Figure 1

D. The warning system provides an amber light and level B EICAS caution message should the spoiler/speedbrake surfaces be extended at altitudes less than 800 feet. The amber SPEED BRAKES light is located on the pilot's main panel P1. The amber EICAS caution message reads SPEED BRAKES EXT. Refer to 31-51-00, Warning system - Description and Operation, for more information.

E. Description and operation of the SCMs is covered in this section. Maintenance practices of the SCMs is covered in 27-09-00.

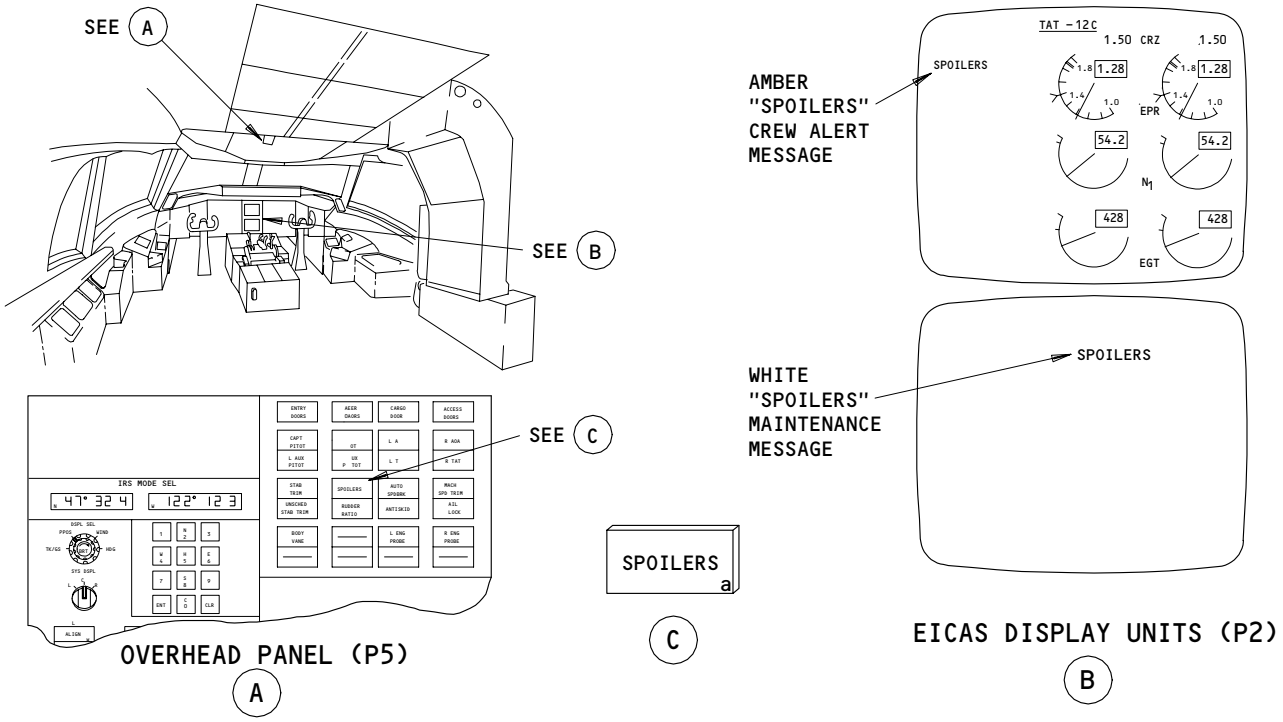
2. Spoiler Component Details

A. Rotary Variable Differential Transducers (RVDTs) (Fig. 3)

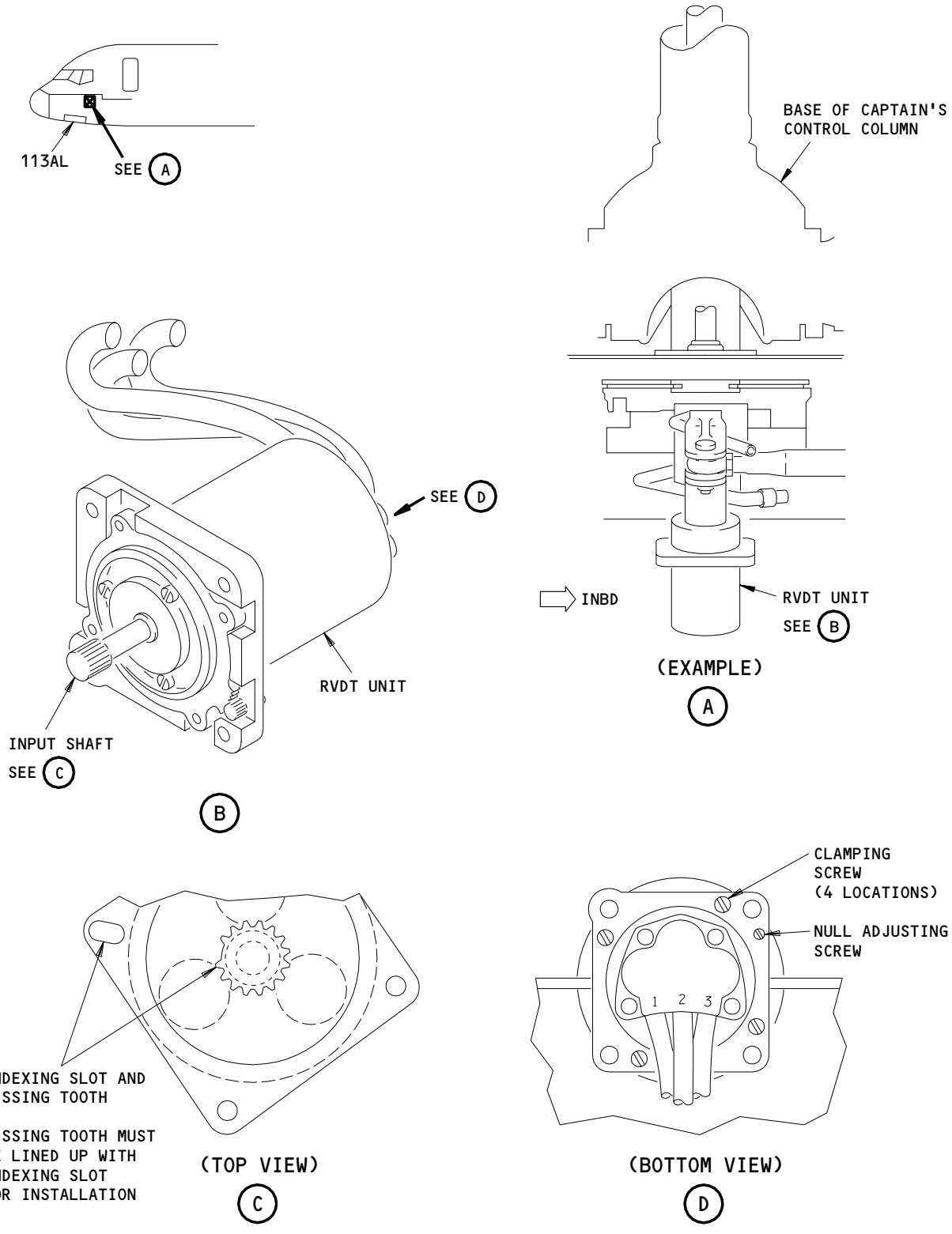
(1) Three RVDTs are grouped together in a can-like unit. The unit is mounted on the bottom of each control drum assembly. The units are accessible through an access panel forward of the nose gear wheel well.

(2) The six spoiler RVDTs translate aileron control wheel rotation into electrical signals. The signal voltage is porportional to the amount of control wheel movement. The SCMs mix RVDT inputs with other inputs according to preprogrammed logic.

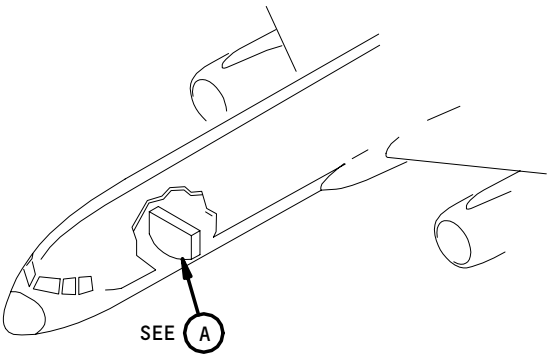
B. Spoiler Control Modules (SCMs) (Fig. 4)

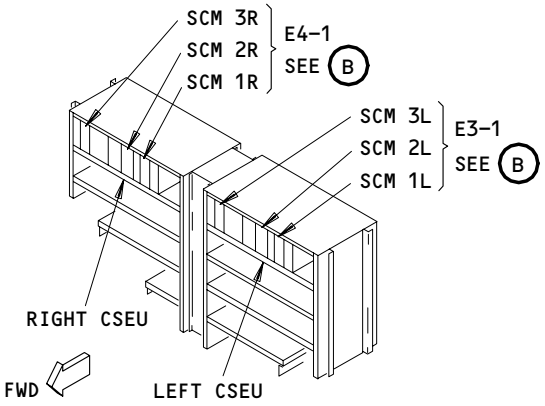


Flight Deck Indications
Figure 2



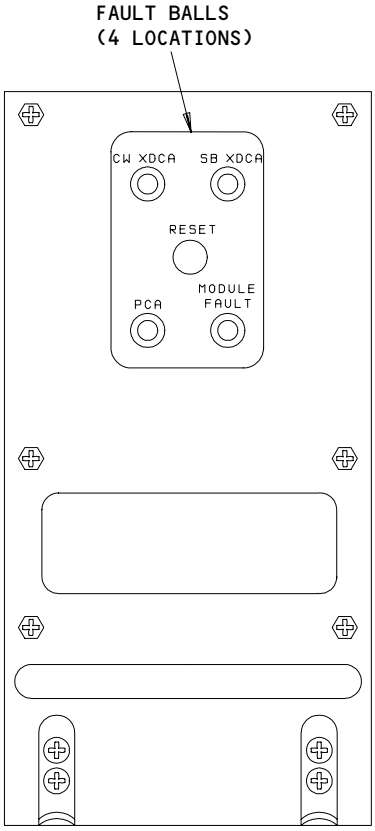
Rotary Variable Differential Transducer
Figure 3





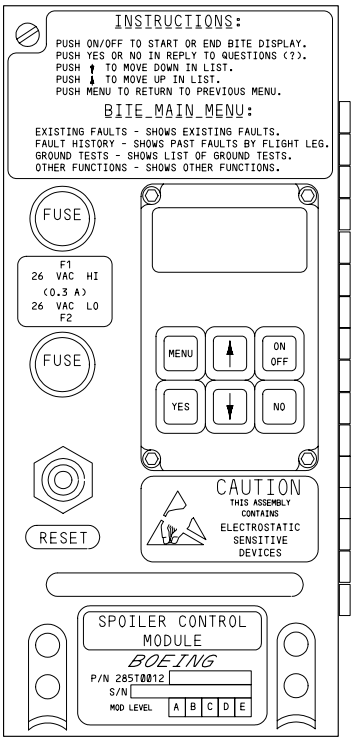
MAIN EQUIPMENT CENTER

A



SPOILER CONTROL MODULE

B 1



SPOILER CONTROL MODULE

B 2

1 -100 SERIES SCMs

2 -200 SERIES SCMs

Spoiler Control Modules
Figure 4

(1) Six SCMs control the twelve spoiler surfaces. Each SCM operates a symmetrical pair of spoilers. The modules are part of the flight control system electronics units (CSEU). Three SCMs are part of the left CSEU and three are part of the right CSEU.

(2) The SCMs will show you when failures in the spoiler/speedbrake system occur.

(a) The -100 series SCMs have small windows (called fault balls) on the front of them that show yellow when a failure occurs. The yellow fault ball identifies the failure. You can push the reset button on the SCM to make the fault ball black.

(b) The -200 series SCMs have a display to show failures. The failures are shown as words on the display. The -200 series SCM is better for trouble-shooting than the older -100 series SCM. Refer to 27-09-00 for more information on the SCMs.

C. Power Control Actuators (PCAs) (Fig. 5)

(1) The inboard and outboard spoiler PCAs are similar. Each PCA consists of an actuator, an electrohydraulic servo valve (EHSV), and a rotary variable differential transformer (RVDT). The outboard PCAs are trunnion-mounted on the wing rear spar. The inboard PCAs are trunnion-mounted on the landing gear support beam. The PCA rod ends are attached to spoiler panel surfaces. Each spoiler has one PCA, powered by one of the three hydraulic systems. The PCAs are accessible when the trailing edge flaps are extended.

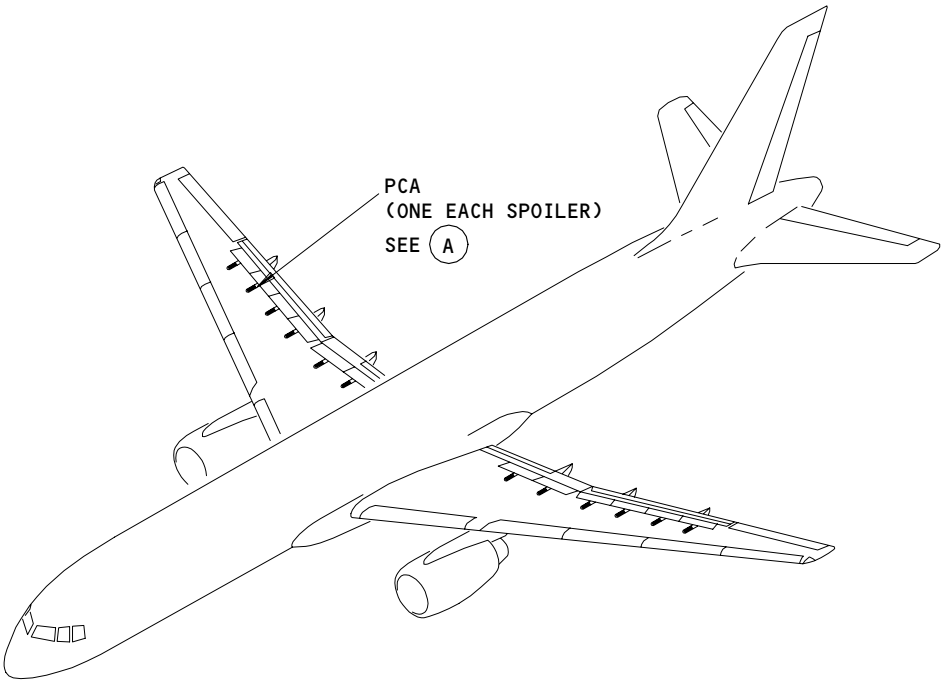
(2) The PCA extends or retracts as commanded to raise or lower the spoiler. The RVDT sends a feedback signal to the SCM porportional to the amount of PCA movement. This signal cancels out the input signal to the EHSV when the PCA reaches the commanded position.

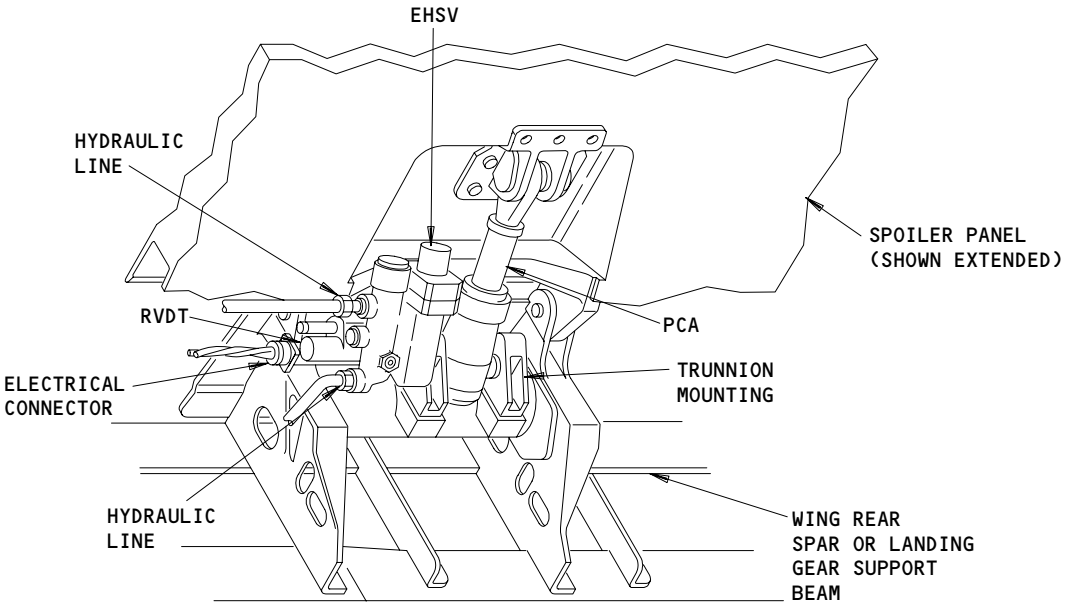
(3) Each PCA has a manual release cam which is accessible from underneath the PCA. The manual release cam opens the PCA thermal relief valve to release trapped hydraulic fluid after the hydraulic system is depressurized. Releasing trapped fluid is necessary to raise the spoiler panel for maintenance. The manual release cam cannot be used to raise a spoiler panel when power is available to its PCA. Also, a spoiler panel which was raised using the manual release cam when hydraulic power was removed will immediately retract if hydraulic power is reapplied. Therefore, the manual release cam should be used with caution, and only when it is certain hydraulic power will not be applied when the panel is raised.

D. Electrohydraulic Servo Valves (EHSVs) (Fig. 6)

(1) The EHSV controls the flow of hydraulic fluid in the PCA in response to SCM commands. The command operates a jet pipe that supplies hydraulic fluid to the EHSV control bobbin. The EHSV is spring biased in the retract position. This causes the spoiler panel to retract if there is no command signal. Pressure is available to the EHSV whenever the hydraulic system supplying the PCA is pressurized.

E. Spoiler Panels (Fig. 7)





A

Power Control Actuators
Figure 5

(1) Each wing has six spoiler panels. The spoilers are numbered 1 through 12 consecutively from the left wing outboard to the right wing outboard. Spoilers 4 and 9 are ground speedbrakes only. These panels are not actuated during flight under any circumstances.

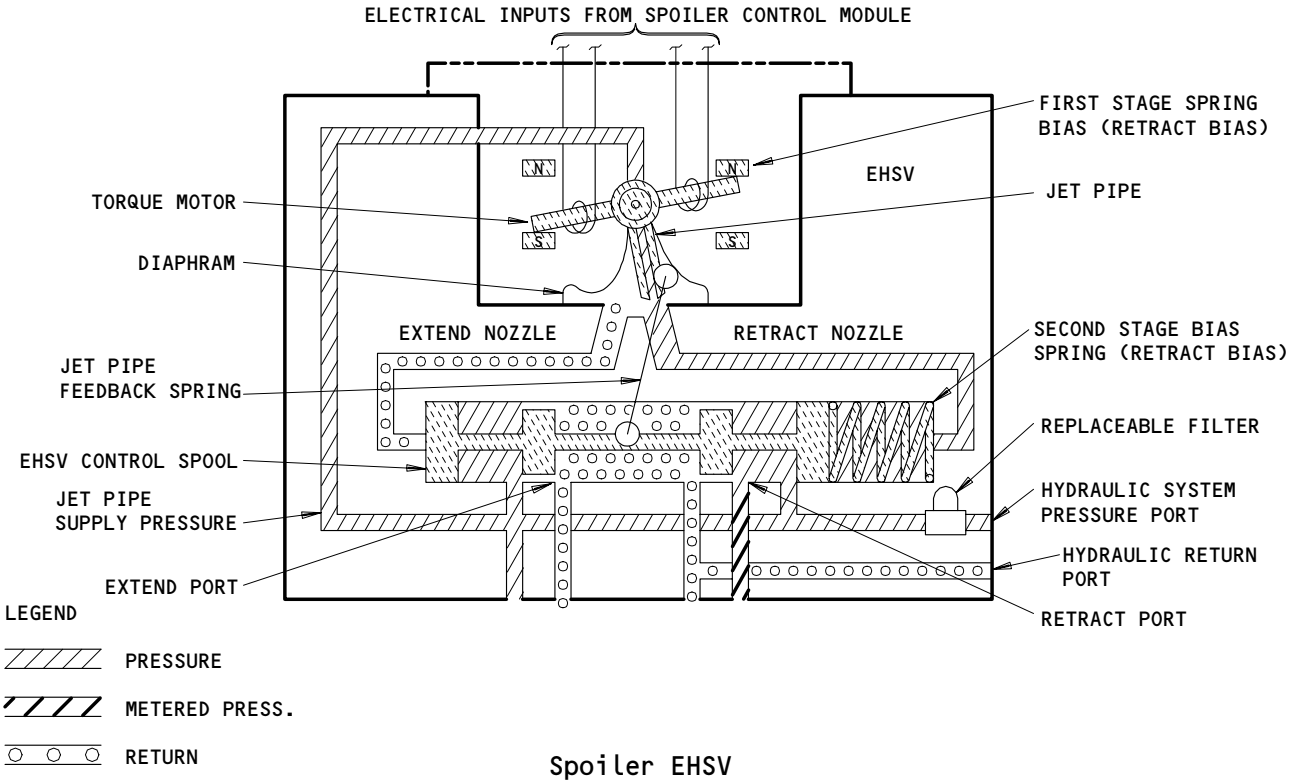
(2) Each spoiler is attached to wing structure at four hinge points. The PCA rod ends are attached to the center of each panel.

3. Speedbrake Component Details

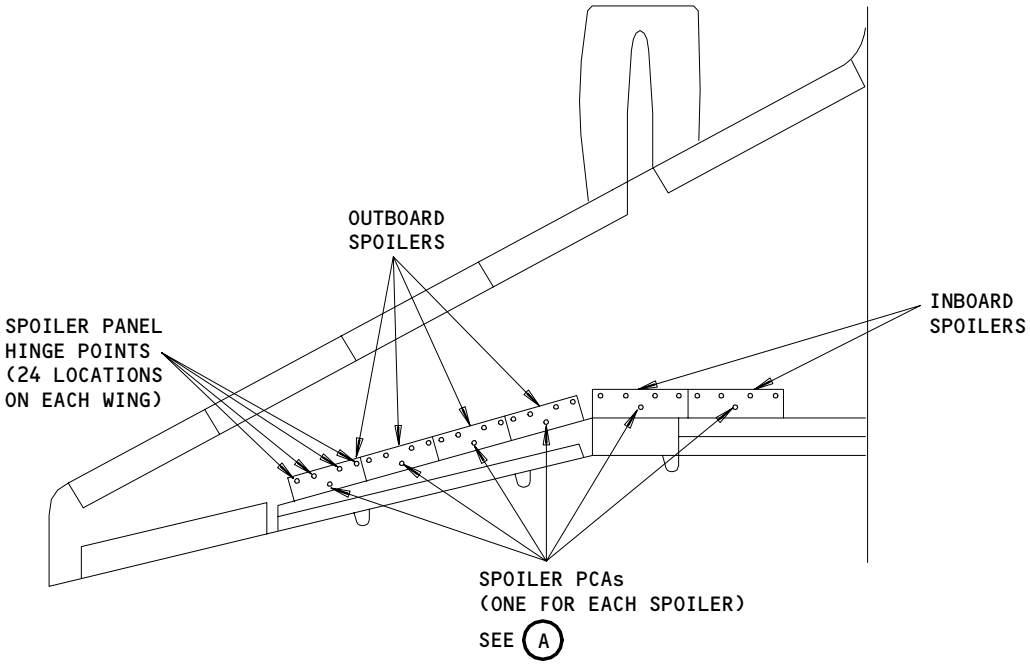
A. Speedbrake Lever and LVDTs (Fig. 8)

(1) The speedbrake lever is located on the control stand between the stabilizer trim switches and the engine thrust levers. An adjustable connecting rod links the lever to the speedbrake mechanism.

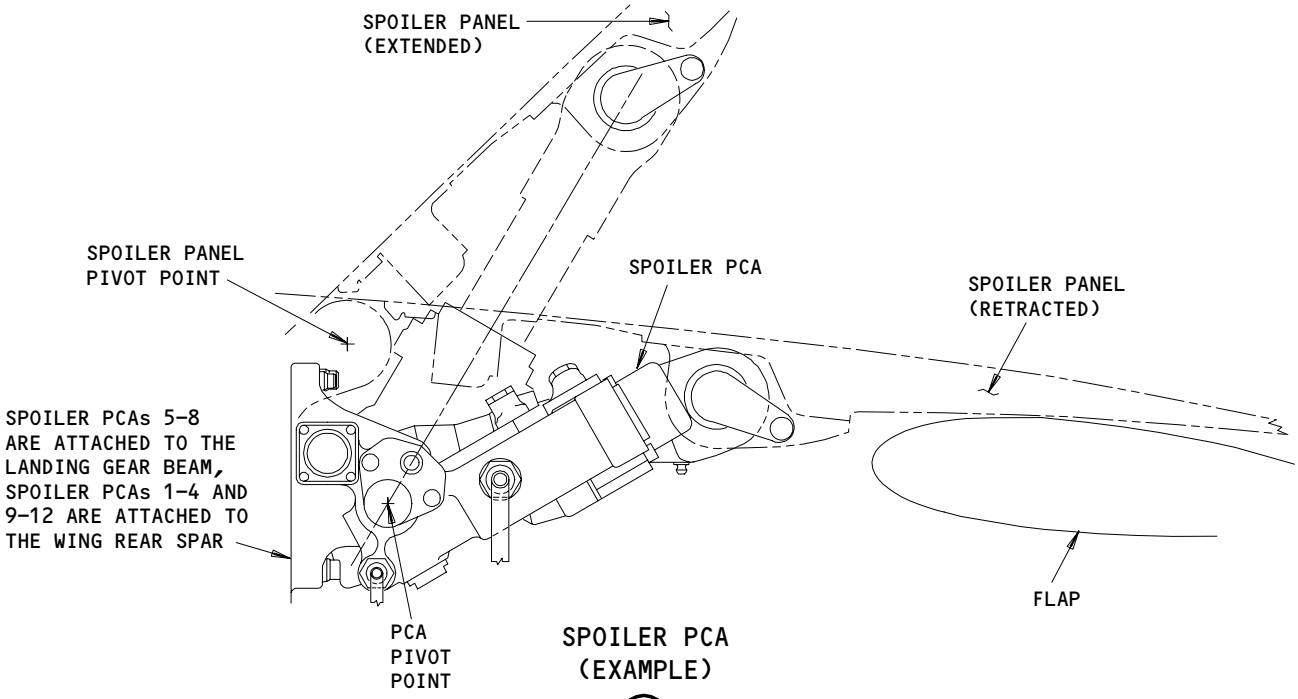
(2) The six speedbrake LVDTs are arranged in pairs. Each pair of LVDTs is attached to the speedbrake mechanism at a common point. Speedbrake lever movement will cause the LVDTs to send a signal to the SCMs corresponding to lever position.



Spoiler EHSV
Figure 6



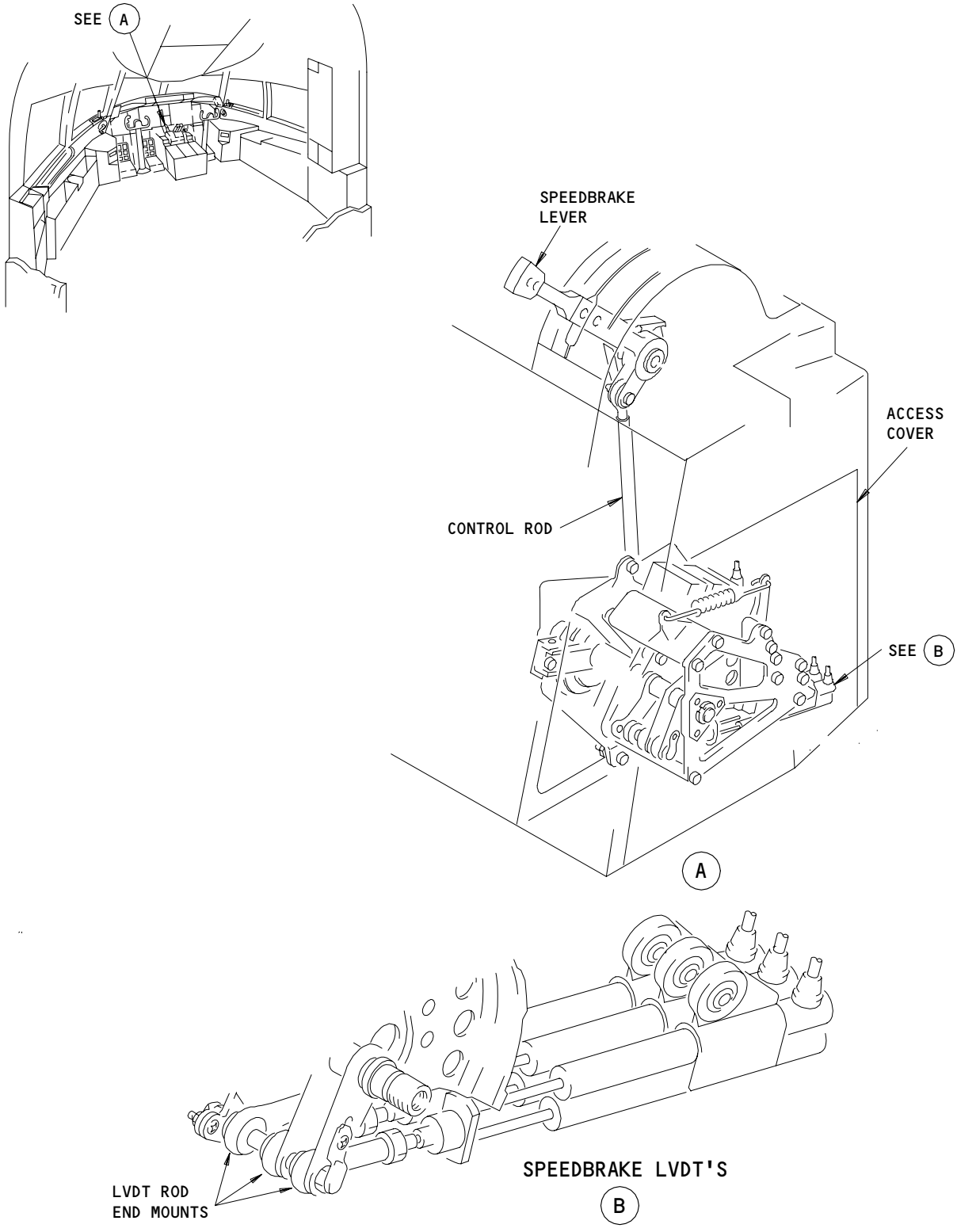
LEFT WING
(PLAN VIEW)



SPOILER PCA
(EXAMPLE)

A

Spoiler Panels
Figure 7



Speedbrake Lever and LVDT's
Figure 8

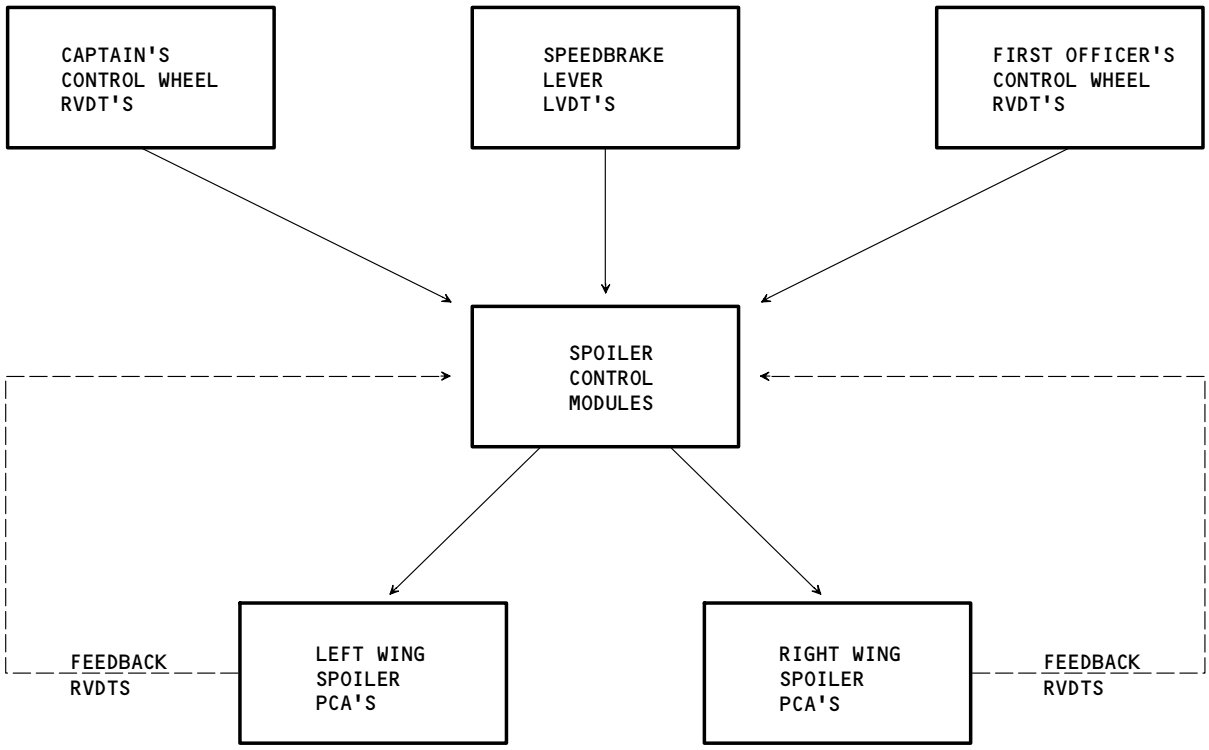
(3) The speedbrake lever has three positions. In the DOWN position, the spoiler panels are retracted. Pulling up on the lever and moving it aft places the lever in the ARMED position. This prepares the speedbrake system for automatic operation. Pulling the lever all the way back to the UP position will raise the speedbrakes to full extension.

4. Operation

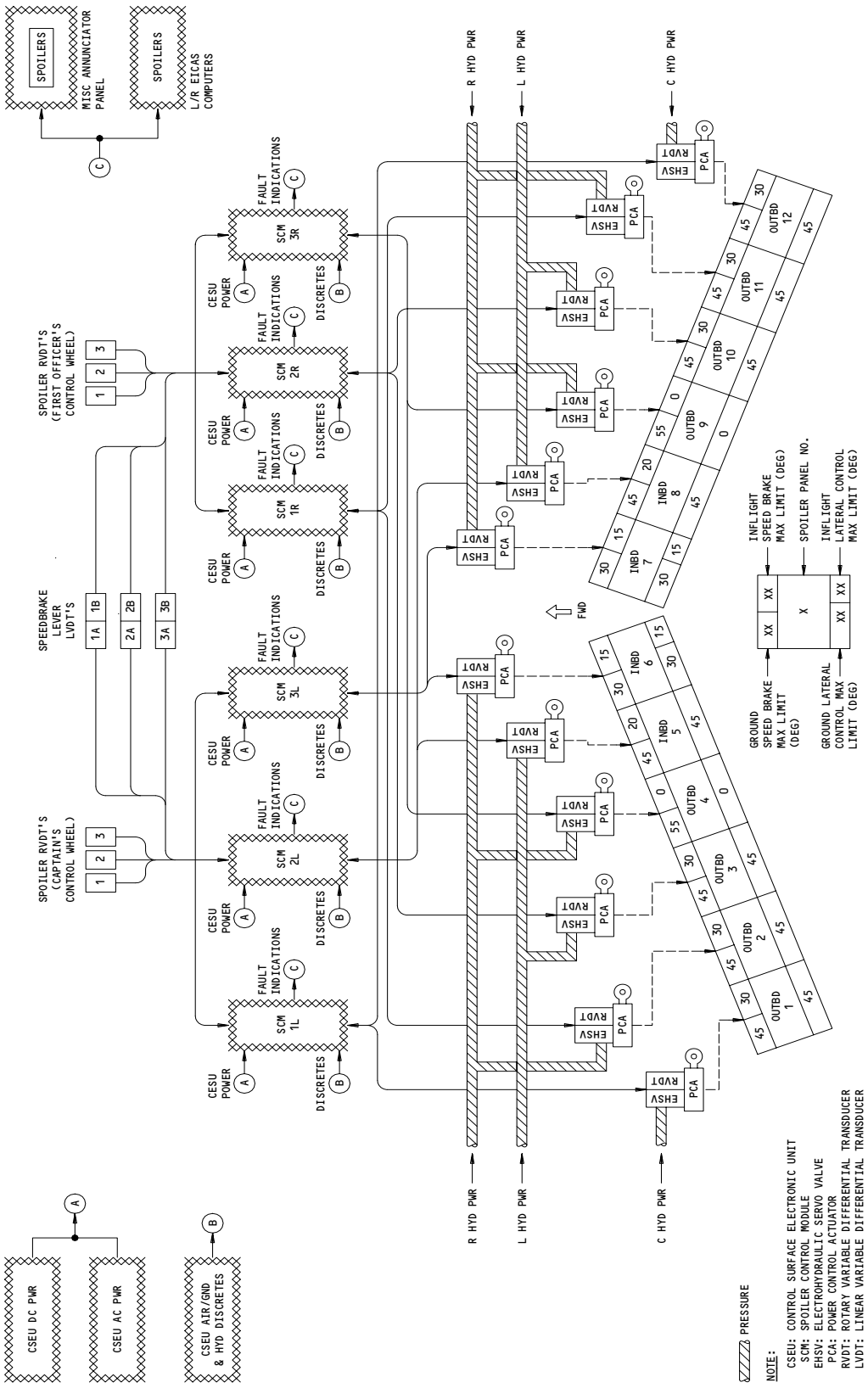
A. Functional Description

(1) General (Fig. 9 and 10)

(a) Spoiler assist in lateral control begins when the control wheel rotates. Either the flight crew or the autopilot system can operate the control wheels. The bus force limiter linking the control drums transfers input from one control wheel to the other. All the RVDTs move anytime either control wheel is rotated.



Spoiler Command and Feedback Signals
Figure 9



Spoiler and Speedbrake System Simplified Schematic
Figure 10

(b) RVDT signals received by the SCMs are processed and mixed with other inputs. SCM logic then determines which spoilers, if any, should be deployed. The SCM sends an appropriate command signal to the left or right flight spoiler PCAs. As the spoiler moves to the commanded position, the PCA RVDTs feed signals back to the SCM. The feedback signal is compared with input commands. When the two signals agree, spoiler movement is stopped.

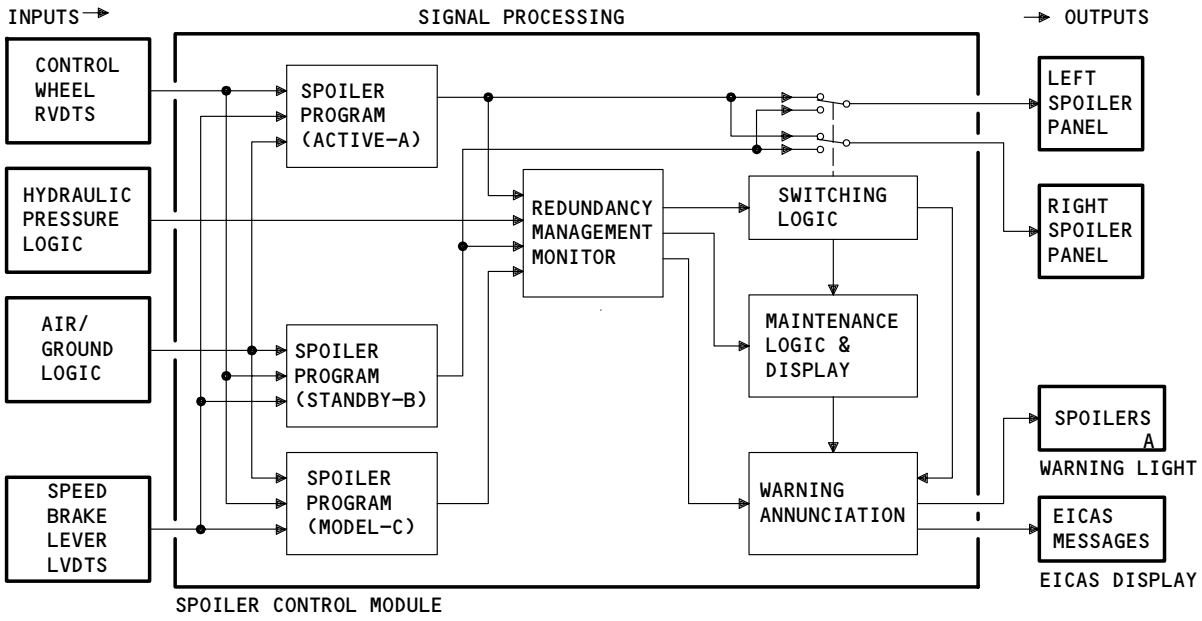
(c) Manual operation of the speedbrakes in flight begins when the speedbrake lever is moved from the DOWN position through ARMED to the UP position. There is no speedbrake movement when the lever is moved from the down and locked position to the ARMED detent.

(d) Inputs to the SCMs for the speedbrake system come from the speedbrake LVDT pairs. Speedbrake lever movement is transferred to the LVDTs through a linkage and the speedbrake mechanism. One LVDT of a pair sends a signal to each SCM in the left CSEU and the other LVDT sends a signal to each SCM in the right CSEU.

(e) The SCMs process and mix LVDT signals to produce a command signal. All flight spoilers respond to speedbrake commands during flight.

(f) When there is input from both control drum RVDTs and speedbrake LVDTs, the SCMs combine the two signals. The resulting SCM command is a summation of the two signals.

(2) Spoiler Control Module (SCM) Operation (Fig. 11)



Spoiler Control Module
Figure 11

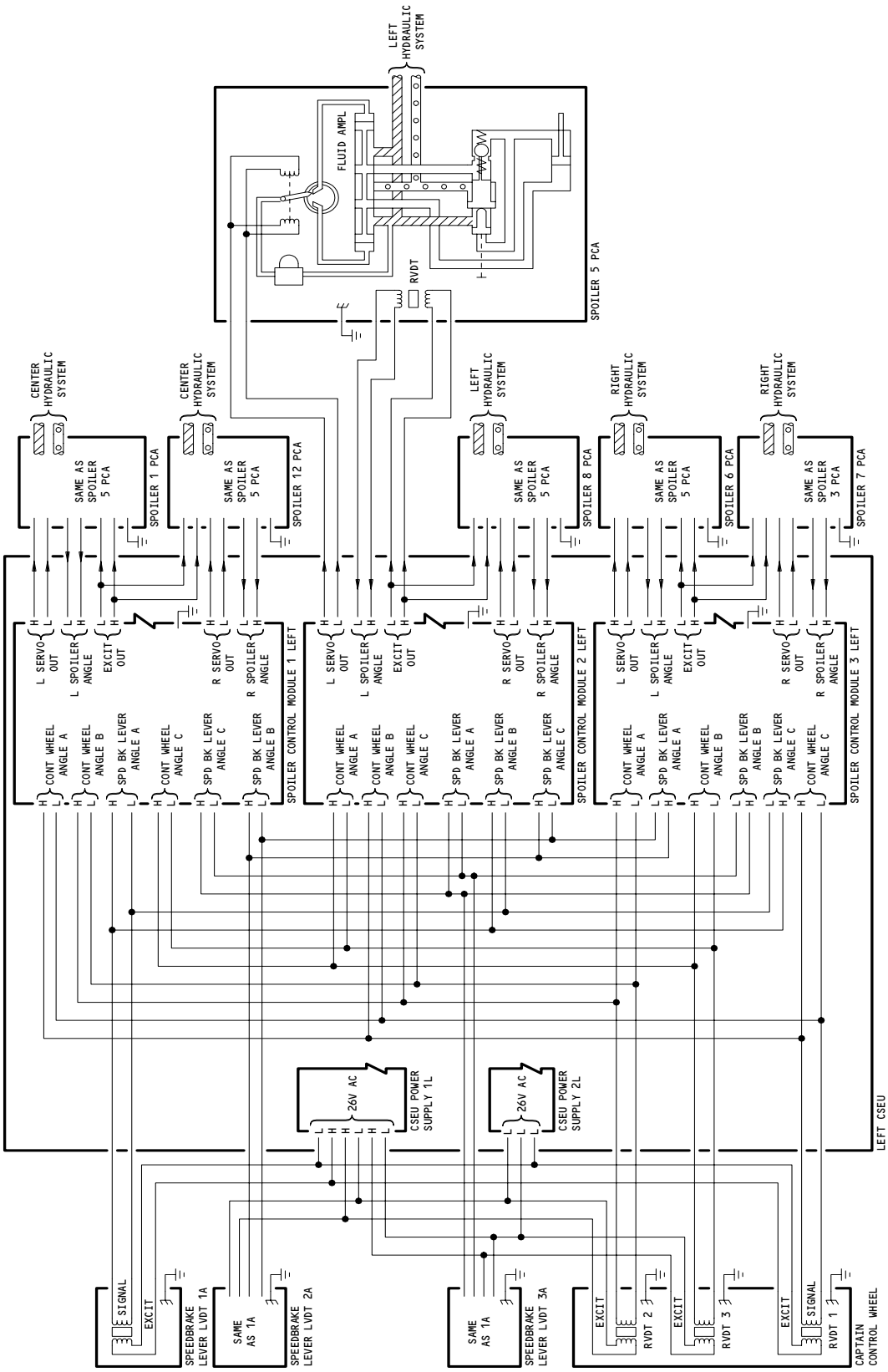
(a) The SCM contains a redundancy management circuit, maintenance logic circuit, switch circuit, and three physically, electrically, and functionally isolated sub-channel circuits (cards). The three sub-channel cards are called active (A), standby (B), and model(C). The active sub-channel operates the spoiler panels during normal operation. The standby channel acts as a backup. The model sub-channel, which cannot operate the spoilers, is used to test the active and standby sub-channels.

(b) Each sub-channel card receives input from a control wheel RVDT, a speedbrake LVDT, an air/ground relay, a right PCA RVDT, and a left PCA RVDT. The sub-channels demodulate, process, and mix these inputs to generate command signals. The active sub-channel compares its input command signal to the PCA RVDT feedback signal. The difference between the two signals is sent to the EHSV as a control signal. The standby and model sub-channels send their command signals to the redundancy management circuit.

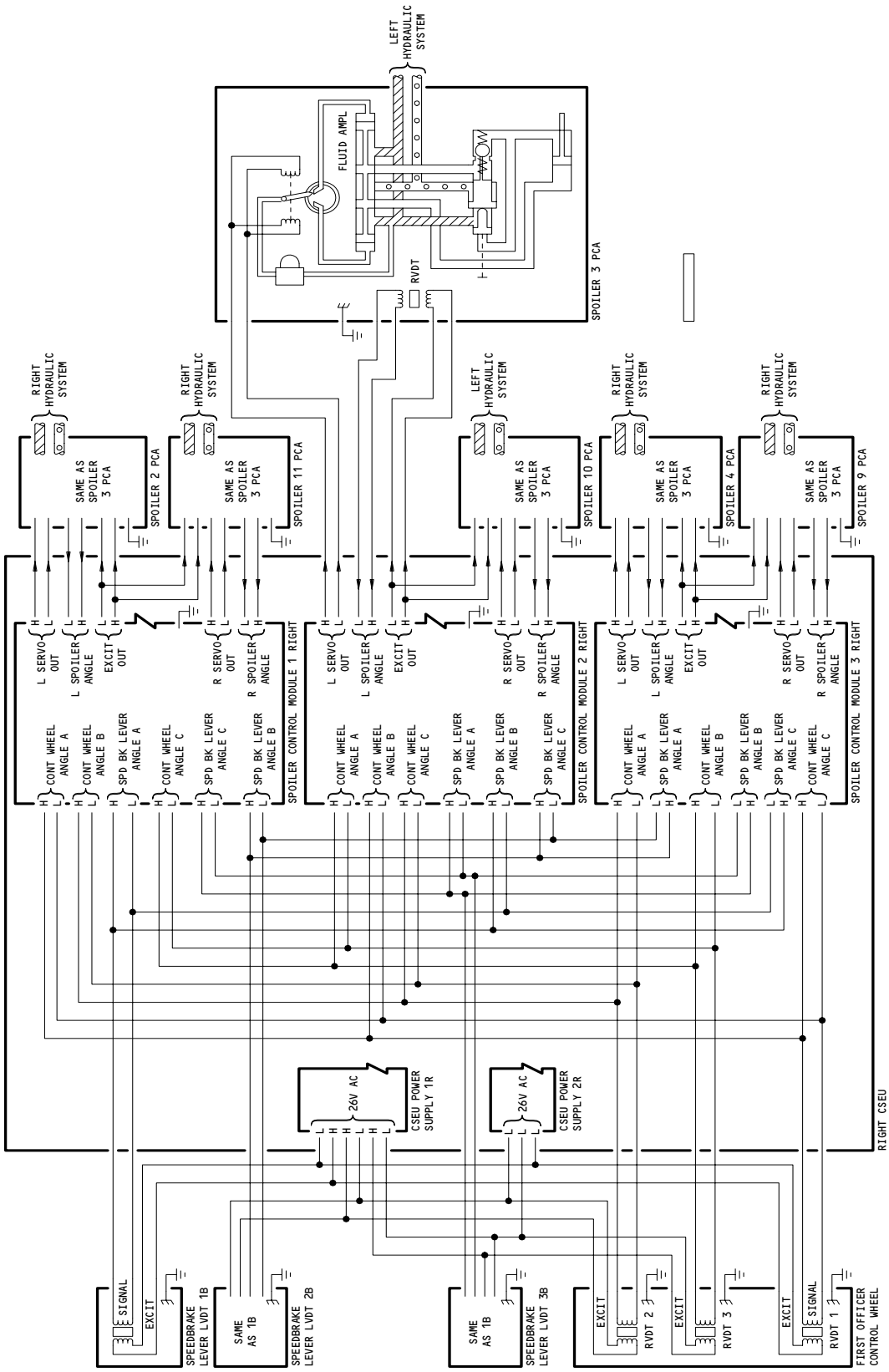
(c) A decision to switch control from the active sub-channel to the standby sub-channel is made by the redundancy management circuit. The redundancy management circuit uses these three tests to make the decision to switch sub-channels. The first test is made on the servo amplifiers in the standby sub-channel to detect a failed amplifier. If the test detects a failed amplifier, the redundancy management circuit is prevented from switching control from the active sub-channel to the standby sub-channel. The second test is made on the command signal from the standby sub-channel and the active sub-channel PCA RVDT feedback signal. The standby sub-channel threshold monitors check the two signals for disagreement. The third test is made on the command signal from the model sub-channel and the active sub-channel PCA RVDT feedback signal. The model sub-channel threshold monitors check the two signals for disagreement. If the second and third tests indicate disagreement at the same time, the redundancy management circuit switches control from the active sub-channel to the standby sub-channel.

(d) The maintenance logic circuit monitors the spoiler RVDTs, speedbrake LVDTs, and the PCAs. If any of these units fail, the maintenance logic circuit will cause a fault to show on the front of the SCM. The maintenance logic circuit also sends a signal to the redundancy management circuit to store an EICAS maintenance message. The maintenance logic circuit will cause a fault to show if the redundancy management circuit finds a failure in one of the SCM channels.

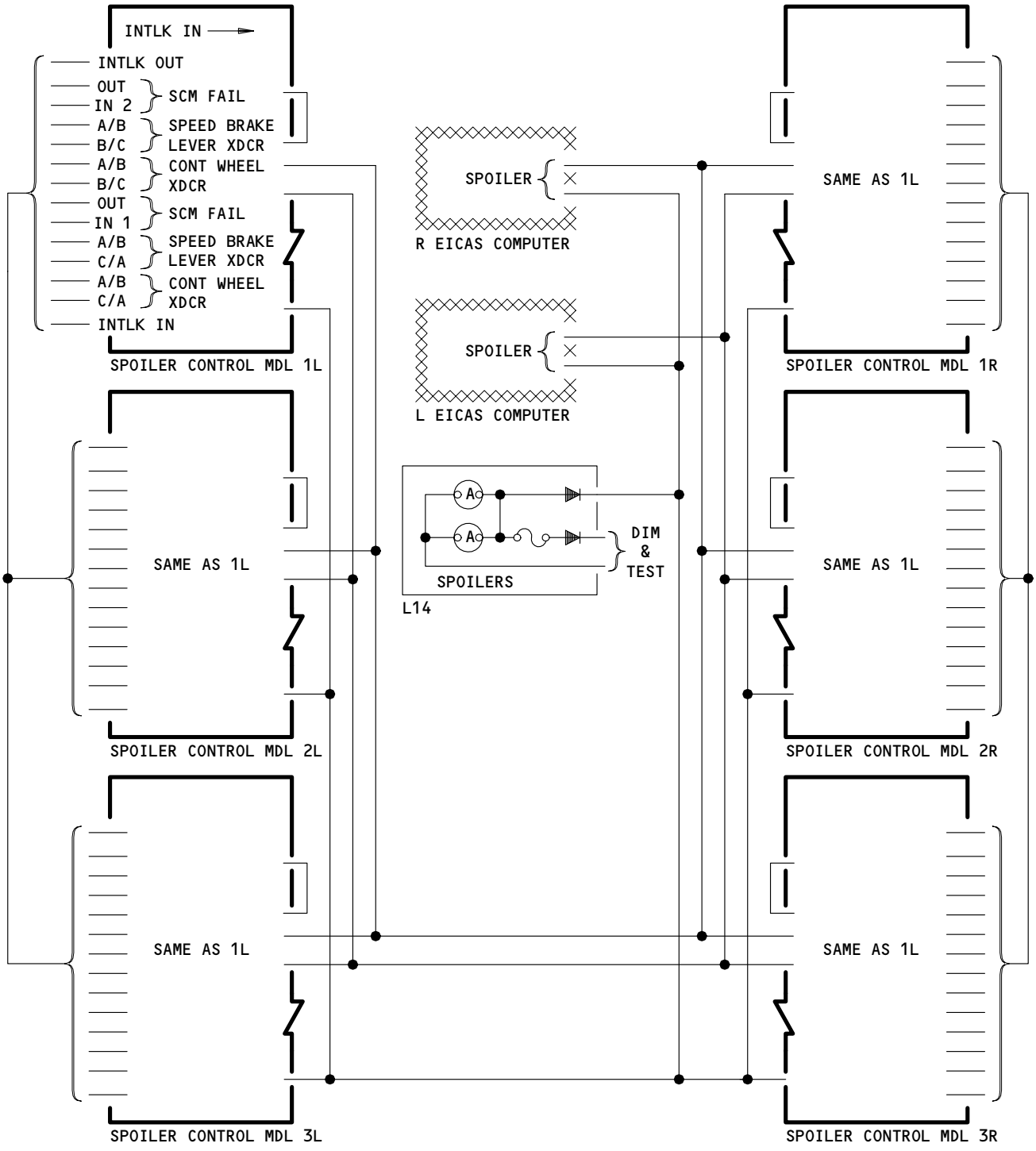
(3) Spoiler/Speedbrake System Operation (Fig. 12)



Spoiler/Speedbrake Control Simplified Schematic
Figure 12 (Sheet 1)



Spoiler/Speedbrake Control Simplified Schematic
Figure 12 (Sheet 2)



Spoiler/Speedbrake Control Simplified
Figure 12 (Sheet 3)

(a) Each of the SCMs receives input from three spoiler RVDTs. The three SCMs in the left CSEU receive inputs from the captain's control wheel RVDTs. The three SCMs in the right CSEU receive inputs from the first officer's control wheel RVDTs. Each SCM also receives inputs from three speedbrake LVDTs and two PCA RVDTs. The resultant output is sent to the PCAs to position spoiler panels.

(b) The ten flight spoilers respond to control wheel inputs. These flight spoilers extend 45° with full control wheel movement except for 6 and 7 which extend 15°. As flight speedbrakes, spoilers 1, 2, 3, 10, 11, and 12 extend 30°; spoilers 5 and 8 extend 20°; and spoilers 6 and 7 extend 15°. Spoilers 4 and 9 are ground speedbrakes only.

B. Control

(1) Provide electrical power (Ref 24-22-00).

WARNING: TO PREVENT INJURY OR DAMAGE, CLEAR PERSONNEL AND EQUIPMENT FROM CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. KEEP AREA CLEAR WHEN OPERATING CONTROL SURFACES.

(2) Provide left, center, and right hydraulic system power (Ref 29-11-00).

(3) Spoiler operation (aileron control wheel)

(a) Place speedbrake lever in the DOWN position.

(b) Rotate one control wheel clockwise or counterclockwise to raise the left or right wing spoilers.

(c) Return control wheel to neutral to lower the spoilers.

(4) Spoiler operation (speedbrake lever)

(a) Place control wheels in the neutral position.

(b) Move speedbrake lever to the UP position to raise the speedbrakes.

(c) Move speedbrake lever to the DOWN position to lower the speedbrakes.

(5) Remove hydraulic power.

(6) Remove electrical power if no longer required.

SPOILER/SPEEDBRAKE CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR (PCA) - SPOILER POWER CONTROL	2	12	WING REAR SPAR OR MAIN LG BEAM	27-61-02
SPOILER 1 PCA, M306				
SPOILER 2 PCA, M307				
SPOILER 3 PCA, M308				
SPOILER 4 PCA, M309				
SPOILER 5 PCA, M310				
SPOILER 6 PCA, M311				
SPOILER 7 PCA, M312				
SPOILER 8 PCA, M313				
SPOILER 9 PCA, M314				
SPOILER 10 PCA, M315				
SPOILER 11 PCA, M316				
SPOILER 12 PCA, M317				
CIRCUIT BREAKER -	1		FLT COMPT, OVERHEAD PANEL, P11	
CSEU 1L AC, C1538 OR		1	11C6	
FLT CONT ELEC 1L AC, C1538				*
CSEU 1L DC, C1534 OR		1	11C7	
FLT CONT ELEC 1L DC, C1534				*
CSEU 1R AC, C1536 OR		1	11G17	
FLT CONT ELEC 1R AC, C1536				*
CSEU 1R DC, C1531 OR		1	11G18	
FLT CONT ELEC 1R DC, C1531				*
CSEU 2L AC, C1537 OR		1	11C8	
FLT CONT ELEC 2L AC, C1537				*
CSEU 2L DC, C1533 OR		1	11C9	
FLT CONT ELEC 2L DC, C1533				*
CSEU 2R AC, C1535 OR		1	11G27	
FLT CONT ELEC 2R AC, C1535				*
CSEU 2R DC, C1532 OR		1	11G28	
FLT CONT ELEC 2R DC, C1532				*
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
LIGHT - SPOILERS, L14	1	1	FLT COMPT, OVERHEAD PANEL, P5 AUX ANNUN PANEL, M10394	*
MODULE - (FIM 27-09-00/101)				
POWER SUPPLY 1L (PSM 1L), M536				
POWER SUPPLY 1R (PSM 1R), M538				
POWER SUPPLY 2L (PSM 2L), M537				
POWER SUPPLY 2R (PSM 2R), M532				
SPOILER CONTROL 1L (SCM 1L), M530	3	1		
SPOILER CONTROL 1R (SCM 1R), M533	3	1		
SPOILER CONTROL 2L (SCM 2L), M531	3	1		
SPOILER CONTROL 2R (SCM 2R), M534	3	1		
SPOILER CONTROL 3L (SCM 3L), M532	3	1		
SPOILER CONTROL 3R (SCM 3R), M535	3	1		
PANEL - (FIM 30-31-00/101)				
AUXILIARY ANNUNCIATOR, M10394				

* SEE THE WDM EQUIPMENT LIST

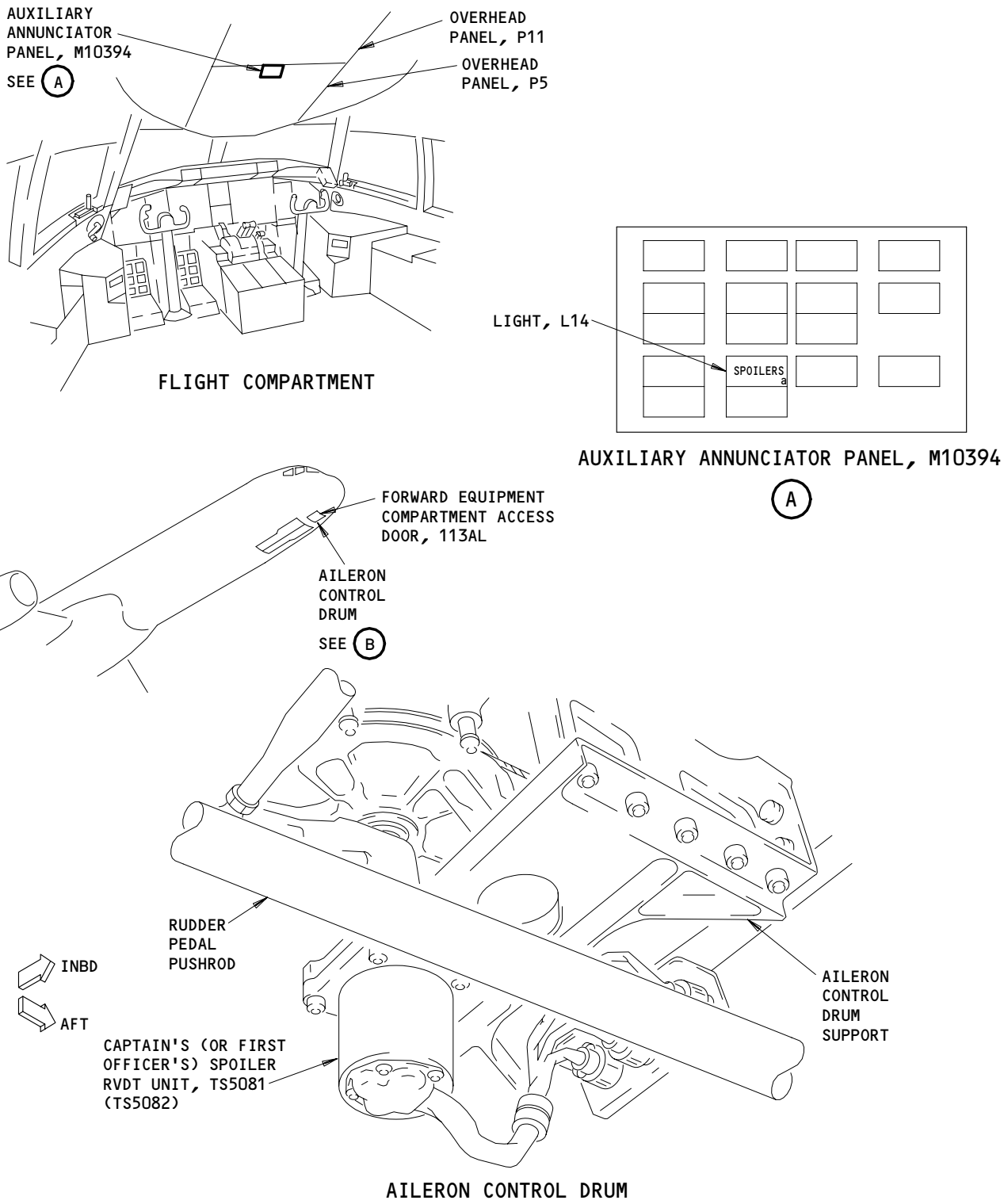
Spoiler/Speedbrake Control System - Component Index
Figure 101 (Sheet 1)

SPOILER/SPEEDBRAKE CONTROL SYSTEM

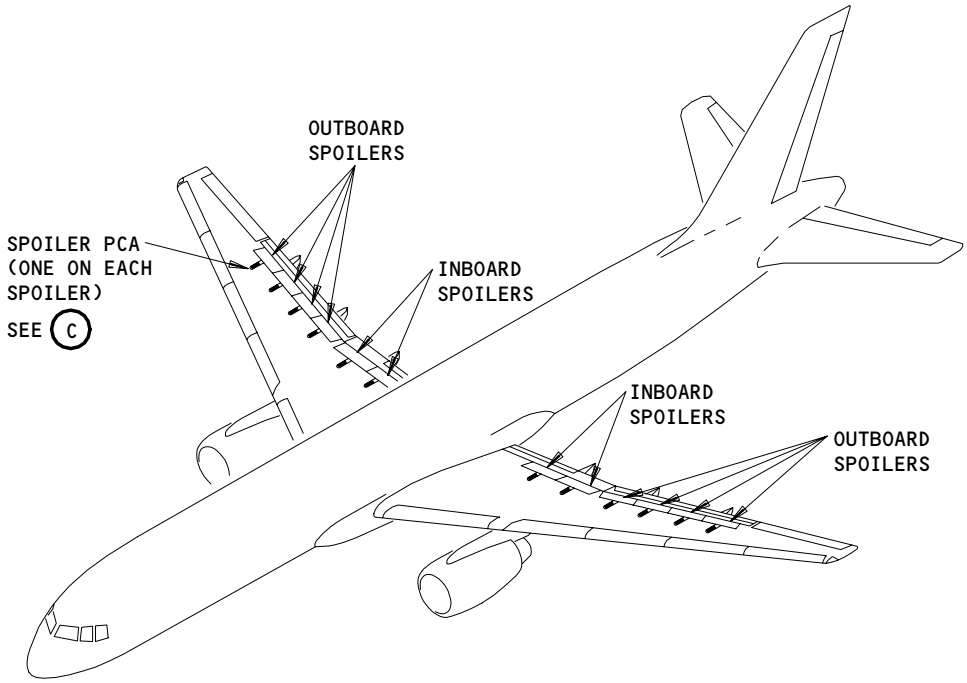
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SCREEN - SPOILER PCA FILTER	2	12	SPOILER PCA	27-61-02
SPOILER - INBOARD, 554,553,653,654	2	4	WING TRAILING EDGE	27-61-01
SPOILER - OUTBOARD, 565,564,563,562,662,663, 664,665	2	8	WING TRAILING EDGE	27-61-01
SWITCH - CENTER HYDRAULIC SYSTEM PRESSURE, S10002 (REF 29-11-00, FIG. 101)				
UNIT - CAPTAIN'S CONTROL WHEEL SPOILER TRANSDUCER (RVDT), TS5081	1	1	113AL, FWD EQUIP COMPT, AILERON CONTROL DRUM ASSEMBLY	27-61-04
UNIT - FIRST OFFICER'S CONTROL WHEEL SPOILER TRANSDUCER (RVDT), TS5082	1	1	113AL, FWD EQUIP COMPT, AILERON CONTROL DRUM ASSEMBLY	27-61-04
VALVE (EHSV) - SPOILER PCA ELECTROHYDRAULIC SERVO	2	12	SPOILER PCA	27-61-02

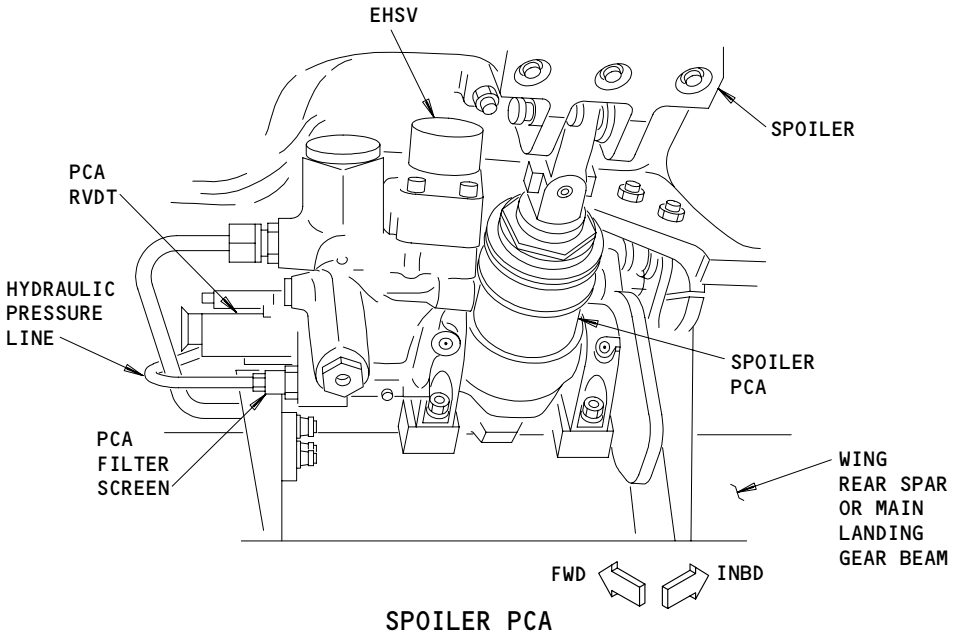
* SEE THE WDM EQUIPMENT LIST

Spoiler/Speedbrake Control System - Component Index
Figure 101 (Sheet 2)



Spoiler/Speedbrake Control System - Component Location
Figure 102 (Sheet 1)



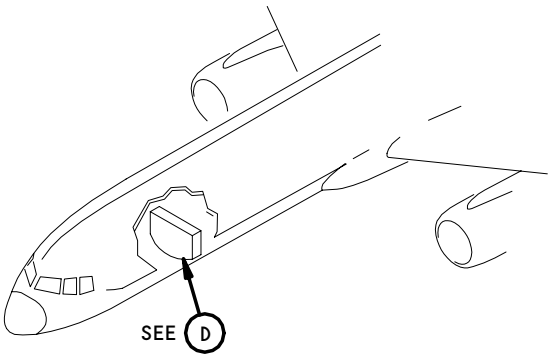


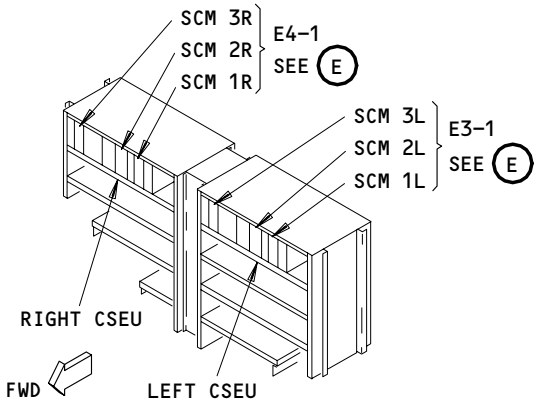
SPOILER PCA

C

NOTE: THE SPOILERS ARE NUMBERED 1 THRU 12 FROM THE OUTBOARD LEFT WING SPOILER TO THE OUTBOARD RIGHT WING SPOILER.

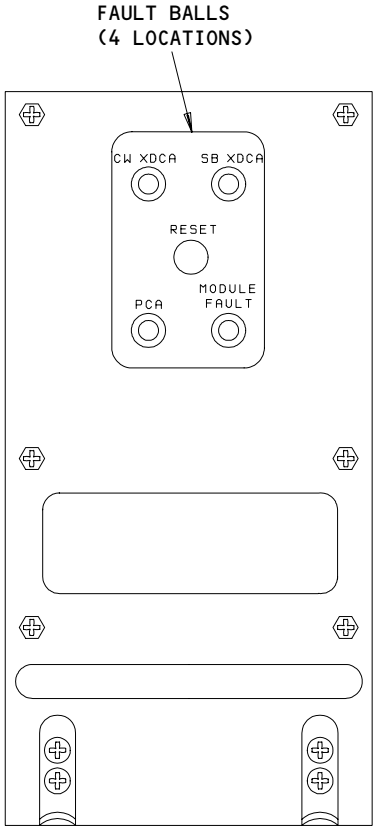
Spoiler/Speedbrake Control System - Component Location
Figure 102 (Sheet 2)





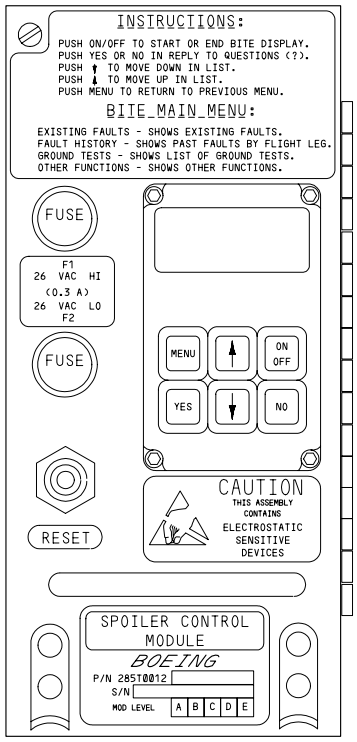
MAIN EQUIPMENT CENTER

D



SPOILER CONTROL MODULE

E 1



SPOILER CONTROL MODULE

E 2

1 -100 SERIES SCMs

2 -200 SERIES SCMs

Spoiler/Speedbreak Control System - Component Location
Figure 102 (Sheet 3)

A13098

SPOILER/SPEEDBRAKE CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the deactivation and activation tasks for the spoiler/speedbrake control system. These tasks are used to prevent accidental movement of the spoilers during maintenance.
   B. Use these procedures when you do maintenance near the spoilers or when you do maintenance that can cause the spoilers to operate.
   C. The spoiler/speedbrake system uses hydraulic power and is electrically controlled. Each of the twelve spoilers is moved by a power control actuator (PCA) that gets power from one of the three main hydraulic systems.
   D. The spoiler control modules (SCMs) control the spoiler movement and are connected to many airplane systems. If you do work on other systems, it is possible for the spoilers to move accidentally. Be very careful, because the spoilers move very quickly and can cause injury to persons or damage to equipment.
   E. The spoilers are numbered 1 thru 12 from the outboard left wing spoiler to the outboard right wing spoiler.

TASK 27-61-00-042-008

2. Spoiler/Speedbrake Deactivation
   A. General

   WARNING: BE VERY CAREFUL WHEN YOU DO MAINTANANCE NEAR THE SPOILER. THE SPOILERS WILL MOVE THROUGH THEIR FULL TRAVEL RANGE IN LESS THAN ONE SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) These are the Possible Dangers and the Applicable Spoiler/Speedbrake Deactivation Procedures:
         (a) The installation of PCA locks is the recommended procedure for spoiler deactivation. In some maintenance procedures you cannot install the PCA locks and you must use a different deactivation procedure. The data that follows will tell you how the spoilers operate and when to use a different deactivation procedure.
         (b) The spoilers will extend when you operate the reverse thrust levers if these conditions are satisfactory:

            - The speedbrake lever is in its down-and-locked position
            - Electrical power is on
            - Hydraulic power is on.

            To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Deactivate the Spoiler/Speedbrakes for Operation of the Forward or Reverse Thrust Levers" group of steps.

(c) The spoilers will extend when you move the forward thrust levers to less than 50% thrust if these conditions are satisfactory:

- The speedbrake lever is in its ARMED detent position
- Electrical power is on
- Hydraulic power is on.

To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Deactivate the Spoiler/Speedbrakes for Operation of the Forward or Reverse Thrust Levers" group of steps.

(d) The spoilers will retract when you move the forward thrust levers to more than 50% thrust if these conditions are satisfactory:

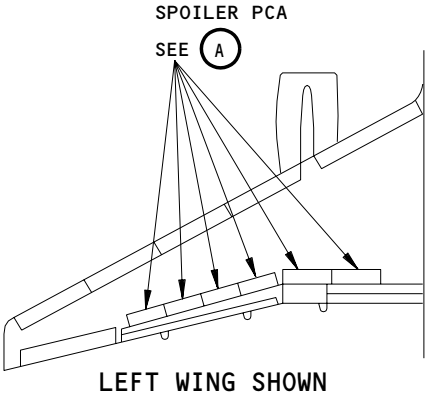
- The speedbrake lever is in its UP detent position
- Electrical power is on
- Hydraulic power is on.

To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Deactivate the Spoiler/Speedbrakes for Operation of the Forward or Reverse Thrust Levers" group of steps.

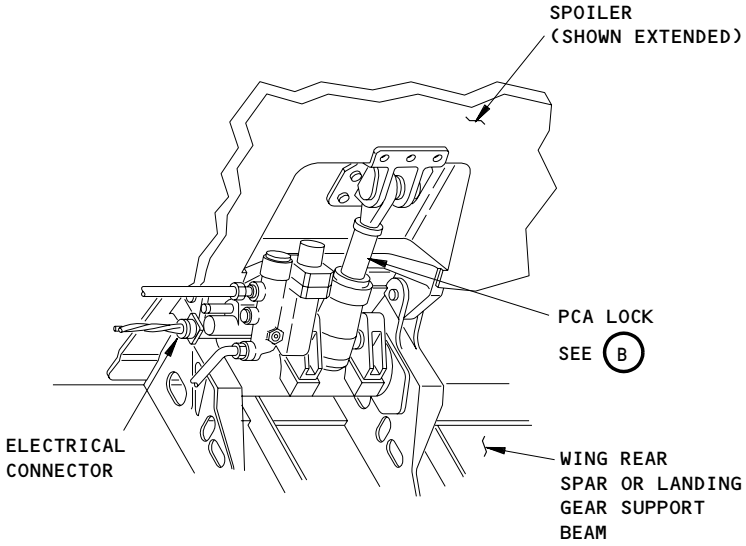
(e) Spoilers 4 and 9 will retract and the other spoilers will move down if you open an air/ground circuit breaker or simulate the air mode when these conditions are satisfactory:

- The speedbrake lever is in its UP detent position
- Electrical power is on
- Hydraulic power is on.

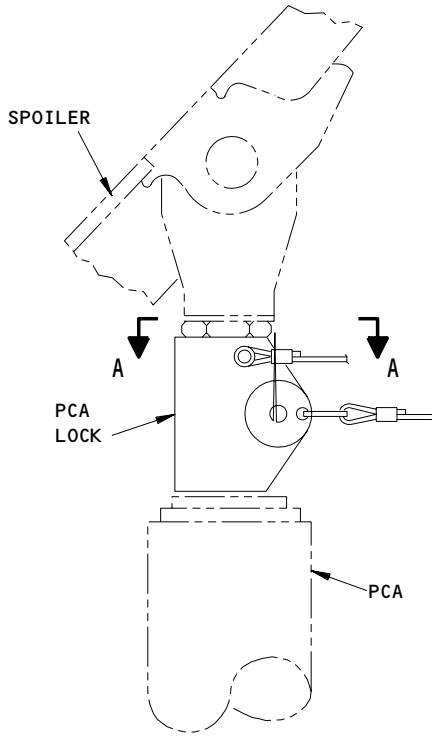
To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Spoiler/Speedbrake Deactivation When You Will Open the Air/Ground Circuit Breakers or Simulate the Air Mode" group of steps.



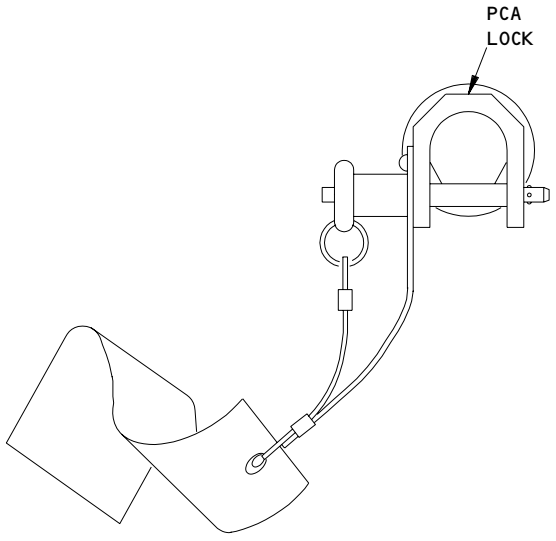
LEFT WING SHOWN
(RIGHT WING OPPOSITE)



SPOILER PCA
A



PCA LOCK
B



A-A

Spoiler Power Control Actuator (PCA) Lock Installation
Figure 201

(f) Spoilers 4 and 9 will move to their full up positions and the other spoilers will move up if you close the AIR/GND circuit breakers when these conditions are satisfactory:

- The speedbrake lever is in its Up detent position
- Electrical power is on
- Hydraulic power is on
- LANDING GEAR circuit breakers POS SYS 1 and SYS 2 are open
- AIR/GND circuit breakers SYS 1 and SYS 2 are open.

To prevent injury to persons or damage to equipment, do the "Install the PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Spoiler/Speedbrake Deactivation When You Will Open the Air/Ground Circuit Breakers or Simulate the Air mode" group of steps.

(g) The spoilers will retract when you open the CSEU circuit breakers or remove electrical power when these conditions are satisfactory:

- The speedbrake lever is in its UP detent position
- Electrical power is on
- Hydraulic power is on.

To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Spoiler/Speedbrake Deactivation When You Will Open the CSEU Circuit Breakers or Remove Electrical Power" group of steps.

(h) The spoilers will retract if you disconnect the electrical connector from a spoiler PCA when these conditions are satisfactory:

- The speedbrake lever is in its UP detent position
- Electrical power is on
- Hydraulic power is on.

To prevent injury to persons or damage to equipment, do the "Install PCA Locks to Deactivate the Spoiler/Speedbrakes" or the "Deactivate the Spoiler/Speedbrakes When You Will Disconnect the Electrical Connector From a PCA" group of steps.

B. Equipment
   (1) Spoiler Actuator Lock Set - B27007-15
C. References
   (1) 24-22-00/201, Electrical Power - Control
   (2) 27-51-00/201, Trailing Edge Flap System
   (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(4) 32-09-02/201, Air/Ground Relays
(5) 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

E. Install the PCA Locks to Deactivate the Spoiler/Speedbrakes (Fig. 201)

NOTE: This task puts the spoilers in their up position and holds them there during maintenance.

S 862-009
(1) Supply electrical power (Ref 24-22-00).

S 042-001

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 862-002

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-010
(4) Extend the trailing edge flaps.

S 042-011
(5) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 862-012
(6) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

S 212-013
(7) Make sure these circuit breakers on the P11 panel are closed:
(a) 11C30, LANDING GEAR POS SYS 1
(b) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC
(c) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC
(d) 11S15, AIR/GND SYS 1
(e) 11S19, AIR/GND SYS 2
(f) 11S23, POS SYS 2

S 212-014
(8) Make sure the control wheels are in their neutral positions.

S 862-015
(9) Move the speedbrake lever to its full UP position and attach a DO-NOT-OPERATE tag.

NOTE: The speedbrake lever must stay in its full UP position during this procedure.

S 862-016

(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 492-003

WARNING: MAKE SURE HYDRAULIC POWER IS NOT SUPPLIED TO THE SPOILER PCAS DURING THE PCA LOCK INSTALLATION. THE SPOILERS WILL RETRACT IN LESS THAT 1 SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

STOP AIRPLANE MAINTENANCE DURING THE SPOILER PCA LOCK INSTALLATION. DO NOT MOVE THE SPEEDBRAKE LEVER OR ENGINE THRUST LEVERS, OR OPEN THE CIRCUIT BREAKERS SHOWN ABOVE. THE SPOILERS WILL RETRACT IN LESS THAN 1 SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

IF YOU USE THE MANUAL RELEASE CAM TO LIFT THE SPOILER, THE SPOILER WILL RETRACT IMMEDIATELY IF HYDRAULIC POWER IS SUPPLIED TO THE PCA.

(11) Be careful, and install the PCA locks on all twelve spoiler PCAs.

NOTE: After hydraulic power is removed, the spoilers can move down a small distance. If it is necessary, operate the manual release cam (to release unwanted hydraulic pressure) and lift the spoilers to install the PCA locks.

S 862-017

WARNING: MAKE SURE THE TWELVE SPOILER LOCKS ARE INSTALLED ON THE TWELVE SPOILER PCAS. MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE SPOILERS BEFORE YOU CONTINUE THIS PROCEDURE. ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(12) Supply pressure to the left hydraulic system (Ref 29-11-00).

S 862-018

(13) Retract the trailing edge flaps if it is necessary for maintenance (Ref 27-51-00).

S 862-019

(14) Remove hydraulic power if it is necessary for maintenance (Ref 29-11-00).

S 862-020

CAUTION: MAKE SURE YOU REMOVE HYDRAULIC POWER BEFORE YOU REMOVE ELECTRICAL POWER OR OPEN ONE OF THE CIRCUIT BREAKERS SHOWN ABOVE. SPOILERS WITH HYDRAULIC POWER WILL TRY TO RETRACT AND CAN CAUSE DAMAGE TO THE SPOILERS.

(15) Remove electrical power if it is necessary for maintenance (Ref 24-22-00).

NOTE: Because the spoilers are in their up positions, the spoiler/speedbrake system will be set to off when you remove electrical power. The SPOILERS light on the overhead panel, P5, will come on and the amber SPOILERS message will show on the top EICAS display. Also, the SCM faultballs will be yellow.

F. Deactivate the Spoiler/Speedbrakes for Operation of the Forward or Reverse Thrust Levers

NOTE: Use this procedure to prevent spoiler movement when you move the forward or reverse thrust levers.

S 862-021

WARNING: MAKE SURE THE SPEEDBRAKE LEVER IS IN ITS DOWN-AND-LOCKED POSITION AND THE SPEEDBRAKE CIRCUIT BREAKER IS OPEN BEFORE YOU OPERATE THE THRUST LEVERS. ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Move the speedbrake lever to its down-and-locked position.

S 862-022
(2) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

S 212-023
(3) Make sure all persons and equipment are away from the spoilers.

S 862-024
(4) Move the forward thrust levers if it is necessary for maintenance.

S 862-025
(5) Move the reverse thrust levers if it is necessary for maintenance.

G. Spoiler/Speedbrake Deactivation When You Will Open the CSEU Circuit Breakers or Remove Electrical Power

NOTE: This procedure makes sure the spoilers do not retract when you remove electrical power or open the CSEU circuit breakers.

S 862-026

WARNING: MAKE SURE THE SPEEDBRAKE LEVER IS IN ITS DOWN-AND-LOCKED POSITION BEFORE YOU OPEN THE CSEU CIRCUIT BREAKERS OR REMOVE ELECTRICAL POWER. THE SPOILERS WILL RETRACT IN LESS THAN ONE SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Move the speedbrake lever to its down-and-locked position.

S 862-027
(2) If it is necessary, open these circuit breaker(s) on the P11 panel and attach DO-NOT-CLOSE tags:
(a) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC

(b) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

S 862-028

(3) Remove electrical power if it is necessary for maintenance (Ref 24-22-00).

H. Spoiler/Speedbrake Deactivation When You Will Open the Air/Ground Circuit Breakers or Simulate the Air Mode

NOTE: This procedure prevents spoiler movement when you change the air/ground logic system.

S 862-029

WARNING: MAKE SURE THE SPEEDBRAKE LEVER IS IN ITS DOWN-AND-LOCKED POSITION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS OR SIMULATE THE AIR MODE. ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Move the speedbrake lever to its down-and-locked position.

S 862-004

(2) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

S 862-030

(3) If it is necessary, open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C30, LANDING GEAR POS SYS 1

(b) 11S23, POS SYS 2
(c) 11S13, AIR/GND SYS 1
(d) 11S19, AIR/GND SYS 2

S 862-031

(4) Simulate the air mode if it is necessary for maintenance (Ref 32-09-02).

I. Deactivate the Spoiler/Speedbrakes When You Will Disconnect the Electrical Connector From a PCA

NOTE: This procedure prevents spoiler retraction when an electrical connector is disconnected from a spoiler PCA.

S 862-032

WARNING: MAKE SURE THE SPEEDBRAKE LEVER IS IN ITS DOWN-AND-LOCKED POSITION BEFORE YOU DISCONNECT AN ELECTRICAL CONNECTOR FROM A SPOILER PCA. THE SPOILERS WILL RETRACT IN LESS THAN ONE SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Move the speedbrake lever to its down-and-locked position.

S 862-033

(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC

(b) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

S 862-034

(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 032-035

(4) Disconnect the spoiler PCA electrical connectors as necessary for maintenance.

TASK 27-61-00-442-036

3. Spoiler/Speedbrake Activation

A. General

WARNING: BE VERY CAREFUL WHEN YOU DO MAINTANANCE NEAR THE SPOILER. THE SPOILERS WILL MOVE THROUGH THEIR FULL TRAVEL RANGE IN LESS THAN ONE SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) This task contains procedures to activate the spoilers after you have done the applicable deactivation procedure and the necessary airplane maintenance.

B. References

(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/201, Trailing Edge Flap System
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-09-02/201, Air/Ground Relays
(5) 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

D. Remove the PCA Locks to Activate the Spoiler/Speedbrakes

NOTE: Do these steps if you did the "Install the PCA Locks to Deactivate the Spoiler/Speedbrakes" group of steps to deactivate the spoilers.

S 862-037

(1) Supply electrical power (Ref 24-22-00).

S 212-038

(2) Make sure these conditions are satisfactory:
  (a) Make sure the SPOILERS light on the overhead panel, P5, is off.
  (b) Make sure the amber SPOILERS message does not show on the top EICAS display.
  (c) Make sure the faultballs on the spoiler control modules (SCMs) are black.

S 822-039

(3) Do these steps if the above conditions are not satisfactory:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

  (a) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).
  (b) Move the speedbrake lever to its full upstop position.
  (c) Open these circuit breakers on the overhead panel, P11:
    1) GUI 115;
      11C6, CSEU 1L AC
      11C7, CSEU 1L DC
      11C8, CSEU 2L AC
      11C9, CSEU 2L DC
      11G17, CSEU 1R AC
      11G18, CSEU 1R DC
      11G27, CSEU 2R AC
      11G28, CSEU 2R DC

2) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

(d) Close the P11 panel circuit breakers shown above.
(e) Push the RESET switch on each of the six SCMs.

S 212-040
(4) Make sure these circuit breakers on the P11 panel are closed:

(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S15, AIR/GND SYS 1
(c) 11S19, AIR/GND SYS 2
(d) 11S23, GEAR POS SYS 2

S 862-005

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-041
(6) Extend the trailing edge flaps.

S 042-042
(7) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 212-043

(8) Make sure the control wheels are in their neutral positions.

S 862-044

(9) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 092-006

WARNING: MAKE SURE HYDRAULIC POWER IS NOT SUPPLIED TO THE SPOILER PCAS DURING THE PCA LOCK REMOVAL. THE SPOILERS WILL RETRACT IN LESS THAT 1 SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

STOP AIRPLANE MAINTENANCE DURING THE SPOILER PCA LOCK REMOVAL. DO NOT MOVE THE SPEEDBRAKE LEVER OR ENGINE THRUST LEVERS, OR OPEN THE CIRCUIT BREAKERS SHOWN ABOVE. THE SPOILERS WILL RETRACT IN LESS THAN 1 SECOND AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

IF YOU USE THE MANUAL RELEASE CAM TO LIFT THE SPOILER, THE SPOILER WILL RETRACT IMMEDIATELY IF HYDRAULIC POWER IS SUPPLIED TO THE PCA.

(10) Be very careful, and remove the spoiler PCA locks from all twelve spoiler PCAs.

NOTE: When you remove hydraulic power, the spoilers can move down a small distance. If it is necessary, use the manual release cam to lift the spoiler and remove the PCA lock.

S 862-007

WARNING: MAKE SURE THAT ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE SPOILERS BEFORE YOU CONTINUE THIS PROCEDURE. ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-045
(12) Move the speedbrake lever to its down-and-locked position.

S 862-046
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 442-047
(14) Do the activation procedure for the thrust reverser (Ref 78-31-00).

S 862-048
(15) Retract the trailing edge flaps (Ref 27-51-00).

S 862-049
(16) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-050
(17) Remove electrical power if it is not necessary (Ref 24-22-00).

E. Activate the Spoiler/Speedbrakes After Operation of the Forward or Reverse Thrust Levers

NOTE: Do these steps if you did the "Deactivate the Spoilers/Speedbrakes for Operation of the Forward or Reverse Thrust Levers" group of steps to deactivate the spoilers.

S 862-051
(1) Move the forward thrust levers to their IDLE positions.

S 862-052
(2) Move the reverse thrust levers to their OFF positions.

S 212-053
(3) Make sure the speedbrake lever is in its down-and-locked position.

S 862-054

(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:

(a) 11G11, AUTO SPEEDBRAKE

F. Spoiler/Speedbrake Activation After You Open the CSEU Circuit Breakers or Remove Electrical Power

NOTE: Do these steps if you did the "Spoiler/Speedbrake Deactivation When You Will Open the CSEU Circuit Breakers or Remove Electrical Power" group of steps to deactivate the spoilers.

S 862-055

(1) Supply electrical power (Ref 24-22-00).

S 212-056

(2) Remove the DO-NOT-CLOSE tags and make sure these circuit breakers on the P11 panel are closed:

(a) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC

(b) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

G. Spoiler/Speedbrake Activation After You Open the Air/Ground Circuit Breakers or Simulate the Air Mode

NOTE: Do these steps if you did the "Spoiler/Speedbrake Deactivation When You Will Open the Air/Ground Circuit Breakers or Simulate the Air Mode" group of steps to deactivate the spoilers.

S 212-057

(1) Make sure the speedbrake lever is in its down-and-locked position.

S 862-058

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11C30, LANDING GEAR POS SYS 1
   (b) 11S23, POS SYS 2
   (c) 11S13, AIR/GND SYS 1
   (d) 11S19, AIR/GND SYS 2

S 862-059

(3) Remove the air mode simulation (Ref 32-09-02).

S 862-060

(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
   (a) 11G11, AUTO SPEED BRAKE

H. Spoiler/Speedbrake Activation After You Disconnect an Electrical Connector From a Spoiler PCA

NOTE: Do these steps if you did the "Deactivate the Spoiler/Speedbrakes When You Will Disconnect the Electrical Connector from a PCA" group of steps to deactivate the spoilers.

S 212-066

(1) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 212-061
(2) Make sure these circuit breakers on the P11 panel are open:
(a) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC
(b) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

S 432-062
(3) Connect the electrical connector to the PCA.

S 212-063
(4) Make sure the spoiler and its PCA are retracted.

S 212-064
(5) Make sure the speedbrake lever is in its down-and-locked position.

S 862-065
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) GUI 115;
11C6, CSEU 1L AC
11C7, CSEU 1L DC
11C8, CSEU 2L AC
11C9, CSEU 2L DC
11G17, CSEU 1R AC
11G18, CSEU 1R DC
11G27, CSEU 2R AC
11G28, CSEU 2R DC

(b) ALL EXCEPT GUI 115;
11C6, FLT CONT ELEC 1L AC
11C7, FLT CONT ELEC 1L DC
11C8, FLT CONT ELEC 2L AC
11C9, FLT CONT ELEC 2L DC
11G17, FLT CONT ELEC 1R AC
11G18, FLT CONT ELEC 1R DC
11G27, FLT CONT ELEC 2R AC
11G28, FLT CONT ELEC 2R DC

SPOILER/SPEEDBRAKE CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains the operational test, the adjustment, and the system test tasks for the spoiler/speedbrake control system. Refer to 27-62-00/501 for the applicable adjustment and test data for the auto-speedbrake control system.

TASK 27-61-00-715-409

2. Operational Test - Spoiler/Speedbrake Control System
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-00/201, Trailing Edge Flap System
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-09-02/201, Air/Ground Relays
      (5) 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

   C. Prepare for the Test

      S 865-021
      (1) Supply electrical power (Ref 24-22-00).

      S 865-022
      (2) Move the STBY POWER switch on the overhead panel, P5, to the AUTO position.

      S 865-023
      (3) Retract the trailing edge flaps.

      S 045-024
      (4) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

      S 865-025
      (5) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11G11, AUTO SPEED BRAKE

S 045-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(6) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 865-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 215-026

(8) Make sure the control wheels are in their neutral positions.

S 215-410

(9) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

D. Spoiler/Speedbrake Control System - Test

S 865-027

(1) Move the speedbrake lever to its ARMED position.

S 215-028

(2) Do these steps three times:
(a) Slowly move the speedbrake lever from its ARMED position to a position that is approximately one-half of its full travel. Do this check:
1) Make sure the spoilers move up.
(b) Move the lever back to its ARMED position and do this check:
1) Make sure the spoilers move to their full down positions.

S 215-029

(3) Do these steps three times:
(a) Slowly move the speedbrake lever from its ARMED position to its full upstop position and do this check:
1) Make sure the spoilers move to their full up positions.
(b) Slowly move the speedbrake lever from its full upstop position to its ARMED position and do this check:
1) Make sure the spoilers move to their full down positions.

S 215-030

(4) Move the speedbrake lever back to its down-and-locked detent position and do these steps:
   (a) Make sure the spoilers move to their full down positions.
   (b) Stop for 30 seconds.
   (c) Make sure the amber SPOILERS light on the P5 panel is off.
   (d) Push the ECS/MSG switch on the right side panel, P61, and do this check:
      1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

E. Control Wheel Inputs and Spoiler Operation - Test

S 215-031

(1) Make sure the speedbrake lever is in its down-and-locked detent position.

S 045-006

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the deactivation procedure for flight mode simulation and put the air/ground relay system in air mode (AMM 32-09-02/201).

S 215-033

(3) Turn the control wheel counterclockwise and do these checks:
   (a) Make sure spoilers 1, 2, 3, 5, and 6 move up.

      NOTE: The spoilers are numbered 1 thru 12 from the outboard left wing spoiler to the outboard right wing spoiler.

   (b) Make sure spoilers 4 and 7 thru 12 stay down.

S 215-034

(4) Turn the control wheel clockwise and do these checks:
   (a) Make sure spoilers 7, 8, and 10 thru 12 move up.
   (b) Make sure spoilers 9 and 1 thru 6 stay down.

S 215-035
(5) Move the control wheel back to its neutral position and do these steps:
(a) Stop for 30 seconds.
(b) Make sure the amber SPOILERS light on the P5 panel is off.
(c) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

F. Speedbrake Lever Inputs and Spoiler Operation in the Air Mode - Test

S 215-036
(1) Move the speedbrake lever to its ARMED position and do this check:
(a) Make sure all the spoilers stay in their down positions.

S 215-037
(2) Slowly move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 1 thru 3, 5 thru 8, and 10 thru 12 move up.
(b) Make sure spoilers 4 and 9 stay in their down positions.

S 215-038
(3) Move the speedbrake lever to its down-and-locked detent position and do these steps:
(a) Make sure spoilers 1 thru 3, 5 thru 8, and 10 thru 12 go back to their down positions.
(b) Stop for 30 seconds.
(c) Make sure the amber SPOILERS light on the P5 panel is off.

G. Control Wheel and Speedbrake Lever Inputs for Spoiler Operation in the Ground Mode - Test

S 215-571
(1) Do the procedure for the ground mode (AMM 32-09-02/201).

S 865-040
(2) Stop for 30 seconds.

S 215-041
(3) Move the speedbrake lever to its ARMED position and do this check:
(a) Make sure all the spoilers are in their down positions.

S 215-042
(4) Slowly move the speedbrake lever to its full upstop position and do this check:
(a) Make sure all the spoilers move up.

S 215-043
(5) Slowly turn the control wheel to its full clockwise position and do these checks:
(a) Make sure spoilers 1 thru 3, 5, and 6 move down.
(b) Make sure spoilers 4 and 7 thru 12 stay up.

S 215-044
(6) Slowly turn the control wheel back to its neutral position and do this check:
(a) Make sure spoilers 1 thru 3, 5, and 6 move up.

S 215-045
(7) Slowly move the control wheel to its full counterclockwise position and do these checks:
(a) Make sure spoilers 9 and 1 thru 6 stay up.
(b) Make sure spoilers 7, 8, and 10 thru 12 move down.

S 215-046
(8) Slowly move the control wheel to its neutral position and do this check:
(a) Make sure spoilers 7, 8, and 10 thru 12 move up.

S 215-047
(9) Move the speedbrake lever to its ARMED position and do this check:
(a) Make sure all the spoilers move to their full down positions.

S 215-048
(10) Move the speedbrake lever to its down-and-locked detent position and do these steps:
(a) Stop for 30 seconds.
(b) Make sure the amber SPOILERS light on the P5 panel is off.
(c) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

H. Spoiler Operation With a Hydraulic Pressure Failure - Test

S 865-049
(1) Remove the power from the left hydraulic system (Ref 29-11-00).

S 215-050
(2) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for 8 seconds.
(b) Make sure spoilers 1, 2, 4, 6, 7, 9, 11, and 12 move up.
(c) Make sure spoilers 3, 5, 8, and 10 stay in their down positions.
(d) Make sure the amber SPOILERS light on the P5 panel is on.
(e) Make sure the amber SPOILERS message shows on the top EICAS display.

S 865-051
(3) Move the speedbrake lever back to its down-and-locked detent position.

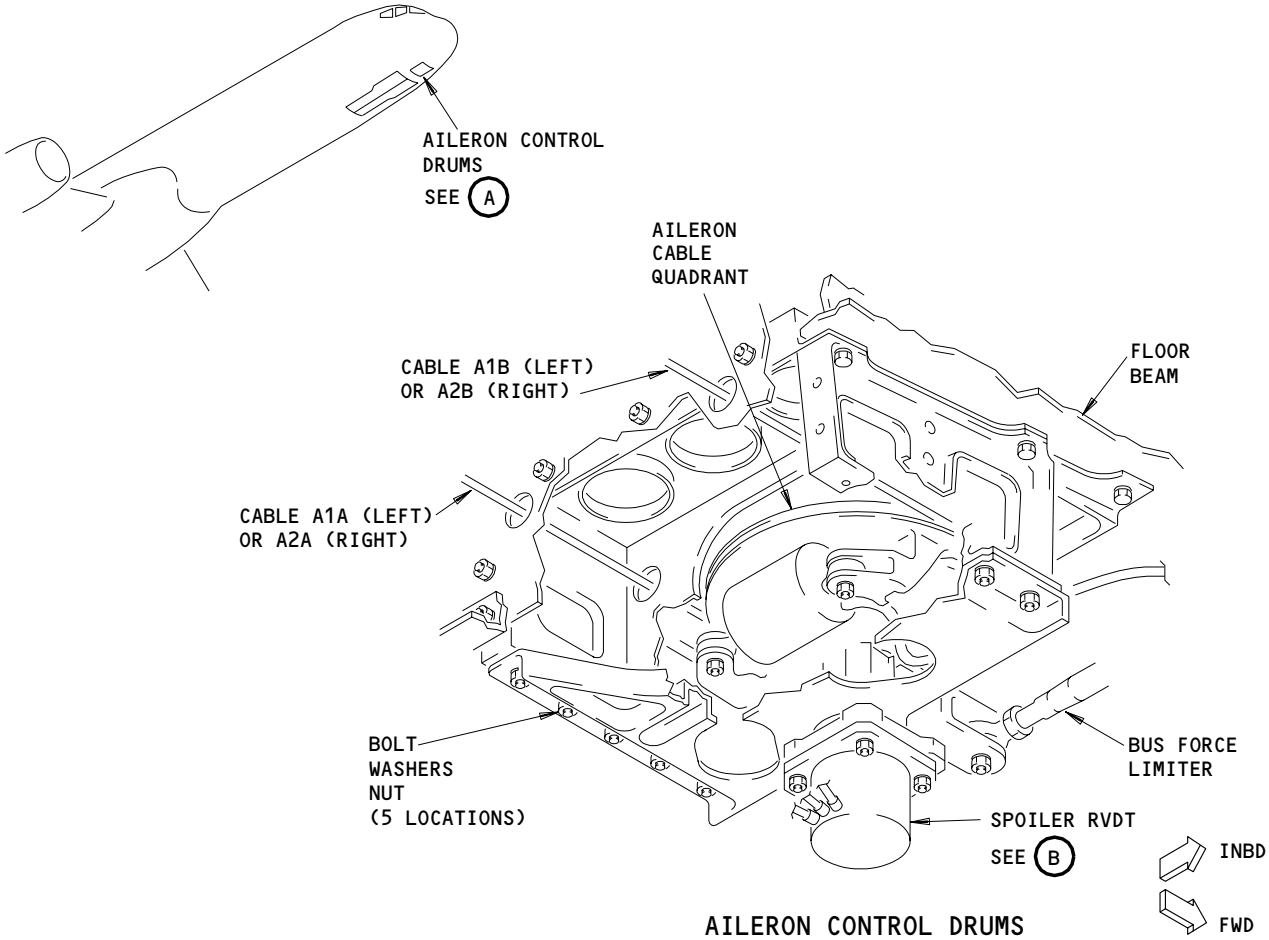
S 215-052
(4) Supply pressure to the left hydraulic system (Ref 29-11-00) and do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 865-053
(5) Remove the power from the right hydraulic system (Ref 29-11-00).

S 215-054
(6) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for 8 seconds.
(b) Make sure spoilers 1, 3, 5, 8, 10, and 12 move up.
(c) Make sure spoilers 2, 4, 6, 7, 9, and 11 stay in their down positions.
(d) Make sure the amber SPOILERS light on the P5 panel is on.
(e) Make sure the amber SPOILERS message shows on the top EICAS display.

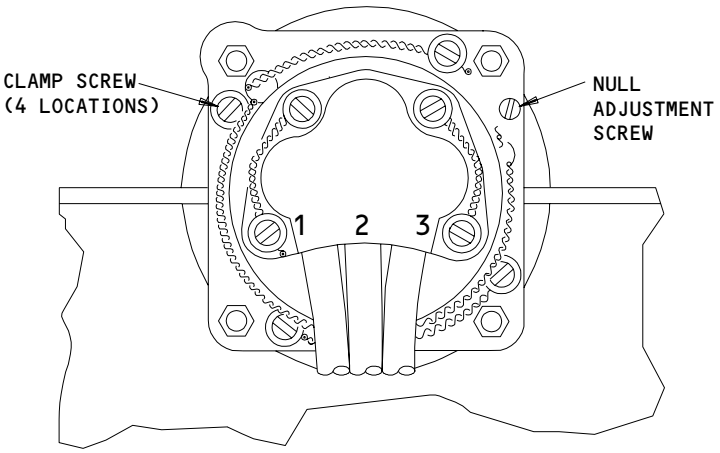
S 865-055
(7) Move the speedbrake lever back to its down-and-locked detent position.

S 215-056
(8) Supply pressure to the right hydraulic system (Ref 29-11-00) and do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Make sure the amber SPOILERS message does not show on the top EICAS display.



AILERON CONTROL DRUMS
(EXAMPLE)

A



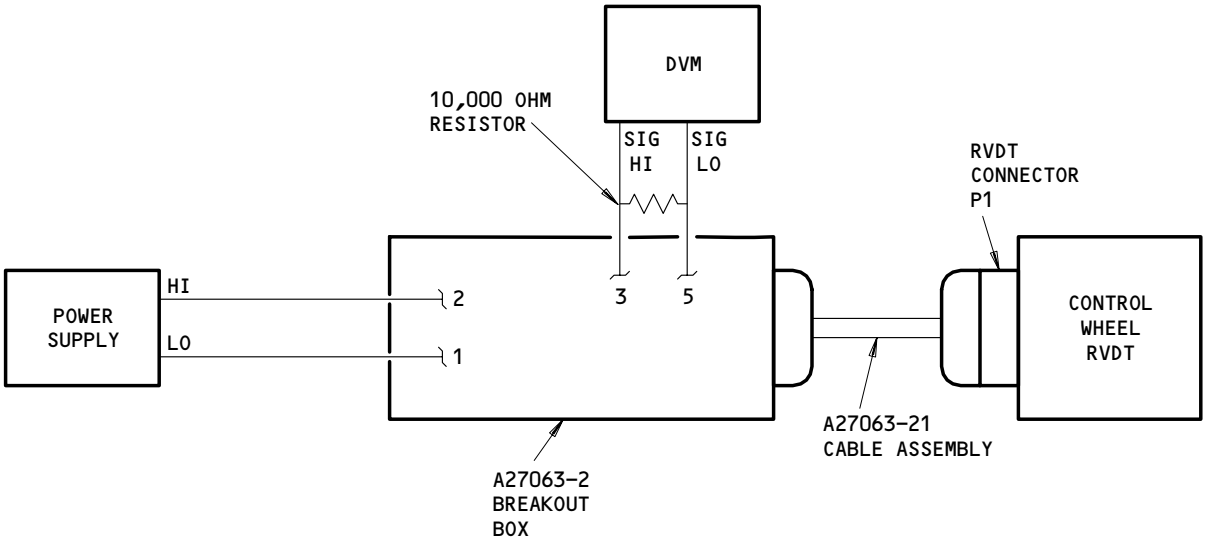
SPOILER RVDT

B

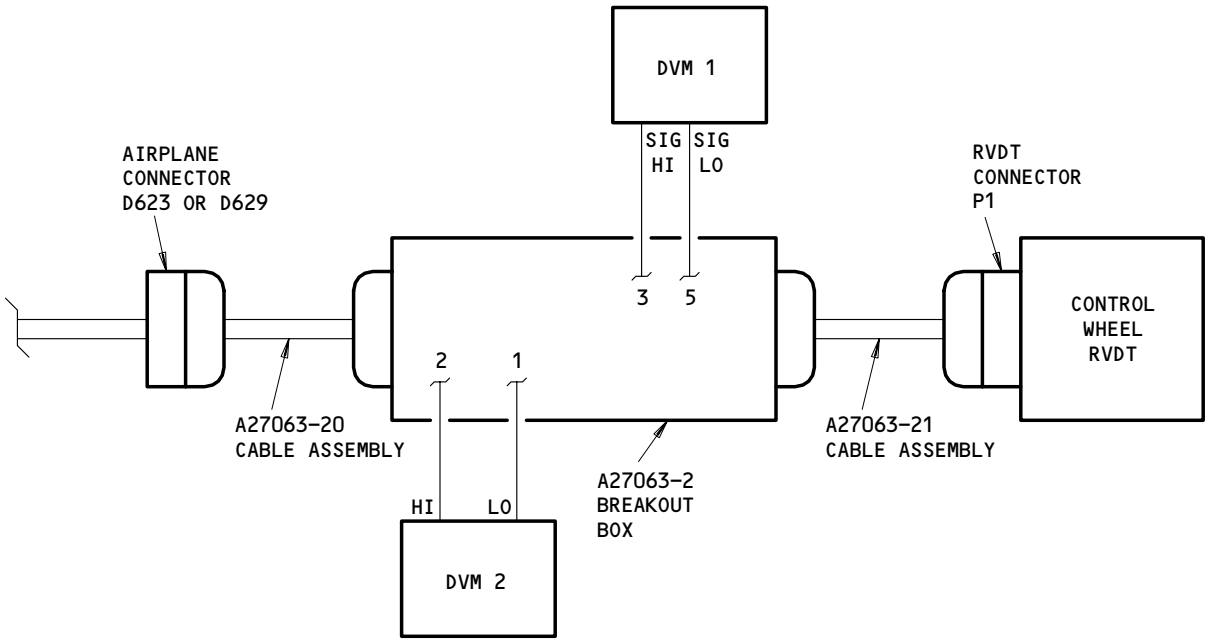
NOTE: THE CAPTAIN'S DRUM ASSEMBLY IS SHOWN.
THE FIRST OFFICER'S DRUM ASSEMBLY IS EQUIVALENT.

Control Wheel Spoiler RVDTs Adjustment
Figure 501 (Sheet 1)

54035



PROCEDURE 1



LEGEND

DVM - DIGITAL VOLTMETER

PROCEDURE 2

NOTE: IF ONLY ONE DVM IS USED, MONITOR THE AIRPLANE POWER AS SHOWN (DVM 2). THEN CONNECT IT TO THE BREAKOUT BOX AS SHOWN (DVM 1) TO DO THE ADJUSTMENT.

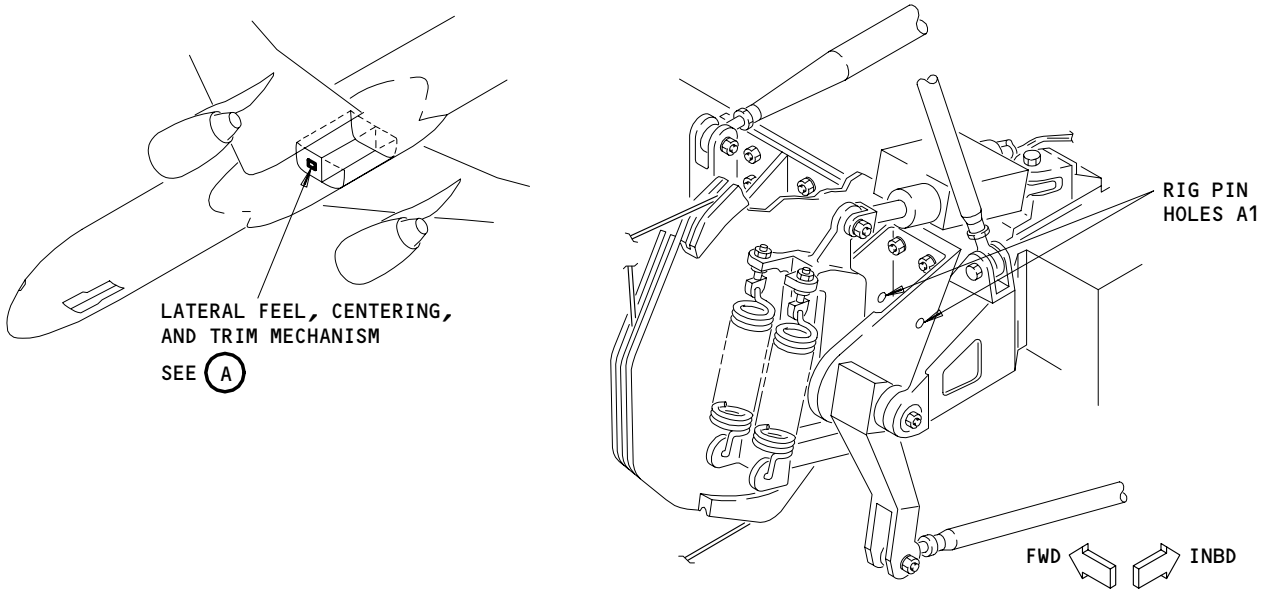
Control Wheel Spoiler RVDTs Adjustment
Figure 501 (Sheet 2)

S 865-057
(9) Remove the power from the center hydraulic system (Ref 29-11-00).

S 215-058
(10) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for 8 seconds.
(b) Make sure spoilers 2 thru 11 move up.
(c) Make sure spoilers 1 and 12 stay in their down positions.
(d) Make sure the amber SPOILERS light on the P5 panel is on.
(e) Make sure the amber SPOILERS message shows on the top EICAS display.

S 865-059
(11) Move the speedbrake lever back to its down-and-locked detent position.

S 215-060
(12) Supply pressure to the center hydraulic system (Ref 29-11-00) and do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Make sure the amber SPOILERS message does not show on the top EICAS display.



Rig Pin Location
Figure 502

S 215-061
(13) Make sure none of the six spoiler control modules (SCMs) have a fault.

NOTE: The six SCMs are found on the E3-1 and the E4-1 shelves in the main equipment center.

(a) For -100 Series SCMs,
make sure all the faultballs are black.
(b) For -200 Series SCMs,
make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX?, do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

I. Ground Speedbrake Delay - Test

S 045-005

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for flight mode simulation and put the air/ground relay system in air mode (AMM 32-09-02/201).

S 215-063
(2) Move the speedbrake lever to a position that is one-half of its full travel and do this check:
(a) Make sure all the flight spoilers extend to approximately one-half of full travel.

NOTE: Spoilers 4 and 9 will stay in their down positions.

S 215-572
(3) Do the procedure for the ground mode (AMM 32-09-02/201).

S 225-077
(4) Make sure spoilers 2, 3, 10, and 11 move to their full down positions. After 1.0 to 1.5 seconds, make sure these spoilers go back to approximately one-half of their full travel positions.

S 215-078
(5) Move the speedbrake lever to its down-and-locked detent position and do these steps:
(a) Make sure the SPOILERS light on the P5 panel is off.

NOTE: Ignore the white SPOILERS message on the bottom EICAS display.

NOTE: FOR -100 SERIES SCMs:
Ignore the yellow MODULE faultball on SCMs 1R and 2R.

(b) Push the RESET switch on the six SCMs.

J. Put the Airplane Back to Its Usual Condition

S 215-079
(1) Make sure the control wheels are in their neutral positions.

S 215-080
(2) Make sure the speedbrake lever is in its down-and-locked detent position.

S 865-081
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 865-082
(4) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 445-083
(5) Do the activation procedure for the thrust reverser (Ref 78-31-00).

S 865-084
(6) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-61-00-825-085

3. Adjustment - Spoiler/Speedbrake Control System

A. General

(1) Before you adjust the spoiler/speedbrake control system, make sure the trailing edge flap system and the auto-speedbrake system are adjusted correctly. Refer to 27-51-00/501 for the adjustment procedure for the trailing edge flaps. Refer to 27-62-00/501 for the adjustment procedure for the auto-speedbrake system.

(2) Make sure the airplane is on its landing gear when you adjust the spoiler/speedbrake system.

B. Equipment

(1) Breakout Box, Cables - A27063-91 (Preferred)
Position Transmitter Tester - PTTS-892B
(Alternate)
Phase Synchronous Voltmeter - 101-ACX
(Alternate)

(2) 10,000 ohm Resistor, Commercially Available

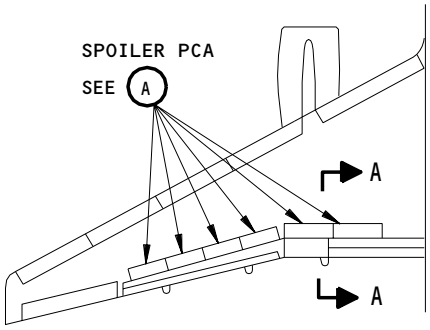
(3) Digital Voltmeter (DVM) - John Fluke 8020B (control wheel RVDT adjustment PROCEDURE 1, 2 or 4; spoiler PCA RVDT adjustment PROCEDURE 3), John Fluke Manufacturing Co. Inc., Everett, Washington

(4) Power Supply - Powertron Model 5900 (control wheel RVDT adjustment PROCEDURE 1; spoiler PCA RVDT adjustment PROCEDURE 1), Industrial Test Equipment Corp., Port Washington, New York

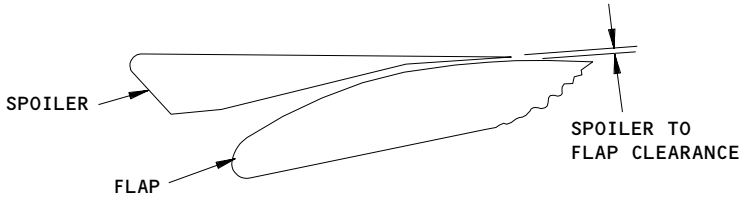
(5) Digital Phase Angle Voltmeter (PAV) - North Atlantic Instruments Model 2250 (spoiler PCA RVDT adjustment PROCEDURE 1 or 3); 170 Wilbur Place, Bohemia, New York; Tel: 516-567-1100

(6) Ratiometric PAV - North Atlantic Model 225-400-400R30 (spoiler PCA RVDT adjustment PROCEDURE 2), North Atlantic Industries Inc., Hauppauge, New York

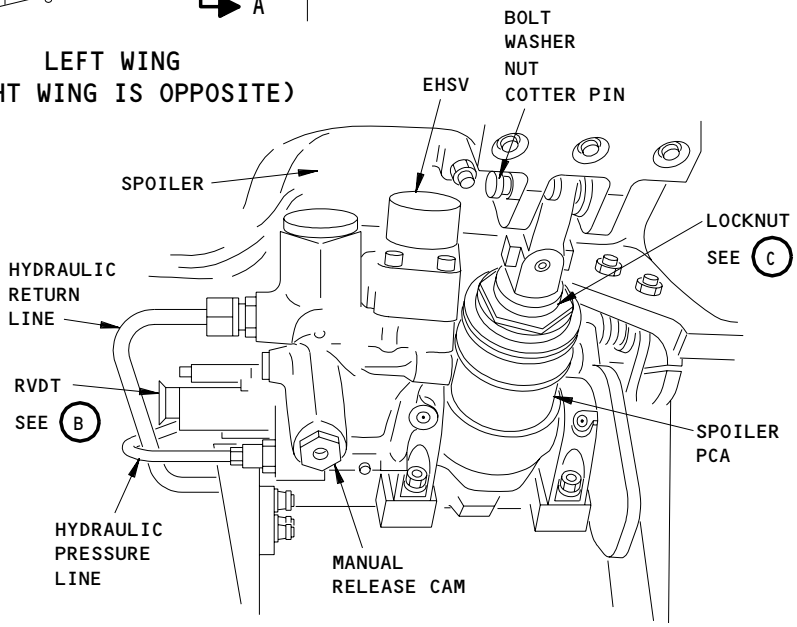
(7) Phase Synchronous Voltmeter - Model 101A (control wheel RVDT adjustment PROCEDURE 3, spoiler PCA RVDT adjustment PROCEDURE 5), Electronic Aviation Systems, Renton, Washington



LEFT WING
(RIGHT WING IS OPPOSITE)

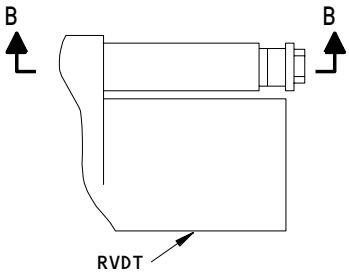


(AN EXAMPLE FOR ALL SPOILERS)
A-A

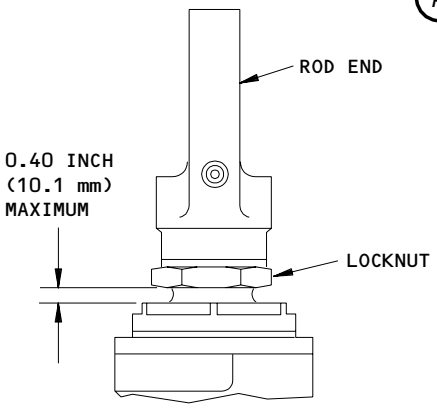


NOTE: THE ELECTRICAL CONNECTOR IS BEHIND THE RVDT.

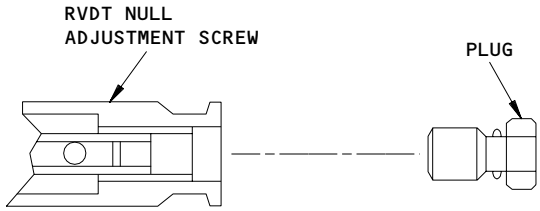
SPOILER POWER CONTROL ACTUATOR (PCA)
A



RVDT
B



LOCKNUT
C



B-B

Spoiler PCA Adjustment
Figure 503

(8) Rig Pin, A1 - P/N B20003-27, part of set B20003-XX (Ref 20-10-24)
(9) Masking Tape, Commercially Available
(10) Tape Measure or Scale - Accurate to 0.001 inch, Commercially Available

C. Consumable Materials
(1) A00250 Compound Sealant - BMS 5-26 Class B.

D. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 20-10-24/201, Rig Pins
(3) 24-22-00/201, Electrical Power - Control
(4) 27-09-00/201, Flight Control System Electronics Unit (CSEU)
(5) 27-11-00/501, Aileron and Aileron Trim Control System
(6) 27-51-00/201, Trailing Edge Flap System
(7) 27-51-00/501, Trailing Edge Flap System
(8) 27-62-00/501, Auto-Speedbrake Control System
(9) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(10) 32-00-15/201, Landing Gear Door Locks
(11) 32-00-20/201, Landing Gear Downlocks
(12) 78-31-00/201, Thrust Reverser System
(13) FIM 27-61-00/101, Spoiler/Speedbrake Control System

E. Access
(1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

(2) Access Panel

113AL	Flight Control Components

F. Prepare for the Adjustment

S 865-086
(1) Supply electrical power (Ref 24-22-00).

S 215-087
(2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 495-007

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 215-088

(4) Make sure the speedbrake lever is in its down-and-locked detent position.

S 865-089

(5) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

S 045-001

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(6) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 865-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

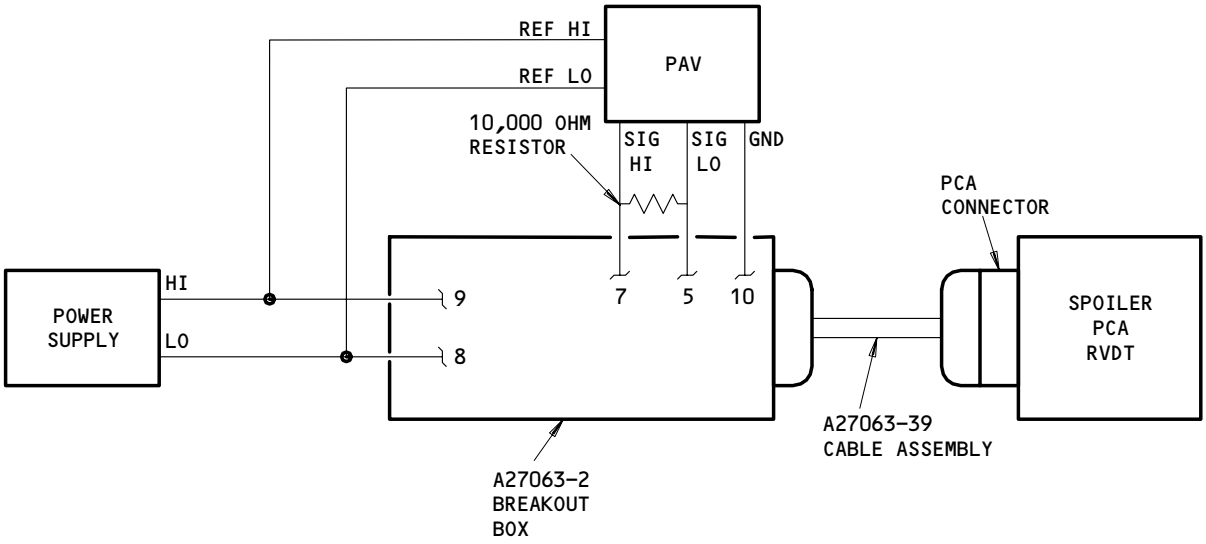
(7) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 215-090

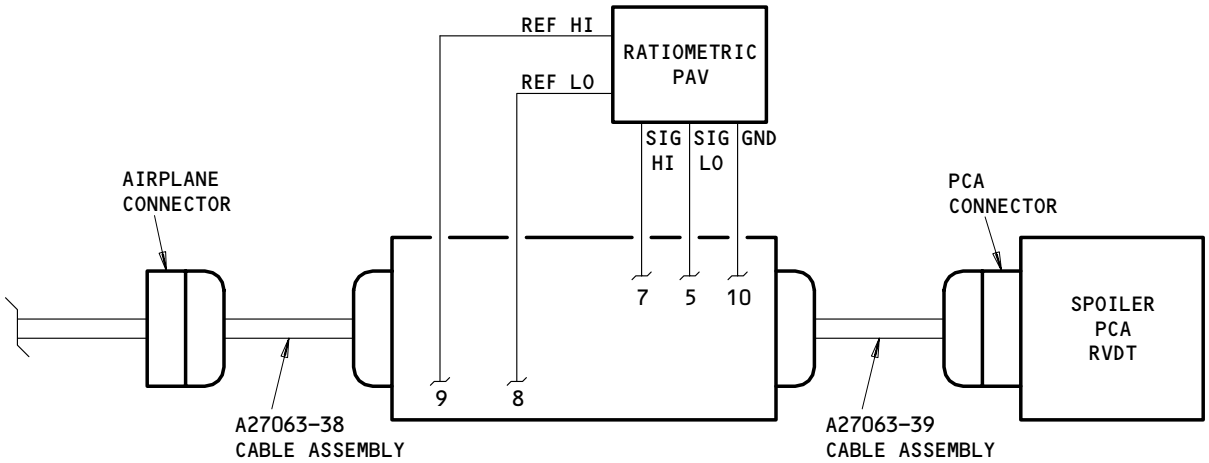
(8) Make sure the control wheels are in their neutral positions.

S 215-092

(9) Make sure rig pin A1 can be easily installed and removed from the lateral control feel, centering, and trim mechanism.



PRODEDURE 1



PROCEDURE 2

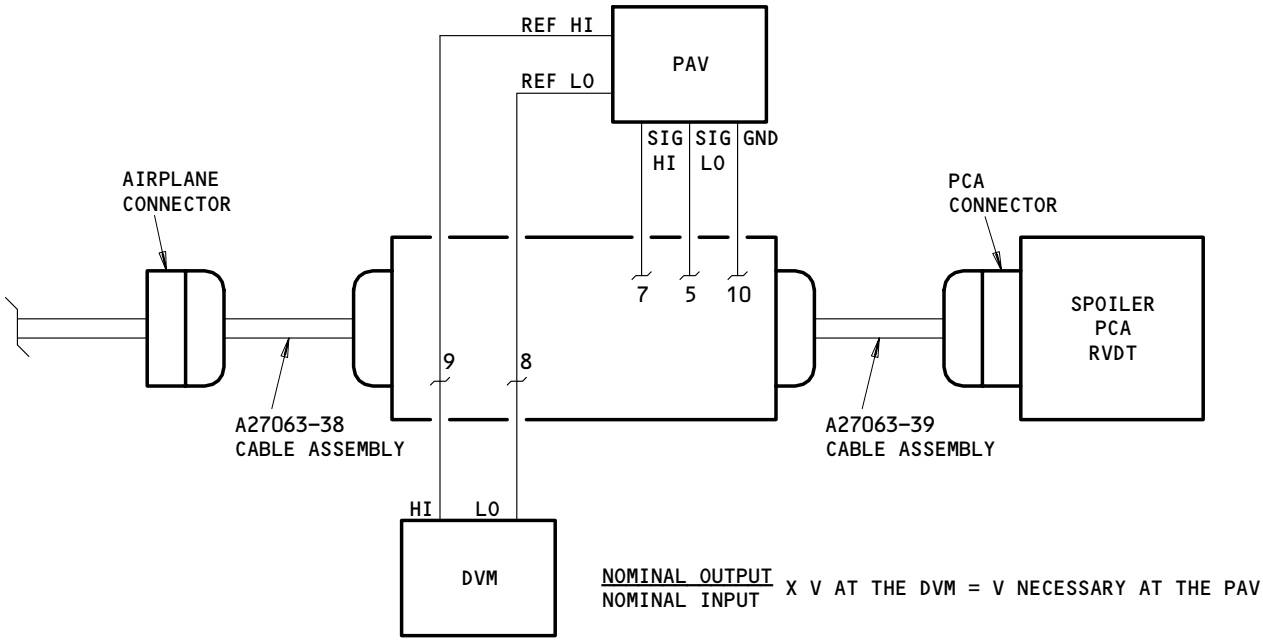
LEGEND

DVM – DIGITAL VOLTMETER
PAV – DIGITAL PHASE ANGLE VOLTMETER
RATIOMETRIC PAV – RATIOMETRIC DIGITAL PHASE ANGLE VOLTMETER

Spoiler PCA RVDT Adjustment
Figure 504 (Sheet 1)

S 215-091

(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).



PROCEDURE 3

Spoiler PCA RVDT Adjustment
Figure 504 (Sheet 2)

G. Adjust the Captain's (First Officer's) Control Wheel RVDTs (Fig. 501)

NOTE: Four procedures are supplied to adjust the control wheel RVDTs.

PROCEDURE 1 uses a commercially available power supply, a resistor, a digital voltmeter (DVM), and the breakout box equipment.

PROCEDURE 2 uses airplane power and a DVM with the breakout box equipment.

PROCEDURE 3 uses a phase synchronous voltmeter only.

PROCEDURE 4 uses a DVM without the breakout box equipment.

NOTE: Before you adjust the control wheel RVDTs, make sure these components are adjusted correctly (Ref 27-11-00):

- The Aileron Control Wheels and the Bus Force Limiter
- The Aileron Body and Wing Cables A1A, A1B, A2A, and A2B.

S 015-093

(1) Open access door 113AL (Ref 06-41-00).

S 865-094

(2) Open the circuit breakers on the P11 panel that are shown in Table 501 and attach the DO-NOT-CLOSE tags.

TABLE 501 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 825-095

(3) Adjust the control wheel RVDTs (PROCEDURE 1)

(a) For The Captain's RVDT, disconnect the airplane connector D623 from the RVDT connector P1.

(b) For The First Officer's RVDT, disconnect the airplane connector D629 from the RVDT connector P1.

(c) Do these steps to connect the breakout box equipment:

1) Connect the breakout box and the cable assembly to the RVDT connector P1.

2) Connect the digital voltmeter (DVM) to the breakout box at pins 3 (SIG HI) and 5 (SIG LO).

3) Connect the resistor between pins 3 and 5.

4) Connect the power supply to the breakout box at pins 1 (LO) and 2 (HI) and do this step:

a) Adjust the power supply to 26 ±0.02 volts ac RMS.

(d) Loosen the four clamp screws on the bottom of the RVDT.

(e) Adjust the null adjustment screw until the output voltage is 0 ±0.050 volts ac RMS at the DVM.

(f) Tighten the clamp screws and do this check:

1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.

(g) Lock the clamp screws with a wire.

(h) Do these steps to disconnect the breakout box equipment:

1) Disconnect the power supply, the resistor, and the DVM from the breakout box.

2) Disconnect the breakout box and the cable assembly from the RVDT.

(i) Connect the airplane connector to the RVDT.

S 825-096

(4) Adjust the control wheel RVDTs (PROCEDURE 2)

(a) For The Captain's RVDT, disconnect the airplane connector D623 from the RVDT connector P1.

(b) For The First Officer's RVDT, disconnect the airplane connector D629 from the RVDT connector P1.

(c) Do these steps to connect the breakout box equipment:

1) Connect the breakout box and the cable assembly to the RVDT connector P1.

2) Connect the digital voltmeter (DVM) to the breakout box at pins 3 (SIG HI) and 5 (SIG LO).

3) Connect the cable assembly between the airplane connector D623 and the breakout box.
4) Connect DVM 2 to the breakout box at pins 1 (LO) and 2 (HI) to monitor the airplane power.

(d) Remove the DO-NOT-CLOSE tags and close the circuit breakers on the P11 panel that are shown in Table 501.
(e) Make sure the airplane voltage is between 24 and 30 volts ac RMS at DVM 2.
(f) Loosen the four clamp screws on the RVDT.
(g) Turn the null adjustment screw until the RVDT output voltage is 0 ±0.050 volts ac RMS at DVM 1.
(h) Tighten the clamp screws and do this check:
1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.
(i) Lock the clamp screws with a wire.
(j) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.
(k) Do these steps to disconnect the breakout box equipment:
1) Disconnect the cable assembly from the airplane connector.
2) Disconnect the DVMs from the breakout box.
3) Disconnect the cable assembly and the breakout box from the RVDT connector P1.
(l) Connect the airplane connector to the RVDT.

S 825-097
(5) Adjust the control wheel RVDTs (PROCEDURE 3)
(a) For The Captain's RVDT,
disconnect the airplane connector D623 from the RVDT connector P1.
(b) For The First Officer's RVDT,
disconnect the airplane connector D629 from the RVDT connector P1.
(c) Use the data supplied with the tool to prepare the phase synchronous voltmeter for use.
(d) Connect the applicable cable assembly between the voltmeter and the RVDT connector.

(e) Loosen the four clamp screws on the RVDT.
(f) Turn the null adjustment screw until the voltmeter shows 0 ±0.050 volts.
(g) Tighten the clamp screws and do this check:
1) Make sure the RVDT voltage stays at 0 ±0.050 volts.
(h) Lock the clamp screws with a wire.
(i) Disconnect the voltmeter and the cable from the RVDT connector.
(j) Connect the airplane connector to the RVDT.

S 825-098
(6) Adjust the Control Wheel RVDTs (PROCEDURE 4)
(a) Do these steps to adjust the captain's control wheel RVDT:
1) Remove spoiler control module (SCM) 1L located on the E1-1 equipment shelf (Ref 27-09-00).
2) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.
3) Use a DVM to measure the RVDT output voltages at these pins on the E1-1 equipment shelf:

CONNECTOR	PINS
D635A	J3 and J4
D635B	J4 and J5
	J12 and J13

4) Loosen the four clamp screws on the captain's RVDT.
5) Turn the null adjustment screw until the output voltage is 0 ±0.050v ac RMS at the DVM.
6) Tighten the clamp screws and do this check:
a) Make sure the RVDT output voltage stays at 0 ±0.050v ac RMS at the DVM.
7) Lock the clamp screws with a wire.
8) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.
9) Install SCM 1L (Ref 27-09-00).
(b) Do these steps to adjust the first officer's control wheel RVDT:
1) Remove SCM 1R located on the E2-1 equipment shelf (Ref 27-09-00).

2) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.
3) Use a DVM to measure the RVDT output voltages at these pins on the E1-1 equipment shelf:

CONNECTOR	PINS
D665A	J3 and J4
D665B	J4 and J5
	J12 and J13

4) Loosen the four clamp screws on the first officer's RVDT.
5) Turn the null adjustment screw until the output voltage is 0 ±0.050v ac RMS at the DVM.
6) Tighten the clamp screws and do this check:
   a) Make sure the RVDT output voltage stays at 0 ±0.050v ac RMS at the DVM.
7) Lock the clamp screws with a wire.
8) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.
9) Install SCM 1R (Ref 27-09-00).

S 865-099

(7) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

H. Adjust the Spoiler Power Control Actuators (PCAs) (Fig. 503)

NOTE: Make sure the control wheel RVDTs are adjusted correctly before you adjust the PCAs.

If you will do a check of the adjustment of the PCAs because of a report of uncommanded roll or large aileron trim, do the troubleshooting procedure (FIM 27-61-00/101, Fig. 103 or 104A).

S 215-100

(1) Make sure the speedbrake lever is in its down-and-locked detent position.

S 865-101
(2) Retract the trailing edge flaps.

S 045-102
(3) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-008

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-103
(5) Stop for one minute to let the spoiler positions become stable.

S 225-105
(6) On SPOILERS 1, 2, 3, 4, 9, 10, 11, and 12, make sure the spoiler to flap clearances along the spoiler trailing edge are as follows:

Configurations	Spoiler to Flap Clearance (Inch) *[1]	
	Maximum	Minimum
On jacks with engines installed	0.32	0.06
On gear with engines installed	0.34	0.06
On gear, engines installed and 3000 lbs of fuel on each wing	0.32	0.04
On gear, unloaded condition *[2]	0.30	0.04

*[1] The spoiler to flap clearance can be adjusted while the airplane is in the same configuration that it was while they were measured. But, if the gaps are checked and adjusted while on jacks, the gaps should also be checked once the airplane is lowered from the jacks.

*[2] The on gear, unloaded condition, refers to the condition of an airplane that is empty of fuel, and has no engines.

S 225-106

(7) On SPOILERS 5, 6, 7, and 8, make sure the spoiler to flap clearances along the spoiler trailing edge are as follows:

Configurations	Spoiler to Flap Clearance (Inch) *[1]	
	Maximum	Minimum
On jacks with engines installed	0.54	0.04
On gear with engines installed	0.52	0.04
On gear, engines installed and 3000 lbs of fuel on each wing	0.59	0.04
On gear, unloaded condition *[2]	0.60	0.04

*[1] The spoiler to flap clearance can be adjusted while the airplane is in the same configuration that it was while they were measured. But, if the gaps are checked and adjusted while on jacks, the gaps should also be checked once the airplane is lowered from the jacks.

*[2] The on gear, unloaded condition, refers to the condition of an airplane that is empty of fuel, and has no engines.

S 825-107

(8) Do these steps if the spoiler to flap clearance is not correct:
  (a) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).
  (b) Extend the trailing edge flaps.
  (c) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).
  (d) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

WARNING: MAKE SURE YOU OPEN THE CIRCUIT BREAKERS FOR THE CONTROL SURFACE ELECTRONIC UNIT. THIS WILL PREVENT AUTOMATIC SPOILER RETRACTION WHEN ELECTRICAL POWER IS REMOVED. THE SPOILERS MOVE VERY QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(e) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.
(f) Disconnect the electrical connector from the spoiler PCA.

WARNING: MAKE SURE YOU OPEN THE CIRCUIT BREAKERS FOR THE CONTROL SURFACE ELECTRONIC UNIT. THIS WILL PREVENT AUTOMATIC SPOILER RETRACTION WHEN ELECTRICAL POWER IS REMOVED. THE SPOILERS MOVE VERY QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(g) Operate the manual release cam on the bottom of the PCA to release unwanted hydraulic pressure from the PCA.
(h) Manually raise the spoiler panel and hold it in the up position using a piece of wood.
(i) Disconnect the PCA from the spoiler panel by removing the cotter pin, nuts, washers, and bolts.
(j) Loosen the locknut at the rod end of the PCA.
(k) Adjust the PCA rod end to increase or decrease the length of the PCA.

NOTE: If you increase the length, the clearance will increase. If you decrease the length, the clearance will decrease.

An adjustment that is equal to one (1) lock washer serration will lift or lower the spoiler trailing edge 0.006 inch (0.15 mm).

(l) Tighten the locknut to 1260-1380 pound-inches (143-155 Nm).

(m) Do these steps to connect the PCA to the spoiler:
1) Install the bolt that connects the PCA to the spoiler.
2) Install the bolt, washer, and nut that connect the bolt head to the spoiler clevis.
3) Install the washer, nut, and cotter pin that connect the PCA rod end to the spoiler.

NOTE: Install the nut to the shoulder of the bolt. Turn it back one castellation and then install the cotter pin.

(n) Remove the wooden block and lower the spoiler.
(o) Connect the electrical connector to the PCA.
(p) Make sure the spoiler to flap clearances are correct (see above).
(q) If the spoiler to flap clearances are not correct, do the adjustment procedure again.

S 445-108
(9) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-109
(10) Extend the trailing edge flaps.

S 045-110
(11) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-111
(12) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 225-112
(13) Make sure the rod end to locknut clearance is not more than 0.40 inch (View C).

S 435-113
(14) Lock the PCA locknut with a wire.

S 865-010

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(15) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-114
(16) Remove the DO-NOT-CLOSE tags and close the circuit breaker shown in Table 501.

S 865-115
(17) Move the speedbrake lever from its down-and-locked position to its full upstop position four times.

S 445-116
(18) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-117
(19) Retract the trailing edge flaps.

S 225-118
(20) Move the speedbrake lever to its down-and-locked position and do this check:
(a) Make sure the spoiler to flap clearance is correct (see above).

S 865-119
(21) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

I. Adjust the Spoiler PCA RVDT (PROCEDURE 1)

NOTE: Seven procedures are supplied to adjust the PCA RVDTs.

PROCEDURE 1 uses a commercially available power supply, a resistor, a digital phase angle voltmeter (PAV), and the breakout box equipment.

PROCEDURE 2 uses airplane power and a ratiometric digital phase angle voltmeter (ratiometric PAV) with the breakout box equipment.

PROCEDURE 3 uses airplane power and a PAV with the breakout box equipment.

PROCEDURE 4 uses the airplane equipment only.

PROCEDURE 5 uses a phase synchronous voltmeter (PSV) only.

PROCEDURE 6 uses the airplane equipment only.

ALTERNATE PROCEDURE 6 uses the airplane equipment only. This procedure can only be used if a S285T0012-201 SCM is installed for the spoiler pair being adjusted. This procedure requires that one of the PCA RVDTs in the pair is already properly adjusted. The procedure checks the adjustment of one of the PCA RVDTs, and then adjusts the other to match.

S 215-412

(1) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-120

(2) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 035-121

(3) Disconnect the electrical connector from the PCA.

S 495-122

(4) Do these steps to connect the breakout box equipment:
   (a) Connect the breakout box and the cable assembly to the PCA.
   (b) Connect the PAV to the breakout box at pins 5 (SIG LO), 7 (SIG HI), and 10 (GND).
   (c) Connect the power supply to the breakout box at pins 8 (LO) and 9 (HI).
   (d) Connect the resistor between pins 5 and 7.

(e) Adjust the power supply to 26 ±0.02 volts ac RMS.
(f) Supply 26 ±0.02 volts ac RMS from the power supply HI and LO to the PAV REF pins.

S 035-123
(5) Remove the plug from the RVDT null adjustment screw.

S 825-124
(6) On SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, 11, 12,
use a 5/64-inch hex wrench to adjust the null adjustment screw until the output voltage is -8.013 ±0.050 volts ac RMS at the PAV.

S 825-125
(7) On SPOILERS 4 and 9,
use a 5/64-inch hex wrench to adjust the null adjustment screw until the output voltage is -7.05 ±0.050 volts ac RMS at the PAV.

S 225-126
(8) Install the plug for the null adjustment screw and do these steps:
(a) On SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, 11, 12,
make sure the output voltage for the RVDT stays at -8.013 ±0.050 volts RMS.
(b) On SPOILERS 4 and 9,
make sure the output voltage for the RVDT stays at -7.05 ±0.050 volts ac RMS.
(c) Lock the plug with a wire.

S 095-127
(9) Do these steps to disconnect the breakout box equipment:
(a) Disconnect the power supply, resistor, and PAV from the breakout box.
(b) Disconnect the breakout box and the cable assembly from the PCA.

S 435-128
(10) Connect the airplane electrical connector to the PCA.

S 625-129
(11) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 865-130
(12) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 445-131
(13) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-132
(14) Retract the trailing edge flaps.

J. Adjust the Spoiler PCA RVDT (PROCEDURE 2)

S 215-413
(1) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-133
(2) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 035-134
(3) Disconnect the electrical connector from the PCA.

S 495-135
(4) Do these steps to connect the breakout box equipment:
(a) Connect the breakout box and the cable assembly to the PCA.
(b) Connect the ratiometric PAV to the breakout box at pins 5 (SIG LO), 7 (SIG HI), and 10 (GND).
(c) Connect the breakout box and the cable assembly to the airplane electrical connector.

(d) Connect the breakout box pins 8 (LO) and 9 (HI) to the ratiometric PAV REF pins.

S 865-136

(5) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 035-137

(6) Remove the plug from the RVDT null adjustment screw.

S 825-138

(7) On SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, 11, AND 12, use a 5/64-inch hex wrench to adjust the null adjustment screw until the ratiometric PAV shows -0.3082.

S 825-415

(8) On SPOILERS 4 AND 9, use a 5/64-inch hex wrench to adjust the null adjustment screw until the ratiometric PAV shows -0.2712.

S 225-139

(9) Install the plug for the null adjustment screw and do this step:
(a) On SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, AND 12, make sure the ratiometric PAV shows -0.3082.
(b) On SPOILERS 4 AND 9, make sure the ratiometric PAV shows -0.2712.

S 865-446

(10) Open the circuit breaker shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-140

(11) Do these steps to disconnect the breakout box equipment:
(a) Disconnect the breakout box and the cable assembly from the airplane connector.

(b) Disconnect the ratiometric PAV from the breakout box.
(c) Disconnect the breakout box and the cable assembly from the PCA.

S 435-141
(12) Connect the airplane electrical connector to the PCA.

S 625-142
(13) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 865-143
(14) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 445-144
(15) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-145
(16) Retract the trailing edge flaps.

K. Adjust the Spoiler PCA RVDT (PROCEDURE 3)

S 215-414
(1) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 865-146
(2) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 035-147
(3) Disconnect the electrical connector from the PCA.

S 495-148
(4) Do these steps to connect the breakout box equipment:
(a) Connect the breakout box and the cable assembly to the PCA.

(b) Connect the PAV to the breakout box at pins 5 (SIG LO), 7 (SIG HI), and 10 (GND).
(c) Connect the breakout box and the cable assembly to the airplane connector.
(d) Connect the DVM to the breakout box at pins 8 (LO) and 9 (HI) to monitor the airplane power.
(e) Connect the breakout box pins 8 (LO) and 9 (HI) to the PAV REF pins.

S 865-149
(5) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 975-150
(6) Measure the airplane input voltage on the DVM. Then, do this calculation to find the necessary RVDT output voltage:

NOMINAL OUTPUT
---------- x measured input = the necessary RVDT voltage
NOMINAL INPUT (the DVM voltage) (the PAV voltage)

where,

NOMINAL OUTPUT = -8.013 ±0.05v for spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, 12.
= -7.05 ±0.05v for spoilers 4 and 9.

NOMINAL INPUT = 26.00v

S 035-151
(7) Remove the plug from the RVDT null adjustment screw.

S 825-152
(8) Use a 5/64-inch hex wrench to adjust the null adjustment screw until the PAV shows the voltage you calculated.

S 225-153
(9) Install the plug for the null adjustment screw and do these steps:
(a) Make sure the PAV shows the voltage you calculated.
(b) Lock the plug with a wire.

S 865-154
(10) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-155
(11) Do these steps to disconnect the breakout box equipment:
(a) Disconnect the breakout box and cable assembly from the airplane connector.
(b) Disconnect the DVM and the PAV from the breakout box.
(c) Disconnect the breakout box and the cable assembly from the PCA.

S 435-156
(12) Connect the airplane electrical connector to the PCA.

S 625-157
(13) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 865-158
(14) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 445-159
(15) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-160
(16) Retract the trailing edge flaps.

L. Adjust the Spoiler PCA RVDT (PROCEDURE 4: for spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12)

NOTE: This procedure is only applicable when the PCA that is opposite the PCA you will adjust is adjusted correctly (as specified in procedures 1, 2, 3, or 5).

S 865-161

WARNING: TO PREVENT INJURY OR DAMAGE, BE VERY CAREFUL WHEN YOU ADJUST THE SPOILER PCA RVDT. THE SPOILERS WILL HAVE POWER DURING THE ADJUSTMENT AND CAN MOVE VERY QUICKLY.

(1) Supply pressure to the hydraulic system that supplies power to the spoiler you will adjust (Ref 29-11-00).

NOTE: The left system supplies spoilers 3, 5, 8, and 10.
The center system supplies spoilers 1 and 12.
The right system supplies spoilers 2, 4, 6, 7, 9, and 11.

S 865-162

(2) Operate the aileron trim switches on the aft electronic control panel, P8, until rig pin A1 can be easily installed and removed.

S 975-163

(3) Put a piece of tape over the aileron trim decal on the captain's control wheel and do this step:
(a) Make a mark for the control wheel neutral position on the tape.

S 975-164

(4) Turn the control wheel until the spoiler that is opposite the spoiler you will adjust starts to move and do this step:

NOTE: These spoilers are opposite:

- 1 is opposite of 12
- 2 is opposite of 11
- 3 is opposite of 10
- 5 is opposite of 8
- 6 is opposite of 7

NOTE: Turn the control wheel clockwise to operate spoilers 7, 8, 10, 11, or 12. Turn the control wheel counterclockwise to operate spoilers 1, 2, 3, 5, or 6.

(a) Make a mark of the control wheel position on the tape.

NOTE: You must be less than 24 inches (609 mm) away from the spoiler when you monitor the spoiler movement. Make sure the mark is made immediately after the spoiler starts to move.

If the spoiler does not move, this procedure cannot be used to adjust the RVDT.

S 975-165

(5) Measure the distance between the neutral position mark (on the tape) and the mark where the spoilers started to move. Keep a written record of this distance.

S 865-166

(6) Move the control wheel back to its neutral position.

S 865-167
(7) If the distance you measured is more than 0.47 inch (11.9 mm), do not use this procedure to adjust the spoiler RVDT. Use procedure 1, 2, 3, or 5 to adjust the RVDT.

S 865-168
(8) Operate the aileron trim switches on the P8 panel until this condition is correct:
  (a) The control wheel moves the same distance (use your record) in the opposite direction.

S 825-169
(9) Do these steps to adjust the RVDT:
  (a) Remove the plug from the RVDT null adjustment screw.
  (b) Use a 5/64-inch hex wrench to adjust the null adjustment screw until the spoiler starts to move up. Stop the adjustment immediately after the spoiler starts to move.
  (c) If it is necessary, turn the null adjustment screw until the spoiler PCA retracts and do the above step again.
  (d) If the spoiler does not move, turn the control wheel a maximum of 0.06 inch (1.5 mm) in the direction of the trim and do these steps:
    1) Make sure the control wheel is not more than 0.47 inch (11.9 mm) away from the neutral position mark.
    2) Adjust the RVDT null adjustment screw again.

S 865-170
(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 435-171
(11) Install the plug for the RVDT null adjustment screw and do this step:
  (a) Lock the null adjustment screw with a wire.

S 625-172
(12) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 445-173
(13) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-174
(14) Retract the trailing edge flaps.

M. Adjust the Spoiler PCA RVDT (PROCEDURE 4: for spoilers 4 or 9)

NOTE: This procedure is only applicable when the PCA that is opposite the PCA you will adjust is adjusted correctly (as specified in procedures 1, 2, 3, or 5).

S 865-444

WARNING: TO PREVENT INJURY OR DAMAGE, BE VERY CAREFUL WHEN YOU ADJUST THE SPOILER PCA RVDT. THE SPOILERS WILL HAVE POWER DURING THE ADJUSTMENT AND CAN MOVE VERY QUICKLY.

(1) Supply pressure to the right hydraulic system only (Ref 29-11-00).

S 975-175
(2) Put a piece of masking tape near the side of the speedbrake lever and do this step:
(a) Make a mark for the ARMED position of the speedbrake lever on the tape.

S 975-176
(3) Slowly move the lever aft of the ARMED position until the spoiler that is opposite the spoiler you will adjust starts to move. Do these steps:

NOTE: The spoiler will move quickly 2° to 4° when it starts to move up. If the spoiler does not move, you cannot use this procedure to adjust the RVDT.

(a) Make a mark for the position of the speedbrake lever on the tape.

(b) Measure the distance between the ARMED position (on the tape) and the mark where the spoilers started to move. Keep a written record of this distance.

S 865-177

(4) If the distance you measured is more than 0.55 inch (14 mm), you cannot use this procedure to adjust the RVDT. Use procedure 1, 2, 3, or 5 to adjust the RVDT.

S 975-178

(5) Measure the distance from the top surface of the adjacent spoiler to the trailing edge of the extended spoiler.

NOTE: Measure this distance for the spoiler that is opposite the spoiler you will adjust.

S 035-179

(6) Remove the plug from the RVDT null adjustment screw on the spoiler you will adjust.

S 825-180

(7) Turn the null adjustment screw until the spoiler extends to the same dimension as the opposite spoiler.

S 865-181

(8) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 435-182

(9) Install the plug for the RVDT null adjustment screw and do this step:
(a) Lock the null adjustment screw with a wire.

S 625-183

(10) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 445-184
(11) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-185
(12) Retract the trailing edge flaps.

N. Adjust the Spoiler PCA RVDT (PROCEDURE 5)

S 865-186
(1) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 035-187
(2) Disconnect the electrical connector from the PCA.

S 865-188
(3) Use the tool instructions to prepare the phase synchronous voltmeter for use.

S 495-189
(4) Connect the applicable cable assembly between the voltmeter and the PCA RVDT.

S 035-190
(5) Remove the plug from the RVDT null adjustment screw.

S 825-191
(6) ON SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, 11, 12;
Use a 5/64-inch hex wrench to turn the null adjustment screw until the voltmeter shows -8.013 ±0.050 volts.

S 825-192
(7) On SPOILERS 4 and 9,
use a 5/64-inch hex wrench to turn the null adjustment screw until the voltmeter shows -7.05 ±0.050 volts.

S 225-193
(8) Install the plug for the RVDT null adjustment screw and do these steps:
(a) On SPOILERS 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, make sure the voltage stays at -8.013 ±0.050 volts.
(b) On SPOILERS 4 and 9, make sure the voltage stays at -7.05 ±0.050 volts.
(c) Lock the null adjustment screw with a wire.

S 095-194
(9) Disconnect the voltmeter and its cable assembly from the PCA RVDT.

S 435-195
(10) Connect the airplane electrical connector to the PCA.

S 625-196
(11) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 865-197
(12) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 445-198
(13) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-199
(14) Retract the trailing edge flaps.

O. Adjust the Spoiler PCA RVDT (PROCEDURE 6: for spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12)

NOTE: This procedure is only applicable when the PCA that is opposite the PCA you will adjust is adjusted correctly (as specified in procedures 1, 2, 3, or 5), and an S285T0012-201 spoiler control module is used for the spoiler pair.

S 865-448

WARNING: TO PREVENT INJURY OR DAMAGE, BE VERY CAREFUL WHEN YOU ADJUST THE SPOILER PCA RVDT. THE SPOILERS WILL HAVE POWER DURING THE ADJUSTMENT AND CAN MOVE VERY QUICKLY.

(1) Supply pressure to the hydraulic system that supplies power to the spoiler you will adjust (Ref 29-11-00).

NOTE: The left system supplies spoilers 3, 5, 8, and 10.
The center system supplies spoilers 1 and 12.
The right system supplies spoilers 2, 4, 6, 7, 9, and 11.

S 865-568

(2) Operate the aileron trim switches on the aft electronic control panel, P8, until rig pin A1 can be easily installed and removed.

S 015-450

(3) Access the spoiler control module that controls the spoiler PCA being adjusted. Show the PCA RVDT voltages on the SCM BITE display (Ref 27-09-00).

S 865-451

(4) Turn the control wheel and hold at exactly 2 units to move the spoiler that is opposite the spoiler you will adjust.

NOTE: Turn the control wheel clockwise to operate spoilers 7, 8, 10, 11 or 12. Turn the control wheel counterclockwise to spoilers 1, 2, 3, 5 or 6. These spoilers are opposite:

- 1 is opposite of 12
- 2 is opposite of 11
- 3 is opposite of 10
- 5 is opposite of 8
- 6 is opposite of 7

(a) Read the voltage on the SCM for the RVDT on the PCA that has been moved. Keep a record of this reading.

S 865-569
(5) Turn the control wheel and hold at exactly 2 units to move the spoiler that is to be adjusted.
  (a) Read the voltage on the SCM for the RVDT on the PCA to be adjusted.

S 825-453
(6) Do these steps to adjust the RVDT.
  (a) Remove the plug from the RVDT null adjustment screw.
  (b) Use a 5/64 inch hex wrench to adjust the null adjustment screw until the RVDT voltage reading is the same as the reading taken for the opposite spoiler (within +/- 0.10 VAC as measured on the SCM).

S 865-454
(7) Turn the control wheel and hold at 4 units to move the PCA that was adjusted.
  (a) Read the voltage on the SCM for the RVDT that was adjusted.

S 865-455
(8) Turn the control wheel to move the PCA opposite the one that was adjusted, until the SCM voltage reading is within +/- 0.10 VAC of the voltage reading in the previous step.
  (a) Check that the control wheel is at 4 units.

S 825-456
(9) If the control wheel rotation readings do not match at 4 units, repeat the RVDT adjustment procedure.

S 865-457
(10) Remove the power from the left, right and center hydraulic systems (Ref 29-11-00).

S 425-459
(11) Install the plug for the RVDT null adjustment screw and do this step:
  (a) Lock the null adjustment screw with a wire.

S 395-458

(12) Apply some of the sealant to the PCA rod, locknut, washers and the lockwire.

S 445-460

(13) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-461

(14) Retract the trailing edge flaps.

P. Adjust the Spoiler PCA RVDT (PROCEDURE 6: for spoilers 4 and 9).

NOTE: This procedure is only applicable when the PCA that is opposite the PCA you will adjust is adjusted correctly (as specified in procedures 1, 2, 3, or 5), and an S285T0012-201 spoiler control module is used for the spoiler pair.

S 865-462

WARNING: TO PREVENT INJURY OR DAMAGE, BE VERY CAREFUL WHEN YOU ADJUST THE SPOILER PCA RVDT. THE SPOILERS WILL HAVE POWER DURING THE ADJUSTMENT AND CAN MOVE VERY QUICKLY.

(1) Supply pressure to the right hydraulic system only (Ref 29-11-00).

S 955-463

(2) Put a piece of masking tape near the side of the speedbrake lever and do this step:

(a) Make a mark for the ARMED position of the speedbrake lever on the tape.

S 865-464

(3) Slowly move the lever aft of the ARMED position until the spoiler that is opposite the spoiler you will adjust starts to move. Do these steps:

NOTE: The spoiler will move quickly 2° to 4° when it starts to move up. If the spoiler does not move, you cannot use this procedure to adjust the RVDT.

(a) Make a mark for the position of the speedbrake lever on the tape.

(b) Measure the distance between the ARMED position (on the tape) and the mark where the spoilers started to move. Keep a written record of this distance.

S 225-465

(4) If the distance you measured is more than 0.55 inch (14 mm), you cannot use this procedure to adjust the RVDT. Use procedure 1, 2, 3, or 5 to adjust the RVDT.

S 015-466

(5) Access the spoiler control module that controls the spoiler PCA being adjusted. Show the PCA RVDT voltage on the SCM BITE display (Ref 27-09-00).

S 865-467

(6) Move the speedbrake lever aft of the ARMED position approximately 1 inch.
   (a) Make a mark for the position of the speedbrake lever on the tape.
   (b) Read the voltage on the SCM for the RVDT on the PCA opposite the PCA to be adjusted. Keep a record of this reading.
   (c) Read the voltage on the SCM for the RVDT on the PCA to be adjusted.

S 825-468

(7) Do these steps to adjust the RVDT.
   (a) Remove the plug from the RVDT null adjustment screw.
   (b) Use a 5/64 inch hex wrench to adjust the null adjustment screw until the RVDT voltage reading is the same as the reading taken for the opposite spoiler (within +/- 0.10 VAC as measured on the SCM).

S 865-469

(8) Move the speedbrake lever to the down detent. Then move the speedbrake lever to the position marked on the tape at which the RVDT was adjusted.
   (a) Read the voltage on the SCM for both of the RVDT's.

S 825-470
(9) If the voltages recorded do not match within +/- 0.10 VAC, repeat the RVDT adjustment procedure.

S 865-471
(10) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 425-472
(11) Install the plug for the RVDT null adjustment screw and do this step:
(a) Lock the null adjustment screw with a wire.

S 395-473
(12) Apply some of the sealant to the PCA rod, locknut, washers, and the lockwire.

S 445-474
(13) Do the activation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-475
(14) Retract the trailing edge flaps.

Q. Adjust the Spoiler PCA RVDT (ALTERNATE PROCEDURE 6: for spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12)

NOTE: This procedure can only be used if a S285T0012-201 SCM is installed for the spoiler pair being adjusted. This procedure requires that one of the PCA RVDTs in the pair is already properly adjusted. The procedure checks the adjustment of one of the PCA RVDTs, and then adjusts the other to match.

S 865-577

WARNING: TO PREVENT INJURY OR DAMAGE, MOVE ALL PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES BEFORE HYDRAULIC POWER IS SUPPLIED. STAY AWAY FROM THE AREA DURING THEIR OPERATION.

(1) Supply pressure to the hydraulic system that supplies power to the spoiler you will adjust (AMM 29-11-00).

NOTE: The left system supplies spoilers 3, 5, 8, and 10. The center system supplies spoilers 1 and 12. The right system supplies spoilers 2, 4, 6, 7, 9, and 11.

S 865-578

(2) Operate the aileron trim switches on the aft electronic control panel, P8, until rig pin A1 can be easily installed and removed removed (Fig 502).

S 845-579

(3) Do these steps to prepare for the adjustment:
  (a) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
    1) 11G11, AUTO SPEEDBRAKE
  (b) Make sure the control wheel is in the neutral position.
  (c) Make sure the speedbrake lever is in the down-and-locked position.
  (d) Make sure all the spoiler panels are down.

S 865-580

(4) Access the spoiler control module that controls the spoiler PCA being adjusted. The SCMs are located on the E3 and E4 shelves in the main equipment center.
  (a) SCM 1L controls spoilers 1 and 12
  (b) SCM 2L controls spoilers 5 and 8
  (c) SCM 3L controls spoilers 6 and 7
  (d) SCM 1R controls spoilers 1 and 11
  (e) SCM 2R controls spoilers 3 and 10

S 745-581

(5) Do these steps to read the PSM voltage:
  (a) Press the ON/OFF key on the SCM.
  (b) Select OTHER FUNCTIONS.
  (c) Select I/O MONITOR.
  (d) Record the PSM Voltage for 26 VAC A, 26 VAC B, and 26 VAC C.

S 745-582

(6) Check the PCA RVDT voltage for the spoiler PCA that is opposite the one you want to adjust.
  (a) Record the PCA RVDT voltage for the spoiler PCA that is opposite the one you wantto adjust.

(b) Find the nominal PCA RVDT voltage, based on the PSM voltage that you recorded (Table 502).

Table 502	
PSM 26 VAC	NOMINAL PCA RVDT VAC
24.4	-7.51
24.9	-7.68
25.5	-7.85
26.0	-8.01
26.3	-8.09
26.5	-8.17
26.8	-8.25
27.0	-8.33
27.3	-8.41
27.6	-8.49
27.8	-8.57
28.1	-8.65
28.3	-8.73
28.6	-8.81
28.9	-8.89
29.1	-8.97
29.4	-9.05
29.6	-9.13
29.9	-9.21
30.2	-9.30

(c) Compare the recorded RVDT voltage (for the spoiler that is opposite the one you will adjust) to the nominal voltage at the recorded PSM voltage (from the table).
(d) If the actual PCA voltage and the nominal PCA voltage are not within ± 0.30 volts, you can not use this procedure. You must use PROCEDURES 1, 2, 3, 4, or 5 to adjust the spoiler RVDT.
(e) If the actual PCA voltage and the nominal PCA voltage are within ± 0.30 volts, continue with the procedure.

S 825-583
(7) Adjust the RVDT.
(a) Remove the plug from the RVDT null adjustment screw of the PCA you are adjusting.
(b) Use a 5/64 inch hex wrench to adjust the null adjustment screw until the RVDT voltage reading is the same as the reading taken for the opposite spoiler (within ± 0.10 VAC as measured on the SCM).

S 865-584
(8) Move the speedbrake handle to the UP position and back to the DOWN position.

S 745-585
(9) Read the PCA RVDT voltage on the SCM for the spoiler pair.

S 975-586
(10) Make sure the voltages are within ± 0.10 VAC as measured on the SCM.
(a) Re-adjust the PCA RVDT as necessary.

S 865-587
(11) Remove the power from the left, right and center hydraulic systems (AMM 29-11-00).

S 425-588
(12) Install the plug for the RVDT null adjustment screw and do this step:
(a) Lock the null adjustment screw with a wire.

S 865-589
(13) Do the activation procedure for the trailing edge flaps (AMM 27-51-00).

S 865-590
(14) Retract the trailing edge flaps.

S 865-591
(15) Remove the safety tag and close this circuit breaker:
(a) 11G11, AUTO SPEEDBRAKE

R. Adjust the Spoiler PCA RVDT (ALTERNATE PROCEDURE 6: for spoilers 4 and 9)

NOTE: This procedure can only be used if SCM 3R is a S285T0012-201 SCM. This procedure requires that one of the PCA RVDTs (4 or 9) is already properly adjusted. The procedure checks the adjustment of one of the PCA RVDTs, and then adjusts the other to match.

S 865-592

WARNING: TO PREVENT INJURY OR DAMAGE, BE VERY CAREFUL WHEN YOU ADJUST THE SPOILER PCA RVDT. THE SPOILERS WILL HAVE POWER DURING THE ADJUSTMENT AND CAN MOVE VERY QUICKLY.

(1) Supply pressure to the right hydraulic system.

S 865-593

(2) Operate the aileron trim switches on the aft electronic control panel, P8, until rig pin A1 can be easily installed and removed (Fig. 502).

S 845-594

(3) Do these steps to prepare for the adjustment:
  (a) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
    1) 11G11, AUTO SPEEDBRAKE
  (b) Make sure the control wheel is in the neutral position.
  (c) Make sure the speedbrake lever is in the down-and-locked position.
  (d) Make sure all the spoiler panels are down.

S 745-595

(4) Access the spoiler control module SCM (3R) that controls the spoiler PCAs 4 and 9. The SCM is located on the E4 shelf in the main equipment center.

S 745-596

(5) Do these steps to read the PSM voltage:
  (a) Press the ON/OFF key on the SCM.
  (b) Select OTHER FUNCTIONS.
  (c) Select I/O MONITOR.
  (d) Record the PSM Voltage for 26 VAC A, 26 VAC B, and 26 VAC C.

S 975-597

(6) Check the PCA RVDT voltage for the spoiler PCA that is opposite the one you want to adjust.
  (a) Record the PCA RVDT voltage for the spoiler PCA that is opposite the one you want to adjust.

(b) Find the nominal PCA RVDT voltage, based on the PSM voltage that you recorded (Table 503).

Table 503	
PSM 26 VAC	NOMINAL PCA RVDT VAC
24.4	-6.61
24.9	-6.76
25.5	-6.90
26.0	-7.05
26.3	-7.12
26.5	-7.19
26.8	-7.26
27.0	-7.33
27.3	-7.40
27.6	-7.47
27.8	-7.54
28.1	-7.61
28.3	-7.68
28.6	-7.75
28.9	-7.82
29.1	-7.89
29.4	-7.97
29.6	-8.04
29.9	-8.11
30.2	-8.18

(c) Compare the recorded RVDT voltage (for the spoiler that is opposite the one you will adjust) to the nominal voltage at the recorded PSM voltage (from the table).
(d) If the actual PCA voltage and the nominal PCA voltage are not within ± 0.30 volts, you can not use this procedure. You must use PROCEDURES 1, 2, 3, 4, or 5 to adjust the spoiler RVDT.
(e) If the actual PCA voltage and the nominal PCA voltage are within ± 0.30 volts, continue with the procedure.

S 825-598
(7) Adjust the RVDT.
(a) Remove the plug from the RVDT null adjustment screw of the PCA you are adjusting.
(b) Use a 5/64-inch hex wrench to adjust the null adjustment screw until the RVDT voltage reading is the same as the reading taken for the opposite spoiler (within ± 0.10 VAC as measured on the SCM).

S 865-599
(8) Move the speedbrake handle to the UP position and back to the DOWN position.

S 745-600
(9) Read the PCA RVDT voltage on the SCM for the spoiler pair.

S 975-601
(10) Make sure the voltages are within ± 0.10 VAC as measured on the SCM.

S 825-602
(11) Re-adjust the PCA RVDT as necessary.

S 865-603
(12) Remove the power from the right hydraulic system (AMM 29-11-00).

S 425-604
(13) Install the plug for the RVDT null adjustment screw and do this step:
(a) Lock the null adjustment screw with a wire.

S 865-605
(14) Do the activation procedure for the trailing edge flaps (AMM 27-51-00).

S 865-606
(15) Retract the trailing edge flaps.

S 865-607
(16) Remove the safety tag and close this circuit breaker:
(a) 11G11, AUTO SPEEDBRAKE

S. Put the Airplane Back to Its Usual Condition

S 865-200
(1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 095-011

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 865-201
(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 445-202
(4) Do the activation procedure for the thrust reversers (Ref 78-31-00).

S 865-203
(5) Remove electrical power if it is not necessary (Ref 24-22-00).

S 415-020
(6) Close access door 113AL (Ref 06-41-00).

TASK 27-61-00-735-204

4. System Test - Spoiler/Speedbrake Control System

A. General
(1) Make sure the main landing gear is in its NOT TILT position before you do this test.

B. Equipment
(1) Control Wheel Rigging Beam - B27049-1
(2) Control Wheel Protractor - A27021-29
(3) Control Wheel Adapter Equipment - A27021-97 or -98
(4) Bubble Protractor, Commercially Available
(5) Stopwatch, Commercially Available

C. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/201, Trailing Edge Flap System
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-09-02/201, Air/Ground Relays
(5) 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

E. Prepare for the Test

S 865-205
(1) Supply electrical power (Ref 24-22-00).

S 865-206

(2) Move the STBY POWER switch on the overhead panel, P5, to the AUTO position.

S 865-207

(3) Retract the trailing edge flaps.

S 045-208

(4) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 865-209

(5) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

S 045-012

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(6) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance. (Ref 78-31-00).

S 865-013

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 215-210
(8) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 865-211
(9) Move the speedbrake lever to its ARMED position.

S 865-411
(10) Do these steps three times:
(a) Slowly move the speedbrake lever aft to a position that is approximately one-half of full lever travel.
(b) Slowly move the speedbrake lever back to its ARMED position.

S 865-212
(11) Do these steps three times:
(a) Slowly move the speedbrake lever slowly aft to its full upstop position.
(b) Slowly move the speedbrake lever back to its ARMED position.

S 865-213
(12) Move the speedbrake lever back to its down-and-locked detent position.

S 865-214
(13) Push the ECS/MSG switch on the right side panel, P61.

S 215-215
(14) Move the EICAS computer select switch on the EICAS DISPLAY select panel, P9, to L and do these steps:
(a) Stop for 30 seconds.
(b) Make sure the white SPOILERS message does not show on the bottom EICAS display.

S 215-216
(15) Move the EICAS computer select switch on the P9 panel to R and do these steps:
(a) Stop for 30 seconds.
(b) Make sure the white SPOILERS message does not show on the bottom EICAS display.

S 865-217
(16) Open the circuit breakers shown in Table 504 and attach the DO-NOT-CLOSE tags.

TABLE 504 OVERHEAD EQUIPMENT PANEL, P11
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 215-218
(17) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-219
(18) Move the EICAS computer select switch on the P9 panel to L and do this check:
(a) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 865-220
(19) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 504.

S 215-221
(20) Make sure the yellow SPOILERS message does not show on the top EICAS display.

S 215-222
(21) Make sure the amber SPOILERS light on the P5 panel is off.

S 865-223
(22) Open the circuit breakers shown in Table 505 and attach the DO-NOT-CLOSE tags.

TABLE 505 OVERHEAD EQUIPMENT PANEL, P11
11C7, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C9, CSEU 2L AC OR FLT CONT ELEC 2L AC
11G18, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G28, CSEU 2R AC OR FLT CONT ELEC 2R AC

S 215-224
(23) Make sure the amber SPOILERS light on the P5 panel is on.

S 215-225
(24) Make sure the yellow SPOILERS message shows on the top EICAS display.

S 215-226
(25) Move the EICAS computer select switch on the P9 panel to R and do this check:
(a) Make sure the yellow SPOILERS message shows on the top EICAS display.

S 865-227
(26) Move the EICAS computer select switch on the P9 panel to AUTO.

S 865-228
(27) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 505.

S 215-229
(28) Make sure the amber SPOILERS light on the P5 panel is off.

S 215-230
(29) Make sure the white SPOILERS message does not show on the bottom EICAS display.

F. Control Wheel Inputs and Spoiler Operation in the Air Mode - Test

S 215-231
(1) Make sure the speedbrake lever is in its down-and-locked detent position.

S 495-232
(2) Install the control wheel adapter equipment and protractor on the control wheel.

S 045-014

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do the deactivation procedure for flight mode simulation (Ref 32-09-02).

S 865-233
(4) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C30, LANDING GEAR POS SYS 1

(b) 11S19, AIR/GND SYS 2

S 215-234

(5) Turn the control wheel counterclockwise to the positions shown in Table 506 and do these checks:
   (a) Make sure the right wing spoilers stay down when the control wheel is operated.
   (b) Make sure the trailing edges of spoilers 1, 2, and 3 are aligned (use a tolerance of ±2 inches (+/- 50 mm)).
   (c) Make sure the trailing edges of spoilers 5 and 6 are aligned (use a tolerance of ±2 inches (+/- 50 mm)).
   (d) Make sure spoilers 4 and 9 stay aligned with the wing.

   NOTE: The spoilers are numbered 1 thru 12 from the outboard left wing spoiler to the outboard right wing spoiler.

S 215-235

(6) Turn the control wheel clockwise to the positions shown in Table 506 and do these checks:
   (a) Make sure the left wing spoilers stay down when the control wheel is operated.
   (b) Make sure the trailing edges of spoilers 9, 10, and 11 are aligned (use a tolerance of ±2 inches (+/- 50 mm)).
   (c) Make sure the trailing edges of spoilers 7 and 8 are aligned (use a tolerance of ±2 inches (+/- 50 mm)).
   (d) Make sure spoilers 4 and 9 stay aligned with the wing.

TABLE 506
Control Wheel Inputs and Spoiler Operation in the Air Mode

CONTROL WHEEL POSITION ± 1/4 DEGREE	SPOILERS 1, 2, 3 OR 10, 11, 12		SPOILERS 5 OR 8		SPOILERS 6 OR 7	
	DEGREES	INCHES	DEGREES	INCHES	DEGREES	INCHES
14	breakout	breakout	breakout	breakout	breakout	breakout
50	9.09±2.0	3.65±0.80	9.09±2.0	4.28±0.94	9.09±2.0	4.28±0.94
MAX TRAVEL	44.5±1.5	17.42±0.56	44.5±1.5	20.45±0.66	15.0±1.0	7.05±0.47
6.2	full down	full down	full down	full down	full down	full down

S 215-236

(7) Move the control wheel back to its neutral position and do these steps:
   (a) Stop for 30 seconds.
   (b) Make sure the SPOILERS light on the P5 panel is off.
   (c) Make sure the yellow SPOILERS message does not show on the top EICAS display.
   (d) Push the ECS/MSG switch on the P61 panel and do this check:
      1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

G. Speedbrake Lever Inputs and Spoiler Operation in the Air Mode - Test

S 215-237

(1) Move the speedbrake lever to its ARMED position and do this check:
   (a) Make sure all the spoilers stay aligned with the wing.

S 215-238

(2) Move the speedbrake lever aft no more than 0.55 inch (14 mm) away from its ARMED position and do this check:
   (a) Make sure that spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12 move up a small distance from their full down positions.

S 225-239

(3) Move the speedbrake lever to its full upstop position and do these checks:

NOTE: You can measure the position of the spoiler anywhere along the trailing edge of the spoiler panel.

(a) Make sure spoilers 1, 2, 3, 10, 11, and 12 move up 29.4 ±1.5 degrees or 11.67 ±0.59 inches (296 +/- 15 mm).
(b) Make sure that spoilers 4 and 9 stay aligned with the wing.
(c) Make sure spoilers 5 and 8 move up 19.6 ±1.4 degrees or 9.19 ±0.66 inches (233 +/- 16 mm).
(d) Make sure spoilers 6 and 7 move up 15.0 ± 1.0 degrees or 7.05 ±0.47 inches (179 +/- 11 mm).

S 215-240

(4) Move the speedbrake lever back to its ARMED position and do this check:
(a) Make sure all the spoilers move to their full down positions (aligned with the wing).

S 215-241

(5) Move the speedbrake lever to its down-and-locked detent position and do these steps:
(a) Stop for 30 seconds.
(b) Make sure the amber SPOILERS light on the P5 panel is off.
(c) Make sure the yellow SPOILERS message does not show on the top EICAS display.
(d) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

S 865-242

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S19, AIR/GND SYS 2

H. Control Wheel and Speedbrake Lever Inputs for Spoiler Operation in the Ground Mode - Test

NOTE: The spoiler positions during control wheel operation are shown in Table 507.

S 215-243

(1) Move the speedbrake lever to its ARMED position and do this check:
(a) Make sure all the spoilers stay aligned with the wing.

S 865-244
(2) Put a small load on the speedbrake lever in the aft direction to remove all the freeplay.

S 215-245
(3) Move the speedbrake lever aft no more than 0.55 inch (14 mm) away from its ARMED position and do this check:
(a) Make sure that all the spoilers move up a small distance from their full down positions.

S 215-246
(4) Move the speedbrake lever to its full upstop position and do this check:
(a) Make sure all the spoilers move up smoothly.

S 215-247
(5) Turn the control wheel to its full clockwise position and do these checks:
(a) Make sure spoilers 1, 2, 3, 5, 6, move down.
(b) Make sure all the right wing spoilers and spoiler number 4 stay in their up positions.

S 215-248
(6) Move the control wheel back to its neutral position and do this check:
(a) Make sure the left wing spoilers go back to their up positions.

S 215-249
(7) Turn the control wheel to its full counterclockwise position and do these checks:
(a) Make sure spoilers 7, 8, 10, 11, and 12 move down.
(b) Make sure the left wing spoilers and spoiler number 9 stay in their up positions.

TABLE 507
Control Wheel and Speedbrake Lever Inputs for Spoiler Operation in the Ground Mode

SPOILER	CONTROL WHEEL NEUTRAL		CONTROL WHEEL FULL CW		CONTROL WHEEL FULL CCW	
	SPOILER DEFLECTION		SPOILER DEFLECTION		SPOILER DEFLECTION	
	DEGREES	INCHES	DEGREES	INCHES	DEGREES	INCHES
1,2,3	45.5±0.5	17.79±0.18	2.25±2.25	0.9±0.9	45.5±0.5	17.79±0.18
4	56.0±1.0	21.6±0.36	56.0±1.0	21.6±0.36	56.0±1.0	21.6±0.36
5	45.5±0.5	20.88±0.21	1.9±1.9	0.9±0.9	45.5±0.5	20.88±0.21
6	30.0±0.5	14.2±0.25	1.9±1.9	0.9±0.9	30.0±0.5	14.00±0.25
7	30.0±0.5	14.2±0.25	30.0±0.5	14.2±0.25	1.9±1.9	0.9±0.9
8	45.5±0.5	20.88±0.21	45.5±0.5	20.88±0.21	1.9±1.9	0.9±0.9
9	56.0±1.0	21.6±0.36	56.0±1.0	21.6±0.36	56.0±1.0	21.6±0.36
10,11,12	45.5±0.5	17.79±0.18	45.5±0.5	17.79±0.18	2.25±2.25	0.9±0.9

S 215-250
(8) Move the control wheel back to its neutral position and do this check:
  (a) Make sure the right wing spoilers move back to their up positions.

S 215-251
(9) Move the speedbrake lever to its ARMED position and do this check:
  (a) Make sure all the spoilers move smoothly to their down positions.

S 215-252
(10) Move the speedbrake lever to its down-and-locked detent position and do these steps:
  (a) Stop for 30 seconds.
  (b) Make sure the amber SPOILERS light on the P5 panel is off.
  (c) Make sure the yellow SPOILERS message does not show on the top EICAS display.

(d) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

I. Spoiler Speed - Test

S 865-253
(1) Move the speedbrake lever to its ARMED position.

S 225-254
(2) Move the speedbrake lever to its full upstop position in less than one second and do this check:
(a) Make sure the spoilers move to their full up positions in less than 1.0 second.

S 225-255
(3) Move the speedbrake lever to its ARMED position in less than one second and do this check:
(a) Make sure the spoilers move to their full down positions in less than 1.0 second.

S 865-256
(4) Move the speedbrake lever back to its down-and-locked detent position.

J. Spoiler/Speedbrake Operation with Spoiler Control Wheel RVDT and Speedbrake LVDT Failures - Test

S 865-257
(1) Push the RESET switch on the spoiler control modules (SCMs).

NOTE: The six SCMs are located on shelves E3-1 and E4-1 in the main equipment bay.

S 865-258
(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC

(b) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC

S 865-259

(3) Move the speedbrake lever to its full upstop position.

S 215-260

(4) Turn the control wheel to its full counterclockwise position and hold it there for 30 seconds. Do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.
(c) Make sure none of the left SCMs have a fault.
1) For -100 Series SCMs,
make sure all the faultballs are black.
2) For -200 Series SCMs,
make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX?, do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

S 215-261

(5) Disconnect electrical connector D41761 from the E3-1 equipment shelf and do this check:
(a) Look at the left SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the CW XDCR and SB XDCR faultballs on the 1L SCM (M530) are yellow.

b) Make sure the CW XDCR and SB XDCR faultballs on the 2L and 3L SCMs are black.

2) For -200 Series SCMs:

a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1L, 2L, and 3L.

S 435-262

(6) Connect electrical connector D41761 to the E3-1 equipment shelf and do this step:

(a) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 215-263

(7) Disconnect electrical connector D41763 from the E3-1 equipment shelf and do these checks:

(a) Look at the left SCMs for these faults:

1) For -100 Series SCMs:

a) Make sure the CW XDCR and SB XDCR faultballs on the 2L SCM (M531) are yellow.

b) Make sure the CW XDCR and SB XDCR faultballs on the 1L and 3L SCMs are black.

2) For -200 Series SCMs:

a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1L, 2L, and 3L.

S 435-264

(8) Connect electrical connector D41763 to the E3-1 equipment shelf and do this step:

(a) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 215-265

(9) Disconnect electrical connector D41765 from the E3-1 equipment shelf and do these checks:

(a) Look at the left SCMs for these faults:

1) For -100 Series SCMs:

a) Make sure the CW XDCR and SB XDCR faultballs on the 3L SCM (M532) are yellow.

b) Make sure the CW XDCR and SB XDCR faultballs on the 1L and 2L SCMs are black.

2) For -200 Series SCMs:

a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1L, 2L, and 3L.

S 435-266

(10) Connect electrical connector D41765 to the E3-1 equipment shelf and do this step:

(a) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 865-267

(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC

(b) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC

S 865-268

(12) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC

(b) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC

S 215-269

(13) Turn the control wheel to its full clockwise position and hold it there for 30 seconds. Do these checks:

(a) Make sure the amber SPOILERS light on the P5 panel is off.

(b) Push the ECS/MSG switch on the P61 panel and do this check:

1) Make sure the white spoilers message does not show on the bottom EICAS display.

(c) Make sure none of the right SCMs have a fault.

1) For -100 Series SCMs,
make sure all the faultballs are black.

2) For -200 Series SCMs,
make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX?, do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

S 215-270
(14) Disconnect electrical connector D41767 from the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the CW XDCR and SB XDCR faultballs on the 1R SCM (M533) are yellow.
b) Make sure the CW XDCR and SB XDCR faultballs on the 2R and 3R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1R, 2R, and 3R.

S 435-271
(15) Connect electrical connector D41767 to the E4-1 equipment shelf and do this step:
(a) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 215-272
(16) Disconnect electrical connector D41769 from the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the CW XDCR and SB XDCR faultballs on the 2R SCM (M534) are yellow.
b) Make sure the CW XDCR and SB XDCR faultballs on the 1R and 3R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1R, 2R, and 3R.

S 435-273
(17) Connect electrical connector D41769 to the E4-1 equipment shelf and do this step:
(a) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 215-274
(18) Disconnect electrical connector D41771 from the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the CW XDCR and SB XDCR faultballs on the 3R SCM (M535) are yellow.
b) Make sure the CW XDCR and SB XDCR faultballs on the 1R and 2R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the CW RVDT FAULT and the S/B LVDT FAULT are in the EXISTING FAULTS of SCMs 1R, 2R, and 3R.

S 435-275
(19) Connect electrical connector D41771 to the E4-1 equipment shelf and do this step:
(a) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 865-276
(20) Move the control wheel back to its neutral position.

S 865-277
(21) Move the speedbrake lever back to its down-and-locked detent position.

S 865-278
(22) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
(b) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC

K. Spoiler/Speedbrake System Operation With a Power Control Actuator Failure - Test

S 865-279
(1) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC

(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 215-280
(2) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message does not show on the bottom EICAS display.

S 035-281
(3) Disconnect electrical connector D41761 from the E3-1 equipment shelf.

S 215-282
(4) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is on.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-283
(5) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 1 and 12 stay in their down positions (aligned with the wing).
(b) Make sure spoilers 2 thru 11 move up.

S 865-284
(6) Move the speedbrake lever back to its down-and-locked detent position.

S 215-285
(7) Connect electrical connector D41761 to the E3-1 equipment shelf and do these checks:
(a) Look at the left SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 1L SCM (M530) are yellow.

b) Make sure the PCA faultballs on the 2L and 3L SCMs are black.

2) For -200 Series SCMs:

a) Make sure the S/B LVDT FAULT, the PCA 1 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 1L SCM (M530).

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX? , do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

Push one of the arrow keys to move through the faults.

b) Make sure no PCA faults are in the EXISTING FAULTS of the 2L and 3L SCMs.

S 865-286

(8) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 035-287

(9) Disconnect electrical connector D41763 on the E3-1 equipment shelf.

S 215-288

(10) Stop for 30 seconds and then do these checks:

(a) Make sure the amber SPOILERS light on the P5 panel is on.

(b) Push the ECS/MSG switch on the P61 panel and do this check:

1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-289
(11) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 5 and 8 stay in their down positions (aligned with the wing).
(b) Make sure spoilers 1, 2, 3, 4, 6, 7, 9, 10, 11, and 12 move up.

S 865-290
(12) Move the speedbrake lever back to its down-and-locked detent position.

S 215-291
(13) Connect electrical connector D41763 to the E3-1 equipment shelf and do these checks:
(a) Look at the left SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 2L SCM (M531) are yellow.
b) Make sure the PCA faultballs on the 1L and 3L SCMs are black.
2) For -200 Series SCMs:
a) Make sure the S/B LVDT FAULT, the PCA 5 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 2L SCM (M531).
b) Make sure no PCA faults are in the EXISTING FAULTS of the 1L and 3L SCMs.

S 865-292
(14) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 035-293
(15) Disconnect electrical connector D41765 from the E3-1 equipment shelf.

S 215-294
(16) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is on.

(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-295
(17) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 6 and 7 stay in their down positions (aligned with the wing).
(b) Make sure spoilers 1, 2, 3, 4, 5, 8, 9, 10, 11, and 12 move up.

S 865-296
(18) Move the speedbrake lever back to its down-and-locked detent position.

S 215-297
(19) Connect electrical connector D41765 to the E3-1 equipment shelf and do these checks:
(a) Look at the left SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 3L SCM (M532) are yellow.
b) Make sure the PCA faultballs on the 1L and 2L SCMs are black.
2) For -200 Series SCMs:
a) Make sure the S/B LVDT FAULT, the PCA 6 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 3L SCM (M532).
b) Make sure no PCA faults are in the EXISTING FAULTS of the 1L and 2L SCMs.

S 865-298
(20) Push the RESET switch on SCMs 1L, 2L, and 3L.

S 865-299
(21) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC

(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 865-300
(22) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 215-301
(23) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the R FLT CONT ELEC message does not show on the bottom EICAS display.

S 035-302
(24) Disconnect electrical connector D41767 from the E4-1 equipment shelf.

S 215-303
(25) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is on.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-304
(26) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 2 and 11 stay in their down positions (aligned with the wing).
(b) Make sure spoilers 1, 3 thru 10, and 12 move up.

S 865-305
(27) Move the speedbrake lever back to its down-and-locked detent position.

S 215-306
(28) Connect electrical connector D41767 to the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 1R SCM (M533) are yellow.
b) Make sure the PCA faultballs on the 2R and 3R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the S/B LVDT FAULT, the PCA 2 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 1R SCM (M533).
b) Make sure no PCA faults are in the EXISTING FAULTS of the 2R and 3R SCMs.

S 865-307
(29) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 035-308
(30) Disconnect electrical connector D41769 from the E4-1 equipment shelf.

S 215-309
(31) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is on.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-310
(32) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 3 and 10 stay in their down positions (aligned with the wing).

(b) Make sure spoilers 1, 2, 4 thru 9, 11, and 12 move up.

S 865-311
(33) Move the speedbrake lever back to its down-and-locked detent position.

S 215-312
(34) Connect electrical connector D41769 to the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 2R SCM (M534) are yellow.
b) Make sure the PCA faultballs on the 1R and 3R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the S/B LVDT FAULT, the PCA 3 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 2R SCM (M534).
b) Make sure no PCA faults are in the EXISTING FAULTS of the 1R and 3R SCMs.

S 865-313
(35) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 035-314
(36) Disconnect electrical connector D41771 from the E4-1 equipment shelf.

S 215-315
(37) Stop for 30 seconds and then do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is on.
(b) Push the ECS/MSG switch on the P61 panel and do this check:
1) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 215-316
(38) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 4 and 9 stay in their down positions (aligned with the wing).
(b) Make sure spoilers 1, 2, 3, 5, 6, 7, 8, 10, 11, and 12 move up.

S 865-317
(39) Move the speedbrake lever back to its down-and-locked detent position.

S 215-318
(40) Connect electrical connector D41771 to the E4-1 equipment shelf and do these checks:
(a) Look at the right SCMs for these faults:
1) For -100 Series SCMs:
a) Make sure the SB XDCR and PCA faultballs on the 3R SCM (M535) are yellow.
b) Make sure the PCA faultballs on the 1R and 2R SCMs are black.
2) For -200 Series SCMs:
a) Make sure the S/B LVDT FAULT, the PCA 4 FAULT, and the PSM 2 FAULT are in the EXISTING FAULTS of the 3R SCM (M535).
b) Make sure no PCA faults are in the EXISTING FAULTS of the 1R and 2R SCMs.

S 865-319
(41) Push the RESET switch on SCMs 1R, 2R, and 3R.

S 865-320
(42) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC

(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

L. Spoiler/Speedbrake System Operation With a Left Hydraulic System Pressure Failure - Test

S 215-321

(1) Make sure the control wheel is in its neutral position.

S 865-322

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 215-323

(3) Move the speedbrake lever to its full upstop position and do these checks:
   (a) Make sure the amber SPOILERS light on the P5 panel comes on in less than eight seconds.
   (b) Make sure the amber SPOILERS message shows on the top EICAS display.
   (c) Make sure spoilers 3, 5, 8, and 10 stay in their down positions (aligned with the wing).
   (d) Make sure spoilers 1, 2, 4, 6, 7, 9, 11, and 12 move up.

S 865-324

(4) Move the speedbrake lever back to its down-and-locked detent position.

S 865-325

(5) Supply pressure to the left hydraulic system (Ref 29-11-00).

S 215-326

(6) Do these checks:
   (a) Make sure the amber SPOILERS light on the P5 panel is off.
   (b) Make sure the amber SPOILERS message does not show on the top EICAS display.

M. Spoiler/Speedbrake System Operation With a Right Hydraulic System Pressure Failure - Test

S 865-327

(1) Remove the power from the right hydraulic system (Ref 29-11-00).

S 215-328

(2) Move the speedbrake lever to its full upstop position and do these checks:
   (a) Make sure the amber SPOILERS light on the P5 panel comes on in less than eight seconds.
   (b) Make sure the amber SPOILERS message shows on the top EICAS display.
   (c) Make sure spoilers 2, 4, 6, 7, 9, and 11 stay in their down positions (aligned with the wing).
   (d) Make sure spoilers 1, 3, 5, 8, 10, and 12 move up.

S 865-329

(3) Move the speedbrake lever back to its down-and-locked detent position.

S 865-330

(4) Supply pressure to the right hydraulic system (Ref 29-11-00).

S 215-331

(5) Do these checks:
   (a) Make sure the amber SPOILERS light on the P5 panel is off.
   (b) Make sure the amber SPOILERS message does not show on the top EICAS display.

N. Spoiler/Speedbrake System Operation With a Center Hydraulic System Pressure Failure - Test

S 865-332

(1) Remove the power from the center hydraulic system (Ref 29-11-00).

S 215-333

(2) Move the speedbrake lever to its full upstop position and do these checks:
   (a) Make sure the amber SPOILERS light on the P5 panel comes on in less than eight seconds.

(b) Make sure spoilers 1 and 12 stay in their down positions (aligned with the wing).
(c) Make sure spoilers 2 thru 11 move up.

S 865-334
(3) Move the speedbrake lever back to its down-and-locked detent position.

S 865-335
(4) Supply pressure to the center hydraulic system (Ref 29-11-00).

S 215-336
(5) Do these checks:
(a) Make sure the amber SPOILERS light on the P5 panel is off.
(b) Make sure the amber SPOILERS message does not show on the top EICAS display.
(c) Make sure none of the SCMs have a fault.
1) For -100 Series SCMs, make sure all the faultballs are black.
2) For -200 Series SCMs, make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX?, do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

O. Ground Speedbrake Delay - Test

S 045-015

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for flight mode simulation (Ref 32-09-02).

S 865-337
(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S19, AIR/GND SYS 2

S 215-338
(3) Move the speedbrake lever to a position that is approximately one-half of its full travel position and do this check:
(a) Make sure all the spoilers extend to a position that is approximately one-half of their full travel positions.

S 865-339
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel at the same time:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S19, AIR/GND SYS 2

S 225-352
(5) Make sure spoilers 2, 3, 10, and 11 move to their full down positions. After 1.0 to 1.5 seconds, make sure these spoilers go back to approximately one-half of their full travel positions.

S 215-353
(6) Move the speedbrake lever back to its down-and-locked detent position and do this check:
(a) Make sure the SPOILERS light on the P5 panel is off.

NOTE: Ignore the white SPOILERS message on the bottom EICAS display and the yellow MODULE faultballs (-100 series SCMs only).

S 865-354
(7) Push the RESET switch on the six SCMs.

P. Spoiler Panel Position Monitor - Test

S 215-355
(1) Make sure the control wheel is in its neutral position.

S 865-356
(2) Move the speedbrake lever in the direction of its upstop position until spoilers 6 and 7 extend 25 ±1.0 degrees (11.69 ±0.46 inches (296 +/- 11 mm)).

S 215-357
(3) Make sure all the spoiler panels are up.

S 215-358
(4) Disconnect electrical connector D40105 from the E3-1 equipment shelf and do these checks:
(a) Make sure spoilers 6 and 7 move down.
(b) Make sure spoilers 1 thru 5 and 8 thru 12 stay in their up positions.

S 215-359
(5) Move the speedbrake lever to its full upstop position and do these checks:
(a) Make sure spoilers 5 and 8 move down.
(b) Make sure spoilers 5 thru 8 stay in their full down positions.
(c) Make sure that spoilers 1 thru 4, 6, 7, and 9 thru 12 stay up.

S 865-360
(6) Move the speedbrake lever back to its down-and-locked detent position.

S 435-361
(7) Connect electrical connector D40105 to the E3-1 equipment shelf and do this step:
(a) Push the RESET switch on SCMs 2L and 3L.

S 215-362
(8) Move the speedbrake lever to its full upstop position and do this check:
(a) Make sure all the spoilers move up.

S 865-363

(9) Move the speedbrake lever back to its down-and-locked detent position.

S 215-364

(10) Stop for 30 seconds and then do these checks:

(a) Make sure the amber SPOILERS light on the P5 panel is off.

(b) Make sure the white SPOILERS message does not show on the bottom EICAS display.

Q. CSEU Power Supply Interface - Test

S 865-365

(1) Open the circuit breakers shown in Table 508 and attach the DO-NOT-CLOSE tags:

TABLE 508 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 025-366
(2) Remove power supply modules (PSMs) 1R M538, 1L M536, and 2L (M537) (Ref 27-09-00).

S 865-367
(3) Move the EICAS computer select switch on the P9 panel to L.

S 865-368
(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 215-369
(5) Stop for 31 seconds and then do these steps:
(a) Push the ECS/MSG switch on the P61 panel and do these checks:
1) Make sure the R FLT CONT ELEC message shows on the bottom EICAS display.
2) Make sure the L FLT CONT ELEC message does not show on the bottom EICAS display.

S 865-370
(6) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 025-371
(7) Remove PSM 2R (M539) (Ref 27-09-00).

S 425-016
(8) Install PSM 2L (M537) (Ref 27-09-00).

S 865-372
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC

(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 215-373
(10) Stop for 31 seconds and then do these steps:
(a) Make sure the L FLT CONT ELEC message shows on the bottom EICAS display.
(b) Make sure the R FLT CONT ELEC message does not show on the bottom EICAS display.

S 865-374
(11) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 425-375
(12) Install PSM 1R (M538) (Ref 27-09-00).

S 025-017
(13) Remove PSM 2L (M537) (27-09-00).

S 865-376
(14) Move the EICAS computer select switch on the P9 panel to R.

S 865-377
(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
(b) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC

S 215-378
(16) Stop for 31 seconds and then do these checks:
(a) Make sure the R FLT CONT ELEC message shows on the bottom EICAS display.
(b) Make sure the L FLT CONT ELEC message does not show on the bottom EICAS display.

S 865-379
(17) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
(b) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC

S 025-380
(18) Remove PSM 1R (M538) (Ref 27-09-00).

S 425-019
(19) Install PSM 1L (M536) (Ref 27-09-00).

S 865-381
(20) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
(b) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC

S 215-382
(21) Stop for 31 seconds and then do these checks:
(a) Make sure the L FLT CONT ELEC message shows on the bottom EICAS display.
(b) Make sure the R FLT CONT ELEC message does not show on the bottom EICAS display.

S 865-383
(22) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
(b) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC

S 425-384
(23) Install PSMs 1R (M538), 2L (M537), and 2R (M539) (Ref 27-09-00).

S 865-385
(24) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 508.

S 215-386
(25) Stop for 31 seconds and then do these steps:
(a) Push the RESET switch on each PSM and do this check:

NOTE: If it is necessary, temporarily open these circuit breakers to remove the PSM faultball:

- 11J2, EICAS CMPTR L
- 11J29, EICAS CMPTR R

1) Make sure the white SPOILERS, L FLT CONT ELEC, and R FLT CONT ELEC messages do not show on the bottom EICAS display.

S 865-387
(26) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 215-388
(27) Stop for 11 seconds and then do this check:
(a) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 865-389
(28) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
(b) 11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC

S 215-390
(29) Stop for 11 seconds and then do this check:
(a) Make sure the white SPOILERS message does not show on the bottom EICAS display.

S 865-391
(30) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 215-392
(31) Stop for 11 seconds and then do this check:
(a) Make sure the white SPOILERS message shows on the bottom EICAS display.

S 865-393
(32) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
(b) 11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 215-394
(33) Stop for 11 seconds and then do these checks:
(a) Make sure the white SPOILERS message does not show on the bottom EICAS display.
(b) Make sure the amber SPOILERS light on the P5 panel is off.

S 865-395
(34) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
(b) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC

S 215-396
(35) Stop for 11 seconds and then do this check:
(a) Make sure the amber SPOILERS light on the P5 panel is on.

S 865-397
(36) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC

(b) 11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC

S 215-398
(37) Stop for 11 seconds and then do this check:
(a) Make sure the amber SPOILERS light on the P5 panel is off.

S 865-399
(38) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
(b) 11G28, CSEU 2R AC OR FLT CONT ELEC 2R AC

S 215-400
(39) Stop for 11 seconds and then do this check:
(a) Make sure the amber SPOILERS light on the P5 panel is on.

S 865-401
(40) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
(b) 11G28, CSEU 2R AC OR FLT CONT ELEC 2R AC

S 865-402
(41) Push the RESET switch on each PSM.

NOTE: If it is necessary, temporarily open these circuit breakers to remove the PSM faultball:

- 11J2, EICAS CMPTR L
- 11J29, EICAS CMPTR R

S 215-403
(42) Stop for 31 seconds and then do these checks:
(a) Make sure the white SPOILERS, L FLT CONT ELEC or R FLT CONT ELEC messages do not show on the bottom EICAS display.

(b) Make sure the amber SPOILERS light on the P5 panel is off.
(c) Make sure all the PSM faultballs are black.

R. Put the Airplane Back to Its Usual Condition

S 095-404
(1) If it is necessary, remove the control wheel adapter equipment and protractor.

S 865-405
(2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 865-406
(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 445-407
(4) Do the activation procedure for the thrust reversers (Ref 78-31-00).

S 865-408
(5) Remove electrical power if it is not necessary (Ref 24-22-00).

SPOILERS - REMOVAL INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the twelve spoilers.
   B. The spoiler panels for spoilers 1 thru 3 and 10 thru 12 are the same but opposites. The spoiler panels for spoilers 4 and 9 are the same but opposites. The spoiler panels for spoilers 5 and 8 are the same but opposites. The spoiler panels for spoilers 6 and 7 are the same but opposites.
      (1) The spoilers are numbered 1 thru 12 from the outboard left wing spoiler to the outboard right wing spoiler.

TASK 27-61-01-024-011

2. Spoilers - Removal
   A. General
      (1) This task contains the removal procedures for the six spoiler pairs. Because this task contains six procedures, do only the applicable groups of steps.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.
   B. Equipment
      (1) Wooden Block/Wedge (to hold the spoiler in its up position)
   C. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-00/201, Trailing Edge Flap System
      (3) 27-61-02/201, Spoiler Power Control Actuator (PCA)
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) 78-31-00/201, Thrust Reverser System
   D. Access
      (1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

E. Prepare for the Removal

S 864-012
(1) Supply electrical power (Ref 24-22-00).

S 044-001

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(2) Do this procedure: Thrust Reverser Deactivation For Ground Maintenance (Ref 78-31-00).

S 864-002

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-139
(4) Extend the trailing edge flaps.

S 044-140
(5) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 864-003
(6) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-150
(7) Open the circuit breakers on the P11 panel that are shown in Table 401 and attach the DO-NOT-CLOSE tags.

TABLE 401 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 864-151
(8) Open the following circuit breaker on the P11 panel and attach the DO-NOT-CLOSE tags.
(a) 11G11, AUTO SPEED BRAKE

S 034-014
(9) Disconnect the PCA rod end from the applicable spoiler (Ref 27-61-02).

S 494-015
(10) Manually lift the applicable spoiler and use the wooden block to hold it in its up position.

F. Remove Spoiler 1 or 12 (Fig. 401)

S 034-016
(1) Disconnect the bonding jumper (4) from the spoiler (1) (2 locations).

S 034-017
(2) Remove the bolts (9, 25) from the bolt retainers (2).

S 034-018
(3) Remove the hinge bolts (17, 18).

S 024-019
(4) Remove the spoiler (1).

G. Remove Spoiler 2 or 11 (Fig. 402)

S 034-020
(1) Disconnect the bonding jumper (4, 10) from the spoiler (1) (2 locations).

S 034-021
(2) Remove the bolts (16, 25) from the bolt retainers (3, 8, 9).

S 034-022
(3) Remove the hinge bolts (11, 20).

S 024-023
(4) Remove the spoiler (1).

H. Remove Spoiler 3 or 10 (Fig. 403)

S 034-024
(1) Disconnect the bonding jumper (4) from the spoiler (1) (2 locations).

S 034-025
(2) Remove the bolts (18, 19) from the bolt retainers (3, 8, 9, 25).

S 034-026
(3) Remove the hinge bolts (14, 24).

S 024-027
(4) Remove the spoiler (1).

I. Remove Spoiler 4 or 9 (Fig. 404)

S 034-028
(1) Disconnect the bonding jumper (4) from the spoiler (1) (2 locations).

S 034-029
(2) Remove the bolts (18, 24) from the bolt retainers (2, 8, 9, 25).

S 034-030
(3) Remove the hinge bolts (14, 19).

S 024-031
(4) Remove the spoiler (1).

J. Remove Spoiler 5 or 8 (Fig. 406)

S 034-032
(1) Disconnect the bonding jumper (6) from the spoiler (1) (2 locations).

S 034-033
(2) Remove the bolts (7, 18) from the bolt retainers (11, 12).

S 034-034
(3) Remove the hinge bolts (17, 27).

S 024-035
(4) Remove the spoiler (1).

K. Remove Spoiler 6 or 7 (Fig. 408)

S 034-036
(1) Disconnect the bonding jumper (5) from the spoiler (1) (2 locations).

S 034-037
(2) Remove the bolts (7, 15) from the bolt retainers (11,16)

S 034-038
(3) Remove the hinge bolts (17, 27).

S 024-039
(4) Remove the spoiler (1).

TASK 27-61-01-424-040

3. Spoiler - Installation

A. General

(1) This task contains the installation procedures for the six spoiler pairs. Because this task contains six procedures, do only the applicable groups of steps.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Put the Airplane Back to Its Usual Condition" group of steps.

NOTE: If the bolt head and retainer are on the same side, then the bolt head may be on either side of the hinge.

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00015 Grease BMS 3-24 (Alternate)
(3) A00247 Sealant - Chromate Type - BMS 5-95

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Spoiler Assy - No. 1 (LH)	57-70-01	02	325 590

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	1	Spoiler Assy - No. 2 (LH)	57-70-01	02	325 590

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
403	1	Spoiler Assy - No. 3 (LH)	57-70-01	02	325 590

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
404	1	Spoiler Assy - No. 4 (LH)	57-70-01	02	685

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
406	1	Spoiler Assy - No. 5 (LH)	57-70-01	01	260 395

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
408	1	Spoiler Assy - NO. 6 (LH)	57-70-01	01	520 660

D. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/201, Trailing Edge Flap System
(3) 27-61-02/201, Spoiler Power Control Actuator (PCA)
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 27-61-00/501, Spoiler/Speedbrake Control System
(6) 78-31-00/201, Thrust Reverser System

E. Access
(1) Location Zones
553/653 Spoiler Number 6 and 7
554/654 Spoiler Number 5 and 8
562/662 Spoiler Number 4 and 9
563/663 Spoiler Number 3 and 10
564/664 Spoiler Number 2 and 11
565/665 Spoiler Number 1 and 12

F. Install Spoiler 1 or 12 (Fig. 401)

S 644-041
(1) Apply a thin layer of grease to the smooth surfaces on the bolts and washers before you install them.

S 984-042
(2) Put the spoiler (1) in its correct location on the airplane.

S 434-043
(3) Install these components:
(a) The bolt (18) through the bolt retainer (8), washers (21, 22), bushing (19), and nut (20) (View A)
1) Tighten the nut (20) to 1000-1400 pound-inches (113-158 Nm).
(b) The bolt (17) through the link assembly (3), washer (13, 15), bushing (14), and nut (16) (View E-E, 2 locations)
1) Tighten the nut (16) to 65-100 pound-inches (7.4-11.3 Nm).
(c) The bolt (9) through the bolt retainer (2), washers (10, 11), and nut (12) (View D-D)
(d) The bolt (25) through the bolt retainer (2), washers (10, 24), and nut (23) (View G-G)
(e) The bolt (18) through the bolt retainer (8), bushings (19), washers (21, 22), and nut (20) (View F-F).
1) Tighten the nut (20) to 1000-1400 pound-inches (113-158 Nm).

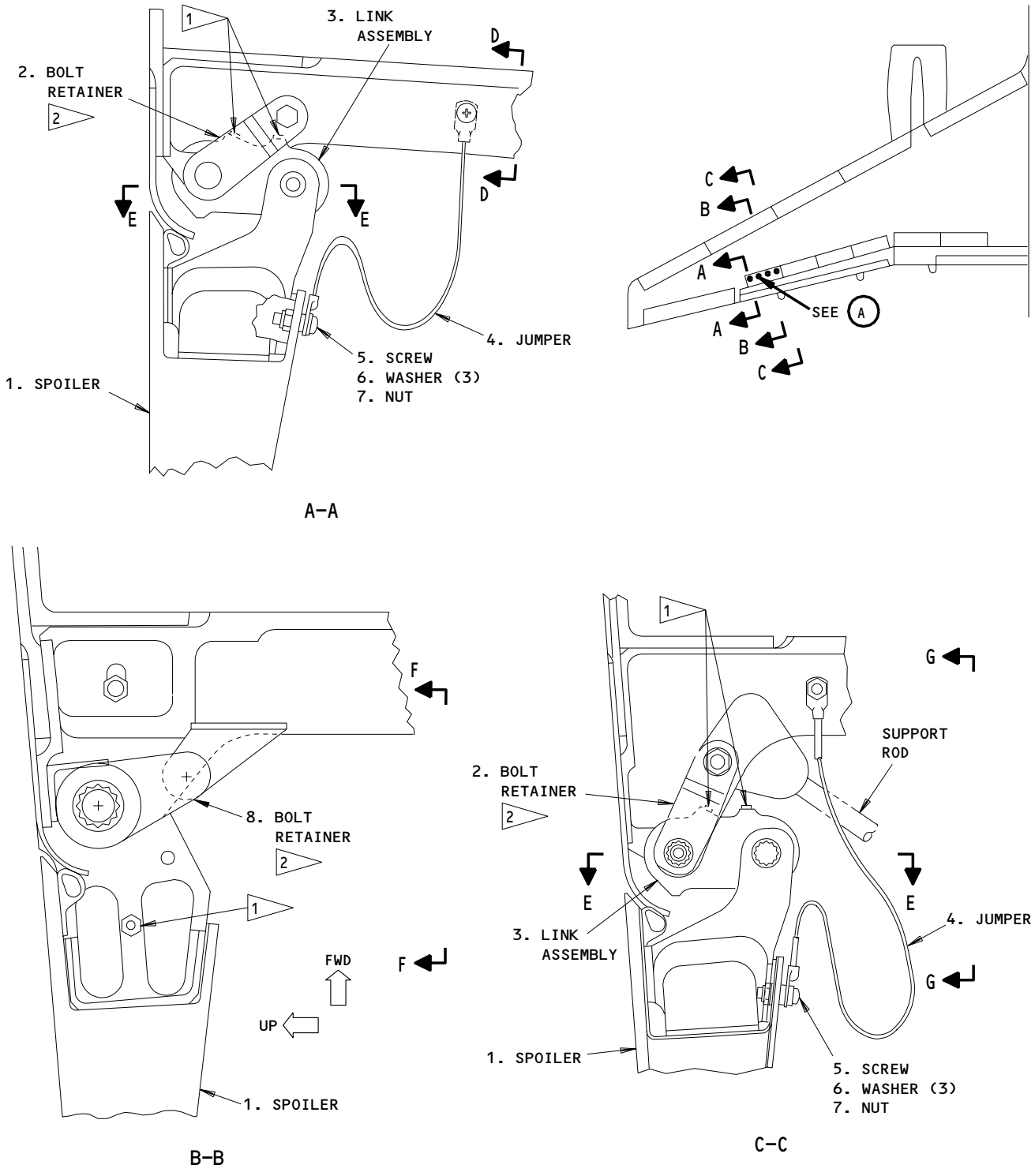
S 434-044
(4) Connect the jumper (4) to the spoiler (1) (2 locations) and do this step:
(a) Apply some of the sealant to the connection points for the jumper.

S 094-045
(5) Remove the wooden block and lower the spoiler.

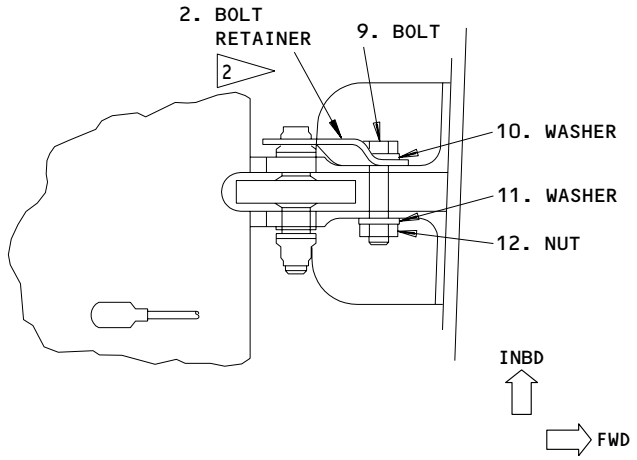
S 214-046
(6) Manually move the spoiler through its full travel range and do this check:
(a) Make sure the spoiler moves freely.

S 434-047
(7) Connect the PCA rod end to the spoiler (Ref 27-61-02).

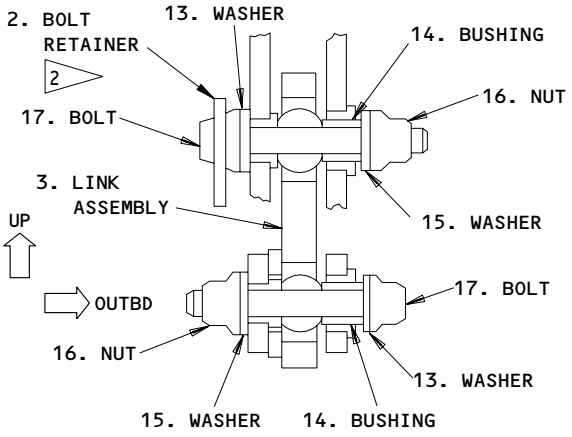
S 644-048
(8) Lubricate the grease fittings.



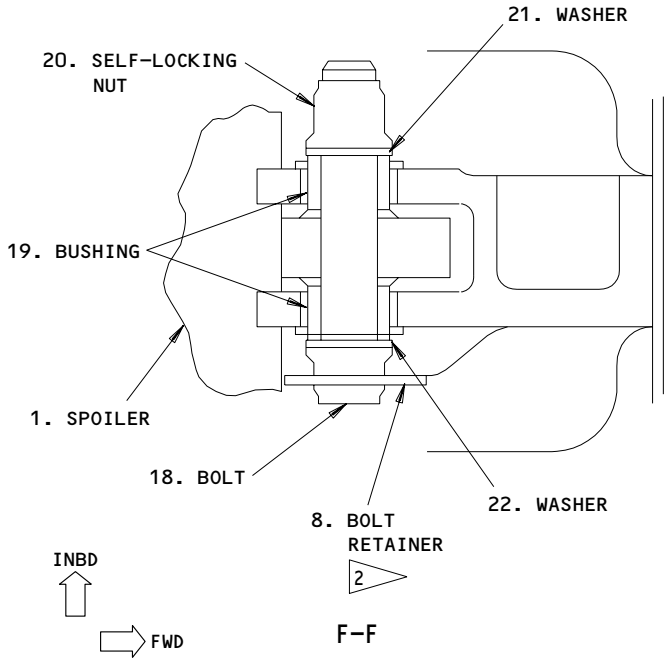
Spoiler 1 or 12 Installation
Figure 401 (Sheet 1)



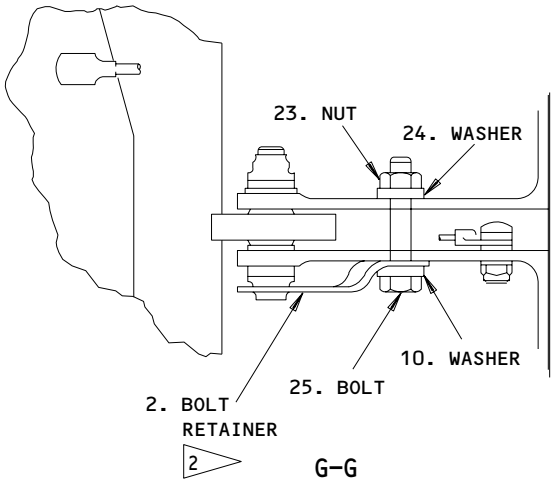
D–D



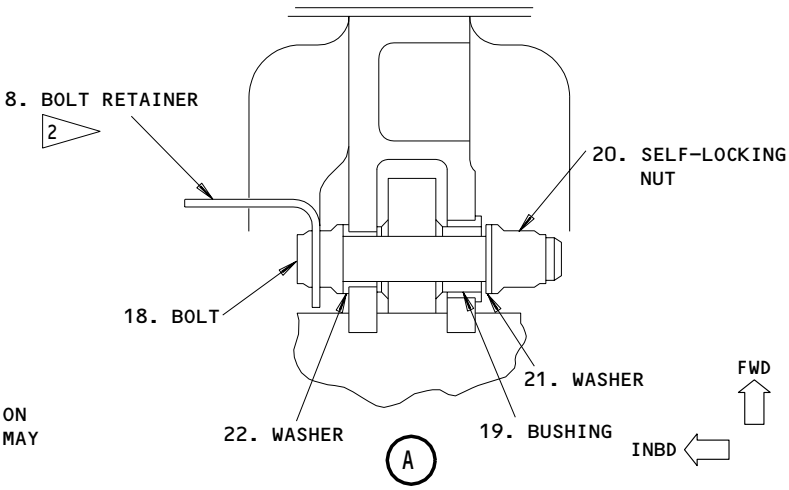
E–E



F–F



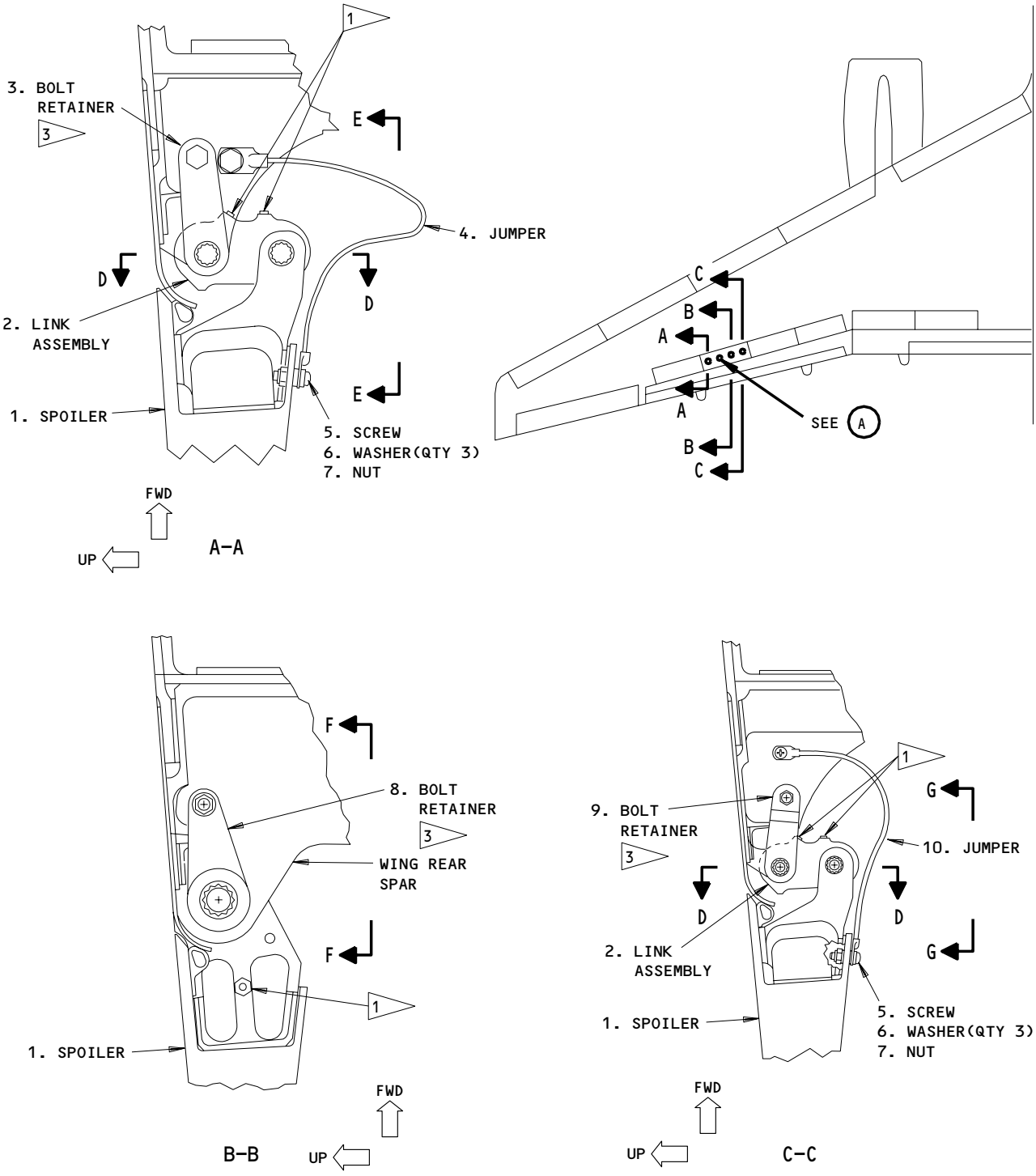
G–G



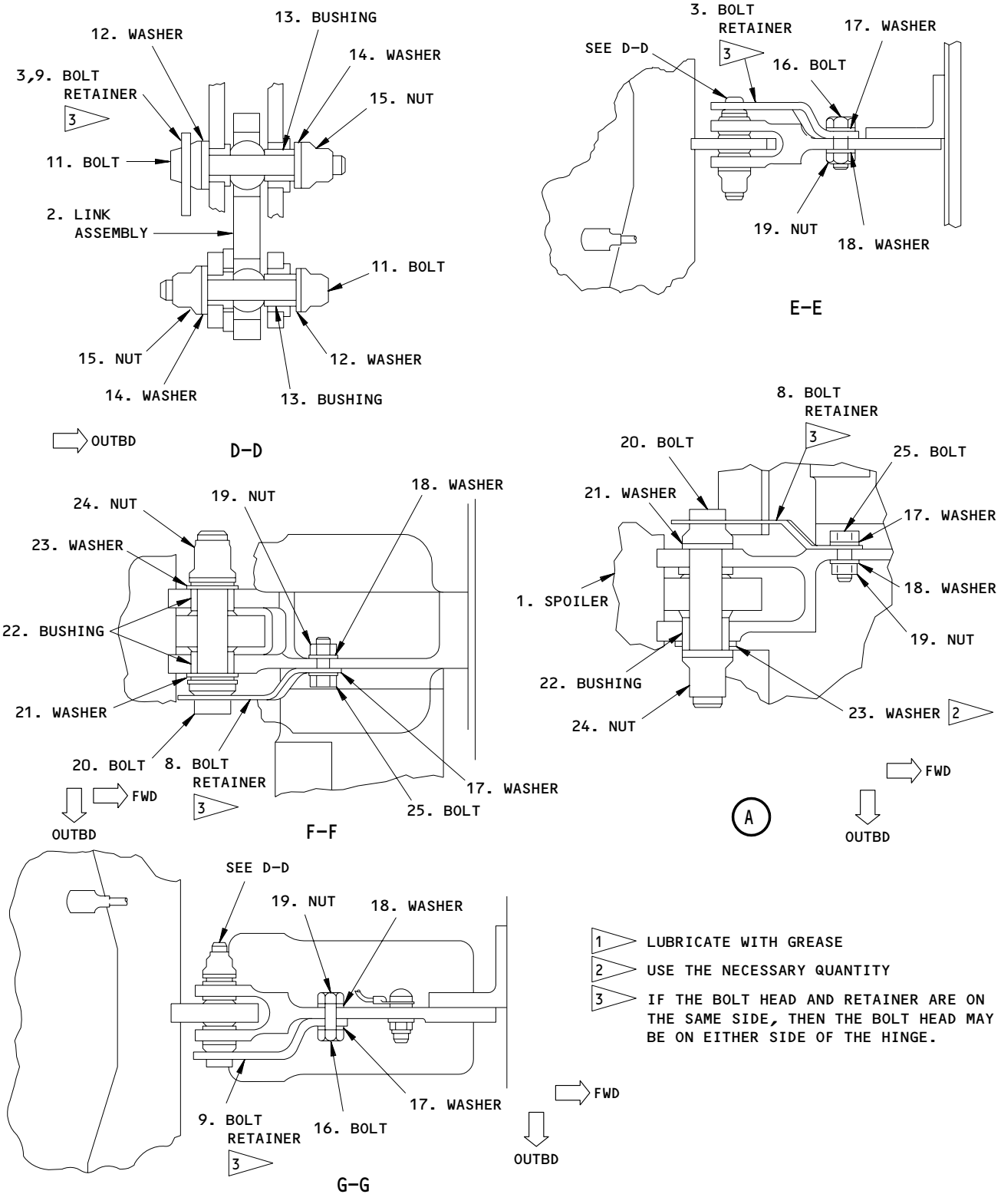
1 LUBRICATE WITH GREASE

2 IF THE BOLT HEAD AND RETAINER ARE ON THE SAME SIDE, THEN THE BOLT HEAD MAY BE ON EITHER SIDE OF THE HINGE.

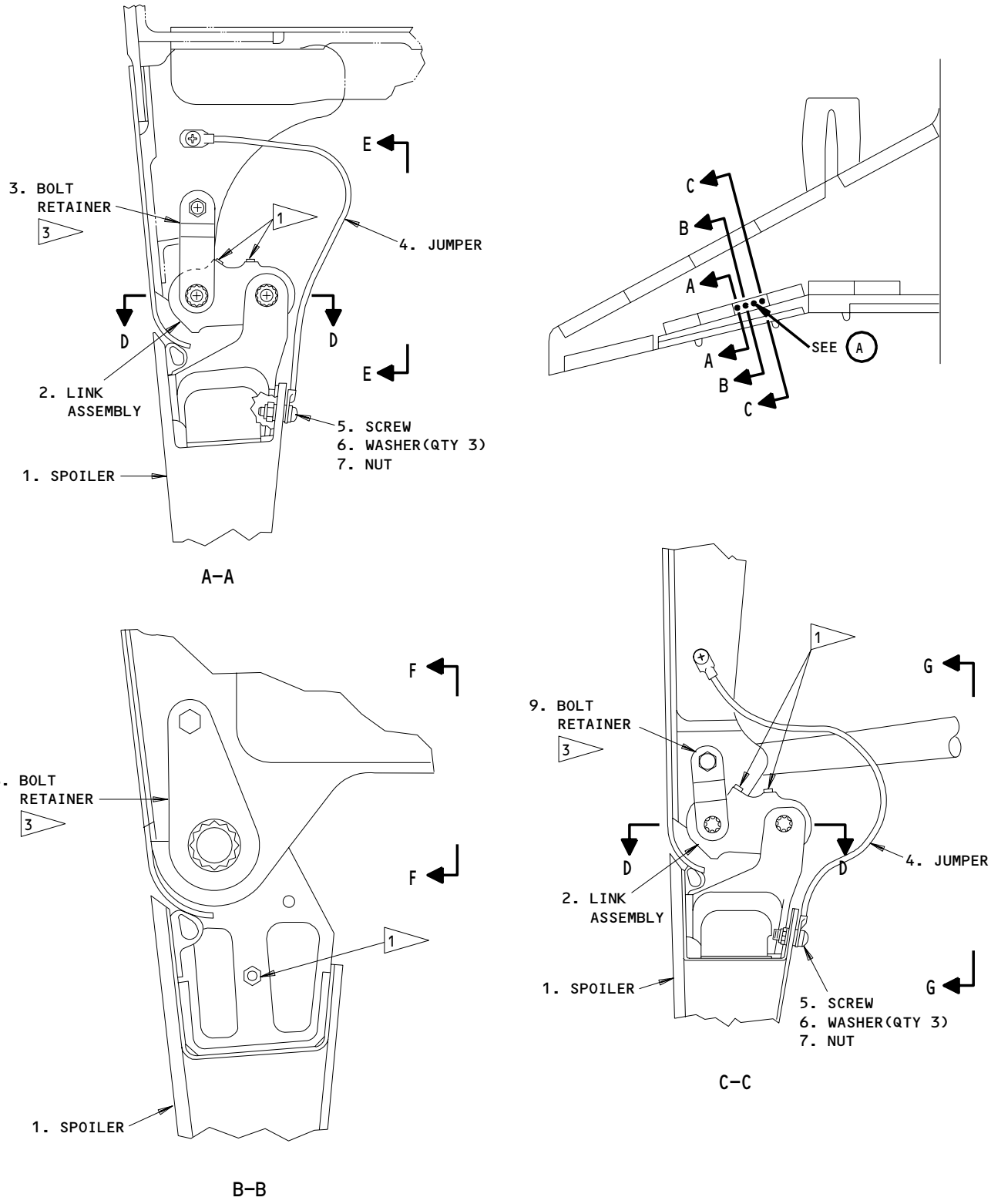
Spoiler 1 or 12 Installation
Figure 401 (Sheet 2)



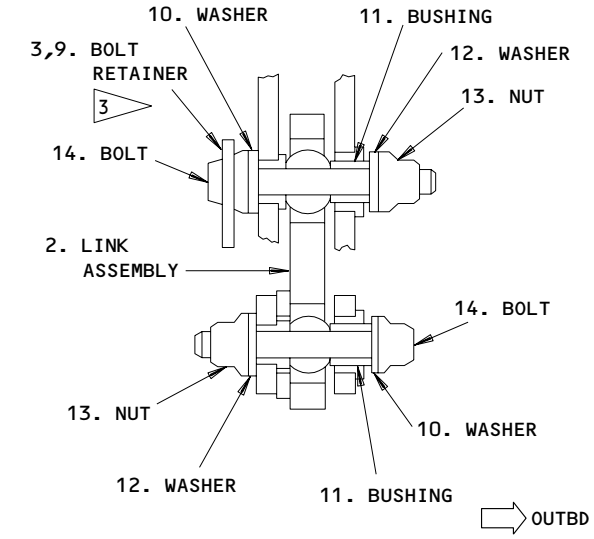
Spoiler 2 OR 11 Installation
Figure 402 (Sheet 1)



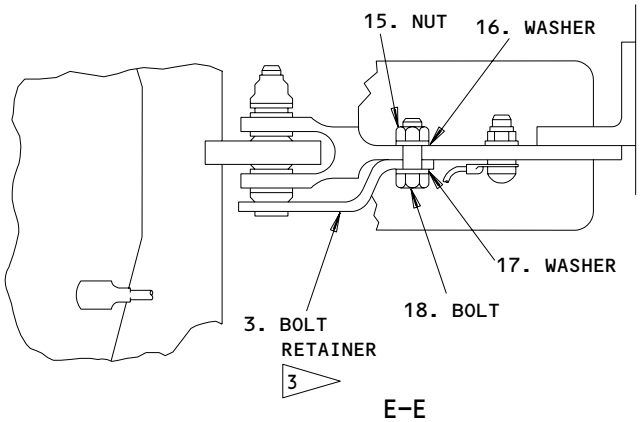
Spoiler 2 or 11 Installation
Figure 402 (Sheet 2)



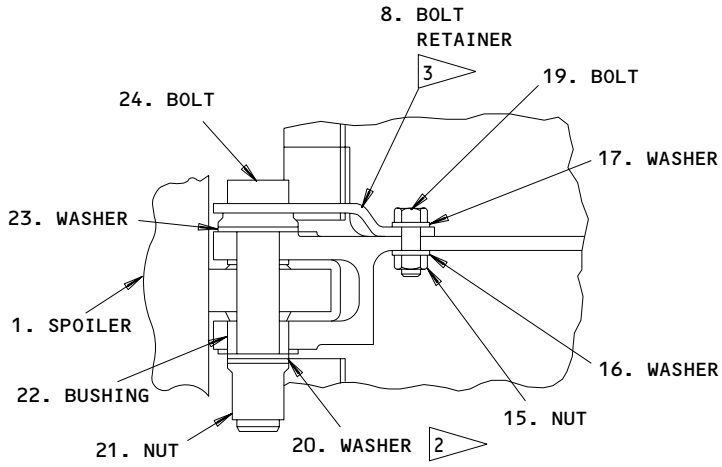
Spoiler 3 or 10 Installation
Figure 403 (Sheet 1)



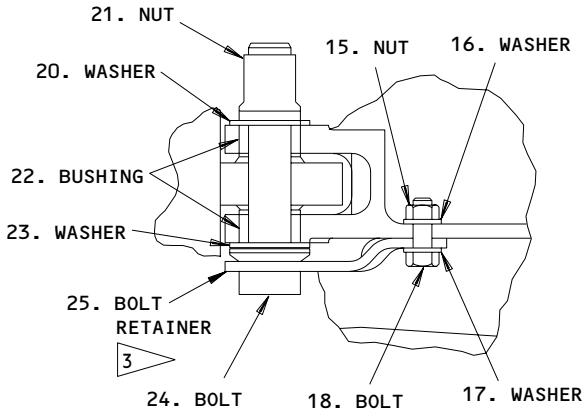
D–D



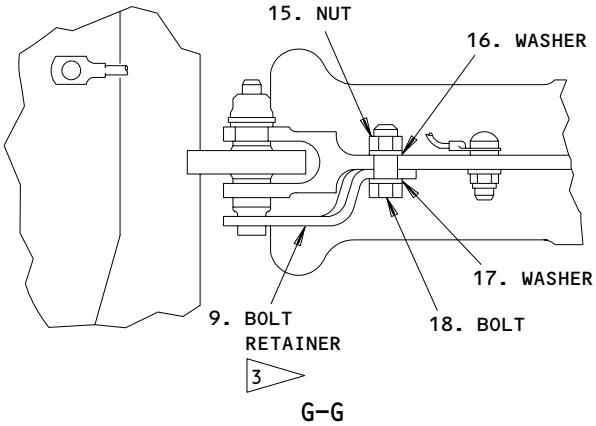
E–E



F–F



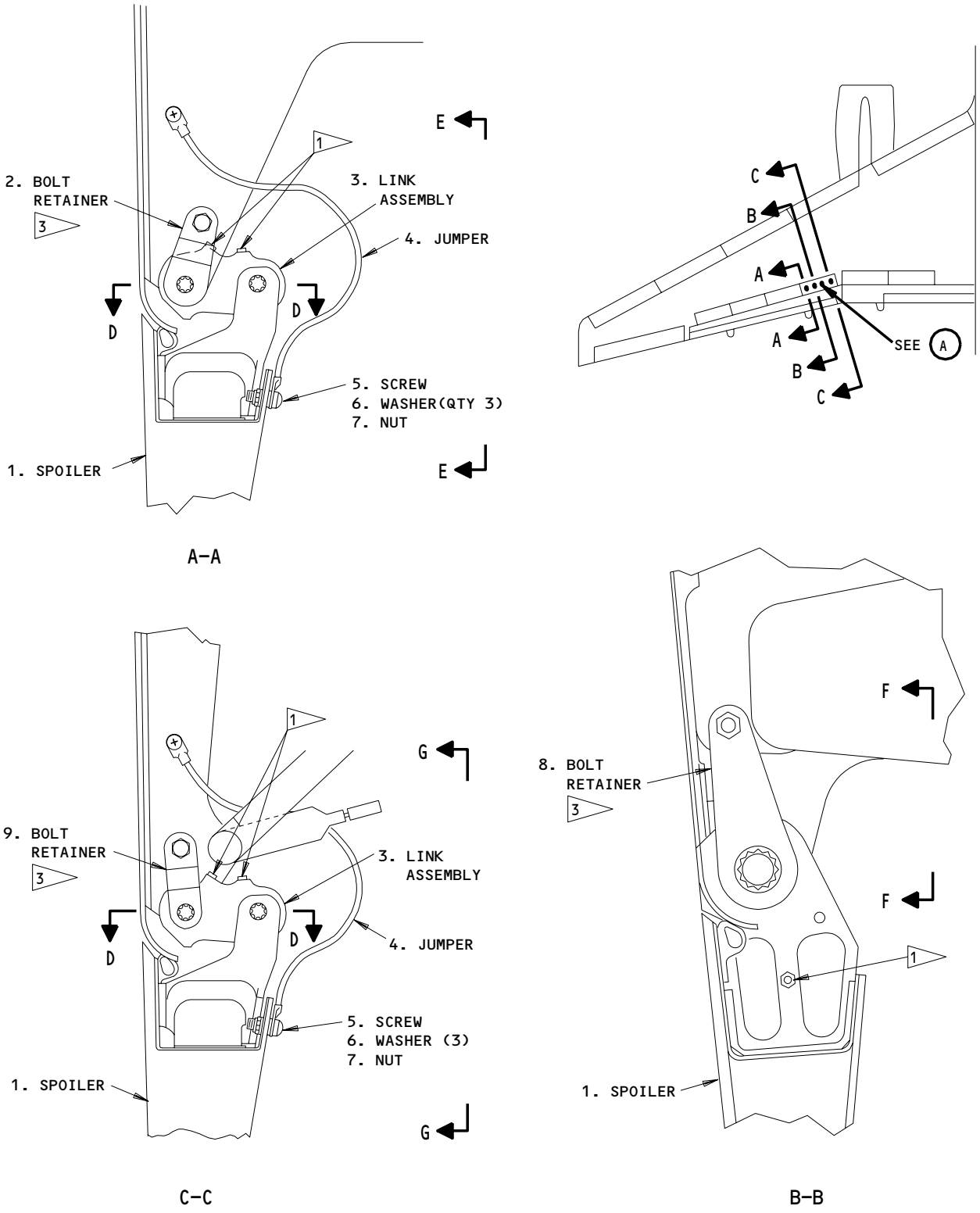
A



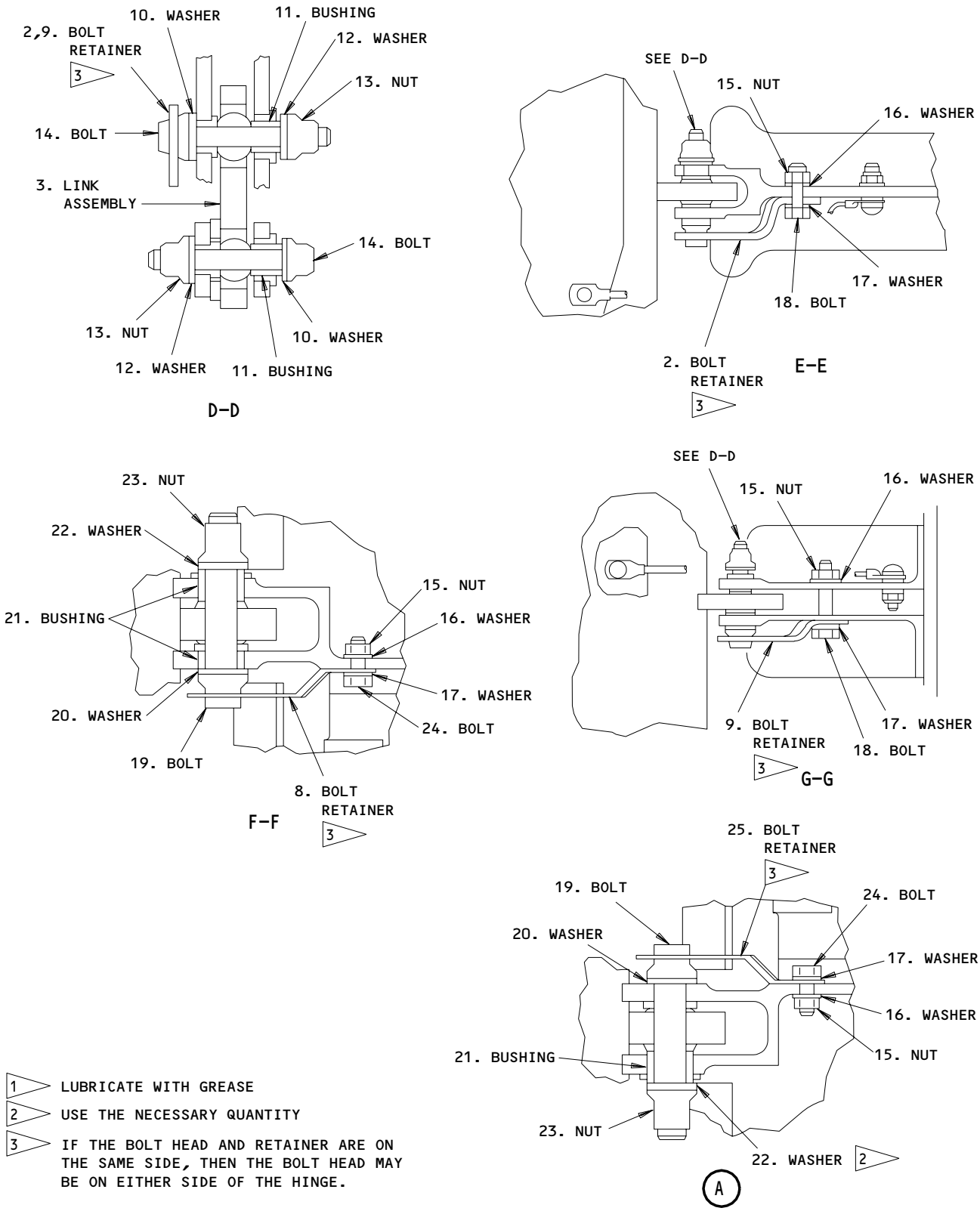
G–G

1. LUBRICATE WITH GREASE
2. USE THE NECESSARY QUANTITY
3. IF THE BOLT HEAD AND RETAINER ARE ON THE SAME SIDE, THEN THE BOLT HEAD MAY BE ON EITHER SIDE OF THE HINGE.

Spoiler 3 or 10 Installation
Figure 403 (Sheet 2)



Spoiler 4 or 9 Installation
Figure 404 (Sheet 1)

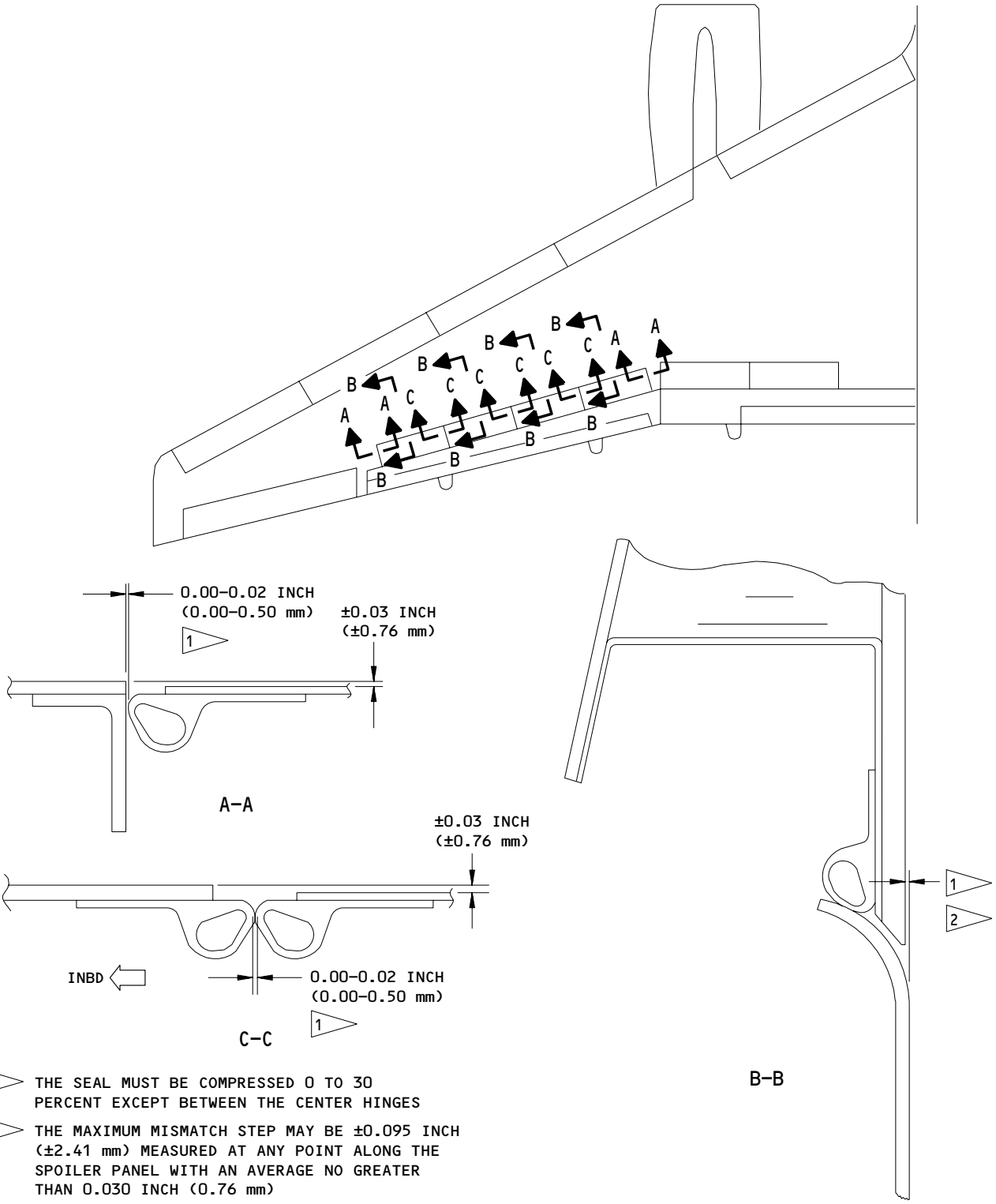


1 LUBRICATE WITH GREASE

2 USE THE NECESSARY QUANTITY

3 IF THE BOLT HEAD AND RETAINER ARE ON THE SAME SIDE, THEN THE BOLT HEAD MAY BE ON EITHER SIDE OF THE HINGE.

Spoiler 4 or 9 Installation
Figure 404 (Sheet 2)



1 THE SEAL MUST BE COMPRESSED 0 TO 30 PERCENT EXCEPT BETWEEN THE CENTER HINGES

2 THE MAXIMUM MISMATCH STEP MAY BE ±0.095 INCH (±2.41 mm) MEASURED AT ANY POINT ALONG THE SPOILER PANEL WITH AN AVERAGE NO GREATER THAN 0.030 INCH (0.76 mm)

Outboard Spoiler Seals
Figure 405

S 864-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-049

(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

TABLE 402 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 864-050
(11) Move the speedbrake lever to its full upstop position.

S 864-051
(12) Retract the trailing edge flaps.

S 044-052
(13) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-053
(14) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-054
(15) Make sure the spoiler PCA RVDT is adjusted correctly (Ref 27-61-00).

S 824-055
(16) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary (Fig. 405).

S 824-005
(17) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

G. Install Spoiler 2 or 11 (Fig. 402)

S 644-056
(1) Apply a thin layer of grease to the smooth surfaces of the bolts and washers before you install them.

S 984-057
(2) Put the spoiler (1) in its correct location on the airplane.

S 434-058
(3) Install these components:
(a) The bolt (20) through the bolt retainer (8), washers (21, 23), bushing (22), and nut (24) (View A).
1) Tighten the nut (24) to 1000-1470 pound-inches (113-166 Nm).

(b) The bolt (25) through the bolt retainer (8), washers (17, 18), and nut (19)
(c) The bolt (11) through the link assembly (2), washers (12, 14), bushing (13), and nut (15) (View D-D) (2 locations)
1) Tighten the nut (15) to 65-100 pound-inches (7.4-11.2 Nm).
(d) The bolt (16) through the bolt retainer (3, 9), washers (17, 18), and nut (19) (View E-E and G-G)
(e) The bolt (20) through the bolt retainer (8), bushings (22), washers (21, 23), and nut (24) (View F-F)
1) Tighten the nut (24) to 1000-1470 pound-inches (113-166 Nm).
(f) The bolt (25) through the bolt retainer (8), washers (17, 18), and nut (19).

S 434-059
(4) Connect the jumper (4, 10) to the spoiler (2 locations) and do this step:
(a) Apply some of the sealant to the connection points for the jumper.

S 094-060
(5) Remove the wooden block and lower the spoiler.

S 214-061
(6) Manually move the spoiler through its full travel range and do this check:
(a) Make sure the spoiler moves freely.

S 434-063
(7) Connect the PCA rod end to the spoiler (Ref 27-61-02).

S 644-064
(8) Lubricate the grease fittings.

S 864-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-152
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

S 864-066
(11) Move the speedbrake lever to its full upstop position.

S 864-067
(12) Retract the trailing edge flaps.

S 044-068
(13) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-069
(14) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-070
(15) Operate the spoilers through their full travel and ensure that no spoiler faults are indicated on EICAS or CSEU's.

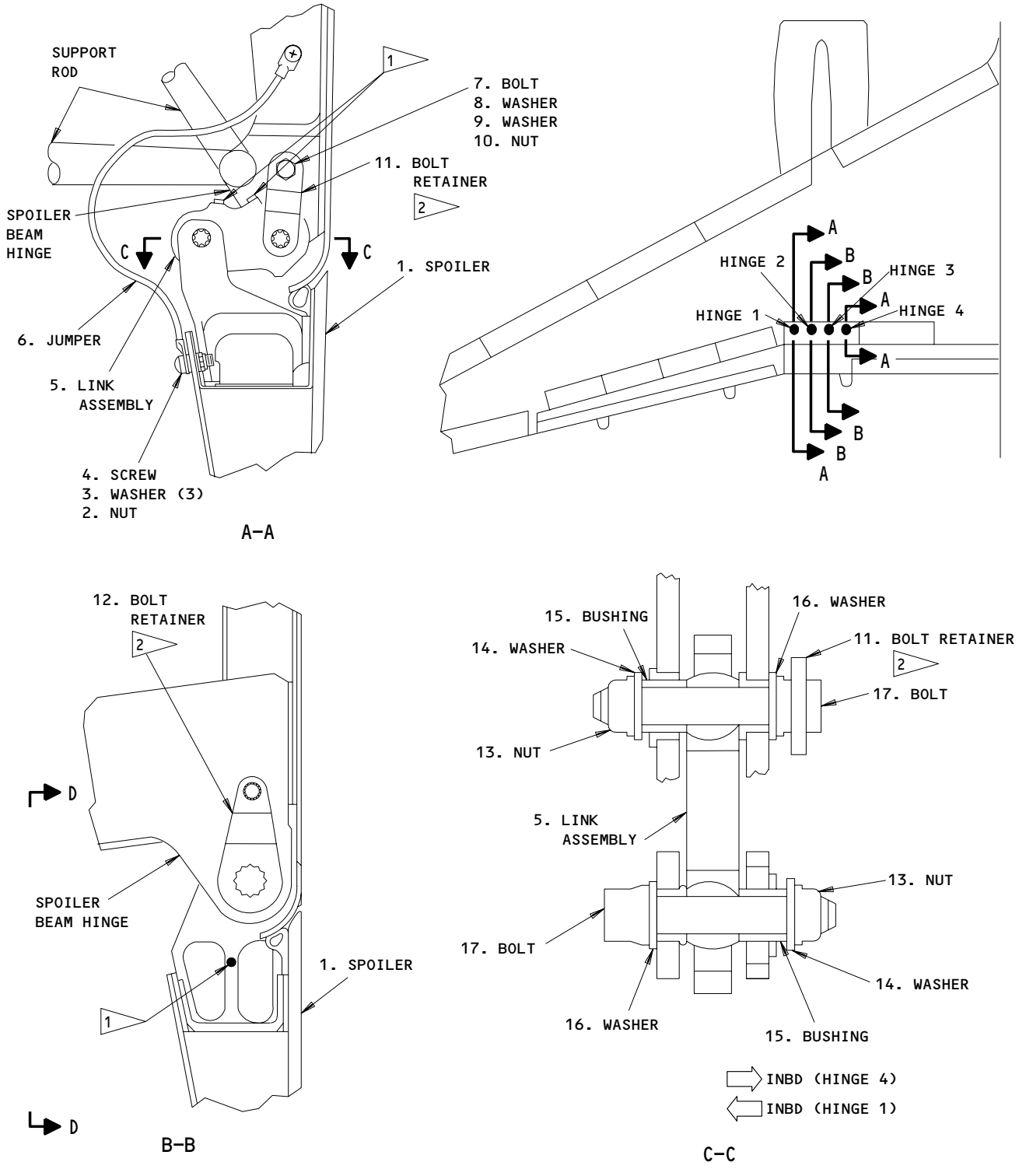
S 824-071
(16) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary (Fig. 405).

S 824-072
(17) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

H. Install Spoiler 3 or 10 (Fig. 403)

S 644-073
(1) Apply a thin layer of grease to the nuts, bolts, and washers before you install them.

S 984-074
(2) Put the spoiler (1) in its correct location on the airplane.



Spoiler 5 or 8 Installation
Figure 406 (Sheet 1)

S 434-075

(3) Install these components:

(a) The bolt (24) through the bolt retainer (25), washers (20, 23), bushings (22), and nut (21) (View A)

1) Tighten the nut (21) to 1000-1400 pound-inches (113-158 Nm).

(b) The bolt (18) through the bolt retainer (25), washers (16, 17), and nut (15)

(c) The bolt (14) through the link assembly (2), washers (10, 12), bushing (11), and nut (13), (View D-D, 2 locations)

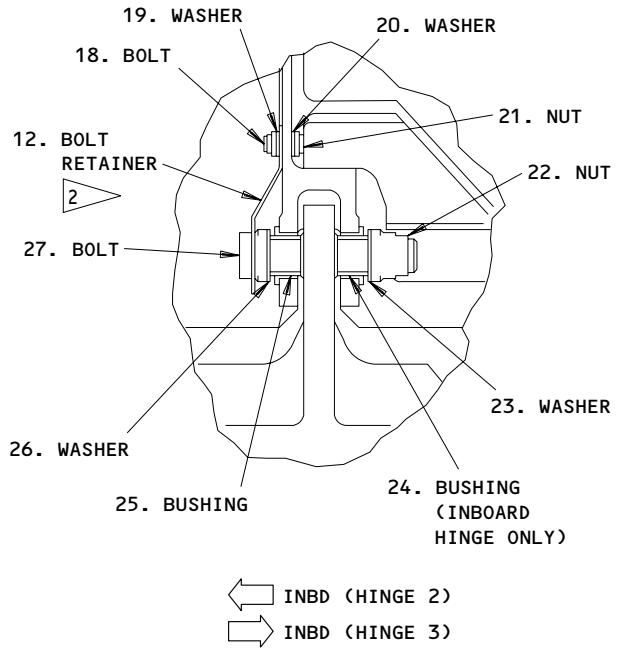
1) Tighten the nut (13) to 65-100 pound-inches (7.4-11.2 Nm).

(d) The bolt (18) through the bolt retainer (3 or 9), washers (16, 17) and nut (15) (View E-E and G-G)

(e) The bolt (24) through the bolt retainer (8), bushing (22), washers (20, 23), and nut (21) (View F-F)

1) Tighten the nut (21) to 1000-1400 pound-inches (113-158 Nm).

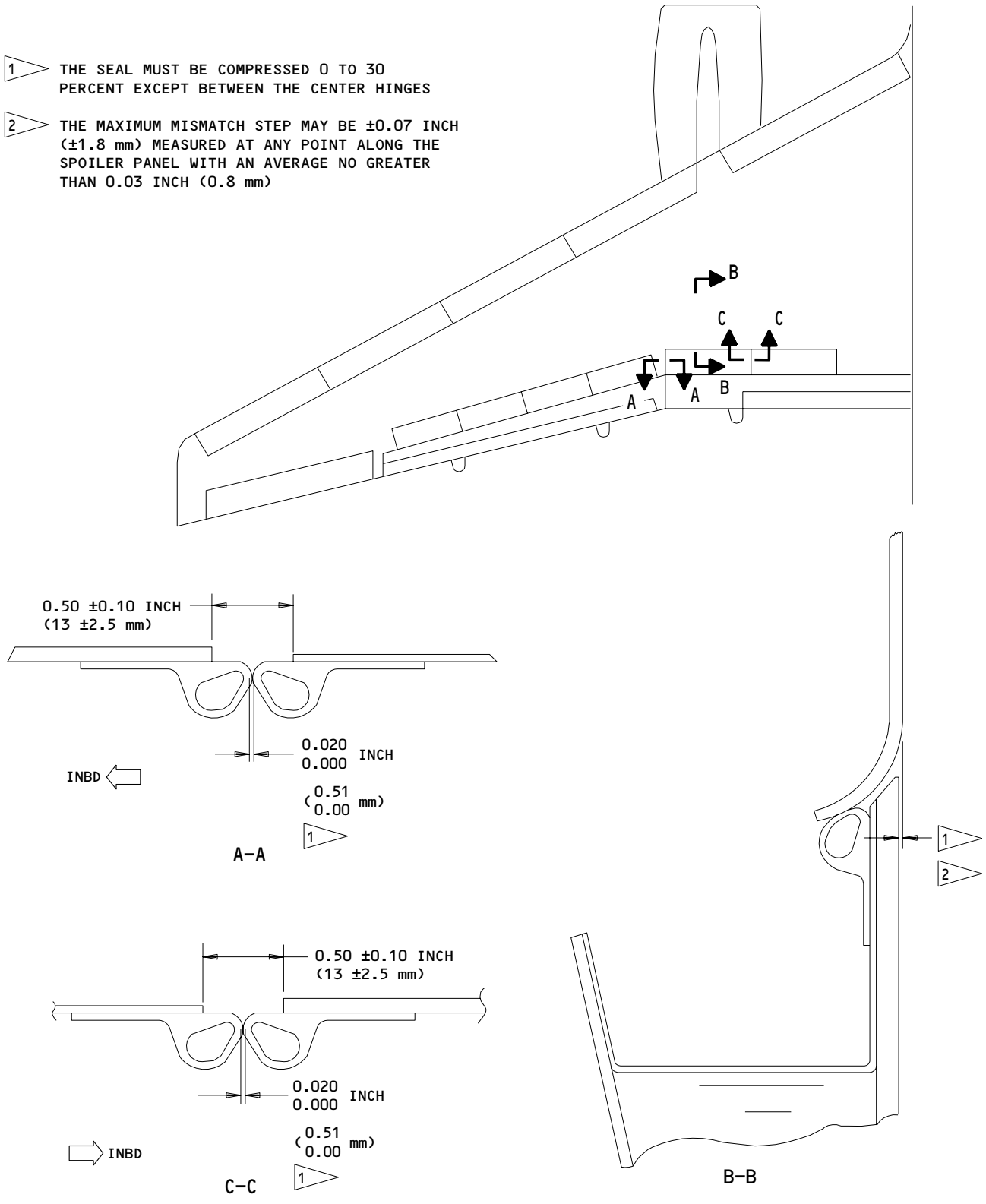
(f) The bolt (19) through the bolt retainer (8), washers (16, 17), and nut (15).



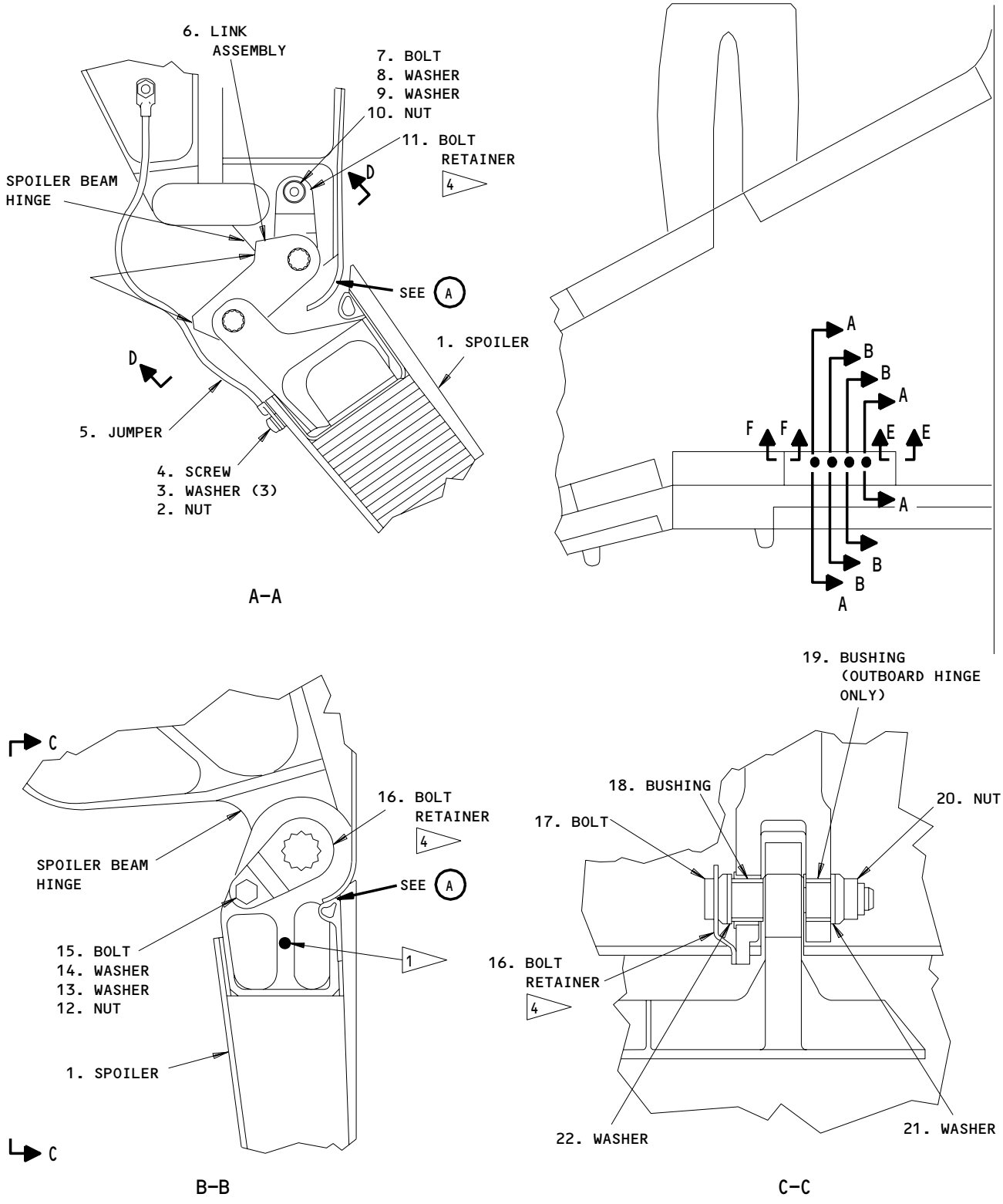
1 LUBRICATE WITH GREASE

2 IF THE BOLT HEAD AND RETAINER ARE ON THE SAME SIDE, THEN THE BOLT HEAD MAY BE ON EITHER SIDE OF THE HINGE.

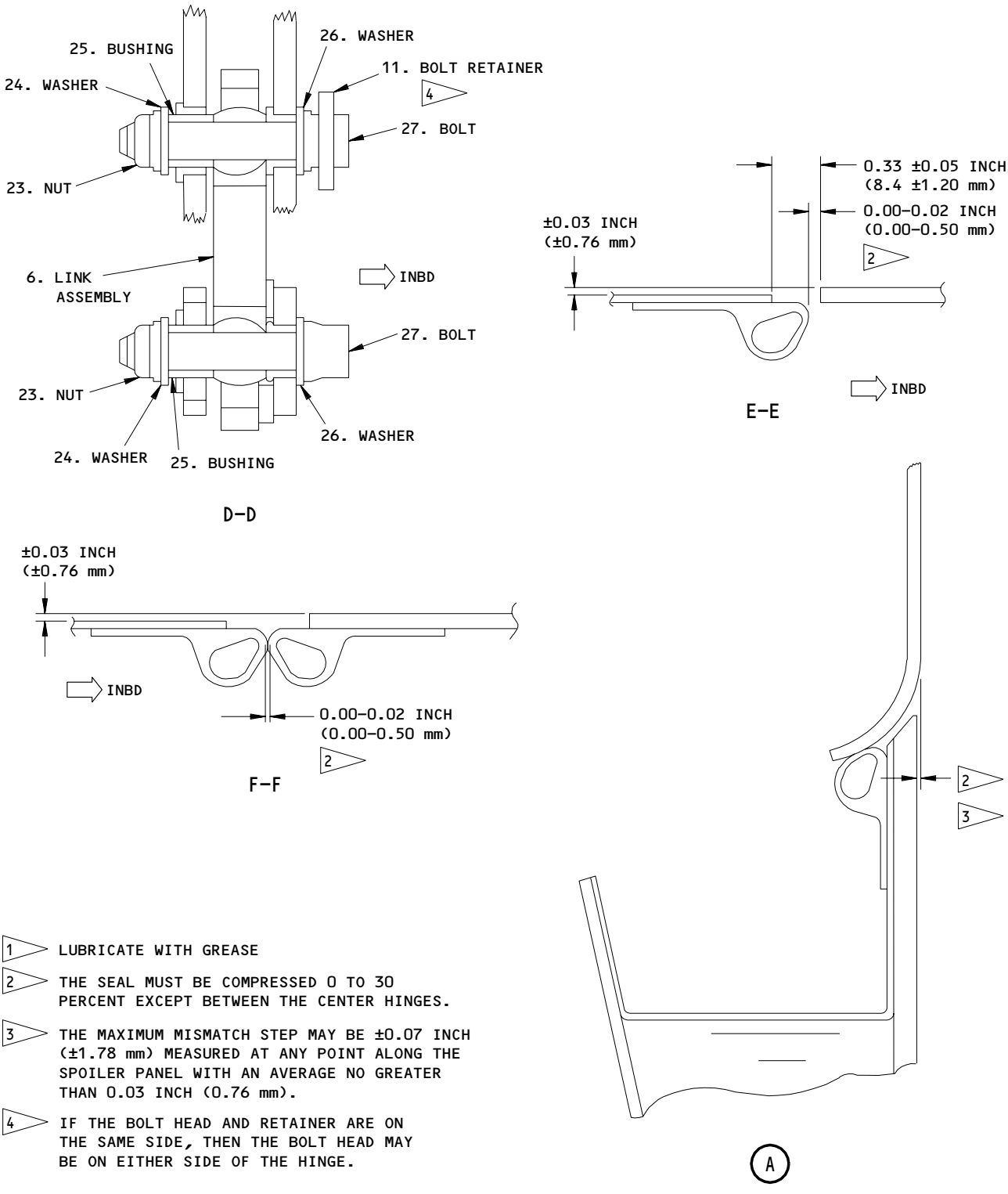
Spoiler 5 or 8 Installation
Figure 406 (Sheet 2)



Spoiler 5 or 8 Seals
Figure 407



Spoiler 6 or 7 Installation
Figure 408 (Sheet 1)



1. LUBRICATE WITH GREASE
2. THE SEAL MUST BE COMPRESSED 0 TO 30 PERCENT EXCEPT BETWEEN THE CENTER HINGES.
3. THE MAXIMUM MISMATCH STEP MAY BE ±0.07 INCH (±1.78 mm) MEASURED AT ANY POINT ALONG THE SPOILER PANEL WITH AN AVERAGE NO GREATER THAN 0.03 INCH (0.76 mm).
4. IF THE BOLT HEAD AND RETAINER ARE ON THE SAME SIDE, THEN THE BOLT HEAD MAY BE ON EITHER SIDE OF THE HINGE.

Spoiler 6 or 7 Installation
Figure 408 (Sheet 2)

S 434-076
(4) Connect the jumper (4, 10) to the spoiler (1) (2 locations) and do this step:
(a) Apply some of the sealant to the connection points for the jumper.

S 094-077
(5) Remove the wooden block and lower the spoiler.

S 214-138
(6) Manually move the spoiler through its full travel range and do this check:
(a) Make sure the spoiler moves freely.

S 434-078
(7) Connect the PCA rod end to the spoiler (Ref 27-61-02).

S 644-079
(8) Lubricate the grease fittings.

S 864-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABLIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-153
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

S 864-081
(11) Move the speedbrake lever to its full upstop position.

S 864-082
(12) Retract the trailing edge flaps.

S 044-083
(13) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-084
(14) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-085
(15) Make sure the spoiler PCA RVDT is adjusted correctly (Ref 27-61-00).

S 824-086
(16) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary (Fig. 405).

S 824-087
(17) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

I. Install Spoiler 4 or 9 (Fig. 404)

S 644-088
(1) Apply a thin layer of grease to the smooth surfaces of the bolts and washers before you install them.

S 984-089
(2) Put the spoiler (1) in its correct location on the airplane.

S 434-090
(3) Install these components:
(a) The bolt (19) through the bolt retainer (25), washer (20, 22), bushing (21), and nut (23) (View A)
1) Tighten the nut (23) to 1000-1470 pound-inches (113-166 Nm).

(b) The bolt (24) through the bolt retainer (25), washers (16, 17), and nut (15)
(c) The bolt (14) through the link assembly (3), washers (10, 12), bushing (11), and nut (13) (View D-D, 2 locations)
1) Tighten the nut (13) to 65-100 pound-inches (7.4-11.2 Nm).
(d) The bolt (18) through the bolt retainer (2 or 9), washers (16, 17), and nut (15) (View E-E and G-G)
(e) The bolt (19) through the bolt retainer (8), bushings (21), washers (20, 22), and nut (23) (View F-F)
1) Tighten the nut (23) to 1000-1470 pound-inches (113-166 Nm).
(f) The bolt (24) through the bolt retainer (8), washers (16, 17), and nut (15).

S 434-091
(4) Connect the jumper (4) to the spoiler (1) (2 locations) and do this step:
(a) Apply some of the sealant to the connection points for the jumper.

S 094-092
(5) Remove the wooden block and lower the spoiler.

S 214-093
(6) Manually move the spoiler through its full travel range and do this check:
(a) Make sure the spoiler is moves freely.

S 434-094
(7) Connect the PCA rod end to the spoiler (Ref 27-61-02).

S 644-095
(8) Lubricate the grease fittings.

S 864-008

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-154
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

S 864-097
(11) Move the speedbrake lever to its full upstop position.

S 864-098
(12) Retract the trailing edge flaps.

S 044-099
(13) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-100
(14) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-101
(15) Make sure the spoiler PCA RVDT is adjusted correctly (Ref 27-61-00).

S 824-102
(16) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary (Fig. 405).

S 824-103
(17) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

J. Install Spoiler 5 or 8 (Fig. 406)

S 644-104
(1) Apply a thin layer of grease to the smooth surfaces of the bolts before you install them.

S 434-105
(2) Install these components:
(a) The bolt (27) through the bolt retainer (12), washers (23, 26), bushings (24, 25), and nut (22) (View D-D)
1) Tighten the nut (22) to 1000-1470 pound-inches (7.4-11.2 Nm).

(b) The bolt (18) through the bolt retainer (12), washers (19, 20), and nut (22)
(c) The bolt (17) through the link assembly (5), washers (15, 16), bushing (15), and nut (13) (View C-C, 2 locations)
1) Tighten the nut (13) to 65-100 pound-inches (7.4-11.2 Nm).
(d) The bolt (7) through the bolt retainer (11), washers (8, 9), and nut (10) (View A-A)
(e) The bolt (27) through the bolt retainer (12), bushing (25), washers (23, 26), and nut (22) (View D-D)
1) Tighten the nut (22) to 1000-1470 pound-inches (113-166 Nm).
(f) The bolt (18) through the bolt retainer (12), washers (19, 20), and nut (21).

S 424-141
(3) Connect the jumper (6) to the spoiler (1) (2 locations) and do this step:
(a) Apply some of the sealant to the connection points for the jumper.

S 094-106
(4) Remove the wooden block and lower the spoiler.

S 214-107
(5) Manually move the spoiler through its full travel range and do this check:
(a) Make sure the spoiler moves freely.

S 434-108
(6) Connect the PCA rod end to the spoiler (Ref 27-61-02).

S 644-109
(7) Lubricate the grease fittings.

S 864-009

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(8) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-155
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

S 864-111
(10) Move the speedbrake lever to its full upstop position.

S 864-112
(11) Retract the trailing edge flaps.

S 044-113
(12) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-114
(13) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-115
(14) Make sure the spoiler PCA RVDT is adjusted correctly (Ref 27-61-00).

S 824-116
(15) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary (Fig. 407).

S 824-117
(16) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

K. Install Spoiler 6 or 7 (Fig. 408)

S 644-118
(1) Apply a thin layer of grease to the smooth surfaces of the bolts and washers before you install them.

S 984-119
(2) Put the spoiler (1) in its correct position on the airplane.

S 434-120

(3) Install these components:

(a) The bolt (27) through the link assembly (6), washers (26, 24), bushing (25), and nut (23) (View D-D, 2 locations)

1) Tighten the nut (23) to 65-100 pound-inches (7.4-11.2 Nm).

(b) The bolt (7) through the bolt retainer (11), washers (8, 9), and nut (10) (View A-A)

(c) The bolt (17) through the bolt retainer (16), bushings (18, 19), washers (21, 22), and nut (20) (View C-C, 2 locations)

1) Tighten the nut (20) to 1400-1900 pound-inches (159-214 Nm).

(d) The bolt (15) through the bolt retainer (16), washers (13, 14), and nut (12).

S 434-121

(4) Connect the jumper (5) to the spoiler (1) (2 locations) and do this step:

(a) Apply some of the sealant to the connection points for the jumper.

S 094-122

(5) Remove the wooden block and lower the spoiler.

S 214-123

(6) Manually move the spoiler through its full travel range and do this check:

(a) Make sure the spoiler moves freely.

S 434-124

(7) Connect the PCA rod end to the spoiler (Ref 27-61-02).

S 644-125

(8) Lubricate the grease fittings.

S 864-010

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 864-156
(10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 that are shown in Table 402.

S 864-127
(11) Move the speedbrake lever to its full upstop position.

S 864-128
(12) Retract the trailing edge flaps.

S 044-129
(13) Do the deactivation procedure for the trailing edge flaps (Ref 27-51-00).

S 824-130
(14) Do a check of the spoiler PCA adjustment and adjust the PCA rod end if it is necessary (Ref 27-61-00).

S 224-131
(15) Make sure the spoiler PCA RVDT is adjusted correctly (Ref 27-61-00).

S 824-132
(16) Do a check of the clearance between the adjacent spoiler and adjust the seal if it is necessary.

S 824-133
(17) Do a check of the clearance between the spoiler and the adjacent structure and adjust the seal if it is necessary.

L. Put the Airplane Back to Its Usual Condition

S 864-134
(1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 864-135
(2) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 444-136
(3) Do the activation procedure for the thrust reversers (Ref 78-31-00).

S 864-137
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

SPOILER POWER CONTROL ACTUATOR (PCA) - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation tasks for the spoiler power control actuators (PCAs) and their parts.
   B. The PCAs for spoilers 1 thru 5 and 8 thru 12 are the same. The PCAs for spoilers 6 and 7 are not the same as the PCAs for spoilers 1 thru 5 and 8 thru 12. These procedures are applicable to the two different types of spoiler PCAs.

TASK 27-61-02-022-001

2. Spoiler PCA and Its Components - Removal
   A. General
      (1) This task contains these procedures:

- Remove the Spoiler PCA
- Remove the Electro Hydraulic Servo Valve (EHSV)
- Remove the Rotary Variable Differential Transformer (RVDT)
- Remove the Spoiler PCA Filter.

Because this task contains four procedures, do only the applicable groups of steps.

To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) Wooden Block/Wedge (to hold the spoiler in its up position only when spoiler PCA is removed)
      (2) Spoiler Actuator Lock Set - B27007-15
   C. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-00/201, Trailing Edge Flap System
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 78-31-00/201, Thrust Reverser System
   D. Access
      (1) Location Zones

553/653	Spoiler Number 6 and 7
554/654	Spoiler Number 5 and 8
562/662	Spoiler Number 4 and 9
563/663	Spoiler Number 3 and 10
564/664	Spoiler Number 2 and 11
565/665	Spoiler Number 1 and 12

   E. Prepare for the Removal

S 862-002

      (1) Supply electrical power (AMM 24-22-00/201).

S 212-003

(2) Make sure the control wheels are in their neutral positions and the speedbrake lever is in its down-and-locked position.

S 862-004

WARNING: MAKE SURE YOU OPEN THE CIRCUIT BREAKERS FOR THE CONTROL SURFACE ELECTRONIC UNIT. THIS WILL PREVENT AUTOMATIC SPOILER RETRACTION WHEN ELECTRICAL POWER IS REMOVED. THE SPOILERS MOVE VERY QUICKLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Open the circuit breakers on the P11 panel that are shown in Table 201 and attach the DO-NOT-CLOSE tags.

TABLE 201 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 862-093
(4) Open the following circuit breaker on the P11 panel, and attach the DO-NOT-CLOSE tag.
(a) 11G11, AUTO SPEED BRAKE

S 042-078

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(5) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 862-005
(6) Extend the trailing edge flaps.

S 042-006
(7) Do the deactivation procedure for the trailing edge flaps (AMM 27-51-00/201).

S 862-007

WARNING: MAKE SURE HYDRAULIC POWER IS NOT SUPPLIED TO THE SPOILER PCAS DURING MAINTENANCE. SPOILERS WITH HYDRAULIC POWER MOVE VERY QUICKLY TO THEIR DOWN POSITIONS AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Remove the pressure from the hydraulic system and reservoir that supplies the PCA you will repair (AMM 29-11-00/201).

NOTE: The left hydraulic system supplies power to the PCAs for spoilers 3, 5, 8, and 10.

The center hydraulic system supplies power to the PCAs for spoilers 1 and 12.

The right hydraulic system supplies power to the PCAs for spoilers 2, 4, 6, 7, 9, and 11.

S 032-008
(9) Disconnect the electrical connector (29) from the PCA.

S 862-009
(10) Do one of these two steps to move the spoiler to its up position:
(a) Disconnect the PCA (9) rod end from the spoiler (6).

WARNING: IF YOU USE THE MANUAL RELEASE CAM TO MOVE THE SPOILER TO ITS UP POSITION, MAKE SURE HYDRAULIC POWER IS NOT SUPPLIED TO THE PCA DURING MAINTENANCE. THE SPOILER WILL MOVE VERY QUICKLY TO ITS DOWN POSITION AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Operate the manual release cam on the bottom of the PCA (9) to release the unwanted hydraulic pressure from the PCA.

F. Remove the Spoiler PCA (Fig. 201)

S 492-082

(1) Install the wooden block to hold the spoiler panel in its up position.

S 032-011

(2) Disconnect these components:
(a) The PCA (9) from the spoiler (6)
(b) The hydraulic lines (16, 18) from the PCA and do this step:
1) Seal the hydraulic lines with a cap.

S 032-012

(3) Remove the bolts that connect the PCA pillow block (14) to the airplane structure (5 locations).

S 022-013

(4) Remove the PCA from the airplane.

S 972-014

(5) Measure and keep a written record of the distance from the bottom of the locknut (8) to the PCA rod (View C).

G. Remove the Electrohydraulic Servo Valve (EHSV) (Fig. 201)

S 492-083

(1) Install the PCA lock to hold the spoiler panel in its up position.

S 032-015

(2) Remove the screws (4) and washers (5) that connect the EHSV (2) to the spoiler PCA (9) (4 locations).

S 022-016

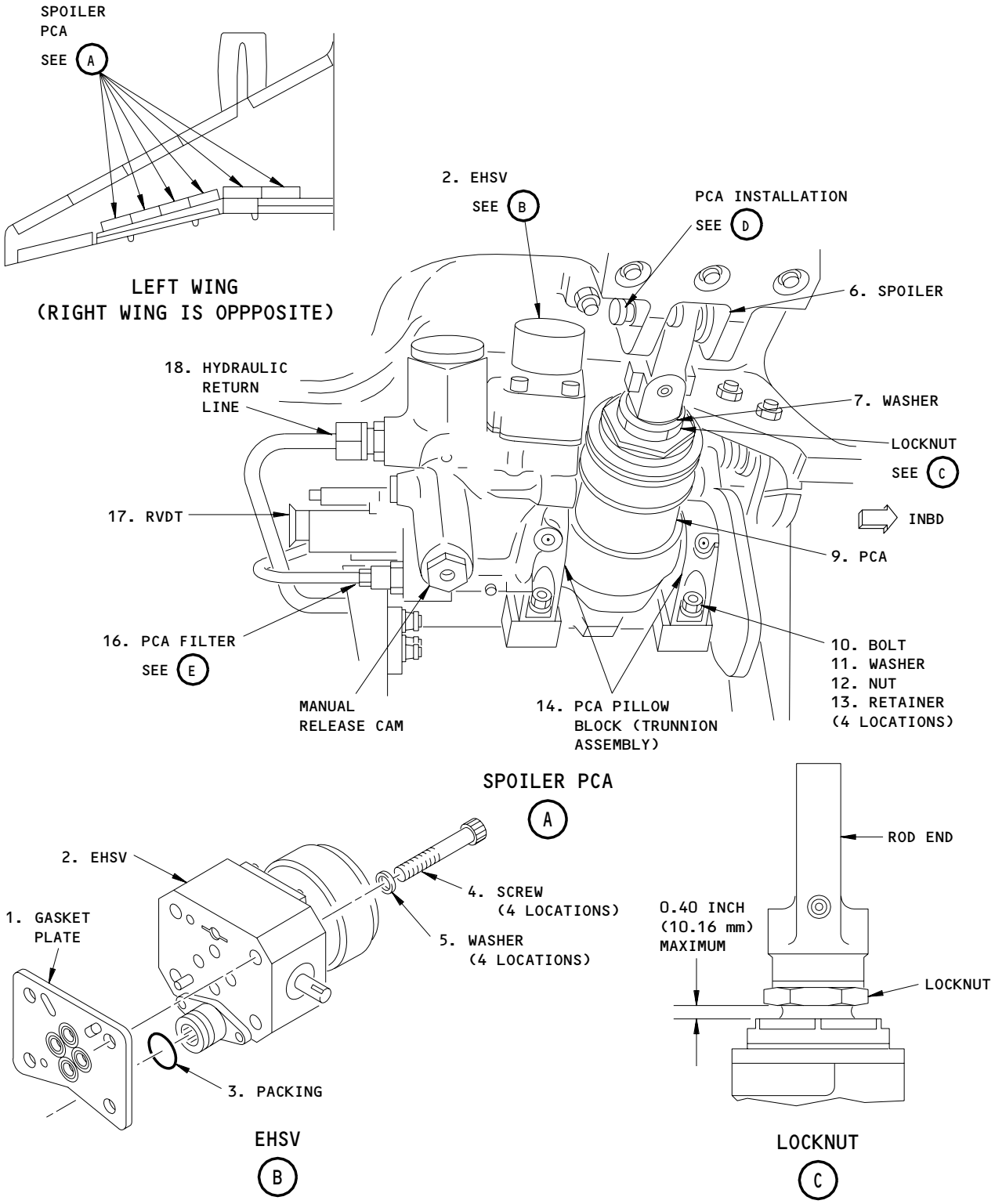
(3) Remove the EHSV (2) and the gasket plate (1) from the PCA (9).

S 032-017

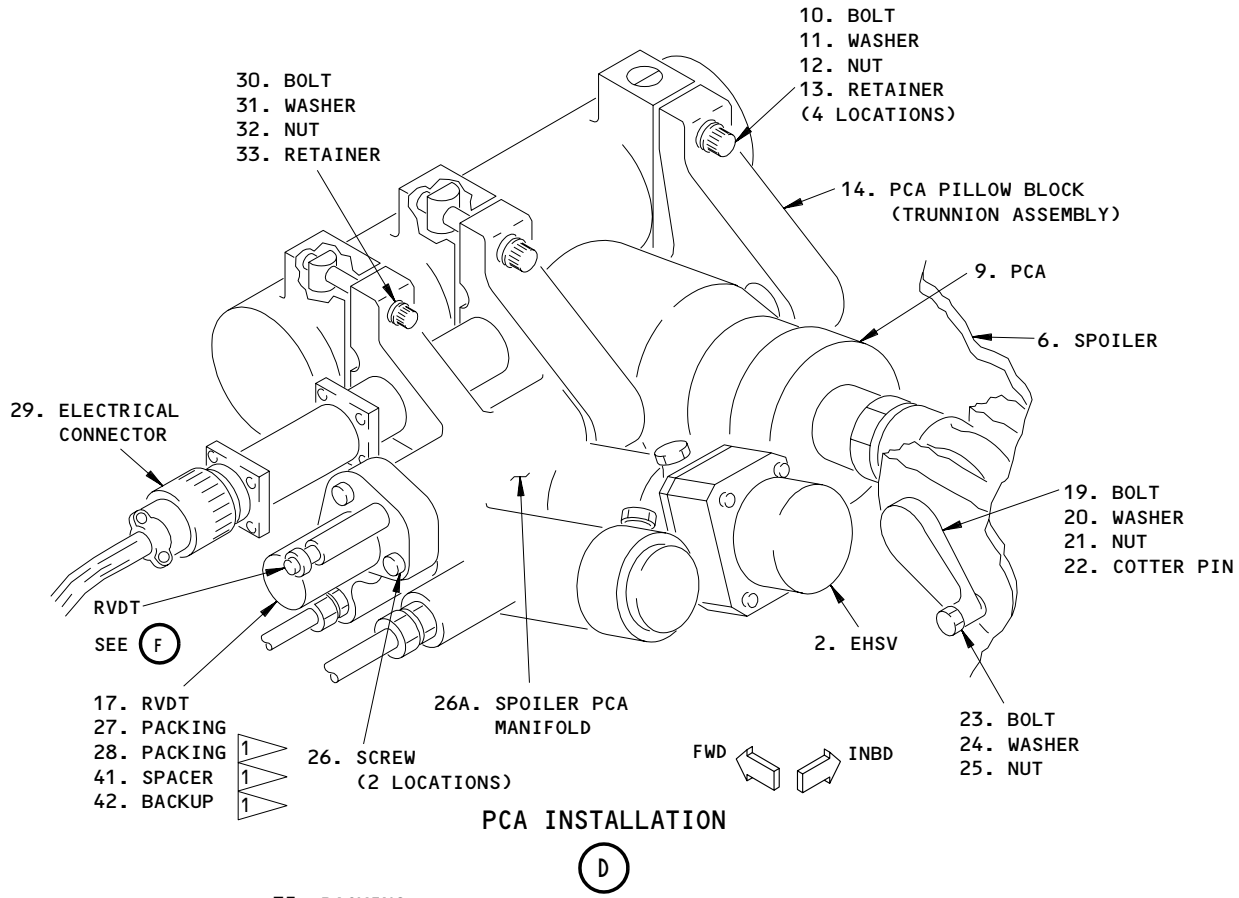
(4) Remove the packing (3) from the EHSV (2).

S 212-018

(5) Make sure there is no corrosion between the EHSV electrical connector (2) and the spoiler PCA manifold (26A) connection.

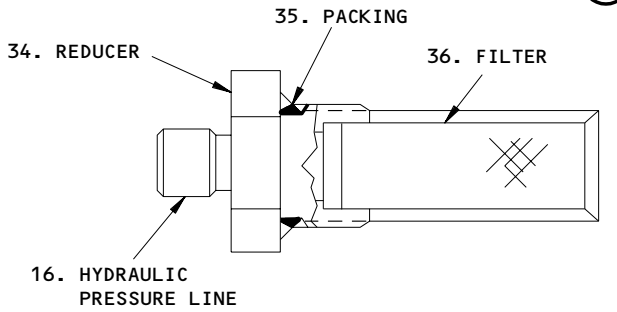


Spoiler PCA Maintenance Practices
Figure 201 (Sheet 1)



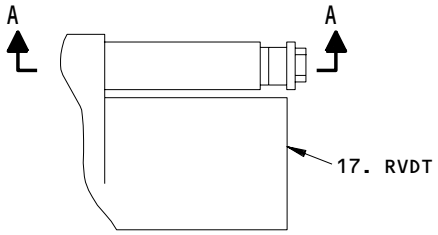
PCA INSTALLATION

D



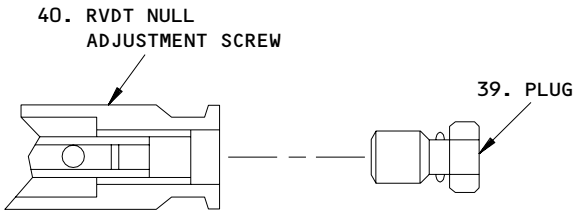
PCA FILTER

E



RVDT

F



A-A

1 ON SOME AIRPLANES

Spoiler PCA Maintenance Practices
Figure 201 (Sheet 2)

S 102-019
(6) Do this step if there is corrosion on the electrical connections:
(a) Clean the EHSV electrical connector and the PCA manifold connection.

H. Remove the Rotary Variable Differential Transducer (RVDT) (Fig. 201)

S 492-084
(1) Install the PCA lock to hold the spoiler panel in its up position.

S 032-020
(2) Remove the screws (26) that connect the RVDT (17) to the PCA (9) (2 locations).

S 022-021
(3) Do these steps to remove the RVDT (17) and its packings (27, 28):
(a) If it is necessary, remove the wiring bracket to get access to the RVDT.
(b) If it is necessary, disconnect the hydraulic line from the PCA.
(c) Remove the RVDT.

S 212-022
(4) Make sure there is no corrosion between the RVDT electrical connector (2) and the spoiler PCA manifold (26A).

S 102-023
(5) Do this step if there is corrosion on the electrical connections:
(a) Clean the RVDT electrical connector and the PCA manifold connection.

I. Remove the Spoiler PCA Filter (Fig. 201)

S 492-085
(1) Install the PCA lock to hold the spoiler panel in its up position.

S 032-024
(2) Disconnect the hydraulic pressure line (16) and do this step:
(a) Seal the hydraulic line with a cap.

S 032-025
(3) Remove the reducer (34) and the packing (35).

S 022-026
(4) Remove the filter screen (36).

TASK 27-61-02-422-027

3. Spoiler PCA and Its Components - Installation

A. General

(1) This task contains these procedures:

- Install the Spoiler Power Control Actuator (PCA)
- Install the Electro Hydraulic Servo Valve (EHSV)
- Install the Rotary Variable Differential Transformer (RVDT)
- Install the Spoiler PCA Filter.

Because this task contains four procedures, do only the applicable groups of steps.

To start one of these procedures, do the group of steps that is necessary to install the component. Then, do the "Spoiler PCA - Test" group of steps. And last, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. Equipment

(1) Spoiler Actuator Lock Set - B27007-15

C. Consumable Materials

(1) A00250 Compound Sealant - BMS 5-26 Class B.
(2) B00083 Solvent, TT-N-95, Aliphatic Naptha
(3) D00153 Lubricant, Fire Resistant Hydraulic Fluid - BMS 3-11
(4) D00633 Grease, Corrosion Preventive - BMS 3-33 (preferred)
(5) D00015 Grease, Corrosion Preventive - BMS 3-24 (alternate)

D. Parts

(1) OUTBOARD SPOILERS PCA INSTALLATION; use this table:

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	1	Gasket Plate	27-61-02	04	80
	2	EHSV			65
	3	Packing (O-ring)			84
	9	Outboard Spoilers PCA		01	5, 6
	17	RVDT		04	10
	27	Packing (O-ring)	27-61-04	01	65
	28	Packing (O-ring)			70
	35	Packing (O-ring)			130
	36	Filter Screen			135

(2) INBOARD SPOILERS PCA INSTALLATION;
use this table:

MM			IPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
201	1	Gasket Plate	27-61-02	04	80
	2	EHSV			65
	3	Packing (O-ring)			84
	9	Inboard Spoiler PCA	27-61-04	01	5, 6
					1, 2
	17	RVDT	27-61-02	04	10
	27	Packing (O-ring)	27-61-04	01	65
	28	Packing (O-ring)			70
	35	Packing (O-ring)			130
	36	Filter Screen			135

E. References
(1) 20-10-24/201, Rig Pins
(2) 24-22-00/201, Electrical Power - Control
(3) 27-51-00/201, Trailing Edge Flap System
(4) 27-61-00/501, Spoiler/Speedbrake Control System
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 78-31-00/201, Thrust Reverser System

F. Access
(1) Location Zones
553/653 Spoiler Number 6 and 7
554/654 Spoiler Number 5 and 8
562/662 Spoiler Number 4 and 9
563/663 Spoiler Number 3 and 10
564/664 Spoiler Number 2 and 11
565/665 Spoiler Number 1 and 12

G. Install the Spoiler PCA (Fig. 201)

S 212-028
(1) Make sure the PCA (9) you install is in its fully retracted position.

S 822-029
(2) Do these steps to adjust the length of the PCA:
(a) Loosen the locknut (8) and turn the rod end until the dimension you measured is correct.

NOTE: Use the record you kept.

(b) Tighten the nut to 1260-1380 pound-inches (143-155 Nm).
(c) Apply the sealant to the locknut and the threads of the PCA rod end.

S 432-030
(3) Do these steps to connect the PCA pillow block to the airplane structure:
(a) Align the pillow block with the structure.
(b) Install the bolt (10), washer (11), nut (12), and the retainer (13) (4 locations).
(c) Install the bolt (30), washer (31), and the nut (32).
(d) Install the retainer (33).

S 642-031
(4) Apply the grease to the grease fitting on the PCA rod end.

S 092-032
(5) Remove the wooden block and lower the spoiler (6).

S 422-033
(6) Do these steps to connect the PCA (9) to the spoiler (6):
(a) Install the bolt (19) that connects the PCA to the spoiler (6).
(b) Install the bolt (23), washer (24), and nut (25) that connect the bolt head (19) to the spoiler clevis.
(c) Install the washer (20), nut (21), and cotter pin (22) that connect the PCA rod end to the spoiler.

NOTE: Install the nut to the shoulder of the bolt. Turn it back one castellation and then install the cotter pin.

S 102-034
(7) Use the solvent to clean all the unwanted grease from the PCA.

S 432-035
(8) Connect these components to the PCA:
(a) The hydraulic lines (16, 18)
(b) The electrical connector (29).

S 862-036

(9) Remove the DO-NOT-CLOSE tags and close the circuit breakers on the overhead panel, P11 shown on Table 202.

TABLE 202 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 862-079

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(10) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 212-037

(11) Make sure the control wheels are in their neutral positions.

S 862-038

(12) Move the speedbrake lever to its full upstop position.

NOTE: Move the spoilers to their up position to make sure the flaps do not hit the spoilers when the flaps are retracted.

S 212-039

(13) Do a check for leaks at the PCA hydraulic connections.

S 442-040
(14) Do the activation procedure for the trailing edge flaps (AMM 27-51-00/201).

S 862-042
(15) Move the trailing edge flaps to their fully retracted position (AMM 27-51-00/201).

NOTE: Use hydraulic power to retract the flaps. Keep them powered for at least one minute after they move to their full up positions.

S 862-043
(16) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 822-044
(17) Do the adjustment procedure for the spoiler PCAs (Ref AMM 27-61-00/501).

H. Install the EHSV (Fig. 201)

S 492-086
(1) Make sure that the PCA Lock is installed.

NOTE: This holds the spoiler in its up position.

S 432-046
(2) Apply the lubricant to the packing (3) and install it on the EHSV (2).

S 422-047
(3) Do these steps to install the EHSV on the PCA:
(a) Align the gasket plate (1) and the EHSV (2) with the PCA connection points.
(b) Make sure the EHSV connector is correctly aligned.

CAUTION: YOU CANNOT ADJUST THE EHSV WHEN IT IS INSTALLED ON THE AIRPLANE. MOVEMENT OF THE EHSV END CAP CAN CAUSE DAMAGE TO THE PCA.

(c) Carefully install the EHSV (2) on the PCA (9).
(d) Install the washers (5) and screws (4) and tighten them to 30-40 pound-inches (3.4-4.5 Nm).
(e) Safety the screws with a wire.

S 092-048
(4) Remove the PCA lock and lower the spoiler panel (6).

I. Install the RVDT (Fig. 201)

S 492-087
(1) Make sure that the PCA lock is installed.

NOTE: This holds the spoiler in its up position.

S 412-094
(2) If applicable, install the spacer (41) and backup (42).

NOTE: The spacer and backup are on the -2 RVDT only.

S 432-049
(3) Apply the lubricant to the packing (27, 28) and install them on the RVDT (17).

NOTE: The -5 RVDT has only one packing.

S 422-050
(4) Do these steps to install the RVDT on the spoiler PCA:
(a) Align the electrical connector on the RVDT with its connection point on the PCA manifold.
(b) Make sure the keyway is aligned correctly in the RVDT.
(c) Carefully install the RVDT (17) on the PCA (9).
(d) Install the screws (26) and tighten them to 30-40 pound-inches (3.4-4.5 Nm).

S 092-051
(5) Remove the PCA lock and lower the spoiler (6).

S 432-053
(6) If you disconnected the wiring bracket, align the bracket with its holes and install the bolts.

S 432-054
(7) If you disconnected a hydraulic line, connect it to the PCA.

S 822-052
(8) Do the adjustment procedure for the spoiler RVDT (AMM 27-61-00/501).

J. Install the Spoiler PCA Filter (Fig. 201)

S 492-088
(1) Make sure that the PCA lock is installed.

NOTE: This holds the spoiler in its up position.

S 432-055
(2) Put the filter (36) in the PCA pressure port.

S 432-056
(3) Install the packing (35) on the reducer (34).

S 642-057
(4) Apply lubricant to the reducer threads.

S 422-058
(5) Install the reducer and tighten it to 240-300 inch-pounds (27.2-33.8 Nm).

S 432-059
(6) Connect the hydraulic pressure line (16).

S 092-060
(7) Remove the PCA lock and lower the spoiler (6).

K. Spoiler PCA - Test

S 212-081
(1) Make sure the circuit breakers on the P11 panel shown on Table 202 are closed.

S 212-061
(2) Make sure the speedbrake lever is in its down-and-locked position.

S 862-080

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 862-062
(4) Push the RESET switches on the spoiler control modules (SCMs) located on the E3 and E4 shelves in the main equipment center.

S 212-063
(5) Turn the control wheel to its full counterclockwise position and hold it there for four seconds. Do this check:
(a) Make sure the amber SPOILERS light on the overhead panel, P5, is off.

S 212-064
(6) Turn the control wheel to its full clockwise position and hold it there for four seconds. Do this check:
(a) Make sure the amber SPOILERS light on the P5 panel is off.

S 862-065
(7) Move the control wheel back to its neutral position.

S 212-066
(8) Move the speedbrake lever to its full upstop position and hold it there for four seconds. Do this check:
(a) Make sure the amber SPOILERS light on the P5 panel is off.

S 212-067
(9) Move the speedbrake lever to its down-and-locked position and do this check:
(a) Make sure the faultballs on the SCMs are black.

S 212-068
(10) Move the speedbrake lever to its ARMED detent position and do this check:
(a) Make sure the spoilers are in their full down positions.

S 972-070
(11) Make a mark for the position of the bottom trailing edge of the spoiler panel on the trailing edge flap.

NOTE: The spoiler movement will be measured from this mark.

S 212-069
(12) Move the speedbrake lever aft no more than 0.55 inch (14 mm) out of the ARMED detent position and do this check:
(a) Make sure the spoiler panels move a small distance.

S 212-071
(13) Move the speedbrake lever to its full upstop position and do this check:
(a) Make sure the spoilers move to the positions that follow:
1) For spoilers 1, 2, 3, 10, 11, 12: 44.75 +/- 1.25 degrees or 17.97 +/- 0.46 inches (456 +/- 11 mm)
2) For spoilers 4 and 9: 55.25 +/- 1.75 degrees or 21.33 +/- 0.62 inches (542 +/- 15 mm)

3) For spoilers 5 and 8: 44.75 +/- 1.25 degrees or 20.56 +/- 0.55 inches (522 +/- 14 mm)
4) For spoilers 6 and 7: 29.75 +/- 1.75 degrees or 13.86 +/- 0.80 inches (352 +/- 20 mm)

S 212-072
(14) Move the speedbrake lever to its ARMED detent position and do this check:
(a) Make sure that all the spoilers move to their full down positions.

S 862-073
(15) Move the speedbrake lever to its down-and-locked position.

L. Put the Airplane Back to Its Usual Condition

S 862-074
(1) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 442-075
(2) Do the activation procedure for the thrust reversers (AMM 78-31-00/201).

S 862-076
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 862-077
(4) Remove electrical power if it is not necessary (AMM 24-22-00/201).

SPOILER RVDT UNIT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the control wheel RVDT units.
   B. The six control wheel RVDTs are in two can-like units. Each of these units contain three RVDTs. The two RVDT units are installed on the bottom of the captain's and first officer's aileron drum assemblies.

TASK 27-61-04-024-028

2. Spoiler RVDT Unit - Removal
   A. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zone
          311 Area Forward of the NLG Wheel Well

      (2) Access Panel
          113AL Flight Control Components

   C. Prepare for the Removal

      S 864-004
      (1) Supply electrical power (AMM 24-22-00/201).

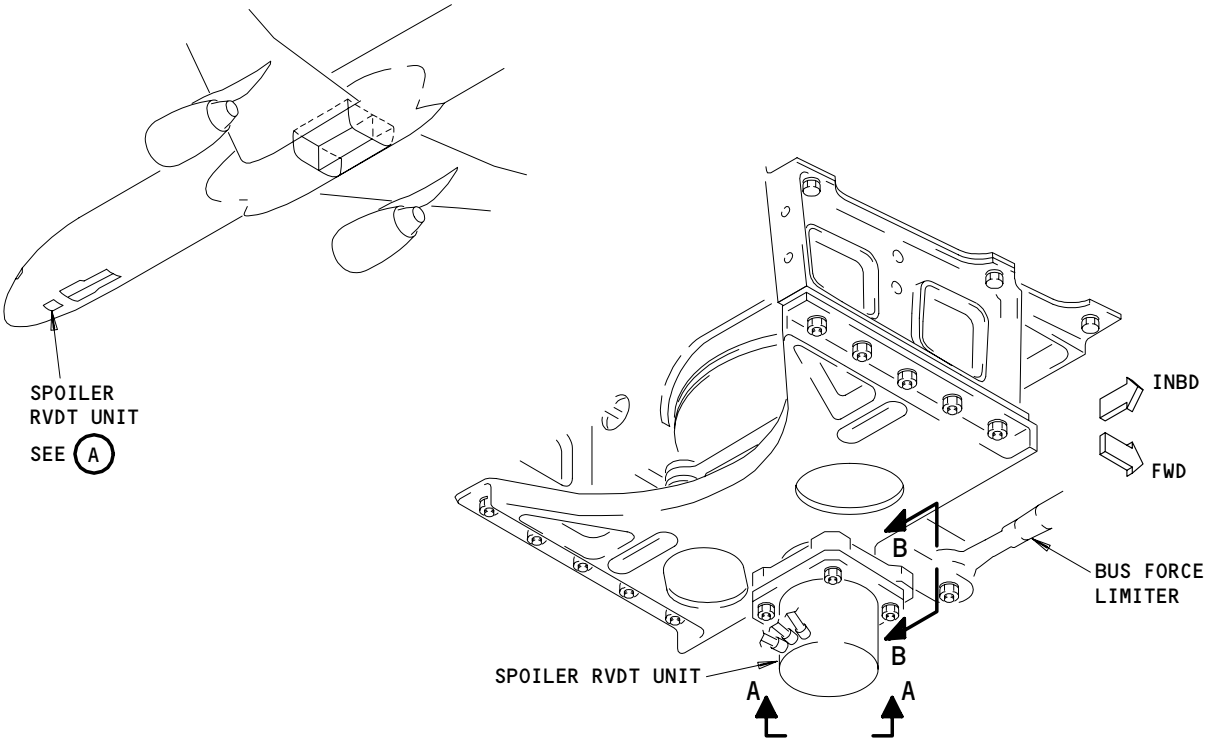
      S 214-005
      (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-001

      WARNING: REFER TO AMM 32-00-15/201 FOR THE PROCEDURE TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

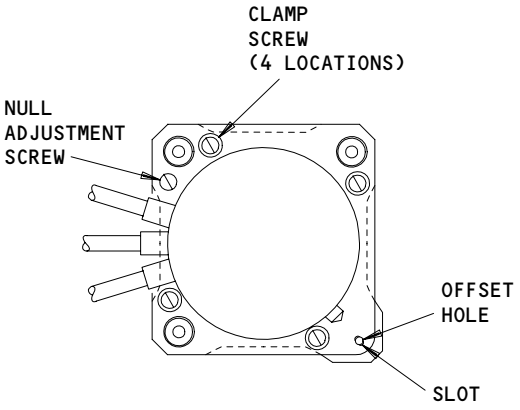
      (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 214-006
      (4) Make sure the speedbrake lever is in its down-and-locked detent position.

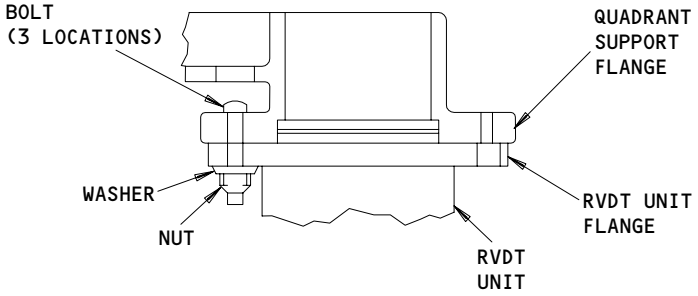


SPOILER RVDT UNIT

(A)



A–A



B–B

NOTE: THE CAPTAIN'S DRUM ASSEMBLY IS SHOWN.
THE FIRST OFFICER'S DRUM ASSEMBLY IS OPPOSITE

Spoiler RVDT Unit Installation
Figure 401

S 864-031
(5) Open the circuit breakers on the P11 panel that are shown in Table 401 and attach the DO-NOT-CLOSE tags.

TABLE 401 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 014-008
(6) Open access door 113AL to get access to the RVDT units (Ref 06-41-00).

D. Remove the RVDT unit (Fig. 401)

S 034-009
(1) Disconnect the three airplane connectors from the RVDT and tag them for identification.

S 024-010
(2) Do these steps to remove the RVDT unit:
(a) Remove the bolts, washers, and nuts that connect the RVDT unit to the quadrant support flange.
(b) Lower the RVDT unit and remove it from the airplane.

NOTE: Keep a record for the position of the missing tooth on the RVDT shaft.

TASK 27-61-04-424-011

3. Spoiler RVDT Unit - Installation

A. References
(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control

(3) 27-61-00/501, Spoiler/Speedbrake Control System
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 32-00-15/201, Landing Gear Door Locks
(6) 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zone
311 Area Forward of the NLG Wheel Well

(2) Access Panel
113AL Flight Control Components

C. Install the RVDT Unit (Fig. 401)

S 824-012
(1) Align the missing tooth in the spline of the RVDT unit with the missing tooth on the quadrant shaft.

S 824-013
(2) Align the slot in the RVDT unit flange with the offset hole in the quadrant support flange.

S 824-027

CAUTION: DO NOT TURN THE RVDT SHAFT BEFORE YOU INSTALL IT. DO NOT LET THE RVDT TOUCH ITS INTERNAL STOPS. DO NOT BEND THE RVDT SHAFT DURING THE INSTALLATION. BE VERY CAREFUL BECAUSE THE RVDT CAN BE EASILY DAMAGED.

(3) Engage the RVDT splines with the shaft in the aileron quadrant.

S 434-014
(4) Install the bolt, washer and nut that connects the RVDT unit to the quadrant support (4 locations).

S 824-015
(5) Do the adjustment procedure for the control wheel RVDTs (Ref 27-61-00).

D. Control Wheel RVDT - Test

S 864-016
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 shown on Table 402.

TABLE 402 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 044-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(2) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 864-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 214-017

(4) Do a check for CW XDCR faultballs on the spoiler control modules (SCMs).

NOTE: SCMs on the E3-1 shelf get inputs from the captain's RVDT unit. SCMs on the E4-1 shelf get inputs from the first officer's RVDT unit.

S 824-018
(5) If it is necessary, push the RESET switch on the SCMs.

S 214-019
(6) Turn the control wheel to its full counterclockwise position and do these steps:
(a) Stop for 4 seconds.
(b) Make sure the amber SPOILERS light on the overhead panel, P5, is off.
(c) Release the control wheel.

S 214-020
(7) Turn the control wheel to its full clockwise position and do these steps:
(a) Stop for 4 seconds.
(b) Make sure the amber SPOILERS light on the P5 panel is off.
(c) Release the control wheel.

S 214-021
(8) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for 4 seconds.
(b) Make sure the amber SPOILERS light on the P5 panel is off.

S 214-022
(9) Move the speedbrake lever to its down-and-locked detent position and do this check:
(a) Make sure all the faultballs on the SCMs are black.

E. Put the Airplane Back to Its Usual Condition

S 864-023
(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

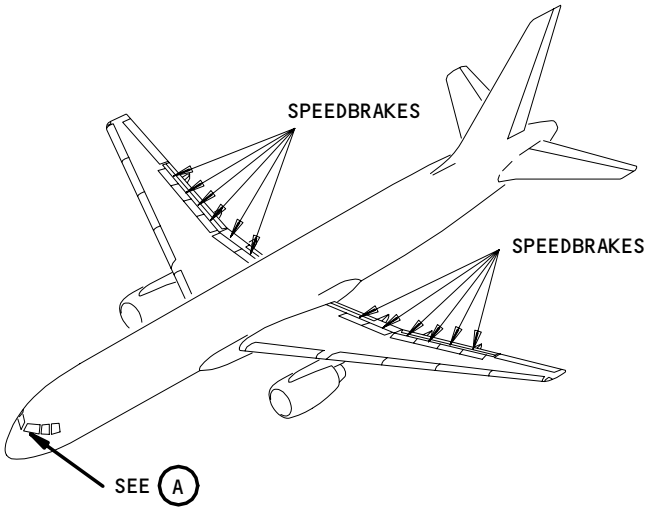
S 444-024
(2) Do the activation procedure for the thrust reverser (Ref 78-31-00).

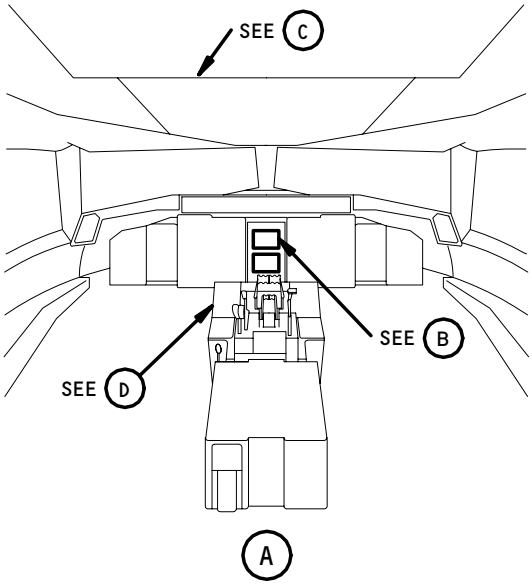
S 414-025
(3) Close access door 113AL (Ref 06-41-00).

S 864-026
(4) Remove electrical power if it is not necessary (Ref 24-22-00).

AUTO-SPEEDBRAKE CONTROL SYSTEM - DESCRIPTION AND OPERATION

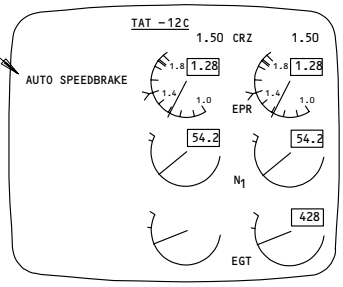
1. General (Fig. 1)
   A. The auto-speedbrake system automatically deploys the spoilers at touchdown and after a refused takeoff. The system also automatically retracts the spoilers when a go-around is initiated after touchdown. For a more complete discussion of the spoiler/speedbrake system, refer to 27-61-00, Description and Operation.
   B. Auto-speedbrake system failures cause the amber AUTO SPDBRK light on the pilot's overhead panel P5 to come on. An amber AUTO SPEEDBRAKE message will also appear on the upper EICAS display unit.
   C. The warning system provides an amber light and level B EICAS caution message should the spoiler panels be extended at altitudes less than 800 feet. The amber SPEED BRAKES light is located on the pilot's main panel P1. The amber EICAS caution message reads SPEED BRAKES EXT. Refer to 31-51-00, Warning System - Description and Operation, for more information.
2. Component Details
   A. Auto-Speedbrake Switches (Fig. 2)
      (1) The auto-speedbrake actuator arming switch is a single roller switch on the speedbrake lever mechanism. Placing the speedbrake lever in the ARMED position activates the arming switch. The activated switch provides power to the auto-speedbrake actuator operating relays.
      (2) The speedbrake lever position switch is a double roller switch located below the arming switch. The left switch disarms the autobrake system when the speedbrake lever is moved from the up position towards the down and locked detent. The right switch signal is sent to the takeoff warning system which then compares speedbrake lever position to throttle position during takeoff. The auto-speedbrake switches are accessible through the control stand side panels.
   B. Auto-Speedbrake Actuator and No-Back Clutch (Fig. 3)
      (1) The auto-speedbrake actuator drives the speedbrake lever to the UP position to operate the LVDT's which input to the spoiler control modules (SCM's). The actuator is attached to the no-back clutch at one end and structure at the other. The actuator is accessible through control stand side panel.
      (2) The no-back clutch has two functions. The clutch enables the flight crew to manually operate the speedbrake lever without having to back-drive the electric actuator as well as override an unscheduled auto-speedbrake deploy signal. The clutch also enables the actuator to drive the speedbrake lever to the UP position which in turn will operate the LVDT's which then provide input to the SCM's to raise or lower the panels.
   C. Reverse Thrust Mechanism (Fig. 4)





A

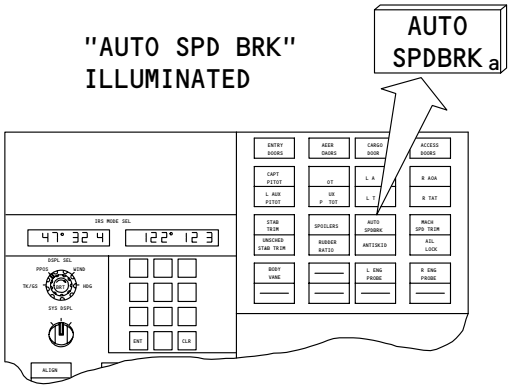
"AUTO SPEEDBRAKE"
AMBER CREW ALERT
MESSAGE



UPPER EICAS DISPLAY UNIT (P2)

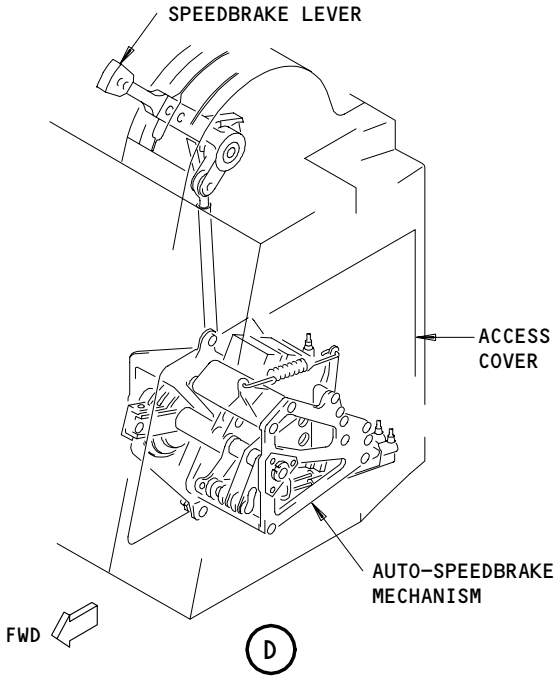
B

"AUTO SPD BRK"
ILLUMINATED



OVERHEAD PANEL (P5)

C



D

Auto-Speedbrake System
Figure 1

(1) The reverse thrust mechanism mechanically moves the speedbrake lever out of the down and locked detent position when one or both thrust levers are moved into reverse idle range. The reverse thrust mechanism includes a cam, shafts, linkages, and the engine reverse thrust switch. The mechanism is accessible through control stand panels.

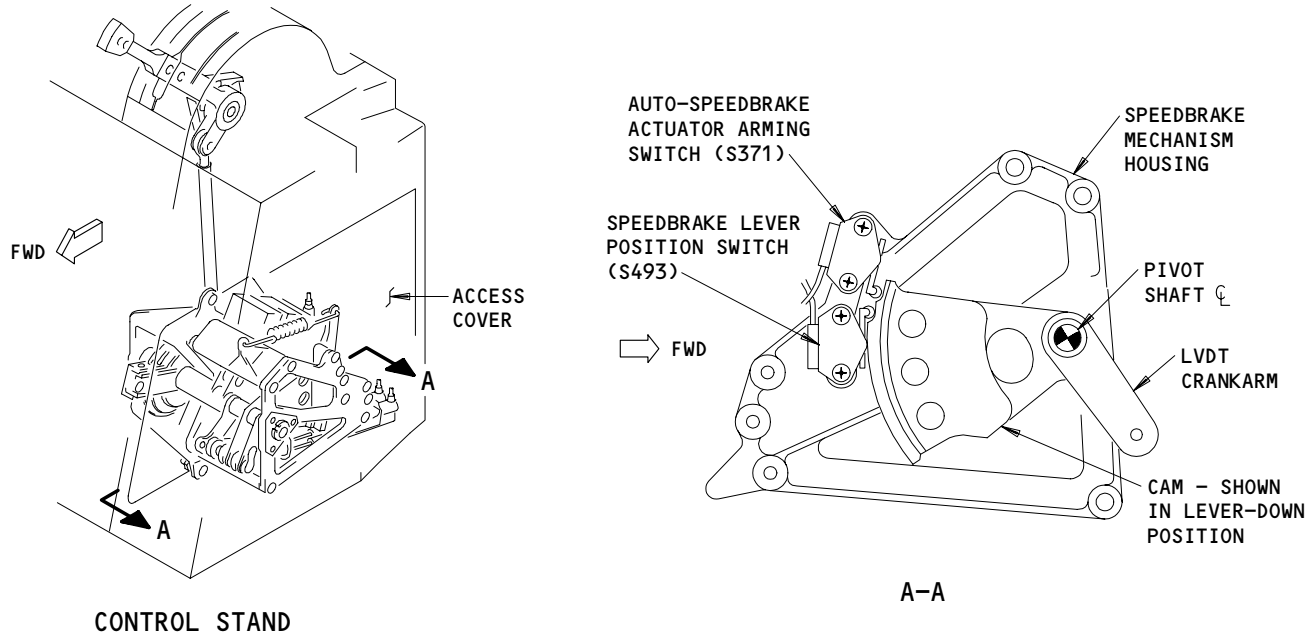
D. Forward Thrust Lever Position Switches (Fig. 5)

(1) The forward thrust lever position switches are part of the autothrottle switch pack. The switch pack is located under the flight deck at the base of the autothrottle quadrant. Access to the switch pack is through the panels forward of the nose gear doors.

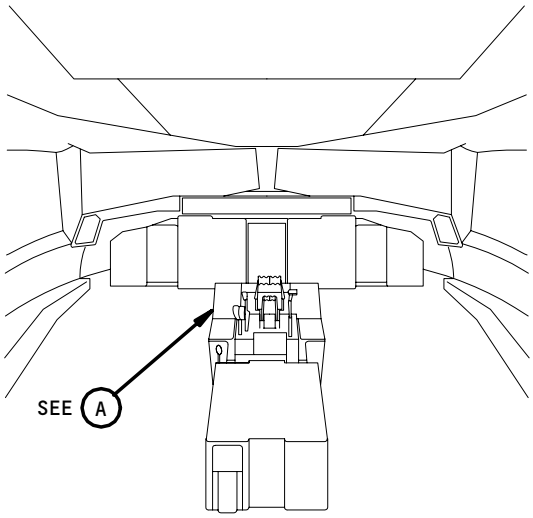
(2) The position switches form part of the auto-speedbrake control circuit. When the forward thrust levers are in less than 50 percent total lever travel position, the auto-speedbrake system is operable. And when the levers are more than 50 percent total lever travel position, the switches inhibit auto-speedbrake function.

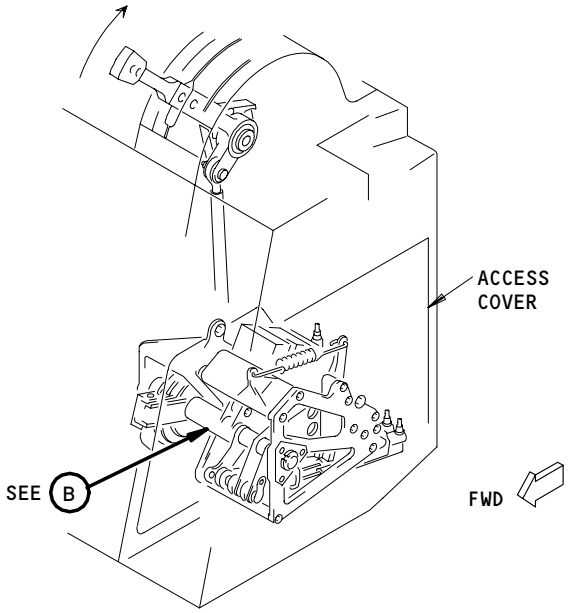
3. Operation

A. Functional Description (Fig. 6)



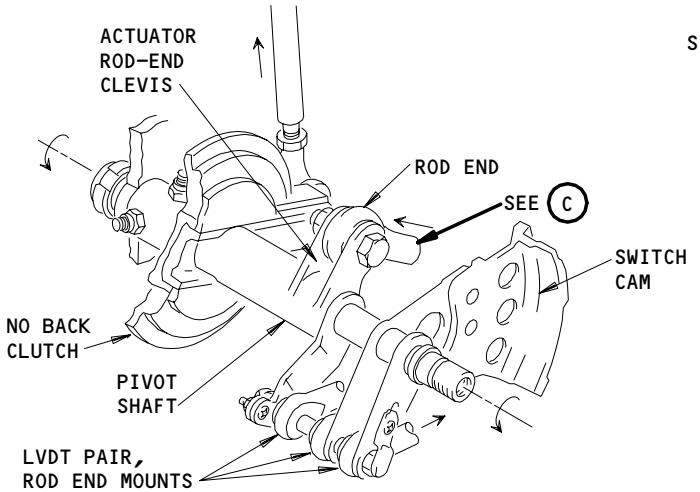
Auto-Speedbrake Switches
Figure 2





CONTROL STAND

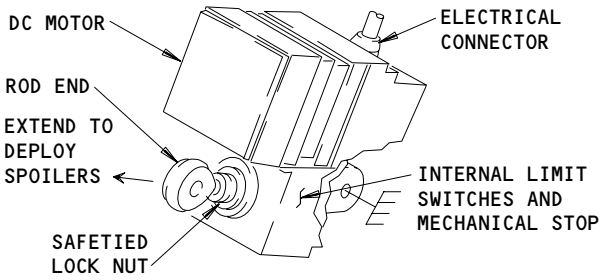
A



NO-BACK CLUTCH

B

NOTE: DIRECTIONAL ARROWS SHOW AN "EXTEND" INPUT.



AUTO SPEEDBRAKE ACTUATOR

C

Auto-Speedbrake Actuator and No-Back Clutch
Figure 3

(1) General

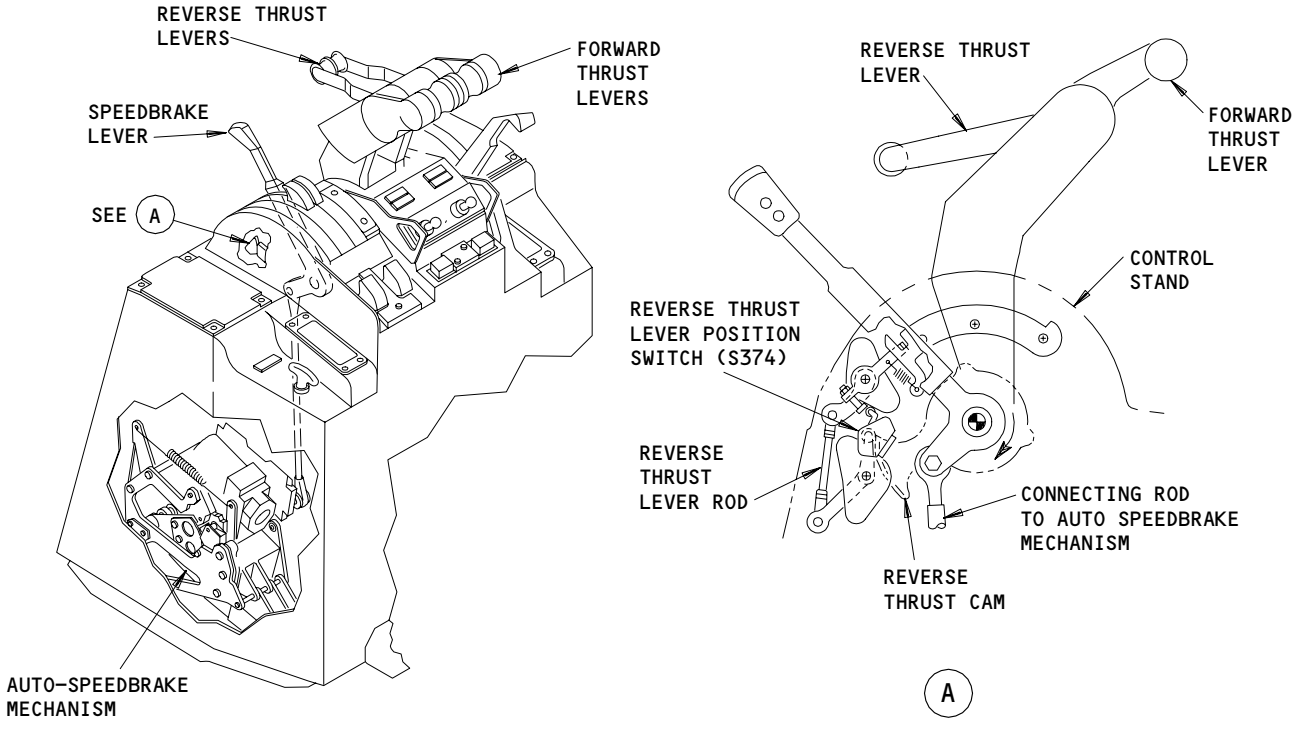
(a) The auto-speedbrake system raises all spoiler panels when commanded by the SCM's. The SCM's process inputs from the auto-speedbrake switches, engine reverse thrust switch, forward thrust lever position switches, truck tilt pressure switches, and air/ground logic. Air/ground logic originates with the truck tilt proximity switches (Ref 32-09-03, Description and Operation). The system will also automatically retract the spoiler panels during a go-around after touchdown.

(2) Normal Operation

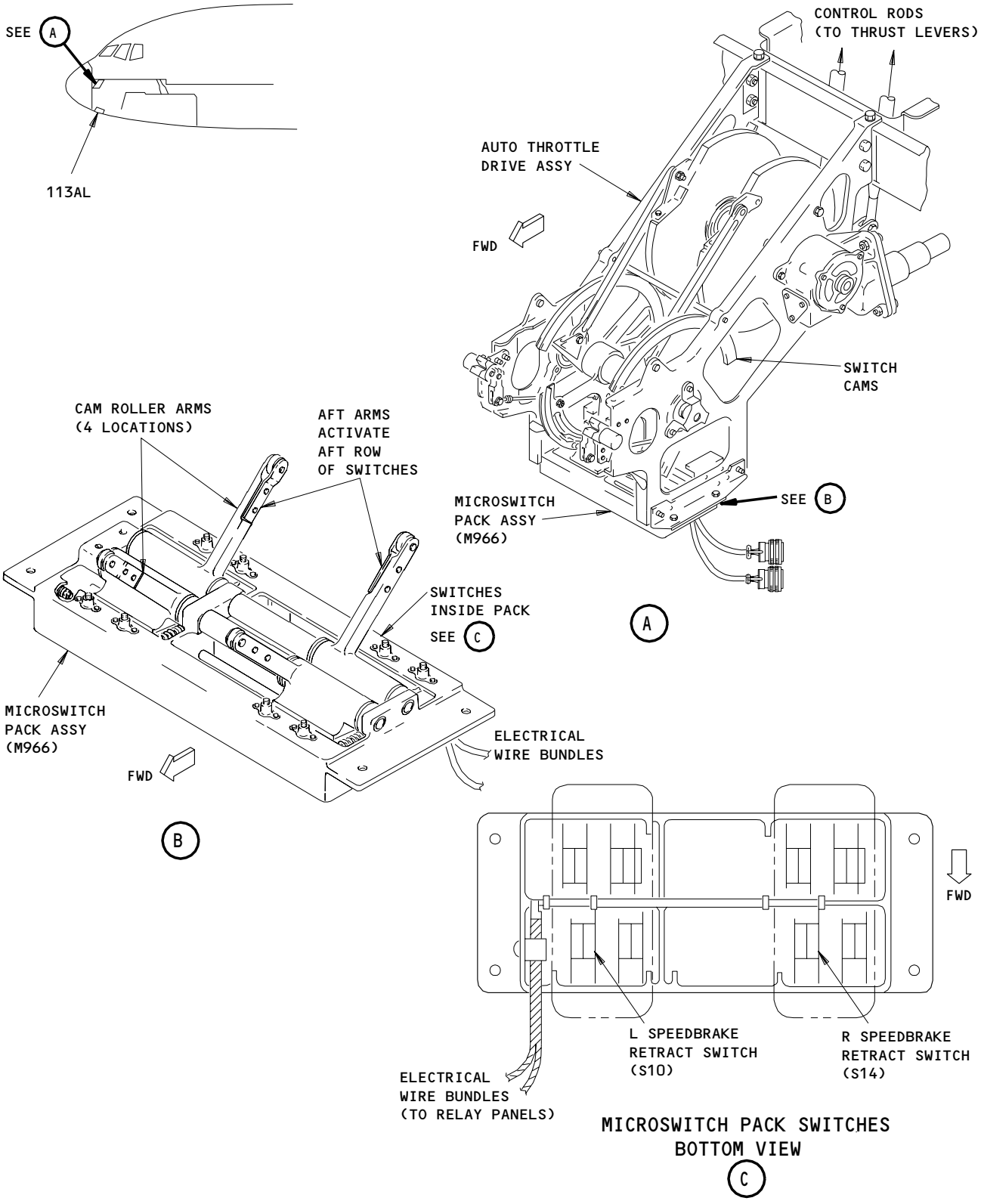
(a) During a normal landing, the flight crew arms the auto-speedbrake system by moving the speedbrake lever out of the down and locked detent to the ARMED position. When the following conditions are met, the auto-speedbrake actuator moves the speedbrake lever to the UP position.

1) Both engine forward thrust levers are set at less than 50 percent total lever travel.

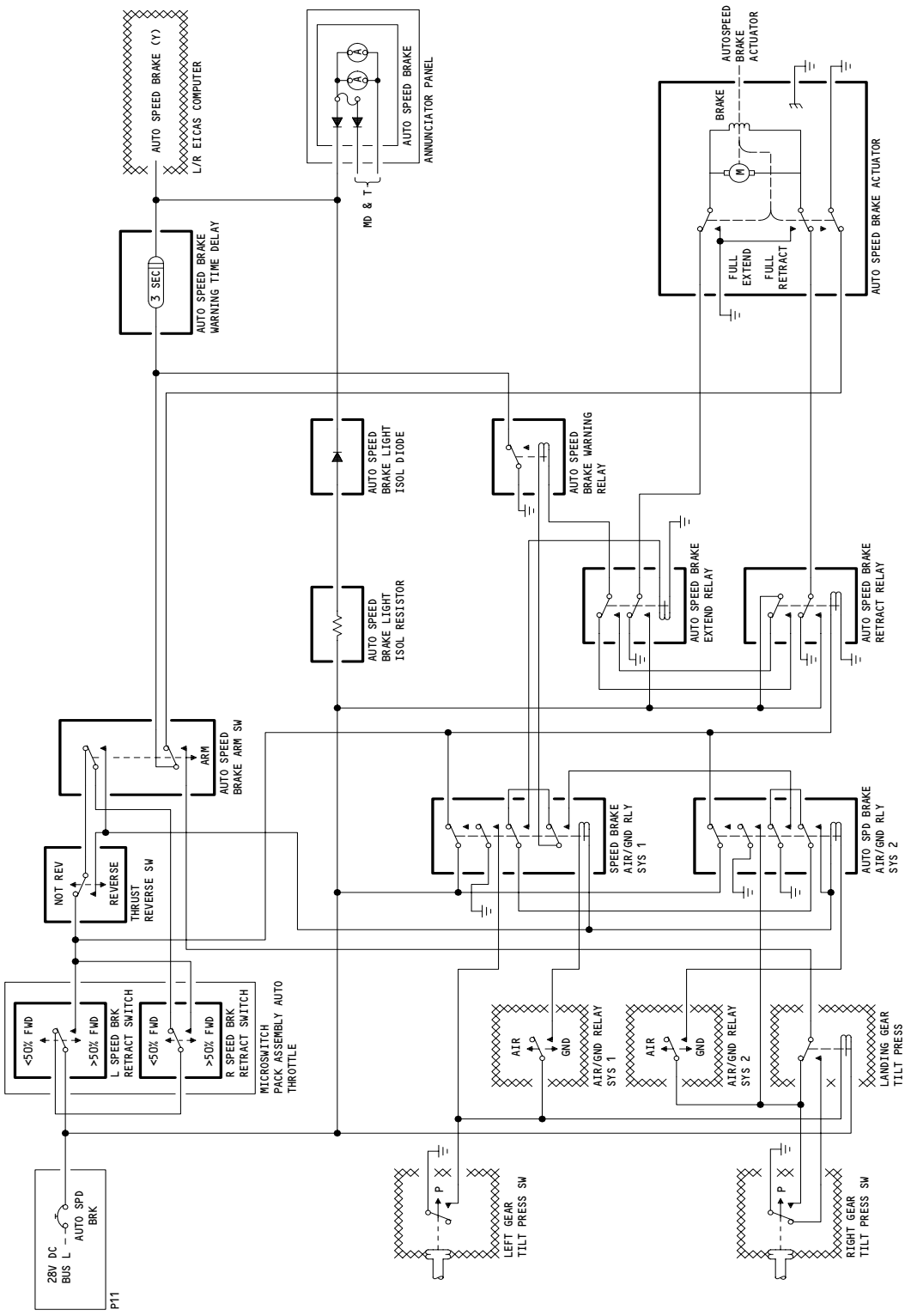
2) Both truck tilt pressure switches signal high pressure.



Reverse Thrust Mechanism
Figure 4



Forward Thrust Lever Position Switches
Figure 5



Auto-Speedbrake Control System Schematic
Figure 6

(3) Refused Takeoff or Emergency Landing

(a) During a refused takeoff or an emergency landing with the system unarmed, the spoiler panels will extend when the reverse thrust levers are moved into the reverse idle range. The levers mechanically release the speedbrake lever from the down and locked detent to the ARMED position and close the engine reverse thrust switch. When the following conditions are met, the auto-speedbrake actuator moves the speedbrake lever to the UP position.

1) Both truck tilt pressure switches signal high pressure.
2) All truck tilt proximity switches signal that the landing gear is not tilted.

(4) Go-Around After Touchdown

(a) After a normal landing sequence, the auto-speedbrake system retracts the spoiler panels during a go-around after touchdown. Moving either of the forward thrust levers to greater than 50 percent total lever travel will fully retract the auto-speedbrake actuator, moving the speedbrake lever to the down and locked detent.

B. Control

(1) Provide electrical power (Ref 24-22-00).

WARNING: TO PREVENT INJURY OR DAMAGE, CLEAR PERSONNEL AND EQUIPMENT FROM CONTROL SURFACES BEFORE PROVIDING HYDRAULIC POWER. KEEP AREA CLEAR WHEN OPERATIONG CONTROL SURFACES.

(2) Provide left, center, and right hydraulic system power (Ref 29-11-00).

(3) Place control wheels in the neutral position.

(4) Speedbrake operation (speedbrake lever)

(a) Move speedbrake lever to the full UP stop. Spoiler panels 4 and 9 will extend 55 degrees. Spoiler panels 6 and 7 will extend 30 degrees. The other spoiler panels will extend 45 degrees.

(b) Move speedbrake lever to the down-and-locked detent. All spoiler panels will return to the faired position.

(5) Speedbrake operation (auto-speedbrake)

(a) Place forward thrust levers at greater than 50 percent total lever travel.

(b) Move speedbrake lever to ARMED position.

(c) Move forward thrust levers to less than 50 percent total lever travel. The speedbrake lever will move to the UP position. Spoiler panels 4 and 9 will extend 55 degrees. Spoiler panels 6 and 7 will extend 30 degrees. All other panels will extend 45 degrees.

(d) Move forward thrust levers to greater than 50 percent total lever travel. The speedbrake lever will move to the down and locked detent. All spoiler panels will return to the faired position.

(e) Place reverse thrust levers in the full reverse thrust position. The speedbrake lever will move to the full UP stop position. The spoiler panels will extend as above.

(f) Move reverse thrust levers to the idle position. The speedbrake lever will remain at the full UP stop position . All spoiler panels will remain fully extended.

(g) Return speedbrake lever to down and locked detent and the spoiler panels will return to faired position. The AUTO SPDBRK light on the P5 panel may come on for 3 - 4 seconds.

(6) Remove hydraulic power.

(7) Remove electrical power if no longer required.

AUTO-SPEEDBRAKE CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ASSEMBLY - (FIM 22-32-00/101)				
AUTOTHROTTLE MICROSWITCH PACK, M966				
ACTUATOR - AUTO-SPEEDBRAKE, M577	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
CIRCUIT BREAKER -	1		FLT COMPT, P11	
AUTO SPEED BRAKE, C1023		1	11G11	*
CLUTCH - AUTO SPEEDBRAKE NO-BACK	2	1	FLT COMPT, CONTROL STAND P10	27-62-02
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
DELAY - (FIM 31-01-36/101)				
AUTO-SPEEDBRAKE TIME, M963				*
DIODE - (FIM 31-01-37/101)				
AUTO-SPEEDBRAKE LIGHT ISOL, R10213 1>				*
LEVER - SPEEDBRAKE	1	1	FLT COMPT, CONTROL STAND P10	27-62-01
LEVERS - (FIM 76-11-00/101)				
FORWARD THRUST				
REVERSE THRUST				
LIGHT - AUTO SPD BRK, L15	1	1	FLT COMPT, P5, AUX ANN M10394	*
MECHANISM - SPEEDBRAKE		1	FLT COMPT, CONTROL STAND P10	27-62-02
PANEL - (FIM 30-31-00/101)				
AUXILIARY ANNUNCIATOR, M10394				
RELAY - (FIM 32-09-00/101)				
AIR/GND SYS 1, K167				
AIR/GND SYS 2, K211				
RELAY - (FIM 31-01-36/101)				
AUTO-SPEEDBRAKE AIR/GND 1, K87				
AUTO-SPEEDBRAKE AIR/GND 2, K88				
AUTO-SPEEDBRAKE EXTEND, K217				
AUTO-SPEEDBRAKE RETRACT, K218				
AUTO-SPEEDBRAKE WARNING, K220				
RELAY - (FIM 31-01-37/101)				
LANDING GEAR TILT PRESSURE, K550				
RESISTOR - (FIM 31-01-37/101)				
AUTO-SPEEDBRAKE LIGHT ISOL, R10214 1>				

* SEE THE WDM EQUIPMENT LIST

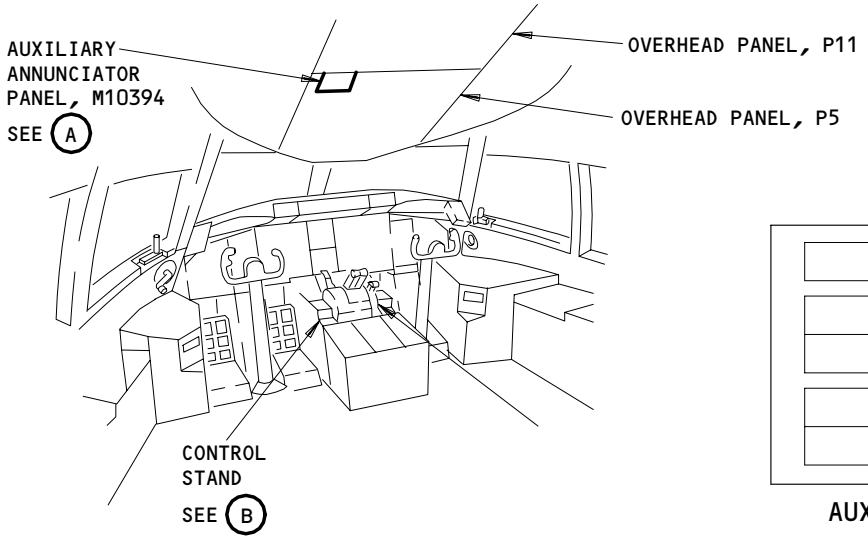
1> IF INSTALLED (POST-SB 31-19)

Auto-Speedbrake Control System - Component Index
Figure 101 (Sheet 1)

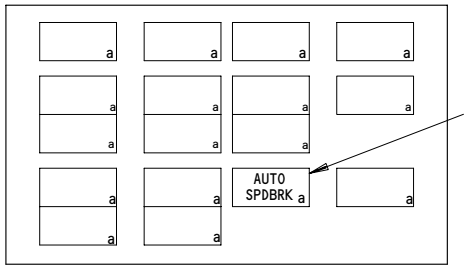
AUTO-SPEEDBRAKE CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - AUTO-SPEEDBRAKE ARMING, S371	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
SWITCH - LEFT SPEEDBRAKE RETRACT LEVER POSITION, S10	2	1	113AL, FWD EQUIP COMPT, AUTO-THROTTLE MICROSWITCH PACK ASSEMBLY M966	27-62-07
SWITCH - LEFT GEAR TILT PRESSURE, S452 (REF 32-30-00, FIG. 101)				
SWITCH - REVERSE THRUST LEVER POSITION, S374	1	1	FLT COMPT, CONTROL STAND P10	27-62-08
SWITCH - RIGHT SPEEDBRAKE RETRACT LEVER POSITION, S14	2	1	113AL, FWD EQUIP COMPT, AUTO-THROTTLE MICROSWITCH PACK ASSEMBLY M966	27-62-07
SWITCH - RIGHT GEAR TILT PRESSURE, S453 (REF 32-30-00, FIG. 101)				
SWITCH - SPEEDBRAKE LEVER POSITION, S493 (REF 31-51-00, FIG. 101)				
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 1, TS35	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 2, TS36	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02
TRANSDUCER (LVDT) - SPEEDBRAKE UNIT 3, TS37	2	1	FLT COMPT, CONTROL STAND P10, SPEEDBRAKE MECHANISM	27-62-02

Auto-Speedbrake Control System - Component Index
Figure 101 (Sheet 2)

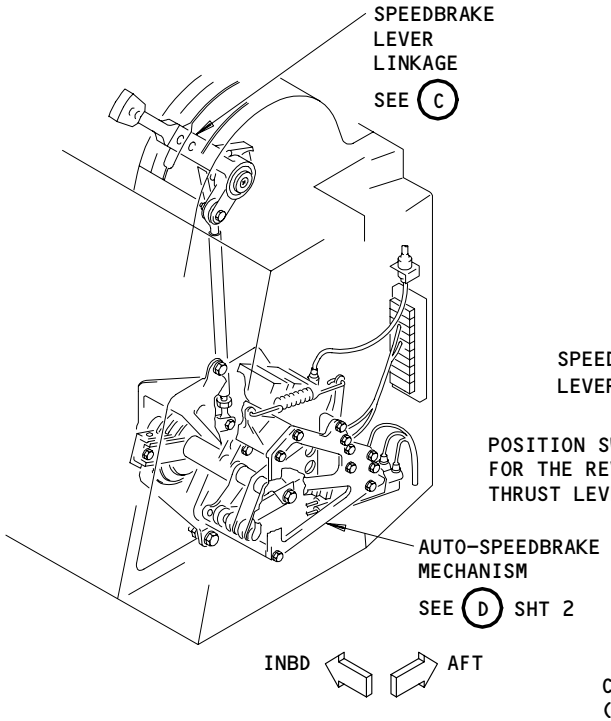


FLIGHT COMPARTMENT



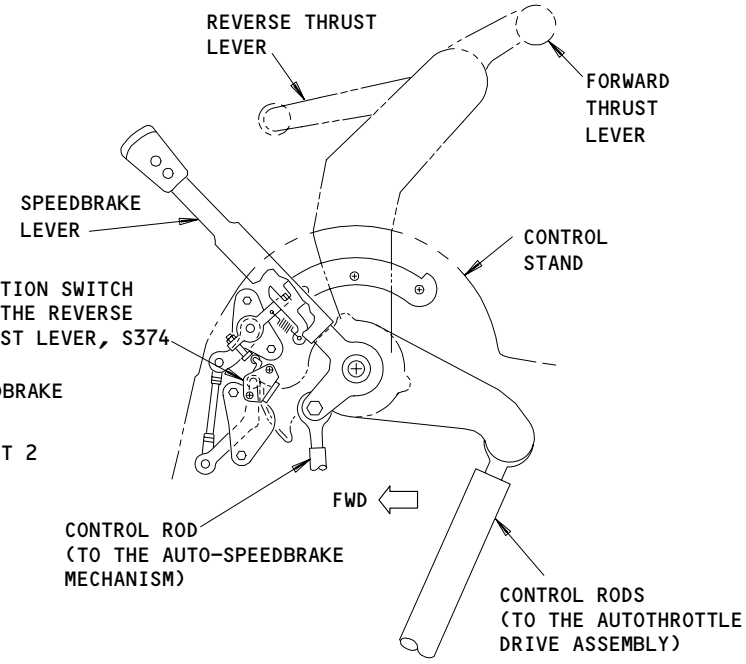
AUXILIARY ANNUNCIATOR PANEL, M10394

A



CONTROL STAND

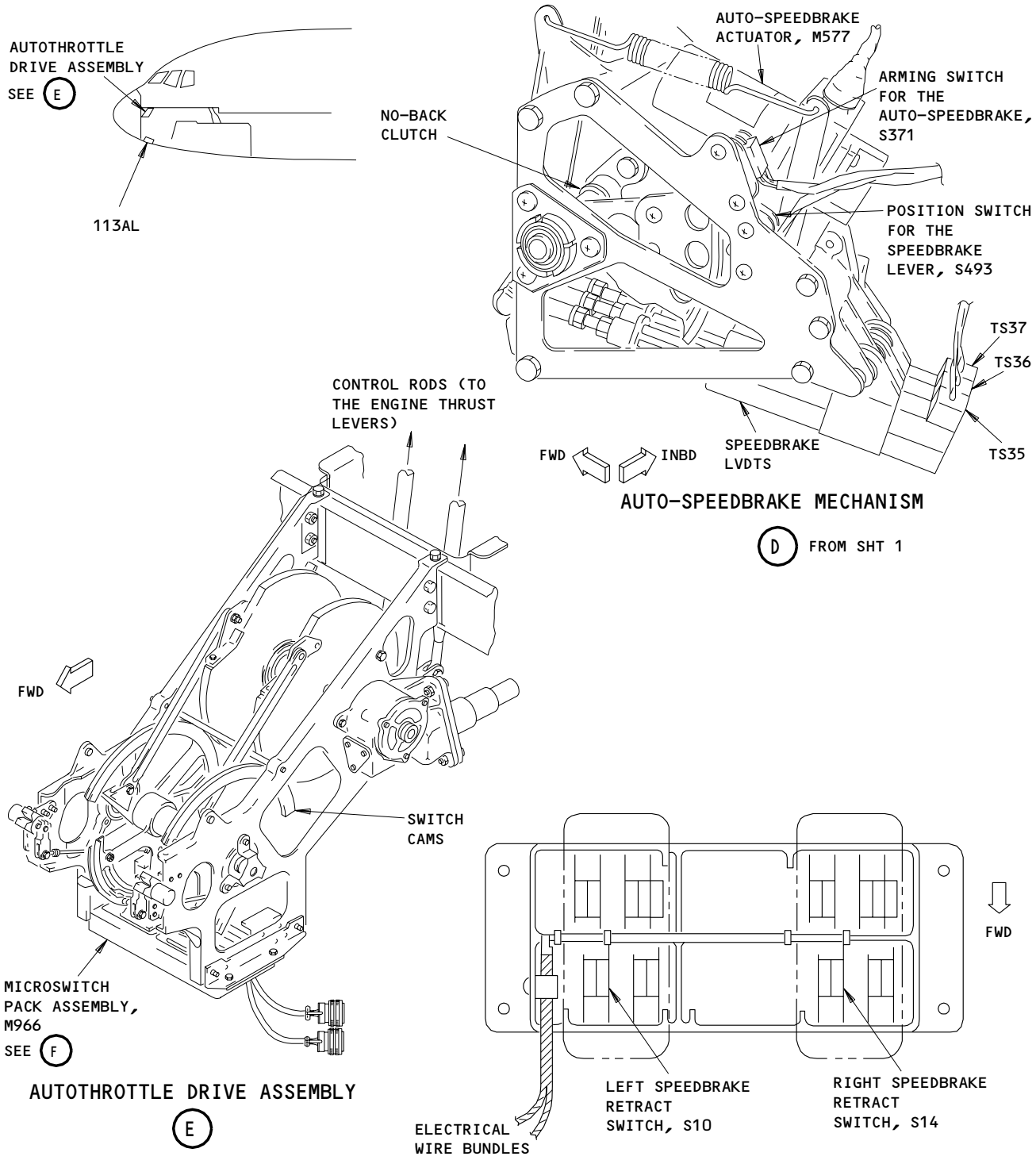
B



SPEEDBRAKE LEVER LINKAGE

C

Auto-Speedbrake Control System - Component Location
Figure 102 (Sheet 1)



Auto-Speedbrake Control System - Component Location
Figure 102 (Sheet 2)

AUTO-SPEEDBRAKE CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains the operational test, the adjustment, and the system test tasks for the auto-speedbrake system. Refer to 27-61-00/501 for the applicable adjustment and test data for the spoiler control system.

TASK 27-62-00-715-012

2. Operational Test - Auto-Speedbrake System
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zone
          211/212 Control Cabin

   C. Prepare for the Test

      S 865-205
      (1) Supply electrical power (AMM 24-22-00/201).

      S 865-206
      (2) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

      S 045-002

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

      (3) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 865-003

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(4) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 865-013

(5) Move the control wheels to their neutral positions.

S 865-014

(6) Make sure the forward and the reverse thrust levers are in their idle positions.

D. GUI 001, 002, 115;
Auto-Speedbrake System - Test

S 865-192

(1) Make sure these circuit breakers on the P11 panel are closed:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S15, AIR/GND SYS 1
(c) 11S19, AIR/GND SYS 2
(d) 11G11, AUTO SPEED BRAKE

S 865-193

(2) Make sure the speedbrake lever is in the down-and-locked detent position.

S 865-194

(3) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11C30, LANDING GEAR POS SYS 1

S 865-196

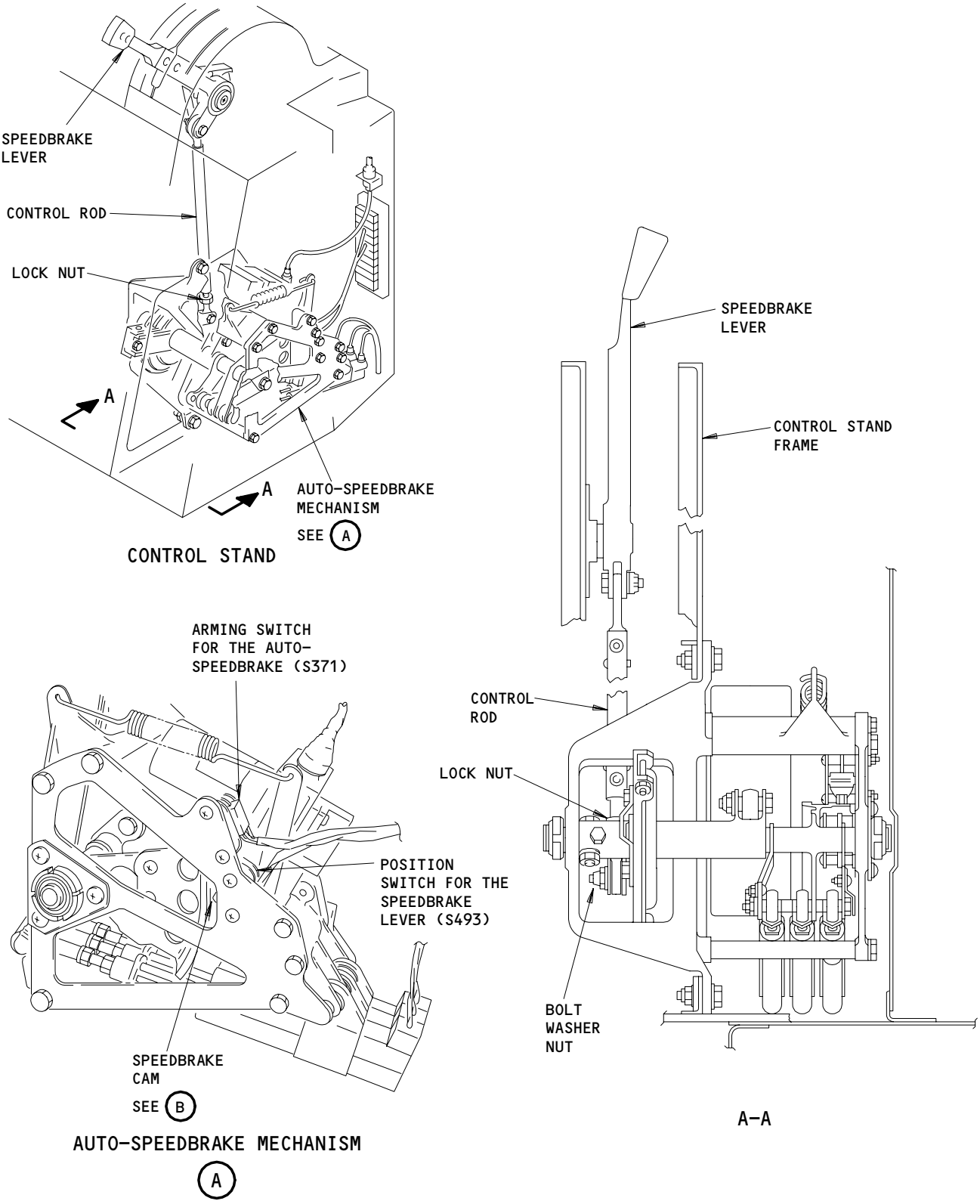
(4) Move the speedbrake lever to its ARMED position.

S 865-197

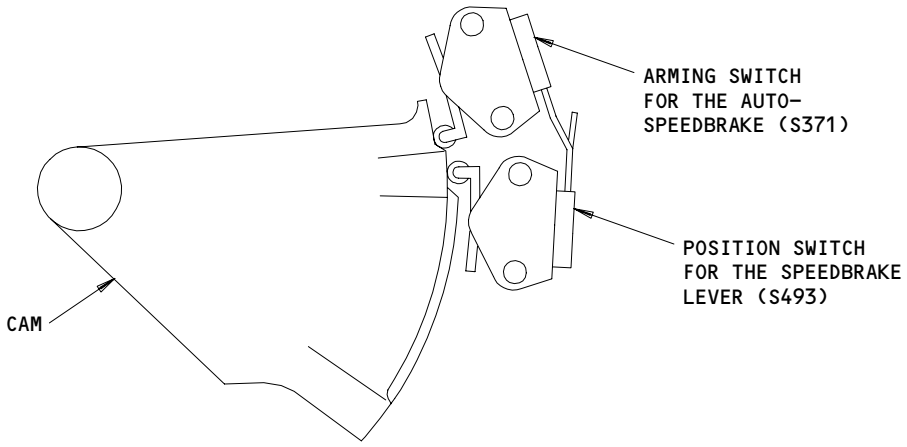
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C30, LANDING GEAR POS SYS 1

S 865-198

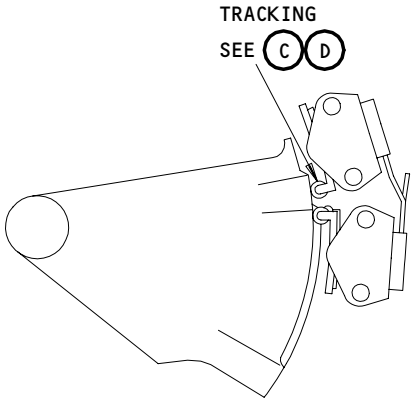
(6) Make sure the speedbrake lever moves to its full upstop position.



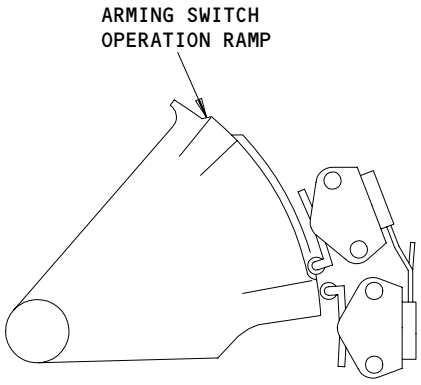
Auto-Speedbrake System Adjustment
Figure 501 (Sheet 1)



SPEEDBRAKE LEVER DOWN



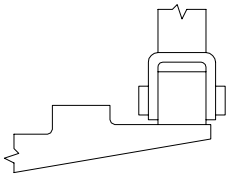
AUTO-SPEEDBRAKE SYSTEM ARMED



SPEEDBRAKE LEVER UP

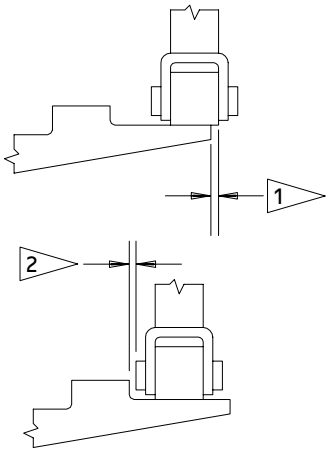
SPEEDBRAKE CAM

B



NORMAL TRACKING

C



TRACKING LIMITS

D

1 0.03 INCH MAXIMUM OVER THE FULL TRACK

2 0.002 INCH MINIMUM CLEARANCE OVER THE FULL TRACK.

Auto-Speedbrake System Adjustment
Figure 501 (Sheet 2)

S 865-273
(7) Make sure the spoilers move to their full up positions.

S 215-016
(8) Move the left forward thrust lever to a position that is more than 50 percent thrust and do this check:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.
(b) Make sure the spoilers move to their full down positions.

S 865-022
(9) Move the left forward thrust lever to the idle thrust position.

S 865-208
(10) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11C30, LANDING GEAR POS SYS 1

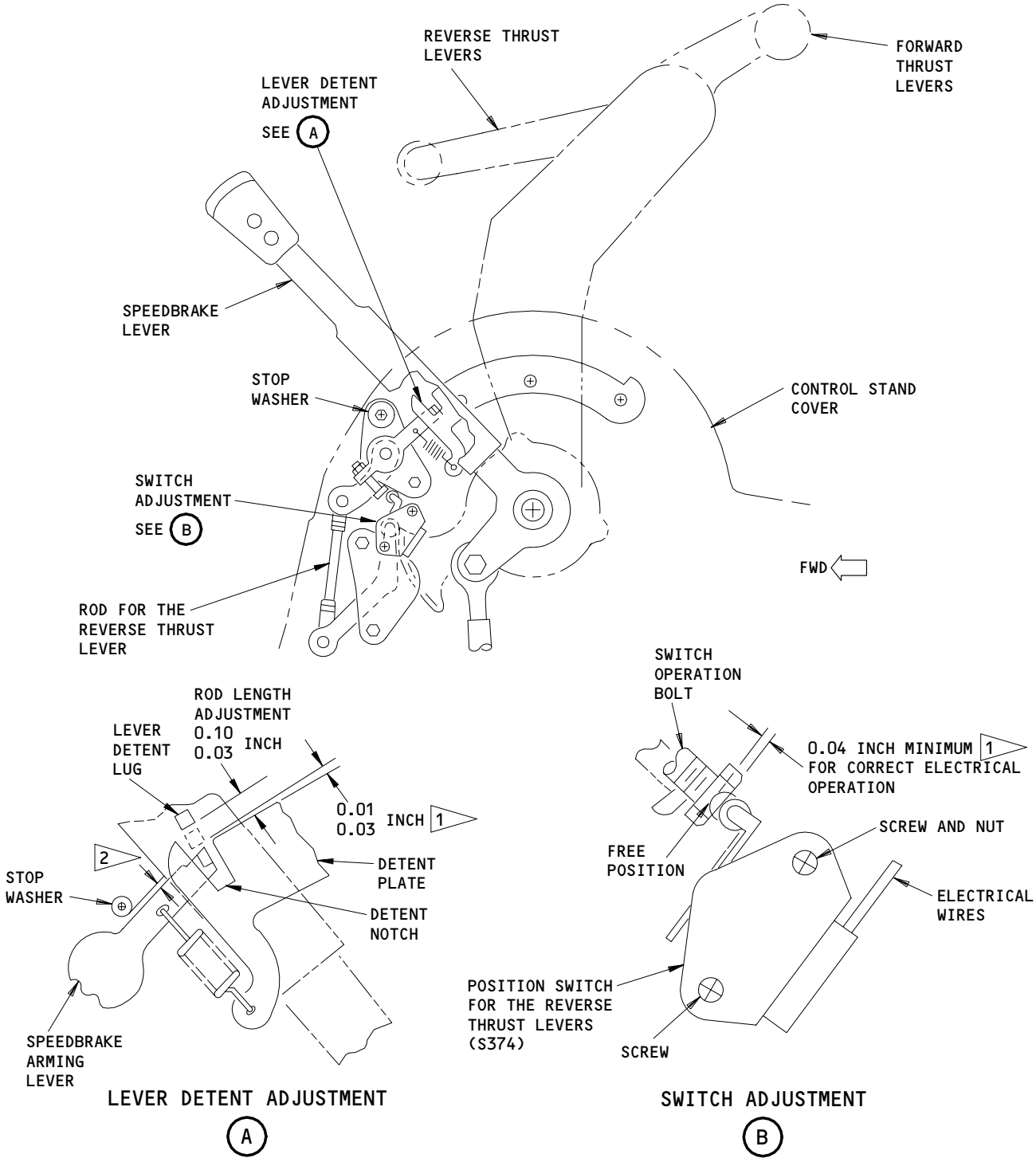
S 865-209
(11) Move the speedbrake lever to its ARMED position.

S 865-210
(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C30, LANDING GEAR POS SYS 1

S 865-211
(13) Make sure the speedbrake lever moves to its full upstop position.

S 865-212
(14) Make sure the spoilers move to their full up positions.

S 215-214
(15) Move the right forward thrust lever to a position that is more than 50 percent thrust and do these checks:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.
(b) Make sure the spoilers move to their full down positions.



Position Switch for the Reverse Thrust Lever - Adjustment
Figure 502

S 865-217
(16) Move the right forward thrust lever to the idle thrust position.

S 215-023
(17) Move the reverse thrust levers to the deployment interlock stop and do these checks:
(a) Make sure the speedbrake lever moves to its full upstop position.
(b) Make sure the spoilers move to their full up positions.

S 865-024
(18) Move the reverse thrust levers fully forward and down.

E. GUI 003-114, 116-999;
Auto-Speedbrake System - Test

S 865-180
(1) Make sure these circuit breakers on the P11 panel are closed:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S19, LANDING GEAR AIR/GND SYS 2
(c) 11G11, AUTO SPEEDBRAKE

S 865-181
(2) Make sure these circuit breakers on the P6 panel are closed:
(a) 6F5, LANDING GEAR ALT EXT CONT

S 865-182
(3) Make sure the speedbrake lever is in the down-and-locked detent position.

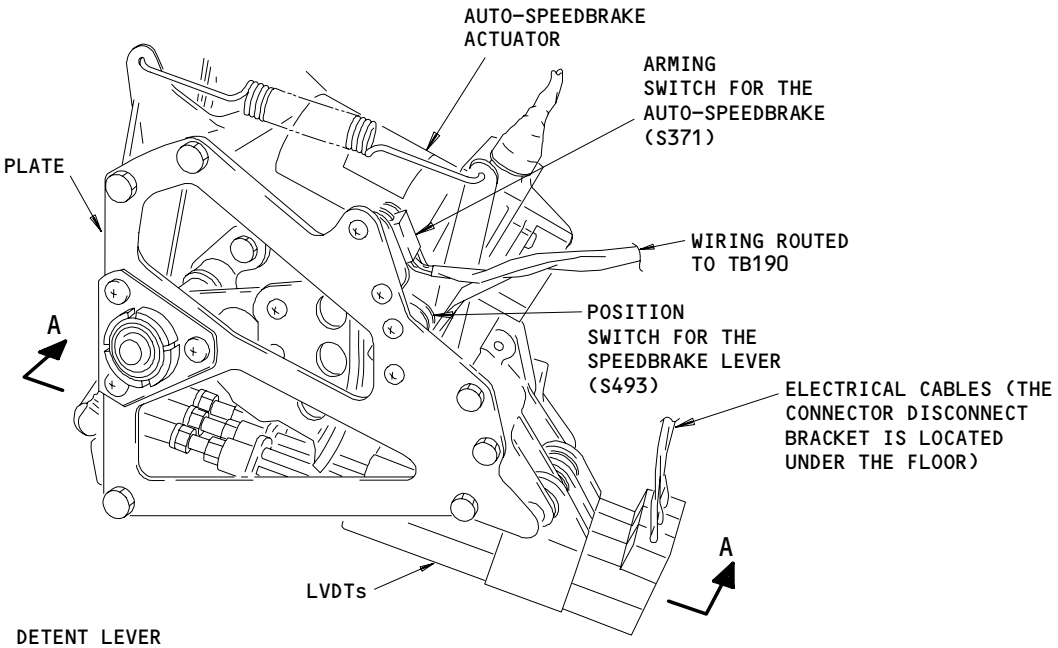
S 865-183
(4) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11C30, LANDING GEAR POS SYS 1

S 865-195
(5) Move the speedbrake lever to its ARMED position.

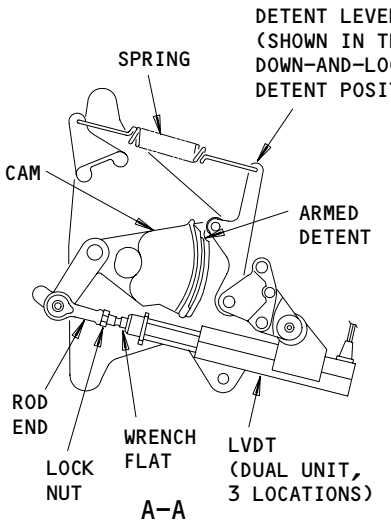
S 865-184
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11C30, LANDING GEAR POS SYS 1

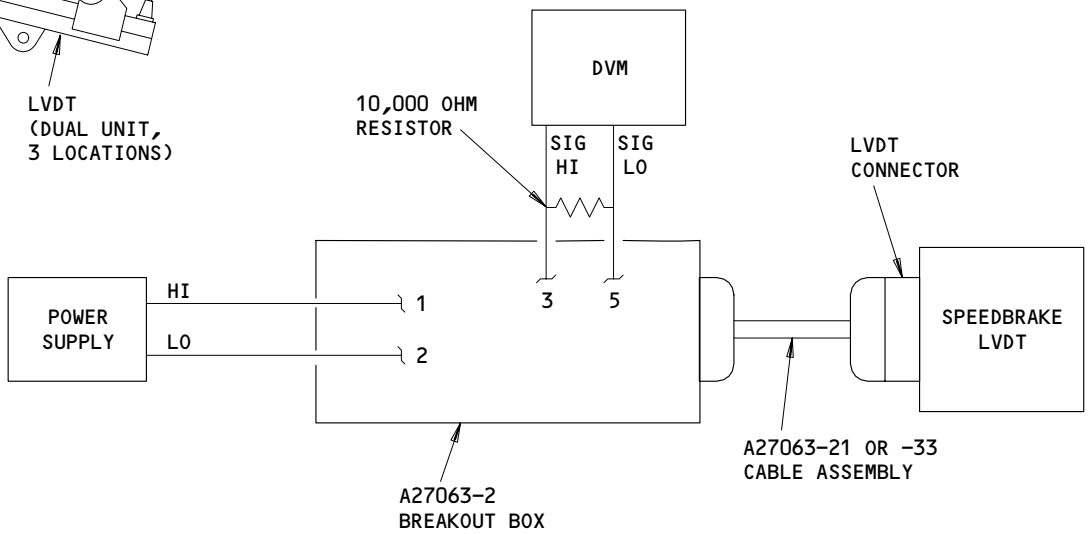
S 865-189
(7) Make sure the speedbrake lever moves to its full upstop position.

S 215-185
(8) Move the left forward thrust lever to a position that is more than 50 percent thrust and do this check:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.



SPEEDBRAKE MECHANISM

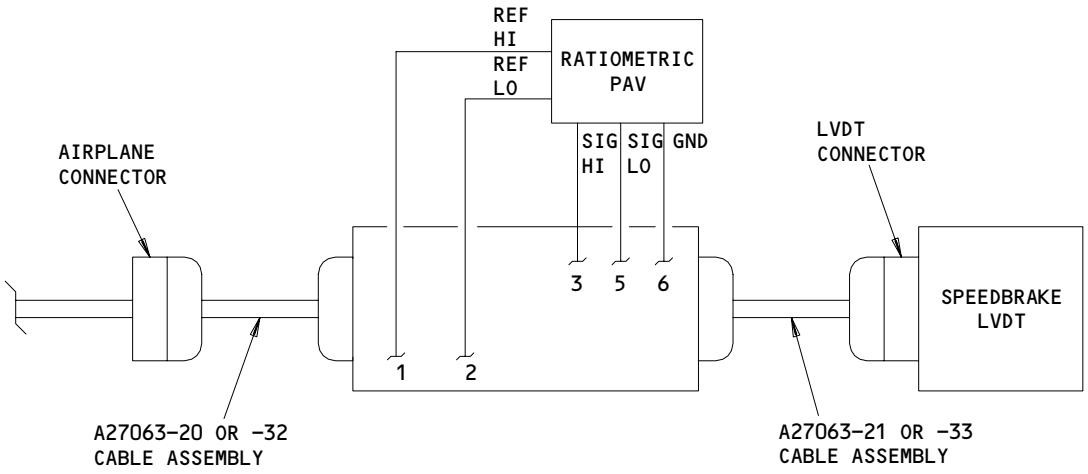




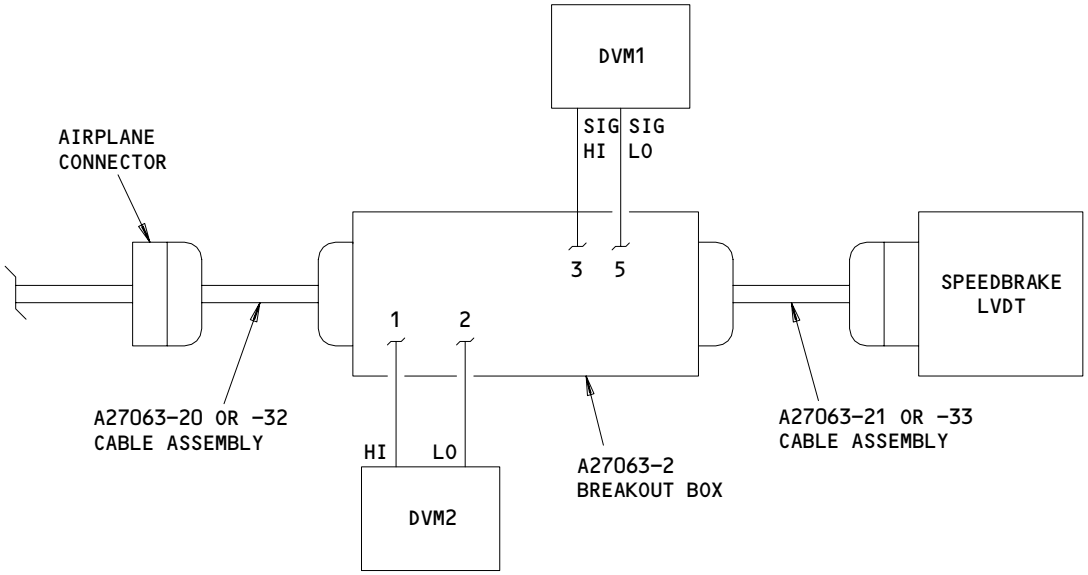
LEGEND
DVM - DIGITAL VOLTMETER
RATIOMETRIC PAV - RATIOMETRIC DIGITAL PHASE ANGLE VOLTMETER

PROCEDURE 1

Speedbrake LVDTs Adjustment
Figure 503 (Sheet 1)



PROCEDURE 2



$\frac{7.10}{26.00}$ X V AT DVM2 = THE NECESSARY V AT DVM1

NOTE: IF ONLY ONE DVM IS USED, MONITOR THE AIRPLANE POWER AS SHOWN (DVM2). THEN, CONNECT IT TO THE BREAKOUT BOX AS SHOWN (DVM1) TO DO THE ADJUSTMENT.

PROCEDURE 3

Speedbrake LVDTs Adjustment
Figure 503 (Sheet 2)

S 865-186
(9) Move the left forward thrust lever to the idle thrust position.

S 865-190
(10) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C30, LANDING GEAR POS SYS 1

S 865-187
(11) Move the speedbrake lever to its ARMED position.

S 865-188
(12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C30, LANDING GEAR POS SYS 1

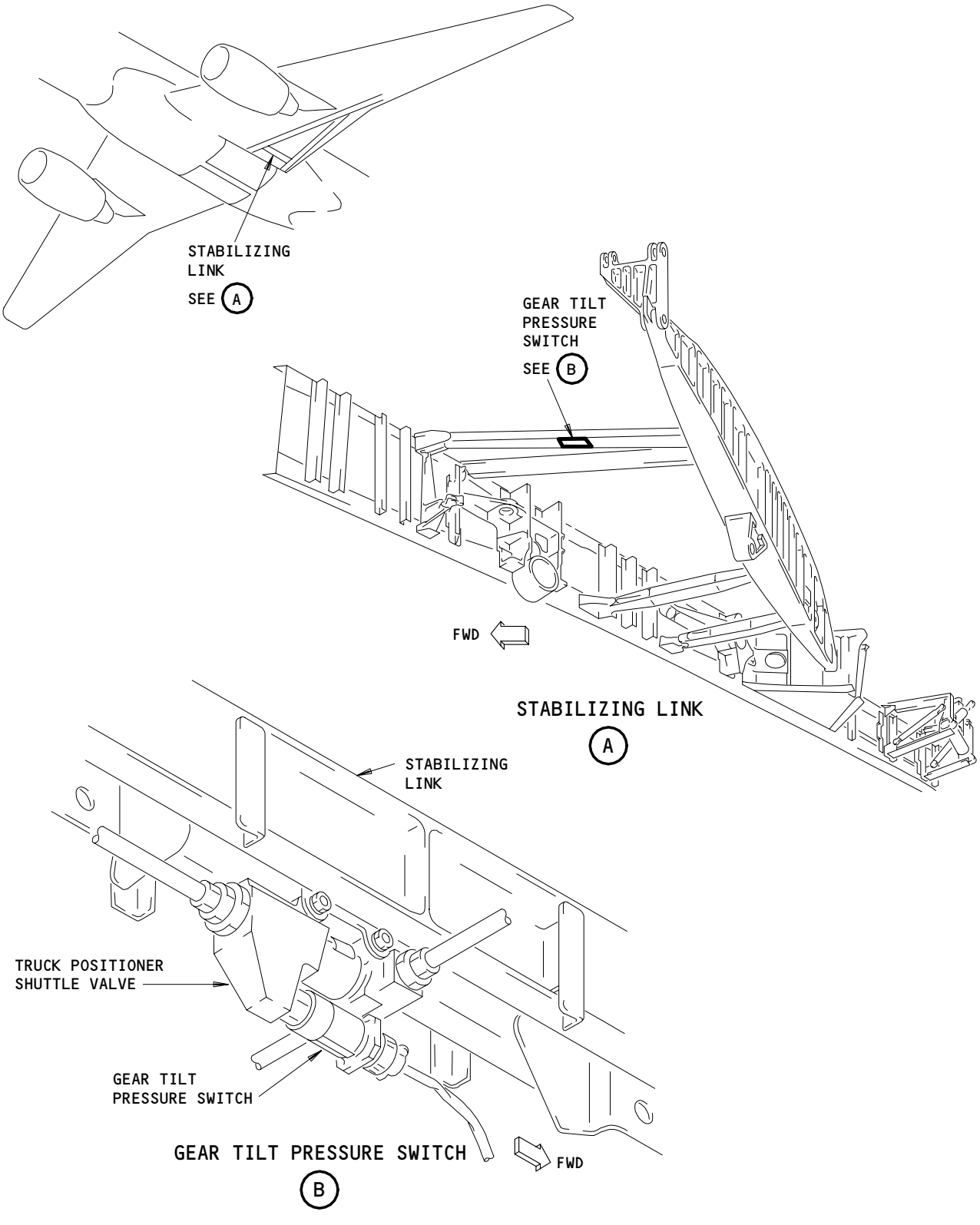
S 215-191
(13) Make sure the speedbrake lever moves to its full upstop position.

S 215-193
(14) Make sure the spoilers move to their full up positions.

S 215-186
(15) Move the right forward thrust lever to a position that is more than 50 percent thrust and do these checks:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.
(b) Make sure the spoilers move to their full down positions.

S 865-220
(16) Move the right forward thrust lever to the idle thrust position.

S 215-215
(17) Move the reverse thrust levers to the deployment interlock stop and do these checks:
(a) Make sure the speedbrake lever moves to its full upstop position.



Gear Tilt Pressure Switch
Figure 504

(b) Make sure the spoilers move to their full up positions.

S 865-216

(18) Move the reverse thrust levers fully forward and down.

F. Put the Airplane Back to Its Usual Condition

S 865-025

(1) Move the speedbrake lever to its down-and-locked detent position.

S 865-027

(2) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the P10 panel.

S 865-028

(3) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201)/

S 445-029

(4) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 865-030

(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-62-00-825-031

3. Adjustment - Auto-Speedbrake System

A. Equipment

(1) Breakout Box, Cables - A27063-91 (Preferred)
Position Transmitter Tester - PTTS-892B
(Alternate)
Phase Synchronous Voltmeter - 101-ACX
(Alternate)

(2) 10,000 ohm Resistor, Commercially Available

(3) Digital Voltmeter (DVM) - John Fluke 8020B
(speedbrake LVDT adjustment PROCEDURE 1 or 3)
John Fluke Manufacturing Co., Inc., Everett,
Washington

(4) Power Supply - Powertron Model 5900 (speedbrake LVDT adjustment PROCEDURE 1), Industrial Test Equipment Corp., Port Washington, New York

(5) Ratiometric Digital Phase Angle Voltmeter - North Atlantic Model 225-400-400R30 (speedbrake LVDT adjustment PROCEDURE 2), North Atlantic Industries Inc., Hauppauge, New York

(6) Phase Synchronous Voltmeter - Model 101A
Electronic Aviation Systems, Renton, Washington
(speedbrake lever LVDT adjustment PROCEDURE 4)

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access
(1) Location Zone
211/212 Control Cabin

D. Prepare for the Adjustment

S 865-032
(1) Supply electrical power (AMM 24-22-00/201).

S 215-034
(2) Make sure the speedbrake lever is in its down-and-locked detent position.

S 865-249
(3) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags:

TABLE 501 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 865-035

(4) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

S 865-036

(5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
   (a) 11B30, ENGINES RIGHT T/R CONT
   (b) 11D12, ENGINES LEFT T/R CONT
   (c) 11G11, AUTO SPEED BRAKE

S 015-037

(6) Remove the access panel from the left side of the control stand.

E. Adjust the Speedbrake Lever

S 215-038

(1) Move the speedbrake lever aft until the detent lever roller is in its ARMED detent on the cam and do these checks:
   (a) Make sure the aft side of the speedbrake lever is at the ARMED position on the lightplate.
   (b) Make sure the rollers for switches S371 and S493 are in the positions shown (Fig. 501, View B, Auto-Speedbrake Armed).
   (c) If the switch rollers are not in their correct positions, adjust the control rod length.

S 825-039

(2) Do these steps to adjust the length of the control rod between the speedbrake lever and the speedbrake mechanism:
   (a) Loosen the locknut.
   (b) Remove the rod end bolt.
   (c) Turn the rod end to increase or decrease the length of the control rod.
   (d) Connect the control rod to the speedbrake lever.
   (e) Tighten the locknut.

S 215-040

(3) Move the speedbrake lever to its down-and-locked detent position and do these steps:
   (a) Make sure the rollers for switches S371 and S493 are in the positions shown (Fig. 501, View B, Speedbrake Lever Down).
   (b) If the switch rollers are not in their correct positions, adjust the control rod length.

S 215-041

(4) Move the speedbrake lever to its full upstop position and do these steps:
   (a) Make sure the roller for switch S493 is in the position shown (Fig. 501, View B, Speedbrake Lever Up).
   (b) If the switch rollers are not in their correct positions, adjust the control rod length.

S 865-042

(5) Move the speedbrake lever back to its down-and-locked detent position.

S 215-043

(6) Make sure the control rod threads can be seen in at least one-half of the inspection hole in the control rod.

F. Adjust the Position Switch for the Reverse Thrust Lever (Fig. 502)

S 825-044

(1) Do these steps to adjust the position switch:
   (a) Make sure the thrust levers are in their idle positions.
   (b) Move the left reverse thrust lever to its full reverse thrust position.
   (c) Adjust the length of the rod for the reverse thrust lever until this condition is satisfactory:
      1) The lever detent lug is pushed out of the down detent notch to the clearance shown (View A).
   (d) Adjust the switch operation bolt until the position switch roller is in the position shown (View B) and do these steps:
      1) Make sure the position switch operates electrically to the clearance shown (View A).
      2) Tighten the jamnuts on the bolt.
   (e) Move the left reverse thrust lever to its OFF position.

S 825-045
(2) Do the above step again for the right reverse thrust lever.

S 825-047
(3) Do these steps to examine the stop washer clearance:
(a) Move the two reverse thrust levers to their full reverse thrust positions.
(b) Make sure the clearance between the stop washer and the speedbrake arming lever is at least 0.01 inch (View A).

S 215-048
(4) Move the left reverse thrust lever to its full reverse thrust position and then back to its OFF position. Do these checks:
(a) Make sure the lever detent lug goes back to its full down position.
(b) Make sure the position switch goes to its free position.

S 215-049
(5) Do the above step again for the right reverse thrust lever.

G. Adjust the Speedbrake LVDTs (PROCEDURE 1) (Fig. 503)

NOTE: Four procedures are supplied to adjust the speedbrake LVDTs.

PROCEDURE 1 uses a commercially available power supply, a resistor, a digital voltmeter (DVM), and the breakout box equipment.

PROCEDURE 2 uses airplane power and a ratiometric digital phase angle voltmeter (ratiometric PAV) with the breakout box equipment.

PROCEDURE 3 uses airplane power, a DVM, and the breakout box equipment.

PROCEDURE 4 uses a phase synchronous voltmeter only.

S 035-050
(1) Disconnect the electrical connectors from the LVDTs (6 locations).

S 495-051
(2) Do these steps to connect the breakout box equipment:
(a) Connect the breakout box and the cable assembly to one of the six LVDT connectors.
(b) Connect the digital voltmeter (DVM) to the breakout box at pins 3 (SIG HI) and 5 (SIG LO).
(c) Connect the power supply to the breakout box at pins 1 (HI) and 2 (LO).
(d) Connect the resistor between pins 3 and 5.
(e) Adjust the power supply to 26 ±0.02 volts ac RMS.

S 865-052
(3) Move the speedbrake lever from its down-and-locked position to its full upstop position and then back to its down-and-locked position.

S 825-053
(4) Move the speedbrake lever to its ARMED position and do these steps:
(a) Make sure the cam roller for the detent lever is in the ARMED detent position.
(b) Loosen the LVDT locknut.
(c) Adjust the LVDT at the wrench flat until the output voltage is 0 ±0.050 volts ac RMS at the DVM.
(d) Tighten the locknut and do this check:
1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.

S 225-054
(5) Move the speedbrake lever to its full upstop position and do this check:
(a) Make sure the LVDT output voltage at the DVM is at least 7.10 volts ac RMS.

S 865-055
(6) Move the speedbrake lever back to its ARMED position.

S 095-056
(7) Disconnect the cable assembly from the LVDT electrical connector.

S 495-057
(8) Connect the cable assembly to the other electrical connector from the dual LVDT assembly.

S 825-058
(9) Do the adjustment procedure again for the second LVDT in the dual LVDT assembly.

S 095-059
(10) Disconnect the cable assembly and the breakout box from the LVDT.

S 825-060
(11) Do the adjustment procedure again for the four remaining LVDTs (two dual LVDT assemblies).

S 865-061
(12) Move the speedbrake lever back to its down-and-locked detent position.

S 435-063
(13) Connect the airplane electrical connectors to the LVDTs.

H. Adjust the speedbrake LVDTs (PROCEDURE 2)

S 035-064
(1) Disconnect the electrical connectors from the LVDTs (6 locations).

S 495-065
(2) Do these steps to connect the breakout box equipment:
  (a) Connect the breakout box and the cable assembly to one of the six LVDT connectors.
  (b) Connect the ratiometric digital phase angle voltmeter (ratiometric PAV) to the breakout box at pins 3 (SIG HI), 5 (SIG LO), and 6 (GND).
  (c) Connect the cable assembly between the airplane connector and the breakout box.
  (d) Connect breakout box pins 1 (HI) and 2 (LO) to the applicable REF pins on the ratiometric PAV.

S 865-066
(3) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 865-067
(4) Move the speedbrake lever from its down-and-locked position to its full upstop position and then back to its down-and-locked position.

S 825-068
(5) Move the speedbrake lever to its ARMED position and do these steps:
  (a) Make sure the cam roller for the detent lever is in the ARMED detent position.
  (b) Loosen the LVDT locknut.
  (c) Adjust the LVDT at the wrench flat until the output voltage is 0 ±0.050 volts ac RMS at the ratiometric PAV.
  (d) Tighten the locknut and do this check:
    1) Make sure the output voltage stays at 0 ±0.050 volt ac RMS.

S 225-069
(6) Move the speedbrake lever to its full upstop position and do this check:
  (a) Make sure the ratiometric PAV shows at least 0.2731.

    NOTE: Use the ratio function on the ratiometric PAV.

S 865-070
(7) Move the speedbrake lever back to its ARMED position.

S 865-071
(8) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-072
(9) Disconnect the breakout box from the LVDT and the airplane connector.

S 495-073
(10) Connect the cable assembly between the other electrical connector from the dual LVDT assembly and the applicable airplane connector.

S 865-074
(11) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 825-075
(12) Do the adjustment procedure again for the second LVDT in the dual LVDT assembly.

S 865-076
(13) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-077
(14) Disconnect the breakout box and the two cable assemblies from the LVDT and the airplane connector.

S 825-078
(15) Do the adjustment procedure again for the four remaining LVDTs (two dual LVDT assemblies).

S 865-079
(16) Move the speedbrake lever back to its down-and-locked detent position.

S 435-080
(17) Connect the airplane electrical connectors to the LVDTs.

I. Adjust the speedbrake LVDTs (PROCEDURE 3)

S 035-081
(1) Disconnect the electrical connectors from the LVDTs (6 locations).

S 495-082
(2) Do these steps to connect the breakout box equipment:
(a) Connect the breakout box and the cable assembly to one of the six LVDT connectors.
(b) Connect DVM 1 to the breakout box at pins 3 (SIG HI) and 5 (SIG LO).
(c) Connect the cable assembly between the airplane connector and the breakout box.
(d) Connect DVM 2 to the breakout box at pins 1 (HI) and 2 (LO) to monitor airplane power.

S 865-083
(3) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 865-084
(4) Move the speedbrake lever from its down-and-locked position to its full upstop position and then back to its down-and-locked position.

S 825-085
(5) Move the speedbrake lever to its ARMED position and do these steps:
(a) Make sure the cam roller for the detent lever is in the ARMED detent position.

(b) Make sure the airplane input voltage is between 24 and 30 volts ac RMS at DVM 2.
(c) Loosen the LVDT locknut.
(d) Adjust the LVDT at the wrench flat until the output voltage is 0 ±0.050 volts ac RMS at DVM 1.
(e) Tighten the locknut and do this check:
1) Make sure the output voltage stays at 0 ±0.050 volts ac RMS.

S 975-086
(6) Move the speedbrake lever to its full upstop position and do these steps:
(a) Measure the airplane input voltage on DVM 2. Then, calculate the necessary LVDT output voltage.

$$\frac{\text{NOMINAL OUTPUT}}{\text{NOMINAL INPUT}} \times \text{measured input (the voltage at DVM2)} = \text{the necessary LVDT voltage (the voltage at DVM1)}$$

where,

NOMINAL OUTPUT = 7.10 Volts ac RMS
NOMINAL INPUT = 26.00 Volts ac RMS

(b) Make sure the voltage shown on DVM 1 is equal to or more than the voltage you calculated.

S 865-087
(7) Move the speedbrake lever back to its ARMED position.

S 865-088
(8) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-089
(9) Disconnect the breakout box from the LVDT and the airplane connector.

S 495-090
(10) Connect the cable assembly between the other electrical connector from the dual LVDT assembly and the applicable airplane connector.

S 865-091
(11) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 825-092
(12) Do the adjustment procedure again for the second LVDT in the dual LVDT assembly.

S 865-093
(13) Open the circuit breakers shown in Table 501 and attach the DO-NOT-CLOSE tags.

S 095-094
(14) Disconnect the breakout box and the two cable assemblies from the LVDT and the airplane connector.

S 825-095
(15) Do the adjustment procedure again for the four remaining LVDTs (two dual LVDT assemblies).

S 865-096
(16) Move the speedbrake lever back to its down-and-locked detent position.

S 435-097
(17) Connect the airplane electrical connectors to the LVDTs.

J. Adjust the speedbrake LVDTs (PROCEDURE 4)

S 035-098
(1) Disconnect the electrical connectors from the LVDTs (6 locations).

S 865-099
(2) Use the data supplied with the phase synchronous voltmeter to prepare it for use.

S 495-100
(3) Connect the applicable cable assembly from the voltmeter to one of the connectors in the dual LVDT assembly.

S 865-101
(4) Move the speedbrake lever from its down-and-locked position to its full upstop position and then back to its down-and-locked position.

S 825-102
(5) Move the speedbrake lever to its ARMED position and do these steps:
  (a) Make sure the cam roller for the detent lever is in the ARMED detent position.
  (b) Loosen the LVDT locknut.
  (c) Adjust the LVDT at the wrench flat until the output voltage is 0 ±0.050 volts ac RMS at the voltmeter.
  (d) Tighten the locknut and do this check:
    1) Make sure the output voltage stays at 0 ±0.050 volt ac RMS.

S 225-103
(6) Move the speedbrake lever to its full upstop position and do this check:
  (a) Make sure the LVDT output voltage at the voltmeter is at least 6.95 volts ac RMS.

S 865-104
(7) Move the speedbrake lever back to its ARMED position.

S 095-105
(8) Disconnect the cable assembly from the LVDT electrical connector.

S 495-106
(9) Connect the cable assembly to the other electrical connector from the dual LVDT assembly.

S 825-107
(10) Do the adjustment procedure again for the second LVDT in the dual LVDT assembly.

S 095-108
(11) Disconnect the cable assembly from the LVDT.

S 825-109
(12) Do the adjustment procedure again for the four remaining LVDTs (two dual LVDT assemblies).

S 865-110
(13) Move the speedbrake lever back to its down-and-locked detent position.

S 435-111
(14) Connect the airplane connectors to the LVDTs.

K. Put the Airplane Back to Its Usual Condition

S 415-112
(1) Install the access panel on the left side of the control stand and do this step:
(a) Make sure the panel does not touch the speedbrake mechanism.

S 865-114
(2) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 501.

S 865-115
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT
(c) 11G11, AUTO SPEED BRAKE

S 865-116

(4) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the P10 panel.

S 865-117

(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 27-62-00-715-262

4. Speedbrake Lever Force Test

A. General

(1) This test does a mechanical check of the Speedbrake lever.

B. References

(1) AMM 24-22-00/201, Manual Control

(2) AMM 29-11-00/201, Hydraulic Systems

C. Equipment

(1) Scale

(a) DPPH-50 Scale - Spring, 0-50 Lbs.
Chatillon, John and Sons Inc. (Vendor Code 11710)
83-30 Kew Gardens Road, Kew Gardens, NY 11415

D. Access

(1) Location Zone
211/212 Control Stand

E. Prepare for the Test

S 865-271

WARNING: KEEP PERSONS AND EQUIPMENT CLEAR OF THE FLIGHT CONTROL SURFACES, AND THE THRUST REVERSERS. THESE COMPONENTS CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Supply electrical power (AMM 24-22-00/201).

S 865-266

(2) Make sure both thrust levers are against the idle stop.

S 225-265

(3) Measure the force necessary to move the Speedbrake lever to the UP detent:

(a) Move the Speedbrake lever out of the UP detent.

(b) Put a scale, DPPH-50 on the end of the speedbrake lever.
(c) Use the scale to move the speedbrake lever to the ARMED detent.

NOTE: Make sure the scale, DPPH-50 is perpendicular to the speedbrake lever when you measure the force.

(d) Make sure the force necessary to move the speedbrake lever is less than 6 pounds (22 newtons).

S 225-267
(4) Use the scale, DPPH-50 to measure the force necessary to move the speedbrake lever to the UP position.
(a) Make sure the force necessary to move the speedbrake lever is less than 6 pounds (22 newtons).

S 225-268
(5) Use the scale, DPPH-50 to measure the force necessary to move the speedbrake lever to the DOWN position with a stop at ARMED detent.
(a) Make sure the force necessary to move the speedbrake lever is less than 6 pounds (22 newtons).

S 845-269
(6) Remove the scale, DPPH-50 from the end of the speedbrake lever.

F. Put the Airplane Back to its Usual Condition

S 865-270
(1) Remove electrical power (AMM 24-22-00/201).

TASK 27-62-00-735-118

5. System Test - Auto-Speedbrake System

A. Equipment
(1) Stopwatch, Accurate to 0.01 second - Commercially Available

B. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 31-41-00/201, EICAS
(4) AMM 32-00-15/201, Landing Gear Door Locks

(5) AMM 32-00-20/201, Landing Gear Downlocks
(6) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zone
211/212 Control Cabin

D. Prepare for the Test

S 865-119
(1) Supply electrical power (AMM 24-22-00/201).

S 865-120
(2) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

S 865-121
(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 215-122
(4) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 215-123
(5) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 495-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Open the doors for the landing gear and install the doorlocks (AMM 32-00-15/201).

S 045-006

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(7) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 865-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(8) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

E. Truck Tilt Pressure Switch - Test

S 495-365

(1) At the right main landing gear, install the downlock pins and wheel chocks if not installed already (AMM 32-00-20/201).

S 045-009

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Do the deactivation procedure for flight mode simulation (AMM 32-09-02/201).

S 865-124

(3) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C30, LANDING GEAR POS SYS 1
(b) 11S19, AIR/GND SYS 2
(c) GUI 001, 002, 115;
11S15, AIR/GND SYS 1

(d) AIRPLANES WITH TRUCK TILT SENSOR;
11R36, PROX SW TEST

S 215-125
(4) Make sure this circuit breaker on the P11 panel is closed:
(a) 11G11, AUTO SPEEDBRAKE

S 865-126
(5) Move the speedbrake lever to its down-and-locked position.

S 865-127
(6) Move the left and right forward thrust levers to their idle thrust positions.

S 865-171
(7) Move the left and right reverse thrust levers to their off positions.

S 215-369
(8) Make sure the left hydraulic system is not pressurized (AMM 29-11-00).

S 035-128
(9) Disconnect electrical connector D3192 from the left gear tilt pressure switch S452 (Fig. 504).

S 495-129
(10) Connect a jumper wire between pins 1 and 2 on the connector plug (AMM 32-32-18-004).

S 215-130
(11) Make sure the AUTO SPDBRK on the overhead panel, P5, is off.

S 215-131
(12) Move the speedbrake lever to its ARMED position and do these steps:
(a) Make sure the speedbrake lever stays in its ARMED position.

(b) Make sure the AUTO SPDBRK light on the P5 panel is on.

NOTE: The AUTO SPDBRK light may remain on for 3-4 seconds. Make sure that the speedbrake lever stays in the ARMED position.

S 095-132

(13) Remove the jumper wire from the connector D3192.

S 865-218

(14) Supply pressure to the left hydraulic system (AMM 29-11-00/201).
(a) Make sure the AUTO SPDBRK light on the P5 panel comes on.

S 215-364

(15) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 435-133

(16) Connect electrical connector D1392 to the switch (S452).
(a) Make sure the AUTO SPDBRK light on the P5 panel is off.

F. Air/Ground Switch Failure - Test

S 865-135

(1) Make sure these circuit breakers on the P11 panel are closed:
(a) GUI 001, 002, 115;
11S15, AIR/GND SYS 1
(b) GUI 003-114, 116-999;
11C30, LANDING GEAR POS SYS 1
(c) 11S19, AIR/GND SYS 2

S 865-372

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-376

(3) Move the speedbrake lever to the ARMED position.

S 865-371

(4) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11S19, AIR/GND SYS 2

S 215-136

(5) Make sure the AUTO SPDBRK light on the P5 panel is on.

S 865-137
(6) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) GUI 001, 002, 115;
11S15, AIR/GND SYS 1
(b) GUI 003-114, 116-999;
11C30, LANDING GEAR POS SYS 1

S 215-138
(7) Make sure the AUTO SPDBRK light on the P5 panel is on.

S 865-139
(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11S19, AIR/GND SYS 2

S 215-140
(9) Make sure the AUTO SPDBRK light on the P5 panel is on.

G. Truck Tilt High Pressure Valid Hold - Test

S 865-370
(1) Make sure the speedbrake lever is in the ARMED position.

S 865-141
(2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) GUI 001, 002, 115;
11S15, AIR/GND SYS 1
(b) GUI 003-114, 116-999;
11C30, LANDING GEAR POS SYS 1

S 215-142
(3) Make sure the speedbrake lever moves to its full upstop position.

S 215-143
(4) Make sure the AUTO SPDBRK light on the P5 panel is off.

S 215-144
(5) Remove the power from the left hydraulic system (AMM 29-11-00/201) and do these checks:
(a) Make sure the AUTO SPDBRK light on the P5 panel is on.
(b) Make sure the speedbrake lever stays in its full upstop position.

H. Go-Around After Touchdown - Test

S 215-145
(1) Move the left forward thrust lever to a position that is more than 50 percent thrust and do this check:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.

S 865-146
(2) Move the left forward thrust lever to the idle thrust position.

S 215-147
(3) Move the speedbrake lever to its ARMED position and do this check:
(a) Make sure the speedbrake lever stays in its ARMED position.

S 215-148
(4) Supply pressure to the left hydraulic system (AMM 29-11-00/201) and do this check:
(a) Make sure the speedbrake lever moves to its full upstop position.

S 215-149
(5) Move the right forward thrust lever to a position that is more than 50 percent thrust and do this check:
(a) Make sure the speedbrake lever moves to its down-and-locked detent position.

S 865-150
(6) Move the right forward thrust lever to its idle thrust position.

I. Refused Takeoff - Test

S 215-151
(1) Move the left reverse thrust lever toward deploy to the reverse idle detent and do this check:
(a) Make sure the speedbrake lever moves to its full upstop position.

S 865-257
(2) Move the speedbrake lever to its down-and-locked position and do this check:

NOTE: You must lift the lever to move it to the full forward position when the reverse thrust levers are in their reverse thrust positions. The lever will not go into its down-and-locked detent.

S 215-259
(3) Make sure the AUTO SPEEDBRAKE message is displayed on the upper EICAS panel.

S 865-250
(4) Move the left reverse thrust lever back to the "OFF" (stowed) position.

S 215-258
(5) Make sure the AUTO SPEEDBRAKE message is not displayed on the upper EICAS panel.

S 215-252
(6) Move the right reverse thrust lever toward deploy to the reverse idle detent and do this check:
(a) Make sure the speedbrake lever moves to its full upstop position.

S 215-152
(7) Move the speedbrake lever to its down-and-locked position and do this check:

NOTE: You must lift the lever to move it to the full forward position when the reverse thrust levers are in their reverse thrust positions. The lever will not go into its down-and-locked detent.

S 215-260
(8) Make sure the AUTO SPEEDBRAKE message is displayed on the upper EICAS panel.

S 865-253
(9) Move the right reverse thrust lever back to the "OFF" (stowed) position.

S 215-261
(10) Make sure the AUTO SPEEDBRAKE message is not displayed on the upper EICAS panel.

J. Auto-Speedbrake Warning Lights - Test

S 865-155
(1) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEEDBRAKE

S 215-156
(2) Make sure the AUTO SPDBRK light on the P5 panel is on.

S 215-157
(3) Make sure the AUTO SPEEDBRAKE message shows on the top EICAS display.

S 865-158
(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEEDBRAKE

S 215-219
(5) Make sure the AUTO SPDBRK light on the P5 panel is off.

K. Auto-Speedbrake Operation Time - Test

S 045-010

WARNING: DO THE DEACTIVATION PROCEDURE FOR FLIGHT MODE SIMULATION BEFORE YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS. WHEN YOU OPEN THE AIR/GROUND CIRCUIT BREAKERS THE AIRPLANE IS IN FLIGHT MODE. IN FLIGHT MODE, MANY OF THE AIRPLANE SYSTEMS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for flight mode simulation (AMM 32-09-02/201).

S 865-159

(2) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
   (a) GUI 001, 002, 115;
   11S15, AIR/GND SYS 1
   (b) GUI 003-114, 116-999;
   11C30, LANDING GEAR POS SYS 1

S 865-160

(3) Move the speedbrake lever to its ARMED position.

S 865-161

(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
   (a) GUI 001, 002, 115;
   11S15, AIR/GND SYS 1
   (b) GUI 003-114, 116-999;
   11C30, LANDING GEAR POS SYS 1

S 225-162

(5) Make sure the speedbrake lever moves to its full upstop position in 1.2 to 1.6 seconds.

S 225-163

(6) Move the left forward thrust lever to a position that is more than 50 percent thrust and do this check:
   (a) Make sure the speedbrake lever moves to its down-and-locked detent position in 1.2 to 1.6 seconds.

S 865-164

(7) Move the left forward thrust lever to its idle thrust position.

S 865-165

(8) Move the Landing Gear Control Lever to the OFF position.

L. Put the Airplane Back to Its Usual Condition

S 865-166
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 865-167
(2) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the P10 panel.

S 095-011

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-168
(4) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 445-169
(5) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 865-170
(6) Remove electrical power if it is not necessary (AMM 24-22-00/201).

SPEEDBRAKE LEVER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the removal and installation tasks for the speedbrake lever.

TASK 27-62-01-024-004

2. Speedbrake Lever - Removal
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-41-03/401, Alternate Stabilizer Trim Switch
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zone
          211/212 Control Cabin

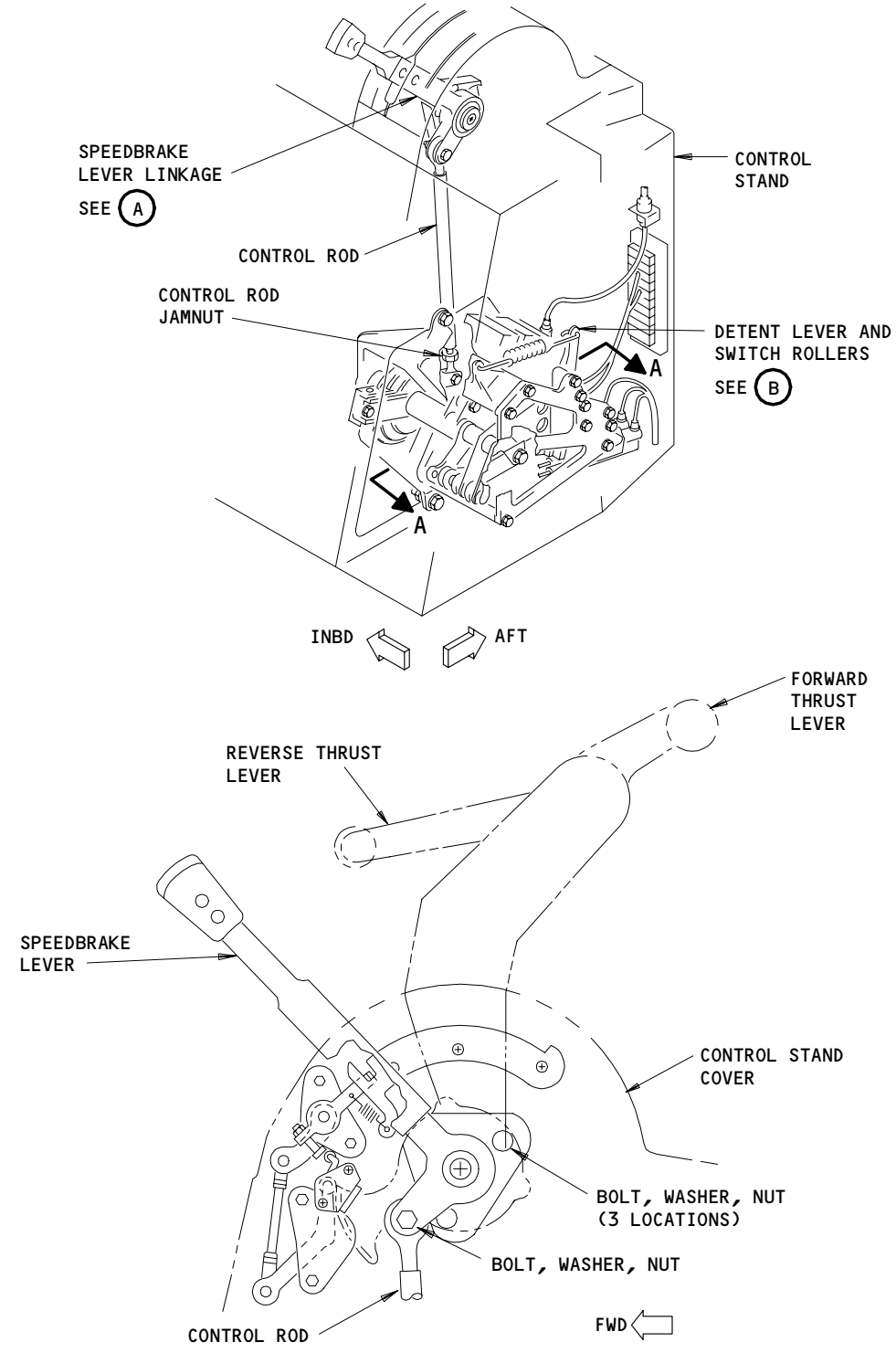
   C. Prepare for the Removal

      S 864-005
      (1) Supply electrical power (Ref 24-22-00).

      S 214-006
      (2) Make sure the speedbrake lever is in its down-and-locked detent position.

      S 864-007
      (3) Open the circuit breakers on the Table 401, and attach DO-NOT-CLOSE tags:

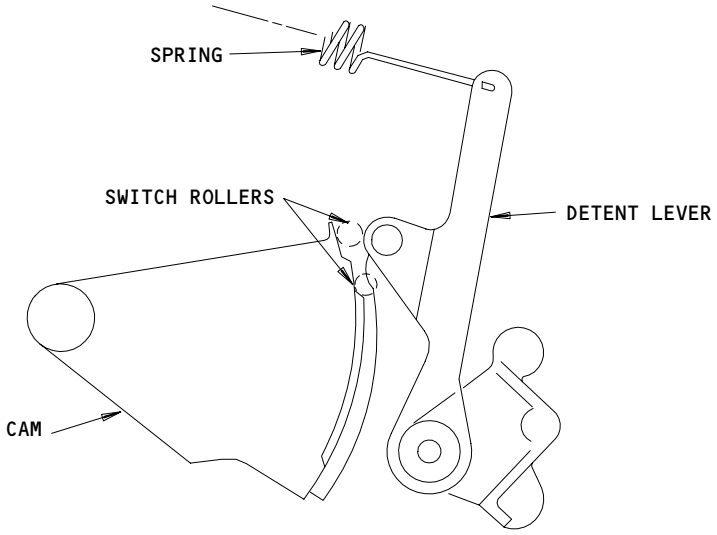
TABLE 401 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC



SPEEDBRAKE LEVER LINKAGE

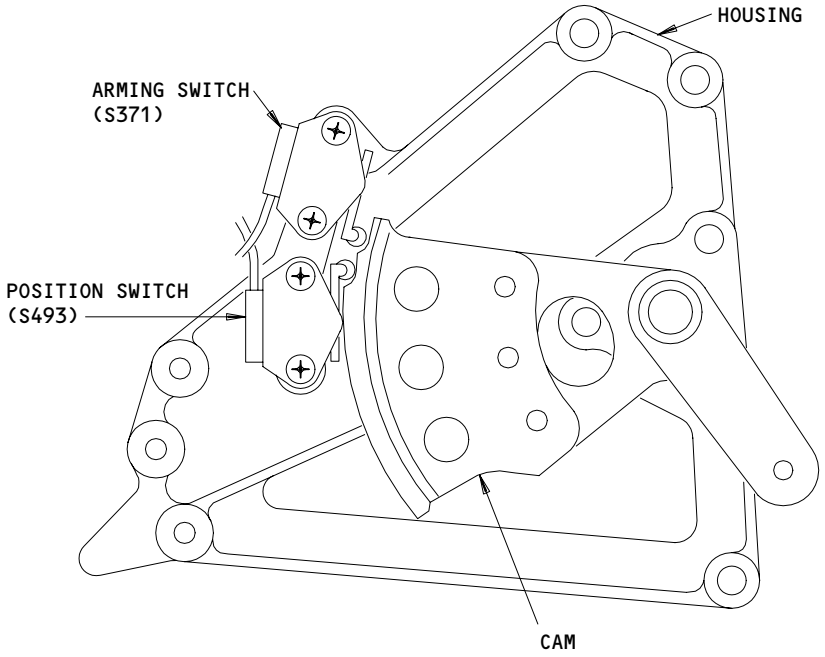
(A)

Speedbrake Lever Installation
Figure 401 (Sheet 1)



DETENT LEVER AND SWITCH ROLLERS
(SHOWN IN THE SPOILER DOWN POSITION)

B



A–A

Speedbrake Lever Installation
Figure 401 (Sheet 2)

S 864-045
(4) Open this circuit breaker on the P11 panel, and attach the DO-NOT-CLOSE tag:
(a) 11G11, AUTO SPEED BRAKE

D. Remove the Speedbrake Lever (Fig. 401)

S 014-030
(1) Remove the access panel from the right side of the control stand (to get access to the wires and the auto-speedbrake mechanism).

S 034-002

CAUTION: BE VERY CAREFUL WHEN YOU DO MAINTENANCE IN THE CONTROL STAND. DAMAGE TO THE SWITCHES, LIGHTS OR MECHANISMS CAN OCCUR.

(2) Cut the ties that hold the wires for the speedbrake lightplate.

S 034-003
(3) Remove these components:
(a) The screw (2 locations) that connects the speedbrake lightplate to the control stand panel, P10, and do this step:
1) Lift the lightplate from the control stand and move it to the side.
(b) The seal assembly for the speedbrake lever.

S 024-033
(4) Remove the stabilizer trim switches (AMM 27-41-03/401).

S 034-009
(5) Disconnect the top of the control rod from the speedbrake lever crank.

NOTE: Do not change the length of the control rod.

S 034-031
(6) Remove the bolts (3 locations) that connect the speedbrake lever to the airplane structure.

S 024-010
(7) Remove the speedbrake lever.

TASK 27-62-01-424-011

3. Speedbrake Lever - Installation

A. Equipment

(1) Controls Adapter Equipment - A27021-97 or -98

B. References

(1) 24-22-00/201, Electrical Power - Control
(2) 27-41-03/401, Alternate Stabilizer Trim Switch
(3) 27-62-00/501, Auto-Speedbrake Control System
(4) 29-11-00/201, Main (Left, Right, and Cneter) Hydraulic Systems
(5) 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zone
211/212 Control Cabin

D. Install the Speedbrake Lever (Fig. 401)

S 424-012
(1) Put the speedbrake lever in its correct position and install the bolts that connect it to the airplane structure (3 locations).

S 214-013
(2) Make sure the speedbrake mechanism is in its DOWN position.

S 434-014
(3) Connect the top of the control rod to the speedbrake lever.

NOTE: Do not change the length of the control rod.

S 424-039
(4) Install the stabilizer trim switches (AMM 27-41-03/401).

S 434-047
(5) Install the seal assembly for the speedbrake lever.

S 434-017
(6) Install the screws that connect the speedbrake lightplate to the control stand panel, P10 (2 locations).

S 434-018
(7) Move the wires and install ties to hold them in their correct positions.

S 494-019
(8) Install the controls adapter equipment.

S 824-020
(9) Move the speedbrake lever aft until the cam roller on the detent lever is in its ARMED detent position and do these steps:
(a) Make sure the speedbrake lever moves 9 ±1 degrees from the down-and-locked position.
(b) If it is necessary, adjust the control rod and tighten the jamnuts.

S 094-021
(10) Remove the controls adapter equipment.

S 224-022
(11) Make sure the speedbrake lever is adjusted correctly (Ref 27-62-00).

S 224-023
(12) Make sure the speedbrake LVDT is adjusted correctly (Ref 27-62-00).

S 414-024
(13) Install the access panel on the right side of the control stand.

S 864-046
(14) Remove the DO-NOT-CLOSE tags and close the circuit breakers on the overhead panel, P11 shown on Table 402.

TABLE 402
OVERHEAD EQUIPMENT PANEL, P11

11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 864-032
(15) Remove the DO-NOT-CLOSE tag and close this circuit breakers on the overhead panel, P11:
(a) 11G11, AUTO SPEED BRAKE

S 214-026

(16) Do these steps to examine the speedbrake lever for smooth movement through its full travel range:

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(a) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(b) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).
(c) Move the speedbrake lever to its down-and-locked detent position and do this check:
1) Make sure the spoilers move to their full down positions.
(d) Move the speedbrake lever to its full upstop and do this check:
1) Make sure the spoilers move to their full up positions.
(e) Move the speedbrake lever to its down-and-locked detent position.

E. Put the Airplane Back to Its Usual Condition

S 864-027

(1) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 444-028

(2) Do the activation procedure for the thrust reversers (Ref 78-31-00).

S 864-029

(3) Remove electrical power if it is not necessary (Ref 24-22-00).

SPEEDBRAKE MECHANISM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains these tasks:
      (1) The removal of the auto-speedbrake mechanism and its components
      (2) The installation of the auto-speedbrake mechanism and its components
      (3) The removal of the arming switch for the speedbrake actuator
      (4) The installation of the arming switch for the speedbrake actuator.
   B. Refer to 31-51-03 to get the removal and installation data for the position switch for the speedbrake lever (S493).

TASK 27-62-02-022-008

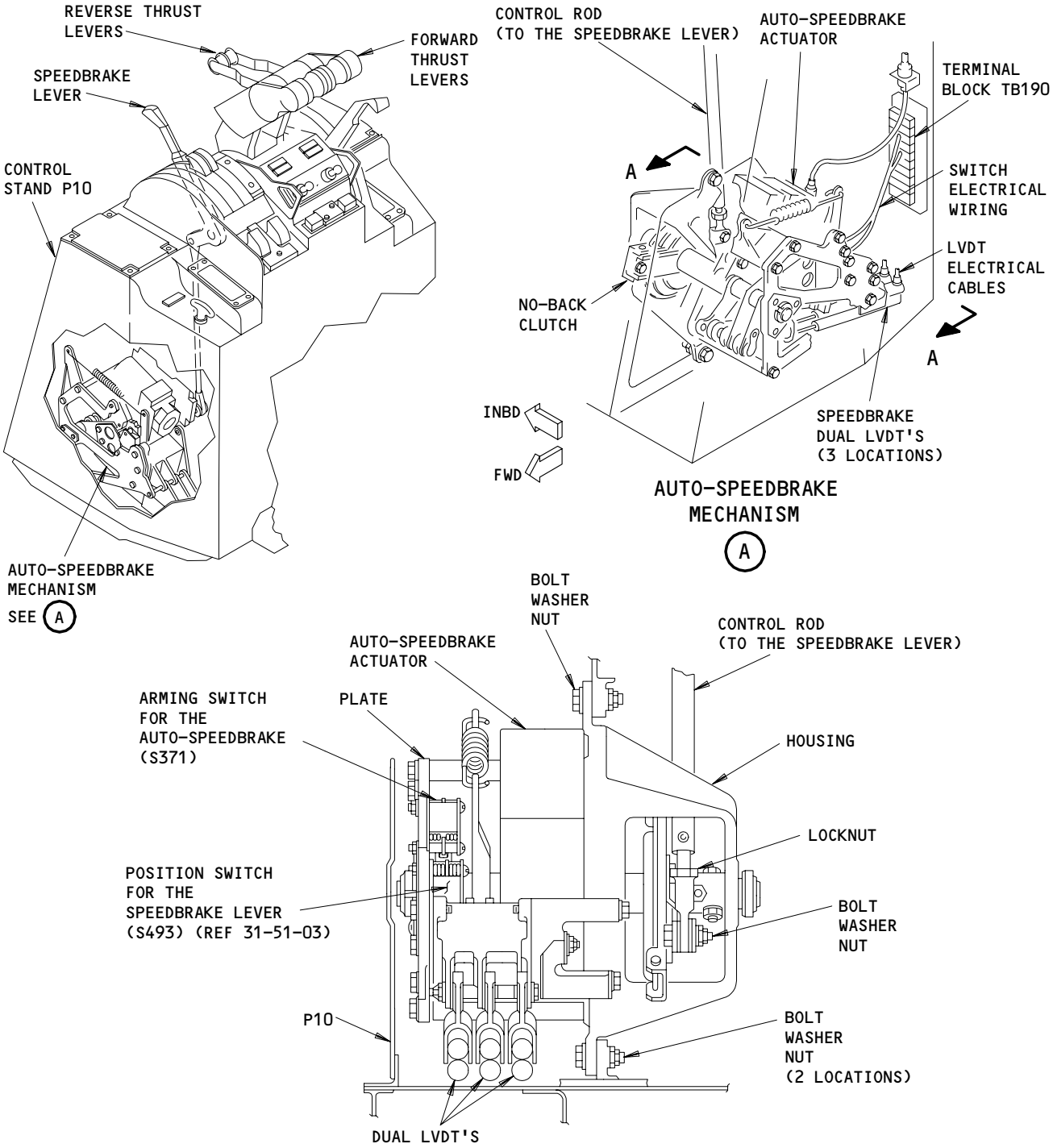
2. Auto-Speedbrake Mechanism and its Components - Removal
   A. General
      (1) This task contains these procedures:

- Remove the Auto-Speedbrake Mechanism
- Remove the Auto-Speedbrake Actuator
- Remove the No-Back Clutch
- Remove the Speedbrake LVDTs.

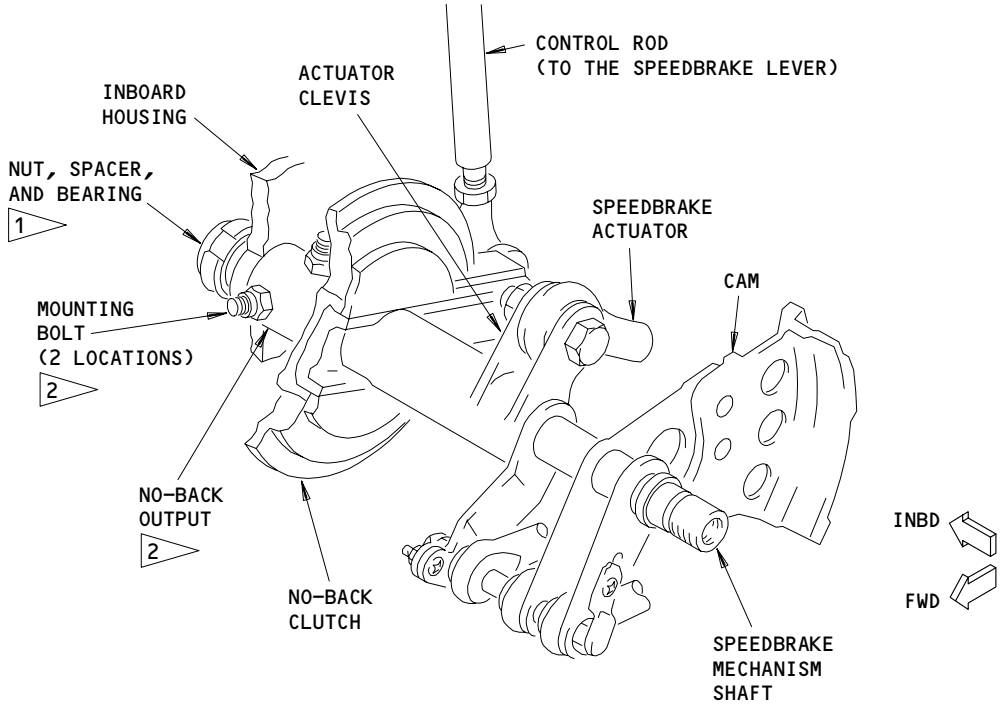
To remove the Auto-Speedbrake actuator, the no-back clutch, or the speedbrake LVDTs, you must remove the auto-speedbrake mechanism first.

To start one of these procedures, do the "Prepare for the Removal" and the "Remove the Auto-Speedbrake Mechanism" groups of steps. Then, if it is necessary, do the applicable group of steps to remove the auto-speedbrake actuator, the no-back clutch, or the speedbrake LVDTs.

   B. Consumable Materials
      (1) G02129 Tape, Vinyl - P29, 3 to 4 inches wide, Colors - Clear, Silver, and Black
   C. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels



Auto-Speedbrake Mechanism Installation
Figure 201 (Sheet 1)

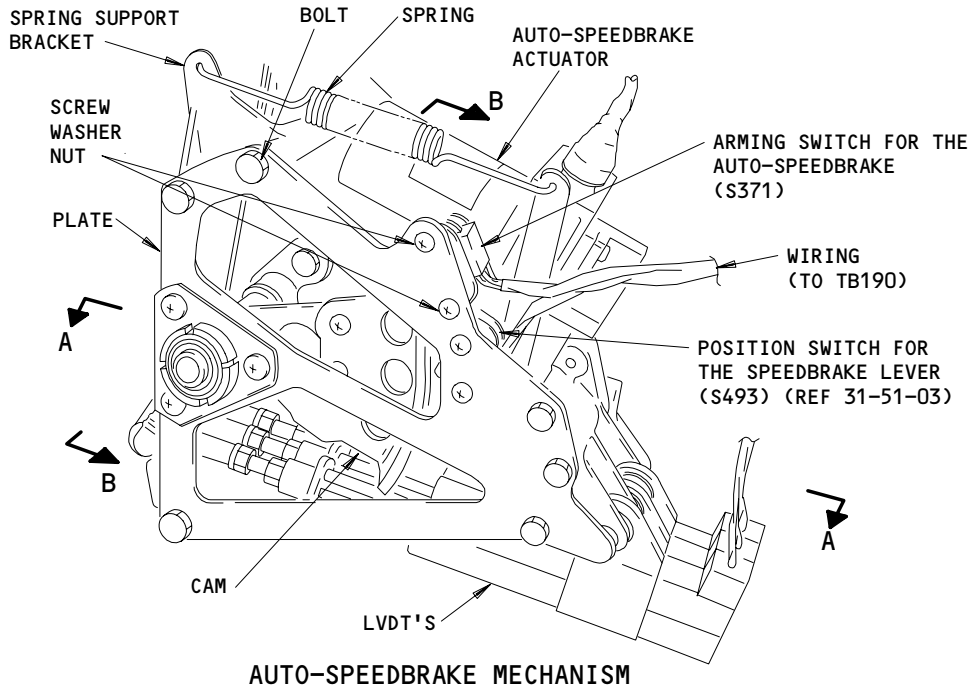


NO-BACK CLUTCH

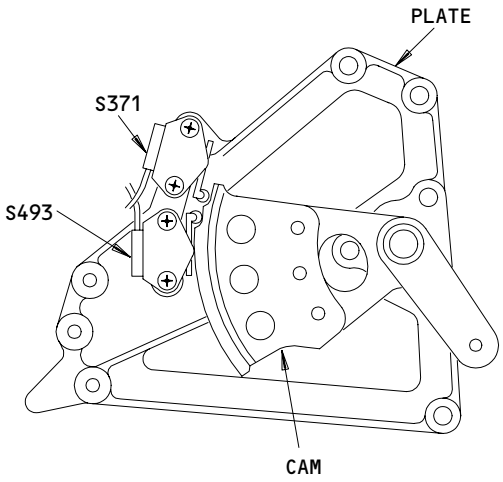
1 APPLY GREASE TO THE BEARING, SHAFT, AND HOUSING.

2 DO NOT REMOVE THE OUTPUT END OF THE NO-BACK ASSEMBLY. THE TWO HOLES IN THE NO-BACK OUPUT MUST BE ACCURATELY ALIGNED WITH THE HOLES IN THE SHAFT.

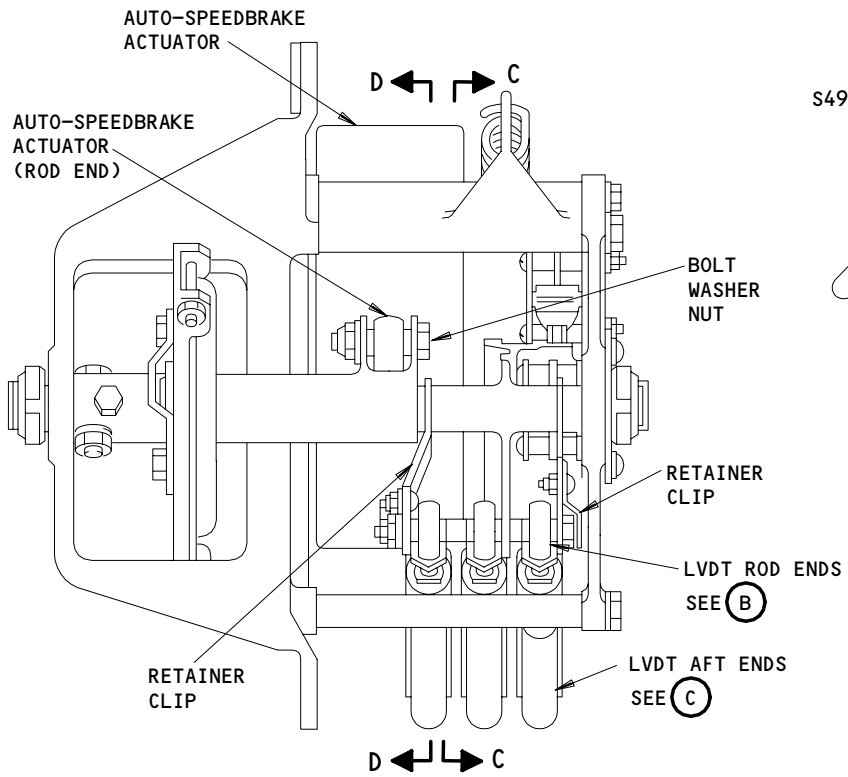
Auto-Speedbrake Mechanism Installation
Figure 201 (Sheet 2)



AUTO-SPEEDBRAKE MECHANISM

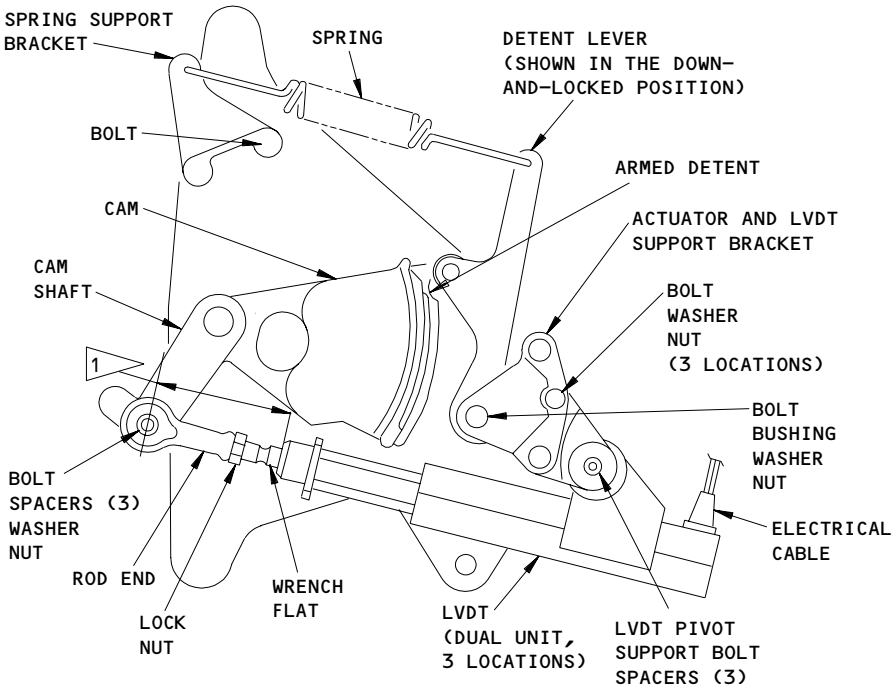


A-A

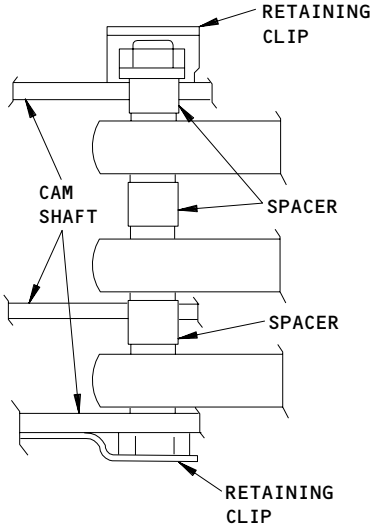


B-B

Auto-Speedbrake Components Installation
Figure 202 (Sheet 1)

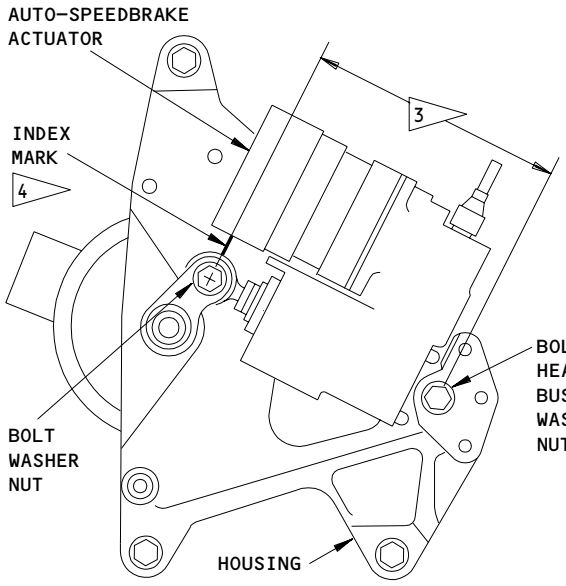


C-C

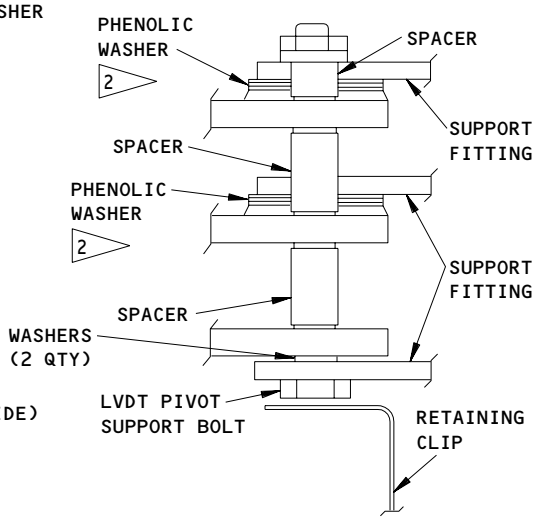


LVDT ROD ENDS

B



D-D



LVDT AFT ENDS

C

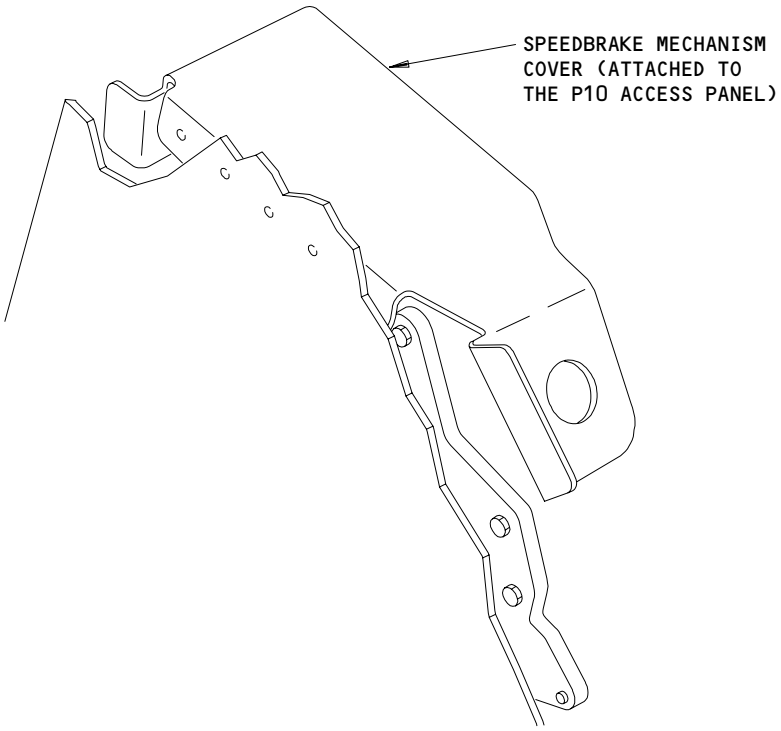
1 BEFORE YOU INSTALL THE LVDT, MAKE SURE THE ROD END LENGTH IS 2.16 ±0.01 INCHES (S253T404-2, -4) OR 2.30 ±0.01 INCHES (S253T404-5) AND THE LOCKNUT IS TIGHT. IF IT IS NECESSARY, ADJUST THE SPEEDBRAKE MECHANISM AFTER YOU INSTALL IT.

2 INSTALL THE NECESSARY QUANTITY OF PHENOLIC WASHERS UNTIL THE CLEARANCE IS 0.015 INCH MAXIMUM.

3 BEFORE YOU INSTALL THE ACTUATOR, MAKE SURE IT IS FULLY RETRACTED. THE DISTANCE BETWEEN THE PIN CENTERS MUST BE APPROXIMATELY 4.43 ±0.15 INCHES.

4 MAKE SURE THE CENTER OF THE ROD END IS ALIGNED WITH THE MARK ON THE HOUSING. IF IT IS NECESSARY, ADJUST THE ROD END AND TIGHTEN THE LOCKNUT.

Auto-Speedbrake Components Installation
Figure 202 (Sheet 2)



Speedbrake Mechanism Cover
Figure 203

(2) 24-22-00/201, Electrical Power - Control
(3) 25-11-01/201, Flight Compartment Seats
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zone
211/212 Control Cabin

(2) Access Panel
113AL Flight Control Components

E. Prepare for the Removal

S 862-009
(1) Supply electrical power (Ref 24-22-00).

S 212-010
(2) Make sure the speedbrake lever is in its down-and-locked position.

S 212-011
(3) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-012
(4) Open the circuit breakers shown in Table 201 and attach the DO-NOT-CLOSE tags.

TABLE 201 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

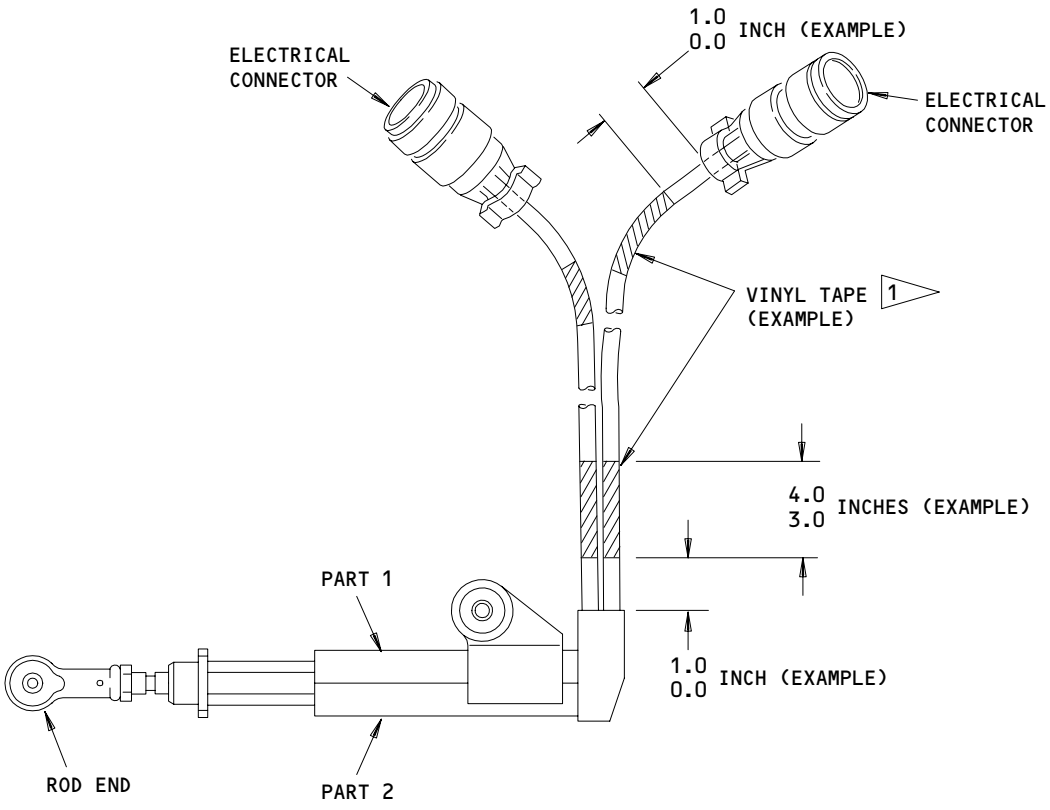


TABLE 1	
LVDT	P29 VINYL TAPE COLOR
INBOARD	CLEAR
CENTER	SILVER
OUTBOARD	BLACK

1 APPLY VINYL TAPE TO THE ENDS OF EACH WIRE BUNDLE AS SHOWN IN TABLE 1.

Speedbrake LVDT Installation
Figure 204

S 862-014
(5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11G11, AUTO SPEED BRAKE
(c) 11J33, WARN ELEX A

S 862-013
(6) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

S 862-015
(7) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 032-016
(8) Remove the captain's seat (Ref 25-11-01).

S 012-017
(9) Remove the access panel from the left side of the control stand.

S 012-018
(10) Open access door 113AL (Ref 06-41-00).

F. Remove the Auto-Speedbrake Mechanism (Fig. 201)

S 032-019
(1) Disconnnect these components:
(a) The wires for switch S371 from terminal block TB190 and tag them for identification
(b) The wires for switch S493 from terminal block TB190 and tag them for identification
(c) The electrical connector for the auto-speedbrake actuator from the bracket that is above TB190.

S 032-020
(2) Disconnect the electrical connectors from the speedbrake LVDTs and use the tape to tag them for identification.

NOTE: Go through access door 113AL to get access to the connectors from below the flight deck floor.

S 032-021
(3) Disconnect the bottom end of the control rod for the speedbrake lever from the speedbrake mechanism.

NOTE: Do not adjust the length of the control rod.

S 032-022
(4) Remove the bolts that connect the speedbrake mechanism to the airplane (3 locations).

S 022-023
(5) Remove the speedbrake mechanism.

G. Remove the Auto-Speedbrake Actuator (Fig. 202)

NOTE: You must remove the auto-speedbrake mechanism first before you can remove the auto-speedbrake actuator.

S 032-024
(1) Remove the top bolt that connects the spring support bracket to the speedbrake mechanism plate.

S 022-025
(2) AIRPLANES WITH THE AFT ACTUATOR CONNECTION BOLT INSTALLED WITH ITS HEAD TO THE NEAR SIDE;
Do these steps:
(a) Turn the spring support bracket aft and remove the spring.
(b) Remove the LVDT pivot support bolt (View C).

(c) Remove the bolt that connects the actuator and LVDT support bracket to the detent lever.
(d) Remove the three bolts that connect the LVDT support bracket to the speedbrake mechanism housing.
(e) Turn the support bracket and actuator up and forward. Be careful, and make sure you do not damage the LVDT rod ends.
(f) Remove the bolts (2 locations) and remove the actuator (View D-D).

S 022-026
(3) AIRPLANES WITH THE AFT ACTUATOR CONNECTION BOLT INSTALLED WITH ITS HEAD TO THE FAR SIDE;
Do these steps:
(a) Turn the spring support bracket aft and remove the spring.
(b) Remove the bolts (2 locations) and remove the actuator (View D-D).

NOTE: Move the cam if it is necessary to remove the actuator.

H. Remove the No-Back Clutch (Fig. 201)

NOTE: You must remove the auto-speedbrake mechanism first before you can remove the no-back clutch.

S 032-027
(1) Remove the nut and the spacer from the inboard shaft end.

S 032-028
(2) Remove the bolts that hold the two parts of the housing together and do this step:
(a) Remove the inboard half of the housing from the speedbrake mechanism.

S 032-029
(3) Remove the two mounting bolts from the no-back clutch output. Make a mark on the output to help when you align the holes.

S 022-030
(4) Remove the no-back clutch from the speedbrake mechanism shaft.

S 032-031
(5) Separate the clutch assembly and keep the output end.

NOTE: The two holes drilled in the no-back output align with the holes that are drilled in the speedbrake mechanism shaft. Keep the output so you will not have to drill new holes in the speedbrake mechanism shaft.

I. Remove the Speedbrake LVDTs (Fig. 202)

NOTE: You must remove the auto-speedbrake mechanism first before you can remove the speedbrake LVDTs.

S 032-002

(1) Remove these components:
  (a) The screw and nut that holds the retaining clip at the LVDT rod end (2 locations)
  (b) The bolt, nut, washer, and the three spacers that connect the LVDT rod ends to the speedbrake mechanism
  (c) The bolts, nuts, and washers that hold the retaining clip over the LVDT pivot support bolt
  (d) The bolt, nut, washers, and spacers that connect the LVDT support bracket to the speedbrake mechanism.

S 022-032

(2) Remove the LVDT and keep a record of the tape color at the end of each LVDT wire bundle (Fig. 204).

TASK 27-62-02-422-033

3. Auto-Speedbrake Mechanism and its Components - Installation

A. General

(1) This task contains these procedures:

- Install the Auto-Speedbrake Actuator
- Install the No-Back Clutch
- Install the Speedbrake LVDTs
- Install the Auto-Speedbrake Mechanism.

Because this task contains four procedures, do only the applicable groups of steps.

If it is necessary, do the steps that install the Auto-Speedbrake actuator, the no-back clutch, or the speedbrake LVDTs. Then, do the "Install the Auto-Speedbrake Mechanism" and the "Speedbrake Mechanism - Test" groups of steps. And last, do the "Put the Airplane Back to Its Usual Condition" group of steps.

B. References

(1) 06-41-00/201, Fuselage Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 25-11-01/201, Flight Compartment Seats
(4) 27-62-00/501, Auto-Speedbrake Control System
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 31-51-03/401, Speedbrake Lever Position Switch
(7) 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zone
211/212 Control Cabin

(2) Access Panel
113AL Flight Control Components

D. Install the Auto-Speedbrake Actuator (Fig. 202)

S 212-034
(1) Make sure the actuator is fully retracted.

S 432-035
(2) Install the bolt (make sure the head points to the far side), bushing, washer, and nut that connect the actuator to the actuator and LVDT support bracket.

S 432-036
(3) Put the actuator rod end in its clevis and do this step:
(a) Install the bolt.

S 432-037
(4) AIRPLANES WITH THE AFT ACTUATOR CONNECTION BOLT INSTALLED WITH ITS HEAD TO THE NEAR SIDE;
Do these steps:
(a) Turn the actuator and its support bracket down and aft. Be careful to prevent damage to the LVDTs.
(b) Put the support bracket in its correct position on the mechanism housing.
(c) Align the bracket with the LVDT aft ends and use the LVDT pivot support bolt to hold it in position.
(d) Make sure the center of the actuator rod end is aligned with the mark on the housing and do this step:
1) Adjust the actuator if it is necessary.
(e) Install the bolt, bushing, washer, and nut that connect the support bracket to the detent lever.
(f) Install the bolts, washers, and nuts that connect the bracket to the housing (3 locations).
(g) Install the LVDT pivot support bolt (View C).
(h) Install the spring on the spring support bracket.

S 432-038
(5) AIRPLANES WITH THE AFT ACTUATOR CONNECTION BOLT INSTALLED WITH ITS HEAD TO THE FAR SIDE;
Do these steps:
(a) Put the detent lever on the cam as shown (View D-D) and do this step:
1) Install the spring on the spring support bracket.

S 432-039
(6) Turn the spring support bracket forward and do this step:
(a) Install the bolt that connects the bracket to the speedbrake mechanism.

E. Install the No-Back Clutch (Fig. 201)

S 432-040
(1) Use the no-back output you removed and assemble the no-back clutch.

S 432-041
(2) Put the no-back clutch on the speedbrake mechanism shaft and do this step:
(a) Install the two mounting bolts that hold the clutch to the speedbrake shaft (View B).

S 432-042
(3) Put the inboard half of the housing on the speedbrake mechanism and do this step:

NOTE: Do not try to adjust the no-back clutch during the installation, there is no adjustment.

(a) Install the bolts that connect the housing.

S 432-043
(4) Install the spacer, bearing, and nut on the inboard end of the shaft.

F. Install the Speedbrake LVDTs (Fig. 202)

S 432-044
(1) Use your record and apply the correct color tape to the end of each LVDT wire bundle (4 locations) (Fig. 204).

S 822-045
(2) Adjust the length of the LVDT rod as shown (View C-C).

S 422-046
(3) Put the LVDTs in the speedbrake mechanism and do these steps:
(a) Install the bolt, nut, washers, and spacers that connect the LVDTs to the speedbrake mechanism.
(b) Install the retaining clips over the LVDT pivot support bolt.
(c) Install the bolt, nut, washer, and spacers that connect the LVDT rod ends to the speedbrake mechanism.
(d) Install the retaining clips over the bolt that connects the LVDT rod ends to the mechanism.

G. Install the Speedbrake Mechanism (Fig. 201)

S 422-047
(1) Put the speedbrake mechanism in in its correct position in the control stand and do this step:
(a) Install the bolts, washers, and nuts that connect the speedbrake mechanism to the airplane (3 locations).

S 822-048
(2) Connect the control rod for the speedbrake lever to the speedbrake mechanism and do these steps:
(a) Move the speedbrake lever to its DOWN, ARMED, and UP positions. Do this check:
1) Make sure the switch rollers are in their correct positions on the cam (Ref 27-62-00).
(b) If it is necessary, adjust the control rod for the speedbrake lever (Ref 27-62-00) and do this step:
1) Tighten the locknut on the control rod and do these checks:
a) Make sure the switch rollers go to their correct positions with the lever in its DOWN, ARMED, and UP positions.
b) Make sure you can see threads in at least one-half of the inspection hole for the control rod.

S 822-049
(3) If You Installed a New LVDT,
do the speedbrake LVDT adjustment procedure (AMM 27-62-00 501).

NOTE: If you do not get the correct voltages, do the speedbrake lever adjustment procedure (AMM 27-62-00/501).

S 432-050
(4) Connect these items:
(a) The LVDT electrical connectors to the LVDTs
(b) The electrical connector for the auto-speedbrake actuator to the actuator
(c) The wires for switches S371 and S493 to terminal block TB190.

S 862-051
(5) Move the speedbrake lever to its down-and-locked position.

S 412-052
(6) Install the access panel on the left side of the control stand and do this check:
(a) Make sure the speed brake mechanism cover fits correctly.

S 432-053
(7) Install the captain's seat (Ref 25-11-01).

S 012-054

(8) Close access door 113AL (Ref 06-41-00).

H. Speedbrake Mechanism - Test

S 042-003

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 862-004

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-056

(3) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 202.

TABLE 202 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 862-057
(4) Push the RESET switch on the six spoiler control modules (SCMs) located on the E3 and E4 shelves in the main equipment center.

S 862-058
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 212-059
(6) Make sure these circuit breakers on the P11 panel are closed:
(a) EICAS (6 locations)

S 862-060
(7) Move the forward thrust levers to a position that is more than 50 percent thrust.

S 212-061
(8) Move the speedbrake lever to its ARMED detent position and do these checks:
(a) Make sure the AUTO SPDBRK light on the overhead panel, P5, is off.
(b) Make sure the AUTO SPEEDBRAKE message does not show on the top EICAS display.
(c) Make sure the amber SPOILERS light on the P5 panel is off.
(d) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-062
(9) Move the forward thrust levers to a position that is less than 50 percent thrust and do these checks:
(a) Make sure the speedbrake lever moves to its full upstop position.
(b) Make sure the speedbrakes move to their full up positions.

(c) Make sure the AUTO SPDBRK light on the P5 panel is off.
(d) Make sure the amber AUTO-SPEEDBRAKE message does not show on the top EICAS display.
(e) Make sure the amber SPOILERS light on the P5 panel is off.
(f) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-063
(10) Move the forward thrust levers to a position that is more than 50 percent thrust and do these checks:
(a) Make sure the speedbrake lever moves to its down-and-locked position.
(b) Make sure the speedbrakes move to their full down positions.
(c) Make sure the AUTO SPDBRK light on the P5 panel is off.
(d) Make sure the amber AUTO-SPEEDBRAKE message does not show on the top EICAS display.
(e) Make sure the amber SPOILERS light on the P5 panel is off.
(f) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-064
(11) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for four seconds.
(b) Make sure the speedbrakes move to their full up positions.
(c) Make sure the amber SPOILERS light on the P5 panel is off.
(d) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-065
(12) Move the speedbrake lever to its down-and-locked detent position and do these checks:
(a) Make sure the speedbrakes move to their full down positions.
(b) Make sure none of the six SCMs have a fault.
1) FOR -100 SERIES SCMs;
Make sure all the faultballs are black.

2) FOR -200 SERIES SCMs;
Make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX? do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

I. Put the Airplane Back to Its Usual Condition

S 862-066
(1) Move the two forward thrust levers to their idle positions.

S 862-067
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11B30, ENGINES RIGHT T/R CONT
(c) 11D12, ENGINES LEFT T/R CONT
(d) 11J33, WARN ELEX A

S 862-068
(3) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the control stand panel, P10.

S 862-069
(4) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 442-070
(5) Do the activation procedure for the thrust reverser (Ref 78-31-00).

S 862-071
(6) Remove electrical power if it is not necessary (Ref 24-22-00).

TASK 27-62-02-022-072
4. Auto-Speedbrake Actuator Arming Switch (S371) - Removal
A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zone
211/212 Control Cabin

C. Prepare for the Removal

S 862-073
(1) Supply electrical power (Ref 24-22-00).

S 212-074
(2) Make sure the speedbrake lever is in its down-and-locked position.

S 212-075
(3) Make sure the power is removed from the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-076
(4) Open the circuit breakers shown in Table 203 and attach the DO-NOT-CLOSE tags.

TABLE 203 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 862-145
(5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11G11, AUTO SPEED BRAKE
(c) 11J33, WARN ELEX A

S 862-078
(6) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

S 862-079
(7) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 012-080
(8) Remove the access panel from the left side of the control stand.

D. Remove the Arming Switch for the Auto-Speedbrake Actuator

S 032-081
(1) Disconnect the wires for switch S371 from terminal block TB190 and tag them for identification.

S 032-082
(2) Remove the screws that connect the switch to the plate (2 locations).

S 022-083
(3) Remove the switch.

TASK 27-62-02-422-084

5. Arming Switch for the Auto-Speedbrake Actuator (S371) - Installation

A. References
(1) 24-22-00/201, Electrical Power - Control

(2) 27-62-00/501, Auto-Speedbrake Control System
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zone
211/212 Control Cabin

C. Install the Arming Switch for the Speedbrake Lever (S371) (Fig. 202)

S 862-085
(1) Put the switch in its correct position.

S 432-086
(2) Install the screws that connect the arming switch to the plate.

S 432-087
(3) Connect the wires for switch S371 to terminal block TB190.

S 222-088
(4) Make sure the speedbrake lever is adjusted correctly (Ref 27-62-00).

D. Speedbrake Mechanism - Test

S 042-006

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 862-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-089
(3) Remove the DO-NOT-CLOSE tags and close the circuit breakers shown in Table 204.

TABLE 204 OVERHEAD EQUIPMENT PANEL, P11
11C6, CSEU 1L AC OR FLT CONT ELEC 1L AC
11C7, CSEU 1L DC OR FLT CONT ELEC 1L DC
11C8, CSEU 2L AC OR FLT CONT ELEC 2L AC
11C9, CSEU 2L DC OR FLT CONT ELEC 2L DC
11G17, CSEU 1R AC OR FLT CONT ELEC 1R AC
11G18, CSEU 1R DC OR FLT CONT ELEC 1R DC
11G27, CSEU 2R AC OR FLT CONT ELEC 2R AC
11G28, CSEU 2R DC OR FLT CONT ELEC 2R DC

S 862-090
(4) Push the RESET switch on the six spoiler control modules (SCMs) located on the E3 and E4 shelves in the main equipment center.

S 862-091
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G11, AUTO SPEED BRAKE

S 212-092
(6) Make sure these circuit breakers on the P11 panel are closed:
    (a) EICAS (6 locations)

S 862-093
(7) Move the forward thrust levers to a position that is more than 50 percent thrust.

S 212-094
(8) Move the speedbrake lever to its ARMED detent position and do these checks:
    (a) Make sure the AUTO SPDBRK light on the overhead panel, P5, is off.
    (b) Make sure the AUTO SPEEDBRAKE message does not show on the top EICAS display.
    (c) Make sure the amber SPOILERS light on the P5 panel is off.
    (d) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-095
(9) Move the forward thrust levers to a position that is less than 50 percent thrust and do these checks:
    (a) Make sure the speedbrake lever moves to its full upstop position.
    (b) Make sure the speedbrakes move to their full up positions.
    (c) Make sure the AUTO SPDBRK light on the P5 panel is off.
    (d) Make sure the amber AUTO-SPEEDBRAKE message does not show on the top EICAS display.
    (e) Make sure the amber SPOILERS light on the P5 panel is off.
    (f) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-096
(10) Move the forward thrust levers to a position that is more than 50 percent thrust and do these checks:
    (a) Make sure the speedbrake lever moves to its down-and-locked position.

(b) Make sure the speedbrakes move to their full down positions.
(c) Make sure the AUTO SPDBRK light on the P5 panel is off.
(d) Make sure the amber AUTO-SPEEDBRAKE message does not show on the top EICAS display.
(e) Make sure the amber SPOILERS light on the P5 panel is off.
(f) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-097
(11) Move the speedbrake lever to its full upstop position and do these steps:
(a) Stop for four seconds.
(b) Make sure the speedbrakes move to their full up positions.
(c) Make sure the amber SPOILERS light on the P5 panel is off.
(d) Make sure the amber SPOILERS message does not show on the top EICAS display.

S 212-098
(12) Move the speedbrake lever to its down-and-locked detent position and do these checks:
(a) Make sure the speedbrakes move to their full down positions.
(b) Make sure none of the six SCMs have a fault.
1) FOR -100 SERIES SCMs;
Make sure all the faultballs are black.
2) FOR -200 SERIES SCMs;
Make sure there are no faults in the EXISTING FAULTS.

NOTE: To look for faults do these steps:
Push the ON/OFF key

If the display shows SCM IN POS XX? , do the next two steps:
- Push an arrow key (if it is necessary) until the correct position for the SCM is shown
- Push YES two times

When the display shows EXISTING FAULTS push YES

The display will show NO FAULTS if there are no faults.

E. Put the Airplane Back to Its Usual Condition

S 862-099
(1) Move the two forward thrust levers to their idle positions.

S 862-100
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11B30, ENGINES RIGHT T/R CONT
(c) 11D12, ENGINES LEFT T/R CONT
(d) 11J33, WARN ELEX A

S 862-101
(3) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the control stand panel, P10.

S 862-102
(4) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 442-103
(5) Do the activation procedure for the thrust reverser (Ref 78-31-00).

S 862-104
(6) Remove electrical power if it is not necessary (Ref 24-22-00).

FORWARD THRUST LEVER POSITION SWITCH - ADJUSTMENT/TEST

1. General
   A. This procedure contains the operational test for the S10 and S14 position switches. Switch S10 is the left SPEEDBRAKE RETRACT lever position switch and switch S14 is the right SPEEDBRAKE RETRACT lever position switch.
   B. The position switches for the engine throttle levers and some autothrottle switches are also found in the microswitch pack assembly. All the switches in the microswitch pack use soldered wire connections and are installed on one of the two shafts. Refer to 22-32-04 for the applicable removal, installation, and adjustment procedures.
   C. Make sure to examine all the switches in the microswitch pack assembly for correct adjustment after you install it. To adjust the switches, push down on the locking bar to release the adjustment bolt. Then, turn the bolt to adjust the switch.
   D. After the adjustment, make sure the adjustment bolts are aligned with the locking bar. Make sure the bar moves up and engages the bolts.

TASK 27-62-07-715-003

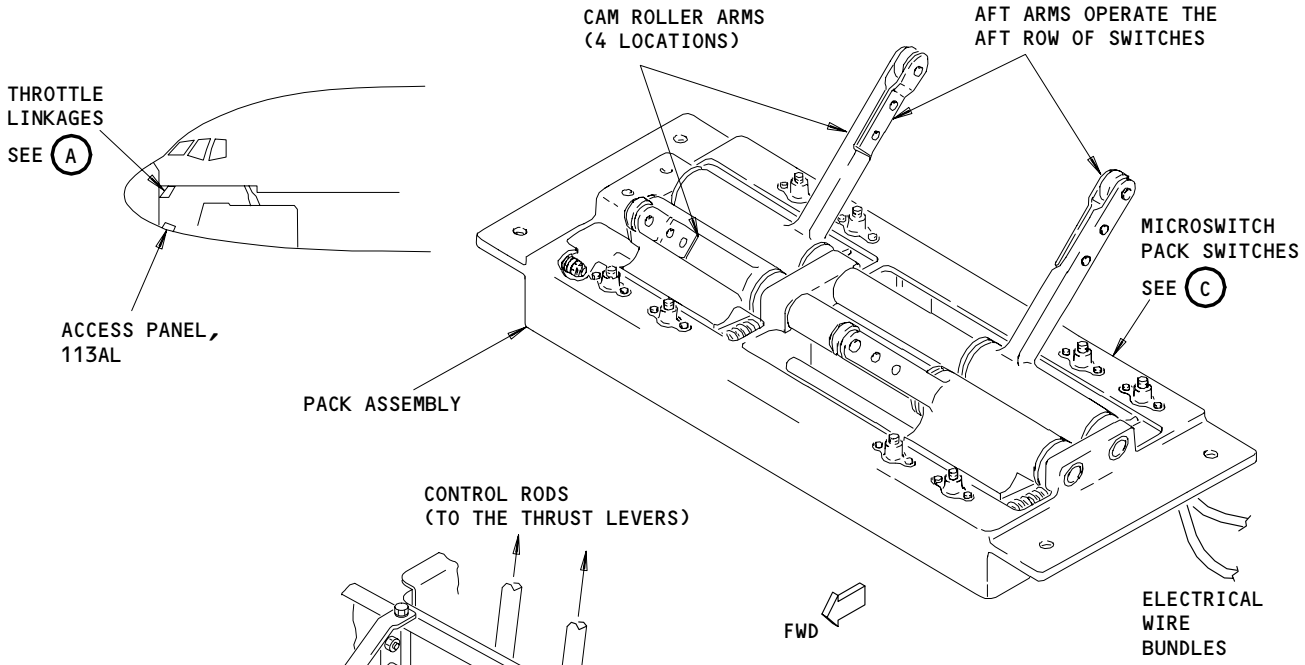
2. Position Switch for the Forward Thrust Levers - Operational Test
   A. References
      (1) AMM 22-32-04/201, Microswitch Pack
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zone
          211/212 Control Cabin

   C. Prepare for the Test

      S 865-004
      (1) Supply electrical power (AMM 24-22-00/201).

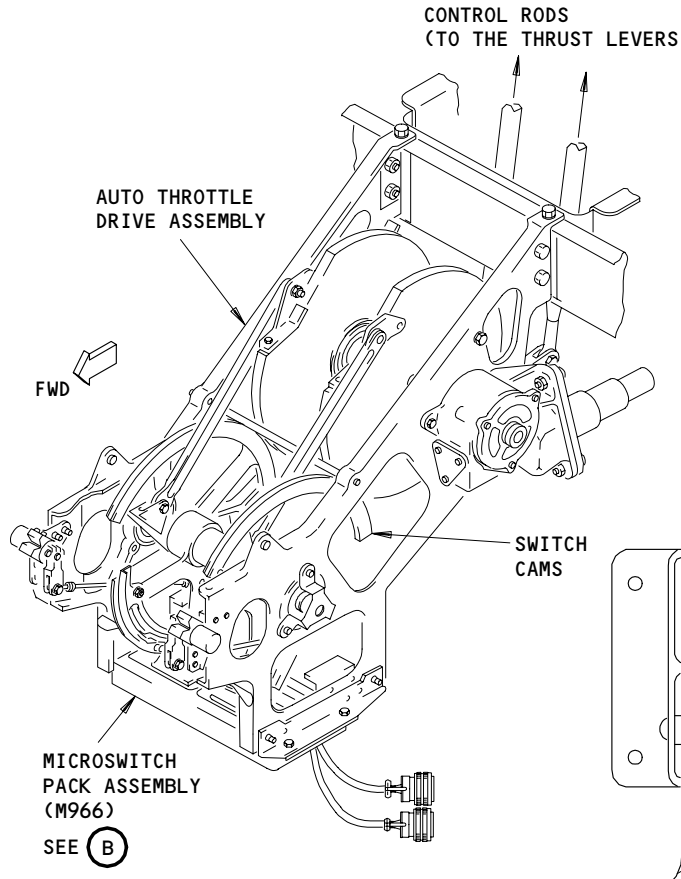
      S 865-005
      (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11B30, ENGINES RIGHT T/R CONT
          (b) 11D12, ENGINES LEFT T/R CONT

      S 865-018
      (3) Move the FUEL CONTROL switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.



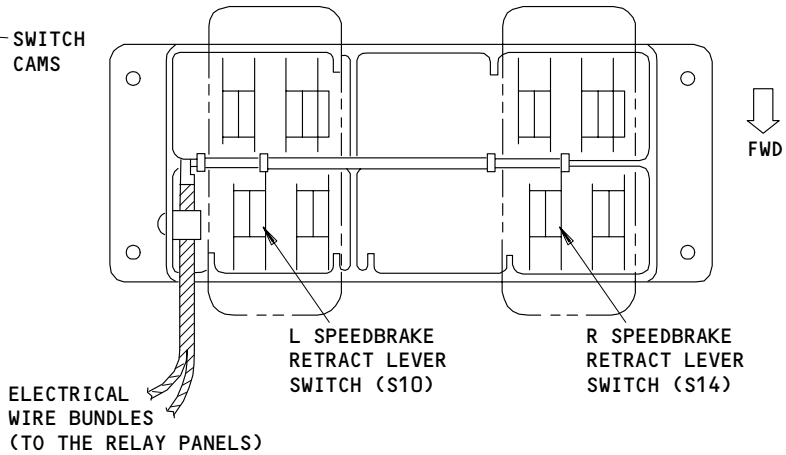
MICROSWITCH PACK ASSEMBLY (M966)

B



THOTTLE LINKAGES

A



MICROSWITCH PACK SWITCHES
(BOTTOM VIEW)

C

Foward Thrust Lever Position Switches
Figure 501

S 045-001

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(4) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 865-002

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(5) Supply pressure to the left, right, and center hydraulic systems (AMM 29-11-00/201).

D. Procedure

S 865-006

(1) Move the forward thrust levers to a position that is more than 50 percent of full travel.

S 865-007

(2) Move the control wheels to their neutral positions.

S 865-008

(3) Move the speedbrake lever to its ARMED position.

S 215-009

(4) Move the forward thrust levers to a position that is approximately 6° forward of the idle stop (on the quadrant) and do these checks:
(a) Make sure the speedbrake lever moves to its UP position.
(b) Make sure the spoilers move to their full up positions.

S 215-010

(5) Move the forward thrust levers to a position that is approximately 10.5° forward of the idle stop and do this check:
(a) Make sure the spoilers move to their full down positions.

S 865-011

(6) Move the forward thrust levers back to their idle positions.

S 215-012

(7) Make sure the speedbrake lever is in its down-and-locked detent position.

E. Put the Airplane Back to Its Usual Condition

S 865-013
(1) Remove the DO-NOT-OPERATE tags from the FUEL CONTROL switches on the P10 panel.

S 865-014
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 865-015
(3) Remove the power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 445-016
(4) Do the activation procedure for the thrust reversers (AMM 78-31-00/201).

S 865-017
(5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

REVERSE THRUST LEVER POSITION SWITCH - MAINTENANCE PRACTICES

1. General
   A. This procedure contains the removal and installation tasks for the position switch for the reverse thrust levers.

TASK 27-62-08-022-001

2. Position Switch for the Reverse Thrust Levers - Removal
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Prepare for the Removal

      S 862-039
      (1) Supply electrical power (Ref 24-22-00).

      S 212-002
      (2) Make sure the speedbrake lever is in its down-and-locked position.

      S 862-003
      (3) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11G11, AUTO SPEED BRAKE

      S 862-004
      (4) Move the FUEL CUTOFF switches on the control stand panel, P10, to their CUTOFF positions and attach DO-NOT-OPERATE tags.

      S 862-005
      (5) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
          (a) 11B30, ENGINES RIGHT T/R CONT
          (b) 11D12, ENGINES LEFT T/R CONT

      S 212-007
      (6) Make sure the reverse thrust levers are in their OFF (idle) positions.

D. Remove the Position Switch for the Reverse Thrust Lever (Fig. 201)

S 012-008

(1) Remove the access panel from the left side of the control stand to get access to the wires for the lightplate and the switch.

S 032-036

WARNING: BE VERY CAREFUL WHEN YOU DO MAINTENANCE IN THE CONTROL STAND. DAMAGE TO THE SWITCHES, LIGHTS, OR MECHANISMS CAN OCCUR.

(2) Do these steps to move the speedbrake lightplate away from the control stand:
   (a) Cut the ties that hold the wires for the speedbrake lightplate.
   (b) Remove the screws (2 locations) that connect the lightplate to the control stand.
   (c) Lift the lightplate up and move it to the side.

NOTE: It is not necessary to disconnect the wires.

S 032-044

(3) Remove the seal assembly for the speedbrake lever.

S 032-010

(4) Disconnect the wires for the position switch from terminal block TB215.

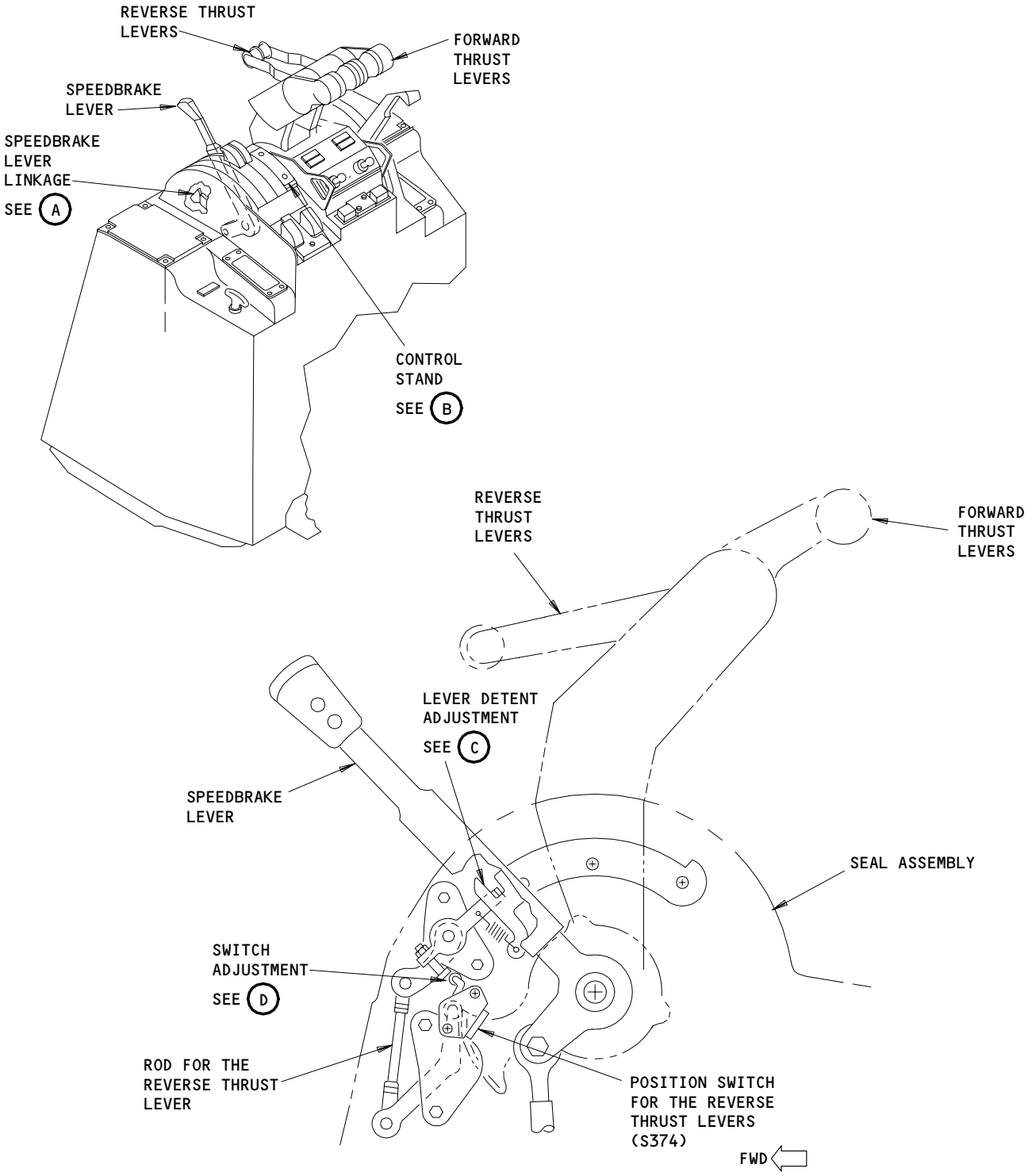
S 022-011

(5) Do these steps to remove the position switch for the reverse thrust levers:
   (a) Remove the screws, nut, washer, and shim.
   (b) Remove the position switch for the reverse thrust levers.

TASK 27-62-08-422-012

3. Position Switch for the Reverse Thrust Levers - Installation

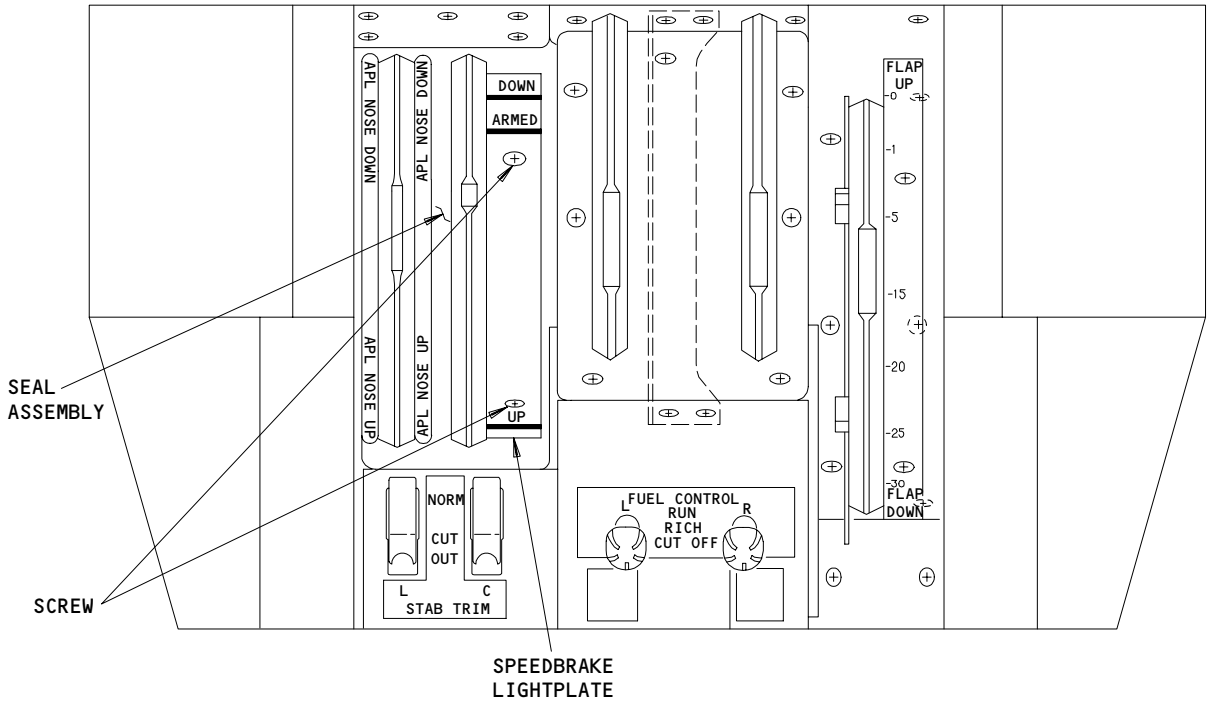
A. References
   (1) 24-22-00/201, Electrical Power - Control
   (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   (3) 78-31-00/201, Thrust Reverser System



SPEEDBRAKE LEVER LINKAGE

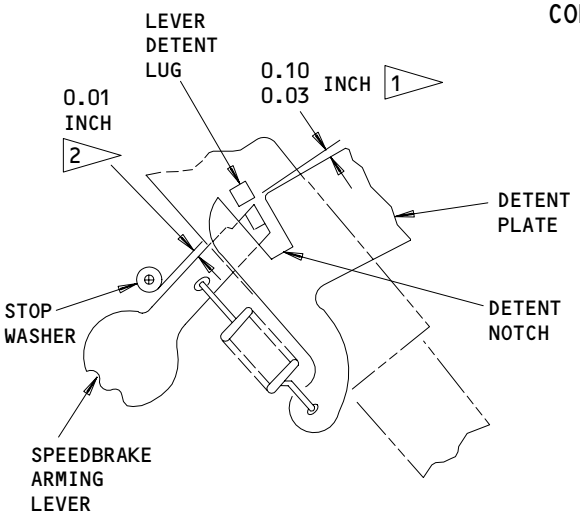
A

Position Switch for the Reverse Thrust Lever Installation
Figure 201 (Sheet 1)



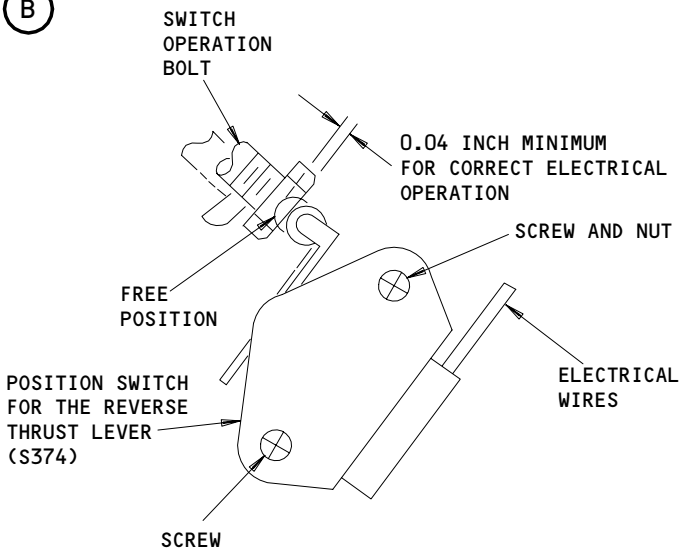
CONTROL STAND

B



LEVER DETENT ADJUSTMENT

C



SWITCH ADJUSTMENT

D

1 THE CLEARANCE MUST BE 0.01–0.03 INCH WHEN THE POSITION SWITCH FOR THE REVERSE THRUST LEVER IS OPERATED.

2 THERE MUST BE A CLEARANCE OF AT LEAST 0.01 INCH BETWEEN THE STOP WASHER AND THE SPEEDBRAKE ARMING LEVER.

Position Switch for the Reverse Thrust Lever Installation
Figure 201 (Sheet 2)

B. Access
(1) Location Zones
211/212 Control Cabin

C. Install the Position Switch for the Reverse Thrust Levers (Fig. 201)

S 422-013
(1) Do these steps to install the position switch:
(a) Put the position switch in its correct position.
(b) Install the screws, shim, washer, and nut that hold the switch in the control stand.
(c) Connect the wires for the switch to terminal block TB215.

S 822-014
(2) Do these steps to adjust the position switch:
(a) Make sure the thrust levers are in their idle positions.
(b) Move the left reverse thrust lever to its full reverse thrust position.
(c) Adjust the length of the rod for the reverse thrust lever until this condition is satisfactory:
1) The lever detent lug is pushed out of the down detent notch to the clearance shown (View C).
(d) Adjust the switch operation bolt until the position switch roller is in the position shown (View D) and do these steps:
1) Make sure the position switch operates.
2) Tighten the jamnuts on the bolt.
(e) Move the left reverse thrust lever to its OFF position.

S 822-015
(3) Do the above step again for the right reverse thrust lever.

S 822-017
(4) Do these steps to examine the stop washer clearance:
(a) Move the two reverse thrust levers to their full reverse thrust positions.

(b) Make sure the clearance between the stop washer and the speedbrake arming lever is at least 0.01 inch (0.25 mm) (View C).

S 212-018

(5) Move the left reverse thrust lever to its full reverse thrust position and then back to its OFF position. Do these checks:
(a) Make sure the lever detent lug goes back to its full down position.
(b) Make sure the position switch goes to its free position.

S 212-019

(6) Do the above step again for the right reverse thrust lever.

S 432-045

(7) Install the seal assembly for the speedbrake lever.

S 432-021

(8) Install the screws (2 locations) that connect the speedbrake lightplate to the control stand panel, P10.

S 432-022

(9) Use ties to hold the loose wires in their correct positions.

S 412-023

(10) Install the access panel on the left side of the control stand.

D. Position Switch for the Reverse Thrust Levers - Test

S 862-025

(1) Supply electrical power (Ref 24-22-00).

S 042-037

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(2) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 862-038

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Supply pressure to the left, right, and center hydraulic systems (Ref 29-11-00).

S 862-026

(4) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11G11, AUTO SPEEDBRAKE

S 212-027

(5) Move the left and right reverse thrust levers to their deployment interlock stops and do these checks:
(a) Make sure the speedbrake lever moves in the aft direction to its full up position.
(b) Make sure the spoilers move to their full up positions.

S 212-028

(6) Move the speedbrake lever to its full downstop position (the lever will not go into the locked detent) and do these checks:
(a) Make sure the amber AUTO SPDBRK light on the overhead panel, P5, is on.
(b) Make sure the spoilers move to their full down positions.

S 212-029

(7) Move the left and right reverse thrust levers to their OFF (idle) positions and do these checks:
(a) Make sure the amber AUTO SPDBRK light on the P5 panel goes off.

(b) Make sure the speedbrake lever is in its down-and-locked detent position.

E. Put the Airplane Back to Its Usual Condition

S 862-030

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B30, ENGINES RIGHT T/R CONT
(b) 11D12, ENGINES LEFT T/R CONT

S 862-031

(2) Remove the DO-NOT-OPERATE tags from the FUEL CUTOFF switches on the control stand panel, P10.

S 862-032

(3) Remove the power from the left, right, and center hydraulic systems (Ref 29-11-00).

S 442-033

(4) Do the activation procedure for the thrust reversers (Ref 78-31-00).

S 862-034

(5) Remove electrical power if it is not necessary (Ref 24-22-00).

LEADING EDGE SLAT SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. Introduction
      (1) The inboard and outboard leading edge slats are extended during takeoff and landing for increased airplane lift.
      (2) The flap lever on the control stand operates the trailing edge flaps by cables between the flap lever and the flap power drive unit (PDU). The slats are driven on primary or alternate power by one slat power drive unit (PDU) for both inboard and outboard slats. The slat PDU is controlled on primary power by cables from the flap PDU. The flap PDU follow-up cam positions the cable system which is connected to the slat PDU input cam. The slat PDU is controlled on alternate power by a position selector switch. The selector switch also controls flaps. The selector switch is operational after arming has been completed.
      (3) The slat PDU rotates torque tubes. The torque tubes operate rotary actuators geared to main tracks on each slat. Movement of the main tracks extends or retracts the slats.
      (4) Primary power to rotate the torque tubes is hydraulic. Alternate power is electrical.
      (5) Full extension of slats from intermediate position is automatic (autoslats) to aid stall recovery.
      (6) Loss of slats No. 2-5 and No. 6-9 is detected by switches in the fixed wing leading edge.
      (7) Failure protection and annunciation for asymmetry, UCM (motion without command and motion opposite to command), and command/position disagreement (no motion when commanded) is provided.
      (8) Inputs to and outputs from the flap/slat electronic units (FSEU-1, FSEU-2, and FSEU-3) assist in control of the flap/slat systems.
      (9) Slat position indication is covered in 27-88-00, Leading Edge Slat Position Indicating System - Description and Operation.
   B. L.E. Slat System Purpose
      (1) The slats and the flaps increase airplane lift by increasing the wing surface. Increased wing surface lowers airplane stall speeds.
      (2) Lower airplane stall speeds allow lower takeoff and landing speeds. This reduces ground roll, increases wheel and brake life, improves climb-out performance, and creates safer operating conditions.
      (3) There are ten slats, five in each wing. The slats are numbered 1 through 10, from left to right. Slats No. 1-4 and No. 7-10 are the left and right sets of outboard slats. Slats No. 5 and No. 6 are the left and right inboard slats.

(4) Automatic slat extension (autoslats) to fully extended is used to enhance airplane stall characteristics when flaps are in takeoff position (slats in intermediate position) and a stall warning signal is present.

C. General Description (Fig. 1)

(1) L.E. Slat Primary Control

(a) Cables connected to the flap lever on the control stand drive the flap PDU input cam. Another set of cables is connected from the flap PDU follow-up cam shaft to the input cam shaft on the slat PDU.

(b) Operation of the flap lever will provide a controlled input to the hydraulic control valve on the flap PDU and to the hydraulic control valve on the slat PDU.

(2) L.E. Slat Alternate Control

(a) Back-up operation of the slats is done with the flap/slat electronic unit (FSEU-2 and FSEU-3), an electric circuit, the hydraulic bypass valve, and the electric motor.

(b) There is one slat arming switch and one flap arming switch. One position selector switch controls positioning of slats and flaps.

(c) The slat arming signal powers the slat hydraulic bypass valve to bypass (closed). The control signal from the position selector switch is monitored by FSEU-2. FSEU-3 generates extend or retract signals to activate power to drive the slat PDU electric motor and to cause the slat PDU electric motor clutch to engage.

(d) The slat arming signal also powers the flap hydraulic bypass valve and the flap/slat hydraulic shutoff valve in the depressurization module closed.

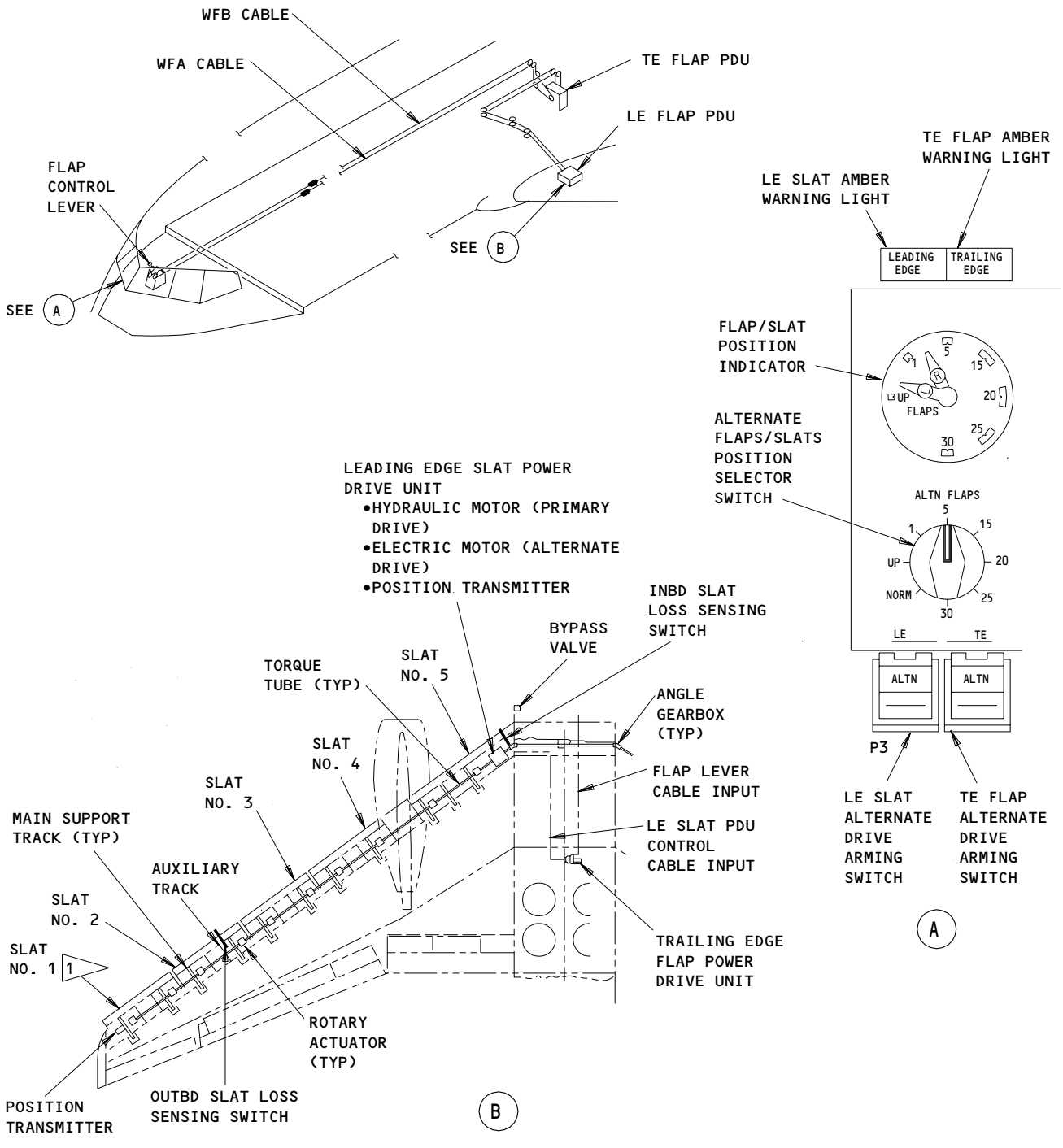
(e) The slat hydraulic bypass valve, the flap hydraulic bypass valve, and the flap/slat shutoff valve in the depressurization module are closed when the flap alternate drive arming switch is activated.

(3) Primary Power

(a) The slat drive primary power is from the left hydraulic system which is pressurized by an engine-driven pump on the left engine. Hydraulic pressure drives the hydraulic motor on the slat PDU. In the event of a left engine failure, the flaps and slats, as well as the landing gear, are powered by the power transfer unit (Ref 29-11-00).

(b) A hydraulic control valve module is mounted on the slat power drive unit.

(c) The hydraulic motor is controlled by the hydraulic control valve module, containing a hydraulic control valve and a dual-solenoid autoslat valve. The slat PDU input cam is rotated by cable input initiated by the flap PDU follow-up cam. The input cam regulates the hydraulic control valve by PDU linkages. The follow-up cam returns the hydraulic control valve to null.



1 SLATS NO. 6 THRU NO. 10 ARE ON RIGHT WING.
SLAT NO. 1 IS OPPOSITE TO SLAT NO. 10

Leading Edge Slat System
Figure 1

(4) Alternate Power
  (a) The slat drive alternate power is supplied by an electric motor on the slat PDU.
  (b) The motor has a torque limiter and a solenoid actuated clutch. The torque limiter protects against system overload.
  (c) The motor clutch is de-energized any time slat motion on alternate control is not commanded. The clutch engages the motor to the output shaft when the solenoid is energized by arming the alternate drive.

(5) Drive System
  (a) The slats are powered by two rotary actuators per slat. All rotary actuators are driven by a common torque tube drive in the left and right wing. The left and right torque tube drives are connected to the output shaft on the slat PDU.

  WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

  (b) The two main tracks on each slat have a gear sector that is driven by a pinion gear on each rotary actuator. The forward end of each main track is connected to the nose of the slat. Slat auxiliary tracks are used to control the slat angle.

(6) Autoslats
  (a) Autoslat operation is initiated by powering of the dual-wound autoslat solenoid valve. The valve is a component of the hydraulic control valve module on the slat PDU.
  (b) Presence of an autoslat extend signal energizes the autoslat solenoid valve and the valve directs hydraulic fluid to move a hydraulic control valve sleeve in the extend direction. This causes the hydraulic motor to extend the slats from intermediate to fully extended position.
  (c) Correction of airplane condition interrupts the autoslat extend signal. This results in retraction of the slats from fully extended to intermediate position.

(7) Slat Loss Detection Switches
  (a) Switches in the fixed wing leading edge control annunciation for loss of slats No. 2-5 and No. 6-9.

(8) Flap/Slat Electronic Units (FSEUs)
  (a) FSEU-1, FSEU-2, and FSEU-3 are identical and are installed in the main equipment center. The FSEUs are physically isolated units. Each unit performs a separate function within the flap/slat systems. Each unit is capable of performing any of the three functions.

(b) The FSEUs receive signals for flap lever, flap, and slat position. The flap and slat alternate drive arming switches, the alternate flap/slat position selector switch, and flap and slat PDU positions are also monitored by the FSEUs. Parameters such as air speed and stall warning are sent to the FSEUs.

(c) Logic circuits within each FSEU analyze all received signals to provide control of the following:
1) Flap/slat depressurization module shutoff valve
2) Annunciation of the flap/slat depressurization module pressure switch failures
3) Autoslats
4) TE flap load relief (Ref 27-51-00)
5) TE flap (Ref 27-51-00) and LE slat alternate drives
6) Annunciation of and protection against flap (Ref 27-51-00) and slat asymmetry, UCM, and command/position disagreement
7) Annunciation of slat loss (treated as slat asymmetry)
8) Position indication (Ref 27-88-00)
9) Data to other systems

(d) Replacement of FSEU components is on a failure basis rather than on a scheduled or time-controlled basis. No adjustment of the FSEU units is required.

(e) Built-in test equipment (BITE) is provided for each FSEU unit to assist in maintenance and trouble shooting.

2. Component Details

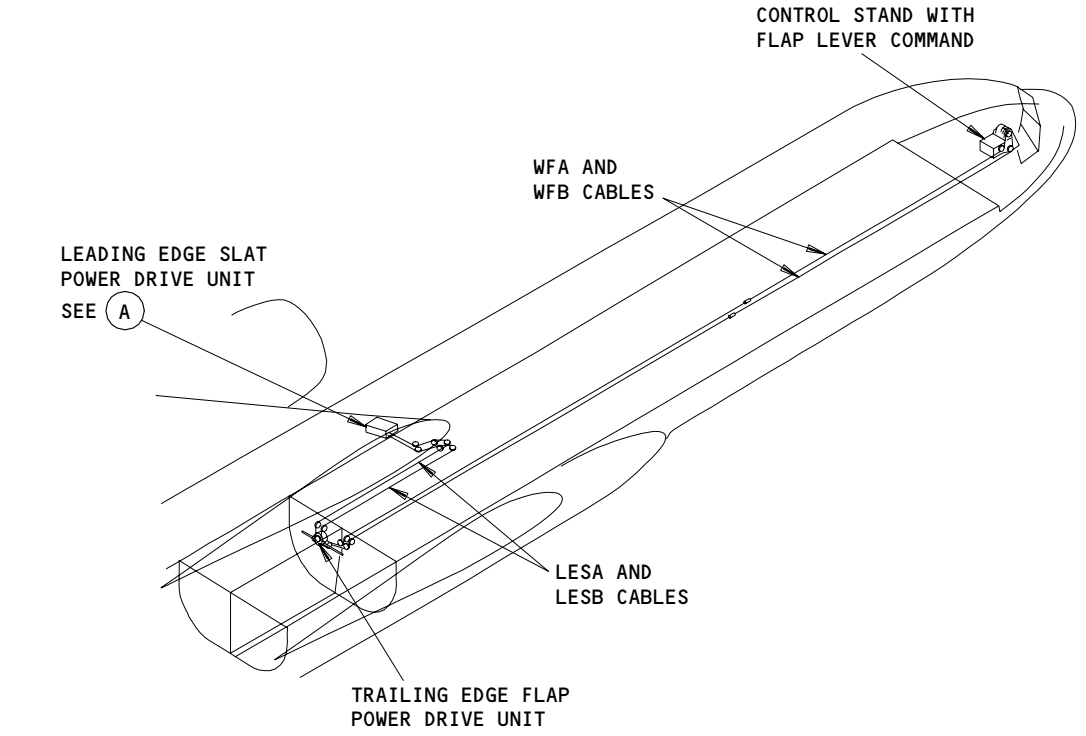
A. Slat Cables (Fig. 2)

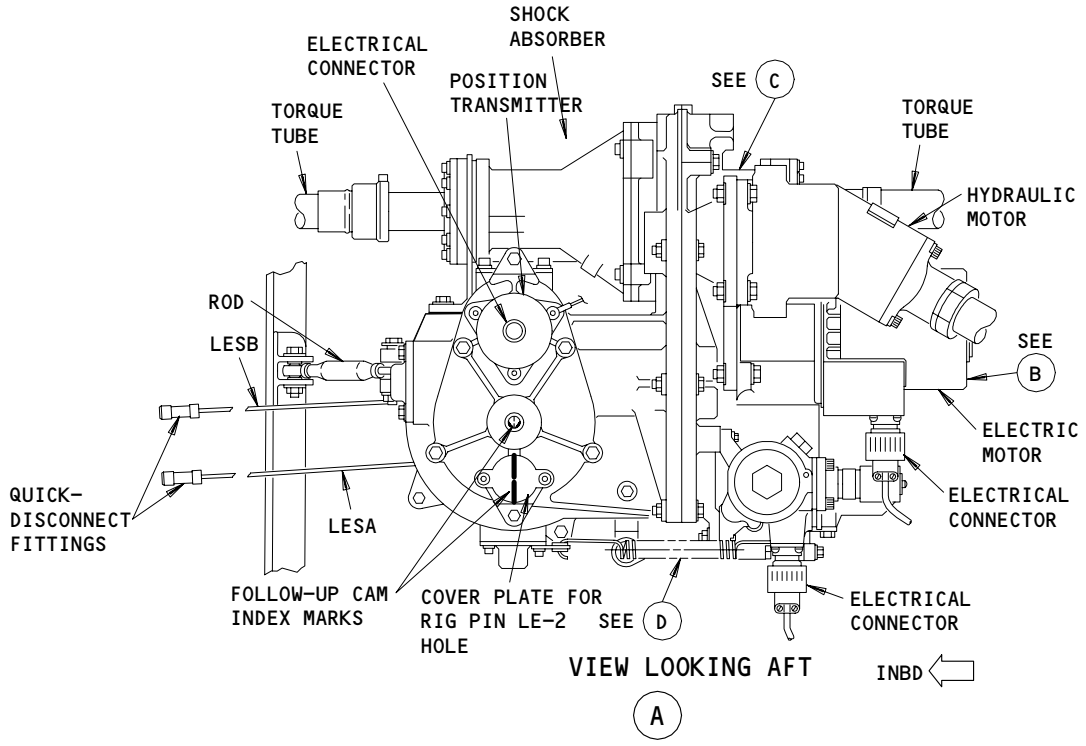
(1) Slat cables LESA and LESB connect the flap PDU follow-up cam shaft to the slat PDU input cam shaft. Flap lever input is mechanically transmitted from the flap lever through the flap cables to the flap PDU input cam shaft. The flap PDU output shaft is attached to the flap PDU follow-up cam. The LESA and LESB cables then transmit flap position to the input cam shaft on the slat PDU.

B. Slat PDU (Fig. 2)

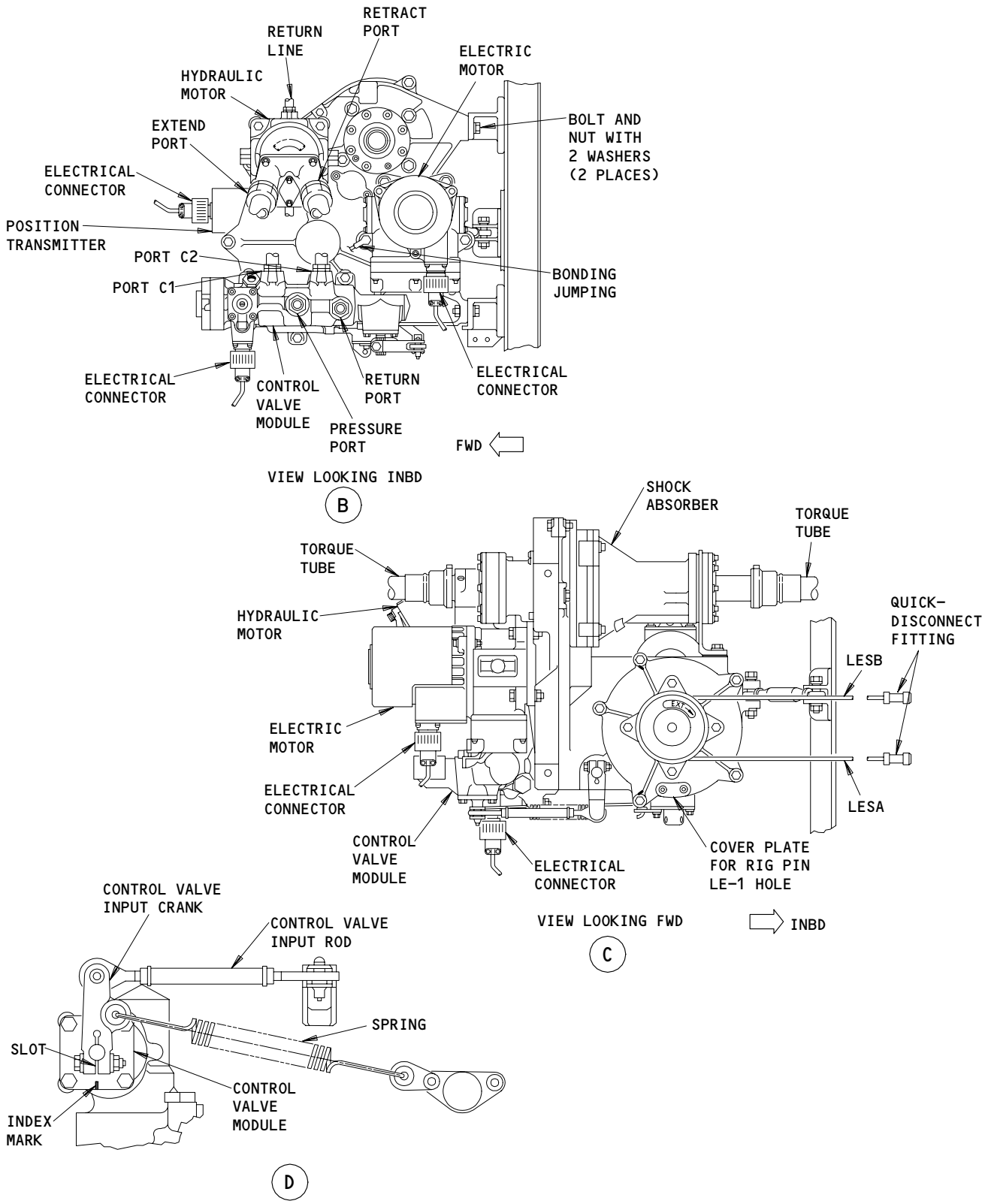
(1) The slat PDU drives all the leading edge slats. The PDU is located aft of the left wing strakelet and is mounted on the left wing front spar. Access to the PDU is through access panels.

(2) The slat PDU consists of two rotating control cams (an input cam and a follow-up cam), with followers and links. Further components are a control valve input rod, a hydraulic control valve module (with a control valve and a dual-solenoid autoslat valve), a hydraulic motor, an electric motor, a position transmitter, and a shock absorber.





Leading Edge Slat Power Drive Unit
Figure 2 (Sheet 1)



Leading Edge Slat Power Drive Unit
Figure 2 (Sheet 2)

(3) Control Cams
  (a) The hydraulic motor is governed by a control valve that can port fluid to either the extend or retract side of the motor. The control valve input is governed by an input rod and links which in turn are governed by the position of two cam followers. The positions of the followers are determined by the contours of two rotating control cams, an input cam and a follow-up cam. The input cam shaft is rotated by cables connected to the flap power drive unit. The input cam moves the follower from one discrete radial position to another, providing a control valve input. The follow-up cam is geared to the PDU output shaft to close the feedback loop. The follow-up cam and its follower return the control valve to null.

(4) Hydraulic Control Valve Module
  (a) A hydraulic control valve module is mounted on the slat PDU. The control valve module performs the PDU hydraulic control functions. The module consists of a control valve and an autoslat valve. The left hydraulic system is the source of hydraulic power.
  (b) The control valve controls the direction of rotation of the hydraulic motor according to the input by the cables at the input cam shaft. The control valve will shut off hydraulic flow when the slats arrive at their selected position as determined by the follow-up cam.
  (c) The autoslat valve is operated by a dual-solenoid. The dual-solenoid regulates the control valve for extension of slats from intermediate to fully extended position, when an autoslat extension has been commanded.
  (d) An autoslat command will occur when slats are in intermediate position on hydraulic power and a stall condition happens. The stall warning signal is sent from the left and/or right stall warning system to the FSEU units. Separate logic circuits in FSEU-1 and FSEU-2 control the dual-solenoid autoslat valve.

(5) Hydraulic Motor
  (a) A hydraulic motor is installed on the gearbox of the PDU for primary power to drive the slats.
  (b) Operation of the hydraulic motor will turn the gears in the gearbox and rotate the torque tubes to the slats. Direction of rotation of the hydraulic motor is controlled by the control valve in the hydraulic control valve module.

(6) Electric Motor
  (a) An electric motor is installed on the gearbox of the PDU. The motor uses alternate electric power to drive the slats.

(b) Operation of the motor turns the gears in the gearbox. The gearbox rotates the torque tubes to the slats. Direction of rotation of the electric motor is controlled by the alternate flap/slat position selector switch. The switch is on P3.

(c) The motor has a torque limiter for protection against system overload and a solenoid actuated clutch which is de-energized any time slat motion on alternate control is not commanded. The clutch engages the motor to the output shaft when the solenoid is energized.

(7) Gearbox

(a) Hydraulic or electric power is converted to mechanical power by the PDU gearbox. The gearbox rotates the torque tubes to the slats.

(b) The gearbox drives the follow-up cam and the position transmitter through gearing.

(8) Position Transmitter

(a) The input shaft on the transmitter is driven by follow-up cam rotation. Gears in the transmitter drive a brushless phase shift resolver. The position signal is sent to FSEU-3. A logic circuit in FSEU-3 uses the position signal for control of the PDU electric motor.

(9) Shock Absorber

(a) The shock absorber is installed on the PDU and transmits torque from the PDU to the slat drive torque tubes. Functioning as a torque limiter/shock absorber, the unit limits torque to the drive system and absorbs rotational kinetic energy from the PDU in an overtorque condition.

(b) The shock absorber consists of an input gear, two output shafts, two torque limiters, and a shock absorber. The input gear meshes with gearing in the PDU gearbox. The output shafts mate with couplings connected to the slat drive torque tubes. The torque limiters are located at both ends of the unit. Each torque limiter has an overload indicator. A ground lock pin feature is provided for manual insertion of a lock pin to prevent rotation of the slat drive.

(10) Rigging

(a) A rig pin inserted in the slat PDU input cam is used to adjust the cables between the flap PDU and the slat PDU.

(b) Mechanical null of the slat PDU is accomplished when a rig pin is installed in the input cam, a rig pin is installed in the follow-up cam, and the slot in the hydraulic control valve input crank is lined up with the index mark on the hydraulic control valve.

(c) Subsequent hydraulic nulling of the slat PDU requires that the rig pin in the follow-up cam and the rig pin in the input cam fit freely at the same time with hydraulic power on. Hydraulic nulling is the condition of the hydraulic control valve when all ports are blocked and there is no hydraulic flow.

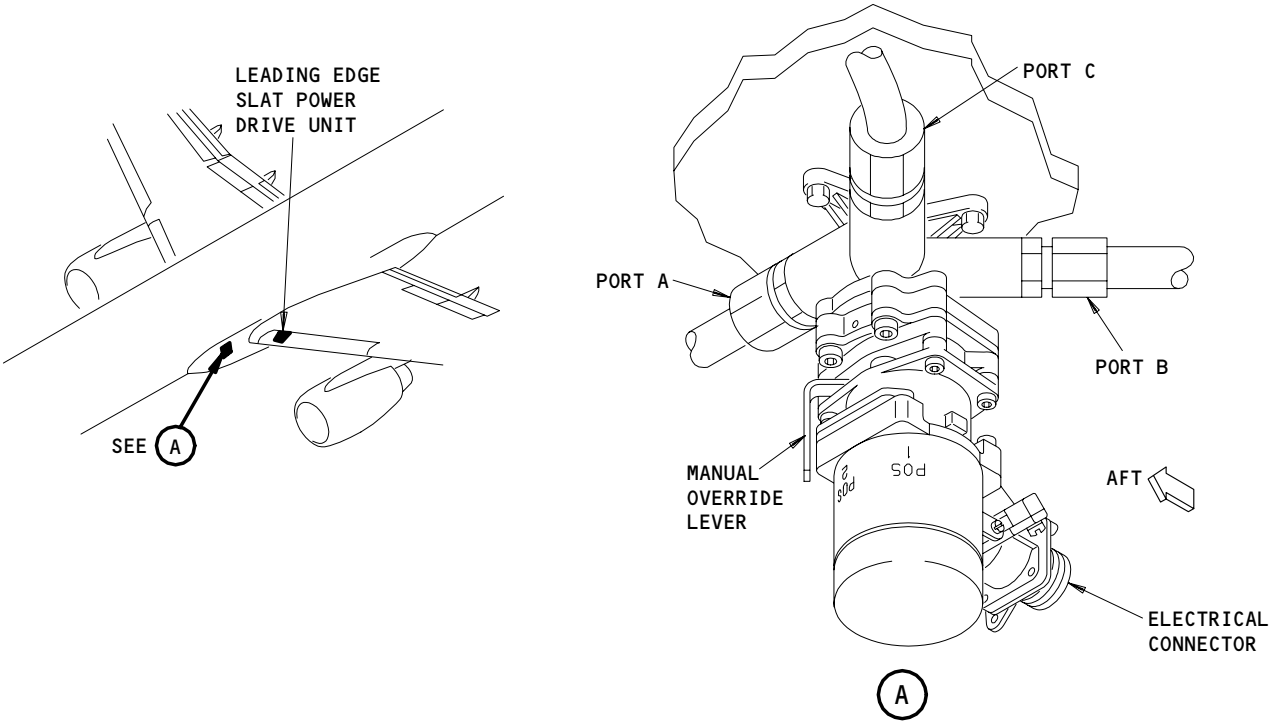
C. Slat Bypass Valve (Fig. 3)

(1) The bypass valve is installed in the left wing-body fairing forward of the wing. The valve is electric-motor operated and serves to bypass hydraulic power when the slat alternate drive is armed and when slat asymmetry or slat uncommanded motion occurs. The valve can also be operated manually by a lever. The bypass mode of the valve is indicated by Position 1. The normal mode is indicated by Position 2.

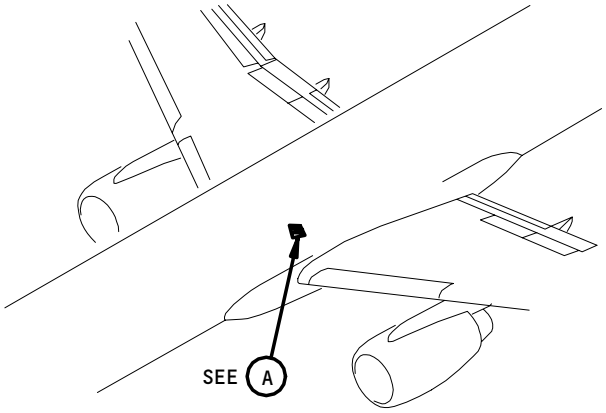
(2) The valve consists of a 3-way, 2-position, rotary selector valve operated by an electric actuator. The valve has three ports. In the event of alternate operation or protection shutdown, the valve is positioned so that the extend port and retract port of the hydraulic motor are connected.

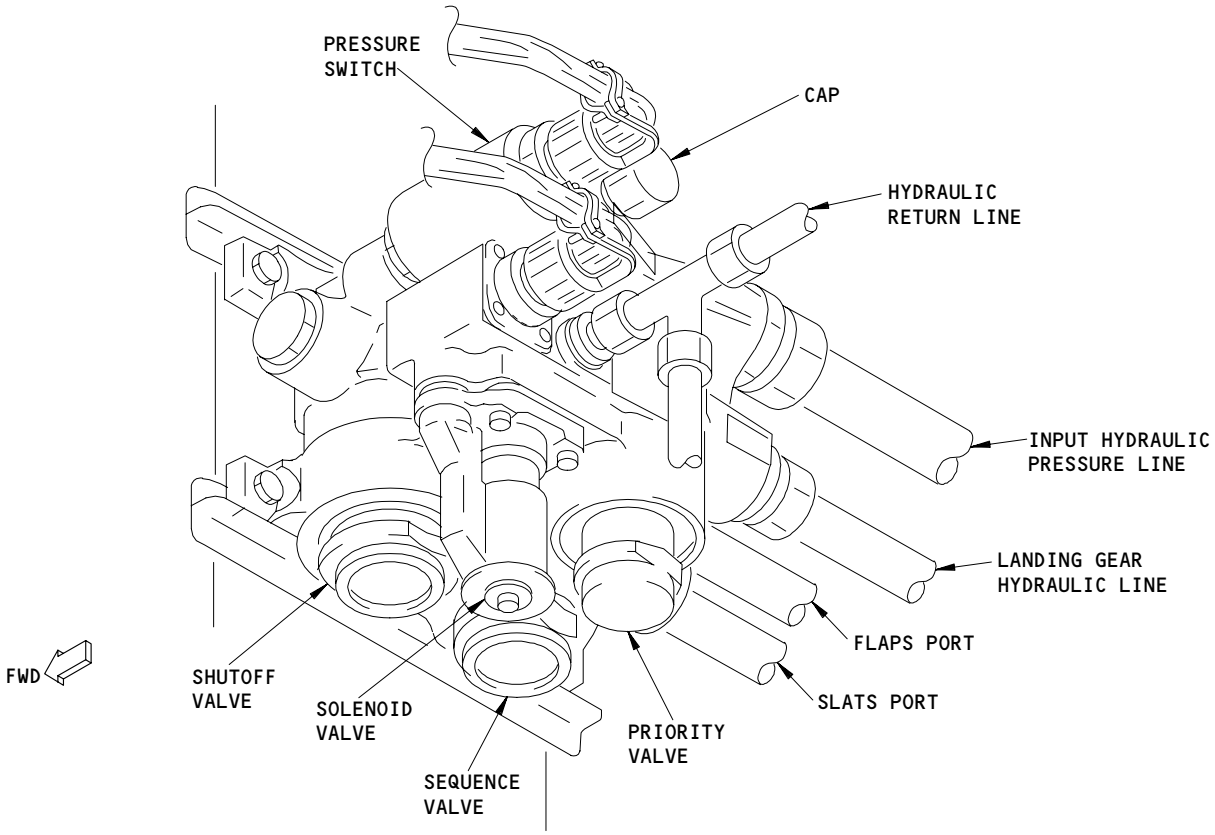
D. Flap/Slat Depressurization Module (Fig. 4)

(1) The flap/slat depressurization module is in the left main gear wheel well near the flap PDU. Hydraulic fluid is ported to flaps and slats through the module. The module has a dual-solenoid pilot valve, a shutoff valve, a priority valve, a flap/slat sequencing valve, and a pressure switch.



Leading Edge Slat Bypass Valve
Figure 3





FLAP/SLAT DEPRESSURIZATION MODULE
(LEFT MAIN GEAR WHEEL WELL)

A

Flap/Slat Depressurization Module
Figure 4

(2) The module removes hydraulic pressure to flap and slat PDUs as follows:
  (a) During cruise and in the event of flap and/or slat asymmetry, UCM, or command/position disagreement, a signal from FSEU-1 to the solenoid pilot valve circuit allows the first pilot valve coil to be energized.
  (b) When flap and/or slat alternate drives are armed, the arming signal is grounded to the solenoid pilot valve circuit to allow the second pilot valve coil to be energized.

(3) Solenoid Pilot Valve and Shutoff Valve
  (a) The shutoff valve is normally spring-loaded open. The shutoff valve closes when hydraulic pressure is ported to the valve by the dual-solenoid pilot valve. A signal from FSEU-1 or a grounded flap and/or slat alternate drive arming signal to the dual-solenoid pilot valve electrical circuit opens the pilot valve, causing the shutoff valve to close and shutting down flaps and slats by venting shutoff valve control ports to return pressure. Removal of FSEU-1 and grounded alternate drive arming signals spring-loads the pilot valve to closed and spring-loads the shutoff valve to open.
  (b) In the event of electrical failure, the shutoff valve remains open so that primary control of flaps and slats is available.
  (c) The solenoid pilot valve has a dual coil. One coil receives an electrical signal to open the valve when logic in FSEU-1 interprets that the airplane is in cruise or when logic in the FSEU-1 interprets asymmetry, UCM, or command/position disagreement. The other coil receives a grounded signal to open the valve when the flap and/or the slat alternate drive has been armed.

(4) Priority Valve
  (a) The priority valve gives flap and slat operation priority over the landing gear system. When left hydraulic system pressure drops below 1800 psi, the priority valve closes, leaving a 3 gpm orifice for the landing gear. At left hydraulic system pressure above 1800 psi, full flow of 29 gpm is permitted to the landing gear.

(5) Flap/Slat Sequencing Valve
  (a) The flap/slat sequencing valve serves to reduce the total hydraulic flow to the flaps and slats when both systems are operating simultaneously to assure that neither flaps nor slats stop due to reduced flow.

(6) Pressure Switch
  (a) The pressure switch monitors left hydraulic system pressure downstream of the shutoff valve. If pressure remains high during a depressurized state, or low during a pressurized state, a FLAP ISLN VALVE message is sent to EICAS. Output to EICAS is controlled by logic in FSEU-1.

E. Slat Drive Torque Tubes (Fig. 5)

(1) Input between the slat PDU and the slat rotary actuators is by means of torque tubes. The torque tubes extend into the left and right wing from the slat PDU along the forward side of the wing front spars. Within the fuselage the torque tubes extend across the aft end of the forward cargo compartment. The torque tubes are hollow aluminum shafts connected to each other and to the PDU, the angle gearboxes, and the rotary actuators by means of splined couplings. The torque tubes are supported additionally by bearing supports.

F. Angle Gearboxes (Fig. 5)

(1) Angle gearboxes are used in the slat drive where the torque tubes penetrate the fuselage left and right. The gearboxes change torque tube alignment. Alignment is changed through bevel gears.

G. Rotary Actuators and Pinion Gears (Fig. 5)

(1) Rotary actuators are installed in the leading edge of each wing. Each slat is operated by two rotary actuators. All the rotary actuators are installed in the torque tube drive train extending left and right from the slat PDU. The rotary actuators transfer torque to the geared slat main tracks by means of pinion gears. The pinion gears are rotated by the rotary actuator output shafts.

(2) Each rotary actuator consists of four mechanisms: A sun ring and planet gear mechanism to amplify torque while reducing speed, a ball ramp actuator mechanism to limit the torque to the slats, a pawl and ratchet mechanism to positively maintain a stationary position against backdriving loads, and an indicator pin to show when an overload has occurred.

(3) The two rotary actuators at the left and right most outboard locations (slats No. 1 and 10 outboard rotary actuators) provide a mounting pad for a slat position transmitter.

H. Slats (Fig. 6)

(1) The geared slat main tracks associated with each rotary actuator are extended and retracted by the rotating pinion gears driven off the rotary actuators. The forward end of each main track is connected to the slat nose. Extension and retraction of the main tracks extend and retract the slats. The angle of each slat is controlled by auxiliary tracks in the fixed leading edge.

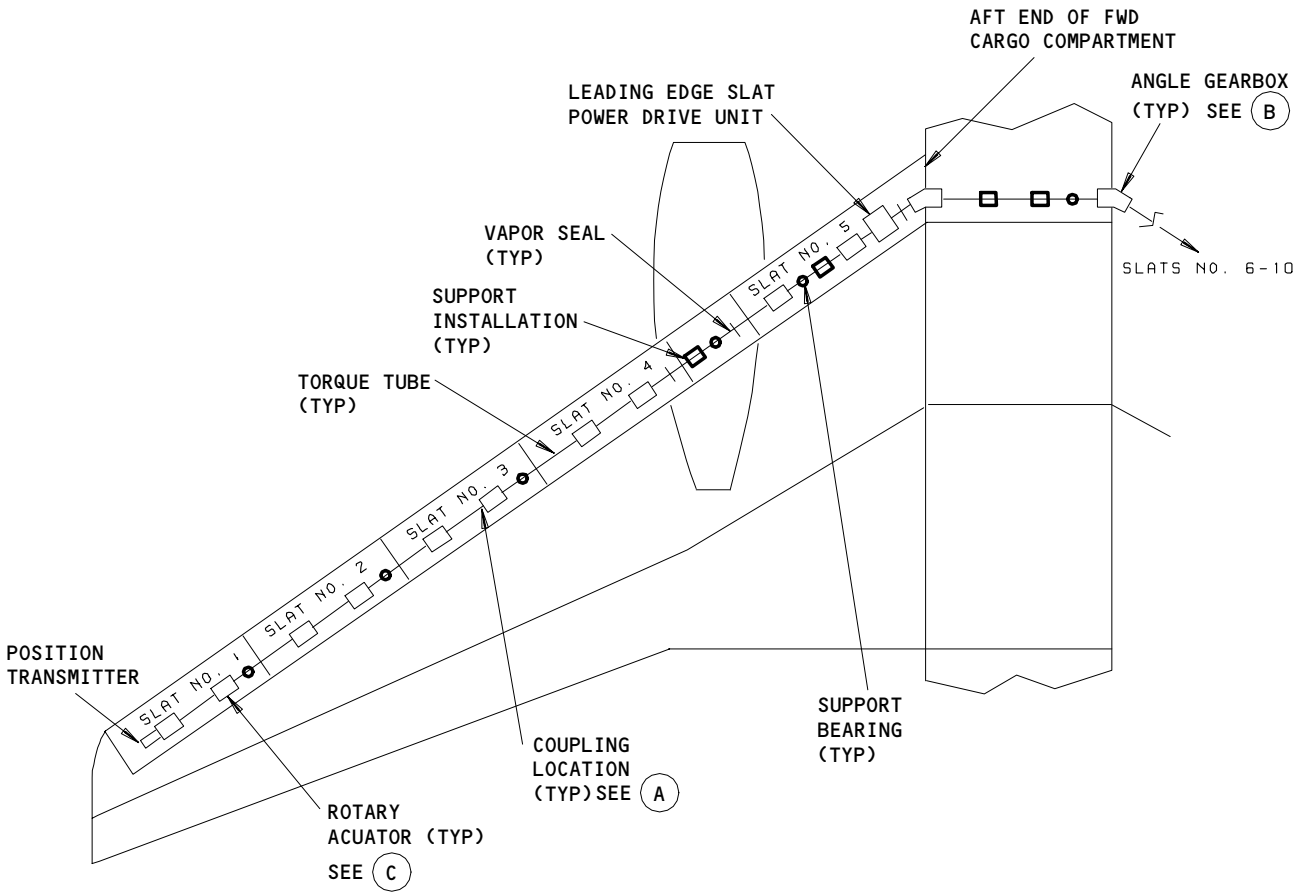
(2) Each main track at the rotary actuator locations incorporates a down stop and an up stop. The fixed leading edge also incorporates up stops and down stops. The stops are used during rigging and testing of the slats.

I. Slat Loss Detection (Figs. 7 and 8)

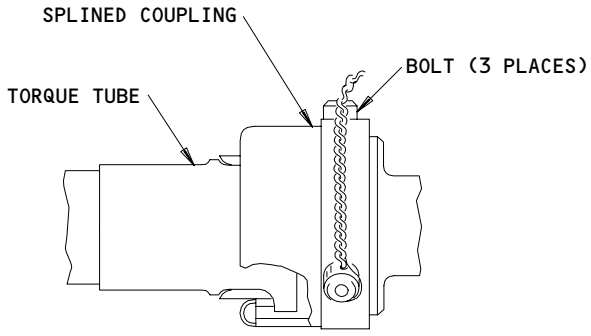
(1) The loss of slats No. 2-5 and No. 6-9 is detected by switches in the fixed wing leading edge. Loss of any or all of the affected slats will ground an electrical circuit to FSEU-1 and FSEU-2 and cause failure annunciation (LE SLAT ASYM message on EICAS display and LEADING EDGE light on P3).

J. Slat Position Transmitters (Fig. 9)

(1) One slat position transmitter is in the left wing, installed on the outboard rotary actuator of slat No. 1. Another slat position transmitter is in the right wing installed on the outboard rotary actuator of slat No. 10.

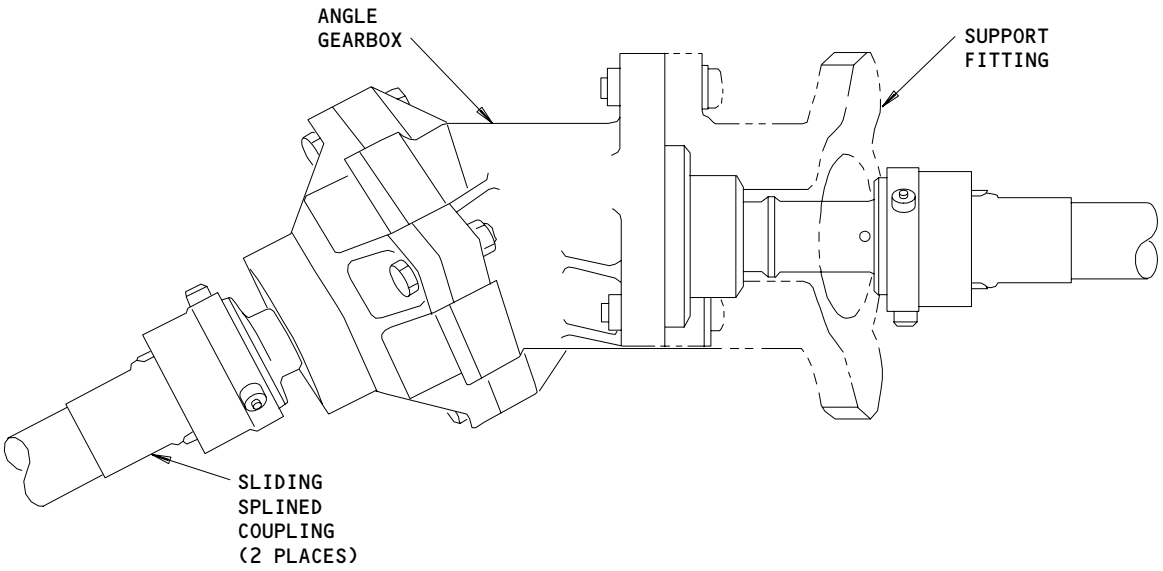


PLAN VIEW LEFT WING (RIGHT WING OPP)



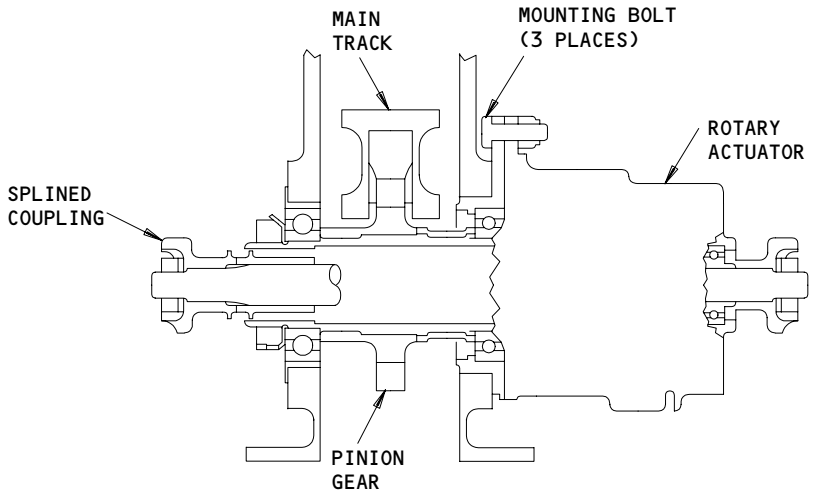
TYPICAL COUPLING
A

Leading Edge Slat Drive Torque Tubes, Angle Gearboxes, and Rotary Actuators
Figure 5 (Sheet 1)



LEFT ANGLE GEARBOX SHOWN
(RIGHT ANGLE GEARBOX OPPOSITE)
PLAN VIEW

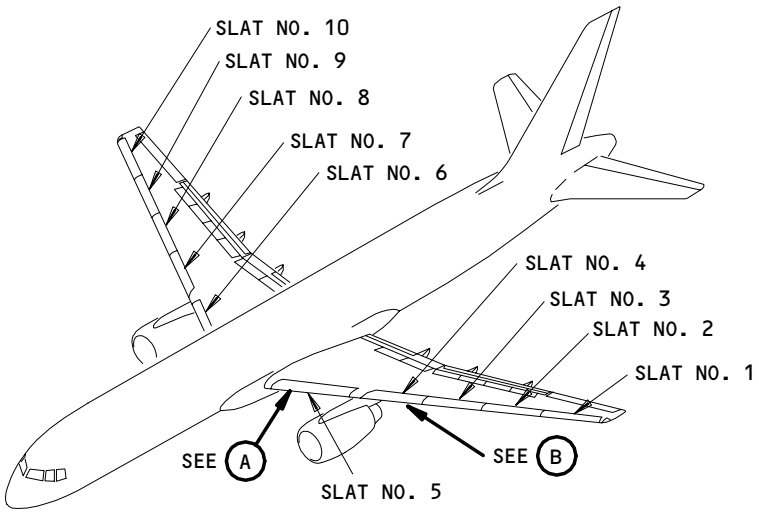
B

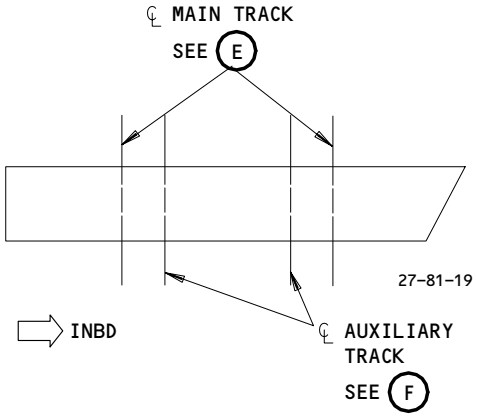


SLAT NO. 1 INBD ROTARY ACTUATOR
(TYP SLAT NO. 1-10)

C

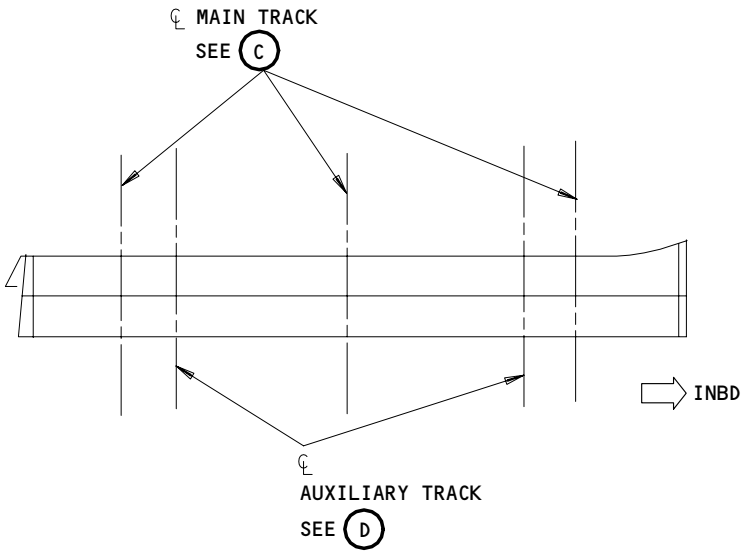
Leading Edge Slat Drive Torque Tubes, Angle Gearboxes, and Rotary Actuators
Figure 5 (Sheet 2)





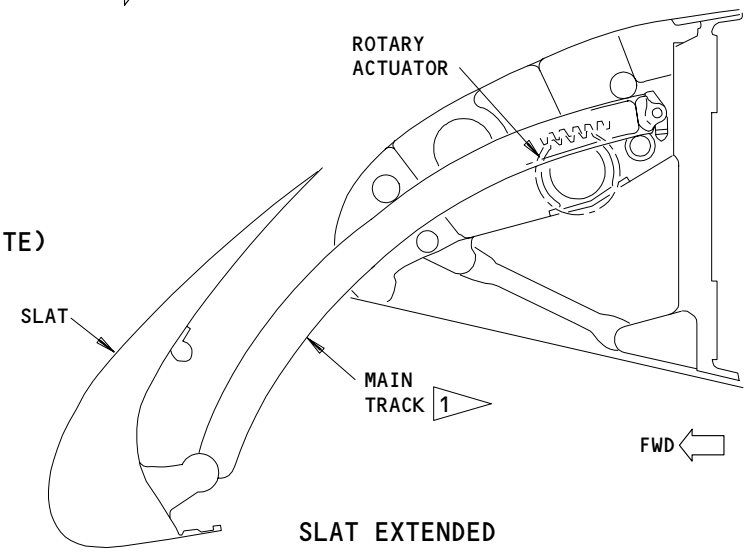
LEFT OUTBOARD SLAT NO. 4
PLAN VIEW
(EXAMPLE OUTBOARD SLATS
NO. 1-3 AND 7-10)

B



LEFT INBOARD SLAT NO 5
PLAN VIEW
(RIGHT INBOARD SLAT NO 6 OPPOSITE)

A



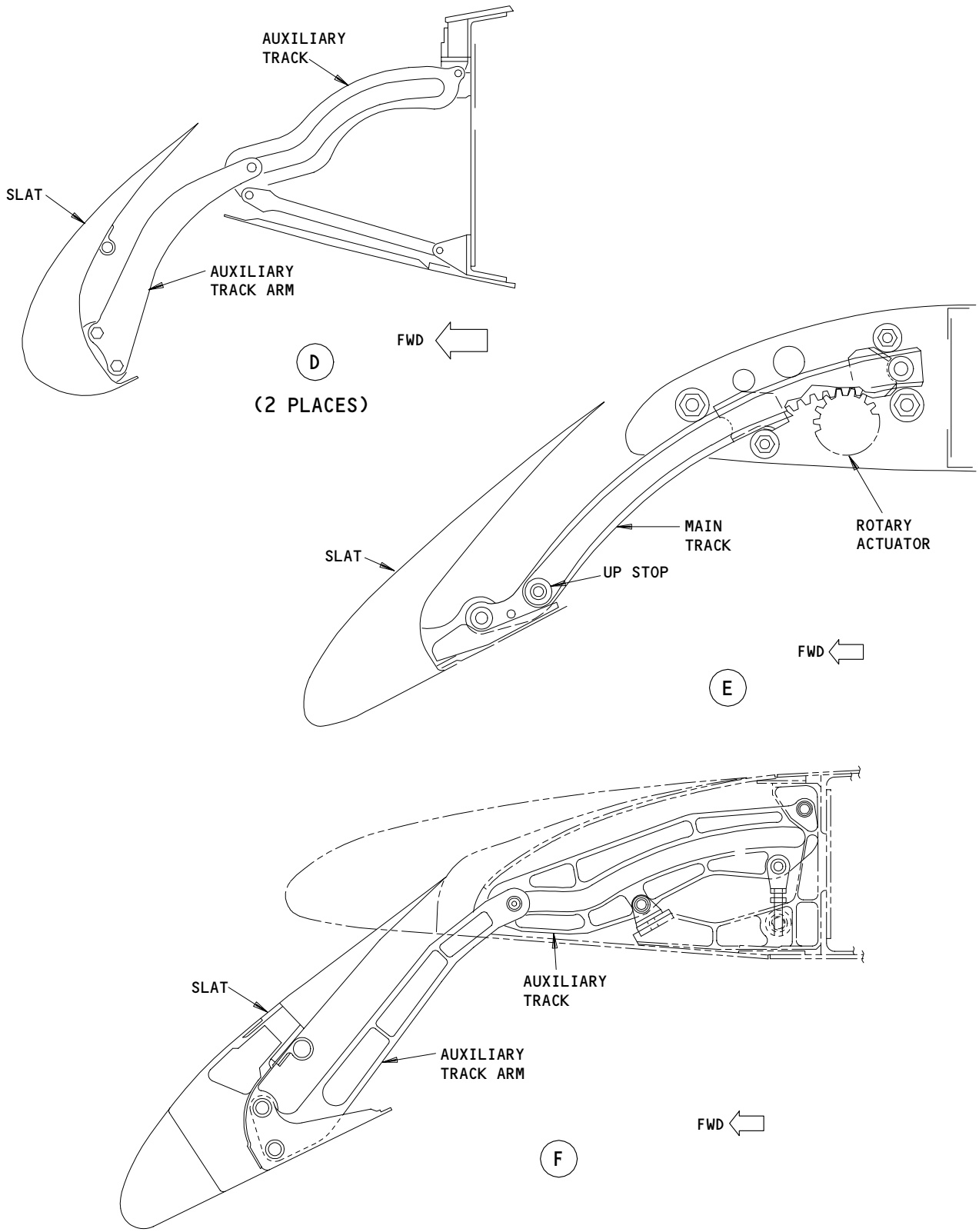
SLAT EXTENDED
(3 LOCATIONS)

C

1 CENTER MAIN TRACK DOES
NOT HAVE GEAR TEETH
OR UP AND DOWN STOPS

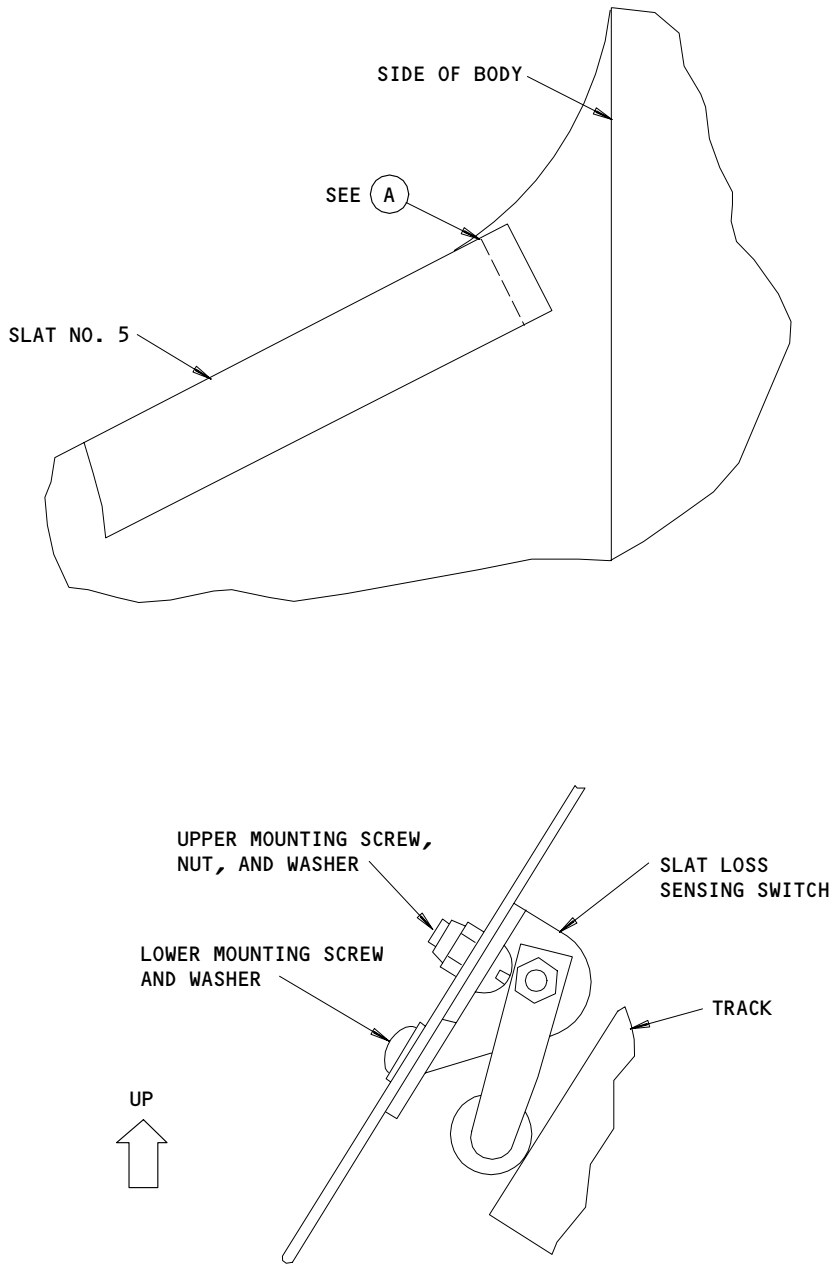
Leading Edge Slats
Figure 6 (Sheet 1)

53346

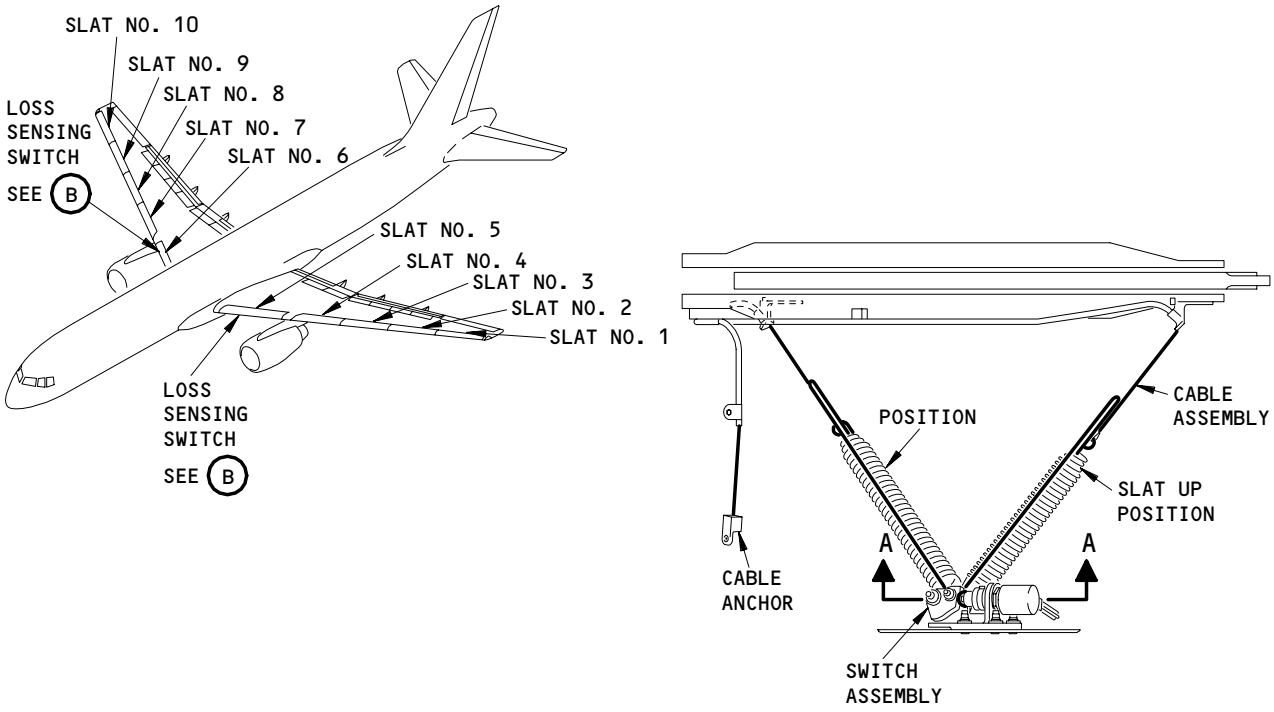


Leading Edge Slats
Figure 6 (Sheet 2)

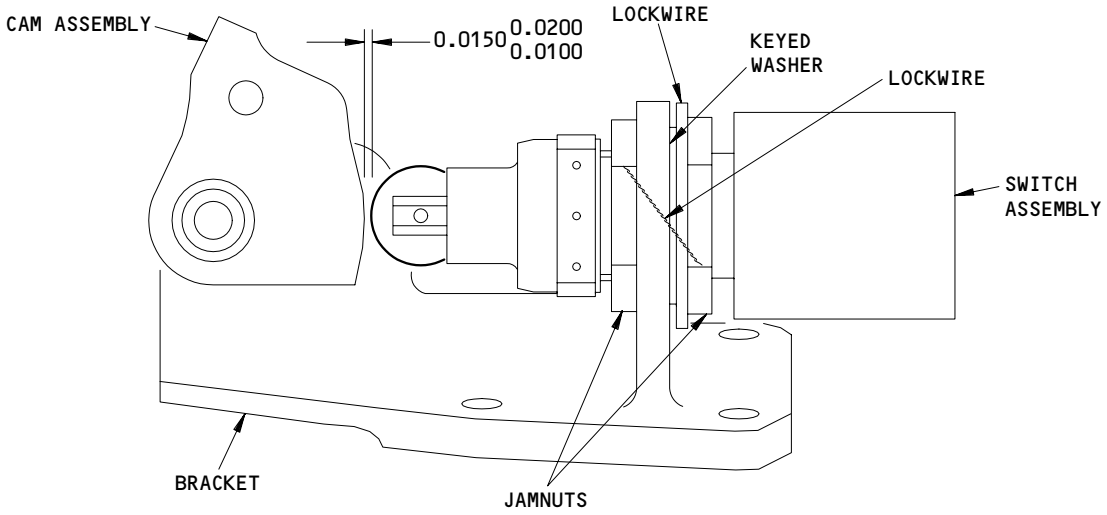
53357



Inboard Leading Edge Slat Loss Detection
Figure 7 (Sheet 1)



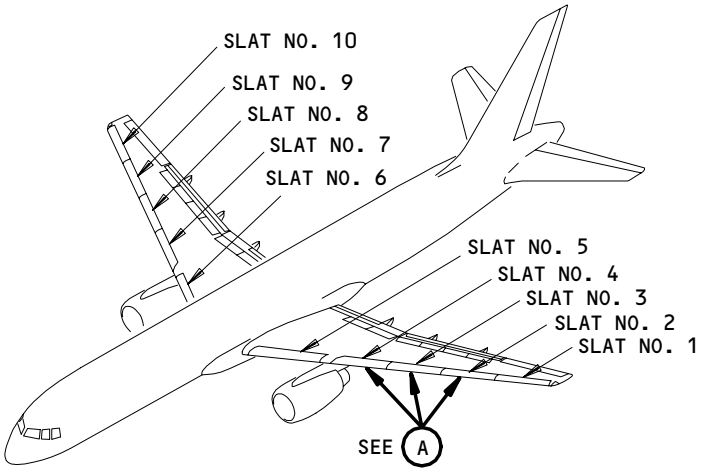
LOSS SENSING SWITCH
B

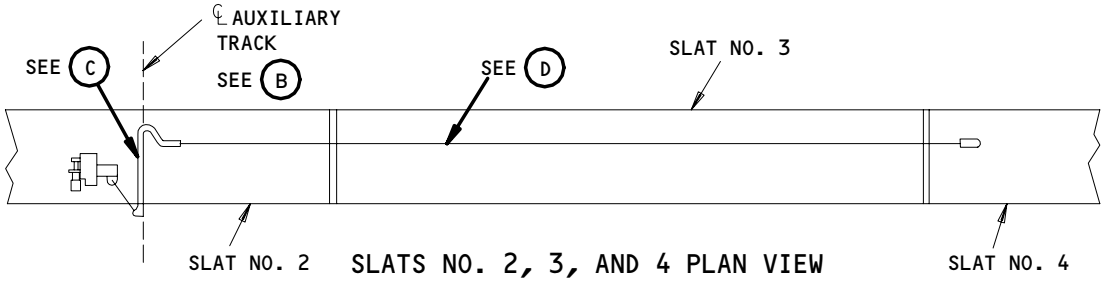


SWITCH ASSEMBLY
A–A

Inboard Leading Edge Slat Loss Sensing
Figure 7 (Sheet 2)

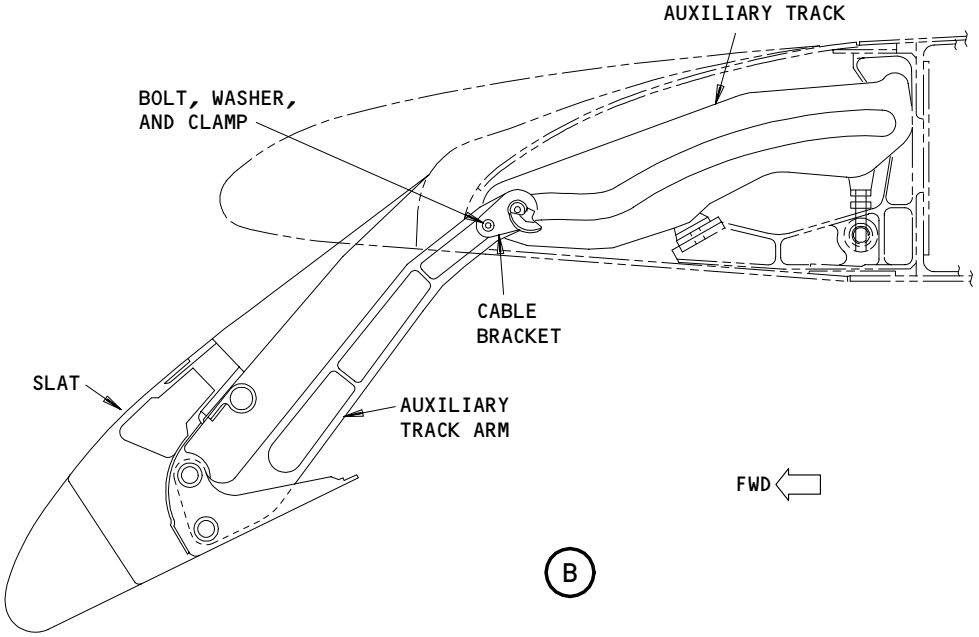
F29768





SLATS NO. 2, 3, AND 4 PLAN VIEW
(SLATS NO. 7, 8, AND 9 OPPOSITE)

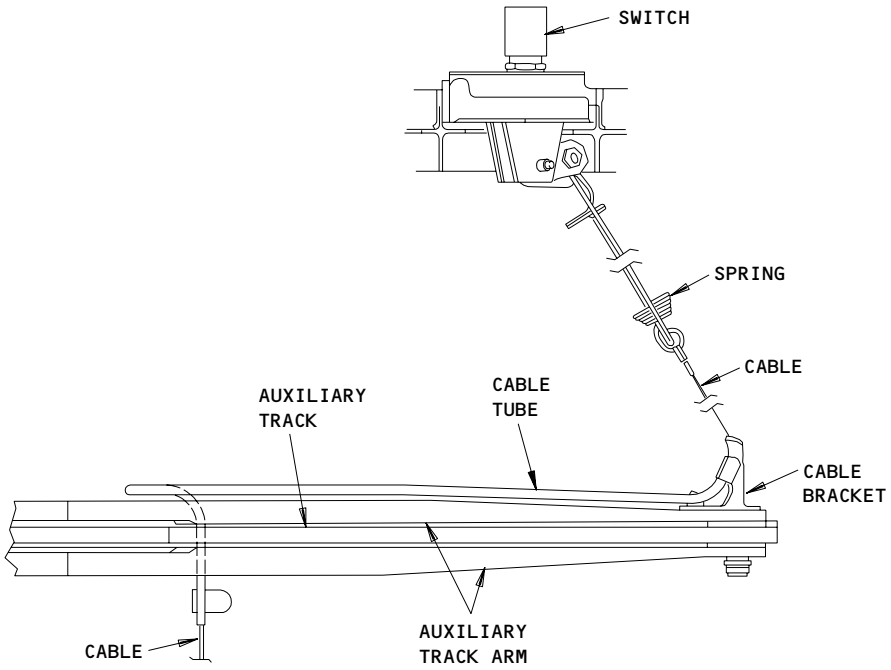
A



B

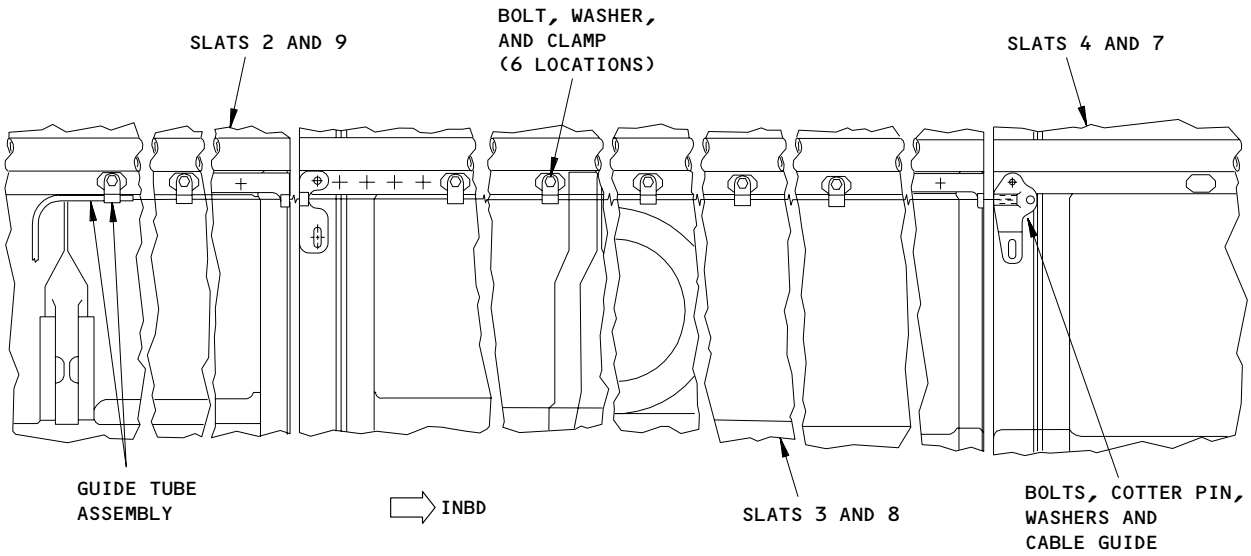
Outboard Leading Edge Slat Loss Detection
Figure 8 (Sheet 1)

53358



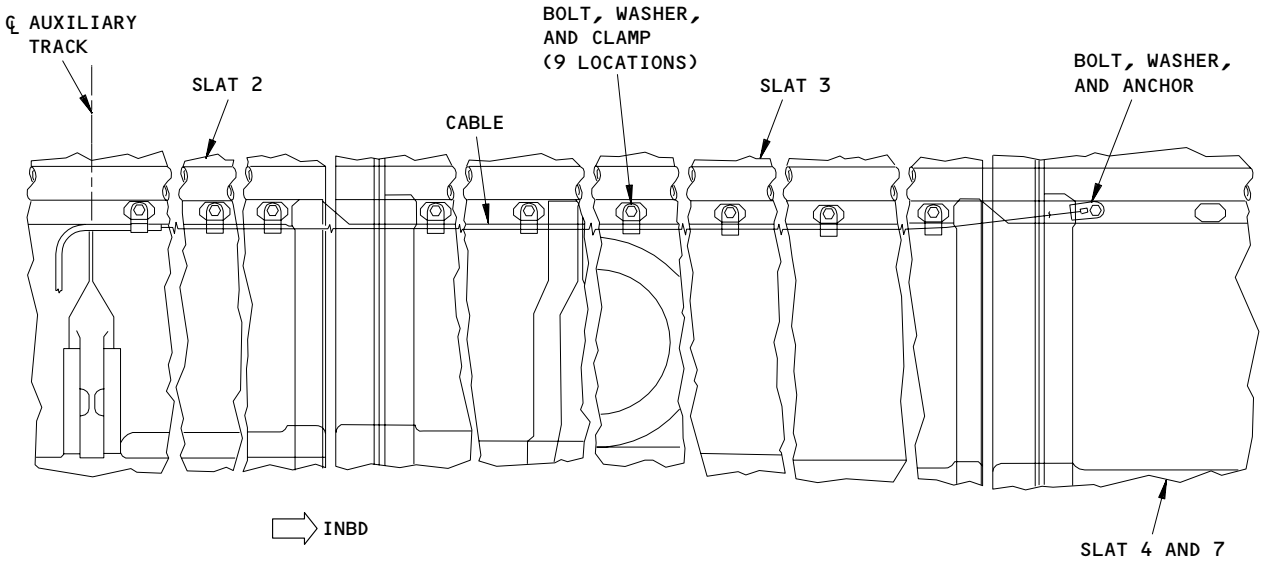
C

Outboard Leading Edge Slat Loss Detection
Figure 8 (Sheet 2)



AIRPLANES WITH CABLE GUIDE AT SLATS 4 AND 7

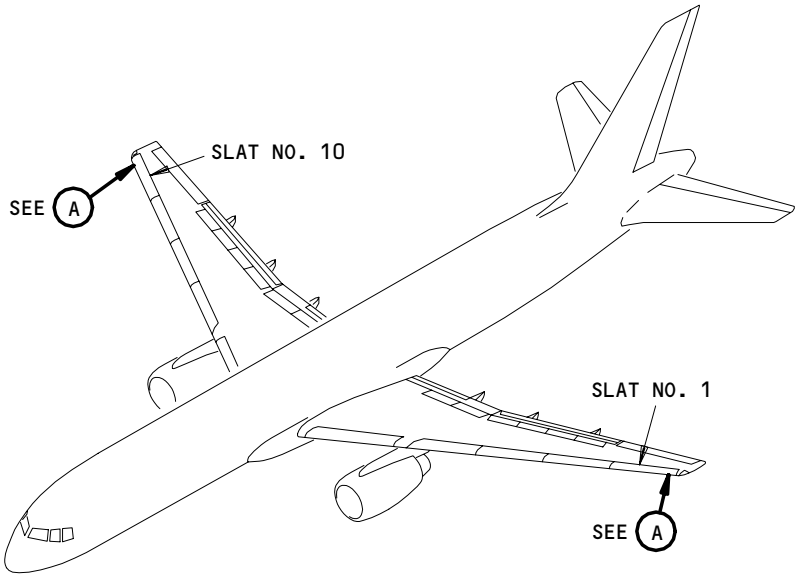
D

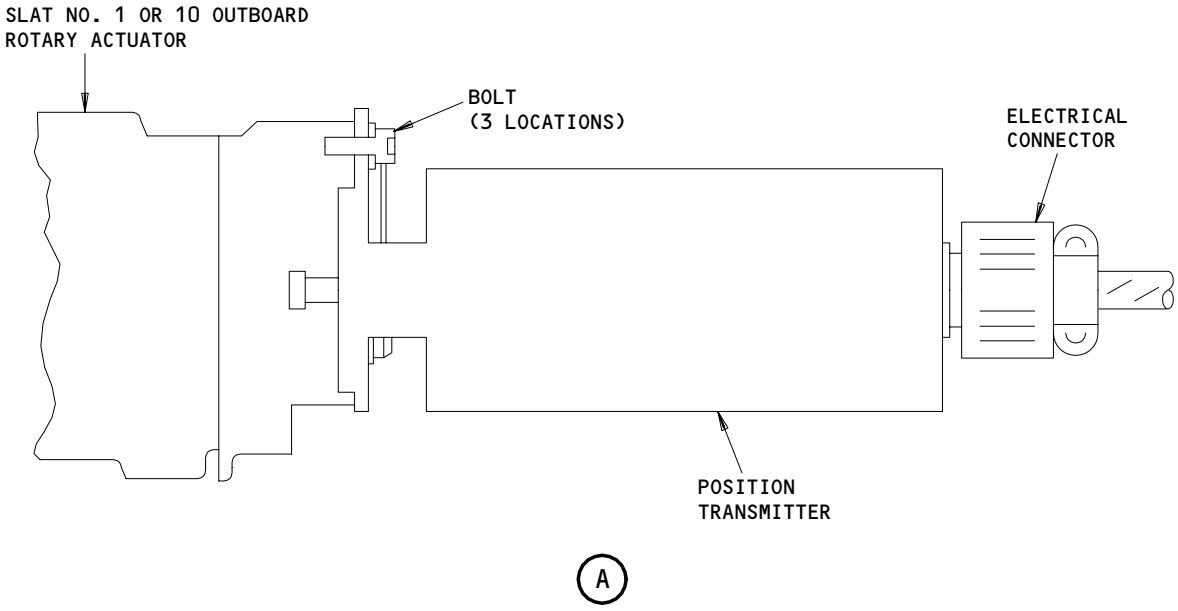


AIRPLANES WITH ANCHOR AT SLATS 4 AND 7

D

Outboard Leading Edge Slat Loss Detection
Figure 8 (Sheet 3)





Leading Edge Slat Position Transmitter
Figure 9

53363

(2) Each transmitter consists of a two-stage gear reducer driving two gear-driven, brushless phase shift resolvers.

K. Flap/Slat Electronics Units (FSEUs) (Fig. 10)

(1) Three identical FSEU units are installed in the main equipment center. Each unit performs a separate function within the flap/slat system. Each unit is capable of performing any of the three functions. The particular function performed by a unit is determined by its inputs. The FSEU units are referred to as FSEU-1, FSEU-2, and FSEU-3.

(2) The FSEU units receive signals for flap lever, flap and slat alternate drive arming switch, alternate flap/slat position selector switch, flap and slat PDU follow-up cam, flap, and slat position, and for motion of flaps and slats. Parameters such as air speed and stall warning are also sent to the FSEU units.

(3) All signals are electrical. Logic circuits and electronic components within each FSEU unit analyze all received signals. Completion or interruption of separate logic requirements establishes control of flap/slat components.

(4) Built-in test equipment (BITE) is provided for each FSEU unit to assist in maintenance and trouble shooting. Figure 10 shows the menus that are part of the BITE in the -40 FSEUs.

(5) Flap/Slat Depressurization Module

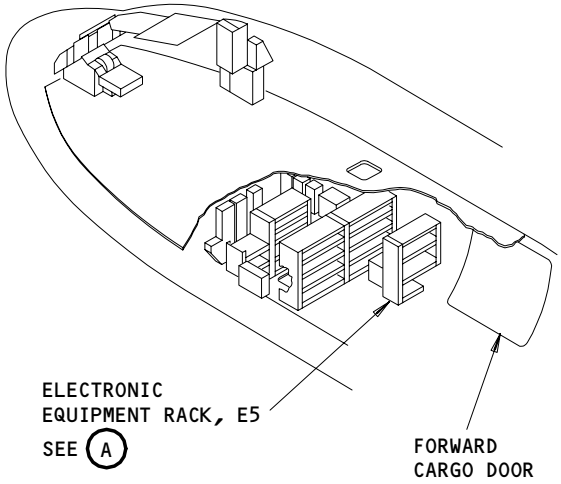
(a) Solenoid Pilot Valve and Shutoff Valve

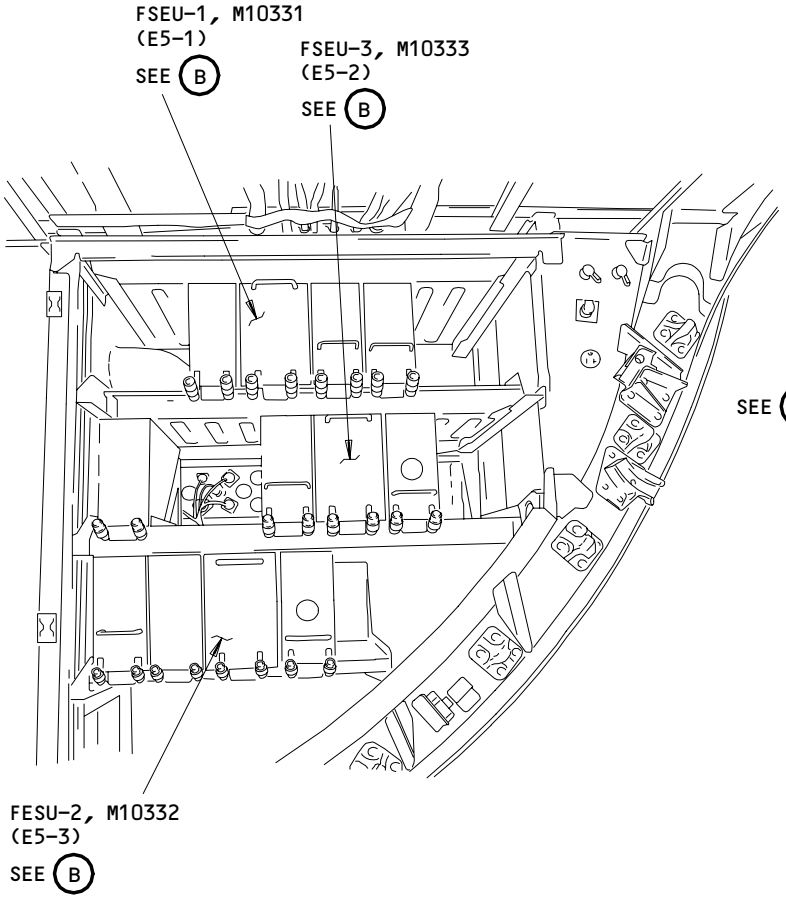
1) Logic circuits in FSEU-1 provide a ground for a relay in the solenoid pilot valve electrical circuit to be activated allowing power to open the solenoid pilot valve. Opening of the solenoid pilot valve closes the shutoff valve, shutting off hydraulic power to flaps and slats. When the logic circuit grounds are removed, the relay is deactivated and the solenoid pilot valve is spring-loaded closed to allow the shutoff valve to open under spring load.

a) The logic circuits provide a ground when FSEU-1 gets signals that the flap lever is in the zero (FLAPS UP) detent, the flaps are up, the slats are up, and a time delay has expired after slats are up. The ground is removed when the flap lever is moved out of the zero (FLAPS UP) detent.

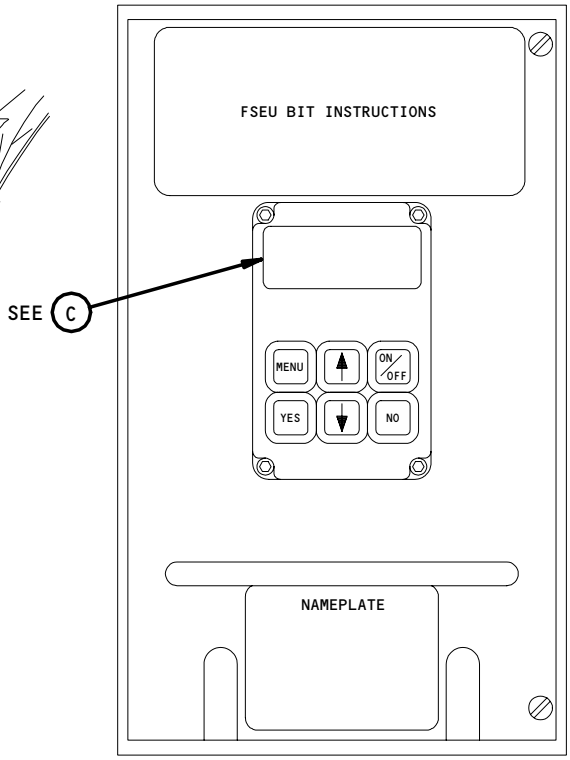
b) The logic circuits also provide a ground when FSEU-1 due to signal inputs interprets a condition of asymmetry, UCM, or command/position disagreement. When the condition of asymmetry, UCM, or command/position disagreement is corrected, the ground is removed.

2) The dual-solenoid pilot valve is also opened when the flap and/or slat alternate drive is armed. In this case the alternate drive arming signal is grounded directly to the dual-solenoid pilot valve circuit and the FSEU units are not involved.



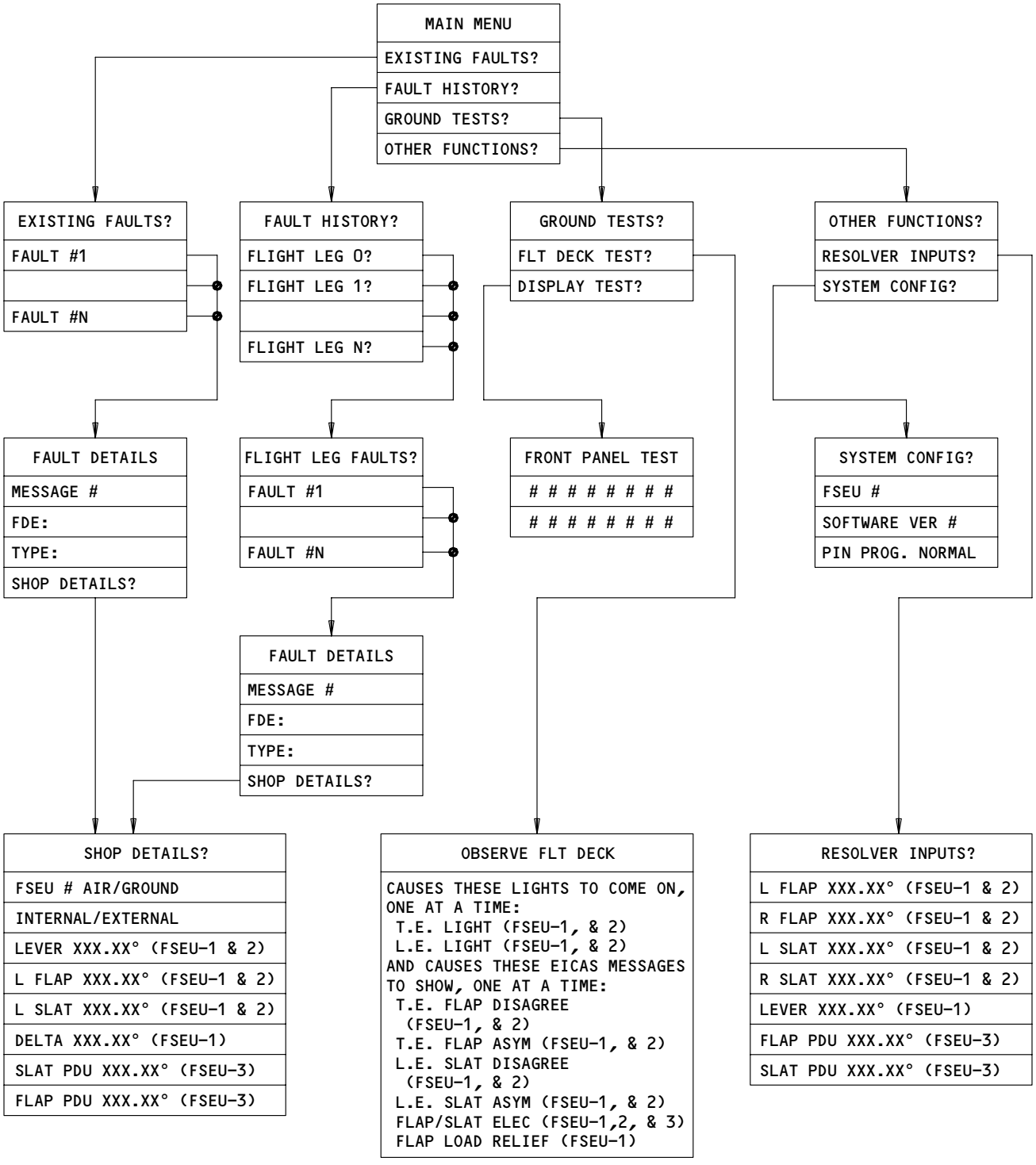


ELECTRONIC EQUIPMENT RACK, E5
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Unit
Figure 10 (Sheet 1)



-40 FSEU MENU OUTLINE

(C)

Flap/Slat Electronic Unit (FSEU)
Figure 10 (Sheet 2)

(b) Pressure Switch

1) When FSEU-1 logic knows that a command has been given to close the shutoff valve and the pressure switch signal to the FSEU-1 is that hydraulic pressure remains high, a FLAP ISLN VALVE message is present for EICAS.

2) The same message is available when FSEU-1 logic knows that the shutoff valve has been commanded open and pressure is low.

(6) Slat Alternate Drive Control

(a) When the slat alternate drive arming switch is armed, the alternate drive electrical circuit places the slat bypass valve in the bypass mode. The flap bypass valve is also placed in the bypass mode and the flap/slat shutoff valve in the depressurization module is closed.

(b) The power for the PDU electric motor to operate in the extend or retract direction is available when extend or retract relays in the alternate drive electrical circuit are activated. The relays are activated when grounds are provided by logic circuits in FSEU-3.

(c) When logic in FSEU-3 knows that the slat alternate drive arming switch has been armed, that the alternate flaps/slats position selector switch has given a command, and that slat position is less than commanded position, a ground is provided to activate the extend relay, engage the electric motor clutch, and operate the electric motor in the extend direction. The electric motor will stop when FSEU-3 logic knows that commanded position matches actual slat position.

(d) FSEU-3 retract logic is similar to the extend logic.

(7) Autoslats

(a) The PDU autoslat solenoid valve has a dual-coil input. Activation of either coil will cause a sleeve in the PDU hydraulic control valve to move so that hydraulic fluid is ported to the PDU hydraulic motor for extension of the slats from intermediate to fully extended position. Retraction of the slats from fully extended to intermediate position will occur when the autoslat solenoid valve is deactivated by absence of a signal to the coils.

(b) One coil is activated by an autoslat extend signal from FSEU-1 and the other coil is activated by an autoslat extend signal from FSEU-2.

(c) FSEU-1 Logic

1) An output autoslat extend signal from FSEU-1 will occur when logic in FSEU-1 knows that flaps and slats are in takeoff (slats intermediate) position and a stall warning signal is transmitted to FSEU-1 from the right stall warning system.

(d) FSEU-2 Logic

1) The logic is the same as for FSEU-2, except that a stall warning signal from the left stall warning system is used.

(e) When the airplane stall condition is corrected, FSEU-1 and FSEU-2 will interupt output of the autoslat extend signal.

(8) Slat Loss Sensing Switches

(a) AIRPLANES WITH ROLLER ARM SWITCH;
The loss of inboard slats No. 5 and No. 6 is detected by a switch that is attached to wing left and right leading edge structure. Loss of either slat will open the switch and cause grounding of a signal to FSEU-1 and FSEU-2. Grounding of the logic circuits in FSEU-1 and/or FSEU-2 causes the LEADING EDGE light on P3 to come on and printout of LE SLAT SYM message on the EICAS display.

(b) AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES
The loss of inboard slat No. 5 is detected by a switch in the wing leading edge that is operated by a cable. A similar switch and cable arrangement detects loss of slat No. 6. When the switch is operated by the cable, a signal to FSEU-1 and FSEU-2 is grounded. Grounding of the logic circuits in FSEU-1 and/or FSEU-2 causes the LEADING EDGE light on P3 to come on and printout of LE SLAT ASYM message on the EICAS.

(c) The loss of inboard slat No. 5 is detected by a switch in the wing leading edge that is operated by a cable. A similar switch and cable arrangement detects loss of slat No. 6. When the switch is operated by the cable, a signal to FSEU-1 and FSEU-2 is grounded. Grounding of the logic circuits in FSEU-1 and/or FSEU-2 causes the LEADING EDGE light on P3 to come on and printout of LE SLAT ASYM message on the EICAS.

(d) The loss of outboard slats No. 2, 3, and 4 is detected by a switch in the wing leading edge that is operated by a cable running from the inboard side of slat No. 2, through slat No. 3, and to the outboard side of slat No. 4. A similar switch and cable arrangement detects loss of slats No. 7, 8, and 9. When the switch is operated by the cable, a signal to FSEU-1 and FSEU-2 is grounded. Grounding of the logic circuits in FSEU-1 and/or FSEU-2 causes the LEADING EDGE light on P3 to come on and printout of LE SLAT ASYM message on the EICAS display.

(9) Asymmetry

(a) FSEU-1 and FSEU-2 logic uses flap/slat system position signal inputs to interpret a condition of asymmetry during normal hydraulic and alternate electric operation, respectively. Detection of asymmetry by FSEU-1 or FSEU-2 causes failure annunciation and protection (refer to functional description).

(10) UCM and Command/Position Disagreement

(a) FSEU-1 and FSEU-2 logic uses flap/slat system position signal inputs to interpret a condition of UCM or command/position disagreement during normal hydraulic and alternate electrical operation. Detection of UCM or command/position disagreement causes failure annunciation and protection (refer to functional description).

(11) BITE

(a) Built-in test equipment is provided to aid in maintenance and trouble shooting. BITE will identify faults down to components (LRUs) as follows: FSEU-1, FSEU-2, FSEU-3, flap lever position transmitter, left and right flap position transmitters, left and right slat position transmitters, flap PDU and slat PDU position transmitters, and data links.

(b) A BITE control and display panel is provided on the front cover of each FSEU. The panel contains the following:

1) An amber fault indication for each LRU.
2) A green test-complete light
3) A green active FSEU (channel) light.
4) A system test initiate switch
5) A BITE instruction placard.

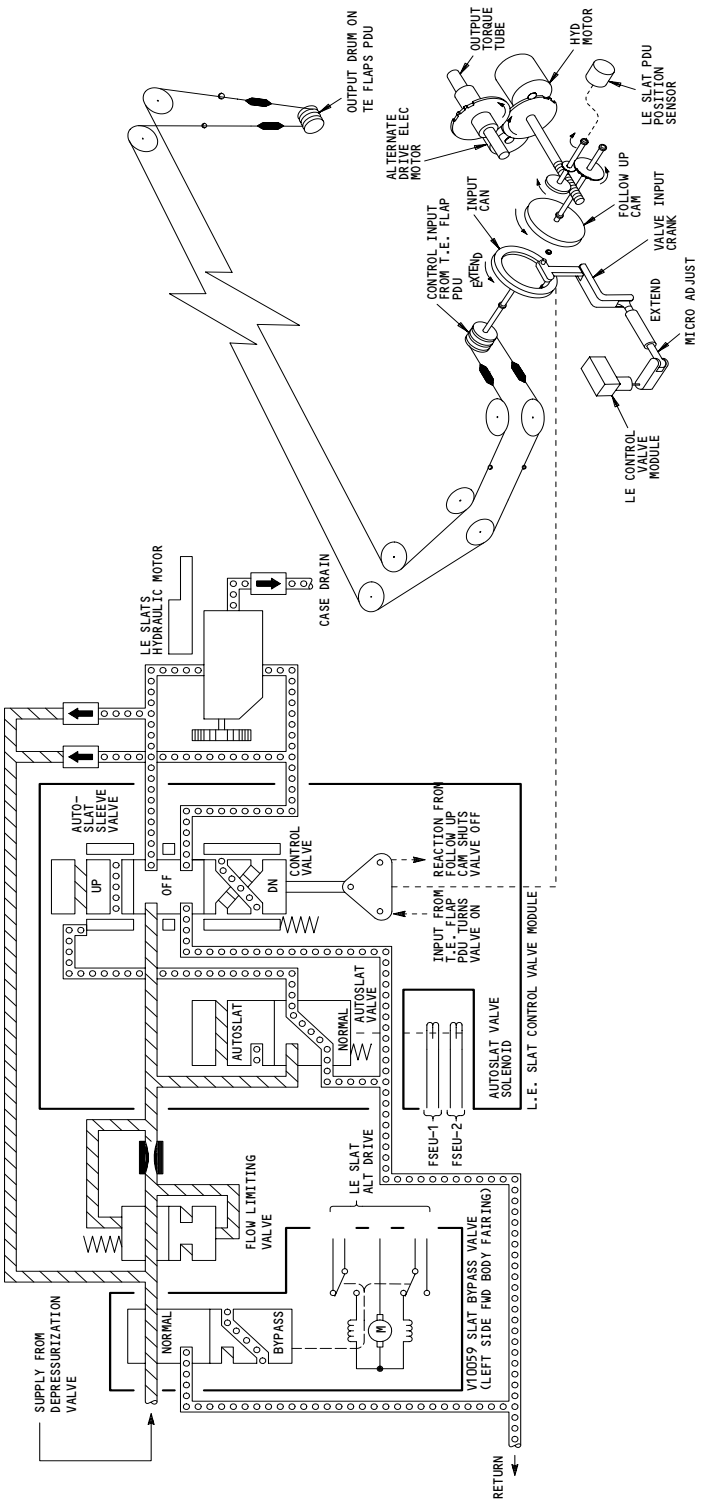
(c) Activation of BITE test causes TRAILING EDGE and LEADING EDGE lights to illuminate and EICAS messages to print on EICAS display successively by time intervals per following table as a check of the availability of the lights and the EICAS messages.

TABLE FOR FSEU BITE CHECK OF T.E. AND L.E. LIGHTS AND EICAS MESSAGES

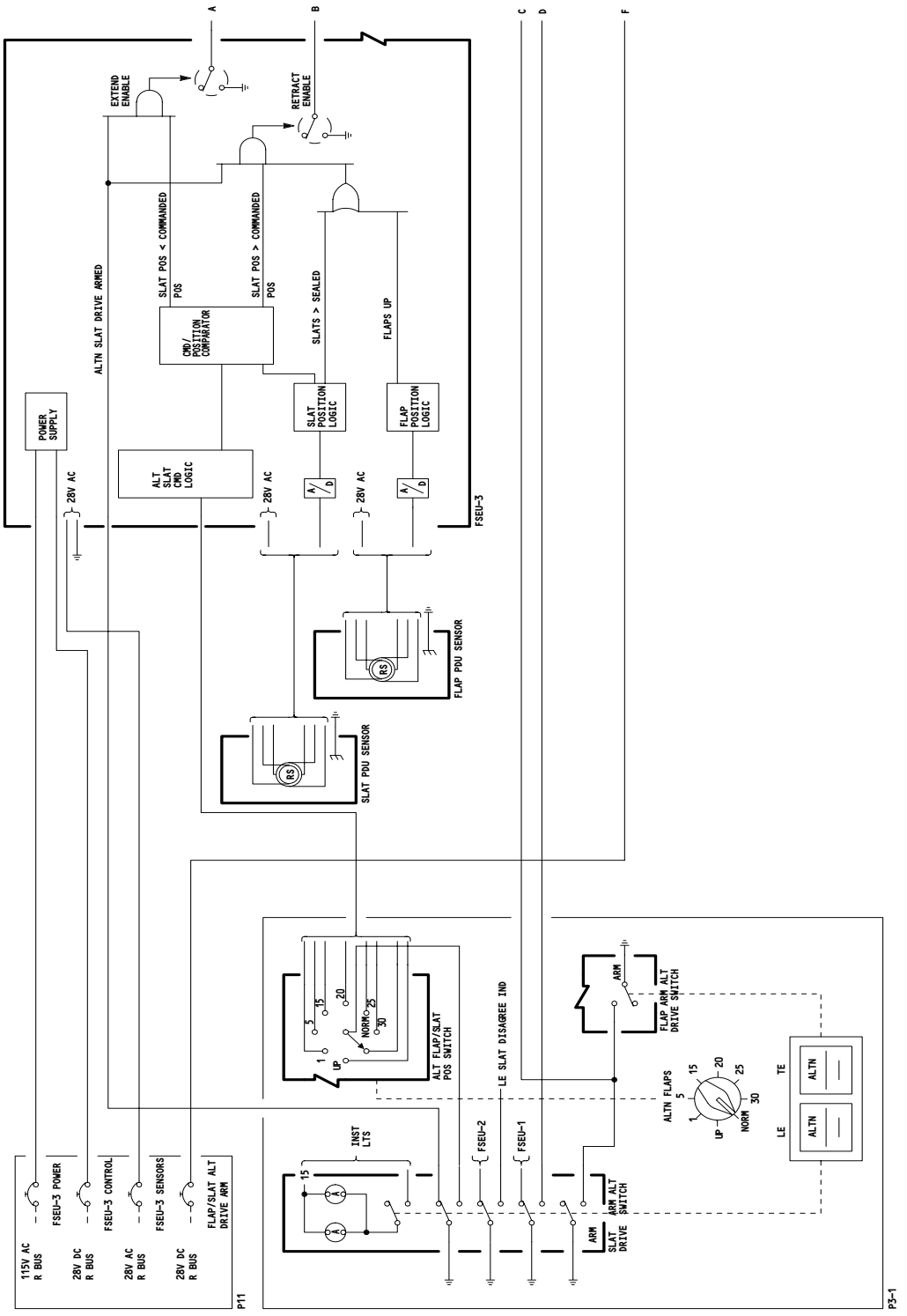
FSEU	OUTPUT	TIME INTERVAL *[1] (SECONDS)
NO. 1	T.E. LIGHT	0 - 1.9
	L.E. LIGHT	2.0 - 3.9
	T.E. FLAP DISAGREE	3.0 - 5.9
	T.E. FLAP ASYM	5.4 - 8.3
	L.E. SLAT DISAGREE	7.8 - 10.7
	L.E. SLAT ASYM	10.2 - 13.1
	FLAP/SLAT ELEC	11.0 - 18.9
	FLAP LOAD RELIEF	12.6 - 15.5
NO. 2	T.E. LIGHT	0 - 1.9
	L.E. LIGHT *[2]	2.0 - 3.9
	T.E. FLAP DISAGREE	3.0 - 5.9
	T.E. FLAP ASYM	5.4 - 8.3
	L.E. SLAT DISAGREE	7.8 - 10.7
	FLAP/SLAT ELEC	8.6 - 16.5
	L.E. SLAT ASYM	10.2 - 13.1
NO. 3	FLAP/SLAT ELEC	0 - 7.9

*[1] Time zero is time of BITE test initiation.
*[2] LE slat alternate drive arming switch (P3) must be armed.

3. Operation
   A. Functional Description
      (1) Primary Function (Fig. 11)
         (a) The flap lever on the control stand positions the flap cables. The flap cables rotate the flap PDU input cam, and the hydraulic control valve on the flap PDU ports fluid to the flap PDU hydraulic motor to drive the flap PDU output shafts. The flap PDU output shafts drive the flap PDU follow-up cam. The follow-up cam shaft positions the slat cables connected to the shaft on the slat PDU input cam.
         (b) The slat PDU input cam, rotated by the slat cables, allows the hydraulic control valve on the slat PDU to port hydraulic fluid to the slat PDU hydraulic motor. The hydraulic motor drives the slat PDU output shafts.
         (c) When the slat PDU output shafts rotate, the slat PDU gearbox gears drive the follow-up cam. When the follow-up cam profile matches required input cam command, the follower on the follow-up cam initiates link changes to the hydraulic control valve and the valve is nulled to shut off porting of hydraulic fluid to the hydraulic motor. When the hydraulic motor stops, the slat PDU output shafts stop rotating.
         (d) With the flap lever in detents between the 1-unit detent and the 20-unit detent, the slat PDU follow-up cam will command the slats to the intermediate position. With the flap lever in the 25-unit and 30-unit detents, the slat PDU follow-up cam will command the slats to the fully extended position. With the flap lever in the zero (FLAPS UP) detent, the slat PDU follow-up cam will command the slats to the fully retracted position.
         (e) When the flaps and slats are fully retracted with the flap lever in zero (FLAPS UP) detent, logic in FSEU-1 commands the shutoff valve in the flap/slat depressurization module to close.
      (2) Alternate Function (Fig. 12)
         (a) Pressing the slat alternate drive arming switch on P3 arms the slat alternate drive (upper switch segment lights up ALTN) as follows:
            1) The alternate slat circuit is activated to make electric motor drive power available on command by the alternate flaps/slats position selector switch.

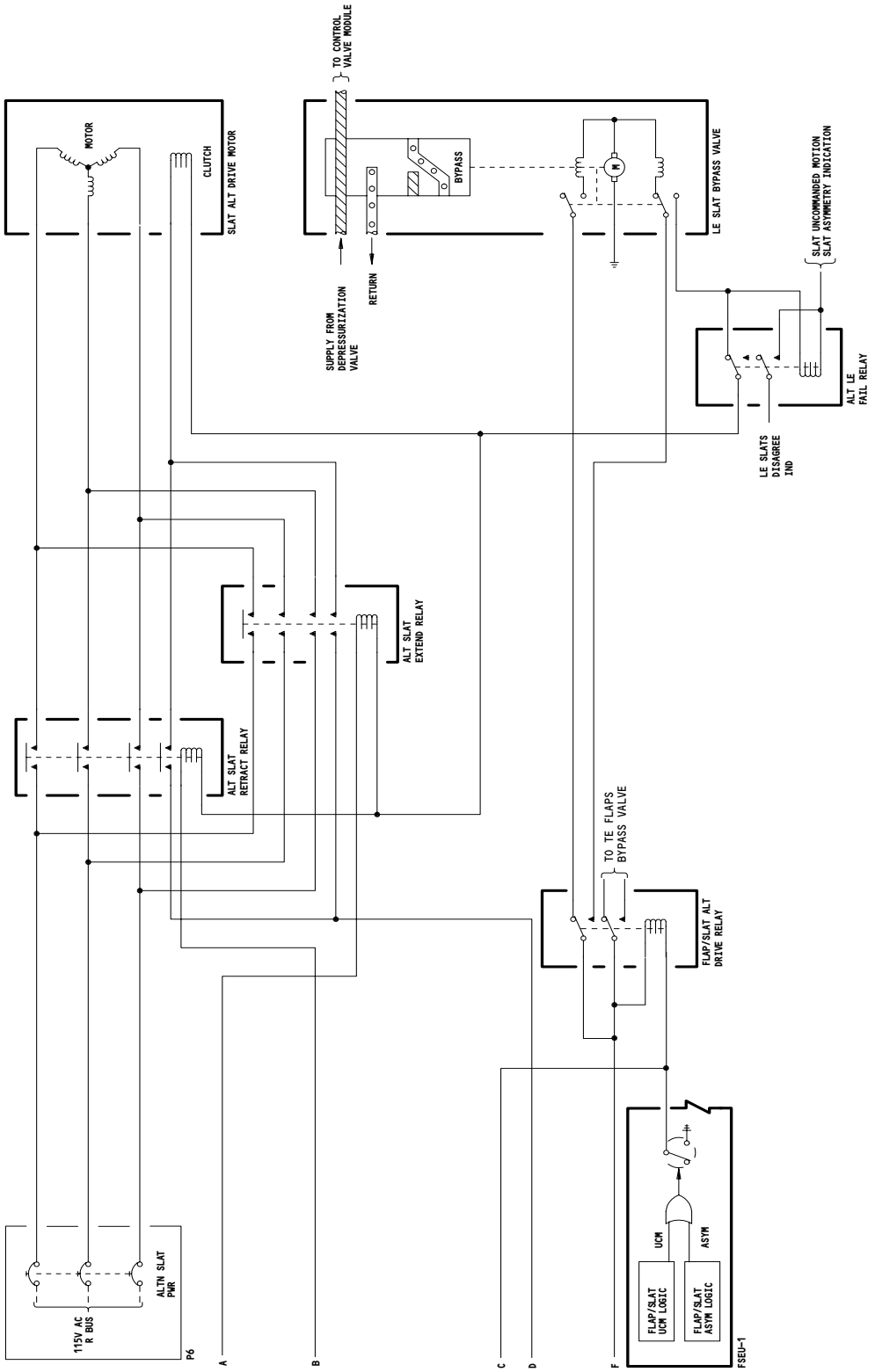


Leading Edge Slat Primary Drive Schematic
Figure 11



Leading Edge Slat Alternate Drive Schematic
Figure 12 (Sheet 1)

F09810



Leading Edge Slat Alternate Drive Schematic
Figure 12 (Sheet 2)

2) The slat bypass valve goes to bypass (closed), shutting off left hydraulic system power to the slat PDU hydraulic motor.
3) The flap bypass valve goes to bypass (closed), shutting off left hydraulic system power to the flap PDU hydraulic motor.
4) Logic in FSEU-1 commands the shutoff valve in the flap/slat depressurization module to close.

(b) An extend signal to the slats is given by placing the alternate flaps/slats position selector switch (P3) out of the NORM and UP detents. The extend signal is sent to FSEU-3. FSEU-3 logic powers the alternate slat circuit to engage the slat PDU electric motor clutch and to allow electric motor drive power to drive the slat PDU electric motor. Note that the flap PDU electric motor will not be operated, because FSEU-3 logic recognizes that the alternate flap drive arming switch has not been armed.

(c) When the slats are in the commanded position, FSEU-3 logic shuts off electric motor drive power in the alternate slat circuit. The slat PDU electric motor is turned off and the clutch is disengaged.

(d) When the alternate flaps/slats position selector switch is selected to retract the slats, the circuits operate the same as for extension. FSEU-3 retract logic and the alternate slat retract circuit is used in this case.

(e) The slat alternate drive arming switch is pressed to disarm the slat alternate drive (upper switch segment black):
1) The alternate slat circuit is deactivated so that electric motor drive power will not be available on command by the alternate flaps/slats position selector switch.
2) The slat bypass valve opens, allowing left hydraulic system power to the slat PDU hydraulic motor.
3) The flap bypass valve opens, allowing left hydraulic system power to the flap PDU hydraulic motor.
4) Logic in FSEU-1 commands the shutoff valve in the flap/slat depressurization module to open.

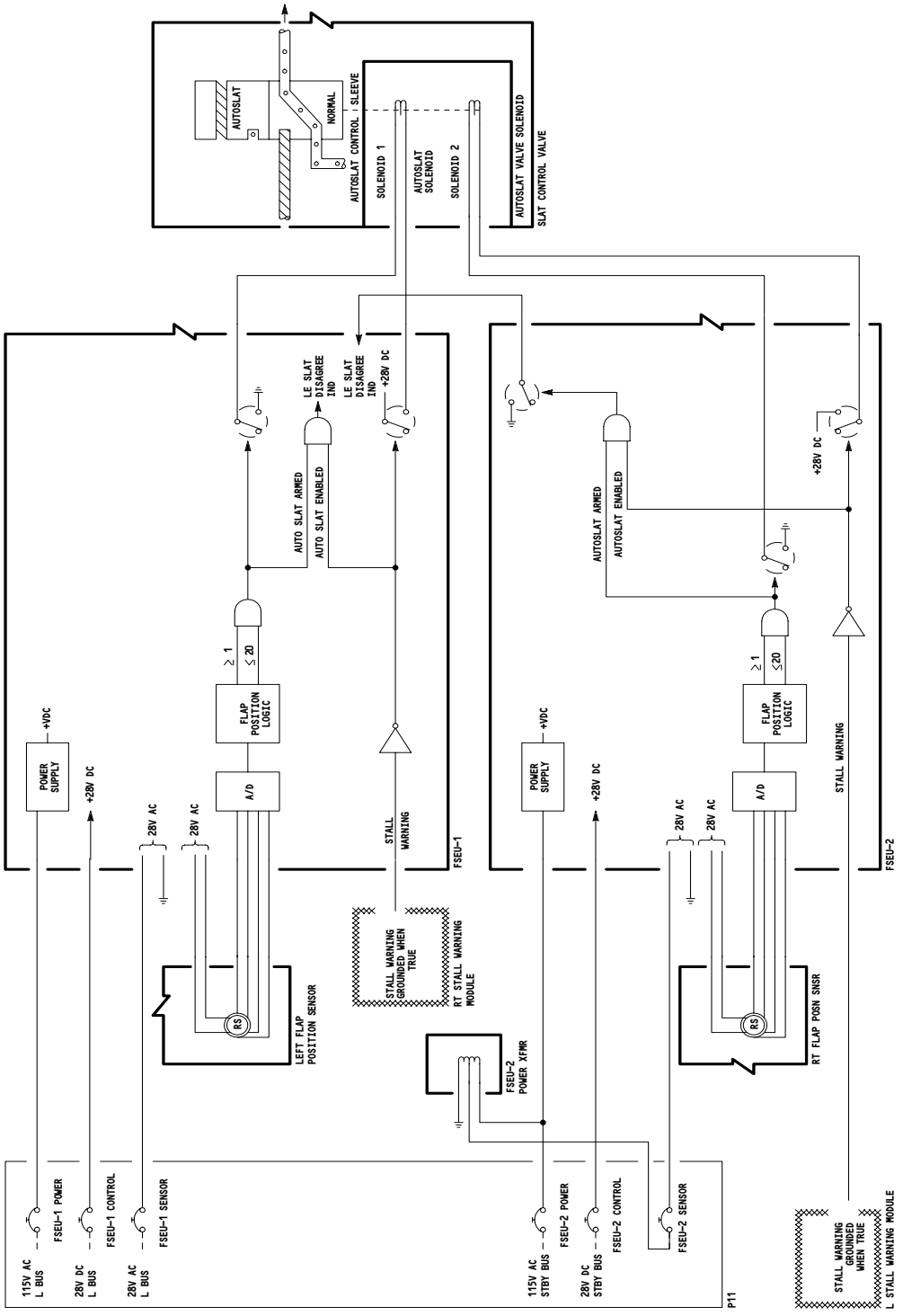
(f) With the alternate flaps/slats position selector switch in any of detents 1, 5, and 15, the slats will be commanded to the intermediate position. With the alternate flaps/slats position selector switch in any of detents 20, 25, and 30, the slats will be commanded to the fully extended position. With the alternate flaps/slats position selector switch in UP, the slats will be commanded to the fully retracted position. A feedback signal from the slat PDU position transmitter to FSEU-3 is part of the logic in FSEU-3 to control the activation and deactivation of the slat PDU electric motor.

(3) Slat Drive Function (Fig. 5)
  (a) The gearbox on the slat PDU is driven by the hydraulic motor or the electric motor. Torque tubes extend into the left and right wing leading edges from the left and right output shafts of the gearbox. The torque tubes are rotated by rotation of the gearbox output shafts.
  (b) Angle gearboxes at the two points where the torque tubes penetrate the fuselage change the alignment of the torque tubes.
  (c) The torque tubes drive two rotary actuators for each slat. Each rotary actuator drives a pinion gear. Each pinion gear drives a geared main track.
  (d) The two main tracks associated with each rotary actuator per slat are connected to the slat at the forward end. Extension and retraction of the main tracks extend and retract the slats. The slat angle is changed by two auxiliary tracks per slat.
  (e) A position indicator is mounted on each outboard rotary actuator for slat No. 1 and No. 10. The position transmitters relay slat position signals to the FSEUs.

(4) Autoslat Function (Fig. 13)
  (a) When the flaps and slats are in takeoff position (slats intermediate) and a stall warning is present, the signals for this airplane condition are transmitted to FSEU-1 and FSEU-2. FSEU-1 gets a stall warning signal from the right stall warning system and FSEU-2 gets a stall warning signal and FSEU-2 gets a stall warning signal from the left stall warning system. The presence of the signals in either FSEU completes FSEU logic circuits. The logic circuits allow power in the autoslat circuit to energize the dual-solenoid autoslat valve in the slat PDU hydraulic control valve. Operation of the dual-solenoid positions a sleeve in the hydraulic control valve. This overrides input from the slat PDU input cam and hydraulic fluid is ported from the hydraulic control valve to the slat PDU hydraulic motor. The hydraulic motor extends the slats from intermediate to fully extended position.
  (b) When both FSEU-1 and FSEU-2 logic circuits know that the airplane condition has been corrected, the dual-solenoid autoslat valve is de-energized. Then the sleeve is moved back by spring-action and the hydraulic control valve is commanded to retract the slats to intermediate position as required by the slat PDU input cam input.

(5) Alternate Control Annunciation Function
  (a) When the slat alternate drive arming switch is armed, the upper switch segment lights up ALTN amber on black background and the lower switch segment is black.
  (b) When the slat alternate drive arming switch is disarmed, the upper and lower switch segments are both black.

(6) Failure Annunciation and Protection Function
  (a) Level B messages on EICAS display are accompanied by aural caution and illumination of the master caution lights.



Autoslat Extension/Retraction Schematic
Figure 13

(b) Autoslat Failure
1) Failure of slats to respond to an autoslat command causes following annunciation and protection:
a) LEADING EDGE light on.
b) LE SLAT DISAGREE level B message on EICAS display.
c) The slat bypass valve, the flap PDU bypass valve, and the flap/slat depressurization module shutoff valve close.
d) Slat UCM and slat command/position disagreement annunciation and protection is available during autoslat operation.

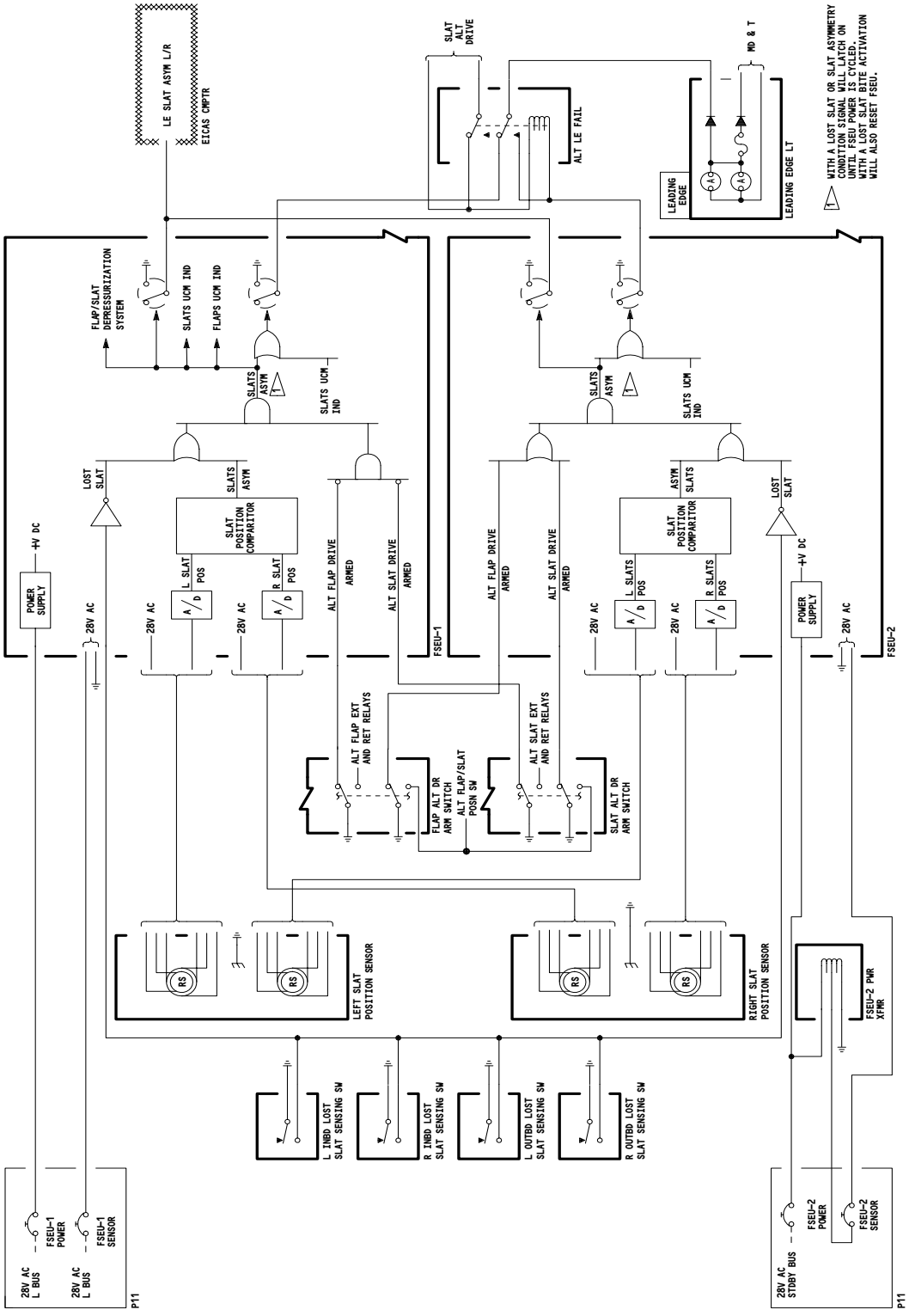
(c) Slat Loss
1) Loss of any of all of slats No. 2-5 or No. 6-9 causes following annunciation and protection:
a) LEADING EDGE light on.
b) LE SLAT ASYM level B message on EICAS display.
c) The slat bypass valve, the flap PDU bypass valve, and the flap/slat depressurization module shutoff valve close.

(d) Slat Asymmetry on Normal Hydraulic Power (Fig. 14)
1) Slat asymmetry during normal hydraulic operation causes the same annunciation and protection as slat loss.

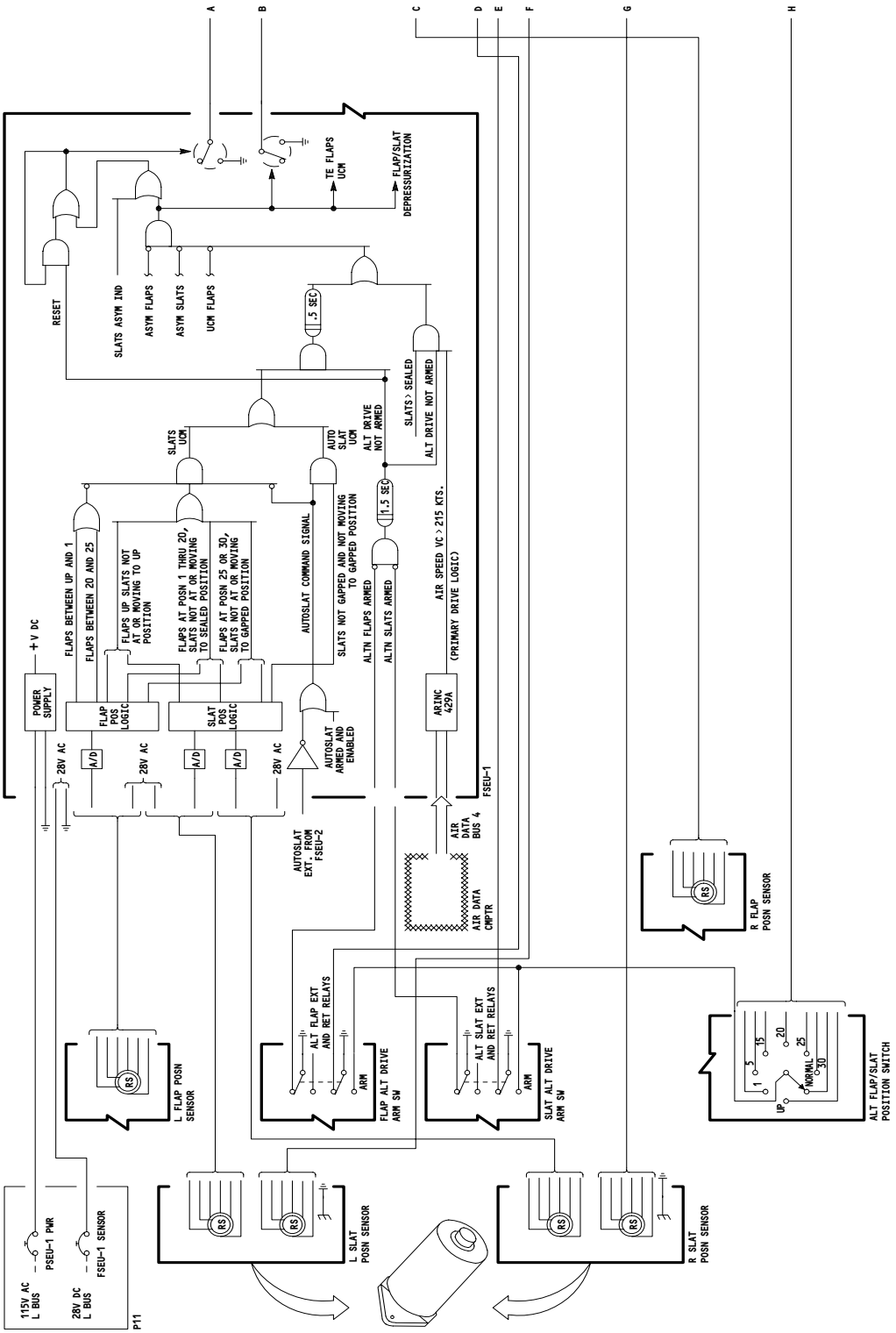
(e) Slat UCM or Slat Command/Position Disagreement on Normal Hydraulic Power (Fig. 15)
1) Slat UCM or slat command/position disagreement during normal hydraulic operation causes the same annunciation and protection as autoslat failure.

(f) Slat Asymmetry on Alternate Electric Power
1) Slat asymmetry during alternate electric operation causes following annunciation and protection:
a) LEADING EDGE light on.
b) LE SLAT ASYM level B message on EICAS display.
c) Power to slat PDU electric motor interrupted.

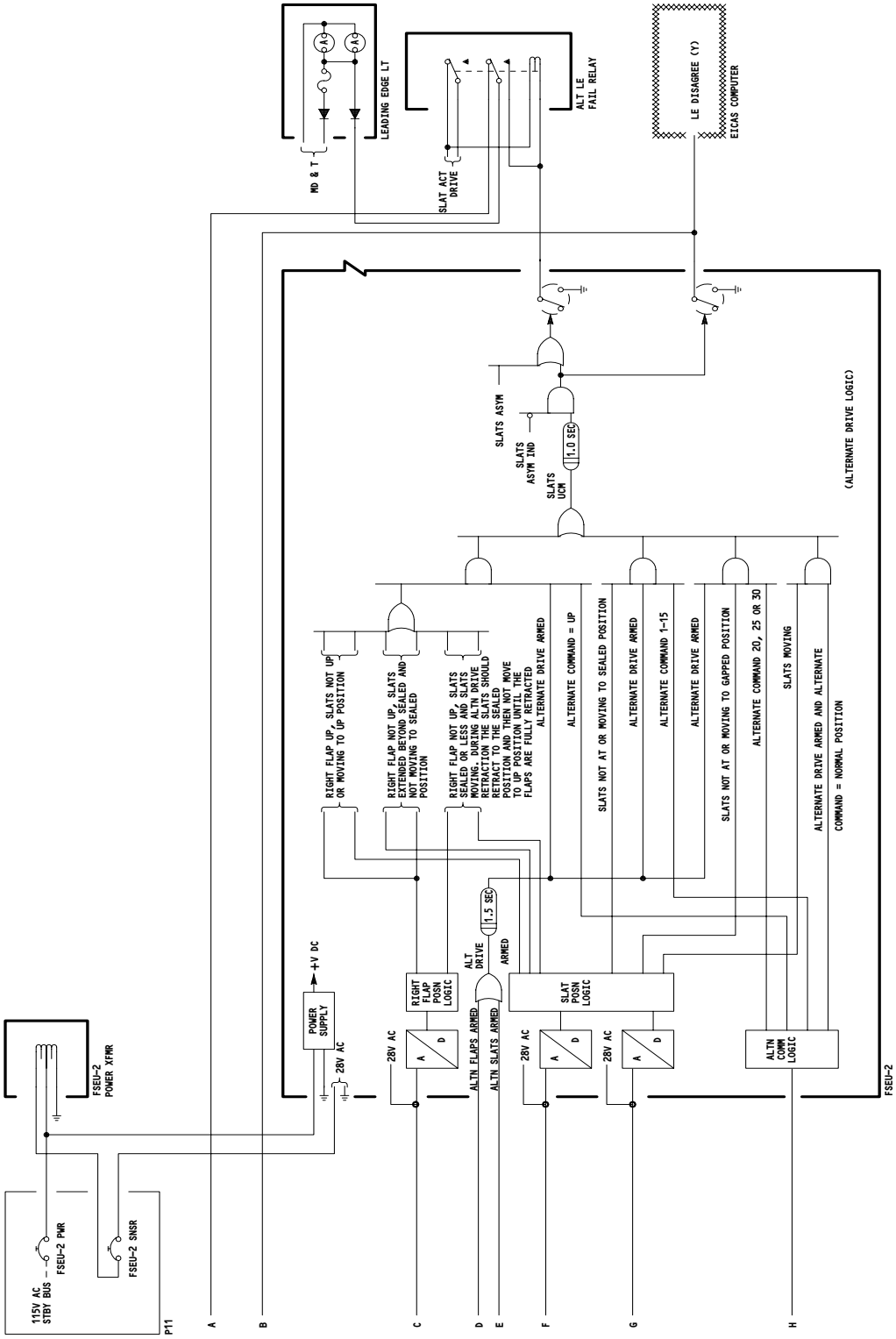
(g) Slat UCM or Slat Command/Position Disagreement on Alternate Electric Power
1) Slat UCM or slat command/position disagreement during alternate electric operation causes following annunciation and protection:
a) LEADING EDGE light on.



Leading Edge Slat Asymmetry Indication Schematic
Figure 14



Leading Edge Slat Disagreement Indication Schematic
Figure 15 (Sheet 1)



Leading Edge Slat Disagreement Indicaton Schematic
Figure 15 (Sheet 2)

b) LE SLAT DISAGREE level B message on EICAS display.
c) Power to slat PDU electric motor interrupted.

(h) Flap/Slat Depressurization Module Shutoff Valve Failure
1) Failure of the flap/slat depressurization module shutoff valve to open or close as required causes following annunciation:
a) FLAP ISLN VALVE message is available for printing on EICAS dsisplay.

B. Control
(1) General
(a) Positioning of flaps and slats is per following Table I:

Table I

CONTROL INPUT DETENT (SOURCE *[1])	HIGH LIFT CONTROL SURFACE POSITION		
	FLAPS (ON HYD OR ELEC POWER *[2])	SLATS (ON HYD POWER *[2])	SLATS (ON ELECT POWER *[2])
ZERO (UP)	FULLY RETR	FULLY RETR	FULLY RETR
1	1°	INTERMEDIATE *[3]	INTERMEDIATE *[3]
5	5°	INTERMEDIATE *[3]	INTERMEDIATE *[3]
15	15°	INTERMEDIATE *[3]	INTERMEDIATE *[3]
20	20°	INTERMEDIATE *[3]	FULLY EXT *[4]
25	25°	FULLY EXT *[4]	FULLY EXT *[4]
30	30°	FULLY EXT *[4]	FULLY EXT *[4]

*[1] FLAP LEVER (HYDRAULIC CONTROL) OR ALTERNATE FLAPS SLATS POSITION SELECTOR SWITCH (ELECTRIC CONTROL).

*[2] PRIMARY CONTROL IS FROM HYDRAULIC POWER AND ALTERNATE CONTROL IS FROM ELECTRIC POWER.

*[3] TAKEOFF POSITION.

*[4] LANDING POSITION.

LEADING EDGE SLAT SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - ROTARY	10	20	SEE THE SPECIFIC SLAT	27-81-18
CIRCUIT BREAKERS	1		FLIGHT COMPARTMENT, P6 PANEL, P11 PANEL	
ALTN FLAP PWR, C323		1	6D23	*
ALTN SLAT PWR, C3014		1	6D20	*
FLAP/SLAT ALTN DR SHUTOFF 2, C4271		1	11H24	*
FLAP/SLAT ALTN DR SHUTOFF ARM, C4212		1	11H23	*
FLAP/SLAT ELEC UNIT 1 CONT, C1539		1	11G13	*
FLAP/SLAT ELEC UNIT 1 POWER, C1025		1	11G12	*
FLAP/SLAT ELEC UNIT 1 SENSOR, C1037		1	11G14	*
FLAP/SLAT ELEC UNIT 2 CONT, C1541		1	11C15	*
FLAP/SLAT ELEC UNIT 2 POWER, C1521		1	11C14	*
FLAP/SLAT ELEC UNIT 2 SENSOR, C1524		1	11C16	*
FLAP/SLAT ELEC UNIT 3 CONT, C1540		1	11G22	*
FLAP/SLAT ELEC UNIT 3 POWER, C4210		1	11G21	*
FLAP/SLAT ELEC UNIT 3 SENSOR, C1038		1	11G23	*
FLAP/SLAT SHUTOFF 1, C4110		1	11C17	*
STICK SHAKER LEFT, C1039		1	11C11	*
STICK SHAKER RIGHT, C4209		1	11J21	*
WARN ELEX A, C565		1	11J33	*
WARN ELEX B, C566		1	11B18	*
COMPUTER - (REF 31-41-00, FIG. 101)				
EICAS LEFT, M10181				
EICAS RIGHT, M10182				
COMPUTER - (REF 34-12-00, FIG. 101)				
LEFT AIR DATA, M100				
GEARBOX - ANGLE	5	1	511BB,611BB	27-81-15
INDICATOR - FLAP/SLAT POSITION, N15	1	1	FLIGHT COMPARTMENT, P3 PANEL	*
LEVER - (REF 27-51-00, FIG. 101)				
FLAP CONTROL				
LIGHT - LEADING EDGE, L433	1	1	FLIGHT COMPARTMENT, P3 PANEL	*
MODULE - (REF 27-32-00, FIG. 101)				
LEFT STALL WARNING, M615				
RIGHT STALL WARNING, M938				
MODULE - FLAP/SLAT DEPRESSURIZATION, V10060	11	1	LEFT MAIN GEAR WHEEL WELL	27-51-29
MODULE - LE SLAT CONTROL VALVE	4	1	511CB	27-81-06
MOTOR - ALTERNATE LE SLAT DRIVE, M10220	4	1	511CB	27-81-08
MOTOR - HYDRAULIC	4	1	511CB	27-81-08
RELAY - (REF 31-01-33, FIG. 101)				
ALT LE SLAT, K10494				
ALT SLAT EXTEND, K10097				
ALT SLAT RETRACT, K10098				
FLAP/SLAT ALT DRIVE, K10095				
SLAT - INBOARD LE				
SLAT NO. 5	8	1	511DB,511EB,511FB,511GB,511HB,511JB	27-81-01
SLAT NO. 6	8	1	611DB,611EB,611FB,611GB,611HB,611JB	27-81-01

* SEE THE WDM EQUIPMENT LIST

Leading Edge Slat System - Component Index
Figure 101 (Sheet 1)

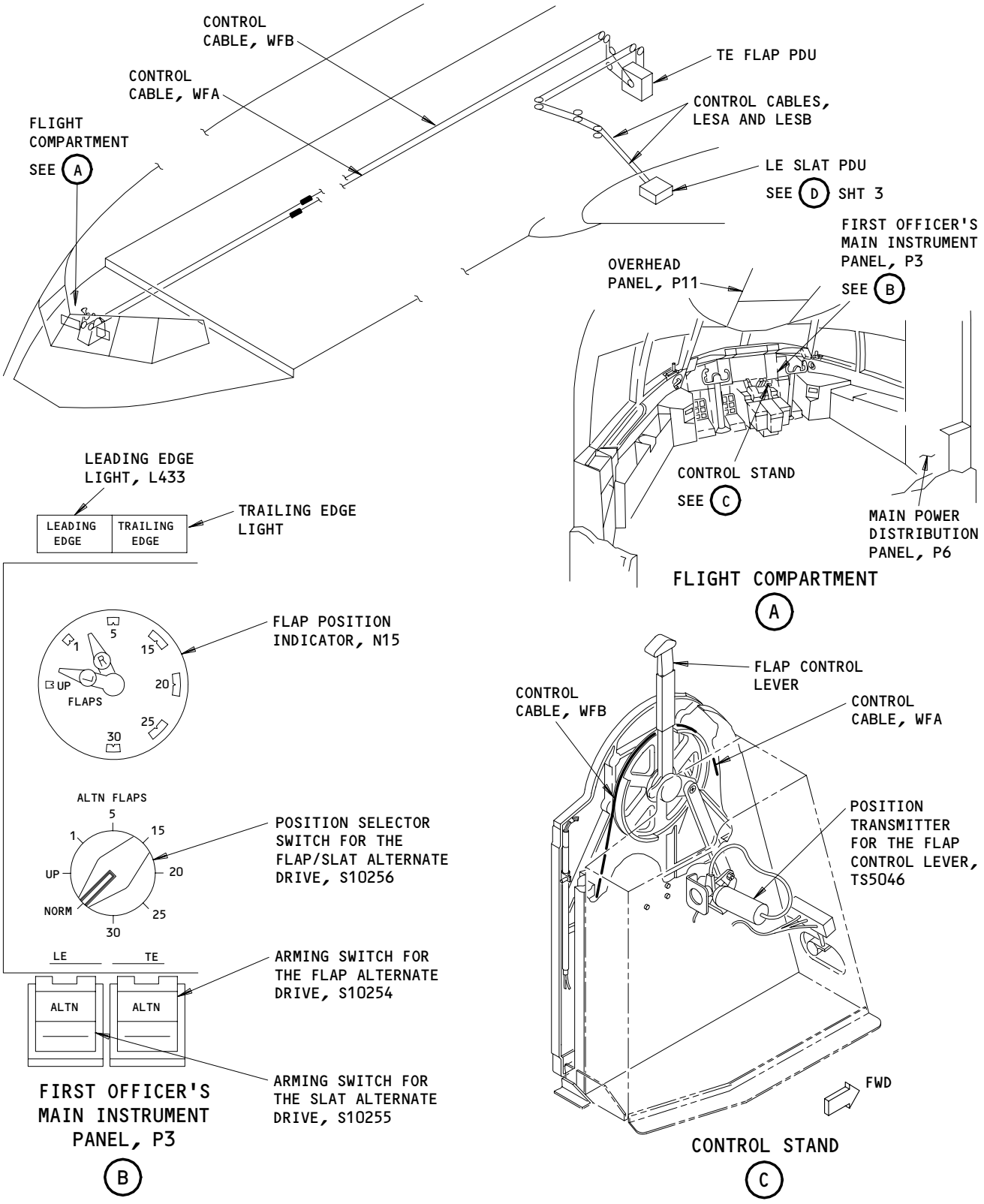
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SLAT - OUTBOARD LE				
SLAT NO. 1	8	1	521RB,521PB	27-81-02
SLAT NO. 2	8	1	521MB,521KB	27-81-02
SLAT NO. 3	8	1	521GB,521EB	27-81-02
SLAT NO. 4	8	1	521CB,521AB	27-81-02
SLAT NO. 7	8	1	621AB,621CB	27-81-02
SLAT NO. 8	8	1	621EB,621GB,621HB	27-81-02
SLAT NO. 9	8	1	621KB,621MB	27-81-02
SLAT NO. 10	8	1	621PB,621RB	27-81-02
SOLENOID - AUTO SLAT VALVE	4	1	511CB	27-81-06
SWITCH - (FIM 27-51-00/101) DRIVE ARMING, S10254 FLAP/SLAT DEPRESSURIZATION PRESSURE, S1 TRAILING EDGE ALTERNATE				
SWITCH - ALTERNATE FLAPS/SLATS POSITION SELECTOR, S10256	1	1	FLIGHT COMPARTMENT, P3 PANEL	*
SWITCH - INBOARD SLAT LOSS SENSING, S10340	6	1	1> 511DB; 2> 511HB	27-81-41
SWITCH - INBOARD SLAT LOSS SENSING, S10338	6	1	1> 611DB; 2> 611HB	27-81-41
SWITCH - LE SLAT ALTERNATE ARM, S10255	1	1	FLIGHT COMPARTMENT, P3 PANEL	*
SWITCH - OUTBOARD SLAT LOSS SENSING, S10341	6	1	521KB	27-81-42
SWITCH - OUTBOARD SLAT LOSS SENSING, S10339	6	1	621KB	27-81-42
TRACK - INBOARD LE SLAT AUXILIARY	8	4	SEE THE SPECIFIED SLAT	27-81-11
TRACK - INBOARD LE SLAT MAIN	8	6	SEE THE SPECIFIED SLAT	27-81-10
TRACK - OUTBOARD LE SLAT AUXILIARY	8	32	SEE THE SPECIFIED SLAT	27-81-13
TRACK - OUTBOARD LE SLAT MAIN	8	32	SEE THE SPECIFIED SLAT	27-81-12
TRANSFORMER - (FIM 31-01-70/101) FSEU-2, T153				
TRANSMITTER - (FIM 27-51-00/101) FLAP PDU POSITION, TS5050 LEFT FLAP POSITION, TS5049 RIGHT FLAP POSITION, TS5051				
TRANSMITTER - (FIM 27-81-00/101) LEFT SLAT POSITION, TS5083 RIGHT SLAT POSITION, TS5047				
TRANSMITTER - LE SLAT PDU POSITION, TS5048	4	1	511CB	27-81-08
TUBE - TORQUE	2		SEE SPECIFIED SLAT AND THE AFT END OF THE FORWARD CARGO COMPARTMENT	27-81-20
UNIT - (FIM 27-51-00/101) FLAP/SLAT ELECTRONIC-1, M10331 FLAP/SLAT ELECTRONIC-2, M10332 FLAP/SLAT ELECTRONIC-3, M10333				
UNIT - LE SLAT POWER DRIVE	3	1	511CB,511DB	27-81-07
VALVE - (FIM 27-51-00/101) FLAP/SLAT DEPRESSURIZATION PRIORITY FLAP/SLAT DEPRESSURIZATION SEQUENCE FLAP/SLAT DEPRESSURIZATION SHUT OFF FLAP/SLAT DEPRESSURIZATION SOLENOID, V1				
VALVE - LE SLAT BYPASS,	7	1	193BL (LEFT WING-BODY FAIRING, FOUND FORWARD OF WING)	27-81-09

* SEE THE WDM EQUIPMENT LIST

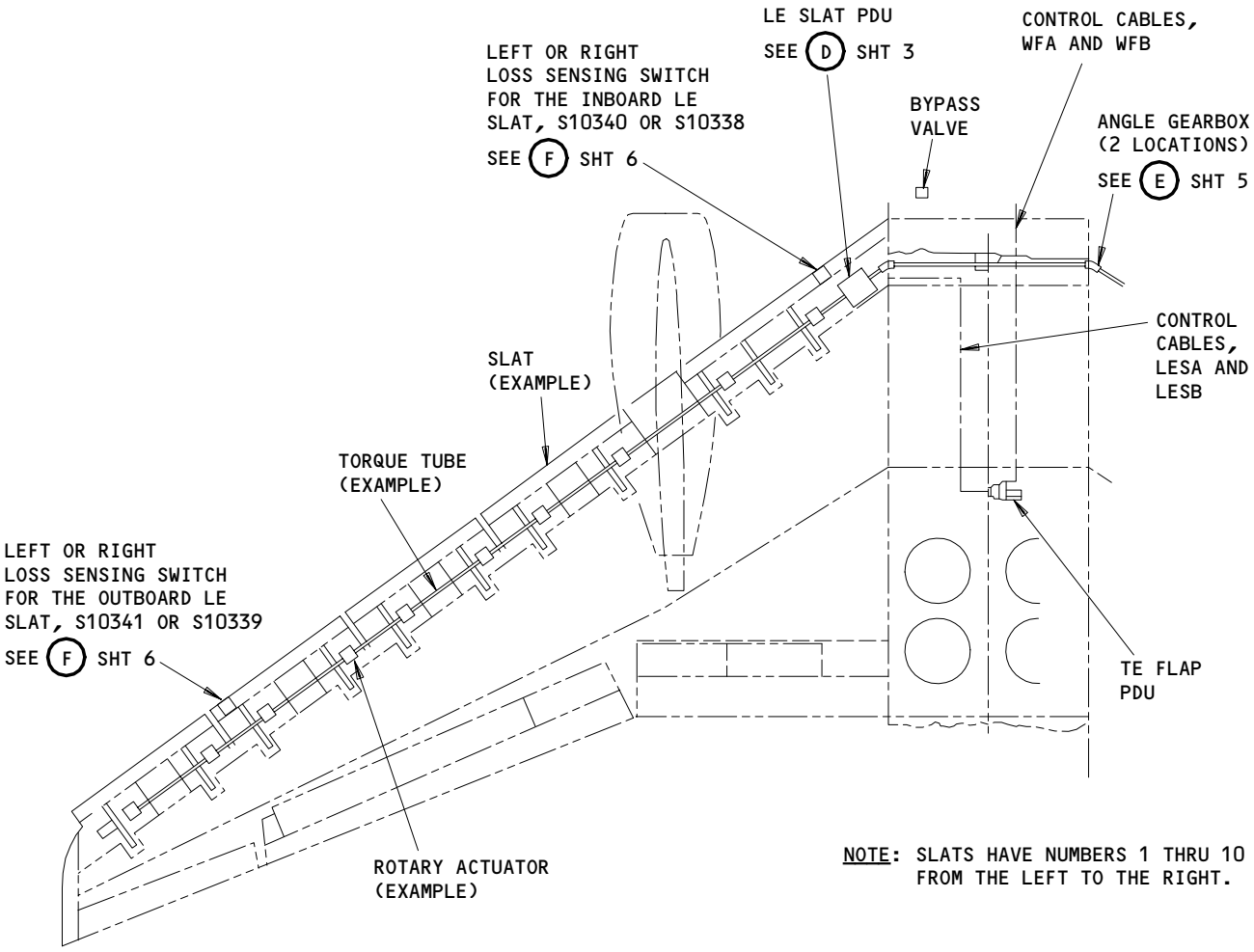
1> FOR ROLLER TYPE SENSOR SWITCH

2> FOR CAM TYPE SENSOR SWITCH

Leading Edge Slat System - Component Index
Figure 101 (Sheet 2)

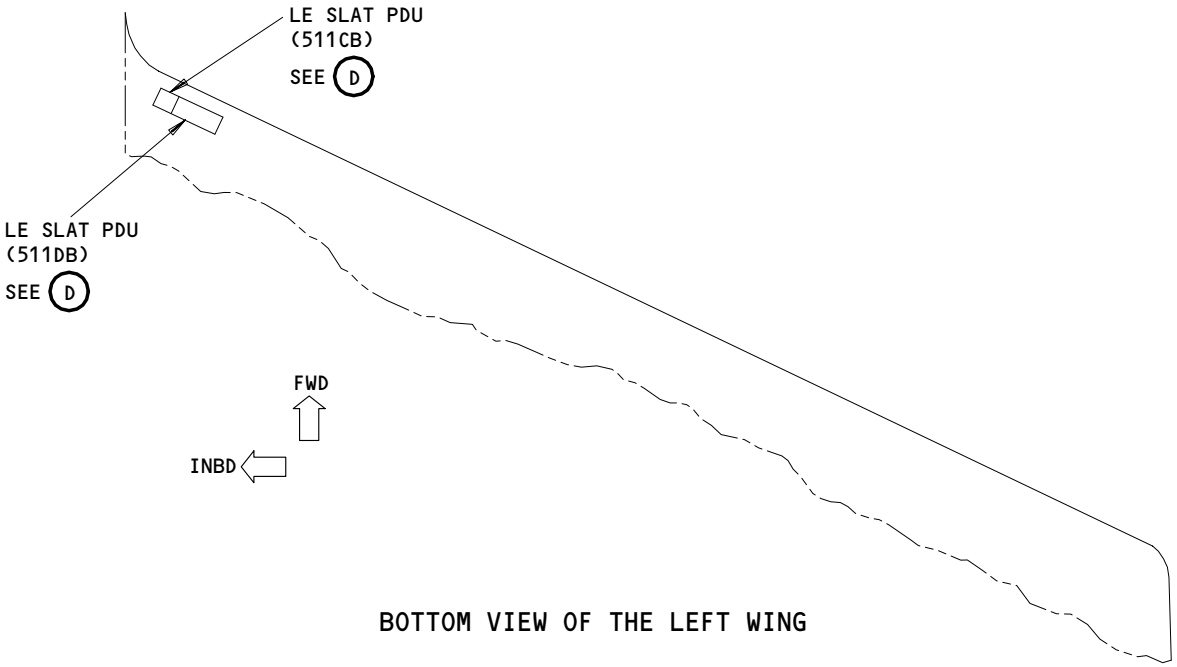


Leading Edge Slat System - Component Location
Figure 102 (Sheet 1)

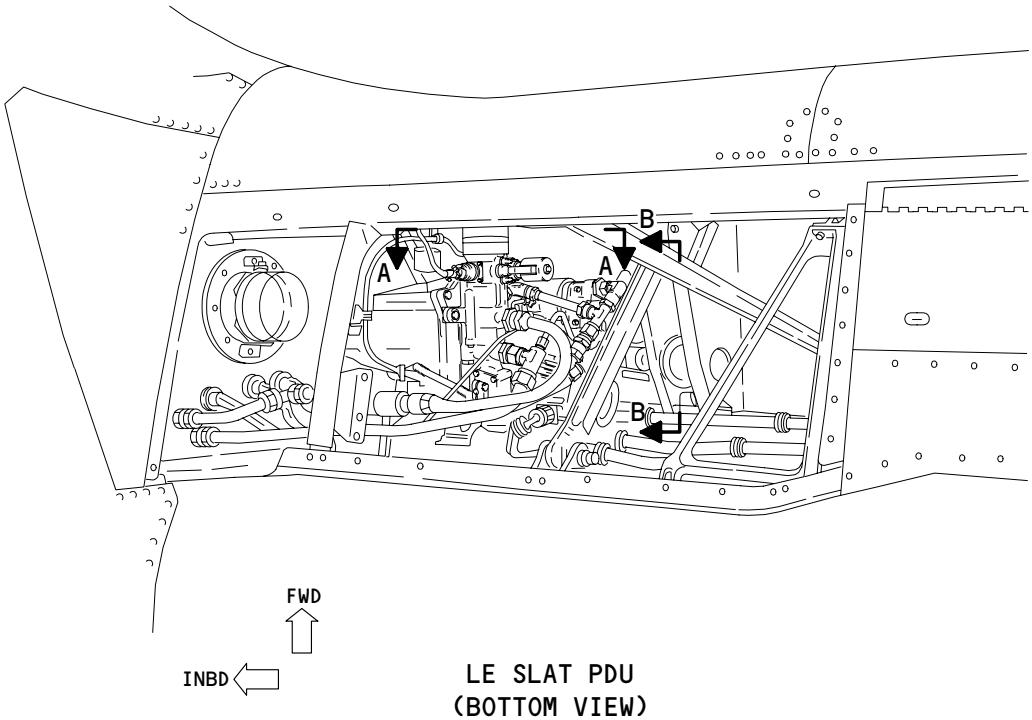


PLAN VIEW
(LEFT WING SHOWN, RIGHT WING IS OPPOSITE)

Leading Edge Slat System - Component Location
Figure 102 (Sheet 2)

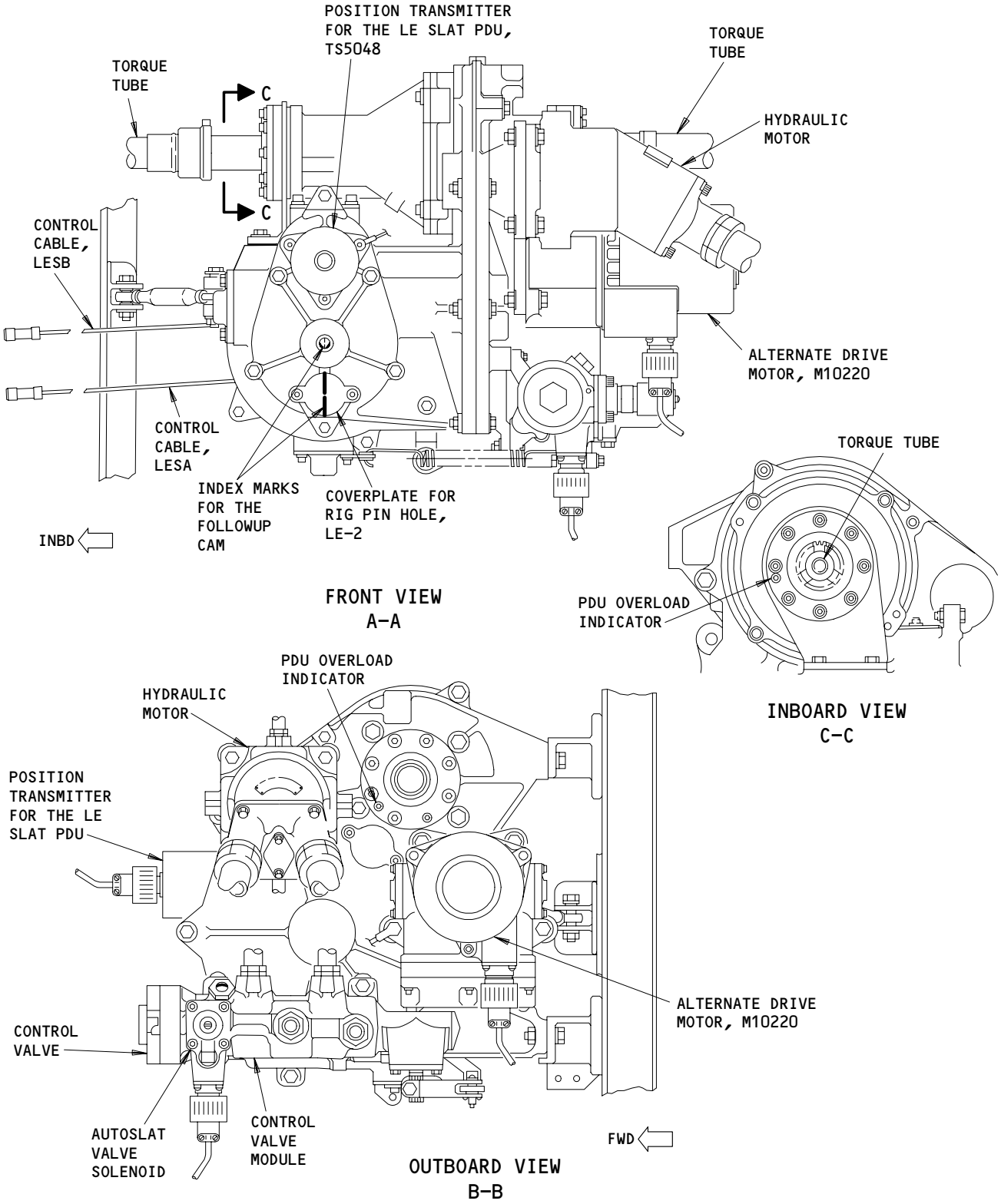


BOTTOM VIEW OF THE LEFT WING

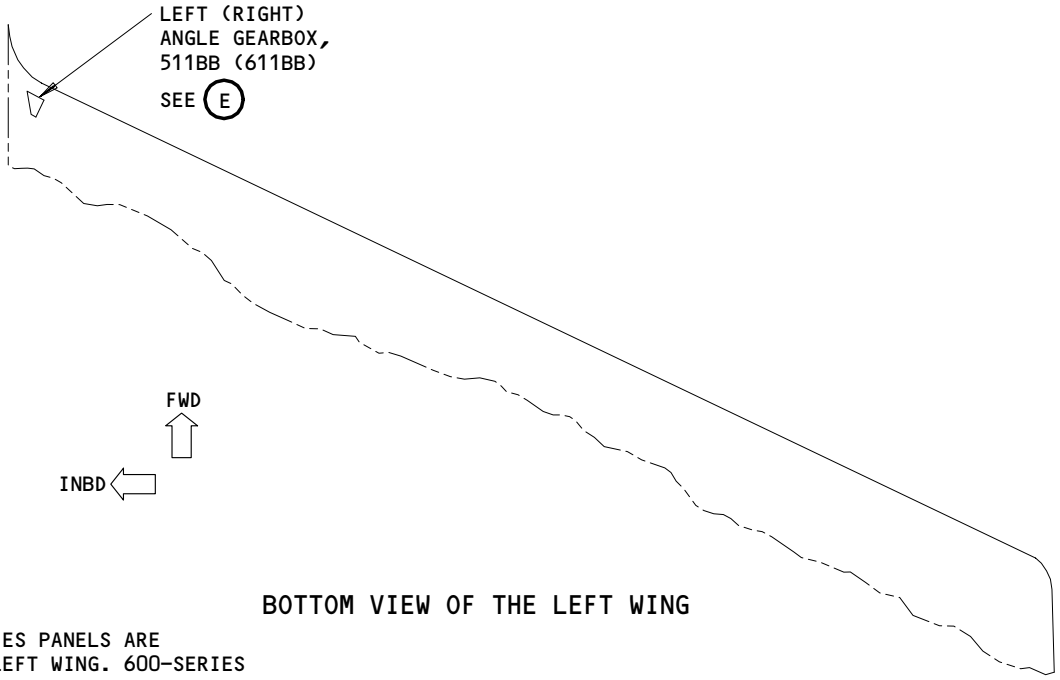


LE SLAT PDU
(BOTTOM VIEW)
D

Leading Edge Slat System – Component Location
Figure 102 (Sheet 3)

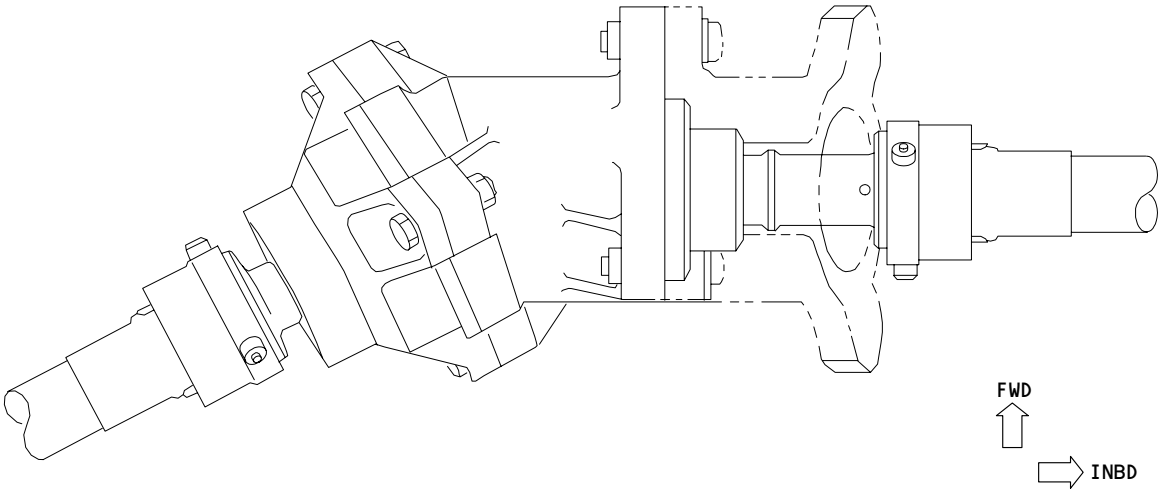


Leading Edge Slat System - Component location
Figure 102 (Sheet 4)



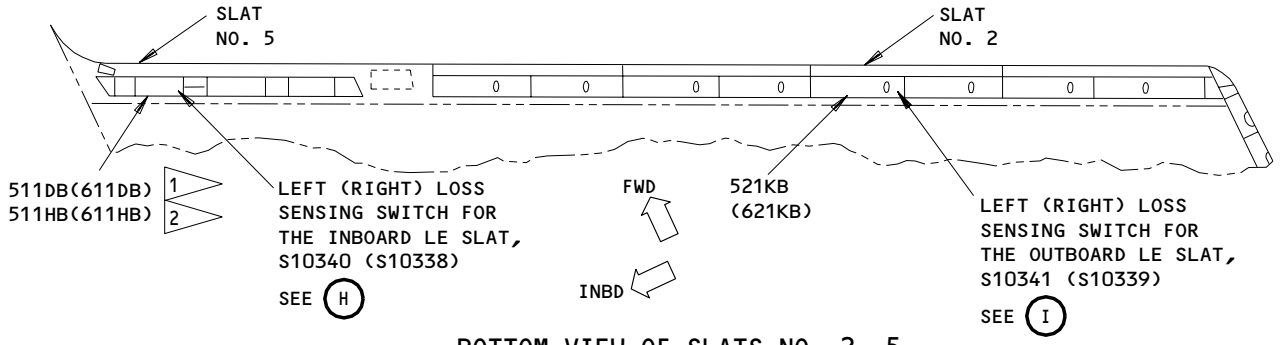
BOTTOM VIEW OF THE LEFT WING

NOTE: 500-SERIES PANELS ARE ON THE LEFT WING. 600-SERIES PANELS ARE ON THE RIGHT WING.



ANGLE GEARBOX
(LEFT WING SHOWN, RIGHT WING IS OPPOSITE)
(E)

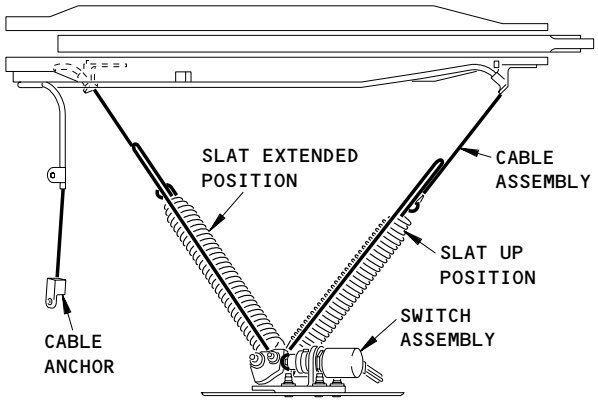
Leading Edge Slat System - Component Location
Figure 102 (Sheet 5)



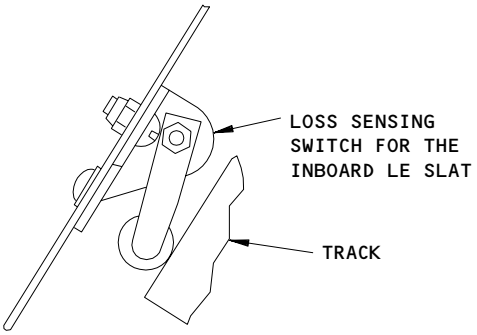
BOTTOM VIEW OF SLATS NO. 2, 5
(SLATS NO. 6-10 ARE OPPOSITE)

F FROM SHT 2

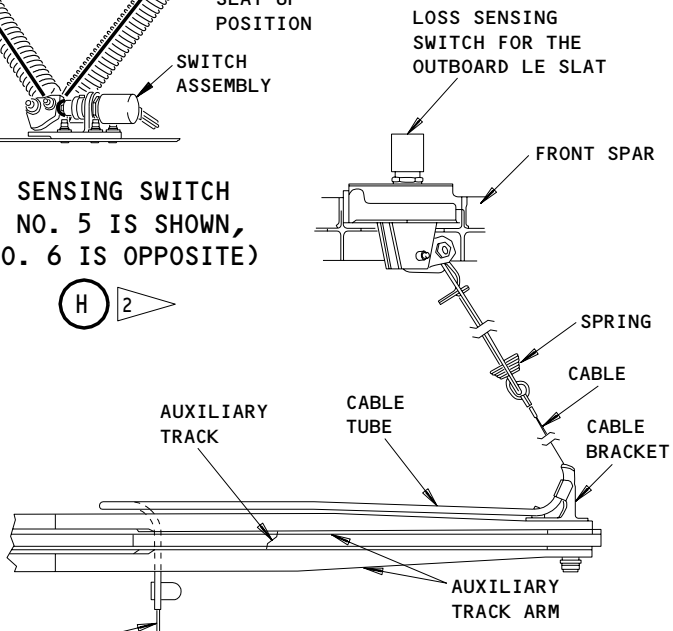
NOTE: 500-SERIES PANELS ARE ON THE LEFT WING. 600-SERIES PANELS ARE ON THE RIGHT WING.



LOSS SENSING SWITCH
(SLAT NO. 5 IS SHOWN,
SLAT NO. 6 IS OPPOSITE)
H 2



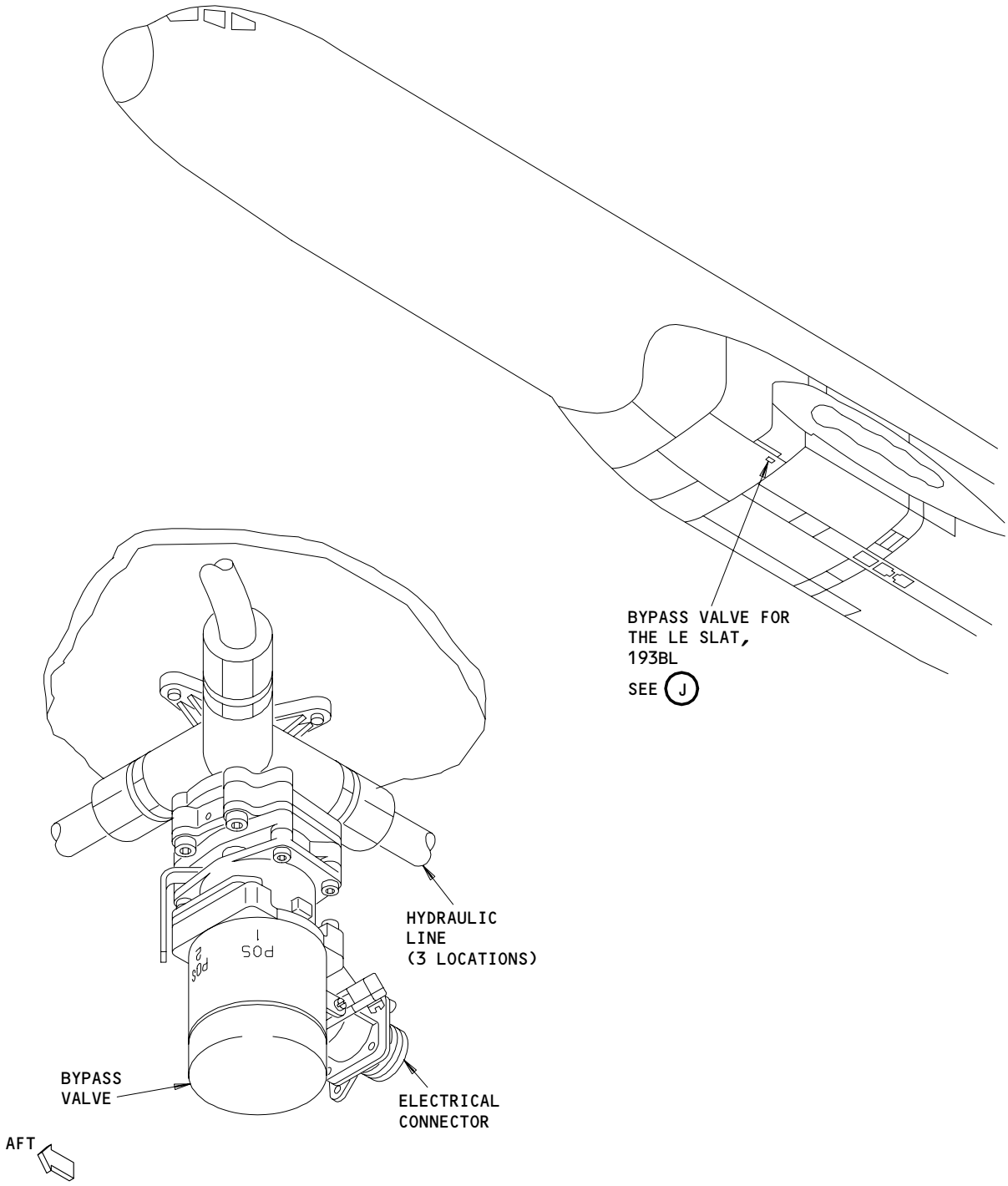
LOSS SENSING SWITCH
(SLAT NO. 5 IS SHOWN,
SLAT NO. 6 IS OPPOSITE)
H 1



LOSS SENSING SWITCH
(SLAT NO. 2 IS SHOWN,
SLAT NO. 10 IS OPPOSITE)
I

1 FOR ROLLER TYPE SENSOR SWITCH
2 FOR CAM TYPE SENSOR SWITCH

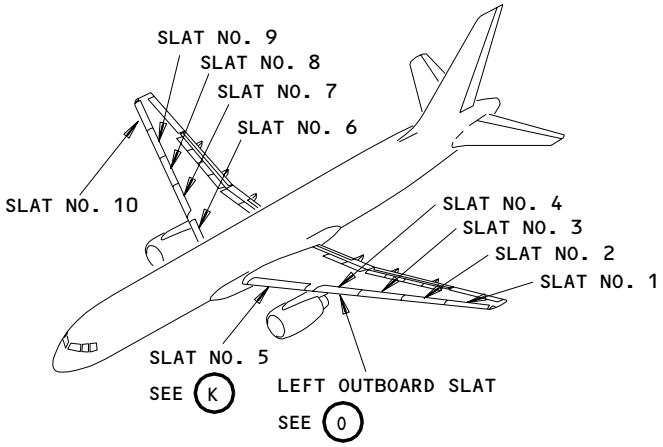
Leading Edge Slat System - Component Location
Figure 102 (Sheet 6)

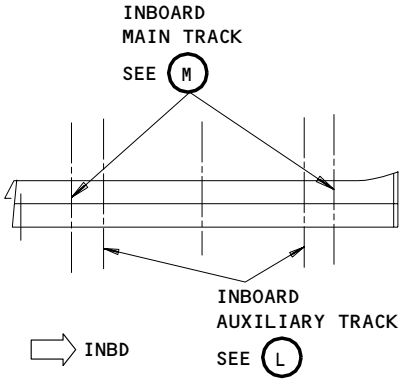


BYPASS VALVE FOR THE LE SLAT, V10059

(J)

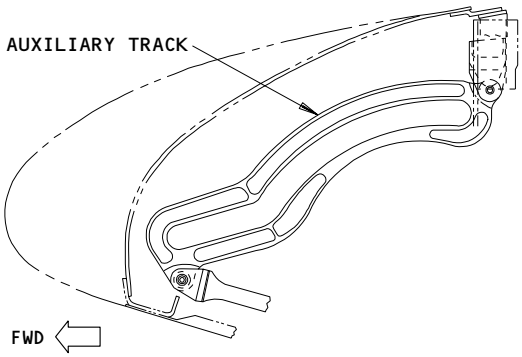
Leading Edge Slat System – Component Location
Figure 102 (Sheet 7)





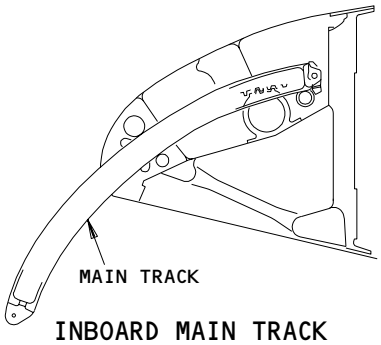
SLAT NO. 5
(EXAMPLE SLAT NO. 6)

K



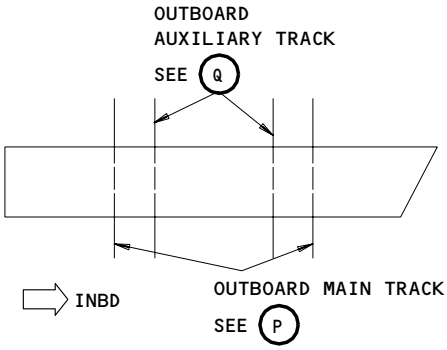
INBOARD AUXILIARY TRACK

L



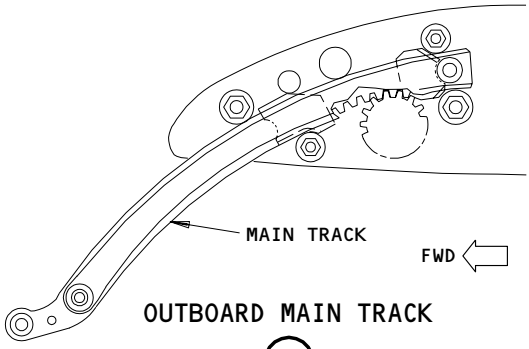
INBOARD MAIN TRACK

M



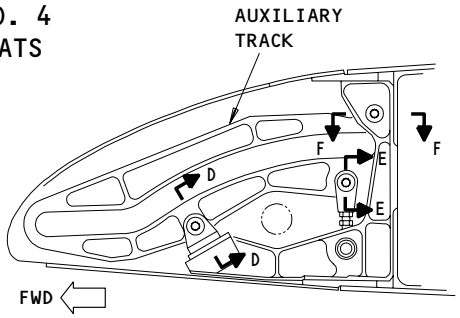
LEFT OUTBOARD SLAT NO. 4
(EXAMPLE OUTBOARD SLATS
NO. 1-3 AND 7-10)

O



OUTBOARD MAIN TRACK

P

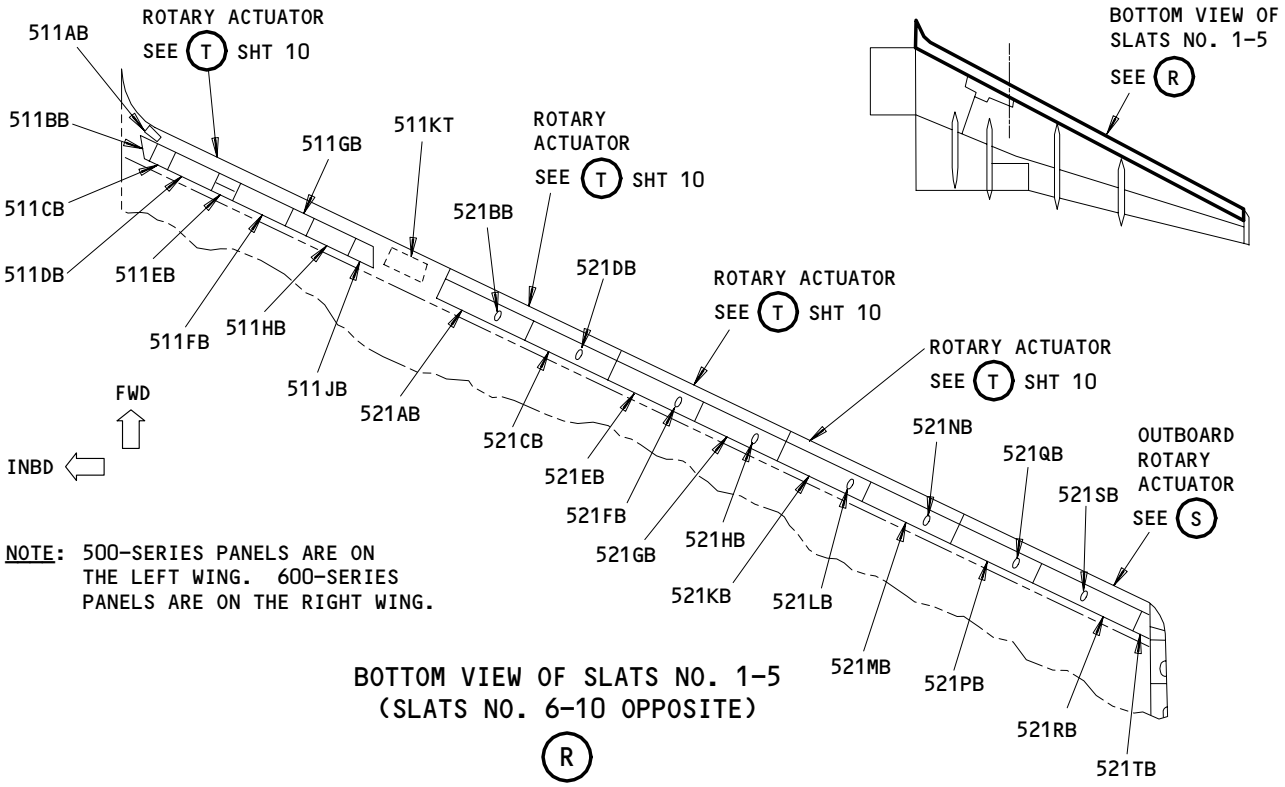


NOTE: SEE FIG. 102 (SHEET 12) FOR SECTIONAL VIEWS.

OUTBOARD AUXILIARY TRACK

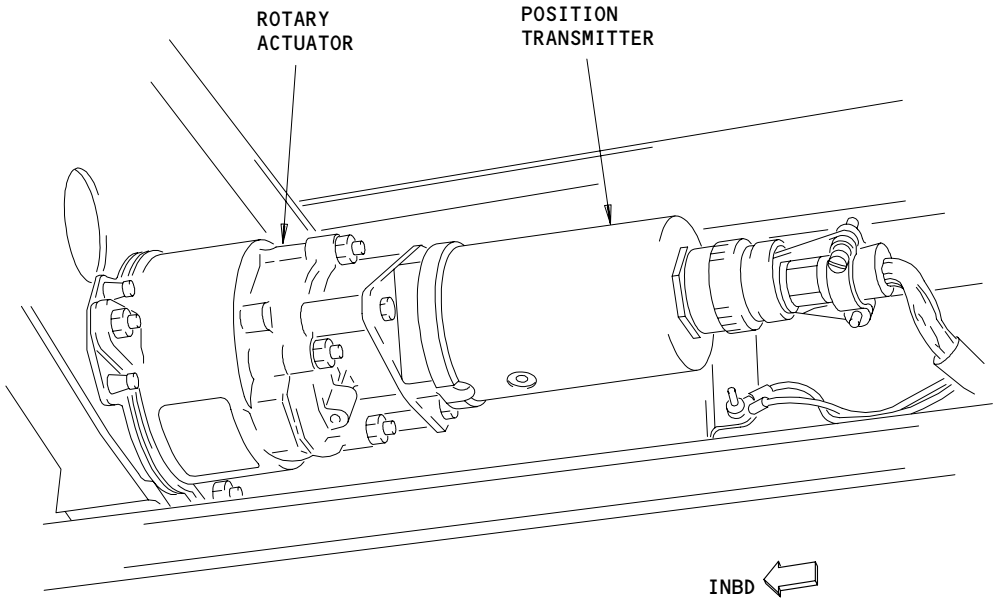
Q

Leading Edge Slat System - Component Location
Figure 102 (Sheet 8)



BOTTOM VIEW OF SLATS NO. 1-5
(SLATS NO. 6-10 OPPOSITE)

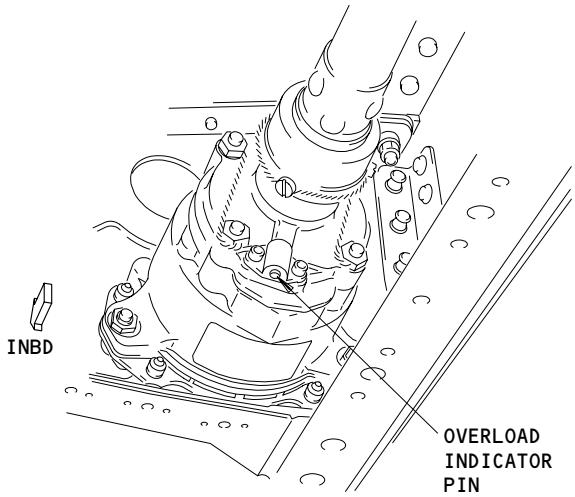
(R)



OUTBOARD ROTARY ACTUATOR

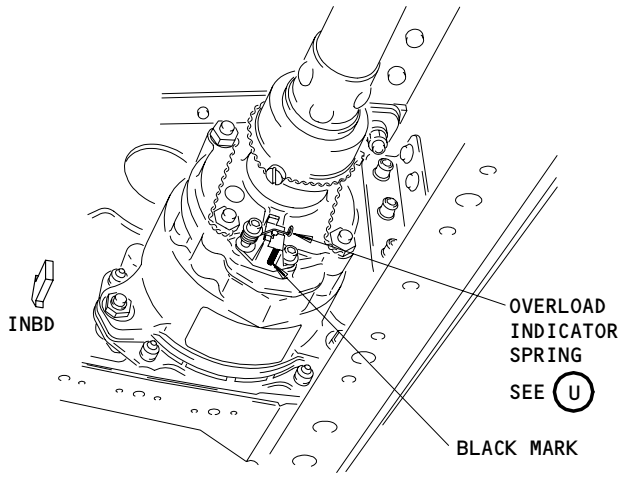
(S)

Leading Edge Slat System - Component Location
Figure 102 (Sheet 9)



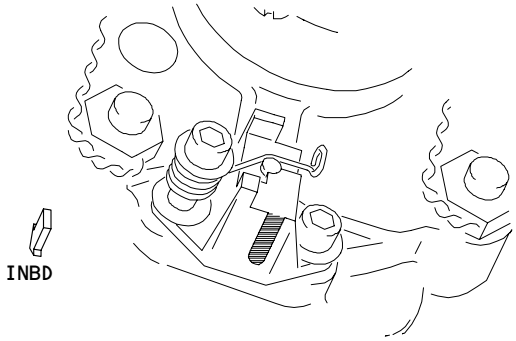
ROTARY ACTUATOR
(ROTARY ACTUATORS WITH
AN OVERLOAD INDICATOR PIN)

(T) FROM SHT 9 1



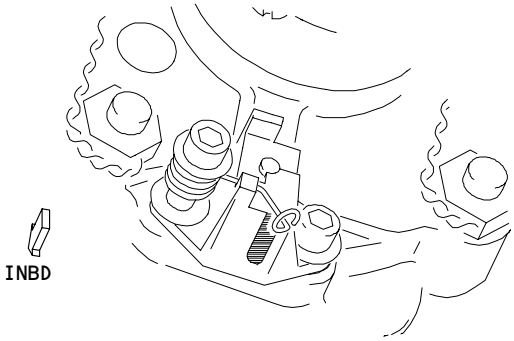
ROTARY ACTUATOR
(ROTARY ACTUATORS WITH
AN OVERLOAD INDICATOR SPRING)

(T) FROM SHT 9 2



OVERLOAD INDICATOR SPRING
(NON-TRIPPED CONDITION)

(U)



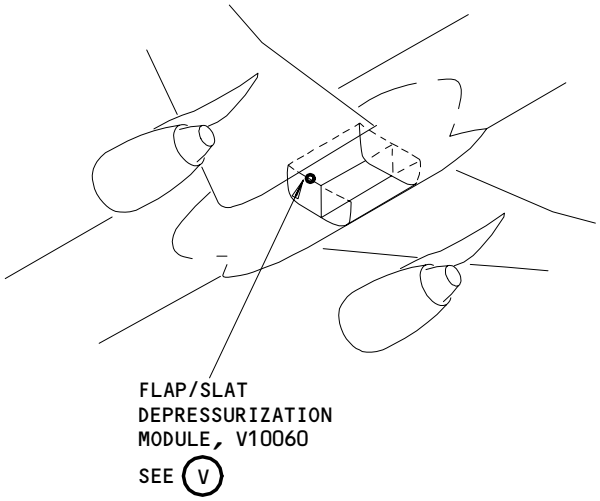
OVERLOAD INDICATOR SPRING
(TRIPPED CONDITION)

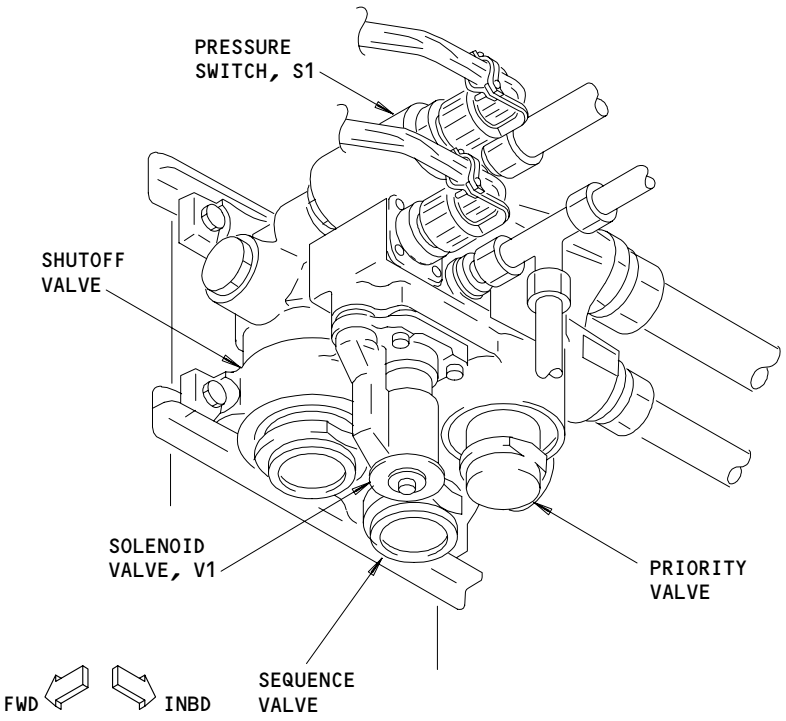
(U)

1 AN OVERLOAD INDICATOR PIN WILL BE ABOVE THE OUTER ADJACENT HOUSING OR THE RED PART OF THE PIN WILL SHOW IF THE OVERLOAD INDICATOR CAME ON.

2 AN OVERLOAD INDICATOR SPRING WILL BE ALIGNED WITH THE BLACK MARK ON THE ROTARY ACTUATOR HOUSING IF THE OVERLOAD INDICATOR CAME ON.

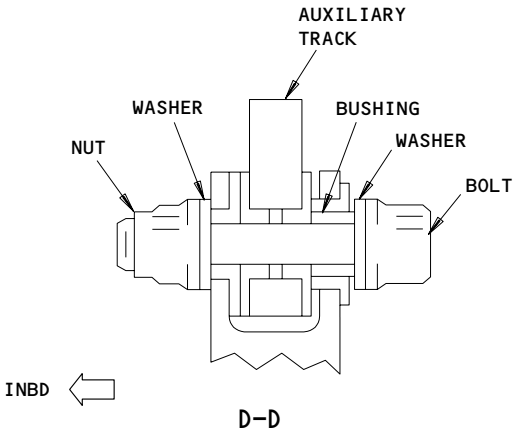
Leading Edge Slat System - Component Location
Figure 102 (Sheet 10)



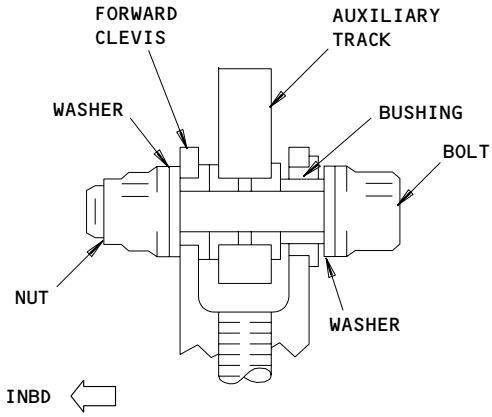


FLAP/SLAT DEPRESSURIZATION
MODULE, V10060
(V)

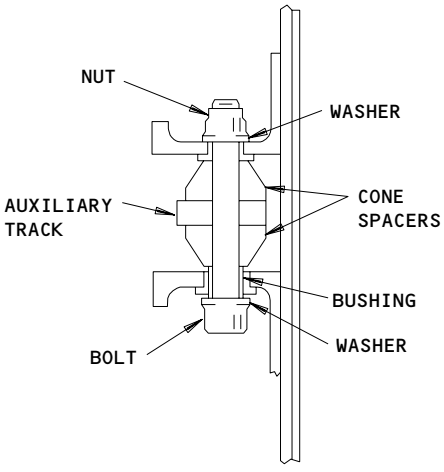
Leading Edge Slat System – Component Location
Figure 102 (Sheet 11)



D-D



E-E



F-F

Leading Edge Slat System - Component Location
Figure 102 (Sheet 12)

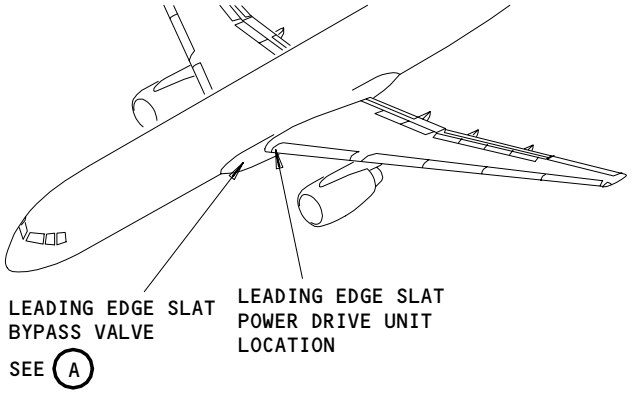
LEADING EDGE SLAT SYSTEM - MAINTENANCE PRACTICES

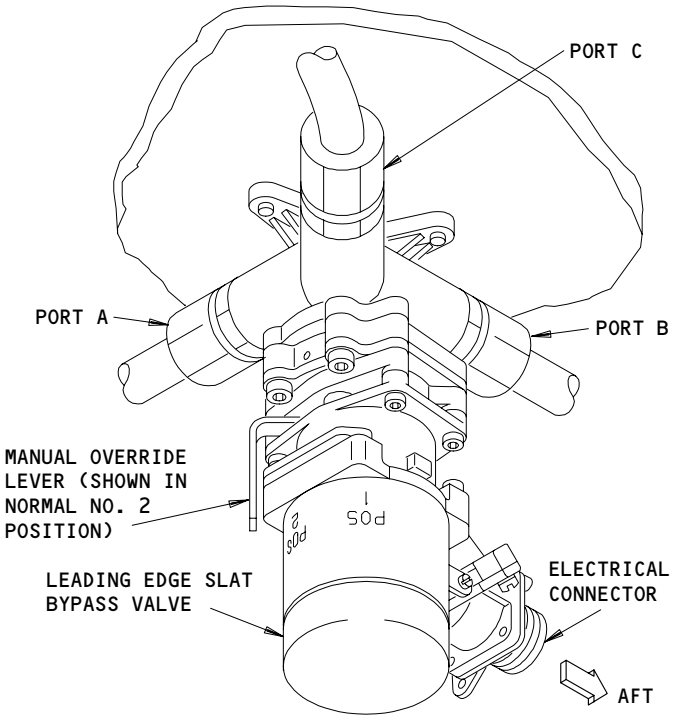
1. General
   A. This procedure contains two tasks. The first task gives steps for the deactivation of the slat drive system to prevent slat movement when you do work near the slat system. The second task operates the slat system with normal hydraulic power or alternate electric power.

TASK 27-81-00-042-001

2. Deactivation of the LE Slats (Fig. 201)
   A. General
      (1) This task contains two procedures to deactivate the leading edge (LE) slats. The first procedure gives steps for the deactivation of the LE slats when hydraulic operation of the trailing edge (TE) flaps is not necessary. The second procedure gives steps for the deactivation of the LE slats when hydraulic operation of the TE flaps is necessary.
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 06-44-00/201, Wing Access Doors and Panels
      (3) AMM 24-22-00/201, Electrical Power - Control
      (4) AMM 27-51-27/201, Trailing Edge Flap Power Drive Unit Components
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
   C. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
          (b) Valve Lock - B27020-32
          (c) Valve Lock - B27077-1 (for airplanes Line Number 643 and on, or Post SB 29A0048)
   D. Access
      (1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
511/611	Leading Edge to Front Spar
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors





LEADING EDGE SLAT BYPASS VALVE
(A)

CONTROL INPUT DETENT (SOURCE 1)	HIGH LIFT CONTROL SURFACE POSITION		
	FLAPS (ON HYDRAULIC OR ELECTRIC POWER 2)	SLATS (ON HYDRAULIC POWER 2)	SLATS (ON ELECTRIC POWER 2)
ZERO (UP)	FULLY RETRACTED	FULLY RETRACTED	FULLY RETRACTED
1	1°	INTERMEDIATE 3	INTERMEDIATE 3
5	5°	INTERMEDIATE 3	INTERMEDIATE 3
15	15°	INTERMEDIATE 3	INTERMEDIATE 3
20	20°	INTERMEDIATE 3	FULLY EXTENDED 4
25	25°	FULLY EXTENDED 4	FULLY EXTENDED 4
30	30°	FULLY EXTENDED 4	FULLY EXTENDED 4

TABLE I

1 FLAP CONTROL LEVER (HYDRAULIC CONTROL) OR POSITION SELECTOR SWITCH FOR THE FLAP/SLAT ALTERNATE DRIVE (ELECTRIC CONTROL)

2 PRIMARY CONTROL IS FROM HYDRAULIC POWER AND ALTERNATE CONTROL IS FROM ELECTRIC POWER

3 TAKEOFF POSITION

4 LANDING POSITION

Power Drive Unit and Bypass Valve for the Leading Edge Slat
Figure 201

(2) Access Panel
193BL Ram Air Inlet Door Actuator/LE Slat Bypass Valve
193KL Leading Edge Slat Bypass Valve
193HL ECS Components (left bay)

E. Deactivation of the LE Slat System when Hydraulic Operation of the TE Flaps is not Necessary

S 212-002
(1) Make sure the position of the LE slats is the same as the position of the flap control lever (Table I, Fig. 201).

S 492-003
(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 862-004
(3) Supply electrical power (AMM 24-22-00/201).

S 212-005
(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-006

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install door locks (AMM 32-00-15/201).

S 862-076
(6) If the alternate system for the trailing edge (TE) flaps is armed, make sure the position selector switch for the flap/slat alternate drive, on the first officers main instrument panel, P3, and the TE flap position are the same.

S 862-077
(7) If the alternate system for the TE flaps is not armed, make sure the position of the flap control lever and the position of the TE flaps are the same.

S 862-007
(8) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 862-008
(9) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-009
(10) Open this circuit breaker on the main power distribution panel, P6, and install a circuit breaker lock:
(a) 6D20, ALTN SLAT PWR

S 862-010
(11) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 012-011
(12) Get access to the TE flap PDU (AMM 06-44-00/201).

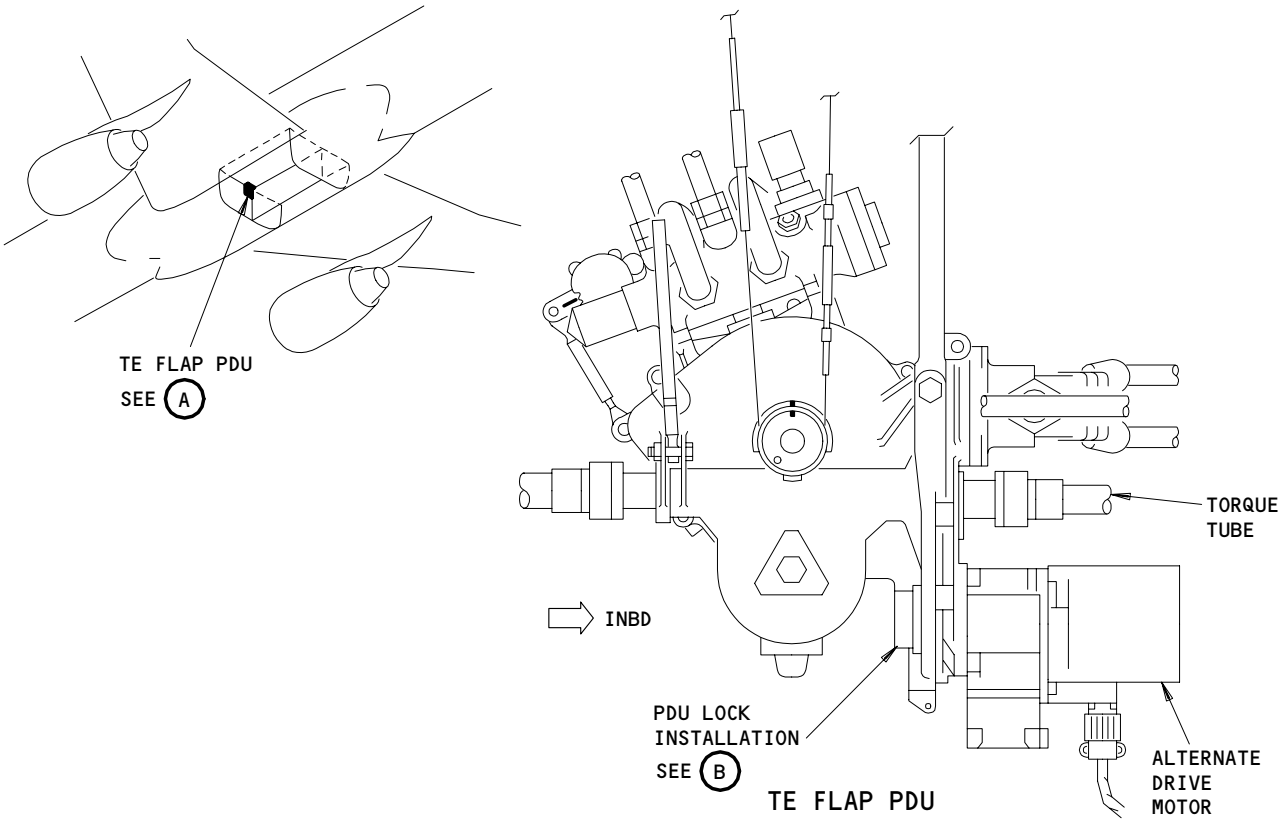
S 492-012
(13) Install a PDU lock in the TE flap PDU (Fig. 202).

S 012-075
(14) Open one of these three access doors to get access to the LE slat bypass valve (AMM 06-41-00/201): 193BL, 193KL or 193HL.

NOTE: 193KL (if installed) replaces 193BL for bypass valve access. The left ECS bay access door can also be used to get access to the valve.

S 862-013
(15) Move the manual override lever on the LE slat bypass valve to the No. 1 (bypass mode) position.

S 492-014
(16) Install a valve lock on the override lever in the No. 1 (bypass mode) position.



PDU Lock for the TE Flap PDU
Figure 202

S 032-015

(17) Remove the electrical connector from the bypass valve, and attach a DO-NOT-OPERATE tag.

S 862-052

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(18) Pressurize the left hydraulic system, if it is necessary for other maintenance (AMM 29-11-00/201).

S 862-017

(19) After you complete the maintenance that required the deactivation of the LE slat system, do the steps to Put the Airplane Back to Its Usual Condition.

F. Deactivation of the LE Slat System when Hydraulic Operation of the TE Flaps is Necessary

S 212-018

(1) Make sure the position of the LE slats is the same as the position of the flap control lever (Table I, Fig. 201).

S 492-019

(2) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-020

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-021

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 862-022
(5) Open this circuit breaker on the overhead panel, P11, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-023
(6) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
(a) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR

S 862-024
(7) Open this circuit breaker on the main power distribution panel, P6, and install a circuit breaker lock:
(a) 6D20, ALTN SLAT PWR

S 862-025
(8) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 012-026
(9) Get access to the TE flap PDU (AMM 06-44-00/201).

S 012-074
(10) Open one of these access doors to get access to the LE slat bypass valve (AMM 06-41-00/201): 193BL, 193KL or 193HL.

NOTE: 193KL (if installed) replaces 193BL for bypass valve access. The left ECS bay access door can also be used to get access to the valve.

S 862-027
(11) Move the manual override lever on the LE slat bypass valve to the No. 1 (bypass mode) position.

S 492-028
(12) Install a valve lock on the override lever in the No. 1 (bypass mode) position.

S 032-029
(13) Remove the electrical connector from the bypass valve, and attach a DO-NOT-OPERATE tag.

S 862-030
(14) Make sure the manual override lever on the TE flap bypass valve is in the No. 2 (normal mode) position (AMM 27-51-00/201).

S 862-053

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(15) Pressurize the left hydraulic system, if it is necessary for other maintenance (AMM 29-11-00/201).

S 862-032

(16) After you complete the maintenance that required the deactivation of the LE slat system, do the "Put the Airplane Back to Its Usual Condition" group of steps.

G. Put the Airplane Back to Its Usual Condition

S 212-033

(1) Make sure the position of the LE slats is the same as the position of the flap control lever (Table I, Fig. 201).

S 862-078

(2) If the alternate system for the TE flaps is armed, make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, and the position of the TE flaps are the same.

S 862-079

(3) If the alternate system for the TE flaps is not armed, make sure the position of the flap control lever and the position of the TE flaps are the same.

S 092-034

(4) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 862-035

(5) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 092-036

(6) Remove the PDU lock from the TE flap PDU (Fig. 202).

S 432-037

(7) Remove the DO-NOT-OPERATE tag and install the electrical connector on the bypass valve.

S 862-038
(8) Remove the valve lock from the manual override lever on the LE slat bypass valve, and move the override lever to the No. 2 (normal mode) position.

S 862-039
(9) Remove the circuit breaker locks and DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
(d) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(e) 11J33, WARN ELEX A

S 862-040
(10) Remove the circuit breaker lock and close this circuit breaker on the P6 panel:
(a) 6D20, ALT SLAT PWR

S 862-041
(11) If the TE flaps and LE slats are extended and this position is not necessary, retract the TE flaps and LE slats as shown in the Operation of the LE Slat System.

S 412-042

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(12) Remove the door locks for the landing gear doors and close the doors (AMM 32-00-15/201).

S 862-043
(13) Remove the power from the left hydraulic system, if it is not necessary (AMM 29-11-00/201).

S 862-044
(14) Remove the electrical power, if it is not necessary (AMM 24-22-00/201).

S 432-054
(15) Install the access panels or close access doors for the TE flap PDU and the LE slat bypass valve (left wing-body fairing) (AMM 06-44-00/201, AMM 06-41-00/201).

TASK 27-81-00-862-045

3. Operation of the LE Slat System

A. General

(1) During normal hydraulic operation, the TE flaps and LE slats move by the operation of the flap control lever.

During alternate operation, the LE slats can move independently of the TE flaps. If you arm the flap and slat alternate drives, you can control the TE flaps and the LE slats with the position selector switch for the flap/slat alternate drive. If you arm only the slat alternate drive, you can control only the movement of the LE slats.

B. References

(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 27-51-00/201, Trailing Edge Flap System
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin

D. Normal Hydraulic Operation of the LE Slat System

S 212-046

(1) Make sure the PDU lock is removed from the TE flap PDU (Fig. 202).

S 862-047

(2) Do these steps to extend the LE slats:
(a) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.
(b) Supply electrical power (AMM 24-22-00/201).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(c) Pressurize the left hydraulic system (AMM 29-11-00/201).
(d) Move the flap control lever to the necessary detent and let the flaps and slats move to the correct positions.
(e) If you do work near the slat control surfaces, deactivate the slat drive system (Deactivation of the LE Slats).

(f) If you do work near the flap control surfaces, deactivate the flap drive system (AMM 27-51-00/201).
(g) Remove the power from the left hydraulic system, if it is not necessary (AMM 29-11-00/201).
(h) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 862-048
(3) Do these steps to retract the LE slats:
(a) Make sure the position of the TE flaps and LE slats and the position of the flap control lever are the same (Table I, Fig. 201).
(b) Supply electrical power (AMM 24-22-00/201).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(c) Pressurize the left hydraulic system (AMM 29-11-00/201).
(d) Move the flap control lever to the zero (FLAP UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.
(e) Remove the electrical power, if it is not necessary (AMM 24-22-00/201).
(f) Remove the power from the left hydraulic system, if it is not necessary (AMM 29-11-00/201).

E. Alternate Electric Operation of the LE Slats

S 212-049
(1) Make sure the PDU lock is removed from the TE flap PDU (Fig. 202).

S 862-050
(2) Do these steps to extend the LE slats:
(a) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.
(b) Make sure the position selector switch for the flap/slat alternate drive, on the first officer's main instrument panel, P3, is in the NORM detent.
(c) Supply electrical power (AMM 24-22-00/201).
(d) Turn the dimmer control knob for the first officer's panel on the pilots glare shield panel, P7, fully clockwise.

(e) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not in the armed position (switch lights will be off).
(f) Push the arming switch for the slat alternate drive to arm the slat alternate drive (switch light will come on).

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR A MINIMUM OF 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(g) Move the position selector switch for the flap/slat alternate drive to the necessary detent and let the LE slats move to the correct position.

NOTE: The TRAILING EDGE light on the P3 panel will come on and the TE FLAP DISAGREE message will show on the EICAS display.

(h) Remove the electrical power if it is not necessary (AMM 24-22-00/201).
(i) If you do work near the slat control surfaces, deactivate the slat drive system.

S 862-051
(3) Do these steps to retract the LE slats:
(a) Make sure the position of the LE slats is the same as the position of the position selector switch for the flap/slat alternate drive (Table I, Fig. 201).
(b) Supply electrical power (AMM 24-22-00/201).
(c) Turn the dimmer control knob for the first officer's panel on the P7 panel fully clockwise.
(d) Move the position selector switch for the flap/slat alternate drive to the UP detent and make sure the LE slats move to the fully retracted position.

NOTE: The TRAILING EDGE light on the P3 panel will go off and the TE FLAP DISAGREE message will go off the EICAS display.

(e) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.
(f) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).
(g) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

LEADING EDGE SLAT SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains 3 tasks as follows:
      (1) The first task is an operational test of the leading edge (LE) slat system and the position indicating system for the LE slat.
      (2) The second task is an adjustment of the LE slat system.
      (3) The third task is a system test of the LE slat system and the position indicating system for the LE slat.
      (4) The fourth task is a test of the autoslat extension and retraction.
      (5) The fifth task is a test of the slat loss detection switches.

      The fourth and fifth tasks are included in the third task. Thus, if you do the third task you do not need to do tasks four and five.

   B. The position transmitter for the flap control lever must be adjusted (Ref 27-51-33) before adjustment of the LE slat system.
   C. The trailing edge (TE) flap system and the position transmitters for the TE flaps (left and right wing transmitters and TE flap PDU transmitter) must be adjusted (Ref 27-51-00) before adjustment of the LE slats.
   D. The numbers for the slats are numbered No. 1 thru 10 from left to right, five on each wing (Fig. 501). The Slats No. 1 thru 4 and the slats No. 7 thru 10 are the left and right outboard slats, and slats No. 5 and 6 are the left and right inboard slats.

TASK 27-81-00-715-001

2. Operational Test - LE Slat System
   A. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-51-00/501, Trailing Edge Flap System
      (3) 27-81-20/401, LE Slat Drive Torque Tube
      (4) AMM 34-21-00/501, Inertial Reference System
      (5) 29-11-00/201, Main (Left, Center, and Right) Hydraulic Systems
      (6) 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

119/120	Main Equipment Center
211/212	Control Cabin
500/600	Left Wing/Right Wing

   C. Prepare for the Test

      S 045-383

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 215-350
(2) Make sure the trailing edge flaps and leading edge slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.

S 215-351
(3) Make sure the position selector switch for the alternate flaps/slats on the first-officer's main instrument panel, P3, is in NORM position.

S 865-352
(4) Supply electrical power (Ref 24-22-00).

S 215-353
(5) Make sure the arming switches for the alternate drive of the TE flaps and LE slats on the P3 panel are not in the armed position (switch lights will go off).

NOTE: You will need to put these arming switches in the armed position for the LEADING EDGE light to come on when you do the FSEU-2 BITE test in the steps below.

S 865-329
(6) Make sure these circuit breakers on the overhead circuit breaker panel, P11, are closed:
(a) EICAS (6 locations)

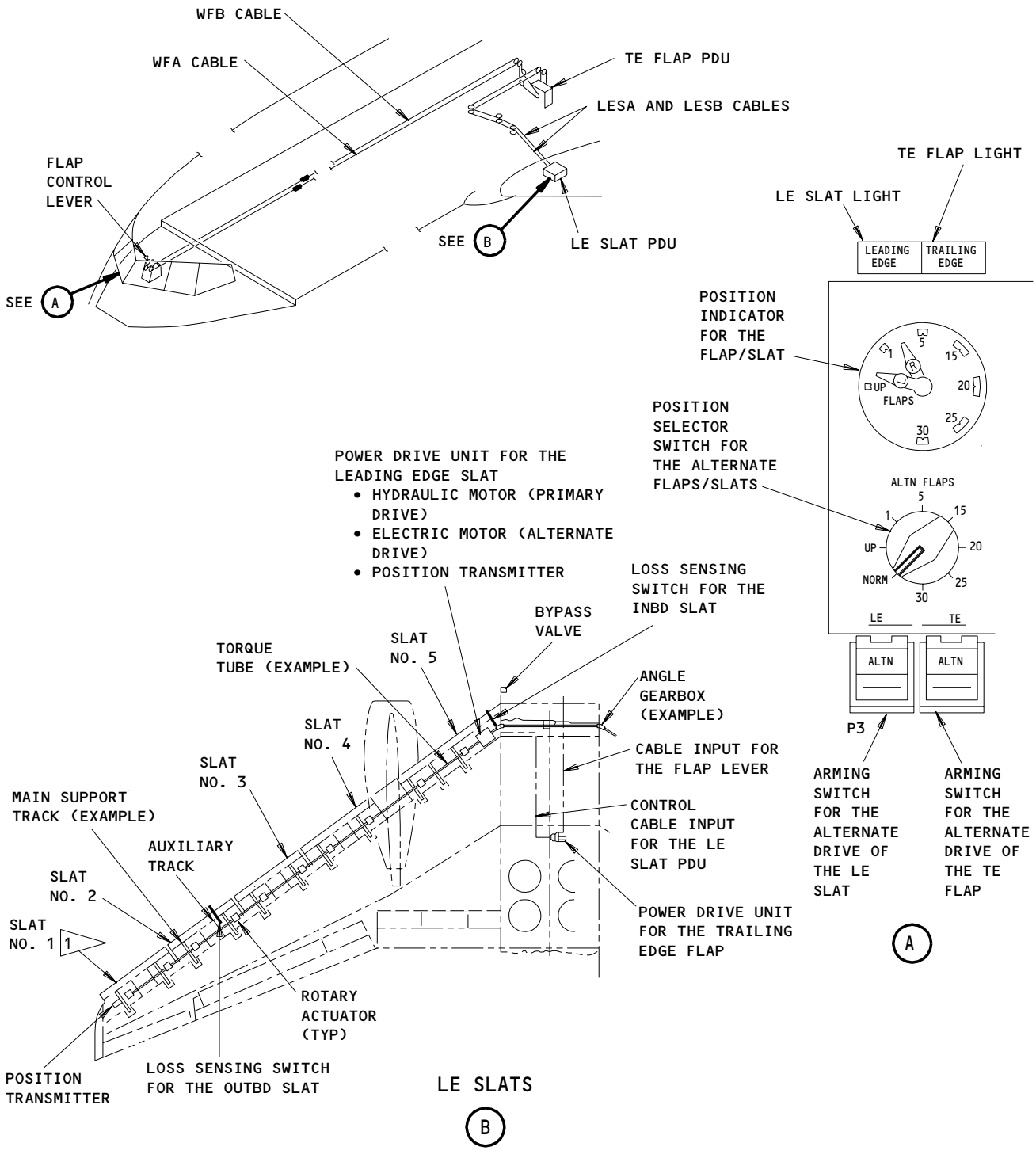
S 865-389

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

D. Flap/Slat Electronic Unit (FSEU) - Test

S 715-282
(1) Do the FSEU test that follows:
(a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
(b) Push the YES switch on the FSEU.
(c) Make sure the NO FAULTS message shows on the display.
(d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.



Leading-Edge Slat System
Figure 501

(e) Push the NO switch two times to show the GROUND TESTS? message on the display.
(f) Push the YES switch to show the FLT DECK TEST? message on the display.
(g) Push the NO switch to show the DISPLAY TEST? message on the display.
(h) Push the YES switch.
(i) Make sure all LED's on the face panel of the FSEU come on.
(j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
(k) Push the NO switch two times to show the GROUND TESTS? message on the display.
(l) Push the YES switch to show the FLT DECK TEST? message on the display.
(m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

FSEU-1

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP LOAD RELIEF	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[2]	EICAS STATUS PAGE

FSEU-2

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT *[1]	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[2]	EICAS STATUS PAGE

FSEU-3

INDICATION	LOCATION
FLAP/SLAT ELEC *[2]	EICAS STATUS PAGE

*[1] The LEADING EDGE light will come only if the LE slat alternate drive is armed (the switch light will be on) while the FSEU-2 BITE test is run.
*[2] EICAS status page must be on for message to show.

E. Slat Primary Power and Drive Test

S 215-009
(1) Make sure the LEADING EDGE light on the P3 panel is off.

S 215-012
(2) Make sure no EICAS messages show on the display unit

S 215-011
(3) Make sure the L and R indicator needles for the flap/slat position on the P3 panel are in the UP tolerance band.

S 215-010
(4) Put the flap control lever in the 1-unit detent to move TE flaps to the 1-unit position and LE slats to the intermediate position and do a check as follows:
    (a) As the flaps and slats move:
        1) Make sure the L and R indicator needles are in a position between the UP and 1-unit.
    (b) After the flaps stop in the 1-unit position and slats stop in the intermediate position:
        1) Make sure the L and R indicator needles are in the 1-unit tolerance band.
        2) Make sure the LEADING EDGE light is off.
        3) Make sure no EICAS messages come on the display unit for the slat.

S 215-013
(5) Put the flap control lever in the 20-unit detent to move the TE flaps to the 20-unit position and do a check as follows:
    (a) The flaps move to the 20-unit position.
    (b) The slats stay in the intermediate position.

S 215-014
(6) Position flap control lever in the 25-unit detent to move the TE flaps to the 25-unit position and leading edge slats to the fully extended position and do a check as follows:
    (a) The flaps move to the 25-unit position.

(b) The slats move to the fully extended position.
(c) After the slats stop in the fully extended position do a check as follows:
1) Make sure the LEADING EDGE light is off.
2) Make sure that no EICAS messages come on the display unit for the slats.

S 215-015
(7) Put the flap control lever in the 30-unit detent to move the TE flaps to the 30-unit position and do a check as follows:
(a) The flaps move to the 30-unit position.
(b) Slats stay in the fully extended position.

S 215-016
(8) Put the flap control lever in the 25-unit detent to move the TE flaps to the 25-unit position and do a check as follows:
(a) The flaps move to the 25-unit position.
(b) The slats stay in the fully extended position.

S 215-017
(9) Put the flap control lever in the 20-unit detent to move the TE flaps to the 20-unit position and LE slats to the intermediate position and do a check as follows:
(a) The flaps move to the 20-unit position.
(b) The slats move to the intermediate position.
(c) After the slats stop in the intermediate position, do a check as follows:
1) Make sure the LEADING EDGE light is off.
2) Make sure that no EICAS messages show on the display unit for the slat.

S 215-264
(10) Put the flap control lever in 1-unit detent to move the TE flaps to the 1-unit position and do a check as follows:
(a) The flaps move to the 1-unit position.

(b) The slats stay in the intermediate position.
(c) L and R indicator needles in the 1-unit tolerance band.
(d) The LEADING EDGE light is off.
(e) Make sure that no EICAS messages show on the display unit for the slat.

S 215-265
(11) Put the flap control lever in the zero (FLAPS UP) detent to move the TE flaps and the LE slats to the fully retracted position and do a check as follows:
(a) As the flaps and slats move:
1) Make sure the L and R indicator needles are in a position between the 1-unit and UP.
(b) After the flaps and slats stop in the fully retracted position:
1) Make sure the L and R indicator needles are in the UP tolerance band.
2) Make sure the LEADING EDGE light is off.
3) Make sure that no EICAS messages show on the display unit for the slats.

S 215-266
(12) Move the flap control lever to the 30-unit detent and do a check as follows:
(a) Make sure the TE flaps and LE slats go to the fully extended position in less than 52 seconds of initial flap control lever movement.

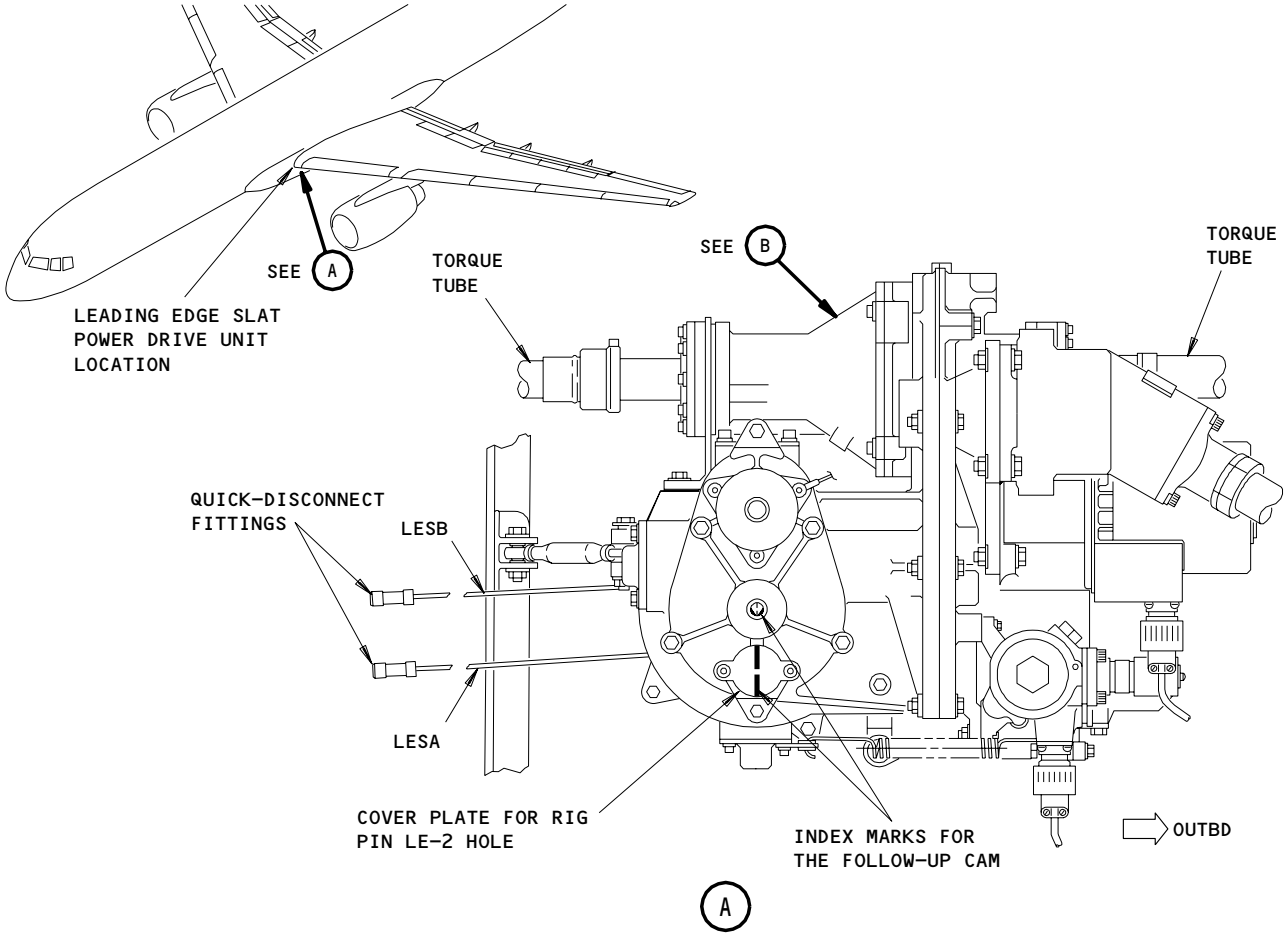
S 215-267
(13) Move the flap control lever to the zero (FLAPS UP) detent and do a check as follows:
(a) Make sure the TE flaps and LE slats go to the fully retracted position in less than 52 seconds of initial flap control lever movement.

S 735-347
(14) Do the alternate (electric) power system test (AMM 27-51-00, Operational Test)

F. Auto Slat Extension and Retraction Test

S 715-286
(1) Make sure the IRU is in operation (AMM 34-21-00/501).

S 215-354
(2) Put the flap lever in the 1-unit detent and do a check as follows:
(a) Make sure the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.

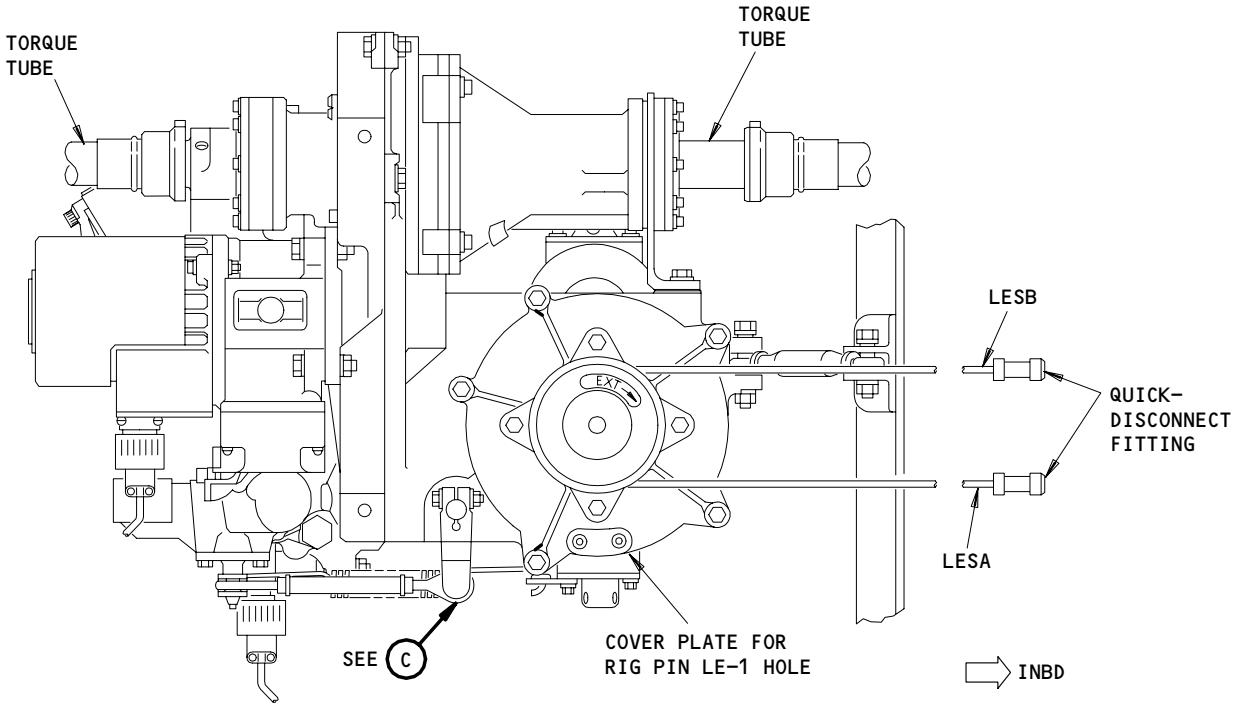


SLAT CABLE ADJUSTMENT LOAD	
TEMP °F (°C) ±5°F (±3°C)	LESA, LESB POUNDS (Kgs)
110 (43)	118 (53)
90 (32)	109 (49)
80 (26)	104 (47)
70 (21)	100 (45)
60 (15)	96 (43)
50 (10)	92 (41)
40 (4.4)	88 (39)
30 (-1.1)	84 (38)
10 (-12)	75 (34)
-10 (-23)	67 (30)
-30 (-34)	59 (26)
-40 (-40)	53 (24)

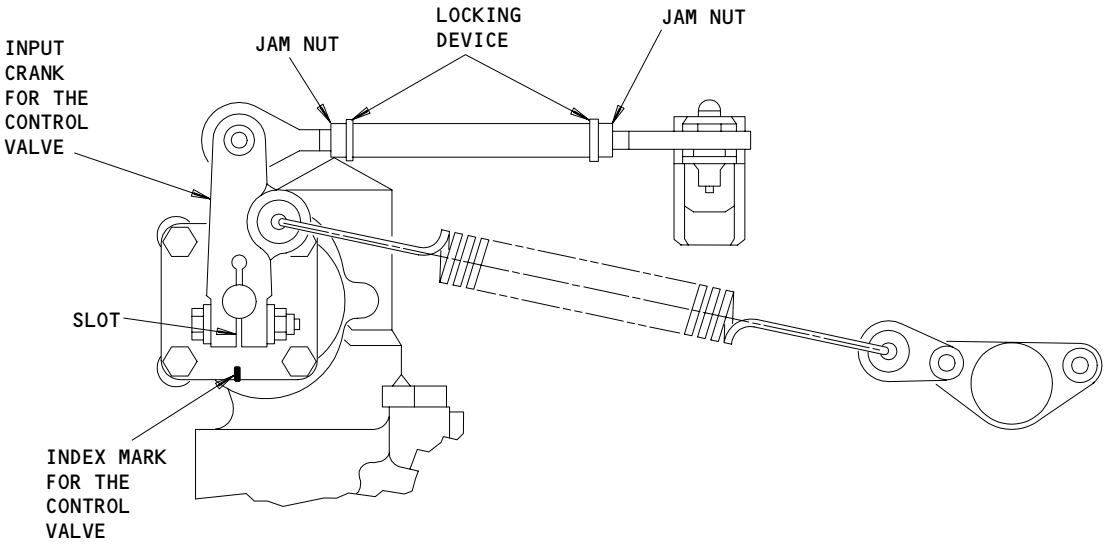
NOTE: THE CABLE TENSION VALUES ARE NOT CORRECT IF THE TEMPERATURE DIFFERENCES ARE GREATER THAN 5°F (3°C) AT TWO DIFFERENT POINTS ON THE CABLE RUN. MAKE SURE THAT THE AIRCRAFT AND AIR TEMPERATURES ARE STABLE FOR ONE HOUR BEFORE ADJUSTMENT.

TABLE I

Leading-Edge Slat Power-Drive-Unit
Figure 502 (Sheet 1)

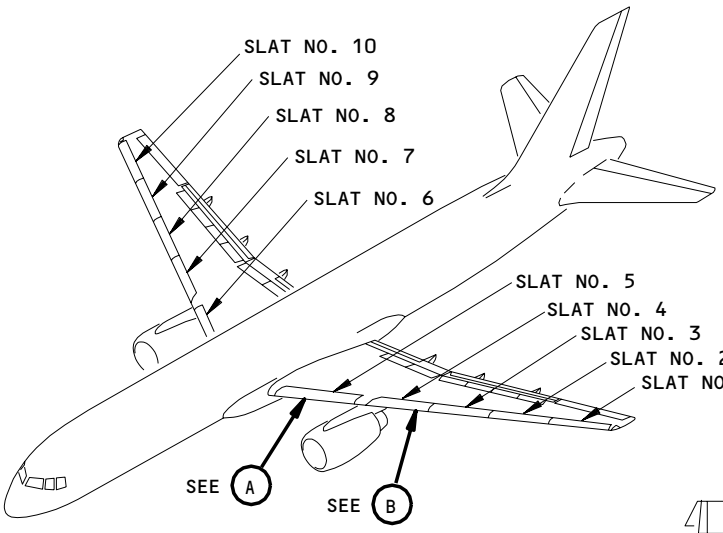


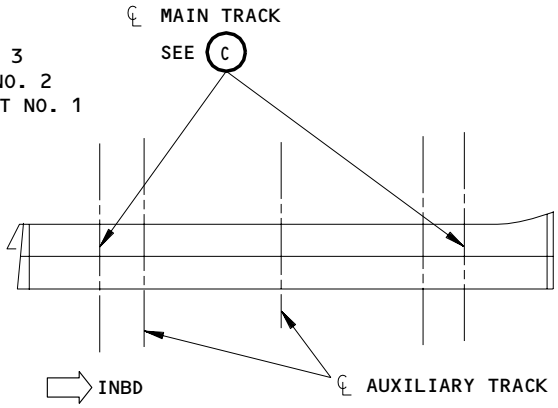
B



C

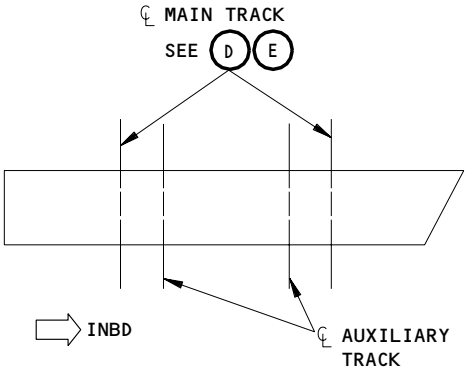
Leading-Edge Slat Power-Drive-Unit
Figure 502 (Sheet 2)





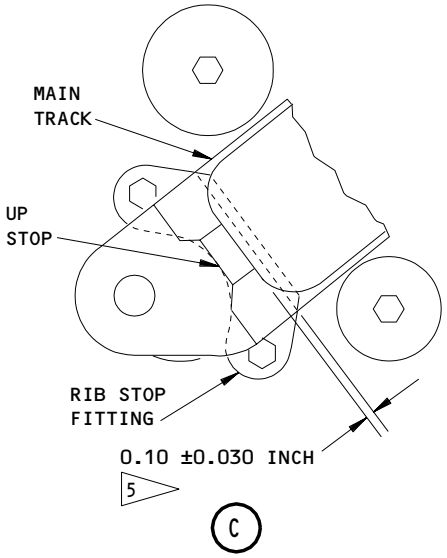
SLAT NO. 5
(TOP VIEW)
(SLAT NO. 6 IS OPPOSITE)

A



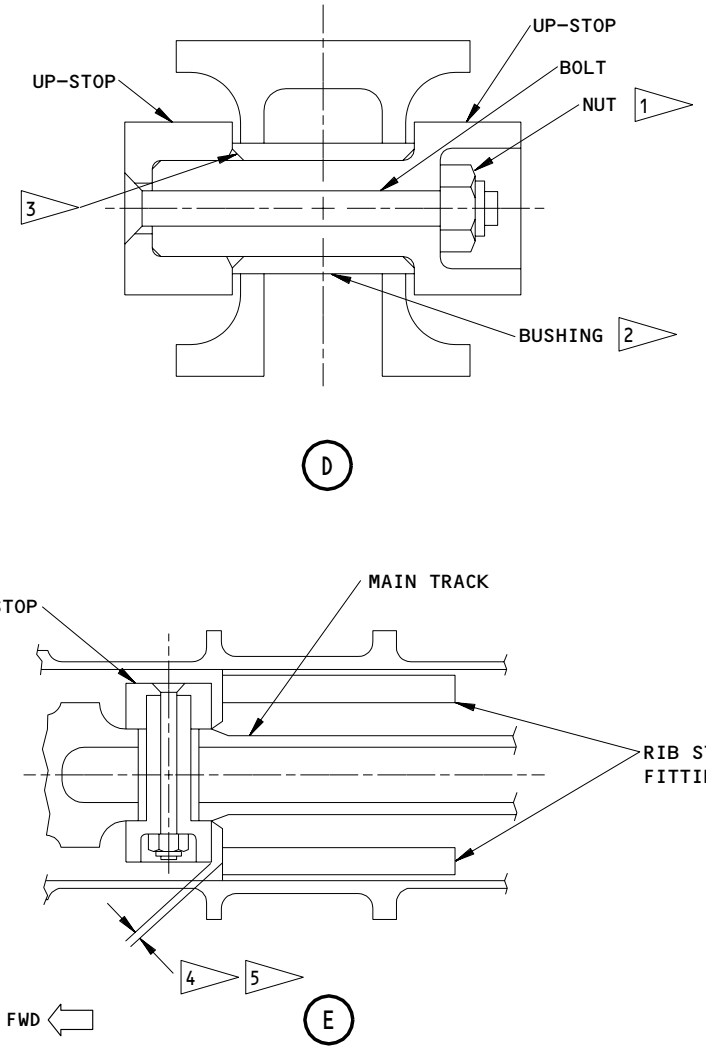
LEFT OUTBOARD SLAT NO. 4
(TOP VIEW)
(OUTBOARD SLATS NO. 1-3 ARE THE SAME
AND SLATS 7-10 ARE OPPOSITE)

B



C

Inboard and Outboard Leading Edge Slats
Figure 503 (Sheet 1)



1 THE END OF THE BOLT MUST NOT EXTEND FARTHER THAN THE END OF THE UP-STOP. NO MORE THAN FOUR THREADS ARE PERMITTED IN THE BEARING.

2 APPLY A LARGE QUANTITY OF PRIMER TO THE ID OF HOUSING AND THE OD OF BUSHING. ASSEMBLE THE HOUSING AND THE BUSHING WHILE THEY ARE WET WITH PRIMER. FILLET THE SEAL BUSHING OD WITH SEALANT.

3 CHAMFER ID OF BOTH ENDS OF THE BUSHING 0.030-0.035 INCH X 45 DEGREES.

4 0.1 ±0.03 INCH (2.54 ±0.76 mm)

5 YOU CAN USE MODELING CLAY AND A SCALE TO MEASURE THE CLEARANCE BETWEEN THE MAIN TRACK UP-STOP AND THE RIB UP-STOP FITTINGS.

Inboard and Outboard Leading-Edge Slats
Figure 503 (Sheet 2)

S 215-545

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(3) Operate and hold the test switch for the LEFT STALL warning on the side panel, P61, and do a check as follows:
(a) Make sure the LE slats move to the fully extended position and the captain's stick shaker operates.

S 215-356

(4) Release LEFT stall warning test switch and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the stick shaker stops.

S 215-357

(5) Operate and hold the test switch for the RIGHT stall warning and do a check as follows:
(a) Make sure the LE slat moves to the fully extended position and the first officer's stick shaker operates.

S 215-358

(6) Release the test switch and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the first-officer's stick shaker stops.

S 215-365

(7) Operate and hold the test switches for the LEFT and RIGHT stall warning and do a check as follows:
(a) Make sure the LE slats move to the fully extended position and the two stick shakers operate.

S 215-366

(8) Release the two test switches and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the two stick shakers stop.

S 845-359

(9) Put the flap control lever in the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

G. Put the Airplane Back to Its Usual Condition

S 865-432

(1) Remove pressure from the hydraulic system (Ref 29-11-00).

S 865-360

(2) Remove electrical power (Ref 24-22-00).

S 865-382

(3) Activate the thrust reverser (Ref 78-31-00).

TASK 27-81-00-825-296

3. Adjustment - LE Slat System

A. General

(1) Refer to 27-81-08 to remove/install/adjust the transmitter for the LE slat PDU. Refer to 27-88-01 to remove/install/adjust the position transmitters for the LE slats.

(2) The LE slat system is correctly adjusted when conditions that follow are met:

(a) Power Drive Unit for the LE Slat

1) With the slats fully retracted by hydraulic power and the flap control lever in the zero (FLAPS UP) detent, the LE slat system must agree with the condition that follows: the rig pin LE1 for the input cam installs easily in the rig pin hole and the rig pin LE2 for the follow-up cam installs easily in the rig pin hole (Fig. 502). If these steps can not be done, do the steps in the Adjust LE Slat PDU paragraph.

(b) LE Slat Fully Retracted Position (by hydraulic power)

1) At each slat rotary actuator, the clearance between the main track up-stop and the rib up-stop fittings is 0.07-0.13 inch (1.8-3.3 mm) (Fig. 503). You can use modeling clay and a scale to measure this clearance. If this clearance is not met, refer to the procedures "Adjust Inboard LE Slat Drive" or "Adjust Outboard LE Slat Drive".
.

B. Equipment

(1) Rigging Equipment, Inboard Slats from Set - B27001-1, B27001-33, or B27001-40 as follows:

(a) Spacer Assembly (Spring Clip), Main Track Upstop - B27001-8 (4 required; 2 for each inboard slat)

(2) Rigging Equipment, Outboard Slats from Set - B27001-51) as follows:

(a) Pin Assembly, Main Track Upstop Rigging, Outboard Slat Requires the following parts:

1) Pin Assembly - B27001-3 (16 required, 2 per slat)
2) Cap - B27001-4 (16 required; 2 per slat)
3) Screw - MS24694-C71 (Commercially Available) (To hold pin assembly and cap together)
4) Nut - MS21044NS (Commercially Available) (To hold pin assembly and cap together)

(3) Rig Pins from Kit B20003-XX (Ref 20-10-24)
(a) LE1 P/N B20003-3
(b) LE2 P/N B20003-3
(4) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
(a) Circuit Breaker Lock - B27020-25

C. Consumable Materials
(1) C00259 Primer - BMS 10-11, Type 1
(2) A00247 Sealant - BMS 5-95
(3) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

D. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) AMM 20-10-03/401, Control Cables - Removal/Installation
(3) 24-22-00/201, Electrical Power - Control
(4) 27-81-01/401, Inboard Leading Edge Slat
(5) 27-81-02/401, Outboard Leading Edge Slat
(6) 27-81-08/201, Leading Edge Slat Power Drive Unit Components
(7) 27-88-01/401, Leading Edge Slat Position Transmitter
(8) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

E. Access
(1) Location Zones

193	Wing to Body - Forward Lower Half Left
211/212	Control Cabin - Section 41 (Left/Right)
510/610	Wing Leading Edge - Forward of Front Spar and Inboard of Nacelle Strut
520/620	Wing Leading Edge - Forward of Front Spar and Outboard of Nacelle Strut

(2) Access Panel

511CB/611CB	Power Drive Unit and Hydraulics (Left/Right)

F. Prepare for Adjustment

S 045-254

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO YOU OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00/201).

S 845-029
(2) Make sure the trailing-edge flap-system and the position transmitters fot the trailing edge flaps (left and right wing transmitters and TE flap PDU transmitter) are correctly adjusted (Ref 27-51-00).

S 845-030

(3) Make sure the position transmitter for the flap control lever is adjusted correctly (Ref 27-51-33).

S 865-267

CAUTION: MAKE SURE YOU USE NORMAL HYDRAULIC POWER (FLAP CONTROL LEVER) TO MOVE THE TE FLAPS AND LE SLATS WHEN YOU ADJUST THE LE SLAT SYSTEM. DO NOT USE ELECTRIC POWER (POSITION SELECTOR SWITCH FOR THE FLAP/SLAT ALTERNATE DRIVE) TO MOVE THE TE FLAPS AND LE SLATS. IF YOU DO NOT USE HYDRAULIC POWER TO MOVE THE TE FLAPS AND LE SLATS, YOU CAN INCORRECTLY ADJUST THE LE SLATS AND CAUSE DAMAGE TO THE AIRPLANE.

(4) Make sure the TE flaps and LE slats are in the fully retracted position, and that the flap control lever is in the zero (FLAPS UP) detent.

S 845-032

(5) Put a DO-NOT-OPERATE tag on the flap control lever.

S 845-033

(6) Make sure the downlocks for the nose and main landing gear are installed (Ref 32-00-20).

S 495-034

WARNING: OBEY PROCEDURE INSTRUCTIONS FOR INSTALLATION OF DOOR LOCKS. FAST ACTION OF DOORS CAN CAUSE INJURY OR DAMAGE IF LOCKS ARE NOT PROPERLY INSTALLED.

(7) Open the main gear doors and install the locks (AMM 32-00-15/201).

S 865-035

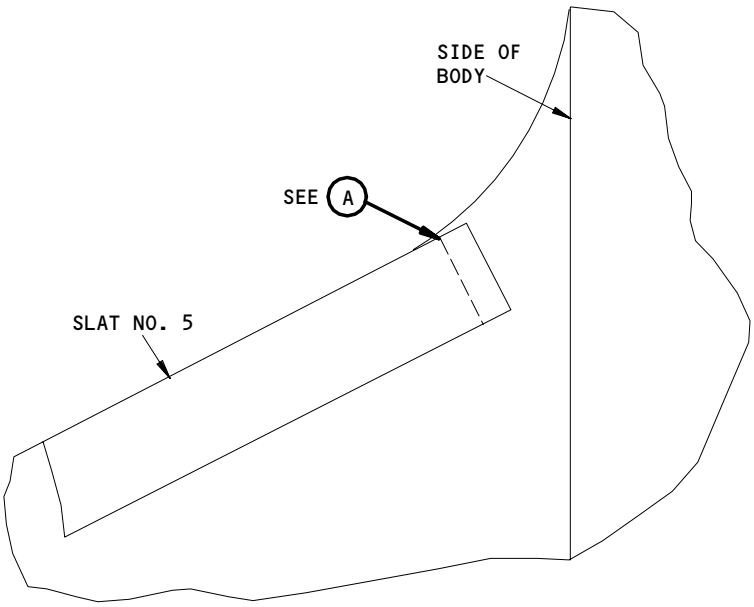
(8) Remove the pressure from the left hydraulic system (Ref 29-11-00).

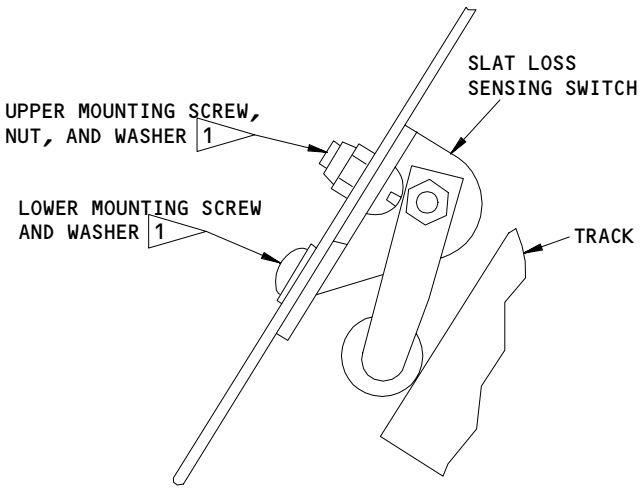
S 495-036

(9) Install the lock in the power drive unit (PDU) for the TE flaps (Fig. 507).

S 865-037

(10) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER



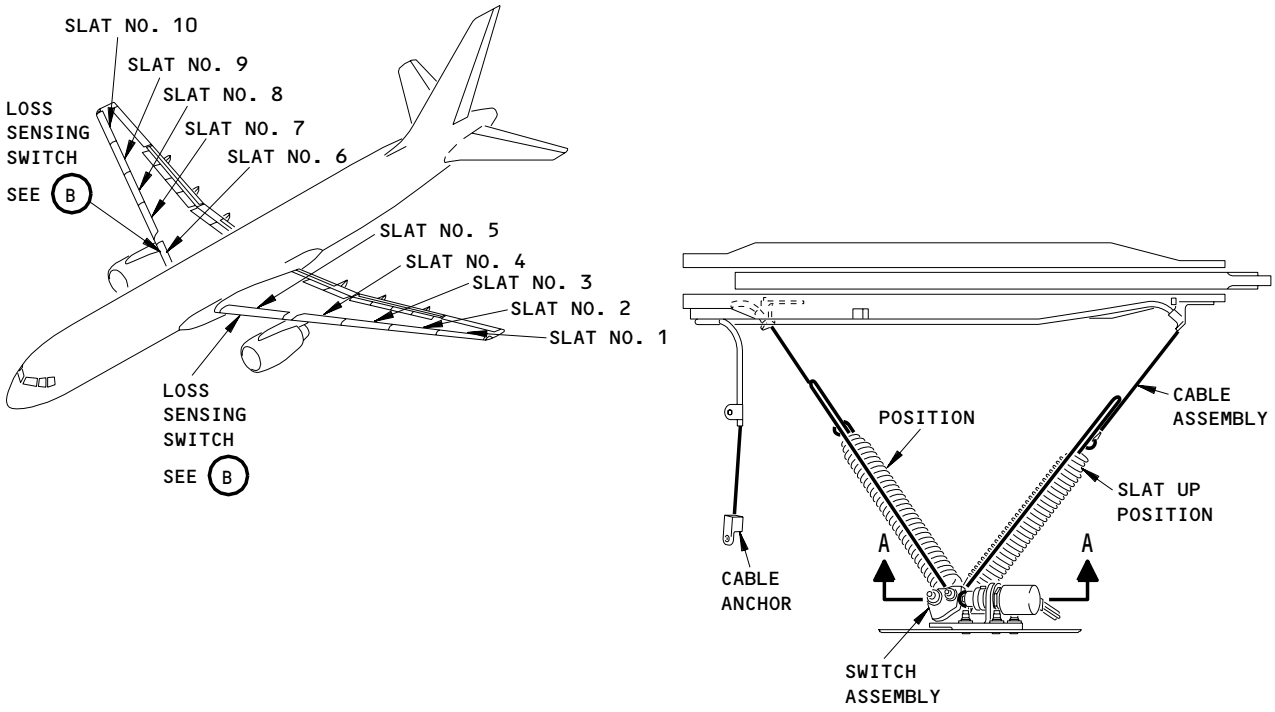


SLAT NO. 5 SHOWN
(SLAT NO. 6 OPPOSITE)

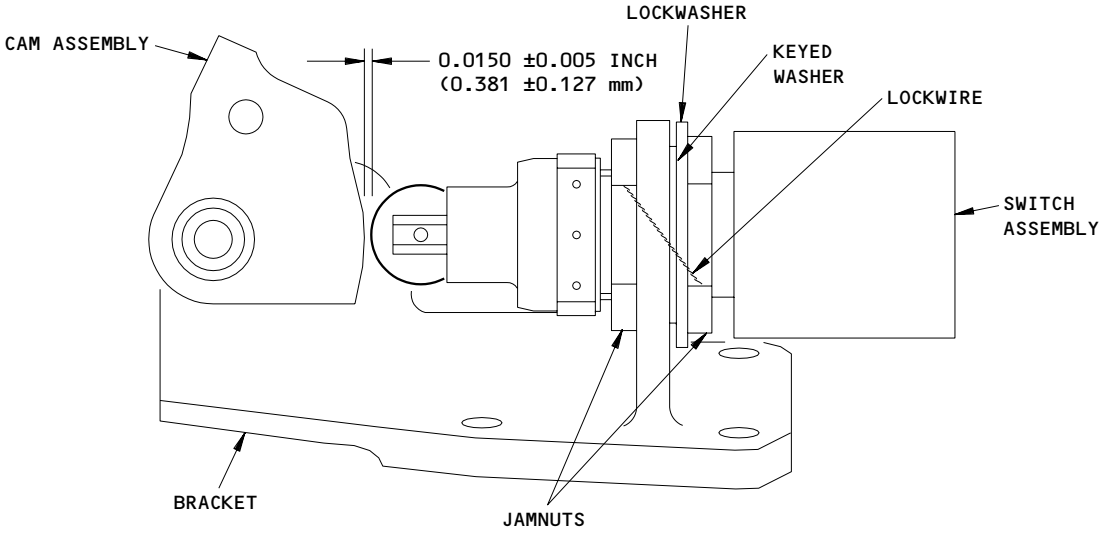
A

1 INSTALL WITH BMS 5-95 SEALANT
(REF 51-31-01)

Inboard Leading Edge Slat Loss Sensing Installation
Figure 504 (Sheet 1)



LOSS SENSING SWITCH
B

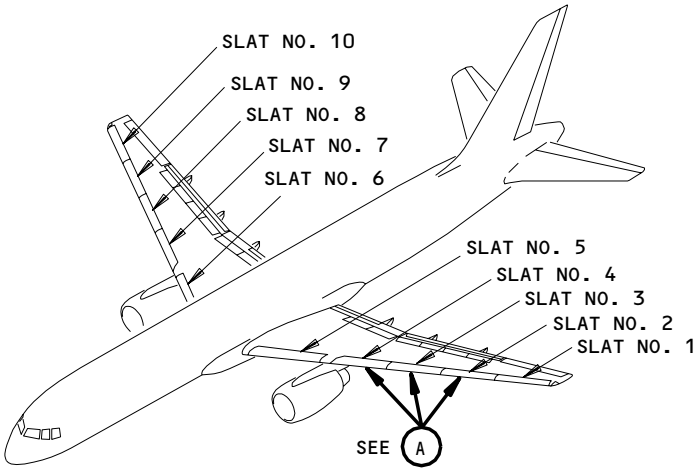


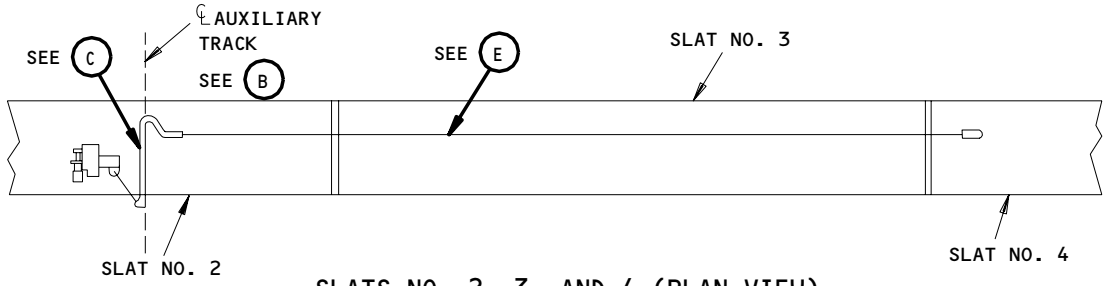
SWITCH ASSEMBLY
A-A

Inboard Leading Edge Slat Loss Sensing Installation
Figure 504 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH CABLE AND CAM ACTUATED SWITCH;

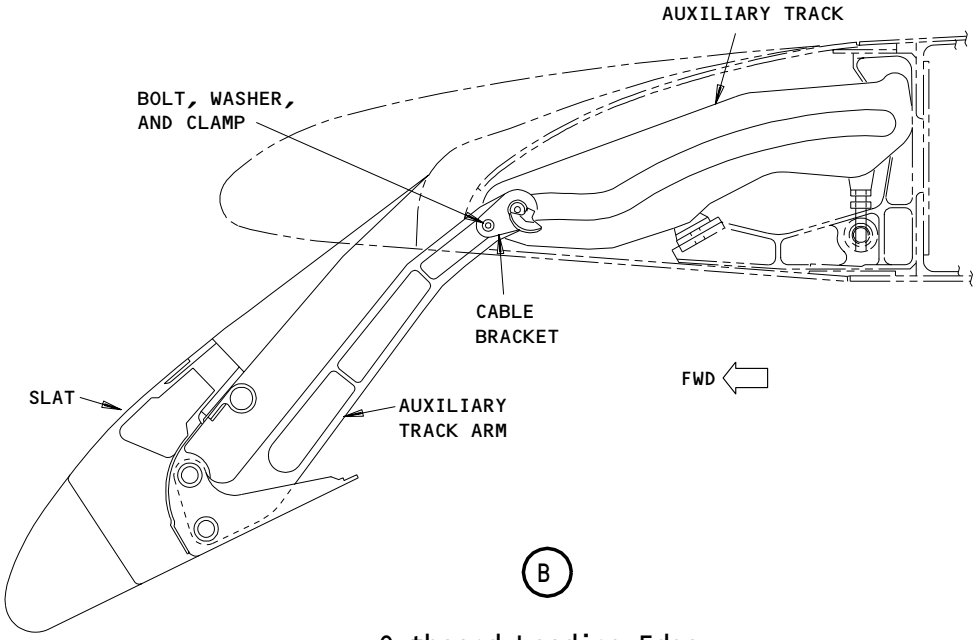
F28116





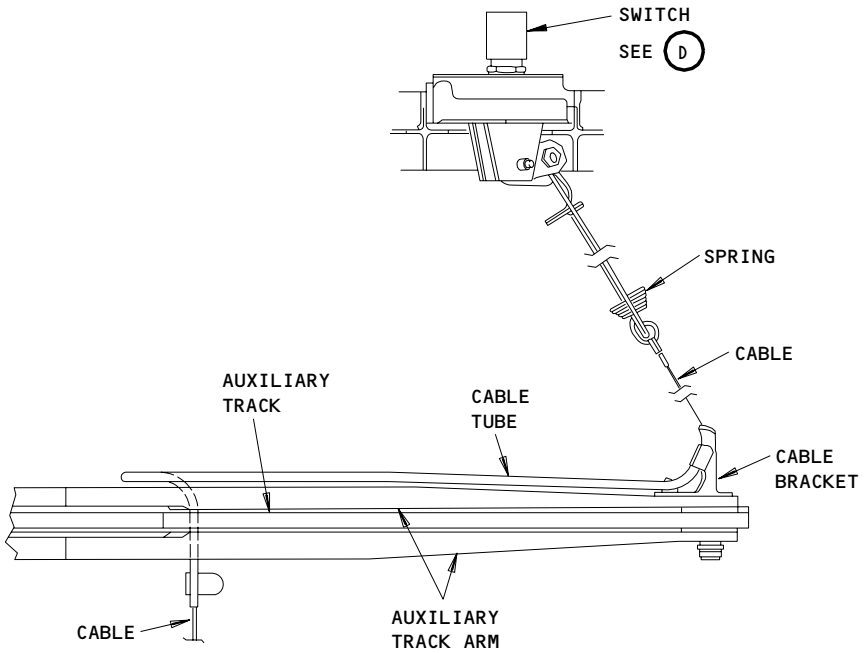
SLATS NO. 2, 3, AND 4 (PLAN VIEW)
(SLATS NO. 7, 8, AND 9 ARE OPPOSITE)

A

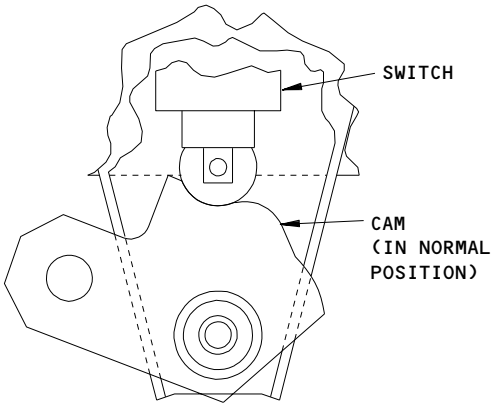


B

Outboard Leading Edge
Slat Loss Sensing and Indication Cable Installation
Figure 505 (Sheet 1)

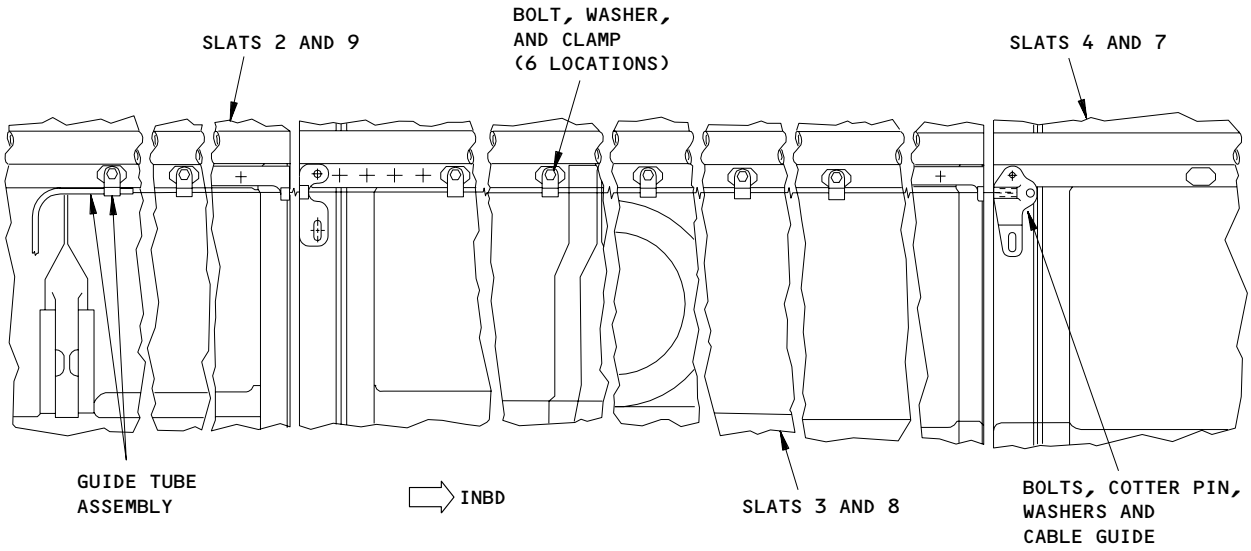


C



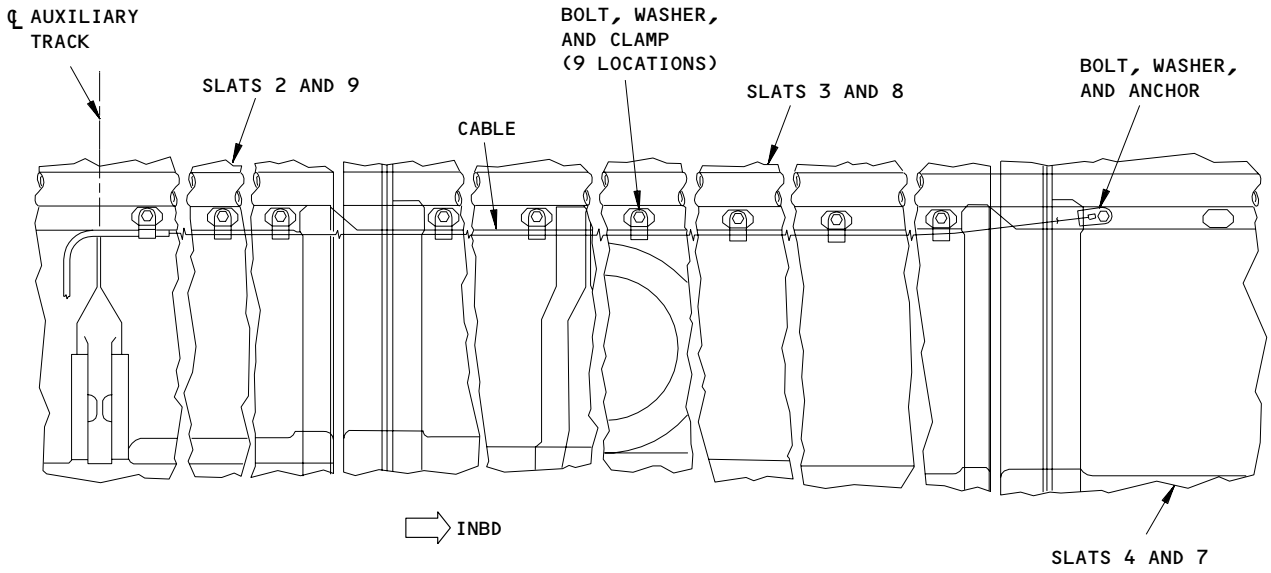
D

Outboard Leading Edge
Slat Loss Sensing and Indication Cable Installation
Figure 505 (Sheet 2)



AIRPLANES WITH CABLE GUIDE AT SLATS 4 AND 7

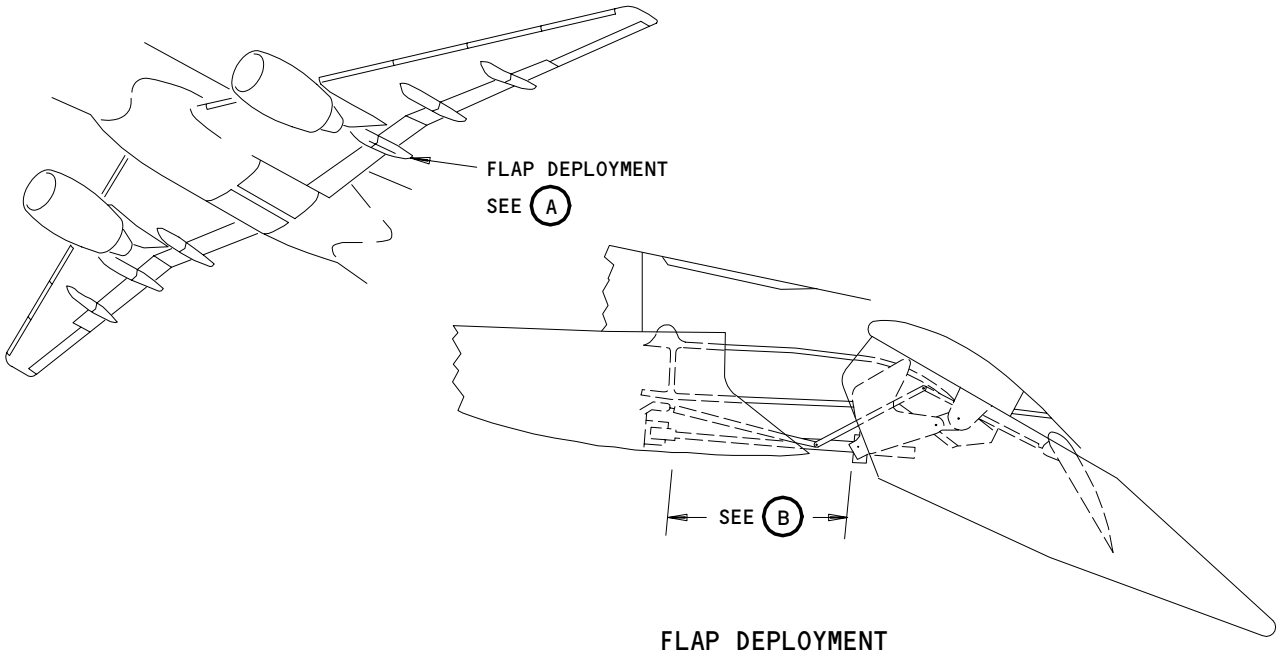
(E)



AIRPLANES WITH ANCHOR AT SLATS 4 AND 7

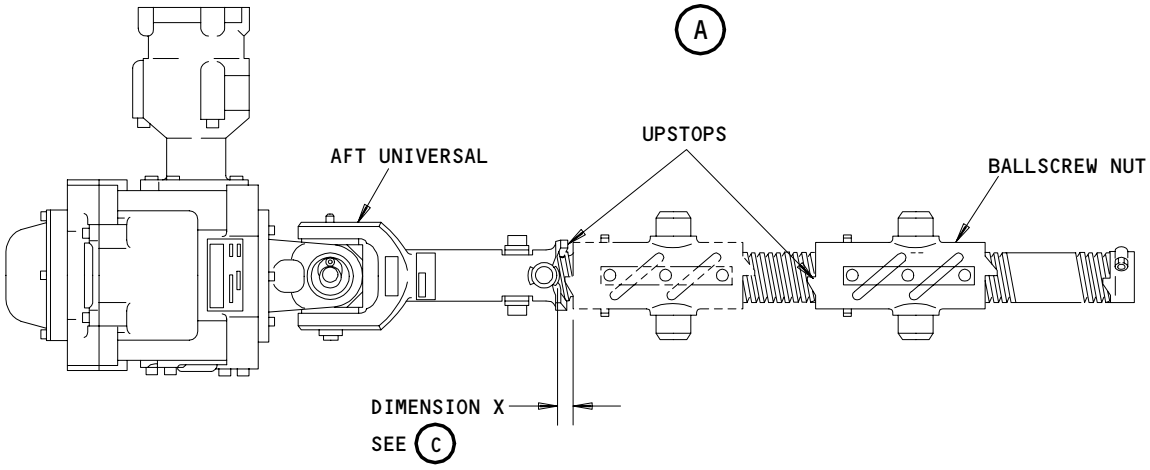
(E)

Outboard Leading Edge
Slat Loss Sensing and Indication Cable Installation
Figure 505 (Sheet 3)

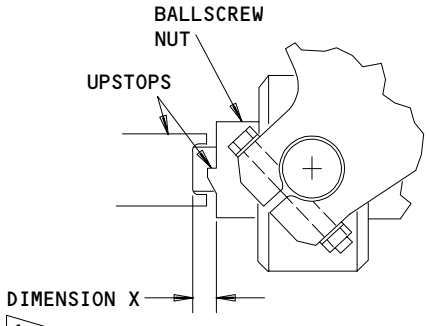


FLAP DEPLOYMENT

A



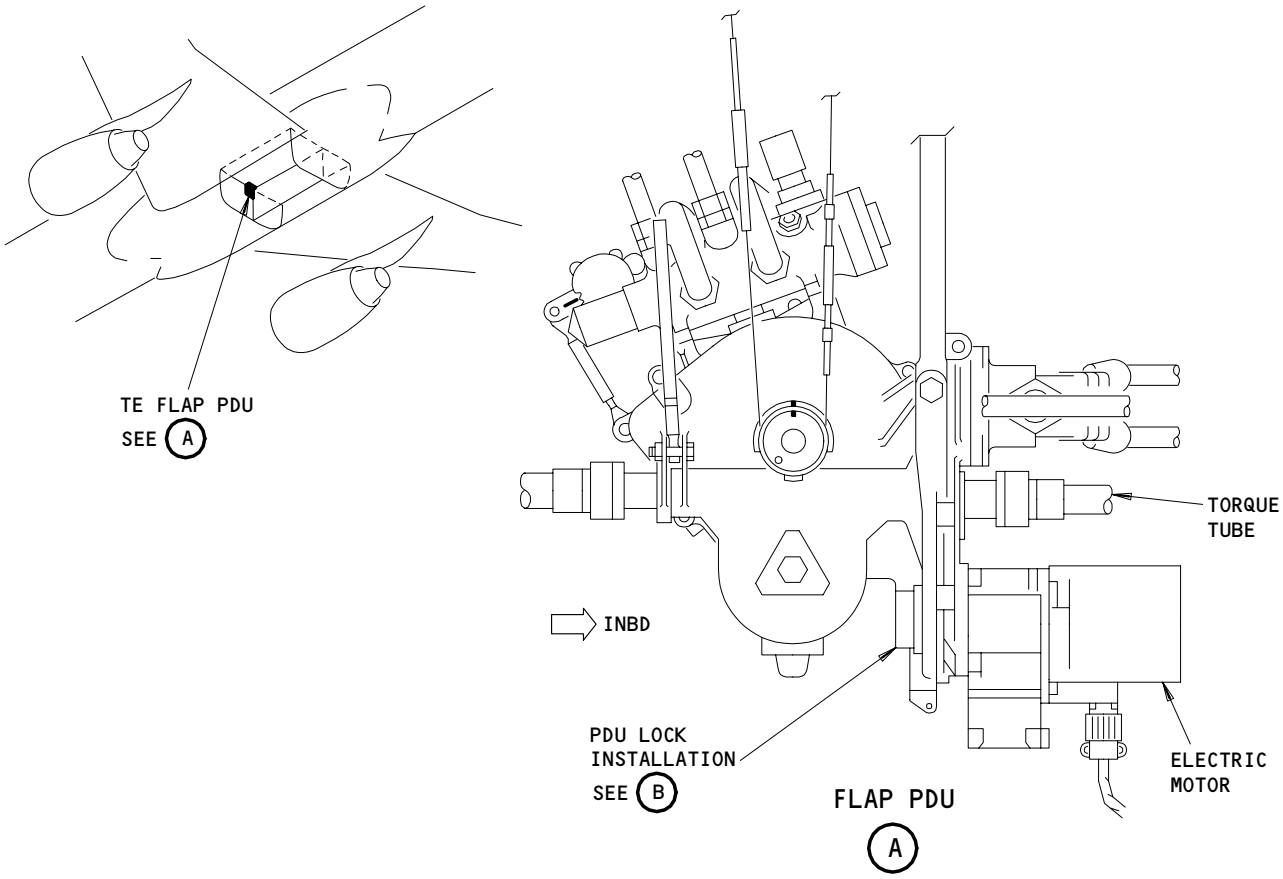
B



C

1 MEASURE DIMENSION X AS STARTING POINT FOR MEASUREMENT OF BALLSCREW NUT TRAVEL

Flap Travel Measurement
Figure 506



TE-Flap PDU Lock
Figure 507

(c) 11C17, FLAP/SLAT SHUTOFF 1
(d) 11D31, HYDRAULICS PTU CONT
(e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(g) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(h) 11J33, WARN ELEX A

S 865-038
(11) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-297
(12) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 015-298
(13) Remove the access panels that follow (Ref 06-44-00/201):
(a) 511CB/611CB Power Drive Unit and Hydraulics (Left)/(Right)

S 295-553

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(14) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

G. Adjust the LE Slat PDU (Fig. 502)

S 035-039
(1) Disconnect the torque tube on each side of the PDU for the LE slats (Ref 27-81-20).
(a) Attach the torque tubes to the airplane structure so they cannot turn.

S 095-328

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Remove the lock from the PDU for the TE flaps.

S 865-045
(3) Pressurize the left hydraulic system (Ref 29-11-00).

S 865-044
(4) Move the TE flaps as follows:
(a) Remove the DO-NOT-OPERATE tag from the flap control lever.
(b) Move the flap control lever to the 30-unit detent and make sure the TE flaps go to the fully extended position.
(c) Move the flap control lever to the zero (FLAPS UP) detent and make sure the TE flaps move to the fully retracted position.
(d) Let the TE flaps stay in the fully retracted position for at least 30 seconds so the PDU for the TE flaps becomes stable.

S 865-043
(5) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 495-042
(6) Install the lock for the TE flap PDU.

S 835-041
(7) Release the tension in the LESA and LESB cables and do the steps as follows:
(a) Disconnect the cables from the PDU at the quick-disconnect fittings for the cables.
(b) Keep sufficient tension on the cables so they will not fall off the pulleys.

S 835-040
(8) Install and adjust the LESA and LESB cables as follows:

NOTE: Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

(a) Remove the coverplate for the rig pin LE1.
(b) Connect the LESA and LESB cables to the PDU at the cable quick-disconnect fittings.
(c) Tighten the cables to the values shown in Table I, Figure 502, and do the step that follows:
(d) Make sure the rig pin LE1 can be removed and installed easily.
(e) Remove the rig pin LE1.
(f) Do a check for shearout on the output drum of the PDU for the TE flaps as follows:
1) Put a straight 0.032-inch diameter wire into the drum inspection hole.
2) The shearout is O.K. if the wire can be pushed in 1.00 inches.

S 095-047
(9) Remove the lock from the TE flap PDU.

S 865-048
(10) Pressurize the left hydraulic system (Ref 29-11-00).

S 835-049

(11) Do a check of the LESA and LESB cables as follows:

(a) Extend the flaps as follows:

1) Put the flap control lever in the 30-unit detent.

2) Make sure the TE flaps move to the fully extended position.

3) Make sure the disconnected output shaft on the LE slat PDU turns and stops.

(b) Retract the TE flaps as follows:

1) Put the flap control lever in the zero (FLAPS UP) detent.

2) Make sure the TE flaps move to the fully retracted position.

3) Make sure the disconnected output shaft on the LE slat PDU turns and stops.

4) Wait 30 seconds to let the TE flap PDU become stable.

(c) Put rig pin LE1 in the LE slat PDU and make sure the rig pin moves freely.

NOTE: If the rig pin cannot move freely, do the install and adjust the LESA and LESB cables procedure again and do a check of the LESA and LESB cables to this step. Refer to AMM 20-10-03/401 for instructions on control cable removal/installation.

(d) Remove the rig pin LE1.

(e) Make sure that no more than two turnbuckle threads show.

(f) Install the turnbuckle locking clip.

(g) Apply a corrosion preventative compound.

(h) Do a check of the shearout for the output drum of the TE flap PDU as follows:

1) Put a straight 0.032-inch diameter wire into the drum inspection hole.

2) The shearout is correct if the wire can be pushed in 1.00 inch.

(i) Put a DO-NOT-OPERATE tag on the flap control lever in the zero (FLAPS UP) detent.

S 865-052

(12) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 495-051

(13) Install the lock in the TE flap PDU.

S 835-050

(14) Do the mechanical null of the PDU as follows:

(a) Install the rig pin LE1 in the rig pin hole of the input cam on the LE slat PDU.

CAUTION: ROTATE POWER DRIVE UNIT OUTPUT SHAFT MANUALLY ONLY. DAMAGE MAY OCCUR IF A POWER TOOL IS USED FOR OUTPUT SHAFT ROTATION.

(b) Remove the coverplate for the rig pin LE2.
(c) Install the rig pin LE2 in the rig pin hole for the follow-up cam.

NOTE: To install the rig pin you may have to turn the output shaft for the PDU.

(d) Make sure the input crank of the control valve is set so the index mark on the control valve is aligned with the input crank slot.
(e) If the slot and mark were not aligned adjust as follows:
1) Loosen the jam nut and locking device at each end of the input rod on the control valve.
2) Turn the input rod barrel until the input crank slot aligns with the index mark on the control valve.
3) Tighten the jam nuts against the locking devices.
4) Make sure no more than eight threads are seen at each end of the input rod.

NOTE: Do not install the lockwire at this time.

(f) Make sure the rig pins LE1 and LE2 can be installed easily with the input crank slot aligned with the index mark on the control valve.
(g) Remove the rig pins LE1 and LE2.

S 865-055
(15) Supply electrical power (Ref 24-22-00).

S 865-054
(16) Pressurize the left hydraulic system (Ref 29-11-00).

NOTE: The output shaft of the PDU may make a small movement.

S 835-053
(17) Do the hydraulic null of the power drive unit as follows:

NOTE: You must supply electrical power and pressurize the left hydraulic system to do this procedure.

(a) Make sure the rig pin LE2 can be installed easily in the rig pin hole for the follow-up cam and if the rig pin cannot be easily installed do the adjustment that follows:

NOTE: If the rig pin can be easily installed, the input crank does not have to align with the index mark.

1) Remove the rig pin LE2.
2) Loosen the jam nut and locking device at each end of input rod of the control valve.
3) Turn the input rod barrel until the rig pin LE2 can be easily installed.

NOTE: Do not turn the barrel with rig pin LE2 installed. If the rig pin can be easily installed, the input crank does not have to be aligned with the index mark.

4) Tighten the jam nuts against the locking devices of the input rod.
5) Make sure that no more than eight threads are seen at each end of the input rod.
6) Install the lockwire on the jam nuts by the double twist method.
7) Make sure the rig pin LE2 can be easily installed.

(b) If not done, install the lockwire to the jam nuts by the double twist method.

S 865-061
(18) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 095-060
(19) Remove the rig pin LE2.

S 415-059
(20) Install the coverplate for the rig pin LE2.

S 735-058
(21) Make sure the coverplate index mark and the index mark for the gear shaft align in less than ± 0.01 inch (+/- 0.25 mm).

S 825-056

(22) If you have to adjust the LE slat system, do the steps that follow:
  (a) Adjust the drives for the inboard and outboard LE slat (Ref Adjust Inboard LE Slat Drive or Adjust Outboard LE Slat Drive, this subject).
  (b) Adjust the position transmitters for the LE slat PDU, the left wing LE slat and the right wing LE slat (Ref Adjust LE Slat PDU Position Transmitter, this subject).
  (c) Return the airplane back to its usual condition (Ref Return the Airplane Back to Its Usual Condition, this subject).

S 865-062

(23) If you do not have to adjust the LE slat system, do the steps that follow:
  (a) Install the torque tubes on each side of the LE slat PDU (Ref 27-81-20).
  (b) Adjust the position transmitters for the LE slat PDU, the left wing LE slat and the right wing LE slat (Ref Adjust LE slat PDU Position Transmitter, this subject).
  (c) Return the airplane back to its usual condition (Ref Return the Airplane Back to Its Usual Condition, this subject).

H. Adjust Inboard LE Slat Drive (Slats No. 5 and 6) (Fig. 503)

S 295-554

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 845-063

(2) Make sure the LE slat PDU is correctly adjusted (Ref Adjust LE PDU, this subject).

S 035-064

(3) If not done before, remove the torque tube on each side of the LE slat PDU (Ref 27-81-20).

S 035-065

(4) Remove the torque tube on the outboard side of the outboard rotary actuator of slat No. 5 and 6 (Ref 27-81-20).

S 845-066

(5) If slat No. 5 or 6 must be adjusted for fit and fair, remove and install slat (Ref 27-81-01). If not, do the subsequent step as follows:

(a) Manually adjust slats No. 5 and No. 6 so the clearance between the main track upstops and the rib upstop fittings is 0.10 +/- 0.030 inch (2.54 +/- 0.76 mm) by use of a B27001-8 Rigging Tool (Detail C, Fig. 503).

NOTE: You can use modeling clay and a scale to measure this clearance. Do not move the slats from this position.

S 425-067

(6) Install the torque tube on each side of the LE slat PDU (Ref 27-81-20).

NOTE: Make sure the adjust position of the output shaft for the LE slat PDU and adjusted positions for the slats No. 5 and 6 are not moved while the torque tubes are installed.

S 825-068

(7) Adjust the outboard LE slats No. 1-4 and 7-10 (Ref Adjust Outboard LE Slat Drive, this subject).

I. Adjust Outboard LE Slat Drive (Slats No. 1-4 and 7-10) (Fig. 503).

S 295-555

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 845-069

(2) Make sure the LE slat PDU is correctly adjusted (Ref Adjust LE Slat PDU, this subject).

S 845-070

(3) Make sure the inboard LE slat drive (slats No. 5 and 6) is correctly adjusted (Ref Adjust Inboard LE Slat Drive, this subject) and connected to the LE slat PDU.

S 035-071

(4) If not done before, remove the torque tube on the outboard side of the outboard rotary actuator for the slats No. 5 and 6 (Ref 27-81-20).

S 035-072
(5) Remove the torque tubes (Ref 27-81-20) between the slats that follow:
(a) Slats No. 1 and 2
(b) Slats No. 2 and 3.
(c) Slats No. 3 and 4.
(d) Slats No. 7 and 8
(e) Slats No. 8 and 9.
(f) Slats No. 9 and 10.

S 025-076
(6) If one or more of the slats No. 1-4 or 7-10 must by adjusted for fit-and-fair, remove and install the slat (Ref 27-81-02).

S 025-065
(7) Remove the main track upstops (two locations) at each slat and do the step that follows (Views D and E, Fig. 503):

NOTE: You can use modeling clay and a scale to measure the clearance between the main track up-stop and the rib up-stop fittings.

(a) Install the rigging upstop.

S 865-075
(8) Manually put each slat with the rigging upstops against the rib upstop fittings.

S 435-074
(9) Install the torque tubes between the slats (Ref 27-81-20) that follow:
(a) Slats No. 1 and 2.
(b) Slats No. 2 and 3.
(c) Slats No. 3 and 4.
(d) Slats No. 7 and 8.
(e) Slats No. 8 and 9.
(f) Slats No. 9 and 10.

S 435-073
(10) Install the torque tube to the outboard rotary actuator on the outboard side of the slats No. 5 and 6 outboard rotary actuator (Ref 27-81-20)

NOTE: This connects the outboard slat drive to the inboard slat drive. Maintain the retracted rig position of the slats No. 5 and 6 as the outboard slat drive is connected to the inboard slat drive.

S 095-258

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(11) Remove the lock from the TE flap PDU.

S 865-077
(12) Pressurize the left hydraulic system (Ref 29-11-00).

S 095-078
(13) Remove the tag from the flap control lever.

S 865-079
(14) Put the flap control lever in the 1-unit detent and make sure the TE flaps move to the 1-unit position, and the LE slats move to the intermediate position.

S 495-080
(15) Put a DO-NOT-OPERATE tag on the flap control lever.

S 865-081
(16) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 495-082
(17) Install the lock in the TE flap PDU.

S 035-083
(18) Remove the rigging upstop (two locations) at each outboard slat and and the step that follows:
(a) Install the main track upstop (Views D and E, Fig. 503).

NOTE: You can use modeling clay and a scale to measure the clearance between the main track up-stop and the rib up-stop fittings.

S 095-084
(19) Remove the lock from the TE flap PDU.

S 865-085
(20) Pressurize the left hydraulic system (Ref 29-11-00).

S 095-086
(21) Remove the tag from the flap control lever.

S 865-087
(22) Put the flap control lever in the zero (FLAPS UP) detent and make sure the LE slats and TE flaps move to the fully retracted position.

S 865-088
(23) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 495-089
(24) Install the lock in the TE flap PDU.

S 825-090
(25) Adjust the position transmitter for the LE slats No. 1 and 10 and the position transmitter for the LE slat PDU (Ref Adjust LE Slat PDU Position Transmitter, this subject).

S 845-091
(26) Return the airplane to back its usual condition (Ref Return the Airplane Back to Its Usual Condition paragraph).

J. Adjust the LE Slat PDU Position Transmitter and the Slat No. 1 or 10 Position Transmitter

S 825-092
(1) Refer to 27-81-08 to adjust the position transmitter on the LE slat PDU and to 27-88-00, to adjust the position transmitter at the slats No. 1 and 10.

K. Return the Airplane Back to its Usual Condition

S 095-093
(1) Check that trailing edge flaps and leading edge slats are in fully retracted position, and that flap lever is in zero (FLAPS UP) detent. Remove DO-NOT-OPERATE tag from flap lever.

S 095-094
(2) Remove the tag from the flap control lever.

S 495-095
(3) Remove the lock from the TE flap PDU.

S 865-096
(4) Remove the circuit breaker locks and the DO-NOT-CLOSE tag and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C17, FLAP/SLAT SHUTOFF 1
(d) 11D31, HYDRAULICS PTU CONT
(e) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(f) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(g) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(h) 11J33, WARN ELEX A

S 865-097

(5) Remove the circuit breaker locks and close these circuit breakers on the P6 panel that follow:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 295-556

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(6) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 015-098

(7) Install the access panels and close the access doors (Ref 06-44-00).

S 095-299

WARNING: OBEY PROCEDURE INSTRUCTIONS FOR THE REMOVAL OF DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Remove the main gear door locks and close the doors (AMM 32-00-15/201).

S 445-099

(9) Do this procedure: Thrust Reverser Activation (Ref 78-31-00).

TASK 27-81-00-735-300

4. System Test - LE Slat System

A. General

(1) The usual operation of the leading edge (LE) slat system must have the systems that follow operational:
(a) The position indicating system for the LE slats
(b) The trailing-edge (TE) flap system
(c) The position indicating system for the TE flaps
(d) The flap/slat electronic unit (FSEU).

(2) While the LE slats are tested, the trailing edge flaps will move to the control input.

(3) Use a Hydraulic Service Cart or the Engine Driven Pump (EDM) to supply hydraulic pressure during the test of the slat system. The alternate current motor pump (ACMP) does not supply enough hydraulic pressure to complete the test of the slat system.

(4) TE flaps and LE slats operate in a controlled sequence. The flap motion and slat motion will not always occur at the same time. For test of the TE flap system refer to 27-51-00.

(5) Test the takeoff warning for the LE slats (Ref 31-51-00, Warning System - Adjustment/Test).

B. Equipment

(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1

(2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:

(a) Circuit Breaker Lock - B27020-25

C. References

(1) 24-22-00/201, Electrical Power - Control

(2) 27-51-00/501, Trailing Edge Flap System

(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(4) 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

119/120	Main Equipment Center (Left/Right)
211/212	Control Cabin - Section 41 (Left/Right)
500/600	Left Wing/Right Wing

E. Prepare for the Test

S 865-433

(1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 865-386

(2) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach DO-NOT-CLOSE tags:

(a) 11B18, WARN ELEX B

(b) 11D31, HYDRAULICS PTU CONT

(c) 11J33, WARN ELEX A

S 215-367

(3) Make sure circuit breakers on the P11 panel are closed:

(a) EICAS (6 locations)

S 215-368

(4) Make sure the alternate drives for the TE flaps and LE slats are in the condition that follows:

(a) Make sure the position selector switch for the alternate flaps/slats on the first-officer's main instrument panel, P3, is in the NORM position.

S 865-369

(5) Supply electrical power (Ref 24-22-00).

S 215-370

(6) Make sure the arming switches for the alternate drives of the TE flap and LE slat on the P3 panel are not in the armed position (switch lights will go off).

S 865-388

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

F. Test of the FSEU BITE

S 215-270

(1) Make sure the computer switch on the EICAS DISPLAY SELECT panel, P9, is in the L position.

S 745-271

(2) Do the BITE test on the FSEU-1 in the main equipment center as follows:
   (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (b) Push the YES switch on the FSEU.
   (c) Make sure the NO FAULTS message shows on the display.
   (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (f) Push the YES switch to show the FLT DECK TEST? message on the display.
   (g) Push the NO switch to show the DISPLAY TEST? message on the display.
   (h) Push the YES switch.
   (i) Make sure all LED's on the face panel of the FSEU come on.
   (j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
   (k) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (l) Push the YES switch to show the FLT DECK TEST? message on the display.
   (m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP LOAD RELIEF	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] The EICAS status page must be on for the message to show.

S 745-272

(3) Do the BITE test on the FSEU-2 in the main equipment center as follows:
   (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (b) Push the YES switch on the FSEU.
   (c) Make sure the NO FAULTS message shows on the display.
   (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (f) Push the YES switch to show the FLT DECK TEST? message on the display.
   (g) Push the NO switch to show the DISPLAY TEST? message on the display.
   (h) Push the YES switch.
   (i) Make sure all LED's on the face panel of the FSEU come on.
   (j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
   (k) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (l) Push the YES switch to show the FLT DECK TEST? message on the display.
   (m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:

INDICATION	LOCATION
TRAILING EDGE LIGHT	P3
LEADING EDGE LIGHT *[2]	P3
TE FLAP DISAGREE	UPPER EICAS SCREEN
TE FLAP ASYM	UPPER EICAS SCREEN
LE SLAT DISAGREE	UPPER EICAS SCREEN
LE SLAT ASYM	UPPER EICAS SCREEN
FLAP/SLAT ELEC *[1]	EICAS STATUS PAGE

*[1] The EICAS status page must be on for the message to show.
*[2] The LEADING EDGE light will come only if the LE slat alternate drive switch is armed (the switch light will be on) while the FSEU-2 BITE test is run.

S 745-273

(4) Do the BITE test on the FSEU-3 in the main equipment center as follows:
   (a) Push the ON/OFF switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (b) Push the YES switch on the FSEU.
   (c) Make sure the NO FAULTS message shows on the display.
   (d) Push the MENU switch on the face panel of the FSEU to show the EXISTING FAULTS? message on the display.
   (e) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (f) Push the YES switch to show the FLT DECK TEST? message on the display.
   (g) Push the NO switch to show the DISPLAY TEST? message on the display.
   (h) Push the YES switch.
   (i) Make sure all LED's on the face panel of the FSEU come on.
   (j) Push the MENU switch on the face panel of the FSEU until the EXISTING FAULTS? message shows on the display.
   (k) Push the NO switch two times to show the GROUND TESTS? message on the display.
   (l) Push the YES switch to show the FLT DECK TEST? message on the display.
   (m) Push the YES switch on the face panel of the FSEU and make sure the indications that follow show momentarily at the locations that follow:
   (n) Make sure the EICAS message, FLAP/SLAT ELEC, shows momentarily on the status display.

NOTE: The EICAS status page must be on for the message to show.

S 865-280
(5) Put the computer switch for the EICAS DISPLAY SELECT panel, P9, to the R position and do the BITE test on the FSEU-3 again.

S 865-281
(6) Put the computer switch in the L position.

G. Test Slat Primary Power and Drive

S 215-146
(1) Make sure the flap control lever is in the zero (FLAPS UP) detent and the TE flaps and LE slats are in the fully retracted position.

S 215-145
(2) Make sure the position indicator needles for the L and R flaps are in the tolerance band for the UP-unit position.

S 745-144
(3) Do the BITE test on the FSEU-1 in the main equipment center and make sure the BITE test shows no failures on the face panel.

S 865-143
(4) Move the flap control lever to the 1-unit detent and let the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.

S 215-142
(5) Make sure the TE flaps go to the 1-unit position in 5 to 7 seconds of the flap control lever movement.

S 215-141
(6) Make sure the position indicator needles for the L and R flap are in the tolerance band for the 1-unit position.

S 745-140
(7) Do the BITE test on the FSEU-1 and make sure the BITE test shows no failures on the face panel.

S 215-139
(8) Move the flap control lever to the 5, 15, 20, 25, and 30-unit detents and then to the 25, 20, 15, 5, and 1-unit detents and do the checks that follows at each detent:
  (a) Let the TE flaps and LE slats go to the correct position.
  (b) Make sure the position indicator needles for the L and R flap are in the tolerance band of the unit position set on the flap control lever.
  (c) Do the BITE test on the FSEU-1 and make sure the BITE test shows no failures on the face panel.

S 865-156
(9) Move the flap control lever to the zero (FLAPS UP) detent and let the TE flaps and the LE slats fully retract.

S 215-155
(10) Make sure the position indicator needles for the L and R flap are in the tolerance band for the UP-unit position.

S 865-154
(11) Move the flap control lever to the 30-unit detent.

S 215-153
(12) Make sure the TE flaps and LE slats move to the fully extended position in less than 52 seconds of the flap control lever movement.

S 865-152
(13) Move the flap control lever to the zero (FLAPS UP) detent.

S 215-151
(14) Make sure the TE flaps and LE slats fully retract in less than 52 seconds after the flap control lever movement.

S 215-150
(15) Make sure the position indicator needles for the L and R flap are in the tolerance band for the UP-unit position.

S 865-149
(16) Open these circuit breakers on the overhead P11 panel:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 215-148
(17) Make sure the EICAS message, FLAP/SLAT ELEC, shows on the status and ECS/MSG display.

S 215-147
(18) Push arming switch for the alternate drive of the LE slat on P3 panel to arm the slat alternate drive (switch light will come on).

S 865-262

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(19) Move the flap control lever to the 1-unit detent and let TE flaps and LE slats go to the commanded position.

S 215-168
(20) Make sure the EICAS message, FLAP ISLN VAL, shows on the status display unit.

S 865-167
(21) Close this circuit breaker on P11 panel:
(a) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-166
(22) Erase the EICAS message, FLAP ISLN VAL, from the ECS/MSG display and make sure the EICAS message does not show on the status display.

S 215-165
(23) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats do not move.

S 865-164
(24) Close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-163
(25) Open this circuit breaker on the P11 panel:
(a) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-162
(26) Make sure the EICAS message, FLAP ISLN VAL, shows on the ECS/MSG and status displays.

S 215-161
(27) Make sure the TE flaps and the LE slats do not move.

S 865-160
(28) Push the arming switch for the alternate drive of the TE flaps on the P3 panel to arm the flap alternate drive (switch light will come on).

S 865-159
(29) Push the arming switch for the alternate drive of the LE slat to disarm the slat alternate drive (switch light will go off).

S 215-158
(30) Make sure the TE flaps and LE slats do not move.

S 865-157
(31) Open this circuit breaker on the P11 panel and install a circuit breaker lock.
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-260

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(32) Move the manual override lever on the bypass valve for the TE flap to the usual position (POS 2), and let the TE flaps retract.

S 735-066

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES. IN THE STEP THAT FOLLOWS, THE LE SLATS AND/OR THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(33) Move the manual override lever on the bypass for the LE slat PDU (left wing-body fairing forward of wing) to the usual position (POS 2), and let the LE slats retract, while the TE flaps do not move.

S 735-260

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES. IN THE STEP THAT FOLLOWS, THE LE SLATS AND/OR THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(34) Move the flap control lever to the 1-unit detent, and make sure the LE slats go to the intermediate position in 9-11 seconds after the start of the flap control lever movement.

S 735-170

(35) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the LE slats go to the fully retracted position in 9-11 seconds after the start of the flap control lever movement.

S 865-172

(36) Push the arming switch for the alternate drive of the TE flaps to disarm the flap alternate drive (switch light will go off).

S 865-173

(37) Remove the DO-NOT-CLOSE tags and the circuit breaker lock and close these circuit breakers on the P11 panel:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(c) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-175

(38) Erase the EICAS message, FLAP ISLN VAL, from the ECS/MSG display and make sure the EICAS message does not show on the ECS/MSG display.

S 215-176
(39) Make sure the TRAILING EDGE and LEADING EDGE lights are off.

S 215-177
(40) Make sure the EICAS message, FLAP/SLAT ELEC, does not show on the status and ECS/MSG displays.

H. Test the Electrical Circuits (the FLAP/SLAT BITE message, the flap position indication, and the FSEU-2 to thealternate-flaps/slats position-selector-switch)

S 865-174
(1) Open these circuit breakers on the P11 panel:
  (a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
  (b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
  (c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
  (d) 11G21, FLAP SLAT ELEC UNIT 3 POWER
  (e) 11G22, FLAP SLAT ELEC UNIT 3 CONT
  (f) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR

S 215-178
(2) Make sure the EICAS message, FLAP/SLAT BITE, shows on the ECS/MSG display and do the steps that follow:
  (a) Move the computer switch on the EICAS DISPLAY SELECT panel, P9, to the R position.
  (b) Make sure the EICAS message, FLAP/SLAT BITE, shows on the ECS/MSG display.
  (c) Put the computer switch in the L position.

S 215-179
(3) Move the flap control lever to the 1-unit detent, and do the check that follows:
  (a) After the TE start to extend make sure the position indicator needles for the L and R flap jump quickly to an intermediate position between the UP-unit and 1-unit positions.
  (b) Make sure the position indicator needles for the L and R flap are in the tolerance band for the 1-unit position when the TE flaps go to the 1-unit position and LE slats go to the intermediate position.

S 865-180
(4) Close these circuit breakers on the P11 panel:
  (a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
  (b) 11C15, FLAP SLAT ELEC UNIT 2 CONT
  (c) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
  (d) 11G21, FLAP SLAT ELEC UNIT 3 POWER
  (e) 11G22, FLAP SLAT ELEC UNIT 3 CONT
  (f) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR

S 735-187
(5) Erase the EICAS message, FLAP/SLAT BITE, from the ECS/MSG display.

S 865-186
(6) Open this circuit breaker on the P11 panel:
(a) 11G22, FLAP SLAT ELEC UNIT 3 CONT

S 215-185
(7) Make sure the EICAS message, FLAP/SLAT BITE, shows on the ECS/MSG display.

S 865-184
(8) Close this circuit breaker on the P11 panel:
(a) 11G22, FLAP SLAT ELEC UNIT 3 CONT

S 735-183
(9) Erase the EICAS message, FLAP/SLAT BITE, from the ECS/MSG display.

S 865-182
(10) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and the LE slats fully retract.

S 865-181
(11) Open this circuit breaker on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 215-188
(12) Move the flap control lever to the 1-unit detent in less than 15 seconds after the above circuit-breaker is closed and do the check that follows:
(a) Make sure the position indicator needles for the L and R flap do not move quickly to an intermediate position between the UP-unit and 1-unit positions as the TE flaps start to extend.
(b) Make sure the position indicator needles are in the tolerance band for the 1-unit position when the TE flaps go to the 1-unit position and the LE slats go to the intermediate position.

S 865-189
(13) Close this circuit breaker on the P11 panel:
(a) 11C17, FLAP SLAT SHUTOFF 1

S 865-194
(14) Open this circuit breaker on the P11 panel:
(a) 11H12, FLAP POS IND LEFT

S 865-193
(15) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats fully retract.

S 215-192
(16) Make sure the position indicator needle for the L flap does not move as the position indicator needle for the R flap goes to the UP-unit position.

S 215-191
(17) Close this circuit breaker on the P11 panel and make sure the position indicator needle for the L flap moves to the tolerance band for the UP-unit position:
(a) 11H12, FLAP POS IND LEFT

S 865-190
(18) Open this circuit breaker on the P11 panel:
(a) 11H13, FLAP POS IND RIGHT

S 865-195
(19) Move the flap control lever to the 1-unit detent and let the TE flaps move to the 1-unit position and the LE slats move to the intermediate position:

S 215-203
(20) Make sure the position indicator needle for the R flap does not move as the position indicator for the L flap moves to the 1-unit position.

S 215-202
(21) Close this circuit breaker on the P11 panel and make sure the position indicator needle for the R flap moves to the tolerance band for the 1-unit position:
(a) 11H13, FLAP POS IND RIGHT

S 215-201
(22) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and the LE slats to fully retract, and make sure the position indicator needles for the L and R flap are in the tolerance band for the UP-unit position.

S 215-200
(23) Make sure the position indicator needles for the L and R flap are in the tolerance band for the UP-unit position.

S 865-199
(24) Push arming switches for the alternate drive of the LE slats and TE flaps to arm the flap and slat alternate drives (switch lights will come on).

S 865-198
(25) Put the position selector switch for the alternate flaps/slats in the UP-unit detent.

S 865-197
(26) Open this circuit breaker on the main power distribution panel, P6:
(a) 6D23, ALTN FLAP PWR

S 215-196

CAUTION: AFTER THE ALTERNATE DRIVE MOTOR HAS RUN FOR 12 MINUTES (2 SLAT CYCLES), DO NOT OPERATE THE MOTOR FOR 3 MINUTES. IF LET THE MOTOR RUN FOR TOO MUCH TIME POSSIBLE DAMAGE COULD OCCUR.

(27) Put the position selector switch for the alternate flaps/slats in the 1, 5, 15, 20, 25, and 30-unit detents, at each detent do the check that follows:
  (a) Wait for a minimum of 5 seconds in each detent.
  (b) Make sure the TE flaps do not move.
  (c) Make sure the LE slats move to intermediate position with the position selector switch in the 1-unit detent.
  (d) Make sure the LE slats move to the fully extended position with the position selector switch in the 20-unit detent.
  (e) In each detent, make sure the TRAILING EDGE light is on and the EICAS message, TE FLAP DISAGREE, shows on the display.

S 865-204
(28) Close this circuit breaker on the P6 panel:
  (a) 6D23, ALTN FLAP PWR

S 215-205
(29) Put the position selector switch for the alternate flaps/slats in the 1-unit detent and do the check that follows:
  (a) Make sure the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.
  (b) Make sure the TRAILING EDGE light is off and the EICAS message, TE FLAP DISAGREE, is off the display.

S 865-206
(30) Open this circuit breaker on the P6 panel:
  (a) 6D23, ALTN FLAP PWR

S 215-207
(31) Put the position selector switch in the UP-unit detent, and do the check that follows:
  (a) Make sure the TE flaps and LE edge slats do not move.
  (b) Make sure the TRAILING EDGE light is on and the EICAS message, TE FLAP DISAGREE, is on the display.

S 865-208
(32) Close this circuit breaker on the P6 panel:
  (a) 6D23, ALTN FLAP PWR

S 735-209
(33) Move the position selector switch to the 1-unit detent and quickly back to the UP-unit detent.

S 215-067
(34) Make sure the TE flaps and LE slats move to the UP position.

S 865-210
(35) Put the position selector switch in the NORM detent.

S 865-211
(36) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-212
(37) Open this circuit breaker on the P11 panel, and install a DO-NOT-CLOSE tag:
(a) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 215-213
(38) Make sure the EICAS message, FLAP ISLN VAL, shows on the ECS/MSG and status display.

S 215-214
(39) Move the flap control lever to the 5-unit detent, and make sure the TE flaps and LE slats do not move.

S 215-261

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES. IN THE STEP THAT FOLLOWS, THE LE SLATS AND/OR THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(40) Move the manual override lever on the bypass valve of the TE flap PDU to the usual position (POS 2), and do the check that follows:
(a) Make sure the TE flaps move to the 5-unit position.
(b) Make sure the TRAILING EDGE light comes on momentarily.
(c) Make sure the EICAS message, TE FLAP DISAGREE, comes on the display momentarily.

S 865-215
(41) Remove the circuit breaker lock and the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 735-262

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES. IN THE STEP THAT FOLLOWS, THE LE SLATS AND/OR THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(42) Push the arming switches for the alternate drive of the TE flap and LE slat to disarm the flap and slat alternate drives (switch lights will go off).

S 215-216
(43) Make sure the LE slats move to the intermediate position.

S 865-217
(44) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats to fully retract.

S 735-218
(45) Erase the EICAS message, FLAP ISLN VAL, from the ECS/MSG display.

S 215-219
(46) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL, are not shown on the status display.

S 215-220
(47) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP/SLAT BITE, are not shown on the ECS/MSG display.

S 215-221
(48) Make sure the TRAILING EDGE light is off and the EICAS message, TE FLAP DISAGREE, does not show on the display.

S 735-348
(49) Do the test of the alternate-electric operation (Ref 27-51-00, System Test)

I. Test the Auto-Slat Extension and Retraction

S 715-287
(1) Make sure the IRU is in operation (AMM 34-21-00/501).

S 865-222
(2) Close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11J33, WARN ELEX A

S 215-223
(3) Operate and hold the test switch for the LEFT stall warning on side panel P61, and make sure the captain's stick shaker operates.

S 735-224
(4) Release the test switch and make sure the stick shaker stops.

S 735-225
(5) Operate and hold the test switch for the RIGHT stall warning and make sure the first-officer's stick shaker operates.

S 735-226
(6) Release the test switch and make sure the stick shaker stops.

S 215-227
(7) Put the flap control lever in the 1-unit detent and make sure the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.

S 215-546

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(8) Operate and hold LEFT stall warning test switch, and make sure the LE slats move to the fully extended position and the captain's stick shaker operates.

S 735-228
(9) Release the warning test switch, and make sure the LE slats move to the intermediate position and the captain's stick shaker stops.

S 735-229
(10) Operate and hold the test switch for the RIGHT stall warning, and make sur the LE slats move to the fully extended position and the the first-officer's stick shaker operates.

S 735-230
(11) Release the test switch, and make sure the LE slats move to the intermediate position and the first-officer's stick shaker stops.

S 735-231
(12) Operate and hold the test switches for the RIGHT and LEFT stall warining, and make sure the LE slats move to the fully extended position and the two stick shakers operate.

S 865-232
(13) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 735-233
(14) Release the two test switches and make sure the LE slats stay in the fully extended position and the two stick shakers stop.

NOTE: An EICAS message, LEADING EDGE DISAGREE, will show on the display and a "LEADING EDGE" light will come on, on the P3 panel.

S 865-234
(15) Push the arming switch for the alternate drive of the LE slat on the first-officer's instrument panel, P3, to arm the slat alternate drive (switch light on).

S 495-235
(16) Install a lock in the TE flap PDU (Fig. 507).

S 735-236
(17) Do the steps that follow to make sure the LE slats are not against the downstops.
(a) Make sure the torque tube on the outboard side of the LE slat PDU can be turned in the extend direction (clockwise, inboard at the slat PDU from the left wing).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(b) Remove the lock from TE flap PDU.
(c) Pressurize the left hydraulic system (Ref 29-11-00).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE CONTROL SURFACES. IN THE STEP THAT FOLLOWS, THE LE SLATS AND/OR THE TE FLAPS WILL MOVE AND MAY CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(d) Push the arming switch for the alternate drive of the LE slats to disarm the slat alternate drive (switch light off), and make sure the LE slats move to the intermediate position.
(e) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and LE slats move to the fully extended position.
(f) Operate and hold the test switch for the LEFT stall warning on the side panel P61, and make sure the captain's stick shaker operates.
(g) Release the test switch and make sure the stick shaker stops.
(h) Operate and hold the test switch for the RIGHT stall warning and make sure the first-officer's stick shaker operates.

(i) Release the test switch and make sure the stick shaker stops.
(j) Put the flap control lever in the zero (FLAPS UP) detent, and make sure the TE flaps and the LE slats move to the fully retracted position.
(k) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL, do not show on the status display.
(l) Make sure the EICAS messages, FLAP/SLAT ELEC, FLAP ISLN VAL, and FLAP/SLAT BITE, do not show on the ECS/MSG display.

J. Test the LE Slat Loss Detection Switches

S 865-371
(1) Move the flap control lever to the 25-unit detent and make sure the TE flaps move to the 25-unit position and the LE slats move to the fully extended position.

S 865-372
(2) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 495-387
(3) Install a lock in the TE flap PDU.

S 735-373
(4) Test the left or right inboard-slat (No. 5 or No. 6) loss sensing-switch (roller type) as follows (Fig. 504):
(a) Loosen the upper mounting screw.
(b) Remove lower mounting screw.
(c) Turn the switch until the roller the falls off track.
(d) Make sure the LEADING EDGE light on the P3 is on and the EICAS message, LE SLAT ASYM, shows on the display.
(e) Push the arming switch for the alternate drive of the LE slat to arm slat alternate drive (switch light will come on).
(f) Make sure the LEADING EDGE light stays on and the EICAS message, LE SLAT ASYM, stays on the display.
(g) Remove the lock from the TE flap PDU.
(h) Put the position selector switch for the alternate flap/slats in the 1-unit detent, and make sure the TE flaps and LE slats do not move.
(i) Put position selector switch in the NORM detent.
(j) Push the arming switch for the alternate drive of the LE slat to disarm the slat alternate drive (switch light off).
(k) Install a lock in the TE flap PDU.
(l) Compress the roller arm and install the switch assembly on track arm.
(m) Install the upper and lower mounting screws of the loss sensing switch.

S 215-374
(5) Open and then close these circuit breakers on the P11 panel and make sure the LEADING EDGE light goes out and the EICAS message, LE SLAT ASYM, goes off the EICAS display:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER

(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 735-376

(6) Do a test on the loss sensing switch cable for the left outboard slat (Fig. 505) as follows:
(a) Make sure the cable assembly is correctly installed and aligned through the guides on the slats before and after this test (AMM 27-81-42/401).
(b) Remove the anchor or cable guide.
(c) Pull on the anchor or cable guide and the cable in the inboard direction until the cam turns clear of the switch.
(d) Make sure the LEADING EDGE light is on and the EICAS message, LE SLAT ASYM, shows on the display.
(e) Make sure the force to pull the cable is between 10 and 30 pounds.
(f) Install the anchor.
(g) Put the sensor switch cam back to its usual position.

S 215-377

(7) Open and then close these circuit breakers and make sure the LEADING EDGE light goes out and the EICAS message, LE SLAT ASYM, does not show on the display:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 735-378

(8) Do the same test on the loss sensing switch cable for the right outboard slat as you did for the left outboard slat.

S 095-264

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(9) Remove the lock from the TE flap PDU.

S 865-247

(10) Pressurize the left hydraulic system (Ref 29-11-00).

S 865-379

(11) Put the flap control lever in the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

S 215-380

(12) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL, do not show on the status display.

S 215-381
(13) Make sure the EICAS messages, FLAP/SLAT ELEC, FLAP ISLN VAL, and FLAP/SLAT BITE, do not show on the ECS/MSG display.

K. Put the Airplane Back to its Usual Condition

S 215-361
(1) Make sure the lock in the TE flap PDU is removed.

S 865-362
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 865-363
(3) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 865-364
(4) Remove electrical power (Ref 24-22-00).

S 445-384
(5) Do this procedure: Thrust Reverser Activation (Ref 78-31-00).

TASK 27-81-00-715-290

5. Test of the Auto Slat Extension and Retraction

NOTE: This is a scheduled maintenance task.

A. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/501, Trailing Edge Flap System
(3) 27-81-20/401, LE Slat Drive Torque Tube
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zones

119/120	Main Equipment Center
211/212	Control Cabin
500/600	Left Wing/Right Wing

C. Prepare for the Test

S 045-426

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00/201).

S 215-427

(2) Make sure the trailing edge flaps and leading edge slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.

S 215-428

(3) Make sure the position selector switch for the flap/slat alternate drive on the first-officer's main instrument panel, P3, is in the NORM detent.

S 865-429

(4) Supply electrical power (Ref 24-22-00/201).

S 215-430

(5) Make sure the arming switches for the flap and slat alternate drive, on the P3 panel, are not armed (switch lights will be off).

S 215-288

(6) Make sure the six EICAS circuit breakers on the overhead circuit breaker panel, P11, are closed.

S 215-289

(7) Make sure the IRU is in operation (AMM 34-21-00/501).

S 865-431

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(8) Pressurize the left hydraulic system (Ref 29-11-00/201).

D. Auto Slat Extension and Retraction Test

S 215-415

(1) Put the flap lever in the 1-unit detent and do a check as follows:
   (a) Make sure the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.

S 215-416

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Operate and hold the test switch for the LEFT STALL warning on the side panel, P61, and do a check as follows:
(a) Make sure the LE slats move to the fully extended position and the captain's stick shaker operates.

S 215-417

(3) Release the LEFT stall warning test switch and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the stick shaker stops.

S 215-418

(4) Operate and hold the test switch for the RIGHT stall warning and do a check as follows:
(a) Make sure the LE slat moves to the fully extended position and the first officer's stick shaker operates.

S 215-419

(5) Release the test switch and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the first-officer's stick shaker stops.

S 215-420

(6) Operate and hold the test switches for the LEFT and RIGHT stall warning and do a check as follows:
(a) Make sure the LE slats move to the fully extended position and the two stick shakers operate.

S 215-421

(7) Release the two test switches and do a check as follows:
(a) Make sure the LE slats move to the intermediate position and the two stick shakers stop.

S 845-422

(8) Put the flap control lever in the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

E. Put the Airplane Back to Its Usual Condition

S 865-423

(1) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 865-424
(2) Remove the electrical power if it is not necessary (Ref 24-22-00/201).

S 865-425
(3) Do the activation procedure for the thrust reverser (Ref 78-31-00/201).

TASK 27-81-00-715-294

6. Test of the LE Slat Loss Detection Switches

NOTE: This is a scheduled maintenance task.

A. Equipment
(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1

B. References
(1) 24-22-00/201, Electrical Power - Control
(2) 27-51-00/501, Trailing Edge Flap System
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

119/120	Main Equipment Center
211/212	Control Cabin
511, 512, 522	Left Wing
611, 612, 622	Right Wing

(2) Access Panel

511CB/611CB	Power Drive Unit and Hydraulics (Left/Right)/ Slat Loss Detection System

D. Prepare for the Test

S 215-408
(1) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 865-409
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 215-410
(3) Make sure the six EICAS circuit breakers on the P11 panel are closed.

S 215-411
(4) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 865-412
(5) Supply electrical power (Ref 24-22-00/201).

S 215-413
(6) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not armed (switch lights will be off).

S 865-414

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Pressurize the left hydraulic system (Ref 29-11-00/201).

E. Test of the LE Slat Loss Detection Switches

S 865-390
(1) Move the flap control lever to the 25-unit detent and make sure the TE flaps move to the 25-unit position and the LE slats move to the fully extended position.

S 865-391
(2) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 495-392
(3) Install a PDU lock in the TE flap PDU (Fig. 507).

S 735-454
(4) AIRPLANES WITH ROLLER ARM SWITCHES;
do a test for the left or right inboard-slat (No. 5 or No. 6) loss sensing-switch (roller type) as follows (Fig. 504):
(a) Loosen the upper mounting screw.
(b) Remove lower mounting screw.
(c) Turn the switch until the roller falls off track.
(d) Make sure the LEADING EDGE light, on the P3 panel, is on and the EICAS message, LE SLAT ASYM, shows on the display.
(e) Push the arming switch for the slat alternate drive to arm the slat alternate drive (switch light will come on).
(f) Make sure the LEADING EDGE light stays on and the EICAS message, LE SLAT ASYM, stays on the display.
(g) Remove the PDU lock from the TE flap PDU (Fig. 507).

(h) Put the position selector switch for the flap/slat alternate drive in the 1-unit detent, and make sure the TE flaps and LE slats do not move.
(i) Put the position selector switch for the flap/slat alternate drive in the NORM detent.
(j) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).
(k) Install a PDU lock in the TE flap PDU (Fig. 507).
(l) Install the upper and lower mounting screws.

S 865-544
(5) Open and then close these circuit breakers, on the P11 panel, and make sure the LEADING EDGE light goes out and the EICAS message, LE SLAT ASYM, goes off the EICAS display:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 735-460
(6) AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES;
do a test for the slat loss sensing-switch cable on the left and/or right inboard slat(s) as follows (Fig. 504):
(a) Remove the anchor.
(b) Pull on the anchor and cable along the axis of the spring until the cam turns clear of the switch.
(c) Make sure the LEADING EDGE light is on and the EICAS message, LE SLAT ASYM, shows on the display.
(d) Make sure the force to pull the cable is between 20 and 45 pounds.
(e) Install the anchor.
(f) Put the sensor switch cam back to its usual position.

S 215-394
(7) Open and then close these circuit breakers, on the P11 panel, and make sure the LEADING EDGE light goes out and the EICAS message, LE SLAT ASYM, goes off the EICAS display:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 735-397
(8) Do a test on the loss sensing switch cable for the left outboard slat (Fig. 505) as follows:
(a) Make sure the cable assembly is correctly installed and aligned through the guides on the slats before and after this test (AMM 27-81-42/401).

(b) Remove the anchor or cable guide.
(c) Pull on the cable guide or anchor and cable in the inboard direction until the cam turns clear of the switch.
(d) Make sure the LEADING EDGE light is on and the EICAS message, LE SLAT ASYM, shows on the display.
(e) Make sure the force to pull the cable is between 10 and 30 pounds.
(f) Install the anchor or cable guide.
(g) Put the sensor switch cam back to its usual position.

S 215-398
(9) Open and then close these circuit breakers, on the P11 panel, and make sure the LEADING EDGE light goes out and the EICAS message, LE SLAT ASYM, does not show on the display:
(a) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(b) 11G12, FLAP SLAT ELEC UNIT 1 POWER

S 735-399
(10) Do the same test on the loss sensing switch cable for the right outboard slat as you did for the left outboard slat.

S 865-283

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(11) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 095-284
(12) Remove the PDU lock from the TE flap PDU (Fig. 507).

S 865-400
(13) Put the flap control lever in the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

S 215-401
(14) Make sure the EICAS messages, FLAP/SLAT ELEC and FLAP ISLN VAL, do not show on the status display.

S 215-402
(15) Make sure the EICAS messages, FLAP/SLAT ELEC, FLAP ISLN VAL, and FLAP/SLAT BITE, do not show on the ECS/MSG display.

F. Put the Airplane Back to Its Usual Condition

S 215-403
(1) Make sure the PDU lock is removed from the TE Flap PDU (Fig. 507).

S 865-404
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 865-405
(3) Remove the pressure from the left hydraulic system (Ref 29-11-00/201).

S 865-406
(4) Remove the electrical power if it is not necessary (Ref 24-22-00/201).

S 445-407
(5) Do the activation procedure for the thrust reverser (Ref 78-31-00/201).

INBOARD LEADING EDGE SLAT - REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks. The first task removes the inboard leading edge (LE) slat. The second task installs the inboard LE slat.

The leading edge slats have numbers No. 1 through No. 10. The procedures in this subject give instructions for the inboard slats No. 5 and No. 6.

TASK 27-81-01-024-001

2. Remove the Inboard LE Slat

A. Equipment

(1) Sling for the Inboard LE Slat - B27019-10
(2) TE Flap PDU Lock - B27008-1
(3) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
(a) Circuit Breaker Lock - B27020-25 Optional Lock/Commercially Available)
(4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
(a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)

B. References

(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-81-01/601, Inboard Leading Edge Slat
(4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) 32-00-15/201, Landing Gear Door Locks
(6) 32-00-20/201, Landing Gear Downlocks
(7) 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

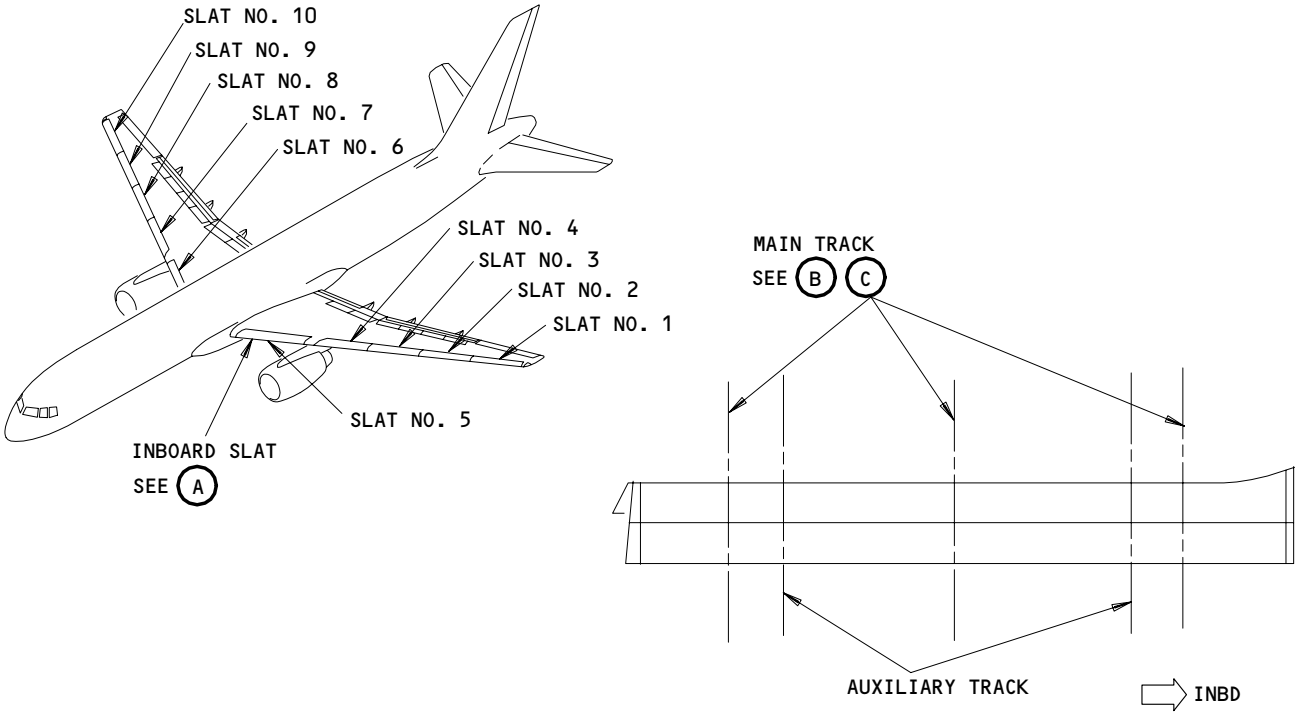
143	MLG Wheel Well
211/212	Control Cabin
512	Slat No. 5
612	Slat No. 6
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

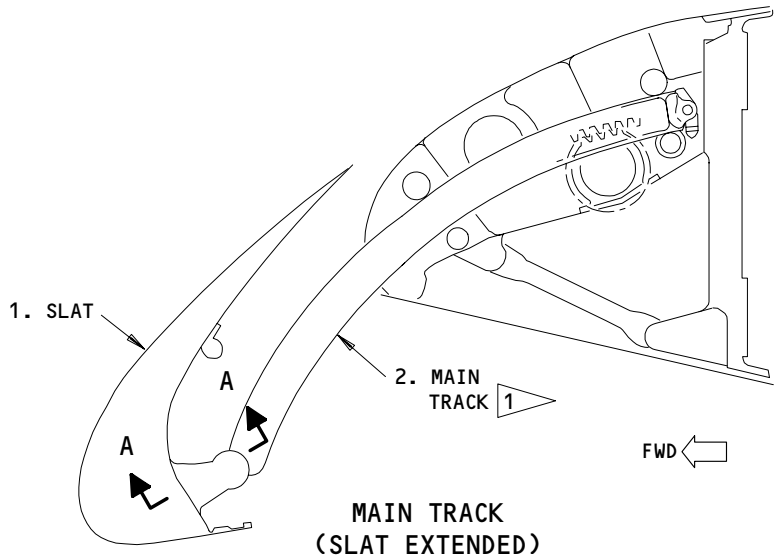
S 044-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).



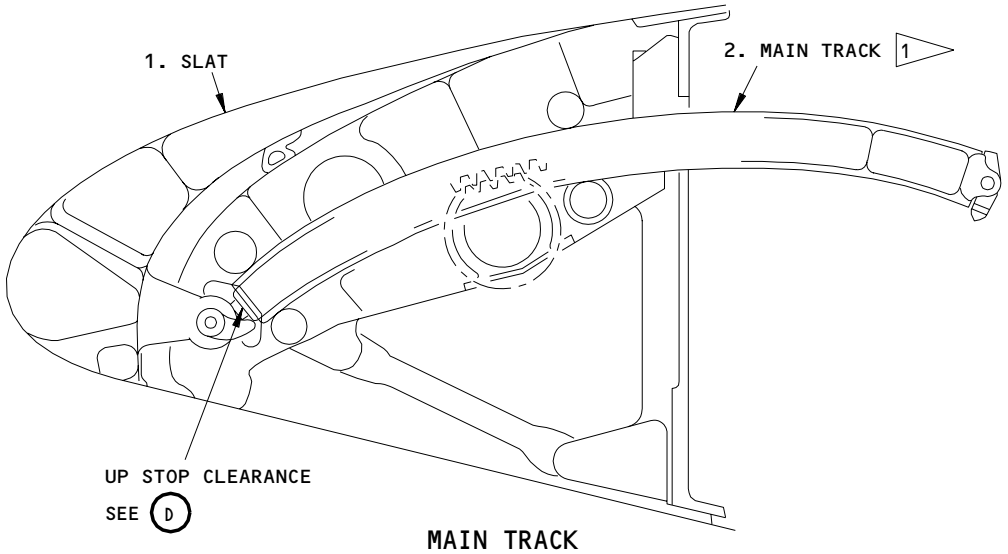
INBOARD SLAT
(LEFT WING SHOWN, RIGHT WING OPPOSITE)
A



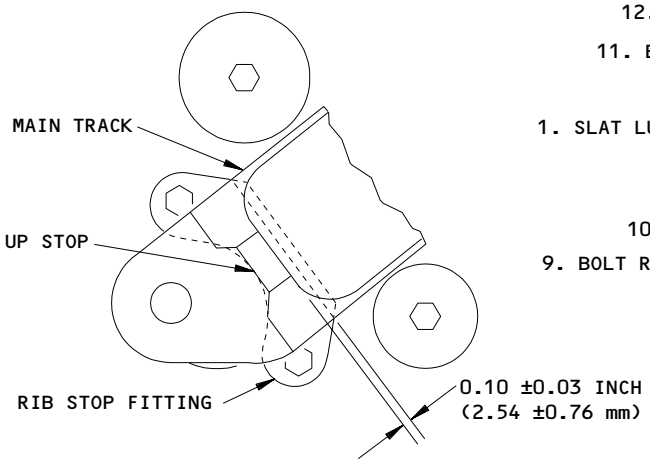
MAIN TRACK
(SLAT EXTENDED)
(3 LOCATIONS)
B

1 THE CENTER MAIN TRACK DOES NOT HAVE GEAR TEETH OR UP AND DOWN STOPS

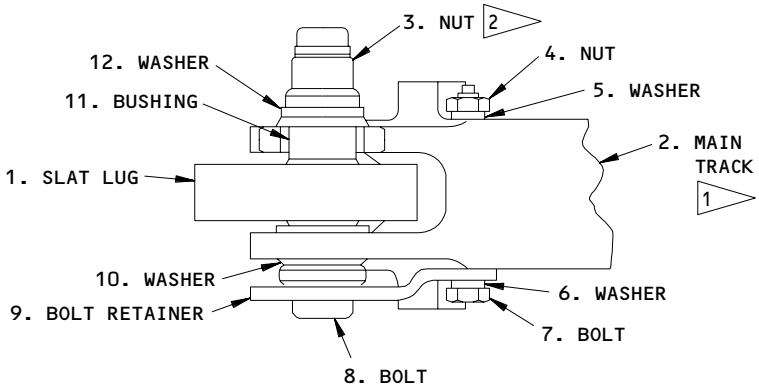
Main Tracks for the Inboard LE Slat
Figure 401 (Sheet 1)



MAIN TRACK
(SLAT RETRACTED)
(3 LOCATIONS)
C



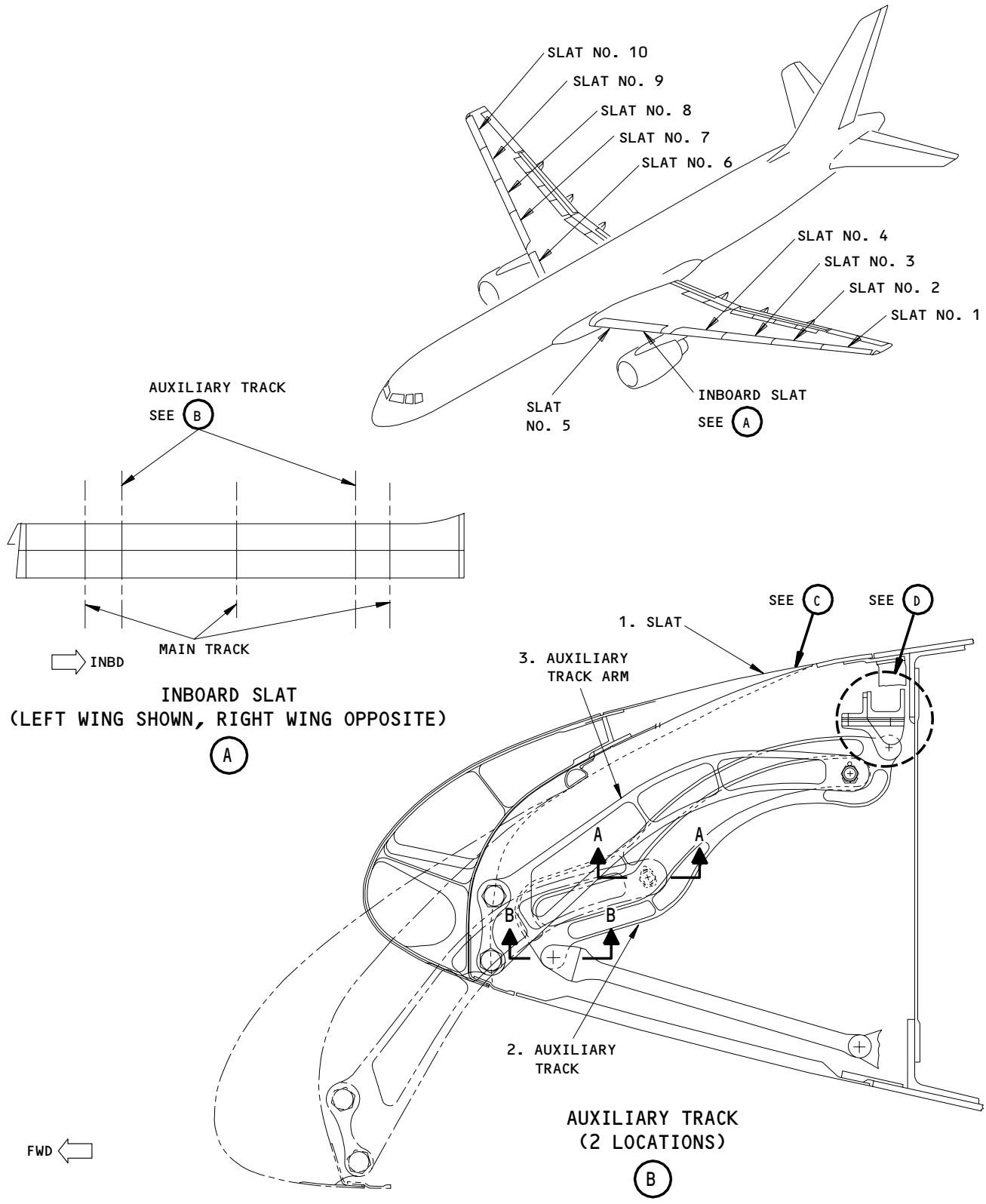
UP STOP CLEARANCE
D



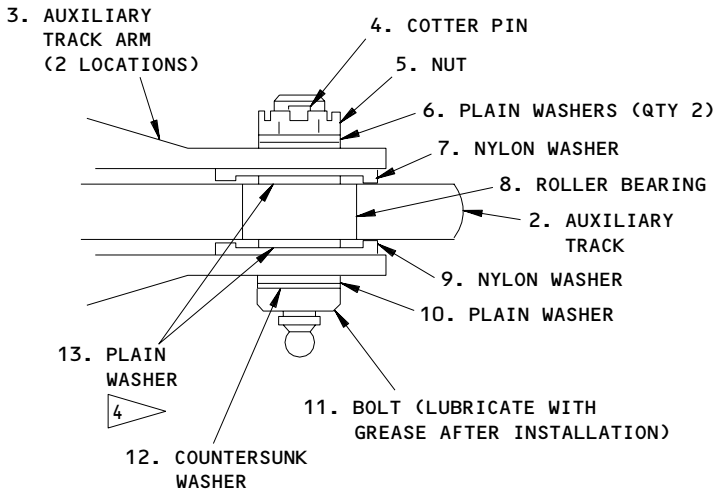
CONNECTION POINT
(3 LOCATIONS)
A-A

2 TORQUE NUT TO 700-950 POUND-INCHES (79.08-107.33 NEWTON-METERS)

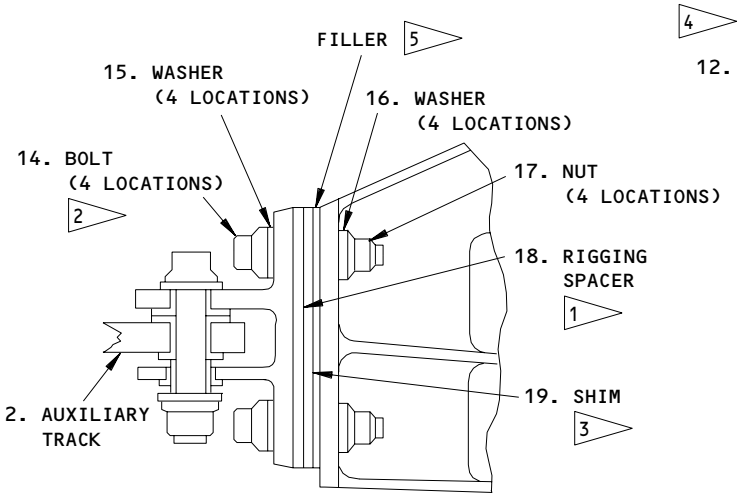
Main Tracks for the Inboard LE Slat
Figure 401 (Sheet 2)



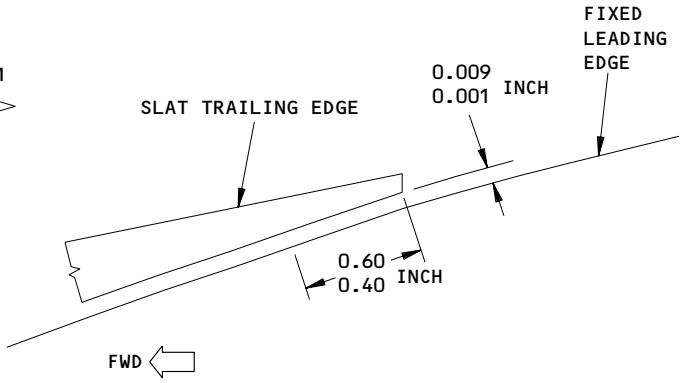
Auxiliary Tracks for the Inboard LE Slat
Figure 402 (Sheet 1)



A-A



FORWARD CLEVIS
B-B



CLEARANCE BETWEEN SLAT TRAILING EDGE AND FIXED LEADING EDGE - PRIOR TO APPLICATION OF RIGGING PRELOAD

C

1 INSTALL ONE RIGGING SPACER AT THE OUTBOARD LOCATION AND ONE AT THE INBOARD LOCATION.

2 APPLY WET PRIMER TO THE BOLT HOLE BEFORE YOU INSTALL THE BOLT.

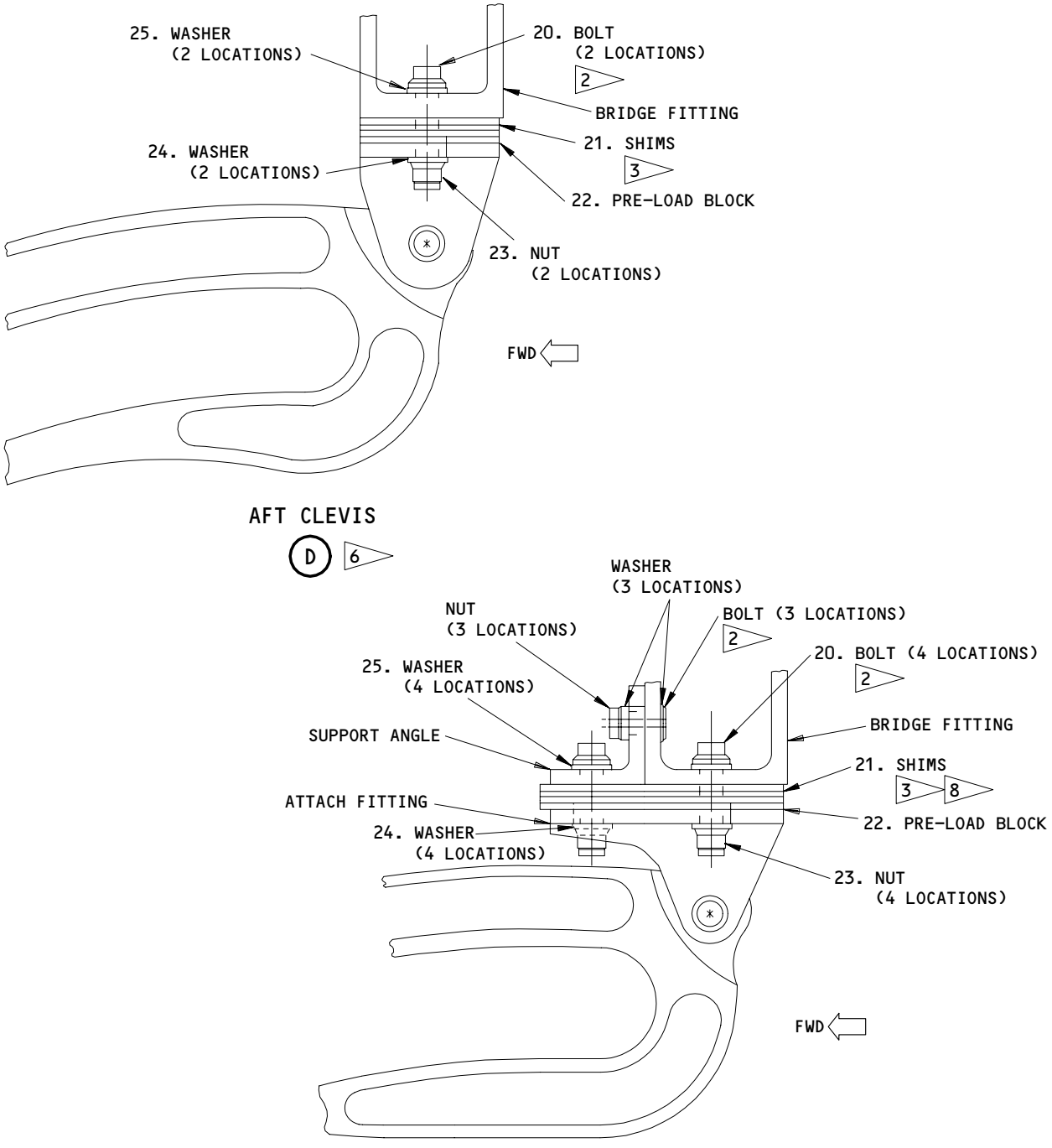
3 APPLY PRIMER TO THE SHIM BEFORE YOU INSTALL IT.

4 CAUTION: MAKE SURE YOU INSTALL THE CORRECT NUMBER OF WASHERS THAT YOU FOUND INSTALLED IN THIS JOINT TO PREVENT ROLLER BEARING DAMAGE.

NOTE: NOT ALL AIRPLANES USE THESE WASHERS. TRACK ARM ASSEMBLIES WITH THICKER FLANGED BUSHINGS IN THE CLEVIS MAKE WASHERS UNNECESSARY.

5 INSTALLED ON SOME AIRPLANES.

Auxiliary Tracks for the Inboard LE Slat
Figure 402 (Sheet 2)

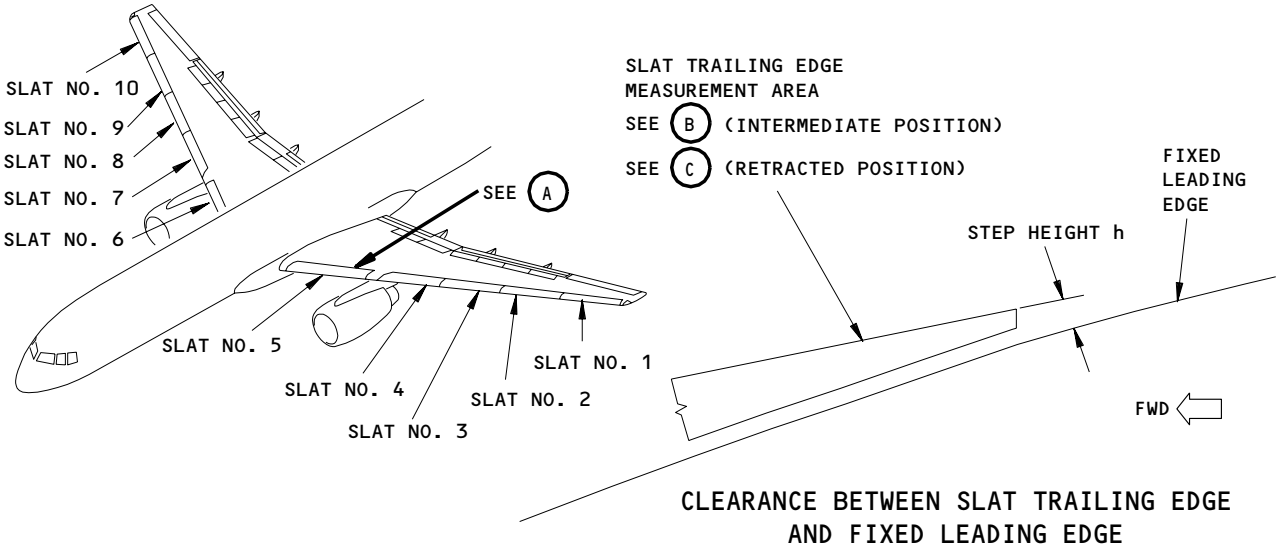


6 AIRPLANES WITHOUT SUPPORT ANGLE

7 AIRPLANES WITH SUPPORT ANGLE

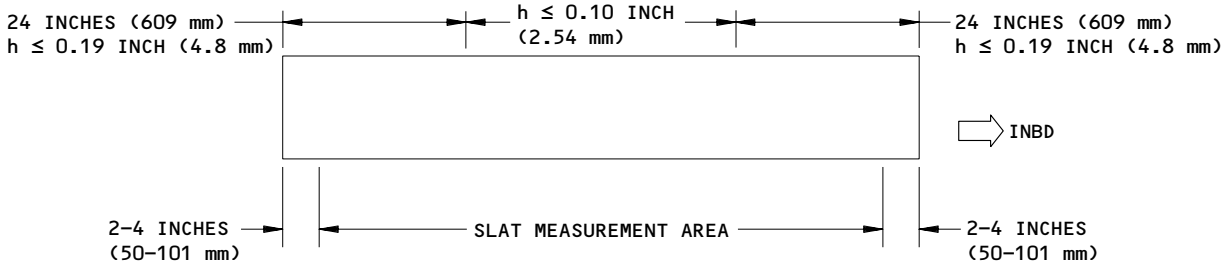
8 THE MAXIMUM THICKNESS OF SLOTTED SHIMS IS 0.350 INCH.

Auxiliary Tracks for the Inboard LE Slat
Figure 402 (Sheet 3)



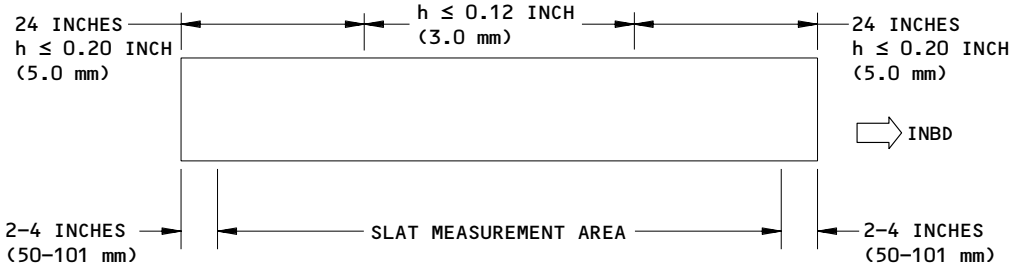
CLEARANCE BETWEEN SLAT TRAILING EDGE
AND FIXED LEADING EDGE
(ALTERNATE METHOD)

A



SLAT MEASUREMENT AREA
(INTERMEDIATE POSITION)

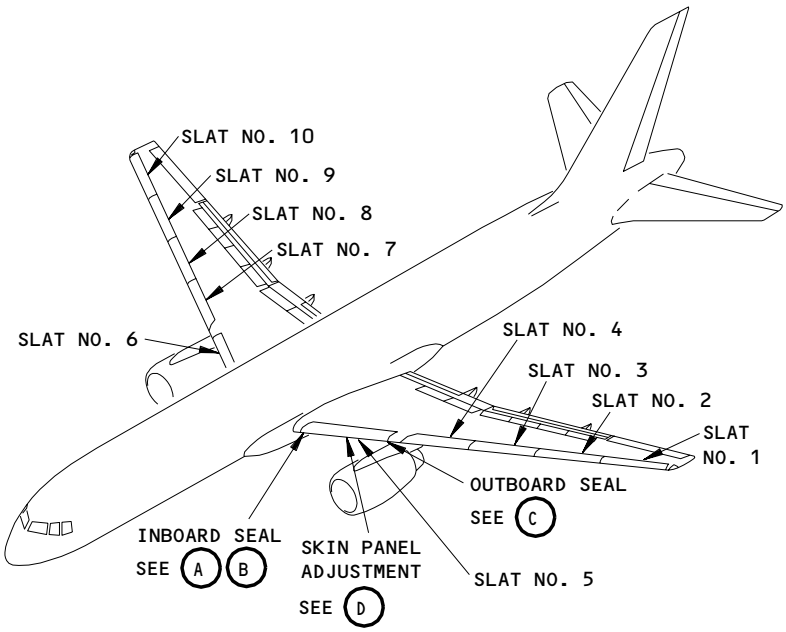
B

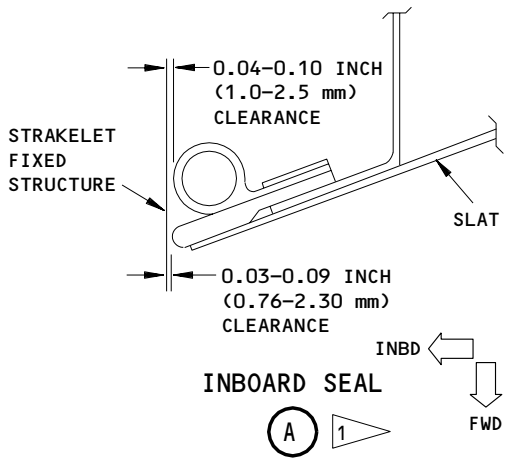


SLAT MEASUREMENT AREA
(RETRACTED POSITION)

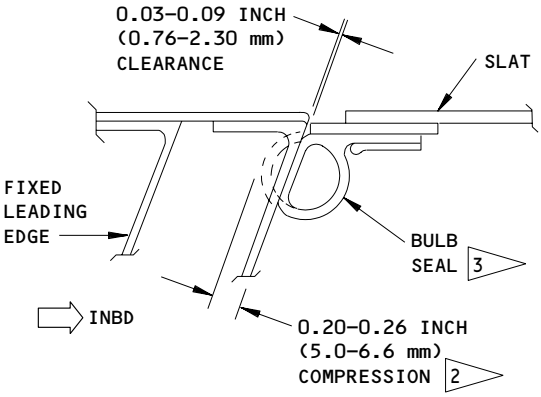
C

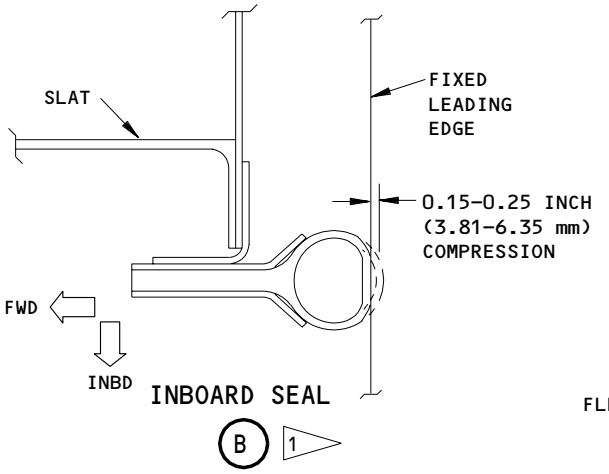
Auxiliary Track for the Inboard LE Slat (Alternate Adjustment)
Figure 402A





NOTE: THE MAXIMUM MISMATCH BETWEEN THE SLAT AND ADJACENT STRUCTURE WITH THE SLATS FULLY RETRACTED HYDRAULICALLY IS 0.10 INCH (2.5 mm). YOU MUST HAVE AN AVERAGE MISMATCH OF 0.06 INCH (1.5 mm) OR LESS AND IS MEASURED AT SIX EQUAL DISTANCES ON THE OUTER EDGE.

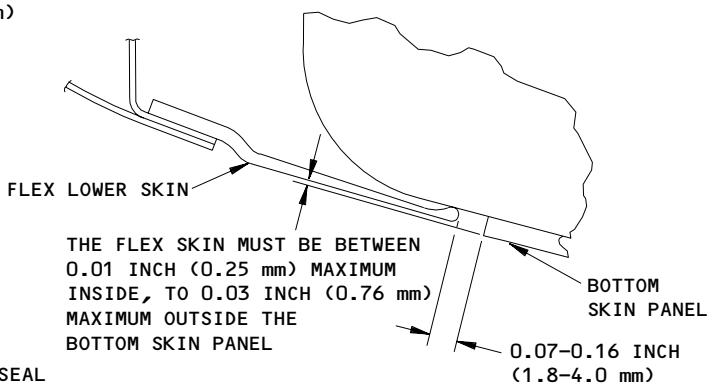




1 APPLIES TO SLAT NO. 5 AND 6

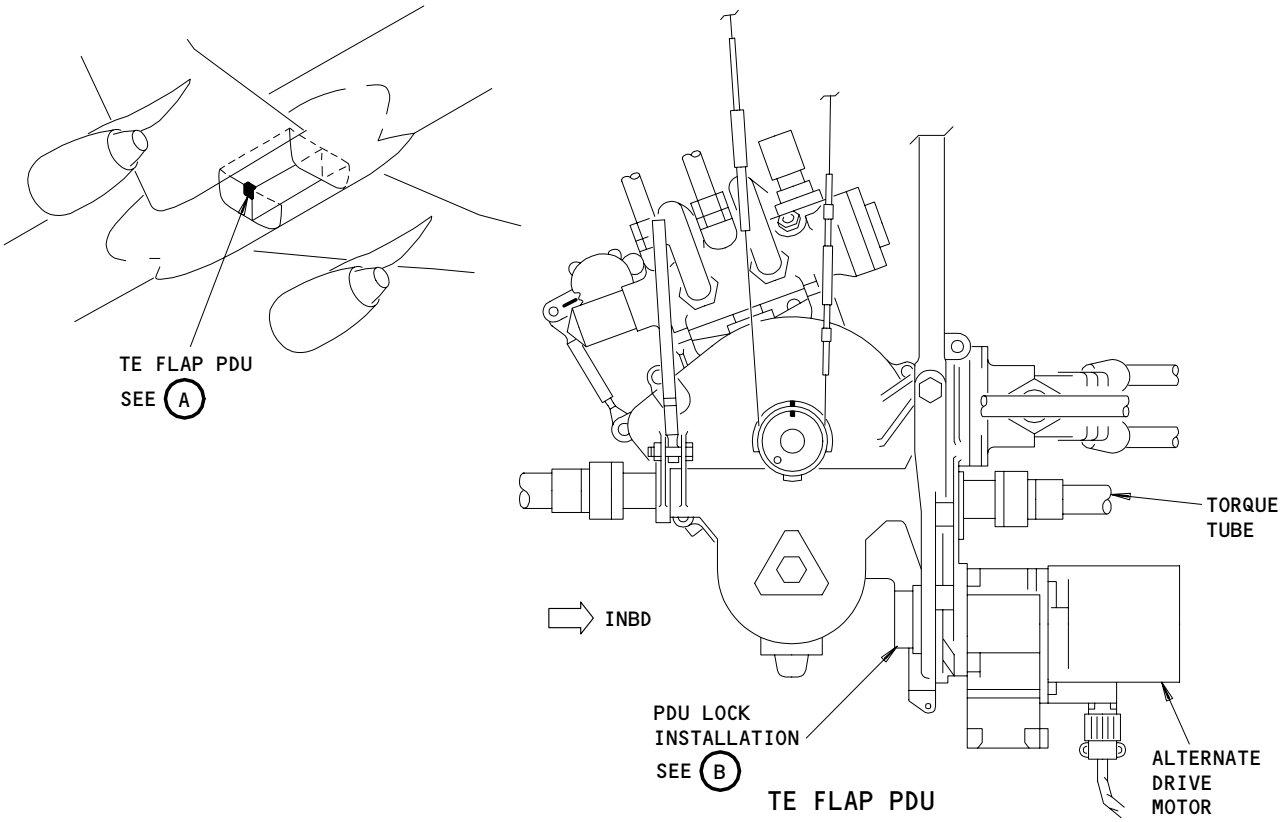
2 ALIGN THE BLADE SEAL WITH THE OUTSIDE OF THE BULB SEAL AFTER YOU ADJUST THE BULB SEAL

3 BLADE SEAL NOT SHOWN

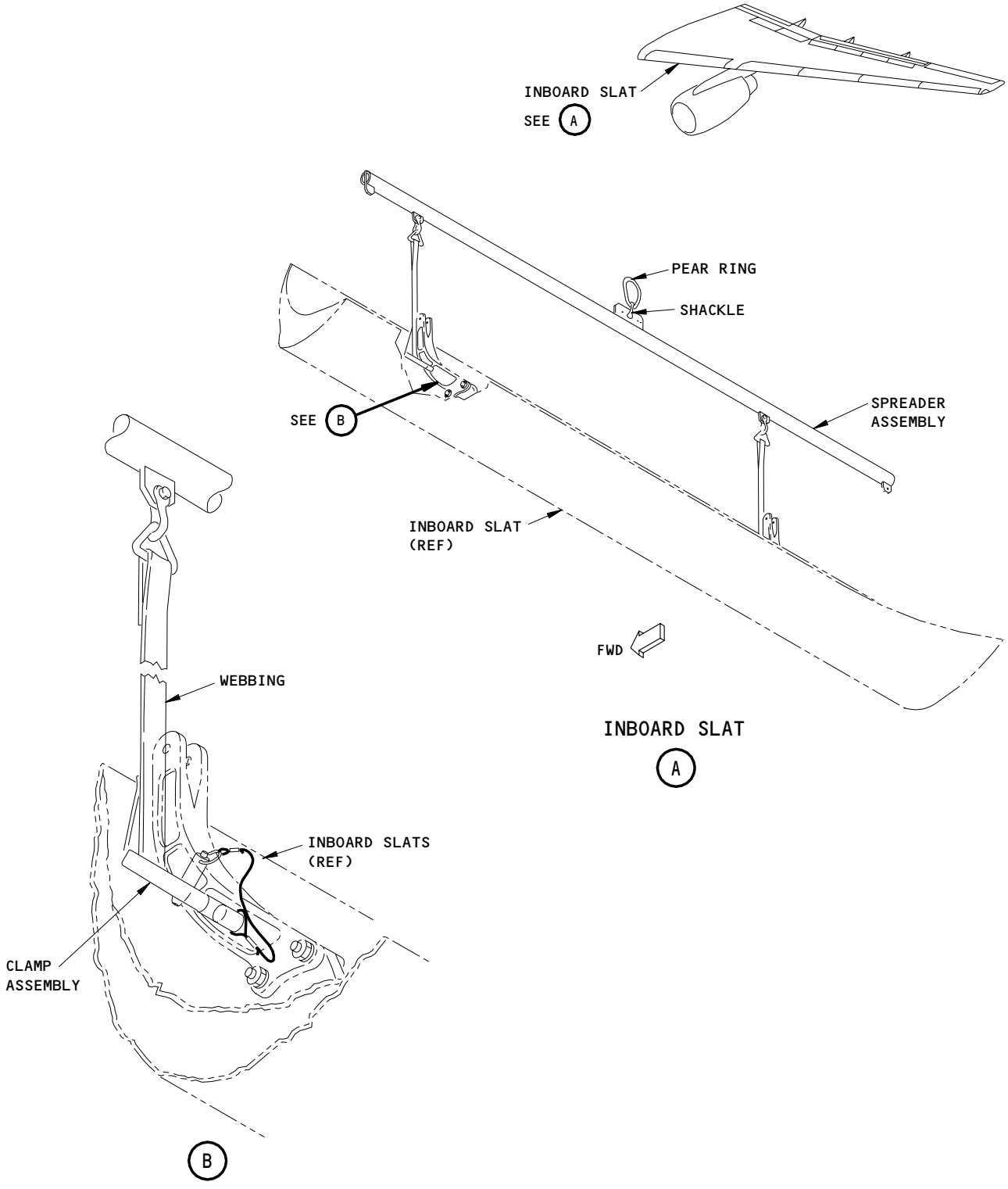


SKIN PANEL ADJUSTMENT
(SLAT NO. 5 IS SHOWN, SLAT NO. 6 IS OPPOSITE)
D

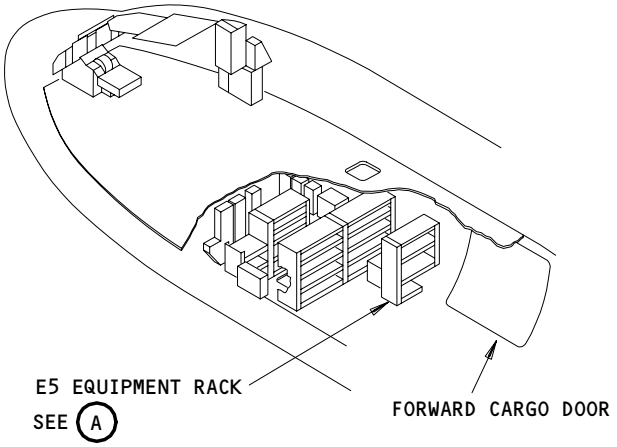
Permitted Clearances and Mismatch for the Inboard LE Slat
Figure 403

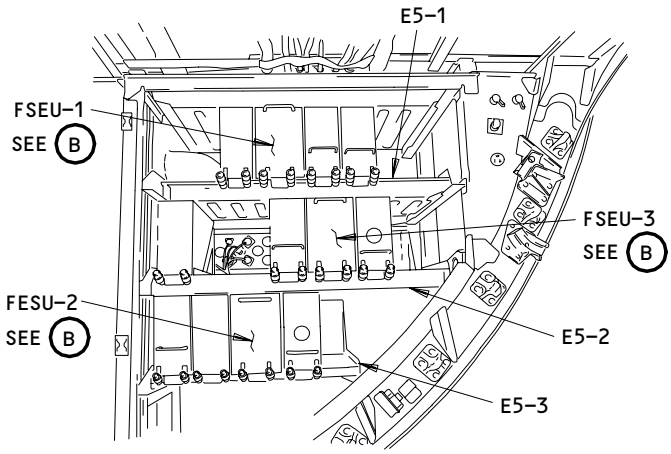


PDU Lock for the TE Flap PDU
Figure 404

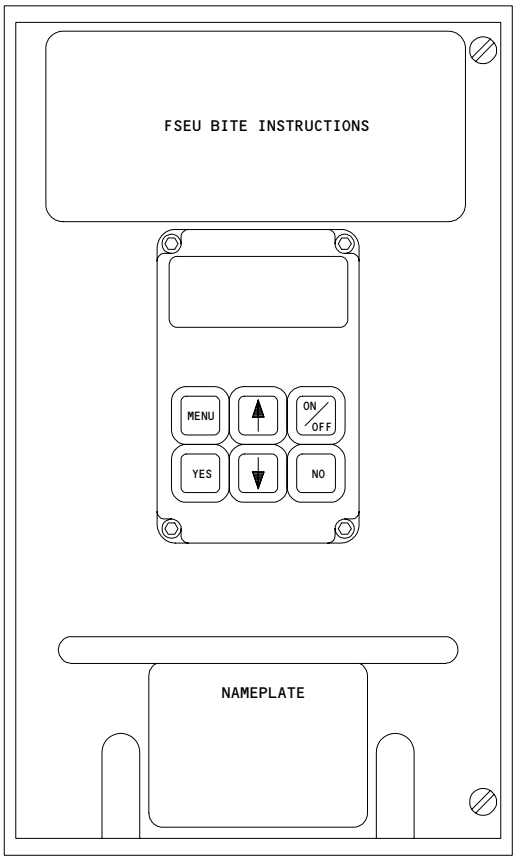


Sling for the Inboard LE Slat
Figure 405



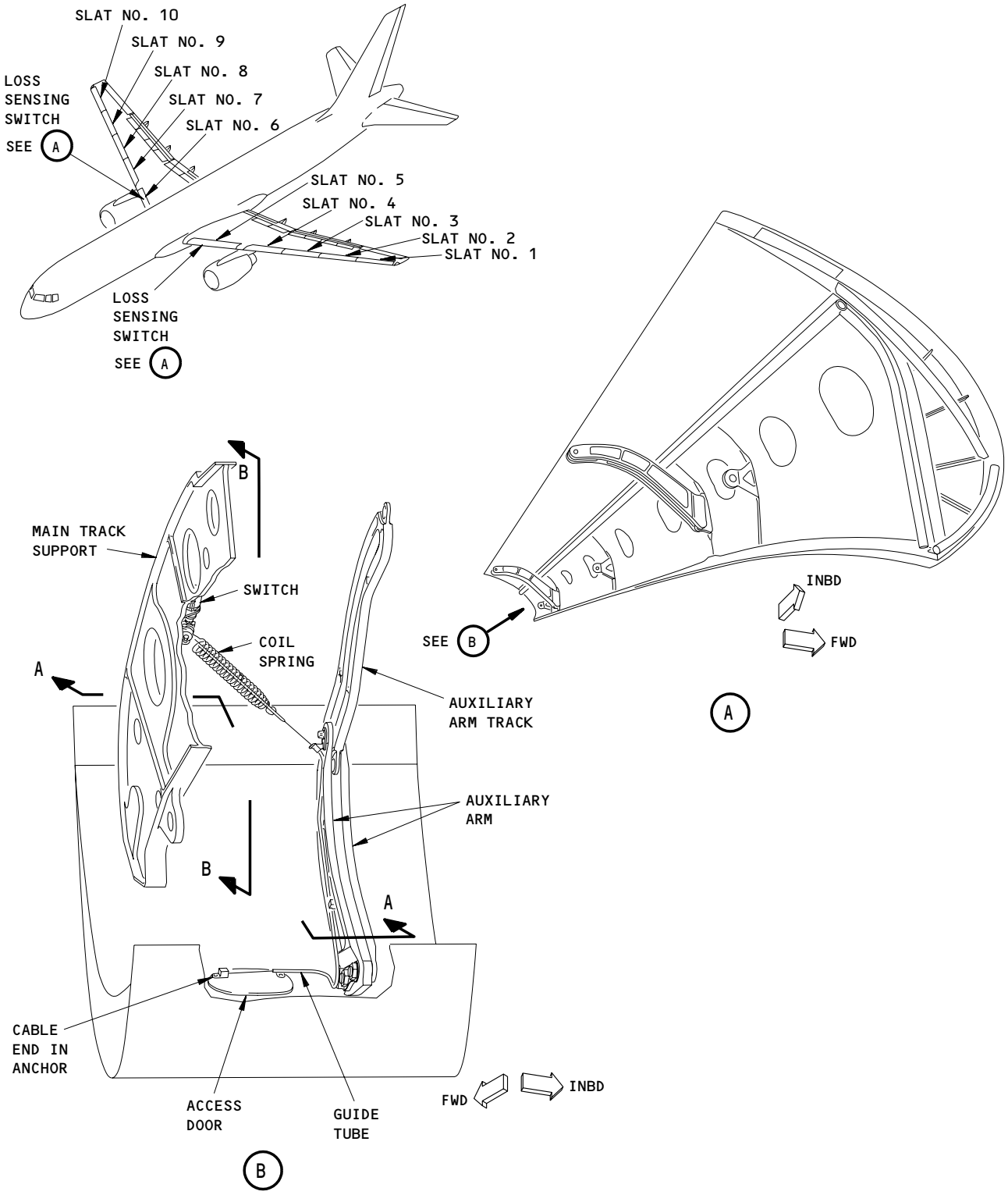


E5 EQUIPMENT RACK (AFT VIEW)
A

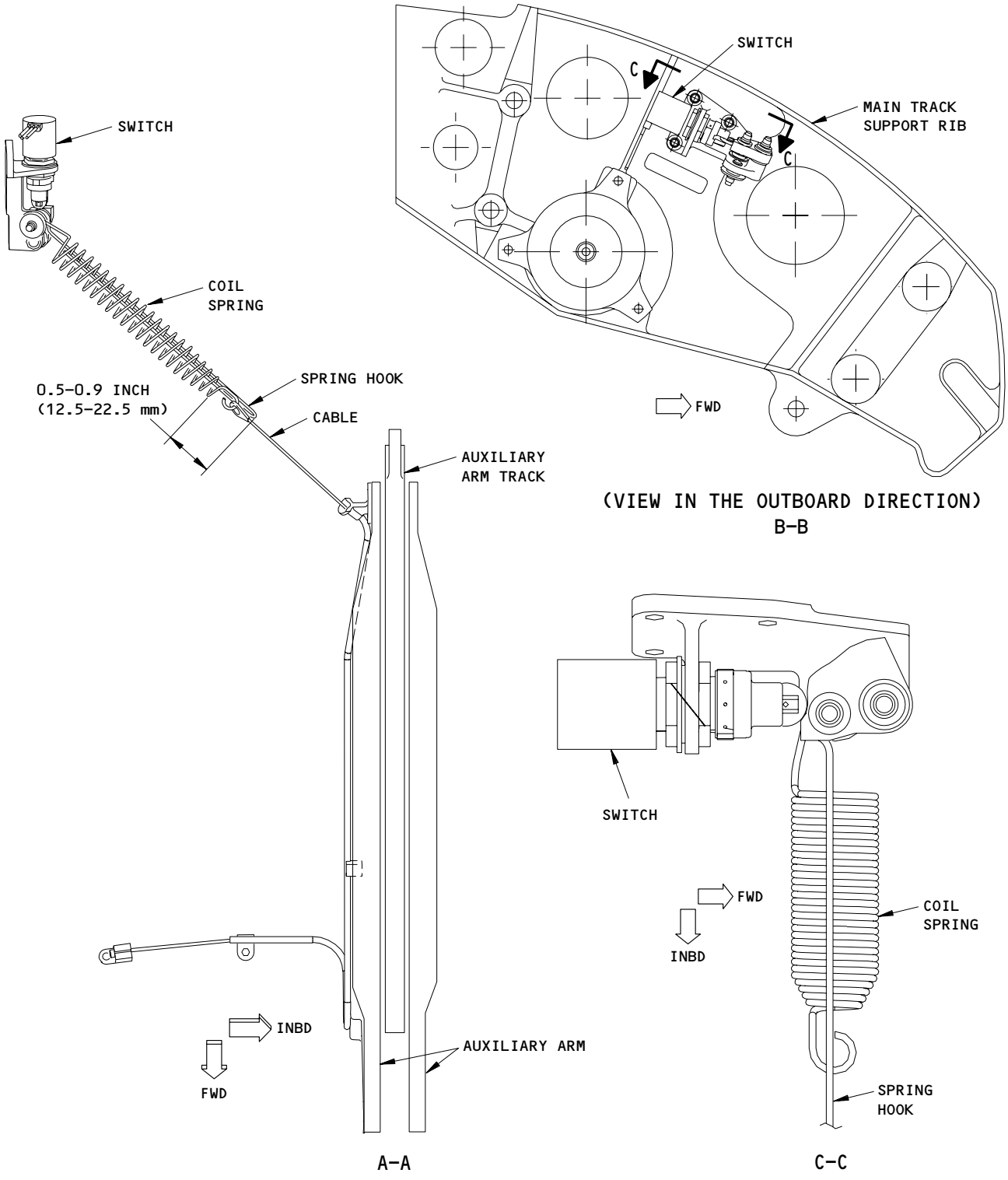


FSEU (EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 406



Loss Sensing Switch (for the Inboard LE Slat) Cable Installation
Figure 407 (Sheet 1)



Loss Sensing Switch (for the Inboard LE Slat) Cable Installation
Figure 407 (Sheet 2)

S 214-003
(2) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-101
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-004

WARNING: USE AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 864-005
(5) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 864-006
(6) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-007
(7) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-008
(8) Supply electrical power (Ref 24-22-00).

S 864-009

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-010

(10) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and LE slats move to the fully extended position.

S 494-011

(11) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-012

(12) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-013

(13) Install a PDU lock in the TE flap PDU (Fig. 404).

S 014-014

(14) Remove the necessary access panels for the fixed leading edge and open the necessary access doors (Ref 06-44-00).

E. Remove the Inboard LE Slat

S 294-248

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 494-015

(2) Install the sling equipment on the LE slat (Fig. 405).

S 494-016

WARNING: MAKE SURE YOU SAFETY THE CENTER MAIN TRACK WHEN YOU REMOVE THE LE SLAT. THE TRACK CAN FALL OUT OF THE LE DURING THE SLAT REMOVAL PROCEDURE. THIS CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Safety the center main track to prevent all free movement.

S 024-217

(4) On airplanes with (cable and cam type) slat loss sensing switch (SB 27-0117/PRR 54530-77), do these steps when you remove slats 5 and 6 (Fig. 407):
   (a) Remove the necessary parts of the slat loss sensing switch and cable assembly.

S 034-017

(5) Do these steps to disconnect the LE slat:
   (a) Disconnect the auxiliary track arms (3) by removing the rollers from the auxiliary tracks (View A-A, Fig. 402).

   NOTE: If the airplane has washers installed between the auxiliary track arm and the auxiliary track roller bearing, note the number of washers for re-installation.

   (b) Remove the bolt retainers from the main tracks (2) and disconnect the LE slat from the main tracks (Fig. 401).

S 024-018

(6) Remove the LE slat.

F. Inspect the main and auxiliary slat tracks.

S 214-108

(1) Do a wear limit inspection for the main and auxiliary slat track attachment bearings, bushings and attaching hardware (27-81-01/601).

TASK 27-81-01-424-019

3. Install the Inboard LE Slat

A. Equipment
   (1) Sling for the Inboard LE Slat - B27019-10
   (2) TE Flap PDU Lock - B27008-1
   (3) GUI 001-009, 115 WITH SB 57-0035 AND GUI 010-099, 101-114, 116-999; Inboard Slat Rigging Equipment Set - B27001-33 or B27001-40:
      (a) Rigging Spacer - B27001-34 or B27001-41
      (b) Rigging Spacer - B27001-35 or B27001-42
      (c) Rigging Tool - B27001-8
   (4) GUI 001-009, 115 WITHOUT SB 57-0035; Inboard Slat Rigging Equipment Set - B27001-1:
      (a) Rigging Spacer B27001-15
      (b) Rigging Spacer - B27001-16

(c) Rigging Tool - B27001-8

(5) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:

(6) Circuit Breaker Lockout Clip (Commercially Available)

(a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)

(7) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:

(a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Slat Assy - No. 5	27-81-01	01A	TBD
	1	Slat Assy - No. 6			TBD
402	4	Cotter Pin			220

C. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1

(2) A00247 Sealant - BMS 5-95

(3) D00121 Silicone Grease - DC-33 Medium

D. References

(1) 06-44-00/201, Wing Access Doors and Panels

(2) 24-22-00/201, Electrical Power - Control

(3) AMM 27-81-00/501, Leading Edge Slat System

(4) 27-81-20/401, Leading Edge Slat Drive Torque Tube

(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(6) 32-00-15/201, Landing Gear Door Locks

(7) 78-31-00/201, Thrust Reverser System

(8) CMM 57-43-38, Wing Leading Edge Inboard No. 5 and No. 6 Slat Assembly

E. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
512	Slat No. 5
612	Slat No. 6
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panels

521RB/621RB	Electrical and Mechanical Systems (Airnut Setter Square Drive)

F. Install the Inboard LE Slat

S 214-020
(1) Make sure the TE flaps and LE slats are in the fully extended position and the flap control lever is in the 30-unit detent.

S 214-021
(2) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 214-022
(3) Make sure the flap/slat alternate drives are off.

S 294-249

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(4) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 214-023
(5) On the slat to be installed, make sure the track for the loss sensing switch is installed on the slat support rib at the inboard slat station 108.40.
(a) If it is not installed, install the track.

S 494-024

WARNING: MAKE SURE YOU SAFETY THE CENTER MAIN TRACK WHEN YOU INSTALL THE LE SLAT. THE TRACK CAN FALL OUT OF THE LE SLAT DURING THE SLAT INSTALLATION PROCEDURE. THIS CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Safety the center main track to prevent all free movement.

S 494-025
(7) Install the sling equipment on the LE slat (Fig. 405).

S 424-026
(8) Lift the slat into its position for installation.

S 434-027

(9) Do these steps to connect the slat:

(a) Connect the slat to the main tracks and install the bolt retainers (Fig. 401).

NOTE: Make sure the bolt head faces inboard on the left wing and outboard on the right wing.

CAUTION: MAKE SURE YOU INSTALL THE SAME NUMBER OF WASHERS THAT YOU FOUND INSTALLED BETWEEN THE AUXILIARY ARM CLEVIS AND THE AUXILIARY TRACK ROLLER BEARING (VIEW A-A, FIG. 402). FAILURE TO INSTALL THE WASHERS CORRECTLY CAN CAUSE DAMAGE TO THE SLAT AUXILIARY TRACK.
NOT ALL AIRPLANES USE WASHERS IN THIS JOINT. TRACK ARM ASSEMBLIES WITH THICKER FLANGED BUSHINGS IN THE CLEVIS MAKE THE USE OF WASHERS UNNECESSARY.

(b) Connect the auxiliary track arms with the auxiliary tracks (View A-A, Fig. 402).
1) Tighten nut to 290-510 inch-pounds (32.8-57.6 Nm).

(c) Remove the safety from the center main track.

S 094-028

(10) Remove the sling equipment from the LE slat (Fig. 405).

S 214-029

(11) Make sure the roller on the loss sensing switch touches the track.

S 714-219

(12) Connect one end of the slat loss sensing cable assembly to the switch assembly and the other end to the access door in the cove of the slat with the steps that follow (Fig. 407):

(a) Attach the cable assembly to the coil spring hook on the switch assembly.

(b) Put the end of the helical coil spring (part of the switch assembly) through the terminal on the end of the cable assembly.

(c) Make sure that the distance from the end of the spring hook to the first coil on the coil spring is 0.5 to 0.9 inch (12.7-22.8 mm).

NOTE: The dimension must be 0.5 inch minimum. A dimension of more than 0.9 inch (22.8 mm) is permitted if some amount of tension is held in the spring (this is when you can see clearance between the coils) throughout the full movement of the slat

(d) If necessary, lubricate with silicon grease, Dow Corning 33, Medium or equivalent these parts of the switch assembly: cam pivot, cam surface, switch roller, switch plunger.
(e) Pull the cable and make sure that:
1) The switch actuates as soon as the first spring coil touches the bend of the hook, and the spring hook does not catch on the cable or on the hook portion of the coil spring.
(f) Attach the cable anchor at the other end of the cable assembly to the access panel in the cove of the slat.

NOTE: Make sure that the centerline of the cable aligns with the center line of the anchor, after the fastener is tightened.

(g) If necessary, fill the guide tube with silicon grease, Dow Corning 33 Medium or equivalent.
(h) Do the test of the loss sensing switch cables (AMM 27-81-00/501).

S 824-061
(13) If you installed the same slat that you removed, rigging of the slat is not necessary when you obey the conditions that follow:
(a) The auxiliary track adjustments are not changed.
(b) The auxiliary arms are not removed from the slat.
(c) The slat and/or auxiliary arm hardware are not repaired, modified, adjusted or replaced.

S 824-228
(14) Full slat rigging is not necessary when you complete any of the following tasks and the checks listed below:
(a) You replace bolt, washer, and nut with the same type, size, or thickness as the original parts.
(b) You replace bolt, washer and nut at slat connection where slat out-of-rig condition will not occur.
(c) You remove the auxiliary arms for minor rework not involving the arms attachment holes.

NOTE: The location of the auxiliary arms can be affected if removed or loosened from the slat due to clearances or wear at the attach bolts holes.

(d) You do a slat to adjacent structure check for mismatch.
(e) You do a check on the slat trailing edge to fixed wing for a clearance of 0.001 to 0.009 inch (0.025-0.23 mm) before applying preload.

CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

(f) You do a clay check for upstops and downstops.

S 824-030

(15) Do the steps to adjust the LE slat in Adjust the Inboard LE Slat.

NOTE: You can use the Airnut Setter/square drive procedure that follows, as an option to move the slats when hydraulic power is not available, but only when adjusting the slats. The system is to be run by hydraulics when testing the positions of the slats and the adjustments of the slats done. Also make sure not to bottom the auxiliary arm rollers when doing the adjustment

The airnut setter (square drive) is located between the outboard slat actuator and the outboard slat position transmitter (OSS.814)

S 824-186

(16) Do these steps to use the airnut setter/square drive to move the slat during adjustment:

(a) Pressurize the left hydraulic system (AMM 29-11-00/205)

(b) Move the flap control lever to the zero(flaps up) detent and make sure the LE slats move to the fully retracted position.

(c) Remove the power from the left hydraulic system (AMM 29-11-00/201).

(d) Do the steps to prepare the slats for manual extension as described in the "Adjust the Inboard LE Slat" section of this procedure.

(e) Disconnect the outboard slat position transmitter TS5047 or TS5083 from the outboard slat rotary actuator by removing the three mounting bolts.

NOTE: Make sure you do not rotate the transmitter spline after the removal, because if you do it, you will have to re-rig the transmitter (AMM 27-58-01/501).

(f) Remove the access panel 521RB or 621RB.

(g) Rotate the square drive (with a suitable socket) using an airnut setter to get the slat position you want.

NOTE: You may move the slat from the zero (flaps up) position# to the intermediate position with 149.6 revolutions of the torque tubes. You may move the slat from the zero (flaps up) position to the fully extended position with 199.9 revolutions of the torque tubes.

(h) Move the slats back to the zero (flaps up) position using the airnut setter when your rigging actions are completed.
(i) Pressurize the left hydraulic system (AMM 29-11-00/201).
(j) Make sure the slats remain in the zero (flaps up) position.

NOTE: If the slats have not retracted exactly to the zero(flaps up) position, it is because some acceptable small rotation of the torque tubes may have ocurred.

(k) Connect the outboard slat position transmitter to the outboard slat rotary actuator with the three mounting bolts.

NOTE: If the position transmitter spline was rotated after its removal, you have to re-rig it (AMM27-58-01/501).

(l) Continue with the remaining steps that you have to do, to complete the adjustment of the slats.

G. Adjust the Inboard LE Slat

S 294-250

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 034-104
(2) Remove the preload blocks at the aft clevises of the auxiliary tracks (Detail D, Fig. 402):
(a) Loosen the aft clevis nuts (23).
(b) Remove the preload blocks (22) and shims (21).
(c) Tighten the aft clevis nuts (23) to 65-100 pound-inches (7.4-11.3 Nm).

S 864-034
(3) Supply electrical power (AMM 24-22-00/201).

S 094-035
(4) Remove the PDU lock from the TE flap PDU (Fig. 404).

S 864-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-037
(6) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-038
(7) Move the flap control lever to the 20-unit detent.
  (a) Make sure the TE flaps and LE slats move to the intermediate position.

S 494-039
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-040
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-041
(10) Install a PDU lock in the TE flap PDU (Fig. 404).

S 864-042
(11) Do these steps to prepare the slats for manual extension:
  (a) Make sure the position selector switch for the flap/slat alternate drive, on the first officer's main instrument panel, P3, is in the NORM detent.
  (b) Install a DO-NOT-OPERATE tag on the position selector switch.
  (c) Supply electrical power (AMM 24-22-00/201).
  (d) Remove the DO-NOT-CLOSE tags, the circuit breaker locks and close these circuit breakers:
    1) P6 Panel
      a) 6D20, ALTN SLAT PWR
    2) P11 Panel
      a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

(e) Push the arming switch for the slat alternate drive to arm the slat alternate drive (switch light will come on).
(f) Install a DO-NOT-OPERATE tag on the arming switch.
(g) Open these circuit breakers, install circuit breaker locks and attach DO-NOT-CLOSE tags:
1) P6 Panel
a) 6D20, ALTN SLAT PWR
2) P11 Panel
a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 984-043
(12) Manually move the slats until the trailing edge of the slat is clear of the upper panel of the fixed leading edge by a minimum of 0.50 inch.
(a) Make an accurate note of the number of full turns you made to the torque tube.

S 094-092
(13) GUI 001-009, 115 WITH SB 57-0035 AND GUI 010-099, 101-114, 116-999; remove the fillers and shims at the forward clevises of the auxiliary tracks (View B-B, Fig. 402):
(a) Loosen the forward clevis nuts (17).
(b) Remove the fillers and shims (19).
(c) Tighten the forward clevises nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

S 094-116
(14) GUI 001-009, 115 WITHOUT SB 57-0035;
remove the shims at the forward clevises of the auxiliary tracks (View B-B, Fig. 402):
(a) Loosen the forward clevis nuts (17).
(b) Remove the shims (19).
(c) Tighten the forward clevises nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

S 984-044
(15) Turn the torque tube the same number of turns in the opposite direction to retract the slat to the intermediate position.

S 864-045
(16) Do these steps to provide hydraulic power for the slats:
(a) Remove the DO-NOT-CLOSE tags, the circuit breaker locks and close these circuit breakers:
1) P6 Panel
a) 6D20, ALTN SLAT PWR
2) P11 Panel
a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(b) Remove the DO-NOT-OPERATE tag from the arming switch.
(c) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).

(d) Open these circuit breakers, install circuit breaker locks and attach DO-NOT-CLOSE tags:
1) P6 Panel
a) 6D20, ALTN SLAT PWR
2) P11 Panel
a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(e) Remove the PDU lock from the TE flap PDU (Fig. 404).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(f) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-052
(17) Remove the DO-NOT-OPERATE tag on the flap control lever.

S 864-048
(18) Move the flap control lever to the zero (FLAPS UP) detent.
(a) Make sure the TE flaps and the LE slats move to the fully retracted position.

S 864-049
(19) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-051
(20) Install a DO-NOT-OPERATE tag on the flap control lever.

S 494-050
(21) Install a PDU lock in the TE flap PDU (Fig. 404).

S 824-046

(22) Do these steps to set a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge (Detail C, Fig. 402).

NOTE: In the area over the centerline of the auxiliary track, the clearance is the distance between the slat trailing edge and the upper panel of the fixed leading edge. Make sure you measure along the trailing edge, 3.00 inches (7.62 cm) inboard to 3.00 inches (7.62 cm) outboard of the centerline, and to a depth of 0.40-0.60 inch (10.2-15.2 mm) from the trailing edge.

The satisfactory range of clearance is 0.001-0.009 inch (0.025-0.228 mm). The minimum clearance, at all points in the measured area, must be 0.000 inch or more. The maximum clearance at its smallest dimension in the measured area, must not be more than 0.009 inch.

For example, if the dimension at one point in the measured area is 0.009 inch, and the dimension at another point in the measured area is 0.012 inch, the clearance is satisfactory. If the dimensions at all points in the measured area are more than 0.009 inch, the clearance is unsatisfactory.

(a) Loosen the aft clevis nuts (23).
(b) Install and adjust the shims (21) to get a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge.
(c) If you cannot get a clearance of 0.001-0.009 inch (0.025-0.228 mm), write down the clearance value and continue.
(d) Apply primer to all the bare surfaces of the shims (21).
(e) Install the shims (21).
(f) Tighten the aft clevis nuts (23) to 65-100 pound-inches (7.4-11.3 Nm).

S 864-064

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(23) Do the steps that provide hydraulic power for the slats.

S 094-053
(24) Remove the DO-NOT-OPERATE tag on the flap control lever.

S 864-054
(25) Move the flap control lever to the 20-unit detent.
  (a) Make sure the TE flaps and the LE slats move to the intermediate position.

S 864-055
(26) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-056
(27) Install a DO-NOT-OPERATE tag on the flap control lever.

S 494-057
(28) Install a PDU lock in the TE flap PDU (Fig. 404).

S 864-058
(29) Do the steps that prepare the slats for manual extension.

S 984-059
(30) Manually move the slats until the trailing edge slat clears the upper panel of the fixed leading edge by a minimum of 0.50 inch (12.7 mm).
  (a) Make an accurate note of the number of full turns you made to the torque tube.

S 494-144
(31) GUI 001-009, 115 WITH SB 57-0035 AND GUI 010-099, 101-114, 116-999; install the rigging spacers, fillers, and shims at the forward clevises of the auxiliary tracks (View B-B, Fig. 402):
  (a) Loosen the forward clevis nuts (17).

(b) Install the rigging spacers (18), fillers, and shims (19).

NOTE: Install rigging spacer B27001-41 (0.163 inch) at ISS 234 and rigging spacer B27001-42 (0.224 inch) at ISS 147.

(c) Tighten the nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

S 494-171

(32) GUI 001-009, 115 WITHOUT SB 57-0035;
install the rigging spacers and shims at the forward clevises of the auxiliary tracks (View B-B, Fig. 402):
(a) Loosen the forward clevis nuts (17).
(b) Install the rigging spacers (18) and shims (19).

NOTE: Install B27001-15 rigging spacer (0.292 inch)(7.41 mm) at ISS 234 and B27001-16 (0.388 inch)(9.85 mm) at ISS 147, if you have not started modifications by SB 57-0035 yet. Install B27001-34 rigging spacer (0.063 inch)(1.6 mm) at ISS 234 and B27001-35 (0.10 inch)(2.5 mm) at ISS 147, if you have completed modifications by SB 57-0035 revision 1. After completion of revision 2 you will use B27001-41/-42 rigging spacers.

(c) Install the rigging spacers (18) and shims (19).

NOTE: Install B27001-15 rigging spacer (0.292 inch)(7.41 mm) at ISS 234 and B27001-16 (0.388 inch)(9.85 mm) at ISS 147, if you have not started modifications by SB 57-0035 yet.

(d) Tighten the nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

S 984-060

(33) Turn the torque tube the same number of turns in the opposite direction to retract the slat to the intermediate position.

S 824-197

(34) Do these steps to set a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge (Detail C, Fig. 402).

NOTE: In the area over the centerline of the auxiliary track, the clearance is the distance between the slat trailing edge and the upper panel of the fixed leading edge. Make sure you measure along the trailing edge, 3.00 inches (7.62 cm) inboard to 3.00 inches (7.62 cm) outboard of the centerline, and to a depth of 0.40-0.60 inch (10.2-15.2 mm) from the trailing edge.

The satisfactory range of clearance is 0.001-0.009 inch (0.025-0.228 mm) . The minimum clearance, at all points in the measured area, must be 0.000 inch or more. The maximum clearance at its smallest dimension in the measured area, must not be more than 0.009 inch.

For example, if the dimension at one point in the measured area is 0.009 inch (0.228 mm), and the dimension at another point in the measured area is 0.012 inch (0.304 mm), the clearance is satisfactory. If the dimensions at all points in the measured area are more than 0.009 inch (0.228 mm), the clearance is unsatisfactory.

(a) Loosen the forward clevis nuts (17).
(b) Adjust the shims (19) to get a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge.
(c) If you cannot get a clearance of 0.001-0.009 inch (0.025-0.228 mm), write down the clearance value and continue.
(d) Apply primer to all the bare surfaces of the shims (19).
(e) Install the shims (19).
(f) Tighten the nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

S 984-062

(35) Manually move the slats until the trailing edge slat clears the upper panel of the fixed leading edge by a minimum of 0.50 inch (12.7 mm).
(a) Make an accurate note of the number of full turns you made to the torque tube.

S 094-209

(36) Remove the rigging spacers at the forward clevises of the auxiliary tracks (View B-B, Fig. 402):
(a) Loosen the forward clevis nuts (17).
(b) Remove the rigging spacers (18).
(c) Tighten the forward clevis nuts (17) to 65-100 pound-inches (7.4-11.3 Nm).

(d) Apply sealant around the nuts (17).

S 494-110

(37) Install the preload blocks at the aft clevises for the auxiliary tracks (Detail D, Fig. 402).
(a) Loosen the aft clevis nuts (23).
(b) Install the preload blocks (22).
(c) Tighten the aft clevis nuts (23) to 65-100 pound-inches (7.4-11.3 Nm).
(d) Apply sealant around the washers (24, 25) and the nuts (23).

S 984-198

(38) Turn the torque tube the same number of turns in the opposite direction to retract the slat to the intermediate position.

S 824-177

(39) If the maximum clearance between the slat trailing edge and the fixed leading edge that you wrote down in the previous steps is more than 0.009 inch (0.228 mm), do these steps:

NOTE: The minimum clearance must not be less than 0.001 inch (0.025 mm).

(a) Move the slats to the position for which the clearance was not met.
(b) Measure and write down the step height, h, in the slat measurement area (Fig. 402A), for each slat that did not meet the clearance requirement.

NOTE: If dial calipers are used to measure h, make sure you hold the calipers perpendicular to the slat.

1) Start to measure the step height, h, 2-4 inches (5-10 cm) from one end of the slat.
2) Continue to measure the step height, h, every 6 inches (15.2 cm) until you are 2-4 inches (5-10 cm) from the other end of the slat.
a) Make sure each step height, h, is in the limits shown (Detail B, Fig. 402A), for the intermediate position or (Detail C, Fig. 402A) for the retracted position.
3) Calculate the average step height, H, for each slat.
(c) Make sure the average step height, H, for each slat is not more than 0.09 inch (2.28 mm) for the intermediate position or 0.12 inch (3.04 mm) for the retracted position.

H. Test of the LE Slat Installation

S 864-187

(1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6D20, ALTN SLAT PWR

S 864-056
(2) Remove the circuit breaker lock and close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-057
(3) Remove the DO-NOT-OPERATE tag from the arming switch for the slat alternate drive.

S 864-188
(4) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).

S 094-059
(5) Remove the DO-NOT-OPERATE tag from the position selector switch for the flap/slat alternate drive.

S 864-060
(6) Open this circuit breaker on the P6 panel, and attach a DO-NOT-CLOSE tag:
(a) 6D20, ALTN SLAT PWR

S 864-061
(7) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 214-062
(8) Make sure the flap control lever is in the 20-unit detent and the TE flaps and the LE slats are in the intermediate position.

S 084-196
(9) Remove the PDU lock from the TE flap PDU (Fig. 404).

S 494-067
(10) Make sure a PDU lock is installed in the TE flap PDU (Fig. 404).

S 224-068
(11) With the slats rigged and adjusted correctly, do these steps to examine the 0.10 +/- 0.03 inch clearance between the slat upstop and the upstop fitting:
(a) Clean the slat upstops to remove the grease on the surface.
(b) Put a ball of clay (.5 inch in diameter) on the slat upstops.
1) Make the clay flat with your hands to approximately .25 inch thickness.
2) Make sure the clay is in a position where it will touch the track stop fittings that are mounted on the rib.
3) Make sure the clay stays on the slat upstops.
4) Put a thin layer of grease on the clay surfaces that will touch the track stop fittings.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the left hydraulic system (Ref 29-11-00/201).
(d) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats move to the fully retracted position.
(e) Move the flap control lever to the 1-unit detent and let the flaps and slats move to the 1-unit position.
(f) Remove power from the left hydraulic system (AMM 29-11-00/201).
(g) Measure the clay thickness.
    1) Make sure the thickness is 0.10 ±0.03 inch (2.5 +/- 0.76 mm).
(h) If the upstop clearance (clay thickness) is not correct, do these steps to correct the adjustment:
    1) Put the face of a straightedge on the bottom of the main track and move it up until it touches the lower rib surface.
    2) Use a sharp pencil to draw a line on the main track surface along the top edge of the straightedge.
        a) Disconnect the torque tubes adjacent to rotary actuator that was replaced.
        b) Turn the input shaft of the rotary actuator the number of turns that are necessary to get the correct adjustment.

            NOTE: Table 401 gives the linear displacement of each track; for the listed slats, per turn of the input shaft of the rotary actuator.

TABLE 401

SLAT NUMBER	DISTANCE MOVED AT THE SLAT UPSTOP FOR EACH FULL TURN OF THE INPUT SHAFT
1, 2, 9, or 10	.0577 INCH
3, 4, 7, or 8	.0580 INCH
5, or 6	.0774 INCH

        c) At the same time, monitor the line you made on the bottom of the main track with the flaps in the 1-unit position.

d) If the thickness of the clay is too large, make sure the line moves in the direction of the actuator.
e) If the thickness of the clay is too small, make sure the line moves away from the actuator.

(i) Remove all of the clay from the slat upstops.

S 434-234

(12) Install the screws in the splined couplings.

S 434-235

(13) Safety them with a wire.

S 434-236

(14) ROTARY ACTUATORS WITH A PIN OVERLOAD INDICATOR;
push the pin on the rotary actuator with approximately 2 pounds (0.9 Kg) to set the overload indicator.

S 434-237

(15) ROTARY ACTUATORS WITH A SPRING OVERLOAD INDICATOR;
push the spring back until it sets behind the pin.

S 224-069

(16) Examine the slat seals, leading edge clearances, and the slat mismatch, and make sure all measurements are permitted (Fig. 403).

NOTE: If necessary examine the clearance between the slat upstop and the upstop fitting in the step above to adjust the slats, as needed, to get the permitted mismatch and clearances.

S 214-070

(17) Make sure the six EICAS circuit breakers on the P11 panel are closed.

S 094-207

(18) Remove the PDU lock from the TE flap PDU (Fig. 404).

S 864-072

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(19) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-073

(20) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent and do these steps:
   (a) Stop in each detent to let the TE flaps and LE slats move to the correct position.
   (b) Make sure at each detent the TRAILING EDGE and LEADING EDGE lights on the P3 panel are off and that no messages show on the EICAS display.

S 864-074

(21) Remove the circuit breaker lock and the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (d) 11J33, WARN ELEX A

S 864-075

(22) Remove the circuit breaker locks, and close these circuit breakers on the P6 panel:
   (a) 6D20, ALTN SLAT PWR
   (b) 6D23, ALTN FLAP PWR

I. Test of the Position Transmitters for the LE Slat

NOTE: This procedure is necessary if the position transmitters on the wings or on the PDU were adjusted during the removal and installation procedure for the slat or the main track.

S 744-078
(1) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center (Fig. 406).

NOTE: Make sure the NO FAULTS message shows on the FSEU display.

S 864-079
(2) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.

S 864-080
(3) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 864-081

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(4) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended position.

S 864-082
(5) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-083
(6) Install a PDU lock in the TE flap PDU (Fig. 404).

S 864-084
(7) Release the test switch for the LEFT stall warning, and make sure the LE slats stay in the fully extended position.

S 864-085
(8) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will go on).

S 214-247

CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

(9) Make sure the downstop assembly is installed correctly and the nut has the correct torque.

S 214-252

(10) Make sure, at all rotary actuators on all slats, the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure you can turn the torque tube, found immediately outboard of the LE slat PDU, in the extend direction (in the clockwise direction if you look inboard at the LE slat PDU from the left wing).

S 094-208

(11) Remove the PDU lock from the TE flap PDU (Fig. 404).

S 864-088

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(12) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-089

(13) Push the arming switch for the slat alternate drive, on the P3 panel, to disarm the slat alternate drive (switch light will go off).
(a) Make sure the LE slats move to the intermediate position.

S 864-090

(14) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 864-091
(15) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will go on).

S 864-092
(16) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent and make sure the flaps and slats move to the UP position.

S 864-093
(17) Move the flap control lever to the zero (FLAPS UP) detent.

S 864-094
(18) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.

S 864-095
(19) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

J. Put the Airplane Back to Its Usual Condition

S 294-251

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 414-096

WARNING: USE AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-097
(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-098
(4) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 414-099
(5) Install the access panels and close the access doors (Ref 06-44-00).

S 444-100

(6) Do the activation procedure for the thrust reverser (Ref 78-31-00).

INBOARD LEADING EDGE SLAT - INSPECTION/CHECK

1. General
   A. This procedure only has an illustration and wear limit table which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to the Inboard Leading Edge Slat - Removal/Installation for procedures to do these tasks.

TASK 27-81-01-226-001

2. Wear Limits for the Inboard Leading Edge Slat (Fig. 601)
   A. Procedure

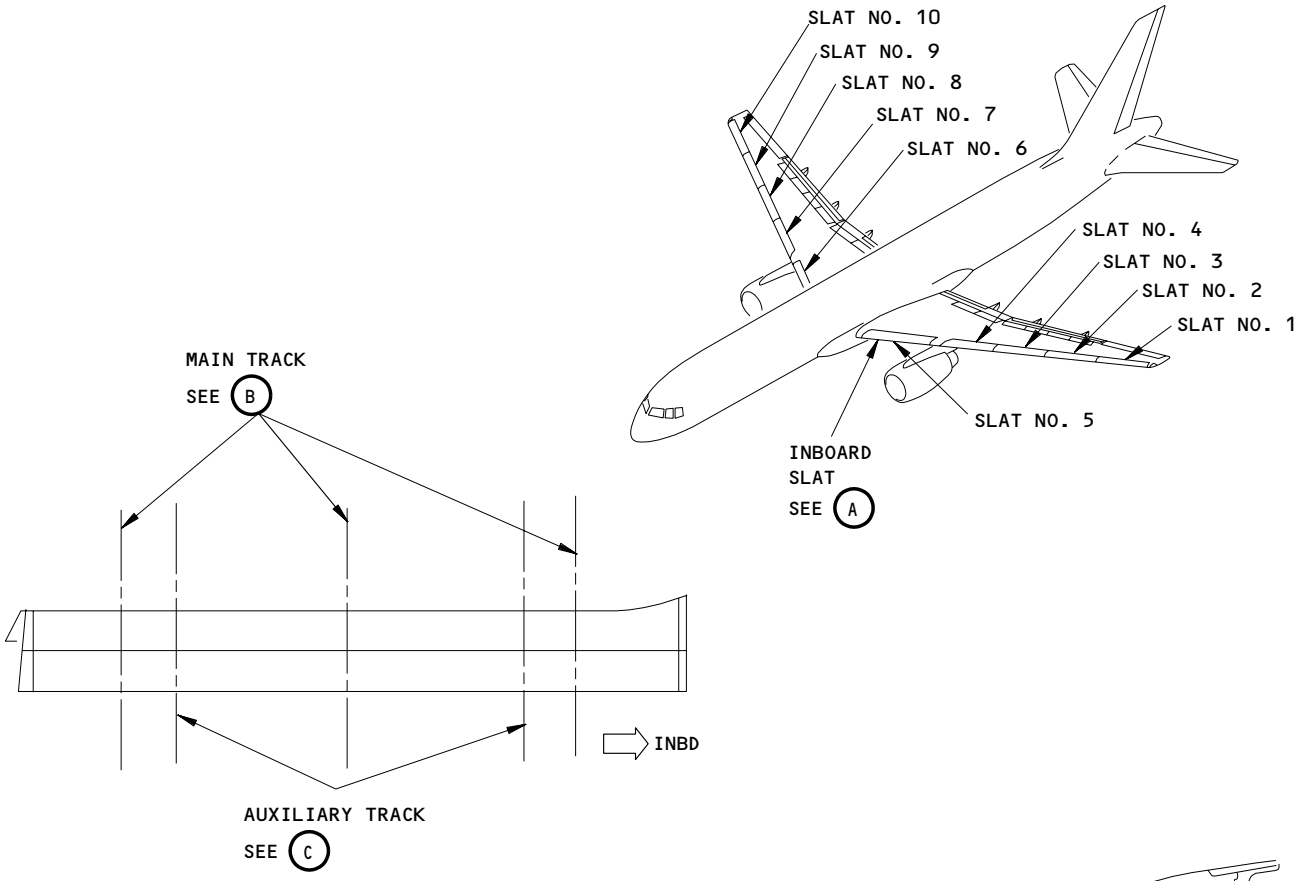
S 486-005

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

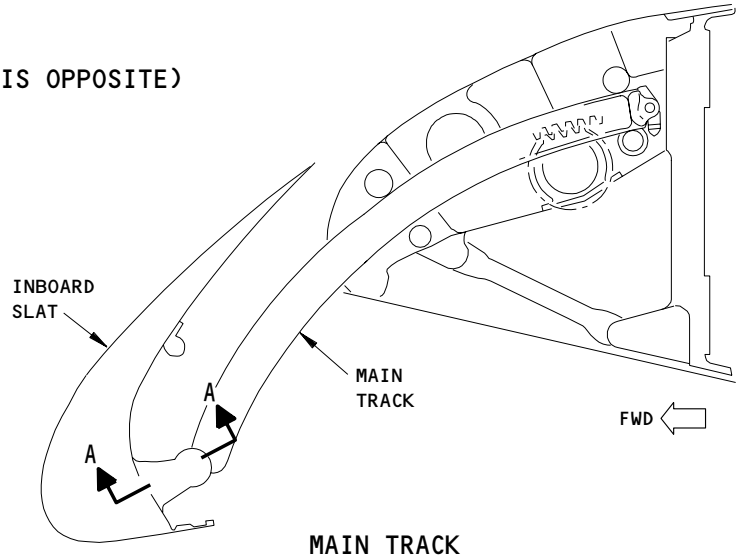
(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 226-004

(2) Do the wear limit inspection for the main and auxiliary track roller bearings, bushings and attaching hardware.



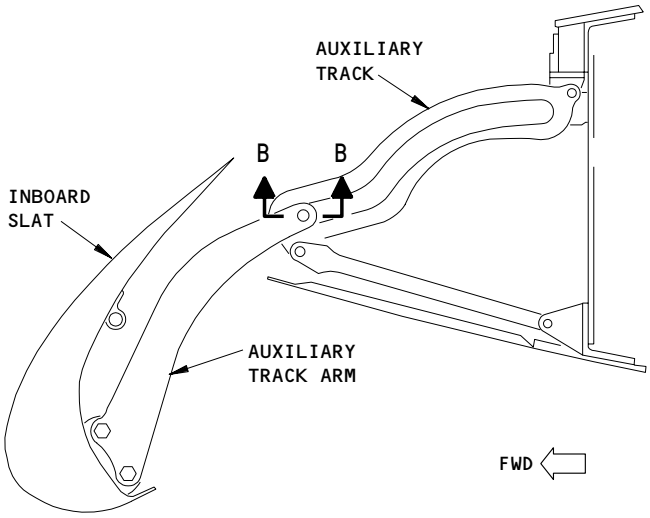
INBOARD SLAT
(LEFT WING IS SHOWN, RIGHT WING IS OPPOSITE)
A



MAIN TRACK
(3 MAIN TRACKS ON EACH INBOARD SLAT)
B

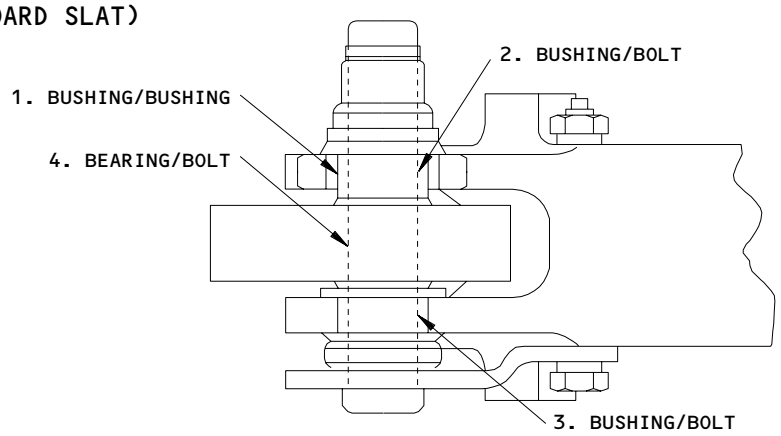
NOTE: THE CENTER MAIN TRACK DOES NOT HAVE GEAR TEETH OR UP AND DOWN STOPS.

Wear Limits for the Inboard Leading Edge Slat
Figure 601 (Sheet 1)

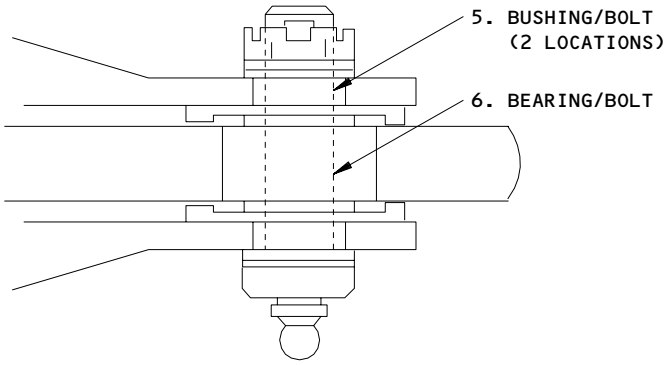


AUXILIARY TRACK
(2 AUXILIARY TRACKS ON EACH INBOARD SLAT)

C



(2 LOCATIONS)
A-A



(2 LOCATIONS)
B-B

Wear Limits for the Inboard Leading Edge Slat
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.6870 (17.450)	0.6880 (17.475)	0.6915 (17.564)	0.0050 (0.127)	1 5		
	BUSHING	OD	0.6860 (17.424)	0.6865 (17.437)	0.6830 (17.348)		2		
2	BUSHING	ID	0.5000 (12.700)	0.5010 (12.725)	0.5055 (12.840)	0.0050 (0.127)	1		
	BOLT	OD	0.4990 (12.675)	0.4995 (12.687)	0.4985 (12.662)		3		
3	BUSHING	ID	0.5000 (12.700)	0.5005 (12.713)	0.5045 (12.814)	0.0050 (0.127)	2 5		
	BOLT	OD	0.4990 (12.675)	0.4995 (12.687)	0.4955 (12.586)		3		
4	BEARING	ID	0.5000 (12.700)	0.5004 (12.710)	0.5045 (12.814)	0.0050 (0.127)	4		
	BOLT	OD	0.4990 (12.675)	0.4995 (12.687)	0.4955 (12.586)		3		
5	BUSHING	ID	0.4995 (12.687)	0.5005 (12.713)	0.5045 (12.814)	0.0050 (0.127)	1 5		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4955 (12.586)		3		
6	BEARING	ID	0.4993 (12.682)	0.5000 (12.700)	0.5045 (12.814)	0.0050 (0.127)	4		
	BOLT	OD	0.4985 (12.662)	0.4995 (12.687)	0.4950 (12.573)		3		

1 REPLACE AND REAM THE BUSHING

2 REPLACE THE BUSHING

3 REPLACE THE BOLT

4 REPLACE THE BEARING

5 APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE HOLE AND THE OUTER DIAMETER OF THE BUSHING. ASSEMBLE IT IMMEDIATELY. FILLET SEAL THE BUSHING FLANGE WITH BMS 5-95 SEALANT.

Wear Limits for the Inboard Leading Edge Slat
Figure 601 (Sheet 3)

OUTBOARD LEADING EDGE SLAT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the outboard leading edge (LE) slat. The second task installs the outboard LE slat.
   B. The LE slats have numbers No. 1 through No. 10. The procedures in this subject give instructions for the outboard slats No. 1 thru 4 and No. 7 thru 10.

TASK 27-81-02-024-001

2. Remove the Outboard LE Slat
   A. Equipment
      (1) Sling for the Outboard LE Slat - B27019-10
      (2) TE Flap PDU Lock - B27008-1
      (3) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (4) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (Commercially Available)
      (5) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 24-22-00/201, Electrical Power - Control
      (3) 27-81-02/601, Outboard Leading Edge Slat
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) 32-00-15/201, Landing Gear Door Locks
      (6) 32-00-20/201, Landing Gear Downlocks
      (7) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

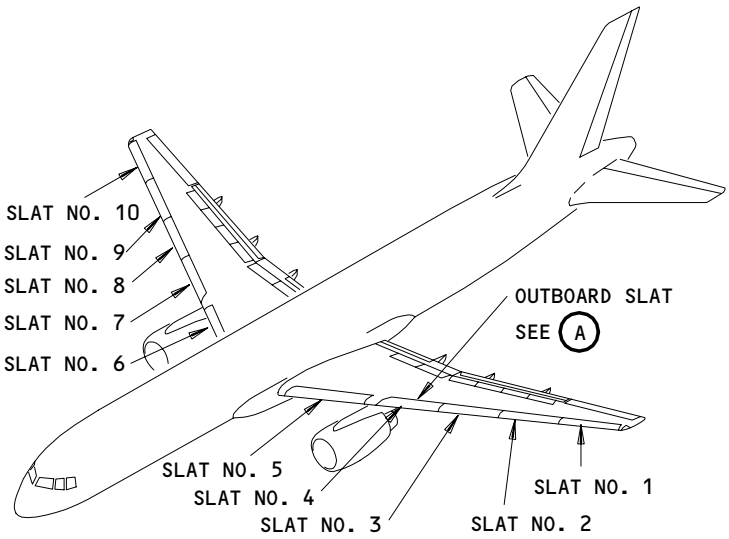
143	MLG Wheel Well
211/212	Control Cabin
520/620	Wing Leading Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

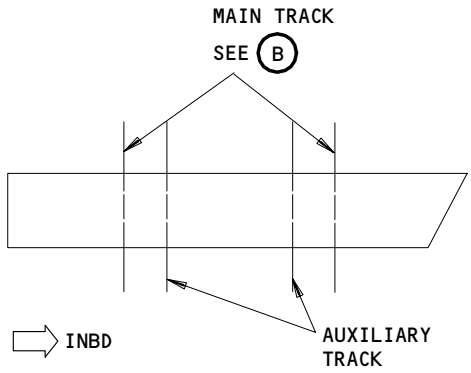
   D. Prepare for the Removal

S 044-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

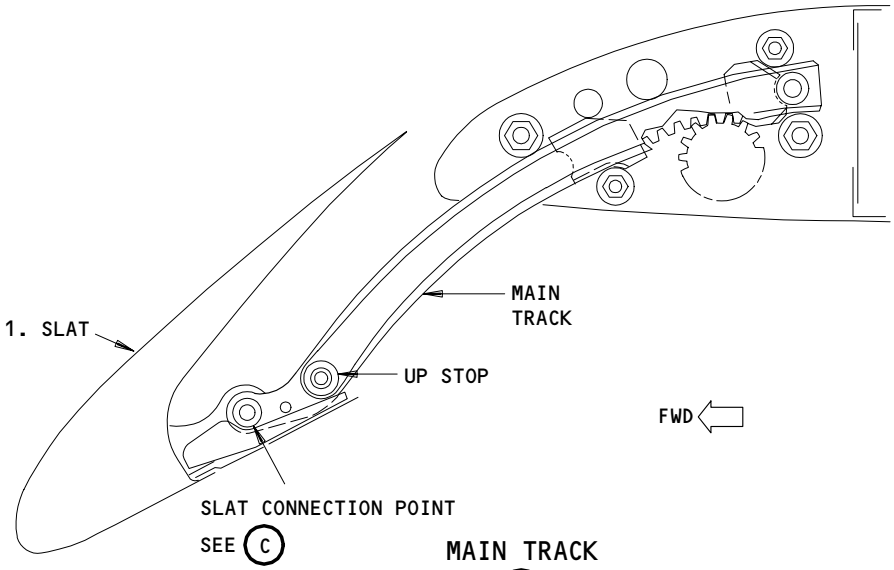
(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).





OUTBOARD SLAT NO. 4 SHOWN
(EXAMPLE OUTBOARD SLATS
NO. 1-3 AND 7-10)

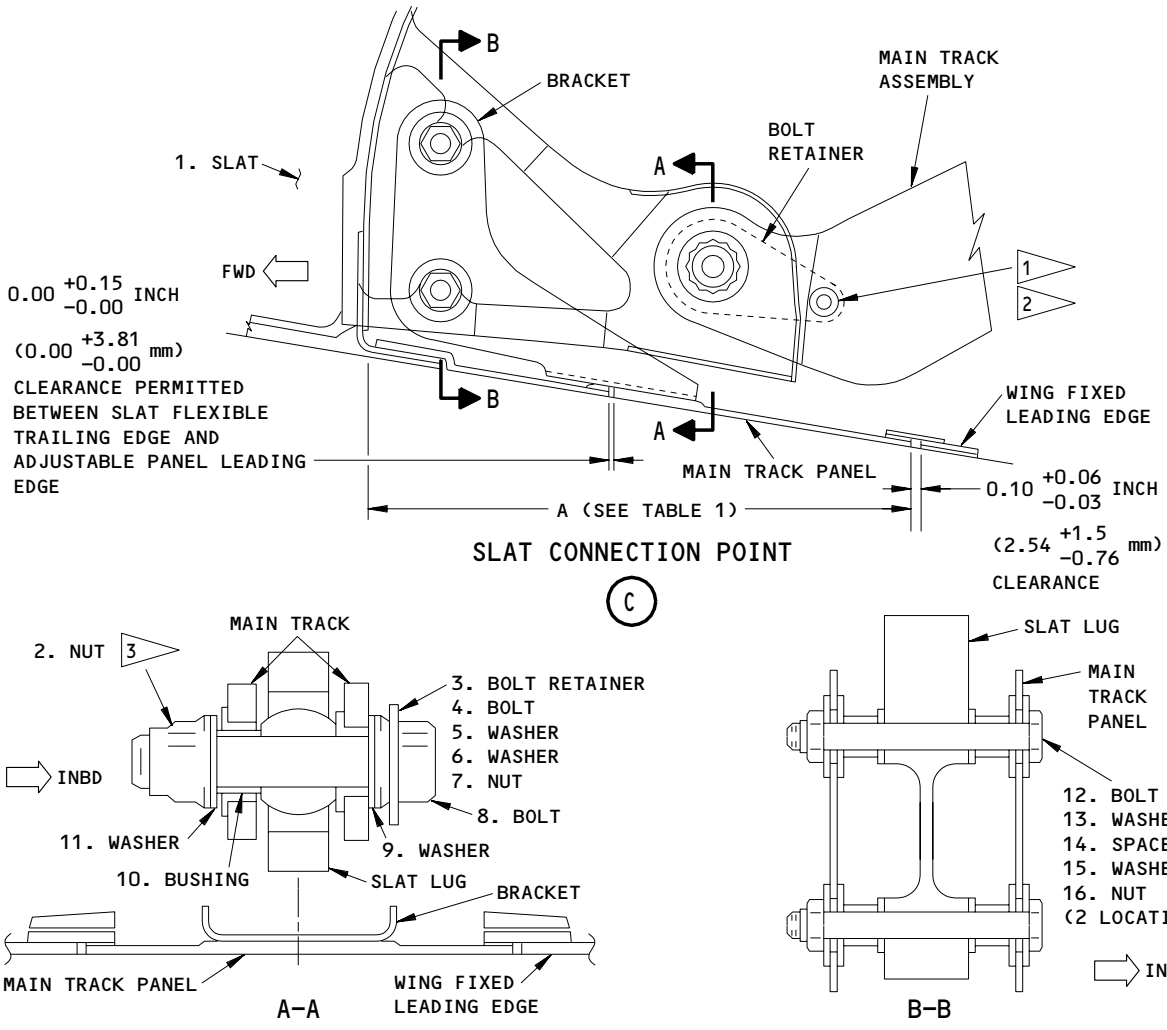
A



MAIN TRACK

B

Main Track for the Outboard LE Slat
Figure 401 (Sheet 1)



OUTBOARD SLAT STATION (OSS) FOR MAIN TRACK CENTERLINES	MAIN TRACK PANELS	A ±0.01 (±0.25) INCHES (mm)
344.50	AT SLATS 4 AND 7	6.569 (166.85)
404.80	AT SLATS 4 AND 7	6.575 (167.00)
471.30	AT SLATS 3 AND 8	6.582 (167.18)
542.70	AT SLATS 3 AND 8	6.589 (167.36)
605.30	AT SLATS 2 AND 9	6.596 (167.53)
677.50	AT SLATS 2 AND 9	6.603 (167.71)
736.70	AT SLATS 1 AND 10	6.609 (167.86)
809.46	AT SLATS 1 AND 10	6.617 (168.07)

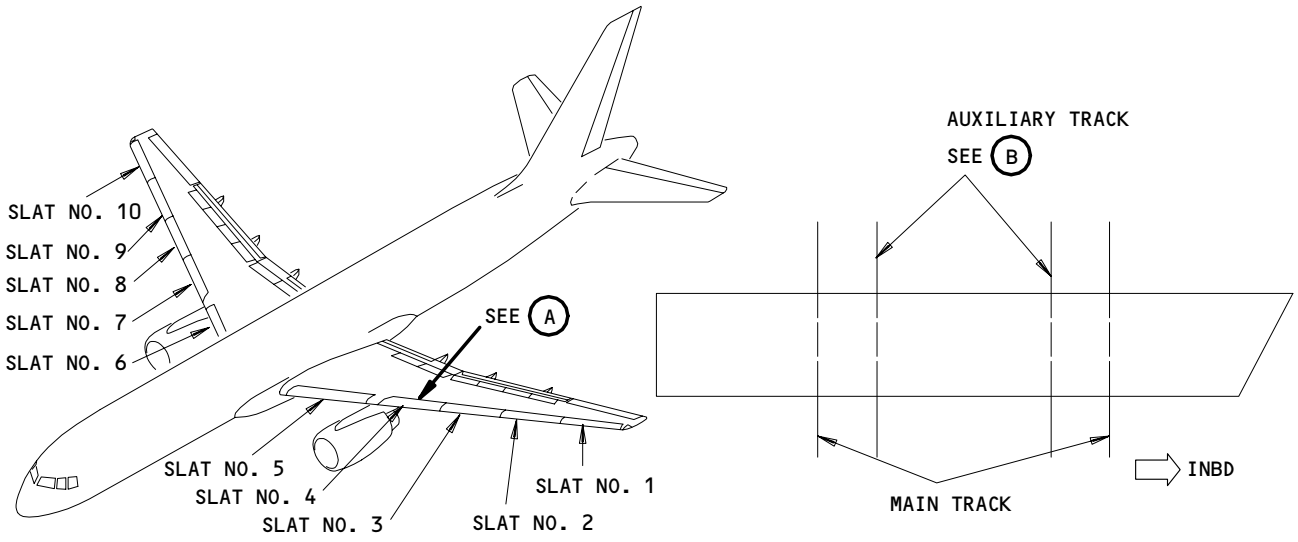
TABLE 1

1. INSTALL THE BOLT RETAINER AND BOLT WITH A WASHER UNDER THE NUT AND UNDER THE BOLTHEAD. THE HEAD OR SHANK OF THE THE BOLT MUST NOT BE MORE THAN 0.05 INCH (1.27 mm) ABOVE THE BRACKET. BOLT THREADS IN THE BEARING ARE PERMITTED.

2. APPLY BMS 10-11 PRIMER AND MIL-C-11796 CORROSION PREVENTIVE COMPOUND IN THE HOLE

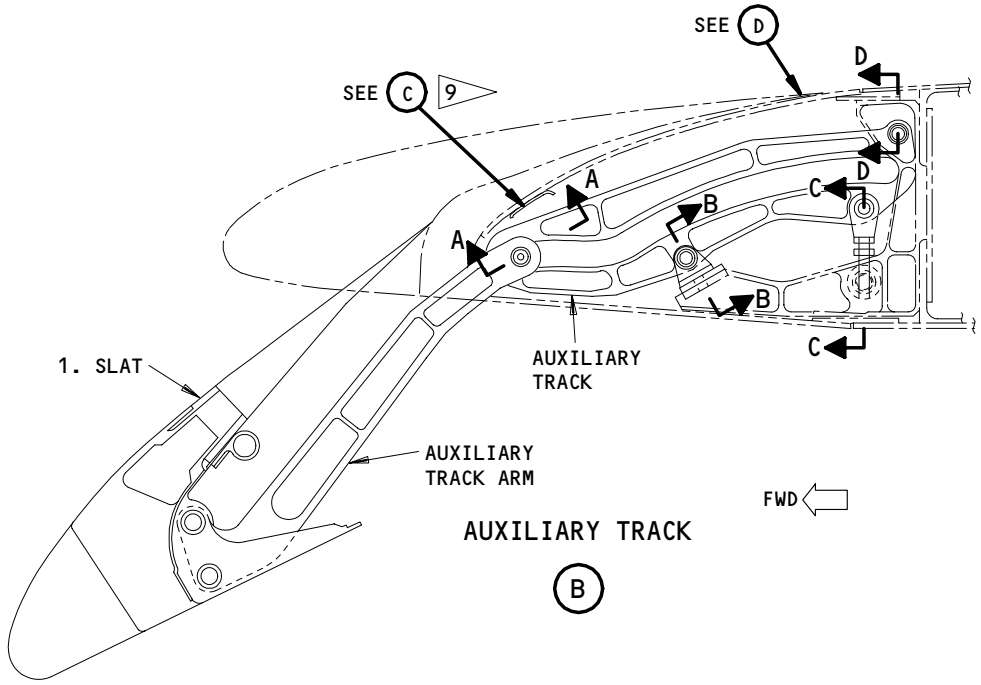
3. TORQUE TO 700-900 INCH-LBS (79-101 Nm)

Main Track for the Outboard LE Slat
Figure 401 (Sheet 2)



OUTBOARD SLAT NO. 4 SHOWN
(EXAMPLE OUTBOARD SLATS NO. 1-3 AND 7-10)

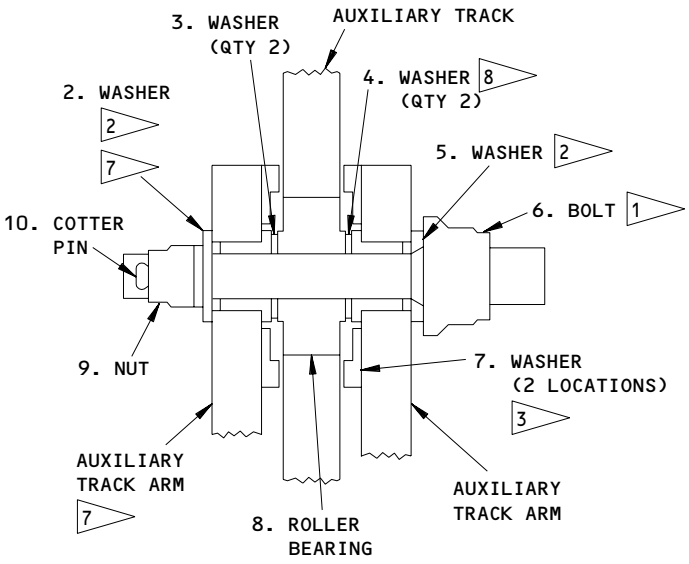
A



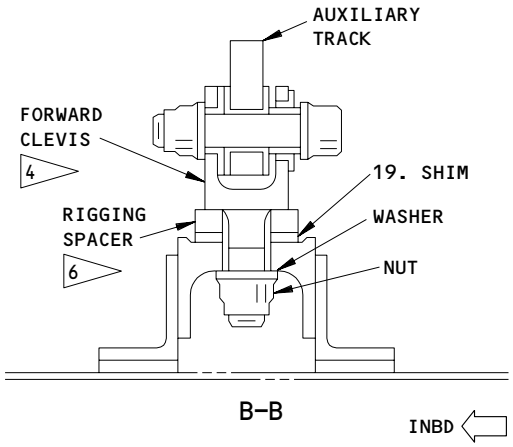
AUXILIARY TRACK

B

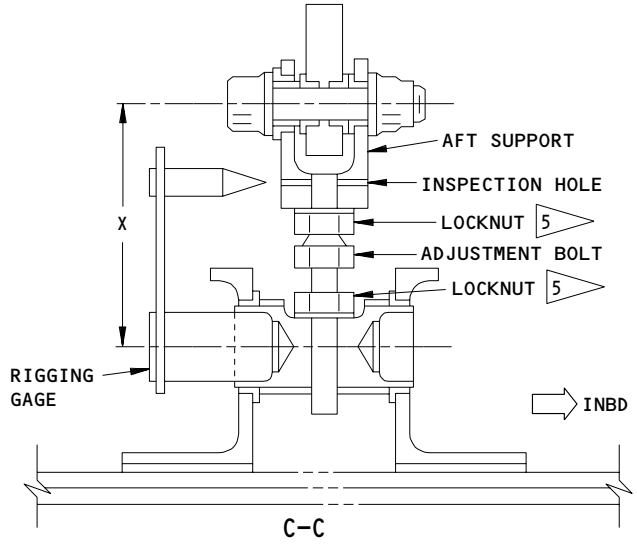
Auxiliary Track for the Outboard LE Slat
Figure 402 (Sheet 1)



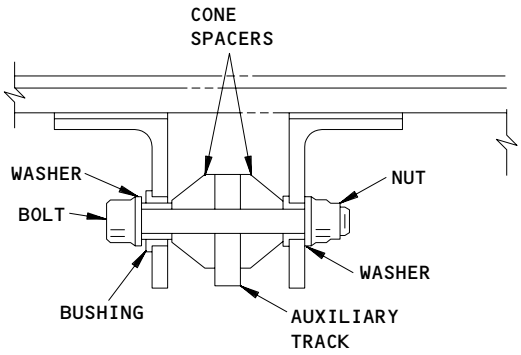
A–A



B–B



C–C



D–D

1 LUBRICATE WITH GREASE (MIL–PRF–23827). IF THE BOLT HAS LUBE FITTING INSTALL BOLTHEAD ON THE MOST CONVENIENT SIDE FOR LUBRICATION THROUGH LEADING EDGE ACCESS PLATE.

2 APPLY SEALANT TO THE WASHER FAYING SURFACE.

3 ABRADE AND WIPE THE FAYING SURFACE WITH SOLVENT. BOND THE WASHERS IN POSITION.

4 INSTALL WITH CORROSION PREVENTIVE COMPOUND (MIL–C–11796, CLASS 3).

5 LOCK THE LOCKNUTS WITH WIRE AFTER THE RIGGING PROCEDURE IS COMPLETED.

6 INSTALL THE RIGGING SPACER BETWEEN THE FORWARD CLEVIS AND THE SHIM.

7 A BRACKET FOR THE CABLE FOR THE LOSS SENSING SWITCH AT SLAT NO. 2 AND 9 ATTACHES BETWEEN THE WASHER AND THE AUXILIARY TRACK ARM, SEE FIG. 404.

8 THE ROLLER BEARING CAN BE DAMAGED IF WASHERS ARE NOT INSTALLED. WASHERS ARE INSTALLED BETWEEN THE 4AFC614 (BACB10ET4) OR BACB10GH04N AUXILIARY TRACK ROLLER BEARINGS AND THE FOLLOWING TRACK ARM ASSEMBLIES WITH BACB28AP04P024 BUSHING (0.060 INCH FLANGE):

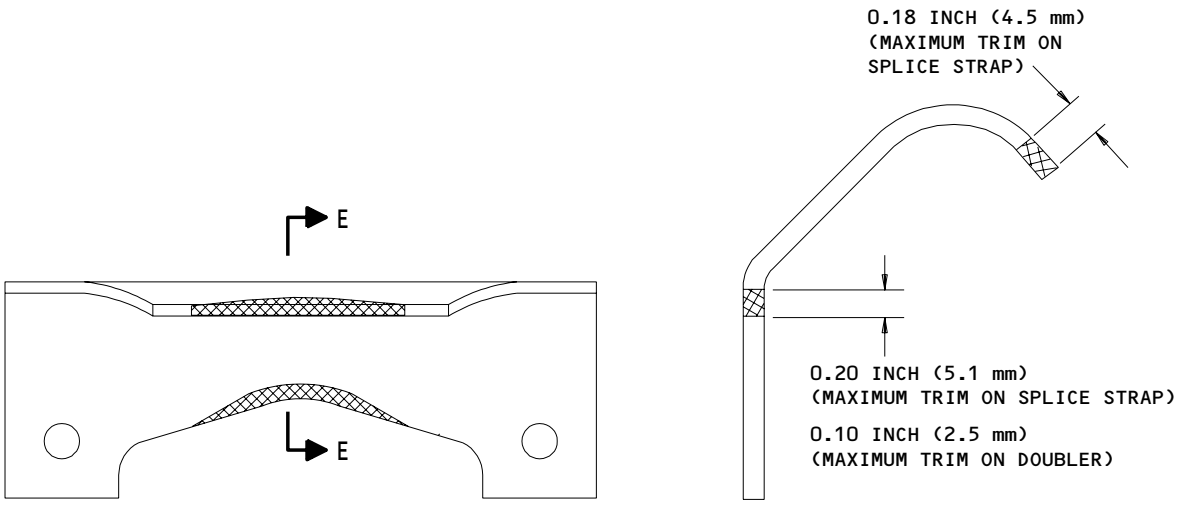
- 114N4063 (ALL DASH NUMBERS EXCEPT –21 AND –22)
- 114N4127, 114N4128, 114N4129, 114N4130, 114N4131 (–1, –2, –7 AND –8).

NO WASHERS ARE INSTALLED BETWEEN THE BACB10GH04N AUXILIARY TRACK ROLLER BEARING AND THE –9, –10, –13 AND –14 OF THE TRACK ARM ASSEMBLIES WITH 114N4156 BUSHING (0.092 INCH FLANGE):

- 114N4127, 114N4128, 114N4129, 114N4130, 114N4131.

SEE IPC 27–81–02–01 THRU 27–81–02–03 FOR ASSEMBLY BREAKDOWN.

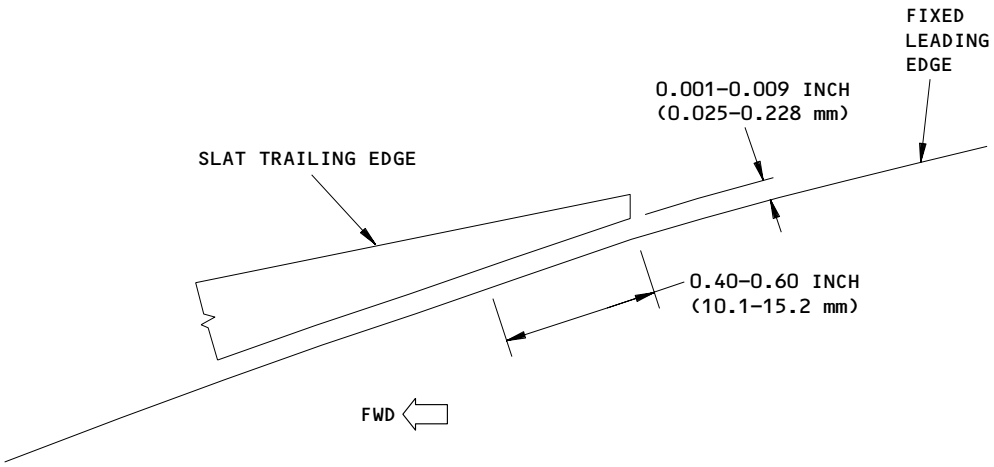
Auxiliary Track for the Outboard LE Slat
Figure 402 (Sheet 2)



SPLICE STRAP

C 9

E-E

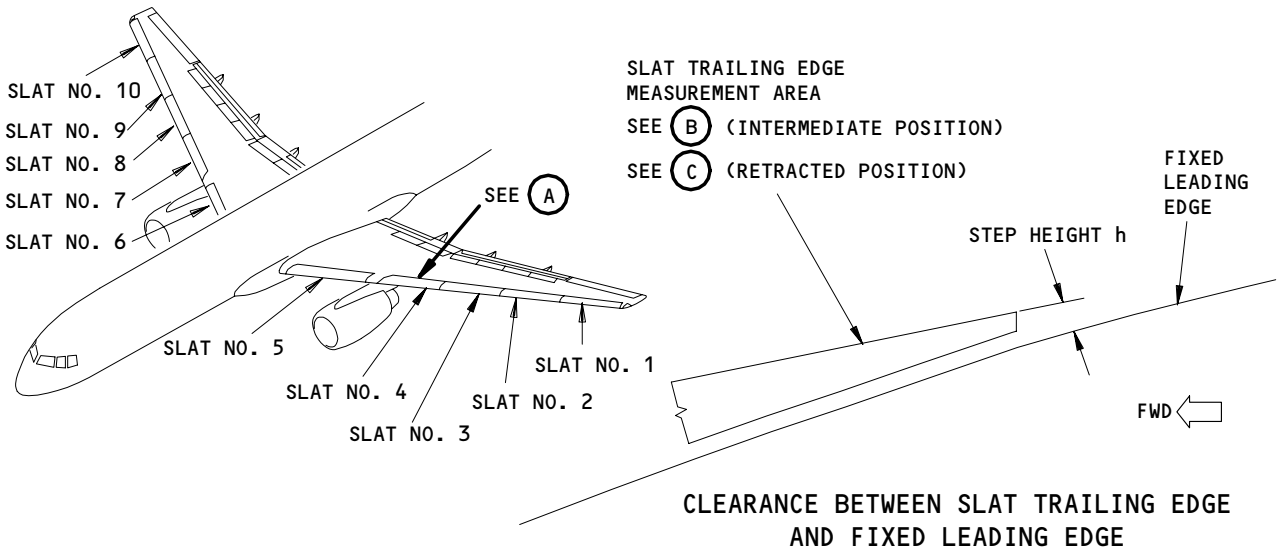


CLEARANCE BETWEEN SLAT TRAILING EDGE AND FIXED LEADING EDGE

D

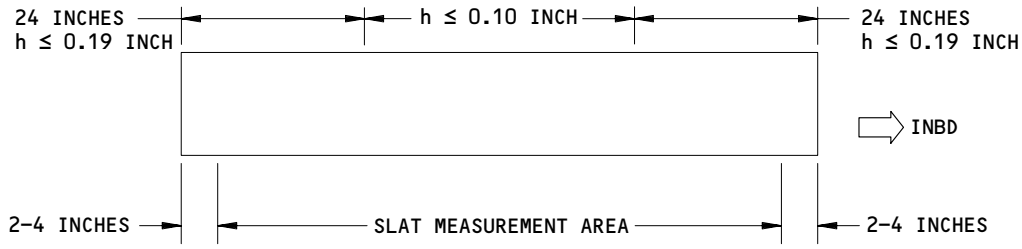
9 GUI 001–009, 115 POST–SB 57–35;
GUI 010–099, 101–114, 116–999;
SLAT 1 AND 10 ONLY

Auxiliary Track for the Outboard LE Slat
Figure 402 (Sheet 3)



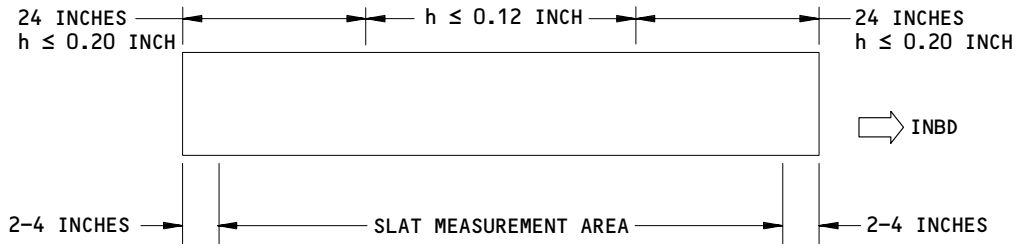
CLEARANCE BETWEEN SLAT TRAILING EDGE
AND FIXED LEADING EDGE
(ALTERNATE METHOD)

A



SLAT MEASUREMENT AREA
(INTERMEDIATE POSITION)

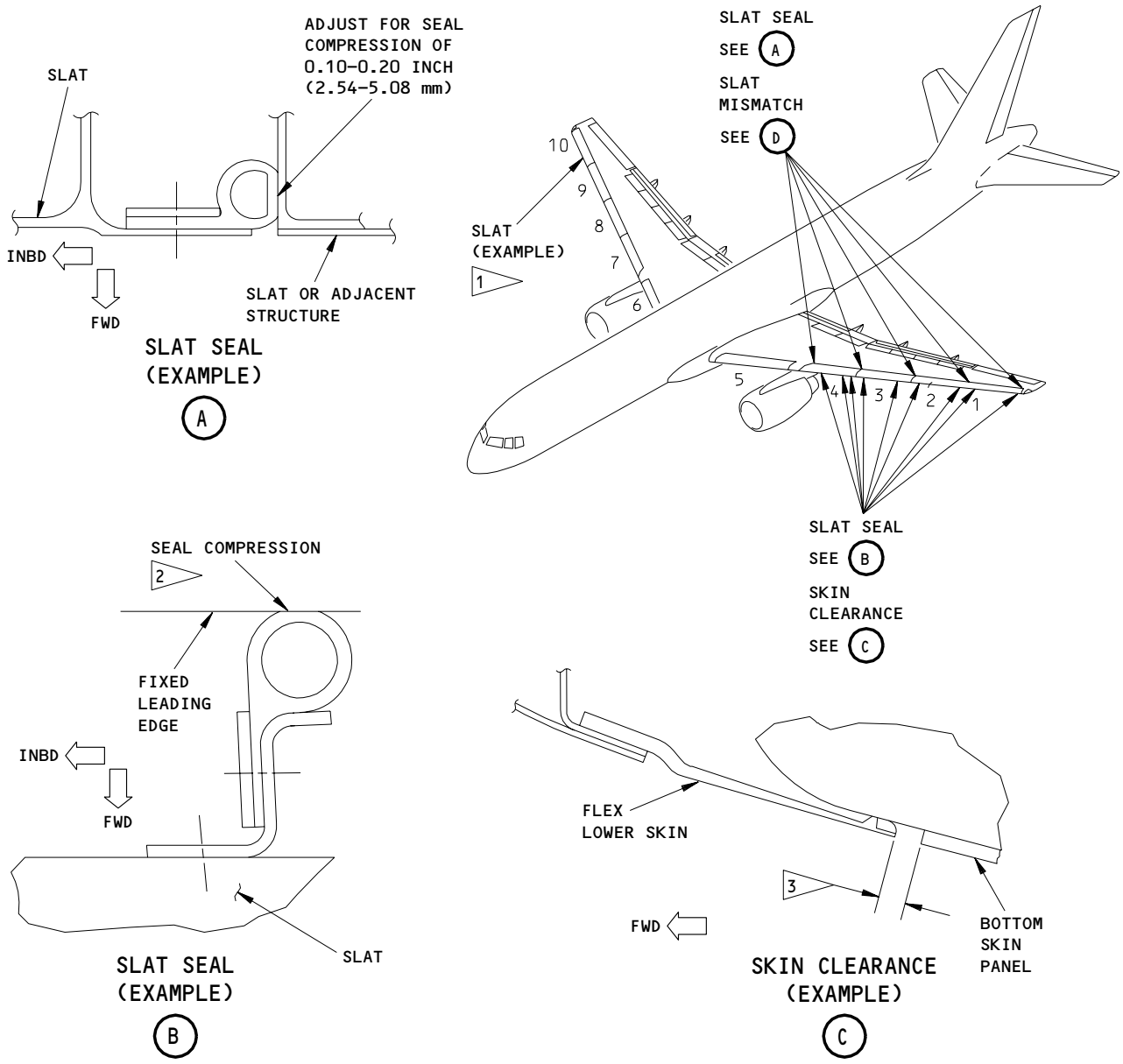
B



SLAT MEASUREMENT AREA
(RETRACTED POSITION)

C

Auxiliary Track for the Outboard LE Slat (Alternate Adjustment)
Figure 402A

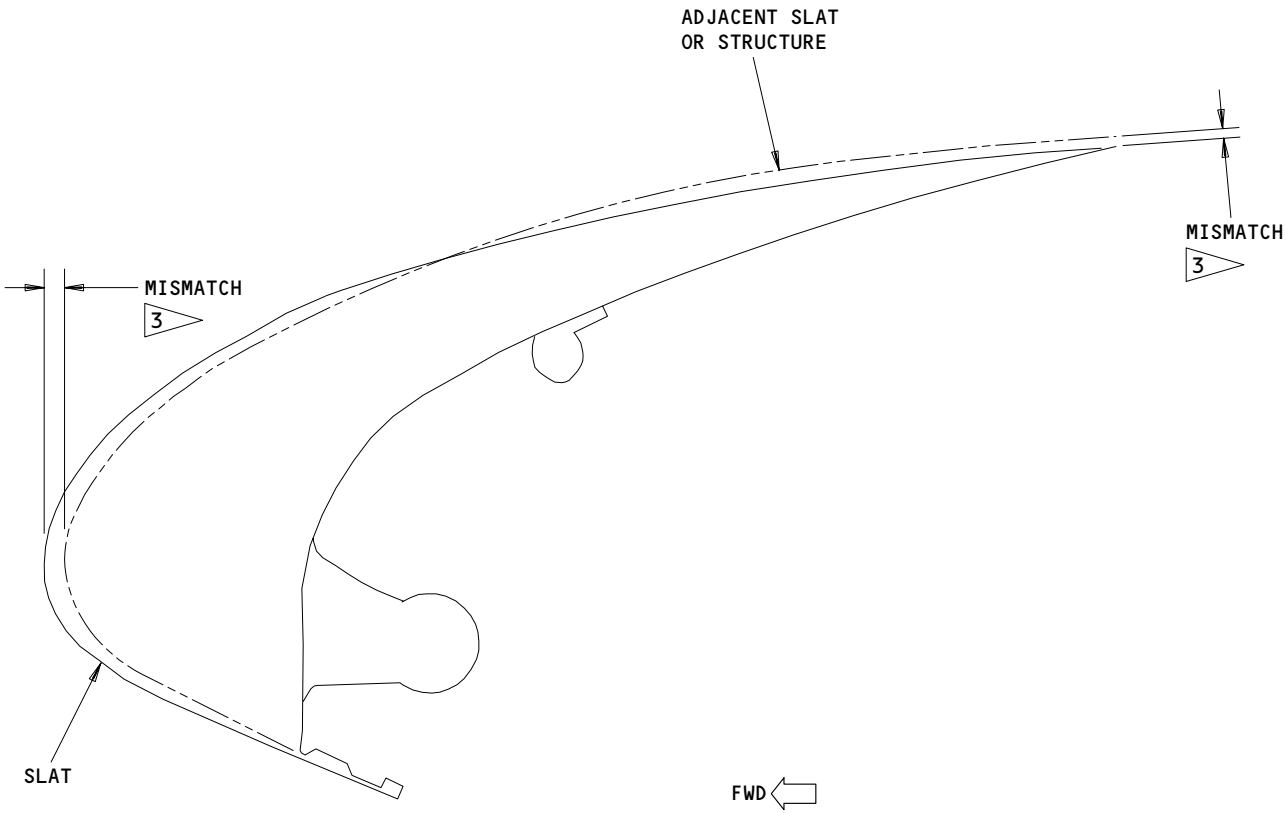


1 SLATS ARE NUMBERED NO. 1–10

2 TAPE PAPER ON THE FIXED LEADING EDGE AND PUT INK ON THE SEAL. THEN RETRACT AND EXTEND THE SLATS. lOOK FOR INK ON THE PAPER TO FIND IF THE SEAL TOUCHES THE FIXED LEADING EDGE (A MINIMUM SEAL COMPRESSION IS NECESSARY).
PREVENT TOO MUCH COMPRESSION ON THE BULB SEAL.
METAL TO METAL CONTACT BETWEEN SEAL RETAINER AND SKIN PANEL MAY CAUSE SURFACE DAMAGE.

3 0.07–0.19 INCH (1.77–4.82 mm) AT SLAT END TAPERING TO 0.07–0.16 INCH (1.77–4.06 mm) AT NEAREST AUXILIARY TRACK AND BETWEEN AUXILIARY TRACKS.

Permitted Clearances for the Outboard LE Slat
Figure 403 (Sheet 1)



SLAT MISMATCH

(D)

3 MEASURE THE MISMATCH BETWEEN THE ADJACENT SLATS OR BETWEEN THE SLAT AND THE ADJACENT STRUCTURE (WITH THE SLATS FULLY RETRACTED HYDRAULICALLY)

1. THE MAXIMUM MISMATCH IS 0.10 INCH
2. THE MAXIMUM AVERAGE MISMATCH IS 0.06 INCH WHEN YOU MEASURE IT AT SIX EQUAL DISTANCES ALONG THE SLAT EDGES.
   TO CALCULATE THE AVERAGE MISMATCH MULTIPLY EACH NEGATIVE MISMATCH MEASUREMENT BY -0.47 BEFORE ADDING TO THE POSITIVE MISMATCH MEASUREMENTS

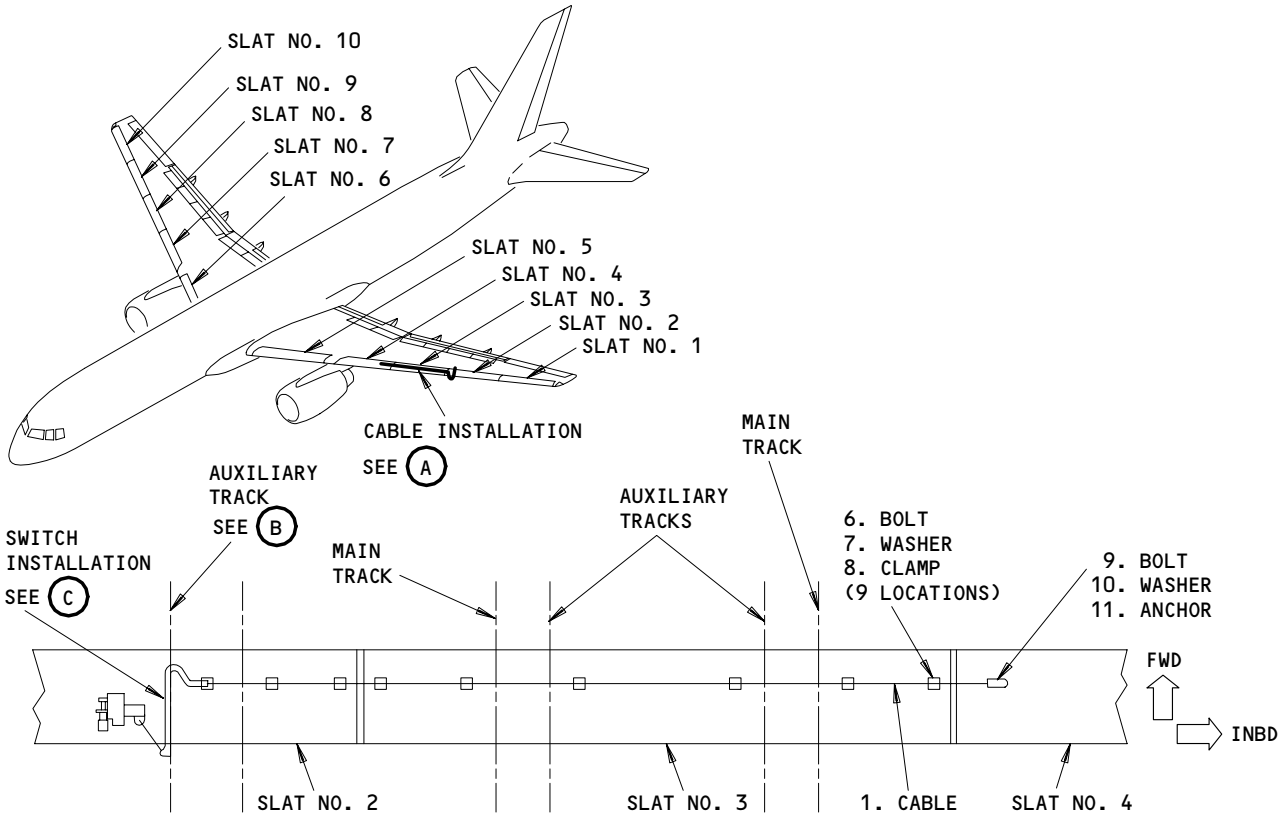
EXAMPLE: MEASUREMENTS ARE 0.09, 0.06, -0.05, -0.04, 0.02, 0.03

SUM: 0.09+0.06-0.05(-0.47)-0.04(-0.47)+0.02+0.03

AVERAGE= SUM/6 = 0.040

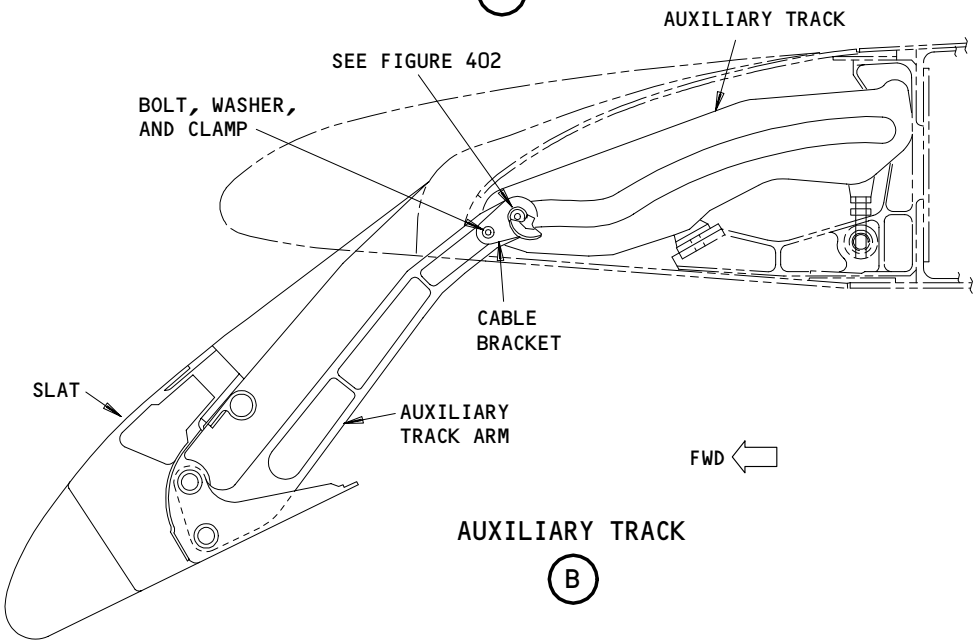
NOTE: THE CLEARANCE BETWEEN ADJACENT SLATS OR BETWEEN THE SLAT AND THE ADJACENT STRUCTURE (WITH THE SLATS RETRACTED) IS 0.20 TO 0.40 INCH.

Permitted Clearances for the Outboard LE Slat
Figure 403 (Sheet 2)



CABLE INSTALLATION
SLATS NO. 2, 3, AND 4 SHOWN
(SLATS NO. 7, 8, AND 9 OPPOSITE)

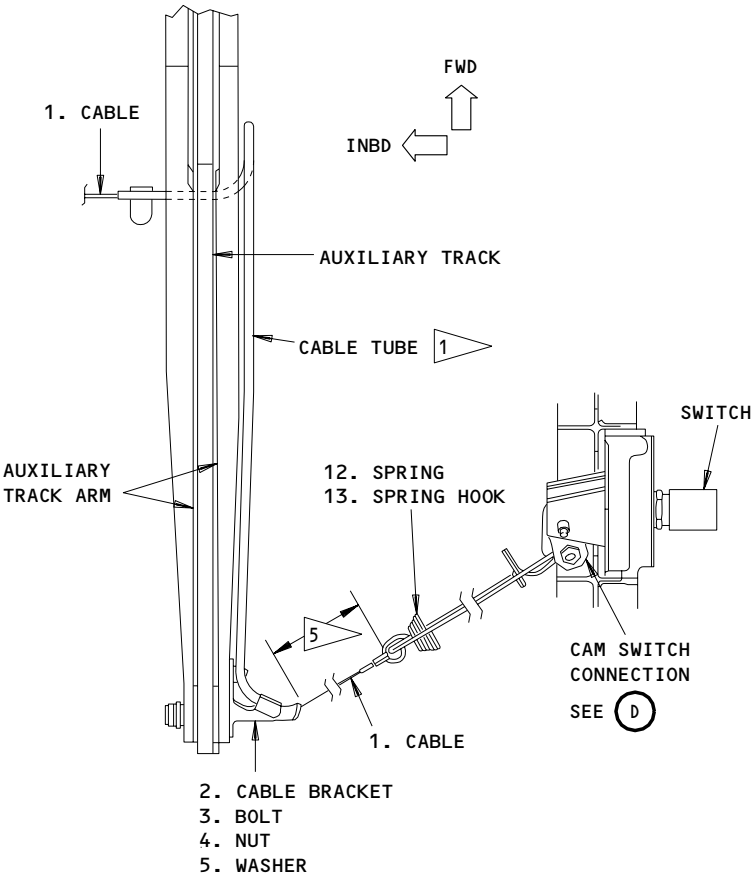
A

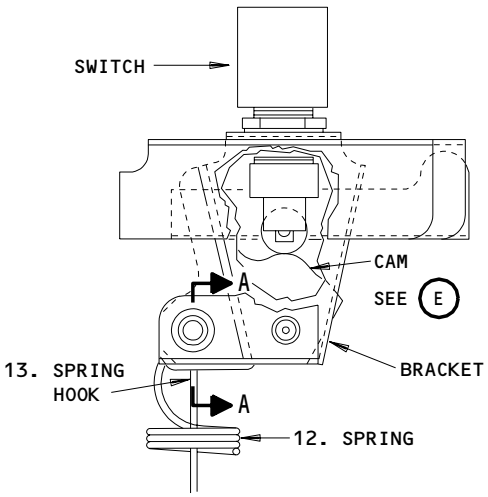


AUXILIARY TRACK

B

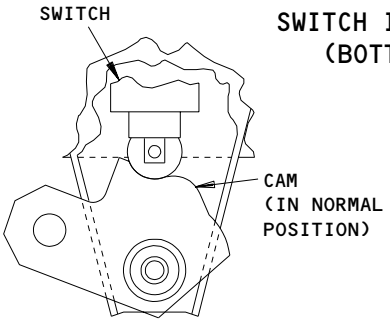
Slat Loss Sensing and Indication Cable Installation
Figure 404 (Sheet 1)





CAM SWITCH CONNECTION

D

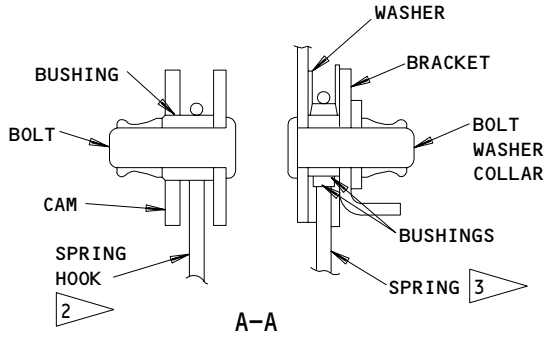


SWITCH INSTALLATION
(BOTTOM VIEW)

C

CAM

E



A–A

1 REMOVE ALL OLD GREASE FROM THE CABLE TUBE. FILL THE CABLE TUBE FULLY WITH DOW CORNING MOLYKOTE 33 SILICONE GREASE, MEDIUM. FILL THE TUBE FROM ONE END. GREASE WILL FLOW FROM THE OTHER END WHEN THE TUBE IS FULL.

2 ATTACH THE SPRING HOOK TO THE CAM WITH A BOLT 4, A BUSHING, AND A COLLAR

3 ATTACH THE SPRING TO THE BRACKET WITH A BOLT 4, BUSHINGS, AND WASHERS NEXT TO THE BUSHINGS, AND COLLAR, WITH WASHER UNDER THE COLLAR

4 APPLY A THIN COAT OF MIL–C–16173, GRADE 2, CORROSION PREVENTIVE COMPOUND TO THE BOLT SHANK AND THREADS BEFORE YOU INSTALL THE BOLT.

5 AIRPLANES PRE–SB 27–0126;
4.0 ±0.2 INCHES (101.6 ±5.8 mm)
AIRPLANES POST–SB 27–0126;
3.6 ±0.2 INCHES (91.44 ±5.8 mm)

Slat Loss Sensing and Indication Cable Installation
Figure 404 (Sheet 2)

S 214-003
(2) Make sure the trailing edge (TE) flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-004
(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-005

WARNING: OBEY THE PROCEDURE INSTRUCTIONS FOR THE INSTALLATION OF DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

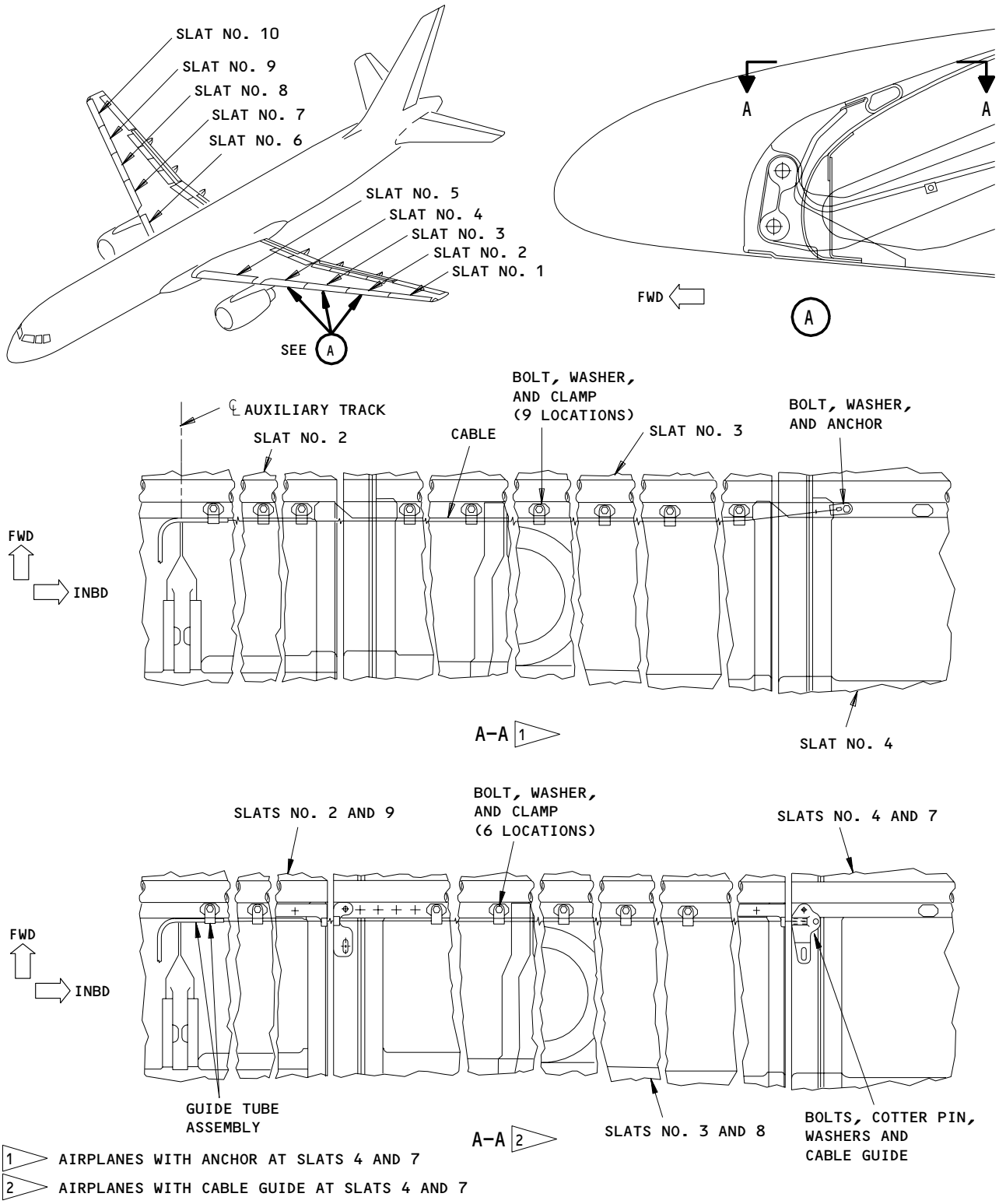
(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006
(5) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

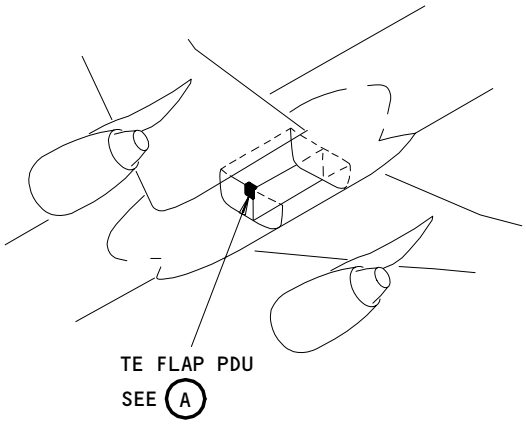
S 864-007
(6) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

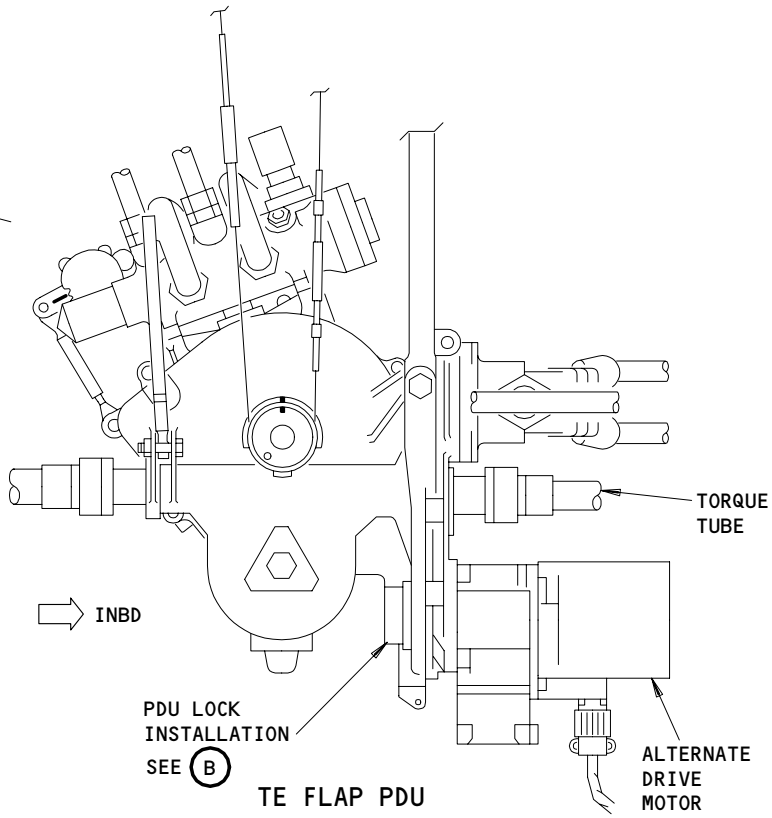
S 864-008
(7) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-009
(8) Supply electrical power (Ref 24-22-00).

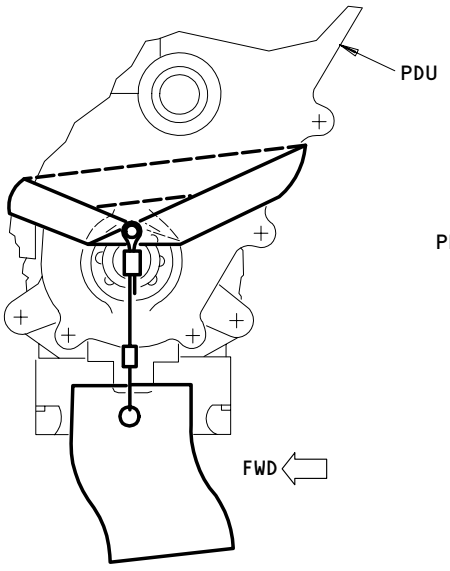


Slat Loss Sensing and Indication Cable Installation
Figure 404A

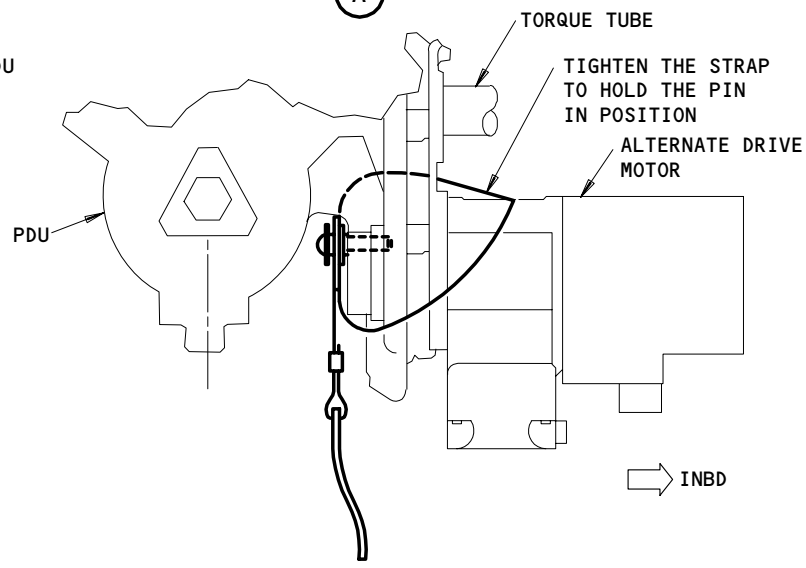




TE FLAP PDU
(AFT VIEW)
A

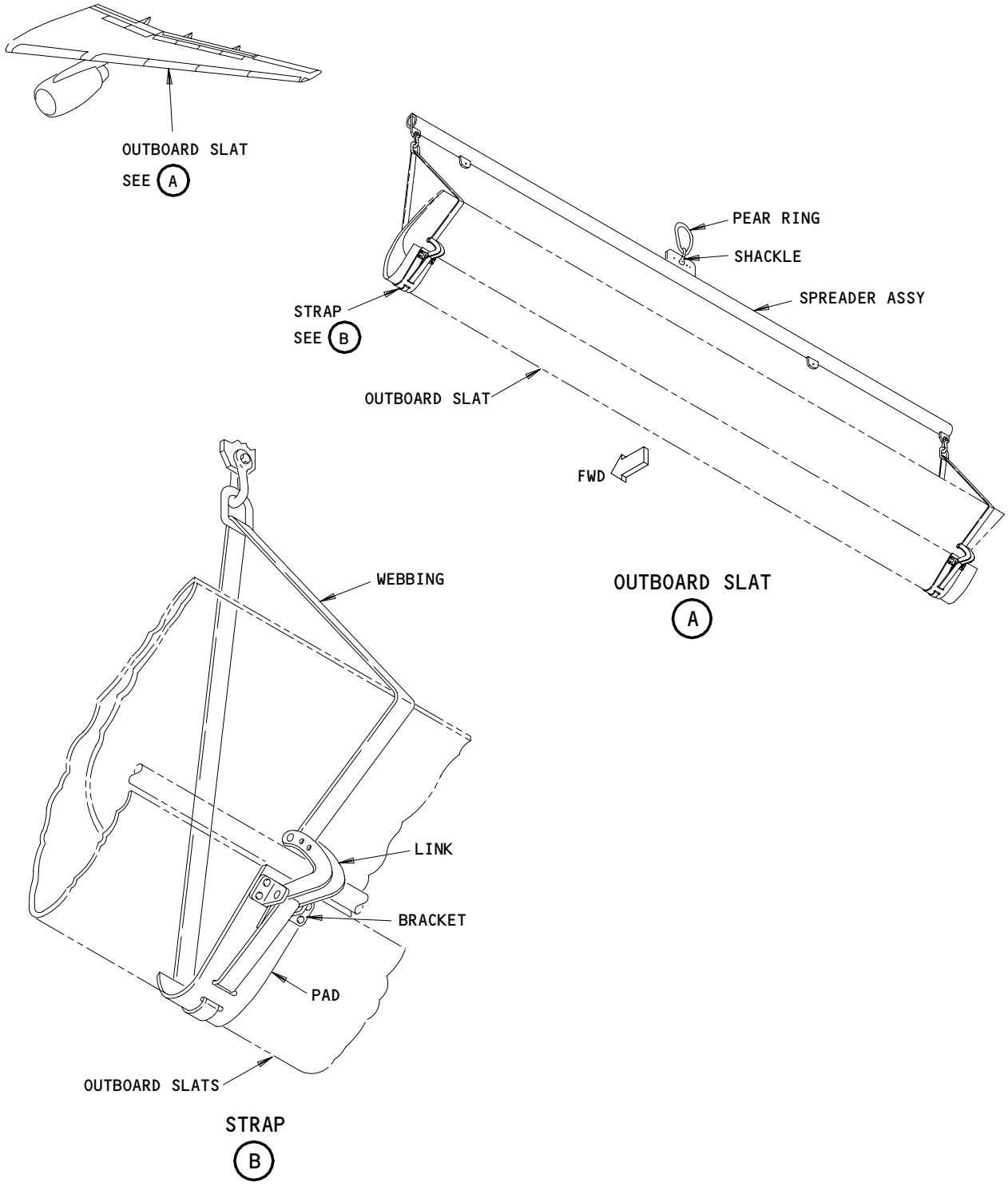


PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 405



Sling for the Outboard LE Slat
Figure 406

S 864-010

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-011

(10) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and LE slats move to the fully extended position.

S 494-012

(11) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-013

(12) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-014

(13) Install a PDU lock in the TE flap PDU (Fig. 405).

S 014-015

(14) Remove the necessary access panels for the fixed leading edge and open the necessary access doors (Ref 06-44-00).

S 294-291

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(15) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

E. Remove the Outboard LE Slat

NOTE: The Outboard LE Slat weighs approximately 80 pounds (36 Kg).

S 494-016

(1) Install the sling equipment on the LE slat (Fig. 406).

S 034-017
(2) Disconnect the thermal anti-ice duct.

NOTE: If you install a new slat, remove the necessary duct parts and keep them for the subsequent installation.

S 024-018
(3) Do these steps if you remove slat No. 2, 3, 4, 7, 8, or 9:
(a) Remove the necessary parts of the loss sensing switch and cable (Fig. 404).

NOTE: Do not change the cable length.

S 034-019
(4) Do these steps to disconnect the slat:
(a) Disconnect the auxiliary track arms and remove the rollers from the auxiliary tracks (Fig. 402).
(b) Remove the bolt retainers from the main track (Fig. 401).
(c) Disconnect the slat from the main tracks.

S 024-020
(5) Remove the slat.

F. Inspect the main and auxiliary slat tracks.

S 214-283
(1) Do a wear limit inspection for the main and auxiliary slat track attachment bearings, bushings and attaching hardware (AMM 27-81-02/601).

TASK 27-81-02-424-021

3. Install the Outboard LE Slat

A. Equipment
(1) Sling for the Outboard LE Slat - B27019-10
(2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
(3) Circuit Breaker Lockout Clip (Commercially Available)
(a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
(4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
(a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
(5) Outboard Slat Rigging Equipment Set - B27001-51:
(a) Rigging Gage - B27001-18
(b) Rigging Spacer - B27001-28 (2 necessary for each slat)

B. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Slat Assy - No. 1	27-81-02	01	11,13
				01B	TBD
				01D	TBD
	1	Slat Assy - No. 10	27-81-02	01A	12
				01C	TBD
				01E	TBD
402	10	Cotter Pin	27-81-02	01	265
				01A	420
				01D	270
				01E	270

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Slat Assy - No. 2	27-81-02	02	TBD
				02B	TBD
				02D	TBD
	1	Slat Assy - No. 9	27-81-02	02A	TBD
				02C	TBD
				02E	TBD
402	10	Cotter Pin	27-81-02	02	400
				02A	385
				02D	287
				02E	331

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Slat Assy - No. 3	27-81-02	03	TBD
					TBD
				03B	TBD
				03D	TBD
	1	Slat Assy - No. 8	27-81-02	03A	TBD
				03C	TBD
				03E	TBD
402	10	Cotter Pin	27-81-02	03	405
				03A	430
				03B	355
				03C	355
				03D	425
				03E	425

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Slat Assy - No. 4	27-81-02	04	TBD
				04B	TBD
				04D	TBD
	1	Slat Assy - No. 7	27-81-02	04A	TBD
				04C	TBD
				04E	TBD
402	10	Cotter Pin	27-81-02	04	525
				04A	610
				04B	550
				04C	550
				04D	510
				04E	565

C. Consumable Materials
(1) D00013 Grease - MIL-G-23827
(2) D00121 Silicone Grease - Dow Corning Molykote 33, Medium
(3) A00247 Sealant - BMS 5-95
(4) G00251 Abrasive Paper - Scotch Brite
(5) B00316 Solvent - Aliphatic Naphtha, TT-N-95
(6) A00156 Adhesive - BMS 5-31
(7) C00308 Corrosion Preventive Compound - MIL-C-11796 (Class 3)
(8) C00174 Corrosion Preventive Compound - MIL-C-16173 (Grade 2)
(9) C00259 Primer - BMS 10-11, Type 1

D. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) 32-00-15/201, Landing Gear Door Locks
(5) 78-31-00/201, Thrust Reverser System

E. Access
(1) Location Zones

211/212	Control Cabin
520/620	Wing Leading Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panels

521RB/621RB	Electrical and Mechanical Systems (Airnut Setter Square Drive)

F. Install the Outboard LE Slat

S 824-270
(1) Inspect, repair or replace slat wedge per Service Bulletin 757-57A0045, Non Destructive Test Manuals 51-00-05 (Part 4), 51-05-01 (Part 1), and Structural Repair Manuals 57-43-01, 57-43-02, if the wedge of the slat trailing edge shows signs of skin separation or damage.

S 294-292

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(2) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 214-022

(3) Make sure the TE flaps and LE slats are in the fully extended position and the flap control lever is in the 30-unit detent.

S 214-023

(4) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 214-024

(5) Make sure the flap/slat alternate drives are off.

S 424-025

(6) Do this step if you install the loss sensing switch:
   (a) Make sure the hole to connect the loss sensing switch and cable is drilled in the inboard auxiliary track arm.
      1) If it is not drilled, drill the hole.
      2) Lubricate cam pivot, cam surface, switch roller, and switch plunger with silicone grease, Dow Corning 33 Medium.
   (b) Make sure you install the cable assembly correctly with the steps that follow:
      1) Install the cable assembly with its terminal (nipple) against the slot surface of the anchor installed at slats 4 and 7.
      2) Make sure the cable does not run over the head of the bolt that attaches the anchor to the slat.

         NOTE: The ends of the anchor can move left to right if bolt gets loose. The cable terminal (nipple) can move from the slot surface of anchor and get stuck against the back surface of anchor.

      3) Make sure the center line of the anchor aligns with the center line of cable after the bolt that attaches the anchor to the slat is tightened.

4) Examine cable run for hang-ups and adjust cable guides along the slots to decrease cable riding conditions.
5) Make sure cable extends 3.8 to 4.2 inches (97-106 mm) from guide.
6) Make sure the switch actuates from contact of the first coil on the spring against the hook during cable pull.

NOTE: Make sure the cable does not hang up against the cable or the hook portion of the spring. A hang up problem shows incorrect routing of the cable.

7) Fill cable tube completely with silicone grease, Dow Corning 33 after cable assembly is installed.

S 494-026
(7) Install the sling equipment on the slat (Fig. 406).

S 424-027
(8) Lift the slat into its position.

S 434-028
(9) Do these steps to connect the slat:
(a) Connect the slat to the main tracks and install the bolt retainers as shown (Fig. 401).

NOTE: Make sure the bolt head faces inboard on the left wing and outboard on the right wing.

CAUTION: MAKE SURE YOU INSTALL THE BUSHINGS FOR THE SLAT AUXILIARY TRACK AS IT IS SHOWN IN FIG. 402. A FAILURE TO INSTALL THE BUSHINGS CORRECTLY CAN CAUSE DAMAGE TO THE SLAT AUXILIARY TRACK.

(b) Connect the auxiliary track arms with the auxiliary tracks as shown (Fig. 402).
(c) Tighten the nut at the forward support to 30-40 pound-inches (3.4-4.5 Nm) (for nut installed on bolt with lube fitting), or to 65-100 pound-inches (7.4-11.3 Nm) (for nut installed on bolt without lube fitting).
(d) If you install slat No. 2, 3, 4, 7, 8 or 9, connect the loss sensing switch and cable (Fig. 404).

S 094-029
(10) Remove the sling equipment (Fig. 406).

S 434-120
(11) Connect the thermal anti-ice duct.

NOTE: If you install a new slat, install the necessary duct parts.

S 824-189
(12) If you install the same removed outboard slat, adjustment of the slats is not necessary when the following conditions are met:
(a) The auxiliary track adjustments are not changed.
(b) The auxiliary arms are not removed from the slat.
(c) The slat and/or auxiliary arm hardware are not repaired, modified, adjusted or replaced.

S 824-030
(13) Do the steps to adjust the slat in the Adjust the Outboard LE Slat.

NOTE: You can use the Airnut Setter/square drive procedure that follows, as an option to move the slats when hydraulic power is not available, but only when adjusting the slats. The system is to be run by hydraulics when testing the positions of the slats and the adjustments of the slats done. Also make sure not to bottom the auxiliary arm rollers when doing the adjustment

The airnut setter (square drive) is located between the outboard slat actuator and the outboard slat position transmitter (OSS.814)

S 824-248
(14) Do these steps to use the airnut setter/square drive to move the slat during adjustment:
(a) Pressurize the left hydraulic system (AMM 29-11-00/205)
(b) Move the flap control lever to the zero(flaps up) detent and make sure the LE slats move to the fully retracted position.
(c) Remove the power from the left hydraulic system (AMM 29-11-00/201).
(d) Do the steps to prepare the slats for manual extension as described in the "Adjust the Outboard LE Slat" section of this procedure.
(e) Disconnect the outboard slat position transmitter TS5047 or TS5083 from the outboard slat rotary actuator by removing the three mounting bolts.

NOTE: Make sure you do not rotate the transmitter spline after the removal, because if you do it, you will have to re-rig the transmitter (AMM 27-58-01/501).

(f) Remove the access panel 521RB or 621RB.
(g) Rotate the square drive (with a suitable socket) using an airnut setter to get the slat position you want.

NOTE: You may move the slat from the zero (flaps up) position to the intermediate position with 149.6 revolutions of the torque tubes. You may move the slat from the zero (flaps up) position to the fully extended position with 199.9 revolutions of the torque tubes.

(h) Move the slats back to the zero (flaps up) position using the airnut setter when your rigging actions are completed.
(i) Pressurize the left hydraulic system (AMM 29-11-00/201).
(j) Make sure the slats remain in the zero (flaps up) position.

NOTE: If the slats have not retracted exactly to the zero(flaps up) position, it is because some acceptable small rotation of the torque tubes may have ocurred.

(k) Connect the outboard slat position transmitter to the outboard slat rotary actuator with the three mounting bolts.

NOTE: If the position transmitter spline was rotated after its removal, you have to re-rig it (AMM27-58-01/501).

(l) Continue with the remaining steps that you have to do, to complete the adjustment of the slats.

G. Adjust the Outboard LE Slat

S 094-140
(1) Remove the PDU lock from the TE flap PDU (Fig. 405).

S 864-141

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-143
(3) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-144
(4) Move the flap control lever to the 20-unit detent.
(a) Make sure the TE flaps and LE slats move to the intermediate position.

S 864-255
(5) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-145
(6) Remove power from the left hydraulic system (AMM 29-11-00/201).

S 494-146
(7) Install a PDU lock in the TE flap PDU (Fig. 405).

S 824-031
(8) Use the rigging gage to get the Dimension X (View C-C, Fig. 402) at the aft supports of the auxiliary track as follows :

NOTE: If you think it is necessary, you can increase the rigging Dimension X (2.52 inches)(64 mm) to get a 0.001 inch (0.025 mm) clearance before you apply the rigging preload.

(a) Loosen the bolt thru the cone spacers.
(b) Adjust the height of the adjustment bolt to the 2.52 inch (64 mm) rigging Dimension X.

NOTE: Make sure you can see the end of the adjustment bolt in the inspection hole.

(c) Tighten the locknuts, but do not safety the locknuts with a wire.

(d) Tighten the bolts through the cone spacers finger-tight.

S 824-191

(9) GUI 001-009, 115 WITH SB 57-35, AND GUI 010-099, 101-114, 116-999; Do these steps on slats No. 1 and No. 10 (View C, Fig. 402):
   (a) Make sure there is at least 0.003 inch (0.076 mm) clearance between the top of the auxiliary track and the splice strap.
   (b) Do these steps if more clearance is necessary:
      1) Remove the slat to get access to cut material from the splice strap.
      2) Cut material from the splice strap.
      3) Break all sharp edges.
      4) Apply a layer of Alodine and a layer of primer to any bare areas.

S 424-187

(10) Install the rigging spacers and shims.

S 824-148

(11) Adjust the shims (19) under the forward auxiliary track clevis to get a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge (View D, Fig. 402).

NOTE: In the area over the centerline of the auxiliary track, clearance is the distance between the slat trailing edge and the upper panel of the fixed leading edge. Make sure you measure along the trailing edge, 3.00 inches (76.2 mm) inboard to 3.00 inches (76.2 mm) outboard of the centerline, and to a depth of 0.40-0.60 inch (10-15 mm) from the trailing edge.

The satisfactory range of clearance is 0.001-0.009 inch (0.025-0.228 mm). The minimum clearance, at all points in the measured area, must be 0.001 inch (0.025 mm) or more. The maximum clearance at its smallest dimension in the measured area, must not be more than 0.009 inch (0.228 mm).

For example, if the dimension at one point in the measured area is 0.009 inch (0.228 mm), and the dimension at another point in the measured area is 0.012 inch (0.304 mm), the clearance is satisfactory. If the dimensions at all points in the measured area are more than 0.009 inch (0.228 mm), the clearance is unsatisfactory.

If you cannot get the clearance of 0.001-0.009 inch (0.025-0.228 mm), write down the clearance value and continue.

S 974-185

(12) Measure and make a note of the thickness of the shims.

(a) Make sure the total thickness of the shims installed (3/8 bolt) not to exceed 0.26 inch (6.6 mm) (excluding the rigging spacer).

NOTE: You can use a shim with an additional 0.02 inch (0.5 mm)

thickness during the clearance adjustment, but you must remove the excess thickness of shim before the forward clevis bolts are tightened.

S 984-147

(13) Do these steps to manually extend the slats:

(a) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

(b) Install a DO-NOT-OPERATE tag on the position selector switch.

(c) Supply electrical power (AMM 24-22-00/201).

(d) Remove the DO-NOT-CLOSE tags and the circuit breaker locks and close these circuit breakers:

1) P6 Panel
   a) 6D20, ALTN SLAT PWR
2) P11 Panel
   a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

(e) Push the arming switch, on the P3 panel, to arm the slat alternate drive (switch light will come on).

(f) Install a DO-NOT-OPERATE tag on the arming switch.

(g) Open these circuit breakers and install circuit breaker locks and attach DO-NOT-CLOSE tags :

1) P6 Panel
   a) 6D20, ALTN SLAT PWR
2) P11 Panel
   a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

(h) Manually move the slats until the trailing edge of the slat is clear of the upper panel of the fixed leading edge by a minimum of 0.50 inch (12.7 mm).

1) Make an accurate note of the number of full turns you made to the torque tube.

S 094-179

(14) Remove the rigging spacers at the forward clevises of the auxiliary track (Fig. 402).

S 434-180

(15) Tighten the forward clevis bolts.

S 424-223

(16) Tighten the nut (3/8 bolt) to 275-330 pound-inches (31-37 Nm).

S 984-182
(17) Turn the torque tube the same number of full turns in the opposite direction to retract the slat to the intermediate position.

S 864-181
(18) Do these steps to hydraulically retract the slats:
(a) Remove the DO-NOT-CLOSE tags and the circuit breaker locks and close these circuit breakers:
1) P6 Panel
a) 6D20, ALTN SLAT PWR
2) P11 Panel
a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(b) Remove the DO-NOT-OPERATE tag from the arming switch on the P3 panel.
(c) Push the arming switch to disarm the slat alternate drive (switch light will go off).
(d) Remove the DO-NOT-OPERATE tag from the position selector switch for the flap/slat alternate drive, on the P3 panel.
(e) Open these circuit breakers and install circuit breaker locks and attach DO-NOT-CLOSE tags:
1) P6 Panel
a) 6D20, ALTN SLAT PWR
2) P11 Panel
a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(f) Remove the PDU lock from the TE flap PDU (Fig. 405).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(g) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-254
(19) Remove the DO-NOT-OPERATE tag on the flap control lever.
(a) Move the flap control lever to the zero (FLAPS UP) detent.
1) Make sure the TE flaps and LE slats move to the fully retracted position.

(b) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-256

(20) Install a DO-NOT-OPERATE tag on the flap control lever.
(a) Install a PDU lock in the TE flap PDU (Fig. 405).

S 824-184

(21) Adjust the aft support of the auxiliary track to get a clearance of 0.001-0.009 inch (0.025-0.228 mm) between the slat trailing edge and the upper panel of the fixed leading edge (View D, Fig. 402).

NOTE: In the area over the centerline of the auxiliary track, the clearance is the distance between the slat trailing edge and the upper panel of the fixed leading edge. Make sure you measure along the trailing edge, 3.00 inches (76.2 mm) inboard to 3.00 inches (76.2 mm) outboard of the centerline, and to a depth of 0.40-0.60 inch (10-15 mm) from the trailing edge.

The satisfactory range of clearance is 0.001-0.009 inch (0.025-0.228 mm) . The minimum clearance, at all points in the measured area, must be 0.001 inch (0.025 mm) or more. The maximum clearance at its smallest dimension in the measured area, must not be more than 0.009 inch (0.228 mm).

For example, if the dimension at one point in the measured area is 0.009 inch (0.228 mm), and the dimension at another point in the measured area is 0.012 inch (0.30 mm), the clearance is satisfactory. If the dimensions at all points in the measured area are more than 0.009 inch (0.228 mm), the clearance is unsatisfactory.

If you cannot get the clearance of 0.001-0.009 inch (0.025-0.228 mm), write down the clearance value and continue.

(a) Loosen the bolt through the cone spacers.
(b) Adjust the height of the adjustment bolt (rigging Dimension X, View C-C, Fig. 402) to get the correct clearance.

NOTE: Make sure you can see the end of the adjustment bolt in the inspection hole.

S 974-183
(22) Measure and make a note of the distance between the attachment points of the adjustment bolt (rigging Dimension X).

S 824-197
(23) GUI 001-009, 115 WITHOUT SB 57-35;
adjust the adjustment bolt for the aft support to decrease the distance between the attachment points (rigging Dimension X) by 0.114 inch (2.89 mm) (1 1/3 turns of the adjustment bolt).

NOTE: Make sure you can see the end of the adjustment bolt in the inspection hole.

S 824-204
(24) GUI 001-009, 115 WITH SB 57-35 AND GUI 010-099, 101-114, 116-999;
adjust the adjustment bolt for the aft support (rigging Dimension X, View C-C, Fig. 402) to decrease the distance between the attachment points by 0.057 inch (1.44 mm) (2/3 turns of the adjustment bolt).

NOTE: Make sure you can see the end of the adjustment bolt in the inspection hole.

S 494-106
(25) Safety the adjustment bolt and locknuts with a wire.

S 434-107
(26) Tighten the bolts thru the cone spacers.

S 434-136
(27) Tighten the nut to 165-225 pound-inches.

S 824-247
(28) If the maximum clearance is more than 0.009 inch (0.230 mm), do these steps:

NOTE: The minimum clearance must not be less than 0.001 inch (0.025 mm).

(a) Move the slats to the position for which the clearance was not met.

(b) Measure and write down the step heights, h, in the slat measurement area (Fig. 402A) for each slat that did not meet the clearance requirement.

NOTE: If dial calipers are used to measure h, make sure you hold the caliper perpendicular to the slat.

1) Start to measure the step height, h, 2-4 inches (51-100 mm) from one end of the slat.
2) Continue to measure the step height, h, every 6 inches until you are 2-4 inches (51-100 mm) from the other end of the slat.
   a) Make sure each step height, h, is in the limits shown (Detail B Fig. 402A) for the intermediate position or (Detail C, Fig. 402A) for the retracted position.
3) Calculate the average step height, H, for each slat.

(c) Make sure the average step height, H, for each slat is not more than 0.09 inch (2.28 mm) in the intermediate position or 0.12 inch (3.0 mm) in the retracted position.

S 824-268

(29) If you need to adjust the main track panel (s) do the steps that follow (Fig. 401):
(a) Loosen bracket attachment bolts (2 places) for forward-aft and misfair adjustment.
(b) Align main track panel in the slat flexible trailing edge/wing fixed leading edge opening and retighten bolts.

NOTE: You can put both washers on the inboard or outboard side of the slat lug to get inboard or outboard panel alignment.

(c) Trim panel as needed to get the correct size and clearances.

S 224-121

(30) Examine the slat seals, the leading edge clearances, and the slat mismatch, and make sure all measurements are permitted (Fig. 403).

H. Test of the LE Slat Installation

S 214-122

(1) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 864-123
(2) Remove the circuit breaker lock and the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J33, WARN ELEX A

S 864-124
(3) Remove the circuit breaker lock and the DO-NOT-CLOSE tag, and close these circuit breakers on the P6 panel:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 094-125
(4) Remove the PDU lock from the TE flap PDU (Fig. 405).

S 864-126

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(5) Pressurize the left hydraulic system (Ref 29-11-00).

S 714-127
(6) Do these steps to do a test on the operation of the slats:
(a) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent, and do these steps:
1) Stop in each detent to let the TE flaps and LE slats move to the correct position.
2) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 714-128
(7) Do these steps to do a test on the loss sensing switch:
(a) Move the flap control lever to the 25-unit detent, and let the TE flaps move to the 25-degree position and the LE slats move to the fully extended position.

(b) Remove the power from the left hydraulic system (Ref 29-11-00).
(c) Install a PDU lock in the TE flap PDU (Fig. 405).
(d) Remove the anchor (11) (Fig. 404).
(e) Pull on the anchor and cable in the inboard direction until the cam turns away from the loss sensing switch.
    1) Make sure the LEADING EDGE light is on and the LE SLAT ASYM message shows on the EICAS display.
    2) Make sure the force to pull the cable is between 10 and 30 pounds.
(f) Install the anchor.
(g) Set the cam back to the usual position (Fig. 404).
(h) Open and close these circuit breakers on the P11 panel:
    1) 11G12, FLAP SLAT ELEC UNIT 1 POWER
    2) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(i) When you open and close the circuit breakers, make sure the LEADING EDGE light goes off and the LE SLAT ASYM message goes off the EICAS display.
(j) Remove the PDU lock from the TE flap PDU (Fig. 405).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(k) Pressurize the left hydraulic system (Ref 29-11-00).
(l) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats move to the fully retracted position.

S 704-129

(8) If you adjusted the position transmitters for the LE slat or on the LE slat PDU during the slat or main track removal and installation, do these steps:

(a) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center.

NOTE: Make sure the NO FAULTS message shows on the FSEU display.

(b) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.

(c) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
1) 11C11, STICK SHAKER LEFT
2) 11J21, STICK SHAKER RIGHT

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(d) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended position.

(e) Remove the power from the left hydraulic system (Ref 29-11-00).

(f) Install a PDU lock in the TE flap PDU (Fig. 405).

(g) Release the test switch for the LEFT stall warning, and make sure the LE slats stay in the fully extended position.

(h) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will come on).

CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

(i) Make sure, at all rotary actuators on all slats, that the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure you can turn the torque tube, found immediately outboard of the LE slat PDU, in the extend direction (in the clockwise direction if you look inboard at the LE slat PDU from the left wing).

(j) Remove the PDU lock from the TE flap PDU (Fig. 405).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(k) Pressurize the left hydraulic system (Ref 29-11-00).
(l) Push the arming switch for the slat alternate drive, on the P3 panel, to disarm the slat alternate drive (switch light will go off).
    1) Make sure the LE slats move to the intermediate position.
(m) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
    1) 11C11, STICK SHAKER LEFT
    2) 11J21, STICK SHAKER RIGHT
(n) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).
(o) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent.
    1) Make sure the TE flaps and LE slats move to the UP position.
(p) Move the flap control lever to the zero (FLAPS UP) detent.
(q) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM detent.

(r) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

I. Put the Airplane Back to Its Usual Condition

S 294-293

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 414-130

WARNING: OBEY THE PROCEDURE INSTRUCTIONS FOR THE REMOVAL OF DOOR . LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-131

(3) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-132

(4) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 414-133

(5) Install the access panels and close the access doors (Ref 06-44-00).

S 444-134

(6) Do the activation procedure for the thrust reverser (Ref 78-31-00).

OUTBOARD LEADING EDGE SLAT - INSPECTION/CHECK

1. General
   A. This procedure only has an illustration and a wear limit table which show the data for wear limits. There are no procedures for the access, the removal, or the installation of the parts. Refer to the Outboard Leading Edge Slat - Removal/Installation for procedures to do these tasks.

TASK 27-81-02-226-001

2. Wear Limits for the Outboard Leading Edge Slat
   A. Procedure

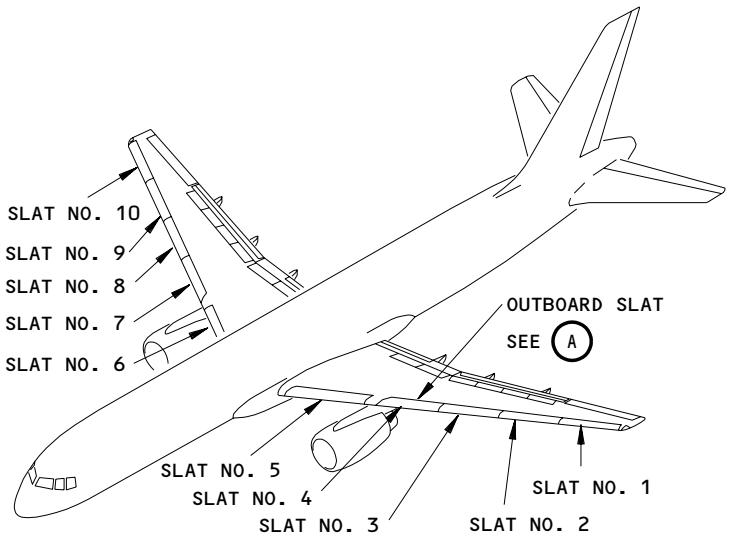
S 296-005

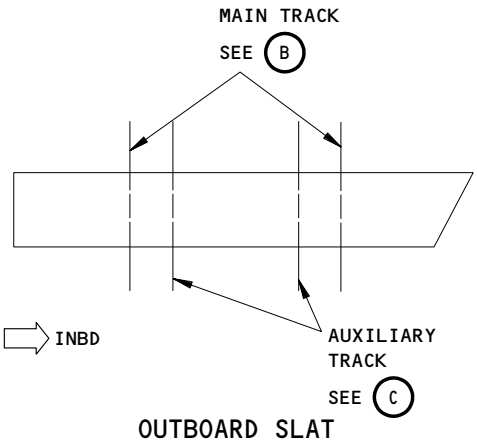
WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 226-002

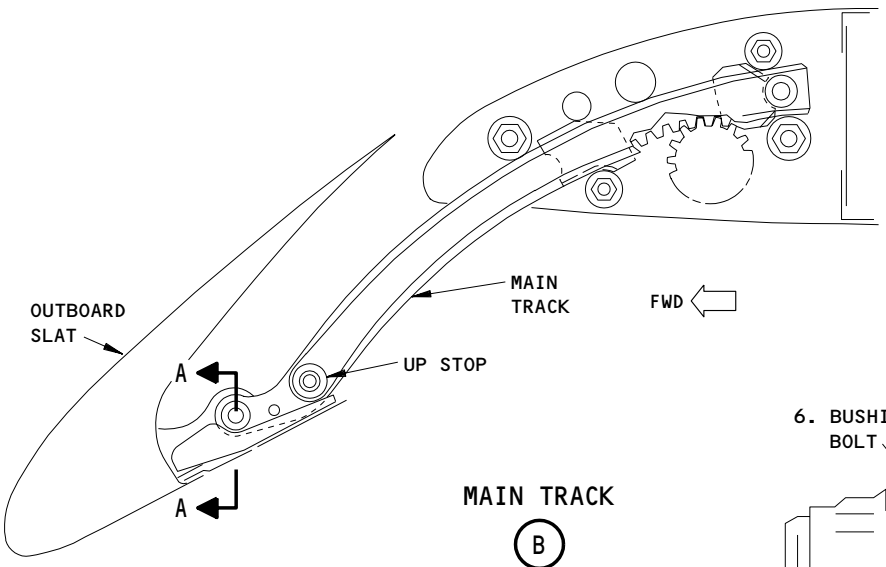
(2) Do the wear limit inspection for the main and auxiliary track roller bearings, bushings and attaching hardware (Fig. 601).





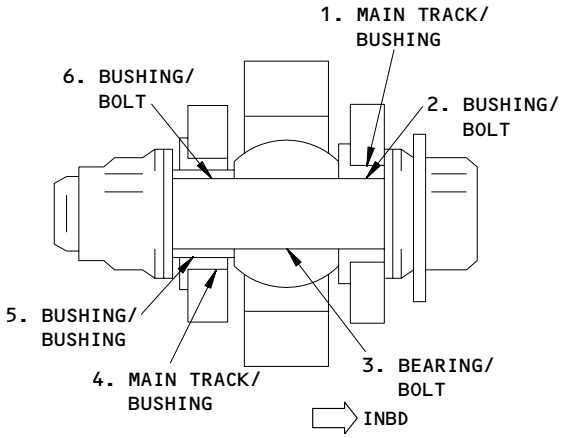
OUTBOARD SLAT
(LEFT WING IS SHOWN,
RIGHT WING IS OPPOSITE)

A



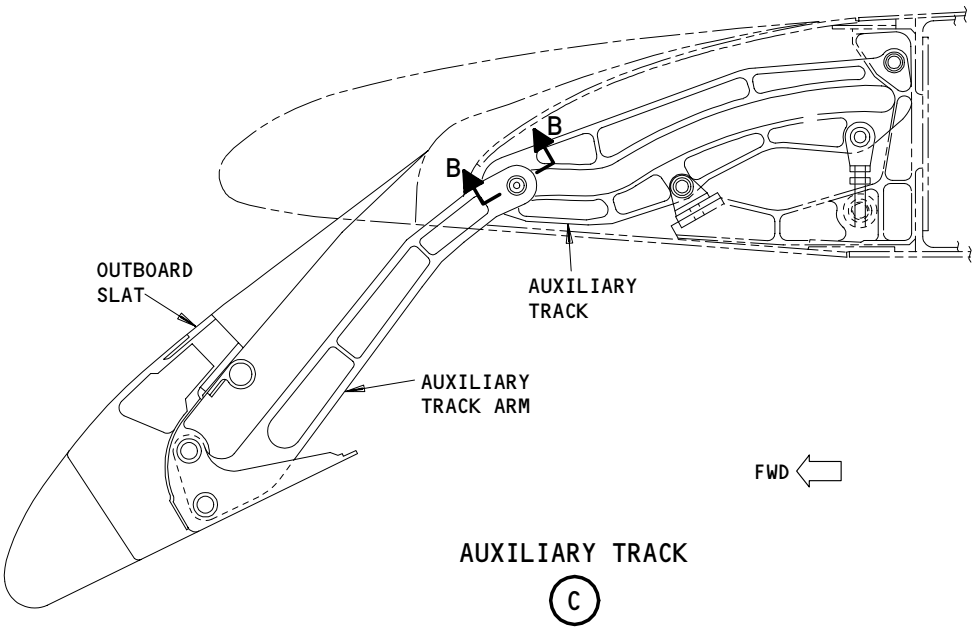
MAIN TRACK

B

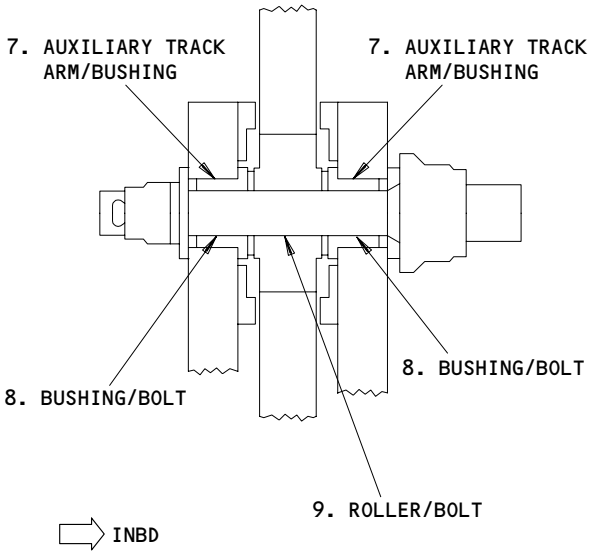


A-A

Wear Limits for the Outboard Leading Edge Slat
Figure 601 (Sheet 1)



AUXILIARY TRACK
C



B-B

Wear Limits for the Outboard Leading Edge Slat
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS PERMITTED WEAR DIM.	WEAR LIMITS MAX DIA CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
1	MAIN TRACK	ID	0.6250	0.6256	0.0000	0.0000		1	
	BUSHING	OD	0.6261	0.6267	---		2 3		4
2	BUSHING	ID	0.5000	0.5010	0.5045	0.0050	2 5		
	BOLT	OD	0.4990	0.4995	0.4960		6		
3	BEARING	ID	0.5000	0.5010	0.5045	0.0050	7		
	BOLT	OD	0.4990	0.4995	0.4954		6		
4	MAIN TRACK	ID	0.8125	0.8132	0.0000	0.0000		1	
	BUSHING	OD	0.8137	0.8144	---		8 3		4
5	BUSHING	ID	0.6870	0.6880	0.6915	0.0050	8 5		
	BUSHING	OD	0.6860	0.6865	0.6830		9		
6	BUSHING	ID	0.5000	0.5005	0.5045		9 5		
	BOLT	OD	0.4990	0.4995	0.4955		6		
7	AUXILIARY TRACK ARM	ID	0.3750	0.3756	0.0000	0.0000		10	
	BUSHING	OD	0.3759	0.3765	---		2 3		4
8	BUSHING	ID	0.2495	0.2505	0.2545	0.0050	2 5		
	BOLT	OD	0.2485	0.2495	0.2455		6		
9	ROLLER	ID	0.2493	0.2500	0.2545	0.0050	11		
	BOLT	OD	0.2485	0.2495	0.2480		6		

ALL DIMENSIONS ARE IN INCHES

Wear Limits for the Outboard Leading Edge Slat
Figure 601 (Sheet 3)

1 REAM THE HOLE TO REMOVE ALL CORROSION. CADMIUM-TITANIUM ALLOY PLATE, BAKE 12 HOURS MINIMUM AT 350-400°F, AND APPLY A CHROMATE POST-PLATE TREATMENT. THE HOLE DIAMETER MUST BE NO MORE THAN THE MAXIMUM DESIGN INNER DIAMETER PLUS 0.0600.

2 REPLACE THE BUSHING WITH A CRES BUSHING.

3 THE NEW BUSHING MUST HAVE AN OUTER DIAMETER BETWEEN THE MAXIMUM AND MINIMUM VALUES SPECIFIED.

4 APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE HOLE AND THE OUTER DIAMETER OF THE BUSHING. ASSEMBLE IT IMMEDIATELY. FILLET SEAL THE OUTER DIAMETER OF THE BUSHING FLANGE OUTER DIAMETER WITH BMS 5-95 SEALANT.

5 REAM THE INNER DIAMETER TO THE DESIGN LIMITS. MAKE SURE THE CENTER OF THE INNER AND OUTER DIAMETER ARE ALIGNED.

6 REPLACE THE BOLT.

7 REPLACE THE BEARING BY ROLLER SWAGE (PUSH OUT LOAD 1423 POUNDS).

8 REPLACE THE BUSHING WITH AN AL-NI-BR BUSHING.

9 REPLACE THE BUSHING.

10 REAM THE HOLE TO REMOVE ALL CORROSION. CHROMIC ACID ANODIZE THE HOLE TO MIL-A-8625, TYPE 1. THE HOLE DIAMETER MUST BE NO MORE THAN THE MAXIMUM DESIGN INNER DIAMETER PLUS 0.0600.

11 REPLACE THE ROLLER.

Wear Limits for the Outboard Leading Edge Slat
Figure 601 (Sheet 4)

86884

LEADING EDGE SLAT POWER DRIVE UNIT CONTROL VALVE MODULE AND COMPONENTS - MAINTENANCE PRACTICES

1. General
   A. This procedure contains two tasks. The first task removes the control valve module and the autoslat solenoid valve for the leading edge (LE) slat power drive unit (PDU). The second task installs the control valve module and the autoslat solenoid valve.

TASK 27-81-06-022-001

2. Remove the Control Valve Module and the Autoslat Solenoid Valve
   A. Equipment
      (1) Rig Pins from Set B20003-XX (Ref 20-10-24):
          (a) LE1 - P/N B20003-3
      (2) TE Flap PDU Lock - B27008-1
      (3) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-28:
      (4) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (5) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - B27020-25 (Optional lock/Commercially Available)
   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 20-10-24/201, Rig Pins
      (3) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) 32-00-15/201, Landing Gear Door Locks
      (5) 32-00-20/201, Landing Gear Downlocks
      (6) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

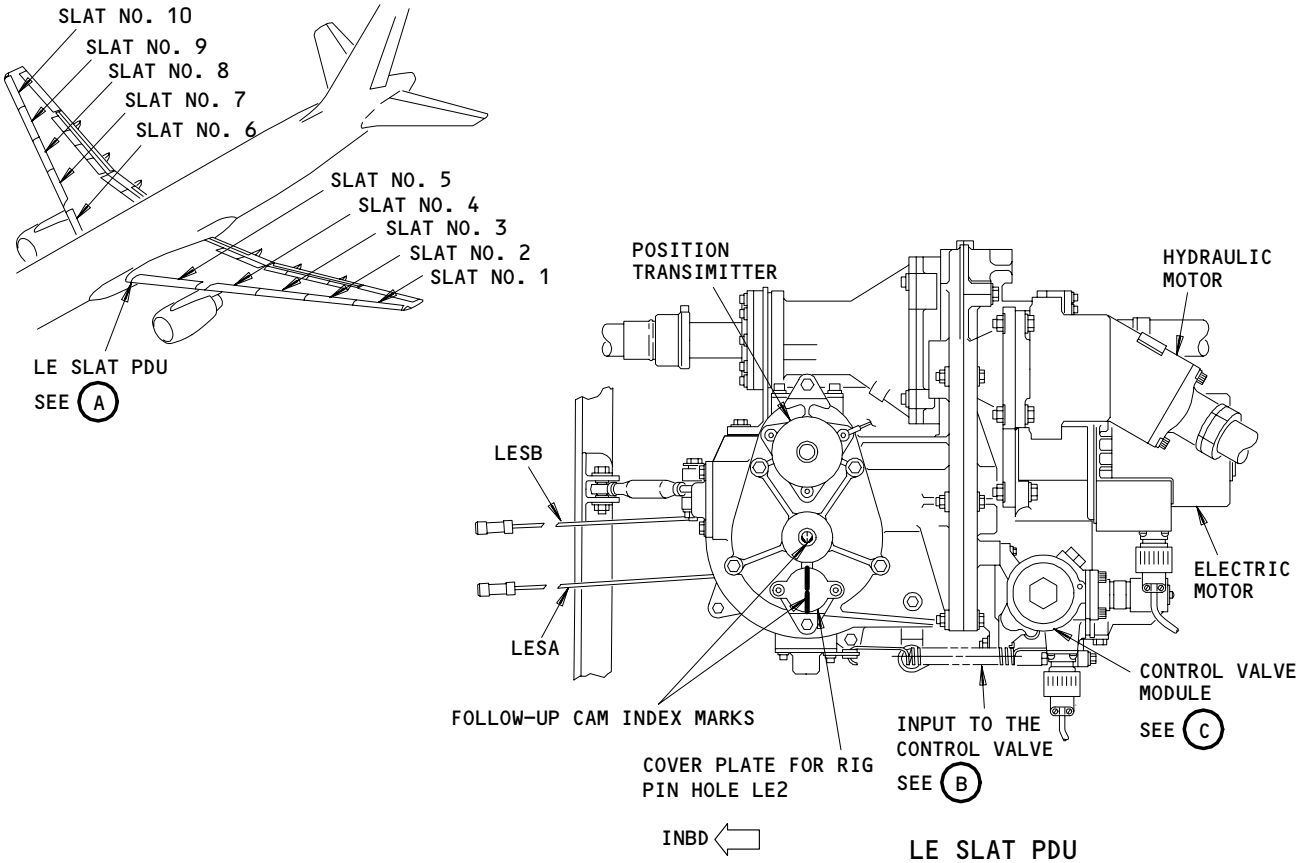
143	MLG Wheel Well
211/212	Control Cabin
511	Leading Edge to Front Spar (Left)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 042-002

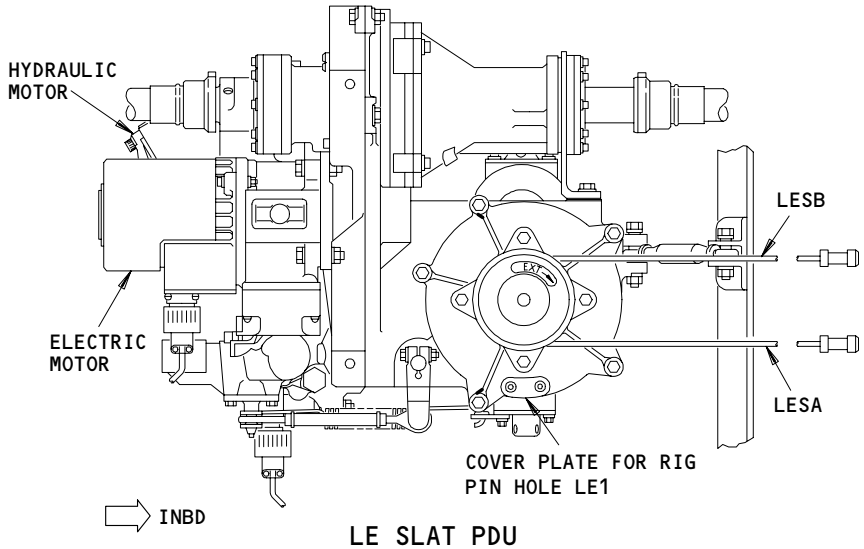
WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).



LE SLAT PDU
(FRONT VIEW)

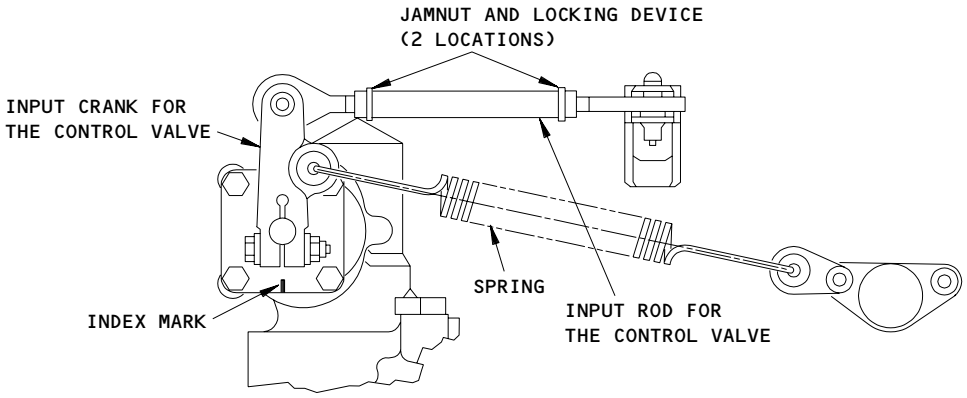
A



LE SLAT PDU
(AFT VIEW)

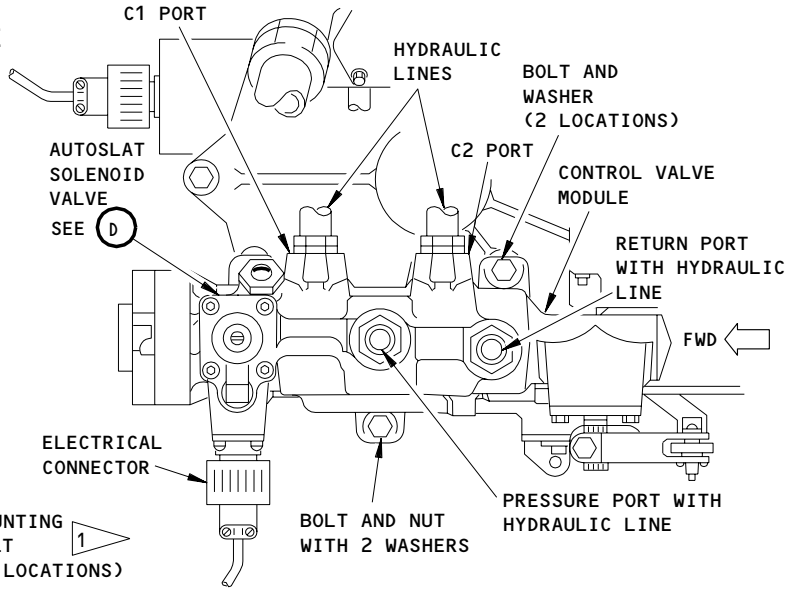
B

Control Valve Module for the LE Slat PDU
Figure 201 (Sheet 1)



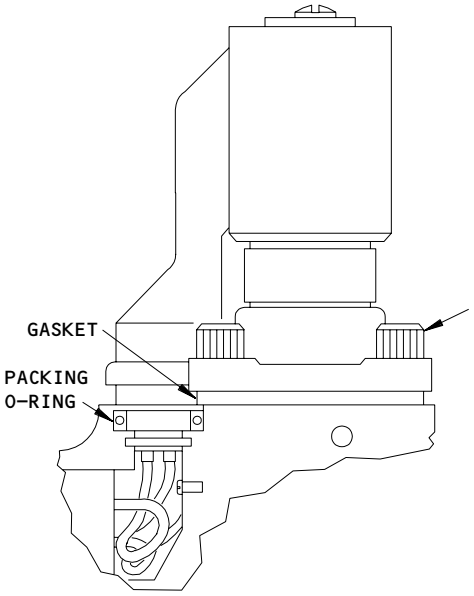
INPUT TO THE CONTROL VALVE

B



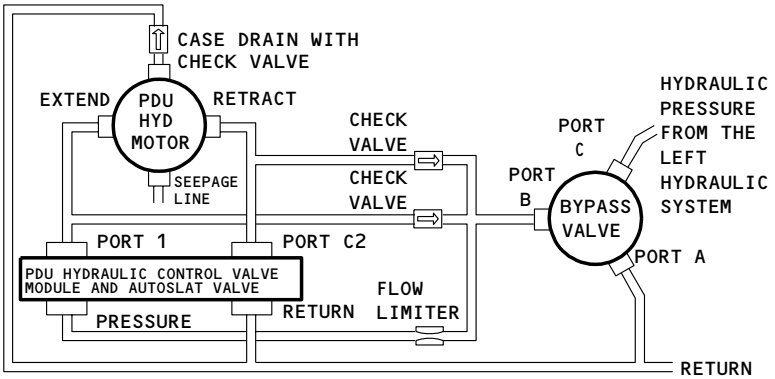
CONTROL VALVE MODULE (OUTBOARD VIEW)

C



AUTOSLAT SOLENOID VALVE

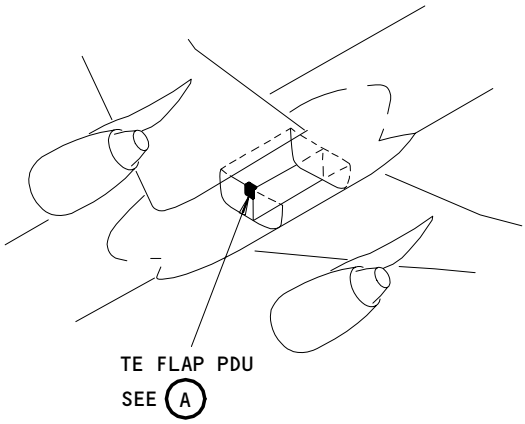
D

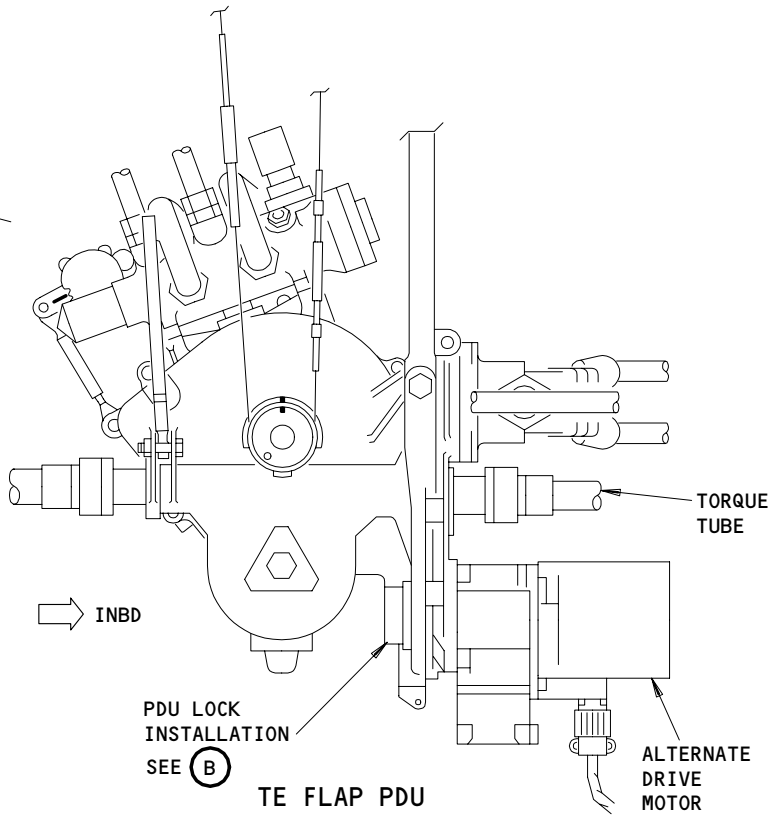


1 LOCK THE BOLTS TOGETHER WITH WIRE IN PAIRS (DOUBLE TWIST)

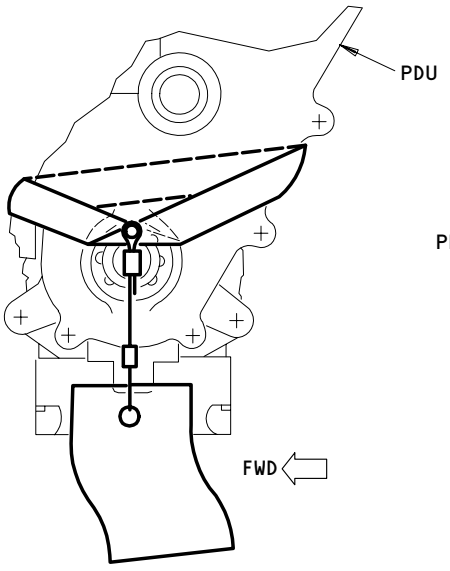
SCHEMATIC FOR THE CONNECTION OF THE HYDRAULIC LINES

Control Valve Module for the LE Slat PDU
Figure 201 (Sheet 2)

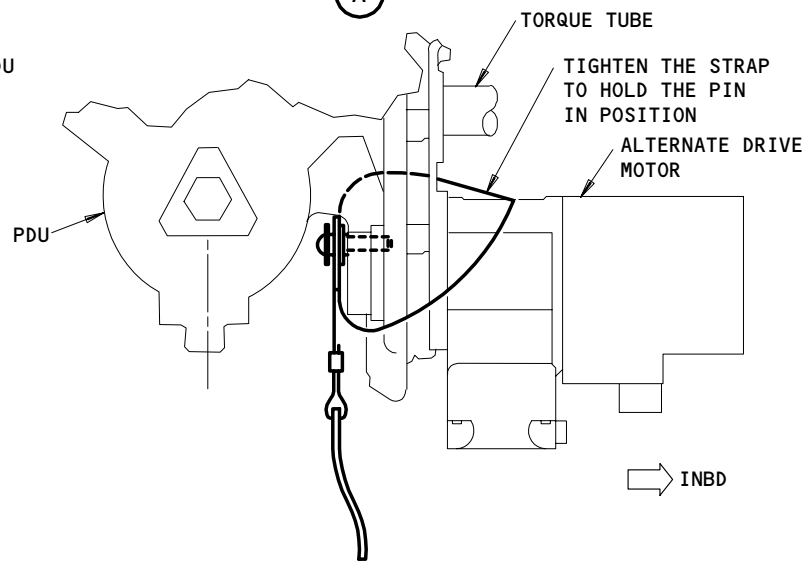




TE FLAP PDU
(AFT VIEW)
A

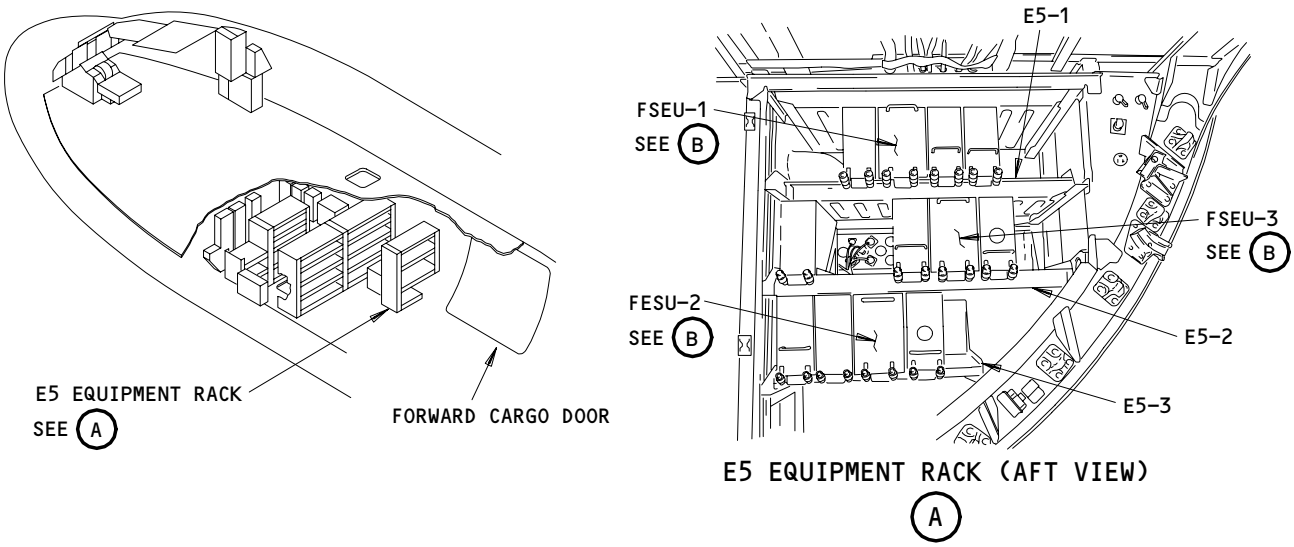


PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B

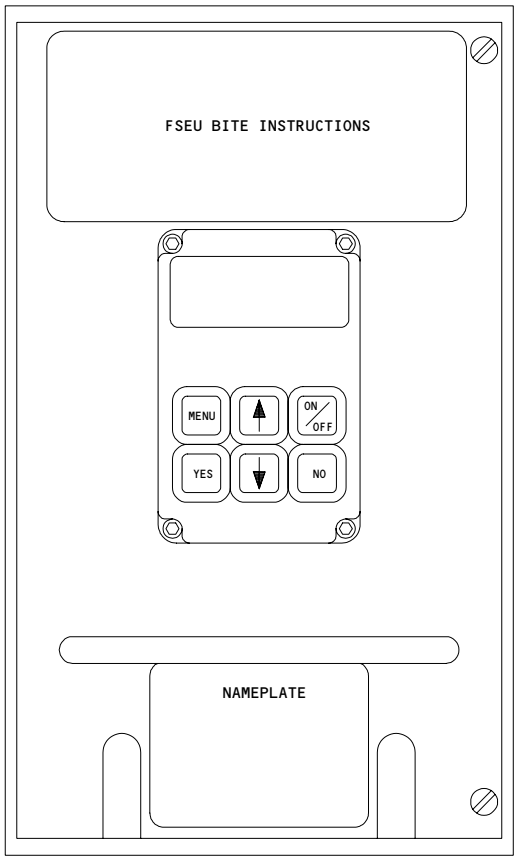


PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 202



E5 EQUIPMENT RACK (AFT VIEW)
A



FSEU (EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 203

S 212-003
(2) Make sure the trailing edge (TE) flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 492-004
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-005
(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 012-006

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 862-007
(6) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 492-008
(7) Install a PDU lock in the TE flap PDU (Fig. 202).

S 862-009
(8) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-OPERATE tags:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11D31, HYDRAULICS PTU CONT
(f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(i) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(j) 11J33, WARN ELEX A

S 862-010
(9) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-011
(10) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR

(b) 6D23, ALTN FLAP PWR

S 012-012
(11) Remove the necessary access panels and open the necessary access doors (Ref 06-44-00).

E. Remove the Control Valve Module (Fig. 201)

S 832-013
(1) Remove the cover plate for rig pin LE1 and install the rig pin.

S 032-014
(2) Remove the electrical connector.

S 032-015
(3) Disconnect the input rod for the control valve module.

S 032-016
(4) Disconnect the spring from the input crank on the control valve module.

NOTE: Do not change the length of the input rod on the control valve module when or after you disconnect the spring.

S 032-017
(5) Disconnect the hydraulic lines from the control valve module.

S 492-018
(6) Install plugs in the hydraulic lines and caps on the hydraulic ports.

S 032-019
(7) Remove the mounting bolts.

S 022-020
(8) Remove the control valve module.

F. Remove the Autoslat Solenoid Valve (Fig. 201)

S 032-021
(1) Remove the mounting bolts (4 locations).

S 022-022
(2) Remove the autoslat solenoid valve.

S 492-023
(3) Use a cover on the mounting surfaces of the autoslat solenoid valve and LE slat PDU.

TASK 27-81-06-422-024

3. Install the Control Valve Module and the Autoslat Solenoid Valve

A. Equipment

(1) Rig Pins from Set B20003-XX (Ref 20-10-24):

(a) LE2 - P/N B20003-3

B. Consumable Materials

(1) D00054 Skydrol Assembly Lube - MCS 352B

(2) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

C. References

(1) 06-44-00/201, Wing Access Doors and Panels

(2) 12-12-01/301, Hydraulic Systems

(3) 20-10-24/201, Rig Pins

(4) 24-22-00/201, Electrical Power - Control

(5) 27-81-08/201, Leading Edge Slat Power Drive Unit Components

(6) 27-81-20/401, Leading Edge Slat Drive Torque Tube

(7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

(8) 32-00-15/201, Landing Gear Door Locks

(9) 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
511	Leading Edge to Front Spar (Left)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Control Valve Module (Fig. 201)

S 212-025

(1) Make sure the pressure is removed from the left hydraulic system (Ref 29-11-00).

S 212-026

(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 212-027

(3) Make sure the flap/slat alternate drives are off.

S 212-028

(4) Make sure that rig pin LE1 is installled.

S 422-029

(5) Put the control valve module in its position on the LE slat PDU and install the mounting bolts.

S 092-030
(6) Remove the plugs from the hydraulic lines and the caps from the hydraulic ports.

S 432-031
(7) Connect the hydraulic lines to the control valve module.

S 642-032
(8) Apply a thin layer of Skydrol assembly lube or hydraulic fluid to the O-rings and the fittings before you install them.

S 432-033
(9) Connect the electrical connector.

S 432-034
(10) Connect the input rod for the control valve module.

S 432-035
(11) Connect the spring to the input crank for the control valve module.

NOTE: Do not change the length of the input rod for the control valve module when you connect the spring.

S 022-036

CAUTION: DO NOT OPERATE THE LE SLAT PDU UNTIL IT IS INSTALLED AND CORRECTLY RIGGED, TO PREVENT AVOID DAMAGE TO THE INTERNAL MECHANISM.

IF YOU MUST DRIVE THE LE SLAT PDU AT THE SAME TIME THAT YOU ADJUST THE LE SLAT SYSTEM, USE A MANUAL (NON-POWERED) METHOD TO PREVENT DAMAGE TO THE INTERNAL MECHANISM OF THE LE SLAT PDU.

IF IT IS NECESSARY TO BACKDRIVE THE LE SLAT PDU, DO NOT BACKDRIVE THE LE SLAT PDU INTO THE AREA WHERE THE GEARS ARE NOT ENGAGED, AS SHOWN ON THE SLAT POSITION PLACARD ON THE FRONT OF THE LE SLAT PDU (ABOVE THE COVER PLATE FOR RIG PIN LE2).

IF THE INTERNAL MECHANISM OF THE LE SLAT PDU MUST BE ENGAGED AGAIN, TURN THE OUTPUT SHAFT BY HAND, AND AT THE SAME TIME TURN THE INDEX POINTER (MACHINED INTO THE END OF THE FOLLOW-UP CAM/GEAR SHAFT) BY HAND.

(12) Make a mark on the torque tubes adjacent to the LE slat PDU.

NOTE: This will keep a record of the adjusted position for the subsequent installation.

S 032-037
(13) Remove the torque tubes on each side of the LE slat PDU (Ref 27-81-20).

NOTE: Do not turn the torque tube while it is disconnected. It will be necessary to adjust the slat drive system if you turn the torque tube (Ref 27-81-00).

S 492-042
(14) Remove the cover plate for rig pin LE2 and install rig pin LE2 in the rig pin hole of the follow-up cam.

NOTE: You can turn the output shaft of the LE slat PDU if it is necessary.

S 212-039
(15) Make sure the input crank for the control valve module is in a position that the index mark on the control valve module is aligned with the slot on the input crank.
(a) Make sure rig pins LE1 and LE2 can easily be removed and installed.

S 822-040
(16) If the above condition is not true,
do these steps to adjust the input crank of the control valve module:
(a) Loosen the jamnut and the locking device at each end of the input rod for the control valve module.
(b) Turn the input rod barrel until the slot on the input crank aligns with the index mark on the control valve module.
1) Make sure rig pins LE1 and LE2 can easily be removed and installed.
(c) Tighten the jamnuts against the locking devices.
1) Make sure you can see no more than eight threads at each end of the input rod.

NOTE: Do not install a safety wire at this time.

S 092-041
(17) Remove rig pins LE1 and LE2.

S 862-043
(18) Supply electrical power (Ref 24-22-00).

S 862-044

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(19) Pressurize the left hydraulic system (Ref 29-11-00).

NOTE: The output shaft of the LE slat PDU can move a small distance.

S 212-045

(20) Make sure that rig pin LE2 can easily be removed and installed in the rig pin hole of the follow-up cam.

S 492-046

(21) If rig pin LE2 can easily be removed and installed, safety the jamnuts on the input rod of the control valve module with a wire (double-twist).

NOTE: Ignore the input crank and index mark alignment.

S 822-047

(22) If rig pin LE2 can not be easily removed and installed, adjust the control valve module as follows:
(a) Remove rig pin LE2.
(b) Loosen the jamnut and locking device at each end of the input rod for the control valve module.
(c) Turn the input rod barrel until rig pin LE2 can easily be removed and installed.

NOTE: Do not turn the barrel with rig pin LE2 installed. Ignore the input crank and index mark alignment.

(d) Tighten the jamnuts against the locking devices.
1) Make sure you can see no more than eight threads at each end of the input rod.
(e) Safety the jamnuts with a wire (double-twist).
(f) Make sure that rig pin LE2 can easily be removed and installed.

S 862-048
(23) Remove the power from the left hydraulic system (Ref 29-11-00).

NOTE: Keep the PDU lock in the TE flap PDU.

S 092-049
(24) Remove rig pin LE2.

S 412-050
(25) Install the cover plate for rig pin LE2 with the index mark on the cover plate and the index mark on the gear shaft aligned (+/-0.01 inch).

S 412-052
(26) Install the cover plate for rig pin LE1.

S 432-054
(27) Use the marks you made on the torque tubes to connect the torque tubes on each side of the LE slat PDU in the same position they were in before you disconnected them (Ref 27-81-20).

NOTE: Do not turn the torque tubes while you connect them to the LE slat PDU. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

S 822-055
(28) Adjust the position transmitter for the LE slat PDU (Ref 27-81-08).

S 712-056
(29) Do a test on the LE slat PDU in the Test of the LE Slat PDU.

F. Install the Autoslat Solenoid Valve (Fig. 201)

S 212-057
(1) Make sure the pressure is removed from the left hydraulic system (Ref 29-11-00).

S 212-058
(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 212-059
(3) Make sure the flap/slat alternate drives are off.

S 092-060
(4) Remove the cover from the mounting surfaces of the autoslat solenoid valve and the LE slat PDU.

S 422-061
(5) Put the autoslat solenoid valve in the mounting position and install the mounting bolts (4 locations).

S 712-062
(6) Do a test on the LE slat PDU in the Test of the LE Slat PDU.

G. Test of the LE Slat PDU

S 092-063
(1) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 862-064
(2) Remove the DO-NOT-CLOSE tags and the circuit breaker lock and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11D31, HYDRAULICS PTU CONT
(f) 11G12, FLAP SLAT ELEC UNIT 1 POWER

(g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(i) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(j) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(k) 11J33, WARN ELEX A

S 862-065

(3) Remove the circuit breaker locks and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-066

(4) Supply electrical power (Ref 24-22-00).

S 212-067

(5) Make sure the arming switches for the flap and slat alternate drives, on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 212-068

(6) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 212-069

(7) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 862-070

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(8) Pressurize the left hydraulic system (Ref 29-11-00).

S 092-071
(9) Remove the PDU lock from the TE flap PDU (Fig. 202).

S 702-072
(10) If you removed and installed the control valve module, do this step:
(a) Go to the EXISTING FAULTS? part of the main menu on FSEU-1 , FSEU-2, and FSEU-3 (one at a time), in the main equipment center (Fig. 203).

NOTE: Make sure the NO FAULTS message shows on the FSEU display. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

S 862-073
(11) Move the flap control lever to the 1-unit detent and do these checks:
(a) Make sure the TE flaps move to the 1-degree position.
(b) Make sure the LE slats move to the intermediate position in less than 9-11 seconds from when the slats start to move.
(c) Make sure the LEADING EDGE light on the P3 panel is off and no messages show on the EICAS display.

S 862-074
(12) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 702-075
(13) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended position.

S 862-076
(14) Remove the power from the left hydraulic system (Ref 29-11-00).

S 492-077
(15) Install a PDU lock in the TE flap PDU (Fig. 202).

S 702-078
(16) Release the test switch for the LEFT stall warning, and make sure the LE slats stay in the fully extended position.

S 862-079
(17) Push the arming switch for the slat alternate drive, on the first officer's main instrument panel, P3, to arm the slat alternate drive (switch light will come on).

S 212-080
(18) Make sure, at all rotary actuators on all slats, that the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure the torque tube, found immediately outboard of the LE slat PDU, can turn in the extend direction (in the clockwise direction if you look inboard at the LE slat PDU from the left wing).

S 092-081
(19) Remove the PDU lock from the TE flap PDU (Fig. 202).

S 862-083

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(20) Pressurize the left hydraulic system (Ref 29-11-00).

S 862-084
(21) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).
(a) Make sure the LE slats move to the intermediate position.

S 702-085
(22) Push and hold the test switch for the RIGHT stall warning, and make sure the slats move to the fully extended position.

S 702-086
(23) Release the test switch for the RIGHT stall warning, and make sure the slats move to the intermediate position.

S 702-087
(24) Push and hold the test switches for the LEFT and RIGHT stall warnings, and make sure the LE slats move to the fully extended position.

S 702-088
(25) Release the test switches for the LEFT and RIGHT stall warnings, and make sure the LE slats move to the intermediate position.

S 862-089
(26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C11, STICK SHAKER LEFT
(b) 11J21, STICK SHAKER RIGHT

S 862-090
(27) Move the flap control lever to the 25-unit detent and do these checks:
(a) Make sure the TE flaps extend to the 25-degree position and the LE slats extend fully.
(b) Make sure the LEADING EDGE light is off and that no messages show on the EICAS display.

S 862-091
(28) Move the flap control lever to the 1-unit detent, and make sure the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.

S 862-092
(29) Move the flap control lever to the zero (FLAPS UP) detent and do these checks:
(a) Make sure the TE flaps retract fully.
(b) Make sure the LE slats retract fully in less than 9-11 seconds from when the slats start to move.
(c) Make sure the LEADING EDGE light, on the P3 panel, is off and that no messages show on the EICAS display.

S 212-093
(30) Make sure the overload indicators on the torque limiters for the LE slat PDU did not come on.

NOTE: An overload indicator will extend approximately 0.25 inch (6.35 mm) from the adjacent surface if it came on.

S 212-094
(31) Make sure there are no leaks at the hydraulic connection points to the LE slat PDU.

H. Put the Airplane Back to Its Usual Condition

S 412-095

WARNING: USE AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 862-096
(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 862-097
(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 412-098
(4) Install the access panels and close the access doors (Ref 06-44-00).

S 612-099
(5) Do the servicing steps for the reservoir of the left hydraulic system if you disconnected the hydraulic lines (Ref 12-12-01).

S 442-100

(6) Do the activation procedure for the thrust reverser (Ref 78-31-00).

LEADING EDGE SLAT POWER DRIVE UNIT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the Power Drive Unit (PDU) for the leading edge (LE) slat. The second task installs the PDU for the LE slat.

   TASK 27-81-07-024-001

2. Remove the PDU for the LE Slat
   A. Equipment
      (1) Hoist Equipment - LE Slat PDU, B27006-65
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (2 necessary) (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) 06-44-00/201, Wing Access Panels and Doors
      (2) 27-81-00/501, Leading Edge Slat System
      (3) 27-81-20/401, Leading Edge Slat Torque Tube
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) 32-00-15/201, Landing Gear Door Locks
      (6) 32-00-20/201, Landing Gear Downlocks
      (7) 36-11-01/401, Pneumatic Duct
      (8) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

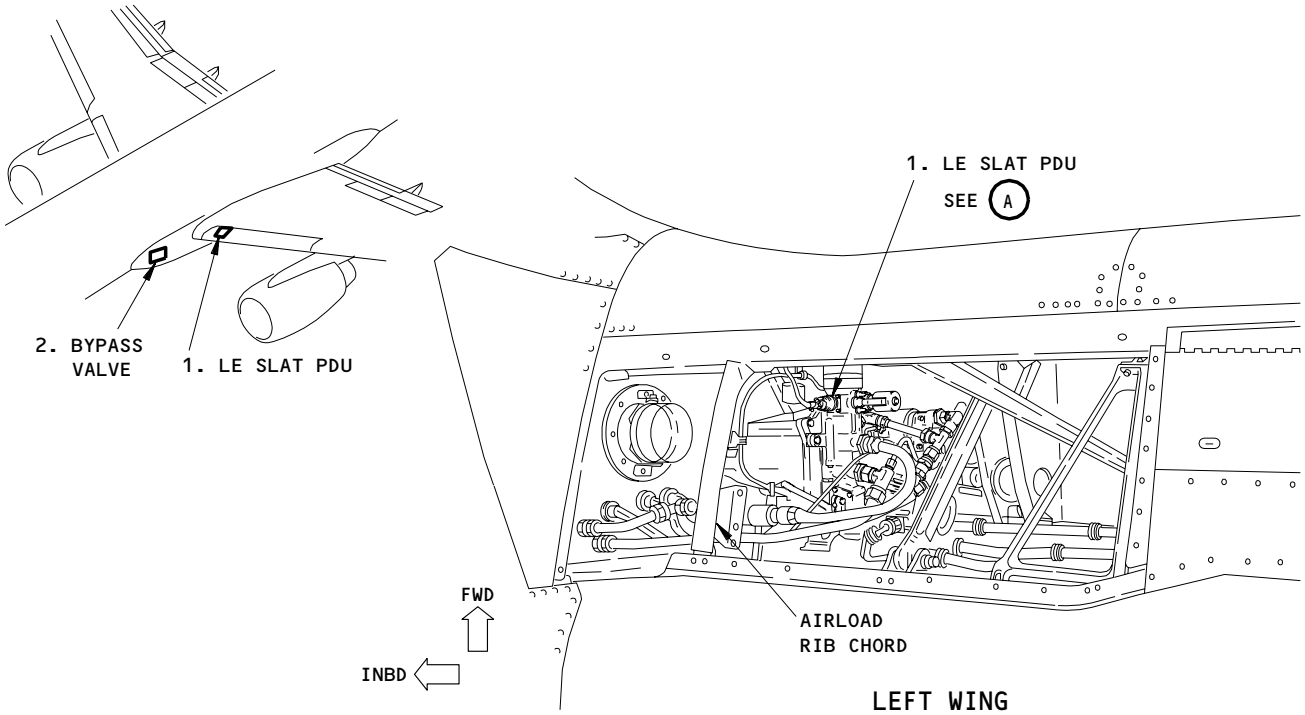
211/212	Control Cabin
510/610	Wing Leading Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

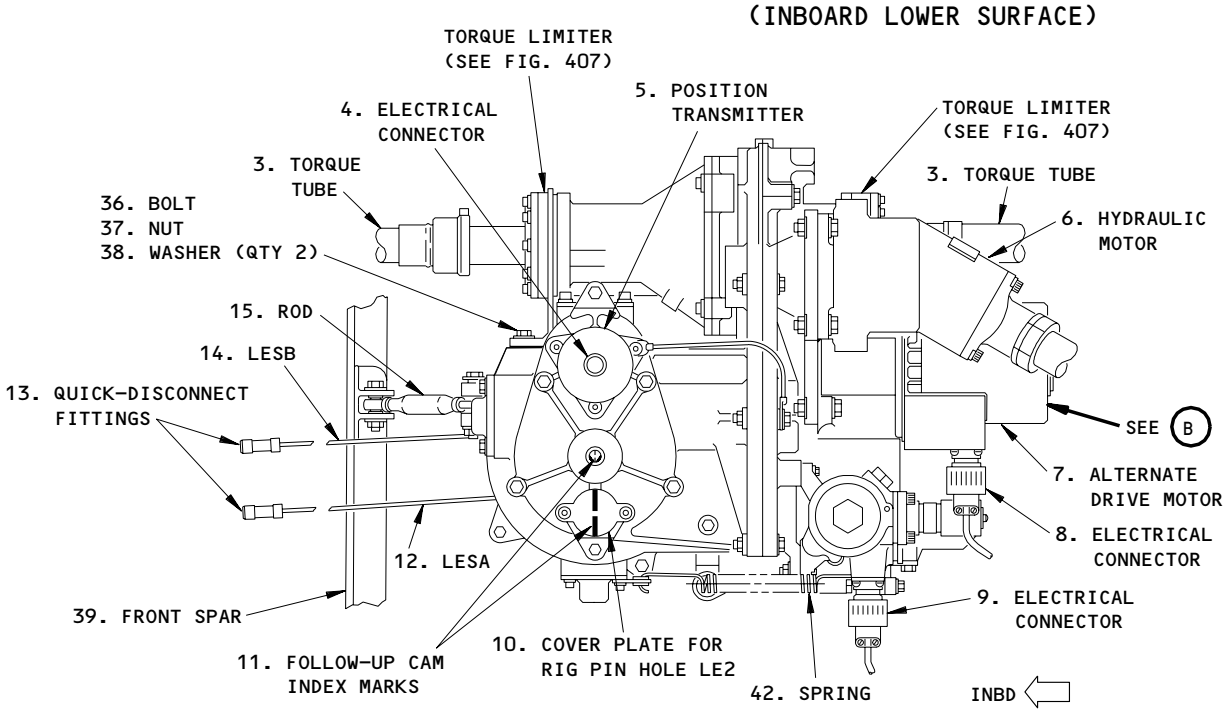
      S 044-002

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

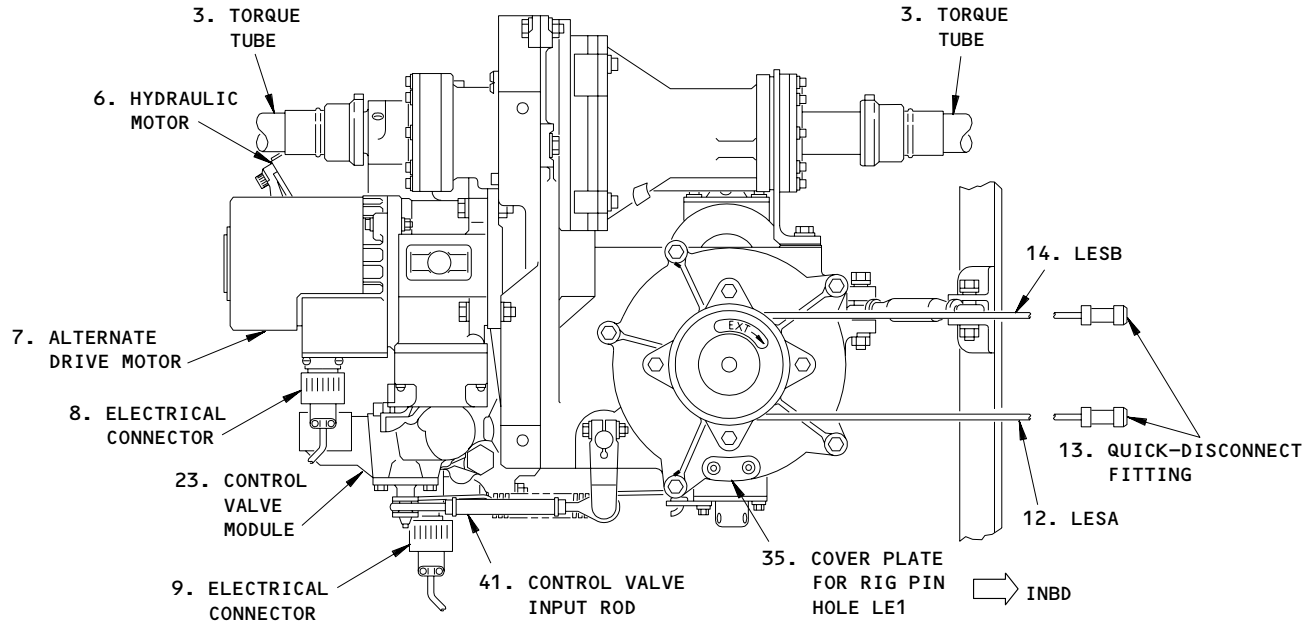


LEFT WING
(INBOARD LOWER SURFACE)



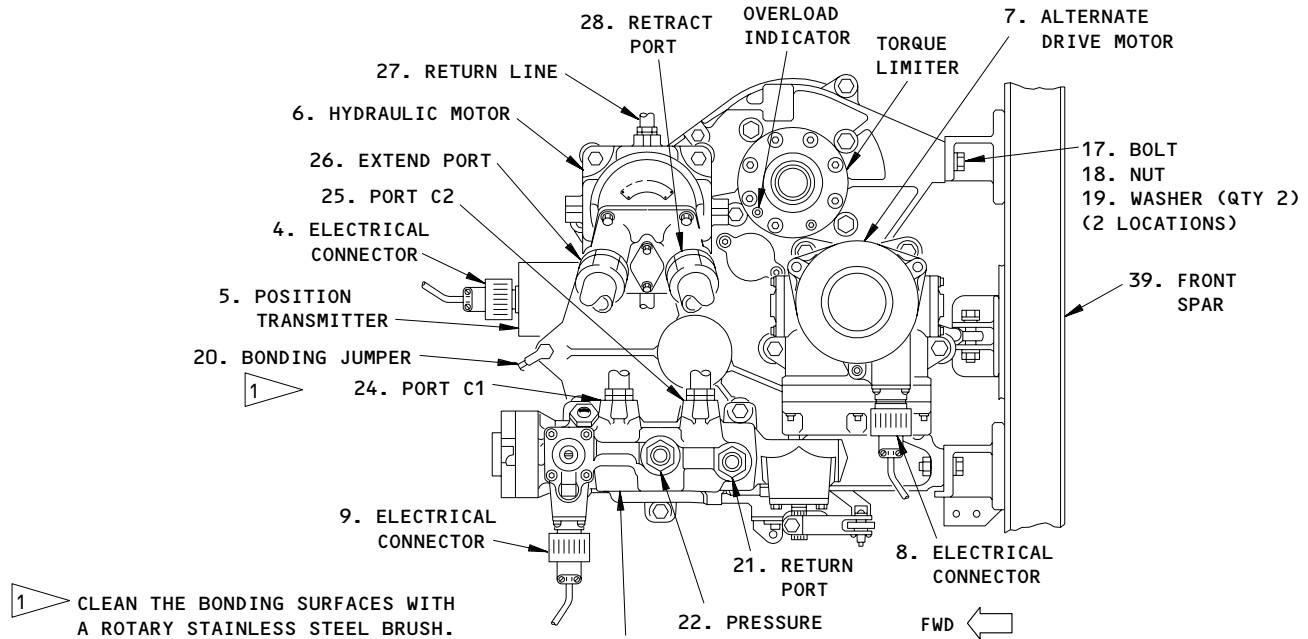
LE SLAT PDU
(FRONT VIEW)
A

Installation of the LE Slat Power Drive Unit
Figure 401 (Sheet 1)



LE SLAT PDU
(AFT VIEW)

A



1 CLEAN THE BONDING SURFACES WITH A ROTARY STAINLESS STEEL BRUSH. ON ONE SIDE INSTALL A BOLT, A WASHER, A BONDING JUMPER, AND A WASHER. ON THE OTHER SIDE INSTALL A WASHER AND A NUT. MAKE SURE THE RESISTANCE ACROSS THE BOND IS NOT MORE THAN 0.001 OHM.

LE SLAT PDU
(OUTBOARD VIEW)

B

Installation of the LE Slat Power Drive Unit
Figure 401 (Sheet 2)

S 214-003
(2) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 214-004
(3) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-005
(4) Install a DO-NOT-OPERATE tag on the flap control lever.

S 014-006

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 864-007
(6) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 864-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-OPERATE tags:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11D31, HYDRAULICS PTU CONT
(f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(i) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(j) 11G22, FLAP SLAT ELEC UNI 3 CONT
(k) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(l) 11J33, WARN ELEX A

S 864-009
(8) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-010
(9) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-011
(10) Remove the necessary access panels and open the necessary access doors (Ref 06-44-00).

S 014-012
(11) Remove the airload rib chord from the fixed leading edge rib (Fig. 401).

E. Remove the LE Slat PDU (Fig. 401)

S 014-013
(1) Remove the pneumatic duct (Ref 36-11-01).

S 934-014
(2) Make a mark on the adjacent torque tubes that you will not remove.

NOTE: This will keep a record of the adjusted position for the subsequent installation.

S 024-015
(3) Remove the torque tubes (3) on each side of the LE slat PDU (Ref 27-81-20).

NOTE: Do not turn the torque tube while it is disconnected. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

S 034-016
(4) Release the tension in the LESA (12) and LESB (14) cables, and disconnect the cables at the quick-disconnect fittings (13).

NOTE: Keep the cables tight to make sure the cables do not jump from the pulleys.

S 034-017
(5) Disconnect the electrical connectors (4, 8, and 9).

S 034-018
(6) Disconnect the hydraulic lines (21, 22, 24, 25, 26, 27 and 28).

S 494-019
(7) Install plugs in the hydraulic lines and caps on the hydraulic ports.

S 034-020
(8) Disconnect the bonding jumper (20) from the electrical motor (16).

S 494-021
(9) Install the mounting bolt for the electrical motor after you disconnect the bonding jumper (20).

S 494-022
(10) Install the hoist equipment to hold the weight of the LE slat PDU (Fig. 404).

S 214-023
(11) Make sure the electrical wires are clear from the area to lower the LE slat PDU (1).

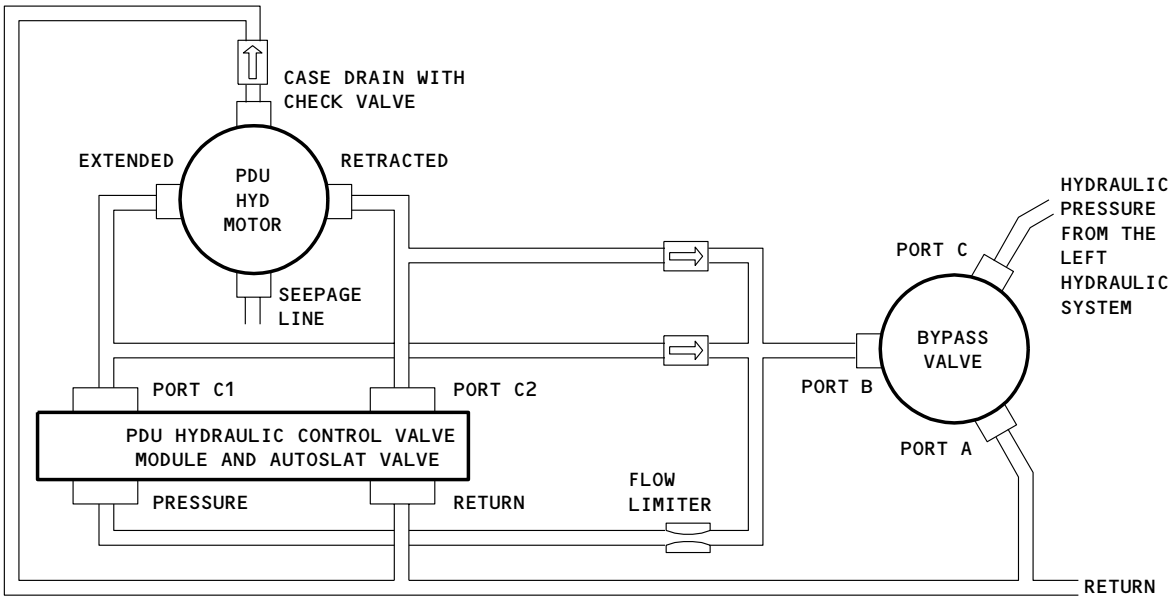
S 034-024
(12) Disconnect the rod (15) from the PDU (1).

S 034-025
(13) Disconnect LE slat PDU (1) from the front spar (39).

S 024-026
(14) Use the hoist equipment to remove the PDU (Fig. 404).

TASK 27-81-07-424-027

3. Install the LE Slat PDU (Fig. 401)
   A. Equipment
      (1) Hoist Equipment - LE Slat PDU, B27006-65
      (2) TE Flap PDU Lock - B27008-1
      (3) Rig Pins from Set B20003-XX (Ref 20-10-24):
         (a) LE1 - P/N B20003-3
         (b) LE2 - P/N B20003-3
      (4) Rotary Stainless Steel Brush - Commercially Available
      (5) Bonding Meter Microhm Bridge, Type 2 Bonding Meter, Avtron - Model T477W or equivalent
         Avtron Manufacturing Inc.
         Cleveland, Ohio



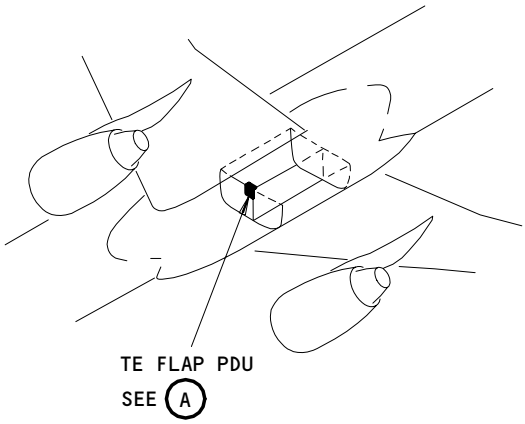
SCHEMATIC FOR THE CONNECTION OF THE HYDRAULIC LINES

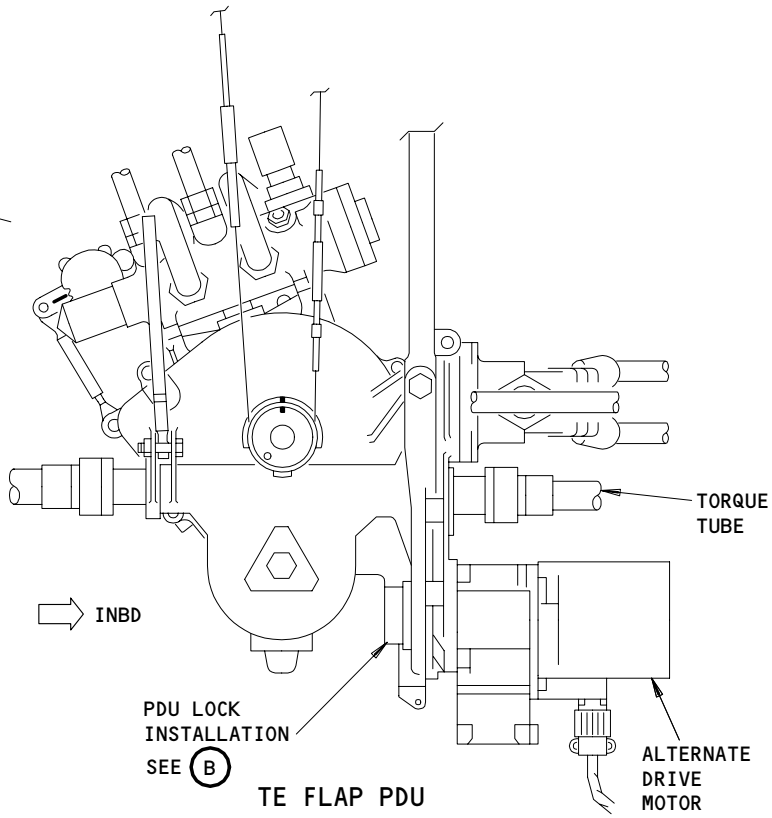
SLAT CABLE TENSION LOADS	
TEMP °F (°C) ±5°F (±3°C)	LESA, LESB POUNDS (Kgs)
110 (43)	118 (53)
90 (32)	109 (49)
80 (26)	104 (47)
70 (21)	100 (45)
60 (15)	96 (43)
50 (10)	92 (41)
40 (4.4)	88 (39)
30 (-1.1)	84 (38)
10 (-12)	75 (34)
-10 (-23)	67 (30)
-30 (-34)	59 (26)
-40 (-40)	53 (24)

TABLE I

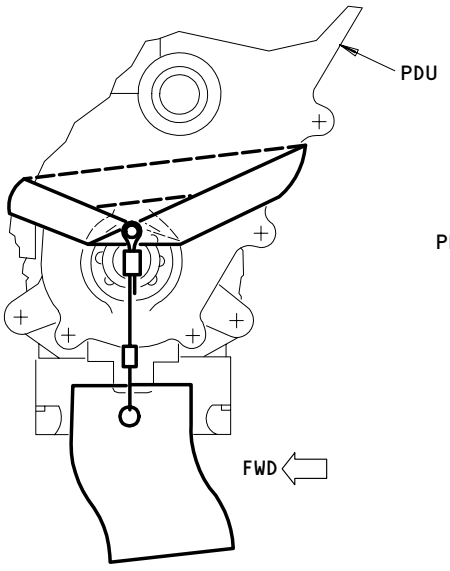
NOTE: THE CABLE TENSION VALUES WILL NOT BE CORRECT WHEN THE TEMPERATURE DIFFERENCES ALONG THE CABLE ARE MORE THAN 5°F (3°C). LET THE DIFFERENCE BETWEEN THE AIRPLANE TEMPERATURE AND THE AIR TEMPERATURE THAT IS NEAR THE AIRPLANE BECOME STABLE ONE HOUR BEFORE YOU ADJUST THE SLAT CABLES.

Hydraulic Line Schematic and Slat Cable Rigging Loads
Figure 402

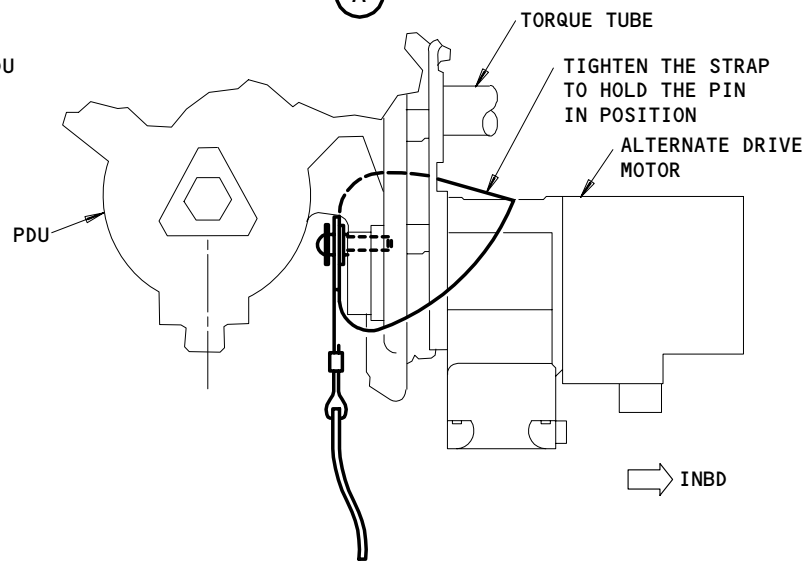




TE FLAP PDU
(AFT VIEW)
A

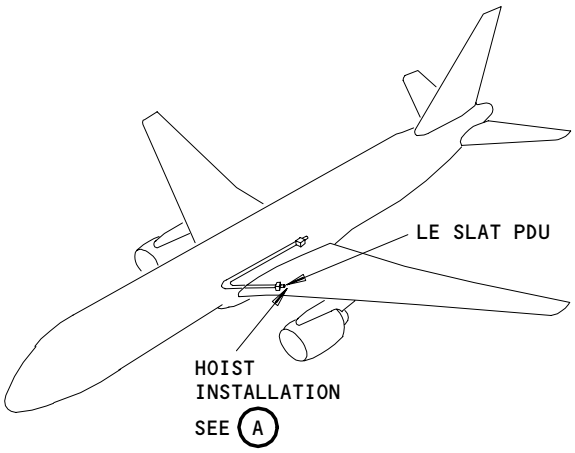


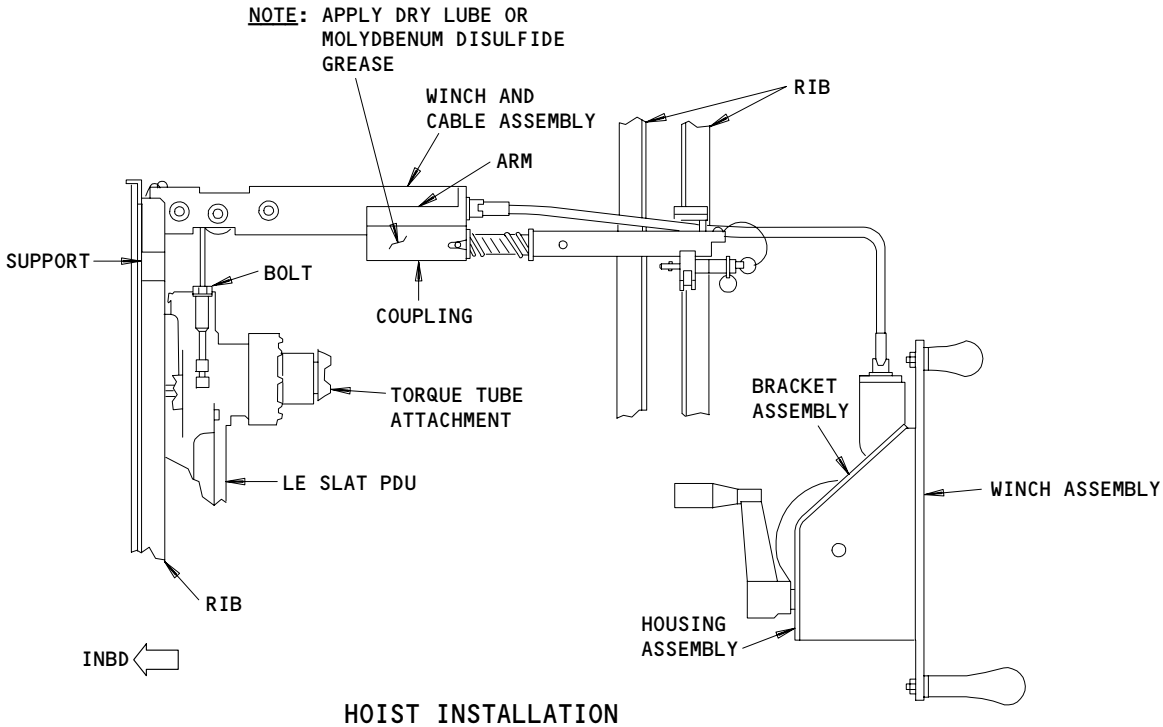
PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

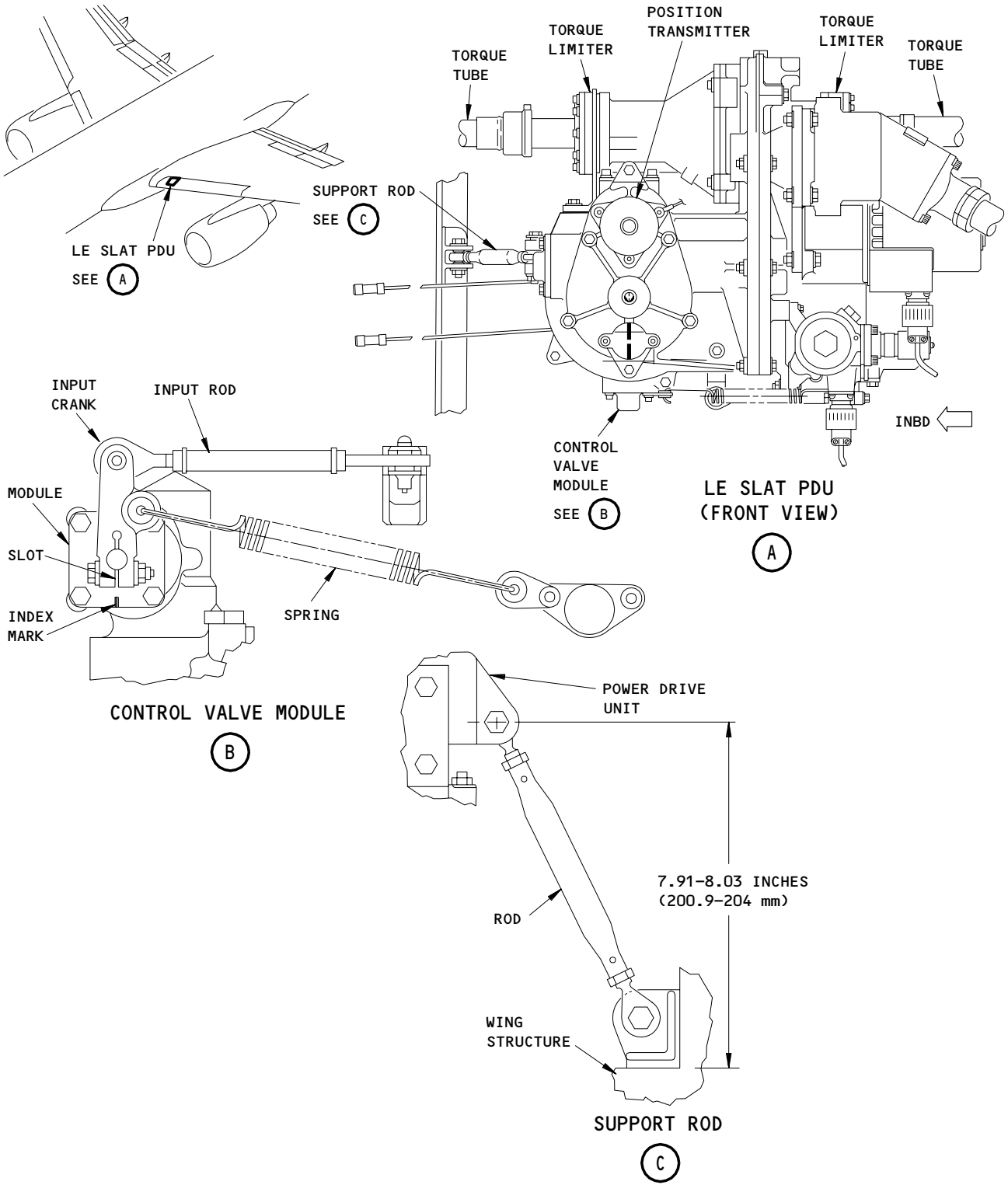
PDU Lock for the TE Flap PDU
Figure 403



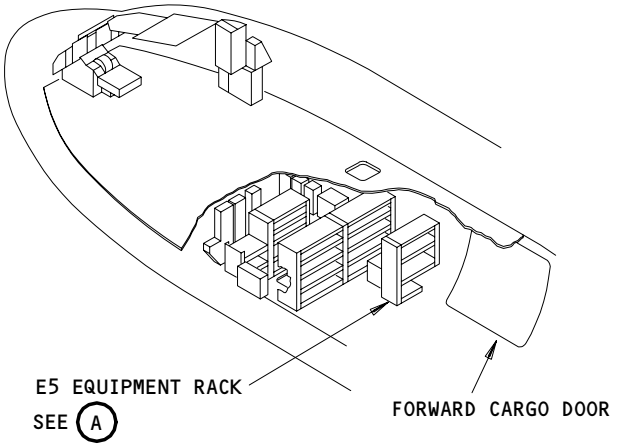


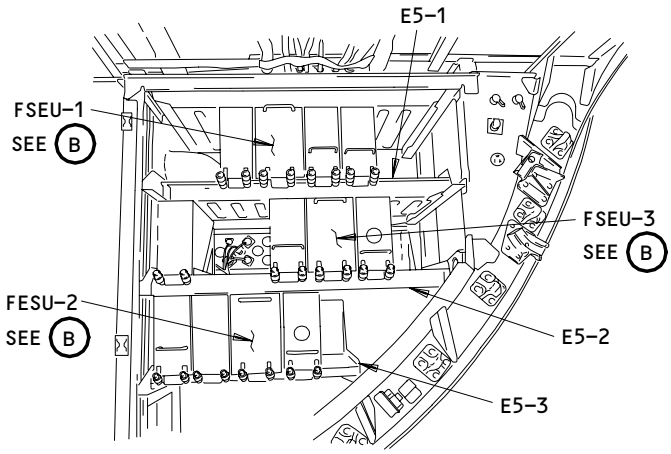
HOIST INSTALLATION
A

Hoist Equipment for the LE Slat PDU
Figure 404

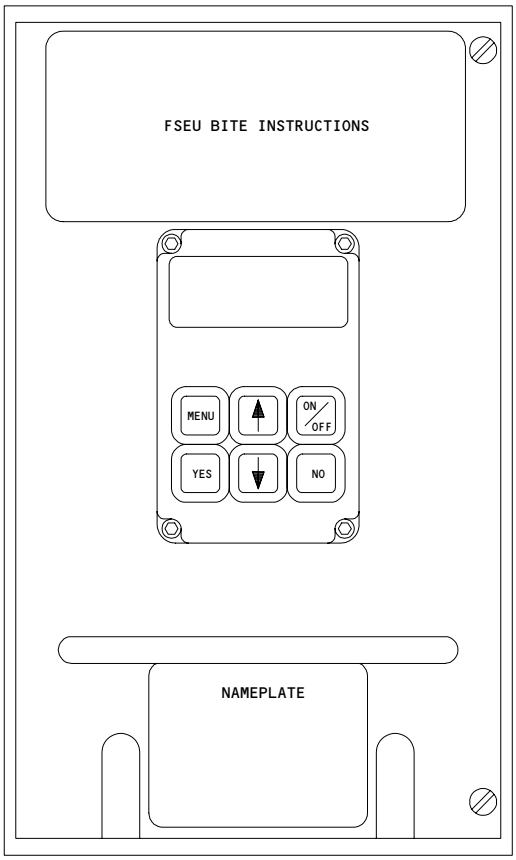


Adjustments for the PDU Support Rod and Control Valve Module
Figure 405



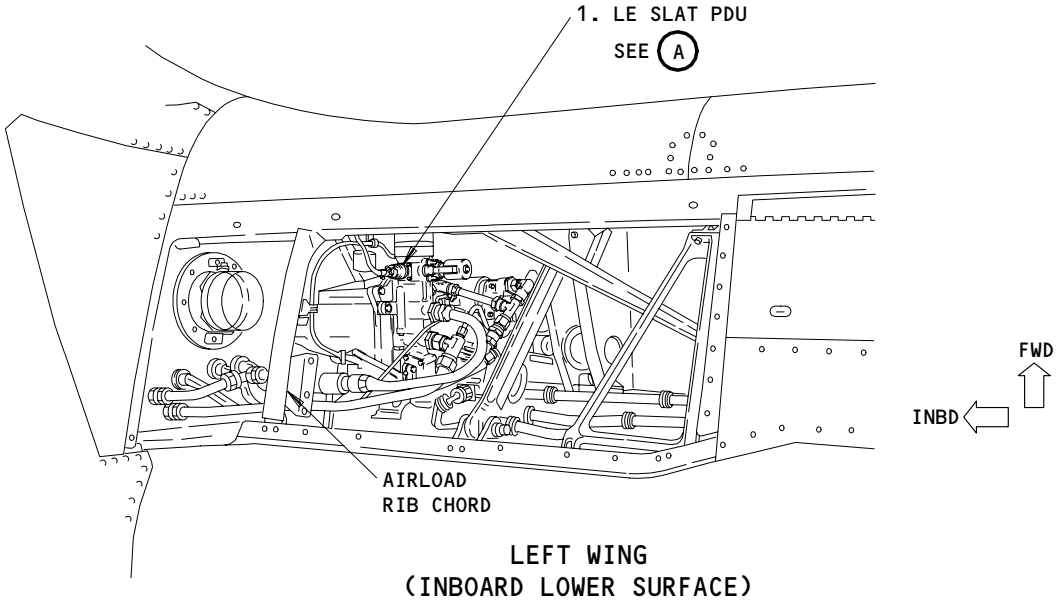


E5 EQUIPMENT RACK (AFT VIEW)
A

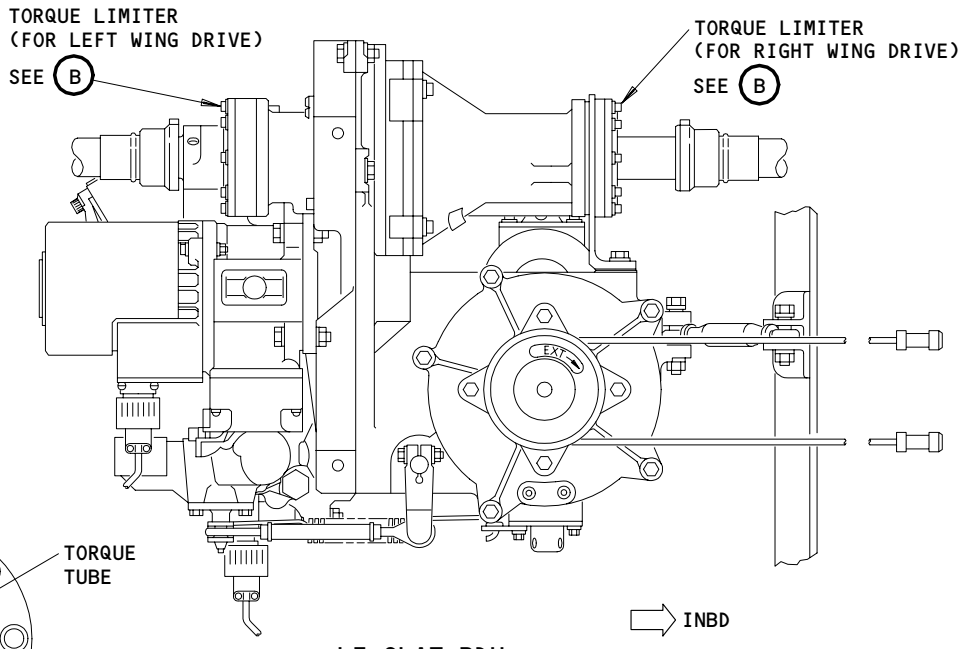


FSEU (EXAMPLE)
B

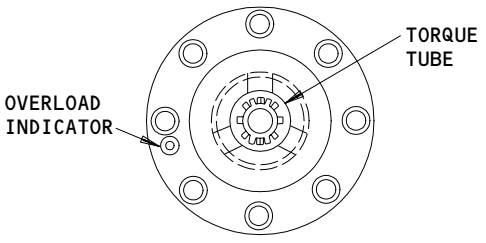
Flap/Slat Electronic Units (FSEU's)
Figure 406



LEFT WING
(INBOARD LOWER SURFACE)



LE SLAT PDU
(AFT VIEW)
A



TORQUE LIMITER
(EXAMPLE)
B

Torque Limiters for the LE Slat Drive
Figure 407

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Power Drive Unit	27-81-07	01	125

C. Consumable Materials
(1) D00054 Skydrol Assembly Lube - MCS 352B
(2) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11
(3) C00308 Corrosion Preventive Compound - MIL-C-11796, Class 3

D. References
(1) 06-44-00/201, Wing Access Panels and Doors
(2) 12-12-01/301, Hydraulic Systems
(3) 20-10-24/201, Rig Pins
(4) 24-22-00/201, Electrical Power - Control
(5) 27-81-00/501, Leading Edge Slat System
(6) 27-81-08/201, Leading Edge Slat Power Drive Unit Components
(7) 27-81-20/401, Leading Edge Slat Torque Tube
(8) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(9) 32-00-15/201, Landing Gear Door Locks
(10) 36-11-01/401, Pneumatic Duct
(11) 78-31-00/201, Thrust Reverser System

E. Access
(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
510/610	Wing Leading Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

F. Install the LE Slat PDU (Fig. 401)

S 214-071

CAUTION: DO NOT OPERATE THE PDU UNTIL IT IS INSTALLED AND CORRECTLY RIGGED, TO PREVENT DAMAGE TO THE INTERNAL MECHANISM.

IF YOU MUST BACKDRIVE THE LE SLAT PDU AT THE SAME TIME THAT YOU ADJUST THE LE SLAT SYSTEM, USE A MANUAL (NON-POWERED) METHOD TO PREVENT DAMAGE TO THE PDU INTERNAL MECHANISM.

IF IT IS NECESSARY TO BACKDRIVE THE LE SLAT PDU, DO NOT BACKDRIVE THE LE SLAT PDU INTO THE AREA WHERE THE GEARS ARE NOT ENGAGED, AS SHOWN ON THE SLAT POSITION PLACARD ON THE FRONT OF THE LE SLAT PDU (ABOVE THE COVER PLATE FOR RIG PIN LE2).

IF THE INTERNAL MECHANISM MUST BE ENGAGED AGAIN, TURN THE OUTPUT SHAFT BY HAND, AND AT THE SAME TIME TURN THE INDEX POINTER (MACHINED INTO THE END OF THE FOLLOW-UP CAM/GEAR SHAFT) BY HAND.

(1) Make sure the pressure is removed from the left hydraulic system (Ref 29-11-00).

S 214-029

(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 214-030

(3) Make sure the flap/slat alternate drives are off.

S 424-031

(4) If it is necessary, install the hydraulic motor (6) and the electric motor (7) (Ref 27-81-08).

S 424-032

(5) Use the hoist equipment and put the LE slat PDU (1) in its mounting position on the front spar (39).

S 434-033

(6) Install the mounting bolts (17) between the LE slat PDU (1) and the front spar (39).

S 434-034
(7) Connect the rod (15) to the PDU (1).

S 214-035
(8) Make sure the rod length is correct (Fig. 405).

S 094-036
(9) Remove the hoist equipment from the PDU (Fig. 404).

S 824-037
(10) Do these steps to install and to adjust LESA and LESB cables (12) and (14).
(a) Remove the cover plate for rig pin LE1 (35).
(b) Connect the LESA and LESB cables at the quick-disconnect fittings (13).
(c) Tighten the cables (Table I) and at the same time make sure rig pin LE1 can easily be removed and installed.
(d) Remove rig pin LE1.
(e) Put a straight 0.032-inch (0.813 mm) diameter wire into the drum inspection hole to see if there is damage to the output drum.

NOTE: There is no damage to the output drum if you can easily push the wire in 1.00 inch (25.4 mm).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(f) Pressurize the left hydraulic system (Ref 29-11-00).
(g) Remove the DO-NOT-OPERATE tag from the flap control lever.
(h) Move the flap control lever to the 30-unit detent and make sure the TE flaps move to the fully extended position.

NOTE: The disconnected output shaft on the LE slat PDU will turn and stop.

(i) Move the flap control lever to the zero (FLAPS UP) detent and make sure the TE flaps move to the fully retracted position.

NOTE: The disconnected output shaft on the LE slat PDU will turn and stop.

(j) Let the TE flap PDU become stable for thirty seconds.
(k) Insert rig pin LE1 in the LE slat PDU (1) and make sure it can be easily removed and installed.
1) If it can not be easily removed and installed, do the installation and adjustment of the LESA and LESB cables again.
(l) Remove rig pin LE1.
(m) Make sure you can see no more than two turnbuckle threads.
(n) Install the turnbuckle locking clip and apply corrosion preventive compound.
(o) Put a 0.032-inch (0.813 mm) diameter wire into the drum shear inspection hole to examine the shear out on the PDU output drum (AMM 27-51-26/401).

NOTE: There is no damage to the output drum if you can easily push the wire in 1.00 inch (25.4 mm).

(p) Make sure the flap control lever is in the zero (FLAPS UP) detent.
(q) Install a DO-NOT-OPERATE tag on the flap control lever.
(r) Remove the power from the left hydraulic system (Ref 29-11-00).
(s) Install a PDU lock in the TE flap PDU (Fig. 403).

S 824-038
(11) Do these steps to adjust the LE slat PDU to the mechanical neutral position:
(a) Install rig pin LE1 in the rig pin hole of the input cam.

CAUTION: TURN THE OUTPUT SHAFT MANUALLY ONLY. DAMAGE CAN OCCUR IF YOU USE A POWER TOOL TO TURN THE OUTPUT SHAFT.

(b) Remove the cover plate (10) for rig pin LE2 and install the rig pin in the rig pin hole of the follow-up cam.

NOTE: You can turn the output shaft of the LE slat PDU if it is necessary.

(c) Make sure the input crank of the control valve module is in a position that the index mark on the control valve module aligns with the input crank slot (44).
(d) If the index mark does not align with the input crank slot (44), do these steps:
1) Loosen the jamnut and the locking device at each end of the input rod of the control valve module.

2) Turn the input rod barrel until the input crank slot aligns with the index mark on the control valve module.
3) Tighten the jamnuts against the locking devices.
4) Make sure you can see no more than eight threads at each end of the input rod (41).

NOTE: Do not safety the input rod with a wire at this time.

(e) Make sure rig pins LE1 and LE2 can easily be removed and installed with the input crank slot aligned with the index mark on the control valve module.
(f) Remove rig pins LE1 and LE2.

S 104-039
(12) Clean the bonding surfaces with a rotary stainless steel brush.

S 434-040
(13) Connect the bonding jumper (20) to the electric motor (7) with the mounting bolt for the electric motor.

S 214-041
(14) Make sure the resistance across the bond is not more than 0.001 ohm.

S 094-042
(15) Remove the plugs from the hydraulic lines and the caps from the hydraulic ports (21, 22, 24, 25, 26, 27 and 28).

S 644-043
(16) Apply a thin layer of Skydrol assembly lube or hydraulic fluid to the fittings before you install them.

S 434-044
(17) Connect the hydraulic lines (21, 22, 24, 25, 26, 27 and 28).

NOTE: Make sure you install the check valve at the case drain port for the hydraulic motor.

S 434-045
(18) Connect the three electrical connectors (4, 8 and 9).

S 824-046
(19) Do these steps to adjust the LE slat PDU to the hydraulic neutral position:
(a) Supply electrical power (Ref 24-22-00).
(b) Pressurize the left hydraulic system (Ref 29-11-00).

NOTE: The output shaft of the LE slat PDU can move a small distance.

(c) Make sure rig pin LE2 can easily be removed and installed in the rig pin hole of the follow-up cam.
(d) If rig pin LE2 can be easily removed and installed, safety the jamnuts on the input rod for the control valve module.

NOTE: Ignore the input crank and index mark alignment.

(e) If rig pin LE2 can not be easily removed and installed, do these steps to the LE slat PDU:
1) Remove rig pin LE2.
2) Loosen the jamnut and the locking device at each end of the input rod (41) for the control valve module.
3) Turn the input rod barrel until rig pin LE2 can easily be removed and installed.

NOTE: Do not turn the barrel with rig pin LE2 installed. Ignore the input crank and index mark alignment.

4) Tighten the jamnuts against the locking devices at each end of the input rod.
5) Make sure you can see no more than eight threads at each end of the input rod.
6) Safety the jamnuts with a wire.
7) Make sure rig pin LE2 can easily be removed and installed.
(f) Remove rig pin LE2.
(g) Install the cover plate (10) for rig pin LE2 with the index marks (11) on the cover plate and the gear shaft aligned (+/- 0.01 inch (+/- 0.25 mm)).

(h) Remove the power from the left hydraulic system (Ref 29-11-00).
(i) Install the cover plate (35) for rig pin LE1.

S 424-047
(20) Use the marks you made on the adjacent torque tubes to install the torque tubes (3) on each side of the LE slat PDU (1) (Ref 27-81-20).
(a) Make sure you install the torque tubes to the same position they were in before you removed them.

NOTE: If it is necessary, adjust the slat drive system (Ref 27-81-00).

S 824-048
(21) Adjust the position transmitter (5) for the LE slat PDU (Ref 27-81-08).

S 414-049
(22) Install the pneumatic duct (Ref 36-11-01).

S 414-050
(23) Install the airload rib chord to the fixed leading edge (Fig. 401).

S 864-051
(24) Remove the circuit breaker locks and the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel P11:
(a) 11B18, WARN ELEX B
(b) 11C14, FLAP SLAT ELEC UNIT 2 POWER
(c) 11C15, FLAP SLAT ELEC UNIT 2 CONT
(d) 11C16, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11D31, HYDRAULICS PTU CONT
(f) 11G12, FLAP SLAT ELEC UNIT 1 POWER
(g) 11G13, FLAP SLAT ELEC UNIT 1 CONT
(h) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR
(i) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(j) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(k) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(l) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(m) 11J33, WARN ELEX A

S 864-052
(25) Remove the circuit breaker locks, and close these circuit breakers on the main power distribution panel P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-053
(26) Turn the dimmer control knob for the first officer's panel, on the light shield panel, P7, fully clockwise.

S 214-054
(27) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 214-055
(28) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 214-056
(29) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 094-057
(30) Remove the PDU lock from the TE flap PDU (Fig. 403).

S 864-058

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(31) Pressurize the left hydraulic system (Ref 29-11-00).

S 864-059

(32) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
   (a) Stop in each detent to let the TE flaps and LE slats move to the correct positions.
   (b) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 714-060

(33) Do these steps to do a test on the hydraulic motor:
   (a) Move the flap control lever to the 1-unit detent.
      1) Make sure the TE flaps move to the 1-degree position.
      2) Make sure the LE slats move to the intermediate position in no more than 9-11 seconds from when the slats start to move.
   (b) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats retract fully.

S 714-061

(34) Do these steps to do a test on the control valve module:
   (a) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.
   (b) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
      1) 11C11, STICK SHAKER LEFT
      2) 11J21, STICK SHAKER RIGHT
   (c) Push and hold the test switch for the LEFT stall warning, on the side panel, P61, and make sure the LE slats move to the fully extended position.
   (d) Remove the power from the left hydraulic system (Ref 29-11-00).
   (e) Install a PDU lock in the TE flap PDU (Fig. 403).

(f) Release the test switch for the LEFT stall warning, and make sure the LE slat stays in the fully extended position.
(g) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will go on).
(h) Make sure, at all rotary actuators on all slats, the main track downstops do not touch the rib downstop fittings.

NOTE: To do this, make sure you can turn the torque tube, found immediately outboard of the LE slat PDU, in the extend direction (in the clockwise direction if you look outboard at the LE slat PDU from the left wing).

(i) Remove the PDU lock from the TE flap PDU (Fig. 403).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(j) Pressurize the left hydraulic system (Ref 29-11-00).
(k) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).
    1) Make sure the LE slats move to the intermediate position.
(l) Push and hold the test switch for the RIGHT stall warning, and make sure the LE slats move to the fully extended position.
(m) Release the test switch for the RIGHT stall warning, and make sure the LE slats move to the intermediate position.
(n) Push and hold the test switches for the LEFT and RIGHT stall warning, and make sure the LE slats move to the fully extended position.
(o) Release the test switches for the LEFT and RIGHT stall warning, and make sure the LE slats move to the intermediate position.
(p) Move the flap control lever to the 25-unit detent, and make sure the TE flaps move to the 25-degree position and the LE slats move to the fully extended position.
(q) Move the flap control lever to the 1-unit detent, and make sure the TE flaps move to the 1-degree position and the LE slats move to the intermediate position.
(r) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and the LE slats retract fully.
    1) Make sure the LE slats move to the fully retracted position in no more than 9-11 seconds from when the slats start to move.

(s) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11C11, STICK SHAKER LEFT
2) 11J21, STICK SHAKER RIGHT

(t) Make sure the overload indicators for the torque limiter on the LE slat PDU did not come on (Fig. 407). An overload indicator came on if one of these conditions ocurred:
1) The overload indicator is above the adjacent surface approximately 0.25 inch (6.35 mm).
2) If the overload indicator is a small distance above the adjacent surface, push the indicator. If the indicator does not come back out above the surface, it came on.

S 714-062

(35) Do these steps to do a test on the electric motor:

(a) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE MOTOR.

(b) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent and do these checks:
1) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.
2) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the UP position.
3) Make sure the LE slats are retracted.

(c) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the 30-detent and do these checks:
1) Make sure the TE flaps move to the fully extended position in less than 210 seconds.

2) Make sure the LE slats move to the fully extended position in less than 85 seconds.
3) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 30-unit position.
4) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off, and that no messages show on the EICAS display.

(d) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the UP detent and let the TE flaps and LE slats move to the fully retracted position.
(e) Move the position selector switch for the flap/slat alternate drive, on the P3 panel, to the NORM position.
(f) Push the arming switches for the flap and slat alternate drives to disarm the flap and slat alternate drives (switch lights will go off).

S 714-063

(36) Do these steps to do a test on the position transmitter for the LE slat:
(a) Go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center (Fig. 406).

NOTE: Make sure the NO FAULTS message shows on the FSEU display. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

S 214-064

(37) Make sure there are no leaks at the hydraulic connections to the LE slat PDU.

G. Put the Airplane Back to Its Usual Condition

S 414-065

WARNING: USE AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (Ref 32-00-15).

S 864-066

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-067
(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 414-068
(4) Install the access panels and close the access doors (Ref 06-44-00).

S 614-069
(5) Do the servicing steps for the reservoir of the left hydraulic system (Ref 12-12-01).

S 444-070
(6) Do the activation procedure for the thrust reverser (Ref 78-31-00).

LEADING EDGE SLAT POWER DRIVE UNIT COMPONENTS - MAINTENANCE PRACTICES

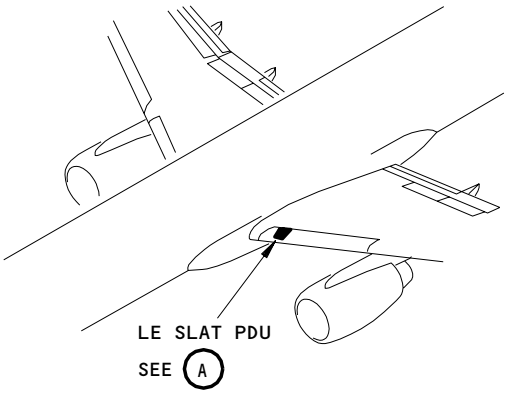
1. General
   A. This procedure contains steps to remove and install the components of the power drive unit (PDU) for the leading edge (LE) slats.

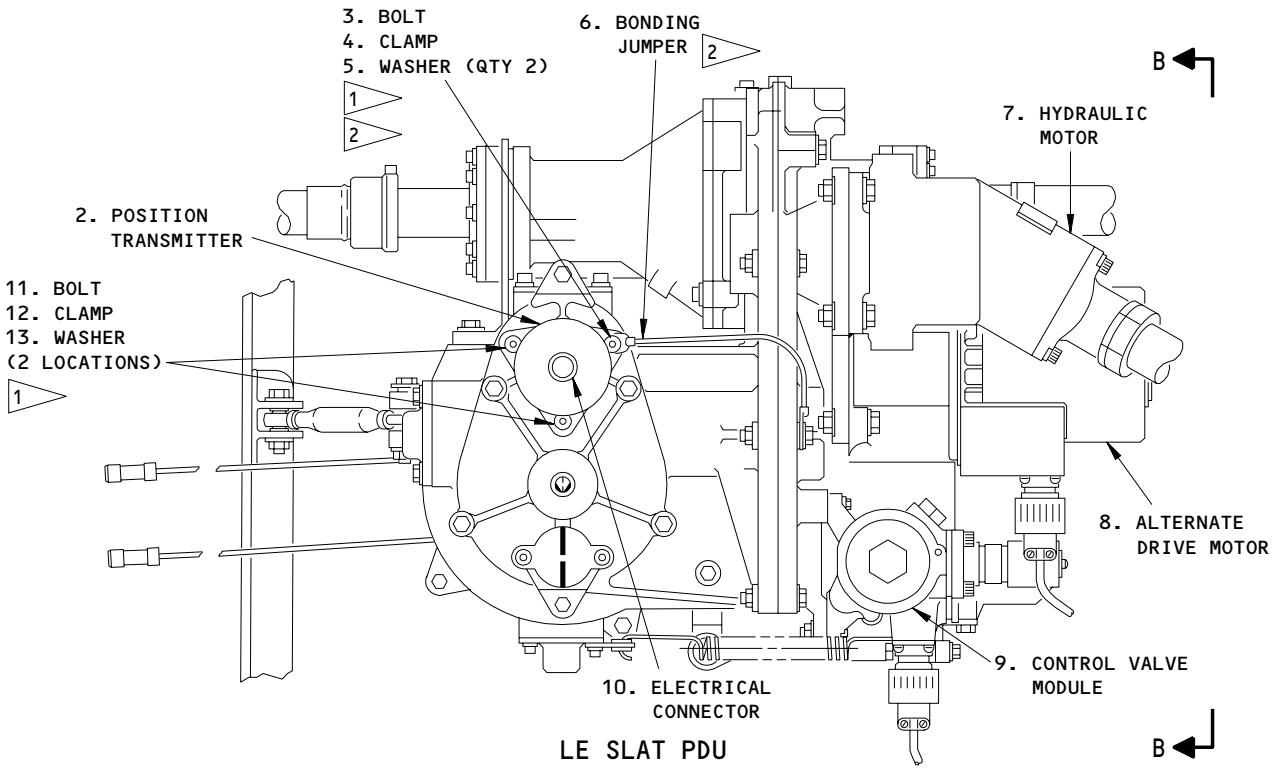
TASK 27-81-08-022-001

2. Remove the Components for the LE Slat PDU
   A. General
      (1) This task contains three procedures, one to remove the hydraulic motor, one to remove the alternate drive motor, and one to remove the position transmitter. Because this task contains three procedures, only the applicable group of steps must be done.

          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
          (a) Circuit Breaker Lockout Clip (Commercially Available)
          (b) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (2) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (3) Bonding Meter - Microhm Bridge, Type W Bonding Meter, Avtron Model T477W, Avtron Manufacturing Inc., Cleveland Ohio, or equivalent
      (4) Rotary Stainless Steel Brush - Commercially Available
   C. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlocks
      (5) 36-11-01/401, Pneumatic Duct
      (6) 78-31-00/201, Thrust Reverser System



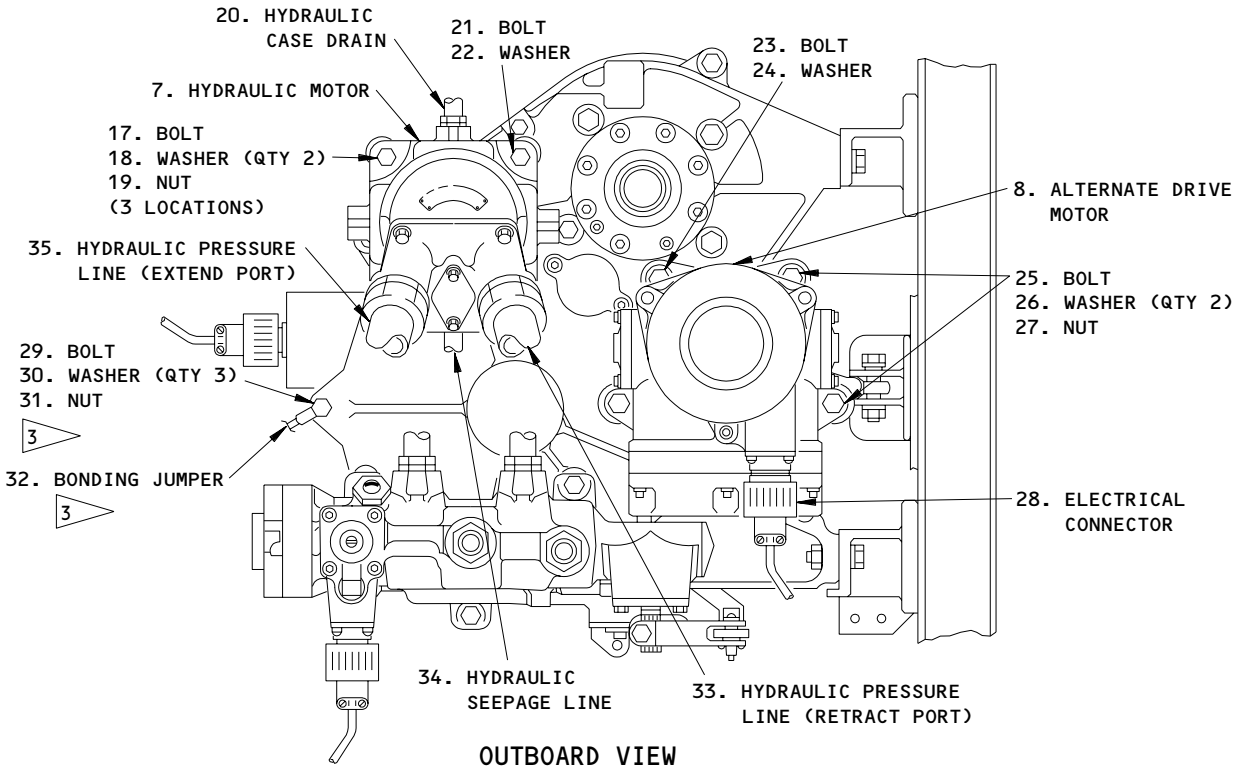


LE SLAT PDU
(FRONT VIEW)

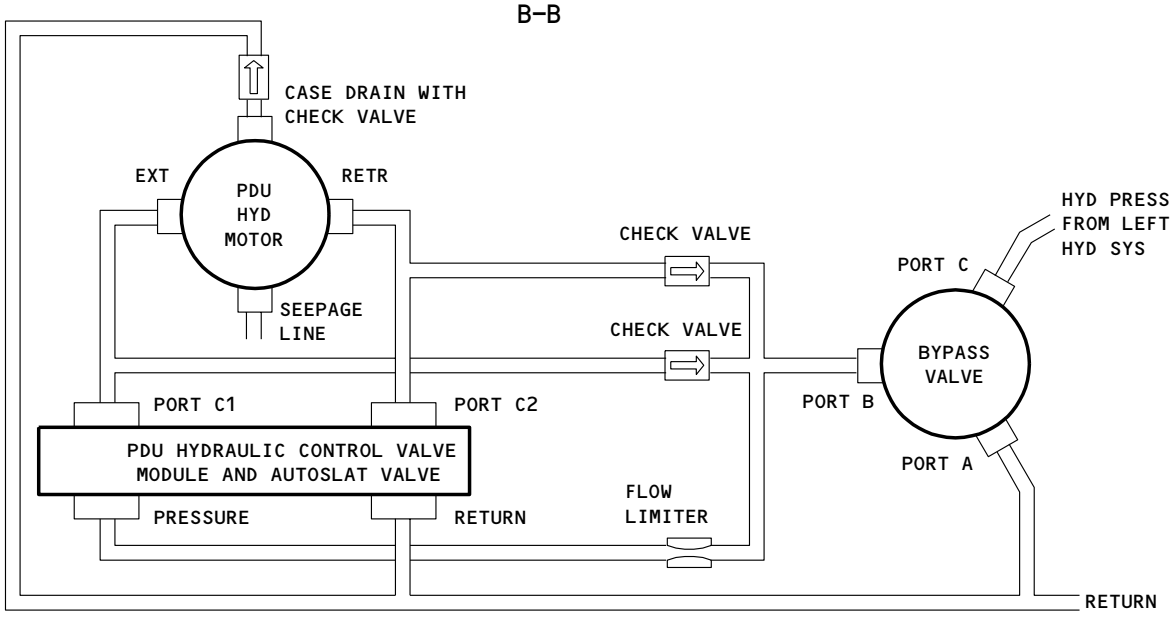
(A)

1. SAFETY THE BOLT WITH A WIRE (DOUBLE TWIST)
2. CLEAN THE BONDING SURFACES WITH A ROTARY STAINLESS STEEL BRUSH. INSTALL ONE WASHER (13) UNDER HEAD OF THE BOLT (14) AND ONE WASHER (15) UNDER THE BONDING JUMPER (16). THE TOTAL RESISTANCE ACROSS THE BOND MUST NOT BE MORE THAN 0.001 OHM. THE BONDING JUMPER IS CONNECTED TO THE PDU GEARBOX AT THE OTHER END.

Leading Edge Slat PDU Components
Figure 201 (Sheet 1)



OUTBOARD VIEW
B-B



SCHEMATIC FOR CONNECTION OF HYDRAULIC LINES

3 CLEAN THE BONDING SURFACES WITH A ROTARY STAINLESS STEEL BRUSH. INSTALL ONE WASHER (30) UNDER THE HEAD OF THE BOLT (29) AND ONE WASHER (30) UNDER THE BONDING JUMPER (32) ON ONE SIDE OF THE PDU AND ONE WASHER (30) UNDER THE NUT (31) ON THE OTHER SIDE OF THE PDU. THE TOTAL RESISTANCE ACROSS THE BOND MUST NOT BE MORE THAN 0.001 OHM. THE BONDING JUMPER IS CONNECTED TO THE STRUCTURE AT THE OTHER END.

Leading Edge Slat PDU Components
Figure 201 (Sheet 2)

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
510/610	Wing Leading Edge
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Removal

S 042-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 212-003

(2) Make sure the trailing edge (TE) flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 492-004

(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 212-005

(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 012-006

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

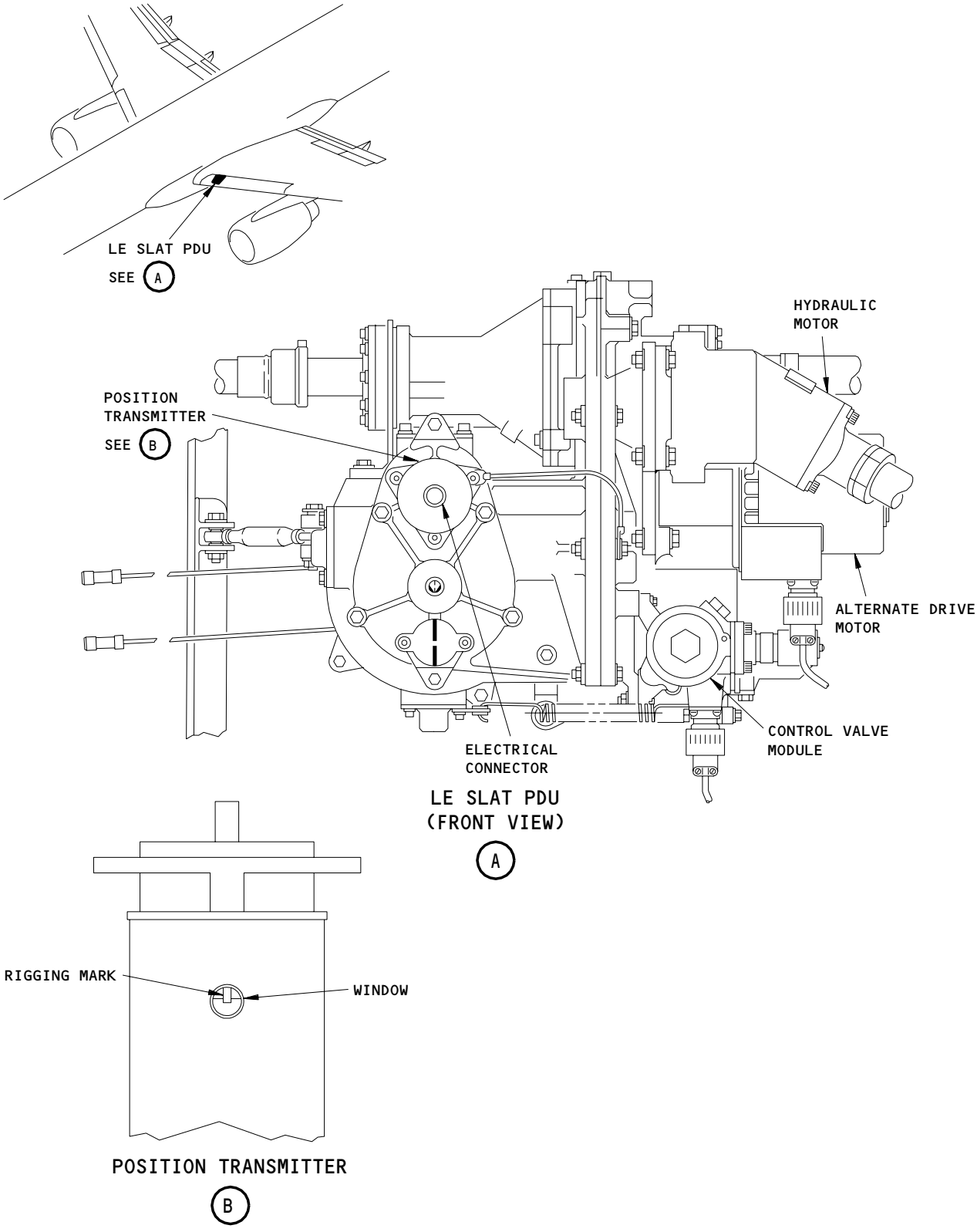
(5) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 862-007

(6) Remove the power from the left hydraulic system (Ref 29-11-00).

S 862-008

(7) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(d) 11G22, FLAP SLAT ELEC UNIT 3 CONT



Position Transmitter for the LE Slat PDU
Figure 202

55959

(e) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(f) 11J33, WARN ELEX A

S 862-009
(8) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 862-010
(9) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 012-011
(10) Remove the necessary access panels and open the necessary access doors (Ref 06-44-00).

S 012-012
(11) Remove the lower chord from the fixed LE rib at the inboard slat station 119.00.

S 012-013
(12) Remove the pneumatic duct clamps and turn the pneumatic duct until you can get access the PDU (Ref 36-11-01).

F. Remove the Hydraulic Motor (Fig. 201)

S 022-014
(1) Do these steps to remove the hydraulic motor (7):
(a) Disconnect the hydraulic lines (20, 33, 34, 35).
1) Install plugs in the hydraulic lines.
2) Install caps on the hydraulic motor ports.
(b) Remove the mounting bolts (17, 21), nuts (19), and washers (18, 22).
(c) Remove the hydraulic motor (7).
(d) Put a cover on the hydraulic motor (7) and the gearbox mounting surfaces.

G. Remove the Alternate Drive Motor (Fig. 201)

S 022-015
(1) Do these steps to remove the alternate drive motor (8):
(a) Disconnect the electrical connector (28) (View B).
(b) Remove the mounting bolts (25), washers (26) and nuts (27).
(c) Remove the alternate drive motor (8).
(d) Put a cover on the alternate drive motor (8) and the gearbox mounting surfaces.

H. Remove the Position Transmitter (Fig. 202)

S 022-016

(1) Do these steps to remove the position transmitter (2):
(a) Disconnect the electrical connector (10).
(b) Remove the bolt (3) that holds the bonding jumper in its position.
(c) Remove the bonding jumper (6).

CAUTION: BE CAREFUL WHEN YOU REMOVE THE POSITION TRANSMITTER. THE INPUT SHAFT FOR THE PDU CAN EASILY BE BENT.

(d) Remove the mounting bolts (11), washers (13) and clamps (12).
(e) Remove the position transmitter (2).
(f) Put a cover on the position transmitter (2) and the PDU mounting surfaces.

TASK 27-81-08-422-017

3. Install the Components for the LE Slat PDU

A. Equipment
(1) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
(a) Circuit Breaker Lockout Clip (Commercially Available)
(b) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
(2) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
(a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
(3) Bonding Meter - Microhm Bridge, Type W Bonding Meter, Avtron Model T477W, Avtron Manufacturing Inc., Cleveland Ohio, or equivalent
(4) Rotary Stainless Steel Brush - Commercially Available

B. Consumable Materials
(1) D00054 Skydrol Assembly Lube - MCS 352B
(2) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

(3) D00633 Grease - BMS 3-33 (Preferred)
(4) D00014 Grease MIL-G-21164 (Alternate)
(5) D00013 Grease MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(6) B00316 Solvent - Aliphatic Naphtha, TT-N-95
(7) A00779 Sealant - BMS 5-26 Type II

C. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Position Transmitter	27-81-07	01	TBD
	7	Hydraulic Motor	27-81-08	01	60
					33
	8	Electric Motor			5

D. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 12-12-01/301, Hydraulic Systems
(3) 24-22-00/201, Electrical Power - Control
(4) 27-58-01/501, Trailing Edge Flap System and Leading Edge Slat System Position Transmitter
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 32-00-15/201, Landing Gear Door Locks
(7) 36-11-01/401, Pneumatic Duct
(8) 78-31-00/201, Thrust Reverser System

E. Access
(1) Location Zones
143 MLG Wheel Well (Left)
211/212 Control Cabin
510/610 Wing Leading Edge
710 Nose Landing Gear and Doors
730/740 Main Landing Gear and Doors

F. Install the Hydraulic Motor (Fig. 201)

S 212-036
(1) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 212-035
(2) Make sure the flap/slat alternate drives are off.

S 422-018
(3) Do these steps to install the hydraulic motor:
(a) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.
(b) Remove the cover from the hydraulic motor.
(c) Remove the caps from the hydraulic motor ports.
(d) Apply a thin layer of Skydrol assembly lube or hydraulic fluid to the hydraulic fittings.
(e) Apply a thin layer of grease to the external spline of the hydraulic motor (7).
(f) Remove the cover from the gearbox mounting surface.
(g) Apply a thin layer of grease to the internal spline of the gearbox.
(h) Carefully put the hydraulic motor (7) on the gearbox.
(i) Install the mounting bolts (17, 21), washers (18, 22) and nuts (19).
(j) Remove the plugs from the hydraulic lines (20, 33, 34, 35).
(k) Fill the hydraulic motor (7) with hydraulic fluid.
(l) Install the hydraulic lines (20, 33, 34, 35).
(m) Tighten the nuts.
(n) Apply a bead of sealant to the mating surfaces of the hydraulic motor.
(o) Put the pneumatic duct in its position and install the pneumatic duct clamps (Ref 36-11-01).
(p) Install the lower chord to the fixed LE rib at the inboard slat station 119.00.

S 712-019
(4) Do a test on the hydraulic motor installation in the Operational Test for the LE Slat PDU.

G. Install the Alternate Drive Motor (Fig. 201)

S 212-037
(1) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 212-038

(2) Make sure the flap/slat alternate drives are off.

S 422-020

(3) Do these steps to install the alternate drive motor:
  (a) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.
  (b) Remove the covers from the alternate drive motor (8) and the gearbox mounting surfaces.
  (c) Clean the mounting surfaces of the gearbox with solvent.
  (d) Apply a thin layer of grease to the splines of the alternate drive motor (8) and the gearbox.
  (e) Put the alternate drive motor (8) on the gearbox and install the mounting bolts (25), washers (26) and nuts (27).
  (f) Install the electrical connector (28).
  (g) Put the pneumatic duct in its position and install the pneumatic duct clamps (Ref 36-11-01).
  (h) Install the lower chord to the fixed LE rib at the inboard slat station 119.00.

S 712-021

(4) Do a test on the installation of the alternate drive motor in the Operational Test for the LE Slat PDU.

H. Install the Position Transmitter (Fig. 202)

NOTE: To adjust the position transmitter, you must move the LE slat PDU (hydraulically), and let it become stable, to the same position when the flap control lever is in the zero (FLAPS UP) detent (Ref 27-81-00).

S 212-039

(1) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 212-040
(2) Make sure the flap/slat alternate drives are off.

S 422-022
(3) Do these steps to install the position transmitter (2):
(a) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.
(b) Remove the rig tool (if installed) that holds the input shaft stable.

NOTE: Do not let the drive shafts move during the position transmitter adjustments.

(c) Turn the input shaft, if it is necessary, to put the white mark in the center of the window.

NOTE: Do not turn the input shaft more than five turns to see the white mark.

1) At the same time, make sure the dot on the input shaft and the dot on the position transmitter housing align.
(d) Put the position transmitter in its position with the window pointed inboard and down, approximately 45 degrees from the horizontal axis.

CAUTION: BE CAREFUL WHEN YOU INSTALL THE POSITION TRANSMITTER. THE INPUT SHAFT FOR THE PDU CAN EASILY BE BENT.

(e) Install the position transmitter (2) loosely with mounting bolts (11), washers (13) and clamps (12).
(f) Install the bonding jumper (6).
(g) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
1) 11B18, WARN ELEX B
2) 11D31, HYDRAULICS PTU CONT
3) 11G21, FLAP SLAT ELEC UNIT 3 POWER
4) 11G22, FLAP SLAT ELEC UNIT 3 CONT
5) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
6) 11J33, WARN ELEX A

S 712-023
(4) Adjust and do a test of the position transmitter installation (Ref 27-58-01).

I. Operational Test for the LE Slat PDU

S 092-041
(1) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 862-042
(2) Remove the circuit breaker locks and DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G21, FLAP SLAT ELEC UNIT 3 POWER
(d) 11G22, FLAP SLAT ELEC UNIT 3 CONT
(e) 11G23, FLAP SLAT ELEC UNIT 3 SENSOR
(f) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(g) 11J33, WARN ELEX A

S 862-043
(3) Remove the circuit breaker locks, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 862-044
(4) Supply electrical power (Ref 24-22-00).

S 212-045
(5) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will go off).

S 212-046
(6) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.
(a) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 862-047

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EUQIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

S 712-025

(8) Do the steps that follow to do a test on the LE slat PDU:
   (a) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
      1) Stop in each detent to let the TE flaps and LE slats move to the correct position.
      2) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

S 712-026

(9) Do the steps that follow to do a test on the hydraulic motor:
   (a) Move the flap control lever to the 1-unit detent.
      1) Make sure the TE flaps move to the 1-unit position.
      2) Make sure the LE slats move to the intermediate position in less than 9-11 seconds from the time the slats started to move.
   (b) Move the flap control lever to the zero (FLAPS UP) detent, and let the TE flaps and LE slats move to the fully retracted position.

S 712-027

(10) Do the steps that follow to do a test on the alternate drive motor:
   (a) Push the arming switches for the TE flap and LE slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).

   CAUTION: DO NOT OPERATE THE ALTERNATE DRIVE MOTOR CONTINUOUSLY FOR MORE THAN 12 MINUTES (2 FLAP CYCLES). DO NOT OPERATE THE ALTERNATE DRIVE MOTOR AGAIN UNTIL IT IS COOL FOR AT LEAST 3 MINUTES TO PREVENT DAMAGE TO THE ALTERNATE DRIVE MOTOR.

   (b) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP-detent and do these checks:
      1) Make sure the LE slats are fully retracted.
      2) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.
      3) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the UP-unit position.
   (c) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the 30-unit detent and do these checks:
      1) Make sure the TE flaps extend fully in less than 210 seconds.
      2) Make sure the LE slats extend fully in less than 85 seconds.

3) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.
4) Make sure the L and R needles on the flap position indicator, on the P3 panel, are in the tolerance band of the 30-unit position.

(d) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP-detent, and let the TE flaps and LE slats retract fully.
(e) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.
(f) Push the arming switches for the TE flap and LE slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switch lights will go off).

S 212-028

(11) Make sure there are no leaks at the hydraulic connections of the LE slat PDU.

J. Put the Airplane Back to Its Usual Condition

S 412-029

WARNING: USE AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 862-030

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 862-031

(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 412-032

(4) Install the access panels that you removed and close the access doors that you opened (Ref 06-44-00).

S 612-033

(5) Do the servicing steps to the left hydraulic system reservoir if the hydraulic lines were disconnected (Ref 12-12-01).

S 442-034

(6) Do the activation procedure for the thrust reverser (Ref 78-31-00).

LEADING EDGE SLAT BYPASS VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the bypass valve for the leading edge (LE) slat. The second task installs the bypass valve. Instructions for inspection of the bypass valve are given in SB 29A0048 or SB 29A0051 as applicable.

TASK 27-81-09-024-001

2. Remove the Bypass Valve for the LE Slat
   A. Equipment
      (1) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (2) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (3) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

      (2) Access Panel

193BL	Ram Air Inlet Door Actuator/LE Slat Bypass Valve
193KL	Leading Edge Slat Bypass Valve
193HL	ECS Components (left bay)

   D. Prepare for the Removal

      S 714-054
      (1) If you need to inspect the slat bypass valve before replacing the slat bypass valve, do the steps that follow (SB 29A0048 through SB 29A0051 as applicable):
          (a) Remove the wing body structure panel 191AL to get access to the slat bypass valve which is installed forward of the left wing behind the wing/body structure panel (AMM 06-41-00/201).

(b) Supply electrical power (AMM 24-22-00/201).
(c) Make sure the valve indicator is in Position 2 (Normal).
(d) Close this circuit breaker on the P11 panel to supply electrical power to the related motor operated hydraulic valve.
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(e) Push down either the LE or TE ALTN ARM switches on the P3 panel.
(f) Make sure the valve indicator moved to Position 1 (Bypass) and listen to the valve motor to make sure the motor is not in operation.
(g) Open this circuit breaker on the P11 panel and install a circuit breaker lock to remove electrical power from the related motor operated hydraulic valve:
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(h) Manually move the valve indicator to the center position between Position 1 (open) and Position 2 (closed).
(i) Remove the circuit breaker lock, and close this circuit breaker on the P11 panel to supply electrical power to the related motor operated hydraulic valve.
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(j) Make sure the valve indicator moved to Position 1 (Bypass) and listen to the valve motor to make sure the motor is not in operation.
(k) Push down either the LE or TE ALTN ARM switches on the P3 panel.
(l) Make sure the valve indicator moved to Position 2 (Normal) and listen to the valve motor to make sure the motor is not in operation.
(m) Open this circuit breaker on the P11 panel and install a circuit breaker lock to remove electrical power from the related motor operated hydraulic valve:
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(n) Manually move the position indicator arm to the center position between Position 1 (open) and Position 2 (closed).
(o) Remove the circuit breaker lock, and close this circuit breaker on the P11 panel to supply electrical power to the related motor operated hydraulic valve.
1) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(p) Make sure the valve indicator moved to Position 2 (Normal) and listen to the valve motor to make sure the motor is not in operation.
(q) Replace the slat bypass valve, if the valve indicator did not move from the center position or if the valve indicator moved to Position 2 but the motor continued in operation.

S 214-002
(2) Make sure the trailing edge (TE) and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 494-003
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-004
(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006
(6) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).

S 864-007
(7) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags.
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

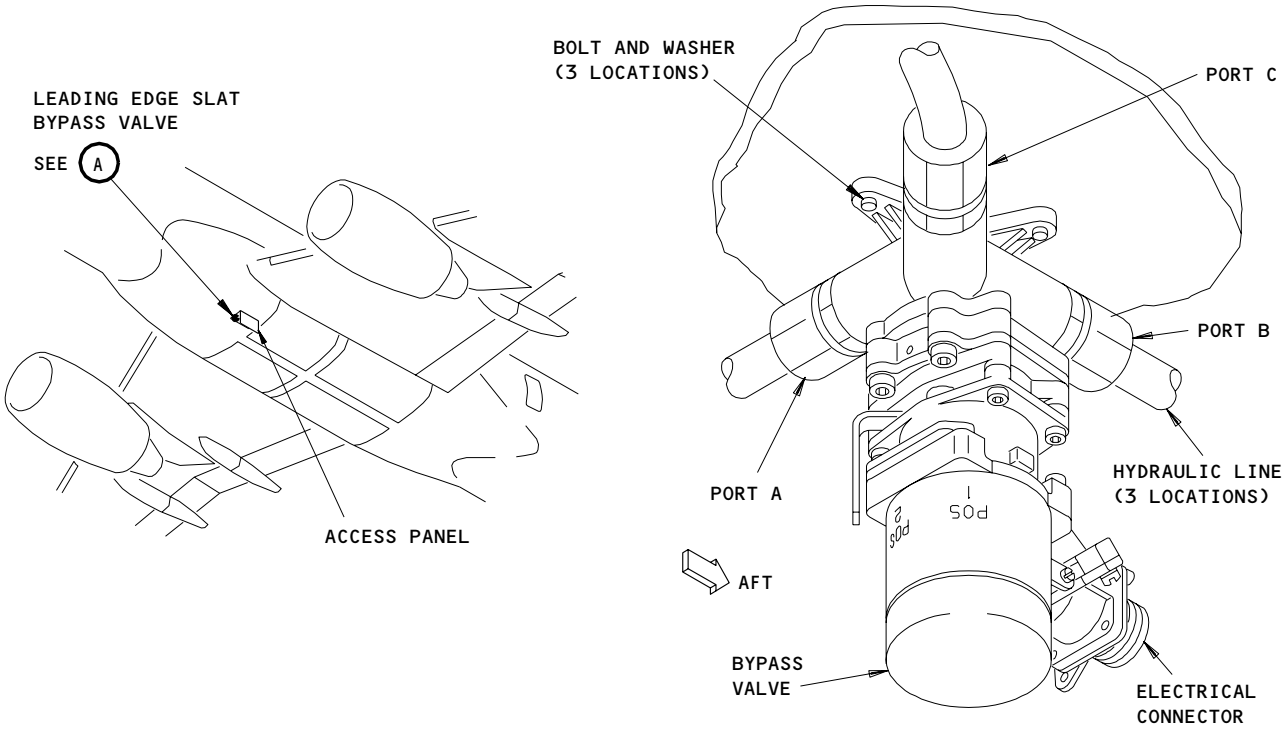
S 864-008
(8) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-009
(9) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-053
(10) Open one of these doors to get access to the LE slat bypass valve (AMM 06-41-00/201): 191AL, 193HL, 193BL or 193KL.

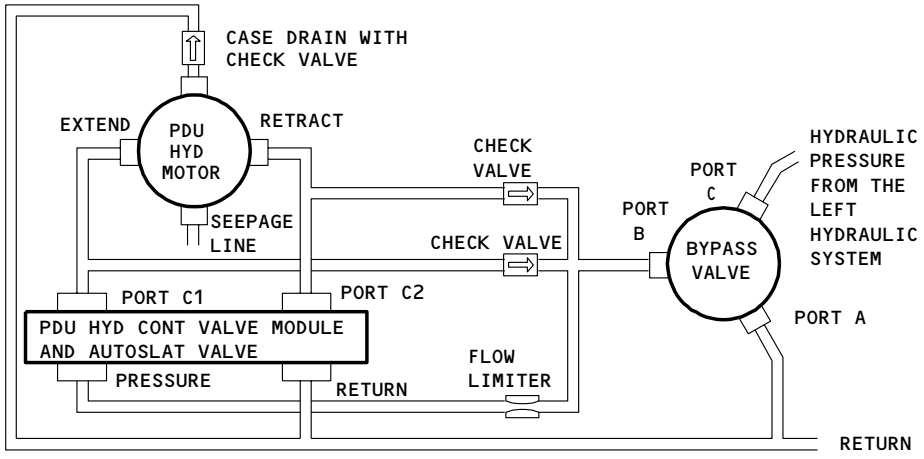
NOTE: 193KL (if installed) replaces 193BL for bypass valve access. The left ECS bay access door can also be used to get access to the valve. The slat bypass valve is installed forward of the left wing behind the wing/body structure panel.

E. Remove the Bypass Valve (Fig. 401)



BYPASS VALVE FOR THE LE SLAT

A



SCHEMATIC FOR THE CONNECTION OF THE HYDRAULIC LINES

Bypass Valve for the LE Slat
Figure 401

S 034-011
(1) Disconnect the electrical connector.

S 034-012
(2) Disconnect the hydraulic lines (3 locations).

S 494-013
(3) Install plugs in the hydraulic lines and caps on the hydraulic ports.

S 034-014
(4) Remove the mounting bolts for the bypass valve (3 locations).

S 024-015
(5) Remove the bypass valve from the airplane.

TASK 27-81-09-424-016

3. Install the Bypass Valve for the LE Slat

A. Equipment
(1) Bonding Meter - Microhm Bridge, Type 2 Bonding Meter, Avtron - Model T477W or equivalent
Avtron Manufacturing Inc.
Cleveland, Ohio

B. Consumable Materials
(1) B00316 Solvent - Aliphatic Naphtha, TT-N-95
(2) D00054 Skydrol Assembly Lube - MCS 352B
(3) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

C. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 06-41-00/201, Fuselage Access Doors and Panels
(3) AMM 12-12-01/301, Hydraulic Systems
(4) AMM 24-22-00/201, Electrical Power - Control
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks

D. Access
(1) Location Zones

211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panel

193BL	Ram Air Inlet Door Actuator/LE Slat Bypass Valve
193KL	Leading Edge Slat Bypass Valve
193HL	ECS Bay (left bay)

E. Install the Bypass Valve (Fig. 401)

S 214-017
(1) Make sure the pressure is removed from the left hydraulic system (AMM 29-11-00/201).

S 214-018
(2) Make sure the flap and slat alternate drives are off.

S 214-019
(3) Make sure the flaps and slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 104-020
(4) Use solvent to clean the faying surfaces.

S 424-021
(5) Put the bypass valve in the mounting position.

S 434-022
(6) Install the mounting bolts (3 locations).

S 704-023
(7) Make sure the maximum resistance across the faying surface is 0.0025 ohm.

S 034-024
(8) Remove the plugs from the hydraulic lines and the caps from the hydraulic ports.

S 644-025
(9) Carefully apply the Skydrol assembly lube or hydraulic fluid to the O-rings and the fittings before you install them.

S 434-026
(10) Connect the hydraulic lines (3 locations) to the bypass valve as shown in the Schematic for the Connection of the Hydraulic Lines.

S 434-027
(11) Install the electrical connector.

S 714-028
(12) Do a test on the bypass valve installation in the Test for the Bypass Valve.

F. Test for the Bypass Valve

S 214-029
(1) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 094-030
(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-031
(3) Supply electrical power (AMM 24-22-00/201).

S 214-032
(4) Make sure the arming switches for the flap and slat alternate drives, on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 214-033
(5) Make sure the position selector switch for the flap/slat alternate drive is in the NORM detent.

S 214-034
(6) Make sure the six EICAS circuit breakers on the overhead panel, P11, are closed.

S 864-035

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-037
(8) Remove the circuit breaker lock, and close this circuit breaker on the P11 panel:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-038
(9) Remove the circuit breaker locks, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-039
(10) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent and do these steps:
(a) Stop in each detent to let the TE flaps and LE slats move to the correct position.
(b) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no messages show on the EICAS display.

S 864-040
(11) Open these circuit breakers on the P11 panel, and install DO-NOT-CLOSE tags.
(a) 11C17 or 11C18 or 11H14, FLAP/SLAT SHUTOFF 1

NOTE: The FLAP/SLAT SHUTOFF 1 circuit breaker can be in one of these three locations.

(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 864-041
(12) Move the flap control lever to the 5-unit detent and let the flaps start to move to the 5-degree position and the slats start to move to the intermediate position.
(a) Push the arming switch for the slat alternate drive to arm the slat alternate drive (switch light will come on), and make sure the flaps and slats stop their movement.

S 864-042
(13) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light will go off).
(a) Make sure the flaps move to the 5-degree position and the slats move to the intermediate position.

S 864-043
(14) Move the flap control lever to the zero (FLAPS UP) detent, and let the flaps and slats retract fully.

S 864-044
(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11C17 or 11C18 or 11H14, FLAP/SLAT SHUTOFF 1
(b) 11H24, FLAP/SLAT ALTN DR SHUTOFF 2

S 214-045
(16) Make sure there are no leaks at the hydraulic connections to the bypass valve.

G. Put the Airplane Back to Its Usual Condition

S 414-046

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-047

(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-048

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 864-049

(4) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 614-051

(5) Do the servicing steps for the left hydraulic system reservoir (AMM 12-12-01/301).

S 414-050

(6) Install the access panels that you removed and close the access doors that you opened (AMM 06-41-00/201).

INBOARD LEADING EDGE SLAT MAIN TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the main track for the inboard leading edge (LE) slat. The second task installs the main track.

      The center main track and the outer main tracks are very much the same. The only differences are that the center main track does not have a gear or upstops and downstops.

TASK 27-81-10-024-001

2. Remove the Main Track for the Inboard LE Slat
   A. Equipment
      (1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-81-00/501, Leading Edge Slat System
      (3) 27-81-01/401, Inboard Leading Edge Slat
      (4) 27-81-20/401, Leading Edge Slat Drive Torque Tube
      (5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) 32-00-15/201, Landing Gear Door Lock
      (7) 32-00-20/201, Landing Gear Downlock
      (8) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
512	Slat No.5 (Left)
612	Slat No.6 (Right)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Prepare for the Removal

S 044-007

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 214-002

(2) Make sure the TE flaps and LE slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 094-003

(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-004

(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

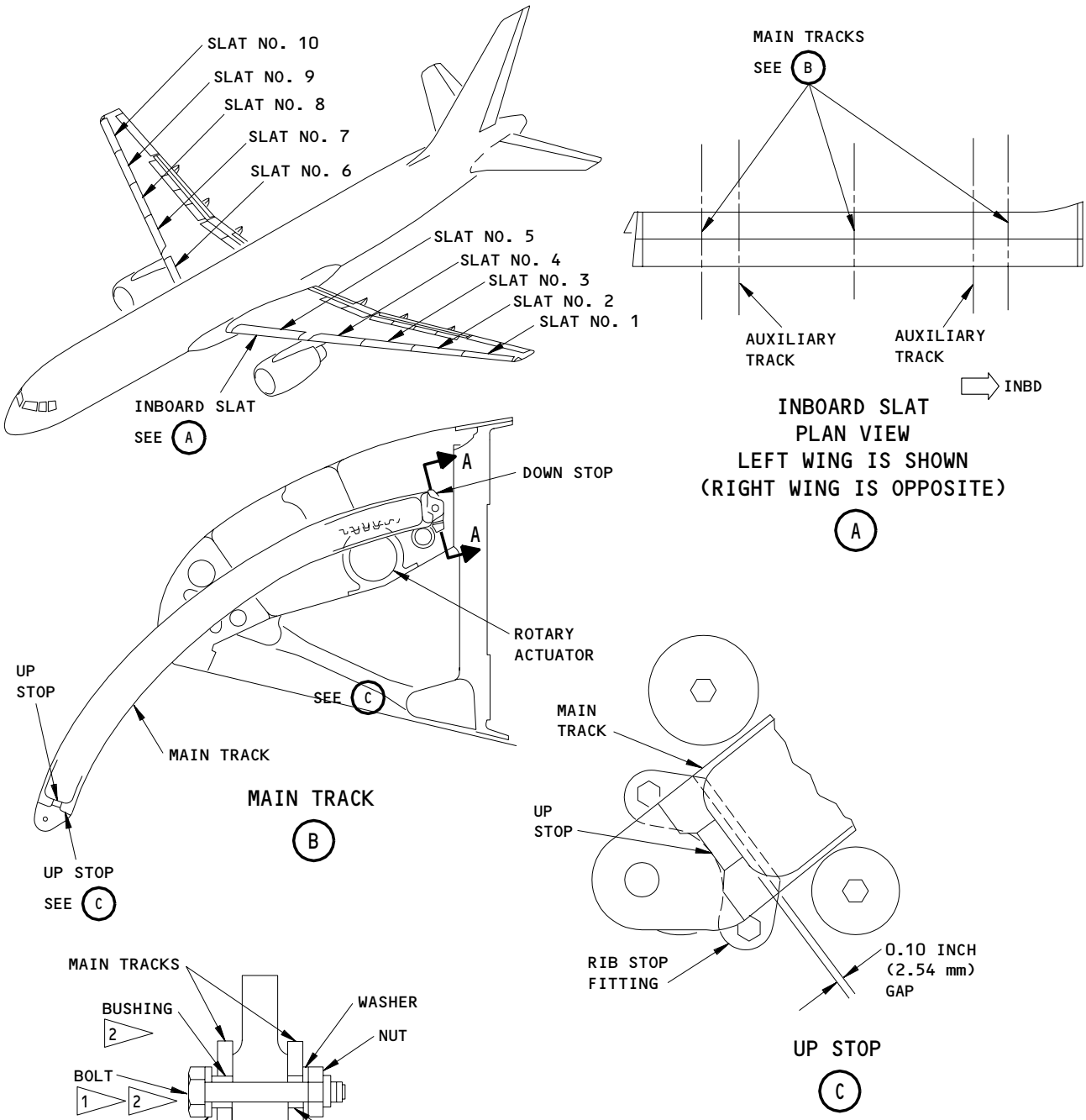
S 014-005

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

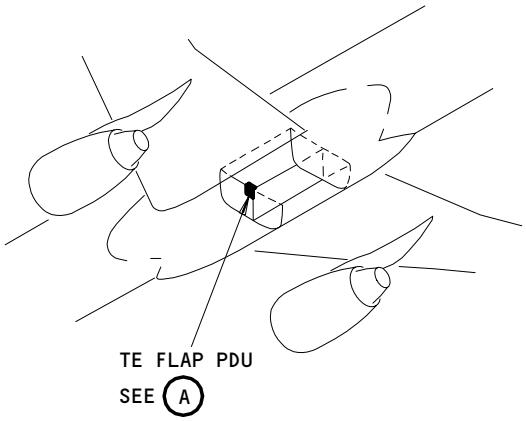
(5) Open the doors for the landing gear and install door locks (Ref 32-00-15).

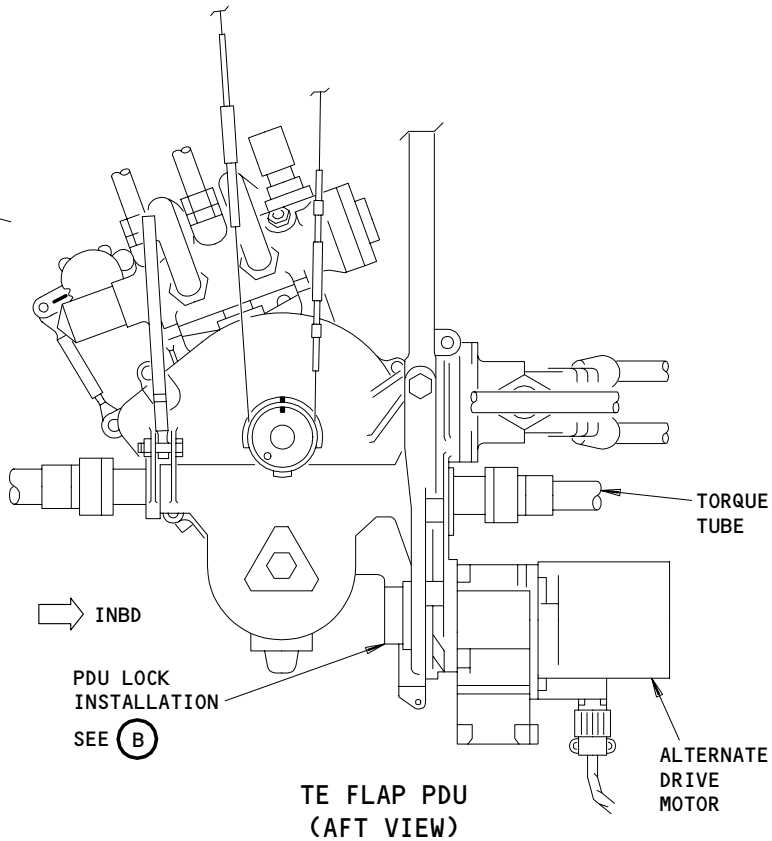
S 494-011

(6) Install a PDU lock in the TE flap PDU (Fig. 402).

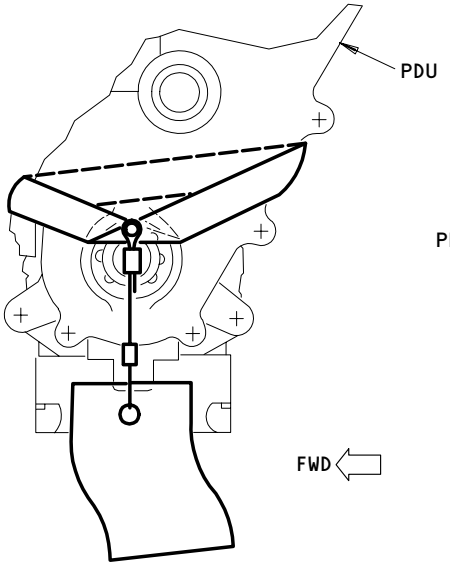


Main Track for the Inboard Leading Edge Slat
Figure 401

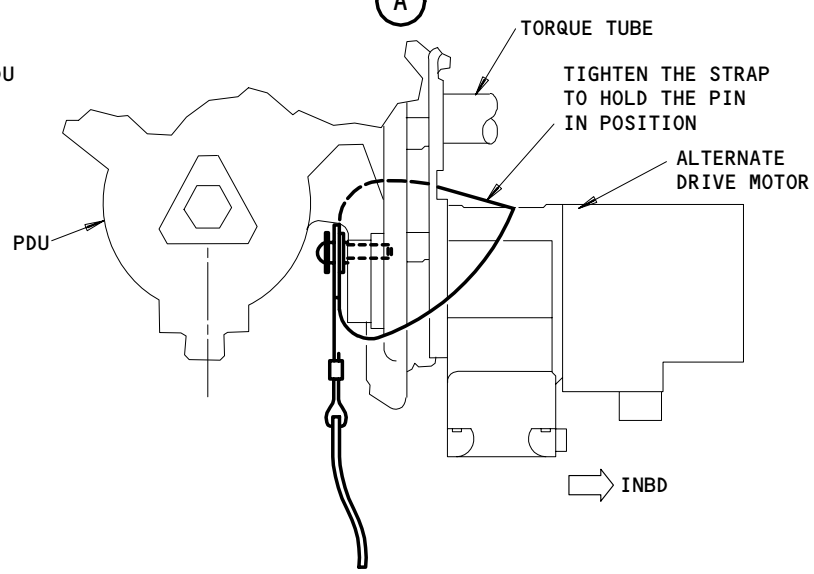




TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

S 014-012
(7) Remove the inboard LE slat (Ref 27-81-01).

S 214-013
(8) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 864-008
(9) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 864-010
(10) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-009
(11) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-014
(12) Supply electrical power (Ref 24-22-00).

E. Remove the Main Track (Fig. 401)

S 294-048

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 024-015
(2) Do the step that follows to remove the main track in the center:
(a) Move the main track out from between the rollers.

S 024-016

(3) Do the steps that follow to remove the outer main tracks:

(a) Make an index mark on the torque tube adjacent to the LE slat PDU, to help you connect the torque tubes during the installation procedure.

NOTE: Do not turn the torque tube when you disconnect it. It will be necessary to adjust the slat drive if you turn the torque tubes (Ref 27-81-00).

(b) Use a support on the torque tubes to prevent too much weight on the adjacent connections.

(c) Disconnect the torque tubes on each side of the rotary actuator at the splined couplings (Ref 27-81-20).

(d) Turn the rotary actuator to put the track in a position that you can get access to the downstop.

(e) Remove the downstop.

(f) Move the track out from between the rollers.

TASK 27-81-10-424-017

3. Install the Main Track for the Inboard LE Slat

A. Equipment

(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1

(2) Rigging Equipment from LE Slat Rigging Equipment Set, P/N B27001-1:

(a) Rigging Tool - B27001-8

(3) Rigging Upstop - Kit B27001-2:

(a) Pin - P/N B27001-3

(b) Cap - P/N B27001-4

B. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1

C. References

(1) 24-22-00/201, Electrical Power - Control

(2) 27-81-00/501, Leading Edge Slat System

(3) 27-81-01/401, Inboard Leading Edge Slat

(4) 27-81-12/401, Outboard Leading Edge Slat Main Track

(5) 27-81-20/401, Leading Edge Slat Drive Torque Tube

(6) 27-88-01/401, Leading Edge Slat Position Transmitter

(7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
512	Slat No.5 (Left)
612	Slat No.6 (Right)

E. Install the Main Track (Fig. 401)

S 214-018

(1) Make sure the power is removed from the left hydraulic system (29-11-00).

S 214-019

(2) Make sure the flap/slat alternate drives are off.

S 214-020

(3) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.

S 294-049

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(4) Make sure the main track housing behind the wing front spar is clear of all unwanted material.

S 424-022

(5) Do the steps that follow to install the main track in the center:
   (a) Put the main track in between the rollers.
   (b) Manually extend and retract the main track to make sure the main track moves freely.

S 424-023

(6) Do the steps that follow to install the outer main track on the inboard side:
   (a) Put the track in between the rollers and engage the gear teeth with the pinion gear of the rotary actuator.

   CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

   (b) Turn the rotary actuator to put the main track in a position to install the downstop.
   (c) Install the downstop.
   (d) Turn the rotary actuator until the main track upstops are 0.10 inch from the rib upstop fittings with the rigging tool (View C).

(e) Do these steps to connect the torque tubes on each side of the rotary actuator where the outer main track was installed:
1) Remove the supports from the torque tubes and connect the torque tubes to the rotary actuator (Ref 27-81-20).

NOTE: Do not turn the torque tubes while you connect them. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

2) Make sure the upstops for the outer main track are 0.10 inch from the rib upstop fittings.
3) Make sure the index mark on the torque tube adjacent to the LE slat PDU is in the same position when you disconnected the torque tube.

S 424-024
(7) Do the steps that follow to install the outer main track on the outboard side:
(a) Move the main track in between the rollers and engage the gear teeth with the pinion gear of the rotary actuator.

CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

(b) Turn the rotary actuator to put the main track in a position that you can install the downstop.
(c) Make sure the main track moves freely.
(d) Install the downstop.
(e) Do this step at the most inboard rotary actuator of the outboard slats:
1) Manually turn the torque tubes, outboard of the rotary actuator (where the main track is installed), to extend the outboard slats a sufficient distance to replace the main track upstop with the rigging upstop (Ref 27-81-12).
(f) Manually retract the outboard slats until the rigging upstop of the main track is against the rib upstop fitting.

NOTE: Keep the outboard slats in this position.

(g) Turn the rotary actuator until the main track upstop is 0.10 inch from the rib upstop fitting with the rigging tool (View C).

(h) Do these steps to connect the torque tubes on each side of the rotary actuator where the outer main track was installed:

1) Remove the supports from the torque tubes, and connect the torque tubes to the rotary actuator (Ref 27-81-20).

NOTE: Do not turn the torque tubes when you connect them. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

2) Make sure the upstops for the outer main tracks are 0.10 inch from the rib upstop fittings.
3) Make sure the index mark on the torque tube adjacent to the LE slat PDU is in the same position when you disconnected the torque tube.
4) Make sure the rigging upstop for the main track is against the rib upstop fitting at the most inboard rotary actuator of the outboard slats.

S 904-025

(8) If it is necessary, remove, adjust, and install the slat position transmitter (at slat No. 1 and 10) in the wing where the main track was removed and installed (Ref 27-88-01).

S 864-026

(9) Supply electrical power (Ref 24-22-00).

S 864-027

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(10) Pressurize the left hydraulic system (Ref 29-11-00).

S 094-028

(11) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 094-029

(12) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-030
(13) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and LE slats move to the fully extended position.

S 094-031
(14) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-032
(15) Remove the power from the left hydraulic system (Ref 29-11-00).

S 094-033
(16) Install a PDU lock in the TE flap PDU (Fig. 402).

S 094-034
(17) If you removed and installed the outer main track on the outboard side, do the step that follows:
(a) At the most inboard rotary actuator of the outboard slats, replace the rigging upstop with the main track upstop (Ref 27-81-12).

S 864-042

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(18) Pressurize the left hydraulic system (Ref 29-11-00).

S 094-041
(19) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 294-050

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(20) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 094-040
(21) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-036
(22) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

S 494-037
(23) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-038
(24) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-039
(25) Install a PDU lock in the TE flap PDU (Fig. 402).

S 424-035
(26) Install, adjust, and do a test on the inboard LE slat (Ref 27-81-01).

NOTE: Do the steps to put the airplane back to its usual condition in the procedure to install the LE slat.

INBOARD LEADING EDGE SLAT MAIN TRACK - INSPECTION/CHECK

1. General
   A. This procedure only has illustrations and wear limit tables which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to the Inboard Leading Edge Slat Main Track - Removal/Installation for procedures to do these tasks.

TASK 27-81-10-206-001

2. Wear Limits for the Main Track of the Inboard Leading Edge Slat
   A. Procedure

S 296-007

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 426-008

CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

(2) Make sure the downstops are installed correctly.

S 226-002

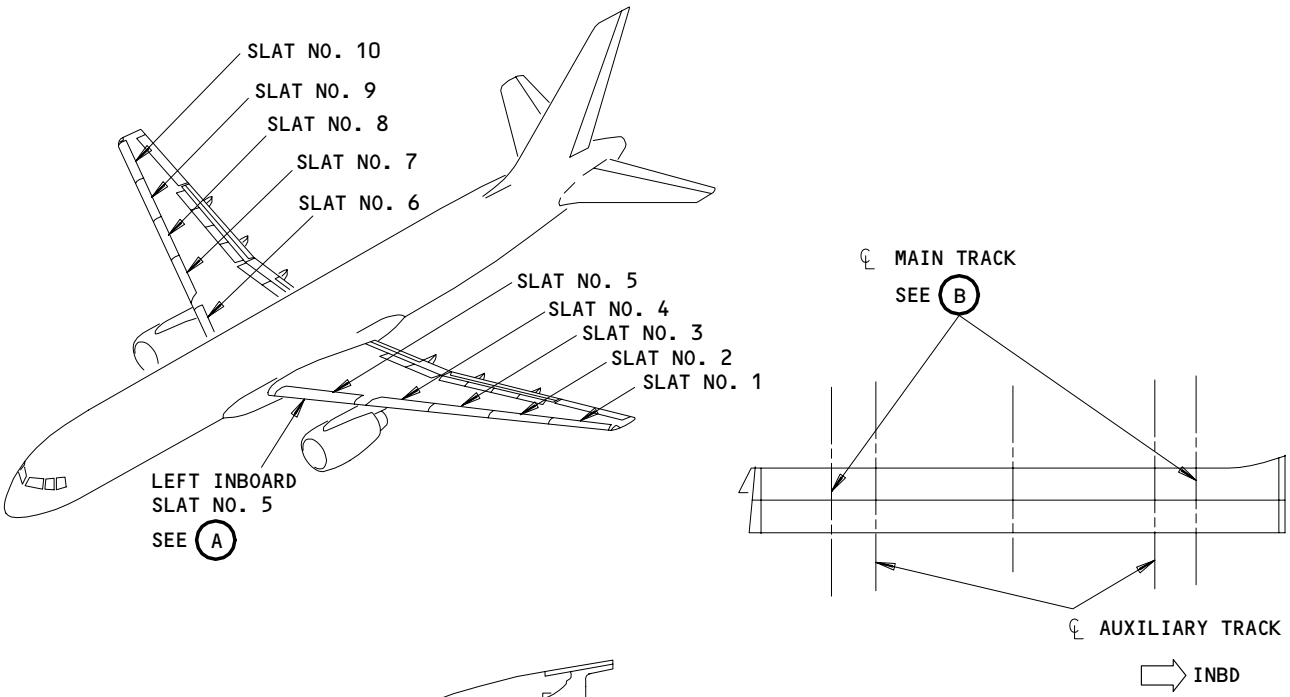
(3) Use the supplied data (Fig. 601) to examine the downstop on the main track.

S 226-003

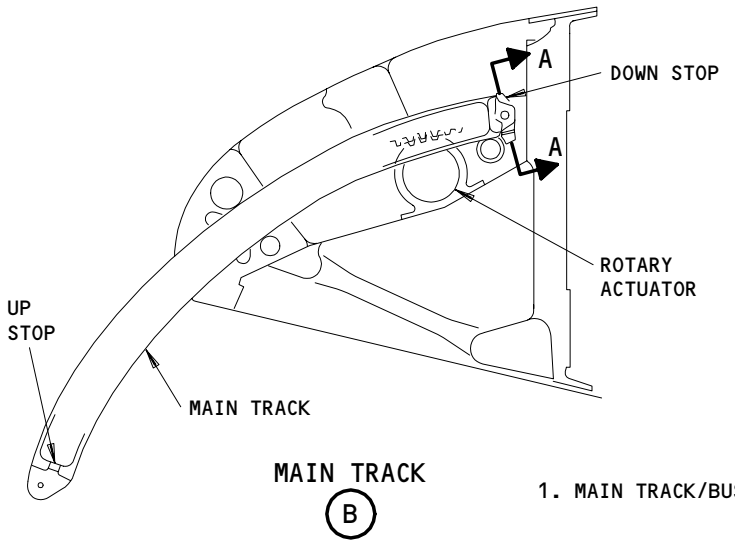
(4) Use the supplied data (Fig. 602) to examine the main track gear and the pinion gear.

S 226-004

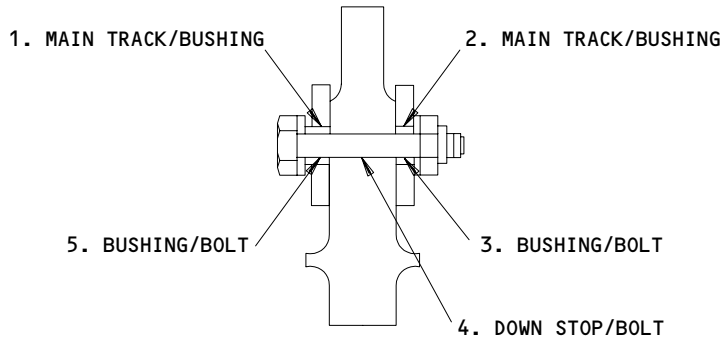
(5) Use the supplied data (Fig. 603) to examine the side load pad.



LEFT INBOARD SLAT NO. 5
RIGHT WING SHOWN
(LEFT WING OPPOSITE - SLAT NO. 6)
A



MAIN TRACK
B



A-A

Wear Limits for the Main Track Down Stop on the Inboard Leading Edge Slat
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	MAIN TRACK	ID	0.3761 (9.553)	0.3771 (9.578)	0.3811 (9.680)	0.0050 (0.127)		1	
	BUSHING	OD	0.3756 (9.540)	0.3761 (9.553)	0.3721 (9.451)		2		
2	MAIN TRACK	ID	0.3761 (9.553)	0.3771 (9.578)	0.3811 (9.680)	0.0050 (0.127)		1	
	BUSHING	OD	0.3756 (9.540)	0.3761 (9.553)	0.3721 (9.451)		2		
3	BUSHING	ID	0.2500 (6.350)	0.2515 (6.388)	0.2545 (6.464)	0.0050 (0.127)	3		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2465 (6.261)		4		
4	DOWN STOP	ID	0.2495 (6.337)	0.2505 (6.363)	0.2545 (6.464)	0.0050 (0.127)		5	
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2455 (6.236)		4		
5	BUSHING	ID	0.2500 (6.350)	0.2515 (6.388)	0.2545 (6.464)	0.0050 (0.127)	3		
	BOLT	OD	0.2485 (6.312)	0.2495 (6.337)	0.2465 (6.261)		4		

ALL DIMENSIONS ARE IN INCHES

1 REAM THE HOLE TO REMOVE THE CORROSION. CADMIUM-TITANIUM ALLOY PLATE, BAKE 12 HOURS MINIMUM AT 350-400°F (176.2 - 204.4°C) AND APPLY CHROMATE POST-PLATE TREATMENT. APPLY BMS 10-11, TYPE 1, PRIMER. THE MAXIMUM HOLE DIAMETER MUST BE NO MORE THAN THE DESIGN INNER DIAMETER PLUS 0.0600 (1.524 mm). INSTALL AN OVERSIZE CRES BUSHING.

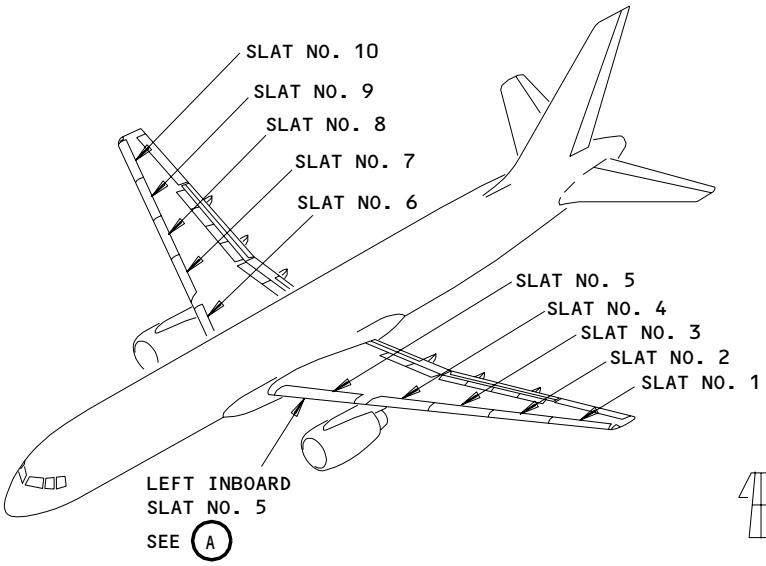
2 REPLACE THE BUSHING WITH A CRES BUSHING. COAT THE BUSHING OUTER DIAMETER AND THE MAIN TRACK HOLE WITH BMS 10-11, TYPE 1, PRIMER AND ASSEMBLE IT IMMEDIATELY.

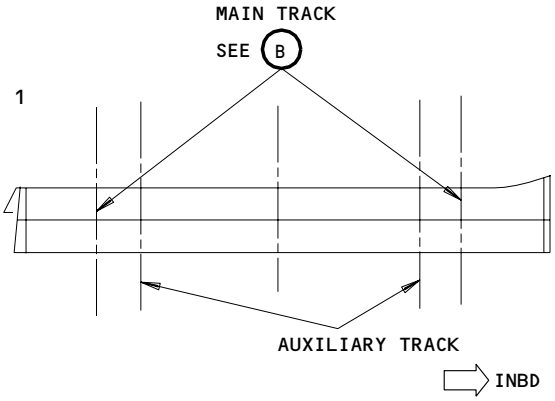
3 REPLACE THE BUSHING. REAM THE INNER DIAMETER TO THE DESIGN DIAMETER IF NECCESSARY. KEEP THE INNER AND OUTER DIAMETERS CONCENTRIC.

4 REPLACE THE BOLT. COAT THE BOLT WITH BMS 10-11, TYPE 1, PRIMER AND ASSEMBLE IT IMMEDIATELY.

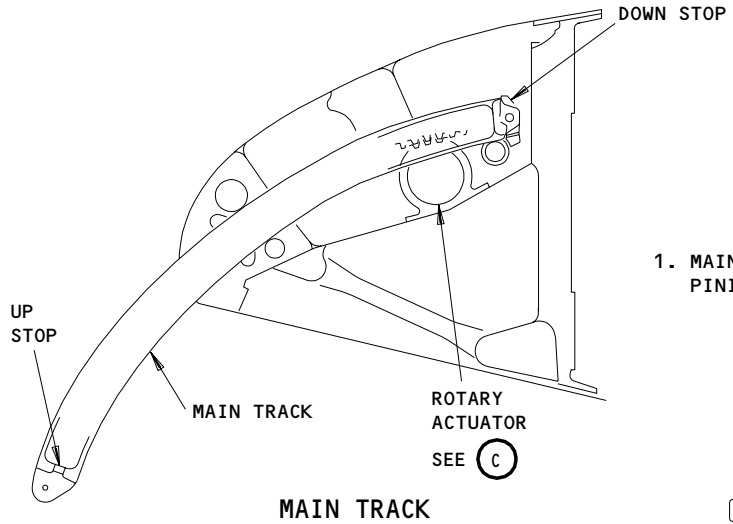
5 REAM THE HOLE TO REMOVE THE CORROSION. CHROMIC ACID ANODIZE PER MIL-A-8625, TYPE 1, AND APPLY ONE COAT OF BMS 10-11, TYPE 1, PRIMER. THE MAXIMUM HOLE DIAMETER MUST BE NO MORE THAN THE DESIGN INNER DIAMETER PLUS 0.600 (15.24 mm).

Wear Limits for the Main Track Down Stop on the Inboard Leading Edge Slat
Figure 601 (Sheet 2)

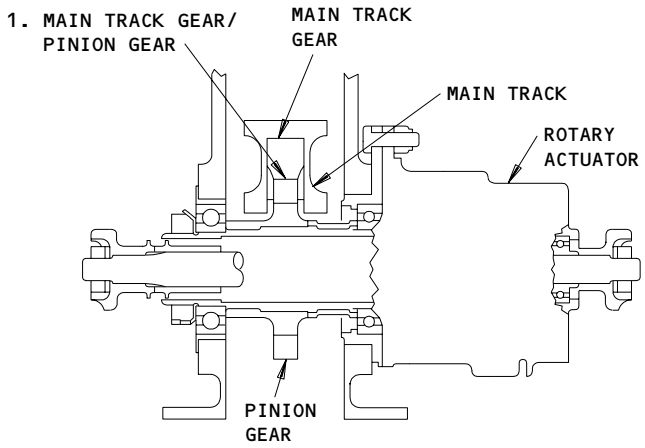




LEFT INBOARD SLAT NO. 5
(RIGHT WING)
(LEFT WING IS OPPOSITE - SLAT NO. 6)
A



MAIN TRACK
B



ROTARY ACTUATOR
C

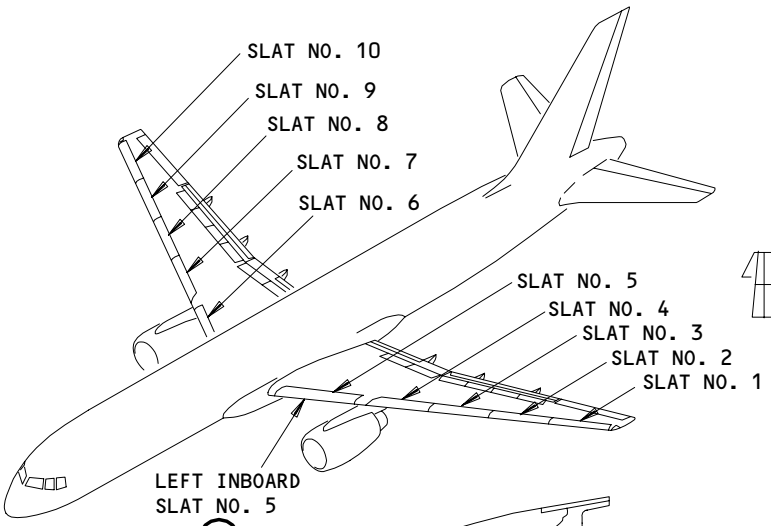
Wear Limits for the Main Track Gear/Pinion Gear on the Inboard Leading Edge Slat
Figure 602 (Sheet 1)

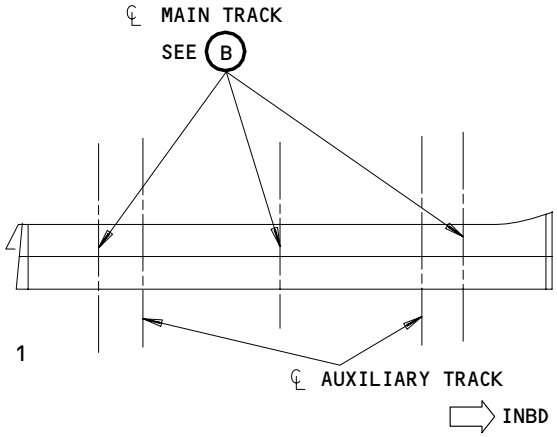
INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	MAIN TRACK GEAR	ID	——	——	——	0.018 (0.45)	1		
	PINION GEAR	OD	——	——	——		1		

1 1. MEASURE THE BACKLASH AT THE PITCH DIAMETER.
2. VISUALLY EXAMINE THE TOOTH BEARING PATTERN. MAKE SURE THE BEARING PATTERN IS IN LINE WITH THE PITCH DIAMETER. EXAMINE THE BACKLASH AND THE GEAR TEETH FOR SURFACE DEFECTS. IF ONLY THE BACKLASH IS HIGH AND THE TEETH ARE IN GOOD CONDITION, REPLACE THE PINION GEAR. IF THE BACKLASH IS HIGH AFTER YOU REPLACE THE PINION GEAR, YOU MUST ALSO REPLACE THE MAIN TRACK GEAR

Wear Limits for the Main Track Gear/Pinion Gear on the Inboard Leading Edge Slat
Figure 602 (Sheet 2)

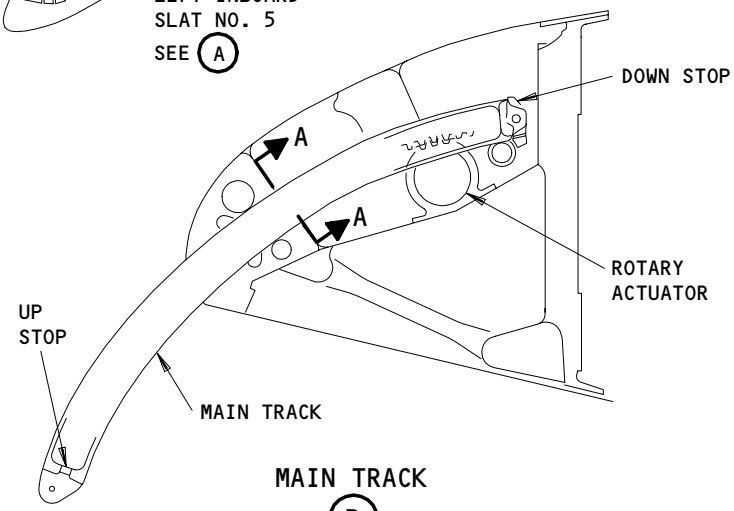
M35399





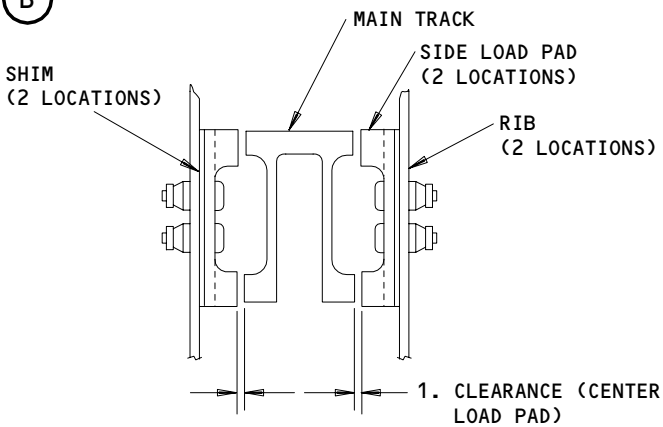
LEFT INBOARD SLAT NO. 5
RIGHT WING SHOWN
(LEFT WING OPPOSITE - SLAT NO. 6)

A



MAIN TRACK

B



A-A

1. CLEARANCE (CENTER MAIN TRACK/SIDE LOAD PAD)
2. CLEARANCE (INBOARD MAIN TRACK/SIDE LOAD PAD)
3. CLEARANCE (OUTBOARD MAIN TRACK/SIDE LOAD PAD)

Wear Limits for the Side Load Pad on the Main Track of the Inboard Leading Edge Slat
Figure 603 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	SIDE LOAD PAD	ID	---	---	---	0.0150 (0.381) TO 0.0300 (0.760)		1	
	CTR MAIN TRACK	OD	1.4900 (37.800)	1.5000 (38.3000)	---				
2, 3	SIDE LOAD PAD	ID	---	---	---	0.0150 (0.381) TO 0.0300 (0.760)		1	
	INBD OR OUTBD MAIN TRACK	OD	1.4900 (37.800)	1.5000 (38.3000)	---				

ALL DIMENSIONS ARE IN INCHES

1 IF THE CLEARANCE IS LARGER THAN 0.030 (0.7600), ADD SHIMS AND/OR REPLACE THE SIDE LOAD PAD AS NECESSARY. THE MAXIMUM SHIM THICKNESS IS 0.090 (2.3000 mm). APPLY BMS 10-11, TYPE 1, PRIMER TO THE SHIMS.

Wear Limits for the Side Load Pad on the Main Track of the Inboard Leading Edge Slat
Figure 603 (Sheet 2)

INBOARD LEADING EDGE SLAT AUXILIARY TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the auxiliary track for the inboard leading edge (LE) slat. The second task installs the auxiliary track.
   B. You must remove the LE slat to remove the auxiliary track.

TASK 27-81-11-024-001

2. Remove the Auxiliary Track for the Inboard LE Slat
   A. References
      (1) 27-81-01/401, Inboard Leading Edge Slat
   B. Access
      (1) Location Zones
          512 Slat No. 5 (Left)
          612 Slat No. 6 (Right)

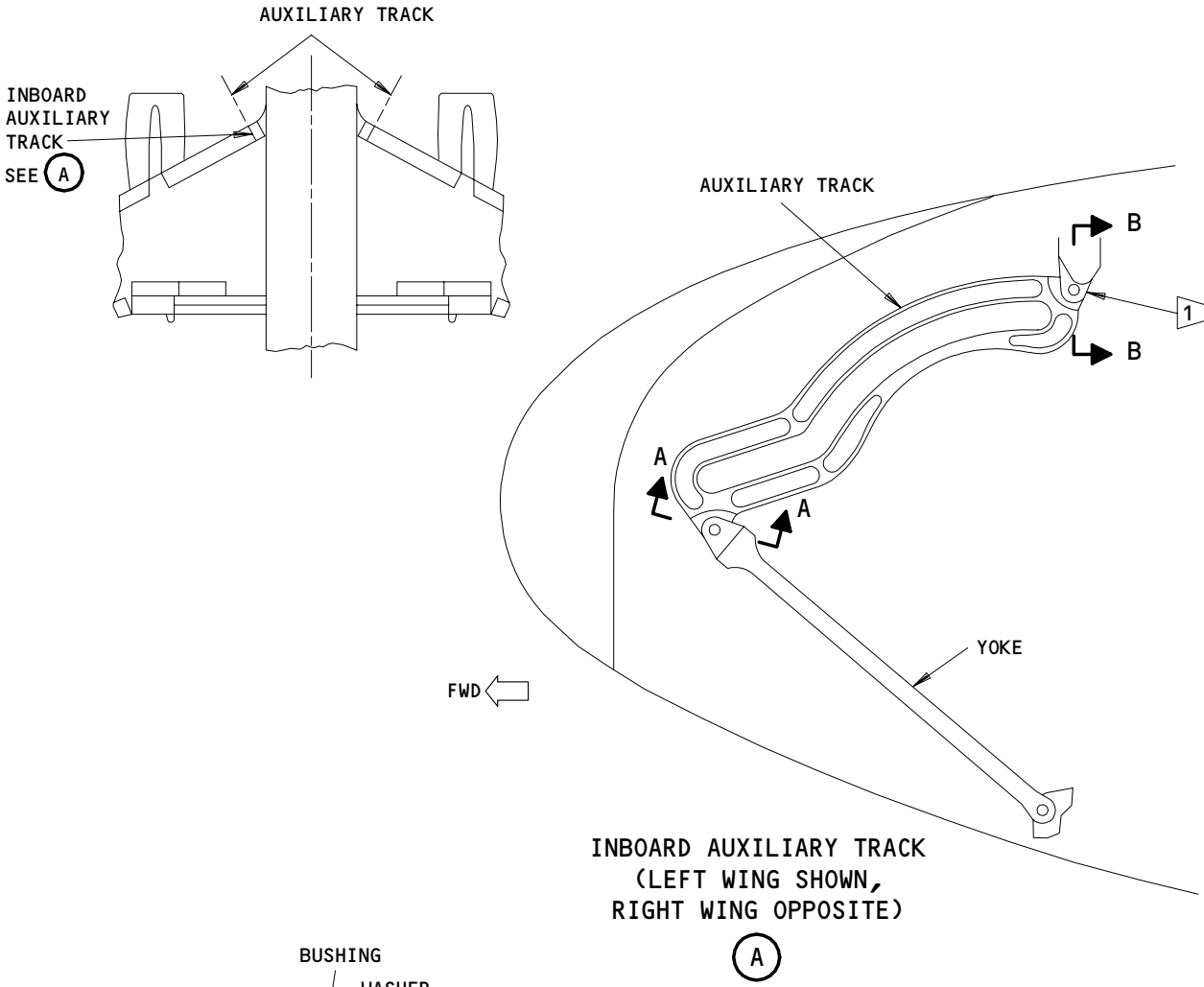
   C. Prepare for the Removal

      S 014-002
      (1) Remove the inboard LE slat (Ref 27-81-01/401).
   D. Remove the Auxiliary Track (Fig. 401)

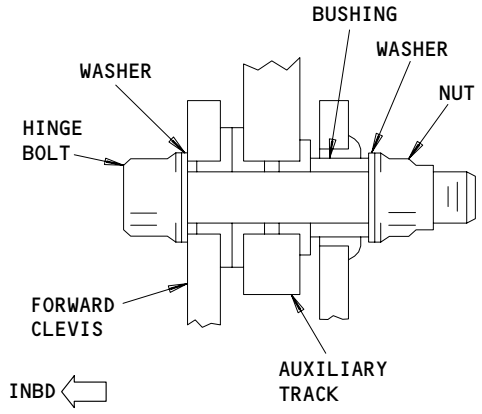
      S 024-003
      (1) Do these steps to remove the inboard or outboard auxiliary track:
          (a) Remove the hinge bolt at the forward and aft clevises.
          (b) Remove the auxiliary track.

TASK 27-81-11-424-005

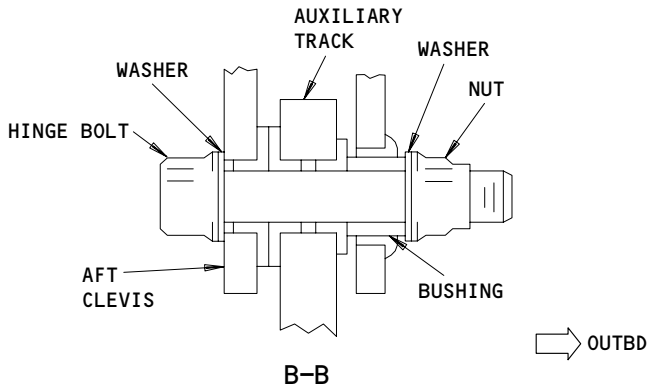
3. Install the Auxiliary Track for the Inboard LE Slat
   A. References
      (1) 27-81-01/401, Inboard Leading Edge Slat
   B. Access
      (1) Location Zones
          512 Slat No. 5 (Left)
          612 Slat No. 6 (Right)



INBOARD AUXILIARY TRACK
(LEFT WING SHOWN,
RIGHT WING OPPOSITE)
A



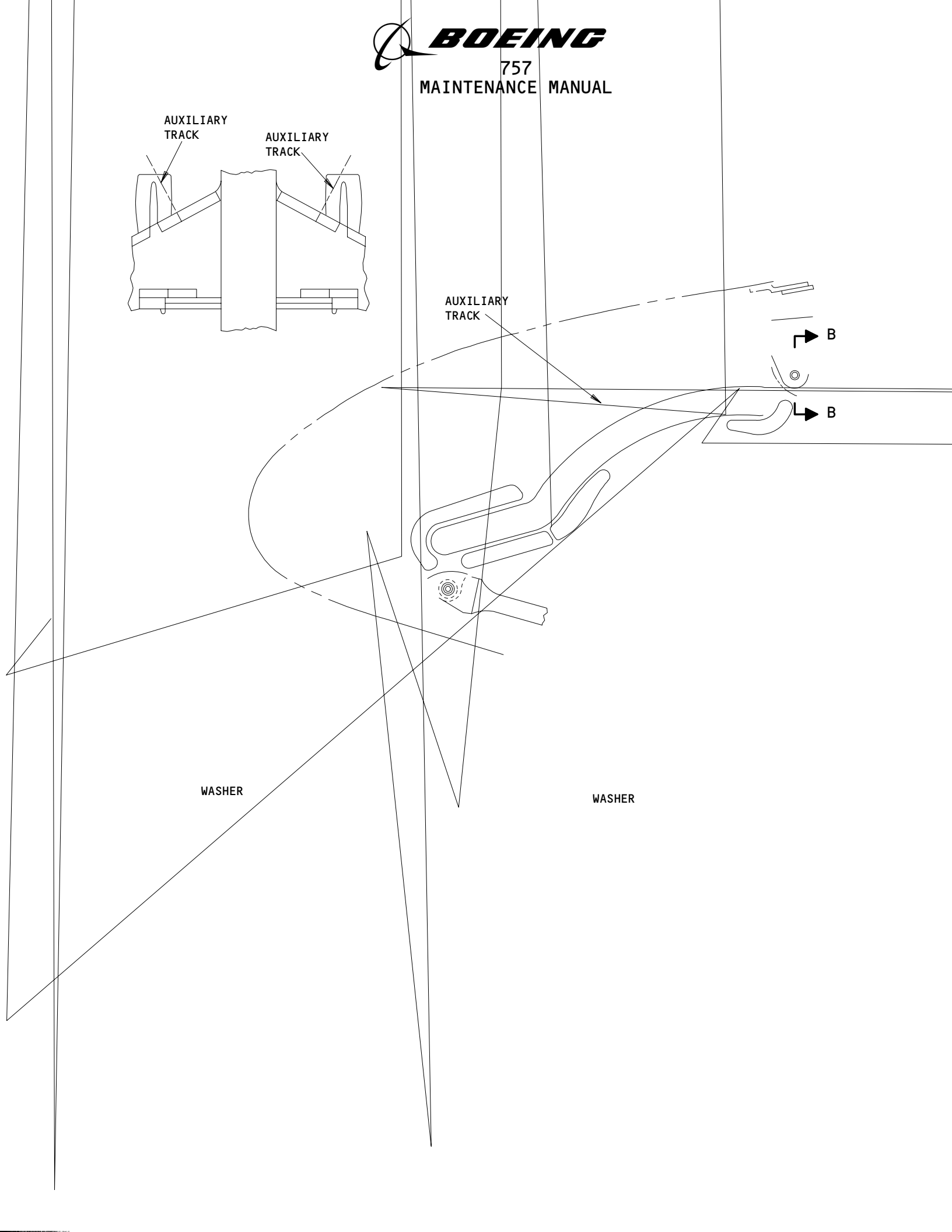
A–A



B–B

1 ON THE INBOARD TRACK;
THE HOLE FOR THE HINGE BOLT
IN THE AFT CLEVIS IS FORWARD
OF THE MOUNTING BOLTS.

Auxiliary Track of the Inboard LE Slat
Figure 401 (Sheet 1)


AUXILIARY TRACK
AUXILIARY TRACK
AUXILIARY TRACK
B
B
WASHER
WASHER

C. Install the Auxiliary Track (Fig. 401)

S 424-006

(1) Do these steps to install the inboard or outboard auxiliary track:
   (a) Put the auxiliary track in the correct location.
   (b) Install the hinge bolts at the forward and aft clevises.
   (c) Tighten each nut to 165-225 pound-inches (18.7-25.4 Nm).

D. Put the Airplane Back to Its Usual Condition

S 414-008

(1) Install, adjust, and do a test on the inboard LE slat (Ref 27-81-01/401).

INBOARD LEADING EDGE SLAT AUXILIARY TRACK - INSPECTION/CHECK

1. General
   A. This procedure only has illustrations and wear limit tables which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to the Inboard Leading Edge Slat Auxilliary Track - Removal/Installation for procedures to do these tasks.

TASK 27-81-11-226-001

2. Wear Limits for the Inboard Auxiliary Track of the Inboard Leading Edge Slat (Fig. 601)
   A. Procedure

      S 226-002
      (1) Do the wear limit inspection for the Inboard Auxiliary Track (Fig. 603).

TASK 27-81-11-226-003

3. Wear Limits for the Outboard Auxiliary Track of the Inboard Leading Edge Slat (Fig. 602)
   A. Procedure

      S 226-004
      (1) Do the wear limit inspection for the Outboard Auxiliary Track (Fig. 603).

TASK 27-81-11-226-005

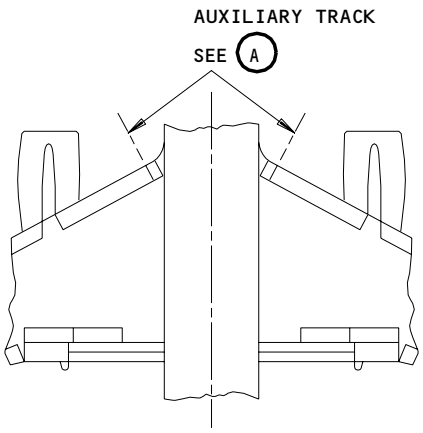
4. Wear Limits for the Inboard Track Yoke of the Inboard Leading Edge Slat (Fig. 604)
   A. Procedure

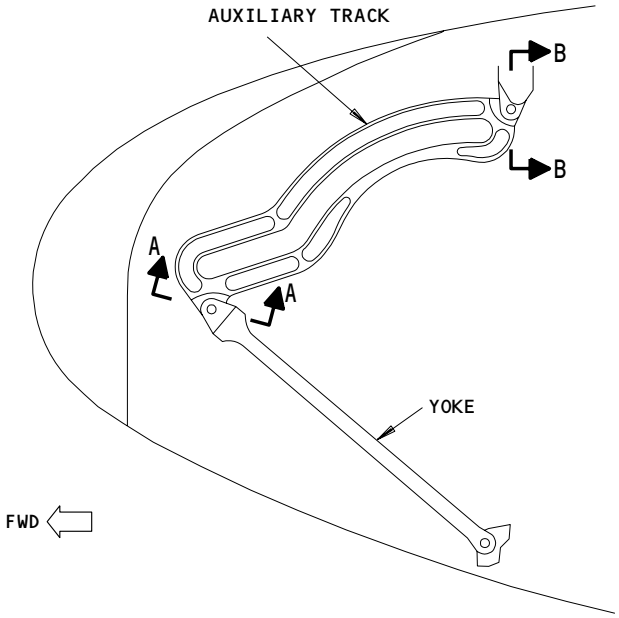
      S 226-006
      (1) Do the wear limit inspection for the Inboard Track Yoke (Fig. 606).

TASK 27-81-11-226-007

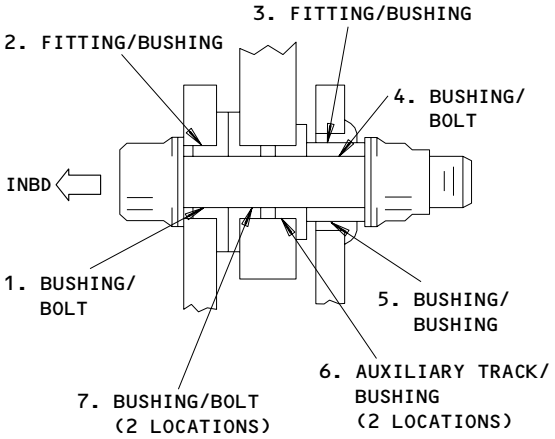
5. Wear Limits for the Outboard Track Yoke of the Inboard Leading Edge Slat (Fig. 605)
   A. Procedure

      S 226-008
      (1) Do the wear limit inspection for the Outboard Track Yoke (Fig. 606).

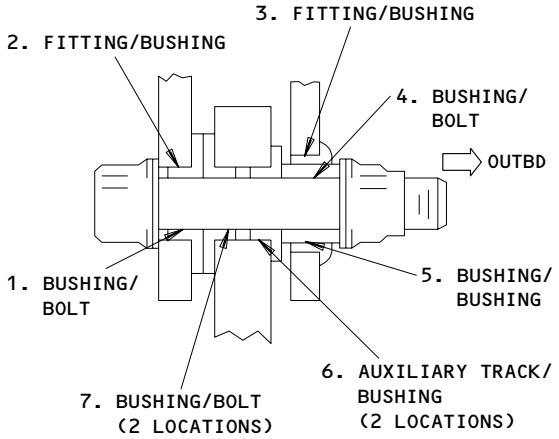




AUXILIARY TRACK
LEFT WING SHOWN
(RIGHT WING OPPOSITE)
A



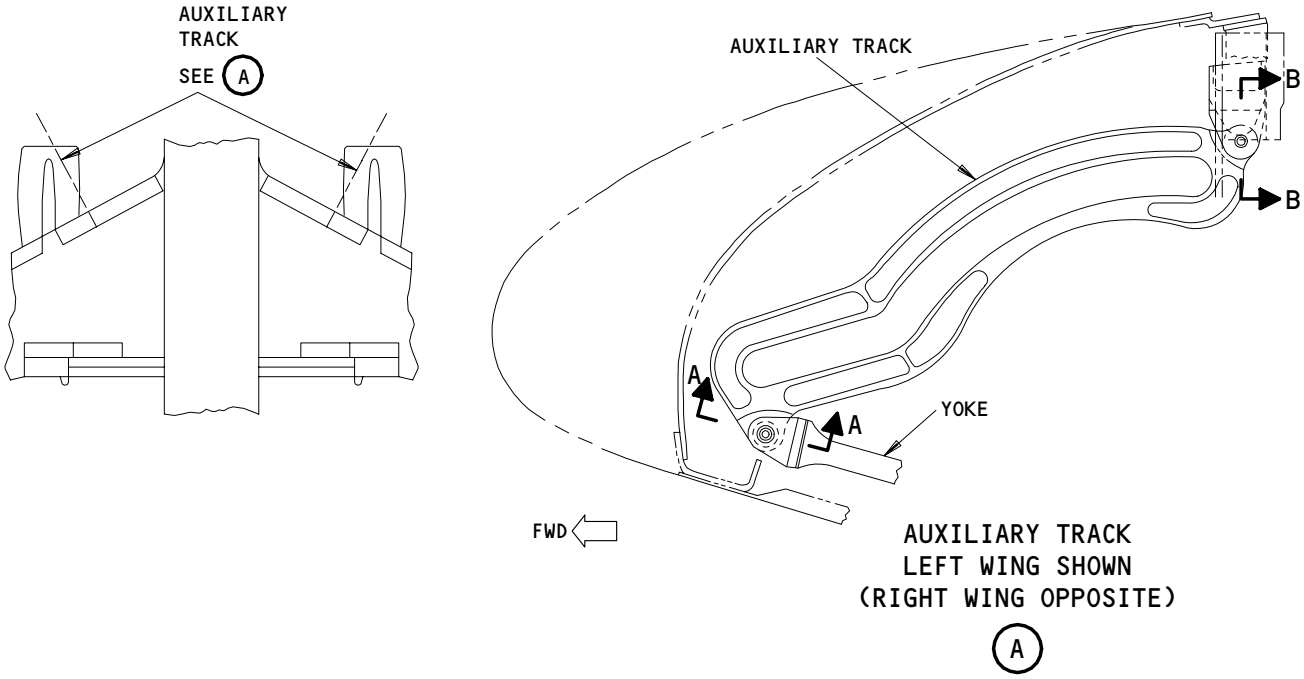
A-A 1

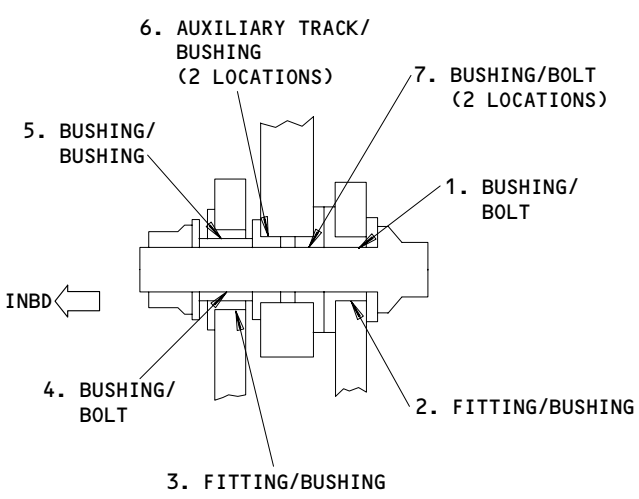


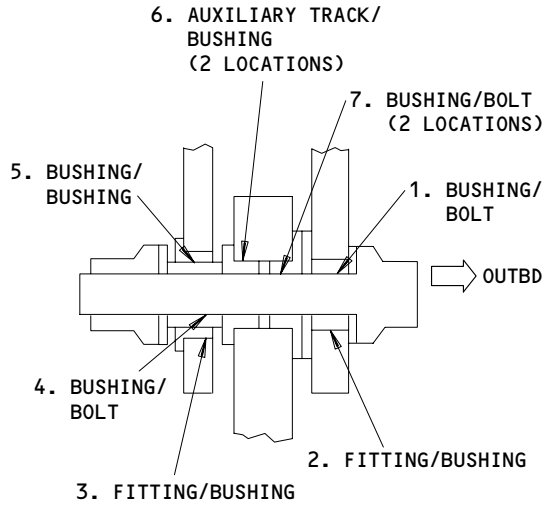
B-B 1

1 SEE FIG. 603
FOR THE WEAR LIMITS TABLE

Wear Limits for the Inboard Auxiliary Track of the Inboard LE Slat
Figure 601







1 SEE FIG. 603 FOR THE WEAR LIMITS TABLE

Wear Limits for the Outboard Auxiliary Track of the Inboard LE Slat
Figure 602

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	1 2		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		3		
2	FITTING	ID	0.4371 (11.102)	0.4378 (11.120)	0.0000 (0.000)	0.0000 (0.000)		4	
	BUSHING	OD	0.4381 (11.128)	0.4386 (11.140)	--		1 5		8
3	FITTING	ID	0.5625 (14.288)	0.5631 (14.303)	0.0000 (0.000)	0.0000 (0.000)		4	
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		5 6		
4	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	2 7		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		3		
5	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4425 (11.240)	0.0050 (0.127)	2 6		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		7		
6	AUX TRACK	ID	0.4371 (11.102)	0.4378 (11.120)	0.0000 (0.000)	0.0000 (0.000)		10	
	BUSHING	OD	0.4381 (11.128)	0.4386 (11.140)	--		1 5		5
7	BUSHING	ID	0.3120 (7.925)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	1 2		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		3		

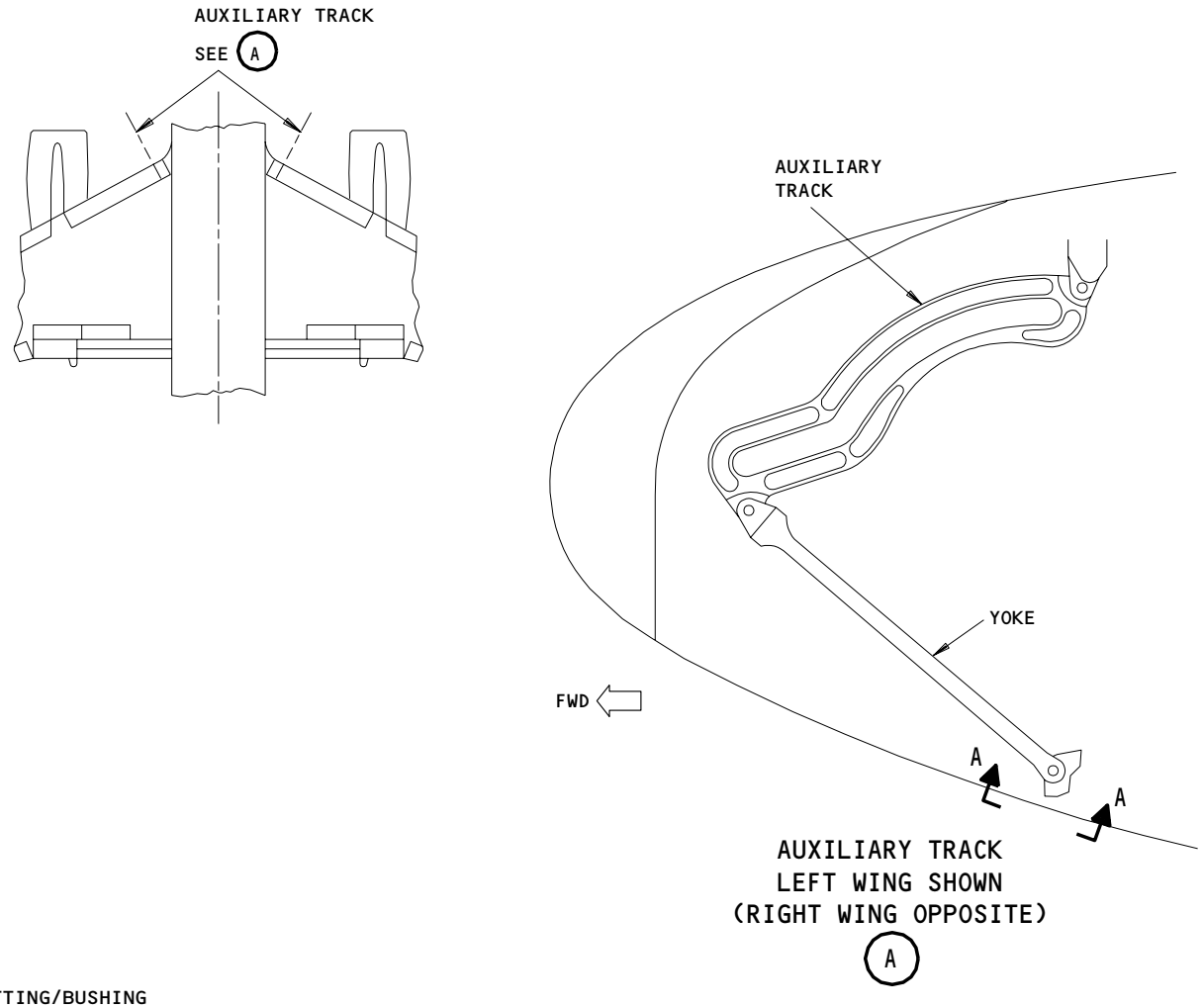
Wear Limits for the Inboard and Outboard Auxiliary Tracks of the Inboard LE Slat
Figure 603 (Sheet 1)

ALL DIMENSIONS ARE IN INCHES

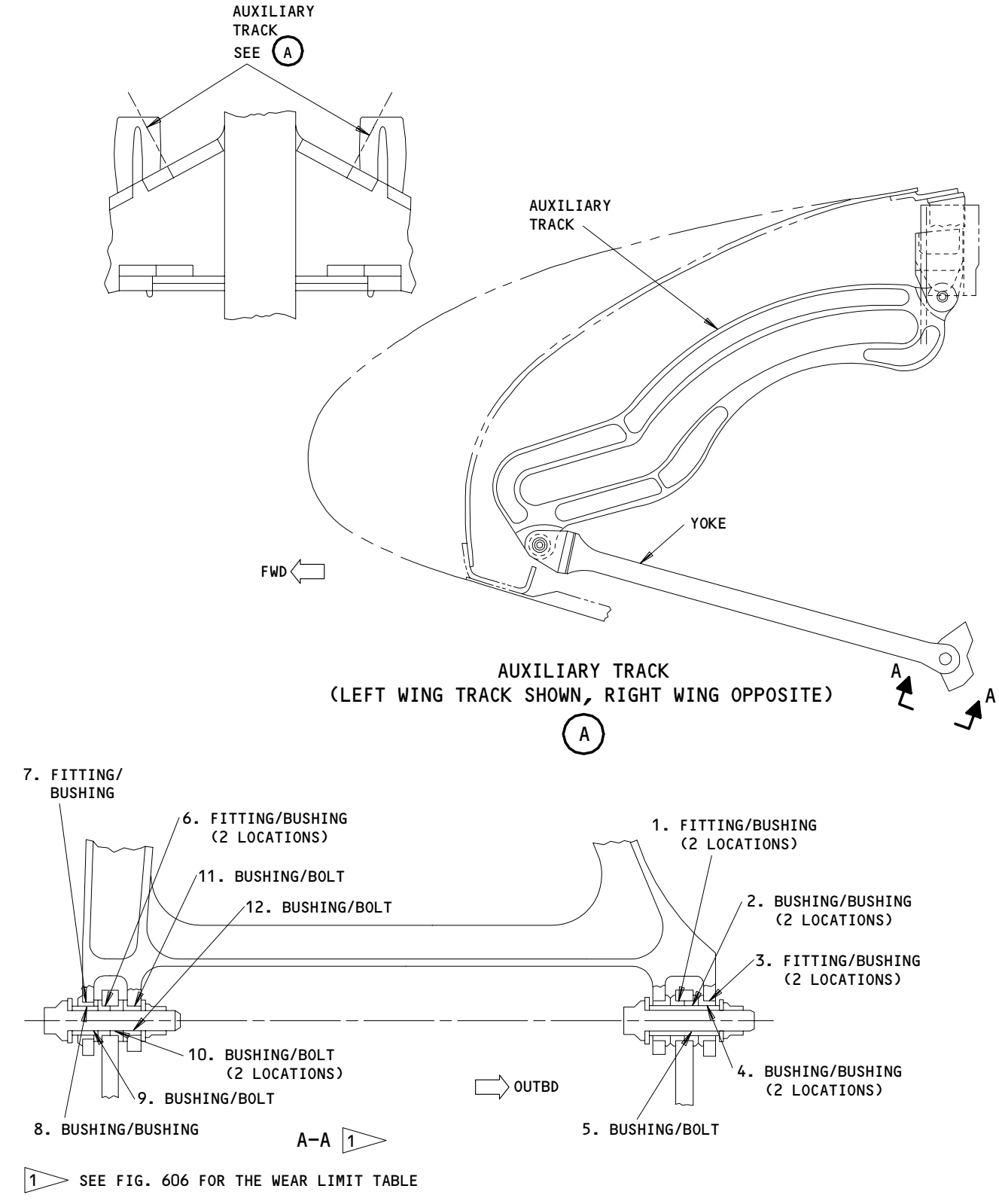
1. REPLACE THE BUSHING WITH A 17-4PH CRES BUSHING.
2. REAM THE INNER DIAMETER TO THE DESIGN LIMITS. MAKE SURE THE CENTERS OF THE INNER AND OUTER DIAMETERS ARE ALIGNED.
3. REPLACE THE BOLT.
4. REAM THE HOLE TO REMOVE ALL OF THE CORROSION. CHROMIC ACID ANODIZE AS SPECIFIED IN MIL-A-8625, TYPE 1. THE OVERSIZE HOLE IN THE FITTING MUST NOT BE MORE THAN THE MAXIMUM DESIGN LIMIT PLUS 0.0600 (15.24 mm). REPLACE THE FITTING IF IT IS NECESSARY.
5. THE NEW BUSHING MUST HAVE AN OUTER DIAMETER BETWEEN THE MAXIMUM AND MINIMUM VALUES SPECIFIED.
6. REPLACE THE BUSHING WITH AN ALUM-NICKEL-BRONZE BUSHING.
7. REPLACE THE BUSHING WITH A 15-5PH CRES BUSHING.
8. APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE HOLE AND THE BUSHING OUTER DIAMETER AND ASSEMBLE IMMEDIATELY. THE CHAMFER ON THE BUSHING AFTER INSTALLATION MUST BE 0.005-0.015 X 45 DEGREES ON EACH END. FILLET SEAL THE BUSHING FLANGE OUTER DIAMETER WITH BMS 5-95 SEALANT.
9. APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE HOLE AND THE BUSHING OUTER DIAMETER. ASSEMBLE IT IMMEDIATELY. FILLET SEAL AND FILL THE DISTANCE BETWEEN THE BUSHINGS WITH BMS 5-95 SEALANT.
10. REAM THE HOLE TO REMOVE ALL OF THE CORROSION. CADMIUM-TITANIUM ALLOY PLATE (0.0005-0.0007) AND APPLY CHROMATE POST-PLATE TREATMENT. APPLY BMS 10-11, TYPE 1, PRIMER. THE OVERSIZE HOLE MUST NOT BE MORE THAN THE MAXIMUM DESIGN LIMIT PLUS 0.0600 (15.24 mm).

Wear Limits for the Inboard and Outboard Auxiliary Tracks of the Inboard LE Slat
Figure 603 (Sheet 2)

M36562



Wear Limits for the Inboard Track Yoke of the Inboard LE Slat
Figure 604



Wear Limits for the Outboard Track Yoke of the Inboard LE Slat
Figure 605

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	FITTING	ID	0.5625 (14.288)	0.5631 (14.303)	0.0000 (0.000)	0.0000 (0.000)		1	
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		2	3 4	
2	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	2		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		5		
3	FITTING	ID	0.5625 (14.288)	0.5631 (14.303)	0.0000 (0.000)	0.0000 (0.000)		1	
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		2	3 6	
4	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	2		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		5		
5	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	5		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		7		
6	FITTING	ID	0.4375 (11.113)	0.4381 (11.128)	0.0000 (0.000)	0.0000 (0.000)		1	
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	--		5	3 4	
7	FITTING	ID	0.5625 (14.288)	0.5631 (14.303)	0.0000 (0.000)	0.0000 (0.000)		1	
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	--		2	3 6	
8	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	2		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		5		
9	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	5		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		7		
10	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	5		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		7		

Wear Limits for the Track Yoke of the Inboard LE Slat
Figure 606 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
11	FITTING	ID	0.4375 (11.113)	0.7381 (18.748)	0.0000 (0.000)	0.0000 (0.000)		1	
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	--		5	3 6	
12	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	5		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		5		

ALL DIMENSIONS ARE IN INCHES

1> REAM THE HOLE TO REMOVE ALL OF THE CORROSION. CHROMIC ACID ANODIZE AS SPECIFIED IN MIL-A-8625, TYPE 1. THE OVERSIZE HOLE IN THE FITTING MUST NOT BE MORE THAN THE MAXIMUM DESIGN DIAMETER PLUS 0.0600 (15-24 mm).

2> REPLACE THE BUSHING WITH AN ALUM-NICKEL BRONZE BUSHING. REAM THE INNER DIAMETER TO THE DESIGN LIMITS. MAKE SURE THE CENTERS OF THE INNER AND OUTER DIAMETERS ARE ALIGNED.

3> MAKE SURE YOU HAVE AN INTERFERENCE FIT AS SPECIFIED IN THE DESIGN LIMITS.

4> APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE FITTING HOLE AND THE BUSHING OUTER DIAMETER. ASSEMBLE IT IMMEDIATELY. THE CHAMFER ON THE BUSHING AFTER INSTALLATION MUST BE 0.005-0.015 X 45 DEGREES ON THE FLANGE SIDE. FILLET SEAL THE OUTER DIAMETER OF THE BUSHING FLANGE AND FILL THE DISTANCE BETWEEN THE BUSHINGS WITH BMS 5-95 SEALANT.

5> REPLACE THE BUSHING WITH A 15-5PH CRES BUSHING. REAM THE INNER DIAMETER TO THE DESIGN LIMITS. MAKE SURE THE CENTERS OF THE INNER AND OUTER DIAMETERS ARE ALIGNED.

6> APPLY A LAYER OF BMS 10-11, TYPE 1, PRIMER TO THE HOLE AND THE BUSHING DIAMETER AND ASSEMBLE IMMEDIATELY. THE CHAMFER ON THE BUSHING AFTER INSTALLATION MUST BE 0.005-0.015 X 45 DEGREES ON EACH END. FILLET SEAL THE OUTER DIAMETER OF THE BUSHING FLANGE WITH BMS 5-95 SEALANT.

7> REPLACE THE BOLT.

Wear Limits for the Track Yoke of the Inboard LE Slat
Figure 606 (Sheet 2)

OUTBOARD LEADING EDGE SLAT MAIN TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the main track for the outboard leading edge (LE) slat. The second task installs the main track.

   TASK 27-81-12-024-001

2. Remove the Main Track for the Outboard LE Slat
   A. Equipment
      (1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) 24-22-00/201, Electrical Power - Control
      (2) 27-81-00/501, Leading Edge Slat System
      (3) 27-81-02/401, Outboard Leading Edge Slat
      (4) 27-88-01/401, Leading Edge Slat Position Transmitter
      (5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) 32-00-15/201, Landing Gear Door Locks
      (7) 32-00-20/201, Landing Gear Downlocks
      (8) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
510/610	Wing Leading Edge - Inboard
520/620	Wing Leading Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

      S 044-033

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT TH OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 864-006
(2) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-007
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-035
(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-034

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

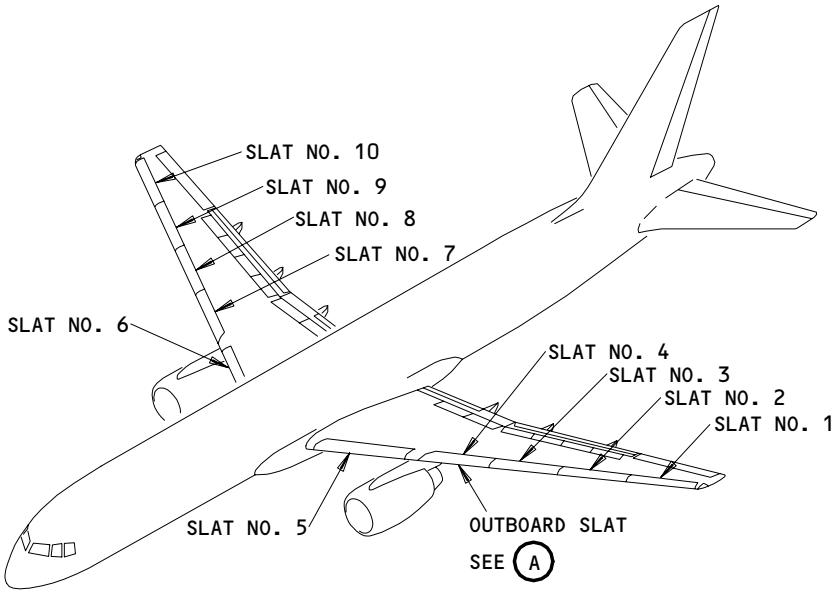
(5) Open the doors for the landing gear and install door locks (Ref 32-00-15).

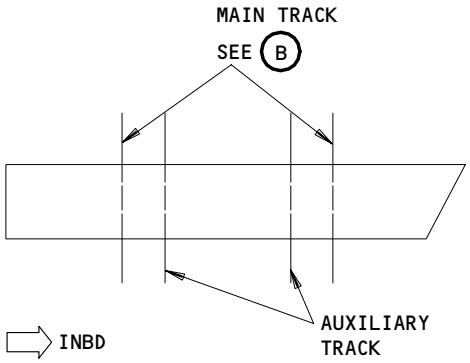
S 014-002
(6) Remove the outboard LE slat (Ref 27-81-02).

S 864-037
(7) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

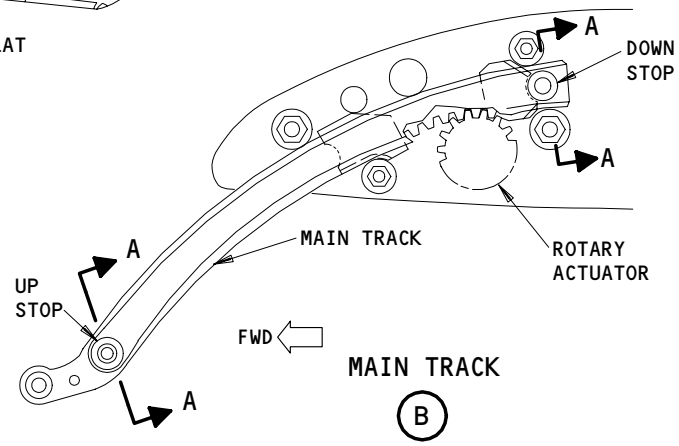
S 864-038
(8) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

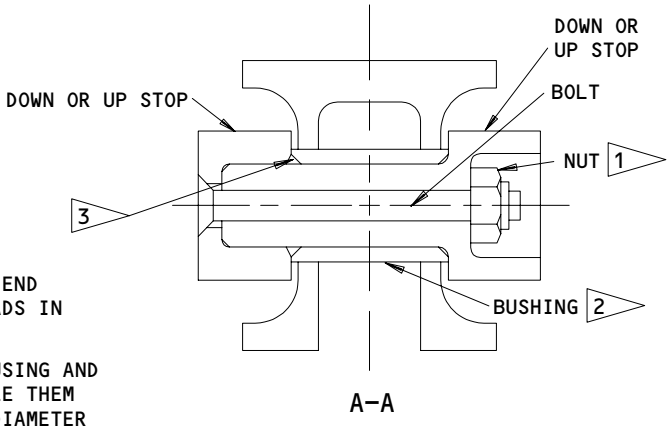
S 864-039
(9) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR





OUTBOARD SLAT
PLAN VIEW
(EXAMPLE OUTBOARD SLATS
NO. 1-3 AND 7-10)
A





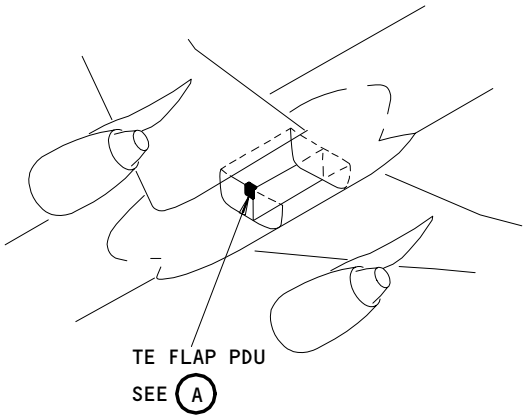
A-A

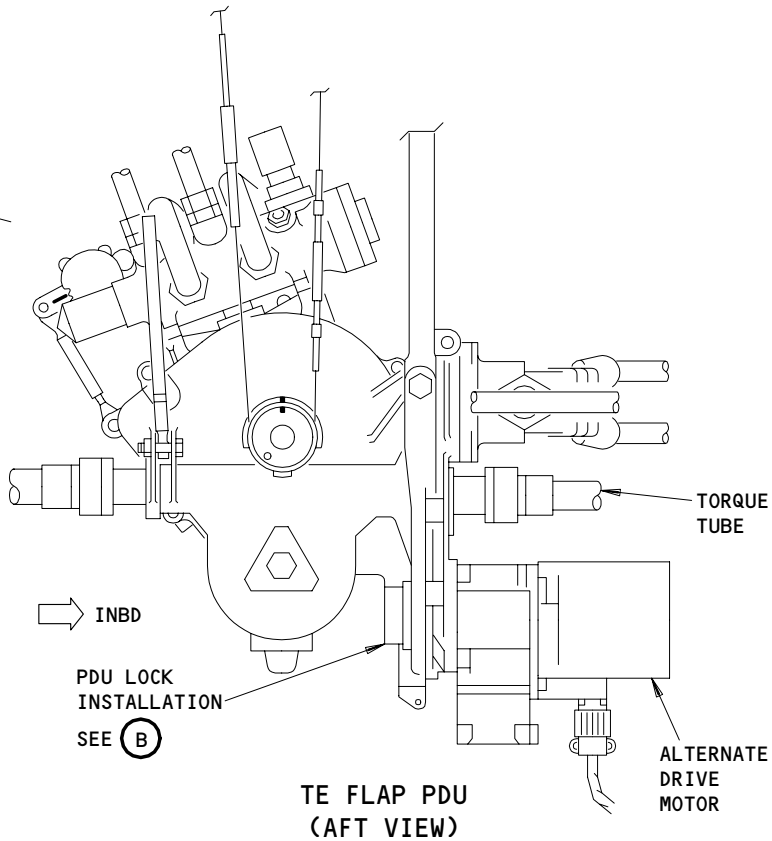
1 THE END OF THE BOLT MUST NOT COME OUT OF THE END OF THE STOP FITTING. NO MORE THAN FOUR THREADS IN THE BEARING IS PERMITTED.

2 APPLY PRIMER TO THE INNER DIAMETER OF THE HOUSING AND THE OUTER DIAMETER OF THE BUSHING AND ASSEMBLE THEM IMMEDIATELY. FILLET SEAL THE BUSHING OUTER DIAMETER WITH SEALANT.

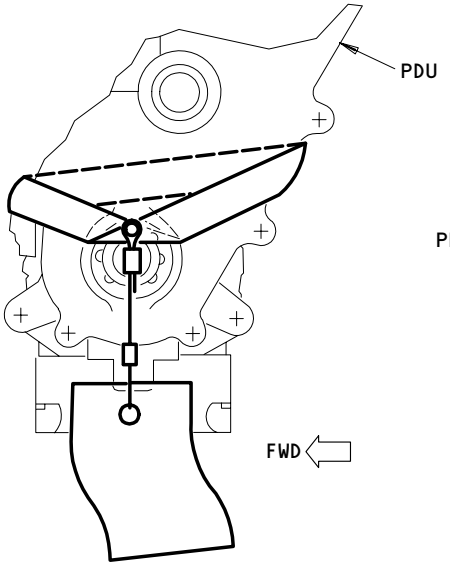
3 CHAMFER THE INNER DIAMETER OF EACH END OF THE BUSHING 0.030-0.035 INCH X 45 DEGREES.

Main Track for the Outboard Leading Edge Slat
Figure 401

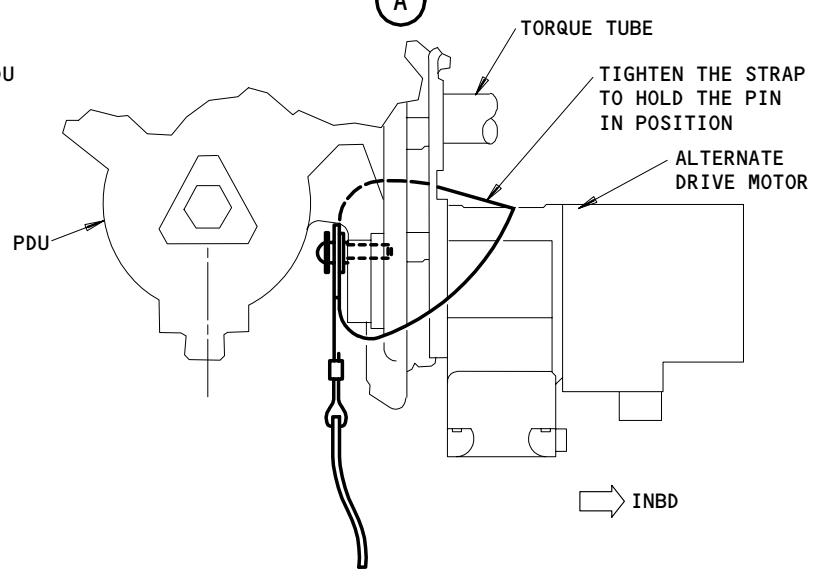




TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

S 864-003
(10) Supply electrical power (Ref 24-22-00).

S 214-036
(11) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 494-009
(12) Install a PDU lock in the TE flap PDU (Fig.402).

S 294-044

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(13) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

E. Remove the Main Track (Fig. 401)

S 014-027
(1) If you remove an outboard main track at slat No. 1 or 10, remove the position transmitter for the LE slat (Ref 27-88-01).

S 824-028
(2) Make a mark on the adjacent torque tubes that you will not disconnect to identify the adjusted position for the subsequent installation.

NOTE: Do not turn the torque tube when you disconnect it. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

S 864-029
(3) Turn the rotary actuator to put the main track in a position that you can get access to the downstop.

S 034-030
(4) Remove the downstop (View A-A).

S 024-031
(5) Move the main track out from between the rollers.

TASK 27-81-12-424-011

3. Install the Main Track for the Outboard LE Slat

A. Equipment

(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1

(2) Rigging Up Stop Kit - B27001-2:

(a) Pin - P/N B27001-3

(b) Cap - P/N B27001-4

B. Consumable Materials

(1) C00259 Primer - BMS 10-11, Type 1

(2) A00247 Sealant - BMS 5-95

C. References

(1) 24-22-00/201, Electrical Power - Control

(2) 27-81-00/501, Leading Edge Slat System

(3) 27-81-02/401, Outboard Leading Edge Slat

(4) 27-81-20/401, Leading Edge Slat Drive Torque Tube

(5) 27-88-01/401, Leading Edge Slat Position Transmitter

(6) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
510/610	Wing Leading Edge - Inboard
520/620	Wing Leading Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Main Track (Fig. 401)

S 214-012

(1) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 214-032

(2) Make sure the flap/slat alternate drives are off.

S 214-013

(3) Make sure the TE flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 294-045

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(4) Make sure the main track housing behind the wing front spar is clear of all unwanted material.

S 424-015

(5) Do these steps to install the main track:
   (a) Put the main track in between the rollers and engage the gear teeth with the pinion gear of the rotary actuator.
   (b) Turn the rotary actuator to put the main track in a position to install the downstop.
      1) Make sure the main track moves freely.

   CAUTION: MAKE SURE THAT THE DOWSTOPS ARE INSTALLED CORRECTLY AND THE NUT HAS THE CORRECT TORQUE. IF THEY ARE NOT, THE MAIN TRACK/STRUCTURE JOINT CAN BECOME LOOSE. THE DOWNSTOP PARTS CAN DISCONNECT AND CAN CAUSE DAMAGE TO THE SLAT TRACK HOUSING.

   (c) Install the downstop (View A-A).
   (d) Manually extend the two main tracks a sufficient distance to get access to the main track upstop.
   (e) If you install the outboard main track at slat No.1 or No.10, do this step:
      1) At the most outboard location of the outboard slats, replace the main track upstop with a rigging upstop for the main track (View A-A).
   (f) If you install the main track at a location other than the outboard main track at slat No.1 or No.10, do this step:
      1) Replace the main track upstop with the rigging upstop at the two main track locations (View A-A).
   (g) Manually retract the two main tracks until the rigging upstops are against the rib upstop fittings.

      NOTE: Keep the main tracks in this position.

(h) Do these steps to connect the torque tubes on each side of the rotary actuator where the main track was replaced:

1) Remove the supports from the torque tubes, and connect the torque tubes to the rotary actuator (Ref 27-81-20).

NOTE: Do not turn the torque tube while you connect it to the rotary actuator. It will be necessary to adjust the slat drive if you turn the torque tube (Ref 27-81-00).

2) Make sure the rigging upstops are against the rib upstop fittings.

3) Make sure the position of the adjacent torque tube did not move during the removal or installation procedure of the main track.

S 424-016

(6) If the main track is replaced at slat No.1 or No.10, install and adjust the position transmitter for the LE slat in the wing where the main track was replaced (Ref 27-88-01).

F. Operational Test for the Main Track of the LE Slat

S 864-017

(1) Supply electrical power (Ref 24-22-00).

S 864-018

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Pressurize the left hydraulic system (Ref 29-11-00).

S 094-019

(3) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 864-020

(4) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and LE slats move to the fully extended position.

S 494-021
(5) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-022
(6) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-023
(7) Install a PDU lock in the TE flap PDU (Fig. 402).

S 094-024
(8) If you replaced an outboard main track at slat No. 1 or 10, do this step:
(a) At the farthest outboard location of the main tracks, replace the rigging upstop with the main track upstop (View A-A).

S 094-025
(9) If you replaced a main track at a location other than the outboard main track at slat No. 1 or 10, do this step:
(a) At the locations where you installed a rigging upstop, replace the main track rigging upstop with main track upstop (View A-A).

S 294-046

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(10) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 414-026
(11) Install, adjust, and do a test on the outboard LE slat (Ref 27-81-02).

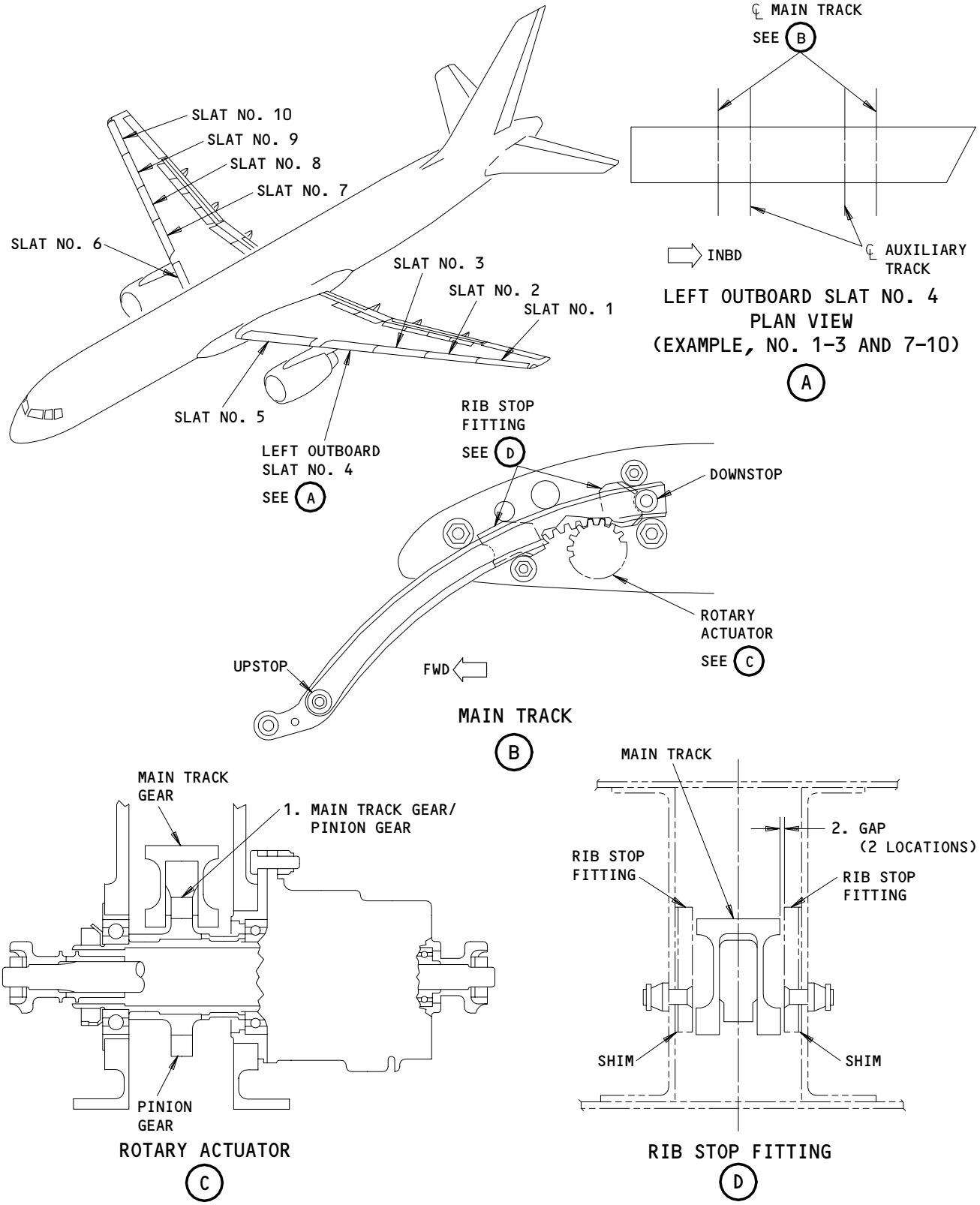
NOTE: Do the steps to put the airplane back to its usual condition in the procedure to install the outboard LE slat.

OUTBOARD LEADING EDGE SLAT MAIN TRACK - INSPECTION/CHECK

1. General
   A. This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacement of components that you will examine for wear. Refer to the Outboard Leading Edge Slat Main Track - Removal/Installation to remove or replace these components.

TASK 27-81-12-226-001

2. Wear Limits for the Main Track, Outboard Leading Edge Slat (Fig. 601)
   A. General
      (1) This data contains illustrations and wear limit charts. This section gives no procedure for the access, removal, or replacement of components that you will examine for wear. Refer to the Outboard Leading Edge Slat Main Track - Removal/Installation to remove or replace these components.



Wear Limits for the Main Track, Outboard Leading Edge Slat
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	MAIN TRACK GEAR	ID	---	---	---	0.0180 (0.450)	1		
	PINION GEAR	OD	---	---	---		1		
2	RIB STOP FITTING	ID	---	---	---	0.0300 0.760)		3	
	MAIN TRACK	OD	1.4900 (37.800)	1.5100 (38.300)	1.4900 (37.800)	2	4		

ALL DIMENSIONS ARE IN INCHES

1 • MEASURE THE BACKLASH AT THE PITCH DIAMETER.
• VISUALLY EXAMINE THE TOOTH BEARING PATTERN. MAKE SURE THE BEARING PATTERN IS IN LINE WITH THE PITCH DIAMETER. EXAMINE THE BACKLASH AND THE GEAR TEETH FOR SURFACE DEFECTS. IF ONLY THE BACKLASH IS HIGH AND THE TEETH ARE IN GOOD CONDITION, REPLACE THE PINION GEAR. IF THE BACKLASH IS HIGH AFTER YOU REPLACED THE PINION GEAR, YOU MUST ALSO REPLACE THE MAIN TRACK GEAR.

2 MINIMUM DIAMETER CLEARANCE IS 0.0150 (0.3810 mm) INCH MEASURED WITH THE LEADING EDGE SLAT RETRACTED.

3 IF THE CLEARANCE IS LARGER THAN 0.030 (0.760 mm) INCH (MEASURED WITH SLATS RETRACTED) BETWEEN THE SIDE SURFACES OF THE MAIN TRACK AND THE INSIDE SURFACES OF THE RIB STOP FITTINGS, ADD SHIMS OR REPLACE THE RIB STOP FITTINGS. APPLY BMS 10-11, TYPE 1, PRIMER TO THE SHIMS.

4 REPLACE THE MAIN TRACK.

Wear Limits for the Main Track, Outboard Leading Edge Slat
Figure 601 (Sheet 2)

OUTBOARD LEADING EDGE SLAT AUXILIARY TRACK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the auxiliary track for the outboard leading edge (LE) slat. The second task installs the auxiliary track.

TASK 27-81-13-024-006

2. Remove the Auxiliary Track for the Outboard LE Slat
   A. References
      (1) 27-81-02/401, Outboard Leading Edge Slat
   B. Access
      (1) Location Zones
          520/620 Wing Leading Edge - Outboard

   C. Prepare for the Removal

      S 014-007
      (1) Remove the outboard LE slat (Ref 27-81-02).
   D. Remove the Auxiliary Track (Fig. 401)

      S 034-001
      (1) Remove the mounting bolts as shown in Views A-A, B-B, and C-C.

      S 024-002
      (2) Remove the auxiliary track.

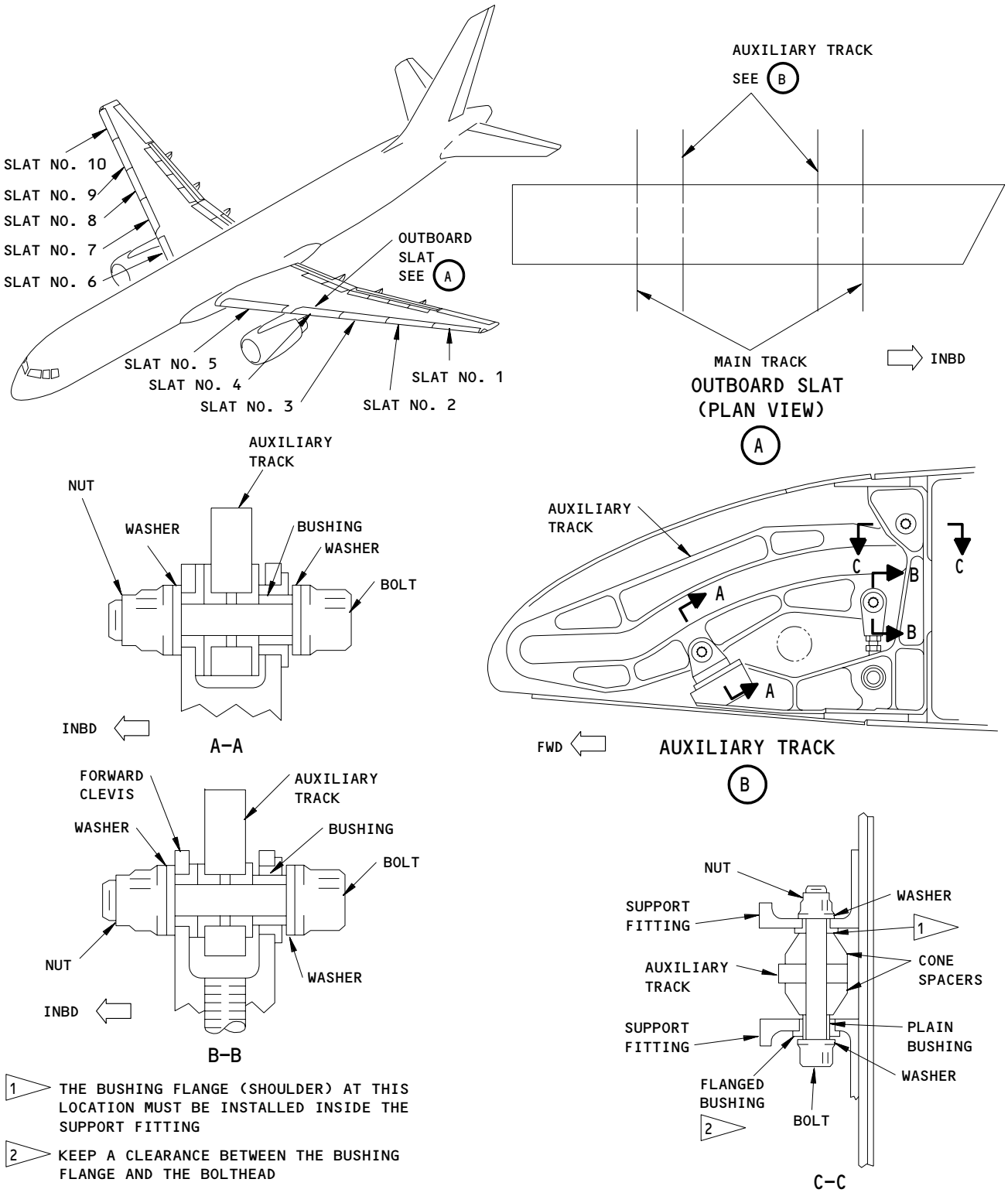
TASK 27-81-13-424-008

3. Install the Auxiliary Track for the Outboard LE Slat
   A. References
      (1) 27-81-02/401, Outboard Leading Edge Slat
      (2) 27-81-13/601, Outboard Leading Edge Slat Auxiliary Track
   B. Access
      (1) Location Zones
          520/620 Wing Leading Edge - Outboard

   C. Install the Auxiliary Track (Fig. 401)

      NOTE: The wear limits for these components are given in 27-81-13/601.

      S 424-003
      (1) Put the auxiliary track in the correct location.



1 THE BUSHING FLANGE (SHOULDER) AT THIS LOCATION MUST BE INSTALLED INSIDE THE SUPPORT FITTING

2 KEEP A CLEARANCE BETWEEN THE BUSHING FLANGE AND THE BOLTHEAD

Auxiliary Track of the Outboard Leading Edge Slat
Figure 401

S 434-010

CAUTION: MAKE SURE YOU INSTALL THE BUSHINGS FOR THE SLAT AUXILIARY TRACK AS IT IS SHOWN IN FIG. 401. A FAILURE TO INSTALL THE BUSHINGS CORRECTLY CAN CAUSE DAMAGE TO THE SLAT AUXILIARY TRACK.

(2) Make sure the flanged bushings in the auxiliary track support fitting, and plain bushings, bolts, washers, cone spacers, and nuts are installed correctly.

NOTE: If the bushings are not installed correctly and no clearance is found between the bushing flange and the bolthead, look for a clearance between the other bushing flange and the washer under the nut. If no clearance is found between the washer and the bushing flange, remove as necessary, the bolt, nut, washers, cone spacers, and bushings and install them in the correct connection configuration.

(a) Install the bolts as shown in Views A-A, B-B, and C-C.
(b) Tighten the nuts to 165-225 pound-inches (18.7-25.4 Nm).

S 424-005
(3) Install, adjust, and do a test on the outboard LE slat (Ref 27-81-02).

OUTBOARD LEADING EDGE SLAT AUXILIARY TRACK INSPECTION/CHECK

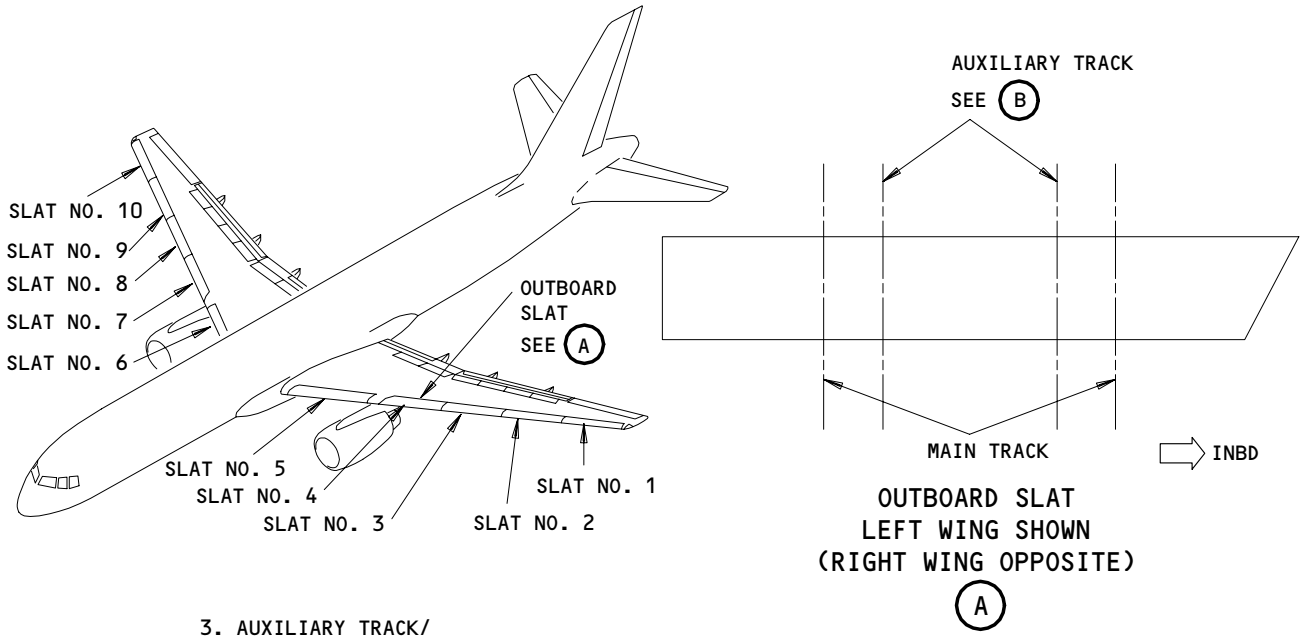
1. General
   A. This procedure only has an illustration and a wear limit table which show the data for wear limits. There are no procedures for the access, the removal, or the installation of the parts. Refer to the Outboard Leading Edge Slat Auxiliary Track-Removal/Installation for procedures to do these tasks.

TASK 27-81-13-226-002

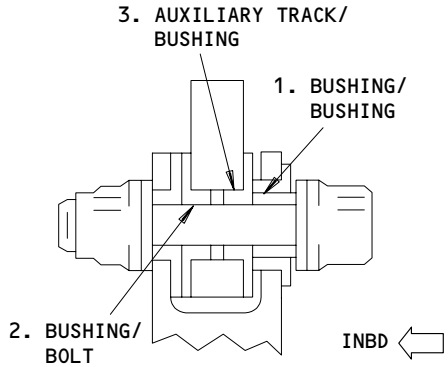
2. Wear Limits for the Auxiliary Track of the Outboard Leading Edge Slat (Fig. 601).
   A. Procedure

S 226-001

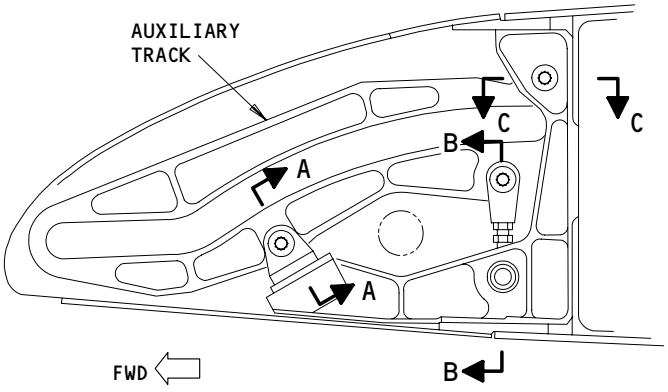
(1) Do the wear limit inspection for the auxiliary track of the outboard LE slat.



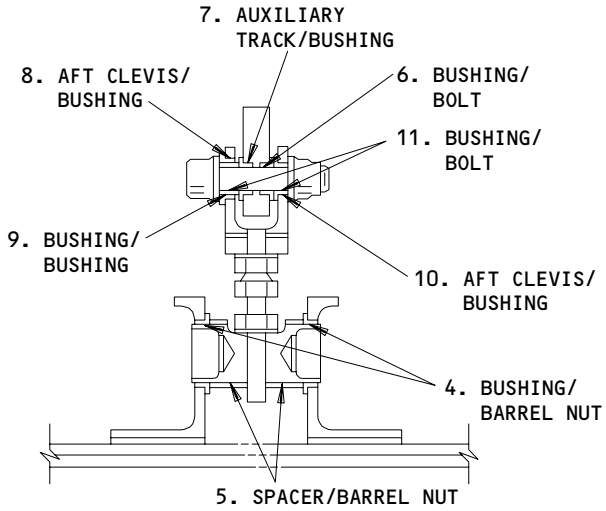
OUTBOARD SLAT
LEFT WING SHOWN
(RIGHT WING OPPOSITE)
A



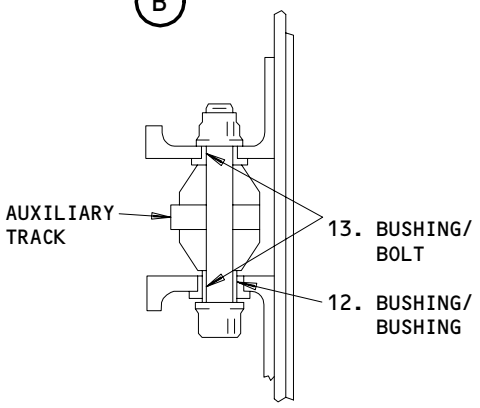
A–A



AUXILIARY TRACK
B



B–B



C–C

Wear Limits for the Auxiliary Track of the Outboard Leading Edge Slat
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		
2	BUSHING	ID	0.3125 (7.938)	0.3131 (7.953)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3081 (7.826)		X		
3	AUXILIARY TRACK	ID	0.4375 (11.113)	0.4381 (11.128)	---	---		X	1
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	---		X		
4	BUSHING	ID	0.8120 (20.625)	0.8128 (20.645)	0.8175 (20.765)	0.0050 (0.127)	X		
	BARREL NUT	OD	0.8110 (20.599)	0.8115 (20.612)	0.8078 (20.518)		X		
5	SPACER	ID	0.8120 (20.625)	0.8128 (20.645)	0.8165 (20.739)	0.0050 (0.127)	X		
	BARREL NUT	OD	0.8110 (20.599)	0.8115 (20.612)	0.8078 (20.518)		X		
6	BUSHING	ID	0.3120 (7.925)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		X		
7	AUXILIARY TRACK	ID	0.4375 (11.113)	0.4381 (11.128)	---	---		X	1
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	---		X		
8	AFT CLEVIS	ID	0.5625 (14.288)	0.5631 (14.303)	---	---		X	1
	BUSHING	OD	0.5636 (14.315)	0.5642 (14.331)	---		X		
9	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		
10	AFT CLEVIS	ID	0.4375 (11.113)	0.4381 (11.128)	---	0.0050 (0.127)		X	1
	BUSHING	OD	0.4384 (11.135)	0.4390 (11.151)	---		X		

Wear Limits for the Auxiliary Track of the Outboard Leading Edge Slat
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
11	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3115 (7.912)	0.3120 (7.925)	0.3080 (7.823)		X		
12	BUSHING	ID	0.4375 (11.113)	0.4382 (11.130)	0.4420 (11.227)	0.0050 (0.127)	X		
	BUSHING	OD	0.4365 (11.087)	0.4370 (11.100)	0.4332 (11.003)		X		
13	BUSHING	ID	0.3125 (7.938)	0.3130 (7.950)	0.3170 (8.052)	0.0050 (0.127)	X		
	BOLT	OD	0.3110 (7.899)	0.3120 (7.925)	0.3080 (7.823)		X		

1 THIS PART CAN BE REPAIRED.

Wear Limits for the Auxiliary Track of the Outboard Leading Edge Slat
Figure 601 (Sheet 3)

M36772

LEADING EDGE SLAT DRIVE ANGLE GEARBOX - REMOVAL/INSTALLATION

TASK 27-81-15-024-001

1. Remove the Angle Gearbox for the LE Slat

A. Equipment

(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1

(2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:

(3) Circuit Breaker Lockout Clip (Commercially Available)

(a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)

(4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:

(5) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)

B. References

(1) 06-44-00/201, Wing Access Doors and Panels
(2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) 32-00-15/201, Landing Gear Door Locks
(4) 32-00-20/201, Landing Gear Downlocks
(5) 78-31-00/201, Thrust Reverser System

C. Prepare for the Removal

S 044-038

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00).

S 214-003

(2) Make sure the trailing edge (TE) flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.

S 864-039

(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-004

(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 014-005

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

S 864-006

(6) Remove the power from the left hydraulic system (Ref 29-11-00).

S 494-007

(7) Install a PDU lock in the TE flap PDU (Fig. 402).

S 864-008

(8) Open these circuit breakers on the overhead panel P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 864-009

(9) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-010

(10) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-011

(11) Get access to the angle gearbox in the aft end of the forward cargo compartment.

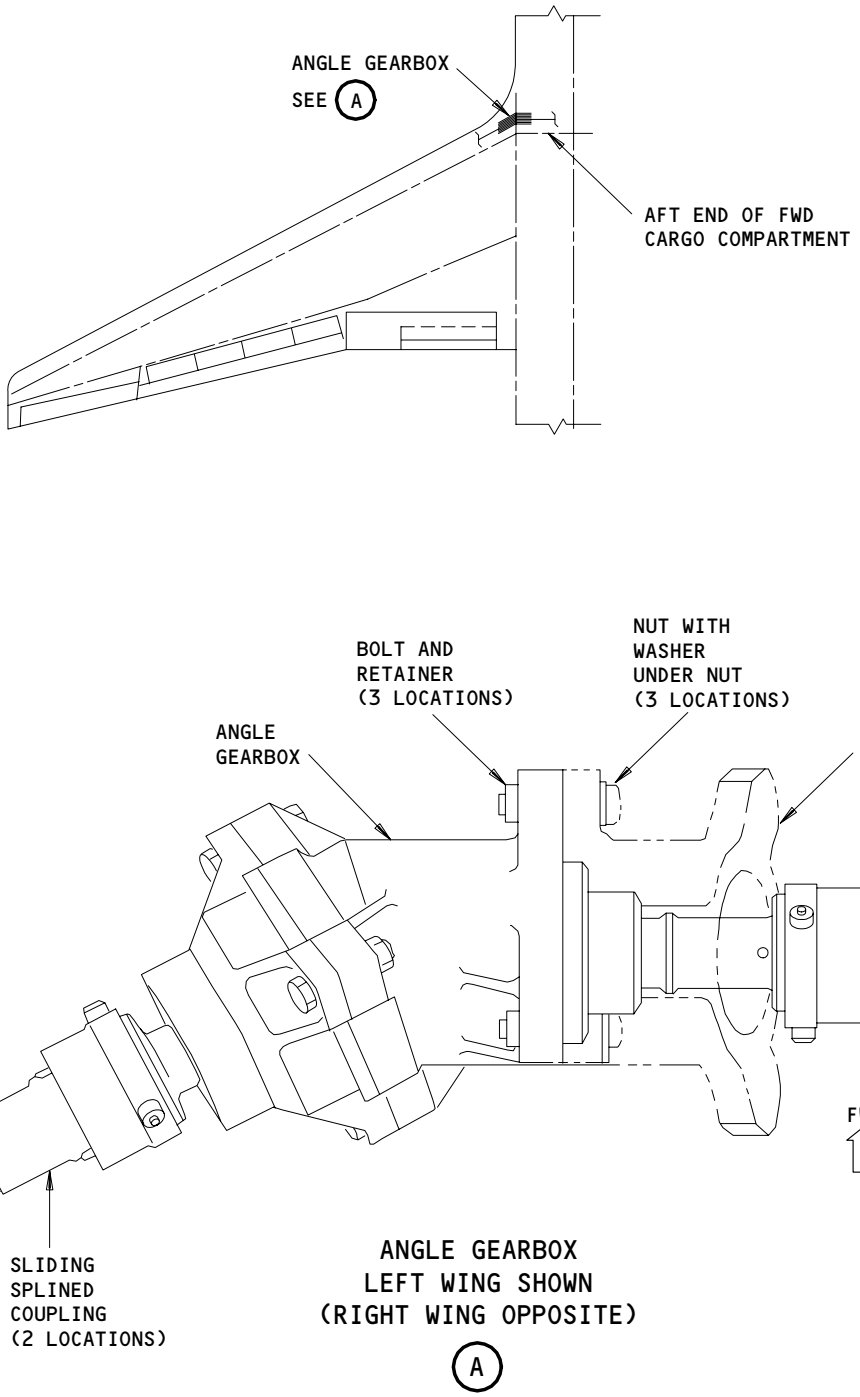
S 014-012

(12) Remove the necessary access panels and open the necessary access doors (Ref 06-44-00).

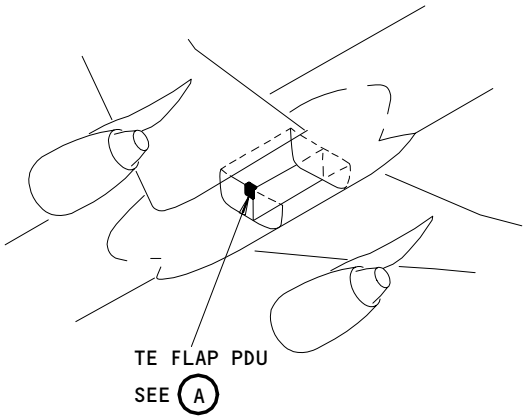
D. Remove the Angle Gearbox (Fig. 401)

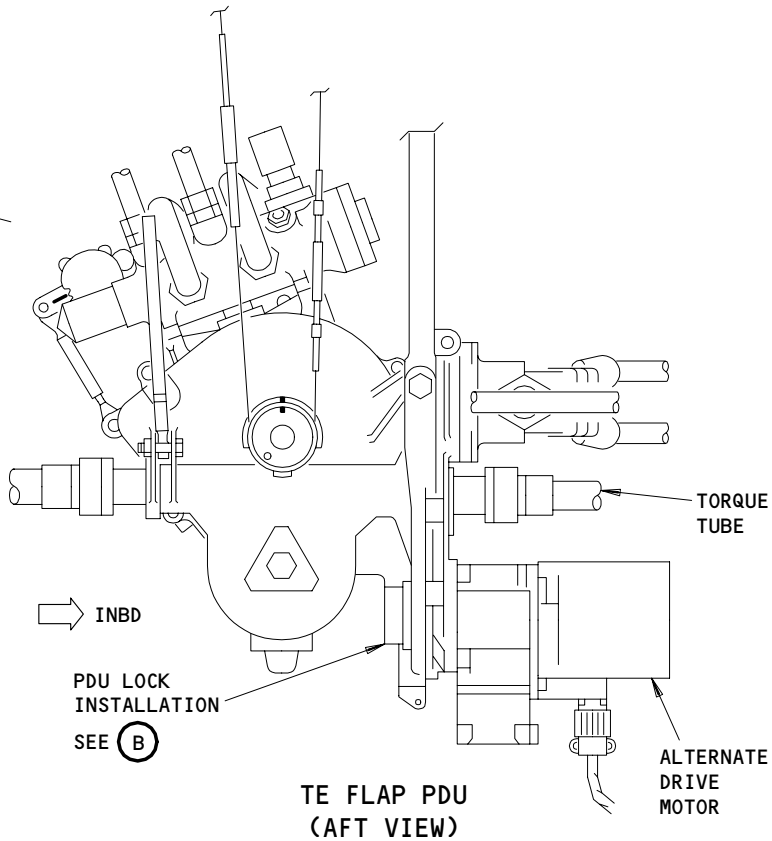
S 824-024

(1) Make an index mark on the adjacent torque tubes to identify the position of the torque tubes.

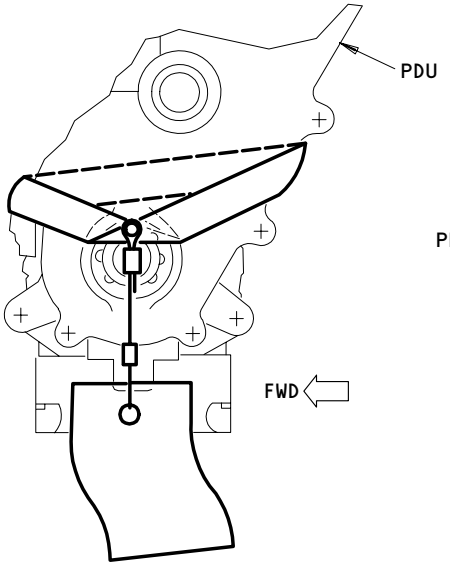


Angle Gearbox for the Leading Edge Slat Drive
Figure 401

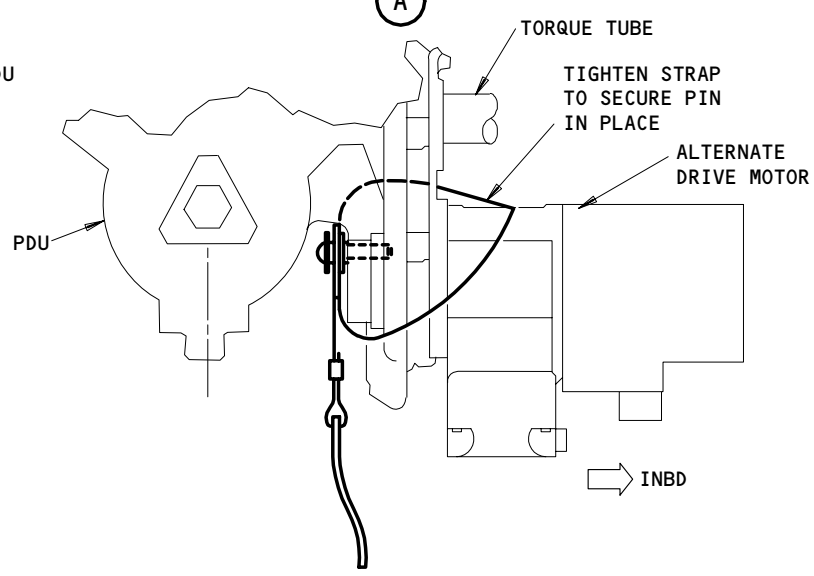




TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

S 024-025
(2) Remove the torque tubes on each side of the angle gearbox (Ref 27-81-20).

NOTE: Do not turn the adjacent torque tubes. You must adjust the slat drive system if the adjacent torque tubes turn (Ref 27-81-00).

S 034-026
(3) Remove the nuts that connect the angle gearbox to the support fitting.

S 024-027
(4) Remove the angle gearbox.

TASK 27-81-15-424-014

2. Install the Angle Gearbox

A. Consumable Materials
(1) C00259 Primer - BMS 10-11, Type 1

B. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-81-00/501, Leading Edge Slat System
(4) 27-81-20/401, Leading Edge Slat Drive Torque Tube
(5) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) 32-00-15/201, Landing Gear Door Locks
(7) 78-31-00/201, Thrust Reverser System

C. Install the Angle Gearbox (Fig. 401)

S 214-028
(1) Make sure the power is removed from the left hydraulic system (Ref 29-11-00).

S 214-029
(2) Make sure the flap/slat alternate drives are off.

S 424-015
(3) Do these steps to install the angle gearbox:
(a) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.
(b) Put the angle gearbox in the correct position to attach it to the support fitting.
(c) Install the nuts that hold the angle gearbox to the support fitting.
(d) Apply primer around the surfaces where the angle gearbox and the support fitting touch.

(e) Do these steps to install the torque tubes on each side of the angle gearbox:
1) Make sure the adjacent torque tubes did not move during the removal or installation procedures of the angle gearbox.
a) Make sure the index marks align.
2) Connect the torque tubes to the angle gearbox (Ref 27-81-20).

NOTE: Do not turn the adjacent torque tubes. You must adjust the slat drive system if the adjacent torque tubes turn (Ref 27-81-00).

(f) At each rotary actuator adjacent to the angle gearbox that you replaced, make sure the clearance between the main track upstop and the rib upstop fitting is 0.07-0.13 inch (1.8-3.3 mm)

S 714-016
(4) Do a test on the angle gearbox installation in the Operational Test for the Angle Gearbox.

D. Operational Test for the Angle Gearbox

S 214-030
(1) Make sure the TE flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 094-031
(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-032
(3) Remove the circuit breaker lock and DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J33, WARN ELEX A

S 864-033
(4) Remove the circuit breaker locks, and these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 214-034
(5) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 864-035
(6) Supply electrical power (Ref 24-22-00).

S 864-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Pressurize the left hydraulic system (Ref 29-11-00).

S 094-037

(8) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 714-018

(9) Do these steps to do a test on the angle gearbox:
   (a) Move the flap control from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.
   (b) Stop in each detent to let the TE flaps and LE slats move to the correct position.
   (c) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

E. Put the Airplane Back to Its Usual Condition

S 414-019

WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (Ref 32-00-15).

S 864-020

(2) Remove the power from the left hydraulic system (Ref 29-11-00).

S 864-021

(3) Remove the electrical power if it is not necessary (Ref 24-22-00).

S 414-022

(4) Install the access panels that you removed and close the access doors that you opened (Ref 06-44-00).

S 444-023

(5) Do the activation procedure for the thrust reverser (Ref 78-31-00).

LEADING EDGE SLAT DRIVE ROTARY ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the rotary actuator for the leading edge (LE) slats. The second task installs the rotary actuator.

TASK 27-81-18-024-001

2. Remove the Rotary Actuator for the LE Slats
   A. Equipment
      (1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27065-1 (Optional Lock/Commercially Available)
          (b) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)

   B. References
      (1) 06-44-00/201, Wing Access Doors and Panels
      (2) 27-81-20/401, Leading Edge Slat Drive Torque Tube
      (3) 27-88-01/401, Leading Edge Slat Position Transmitter
      (4) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) 32-00-15/201, Landing Gear Door Locks
      (6) 32-00-20/201, Landing Gear Downlocks
      (7) 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well
211/212	Control Cabin
510/610	Wing Leading Edge - Forward of the Front Spar and Inboard of the Nacelle Strut
520/620	Wing Leading Edge - Forward of the Front Spar and Outboard of the Nacelle Strut
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 044-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (Ref 78-31-00/201).

S 214-003

(2) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-005

(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20/201).

S 014-006

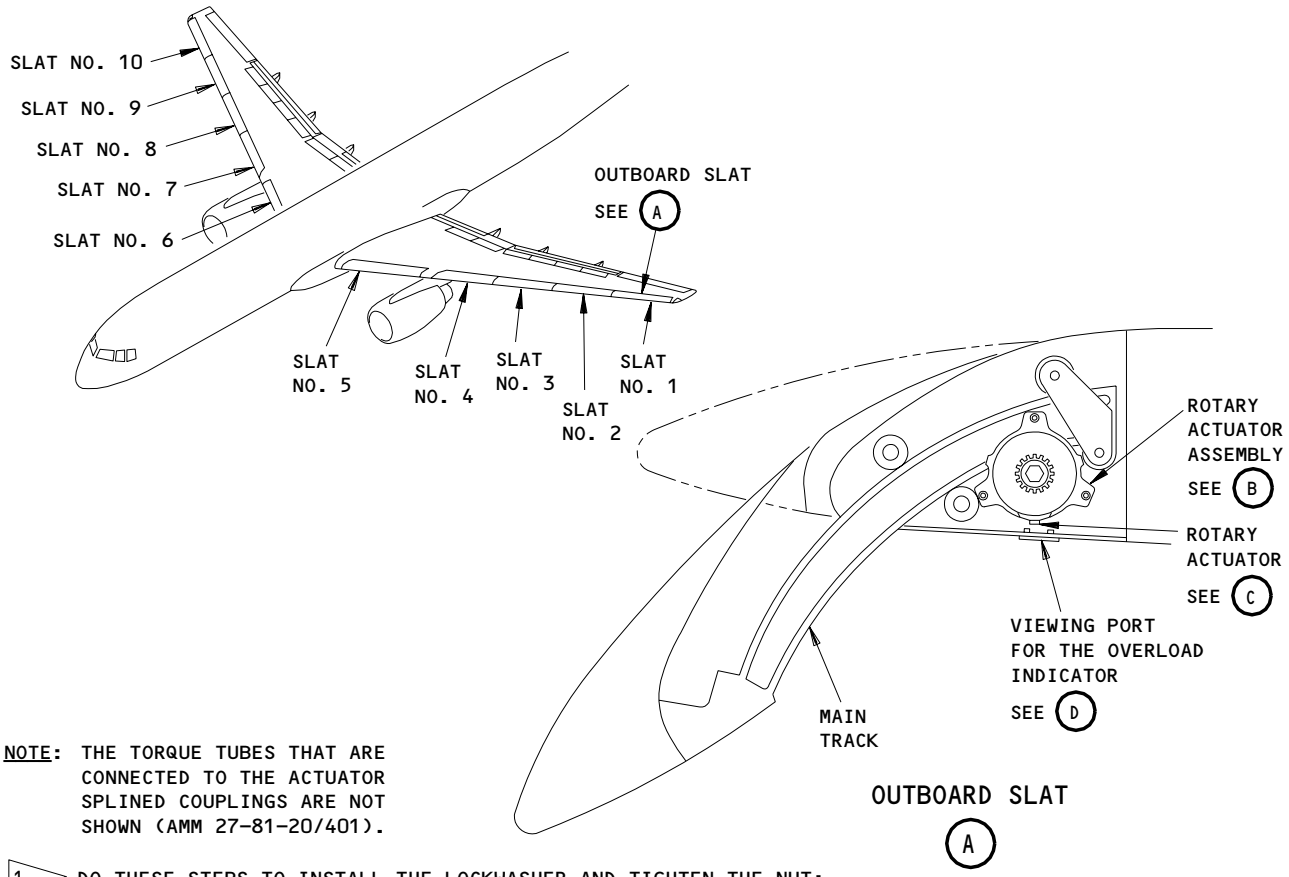
WARNING: OBEY THE PROCEDURE INSTRUCTIONS FOR THE INSTALLATION OF THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-009

(5) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

E. Remove the Rotary Actuator (Fig. 401)



NOTE: THE TORQUE TUBES THAT ARE CONNECTED TO THE ACTUATOR SPLINED COUPLINGS ARE NOT SHOWN (AMM 27-81-20/401).

1 DO THESE STEPS TO INSTALL THE LOCKWASHER AND TIGHTEN THE NUT:

1. MAKE SURE THE TAB IS IN POSITION BEFORE YOU INSTALL THE NUT. THIS WILL MAKE SURE THE TAB DOES NOT DISENGAGE FROM THE KEYWAY BECAUSE OF LATERAL FREE PLAY PERMITTED BY THE WASHER INNER DIAMETER.

2. WHEN YOU TIGHTEN THE NUT, DO NOT LET THE WRENCH FINGERS TOUGH THE WASHER LOCKING TANG.

3. AFTER YOU INITIALLY TIGHTEN THE NUT (APPROXIMATELY 50 POUND-INCHES), MAKE A MARK AND A RECORD OF THE POSITION OF ONE TANG IN RELATION TO THE BEARING RETAINER. IF THIS DISTANCE CHANGES WHILE YOU TIGHTEN THE NUT MORE, THE KEY TAB HAS BEEN DAMAGED AND THE LOCKWASHER MUST BE REPLACED.

4. TIGHTEN THE NUT TO 300 POUND-INCHES MORE THAN THE RUN-ON TORQUE. EXAMINE ONE LOCKING TANG AND NUT SLOT TO MAKE SURE THEY ALIGN. IF THEY DO NOT ALIGN, INCREASE THE TORQUE TO GET THEM ALIGNED. DO NOT USE A TORQUE MORE THAN 500 POUND-INCHES MORE THAN THE RUN-ON TORQUE.

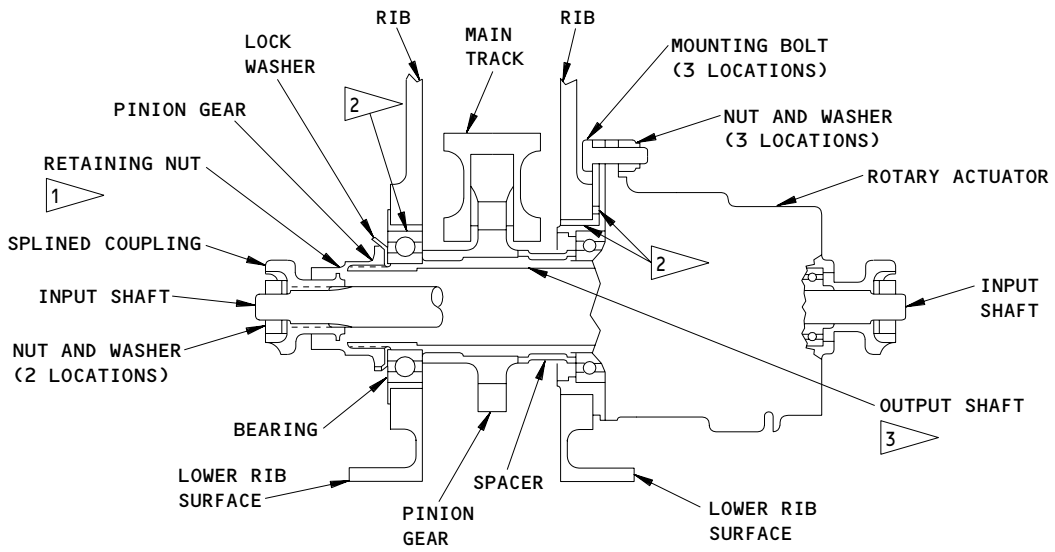
5. USE ONE TANG THAT IS CORRECTLY ALIGNED AND BEND IT INTO THE SLOT TO MAKE SURE THE ENGAGED POSITION IS INSIDE THE NUT OUTER DIAMETER.

6. MAKE SURE THAT THE TANG HAS THE CORRECT CONTAINMENT IN THE NUT SLOT AND THAT THE TANG IS NOT DAMAGED.

2 APPLY GREASE BMS 3-33 (RECOMMENDED) OR BMS 3-24 (OPTIONAL) TO THE INSIDE DIAMETER OF THE RIB BUSHINGS AND THE ACTUATOR FAYING SURFACE BEFORE THE INSTALLATION PROCEDURE.

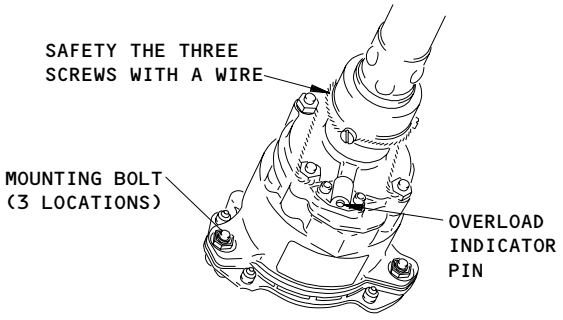
3 APPLY BMS 3-33 GREASE (RECOMMENDED) OR BMS 3-24 GREASE (OPTIONAL) OR BMS 3-27 (MASTINOX 6856K) CORROSION INHIBITER ON THE OUTPUT SHAFT PER INSTRUCTIONS GIVEN IN THE PROCEDURE FOR ROTARY ACTUATOR INSTALLATION.

Rotary Actuator for the Leading Edge Slat Drive
Figure 401 (Sheet 1)



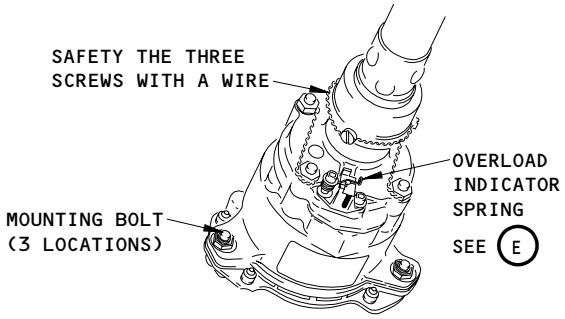
ROTARY ACTUATOR ASSEMBLY

B



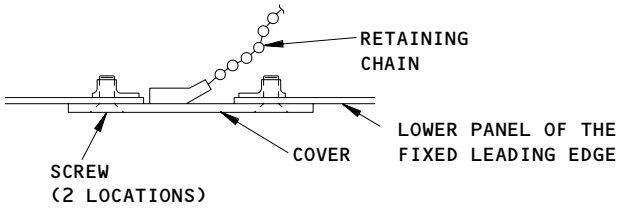
ROTARY ACTUATOR
(ON ROTARY ACTUATORS WITH AN OVERLOAD INDICATOR PIN)

C



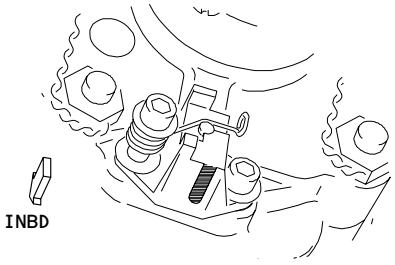
ROTARY ACTUATOR
(ON ROTARY ACTUATORS WITH AN OVERLOAD INDICATOR SPRING)

C



OVERLOAD INDICATOR VIEWING PORT

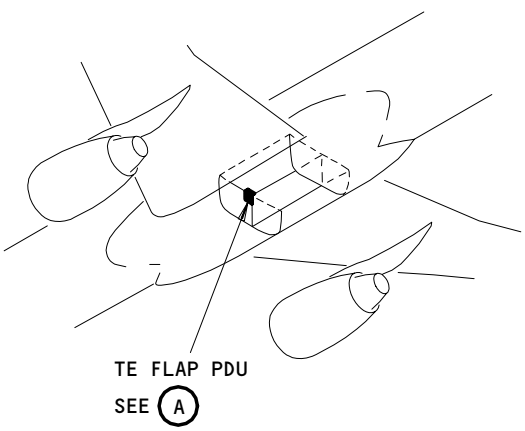
D

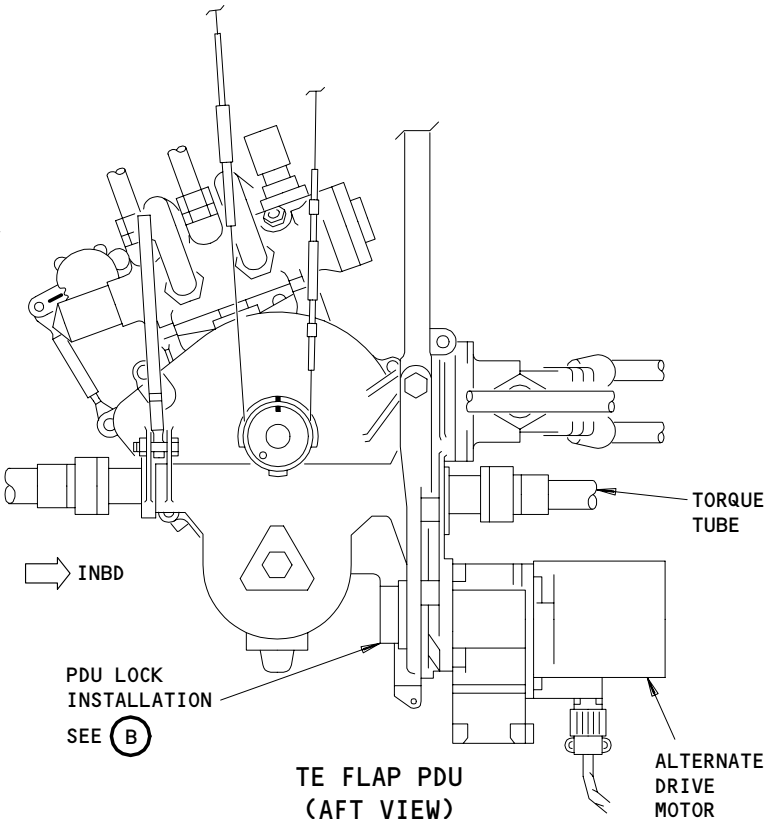


OVERLOAD INDICATOR SPRING
(NON-TRIPPED CONDITION)

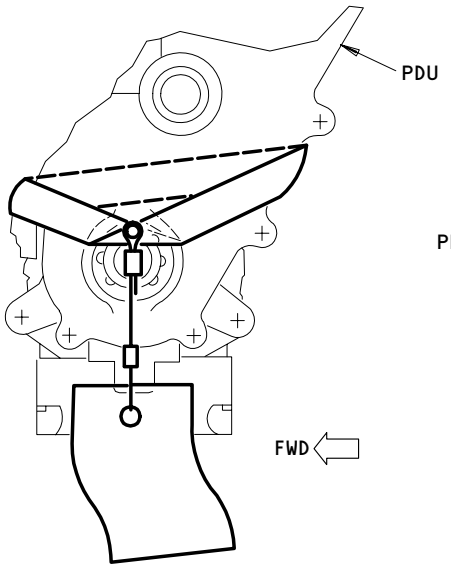
E

Rotary Actuator for the Leading Edge Slat Drive
Figure 401 (Sheet 2)

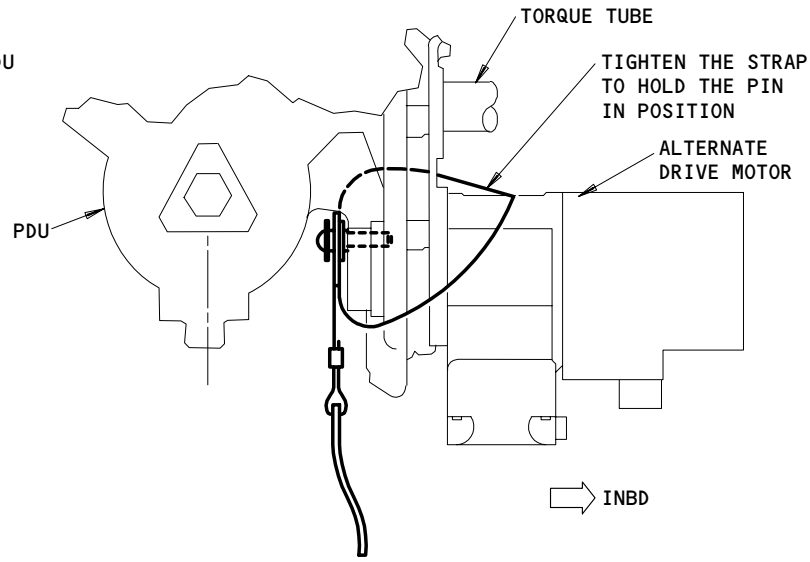




TE FLAP PDU
(AFT VIEW)
A

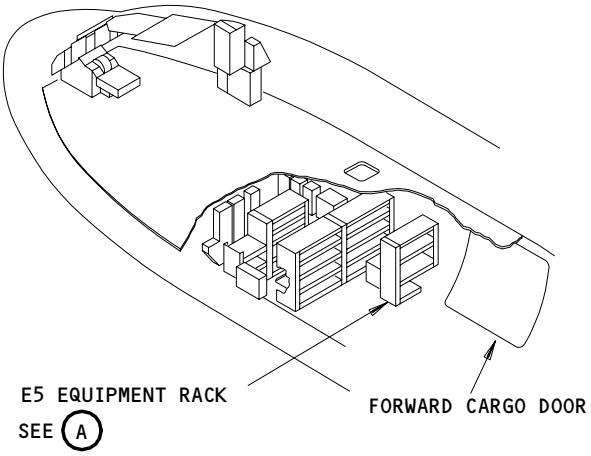


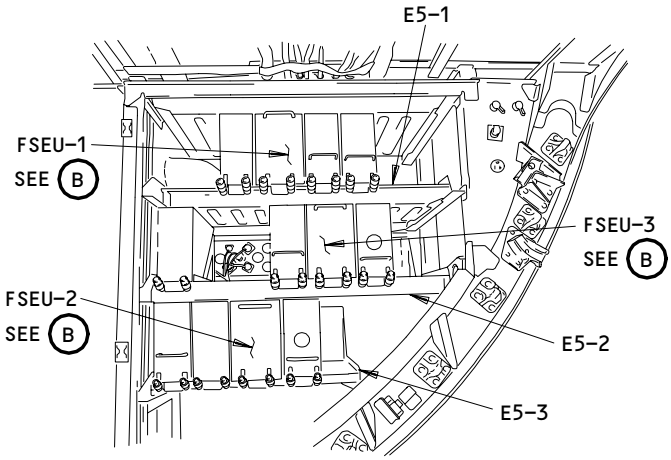
PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



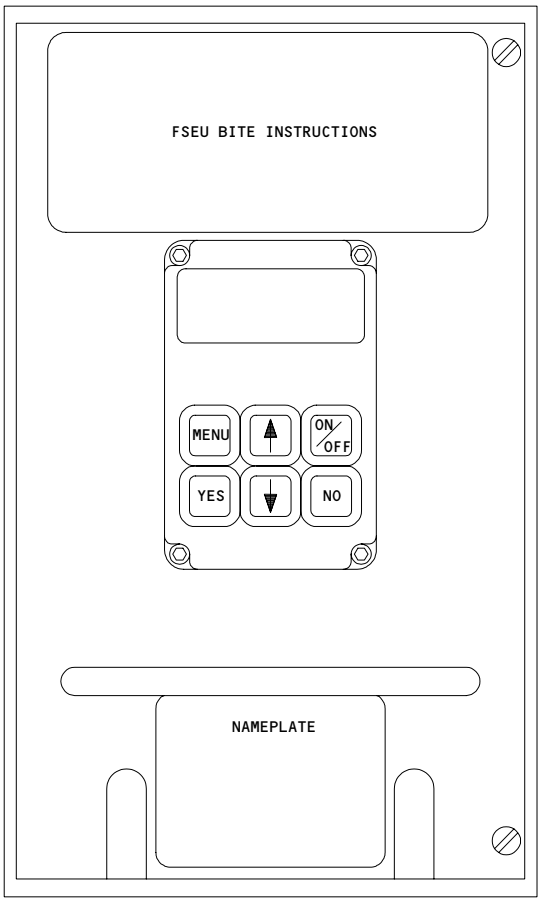
PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402





E5 EQUIPMENT RACK
(AFT VIEW)
A



FSEU
(EXAMPLE)
B

Flap/Slat Electronic Units (FSEU's)
Figure 403

S 864-012

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(1) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 864-014

(2) Move the flap control lever to the 30-unit detent and make sure the TE flaps and LE slats extend fully.

NOTE: The LE SLAT DISAGREE and FLAP ISLN VAL messages will come on.

S 494-015

(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-080

(4) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 864-079

(5) Open these circuit breakers on the (overhead circuit breaker panel) P11 and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DRIVE ARM
(b) 11C18 or 11H14, FLAP/SLAT SHUTOFF 1

S 864-016

(6) Remove the power from the left hydraulic system (Ref 29-11-00/201).

S 494-010

(7) Install a PDU lock on the TE FLAP PDU (Fig. 402).

S 014-017

(8) Remove the access panels below the actuator you need to replace and below the adjacent actuators (Ref 06-44-00/201).

S 294-083

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(9) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 024-018

(10) Do these steps to remove the rotary actuator (Figs. 401 and 403):

(a) use the -40 FSEU to read and record the left and right slat position resolvers from the FSEU-2 (Fig. 403).

(b) If you remove the rotary actuator from the outboard slat No. 1 or No. 10, remove the slat position transmitter (AMM 27-88-01/401).

NOTE: Make sure the input shaft for the position transmitter does not turn during or after the removal procedure.

(c) At the actuator you replace, put the face of a straightedge on the bottom of the main track and move it up until it touches the lower rib surface.

(d) Make a line across the width of the track surface along the top edge of the straightedge.

NOTE: This will give you something to refer to for the rigging procedure of the actuator after it is replaced.

(e) Disconnect the torque tubes from each side of the actuator that is necessary to replace (Ref 27-81-20/401).

NOTE: Disconnect the torque tubes from the adjacent actuators to give a sufficient clearance to remove the actuator.

CAUTION: HOLD THE SPLINED COUPLING WITH AN ADJUSTABLE LOCKING PLIERS WHEN YOU UNTIGHTEN THE NUT. USE PROTECTION TO PREVENT DAMAGE TO THE SPLINED COUPLING FROM THE LOCKING PLIERS.

(f) Remove the nut and washer from the splined coupling (Fig. 401)

NOTE: Remove the nut installed on the input shaft end opposite to the actuator housing side only. Removal of both of the nuts installed at both ends of the input shaft is not required for the removal of the actuator.

NOTE: One option you have besides using an adjustable pliers is to make a female socket (tool aid) from an old torque tube coupling. Another option you have is to use a Snap-On, Model YA826A strap wrench.

(g) Remove the splined coupling.

CAUTION: HOLD THE SPLINED COUPLING WITH AN ADJUSTABLE LOCKING PLIERS WHEN YOU UNTIGHTEN THE RETAINING NUT. USE PROTECTION TO PREVENT DAMAGE TO THE SPLINED COUPLING FROM THE LOCKING PLIERS.

(h) Loosen and remove the retaining nut and the lockwasher.
(i) Loosen and remove the three nuts and washers to remove the outboard slat actuator. Loosen and remove the three nuts, washers and mounting bolts to remove the inboard slat actuator.
(j) Hold the slat drive pinion and remove the actuator.

NOTE: Lightly hit the end of the input shaft, if it is necessary, to remove the actuator.

(k) Remove the slat drive pinion.
(l) Remove the spacer from the rotary actuator.

NOTE: If you can use the pinion spacer from the rotary actuator that you remove, use it in the installation procedure on the new rotary actuator.

TASK 27-81-18-424-019

3. Install the Rotary Actuator for the LE Slats

A. Equipment

(1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
(2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:

(3) Circuit Breaker Lockout Clip
(Commercially Available)
(a) Circuit Breaker Lock - B27020-25
(Optional Lock/Commercially Available)
(4) Circuit Breaker Lock from Lock Set, Flap
Alternate Drive - B27020-29:
(a) Circuit Breaker Lock - B27020-25
(Optional Lock/Commercially Available)

B. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00015 Grease - BMS 3-24 (Alternate)
(3) C00913 Corrosion Inhibiter Mastinox 6856K - BMS 3-27 (Preferred)
(4) C50056 Compound - Non-drying Corrosion Inhibiting Resin Mix -
BMS 3-38 (Alternate)
(5) G50136 Paste - Corrosion Inhibiting Non-drying -BMS 3-38 (Alternate)
(6) G50237 Compound - Corrosion Inhibiting Non-drying Cor-Ban 27L -
BMS 3-38 (Alternate)
(7) A00247 Sealant - BMS 5-95
(8) G02020 Modeling Clay

C. References
(1) 06-44-00/201, Wing Access Doors and Panels
(2) 24-22-00/201, Electrical Power - Control
(3) 27-58-01/501, TE Flap Position Indicating System
(4) 27-81-00/501, Leading Edge Slat System
(5) 27-81-20/401, Leading Edge Slat Drive Torque Tube
(6) 27-88-01/401, Leading Edge Slat Position Transmitter
(7) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) 32-00-15/201, Landing Gear Door Locks
(9) 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones

119/120	Main Equipment Center
143	MLG Wheel Well
211/212	Control Cabin
510/610	Wing Leading Edge - Forward of the Front Spar and Inboard of the Nacelle Strut
520/620	Wing Leading Edge - Forward of the Front Spar and Outboard of the Nacelle Strut
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Rotary Actuator for the LE Slats (Fig. 401)

S 214-020
(1) Make sure the flaps and slats are in the fully extended position.

S 214-021
(2) Make sure the flap and slat drives are off.

S 424-063

(3) Do these steps to prepare for the installation of the rotary actuator:

(a) install the splined coupling as follows:

1) Make sure the splined coupling with the missing tooth is installed on the input shaft spline (on the side opposite to the rotary actuator housing).
2) Make sure the full splined coupling is installed on the rotary actuator (on the housing side of the input shaft).
3) Make sure the splined couplings with nuts and washers are installed at both ends of the input shaft of the rotary actuator.

WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). iF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

(b) Apply grease (on rotary actuators with pinion gears 251N5088/251N5089 -6) or BMS 3-27 (Mastinox 6856K) corrosion inhibiter (on rotary actuators with pinion gears 251N5088/251N5089 -1 thru -5) to the full length of the internal pinion gear spline and to the full length of the spacer inside diameter.

NOTE: BMS 3-27 (Mastinox 6856K) is used to prevent dissimilar metal corrosion.

(c) On a rotary actuator with pinion gears 251N5088/251N5089 -1, or or -2, or -3, turn the input shaft until the drain hole and the line you made align with the center of the three drain holes on the housing.

NOTE: This will help engage the pinion gear with the spline area on the output shaft that does not have a spline tooth.

(d) On a rotary actuator with pinion gears 251N5088/251N5089 -4, turn the input shaft until the missing spline tooth on the output shaft aligns with the center of the three drain holes on the housing.

(e) On a rotary actuator with pinion gears 251N5088/251N5089 -1, -2 or -3 clean the output shaft of the rotary actuator and make an axial line with a felt tip marker along the length of the output shaft that goes through the drain hole.

(f) On a rotary actuator with pinion gears 251N5088/251N5089 -4, clean the hub of the pinion gear and using a felt tip marker make an axial mark on the hub of the pinion gear to show the location of the missing spline tooth-space.

WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

(g) Clean the output shaft and apply a light layer of BMS 3-27 (Mastinox 6856K) corrosion inhibiter to the external splines of the output shafts on rotary actuators with steel pinion gears (251N5088/251N5089 -1, -2, -3, -4 and -5), or grease on rotary actuators with stainless steel pinion gears 251N5088/251N5089 -6.

NOTE: BMS 3-27 (Mastinox 6856K) is recommended to prevent dissimilar metal corrosion.

(h) On rotary actuators with pinion gears 251N5088/251N5089 -1, -2, and -3 fill the pinion gear drain holes with BMS 5-95 sealant.

(i) On rotary actuators with pinion gears 251N5088/251N5089 - 1, -2, and -3 make sure that you can still see the alignment mark.

(j) Install the pinion gear spacer.

NOTE: If you can use the pinion gear spacer from the rotary actuator that you removed, install that pinion gear spacer on the new rotary actuator.

(k) On rotary actuators with pinion gears 251N5088/251N5089-4 and -5, reduce the amount of BMS 3-27 (Mastinox 6856K) that is permitted to go through the output shaft drain hole.

(l) On rotary actuators with pinion gears 251N5088/251N5089-4 and -5, clean excess of BMS 3-27 (Mastinox 6856K) from any bearing surface such as shields, seals or seal retainer, except the bearing outside/inside diameter and remove it from surfaces that will be lubricated.

(m) Apply grease to the rib bushing/actuator bearing interface, to the rib surface/actuator body flange interface, and to the rib bushing/actuator body bore interface.

S 424-064

(4) Do these steps to install the rotary actuator and the slat drive pinion (View B):

(a) On a rotary actuator with pinion gears 251N5088/251N5089 -1, -2, or -3, hold the pinion gear and bearing shield between the ribs with the drain hole pointed down in a position that you can see the pinion drain hole.

(b) On a rotary actuator with pinion gears 251N5088/251N5089 -4, hold the pinion gear and bearing shield between the ribs in a position that you can see the pinion hub alignment mark.

(c) On a rotary actuator with pinion gears 251N5088/251N5089 -5 or -6, hold the pinion gear and bearing shield between ribs.

(d) On a rotary actuator with pinion gears 251N5088/251N5089 -1, 2, or -3, move the rotary actuator to its position and align the line on the output shaft with the drain hole of the pinion gear.

(e) On a rotary actuator with pinion gears 251N5088/251N5089 -4, move the rotary actuator to its position and align the mark on the pinion gear hub with the missing spline tooth on the output shaft.

(f) Turn the input shaft until you can install the three mounting bolts.

NOTE: The rotary actuator housing will turn in the same direction the input shaft does.
The actuator will seat against its mounting bracket when the spline and mounting holes are correctly aligned.

(g) On rotary actuators with pinion gears 251N5088/251N5089-4 and -5, clean excess of BMS 3-27 (Mastinox 6856K) from any bearing surface such as shields, seals or seal retainer, except the bearing outside/inside diameter and remove it from surfaces that will be lubricated.

CAUTION: DO NOT USE FORCE WHEN YOU START TO ENGAGE THE SPLINE OR THE MOUNTING BOLTS. NO SIGNIFICANT FORCE IS REQUIRED TO PROPERLY INSTALL THE ACTUATOR. FORCING THE INSTALLATION INTO PLACE IS AN INDICATION OF MISALIGNMENT. THIS CAN CAUSE DAMAGE TO THE COMPONENTS.

(h) Install the outboard slat actuator with three washers and nuts on the mounting bolts. Install the inboard slat actuator with three washers, nuts and mounting bolts.

NOTE: If it is necessary, lightly hit the rotary actuator until the mounting face touches the rib.

(i) Tighten the nuts to 50-80 pound-inches (5.7-9.0 Nm).

(j) Install the lockwasher and the retaining nut per the flag note instructions given in Fig. 401.

CAUTION: HOLD THE SPLINED COUPLING WITH AN ADJUSTABLE LOCKING PLIERS WHEN YOU TIGHTEN THE RETAINING NUT. USE PROTECTION TO PREVENT DAMAGE TO THE SPLINED COUPLING FROM THE LOCKING PLIERS.

(k) Tighten the retainer nut.
(l) Grease the input shaft spline near the output shaft.
(m) Install the spline coupling and the nut.

CAUTION: HOLD THE SPLINED COUPLING WITH AN ADJUSTABLE LOCKING PLIERS WHEN YOU TIGHTEN THE NUT. USE PROTECTION TO PREVENT DAMAGE TO THE SPLINED COUPLING FROM THE LOCKING PLIERS.

(n) Tighten the nut to 290-370 pound-inches (32.8-41.8 Nm).

NOTE: One option you have besides using an adjustable locking pliers is to make a female socket (tool aid) from an old torque tube coupling. Another option you have is to use a Snap-On, Model YA826A strap wrench.

(o) Put the straightedge on the track and move it up until it touches the ribs.
(p) Turn the input shaft until the line you made on the main track during the removal procedure aligns with the straightedge.

S 704-052
(5) Use the -40 FSEU to examine the resolver position on the opposite wing of the replaced rotary actuator (Fig. 403).

S 824-066
(6) Do these steps if the resolver position (on the opposite wing of the replaced rotary actuator) is not at the initial position you recorded during the removal procedure:
(a) Push the arming switch on the slat alternate drive to arm the slat alternate drive (switch light will come on).
(b) Turn the torque tube that is connected to the adjacent rotary actuator on the inboard side until you get the initial resolver position.
(c) Push the arming switch on the slat alternate drive to disarm the slat alternate drive (switch light will go off).

S 434-025
(7) Attach each end of the torque tube on the inboard side of the replaced rotary actuator with one screw in each splined coupling (Ref 27-81-20/401).

NOTE: Do not turn the adjacent rotary actuators. If the slat drive adjustment moved, you must adjust the LE slat drive (Ref 27-81-00/501).

S 704-056
(8) Use the -40 FSEU to examine the resolver position on the same wing as the replaced rotary actuator (Fig. 403).

S 214-071
(9) Do this step if the resolver (on the same wing as the replaced rotary actuator) is not at the position you made a record of during the removal procedure:
(a) Turn the torque tube that is connected to the adjacent rotary actuator on the outboard side until you get the initial resolver position.

NOTE: It is not necessary to arm the slat alternate drive system because the PDU does not turn when you turn this torque tube.

S 434-027
(10) Attach each end of the torque tube on the outboard side of the replaced rotary actuator with one screw in each splined coupling.

S 424-028
(11) If you replaced the rotary actuator at the outboard slat No. 1 or No. 10, install the slat position transmitter (Ref 27-88-01/401).

S 824-029
(12) If you install the slat position transmitter, do the adjustment and the test on the position transmitter for the LE slat (Ref 27-58-01/501).

S 094-030
(13) Remove the PDU lock from the TE flap PDU (Fig. 402).

F. Rotary Actuator Adjustment

S 094-031
(1) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-032

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(2) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 864-033

(3) Move the flap control lever to the 1-unit detent and let the flaps and slats move to the 1-unit position.

S 864-065

(4) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 824-034

(5) Do these steps to adjust the rotary actuator:
   (a) Clean the slat upstops to remove the grease on the surface.
   (b) Put a ball of clay (.5 inch in diameter) on the slat upstops.
      1) Make the clay flat with your hands to approximately .25 inch thickness.
      2) Make sure the clay is in a position where it will touch the track stop fittings that are mounted on the rib.
      3) Make sure the clay stays on the slat upstops.
      4) Put a thin layer of grease on the clay surfaces that will touch the track stop fittings.

   WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

   (c) Pressurize the left hydraulic system (Ref 29-11-00/201).
   (d) Move the flap control lever to the zero (FLAPS UP) detent and let the flaps and slats move to the fully retracted position.
   (e) Move the flap control lever to the 1-unit detent and let the flaps and slats move to the 1-unit position.
   (f) Remove power from the left hydraulic system (AMM 29-11-00/201).
   (g) Measure the clay thickness.
      1) Make sure the thickness is 0.10 ±0.03 inch (2.5 +/- 0.76 mm).
   (h) If the upstop clearance (clay thickness) is not correct, do these steps to correct the adjustment:
      1) Put the face of a straightedge on the bottom of the main track and move it up until it touches the lower rib surface.

2) Use a sharp pencil to draw a line on the main track surface along the top edge of the straightedge.
   a) Disconnect the torque tubes adjacent to rotary actuator that was replaced.
   b) Turn the input shaft of the rotary actuator the number of turns that are necessary to get the correct adjustment.

      NOTE: Table 401 gives the linear displacement of each track; for the listed slats, per turn of the input shaft of the rotary actuator.

TABLE 401	
SLAT NUMBER	DISTANCE MOVED AT THE SLAT UPSTOP FOR EACH FULL TURN OF THE INPUT SHAFT
1, 2, 9, or 10	.0577 INCH
3, 4, 7, or 8	.0580 INCH
5, or 6	.0774 INCH

   c) At the same time, monitor the line you made on the bottom of the main track with the flaps in the 1-unit position.
   d) If the thickness of the clay is too large, make sure the line moves in the direction of the actuator.
   e) If the thickness of the clay is too small, make sure the line moves away from the actuator.
3) Remove all of the clay from the slat upstops.

S 434-035
(6) Install the screws in the splined couplings.

S 434-036
(7) Safety them with a wire.

S 434-077
(8) ROTARY ACTUATORS WITH A PIN OVERLOAD INDICATOR;
push the pin on the rotary actuator with approximately 2 pounds (0.9 Kg) to set the overload indicator.

S 434-078
(9) ROTARY ACTUATORS WITH A SPRING OVERLOAD INDICATOR;
push the spring back until it sets behind the pin.

G. Operational Test for the Rotary Actuator

S 864-037
(1) Supply electrical power (Ref 24-22-00/201).

S 214-038
(2) Make sure the arming switches for the flap and slat alternate drives on the first officer's instrument panel, P3, are not in the armed position (switch lights will be off).

S 214-039
(3) Make sure the selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 214-040
(4) Make sure the five EICAS circuit breakers, on the P11 panel, are closed.

S 094-041
(5) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 294-084

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(6) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 864-042

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(7) Pressurize the left hydraulic system (Ref 29-11-00/201).

S 864-043
(8) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent, and from the 30-unit to the zero detent and do these checks:
(a) Stop in each position and make sure the flaps and slats move to the correct position.
(b) Make sure the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS messages show on the display.
(c) Make sure the slats extend and retract smoothly.

(d) ROTARY ACTUATORS WITH AN PIN OVERLOAD INDICATOR;
make sure the overload indicator pin on the new rotary actuator did not come on.

NOTE: An overload indicator pin will be above the outer adjacent housing or the red part of the pin will show if it comes on.

(e) ROTARY ACTUATORS WITH AN SPRING OVERLOAD INDICATOR;
make sure the overload indicator spring on the new rotary actuator did not come on.

NOTE: An overload indicator spring will be aligned with the black mark on the rotary actuator housing if the overload indicator came on.

H. Put the Airplane Back to Its Usual Condition

S 864-044
(1) Remove the power from the left hydraulic system (Ref 29-11-00/201).

S 864-045
(2) Remove the DO-NOT-CLOSE tags and the circuit breaker locks and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A
(d) 11H23, FLAP/SLAT ALTN DR ARM
(e) 11C18 or 11H14, FLAP/SLAT SHUTOFF 1

S 864-046
(3) Remove the circuit breaker locks and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 414-047

WARNING: OBEY THE PROCEDURE INSTRUCTIONS FOR THE REMOVAL OF THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 864-048
(5) Remove the electrical power if it is not necessary (Ref 24-22-00/201).

S 414-049
(6) Install the access panels that you removed (Ref 06-44-00/201).

S 444-050

(7) Do the activation procedure for the thrust reverser (Ref 78-31-00/201).

LEADING EDGE SLAT DRIVE ROTARY ACTUATOR - INSPECTION/CHECK

1. General
   A. This procedure gives instruction to make an inspection of the rotary actuators for the leading edge (LE) slat. This section gives no procedure for the access, removal, or replacement of the components you will examine.

TASK 27-81-18-706-001

2. Inspection of the Rotary Actuator
   A. General
      (1) This task helps you find the rotary actuator that caused the LE SLAT DISAGREE message on the EICAS display. This procedure is to be used only when the problem occured as the slats extended.
      (2) You can use this procedure if a -32 (Mod A or B), -37 (Mod A or B), or a -40 FSEU was in the FSEU-1 position (in the E-5 Equipment Rack) when the problem occurred. If you had a FSEU other than the ones listed above in the FSEU-1 position (when the problem was recorded), you can not use this procedure.
      (3) This procedure uses the fact that the FSEU can measure the angle that the torque tube turns when the PDU supplies a constant torque. The torque tube wind-up (ground wind-up angle) is related to the PDU output torque and the length of the torque tube between the PDU and the defective rotary actuator. This procedure gives instructions to calculate the ground wind-up and from a table you can find the defective rotary actuator.
      (4) If a rotary actuator is found in the "tripped" condition and there is no history of L/E DISAGREE message on EICAS, then you do not need to remove or replace the rotary actuator. Reset the rotary actuator trip indicator and cycle the slats to make sure that the actuator indicator does not get tripped again.
   B. Equipment
      (1) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-28:
         (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (2) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-20:
         (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (3) Lockout Tool for the Outboard Actuator - B27073-1
   C. References
      (1) 27-81-18/401, Leading Edge Slat Drive Rotary Actuator
      (2) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) 32-00-15/201, Landing Gear Door Locks
      (4) 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zones

143	MLG Wheel Well
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Prepare for the Inspection

S 296-073

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 216-002
(2) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 496-003
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 216-004
(4) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

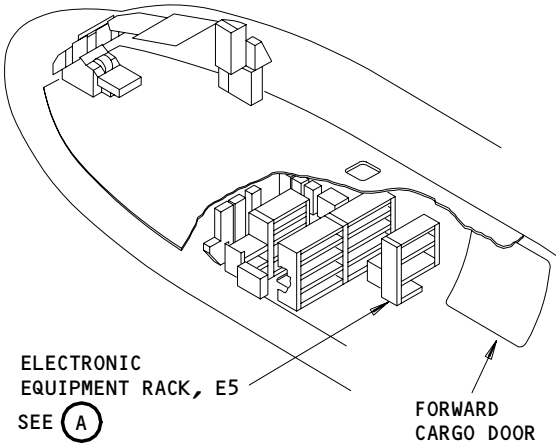
S 016-005

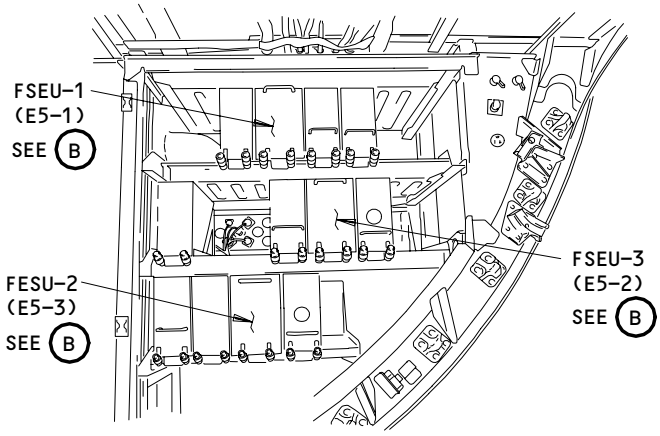
WARNING: USE AMM 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (Ref 32-00-15).

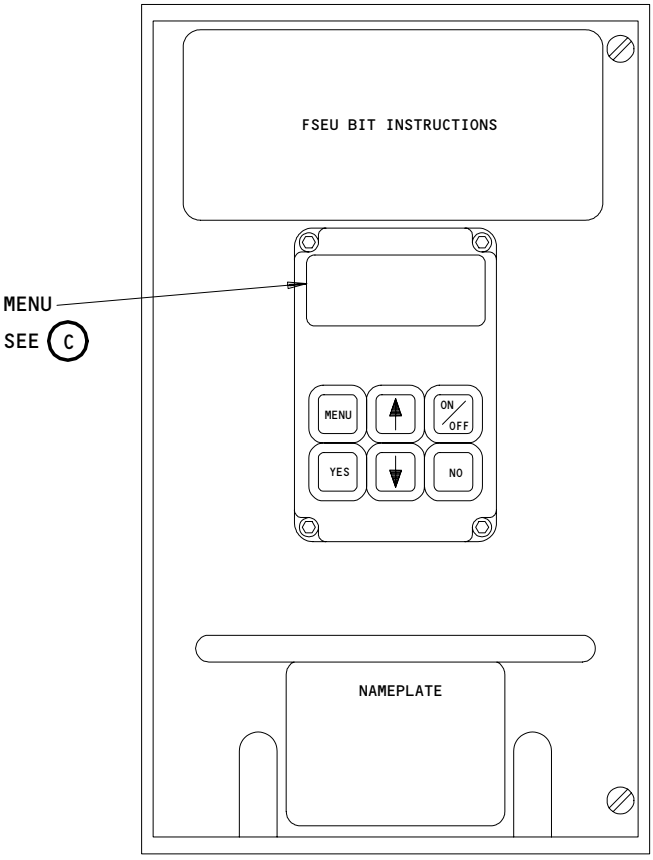
S 866-006
(6) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 866-007
(7) Open this circuit breaker on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR ARM



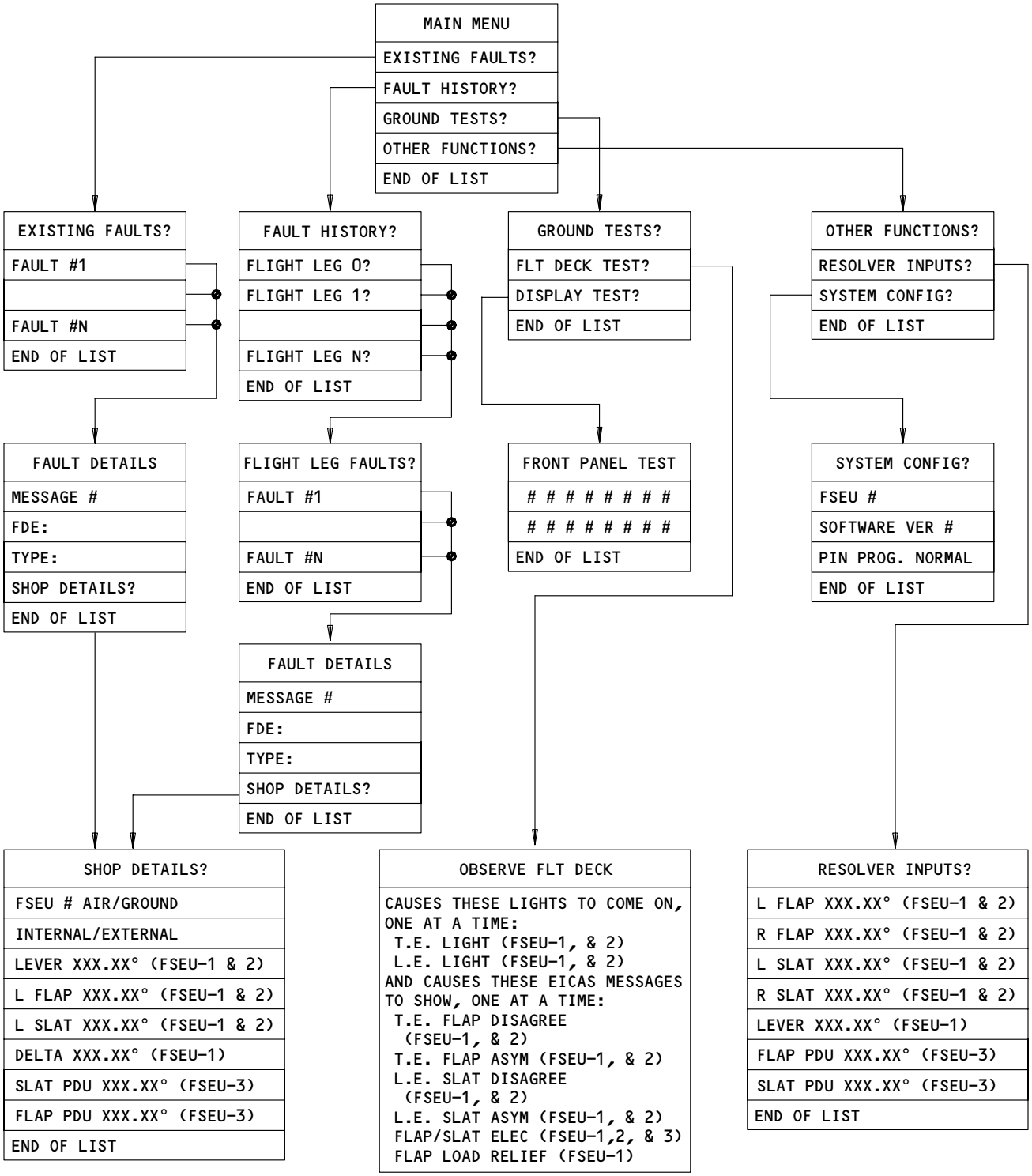


ELECTRONIC EQUIPMENT RACK, E5
(AFT VIEW)
A



FSEU (EXAMPLE)
B

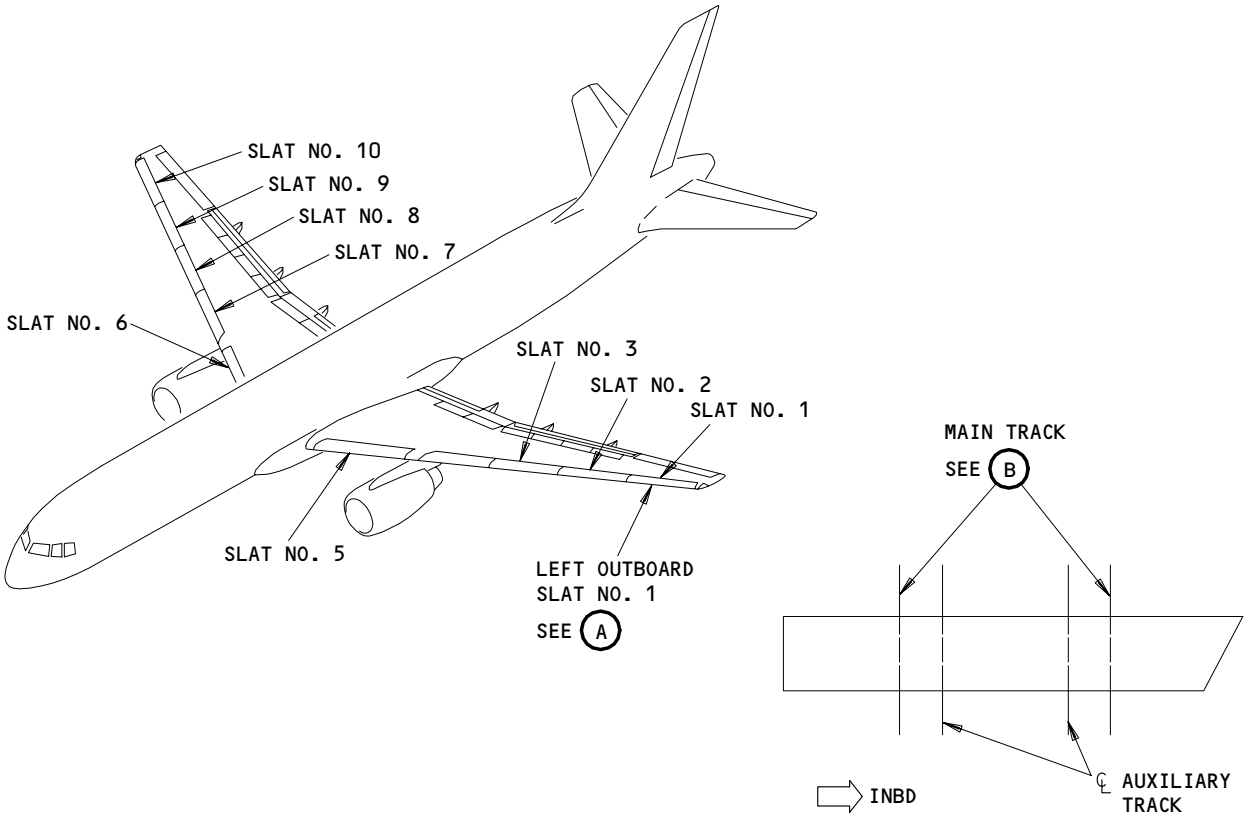
Flap/Slat Electronic Units (FSEUs)
Figure 601 (Sheet 1)



-40 FSEU MENU OUTLINE

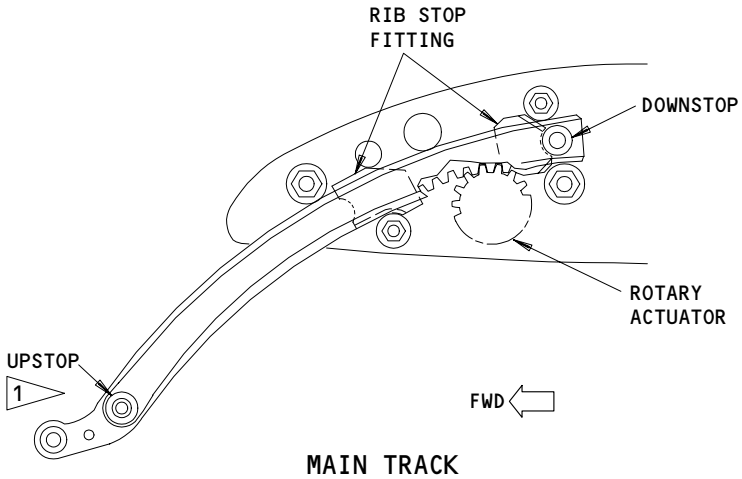
(C)

Flap/Slat Electronic Units (FSEUs)
Figure 601 (Sheet 2)



OUTBOARD SLAT
PLAN VIEW
(NO. 1 SHOWN, NO. 10 OPPOSITE)

A



MAIN TRACK

B

1 REMOVE THE UPSTOP AND INSTALL THE LOCKOUT TOOL IN THIS LOCATION

Tool Installation
Figure 602

DEFECTIVE ROTARY ACTUATORS (LEFT WING)										
	GROUND WIND-UP ANGLE (MEASURED WITH A LOCKOUT ROTARY ACTUATOR NO. 1)									
	-0.84 TO -0.92		-0.93 TO -1.01		-1.02 TO -1.10		-1.11 TO -1.18		-1.19 TO -1.27	
IN-FLIGHT ANGLE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE
0.04 TO -0.04	10	--	10	--	10	--	10	--	10	--
-0.05 TO -0.13	9,10	8	9,10	8	9,10	8	9,10	8	10	9
-0.14 TO -0.22	8,9	7,10	9	8,10	9,10	8	9,10	8	9,10	8
-0.23 TO -0.30	7,8	6,9	8,9	7,10	8,9	7,10	8,9	7,10	9	8,10
-0.31 TO -0.39	6,7	5,8	7	6,8	7,8	6,9	8	7,8	8,9	7,10
-0.40 TO -0.48	4,5	3,6	5,6	4,7	6,7	5,8	7	6,8	7,8	6,9
-0.49 TO -0.57	2,3	1,4	4	3,5	5	4,6	6	5,7	6,7	5,8
-0.58 TO -0.66	1,2	3	2,3	1,4	4	3,5	4,5	3,6	5,6	4,7
-0.67 TO -0.74	1	2	1,2	3	2,3	1,4	3,4	2,5	4,5	3,6
-0.75 TO -0.83	1	--	1	2	1,2	3	2,3	1,4	3,4	2,5
-0.84 TO -0.92			1	--	1	2	1,2	3	2,3	1,4
-0.93 TO -1.01					1	--	1	2	1,2	3
-1.02 TO -1.10							1	--	1	2
-1.11 TO -1.18									1	--
-1.19 TO -1.27										
-1.28 TO -1.36										
-1.37 TO -1.49										
-1.50 TO -1.63										

(CONTINUED)

Rotary Actuator Replacement with the Delta Shutdown Angle
Figure 603 (Sheet 1)

DEFECTIVE ROTARY ACTUATORS (LEFT WING) (CONT)								
	GROUND WIND-UP ANGLE (MEASURED WITH A LOCKOUT ROTARY ACTUATOR NO. 1)							
	-1.28 TO -1.36		-1.37 TO -1.45		-1.46 TO -1.54		-1.55 TO -1.63	
IN-FLIGHT ANGLE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE
0.04 TO -0.04	10	--	10	--	10	--	10	--
-0.05 TO -0.13	10	9	10	9	10	--	10	--
-0.14 TO -0.22	9,10	8	9,10	8	9,10	8	10	9
-0.23 TO -0.30	9	8,10	9,10	8	9	8,10	9,10	8
-0.31 TO -0.39	8,9	7,10	8,9	7,10	8,9	7,10	9	8,10
-0.40 TO -0.48	8	7,9	8,9	7,10	8,9	7,10	8,9	7,10
-0.49 TO -0.57	7	6,8	7,8	6,9	8	7,9	8	7,9
-0.58 TO -0.66	6,7	5,8	6,7	5,8	6,7	5,8	7	6,8
-0.67 TO -0.74	5	4,6	6	5,7	6	5,7	6	5,7
-0.75 TO -0.83	4,5	3,6	4,5	3,6	4,5	3,6	5,6	4,7
-0.84 TO -0.92	3	2,4	4	3,5	4	3,5	4,5	3,6
-0.93 TO -1.01	2	1,3	3	2,4	2,3	1,4	4	3,5
-1.02 TO -1.10	1,2	3	2	1,3	2	1,3	2,3	1,4
-1.11 TO -1.18	1	2	1,2	3	1,2	3	2	1,3
-1.19 TO -1.27	1	--	1	2	1,2	3	1,2	3
-1.28 TO -1.36			1	--	1	2	1,2	3
-1.37 TO -1.49					1	--	1	2
-1.50 TO -1.63						--	1	

Rotary Actuator Replacement with the Delta Shutdown Angle
Figure 603 (Sheet 2)

DEFECTIVE ROTARY ACTUATORS (RIGHT WING)												
	GROUND WIND-UP ANGLE (MEASURED WITH A LOCKOUT ROTARY ACTUATOR NO. 20)											
	0.93 TO 1.01		1.02 TO 1.10		1.11 TO 1.18		1.19 TO 1.27		1.28 TO 1.36		1.37 TO 1.45	
IN-FLIGHT ANGLE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE
0.05 TO 0.13	11	--	11	--	11	--	11	--	11	--	11	--
0.14 TO 0.22	11	12	11	12	11	12	11	12	11		11	--
0.23 TO 0.30	11,12	13	11,12	13	11	12	11	12	11		11	12
0.31 TO 0.39	12,13	11,14	12	13,14	11,12	13	11,12	13	11,12	13	11	12
0.40 TO 0.48	13,14	12,15	13	12,14	12,13	11,14	12,13	11,14	12	11,13	11,12	13
0.49 TO 0.57	15,16	14,17	14,15	13,16	13,14	12,15	13	12,14	12,13	11,14	12,13	11,14
0.58 TO 0.66	17	16,18	15,16	14,17	14,15	13,16	14	13,15	13,14	12,15	13	12,14
0.67 TO 0.74	19	18,20	17,18	16,19	16,17	15,18	15	14,16	14,15	13,16	13,14	12,15
0.75 TO 0.83	20	19	19	18,20	17	16,18	16,17	15,18	15,16	14,17	14,15	13,16
0.84 TO 0.92	20	--	20	19	19	18,20	18	17,19	17	16,18	16	15,17
0.93 TO 1.01	20	--	20	--	20	19	19,20	18	18	17,19	17	16,18
1.02 TO 1.10			20	--	20	--	20	19	19,20	18	18,19	17,20
1.11 TO 1.18					20	--	20	--	20	19	19,20	18
1.19 TO 1.27							20	--	20	--	20	19
1.28 TO 1.36									20	--	20	--
1.37 TO 1.45											20	--
1.46 TO 1.54												
1.55 TO 1.62												
1.63 TO 1.71												
1.72 TO 1.80												
1.81 TO 1.89												

(CONTINUED)

Rotary Actuator Replacement with the Delta Shutdown Angle
Figure 604 (Sheet 1)

DEFECTIVE ROTARY ACTUATORS (RIGHT WING) (CONT)										
	GROUND WIND-UP ANGLE (MEASURED WITH A LOCKOUT ROTARY ACTUATOR NO. 20)									
	1.46 TO 1.54		1.55 TO 1.62		1.63 TO 1.71		1.72 TO 1.80		1.81 TO 1.89	
IN-FLIGHT ANGLE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE	FIRST ALTER-NATIVE	SECOND ALTER-NATIVE
0.05 TO 0.13	11	--	11	--	11	--	11	--	11	--
0.14 TO 0.22	11	--	11	--	11	--	11	--	11	--
0.23 TO 0.30	11	12	11	12	11	--	11	--	11	--
0.31 TO 0.39	11	12	11	12	11	12	11	12	11	12
0.40 TO 0.48	11,12	13	11,12	13	11	12	11	12	11	12
0.49 TO 0.57	12	11,13	11,12	13	11,12	13	11,12	13	11,12	13
0.58 TO 0.66	12,13	11,14	12,13	11,14	12,13	11,14	12	11,13	12	11,13
0.67 TO 0.74	13,14	12,15	13	12,14	13	12,14	12,13	11,14	12,13	11,14
0.75 TO 0.83	14,15	13,16	13,14	12,15	13,14	12,15	13,14	12,15	13	12,14
0.84 TO 0.92	15	14,16	14,15	13,16	14,15	13,16	14	13,15	13,14	12,15
0.93 TO 1.01	16,17	15,18	15,16	14,17	15,16	14,17	14,15	13,16	14	13,15
1.02 TO 1.10	17,18	16,19	16,17	15,18	16,17	15,18	16	15,17	14,15	13,16
1.11 TO 1.18	18,19	17,20	17,18	16,19	17	16,18	16,17	15,18	15	14,16
1.19 TO 1.27	19,20	18	18,19	17,20	18,19	17,20	17,18	16,19	15,16	14,17
1.28 TO 1.36	20	19	19,20	18	19	18,20	18,19	17,20	16,17	15,18
1.37 TO 1.45	20	--	20	19	19,20	18	19	18,20	17,18	16,19
1.46 TO 1.54	20	--	20	--	20	19	19,20	18	18,19	17,20
1.55 TO 1.62			20	--	20	--	20	19	19,20	18
1.63 TO 1.71					20	--	20	--	20	19
1.72 TO 1.80							20	--	20	--
1.81 TO 1.89									20	--

Rotary Actuator Replacement with the Delta Shutdown Angle
Figure 604 (Sheet 2)

S 866-008

(8) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
  (a) 6D20, ALTN SLAT PWR
  (b) 6D23, ALTN FLAP PWR

F. Do the Inspection of the Rotary Actuators

S 216-033

(1) Do these steps on the number 1 FSEU to find the shutdown DELTA angle (in-flight angle):
  (a) Go to "FAULT HISTORY?".
  (b) Go through the FLIGHT LEGs until you find the SLAT DISAGREE fault.
  (c) Go to "FAULT DETAILS" and then to "SHOP DETAILS?" for the SLAT DISAGREE fault.
  (d) Make a record of the DELTA angle. This is the in-flight angle.

S 706-014

(2) Do these steps to find the ground wind-up angle:

NOTE: If the in-flight angle (from above) is negative, do these steps to the outboard actuator upstop on the left wing (number 1 rotary actuator). If the in-flight angle is positive, do these steps to the outboard actuator upstop on the right wing (number 20 rotary actuator).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

  (a) Pressurize the left hydraulic system (Ref 29-11-00/201).
  (b) Remove the DO-NOT-OPERATE tag from the flap control lever.
  (c) Move the flap control lever to the 1-unit detent and let the slats move to the intermediate position.
  (d) Remove hydraulic power (Ref 29-11-00/201).
  (e) Attach a DO-NOT-OPERATE tag to the flap control lever.
  (f) Remove the upstops from the applicable track (number 1 or 20).

(g) Do these steps to install the lockout tool in the position of the removed upstop.

NOTE: The overtorque indicator on the applicable slat actuator (1 or 20) will trip because the actuator is forced into a lockout by the lockout tool. Reset the trip indicator on the applicable outboard actuator after the lockout tool is removed.

NOTE: Use the fasteners from the upstop to attach the lockout tool.

1) Put the lockout tool in its position with its larger side to the rear.
2) Tighten the fasteners lightly.

NOTE: Keep the fasteners sufficiently loose to let the lockout tool turn (to adjust to the correct position) when you retract the slats.

(h) Open these circuit breakers on the P11 panel and install DO-NOT-CLOSE tags:

1) 11C18, FLAP/SLAT SHUTOFF 1

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(i) Pressurize the left hydraulic system (Ref 29-11-00/201).
(j) Remove the DO-NOT-OPERATE tag from the flap control lever.
(k) Move the flap control lever to the zero (FLAPS UP) detent. Make sure the flaps and slats move to the fully retracted position.

NOTE: LE SLAT DISAGREE and FLAP ISLN VALVE can show on EICAS. Ignore them if they show.

(l) Do these steps on the number 1 FSEU to find the ground DELTA angle (ground wind-up angle):
1) Go to "EXISTING FAULTS?".
2) Find the SLAT DISAGREE fault.
3) Go to "FAULT DETAILS" and then to "SHOP DETAILS?" for the SLAT DISAGREE fault.

4) Make a record of the DELTA angle. This is the ground wind-up angle.

NOTE: If the in-flight angle value (for the left wing) is negative, then the ground wind-up value is read as negative also.

If the in-flight angle value (in the right wing) is positive, then the ground wind-up value is positive also.

S 866-054

(3) If a ground wind-up angle cannot be obtained:
(a) Make sure that the outboard slat on the affected side is correctly rigged (AMM 27-81-00/501).
(b) Make sure that the transmitter on the outboard slat actuator is correctly adjusted (AMM 27-58-01/501).

S 866-046

(4) Move the flap control lever to the 1-unit detent and let the slats move to the intermediate position.

S 866-047

(5) Remove hydraulic power (Ref 29-11-00/201).

S 866-048

(6) Attach a DO-NOT-OPERATE tag to the flap control lever.

S 866-049

(7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11H23, FLAP/SLAT ALTN DR ARM
(b) 11C18, FLAP/SLAT SHUTOFF 1

S 866-050

(8) Do these steps to remove the LE SLAT DISAGREE and FLAP ISLN VALVE messages from EICAS:
(a) Put the ALTN FLAPS switch in the NORM position (if it is not there).
(b) Put the LE ALTN and TE ALTN switches in the armed position.
(c) Put the LE ALTN and TE ALTN switches back in the not armed position.

G. Find the Bad Rotary Actuator

S 976-042

(1) Do these steps to find the rotary actuator that caused the problem.

NOTE: The rotary actuators are numbered 1 thru 20 , from left to right. The number 1 rotary actuator is at the outboard end of the left wing; the number 20 rotary actuator is on the outboard end of the right wing.

NOTE: If there is a tripped PDU torque limiter, then you do the inspection check of the rotary actuators on the wing controlled by that PDU torque limiter.

NOTE: Operators have reported poor grease condition and/or corrosion earlier than the 20,000 cycle MPD 27-079-01 lubrication interval. It is believed that the current grease may start break down after 5 to 7 years. Once the grease properties degrade, component wear will likely increase as a function of component utilization. Since the grease degrades with time, actuators that have not been refreshed recently are suspect of failure. The airplane operator should adjust the actuator lubrication intervals based on their operating conditions and field experience.

NOTE: Stiff bearings (like the actuator rib support bearing other than the improved bearing made of CRES material P/N BACB10GU35PP) can be the cause of the actuator overload. Replacement of stiff bearings, resetting the overload indicators and monitoring the system for subsequent indicator trips is recommended. An actuator removal is justified if an associated L/E DISAGREE EICAS message occurs and if this AMM is properly followed to identify the appropiate bad actuator. Also, be aware that the actuator overload indicators can be tripped inadvertently during unrelated maintenance in the area of the rotary actuator.

NOTE: The new spring type overload indicators on the rotary actuators are highly reliable and not prone to nuisance tripping (AMM 27-81-18/401).

(a) Use the in-flight angle and the ground wind-up angle (recorded earlier) in table 603 or 604 to find the bad actuator.

NOTE: Use the data in Fig. 603 if the in-flight and ground wind-up angles are negative. Use the data in Fig. 604 if they are positive.

The "First Alternative" is the actuator that is most likely to be bad. The "Second Alternative" is the actuator less likely to be bad.

(b) Look at the trip indicator (also known as the over torque indicator) on the first alternative and second alternative rotary actuators. An actuator with the trip indicator operated is most likely to be bad.

NOTE: If a rotary actuator is found in the "tripped" condition and there is no history of L/E DISAGREE message on EICAS, then you do not need to remove or replace the rotary actuator. Reset the rotary actuator trip indicator and cycle the slats to make sure that the indicator does not get tripped again

S 966-034

(2) Replace all the bad rotary actuators (Ref 27-81-18/401).

H. Put the Airplane Back to Its Usual Condition

S 866-035

(1) Set the trip indicators on all the rotary actuators to their usual position (not tripped).

S 866-036

(2) Set the PDU trip indicator to its usual position (not tripped).

S 086-051

(3) Remove the lockout tool from the slat track.

S 426-052

(4) Install the upstop on the track.

S 296-074

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(5) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 866-053

(6) Do these steps to retract the slats:

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(a) Pressurize the left hydraulic system (Ref 29-11-00/201).
(b) Remove the DO-NOT-OPERATE tag from the flap control lever.
(c) Move the flap control lever to the zero (FLAPS UP) detent and make sure the flaps and slats move to the fully retracted position.
(d) Remove hydraulic power (Ref 29-11-00/201).

S 866-020

(7) Remove the DO-NOT-CLOSE tags and circuit breaker locks and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J33, WARN ELEX A

S 866-021

(8) Remove the circuit breakers locks and close these circuit breakers on the main power distribution panel:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 866-023

(9) Remove the electrical power if it is not necessary (Ref 24-22-00).

LEADING EDGE SLAT DRIVE TORQUE TUBE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the torque tube for the leading edge (LE) slat. The second task installs the torque tube.

TASK 27-81-20-024-001

2. Remove the Torque Tube for the LE Slat
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 27-81-00/501, Leading Edge Slat System
      (3) AMM 27-81-18/401, LE Slat Drive Rotary Actuator R/I
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) AMM 32-00-15/201, Landing Gear Door Locks
      (6) AMM 32-00-20/201, Landing Gear Downlocks
      (7) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

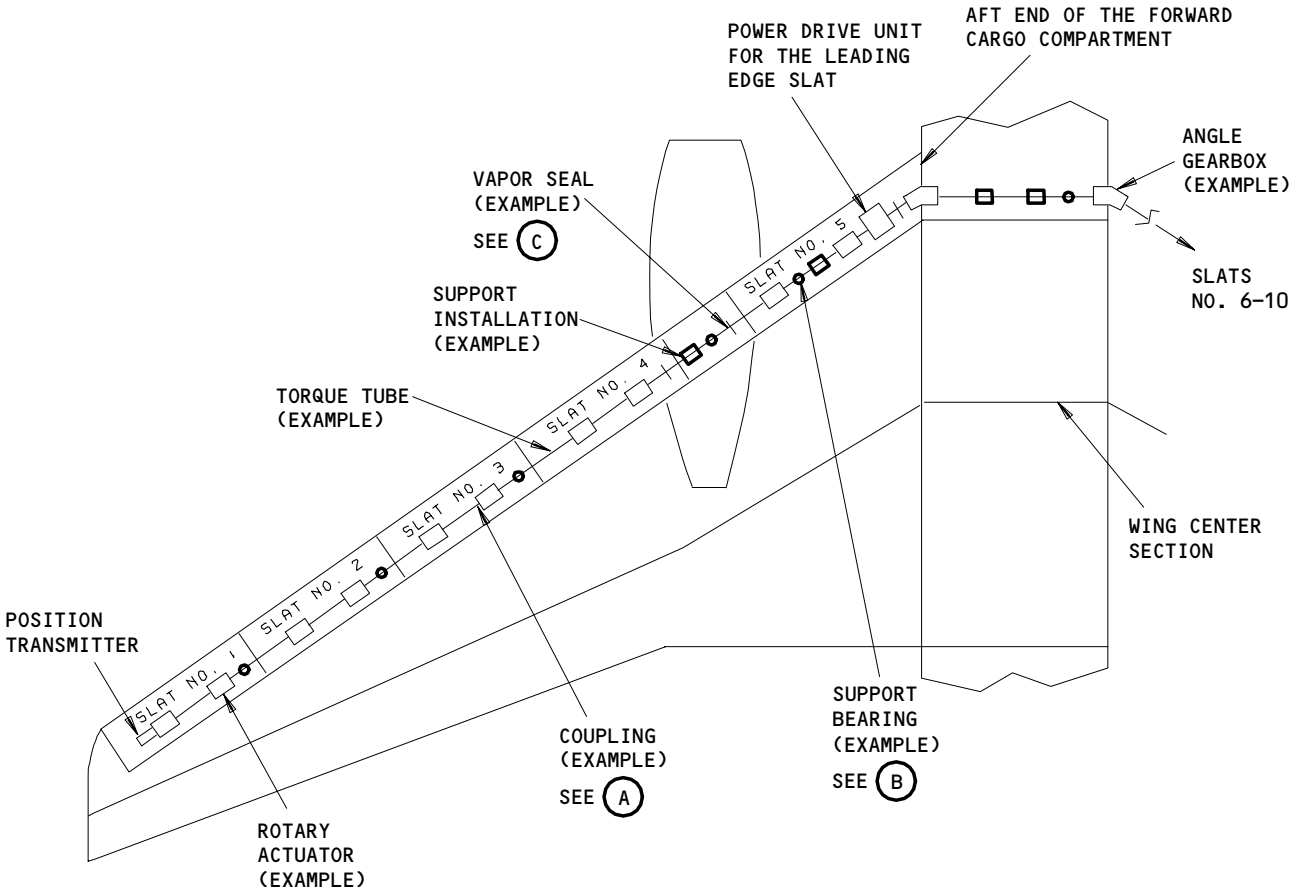
143	MLG Wheel Well (Left)
211/212	Control Cabin
510/610	Wing Leading Edge - Inboard
520/620	Wing Leading Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 044-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



PLAN VIEW LEFT WING (RIGHT WING OPPOSITE)

1 SAFETY THE BOLTS TOGETHER WITH WIRE (DOUBLE TWIST).

2 APPLY A THIN LAYER OF GREASE TO THE FULL LENGTH OF THE INTERNAL SPLINE BEFORE YOU INSTALL THE COUPLING.

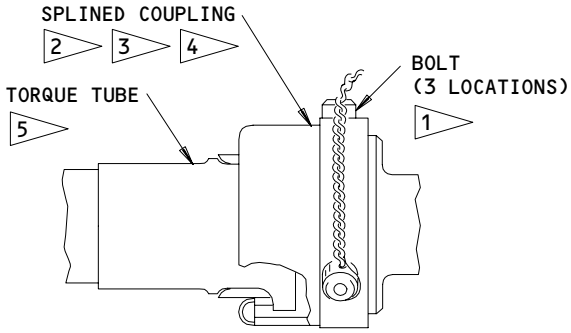
3 FILL WITH GREASE THROUGH THE LUBRICATION HOLES AFTER YOU INSTALL THE COUPLING.

4 USE TAPE TO HELP MOVE THE COUPLING ON/OFF SEAL.

5 DO THESE STEPS TO DO A TEST ON THE TORQUE TUBE AFTER IT IS INSTALLED:

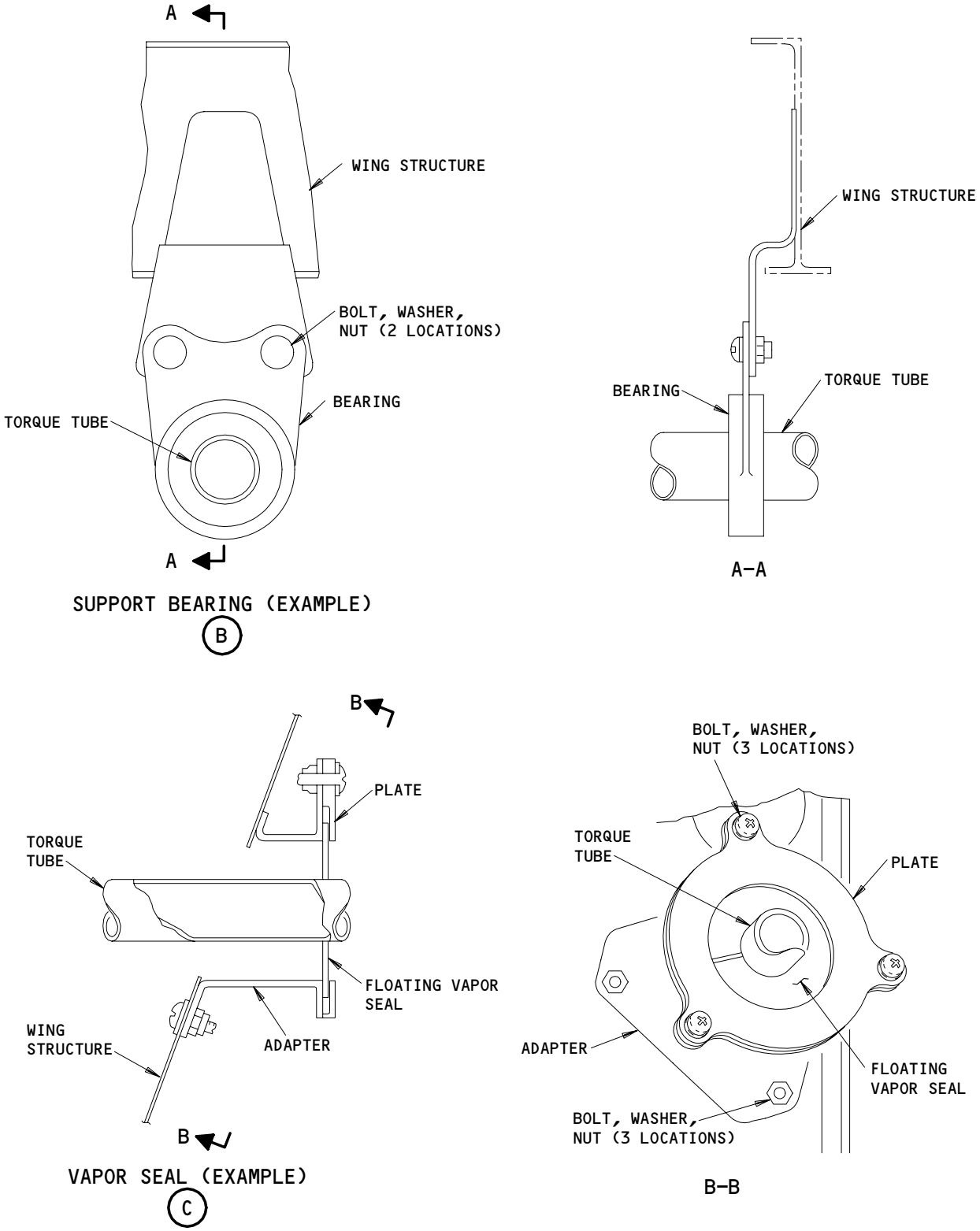
1. WITH THE TORQUE TUBE PUSHED TIGHTLY AGAINST ONE END, EXAMINE THE TORQUE TUBE POSITION.
2. MOVE THE TORQUE TUBE AXIALLY UNTIL IT TOUCHES AT THE OPPOSITE END. MAKE SURE THAT THE TORQUE TUBE MOVES EASILY.
3. EXIMINE THE POSITION AGAIN TO FIND THE TOTAL MOVEMENT. AXIAL MOVEMENT FOR TORQUE TUBES IN THE WING CENTER SECTION MUST BE 0.06 INCH. AXIAL MOVEMENT FOR ALL OTHER TUBES MUST BE 0.20 ±0.05 INCH.

NOTE: APPLY ONE LAYER OF PRIMER TO ALL BOLT AND SCREW INSTALLATION POINTS OF THE TORQUE TUBES.

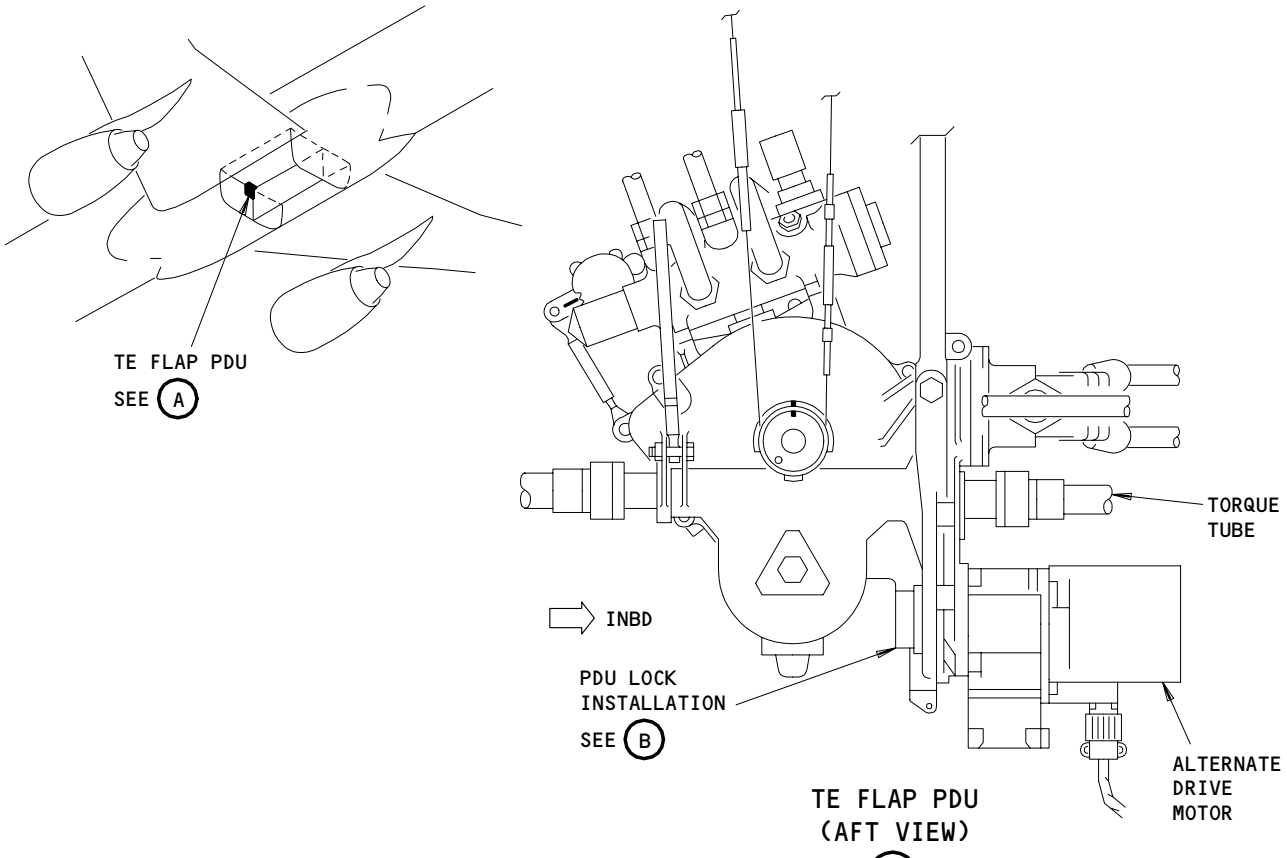


COUPLING (EXAMPLE)
A

Torque Tubes for the LE Slat Drive
Figure 401 (Sheet 1)



Torque Tubes for the LE Slat Drive
Figure 401 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 402

S 214-003
(2) Make sure the trailing edge (TE) flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-004
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-005
(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-006

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-007
(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-008
(7) Install a PDU lock in the TE flap PDU (Fig. 402).

S 864-009
(8) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 864-010
(9) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-011
(10) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-012
(11) Remove the necessary access panels and open the necessary access doors (AMM 06-44-00/201).

S 014-013

(12) Get access to the torque tubes in the aft end of the forward cargo compartment.

S 294-043

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(13) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

E. Remove the Torque Tube (Fig. 401)

NOTE: Remove the rotary actuator and the wing rib (press fit) bearing where it is necessary to complete torque tube removal (AMM 27-81-18/401).

S 024-014

(1) Do these steps to remove the torque tube:
(a) Make a mark on the adjacent torque tubes that you do not remove to identify the adjusted position for the subsequent installation.

NOTE: Do not turn the torque tubes when you disconnect them. It will be necessary to adjust the slat drive if you turn the torque tube (AMM 27-81-00/501).

(b) Remove the two bolts that attach the support bearing to the adjacent structure.
(c) Remove the three bolts that attach the vapor seal plate to the adjacent structure.
(d) Remove the three bolts at each end of the torque tube with a splined coupling.
(e) Remove the torque tube.

TASK 27-81-20-424-015

3. Install the Torque Tube for the LE Slat

A. Equipment
(1) TE Flap PDU Lock - B27008-1

B. Consumable Materials
(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00014 Grease - MIL-G-21164 (Alternate)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) C00259 Primer - BMS 10-11, Type 1

C. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control

(3) AMM 27-81-00/501, Leading Edge Slat System
(4) AMM 27-88-01/401, Leading Edge Slat Position Transmitter
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

143	MLG Wheel Well (Left)
211/212	Control Cabin
510/610	Wing Leading Edge - Inboard
520/620	Wing Leading Edge - Outboard
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

E. Install the Torque Tube (Fig. 401)

NOTE: Install the wing rib (press fit) bearing and the rotary actuator if they were removed (AMM 27-81-18/401).

S 294-044

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 214-025

(2) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 214-026

(3) Make sure the flap/slat alternate drive are off.

S 424-016

(4) Do these steps to install the torque tube:
(a) Make sure the TE flaps and LE slats are fully retracted and the flap control lever is in the zero (FLAPS UP) detent.
(b) Make sure the adjacent torque tubes are in the adjusted position.
(c) Put the torque tube and the components in the correct position to connect the torque tubes.

(d) Install the three bolts at the splined couplings to connect the torque tube.

NOTE: Do not turn the adjacent torque tubes when you connect the replaced torque tube. It will be necessary to adjust the slat drive if you turn the torque tube (AMM 27-81-00/501).

(e) If the adjusted position of a slat position transmitter at slat No. 1 or 10 was moved, you must adjust the position transmitter (AMM 27-88-01/401).

(f) At each rotary actuator adjacent to the torque tube that you replaced, make sure the clearance between the main track upstop and the rib upstop fitting is 0.07-0.13 inch (1.8-3.3 mm).

CAUTION: MAKE SURE YOU INSTALL LOCKWIRE ON THE COUPLING SCREWS. IF THE COUPLING SCREWS COME OFF, THE TORQUE TUBE COUPLING WILL DISCONNECT AND CAUSE DAMAGE TO THE AIRPLANE.

(g) Safety the three bolts at the splined coupling with a lockwire.

F. Operational Test for the Torque Tube

S 214-027

(1) Make sure the TE flaps and LE slats are fully retracted, and the flap control lever is in the zero (FLAPS UP) detent.

S 094-028

(2) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 864-029

(3) Remove the DO-NOT-CLOSE tags and the circuit breaker lock, and close these circuit breakers on the overhead panel, P11:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J33, WARN ELEX A

S 864-030

(4) Remove the circuit breaker locks, and close these circuit breakers on the main power distribution panel, P6:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 864-031

(5) Supply electrical power (AMM 24-22-00/201).

S 864-032

(6) Turn the dimmer control knob for the first officer's panel on the pilot's glare shield panel, P7, fully clockwise.

S 214-033

(7) Make sure the arming switches for the flap and slat alternate drives on the first officer's main instrument panel, P3, are not in the armed position (switch lights will be off).

S 214-034

(8) Make sure the position selector switch for the flap/slat alternate drive, on the P3 panel, is in the NORM detent.

S 214-035

(9) Make sure the six EICAS circuit breakers, on the P11 panel, are closed.

S 864-036

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(10) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 094-037

(11) Remove the PDU lock from the TE flap PDU (Fig. 402).

S 714-018

(12) Do these steps to do a test on the torque tube installation:

(a) Move the flap control lever from the zero (FLAPS UP) detent to the 30-unit detent and from the 30-unit detent to the zero (FLAPS UP) detent.

1) Stop in each detent to let the TE flaps and LE slats move to the correct position.

2) Make sure at each detent that the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, are off and that no EICAS data shows on the display.

(b) AIRPLANES WITH -32 AND LOWER FSEU;
push and release the BIT test switch on the FSEU-1, FSEU-2, and FSEU-3, one at a time, in the main equipment center, and make sure there are no indications of a failure or defect.

NOTE: A green test-complete light shows the end of the test. Ignore the TRAILING EDGE and LEADING EDGE lights, on the P3 panel, and the flap/slat data on the EICAS display if they momentarily come on while you do the test.

(c) AIRPLANES WITH -40 FSEU;
go to the EXISTING FAULTS? part of the main menu on FSEU-1, FSEU-2, and FSEU-3 (one at a time), in the main equipment center.

NOTE: Make sure the NO FAULTS message shows on the FSEU display. Ignore the TRAILING EDGE and LEADING EDGE lights and the flap/slat messages on the EICAS display if they momentarily come on while you do the test.

(d) Move the flap control lever to the 1-unit detent, and let the TE flaps move to the 1-unit position and the LE slats move to the intermediate position.
(e) Open these circuit breakers on the P11 panel, and attach DO-NOT-CLOSE tags:
1) 11C11, STICK SHAKER LEFT
2) 11J20 or 11J21, STICK SHAKER RIGHT
(f) Push and hold the LEFT test switch for the stall warning on the side panel, P61, and make sure the LE slats move to the fully extended position.
(g) Remove the power from the left hydraulic system (Ref 29-11-00).
(h) Install a PDU lock in the TE flap PDU (Fig. 402).
(i) Release the LEFT test switch for the stall warning, and make sure the LE slats stay fully extended.
(j) Push the arming switch for the slat alternate drive, on the P3 panel, to arm the slat alternate drive (switch light will come on).
(k) Make sure, at all rotary actuators on all slats, that the main track downstops do not touch the rib downstop fittings.
(l) Make sure you can turn the torque tube immediately outboard of the slat PDU in the extended direction (clockwise if you look inboard at the slat PDU from the left wing).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(m) Pressurize the left hydraulic system (AMM 29-11-00/201).
(n) Remove the PDU lock from the TE flap PDU (Fig. 402).
(o) Push the arming switch for the slat alternate drive, on the P3 panel, to disarm the slat alternate drive (switch light will go off).
(p) Make sure the LE slats move to the intermediate position.
(q) Remove the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
1) 11C11, STICK SHAKER LEFT
2) 11J20 or 11J21, STICK SHAKER RIGHT
(r) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to arm the flap and slat alternate drives (switch lights will come on).
(s) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the UP detent.
(t) Make sure the TE flaps and LE slats move to the UP position.
(u) Move the flap control lever to the zero (FLAPS UP) detent.
(v) Put the position selector switch for the flap/slat alternate drive, on the P3 panel, in the NORM detent.
(w) Push the arming switches for the flap and slat alternate drives, on the P3 panel, to disarm the flap and slat alternate drives (switches lights will go off).

G. Put the Airplane Back to Its Usual Condition

S 414-019

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

S 864-020
(2) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-021

(3) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 294-042

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(4) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 414-022

(5) Install the access panels that you removed and close the access doors that you opened (AMM 06-44-00/201).

S 414-023

(6) Install the panels that you removed to get access to the aft end of the forward cargo compartment.

S 444-024

(7) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

LEADING EDGE SLAT DRIVE TORQUE TUBE - APPROVED REPAIRS

TASK 27-81-20-308-001

1. Approved Repairs for the Torque Tube of the Leading Edge Slat

A. General

(1) This procedure gives instructions for the repair of damaged torque tubes worn on the outer diameter. This procedure does not give instructions to remove or install the torque tube.

B. Consumable Materials

(1) C00064 Alodine 1200S
(2) C00259 Primer - BMS 10-11, Type 1
(3) C00033 Gloss Enamel - BMS 10-60, Type 2, Boeing Color 707 Grey

C. References

(1) AMM 27-81-20/401, Leading Edge Slat Drive Torque Tube
(2) AMM 51-21-04/701, Alodine Coating
(3) AMM 51-21-10/701, Decorative Exterior Finishes
(4) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

510/610	Wing Leading Edge - Inboard
520/620	Wing Leading Edge - Outboard

E. Examine the Torque Tube for Repair or Replacement

S 298-013

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 968-002

(2) You must replace the torque tube if you have one or more of these conditions (AMM 27-81-20/401):
   (a) The full diameter surface at the worn area of the torque tube was repaired before.
   (b) The worn area is adjacent to the end fitting fasteners.
   (c) The depth of the repair done before is larger than the repair limits shown in Table 801.

S 308-003

(3) You can repair the torque tube if the repair is less than the limits shown in Table 801 below:

TABLE 801

OUTER DIAMETER OF THE TORQUE TUBE	AREA OF THE REPAIR *[1]*[2]	PERMITTED DEPTH OF THE REPAIR *[1]
1.00 inch	less than 3 inches	0.008 inch
	3 inches or more	0.004 inch
1.25 inch	less than 3 inches	0.017 inch
	3 inches or more	0.008 inch

*[1] THE REPAIR LIMITS ARE THE TOTAL OF THE REPAIR THAT YOU WILL DO AND THE REPAI DONE BEFORE
*[2] PERMITTED "DEFECT WIDTH" LIMIT. LINEAR (ONE DIMENSIONAL) VALUE, IN INCHES.

F. Repair the Torque Tube

S 868-011

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 328-005

(2) Machine the worn area.

NOTE: The torque tube is structurally satisfactory if the depth of the repair (include the repair done before) is not more than the repair limits given by Table 801.

S 238-006

(3) Do a penetrant inspection of the repaired area.

S 628-007

(4) Apply Alodine to the repaired surface (AMM 51-21-04/701).

S 628-008
(5) Apply one layer of primer to the repaired surface (AMM 51-21-10/701).

S 628-009
(6) Apply one layer of enamel to the repaired surface (AMM 51-21-10/701).

S 868-010
(7) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

INBOARD LE SLAT LOSS SENSING COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the loss sensing switch and cable assembly for the inboard leading edge (LE) slats. The second task installs the loss sensing switch and cable assembly.

   TASK 27-81-41-024-001

2. Loss Sensing Switch and Cable Assembly Removal
   A. Equipment
      (1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) AMM 06-44-00/201, Wings access doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
      (6) AMM 57-41-52/401, Landing Light Lens
      (7) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

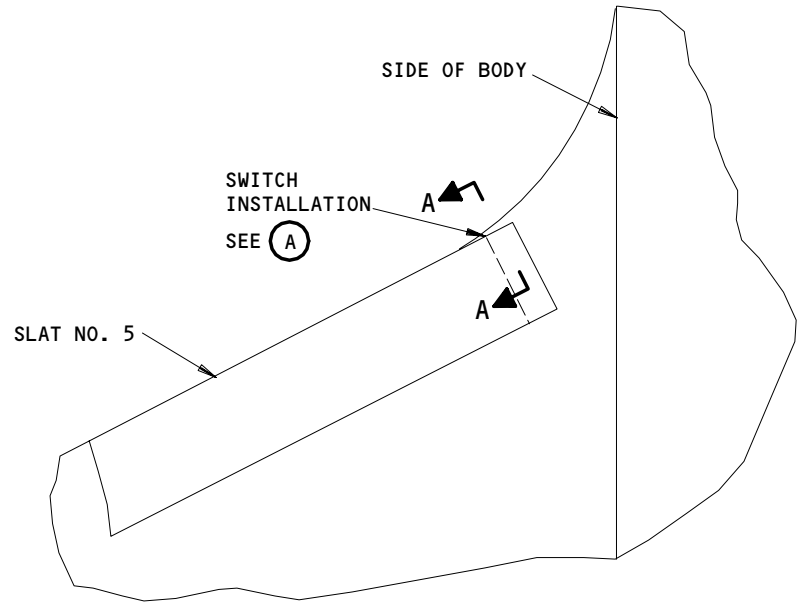
143	MLG Wheel Well (Left)
211/212	Control Cabin
512	Slat No. 5 (Left)
612	Slat No. 6 (Right)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

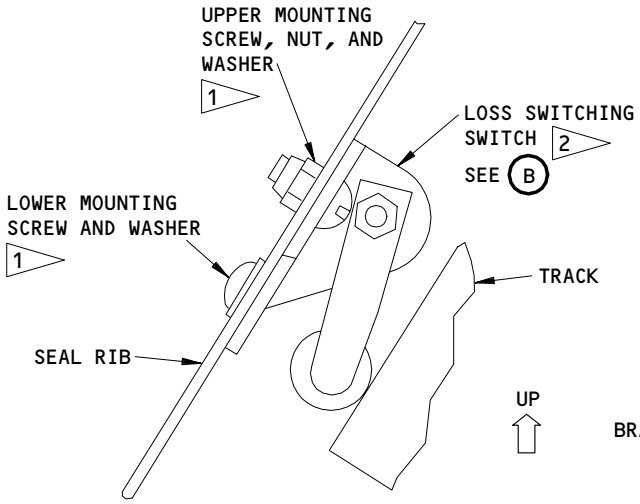
   D. Prepare for the Removal

      S 044-002

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

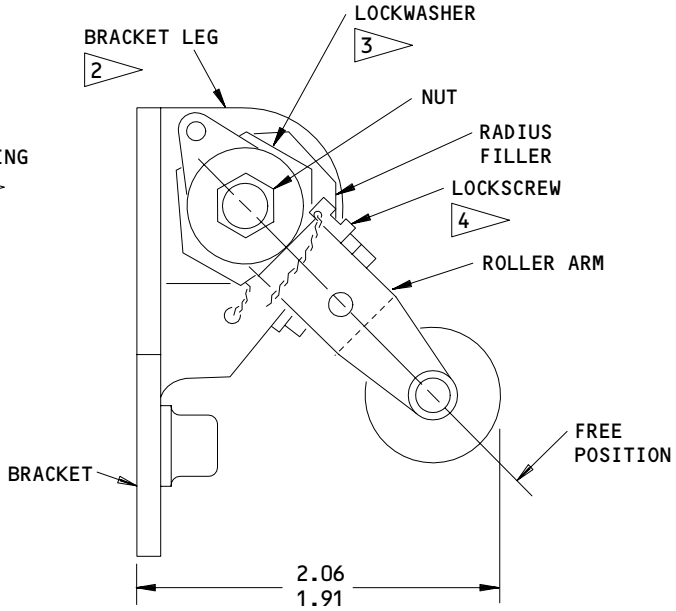
      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).





SWITCH INSTALLATION
SLAT NO. 5 SHOWN
(SLAT NO. 6 OPPOSITE)

A



LOSS SENSING SWITCH

B

1 INSTALL WITH BMS 5-95 SEALANT

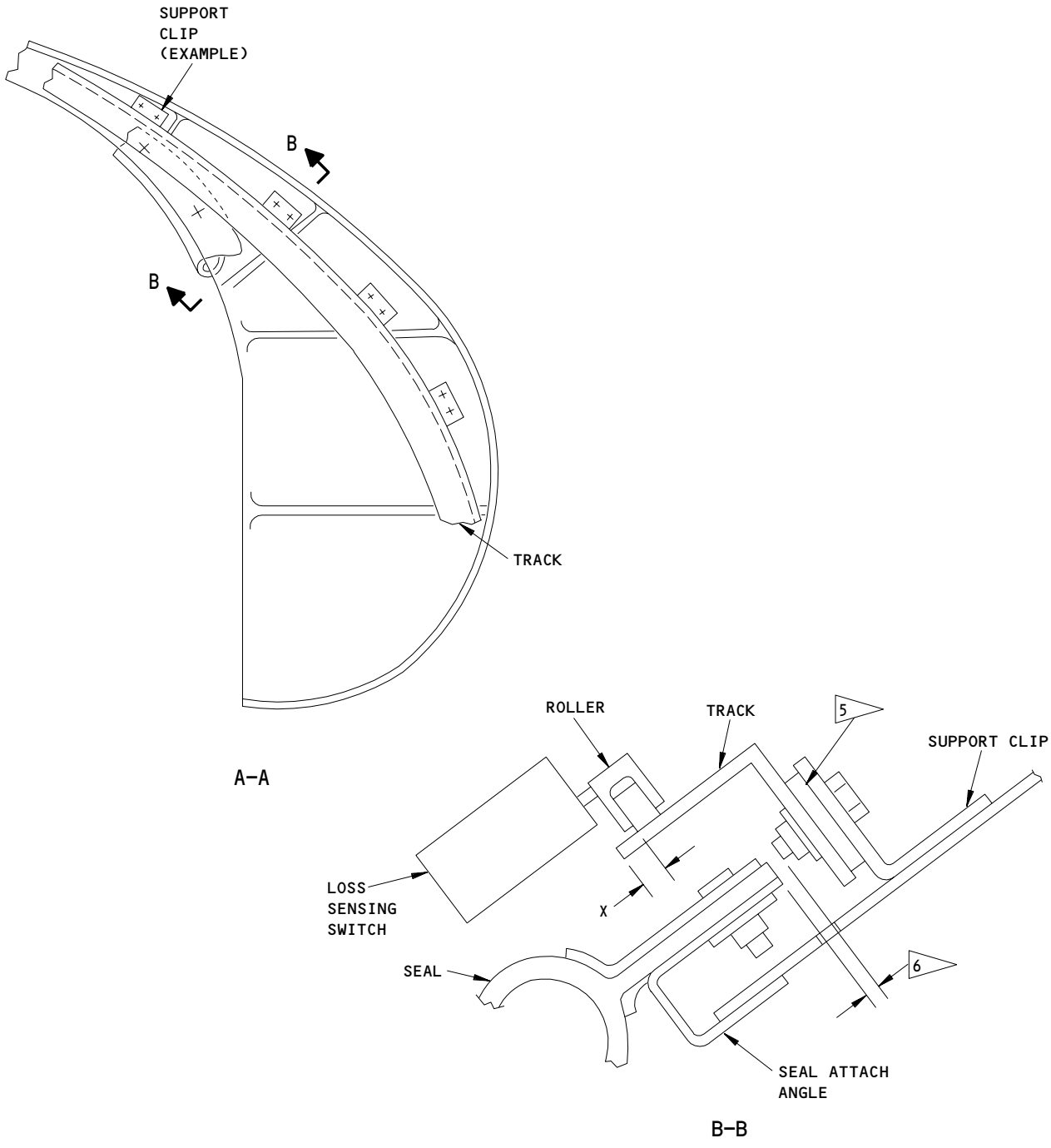
2 SENSING SWITCH BODY IS ON THE OTHER SIDE OF BRACKET LEG

3 SAFETY THE LOCKWASHER TO THE BRACKER WITH A WIRE (DOUBLE TWIST)

4 SAFETY THIS LOCKSCREW WITH A WIRE ON THIS SIDE OF THE ADJUSTING WORM GEAR

Loss Senssing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 1)

784465



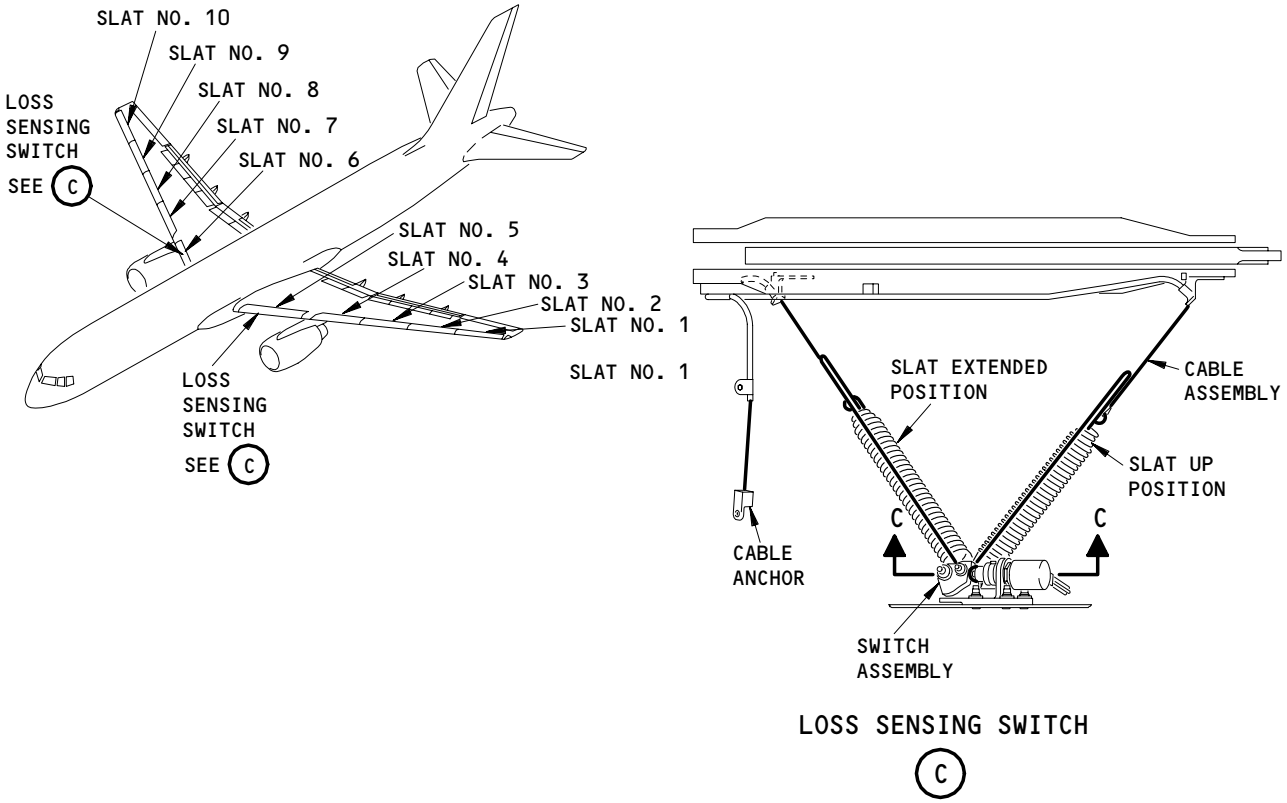
5 USE SHIMS TO GET THE NECESSARY EDGE DISTANCE FOR THE LOSS SENSING SWITCH

6 TRIM THE SEAL A MAXIMUM OF 0.10 INCH (2.54 mm) IF IT IS NECESSARY

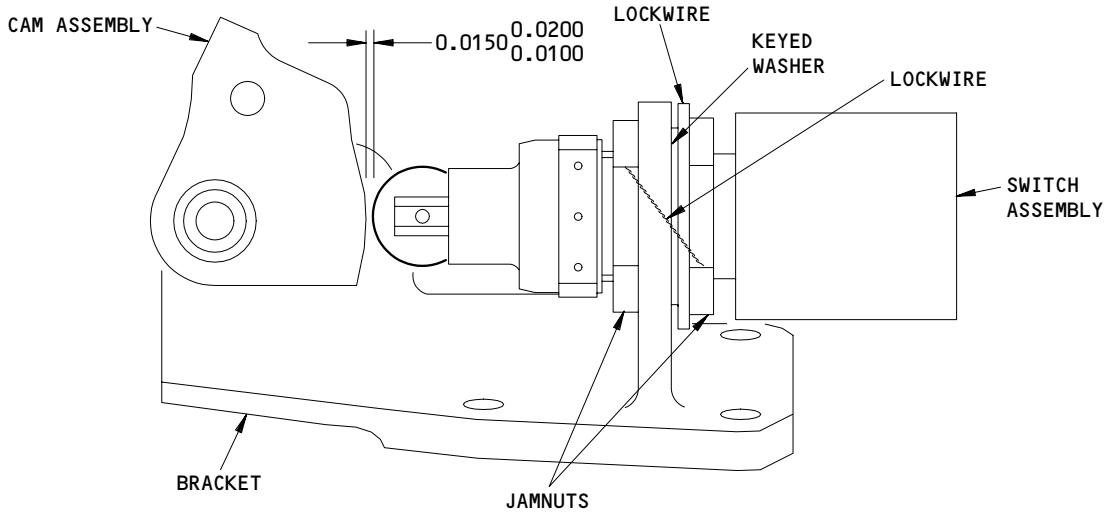
Loss Sensing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 2)

EFFECTIVITY
AIRPLANES WITH ROLLER ARM SWITCH
(PRE-SB 27-117)

E50969

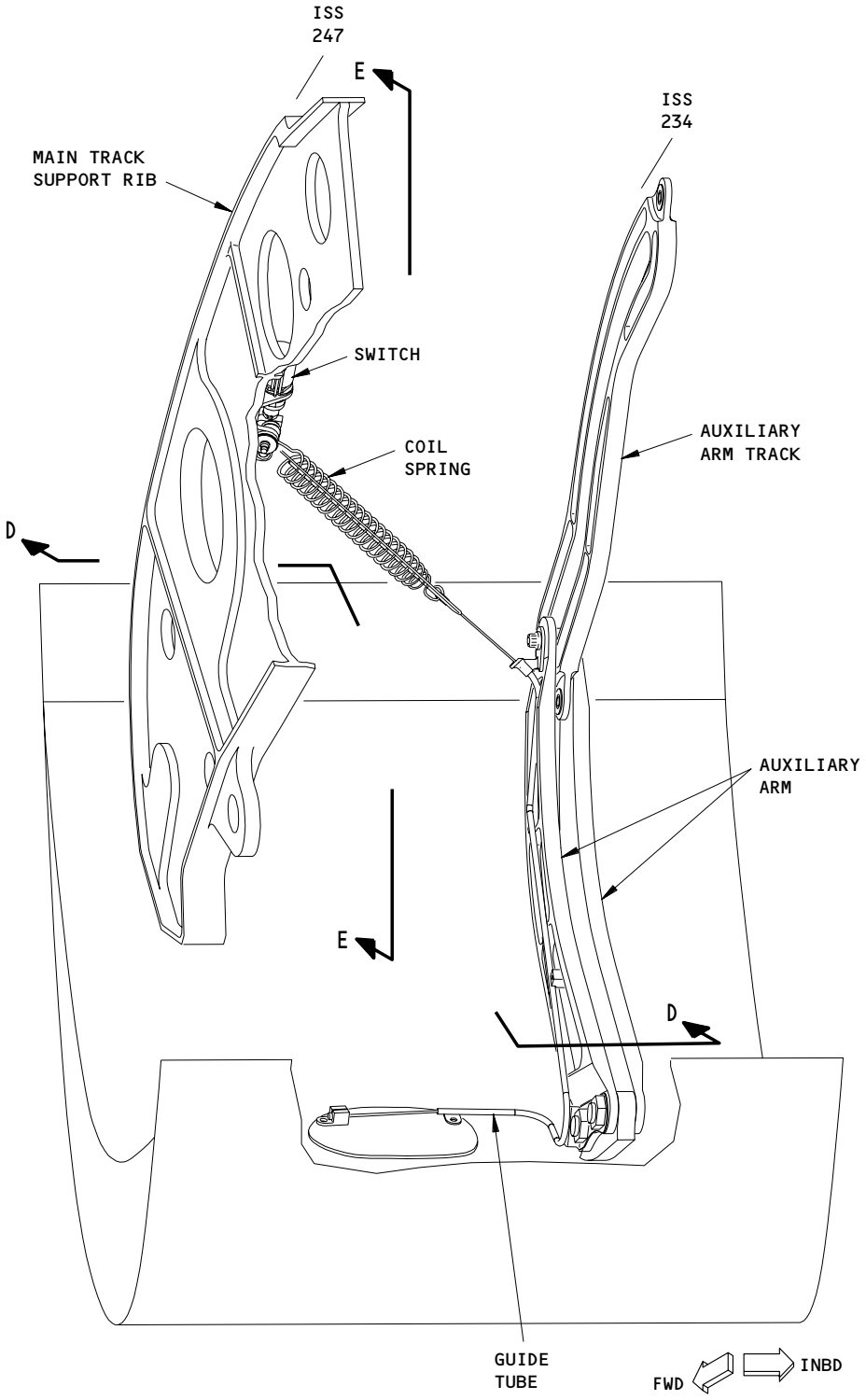


LOSS SENSING SWITCH
C

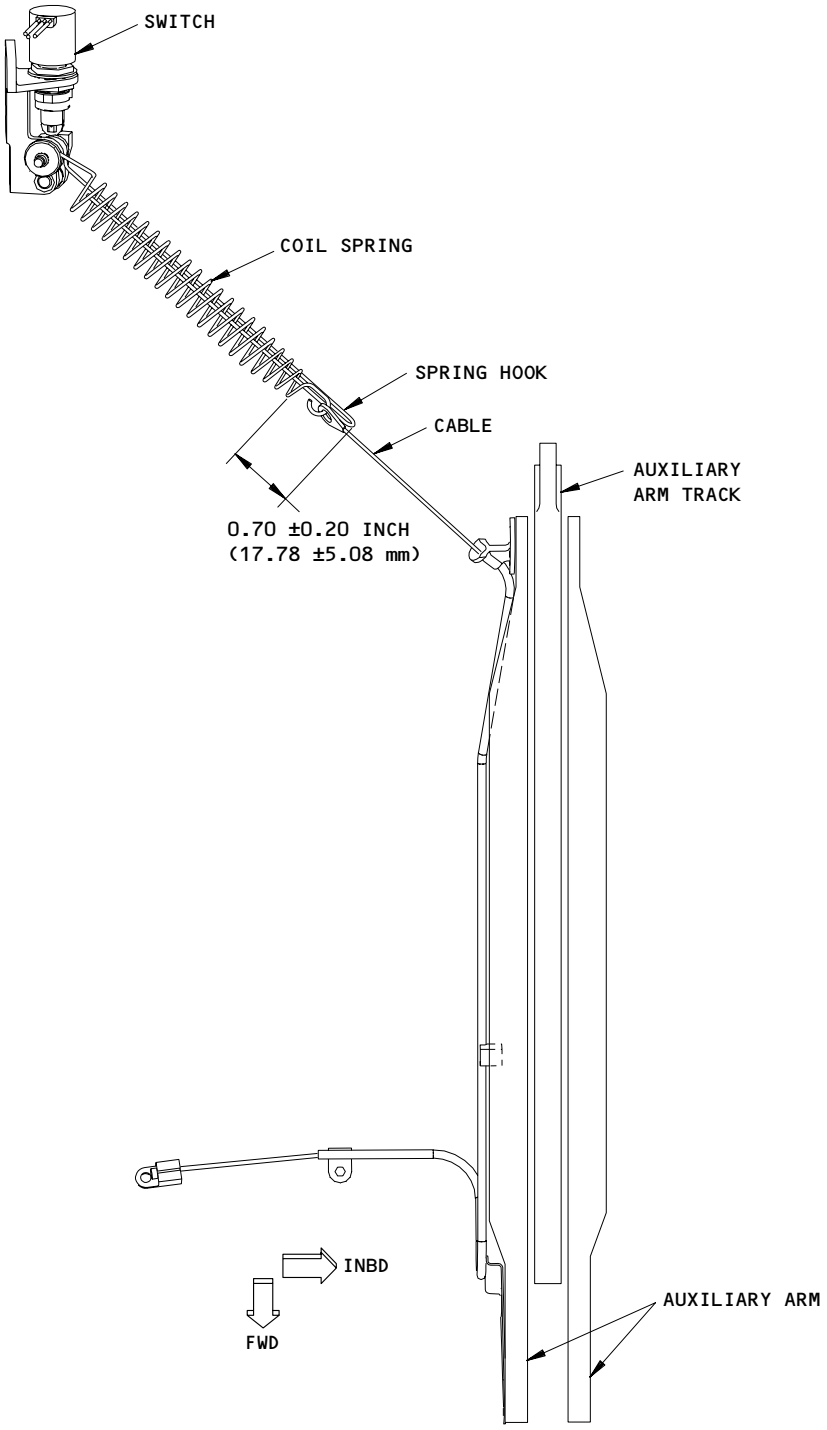


SWITCH ASSEMBLY
C-C

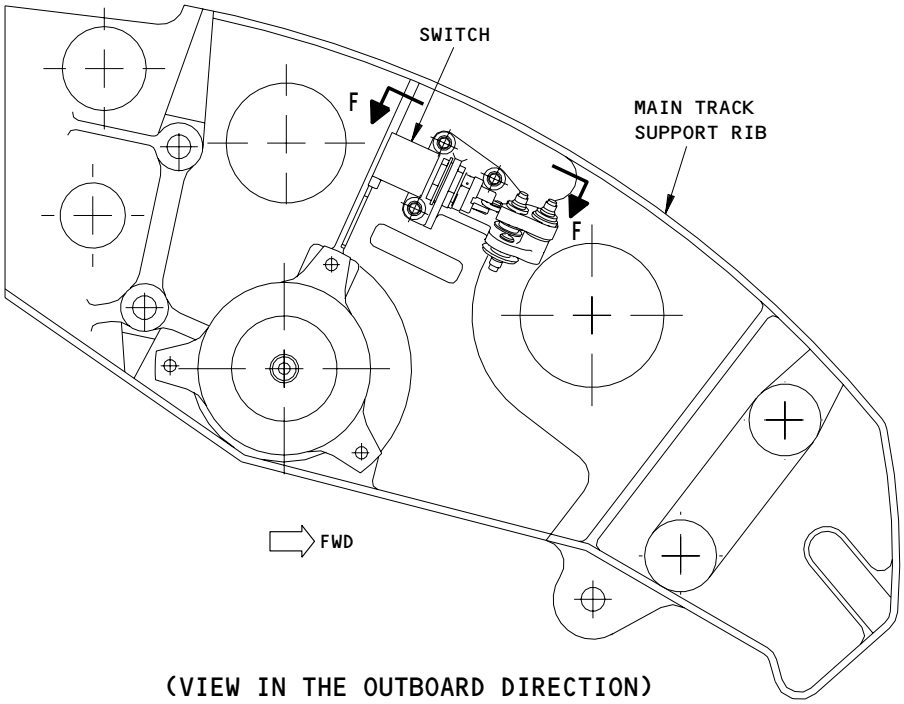
Loss Sensing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 3)



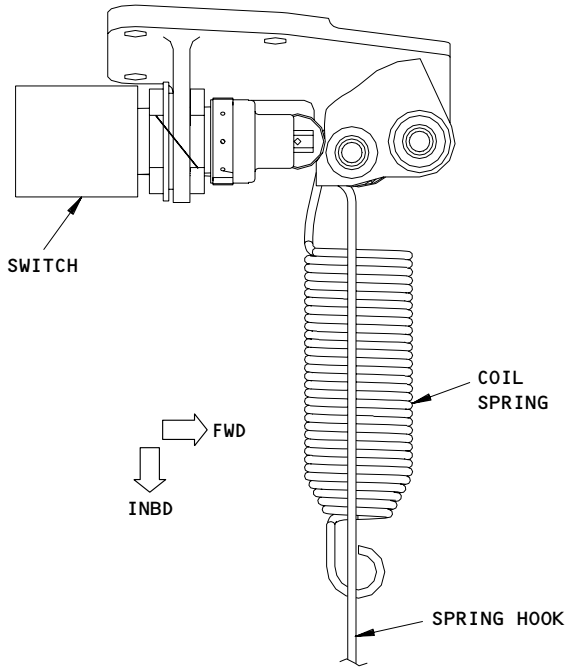
Loss Sensing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 4)



Loss Sensing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 5)

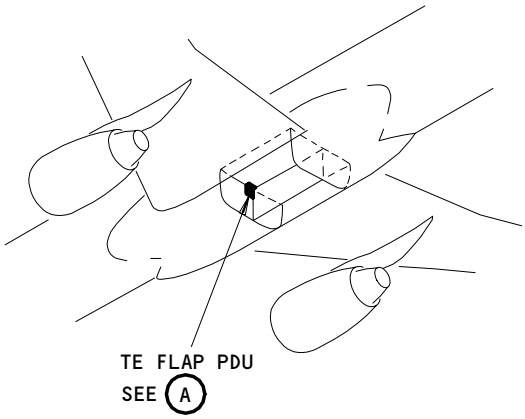


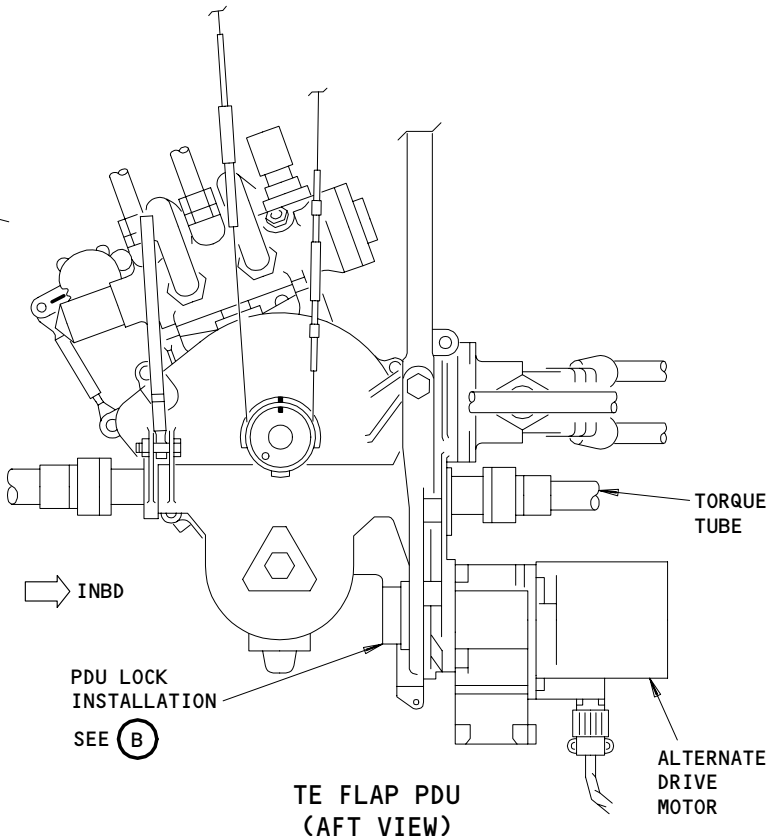
(VIEW IN THE OUTBOARD DIRECTION)
E-E



F-F

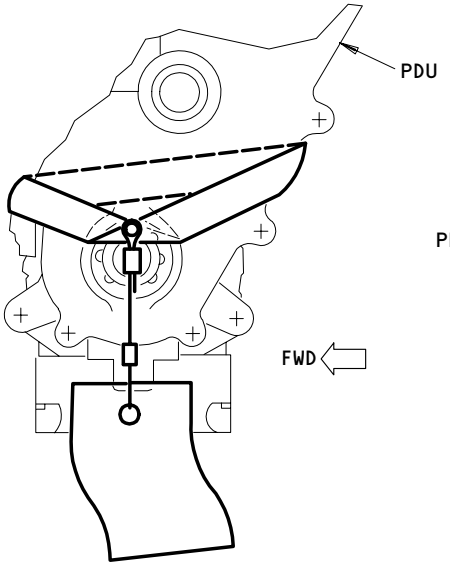
Loss Sensing Switch (for the Inboard LE Slat) Installation
Figure 401 (Sheet 6)





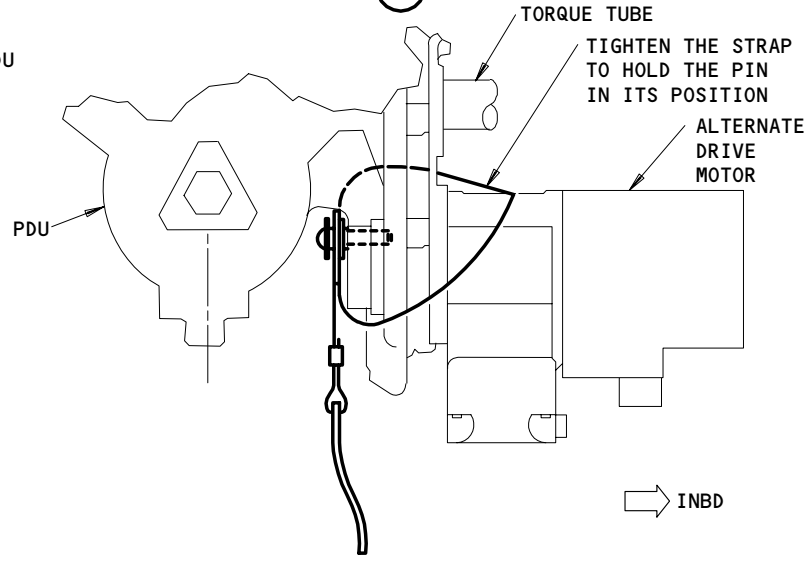
TE FLAP PDU
(AFT VIEW)

A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)

B



PDU LOCK INSTALLATION
(AFT VIEW)

B

PDU Lock for the TE Flap PDU
Figure 402

S 214-003
(2) Make sure the trailing edge (TE) flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-004
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006
(5) Supply electrical power (AMM 24-22-00/201).

S 864-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 864-008
(7) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and the LE slats move to the fully extended position.

NOTE: If an FSEU BITE check shows a slat loss indication, open the C1025 circuit breaker (11G12, FSEU-1 PWR or 11G12, FLAP/SLAT ELEC UNIT 1 POWER) on the P11 overhead circuit breaker panel. This will let the slats extend in the normal mode.

S 494-009
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-010
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-011
(10) Install a PDU lock on the TE flap PDU (Fig. 402).

S 864-012
(11) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULIC PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
(d) 11J33, WARN ELEX A

S 864-013
(12) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-014
(13) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 294-110

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(14) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

E. AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117);
Remove the Loss Sensing Switch (Fig. 401):

S 014-037
(1) Remove the access panels and landing light lens to get access to the loss sensing switch (AMM 06-44-00/201, AMM 57-41-52/401).

S 024-020
(2) Disconnect the electrical wires of the loss sensing switch from the airplane.

S 024-022
(3) Remove the mounting screws to release the switch and bracket.

S 024-030
(4) Remove the switch assembly from the track arm.

S 024-016
(5) Do these steps to remove the roller arm from the bracket (Fig. 401):
(a) Remove the wire that locks the screw in its position in relation to the roller arm.
(b) Remove the screw from the roller arm.
(c) Remove the nut that holds the roller arm to the switch.
(d) Remove the wire that locks the lockwasher to the bracket.

S 024-031
(6) Do these steps to remove the loss sensing switch from the bracket.
(a) Start to remove the lockwasher and at the same time move the switch in the inboard direction.
(b) Move the switch out of the bracket and, at the same time, remove the lockwasher and the radius filler.

F. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES (POST-SB 27-117 OR PRR54530-77);
Remove the Loss Sensing Cable Assembly (Fig. 401):

S 024-079
(1) Remove the lower access panels to get access to the cable assembly at slats 5 or 6 (AMM 06-44-00/201).

S 024-082
(2) Remove the bolt that holds the cable anchor to the access panel at the cove of the slat.

S 024-081
(3) Remove the cable anchor from the cable assembly.

S 024-083
(4) Disconnect the cable assembly at the other end from the coil spring on the switch assembly.

S 024-084
(5) Remove the cable assembly.

G. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES (POST-SB 27-117 OR PRR54530-77);
Remove the Loss Sensing Switch (Fig. 401):

S 024-038
(1) Disconnect the electrical wires of the switch from the airplane.

S 024-039
(2) Remove the safety wires of the switch.

S 024-040
(3) Remove the jamnut that holds the switch on the bracket.

S 024-041
(4) Remove the switch.

TASK 27-81-41-424-097

3. Loss Sensing Switch and Cable Assembly Installation

A. Consumable Materials
(1) D00121 Silicone Grease - DC-33 Medium

B. References
(1) AMM 06-44-00/201, Wings access doors and Panels
(2) AMM 20-10-23/401, Lockwires
(3) AMM 27-81-41/501, Inboard Leading Edge Slat Loss Sensing Switch
(4) AMM 57-41-52/401, Landing Light Lens

C. Access
(1) Location Zones

512	Slat No. 5 (Left)
612	Slat No. 6 (Right)

D. AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117);
Install the Loss Sensing Switch (Fig. 401):

S 424-018
(1) Do these steps to install the loss sensing switch to bracket:
(a) Put the switch in the bracket, a short distance, to install the radius filler and the lockwasher.
(b) Install the switch in the bracket and tighten the lockwasher.
(c) Safety the lockwasher to the bracket with a wire (double-twist) (AMM 20-10-23/401).

S 424-032
(2) Do these steps to install the roller arm to the bracket:
(a) Attach the roller arm to the switch.
(b) Make sure the distance between the outer edge of the bracket and the roller in the free position is between 1.91 and 2.06 inches (Fig. 401).
(c) Install the nut and tighten.
(d) Install the lockscrew in the roller arm.
(e) Safety the screw in its position with a wire (single-twist).

S 434-021
(3) Connect the electrical wires of the loss sensing switch to the airplane, if it is disconnected.

S 424-033
(4) Compress the roller arm and install the switch assembly on the track arm.

S 434-023
(5) Install the mounting screws that hold the switch and the bracket in their position.

S 224-025
(6) Measure the Dimension X (View B-B, Fig. 401).

S 824-026
(7) If Dimension X is less than 0.15 inch (3.8 mm), do these steps to get a Dimension X of at least 0.15 inch (3.8 mm):
(a) Use shims between the track and the two support clips.

NOTE: Do not use shims that add up to more than 0.10 inch (2.54 mm).

(b) Use AN960KD10L and KD10 washers together.
(c) If it is necessary, trim the seal attach angles no more than 0.10 inch (2.54 mm) (View B-B).

S 714-024
(8) Do a test on the installation of the loss sensing switch (AMM 27-81-41/501, "Test the Loss Sensing Switch").

E. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES (POST-SB 27-117 OR PRR54530-77);
Install the Loss Sensing Switch (Fig. 401):

S 864-109
(1) Prepare faying surfaces for installation of the switch assembly bracket on the main track support rib and/or between the switch and the switch bracket using cleaning method CM1 (SOPM 20-11-03).
(a) Apply conductive chemical film treatment using Type 2 procedure (SOPM 20-43-03).
(b) Make sure the resistance between the switch assembly bracket and the main track support rib and/or between the switch and the switch bracket is less than 25 milliohms (0.25 ohms) (SOPM 20-11-03).

S 864-073
(2) Make sure you install one jamnut on the switch.

S 424-074
(3) Do these steps to install the switch on the bracket:
(a) Put the switch in its correct position in the bracket.
(b) Install the jamnut to hold the switch in its position.

NOTE: Do not tighten the jamnut before you adjust the switch in the next steps.

(c) Adjust the switch to get 0.01-0.02 inch (0.25-0.50 mm) clearance between the roller and the cam.
(d) Tighten the jamnuts.
(e) Install the safety wire.
(f) Connect the electrical wires of the switch to the airplane.
(g) Lubricate the cam pivot (and cam surface, switch roller, and switch plunger, if necessary) with silicone grease, Dow Corning 33, Medium.

F. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCHES (POST-SB 27-117 OR PRR54530-77);
Install the Loss Sensing Cable Assembly (Fig. 401):

S 864-099
(1) Attach cable anchor to the cable.

S 864-100
(2) Attach cable anchor with bolt to the access panel at the cove of slat.

NOTE: Make sure the centerline of the cable aligns with the centerline of the cable anchor, after tightening fastener.

S 864-101
(3) Put the cable through the tube.

S 864-102
(4) Attach the cable assembly to the coil spring in the switch assembly.

S 864-103
(5) Put the end of the helical coil spring (part of the switch assembly) through the terminal on the end of the cable assembly.

S 864-104
(6) Fill the guide tube with silicone grease Dow Corning 33 Medium, or equivalent after the cable assembly is installed.

S 864-105
(7) Make sure there are no hang-ups through the cable run.

S 864-106
(8) Make sure the distance from the end of the spring hook to the first coil on the coil spring is 0.70 +/- 0.20 inch (17.78 +/- 5.08 mm).

NOTE: This dimension applies to the fully extended position only. The dimension must be 0.50 inch (12.70 mm) minimum. A dimension of more than 0.90 inch (22.86 mm) is permitted if some amount of tension remains in the spring (clearance visible between the coils) throughout the full motion of the slat.

S 864-107
(9) Pull the cable.

S 864-108
(10) Make sure the switch actuates as soon as the first spring coil touches the bend of the hook during cable pull, and the spring hook does not catch on the cable or on the hook portion of the coil spring .

NOTE: The hook must not hang up against the cable or the hook portion of the spring. A hang up problem shows incorrect routing of the cable.

S 714-075

(11) Do a test on the installation of the loss sensing switch (AMM 27-81-41/501, "Test the Loss Sensing Switch").

G. Put the Airplane Back to Its Usual Condition

S 294-111

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 084-076

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks for the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-077

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 864-078

(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

H. AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117);
Install the landing light lens (AMM 57-41-52/401).

S 444-029

(1) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

INBOARD LEADING EDGE SLAT LOSS SENSING SWITCH - ADJUSTMENT/TEST

1. General
   A. This procedure contains steps to adjust the loss sensing switch for the inboard leading edge (LE) slat.

TASK 27-81-41-825-001

2. Adjust the Loss Sensing Switch for the Inboard LE Slat
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
         (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
         (b) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
         (c) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
   B. Consumable Materials
      (1) Washers - AN960KD10L and KD10
      (2) A00247 Sealant - BMS 5-95
   C. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
      (5) AMM 57-41-52/401, Landing Light Lens
      (6) AMM 78-31-00/201, Thrust Reverser System
   D. Access
      (1) Location Zones

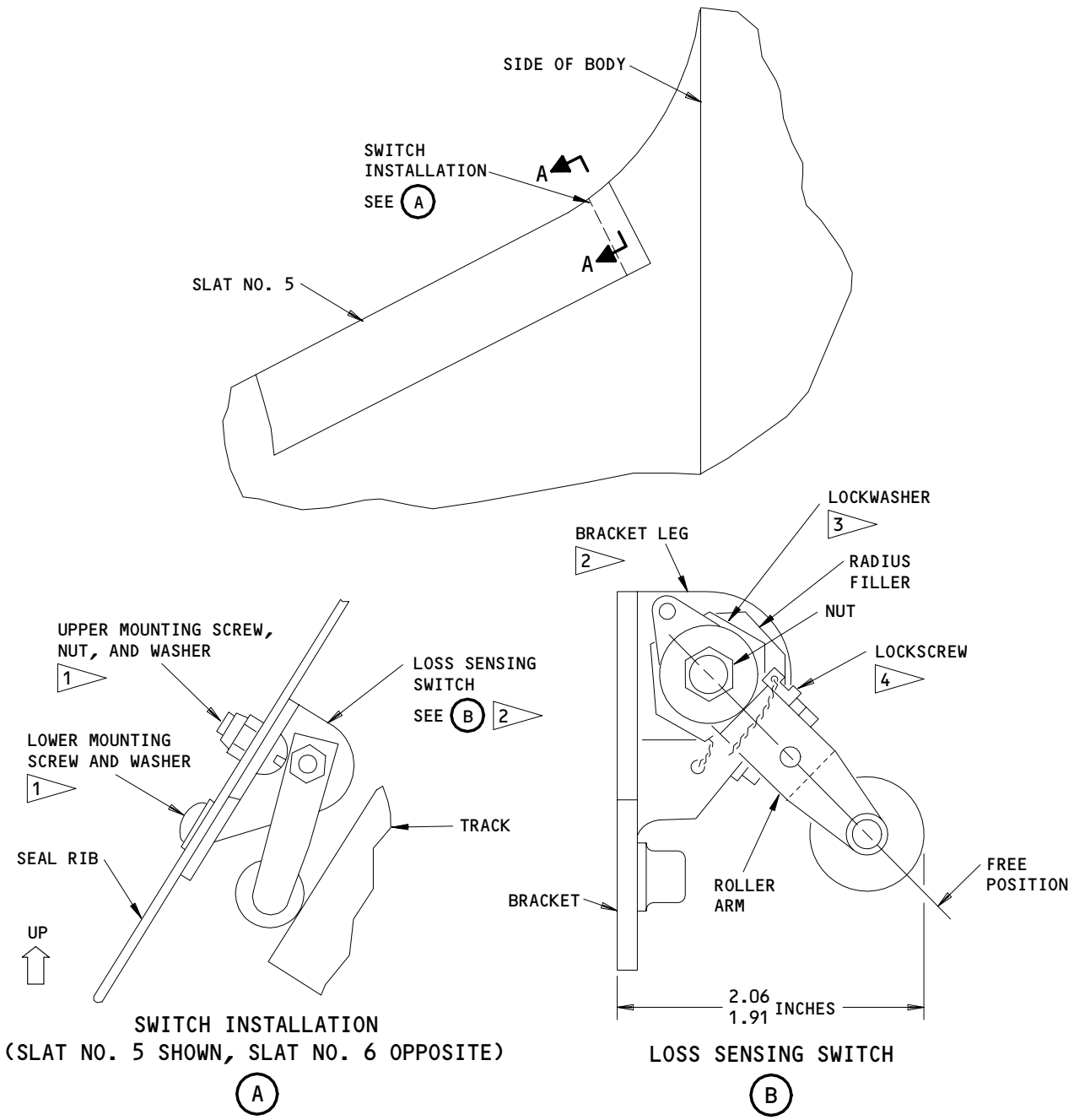
143	MLG Wheel Well (Left)
211/212	Control Cabin
512	Slat No. 5 (Left)
612	Slat No. 6 (Right)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   E. Prepare for the Adjustment

S 045-002

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



1 INSTALL WITH BMS 5-95 SEALANT

2 SENSOR SWITCH BODY IS ON THE OTHER SIDE OF BRACKET LEG

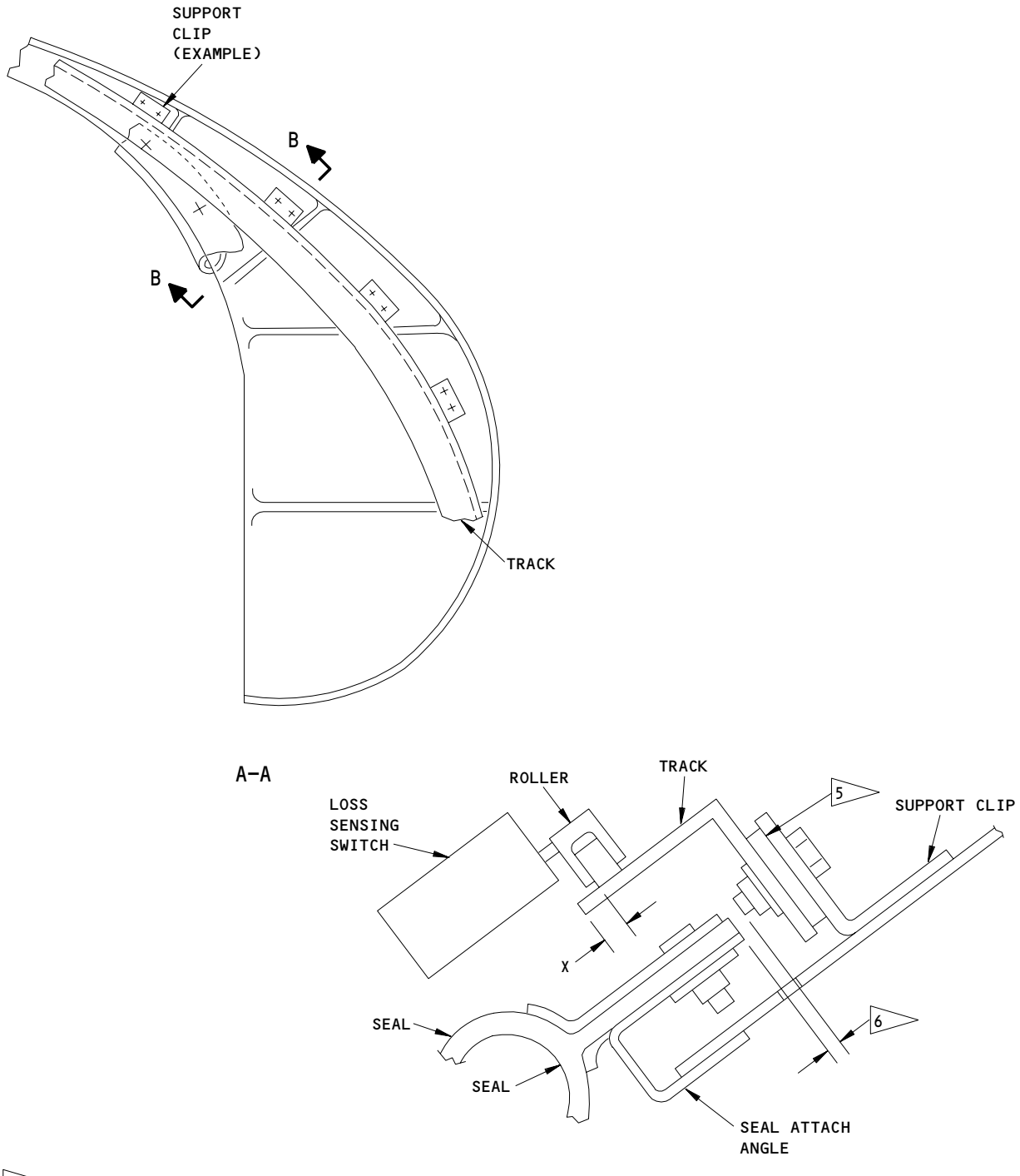
3 SAFETY THE LOCKWASHER TO THE BRACKET WITH A WIRE (DOUBLE TWIST)

4 SAFETY THIS LOCKSCREW WITH A WIRE ON THIS SIDE OF THE ADJUSTING WORM GEAR

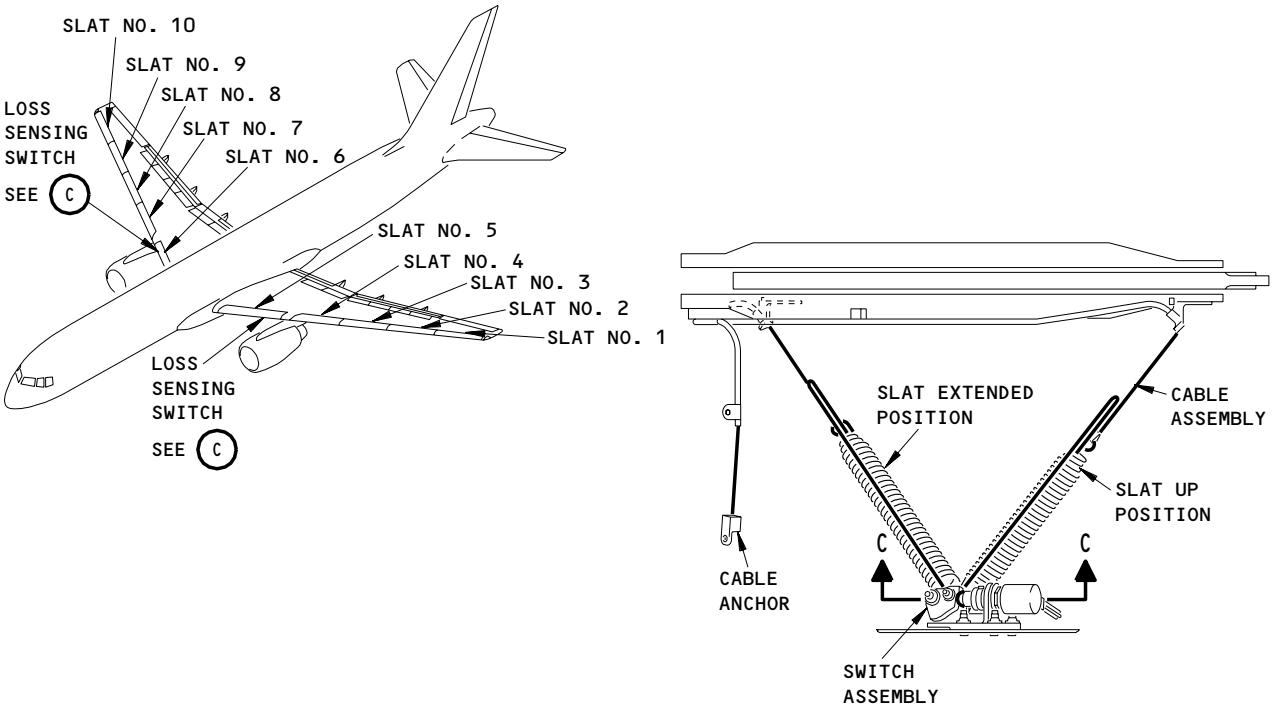
Loss Sensing Switch (for the Inboard LE Slat) Adjustment
Figure 501 (Sheet 1)

EFFECTIVITY
AIRPLANE WITH ROLLER ARM SWITCH
(PRE-SB 27-117)

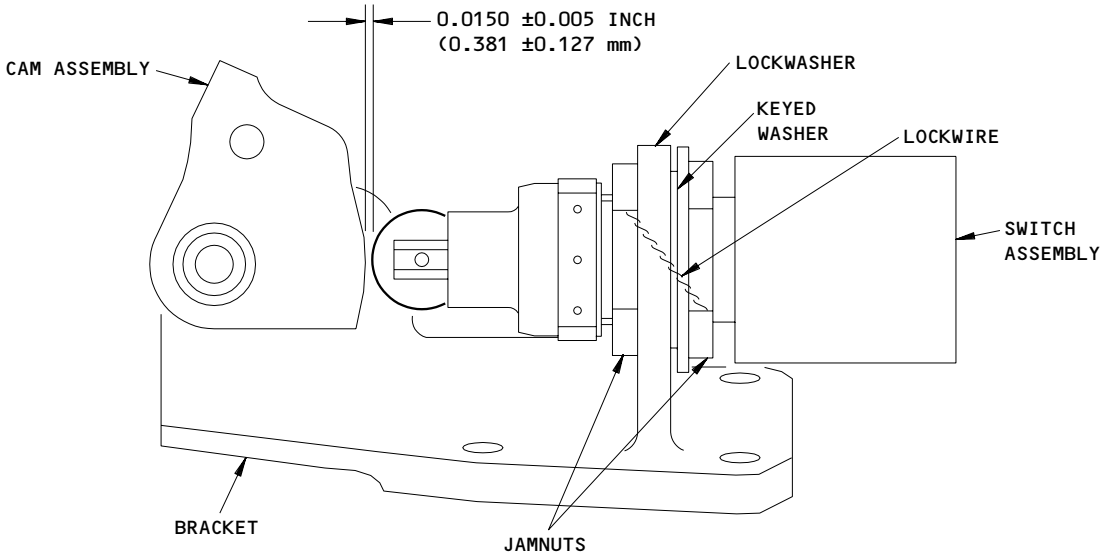
87595



Loss Sensing Switch (for the Inboard LE Slat) Adjustment
Figure 501 (Sheet 2)

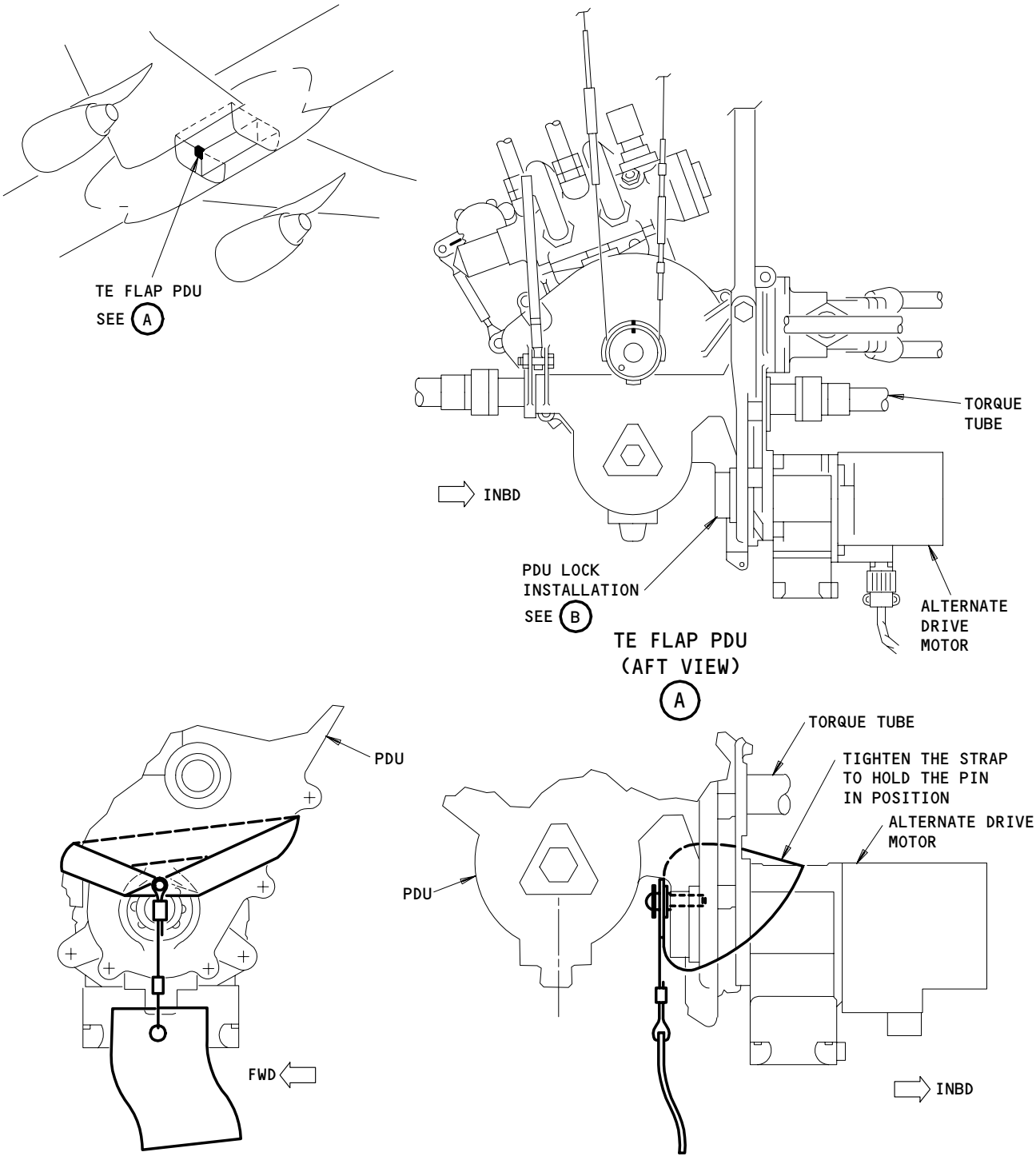


LOSS SENSING SWITCH
C



SWITCH ASSEMBLY
C-C

Loss Sensing Switch (for the Inboard LE Slat) Adjustment
Figure 501 (Sheet 3)



PDU Lock for the TE Flap PDU
Figure 502

S 215-003

(2) Make sure the trailing edge (TE) flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 215-004

(3) Make sure the downlocks are installed on the nose and main landing gear (Ref 32-00-20).

S 015-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 865-006

(5) Supply electrical power (AMM 24-22-00/201).

S 865-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-041
(7) Move the flap control lever to the 30-unit detent, and make sure the TE flaps and the LE slats move to the fully extended position.

NOTE: If an FSEU BITE check shows a slat loss indication, open the C1025 circuit breaker (11G12, FSEU-1 PWR or 11G12, FLAP SLAT ELEC UNIT 1 POWER) on the P11 overhead circuit breaker panel. This will let the slats extend in the normal mode.

S 495-009
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 865-010
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-011
(10) Install a PDU lock in the TE flap PDU (Fig. 502).

S 865-012
(11) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G12, FSEU-1 PWR or FLAP SLAT ELEC UNIT 1 POWER
(d) 11C14, FSEU-2 PWR or FLAP SLAT ELEC UNIT 2 POWER
(e) 11J33, WARN ELEX A

S 865-013
(12) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-014
(13) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 295-120

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(14) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

F. AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117); adjust the Loss Sensing Switch (Fig. 501)

S 015-054

(1) Remove landing light lens (AMM 57-41-52/401) to get access to the loss sensing switch.

S 035-016

(2) Remove the mounting screws to let the switch and bracket come free.

S 215-017

(3) Make sure the distance between the outer edge of the bracket and the roller in the free position is between 1.91 and 2.06 inches (48.5-52.3 mm).

S 825-018

(4) Adjust the switch if it is necessary.

S 495-019

(5) Safety the lockscrew with a wire, if you had it loose or removed.

S 215-020

(6) Examine the switch roller for damage and replace the switch if it is necessary.

S 215-021

(7) Loosen the nut that holds the switch in the bracket and make sure the switch anti-rotation mechanism is not damaged.

S 435-022

(8) Tighten the nut.

S 865-063

(9) Remove the circuit breaker locks and the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
(a) 11G12, FSEU-1 PWR or FLAP SLAT ELEC UNIT 1 POWER
(b) 11C14, FSEU-2 PWR or FLAP SLAT ELEC UNIT 2 POWER
(c) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
(d) 11J33, WARN ELEX A
(e) 11B18, WARN ELEX B
(f) 11D31, HYDRAULICS PTU CONT

S 865-064
(10) Remove the circuit breaker locks, and close these circuit breakers on the P6 panel:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 215-066
(11) Make sure the position selector switch for the flap/slats alternate drive, on the P3 panel, is in the NORM detent.

S 215-067
(12) Make sure the arming switches for the flap and slat alternate drives, on the P3 panel, are not armed (switch lights are off).

S 715-068
(13) Compress the roller arms to the mounting plates on both switches.

S 765-081
(14) Make sure that pin 4 of connector D1251 (E5 rack aft face) is not grounded (open).

S 715-082
(15) Release the left switch roller arm.

S 765-083
(16) Make sure that pin 4 of connector D1251 is grounded (closed).

S 715-084
(17) Compress the left switch roller arm.

S 765-087
(18) Make sure that pin 4 of connector D1251 is not grounded (open).

S 715-085
(19) Release the right switch roller arm.

S 765-088
(20) Make sure that pin 4 of connector D1251 is grounded.

S 715-086
(21) Release the left switch roller arm.

S 215-069
(22) Make sure the LEADING EDGE light, on the P3 panel, is on and the EICAS message, LE SLAT ASYM, shows on the display.

S 865-070
(23) Push the arming switch for the slat alternate drive to arm the slat alternate drive (switch light comes on).

S 215-071
(24) Make sure the LEADING EDGE light and the EICAS message, LE SLAT ASYM stay on the display.

S 435-023
(25) Install the lower and upper mounting screws that hold the switch and the bracket in their position.

S 225-024
(26) Measure the Dimension X (View B-B).

S 825-025
(27) If Dimension X is less than 0.15 inch (3.81 mm), do these steps to get a Dimension X of 0.15-0.20 inch (3.8-5.0 mm):
(a) Use shims between the track and the two support clips

NOTE: Do not use shims that add up to more than 0.10 inch (2.54 mm).

(b) Use AN960KD10L and KD10 washers together.
(c) If it is necessary, trim the seal attach angles no more than 0.10 inch (2.54 mm) (View B-B).

NOTE: Repeat the steps above if you need to get both sensing switches checked and adjusted (one at each inboard slat).

G. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCH (POST-SB 27-117 OR PRR 54530-77);
adjust the Loss Sensing Switch (Fig. 501)

S 015-118
(1) Open access door 511HB and/or 611HB.

S 025-055
(2) Remove the anchor for the switch.

S 825-059
(3) Do these steps to adjust the switch:
(a) Loosen the jamnuts that hold the switch to the bracket.
(b) Adjust the switch to get 0.01-0.02 inch (0.25-0.5 mm) clearance between the roller and the constant radius on the cam (with the cam in the open position).
(c) Tighten the jamnuts.
(d) Install the safety wire.

(e) Lubricate the cam pivot with silicone grease.

S 425-060

(4) Install the anchor.

S 015-117

(5) Close access door 511HB and/or 611HB at the end of switch adjustment or switch test below.

H. AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117); test the Loss Sensing Switch (roller type) for the left and/or right inboard slats.

NOTE: It is only necessary to test the installation of the switch being replaced. If you are replacing both of the two switches (one at each inboard slat), do the next steps for both of the switches.

S 095-029

(1) Remove the PDU lock from the TE flap PDU (Fig. 502).

S 865-047

(2) Put the position selector switch for the flap/slat alternate drive in the 1-unit detent, and make sure the TE flaps and LE slats do not move.

S 865-048

(3) Put the position selector switch for the flap/slat alternate drive in the NORM detent.

S 865-049

(4) Push the arming switch for the slat alternate drive to disarm the slat alternate drive (switch light goes off).

S 485-050

(5) Install a PDU lock in the TE FLAP PDU (Fig. 502).

S 865-051
(6) Open and then close these circuit breakers, on the P11 panel, and make sure the LEADING EDGE light goes out, and the LE SLAT ASYM message goes off the EICAS display.
(a) 11C14, FSEU-2 PWR or FLAP SLAT ELEC UNIT 2 POWER
(b) 11G12, FSEU-1 PWR or FLAP SLAT ELEC UNIT 1 POWER

S 865-052
(7) Remove the circuit breaker locks and the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel.
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11J33, WARN ELEX A

S 085-053
(8) Remove the PDU lock from the TE flap PDU (Fig. 502).

S 865-030

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 095-031
(10) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-032
(11) Move the flap control lever to the zero (FLAPS UP) detent and make sure the flaps and slats move to the fully retracted position.

NOTE: Monitor the loss sensing switch while you can still see it.

S 865-033
(12) Move the flap control lever to the 20-unit detent and make sure the flaps move to the 20-unit position and the slats move to the intermediate position.
(a) Make sure the LEADING EDGE light on the P3 panel is not on and that no messages show on the EICAS display.

S 865-034

(13) Move the flap control lever to the 30-unit detent and make sure the flaps and slats move to the fully extended position.

(a) Make sure the LEADING EDGE light on the P3 panel is not on and that no messages show on the EICAS display.

S 865-035

(14) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the flaps and slats move to the fully retracted position.

(a) Make sure the LEADING EDGE light is not on and that no messages show on the EICAS display.

I. AIRPLANES WITH CABLE AND CAM ACTUATED SWITCH (POST-SB 27-117 OR PRR 54530-77);
test the loss sensing switch (cam actuation type) for the left and/or right inboard slats.

NOTE: It is only necessary to test the installation of the switch being replaced. If you are replacing both of the two switches (one at each inboard slat), do the next steps for both of the switches.

S 865-072

(1) Make sure that all circuit breakers are closed.

S 865-073

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(2) Make sure external electrical power is connected to the airplane.

S 865-077

(3) Make sure that no "TRAILING EDGE" or "LEADING EDGE" lights and, no messages on the EICAS are shown on the P3-1 panel.

S 865-078

(4) Make sure left hydraulic system is pressurized.

S 865-079

(5) Test the left and/or right inboard slat sensor switches with these steps:
   (a) Extend and retract the slat several times to make sure that a new switch installation (switch, cable assembly, guide tube or any other switch hardware) does not cause interference with the structure.
   (b) Make sure that the EICAS message LE SLAT ASYM does not show and that a LEADING EDGE light on the P3-1 panel does not come on.
   (c) Move the flap control lever to the 25-unit detent and make sure that the LE slats and TE flaps move to the correct position.
   (d) Remove the screw from the cable anchor on the (left or right) inboard slat access panel.
   (e) Pull the cable outboard until the cam (on the switch assembly) rotates clear of the switch.
   (f) Make sure that the force necessary to operate the switch is between 20 and 45 pounds (9.1-20.4 Kg).
   (g) Make sure that the message LE SLAT ASYM shows on the EICAS and that a LEADING EDGE light on the P3-1 panel comes on when the cam rotates clear of the switch.
   (h) Push the LE ALTN switch to put the slat system in alternate control.
   (i) Make sure that the EICAS message LE SLAT ASYM and the LEADING EDGE light on the P3-1 panel stay on.
   (j) Move the rotary selector switch on the P3-1 panel to the "1" position.

      NOTE: The TRAILING EDGE light will come on and a TE DISAGREE message will show on the EICAS.

   (k) Make sure that the flaps and slats do not move.
   (l) Move the rotary selector switch to the NORMAL position.
   (m) Push the LE ALTN switch to put the slat system in normal control.
   (n) Install the cable anchor and mounting screw on the slat access panel.
   (o) Put the cam on the slat loss switch to the normal position.
   (p) Open and close these circuit breakers:
      1) 11G12, FSEU-1 PWR or FLAP SLAT ELEC UNIT 1 POWER
      2) 11C14, FSEU-2 PWR or FLAP SLAT ELEC UNIT 2 POWER
   (q) Make sure that the LE SLAT ASYM message on the left EICAS display and the LEADING EDGE light on the P3-1 panel go off.

(r) Make sure that the EICAS does not show a FLAP/SLAT ELEC, a FLAP ISLN VALVE, or a FLAP/SLAT BITE message.

J. Put the Airplane Back to Its Usual Condition

S 295-121

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(1) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

S 415-036

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Remove the door locks for the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-037

(3) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 865-038

(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 415-087

(5) AIRPLANES WITH ROLLER ARM SWITCH (PRE-SB 27-117); install the landing light lens (AMM 57-41-52/401).

S 445-040

(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

OUTBOARD LE SLAT LOSS SENSING SWITCH AND CABLE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the loss sensing switch for the outboard leading edge (LE) slats. The second task installs the loss sensing switch.

TASK 27-81-42-024-001

2. Remove the Loss Sensing Switch and/or Cable for the Outboard LE Slats
   A. Equipment
      (1) Trailing Edge Flap Power Drive Unit Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - P/N B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) AMM 06-44-00/201, Wings Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
      (6) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

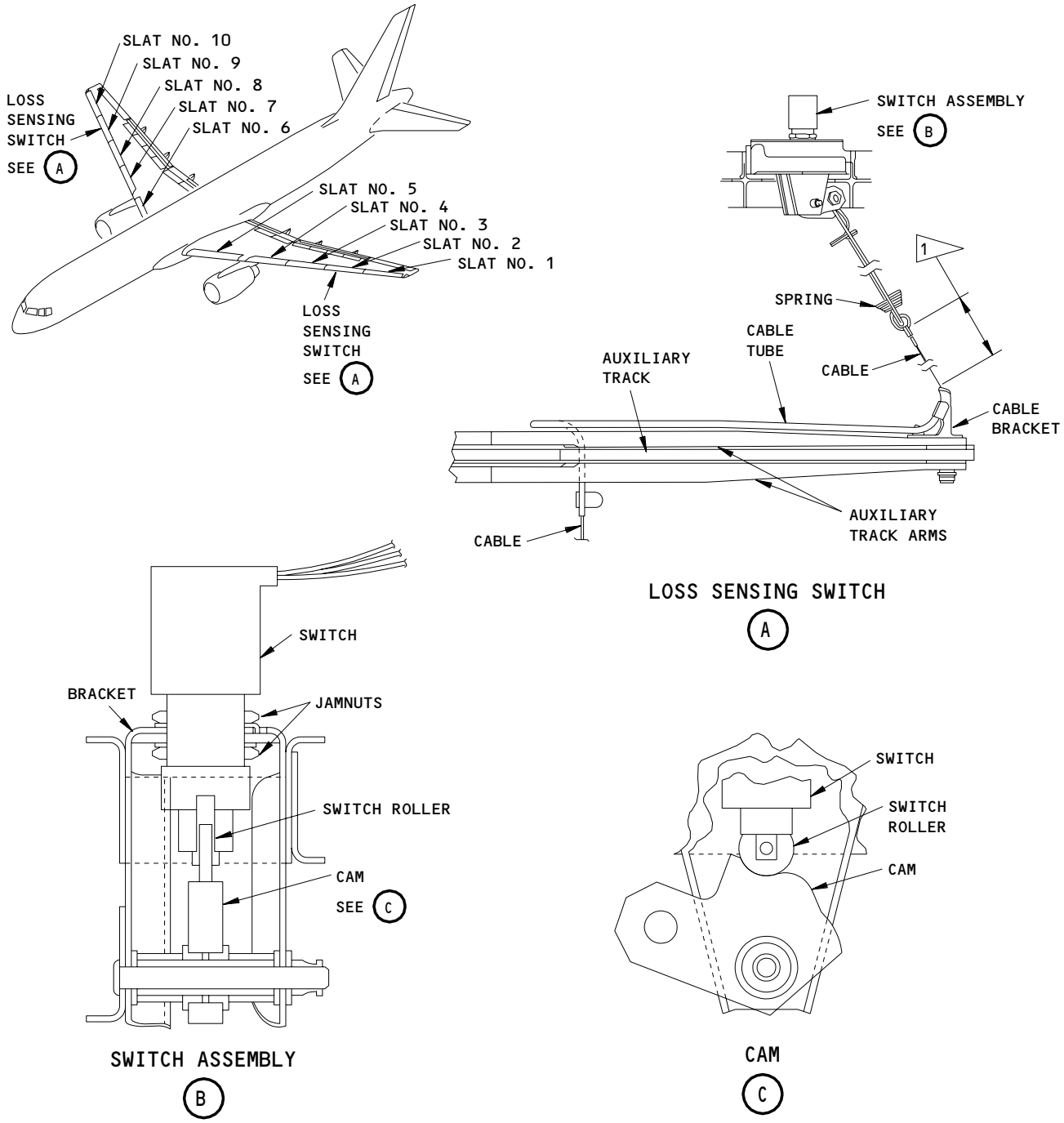
143	MLG Wheel Well (Left)
211/212	Control Cabin
524	Slat No. 2 (Left)
624	Slat No. 9 (Right)
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

S 044-002

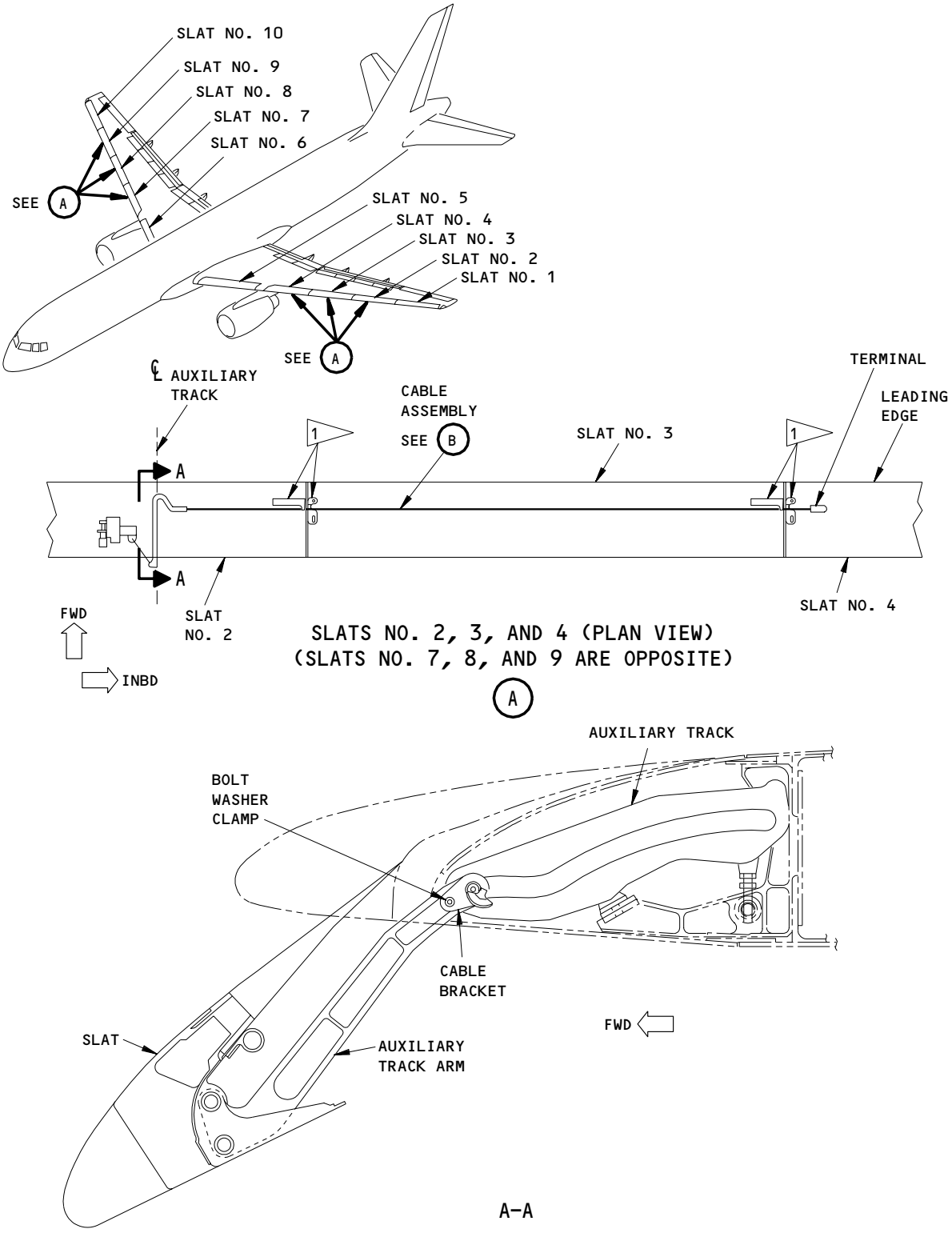
WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

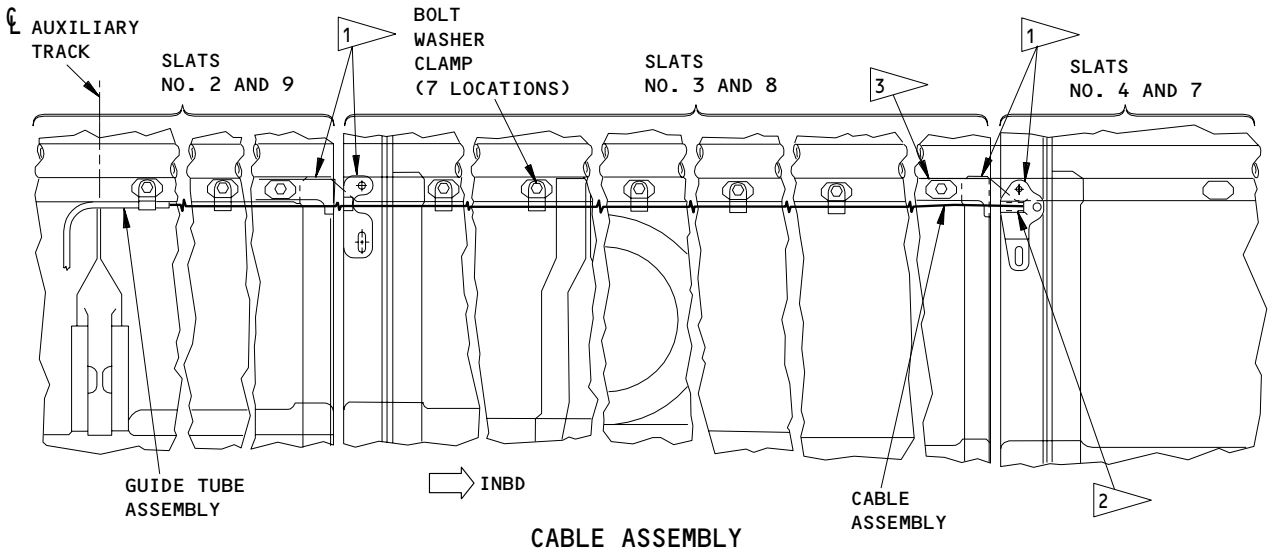


1 AIRPLANES PRE-SB 27-0126;
4.0 ±0.2 INCHES (101.6 ±5.8 mm)
AIRPLANES POST-SB 27-0126;
3.6 ±0.2 INCHES (91.44 ±5.8 mm)

Loss Sensing Switch for the Outboard LE Slat
Figure 401

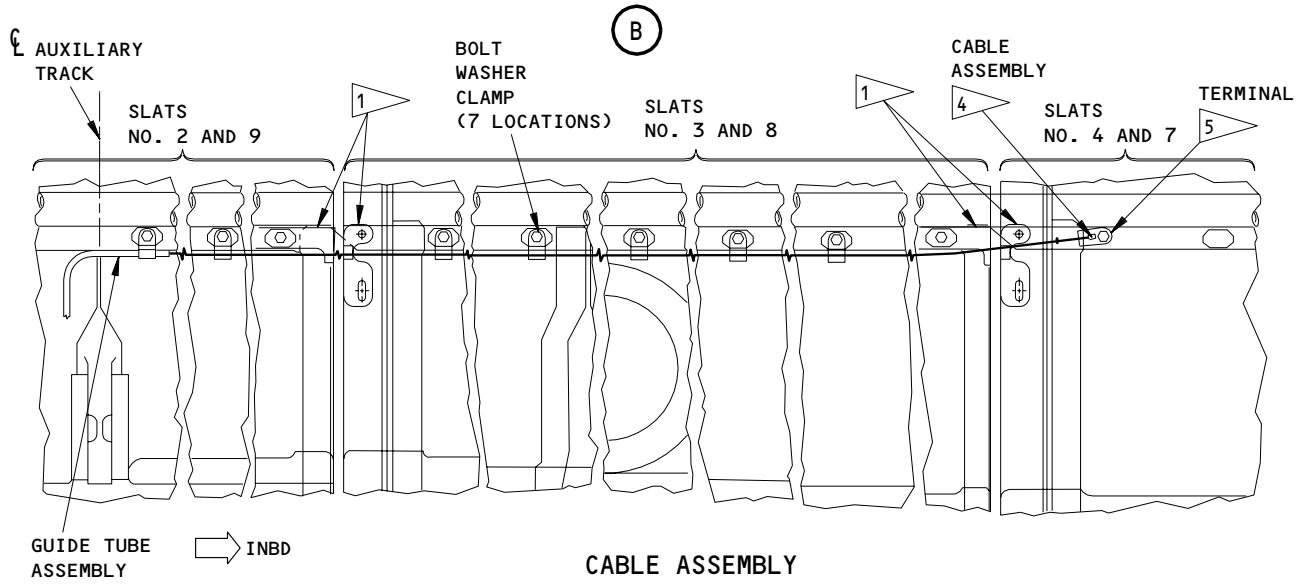


Outboard Leading Edge Slat Loss Sensing and Indication Cable Installation
Figure 402 (Sheet 1)



CABLE ASSEMBLY
(AIRPLANES WITH CABLE GUIDE AT SLATS NO. 4 AND 7)

B



CABLE ASSEMBLY
(AIRPLANES WITH ANCHOR AT SLATS NO. 4 AND 7)

B

1 CABLE GUIDES (251W5220) ADDED FOR ENHANCED LEADING EDGE SKEW DETECTION (IPC 27-81-42-01).

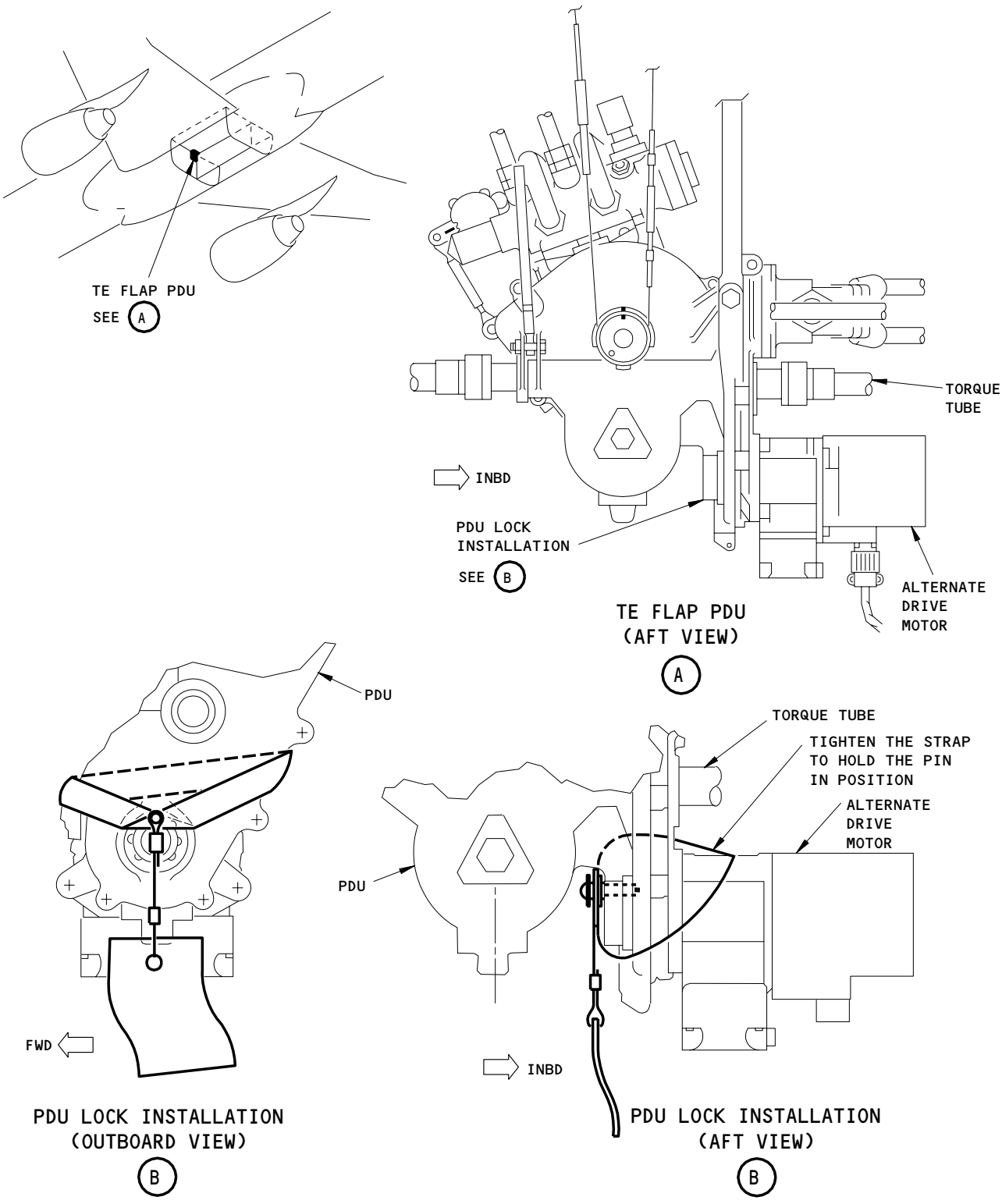
2 INSTALL COTTER PIN AFTER CABLE INSTALLATION.

3 ADJUST CABLE GUIDES ALONG SLOTS TO REDUCE CABLE RIDDING CONDITIONS.

4 CENTER LINE OF ANCHOR MUST ALIGN WITH CENTER LINE OF CABLE AFTER TIGHTENING FASTENER.

5 IPC 27-81-42-01.

Outboard Leading Edge Slat Loss Sensing and Indication Cable Installation
Figure 402 (Sheet 2)



PDU Lock for the TE Flap PDU
Figure 403

S 214-003

(2) Make sure the trailing edge (TE) flaps and the LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 214-004

(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-006

(5) Supply electrical power (AMM 24-22-00/201).

S 864-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 214-008

(7) Put the flap control lever in the 30-unit detent, and make sure the TE flaps and the LE slats move to the fully extended position.

NOTE: If an FSEU BITE check shows a slat loss indication, open the C1025 circuit breaker (11G12, FSEU-1 PWR) on the P11 overhead circuit breaker panel. This will let the slats extend in the normal mode.
You can move the slats electrically (if hydraulic power is not available), but first remove the power to the FSEU 2.

S 494-009
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 864-010
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-011
(10) Install a PDU lock on the TE flap PDU (Fig. 402).

S 864-012
(11) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULIC PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
(d) 11J33, WARN ELEX A

S 864-013
(12) Open this circuit breakers on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-014
(13) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

E. Remove the Loss Sensing Cable (Fig. 401)

S 034-033
(1) Remove the lower outboard access panels of the fixed leading edge on the left or right wing as necessary to access the slat loss sensor installation (AMM 06-44-00/201).

S 034-034
(2) Remove cable anchor and fasteners to disconnect cable assembly from the cove of slat 4 or 7.

S 034-035
(3) Slide cable terminal out of cable anchor, through clamps, out of guide tube and disconnect cable from the switch coil spring at slat 2 or 9.

F. Remove the Loss Sensing Switch (Fig. 401)

S 034-015
(1) Disconnect the electrical wires of the loss sensing switch from the airplane.

S 034-028
(2) Remove the wire that locks the jamnut to the bracket.

S 034-024
(3) Remove the jamnut that holds the switch on the bracket.

S 024-025
(4) Remove the switch from the airplane.

TASK 27-81-42-424-031

3. Install the Loss Sensing Switch and/or Cable for the Outboard LE Slats

A. Consumable Materials
(1) D00121 Silicone Grease - DC-33 Medium

B. References
(1) AMM 06-44-00/201, Wings Access Doors and Panels
(2) AMM 27-81-42/501, Outboard Leading Edge Slat Loss Sensing Switch

C. Access
(1) Location Zones

524	Slat No. 2 (Left)
624	Slat No. 9 (Right)

D. Install the Loss Sensing Switch (Fig. 401)

S 214-030
(1) Make sure one jamnut is installed on the loss sensing switch.

S 024-026
(2) Put the switch in its correct position in the bracket.

S 034-027
(3) Install the jamnut to hold the switch in its position.

S 434-029
(4) Safety the jamnuts to each other with a wire.

S 434-022
(5) Connect the electrical wires of the loss sensing switch to the airplane.

S 714-046
(6) Adjust and do a test on the installation of the loss sensing switch (AMM 27-81-42/501).

E. Install the Loss Sensing Cable (Fig. 401)

S 034-036
(1) Install the cable assembly in reverse order of removal. Do not tighten fasteners.

S 064-037
(2) Fill the guide tube with Molykote No. 33 silicone grease, using the grease fitting in the center of the tube.

S 434-038
(3) Pull on the anchor end of the cable and make sure the switch actuates with 10 to 30 pounds pull force (44.48 to 133.45 newtons).

S 434-039
(4) Tighten the cable anchor fasteners.

S 434-040
(5) Make sure the center line of the cable anchor aligns with the center line of the cable after tightening the fastener.

S 434-047
(6) Do a cable run check for hang ups. The cable must extend 3.4 to 3.8 inches (86.36 to 96.52 mm) from the guide tube, or 3.8 to 4.2 inches (96.52 to 106.68 mm) if SB 27-0126 is not completed.

S 434-048
(7) If necessary, adjust the cable guides along the slots to minimize cable riding conditions.

S 434-049
(8) Make sure the switch actuates from contact of the first coil on the spring against the hook during cable pull.

NOTE: the hook must not hang up against the cable or the hook portion of the spring. A hang up problem shows incorrect routing of the cable.

S 434-045
(9) Install cotter pin at cable anchor after cable installation is completed.

S 434-042
(10) Reset the switch after releasing the cable by rotating the cam until the roller on the switch is in detent on cam.

S 434-043
(11) If the airplane has a lever and pushbutton switch assembly, the switch is self resseting.

S 434-044
(12) Install the lower outboard access panels for the fixed leading edge on the left or right wing when you complete your task (AMM 06-44-00/201).

S 714-023

(13) Adjust and do a test on the installation of the loss sensing switch (AMM 27-81-42/501).

NOTE: The steps to put the airplane back to its usual condition are shown in the AMM 27-81-42/501.

OUTBOARD LEADING EDGE SLAT LOSS SENSING SWITCH - ADJUSTMENT/TEST

1. General
   A. This procedure contains steps to adjust the loss sensing switch for the outboard leading edge (LE) slat.

TASK 27-81-42-825-032

2. Adjust the Loss Sensing Switch for the Outboard LE Slat
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27202-31:
      (3) Circuit Breaker Lockout Clip (Commercially Available)
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (4) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (5) Rig Pin from Set B20003-XX (AMM 20-10-24/201):
      (6) LE3 - P/N B20003-61
   B. Consumable Materials
      (1) D00121 Silicone Grease - Grease DC-33
   C. References
      (1) AMM 12-21-08/301, Leading Edge Slat System Servicing
      (2) AMM 20-10-24/201, Rig Pins
      (3) AMM 24-22-00/201, Electrical Power - Control
      (4) AMM 27-81-00/501, Leading Edge Slat System
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
      (8) AMM 78-31-00/201, Thrust Reverser System
   D. Access
      (1) Location Zones

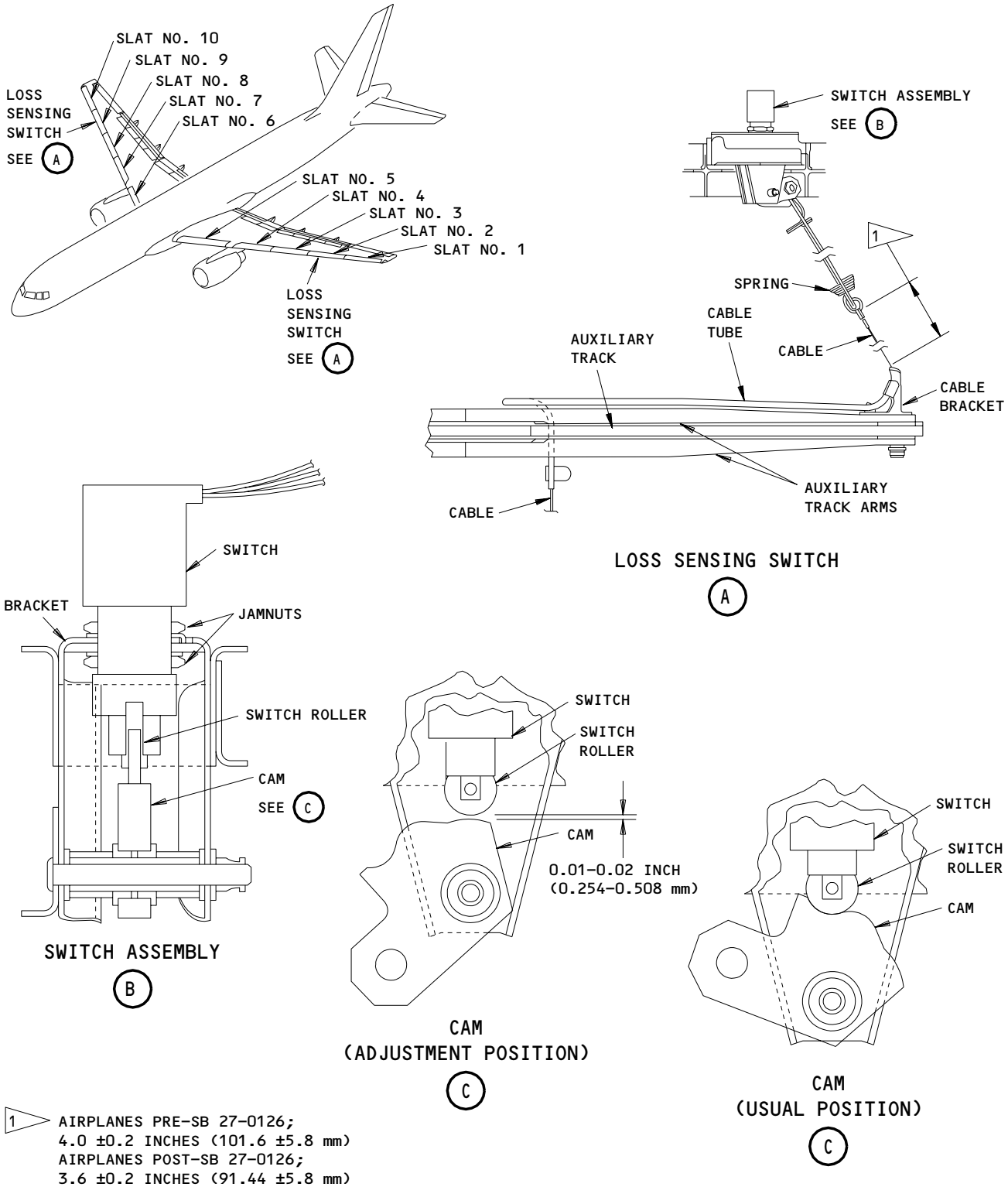
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   E. Prepare for the Adjustment

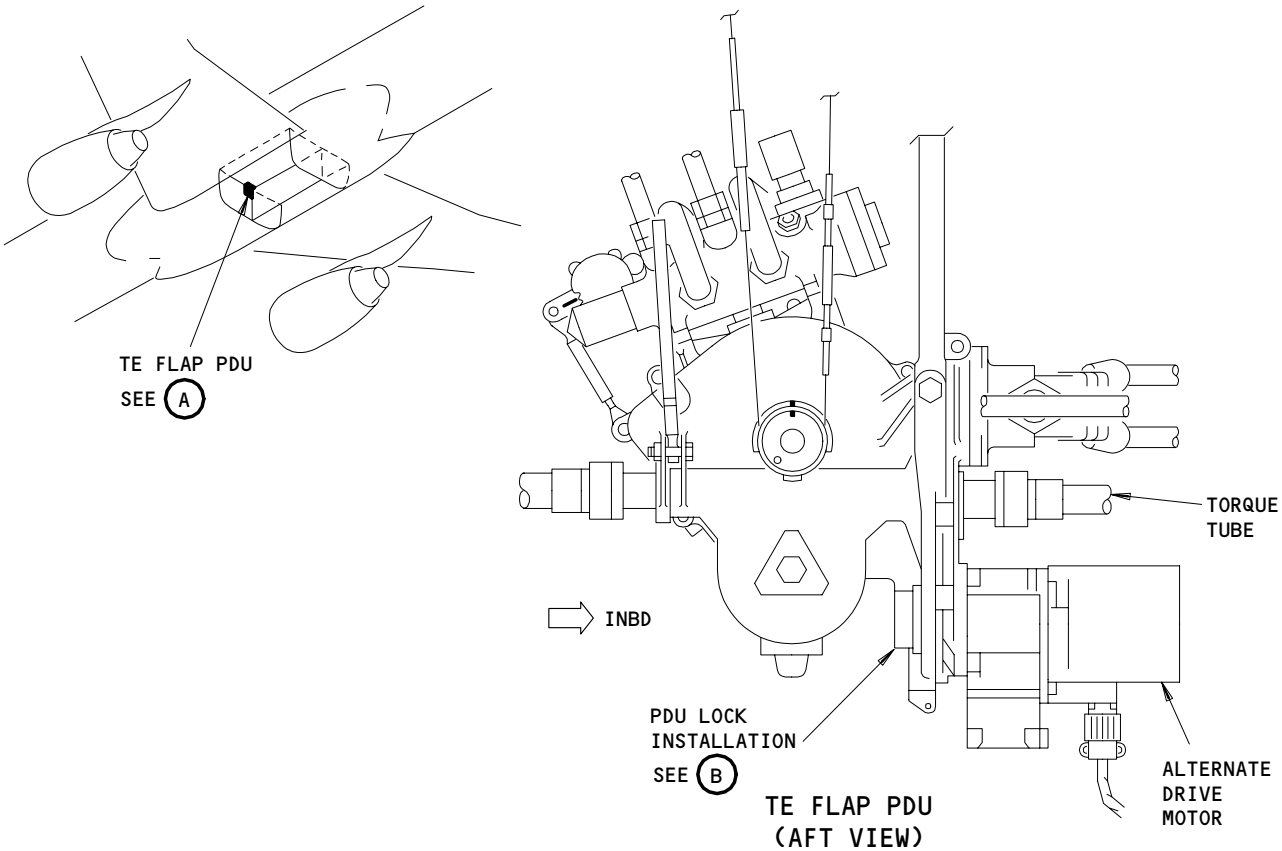
      S 045-001

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



Adjustment of the Loss Sensing Switch for the Outboard LE Slat
Figure 501



PDU Lock for the TE Flap PDU
Figure 502

S 215-002
(2) Make sure the TE flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 215-003
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-004

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 865-005
(5) Supply electrical power (AMM 24-22-00/201).

S 865-006

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRUALIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQ UIMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(6) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-007
(7) Move the flap control lever to the 30-unit detent and make sure the TE flaps and LE slats move to the fully extended position.

S 495-008
(8) Install a DO-NOT-OPERATE tag on the flap control lever.

S 865-009
(9) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 495-010
(10) Install a PDU lock in the TE flap PDU (Fig. 502).

S 865-011
(11) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
(d) 11J33, WARN ELEX A

S 865-012
(12) Open this circuit breaker on the P11 panel, and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 865-013
(13) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

F. Adjust the Loss Sensing Switch (Fig. 501)

S 035-014
(1) Remove the anchor at the inboard end of the cable for the slat loss sensing switch (slat No. 4 on the left side, slat No. 7 on the right side).

S 035-015
(2) Loosen the jamnuts that hold the loss sensing switch to the bracket.

S 825-018
(3) Turn the cam to the adjustment position.

S 825-019
(4) Adjust the switch to get the 0.01-0.02 clearance between the switch roller and the cam.

S 435-020
(5) Tighten the jamnuts and safety them with a wire.

S 825-021
(6) Turn the cam to the usual position.

S 645-022
(7) Lubricate the switch mechanism with silicone grease (AMM 12-21-08/301).

S 095-023
(8) Remove the PDU lock from the TE flap PDU (Fig. 502).

S 865-024

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR FROM THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(9) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 435-025

(10) Connect the anchor at the inboard end of the cable for the loss sensing switch:
   (a) Measure the cable length (View A, Fig. 501) from the guide tube entrance to the end of the cable end (not to the spring or the hole in the cable end) with the switch in the closed position.

      NOTE: Make sure the cable is not misrouted.

   (b) Make sure the switch operates from contact of the first coil on the spring against the safety hook during cable pull.
   (c) Make sure the safety hook do not hang up against the cable or the hook part of the spring.

      NOTE: A hang up problem indicates incorrect routing of the cable.

S 095-026

(11) Remove the DO-NOT-OPERATE tag from the flap control lever.

S 865-027

(12) Move the flap control lever to the zero (FLAPS UP) detent, and make sure the TE flaps and LE slats move to the fully retracted position.

S 865-028

(13) Remove the circuit breaker lock and the DO-NOT-CLOSE tags, and close these circuit breakers on the P11 panel:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
   (d) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

(e) 11J33, WARN ELEX A

S 865-029

(14) Remove the circuit breaker locks, and close these circuit breakers on the P6 panel:
(a) 6D20 ALTN SLAT PWR
(b) 6D23 ALTN FLAP PWR

S 715-030

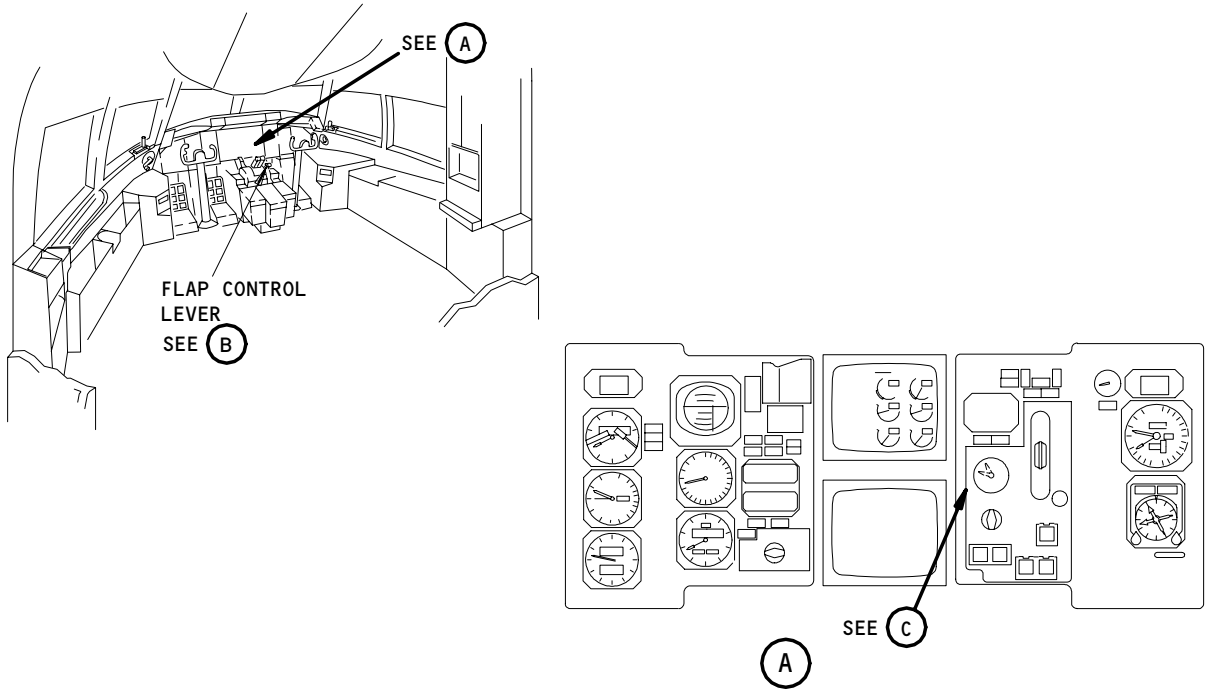
(15) Do an operational test on the loss sensing switch (AMM 27-81-00/501).

S 445-031

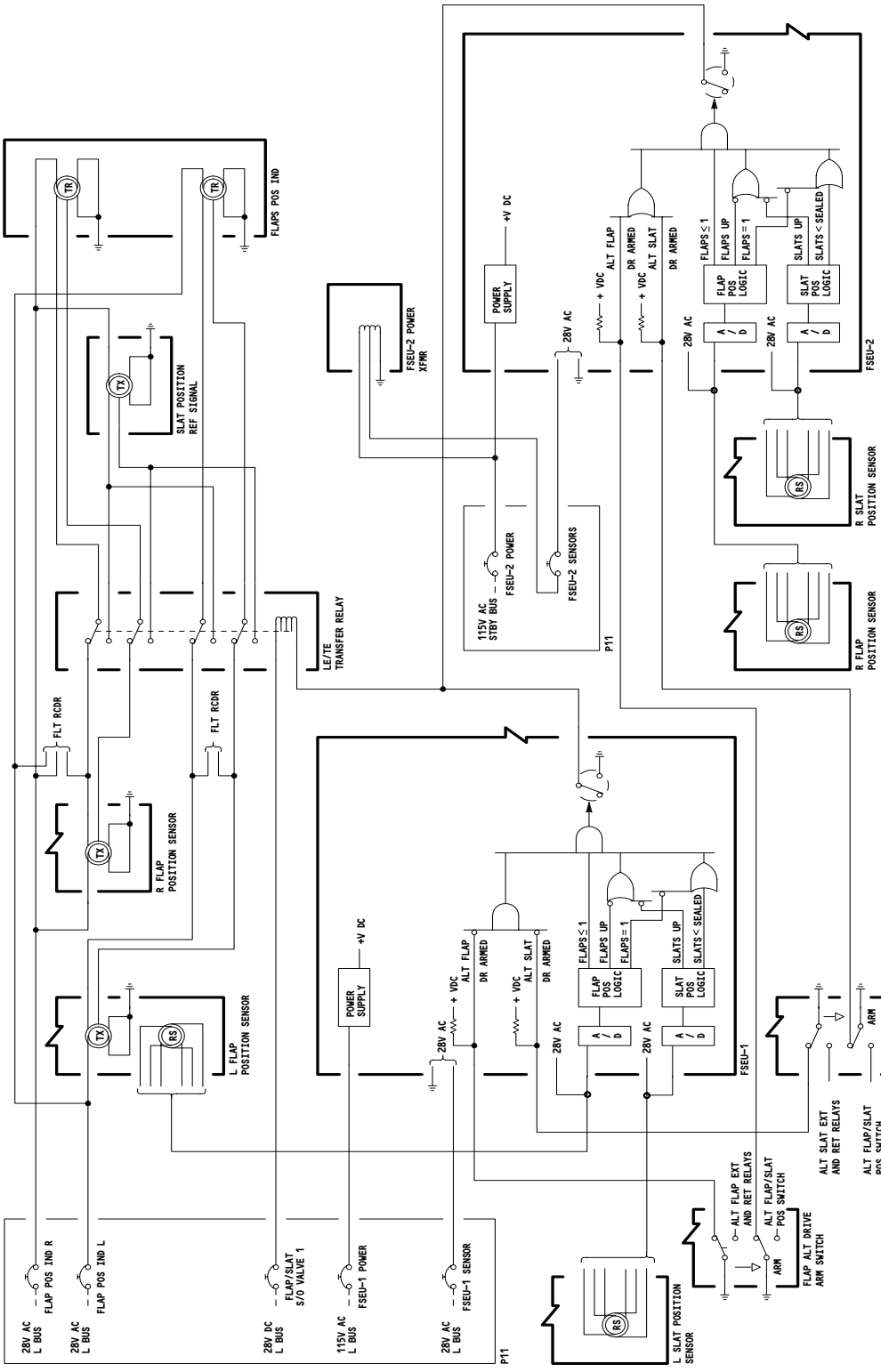
(16) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

LEADING EDGE SLAT POSITION INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. Purpose
      (1) Indication of slat position is by the flap/slat position indicator on the first officer's main instrument panel P3 (Fig. 1).
      (2) Absence of fault annunication indicates correct position of slats as related to command by the flap lever on primary power or the alternate flap/slats position selector switch on alternate power. For a description of fault annunication and protection, refer to AMM 27-81-00/001, Leading Edge Slat System - Description and Operation.
      (3) For a description of leading edge slat position transmitters, refer to AMM 27-81-00/001, Leading Edge Slat System - Description and Operation.
2. General Description
   A. Flap/Slat Position Indication on Primary Power (Fig. 2)
      (1) The logic in FSEU-1 controls activation and deactivation of a relay in the flap/slat position indicator circuit. The relay controls transmission of a fixed 1/2-unit signal to the indicator.
      (2) When the flaps and the slats are fully retracted, the indicator needles are in UP, because the logic in FSEU-1 deactivates the relay to allow transmission of the fully-retracted signal from the flap position transmitters to the indicator.
      (3) When either the flaps or the slats extend from the fully retracted position, the indicator needles jump from UP to 1/2, because the logic in FSEU-1 activates the relay to allow transmission of the fixed 1/2-unit signal to the indicator.
      (4) When the flaps are in the 1-degree position and the slats are in the intermediate position, the indicator needles jump from 1/2 to 1, because the logic in FSEU-1 deactivates the relay to allow transmission of the position signals from the flap position transmitters to the indicator.
      (5) The needles indicate flap position only for flap lever between greater than 1-unit detent and 30-unit detent.
      (6) When the flaps retract from the 1-unit position, the indicator needles jump from 1 to 1/2, because the logic in FSEU-1 activates the relay to allow transmission of the fixed 1/2-unit signal to the indicator.
      (7) When the flaps and the slats are fully retracted, the indicator needles jump from 1/2 to UP, because the logic in FSEU-1 deactivates the relay to allow transmission of the fully-retracted signal from the flap position transmitters to the indicator.



Leading Edge Slat Position Indication
Figure 1



Trailing Edge Flap/Leading Edge Slat Position Indicating System Schematic
Figure 2

B. Flap/Slat Position Indication on Alternate Power (Fig. 2)
   (1) The logic in FSEU-2 controls activation and deactivation of a relay in the indicator circuit. The relay controls transmission of a fixed 1/2-unit signal to the indicator.
   (2) If the alternate flap and alternate slat drive systems are armed at the same time, the flap/slat position indication is the same as on primary power, except that the indicator circuit relay is controlled by logic in FSEU-2.
   (3) If the alternate slat drive system is armed by itself, the indicator reflects slat position as follows:
      (a) When the slats are extended to intermediate or fully extended positions, the indicator needles jump from UP to 1/2, because the logic in FSEU-2 activates the relay to allow transmission of the fixed 1/2-unit signal to the indicator.
      (b) When the slats are retracted, the indicator needles jump from 1/2 to UP, because the logic in FSEU-2 deactivates the relay to allow transmission of the fully-retracted signal from the flap position transmitters to the indicator.

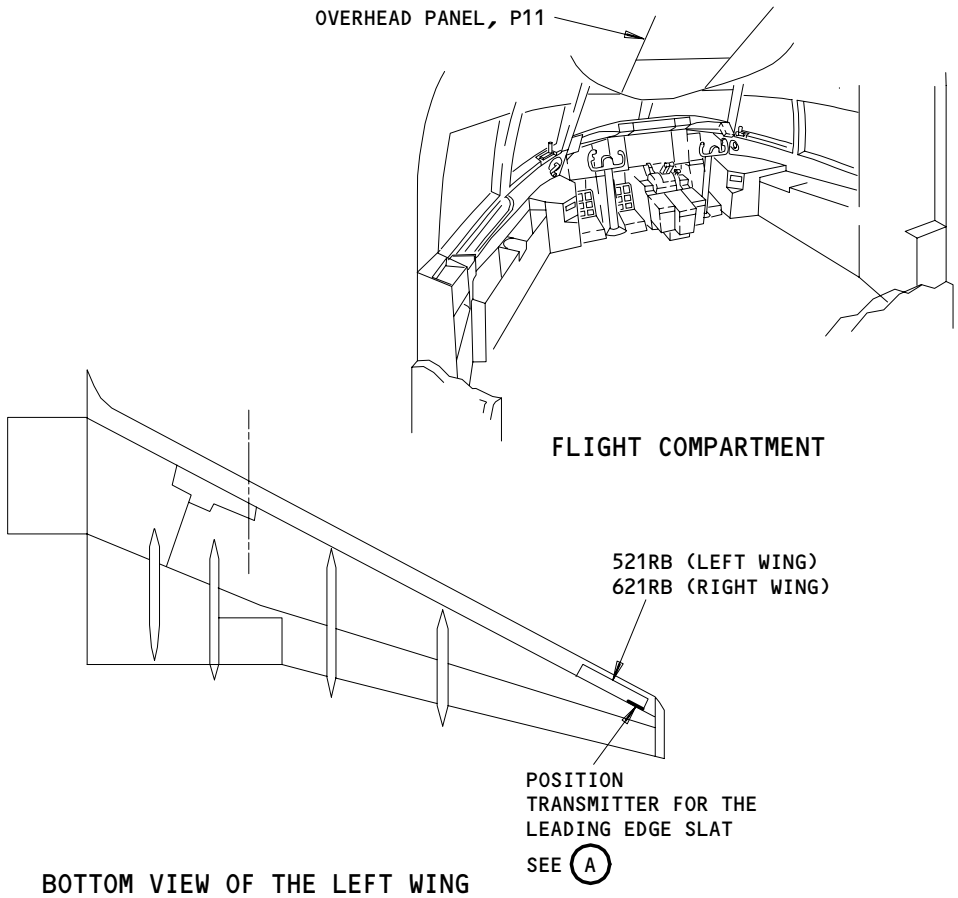
C. Takeoff Warning
   (1) If the slats are not in takeoff position (intermediate position) as commanded by the flap lever and the thrust levers are advanced into the takeoff range with the engines running, takeoff warning is announced as follows:
      (a) A red (level A) FLAPS message will appear on the EICAS display.
      (b) The master warning lights on P2 will come on.
      (c) The aural warning will sound.
      (d) The red CONFIGURATION light on P2 will come on.

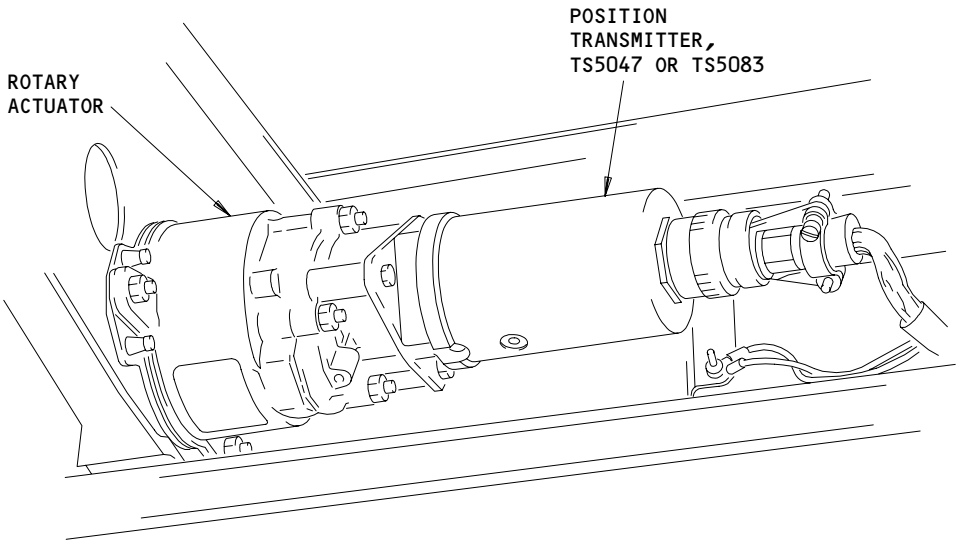
LEADING EDGE SLAT POSITION INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS	-		FLIGHT COMPARTMENT, P11 PANEL	
FLAP LOAD RELIEF, C1022		1	11J18	*
FLAP POS IND LEFT, C1008		1	11H12	*
FLAP POS IND RIGHT, C1522		1	11H13	*
FLAP SLAT ELEC UNIT 1 CONT, C1539		1	11G13	*
FLAP SLAT ELEC UNIT 1 POWER, C1025		1	11G12	*
FLAP SLAT ELEC UNIT 1 SENSOR, C1037		1	11G14	*
FLAP SLAT ELEC UNIT 2 CONT, C1541		1	11C15	*
FLAP SLAT ELEC UNIT 2 POWER, C1521		1	11C14	*
FLAP SLAT ELEC UNIT 2 SENSOR, C1524		1	11C16	*
FLAP SLAT ELEC UNIT 3 CONT, C1540		1	11G22	*
FLAP SLAT ELEC UNIT 3 POWER, C4210		1	11G21	*
FLAP SLAT ELEC UNIT 3 SENSOR, C1038		1	11G23	*
FLAP SLAT SHUTOFF 1		1	11C17	*
RELAY - (REF 31-01-36, FIG. 101) LE/TE TRANSFER, K10244				
TRANSMITTER - LE SLAT POSITION, TS5047, TS5083	-	2	521RB (LEFT), 621RB (RIGHT)	27-88-01
UNIT - (REF 27-51-00, FIG. 101) FLAP/SLAT ELECTRONIC-1, M10331				

* SEE THE WDM EQUIPMENT LIST

Leading Edge Slat Position Indicating System - Component Index
Figure 101





Leading Edge Slat Position Indicating System – Component Location
Figure 102

LEADING EDGE SLAT POSITION INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure gives instructions to adjust and to do a test on the position indicating system for the leading edge (LE) slat.

TASK 27-88-00-825-004

2. Adjustment/Test of the Position Indicating System for the LE Slat
   A. References
      (1) AMM 27-58-01/501, Trailing Edge Flap System and Leading Edge Slat System Position Transmitter
      (2) AMM 27-81-00/501, Leading Edge Slat System
      (3) AMM 27-81-08/201, Leading Edge Slat Power Drive Unit Components
      (4) AMM 31-51-00/501, Warning System
   B. Adjust and do a Test of the Position Indicating System

      S 705-001
      (1) Do an operational and a system test of the position indicating system for the LE slat (AMM 27-81-00/501).

      S 825-002
      (2) If necessary, adjust these position transmitters:
         (a) The slat position transmitters at the outboard rotary actuators (AMM 27-58-01/501).
         (b) The position transmitter on the LE slat PDU (AMM 27-81-08/201).

      S 705-003
      (3) Do a test of the Warning System for the LE slat (AMM 31-51-00/501).

LEADING EDGE SLAT POSITION TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the position transmitter for the leading edge (LE) slat. The second task installs the position transmitter.

   TASK 27-88-01-024-001

2. Remove the Position Transmitter for the LE Slat
   A. Equipment
      (1) TE Flap PDU Lock - B27008-1
      (2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:
          (a) Circuit Breaker Lock - B27065-1 (Optional Lock/Commercially Available)
          (b) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
      (3) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:
          (a) Circuit Breaker Lock - B27020-25 (Optional Lock/Commercially Available)
   B. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 27-58-01/501, TE Flap System and LE Slat System Position Transmitter
      (4) AMM 27-81-00/201, Leading Edge Slat System
      (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
      (8) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

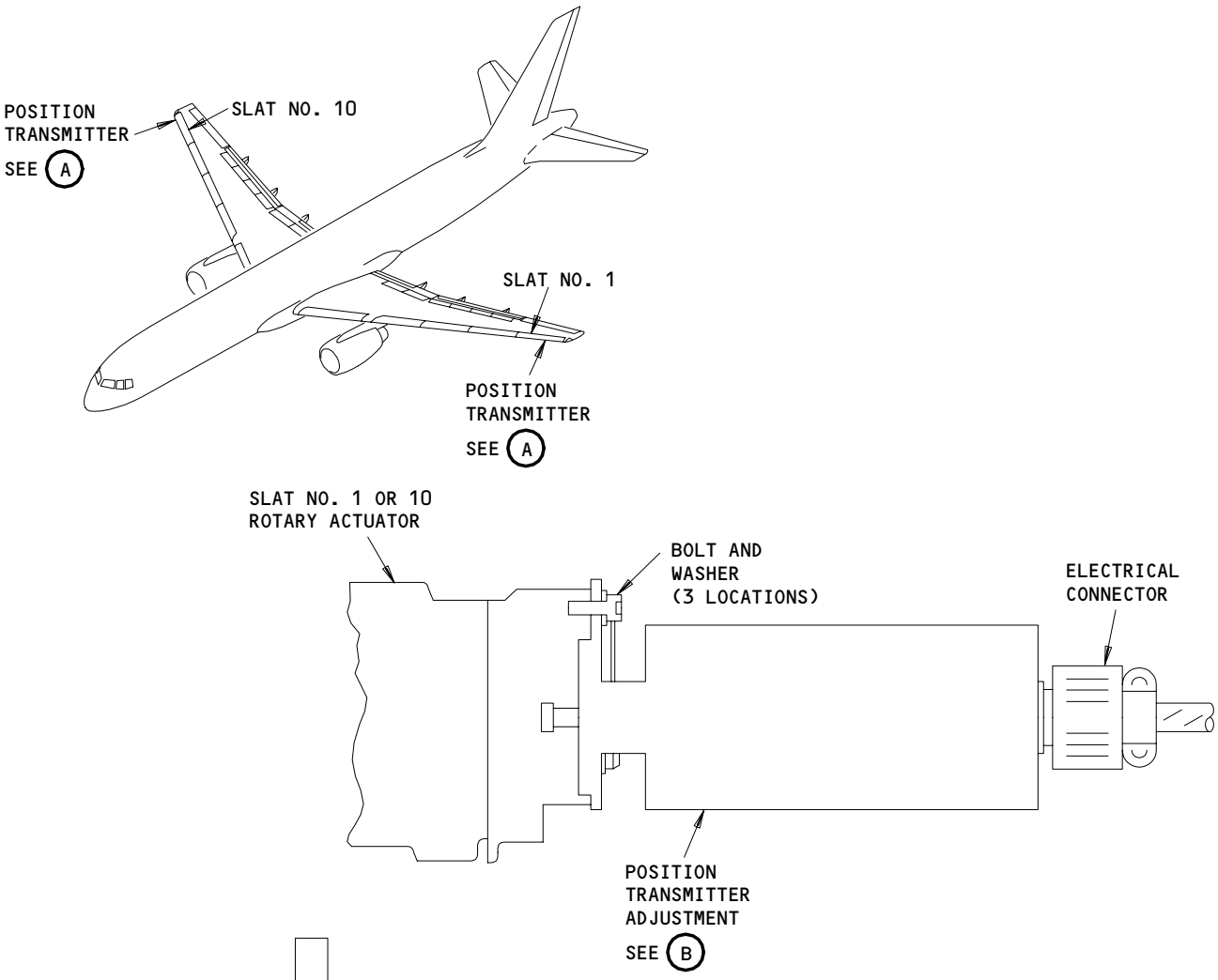
211/212	Control Cabin
525	Slat No. 1
625	Slat No. 10
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

   D. Prepare for the Removal

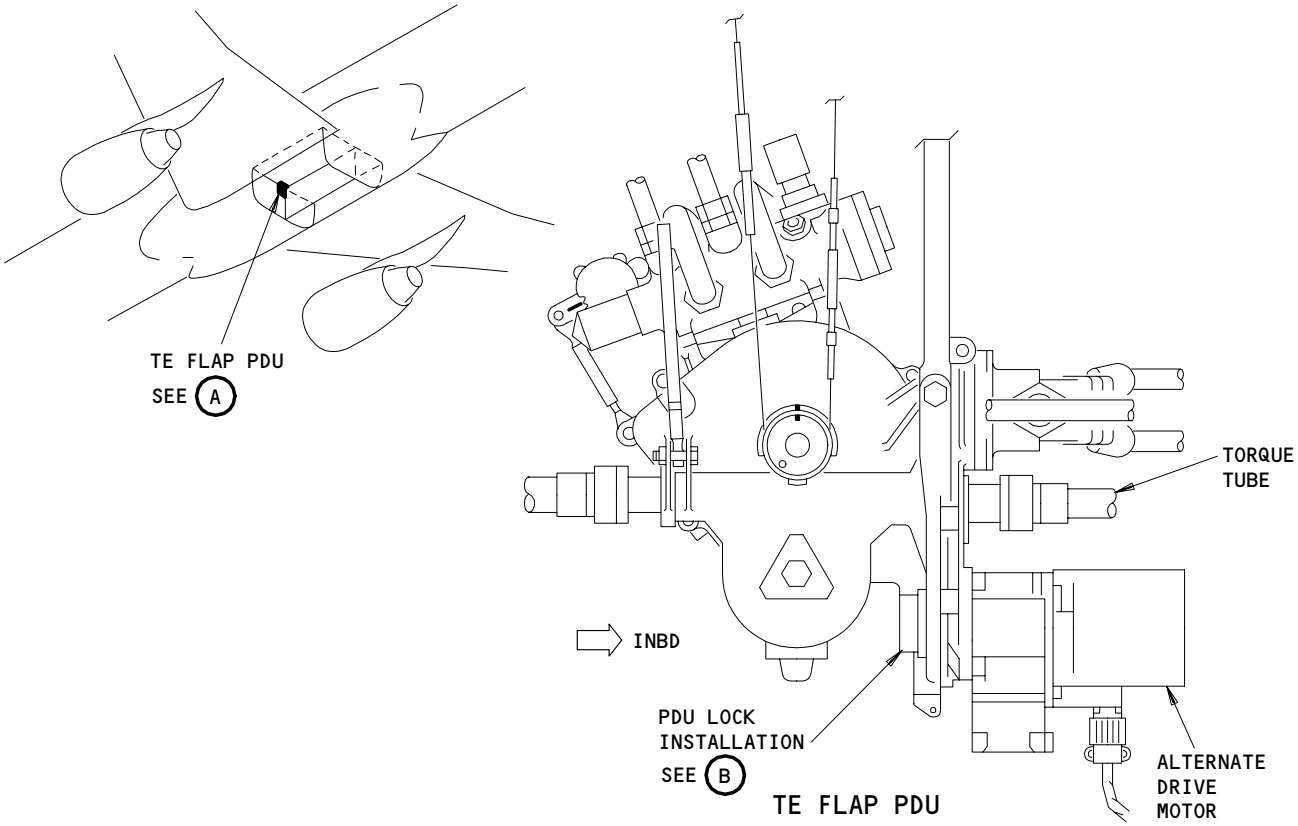
      S 044-002

      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

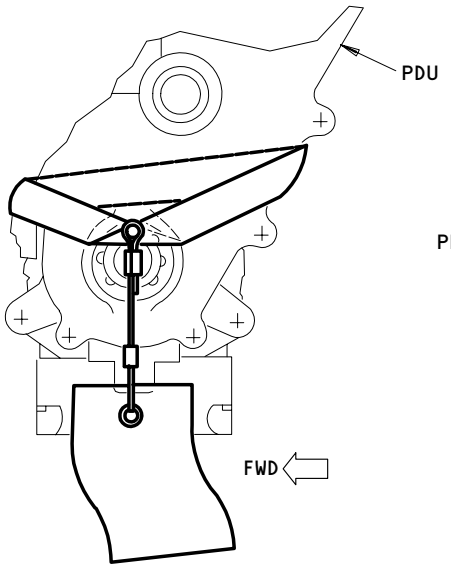
      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



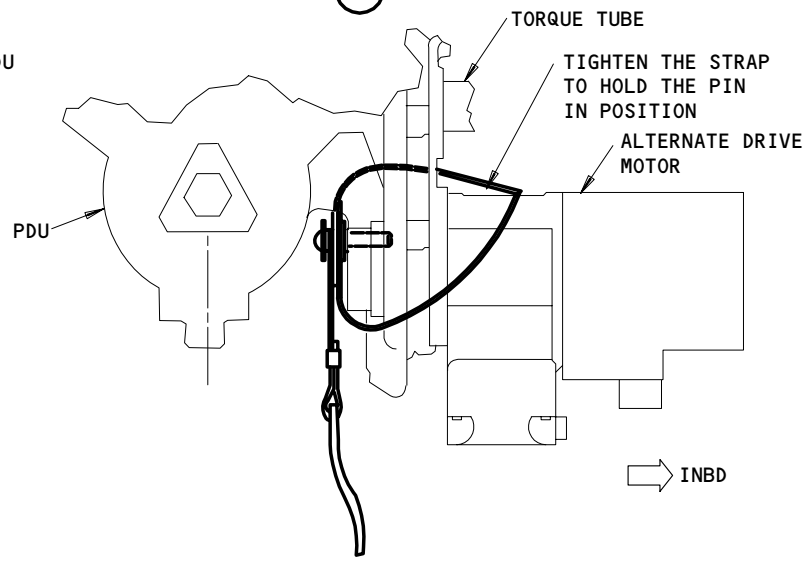
Position Transmitter for the LE Slat
Figure 401



TE FLAP PDU
(AFT VIEW)
A



PDU LOCK INSTALLATION
(OUTBOARD VIEW)
B



PDU LOCK INSTALLATION
(AFT VIEW)
B

PDU Lock for the TE Flap PDU
Figure 402

S 214-003
(2) Make sure the trailing edge (TE) flaps and LE slats are in the fully retracted position, and the flap control lever is in the zero (FLAPS UP) detent.

S 494-004
(3) Install a DO-NOT-OPERATE tag on the flap control lever.

S 214-006
(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-007
(6) Remove the power from the left hydraulic system (AMM 29-11-00/201).

S 494-008
(7) Install a PDU lock in TE flap PDU (Fig. 402).

S 864-009
(8) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11B18, WARN ELEX B
(b) 11D31, HYDRAULICS PTU CONT
(c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 POWER
(d) 11G13 OR 11C17, FLAP SLAT ELEC UNIT 1 CONT or FSEU-1 CONT
(e) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR or FSEU-1 SENSOR
(f) 11J33, WARN ELEX A

S 864-010
(9) Open these circuit breakers on the P11 panel and install a circuit breaker lock:
(a) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM

S 864-011
(10) Open these circuit breakers on the main power distribution panel, P6, and install circuit breaker locks:
(a) 6D20, ALTN SLAT PWR
(b) 6D23, ALTN FLAP PWR

S 014-012

(11) Remove the access panels on the fixed leading edge and open the necessary access doors (AMM 06-44-00/201).

S 294-024

WARNING: DO NOT LET OBJECTS GET IN THE HOUSING ASSEMBLY OF THE SLAT TRACK. THIS WILL HELP PREVENT A PUNCTURE OF THE HOUSING ASSEMBLY THAT COULD CAUSE A FUEL LEAK. THE FUEL LEAK COULD CAUSE A FIRE AND POSSIBLE DEATH OR INJURY TO PERSONNEL.

(12) Keep clean and free of all unwanted objects (FOD), the housing (can) assemblies of the slat main tracks, at all time.

E. Remove the Position Transmitter (Fig. 401)

S 034-013

(1) Remove the electrical connector.

S 024-014

CAUTION: BE CAREFUL WHEN YOU REMOVE THE POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BEND WHEN YOU REMOVE THE POSITION TRANSMITTER.

(2) Remove the mounting bolts and the position transmitter.

NOTE: Do not turn the input shaft of the position transmitter when you remove it from the airplane.

TASK 27-88-01-424-015

3. Install Leading Edge Slat Position Transmitter (Fig. 401)

NOTE: To adjust the position transmitter, make sure the LE slat PDU was last hydraulically driven to and become stable in a position the same as the flap control lever in the zero (FLAPS UP) detent (AMM 27-81-00/201).

You will install the slat position transmitter in the position transmitter adjustment.

A. Equipment

(1) TE Flap PDU Lock - B27008-1

(2) Circuit Breaker Lock from Lock Set, Leading Edge Slat Drive - B27020-31:

(3) Circuit Breaker Lock - B27065-1
(Optional Lock/Commercially Available)
(4) Circuit Breaker Lock - B27020-25
(Optional Lock/Commercially Available)
(5) Circuit Breaker Lock from Lock Set, Flap Alternate Drive - B27020-29:

B. References
(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 27-58-01/501, TE Flap System and Le Slat System Position Transmitter
(4) AMM 27-81-00/201, Leading Edge Slat System
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 32-00-20/201, Landing Gear Downlocks
(8) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

211/212	Control Cabin
525	Slat No. 1
625	Slat No. 10
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

D. Install the Position Transmitter

NOTE: Do not move the flaps or slats when you install and adjust the position transmitter.

S 214-016
(1) Make sure the power is removed from the left hydraulic system (AMM 29-11-00/201).

S 214-017
(2) Make sure the flap and slat alternate drives are off.

S 214-018

(3) Make sure the flaps and slats are in the fully retracted position and the flap control lever is in the zero (FLAPS UP) detent.

S 094-020

(4) If it is installed, remove the rig tool that holds the input shaft in its position.

S 864-021

(5) Remove the circuit breaker lock and the DO-NOT-CLOSE tags, and close these circuit breakers on the overhead panel, P11:
   (a) 11B18, WARN ELEX B
   (b) 11D31, HYDRAULICS PTU CONT
   (c) 11G12, FLAP SLAT ELEC UNIT 1 POWER or FSEU-1 PWR
   (d) 11G13 OR 11C17, FLAP SLAT ELEC UNIT 1 CONT or FSEU-1 CONT
   (e) 11G14, FLAP SLAT ELEC UNIT 1 SENSOR or FSEU-1 SENSOR
   (f) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
   (g) 11J33, WARN ELEX A

S 094-022

CAUTION: BE CAREFUL WHEN YOU REMOVE THE SHIPPING RIG TOOL FROM THE POSITION TRANSMITTER. THE INPUT SHAFT OF THE POSITION TRANSMITTER CAN EASILY BE BENT WHEN YOU REMOVE THE SHIPPING RIG TOOL.

CAUTION: BE CAREFUL WHEN YOU INSTALL THE POSITION TRANSMITTER. THE INPUT SHAFT CAN EASILY BEND WHEN YOU INSTALL THE POSITION TRANSMITTER.

(6) Install, adjust and do a test on the slat position transmitter (AMM 27-58-01/501).

NOTE: The steps to "Put the Airplane Back to Its Usual Condition" are given in the Trailing Edge Flap System and Leading Edge Slat System Position Transmitter - Adjustment/Test procedure (AMM 27-58-01/501).