

B757 MANUAL SUPPLEMENT - ATP 3510
SECTION 1 CHAPTER 29
CONTROL PAGE ISSUE 6

- 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.
29-00-00	201	29-515
29-11-00	201	29-520
29-11-00	202	Alert 29-529
29-11-00	206	Alert 29-532
29-11-00	208	Alert 29-523
29-11-00	209	Alert 29-526
29-11-07	601	* 29-537
29-11-07	801	* 29-538
29-33-01	601	29-517

- D. Remove and Destroy the following TRs/Alerts:

* Indicates TRs/Alerts issued with this control page

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19 March, 1998**

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 29-515

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) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DA1/8566/78.



For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 29-00-00 Page 201

REASON FOR REVISION

To add a caution to ensure hydraulic pipes are not cross connected.

ACTION

HYDRAULIC POWER - MAINTENANCE PRACTICES

1. General

Read the following additional caution

CAUTION: IF MORE THAN ONE HYDRAULIC PIPE IS DISCONNECTED IN THE SAME AREA, A FULL FUNCTION CHECK OF THE DISTURBED SYSTEM(S) MUST BE CARRIED OUT AFTER RECONNECTION.

Originator: S.GURD
Reference: 2798
Workbook: 29-146

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3 November, 1998

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TEMPORARY REVISION No. 29-520

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) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.

 For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 29-11-00 Page 201

REASON FOR REVISION

To add an alternative flushing procedure to using the hydraulic flushing rig.

ACTION

General

This procedure contains two tasks. The first task is a hydraulic system flush of the left or right hydraulic system. The second task is a hydraulic system flush of the centre hydraulic system. Both tasks require draining the system reservoir three times.

A. Hydraulic system flush procedure for Left and Right systems

1. Drain the left (right) hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
2. Fill the left (right) hydraulic system reservoir (AMM 29-11-00/201).
3. Pressurise the left (right) hydraulic system with left (right) ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

4. Operate elevators, rudder, ailerons, spoilers and flaps (flaps for left system only) for six full motion cycles to allow hydraulic fluid to circulate through the system.
5. Drain the left (right) hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
6. Fill the left (right) hydraulic system reservoir (AMM 29-11-00/201).
7. Pressurise the left (right) hydraulic system with left (right) ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

8. Operate elevators, rudder, ailerons, spoilers and flaps (flaps for left system only) for six full motion cycles to allow hydraulic fluid to circulate through the system.

Originator: P.CRONK
Reference: 00003350
Workbook: 29-149

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9. Drain the left (right) hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
10. Fill the left (right) hydraulic system reservoir (AMM 29-11-00/201).
11. Pressurise the left (right) hydraulic system with left (right) ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

12. Operate elevators, rudder, ailerons, spoilers and flaps (flaps for left system only) for six full motion cycles to allow hydraulic fluid to circulate through the system.

NOTE: Steps 13, 14 and 15 are only applicable if hydraulic system flush is required due to high particle count. If flush is required due to high acidity or water content only then steps 13, 14 and 15 are not applicable.

13. Replace the left (right) hydraulic EDP pressure and case drain filters (AMM 29-11-17/401).
14. Replace the left (right) hydraulic ACMP pressure and case drain filters (AMM 29-11-18/401).
15. Replace the left (right) hydraulic system return filter (AMM 29-11-15/401).
16. Ensure the left (right) hydraulic reservoir is full (AMM 12-12-01/301).
17. Ensure the left (right) hydraulic reservoir drain valve is wirelocked in the closed position.
18. Restore the aircraft to normal.
19. Raise a Cat Q ADD to sample the left (right) hydraulic system within 100 hrs (AMM 29-00-00/601) and route to EHM, W940, TBD for analysis.

NOTE: To allow EHM to action all required tests annotate ADD with requirement to fill sample to neck of bottle. Sample kit part number 4-48572 should be demanded against the ADD.

B. Hydraulic system flush procedure for Centre system

1. Drain the centre hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
2. Fill the centre hydraulic system reservoir (AMM 29-11-00/201).
3. Pressurise the centre hydraulic system with centre C1 and C2 ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

4. Operate elevators, rudder, ailerons and spoilers for six full motion cycles to allow hydraulic fluid to circulate through the system.
5. Drain the centre hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
6. Fill the centre hydraulic system reservoir (AMM 29-11-00/201).

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7. Pressurise the centre hydraulic system with the centre C1 and C2 ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

8. Operate elevators, rudder, ailerons and spoilers for six full motion cycles to allow hydraulic fluid to circulate through the system.
9. Drain the centre hydraulic system reservoir (AMM 29-11-22/401 Para 2A to 2C).
10. Fill the centre hydraulic system reservoir (AMM 29-11-00/201).
11. Pressurise the centre hydraulic system with the centre C1 and C2 ACMP (AMM 29-11-00/201).

WARNING: PRESSURISATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO FLIGHT CONTROLS AND LANDING GEAR SYSTEMS. TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT ENSURE FLIGHT CONTROLS ARE CLEAR AND SPOILERS AND GEAR SELECTED DOWN WITH ALL DOWNLOCKS FITTED.

12. Operate elevators, rudder, ailerons and spoilers for six full motion cycles to allow hydraulic fluid to circulate through the system.

NOTE Steps 13 and 14 are only applicable if hydraulic system flush is required due to high particle count. If flush is required due to high acidity or water content only then steps 13 and 14 are not applicable.

13. Replace the centre hydraulic C1 and C2 ACMP pressure and case drain filters (AMM 29-11-19/401).
14. Replace the centre hydraulic system return filter (AMM 29-11-13/401).
15. Ensure the centre hydraulic reservoir is full (AMM 12-12-01/301).
16. Ensure the centre hydraulic reservoir drain valve is wirelocked in the closed position.
17. Restore the aircraft to normal.
18. Raise a Cat Q ADD to sample the centre hydraulic system within 100 hrs (AMM 29-00-00/601) and route to EHM, W940, TBD for analysis.

NOTE: To allow EHM to action all required tests annotate ADD with requirement to fill sample to neck of bottle. Sample kit part number 4-48572 should be demanded against the ADD.

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7 July, 1999

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ALERT No. 29-529

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 29-11-00 Page 202

REASON FOR REVISION

Modification to the engine T/R i.a.w. Boeing SB 757-78-0040 (BA Mod 78G070) introduces requirement for additional caution on application of Hydraulic Power.

ACTION

TASK 29-11-00-862-285

2. Pressurise the Main Hydraulic Systems with a Hydraulic Service Cart

E. Procedure

Read the following additional warning

WARNING: MAKE SURE THE THRUST REVERSER POSITION AGREES WITH THE POSITION OF THE REVERSE THRUST LEVER. IF THEY DO NOT AGREE, THE THRUST REVERSER WILL TRANSLATE WHEN YOU APPLY HYDRAULIC PRESSURE. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

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

(1) Do this procedure:

(a) Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-0/201).

(b) Attach a DO NOT OPERATE tag to the thrust reverser lever.

Persons performing a supervisory function are responsible for informing their appropriate staff of the substance of this ATP Alert.

Originator: K.Browne.

Reference: Mcr/Ref.3769.

Workbook: 29-153.(R.B.S.).

29-11-00

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7 July, 1999

757 MAINTENANCE MANUAL

ALERT No. 29-532

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 29-11-00 Page 206

REASON FOR REVISION

Modification to the engine T/R i.a.w. Boeing SB 757-78-0040 (BA Mod 78G070) introduces requirement for additional caution on application of Hydraulic Power.

ACTION

TASK 29-11-00-862-019

3. Pressurise the Main Hydraulic Systems with an ACMP

C. Procedure

Read the following additional information

WARNING: MAKE SURE THE THRUST REVERSER POSITION AGREES WITH THE POSITION OF THE REVERSE THRUST LEVER. IF THEY DO NOT AGREE, THE THRUST REVERSER WILL TRANSLATE WHEN YOU APPLY HYDRAULIC PRESSURE. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: IF MAINTENANCE ACTION IS TO BE CARRIED OUT IN OR AROUND THE THRUST REVERSER WITH THE HYDRAULIC SYSTEM PRESSURISED DEACTIVATE THE THRUST REVERSER.

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

(1) Do this procedure:

Persons performing a supervisory function are responsible for informing their appropriate staff of the substance of this ATP Alert.

Originator: K.Browne.
Reference: 3774
Workbook: 29-154

29-11-00
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- (a) Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-0/201).
- (b) Attach a DO NOT OPERATE tag to the thrust reverser lever.

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ALERT No. 29-523

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CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 29-11-00 Page 208

REASON FOR REVISION

Modification to the engine T/R i.a.w. Boeing SB 757-78-0040 (BA Mod 78G070) introduces requirement for additional caution on application of Hydraulic Power.

ACTION

TASK 29-11-00-862-027

4. Pressurise the L or R Main Hydraulic Systems with an EDP

C. Procedure

Read the following additional information

WARNING: MAKE SURE THE THRUST REVERSER POSITION AGREES WITH THE POSITION OF THE REVERSE THRUST LEVER. IF THEY DO NOT AGREE, THE THRUST REVERSER WILL TRANSLATE WHEN YOU APPLY HYDRAULIC PRESSURE. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: IF MAINTENANCE ACTION IS TO BE CARRIED OUT IN OR AROUND THE THRUST REVERSER WITH THE HYDRAULIC SYSTEM PRESSURISED DEACTIVATE THE THRUST REVERSER.

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

(1) Do this procedure:

Persons performing a supervisory function are responsible for informing their appropriate staff of the substance of this ATP Alert.

Originator: K.Browne.

Reference: 3775

Workbook: 29-151

29-11-00

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- (a) Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-0/201).
- (b) Attach a DO NOT OPERATE tag to the thrust reverser lever.

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7 July, 1999

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ALERT No. 29-526

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CAA DESIGN APPROVAL No. DAI/8566/78.

Manual Reference 29-11-00 Page 209

REASON FOR REVISION

Modification to the engine T/R i.a.w. Boeing SB 757-78-0040 (BA Mod 78G070) introduces requirement for additional caution on application of Hydraulic Power.

ACTION

TASK 29-11-00-862-033

5. Pressurise the Reservoirs in the Main Hydraulic System with an External Air Source

E. Procedure

Read the following additional information

WARNING: MAKE SURE THE THRUST REVERSER POSITION AGREES WITH THE POSITION OF THE REVERSE THRUST LEVER. IF THEY DO NOT AGREE, THE THRUST REVERSER WILL TRANSLATE WHEN YOU APPLY HYDRAULIC PRESSURE. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: IF MAINTENANCE ACTION IS TO BE CARRIED OUT IN OR AROUND THE THRUST REVERSER WITH THE HYDRAULIC SYSTEM PRESSURISED DEACTIVATE THE THRUST REVERSER.

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

(1) Do this procedure:

Persons performing a supervisory function are responsible for informing their appropriate staff of the substance of this ATP Alert.

Originator: K.Browne.
Reference: 3776
Workbook: 29-152

29-11-00
Page 209

- (a) Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-0/201).
- (b) Attach a DO NOT OPERATE tag to the thrust reverser lever.

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30 October, 2000

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TEMPORARY REVISION No. 29-537

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 as 29-11-07 Page 601

REASON FOR REVISION

ENGINE DRIVEN PUMP HOSES - INSPECTION/CHECK

1. General

A. This procedure contains an inspection of the Hydraulic - Engine Driven Pump (EDP), supply, drain and pressure line hoses fitted to the EDP and between the engine and pylon.

2. Engine Driven Pump (EDP) Hose Inspection

A. References

- (1) 71-11-04/201, Fan Cowl Panels
- (2) 29-11-07/801, Engine Driven Pump Hoses

B. Access

- (1) Location Zones
 - 410 Left Engine
 - 420 Right Engine

(2) Access Panels

- 414/424 Fan Cowl Panel (RH)

C. Prepare for the Inspection.

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (1) Open the right fan cowl panel (Ref 71-11-04/201)

D. The EDP hose inspection.

- (1) Examine the rubber outer fire sleeve of the supply, drain and pressure hose for nicks, cuts or chaffing.
- (2) Examine the steel-braid inner core of the supply, drain and pressure hose for damage.

E. Acceptance standard - EDP hoses.

- (1) If there is damage to the steel-braid inner core - Reject.

Originator: I.HODGES

Reference: 6041

Workbook: 29-155

29-11-07

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- (2) Chafing of the rubber outer fire sleeve:
 - (a) Chafing up to 0.030 inches (0.762 mm) in depth - Accept.
 - (b) Chafing more than 0.030 inches (0.762 mm) - Repair to FRS 5353 (Ref 29-11-07/801).

- (3) Cuts or nicks in the rubber outer fire sleeve that do not extend to the full thickness of the material - Repair to FRS 5353 (Ref 29-11-07/801).

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30 October, 2000

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TEMPORARY REVISION No. 29-538

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. DA1/8566/78.

Manual Reference as 29-11-07 Page 801

REASON FOR REVISION

ENGINE DRIVEN PUMP HOSES - APPROVED REPAIRS

1. General

A. This procedure includes the data for the FRS 5353 - Flexible hoses - repair damage to the rubber outer fire sleeve by patching. The inner metal braid core cannot be repaired and therefore the hose assembly must be renewed if the inner metal braid core is damaged.

B. The procedure is applicable to the hydraulic hose assemblies with these part numbers:

RB211-535C Engines

RB211-535E4 Engines

108197
AE706332-1
108198
AE705958-1
108199
AE706128-3
AE706127-11

107316
AE706332-2
107314
AE705958-2
107315
AE706128-69
AE706127-67

C. This repair scheme cannot be applied at a clipping point or at the end of the end of the fire sleeve.

2. Repair the Engine Driven Pump (EDP) Hose Outer Sleeve

A. Consumable Materials

- (1) Isopropyl alcohol OMat No. - 1/40
- (2) Silicone compound, cold curing, RTV106 OMat No. - 872A
- (3) Lockwire, 20 S.W.G. OMat No. - 2/72
- (4) Clean, lint free cloth
- (5) Fire sleeve patch British Spec - UL17697

B. References

- (1) AMM 71-11-04/201, Fan Cowl Panels

Originator: I.HODGES
Reference: 6041
Workbook: 29-155

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TEMPORARY REVISION No. 29-538 (Cont'd)

C. Access

(1) Location Zones

- 410 Left Engine
- 420 Right Engine

(2) Access Panels

- 414/424 Fan Cowl Panel (RH)

D. Prepare to repair the Outer Fire sleeve.

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (1) Open the right fan cowl panel (Ref 71-11-04/201)

E. Repair the Outer Fire sleeve.

(1) Do these steps to repair the outer fire sleeve:

- (a) Clean the damaged area with Isopropyl alcohol and a clean, lint free cloth.
 - 1) Let the damaged area dry for 15 minutes.
- (b) Fill the damaged area with the silicone compound.
 - 1) Make the silicone compound the same shape as the initial hose diameter.
- (c) Let the silicone compound cure for 30 minutes.
- (d) Cut the fire sleeve patch to the dimension of the damaged area.
 - 1) Cut the fire sleeve patch such that dimension B is not less than 2.00 inches (50.8 mm) (Fig.801).
 - 2) Make the fire sleeve patch with a sufficient length to wind around the damaged area two times.
- (e) Find the identification tag for the hose.
 - 1) If the tag is near the damaged area, relocate to an undamaged section of the hose.
- (f) Apply a bead of the silicone compound to the bottom edges (but not the outer edge) of the patch.
- (g) Put the inner edge of the fire sleeve patch opposite the damaged area.
- (h) Wind the fire sleeve patch around the LP fuel hose.
 - 1) Make sure that dimension B stays constant (Fig. 801).
 - 2) Push the edges of the patch (but not the outer edge) tightly in its position.
 - 3) Push all of the air from below the patch.
- (i) Apply the silicone compound to the outer edge of the patch.
- (j) Push the outer edge tightly in the correct position.
- (k) Remove the unwanted silicone compound with a clean, lint free cloth.

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TEMPORARY REVISION No. 29-538 (Cont'd)

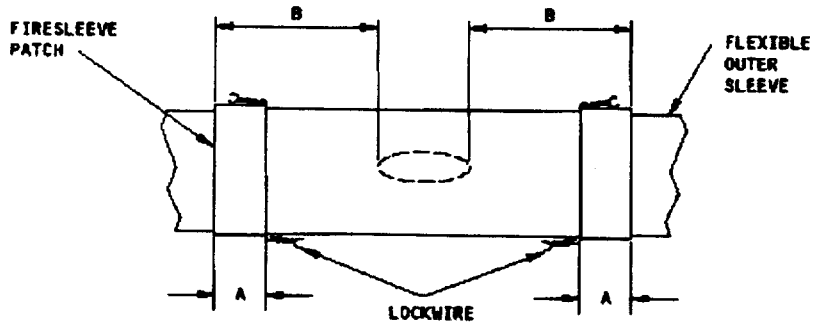
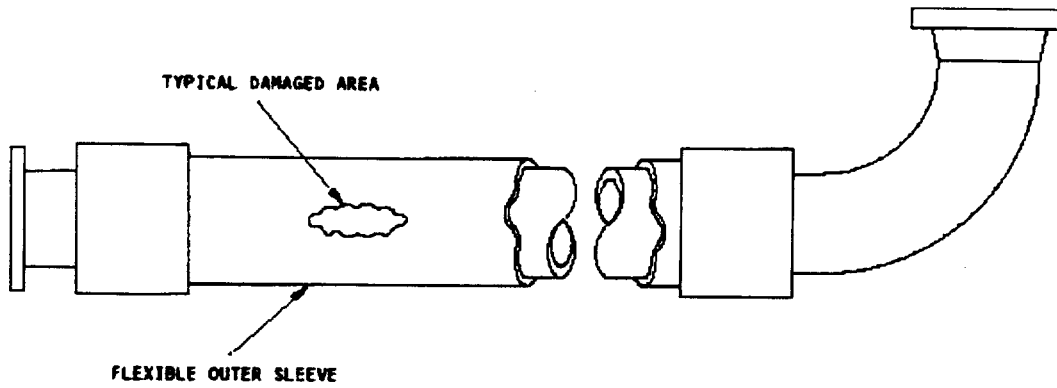
- (1) Wind a lockwire around each end of the patch such that dimension A is 0.5 inches (12.7 mm) (Fig.801).
 - 1) Apply the silicone compound to the twisted ends of the lockwire.
- (m) Apply the silicone compound to the edge of the patch.
- (n) Seal the patch to the flexible outer fire sleeve of the hose.
- (o) Write FRS 5353 adjacent to the part number with a vibro engraver.

F. Put the Airplane Back to its Usual Condition.

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (1) Close the right fan cowl panel (AMM 71-11-04/201).

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TEMPORARY REVISION No. 29-538 (Cont'd)



79350

Installation of Firesleeve Patch
Figure 801

**ATP
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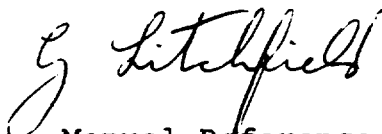
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TEMPORARY REVISION No. 29-517

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) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DA1/8586/78.



For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 29-33-01 as Page 601

REASON FOR REVISION

To add a contamination test (Ref Gull Electronics Systems SL 019-012-29-02).

ACTION

HYDRAULIC FLUID QUANTITY TRANSMITTER - INSPECTION/CHECK

1. General

- A. This procedure contains one task. This task is to detect for possible contamination of the connector and/or high tube assembly of the fluid quantity transmitter fitted to the hydraulic reservoir on the left, right and centre hydraulic systems.
- B. This procedure is effective to the following components

Part Number	Description
019-012-001	Transmitter - L and R systems
019-012-003	Transmitter - Centre system

2. Check the Fluid Quantity Transmitter (Reservoir)

A. Equipment

- (1) Megohmmeter 361-012-001

B. References

- (1) 06-41-00/201, Fuselage Access Door and Panels
- (2) 12-12-01/301, Hydraulic System - Servicing
- (3) 12-25-01/301, Airplane Servicing - Clean and Polish
- (4) 24-22-00, Control - Description and Operation
- (5) 29-11-00/201 Main (L, R and Centre) Hydraulic Systems
- (6) 29-33-01/401 Hydraulic Quantity Transmitter R/I
- (7) 32-00-15/201 Landing Gear Door Locks

Originator: J.COCHRAN
Reference: A09918
Workbook: 29-148

29-33-01
Page 601

C. Access

(1) Location Zones

143/144	MLG Wheel Well
197	Wing to Body - Aft Lower Half (Left)
211/212	Control Cabin
732/742	MLG Body Door

(2) Access Panels

197KL	Hydraulic Service Bay
-------	-----------------------

D. Prepare for the Check

WARNING: USE THE PROCEDURE IN 32-00-15 TO INSTALL THE DOOR LOCKS. THE DOORS CAN OPEN AND CLOSE VERY QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

- (1) To remove the fluid quantity transmitter from the L or R reservoir, open the doors for the landing gear and install the door locks (AMM 32-00-15).
- (2) To remove the fluid quantity transmitter from the Centre reservoir, open the access door for the hydraulic service bay, 197KL (AMM 06-41-00).
- (3) Remove the pressure from the hydraulic system that contains the fluid quantity transmitter to be removed (AMM 29-11-00).

WARNING: DO NOT CLOSE THE DRAIN VALVE UNTIL YOU REPLACE THE TRANSMITTER. IF YOU CLOSE THE DRAIN VALVE THE FLUID CAN COLLECT IN THE RESERVOIR AND FLOW ONTO YOU WHEN YOU REMOVE THE TRANSMITTER.

- (4) Open the drain valve and drain the reservoir.
- (5) Open these CB's on the overhead panel P11 and attach DO NOT CLOSE tags
 - (a) 11K15, HYD ELEC PUMP C1
 - (b) 11K16, HYD ELEC PUMP R
 - (c) 11K19, HYD QTY CTR
 - (d) 11K20, HYD QTY L
 - (e) 11K21, HYD QTY R
 - (f) 11K24, HYD ELEC PUMP C2
 - (g) 11K25, HYD ELEC PUMP L

CAUTION: DO NOT CAUSE DAMAGE TO THE FLUID QUANTITY TRANSMITTER OR THE RESERVOIR WHEN YOU REMOVE THE FLUID QUANTITY TRANSMITTER.

- (6) Remove the hydraulic quantity transmitter (AMM 29-33-01/401).

E. Check the Transmitter

- (1) Use the megohmmeters external resistance terminals to measure between the following connector pins

NOTE: Do this check as soon as possible following removal of the fluid quantity transmitter from the reservoir to ensure any contaminants are detected before they are able to drain away.

FROM PIN	TO PIN	RESULT
7	5	Less than 20K Megohms - Reject Hyd Probe
7	6	Less than 20K Ohms - Reject Hyd probe
5	6	Less than 20K Ohms - Reject Hyd probe

F. Put the Airplane back to its Usual Condition

- (1) Install a serviceable hydraulic quantity transmitter (AMM 29-33-01/401).
- (2) Connect the electrical connector.
- (3) Close the drain valve.
- (4) Lockwire the valve handle.
- (5) Supply electrical power.
- (6) Remove the DO NOT CLOSE tags and close these CB's on the overhead panel P11
 - (a) 11K15, HYD ELEC PUMP C1
 - (b) 11K16, HYD ELEC PUMP R
 - (c) 11K19, HYD QTY CTR
 - (d) 11K20, HYD QTY L
 - (e) 11K21, HYD QTY R
 - (f) 11K24, HYD ELEC PUMP C2
 - (g) 11K25, HYD ELEC PUMP L
- (7) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side of panel P61.
- (8) Refill the reservoir (AMM 12-12-01).
- (9) Pressurise the reservoir (AMM 29-1-00).
- (10) Make sure there is no hydraulic leakage at the fluid quantity transmitter.

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (11) Clean all hydraulic fluid from the installation area (AMM 12-25-01).
- (12) Make sure the L, Centre and R, HYD QTY indication on the EICAS display is the same as the quantity of hydraulic fluid in the reservoir.
- (13) If work was carried out on the centre system hydraulic fluid quantity transmitter, close the access door for the hydraulic service bay, 197KL (AMM 06-41-00).

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WARNING: USE THE PROCEDURE IN 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS CAN OPEN AND CLOSE VERY QUICKLY AND CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

- (14) If work was carried out on the L or R hydraulic fluid quantity transmitter, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15).
- (15) Remove the hydraulic power if it is not required (AMM 29-11-00).
- (16) Remove the electrical power if it is not required (AMM 24-22-00).

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5	SEP 28/05	GUI	D 24	DELETED	09	238	SEP 28/06	02
6	SEP 28/05	GUI	D 25	DELETED	11	239	SEP 28/06	01
7	MAY 28/06	GUI	D 26	DELETED	07	240	SEP 28/06	01
8	SEP 28/05	GUI				241	SEP 28/06	01
9	SEP 28/05	GUI	29-11-00			242	SEP 28/06	01
10	SEP 28/05	GUI	101	JAN 28/03	04			
11	SEP 28/05	GUI	102	SEP 20/92	09	29-11-00		
12	BLANK		103	SEP 20/92	08	501	MAY 28/99	01
29-00-00			104	SEP 20/92	12	502	JAN 20/99	01
1	MAR 15/83	01	105	SEP 20/92	04	503	MAY 28/99	02
2	JAN 28/00	03	106	SEP 20/92	01	504	SEP 28/01	04
3	SEP 28/05	03	107	MAR 20/91	04	505	MAY 28/99	02
4	JAN 28/02	01	108	JUN 20/93	01	506	SEP 20/93	02
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607	JAN 28/01	01	203	SEP 28/06	01	517	SEP 28/00	05
608	BLANK		204	SEP 28/06	01	518	JUN 20/91	03
29-11-00			205	SEP 28/06	01	519	JUN 20/91	04
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4	MAR 15/83	01	209	JAN 28/02	03	523	SEP 28/00	04
5	DEC 20/87	01	210	SEP 28/99	03	524	JUN 20/91	04
6	SEP 20/98	03	211	JAN 28/01	03	525	SEP 28/00	04
7	DEC 20/87	01	212	SEP 28/00	03	526	MAY 28/03	05
8	DEC 20/87	01	213	MAY 28/02	01	527	JAN 28/01	07
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10	MAR 15/87	03	215	JAN 28/02	01	529	SEP 28/00	04
11	DEC 20/87	05	216	SEP 28/99	01	530	SEP 28/00	05
12	DEC 20/87	06	217	JAN 28/02	01	531	MAY 28/99	05
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602	MAY 28/01	01	660	MAY 28/02	12	682J	JAN 28/02	12
603	MAY 28/01	01	661	MAY 28/02	15	682K	DEC 20/94	07
604	MAY 28/01	01	662	MAY 28/02	20	682L	DEC 20/94	07
605	SEP 28/01	01	663	MAY 28/02	12	682M	DEC 20/94	06
606	SEP 28/01	01	664	JAN 28/02	13	682N	DEC 20/94	06
607	JUN 20/91	01	665	JAN 28/02	15	682O	DEC 20/94	06
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610	JUN 20/91	04	668	JAN 28/02	12	682R	DEC 20/94	09
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612	MAY 28/01	01	670	JAN 28/02	12	682T	JAN 28/02	15
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614	SEP 28/01	01	672	JAN 28/02	16	682V	JAN 28/02	13
615	SEP 28/01	01	673	JAN 28/02	15	682W	DEC 20/94	06
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628	SEP 28/02	16	680F	MAY 28/01	10	684H	JAN 28/02	11
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403	MAY 28/06	01	401	MAY 28/99	01	506	JUN 20/91	01
404	MAY 28/99	01	402	DEC 20/90	01	507	JUN 20/91	01
405	SEP 28/01	01	403	DEC 20/90	01	508	JAN 28/00	08
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404	MAY 28/99	02	4	MAR 20/89	02	521	MAY 20/08	09
29-11-30			5	JAN 28/02	06	522	JAN 28/00	10
501	JAN 28/01	01	R 6	JAN 20/09	05.101	523	SEP 28/00	06
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503	JAN 28/01	01	R 8	JAN 20/09	02.1	525	SEP 20/08	12
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403	MAY 28/99	01	209	SEP 28/07	06	413	SEP 20/97	06
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CHAPTER 29 – HYDRAULIC POWER

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HYDRAULIC POWER – DESCRIPTION AND OPERATION

1. General

- A. Three separate hydraulic systems provide fluid at 3000 psi to operate the airplane systems shown in figure 1. The hydraulic systems are identified as left, right, and center.
- B. High pressure lines and critical return lines are made from titanium. Aluminum is used for non-critical return lines and steel tubing is used in fire zones. Hydraulic tubing is color coded by system. The left system is coded red, right is green, and center is blue.
- C. Two auxiliary hydraulic systems provide reserve power. These are the ram air turbine (RAT) and the power transfer unit (PTU).
- D. A ground servicing system fills all hydraulic reservoirs from one location.
- E. The indicating systems inform the pilots of the operating conditions of each hydraulic system.

2. Main Hydraulic Systems (Fig 2)

- A. The center system components are located in the aft left wing/body fairing. The pressure sources for the center system are two alternating current motor pumps (ACMP). When the ELEC pump select switches are in the ON position, the ACMP's run all the time.
- B. The left and right system components are located on each engine, engine strut, and main wheel well forward fairing. The pressure sources for each of the left and right systems consist of one engine driven pump (EDP) and one alternating current motor pump (ACMP). The EDP runs all the time that the engine is running. When the ELEC pump switch is ON, the ACMP runs all the time.
- C. Each hydraulic system has a fluid reservoir which is pressurized by air from the pneumatic system. Filter modules clean the fluid after being pressurized or after passing through the pump case drain and after returning from user systems. Heat exchangers in the fuel tanks cool the pump case drain fluid before it returns to the reservoir.
- D. Ground power connections are provided in each engine strut and in the aft left wing/body fairing for attachment of an external hydraulic pressure source.

3. Auxiliary Hydraulic Systems

- A. The ram air turbine (RAT) is stowed in the aft right wing/body fairing. The RAT consists of a hinged strut with a hydraulic pump powered by a ram air driven turbine. The RAT deploys automatically if power is lost in both engines. The RAT can be deployed manually with the RAT deployment switch in the flight compartment. The RAT supplies pressure to the center system for operation of the flight controls.

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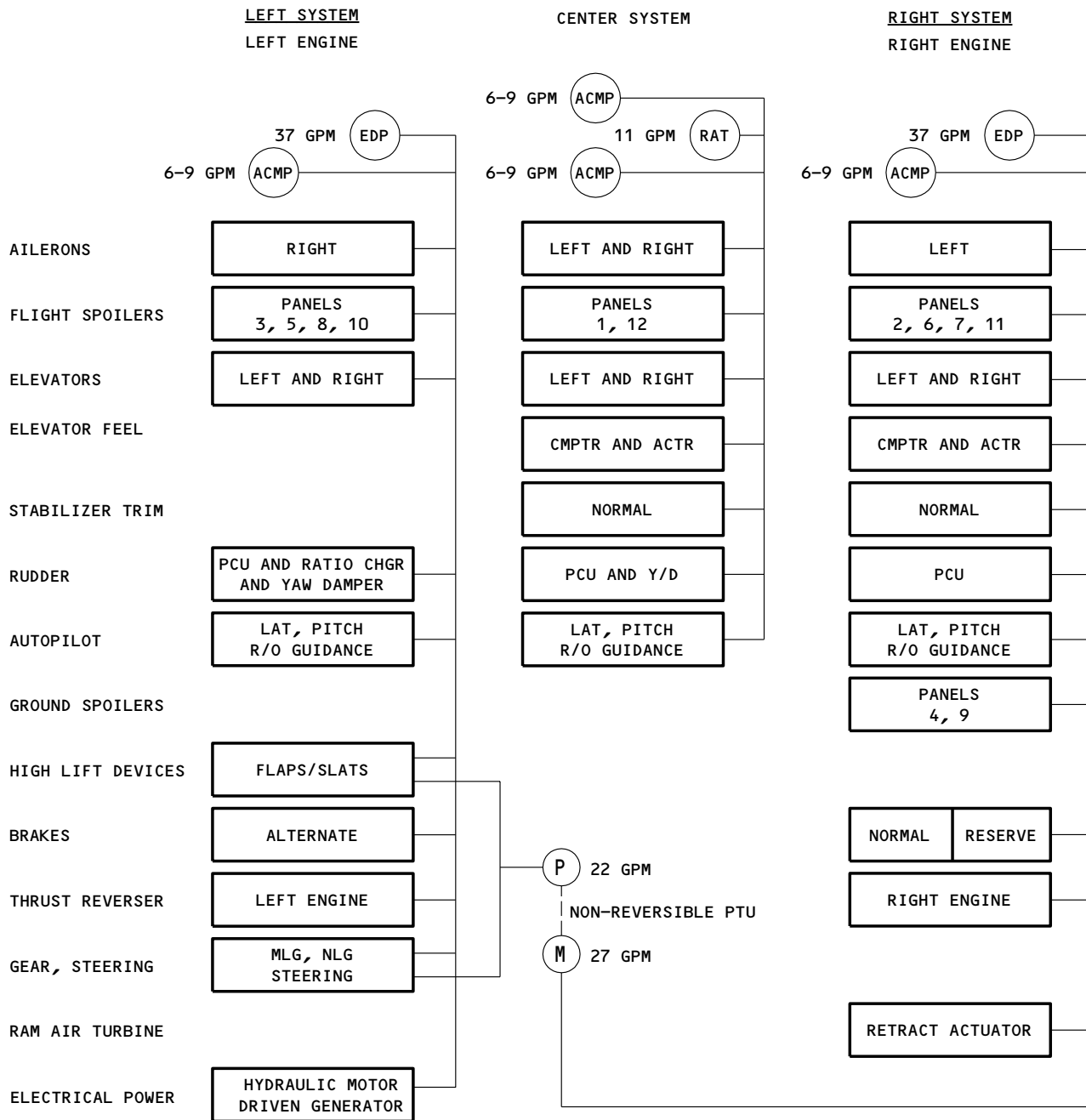
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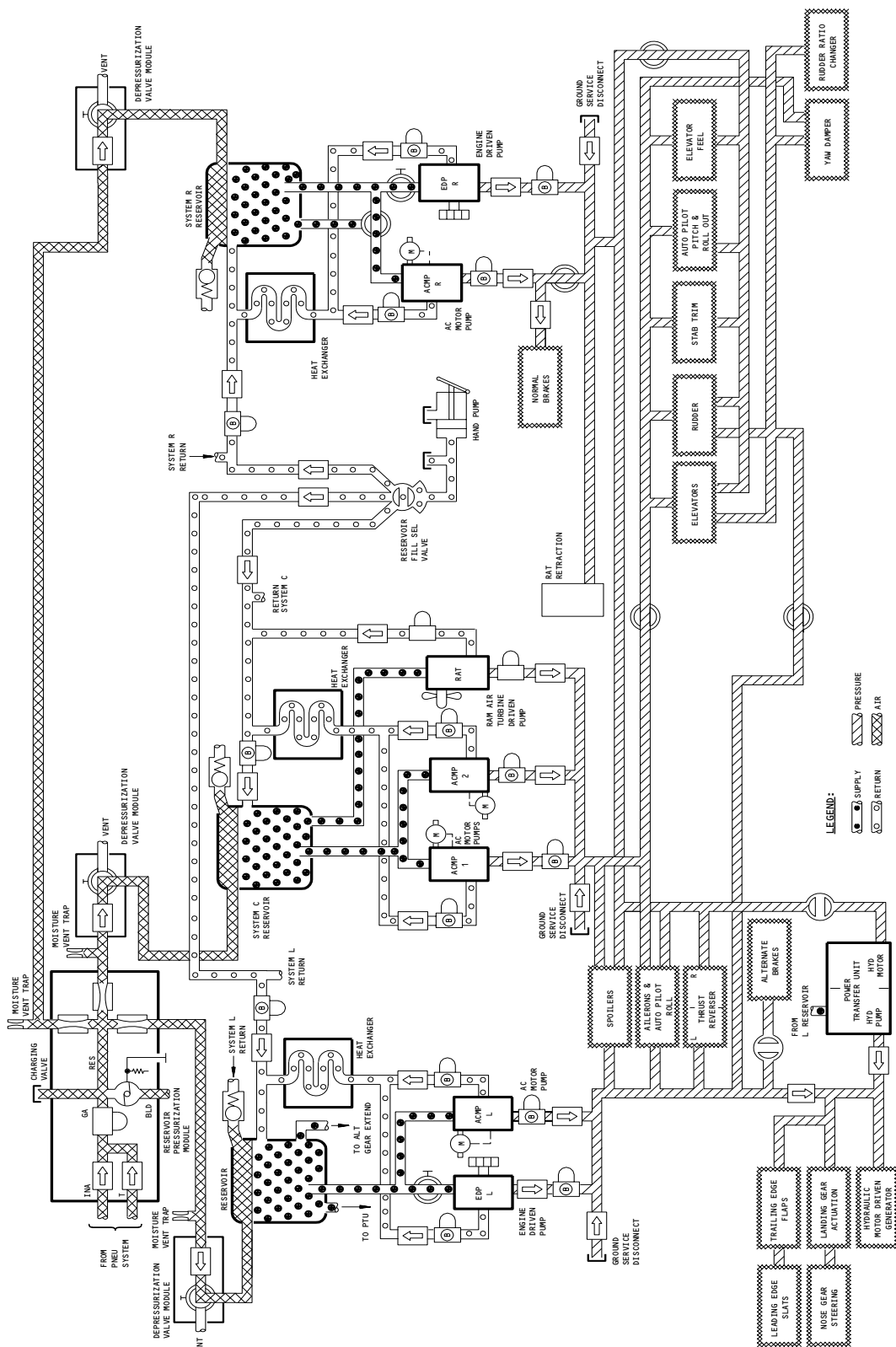
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Hydraulic System Block Diagram
Figure 1

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Hydraulic System Schematic
Figure 2

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- B. The power transfer unit (PTU) in the left wheel well operates if power is lost in the left engine or if left EDP output pressure is low. The PTU can also be switched on manually. The PTU consists of a hydraulic motor connected to a hydraulic pump. The motor is driven by right hydraulic system pressure and the pump supplies pressure to the left system. There is no fluid interchange between the right and left hydraulic systems. Left system pressure supplied by the PTU operates the following systems:
- (1) Nose gear steering
 - (2) Flaps and slats
 - (3) Landing gear
 - (4) ON AIRPLANES WITH HYDRAULIC MOTOR-DRIVEN GENERATOR;
hydraulic motor-driven generator

4. Ground Servicing System

- A. A central ground servicing station is located in the aft left wing/body fairing. Hydraulic fluid is added to the reservoirs of all three systems from this station. A fill valve selects which reservoir is to receive fluid. A remote quantity indicator shows fluid level in the reservoir selected by the fill valve. Fluid can be added under pressure from a ground service cart or with the manual fill pump installed at the servicing station.

5. Indicating Systems

- A. The indicating system consists of warning lights on the hydraulic control panel and messages on the engine indicating and crew alerting system (EICAS). The indicating systems monitor fluid pressure, temperature, and quantity and reservoir air pressure.
- B. For information on the fluid pressure, temperature, quantity and reservoir air pressure indicating systems refer to 29-31-00, 29-32-00, 29-33-00, and 29-35-00, respectively.

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HYDRAULIC POWER – MAINTENANCE PRACTICES

TASK 29-00-00-912-001

1. Airworthiness Limitation Precautions

A. General

- (1) Critical Design Configuration Control Limitations (CDCCLs)
 - (a) All occurrences of CDCCLs found in this chapter of the AMM are identified by this note after each applicable CDCCL design feature:
 - 1) NOTE: CDCCL – Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).
 - (b) Design features that are CDCCLs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and can be found in Section 9 of the Maintenance Planning Data (MPD) document. CDCCLs are a means of identifying certain design configuration features intended to preclude a fuel tank ignition source for the operational life of the airplane. CDCCLs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency. A critical fuel tank ignition source prevention feature may exist in the fuel system and its related installation or in systems that, if a failure condition were to develop, could interact with the fuel system in such a way that an unsafe condition would develop without this limitation. Strict adherence to configuration, methods, techniques, and practices as prescribed is required to ensure the CDCCL is complied with. Any use of parts, methods, techniques or practices not contained in the applicable CDCCL must be approved by the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.
- (2) Airworthiness Limitation Instructions (ALIs)
 - (a) All occurrences of fuel tank system ALIs found in this chapter of the AMM are identified by this step after the General section in the applicable ALI inspection task:
 - 1) ALI – Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on airworthiness limitation instructions (ALIs).

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(b) Inspection tasks that are ALIs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and can be found in Section 9 of the Maintenance Planning Data (MPD) document. These ALIs identify inspection tasks related to fuel tank ignition source prevention which must be done to maintain the design level of safety for the operational life of the airplane. These ALIs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency. Strict adherence to methods, techniques and practices as prescribed is required to ensure the ALI is complied with. Any use of methods, techniques or practices not contained in these ALIs must be approved by the FAA office that is responsible for the airplane model Type Certificate, or applicable regulatory agency.

B. Access

(1) Location Zones

100	Lower Half of Fuselage
200	Upper Half of Fuselage
500	Left Wing
600	Right Wing

C. Critical Design Configuration Control Limitations (CDCCLs)

S 912-004

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO ANY MAINTENANCE THAT MAY AFFECT A CDCCL. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE THE RISK OF A FUEL TANK IGNITION SOURCE.

(1) Make sure you follow the procedures for items identified as CDCCLs.

D. Airworthiness Limitation Instructions (ALIs)

S 912-005

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO ANY MAINTENANCE THAT MAY AFFECT AN ALI. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE RISK OF A FUEL TANK IGNITION SOURCE.

(1) Make sure you follow the procedures for tasks identified as ALIs.

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HYDRAULIC POWER – INSPECTION/CHECK

1. General

- A. This procedure has one task. This task does a check of the hydraulic fluid.
- B. The operational environment of the airplane hydraulic system can affect the service life of the hydraulic fluid. You make a decision to take a sample of the hydraulic fluid for analysis if you find that it is necessary from your service experience. Make sure that the fluid analysis results agree with the fluid specification limits shown on Table 601. If the fluid properties are greater than the limits in Table 601, replace some quantity of fluid with new fluid until the fluid properties agree with the limits shown. You make a decision on the quantity of fluid to be replaced.

TASK 29-00-00-206-001

2. Hydraulic Fluid Check

A. General

- (1) You must do the steps in this procedure to clean the bottles which will hold the fluid samples. If you do not do this, it is possible the fluid samples will not be correct. You must get two fluid samples from each hydraulic reservoir. Get the samples in either a polyethylene bottle or a glass bottle which has a capacity of one pint. Get the other sample in a glass bottle. Each bottle has a capacity of 1 pint.

B. Equipment

- (1) Polyethylene Bottle (capacity of 1-pint and a polyethylene screw cap with a seal)
- (2) Glass Bottle (capacity of one pint and a polyethylene screw cap with a seal) – Commercially Available
- (3) Clean Polyethylene Bags (to hold the bottles)

C. Consumable Materials

- (1) B00459 Petroleum Ether, approximately 1-pint, put through a micron filter membrane.
- (2) B00047 Nitric Acid (20% by volume), approximately 1-pint
- (3) G01061 Distilled Deionized Water, approximately 1-pint

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D. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 32-00-15/201, Main Gear Door Locks
- (5) AMM 32-00-20/201, Landing Gear Downlocks

E. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

F. Hydraulic Fluid Property Limits

- S 286-026
- (1) Use this table for the hydraulic fluid check.

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Hydraulic Fluid, BMS 3-11, Property Limits TABLE 601		
FLUID PROPERTIES	IN-SERVICE FLUID LIMITS	TEST PROCEDURE
Visual	Must be transparent. No phase separation or precipitation. All colors are satisfactory.	Visual
Specific Gravity 25°C/25°C	0.970 - 1.066	ASTM D1217 or ASTM D4052
Percent of Water by weight	0.8 max.	ASTM D6304 or Infrared
Neutralization No. mg KOH/gm	1.5 max. *[3]	ASTM D974
Viscosity, cs at 100°F	6.0 to 12.5	ASTM D445
Organic Contamination	Not Found by Infrared	Infrared *[1]
Elemental Contamination *[2]		A Procedure with the Precision that Follows:
Calcium Potassium Sodium Chlorine Sulfur	50 ppm max. 50 ppm max. 50 ppm max. 200 ppm max. 500 ppm max.	± 4 ppm ± 2 ppm ± 3 ppm ± 20 ppm ± 10 ppm *[4]

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Hydraulic Fluid, BMS 3-11, Property Limits TABLE 601		
FLUID PROPERTIES	IN-SERVICE FLUID LIMITS	TEST PROCEDURE
Particulate Contamination	NAS 1638, Class 9 *[5]	SAE ARP 598
Particle Size Range (Microns)	Maximum Number of Particles Allowed	
5 to 15	128,000	
15 to 25	22,800	
25 to 50	4,050	
50 to 100	720	
Over 100	128	

- *[1] If you think there is contamination, do the procedure in Boeing Document D6-24429, An Analytical Method for Contaminates in BMS 3-11 Fluids and Their Mixtures Using Differential IR Spectroscopy.
- *[2] Contamination is a quantity that is more than that in the new fluid. Compare the data from the fluid analysis with the limits put on the new fluid.
- *[3] Since the Center system is small, the neutralization number increases faster than the Left and Right systems. It is easier to control neutralization number to 1.5 maximum if you act when neutralization number reaches 0.5. Actions could be draining and refilling the reservoir or complete system flushes, as necessary. Boeing recommends sampling Center system fluid every C-check.
- *[4] The precision of ± 10 ppm is applicable to total values in the range from 0 to 1000 ppm. In the range from 1000 to 3000 ppm, the precision will decrease to ± 50 ppm with some equipment.
- *[5] These are the maximum contamination limits based on a 100 milliliter sample size.

G. Prepare for the Check

S 116-002

- (1) Do these steps, to clean the polyethylene bottle:
 - (a) Clean the bottle fully in a solution of liquid detergent and hot water.
 - (b) Flush the bottle two times in hot potable water that does not have minerals.

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- (c) Flush the bottle two times in deionized water which is distilled two times.
- (d) Drain the water from the bottle.
- (e) Dry the bottle in the air of a laminar flow bench in a clean room.

NOTE: If the laminar flow bench is not available, put the bottle in a clean dry room, with the top in a down position. Keep all persons from the room until the bottle is dry and you put a cap on it.

- (f) After the bottle is dry, install a cap on the bottle.
- (g) Put the bottle in a new polyethylene bag.
- (h) Seal the bag with a knot or tape.
- (i) Identify the bag.

S 116-003

- (2) Do these steps, to clean the glass bottle:
 - (a) Flush the bottle in a solution which has 20% by volume of nitric acid.
 - (b) Flush the bottle two times in hot potable water that does not have minerals.
 - (c) Flush the bottle two times in distilled water.
 - (d) Flush the bottle with clean isopropyl alcohol which was put through a filter.
 - (e) Flush the bottle with clean petroleum ether which was put through a filter.
 - (f) Dry the bottle in the air of a laminar flow bench in a clean room.

NOTE: If the laminar flow bench is not available, put the bottle in a clean dry room, with the top in a down position. Keep all persons from the room until the bottle is dry and you put a cap on it.

- (g) After the bottle is dry, install a cap on the bottle.
- (h) Put the bottle in a new polyethylene bag.
- (i) Seal the bag with a knot or tape.
- (j) Identify the bag.

S 866-004

- (3) Pressurize all the hydraulic systems and the reservoirs (AMM 29-11-00/201).

S 496-005

- (4) For the left or right hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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S 496-006

WARNING: DO 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.

- (5) For the left or right hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 416-007

- (6) For the center hydraulic system, open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 866-008

- (7) Operate all the flight controls, 6 to 8 times, to let the fluid flow through all the systems.

NOTE: You must get the sample in less than one hour after you stop the hydraulic system.

S 866-009

- (8) Remove the pressure from all the hydraulic systems and the reservoirs (AMM 29-11-00/201).

H. Hydraulic Fluid Check

S 686-010

- (1) Open the sampling valve on the reservoir to supply a smooth flow of fluid.

S 686-011

- (2) Drain a minimum of one pint of hydraulic fluid before you get a sample.

S 686-012

- (3) Remove the cap from the polyethylene bottle or glass bottle.

S 686-013

- (4) Put the bottle in the fluid flow but do not touch the sampling valve.

S 686-014

- (5) When the bottle is full, remove the bottle from the fluid flow.

NOTE: Do not close the sampling valve while the bottle is in the fluid flow. This can loosen the contamination which can get into the sample.

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- S 686-016
(6) Install the cap on the bottle.
- S 686-017
(7) Close the sampling valve.
- S 436-018
(8) Safety the sampling valve with a lockwire.
- S 936-019
(9) Identify the bottle with this data:
(a) Airplane model
(b) Airplane number
(c) Hydraulic system number
(d) Date
(e) Location.
- S 616-020
(10) Fill the hydraulic reservoirs (AMM 12-12-01/301).
- S 416-021
(11) For the center hydraulic system, close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 096-022
- 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.
- (12) For the left or right hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS -
DESCRIPTION AND OPERATION

1. General

- A. The main hydraulic systems consist of the left, right, and center systems. These systems provide fluid under pressure of 3000 psi to portions of the flight control, auto flight, landing gear, and thrust reverser systems. The components of the main hydraulic systems are shown in figures 1 and 2.
- B. The pressure sources for the left and right systems are one engine driven pump (EDP) and one alternating current motor pump (ACMP) installed in parallel. The EDP runs all the time that the engine is running. When the ELEC pump switch is ON, the ACMP runs all the time.
- C. The pressure sources for the center system are two ACMP's installed in parallel. When the ELEC pump select switches are ON, the ACMP's run all the time.

2. Engine Driven Pump (EDP) (Fig. 3)

- A. The engine driven pumps (EDP) are one of the pressure sources for the left and right systems. The EDP is driven by the engine gearbox and is located on the right side of the engine. Each EDP supplies 37 gpm at 3700 rpm and 2850 psi. A valve in the pump varies the amount of fluid delivered to hold system pressure constant until system demand exceeds rated flow of pump. When system pressure reaches 3100 psi the EDP delivery flow is zero for all pump speeds.
- B. The EDP moves fluid through the pump case to lubricate and cool the pump. This fluid flows out the case drain port to the system heat exchanger and returns to the reservoir.
- C. The output of the EDP can be shut off by a depressurization valve on the pump. This valve closes the pump outlet port when the engine pump switch on the hydraulic control panel is moved to DEPRESS. The valve also closes when the engine fire switch on the aft electronic control panel P8 is pulled out to FIRE position.

3. Alternating Current Motor Pump (ACMP) (Fig. 4)

- A. The left and right systems each have one ACMP and the center system has two ACMPs. The left and right system ACMP's are in the left and right main wheel well forward fairings, respectively. The two center system ACMP's are in the aft left wing/body fairing. Each pump is attached to vibration absorbing mounts.
- B. The ACMP supplies 12 gpm at 1000 psi. At pressure above 1000 psi the pump output decreases to 6.7 gpm at 2850 psi. When pressure reaches 3025 psi the pump delivery flow is zero.
- C. The pump is driven by a 115/200-volt 3-phase 400 Hz motor. The motor is controlled by the ELEC pump switches on the hydraulic control panel. The right system ACMP will also operate when the RESERVE BRAKE switch on main instrument panel P1 is on. The ACMP moves fluid through the pump case to lubricate and cool the pump. This fluid flows out the case drain port to the system heat exchanger and returns to the reservoir.

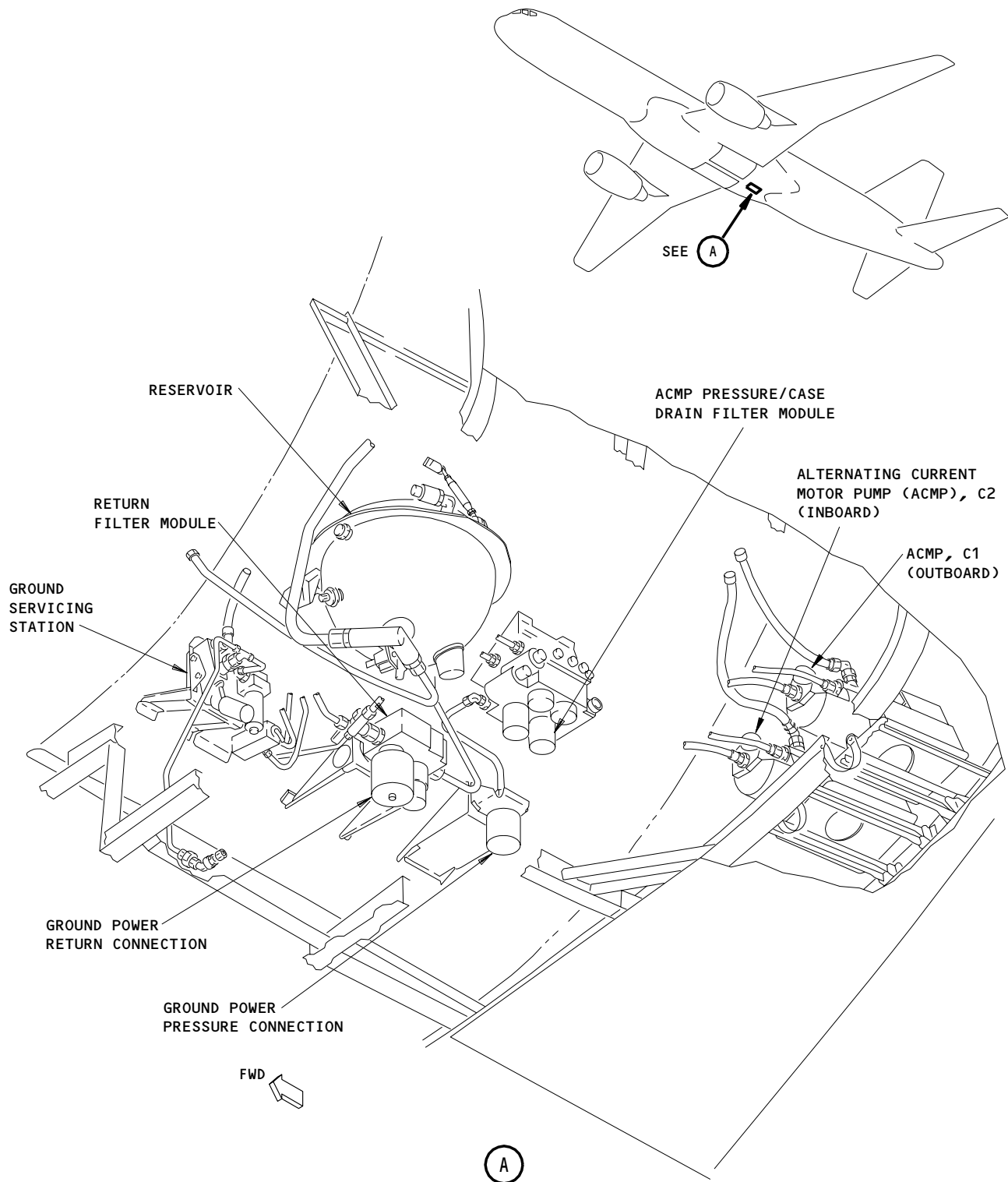
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C System - Component Location
Figure 1

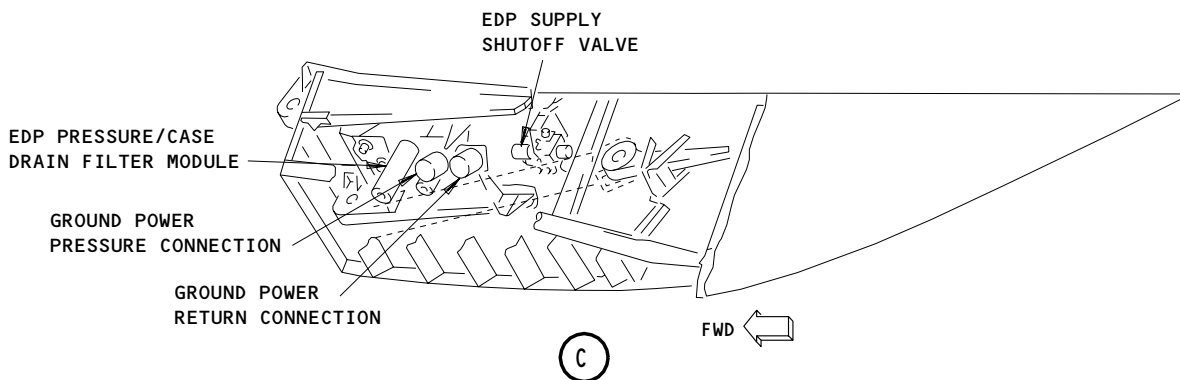
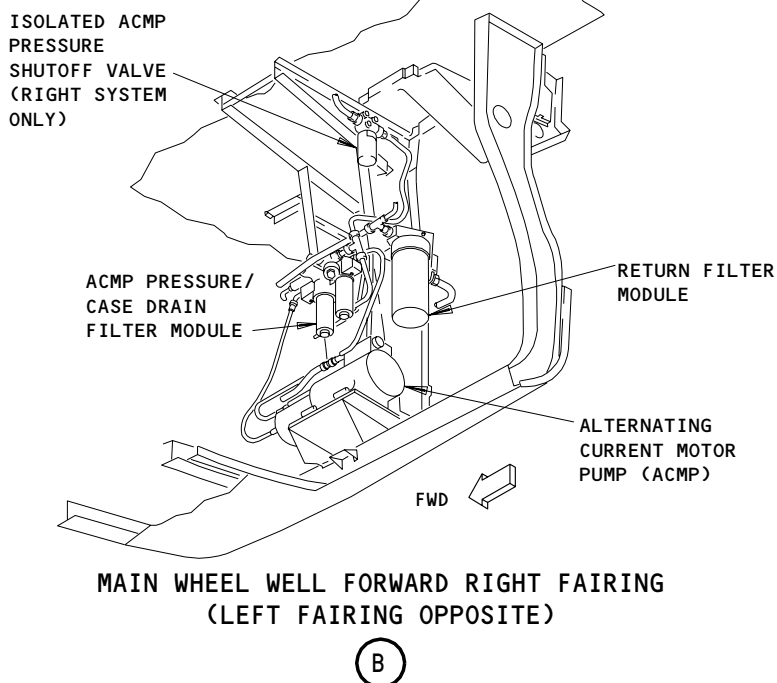
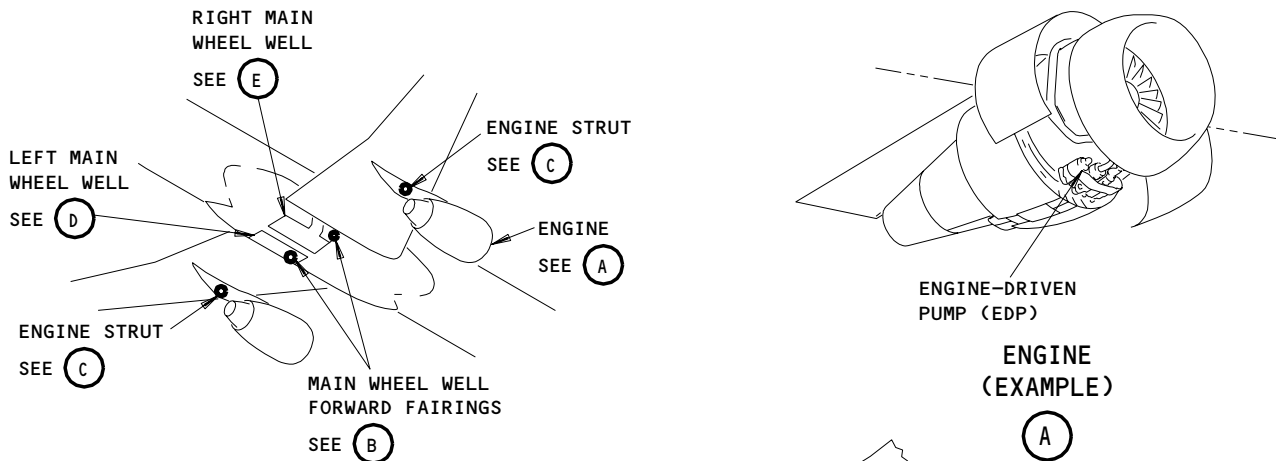
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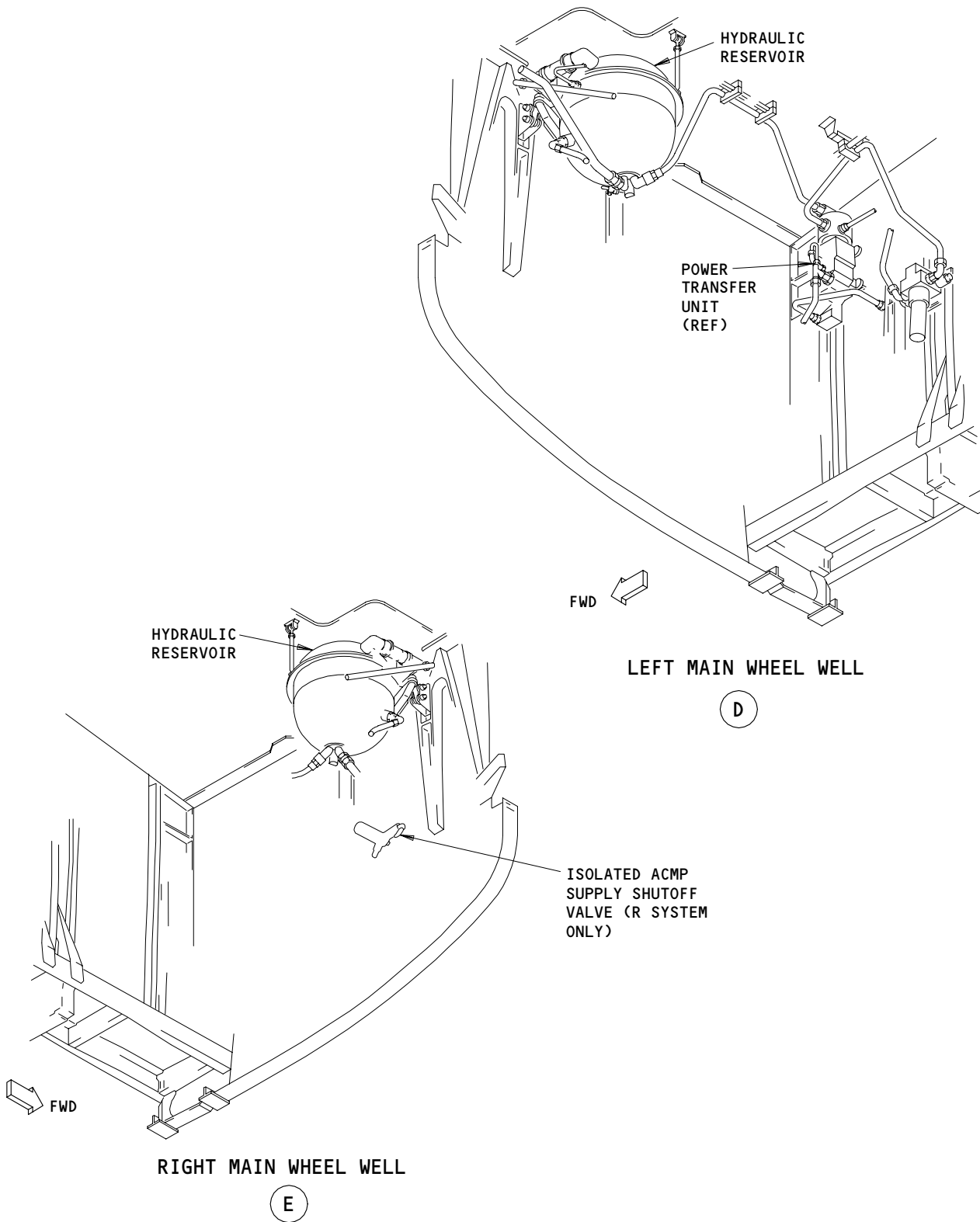
Left and Right System Component Location
Figure 2 (Sheet 1)

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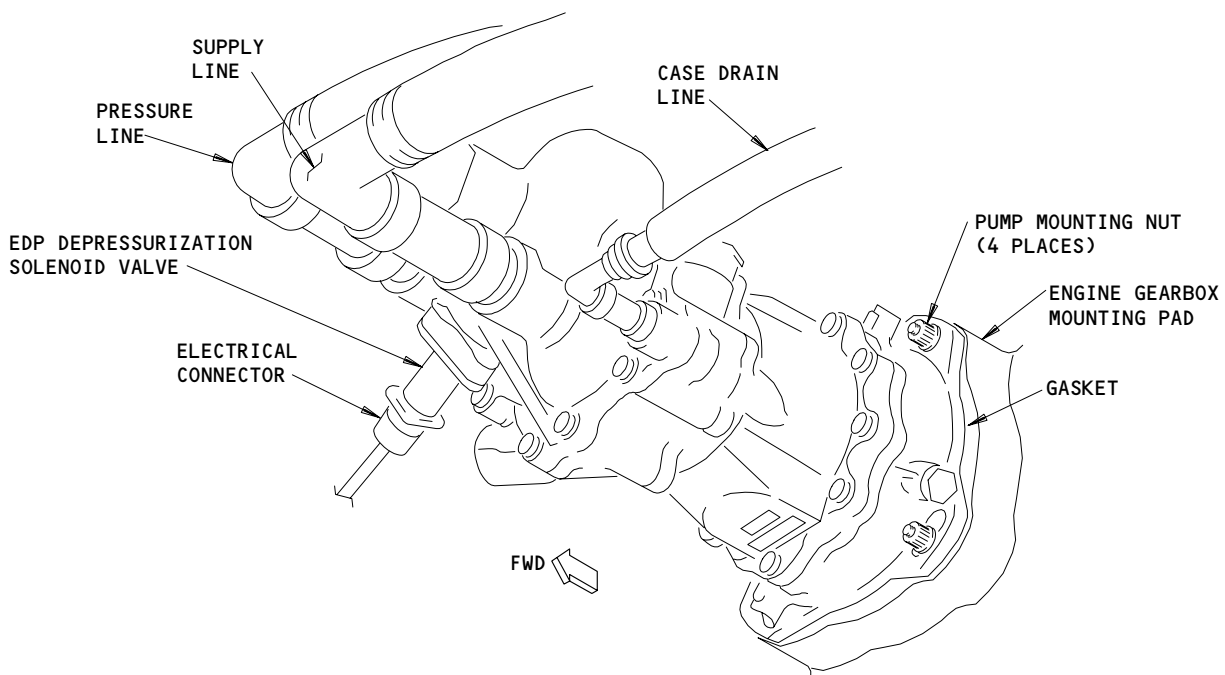
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L and R System Component Location
Figure 2 (Sheet 2)

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Engine-Driven Pump (EDP)
Figure 3

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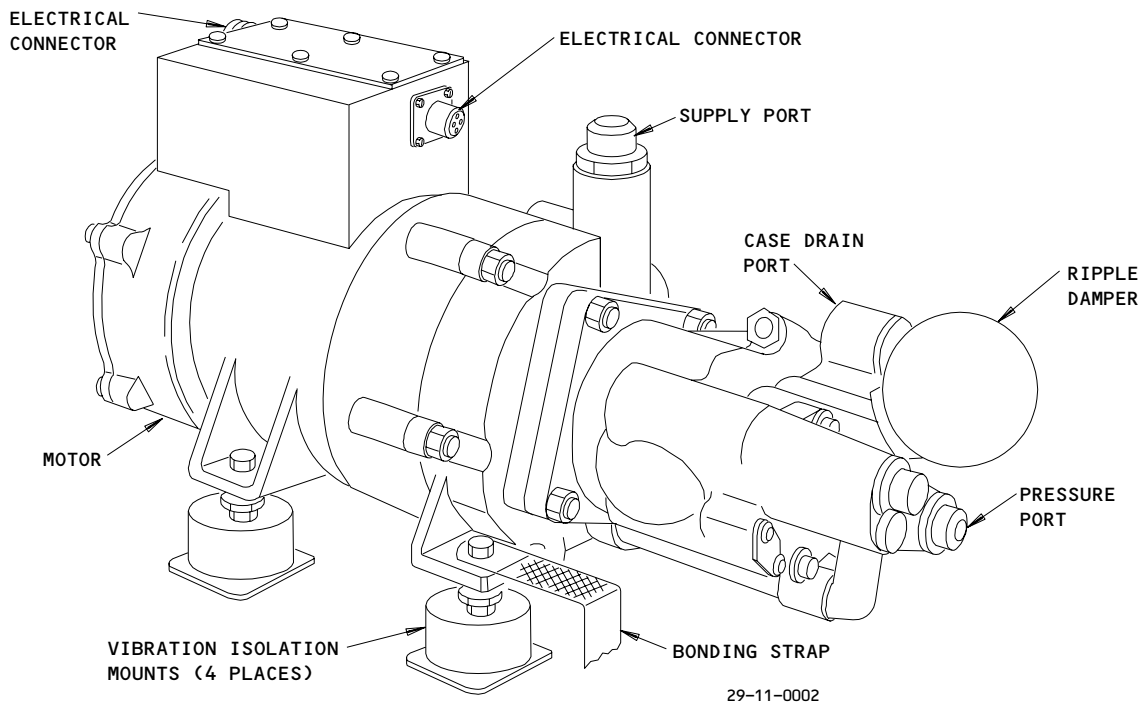
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D. The 28-volt dc control circuit for each ACMP contains a time delay. The duration of time delay for each pump is different and ranges from 2 to 5 seconds for the various pumps. The ACMP time delays prevent a large surge on the electrical power system as the ACMP's restart if a temporary interruption of dc power occurs.

4. Hydraulic Reservoir (Fig. 5 and 6)

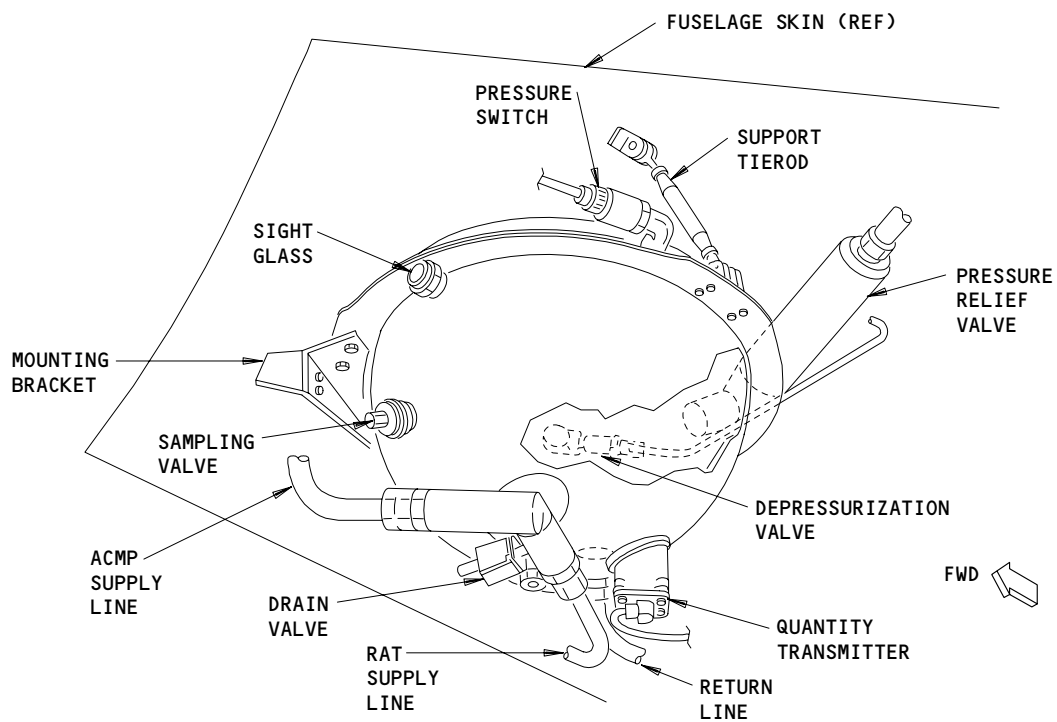
- A. The hydraulic reservoir for each system supplies hydraulic fluid for the flow demands of the user systems. The reservoirs for the left and right systems are in the left and right main wheel wells, respectively. The center system reservoir is in the aft left wing/body fairing.
- B. The three reservoirs are round tanks of the same design but of different size. Each reservoir holds 6.6 gallons (25 liters, 5.5 imperial gallons) for left and right systems and 3.5 gallons (13 liters, 2.9 imperial gallons) for the center system. The reservoirs are pressurized to 45-50 psi by the pneumatic system to assure a supply of fluid to the pumps.
- C. Each reservoir has a quantity transmitter and a sight glass for checking fluid level. Pressure relief, depressurization, drain, and sampling valves and a fluid trap are on each reservoir.
- D. The pressure relief valve is near the top of the reservoir. The pressure relief valve opens under high air or fluid pressure (60 to 65 psi) to protect the reservoir. The drain valve is a manual valve at the bottom of the reservoir. The sampling valve removes fluid samples at the level of the supply line outlets. The fluid trap holds fluid at the pump supply line outlets during negative-G forces.



Alternating Current Motor Pump (ACMP)
Figure 4

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C System Hydraulic Reservoir
Figure 5

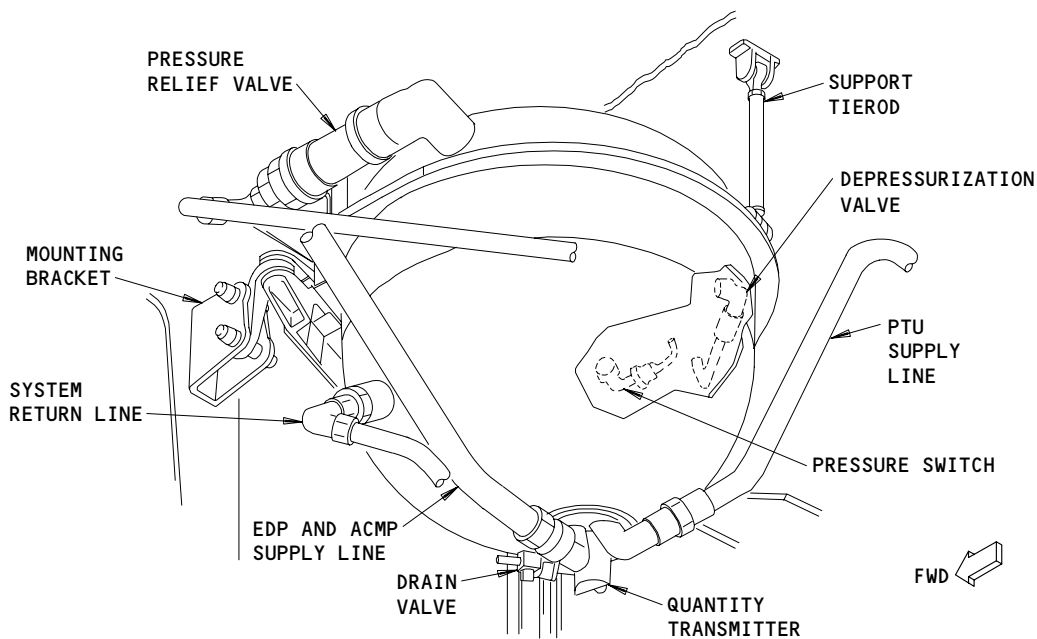
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- E. The depressurization valve is a manual valve located near the top of the reservoir. When a slider on the valve is held in the vented position the pneumatic line is shutoff and reservoir air pressure is vented. A valve lock can be installed to hold the valve slider in the vented position during maintenance. This valve lock must be removed before flight to allow the reservoir to be pressurized by the pneumatic system.
 - F. Each reservoir has two supply outlets. One outlet is connected to a standpipe inside the reservoir to retain a reserve fluid supply at the bottom of the reservoir. The second, or reserve, outlet is not connected to a standpipe and draws fluid from the bottom of the reservoir. In the left and right systems, the reservoir standpipe outlet supplies fluid to the EDP and ACMP. In the center system, the standpipe outlet supplies fluid to the two ACMP's. In the right system, the reserve outlet supplies fluid to the isolated ACMP supply shutoff valve for use in the reserve brakes system. In the left system, the reserve outlet supplies fluid to the power transfer unit (PTU) pump. In the center system, the reserve outlet supplies fluid to the ram air turbine (RAT) pump.
5. Reservoir Pressurization Module (Fig. 7)
- A. This module filters and distributes air from the pneumatic system to the three reservoirs. The module is on the keel beam forward of the main wheel wells. The module includes a filter, two check valves and a manual bleed valve.
6. Return Filter Modules (Fig. 8)



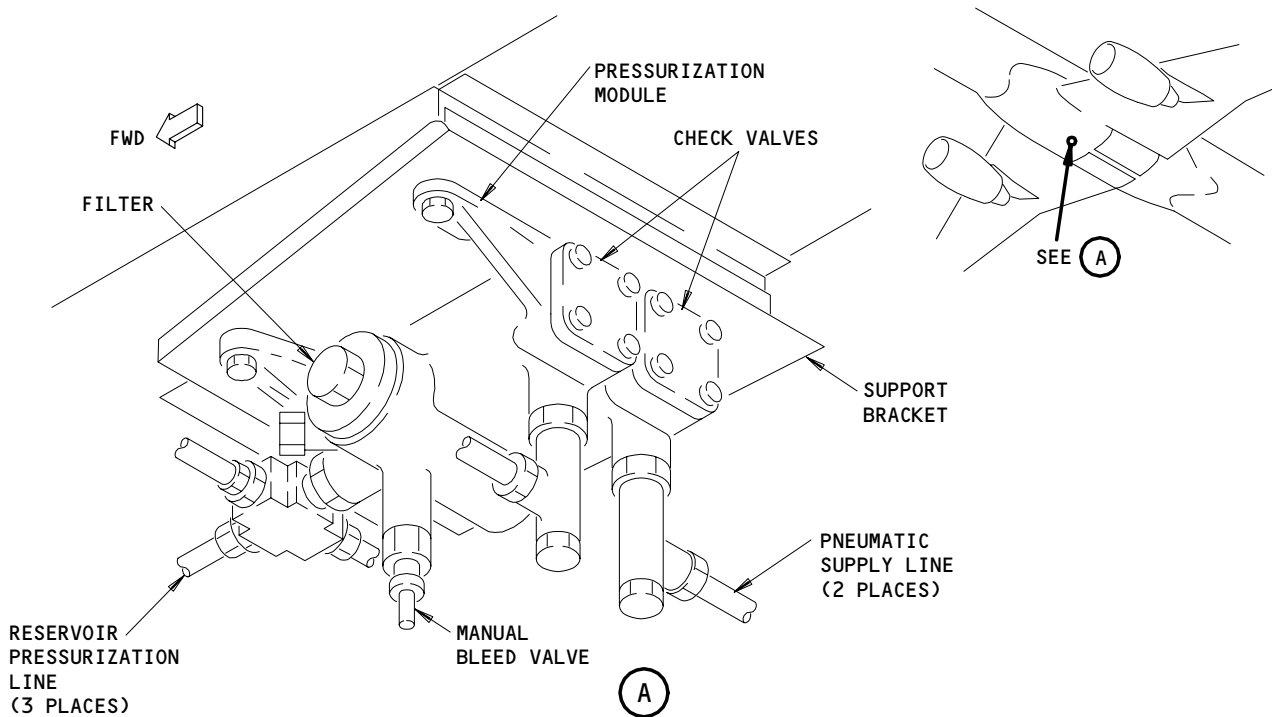
LEFT SYSTEM RESERVOIR SHOWN (RIGHT SYSTEM SIMILAR)

L and R System Hydraulic Reservoir
Figure 6

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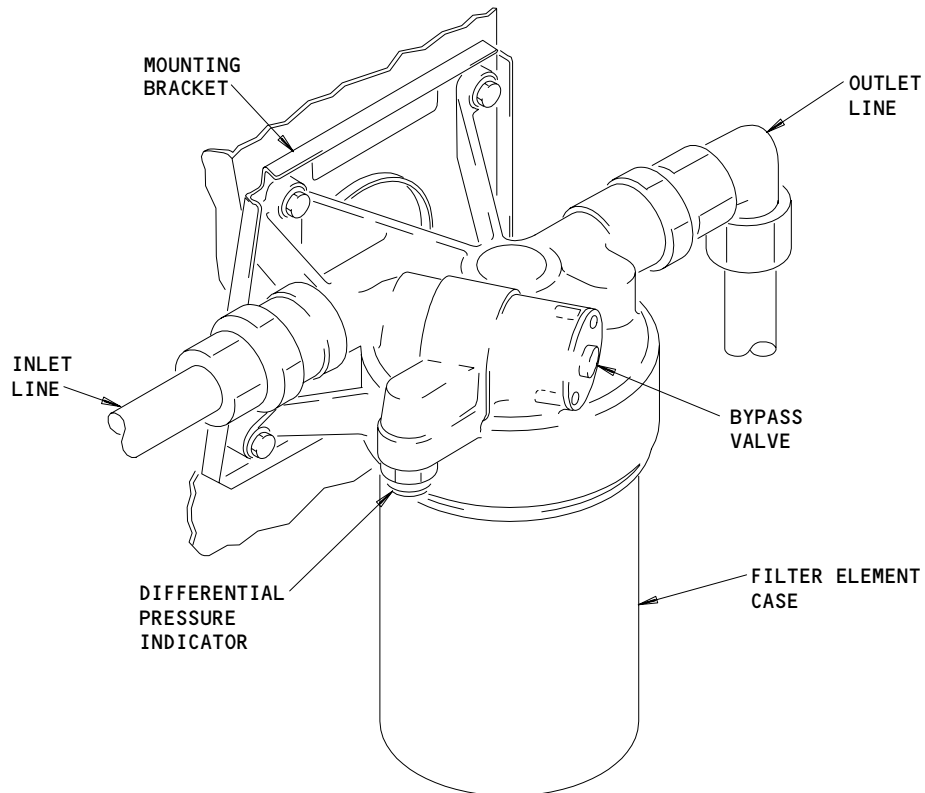
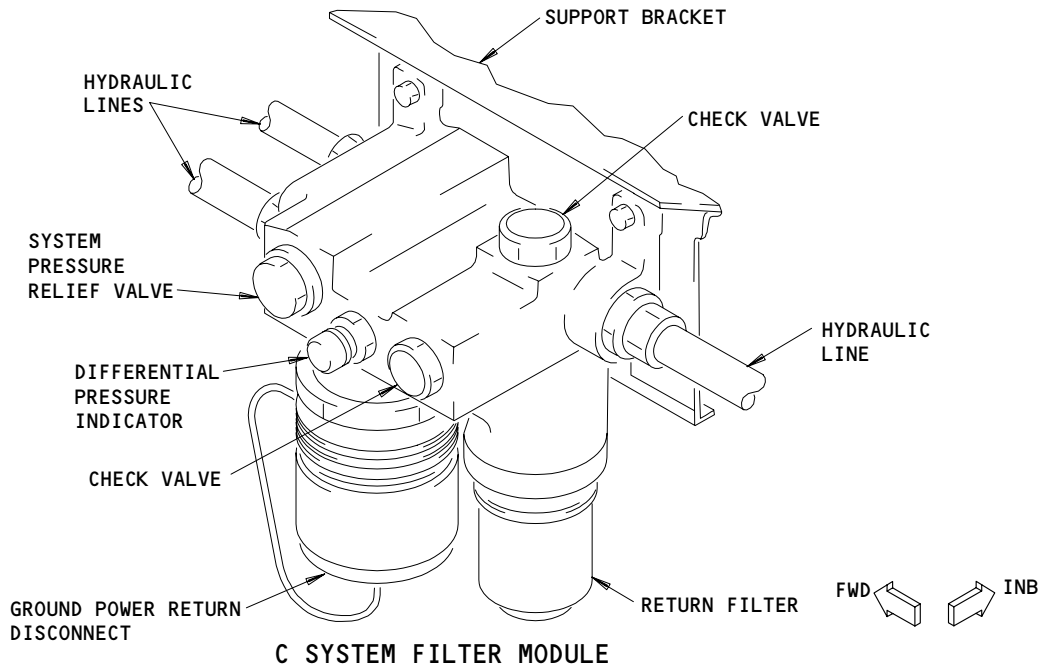
- A. The return module in each system filters all fluid returning to the reservoir. The left and right system return modules are in the left and right wheel well forward fairings, respectively. The center system return module is in the aft left wing/body fairing.
- B. Each module includes a throw-away filter. A differential pressure indicator shows when the filter is blocked. A by-pass valve routes fluid around a blocked filter. A spring-loaded valve in the module prevents fluid draining when the filter element is removed. The module has two check valves to prevent backflow through the filter.



Reservoir Pressurization Module
Figure 7

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L AND R SYSTEM FILTER MODULE
Return Filter Modules
Figure 8

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- C. The center system module also includes a ground power return connector and the system pressure relief valve.
- 7. EDP Pressure/Case Drain Filter Module (Fig. 9)
 - A. The EDP modules filter both pressure and case drain fluid from the EDP's. The EDP modules are in each engine strut.
 - B. Each module includes two throw-away filters. Differential pressure indicators show when each filter is blocked. A spring-loaded valve at each filter prevents fluid draining when the filter element is removed.
 - C. Each module also contains a pump pressure switch, a system pressure switch, a pump temperature switch, and two check valves.
- 8. ACMP Pressure/Case Drain Filter Module (Fig. 9)
 - A. The ACMP modules filter both pressure and case drain fluid from the ACMP's. The left and right system return modules are in the left and right wheel well forward fairings, respectively. The center system module is in the aft left wing/body fairing.
 - B. Left and Right System Modules
 - (1) Each module includes two throw-away filters. Differential pressure indicators show when each filter is blocked. A spring-loaded valve at each filter prevents fluid draining when the filter element is removed. Each module also has a pump pressure switch and two check valves.
 - C. Center System Module
 - (1) The center system filter module is a dual unit which filters fluid from two ACMP's. This module is the same as two left or right system modules installed in one housing. The center system module also has a system pressure switch.
- 9. EDP Supply Shutoff Valve (Fig. 10)
 - A. The supply shutoff valve controls fluid supply to the EDP and is normally in the open position. The valve is operated by a 28 volt dc motor which is controlled by the engine fire switch. A position indicator on the valve provides a valve CLOSED or OPEN indication. The valve is installed in the EDP supply line in the engine strut.
- 10. Isolated ACMP Shutoff Valves (Fig. 10)
 - A. Two valves provide a reserve hydraulic system to power normal brakes in the event of loss of the right and left hydraulic systems. These valves consist of a supply and a pressure shutoff valve. Each valve is operated by a 28 volt dc motor.
 - B. The right system ACMP normally draws fluid from the reservoir through a standpipe. When the shutoff valves are activated, the supply shutoff valve provides fluid to the right ACMP from the bottom of the reservoir. The pressure shutoff valve isolates the output of the right ACMP to power only the normal brakes.
 - C. The RESERVE BRAKE switch on the captain's main instrument panel P1 operates both valves and turns on the right ACMP.
- 11. Heat Exchanger (Fig. 11)

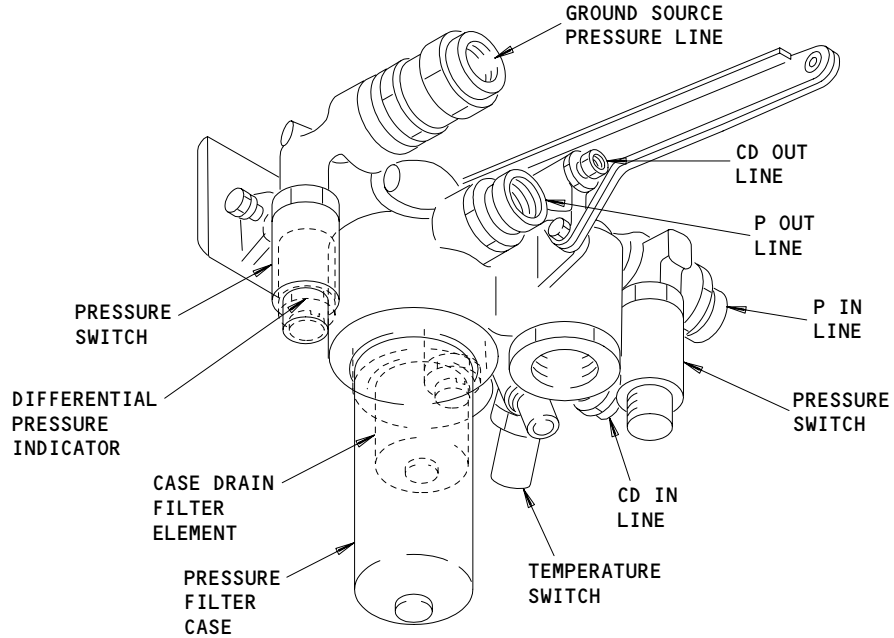
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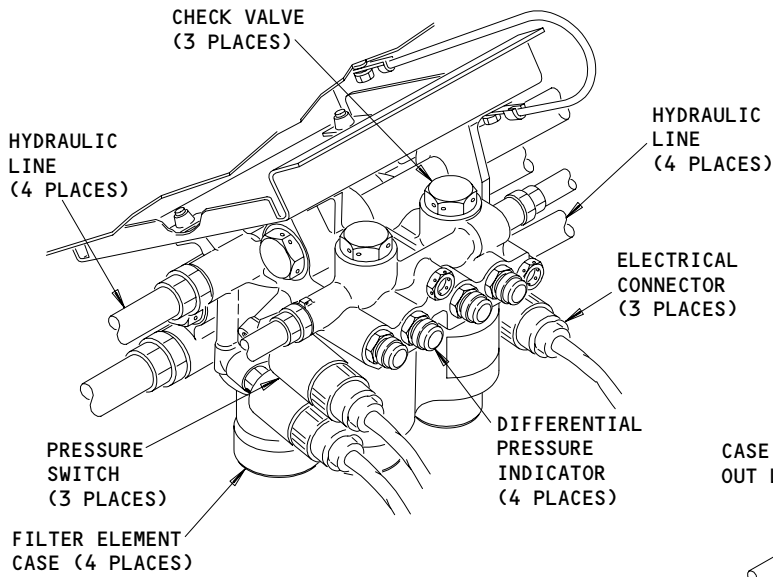
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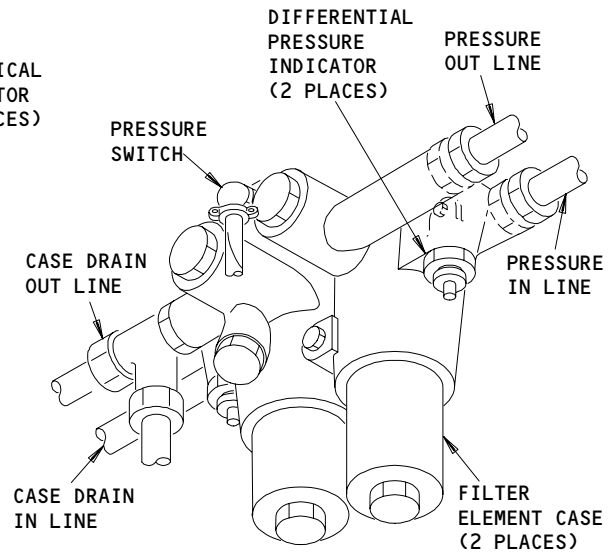
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L AND R SYSTEM EDP FILTER MODULE



C SYSTEM ACP FILTER MODULE

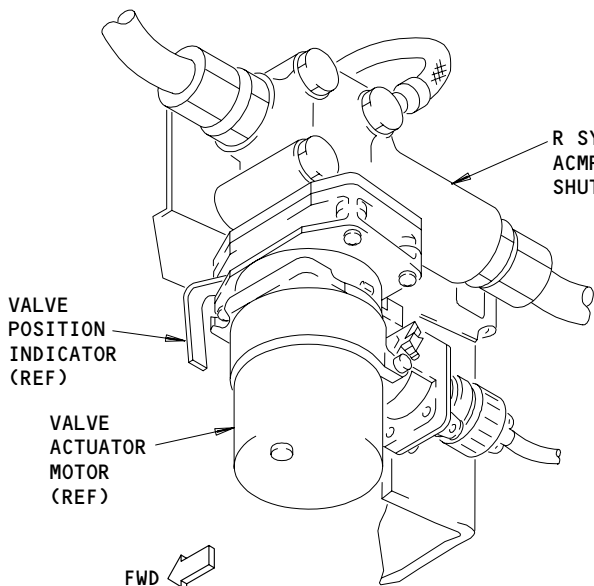


L AND R SYSTEM ACP FILTER MODULE

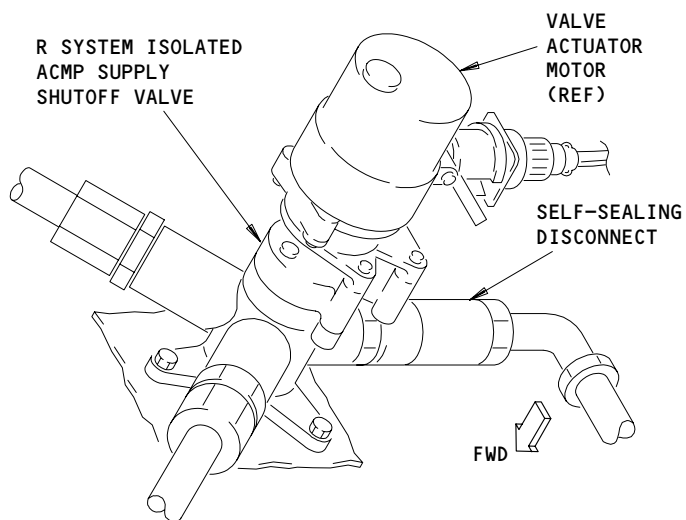
Pressure/Case Drain Filter Modules
Figure 9

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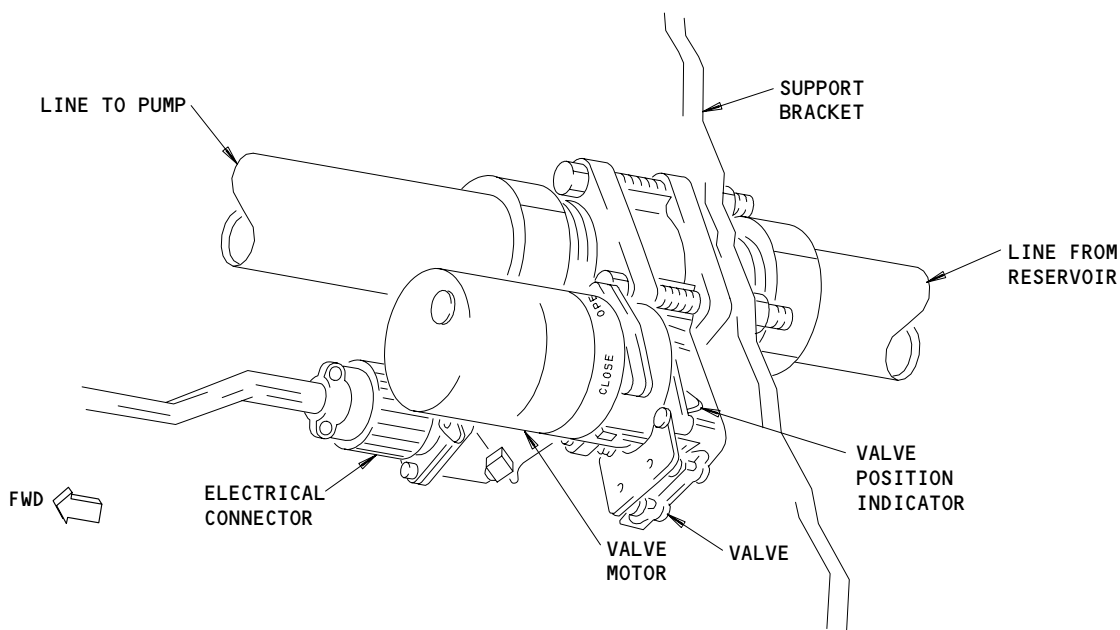
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**RIGHT SYSTEM ISOLATED ACMP
PRESSURE SHUTOFF VALVE**



**RIGHT SYSTEM ISOLATED ACMP
SUPPLY SHUTOFF VALVE**

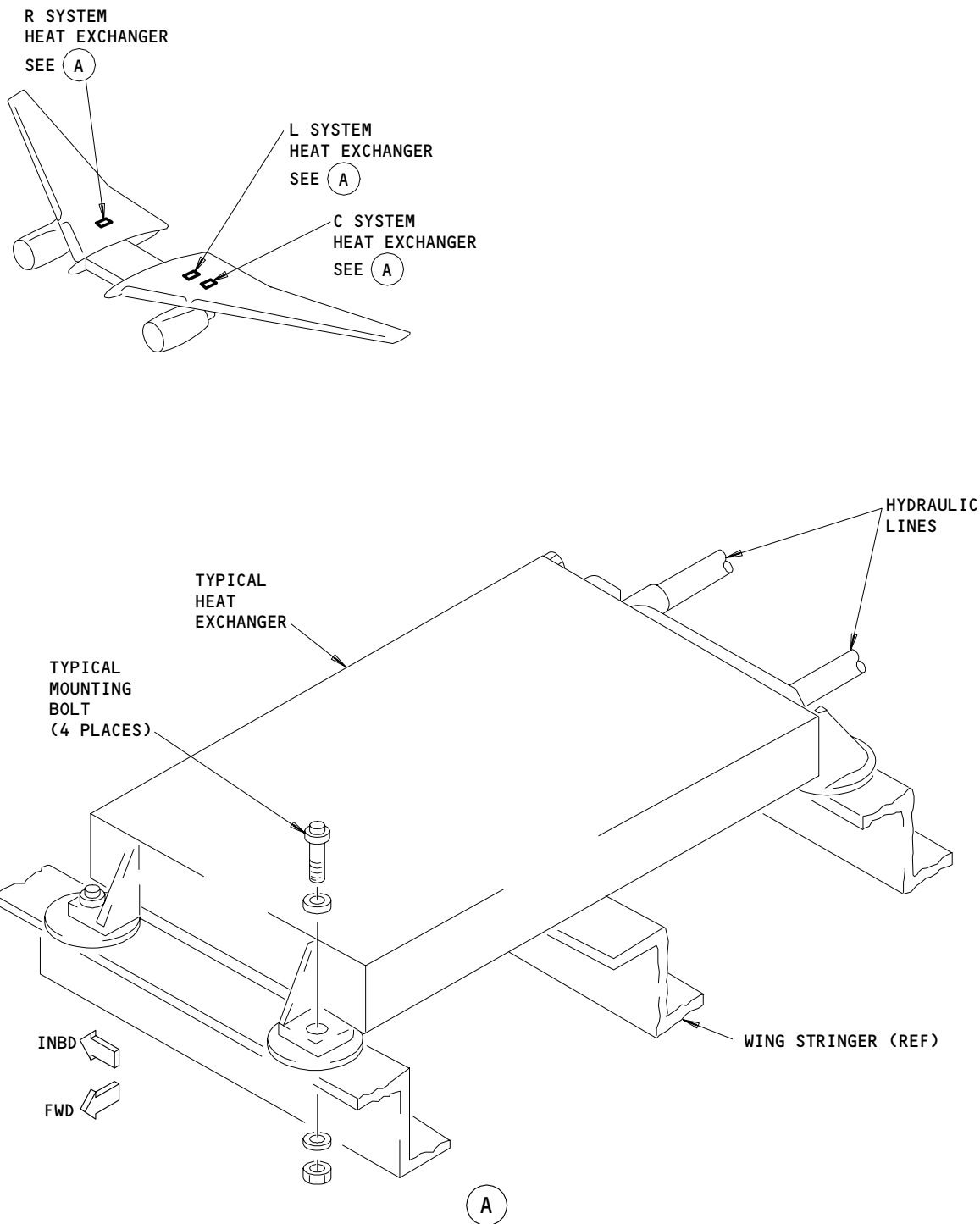


EDP SUPPLY SHUTOFF VALVE

**Shutoff Valves
Figure 10**

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Heat Exchangers
Figure 11

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A. A heat exchanger in each system cools pump case drain fluid as the fluid returns to the reservoir. The three identical heat exchangers are in the wing fuel tanks and use fuel as a coolant. The left and right system heat exchangers are at the inboard end of the left and right main fuel tanks, respectively. The center system heat exchanger is adjacent to the left system exchanger. A minimum of 600 gallons (4020 pounds/1827 kilograms) of fuel is required in each main tank to provide hydraulic fluid cooling.

12. Ground Power Connections (Fig. 1 and 2)

A. Each hydraulic system can be pressurized from a hydraulic ground cart connected to the ground power connections. The left and right system connections are in the left and right engine struts, respectively. The center system connections are in the aft left wing/body fairing. At each location, the ground power connections consist of self-sealing quick-disconnects for the pressure and return lines.

13. Hydraulic Control Panel (Fig. 12)

- A. The control panel is on the pilot's overhead panel, P5 and contains the pump select switches and system warning lights.
- B. The pump select switch for each EDP and ACMP is a push-to-activate type and contains an ON light and pump low pressure light. The switch has a mechanical ON/DEPRESS indicator for the EDP's and ON/OFF for the ACMP's.
- C. The panel has warning lights for low pressure and low fluid quantity in each system. Warning lights are provided for low pressure and overheat in each pump.

14. Operation

A. Functional Description - L and R Systems

- (1) The left and right systems operate the same. The system reservoir supplies a flow of fluid under pressure to the pumps. Fluid flows directly to the ACMP and through the EDP shutoff valve to the EDP. The output of the pumps flows through filters in the ACMP or EDP filter modules before going to the operating systems. Return fluid from the operating systems flows through a filter in the return module before entering the reservoir.
- (2) If system pressure becomes too high, a pressure relief valve opens to route fluid to the system return line.
- (3) Fluid flows through the ACMP and EDP cases for cooling and lubrication. This case drain fluid is filtered by the ACMP or EDP modules and is cooled by the system heat exchanger. The cooled fluid is returned to the system reservoir through the return filter module.
- (4) The ENG pump select switch on the hydraulic control panel controls the EDP. With the switch in the ON position, the depressurization valve is de-energized and the pump outlet port is open. The pump supplies fluid flow as demanded by the operating systems. Placing the switch in the DEPRESS position energizes the valve to block fluid flow from the pump. The only output is the case drain flow for pump cooling and lubrication. Pulling the engine fire switch on the aft electronic control panel P8 to the FIRE position will also energize the valve. This also closes the EDP supply shutoff valve to block fluid flow to the pump.

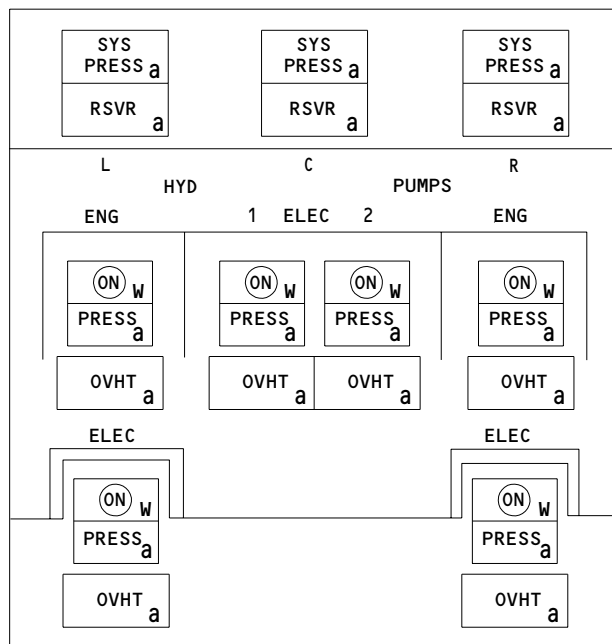
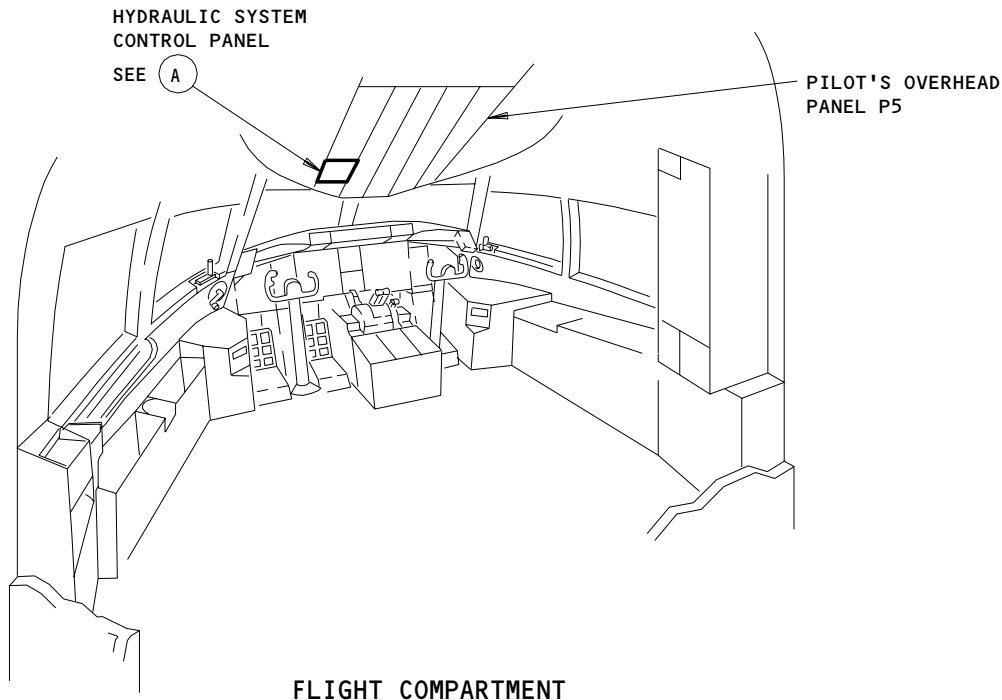
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HYDRAULIC SYSTEM CONTROL PANEL

(A)

Hydraulic System Control Panel
Figure 12

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- (5) The ELEC pump select switch on the hydraulic control panel controls the ACMP. In the ON position the switch energizes the ACMP control relay to supply 28 volts dc to the ACMP electrical load control unit (ELCU). The ELCU relay closes to supply 115/200 volt, 400 Hz, 3-phase power to the pump motor. The pump then supplies fluid flow as demanded by the operating systems. Moving the pump select switch to the OFF position removes power and stops the pump.
- (6) If power is lost on the left main AC bus, the right ACMP enable relay opens to de-energize and reset the right ACMP time delay.
- (7) The RESERVE BRAKE switch on main instrument panel P1 controls the right ACMP isolation valves. In the ON position, the switch energizes the reserve brakes control relay to supply 28 volts dc to the supply and pressure shutoff valves. The reserve brakes control relay also energizes the right ACMP control relay to turn on the right ACMP. The supply shutoff valve motor drives the valve to the reserve position which supplies fluid to the right ACMP from the bottom of the reservoir. The pressure shutoff valve motor drives the valve to the closed position. This isolates the right ACMP output to power only the normal brakes. A white ON switch light is illuminated when the switch is in the reserve brake position. EICAS message RSV BRAKE VAL will be displayed while the valves are in transit and when position of either valve does not agree with the switch position.
- (8) If left engine power is lost, the right hydraulic system drives a power transfer unit (PTU) to provide left system pressure. For information on the PTU, refer to 29-22-00.

B. Functional Description - C System

- (1) The system reservoir supplies a flow of fluid under pressure to the two ACMP's. The output of the pumps flows through filters in the ACMP filter module before going to the operating systems. Return fluid from the operating systems flows through a filter in the return module before entering the reservoir.
- (2) If system pressure becomes too high, a pressure relief valve in the return filter module opens to route fluid through the filter to the system return line.

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- (3) Fluid flows through the case of each ACMP for cooling and lubrication. This case drain fluid is filtered by the ACMP filter module and is cooled by the system heat exchanger. The cooled fluid is returned to the system reservoir through the return filter module.
- (4) The ELEC pump select switches on the hydraulic control panel control the two ACMP's. In the ON position the switch energizes the ACMP control relay to supply 28 volts dc to the ACMP electrical load control unit (ELCU). The ELCU relay closes to supply 115/200 volt, 400 Hz, 3-phase power to the pump motor. The pump then supplies fluid flow as demanded by the operating systems. Moving the pump select switch to the OFF position removes power and stops the pump.
- (5) If power is lost on the right main AC bus, the C2 ACMP enable relay opens to de-energize and reset the C2 ACMP time delay. During category 3 autoland, if power is lost on the left main AC bus, the C1 ACMP enable relay and the autoland relays open to de-energize and reset the C1 ACMP time delay.
- (6) If power is lost in both engines, the ram air turbine (RAT) deploys to supply center system pressure for operation of the flight controls. For information on the RAT, refer to 29-21-00.
- (7) ACMP electrical load shedding
 - (a) To reduce electrical power system loads, power is removed from C2 ACMP when all the following conditions are met:
 - 1) The C2 ACMP select switch on the hydraulic control panel is on.
 - 2) The C1 ACMP select switch on the hydraulic control panel is on and the pump is operating (electrical load control unit M10006 is energized).
 - 3) The left and right bus tie breakers (BTBs) are both closed.
 - (b) The two closed BTBs indicate that a single source is supplying all ac electrical power. If a second source comes on line, the BTBs will open to isolate the sources. This will return power to the C2 ACMP. If only one BTB is open the C2 ACMP will not be shed. If the C1 ACMP is off, the C2 ACMP will not be shed.

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MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	1		FLIGHT COMPARTMENT, P6 PANEL	
HYD EMP ENABLE C1, C4329		1	6K13	*
HYD EMP ENABLE R, C4330		1	6K14	*
HYD EMP ENABLE C2, C4331		1	6K19	*
CIRCUIT BREAKER -	1		FLIGHT COMPARTMENT, P11 PANEL	
ELEC PUMP C1, C4043		1	11K15	*
ELEC PUMP C2, C4014		1	11K24	*
ELEC PUMP LEFT, C4045		1	11K25	*
ELEC PUMP RIGHT, C4044		1	11K16	*
HYDRAULICS ENG PUMP SUPPLY L, C4023		1	11D28	*
HYDRAULICS ENG PUMP SUPPLY R, C4025		1	11D29	*
HYDRAULICS QTY CENTER, C4192		1	11K19	*
HYDRAULICS QTY LEFT, C1101		1	11K20	*
HYDRAULICS QTY RIGHT, C4193		1	11K21	*
RESERVE BRAKE SOURCE, C4292		1	11K22	*
L ENG PUMP DEPRESS, C4024		1	11K14	*
R ENG PUMP DEPRESS, C4026		1	11K23	*
SYSTEM PRESS CENTER, C1082		1	11K18	*
SYSTEM PRESS LEFT, C1080		1	11K17	*
SYSTEM PRESS RIGHT, C1081		1	11K26	*
CIRCUIT BREAKER - (FIM 31-01-31/101)				
LEFT BUS TIE, C902				
CIRCUIT BREAKER - (FIM 31-01-32/101)				
RIGHT BUS TIE, C904				
COMPUTER - (FIM 31-41-00/101)				
EICAS L, M10181				
EICAS R, M10182				

* SEE THE WDM EQUIPMENT LIST

Main (Left, Right, and Center) Hydraulic Systems - Component Index
Figure 101 (Sheet 1)

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

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COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CONNECTION - CENTER SYSTEM HYDRAULIC GROUND POWER PRESSURE	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-00
CONNECTION - CENTER SYSTEM HYDRAULIC GROUND POWER RETURN	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-00
CONNECTION - LEFT SYSTEM HYDRAULIC GROUND POWER PRESSURE	2	1	434AL, LEFT NACELLE STRUT-AFT FAIRING	29-11-00
CONNECTION - LEFT SYSTEM HYDRAULIC GROUND POWER RETURN	2	1	434AL, LEFT NACELLE STRUT-AFT FAIRING	29-11-00
CONNECTION - RIGHT SYSTEM HYDRAULIC GROUND POWER PRESSURE	2	1	444AL, RIGHT NACELLE STRUT-AFT FAIRING	29-11-00
CONNECTION - RIGHT SYSTEM HYDRAULIC GROUND POWER RETURN	2	1	444AL, RIGHT NACELLE STRUT-AFT FAIRING	29-11-00
EXCHANGER - CENTER SYSTEM HEAT	9	1	541BB, LEFT WING	29-11-26
EXCHANGER - LEFT SYSTEM HEAT	9	1	541BB, LEFT WING	29-11-26
EXCHANGER - RIGHT SYSTEM HEAT	9	1	641BB, RIGHT WING	29-11-26
JACKS - CENTER HYDRAULIC SYSTEM INTERNAL LEAK TEST, YQZJ7,YQZJ8 	1	2	FLIGHT COMPARTMENT, P61 PANEL, GENERATOR FIELD AND HYDRAULIC CONTROL PANEL, M10191	*
JACKS - LEFT HYDRAULIC SYSTEM INTERNAL LEAK TEST, YQZJ5,YQZJ6 	1	2	FLIGHT COMPARTMENT, P61 PANEL, GENERATOR FIELD AND HYDRAULIC CONTROL PANEL, M10191	*
JACKS - RIGHT HYDRAULIC SYSTEM INTERNAL LEAK TEST, YQZJ9,YQZJ10 	1	2	FLIGHT COMPARTMENT, P61 PANEL, GENERATOR FIELD AND HYDRAULIC CONTROL PANEL, M10191	*
MODULE - RESERVOIR PRESSURIZATION	8	1	193HL/194ER, LEFT/RIGHT ECS ACCESS PANELS	29-11-16
MODULE - CENTER SYSTEM ACPM PRESSURE/CASE DRAIN FILTER	7	2	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-19
MODULE - CENTER SYSTEM RETURN FILTER	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-13
MODULE - LEFT SYSTEM ACPM PRESSURE/CASE DRAIN FILTER	4	1	LEFT WHEEL WELL	29-11-18
MODULE - LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER	2	1	434AL, LEFT NACELLE STRUT-AFT FAIRING	29-11-17
MODULE - LEFT SYSTEM RETURN FILTER	4	1	LEFT WHEEL WELL	29-11-15
MODULE - RIGHT SYSTEM ACPM PRESSURE/CASE DRAIN FILTER	4	1	RIGHT WHEEL WELL	29-11-18
MODULE - RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER	2	1	444AL, RIGHT NACELLE STRUT-AFT FAIRING	29-11-17
MODULE - RIGHT SYSTEM RETURN FILTER	4	1	RIGHT WHEEL WELL	29-11-15
PANEL - (26-21-00/101) ENGINE FIRE CONTROL, M10443				
PANEL - (24-22-00/101) GENERATOR FIELD & HYDRAULIC CONTROL, M10191				
PANEL - HYDRAULIC CONTROL, M10050	1	1	FLIGHT COMPARTMENT, P5 PANEL	29-11-00
PUMP (ACMP) - CENTER SYSTEM ALTERNATING CURRENT MOTOR C1, M10029	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-02
PUMP (ACMP) - CENTER SYSTEM ALTERNATING CURRENT MOTOR C2, M10030	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-02
PUMP (ACMP) - LEFT SYSTEM ALTERNATING CURRENT MOTOR, M231	4	1	LEFT WHEEL WELL	29-11-01
PUMP (ACMP) - RIGHT SYSTEM ALTERNATING CURRENT MOTOR, M234	4	1	RIGHT WHEEL WELL	29-11-01
PUMP (EDP) - LEFT SYSTEM ENGINE DRIVEN	2	1	413AL/414AR, LEFT ENGINE	29-11-05
PUMP (EDP) - RIGHT SYSTEM ENGINE DRIVEN	2	1	423AL/424AR, RIGHT ENGINE	29-11-05

* SEE THE WDM EQUIPMENT LIST

Main (Left,Right, and Center) Hydraulic Systems - Component Index
Figure 101 (Sheet 2)

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

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COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
RELAY - (31-01-31/101) LEFT AUTO LAND, K526				
RELAY - (31-01-32/101) RIGHT AUTO LAND, K527				
RELAY - (31-01-33/101) LEFT SYSTEM ACMP CONTROL, K10253				
RELAYS - (31-01-36/101) CENTER SYSTEM ACMP C1 CONTROL, K10404 CENTER SYSTEM ACMP C1 ENABLE, K10526 CENTER SYSTEM ACMP C2 CONTROL, K128 CENTER SYSTEM ACMP C2 ENABLE, K10527 RIGHT SYSTEM ACMP CONT, K10255 RIGHT SYSTEM ACMP ENABLE, K10525				
RELAY - (31-01-37/101) RESERVE BRAKE CONTROL, K10426				
RESERVOIR - CENTER SYSTEM HYDRAULIC	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-21
RESERVOIR - LEFT SYSTEM HYDRAULIC	5	1	LEFT WHEEL WELL	29-11-20
RESERVOIR - RIGHT SYSTEM HYDRAULIC	5	1	RIGHT WHEEL WELL	29-11-20
SWITCH - RESERVE BRAKES, S10390	1	1	FLIGHT COMPARTMENT, P1 PANEL	*
SWITCHES - (26-21-00/101) LEFT ENGINE FIRE, YQNS37 RIGHT ENGINE FIRE, YQNS38				
SWITCH/LIGHT - CENTER SYSTEM ACMP C1, YQTS2	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH/LIGHT - CENTER SYSTEM ACMP C2, YQTS3	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH/LIGHT - LEFT SYSTEM ACMP, YQTS5	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH/LIGHT - LEFT SYSTEM EDP, YQTS1	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH/LIGHT - RIGHT SYSTEM ACMP, YQTS6	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH/LIGHT - RIGHT SYSTEM EDP, YQTS4	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
TIME DELAY - (31-01-33/101) LEFT SYSTEM ACMP, M499				
TIME DELAYS - (31-01-36/101) CENTER SYSTEM ACMP C1 ON, M10482 CENTER SYSTEM ACMP C2 ON, M10020 RIGHT SYSTEM ACMP, M500				
TRANSFORMERS - (31-01-31/101) CENTER SYSTEM HYDRAULIC LEAK DETECTION CURRENT, T157 				
RIGHT SYSTEM HYDRAULIC LEAK DETECTION CURRENT, T155 				
TRANSFORMER - (31-01-32/101) LEFT SYSTEM HYDRAULIC LEAK DETECTION CURRENT, T156 				

* SEE THE WDM EQUIPMENT LIST

Main (Left,Right, and Center) Hydraulic Systems - Component Index
Figure 101 (Sheet 3)

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COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
UNITS - (31-01-31/101) CENTER SYSTEM ACMP C1 ELECTRICAL LOAD CONTROL, M10006 RIGHT SYSTEM ACMP ELECTRICAL LOAD CONTROL, M10005				
UNITS - (31-01-32/101) CENTER SYSTEM ACMP C2 ELECTRICAL LOAD CONTROL, M10022 LEFT SYSTEM ACMP ELECTRICAL LOAD CONTROL, M10001				
VALVE - CENTER SYSTEM RESERVOIR DRAIN	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-22
VALVE - CENTER SYSTEM RESERVOIR PRESSURE RELIEF	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-24
VALVE - CENTER SYSTEM RESERVOIR MANUAL DEPRESSURIZATION	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-25
VALVE - CENTER SYSTEM RESERVOIR SAMPLING	7	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-11-23
VALVE - LEFT SYSTEM EDP SUPPLY SHUTOFF, V10005	2	1	434AL, LEFT NACELLE STRUT-AFT FAIRING,	29-11-06
VALVE - LEFT SYSTEM PRESSURE RELIEF	6	1	LEFT WHEEL WELL	29-11-29
VALVE - LEFT SYSTEM RESERVOIR DRAIN	6	1	LEFT WHEEL WELL	29-11-22
VALVE - LEFT SYSTEM RESERVOIR MANUAL DEPRESSURIZATION	6	1	RIGHT WHEEL WELL	29-11-25
VALVE - LEFT SYSTEM RESERVOIR PRESSURE RELIEF	6	1	LEFT WHEEL WELL	29-11-24
VALVE - LEFT SYSTEM RESERVOIR SAMPLING	6	1	LEFT WHEEL WELL	29-11-23
VALVE - RIGHT SYSTEM EDP SUPPLY SHUTOFF, V10006	2	1	444AL, RIGHT NACELLE STRUT-AFT FAIRING	29-11-06
VALVE - RIGHT SYSTEM ISOLATED ACMP PRESSURE SHUTOFF, V10118	4	1	RIGHT WHEEL WELL	29-11-28
VALVE - RIGHT SYSTEM ISOLATED ACMP SUPPLY SHUTOFF, V10117	5	1	RIGHT WHEEL WELL	29-11-27
VALVE - RIGHT SYSTEM PRESSURE RELIEF	6	1	RIGHT WHEEL WELL	29-11-29
VALVE - RIGHT SYSTEM RESERVOIR DRAIN	6	1	RIGHT WHEEL WELL	29-11-22
VALVE - RIGHT SYSTEM RESERVOIR MANUAL DEPRESSURIZATION	6	1	LEFT WHEEL WELL	29-11-25
VALVE - RIGHT SYSTEM RESERVOIR PRESSURE RELIEF	6	1	RIGHT WHEEL WELL	29-11-24
VALVE - RIGHT SYSTEM RESERVOIR SAMPLING	6	1	RIGHT WHEEL WELL	29-11-23

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Main (Left,Right, and Center) Hydraulic Systems - Component Index
Figure 101 (Sheet 4)

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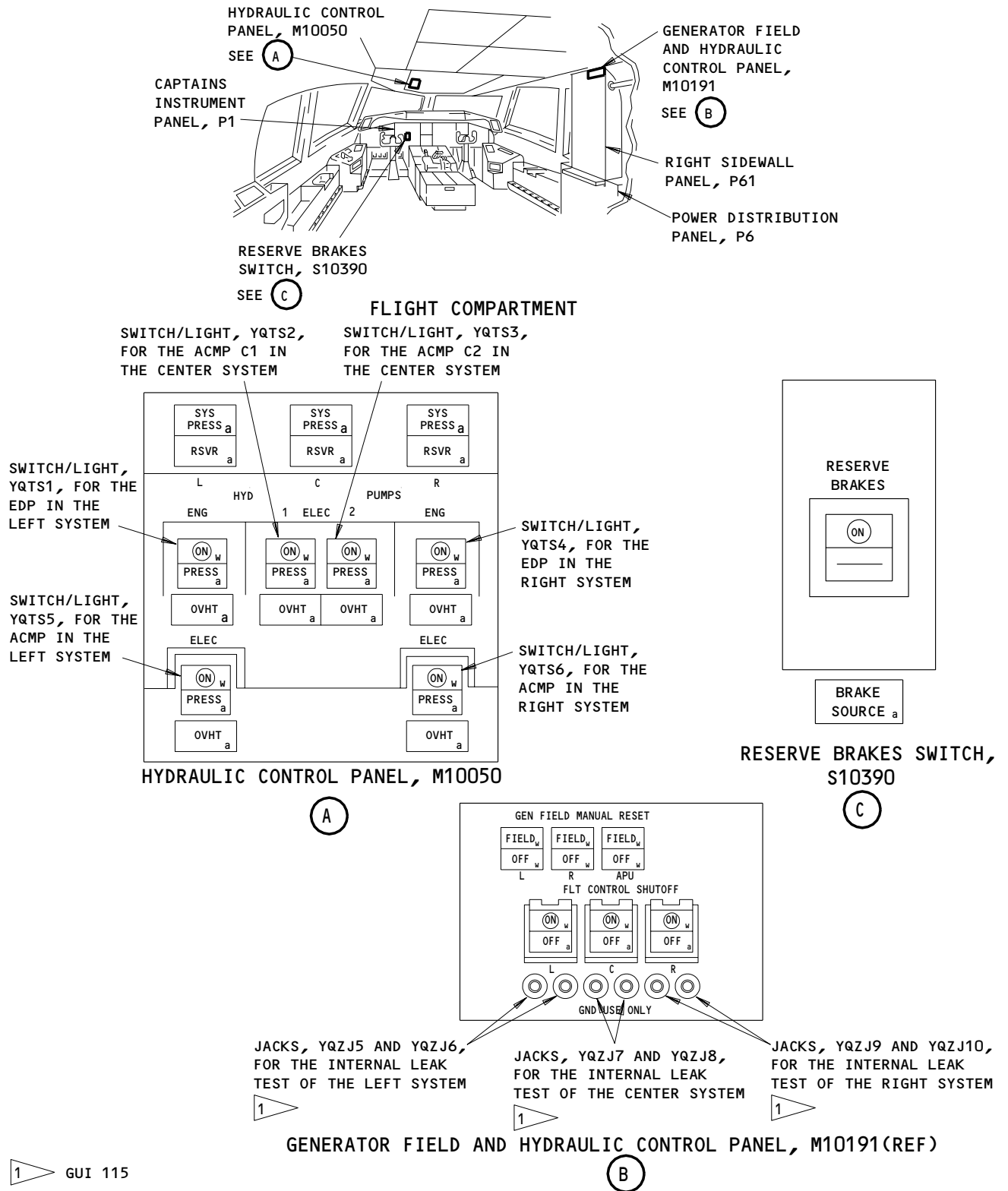
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29-11-00

BOEING

757

FAULT ISOLATION/MAINT MANUAL

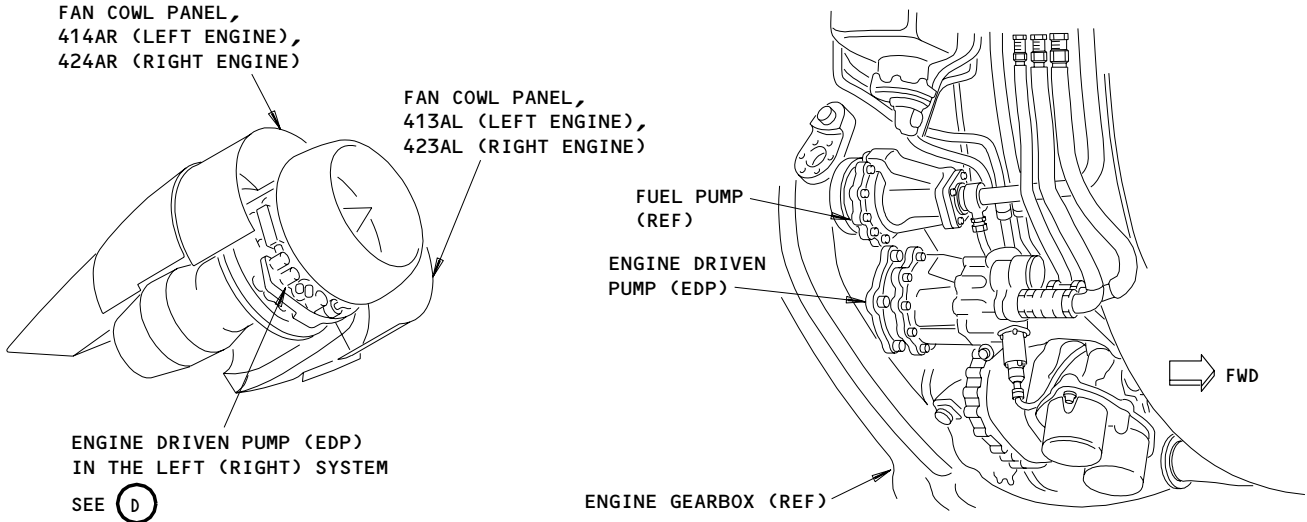


Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 1)

EFFECTIVITY	
	ALL

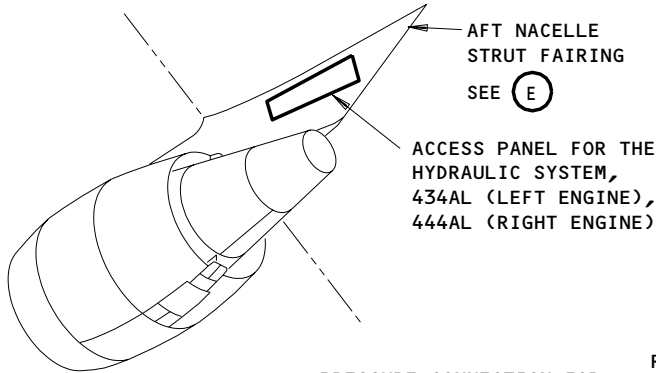
29-11-00

BOEING
757
FAULT ISOLATION/MAINT MANUAL



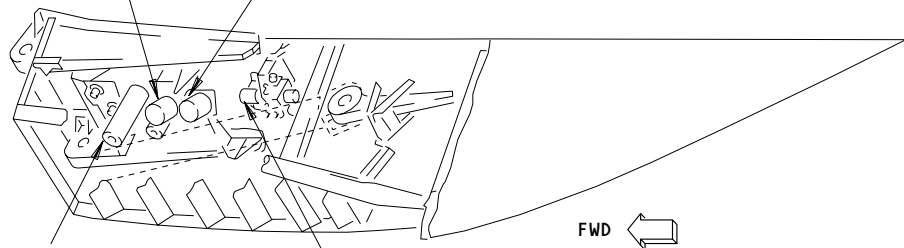
ENGINE DRIVEN PUMP (EDP)
IN THE LEFT (RIGHT) SYSTEM

(D)



PRESSURE CONNECTION FOR
THE GROUND POWER IN THE
LEFT (RIGHT) SYSTEM

RETURN CONNECTION FOR
THE GROUND POWER IN THE
LEFT (RIGHT) SYSTEM



FILTER MODULE FOR
THE PRESSURE AND CASE
DRAIN OF THE EDP IN THE
LEFT (RIGHT) SYSTEM
SEE (F) SHT 3

SUPPLY SHUTOFF VALVE,
V10005 (V10006), FOR
THE EDP IN THE LEFT
(RIGHT) SYSTEM
SEE (G) SHT 3

AFT NACELLE STRUT FAIRING (EXAMPLE)

(E)

Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 2)

EFFECTIVITY

ALL

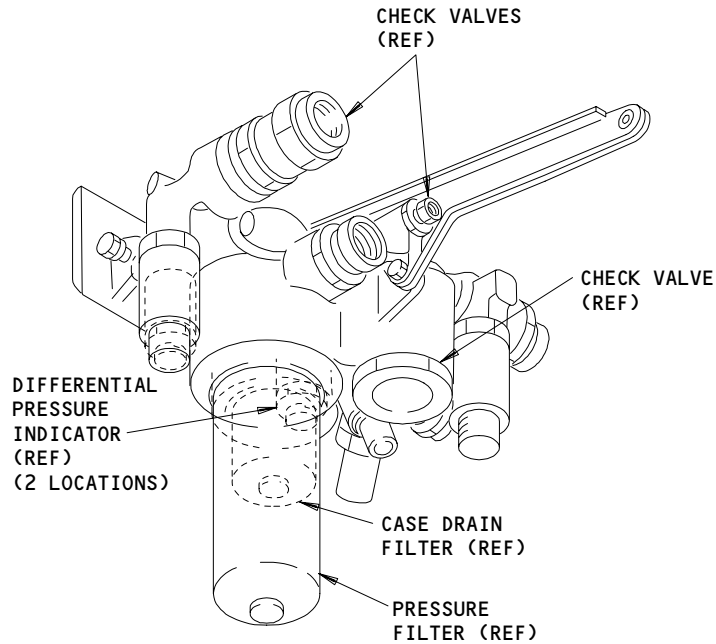
29-11-00

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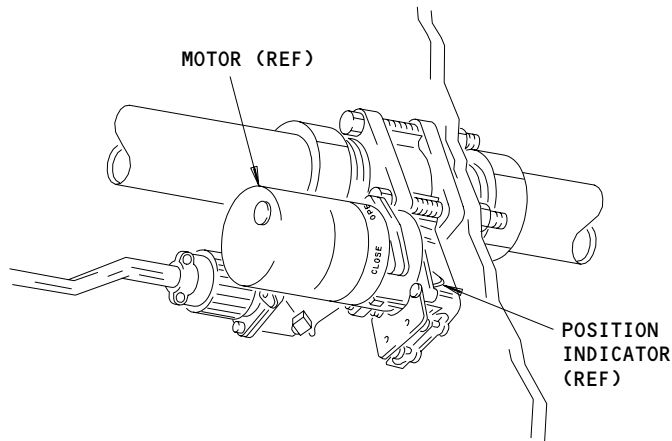
229853

BOEING
757
FAULT ISOLATION/MAINT MANUAL



FILTER MODULE FOR THE PRESSURE AND CASE DRAIN OF THE EDP IN THE LEFT (RIGHT) SYSTEM

F



SUPPLY SHUTOFF VALVE, V10005 (V10006), FOR THE EDP IN THE LEFT (RIGHT) SYSTEM

G

Main (Left, Right, and Center) Hydraulic Systems - Component Location
(Details from Sht 2)
Figure 102 (Sheet 3)

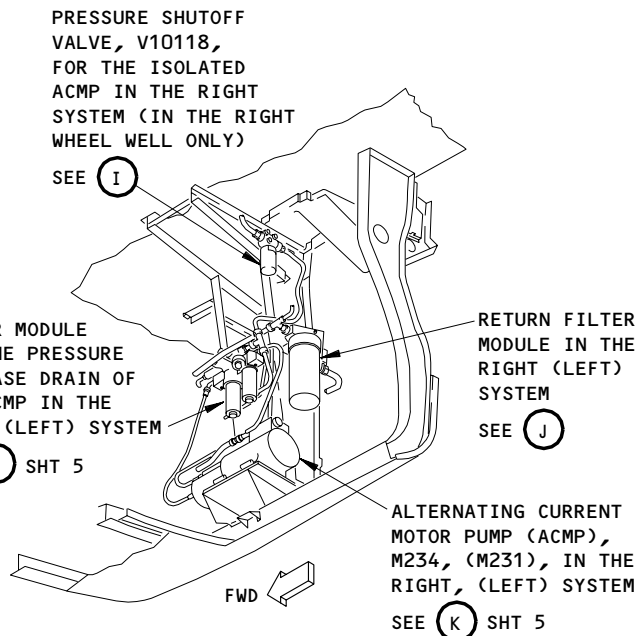
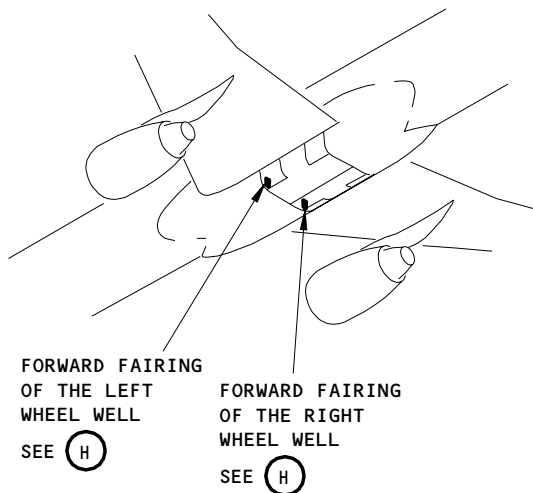
EFFECTIVITY	
	ALL

29-11-00

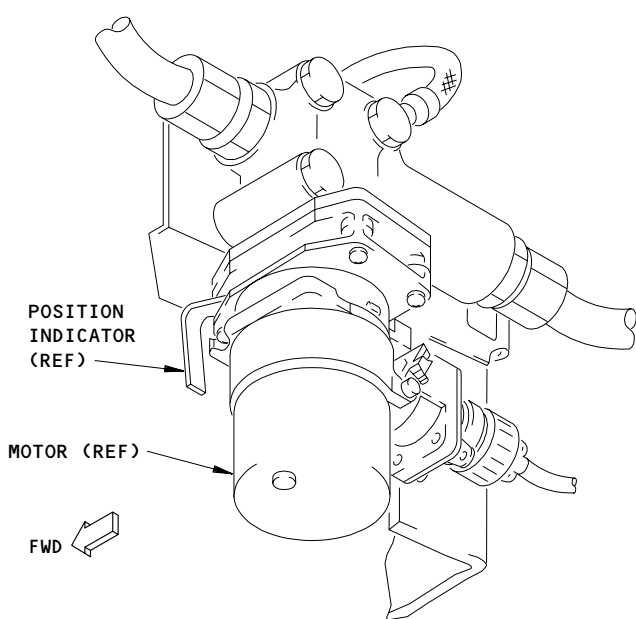
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129849

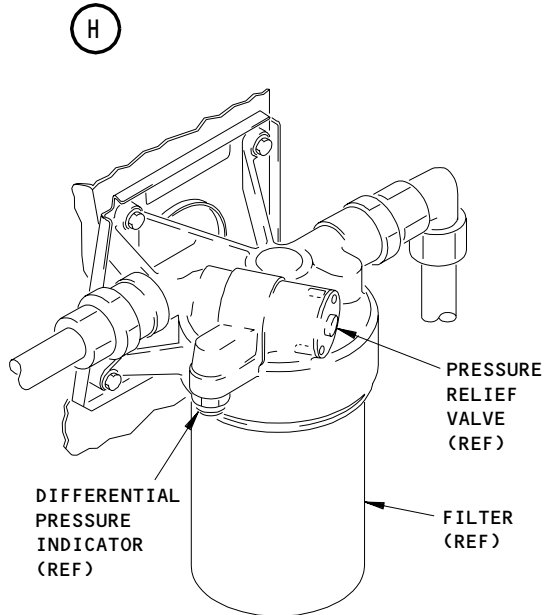


**FORWARD FAIRING OF THE RIGHT WHEEL WELL
(THE FORWARD FAIRING OF THE LEFT WHEEL WELL IS OPPOSITE)**



PRESSURE SHUTOFF VALVE, V10118, FOR THE ISOLATED ACMP IN THE RIGHT SYSTEM

(I)



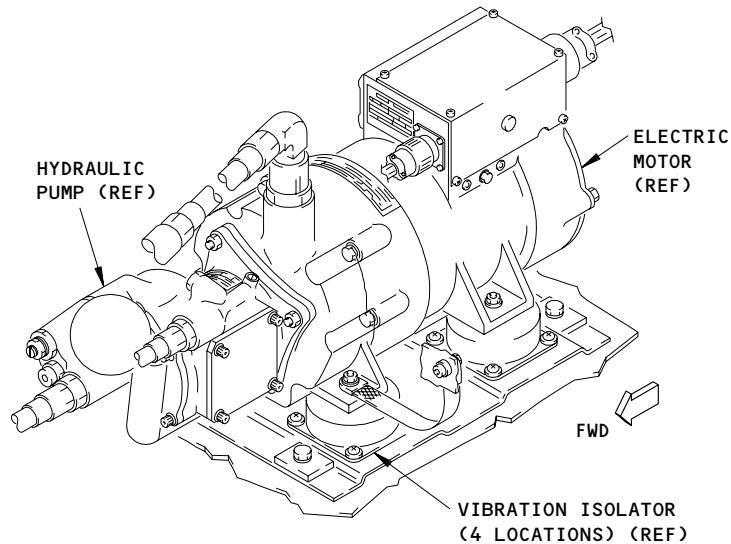
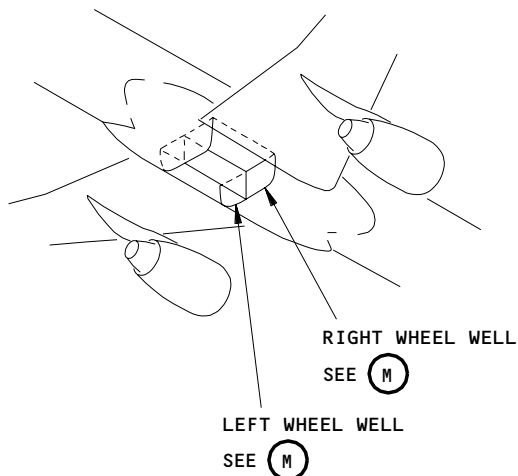
RETURN FILTER MODULE FOR THE RIGHT (LEFT) SYSTEM

(J)

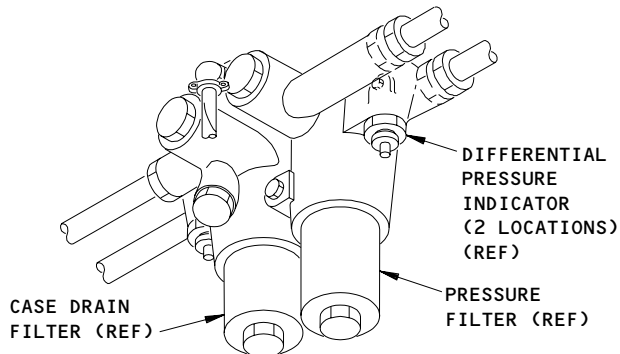
Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 4)

EFFECTIVITY	ALL
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29-11-00

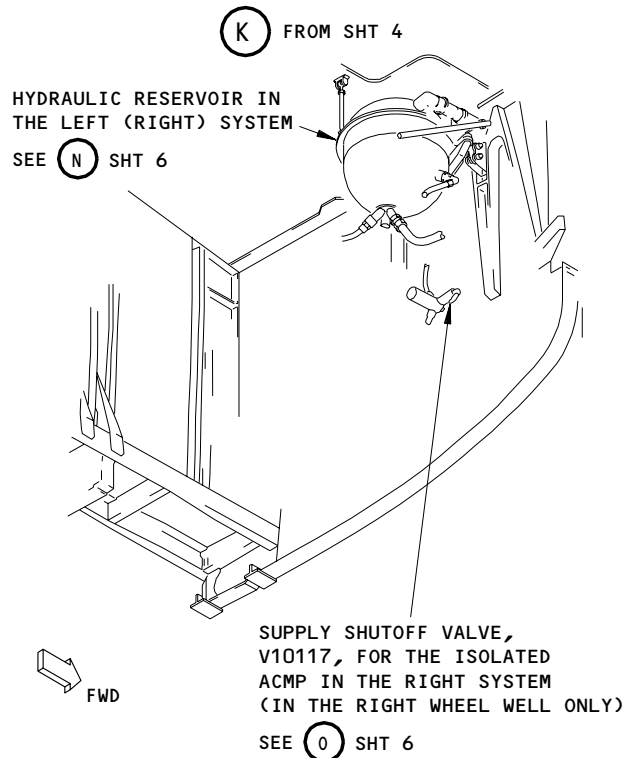


ALTERNATING CURRENT MOTOR PUMP (ACMP), M231 (M234), IN THE LEFT (RIGHT) SYSTEM (EXAMPLE)



FILTER MODULE FOR THE PRESSURE AND CASE DRAIN OF THE ACMP IN THE LEFT (RIGHT) SYSTEM

(L) FROM SHT 4



RIGHT WHEEL WELL (THE LEFT WHEEL WELL IS OPPOSITE)

(M)

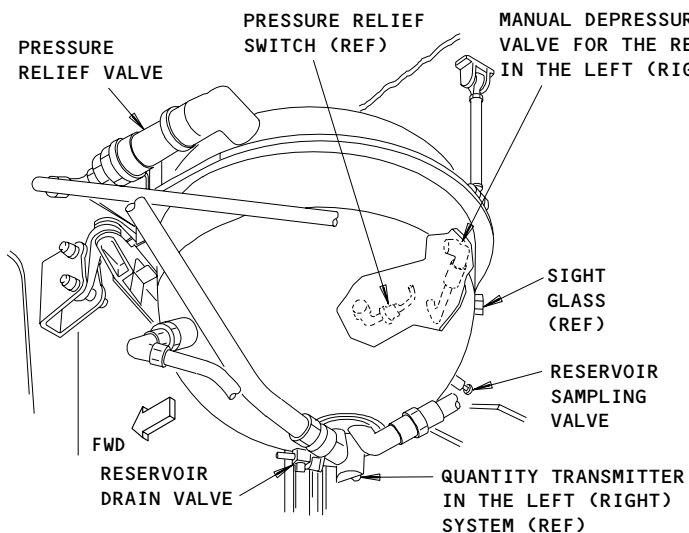
Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 5)

EFFECTIVITY	
	ALL

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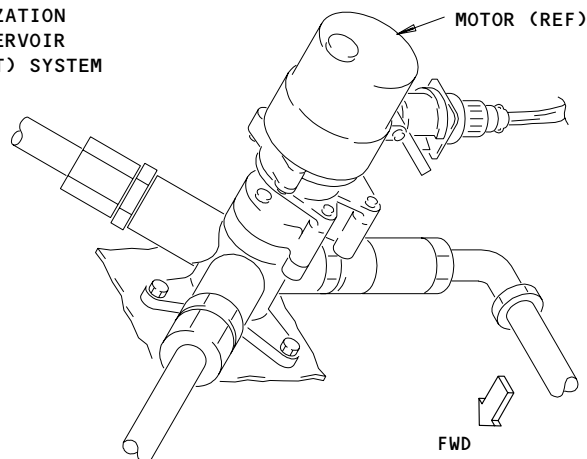
BOEING

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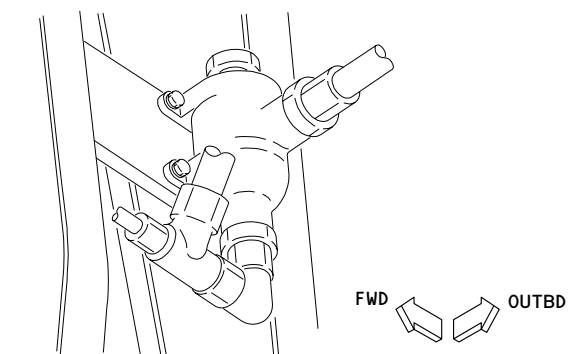
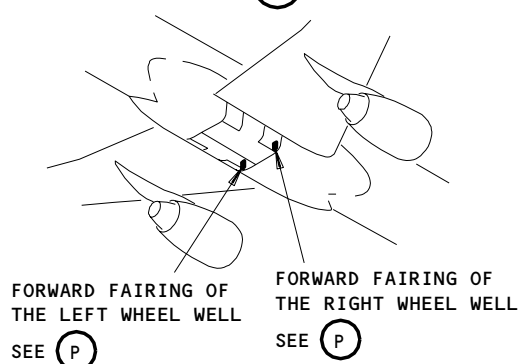
HYDRAULIC RESERVOIR IN THE LEFT (RIGHT) SYSTEM

(N) FROM SHT 5



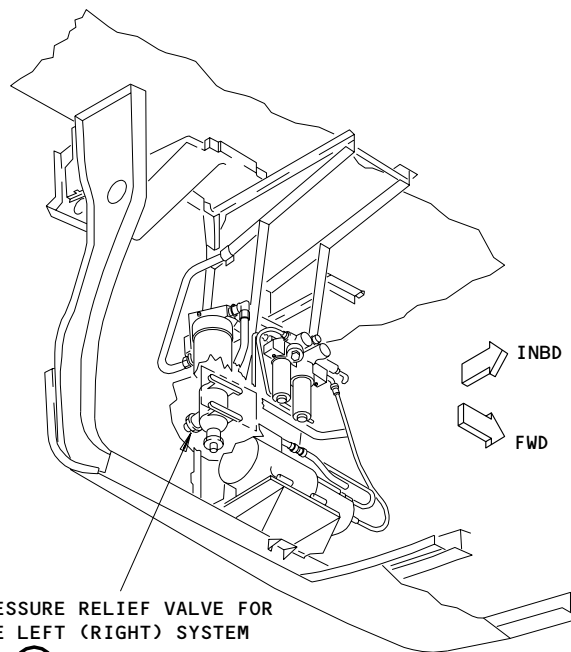
SUPPLY SHUTOFF VALVE, V10117, FOR THE ISOLATED ACMP IN THE RIGHT SYSTEM

(O) FROM SHT 5



PRESSURE RELIEF VALVE FOR THE LEFT (RIGHT) SYSTEM

(Q)



FORWARD FAIRING OF THE LEFT WHEEL WELL (THE FORWARD FAIRING OF THE RIGHT WHEEL WELL IS OPPOSITE)

(P)

**Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 6)**

EFFECTIVITY	
	ALL

29-11-00

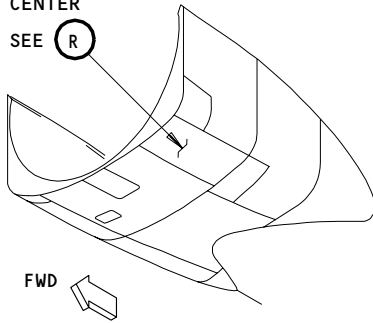
BOEING

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FAULT ISOLATION/MAINT MANUAL

ACCESS DOOR, 197KL,
FOR THE CENTRAL
HYDRAULIC SERVICE
CENTER

SEE (R)



FWD

AFT LEFT WING-TO-BODY FAIRING

HYDRAULIC
RESERVOIR IN
THE CENTER
SYSTEM

SEE (S)

RETURN FILTER
MODULE IN THE
CENTER SYSTEM

SEE (T)

FWD

RETURN CONNECTION FOR
THE GROUND POWER IN
THE CENTER SYSTEM

PRESSURE CONNECTION FOR
THE GROUND POWER IN
THE CENTER SYSTEM

ALTERNATING CURRENT
MOTOR PUMP (ACMP)
C2, M10030, IN THE
CENTER SYSTEM

SEE (U) SHT 8

ALTERNATING CURRENT
MOTOR PUMP (ACMP)
C1, M10029, IN THE
CENTER SYSTEM

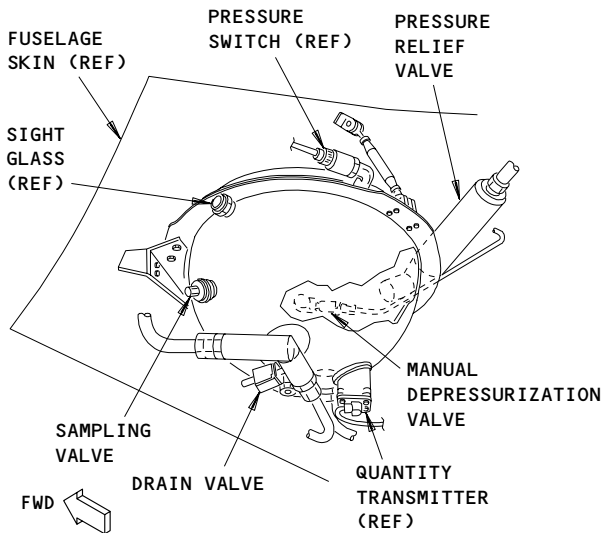
SEE (U) SHT 8

FILTER MODULE FOR
THE PRESSURE AND
CASE DRAIN OF THE
ACMP IN THE CENTER
SYSTEM

SEE (V) SHT 8

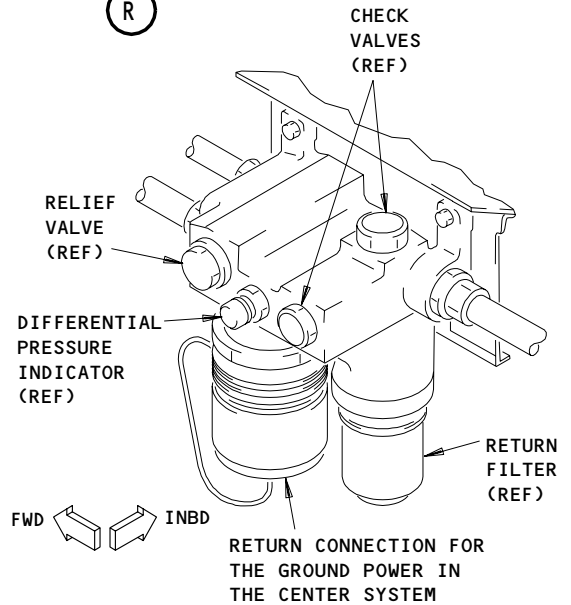
CENTRAL HYDRAULIC SERVICE CENTER

(R)



HYDRAULIC RESERVOIR IN THE CENTER SYSTEM

(S)



RETURN FILTER MODULE IN THE CENTER SYSTEM

(T)

Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 7)

EFFECTIVITY

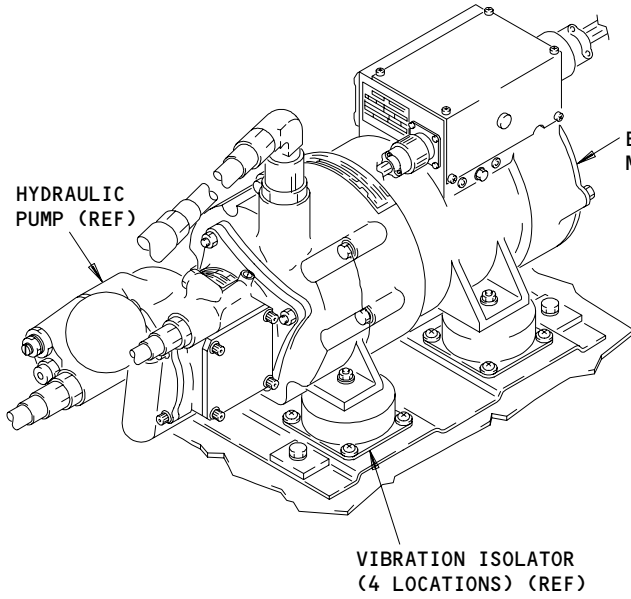
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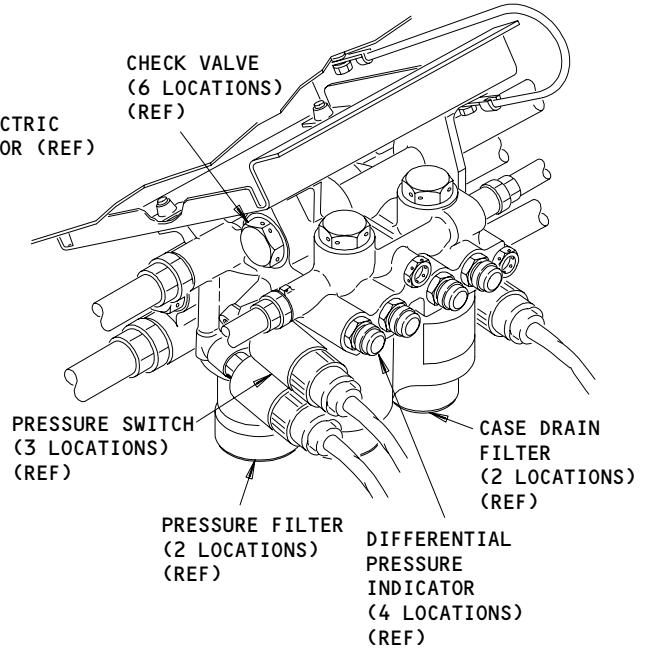
Page 111
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757
FAULT ISOLATION/MAINT MANUAL



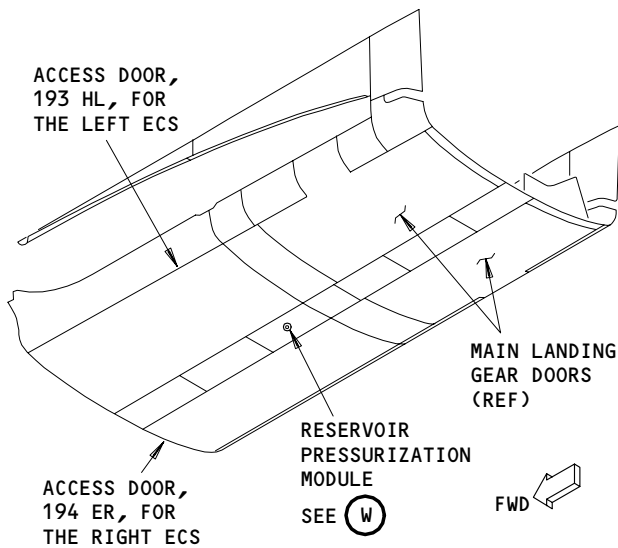
ALTERNATING CURRENT MOTOR PUMP (ACMP) C1, M10029 OR C2, M10030, IN THE CENTER SYSTEM

U FROM SHT 7

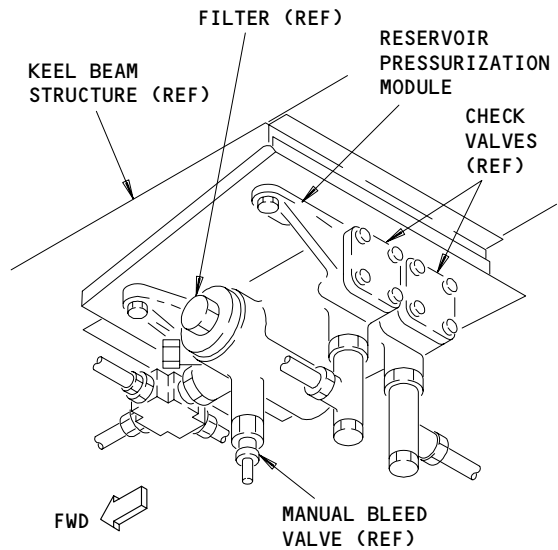


FILTER MODULE FOR THE PRESSURE AND CASE DRAIN OF THE ACMP IN THE CENTER SYSTEM

V FROM SHT 7



WING-TO-BODY FAIRING



RESERVOIR PRESSURIZATION MODULE

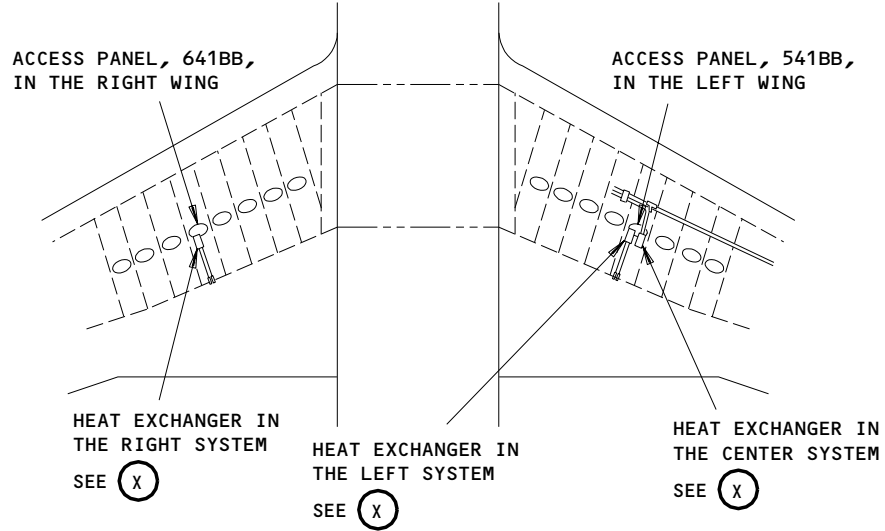
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Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 8)

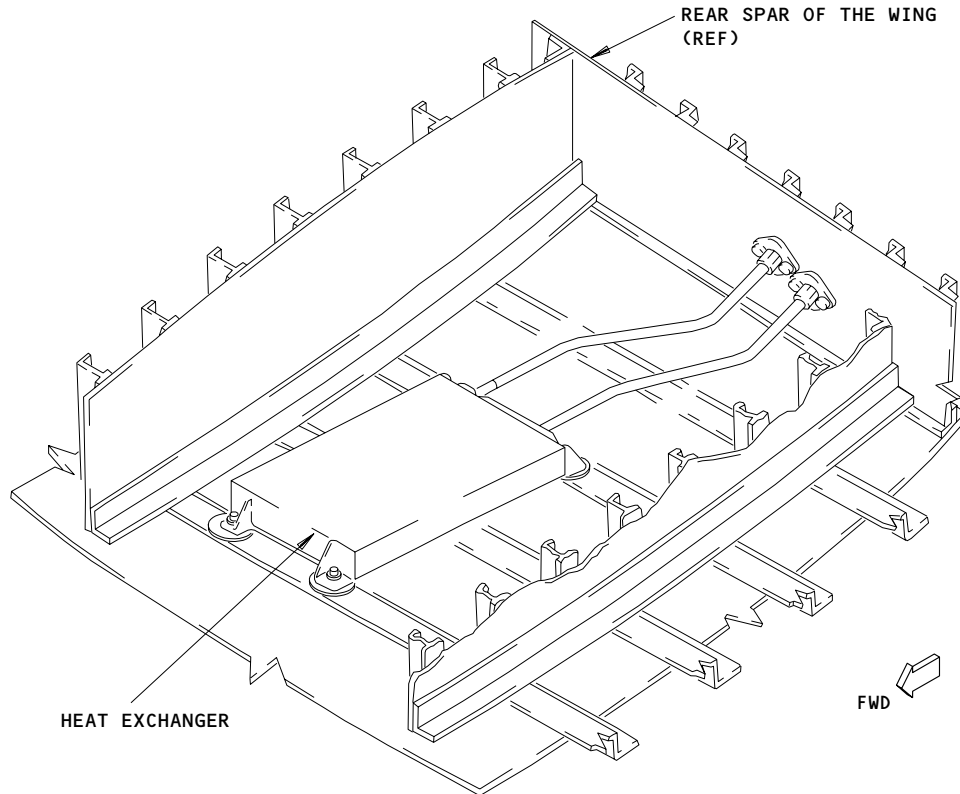
EFFECTIVITY	ALL
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29-11-00

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FAULT ISOLATION/MAINT MANUAL



WING - BOTTOM VIEW



**HEAT EXCHANGER (EXAMPLE)
(THE TOP SKIN OF THE WING IS NOT SHOWN)**

(X)

**Main (Left, Right, and Center) Hydraulic Systems - Component Location
Figure 102 (Sheet 9)**

EFFECTIVITY	ALL
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MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS – MAINTENANCE PRACTICES

1. General

- A. This procedure has the tasks which follow:
- (1) Pressurize the Main Hydraulic Systems with a Hydraulic Service Cart
 - (2) Pressurize the Main Hydraulic Systems with an Alternating Current Motor Pump (ACMP)
 - (3) Pressurize the Left or Right Main Hydraulic System with an Engine-Driven Pump (EDP)
 - (4) Pressurize the Reservoirs in the Main Hydraulic Systems with an External Air Source
 - (5) Remove the Pressure from the Main Hydraulic Systems and Reservoirs
 - (6) Hydraulic System Fluid Replacement.
 - (a) This procedure stops the hydraulic pressure sources and removes the pressure which stays in the hydraulic lines. This procedure also removes the air pressure from the reservoir.
 - (7) Remove Hydraulic Power
 - (a) This procedure stops the main hydraulic system when the hydraulic pressure is not necessary. This procedure does not remove the pressure which stays in the system after the pressure sources stop.
 - (8) Flush the Hydraulic System.
 - (a) This procedure flushes the left or right hydraulic systems after the replacement of a hydraulic pump which is defective.
- B. There are three procedures to pressurize the left or right hydraulic systems: a hydraulic service cart, the system ACMP, or the system EDP. There are two procedures to pressurize the center hydraulic system: a hydraulic service cart or the system ACMPs.
- C. The sequence in which you pressurize or remove pressure from the hydraulic systems can cause fluid to move between the left and right systems. This can cause a high fluid level in one system and a low fluid level in the other system. To keep the movement of the fluid between the systems to a minimum, pressurize the right system before you pressurize the center and left systems. Also, remove the pressure from the center and left systems before you remove the pressure from the right system.
- (1) The fluid can move to the left system if you set the parking brake in one of the following conditions and then release the brake with only the left system pressurized:
 - the right and left hydraulic systems pressurized
 - only the right hydraulic system pressurized
 - no hydraulic system pressurized

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- (2) The fluid can move to the right system if you set the parking brake with only the left system pressurized and then release the brake in one of these conditions:
- the right and left hydraulic systems pressurized
 - only the right hydraulic system pressurized
 - no hydraulic system pressurized
- D. It can be necessary to flush the hydraulic system and replace or examine the filter elements if there is a hydraulic system failure. The table below contains the failure conditions and the procedures that are necessary to correct the failure.

CAUTION: DO NOT OPERATE THE PUMP WHILE THE SHUTOFF VALVE IS CLOSED. THIS WILL CAUSE DAMAGE TO THE PUMP.

- E. Do not operate the pump while the shutoff valve is closed.

Table 201: Hydraulic System Failures Corrective Action		
CONDITION NO.	CONDITION	PROCEDURE TO CORRECT THE CONDITION
1.	A pump failure or complete loss of system fluid that does not cause a hydraulic fluid contamination. This condition could be the result of an erratic pressure output, a pump seal problem or depressurization function.	<ol style="list-style-type: none"> 1. It is not necessary to flush the system. 2. Do a check of the pressure and case drain module differential pressure indicators. If any are extended, replace the filter elements (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401) 3. It is not necessary to replace the return filter element. 4. Replenish/replace hydraulic fluid as necessary (AMM 12-12-01/301 or AMM 29-11-00/201).
2.	A pump failure or complete loss of system fluid that causes hydraulic fluid contamination.	<ol style="list-style-type: none"> 1. Flush the applicable pressure/case drain line (AMM 29-11-00/201). 2. Replace the filter elements in the pressure/case drain module for the applicable pump (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401). 3. Do a check of the differential pressure indicator for the return module (AMM 29-11-13/401 or AMM 29-11-15/401). If it is extended, refer to condition No. 4. 4. Replenish/replace hydraulic fluid as necessary (AMM 12-12-01/301 or AMM 29-11-00/201).

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Table 201: Hydraulic System Failures Corrective Action

CONDITION NO.	CONDITION	PROCEDURE TO CORRECT THE CONDITION
3.	A pump overheat because the supply fluid decreased.	<ol style="list-style-type: none"> 1. Examine the supply, the pressure, and case drain hoses and the heat shields for heat damage. Replace all the components that have heat damage. 2. Flush the pump pressure and the case drain lines (AMM 29-11-00/201). 3. Replace the applicable pressure/case drain filter elements (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401).
4.	The differential pressure indicator for the return filter module extends because of a pump failure that causes hydraulic fluid contamination.	<ol style="list-style-type: none"> 1. Replace the filter element for the return module (AMM 29-11-13/401, AMM 29-11-15/401). 2. Flush the supply line (AMM 29-11-00/201). 3. Flush the pressure and the case drain lines (AMM 29-11-00/201). 4. Replace the filter elements in the applicable pressure/case drain module (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401)
5.	A failure of the check valve for the pressure or the case drain line occurs due to a pump failure	<ol style="list-style-type: none"> 1. Replace the check valve which does not operate. Disassemble and clean the remaining check valves in the pressure and case drain lines and modules (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401). 2. Flush the applicable pressure/case drain lines (AMM 29-11-00/201). 3. Do a check of the differential pressure indicator on the applicable Return Module (AMM 29-11-13/401, or AMM 29-11-15/401). If it is extended refer to condition No. 4.

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Table 201: Hydraulic System Failures Corrective Action

CONDITION NO.	CONDITION	PROCEDURE TO CORRECT THE CONDITION
6.	A failure of the pressure filter element that occurs with a pump failure that causes hydraulic fluid contamination	1. Do a check of the filters for the flight control package to find the level of the contamination. If there is contamination, flush the system (AMM 29-11-00/201). 2. Flush the applicable pressure/case drain lines (AMM 29-11-00/201). 3. Replace the applicable pressure/case drain filter elements (AMM 29-11-17/401, AMM 29-11-18/401, AMM 29-11-19/401). 4. Do a check of the differential pressure indicator for the applicable return module (AMM 29-11-13/401, AMM 29-11-15/401) If it is extended, refer to condition No. 4.
7.	A pressure filter failure that occurs with a pump failure	1. Get a sample of the reservoir fluid. If there are signs of contamination, flush the system (AMM 29-11-00/201). 2. Replace the elements in the applicable pressure/case drain module (AMM 29-11-17/401, 29-11-18/401, 29-11-19/401).
8.	The hydraulic system is opened for a component replacement or for general repairs	1. It is not necessary to flush the system.

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Table 201: Hydraulic System Failures Corrective Action		
CONDITION NO.	CONDITION	PROCEDURE TO CORRECT THE CONDITION
9.	There is a high acid content in the hydraulic fluid	1. It is not necessary to flush the system. 2. Replace the hydraulic fluid in the system (AMM 29-11-00/201).
10.	Pump failure that causes contamination of the engine oil system	1. Do the Oil System Inspection procedure (AMM 79-00-00/701).

TASK 29-11-00-862-285

2. Pressurize the Main Hydraulic Systems with a Hydraulic Service Cart

A. Equipment

- (1) Hydraulic Service Cart, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, BMS 3-11

B. Consumable Materials

- (1) D00153 Hydraulic Fluid, Fire Resistant - BMS 3-11

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (3) AMM 24-22-00/201, Electrical Power - Control
- (4) AMM 36-00-00/201, Pneumatic - General
- (5) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

- | | |
|---------|--------------------------------------|
| 143/144 | MLG Wheel Well |
| 197 | Wing to Body - Aft Lower Half (Left) |
| 434/444 | Nacelle Strut - Aft Fairing |

(2) Access Panels

- | | |
|-------------|----------------------------------|
| 197KL | Central Hydraulic Service Center |
| 434AL/444AL | Hydraulic Bay |

E. Procedure

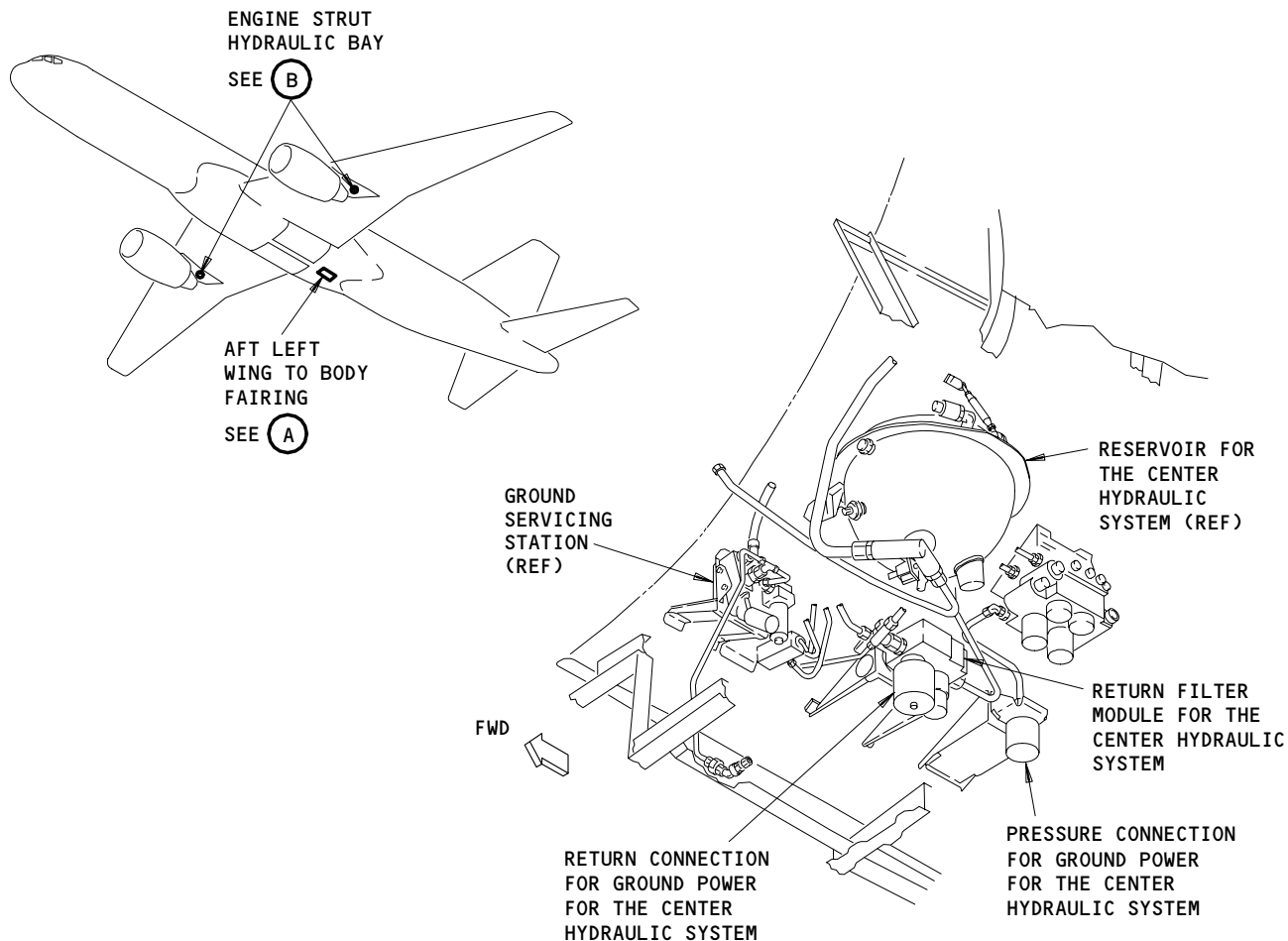
EFFECTIVITY

ALL

29-11-00

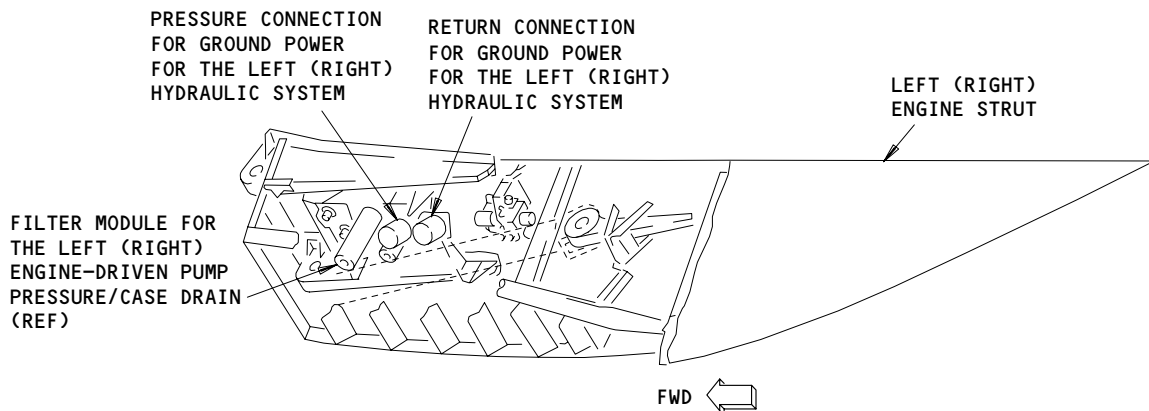
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AFT LEFT WING TO BODY FAIRING

(A)



ENGINE STRUT HYDRAULIC BAY (EXAMPLE)

(B)

Hydraulic Ground Power Connections
Figure 201

EFFECTIVITY	
	ALL

29-11-00

S 862-002

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

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

S 012-003

- (2) For the left system, open the access panel 434AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 012-005

- (3) For the right system, open the access panel 444AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 492-008

- (4) For the left or right systems, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-009

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (5) For the left or right system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 012-010

- (6) For the center system, open the access door 197KL for the central hydraulic service center (AMM 06-41-00/201).

S 862-011

- (7) Remove the pneumatic power (AMM 36-00-00/201).

S 492-012

WARNING: PUT A RAG AROUND THE DEPRESSURIZATION VALVE ON THE RESERVOIR TO CATCH A SPRAY OF HYDRAULIC FLUID. A SPRAY OF HYDRAULIC FLUID CAN CAUSE INJURY TO PERSONS. IF THE HYDRAULIC FLUID TOUCHES YOUR SKIN, FLUSH THE SKIN WITH WATER. IF THE HYDRAULIC FLUID TOUCHES YOUR EYES, FLUSH THE EYES WITH WATER AND GET MEDICAL AID.

- (8) Put a rag around the depressurization valve on the reservoir to catch a spray of hydraulic fluid from the valve.

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S 862-013

CAUTION: REMOVE THE PNEUMATIC PRESSURE FROM THE RESERVOIR BEFORE YOU CONNECT THE HYDRAULIC SERVICE CART. IF THERE IS PRESSURE IN THE RESERVOIR, THE HYDRAULIC FLUID CAN MOVE FROM THE AIRPLANE TO THE SERVICE CART.

(9) Open the depressurization valve on the reservoir to remove the air pressure.

S 862-316

(10) Put the depressurization valve in the closed position when you can not hear the flow of air from the valve.

S 492-016

(11) Connect the pressure and return lines from the service cart to the ground power connections on the airplane.

S 862-017

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

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S 862-284

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO COMPONENTS OF THE AILERON, ELEVATOR, RUDDER, SPOILER, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. WHEN YOU SUPPLY THE HYDRAULIC POWER, THE AILERONS AND ELEVATORS WILL TRY TO MOVE TO THE NEUTRAL POSITION. ALSO, ALL SYSTEMS WILL TRY TO MOVE TO THE POSITION OF THE CONTROLS. MAKE SURE YOU ISOLATE THE SYSTEMS AND CONTROLS WHICH MUST NOT OPERATE TO PREVENT MOVEMENT OF COMPONENTS WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

WITH ELECTRICAL AND HYDRAULIC POWER AVAILABLE, IF YOU REMOVE THE ELECTRICAL POWER, MOVE THE THRUST LEVERS, OR DO THE AIR/GROUND RELAYS FLIGHT MODE SIMULATION PROCEDURE, THIS CAN CAUSE ACCIDENTAL MOVEMENT OF THE SPOILERS. REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. THE ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS.

CAUTION: WHEN YOU PRESSURIZE THE HYDRAULIC SYSTEMS, CAREFULLY MONITOR THE HYDRAULIC INDICATING SYSTEMS IN THE FLIGHT COMPARTMENT TO MAKE SURE THE SYSTEMS OPERATE SATISFACTORILY. IF THE HYDRAULIC FLUID BECOMES TOO HOT, STOP THE OPERATION OF THE SYSTEM.

TO PREVENT TOO MUCH PRESSURE IN THE HYDRAULIC RETURN SYSTEM BECAUSE OF INTERNAL LEAKAGE, MAKE SURE YOU DO NOT PRESSURIZE THE HYDRAULIC SYSTEM WHEN THE RETURN LINES ARE BLOCKED. WHEN YOU REMOVE HYDRAULIC LINES OR COMPONENTS, PUT DO-NOT-OPERATE TAGS ON THE HYDRAULIC PUMP SWITCHES AND IDENTIFY THE LINES OR COMPONENTS WHICH YOU REMOVED.

(13) Operate the hydraulic service cart to pressurize the hydraulic system to 3000 psi.

TASK 29-11-00-862-019

3. Pressurize the Main Hydraulic Systems with an ACMP

A. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 24-22-00/201, Electrical Power - Control

B. Access

- (1) Location Zones
 - 211/212 Control Cabin

C. Procedure

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S 862-318

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE 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 862-020

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

S 212-021

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON EICAS IS MORE THAN 100°C (212°F) OR AFTER THE PUMP OVERHEAT LIGHT COMES ON. IF YOU CONTINUE TO OPERATE THE PUMPS, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (3) Make sure there is at least 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 862-115

- (4) If the fuel tank contains less than 4020 pounds of fuel, do these steps:
 - (a) Stop the operation of the pump if the hydraulic temperature indication on EICAS is more than 100°C (212°F) or if the pump overheat light comes on.
 - (b) Do not operate the hydraulic pump more than 10 minutes.
 - (c) After the operation of the pump, let the temperature of the pump decrease for 20 minutes with the pump off.

S 212-022

- (5) Make sure the hydraulic reservoir is full (AMM 12-12-01/301).

S 862-023

CAUTION: PRESSURIZE THE CENTER SYSTEM RESERVOIR BEFORE YOU OPERATE THE CENTER SYSTEM ACMP'S. THE OPERATION OF THE PUMPS WITHOUT A SUFFICIENT SUPPLY OF FLUID CAN CAUSE DAMAGE TO THE PUMPS.

- (6) For the center system, do this procedure: Pressurize the Main Hydraulic Systems Reservoirs with a External Air Source.

S 862-024

- (7) For the left or right system, put the L or R HYD PUMPS - ELEC pump switch on the hydraulic control panel to the ON position.

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S 862-025

- (8) For the center system, put the C HYD PUMPS – ELEC 1 and 2 pump switches on the hydraulic control panel to the ON position.

NOTE: You must supply electrical power from two sources if you operate the C1 and C2 ACMPs at the same time.

S 212-026

- (9) Make sure the hydraulic system pressure becomes stable at 2850 to 3150 psi.

TASK 29-11-00-862-027

4. Pressurize the Left or Right Main Hydraulic System with an EDP

A. References

- (1) AMM 12-12-01/301, Hydraulic Systems
(2) AMM 71-00-00/201, Power Plant – General

B. Access

- (1) Location Zones
211/212 Control Cabin

C. Procedure

S 862-319

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE 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 212-028

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON EICAS IS MORE THAN 100°C (212°F) OR AFTER THE PUMP OVERHEAT LIGHT COMES ON. IF YOU CONTINUE TO OPERATE THE PUMPS, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (2) Make sure there is at least 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 862-116

- (3) If the fuel tank contains less than 4020 pounds of fuel, do these steps:
(a) Stop the operation of the pump if the hydraulic temperature indication on EICAS is more than 100°C (212°F) or if the pump overheat light comes on.
(b) Do not operate the hydraulic pump more than 10 minutes.

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(c) After the operation of the pump, let the temperature of the pump decrease for 20 minutes with the pump off.

S 212-029

(4) Make sure the hydraulic reservoir is full (AMM 12-12-01/301).

S 862-030

(5) Put the L or R HYD PUMPS ENG switch on the hydraulic control panel to the ON position.

S 862-031

(6) Motor the engine or operate it at minimum power (AMM 71-00-00/201).

S 212-032

(7) Make sure the hydraulic system pressure becomes stable at 2850 to 3150 psi.

TASK 29-11-00-862-033

5. Pressurize the Reservoirs in the Main Hydraulic System with an External Air Source

A. General

(1) The airplane pneumatic system usually pressurizes the reservoirs when the pneumatic pressure is available (AMM 36-00-00). This procedure pressurizes the reservoir with an external air source.

B. Equipment

(1) Controlled Source of Clean Dry Air, 0 to 100 psi maximum pressure

C. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels

D. Access

(1) Location Zones

193/194 Wing to Body - Forward Lower Half

(2) Access Panels

193HL Reservoir Pressurization Module

194ER Reservoir Pressurization Module

E. Procedure

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S 862-320

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE 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).

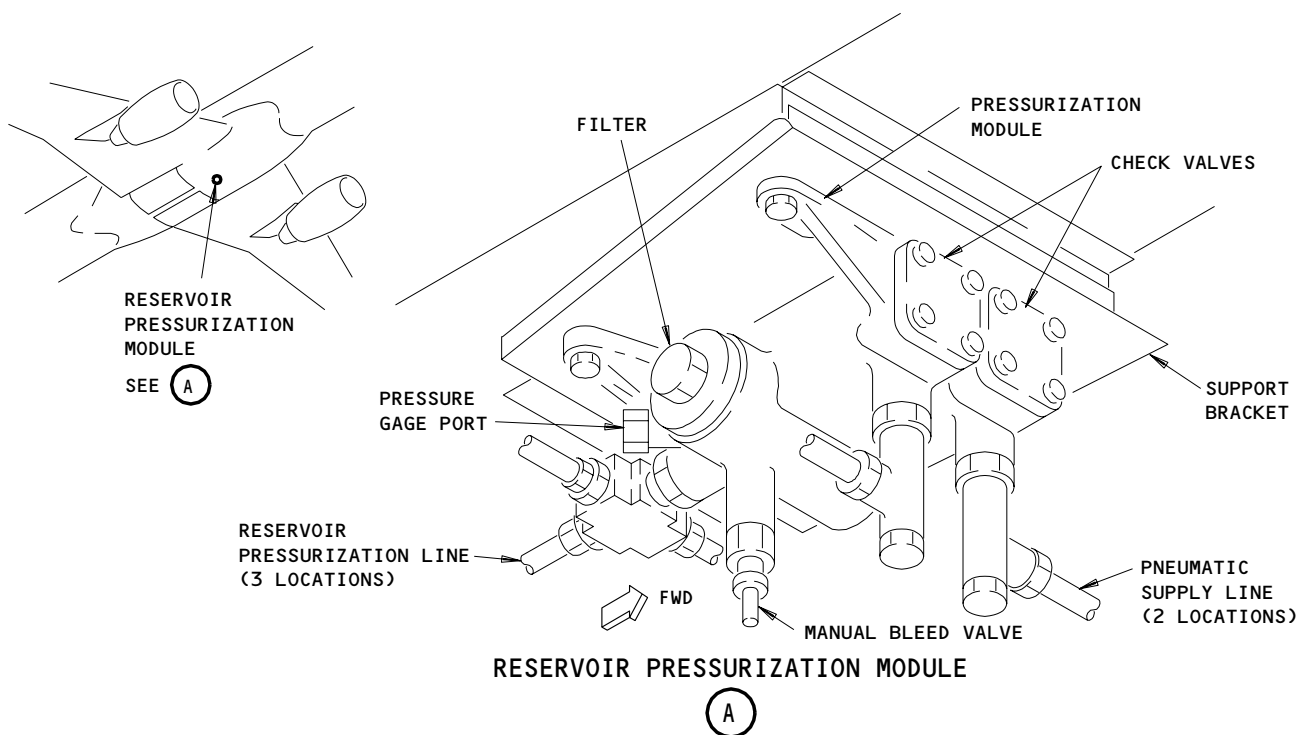
S 862-034

- (2) Make sure the reservoir depressurization valve on each system reservoir is in the closed position.

NOTE: The three hydraulic reservoirs are pressurized at the same time.

S 012-035

- (3) Open the left or right access doors, 193HL or 194ER, for the reservoir pressurization module (AMM 06-41-00/201).



Reservoir Pressurization Module
Figure 202

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- S 492-036
- (4) Connect the controlled air source to the manual bleed valve on the reservoir pressurization module.
- S 862-037
- (5) Push the stem on the manual bleed valve into the pressurization module to pressurize the reservoir.
- S 862-038
- (6) Adjust the pressure of the air supply to pressurize the reservoir to 46 (±1) psi.

NOTE: The air pressure lines between the pressurization module and the reservoirs contain vent orifices. These orifices bleed air pressure from the lines after you remove the air source. The check valves hold the air pressure in each reservoir.

- S 092-039
- (7) After you pressurize the reservoirs, remove the controlled air pressure source from the manual bleed valve.
- S 412-040
- (8) Close the left and right access doors, 193HL and 194ER, for the reservoir pressurization module (AMM 06-41-00/201).

TASK 29-11-00-862-053

6. Remove the Pressure from the Main Hydraulic Systems and Reservoirs

A. Equipment

- (1) Reservoir Depressurization Valve Lock, B29002-1

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
 (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
 (3) AMM 32-00-15/201, Main Gear Door Locks
 (4) AMM 32-00-20/201, Landing Gear Downlocks
 (5) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones

143/144	MLG Wheel Well
197	Wing to Body - Aft Lower Half (Left)
434/444	Nacelle Strut - Aft Fairing

- (2) Access Panels

197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay

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D. Remove the Pressure from the Main Hydraulic Systems

S 862-054

- (1) Stop the hydraulic power source which supplies pressure to the system.

S 862-055

- (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11D31, HYDRAULIC PTU CONT
 - (b) 11K15, ELEC PUMP C1
 - (c) 11K16, ELEC PUMP RIGHT
 - (d) 11K24, ELEC PUMP C2
 - (e) 11K25, ELEC PUMP LEFT

S 862-109

- (3) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 212-110

- (4) Monitor the hydraulic pressure indication on EICAS to make sure the pressure decreased.

S 862-111

- (5) Operate the brake pedals to decrease the pressure in the brake system and the accumulator.

NOTE: The check valves isolate the accumulator in the brake system.

S 092-057

- (6) If you installed the hydraulic service cart, remove the cart and install caps on the airplane ground power connections.

E. Remove the Pressure from the Main Hydraulic System Reservoirs

NOTE: If you will loosen hydraulic connections or open the hydraulic system, you must remove the pressure from the hydraulic reservoir.

S 492-058

- (1) For the left or right system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-059

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (2) For the left or right system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

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S 012-060

- (3) For the center system, open the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).

S 492-061

WARNING: PUT A RAG AROUND THE DEPRESSURIZATION VALVE ON THE RESERVOIR TO CATCH A SPRAY OF HYDRAULIC FLUID. A SPRAY OF HYDRAULIC FLUID CAN CAUSE INJURY TO PERSONS. IF THE HYDRAULIC FLUID TOUCHES YOUR SKIN, FLUSH THE SKIN WITH WATER. IF THE HYDRAULIC FLUID TOUCHES YOUR EYES, FLUSH THE EYES WITH WATER AND GET MEDICAL AID.

- (4) Put a rag around the depressurization valve on the reservoir to catch a spray of hydraulic fluid from the valve.

S 862-062

- (5) Move the slider on the reservoir depressurization valve to the open position. Install the valve lock to hold the valve in the open position.
- F. When It Is Not Necessary to Remove the Pressure from the Main Hydraulic Systems and Reservoirs, Put the Airplane Back to Its Usual Condition

S 092-066

CAUTION: MAKE SURE YOU REMOVE THE VALVE LOCK FROM THE DEPRESSURIZATION VALVE. THE PNEUMATIC SYSTEM CAN NOT PRESSURIZE THE HYDRAULIC RESERVOIR WITH THE VALVE LOCK INSTALLED.

- (1) Remove the valve lock from the reservoir depressurization valve.

S 212-067

- (2) Make sure the spring moves the slider on the valve to the closed position.

S 412-068

- (3) For the left system, close the access panel 434AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 412-070

- (4) For the right system, close the access panel 444AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 862-072

- (5) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

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S 412-073

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (6) For the left or right system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 412-074

- (7) For the center system, close the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).

S 862-075

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11D31, HYDRAULIC PTU CONT
 - (b) 11K15, ELEC PUMP C1
 - (c) 11K16, ELEC PUMP RIGHT
 - (d) 11K24, ELEC PUMP C2
 - (e) 11K25, ELEC PUMP LEFT

TASK 29-11-00-862-079

7. Remove the Hydraulic Power

A. General

- (1) This procedure stops the main hydraulic systems. This procedure does not remove the pressure which stays in the system after the hydraulic power sources stop. If you will loosen hydraulic connections or open the hydraulic system, you must do this procedure: Remove the Pressure from the Main Hydraulic Systems and Reservoirs.

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels.
- (3) AMM 12-12-01/301, Hydraulic Systems
- (4) AMM 24-22-00/201, Electrical Power
- (5) AMM 71-00-00/201, Power Plant - General
- (6) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

143/144	MLG Wheel Well
197	Wing to Body - Aft Lower Half (Left)
211/212	Control Cabin
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay

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D. Remove the Hydraulic Power When You Use a Hydraulic Service Cart

S 862-112

- (1) Stop the hydraulic service cart.

S 862-080

- (2) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 212-113

- (3) Monitor the hydraulic pressure indication on EICAS to make sure the pressure decreased.

S 492-081

WARNING: PUT A RAG AROUND THE DEPRESSURIZATION VALVE ON THE RESERVOIR TO CATCH A SPRAY OF HYDRAULIC FLUID. A SPRAY OF HYDRAULIC FLUID CAN CAUSE INJURY TO PERSONS. IF THE HYDRAULIC FLUID TOUCHES YOUR SKIN, FLUSH THE SKIN WITH WATER. IF THE HYDRAULIC FLUID TOUCHES YOUR EYES, FLUSH THE EYES WITH WATER AND GET MEDICAL AID.

- (4) Put a rag around the depressurization valve on the reservoir to catch a spray of hydraulic fluid from the valve.

S 862-082

- (5) Hold the slider on the depressurization valve on the reservoir in the open position to remove the air pressure.

S 862-083

- (6) Release the slider on the depressurization valve and make sure the spring moves the slider to the closed position.

S 092-085

- (7) Disconnect the service cart and install the caps on the ground power connections.

S 612-086

- (8) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 412-087

- (9) For the left system, close the access panel 434AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 412-287

- (10) For the right system, close the access panel 444AL for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 412-091

- (11) For the center system, close the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).

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S 412-092

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(12) For the left or right system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 862-093

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

E. Remove the Hydraulic Power When You Use an ACMP

S 862-094

(1) For the left or right system, put the L or R HYD PUMPS – ELEC pump switch on the hydraulic control panel to the OFF position.

S 862-095

(2) For the center system, put the C HYD PUMPS – ELEC 1 and 2 pump switches on the hydraulic control panel to the OFF position.

S 862-096

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

F. For the Left or Right System, Remove the Hydraulic Power When You Use an Engine-Driven Pump (EDP)

S 862-097

(1) Stop the engine (AMM 71-00-00/201) or put the L or R HYD PUMPS ENG switch on the hydraulic control panel to the OFF position.

TASK 29-11-00-172-098

8. Flush the Hydraulic System

A. General

(1) Either of the following procedures can be used to flush the hydraulic system after you replace a defective hydraulic pump. The second procedure requires use of an auxiliary hydraulic ground cart and is the preferred method because it offers the most positive cleaning results.

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- (2) Refer to Table 201 for hydraulic system failure conditions and actions required to repair these conditions.
- (3) When you do these procedures, if you find bad contamination because of a damaged filter, then replace the case drain filter element again, after one week of usual operation. After 2 months of operation, replace all filter elements in the system.
- (4) If the contamination of the fluid is from a chemical source, replace the fluid (AMM 29-11-00/201) and the filter elements (AMMs 29-11-17/401, 29-11-18/401 and 29-11-19/401).

B. References

- (1) AMM 29-11-01/401, Left and Right System Alternating Current Motor Pump (ACMP)
- (2) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)
- (3) AMM 29-11-05/401, Engine Driven Pump (EDP)
- (4) AMM 29-11-13/401, Center System Return Filter Module and Components
- (5) AMM 29-11-15/401, System L and R Return Filter Module
- (6) AMM 29-11-17/401, System L and R EDP Pressure/Case Drain Filter Module
- (7) AMM 29-11-18/401, Left and Right System ACMP Pressure and Case Drain Filter Module and Components
- (8) AMM 29-11-19/401, Center System ACMP Pressure and Case Drain Filter Module and Components

C. Access

- (1) Location Zones
211/212 Control Cabin

D. Flushing the Hydraulic System with the Replacement Hydraulic Pump

S 862-099

- (1) Do this procedure: Remove the Pressure from the Main Hydraulic Systems and the Reservoirs.

S 962-100

- (2) Replace the case drain and pressure filter elements in the filter module for the applicable hydraulic pump:
 - (a) Engine-Driven Pump (EDP) (AMM 29-11-17/401)
 - (b) Left and Right system Alternating Current Motor Pump (ACMP) (AMM 29-11-18/401)
 - (c) Center System Alternating Current Motor Pump (ACMP) (AMM 29-11-19/401)

S 962-101

- (3) Replace the filter element in the return filter module of the applicable system:
 - (a) Center hydraulic system (AMM 29-11-13/401)
 - (b) Left or Right hydraulic system (AMM 29-11-15/401)

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- S 862-102
- (4) Pressurize the applicable hydraulic system with the hydraulic pump which you replaced.
- S 862-103
- (5) Operate all the systems which operate with hydraulic pressure (but not the landing gear) at least six times at the maximum rate.
- S 862-104
- (6) Do this procedure: Remove the Pressure from the Main Hydraulic Systems and the Reservoirs.
- S 962-105
- (7) Replace the case drain and pressure filter elements in the filter module for the applicable hydraulic pump:
- (a) Engine-Driven Pump (EDP) (AMM 29-11-17/401)
 - (b) Left and Right system Alternating Current Motor Pump (ACMP) (AMM 29-11-18/401)
 - (c) Center System Alternating Current Motor Pump (ACMP) (AMM 29-11-19/401)
- S 162-321
- (8) Remove, clean, and install the check valves in the filter module for the pressure and case drain of the applicable hydraulic pump:

NOTE: If a check valve does not operate, replace it.

TASK 29-11-00-172-323

9. Flushing the Hydraulic System with a Ground Cart

A. Equipment

- (1) Hydraulic Service Cart - 0 to 3000 psi, with Hydraulic Fluid, Fire-Resistant, BMS 3-11

B. Procedure

S 172-330

- (1) Do these steps to flush the pressure and case drain lines:
- (a) Remove pressure from the main hydraulic systems and reservoirs (AMM 29-11-00/201).

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- (b) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- 1) 11K14, L ENG PUMP VLV DEPRESS or LEFT ENGINE PUMP DEPRESS
 - 2) 11K23, R ENG PUMP VLV DEPRESS or R ENG PUMP DEPRESS

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 AND DAMAGE TO EQUIPMENT.

- (c) Do the deactivation procedure of the thrust reverser for ground maintenance (AMM 78-31-00/201).

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (d) Open the fan cowl panels (AMM 71-11-04/201).
- (e) Open the applicable access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- (f) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).
- (g) Disconnect the electrical connector from the depressurization valve.
- (h) Connect pressure line of hydraulic service cart to the hydraulic pump pressure line.
- (i) Disconnect the pressure line at the pressure OUT port of the pressure/case drain filter module and connect it to an overboard drain line.
- 1) Place the overboard drain line in an appropriate container to catch fluid during the flushing procedure.
- (j) Flush the pressure line for 10 seconds using 30 to 40 gpm at 500 to 700 psi.
- (k) Shut down the service cart and connect the service cart pressure line to the case drain line out of the pump.
- (l) Connect the overboard drain line to the OUT port of the pressure/case drain filter module and place the drain line in the container.
- (m) Operate the service cart to flush the case drain line for 10 seconds using 10 gpm at 500 psi.
- (n) Remove the service cart and drain line.
- (o) Do a check of the check valves in the pressure/case drain filter module:
- 1) Replace any defective check valve.
 - 2) Replace all O-rings and install check valves that are serviceable.
- (p) Connect all hydraulic lines removed for the flushing.
- (q) Pressurize the applicable hydraulic system with the associated engine-driven pump (AMM 29-11-00/201).
- (r) Make sure that there are no hydraulic leaks.

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- (s) Remove the hydraulic power if it is no longer required (AMM 29-11-00/201).
- (t) Service the hydraulic reservoirs as required (AMM 12-12-01/301).
- (u) Close the engine nacelle strut access doors.
- (v) Close the engine cowl panels.
- (w) Close the access panel that was opened for access to the hydraulic bay in the aft strut (AMM 06-43-00/201).

TASK 29-11-00-172-324

10. Flushing the Supply Line (Using a ground cart)

A. General

- (1) Use this procedure to flush the supply line for the left and right hydraulic systems.

B. Equipment

- (1) Hydraulic Service Cart - 0 to 3000 psi, with Hydraulic Fluid, Fire-Resistant, BMS 3-11
- (2) Suitable container and adapter hose to collect fluid
- (3) A29005-1 Sealing Cap - Pressure Transmitter Mount

C. Procedure

S 172-325

- (1) Do these steps to flush the left or right hydraulic system supply line:

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. THE THE DOORS OPEN AND CLOSE QUICKLY. THE MOVEMENT OF THE DOORS CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

- (a) Open the doors for the landing gear and install the doorlocks (AMM 32-00015/201).
- (b) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - 1) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - 2) 11K25, HYDRAULICS ELEC PUMP LEFT
- (c) Remove the pressure from the left or right hydraulic system (AMM 29-11-00/201).
- (d) Remove the hydraulic fluid quantity transmitter from the reservoir (AMM 29-33-01/401).
- (e) Install the A29005-1 Sealing Cap on the reservoir.
- (f) Replace the return module filter elements (AMM 29-11-15/401).
- (g) Connect the hydraulic service cart to the in port of the return filter module.
- (h) Deactivate the thrust reverser for ground maintenance (AMM 78-31-00/201).

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WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTIAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (i) Open the fan cowl panels (AMM 71-11-04/201).
- (j) Disconnect the supply hose from the applicable engine-driven pump.
- (k) Connect a drain hose to the EDP supply hose.
- (l) Put the end of the drain hose into a suitable container to catch hydraulic fluid.
- (m) Operate the hydraulic service cart to flush the supply line for 40 seconds with a flow of 30 gpm at 60 psig.
- (n) Shut down the operation of the hydraulic service cart.
- (o) Disconnect the drain hose from the supply hose to the EDP.
- (p) Connect the supply hose to the EDP.
- (q) Disconnect the hydraulic service cart from the return module.
- (r) Inspect the differential pressure indicator in the return module. If it is extended, replace the return filter.
- (s) Drain the hydraulic reservoir.
- (t) Remove the A29005-1 Sealing Cap from the reservoir.
- (u) Install the hydraulic fluid quantity transmitter for the reservoir (AMM 29-33-01/401).
- (v) Service the applicable hydraulic system reservoir (AMM 12-12-01/301).
- (w) Pressurize the hydraulic system (AMM 29-11-00/201).
- (x) Examine the connections at the EDP supply hose and the return module for hydraulic leaks.
 - 1) Repair any leaks that you find.

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO REMOVE THE LOCKS FROM THE LANDING GEAR DOORS. THE DOORS CAN CLOSE QUICKLY IF YOU DO NOT REMOVE THE DOORLOCKS CORRECTLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (y) Remove doorlocks from the landing gear doors and close the doors (AMM 32-00-15/201).
- (z) Close the fan cowl panels (AMM 71-11-04/201).
- (aa) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

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TASK 29-11-00-172-326

11. Pump Pressure and Case Drain Line Flashing

A. General

- (1) Do this procedure when a pump problem causes metal particles to show in the pressure/case drain module filters. Pump failure with the release of metal debris into the hydraulic system can result in check valve failures.
- (2) When there is metal contamination in the hydraulic system, it can cause malfunctions of the check valves.

B. Equipment

- (1) Hydraulic Service Cart - 0 to 3000 psi, with Hydraulic Fluid, Fire-Resistant, BMS 3-11

C. Procedure

S 172-327

- (1) Do these steps to flush the pressure and case drain lines:
 - (a) If not already done, remove pressure from the main hydraulic systems and reservoirs (AMM 29-11-00/201).
 - (b) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - 1) 11K14, L ENG PUMP VLV DEPRESS or LEFT ENGINE PUMP DEPRESS
 - 2) 11K23, R ENG PUMP VLV DEPRESS or R ENG PUMP DEPRESS

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 AND DAMAGE TO EQUIPMENT.

- (c) Do the deactivation procedure of the thrust reversers for ground maintenance (AMM 78-31-00/201).

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (d) Open the fan cowl panels (AMM 71-11-04/201).
- (e) Open the applicable access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- (f) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).
- (g) Disconnect the electrical connector from the depressurization valve.
- (h) Connect pressure line of hydraulic service cart to the hydraulic pump pressure line.
- (i) Disconnect the pressure line at the pressure OUT port of the pressure/case drain fiber module and connect it to an overboard drain line.
 - 1) Place the overboard drain line in an appropriate container to catch fluid during the flushing procedure.

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- (j) Flush the pressure line for 10 seconds using 30 to 40 gpm at 500 to 700 psi.
- (k) Shut down the service cart and connect the service cart pressure line to the case drain line out of the pump.
- (l) Connect the overboard drain line to the OUT port of the pressure/case drain filter module and place the drain line in the container.
- (m) Operate the service cart to flush the case drain line for 10 seconds using 10 gpm at 500 psi.
- (n) Remove the service cart and drain line.
- (o) Do a check of the check valves in the pressure/case drain filter module:
 - 1) Replace any defective check valve.
 - 2) Replace all O-rings and install check valves that are serviceable.
- (p) Connect all hydraulic lines removed for the flushing.
- (q) Pressurize the applicable hydraulic system with the associated engine-driven pump (AMM 29-11-00/201).
- (r) Make sure that there are no hydraulic leaks.
- (s) Remove the hydraulic power if it is no longer required (AMM 29-11-00/201).
- (t) Service the hydraulic reservoirs as required (AMM 12-12-01/301).
- (u) Close the engine nacelle strut access doors.
- (v) Close the engine cowl panels.
- (w) Close the access panel that was opened for access to the hydraulic bay in the aft strut (AMM 06-43-00/201).

TASK 29-11-00-172-328

12. Return Line Flushing

A. General

- (1) Use this procedure to flush the return line for the left and right hydraulic systems.

B. Equipment

- (1) Hydraulic Service Cart - 0 to 3000 psi, with Hydraulic Fluid, Fire-Resistant, BMS 3-11
- (2) Suitable container and adapter hose to collect fluid
- (3) A29005-1 Sealing cap - Pressure Transmitter Mount

C. Procedure

S 172-329

- (1) Do these steps to flush the left or right hydraulic system return line:

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.

- (a) Open the doors for the landing gear and install the doorlocks (AMM 32-00-15/201).

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- (b) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - 1) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - 2) 11K25, HYDRAULICS ELEC PUMP LEFT
- (c) Remove the pressure from the left or right hydraulic system (AMM 29-11-00/201).
- (d) Remove the hydraulic fluid quantity transmitter from the reservoir (AMM 29-33-01/401).
- (e) Install the A29005-1 Sealing Cap on the reservoir.
- (f) Replace the return module filter elements (AMM 29-11-15/401).

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 AND DAMAGE TO EQUIPMENT.

- (g) Do the deactivation procedure of the thrust reverser for ground maintenance (AMM 78-31-00/201).

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (h) Open the fan cowl panels (AMM 71-11-04/201).
- (i) Disconnect the supply hose from the applicable engine-driven pump.
- (j) Connect a drain hose to the EDP supply hose.
- (k) Put the end of the drain hose into a suitable container to catch hydraulic fluid.
- (l) Operate the hydraulic service cart to flush the return line for 40 seconds with a flow of 30 gpm at 60 psig.
- (m) Shut down the operation of the hydraulic service cart.
- (n) Disconnect the drain hose from the supply hose to the EDP.
- (o) Connect the supply hose to the EDP.
- (p) Disconnect the hydraulic service cart from the return module.

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- (q) Drain the hydraulic reservoir.
- (r) Remove the A29005-1 Sealing Cap from the reservoir.
- (s) Install the hydraulic fluid quantity transmitter for the reservoir (AMM 29-33-01/401).
- (t) Service the applicable hydraulic system reservoir (AMM 12-12-01/301).
- (u) Pressurize the hydraulic system (AMM 29-11-00/201).
- (v) Examine the connections at the EDP supply hose and the return module for hydraulic leaks.
 - 1) Repair any leaks that you find.

WARNING: YOU MUST CAREFULLY DO THE STEPS IN THE TASK BELOW TO REMOVE THE LOCKS FROM THE LANDING GEAR DOORS. THE DOORS CAN CLOSE QUICKLY IF YOU DO NOT REMOVE THE DOORLOCKS CORRECTLY. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (w) Remove doorlocks from the landing gear doors and close the doors (AMM 32-00-15/201).
- (x) Close the fan cowl panels (AMM 71-11-04/201).
- (y) Do the activation procedure for the thrust reverser.
- (z) Engine-driven pump (EDP) (AMM 29-11-17/401)
- (aa) Left and Right Alternating current motor pump (ACMP) (AMM 29-11-18/401)
- (ab) Center System Alternating Current Motor Pump (ACMP) (AMM 29-11-19/401).

S 162-322

- (2) Remove, clean, and install the check valves at the pressure and case drain ports of the Engine Driven hydraulic pump (EDP) (AMM 29-11-17/401).

NOTE: If a check valve does not operate, replace it.

TASK 29-11-00-602-123

13. Hydraulic System Fluid Replacement

A. General

- (1) The following procedure is used to change the fluid in the hydraulic system - (left, right and center).

B. Equipment

- (1) Hydraulic Service Cart - Must supply BMS 3-11 Fire - Resistant Hydraulic Fluid through a 5-15 Micron - Rated Filter and provide 10-20 gpm flow rate at 3000 psig.
- (2) Container with 100 U.S. gallon (364 Liter) capacity, for hydraulic fluid

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C. Consumable Materials

- (1) D00153 Fluid – Hydraulic, Fire Resistant, BMS
3-11 Complete airplane flush requires
approximately 100 gallons

D. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(3) AMM 12-12-01/301, Hydraulic Systems
(4) AMM 24-22-00/201, Electrical Power
(5) AMM 24-25-00/501, Hydraulic Motor-Driven Generator System
(6) AMM 27-11-00/501, Aileron and Aileron Trim Control System
(7) AMM 27-21-00/501, Rudder and Rudder Trim Control System
(8) AMM 27-31-00/501, Elevator Control System
(9) AMM 27-41-00/501, Horizontal Stabilizer Trim Control System
(10) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(11) AMM 52-34-00/201, No. 1 and 2 Cargo Doors
(12) AMM 78-31-00/201, Thrust Reverser System

E. Access

(1) Location Zones

143/144	MLG Wheel Well
197	Wing to Body – Aft Lower Half (Left)
211/212	Control Cabin
434/444	Nacelle Strut – Aft Fairings

(2) Access Panels

197KL	Central Hydraulic Service Center
435AL/445AL	Hydraulic Bay

F. Replace the fluid in the left hydraulic system as follows:

S 862-288

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO COMPONENTS OF THE AILERON, ELEVATOR, RUDDER, SPOILER, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. WHEN YOU SUPPLY THE HYDRAULIC POWER, THE AILERONS AND ELEVATORS WILL TRY TO MOVE TO THE NEUTRAL POSITION. ALSO, ALL SYSTEMS WILL TRY TO MOVE TO THE POSITION OF THE CONTROLS. MAKE SURE YOU ISOLATE THE SYSTEMS AND CONTROLS WHICH MUST NOT OPERATE TO PREVENT MOVEMENT OF COMPONENTS WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 862-125

- (2) Remove the pressure from the left hydraulic system reservoir (AMM 29-11-00/201).

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- S 682-126
- (3) Drain the Left reservoir into a waste container (AMM 29-11-22/401).
Keep the drain open.
- S 862-127
- (4) Provide electrical power to the airplane (AMM 24-22-00/201).
- S 862-128
- (5) Make sure the FLT CONTROL SHUTOFF switches on the Accessory Panel (P61) are in the OFF position.
- S 492-129
- (6) Connect the hydraulic ground cart outlet to the left (EDP) Engine Driven Pump case drain line.
- S 862-130
- (7) Apply 400 psi to the Left EDP case drain line until approximately two gallons of fluid have been flushed into the waste container.
- S 492-131
- (8) Connect the case drain line back to the left EDP.
- S 492-132
- (9) Connect the hydraulic ground cart outlet to the left EDP pressure line.
- S 582-133
- (10) Lift the airplane on jacks to do landing gear retraction (AMM 07-11-01/201).
- S 862-134
- (11) Apply 3000 psi to the left EDP pressure line.
- S 862-135
- (12) Retract and extend the main and nose landing gear and doors through three full cycles (AMM 32-32-00/501 and AMM 32-34-00/501).
- S 862-136
- (13) Remove the pressure from the left EDP pressure line.
- NOTE:** It is not necessary to have the airplane on jacks for the steps that follow.
- S 862-137
- (14) Apply 3000 psi to the left EDP pressure line.

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- S 862-138
(15) Operate the nose wheel steering through three full cycles (AMM 32-51-00/501).
- S 172-139
(16) Operate the right outboard aileron until two gallons of fluid are flushed into the waste container (AMM 27-11-00/501).
- S 172-140
(17) Operate flight spoilers Nos. 3, 5, 8 and 10 until one gallon of fluid is flushed into the waste container (AMM 27-61-00/501).
- S 172-141
(18) Operate the left thrust reverser until one gallon of fluid is flushed into the waste container (AMM 78-31-00/501).
- S 862-142
(19) Remove the pressure from the left EDP pressure line.
- S 492-143
(20) Connect the pressure line back to the left EDP.
- S 492-144
(21) Connect the hydraulic ground cart to the Power Transfer Unit (PTU) pump side case drain line.
- S 862-145
(22) Apply 400 psi to the PTU pump side case drain line until approximately two gallons have been flushed into the waste container.
- S 492-146
(23) Connect the pump side case drain line back to the PTU.
- S 492-147
(24) Connect the hydraulic ground cart to the PTU pump side pressure line.

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S 862-148

- (25) Apply 3000 psi to the PTU pump side pressure line.

S 872-149

- (26) On airplanes with a hydraulic motor generator (HMG): turn the HMG ON (AMM 24-25-00/501).

NOTE: The HMG is located on the upper keel beam in the left main wheel well.

S 862-150

- (27) Operate the leading edge and trailing edge flaps from 0 to 25 to 0 (AMM 27-58-00/501 and 27-81-00/501).

S 862-151

- (28) On airplanes with a HMG: turn the HMG OFF (AMM 24-25-00/501).

S 862-152

- (29) Remove the pressure from the PTU pump side pressure line.

S 492-153

- (30) Connect the pump side pressure line back to the PTU.

S 492-154

- (31) Connect the hydraulic ground cart to the left Alternating Current Motor Pump (ACMP) case drain line.

S 862-155

- (32) Apply 400 psi to the left ACMP case drain line until approximately two gallons of fluid have been flushed into the waste container.

S 492-156

- (33) Connect the case drain line back to the left ACMP.

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- S 492-157
- (34) Connect the hydraulic ground cart to the pressure line of the Left ACMP.
- S 872-158
- (35) On Package Freighters or Combi Airplanes, operate the main cargo door three times (AMM 52-34-00/201).
- S 862-159
- (36) Put the left FLT CONTROL SHUTOFF switch on the Accessory Panel (P61) to ON.
- S 172-161
- (37) Operate the elevators until three gallons of fluid are flushed into the waste container (AMM 27-31-00/501).
- S 172-160
- (38) Operate the rudder until one gallon of fluid is flushed into the waste container (AMM 27-21-00/501).
- S 862-162
- (39) Remove the pressure from the left ACMP pressure line.
- S 862-163
- (40) Put the left FLT CONTROL SHUTOFF switch on the Accessory Panel (P61) to OFF.
- S 872-164
- (41) Pump the brakes full strokes to actuate the brake shuttle valves.
- S 172-165
- (42) Open the bleed fitting on each left truck brake and allow at least 1.5 pints of fluid to bleed from each brake.
- NOTE: There are four brake bleed fittings on the left main gear truck.

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- S 862-166
(43) Close the brake bleed fitting for each left truck brake.
- S 862-167
(44) Apply 3000 psi to the left ACMP pressure line until the BRAKE PRESS gauge on the Main Instrument Panel shows 3000 psi.
- S 862-168
(45) Remove the pressure from the left ACMP pressure line.
- S 872-169
(46) Pump the brakes full strokes to actuate the brake shuttle valves.
- S 872-170
(47) Open the bleed fitting on each right truck brake and allow at least 1.5 pints of fluid to bleed from each brake.
- NOTE: There are four brake bleed fittings on the right main gear truck.
- S 862-171
(48) Close the brake bleed fitting for each right truck brake.
- S 492-172
(49) Connect the pressure line back to the left ACMP.
- S 872-173
(50) Disconnect the supply line from the left ACMP and allow it to drain completely into the waste container.
- S 492-174
(51) Connect the supply line to the left ACMP.
- S 872-175
(52) Disconnect the PTU supply line and allow it to drain completely into a waste container.
- S 492-176
(53) Connect the supply line to the PTU.
- S 872-177
(54) Disconnect the supply line from the left EDP and allow it to drain completely into the waste container.
- S 492-178
(55) Connect the supply line to the left EDP.

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S 872-179

- (56) On Package Freighters or Combi Airplanes disconnect the supply line from the main cargo door hand pump located in the Left main wheel well and allow it to drain completely into a waste container.

S 492-180

- (57) On Package Freighters or Combi Airplanes connect the supply line to the main cargo door hand pump.

S 902-181

- (58) Remove and replace the following filters:
- (a) Left system return filter (AMM 29-11-15/401).
 - (b) Left EDP pressure and case drain filters (AMM 29-11-17/401).
 - (c) Left ACMP pressure and case drain filters (AMM 29-11-18/401).
 - (d) PTU pressure filter (AMM 29-22-02/401).
 - (e) PTU case drain filter (AMM 29-22-05/401).

S 862-182

- (59) Close the left reservoir drain valve and install lockwire.

S 612-183

- (60) Fill the left hydraulic system reservoir (AMM 29-11-00/201).

S 862-184

- (61) Pressurize the left hydraulic system (AMM 29-11-00/201), and check for external leakage.

S 842-185

- (62) Put the airplane back to its normal condition.

G. Replace the fluid in the right hydraulic system as follows:

S 862-289

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO COMPONENTS OF THE AILERON, ELEVATOR, RUDDER, SPOILER, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. WHEN YOU SUPPLY THE HYDRAULIC POWER, THE AILERONS AND ELEVATORS WILL TRY TO MOVE TO THE NEUTRAL POSITION. ALSO, ALL SYSTEMS WILL TRY TO MOVE TO THE POSITION OF THE CONTROLS. MAKE SURE YOU ISOLATE THE SYSTEMS AND CONTROLS WHICH MUST NOT OPERATE TO PREVENT MOVEMENT OF COMPONENTS WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 862-187

- (2) Remove the pressure from the right hydraulic system reservoir (AMM 29-11-00/201).

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- S 872-188
- (3) Drain the right reservoir into a waste container (AMM 29-11-22/401).
Keep the drain open.
- S 862-189
- (4) Provide electrical power to the airplane (AMM 24-22-00/201).
- S 862-190
- (5) Make sure the FLT CONTROL SHUTOFF switches on the Accessory Panel (P61) are in the OFF position.
- S 492-191
- (6) Connect the hydraulic ground cart outlet to the case drain line for the Right Engine Driven Pump (EDP).
- S 862-192
- (7) Apply 400 psi to the right EDP case drain line until approximately two gallons of fluid have been flushed into the waste container.
- S 492-193
- (8) Connect case drain line to the right EDP.
- S 492-194
- (9) Connect the hydraulic ground cart outlet to the right EDP pressure line.
- S 862-195
- (10) Apply 3000 psi to the right EDP pressure line.
- S 172-196
- (11) Operate the left outboard aileron until two gallons of fluid are flushed into the waste container (AMM 27-11-00/501).
- S 172-198
- (12) Operate ground spoilers 4 and 9 until one gallon of fluid is flushed into the waste container (AMM 27-61-00/201).
- S 172-197
- (13) Operate flight spoilers 2, 6, 7 and 11 until one gallon of fluid is flushed into the waste container (AMM 27-61-00/201).
- S 172-199
- (14) Operate thrust reversers until one gallon of fluid is flushed into the waste container (AMM 78-31-00/201).
- S 862-200
- (15) Deploy the Ram Air Turbine (RAT). Stow the RAT (AMM 29-21-00/201).

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- S 862-201
- (16) Put the right FLT CONTROL SHUTOFF switch on the Accessory Panel (P61) to ON.
- S 172-203
- (17) Operate the stabilizer trim until one gallon of fluid is flushed into the waste container (AMM 27-41-00/501).
- S 172-204
- (18) Operate the elevators until three gallons of fluid are flushed into the waste container (AMM 27-31-00/501).
- S 172-202
- (19) Operate the rudder until one gallon of fluid is flushed into the waste container (AMM 27-21-00/501).
- S 862-205
- (20) Put the right FLT CONTROL SHUTOFF switch on the Accessory Panel (P61) to OFF.
- S 862-206
- (21) Remove the pressure from the right EDP pressure line.
- S 492-207
- (22) Connect the pressure line to the right EDP.
- S 492-208
- (23) Connect the hydraulic ground cart outlet to the right Alternating Current Motor Pump (ACMP) case drain line.
- S 862-209
- (24) Apply 400 psi to the right ACMP case drain line until approximately two gallons of fluid have been flushed into the waste container.
- S 492-210
- (25) Connect case drain line to the right ACMP.
- S 492-211
- (26) Connect the hydraulic ground cart to the pressure line of the right ACMP.
- S 872-212
- (27) Pump the brake pedals full stroke, seven times to remove the pressure from the brake accumulator.
- S 862-213
- (28) Apply 3000 psi to the right ACMP pressure line to recharge the brake accumulator.

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- S 862-214
(29) Remove the pressure from the right ACMP pressure line.
- S 872-215
(30) Pump the brakes full stroke seven times to remove the pressure from the brake accumulator.
- S 862-216
(31) Apply 3000 psi to the right ACMP pressure line to pressurize the brake accumulator.
- S 862-217
(32) Remove the pressure from the right ACMP pressure line.
- S 172-218
(33) Open the bleed fitting on each brake and allow at least two quarts of fluid to bleed from each brake.
- NOTE: There are four brake bleed fittings on each main gear truck.
- S 862-219
(34) Close the brake bleed fitting for each brake.
- S 862-220
(35) Apply 3000 psi to the right ACMP pressure line.
- S 862-222
(36) Put the PTU manual control switch on the Accessory Panel (P61) to the ON position.
- S 862-223
(37) Operate the leading and trailing edge devices from full retract to flaps 30 to full retract.
- S 862-224
(38) Put the PTU manual control switch to the OFF position.
- S 862-225
(39) Remove the pressure from the right ACMP pressure line.
- S 492-226
(40) Connect the pressure line to the right ACMP.
- S 862-227
(41) Disconnect the supply line from the right ACMP and allow it to drain completely into a waste container.
- S 492-228
(42) Connect the supply line back to the right ACMP.

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S 862-229

- (43) Disconnect the supply line from the Right EDP and allow it to drain completely into a waste container.

S 492-230

- (44) Connect the supply line to the right EDP.

S 902-231

- (45) Remove and replace the following filters:
(a) Right system return filter (AMM 29-11-15/401).
(b) Right EDP pressure and case drain filters (AMM 29-11-17/401).
(c) Right ACMP pressure and case drain filters (AMM 29-11-18/401).

S 862-232

- (46) Close the right reservoir drain valve and install lockwire.

S 612-233

- (47) Fill the right hydraulic system reservoir (AMM 29-11-00/201).

S 862-234

- (48) Pressurize the right hydraulic system and check for external leakage.

S 842-235

- (49) Put the airplane back to its normal condition.

H. Replace the fluid in the center hydraulic system as follows:

S 862-290

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO COMPONENTS OF THE AILERON, ELEVATOR, RUDDER, SPOILER, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. WHEN YOU SUPPLY THE HYDRAULIC POWER, THE AILERONS AND ELEVATORS WILL TRY TO MOVE TO THE NEUTRAL POSITION. ALSO, ALL SYSTEMS WILL TRY TO MOVE TO THE POSITION OF THE CONTROLS. MAKE SURE YOU ISOLATE THE SYSTEMS AND CONTROLS WHICH MUST NOT OPERATE TO PREVENT MOVEMENT OF COMPONENTS WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 862-237

- (2) Remove the pressure from the center hydraulic system reservoir (AMM 29-11-00/201).

S 872-238

- (3) Drain the center reservoir into a waste container (AMM 29-11-22/401). Keep the drain open.

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- S 862-239
(4) Provide electrical power to the airplane (AMM 24-22-00/201).
- S 862-240
(5) Make sure the FLT CONTROL SHUTOFF switches on the Accessory Panel (P61) are in the OFF position.
- S 862-297
(6) Connect the hydraulic ground cart to the case drain of the C2 Alternating Current Motor Pump (ACMP).
- S 172-298
(7) Apply 400 psi to the C2 ACMP case drain line until approximately two gallons of fluid have been flushed into the waste container.
- S 492-299
(8) Connect the case drain line to the C2 ACMP.
- S 492-294
(9) Disconnect the C1 and C2 ACMP pressured supply and C1 ACMP case drain lines at the forward ends of the flex lines and allow them to drain completely.
- S 492-295
(10) Reconnect the pressure, supply, and case drain lines.
- S 492-296
(11) Connect the hydraulic ground outlet to the GROUND SERVICE C SYS PRESS fitting.
- S 862-241
(12) Deploy the Ram Air Turbine (AMM 29-21-00/201).
- S 862-292
(13) Apply 400 PSI pressure to the Center System.
- S 172-293
(14) Backdrive the Ram Air Turbine for approximately 2 minutes (AMM 29-21-00/501).

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- S 862-255
(15) Apply 3000 psi to the GROUND SERVICE C SYS PRESS fitting.
- S 862-256
(16) Put the center FLT CONTROL SHUTOFF switch on the Accessory Panel (P61) to ON.
- S 172-248
(17) Operate the right and left inboard ailerons until one gallon of fluid is flushed into the waste container (AMM 27-11-00/501). Confirm that flight spoilers 1 and 2 move fully with ailerons.
- S 172-267
(18) Operate the stabilizer until one gallon of fluid is flushed into the waste container (AMM 27-41-00/501).
- S 172-268
(19) Operate the elevators until three gallons of fluid are flushed into the waste container (AMM 27-31-00/501).
- S 172-257
(20) Operate the rudder until one gallon of fluid is flushed into the waste container (AMM 27-21-00/501).
- S 872-272
(21) Disconnect the supply line of C1 ACMP and allow it to drain completely.
- S 862-273
(22) Connect the supply line to the C1 ACMP.
- S 872-274
(23) Disconnect the supply line of C2 ACMP and allow it to drain completely.

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- S 492-275
(24) Connect the supply line to the C2 ACMP.
- S 872-276
(25) Disconnect supply line of the RAT and allow it to drain completely.
- S 492-277
(26) Connect the supply line to the RAT.
- S 902-278
(27) Remove and replace the following filters:
(a) Center system return filter (AMM 29-11-13/401).
(b) Center ACMP pressure and case drain filters (AMM 29-11-19/401).
(c) RAT pressure and case drain filters (AMM 29-21-11/401).
- S 862-279
(28) Close the center reservoir drain valve and install lockwire.
- S 612-280
(29) Fill the center hydraulic system reservoir (AMM 29-11-00/201).
- S 862-281
(30) Pressurize the center hydraulic system and check for external leakage.
- S 862-282
(31) Stow the RAT (AMM 29-21-00/201).
- S 842-283
(32) Put the airplane back to its normal condition.

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MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS - ADJUSTMENT/TEST

1. General

- A. This procedure contains five tasks. The first task is an operational test of the main (left, right, and center) hydraulic systems. The second task is an operational test of the reserve brake system. The third task is an operational test of the hydraulic pressure, on the EICAS display, for the engine-driven pump (EDP) in the left (right) hydraulic system. The fourth task is a system test of the main (left, right, and center) hydraulic systems. The fifth task is an operational test of the engine driven pump pressure switch.

TASK 29-11-00-715-336

2. Operational Test - Main (Left, Right, and Center) Hydraulic Systems
(Fig. 501)

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 71-00-00/201, Power Plant - General

B. Access

- (1) Location Zone
211/212 Control Cabin

C. Prepare for the Operational Test

S 865-002

- (1) Make sure these switches, on the hydraulic control panel, are in the OFF position:
 - (a) L and R HYD PUMPS ELEC
 - (b) C HYD PUMPS ELEC 1 and 2
 - (c) L and R HYD PUMPS ENG

S 865-003

- (2) Make sure the RESERVE BRAKE switch, on the captain's main instrument panel, P1, is in the OFF position.

S 865-004

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

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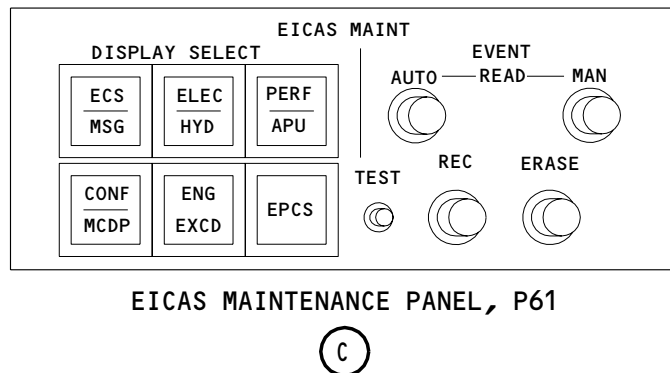
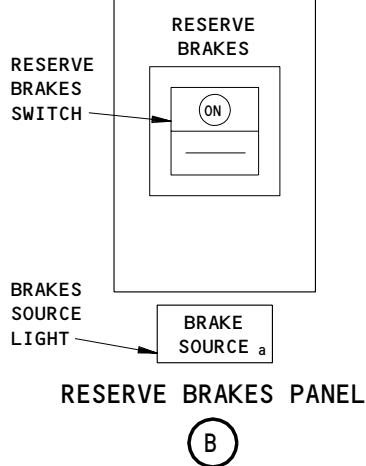
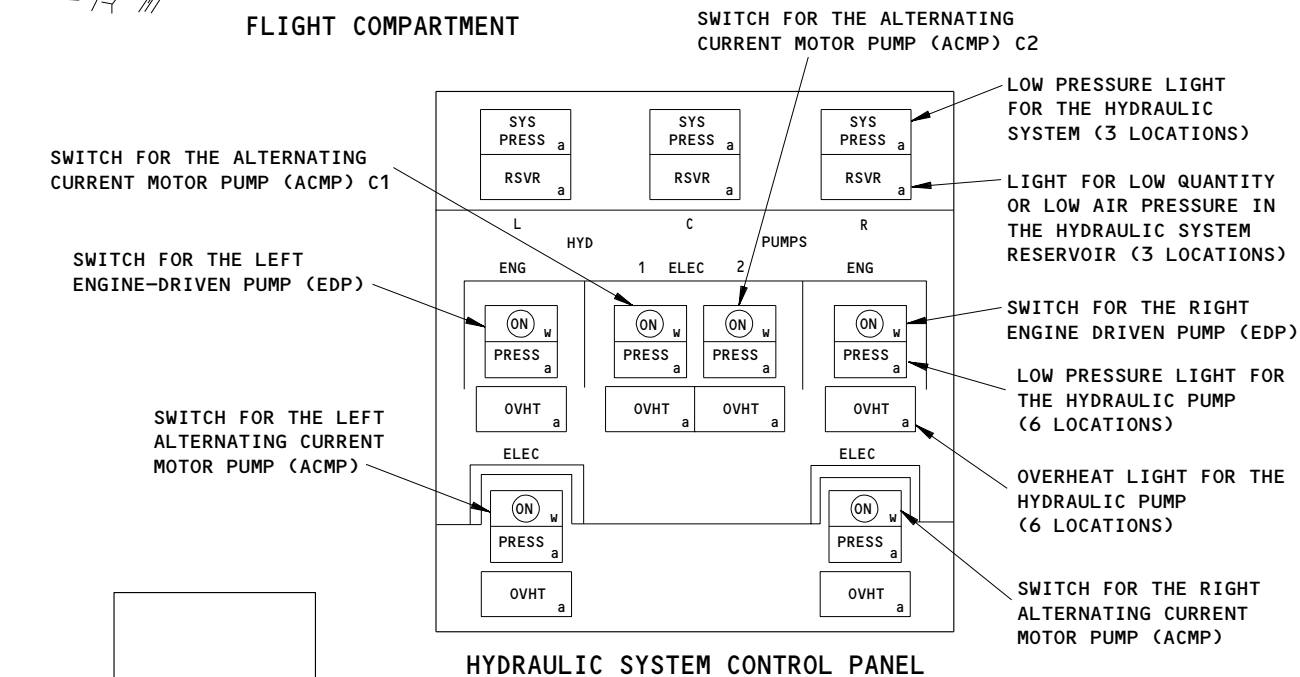
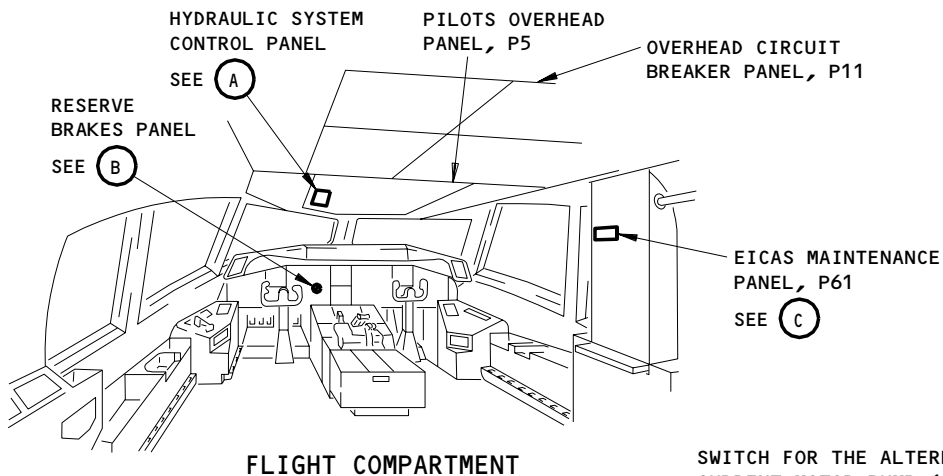
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BOEING

757 MAINTENANCE MANUAL



Hydraulic System Control Panels
Figure 501

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S 865-005

CAUTION: YOU MUST PRESSURIZE THE RESERVOIR IN THE CENTER HYDRAULIC SYSTEM BEFORE YOU OPERATE THE ALTERNATING CURRENT MOTOR PUMPS (ACMP) IN THE CENTER HYDRAULIC SYSTEM. IF YOU OPERATE AN ACMP WITHOUT PRESSURE IN THE RESERVOIR, DAMAGE TO THE ACMP CAN OCCUR.

- (4) Pressurize the reservoir in the center hydraulic system, if the engine bleed air will not pressurize the pneumatic system subsequently in this test (AMM 29-11-00/201).

S 215-006

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON EICAS IS MORE THAN 100°C (212°F) OR AFTER THE PUMP OVERHEAT LIGHT COMES ON. IF YOU CONTINUE TO OPERATE THE PUMPS, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (5) Make sure there is not less than 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 865-007

- (6) If the fuel tank contains less than 4020 pounds of fuel, do these steps:
- (a) Stop the operation of the pump if the hydraulic temperature indication on EICAS is more than 100°C (212°F) or if the pump overheat light comes on.
 - (b) Do not operate the hydraulic pump more than 10 minutes.
 - (c) After the operation of the pump, let the temperature of the pump decrease for 20 minutes with the pump off.

S 865-008

- (7) Make sure these circuit breakers on the overhead panel, P11, are closed:
- (a) 11D28, HYDRAULIC ENG PUMP SOV L or
HYDRAULIC ENG PUMP SUPPLY LEFT

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- (b) 11D29, HYDRAULIC ENG PUMP SOV R or
HYDRAULIC ENG PUMP SUPPLY RIGHT
- (c) 11K9, LEFT ENGINE OIL PRESS
- (d) 11K14, L ENG PUMP VLV DEPRESS or
LEFT ENGINE PUMP DEPRESS
- (e) 11K15, ELEC PUMP C1
- (f) 11K16, ELEC PUMP RIGHT
- (g) 11K17, SYSTEM PRESS LEFT
- (h) 11K18, SYSTEM PRESS CENTER
- (i) 11K19, HYDRAULICS QTY CTR
- (j) 11K20, HYDRAULICS QTY LEFT
- (k) 11K21, HYDRAULICS QTY RIGHT
- (l) 11K22, RESERVE BRAKE SOURCE
- (m) 11K23, R ENG PUMP VLV DEPRESS or
R ENG PUMP DEPRESS
- (n) 11K24, ELEC PUMP C2
- (o) 11K25, ELEC PUMP LEFT
- (p) 11K26, SYSTEM PRESS RIGHT
- (q) 11K35, RIGHT ENGINE OIL PRESS
- (r) 11N2, INSTRUMENT AND PANEL CAPT
- (s) 11N4, INSTRUMENT AND PANEL OVHD
- (t) EICAS (6 locations).

S 865-009

- (8) Make sure these circuit breakers on the power distribution panel, P6, are closed:
 - (a) 6C1, FUEL COND CONT L
 - (b) 6C2, FUEL COND CONT R
 - (c) 6K13, HYD EMP ENABLE C1
 - (d) 6K14, HYD EMP ENABLE R1
 - (e) 6K19, HYD EMP ENABLE C2

S 865-013

- (9) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - (a) 11D31, HYDRAULIC PTU CONT

S 865-014

- (10) Put the OVHD PANEL lights control on the right lighting control panel, on the overhead panel, P5, in the full clockwise position.

S 865-015

- (11) Put the PANEL lights control on the captains lighting control panel, on the pilots glareshield panel, P7, in the full clockwise position.

S 865-016

- (12) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

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S 215-017

- (13) Make sure the L, C, and R HYD QTY indication on the EICAS display is at least 0.80.

D. Do a Test of the Left (Right) Hydraulic System

S 715-338

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM WILL SUPPLY POWER TO COMPONENTS OF THE AILERON, ELEVATOR, RUDDER, SPOILER, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. WHEN YOU SUPPLY THE HYDRAULIC POWER, THE AILERONS AND ELEVATORS WILL TRY TO MOVE TO THE NEUTRAL POSITION. ALSO, ALL SYSTEMS WILL TRY TO MOVE TO THE POSITION OF THE CONTROLS. MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF ALL THE CONTROL SURFACES. MOVEMENT OF THE CONTROL SURFACES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

WITH ELECTRICAL AND HYDRAULIC POWER AVAILABLE, IF YOU REMOVE THE ELECTRICAL POWER, MOVE THE THRUST LEVERS, OR DO THE AIR/GROUND RELAYS FLIGHT MODE SIMULATION PROCEDURE, THIS CAN CAUSE ACCIDENTAL MOVEMENT OF THE SPOILERS. REFER TO AMM 27-61-00/201 FOR THE APPLICABLE SPOILER/SPEEDBRAKE DEACTIVATION PROCEDURE. THE ACCIDENTAL SPOILER MOVEMENT CAN CAUSE INJURY TO PERSONS.

- (1) Do a test of the hydraulic pressure indication, on the EICAS display, for the left (right) engine-driven pump (EDP) as follows:
 - (a) Operate the left (right) engine at minimum power (AMM 71-00-00/201).

NOTE: You can motor the engine with the starter as an alternative to the operation of the engine.

- (b) Put the L (R) HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.
- (c) Make sure the L (R) HYD PUMPS ENG switch/light, on the hydraulic control panel, comes on.
- (d) Make sure the L (R) HYD PRESS indication on the EICAS display is 2850 to 3150 psi.

S 215-019

- (2) Make sure these lights on the hydraulic control panel are off:
 - (a) SYS PRESS light for the left (right) hydraulic system
 - (b) PRESS light for the left (right) EDP
 - (c) OVHT light for the left (right) EDP.

S 215-020

- (3) Make sure the EICAS message, L (R) ENG HYD OVHT, does not show on the EICAS display.

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- S 215-021
- (4) Make sure the HYD TEMP indication for the left (right) hydraulic system, on the EICAS display, is less than 100°C.
- S 215-022
- (5) Make sure the EICAS message, L (R) HYD ELEC PUMP, is shown on the EICAS display.
- S 865-023
- (6) Put the L (R) HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.
- S 215-024
- (7) Make sure the L (R) HYD PUMPS ELEC switch/light, on the hydraulic control panel, comes on.
- S 215-025
- (8) Make sure the PRESS light for the left (right) ACMP, on the hydraulic control panel, is off.
- S 215-026
- (9) Make sure the EICAS message, L (R) HYD ELEC PUMP, does not show on the EICAS display.
- S 865-027
- (10) Put the L (R) HYD PUMPS ENG switch, on the hydraulic control panel, in the OFF position.
- S 215-028
- (11) Make sure the PRESS light for the left (right) EDP, on the hydraulic control panel, is on.
- S 215-029
- (12) Make sure these lights on the hydraulic control panel are off:
- (a) PRESS light for the left (right) ACMP
 - (b) SYS PRESS light for the left (right) hydraulic system
 - (c) OVHT light for the left (right) ACMP.
- S 215-030
- (13) Make sure the L (R) HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.
- S 215-031
- (14) Make sure these EICAS messages do not show on the EICAS display:
- (a) L (R) HYD SYS PRESS
 - (b) L (R) ELEC HYD OVHT.
- S 215-032
- (15) Make sure the EICAS message, L (R) HYD ENG PUMP, shows on the EICAS display.

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S 865-033

- (16) Put the L (R) HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

S 865-034

- (17) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 215-035

- (18) Make sure these lights on the hydraulic control panel are on:
(a) PRESS light for the left (right) EDP
(b) PRESS light for the left (right) ACMP
(c) SYS PRESS light for the left (right) hydraulic system.

S 865-036

- (19) Put the L (R) HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.

S 215-037

- (20) Make sure the PRESS light for the left (right) EDP is off.

S 215-038

- (21) Make sure the EICAS message, L (R) HYD ENG PUMP, does not show on the EICAS display.

S 865-039

- (22) Stop the left (right) engine (AMM 71-00-00/201)

E. Do a Test of the Center Hydraulic System

S 215-054

- (1) Make sure these lights on the hydraulic control panel are on:
(a) SYS PRESS light for the center hydraulic system
(b) PRESS light for the ACMP C1 and C2.

S 215-055

- (2) Make sure the EICAS message, C HYD SYS PRESS, shows on the EICAS display.

S 865-056

- (3) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.

S 215-057

- (4) Make sure the C HYD PUMPS ELEC 1 switch/light comes on.

S 215-058

- (5) Make sure these lights, on the hydraulic control, are off.
(a) SYS PRESS for the center hydraulic system
(b) PRESS light for the ACMP C1.

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- S 215-059
- (6) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, is on
- S 215-060
- (7) Make sure the C HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.
- S 215-061
- (8) Make sure the EICAS message, C HYD ELEC 2, shows on the EICAS display.
- S 215-062
- (9) Make sure the EICAS message, C HYD 1 OVHT, does not show on the EICAS display.
- S 215-063
- (10) Make sure the OVHT light for the ACMP C1, on the hydraulic control panel, is off.
- S 215-064
- (11) Make sure the HYD TEMP indication for the center hydraulic system, on the EICAS display, is less than 100°C.
- S 865-065
- (12) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.
- S 865-066
- (13) Operate the primary flight controls or let the internal leakage decrease the system pressure.
- S 865-067
- (14) Put the C HYD PUMPS ELEC 2 switch, on the hydraulic control panel, in the ON position.
- S 215-068
- (15) Make sure the C HYD PUMPS ELEC 2 switch/light, on the hydraulic control panel, comes on.
- S 215-069
- (16) Make sure these lights on the hydraulic control panel are off:
- (a) SYS PRESS light for the center hydraulic system
 - (b) PRESS light for the ACMP C2
 - (c) OVHT light for the ACMP C2.
- S 215-070
- (17) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, is on.

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S 215-071

- (18) Make sure the C HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 215-072

- (19) Make sure the EICAS message, C HYD ELEC 1, shows on the EICAS display.

S 215-073

- (20) Make sure the EICAS message, C HYD 2 OVHT, does not show on the EICAS display.

S 215-074

- (21) Make sure the HYD TEMP indication for the center hydraulic system, on the EICAS display, is less than 100°C.

S 865-075

- (22) Put the C HYD PUMPS ELEC 2 switch, on the hydraulic control panel, in the OFF position.

S 215-076

- (23) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, is on.

F. Put the Airplane back to Its Usual Condition

S 865-077

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

S 865-078

- (2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULIC PTU CONT

TASK 29-11-00-715-321

3. Operational Test - Reserve Brake System

A. References

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

B. Access

- (1) Location Zone
211/212 Control Cabin

C. Procedure

S 865-331

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

S 865-040

- (2) Make sure the L and R HYD PUMPS ELEC switches, on the hydraulic control panel, are in the OFF position.

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S 865-041

- (3) Make sure the RESERVE BRAKE switch, on the P1 panel, is in the OFF position.

S 215-042

- (4) Make sure the RESERVE BRAKE switch/light, on the P1 panel, is off.

S 215-043

- (5) Make sure the BRAKE SOURCE light, on the P1 panel, is ON.

S 865-335

WARNING: KEEP PERSONS 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.

- (6) Put the RESERVE BRAKE switch, on the P1 panel, in the ON position.

NOTE: This step will pressurize part of the right hydraulic system by the operation of the right alternating current motor pump (ACMP).

S 215-045

- (7) Make sure the RESERVE BRAKE switch/light, on the P1 panel, comes on.

S 215-046

- (8) Make sure the BRAKE SOURCE light, on the P1 panel, is OFF.

S 215-047

- (9) Make sure the R HYD PRESS indication, on the EICAS display, is less than 200 psi.

S 215-048

- (10) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.

S 865-049

- (11) Put the RESERVE BRAKE switch, on the P1 panel, in the OFF position.

S 215-050

- (12) Make sure the BRAKE SOURCE light, on the P1 panel, is ON.

S 215-051

- (13) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.

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S 865-052

- (14) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-053

- (15) Make sure the R HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 865-322

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

TASK 29-11-00-715-323

4. Operational Test - Hydraulic Pressure on the EICAS Display for the Engine-Driven Pump (EDP) in the Left (Right) Hydraulic System (Fig. 501)

A. References

- (1) AMM 24-22-00/201, Electrical Power
(2) AMM 71-00-00/201, Power Plant - General

B. Access

- (1) Location Zone
211/212 Control Cabin

C. Procedure

S 865-324

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

S 865-325

- (2) Operate the left (right) engine at minimum power (AMM 71-00-00/201).

S 865-326

- (3) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 865-327

- (4) Put the L (R) HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.

S 215-328

- (5) Make sure the L (R) HYD PRESS indication on the EICAS display is 2850 to 3150 psi.

S 865-329

- (6) Stop the left (right) engine (AMM 71-00-00/201).

S 865-330

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

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TASK 29-11-00-735-079

5. System Test – Main (Left, Right, and Center) Hydraulic Systems (Fig. 501)

A. Equipment

- (1) Stop Watch, 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 32-09-02/201, Air/Ground Relays
(4) AMM 36-00-00/201, Pneumatic – General
(5) AMM 71-00-00/201, Power Plant – General

C. Access

(1) Location Zones

- | | |
|---------|-------------------------------|
| 120 | Main Equipment Center (Right) |
| 144 | Right MLG Wheel Well |
| 211/212 | Control Cabin |

(2) Access Panel

- | | |
|-------|-----------------------|
| 119BL | Main Equipment Center |
|-------|-----------------------|

D. Prepare for the System Test

S 865-080

- (1) Make sure these switches, on the hydraulic control panel, are in the OFF position:
- (a) L and R HYD PUMPS ELEC
 - (b) C HYD PUMPS ELEC 1 and 2
 - (c) L and R HYD PUMPS ENG.

S 865-081

- (2) Make sure the RESERVE BRAKE switch, on the captain's main instrument panel, P1, is in the OFF position.

S 865-082

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

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S 865-083

CAUTION: YOU MUST PRESSURIZE THE RESERVOIR IN THE CENTER HYDRAULIC SYSTEM BEFORE YOU OPERATE THE ALTERNATING CURRENT MOTOR PUMPS (ACMP) IN THE CENTER HYDRAULIC SYSTEM. IF YOU OPERATE AN ACMP WITHOUT PRESSURE IN THE RESERVOIR, DAMAGE TO THE ACMP CAN OCCUR.

- (4) Pressurize the reservoir in the center hydraulic system, if there is no pressure in the pneumatic system (AMM 29-11-00/201).

S 215-084

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON EICAS IS MORE THAN 100°C (212°F) OR AFTER THE PUMP OVERHEAT LIGHT COMES ON. IF YOU CONTINUE TO OPERATE THE PUMPS, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (5) Make sure there is not less than 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 865-085

- (6) If the fuel tank contains less than 4020 pounds of fuel, do these steps:
- (a) Stop the operation of the pump if the hydraulic temperature indication on EICAS is more than 100°C (212°F) or if the pump overheat light comes on.
 - (b) Do not operate the hydraulic pump more than 10 minutes.
 - (c) After the operation of the pump, let the temperature of the pump decrease for 20 minutes with the pump off.

S 865-086

- (7) Make sure these circuit breakers on the overhead panel, P11, are closed:
- (a) 11D28, HYDRAULIC ENG PUMP SOV L or
HYDRAULIC ENG PUMP SUPPLY LEFT

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- (b) 11D29, HYDRAULIC ENG PUMP SOV R or
HYDRAULIC ENG PUMP SUPPLY RIGHT
- (c) 11K9, LEFT ENGINE OIL PRESS
- (d) 11K14, L ENG PUMP VLV DEPRESS or
LEFT ENGINE PUMP DEPRESS
- (e) 11K15, ELEC PUMP C1
- (f) 11K16, ELEC PUMP RIGHT
- (g) 11K17, SYSTEM PRESS LEFT
- (h) 11K18, SYSTEM PRESS CENTER
- (i) 11K19, HYDRAULICS QTY CTR
- (j) 11K20, HYDRAULICS QTY LEFT
- (k) 11K21, HYDRAULICS QTY RIGHT
- (l) 11K22, RESERVE BRAKE SOURCE
- (m) 11K23, R ENG PUMP VLV DEPRESS or
R ENG PUMP DEPRESS
- (n) 11K24, ELEC PUMP C2
- (o) 11K25, ELEC PUMP LEFT
- (p) 11K26, SYSTEM PRESS RIGHT
- (q) 11K35, RIGHT ENGINE OIL PRESS
- (r) EICAS (6 locations)

S 865-087

- (8) Make sure these circuit breakers on the power distribution panel, P6, are closed:
 - (a) 6C1, FUEL CONT CONT L
 - (b) 6C2, FUEL COND CONT R
 - (c) 6K13, HYD EMP ENABLE C1
 - (d) 6K14, HYD EMP ENABLE R1
 - (e) 6K19, HYD EMP ENABLE C2

S 865-091

- (9) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - (a) 11D31, HYDRAULICS PTU CONT

S 865-092

- (10) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 215-093

- (11) Make sure the L, C, and R HYD QTY indication on the EICAS display is at least 0.80.

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E. Do a Test of the Alternating Current Motor Pump (ACMP) in the Left Hydraulic System with the Engines Not in Operation

S 865-137

- (1) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
- (a) 11K15, ELEC PUMP C1
 - (b) 11K16, ELEC PUMP RIGHT
 - (c) 11K24, ELEC PUMP C2

S 865-138

- (2) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
- (a) 6C1, FUEL COND CONT L
 - (b) 6C2, FUEL COND CONT R

S 865-139

- (3) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 865-140

- (4) Make sure the ACMP in the left hydraulic system, in the left main wheel well, starts after 4 seconds.

S 215-141

- (5) Make sure the PRESS light for the left ACMP, on the hydraulic control panel, goes off in less than 2 seconds after the pump starts.

S 215-142

- (6) Make sure the SYS PRESS light for the left hydraulic system, on the hydraulic control panel, is off.

S 215-143

- (7) Make sure these EICAS messages do not show on the EICAS display:

NOTE: The EICAS computer will not show new EICAS messages until three minutes after you open these circuit breakers on the P6 panel:

6C1, FUEL COND CONT L
6C2, FUEL COND CONT R

- (a) L HYD SYS PRESS

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(b) L HYD ELEC PUMP.

S 215-144

- (8) Make sure the EICAS message, L HYD ENG PUMP, shows on the EICAS display.

S 215-145

- (9) Make sure the L HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 735-146

- (10) Do these steps to do a test of the time delay for the left ACMP indication:
- (a) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.
 - (b) Remove electrical power (AMM 24-22-00/201).
 - (c) Install a jumper between the pins A and B on the time delay module, M10557, for the left ACMP indication, on the miscellaneous electrical power panel, P33.
 - (d) Supply electrical power (AMM 24-22-00/201).
 - (e) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.
 - (f) When the pressure becomes stable, put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position and do these steps:
 - 1) Make a record of the time until the PRESS light for the left ACMP, on the hydraulic control panel, comes on.
 - 2) Make sure the ACMP in the left hydraulic system, in the left wheel well, stops in less than one second.
 - (g) Remove electrical power (AMM 24-22-00/201).
 - (h) Remove the jumper between the pins A and B on the time delay module, M10557, for the left ACMP indication, on the P33 panel.
 - (i) Supply electrical power (AMM 24-22-00/201).
 - (j) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.
 - (k) When the pressure becomes stable, put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.
 - (l) Make a record of the time until the PRESS light for the left ACMP, on the hydraulic control panel, comes on.
 - (m) Compare the times for the PRESS light to come on with and without the jumper installed.

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(n) Make sure the time for the PRESS light to come on, without the jumper installed, is 1.5 to 2.5 seconds more than the time with the jumper installed.

S 215-147

(11) Make sure the EICAS message, L HYD SYS PRESS, shows on the EICAS display.

S 215-148

(12) Make sure the EICAS message, L HYD ENG PUMP, does not show on the EICAS display.

S 215-149

(13) Make sure the L HYD PRESS indication, on the EICAS display, is 0 to 200 psi.

S 215-150

(14) Make sure these lights on the hydraulic control panel are on:
(a) SYS PRESS light for the hydraulic system
(b) PRESS light for the left ACMP.

S 865-151

(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11K15, ELEC PUMP C1
(b) 11K16, ELEC PUMP RIGHT
(c) 11K24, ELEC PUMP C2

S 865-152

(16) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6C1, FUEL COND CONT L
(b) 6C2, FUEL COND CONT R

F. Do a Test of the ACMP in the Right Hydraulic System With the Engines Not in Operation

S 865-153

(1) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
(a) 6C1, FUEL COND CONT L
(b) 6C2, FUEL COND CONT R

S 865-154

(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11K15, ELEC PUMP C1
(b) 11K24, ELEC PUMP C2
(c) 11K25, ELEC PUMP LEFT

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- S 865-155
- (3) Make sure the RESERVE BRAKE switch, on the captains instrument panel, P1, is in the OFF position.
- S 215-156
- (4) Make sure the RESERVE BRAKE switch/light is off.
- S 215-157
- (5) Make sure the BRAKE SOURCE light, on the P1 panel, is ON.
- S 215-158
- (6) Make sure the position indicator on the supply shutoff valve for the isolated ACMP, in the right wheel well, is in POSITION 2.
- S 215-159
- (7) Make sure the position indicator on the pressure shutoff valve for the isolated ACMP, in the right wheel well, is in the OPEN position.
- S 215-160
- (8) Make sure the ACMP in the right hydraulic system, in the right wheel well, is not in operation.
- S 735-161
- (9) Do these steps to do a check of the EICAS message, RSV BRAKE VAL:
- (a) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.
 - (b) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - 1) 11K22, RESERVE BRAKE SOURCE
 - (c) Remove the electrical connector from the supply shutoff valve for the isolated ACMP, in the right wheel well.
 - (d) Manually move the pressure shutoff valve for the isolated ACMP, in the right wheel well, to the CLOSED position.
 - (e) Make sure the EICAS message, RSV BRAKE VAL, shows on the EICAS display not less than 2 seconds after you put the pressure shutoff valve for the isolated ACMP in the CLOSED position.

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- (f) Put the REVERSE BRAKE switch, on the P1 panel, in the ON position.
- (g) Make sure the EICAS message, RSV BRAKE VAL, stays on the EICAS display.
- (h) Push the ELEC/HYD, and then the AUTO-EVENT READ switches on the EICAS MAINT panel, on the right side panel, P61.
- (i) Push and hold the ERASE switch, on the EICAS MAINT panel, for approximately three seconds.
- (j) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.
- (k) Manually move the pressure shutoff valve for the isolated ACMP, in the right wheel well, to the OPEN position.
- (l) Make sure the EICAS message, RSV BRAKE VAL, shows on the EICAS display.
- (m) Remove the electrical connector from the pressure shutoff valve for the isolated ACMP.
- (n) Push the ELEC/HYD, and then the AUTO EVENT READ switches on the EICAS MAINT panel, on the P61 panel.
- (o) Push and hold the ERASE switch, on the EICAS MAINT panel, for approximately three seconds.
- (p) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.
- (q) Install the electrical connector on the supply shutoff valve for the isolated ACMP.
- (r) Make sure the EICAS message, RSV BRAKE VAL, shows on the EICAS display.
- (s) Put the RESERVE BRAKE switch, on the P1 panel, in the OFF position.
- (t) Push the ELEC/HYD, and then the AUTO EVENT READ switches on the EICAS MAINT panel, on the P61 panel.
- (u) Push and hold the ERASE switch, on the EICAS MAINT panel, for approximately three seconds.
- (v) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.
- (w) Manually move the supply shutoff valve for the isolated ACMP, in the right wheel well, to POSITION 1.

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- (x) Make sure the EICAS message, RSV BRAKE VAL, shows on the EICAS display.
- (y) Manually move the supply shutoff valve for the isolated ACMP to POSITION 2.
- (z) Install the electrical connector on the pressure shutoff valve for the isolated ACMP.
- (aa) Push the ELEC/HYD, and then the AUTO EVENT READ switches on the EICAS MAINT panel, on the P61 panel.
- (ab) Push and hold the ERASE switch, on the EICAS MAINT panel, for approximately three seconds.
- (ac) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - 1) 11K22, RESERVE BRAKE SOURCE

S 865-162

- (10) Put the RESERVE BRAKE switch, on the P1 panel, in the ON position.

S 215-163

- (11) Make sure the ACMP, in the right hydraulic system, starts after 5 seconds.

S 215-164

- (12) Make sure the position indicator on the supply shutoff valve for the isolated ACMP, in the right wheel well, is in POSITION 1.

S 215-165

- (13) Make sure the position indicator on the pressure shutoff valve for the isolated ACMP, in the right wheel well, is in the CLOSED position.

S 215-166

- (14) Make sure the BRAKE SOURCE light, on the P1 panel, is off.

S 215-167

- (15) Make sure the EICAS message, RSV BRAKE VAL, does not show on the EICAS display.

S 215-168

- (16) Make sure the RESERVE BRAKE switch/light, on the P1 panel, is on.

S 215-169

- (17) Do these steps to make sure there is hydraulic pressure at the brakes:
 - (a) Push and release the brake pedals and make sure the wear pin indicator on each brake assembly moves.
 - (b) Monitor the pressure in the brake accumulator to make sure it does not decrease while you operate the brake pedals.

S 215-170

- (18) Make sure the R HYD PRESS indication, on the EICAS display, is 0 to 200 psi.

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S 865-171

- (19) Put the RESERVE BRAKE switch, on the P1 panel, in the OFF position.

S 215-172

- (20) Make sure the ACMP in the right hydraulic system, in the right wheel well, stops in less than 1 second.

S 215-173

- (21) Make sure the position indicator on the supply shutoff valve for the isolated ACMP, in the right wheel well, is in POSITION 2.

S 215-174

- (22) Make sure the position indicator on the pressure shutoff valve for the isolated ACMP, in the right wheel well, is in the OPEN position.

S 865-175

- (23) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-176

- (24) Make sure the ACMP in the right hydraulic system, in the right wheel well, starts after 5 seconds.

S 215-177

- (25) Make sure the PRESS light for the right ACMP, on the hydraulic control panel, goes off in less than 2 seconds after the ACMP starts.

S 215-178

- (26) Make sure the SYS PRESS light for the right hydraulic system, on the hydraulic control panel, is off.

NOTE: The EICAS computer will not show new EICAS messages until three minutes after you open this circuit breaker on the P6 panel:

6C2, FUEL COND CONT R

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S 215-179

- (27) Make sure these EICAS messages do not show on the EICAS display:
- (a) R HYD SYS PRESS
 - (b) R HYD ELEC PUMP.

S 215-180

- (28) Make sure the EICAS message, R HYD ENG PUMP, shows on the EICAS display.

S 215-181

- (29) Make sure the R HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 735-182

- (30) Do these steps to do a test of the right ACMP enable relay:
- (a) Open this circuit breaker on the P6 panel:
 - 1) 6K14, HYD EMP ENABLE R1
 - (b) Make sure the ACMP in the right hydraulic system, in the right wheel well, stops.
 - (c) Close this circuit breaker on the P6 panel:
 - 1) 6K14, HYD EMP ENABLE R1
 - (d) Make sure the ACMP in the right hydraulic system, in the right wheel well, starts after 5 seconds.

S 735-186

- (31) Do these steps to do a test of the time delay for the right ACMP indication:
- (a) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.
 - (b) Remove electrical power (AMM 24-22-00/201).
 - (c) Install a jumper between the pins A and B on the time delay module, M10559, for the right ACMP indication, on the left miscellaneous equipment panel, P36.
 - (d) Supply electrical power (AMM 24-22-00/201).
 - (e) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.
 - (f) When the pressure becomes stable, put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

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- (g) Make a record of the time until the PRESS light for the right ACMP, on the hydraulic control panel, comes on.
- (h) Remove electrical power (AMM 24-22-00/201).
- (i) Remove the jumper between the pins A and B on the time delay module, M10559, for the right ACMP indication, on the P36 panel.
- (j) Supply electrical power (AMM 24-22-00/201).
- (k) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.
- (l) When the pressure becomes stable, put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.
- (m) Make a record of the time until the PRESS light for the right ACMP, on the hydraulic control panel, comes on.
- (n) Compare the times for the PRESS light to come on with and without the jumper installed.
- (o) Make sure the time for the PRESS light to come ON, without the jumper installed, is 1.5 to 2.5 seconds more than the time with the jumper installed.

S 215-187

- (32) Make sure the EICAS message, R HYD SYS PRESS, shows on the EICAS display.

S 215-188

- (33) Make sure the EICAS message, R HYD ENG PUMP, does not show on the EICAS display.

S 215-189

- (34) Make sure these lights on the hydraulic control panel are on:
 - (a) SYS PRESS light for the right hydraulic system
 - (b) PRESS light for the right ACMP.

S 865-190

- (35) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
 - (a) 6C1, FUEL COND CONT L
 - (b) 6C2, FUEL COND CONT R

S 215-191

- (36) Make sure the R HYD PRESS indication, on the EICAS display, is 0 to 200 psi.

S 865-192

- (37) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
 - (a) 11K15, ELEC PUMP C1
 - (b) 11K24, ELEC PUMP C2
 - (c) 11K25, ELEC PUMP LEFT

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G. Do a Test of the Alternating Current Motor Pumps (ACMPs) in the Center Hydraulic System With the Engines Not in Operation

S 865-193

- (1) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
 - (a) 11K16, ELEC PUMP R
 - (b) 11K24, ELEC PUMP C2
 - (c) 11K25, ELEC PUMP LEFT

S 865-194

- (2) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.

S 215-195

- (3) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 2 seconds.

S 215-196

- (4) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, goes off in less than 2 seconds after the ACMP starts.

S 215-197

- (5) Make sure the SYS PRESS light for the center hydraulic system, on the hydraulic control panel, is not on.

S 215-198

- (6) Make sure these EICAS messages do not show on the EICAS display:
 - (a) C HYD SYS PRESS
 - (b) C HYD ELEC 1.

S 215-199

- (7) Make sure the EICAS message, C HYD ELEC 2, shows on the EICAS display.

S 215-200

- (8) Make sure the C HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

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- S 865-201
- (9) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.
- S 215-202
- (10) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, stops in less than 1 second.
- S 215-203
- (11) Make sure the EICAS message, C HYD SYS PRESS, shows on the EICAS display.
- S 215-204
- (12) Make sure these EICAS messages do not show on the EICAS display:
- (a) C HYD ELEC 1
 - (b) C HYD ELEC 2.
- S 215-205
- (13) Make sure the C HYD PRESS indication, on the EICAS display, is 0 to 200 psi.
- S 215-206
- (14) Make sure these lights on the hydraulic control panel are on:
- (a) SYS PRESS light for the center hydraulic system
 - (b) PRESS light for the ACMP C1
 - (c) PRESS light for the ACMP C2.
- S 735-207
- (15) Do these steps to do a test of the ACMP C1 enable relay:
- (a) Open this circuit breaker on the P6 panel and attach D0-NOT-CLOSE tags:
 - 1) 6K13, HYD EMP ENABLE C1
 - (b) Remove the isolation request relay, K122, on the P6 panel.
 - (c) Install a jumper between the pins B1 and B2 on the connector D542, on the P6 panel.
 - (d) Put the R BUS TIE switch, on the P5 panel, in the ISLN position.
 - (e) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.
 - (f) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, does not start.
 - (g) Remove the D0-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
 - 1) 6K13, HYD EMP ENABLE C1
 - (h) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 2 seconds.
 - (i) Open this circuit breaker on the P6 panel and attach a D0-NOT-CLOSE tag:
 - 1) 6K13, HYD EMP ENABLE C1

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- (j) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, stops.
- (k) Remove the jumper between the pins B1 and B2 on the connector D542, on the P6 panel.
- (l) Make sure the ACMP C1 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 2 seconds.
- (m) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.
- (n) Install the isolation request relay, K122, on the P6 panel.
- (o) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
 - 1) 6K13, HYD EMP ENABLE C1

S 865-211

- (16) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - (a) 11K15, ELEC PUMP C1

S 095-339

- (17) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - (a) 11K24, ELEC PUMP C2

S 865-212

- (18) Put the left and right BUS TIE switches, on the P5 panel, in the AUTO position.

S 865-213

- (19) Put the C HYD PUMPS ELEC 2 switch, on the hydraulic control panel, in the ON position.

S 215-214

- (20) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 3 seconds.

S 215-215

- (21) Make sure the PRESS light for the ACMP C2 on the hydraulic control panel goes off in less than 2 seconds after the pump starts.

S 215-216

- (22) Make sure the SYS PRESS light for the center hydraulic system, on the hydraulic control panel, is off.

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S 215-217

- (23) Make sure these EICAS messages do not show on the EICAS display:
- (a) C HYD SYS PRESS
 - (b) C HYD ELEC 2.

S 215-218

- (24) Make sure the EICAS message, C HYD ELEC 1, shows on the EICAS display.

S 215-219

- (25) Make sure the C HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 735-220

- (26) Do these steps to do a test of the ACMP C2 enable relay:
- (a) Open this circuit breaker on the P6 panel:
 - 1) 6K19, HYD EMP ENABLE C2
 - (b) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, stops.
 - (c) Close this circuit breaker on the P6 panel:
 - 1) 6K19, HYD EMP ENABLE C2
 - (d) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 3 seconds.

S 865-224

- (27) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
- (a) 11K15, ELEC PUMP C1

S 865-225

- (28) Put the C HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.

S 215-226

- (29) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, stops in less than 1 second.

S 865-227

- (30) Put the left BUS TIE switch, on the P5 panel, in the ISLN position.

S 215-228

- (31) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 3 seconds.

S 865-229

- (32) Put the left BUS TIE switch, on the P5 panel, in the AUTO position.

S 215-230

- (33) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, stops in less than 1 second.

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S 865-231

- (34) Put these switches on the hydraulic control panel in the OFF position:
- (a) C HYD PUMPS ELEC 1
 - (b) C HYD PUMPS ELEC 2.

S 865-232

- (35) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11K16, ELEC PUMP RIGHT
 - (b) 11K25, ELEC PUMP LEFT

H. Do a test of the Engine-Driven Pump (EDP) in the Left Hydraulic System With the Engine in Operation

S 865-233

- (1) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag :
- (a) 11D31, HYDRAULIC PTU CONT

S 865-235

- (2) Put these switches, on the hydraulic control panel, in the OFF position:
- (a) L and R HYD PUMPS ELEC
 - (b) C HYD PUMPS ELEC 1 and 2
 - (c) L and R HYD PUMPS ENG.

S 215-236

- (3) Make sure these lights on the hydraulic control panel are on:
- (a) SYS PRESS light for the left hydraulic system
 - (b) PRESS light for the left EDP.

S 865-237

- (4) Operate the left engine at minimum power (AMM 71-00-00/201).

S 215-238

- (5) Make sure these lights on the hydraulic control panel are on:
- (a) SYS PRESS light for the left hydraulic system

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(b) PRESS light for the left EDP.

S 215-239

(6) Make sure the L HYD PRESS indication, on the EICAS display, is 0 to 200 psi.

S 865-240

(7) Put the L HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.

S 215-241

(8) Make sure the L HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 215-242

(9) Make sure these lights on the hydraulic control panel are off:
(a) SYS PRESS light for the left hydraulic system
(b) PRESS light for the left EDP.

S 215-243

(10) Make sure the EICAS message, L HYD ENG PUMP, does not show on the EICAS display.

S 215-244

(11) Make sure the EICAS message, L HYD ELEC PUMP, shows on the EICAS display.

S 865-245

(12) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11D28, HYDRAULICS ENG PUMP SOV L or
HYDRAULICS ENG PUMP SUPPLY LEFT

S 865-246

(13) Open these circuit breakers on the P6 panel and attach a DO-NOT-CLOSE tag:
(a) 6E1, FUEL VALVES L SPAR
(b) 6C1, FUEL COND CONT L

S 865-247

(14) Push the button behind the fire switch handle for the left engine, on the P8 panel, to release the fire switch handle.

S 865-248

CAUTION: AFTER YOU PULL THE FIRE SWITCH HANDLE, DO NOT TURN THE FIRE SWITCH HANDLE. THIS WILL RELEASE THE CONTENTS OF THE FIRE EXTINGUISHER BOTTLES WHICH ARE PRESSURIZED.

(15) Pull the fire switch handle for the left engine, on the P8 panel, to the emergency fire position.

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S 215-249

- (16) Make sure the L HYD PRESS indication, on the EICAS display, is less than 2500 psi after 60 seconds.

S 865-250

CAUTION: AFTER YOU PULL THE FIRE SWITCH HANDLE, DO NOT TURN THE FIRE SWITCH HANDLE. THIS WILL RELEASE THE CONTENTS OF THE FIRE EXTINGUISHER BOTTLES WHICH ARE PRESSURIZED.

- (17) Push the fire switch handle for the left engine, on the P8 panel, to the usual position.

S 215-251

- (18) Make sure the L HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 865-252

- (19) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11D28, HYDRAULICS ENG PUMP SOV L or
HYDRAULICS ENG PUMP SUPPLY LEFT

S 865-253

- (20) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR
(b) 6C1, FUEL COND CONT L

I. Do a Test of the Alternating Current Motor Pump (ACMP) in the Left Hydraulic System With the Engines in Operation

S 865-279

- (1) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-280

- (2) Make sure the ACMP in the left hydraulic system, in the left wheel well, starts after 4 seconds.

S 865-281

- (3) Put the L HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

S 215-282

- (4) Make sure the ACMP in the left hydraulic system, in the left wheel well, stops in less than 1 second.

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J. Do a Test of the Engine-Driven Pump (EDP) in the Right Hydraulic System With the Engines in Operation

S 215-283

- (1) If the right engine is in operation, do these steps:
- (a) Make sure these lights on the hydraulic control panel are on:
 - 1) SYS PRESS light for the right hydraulic system
 - 2) PRESS light for the right EDP.
 - (b) Put the R HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.

S 215-284

- (2) If the right engine is not in operation, do these steps:
- (a) Put the R HYD PUMPS ENG switch, on the hydraulic control panel, in the ON position.
 - (b) Make sure these lights on the hydraulic control panel are on:
 - 1) SYS PRESS light for the right hydraulic system
 - 2) PRESS light for the right EDP.
 - (c) Operate the right engine at minimum power (AMM 71-00-00/201).

S 215-286

- (3) Make sure the R HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 215-287

- (4) Make sure these lights on the hydraulic control panel are off:
- (a) SYS PRESS light for the right hydraulic system
 - (b) PRESS light for the right EDP.

S 215-288

- (5) Make sure the EICAS message, R HYD ENG PUMP, does not show on the EICAS display.

S 215-289

- (6) Make sure the EICAS message, R HYD ELEC PUMP, shows on the EICAS display.

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S 865-290

- (7) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tags:
- (a) 11D29, HYDRAULICS ENG PUMP SOV R or
HYDRAULICS ENG PUMP SUPPLY RIGHT

S 865-291

- (8) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
- (a) 6C2, FUEL COND CONT R
 - (b) 6E2, FUEL VALVES R SPAR

S 865-293

- (9) Push the button behind the fire switch handle for the right engine, on the pilots aft control stand panel, P8, to release the fire switch handle.

S 865-292

CAUTION: AFTER YOU PULL THE FIRE SWITCH HANDLE, DO NOT TURN THE FIRE SWITCH HANDLE. THIS WILL RELEASE THE CONTENTS OF THE FIRE EXTINGUISHER BOTTLES WHICH ARE PRESSURIZED.

- (10) Pull the fire switch handle for the right engine, on the P8 panel, to the emergency fire position.

S 215-294

- (11) Make sure the R HYD PRESS indication, on the EICAS display, is less than 2500 psi after 60 seconds.

S 865-295

- (12) Push the fire switch handle for the right engine, on the P8 panel, to the usual position.

S 215-296

- (13) Make sure the R HYD PRESS indication, on the EICAS display, is 2850 to 3150 psi.

S 865-297

- (14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
- (a) 11D29, HYDRAULIC ENG PUMP SOV R or
HYDRAULIC ENG PUMP SUPPLY RIGHT

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S 865-298

- (15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
- (a) 6C2, FUEL COND CONT R
 - (b) 6E2, FUEL VALVES R SPAR

K. Do a Test of the Alternating Current Motor Pump (ACMP) in the Right Hydraulic System With the Engines in Operation

S 865-299

- (1) Put the EXT PWR switch, on the P5 panel, in the ON position.

S 865-300

- (2) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-301

- (3) Make sure the ACMP in the right hydraulic system, in the right wheel well, starts after 5 seconds.

S 865-302

- (4) Put the R HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

S 215-303

- (5) Make sure the ACMP in the right hydraulic system, in the right wheel well, stops in less than 1 second.

L. Do a Test of the Alternating Current Motor Pumps (ACMPs) in the Center Hydraulic System With the Engines in Operation

S 865-304

- (1) Put these switches on the hydraulic control panel in the ON position:
- (a) C HYD PUMPS ELEC 1
 - (b) C HYD PUMPS ELEC 2.

S 865-305

- (2) Put the left and right BUS TIE switches, on the P5 panel, in the AUTO position.

S 865-306

- (3) Put the R GEN CONT switch, on the P5 panel, in the ON position.

S 865-307

- (4) Put these switches on the P5 panel in the OFF position:
- (a) L GEN CONT
 - (b) APU GEN
 - (c) EXT PWR.

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S 215-308

- (5) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, is not in operation.

S 865-309

- (6) Put the right BUS TIE switch, on the P5 panel, in the ISLN position.

S 215-310

- (7) Make sure the ACMP C2 in the center hydraulic system, in the aft left wing-to-body fairing, starts after 3 seconds.

S 865-311

- (8) Put the right BUS TIE switch, on the P5 panel, in the AUTO position.

S 865-312

- (9) Put these switches on the hydraulic control panel in the OFF position:

(a) C HYD PUMPS ELEC 1

(b) C HYD PUMPS ELEC 2.

M. Put the Airplane Back to Its Usual Condition

S 865-313

- (1) Stop the left and right engines (AMM 71-00-00/201).

S 865-314

- (2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:

(a) 11D31, HYDRAULICS PTU CONT

S 865-316

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

TASK 29-11-00-705-355

6. Operational Test - Engine Driven Pump Pressure Switch

A. References

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

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- (2) AMM 32-00-15/201, Main Gear Door Locks
 - (3) AMM 32-00-20/201, Landing Gear Downlocks
 - (4) AMM 71-00-00/201, Power Plant - General
- B. Access
- (1) Location Zones
 - 211/212 Control Cabin
 - 143/144 Main Landing Gear Wheel Well
- C. Procedure

S 845-341

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

S 845-342

- (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 495-343

WARNING: OBEY THE INSTALLATION PROCEDURE FOR 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 845-344

- (4) Make sure both engines are off (AMM 71-00-00/201).

S 845-345

- (5) Put these switches, on the hydraulic control panel, in the ON position:
 - (a) L and R HYD PUMPS ELEC
 - (b) C HYD PUMPS ELEC 1 and 2.
 - (c) R HYD PUMP ENG

S 845-346

- (6) Put the L HYD PUMP ENG switch on the hydraulic control panel to the OFF position.

S 845-347

- (7) Operate the right engine at minimum power (AMM 71-00-00/201).

S 715-356

- (8) Listen to the power transfer unit to make sure it operates smoothly and allow it to run for 10 to 15 seconds.
 - (a) Make sure the control valve of the power transfer unit is in POS 1 (open position).

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- S 845-349
- (9) Put these switches, on the hydraulic control panel, in the OFF position:
- (a) R HYD PUMP ENG
 - (b) R HYD PUMP ELEC
- S 715-357
- (10) Listen to the power transfer unit to make sure it stops.
- (a) Make sure the control valve of the power transfer unit is in POS 2 (closed position) after 3 seconds.
- S 715-358
- (11) Put these switches, on the hydraulic control panel, in the ON position:
- (a) R HYD PUMP ENG
 - (b) R HYD PUMP ELEC.
- S 725-368
- (12) Open then close this circuit breaker on the overhead panel, P11:
- (a) 11D31, HYDRAULIC PTU CONT
- S 715-359
- (13) Listen to the power transfer unit to make sure it operates smoothly and allow it to run 10 to 15 seconds.
- (a) Make sure the control valve of the power transfer unit is in POS 1 (open position).
- S 845-353
- (14) Operate the left engine at minimum power (AMM 71-00-00/201).
- S 715-360
- (15) Listen to the power transfer unit to make sure it is still running.
- S 715-361
- (16) Put the L HYD PUMP ENG switch, on the hydraulic control panel, to the ON position.
- (a) Listen to the power transfer unit to make sure it stops.
 - (b) Make sure the control valve of the power transfer unit is in POS 2 (closed position).
- S 715-362
- (17) Put the L HYD PUMP ENG, on the hydraulic control panel, in the OFF position.
- (a) Listen to the power transfer unit to make sure it operates smoothly and allow it to run for 10 to 15 seconds.
 - (b) Make sure the control valve of the power transfer unit is in POS 1 (open position).

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S 715-363

- (18) Stop the right engine (AMM 71-00-00/201).
 - (a) Listen to the power transfer unit to make sure it stops.
 - (b) Make sure the control valve of the power transfer unit is in POS 2 (closed position).

S 715-364

- (19) Stop the left engine (AMM 71-00-00/201).
- D. Put the Airplane Back to Its Usual Condition

S 095-365

WARNING: OBEY THE REMOVAL PROCEDURE FOR 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 845-366

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

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MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS – INSPECTION/CHECK

1. General

A. This procedure has these tasks:

- (1) Main Hydraulic Systems Inspection
- (2) Differential Pressure Indicators Inspection for the Pressure Filters of the Alternating Current Motor Pumps (ACMP), the Power Transfer Unit (PTU) and the Left Engine-Driven Pump (EDP) and Bearing Wear Indicator Inspection for the PTU.
- (3) Differential Pressure Indicator Inspection for the Pressure Filter of the Right Engine-Driven Pump (EDP)
- (4) Differential Pressure Indicators Inspection for the Case Drain Filters of the Alternating Current Motor Pumps (ACMP) and the Engine-Driven Pumps (EDP) and for the Return Filters in the Left, Right, and Center Hydraulic Systems.
- (5) Differential Pressure Indicator Inspection for the Case Drain Filter of the Power Transfer Unit (PTU)
- (6) Hydraulic System External Leakage Check
- (7) Hydraulic System PCA Initial Leakage Check
- (8) Hydraulic System Gross Internal Leakage Check
- (9) Hydraulic System Elevator and Rudder Power Control Actuators (PCAs) Internal Leakage Check (This Includes the Elevator and Rudder PCA Monitoring System)
- (10) Hydraulic System ACMP Check Valves Internal Leakage Check
- (11) Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage.

TASK 29-11-00-206-001

2. Main Hydraulic Systems Inspection

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
- (4) AMM 29-11-16/401, Reservoir Pressurization Module
- (5) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (6) AMM 29-21-11/401, RAT Checkout Module and Components

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- (7) AMM 32-00-15/201, Main Gear Door Locks
- (8) AMM 32-00-20/201, Landing Gear Downlocks
- (9) AMM 71-11-04/201, Fan Cowl Panels
- (10) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

139	Forward Section of Keel Beam
143/144	MLG Wheel Well
197	Wing to Body - Aft Lower Half (Left)
198	Wing to Body - Aft Lower Half (Right)
411/412	Engine
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

193HL/194ER	ECS Components
197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay
732/742	MLG Doors (L/R)

C. Examine the Main Hydraulic Systems

S 496-003

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-004

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.

- (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 866-005

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

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

S 016-006

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (4) Open the fan cowl panels (AMM 71-11-04/201).

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- S 016-002
- (5) Open the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- S 016-009
- (6) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 866-010
- (7) Extend the ram air turbine (RAT) (AMM 29-21-00/201).
- S 216-011
- (8) Examine the hydraulic tubing in the areas that follow for a color change which shows the hydraulic fluid was too hot:
- (a) Engine
 - (b) Engine strut hydraulic area
 - (c) Left and right wheel wells
 - (d) Aft-left wing/body fairing.
- S 866-012
- (9) Pressurize the hydraulic systems and reservoirs (AMM 29-11-00/201).
- S 216-013
- (10) Examine all hydraulic line connections, hydraulic fittings, and hydraulic components for signs of external leakage.
- S 866-014
- (11) Remove the pressure from the hydraulic systems and reservoirs (AMM 29-11-00/201).
- S 366-015
- (12) Replace or repair the hydraulic components which leak or are damaged.
- S 216-021
- (13) Do these steps to examine the reservoir pressurization module filter.
- (a) Examine the filter element for a dirty condition.

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(b) If necessary, clean the filter element (Ref 29-11-16/401).

S 216-379

(14) Do these steps to examine the RAT checkout module pressure and case drain filters.

(a) Remove the filter elements and check for a dirty condition.

(b) If you find many metal particles, replace the filter element (AMM 29-21-11/401).

S 866-022

(15) Retract the RAT (AMM 29-21-00/201).

S 416-023

(16) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 416-024

(17) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 866-026

(18) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 416-027

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(19) Close the fan cowl panel (AMM 71-11-04/201).

S 416-029

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.

(20) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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TASK 29-11-00-206-420

3. Differential Pressure Indicators Inspection for the Pressure Filters of the Alternating Current Motor Pumps (ACMP), the Power Transfer Unit (PTU) and the Left Engine-Driven Pump (EDP) and Bearing Wear Indicator Inspection for the PTU.

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (3) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure and Case Drain Filter Module and Components
- (4) AMM 29-11-18/401, Left and Right System Alternating Current Motor Pump (ACMP) Pressure and Case Drain Filter Module and Components
- (5) AMM 29-11-19/401, Center Sytem Alternating Current Motor Pump (ACMP) Pressure and Case Drain Filter Module and Components
- (6) AMM 29-22-01/401, Hydraulic Power Transfer Unit (PTU)
- (7) AMM 29-22-02/401, Power Transfer Unit (PTU) Pressure Filter Module and Components
- (8) AMM 32-00-15/201, Main Gear Door Locks
- (9) AMM 32-00-20/201, Landing Gear Downlocks
- (10) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

- | | |
|---------|--------------------------------------|
| 143/144 | MLG Wheel Well |
| 197 | Wing to Body - Aft Lower Half (Left) |
| 434/444 | Nacelle Strut - Aft Fairing |
| 732/742 | Main Landing Gear and Doors |

(2) Access Panels

- | | |
|-------|----------------------------------|
| 197KL | Central Hydraulic Service Center |
| 434AL | Hydraulic Bay |

C. Procedure

S 496-421

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-422

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).

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S 866-423

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

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

S 016-424

- (4) Open the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 016-428

- (5) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 216-429

- (6) Do these steps to examine the bearing wear indicator for the power transfer unit (PTU) (Fig. 601):
- (a) Make sure the red indicator button on the bearing wear indicator for the PTU did not come out.
 - (b) If the red indicator button came out, replace the PTU (AMM 29-22-01/401).

S 216-430

- (7) Do the steps which follow to examine the differential pressure indicators for these filters:
- Pressure Filter for the ACMP in the Left Hydraulic System (Fig. 602)
 - Pressure Filter for the ACMP in the Right Hydraulic System (Fig. 602)
 - Pressure Filters for the ACMPs in the Center Hydraulic System (Fig. 603)
 - Pressure Filter for the EDP in the Left Hydraulic System (Fig. 602)
 - Pressure Filter for the PTU (Fig. 601).
- (a) Make sure the red indicator button on each differential pressure indicator did not come out.
- (b) If the red indicator button came out, replace the filter element and set the indicator button as follows:
- 1) Pressure Filter for the ACMP in the Left and Right Hydraulic Systems (AMM 29-11-18/401).
 - 2) Pressure Filters for the ACMPs in the Center Hydraulic System (AMM 29-11-19/401).
 - 3) Pressure Filter for the EDP in the Left Hydraulic System (AMM 29-11-17/401)

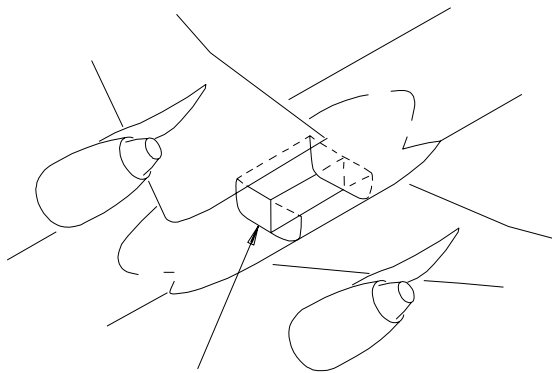
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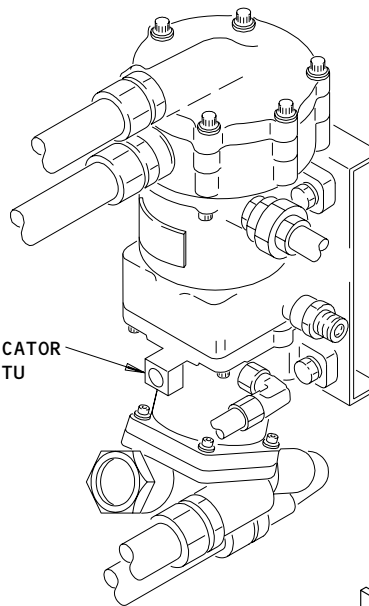
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LEFT MAIN
WHEEL WELL
SEE (A)

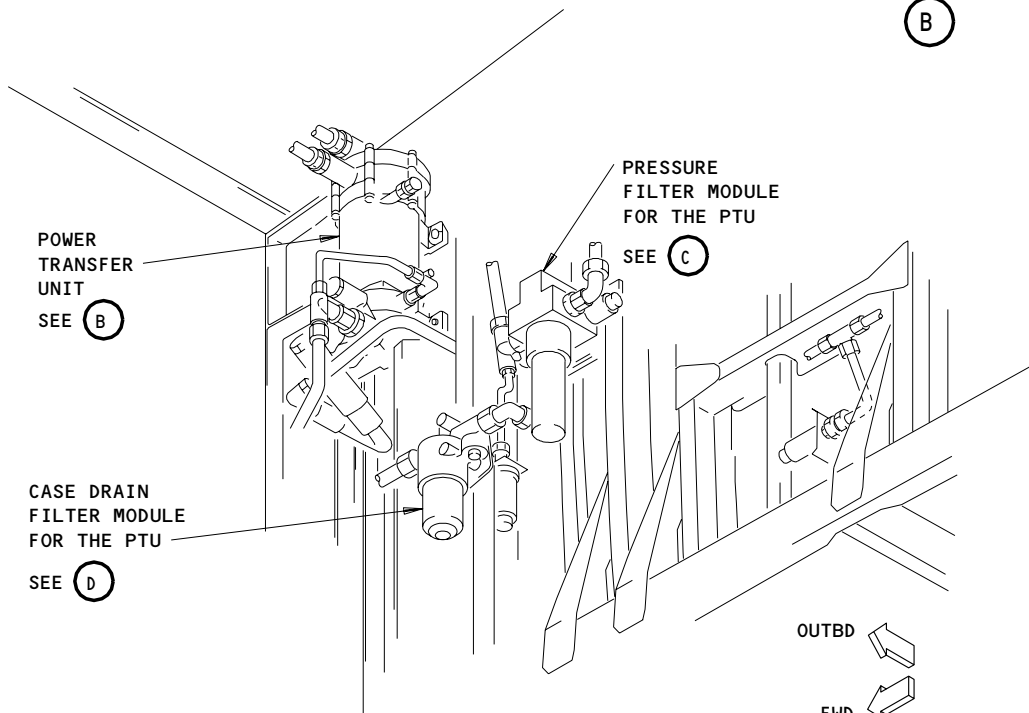


WEAR INDICATOR
FOR THE PTU
BEARING



POWER TRANSFER UNIT

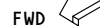
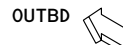
(B)



POWER
TRANSFER
UNIT
SEE (B)

PRESSURE
FILTER MODULE
FOR THE PTU
SEE (C)

CASE DRAIN
FILTER MODULE
FOR THE PTU
SEE (D)



LEFT MAIN WHEEL WELL

(A)

Differential Pressure and Wear Indicators for the PTU System
Figure 601 (Sheet 1)

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4) Pressure Filter for the PTU (AMM 29-22-02/401).

S 416-431

(8) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 416-432

(9) Close the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

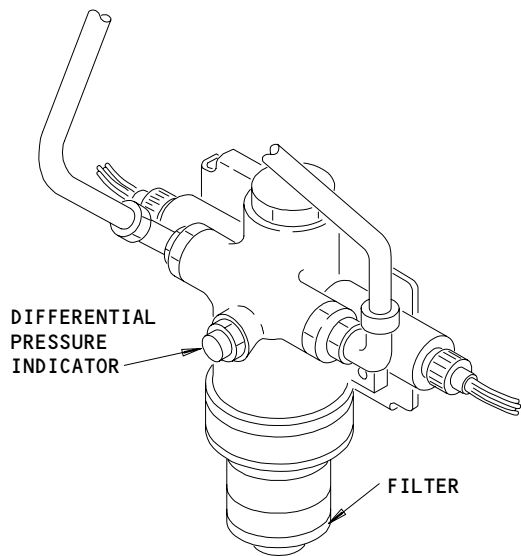
S 866-436

(10) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 416-437

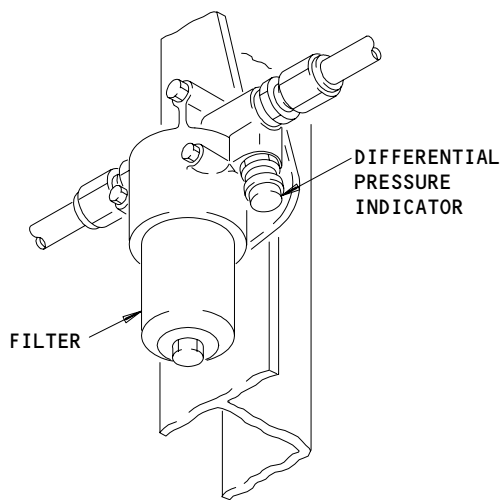
WARNING: USE THE PROCEDURE AMM 32-00-15 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).



PRESSURE FILTER FOR THE PTU

(C)



CASE DRAIN FILTER MODULE FOR THE PTU

(D)

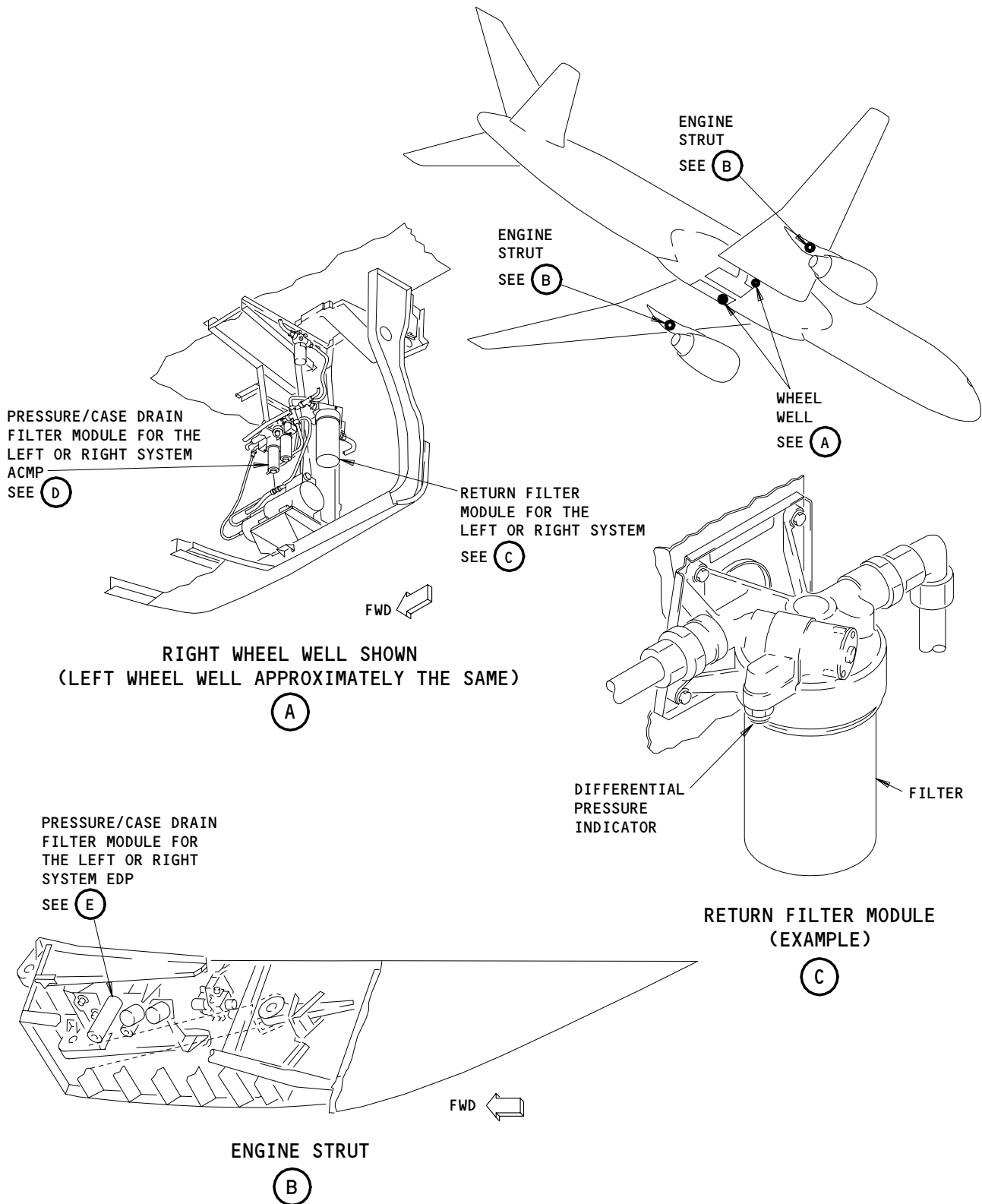
Differential Pressure and Wear Indicators for the PTU System
Figure 601 (Sheet 2)

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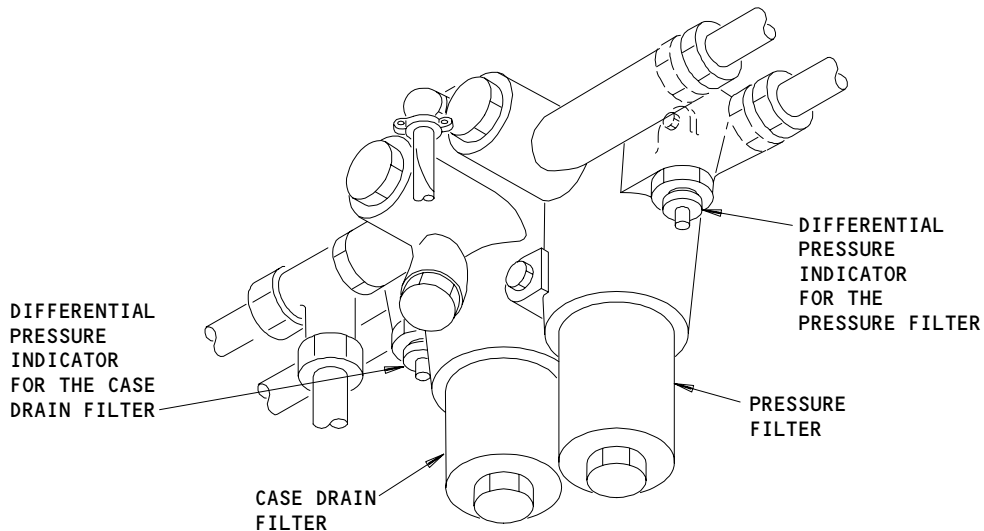
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Differential Pressure Indicators for the Left or Right System
Figure 602 (Sheet 1)

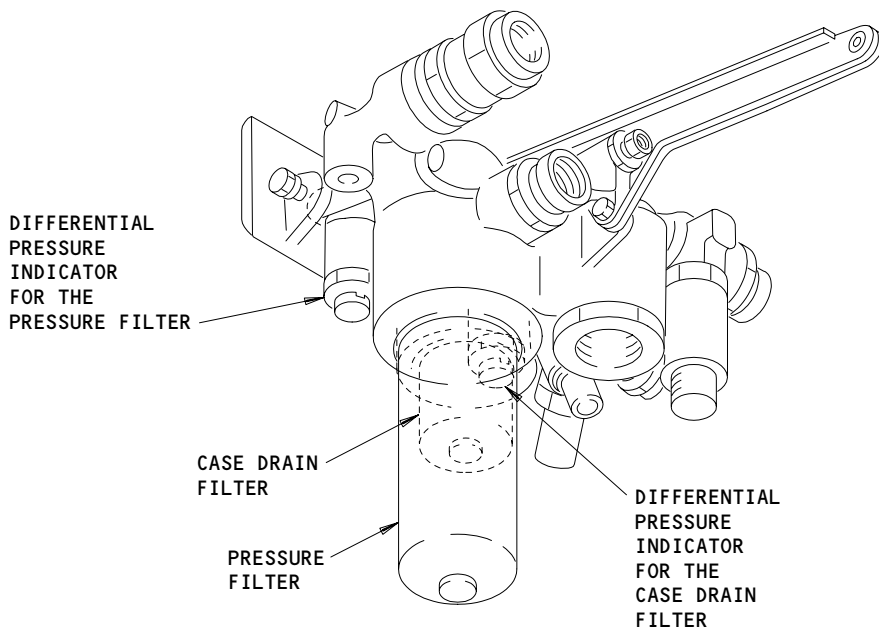
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ACMP FILTER MODULE
(EXAMPLE)

(D)



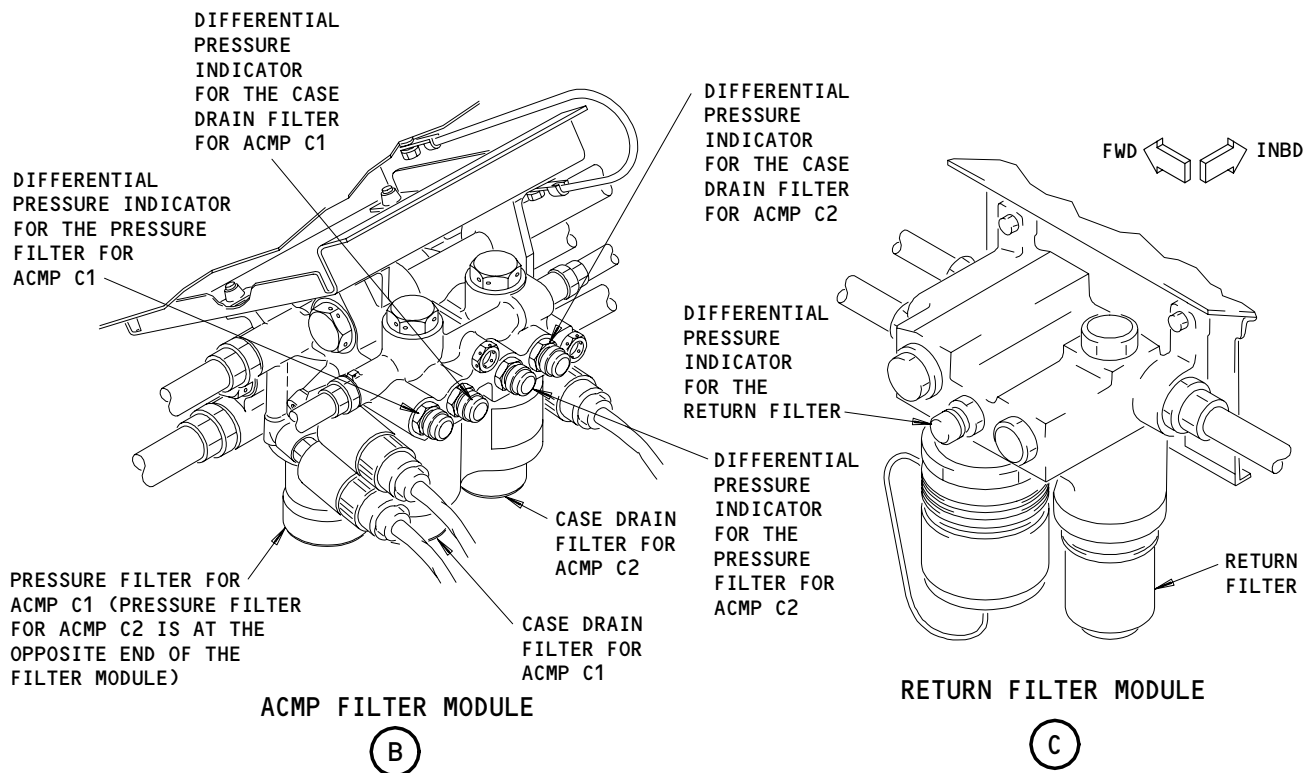
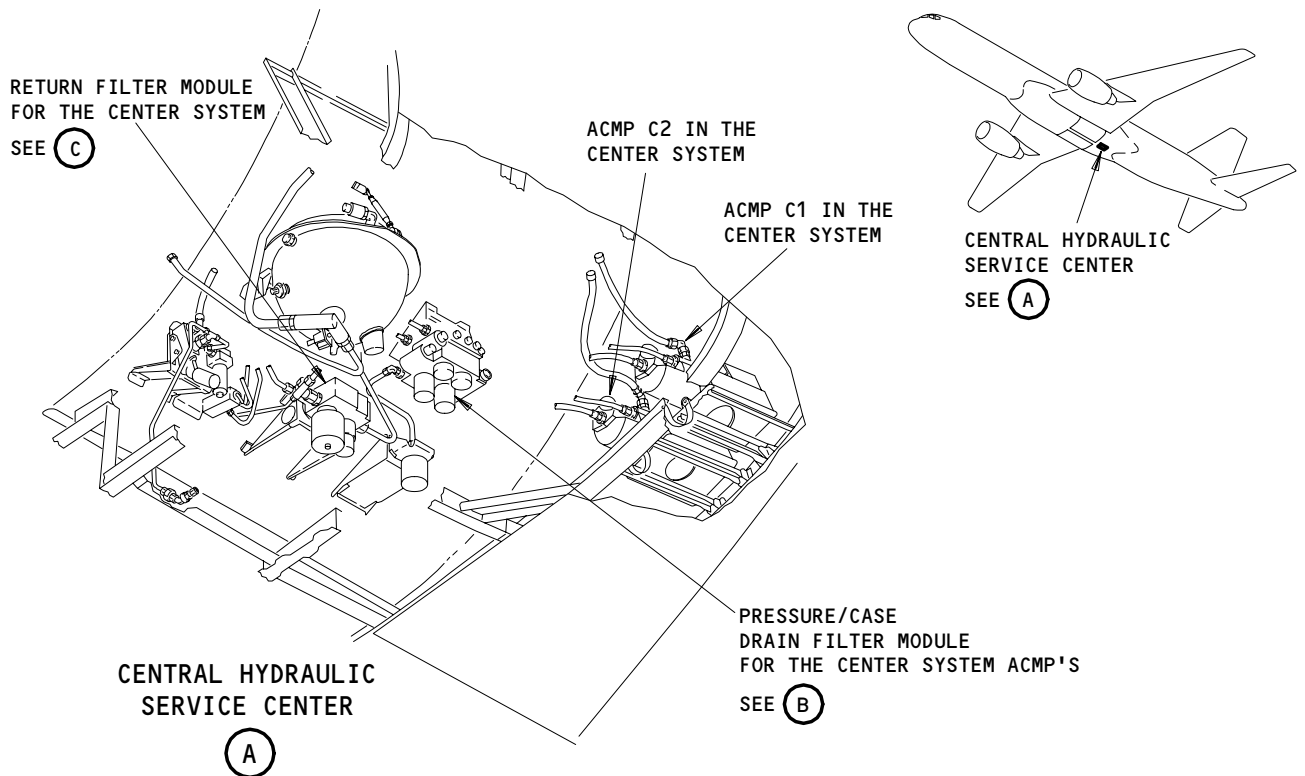
EDP FILTER MODULE
(EXAMPLE)

(E)

Differential Pressure Indicators for the Left or Right System
Figure 602 (Sheet 2)

EFFECTIVITY	
	ALL

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Differential Pressure Indicators for the Center System
Figure 603

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TASK 29-11-00-206-438

4. Differential Pressure Indicator Inspection for the Pressure Filter of the Right (R) Engine-Driven Pump (EDP)

A. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure and Case Drain Filter Module and Components
- (3) AMM 78-31-00/201, Thrust Reverser System

B. Access

- (1) Location Zones
444/445 Nacelle Strut - Aft Fairing
- (2) Access Panels
444AL Hydraulic Bay

C. Procedure

S 866-439

WARNING: DO THE THRUST REVERSER 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 016-440

- (2) Open the access panel, 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 216-444

- (3) Do the steps which follow to examine the differential pressure indicator for the pressure filter of the EDP in the right hydraulic system (Fig. 602):
 - (a) Make sure the red indicator button on the differential pressure indicator did not come out.
 - (b) If the red indicator button came out, replace the filter element and set the red indicator button for the pressure filter of the right EDP (AMM 29-11-17/401).

S 416-445

- (4) Close the access panel, 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 866-449

- (5) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

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TASK 29-11-00-206-450

5. Differential Pressure Indicators Inspection for the Case Drain Filters of the Alternating Current Motor Pumps (ACMP) and the Engine-Driven Pumps (EDP) and for the Return Filters in the Left, Right, and Center Hydraulic Systems.

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (3) AMM 29-11-01/401, Left and Right System Alternating Current Motor Pump (ACMP)
- (4) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)
- (5) AMM 29-11-05/401, Engine-Driven Pump (EDP)
- (6) AMM 29-11-13/401, Center System Return Filter Module and Components
- (7) AMM 29-11-15/401, Left and Right System Return Filter Module and Components
- (8) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure and Case Drain Filter Module and Components
- (9) AMM 29-11-18/401, Left and Right System Alternating Current Motor Pump (ACMP) Pressure and Case Drain Filter Module and Components
- (10) AMM 29-11-19/401, Center System Alternating Current Motor Pump (ACMP) Pressure and Case Drain Filter Module and Components
- (11) AMM 32-00-15/201, Main Gear Door Locks
- (12) AMM 32-00-20/201, Landing Gear Downlocks
- (13) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

143/144	MLG Wheel Well
197	Wing to Body - Aft Lower Half (Left)
434/444	Nacelle Strut - Aft Fairing
730/740	Main Landing Gear and Doors

(2) Access Panels

197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay

C. Procedure

S 496-451

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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S 016-452

WARNING: USE THE PROCEDURE 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 866-453

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

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

S 016-454

- (4) Open the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 016-458

- (5) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 216-459

- (6) Do the steps which follow to examine the differential pressure indicators for these filters:
- Case Drain Filter for the ACMP in the Left Hydraulic System (Fig. 602)
 - Case Drain Filter for the ACMP in the Right Hydraulic System (Fig. 602)
 - Case Drain Filters for the ACMPs in the Center Hydraulic System (Fig. 603)
 - Case Drain Filter for the EDP in the Left Hydraulic System (Fig. 602)
 - Case Drain Filter for the EDP in the Right Hydraulic System (Fig. 602)
 - Return Filter in the Left Hydraulic System (Fig. 602)
 - Return Filter in the Right Hydraulic System (Fig. 602)
 - Return Filter in the Center Hydraulic System (Fig. 603).
- (a) Make sure the red indicator button on each differential pressure indicator did not come out.
- (b) If the red indicator button came out, replace the filter element and set the indicator button as follows:
- 1) Case Drain Filter for the ACMP in the Left and Right Hydraulic Systems (AMM 29-11-18/401).
 - 2) Case Drain Filters for the ACMPs in the Center Hydraulic System (AMM 29-11-19/401).

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- 3) Case Drain Filter for the EDP in the Left and Right Hydraulic Systems (AMM 29-11-17/401).
 - 4) Return Filter in the Left and Right Hydraulic System (AMM 29-11-15/401).
 - 5) Return Filter Module in the Center Hydraulic System (AMM 29-11-13/401).
- (c) If a case drain filter module contains many metal particles, replace the related hydraulic pump as follows:
- 1) ACMP in the left and right hydraulic system (AMM 29-11-01/401).
 - 2) ACMP in the center hydraulic system (AMM 29-11-02/401)
 - 3) EDP in the left and right hydraulic system (AMM 29-11-05/401).

S 416-460

- (7) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 416-461

- (8) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 866-465

- (9) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 416-466

WARNING: USE THE PROCEDURE 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.

- (10) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

TASK 29-11-00-206-467

6. Differential Pressure Indicator Inspection for the Case Drain Filter of the Power Transfer Unit (PTU)

A. References

- (1) AMM 29-22-01/401, Power Transfer Unit (PTU)
- (2) AMM 29-22-05/401, Power Transfer Unit (PTU) Case Drain Filter Module and Components
- (3) AMM 32-00-15/201, Main Gear Door Locks
- (4) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zones
143 Left MLG Wheel Well

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C. Procedure

S 496-468

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-469

WARNING: USE THE PROCEDURE 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 216-470

- (3) Do the steps which follow to examine the differential pressure indicator for the case drain filter of the power transfer unit (PTU) (Fig. 601).
 - (a) Make sure the red indicator button on the differential pressure indicator did not come out.
 - (b) If the red indicator button came out, replace the filter element and set the red indicator button for the case drain filter of the PTU (AMM 29-22-05/401).
 - (c) If the case drain filter contains many metal particles, replace the PTU (AMM 29-22-01/401).

S 416-471

WARNING: USE THE PROCEDURE 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.

- (4) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

TASK 29-11-00-796-030

7. Hydraulic System External Leakage Check

A. General

- (1) This procedure gives the external leakage limits which are permitted for normal operation and for dispatch of the airplane to avoid a delay. An external leakage rate which is not more than these limits will not have a bad effect on the component or system operation. You must make an analysis of each of the leakage rates to make a decision on the maximum total leakage rate that the average length of flight will permit.

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- (2) The conditions which follow are important when you do a leakage check for the various components:
- (a) Metal-to-metal surfaces make the seal at the B-nut tube connections. If a leak does not stop when you tighten the B-nut to the correct torque, the joint is defective and you must repair it.
 - (b) Measure the leakage with hydraulic pressure supplied to the component.
 - (c) Where possible, operate the actuators to see if the leakage changes during the travel.
 - (d) Make sure the leak is not a type which will increase to a much higher rate with time. Use the type of leak and the length of time the component has pressure on it to make this decision.
 - (e) If a component has a continuous leak, or a leak that can possibly increase with time, check it a minimum of once daily, to make sure that leakage does not exceed limits shown in Table 601.
 - (f) Fill all the reservoirs before the flight.
 - (g) Large quantities of hydraulic fluid in the area of the leak must not cause damage to the airplane equipment.
- B. Do a Check of the Hydraulic System External Leakage (Table 601)

S 016-031

- (1) Get access to the component which has a leak.

S 866-032

- (2) Make sure the component has pressure on it when you do a check of the leak rate.

S 866-033

- (3) If possible operate the component.

S 166-034

- (4) Clean all surfaces of the component which has a leak.

S 796-035

- (5) Do a check of the leakage rate as shown in Table 601.

NOTE: There are approximately 20 drops in a cubic centimeter and 75,700 drops in a gallon.

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Hydraulic System External Leakage Limits
Table 601

COMPONENTS	NORMAL OPERATION LIMITS *[1]	DISPATCH LIMITS TO AVOID DELAY *[2]
Hydraulic Pumps *[3]	5 Drops in a Minute	10 Drops in a Minute *[4]
Hydraulic Motors	5 Drops in a Minute	10 Drops in a Minute *[4]
Dynamic Seals for All Actuators Except Flight Cntrls/Brake Assys *[5]	4 Drops in a Minute (Stopped or in Operation)	15 Drops in a Minute (Stopped or in Operation)
Dynamic Seals for the Flight Controls	8 Drops in a Minute (Stopped or in Operation)	30 Drops in a Minute *[4] (Stopped or in Operation)
Static Seals	1 Drop in 10 Minutes	1 Drop in 10 Minutes
B Nuts, Tubing, Hoses	No leakage	No leakage
Landing Gear Brake Assemblies	No leakage	Refer to AMM 32-41-10/601 for brake examination and leakage limit details.

- *[1] The total leakage in each system must not be more than 100 drops in a minute or 0.10 gallon in a hour.
- *[2] Each system must not have more than two leaks which are larger than the normal operation limits in Table 601. The airplane must not have more than four which are larger than the normal operation limits in Table 601. Total leakage for each system must not be more than 100 drops in a minute or 0.10 gallon in an hour.
- *[3] Operate the pumps during the test. The alternating current motor pump (ACMP) leakage must not be larger than the Static Seal leakage in Table 601.
- *[4] Correct when possible.
- *[5] These leakage limits do not apply to landing gear brake assemblies. Refer to AMM 32-41-10 for brake inspection details.

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TASK 29-11-00-796-036

8. Hydraulic System PCA Initial Leakage Check

A. General

- (1) This procedure quickly identifies the flight control system which has PCA's that possibly must be replaced in the Full Hydraulic System Internal Leakage Check procedure. This procedure quickly identifies PCA's with high leakage but it is not a replacement for the Full Hydraulic System Internal Leakage Check procedure. It does not do a check of the system check valves, the brakes and landing gear systems, the autopilot, or the secondary flight controls. This procedure also does not identify the one PCA which has high leakage.
- (2) The airplane must be in the cruise condition with the brakes and flaps/slats subsystems off. This procedure will find the spoiler, aileron, rudder, and elevator PCAs which have high leakage rates.
- (3) When you do trouble-shooting, it is not necessary to do a check of all the systems. In the system with high leakage, feel for hot tubing or actuators and listen for fluid leakage. This method will isolate the defective components in a subsystem which has too much internal leakage. Use approved tools to find heat, vibration, or sound. Before you do an internal leakage check, operate the components to make sure persons will not be injured or equipment will not be damaged when the component moves.
- (4) Measure all leakage in the pressure side of the hydraulic systems while the system pressure is at approximately 3000 psi.
- (5) There are two techniques to measure flow rates; the multimeter technique and the flowmeter technique.
 - (a) Multimeter Technique
 - 1) The multimeter technique uses the alternating current motor pumps (ACMP) to measure the hydraulic flow rate.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
to do a test, connect a multimeter to the test jacks on the generator field/hydraulic control panel on the right side panel, P61. The test jacks connect to a transformer in one of the supply lines for electrical power to the ACMP. The multimeter measures the voltage in the transformer caused by the ac current which flows to the ACMP. A graph shown in Fig. 605 changes the voltage to a hydraulic flow rate.
 - 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
a multimeter connects to a clamp-on ac current probe which you put around one of the three wires which connect to the load side of the ACMP ELCU in the P31 and P32 panel. The multimeter with the ac current probe measures the amperage which flows in the one wire to the pump motor. A graph shown in Fig. 605 changes the amperage to a hydraulic flow rate.

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- (b) Flowmeter Technique
 - 1) The flowmeter technique uses a flowmeter to measure flow rates directly while the system is pressurized with an ACMP or a hydraulic service cart. You install the flowmeter in the pressure line between the pressure source and the pressure filter module.
 - (6) The procedure for the PCA leakage check follows. This procedure is the same for all three systems, but the specified leakage limits are different. The sequence in which you do a test of the left, right, and center systems is not important.
- B. Equipment
- (1) Use this equipment with multimeter technique:
 - (a) Digital Multimeter - John Fluke Model 27 YEL.
 - (b) Clamp-on AC Current Probe - John Fluke Model 80i 600.
- NOTE: ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS, the ac current probe is used with the multimeter.
- (2) Use this equipment with the flowmeter technique (optional to the multimeter technique):
 - (a) Flowmeter - Commercially Available, 0.2 to 7.0 GPM range with a precision of ± 3 percent of the indication, specified for operation at 3000 psi
 - (b) Hydraulic Service Cart(s) - Commercially Available, which can supply 6 GPM to each system (18 GPM total) at 3000 psi
- NOTE: The service cart is not necessary if the ACMP is used to pressurize the hydraulic system.
- (3) Mechanic's Stethoscope, GA 111 D, Snap-On-Tools Corporation, Kenosha, Wisconsin
- C. References
- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels

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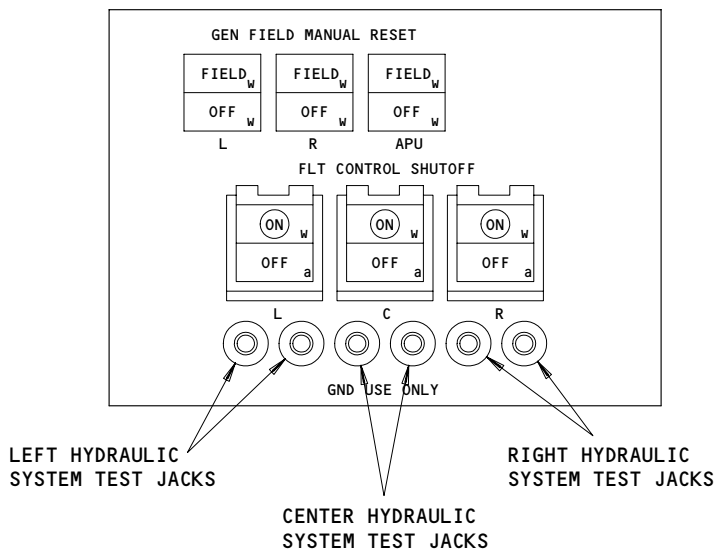
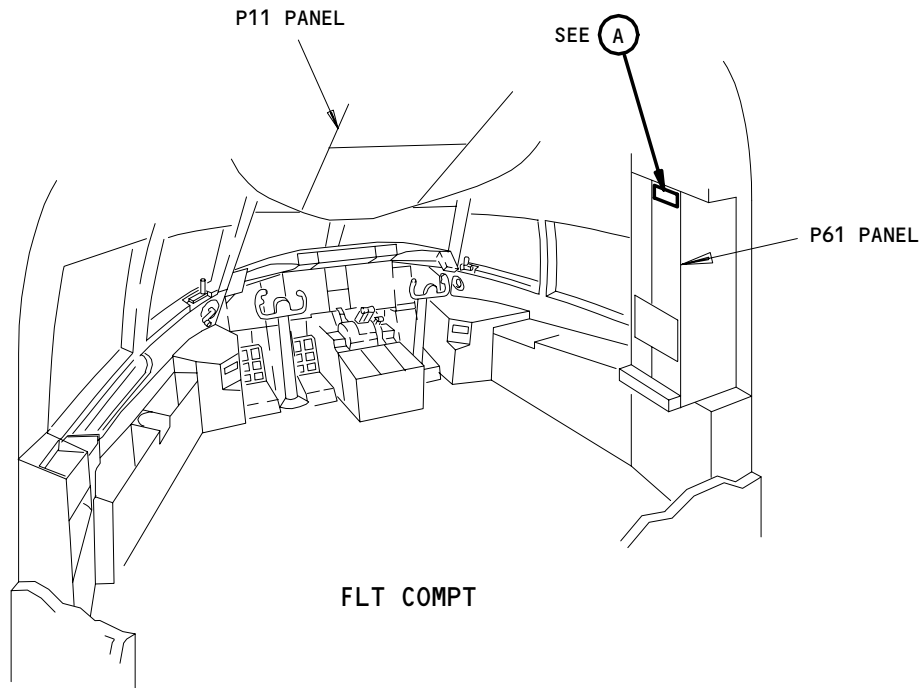
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BOEING
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MAINTENANCE MANUAL



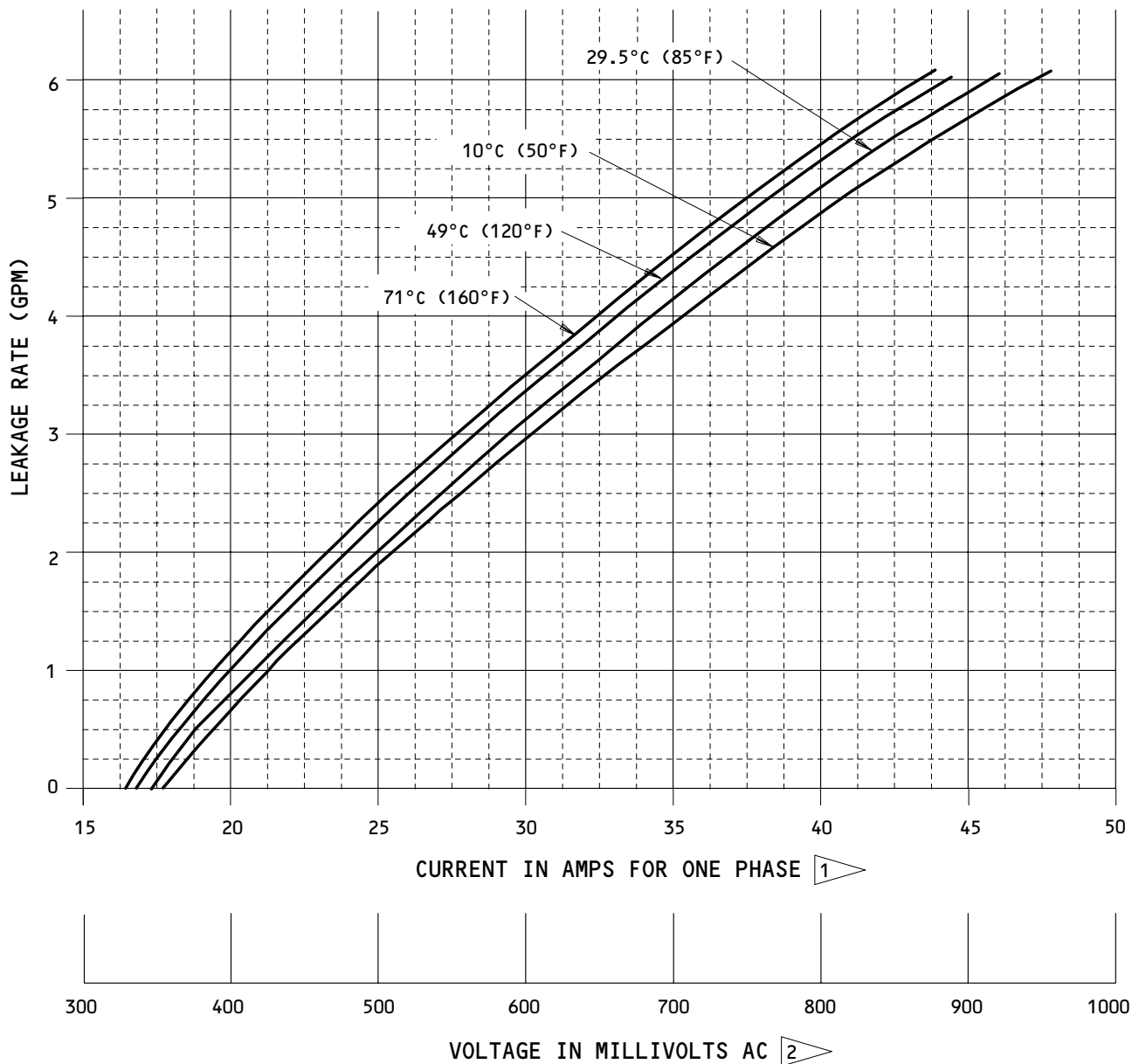
GENERATOR FIELD AND HYDRAULIC CONTROL PANEL

A

Hydraulic System Internal Leak Test Jacks
Figure 604

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(ABEX PUMPS)

- 1 THE MULTIMETER VALUES WHEN THE CLAMP-ON AC CURRENT PROBE IS USED
- 2 THE MULTIMETER VALUES WHEN THE INTERNAL LEAK TEST JACKS ARE USED

ACMP Flow and Multimeter Value
Figure 605 (Sheet 1)

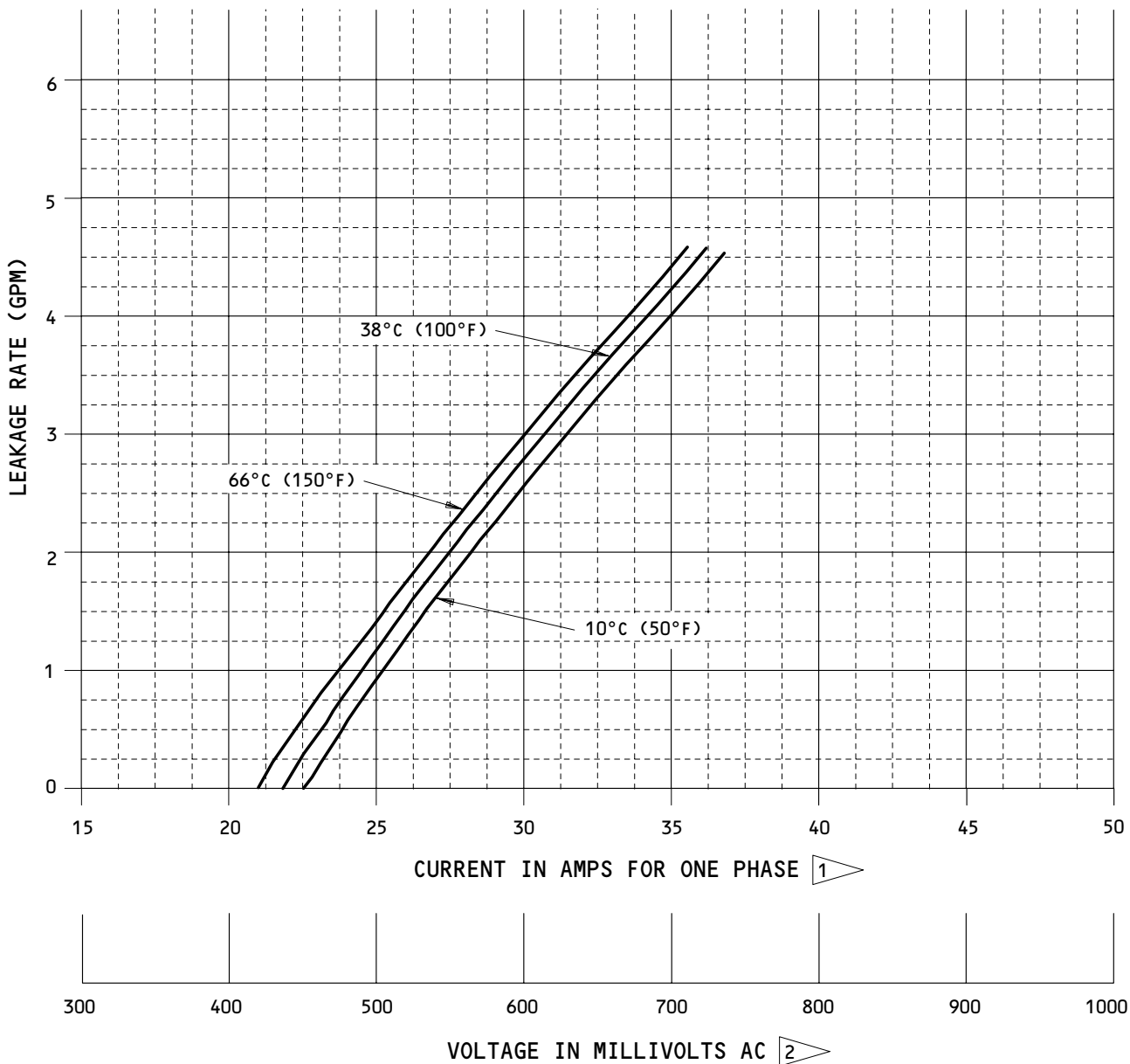
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(VICKERS PUMPS)

- 1 THE MULTIMETER VALUES WHEN THE CLAMP-ON AC CURRENT PROBE IS USED
- 2 THE MULTIMETER VALUES WHEN THE INTERNAL LEAK TEST JACKS ARE USED

ACMP Flow and Multimeter Value
Figure 605 (Sheet 2)

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765004

- (2) AMM 06-43-00/201, Engine and Nacelle Strut 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 System
- (6) AMM 32-00-15/201, Landing Gear Door Locks
- (7) AMM 32-00-20/201, Landing Gear Downlocks

D. Access

(1) Location Zones

- 119/120 Main Equipment Center
- 197 Wing to Body - Aft Lower Half (Left)
- 211/212 Control Cabin
- 434/444 Nacelle Strut - Aft Fairing

(2) Access Panels

- 119BL Main Equipment Center
- 197KL Central Hydraulic Service Center
- 435AL/445AL Hydraulic Bay

(3) Access Panels

- 119BL Main Equipment Center
- 197KL Central Hydraulic Service Center
- 434AL/444AL Hydraulic Bay

E. Prepare for the PCA Leakage Check

S 866-037

- (1) Make sure the persons on the ground can speak with those in the control cabin.

S 496-039

- (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-040

WARNING: USE THE PROCEDURE 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 496-044

- (4) Put chocks on the wheels.

S 866-041

- (5) Make sure the parking brake is set.

S 866-042

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

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S 616-043

- (7) Do a check of the fluid level in the hydraulic reservoirs (AMM 12-12-01/301).

S 866-046

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (8) If you use an ACMP to pressurize the hydraulic system, make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-047

- (9) If you use an ACMP to pressurize the hydraulic system, pressurize the system reservoir (AMM 29-11-00/201).

S 866-048

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

- (10) Pressurize the left, right and center hydraulic systems (AMM 29-11-00/201).

S 866-049

- (11) Put the landing gear lever in the OFF position.

S 866-050

- (12) Fully retract the flaps and slats and keep the flap control lever in the zero detent.

S 866-052

- (13) Make sure the autopilot switches on the pilots' glare shield panel, P55, are in the OFF position.

S 866-053

- (14) Make sure the yaw damper switches on the P55 panel are in the INOP position.

S 866-054

- (15) Put the stabilizer trim hydraulic cutout switches on the control stand panel, P10, to the CUT OUT position.

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S 866-055

- (16) Make sure the flight control shutoff valve switches on the right side panel, P61, are in the ON position.

S 866-051

- (17) Remove the pressure from all three main hydraulic systems (AMM 29-11-00/201).

F. Left System PCA Leakage Check

S 486-056

- (1) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
- 1) Install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the L HYD PUMPS ELEC pump switch to the ON position.
- (b) If you use the hydraulic service cart, do these steps:
- 1) Open the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - 2) Connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line.

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

- 3) Operate the hydraulic service cart to pressurize the left system to 3000 psi.

S 486-057

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the left system, below the flight-control shutoff-valve switches on the P61 panel.
- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:

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29-11-00

- 1) Get access to the left system ACMP ELCU M10001 in the P32 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the L HYD PUMPS ELEC pump switch to the ON position.

S 866-059

- (3) Operate the flight controls (elevator, rudder, ailerons and speed brakes) through five full cycles to cause the hydraulic fluid to become warm.

S 866-060

- (4) Put the control wheel in the neutral position and do not operate the other flight controls.

S 976-476

- (5) Measure the system gross leakage and write the value here:

Left _____ GPM (Value No. 1)

S 866-061

- (6) Put the L FLT CONTROL SHUTOFF switch on the P61 panel to OFF.

NOTE: This removes left system pressure from the empennage flight controls.

S 976-062

- (7) Measure the system gross leakage for the lateral flight controls and write the value here:

Left _____ GPM (Value No. 2)

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S 866-063

- (8) Put the speedbrake lever at approximately the middle position between the ARMED and the UP detents.

S 976-064

- (9) Measure the leakage and write the value here:

Left _____ GPM (Value No. 3)

S 976-065

- (10) Subtract Value No. 2 from Value No. 3 and write the value here:

Left Value No. 3
minus Value No. 2 = _____ GPM (Value No. 4)

S 976-066

- (11) If Value No. 4 is less than -1.5 GPM, usually you must replace a spoiler PCA because of high seal leakage.

S 976-067

- (12) If Value No. 4 is more than 1.5 GPM, usually you must replace a spoiler PCA because of high null leakage.

S 976-068

- (13) If Value No. 4 is between the above limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-069

- (14) Put the speedbrake lever to the down-and-locked position.

S 866-070

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

- (a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

- (b) GUI 115;

Circuit Breakers:

- 1) 11C6, CSEU 1L AC

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- 2) 11C7, CSEU 1L DC
- 3) 11C8, CSEU 2L AC
- 4) 11C9, CSEU 2L DC
- 5) 11G17, CSEU 1R AC
- 6) 11G18, CSEU 1R DC
- 7) 11G27, CSEU 2R AC
- 8) 11G28, CSEU 2R DC

S 866-071

- (16) Turn the pilot's control wheel to the fully right position.

S 976-072

- (17) Measure the leakage and write the value here:

Left _____ GPM (Value No. 5)

S 976-073

- (18) Subtract Value No. 5 from Value No. 2 and write the value here:

Left Value No. 2
minus Value No. 5 = _____ GPM (Value No. 6)

S 976-074

- (19) If Value No. 6 is less than -0.50 GPM, usually you must replace an aileron PCA because of high seal leakage.

S 976-075

- (20) If Value No. 6 is more than 0.50 GPM, usually you must replace an aileron PCA because of high null leakage.

S 976-076

- (21) If Value No. 6 is between the above limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 976-077

- (22) Subtract the Value No. 2 from Value No. 1 and write the value, which is the empennage flight control null leakage, here.

Left Value No. 1
minus Value No. 2 = _____ GPM (Value No. 7)

S 976-078

- (23) If value No. 7 is more than 1 GPM, usually you must replace a rudder or elevator PCA because of high null leakage.

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S 976-079

- (24) If Value No. 7 is less than 1 GPM, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-080

- (25) Move the L FLT CONTROL SHUTOFF switch on the P61 panel to ON.

S 866-081

- (26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on P11 panel.

(a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

(b) GUI 115;

Circuit Breakers:

- 1) 11C6, CSEU 1L AC
- 2) 11C7, CSEU 1L DC
- 3) 11C8, CSEU 2L AC
- 4) 11C9, CSEU 2L DC
- 5) 11G17, CSEU 1R AC
- 6) 11G18, CSEU 1R DC
- 7) 11G27, CSEU 2R AC
- 8) 11G28, CSEU 2R DC

S 086-082

- (27) Put the left hydraulic system back to its usual condition as follows:

(a) If you use the flowmeter technique, do these steps:

- 1) If you use an ACMP to pressurize system, do these steps:
 - a) Put the L HYD PUMPS ELEC pump switch to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.

2) If you use the hydraulic service cart to pressurize the system, do these steps:

- a) Operate the hydraulic service cart to decrease the system pressure to zero.
- b) Disconnect the service cart and install caps on the airplane ground power connections.

- 3) Close the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

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- (b) If you use the multimeter technique, do these steps:
 - 1) Put the L HYD PUMPS ELEC pump switch to the OFF position.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
Remove the multimeter from the test jacks for the left system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
Remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P32 panel.

G. Center System PCA Leakage Check

S 486-083

- (1) If you use the flowmeter technique, do these steps:
 - (a) Open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
 - (b) If you use an ACMP to pressurize the system, do these steps:
 - 1) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter module.

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

- 2) Put the C HYD PUMPS ELEC 1 pump switch to the ON position.
- (c) If you use the hydraulic service cart, do these steps:
 - 1) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line.

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

- 2) Operate the hydraulic service to pressurize the center system to 3000 psi.

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S 486-084

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
connect the multimeter to the test jacks for the center system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the center system ACMP C1 ELCU M10006 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the C HYD PUMPS ELEC 1 pump switch to the ON position.

S 866-086

- (3) Operate the flight controls (elevator, rudder, ailerons and speed brakes) through five full cycles to cause the hydraulic fluid to become warm.

S 866-087

- (4) Put the control wheel in the neutral position and do not operate the other flight controls.

S 976-088

- (5) Measure the system gross leakage and write the value here:

Center _____ GPM (Value No. 1)

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S 866-089

- (6) Put the C FLT CONTROL SHUTOFF switch on the P61 panel to OFF.

NOTE: This removes center system pressure from the empennage flight controls.

S 976-090

- (7) Measure the system gross leakage for the lateral flight controls and write the value here:

Center _____ GPM (Value No. 2)

S 866-091

- (8) Put the speedbrake lever at approximately the middle position between the ARMED and the UP detents.

S 976-092

- (9) Measure the leakage and write the value here:

Center _____ GPM (Value No. 3)

S 976-093

- (10) Subtract Value No. 2 from Value No. 3 and write the value here:

Center Value No. 3
minus Value No. 2 = _____ GPM (Value No. 4)

S 976-094

- (11) If Value No. 4 is less than -0.75 GPM, usually you must replace a spoiler PCA because of high seal leakage.

S 976-095

- (12) If Value No. 4 is more than 0.75 GPM, usually you must replace a spoiler PCA because of high null leakage.

S 976-096

- (13) If Value No. 4 is between the above PCA limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-097

- (14) Put the speedbrake lever to the down-and-locked position.

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S 866-098

(15) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

(a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

(b) GUI 115;

Circuit Breakers:

- 1) 11C6, CSEU 1L AC
- 2) 11C7, CSEU 1L DC
- 3) 11C8, CSEU 2L AC
- 4) 11C9, CSEU 2L DC
- 5) 11G17, CSEU 1R AC
- 6) 11G18, CSEU 1R DC
- 7) 11G27, CSEU 2R AC
- 8) 11G28, CSEU 2R DC

S 866-099

(16) Turn the pilot's control wheel to the fully right position.

S 976-100

(17) Measure the leakage and write the value here:

Center _____ GPM (Value No. 5)

S 976-101

(18) Subtract Value No. 5 from Value No. 2 and write the value here:

Center Value No. 2
minus Value No. 5 = _____ GPM (Value No. 6)

S 976-102

(19) If Value No. 6 is less than -1.0 GPM, usually you must replace an aileron PCA because of high seal leakage.

S 976-103

(20) If Value No. 6 is more than 1.0 GPM, usually you must replace an aileron PCA because of high null leakage.

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S 976-104

- (21) If Value No. 6 is between the above limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 976-105

- (22) Subtract Value No. 2 from Value No. 1 and write the value, which is the empennage flight control null leakage, here:

Center Value No. 1
minus Value No. 2 = _____ GPM (Value No. 7)

S 976-106

- (23) If Value No. 7 is more than 1 GPM, usually you must replace a rudder or elevator PCA because of high null leakage.

S 976-107

- (24) If Value No. 7 is less than 1 GPM, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-108

- (25) Move the C FLT CONTROL SHUTOFF switch on the P61 panel to ON.

S 866-109

- (26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel.

(a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

(b) GUI 115;

Circuit Breakers:

- 1) 11C6, CSEU 1L AC
- 2) 11C7, CSEU 1L DC
- 3) 11C8, CSEU 2L AC
- 4) 11C9, CSEU 2L DC
- 5) 11G17, CSEU 1R AC
- 6) 11G18, CSEU 1R DC
- 7) 11G27, CSEU 2R AC
- 8) 11G28, CSEU 2R DC

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S 086-110

- (27) Put the center hydraulic system back to its usual condition as follows:
- (a) If you use the flowmeter technique, do these steps:
 - 1) If you use an ACMP to pressurize the system, do these steps:
 - a) Put the C HYD PUMPS ELEC 1 switch to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - 2) If you use the hydraulic service cart to pressurize the system, do these steps:
 - a) Operate the hydraulic service cart to decrease the system pressure to zero.
 - b) Disconnect the service cart and install caps on the airplane ground power connections.
 - 3) Close the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
 - (b) If you use the multimeter technique, do these steps:
 - 1) Put the C HYD PUMPS ELEC 1 switch to the OFF position.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the multimeter from the test jacks for the center system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

H. Right System PCA Leakage Check

S 486-111

- (1) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
 - 1) Install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the R HYD PUMPS ELEC pump switch to the ON position.

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- (b) If you use the hydraulic service cart, do these steps:
- 1) Open the access panel, 444 AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - 2) Connect the service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line.

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

- 3) Operate the hydraulic service cart to pressurize the right system to 3000 psi.

S 486-112

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the right system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the right system ACMP ELCU M10005 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the R HYD PUMPS ELEC pump switch to the ON position.

S 866-114

- (3) Operate the flight controls (elevator, rudder, ailerons and speed brakes) through five full cycles to cause the hydraulic fluid to become warm.

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S 866-115

- (4) Put the control wheel in the neutral position and do not operate the other flight controls.

S 976-116

- (5) Measure the system gross leakage and write the value here:

Right _____ GPM (Value No. 1)

S 866-117

- (6) Put the R FLT CONTROL SHUTOFF switch on the P61 panel to OFF.

NOTE: This removes right system pressure from the empennage flight controls.

S 976-118

- (7) Measure the system gross leakage for the lateral flight control and write the value here:

Right _____ GPM (Value No. 2)

S 866-119

- (8) Put the speedbrake lever at approximately the middle position between the ARMED and the UP detents.

S 976-120

- (9) Measure the leakage and write the value here:

Right _____ GPM (Value No. 3)

S 976-392

- (10) Subtract Value No. 2 from Value No. 3 and write the value here:

Right Value No. 3
minus Value No. 2 = _____ GPM (Value No. 4)

S 976-121

- (11) If Value No. 4 is less than -1.5 GPM, usually you must replace a spoiler PCA because of high seal leakage.

S 976-122

- (12) If Value No. 4 is more than 1.5 GPM, usually you must replace a spoiler PCA because of high null leakage.

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S 976-123

- (13) If Value No. 4 is between the above limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-124

- (14) Put the speedbrake lever to the down-and-locked position.

S 866-125

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

(a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

(b) GUI 115;

Circuit Breakers:

- 1) 11C6, CSEU 1L AC
- 2) 11C7, CSEU 1L DC
- 3) 11C8, CSEU 2L AC
- 4) 11C9, CSEU 2L DC
- 5) 11G17, CSEU 1R AC
- 6) 11G18, CSEU 1R DC
- 7) 11G27, CSEU 2R AC
- 8) 11G28, CSEU 2R DC

S 866-126

- (16) Turn the pilot's control wheel to the fully right position.

S 976-127

- (17) Measure the leakage and write the value here:

Right _____ GPM (Value No. 5)

S 976-128

- (18) Subtract Value No. 5 from Value No. 2 and write the value here:

Right Value No. 2
minus Value No. 5 = _____ GPM (Value No. 6)

EFFECTIVITY

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S 976-129

- (19) If Value No. 6 is less than -0.5 GPM, usually you must replace an aileron PCA because of high seal leakage.

S 976-130

- (20) If Value No. 6 is more than 0.5 GPM, usually you must replace an aileron PCA because of high null leakage.

S 976-131

- (21) If Value No. 6 is between the above limits, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 976-132

- (22) Subtract Value No. 2 from Value No. 1 and write the value, which is the empennage flight control null leakage, here:

Right Value No. 1
minus Value No. 2 = _____ GPM (Value No. 7)

S 976-133

- (23) If Value No. 7 is more than 1 GPM, usually you must replace a rudder or elevator PCA because of high null leakage.

S 976-134

- (24) If Value No. 7 is less than 1 GPM, you can not make a decision about PCA replacement until you do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 866-135

- (25) Move the R FLT CONTROL SHUTOFF switch on the P61 panel to the ON position.

S 866-136

- (26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel.

(a) ALL EXCEPT GUI 115;

Circuit Breakers:

- 1) 11C6, FLT CONT ELEC 1L AC
- 2) 11C7, FLT CONT ELEC 1L DC
- 3) 11C8, FLT CONT ELEC 2L AC
- 4) 11C9, FLT CONT ELEC 2L DC
- 5) 11G17, FLT CONT ELEC 1R AC
- 6) 11G18, FLT CONT ELEC 1R DC
- 7) 11G27, FLT CONT ELEC 2R AC
- 8) 11G28, FLT CONT ELEC 2R DC

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- (b) GUI 115;
Circuit Breakers:
 - 1) 11C6, CSEU 1L AC
 - 2) 11C7, CSEU 1L DC
 - 3) 11C8, CSEU 2L AC
 - 4) 11C9, CSEU 2L DC
 - 5) 11G17, CSEU 1R AC
 - 6) 11G18, CSEU 1R DC
 - 7) 11G27, CSEU 2R AC
 - 8) 11G28, CSEU 2R DC

S 086-137

- (27) Put the right hydraulic system back to its usual condition as follows:
 - (a) If you use the flowmeter technique, do these steps:
 - 1) If you use an ACMP to the pressurize system, do these steps:
 - a) Put the R HYD PUMPS ELEC pump switch to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - 2) If you use the hydraulic service cart to pressurize the system, do these steps:
 - a) Operate the hydraulic service cart to decrease the system pressure to zero.
 - b) Disconnect the service cart and install caps on the airplane ground power connections.
 - 3) Close the access panel, 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - (b) If you use the multimeter technique, do these steps:
 - 1) Put the R HYD PUMPS ELEC pump switch to the OFF position.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the multimeter from the test jacks for the right system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

I. Put the Airplane Back to Its Usual Condition

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S 096-376

WARNING: USE THE PROCEDURE 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 866-139

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

TASK 29-11-00-796-140

9. Hydraulic System Gross Internal Leakage Check

A. General

- (1) This procedure does a gross internal leakage check for each hydraulic system. The total system leakage rate for each hydraulic system must not be more than the approved leakage flow rates. For the left or right system, the total null (neutral) leakage must not be more than 4.5 GPM. For the center system the total null (neutral) leakage must not be more than 4.0 GPM.
- (2) There are two techniques to measure flow rates; the multimeter technique and the flowmeter technique.
 - (a) Multimeter Technique
 - 1) The multimeter technique uses the ACMPs to measure the hydraulic flow rate.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS; to do a test, connect a multimeter to the test jacks on the generator field/hydraulic control panel on the right side panel, P61. The test jacks connect to a transformer in one of the supply lines for electrical power to the ACMP. The multimeter measures the voltage in the transformer caused by the ac current which flows to the ACMP. A graph shown in Fig. 605 changes the voltage to a hydraulic flow rate.
 - 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; a multimeter connects to a clamp-on ac current probe which you put around one of the three wires which connect to the load side of the ACMP ELCU in the P31 and P32 panel. The multimeter with the ac current probe measures the amperage which flows in the one wire to the pump motor. A graph shown in Fig. 605 changes the amperage to a hydraulic flow rate.
 - (b) Flowmeter Technique
 - 1) The flowmeter technique uses a flowmeter to measure flow rates directly while the system is pressurized with an ACMP or a hydraulic service cart. You install the flowmeter in the pressure line between the pressure source and the pressure filter module.

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- (3) Pressurize the three hydraulic systems at the same time during this test with a hydraulic service cart(s) or with an ACMP in each system.
- (4) The procedure for the gross internal leakage check follows. This procedure does a leakage check of one hydraulic system at a time. The sequence in which you do a test of the left, center and right hydraulic systems is not important. When you start the leak check of a system, do not stop until you complete the procedure, to get correct results. In this procedure, all controls must be in the neutral position unless a different position is specified. After you make a test configuration for each test step, do not measure the leakage for at least 15 seconds. This will let the leakage flow become stable before you measure the flow.

B. Equipment

- (1) Use this equipment with the multimeter technique:
 - (a) Digital Multimeter - John Fluke Model 27 YEL.
 - (b) Clamp-on AC Current Probe - John Fluke Model 80i 600.

NOTE: ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS, the ac current probe is used with the multimeter.

- (2) Use this equipment with the flowmeter technique (optional to the multimeter technique):
 - (a) Flowmeter - Commercially Available, 0.2 to 7.0 GPM range with a precision of $\pm 3\%$ of the indication, specified for operation at 3000 psi.
 - (b) Hydraulic Service Cart(s) - Commercially Available, which can supply 6 GPM to each system (18 GPM total) at 3000 psi

NOTE: The service cart is not necessary if you use the ACMP to pressurize the hydraulic system.

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut 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 System
- (6) AMM 32-00-15/201, Landing Gear Door Locks
- (7) AMM 32-00-20/201, Landing Gear Downlocks
- (8) AMM 34-21-00/501, Inertial Reference System

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D. Access

(1) Location Zones

119/120	Main Equipment Center
197	Wing-to-Body - Aft Lower Half (Left)
211/212	Control Cabin
324	Vertical Stabilizer and Rudder
335/345	Horizontal Stabilizer and Elevator
434/444	Nacelle Strut - Aft Fairing
730/740	Main Landing Gear and Doors

(2) Access Panels

119BL	Main Equipment Center
197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay

E. Prepare for the Gross Internal Leakage Check

S 866-141

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

S 616-142

- (2) Do a check of the fluid level in the hydraulic reservoirs (AMM 12-12-01/301).

S 866-393

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (3) If you use an ACMP to pressurize the hydraulic system, make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-380

- (4) If you use an ACMP to pressurize the hydraulic system, pressurize the system reservoir (AMM 29-11-00/201).

S 866-381

- (5) Make sure the persons on the ground can speak with those in the control cabin.

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S 866-478

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

- (6) Pressurize the three hydraulic systems with a hydraulic service cart or the system ACMPs (AMM 29-11-00/201).

S 496-150

- (7) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 096-151

WARNING: USE THE PROCEDURE 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.

- (8) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 496-152

- (9) Put chocks on the wheels.

S 866-153

- (10) Make sure the parking brake is set.

S 866-154

- (11) Put the landing gear lever in the OFF position.

S 866-155

- (12) Operate the flight controls through five full cycles to cause the hydraulic fluid to become warm.

NOTE: One cycle is equivalent to movement from neutral to full control travel, to full control travel in the opposite direction, then back to neutral.

S 866-156

- (13) Operate the flap/slat system through three full cycles.

NOTE: One cycle is equivalent to movement from the retracted position to the fully extended position and then back to the retracted position.

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S 866-157

- (14) Make sure the flap control lever is in the zero detent position.

S 866-158

- (15) Align the inertial reference system to permit you to engage the autopilot during some leak check procedures (AMM 34-21-00/501).

S 866-159

- (16) Make sure all autopilot switches on the pilots' glare shield panel, P55, are in the OFF position.

S 866-160

- (17) Make sure the two yaw damper switches on the pilots' overhead panel, P5, are in the INOP position.

S 866-161

- (18) Put the stab trim switches on the pilots' aisle control stand, P10, to the CUT OUT position.

S 866-162

- (19) Make sure the flight control shutoff valve switches on the right side panel, P61, are in the ON position.

S 866-163

- (20) Make sure the L HYD PUMPS ENG and the R HYD PUMPS ENG switches on the hydraulic control panel on the P5 panel are in the ON position.

S 866-164

- (21) If you do not use the ACMPs to pressurize the system, make sure these switches on the hydraulic control panel on the P5 panel are in the OFF position:

- (a) L HYD PUMPS ELEC
- (b) R HYD PUMPS ELEC
- (c) C HYD PUMPS ELEC 1
- (d) C HYD PUMPS ELEC 2.

F. Left Hydraulic System PTU Internal Leakage Check

S 866-165

- (1) Remove the pressure from the left hydraulic system (Ref 29-11-00).

S 866-166

- (2) Move the PTU manual control switch on the P61 panel to the ON position.

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S 216-167

- (3) Make sure the left hydraulic system pressure shown on EICAS is at least 2500 psi.

NOTE: A pressure of 2500 psi is a general indication of normal PTU operation. If the pressure is not at least 2500 psi, you must trouble shoot the PTU system to find the cause.

S 216-168

- (4) Make sure the left system low pressure light on the hydraulic control panel is on.

NOTE: If the low pressure light is off, you must replace the check valve in the pressure line to the Flap/Slat Depressurization Module because of high leakage. On airplanes with the PTU pressure line routed to the Flap/Slat Depressurization Module, the check valve is located in the module. On airplanes with the PTU pressure port in the Flap/Slat Depressurization Module capped off, the valve is located just aft and outboard of the Flap/Slat Depressurization Module, at approximately Station 1080.

S 866-169

- (5) Put the PTU manual control switch on the P61 panel to the OFF position.

G. Left Hydraulic System Gross Internal Leakage Check

S 486-171

- (1) If you use the flowmeter technique do these steps:
(a) If you use an ACMP to pressurize the system, do these steps:
1) Install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the L HYD PUMPS ELEC pump switch to the ON position.
(b) If you use the hydraulic service cart, do these steps:
1) Open the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
2) Connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line.

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

- 3) Operate the hydraulic service cart to pressurize the left system to 3000 psi.

S 486-172

- (2) If you use the multimeter technique do these steps:
 - (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
connect the multimeter to the test jacks for the left system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the left system ACMP ELCU M10001 in the P32 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the L HYD PUMPS ELEC switch to the ON position.

S 866-173

- (3) Put the flap control lever on the control stand to the 1-unit detent.

S 866-174

- (4) Put the landing gear lever in the DOWN position.

S 866-175

- (5) Put the A/P ENGAGE L switch on the mode control panel on the P55 panel to CMD to engage the left system autopilot.

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- S 866-176
(6) Put the YAW DAMPER L engage switch on the P5 panel to the ON position.

- S 496-177
(7) Make sure there are chocks on the wheels.

- S 866-178
(8) Release the parking brake.

NOTE: This puts the left hydraulic system in the landing configuration.

- S 866-179
(9) Let the left system operate for at least 1 minute to let the leakage flow become stable.

- S 976-180
(10) Measure and write the leakage flow.

NOTE: This is the left system gross neutral leakage flow.

- S 976-181
(11) If the system gross leakage is more than 4.5 GPM, you must do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

- S 366-182
(12) Replace the components with high leakage as necessary to decrease the left system gross leakage to less than 4.5 GPM.

- S 866-183
(13) Set the parking brake.

- S 866-184
(14) Put the flap control lever to the zero detent position to retract the flaps.

- S 866-185
(15) Put the landing gear lever to the OFF position.

- S 866-186
(16) Put the A/P ENGAGE L switch on the mode control panel on the P55 panel to the OFF position to disengage the left system autopilot.

- S 866-187
(17) Push the YAW DAMPER L switch on the P5 panel to the INOP position.

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S 086-188

- (18) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
 - 1) Put the L HYD PUMP ELEC switch on the P5 panel to the OFF position.
 - 2) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - (b) If you use a hydraulic service cart to pressurize the system, do these steps:
 - 1) Operate the service cart to decrease the left system pressure to zero.
 - 2) Remove the flowmeter from the service cart pressure line.
 - 3) Again connect the service cart pressure line to the left system ground power pressure connection.

S 086-189

- (19) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the multimeter from the test jacks for the left system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P32 panel.

S 866-190

- (20) If the hydraulic system gross internal leakage check will continue with the center or right system, pressurize the left hydraulic system with a hydraulic service cart or the system ACMP (AMM 29-11-00/201).

H. Center Hydraulic System Gross Internal Leakage Check

S 486-191

- (1) If you use the flowmeter technique, do these steps:
- (a) Open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
 - (b) If you use an ACMP to pressurize the system, do these steps:
 - 1) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter module.

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

- 2) Put the C HYD PUMPS ELEC 1 pump switch to the ON position.
- (c) If you use the hydraulic service cart, do these steps:
 - 1) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line.

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

- 2) Operate the hydraulic service cart to pressurize the center system to 3000 psi.

S 486-192

- (2) If you use the multimeter technique, do these steps:
 - (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the center system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the center system ACMP ELCU M10006 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

(c) Put the C HYD PUMPS ELEC 1 switch to the ON position.

S 866-193

- (3) Put the A/P ENGAGE C switch on the mode control panel on the P55 panel to CMD, to engage the center system autopilot.

S 866-194

- (4) Put the YAW DAMPER R switch on the P5 panel to the ON position.

S 866-195

- (5) Put the STAB TRIM C hydraulic cutout switch on the P10 panel on the control stand to the NORM position.

S 866-196

- (6) Let the center system operate for at least 15 seconds to let the leakage flow become stable.

S 976-197

- (7) Measure and write the leakage flow.

NOTE: This is the center system gross neutral leakage flow.

S 976-395

- (8) If the system gross leakage is more than 4.0 GPM, you must do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 366-199

- (9) Replace the components with high leakage as necessary to decrease the center system gross leakage to less than 4.0 GPM.

S 866-200

- (10) Put the A/P ENGAGE C switch on the mode control panel on the P55 panel to the OFF position.

S 866-201

- (11) Push the YAW DAMPER R switch on the P5 panel to the INOP position.

S 866-202

- (12) Put the STAB TRIM C hydraulic cutout switch on the P10 panel on the control stand to the CUTOUT position.

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S 086-203

- (13) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
 - 1) Put the C HYD PUMPS ELEC 1 switch to the OFF position.
 - 2) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - (b) If you use a hydraulic service cart to pressurize the system, do these steps:
 - 1) Operate the service cart to decrease the center system pressure to zero.
 - 2) Remove the flowmeter from the service cart pressure line.
 - 3) Again connect the service cart pressure line to the center system ground power pressure connection.

S 086-204

- (14) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the multimeter from the test jacks for the center system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

S 866-205

- (15) If the hydraulic system gross internal leakage check will continue with the left or right system, pressurize the center system with a hydraulic service cart or the system ACMP (Ref 29-11-00).
- I. Right Hydraulic System Gross Internal Leakage Check

S 486-206

- (1) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
 - 1) Install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the R HYD PUMPS ELEC pump switch to the ON position.

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- (b) If you use the hydraulic service cart, do these steps:
- 1) Open the access panel, 444 AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - 2) Connect the service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line.

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

- 3) Operate the hydraulic service cart to pressurize the right system to 3000 psi.

S 486-207

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the right system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the right system ACMP ELCU M10005 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the R HYD PUMPS ELEC pump switch to the ON position.

S 866-208

- (3) Put the A/P ENGAGE R switch on the mode control panel on the P55 panel to CMD, to engage the right system autopilot.

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S 866-209

- (4) Put the landing gear lever in the DOWN position.

NOTE: This supplies flow to the right system brake circuit.

S 866-210

- (5) Put the STAB TRIM R hydraulic cutout switch on the P10 panel on the control stand to the NORM position.

NOTE: This puts the right hydraulic system in the landing configuration.

S 866-211

- (6) Let the right system operate for a least 1 minute to let the leakage flow become stable.

S 976-212

- (7) Measure and write the leakage flow.

NOTE: This is the right system gross neutral leakage flow.

S 976-396

- (8) If the system gross leakage is more than 4.5 GPM, you must do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 366-213

- (9) Replace components with high leakage as necessary to decrease the right system gross leakage to less than 4.5 GPM.

S 866-214

- (10) Put the landing gear lever to the OFF position.

S 866-215

- (11) Put the A/P ENGAGE R switch on the mode control panel on the P55 panel to the OFF position.

S 866-216

- (12) Put the STAB TRIM R hydraulic cutout switch on the P10 panel on the control stand to the CUTOUT position.

S 086-217

- (13) If you use the flowmeter technique, do these steps:
(a) If you use an ACMP to pressurize system, do these steps:
1) Put the R HYD PUMPS ELEC switch on the P5 panel to the OFF position.

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- 2) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
- (b) If you use a hydraulic service cart to pressurize the system, do these steps:
 - 1) Operate the service cart to decrease the right system pressure to zero.
 - 2) Remove the flowmeter from the service cart pressure line.
 - 3) Again connect the service cart pressure line to the right system ground power pressure connection.

S 086-218

- (14) If you use the multimeter technique, do these steps:
 - (a) Put the R HYD PUMP ELEC switch to the OFF position.
 - (b) AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the multimeter from the test jacks for the right system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- (c) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

J. Put the Airplane Back to Its Usual Condition

S 866-219

- (1) Remove hydraulic power (AMM 29-11-00/201).

S 416-222

- (2) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 416-223

- (3) Close the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 416-224

WARNING: USE THE PROCEDURE 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.

- (4) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 866-225

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

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TASK 29-11-00-796-226

10. Hydraulic System Elevator and Rudder Power Control Actuators (PCA's) Internal Leakage Check (This Includes the Elevator and Rudder PCU Monitoring System)

A. General

- (1) This procedure does an internal leakage check for the elevator and rudder PCAs. The leakage rate for the PCAs in each hydraulic system must not be more than the approved leakage rates which follow:
 - (a) The difference between the seal and the null leakage for the rudder PCAs must not be more than 2.0 GPM.
 - (b) The difference between the seal and the null leakage for the elevator PCAs must not be more than 1.0 GPM.
- (2) When you do trouble shooting, it is not necessary to do a check of all the systems. In the system with high leakage, feel for hot tubing or actuators and listen for fluid leakage. This method will isolate the defective components in a subsystem which has too much internal leakage. Use approved tools to find heat, vibration, or sound. Before you do an internal leakage check, make sure persons will not be injured or equipment will not be damaged when the component moves.
- (3) There are two techniques to measure flow rates; the multimeter technique and the flowmeter technique.
 - (a) Multimeter Technique
 - 1) The multimeter technique uses the ACMPs to measure the hydraulic flow rate.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
to do a test, connect a multimeter to the test jacks on the generator field/hydraulic control panel on the right side panel, P61. The test jacks connect to a transformer in one of the supply lines for electrical power to the ACMP. The multimeter measures the voltage in the transformer caused by the ac current which flows to the ACMP. A graph shown in Fig. 605 changes the voltage to a hydraulic flow rate.
 - 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
a multimeter connects to a clamp-on ac current probe which you put around one wire at the ACMP ELCU in the P31 and P32 panel. The multimeter with the ac current probe measures the amperage which flows in the one wire to the pump motor. A graph shown in Fig. 605 changes the amperage to a hydraulic flow rate.
 - (b) Flowmeter Technique
 - 1) The flowmeter technique uses a flowmeter to measure flow rates directly while the system is pressurized with an ACMP or a hydraulic service cart. You install the flowmeter in the pressure line between the pressure source and the pressure filter module.
- (4) Measure all leakage in the pressure side of the hydraulic system while the system is kept at approximately 3000 psi. Pressurize the three hydraulic systems at the same time during the test with a hydraulic service cart(s) or an ACMP in each system.

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- (5) The procedure for the internal leakage check of the elevator and rudder PCAs follows. This procedure does a leakage check of one hydraulic system at a time. The sequence in which you do a test of the left, center and right hydraulic systems is not important. When start the leak check of a system, do not stop until you complete the procedure, to get correct results. In this procedure, all controls must be in the neutral position unless a different position is specified. After you make a test configuration for each test step, do not measure the leakage for at least 15 seconds. This will let the leakage flow become stable before you measure the flow.
- (6) The test procedure is in the paragraphs and figures which follow. Each figure is identified with the system and subsystem on which the test is done. The procedure is written in short steps. Make a mark on the figure next to each step when you do the step. There is space on each figure to write the flow, and the null and seal leakage. There is also space on each figure to calculate the leakage rates. A Corrective Action/Defective Component/Comment column tells how to correct a failure or isolate a defective component and tells more about the test step.

B. Equipment

- (1) Use this equipment with the multimeter technique:
 - (a) Digital Multimeter - John Fluke Model 27 YEL.
 - (b) Clamp-on AC Current Probe - John Fluke Model 80i 600.

NOTE: ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS, the ac current probe is used with the multimeter.

- (2) Use this equipment with the flowmeter technique (optional to the multimeter technique):
 - (a) Flowmeter - Commercially Available, 0.2 to 7.0 GPM range with a precision of ± 3 percent of the indication, specified for operation at 3000 psi
 - (b) Hydraulic Service Cart(s) - Commercially Available, which can supply 6 GPM to each system (18 GPM total) at 3000 psi

NOTE: The service cart is not necessary if you use the ACMP to pressurize the hydraulic system.

- (3) Elevator pogo compressor, B27032-9

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- (4) Yaw Damper Module simulator, B29005-2 (2 necessary) part of kit B29005-1
- (5) Mechanic's Stethoscope, GA 111 D, Snap-On-Tools Corporation, Kenosha, Wisconsin

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 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (4) AMM 12-12-01/301, Hydraulic Systems
- (5) AMM 22-21-00/501, Yaw Damper System
- (6) AMM 24-22-00/201, Electrical Power - Control
- (7) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic System
- (8) AMM 32-00-15/201, Landing Gear Door Locks
- (9) AMM 32-00-20/201, Landing Gear Downlocks

D. Access

(1) Location Zones

119/120	Main Equipment Center
197	Wing to Body - Aft Lower Half (Left)
211/212	Control Cabin
330/340	Horizontal Stabilizer and Elevator
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

119BL	Main Equipment Center
197KL	Central Hydraulic Service Center
335DB	Left Elevator PCAs
345DB	Right Elevator PCAs
434AL/444AL	Hydraulic Bay

E. Prepare for the Internal Leakage Check of the Elevator and Rudder PCAs

S 866-227

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

S 616-228

- (2) Do a check of the fluid level in the hydraulic reservoirs (AMM 12-12-01/301).

S 866-382

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (3) If you use an ACMP to pressurize the hydraulic system, make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

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S 866-383

- (4) If you use an ACMP to pressurize the hydraulic system, pressurize the system reservoir (AMM 29-11-00/201).

S 866-229

- (5) Make sure the persons on the ground can speak with those in the control cabin.

S 496-231

- (6) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-232

WARNING: USE THE PROCEDURE 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.

- (7) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 496-233

- (8) Put chocks on the wheels.

S 866-234

- (9) Make sure the parking brake is set.

S 866-235

- (10) Put the landing gear lever in the OFF position.

S 016-236

- (11) Remove the right elevator PCA access panel 345DB and the left elevator PCA access panel 335DB (AMM 06-42-00/201).

S 486-237

- (12) If you use the flowmeter technique, do these steps for the system on which you do the check:

- (a) If you use an ACMP to pressurize the system, do these steps:
1) Install the flowmeter in the pressure line between the system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the system electric pump switch on the overhead panel, P5, to the ON position.

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- (b) If you use the hydraulic service cart, do these steps:
- 1) For the left hydraulic system, open the access panel, 434AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - 2) For the right hydraulic system, open the access panel, 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
 - 3) For the center hydraulic system, open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
 - 4) Connect the hydraulic service cart pressure and return lines to the hydraulic system ground power connections with a flowmeter installed in the cart pressure line.

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

- 5) Operate the hydraulic service cart to pressurize the system to 3000 psi.

S 486-238

- (13) If you use the multimeter technique, do these steps for the system on which you do the check:

- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the system on which you do the test. The test jacks are below the flight-control shutoff-valve switches on the P61 panel.
- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) For the left hydraulic system, get access to the ACMP ELCU M10001 in the P32 panel.
 - 2) For the right hydraulic system, get access to the ACMP ELCU M10005 in the P31 panel.
 - 3) For the center hydraulic system, get access to the ACMP ELCU M10006 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 4) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.

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5) Connect the multimeter to the clamp-on ac current probe.

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

(c) Put the system electric pump switch on the P5 panel to the ON position.

S 866-239

(14) Pressurize the two hydraulic systems which are not in the test with a hydraulic service cart or the system ACMP (AMM 29-11-00/201).

S 866-244

(15) Make sure all the flight control shutoff valve switches on the right side panel, P61, are in the ON position.

S 866-240

(16) Operate the flight controls through five complete cycles to cause the hydraulic fluid to become warm.

NOTE: One cycle is equivalent to movement from neutral to full control travel, to full control travel in the opposite direction, then back to neutral.

S 866-241

(17) Make sure all autopilot switches on the pilots glare shield panel, P55, are in the OFF position.

S 866-242

(18) Make sure the two yaw damper switches on the pilots' overhead panel, P5, are in the INOP position.

S 866-243

(19) Put the stab trim switches on the pilots' aisle control stand, P10, to the CUT OUT position.

S 866-377

(20) Make sure the L HYD PUMPS ENG and the R HYD PUMPS ENG switches on the hydraulic control panel on the P5 panel are in the ON position.

S 866-378

(21) If you do not use the ACMPs to pressurize the system, make sure these switches on the hydraulic control panel on the P5 panel are in the OFF position:

(a) L HYD PUMPS ELEC

(b) R HYD PUMPS ELEC

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- (c) C HYD PUMPS ELEC 1
- (d) C HYD PUMPS ELEC 2.

S 796-489

- (22) Do the left hydraulic system elevator and rudder PCAs internal leakage check (Fig. 606).

S 796-490

- (23) Do the center hydraulic system elevator and rudder PCAs internal leakage check (Fig. 608).

S 796-491

- (24) Do the right hydraulic system elevator and rudder PCAs internal leakage check (Fig. 609).

F. Put the Airplane Back to Its Usual Condition

S 866-220

- (1) Remove hydraulic power (AMM 29-11-00/201).

S 026-511

- (2) Remove the Yaw Damper Module Simulators and put the Yaw Damper Modules into place (Fig. 607).

S 086-246

- (3) If you used the flowmeter technique with an ACMP, remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.

S 086-247

- (4) If you used the multimeter technique to do this test, do these steps:
 - (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the multimeter from the test jacks on the P61 panel (Fig. 604).

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 or P32 panel.

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	MAKE SURE ALL THREE FLIGHT CONTROL SHUTOFF VALVE SWITCHES, ON THE P61 PANEL, ARE IN THE ON POSITION.							
2	AFTER ONE MINUTE, WRITE THE FLOW FOR THE LEFT SYSTEM.							THIS IS THE GROSS NEUTRAL LEAKAGE FOR THE LEFT SYSTEM.
3	COMPRESS THE LEFT SYSTEM LEFT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE LEFT SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE LEFT SYSTEM RIGHT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE LEFT SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.

MINIMUM CHECK


Internal Leakage Check for the Left Hydraulic System - Elevator and Rudder PCAs
Figure 606 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	REMOVE THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1), IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT PLUS THE YAW DAMPER MODULE SIMULATORS INPUT CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
15C	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15D	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15E	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

MINIMUM CHECK

 MAKE SURE THAT ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONABLE.

Internal Leakage Check for the Left Hydraulic System - Elevator and Rudder PCAs
Figure 606 (Sheet 2)

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
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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15F	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 
15G	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15H	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
16	COMPARE THE FLOW OF STEPS 15A AND 15G. WRITE THE LARGEST FLOW HERE.							THIS IS THE LEFT SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE LEFT SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 5</u>			±1.0 GPM	THIS IS THE LEFT SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE LEFT SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 9</u>			±1.0 GPM	THIS IS THE LEFT SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE LEFT SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS <u>STEP 16</u>			±2.0 GPM	THIS IS THE LEFT SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF".							

MINIMUM CHECK

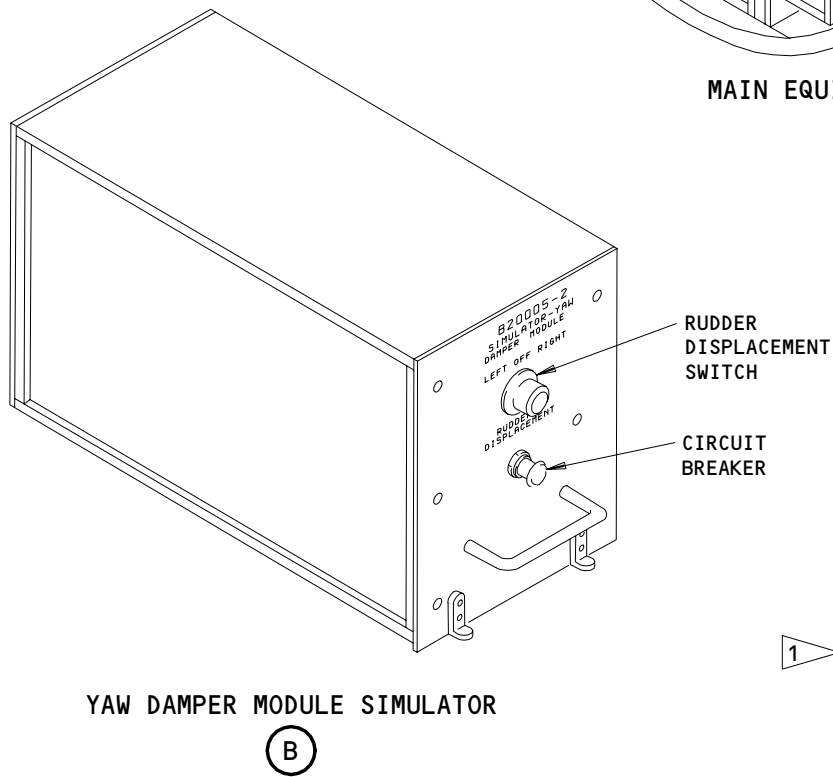
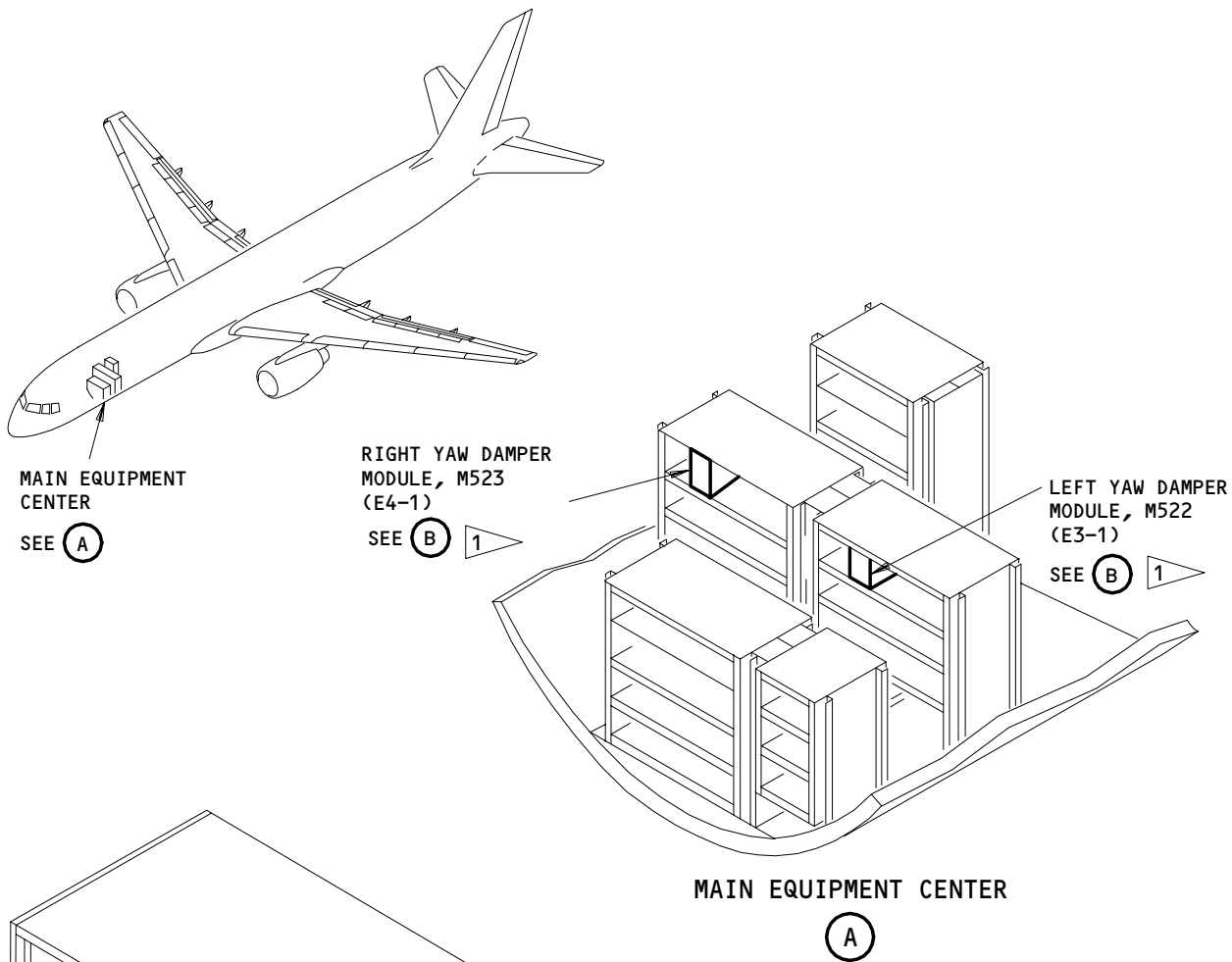
 MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Left Hydraulic System - Elevator and Rudder PCAs
Figure 606 (Sheet 3)

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1 DURING A TEST, THE YAW DAMPER MODULE SIMULATORS REPLACE THE LEFT AND RIGHT YAW DAMPER MODULES

Yaw Damper Module Simulator
Figure 607

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	MAKE SURE ALL THREE FLIGHT CONTROL SHUTOFF VALVE SWITCHES, ON THE P61 PANEL, ARE IN THE ON POSITION.							
2	AFTER ONE MINUTE WRITE THE FLOW FOR THE CENTER SYSTEM.							THIS IS THE GROSS NEUTRAL LEAKAGE FOR THE CENTER SYSTEM.
3	COMPRESS THE CENTER SYSTEM LEFT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE CENTER SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE CENTER SYSTEM RIGHT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE CENTER SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL MAINTAIN THE COMMANDED POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.

MINIMUM CHECK


Internal Leakage Check for the Center Hydraulic System - Elevator and Rudder PCAs
Figure 608 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	REMOVE THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1), IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT PLUS THE YAW DAMPER MODULE SIMULATORS INPUT CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
15C	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15D	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15E	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

MINIMUM CHECK

 MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Center Hydraulic System - Elevator and Rudder PCAs
Figure 608 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15F	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501).
15G	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15H	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
16	COMPARE THE FLOW OF STEPS 15A AND 15G. WRITE THE LARGEST FLOW HERE.							THIS IS THE CENTER SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE CENTER SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS STEP 5			±1.0 GPM	THIS IS THE CENTER SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE CENTER SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS STEP 9			±1.0 GPM	THIS IS THE CENTER SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE CENTER SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS STEP 16			±2.0 GPM	THIS IS THE CENTER SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IN THE "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF".							

MINIMUM CHECK

MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Center Hydraulic System - Elevator and Rudder PCAs
Figure 608 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	MAKE SURE ALL THREE FLIGHT CONTROL SHUTOFF VALVE SWITCHES, ON THE P61 PANEL, ARE IN THE ON POSITION.							
2	AFTER ONE MINUTE WRITE THE FLOW FOR THE RIGHT SYSTEM.							THIS IS THE GROSS NEUTRAL LEAKAGE FOR THE RIGHT SYSTEM.
3	COMPRESS THE RIGHT SYSTEM LEFT ELEVATOR PCA ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE RIGHT SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE RIGHT SYSTEM RIGHT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE RIGHT SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL MAINTAIN THE COMMANDED POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.

MINIMUM CHECK

Internal Leakage Check for the Right Hydraulic System - Elevator and Rudder PCAs
Figure 609 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	REMOVE THE YAW DAMPER MODULES M522 (E3-1) AND M523 (E4-1) IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT PLUS THE YAW DAMPER MODULE SIMULATORS INPUT CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501).
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
15C	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15D	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15E	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

MINIMUM CHECK

MAKE SURE ALL THE SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Right Hydraulic System - Elevator and Rudder PCAs
Figure 609 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15F	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 1
15G	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15H	ERASE THE EICAS "RUD PCU" MESSAGE BY DOING THIS PROCEDURE: MAINTENANCE MESSAGE ERASE PROCEDURE (FIM 31-41-00/101, FIG. 109).							
16	COMPARE THE FLOW OF STEPS 15A AND 15G. WRITE THE LARGEST FLOW HERE.							THIS IS THE RIGHT SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE RIGHT SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 5</u>			±1.0 GPM	THIS IS THE RIGHT SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE RIGHT SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 9</u>			±1.0 GPM	THIS IS THE RIGHT SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE RIGHT SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS <u>STEP 16</u>			±2.0 GPM	THIS IS THE RIGHT SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGA-TIVE, WRITE IT IN THE "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF".							
21	REMOVE THE YAW DAMPER MODULE SIMULATORS AND INSTALL THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1)(FIG. 607).							

MINIMUM CHECK

1 MAKE SURE ALL THE SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Right Hydraulic System - Elevator and Rudder PCAs
Figure 609 (Sheet 3)

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- S 716-524
- (5) Do the operational test of the yaw damper system (AMM 22-21-00/501).
- S 416-249
- (6) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- S 416-250
- (7) Close the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 416-251
- (8) Install the access panel, 345DB, for the right elevator PCA and the access panel, 335DB, for the left elevator PCA (AMM 06-42-00/201).

S 416-252

WARNING: USE THE PROCEDURE 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 (AMM 32-00-15/201).
- S 866-253
- (10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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11. Hydraulic System ACMP Check Valves Internal Leakage Check

A. General

- (1) This procedure does an internal leakage check of the ACMP check valves in each hydraulic system.

B. Equipment

- (1) Hydraulic Service Cart(s) - Commercially Available, which can supply 6 GPM to each system (18 GPM total) at 3000 psi
- (2) Caps for the ACMP Pressure Lines.

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut 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 System
- (6) AMM 29-11-02/401, C System Alternating Current Motor Pump (ACMP)
- (7) AMM 29-11-18/401, System L and R ACMP Pressure/Case Drain Filter Module and Components
- (8) AMM 29-11-19/401, System C ACMP Pressure/Case Drain Filter Module and Components
- (9) AMM 32-00-15/201, Landing Gear Door Locks
- (10) AMM 32-00-20/201, Landing Gear Downlocks

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D. Access

(1) Location Zones

197	Wing to Body - Aft Lower Half (Left)
211/212	Control Cabin
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

197KL	Central Hydraulic Service Center
434AL/444AL	Hydraulic Bay

E. Prepare for the Internal Leakage Check of the ACMP Check Valves

S 866-255

- (1) Make sure the persons on the ground can speak with those in the control cabin.

S 616-256

- (2) Do a check of the fluid level in the hydraulic reservoirs (AMM 12-12-01/301).

S 866-384

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (3) Make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-385

- (4) Pressurize the hydraulic system reservoirs (AMM 29-11-00/201).

S 866-258

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

S 016-260

- (6) Open the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 016-261

- (7) Open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 496-262

- (8) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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S 016-263

WARNING: USE THE PROCEDURE 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) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

F. Left Hydraulic System ACMP Check Valve Internal Leakage Check

S 866-386

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

- (1) Pressurize the left hydraulic system with a hydraulic service cart (AMM 29-11-00/201).

NOTE: You can not use the system ACMP to do this step. You can motor the engine to supply hydraulic pressure with the EDP to do a check of the ACMP low pressure light.

S 216-265

- (2) Make sure the PRESS light for the left ACMP on the hydraulic control panel on the pilots overhead panel, P5, is on.

NOTE: If there is a leak of system pressure through the check valve in the ACMP filter module, the PRESS light will be off.

S 366-266

- (3) If the PRESS light is off, replace the check valve in the left ACMP filter module (AMM 29-11-18/401).

S 866-267

- (4) Push the L HYD PUMPS ELEC switch on the hydraulic control panel on the P5 panel to ON.

S 216-268

- (5) Make sure the PRESS light for the left ACMP on the P5 panel is off.

S 816-269

- (6) If the PRESS light is on, repair the pressure indication circuit for the left system and again do the two steps above.

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S 866-270

- (7) Push the L HYD PUMPS ELEC switch on the hydraulic control panel on the P5 panel to off.

S 866-271

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

G. Center Hydraulic System ACMP Check Valves Internal Leakage Check

S 866-387

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

- (1) Push the C HYD PUMPS ELEC 1 switch on the hydraulic control panel on the P5 panel to ON.

S 216-274

- (2) Make sure the PRESS light for the center ACMP C1 on the P5 panel is off.

S 816-275

- (3) If the PRESS light for the center ACMP C1 is on, repair the pressure indication circuit for this light and again do the two steps above.

S 216-276

- (4) Make sure the PRESS light for the center ACMP C2 is on.

NOTE: If there is a leak of system pressure through the ACMP C2 check valve, the PRESS light will be off.

S 366-277

- (5) If the PRESS light for ACMP C2 is off, replace the check valve for ACMP C2 in the center ACMP filter module (AMM 29-11-19/401).

S 866-279

- (6) Push the C HYD PUMPS ELEC 1 switch to OFF and the C HYD PUMPS ELEC 2 switch to ON on the P5 panel.

S 216-280

- (7) Make sure the PRESS light for the center ACMP C2 is off.

S 816-278

- (8) If the PRESS light for the center ACMP C2 is on, repair the pressure indication circuit for this light and again do the two steps above.

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S 216-281

- (9) Make sure the PRESS light for the center ACMP C1 is on.

NOTE: If there is a leak of system pressure through the ACMP C1 check valve, the PRESS light will be off.

S 366-282

- (10) If the PRESS light for ACMP C1 is off, replace the check valve for ACMP C2 in the center ACMP filter module (AMM 29-11-19/401).

S 866-283

- (11) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

S 036-284

- (12) Disconnect the pressure hose at the ACMP C1 (AMM 29-11-02/401).

S 036-285

- (13) Install a cap on the ACMP C1 pressure port and put the end of the pressure hose in a container to catch the fluid.

NOTE: This a check to make sure a pressure leak through the ACMP C1 check valve does not back-drive the ACMP.

S 866-286

CAUTION: USE CARE WHEN YOU DO A CHECK FOR FLUID LEAKAGE FROM THE PRESSURE HOSE. A SPRAY OF FLUID FROM THE PRESSURE HOSE CAN CAUSE INJURY TO PERSONS.

- (14) Push the C HYD PUMPS ELEC 2 switch on the hydraulic control panel to ON.

S 796-398

- (15) After the initial quantity of fluid drains from the hose, make sure there is no fluid leakage through the check valve.

NOTE: If the ACMP C1 check valve has a leak, the fluid will continue to drain from the pressure hose.

S 396-287

- (16) If the ACMP C1 check valve has a leak, replace this check valve in the ACMP filter module (AMM 29-11-19/401).

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S 866-288

- (17) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

S 866-289

- (18) Remove the cap from the ACMP C1 pressure port and install the pressure hose to the ACMP C1 (AMM 29-11-02/401).

H. Right Hydraulic System ACMP Check Valve Internal Leakage Check

S 866-388

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

- (1) Pressurize the right hydraulic system with the hydraulic service cart (AMM 29-11-00/201).

NOTE: You can not use the system ACMP to do this step. You can motor the engine to supply hydraulic pressure with the EDP, to do a check of the ACMP low pressure light.

S 216-291

- (2) Make sure the PRESS light for the right ACMP on the hydraulic control panel on the P5 panel is on.

NOTE: If there is a leak of system pressure through the check valve in the ACMP filter module, the PRESS light will be off.

S 366-292

- (3) If the PRESS light is off, replace the check valve in the right ACMP filter module (AMM 29-11-18/401).

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- S 866-293
- (4) Push the R HYD PUMPS ELEC switch on the hydraulic control panel on the P5 panel to ON.
- S 216-294
- (5) Make sure the PRESS light for the right ACMP on the P5 panel is off.
- S 816-295
- (6) If the PRESS light is on, repair the pressure indication circuit for the right system and again do the two steps above.
- S 866-296
- (7) Push the R HYD PUMPS ELEC switch on hydraulic control panel on the P5 panel to OFF.
- S 866-297
- (8) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

I. Put the Airplane Back to Its Usual Condition

- S 416-298
- (1) Close the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 416-301
- (2) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- S 416-302

WARNING: USE THE PROCEDURE 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 door (AMM 32-00-15/201).

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- S 866-300
(4) Remove electrical power if it is not necessary (AMM 24-22-00).

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12. Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage.

A. General

- (1) If the system leakage is more than the approved leakage rates, you must find and replace the components with too much leakage. The tests must be done with the airplane in a landing configuration.
- (2) The approved total system null leakage limit is 4.5 GPM for the left and right systems and 4.0 GPM for the center system. If the null leakage is more than the allowable limits, replace components until the leakage is less than the limits.
- (3) The system performance can also be decreased by too much internal leakage when the flight control PCAs are "off null". You must do a check of the internal leakage "off null" ("seal" leakage) and replace components until the leakage is less than the approved limits. The rudder PCAs must not have a difference between the null and the seal leakage of more than 2.0 GPM. The elevator PCAs must not have a difference between the null and the seal leakage of more than 1.0 GPM.
- (4) The valves which follow must have minimum leakage to isolate the system:
 - (a) Alternating Current Motor Pump (ACMP) check valves
 - (b) Engine Driven Pump (EDP) check valves
 - (c) EDP supply shutoff valves
 - (d) Power Transfer Unit (PTU) is isolation check valve
 - (e) Reserve brake (isolated ACMP) pressure shutoff valve.
- (5) When you do trouble shooting, it is not necessary to do a check of all the systems. In the system with high leakage, feel for hot tubing or actuators and listen for fluid leakage. This method will isolate the defective components in a subsystem which has too much internal leakage. Use approved tools to find heat, vibration, or sound. Before you do an internal leakage check, operate the components to make sure persons will not be injured or equipment will not be damaged when the component moves.
- (6) There are two techniques to measure flow rates; the multimeter technique and the flowmeter technique.
 - (a) Multimeter Technique
 - 1) The multimeter technique uses the ACMPs to measure the hydraulic flow rate.

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- 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
to do a test, connect a multimeter to the test jacks on the generator field/hydraulic control panel on the right side panel, P61. The test jacks connect to a transformer in one of the supply lines for electrical power to the ACMP. The multimeter measures the voltage in the transformer caused by the ac current which flows to the ACMP. A graph shown in Fig. 605 changes the voltage to a hydraulic flow rate.
 - 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
a multimeter connects to a clamp-on ac current probe which you put around one wire at the ACMP ELCU in the P31 and P32 panel. The multimeter with the ac current probe measures the amperage which flows in the one wire to the pump motor. A graph shown in Fig. 605 changes the amperage to a hydraulic flow rate.
- (b) Flowmeter Technique
- 1) The flowmeter technique uses a flowmeter to measure flow rates directly while the system is pressurized with an ACMP or a hydraulic service cart. You install the flowmeter in the pressure line between the pressure source and the pressure filter module.
- (7) Pressurize the three hydraulic systems at the same time during the test with a hydraulic service cart(s) or an ACMP in each system.
 - (8) The procedures for the system gross internal leakage check and for component leakage check follow. This procedure does a leakage check of one hydraulic system at a time. The sequence in which you do a test of the left, center and right hydraulic systems is not important. When you start the leak check of a system, do not stop until you complete the procedure, to get correct results. In this procedure, all controls must be in the neutral position unless a different position is specified. After you make a test configuration for each test step, do not measure the leakage for at least 15 seconds. This will let the leakage flow become stable before you measure the flow.
 - (9) The test procedure is in the paragraphs and figures which follow. Each figure is identified with the system and subsystem on which the test is done. The procedure is written in short steps. Make a mark on the figure next to each step when you do the step. There is space on each figure to write the flow, and the null and seal leakage. There is also space on each figure to calculate the leakage rates. A Corrective Action/Defective Component/Comment column tells how to correct a failure or isolate a defective component and tells more about the test step.
 - (10) A data summary sheet is at the end of each hydraulic system test procedure to help identify which PCAs to replace.

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B. Equipment

- (1) Use this equipment with the multimeter technique:
(a) Digital Multimeter - John Fluke Model 27 YEL.
(b) Clamp-on AC Current Probe - John Fluke Model 80i 600.

NOTE: ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS,
the ac current probe is used with the multimeter.

- (2) Use this equipment with the flowmeter technique (optional to the multimeter technique):
(a) Flowmeter - Commercially Available, 0.2 to 7.0 GPM range with a precision of ± 3 percent of the indication, specified for operation at 3000 psi
(b) Hydraulic Service Cart(s) - Commercially Available, which can supply 6 GPM to each system (18 GPM total) at 3000 psi

NOTE: The service cart is not necessary if you use the ACMP to pressurize the hydraulic system.

- (3) Control Wheel Protractor Kit, A27021-29
(4) Control Wheel Adapter Equipment, A27021-97

NOTE: The control wheel adapter equipment and the protractor measure the control wheel positions. As an alternative to this equipment, you can use the aileron trim indicator on top of the control column to measure the control wheel positions. Five degrees of control wheel movement is equal to one unit on the aileron trim indicator.

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- (5) Elevator Pogo Compressor, B27032-9
- (6) Aileron PCA Leak Test Block, B27054-14
- (7) Yaw Damper Module simulator, B29005-2 (2 necessary) part of kit B29005-1
- (8) Caps for the ACMP and EDP pressure lines.
- (9) Bubble Protractor or equivalent - Commercially Available
- (10) Mechanic's Stethoscope, GA 111 D, Snap-On-Tools Corporation, Kenosha, Wisconsin

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 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (4) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
- (5) AMM 12-12-01/301, Hydraulic Systems
- (6) AMM 24-22-00/201, Electrical Power - Control
- (7) AMM 27-11-00/501, Aileron and Aileron Trim Control System
- (8) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic System
- (9) AMM 29-11-01/401, L and R System Alternating Current Motor Pump (ACMP)
- (10) AMM 29-11-02/401, C Systems Alternating Current Motor Pump (ACMP)
- (11) AMM 29-11-13/401, System C Return Filter Module and Components
- (12) AMM 29-11-17/401, System L and R EDP Pressure/Case Drain Filter Module and Components
- (13) AMM 29-11-18/401, System L and R ACMP Pressure/Case Drain Filter Module and Components
- (14) AMM 29-11-19/401, System C ACMP Pressure/Case Drain Filter Module and Components
- (15) AMM 32-00-15/201, Landing Gear Door Locks
- (16) AMM 32-00-20/201, Landing Gear Downlocks
- (17) AMM 34-21-00/501, Inertial Reference System

D. Access

- (1) Location Zones
 - 119/120 Main Equipment Center
 - 197 Wing to Body - Aft Lower Half (Left)
 - 211/212 Control Cabin
 - 330/340 Horizontal Stabilizer and Elevator
 - 434/444 Nacelle Strut - Aft Fairing
 - 561 Rear Spar to Trailing Edge (Left)

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- (2) Access Panels
 - 119BL Main Equipment Center
 - 197KL Central Hydraulic Service Center
 - 335DB Left Elevator PCAs
 - 345DB Right Elevator PCAs
 - 434AL/444AL Hydraulic Bay
 - 561AB Aileron Quadrant

E. Prepare for the Internal Leakage Check

S 866-303

- (1) Supply ground electrical power (Ref 24-22-00).

S 866-304

- (2) Make sure the persons on the ground can speak with those in the control cabin.

S 016-307

- (3) Open the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 016-308

- (4) Open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 016-399

- (5) Remove the access panel, 345DB, for the right elevator PCA and the access panel, 335DB, for the left elevator PCA (AMM 06-42-00/201).

S 016-309

- (6) Remove the access panel, 561AB, for the aileron quadrant (AMM 06-44-00/201).

S 496-310

- (7) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 016-311

WARNING: USE THE PROCEDURE 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.

- (8) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 496-312

- (9) Put chocks on the wheels.

S 866-313

- (10) Make sure the parking brake is set.

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S 866-314

- (11) Put the landing gear lever in the OFF position.

S 616-315

- (12) Do a check of the fluid level in the hydraulic reservoirs (AMM 12-12-01/301).

S 866-389

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (13) If you use an ACMP to pressurize the hydraulic system, make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-317

- (14) If you use an ACMP to pressurize the hydraulic system, pressurize the system reservoir (AMM 29-11-00/201).

S 866-318

- (15) Align the inertial reference system to permit you to engage the autopilot during some leak check procedures (AMM 34-21-00/501).

F. Do the Full Left Hydraulic System Internal Leakage Check

S 486-320

- (1) If you use the flowmeter technique, do these steps:
(a) If you use an ACMP to pressurize the system, do these steps:
1) Install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the L HYD PUMPS ELEC pump switch to the ON position.

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- (b) If you use the hydraulic service cart, do these steps:
- 1) Connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line.

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

- 2) Operate the hydraulic service cart to pressurize the left system to 3000 psi.

S 486-321

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the left system, below the flight-control shutoff-valve switches on the P61 panel.
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the left system ACMP ELCU M10001 in the P32 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

WARNING: KEEP PERSONS 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) Put the L HYD PUMPS ELEC pump switch to the ON position.

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- S 866-322
- (3) Pressurize the right and center hydraulic systems with the hydraulic service cart or the system ACMP (Ref 29-11-00).
- S 866-323
- (4) Make sure the landing gear lever is in the OFF position.
- S 866-324
- (5) Make sure the flaps/slats are retracted and the flap handle is in the zero detent.
- S 866-325
- (6) Make sure all autopilot switches on the pilots' glareshield panel, P55, are in the OFF position.
- S 866-326
- (7) Make sure the two yaw damper switches on the pilots' overhead panel, P5, are in the INOP position.
- S 866-327
- (8) Make sure the flight control shutoff valve switches on the right side panel, P61, are in the ON position.
- S 866-328
- (9) Make sure the L HYD PUMPS ENG switch on the hydraulic control panel on the P5 panel is in the ON position.
- S 866-329
- (10) If you do not use the ACMPs to pressurize the system in this test, make sure the L HYD PUMPS ELEC switch on the hydraulic control panel on the P5 panel is in the OFF position.
- S 796-400
- (11) Do the Component Check for the Left Hydraulic System (Fig. 610).
- S 796-401
- (12) Do the Internal Leakage Check for the Left Hydraulic System - Landing Gear (Fig. 611).
- S 796-402
- (13) Do the PTU Leakage Check for the Left Hydraulic System (Fig. 612).
- S 796-407
- (14) Do the Internal Leakage Check for the Left Hydraulic System - Flap/Slat (Fig. 613).

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S 796-404

- (15) Do the Internal Leakage Check for the Left Hydraulic System - Yaw Damper and Autopilot (Fig. 614).

S 796-405

- (16) Do the Internal Leakage Check for the Left Hydraulic System - Lateral Flight Controls (Fig. 615).

S 796-406

- (17) Do the Internal Leakage Check for the Left Hydraulic System - Empennage Flight Controls (Fig. 616).

S 976-330

- (18) Left System Leakage Summary Sheet

- (a) These are the conditions which you can use to make a decision about which components to replace.
- 1) If the leakage flow value of a rudder PCA is 2.0 GPM or more, you must replace the PCA.
 - 2) If the leakage flow valve of an elevator PCA is 1.0 GPM or more, you must replace the PCA.
 - 3) If the total NULL leakage is more than 4.5 GPM, you must replace the PCAs with high leakage until the total NULL leakage is less than 4.5 GPM.
- (b) Use the summary sheet as follows:
- 1) For each component on the summary sheet, find the leakage flow value on the figure and step number shown below the component name.
 - 2) Write the leakage flow values on the summary sheet opposite the component name as follows:
 - a) If the leakage flow value is zero or a negative value, write the value in the SEAL column.
 - b) If the leakage flow value is a positive value, write the value in the NULL column.
 - 3) Add the leakage flow values in the SEAL column and write the result in the space for the SEAL total.
 - 4) If the SEAL total leakage or the NULL total leakage (Flow No. Fig. 615 Step 7) is 4.5 GPM or more, replace components with high leakage as necessary to decrease this leakage to less than 4.5 GPM.
- (c) Left Leakage Summary Sheet

Total Left System "Null" Leakage [Flow No. Fig. 615 Step 7]	_____ GPM
Yaw Damper and Autopilot -----	"NULL" (Pos.)

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Yaw Damper Null Leakage [Flow No. Fig. 614 Step 3]	_____	GPM
Lateral and Pitch Autopilot Null Leakage [Flow No. Fig. 614 Step 7]	_____	GPM
<u>Spoiler Panels</u>		
	"SEAL" (Neg.)	"NULL" (Pos.)
Spoiler Panel No. 3 [Flow No. Fig. 615 Step 34]	_____	_____ GPM
Spoiler Panel No. 5 [Flow No. Fig. 615 Step 35]	_____	_____ GPM
Spoiler Panel No. 8 [Flow No. Fig. 615 Step 38]	_____	_____ GPM
Spoiler Panel No. 10 [Flow No. Fig. 615 Step 36]	_____	_____ GPM
<u>Right Aileron</u>		
[Flow No. Fig. 615 Step 39]	_____	_____ GPM
<u>Elevators</u>		
Left Elevator [Flow No. Fig. 616 Step 17]	_____	_____ GPM
Right Elevator [Flow No. Fig. 616 Step 18]	_____	_____ GPM

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Rudder -----		
[Flow No. Fig. 616 Step 19]	_____	GPM
"SEAL" Total	_____	GPM

S 846-331

(19) Put the left hydraulic system back to its usual condition as follows:

- (a) If you use the flowmeter technique, do these steps:
 - 1) If you use an ACMP to pressurize the system, do these steps:
 - a) Put the L HYD PUMPS ELEC pump switch on the P5 panel to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - 2) If you use a hydraulic service cart to pressurize the system, do these steps:
 - a) Operate the hydraulic service cart to decrease the system pressure to zero.
 - b) Disconnect the service cart and install the caps on the airplane ground power connections.
- (b) If you use the multimeter technique, do these steps:
 - 1) Put the L HYD PUMPS ELEC pump switch to the OFF position.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the multimeter from the test jacks for the left system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P32 panel.

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G. Do the Full Center Hydraulic System Internal Leakage Check

S 486-333

- (1) If you use the flowmeter technique, do these steps:
- (a) If you use an ACMP to pressurize the system, do these steps:
- 1) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter.

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

- 2) Put the C HYD PUMPS ELEC 1 pump switch to the ON position.
- (b) If you use the hydraulic service cart, do these steps:
- 1) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line.

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

- 2) Operate the hydraulic service cart to pressurize the center system to 3000 psi.

S 486-334

- (2) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS; connect the multimeter to the test jacks for the center system, below the flight-control shutoff-valve switches on the P61 panel.
- (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; do these steps to install the multimeter and the clamp-on ac current probe:
- 1) Get access to the center system ACMP C1 ELCU M10006 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.

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3) Connect the multimeter to the clamp-on ac current probe.

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

(c) Put the C HYD PUMPS ELEC 1 pump switch to the ON position.

S 866-335

(3) Pressurize the left and right hydraulic systems with the hydraulic service cart or the system ACMP (AMM 29-11-00/201).

S 866-336

(4) Make sure the landing gear lever is in the OFF position.

S 866-337

(5) Make sure the flaps/slats are retracted and the flap handle is in the zero detent.

S 866-338

(6) Make sure autopilot switches on the pilots' glareshield panel, P55, are in the OFF position.

S 866-339

(7) Make sure the two yaw damper switches on the P5 panel are in the INOP position.

S 866-340

(8) Put the stab trim switches on the control stand panel, P10, to CUTOUT.

S 866-341

(9) Make sure the flight control shutoff valve switches on the P61 panel are in the ON position.

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S 866-342

- (10) If you use the ACMP C1 to pressurize the system, make sure the C HYD PUMPS ELEC 2 switch on the P5 panel is in the OFF position.

S 866-343

- (11) If you do not use the ACMP to pressurize the system, make sure the C HYD PUMPS ELEC 1 and C HYD PUMPS ELEC 2 switches on the P5 panel are in the OFF position.

S 796-344

- (12) Do the Component Check for the Center Hydraulic System (Fig. 617).

S 796-345

- (13) Do the Internal Leakage Check of the Center Hydraulic System - Yaw Damper, Autopilot and Stabilizer Trim (Fig. 618).

S 796-346

- (14) Do the Internal Leakage Check for the Center Hydraulic System - Lateral Flight Controls (Fig. 619).

S 796-347

- (15) Do the Internal Leakage Check for the Center Hydraulic System - Empennage Flight Controls (Fig. 620).

S 976-348

- (16) Center System Leakage Summary Sheet

- (a) These are the conditions which you can use to make a decision about which components to replace.
- 1) If the leakage flow value of a rudder PCA is 2.0 GPM or more, you must replace the PCA.
 - 2) If the leakage flow value of an elevator PCA is 1.0 GPM or more, you must replace the PCA.
 - 3) If the total NULL leakage is more than 4.5 GPM, you must replace the PCAs with high leakage until the total NULL leakage is less than 4.5 GPM.

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- (b) Use the Summary Sheet as follows:
- 1) For each component on the summary sheet, find the leakage flow value on the figure and step number shown below the component name.
 - 2) Write the leakage flow values on the summary sheet opposite the component name as follows:
 - a) If the leakage flow value is zero or a negative value, write the value in the SEAL column.
 - b) If the leakage flow value is a positive value, write the value in the NULL position.
 - 3) Add the leakage flow values in the SEAL column and write the result in the space for the SEAL total.
 - 4) If the SEAL total leakage or the NULL total leakage (Flow No. Fig. 619 Step 4) is 4.0 GPM or more, replace the components with high leakage as necessary to decrease this leakage to less than 4.0 GPM.
- (c) Center Leakage Summary Sheet

Total Center System "Null" Leakage [Flow No. Fig. 619 Step 4]	_____	GPM
Yaw Damper, Autopilot and Stab Trim -----	"NULL"	
	(Pos.)	
Yaw Damper Null Leakage [Flow No. Fig. 618 Step 3]	_____	GPM
Lateral and Pitch Autopilot Null Leakage [Flow No. Fig. 618 Step 7)]	_____	GPM
Stab Trim Null Leakage [Flow No. Fig. 618 Step 11]	_____	GPM
Spoiler Panels -----		
	"SEAL" (Neg.)	"NULL" (Pos.)
Spoiler Panel No. 1 [Flow No. Fig. 619 Step 22]	_____	_____ GPM
Spoiler Panel No. 12 [Flow No. Fig. 619 Step 23]	_____	_____ GPM
Ailerons -----		

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Right Aileron [Flow No. Fig. 619 Step 25]	_____	_____	GPM
Left Aileron [Flow No. Fig. 619 Step 26]	_____	_____	GPM
Elevators -----			
Left Elevator [Flow No. Fig. 620 Step 17]	_____	_____	GPM
Right Elevator [Flow No. Fig. 620 Step 18]	_____	_____	GPM
Rudder -----			
[Flow No. Fig. 620 Step 19]	_____	_____	GPM
"SEAL" Total	_____	_____	GPM

S 846-349

- (17) Put the center hydraulic system back to its usual condition as follows:
- (a) If you use the flowmeter technique, do these steps:
 - 1) If you use an ACMP to pressurize the system, do these steps:
 - a) Put the C HYD PUMPS ELEC 1 pump switch on the P5 panel to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - 2) If you use a hydraulic service cart to pressurize the system, do these steps:
 - a) Operate the hydraulic service cart to decrease the system pressure to zero.
 - b) Disconnect the service cart and install the caps on the airplane ground power connections.
 - (b) If you use the multimeter technique, do these steps:
 - 1) Put the C HYD PUMPS ELEC 1 pump switch to the OFF position.

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- 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the multimeter from the test jacks for the center system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

H. Do the Full Right Hydraulic System Internal Leakage Check

S 496-350

- (1) Connect the hydraulic service cart(s) to the three hydraulic systems (AMM 29-11-00/201).

NOTE: The flowmeter must be installed in the pressure line to the right hydraulic system.

S 486-351

- (2) If you use the flowmeter technique, do these steps:
 - (a) If you use an ACMP to pressurize the system, do these steps:
 - 1) Install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.

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

- 2) Put the R HYD PUMPS ELEC pump switch on the P5 panel to the ON position.
- (b) If you use the hydraulic service cart, do these steps:
 - 1) Connect the service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line.

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

2) Operate the hydraulic service cart to pressurize the right system to 3000 psi.

S 486-352

- (3) If you use the multimeter technique, do these steps:
- (a) AIRPLANES WITH INTERNAL LEAK TEST JACKS;
connect the multimeter to the test jacks for the right system, below the flight-control shutoff-valve switches on the P61 panel (Fig. 604).
 - (b) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS;
do these steps to install the multimeter and the clamp-on ac current probe:
 - 1) Get access to the right system ACMP ELCU M10005 in the P31 panel.

WARNING: BE CAREFUL WHEN YOU INSTALL THE CLAMP-ON AC CURRENT PROBE INTO THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 2) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
- 3) Connect the multimeter to the clamp-on ac current probe.

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

- (c) Put the R HYD PUMPS ELEC pump switch to the ON position.

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- S 866-353
- (4) Pressurize the left and center hydraulic systems with the hydraulic service cart or the system ACMP (AMM 29-11-00/201).
- S 866-354
- (5) Make sure the landing gear lever is in the OFF position.
- S 866-355
- (6) Make sure the flaps/slats are retracted and the flap handle is in the zero detent.
- S 866-356
- (7) Make sure all autopilot switches on the pilots' glareshield panel, P55, are in the OFF position.
- S 866-357
- (8) Make sure the two yaw damper switches on the pilots' overhead panel, P5, are in the INOP position.
- S 866-358
- (9) Put the STAB TRIM C hydraulic cutout switch on the control stand panel, P10, to the CUT OUT position.
- S 866-359
- (10) Make sure the flight control shutoff valve switches on the right side panel, P61, are in the ON position.
- S 866-390
- (11) Make sure the R HYD PUMPS ENG switch on the hydraulic control panel on the P5 panel is in the ON position.
- S 866-361
- (12) If you do not use the ACMPs to pressurize the system in this test, make sure R HYD PUMPS ELEC switch on the hydraulic control panel on the P5 panel is in the OFF position.
- S 796-360
- (13) Do the Component Check for the Right Hydraulic System (Fig. 622).
- S 796-362
- (14) Do the Internal Leakage Check for the Right Hydraulic System - Autopilot and Stabilizer Trim (Fig. 623).
- S 796-361
- (15) Do the Internal Leakage Check Right Hydraulic System - Lateral Flight Controls (Fig. 624).
- S 796-475
- (16) Do the Internal Leakage Check for the Right Hydraulic System - Empennage Flight Controls (Fig. 625).

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S 796-363

- (17) Do the Internal Leakage Check for the Right Hydraulic System - Brake and Reserve Brake (Fig. 626).

S 976-364

- (18) Right System Leakage Summary Sheet

- (a) These are the conditions which you can use to make a decision about which components to replace.
- 1) If the leakage flow value of a rudder PCA is 2.0 GPM or more, you must replace the PCA.
 - 2) If the leakage flow valve of an elevator PCA is 1.0 GPM or more, you must replace the PCA.
 - 3) If the total NULL leakage is more than 4.5 GPM, you must replace PCAs with high leakage until the total NULL leakage is less than 4.5 GPM.
- (b) Use the summary sheet as follows:
- 1) For each component on the summary sheet, find the leakage flow value on the figure and step number shown below the component name.
 - 2) Write the leakage flow values on the summary sheet opposite the component name as follows:
 - a) If the leakage flow value is zero or a negative value, write the value in the SEAL column.
 - b) If the leakage flow value is a positive value, write the value in the NULL column.
 - 3) Add the leakage flow values in the SEAL column and write the result in the space for the SEAL total.
 - 4) If the SEAL total leakage or the NULL total leakage (Flow No. Fig. 624 Step 6) is 4.5 GPM or more, replace components with high leakage as necessary to decrease this leakage to less than 4.5 GPM.
- (c) Right Leakage Summary Sheet

Total Right System "Null" Leakage [Flow No. Fig. 624 Step 6]	_____ GPM
Autopilot and Stab Trim -----	"NULL"
Lateral and Pitch Autopilot Null Leakage [Flow No. Fig. 623 Step 5]	_____ GPM
Stab Trim Null Leakage [Flow No. Fig. 624 Step 9]	_____ GPM

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Spoiler Panels	"SEAL" (Neg.)	"NULL" (Pos.)	
Spoiler Panel No. 2 [Flow No. Fig. 624 Step 47]	_____	_____	GPM
Spoiler Panel No. 4 [Flow No. Fig. 624 Step 38]	_____	_____	GPM
Spoiler Panel No. 6 [Flow No. Fig. 624 Step 49]	_____	_____	GPM
Spoiler Panel No. 7 [Flow No. Fig. 624 Step 44]	_____	_____	GPM
Spoiler Panel No. 9 [Flow No. Fig. 624 Step 43]	_____	_____	GPM
Spoiler Panel No. 11 [Flow No. Fig. 624 Step 42]	_____	_____	GPM
Left Aileron [Flow No. Fig. 624 Sep 50]	_____	_____	GPM
Elevators [Flow No. Fig. 625 Step 17]	_____	_____	GPM

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Right Elevator [Flow No. Fig. 625 Step 18]	_____	_____	GPM
Rudder ----- [Flow No. Fig. 625 Step 19]	_____	_____	GPM
"SEAL" Total	_____		GPM

S 846-365

(19) Put the right hydraulic system back to its usual condition as follows:

- (a) If you use the flowmeter technique, do these steps:
 - 1) If you use an ACMP to pressurize the system, do these steps:
 - a) Put the R HYD PUMPS ELEC pump switch on the P5 panel to the OFF position.
 - b) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.
 - 2) If you use a hydraulic service cart to pressurize the system, do these steps:
 - a) Operate the hydraulic service cart to decrease the system pressure to zero.
 - b) Disconnect the service cart and install the caps on the airplane ground power connections.
- (b) If you use the multimeter technique, do these steps:
 - 1) Put the R HYD PUMPS ELEC pump switch to the OFF position.
 - 2) AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the multimeter from the test jacks for the right system on the P61 panel.

WARNING: BE CAREFUL WHEN YOU REMOVE THE CLAMP-ON AC CURRENT PROBE FROM THE POWER PANEL. THE VOLTAGES IN THE POWER PANEL CAN KILL AND/OR CAUSE DAMAGE TO EQUIPMENT.

- 3) ALL EXCEPT AIRPLANES WITH INTERNAL LEAK TEST JACKS; remove the clamp-on ac current probe from the wire at the ACMP ELCU in the P31 panel.

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I. Put the Airplane Back to Its Usual Condition

S 866-366

- (1) Remove hydraulic power (AMM 29-11-00/201).

S 026-517

- (2) Remove the Yaw Damper Module Simulators and put the Yaw Damper Modules into place (Fig. 207).

S 416-370

- (3) Close the access panels, 434AL and 444AL, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 416-371

- (4) Close the access door for the central hydraulic service center (AMM 06-41-00/201).

S 416-372

- (5) Install the access panel, 561AB, for the aileron quadrant (AMM 06-44-00/201).

S 416-373

- (6) Install the access panel, 345DB, for the right elevator PCA and the access panel, 335DB, for the left elevator PCA (AMM 06-42-00/201).

S 416-374

WARNING: USE THE PROCEDURE 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 866-369

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

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	REMOVE THE PRESSURE FROM THE LEFT SYSTEM (AMM 29-11-00/401).							THIS STARTS THE EDP FIRE SHUTOFF VALVE TEST.
2	PRESSURIZE THE LEFT RESERVOIR (AMM 29-11-00/401).							
3	WARNING: DO NOT TURN THE FIRE SWITCH HANDLE TO THE LEFT OR RIGHT. THIS WILL RELEASE THE CONTENTS OF THE FIRE BOTTLES. PULL THE LEFT ENGINE FIRE SWITCH ON THE P10 PANEL TO THE "FIRE" POSITION.							YOU MUST DISENGAGE THE MANUAL OVERRIDE BEFORE YOU PULL THE FIRE SWITCH.
4	DISCONNECT THE SUPPLY LINE OF THE LEFT EDP BETWEEN THE SHUTOFF VALVE AND THE EDP. NOTE: IF YOU DISCONNECT A SELF-SEAL FITTING, THE LEAKAGE FROM THE SHUTOFF VALVE CAN NOT FLOW FROM THE EDP SUPPLY HOSE.							WITH THE SUPPLY LINE DISCONNECTED, FLUID WILL FLOW FROM THE SUPPLY LINE, IF THE SHUTOFF VALVE HAS A LEAK. AFTER THE INITIAL QUANTITY OF FLUID DRAINS FROM THE SUPPLY LINE, THERE MUST BE NO FLUID FLOW THROUGH THE SHUTOFF VALVE. MONITOR THE OPEN SUPPLY LINE FOR AT LEAST ONE MINUTE.
5	CONNECT THE EDP SUPPLY LINE.							
6	PUSH IN THE LEFT ENGINE FIRE SWITCH.							

FULL CHECK

Component Check for the Left Hydraulic System
Figure 610 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
7	PRESSURIZE THE HYDRAULIC SYSTEMS (AMM 29-11-00).							
	LEFT							
	CENTER							
	RIGHT							
8	OPERATE THE FLIGHT CONTROLS THROUGH FIVE FULL CYCLES TO CAUSE THE HYDRAULIC FLUID TO BECOME WARM. <u>NOTE:</u> ONE CYCLE IS EQUIVALENT TO MOVEMENT FROM NEUTRAL TO FULL CONTROL TRAVEL TO FULL CONTROL TRAVEL IN THE OPPOSITE DIRECTION, THEN BACK TO NEUTRAL.							
9	OPERATE THE FLAP/SLAT SYSTEM THROUGH THREE FULL CYCLES TO CAUSE THE HYDRAULIC FLUID TO BECOME WARM. THEN PUT THE FLAP HANDLE IN THE ZERO DETENT. <u>NOTE:</u> ONE CYCLE IS EQUIVALENT TO MOVEMENT FROM THE RETRACTED POSITION TO THE FULLY EXTENDED POSITION AND THEN BACK TO THE RETRACTED POSITION.							
10 1	MAKE SURE THE LEFT ACMP LOW PRESSURE LIGHT ON THE P5 PANEL IS ON.							IF THE PUMP PRESSURE LIGHT IS OFF, REPLACE THE CHECK VALVE IN THE LEFT ACMP FILTER MODULE (AMM 29-11-18/401).

FULL CHECK

Component Check for the Left Hydraulic System
Figure 610 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
11	PUT THE L HYD PUMPS ELEC SWITCH TO ON AND MAKE SURE THE PUMP PRESS LIGHT IS OFF.							IF THE PUMP PRESS LIGHT IS ON, REPAIR THE PRESSURE INDICATION CIRCUIT AND DO STEP 10 AGAIN.
12	PUT THE L HYD PUMPS ELEC SWITCH TO OFF.							
13	MAKE SURE THE EDP LOW PRESSURE LIGHT IS ON. DO NOT START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) UNTIL THE LIGHT STAYS ON 10 SECONDS.							IF THE EDP PRESS LIGHT IS OFF, REPLACE THE CHECK VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
14	PUSH THE L HYD PUMPS ENG SWITCH TO OFF. MAKE SURE THE EDP LOW PRESSURE LIGHT STAYS ON FOR AT LEAST 10 SECONDS. DO NOT START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) UNTIL THE LIGHT STAYS ON 10 SECONDS.							IF THE LIGHT GOES OFF IN 10 SECONDS, THE EDP LEAKAGE DID NOT LET THE CHECK VALVE LEAKAGE CAUSE THE LIGHT TO GO OFF IN STEP 13. REPLACE THE CHECK VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
15	FEEL THE RETURN LINE FROM THE EDP PRESSURE/CASE DRAIN FILTER MODULE. DO NOT START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) IF THE PRESSURE RELIEF VALVE HAS A LEAK.							IF THE RETURN LINE IS HOTTER THAN THE FLIGHT CONTROL RETURN LINES, THE SYSTEM PRESSURE RELIEF VALVE HAS TOO MUCH LEAKAGE. REPLACE THE PRESSURE RELIEF VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) BEFORE A BAD RELIEF VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.

1 YOU CAN NOT USE THE SYSTEM ACMP TO DO THIS STEP. YOU CAN MOTOR THE ENGINE TO SUPPLY HYDRAULIC PRESSURE WITH THE EDP TO DO A CHECK OF THE ACMP LOW PRESSURE LIGHT.

FULL CHECK

Component Check for the Left Hydraulic System
Figure 610 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT SYSTEM NEUTRAL LEAKAGE.
2	PUT THE LANDING GEAR HANDLE IN THE "DOWN" POSITION.							
3	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT SYSTEM LANDING GEAR "DOWN" AND NEUTRAL LEAKAGE.
4	PUT THE LANDING GEAR HANDLE IN THE "UP" POSITION.							
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT SYSTEM LANDING GEAR "UP" AND NEUTRAL LEAKAGE.
6	PUT THE LANDING GEAR HANDLE IN THE "OFF" POSITION.							
7	CALCULATE THE LANDING GEAR "DOWN" LEAKAGE.			STEP 3 MINUS <u>STEP 1</u>			1.2 GPM	IF THE "DOWN" LEAKAGE IS MORE THAN THE APPROVED LEAKAGE, REPLACE THE LANDING GEAR SYSTEM COMPONENTS WHICH HAVE HIGH LEAKAGE TO DECREASE THE "DOWN" LEAKAGE. IF YOU START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) BEFORE THE "DOWN" LEAKAGE IS SATISFACTORY, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
8	CALCULATE THE LANDING GEAR "UP" LEAKAGE.			STEP 5 MINUS <u>STEP 1</u>			1.2 GPM	IF THE "UP" LEAKAGE IS MORE THAN THE APPROVED LEAKAGE, REPLACE THE LANDING GEAR SYSTEM COMPONENTS WHICH HAVE HIGH LEAKAGE TO DECREASE THE "UP" LEAKAGE. DO NOT CONTINUE THE TEST UNTIL THE "UP" LEAKAGE IS SATISFACTORY.

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Landing Gear
Figure 611

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	REMOVE PRESSURE FROM THE LEFT HYDRAULIC SYSTEM BUT KEEP PRESSURE IN THE RIGHT SYSTEM (AMM 29-11-00).							
2	PUT THE PTU MANUAL CONTROL SWITCH ON THE P61 PANEL TO THE ON POSITION.							
3	MAKE SURE THE LEFT HYDRAULIC SYSTEM PRESSURE INDICATION ON EICAS IS AT LEAST 2500 PSI. DO NOT CONTINUE THE TEST UNTIL THE PTU WILL SUPPLY AT LEAST 2500 PSI.							A PRESSURE OF 2500 PSI IS AN INDICATION OF SATISFACTORY PTU OPERATION. IF THE PRESSURE IS LESS THAN 2500 PSI, YOU MUST DO TROUBLESHOOTING FOR THE PTU SYSTEM TO FIND THE CAUSE.
4	MAKE SURE THE LOW PRESSURE LIGHT FOR THE LEFT SYSTEM IS ON. DO NOT CONTINUE THE TEST UNTIL THE CHECK VALVE LEAKAGE IS SATISFACTORY.							IF THE LIGHT IS OFF, YOU MUST REPLACE THE CHECK VALVE UPSTREAM OF THE PRESSURE SENSOR IN THE FLAP/SLAT DEPRESSURIZATION MODULE BECAUSE THE VALVE HAS TOO MUCH LEAKAGE.
5	PUT THE PTU MANUAL SWITCH ON THE P61 PANEL TO THE OFF POSITION.							
6	PRESSURIZE THE LEFT SYSTEM (AMM 29-11-00).							

FULL CHECK

PTU Leakage Check for the Left Hydraulic System
Figure 612

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE FLAP HANDLE ON THE CONTROL STAND TO THE FLAPS 1 DETENT.							
2	AFTER ONE MINUTE WRITE THE FLOW.							
3	CALCULATE THE EXTENDED FLAP/SLAT LEAKAGE FLOW.			FIG. 613 STEP 2 MINUS FIG. 611 STEP 1			1.0 GPM	IF THE FLAP/SLAT FLOW IS MORE THAN THE APPROVED LEAKAGE, YOU MUST REPLACE THE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE FLAP/SLAT FLOW. THE HIGH LEAKAGE COMPONENTS ARE POSSIBLY THE FLAP AND/OR SLAT MOTORS. IF YOU START THE YAW DAMPER AND AUTOPILOT CHECK (FIG. 614) BEFORE THE FLAP/SLAT LEAKAGE IS SATISFACTORY THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
4	PUT THE FLAP HANDLE ON THE CONTROL STAND TO THE ZERO DETENT TO RETRACT THE FLAPS.							

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Flap/Slat
Figure 613

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUSH THE YAW DAMPER L ENGAGE SWITCH ON THE P5 PANEL TO "ON".							
2	AFTER ONE MINUTE WRITE THE FLOW.							
3	CALCULATE THE LEFT SYSTEM YAW DAMPER LEAKAGE.			FIG. 614 STEP 2 MINUS FIG. 611 STEP 1			0.3 GPM	IF THE YAW DAMPER LEAKAGE IS MORE THAN THE APPROVED LEAKAGE, THE HIGH LEAKAGE COMPONENT IS POSSIBLY THE YAW DAMPER SERVO.
4	PUSH THE YAW DAMPER L ENGAGE SWITCH ON THE P5 PANEL TO "INOP".							
5	PUT THE A/P ENGAGE L SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "CMD".							
6	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE LEFT SYSTEM NEUTRAL AND AUTOPILOT LEAKAGE.
7	CALCULATE THE AUTOPILOT LEAKAGE FLOW.			FIG. 614 STEP 6 MINUS FIG. 611 STEP 1			0.5 GPM	IF THE AUTOPILOT LEAKAGE IS MORE THAN THE APPROVED LEAKAGE, THE HIGH LEAKAGE COMPONENTS ARE POSSIBLY THE LATERAL AND PITCH AUTOPILOT SERVOS.

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Yaw Damper and Autopilot
Figure 614

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE FLAP HANDLE ON THE CONTROL STAND TO THE FLAPS 1 POSITION.							
2	PUT THE LANDING GEAR LEVER IN THE "DOWN" POSITION.							
3	MAKE SURE THE A/P ENGAGE L SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL IS IN THE CMD POSITION.							
4	PUSH THE YAW DAMPER L ENGAGE SWITCH ON THE P5 PANEL TO "ON".							
5	MAKE SURE THERE ARE CHOCKS ON THE WHEELS TO PREVENT MOVEMENT OF THE AIRPLANE.							
6	RELEASE THE PARKING BRAKE.							THIS PUTS THE LEFT HYDRAULIC SYSTEM IN THE LANDING CONFIGURATION.
7	AFTER ONE MINUTE WRITE THE FLOW.					4.5 GPM		THIS IS THE GROSS LEFT SYSTEM "NEUTRAL" LEAKAGE FLOW. IF IT IS MORE THAN THE APPROVED LEAKAGE, REPLACE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE "NEUTRAL" LEAKAGE FLOW. THE TESTS WHICH FOLLOW WILL IDENTIFY THE HIGH LEAKAGE COMPONENTS.
8	SET THE PARKING BRAKE.							
9	PUT THE FLAP HANDLE IN THE ZERO DETENT TO RETRACT THE FLAPS.							
10	PUT THE LANDING GEAR LEVER IN THE "OFF" POSITION.							
11	PUT THE A/P ENGAGE L SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "OFF".							
12	PUSH THE YAW DAMPER L SWITCH ON THE P5 PANEL TO "INOP".							

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Lateral Flight Controls
Figure 615 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
13	PUT THE LEFT SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO "OFF".							THIS STOPS FLOW TO THE EMPENNAGE TO ISOLATE THE LATERAL FLIGHT CONTROLS FROM THE OTHER PARTS OF THE SYSTEM.
14	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE GROSS NEUTRAL LEAKAGE FOR THE LEFT SYSTEM LATERAL FLIGHT CONTROLS.
15	TURN THE CONTROL WHEEL APPROXIMATELY 45° COUNTERCLOCKWISE.							THIS LIFTS THE LEFT WING SPOILERS (PANELS 3 AND 5). WITH THE SPOILER PANELS UP, THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
16	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE RIGHT WING SPOILERS AND THE RIGHT AILERON AND THE NULL LEAKAGE FOR THE LEFT WING FLIGHT SPOILER.
17	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
18	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11C6, FLT CONT ELEC 1L AC - 11C7, FLT CONT ELEC 1L DC - 11C8, FLT CONT ELEC 2L AC - 11C9, FLT CONT ELEC 2L DC • GUI 115: <ul style="list-style-type: none"> - 11C6, CSEU 1L AC - 11C7, CSEU 1L DC - 11C8, CSEU 2L AC - 11C9, CSEU 2L DC 						THIS STOPS THE OPERATION OF THE NO. 5 AND 8 SPOILERS.	
19	TURN THE CONTROL WHEEL APPROXIMATELY 45° COUNTERCLOCKWISE.							THIS LIFTS THE LEFT WING NO. 3 SPOILER.
20	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE NO. 5,8 AND 10 SPOILERS AND THE TWO AILERONS AND THE NULL LEAKAGE FOR NO. 3 SPOILER.
21	TURN THE CONTROL WHEEL APPROXIMATELY 45° CLOCKWISE.							THIS LIFTS THE NO. 10 RIGHT WING SPOILERS.

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Internal Leakage Check for the Left Hydraulic System - Lateral Flight Controls
Figure 615 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
22	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE NO. 3,5 AND 8 SPOILERS AND BOTH AILERONS AND THE NULL LEAKAGE FOR THE NO. 10 SPOILER.
23	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
24	CLOSE ALL THE CIRCUIT BREAKERS WHICH WERE OPENED IN STEP 18.							THIS PERMITS OPERATION OF THE NO. 5 AND NO. 8 SPOILERS.
25	TURN THE CONTROL WHEEL APPROXIMATELY 45° CLOCKWISE.							THIS LIFTS THE NO. 8 AND 10 RIGHT WING SPOILERS.
26	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE NO. 3 AND 5 SPOILERS AND THE TWO AILERONS AND THE NULL LEAKAGE FOR THE NO. 8 AND 10 SPOILERS.
27	PUT THE CONTROL WHEEL IN THE WHEEL IN THE CENTER POSITION.							
28	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 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 • GUI 115: <ul style="list-style-type: none"> - 11C6, CSEU 1L AC - 11C7, CSEU 1L DC - 11C8, CSEU 2L AC - 11C9, CSEU 2L DC - 11C17, CSEU 1R AC - 11C18, CSEU 1R DC - 11C27, CSEU 2R AC - 11C28, CSEU 2R DC 						THIS STOPS THE OPERATION OF ALL THE LEFT SYSTEM SPOILERS.	

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Lateral Flight Controls
Figure 615 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
29	TURN THE CONTROL WHEEL TO THE THE FULL CLOCKWISE POSITION.							THE STEP MOVES THE RIGHT AILERON TO FULL TRAVEL. WITH THE RIGHT AILERON AT FULL TRAVEL, THE SEAL LEAKAGE REPLACES THE NEUTRAL/NULL LEAKAGE.
30	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE LEFT SYSTEM SPOILERS AND THE SEAL LEAKAGE FOR THE AILERON.
31	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
32	CLOSE ALL THE CIRCUIT BREAKERS WHICH WERE OPENED IN STEP 28.							
33	CALCULATE THE LEFT WING SPOILERS NULL MINUS NEUTRAL LEAKAGE (SPOILERS NO. 3 AND 5).			STEP 16 MINUS STEP 14				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
34	CALCULATE THE NO.3 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 20 MINUS STEP 14				IF THE NO. 3 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
35	CALCULATE THE NO. 5 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 33 MINUS STEP 34				IF THE NO. 5 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
36	CALCULATE THE NO. 10 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 22 MINUS STEP 14				IF THE NO. 10 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
37	CALCULATE THE LEFT WING SPOILERS NULL MINUS NEUTRAL LEAKAGE.			STEP 26 MINUS STEP 14				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
38	CALCULATE THE NO. 8 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 37 MINUS STEP 36				IF THE NO. 8 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
39	CALCULATE THE RIGHT AILERON NEUTRAL MINUS SEAL LEAKAGE.			STEP 14 MINUS STEP 30				IF THE AILERON NEUTRAL MINUS SEAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Lateral Flight Controls
Figure 615 (Sheet 4)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE LEFT SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO ON.							
2	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE GROSS SYSTEM NEUTRAL LEAKAGE.
3	COMPRESS THE LEFT SYSTEM LEFT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE LEFT SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE LEFT SYSTEM RIGHT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE LEFT SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.

FULL CHECK

Internal Leakage Check for the Left Hydraulic System - Empennage Flight Controls
Figure 616 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	REMOVE THE YAW DAMPER MODULES M522 (E3-1) AND M523 (E4-1) IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT, PLUS THE YAW DAMPER MODULE SIMULATORS INPUT, CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15E	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501).
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15C	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15D	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

FULL CHECK

MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Left Hydraulic System - Empennage Flight Controls
Figure 616 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15E	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 1
15F	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
16	COMPARE THE FLOW OF STEPS 15A AND 15F. WRITE THE LARGEST FLOW HERE.							THIS IS THE LEFT SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE LEFT SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 5</u>			±1.0 GPM	THIS IS THE LEFT SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE LEFT SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 9</u>			±1.0 GPM	THIS IS THE LEFT SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE LEFT SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS <u>STEP 16</u>			±2.0 GPM	THIS IS THE LEFT SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF".							

FULL CHECK

1 MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Left Hydraulic System – Empennage Flight Controls
Figure 616 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PRESSURIZE THE HYDRAULIC SYSTEMS (AMM 29-11-00). <div style="margin-left: 100px;"> LEFT CENTER RIGHT </div>							
2	OPERATE THE FLIGHT CONTROLS THROUGH FIVE FULL CYCLES TO CAUSE THE HYDRAULIC FLUID TO BECOME WARM. <u>NOTE:</u> ONE CYCLE IS EQUIVALENT TO MOVEMENT FROM NEUTRAL TO FULL CONTROL TRAVEL TO FULL CONTROL TRAVEL IN THE OPPOSITE DIRECTION, THEN BACK TO NEUTRAL.							
3	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 15px; height: 15px; text-align: center; line-height: 15px;">1</div> MAKE SURE THE ACMP C1 AND C2 LOW PRESSURE LIGHTS ON THE P5 PANEL ARE ON. DO NOT START THE YAW DAMPER, AUTOPILOT AND STABILIZER TRIM CHECK (FIG. 618) UNTIL THE THE LIGHTS ARE ON.							IF THE ACMP C1 (C2) LOW PRESSURE LIGHT IS OFF, REPLACE THE CHECK VALVE FOR THE ACMP C1 (C2) IN THE ACMP FILTER MODULE (AMM 29-11-19/401). IF YOU START THE YAW DAMPER, AUTOPILOT AND STABILIZER TRIM CHECK (FIG. 618) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
4	PUT THE C HYD PUMPS ELEC 2 SWITCH TO ON AND MAKE SURE THE ACMP C2 LOW PRESSURE LIGHT IS OFF.							IF THE ACMP C2 LOW PRESSURE LIGHT IS ON, REPAIR THE PRESSURE INDICATION CIRCUIT AND DO STEP 3 AGAIN.
5	PUT THE C HYD PUMPS ELEC 2 SWITCH TO OFF. PUT THE C HYD PUMPS ELEC 1 SWITCH TO ON. MAKE SURE THE ACMP C1 LOW PRESSURE LIGHT IS OFF.							IF THE ACMP C1 LOW PRESSURE LIGHT IS ON, REPAIR THE PRESSURE INDICATION CIRCUIT AND DO STEP 3 AGAIN.

FULL CHECK

1 IF YOU USE THE ACMP TO DO THE TEST, OPERATE ACMP C1 TO DO A TEST OF ACMP C2 CHECK VALVE, THEN OPERATE ACMP C2 TO DO A TEST OF ACMP C1 CHECK VALVE.

Component Check for the Center Hydraulic System Figure 617 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
6 2	PUT THE C HYD PUMPS ELEC 1 SWITCH TO OFF.							
7	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE CENTER SYSTEM NEUTRAL LEAKAGE.
8	FEEL THE RETURN LINE FROM THE THE CENTER SYSTEM RETURN FILTER MODULE. DO NOT START THE YAW DAMPER, AUTOPILOT AND STABILIZER TRIM CHECK (FIG. 618) IF THE PRES- SURE RELIEF VALVE HAS A LEAK.							IF THE RETURN LINE IS HOTTER THAN THE FLIGHT CONTROL RETURN LINES, THE SYSTEM PRESSURE RELIEF VALVE HAS TOO MUCH LEAKAGE. REPLACE THE PRESSURE RELIEF VALVE IN THE RETURN FILTER MODULE (AMM 29-11-13/ 401). IF YOU START THE YAW DAMPER, AUTOPILOT AND STABI- LIZER TRIM CHECK (FIG. 618) BEFORE A BAD RELIEF VALVE IS REPLACED, THE LEAKAGE CALCU- LATIONS WILL NOT BE CORRECT.
9	REMOVE THE PRESSURE FROM THE CENTER SYSTEM (AMM 29-11-00).							
10	DISCONNECT THE PRESSURE HOSE FROM THE ACMP C1 (AMM 29-11-01/401). INSTALL A CAP ON THE PUMP PRESSURE PORT. PUT THE END OF THE PRESSURE HOSE IN A CONTAINER TO CATCH THE FLUID.							THIS A CHECK TO MAKE SURE A PRESSURE LEAK THROUGH THE ACMP C1 CHECK VALVE DOES NOT BACK-DRIVE THE ACMP C1.
11	<p style="text-align: center;">CAUTION</p> <p>BE CAREFUL WHEN YOU DO A CHECK FOR FLUID LEAKAGE FROM THE PRESSURE HOSE. A SPRAY OF FLUID FROM THE PRESSURE HOSE CAN CAUSE INJURY TO PERSONS.</p> <p>SLOWLY PRESSURIZE THE SYSTEM WITH THE HYDRAULIC SERVICE CART OR, IF YOU USE THE ACMP TO DO THE TEST, PUT THE C HYD PUMPS ELEC 2 SWITCH TO ON.</p>							WITH THE PRESSURE HOSE DIS- CONNECTED, A BAD CHECK VALVE WILL LET FLUID FLOW FROM THE HOSE. AFTER THE INITIAL QUANTITY OF FLUID DRAINS FROM THE HOSE, MAKE SURE THERE IS NO FLUID LEAK THROUGH THE CHECK VALVE. IF THE ACMP C1 CHECK VALVE HAS A LEAK, REPLACE THIS CHECK VALVE IN THE ACMP FILTER MODULE (AMM 29-11-19/401). IF YOU START THE YAW DAMPER, AUTO- PILOT AND STABILIZER TRIM CHECK (FIG. 618) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.

FULL CHECK

2 IF YOU USE THE ACMP TO DO THE TEST, DO NOT PUT THE C HYD PUMPS ELEC 1 SWITCH TO OFF.

Component Check for the Center Hydraulic System Figure 617 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	REMOVE THE PRESSURE FROM THE CENTER SYSTEM (AMM 29-11-00).							
13	CONNECT THE PRESSURE HOSE TO ACMP C1 (AMM 29-11-01/401). DISCONNECT THE PRESSURE HOSE FROM ACMP C2 (AMM 29-11-02/401). INSTALL A CAP ON THE PUMP PRESSURE PORT. PUT THE END OF THE PRESSURE HOSE IN A CONTAINER TO CATCH THE FLUID.							THIS IS A CHECK TO MAKE SURE A PRESSURE LEAK THROUGH THE ACMP C2 CHECK VALVE DOES NOT BACK-DRIVE THE ACMP C2.
14	<p style="text-align: center;">CAUTION</p> BE CAREFUL WHEN YOU DO A CHECK FOR FLUID LEAKAGE FROM THE PRESSURE HOSE. A SPRAY OF FLUID FROM THE PRESSURE HOSE CAN CAUSE INJURY TO PERSONS. SLOWLY PRESSURIZE THE SYSTEM WITH THE HYDRAULIC SERVICE CART OR, IF YOU USE THE ACMP TO DO THE TEST, PUT THE C HYD PUMPS ELEC 1 SWITCH TO ON.							WITH THE PRESSURE HOSE DISCONNECTED, A BAD CHECK VALVE WILL LET FLUID FLOW FROM THE HOSE. AFTER THE INITIAL QUANTITY OF FLUID DRAINS FROM THE HOSE, MAKE SURE THERE IS NO FLUID LEAK THROUGH THE CHECK VALVE. IF THE ACMP C2 CHECK VALVE HAS A LEAK, REPLACE THIS CHECK VALVE IN THE ACMP FILTER MODULE (AMM 29-11-19/401). IF YOU START THE YAW DAMPER, AUTO-PILOT AND STABILIZER TRIM CHECK (FIG. 618) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
15	REMOVE PRESSURE FROM THE CENTER SYSTEM (AMM 29-11-00).							
16	REMOVE THE CAP FROM ACMP C2 AND INSTALL THE PRESSURE HOSE TO ACMP C2 (AMM 29-11-02/401).							
17	PRESSURIZE THE CENTER HYDRAULIC SYSTEM (AMM 29-11-00).							

FULL CHECK

Component Check for the Center Hydraulic System
Figure 617 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUSH THE YAW DAMPER R ENGAGE SWITCH ON THE P5 PANEL TO "ON".							
2	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE CENTER SYSTEM NEUTRAL AND YAW DAMPER LEAKAGE.
3	CALCULATE THE CENTER SYSTEM YAW DAMPER LEAKAGE.			FIG. 618 STEP 2 MINUS FIG. 617 <u>STEP 7</u>			0.3 GPM	IF THE CENTER HYDRAULIC SYSTEM YAW DAMPER LEAKAGE IS MORE THAN THE APPROVED LEAKAGE, THE HIGH LEAKAGE COMPONENT IS POSSIBLY THE YAW DAMPER SERVO.
4	PUSH THE YAW DAMPER R SWITCH ON THE P5 PANEL TO "INOP".							
5	PUT THE A/P ENGAGE C SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "CMD".							
6	AFTER 1 MINUTE WRITE THE FLOW.							THIS IS THE CENTER SYSTEM NEUTRAL AND AUTOPILOT LEAKAGE.
7	CALCULATE THE CENTER SYSTEM AUTOPILOT LEAKAGE FLOW.			FIG. 618 STEP 6 MINUS FIG. 617 <u>STEP 7</u>			0.5 GPM	IF THE CENTER SYSTEM AUTOPILOT LEAKAGE FLOW IS MORE THAN THE APPROVED LEAKAGE, THE HIGH LEAKAGE COMPONENTS ARE POSSIBLY THE AUTOPILOT SERVOS.
8	PUT THE A/P ENGAGE C SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "OFF".							

FULL CHECK

Internal Leakage Check for the Center Hydraulic System - Yaw Damper,
Autopilot and Stabilizer Trim
Figure 618 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
9	MAKE SURE THE STAB TRIM C HYDRAULIC CUTOUT SWITCH ON THE CONTROL STAND PANEL P10 IS IN THE "NORM" POSITION. OPERATE THE STAB TRIM FOR 30 SECONDS WITH THE CENTER AISLE TRIM LEVERS.							
10	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE CENTER SYSTEM STAB TRIM PLUS THE AIRPLANE NEUTRAL LEAKAGE FLOW.
11	CALCULATE THE CENTER SYSTEM STAB TRIM LEAKAGE FLOW.			FIG. 618 STEP 10 MINUS FIG. 617 <u>STEP 7</u>			0.2 GPM	IF THE CENTER SYSTEM STAB TRIM LEAKAGE FLOW IS MORE THAN THE APPROVED LEAKAGE, THE STAB TRIM CIRCUIT HAS TOO MUCH LEAKAGE. YOU MUST REPLACE THE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE STAB TRIM LEAKAGE FLOW.

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Internal Leakage Check for the Center Hydraulic System -
Yaw Damper, Autopilot and Stabilizer Trim
Figure 618 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE A/P ENGAGE C SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "CMD".							
2	PUSH THE YAW DAMPER R SWITCH ON THE P5 PANEL TO "ON".							
3	MAKE SURE THE STAB TRIM C HYDRAULIC CUTOFF SWITCH ON THE CONTROL STAND PANEL P10 IS IN THE "NORM" POSITION.							
4	AFTER 15 SECONDS WRITE THE FLOW.						4.0 GPM	THIS IS THE GROSS CENTER SYSTEM "NEUTRAL" LEAKAGE FLOW. IF IT IS MORE THAN THE APPROVED LEAKAGE, REPLACE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE NEUTRAL LEAKAGE FLOW. THE TESTS WHICH FOLLOW WILL IDENTIFY THE COMPONENTS WITH HIGH LEAKAGE.
5	PUT THE A/P ENGAGE C SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "OFF".							
6	PUSH THE YAW DAMPER R SWITCH ON THE P55 PANEL TO "INOP".							
7	PUT THE STAB TRIM C SWITCH ON THE CONTROL STAND PANEL P10 TO "CUTOFF".							
8	PUT THE CENTER SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO OFF.							THIS STOPS FLOW TO THE EMPENNAGE, TO ISOLATE THE LATERAL FLIGHT CONTROLS FROM THE OTHER PARTS OF THE SYSTEM.
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE GROSS CENTER SYSTEM LATERAL FLIGHT CONTROL NEUTRAL LEAKAGE.

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Internal Leakage Check for the Center Hydraulic System - Lateral Flight Controls
Figure 619 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
10	TURN THE CONTROL WHEEL APPROXIMATELY 45° COUNTERCLOCKWISE.							THIS LIFTS THE LEFT WING FLIGHT SPOILER (PANEL NO. 1). WITH THE SPOILER PANEL UP, THE NULL LEAKAGE REPLACES THE NEUTRAL/SEAL LEAKAGE.
11	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE RIGHT SPOILER AND THE TWO AILERONS AND THE NULL LEAKAGE FOR THE LEFT WING SPOILER.
12	TURN THE CONTROL WHEEL APPROXIMATELY 45° CLOCKWISE.							THIS LIFTS THE RIGHT WING FLIGHT SPOILER (PANEL NO. 12). WITH THE SPOILER PANEL UP, THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
13	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE LEFT SPOILER AND THE TWO AILERONS AND THE NULL LEAKAGE FOR THE RIGHT WING SPOILER.
14	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
15	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11C6, FLT CONT ELEC 1L AC - 11C7, FLT CONT ELEC 1L DC - 11C8, FLT CONT ELEC 2L AC - 11C9, FLT CONT ELEC 2L DC • GUI 115: <ul style="list-style-type: none"> - 11C6, CSEU 1L AC - 11C7, CSEU 1L DC - 11C8, CSEU 2L AC - 11C9, CSEU 2L DC 							THIS STOPS THE OPERATION OF THE NO. 1 AND NO. 12 SPOILERS.
16	TURN THE CONTROL WHEEL TO THE FULL CLOCKWISE POSITION.							THIS STEP MOVES THE RIGHT AND LEFT WING AILERONS TO FULL TRAVEL. AT FULL TRAVEL, THE SEAL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
17	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE CENTER SYSTEM SPOILER NEUTRAL LEAKAGE AND AILERON SEAL LEAKAGE.

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Internal Leakage Check for the Center Hydraulic System - Lateral Flight Controls
Figure 619 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
18	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
19	REMOVE THE AILERON QUADRANT ACCESS PANEL, 561AB (AMM 06-44-00/201). INSTALL THE AILERON PCA LEAK TEST BLOCK TOOL WITH THE BLOCK BETWEEN THE STRUCTURE AND THE OUTBOARD SIDE OF THE LINKAGE (FIG. 621).							WITH THE TOOL INSTALLED, THE LEFT AILERON CAN NOT MOVE DOWN.
20	TURN THE CONTROL WHEEL TO THE FULL CLOCKWISE POSITION.							THIS STEP MOVES THE RIGHT AILERON TO FULL TRAVEL. AT FULL TRAVEL, THE SEAL LEAKAGE REPLACES THE NEUTRAL LEAKAGE. THE LEFT AILERON AND THE TWO SPOILERS WILL STAY AT THE NEUTRAL LEAKAGE POSITION.
21	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NEUTRAL LEAKAGE FOR THE CENTER SYSTEM SPOILER AND LEFT AILERON AND THE SEAL LEAKAGE FOR THE RIGHT AILERON.
22	CALCULATE THE NO. 1 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 11 MINUS <u>STEP 9</u>				IF THE NO. 1 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
23	CALCULATE THE NO. 12 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 13 MINUS <u>STEP 9</u>				IF THE NO. 12 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
24	CALCULATE THE LEFT AND RIGHT AILERON NULL MINUS SEAL LEAKAGE.			STEP 9 MINUS <u>STEP 17</u>				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
25	CALCULATE THE RIGHT AILERON NULL MINUS SEAL LEAKAGE.			STEP 9 MINUS <u>STEP 21</u>				IF THE RIGHT AILERON NULL MINUS SEAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.

FULL CHECK

Internal Leakage Check for the Center Hydraulic System - Lateral Flight Controls
Figure 619 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
26	CALCULATE THE LEFT AILERON NULL MINUS SEAL LEAKAGE.			STEP 24 MINUS STEP 25				IF THE LEFT AILERON NULL MINUS SEAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
27	REMOVE THE AILERON PCA LEAK TEST BLOCK TOOL (FIG. 621). INSTALL THE AILERON QUADRANT ACCESS PANEL, 561AB (AMM 06-44-00/201).							
28	CLOSE THE CIRCUIT BREAKERS WHICH WERE OPENED IN STEP 15.							
29	PUT THE CENTER SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO ON.							

FULL CHECK

Internal Leakage Check for the Center Hydraulic System - Lateral Flight Controls
Figure 619 (Sheet 4)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE CENTER SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO ON.							
2	AFTER 1 MINUTE WRITE THE FLOW.							THIS IS THE GROSS SYSTEM NEUTRAL LEAKAGE.
3	COMPRESS THE CENTER SYSTEM LEFT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE CENTER SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE CENTER SYSTEM RIGHT ELEVATOR PCA POGO ROD 0.20 TO 0.25 INCH WITH THE POGO COMPRESSOR TOOL.							THE CENTER SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							

FULL CHECK

Internal Leakage Check for the Center System - Empennage Flight Controls
Figure 620 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.
12	REMOVE THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1), IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT, PLUS THE YAW DAMPER MODULE SIMULATORS INPUT, CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 1
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15C	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15D	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

FULL CHECK

1 MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Center System - Empennage Flight Controls
Figure 620 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15E	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501).
15F	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
16	COMPARE THE FLOW OF STEPS 15A AND 15F. WRITE THE LARGEST FLOW HERE.							THIS IS THE CENTER SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE CENTER SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 5</u>			±1.0 GPM	THIS IS THE CENTER SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE CENTER SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 9</u>			±1.0 GPM	THIS IS THE CENTER SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE CENTER SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS <u>STEP 16</u>			±2.0 GPM	THIS IS THE CENTER SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IN THE "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF".							

FULL CHECK

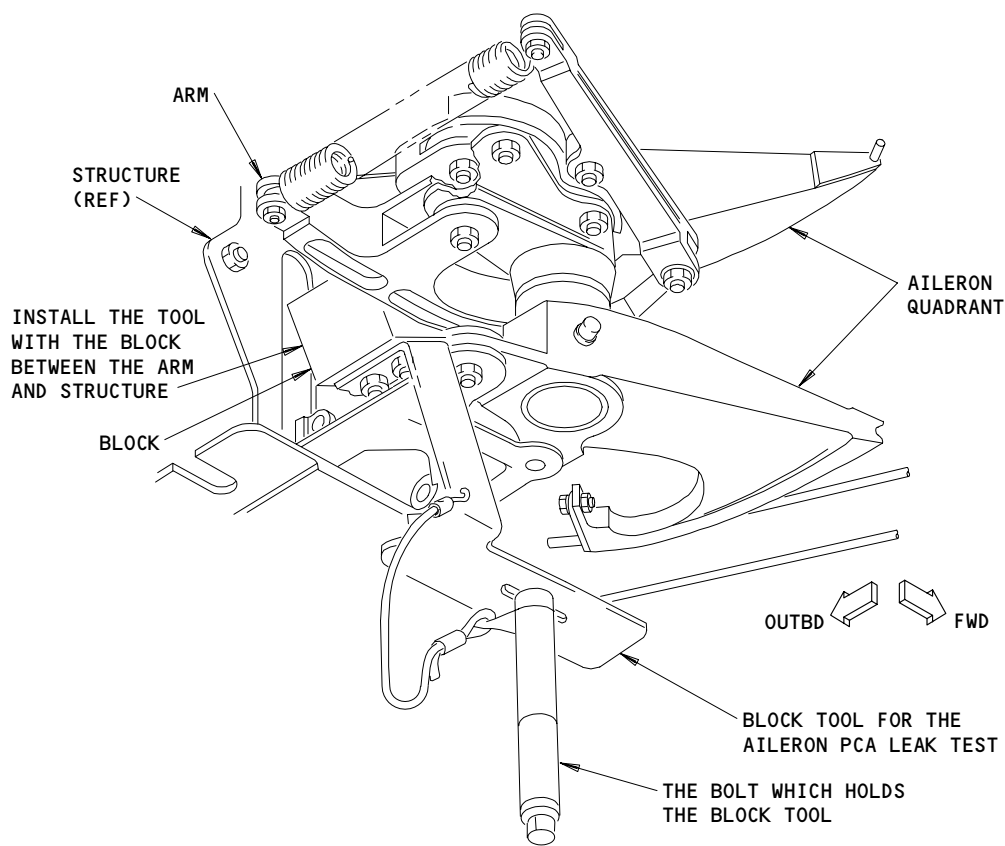
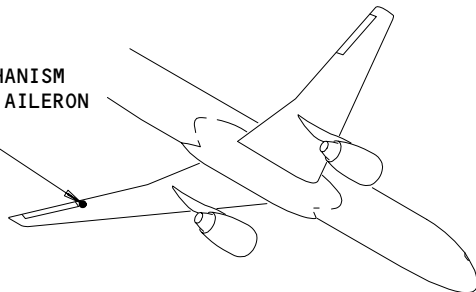
MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Center System – Empennage Flight Controls
Figure 620 (Sheet 3)

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QUADRANT AND
OVERRIDE MECHANISM
FOR THE LEFTAILERON
SEE (A)



QUADRANT AND OVERRIDE MECHANISM
FOR THE LEFTAILERON

(A)

Block Tool for the Aileron PCA Leak Test
Figure 621

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	REMOVE THE PRESSURE FROM THE RIGHT SYSTEM (AMM 29-11-00).							THIS STARTS THE EDP FIRE SHUTOFF VALVE TEST.
2	PRESSURIZE THE RIGHT RESERVOIR (AMM 29-11-00).							
3	WARNING: DO NOT TURN THE FIRE SWITCH HANDLE TO THE LEFT OR RIGHT. THIS WILL RELEASE THE CONTENTS OF THE FIRE BOTTLES. PULL THE RIGHT ENGINE FIRE SWITCH ON THE P10 PANEL TO THE "FIRE" POSITION.							YOU MUST DISENGAGE THE MANUAL OVERRIDE BEFORE YOU PULL THE FIRE SWITCH.
4	DISCONNECT THE SUPPLY LINE OF THE RIGHT EDP BETWEEN THE SHUTOFF VALVE AND THE EDP. NOTE: IF YOU DISCONNECT A SELF-SEAL FITTING, THE LEAKAGE FROM THE SHUTOFF VALVE CAN NOT FLOW FROM THE EDP SUPPLY HOSE.							WITH THE SUPPLY LINE DISCONNECTED, FLUID WILL FLOW FROM THE SUPPLY LINE, IF THE SHUTOFF VALVE HAS A LEAK. AFTER THE INITIAL QUANTITY OF FLUID DRAINS FROM THE SUPPLY LINE, THERE MUST BE NO FLUID FLOW THROUGH THE SHUTOFF VALVE. MONITOR THE OPEN SUPPLY LINE FOR AT LEAST ONE MINUTE.
5	CONNECT THE EDP SUPPLY LINE.							
6	PUSH IN THE RIGHT ENGINE FIRE SWITCH.							

FULL CHECK

Component Check for the Right Hydraulic System
Figure 622 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
7	PRESSURIZE THE HYDRAULIC SYSTEMS (AMM 29-11-00).							
		LEFT						
		CENTER						
		RIGHT						
8	OPERATE THE FLIGHT CONTROLS THROUGH FIVE FULL CYCLES TO CAUSE THE HYDRAULIC FLUID TO BECOME WARM. <u>NOTE:</u> ONE CYCLE IS EQUIVALENT TO MOVEMENT FROM NEUTRAL TO FULL CONTROL TRAVEL TO FULL CONTROL TRAVEL IN THE OPPOSITE DIRECTION, THEN BACK TO NEUTRAL.							
9	MAKE SURE THE ACMP LOW PRESSURE LIGHT ON THE P5 PANEL IS ON. DO NOT START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) UNTIL THE LIGHT IS ON.							IF THE PUMP PRESSURE LIGHT IS OFF, REPLACE THE CHECK VALVE IN THE LEFT ACMP FILTER MODULE (AMM 29-11-18/401). IF YOU START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
10	PUT THE R HYD PUMPS ELEC SWITCH TO ON AND MAKE SURE THE PUMP PRESS LIGHT IS OFF.							IF THE PUMP PRESS LIGHT IS ON, REPAIR THE PRESSURE INDICATION CIRCUIT AND DO STEP 9 AGAIN.
11	PUT THE R HYD PUMPS ELEC SWITCH TO OFF.							

1 YOU CAN NOT USE THE SYSTEM ACMP TO DO THIS STEP. YOU CAN MOTOR THE ENGINE TO SUPPLY HYDRAULIC PRESSURE WITH THE EDP TO DO A CHECK OF THE ACMP LOW PRESSURE LIGHT.

FULL CHECK Component Check for the Right Hydraulic System Figure 622 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
12	MAKE SURE THE EDP LOW PRESSURE LIGHT IS ON. DO NOT START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) UNTIL THE LIGHT IS ON.							IF THE EDP PRESS LIGHT IS OFF, REPLACE THE CHECK VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
13	PUSH THE R HYD PUMPS ENG SWITCH TO OFF. MAKE SURE THE EDP LOW PRESSURE LIGHT STAYS ON FOR AT LEAST 10 SECONDS. DO NOT START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) UNTIL THE LIGHT STAYS ON 10 SECONDS.							IF THE LIGHT GOES OFF IN 10 SECONDS, THE EDP LEAKAGE DID NOT LET THE CHECK VALVE LEAKAGE CAUSE THE LIGHT TO GO OFF IN STEP 13. REPLACE THE CHECK VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) BEFORE A BAD CHECK VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.
14	FEEL THE RETURN LINE FROM THE EDP PRESSURE/CASE DRAIN FILTER MODULE. DO NOT START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) IF THE PRESSURE RELIEF VALVE HAS A LEAK.							IF THE RETURN LINE IS HOTTER THAN THE FLIGHT CONTROL RETURN LINES, THE SYSTEM PRESSURE RELIEF VALVE HAS TOO MUCH LEAKAGE. REPLACE THE PRESSURE RELIEF VALVE IN THE EDP FILTER MODULE (AMM 29-11-17/401). IF YOU START THE AUTOPILOT AND STAB TRIM CHECK (FIG. 623) BEFORE A BAD RELIEF VALVE IS REPLACED, THE LEAKAGE CALCULATIONS WILL NOT BE CORRECT.

FULL CHECK

Component Check for the Right Hydraulic System
Figure 622 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PRESSURIZE THE HYDRAULIC SYSTEMS (AMM 29-11-00). LEFT CENTER RIGHT							
2	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE RIGHT SYSTEM NEUTRAL LEAKAGE.
3	PUT THE A/P ENGAGE R SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "CMD".							
4	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE RIGHT SYSTEM NEUTRAL AND AUTOPILOT LEAKAGE.
5	CALCULATE THE RIGHT SYSTEM AUTOPILOT LEAKAGE FLOW.			STEP 4 MINUS <u>STEP 2</u>			0.5 GPM	IF THE RIGHT SYSTEM AUTOPILOT LEAKAGE FLOW IS MORE THAN THE APPROVED LEAKAGE, THE HIGH LEAKAGE COMPONENTS ARE POSSIBLY THE AUTOPILOT SERVOS.
6	PUT THE A/P ENGAGE R SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "OFF".							
7	MAKE SURE THE STAB TRIM R HYDRAULIC CUTOFF SWITCH ON THE CONTROL STAND PANEL P10 IS IN THE "NORM" POSITION. OPERATE THE STAB TRIM FOR 30 SECONDS TO CAUSE THE HYDRAULIC FLUID TO BECOME WARM.							
8	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT SYSTEM STAB TRIM AND AIRPLANE NEUTRAL LEAKAGE FLOW.
9	CALCULATE THE RIGHT SYSTEM STAB TRIM LEAKAGE FLOW.			STEP 8 MINUS <u>STEP 2</u>			0.2 GPM	IF THE RIGHT SYSTEM STAB TRIM LEAKAGE FLOW IS MORE THAN THE APPROVED LEAKAGE, THE STAB TRIM CIRCUIT HAS TOO MUCH LEAKAGE. YOU MUST REPLACE THE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE STAB TRIM LEAKAGE FLOW.

FULL CHECK

Internal Leakage Check for the Right Hydraulic System -
Autopilot and Stabilizer Trim
Figure 623

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	INSTALL THE PILOTS' CONTROL WHEEL ADAPTER AND PROTRACTOR.							
2	INSTALL A PROTRACTOR ON THE SPEEDBRAKE HANDLE.							
3	PUT THE A/P ENGAGE R SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "CMD".							
4	MOVE THE LANDING GEAR LEVER TO THE "DOWN" POSITION.							THIS PUTS PRESSURE ON THE RIGHT SYSTEM BRAKE CIRCUIT.
5	MAKE SURE THE STAB TRIM R HYDRAULIC CUTOUT SWITCH ON THE CONTROL STAND PANEL P10 IS IN THE "NORM" POSITION.							THE AIRCRAFT RIGHT HYDRAULIC SYSTEM IS NOW CONFIGURED FOR LANDING.
6	AFTER ONE MINUTE WRITE THE FLOW.						4.5 GPM	THIS IS THE GROSS RIGHT SYSTEM "NEUTRAL" LEAKAGE FLOW. IF IT IS MORE THAN THE APPROVED LEAKAGE, REPLACE THE COMPONENTS WITH HIGH LEAKAGE TO DECREASE THE "NEUTRAL" LEAKAGE FLOW. THE TESTS WHICH FOLLOW WILL IDENTIFY THE HIGH LEAKAGE COMPONENTS.
7	PUT THE LANDING GEAR LEVER IN THE "OFF" POSITION.							
8	PUT THE A/P ENGAGE R SWITCH ON THE MODE CONTROL PANEL ON THE P55 PANEL TO "OFF".							
9	PUT THE STAB TRIM R SWITCH ON THE CONTROL STAND PANEL P10 TO "CUTOUT".							
10	PUT THE RIGHT SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO "OFF".							THIS STOPS FLOW TO THE EMPENNAGE, TO ISOLATE THE LATERAL FLIGHT CONTROLS FROM THE OTHER PARTS OF THE SYSTEM.

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Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
11	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE GROSS RIGHT SYSTEM LATERAL FLIGHT CONTROLS NEUTRAL LEAKAGE.
12	PUT THE SPEEDBRAKE HANDLE AT THE 20° POSITION. TURN THE CONTROL WHEEL TO 80° CLOCKWISE.							THIS LIFTS ALL THE RIGHT WING SPOILER PANELS AND CAUSES THE NULL LEAKAGE TO REPLACE THE NEUTRAL LEAKAGE. YOU MUST USE THE SPEEDBRAKE HANDLE TO LIFT THE GROUND SPOILER NO. 9.
13	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT WING SPOILERS AND THE LEFT AILERON NULL LEAKAGE, AND THE LEFT WING SPOILERS NEUTRAL LEAKAGE.
14	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
15	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11C6, FLT CONT ELEC 1L AC - 11C7, FLT CONT ELEC 1L DC - 11C8, FLT CONT ELEC 2L AC - 11C9, FLT CONT ELEC 2L DC • GUI 115: <ul style="list-style-type: none"> - 11C6, CSEU 1L AC - 11C7, CSEU 1L DC - 11C8, CSEU 2L AC - 11C9, CSEU 2L DC 						THIS STOPS THE OPERATION OF THE NO. 6 AND NO. 7 SPOILERS.	
16	TURN THE CONTROL WHEEL TO 80° CLOCKWISE.							THIS LIFTS THE NO. 9 AND 11 SPOILERS AND THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
17	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NULL LEAKAGE FOR THE SPOILERS 9 AND 11 AND THE NEUTRAL LEAKAGE FOR SPOILERS 2,4,6 AND 7 AND THE LEFT AILERON.
18	PUT THE CONTROL WHEEL IN THE CENTER POSITION. PUT THE SPEEDBRAKE HANDLE IN THE DOWN POSITION.							THIS STOPS OPERATION OF THE NO. 4 AND 9 SPOILER PANELS.

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Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
19	TURN THE CONTROL WHEEL TO 80° CLOCKWISE.							THIS LIFTS THE NO. 11 SPOILER AND THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
20	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NULL LEAKAGE FOR SPOILER NO. 11, THE NEUTRAL LEAKAGE FOR SPOILERS 2,4,6,7 AND 9 AND THE SEAL LEAKAGE FOR THE LEFT AILERON.
21	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
22	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11G17, FLT CONT ELEC 1R AC - 11G18, FLT CONT ELEC 1R DC - 11G27, FLT CONT ELEC 2R AC - 11G28, FLT CONT ELEC 2R DC • GUI 115: <ul style="list-style-type: none"> - 11G17, CSEU 1R AC - 11G18, CSEU 1R DC - 11G27, CSEU 2R AC - 11G28, CSEU 2R DC 							THIS STOPS OPERATION OF ALL SPOILERS.
23	TURN THE CONTROL WHEEL TO 80° CLOCKWISE.							THIS MOVES THE AILERON TO FULL TRAVEL WHILE THE SPOILERS STAY DOWN.
24	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE AILERON SEAL LEAKAGE (THE AILERON IS AT FULL TRAVEL AT THE 80° WHEEL POSITION) AND THE SPOILER NEUTRAL LEAKAGE.
25	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
26	CLOSE ALL THE CIRCUIT BREAKERS THAT WERE OPENED IN STEPS 15 AND 22.							
27	PUT THE SPEEDBRAKE HANDLE AT THE 20° POSITION. TURN THE CONTROL WHEEL TO 80° COUNTERCLOCKWISE.							THIS LIFTS ALL THE LEFT WING SPOILER PANELS AND CAUSES THE NULL LEAKAGE TO REPLACE THE NEUTRAL LEAKAGE. YOU MUST USE THE SPEEDBRAKE HANDLE TO LIFT THE GROUND SPOILER NO. 4.

FULL CHECK

Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
28	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT WING SPOILERS AND THE LEFT AILERON NULL LEAKAGE, AND THE RIGHT WING SPOILERS NEUTRAL LEAKAGE.
29	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
30	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11C6, FLT CONT ELEC 1L AC - 11C7, FLT CONT ELEC 1L DC - 11C8, FLT CONT ELEC 2L AC - 11C9, FLT CONT ELEC 2L DC • GUI 115: <ul style="list-style-type: none"> - 11C6, CSEU 1L AC - 11C7, CSEU 1L DC - 11C8, CSEU 2L AC - 11C9, CSEU 2L DC 						THIS STOPS THE OPERATION OF THE NO. 6 AND NO. 7 SPOILERS.	
31	TURN THE CONTROL WHEEL TO 80° COUNTERCLOCKWISE.							THIS LIFTS THE NO. 2 AND 4 SPOILERS AND THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
32	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NULL LEAKAGE FOR SPOILERS 2 AND 4 AND THE NEUTRAL LEAKAGE FOR SPOILERS 6,7,9, AND 11 AND THE LEFT AILERON.
33	PUT THE CONTROL WHEEL IN THE CENTER POSITION. PUT THE SPEEDBRAKE HANDLE IN THE DOWN POSITION.							THIS STOPS OPERATION OF THE NO. 4 AND 9 SPOILER PANELS.
34	TURN THE CONTROL WHEEL TO 80° COUNTERCLOCKWISE.							THIS LIFTS THE NO. 2 SPOILER AND THE NULL LEAKAGE REPLACES THE NEUTRAL LEAKAGE.
35	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE NULL LEAKAGE FOR SPOILERS NO. 2, THE NEUTRAL LEAKAGE FOR SPOILERS 4,6,7,9, AND 11, AND THE SEAL LEAKAGE FOR THE LEFT AILERON.
36	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							

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Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 4)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
37	OPEN THESE CIRCUIT BREAKERS ON THE P11 PANEL: <ul style="list-style-type: none"> • ALL EXCEPT GUI 115: <ul style="list-style-type: none"> - 11G17, FLT CONT ELEC 1R AC - 11G18, FLT CONT ELEC 1R DC - 11G27, FLT CONT ELEC 2R AC - 11G28, FLT CONT ELEC 2R DC • GUI 115: <ul style="list-style-type: none"> - 11G17, CSEU 1R AC - 11G18, CSEU 1R DC - 11G27, CSEU 2R AC - 11G28, CSEU 2R DC 							THE LEFT CSEU CIRCUIT BREAKERS MUST ALSO STAY OPEN.
38	TURN THE CONTROL WHEEL TO 80° COUNTERCLOCKWISE.							THIS MOVES THE AILERONS TO FULL TRAVEL WITH THE SPOILERS DOWN.
39	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE AILERON SEAL LEAKAGE (THE AILERON IS AT FULL TRAVEL AT THE 80° WHEEL POSITION) AND THE SPOILER NEUTRAL LEAKAGE.
40	CALCULATE THE NO. 7, 9, AND 11 SPOILERS NULL MINUS NEUTRAL LEAKAGE.			STEP 13 MINUS <u>STEP 24</u>				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
41	CALCULATE THE NO. 9 AND 11 SPOILERS NULL MINUS NEUTRAL LEAKAGE.			STEP 17 MINUS <u>STEP 24</u>				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
42	CALCULATE THE NO. 11 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 20 MINUS <u>STEP 24</u>				IF THE NO. 11 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
43	CALCULATE THE NO. 9 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 41 MINUS <u>STEP 42</u>				IF THE NO. 9 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
44	CALCULATE THE NO. 7 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 40 MINUS <u>STEP 41</u>				IF THE NO. 7 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
45	CALCULATE THE NO. 2, 4 AND 6 SPOILERS NULL MINUS NEUTRAL LEAKAGE.			STEP 28 MINUS <u>STEP 39</u>				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.

FULL CHECK

Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 5)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
46	CALCULATE THE NO. 2 AND 4 SPOILERS NULL MINUS NEUTRAL LEAKAGE.			STEP 32 MINUS <u>STEP 39</u>				THE RESULT OF THIS CALCULATION IS USED TO CALCULATE THE COMPONENT LEAKAGE.
47	CALCULATE THE NO. 2 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 35 MINUS <u>STEP 39</u>				IF THE NO. 2 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
48	CALCULATE THE NO. 4 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 46 MINUS <u>STEP 47</u>				IF THE NO. 4 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
49	CALCULATE THE NO. 6 SPOILER NULL MINUS NEUTRAL LEAKAGE.			STEP 45 MINUS <u>STEP 46</u>				IF THE NO. 6 SPOILER NULL MINUS NEUTRAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
50	CALCULATE THE AILERON NEUTRAL MINUS SEAL LEAKAGE.			STEP 11 MINUS <u>STEP 39</u>				IF THE LEFT AILERON NEUTRAL MINUS SEAL LEAKAGE IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
51	PUT THE CONTROL WHEEL IN THE CENTER POSITION.							
52	CLOSE THE CIRCUIT BREAKERS THAT WERE OPENED IN STEPS 30 AND 37.							
53	PUT THE SPEEDBRAKE HANDLE IN THE DOWN POSITION.							
54	REMOVE THE PILOTS' CONTROL WHEEL ADAPTER AND PROTRACTOR.							
55	REMOVE THE PROTRACTOR FROM THE SPEEDBRAKE HANDLE.							

FULL CHECK

Internal Leakage Check for the Right Hydraulic System - Lateral Flight Controls
Figure 624 (Sheet 6)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	PUT THE RIGHT SYSTEM FLIGHT CONTROL SHUTOFF VALVE SWITCH ON THE P61 PANEL TO ON.							
2	AFTER ONE MINUTE WRITE THE FLOW.							THIS IS THE GROSS SYSTEM NEUTRAL LEAKAGE.
3	COMPRESS THE RIGHT SYSTEM LEFT ELEVATOR PCA POGO ROD WITH THE POGO COMPRESSOR TOOL.							THE RIGHT SYSTEM LEFT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
4	MAKE SURE THE "L ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "L ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
5	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE LEFT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
6	REMOVE THE POGO COMPRESSOR TOOL FROM THE LEFT ELEVATOR PCA POGO ROD.							
7	COMPRESS THE RIGHT SYSTEM RIGHT ELEVATOR PCA POGO ROD WITH THE POGO COMPRESSOR TOOL.							THE RIGHT SYSTEM RIGHT ELEVATOR PCA WILL TRY TO MOVE THE ELEVATOR, THE OTHER TWO SYSTEMS WILL HOLD THE ELEVATOR IN POSITION.
8	MAKE SURE THE "R ELEV PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "R ELEV PCU" MESSAGE DOES NOT SHOW, DO THE "ELEVATOR PCU MONITOR SYSTEM TEST" (AMM 27-31-00/501).
9	AFTER 15 SECONDS WRITE THE FLOW.							THIS IS THE RIGHT ELEVATOR PCA SEAL LEAKAGE AND THE AIRPLANE NEUTRAL LEAKAGE.
10	REMOVE THE POGO COMPRESSOR TOOL FROM THE RIGHT ELEVATOR PCA POGO ROD.							

FULL CHECK


Internal Leakage Check for the Right Hydraulic System - Empennage Flight Controls
Figure 625 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
11	MAKE SURE THE RUDDER RATIO CHANGER TEST SWITCHES ARE IN THE USUAL POSITION.							THE TEST SWITCH IS ON THE FRONT OF EACH RUDDER RATIO CHANGER MODULE (RCM). THE RCMs ARE IN THE MAIN EQUIPMENT CENTER. THE LEFT RCM IS ON THE E3-1 SHELF. THE RIGHT RCM IS ON THE E4-1 SHELF.
12	REMOVE THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1), IN THE MAIN EQUIPMENT CENTER. INSTALL A YAW DAMPER MODULE SIMULATOR IN PLACE OF EACH YAW DAMPER MODULE (FIG. 607).							
13	SLOWLY PUSH THE LEFT RUDDER PEDAL FULLY FORWARD.							
14	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "LEFT".							THE RUDDER PEDAL INPUT PLUS THE YAW DAMPER MODULE SIMULATORS INPUT CAUSES THE PISTON IN THE RUDDER PCA TO MOVE TO THE END OF ITS TRAVEL WHILE THE PCA CONTROL VALVE STAYS OPEN.
15	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501). 
15A	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
15B	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER TO "OFF".							
15C	SLOWLY PUSH THE RIGHT RUDDER PEDAL FULLY FORWARD.							
15D	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR TO "RIGHT".							

FULL CHECK

 MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Right Hydraulic System - Empennage Flight Controls
Figure 625 (Sheet 2)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
15E	MAKE SURE THE "RUD PCU" MESSAGE IS SHOWN ON THE EICAS STATUS PAGE.							IF THE "RUD PCU" MESSAGE DOES NOT SHOW, DO THE "PCA BOTTOMED TRAVEL AND PCA MONITOR TEST" AND THE "PCA PRESSURE DIFFERENTIAL SENSOR ISOLATION TEST" (AMM 27-21-00/501).
15F	AFTER 15 SECONDS WRITE THE FLOW. RELEASE THE RUDDER PEDAL AFTER YOU WRITE THE FLOW.							
16	COMPARE THE FLOW OF STEPS 15A AND 15F. WRITE THE LARGEST FLOW HERE.							THIS IS THE RIGHT SYSTEM RUDDER PCA SEAL LEAKAGE AND THE SYSTEM NEUTRAL LEAKAGE.
17	CALCULATE THE RIGHT SYSTEM LEFT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 5</u>			±1.0 GPM	THIS IS THE RIGHT SYSTEM LEFT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN. IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
18	CALCULATE THE RIGHT SYSTEM RIGHT ELEVATOR LEAKAGE.			STEP 2 MINUS <u>STEP 9</u>			±1.0 GPM	THIS IS THE RIGHT SYSTEM RIGHT ELEVATOR NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
19	CALCULATE THE RIGHT SYSTEM RUDDER LEAKAGE.			STEP 2 MINUS <u>STEP 16</u>			±2.0 GPM	THIS IS THE RIGHT SYSTEM RUDDER NEUTRAL MINUS SEAL LEAKAGE. IF THE RESULT IS POSITIVE, WRITE IT IN THE "NULL" COLUMN, IF IT IS NEGATIVE, WRITE IT IN THE "SEAL" COLUMN.
20	PUT THE RUDDER DISPLACEMENT SWITCH ON EACH YAW DAMPER MODULE SIMULATOR (MAIN EQUIPMENT CENTER) TO "OFF". REMOVE THE YAW DAMPER MODULE SIMULATOR AND INSTALL THE YAW DAMPER MODULES, M522 (E3-1) AND M523 (E4-1) (FIG. 607).							

FULL CHECK

MAKE SURE ALL SYSTEMS REQUIRED TO PERFORM THIS TEST ARE FUNCTIONAL.

Internal Leakage Check for the Right Hydraulic System - Empennage Flight Controls
Figure 625 (Sheet 3)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
1	MAKE SURE THE LANDING GEAR HANDLE IS IN THE "OFF" POSITION.							
2	MAKE SURE THE PARKING BRAKE IS SET.							
3	MAKE SURE THE PRESSURE ON THE BRAKE ACCUMULATOR GAGE IS MORE THAN 2900 PSI.							
4	REMOVE THE PRESSURE FROM THE THREE HYDRAULIC SYSTEMS. IF YOU USED A HYDRAULIC SERVICE CART IN THIS TEST, REMOVE THE SERVICE CART (AMM 29-11-00). LEFT CENTER RIGHT							THE BRAKE ACCUMULATOR WILL PRESSURIZE THE BRAKE CIRCUIT.
5	AFTER 1 HOUR, WRITE THE THE ACCUMULATOR PRESSURE IN THE FLOW COLUMN.							IF THE ACCUMULATOR PRESSURE HAS DECREASED MORE THAN 400 PSI, THE BRAKE CIRCUIT HAS TOO MUCH INTERNAL LEAKAGE.
6	MOVE THE LANDING GEAR HANDLE TO THE DOWN POSITION.							
7	PUT THE RESERVE BRAKE SWITCH ON THE PILOT'S MAIN INSTRUMENT PANEL, P1, TO THE ON POSITION.							AFTER APPROXIMATELY 5 SECONDS THE RIGHT ACMP WILL START.
8	MAKE SURE THE RESERVE BRAKE SWITCH/LIGHT ON THE P1 PANEL COMES ON. MAKE SURE THE RIGHT HYDRAULIC SYSTEM PRESSURE LIGHT ON THE HYDRAULIC CONTROL PANEL IS ON.							IF THE RIGHT ACMP DOES NOT START, THE RESERVE BRAKE CIRCUIT IS BAD. IF THE SYSTEM PRESSURE LIGHT DOES NOT COME ON, THE ISOLATED ACMP PRESSURE SHUTOFF VALVE AND/OR THE CHECK VALVE WHICH ISOLATE THE RESERVE BRAKE SYSTEM FROM THE OTHER PARTS OF THE SYSTEM ARE BAD. EXAMINE THE ACMP PRESSURE SHUTOFF VALVE TO MAKE SURE ITS POSITION AGREES WITH THE RESERVE BRAKE SWITCH POSITION.

FULL CHECK

Internal Leakage Check for the Right Hydraulic System - Brake and Reserve Brake
Figure 626 (Sheet 1)

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STEP NO.	PROCEDURE	CHECK WHEN DONE	FLOW IN GPM	LEAKAGE			APPROVED LEAKAGE	CORRECTIVE ACTION/BAD COMPONENT/COMMENTS
				CALC.	NULL (+)	SEAL (-)		
9	MONITOR THE EICAS MAINTENANCE PAGE.							IF THE ISOLATED ACMP PRESSURE SHUTOFF OR SUPPLY SHUTOFF VALVES DO NOT AGREE WITH THE POSITION OF THE RESERVE BRAKE SWITCH, A "RSV BRAKE VAL" MESSAGE WILL SHOW ON EICAS. EXAMINE THE POSITION OF EACH VALVE TO FIND WHICH ONE IS BAD.
10	PUT THE RESERVE BRAKE SWITCH ON THE P1 PANEL TO THE OFF POSITION.							THE RIGHT ACMP WILL STOP IN 1 SECOND.

FULL CHECK

Internal Leakage Check for the Right Hydraulic System - Brake and Reserve Brake
Figure 626 (Sheet 2)

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LEFT AND RIGHT SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) –
REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the alternating current motor pumps for the left and right systems. The other task installs the alternating current motor pumps for the left and right systems.
- B. The ACMPs for the left and right hydraulic system come as an assembly that includes the hydraulic pump, four vibration isolators and a mounting plate. The assembly of the ACMP, isolators and mounting plate can be removed as a unit or the ACMP can be removed separately with the isolators and mounting plate left in the airplane if you are installing a 767 ACMP. Operators can choose to accomplish the procedure that is applicable to their situation.

NOTE: If the ACMP is being replaced, you will be required to replace the pressure and case drain filters. Do not replace the filters due to external pump leakage alone.

TASK 29-11-01-004-001

2. Remove the Alternating Current Motor Pumps (ACMPs) for the Left and Right Systems

A. General

- (1) This procedure refers to the alternating current motor pump (ACMP) as the hydraulic pump.

B. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 29-11-18/401, Left and Right System ACMP Filter Module R&I
- (3) AMM 32-00-15/201, Main Gear Door Locks
- (4) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

- (1) Location Zones
143/144 MLG Wheel Well

D. Procedure (Fig. 401)

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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).

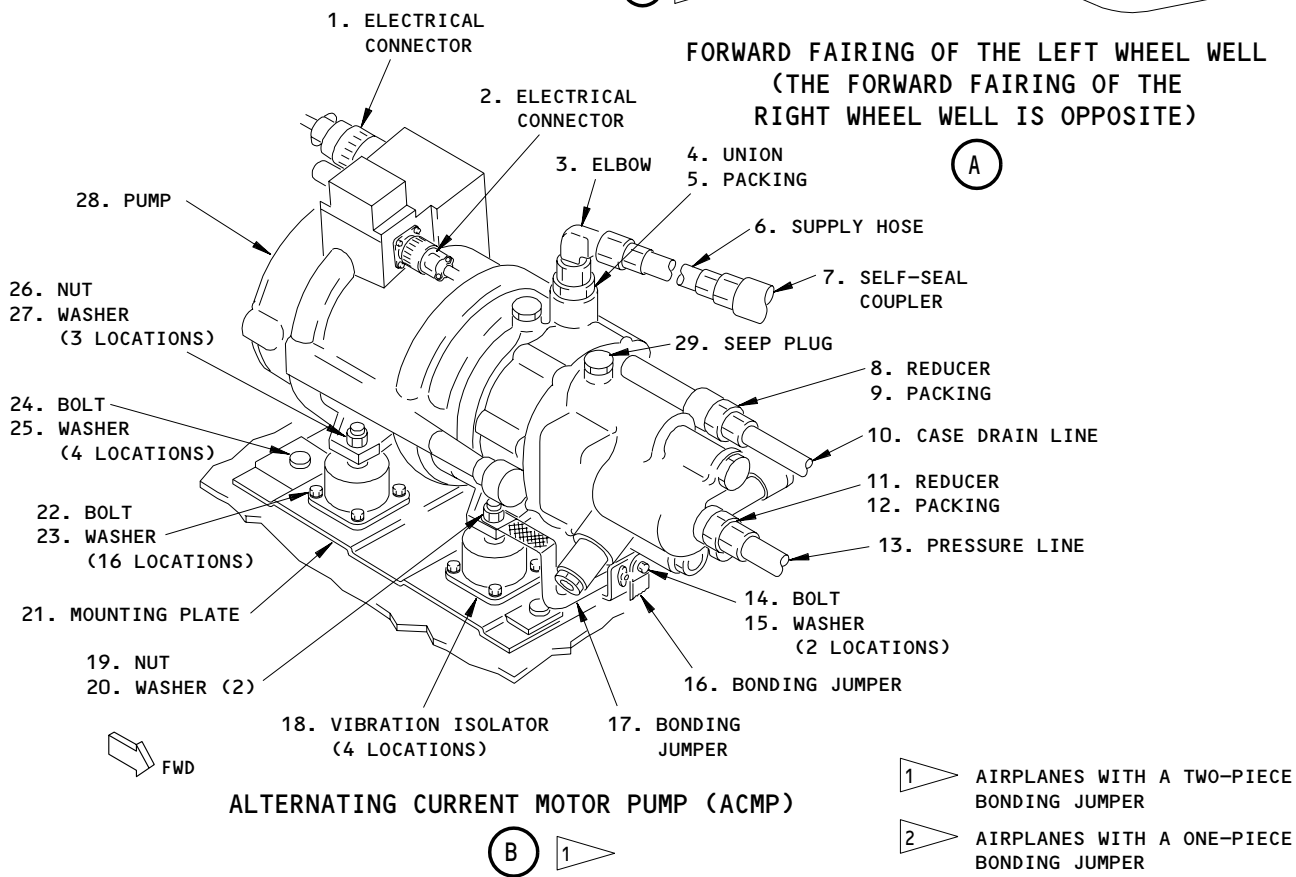
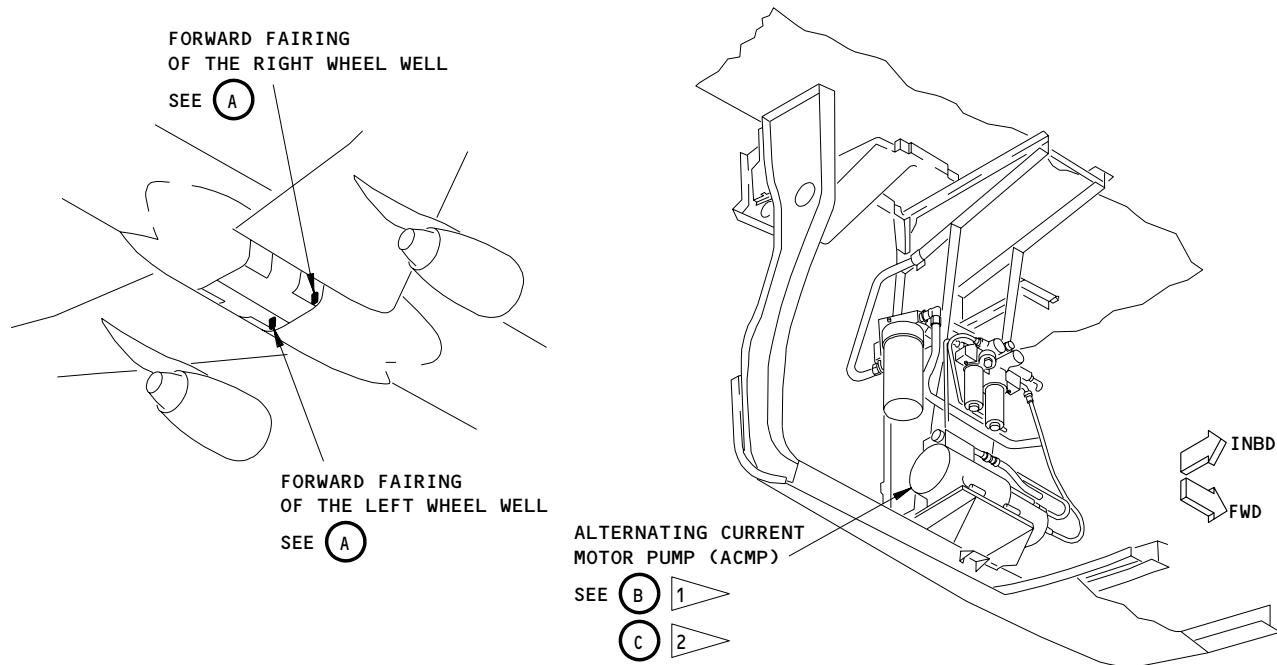
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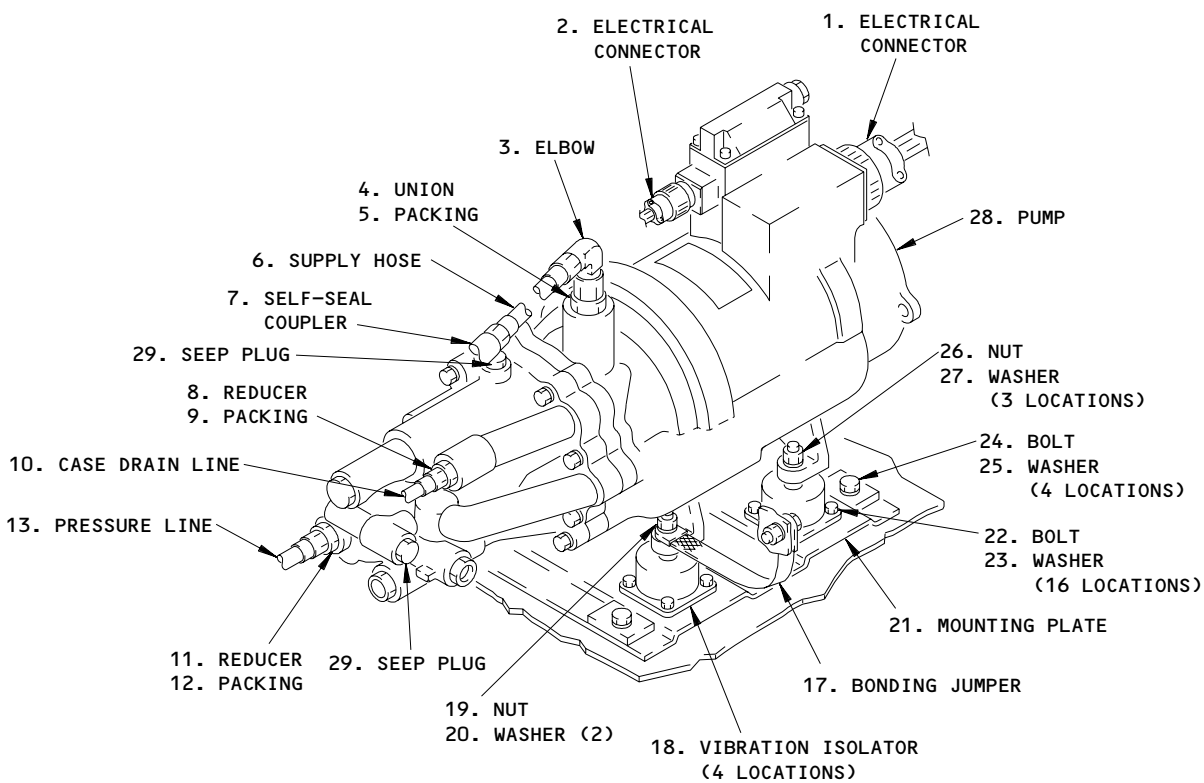
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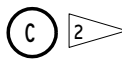
Alternating Current Motor Pump (ACMP) Installation for the Left and Right Systems
Figure 401 (Sheet 1)

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ALTERNATING CURRENT MOTOR PUMP (ACMP)



Alternating Current Motor Pump (ACMP) Installation for the Left and Right Systems
Figure 401 (Sheet 2)

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- S 864-004
- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 864-005
- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).
- S 034-006
- (5) Remove the lockwire from the electrical connectors (1, 2).
- S 034-007
- (6) Disconnect the electrical connectors (1, 2) from the pump (28).
- S 214-057
- (7) Inspect the electrical contacts on the connector, on the airplane side of the ACMP, for damage due to burning. If the contacts appear burned or damaged, replace them.
- S 034-008
- (8) Disconnect the hydraulic lines (10, 13) at the hydraulic pump (28).
- S 034-009
- (9) Disconnect the supply hose (6) at the self-seal coupler (7) at the opposite end from the hydraulic pump (28).
- S 034-010
- (10) Remove the supply hose (6) from the hydraulic pump (28).
- S 034-011
- (11) Remove the union (4) and the reducers (8, 11) from the ports on the hydraulic pump (28).
- S 034-012
- (12) Install caps on the hydraulic lines and the ports of the hydraulic pump (28).

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S 024-060

(13) Do these steps to remove the ACMP (hydraulic pump) if you want to remove the ACMP, the vibration isolators and the mounting plate as a unit:

- (a) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
Remove bonding jumper (16) as follows:
 - 1) Remove the bolt (14) and two washers (15) that attach the bonding jumper (16) to the ground lug on the mounting plate (21).
 - 2) Remove the bonding jumper (16) from the ground lug.
- (b) AIRPLANES WITH A ONE-PIECE BONDING JUMPER;
Remove the bonding jumper (17) as follows:
 - 1) Remove the nut (19) and washers (20) that attach the bonding jumper (17) to the vibration isolator.
 - 2) Remove the bonding jumper (17) from the stud on the vibration isolator (18).
- (c) Remove the bolts (24) and washers (25) that attach the mounting plate (21) to airplane structure.

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (d) Remove the hydraulic pump (28), the vibration isolators (18) and the mounting plate as a unit.
- (e) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
If the replacement pump assembly does not have the bonding jumper (17) installed, remove the bonding jumper (17) from the pump assembly being replaced so that it can be transferred to the replacement pump assembly.

S 024-061

(14) Do these steps if you want to remove the ACMP (hydraulic pump) separately without the removal of the vibration isolators and the mounting plate:

NOTE: This will allow you to install a spare 767 ACMP that does not have a mounting plate and vibration isolators installed.

- (a) Remove nut (19) and washers (20) that attach the bonding jumper (17) to the stud on the vibration isolator.

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- (b) Remove the bonding jumper (17) from the stud on the vibration isolator.
- (c) Remove the nuts (26) and washers (27) at the other locations that secure the pump (28) to the vibration isolators (18).

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE HYDRAULIC PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (d) Remove the hydraulic pump (28).
- (e) Inspect the vibration isolators for damage:
 - 1) Replace any vibration isolator that shows signs of damage.

S 964-050

- (15) If the ACMP is being replaced, the pressure and case drain filters must be replaced (AMM 29-11-18/401). Do not replace the filters due to pump external leakage alone.

TASK 29-11-01-404-020

3. Install the Alternating Current Motor Pumps (ACMPs) for the Left and Right Systems

A. General

- (1) This procedure refers to the alternating current motor pump (ACMP) as the hydraulic pump.

B. Consumable Materials

- (1) D00153 Hydraulic Fluid - BMS 3-11
- (2) D00054 Hydraulic System Lubricant - MCS 352B

C. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Packing	29-11-01	01	90
	9	Packing	29-11-01	01	80
	12	Packing			70
	28	Hydraulic Pump	29-11-01	01	95

D. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 20-10-21/401, Electrical Bonding

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- (4) AMM 20-10-21/601 Electrical Bonding
- (5) AMM 20-10-22/701, Metal Surfaces
- (6) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (7) AMM 32-00-15/201, Main Gear Door Locks
- (8) SWPM 20-20-00, Electrical Bonding Standard Wiring Practices
Manual D6-54446

E. Access

- (1) Location Zones
143/144 MLG Wheel Well

F. Procedure (Fig. 401)

S 144-021

- (1) Clean the surfaces for an electrical bond at the location of each bonding jumper (AMM 20-10-22/701).

S 434-022

- (2) Remove the caps from the hydraulic lines and the ports of the hydraulic pump (28).

S 644-023

- (3) Apply hydraulic lubricant or hydraulic fluid to the packings (5, 9, 12) and to the threads of the union (4) and the reducers (8, 11).

S 434-024

- (4) Install the union (4), the reducers (8, 11) and the packings (5, 9, 12) in the ports of the hydraulic pump (28).

S 034-025

- (5) AIRPLANES WITH VICKERS PUMPS;

Do these steps:

- (a) Look at the plug (29) which is in the seep port of the hydraulic pump (28) to identify the type of the plug. There are two types of plugs; a solid plug or a plug with vents.

NOTE: The solid plug, P/N 73866, does not have vent holes. You can identify the plug with vents by the two holes in the flat surfaces of the hexagonal area.

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CAUTION: YOU MUST REMOVE THE SOLID PLUG, P/N 73866, FROM THE SEEP PORT (29) OF THE PUMP. IF YOU DO NOT REMOVE THIS PLUG, THE PUMP CAN BECOME TOO HOT.

- (b) If a solid plug, P/N 73866, is in the seep port (29) of the hydraulic pump (28), remove the plug (29) and the O-ring from the hydraulic pump (28).

NOTE: If the plug (29) has vent holes, you must not remove it from the hydraulic pump (28).

S 424-062

- (6) Do these steps to install the assembly of the pump, the mounting plate and the vibration isolators:
 - (a) Fill the hydraulic pump (28) with hydraulic fluid.
 - (b) Install the supply hose (6) on the hydraulic pump (28).

WARNING: USE CARE WHEN YOU MOVE THE PUMP. THE HYDRAULIC PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (c) Put the assembly of the hydraulic pump (28), the mounting plate and the vibration isolators in the installed position.
- (d) Install the bolts (24) and the washers (25) to attach the mounting plate to airplane structure.
- (e) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
Do these steps:
 - 1) Remove nut (19) from the vibration isolator stud at the location of the bonding jumper (17).
 - 2) If the replacement pump assembly does not have a bonding jumper (17) installed, transfer the bonding jumper (17) from the removed pump assembly to the replacement pump assembly.
 - 3) Install the bonding jumper (17) on the vibration isolator (18) with the nut (19) and a washer (20) on each side of the bonding jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
 - 4) Connect the bonding jumper (16) to the bonding tab on the mounting plate (21) with the washers (15) and bolt (14) (SWPM 20-20-00 of Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).

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- 5) Make sure that the maximum electrical resistance of the bonding jumper (17) is 0.00025 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual, D6-54446, AMM 20-10-21/601).
- (f) AIRPLANES WITH A ONE-PIECE BONDING JUMPER;
Do these steps:
- 1) Remove the nut (19) from the vibration isolator stud for the bonding jumper (17).
 - 2) Install the bonding jumper (17) on the stud on the vibration isolator (18) with one washer (20) on each side of the jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
 - 3) Install the nut (19) on the vibration isolator stud to secure the bonding jumper (17).
 - 4) Make sure that the maximum electrical resistance of the bonding jumper (17) is 0.0001 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual, D6-54446, AMM 20-10-21/601).

S 424-063

- (7) Do these steps to install a separate pump with the mounting plate (21) and vibration isolators (18) already installed:

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN RESULT.

- (a) Install the hydraulic pump (28) in its position on the vibration isolators (18).
- (b) Fill the hydraulic pump (28) with hydraulic fluid.
- (c) Install the supply hose (6) on the hydraulic pump (28).
- (d) Install the bonding jumper (17) on the stud of the applicable vibration isolator (18) with one washer (20) on each side of the jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual, D6-54446, AMM 20-10-21/401).

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- (e) Install the nut (19) on the vibration isolator stud to secure the bonding jumper (17).
- (f) Make sure that the maximum electrical resistance of the bonding jumper (17) is 0.0001 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual, D6-54446, AMM 20-10-21/601).
- (g) Install the washers (27) and the nuts (26) at three locations.

S 644-037

- (8) Apply hydraulic lubricant or hydraulic fluid to the threads of the fittings on the hydraulic lines.

S 434-038

- (9) Connect the hydraulic lines (10, 13) to the pump (28).

S 644-049

- (10) Apply a thin layer of hydraulic lubricant or hydraulic fluid to the surfaces which make a seal on the self seal coupler.

S 434-039

- (11) Connect the supply hose (6) at the self-seal coupler (7).

S 434-040

- (12) Connect the electrical connectors (1, 2) to the pump (28).

S 434-041

- (13) Safety the electrical connectors (1, 2) with a lockwire.

S 864-042

- (14) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT

S 864-043

- (15) Pressurize the applicable hydraulic system and the reservoir with the ACMP's (AMM 29-11-00/201).

S 794-044

- (16) Make sure there are no leaks at the hydraulic connections while the hydraulic pump (28) is in operation.

S 114-045

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (17) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

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S 614-046

(18) Fill the applicable hydraulic reservoir (AMM 12-12-01/301).

S 094-047

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.

(19) Remove door locks from the landing gear doors and close the doors
(AMM 32-00-15/201).

S 864-048

(20) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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CENTER SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the alternating current motor pumps for the center system. The other task installs the alternating current motor pumps for the center system.
- B. The ACMPs for the left and right hydraulic system come as an assembly that includes the hydraulic pump, four vibration isolators and a mounting plate. The assembly of the ACMP, isolators and mounting plate can be removed as a unit or the ACMP can be removed separately with the isolators and mounting plate left in the airplane if you are installing a 767 ACMP. Operators can choose to accomplish the procedure that is applicable to their situation.

NOTE: If the ACMP is being replaced, you will be required to replace only the pressure and case drain filters associated with the ACMP, (P1F and CD1F or P2F and CD2F), as marked on the filter module case. Do not replace the filters due to external pump leakage alone.

TASK 29-11-02-004-001

2. Remove the Alternating Current Motor Pump (ACMP) for the Center System

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
- (3) AMM 29-11-19/401, Center System ACMP Filter Module R&I
- (4) AMM 53-66-01/401, Aft Wing/Body Fairings

B. Access

- (1) Location Zone
 - 197 Wing to Body – Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center
 - 197ML Alternating Current Motor Pumps

C. Procedure (Fig. 401)

S 014-002

- (1) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 014-003

- (2) If it is necessary for more access to the ACMPs, remove the ACMP access panel, 197ML (AMM 06-41-00/201 and 53-66-01/401).

S 864-004

- (3) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

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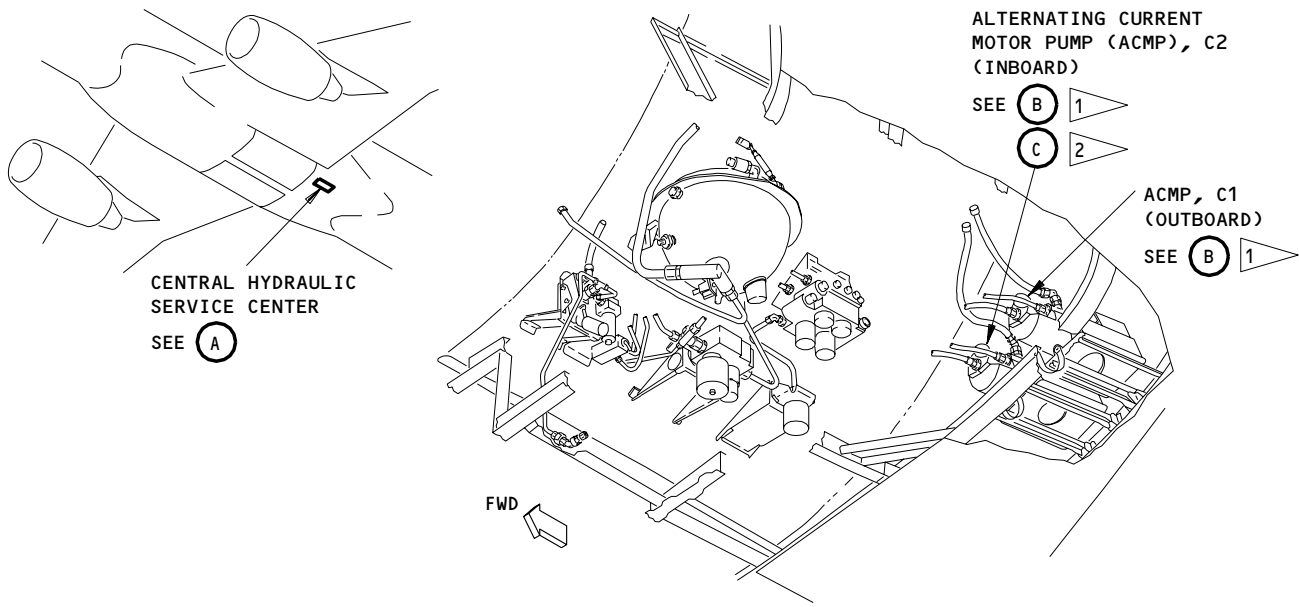
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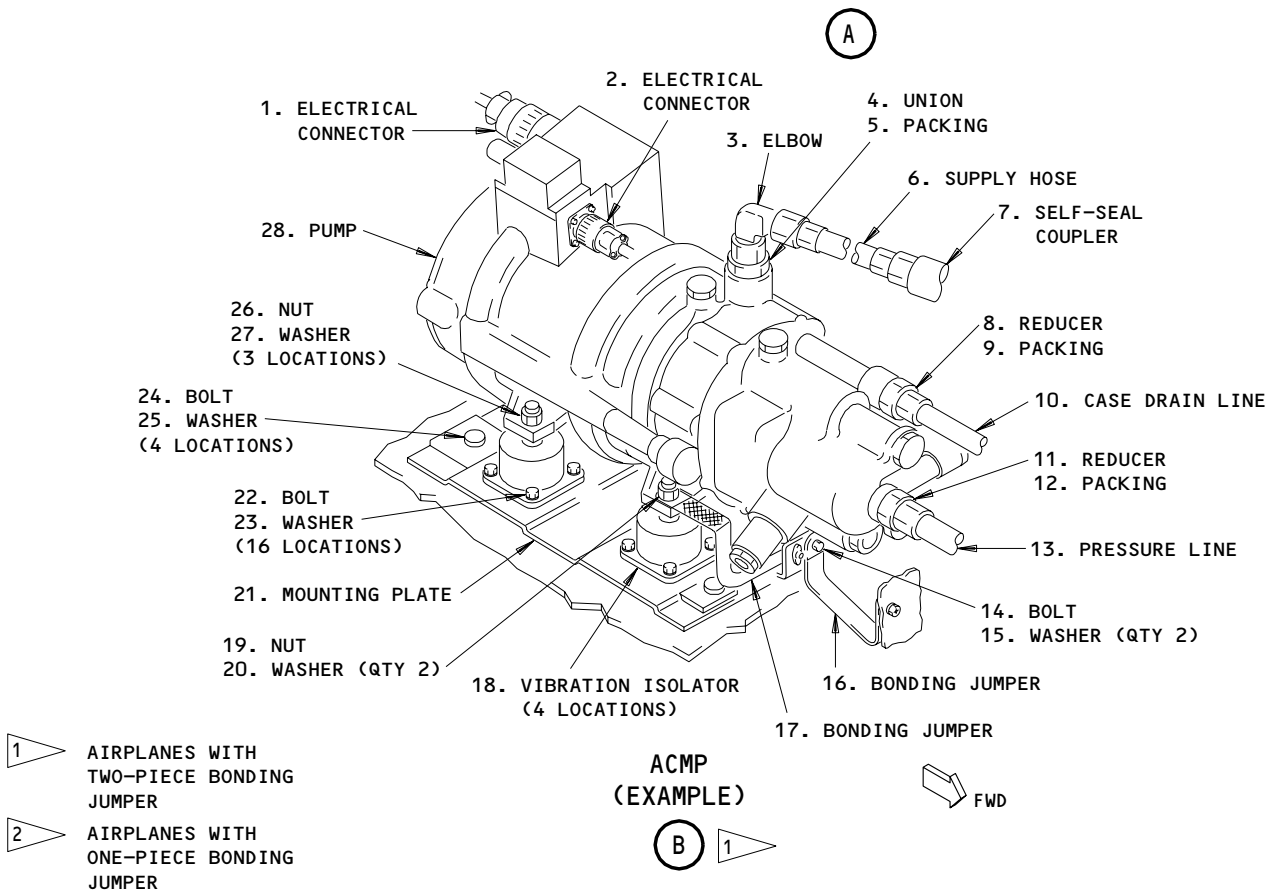
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BOEING

757 MAINTENANCE MANUAL



CENTRAL HYDRAULIC SERVICE CENTER



**Alternating Current Motor Pump (ACMP) Installation for the Center System
Figure 401 (Sheet 1)**

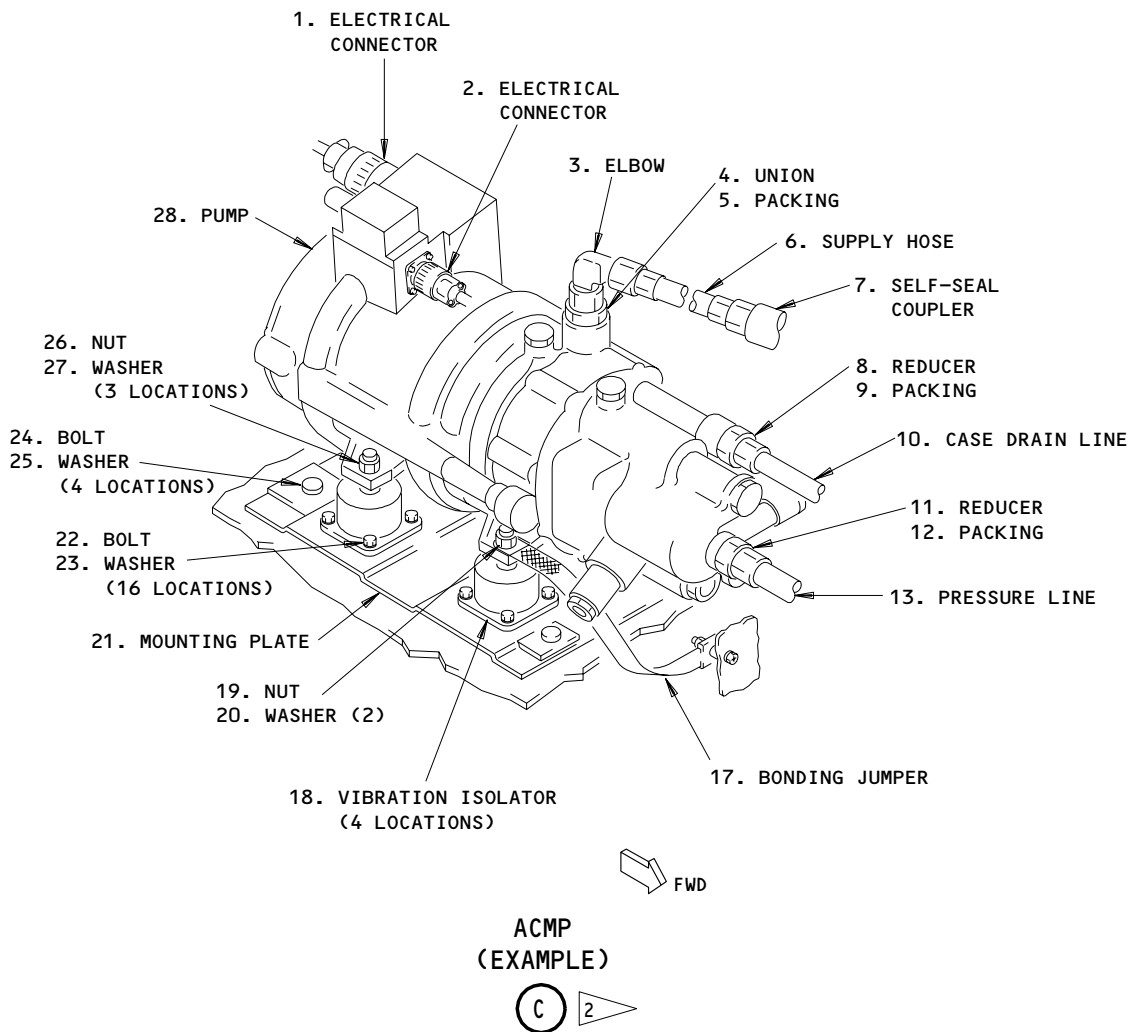
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Alternating Current Motor Pump (ACMP) Installation for the Center System
Figure 401 (Sheet 2)

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- S 864-005
- (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K24, HYDRAULICS ELEC PUMP C2
- S 034-006
- (5) Disconnect the electrical connectors (1, 2) and put the wire bundle away from the pump (28).
- S 214-053
- (6) Inspect the electrical contacts on the connector, on the airplane side of the ACMP, for damage due to burning. If the contacts appear burned or damaged, replace them.
- S 034-007
- (7) Disconnect the hydraulic lines (10, 13) at the pump (28).
- S 034-008
- (8) Disconnect the supply hose (6) at the self-seal coupler which is at the opposite end from the pump (28).
- S 034-009
- (9) Remove the supply hose (6) from the pump (28).
- S 034-010
- (10) Remove the union (4) and reducers (8, 11) from the pump (28).
- S 034-011
- (11) Install caps on the hydraulic lines and the openings in the pump (28).
- S 024-057
- (12) Do these steps to remove the ACMP (hydraulic pump) if you want to remove the ACMP, the vibration isolators and the mounting plate as a unit:
- (a) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
Remove bonding jumper (16) as follows:
 - 1) Remove the bolt (14) with two washers (15) that attach the bonding jumper (16) to the ground lug on the mounting plate (21).

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- 2) Remove the bonding jumper (16) from the ground lug.
- (b) AIRPLANES WITH A ONE-PIECE BONDING JUMPER;
Remove the bonding jumper (17) as follows:
 - 1) Remove the nut (19) and washers (20) that attach the bonding jumper (17) to the vibration isolator.
 - 2) Remove the bonding jumper (17) from the stud on the vibration isolator (18).
- (c) Remove the bolts (24) and washers (25) that attach the mounting plate (21) to structure.

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (d) Remove the hydraulic pump (28), vibration isolators (18) and mounting plate (21) as a unit.
- (e) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
If the replacement pump assembly does not have the bonding jumper (17) installed, remove the bonding jumper (17) from the pump assembly being replaced so that it can be transferred to the replacement pump assembly.

S 024-056

- (13) Do these steps if you want to remove the ACMP (hydraulic pump) separately without the removal of the vibration isolators and the mounting plate:

NOTE: This will allow you to install a spare 767 ACMP without a mounting plate and vibration isolators installed.

- (a) Remove the nut (19) and washers (20) that attach the bonding jumper (17) to the stud on the vibration isolator (18).
- (b) Remove the bonding jumper (17) from the vibration isolator stud.
- (c) Remove the nuts (26) and washers (27) at the other locations that secure the pump (28) to the vibration isolators (18).

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE HYDRAULIC PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (d) Remove the hydraulic pump (28).
- (e) Inspect the vibration isolators for damage:
 - 1) Replace any vibration isolator that shows signs of damage.

S 964-047

- (14) If the ACMP is being replaced, the pressure and case drain filters must be replaced (AMM 29-11-19/401). Do not replace the filters due to pump external leakage alone.

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TASK 29-11-02-404-016

3. Install the Alternating Current Motor Pump for the Center System

A. Consumable Materials

- (1) D00153 Hydraulic Fluid - BMS 3-11
- (2) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Packing	29-11-02	01	95
	5	Packing		02	75
	9	Packing		01	105
	9	Packing		02	85
	12	Packing		01	115
	12	Packing		02	95
	28	Hydraulic Pump		29-11-02	01
	28	Hydraulic Pump	02		100/102

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 20-10-22/701, Metal Surfaces
- (4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
- (5) AMM 53-66-01/401, Aft Wing/Body Fairings
- (6) SWPM 20-20-00, Electrical Bonding Standard Wiring Practices Manual D6-54446

D. Access

- (1) Location Zone
197 Wing to Body - Lower Half (Left)

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- (2) Access Panels
 - 197KL Central Hydraulic Service Center
 - 197ML Alternating Current Motor Pumps

E. Procedure (Fig. 401)

S 144-017

- (1) Clean the surfaces for an electrical bond at the location of each bonding jumper (AMM 20-10-22/701).

S 434-018

- (2) Remove the caps from the hydraulic lines and the openings in the pump (28).

S 644-019

- (3) Apply hydraulic lubricant or hydraulic fluid to the packings (4, 9, 12) and to the threads of the union (4) and the reducers (8, 11).

S 434-020

- (4) Install the union (4), the reducers (8, 11) and the packings (4, 9, 12) in the pump (28).

S 034-021

- (5) AIRPLANES WITH VICKERS PUMPS;

Do these steps:

- (a) Look at the plug which is in the seep port of the pump to identify the type of plug. There are two types of plugs; a solid plug or a plug with vents.

NOTE: The solid plug, P/N 73866, does not have vent holes. You can identify the plug with vents by the two holes in the flat surfaces of the hex.

CAUTION: YOU MUST REMOVE THE SOLID PLUG, P/N 73866, FROM THE SEEP PORT OF THE PUMP. IF YOU DO NOT REMOVE THIS PLUG, THE PUMP CAN BECOME TOO HOT.

- (b) If a solid plug, P/N 73866, is in the seep port of the pump, remove the plug and the O-ring from the pump.

NOTE: If the plug has vent holes, you must not remove it from the pump.

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S 424-054

- (6) Do these steps to install the assembly of the pump, the mounting plate and the vibration isolators:
- (a) Fill the pump (28) with hydraulic fluid.
 - (b) Install the supply hose (6) on the pump (28).

WARNING: USE CARE WHEN YOU MOVE THE HYDRAULIC PUMP. THE PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (c) Put the assembly of the hydraulic pump (28), the mounting plate (21) and the vibration isolators (18) in the installed position.
- (d) Install the bolts (24) and washers (25) to attach the mounting plate to airplane structure.
- (e) AIRPLANES WITH A TWO-PIECE BONDING JUMPER;
Do these steps:
 - 1) Remove the nut (19) from the vibration isolator stud at the location of the bonding jumper (17).
 - 2) If the replacement pump assembly does not have a bonding jumper (17) installed, transfer the bonding jumper (17) from the removed pump assembly to the replacement pump assembly.
 - 3) Install the bonding jumper (17) on the vibration isolator (18) with the nut (19) and a washer (20) on each side of the bonding jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
 - 4) Connect the bonding jumper (16) to the bonding tab on the mounting plate (21) with the washers (15) and bolt (14) (SWPM 20-20-00 of Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
 - 5) Make sure that the maximum electrical resistance of the bonding jumper (17) is 0.00025 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/601).

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(f) AIRPLANES WITH A ONE-PIECE BONDING JUMPER;

Do these steps:

- 1) Remove the nut (19) from the vibration isolator stud for the bonding jumper (17).
- 2) Install the bonding jumper (17) on the stud of the vibration isolator (18) with one washer (20) on each side of the jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
- 3) Install the nut (19) on the vibration isolator stud to secure the bonding jumper (17).
- 4) Make sure that the maximum electrical resistance of the bonding jumper (17) is 0.0001 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/601).

S 424-055

- (7) Do these steps to install a separate pump with the mounting plate and the vibration isolators already in place:

WARNING: USE CARE WHEN YOU MOVE THE PUMP. THE PUMP WEIGHS 45 POUNDS AND IF YOU DROP THE PUMP INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN RESULT.

- (a) Install the hydraulic pump (28) in its position on the vibration isolators (18).
- (b) Fill the hydraulic pump (28) with hydraulic fluid.
- (c) Install the supply hose (6) on the hydraulic pump (28).
- (d) Install the bonding jumper (17) on the stud of the applicable vibration isolator (18) with a washer (20) on each side of the jumper (17) (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/401).
- (e) Install the nut (19) to secure the bonding jumper (17).
- (f) Make sure that the maximum electrical bonding resistance of the bonding jumper (17) is 0.0001 ohm (SWPM 20-20-00 of the Standard Wiring Practices Manual D6-54446, AMM 20-10-21/601).
- (g) Install the washers (27) and nuts (26) at the other three vibration isolators (18).

S 644-033

- (8) Apply hydraulic lubricant or hydraulic fluid to the threads of the fittings on the hydraulic lines.

S 434-034

- (9) Connect the hydraulic lines (10, 13) to the pump (28).

S 644-046

- (10) Apply a thin layer of hydraulic lubricant or hydraulic fluid to the surfaces which make a seal on the self seal coupler (7).

S 434-035

- (11) Connect the supply hose (6) at the self-seal coupler.

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S 434-036

(12) Connect the electrical connectors (1, 2) to the pump (28).

S 434-037

(13) Safety the electrical connectors (1, 2) with a lockwire.

S 864-038

(14) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:

(a) 11K15, HYDRAULICS ELEC PUMP C1

(b) 11K24, HYDRAULICS ELEC PUMP C2

S 864-039

(15) Pressurize the center hydraulic system and the reservoir with the ACMPs (AMM 29-11-00/201).

S 794-040

(16) Make sure there are no leaks at the hydraulic line connections while the pump (28) is in operation.

S 864-041

(17) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 114-042

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(18) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-043

(19) If you removed the ACMP access panel, 197ML, install this panel (AMM 06-41-00/201, 53-66-01/401)

S 414-044

(20) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

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ENGINE-DRIVEN PUMP (EDP) – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. The first task removes the engine-driven pump. The second task installs the engine-driven pump.

NOTE: If the EDP is being replaced, you will be required to replace the pressure and case drain filters. Do not replace the filters due to external pump leakage alone.

- B. When an engine-driven hydraulic pump is replaced due to mechanical failure, flush the affected section of the pressure and case drain lines between the appropriate EDP and down stream Case Drain and pressure filters (AMM 29-11-00).

NOTE: If the EDP is being replaced due to overheat, it is recommended that the operator analyze the affected system fluid for contamination in excess of AMM 29-00-00, Table 601 limits.

TASK 29-11-05-004-001

2. Remove the Engine-Driven Pump (EDP) (Fig. 401)

A. Equipment

- (1) Bucket, 5 gallon capacity - commercially available

B. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 29-11-17/401, Left and Right System EDP Filter Module R&I
(3) AMM 71-11-04/201, Fan Cowl Panels
(4) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones
411/421 Engine
211/212 Control Cabin
(2) Access Panels
413AL/414AR Fan Cowl
423AL/424AR Fan Cowl

D. Procedure

S 864-088

CAUTION: DO NOT HANDLE THE HYDRAULIC PUMP BY THE DRIVE SHAFT. DOING SO MAY DAMAGE OR COMPROMISE THE SHAFT SEAL AND CAUSE SHAFT SEAL LEAKAGE.

- (1) Remove the pressure from the left or right hydraulic system and reservoir (AMM 29-11-00/201).

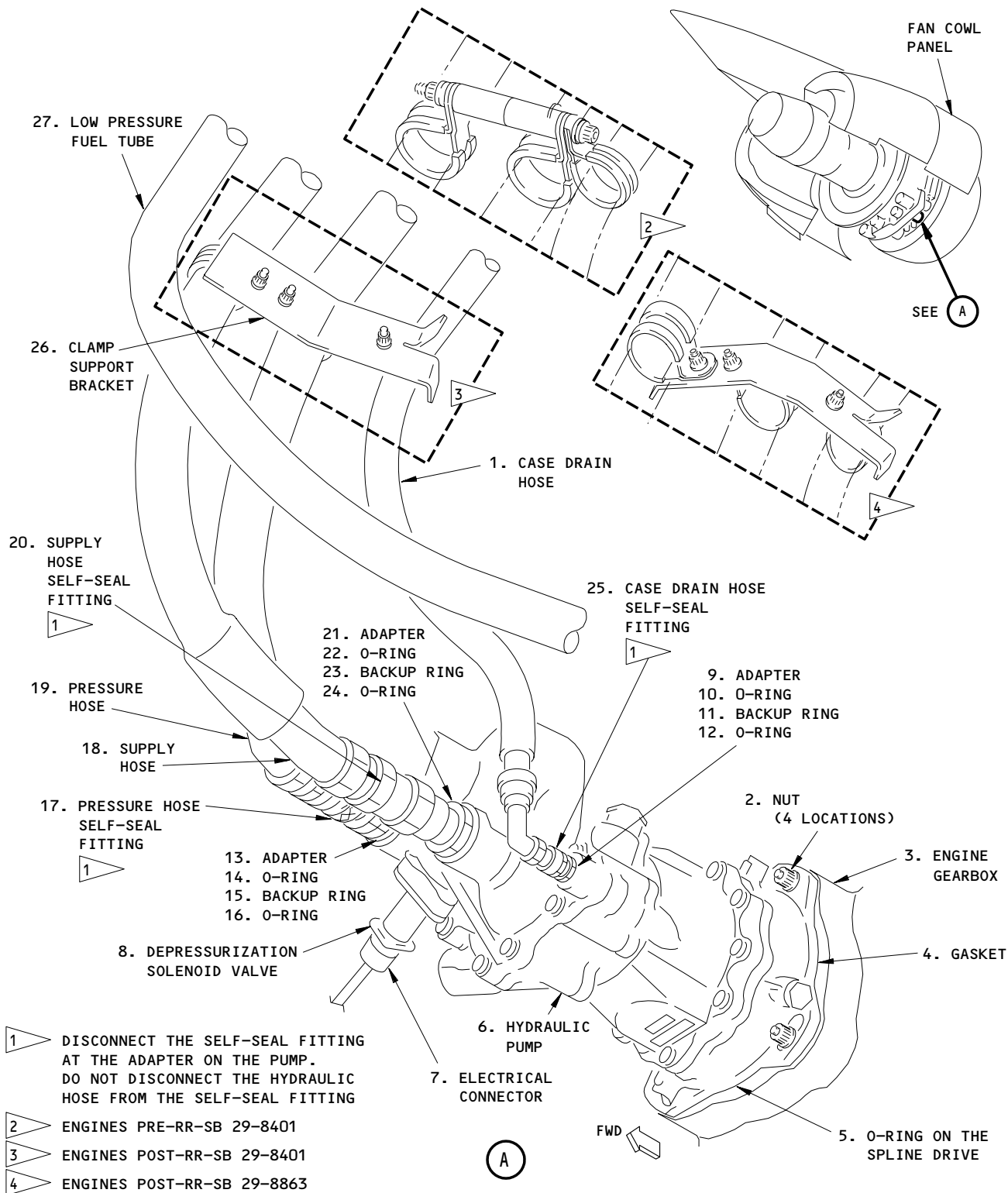
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Engine-Driven Pump Installation
Figure 401

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S 864-003

- (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K14, L ENG PUMP VLV DEPRESS or LEFT ENGINE PUMP DEPRESS
 - (b) 11K23, R ENG PUMP VLV DEPRESS or R ENG PUMP DEPRESS

S 044-080

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.

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

S 014-005

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (4) Open the fan cowl panels (AMM 71-11-04/201).

S 034-081

- (5) Disconnect the electrical connector (7) from the depressurization valve (8).

S 944-008

- (6) Put a bucket under the hydraulic pump (6) to catch all fluid which drains when you disconnect the hydraulic hose fittings.

S 034-082

CAUTION: BE CAREFUL WITH THE PUMP SUPPLY HOSE WHEN IT IS DISCONNECTED TO PREVENT KINKS AND A CLOSED HOSE. DO NOT COIL THE HOSE. A CLOSED HOSE CAN CAUSE FAILURE OF THE PUMP.

- (7) Hold the adapters/unions (9, 13, 21) with a wrench and disconnect the hydraulic hose self-seal fittings (17, 20, 25) from the adapters /unions on the pump (6).

NOTE: To prevent a fluid leak, do not disconnect the hydraulic hoses from the self-seal fittings.

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S 034-012

- (8) Install caps on the pump ports and the hydraulic hose fittings to prevent contamination.

S 024-013

CAUTION: DO NOT LET THE HYDRAULIC FLUID FLOW INTO THE GEARBOX. CONTAMINATION BY HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE GEARBOX.

- (9) Loosen the four nuts (2) which attach the pump (6) to the engine gearbox (3) approximately three turns.

NOTE: If you loosen the nuts more than three turns, hit the shell of the nut to release the self-lock property of the nut.

S 024-014

- (10) Turn the pump (6) clockwise until the nuts (2) can go through the larger ends of the slots on the pump.

S 024-015

- (11) Remove the pump (6) from the engine gearbox (3).

S 024-016

- (12) Remove the adapters/unions (9, 13, 21) from the pump (6) ports.

S 034-018

- (13) Install plugs in the pump ports to prevent contamination.

S 964-087

- (14) If the EDP is being replaced, the pressure and case drain filters must be replaced (AMM 29-11-17/401). Do not replace the filters due to pump external leakage alone.

TASK 29-11-05-404-020

3. Install the Engine-Driven Pump (EDP) (Fig. 401)

A. Consumable Materials

- (1) D00153 Hydraulic Fluid - BMS 3-11
(2) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

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MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Gasket	29-11-05	01	204
	5	O-Ring			205
	6	Hydraulic Pump			175
	9	Adapter			105
	10	O-Ring			110
	11	Backup Ring			115
	12	O-Ring			120
	13	Adapter			125
	14	O-Ring			130
	15	Backup Ring			135
	16	O-Ring			140
	21	Adapter			145
	22	O-Ring			150
	23	Backup Ring			155
24	O-Ring	160			

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
- (4) AMM 71-00-00/201, Power Plant - General
- (5) AMM 78-31-00/201, Thrust Reverser System

D. Access

- (1) Location Zones
 - 411/421 Engine
 - 211/212 Control Cabin
- (2) Access Panels
 - 413AL/414AR Fan Cowl
 - 423AL/424AR Fan Cowl

E. Procedure

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S 214-089

CAUTION: DO NOT HANDLE THE HYDRAULIC PUMP BY THE DRIVE SHAFT. DOING SO MAY DAMAGE OR COMPROMISE THE SHAFT SEAL AND CAUSE SHAFT SEAL LEAKAGE.

- (1) Make sure the seal drain adjacent to the hydraulic pump (6) on the engine gearbox is clear.

S 164-022

- (2) If necessary, clean the seal drain on the engine gearbox (3).

S 214-023

- (3) Make sure the pump gasket (4) on the engine gearbox (3) is in good condition.

S 434-024

- (4) If necessary, install a new gasket (4) on the engine gearbox (3).

S 644-025

- (5) Lubricate the O-ring (5) with a small quantity of oil from the engine gearbox.

S 434-026

CAUTION: MAKE SURE YOU INSTALL THE O-RING ON THE PUMP DRIVE SPLINE. THE O-RING PREVENTS LEAKAGE OF OIL FROM THE ENGINE GEARBOX.

- (6) Install a new O-ring (5) on the pump drive spline.

S 644-027

- (7) Lubricate new O-rings (10, 12, 14, 16, 22, 24) and backup rings (11, 15, 23) with hydraulic lubricant or hydraulic fluid.

S 434-029

- (8) Install new O-rings (10, 12, 14, 16, 22, 24) and backup rings (11, 15, 23) on adapters (9, 13, 21).

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- S 434-031
(9) Remove all plugs from hydraulic pump (6) ports.
- S 644-032
(10) Lubricate the threads on the adapters/unions (9, 13, 21) with hydraulic lubricant or hydraulic fluid.
- S 434-034
(11) Install the adapters/unions (9, 13, 21) in the hydraulic pump (6) ports.
- S 434-037
(12) Tighten adapter (9) in the pump case drain port to 266-294 pound-inches.
- S 434-036
(13) Tighten adapter (13) in the pump pressure port to 713-787 pound-inches.
- S 434-038
(14) Tighten adapter/union (21) in the pump supply port to 855-945 pound-inches.
- S 614-040
(15) If the pump (6) is not filled with hydraulic fluid, add fluid through the case drain port.
- S 424-041
(16) Put the pump (6) in position and carefully engage the pump drive shaft with engine drive shaft.
- NOTE:** Do not lubricate the pump drive shaft, the spline is lubricated by engine oil.
- S 424-084
(17) Turn the pump to let the nuts (2) go through the holes in the flange on the pump.

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S 424-042

- (18) Turn the pump (6) counterclockwise until the small ends of the slots in the pump are hard against the engine gearbox studs.

S 434-043

- (19) Tighten the nuts (2) to 260-320 pound-inches.

S 434-044

- (20) Remove all caps from the self-seal fittings (17, 20, 25) on the hydraulic hoses.

S 434-045

CAUTION: DO A CHECK OF THE EDP SUPPLY HOSE FOR A KINKED OR CLOSED CONDITION. A KINKED OR CLOSED HOSE CAN CAUSE FAILURE OF THE ENGINE-DRIVEN PUMP.

- (21) Connect the self-seal fittings (17, 20, 25) to the adapters/unions (9, 13, 21) on the pump.

S 434-085

CAUTION: DO NOT LET THE ADAPTER TURN WHILE YOU TIGHTEN THE SELF-SEAL FITTING, AT EACH PUMP PORT. IF THE ADAPTER TURNS, IT CAN BECOME TOO TIGHT IN THE HYDRAULIC PUMP PORT.

- (22) Hold the adapter (9) with a wrench and tighten the self-seal fitting (25) at the pump case drain port to 672-732 pound-inches.

S 434-048

- (23) Hold the adapter (13) with a wrench and tighten the self-seal fitting (17) at the pump pressure port to 1140-1260 pound-inches.

S 434-050

- (24) Hold the adapter (21) with a wrench and tighten the self-seal fitting (20) at the pump supply port to 1520-1680 pound-inches.

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S 824-052

- (25) Make sure the clamp support bracket (26) is in a position that gives the maximum clearance between the low pressure fuel tube (27) and the bracket (26), and between the LD harness and the bracket (26).

NOTE: The target clearance is 0.4-inch (10,16 mm).
Give special attention to the tang at the aft end of the clamp support bracket (26).

- (a) If it is necessary, loosen all of the hose retention clips on the clamp support bracket (26) and adjust the orientation to get the maximum clearances.

NOTE: The target clearance is 0.4-inch (10,16 mm).
Give special attention to the tang at the aft end of the clamp support bracket (26).

It is permitted to move the bracket (26) outside of the marks on the hydraulic supply hose (18) to get the target clearances.

- (b) Make sure that there is sufficient clearance between the hydraulic hoses (1, 18, 19) and the low pressure fuel tube (27).

NOTE: Give special attention to possible contact between the hydraulic supply hose (18) and the low pressure fuel tube (27).

- (c) Make sure that there is sufficient clearance between the hydraulic hoses (1, 18, 19) and the adjacent LD harness.

NOTE: Give special attention to possible contact between the case drain hose (1) and the LD harness.

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(d) If the hydraulic hose fire sleeves have repair FRS5353 applied, make sure that the twisted end piece of the lockwire does not reduce the above clearances.

(e) If you cannot get the target clearances at all positions, adjust to get the maximum clearances at the closest point.

S 414-054

(26) Close the fan cowl panel (AMM 71-11-04/201).

S 014-055

(27) Open the oil filler access door in the fan cowl panel.

S 824-056

(28) Make sure there is clearance between the hydraulic hoses (1, 18, 19) and the support struts and brackets for the fan cowl panel.

S 414-057

(29) Close the oil filler access door in the fan cowl panel.

S 014-058

(30) Open the fan cowl panel (AMM 71-11-04/201).

S 824-059

(31) If it is necessary, loosen the clamp (26) and move it to a new position which will give clearance between the hydraulic hoses (1, 18, 19) and the support struts and brackets when the fan cowl panel is closed.

(a) Confirm sufficient clearance between the hydraulic hoses (1, 18, 19) and the LD harness.

S 434-060

(32) Tighten the clamp (26) on the hydraulic hoses (1, 18, 19).

S 434-061

(33) Connect the electrical connector (7) to the pump depressurization valve (8).

S 614-063

(34) Make sure the hydraulic reservoir is full (AMM 12-12-01/301).

S 864-064

(35) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel.

(a) 11K14, L ENG PUMP VLV DEPRESS or LEFT ENGINE PUMP DEPRESS

(b) 11K23, R ENG PUMP VLV DEPRESS or R ENG PUMP DEPRESS

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S 114-079

CAUTION: QUICKLY CLEAN ALL HYDRAULIC FLUID FROM THE GEARBOX SURFACES.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE ENGINE GEARBOX HOUSING.

(36) Clean all hydraulic fluid leakage from the engine and the engine area (AMM 12-25-01/301).

S 864-066

(37) Run the engine at idle (AMM 71-00-00/201).

S 784-068

(38) Make sure the system pressure is between 2850 and 3150 psi.

S 794-069

(39) Make sure there is no leakage at the hydraulic hose connections to the pump.

S 864-070

(40) Put the L (R) HYD PUMPS ENG pump switch to the DEPRESS position.

S 864-071

(41) Let the hydraulic system pressure decrease.

S 214-072

(42) Make sure the engine-driven pump PRESS indicator light comes on.

S 864-073

(43) Put the L (R) HYD PUMPS ENG pump switch to the ON position.

S 784-075

(44) Make sure the system pressure is between 2850 to 3150 psi.

S 214-074

(45) Make sure the engine-driven pump PRESS indicator light goes off.

S 864-076

(46) Stop the engine (AMM 71-00-00/201).

S 414-077

(47) Close the fan cowl panels (AMM 71-11-04/201).

S 444-078

(48) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 174-019

(49) If you replace the pump because of mechanical failure, flush the left or right hydraulic system (AMM 29-11-00/201).

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ENGINE-DRIVEN PUMP (EDP) – INSPECTION/CHECK

1. General

- A. This procedure contains one task. This task is a check for internal damage of the engine-driven pump.

TASK 29-11-05-206-001

2. Internal Damage Check for the Engine-Driven Pump (EDP)

A. General

- (1) This procedure does a check for damage of the EDP after it operates in these conditions:
(a) Operation with the shutoff valve for the EDP supply closed
(b) Operation without a supply of hydraulic fluid.
- (2) If you operate an EDP without a fluid supply, for less than 5 minutes, no maintenance is necessary. Do not add the time of the different incidents together. If you operate an EDP for more than 5 minutes without a supply of fluid, do this procedure.

B. References

- (1) AMM 29-00-00/601, Hydraulic Power
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 29-11-05/401, Engine-Driven Pump (EDP)
(4) AMM 29-11-17/401, System L and R EDP Pressure/Case Drain Filter Module and Components

C. Procedure

NOTE: The operation of the EDP without hydraulic fluid can cause metal contamination of the fluid. Make sure you operate the EDP for at least one minute with a supply of fluid. Then, do a check of the filter elements. This will let the metal contamination move to the filter.

S 036-002

- (1) Remove the filter elements from the filter module for the EDP pressure/case drain (AMM 29-11-17/401).

S 216-003

- (2) Examine each filter element for metal contamination.

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S 216-004

- (3) If you do not find metal in the two filters, do these steps:
- (a) Install new filter elements, but do not replace the EDP (AMM 29-11-17/401).
 - (b) Examine the filter elements again after 200 hours of operation.

S 176-005

- (4) If you find metal in the two filters, do these steps:
- (a) Replace the applicable EDP (AMM 29-11-05/401).
 - (b) Flush the hydraulic system (AMM 29-11-00/201).

S 286-006

- (5) Get a fluid sample from the applicable hydraulic reservoir and do a check that the fluid contamination is less than the limits (AMM 29-00-00/601).

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ENGINE-DRIVEN PUMP (EDP) SUPPLY SHUTOFF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task removes the supply shutoff valve for the engine-driven pump. The second task installs the shutoff valve for the engine-driven pump.

TASK 29-11-06-004-001

2. Remove the Supply Shutoff Valve for the Engine-Driven Pump (Fig. 401)

A. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (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
434/444 Nacelle Strut – Aft Fairing

- (2) Access Panels
434AL/444AL Hydraulic Bay

C. Procedure

S 864-041

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

S 864-002

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

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

S 014-003

- (3) Open the access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).

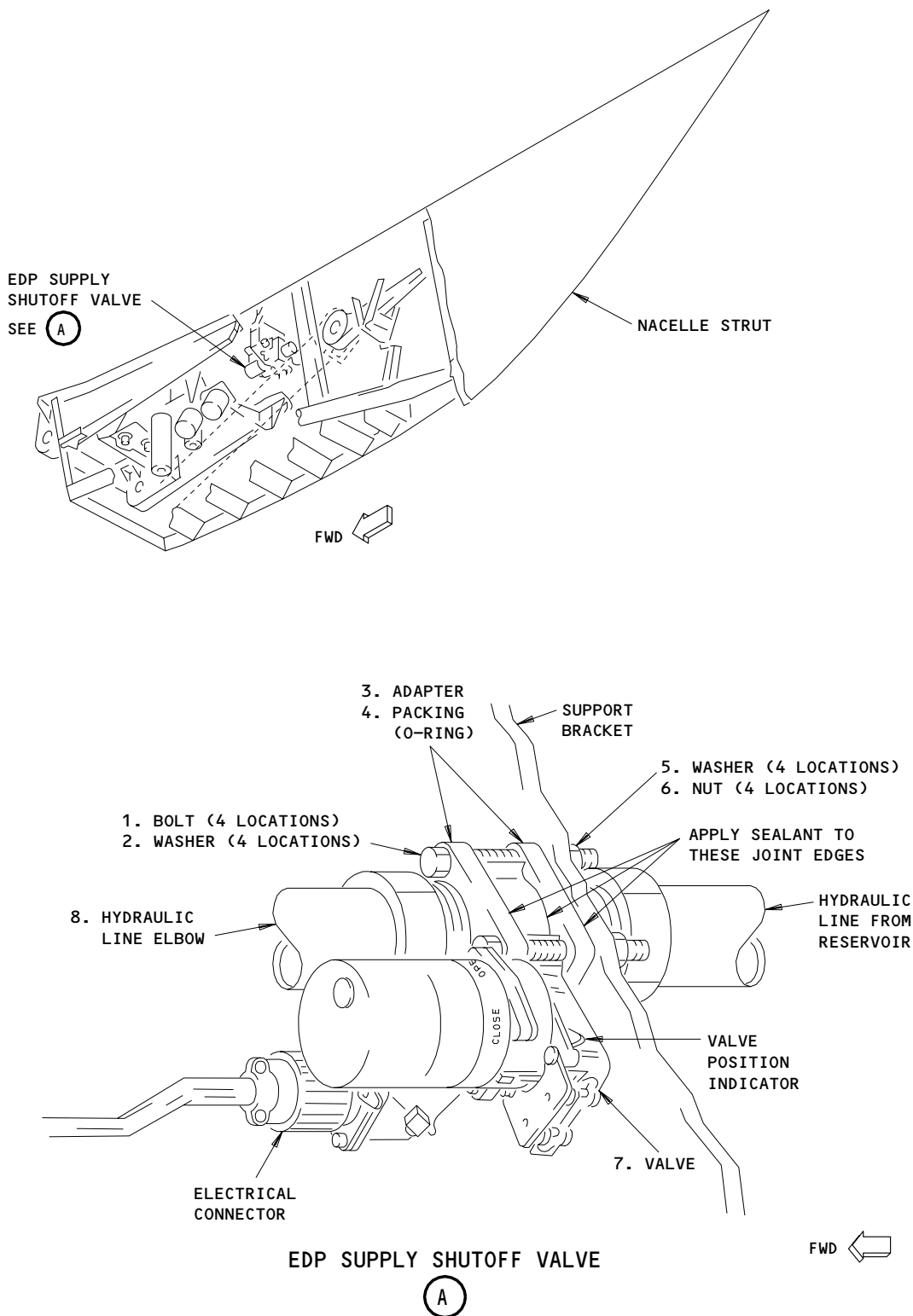
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Engine-Driven Pump (EDP) Supply Shutoff Valve Installation
Figure 401

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S 864-007

- (4) Remove the pressure from the left or right hydraulic system and reservoir (AMM 29-11-00/201).

S 864-008

- (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11D28, HYDRAULIC ENG PUMP SOV L or
HYDRAULIC ENG PUMP SUPPLY LEFT
 - (b) 11D29, HYDRAULIC ENG PUMP SOV R or
HYDRAULIC ENG PUMP SUPPLY RIGHT

S 034-009

- (6) Disconnect the electrical connector from the shutoff valve (7).

S 034-010

- (7) Remove the hydraulic line elbow (8) on the forward side of the shutoff valve (7).

NOTE: Do not remove the hydraulic line from the aft adapter (3) on the shutoff valve (7).

S 024-011

- (8) Remove the four bolts (1) and remove the forward adapter (3).

S 024-012

- (9) Remove the shutoff valve (7).

NOTE: Do not remove the aft adapter (3) from the hydraulic line.

S 034-013

- (10) Install caps on the adapter (3) and the hydraulic line elbow.

TASK 29-11-06-404-014

3. Install the Supply Shutoff Valve for the Engine-Driven Pump (Fig. 401)

A. Consumable Materials

- (1) A00557 Sealant - Dow Corning FS 3452

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- (2) D00054 Hydraulic System Lubricant - MCS 352B
B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-06	01	15
	2	Washer			20
	3	Adapter			35
	4	Packing			40
	5	Washer			25
	6	Nut			30
	7	Valve Assy-Motor Actuated			45
	8	Elbow (Left hydraulic System)	29-11-51	43	490
	8	Elbow (Right hydraulic System)		44	510

C. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 78-31-00/201, Thrust Reverser System

D. Access

- (1) Location Zone
 - 211/212 Control Cabin
 - 434/444 Nacelle Strut - Aft Fairing
- (2) Access Panels
 - 434AL/444AL Hydraulic Bay

E. Procedure

- S 214-044
- (1) ON AIRPLANES POST SERVICE BULLETIN 29A0049;
 - (a) Ensure that replacement valves are one of these numbers:
 - 1) S270T010-15 or 10-3200-6
- S 644-015
- (2) Apply hydraulic lubricant or hydraulic fluid to the 0-rings (4).
- S 434-016
- (3) Install the 0-rings (4) in the grooves on the valve (7).

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- S 424-017
(4) Put the shutoff valve (7) on the aft adapter (3).
- S 424-018
(5) Put the forward adapter (3) on the valve (7).
- S 424-019
(6) Install the bolts (1), washers (2, 5) and nuts (6).
- S 434-020
(7) Tighten the bolts (1) to 50-80 pound-inches.
- S 394-021
(8) Apply a bead of sealant to the edges of the joints between the adapters (3), the valve (7), and the support bracket.
- S 434-022
(9) Install the elbow (8) on the forward side of the valve (7).
- S 434-023
(10) Connect the electrical connector to the valve (7).
- S 434-024
(11) Safety the electrical connector with a lockwire.
- S 864-025
(12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D28, HYDRAULIC ENG PUMP SOV L or
HYDRAULIC ENG PUMP SUPPLY LEFT
(b) 11D29, HYDRAULIC ENG PUMP SOV R or
HYDRAULIC ENG PUMP SUPPLY RIGHT
- S 864-026
(13) Pressurize the reservoir in the left or right hydraulic system (AMM 29-11-00/201).

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S 714-027

- (14) Do these steps to do a test of the EDP supply shutoff valve.
- (a) Make sure the applicable engine fire-shutoff switch on the aft control stand panel, P8, is in the usual position.
 - (b) Push the manual override switch below the handle on the engine fire-shutoff switch.

CAUTION: AFTER YOU PULL THE FIRE SWITCH, DO NOT TURN THE FIRE SWITCH. IF YOU TURN THE FIRE SWITCH, YOU WILL RELEASE THE CONTENTS OF THE FIRE EXTINGUISHER BOTTLES WHICH HAVE PRESSURE IN THEM.

- (c) Pull the engine fire switch to the armed position.
- (d) Make sure the valve position indicator on the valve (7) moves smoothly to the CLOSE position.
- (e) Push the engine fire switch to the usual position.
- (f) Press the L GEN CONT (R GEN CONT) on the P5 electrical system control panel.

NOTE: Cycling the left and right generator control switches resets the generator fields.

- (g) Make sure the valve (7) moves smoothly to the OPEN position.
- (h) Replace the valve (7) for these conditions:
 - 1) The operation of the valve is rough.
 - 2) The valve stops between the OPEN and CLOSED positions.
 - 3) The valve shows signs that it was too hot.

S 214-028

- (15) Make sure there are no leaks at the valve (7) or the hydraulic line connections.

S 864-029

- (16) Remove the pressure from the left or right system reservoir (AMM 29-11-00/201).

S 114-030

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (17) Clean all the hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-031

- (18) Close the access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).

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S 864-035

- (19) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

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CENTER SYSTEM RETURN FILTER MODULE AND COMPONENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task removes the return filter module and components for the center system. The second task installs the return filter module and components for the center system.

TASK 29-11-13-004-001

2. Remove the Center System Return Filter Module and Components

A. General

- (1) This task contains three procedures which remove the components which follow:
- (a) Return filter module for the center system
 - (b) Filter element
 - (c) Filter module components which are the check valves, the relief valve, the indicator for differential pressure, and the ground service connector.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels.
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

- (1) Location Zones
 - 197 Wing to Body – Aft Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

D. Prepare for the Removal

S 014-002

- (1) Open the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).

S 864-003

- (2) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

S 864-004

- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K24, HYDRAULICS ELEC PUMP C2

E. Remove the Return Filter Module (Fig. 401)

S 034-005

- (1) Disconnect the hydraulic lines from the return filter module.

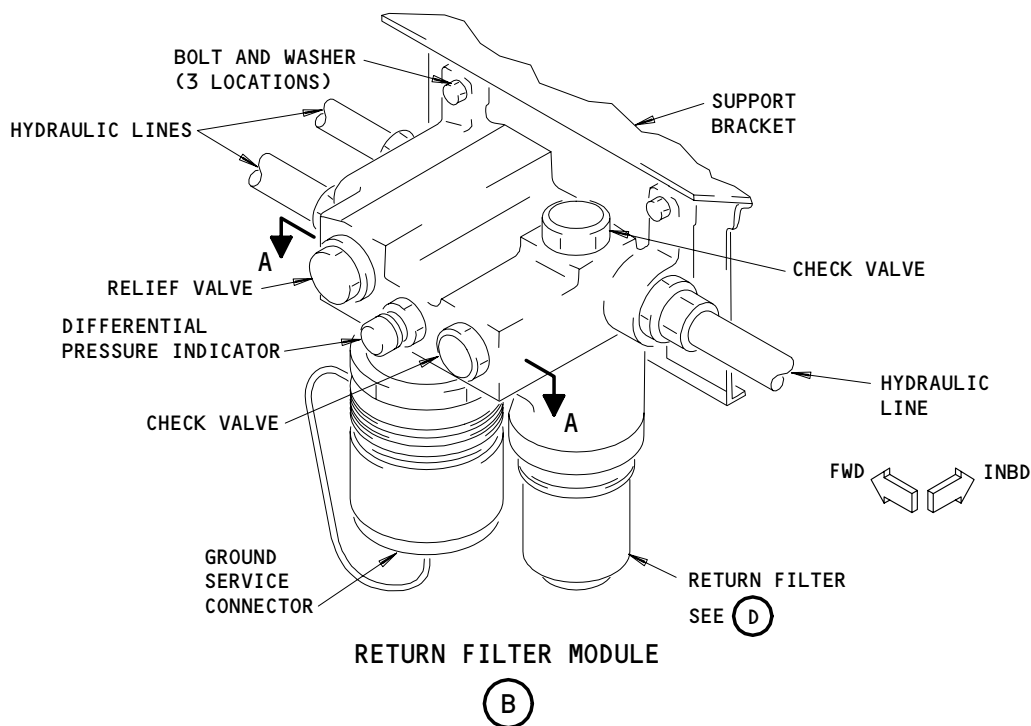
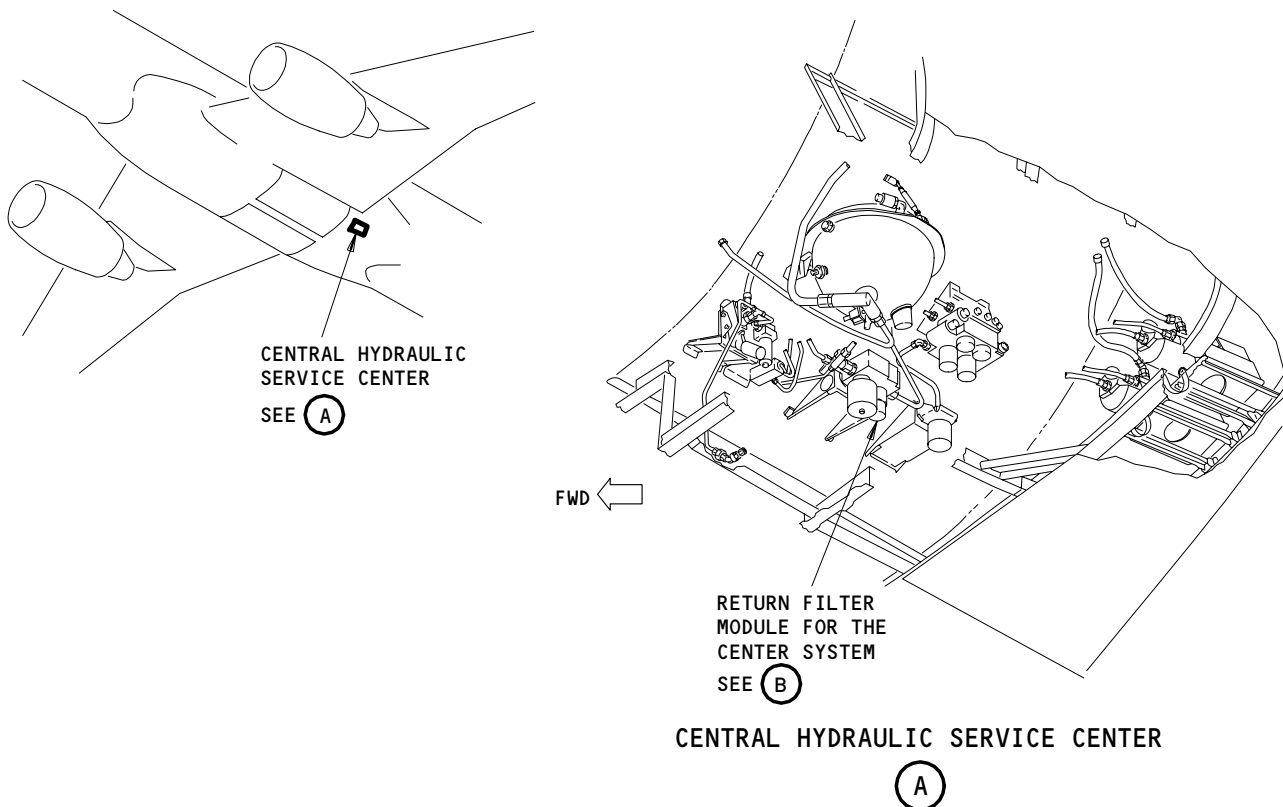
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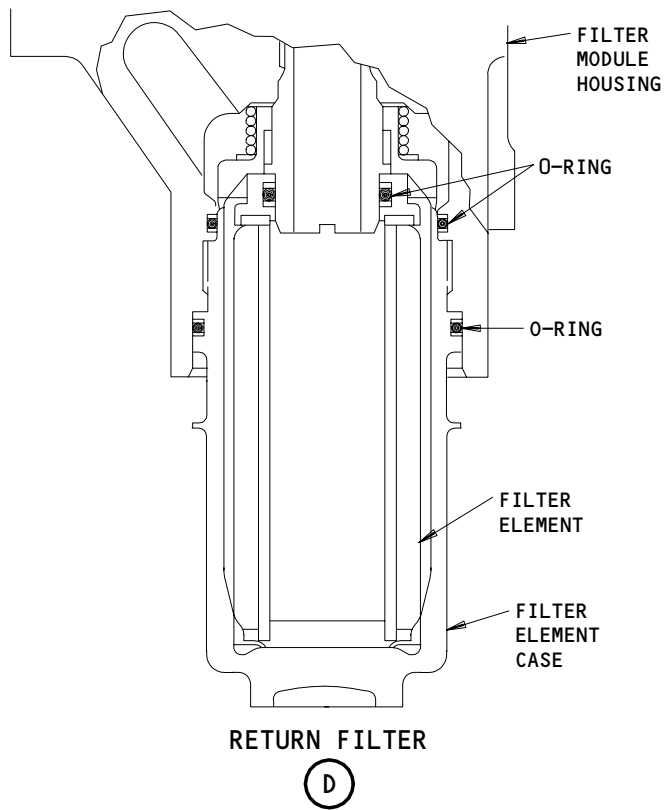
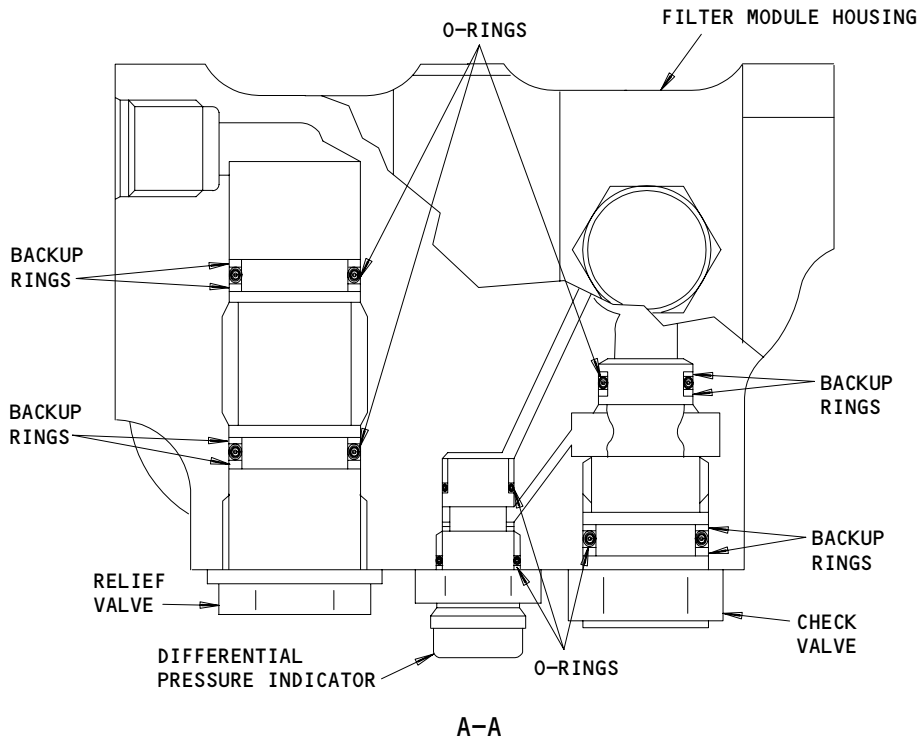
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Center System Return Filter Module Installation
Figure 401 (Sheet 1)

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Center System Return Filter Module Installation
Figure 401 (Sheet 2)

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- S 034-006
(2) Install caps on the hydraulic lines.

- S 024-007
(3) Remove the bolts and washers and remove the return filter module.
F. Remove the Filter Element (Fig. 401)

- S 034-008
(1) Remove the filter case from the return filter module.

- S 024-009
(2) Remove the filter element from the return filter module.
G. Remove the Return Filter Module Components (Fig. 401)

NOTE: The steps which follow are applicable to the check valves, the relief valve, the differential pressure indicator, and the ground service connector.

- S 024-010
(1) Loosen and remove the component from the return filter module.

- S 034-011
(2) Install a plug in the opening in the return filter module.

TASK 29-11-13-404-012

3. Install the Center System Return Filter Module and Components

A. General

- (1) This task contains three procedures which install the components which follow:
(a) Return filter module for the center system
(b) Filter element
(c) Filter module components which are the check valves, the relief valve, the indicator for differential pressure, and the ground service connector.
(2) To start one of these procedures, do the applicable 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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels.
(2) AMM 12-12-01/301, Hydraulic Systems
(3) AMM 12-25-01/301, Exterior Cleaning
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

- (1) Location Zones
197 Wing to Body - Aft Lower Half (Left)

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- (2) Access Panels
197KL Central Hydraulic Service Center

E. Install the Return Filter Module (Fig. 401)

S 424-013

- (1) Put the return filter module in position.

S 424-014

- (2) Install the three bolts and washers which attach the return filter module to the support bracket.

S 644-015

- (3) Lubricate the O-rings and the fitting threads with hydraulic system lubricant or hydraulic fluid.

S 434-016

- (4) Connect and tighten the hydraulic lines to the return filter module.

F. Install the Filter Element (Fig. 401)

S 164-017

- (1) Clean the filter element case.

S 644-018

- (2) Apply hydraulic system lubricant or hydraulic fluid to the new O-rings and the threads on the filter element case.

S 434-019

- (3) Assemble the filter element, the O-rings, and the filter case.

S 424-020

- (4) Install the filter element and case assembly into the return filter module.

S 434-021

- (5) Tighten the filter element case to 20-25 pound-feet.

S 434-022

- (6) Safety the filter element case with a lockwire.

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G. Install the Return Filter Module Components (Fig. 401)

NOTE: The steps which follow are applicable to the check valves, the relief valve, the differential pressure indicator, and the ground service connector.

S 644-023

- (1) Apply hydraulic system lubricant or hydraulic fluid to the O-rings, the backup rings and the threads on the component.

S 434-024

- (2) Install the new O-rings and backup rings on the component, if it is applicable.

S 434-025

- (3) Remove the plug from the opening in the return filter module.

S 434-026

- (4) Install the component in the return filter module and tighten as follows:
- (a) Tighten the check valves to 35-40 pound-feet.
 - (b) Tighten the relief valve to 60-75 pound-feet.
 - (c) Tighten the differential pressure indicator to 15-20 pound-feet.
 - (d) Tighten the ground service connector to 75-80 pound-feet.

H. Put the Airplane Back to Its Usual Condition.

S 864-027

- (1) Push the indicator button on the differential pressure indicator in until it aligns with the adjacent surface.

S 864-028

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K24, HYDRAULICS ELEC PUMP C2

S 864-029

- (3) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 214-030

- (4) Make sure there are no leaks on the return filter module.

S 864-031

- (5) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 614-032

- (6) Fill the center hydraulic system reservoir (AMM 12-12-01/301).

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S 114-033

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (7) Clean all hydraulic fluid from the installation area
(AMM 12-25-01/301).

S 414-034

- (8) Close the access panel 197KL for the central hydraulic service
center (AMM 06-41-00/201).

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LEFT AND RIGHT SYSTEM RETURN FILTER MODULE AND COMPONENTS -
REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the return filter module and components for the left and right systems. The other task installs the return filter module and components for the left and right systems .

TASK 29-11-15-004-001

2. Remove the Return Filter Module and Components for the Left and Right Systems

A. General

- (1) This task contains three procedures which remove the components which follow:
(a) Return filter module for the left and right systems.
(b) Filter element.
(c) Indicator for differential pressure.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 32-00-15/201, Main Gear Door Locks
(3) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

- (1) Location Zones
143/144 MLG Wheel Well

D. Prepare for the Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-003

WARNING: DO 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) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11K16, HYDRAULICS ELEC PUMP RIGHT
(b) 11K25, HYDRAULICS ELEC PUMP LEFT

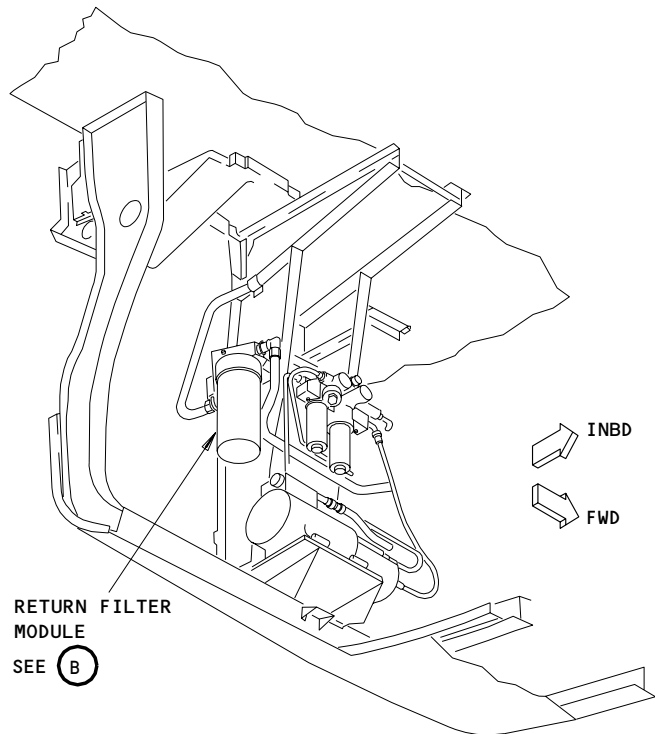
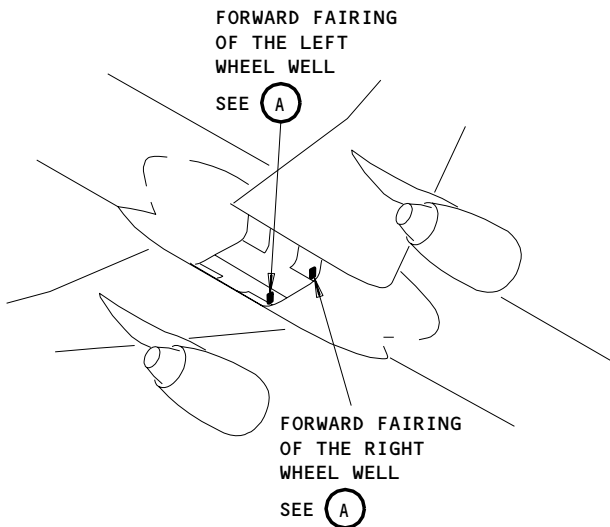
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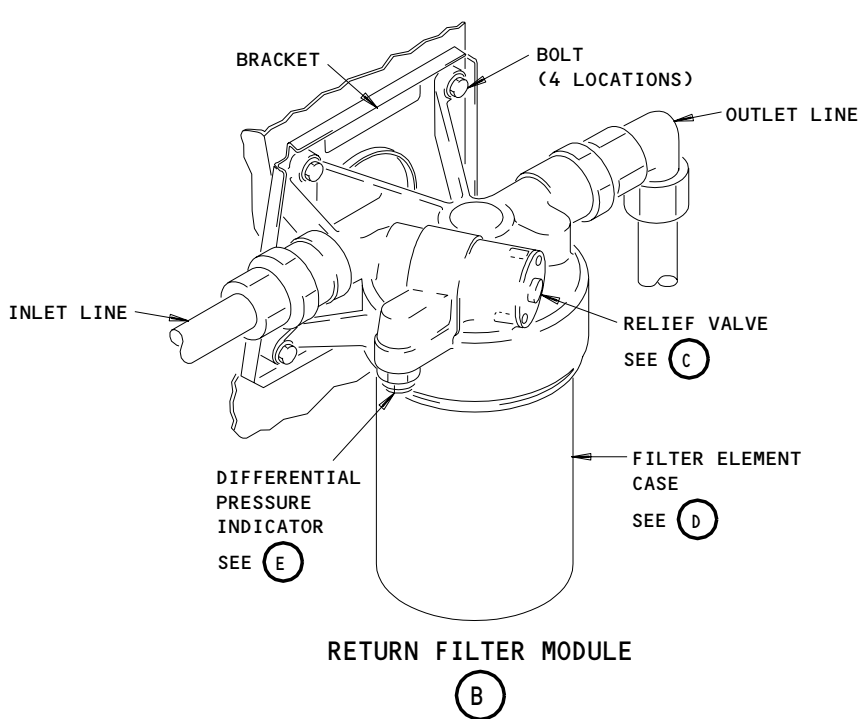
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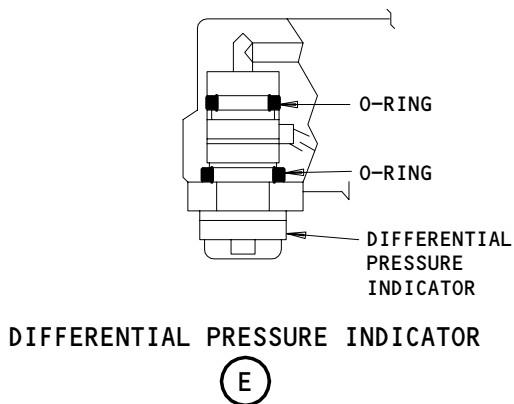
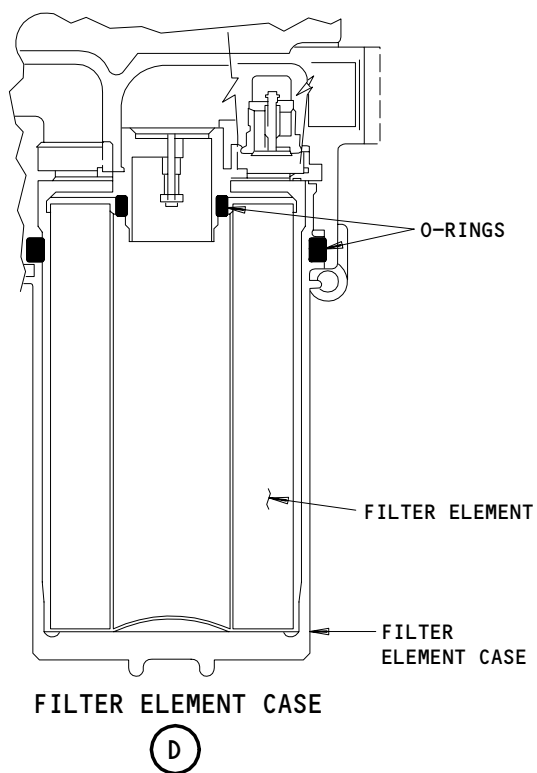
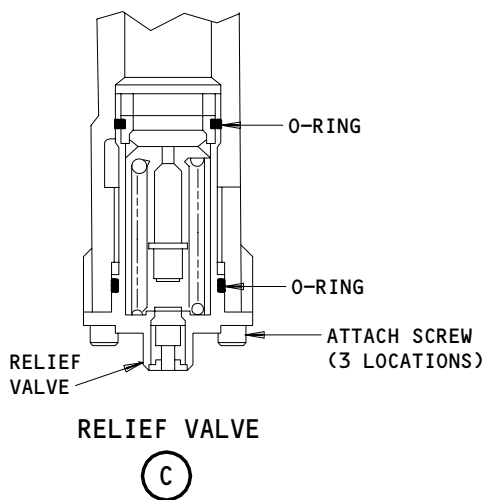
FORWARD FAIRING FOR THE LEFT WHEEL WELL (EXAMPLE)



Left and Right System Return Filter Module Installation
Figure 401 (Sheet 1)

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Left and Right System Return Filter Module Installation
Figure 401 (Sheet 2)

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S 864-005

- (4) Remove the pressure from the left or right hydraulic system and reservoir (AMM 29-11-00/201).

E. Remove the Return Filter Module (Fig. 401)

S 034-006

- (1) Disconnect the hydraulic lines from the return filter module.

S 034-007

- (2) Install caps on the hydraulic lines.

S 024-008

- (3) Remove the bolts and washers and remove the module.

S 034-009

- (4) Remove the unions and the O-rings from the module.

F. Remove the filter element (Fig. 401)

S 034-010

- (1) Remove the filter case from the return filter module.

S 024-011

- (2) Remove the filter element from the return filter module.

G. Remove the Indicator for Differential Pressure (Fig. 401)

S 024-012

- (1) Loosen and remove the indicator.

S 034-013

- (2) Install a plug in the opening in the return filter module.

TASK 29-11-15-404-014

3. Install the Return Filter Module and Components for the Left and Right Systems

A. General

- (1) This task contains three procedures which install the components which follow:
 - (a) Return filter module for the left and right systems.

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- (b) Filter element.
 - (c) Indicator for differential pressure.
 - (2) To start one of these procedures, do the applicable 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. Consumable Materials
- (1) D00054 Hydraulic System Lubricant - MCS 352B
- C. References
- (1) AMM 12-12-01/301, Hydraulic Systems
 - (2) AMM 12-25-01/301, Exterior Cleaning
 - (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
 - (4) AMM 32-00-15/201, Main Gear Door Locks
- D. Access
- (1) Location Zone
143/144 MLG Wheel Well
- E. Install the Return Filter Module (Fig. 401)
- S 644-015
 - (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads on the unions.
 - S 434-016
 - (2) Install the unions and the new O-rings in the openings in the module.
 - S 424-017
 - (3) Put the return filter module in position.
 - S 424-018
 - (4) Install the four bolts and washers which attach the return filter module to the bracket.
 - S 434-019
 - (5) Connect and tighten the hydraulic lines to the return filter module.
- F. Install the Filter Element (Fig. 401)
- S 164-020
 - (1) Clean the filter element case.

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- S 644-021
- (2) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and to the threads on the filter element case.
- S 434-022
- (3) Assemble the filter element, the new O-rings, and the filter case.
- S 424-023
- (4) Install the filter element and case assembly into the return filter module.
- S 434-024
- (5) Tighten the filter element case to 420-480 pound-inches.
- S 434-025
- (6) Safety the filter element case with wire.
- G. Install the Indicator for Differential Pressure (Fig. 401)
- S 644-026
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads on the indicator.
- S 434-027
- (2) Install the indicator in the return filter module.
- S 434-038
- (3) Tighten the indicator to 80-100 pound-inches and safety with wire.
- H. Put the Airplane Back to Its Usual Condition.
- S 864-029
- (1) Push the indicator button on the differential pressure indicator in until it aligns with the adjacent surface.
- S 864-030
- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 864-031
- (3) Pressurize the left or right hydraulic system and reservoir (AMM 29-11-00/201).
- S 794-032
- (4) Make sure there are no leaks on the return filter module.

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S 864-033

- (5) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

S 614-034

- (6) Fill the reservoir in the left or right system (AMM 12-12-01/301).

S 114-035

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (7) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-036

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.

- (8) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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RESERVOIR PRESSURIZATION MODULE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains six tasks. The first task removes the reservoir pressurization module. The second task removes the filter element from the reservoir pressurization module. The third task removes the orifice cross assembly from the reservoir pressurization module. The fourth task installs the reservoir pressurization module. The fifth task installs the filter element in the reservoir pressurization module. The sixth task installs the orifice cross assembly in the reservoir pressurization module.

TASK 29-11-16-004-014

2. Remove the Reservoir Pressurization Module

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 36-00-00/201, Pneumatic – General

B. Access

- (1) Location Zone
 - 135/136 Wing Center Section
 - 139 Forward Section of Keel Beam
 - 193/194 Wing to Body Fairings
- (2) Access Panels
 - 193HL ECS Components (Left)
 - 194ER ECS Components (Right)

C. Prepare for Removal

S 014-015

- (1) Open the access doors, 193HL and 194ER, for the environmental control system (AMM 06-41-00/201).

S 864-016

- (2) Remove the pneumatic power (AMM 36-00-00/201).

D. Remove the Module for Reservoir Pressurization (Fig. 401)

S 034-017

- (1) Disconnect the air lines from the module.

S 034-018

- (2) Remove the bolts which attach the module to the support bracket.

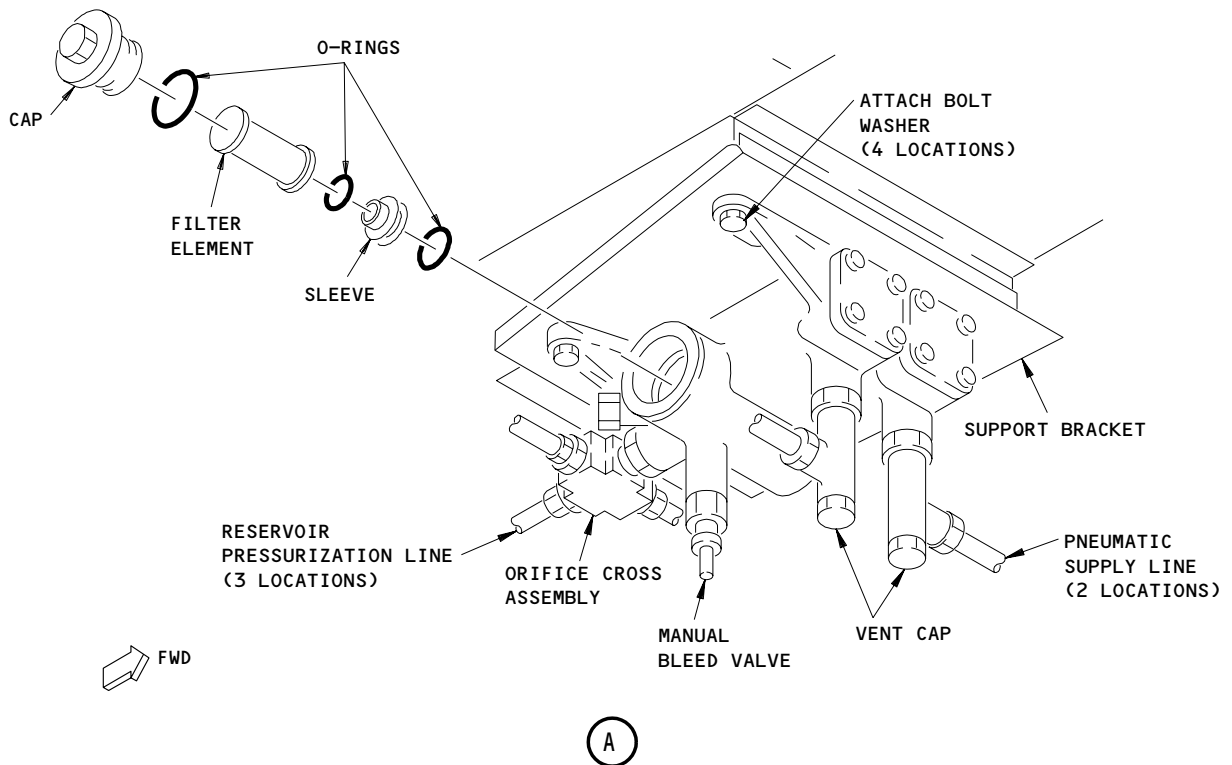
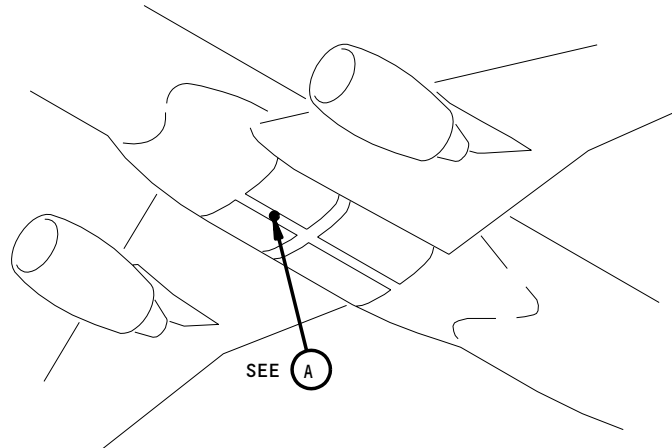
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Reservoir Pressurization Module Installation
Figure 401

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S 024-019

- (3) Remove the module from the support bracket.

TASK 29-11-16-004-055

3. Remove the Filter Element From the Reservoir Pressurization Module

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 36-00-00/201, Pneumatic - General

B. Access

- (1) Location Zone

135/136	Wing Center Section
139	Forward Section of Keel Beam
193/194	Wing to Body Fairings

- (2) Access Panels

- | | |
|-------|------------------------|
| 193HL | ECS Components (Left) |
| 194ER | ECS Components (Right) |

C. Prepare for Removal

S 014-022

- (1) Open the access doors, 193HL and 194ER, for the environmental control system components (AMM 06-41-00/201).

S 864-023

- (2) Remove the pneumatic power (AMM 36-00-00/201).

D. Remove the Filter Element (Fig. 401)

S 034-024

- (1) Remove the filter cap from the reservoir pressurization module.

S 024-025

- (2) Remove the filter element from the reservoir pressurization module.

TASK 29-11-16-024-063

4. Remove the Orifice Cross Assembly From the Reservoir Pressurization Module

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels

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- (2) AMM 36-00-00/201, Pneumatic-General
- B. Access
 - (1) Location Zone
 - 135/136 Wing Center Section
 - 139 Forward Section of Keel Beam
 - 193/194 Wing to Body Fairings
 - (2) Access Panels
 - 193HL ECS Components (Left)
 - 194ER ECS Components (Right)
- C. Prepare for Removal
 - S 014-058
 - (1) Open the access doors, 193HL and 194ER, for the environmental control system components (AMM 06-64-00/201)
 - S 864-059
 - (2) Remove the pneumatic power (AMM 36-00-00/201)
- D. Remove the Orifice Cross Assembly (Fig. 401)
 - S 034-060
 - (1) Disconnect the mating tubes from the orifice cross assembly and remove the assembly from the reservoir pressurization module.

TASK 29-11-16-404-026

5. Install the Reservoir Pressurization Module

- A. Consumable Materials
 - (1) D00054 Hydraulic System Lubricant - MCS 352B
- B. References
 - (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
 - (2) AMM 36-00-00/201, Pneumatic - General
- C. Access
 - (1) Location Zone
 - 135/136 Wing Center Section
 - 139 Forward Section of Keel Beam
 - 193/194 Wing to Body Fairings
 - (2) Access Panels
 - 193HL ECS Components (Left)
 - 194ER ECS Components (Right)
- D. Install the Module For Reservoir Pressurization (Fig. 401)
 - S 424-027
 - (1) Put the module on the mounting bracket.
 - S 434-028
 - (2) Install the bolts and washers to attach the module to the support bracket.

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- S 644-029
- (3) Apply the hydraulic lubricant or the hydraulic fluid to the O-rings and the threads of the air line connections.
- S 434-030
- (4) Connect the air lines to the module.
- E. Put the Airplane Back to its Usual Condition.
 - S 864-031
 - (1) Supply pneumatic power (AMM 36-00-00/201).
 - S 794-032
 - (2) Make sure there are no air leaks at the air line connections on the module.
 - S 864-033
 - (3) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).
 - S 414-034
 - (4) Close the access doors, 193HL and 194ER, for the environmental control system (AMM 06-41-00/201).

TASK 29-11-16-404-035

6. Install the Filter Element in the Reservoir Pressurization Module

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B
- (2) D00090 Trichlorethane 1, 1, 1
- (3) A00363 Sealant - RTV 162
- (4) A00247 Sealant - Chromate Type, BMS 5-95

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 36-00-00/201, Pneumatic - General

C. Access

(1) Location Zone

135/136	Wing Center Section
139	Forward Section of Keel Beam
193/194	Wing to Body Fairings

(2) Access Panels

193HL	ECS Components (Left)
194ER	ECS Components (Right)

D. Install the Filter Element (Fig. 401)

S 144-037

- (1) Remove the sealant remaining on the filter cap and the adjacent surface of the reservoir pressurization module.

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- S 114-038
- (2) Clean the hole in the reservoir pressurization module for the filter element.
- S 114-039
- (3) Clean the filter element with solvent and fully dry the filter element.
- S 644-040
- (4) Apply the hydraulic lubricant or the hydraulic fluid to the new O-rings and the threads of the filter cap.
- S 434-041
- (5) Assemble the filter element, the O-rings and the filter sleeve.
- S 424-043
- (6) Install the filter element assembly in the reservoir pressurization module.
- S 434-044
- (7) Install the filter cap on the reservoir pressurization module.
- S 434-046
- (8) Safety the filter cap with a lockwire.
- S 394-047
- (9) Apply a bead of sealant to the joint between the filter cap and the reservoir pressurization module.

TASK 29-11-16-424-064

7. Install the Orifice Cross Assembly in the Reservoir Pressurization Module (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

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B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 36-00-00/201, Pneumatic - General

C. Access

- (1) Location Zone
 - 135/136 Wing Center Section
 - 139 Forward Section of Keel Beam
 - 193/194 Wing to Body Fairings
- (2) Access Panels
 - 193HL ECS Components (Left)
 - 194ER ECS Components (Right)

D. Install the Orifice Cross Assembly (Fig. 401)

S 644-065

- (1) Apply the hydraulic lubricant or the hydraulic fluid to the new O-rings and threads of the recessed seal boss end of the orifice cross assembly.

S 424-066

- (2) Install the recessed seal boss end of the orifice cross assembly into the reservoir pressurization module.

S 424-067

- (3) Install the mating tube assemblies to the orifice cross assembly.

E. Put the Airplane Back to its Usual Condition.

S 864-048

- (1) Supply pneumatic power (AMM 36-00-00/201).

S 794-049

- (2) Make sure there are no air leaks at the filter cap on the reservoir pressurization module.

S 864-050

- (3) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).

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- S 414-051
- (4) Close the access doors, 193HL and 194ER, for the environmental control system (AMM 06-41-00/201).

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LEFT AND RIGHT SYSTEM ENGINE-DRIVEN PUMP (EDP) PRESSURE AND CASE DRAIN FILTER
MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the filter module and components for the pressure and case drain of the engine-driven pump (EDP) in the left and right systems. The other task installs the filter module and components.

TASK 29-11-17-004-001

2. Remove the Filter Module and Components for the Pressure and Case Drain of the Engine-Driven Pump (EDP) in the Left and Right Systems

A. General

- (1) This task contains the procedures to remove the components which follow:
- (a) Filter module for the pressure and case drain of the engine-driven pump (EDP), referred to in this procedure as the filter module
 - (b) Filter elements
 - (c) Differential pressure indicators
 - (d) Pressure switches
 - (e) Check valve.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-11-00/501, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 29-11-05/401, Engine-Driven Pump (EDP)
- (5) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zone
434/444 Nacelle Strut - Aft Fairing
- (2) Access Panels
434AL/444AL Hydraulic Bay

D. Prepare for the Removal

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT

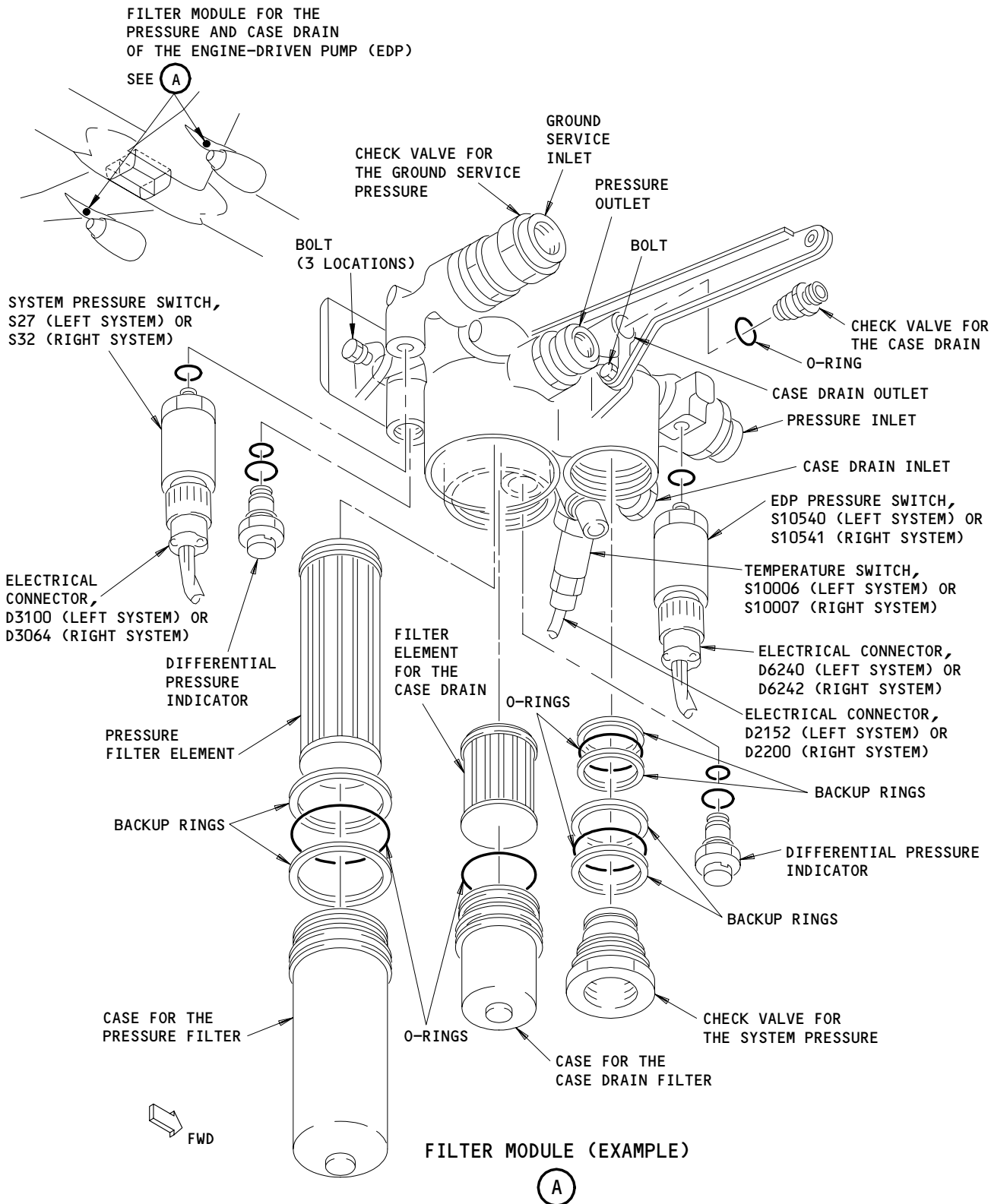
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Filter Module Installation
Figure 401

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S 044-095

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE 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 (AMM 78-31-00/201).

S 014-004

- (3) Open the applicable access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 864-008

- (4) Remove the pressure from the left or right hydraulic system and reservoir (AMM 29-11-00/201).

E. Remove the Filter Module (Fig. 401)

S 034-009

- (1) Disconnect the electrical connectors from the pressure switches and the temperature switch on the filter module.

S 034-010

- (2) Put the electrical connectors in a position that is clear of the filter module.

S 034-101

WARNING: BEFORE YOU DISCONNECT THE HYDRAULIC LINES, MAKE SURE YOU BLEED THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE FILTER MODULE.

- (3) Disconnect the hydraulic lines from the filter module.

S 034-012

- (4) Install caps on the hydraulic lines.

S 024-013

- (5) Remove the bolts which attach the filter module.

S 024-014

- (6) Remove the filter module.

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S 034-015

- (7) Remove the unions and the O-rings from the ports of the filter module.

F. Remove the Filter Element (Fig. 401)

S 024-102

WARNING: BEFORE YOU REMOVE THE FILTER CASE, MAKE SURE YOU BLEED ALL THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

CAUTION: DO NOT PRESSURIZE THE HYDRAULIC SYSTEM AFTER YOU REMOVE THE FILTER ELEMENT CASE. THIS CAN CAUSE DAMAGE TO THE FILTER MODULE OR THE CHECK VALVE.

- (1) Remove the filter case from the filter module.

S 024-017

- (2) Remove the filter element from the filter case.

S 214-111

- (3) Examine the filter element, the filter bowl, and the fluid in the filter bowl for metal contamination.
 - (a) If you find a small quantity of metal particles that have equal dimensions, then replace the filter and do an operational test of the pump (AMM 29-11-00/501). Examine the filter again at the scheduled filter change interval.

NOTE: It is not necessary to replace a pump if the quantity of metal particles is small and they have equal dimensions. The filter can have more particles during initial operation of a new pump while mating parts wear away small surface defects. It is not necessary to replace the pump if more small particles are found at the next filter change after installation of a new pump.

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- (b) If you find a large quantity of small metal particles, large metal particles that are not of equal dimensions, or a large quantity of steel particles, then replace the pump at the next maintenance opportunity (AMM 29-11-05/401).

NOTE: A large quantity of small metal particles, or large metal particles that are not of equal dimensions, can be an indication of an unsatisfactory pump. The particles are usually bronze mixed with a small quantity of steel. A large quantity of steel particles is an indication of unsatisfactorily worn bearings.

- (c) Write down the results of the filter inspection and give them to the pump overhaul facility.

NOTE: The filter inspection results can be used as an aid to find the condition of the pump. A pump with an unsatisfactory bearing can pass the functional test and be returned to service with no fault found. Giving the filter inspection data to the overhaul facility can prevent the return of an unsatisfactory pump to service.

CAUTION: FLUSH THE HYDRAULIC LINES TO REMOVE UNWANTED METAL CONTAMINATION. IF THE LINES ARE NOT FLUSHED, THEN THE REMAINING METAL CONTAMINATION CAN BE FOUND AT THE NEXT FILTER CHANGE. IF A LARGE QUANTITY OF METAL CONTAMINATION STAYS IN THE LINES, THEN THE FILTER CAN BECOME BLOCKED. A CONTAMINATED FILTER CAN CAUSE AN UNWANTED REMOVAL OF A SATISFACTORY PUMP. A BLOCKED FILTER CAN CAUSE A PUMP TO FAIL.

- (d) If a pump is removed because metal contamination is found in the filter, then flush the hydraulic lines and replace the related filter elements (AMM 29-11-00/201).

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G. Remove the Differential Pressure Indicator (Fig. 401)

S 024-018

- (1) Remove the differential pressure indicator from the filter module.

S 034-019

- (2) Install a cap on the opening in the filter module.

H. Remove the Pressure Switch (Fig. 401)

S 034-103

WARNING: BEFORE YOU DISCONNECT THE PRESSURE SWITCH, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

- (1) Disconnect the electrical connector from the pressure switch.

S 024-021

- (2) Remove the switch from the filter module.

S 034-022

- (3) Install a cap on the opening in the filter module.

I. Remove the Check Valve (Fig. 401)

S 024-104

WARNING: BEFORE YOU DISCONNECT THE CHECK VALVE, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

- (1) Remove the check valve from the filter module.

S 034-024

- (2) Install a cap on the opening in the filter module.

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TASK 29-11-17-404-027

3. Install the Filter Module and Components for the Pressure and Case Drain of the Engine-Driven Pump (EDP) in the Left and Right Systems

A. General

- (1) This task contains the procedures to install the components which follow:
 - (a) Filter module for the pressure and case drain of the engine-driven pump (EDP), referred to in this procedure as the filter module
 - (b) Filter elements
 - (c) Differential pressure indicators
 - (d) Pressure switches
 - (e) Check valve.
- (2) To start one of these procedures, do the applicable 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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (5) AMM 78-31-00/201, Thrust Reverser System

D. Access

- (1) Location Zone
434/444 Nacelle Strut - Aft Fairing
- (2) Access Panels
434AL/444AL Hydraulic Bay

E. Install the Filter Module (Fig. 401)

S 644-028

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.

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- S 434-029
- (2) Install the unions and the new O-rings in the ports of the filter module.
- S 164-030
- (3) Clean the surfaces of the filter module that touch the brackets which hold the filter module.
- S 424-031
- (4) Put the filter module on the brackets.
- S 424-032
- (5) Install the bolts to attach the filter module to the brackets.
- S 434-033
- (6) Connect the hydraulic lines to the filter module.
- S 434-034
- (7) Install the electrical connectors on the pressure switches and the temperature switch.
- S 434-035
- (8) Safety the electrical connectors with a lockwire.
- F. Install the Filter Element (Fig. 401)
- S 164-036
- (1) Clean the filter element case.
- S 644-037
- (2) Apply hydraulic lubricant or hydraulic fluid to the O-rings, the backup rings, and the threads on the filter case.
- S 424-038
- (3) Install the filter case and the filter element in the filter module.
- S 434-039
- (4) Tighten the filter case to 270-300 pound-inches.
- S 434-040
- (5) Safety the filter case with a lockwire.
- G. Install the Differential Pressure Indicator (Fig. 401)
- S 434-041
- (1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the differential pressure indicator.

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- S 434-042
- (2) Install the new 0-rings on the differential pressure indicator.
- S 434-043
- (3) Remove the cap from the opening in the filter module.
- S 424-044
- (4) Install the differential pressure indicator in the filter module.
- S 434-109
- (5) Tighten the differential pressure indicator to 265-285 pound-inches.
- H. Install the Pressure Switch (Fig. 401)
- S 644-056
- (1) Apply hydraulic lubricant or hydraulic fluid to the 0-ring and the threads of the pressure switch.
- S 434-057
- (2) Remove the cap from the opening in the filter module.
- S 424-058
- (3) Install the pressure switch on the filter module.
- S 434-110
- (4) Tighten the pressure switch to 265-285 pound-inches.
- S 434-060
- (5) Connect the electrical connector to the pressure switch.
- S 434-061
- (6) Safety the pressure switch and the electrical connector with a lockwire.
- I. Install the Check Valve (Fig. 401)
- S 644-062
- (1) Apply hydraulic lubricant or hydraulic fluid to the 0-rings, backup rings, and the threads of the check valve.
- S 434-063
- (2) Install the 0-rings and the backup rings on the check valve.
- S 434-064
- (3) Remove the cap from the opening in the filter module.

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- S 424-065
- (4) Install the check valve on the filter module.
- S 434-066
- (5) Tighten the check valve for the case drain to 100-125 pound-inches.
- S 434-067
- (6) Tighten the check valve for the system pressure or for the ground service pressure to 1150-1200 pound-inches.
- S 434-078
- (7) Safety the check valve with a lockwire.
- J. Put the Airplane Back to Its Usual Condition
- S 864-084
- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 614-085
- (2) Fill the reservoir in the applicable hydraulic system (AMM 12-12-01/301).
- S 864-086
- (3) Pressurize the applicable hydraulic system and the reservoir (AMM 29-11-00/201).
- S 794-087
- (4) Make sure there are no leaks at the filter module.
- S 164-088
- CAUTION:** QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (5) Clean all the hydraulic fluid from the installation area (AMM 12-25-01/301).
- S 414-089
- (6) Close the applicable access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).
- S 444-093
- (7) Do this procedure: Thrust reverser activation procedure (AMM 78-31-00/201).

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S 864-094

- (8) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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LEFT AND RIGHT SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) PRESSURE AND CASE DRAIN FILTER MODULE AND COMPONENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the filter module and components for the pressure and case drain of the alternating current motor pump (ACMP) in the left and right systems. The other task installs the filter module and components.

TASK 29-11-18-004-001

2. Remove the Filter Module and Components for the Pressure and Case Drain of the Alternating Current Motor Pump (ACMP) in the Left and Right Systems

A. General

- (1) This task contains the procedures to remove the components which follow:
- (a) Filter module for the pressure and case drain of the alternating current motor pump (ACMP), referred to in this procedure as the filter module
 - (b) Filter elements
 - (c) Differential pressure indicators
 - (d) Check valves
 - (e) Pressure switch.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 29-11-00/501, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-11-01/401, Left and Right Hydraulic System Alternating Current Motor Pump (ACMP)
- (4) AMM 32-00-15/201, Main Gear Door Locks
- (5) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

- (1) Location Zones
143/144 MLG Wheel Well

D. Prepare for Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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S 494-003

WARNING: DO 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) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT

S 864-005

- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

E. Remove the Filter Module (Fig. 401)

S 034-006

- (1) Remove the electrical connector from the pressure switch.

S 034-007

- (2) Put the electrical connector in a position that is clear of the filter module.

S 024-096

WARNING: BEFORE YOU DISCONNECT THE HYDRAULIC LINES, MAKE SURE YOU BLEED THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE FILTER MODULE.

- (3) Disconnect the hydraulic lines from the filter module.

S 034-009

- (4) Install caps on the hydraulic lines.

S 024-010

- (5) Remove the bolts which hold the filter module in its position.

S 024-011

- (6) Remove the filter module.

S 034-012

- (7) Remove the unions from the ports of the filter module.

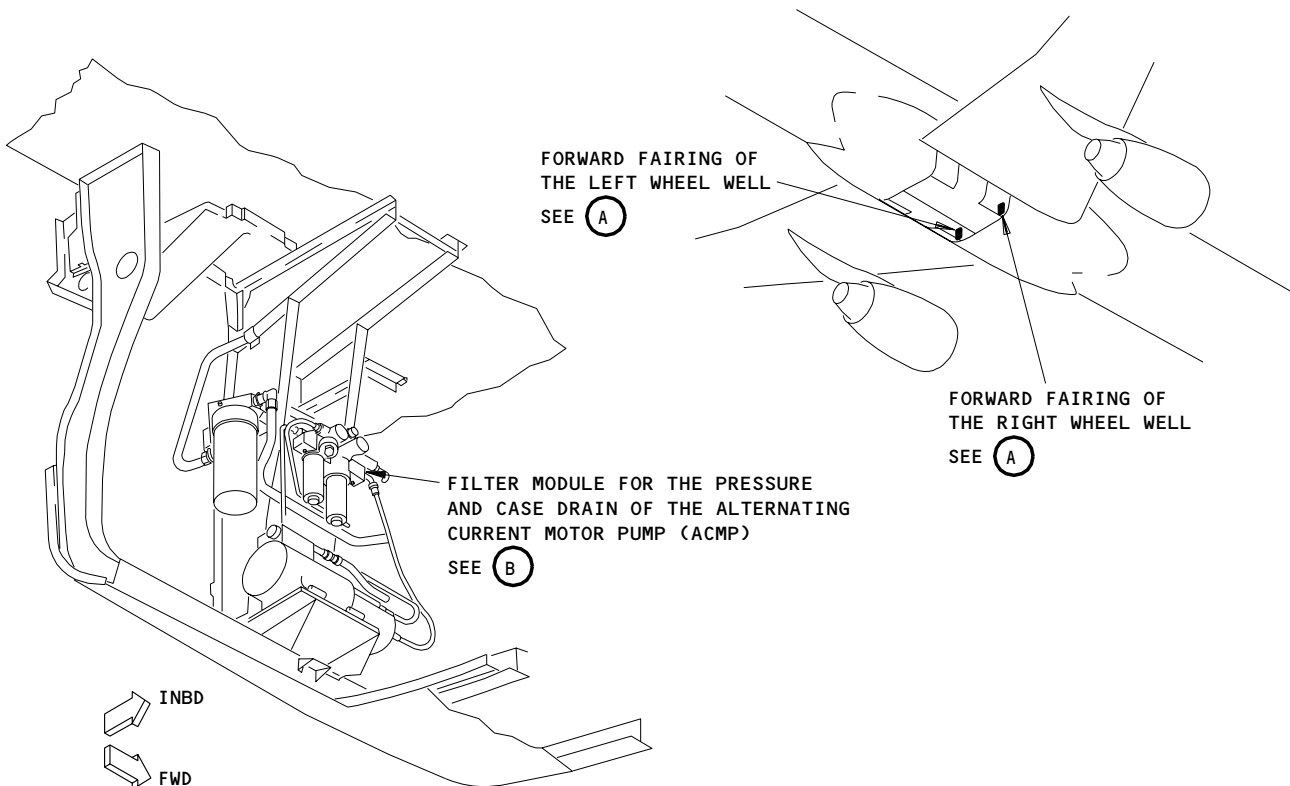
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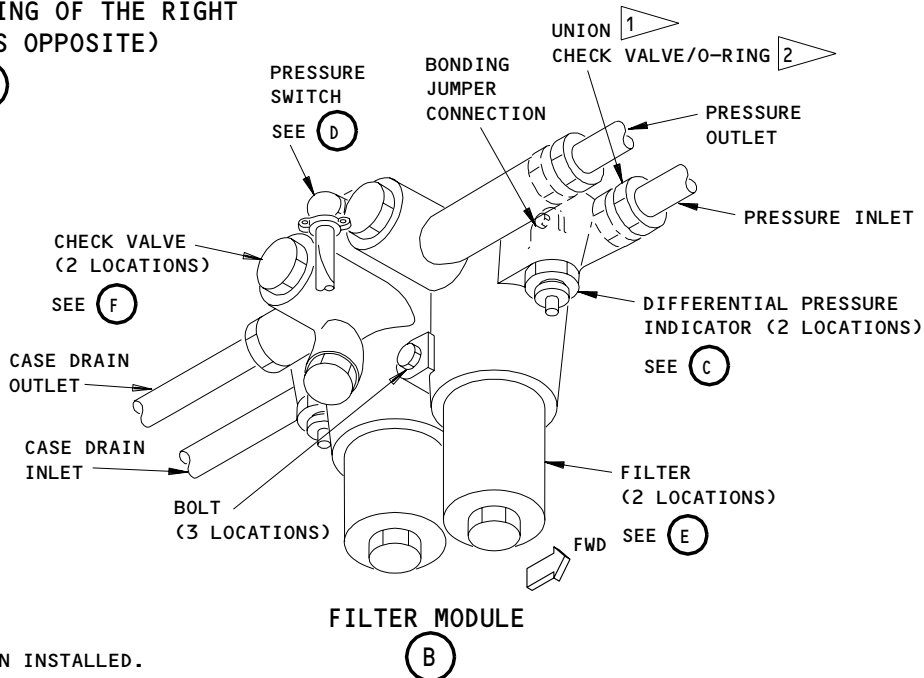
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FORWARD FAIRING OF THE LEFT WHEEL WELL
(THE FORWARD FAIRING OF THE RIGHT WHEEL WELL IS OPPOSITE)

(A)



- 1 FILLER MODULE WITH UNION INSTALLED.
- 2 FILLER MODULE WITH CHECK VALVE INSTALLED.

Filter Module Installation
Figure 401 (Sheet 1)

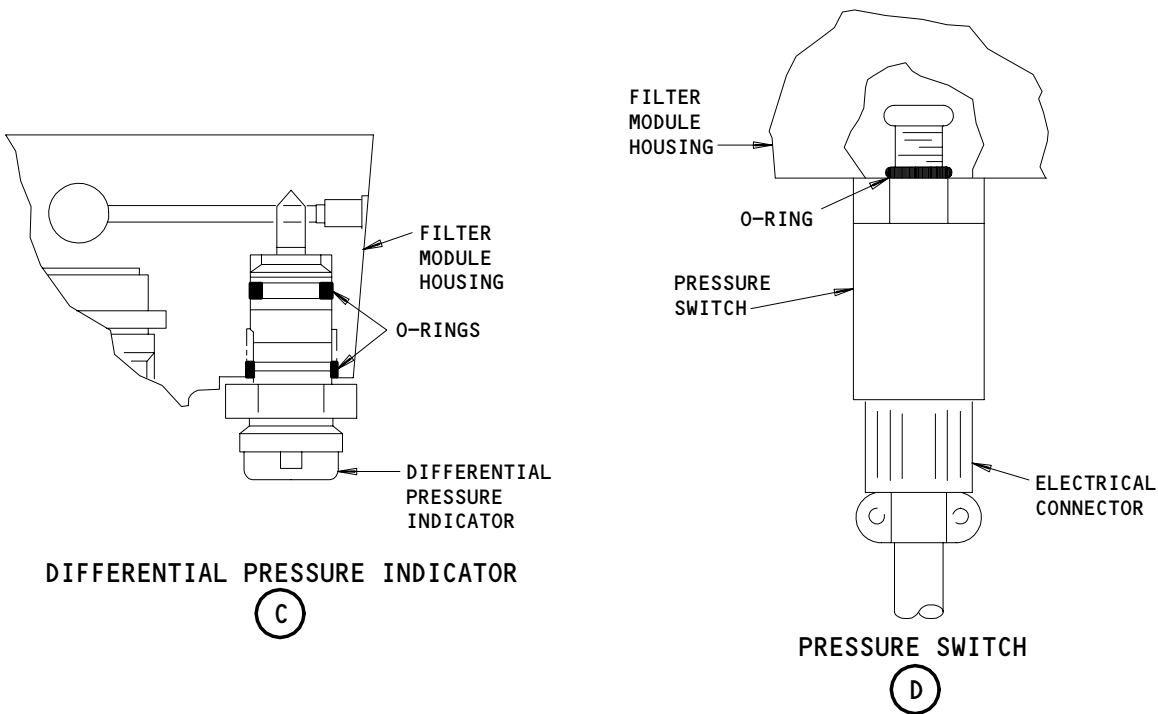
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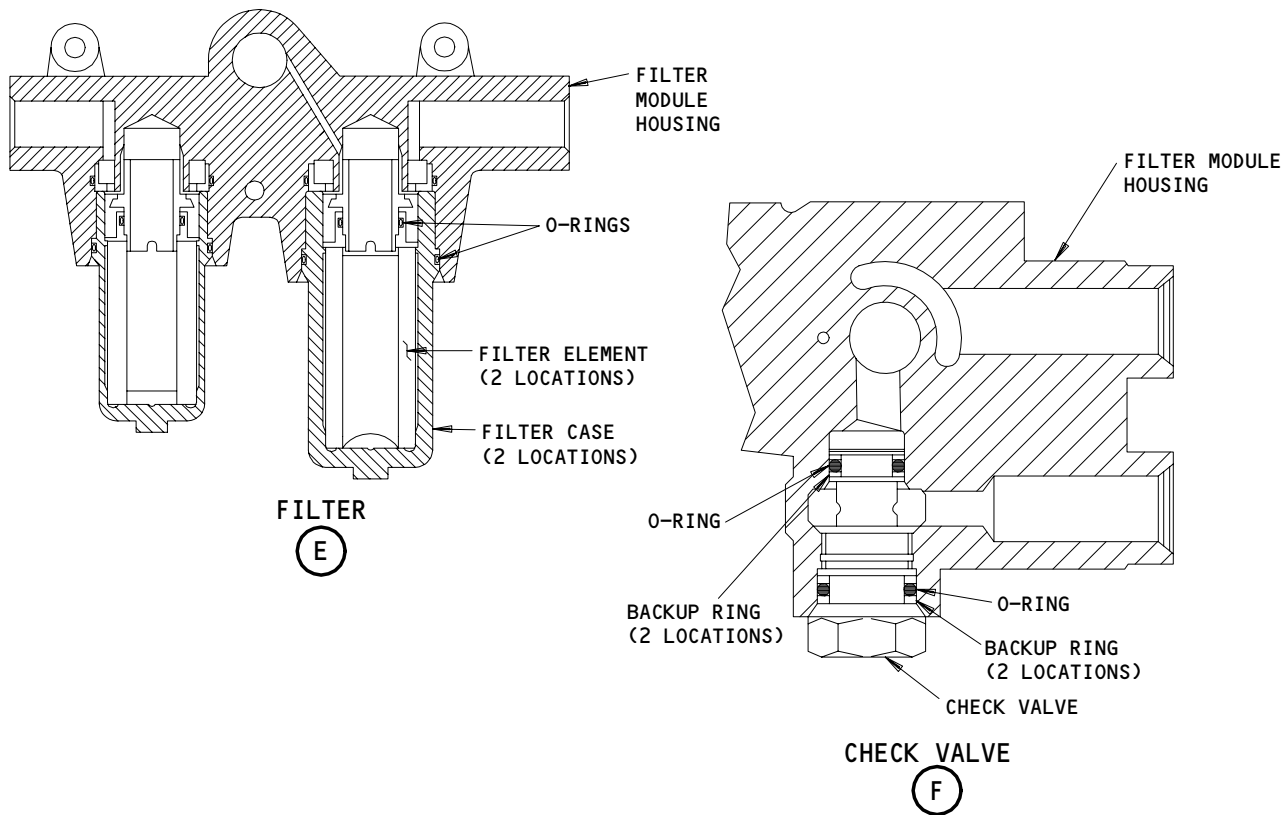


DIFFERENTIAL PRESSURE INDICATOR

(C)

PRESSURE SWITCH

(D)



FILTER

(E)

CHECK VALVE

(F)

Filter Module Installation
Figure 401 (Sheet 2)

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S 034-013

- (8) Remove the check valve or union from the pressure inlet port of the filter module.

S 034-026

- (9) Install caps on the ports of the filter module.
- F. Remove the Filter Element (Fig. 401)

S 024-027

WARNING: BEFORE YOU REMOVE THE FILTER CASE, MAKE SURE YOU BLEED ALL THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

CAUTION: DO NOT PRESSURIZE THE HYDRAULIC SYSTEM AFTER YOU REMOVE THE FILTER ELEMENT CASE. THIS CAN CAUSE DAMAGE TO THE FILTER MODULE OR THE CHECK VALVE.

- (1) Remove the filter case and the filter element from the filter module.

S 024-028

- (2) Remove the filter element from the filter case.

S 214-101

- (3) Examine the filter element, the filter bowl, and the fluid in the filter bowl for metal contamination.
 - (a) If you find a small quantity of metal particles that have equal dimensions, then replace the filter and do an operational test of the pump (AMM 29-11-00/501). Examine the filter again at the scheduled filter change interval.

NOTE: It is not necessary to replace a pump if the quantity of metal particles is small and they have equal dimensions. The filter can have more particles during initial operation of a new pump while mating parts wear away small surface defects. It is not necessary to replace the pump if more small particles are found at the next filter change after installation of a new pump.

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MAINTENANCE MANUAL

- (b) If you find a large quantity of small metal particles, large metal particles that are not of equal dimensions, or a large quantity of steel particles, then replace the pump at the next maintenance opportunity (AMM 29-11-01/401).

NOTE: A large quantity of small metal particles, or large metal particles that are not of equal dimensions, can be an indication of an unsatisfactory pump. The particles are usually bronze mixed with a small quantity of steel. A large quantity of steel particles is an indication of unsatisfactorily worn bearings.

- (c) Write down the results of the filter inspection and give them to the pump overhaul facility.

NOTE: The filter inspection results can be used as an aid to find the condition of the pump. A pump with an unsatisfactory bearing can pass the functional test and be returned to service with no fault found. Giving the filter inspection data to the overhaul facility can prevent the return of an unsatisfactory pump to service.

CAUTION: FLUSH THE HYDRAULIC LINES TO REMOVE UNWANTED METAL CONTAMINATION. IF THE LINES ARE NOT FLUSHED, THEN THE REMAINING METAL CONTAMINATION CAN BE FOUND AT THE NEXT FILTER CHANGE. IF A LARGE QUANTITY OF METAL CONTAMINATION STAYS IN THE LINES, THEN THE FILTER CAN BECOME BLOCKED. A CONTAMINATED FILTER CAN CAUSE AN UNWANTED REMOVAL OF A SATISFACTORY PUMP. A BLOCKED FILTER CAN CAUSE A PUMP TO FAIL.

- (d) If a pump is removed because metal contamination is found in the filter, then flush the hydraulic lines and replace the related filter elements (AMM 29-11-00/201).

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S 164-029

(4) Clean the filter case.

G. Remove the Differential Pressure Indicator (Fig. 401)

S 024-030

(1) Remove the differential pressure indicator from the filter module.

S 034-031

(2) Install a cover on the opening in the filter module.

H. Remove the Check Valve (Fig. 401)

S 024-097

WARNING: BEFORE YOU DISCONNECT THE CHECK VALVE, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

(1) Remove the check valve from the filter module.

S 034-033

(2) Install a cap on the opening in the filter module.

I. Remove the Pressure Switch (Fig. 401)

S 034-034

(1) Disconnect the electrical connector from the pressure switch.

S 024-098

WARNING: BEFORE YOU DISCONNECT THE PRESSURE SWITCH, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

(2) Remove the pressure switch from the filter module.

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S 034-036

- (3) Install a cap on the opening in the filter module.

TASK 29-11-18-404-037

3. Install the Filter Module and Components for the Pressure and Case Drain of the Alternating Current Motor Pump (ACMP) in the Left and Right Systems

A. General

- (1) This task contains the procedures to install the components which follow:
 - (a) Filter module for the pressure and case drain of the alternating current motor pump (ACMP), referred to in this procedure as the filter module
 - (b) Filter elements
 - (c) Differential pressure indicators
 - (d) Check valves
 - (e) Pressure switch.
- (2) To start one of these procedures, do the applicable 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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 32-00-15/201, Main Gear Door Locks

D. Access

- (1) Location Zones
143/144 MLG Wheel Well

E. Install the Filter Module (Fig. 401)

S 164-038

- (1) Clean the surfaces of the filter module which touch the bracket that holds the filter module.

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- S 434-039
- (2) Remove the caps from the ports of the filter module.
- S 434-053
- (3) Do these steps to install the check valve or union in the pressure inlet port of the filter module:
- (a) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the check valve or union.
 - (b) Install the check valve or union and the new O-ring in the pressure inlet port of the filter module.
 - (c) Tighten the check valve to 340-380 pound-inches.
- S 644-054
- (4) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.
- S 434-055
- (5) Install the unions and the new O-rings in the ports of the filter module.
- S 424-056
- (6) Put the filter module and the bonding jumper in their positions.
- S 424-057
- (7) Install the bolts and washers which hold the filter module and the bonding jumper in their positions.
- S 434-058
- (8) Remove the caps from the hydraulic lines.
- S 434-059
- (9) Connect the hydraulic lines to the filter module.
- S 434-060
- (10) Install the electrical connector on the pressure switch.

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F. Install the Filter Element (Fig. 401)

S 644-061

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the filter case.

S 434-062

- (2) Install the new O-rings on the filter element and the filter case.

S 424-063

- (3) Install the filter element and the filter case on the filter module.

S 434-064

- (4) Tighten the filter element case to 270-300 pound-inches.

S 434-065

- (5) Safety the filter element case with a lockwire.

G. Install the Differential Pressure Indicator (Fig. 401)

S 644-066

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the differential pressure indicator.

S 434-067

- (2) Install the new O-rings on the differential pressure indicator.

S 434-068

- (3) Remove the cap from the opening in the filter module.

S 424-069

- (4) Install the differential pressure indicator on the filter module.

S 434-099

- (5) Tighten the differential pressure indicator to 160-175 pound-inches.

S 434-071

- (6) Safety the differential pressure indicator with a lockwire.

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H. Install the Check Valve (Fig. 401)

S 644-072

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings, the backup rings, and the threads of the check valve.

S 434-073

- (2) Install the new O-rings and the backup rings on the check valve.

S 434-074

- (3) Remove the cap from the opening in the filter module.

S 424-075

- (4) Install the check valve on the filter module.

S 434-076

- (5) Tighten the check valve to 100-125 pound-inches.

S 434-077

- (6) Safety the check valve with a lockwire.

I. Install the Pressure Switch (Fig. 401)

S 434-078

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the pressure switch.

S 434-079

- (2) Remove the cap from the opening in the filter module.

S 424-080

- (3) Install the pressure switch on the filter module.

S 434-100

- (4) Tighten the pressure switch to 160-175 pound-inches.

S 434-082

- (5) Safety the pressure switch with a wire.

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S 434-083

- (6) Connect the electrical connector to the pressure switch.

J. Put the Airplane Back to Its Usual Condition

S 864-084

- (1) Push the indicator button, on the differential pressure indicator, until it aligns with the adjacent surface.

S 864-085

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11K16, HYDRAULICS ELEC PUMP RIGHT
(b) 11K25, HYDRAULICS ELEC PUMP LEFT

S 864-086

- (3) Pressurize the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

S 794-087

- (4) Make sure there are no leaks at the filter module.

S 114-088

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (5) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 614-089

- (6) Fill the reservoir in the applicable hydraulic system (AMM 12-12-01/301)

S 094-090

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.

- (7) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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S 864-091

- (8) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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CENTER SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) PRESSURE AND CASE DRAIN
FILTER MODULE AND COMPONENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the filter module and components for the pressure and case drain of the alternating current motor pump (ACMP) in the center system. The other task installs the filter module and components.

TASK 29-11-19-004-001

2. Remove the Filter Module and Components for the Pressure and the Case Drain of the Alternating Current Motor Pump in the Center System

A. General

- (1) This task contains the procedures to remove the components which follow:
- (a) Filter module for the pressure and the case drain of the alternating current motor pump (ACMP), referred to in this procedure as the filter module
 - (b) Filter elements
 - (c) Differential pressure indicators
 - (d) Pressure switches
 - (e) Check valves.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-11-00/501, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)

C. Access

- (1) Location Zone
197 Wing to Body - Lower Half (Left)
- (2) Access Panels
197KL Central Hydraulic Service Center

D. Prepare for the Removal

- S 864-002
- (1) Open the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 864-003
- (2) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

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S 864-004

- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K24, HYDRAULICS ELEC PUMP C2

E. Remove the Filter Module (Fig. 401)

S 034-005

- (1) Disconnect the electrical connectors from the pressure switches on the filter module.

S 024-113

WARNING: BEFORE YOU DISCONNECT THE HYDRAULIC LINES, MAKE SURE YOU BLEED THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE FILTER MODULE.

- (2) Disconnect the hydraulic lines from the filter module.

S 034-007

- (3) Install caps on the hydraulic lines.

S 024-008

- (4) Remove the bolts which attach the filter module.

S 024-009

- (5) Remove the filter module.

S 034-011

- (6) Remove the union or the check valve and the O-ring from the pressure inlet port of the filter module.
 - (a) If a check valve is installed in the inlet port, make a note for re-installation that a check valve is installed.

S 034-010

- (7) Remove the unions and the O-rings from the other ports of the filter module.

F. Remove the Filter Elements (Fig. 401)

S 024-114

WARNING: BEFORE YOU REMOVE THE FILTER CASE, MAKE SURE YOU BLEED ALL THE HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

- (1) Remove the filter case from the filter module.

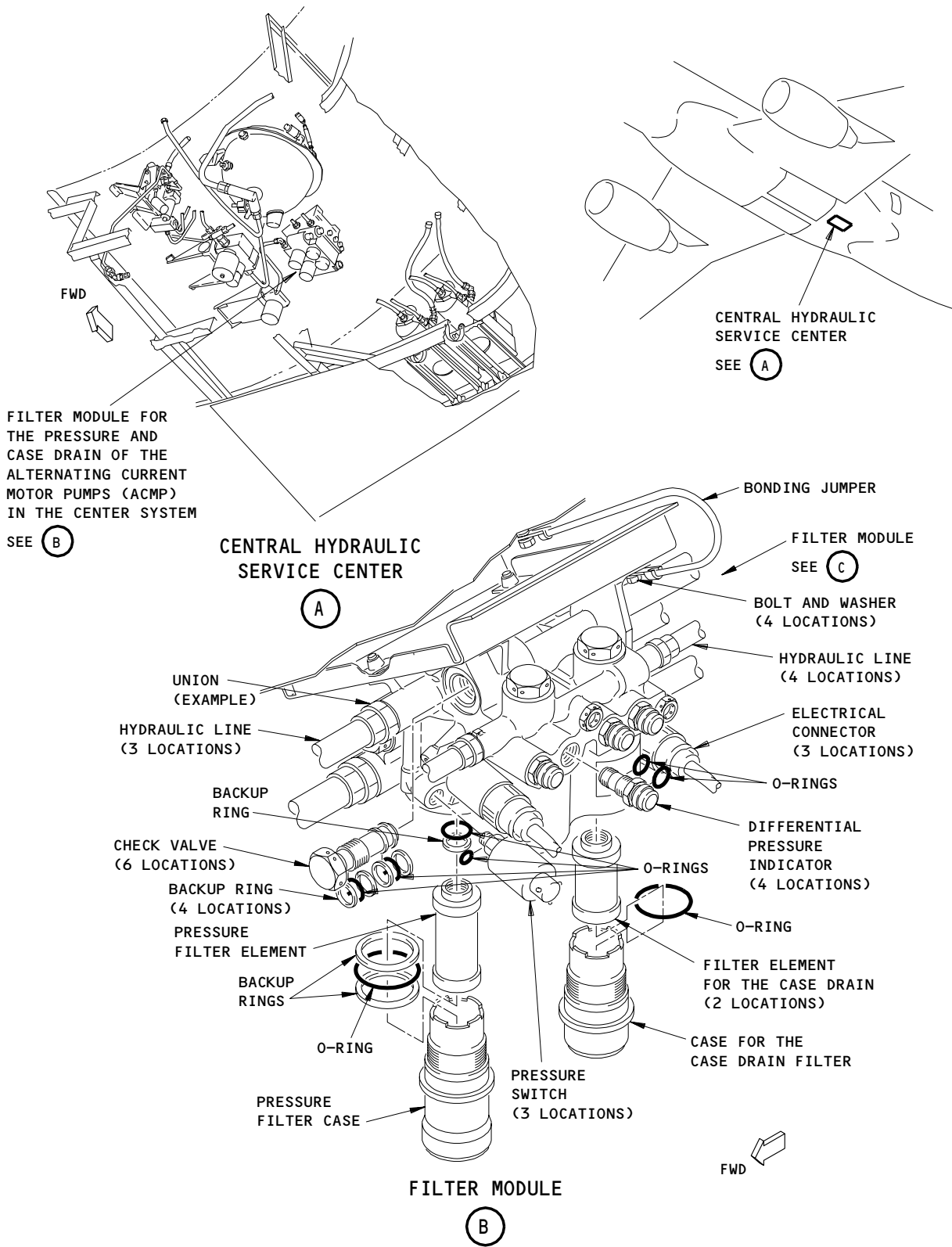
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Filter Module Installation
Figure 401 (Sheet 1)

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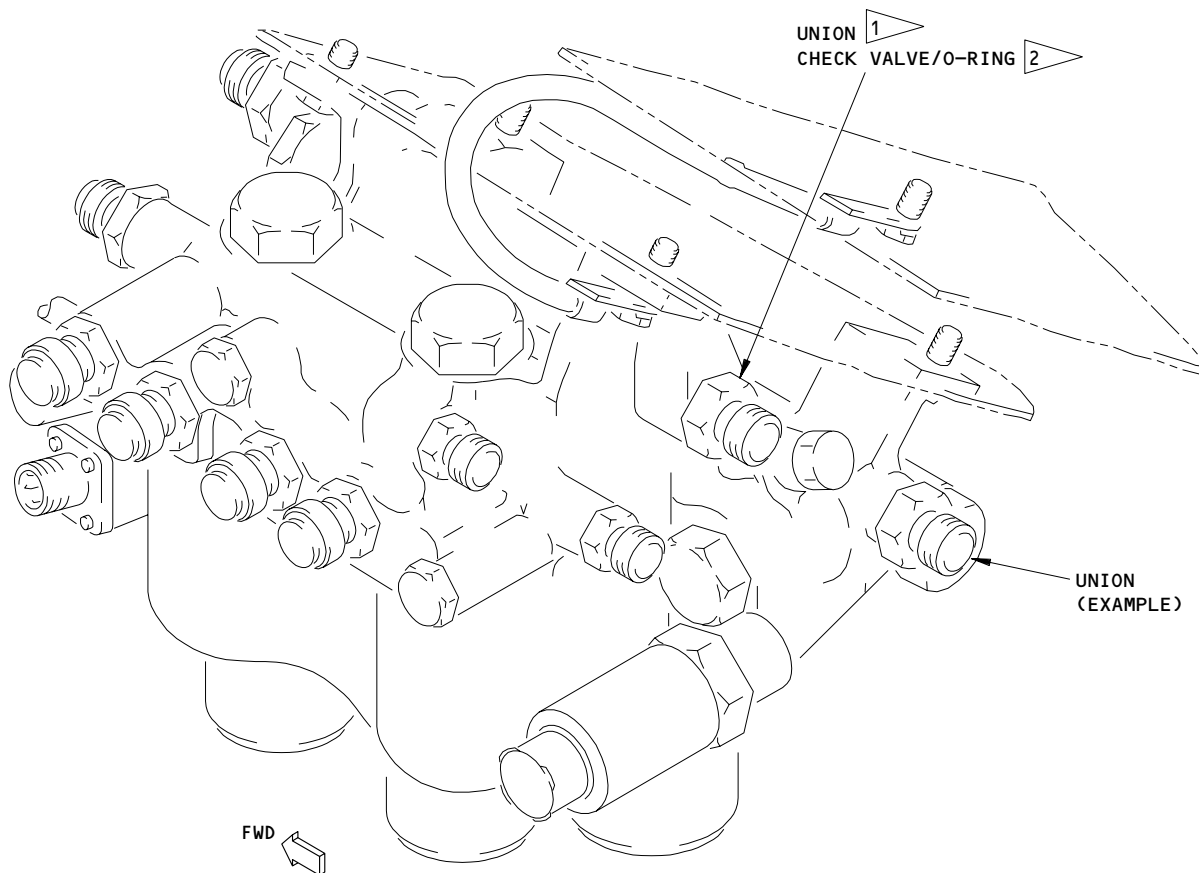
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FILTER MODULE



- 1 FILTER MODULE WITH UNION INSTALLED.
- 2 FILTER MODULE WITH CHECK VALVE INSTALLED.

Filter Module Installation
Figure 401 (Sheet 2)

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S 024-027

- (2) Remove the filter element from the filter case.

S 214-117

- (3) Examine the filter element, the filter bowl, and the fluid in the filter bowl for metal contamination.

- (a) If you find a small quantity of metal particles that have equal dimensions, then replace the filter and do an operational test of the pump (AMM 29-11-00/501). Examine the filter again at the scheduled filter change interval.

NOTE: It is not necessary to replace a pump if the quantity of metal particles is small and they have equal dimensions. The filter can have more particles during initial operation of a new pump while mating parts wear away small surface defects. It is not necessary to replace the pump if more small particles are found at the next filter change after installation of a new pump.

- (b) If you find a large quantity of small metal particles, large metal particles that are not of equal dimensions, or a large quantity of steel particles, then replace the pump at the next maintenance opportunity (AMM 29-11-02/401).

NOTE: A large quantity of small metal particles, or large metal particles that are not of equal dimensions, can be an indication of an unsatisfactory pump. The particles are usually bronze mixed with a small quantity of steel. A large quantity of steel particles is an indication of unsatisfactorily worn bearings.

- (c) Write down the results of the filter inspection and give them to the pump overhaul facility.

NOTE: The filter inspection results can be used as an aid to find the condition of the pump. A pump with an unsatisfactory bearing can pass the functional test and be returned to service with no fault found. Giving the filter inspection data to the overhaul facility can prevent the return of an unsatisfactory pump to service.

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CAUTION: FLUSH THE HYDRAULIC LINES TO REMOVE UNWANTED METAL CONTAMINATION. IF THE LINES ARE NOT FLUSHED, THEN THE REMAINING METAL CONTAMINATION CAN BE FOUND AT THE NEXT FILTER CHANGE. IF A LARGE QUANTITY OF METAL CONTAMINATION STAYS IN THE LINES, THEN THE FILTER CAN BECOME BLOCKED. A CONTAMINATED FILTER CAN CAUSE AN UNWANTED REMOVAL OF A SATISFACTORY PUMP. A BLOCKED FILTER CAN CAUSE A PUMP TO FAIL.

(d) If a pump is removed because metal contamination is found in the filter, then flush the hydraulic lines and replace the related filter elements (AMM 29-11-00/201).

G. Remove the Differential Pressure Indicators (Fig. 401)

S 024-028

(1) Remove the differential pressure indicator from the filter module.

S 034-029

(2) Install a cap on the opening in the filter module.

H. Remove the Pressure Switches (Fig. 401)

S 034-030

(1) Disconnect the electrical connector from the switch.

S 024-115

WARNING: BEFORE YOU DISCONNECT THE PRESSURE SWITCH, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

(2) Remove the switch from the filter module.

S 034-032

(3) Install a cap on the opening in the filter module.

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I. Remove the Check Valves (Fig. 401)

S 024-116

WARNING: BEFORE YOU DISCONNECT THE CHECK VALVE, MAKE SURE YOU BLEED ALL HYDRAULIC PRESSURE LINES COMPLETELY. USE CONTAINERS AS REQUIRED TO CAPTURE RESIDUAL HYDRAULIC FLUID REMAINING IN THE UNIT.

(1) Remove the check valve from the filter module.

S 034-034

(2) Install a cap on the opening in the filter module.

TASK 29-11-19-404-035

3. Install the Filter Module and Components for the Pressure and the Case Drain of the Alternating Current Motor Pump in the Center System

A. General

(1) This task contains the procedures to install the components which follow:

- (a) Filter module for the pressure and the case drain of the alternating current motor pump (ACMP), referred to in this procedure as the filter module
- (b) Filter elements
- (c) Differential pressure indicators
- (d) Pressure switches
- (e) Check valves.

(2) To start one of these procedures, do the applicable 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. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems

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- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

D. Access

- (1) Location Zone
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

E. Install the Filter Module (Fig. 401)

S 164-036

- (1) Clean the surfaces of the filter module which touch the bracket that holds the filter module.

S 434-072

- (2) FILTER MODULES WITH A CHECK VALVE INSTALLED IN THE PRESSURE INLET PORT;

Do these steps:

- (a) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the check valve.
- (b) Install the check valve and the new O-ring in the pressure inlet port of the filter module.
- (c) Tighten the check valve to 265-295 pound-inches.

S 644-053

- (3) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.

S 434-073

- (4) Install the unions and the new O-rings in the ports of the filter module.

S 424-074

- (5) Put the filter module and the bonding jumper in their positions.

S 424-075

- (6) Install the bolts and washers which hold the filter module and the bonding jumper in their positions.

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- S 434-076
- (7) Remove the caps from the hydraulic lines.
- S 434-077
- (8) Connect the hydraulic lines to the filter module.
- S 434-078
- (9) Connect the electrical connectors to the pressure switches on the filter module.
- F. Install the Filter Elements (Fig. 401)
- S 164-079
- (1) Clean the filter element case
- S 644-080
- (2) Apply hydraulic lubricant or hydraulic fluid to the new O-rings, the backup rings, and the threads of the filter case.
- S 434-081
- (3) Install the new O-rings and the backup rings on the filter case.
- S 424-082
- (4) Install the filter element and the filter case on the filter module.
- S 434-083
- (5) Tighten the filter case by hand.
- S 434-084
- (6) Safety the filter case with a lockwire.
- G. Install the Differential Pressure Indicators (Fig. 401)
- S 644-085
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the differential pressure indicator.
- S 434-086
- (2) Install the new O-rings on the differential pressure indicator.
- S 434-087
- (3) Remove the cap from the opening in the filter module.
- S 424-088
- (4) Install the differential pressure indicator on the filter module.
- S 434-089
- (5) Tighten the differential pressure indicator to 200-250 pound-inches.
- S 434-090
- (6) Safety the differential pressure indicator with a lockwire.

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H. Install the Pressure Switches (Fig. 401)

S 644-091

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the pressure switch.

S 434-092

- (2) Install a new O-ring on the pressure switch.

S 434-093

- (3) Remove the cap from the opening in the filter module.

S 424-094

- (4) Install the pressure switch on the filter module.

S 434-095

- (5) Tighten the pressure switch to 90-125 pound-inches.

S 434-096

- (6) Safety the pressure switch with a lockwire.

S 434-097

- (7) Install the electrical connector on the pressure switch.

I. Install the Check Valves (Fig. 401)

S 644-098

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings, the backup rings, and the threads of the check valve.

S 434-099

- (2) Install new O-rings on check valve.

S 434-100

- (3) Remove the cap from the opening in the filter module.

S 424-101

- (4) Install the check valve on the filter module.

S 434-102

- (5) Tighten the check valve to 710-760 pound-inches.

S 434-103

- (6) Safety the check valve with a lockwire.

J. Put the Airplane Back to Its Usual Condition

S 864-104

- (1) Push the indicator button, on the differential pressure indicator, until it aligns with the adjacent surface.

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S 864-105

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K24, HYDRAULICS ELEC PUMP C2

S 864-106

- (3) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 794-107

- (4) Make sure there are no leaks at the filter module.

S 864-108

- (5) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 114-109

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (6) Clean all the hydraulic fluid from the installation area (AMM 12-25-01/301).

S 614-110

- (7) Fill the reservoir in the center hydraulic system (AMM 12-12-01/301).

S 414-111

- (8) Close the access door, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

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LEFT AND RIGHT HYDRAULIC SYSTEM RESERVOIRS – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the reservoir in the left and right hydraulic systems. The other task installs the reservoir.

TASK 29-11-20-004-001

2. Remove the Reservoir in the Left and Right Hydraulic Systems

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 29-11-22/401, Reservoir Drain Valve
- (3) AMM 29-11-23/401, Reservoir Sampling Valve
- (4) AMM 29-11-24/401, Reservoir Pressure Relief Valve
- (5) AMM 29-11-25/401, Reservoir Manual Depressurization Valve
- (6) AMM 29-32-03/401, Reservoir Temperature Transmitter
- (7) AMM 29-33-01/401, Hydraulic Fluid Quantity Transmitter
- (8) AMM 29-35-01/401, Hydraulic Reservoir Pressure Switch
- (9) AMM 32-00-15/201, Main Gear Door Locks
- (10) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zones
143/144 MLG Wheel Well

C. Prepare for the Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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).

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- S 864-004
- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT
 - (e) EICAS (6 locations)
- S 864-005
- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).
- D. Remove the Reservoir (Fig. 401)
- S 684-006
- (1) Open the drain valve on the reservoir.
- S 684-007
- (2) Drain the fluid from the reservoir into a container.
- S 684-008
- (3) Close the drain valve after the fluid drains from the reservoir.
- S 034-009
- (4) Disconnect the hydraulic supply lines and the hydraulic return lines from the reservoir.
- S 034-010
- (5) Disconnect the tube from the pressure relief valve.
- S 034-011
- (6) Disconnect the reservoir pressurization line.
- S 034-012
- (7) Install caps on the hydraulic lines and on the openings on the reservoir.
- S 034-013
- (8) Disconnect the electrical connectors from these components:
- (a) Fluid quantity transmitter
 - (b) Pressure switch
 - (c) Temperature transmitter.
- S 024-014
- (9) Hold the reservoir while you remove the parts which hold the reservoir.
- S 024-015
- (10) Remove the bolt (1) which connects the support rod to the reservoir.

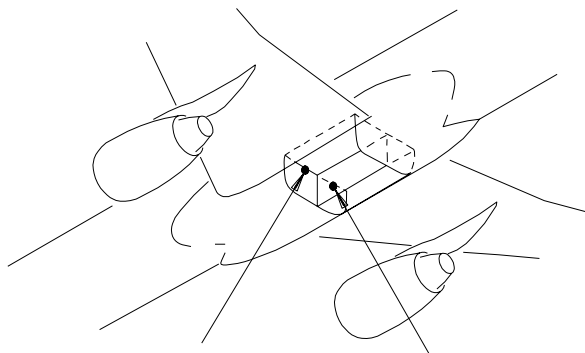
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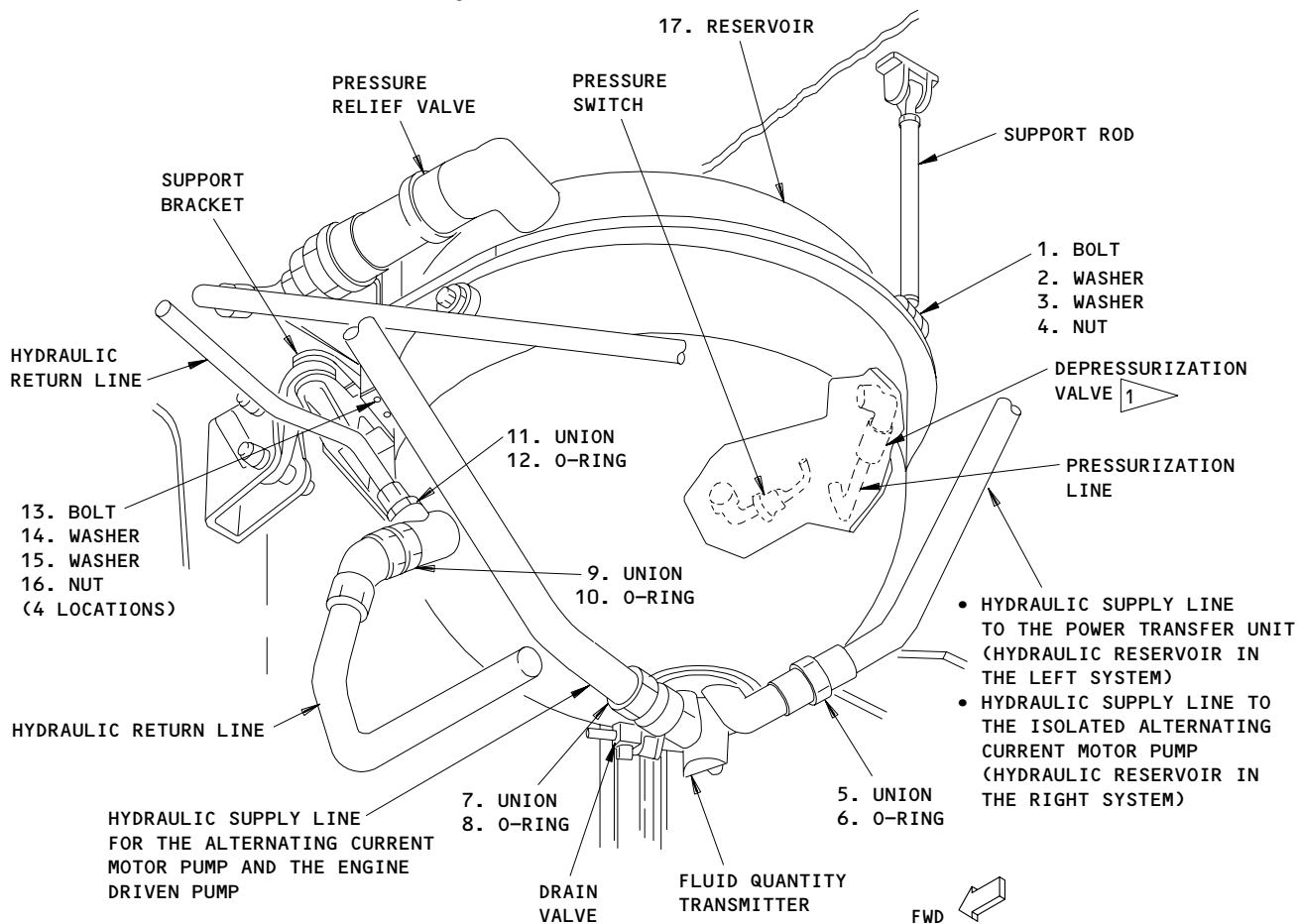


HYDRAULIC RESERVOIR
IN THE LEFT SYSTEM

SEE (A)

HYDRAULIC RESERVOIR
IN THE RIGHT SYSTEM

SEE (A)



HYDRAULIC RESERVOIR IN THE LEFT SYSTEM
(THE HYDRAULIC RESERVOIR IN THE RIGHT SYSTEM IS ALMOST THE SAME)

1 ▷ HYDRAULIC RESEVOIRS WITH A
DEPRESSURIZATION VALVE.

(A)

Hydraulic Reservoir Installation
Figure 401

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- S 024-016
(11) Remove the bolts (13) which connect the support bracket to the reservoir.
- S 024-017
(12) Remove the reservoir (17).
- S 034-018
(13) Remove the union (5) or the check valve (5) from the reservoir.
- S 034-019
(14) Remove the unions (7, 9, 11) from the reservoir (17).
- S 024-060
(15) If the hydraulic reservoir has a depressurization valve installed, do this step:
(a) Remove the depressurization valve from the reservoir (17) (AMM 29-11-25/401).
- S 034-021
(16) Remove the drain valve from the reservoir (17) (AMM 29-11-22/401).
- S 034-022
(17) Remove the pressure relief valve from the reservoir (17) (AMM 29-11-24/401).
- S 034-023
(18) Remove the sampling valve from the reservoir (17) (AMM 29-11-23/401).
- S 034-024
(19) Remove the fluid quantity transmitter from the reservoir (17) (AMM 29-33-01/401).
- S 034-025
(20) Remove the pressure switch from the reservoir (17) (AMM 29-35-01/401).
- S 034-026
(21) Remove the temperature transmitter from the reservoir (17) (AMM 29-32-03/401).

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TASK 29-11-20-404-027

3. Install the Reservoir in the Left and Right Hydraulic System

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

(2) C00308 Corrosion Preventative Compound -
MIL-C-11796

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-20	04	5
	2	Washer			10
	3	Washer			15
	4	Nut			20
	5	Check Valve			73
	6	Packing			76
	7	Union			235
	8	Packing			240
	9	Union			225
	10	Packing			230
	11	Union			232
	12	Packing			233
	13	Bolt			45
	14	Washer			48
	15	Washer			50
	16	Nut			52
	17	Reservoir			40

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MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-20	05	5
	2	Washer			10
	3	Washer			15
	4	Nut			20
	5	Union			205
	6	Packing			210
	7	Union			195
	8	Packing			200
	9	Union			185
	10	Packing			190
	11	Union			192
	12	Packing			193
	13	Bolt			45
	14	Washer			50
	15	Washer			55
	16	Nut			60
	17	Reservoir			40

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 29-11-22/401, Reservoir Drain Valve
- (5) AMM 29-11-23/401, Reservoir Sampling Valve
- (6) AMM 29-11-24/401, Reservoir Pressure Relief Valve
- (7) AMM 29-11-25/401, Reservoir Manual Depressurization Valve
- (8) AMM 29-32-03/401, Reservoir Temperature Transmitter
- (9) AMM 29-33-01/401, Hydraulic Fluid Quantity Transmitter
- (10) AMM 29-35-01/401, Hydraulic Reservoir Pressure Switch
- (11) AMM 32-00-15/201, Main Gear Door Locks

D. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well

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E. Prepare for the Installation

S 414-061

- (1) If the hydraulic reservoir has a depressurization valve installed, do this step:
(a) Install the depressurization valve on the reservoir (17) (AMM 29-11-25/401).

S 434-029

- (2) Install the drain valve on the reservoir (17) (AMM 29-11-22/401).

S 434-030

- (3) Install the pressure relief valve on the reservoir (17) (AMM 29-11-24/401).

S 434-031

- (4) Install the sampling valve on the reservoir (17) (AMM 29-11-23/401).

S 434-032

- (5) Install the fluid quantity transmitter on the reservoir (17) (AMM 29-33-01/401).

S 434-033

- (6) Install the pressure switch on the reservoir (17) (AMM 29-35-01/401).

S 434-034

- (7) Install temperature transmitter on the reservoir (17) (AMM 29-32-03/401).

F. Install the Reservoir (Fig. 401)

S 644-035

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings (6, 8, 10, 12) and the threads of the unions (5, 7, 9, 11).

S 434-036

- (2) Install the new O-rings (6, 8, 10, 12) on the unions (5, 7, 9, 11).

S 434-037

- (3) Install the unions (5, 7, 9, 11) in the ports of the reservoir (17).

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- S 144-038
- (4) Clean the surfaces of the reservoir (17) to make a good electrical bond.
- S 624-039
- (5) Apply corrosion preventive compound to the holes for the bolts in the reservoir.
- S 424-040
- (6) Hold the reservoir (17) on the support bracket.
- S 424-041
- (7) Install the bolts (13), the washers (14, 15) and the nuts (16).
- S 434-042
- (8) Tighten the bolts (13) to 90-125 pound-inches.
- S 424-043
- (9) Install the bolt (1), the washers (2, 3) and the nut (4) to connect the support rod to the reservoir (17).
- S 434-044
- (10) Tighten the bolt (1) to 160-240 pound-inches.
- S 434-045
- (11) Connect the electrical connectors to these components:
(a) Fluid quantity transmitter
(b) Pressure switch
(c) Temperature transmitter.
- S 434-058
- (12) Remove the caps from the hydraulic lines and the openings in the reservoir.
- S 434-046
- (13) Connect the hydraulic supply lines and the hydraulic return lines to the reservoir (17).
- S 434-047
- (14) Connect the tube to the pressure relief valve.

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S 434-048

(15) Connect the reservoir pressurization line to the reservoir (17).

S 864-049

(16) Close the drain valve on the reservoir (17).

S 434-050

(17) Safety the drain valve with a lockwire.

S 614-051

(18) Fill the reservoir (17) (AMM 12-12-01/301).

S 864-052

(19) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:

(a) 11K16, HYDRAULICS ELEC PUMP RIGHT

(b) 11K20, HYDRAULICS QTY LEFT

(c) 11K21, HYDRAULICS QTY RIGHT

(d) 11K25, HYDRAULICS ELEC PUMP LEFT

(e) EICAS (6 locations)

S 864-053

(20) Pressurize the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

S 794-054

(21) Make sure there is no leakage at the connections to the reservoir (17).

S 114-055

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(22) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 094-056

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.

(23) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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S 864-057
(24) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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CENTER SYSTEM HYDRAULIC RESERVOIR – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the reservoir in the center hydraulic system. The other task installs the reservoir.

TASK 29-11-21-004-001

2. Remove the Reservoir in the Center Hydraulic System

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-11-22/401, Reservoir Drain Valve
- (4) AMM 29-11-23/401, Reservoir Sampling Valve
- (5) AMM 29-11-24/401, Reservoir Pressure Relief Valve
- (6) AMM 29-11-25/401, Reservoir Manual Depressurization Valve
- (7) AMM 29-32-03/401, Reservoir Temperature Transmitter
- (8) AMM 29-33-01/401, Hydraulic System Fluid Quantity Transmitter
- (9) AMM 29-35-01/401, Hydraulic Reservoir Pressure Switch

B. Access

- (1) Location Zone
197 Wing to Body – Lower Half (Left)
- (2) Access Panels
197KL Central Hydraulic Service Center

C. Prepare for the Removal

S 014-002

- (1) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 864-003

- (2) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-004

- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K19, HYDRAULICS QTY CTR
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) EICAS (6 locations)

D. Remove the Reservoir (Fig. 401)

S 684-005

- (1) Open the drain valve on the reservoir.

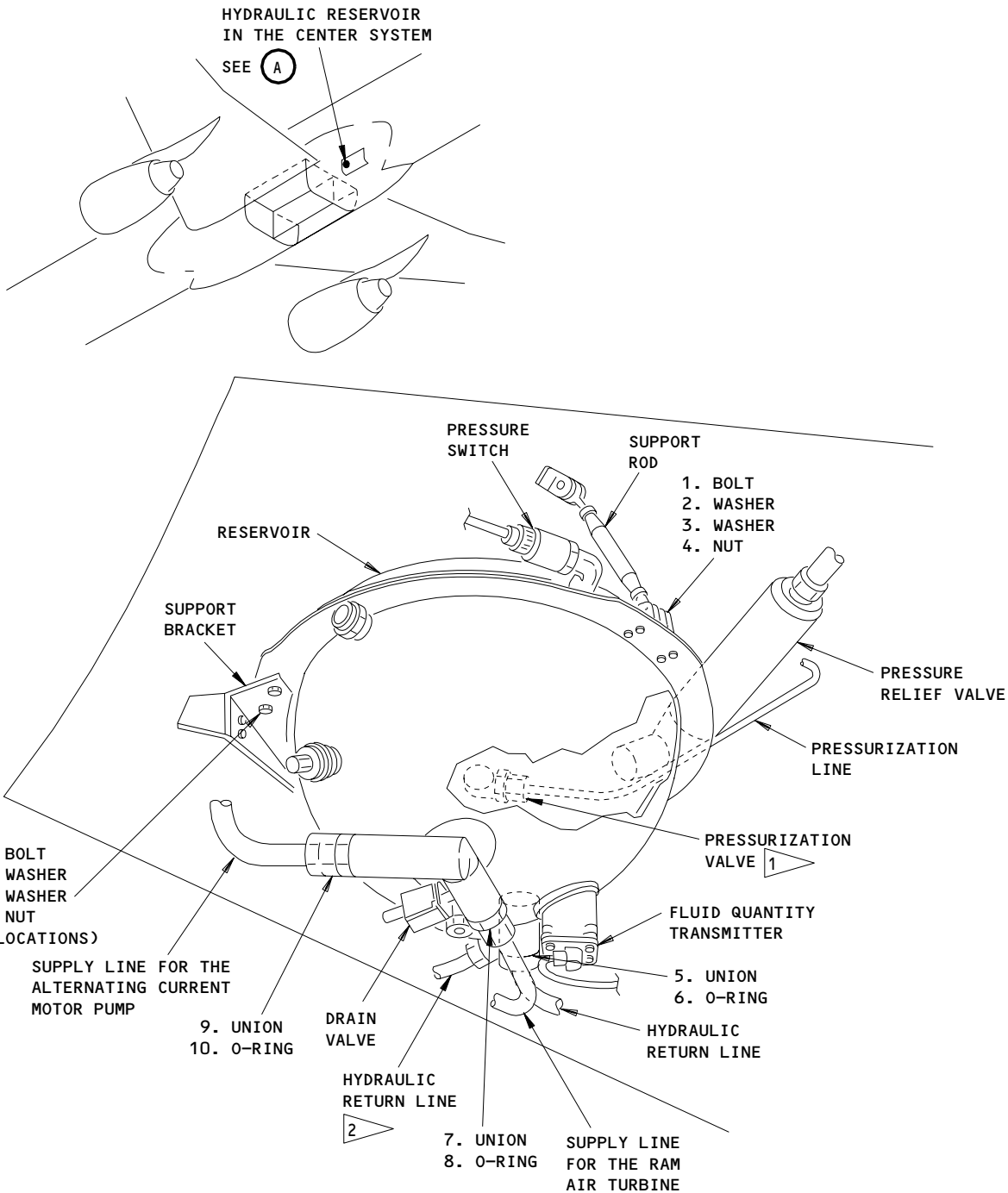
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HYDRAULIC RESERVOIR IN THE CENTER SYSTEM

(A)

- 1 ▷ HYDRAULIC RESEVOIRS WITH A DEPRESSURIZATION VALVE.
- 2 ▷ HYDRAULIC RESEVOIRS WITH TWO HYDRAULIC RETURN LINES.

Hydraulic Reservoir Installation
Figure 401

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- S 684-006
(2) Drain the fluid from the reservoir into a container.
- S 684-007
(3) Close the drain valve after the fluid drains from the reservoir.
- S 034-008
(4) Disconnect the hydraulic supply lines and the hydraulic return lines from the reservoir.
- S 034-009
(5) Install caps on the hydraulic lines and the openings in the reservoir.
- S 034-010
(6) Disconnect the tube from the pressure relief valve.
- S 034-011
(7) Disconnect the reservoir pressurization line.
- S 034-012
(8) Disconnect the electrical connectors from these components:
(a) Fluid quantity transmitter
(b) Pressure switch
(c) Temperature transmitter.
- S 024-013
(9) Hold the reservoir while you remove the parts which hold the reservoir.
- S 024-014
(10) Remove the bolt (1) which connects the support rod to the reservoir.
- S 024-015
(11) Remove the bolts (13) which connect the support bracket to the reservoir.
- S 024-016
(12) Remove the reservoir.
- S 034-017
(13) Remove the unions (5, 7, 9) from the reservoir.

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S 034-055

- (14) If the hydraulic reservoir has a depressurization valve installed, do this step:
(a) Remove the manual depressurization valve from the reservoir (AMM 29-11-25/401).

S 034-019

- (15) Remove the pressure relief valve from the reservoir (AMM 29-11-24/401).

S 034-020

- (16) Remove the drain valve from the reservoir (AMM 29-11-22/401).

S 034-021

- (17) Remove the sampling valve from the reservoir (AMM 29-11-23/401).

S 034-022

- (18) Remove the fluid quantity transmitter from the reservoir (AMM 29-33-01/401).

S 034-023

- (19) Remove the pressure switch from the reservoir (AMM 29-35-01/401).

S 034-024

- (20) Remove the temperature transmitter from the reservoir (AMM 29-32-03/401).

TASK 29-11-21-404-025

3. Install the Reservoir in the Center Hydraulic System

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B
(2) C00308 Corrosion Preventative Compound -
MIL-C-11796, Class 1

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B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-22	05	5
	2	Washer			10
	3	Washer			15
	4	Nut			20
	5	Union			175
	6	Packing			180
	7	Union			210
	8	Packing			215
	9	Reducer			200
	10	Packing			205
	11	Bolt			40
	12	Washer			45
	13	Washer			50
	14	Nut			55
	15	Reservoir			35

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (5) AMM 29-11-22/401, Reservoir Drain Valve
- (6) AMM 29-11-23/401, Reservoir Sampling Valve
- (7) AMM 29-11-24/401, Reservoir Pressure Relief Valve
- (8) AMM 29-11-25/401, Reservoir Manual Depressurization Valve
- (9) AMM 29-32-03/401, Reservoir Temperature Transmitter
- (10) AMM 29-33-01/401, Hydraulic System Fluid Quantity Transmitter
- (11) AMM 29-35-01/401, Hydraulic Reservoir Pressure Switch

D. Access

- (1) Location Zone
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

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E. Prepare for the Installation

S 434-056

- (1) If the hydraulic reservoir has a depressurization valve installed, do this step:
 - (a) Install the reservoir depressurization valve on the reservoir (AMM 29-11-25/401).

S 434-027

- (2) Install the pressure relief valve on the reservoir (AMM 29-11-24/401).

S 434-028

- (3) Install the drain valve on the reservoir (AMM 29-11-22/401).

S 434-029

- (4) Install the sampling valve on the reservoir (AMM 29-11-23/401).

S 434-030

- (5) Install the fluid quantity transmitter on the reservoir (AMM 29-33-01/401).

S 434-031

- (6) Install the pressure switch on the reservoir (AMM 29-35-01/401).

S 434-032

- (7) Install the temperature transmitter on the reservoir (AMM 29-32-03/401).

S 644-033

- (8) Apply hydraulic lubricant or hydraulic fluid to the O-rings (6, 8, 10) and the threads of the unions.

S 434-034

- (9) Install the new O-rings (6, 8, 10) on the unions (5, 7, 9).

S 434-035

- (10) Install the unions (5, 7, 9) in the ports on the reservoir.

F. Install the Reservoir (Fig. 401)

S 144-036

- (1) Clean the surfaces of the reservoir to make a good electrical bond.

S 624-037

- (2) Apply corrosion preventative compound to the holes for the bolts in the reservoir.

S 424-038

- (3) Hold the reservoir on the support bracket.

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- S 424-039
- (4) Install the bolts (11), the washers (12, 13) and the nuts (14).
- S 434-040
- (5) Tighten the bolts (11) to 65-100 pound-inches.
- S 424-041
- (6) Install the bolt (1), the washers (2, 3) and the nut (4) to connect the support rod to the reservoir.
- S 434-042
- (7) Tighten the bolt (1) to 130-200 pound-inches.
- S 434-043
- (8) Connect the electrical connectors to these components:
- (a) Fluid quantity transmitter
 - (b) Pressure switch
 - (c) Temperature switch.
- S 434-044
- (9) Remove the caps from the hydraulic lines and the openings in the reservoir.
- S 434-045
- (10) Connect the tube to the pressure relief valve.
- S 434-046
- (11) Connect the reservoir pressurization line to the reservoir.
- S 864-047
- (12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K19, HYDRAULICS QTY CTR
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) EICAS (6 locations)
- S 114-048
- CAUTION:** QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (13) Clean all hydraulic fluid from the area of the reservoir
(AMM 12-25-01/301).
- S 614-049
- (14) Fill the reservoir in the center hydraulic system
(AMM 12-12-01/301).

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- S 864-050
- (15) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).
- S 794-051
- (16) Make sure there are no leaks at the reservoir.
- S 414-052
- (17) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 864-053
- (18) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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RESERVOIR DRAIN VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the drain valve on the reservoirs in the left, right, or center hydraulic systems. The other task installs the drain valve.

TASK 29-11-22-004-001

2. Remove the Drain Valve (Fig. 401)

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
- (3) AMM 32-00-15/201, Landing Gear Door Locks
- (4) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body – Lower Half (Left)

- (2) Access Panels
 - 197KL Central Hydraulic Service Center

C. Prepare for the Removal

S 494-002

- (1) For the left or right hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) For the left or right hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 014-004

- (3) For the center hydraulic system, open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 864-005

- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

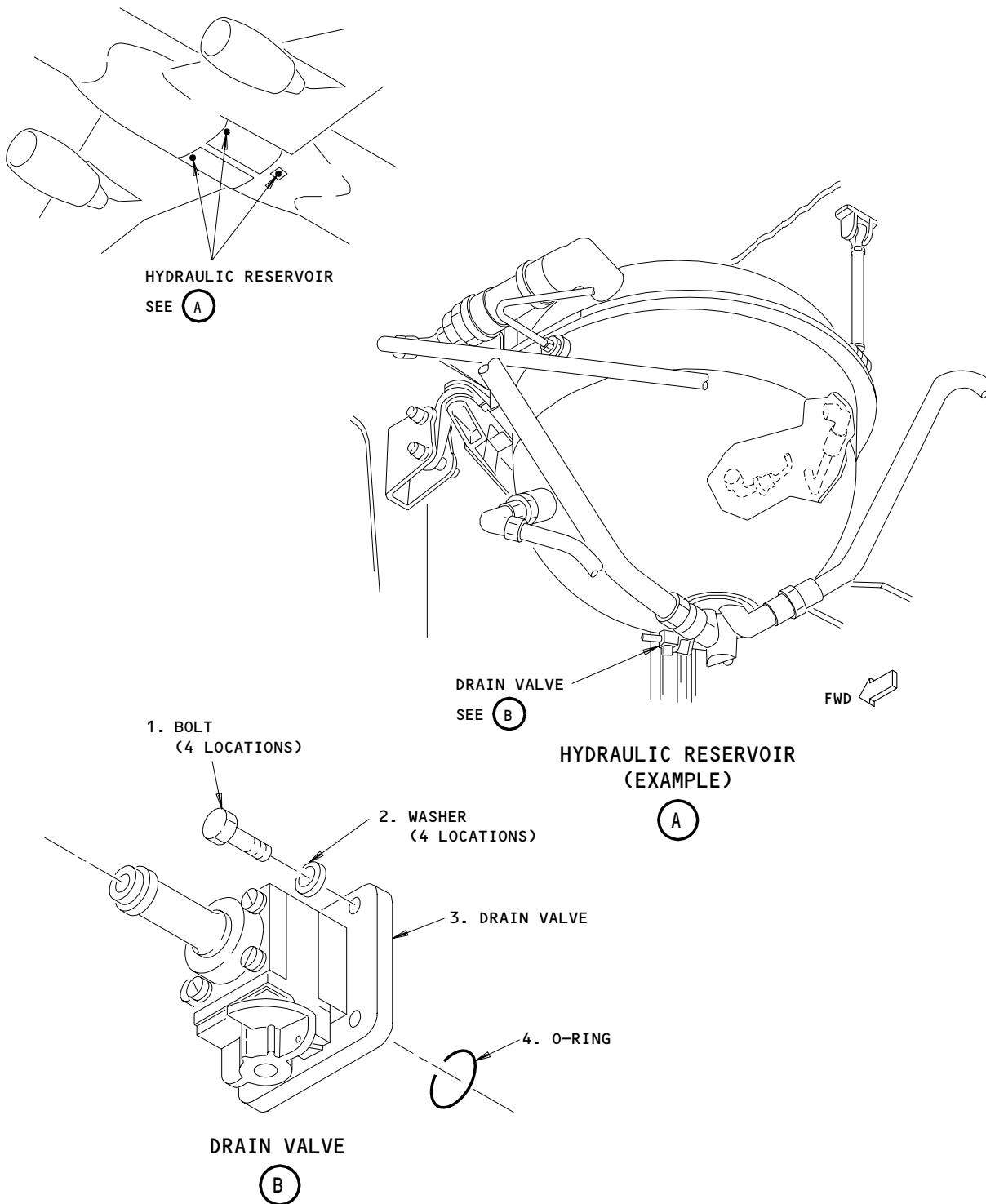
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Drain Valve Installation
Figure 401

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S 864-006

- (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT

S 684-007

- (6) Open the drain valve (3) on the reservoir.

S 684-008

- (7) Drain the hydraulic fluid from the reservoir into a container.

D. Remove the Drain Valve

S 024-009

- (1) Remove the bolts (1) from the drain valve (3).

S 024-010

- (2) Remove the drain valve (3).

S 034-011

- (3) Remove the O-ring (4) from the drain valve (3).

S 034-012

- (4) Install a cap on the opening in the reservoir.

TASK 29-11-22-404-013

3. Install the Drain Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

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B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-20	04	121
					215
	2	Washer	29-11-22	05	99
			29-11-20	04	124
					220
	3	Drain Valve	29-11-22	05	101
			29-11-20	04	118
					225
	4	Packing	29-11-22	05	103
			29-11-20	04	127
					230
				29-11-22	05

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic System
- (5) AMM 32-00-15/201, Landing Gear Door Locks

D. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

E. Install the Drain Valve

- S 644-014
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring (4).
- S 434-015
- (2) Install the new O-ring (4) on the drain valve (3).
- S 434-016
- (3) Remove the cap from the opening in the reservoir.
- S 424-017
- (4) Put the drain valve (3) and the O-ring (4) on the reservoir.
- S 424-018
- (5) Install the bolts (1) and washers (2).

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- S 434-019
- (6) Tighten the bolts (1) to 25-30 pound-inches.
- S 864-020
- (7) Close the drain valve (3).
- S 434-021
- (8) Safety the drain valve (3) with a lockwire.
- S 614-022
- (9) Fill the hydraulic reservoir (AMM 12-12-01/301).
- S 864-023
- (10) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 864-024
- (11) Pressurize the hydraulic reservoir (AMM 29-11-00/201).
- S 794-025
- (12) Make sure there are no leaks at the drain valve (3).

S 114-026

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (13) Clean all hydraulic fluid from the installation area (Ref 12-25-01).

S 414-027

- (14) For the center hydraulic system, close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 494-028

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.

- (15) For the left or right hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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RESERVOIR SAMPLING VALVE – REMOVAL/INSTALLATION

1. General

- A. This task has two tasks. One task removes the sampling valve on the reservoir in the left, right, or center hydraulic systems. The other task installs the sampling valve.

TASK 29-11-23-004-001

2. Remove the Sampling Valve (Fig. 401)

A. References

- (1) AMM 06-41-00/201, Fuselage 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 Downlocks

B. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body – Lower Half (Left)

- (2) Access Panels

- 197KL Central Hydraulic Service Center

C. Prepare for the Removal

S 494-002

- (1) For the left or right hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) For the left or right hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

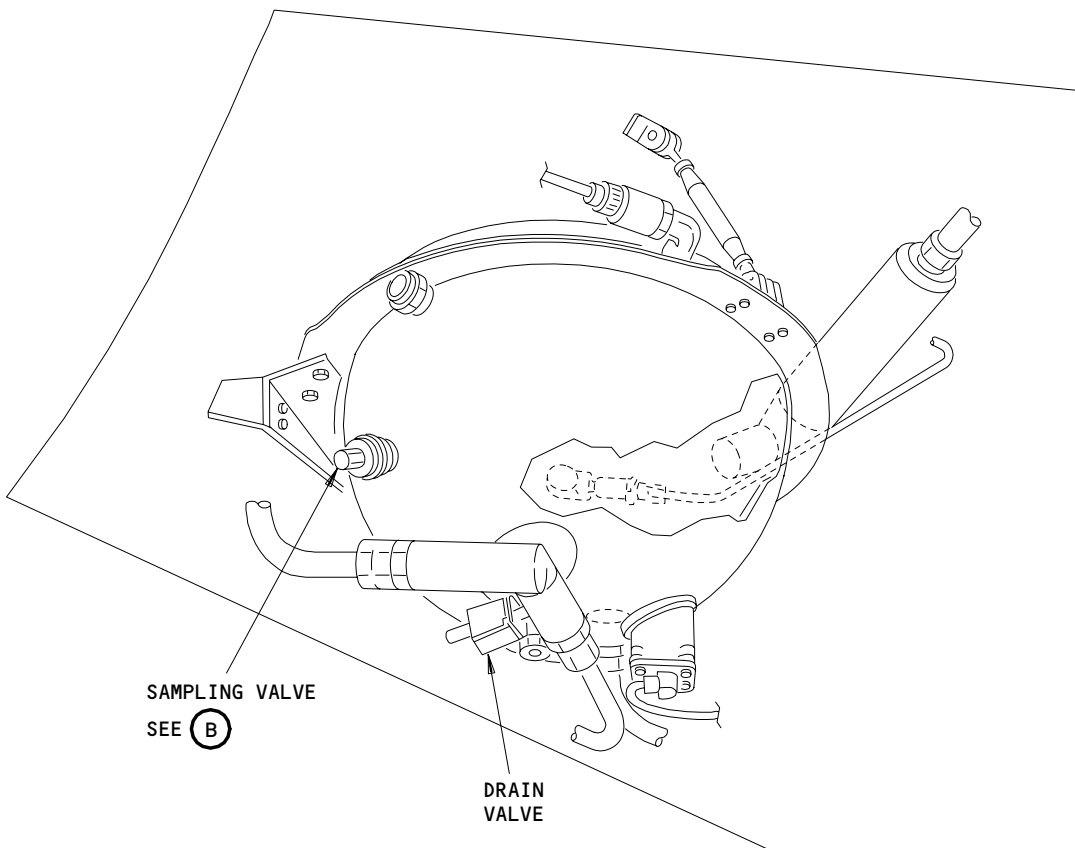
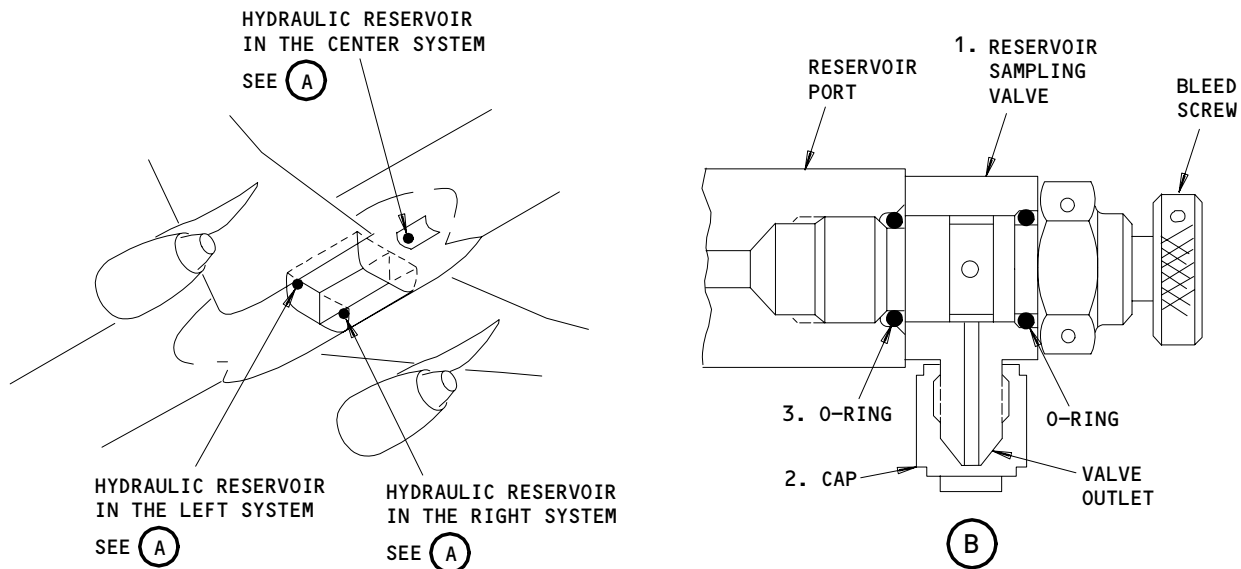
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HYDRAULIC RESERVOIR IN THE CENTER SYSTEM SHOWN
(THE HYDRAULIC RESERVOIRS IN THE LEFT AND RIGHT SYSTEMS ARE ALMOST THE SAME)

(A)

Reservoir Sampling Valve Installation
Figure 401

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- S 014-004
- (3) For the center hydraulic system, open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

- S 864-005
- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

- S 864-006
- (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT
- D. Remove the Sampling Valve
 - S 684-007
 - (1) Open the drain valve on the reservoir.

 - S 684-008
 - (2) Drain the hydraulic fluid from the reservoir into a container.

 - S 684-009
 - (3) Close the drain valve after the hydraulic fluid drains from the reservoir.

 - S 434-010
 - (4) Safety the drain valve with a lockwire.

 - S 024-011
 - (5) Remove the sampling valve (1) from the reservoir.

 - S 034-012
 - (6) Remove the O-ring (3) from the sampling valve (1).

 - S 434-013
 - (7) Install a cap on the opening in the reservoir.

TASK 29-11-23-404-014

3. Install the Sampling Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

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B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Sampling Valve	29-11-20	04	54
				05	70
	2	Cap	29-11-22	05	112
			29-11-20	04	55
				05	71
	3	Packing	29-11-22	05	115
			29-11-20	04	58
				05	72
			29-11-22	05	118

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (5) AMM 32-00-15/201, Landing Gear Door Locks

D. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

E. Install the Sampling Valve

- S 644-015
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring (3) and the threads of the sampling valve (1).
- S 434-016
- (2) Install the new O-ring on the sampling valve (1).

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- S 434-017
(3) Remove the cap from the opening in the reservoir.
- S 424-018
(4) Install the sampling valve (1) on the reservoir.
- S 434-019
(5) Tighten the bleed screw on the sampling valve (1) by hand.
- S 434-020
(6) Safety the bleed screw, on the sampling valve (1), with a lockwire.
- S 434-021
(7) Install the cap (2) on the sampling valve (1).
- S 614-022
(8) Fill the hydraulic reservoir (AMM 12-12-01/301).
- S 864-023
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11K15, HYDRAULICS ELEC PUMP C1
(b) 11K16, HYDRAULICS ELEC PUMP RIGHT
(c) 11K24, HYDRAULICS ELEC PUMP C2
(d) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 864-024
(10) Pressurize the hydraulic reservoir (AMM 29-11-00/201).
- S 794-025
(11) Make sure there are no leaks at the sampling valve (1).
- S 114-026

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (12) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

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S 414-027

- (13) For the center hydraulic system,
close the access panel, 197KL, for the central hydraulic service
center (AMM 06-41-00/201).

S 094-028

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.

- (14) For the left or right hydraulic system,
remove the door locks from the landing gear doors and close the
doors (AMM 32-00-15/201).

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RESERVOIR PRESSURE RELIEF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the pressure relief valve on the reservoir in the left, right, or center hydraulic system. The other task installs the pressure relief valve.

TASK 29-11-24-004-001

2. Remove the Pressure Relief Valve (Fig. 401)

A. References

- (1) AMM 06-41-00/201, Fuselage 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 Downlocks

B. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well
 - 197 Wing to Body – Lower Half (Left)
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

C. Procedure

S 494-002

- (1) For the left or right hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) For the left or right hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

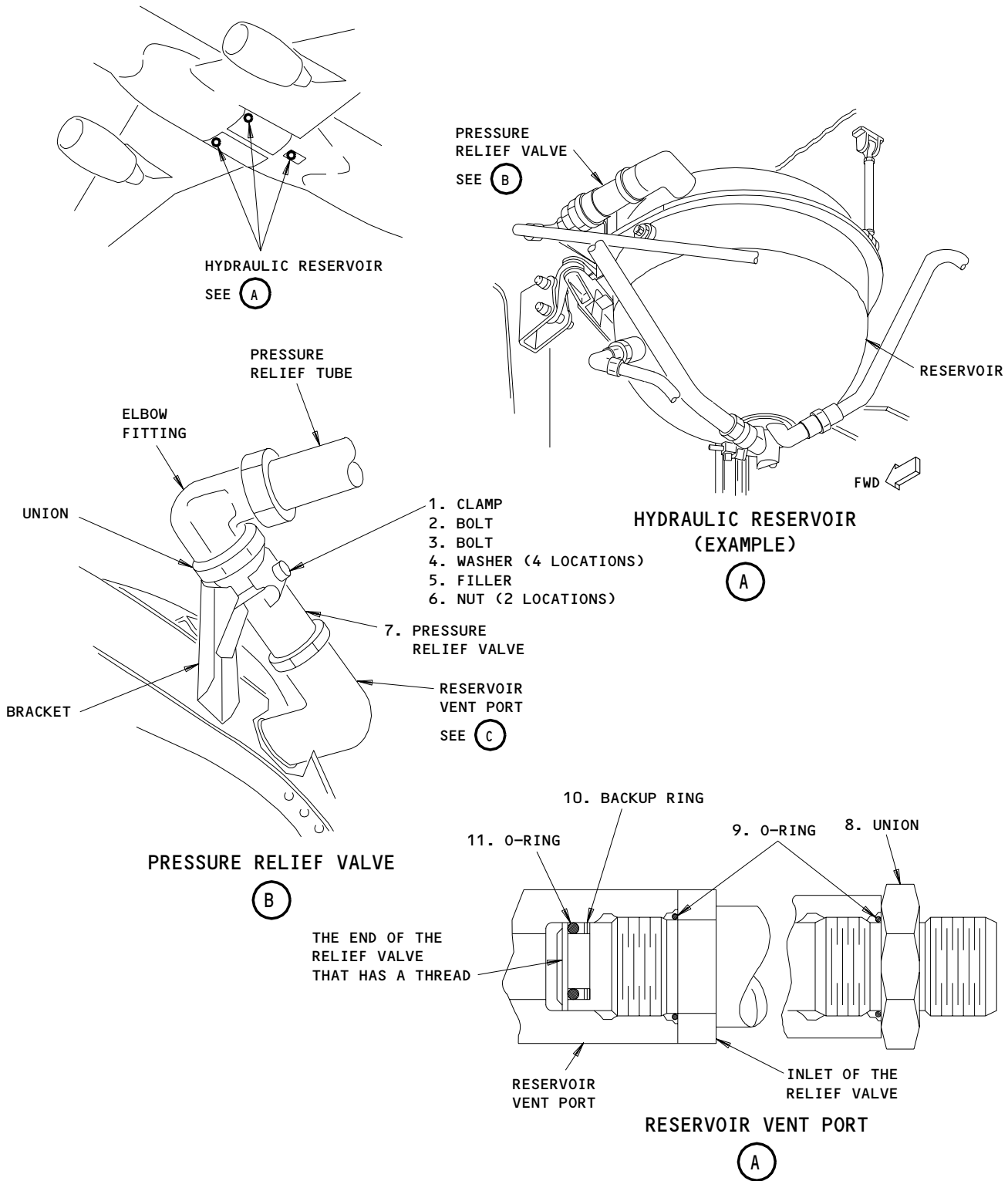
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Pressure Relief Valve Installation
Figure 401

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- S 414-004
- (3) For the center hydraulic system, open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 864-005
- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).
- S 864-006
- (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT
- S 034-007
- (6) Disconnect the pressure relief tube from the pressure relief valve (7) .
- S 034-008
- (7) Install a cap on the pressure relief tube.
- S 024-009
- (8) Remove the clamp (1) which attaches the relief valve to the bracket.
- S 024-010
- (9) Remove the pressure relief valve (7) from the reservoir.
- S 034-011
- (10) Remove the O-rings (9, 11) and the backup ring (10) from the pressure relief valve (7).
- S 034-012
- (11) Install a cap on the opening on the reservoir.
- S 034-013
- (12) Remove the union (8) from the outlet port of the pressure relief valve (7).

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S 034-014

(13) Remove the O-ring (9) from the union (8).

TASK 29-11-24-404-015

3. Install the Reservoir Pressure Relief Valve (Fig. 401)

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Clamp	29-11-20	04	100
				05	120
	2	Bolt	29-11-22	05	89
				29-11-20	04
			05		85
			29-11-22	05	79
	3	Bolt	29-11-20	04	88
				05	90
			29-11-22	05	81
	4	Washer	29-11-20	04	91
				05	95
		29-11-22	05	83	
5	Filler	29-11-20	04	97	
			05	105	
		29-11-22	05	87	
6	Nut	29-11-20	04	94	
			05	100	
		29-11-22	05	85	
7	Relief Valve	29-11-20	04	104	
			05	125	
		29-11-22	05	91	
8	Reducer	29-11-20	04	115	
			05	110	
		29-11-22	05	75	
9	Packing	29-11-20	01	195	
10	Ring	29-11-20	01	205	
11	Packing	29-11-20	01	200	

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C. References

- (1) AMM 06-41-00/201, Fuselage 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

D. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

E. Procedure

S 644-016

- (1) Apply hydraulic lubricant or hydraulic fluid to these components:
 - (a) O-rings (9, 11)
 - (b) Backup ring (10)
 - (c) Threads of the union (8)
 - (d) Threads of the pressure relief valve (7).

S 434-017

- (2) Install the O-ring (9) on the union (8).

S 434-018

- (3) Install the union (8) in the outlet port of the pressure relief valve (7).

S 434-019

- (4) Install the O-rings (9, 11) and the backup ring (10) on the pressure relief valve (7).

S 434-020

- (5) Remove the cap from the opening on the reservoir.

S 424-021

- (6) Install the pressure relief valve (7) on the reservoir.

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S 424-022

- (7) Install these components to hold the pressure relief valve (7) in its position:
- (a) Clamp (1)
 - (b) Bolts (2, 3)
 - (c) Washers (4)
 - (d) Filler (5)
 - (e) Nuts (6).

S 434-023

- (8) Connect the pressure relief tube to the pressure relief valve (7).

S 864-024

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT

S 864-025

- (10) Pressurize the hydraulic reservoir (AMM 29-11-00/201).

S 794-026

- (11) Make sure there are no leaks of air at the pressure relief valve (7).

S 414-027

- (12) For the center hydraulic system, close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 094-028

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.

- (13) For the left or right hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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RESERVOIR DEPRESSURIZATION VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the valve which removes the pressure from the reservoir in the left, right, or center hydraulic system. The other task installs the valve.

TASK 29-11-25-004-001

2. Remove the Valve (Fig. 401)

A. References

- (1) AMM 06-41-00/201, Fuselage 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 Downlocks

B. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body – Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

C. Procedure

S 494-002

- (1) For the left or right hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) For the left or right hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 014-004

- (3) For the center hydraulic system, open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 864-005

- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

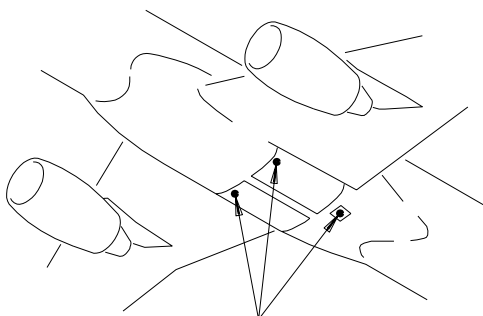
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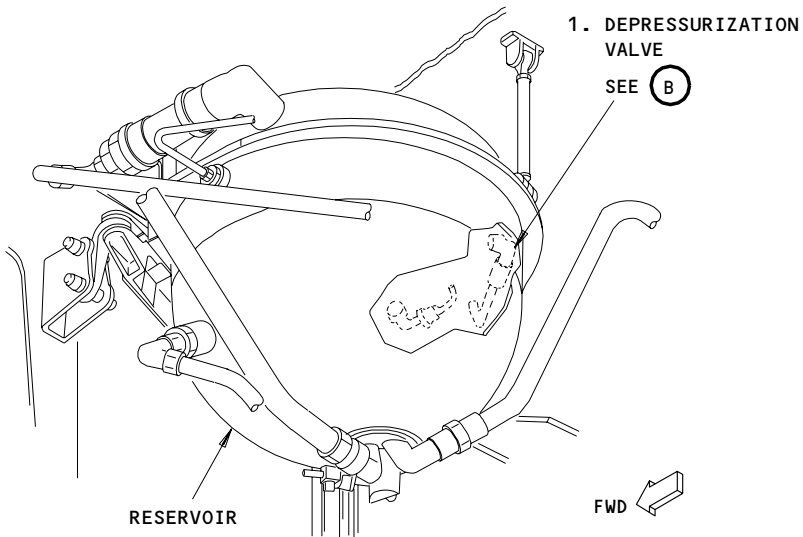
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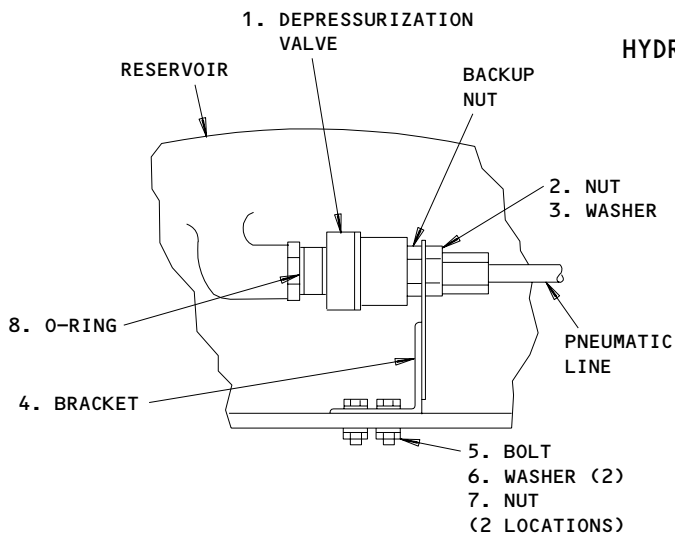
HYDRAULIC RESERVOIR
SEE (A)



1. DEPRESSURIZATION VALVE
SEE (B)

RESERVOIR

FWD



1. DEPRESSURIZATION VALVE

RESERVOIR

BACKUP NUT

HYDRAULIC RESERVOIR
(EXAMPLE)
(A)

2. NUT
3. WASHER

8. O-RING

PNEUMATIC LINE

4. BRACKET

5. BOLT
6. WASHER (2)
7. NUT
(2 LOCATIONS)

DEPRESSURIZATION VALVE
(B)

Depressurization Valve Installation
Figure 401

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- S 034-006
(5) Remove the pneumatic line from the valve (1).
- S 034-007
(6) Remove the bolts (5) from the bracket (4).
- S 024-008
(7) Remove the nut (2).
- S 034-009
(8) Remove the bracket (4) from the valve (1).
- S 024-010
(9) Remove the valve (1) from the reservoir.
- S 034-011
(10) Remove the O-ring (8) from the valve (1).
- S 034-012
(11) Install a cap on the opening on the reservoir.

TASK 29-11-25-404-013

3. Install the Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

- (1) For the left system, refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Vent Valve	29-11-20	04	175
	2	Nut			177
	3	Washer			178
	4	Bracket Assy			190,210,215
	5	Bolt			195
	6	Washer			200
	7	Nut			205
	8	Packing			185

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(2) For the right system, refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Vent Valve	29-11-20	05	235
	2	Nut			237
	3	Washer			238
	4	Bracket Assy			270,275,280
	5	Bolt			255
	6	Washer			260
	7	Nut			265
	8	Packing			240

(3) For the center system, refer to the table that follows:

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Vent Valve	29-11-22	05	160
	2	Nut			162
	3	Washer			163
	4	Bracket Assy			130,135,155
	5	Bolt			140
	6	Washer			145
	7	Nut			150
	8	Packing			165

C. References

- (1) AMM 06-41-00/201, Fuselage 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

D. Access

- (1) Location Zone
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Lower Half (Left)
- (2) Access Panels
 - 197KL Central Hydraulic Service Center

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E. Procedure

- S 434-014
(1) Remove the cap from the opening on the reservoir.
- S 644-015
(2) Apply hydraulic lubricant or hydraulic fluid to the new O-ring (8) and on the threads of the valve (1).
- S 434-016
(3) Install the new O-ring (8) on the valve (1).
- S 424-017
(4) Install the valve (1) on the reservoir.
- S 434-018
(5) Put the bracket (4) on the valve (1) and on the reservoir.
- S 434-019
(6) Install the bolts (5), the washers (6) and the nuts (7).
- S 434-020
(7) Tighten the bolts (5) to 25-30 pound-inches.
- S 424-021
(8) Install the nut (2) and the washer (3) to hold the valve (1) on the bracket (4).
- S 824-022
(9) Adjust the backup nut to align the valve (1) with the bracket (4).
- S 434-023
(10) Install the pneumatic line on the valve (1).
- S 864-024
(11) Pressurize the hydraulic reservoir (AMM 29-11-00/201).

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S 794-025

(12) Make sure there are no leaks of air at the valve (1).

S 414-026

(13) For the center hydraulic system,
close the access panel, 197KL, for the central hydraulic service
center (AMM 06-41-00/201).

S 094-027

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.

(14) For the left or right hydraulic system,
remove the door locks from the landing gear doors and close the
doors (AMM 32-00-15/201).

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HEAT EXCHANGER – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the heat exchanger. The other task installs the heat exchanger.

TASK 29-11-26-004-001

2. Remove the Heat Exchanger (Fig. 401)

A. References

- (1) AMM 12-25-01/301, Exterior Cleaning
- (2) AMM 28-11-00/201, Fuel Tanks
- (3) AMM 28-11-01/401, Main Tank Access Doors
- (4) AMM 28-26-00/201, Defueling
- (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access

(1) Location Zones

- 541 Main Tank – Rib No. 5 to No. 7 (Left)
- 641 Main Tank – Rib No. 5 to No. 7 (Right)

(2) Access Panels

- 541BB Main Tank
- 641BB Main Tank

C. Procedure

S 864-002

- (1) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-003

- (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT

S 654-004

- (3) Remove the fuel from the main fuel tank (AMM 28-26-00/201).

S 014-005

- (4) Remove the access door, 541BB or 641BB, for the main fuel tank (AMM 28-11-01/401).

S 654-006

- (5) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).

S 034-007

- (6) Cut the inlet and the outlet hydraulic lines at the location shown on Figure 401.

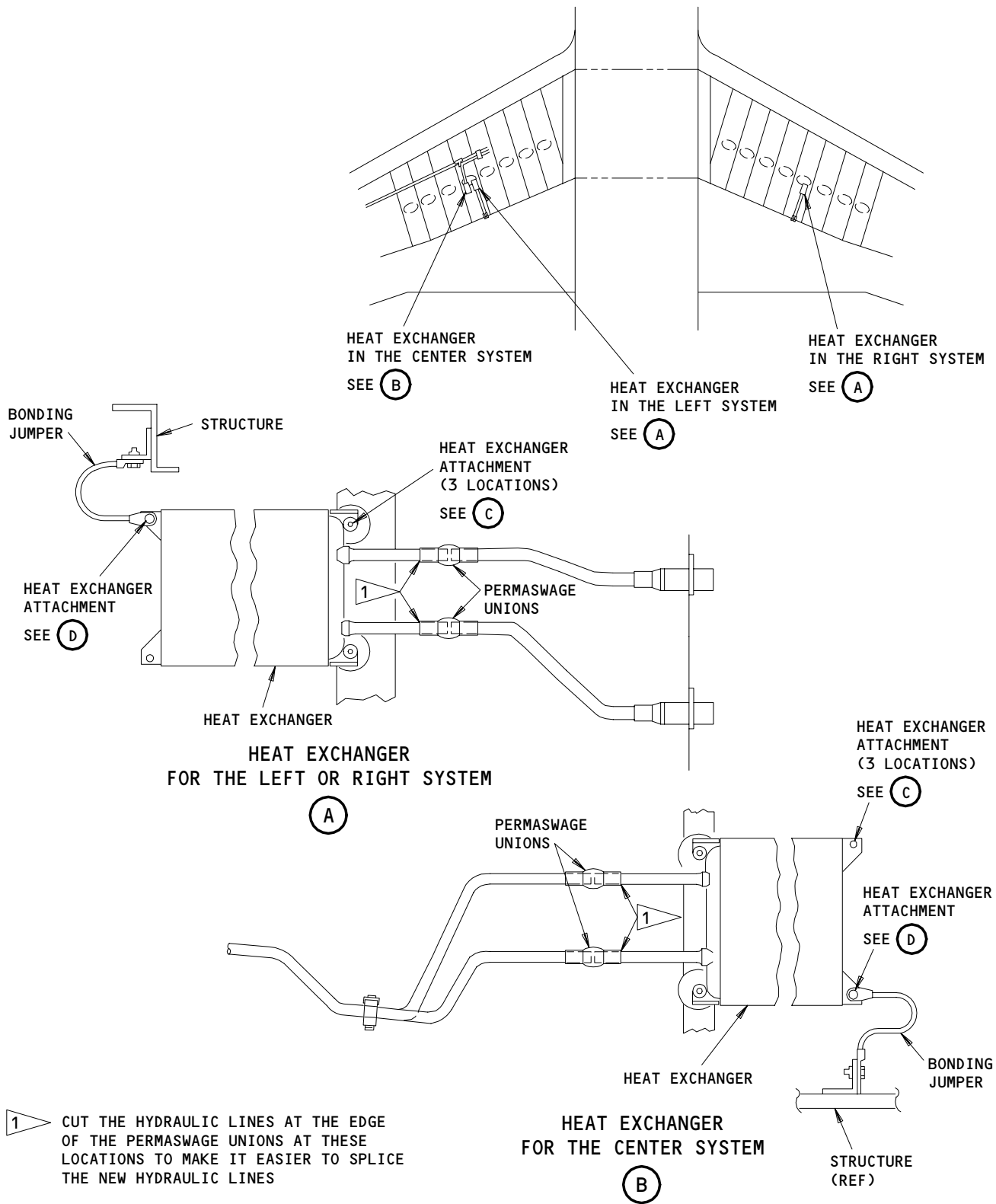
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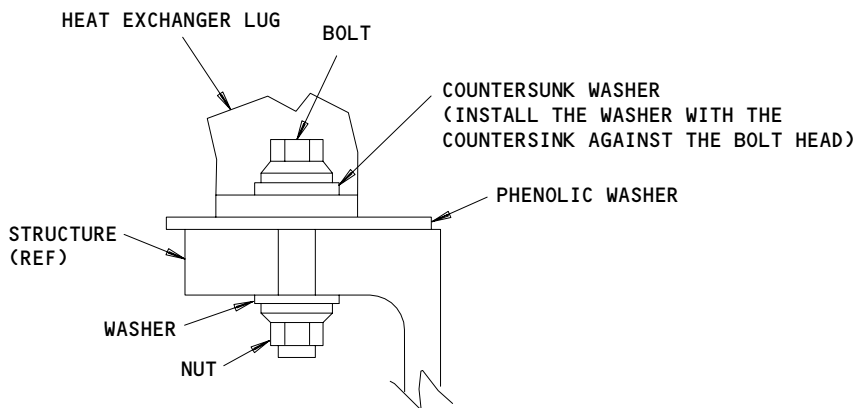
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Heat Exchanger Installation
Figure 401 (Sheet 1)

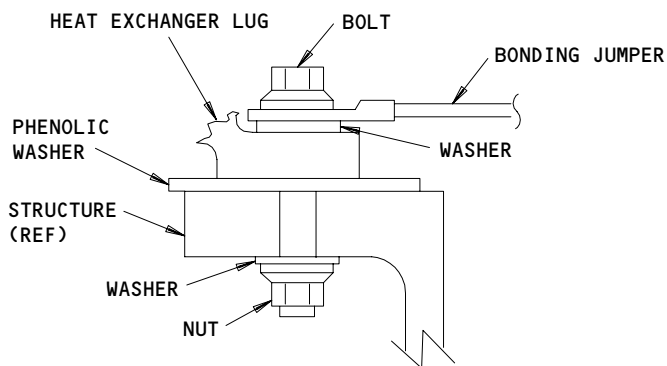
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HEAT EXCHANGER ATTACHMENT

(C)



HEAT EXCHANGER ATTACHMENT

(D)

Heat Exchanger Installation
Figure 401 (Sheet 2)

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S 024-008
(7) Remove the four bolts which hold the heat exchanger.

S 024-009
(8) Remove the heat exchanger.

S 034-010
(9) Install a cap on the hydraulic lines.

S 114-011

CAUTION: QUICKLY CLEAN THE FUEL TANK OF ALL HYDRAULIC FLUID. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(10) Clean all hydraulic fluid from the fuel tank (AMM 12-25-01/301).

TASK 29-11-26-404-012

3. Install the Heat Exchanger (Fig. 401)

A. Equipment

(1) Bonding meter - Model T477W, Avtron Manufacturing, Inc., Cleveland, Ohio

B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 20-10-09/801, Flareless Tubing Assembly
- (4) AMM 20-10-21/401, Electrical Bonding
- (5) AMM 20-10-21/601, Electrical Bonding
- (6) AMM 20-10-22/701, Metal Surfaces
- (7) AMM 28-11-00/201, Fuel Tanks
- (8) AMM 28-11-01/401, Main Tank Access Doors
- (9) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (10) AMM 29-11-26/601, Heat Exchanger

C. Access

(1) Location Zones

541	Main Tank - Rib No. 5 to No. 7 (Left)
641	Main Tank - Rib No. 5 to No. 7 (Right)

(2) Access Panels

541BB	Main Tank
641BB	Main Tank

D. Procedure

S 144-014
(1) Clean the surfaces for a good electrical bond at the locations of the bonding jumpers (AMM 20-10-22/701).

S 434-017
(2) Put the phenolic washers in their positions at the location of the bolts which hold the heat exchanger.

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- S 424-018
- (3) Put the heat exchanger in its position on the washers.
- S 424-019
- (4) Install the bolts which hold the heat exchanger.
- S 434-022
- (5) Do these steps to adjust the clearance at the heat exchanger lugs:
- (a) Measure the clearance at each heat exchanger lug.
 - (b) If the clearance is more than 0.008 inch, do these steps:
 - 1) Remove the phenolic washer.
 - 2) Measure the clearance between the heat exchanger lug and the structure.
 - 3) Install an assembly of phenolic washers with the correct thickness.
- S 214-023
- (6) Make sure the hydraulic lines align with those on the heat exchanger.
- S 434-025
- (7) Connect the bonding jumper with one of the bolts that hold the heat exchanger (AMM 20-10-21/401).
- S 424-026
- (8) Tighten the bolts that hold the heat exchanger.
- S 434-027
- (9) Cut the hydraulic lines as shown on Fig. 401.
- S 434-028
- (10) Install new sections of the hydraulic line with the permaswage unions (AMM 20-10-09/801).
- S 764-040
- WARNING:** MAKE SURE THE RESISTANCE OF THE ELECTRICAL BOND IS NOT MORE THAN THE LIMITS. THE RESISTANCE OF THE ELECTRICAL BOND IS VERY IMPORTANT IF LIGHTNING HITS THE AIRPLANE.
- (11) Do a check, with a bonding meter, that the resistance of the electrical bond is not more than these limits (AMM 20-10-21/601):

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- (a) 0.00075 ohm resistance across the swaged unions, from one tube to the other tube.

NOTE: Do this measure on the tube, 1/4 inch from each end of the union.

- (b) 0.00041 ohm resistance between the tube and the bulkhead fitting.

NOTE: Make this measure on the fitting, one inch from the end which has a permaswage and on the tube, 1/4 inch from the end of the fitting which has a permaswage.

S 764-043

- (12) Do a bonding resistance check for the heat exchanger (AMM 29-11-26/601).

S 394-042

- (13) Apply full-bodied (cap) fillet seal to the bulkhead fitting for the heat exchanger inlet line and outlet at the rear spar with BMS 5-26 per Boeing process specification BAC 5504 (Integral Fuel Tank Structure Sealing).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 414-030

- (14) Install the access door, 541BB or 641BB, for the main fuel tank (AMM 28-11-01/401).

S 864-031

- (15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2
 - (d) 11K25, HYDRAULICS ELEC PUMP LEFT

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S 864-032

CAUTION: USUALLY, YOU MUST HAVE A MINIMUM OF 600 GALLONS OF FUEL IN EACH MAIN TANK TO COOL THE HYDRAULIC FLUID. IF THERE IS NO FUEL IN THE MAIN TANK, DO NOT OPERATE THE PUMPS AFTER THE OVERHEAT LIGHT COMES ON, OR LONGER THAN NECESSARY TO DO THE LEAK CHECK. THIS CAN CAUSE THE HYDRAULIC FLUID TO BECOME TOO HOT.

(16) Pressurize the applicable hydraulic system with the alternating current motor pump (ACMP) (AMM 29-11-00/201).

S 864-033

(17) Remove the hydraulic power (AMM 29-11-00/201).

S 014-034

(18) Remove the access panel, 541BB or 641BB, for the main fuel tank (AMM 28-11-01/401).

S 654-035

(19) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).

S 794-036

(20) Make sure there are no leaks at the heat exchanger.

S 114-037

CAUTION: QUICKLY CLEAN THE FUEL TANK OF ALL HYDRAULIC FLUID. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(21) Clean all hydraulic fluid from the fuel tank (AMM 12-25-01/301).

S 414-038

(22) Install the access panel, 541BB or 641BB, for the main fuel tank (AMM 28-11-01/401).

S 614-039

(23) Fill the reservoir in the applicable hydraulic system (AMM 12-12-01/301).

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HEAT EXCHANGER – INSPECTION/CHECK

1. General

A. This procedure has these tasks:

- (1) Bonding Resistance Check of the Heat Exchanger Bulkhead Fittings
- (2) Bonding Resistance Check of the Hydraulic Lines to the Heat Exchanger

TASK 29-11-26-206-001

2. Bonding Resistance Check of the Heat Exchanger Bulkhead Fittings

A. General

(1) You must perform the bonding resistance checks in this task if the during maintenance any of these items for the hydraulic system heat exchangers have been disturbed:

- (a) Bulkhead fitting (inlet and outlet) installation and hydraulic tube penetrations at the rear spar (outside of main fuel tank)

NOTE: CDCCL – Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

- (b) Bulkhead fitting (inlet and outlet) installation and hydraulic tube penetrations at the rear spar (inside of main fuel tank)

NOTE: CDCCL – Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

- (c) Bonding jumper installation (inside of main fuel tank)

NOTE: CDCCL – Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

B. References

- (1) AMM 28-11-00/201, Fuel Tanks
- (2) AMM 28-11-01/401, Main Tank Access Doors
- (3) AMM 28-26-00/201, Defueling
- (4) AMM 29-00-00/201, Hydraulic Power
- (5) SWPM 20-20-00, Electrical Bonds and Grounds

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C. Equipment

- (1) Bonding Meter – Use one of these:
- (a) Bonding Meter – Model T477W
Avtron Manufacturing, Inc.
Cleveland, Ohio
 - (b) Bonding Meter – Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver, Canada

D. Access

- (1) Location Zones
- 541 Main Tank – Rib No. 5 to No. 7 (Left)
 - 551 Rear Spar to MLG Support Beam (Left)
 - 641 Main Tank – Rib No. 5 to No. 7 (Right)
- (2) Access Panels
- 541BB Main Tank (Left)
 - 551BB Landing Gear Retract Actuator (Left)
 - 641BB Main Tank (Right)
 - 651BB Landing Gear Retract Actuator (Right)

E. Bonding Resistance Checks – Inside of the Main Fuel Tanks

S 656-002

- (1) Defuel the main fuel tanks (AMM 28-26-00/201).

S 016-003

- (2) Remove the access door, 541BB (641BB), for the left (right) main fuel tank (AMM 28-11-01/401).

S 866-004

WARNING: CAREFULLY DO ALL OF THE SAFETY PROCEDURES IN THE PURGING AND ENTRY PROCEDURE FOR THE FUEL TANK. INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).

S 396-014

- (4) Remove the full-bodied (cap) fillet seals from the bulkhead fittings for the heat exchanger inlet line and outlet line at the rear spar inside the main fuel tank.

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S 766-005

WARNING: MAKE SURE THE BONDING RESISTANCE IS LESS THAN THE LIMITS. THE RESISTANCE OF THE ELECTRICAL BOND IS VERY IMPORTANT IF THE LIGHTNING HITS THE AIRPLANE. AN EXPLOSION CAN OCCUR IF THE BONDING RESISTANCE IS NOT IN THE LIMITS DURING AN LIGHTNING STRIKE.

(5) Use a bonding meter to do these checks of the bonding resistance inside the main fuel tanks for each heat exchanger as follows (SWPM 20-20-00):

(a) Make sure the resistance between the structure and the heat exchanger lug is 0.0025 ohms (2.5 milliohms) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

1) If the resistance is more than 0.0025 ohms (2.5 milliohms), rework bonding surface to a value of 0.0025 ohms (2.5 milliohms) or less (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 396-013

(6) Apply full-bodied (cap) fillet seal to the bulkhead fittings for the heat exchanger inlet line and outlet at the rear spar with BMS 5-26 per Boeing process specification BAC 5504 (Integral Fuel Tank Structure Sealing).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

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S 416-007

- (7) Install the access door, 541BB (641BB), for the left (right) main fuel tank (AMM 28-11-01/401).

F. Bonding Resistance Checks - Outside of the Main Fuel Tanks

S 016-008

- (1) Remove the access panel 551BB (651BB) to get access to the bulkhead fittings for the inlet and outlet lines for the heat exchangers at the rear spar.

S 396-015

- (2) Remove the full-bodied (cap) fillet seals from the bulkhead fittings for the heat exchanger inlet line and outlet line at the rear spar outside the main fuel tank.

S 766-009

WARNING: MAKE SURE THE BONDING RESISTANCE IS LESS THAN THE LIMITS. THE RESISTANCE OF THE ELECTRICAL BOND IS VERY IMPORTANT IF THE LIGHTNING HITS THE AIRPLANE. AN EXPLOSION CAN OCCUR IF THE BONDING RESISTANCE IS NOT IN THE LIMITS DURING AN LIGHTNING STRIKE.

- (3) Use a bonding meter to do checks of the bonding resistance outside of the main fuel tanks for each heat exchanger bulkhead fitting:
 - (a) Make sure the resistance between the bulkhead fitting and the rear spar for the inlet line is 0.001 ohm (1 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

- 1) If the resistance is more than 0.001 ohm (1 milliohm), rework bonding surface to a value of 0.001 ohm (1 milliohm) or less (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

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- (b) Make sure the resistance between the bulkhead fitting and the rear spar for the outlet line is 0.001 ohm (1 milliohm) or less.

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

- 1) If the resistance is more than 0.001 ohm (1 milliohm), rework bonding surface to a value of 0.001 ohm (1 milliohm) or less (SWPM 20-20-00).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 396-016

- (4) Apply full-bodied (cap) fillet seal to the bulkhead fittings for the heat exchanger inlet line and outlet at the rear spar with BMS 5-26 per Boeing process specification BAC 5504 (Integral Fuel Tank Structure Sealing) or with BMS 5-95 per BAC 5000 (Sealing General).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

S 416-011

- (5) Install the access panel 551BB (651BB).

TASK 29-11-26-766-017

3. Hydraulic Lines to the Heat Exchanger - Bonding Resistance Check

A. References

- (1) SWPM 20-20-00, Electrical Bonds and Grounds

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B. Equipment

- (1) Bonding Meter – Use one of these:
 - (a) Bonding Meter – Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver, Canada
 - (b) Bonding Meter – Model T477W
Avtron Manufacturing, Inc.
Cleveland, Ohio

C. Access

- (1) Location Zones
 - 551 Rear Spar to MLG Support Beam (Left)
 - 651 Rear Spar to MLG Support Beam (Right)
- (2) Access Panels
 - 551BB Landing Gear Retract Actuator (Left)
 - 651BB Landing Gear Retract Actuator (Right)

D. Procedure

- S 016-018
- (1) Remove the access panel 551BB (651BB) to get access to the hydraulic line fittings at the rear spar.
- S 766-019
- (2) Do a check of the bonding resistance between each of the penetration fittings on the hydraulic lines and the rear spar (SWPM 20-20-00).
 - (a) Make sure the bonding resistance is 0.001 ohm (1.0 milliohm) or less.
- S 416-020
- (3) Install the access panel 551BB (651BB).

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RIGHT SYSTEM ISOLATED ALTERNATING CURRENT MOTOR PUMP (ACMP) SUPPLY SHUTOFF VALVE
- REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the shutoff valve for the supply of the isolated alternating current motor pump (ACMP) in the right system. The other task installs the shutoff valve.

TASK 29-11-27-004-001

2. Remove the Shutoff Valve (Fig. 401)

A. References

- (1) AMM 12-12-01/301, Hydraulic System
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 24-22-00/201, Electrical Power
- (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

B. Access

- (1) Location Zones
143/144 MLG Wheel Well

C. Procedure

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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 pressure from the right hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-005

- (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K22, RESERVE BRAKE SOURCE

S 684-006

- (5) Open the drain valve on the reservoir in the right system.

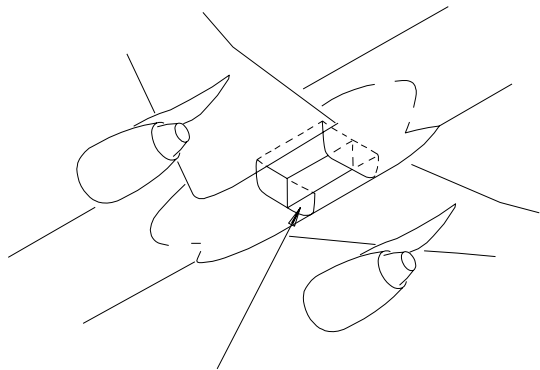
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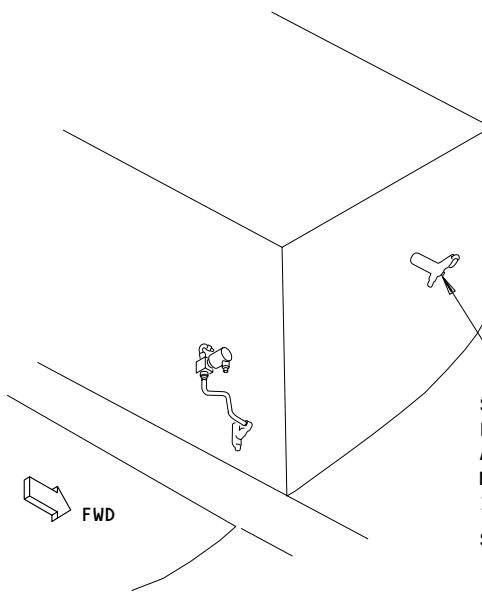
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FORWARD BULKHEAD OF THE RIGHT WHEEL WELL

SEE (A)

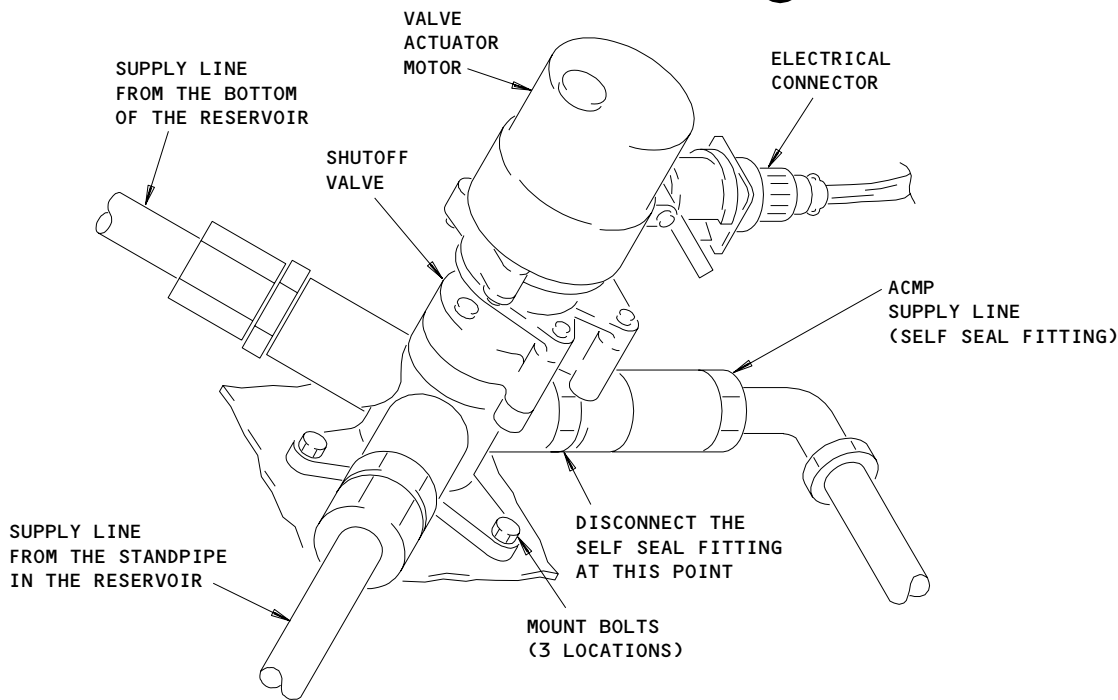


SUPPLY SHUTOFF VALVE FOR THE ISOLATED ALTERNATING CURRENT MOTOR PUMP (ACMP) IN THE RIGHT SYSTEM

SEE (B)

FORWARD BULKHEAD OF THE RIGHT WHEEL WELL

(A)



SUPPLY SHUTOFF VALVE

(B)

Supply Shutoff Valve Installation
Figure 401

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- S 684-007
- (6) Drain the hydraulic fluid from the reservoir into a container.
- S 684-008
- (7) After the fluid drains from the reservoir, close the drain valve.
- S 434-009
- (8) Safety the drain valve with a lockwire.
- S 034-014
- (9) Disconnect the hydraulic lines from the shutoff valve.
- S 034-013
- (10) Install caps on the hydraulic lines.
- S 034-012
- (11) Disconnect the electrical connector from the shutoff valve.
- S 024-015
- (12) Remove the bolts which hold the shutoff valve.
- S 024-016
- (13) Remove the shutoff valve.
- S 034-017
- (14) Remove the two unions and the nipple for the self-seal fitting from the ports of the shutoff valve.

TASK 29-11-27-404-018

3. Install the Shutoff Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B
- (2) A00247 Sealant, BMS 5-95

B. References

- (1) AMM 12-12-01/301, Hydraulic System
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 24-22-00/201, Electrical Power
- (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

D. Procedure

- S 644-019
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions and the nipple for the self-seal fitting.

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- S 434-020
- (2) Install the new O-rings on the unions and the nipple for the self-seal fitting.
- S 434-021
- (3) Install the two unions and the nipple for the self-seal fitting in the ports of the shutoff valve.
- S 144-022
- (4) Clean the surfaces of the shutoff valve which touch the structure.
- S 394-023
- (5) Apply the sealant to the surfaces of the shutoff valve which touch the structure.
- S 424-024
- (6) Hold the shutoff valve in its position.
- S 424-025
- (7) Install the bolts and the washers which hold the shutoff valve.
- S 434-026
- (8) Connect the electrical connector to the shutoff valve.
- S 644-040
- (9) Apply a thin layer of hydraulic lubricant or hydraulic fluid to the surfaces which make a seal on the self seal fitting.
- S 434-027
- (10) Connect the hydraulic lines to the shutoff valve.
- S 614-028
- (11) Fill the reservoir in the right system (AMM 12-12-01/301).
- S 864-029
- (12) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT

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(b) 11K22, RESERVE BRAKE SOURCE

S 864-030

(13) Pressurize the reservoir in the right system (AMM 29-11-00/201).

S 794-031

(14) Make sure there are no leaks at the shutoff valve.

S 864-032

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

S 864-033

(16) Put the RESERVE BKS & STRG switch on the pilot's main instrument panel, P1, to the ON position.

S 214-034

(17) Make sure the position indicator, on the shutoff valve, moved to POSITION 1.

S 864-035

(18) Push the RESERVE BKS & STRG switch, on the P1 panel, to move the valve to the usual position.

S 114-036

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(19) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 094-037

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.

(20) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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S 864-038

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

S 864-039

(22) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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RIGHT SYSTEM ISOLATED ALTERNATING CURRENT MOTOR PUMP (ACMP) PRESSURE SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the shutoff valve for the pressure of the isolated alternating current motor pump (ACMP). The other task installs the shutoff valve.

TASK 29-11-28-004-001

2. Remove the Shutoff Valve (Fig. 401)

A. 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 Downlocks

B. Access

- (1) Location Zones
143/144 MLG Wheel Well

C. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

D. Procedure

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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 pressure from the right hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-005

- (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K22, RESERVE BRAKE SOURCE

S 034-006

- (5) Disconnect the hydraulic lines from the shutoff valve.

S 034-007

- (6) Install caps on the hydraulic lines.

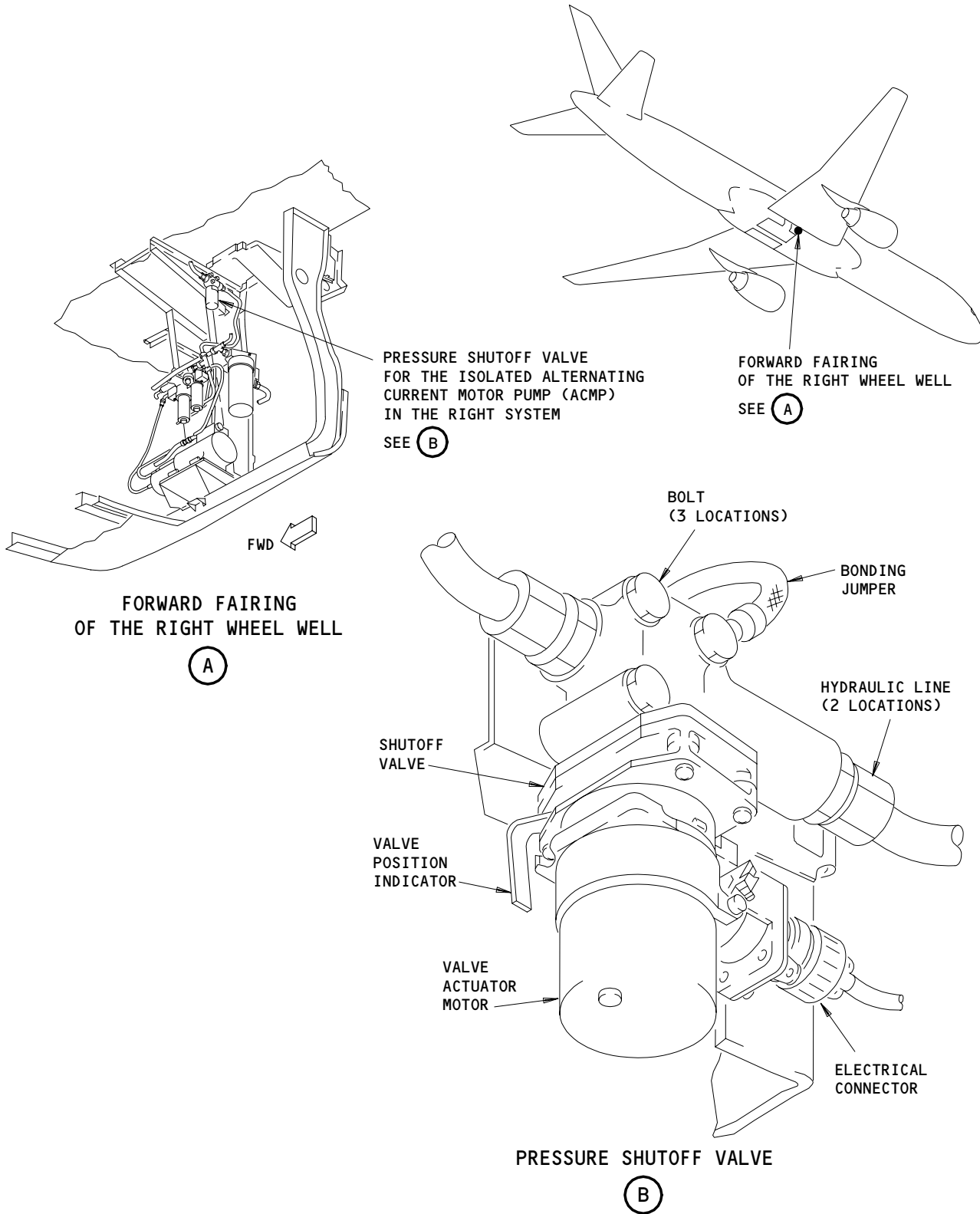
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Pressure Shutoff Valve Installation
Figure 401

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- S 034-008
- (7) Disconnect the electrical connector from the shutoff valve.
- S 024-009
- (8) Remove the bolts which hold the shutoff valve.
- S 024-010
- (9) Remove the shutoff valve.
- S 034-011
- (10) Remove the unions and the O-rings from ports of the shutoff valve.

TASK 29-11-28-404-012

3. Install the Shutoff Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-25-01/301, Exterior Cleaning
- (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
143/144 MLG Wheel Well

D. Procedure

- S 644-013
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.
- S 434-014
- (2) Install the new O-rings on the unions.
- S 434-015
- (3) Install the unions in the ports of the shutoff valve.
- S 424-016
- (4) Hold the shutoff valve in its position.
- S 434-017
- (5) Put the bonding jumper in its position.
- S 424-018
- (6) Install the bolts and the washers which hold the shutoff valve and the bonding jumper.
- S 434-019
- (7) Connect the electrical connector to the shutoff valve.

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- S 434-020
- (8) Connect the hydraulic lines to the shutoff valve.
- S 864-021
- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K22, RESERVE BRAKE SOURCE
- S 864-022
- (10) Pressurize the right hydraulic system and the reservoir (AMM 29-11-00/201).
- S 794-023
- (11) Make sure there are no leaks at the shutoff valve.
- S 864-024
- (12) Supply electrical power (AMM 24-22-00/201).
- S 864-025
- (13) Push the RESERVE BKS & STRG switch on the pilot's main instrument panel, P1-3, to the ON position.
- S 214-026
- (14) Make sure the position indicator on the shutoff valve is in the CLOSED position.
- S 864-027
- (15) Push the RESERVE BKS & STRG switch on the P1 panel.
- S 214-028
- (16) Make sure the position indicator on the shutoff valve moves to the OPEN position.
- S 114-029
- CAUTION:** QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (17) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).
- S 094-030
- 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.
- (18) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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S 864-031

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

S 864-032

(20) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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LEFT AND RIGHT SYSTEM RELIEF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the relief valve for the left and right system. The other task installs the relief valve.

TASK 29-11-29-004-001

2. Remove the Relief Valve (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zones
143/144 MLG Wheel Well

C. Prepare for the Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT

S 864-005

- (4) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

D. Remove the Relief Valve

S 034-006

- (1) Remove the hydraulic lines from the relief valve.

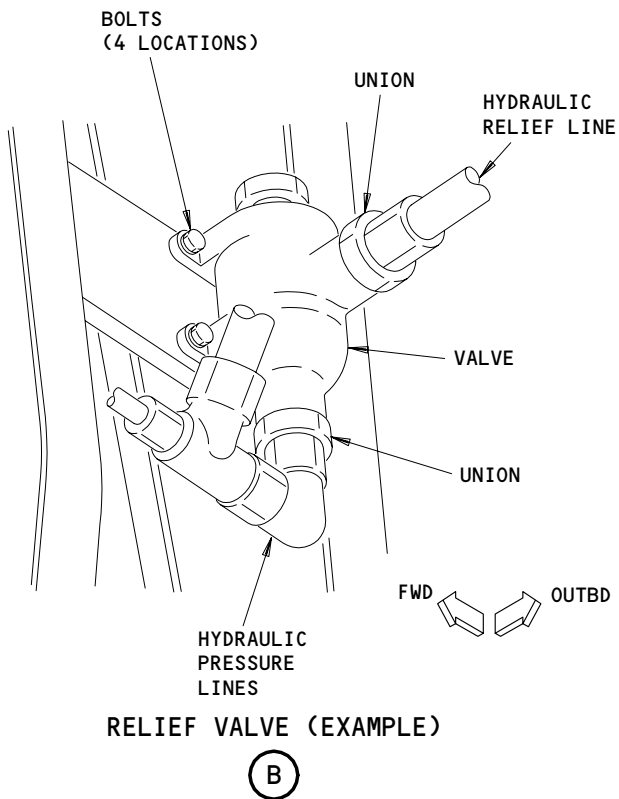
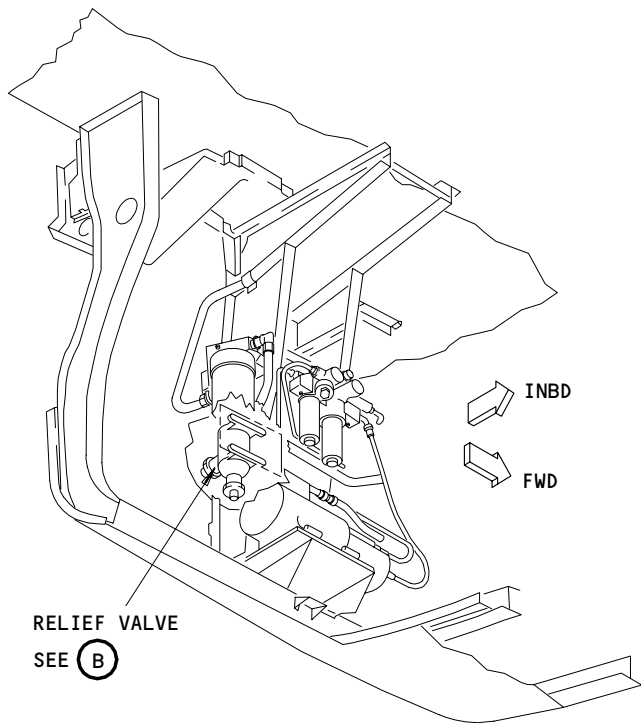
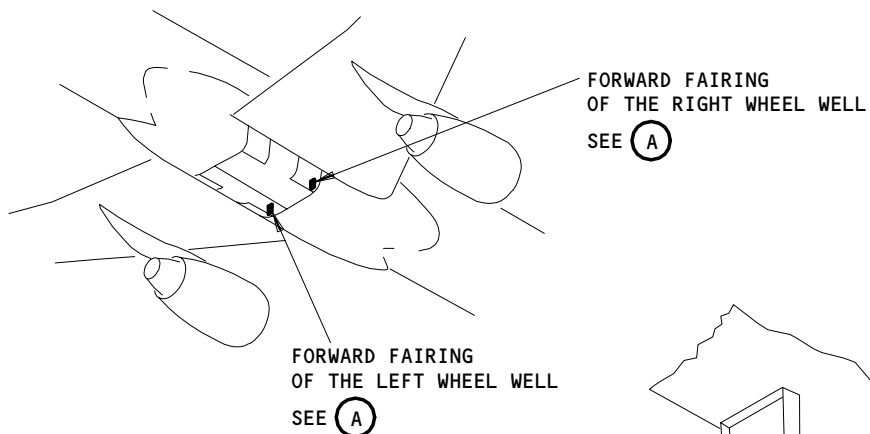
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FORWARD FAIRING OF THE LEFT WHEEL WELL
(THE FORWARD FAIRING OF THE RIGHT WHEEL WELL IS OPPOSITE)
(A)

Relief Valve Installation
Figure 401

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- S 034-007
- (2) Install a cap on the relief valve.

- S 024-008
- (3) Remove the bolts which hold the relief valve.

- S 024-009
- (4) Remove the relief valve.

- S 034-010
- (5) Remove the unions and the O-rings from the relief valve.

TASK 29-11-29-404-011

3. Install the Relief Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 32-00-15/201, Main Gear Door Locks

C. Access

- (1) Location Zones
143/144 MLG Wheel Well

D. Install the Relief Valve

- S 644-012
- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.

- S 434-013
- (2) Install the new O-rings on the unions.

- S 434-014
- (3) Install the unions on the relief valve.

- S 424-015
- (4) Hold the relief valve in its position.

- S 424-016
- (5) Install the bolts to hold the relief valve in its position.

- S 434-017
- (6) Install the hydraulic lines on the relief valve.

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E. Put the Airplane Back to Its Usual Condition

S 864-018

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
 - (a) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (b) 11K25, HYDRAULICS ELEC PUMP LEFT

S 614-019

- (2) Fill the applicable hydraulic reservoir (AMM 12-12-01/301).

S 864-020

- (3) Pressurize the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

S 794-021

- (4) Make sure there are no leaks at the relief valve.

S 114-022

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (5) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 094-023

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.

- (6) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-024

- (7) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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RESERVOIR PRESSURIZATION CHECK VALVE – ADJUSTMENT/TEST

1. General

- A. There is one task in this subject. This task is a reservoir pressurization check valve test.

TASK 29-11-30-705-001

2. Reservoir Pressurization Check Valve Test

A. General

- (1) This procedure does a test of the check valves which keep air pressure in the hydraulic system reservoirs after the pneumatic power is removed. This is a test of each main hydraulic system.

B. Equipment

- (1) Air pressure gage – 0 to 100 psi range – commercially available
(2) A source of clean, dry air or nitrogen, that is controlled from 0 to 100 psi maximum pressure – commercially available

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power – Control
(3) AMM 36-00-00/201, Pneumatic Control

D. Access

(1) Location Zone

139	Forward Keel Beam
193/194	Wing to Body Fairings
212	Control Cabin

(2) Access Panels

193HL/194ER	Environmental Control System Components
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E. Procedure (Fig. 501)

S 865-008

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

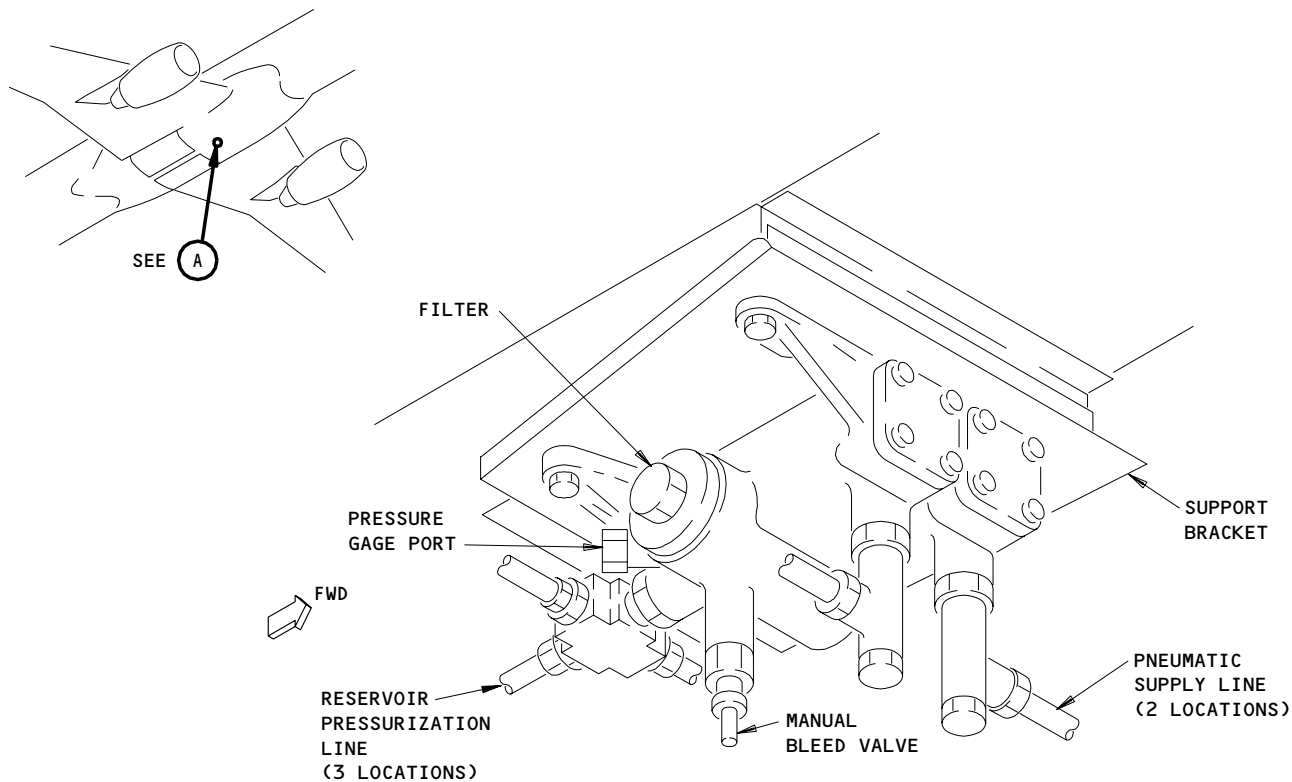
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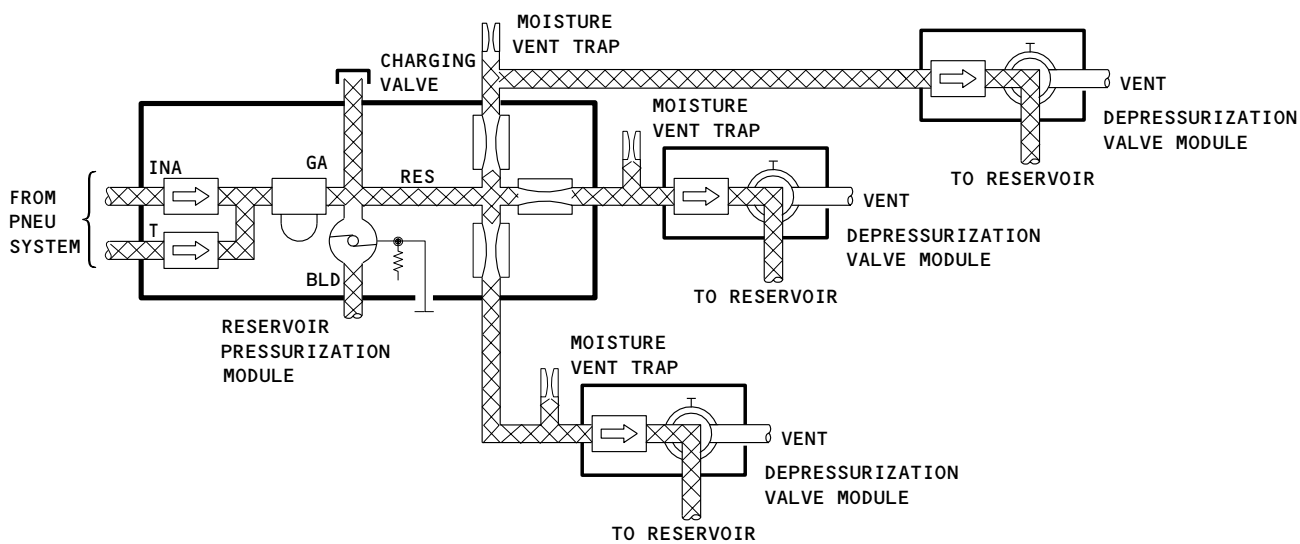
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RESERVOIR PRESSURIZATION MODULE

(A)



PRESSURIZATION SYSTEM
(EXAMPLE)

Reservoir Pressurization Module
Figure 501

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S 865-009

- (2) Make sure these circuit breakers on the overhead panel, P11, are closed:
- (a) 11K19, HYDRAULICS QTY CTR
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT
 - (d) EICAS (6 locations)

S 865-010

- (3) Push the ELEC/HYD switch on the EICAS maintenance panel.

S 215-011

- (4) Make sure the quantity indication on EICAS is at least 0.80 for each hydraulic system.

S 865-012

- (5) If you use the pneumatic system to pressurize the reservoir in each system, supply pneumatic power (AMM 36-00-00/201).

NOTE: If the pneumatic system operated immediately before this test, it is not necessary to pressurize the reservoirs.

S 865-013

- (6) If you use an external air source to pressurize the reservoirs, do these steps:
- (a) Remove the plug from the pressure gage port, GA, on the reservoir pressurization module.
 - (b) Install an air pressure gage in the GA port on the reservoir pressurization module.
 - (c) Connect an air pressure source to the manual bleed valve on the reservoir pressurization module.

NOTE: All three reservoirs will be pressurized at the same time. The reservoir depressurization valve on each reservoir must be in the closed (not vented) position.

- (d) Push the manual bleed valve into the pressurization module.
- (e) Adjust the air supply pressure to pressurize the reservoirs to 33 ±1 psi.

NOTE: The air pressure lines between the pressurization module and the reservoirs have moisture vent orifices. These orifices bleed air pressure from the lines after the air source is removed. The depressurization module check valves hold the air pressure in each reservoir.

- (f) When the reservoirs are pressurized, decrease the air pressure source to zero.
- (g) Remove the air pressure source from the manual bleed valve.

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- (h) Remove the air pressure gage from the GA port on the reservoir pressurization module.
- (i) Install a plug and O-ring in the GA gage port on the reservoir pressurization module.

S 415-022

- (7) Close the access doors, if they are open (AMM 06-41-00/201).

S 865-014

- (8) If you used the pneumatic system to pressurize the reservoirs, remove pneumatic power (AMM 36-00-00/201).

NOTE: The pneumatic power must stay off during this test, after the reservoirs are pressurized.

S 215-015

- (9) Make sure the RSVR PRESS indication on the EICAS maintenance page does not change from the NORM indication for each of the three systems for at least 1 hour.

S 865-016

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

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HYDRAULIC CONTROL MODULE M10050 – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. The first task removes the M10050 hydraulic control module. The second task installs the M10050 hydraulic control panel.
- B. The M10050 Hydraulic Control Module (2) is located on the Pilot's Overhead Panel, P5.

TASK 29-11-40-004-001

2. Remove the Hydraulic Control Module (Fig. 401)

- A. References
 - (1) AMM 24-22-00/201, Electrical Power – Control
- B. Access
 - (1) Location Zones
211/212 Cabin Control

C. Procedure

S 864-002

- (1) Remove Electrical Power (AMM 24-22-00/201).

S 864-003

- (2) Make sure these circuit breakers on the overhead panel, P11, are open:
 - (a) 11K14, HYDRAULIC L ENGINE PUMP DEPRESS
 - (b) 11K15, HYDRAULIC ELEC PUMP C1
 - (c) 11K16, HYDRAULIC R ELEC PUMP
 - (d) 11K17, HYD SYS PRESS L
 - (e) 11K18, HYD SYS PRESS C
 - (f) 11K23, HYDRAULIC R ENGINE PUMP DEPRESS
 - (g) 11K24, HYDRAULIC ELEC PUMP C2
 - (h) 11K25, HYDRAULIC ELEC PUMP L
 - (i) 11K26, HYD SYS PRESS R

S 034-004

- (3) Hold the M10050 Hydraulic Control Module (2) and loosen the four quarter-turn fasteners (1) which hold the module (2) to the Pilot's Overhead Panel, P5.

S 024-005

- (4) Carefully lower the M10050 Hydraulic Control Module (2) out of the Pilot's overhead panel, P5, to get access to the electrical connectors.

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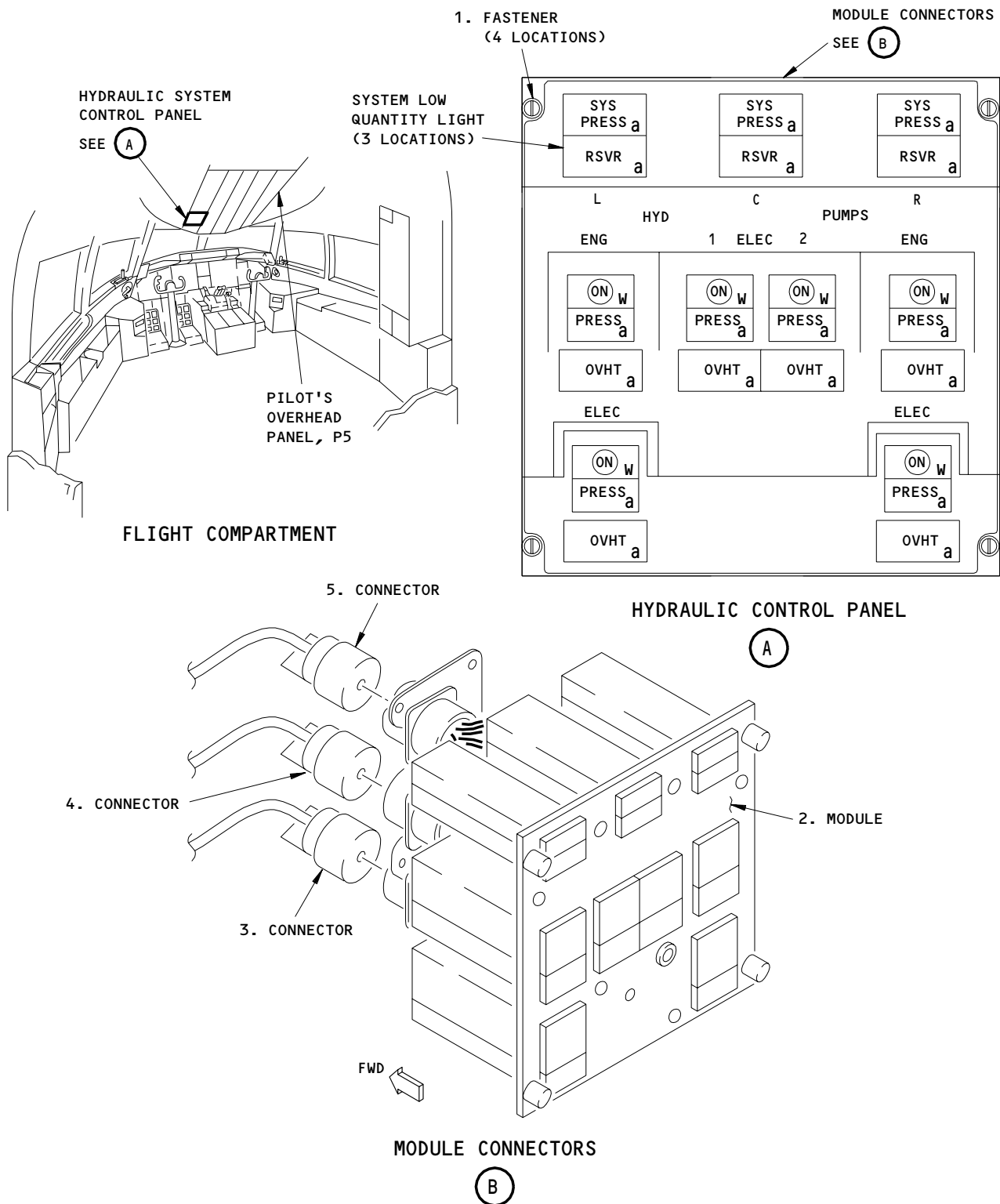
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BOEING

757 MAINTENANCE MANUAL



Hydraulic Control Panel, M10050
Figure 401

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- S 034-006
- (5) Disconnect the electrical connectors (3), (4), and (5).
- S 024-007
- (6) Remove the M10050 Hydraulic Control Module (2).
- S 024-008
- (7) Install protective caps on the electrical connectors (3), (4), and (5) and on the module (2) to prevent damage or contamination.

TASK 29-11-40-404-009

3. Install the Hydraulic Control Module (Fig. 401)

A. References

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

B. Access

- (1) Location Zones
211/212 Cabin Control

C. Procedure

- S 434-010
- (1) Remove the protective caps from the electrical connectors (3), (4), (5), and the module (2).
- S 434-011
- (2) Reconnect the electrical connectors (3, (4) and (5).
- S 424-012
- (3) Put the Hydraulic Control Module (2) into the Pilot's overhead panel, P5.
- S 414-013
- (4) Tighten the four quarter-turn fasteners (1) which hold the module (2) to the Pilot's overhead panel, P5.
- S 214-014
- (5) Make sure all the switches on the Hydraulic Control Module (2) are in the OFF position.
- S 864-015
- (6) Supply Electrical Power (AMM 24-22-00/201).
- S 864-016
- (7) Close these circuit breakers on the overhead panel, P11:
 - (a) 11K14, HYDRAULIC L ENGINE PUMP DEPRESS

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- (b) 11K15, HYDRAULIC ELEC PUMP C1
- (c) 11K16, HYDRAULIC R ELEC PUMP
- (d) 11K17, HYD SYS PRESS L
- (e) 11K18, HYD SYS PRESS C
- (f) 11K23, HYDRAULIC R ENGINE PUMP DEPRESS
- (g) 11K24, HYDRAULIC ELEC PUMP C2
- (h) 11K25, HYDRAULIC ELEC PUMP L
- (i) 11K26, HYD SYS PRESS R

S 714-017

- (8) Do an operational test on the following (AMM 29-11-00/501):
 - (a) L EDP HYD PUMP
 - (b) C1 ACMP ELEC PUMP
 - (c) R ACMP ELEC PUMP
 - (d) C HYD SYS PRESS

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ALTERNATING CURRENT MOTOR PUMP (ACMP) ELECTRICAL LOAD CONTROL UNITS (ELCU) -
REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the electrical load control unit (ELCU) for the alternating current motor pumps (ACMP). The other task installs the ELCU.
- B. The ELCUs for the right system and the center system (C1) are in the left-generator power panel, P31. The ELCUs for the left system and the center system (C2) are in the right-generator power panel, P32.

TASK 29-11-67-004-001

2. Remove the Electrical Load Control Unit (ELCU) (Fig. 401)

A. References

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

B. Access

- (1) Location Zones
119/120 Main Equipment Center
- (2) Access Panel
119BL Main Equipment Center

C. Procedure

S 864-002

WARNING: REMOVE THE ELECTRICAL POWER BEFORE YOU REMOVE OR INSTALL THE COMPONENTS IN THE MAIN EQUIPMENT CENTER. THE HIGH VOLTAGE IN THE MAIN EQUIPMENT CENTER CAN KILL.

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

S 014-003

- (2) Open the power panel, P31 (P32), for the left (right) generator, to get access to the ELCU you will remove.

S 934-004

- (3) Identify the wires to make it easier to install them.

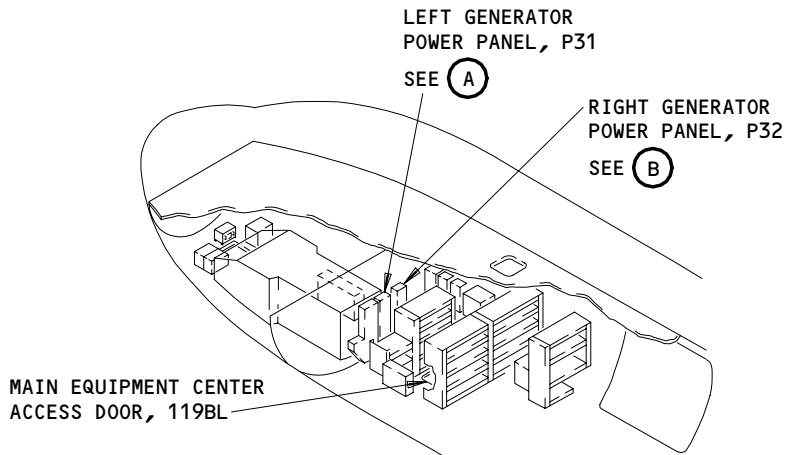
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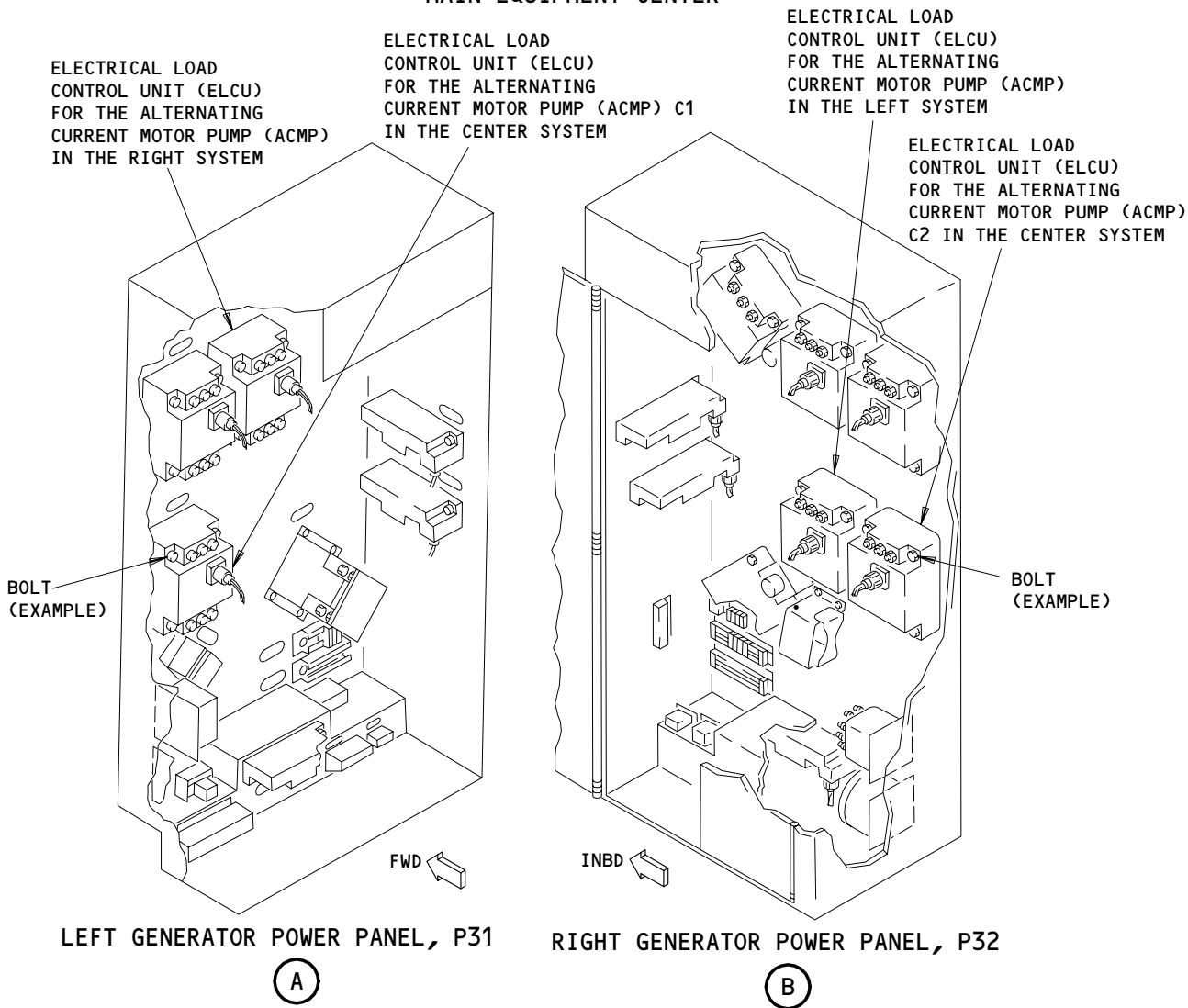
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MAIN EQUIPMENT CENTER



Electrical Load Control Units (ELCU's)
Figure 401

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- S 034-005
- (4) Remove the wires from the terminals on the ELCU.
- S 034-006
- (5) Disconnect the electrical connector from the ELCU.
- S 024-007
- (6) Remove the bolts which hold the ELCU.
- S 024-008
- (7) Remove the ELCU.

TASK 29-11-67-404-009

3. Install the Electrical Load Control Unit (ELCU) (Fig. 401)

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
119/120 Main Equipment Center
- (2) Access Panel
119BL Main Equipment Center

C. Procedure

- S 424-010
- (1) Hold the ELCU in its position.
- S 424-011
- (2) Install the bolts to hold the ELCU in its position.
- S 434-012
- (3) Connect the electrical connector to the ELCU.

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- S 434-013
- (4) Connect the wires to the terminals on the ELCU.
(a) Tighten to 120 - 125 inch-pound (13.0 - 14.1 newton-meters).
- S 414-014
- (5) Close the power panel, P31 (P32), for the left (right) generator.
- S 864-015
- (6) Supply electrical power (AMM 24-22-00/201).
- S 864-016
- (7) Pressurize the applicable hydraulic system with the ACMP to do a check that the ELCU operates (AMM 29-11-00/201).
- S 864-017
- (8) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).
- S 864-018
- (9) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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GROUND SERVICING SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)
 - A. The ground servicing system fills all hydraulic reservoirs from one location. The system components are in the aft left wing/body fairing. The system has a hand pump with suction line and a connection for pressure fill from a ground cart. There is also a remote quantity indicator, a fill selector valve, and a fill filter module.
2. Component Details (Fig. 1)
 - A. Reservoir Manual Fill Pump
 - (1) The manual fill pump is a hand pump used to service the hydraulic reservoirs when pressure fill equipment is not available. The pump handle is stowed in brackets adjacent to the pump.
 - B. Suction Hose
 - (1) One end of the suction hose is connected to the manual fill pump. The other end is placed in a container of hydraulic fluid. When not in use, the free end of the hose is stowed in the pump handle.
 - C. Pressure Fill Connection
 - (1) The pressure fill connection is below the manual fill pump. This connection is used to pressure fill the reservoirs from a ground cart. A protective cap covers the connection when not in use.
 - D. Reservoir Fill Filter Module
 - (1) Fluid from the hand pump and pressure fill connection flows through the filter module. The filter prevents contamination of the system during ground filling. The filter is a nonbypass unit containing a noncleanable filter element.
 - E. Reservoir Fill Selector Valve
 - (1) This manual valve selects which reservoir is to be filled. An electric switch on the valve connects the remote quantity indicator to the quantity transmitter of the reservoir to be filled. The valve shuts off all ports in the closed position. When the valve is in the closed position the electric switch is in the OFF position.
 - F. Reservoir Remote Quantity Indicator
 - (1) The remote quantity indicator shows the fluid level in the reservoir being filled. The fill selector valve controls which reservoir is monitored by the indicator.

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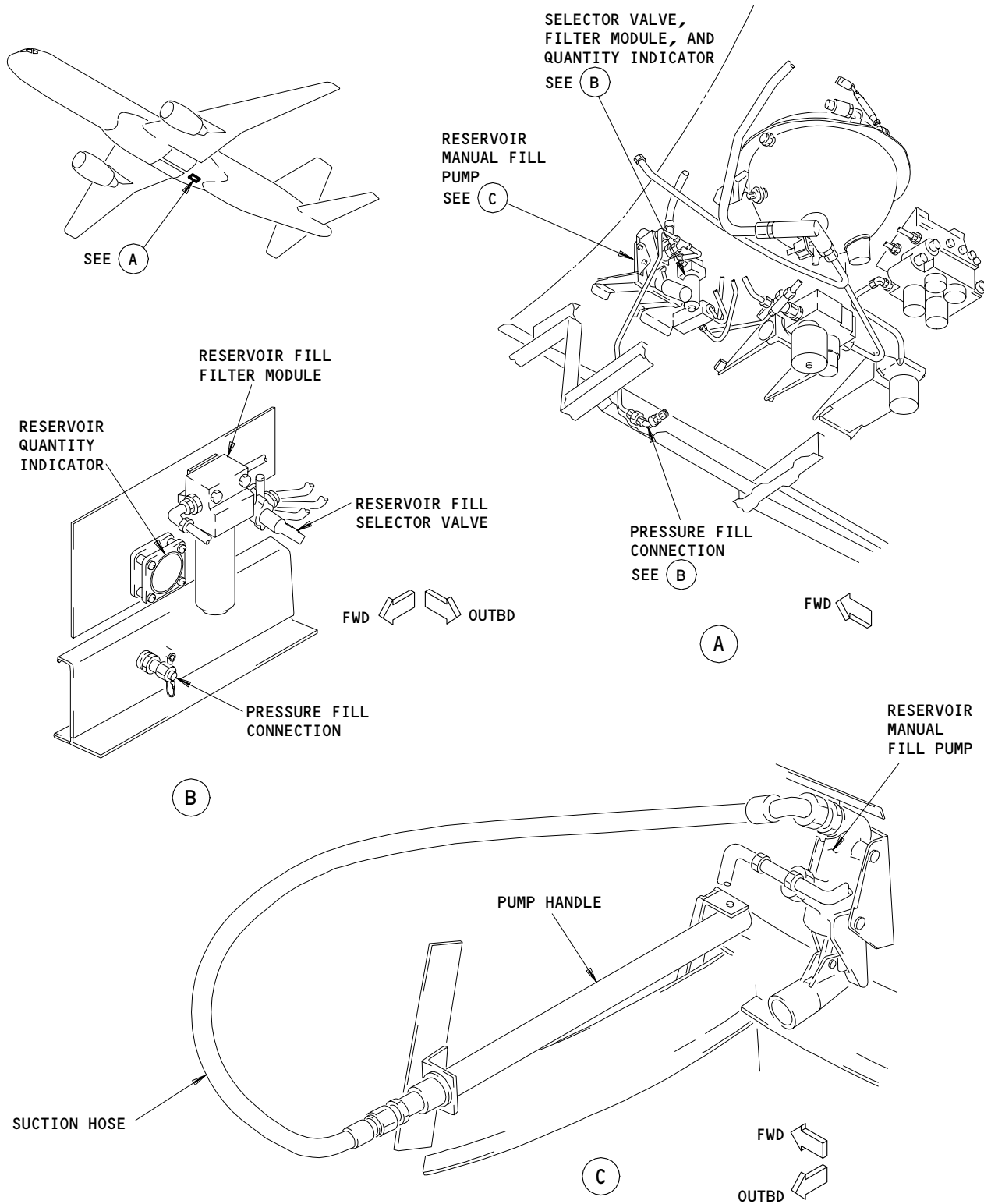
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**Reservoir Central Fill System
Figure 1**

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3. Operation

A. Functional Description

- (1) The ground servicing system fills all hydraulic reservoirs from one location. A manual fill mode and a pressure fill mode can be used for servicing. The reservoir is filled in the manual fill mode with flow from a container of fluid using the hand pump. The pressure fill mode directs flow from a ground servicing cart to the selected system reservoir return lines to fill the reservoir. The selector valve selects the reservoir to be filled. A switch on the valve connects the remote indicator to the respective quantity transmitter.

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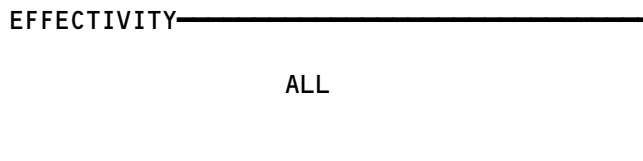
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757
FAULT ISOLATION/MAINT MANUAL

GROUND SERVICING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS	--	1	FLIGHT COMPARTMENT, P11 PANEL	
HYDRAULICS QTY CTR, C4192		1	11K19	*
HYDRAULICS QTY LEFT, C1101		1	11K20	*
HYDRALICS QTY RIGHT, C4193		1	11K21	*
CONNECTION - PRESSURE FILL	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-18-00
INDICATOR - RESERVOIR FILL, N29	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-18-03
MODULE - RESERVOIR FILL FILTER	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-18-04
PUMP - RESERVOIR MANUAL FILL	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-18-01
SWITCH - HYDRAULIC QUANTITY SELECT, S341	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING, RESERVOIR FILL SELECTOR VALVE	*
TRANSMITTER - (REF 29-33-00, FIG. 101) HYDRAULIC FLUID QUANTITY SYS C, M339 SYS L, M338 SYS R, M340				
UNIT - (REF 29-33-00, FIG. 101) HYDRAULIC FLUID QUANTITY MONITOR, M122				
VALVE - RESERVOIR FILL SELECTOR	--	1	197KL, AFT LEFT WING-TO-BODY FAIRING	29-18-02

* SEE THE WDM EQUIPMENT LIST

Ground Servicing System - Component Index
Figure 101

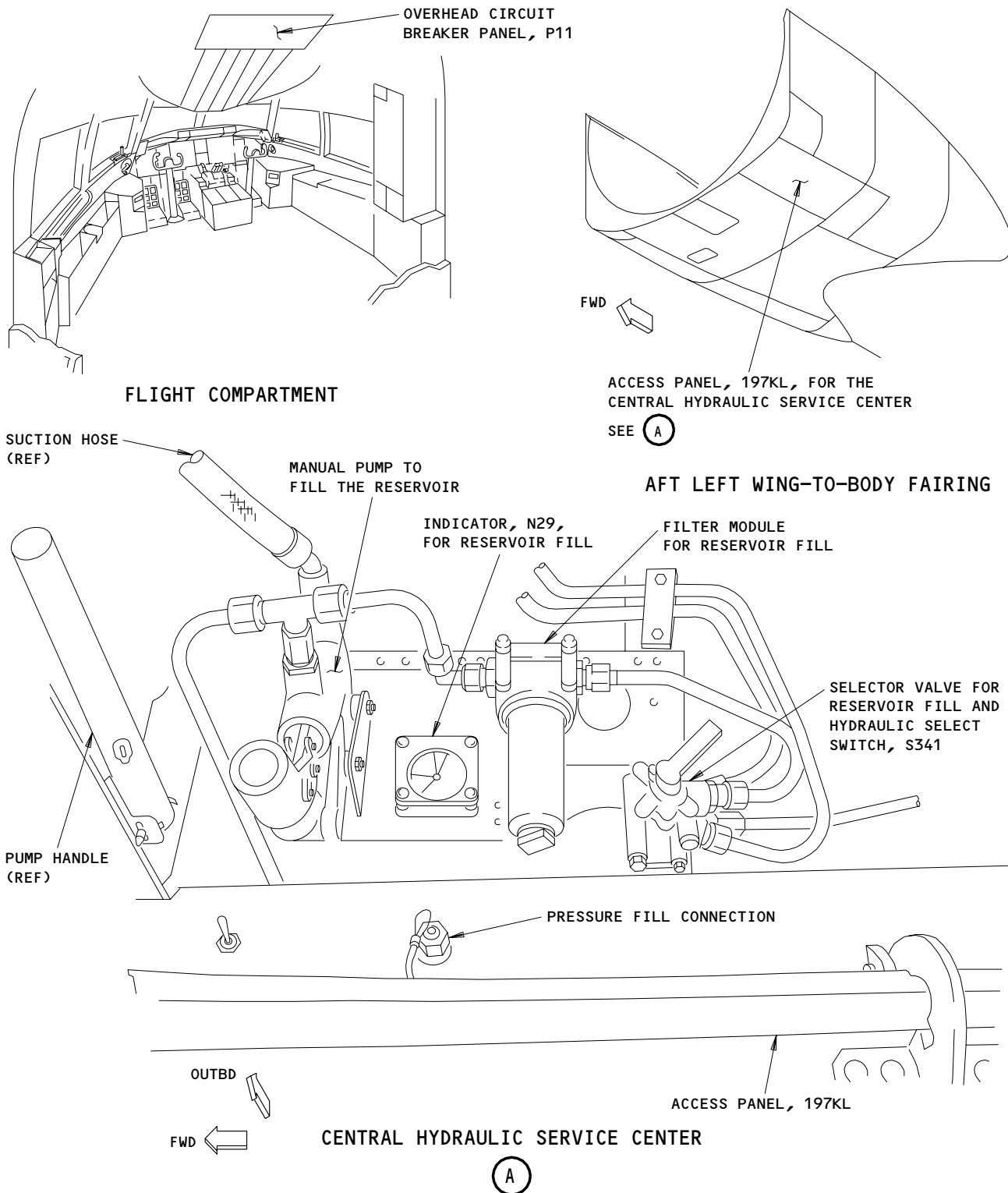


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FAULT ISOLATION/MAINT MANUAL



Ground Servicing System - Component Location
Figure 102

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RESERVOIR MANUAL FILL PUMP – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the manual fill pump for the hydraulic reservoirs. The other task installs the manual fill pump for the hydraulic reservoirs.

TASK 29-18-01-024-001

2. Remove the Manual Fill Pump for the Reservoir

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access

- (1) Location Zones
197 Wing to Body – Aft Lower Half (Left)
- (2) Access Panel
197KL Central Hydraulic Service Center

C. Remove the Manual Fill Pump (Fig. 401)

S 014-002

- (1) Open the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

S 864-003

- (2) Remove the pressure from the hydraulic systems and the reservoirs (AMM 29-11-00/201)

S 034-004

- (3) Disconnect the inlet and outlet lines from the manual fill pump.

S 494-005

- (4) Install caps on the hydraulic lines.

S 034-006

- (5) Remove the two bolts that hold the manual fill pump in the bracket.

S 024-007

- (6) Remove the manual fill pump from the bracket.

S 034-008

- (7) Remove the unions from the ports on the manual fill pump.

TASK 29-18-01-424-009

3. Install the Manual Fill Pump for the Reservoir

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant – MCS 352B

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B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning

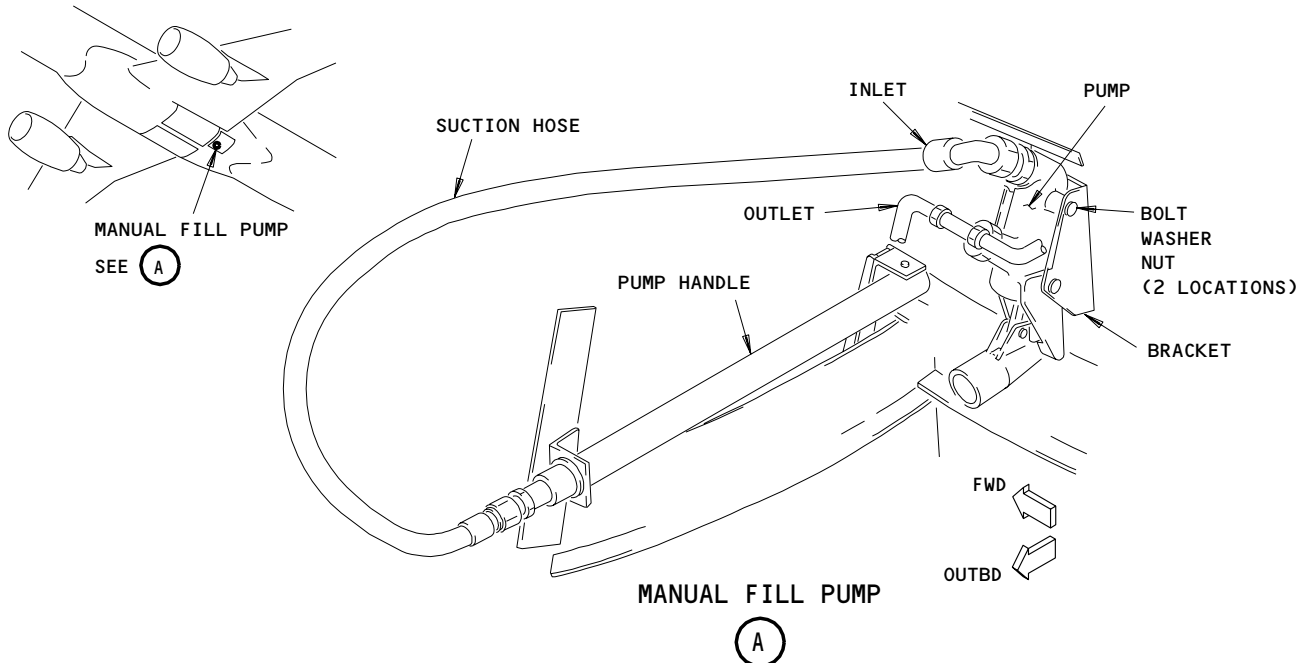
C. Access

- (1) Location Zones
 - 197 Wing to Body - Aft Lower Half (Left)
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

D. Install the Manual Fill Pump (Fig. 401)

S 644-010

- (1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the union threads.



Manual Fill Pump Installation
Figure 401

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- S 434-011
(2) Install the new O-rings on the unions.
- S 434-012
(3) Install the unions in the ports on the manual fill pump.
- S 424-013
(4) Put the manual fill pump in the bracket.
- S 434-014
(5) Install two bolts to hold the manual fill pump in the bracket.
- S 094-015
(6) Remove the caps from the hydraulic lines.
- S 434-016
(7) Connect the inlet and outlet lines to the manual fill pump.
- S 864-017
(8) Pressurize the reservoir fill system with the manual fill pump (AMM 12-12-01/301).
- S 214-018
(9) Make sure there are no leaks at the connection points to the manual fill pump.
- S 104-019
- CAUTION:** QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (10) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).
- S 414-020
(11) Close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

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RESERVOIR FILL SELECTOR VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the selector valve to fill the reservoirs. The other task installs the selector valve to fill the reservoirs.

TASK 29-18-02-024-001

2. Remove the Selector Valve to Fill the Reservoirs

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access

(1) Location Zones

- | | |
|---------|--------------------------------------|
| 197 | Wing to Body – Aft Lower Half (Left) |
| 211/212 | Control Cabin |

(2) Access Panel

- | | |
|-------|----------------------------------|
| 197KL | Central Hydraulic Service Center |
|-------|----------------------------------|

C. Remove the Selector Valve (Fig. 401)

S 014-002

- (1) Open the access door for the hydraulic service bay, 197KL, to get access to the selector valve (AMM 06-41-00/201).

S 864-003

- (2) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
(a) 11K19, HYDRAULICS QTY CTR
(b) 11K20, HYDRAULICS QTY LEFT
(c) 11K21, HYDRAULICS QTY RIGHT

S 864-004

- (3) Remove the pressure from the hydraulic systems and reservoirs (AMM 29-11-00/201).

S 034-005

- (4) Remove the electrical connector on the selector valve.

S 034-006

- (5) Remove the hydraulic lines and install caps on the lines.

S 034-007

- (6) Remove the mount bolts that hold the selector valve in its position.

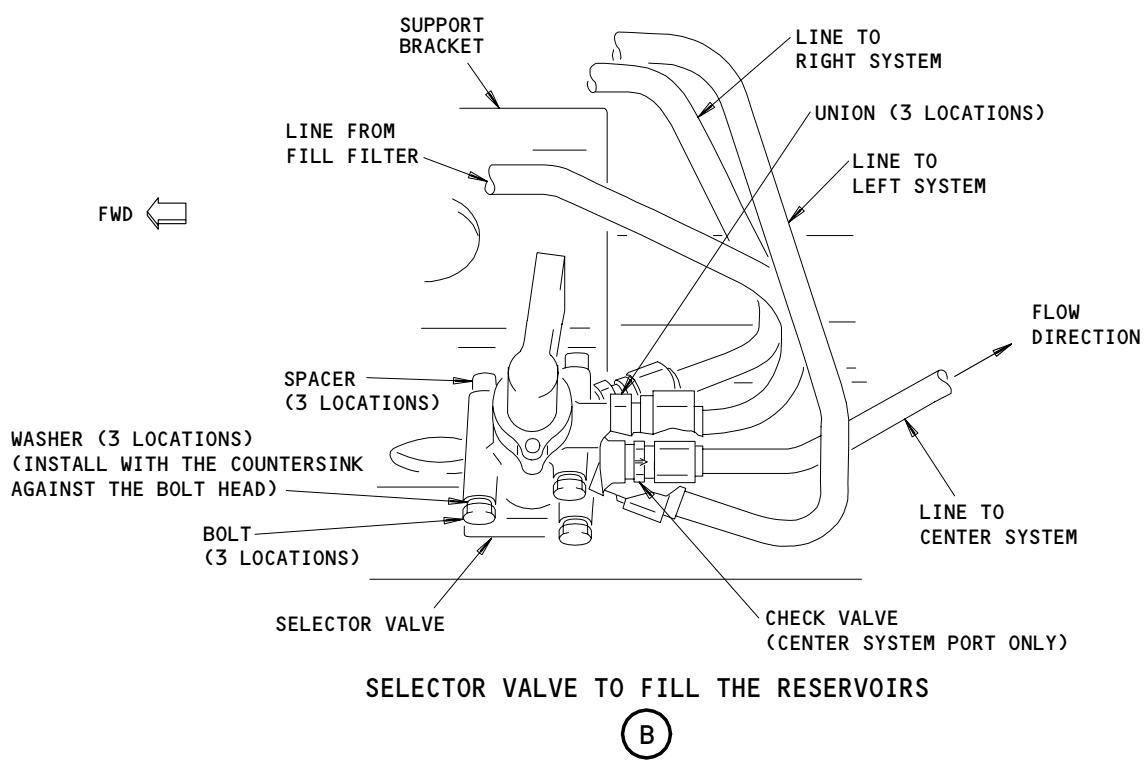
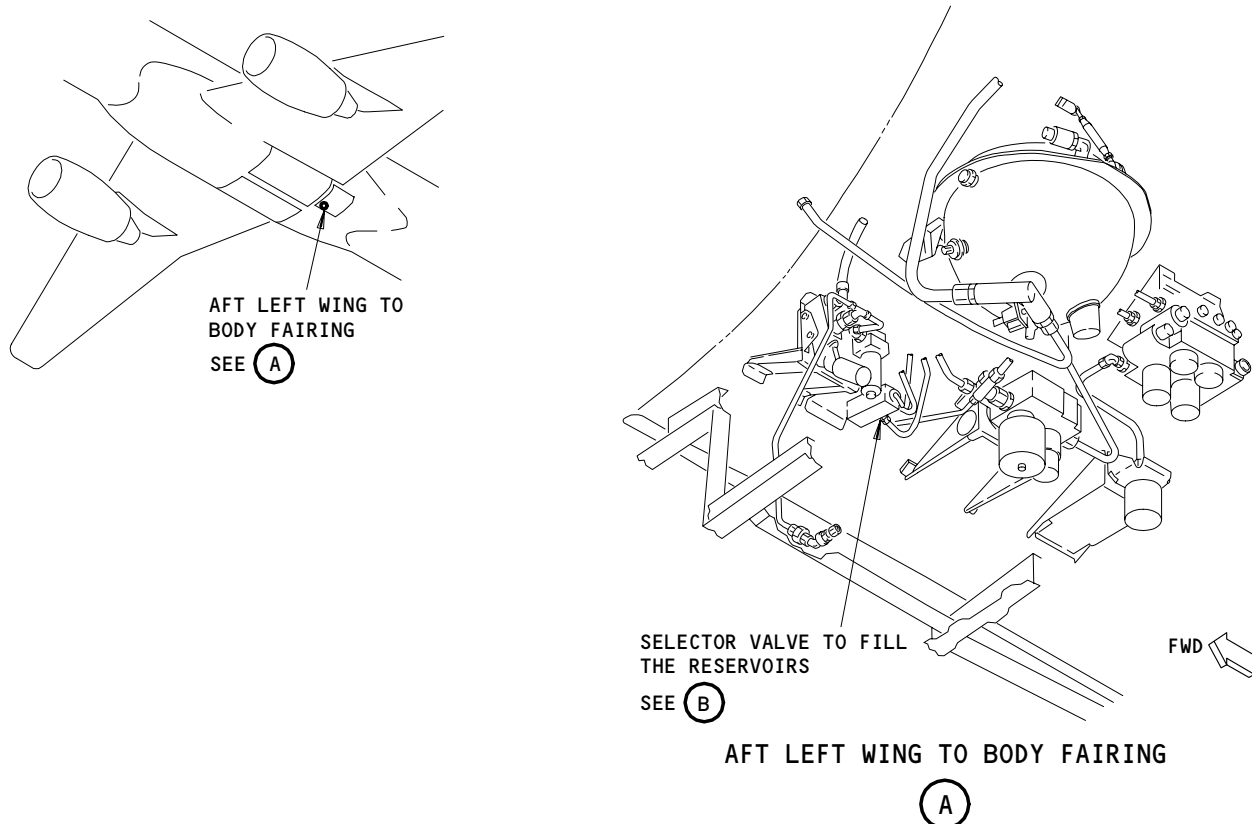
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Reservoir Fill Selector Valve Installation
Figure 401

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S 024-008
(7) Remove the selector valve.

S 034-009
(8) Remove the three unions and one check valve from the selector valve ports.

TASK 29-18-02-424-010

3. Install the Selector Valve to Fill the Reservoirs

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels

(2) AMM 12-12-01/301, Hydraulic Systems

(3) AMM 12-25-01/301, Exterior Cleaning

C. Access

(1) Location Zones

197 Wing to Body - Aft Lower Half (Left)

211/212 Control Cabin

(2) Access Panel

197KL Central Hydraulic Service Center

D. Install the Selector Valve (Fig. 401)

S 644-011

(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads on the unions and the check valve.

S 434-012

(2) Install new O-rings on the unions and the check valve.

S 434-013

(3) Install the check valve in the selector valve port at the center system connection point.

S 434-014

(4) Install the unions in the valve ports for the left and right system connection points.

S 424-015

(5) Put the selector valve in its position and install the mount bolts and washers.

S 434-016

(6) Tighten the mount bolts to 72-88 pound-inches.

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- S 434-017
- (7) Remove the caps from the hydraulic lines and connect them to the selector valve.
- S 434-018
- (8) Connect the electrical connector to the selector valve.
- S 864-019
- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K19, HYDRAULICS QTY CTR
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT
- S 864-020
- (10) Pressurize the reservoir fill system (AMM 12-12-01/301).
- S 214-021
- (11) Make sure there are no leaks at the connection points to the selector valve.
- S 104-022

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (12) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).
- S 414-023
- (13) Close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

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RESERVOIR FILL INDICATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. One task removes the reservoir fill indicator for the hydraulic systems. The other task installs the reservoir fill indicator for the hydraulic systems.

TASK 29-18-03-024-001

2. Remove the Reservoir Fill Indicator

A. References

- (1) AMM 06-41-00/201, Fuselage Access Door and Panels

B. Access

- (1) Location Zones

197	Wing to Body – Aft Lower Half (Left)
211/212	Control Cabin

- (2) Access Panel

197KL	Central Hydraulic Service Center
-------	----------------------------------

C. Remove the Fill Indicator (Fig. 401)

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
- (a) 11K19, HYDRAULICS QTY CTR
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT

S 014-003

- (2) Open the access door for the hydraulic service bay, 197KL to get access to the reservoir fill system (AMM 06-41-00/201).

S 034-004

- (3) Disconnect the electrical connector behind the fill indicator.

S 034-005

- (4) Remove the mounting screws.

S 024-006

- (5) Remove the indicator shield and the fill indicator.

TASK 29-18-03-424-007

3. Install the Reservoir Fill Indicator

A. References

- (1) AMM 06-41-00/201, Fuselage Access Door and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 24-22-00/201, Electrical Power

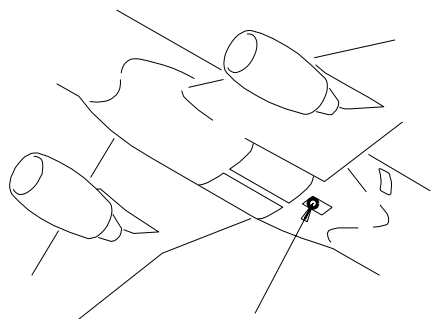
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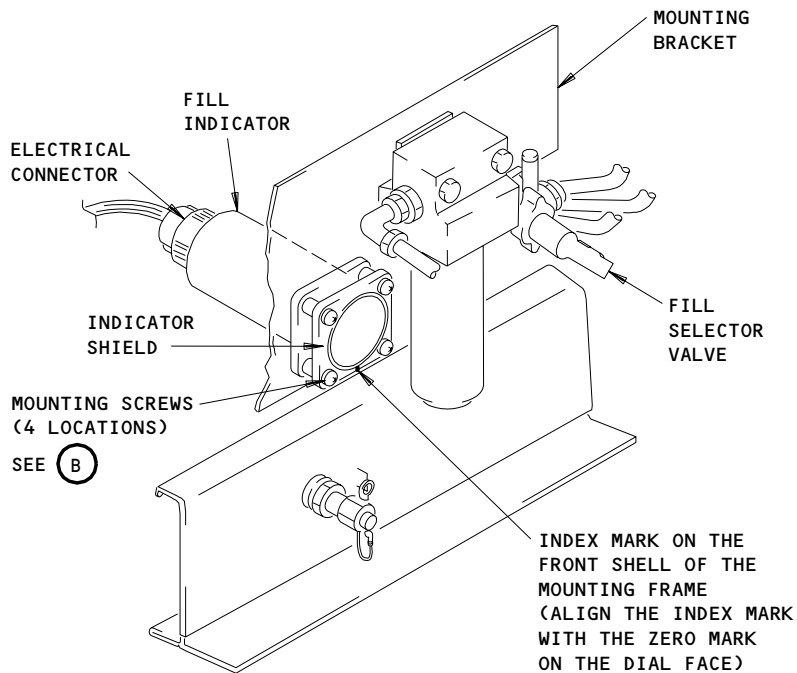
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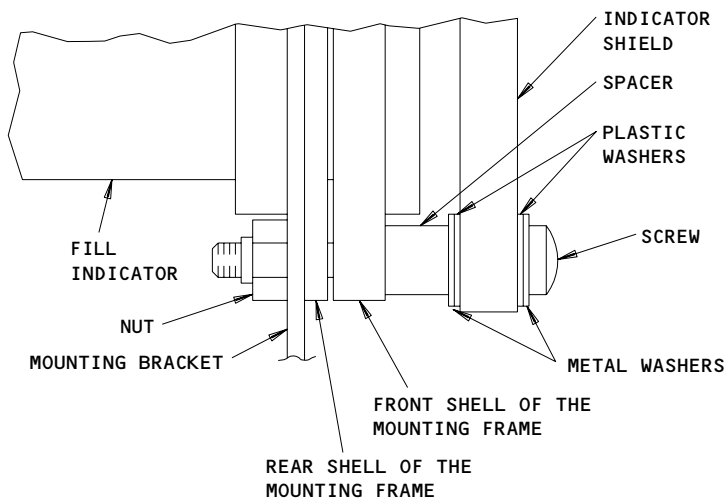


AFT LEFT WING TO BODY FAIRING
SEE (A)



AFT LEFT WING TO BODY FAIRING

(A)



MOUNTING SCREWS

(B)

Reservoir Fill Indicator Installation
Figure 401

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B. Access

(1) Location Zones

197 Wing to Body - Aft Lower Half (Left)
211/212 Control Cabin

(2) Access Panel

197KL Central Hydraulic Service Center

C. Install the Fill Indicator (Fig. 401)

S 434-008

- (1) Put the mounting frame around the fill indicator.

S 434-009

- (2) Assemble the fill indicator, the mounting frame, and the indicator shield, with washers, spacers and screws.

S 424-010

- (3) Put the indicator assembly in its position on the mounting bracket and install nuts on the screws.

NOTE: Align the index mark on the front shell of the mounting frame with the zero mark on the face of the indicator dial before you tighten the nuts.

S 434-011

- (4) Connect the electrical connector.

S 864-012

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:

(a) 11K19, HYDRAULICS QTY CTR
(b) 11K20, HYDRAULICS QTY LEFT
(c) 11K21, HYDRAULICS QTY RIGHT

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- S 864-013
- (6) Supply electrical power (AMM 24-22-00/201).
- S 864-014
- (7) Move the fill selector valve to the left, right, or the center system.
- S 604-015
- (8) Fill the hydraulic system reservoir, that you set the fill selector valve to, until you can see the fluid level in the center of the reservoir sight glass (Ref 12-12-01).
- S 214-016
- (9) Make sure the fill indicator shows 6.1-7.1 gallons (23.1-26.9 liters) for the left or right system and 3.0-4.0 gallons (11.3-15.1 liters) for the center system.
- S 864-018
- (10) Move the fill selector valve to the CLOSED position.
- S 414-019
- (11) Close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).
- S 864-020
- (12) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

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RESERVOIR FILL FILTER MODULE AND COMPONENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains steps to remove and install the filter module and the filter element for the reservoir fill.

TASK 29-18-04-024-001

2. Remove the Filter Module and the Filter Element

A. General

- (1) This task contains two procedures, one to remove the filter module and one to remove the filter element. 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) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

- (1) Location Zones
197 Wing to Body – Aft Lower Half (Left)
- (2) Access Panel
197KL Central Hydraulic Service Center

D. Remove the Filter Module (Fig. 401)

S 864-002

- (1) Remove the pressure from the hydraulic systems and reservoirs (AMM 29-11-00/201).

S 014-003

- (2) Open the access door for the hydraulic service bay, 197KL, on the wing to body fairing (AMM 06-41-00/201).

S 864-004

- (3) Move the handle for the fill selector valve to the OFF position.

S 034-005

- (4) Disconnect the inlet and outlet hydraulic lines and install caps on the hydraulic lines.

S 034-006

- (5) Remove the two mount bolts.

S 024-007

- (6) Remove the filter module.

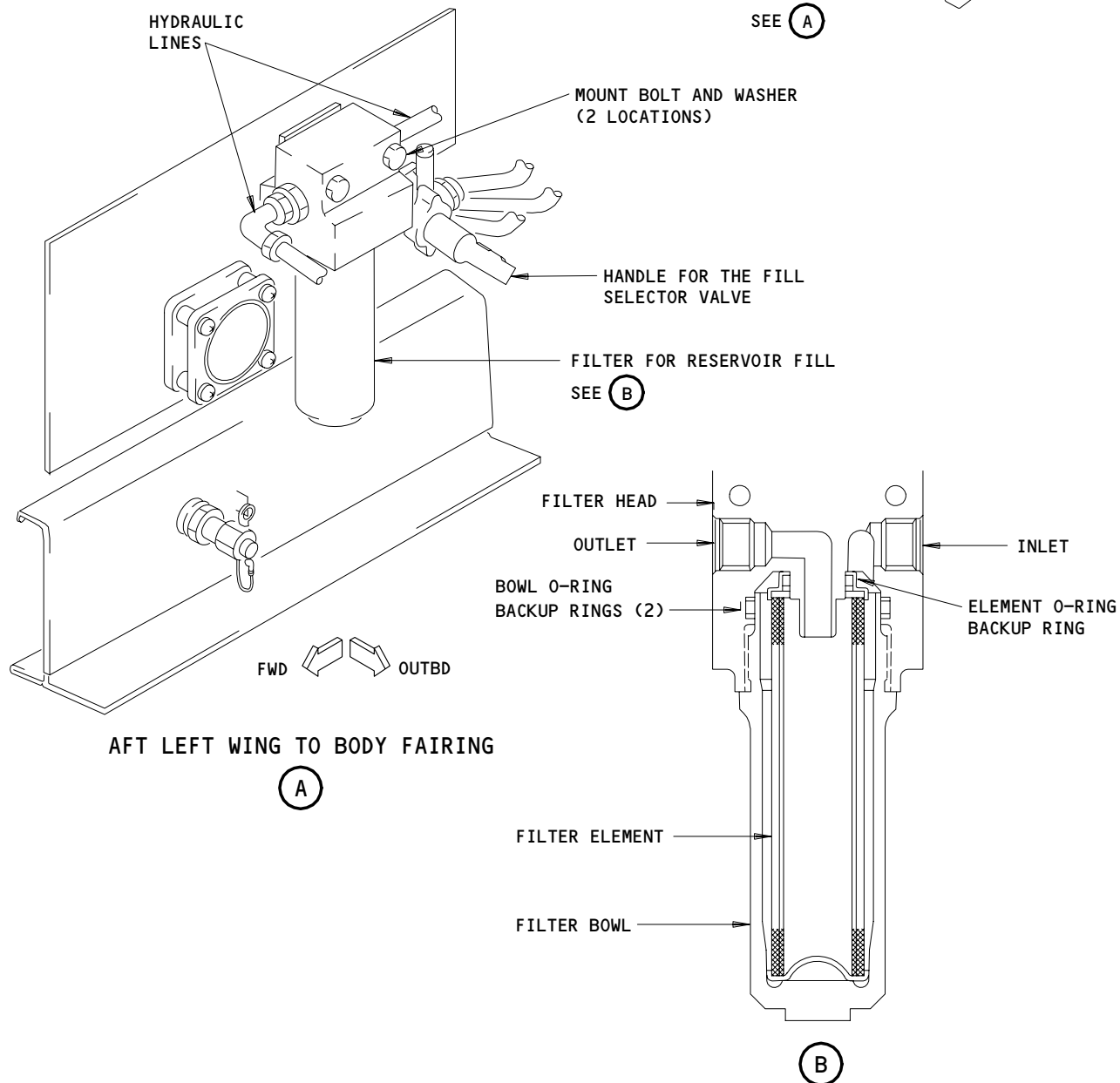
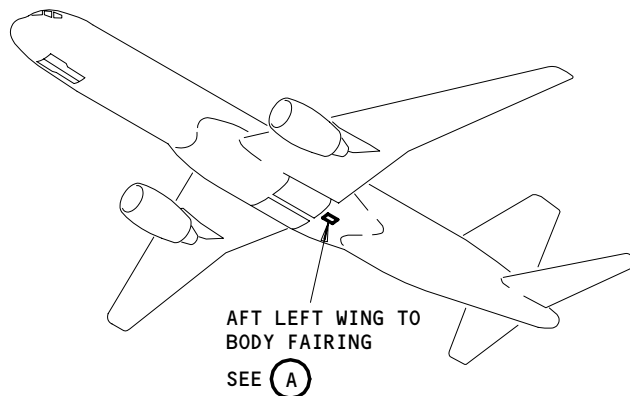
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Filter Module for Reservoir Fill
Figure 401

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S 034-008

(7) Remove the union from each filter module port.

E. Remove the Filter Element (Fig. 401)

S 014-009

(1) Open the access door for the hydraulic service bay, 197KL, on the wing to body fairing (AMM 06-41-00/201).

S 024-010

(2) Remove the filter bowl from the filter head.

S 024-011

(3) Remove the filter element from the filter bowl.

TASK 29-18-04-424-012

3. Install the Filter Module and the Filter Element

A. General

(1) This task contains two procedures, one to install the filter module and one to install the filter element. 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. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels

(2) AMM 12-12-01/301, Hydraulic Systems

(3) AMM 12-25-01/301, Exterior Cleaning

D. Access

(1) Location Zones

197 Wing to Body - Aft Lower Half (Left)

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- (2) Access Panel
197KL Central Hydraulic Service Center

E. Install the Filter Module (Fig. 401)

S 644-013

- (1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the union threads.

S 434-014

- (2) Install new O-rings on the unions.

S 434-015

- (3) Install the unions in the filter module ports.

S 424-016

- (4) Put the filter module on the mounting bracket.

S 434-017

- (5) Put the washers on the mount bolts with the countersunk side of the washer pointed in the direction of the bolt head.

S 434-018

- (6) Install the mount bolts and tighten them to 72-88 pound-inches.

S 434-019

- (7) Remove the caps and connect the inlet and outlet hydraulic lines.

F. Install the Filter Element (Fig. 401).

S 644-020

- (1) Apply hydraulic lubricant or hydraulic fluid to the O-rings.

S 434-021

- (2) Install two backup rings and the bowl O-ring in the groove in the filter head.

S 434-022

- (3) Install the element O-ring and the backup ring in the groove in the filter element.

S 424-023

- (4) Install the filter element on the fitting in the filter head.

S 424-024

- (5) Clean and install the filter bowl.

S 434-025

- (6) Tighten the filter bowl to 75-100 pound-inches.

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G. Put the Airplane Back to Its Usual Condition

S 864-026

- (1) Pressurize the reservoir fill system (AMM 12-12-01/301).

S 214-027

- (2) Make sure there are no leaks at the connection points to the filter module.

S 104-028

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (3) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-029

- (4) Close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

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RAM AIR TURBINE (RAT) SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)

- A. The ram air turbine (RAT) provides reserve hydraulic power to the center system for operation of the flight controls. The RAT is stowed in the aft right wing/body fairing. When deployed, the RAT swings out into the airstream and remains extended until retracted on the ground. The RAT deploys if power is lost in both engines. The RAT can be deployed manually with the RAT deployment switch in the flight compartment.
- B. When the airplane is on the ground, the RAT can be deployed and retracted with the RAT ground manual switch in the right wheel well. Prior to retracting the RAT, the propellor blades must be moved to align index marks on the hub and strut.
- C. The RAT consists of a turbine and a hydraulic pump mounted on a hinged strut housing. The turbine consists of a hub with two propellor blades which are driven by the airstream. The RAT is deployed and retracted by the deployment actuator. The actuator retracts with hydraulic pressure and deploys with spring pressure.

2. Component Details (Fig. 1)

A. RAT Strut

- (1) The RAT strut supports the hydraulic pump and turbine. The strut is pivoted at the upper end where it mounts to the airplane. Swivel valves at the top of the strut transfer fluid from the strut to the center hydraulic system. Internal passages in the strut carry fluid between the swivel valves and hydraulic pump.
- (2) A spring-loaded blade-lock plunger is mounted at the lower end of the strut. The plunger locks the turbine blades in the correct position for stowing the RAT. The plunger also prevents rotation of the blades until clear of the airplane during deployment. The plunger is actuated by a cable attached to a bracket on the outboard swivel valve. A blade index switch actuated by the plunger stops retraction of the RAT if the plunger does not engage the turbine hub.

B. Hydraulic Pump

- (1) The hydraulic pump supplies 11.3 gpm at 2140 psi. The pump flow is controlled by the output pressure. At 3025 psi the pump delivery flow is zero.
- (2) The pump can be used as a hydraulic motor to drive the turbine for a test of the governor. To back-drive the turbine, a valve in the checkout module reverses the fluid flow from the center hydraulic system. The system pressure is then used as a power source to drive the pump as a motor. In this mode, the pump drives the turbine in the normal direction. Prior to backdriving the turbine, a safety screen is installed which completely encloses the turbine blades for personnel protection. The safety screen must be removed before the RAT is retracted.

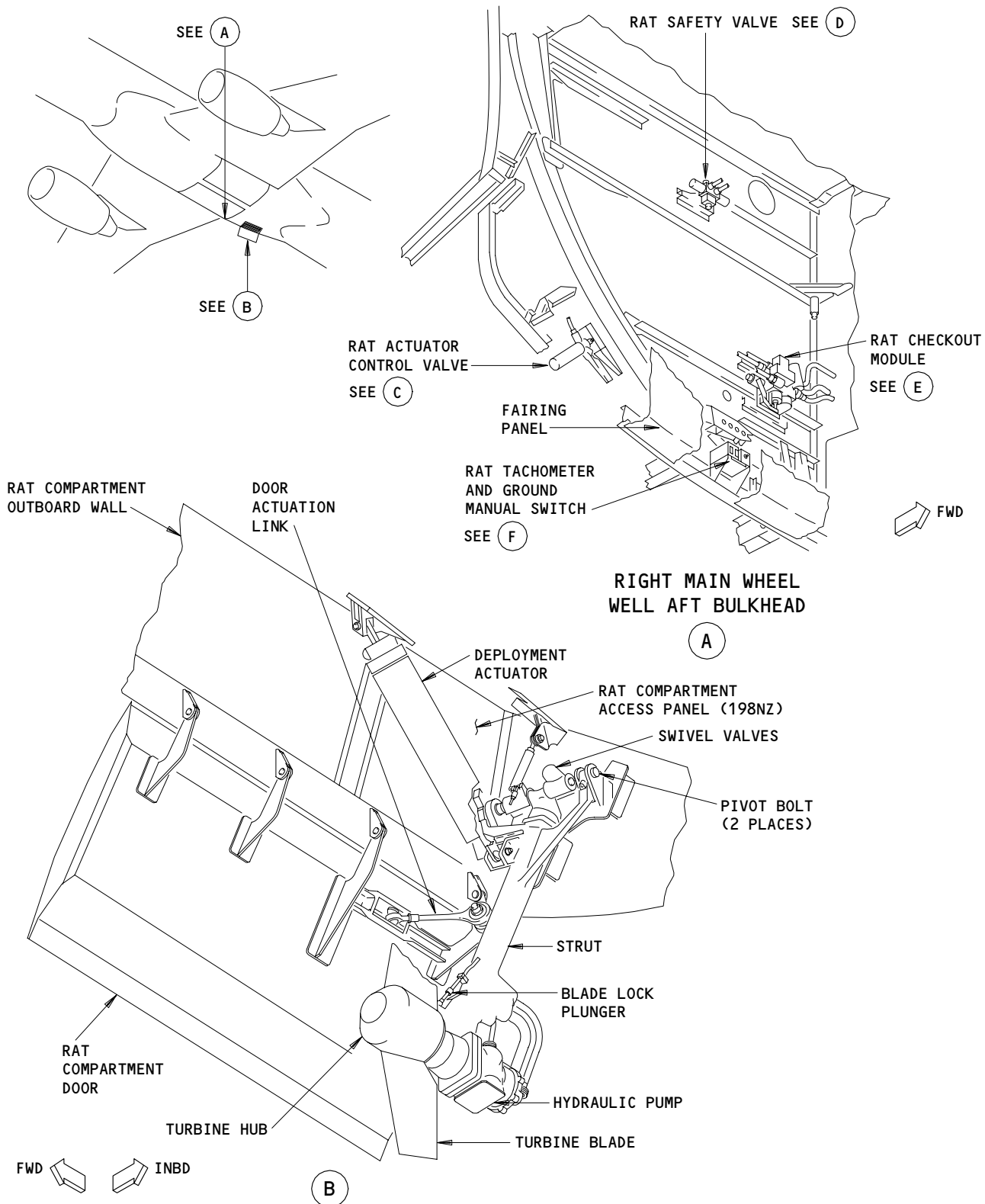
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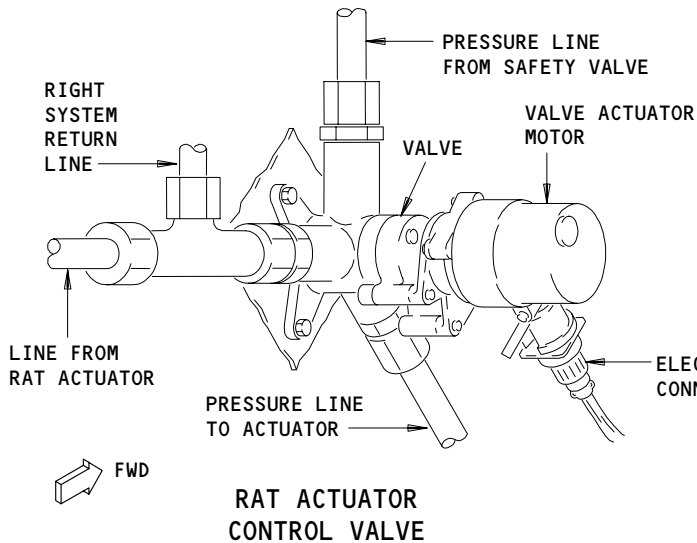
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Ram Air Turbine (RAT) System
Figure 1 (Sheet 1)

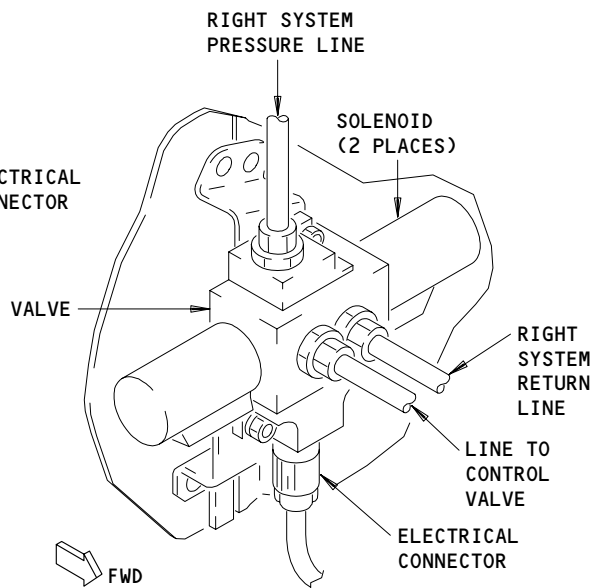
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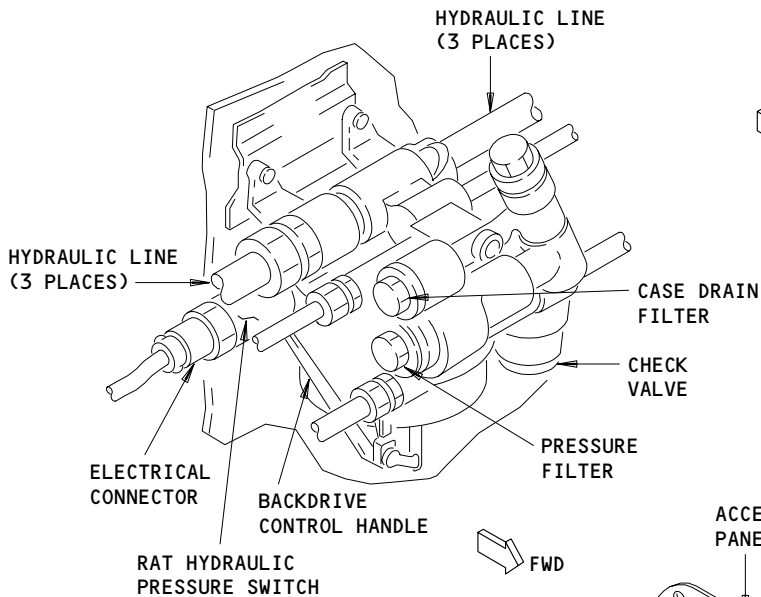
RAT ACTUATOR CONTROL VALVE

(C)



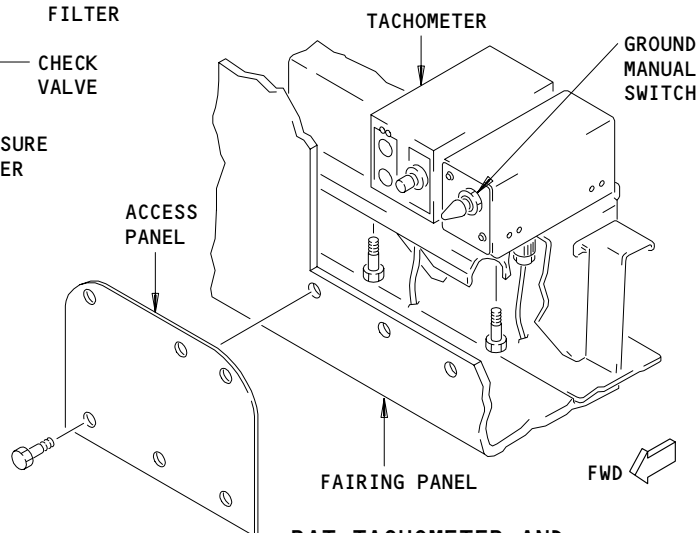
RAT SAFETY VALVE

(D)



RAT CHECKOUT MODULE

(E)



RAT TACHOMETER AND GROUND CHECKOUT MODULE

(F)

**Ram Air Turbine (RAT) System
Figure 1 (Sheet 2)**

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C. Turbine

- (1) The turbine consists of a hub with two propellor blades. The hub is connected to the hydraulic pump by a driveshaft. The blades are attached to a mechanical governor in the hub. The governor varies the blade pitch angle to control the turbine speed.

D. Deployment Actuator

- (1) The deployment actuator is a hydraulic cylinder attached to airplane structure and to the RAT strut. The actuator moves the strut between the deployed and retracted positions. Right hydraulic system pressure drives the actuator to the retracted position where it is held by an internal mechanical lock. The actuator is driven to the deployed position by springs which compress during retraction. The actuator is unlocked by either of two solenoids, one for manual deployment and one for automatic deployment. Hydraulic fluid from the actuator flows into the right system return line as the RAT deploys.

E. Actuator Control Valve

- (1) The control valve connects the deployment actuator to either the right system return line or to the RAT safety valve. The valve is on the fuselage skin inside the aft right wing/body fairing. The two-position valve is operated by a 28-volt dc motor which is controlled by the RAT ground manual switch. The actuator pressure port is normally connected to the right system return line. For deployment or retraction with the RAT ground manual switch, the actuator pressure port is connected to the RAT safety valve.

F. Safety Valve

- (1) The safety valve is on the aft wall of the right main wheel well. The valve is a three-position valve operated by two 28-volt dc solenoids. The valve solenoids are controlled by the RAT ground manual switch. In the retraction position, the valve connects right system pressure to the deployment actuator pressure port. In the deployment position, the valve connects the actuator pressure port to the right system return line. In the off position, the valve blocks flow from the actuator pressure port to stop actuator movement.

G. Checkout Module

- (1) The checkout module is on the aft wall of the right main wheel. The module contains a back-drive valve, filters, pressure switch, check valves, and a volumetric fuse cartridge valve. The module is used to check the operation of the RAT with the airplane on the ground.
- (2) The back-drive valve is a manual valve which reverses the RAT pump connections to the center hydraulic system. In the back-drive position, center system pressure is routed to the supply port of the RAT pump. This causes the pump to act as a motor driving the turbine in the normal direction.
- (3) The module filters both pressure and case drain fluid from the RAT pump. The filters are a non-cleanable type.
- (4) A pressure switch senses pressure output of the RAT pump and turns on the RAT pressure light in the flight compartment.

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- (5) Check valves prevent the RAT system from being pressurized by the center system while the RAT is not in use. An orifice in the back-drive valve permits a small flow of fluid to warm the strut and pump. The fluid returns to the center system through the pump case drain line.
- (6) The volumetric fuse cartridge valve reduces the pressure load on the RAT pump until the turbine reaches governed speed.

H. Tachometer

- (1) The tachometer provides a visual indication of the operating status of the RAT during ground test. The tachometer consists of an indicator and a speed sensor. The tachometer indicator is inside the fairing panel at the lower edge of the right wheel well aft bulkhead.
- (2) The tachometer indicator has two indicator lights and a lamp test switch. A green light indicates turbine speed is at the normal governed speed. A red light indicates turbine overspeed. If no light is on, the turbine speed is below the normal governed speed. The lamp test switch is used to check that the indicator lights are not burned out. When the switch is pressed, with the RAT operating, both indicator lights should illuminate.
- (3) Power for the tachometer indicator and the source of turbine speed sensing is provided by a speed sensor located in the lower end of the RAT strut between the hub and pump. The speed sensor is a permanent magnet generator that produces an electrical signal which is used to power the indicator lights.

I. RAT Compartment Door

- (1) The compartment door is hinged on the outboard side and opens as the RAT is deployed. The door and opening in the fairing have seals to isolate the compartment when the RAT is stowed.

J. Door Actuation Link

- (1) The actuation link joins the RAT strut to the compartment door. The link has a bearing at each end. The link forces the door open or closed as the RAT deploys or retracts.

K. RAT Compartment Access Panel

- (1) An access panel is located in the outboard wall of the RAT compartment, inside the aft right wing/body fairing. Removal of wing/body fairing panel (196CR) and the RAT compartment access panel (198NZ) allows access to the RAT, if it cannot be deployed normally.

3. Operation

A. Functional Description (Fig. 2)

(1) In-Flight Deployment

- (a) In the air mode, the air/ground system No.1 relay provides 28 volt dc power from the battery bus to the RAT arm Q airspeed switch. The RAT arm Q airspeed switch is actuated by the pitot/static system when airplane speed reaches 80 KIAS to arm the RAT automatic deployment circuit.
- (b) If power is lost in both engines, the left and right engine speed cards energize the RAT auto control relay. The auto control relay energizes the auto solenoid to unlock the deployment actuator.

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- (c) The RAT can also be deployed with the RAT deployment switch on the pilot's overhead panel P5. This switch energizes the manual deploy solenoid to unlock the deployment actuator.
 - (d) When unlocked, the actuator deploys the RAT by spring force. The blade-lock plunger unlocks the turbine hub as the RAT deploys. The stowed limit switch moves to the not-stowed position and turns on the RAT UNLOCKED light on the pilot's overhead panel P5. A RAT UNLOCKED message also appears on the EICAS display. The force of the airstream rotates the turbine blades to drive the hydraulic pump. A governor in the hub varies the pitch of the blades to control turbine speed.
 - (e) Fluid is supplied to the hydraulic pump from the reserve supply outlet on the center system reservoir. The reserve supply outlet draws fluid from the bottom of the reservoir to allow use of a reserve amount of fluid retained there for use only by the RAT pump, by a standpipe on the ACMP supply outlet. Pressure and case drain flow from the pump enters the center system through filters in the checkout module. Pump pressure closes the checkout module pressure switch and turns on the RAT pressure light on panel P5.
- (2) Ground Deployment

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WARNING: FOR AIRPLANES DELIVERED PRIOR TO L/N 128 AND WITHOUT SB 757-29A0032 INCORPORATED

THE RAT AUTO CIRCUIT BREAKER ON PANEL P11 AND RAT MANUAL CIRCUIT BREAKER ON PANEL P6 MUST BE OPEN BEFORE PERFORMING PITOT STATIC SYSTEM TESTING. IF SIMULATED PITOT PRESSURE EQUAL TO 80 KNOTS IS APPLIED WITH ENGINES OFF, THE RAM AIR TURBINE WILL DEPLOY.

FOR AIRPLANES DELIVERED WITH RAT AIR/GROUND LOGIC (L/N 128 AND ON) OR EARLIER AIRPLANES WITH SB 757-29A0032 INCORPORATED

THE RAT AUTO CIRCUIT BREAKER ON PANEL P11 AND RAT MANUAL CIRCUIT BREAKER ON PANEL P6 MUST BE OPEN BEFORE PERFORMING PITOT STATIC SYSTEM TESTING. IF SIMULATED PITOT PRESSURE EQUAL TO 80 KNOTS IS APPLIED WITH ENGINES OFF AND THE AIRPLANE IN THE AIR MODE, THE RAM AIR TURBINE COULD DEPLOY.

- (a) In the ground mode, the air/ground system No. 1 relay removes power from the RAT arm Q airspeed switch and provides power to the RAT ground manual switch. While the airplane is on the ground, the RAT can be deployed with either the RAT deployment switch on the pilot's overhead panel P5 or the RAT ground manual switch inside the fairing panel on the right wheel well aft bulkhead. The RAT deployment switch deploys the RAT the same as in-flight deployment and does not provide control to stop the RAT once deployment is started. The RAT ground manual switch deploys the RAT and provides control to stop the RAT at any point during deployment.
 - (b) When the ground manual switch is held in the DEPLOY position the RAT control valve motor is energized. The valve moves to position No. 2 (ground position) and connects the deployment actuator pressure port to the RAT safety valve. In position No. 2 the valve switch closes to energize the deploy solenoid on the RAT safety valve. In the deploy position, the safety valve connects the actuator pressure port to the right hydraulic system return line. This allows fluid to flow out of the actuator as it deploys by spring force. When the ground manual switch is in the DEPLOY position the auto solenoid unlocks the deployment actuator.
 - (c) The ground manual switch returns to the OFF position, if released. This de-energizes the safety valve which moves to the closed position. In the closed position, the valve blocks fluid flow from the actuator and stops RAT deployment.
- (3) Retraction
- (a) The RAT can be retracted only while the airplane is on the ground and with the right hydraulic system pressurized.

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- (b) The RAT turbine hub must be moved to align index marks on the hub and strut. When the ground manual switch is moved to the STOW position power is applied to the safety valve retract solenoid. The safety valve moves to the retract position which connects right system pressure to the actuator pressure port. Hydraulic pressure drives the actuator to the retracted position, stowing the RAT. As the actuator retracts, the deployment springs inside are compressed. A mechanical lock holds the actuator in the retracted position.
 - (c) When the RAT reaches full stow and locked position the RAT control valve is cycled to position No. 1 (air position). The pressure and return ports of the actuator are connected to the right system return line. The RAT is then ready for automatic (air) release.
 - (d) If the blade-lock plunger does not engage the hub during retraction, the blade index switch will de-energize the safety valve. The valve moves to the OFF position, removes hydraulic pressure from the actuator, and prevents actuator movement.
- B. For more details on the Ram Turbine Air system, refer to this wiring diagram and functional schematic:
- (1) WDM 29-21-31: Hydraulic Ram Air Turbine Control and Indication
 - (2) SSM 29-00-04: Center Hydraulic Power

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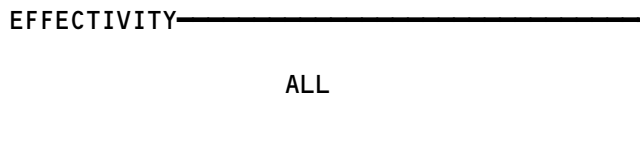
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FAULT ISOLATION/MAINT MANUAL

RAM AIR TURBINE (RAT) SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - RAT DEPLOYMENT	2	1	198MR, AFT RIGHT WING-TO-BODY FAIRING	29-21-05
ASSEMBLY - RAT, M10148	3	1	198MR, AFT RIGHT WING-TO-BODY FAIRING	29-21-01
CABLE - RAT BLADE LOCK	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-19
CARDS - (77-12-00/101) LEFT ENGINE SPEED, M10298 RIGHT ENGINE SPEED, M10311				
CIRCUIT BREAKERS - RAT MAN CONT, C4287 ▶ 1	1	1	FLIGHT COMPARTMENT, P6 PANEL 6F2	*
RAT MAN PWR, C4062		1	6F1	
CIRCUIT BREAKERS - HYDRAULIC RAT AUTO CONT, C4061 ▶ 1	1	1	FLIGHT COMPARTMENT, P11 PANEL 11D26	*
HYDRAULIC RAT CONT, C4061 ▶ 2		1	11D26	*
HYDRAULIC RAT AUTO PWR, C4216 ▶ 1		1	11D27	*
HYDRAULIC RAT AUTO, C4216 ▶ 2		1	11D27	
COMPUTERS - (31-41-00/101) EICAS L, M10181 EICAS R, M10182				
DOOR - RAT COMPARTMENT	2	1	198MR, AFT RIGHT WING-TO-BODY FAIRING	29-21-09
HARNESS - RAT WIRE	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-18
HUB - RAT	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-01
LINK - RAT DOOR ACTUATOR	3	1	198MR, AFT RIGHT WING-TO-BODY FAIRING	29-21-10
MODULE - RAT CHECKOUT PANELS - (80-11-00/101) ENG START/RAT CONT, M10468	5	1	RIGHT WHEEL WELL	29-21-11
PLUNGER - RAT BLADE LOCK	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-19
PUMP - RAT HYDRAULIC	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-01

* SEE THE WDM EQUIPMENT LIST

Ram Air Turbine (RAT) System - Component Index
Figure 101 (Sheet 1)



29-21-00

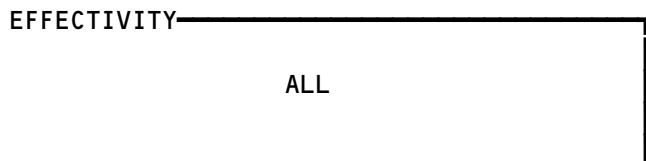
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757
FAULT ISOLATION/MAINT MANUAL

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
RELAY - (31-01-33/101) RAT AUTO CONTROL, K10059				
RELAYS - (31-01-36/101) RAT MANUAL CONTROL, K10058				
SYSTEM 1 AIR/GROUND, K10384				
SENSOR - RAT TACHOMETER SPEED	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-15
SOLENOID - RAT ACTUATOR AUTO, M10407	2	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT DEPLOYMENT ACTUATOR	*
SOLENOID - RAT ACTUATOR MANUAL, M10406	2	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT DEPLOYMENT ACTUATOR	*
SWITCH - RAT ARM Q AIRSPEED, S10334	6	1	119BL, MAIN EQUIPMENT CENTER, E1 RACK	29-21-53
SWITCH - RAT BLADE LOCK LIMIT	4	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-21
SWITCH - RAT GROUND MANUAL, M10405	5	1	RIGHT WHEEL WELL	29-21-51
SWITCH - RAT HYDRAULIC PRESSURE, S10323	5	1	RIGHT WHEEL WELL, RAT GROUND CHECKOUT MODULE	29-21-11
SWITCH - RAT STOWED LIMIT, S10258	3	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-17
SWITCH - RAT STRUT POSITION LIMIT	3	1	198MR, AFT RIGHT WING-TO-BODY FAIRING, RAT ASSEMBLY, M10148	29-21-20
SWITCH/LIGHT - RAT DEPLOYMENT, YQUS1	1	1	FLIGHT COMPARTMENT, P5 PANEL, ENGINE START/RAT CONTROL PANEL, M10468	*
TACHOMETER - RAT, N10028	5	1	RIGHT WHEEL WELL	29-21-51
TIME DELAY - (31-01-33/101) RAT, M10323				
VALVE - RAT ACTUATOR CONTROL, V10070	2	1	198MR, AFT RIGHT WING-TO-BODY FAIRING	29-21-04
VALVE - RAT SAFETY, V10069	5	1	RIGHT WHEEL WELL	29-21-14

* SEE THE WDM EQUIPMENT LIST

- 1 ALL EXCEPT GUI 115
- 2 GUI 115

Ram Air Turbine (RAT) System - Component Index
Figure 101 (Sheet 2)

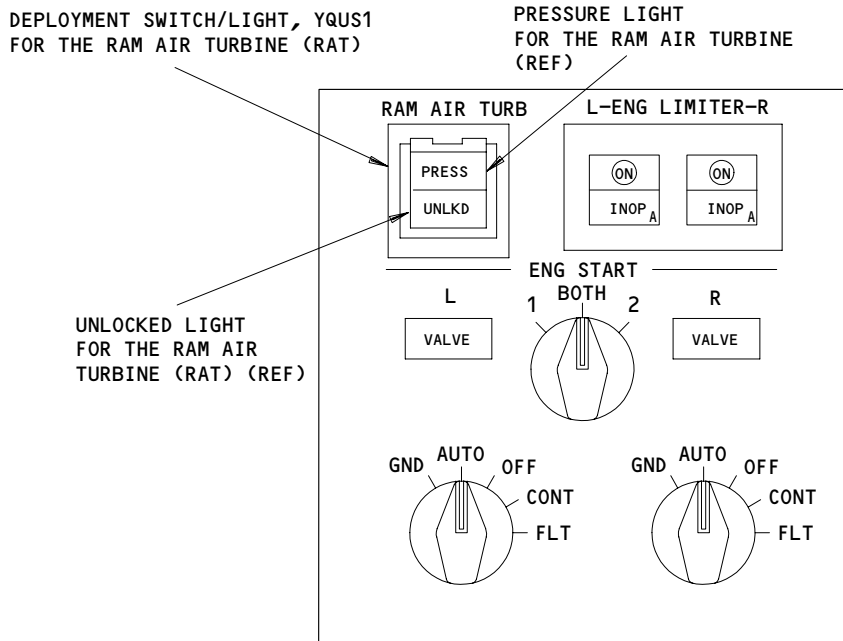
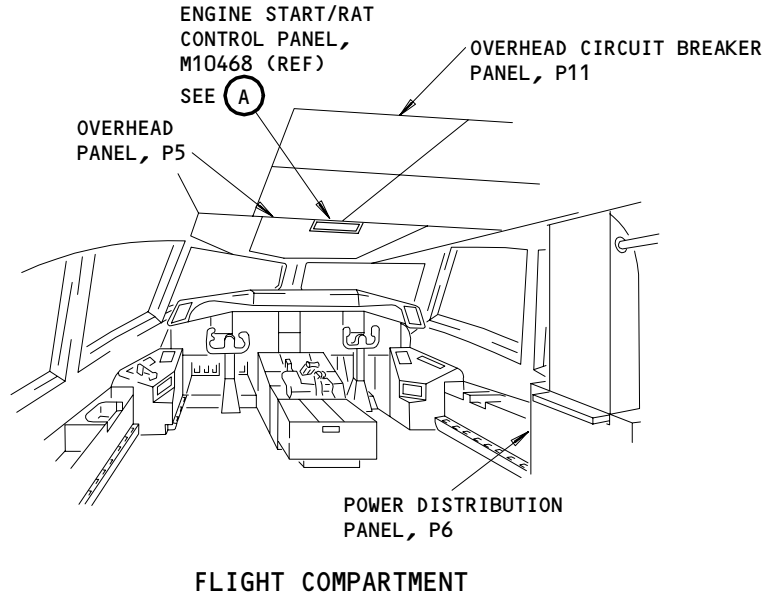


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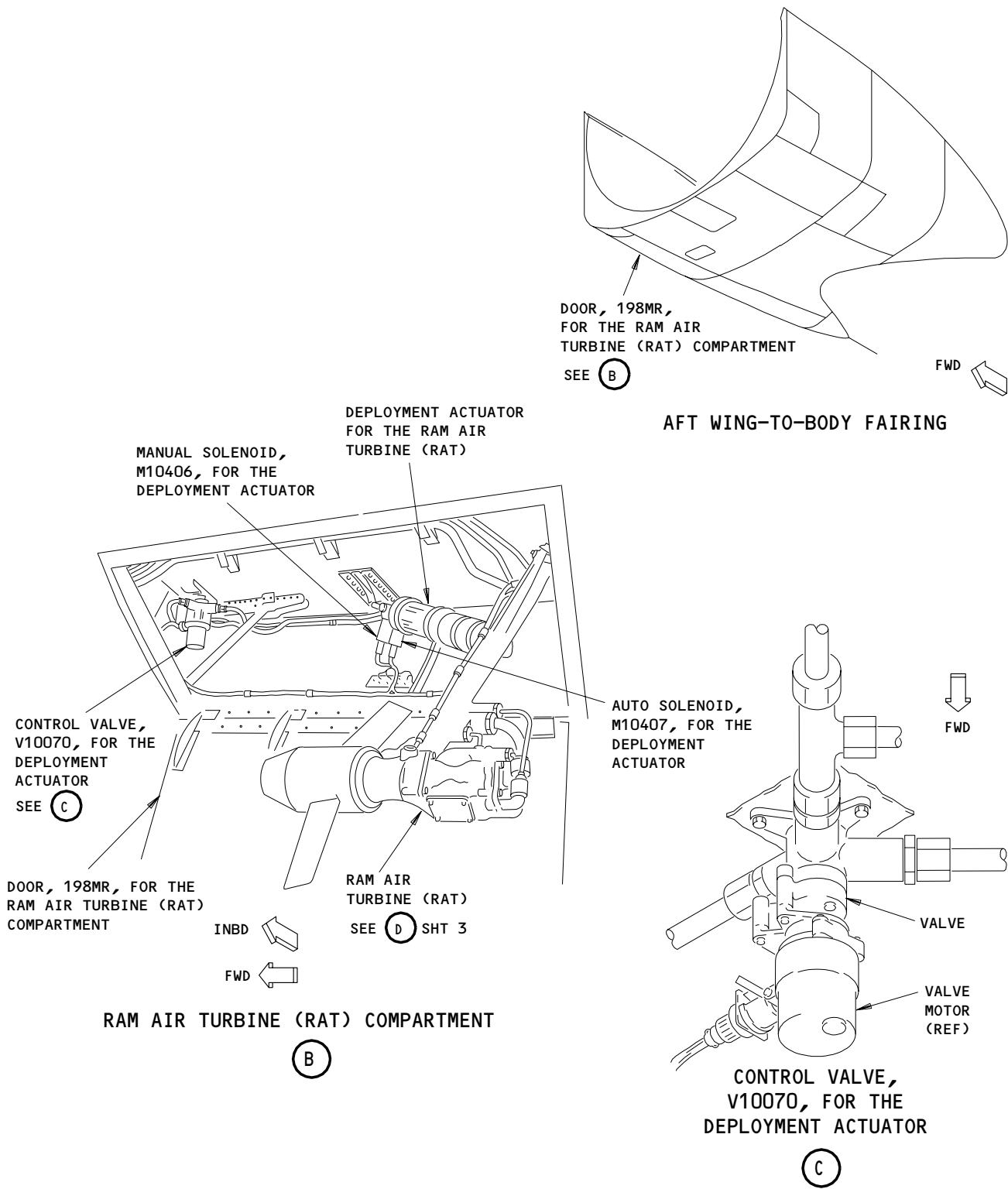


A

Ram Air Turbine (RAT) System - Component Location
Figure 102 (Sheet 1)

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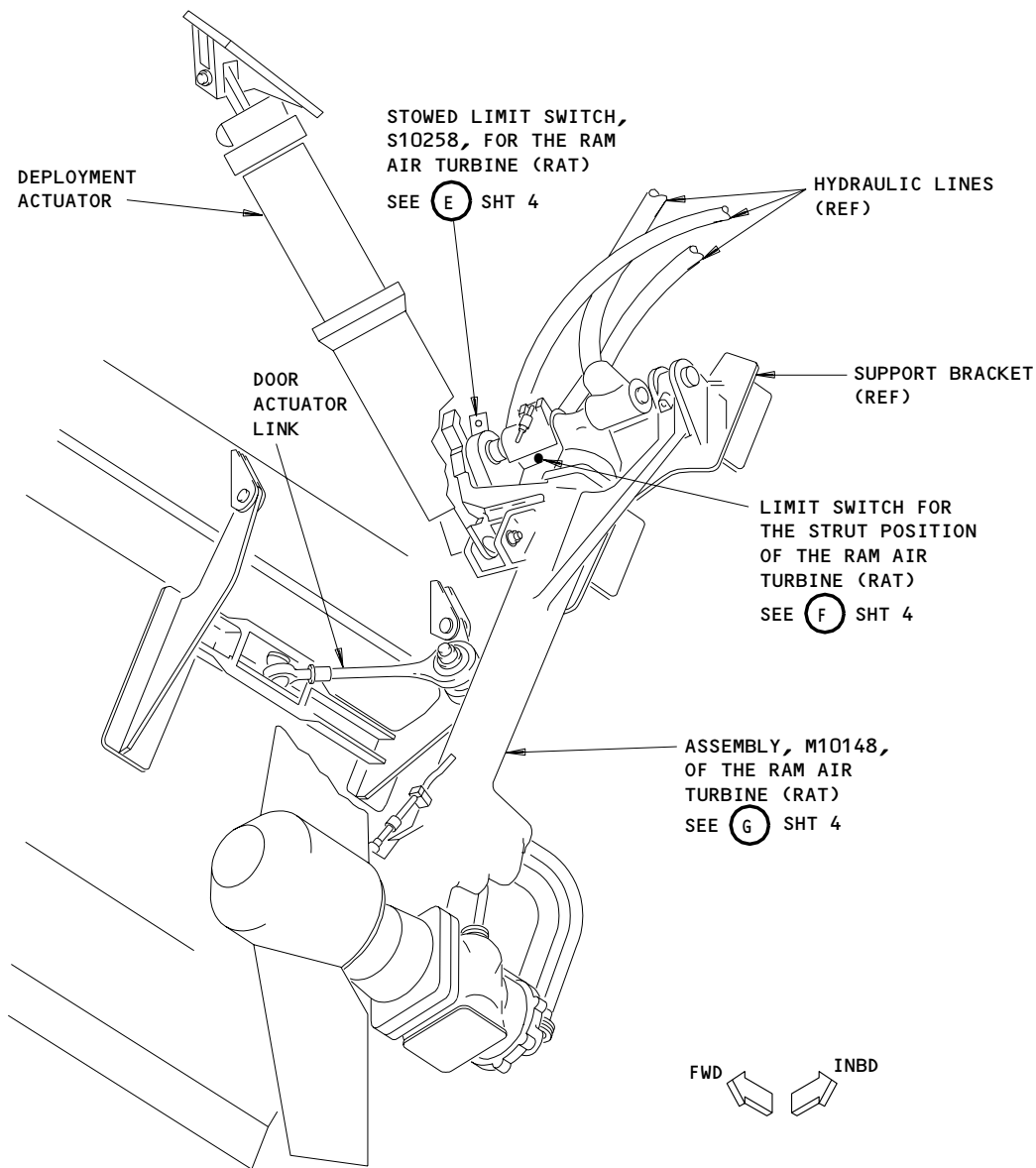
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Ram Air Turbine (RAT) System - Component Location
Figure 102 (Sheet 2)

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RAM AIR TURBINE (RAT)

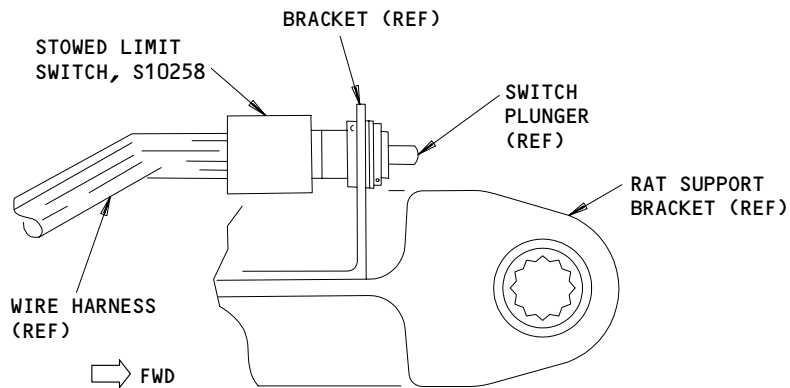
(D)

Ram Air Turbine (RAT) System - Component Location (Detail From Sht 2)
Figure 102 (Sheet 3)

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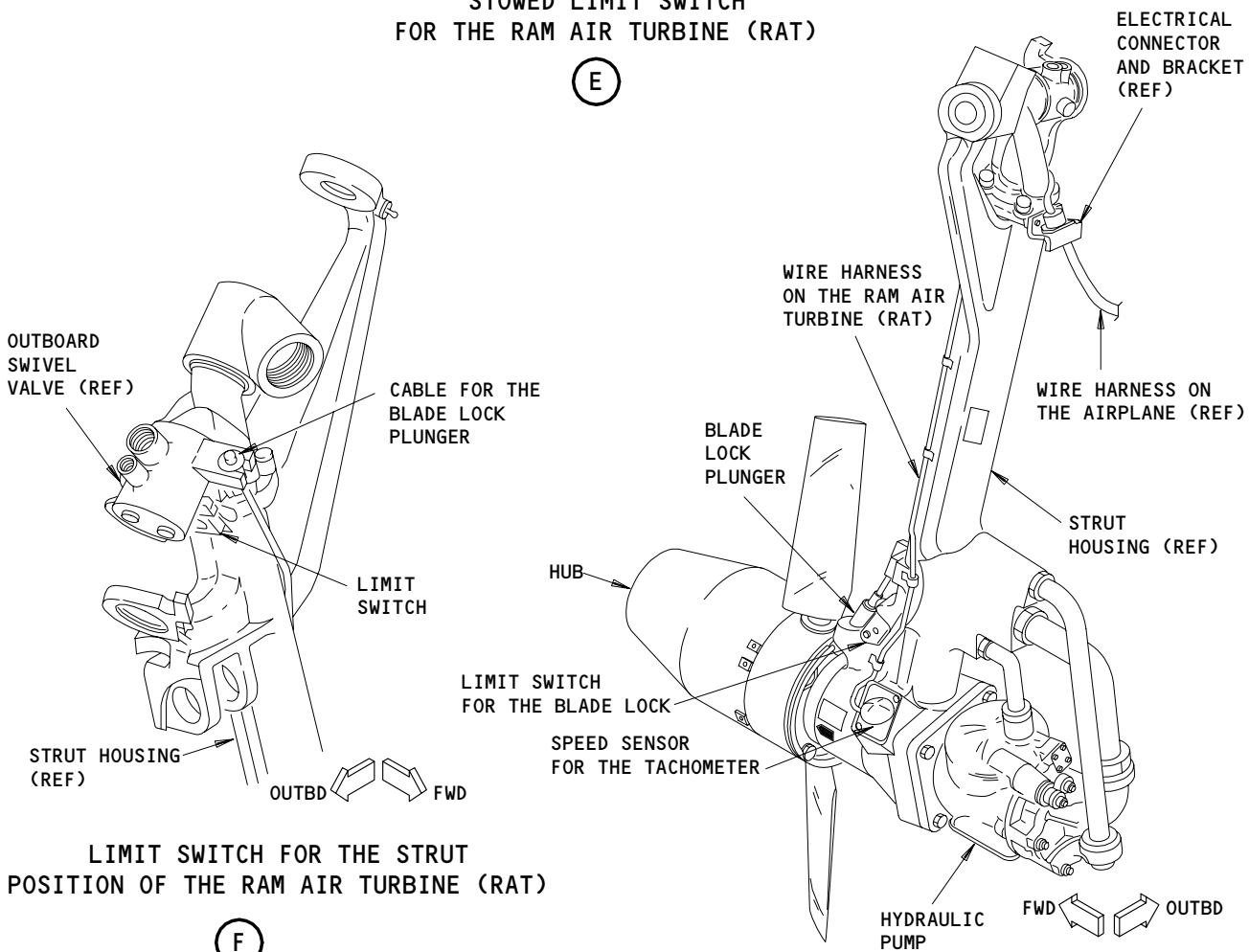
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**STOWED LIMIT SWITCH
FOR THE RAM AIR TURBINE (RAT)**

E



**LIMIT SWITCH FOR THE STRUT
POSITION OF THE RAM AIR TURBINE (RAT)**

F

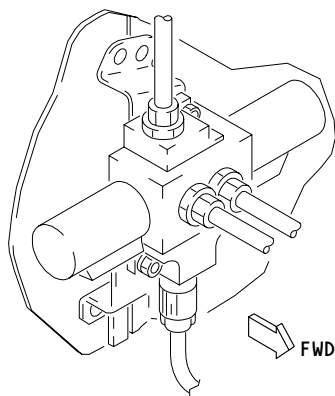
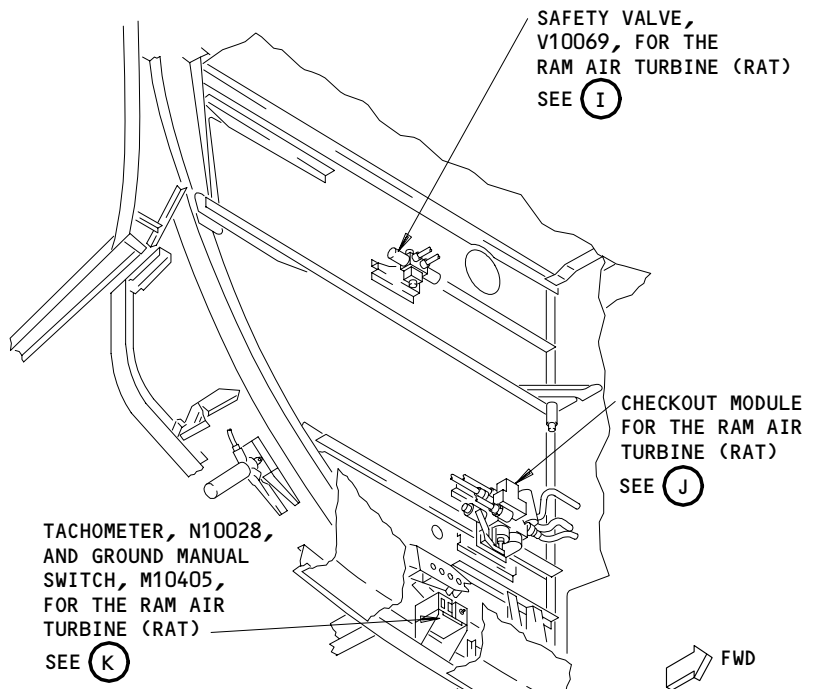
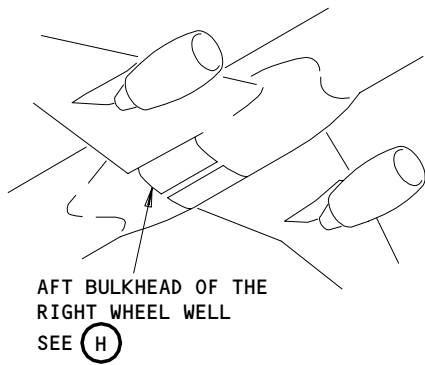
**ASSEMBLY, M10148, OF THE
RAM AIR TURBINE (RAT)**

G

**Ram Air Turbine (RAT) System - Component Location (Details from Sht 3)
Figure 102 (Sheet 4)**

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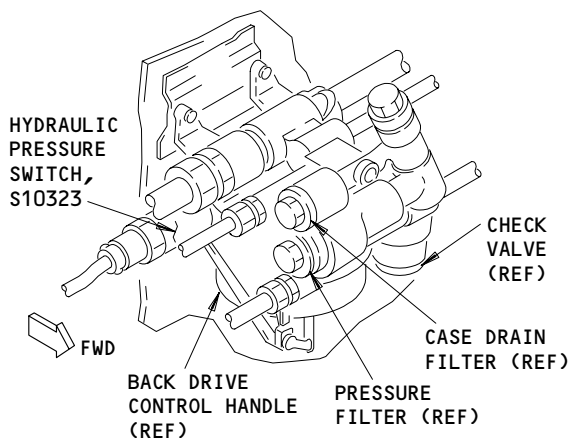


SAFETY VALVE, V10069, FOR THE RAM AIR TURBINE (RAT)

(I)

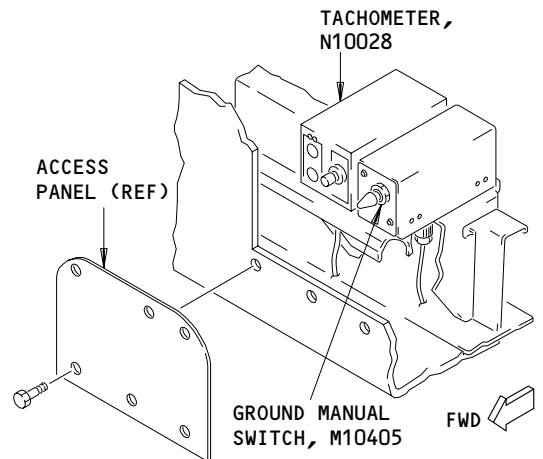
AFT BULKHEAD OF THE RIGHT WHEEL WELL

(H)



CHECKOUT MODULE FOR THE RAM AIR TURBINE (RAT)

(J)



TACHOMETER, N10028, AND GROUND MANUAL SWITCH, M10405, FOR THE RAM AIR TURBINE (RAT)

(K)

Ram Air Turbine (RAT) System - Component Location
Figure 102 (Sheet 5)

EFFECTIVITY

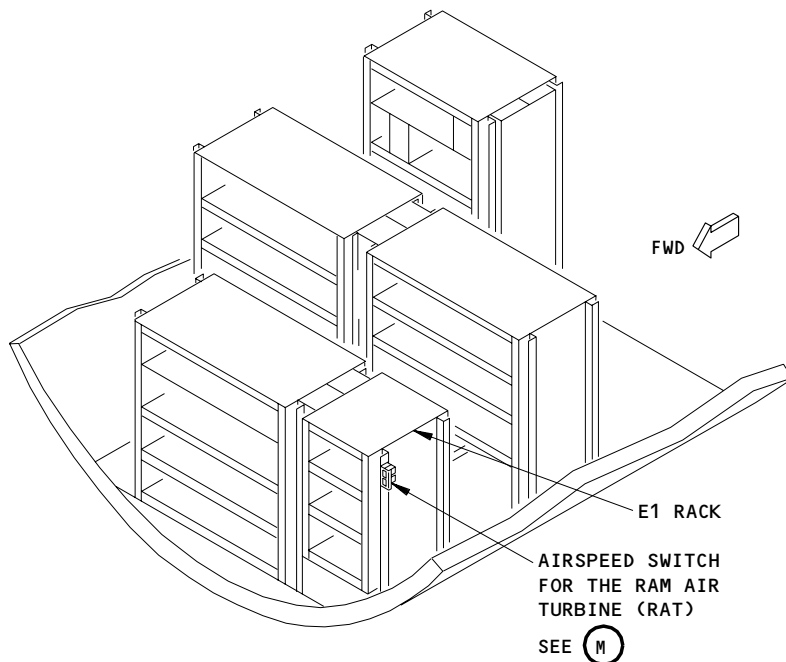
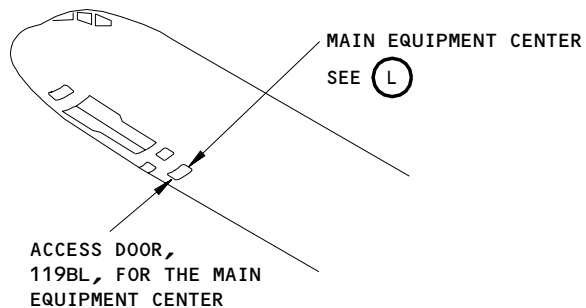
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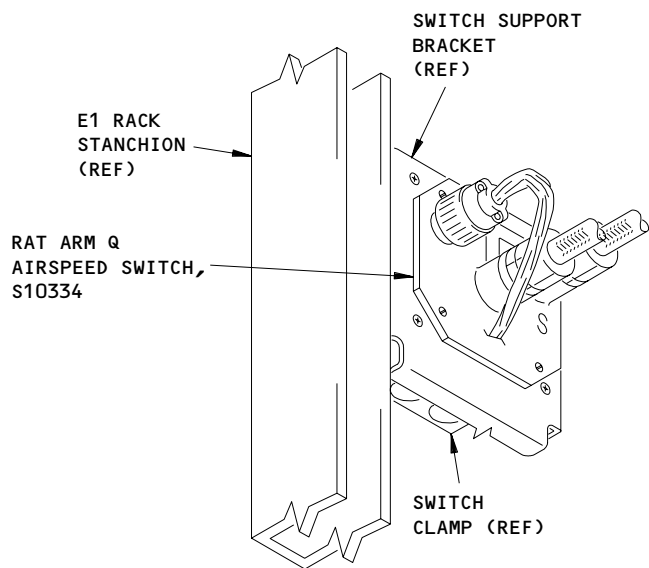
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MAIN EQUIPMENT CENTER
(EXAMPLE)
(L)



AIRSPEED SWITCH FOR THE
RAM AIR TURBINE (RAT)
(M)

Ram Air Turbine (RAT) System - Component Location
Figure 102 (Sheet 6)

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RAM AIR TURBINE (RAT) SYSTEM – MAINTENANCE PRACTICES

1. General

- A. This procedure has these tasks:
 - (1) Extend the Ram Air Turbine (RAT)
 - (2) Retract the RAT
 - (3) Get access to the retracted RAT if it will not extend
- B. If you do a test on the pitot static system, make sure these circuit breakers are open:

NOTE: Do not close the circuit breakers until the pitot static test is done.

- (1) On the main power distribution panel, P6:
 - (a) 6F1, RAT MAN or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT (if installed)
- (2) On the overhead panel, P11:
 - (a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

TASK 29-21-00-862-001

2. Extend the RAT

A. Equipment

- (1) RAT Circuit Breaker Lock Set – B27065-9 or Equivalent
- (2) Ram Air Turbine Blade Protective Cover – 732021
Sundstrand Aviation Corp.
4747 Harrison Ave.
Rockford, IL
- (3) Ram Air Turbine Hub Protective Cover – 734734
Sundstrand Aviation Corp.
4747 Harrison Ave.
Rockford, IL

B. References

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

C. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well
 - 198 Wing to Body – Aft Lower Half (Right)
 - 211/212 Control Cabin
 - 710 Nose Landing Gear and Doors
 - 730/740 Main Landing Gear and Doors

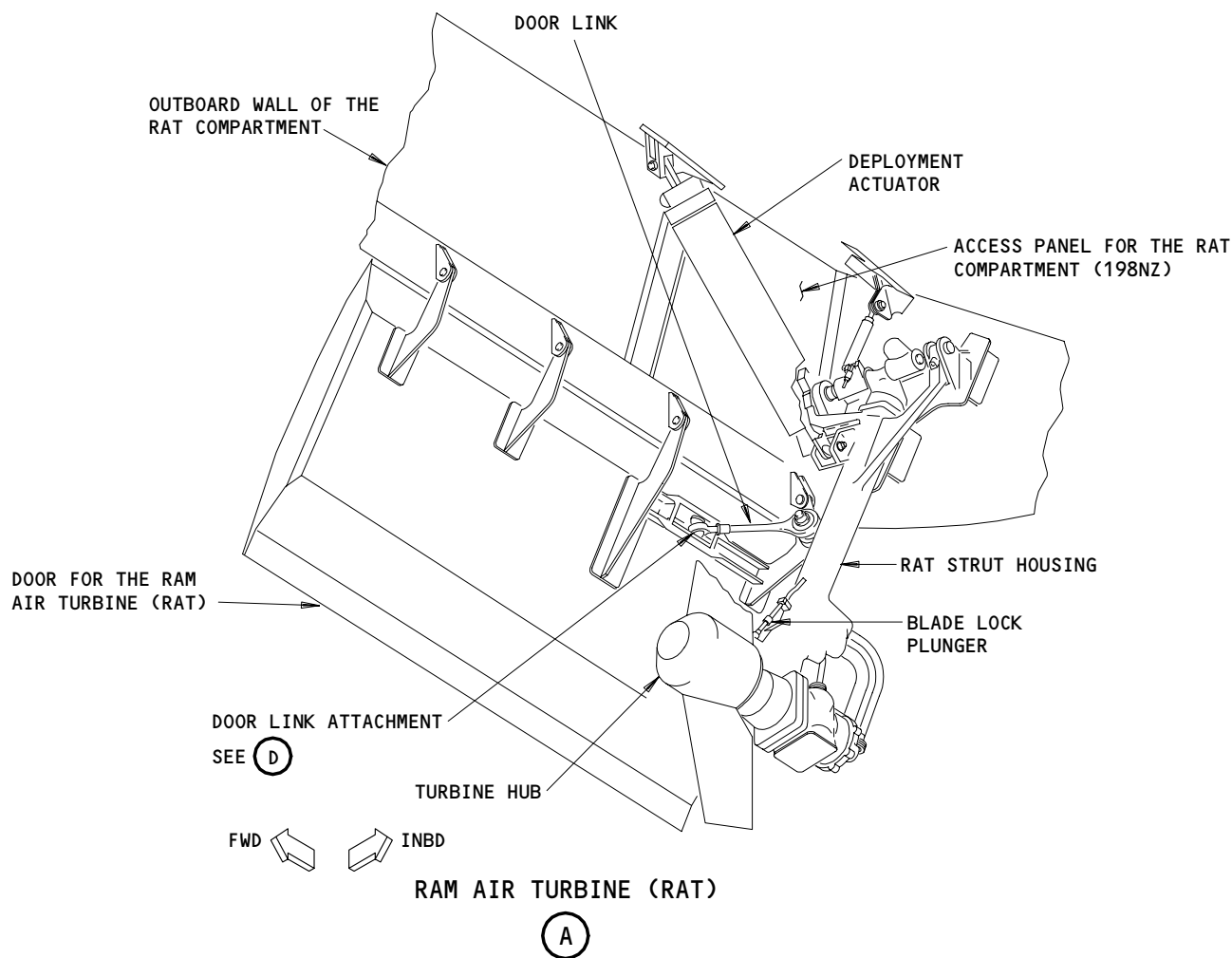
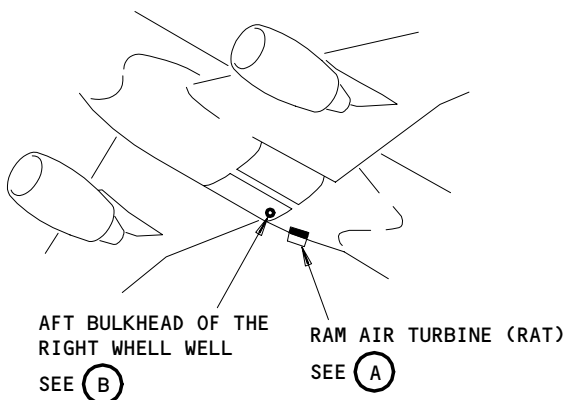
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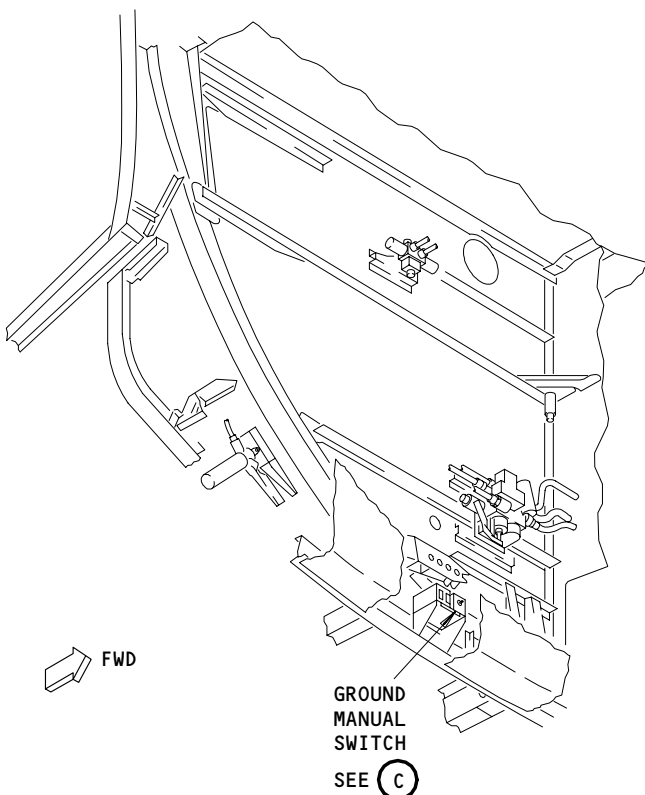
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Extend and Retract Controls for the Ram Air Turbine
Figure 201 (Sheet 1)

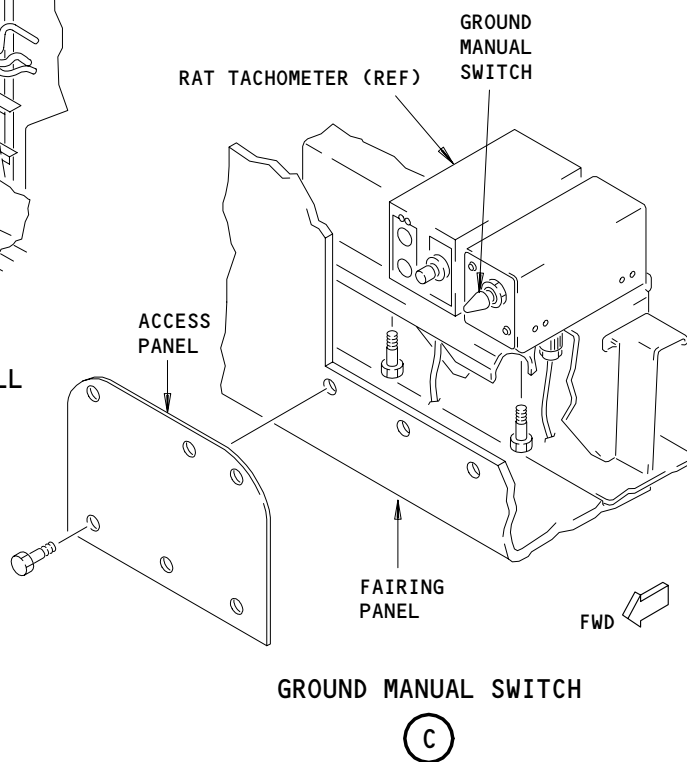
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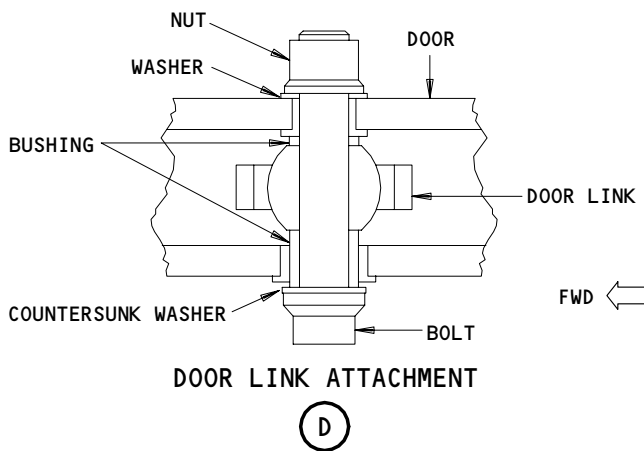
AFT BULKHEAD OF THE RIGHT WHEEL WELL

(B)



GROUND MANUAL SWITCH

(C)



DOOR LINK ATTACHMENT

(D)

Extend and Retract Controls for the Ram Air Turbine
Figure 201 (Sheet 2)

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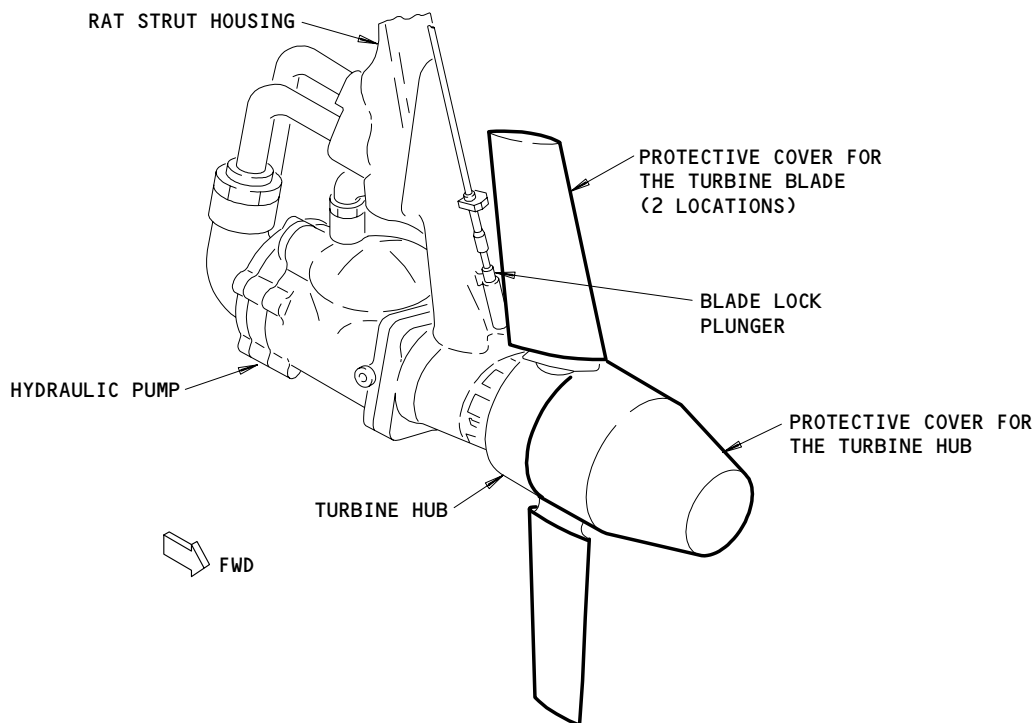
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D. Extend the Rat (Fig. 201)

S 012-002

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.

- (1) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).



RAT Hub and Turbine Blade Protective Covers
Figure 202

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- S 862-003
- (2) Supply electrical power (AMM 24-22-00/201).
- S 862-004
- (3) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
- (a) 6F1, RAT MAN or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT (if installed)
- S 862-005
- (4) Make sure these circuit breakers on the overhead panel, P11, are closed:
- (a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR
- S 012-006
- (5) Remove the access panel for the ground manual switch from the fairing on the aft bulkhead of the right wheel well.
- S 862-007

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE PATH OF THE RAT AND THE RAT COMPARTMENT DOOR. THE RAT AND THE RAT COMPARTMENT DOOR MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (6) Hold the ground manual switch in the down (deploy) position to extend the RAT.

- S 862-008
- (7) Open these circuit breakers on the P11 panel, and install the RAT circuit breaker lock set:
- (a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

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- S 862-009
- (8) Open these circuit breakers on the P6 panel, and install the RAT circuit breaker lockset:
- (a) 6F1, RAT MAN or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT
 - (c) 6F2, RAT MAN CONT (if installed)

- S 862-010
- (9) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).

- S 492-011
- (10) Install the protective covers on the RAT turbine blades and the turbine hub (Fig. 202).

TASK 29-21-00-862-012

3. Retract the RAT

NOTE: Use two persons to do the RAT retraction procedure. One person operates the ground manual switch to retract the RAT. The other person monitors the RAT movement to make sure the RAT blades do not touch the airplane structure.

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 29-21-00/501, Ram Air Turbine (RAT) System
- (4) AMM 32-00-15/201, Main Gear Door Locks

B. Access

(1) Location Zones

143/144	MLG Wheel Well
198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

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C. Retract the RAT (Fig. 201)

S 032-013

CAUTION: REMOVE THE RAT SAFETY SCREEN BEFORE YOU RETRACT THE RAT. IF THE RAT IS RETRACTED WITH THE SAFETY SCREEN ON, DAMAGE CAN OCCUR TO THE AIRPLANE EQUIPMENT.

- (1) If it is installed, remove the RAT safety screen (AMM 29-21-00/501).

S 862-014

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

S 862-043

- (3) Make sure the battery switch, on the P5 panel, is turned ON.

S 862-015

- (4) Remove the RAT circuit breaker lockset and close these circuit breakers on the overhead panel, P11:

- (a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
(b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

S 862-016

- (5) Remove the RAT circuit breaker lockset and close these circuit breakers on the main power distribution panel, P6:

- (a) 6F1, RAT MAN or RAT MAN PWR
(b) 6F2, RAT MAN CONT
(c) 6F2, RAT MAN CONT (if installed)

S 862-017

- (6) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 092-018

- (7) Remove the protective covers from the RAT turbine blades and the turbine hub (Fig. 202).

S 822-019

- (8) Move the turbine hub to align the index marks on the turbine hub and the RAT strut.

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S 862-020

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM THE PATH OF THE RAT AND THE RAT COMPARTMENT DOOR. THE RAT AND THE RAT COMPARTMENT DOOR MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (9) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.

S 212-021

- (10) Make sure the RAT UNLOCKED light on the overhead panel, P5, is off.

S 862-023

- (11) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 212-024

- (12) Make sure the RAT UNLOCKED and RAT messages do not show on the EICAS display.

S 412-025

- (13) Install the access panel for the ground manual switch in the fairing on the aft bulkhead of the right wheel well.

S 412-026

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.

- (14) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 862-027

- (15) Remove the power from the right hydraulic system if it is not necessary (AMM 29-11-00/201).

S 862-028

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

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TASK 29-21-00-012-029

4. Get Access to the Retracted RAT

NOTE: This procedure gives access to the RAT if it is in the retracted position and will not extend.

A. Equipment

(1) RAT Circuit Breaker Lock Set, B27065-9 or Equivalent

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

C. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels

(2) AMM 12-21-30/301, Ram Air Turbine

(3) AMM 53-66-01/401, Aft Wing/Body Fairing

D. Access

(1) Location Zones

143/144	MLG Wheel Well
198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin
710	Nose Landing Gear and Doors
730/740	Main Landing Gear and Doors

(2) Access Panels

198CR	Ram Air Exhaust Louvers
198NZ	Secondary Access RAT Mechanism

E. Get Access to the Retracted RAT

S 862-030

(1) Open these circuit breakers on the overhead panel, P11, and install the RAT circuit breaker lockset:

(a) 11D26, HYDRAULIC RAT CONT, or HYDRAULIC RAT AUTO CONT

(b) 11D27, HYDRAULIC RAT AUTO, or HYDRAULIC RAT AUTO PWR

S 862-031

(2) Open these circuit breakers on the main power distribution panel, P6, and install the RAT circuit breaker lockset:

(a) 6F1, RAT MAN, or RAT MAN PWR

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 **BOEING**
757
MAINTENANCE MANUAL

(b) 6F2, RAT MAN CONT (if installed)

S 012-032

- (3) Remove the aft right wing to body fairing panel, 198CR, that is found outboard of the RAT compartment door (AMM 53-66-01/401).

S 032-033

- (4) Remove the screws around the edges of the access panel for the RAT compartment, 198NZ, in the outboard wall of the RAT compartment (AMM 06-41-00/201).

S 012-034

- (5) Hold the handle on the access panel and move the panel in the outboard direction to remove it.

NOTE: The removal of the access panel will give some access to the RAT compartment. The step that follows will open the compartment door to give full access to do maintenance on the RAT.

S 492-035

- (6) Use a support on the RAT compartment door, while you remove the bolt that holds the door actuation link to the door.

S 032-036

- (7) Remove the bolt that holds the door actuation link to the door, and lower the door to the open position.

NOTE: Do not move the locknut on the door actuation link to keep the adjustment of the door.

S 432-037

- (8) When the maintenance is done, do these steps to install the door actuation link to the compartment door, with the RAT in the extended position:
(a) Apply grease to the bushings.

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- (b) Install the bolt, washers, bushings and nut to hold the door actuation link to the door.
- (c) Install the countersunk washer with the countersunk side pointed in the direction of the bolthead.
- (d) Tighten the nut to 630-1070 pound-inches.
- (e) Lubricate the spherical bearings on the door actuation link (AMM 12-21-30/301).

S 412-038

- (9) Put the access panel for the RAT compartment, 198NZ, in its position at the outboard wall of the RAT compartment.

S 432-039

- (10) Install the screws around the edges of the access panel.

S 412-040

- (11) Install the aft right wing to body fairing panel, 198CR, outboard of the RAT compartment door (AMM 53-66-01/401).

S 862-041

- (12) Put the RAT in its retracted position as shown in the Retract the RAT procedure.

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RAM AIR TURBINE (RAT) SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure has three tasks. The first task is a system test of the ground deployment and retraction system for the ram air turbine (RAT). The second task is a system test of the auto and manual deployment systems for the ram air turbine (RAT). The third task is a system test of the hydraulic pump and drive system for the ram air turbine (RAT).

TASK 29-21-00-735-143

2. System Test – Ram Air Turbine (RAT) Ground Deployment and Retraction System (Fig. 501)

A. References

- (1) AMM 24-22-00/201, Electrical Power
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 32-00-15/201, Main Gear Door Locks

B. Access

(1) Location Zone

- 144 Main Landing Gear Wheel Well
- 198 Wing to Body – Aft Lower Half (Right)
- 212 Control Cabin
- 730/740 Main Landing Gear and Doors

(2) Access Panels

- 198MR Ram Air Turbine

C. Prepare for the Test

S 015-122

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

- (1) Open the landing gear doors and install the door locks (AMM 32-00-15/201).

S 865-123

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

S 865-154

- (3) Remove the pressure from the right and center hydraulic system reservoirs (AMM 29-11-00/201).

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S 865-128

- (4) Push the STATUS switch on the EICAS display select panel.

S 215-129

- (5) Make sure the RAT message is not shown on EICAS.

S 015-130

- (6) Remove the access panel for the ground manual switch from the fairing on the aft bulkhead of the right wheel well.

- D. Do the System Test for the Ground Deployment and Retraction System of the Ram Air Turbine (RAT)

S 865-010

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE RAT AND THE RAT COMPARTMENT DOOR. FAST MOVEMENT OF THE RAT AND THE DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (1) Hold the ground manual switch in the down (deploy) position to extend the RAT .

S 285-011

- (2) Make sure the RAT moves to the extended position in 10 +/- 5 seconds.

S 215-012

- (3) Make sure the RAT UNLOCKED light on the engine start/RAT control panel is on.

S 215-013

- (4) Make sure the RAT UNLOCKED message is shown on EICAS.

S 215-014

- (5) Make sure the RAT message is shown on EICAS.

S 865-015

- (6) Make sure the RAT turbine hub can be manually turned.

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S 825-016

- (7) Turn the hub until the index mark on the hub is 3 degrees away from the index mark on the strut.

NOTE: In this position, the blade-lock plunger will not engage and the blade index switch will not close. If the switch does not stop RAT retraction, the turbine blades will not hit structure.

S 865-017

- (8) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 865-018

- (9) Hold the ground manual switch in the up (stow) position.

S 225-019

- (10) Make sure the RAT starts retraction and then stops when dimension A shown in Fig. 501 is 6.20 ± 0.25 inches.

NOTE: Release the ground manual switch to the neutral position if the RAT continues to retract when dimension A is less than 5.95 inches. Do a check of dimension A immediately after the RAT stops. The RAT position can change if the pressure decreases in the actuator.

S 865-020

- (11) Hold the ground manual switch in the down (deploy) position for approximately one second and then release the switch.

S 285-021

- (12) Make sure the RAT starts to extend and then stops when the switch is released.

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- S 865-022
- (13) Hold the ground manual switch in the down (deploy) position until the RAT is fully extended.
- S 865-023
- (14) Decrease the pressure in the right hydraulic system to zero (Ref 29-11-00).
- S 825-024
- (15) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.
- S 865-025
- (16) Hold the ground manual switch in the up (stow) position.
- S 865-026
- (17) Slowly increase the right system pressure with the hydraulic service cart (AMM 29-11-00/201).
- S 285-027
- (18) Make sure the RAT actuator releases and the RAT starts to retract when the pressure in the right system is 400 to 600 psi.
- S 225-028
- (19) Release the ground manual switch and make sure the RAT retraction stops.
- S 865-029
- (20) Pressurize the right hydraulic system to 3000 psi (AMM 29-11-00/201).
- S 865-030
- (21) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.
- E. Put the Airplane Back to Its Usual condition.
- S 415-131
- (1) Install the access panel for the ground manual switch in the fairing on the aft bulkhead of the right wheel well.
- S 415-132
- (2) Put the reservoir depressurization valves in the right and center systems back to the closed (non-vented) position (AMM 29-11-00/201).

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S 415-133

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (3) Remove the door locks and close the landing gear doors (AMM 32-00-15/201).

S 865-134

- (4) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 865-135

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

TASK 29-21-00-735-144

3. System Test - Ram Air Turbine (RAT) Auto and Manual Deployment Systems
(Fig. 501)

A. References

- (1) AMM 24-22-00/201, Electrical Power
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 32-00-15/201, Main Gear Door Locks
- (4) AMM 32-09-02/201, Air/Ground Relays
- (5) AMM 34-11-00/201, Pitot-Static System

B. Access

(1) Location Zone

144	Main Landing Gear Wheel Well
198	Wing to Body - Aft Lower Half (Right)
212	Control Cabin
730/740	Main Landing Gear and Doors

(2) Access Panels

198MR	Ram Air Turbine
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C. Prepare for the Test

S 015-002

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

- (1) Open the landing gear doors and install the door locks (AMM 32-00-15/201).

S 865-149

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

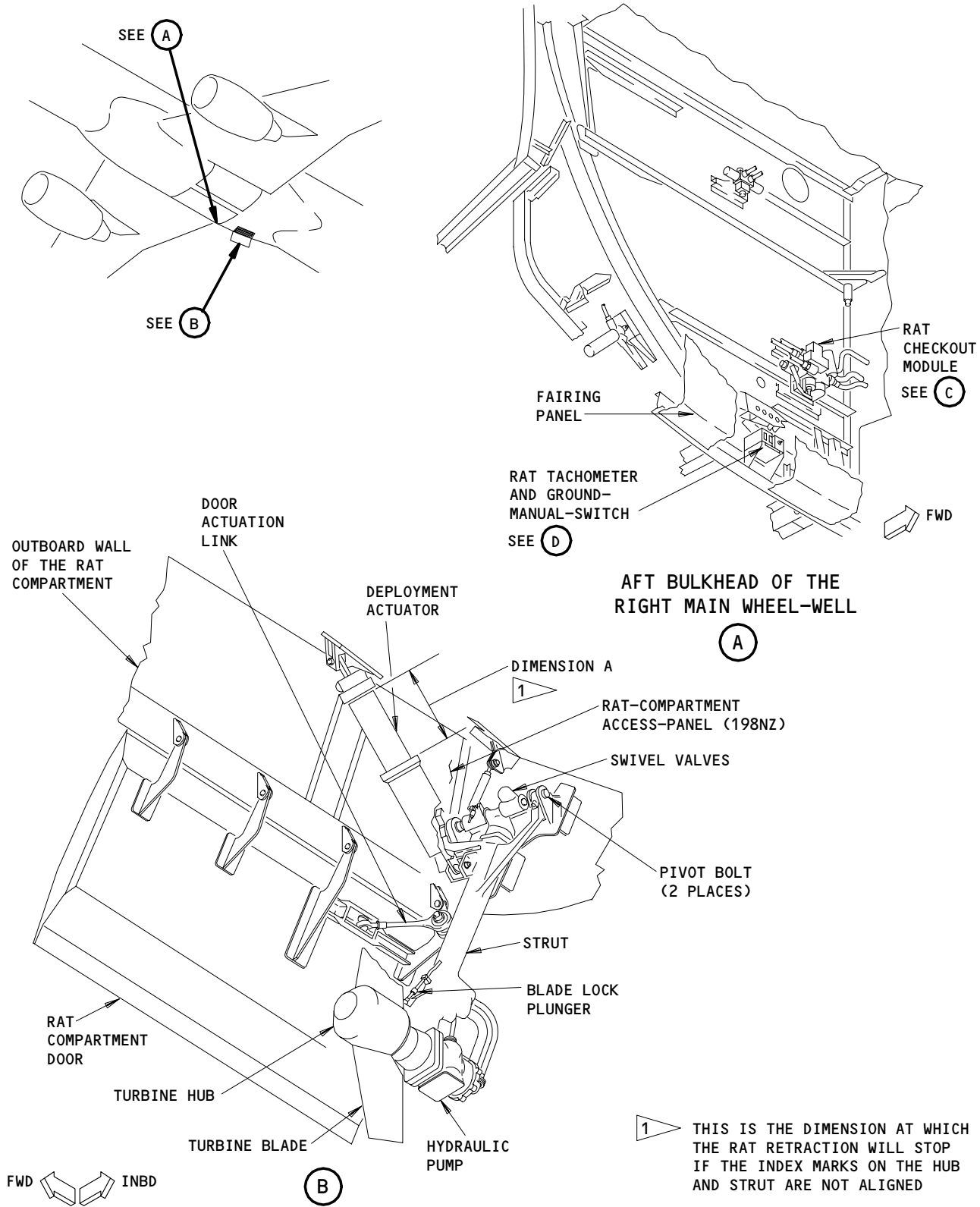
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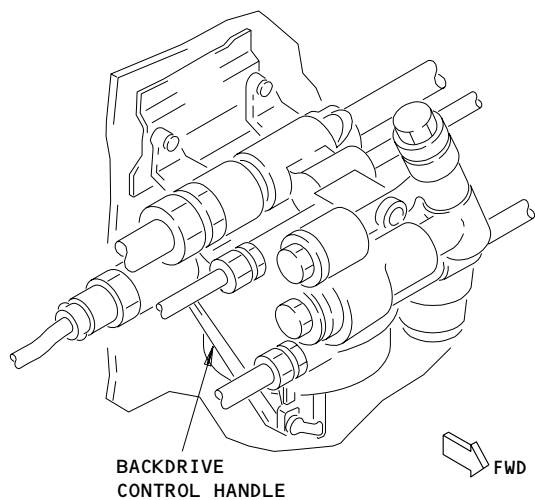
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Ram Air Turbine (RAT) System
Figure 501 (Sheet 1)

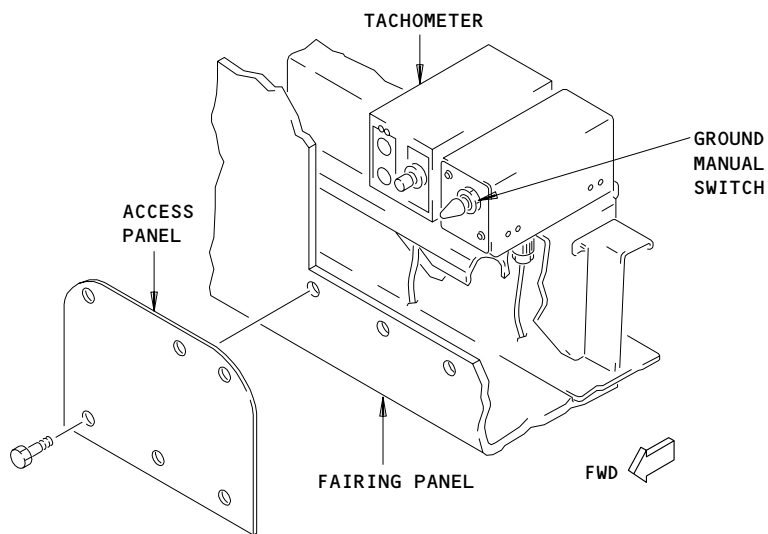
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RAT CHECKOUT MODULE

(C)



RAT TACHOMETER AND
GROUND-MANUAL-SWITCH

(D)

Ram Air Turbine (RAT) System
Figure 501 (Sheet 2)

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- S 865-003
- (3) Remove the pressure from the right and center hydraulic system reservoirs (AMM 29-11-00/201).
- S 865-007
- (4) Push the STATUS switch on the EICAS display select panel.
- S 215-008
- (5) Make sure the RAT message is not shown on EICAS.
- S 015-009
- (6) Remove the access panel for the ground manual switch from the fairing on the aft bulkhead of the right wheel well.
- D. Do the System Test for the Manual Deployment System of the Ram Air Turbine (RAT)

S 865-145

WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION OR EXTENSION. FAST MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: DO NOT HOLD THE SWITCH IN THE DEPLOY POSITION MORE THAN FIVE SECONDS. THE RAT ACTUATOR SOLENOID CAN BE DAMAGED IF IT IS ENERGIZED MORE THAN TEN SECONDS.

- (1) Push the RAT deployment switch on the engine-start/RAT-control panel to the DEPLOY position. Release the RAT deployment switch in less than five seconds.

S 285-041

- (2) Make sure the RAT moves to the extended position in less than five seconds.

NOTE: The time starts when the deployment switch is first pressed and stops when the blade-lock plunger releases the turbine hub.

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- S 825-051
- (3) Manually turn the turbine hub to align the index mark on the hub with the index mark on the strut.
- S 865-137
- (4) Pressurize the right hydraulic system (AMM 29-11-00/201).
- S 825-117
- (5) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.
- S 865-138
- (6) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).
- E. Do the RAT Auto Deployment System Test
- S 865-062
- (1) Open these circuit breakers on the P11 panel:
- (a) 11D26, HYDRAULIC RAT AUTO CONT or HYDRAULIC RAT CONT
 - (b) 11D27, HYDRAULIC RAT AUTO PWR
- S 865-063
- (2) Do the system No. 1 air/ground relays flight mode simulation (AMM 32-09-02/201).
- S 865-064
- (3) Pressurize the auxiliary No. 2 pitot system to 0.50 ± 0.02 in. Hg (105 knots) (AMM 34-11-00/201).
- NOTE:** When the auxiliary No. 2 pitot system is pressurized, the captain's static system and the auxiliary No. 2 static system must stay at ambient pressure.
- S 865-065
- (4) Close these circuit breakers on the P11 panel:
- (a) 11D26, HYDRAULIC RAT AUTO CONT or HYDRAULIC RAT CONT

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(b) 11D27, HYDRAULIC RAT AUTO PWR

S 285-066

- (5) Make sure the RAT moves to the extended position in less than five seconds.

NOTE: The time starts when the circuit breaker is closed and stops when the blade-lock plunger releases the turbine hub.

S 865-067

- (6) Open these circuit breakers on the P11 panel:
(a) 11D27, HYDRAULIC RAT AUTO PWR

S 865-068

- (7) Put the system No. 1 air/ground relays back to the usual condition (Ref 32-09-02).

S 865-069

- (8) Close these circuit breakers on the P11 panel:
(a) 11D27, HYDRAULIC RAT AUTO PWR

S 865-140

- (9) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 865-070

- (10) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.

S 285-071

- (11) Make sure the RAT moves to the retracted position in 10 ± 5 seconds.

NOTE: The time starts when the ground manual switch is moved to the up (stowed) position. The time stops when the RAT UNLOCKED light goes off.

S 215-072

- (12) Make sure the RAT compartment door is fully closed.

S 215-073

- (13) Make sure the RAT stays in the retracted position.

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S 215-074

- (14) Make sure the RAT UNLOCKED light on the engine-start/RAT-control panel is off.

S 215-075

- (15) Make sure the RAT UNLOCKED and RAT messages are not shown on EICAS.

S 865-076

- (16) Decrease the pressure on the auxiliary No. 2 pitot system to zero (AMM 34-11-00/201).

F. Put the Airplane Back to Its Usual condition.

S 415-077

- (1) Install the access panel for the ground manual switch in the fairing on the aft bulkhead of the right wheel well.

S 415-078

- (2) Put the reservoir depressurization valves in the right and center systems back to the closed (non-vented) position (AMM 29-11-00/201).

S 415-079

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (3) Remove the door locks and close the landing gear doors (AMM 32-00-15/201).

S 865-080

- (4) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 865-081

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

TASK 29-21-00-735-082

4. System Test - RAT Hydraulic Pump and Drive System (Fig. 501)

A. Equipment

- (1) RAT Safety Screen - B29001-42
(2) RAT Safety Screen Adapter - B29001-23
(Necessary when lifting fixture - A71015 is used).
(3) Lifting Fixture - A71015-63; Hein-Werner Model 74; or Black Hawk Model 67554

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- (4) RAT Circuit Breaker Lock Set - B27065-9 or Equivalent
- (5) Stroboscopes (optional):
 - (a) Digital Stroboscope - Type 4913
Bruel and Kjaer Instruments, Inc.
185 Forest Street
Marlborough, MA 01752
 - (b) Electronic Stroboscope - Type 1531-AB
Genrad, Inc., EMT Electronic Test Mfg. Group
300 Barker Ave.
Concord, MA 01742
 - (c) Slip-Sync Stroboscope - Strobex Model 109
Chadwick-Helmuth Co., Inc.
111 East Railroad Ave.
Monrovia, CA 91016
 - (d) Stroboscope - Ametek Model 1965
Ametek, Inc., Mansfield and Green Div.
8600 Sommerset Drive
Largo, FL 34643
or stroboscope with equivalent operating features capable of measuring a minimum of 11,000 RPM
- B. Consumable Materials
 - (1) G00270 Masking Tape, Commercially Available
- C. References
 - (1) AMM 24-22-00/201, Electrical Power
 - (2) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
 - (3) AMM 32-00-15/201, Main Gear Door Locks
- D. Access
 - (1) Location Zone
198 Wing to Body - Aft Lower Half (Right)
- E. Do the RAT Hydraulic Pump and Drive System Test.

S 865-083

WARNING: OBEY THE INSTALLATION PROCEDURE FOR THE DOOR LOCKS.
FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR
DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

- (1) Open the landing gear doors and install the door locks (AMM 32-00-15/201).

S 865-084

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

S 865-085

- (3) Remove the pressure from the right and center hydraulic system reservoirs (AMM 29-11-00/201).

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S 015-089

- (4) Remove the access panel for the ground manual switch from the fairing on the aft bulkhead of the right wheel well.

S 865-090

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE RAT AND THE RAT COMPARTMENT DOOR. FAST MOVEMENT OF THE RAT AND THE DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (5) Hold the RAT ground manual switch in the down (deploy) position until the RAT moves to the fully extended position.

S 985-136

- (6) Make sure the internal lock of the deployment actuator stops the movement of the RAT when you push the RAT forward with your hand.

NOTE: This is a check that the RAT is locked in the extended position.

S 865-092

- (7) Open the following circuit breaker on the P6 panel and install the RAT circuit breaker lock set:
 - (a) 6F1, RAT MAN PWR or RAT MAN

S 865-093

- (8) Open these circuit breakers on the P11 panel and install the RAT circuit breaker lock set:
 - (a) 11D26, HYDRAULIC RAT AUTO CONT or HYDRAULIC RAT CONT
 - (b) 11D27, HYDRAULIC RAT AUTO PWR or HYDRAULIC RAT AUTO

NOTE: To back-drive the RAT, the preferred method is to use the safety screen around the RAT blades. However, an optional, alternate method may be used in place of the safety screen. This method uses rope to secure the area below the RAT compartment, by roping off with a 20-foot (6 meter) diameter area. This will keep personnel from entering area close to RAT blades.

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S 495-224

WARNING: BEFORE THE RAT IS BACK-DRIVEN, INSTALL THE SAFETY SCREEN (PREFERRED), OR PUT A 20-FOOT (6 METER) DIAMETER SECURED/ROPED-OFF AREA (ALTERNATE) BELOW THE RAT COMPARTMENT DOOR TO PREVENT PERSONNEL ENTRY. THE FAST MOVEMENT OF THE TURBINE BLADES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (9) If you use the alternate method, put a 20 foot (6 meter) diameter secured/roped-off area below the RAT compartment door to prevent personnel entry. If you use the RAT safety screen method (preferred), do these steps to install the RAT safety screen (Fig. 502):
- (a) If the lift fixture A71015-87 is used, secure the adapter to the safety screen support with a nut and washer.
 - (b) Attach the safety screen support to the lifting fixture.
 - (c) Put the safety screen on the support and tighten the strap around the safety screen.
 - (d) Remove the bolts and move apart the forward and aft cages of the safety screen.
 - (e) Remove the top bolt, spacer, and nut from the brace which is in the aft cage.
 - (f) Loosen the knurled retainer nut on the adjustment screw on each side of the brace in the aft cage.
 - (g) Turn both adjustment screws to retract the pads on the end of the adjustment screws.

NOTE: This will give clearance to install the aft cage on the RAT hydraulic pump.

- (h) Put the aft cage on the RAT hydraulic pump.
- (i) Install the top bolt, spacer, and nut in the brace to attach the aft cage to the RAT.

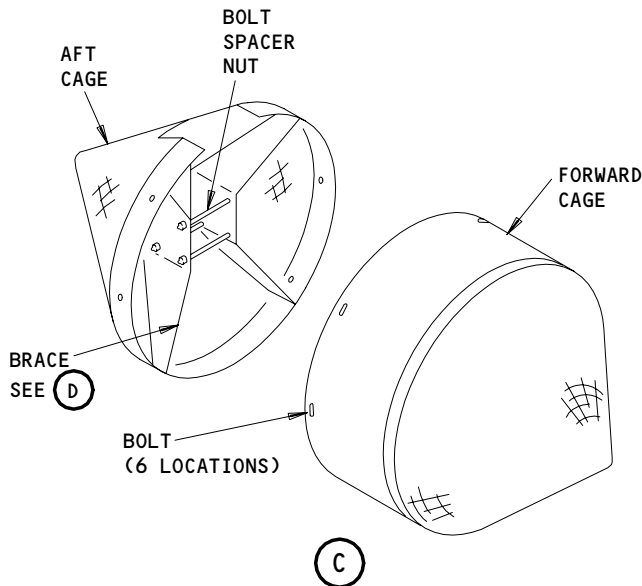
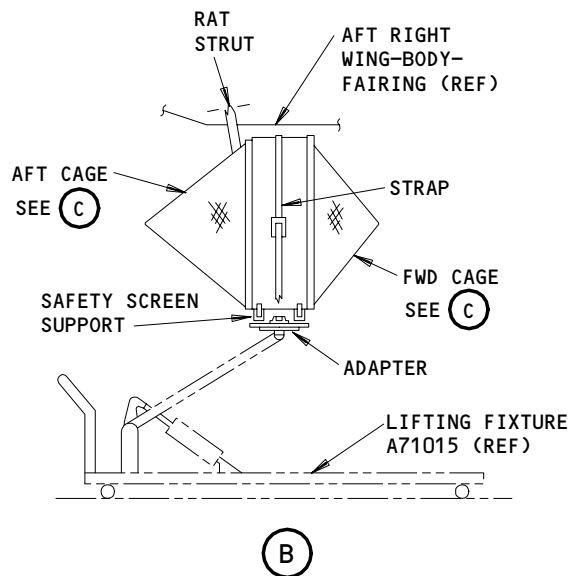
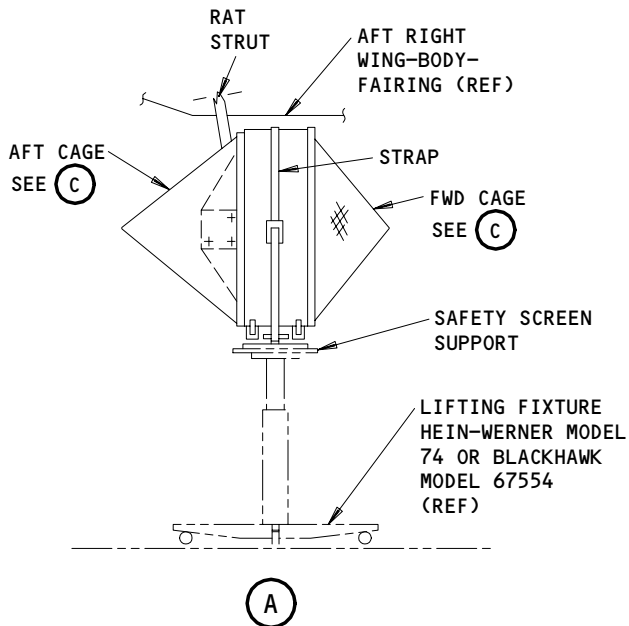
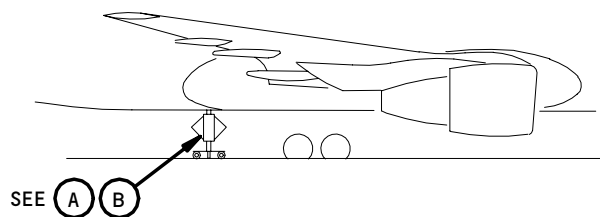
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Ram Air Turbine Safety Screen
Figure 502 (Sheet 1)

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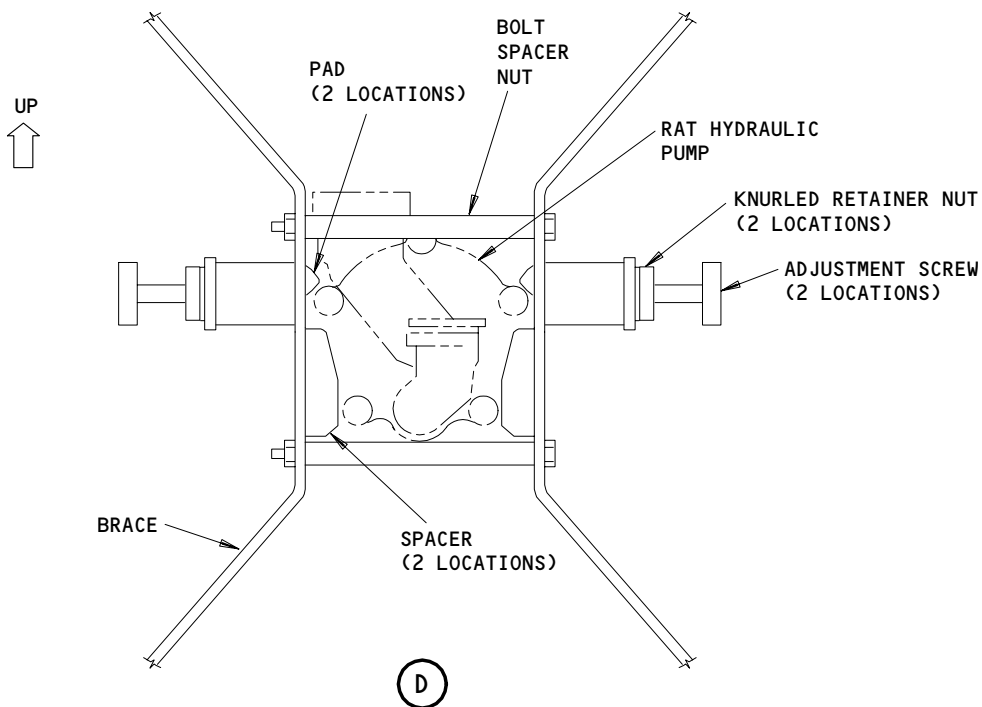
- (j) Turn both adjustment screws on the aft-cage brace until the adjustment-screw pads are tight against the RAT hydraulic pump.
- (k) Tighten the knurled retainer nuts to lock the adjustment screws in position.

CAUTION: SET THE SAFETY SCREEN FORWARD CAGE TO THE CORRECT HEIGHT BEFORE YOU MOVE IT INTO POSITION. IF THE CAGE TOUCHES THE TURBINE BLADES, IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNOR MECHANISM.

- (l) Raise the forward cage to the correct height with the lifting fixture.
- (m) Carefully move the forward cage into position around the RAT so that the cage does not hit the turbine blades.
- (n) Install the bolts to connect the forward and aft cages of the safety screen.
- (o) Loosen the strap and remove it from around the safety screen.
- (p) Lower the lifting fixture and move the fixture away from the safety screen.

S 865-156

- (10) Pressurize the center hydraulic system with a hydraulic service cart (AMM 29-11-00/201) capable of supplying 25 GPM at 3000 PSI.



Ram Air Turbine Safety Screen
Figure 502 (Sheet 2)

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S 865-097

CAUTION: QUICKLY RELEASE THE GROUND-CHECKOUT-MODULE LEVER IF THE TACHOMETER OVER-SPEED LIGHT COMES ON. IF THE SPEED OF THE RAT BECOMES TOO HIGH, DAMAGE TO EQUIPMENT CAN OCCUR.

- (11) Move the back-drive control handle on the RAT checkout module in the right wheel well to the back-drive position.

S 865-098

- (12) Push and hold the lamp test switch on the RAT tachometer.

S 215-099

- (13) Make sure the red and green lights on the RAT tachometer are both on.

S 865-100

- (14) Release the lamp test switch on the RAT tachometer.

S 215-101

- (15) When the turbine blade speed has become stable, make sure the green light on the RAT tachometer is on, and the red light is off.

S 815-147

- (16) If the RAT tachometer overspeed light comes on, quickly release the Ground-Checkout module handle and consult the fault isolation section, under the heading "RAT overspeed light on while performing RAT system test".

S 735-118

- (17) If the green light on the RAT tachometer does not operate, you can do these steps to do a check of the speed of the RAT turbine blades:
- (a) Release the control handle from the back-drive position.
 - (b) Remove the power from the center hydraulic system (AMM 29-11-00/201).
 - (c) Move the lifting fixture below the safety screen.
 - (d) Lift the safety screen support with the lifting fixture until the support touches the screen.
 - (e) Remove the bolts and move apart the forward and aft cages of the safety screen.

CAUTION: REMOVE THE SAFETY SCREEN FORWARD CAGE CAREFULLY. IF THE CAGE TOUCHES THE TURBINE BLADES IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNER MECHANISM.

- (f) Move the forward cage away from the RAT with the lifting fixture.
- (g) Apply a strip of tape that is 1/2 by 2 inches, at one of these locations:
 - 1) On the RAT turbine hub, from the center to the edge

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2) On the end of one RAT turbine blade.

CAUTION: SET THE SAFETY SCREEN FORWARD CAGE TO THE CORRECT HEIGHT BEFORE YOU MOVE IT INTO POSITION. IF THE CAGE TOUCHES THE TURBINE BLADES, IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNER MECHANISM.

- (h) Raise the forward cage to the correct height with the lifting fixture.
- (i) Carefully move the forward cage into position around the RAT so that the cage does not hit the turbine blades.
- (j) Install the bolts to connect the forward and aft cages of the safety screen.
- (k) Lower the lifting fixture and move the fixture away from the safety screen.
- (l) Pressurize the center hydraulic system with a hydraulic service cart (Ref 29-11-00).
- (m) Move the control handle on the RAT checkout module, in the right wheel well, to the back-drive position.
- (n) Set the stroboscope to less than 1500 rpm.
- (o) Monitor the speed of the RAT turbine blades while you increase the adjustment of the stroboscope from 1500 rpm to 9440 rpm.
- (p) Make a record of the highest speed at which the strip of tape shows as one stable mark in the light of the stroboscope.
- (q) Make sure this speed is between 3980 and 4720 rpm.

NOTE: If the governor in the RAT hub does not control the speed correctly, a speed in the range of 1500 to 7500 rpm can occur.

S 865-102

- (18) Quickly release the control handle from the back-drive position. Make sure the RAT green pressure light on the engine start/RAT control panel comes on.

S 865-146

- (19) Make sure the RAT blades and hub stop.

NOTE: It is possible that the RAT blades and hub will continue to turn slowly after you release the control handle. The cause of this condition is a check valve, in the RAT strut, which did not open while the speed of the RAT blades decreased. The check valve will open when you remove the hydraulic pressure. When you supply hydraulic pressure again, the RAT blades will not move. It is not necessary to reject parts because of this condition.

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S 215-103

- (20) If the RAT blades and hub continue to slowly turn when the handle is not in the back-drive position, do these steps:
- (a) Remove the center hydraulic system pressure (AMM 29-11-00/201).
 - (b) Keep the center hydraulic system without pressure for not less than 2 minutes to permit the pressure to bleed from the RAT.
 - (c) Do these steps:
 - 1) Pressurize the center hydraulic system (AMM 29-11-00/201).
 - 2) Make sure that the RAT turbine blades and hub do not turn.
 - 3) If the turbine blades and hub turn, remove the pressure from the center hydraulic system and permit the pressure to fully bleed from the RAT.
 - (d) Do the above steps until the RAT turbine blades and hub do not turn when the center hydraulic system is pressurized.

S 865-104

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

S 215-105

- (22) Make sure the RAT green pressure light on the engine start/RAT control panel goes off when the center system pressure is removed.

NOTE: The RAT pressure light can go off because of internal pressure bleedoff before the center system pressure is removed.

S 865-106

- (23) Move the back-drive handle to the back-drive position and then release the handle.

S 215-107

- (24) Make sure the spring puts the handle back in the usual position.

S 435-108

- (25) Safety the back-drive handle with wire.

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S 215-109

- (26) Make sure there is no leakage at the RAT swivel valves or hydraulic connections.

S 225-110

- (27) Make sure the RAT shaft seal leakage is no more than one drop in 30 minutes with the RAT not in operation.

S 095-111

CAUTION: REMOVE THE RAT SAFETY SCREEN BEFORE YOU RETRACT THE RAT. IF THE RAT IS RETRACTED WITH THE SAFETY SCREEN IN POSITION, EQUIPMENT DAMAGE CAN OCCUR.

- (28) If you used the alternate method of roping off the area, remove the rope. If you used the RAT safety screen method, do these steps to remove the RAT safety screen (Fig. 502):
- (a) Move the lifting fixture below the safety screen.
 - (b) Lift the safety screen support with the lifting fixture until the support touches the screen.
 - (c) Put the strap around the safety screen and tighten the strap.
 - (d) Remove the bolts and move apart the forward and aft cages of the safety screen.

CAUTION: REMOVE THE SAFETY SCREEN FORWARD CAGE CAREFULLY. IF THE CAGE TOUCHES THE TURBINE BLADES IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNOR MECHANISM.

- (e) Move the forward cage away from the RAT and lower the cage with the lifting fixture.
- (f) Loosen the knurled retainer nut on the adjustment screw on each side of the brace in the aft cage.
- (g) Turn both adjustment screws to retract the pads on the end of the adjustment screws.

NOTE: This will give clearance to remove the aft cage from the RAT hydraulic pump.

- (h) Hold the aft cage and remove the top bolt, spacer, and nut from the brace inside the cage.
- (i) Remove the aft cage from the RAT.
- (j) Install the top bolt, spacer, and nut in the brace which is in the aft cage.
- (k) Put the forward and aft cages together and install the attaching bolts.

S 865-112

- (29) Pressurize the right hydraulic system (AMM 29-11-00/201).

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S 865-114

- (30) Remove the RAT circuit breaker lock set and close the following circuit breakers on the P6 panel:
- (a) 6F1, RAT MAN PWR or RAT MAN
 - (b) 6F2, RAT MAN CONT

S 865-115

- (31) Remove the RAT circuit breaker lock set and close these circuit breakers on the P11 panel:
- (a) 11D26, HYDRAULIC RAT AUTO CONT or HYDRAULIC RAT CONT
 - (b) 11D27, HYDRAULIC RAT AUTO PWR or HYDRAULIC RAT AUTO
 - (c) EICAS (6 locations)

S 085-119

- (32) If you installed tape on the hub or blade of the RAT turbine, remove the tape.

S 985-120

- (33) Do these steps to make sure the RAT turbine blades turn freely.
- (a) Manually twist the RAT turbine blades to the fine-pitch position. The blades should move under opposing spring pressure to the fine pitch stop.
 - (b) Release manual force applied to oppose the spring pressure and allow the RAT turbine blades to turn fully back to the coarse-pitch position. If the blades fail to return to the coarse-pitch stop with only spring load, replace the RAT (AMM 29-21-01/401). Do not apply manual force to assist in returning the blades to the coarse-pitch position except as noted below.

NOTE: The RAT turbine blades must be in the coarse-pitch position to make sure that RAT operates correctly when it is deployed and it does not interfere with other airplane structure when RAT is stowed. You can apply manual force to turn the RAT turbine blades back to the coarse-pitch stop as necessary when stowing an unserviceable RAT and moving the aircraft to a location where the RAT can be removed for repair. Application of manual force is not allowed for parts being returned to service.

S 825-116

- (34) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.

S 865-117

- (35) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.

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S 215-118

- (36) Make sure the RAT UNLOCKED light on the engine-start/RAT-control panel is off.

S 865-119

- (37) Push the STATUS switch on EICAS display select panel.

S 215-120

- (38) Make sure the RAT UNLOCKED and RAT messages are not shown on EICAS.

S 415-121

- (39) Install the access panel for the ground manual switch in the fairing on the aft bulkhead of the right wheel well.

S 865-122

- (40) Put the reservoir depressurization valves in the right and center systems back to the closed (non-vented) position (AMM 29-11-00/201).

S 415-123

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK REMOVAL PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (41) Remove the door locks and close the landing gear doors (AMM 32-00-15/201).

S 865-150

- (42) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 865-151

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

TASK 29-21-00-735-213

5. Alternate System Test – RAT Hydraulic Pump and Drive System (Fig. 501)

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NOTE: This procedure should only be used if a hydraulic cart is not available.

- A. The following procedure may be used to operate both center ACMP's with a single electrical power source.

NOTE: Usually, C2 ACMP will not operate with a single electrical power source on the aircraft. This alternate procedure installs a temporary jumper in the control circuit to allow C2 ACMP to operate with a single electrical power source on the aircraft.

S 865-157

CAUTION: TO PREVENT POSSIBLE ELECTRICAL OVERLOAD, THE LEFT AND RIGHT HYDRUALIC SYSTEM ACMP'S MUST NOT BE OPERATED AT THE SAME TIME THE RAT IS BEING TESTED.

- (1) Select all 4 ACMP control switches to OFF.

S 865-208

- (2) Open and tag the following circuit breakers:
(a) 11K, ELEC HYD Control L
(b) 11K16, ELEC HYD PUMP Control R

S 865-209

- (3) Remove electrical power from airplane (AMM 24-22-00/201).

S 015-214

- (4) Get access to the main equipment center through the electronics access door 119BL.

S 215-211

- (5) Locate the ELEC HYD C1 ELCU (M10006), on the P31 panel.

S 025-210

- (6) Remove D2934 connector from M10006 ELCU.

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S 425-220

- (7) Install a suitable jumper between pins 5 and 6 on connectors D2934 at the M10006 ELCU. The jumper, consisting of a short wiring harness to be installed between connector D2943 and the M10006 ELCU, can be assembled as follows:

Assemble a jumper harness of appropriate length using equivalent connectors and wires to match gage material and location of existing harness, except connect locations 5 and 6 (on the back side of the connector that will mate to D2934, pins 5 and 6) with an appropriate wire.

S 865-215

- (8) Supply electrical power to the airplane (AMM 24-22-00/201).
B. Continue with the RAT system test:

S 735-234

- (1) General

S 835-235

- (2) Equipment

- (a) RAT Safety Screen - B29001-42
- (b) RAT Safety Screen Adapter - B29001-23
(Necessary when lifting fixture - A71015 is used).
- (c) Lifting Fixture - A71015-87; Hein-Werner Model 74; or Black Hawk Model 67554
- (d) Lifting Fixture - PM 81782/B
- (e) RAT Circuit Breaker Lock Set - B27065-9 or Equivalent
- (f) Stroboscopes (optional):
 - 1) Digital Stroboscope - Type 4913
Bruel and Kjaer Instruments, Inc.
185 Forest Street
Marlborough, MA 01752
 - 2) Electronic Stroboscope - Type 1531-AB
Genrad, Inc., EMT Electronic Test Mfg. Group
300 Barker Ave.
Concord, MA 01742
 - 3) Slip-Sync Stroboscope - Strobex Model 109
Chadwick-Helmuth Co., Inc.
111 East Railroad Ave.
Monrovia, CA 91016

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- 4) Stroboscope - Ametek Model 1965
Ametek, Inc., Mansfield and Green Div.
8600 Sommerset Drive
Largo, FL 34643
or stroboscope with equivalent operating features capable
of measuring a minimum of 11,000 RPM

S 835-237

- (3) Consumable Materials
(a) G00294 Masking Tape, Permacel No. 76

S 835-238

- (4) References
(a) AMM 24-22-00/201, Electrical Power
(b) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic
Systems
(c) AMM 32-00-15/201, Main Gear Door Locks

S 835-239

- (5) Access
(a) Location Zone
198 Wing to Body - Aft Lower Half (Right)

S 715-233

- (6) Do the RAT Hydraulic Pump and Drive System Test.

WARNING: OBEY THE INSTALLATION PROECEDURE FOR THE DOOR LOCKS. FAST
MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR
DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED
CORRECTLY.

CAUTION: DO NOT OPERATE THE LEFT OR RIGHT ACMP DURING THE RAT
SYSTEM SPIN-UP TEST. IF YOU OPERATE THE ACMP, DAMAGE TO
EQUIPMENT CAN OCCUR.

- (a) Obey this CAUTION for the following steps:
(b) Open the landing gear doors and install the door locks
(AMM 32-00-15/201).

S 865-159

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

S 865-160

- (8) Remove the pressure from the right and center hydraulic system
reservoirs (AMM 29-11-00/201).

S 015-164

- (9) Remove the access panel for the ground manual switch from the
fairing on the aft bulkhead of the right wheel well.

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S 865-165

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE RAT AND THE RAT COMPARTMENT DOOR. FAST MOVEMENT OF THE RAT AND THE DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (10) Hold the RAT ground manual switch in the down (deploy) position until the RAT moves to the fully extended position.

S 985-166

- (11) Make sure the internal lock of the deployment actuator stops the movement of the RAT when you push the RAT forward with your hand.

NOTE: This is a check that the RAT is locked in the extended position.

S 865-168

- (12) Open the following circuit breakers on the P6 panel and install the RAT circuit breaker lock set:
- (a) 6F1, RAT MAN PWR or RAT MAN
 - (b) 6F2, RAT MAN CONT

S 865-169

- (13) Open these circuit breakers on the P11 panel and install the RAT circuit breaker lock set:
- (a) 11D26, HYDRAULIC RAT AUTO CONT or HYDRAULIC RAT CONT
 - (b) 11D27, HYDRAULIC RAT AUTO PWR or HYDRAULIC RAT AUTO

S 495-170

WARNING: INSTALL THE SAFETY SCREEN BEFORE THE RAT IS BACK-DRIVEN. THE FAST MOVEMENT OF THE RAT TURBINE BLADES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (14) Do these steps to install the RAT safety screen (Fig. 502):
- (a) If the lift fixture A71015-87 is used, secure the adapter to the safety screen support with a nut and washer.
 - (b) Attach the safety screen support to the lifting fixture.
 - (c) Put the safety screen on the support and tighten the strap around the safety screen.
 - (d) Remove the bolts and move apart the forward and aft cages of the safety screen.
 - (e) Remove the top bolt, spacer, and nut from the brace which is in the aft cage.
 - (f) Loosen the knurled retainer nut on the adjustment screw on each side of the brace in the aft cage.

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- (g) Turn both adjustment screws to retract the pads on the end of the adjustment screws.

NOTE: This will give clearance to install the aft cage on the RAT hydraulic pump.

- (h) Put the aft cage on the RAT hydraulic pump.
- (i) Install the top bolt, spacer, and nut in the brace to attach the aft cage to the RAT.
- (j) Turn both adjustment screws on the aft-cage brace until the adjustment-screw pads are tight against the RAT hydraulic pump.
- (k) Tighten the knurled retainer nuts to lock the adjustment screws in position.

CAUTION: SET THE SAFETY SCREEN FORWARD CAGE TO THE CORRECT HEIGHT BEFORE YOU MOVE IT INTO POSITION. IF THE CAGE TOUCHES THE TURBINE BLADES, IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNOR MECHANISM.

- (l) Raise the forward cage to the correct height with the lifting fixture.
- (m) Carefully move the forward cage into position around the RAT so that the cage does not hit the turbine blades.
- (n) Install the bolts to connect the forward and aft cages of the safety screen.
- (o) Loosen the strap and remove it from around the safety screen.
- (p) Lower the lifting fixture and move the fixture away from the safety screen.

S 865-218

- (15) Pressurize the center hydraulic system (AMM 29-11-00/201).

S 865-173

CAUTION: QUICKLY RELEASE THE GROUND-CHECKOUT-MODULE LEVER IF THE TACHOMETER OVER-SPEED LIGHT COMES ON. IF THE SPEED OF THE RAT BECOMES TOO HIGH, DAMAGE TO EQUIPMENT CAN OCCUR.

- (16) Move the back-drive control handle on the RAT checkout module in the right wheel well to the back-drive position.

S 865-174

- (17) Push and hold the lamp test switch on the RAT tachometer.

S 215-175

- (18) Make sure the red and green lights on the RAT tachometer are both on.

S 865-176

- (19) Release the lamp test switch on the RAT tachometer.

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S 215-177

- (20) When the turbine blade speed has become stable, make sure the green light on the RAT tachometer is on, and the red light is off.

S 815-178

- (21) If the RAT tachometer overspeed light comes on, quickly release the Ground-Checkout module handle and consult the fault isolation section, under the heading "RAT overspeed light on while performing RAT system test".

S 735-179

- (22) If the green light on the RAT tachometer does not operate, you can do these steps to do a check of the speed of the RAT turbine blades:
- (a) Release the control handle from the back-drive position.
 - (b) Remove the power from the center hydraulic system (AMM 29-11-00).
 - (c) Move the lifting fixture below the safety screen.
 - (d) Lift the safety screen support with the lifting fixture until the support touches the screen.
 - (e) Remove the bolts and move apart the forward and aft cages of the safety screen.

CAUTION: REMOVE THE SAFETY SCREEN FORWARD CAGE CAREFULLY. IF THE CAGE TOUCHES THE TURBINE BLADES IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNER MECHANISM.

- (f) Move the forward cage away from the RAT with the lifting fixture.
- (g) Apply a strip of tape that is 1/2 by 2 inches, at one of these locations:
 - 1) On the RAT turbine hub, from the center to the edge
 - 2) On the end of one RAT turbine blade.

CAUTION: SET THE SAFETY SCREEN FORWARD CAGE TO THE CORRECT HEIGHT BEFORE YOU MOVE IT INTO POSITION. IF THE CAGE TOUCHES THE TURBINE BLADES, IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNER MECHANISM.

- (h) Raise the forward cage to the correct height with the lifting fixture.
- (i) Carefully move the forward cage into position around the RAT so that the cage does not hit the turbine blades.
- (j) Install the bolts to connect the forward and aft cages of the safety screen.
- (k) Lower the lifting fixture and move the fixture away from the safety screen.
- (l) Pressurize the center hydraulic system (AMM 29-11-00/201).
- (m) Move the control handle on the RAT checkout module, in the right wheel well, to the back-drive position.
- (n) Set the stroboscope to less than 1500 rpm.

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- (o) Monitor the speed of the RAT turbine blades while you increase the adjustment of the stroboscope from 1500 rpm to 9440 rpm.
- (p) Make a record of the highest speed at which the strip of tape shows as one stable mark in the light of the stroboscope.
- (q) Make sure this speed is between 3980 and 4720 rpm.

NOTE: If the governor in the RAT hub does not control the speed correctly, a speed in the range of 1500 to 7500 rpm can occur.

S 865-180

- (23) Quickly release the control handle from the back-drive position. Make sure the RAT green pressure light on the engine start/RAT control panel comes on.

S 865-181

- (24) Make sure the RAT blades and hub stop.

NOTE: It is possible that the RAT blades and hub will continue to turn slowly after you release the control handle. The cause of this condition is a check valve, in the RAT strut, which did not open while the speed of the RAT blades decreased. The check valve will open when you remove the hydraulic pressure. When you supply hydraulic pressure again, the RAT blades will not move. It is not necessary to reject parts because of this condition.

S 215-182

- (25) If the RAT blades and hub continue to slowly turn when the handle is not in the back-drive position, do these steps:
 - (a) Remove the center hydraulic system pressure (AMM 29-11-00/201).
 - (b) Keep the center hydraulic system without pressure for not less than 2 minutes to permit the pressure to bleed from the RAT.
 - (c) Do these steps:
 - 1) Pressurize the center hydraulic system (AMM 29-11-00/201).
 - 2) Make sure that the RAT turbine blades and hub do not turn.
 - 3) If the turbine blades and hub turn, remove the pressure from the center hydraulic system and permit the pressure to fully bleed from the RAT.
 - (d) Do the above steps until the RAT turbine blades and hub do not turn when the center hydraulic system is pressurized.

S 865-183

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

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S 215-184

- (27) Make sure the RAT green pressure light on the engine start/RAT control panel goes off when the center system pressure is removed.

NOTE: The RAT pressure light can go off because of internal pressure bleedoff before the center system pressure is removed.

S 865-185

- (28) Move the back-drive handle to the back-drive position and then release the handle.

S 215-186

- (29) Make sure the spring puts the handle back in the usual position.

S 435-187

- (30) Safety the back-drive handle with wire.

S 215-188

- (31) Make sure there is no leakage at the RAT swivel valves or hydraulic connections.

S 225-189

- (32) Make sure the RAT shaft seal leakage is no more than one drop in 30 minutes with the RAT not in operation.

S 095-190

CAUTION: REMOVE THE RAT SAFETY SCREEN BEFORE YOU RETRACT THE RAT. IF THE RAT IS RETRACTED WITH THE SAFETY SCREEN IN POSITION, EQUIPMENT DAMAGE CAN OCCUR.

- (33) Do these steps to remove the RAT safety screen (Fig. 502):
- Move the lifting fixture below the safety screen.
 - Lift the safety screen support with the lifting fixture until the support touches the screen.
 - Put the strap around the safety screen and tighten the strap.
 - Remove the bolts and move apart the forward and aft cages of the safety screen.

CAUTION: REMOVE THE SAFETY SCREEN FORWARD CAGE CAREFULLY. IF THE CAGE TOUCHES THE TURBINE BLADES IT CAN CAUSE DAMAGE TO THE BLADES OR THE GOVERNOR MECHANISM.

- Move the forward cage away from the RAT and lower the cage with the lifting fixture.
- Loosen the knurled retainer nut on the adjustment screw on each side of the brace in the aft cage.

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- (g) Turn both adjustment screws to retract the pads on the end of the adjustment screws.

NOTE: This will give clearance to remove the aft cage from the RAT hydraulic pump.

- (h) Hold the aft cage and remove the top bolt, spacer, and nut from the brace inside the cage.
- (i) Remove the aft cage from the RAT.
- (j) Install the top bolt, spacer, and nut in the brace which is in the aft cage.
- (k) Put the forward and aft cages together and install the attaching bolts.

S 865-191

- (34) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 865-193

- (35) Remove the RAT circuit breaker lock sets and close the circuit breakers on the P6 panel and P11 panel.

S 085-195

- (36) If you installed tape on the hub or blade of the RAT turbine, remove the tape.

S 985-196

- (37) Do these steps to make sure the RAT turbine blades turn freely.
 - (a) Manually twist the RAT turbine blades to the fine-pitch position. The blades should move under opposing spring pressure to the fine pitch stop.
 - (b) Release manual force applied to oppose the spring pressure and allow the RAT turbine blades to turn fully back to the coarse-pitch position. If the blades fail to return to the coarse-pitch stop with only spring load, replace the RAT (AMM 29-21-01/401). Do not apply manual force to assist in returning the blades to the coarse-pitch position except as noted below.

NOTE: The RAT turbine blades must be in the coarse-pitch position to make sure that RAT operates correctly when it is deployed and it does not interfere with other airplane structure when RAT is stowed. You can apply manual force to turn the RAT turbine blades back to the coarse-pitch stop as necessary when stowing an unserviceable RAT and moving the aircraft to a location where the RAT can be removed for repair. Application of manual force is not allowed for parts being returned to service.

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S 825-197

- (38) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.

S 865-198

- (39) Hold the ground manual switch in the up (stow) position until the RAT is fully retracted.

S 215-199

- (40) Make sure the RAT UNLOCKED light on the engine-start/RAT-control panel is off.

S 865-200

- (41) Push the STATUS switch on EICAS display select panel.

S 215-201

- (42) Make sure the RAT UNLOCKED and RAT messages are not shown on EICAS.

S 415-202

- (43) Install the access panel for the ground manual switch in the fairing on the aft bulkhead of the right wheel well.

S 865-203

- (44) Put the reservoir depressurization valves in the right and center systems back to the closed (non-vented) position (AMM 29-11-00/201).

S 415-204

WARNING: OBEY THE REMOVAL PROCEDURE FOR THE DOOR LOCKS. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (45) Remove the door locks and close the landing gear doors (AMM 32-00-15).

S 025-221

CAUTION: DO NOT OPERATE THE AIRPLANE WITH THE JUMPER INSTALLED. IF THE JUMPER IS NOT REMOVED FROM THE AIRPLANE PRIOR TO FLIGHT AND A SINGLE ELECTRICAL GENERATOR FAILURE OCCURS DURING FLIGHT, THE REMAINING GENERATOR COULD BE OVERLOADED AND THE ELECTRICAL SYSTEM REDUNDANCY OF THE AIRPLANE COULD BE SIGNIFICANTLY REDUCED.

- (46) On the P31 panel, remove the test jumper between the D2934 connector and the M10006 ELCU. Restore the D2934 connector to the M10006 ELCU.

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S 865-222

- (47) Make sure the Center System ACMP control circuit is restored by doing the following:
- (a) Provide airplane electrical power from a single airplane generator.
 - (b) Turn all (Left, Right, Center C1, C2) ACMP's to ON.
 - (c) Check that the C2 ACMP is shut down and indicates a low pressure.
 - (d) Turn the C1 ACMP to off, check that it shuts down and indicates a low pressure.
 - (e) Check that the C2 ACMP comes on, the low pressure light is off and that the pump indicates full pressure.
 - (f) Turn all (Left, Right, Center C1, C2) ACMP's to OFF.
- C. Put the Airplane Back to its Usual Condition.

S 865-205

- (1) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

S 865-206

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

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RAM AIR TURBINE (RAT) ASSEMBLY AND COMPONENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks one to remove and one to install the ram air turbine (RAT) assembly, hydraulic pump, and turbine hub.

TASK 29-21-01-024-001

2. Remove the Ram Air Turbine (RAT) Assembly, Hydraulic Pump, and Turbine Hub

A. General

- (1) This task contains three procedures, one to remove the RAT assembly, one to remove the hydraulic pump, and one to remove the turbine hub. 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) Wrench (optional):
(a) Wrench – WAS-33662
Sundstrand Corp.
Rockford, Illinois
(b) 7/16-inch Thin-wall Socket Wrench –
Commercially Available
(2) RAT Circuit Breaker Lock Set – B27065-9 or
Equivalent

C. Consumable Materials

- (1) B00518 Acetone, 0-A-51

D. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 29-21-00/201, Ram Air Turbine System
(3) AMM 29-21-05/401, Ram Air Turbine (RAT) Deployment Actuator
(4) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuator Link

E. Access

- (1) Location Zones
198 Wing to Body – Aft Lower Half (Right)
211/212 Control Cabin

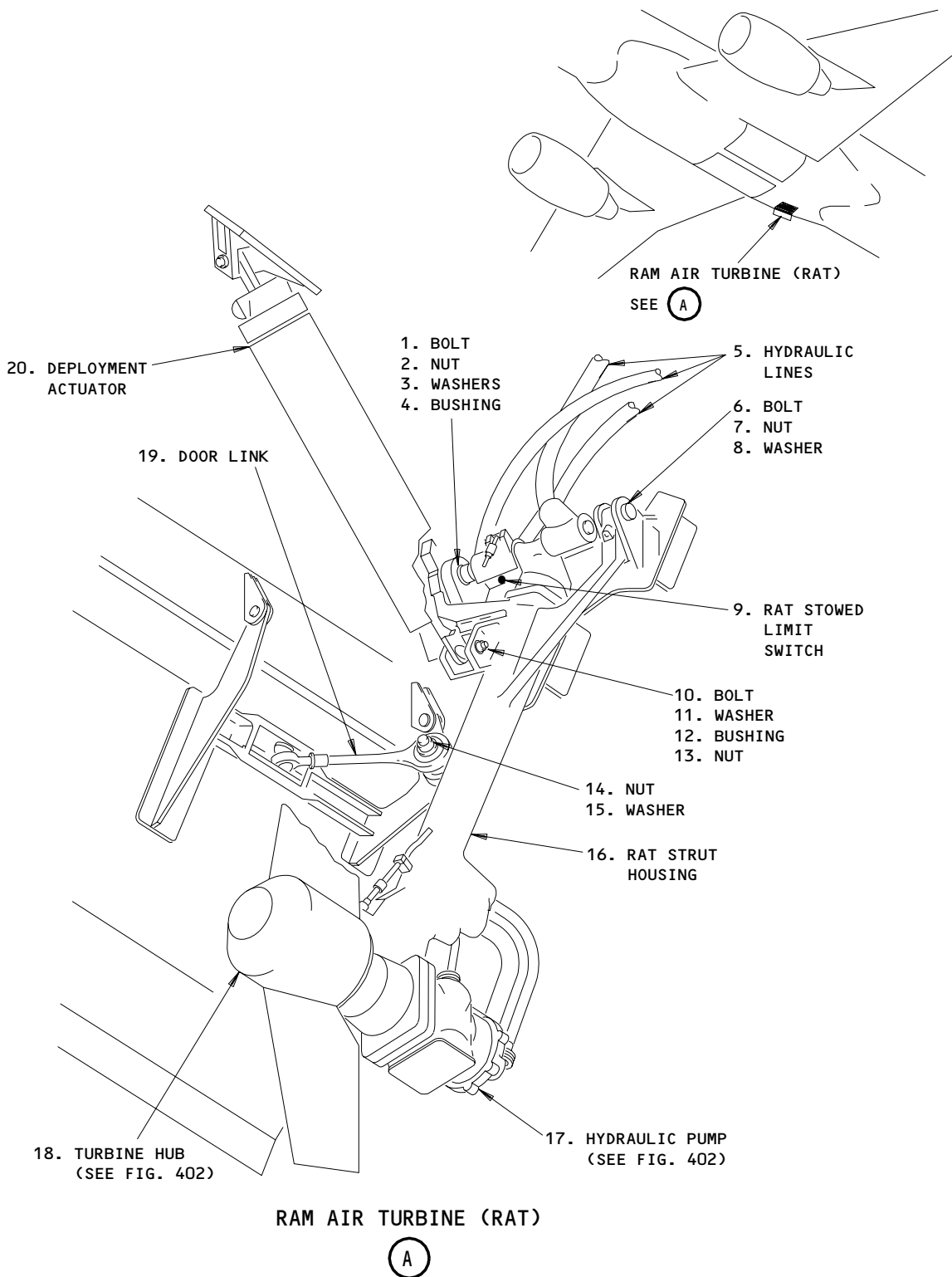
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Ram Air Turbine (RAT) Installation
Figure 401

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- (2) Access Panel
198MR RAT Compartment

F. Prepare for the Removal

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 864-003

- (2) Remove the pressure from the right and center hydraulic systems and the reservoirs (AMM 29-11-00/201).

S 864-004

- (3) Open these circuit breakers on the overhead panel, P11, and install the circuit breaker lock set:
 - (a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

S 864-005

- (4) Open these circuit breakers on the main power distribution panel, P6, and install the circuit breaker lock set:
 - (a) 6F1, RAT MAN or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT (if installed)

G. Remove the RAT Assembly (Fig. 401)

S 034-006

- (1) Remove the nut (14) and washer (15) to disconnect the door link (19) from the RAT strut (AMM 29-21-10/401).

S 034-007

- (2) Remove the nut (13), washer (11), bolt (10), and bushings (12) to disconnect the deployment actuator (20) from the RAT strut (AMM 29-21-05/401).

S 034-008

- (3) Disconnect the three hydraulic lines (5) on the top of the strut.

S 034-009

- (4) Put plugs in the hydraulic lines and caps on the strut ports.

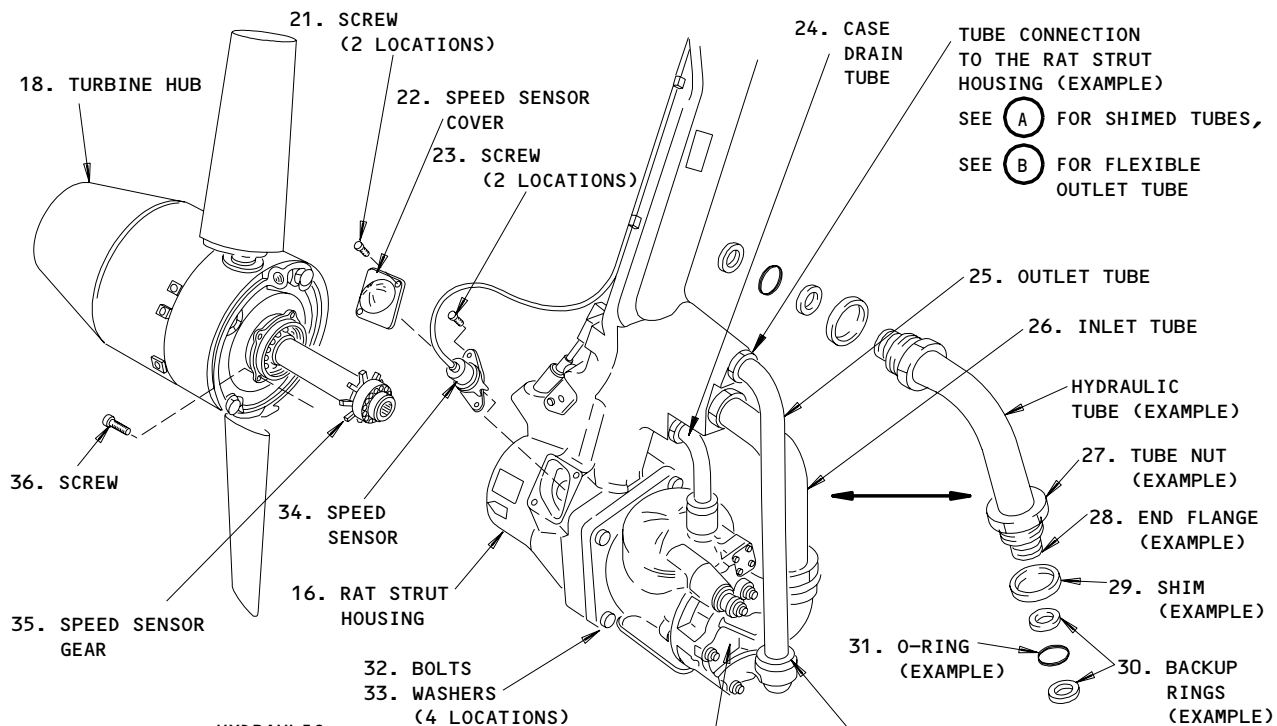
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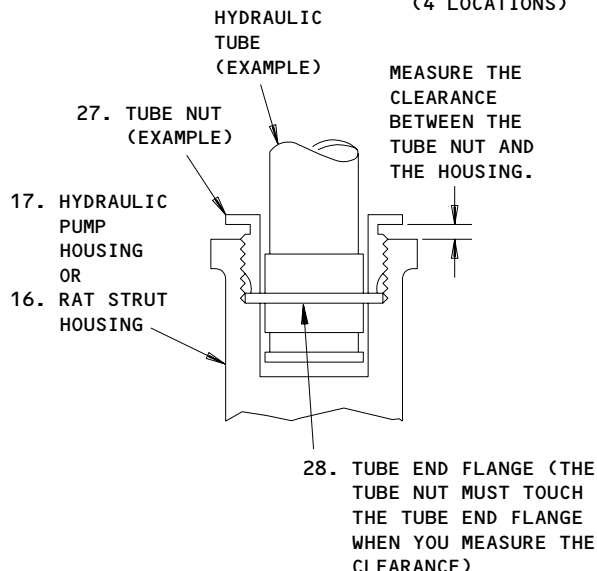
03

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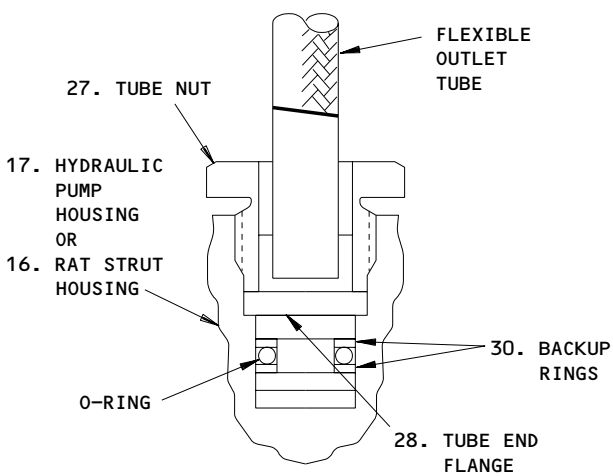
TUBE CONNECTION TO THE RAT STRUT HOUSING (EXAMPLE)
SEE (A) FOR SHIMED TUBES,
SEE (B) FOR FLEXIBLE OUTLET TUBE

TUBE CONNECTION TO THE HYDRAULIC PUMP (EXAMPLE)
SEE (A) FOR SHIMED TUBES,
SEE (B) FOR FLEXIBLE OUTLET TUBE



SHIMED TUBE CONNECTION (EXAMPLE)

(A) 1



FLEXIBLE OUTLET TUBE CONNECTION (EXAMPLE)

(B) 2

- 1 THE O-RINGS, BACKUP RINGS, AND SHIMS ARE NOT SHOWN
- 2 AIRPLANES WITH SB 29A46

Hydraulic Pump and Turbine Hub Installation
Figure 402

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S 034-010

- (5) Disconnect the electrical wires.

S 034-011

CAUTION: DO NOT HOLD THE RAT BY ITS TURBINE BLADES OR PUT THE RAT DOWN ON ITS TURBINE BLADES. THE WEIGHT OF THE RAT CAN CAUSE DAMAGE TO THE TURBINE BLADES OR THE GOVERNOR MECHANISM.

- (6) Hold the RAT while you remove the mounting bolts.

NOTE: The RAT weighs approximately 70 pounds.

S 034-012

- (7) Remove the nut (2), washers (3), bolt (1) and bushings (4) at the outboard pivot point.

S 034-013

- (8) Remove the nut (7), washer (8) and bolt (6) at the inboard pivot point.

S 024-014

- (9) Remove the RAT from the support frame.

H. Remove the Hydraulic Pump (Fig. 402)

S 034-074

- (1) Loosen the tube nuts (27) at the top of the three hydraulic tubes (24, 25, 26) until the tube nuts (27) disengage from the RAT strut housing (16).

NOTE: On airplanes with a flexible outlet tube (25) there will be no shims on the flexible outlet tube (25).

S 934-068

- (2) Make a mark on the top of the three hydraulic tubes (24, 25, 26) with a felt-tip marker to make the installation easier.

S 034-016

- (3) Loosen the tube nuts (27) at the bottom of the three hydraulic tubes (24, 25, 26).

NOTE: Do not remove the three hydraulic tubes (24, 25, 26) from the hydraulic pump.

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S 034-017

- (4) Remove the bolts (32) and washers (33) (4 locations) that hold the hydraulic pump to the RAT strut housing (16).

S 024-069

CAUTION: PULL ON THE HYDRAULIC PUMP TO REMOVE IT. DO NOT USE TOO MUCH FORCE IF YOU PULL ON THE HYDRAULIC TUBES (24, 25, 26). THIS CAN CAUSE DAMAGE TO THE HYDRAULIC TUBES (24, 25, 26) OR THE SHIMS (29).

- (5) Remove the hydraulic pump (17) with the hydraulic tubes (24, 25, 26) attached to it.
- (a) Pull on the hydraulic pump (17) to remove it from the RAT strut housing (16).
 - (b) If it is necessary, pull lightly on the hydraulic tube (26) which has the largest diameter.
 - (c) If it is necessary, lightly shake the hydraulic tube (26) to release the O-ring (31).

S 034-019

- (6) Remove the hydraulic tubes (24, 25, 26) from the hydraulic pump (17).

S 034-075

- (7) Remove the backup rings (30), o-rings (31) and shims (29) from the hydraulic tubes.

NOTE: On airplanes with a flexible outlet tube (25) there will be no shims on the flexible outlet tube (25).

S 144-070

CAUTION: KEEP THE OLD SEALANT OUT OF THE RAT STRUT HOUSING (16), THE HYDRAULIC PUMP (17), AND THE TUBES (24, 25, 26). THE SEALANT CAN CAUSE THESE COMPONENTS TO BECOME CLOGGED.

- (8) Remove the sealant from the RAT strut housing (16), the RAT hydraulic pump (17), and the tube nuts (27) with a plastic or wood scraper.

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S 114-071

WARNING: DO NOT GET ACETONE IN YOUR MOUTH, OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ACETONE. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE ACETONE. KEEP ACETONE AWAY FROM SPARKS, FLAME, AND HEAT. ACETONE IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: KEEP THE ACETONE OUT OF THE RAT STRUT HOUSING AND THE HYDRAULIC PUMP. DO NOT ASSEMBLE THE COMPONENTS FOR A MINIMUM OF FIVE MINUTES TO LET THE ACETONE BECOME DRY. THE ACETONE CAN CAUSE CONTAMINATION OF THE INTERNAL PASSAGES OF THESE COMPONENTS.

(9) Remove all the remaining sealant with acetone.

I. Remove the Hub (Fig. 402)

S 034-021

(1) Remove the screws (21) that attach the speed sensor cover (22) to the RAT strut.

S 034-022

(2) Remove the screws (23) that attach the speed sensor (34) to the RAT strut.

S 034-023

CAUTION: DO NOT LIFT THE HUB BY THE TURBINE BLADES OR PUT THE HUB DOWN ON THE TURBINE BLADES. THE WEIGHT OF THE HUB CAN CAUSE DAMAGE TO THE TURBINE BLADES OR THE GOVERNOR MECHANISM.

(3) Use a wrench WAS-33662 or a thin-wall socket wrench to remove the screws (36) that hold the hub bearing support to the strut housing.

S 024-024

(4) Move the hub (18) forward and remove it from the strut housing.

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TASK 29-21-01-424-025

3. Install the Ram Air Turbine (RAT) Assembly, Hydraulic Pump, and Turbine Hub

A. General

- (1) This task contains three procedures, one to install the RAT assembly, one to install the hydraulic pump, and one to install the turbine hub. Because this task contains three 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) Wrench (optional):
(a) Wrench - WAS-33662
Sundstrand Corp.
Rockford, Illinois
(b) 7/16-inch Thin-wall Socket Wrench -
Commercially Available
(2) RAT Circuit Breaker Lock Set - B27065-9 or
Equivalent

C. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(4) A00064 Sealant - RTV732

D. Parts

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MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-21-01	01	205
	2	Nut			220
	3	Washer			210,215
	4	Bushing			225
	6	Bolt-Pivot			230
	7	Nut			240
	8	Washer			235
	10	Bolt			29-21-05
	11	Washer	45,50		
	12	Bushing	60,65		
	13	Nut	29-21-01	01	55
	14	Nut			105
	15	Washer			115
	17	Pump			285
	18	Hub			385
	21	Screw			365
	22	Cover			360
	23	Screw			375
	24	Tube	340		
	25	Tube	320		
	26	Tube	300		
	29	Shim	315,335, 355		
	30	Retainer (Back-up ring)	305,325, 345		
	31	Packing (O-ring)	310,330, 350		
	32	Bolt	290		
	33	Washer	295		
	34	Speed Sensor	370		
	36	Screw	390		

E. References

- (1) AMM 12-21-30/301, Ram Air Turbine
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (5) AMM 29-21-00/501, Ram Air Turbine (RAT) System
- (6) AMM 29-21-05/401, Ram Air Turbine (RAT) Deployment Actuator
- (7) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuator Link
- (8) AMM 29-21-15/501, Ram Air Turbine (RAT) Tachometer Speed Sensor
- (9) AMM 29-21-17/201, Ram Air Turbine (RAT) Stowed Limit Switch

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F. Access

(1) Location Zones

198 Wing to Body - Aft Lower Half (Right)
211/212 Control Cabin

(2) Access Panel

198MR RAT Compartment

G. Install the RAT Assembly (Fig. 401)

S 824-026

- (1) Hold the RAT in the correct position to install it in the support frame.

S 434-027

- (2) Install the bolt (6), nut (7), and washer (8) at the inboard pivot point and tighten the bolt as follows:

NOTE: Install the washer (8) below the nut (7). The nut (7) must be on the outboard end of the pivot.

- (a) Tighten the bolt (6) to 290 to 510 pound-inches.

S 644-028

- (3) Apply grease on the bushing (4).

S 434-029

- (4) Install the bolt (1), nut (2), washers (3), and bushing (4) at the outboard pivot point and tighten the bolt as follows:

NOTE: Install the countersunk washer (3) below the bolt head with the countersunk side to the bolt head. The nut (2) must be on the inboard end of the pivot.

- (a) Tighten the bolt (1) to 1400 to 1900 pound-inches.

S 434-030

- (5) Connect the electrical wires.

S 644-031

- (6) Apply hydraulic lubricant or hydraulic fluid to the O-rings that you will install in the hydraulic lines.

S 434-032

- (7) Connect the hydraulic lines to the top of the strut.

S 644-033

- (8) Apply a layer of grease to the bushings (12).

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S 434-034

- (9) Install the bushings (12), washers (11), bolt (10), and nut (13) to connect the deployment actuator to the RAT strut (AMM 29-21-05/401).

S 434-035

- (10) Install the washer (15) and nut (14) to connect the door link (19) to the RAT strut (AMM 29-21-10/401).

S 644-036

- (11) Lubricate the RAT (AMM 12-21-30/301).

S 864-037

- (12) Remove the circuit breaker lock set and close these circuit breakers on the overhead panel, P11:
(a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
(b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

S 864-038

- (13) Pressurize the right hydraulic system and reservoir (AMM 29-11-00/201).

S 824-039

- (14) Do the adjustment for the door link (AMM 29-21-00/501).

S 834-040

- (15) Do the adjustment for the stowed limit switch (AMM 29-21-17/201).

H. Install the Hydraulic Pump (Fig. 402)

S 824-076

- (1) Do the steps that follow to find the thickness of the shims (29) for each of the hydraulic tubes (24, 25, 26):

NOTE: Some airplanes have incorporated SB29A46 which replaces the hydraulic tube (25) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (25), disregard the steps that follow used to determine shim size and the steps for the installation of the shims.

Do not install the O-rings, backup rings, or shims at this time.

- (a) Do the steps that follow to measure dimension A on each hydraulic tube (24, 25, 26):
1) Install the hydraulic tubes (24, 25, 26) in the RAT strut housing (16).

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- 2) Tighten the tube nut (27), on each hydraulic tube (24, 25, 26), by hand until it touches the end flange (28).
- 3) Measure the clearance, on each hydraulic tube (24, 25, 26), between the surface of the RAT strut housing (16) and the inner face of the tube nut (27).
- 4) For each hydraulic tube (24, 25, 26), write this clearance as dimension A in Table I.

TABLE I			
CALCULATE THE THICKNESS OF A SHIM FOR THE RAT STRUT HOUSING END OF EACH HYDRAULIC TUBE			
	CASE DRAIN TUBE	OUTLET TUBE	INLET TUBE
DIMENSION D	_____	(The flexible outlet tube does not use shims). _____	_____
DIMENSION A	_____	_____	_____
SUBTRACT DIMENSION A FROM DIMENSION D TO GET THE SHIM THICKNESS (± 0.003) WHICH IS NECESSARY	_____	_____	_____
WRITE THE THICKNESS OF THE SHIM WHICH YOU USE	_____	_____	_____

- 5) Remove the hydraulic tubes (24, 25, 26) from the RAT strut housing (16).

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- (b) Do the steps that follow to measure dimension B on each of the hydraulic tubes (24, 25, 26):

NOTE: Some airplanes have incorporated SB29A46 which replaces the hydraulic tube (25) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (25), disregard the steps that follow used to determine shim size and the steps for the installation of the shims.

Do not install the O-rings, backup rings, or shims at this time.

- 1) Install the hydraulic tubes (24, 25, 26) in the hydraulic pump housing (17).
- 2) Tighten the tube nut (27), on each hydraulic tube (24, 25, 26), by hand until it touches the end flange (28).
- 3) Measure the clearance, on each hydraulic tube (24, 25, 26), between the surface of the hydraulic pump housing (17) and the inner face of the tube nut (27).
- 4) For each hydraulic tube (24, 25, 26), write this clearance as dimension B in Table II.

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TABLE II			
CALCULATE THE THICKNESS OF A SHIM FOR THE HYDRAULIC PUMP END OF EACH HYDRAULIC TUBE			
	CASE DRAIN TUBE	OUTLET TUBE	INLET TUBE
DIMENSION C	_____	(The flexible outlet tube does not use shims) _____	_____
DIMENSION B	_____	_____	_____
SUBTRACT DIMENSION B FROM DIMENSION C TO GET THE SHIM THICKNESS (± 0.003) WHICH IS NECESSARY	_____	_____	_____
WRITE THE THICKNESS OF THE SHIM WHICH YOU USE	_____	_____	_____

(c) Loosen the tube nut (27) on each hydraulic tube (24, 25, 26).

NOTE: Do not remove the tube nuts (27) from the hydraulic pump housing (17).

- (d) Do the steps that follow to measure dimensions C and D on each hydraulic tube (24, 25, 26).
- 1) Put the hydraulic pump (17) in its position on the RAT strut housing (16) and engage the hydraulic tubes (24, 25, 26) with the RAT strut housing (16).
 - 2) Make sure the hydraulic pump (17) is flat against the RAT strut housing (16).
 - 3) Make sure all the tube nuts (27) on all the hydraulic tubes (24, 25, 26) are loose.
 - 4) Install the four bolts (32) to hold the hydraulic pump (17) on the RAT strut housing (16).
 - 5) Tighten the bolts (32) by hand until they touch the self-locking property of the threads in the RAT strut housing (16).

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- 6) Tighten the tube nuts (27), on the two ends of each hydraulic tube (24, 25, 26), by hand until they lightly touch the tube end flanges.

NOTE: The hydraulic pump (17) must remain flat against the RAT strut housing (16). Do not tighten the tube nuts (27) too much. This will cause the hydraulic pump (17) and the RAT strut housing (16) to move apart. If this occurs, the calculated thickness for the shims (29) will not be correct.

- 7) Measure the clearance, on each hydraulic tube (24, 25, 26), between the surface of the hydraulic pump housing (17) and the inner face of the tube nut (27).
 - 8) For each hydraulic tube (24, 25, 26), write this clearance as dimension C in the Table II.
 - 9) Measure the clearance, on each hydraulic tube (24, 25, 26), between the surface of the RAT strut housing (16) and the inner face of the tube nut (27).
 - 10) For each hydraulic tube (24, 25, 26), write this clearance as dimension D in Table I.
- (e) For each hydraulic tube (24, 25, 26), subtract dimension B from dimension C to calculate the shim thickness for the end of the tube at the hydraulic pump housing (17).
 - (f) Write this shim thickness for each hydraulic tube (24, 25, 26) in Table II.
 - (g) For each hydraulic tube (24, 25, 26), subtract dimension A from dimension D to calculate the shim thickness for the end of the tube at the RAT strut housing (16).
 - (h) Write this shim thickness for each hydraulic tube (24, 25, 26) in Table I.
 - (i) Get shims (29) that have the thickness which was calculated in Table I and Table II.

NOTE: The shim thickness must be ± 0.003 inch of the calculated thickness.

- (j) Identify the shims (29) for the correct location for subsequent installation.
- (k) Loosen the tube nuts (27) at the top of the three hydraulic tubes (24, 25, 26) until the tube nuts (27) disengage from the RAT strut housing (16).
- (l) Loosen the tube nuts (27) at the bottom of the three hydraulic tubes (24, 25, 26).

NOTE: Do not remove the three hydraulic tubes (24, 25, 26) from the hydraulic pump (17).

- (m) Remove the bolts (32) that hold the hydraulic pump (17) to the RAT strut housing (16).

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- (n) Remove the hydraulic pump (17) with the hydraulic tubes (24, 25, 26) attached to it.
- (o) Remove the hydraulic tubes (24, 25, 26) from the hydraulic pump (17).

S 424-072

- (2) Do the steps that follow to install the hydraulic pump (17):
 - (a) Apply a layer of hydraulic lubricant or hydraulic fluid on the new O-rings.
 - (b) Install the shims (29), backup rings (30), and O-rings (31) on the end of each of the hydraulic tubes (24, 25, 26).

NOTE: Some airplanes have incorporated SB29A46 which replaces the hydraulic tube (25) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (25), disregard the steps that follow for the installation of the shims.

- (c) Install the hydraulic tubes (24, 25, 26) on the hydraulic pump (17).
- (d) Tighten the tube nuts (27) on each hydraulic tube (24, 25, 26) by hand.
- (e) Put the hydraulic pump (17) in its position on the RAT strut housing (16) and engage the hydraulic tubes (24, 25, 26) with the RAT strut housing (16).
- (f) Make sure the hydraulic pump (17) is flat against the RAT strut housing (16).
- (g) Install the washers (33) and bolts (32) to attach the hydraulic pump (17) to the RAT strut.
- (h) Tighten the bolts (32) by hand until they touch the self-locking property of the threads in the RAT strut housing (16).
- (i) Tighten the tube nuts (27) as follows:
 - 1) Tighten the tube nuts (27) on the case drain tube (24) to 30-40 pound-feet.
 - 2) Tighten the tube nuts (27) on the outlet tube (25) to 40-50 pound-feet. On airplanes with flexible outlet tube restrain the outlet tube from rotation during tightening of tube nuts.
 - 3) Tighten the tube nuts (27) on the inlet tube (26) to 40-50 pound-feet.
- (j) Measure the clearance between the hydraulic pump housing (17) and the RAT strut housing (16).
- (k) If the clearance is more than 0.060 inch, do the steps to find the thickness of the shims (29) again.
- (l) If the clearance is 0.00 to 0.060 inch, tighten the bolts (32) to 20-22 pound-feet.
- (m) Apply a layer of sealant, RTV732, on these surfaces:
 - 1) The mating surfaces around the tube nuts (27).
 - 2) The surface around the joint between the hydraulic pump (17) and the RAT strut housing (16).

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(n) Safety the tube nuts (27) with a lockwire.

I. Install Hub (Fig. 402)

S 424-057

CAUTION: DO NOT LIFT THE HUB BY THE TURBINE BLADES OR PUT THE HUB DOWN ON THE TURBINE BLADES. THE WEIGHT OF THE HUB CAN CAUSE DAMAGE TO THE TURBINE BLADES OR THE GOVERNOR MECHANISM.

(1) Set the hub (18) in the strut housing.

S 434-058

(2) Use a wrench to install the screws (36) to attach the hub bearing support to the strut and tighten the screws as follows:

(a) Tighten the screws (36) to 51-56 pound-inches.

S 834-059

(3) Adjust the speed sensor (34) (AMM 29-21-15/501).

S 434-060

(4) Install the speed sensor cover (22).

J. Put the Airplane Back to Its Usual Condition

S 864-061

(1) Remove the circuit breaker lock set and close these circuit breakers on the overhead panel, P11:

(a) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT

(b) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR

S 864-062

(2) Remove the circuit breaker lock set and close these circuit breakers on the main power distribution panel, P6:

(a) 6F1, RAT MAN or RAT MAN PWR

(b) 6F2, RAT MAN CONT (if installed)

S 714-063

(3) Do the test for the RAT to make sure it operates correctly (Ref 29-21-00/501).

(a) If necessary, replace the RAT.

S 214-064

(4) Do a check for leaks in the RAT assembly.

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- S 864-065
- (5) Retract the RAT (AMM 29-21-00/201).
- S 864-066
- (6) Remove the power from the hydraulic systems (AMM 29-11-00/201).
- S 864-067
- (7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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RAM AIR TURBINE (RAT) - INSPECTION/CHECK

1. General

- A. This procedure only has illustrations 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 Ram Air Turbine (RAT) Assembly and Components Removal/Installation for procedures to do these tasks.

TASK 29-21-01-206-001

2. Ram Air Turbine (RAT) - Inspection/Check

A. Access

- (1) Location Zone

198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel

198GR RAT Compartment

B. Procedure

S 226-003

- (1) Examine the RAT with the wear limits in Figures 601 and 602.

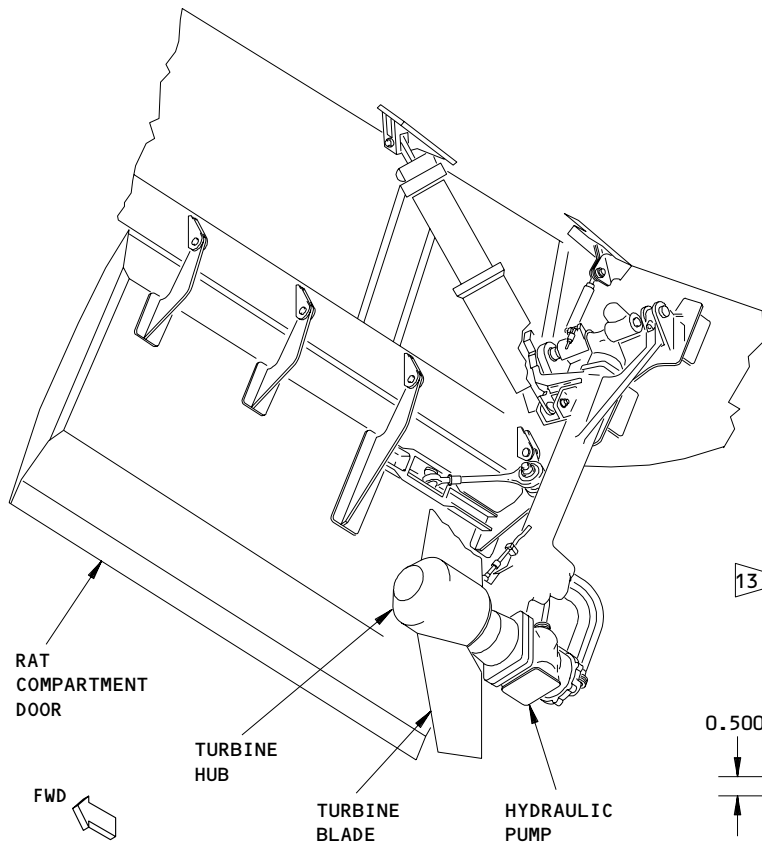
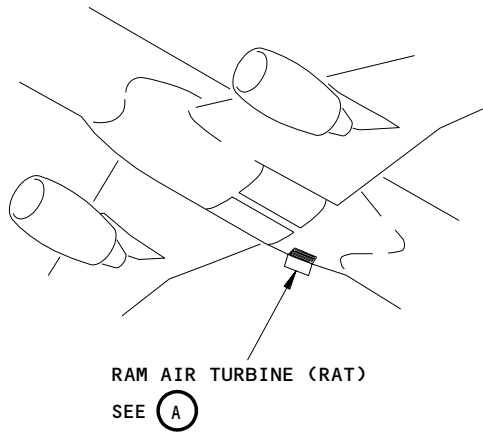
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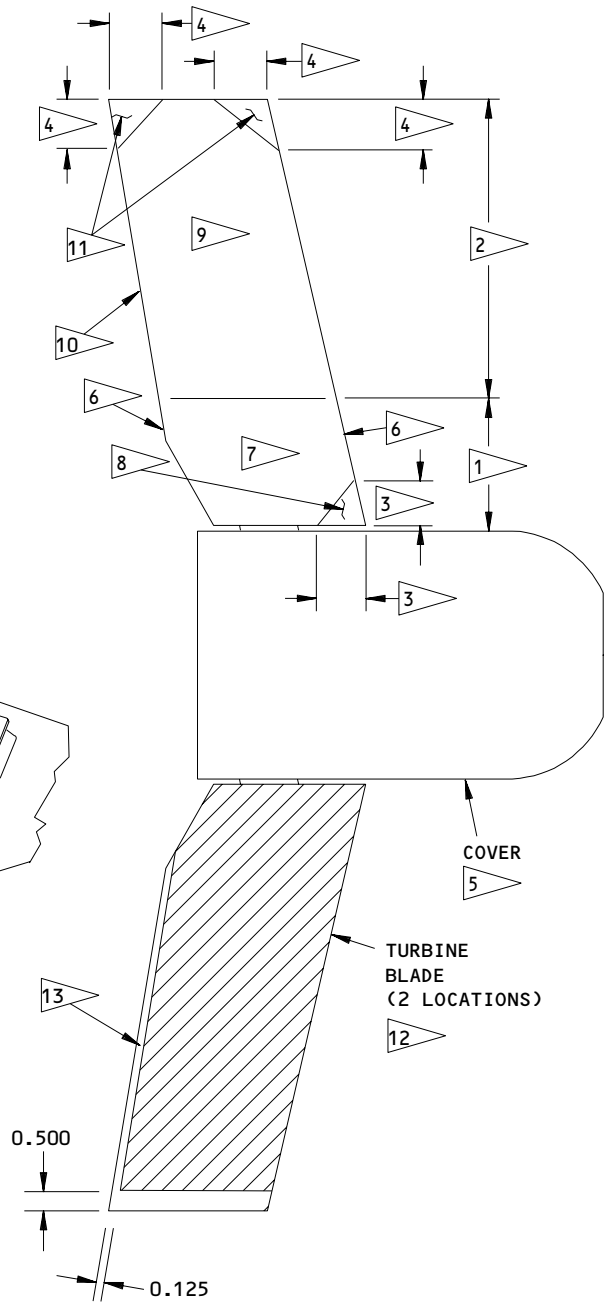
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RAM AIR TURBINE (RAT)

(A)



TURBINE BLADES AND HUB

(B)

Ram Air Turbine (RAT) Inspection
Figure 601 (Sheet 1)

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01.1

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- 1 ▷ 3.000 ±0.010 INCHES
- 2 ▷ 7.656 ±0.010 INCHES
- 3 ▷ 1.400 ±0.010 INCHES
- 4 ▷ 0.600 ±0.010 INCHES
- 5 ▷ THREE OR LESS DENTS THAT ARE SMALLER THAN 0.075 ±0.025 INCH DEEP AND 0.500 INCH IN DIAMETER ARE PERMITTED PER COVER, DENTS THAT ARE LARGER THAN 0.100 INCH DEEP AND 0.500 INCH IN DIAMETER ARE NOT PERMITTED.
- 6 ▷ NICKS ON LEADING AND TRAILING EDGES IN AREA 1 ▷ THAT ARE LARGER THAN 0.005 INCH DEEP AND 0.040 INCH WIDE ARE NOT PERMITTED.
- 7 ▷ SCRATCHES ON THE SURFACES OF AREA 1 ▷ THAT ARE LARGER THAN 0.005 INCH DEEP AND 0.040 INCH WIDE AND 1.500 INCHES LONG ARE NOT PERMITTED.
- 8 ▷ NICKS AND SCRATCHES IN AREA 3 ▷ THAT ARE LARGER THAN 0.040 INCH DEEP AND 0.080 INCH WIDE ARE NOT PERMITTED.
- 9 ▷ DENTS THAT ARE MORE THAN 5% OF TURBINE BLADE THICKNESS OR LARGER THAN 0.040 INCH IN AREA 2 ▷ ARE NOT PERMITTED.
- 10 ▷ NICKS AND DENTS ON LEADING AND TRAILING EDGES IN AREA 2 ▷ THAT ARE MORE THAN 2% OF THE LOCAL CHORD ARE NOT PERMITTED.
- 11 ▷ BLADE TIP CORNERS THAT ARE BENT OR CONTAIN NICKS, CAN BE REPAIRED BY BLENDING THE DAMAGE EQUALLY ON BOTH SIDES OF THE BLADE TIPS NOT TO EXCEED. 4 ▷
- 12 ▷ BENDS ARE NOT PERMITTED.
- 13 ▷ BLADE STRAIGHTNESS INSPECTION REQUIREMENTS:
 1. SET A 1" LONG GAUGE BLOCK (HEIGHT AND WIDTH OF BLOCK OPTIONAL) 0.125" IN FROM THE TRAILING EDGE.
 2. USING A 0.062" WIDE FEELER GAGE 0.010" THICK AS NO-GO GAUGE. VERIFY IT CANNOT BE INSERTED BETWEEN THE BLADE AND BLOCK ANYWHERE ALONG THE LENGTH OF THE BLADE IN THE REGION DEFINED IN FIGURE 601 13 ▷.
 3. IF THE FEELER GAGE CAN BE INSERTED, REPLACE THE TURBINE HUB.

Ram Air Turbine (RAT) Inspection
Figure 601 (Sheet 2)

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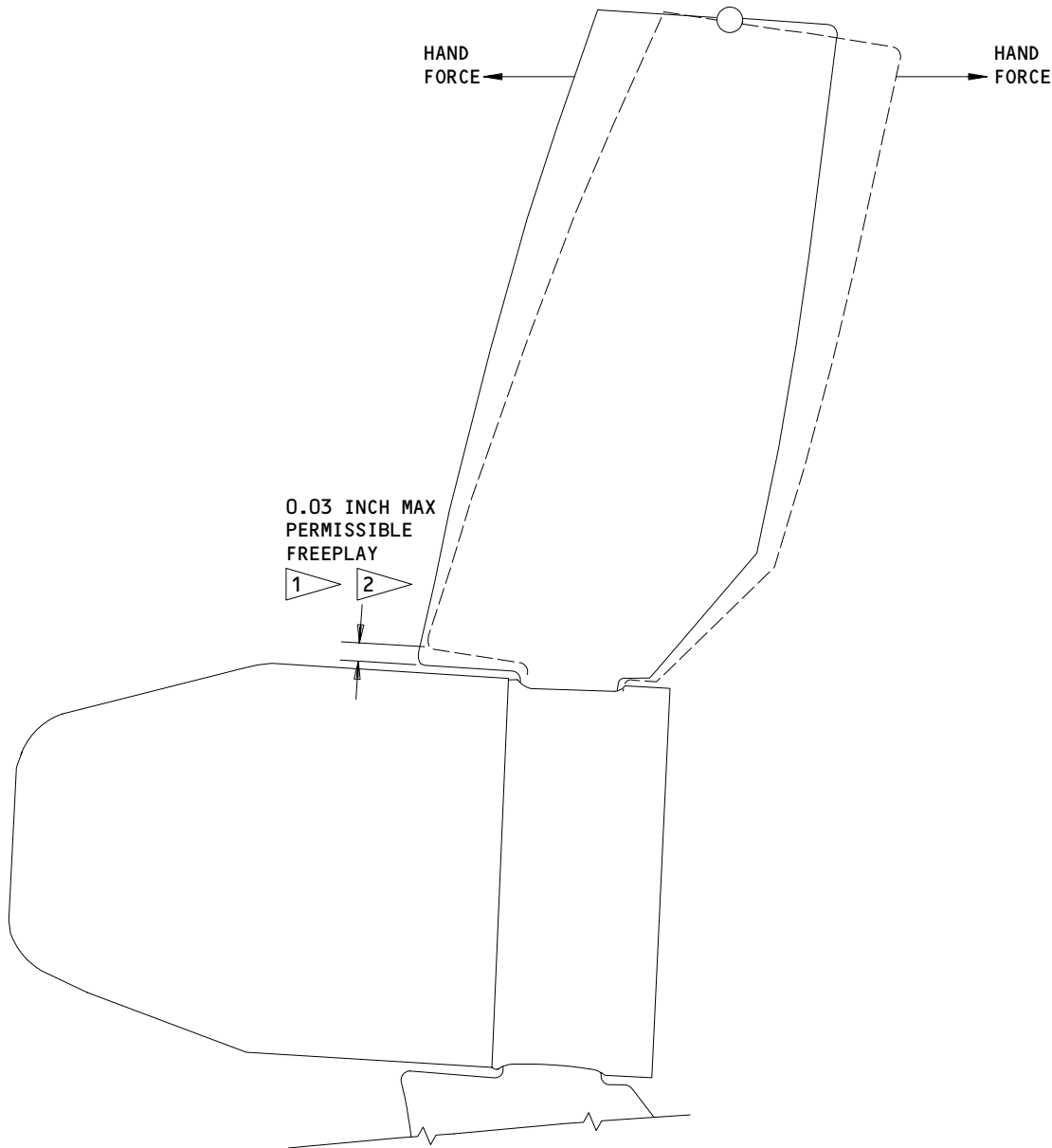
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- 1 TO BE MEASURED AT OUTERMOST PORTION OF BLADE BASE
- 2 APPLIES TO BOTH BLADES

Ram Air Turbine (RAT) Blade End Play Limits
Figure 602

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RAM AIR TURBINE (RAT) ACTUATOR CONTROL VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks one to remove and one to install the control valve on the ram air turbine (RAT) actuator.

TASK 29-21-04-024-001

2. Remove the Control Valve for the Ram Air Turbine (RAT)

A. References

- (1) AMM 24-22-00/201, Electrical Power
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
 - 198 Wing to Body – Aft Lower Half (Right)
 - 211/212 Control Cabin
- (2) Access Panel
 - 198MR RAT Compartment

C. Prepare for the Removal

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 864-003

- (2) If the valve motor does not operate, do these steps to extend the RAT:
 - (a) Open these circuit breakers on the main power distribution panel, P6:
 - 1) 6F1, RAT MAN or RAT MAN PWR
 - 2) 6F2, RAT MAN CONT (if installed)
 - (b) Disconnect the electrical connector from the RAT manual Q switch (S10335) on the E1 rack in the main equipment center.
 - (c) Supply electrical power (AMM 24-22-00/201).

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE RAT AND THE RAT COMPARTMENT DOOR. FAST MOVEMENT OF THE RAT AND THE DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: DO NOT HOLD THE SWITCH IN THE DEPLOY POSITION MORE THAN FIVE SECONDS. THE RAT ACTUATOR SOLENOID CAN BE DAMAGED IF IT IS ENERGIZED MORE THAN TEN SECONDS.

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- (d) Push the RAT deployment switch on the engine-start/RAT-control panel to the DEPLOY position and release.

NOTE: Release the RAT deployment switch in less than 5 seconds.

- (e) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
1) 11D26, HYDRAULIC RAT CONT or HYDRAULIC RAT AUTO CONT
2) 11D27, HYDRAULIC RAT AUTO or HYDRAULIC RAT AUTO PWR
- (f) Open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
1) 6F1, RAT MAN or RAT MAN PWR
2) 6F2, RAT MAN CONT (if installed)
- (g) Remove the jumper from the electrical connector.
- (h) Install the electrical connector on the RAT manual Q switch.
- (i) Remove the pressure from the right hydraulic system and reservoir (AMM 29-11-00/201).

D. Remove the Control Valve (Fig. 401)

S 034-004

- (1) Disconnect the electrical connector from the valve motor.

S 034-005

- (2) Disconnect the hydraulic lines from the control valve.

S 034-006

- (3) Put caps on the hydraulic lines.

S 034-007

- (4) Remove the bolts and washers that hold the control valve to the mounting bracket.

S 024-008

- (5) Remove the control valve.

TASK 29-21-04-424-009

3. Install the Control Valve for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

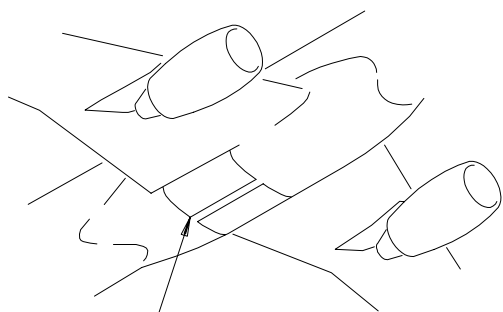
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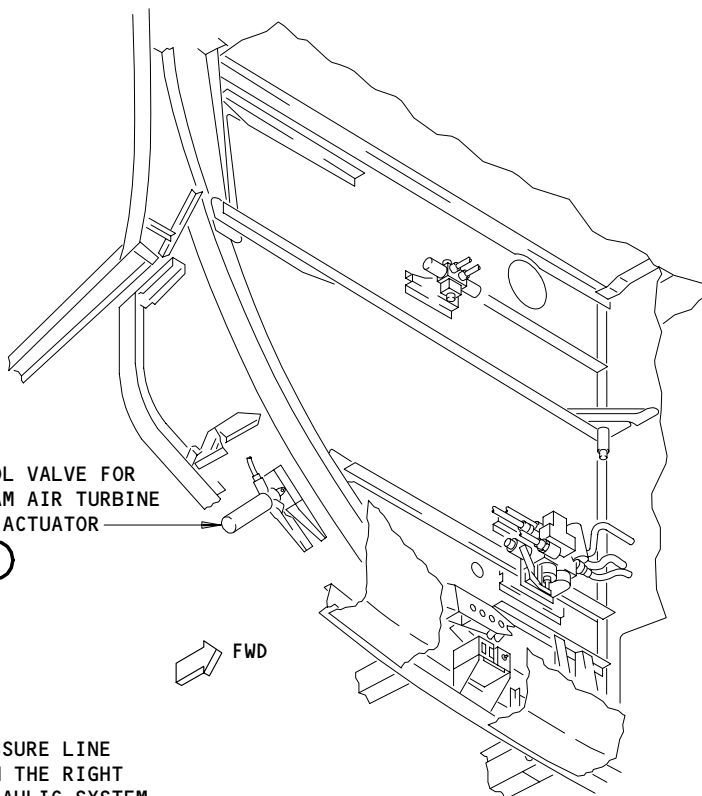
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AFT BULKHEAD OF THE
RIGHT WHEEL WELL

SEE (A)



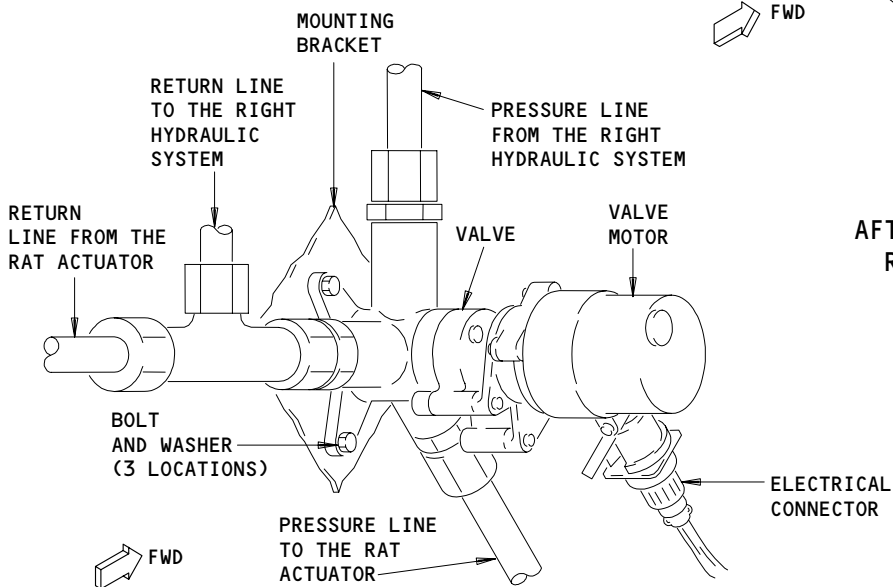
CONTROL VALVE FOR
THE RAM AIR TURBINE
(RAT) ACTUATOR

SEE (B)

FWD

AFT BULKHEAD OF THE
RIGHT WHEEL WELL

(A)



MOUNTING
BRACKET

RETURN LINE
TO THE RIGHT
HYDRAULIC
SYSTEM

PRESSURE LINE
FROM THE RIGHT
HYDRAULIC
SYSTEM

RETURN
LINE FROM THE
RAT ACTUATOR

VALVE

VALVE
MOTOR

BOLT
AND WASHER
(3 LOCATIONS)

ELECTRICAL
CONNECTOR

PRESSURE LINE
TO THE RAT
ACTUATOR

FWD

CONTROL VALVE

(B)

Control Valve Installation
Figure 401

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B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 29-21-00/201, Ram Air Turbine (RAT) System

C. Access

(1) Location Zones

- | | |
|---------|---------------------------------------|
| 198 | Wing to Body - Aft Lower Half (Right) |
| 211/212 | Control Cabin |

(2) Access Panel

- | | |
|-------|-----------------|
| 198MR | RAT Compartment |
|-------|-----------------|

D. Install the Control Valve (Fig. 401)

S 434-010

- (1) Set the control valve on the mounting bracket and install the bolts and washers.

S 644-011

- (2) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threaded fittings.

S 434-012

- (3) Remove the caps and connect the hydraulic lines to the control valve.

S 434-013

- (4) Connect the electrical connector to the valve motor.

S 864-014

- (5) Pressurize the right hydraulic system and reservoir (AMM 29-11-00/201).

S 214-015

- (6) Do a check for leakage in the control valve connections.

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S 164-016

CAUTION: QUICKLY CLEAN THE AREA AROUND THE CONTROL VALVE OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

(7) Clean all hydraulic fluid from the area of the control valve (AMM 12-25-01/301).

S 864-017

(8) Retract the RAT (AMM 29-21-00/201).

S 614-018

(9) Fill the right system reservoir (AMM 12-12-01/301).

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RAM AIR TURBINE (RAT) DEPLOYMENT ACTUATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the deployment actuator on the ram air turbine (RAT).

TASK 29-21-05-024-001

2. Remove the Deployment Actuator for the Ram Air Turbine (RAT)

A. Equipment

- (1) AD 99-05-10
- (2) Shipping sleeve - 1211233-800
- (3) Shipping container - 1211233-801
 - (a) Shipping Sleeve and Container
Arkwin Industries
Westbury, New York 11590

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

C. Access

- (1) Location Zone
198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

D. Remove the Deployment Actuator (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 034-003

- (2) Disconnect the hydraulic lines from the deployment actuator.

S 034-004

- (3) Put caps on the hydraulic lines.

S 034-005

- (4) Disconnect the electrical connectors from the solenoids on the deployment actuator.

S 034-006

- (5) Remove the bolt, washers, bushings, and nut that hold the deployment actuator to the RAT strut housing.

S 034-007

- (6) Hold the deployment actuator and remove the bolt, washer and bushings that hold the deployment actuator to the actuator support fitting.

S 024-008

- (7) Remove the deployment actuator.

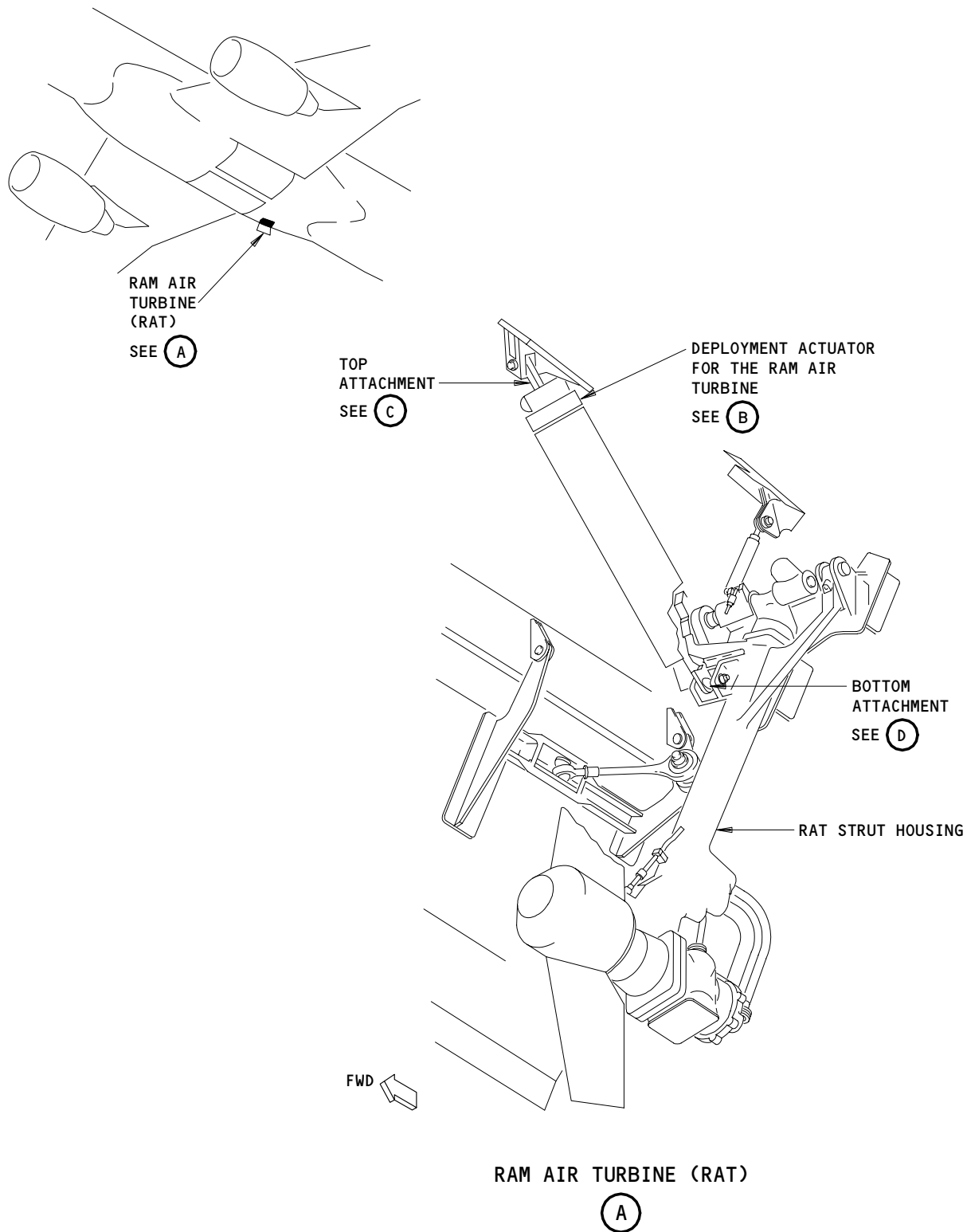
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Deployment Actuator Installation
Figure 401 (Sheet 1)

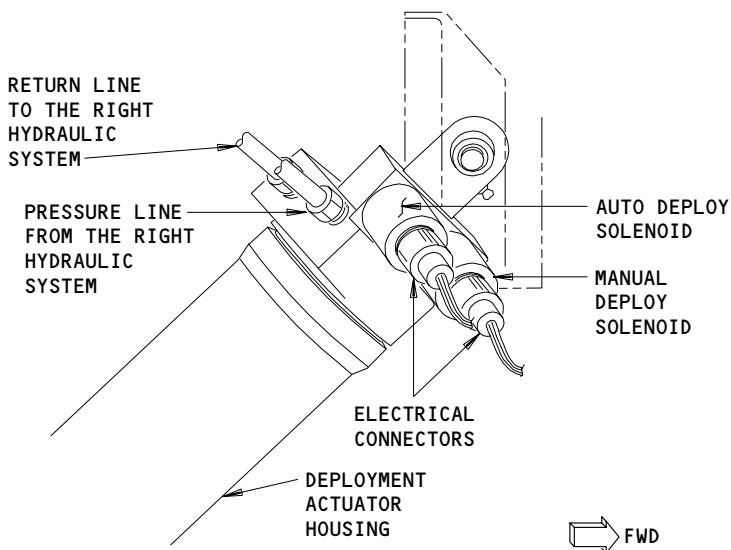
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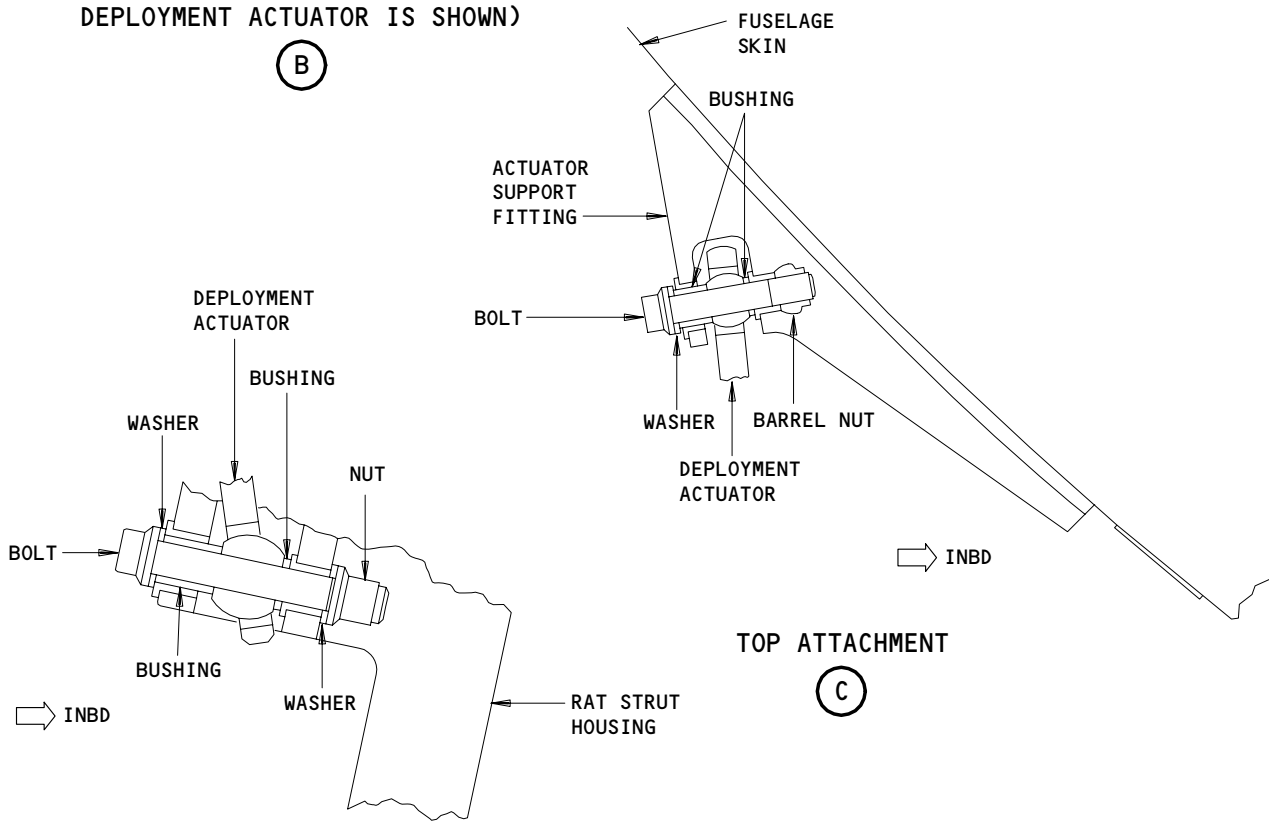
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DEPLOYMENT ACTUATOR
(THE OUTBOARD SIDE OF THE DEPLOYMENT ACTUATOR IS SHOWN)

(B)



BOTTOM ATTACHMENT

(D)

Deployment Actuator Installation
Figure 401 (Sheet 2)

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S 944-022

- (8) Install the shipping sleeve on the actuator and place actuator in shipping container.

TASK 29-21-05-424-009

3. Install the Deployment Actuator for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00633 Grease - BMS 3-33 (Preferred)
- (2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
- (3) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-21-00/501, Ram Air Turbine (RAT) System

C. Access

- (1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel
198MR RAT Compartment

D. Install the Deployment Actuator (Fig. 401)

S 644-025

CAUTION: DO NOT INSTALL AN ACTUATOR THAT DOES NOT HAVE THE SHIPPING SLEEVE, P/N 1211233-800, AND IS NOT IN THE SHIPPING CONTAINER, P/N 1211233-801. REFER TO FEDERAL AVIATION ADMINISTRATION (FAA) AIRWORTHINESS DIRECTIVE, AD 99-05-10, FOR COMPLETE INFORMATION ON USA FEDERALLY MANDATED RAT ACTUATOR SHIPPING REQUIREMENTS.

- (1) Apply a layer of grease to all of the bushings.

S 944-023

- (2) Remove shipping sleeve from actuator.

S 434-011

- (3) Install the bolt, washer, and bushings to attach the deployment actuator to the actuator support fitting and tighten the bolt as follows:
 - (a) Tighten the bolt to 620-760 pound-inches.

S 434-012

- (4) Install the bolt, washers, bushings, and nut to attach the deployment actuator to the RAT strut housing and tighten the nut as follows:
 - (a) Tighten the nut to 630-1070 pound-inches.

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- S 434-013
- (5) Connect the electrical connectors to the solenoids on the deployment actuator.
- S 644-014
- (6) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-rings and the threads on the hydraulic fittings.
- S 434-015
- (7) Connect the hydraulic lines to the deployment actuator.
- S 644-016
- (8) Apply grease to the actuator bearings through fittings on each end of the deployment actuator.
- S 864-017
- (9) Retract, then extend the RAT (AMM 29-21-00/501).
- S 214-018
- (10) Do a check for leaks at the connections on the deployment actuator.
- S 164-019

CAUTION: QUICKLY CLEAN THE AREA AROUND THE DEPLOYMENT ACTUATOR OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (11) Clean all hydraulic fluid from the area of the deployment actuator (AMM 12-25-01/301).
- S 864-020
- (12) Retract the RAT (AMM 29-21-00/501).
- S 614-021
- (13) Fill the right system reservoir (AMM 12-12-01/301).

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RAM AIR TURBINE (RAT) COMPARTMENT DOOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the compartment door for the ram air turbine (RAT).

TASK 29-21-09-024-001

2. Remove the Compartment Door for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

(1) Location Zones

- | | |
|---------|---------------------------------------|
| 198 | Wing to Body – Aft Lower Half (Right) |
| 211/212 | Control Cabin |

(2) Access Panels

- | | |
|-------|-----------------|
| 198MR | RAT Compartment |
|-------|-----------------|

C. Remove the Compartment Door (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 034-003

- (2) Remove the bolt, washers, bushings, and nut that attach the door link to the compartment door.

S 034-004

- (3) Remove the nut and washer to disconnect the bonding jumper from the forward door hinge.

S 034-005

- (4) Remove the bolt, washers, spacers, and nut that attach the depressor springs to the door hinges.

S 034-006

- (5) Hold the door and remove the hinge bolts, washers, bushing and nut at the door hinges.

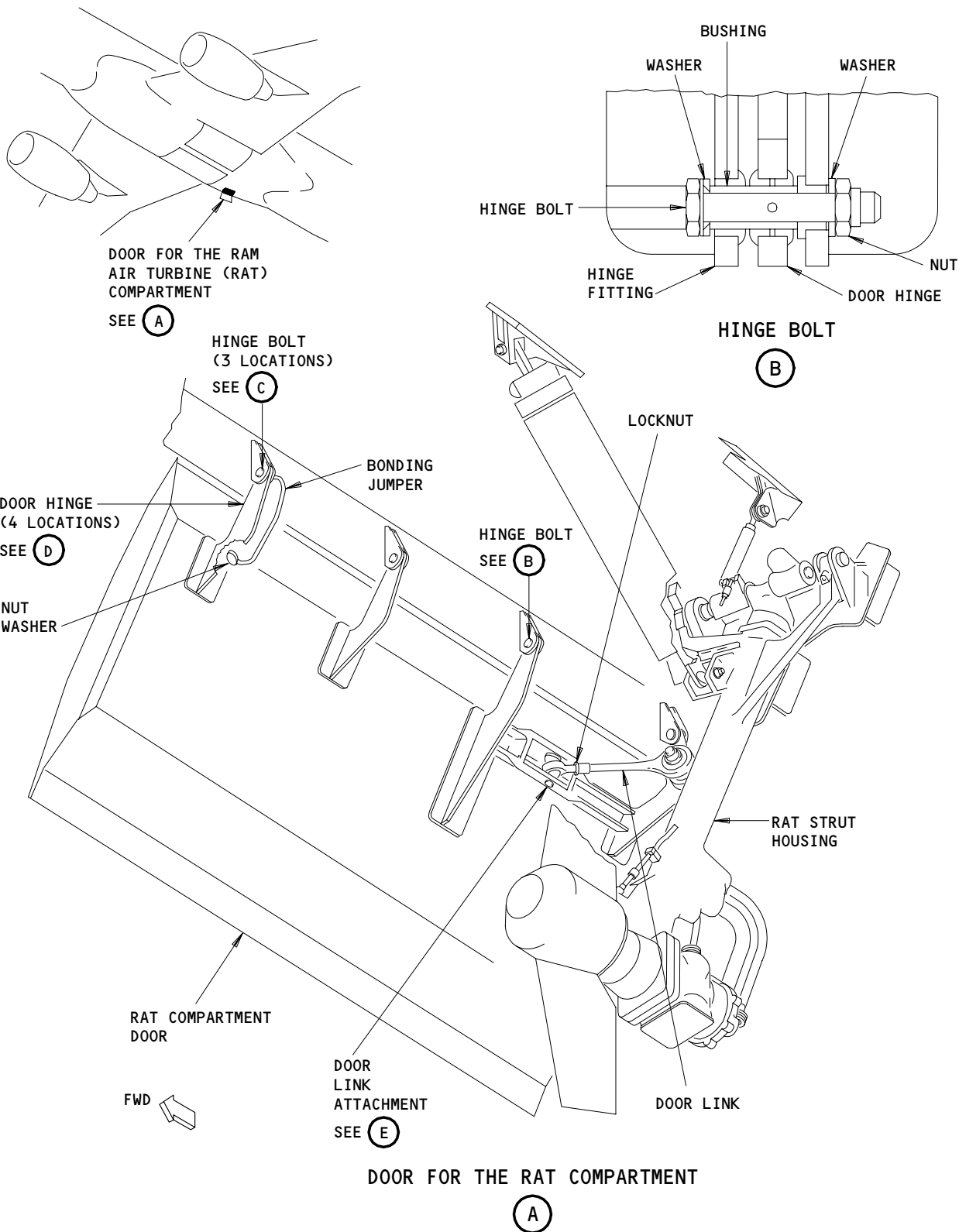
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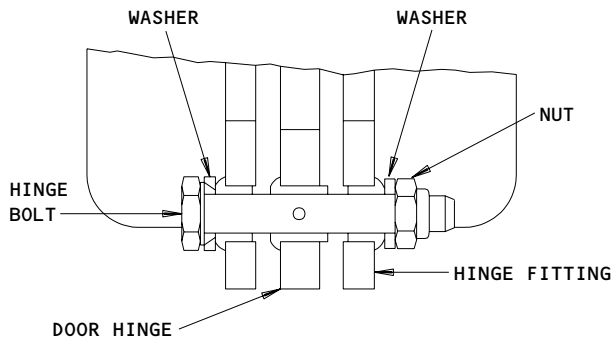
Door Installation
Figure 401 (Sheet 1)

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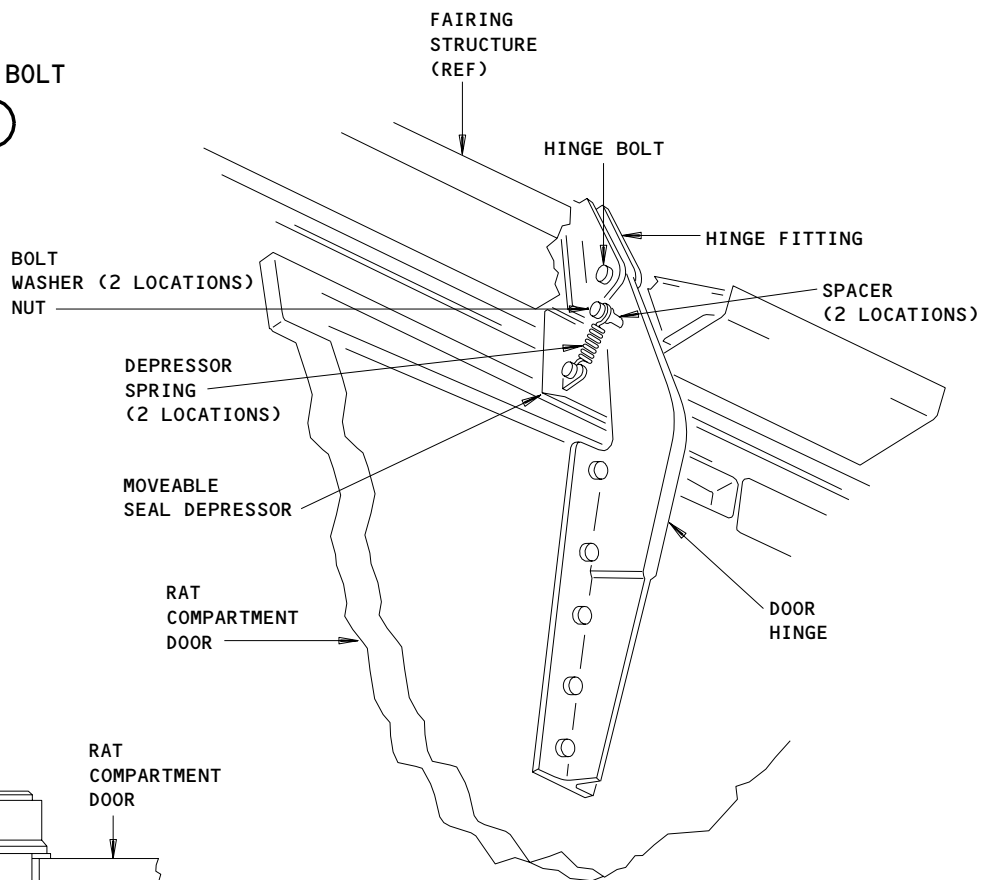
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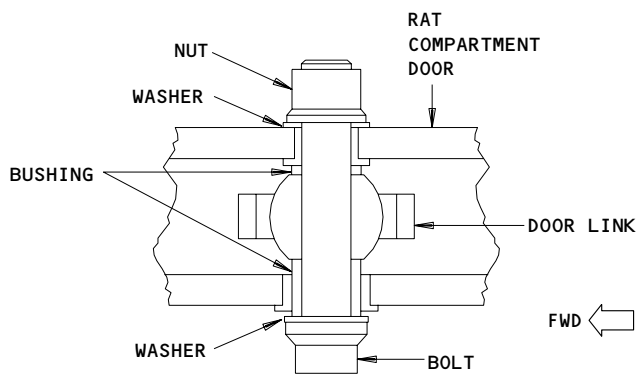
HINGE BOLT

(C)



DOOR HINGE

(D)



DOOR LINK ATTACHMENT

(E)

Door Installation
Figure 401 (Sheet 2)

EFFECTIVITY

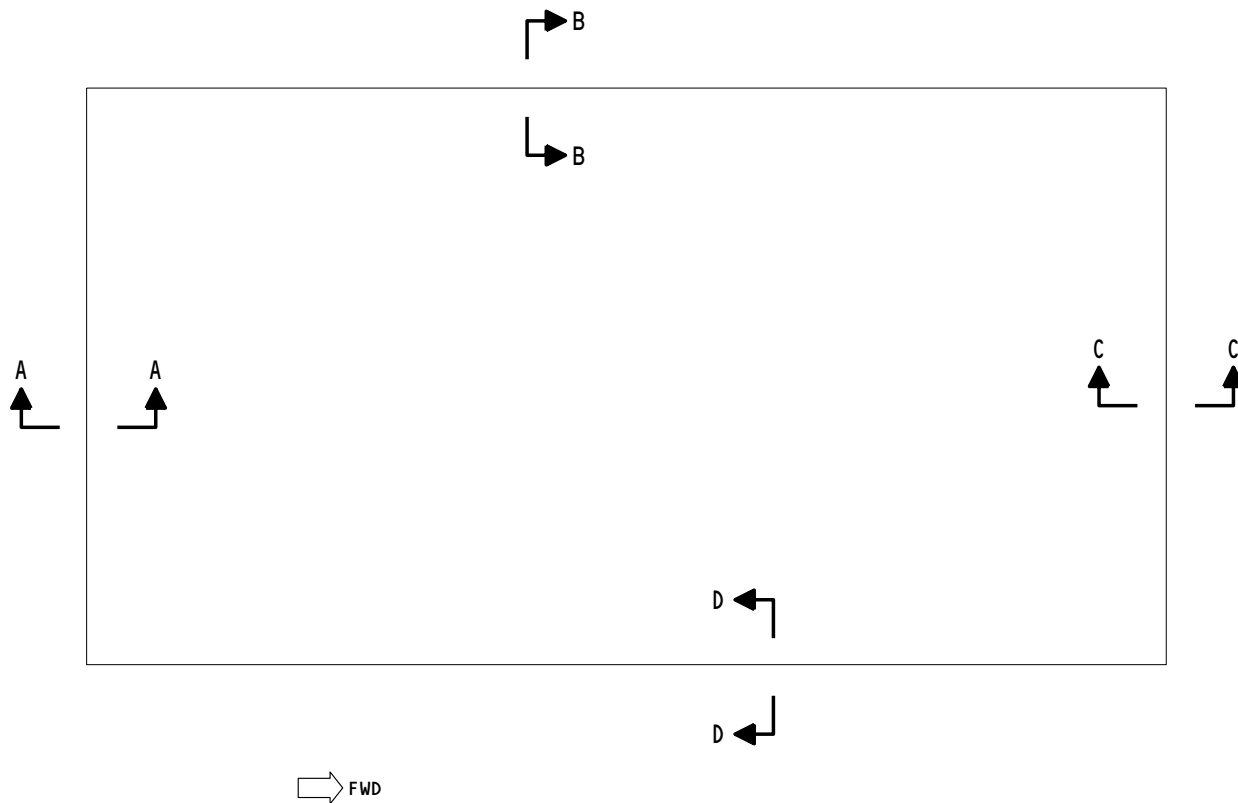
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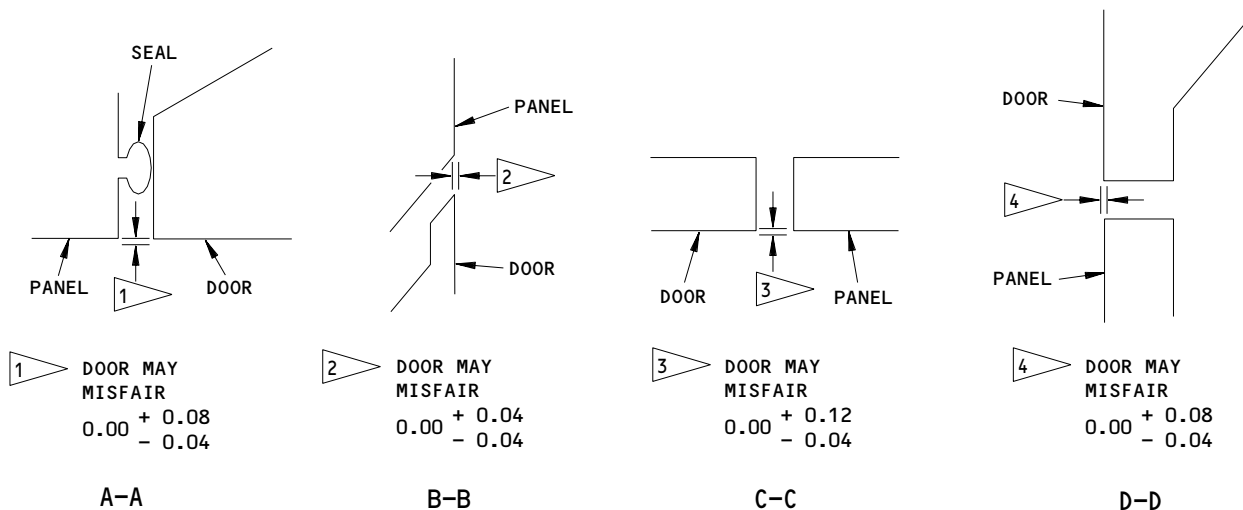
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RAM AIR TURBINE DOOR



Door Installation
Figure 401 (Sheet 3)

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S 024-007

- (6) Remove the compartment door.

TASK 29-21-09-424-008

3. Install the Compartment Door for the Ram Air Turbine (RAT)

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) A00247 Sealant - Chromate Type, BMS 5-95

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-17/201, Ram Air Turbine (RAT) Stowed Limit Switch

C. Access

- (1) Location Zones
 - 198 Wing to Body - Aft Lower Half (Right)
 - 211/212 Control Cabin
- (2) Access Panel
 - 198MR RAT Compartment

D. Install the Compartment Door (Fig. 401)

S 624-009

- (1) Apply a layer of grease to all of the surfaces of the hinge bolts, washers, and bushings.

S 434-010

- (2) Hold the compartment door in its correct position and install the hinge bolts, washers, bushing and nut at the door hinges.

S 434-011

- (3) Install the bolt, washers, spacers, and nut to attach the depressor springs to the door hinges.

S 164-012

- (4) Clean the mating surfaces of the bonding jumper and the door hinge.

S 434-013

- (5) Install the nut and washer to hold the bonding jumper to the forward door hinge and do the steps that follow:
 - (a) Tighten the nut to 50-75 pound-inches.
 - (b) Apply a layer of sealant around the nut.

S 034-014

- (6) Loosen the locknut and extend the door link to its maximum length.

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- S 624-015
- (7) Apply a layer of grease to the locknut and threads on the door link.
- S 624-016
- (8) Apply a layer of grease on the bushings for the door link.
- S 434-017
- (9) Install the bolt, washers, bushings, and nut to attach the door link to the compartment door.
- S 864-018
- (10) Retract the RAT (AMM 29-21-00/201).
- S 214-019
- (11) Do a check to make sure the forward edge of the compartment door and airplane body align correctly.
- S 824-020
- (12) Do the steps that follow until the forward edge of the compartment door aligns with the airplane body:
- (a) Extend the RAT (AMM 29-21-00/201).
 - (b) Decrease the length of the door link a small distance.
 - (c) Retract the RAT (AMM 29-21-00/201).
 - (d) Do a check to make sure the forward edge of the compartment door and the airplane body align correctly.
- S 824-021
- (13) When the forward edge of the compartment door aligns correctly, decrease the length of the door link seven half-turns.
- NOTE:** This will put a preload on the compartment door.
- S 824-022
- (14) Move the end fittings of the door link to 45 degrees of one another (as they are seen from the end of the door link) and tighten the locknut as follows:
- (a) Tighten the locknut to 290-510 pound-inches.
- S 434-028
- (15) Put a lockwire on the locknut.
- S 434-023
- (16) Tighten the nut that attaches the door link to the compartment door to 630-1070 pound inches.
- S 864-024
- (17) Retract the RAT (AMM 29-21-00/201).

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S 214-025

- (18) Make sure the RAT UNLOCKED light on the overhead panel, P5, is on while you retract the RAT.

S 214-026

- (19) Make sure the RAT UNLOCKED light on the P5 panel is off with the conditions that follow:
- (a) The RAT is fully retracted
 - (b) The RAT ground manual switch is in the neutral position.

S 824-027

- (20) If the RAT UNLOCKED light stays on, do the adjustment for the RAT limit switch (AMM 29-21-17/201).

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RAM AIR TURBINE (RAT) DOOR ACTUATOR LINK - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the door link on the compartment door for the ram air turbine (RAT).

TASK 29-21-10-024-001

2. Remove the Door Link for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

(1) Location Zones

- 198 Wing to Body - Aft Lower Half (Right)
211/212 Control Cabin

(2) Access Panel

- 198MR RAT Compartment

C. Remove the Door Link (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 864-003

- (2) Remove the pressure from the right hydraulic system and reservoir (AMM 29-11-00/201).

S 034-004

- (3) Remove the nut and bolt that connect the door link to the door.

S 034-005

- (4) Remove the aft nut that connects the door link to the RAT strut.

S 024-006

- (5) Remove the door link from the RAT strut.

S 034-007

- (6) Remove the link pin from the door link.

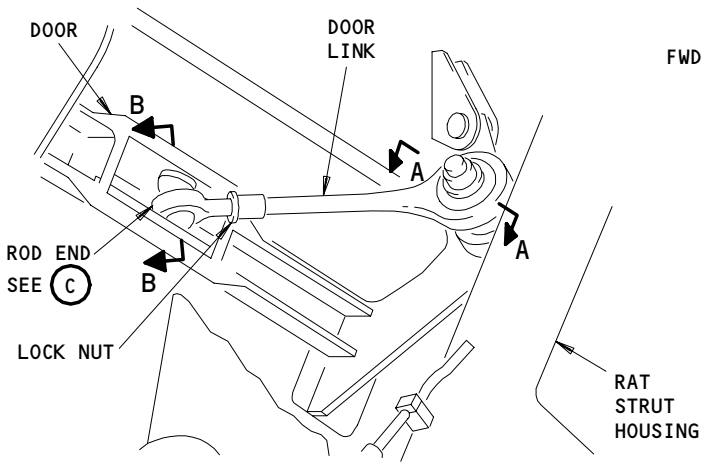
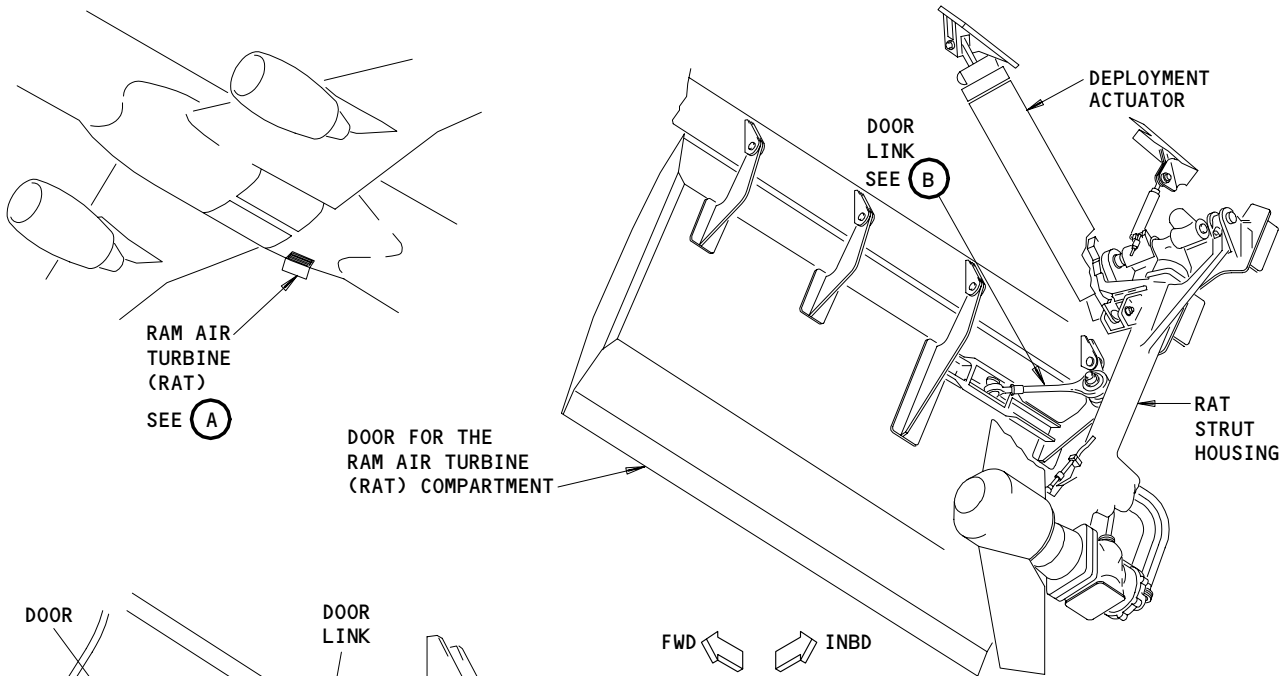
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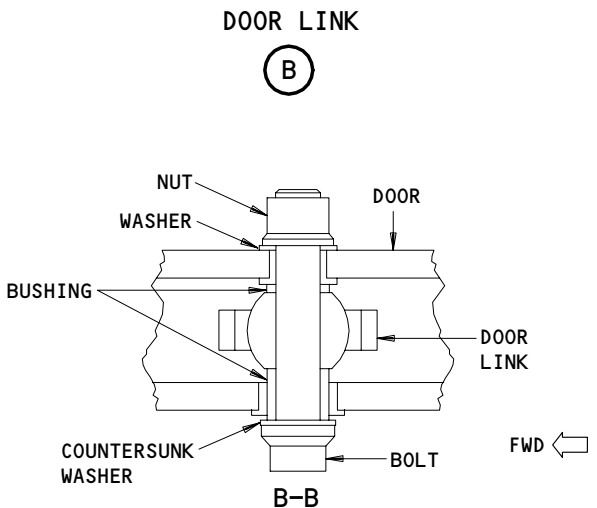
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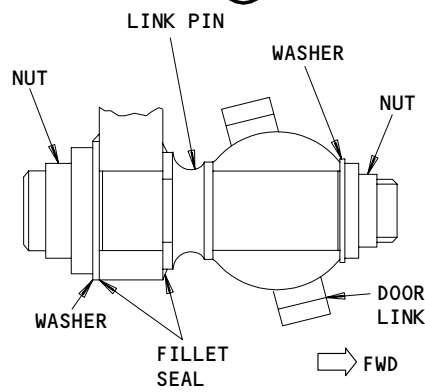
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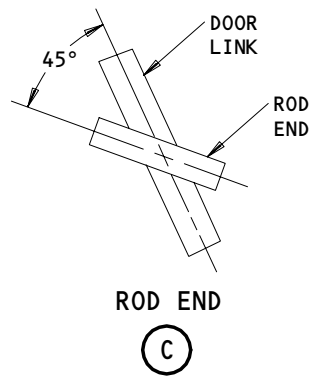
RAM AIR TURBINE (RAT)
(A)



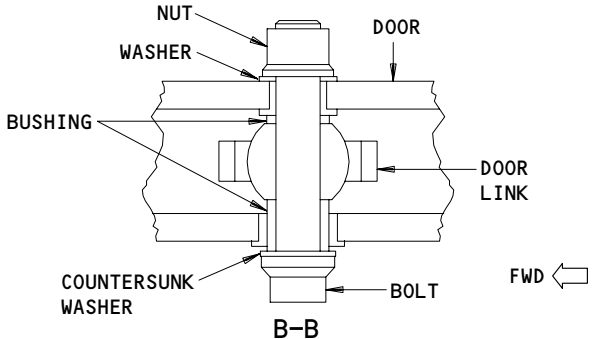
DOOR LINK
(B)



A-A



(C)



B-B

Door Link Installation
Figure 401

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TASK 29-21-10-424-008

3. Install the Door Link for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00633 Grease - BMS 3-33 (Preferred)
- (2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
- (3) A00247 Sealant - BMS 5-95, Class B

B. References

- (1) AMM 12-21-30/301, Ram Air Turbine
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (4) AMM 29-21-17/201, Ram Air Turbine (RAT) Stowed Limit Switch

C. Access

(1) Location Zones

- 198 Wing to Body - Aft Lower Half (Right)
- 211/212 Control Cabin

(2) Access Panel

- 198MR RAT Compartment

D. Install the Door Link (Fig. 401)

S 434-009

- (1) Install the link pin in the door link and tighten the nut as follows:
 - (a) Tighten the nut to 1300-2000 pound-inches.

S 034-010

- (2) Loosen the locknut and extend the door link to its maximum length.

S 624-011

- (3) Apply a layer of grease to the threads on the rod end fitting.

S 824-012

- (4) Hold the door link on the RAT strut.

S 434-013

- (5) Install the washer and nut to attach the door link to the RAT strut and tighten the nut as follows:
 - (a) Tighten the nut to 2200-5300 pound-inches.

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S 434-014

- (6) Install the door link in the door fitting with the bolt, washers, bushings, and nut and tighten the nut as follows:

NOTE: The countersunk face of the washer must be to the bolt head.

- (a) Tighten the nut to 630-1070 pound-inches.

S 644-015

- (7) Lubricate the spherical bearings on the door link (AMM 12-21-30/301).

S 864-016

- (8) Pressurize the right hydraulic system and reservoir (AMM 29-11-00/201).

S 834-017

- (9) Do the steps that follow to adjust the door link:
(a) Retract the RAT (AMM 29-21-00/201).

NOTE: If the RAT will not fully retract, remove the pressure from the hydraulic reservoir. This will decrease the return pressure in the deployment actuator.

- (b) Do a check to make sure the forward edge of the door and the airplane body align correctly.
(c) Do the steps that follow until the forward edge of the compartment door aligns with the airplane body:
1) Extend the RAT (AMM 29-21-00/201).
2) Decrease the length of the door link a small distance.
3) Retract the RAT (AMM 29-21-00/201).
4) Do a check to make sure the forward edge of the door and the airplane body align correctly.
(d) When the forward edge of the door aligns correctly, decrease the length of the door link seven half-turns.

NOTE: This will put a preload on the compartment door.

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- (e) Retract the RAT (AMM 29-21-00/201).
- (f) Make sure the RAT UNLOCKED light on the overhead panel, P5, is on while you retract the RAT.
- (g) Make sure the RAT UNLOCKED light on the P5 panel is off with the conditions that follow:
 - 1) The RAT is fully retracted
 - 2) The RAT ground manual switch is in the neutral position.
- (h) If the RAT UNLOCKED light stays on, do the adjustment for the RAT limit switch (AMM 29-21-17/201).
- (i) Extend the RAT (AMM 29-21-00/201).
- (j) Move the end fittings of the door link to 45 degrees of one another (as they are seen from the end of the door link).
- (k) Tighten the locknut on the door link to 290-510 pound-inches.
- (l) Put a lockwire on the locknut.

S 394-018

- (10) Apply a fillet of sealant on the link pin.

S 864-019

- (11) Retract the RAT (AMM 29-21-00/201).

S 864-020

- (12) Remove the power from the hydraulic system if it is not necessary (AMM 29-11-00/201).

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RAT CHECKOUT MODULE AND COMPONENTS – REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

- (1) Remove the Checkout Module for the Ram Air Turbine (RAT)
- (2) Remove the Pressure Switch for the Ram Air Turbine (RAT)
- (3) Remove the Filter Element for the Ram Air Turbine (RAT)
- (4) Install the Checkout Module for the Ram Air Turbine (RAT)
- (5) Install the Pressure Switch for the Ram Air Turbine (RAT)
- (6) Install the Filter Element for the Ram Air Turbine (RAT)

TASK 29-21-11-004-016

2. Remove the Checkout Module for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zone
 - 144 Right MLG Wheel Well
 - 730/740 Main Landing Gear and Doors

C. Prepare for Removal

S 494-017

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-018

WARNING: DO 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 864-019

- (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

D. Remove the Checkout Module (Fig. 401)

S 034-086

- (1) Disconnect the hydraulic lines from the checkout module.

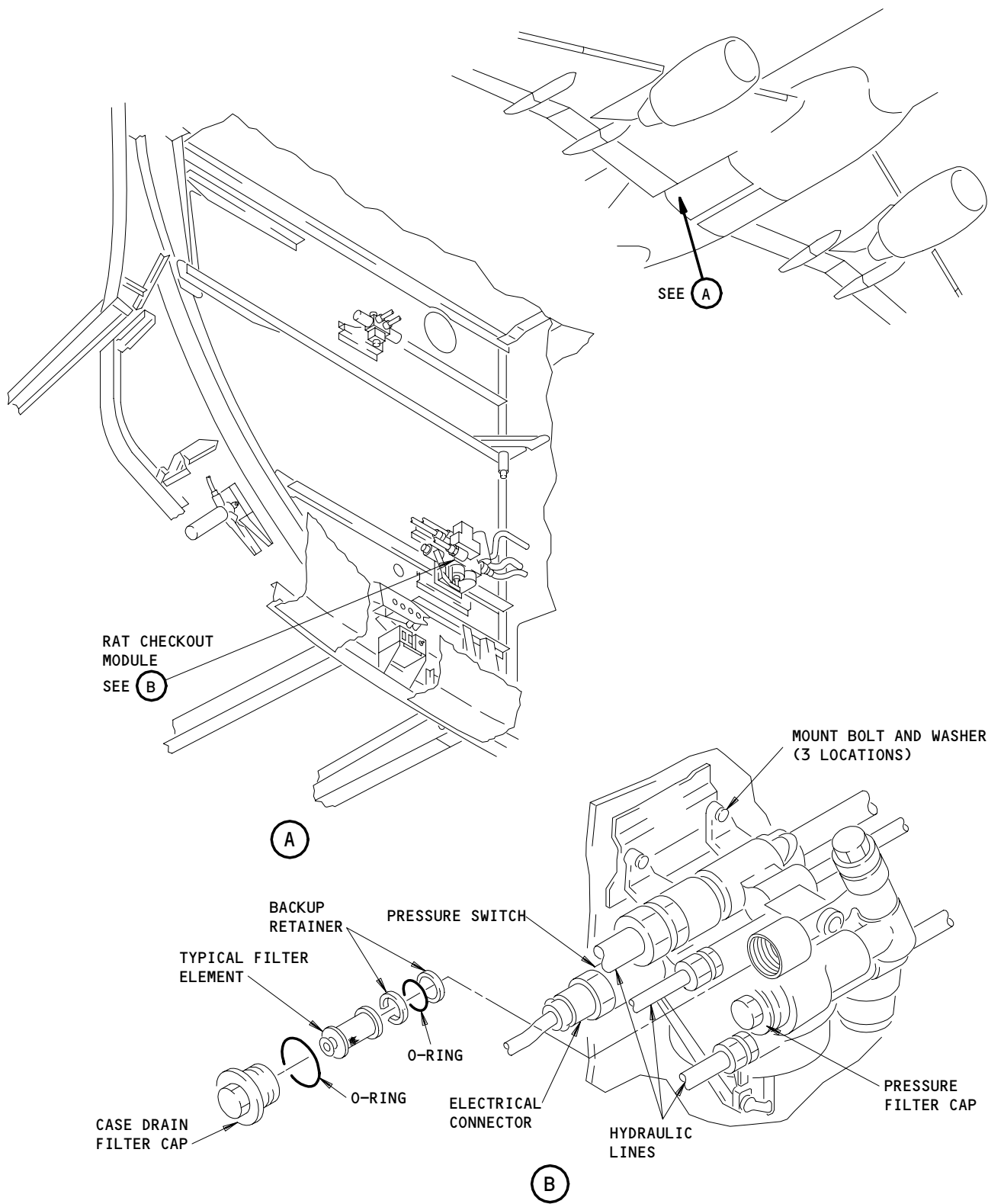
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RAT Checkout Module Installation
Figure 401

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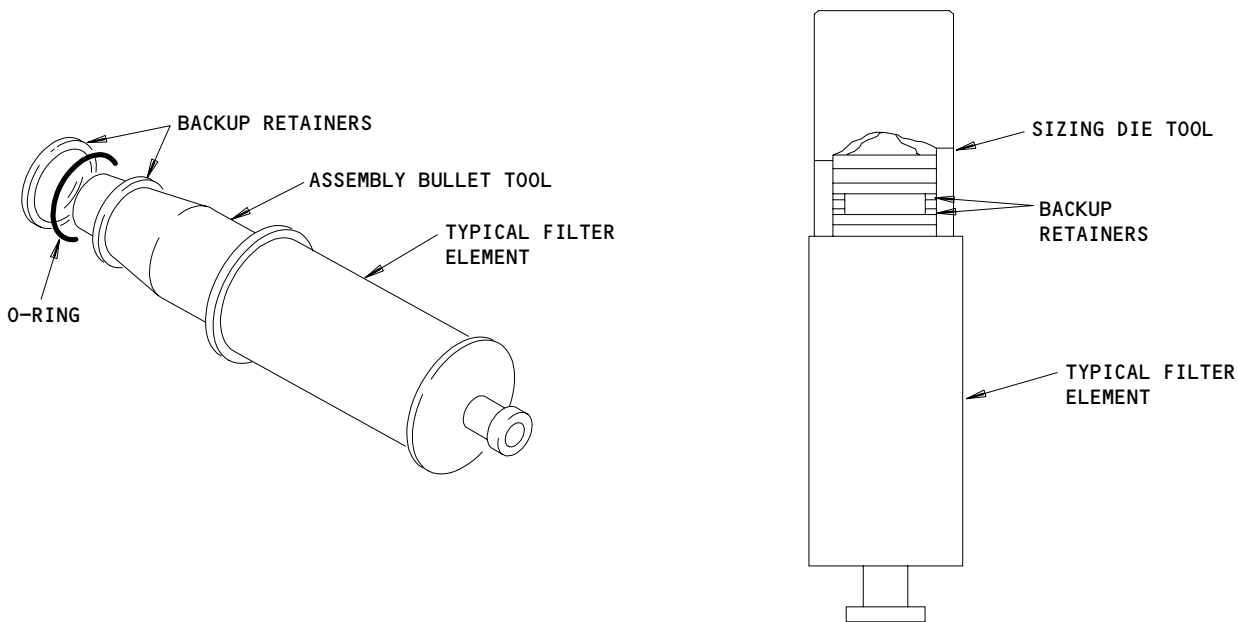
- S 034-020
- (2) Install caps on the hydraulic lines and the ports of the checkout module.
- S 034-021
- (3) Disconnect the electrical connector from the pressure switch.
- S 024-022
- (4) Remove the bolts which attach the checkout module to the support bracket.
- S 024-023
- (5) Remove the checkout module.

TASK 29-21-11-004-024

3. Remove the Pressure Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks



Filter Element O-Ring and Back-up Retainers Installation
Figure 402

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B. Access

- (1) Location Zone
144 Right MLG Wheel Well
730/740 Main Landing Gear and Doors

C. Prepare for Removal

S 494-025

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-026

WARNING: DO 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 864-027

- (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

D. Remove the Pressure Switch (Fig. 401)

S 034-028

- (1) Disconnect the electrical connector from the pressure switch.

S 024-029

- (2) Remove the pressure switch from the checkout module.

S 034-030

- (3) Install a cap in the port on the checkout module.

TASK 29-21-11-004-031

4. Remove the Filter Elements for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 32-00-15/201, Main Gear Door Locks
(3) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zone
144 Right MLG Wheel Well
730/740 Main Landing Gear and Doors

C. Prepare for Removal

S 494-032

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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S 494-033

WARNING: DO 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 864-034

- (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).
- D. Remove the Filter Elements from the case drain and pressure filters (Fig. 401)

S 034-035

- (1) Remove the filter caps from the checkout module.

S 024-036

- (2) Remove the filter elements from the checkout module.

TASK 29-21-11-404-037

5. Install the Checkout Module for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-25-01/301, Exterior Cleaning
- (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (3) AMM 29-21-00/501, Ram Air Turbine (RAT) System
- (4) AMM 32-00-15/201, Main Gear Door Locks

C. Access

- (1) Location Zone

144	Right MLG Wheel Well
730/740	Main Landing Gear and Doors

D. Install the Checkout Module (Fig. 401)

S 434-038

- (1) Remove the caps from the hydraulic lines and the ports on the checkout module.

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S 424-039

- (2) Put the checkout module on the support bracket.

S 424-040

- (3) Install the bolts and washers to attach the checkout module to the support bracket.

NOTE: Install the washers with the countersink against the head of the bolt.

S 644-041

- (4) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the unions.

S 434-042

- (5) Install the unions and O-rings in the ports of the checkout module.

S 434-043

- (6) Connect the hydraulic lines to the checkout module.

S 434-044

- (7) Connect the electrical connector to the pressure switch.

E. Put the Airplane Back to its Usual Condition

S 864-045

- (1) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 734-046

- (2) Do the system test procedure for the hydraulic pump and drive system of the ram air turbine (AMM 29-21-00/501).

S 214-047

- (3) Make sure there are no leaks at the hydraulic line connections on the checkout module.

S 114-048

CAUTION: QUICKLY CLEAN THE AREA AROUND THE CHECKOUT MODULE OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (4) Clean all hydraulic fluid from the area (AMM 12-25-01/301).

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S 094-049

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.

- (5) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-050

- (6) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

TASK 29-21-11-404-051

6. Install the Pressure Switch for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-25-01/301, Exterior Cleaning
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 29-21-00/501, Ram Air Turbine (RAT) System
(4) AMM 32-00-15/201, Main Gear Door Locks

C. Access

- (1) Location Zone

144	Right MLG Wheel Well
730/740	Main Landing Gear and Doors

D. Install the Pressure Switch (Fig. 401)

S 644-052

- (1) Apply the hydraulic lubricant or hydraulic fluid to the O-ring and the threads of the pressure switch.

S 434-053

- (2) Install the new O-ring on the pressure switch.

S 424-054

- (3) Install the pressure switch on the checkout module.

S 434-055

- (4) Tighten the pressure switch to 75-100 pound-inches.

S 434-056

- (5) Safety the pressure switch with a lockwire.

S 434-057

- (6) Connect the electrical connector to the pressure switch.

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E. Put the Airplane Back to its Usual Condition

S 864-058

- (1) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 734-059

- (2) Do the system test procedure for the hydraulic pump and drive system of the ram air turbine (AMM 29-21-00/501).

S 214-060

- (3) Make sure there are no leaks at the pressure switch on the checkout module.

S 114-061

CAUTION: QUICKLY CLEAN THE AREA AROUND THE CHECKOUT MODULE OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (4) Clean all hydraulic fluid from the area (AMM 12-25-01/301).

S 094-062

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.

- (5) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-063

- (6) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

TASK 29-21-11-404-064

7. Install the Filter Elements for the Ram Air Turbine (RAT)

A. Equipment

- (1) Ultrasonic Cleaner - commercially available

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- (2) Assembly Bullet, BLS-34533, Sundstrand Corp.,
4747 Harrison Ave., Rockford, Illinois
 - (3) Assembly Bullet, BLS-34529, Sundstrand Corp.,
4747 Harrison Ave., Rockford, Illinois
 - (4) Sizing Die, DAS-34534, Sundstrand Corp.,
4747 Harrison Ave., Rockford, Illinois
 - (5) Sizing Die, DAS-34530, Sundstrand Corp.,
4747 Harrison Ave., Rockford, Illinois
- B. Consumable Materials
- (1) D00054 Hydraulic System Lubricant - MCS 352B
 - (2) Solvents (Optional)
 - (a) B00521 Solvent - Freon TMS (Preferred)
 - (b) B00175 Solvent - Trichloroethylene, Stabilized, 0-T-634
(Optional)
 - (c) B00019 Solvent - Alcohol, TT-I-735 (Optional)
- C. References
- (1) AMM 12-25-01/301, Exterior Cleaning
 - (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
 - (3) AMM 29-21-00/501, Ram Air Turbine (RAT) System
 - (4) AMM 29-21-01/401, Ram Air Turbine (RAT) Assembly and Components
 - (5) AMM 32-00-15/201, Main Gear Door Locks
- D. Access
- (1) Location Zones,
 - 144 Right MLG Wheel Well
 - 730/740 Main Landing Gear and Doors
- E. Prepare for Installation

S 494-065

WARNING: DO 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.

- (1) Open the landing gear doors and install the door locks
(AMM 32-00-15/201).

S 864-066

- (2) Remove the pressure from the center hydraulic system and reservoir
(AMM 29-11-00/201).

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F. Install the filter elements in the case drain and pressure filters
(Fig. 401)

S 214-067

- (1) Do a check of the condition of the filter elements.
 - (a) Examine the filter elements for bright metal particles that you can identify as broken pieces which are not very small flakes or slivers caused by usual wear.
 - (b) If you find a large quantity of bright metal particles, replace the hydraulic pump of the ram air turbine (AMM 29-21-01/401).
 - (c) Examine the filter elements for pieces of the filter screen from orifice plug in the checkout module.
 - (d) If you find pieces of the filter screen, replace the checkout module.

S 134-068

- (2) Clean the filter elements with an ultrasonic cleaner which contains solvent.

S 964-069

- (3) If you cannot remove the contamination or if the filter elements has damage, replace the filter elements.

S 644-070

- (4) Apply hydraulic lubricant or hydraulic fluid to the O-rings, the backup retainers, and the threads of the filter caps.

S 434-071

- (5) Install a new O-ring on the filter cap.

S 434-072

- (6) Use the assembly bullet as follows to install the O-ring and the backup retainers on the filter elements (Fig. 401).
 - (a) Use the assembly bullet BLS-34533 on the pressure filter element.
 - (b) Use the assembly bullet BLS-34529 on the case drain filter element.

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- S 434-073
- (7) Use the sizing die as follows to compress the backup retainers into the groove of the filter elements (Fig. 402).
- (a) Use the sizing die DAS-34534 on the pressure filter element.
- (b) Use the sizing die DAS-34530 on the case drain filter element.
- S 424-074
- (8) Install the filter elements in the checkout module.
- S 434-075
- (9) Install the filter caps on the checkout module.
- S 434-076
- (10) Tighten the filter cap for the pressure filter to 30-35 pound-feet.
- S 434-077
- (11) Tighten the filter cap for the case drain filter to 15-20 pound-feet.
- S 434-078
- (12) Safety the filter caps with a lockwire.
- G. Put the Airplane Back to its Usual Condition
- S 864-079
- (1) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).
- S 734-080
- (2) Do the system test procedure for the hydraulic pump and drive system of the ram air turbine (AMM 29-21-00/501).
- S 214-081
- (3) Make sure there are no leaks at the pressure switch on the checkout module.
- S 114-082
- CAUTION:** QUICKLY CLEAN THE AREA AROUND THE CHECKOUT MODULE OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (4) Clean all hydraulic fluid from the area (AMM 12-25-01/301).

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S 094-083

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 864-084

- (6) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

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RAM AIR TURBINE (RAT) SAFETY VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the safety valve for the ram air turbine (RAT).

TASK 29-21-14-024-001

2. Remove the Safety Valve for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(2) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body – Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

C. Remove the Safety Valve (Fig. 401)

- S 864-002
(1) Extend the RAT (AMM 29-21-00/201)
- S 864-003
(2) Remove the pressure from the right hydraulic system and reservoir (AMM 29-11-00/201).
- S 034-004
(3) Disconnect the hydraulic lines from the safety valve.
- S 034-005
(4) Put caps on the hydraulic lines.
- S 034-006
(5) Disconnect the electrical connector from the safety valve.
- S 034-007
(6) Remove the bolts and washers that attach the safety valve to the mounting bracket.

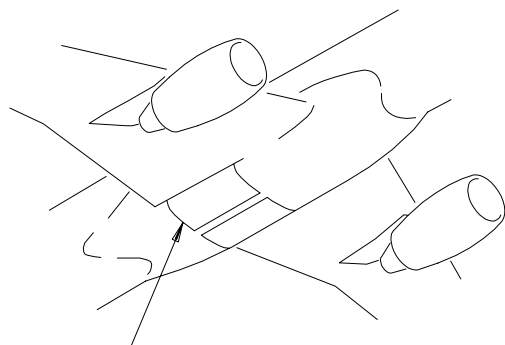
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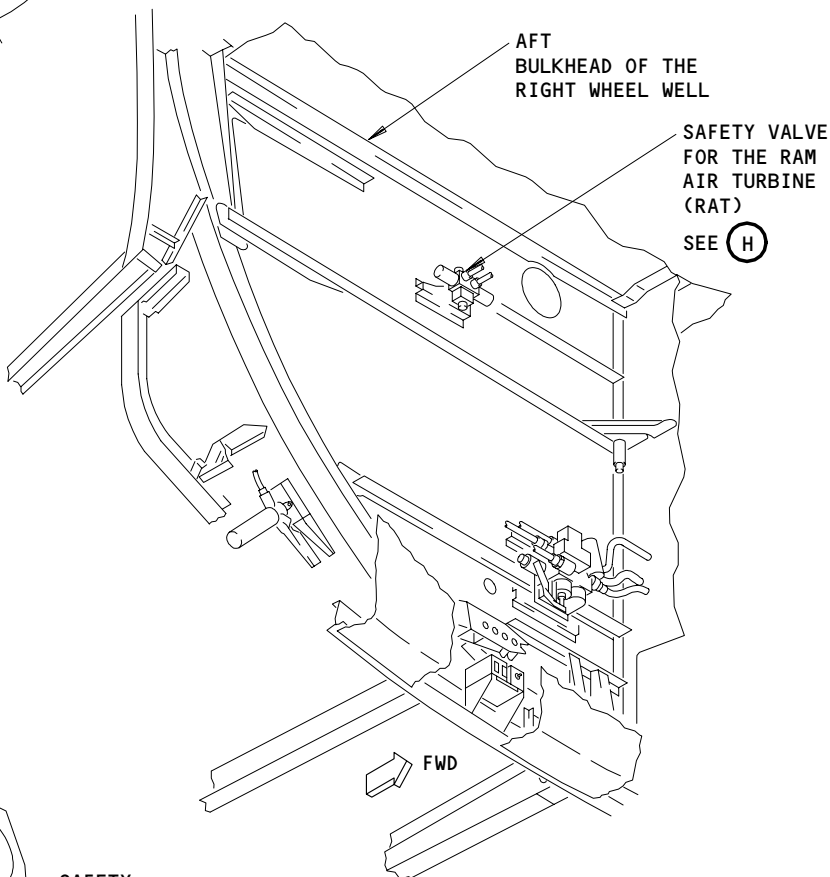
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AFT BULKHEAD OF THE
RIGHT WHEEL WELL

SEE (A)



AFT
BULKHEAD OF THE
RIGHT WHEEL WELL

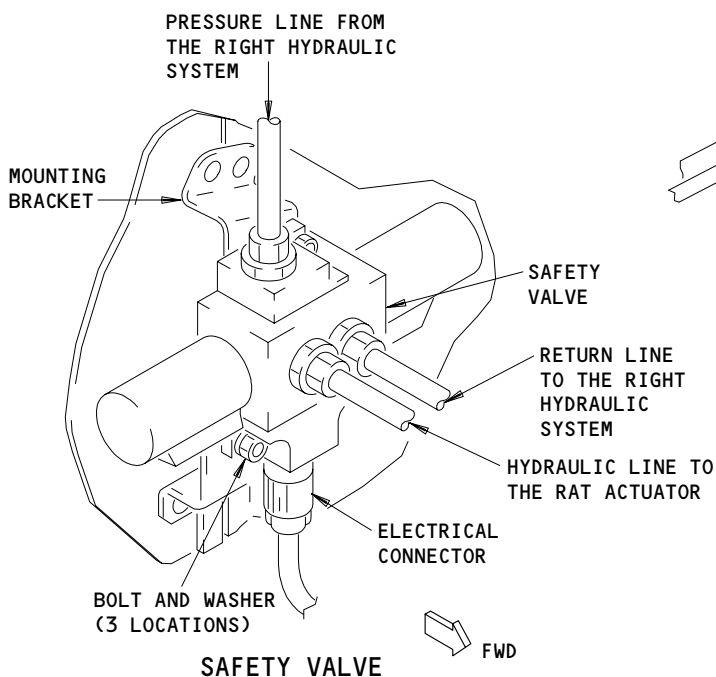
SAFETY VALVE
FOR THE RAM
AIR TURBINE
(RAT)

SEE (H)

FWD

AFT BULKHEAD OF THE
RIGHT WHEEL WELL

(A)



PRESSURE LINE FROM
THE RIGHT HYDRAULIC
SYSTEM

MOUNTING
BRACKET

SAFETY
VALVE

RETURN LINE
TO THE RIGHT
HYDRAULIC
SYSTEM

HYDRAULIC LINE TO
THE RAT ACTUATOR

ELECTRICAL
CONNECTOR

BOLT AND WASHER
(3 LOCATIONS)

SAFETY VALVE

FWD

(B)

Safety Valve Installation
Figure 401

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S 024-008

- (7) Remove the safety valve.

TASK 29-21-14-424-009

3. Install the Safety Valve for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 29-21-00/201, Ram Air Turbine (RAT) System

C. Access

- (1) Location Zones

198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel

198MR RAT Compartment

D. Install the Safety Valve (Fig. 401)

S 434-010

- (1) Hold the safety valve on the mounting bracket and install the bolts and washers.

S 644-011

- (2) Apply a layer of hydraulic fluid or hydraulic lubricant to the O-rings and the threads on the hydraulic line fittings.

S 434-012

- (3) Connect the hydraulic lines to the safety valve.

S 434-013

- (4) Connect the electrical connector to the safety valve.

S 864-014

- (5) Retract, then extend the RAT (AMM 29-21-00/201).

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S 214-015

- (6) Do a check for leakage at the connections on the safety valve.

S 164-016

CAUTION: QUICKLY CLEAN THE AREA AROUND THE SAFETY VALVE OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (7) Clean all hydraulic fluid from the area of the safety valve (AMM 12-25-01/301).

S 864-017

- (8) Retract the RAT (AMM 29-21-00/201).

S 614-018

- (9) Fill the right system reservoir (AMM 12-12-01/301).

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RAM AIR TURBINE (RAT) TACHOMETER SPEED SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the speed sensor on the tachometer for the ram air turbine (RAT).

TASK 29-21-15-024-001

2. Remove the Speed Sensor for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones

198 Wing to Body – Aft Lower Half (Right)

- (2) Access Panel

198MR RAT Compartment

C. Remove the Speed Sensor (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 034-003

- (2) Remove the screws and remove the speed sensor cover from the RAT strut housing.

S 034-004

- (3) Remove the screws and remove the speed sensor from the RAT strut housing.

S 034-005

- (4) SPEED SENSORS WITH IN-LINE ELECTRICAL CONNECTORS;

Cut the heat shrink sleeve that is on the electrical connectors on the wires that go to the speed sensor.

(a) Remove the electrical connectors.

S 034-007

- (5) SPEED SENSORS WITHOUT IN-LINE ELECTRICAL CONNECTORS;

Cut the wires about 1.75 inches away from the speed sensor.

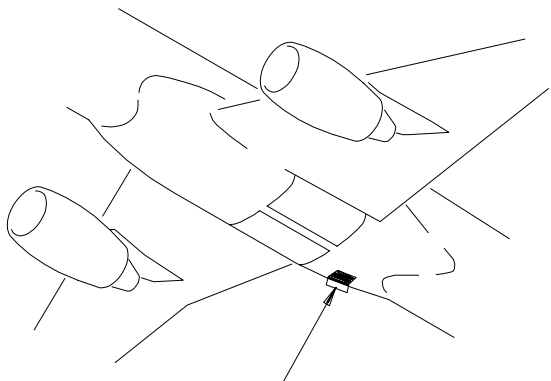
EFFECTIVITY

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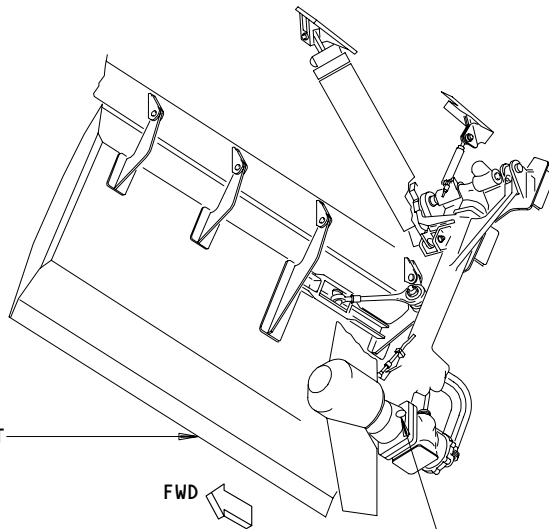
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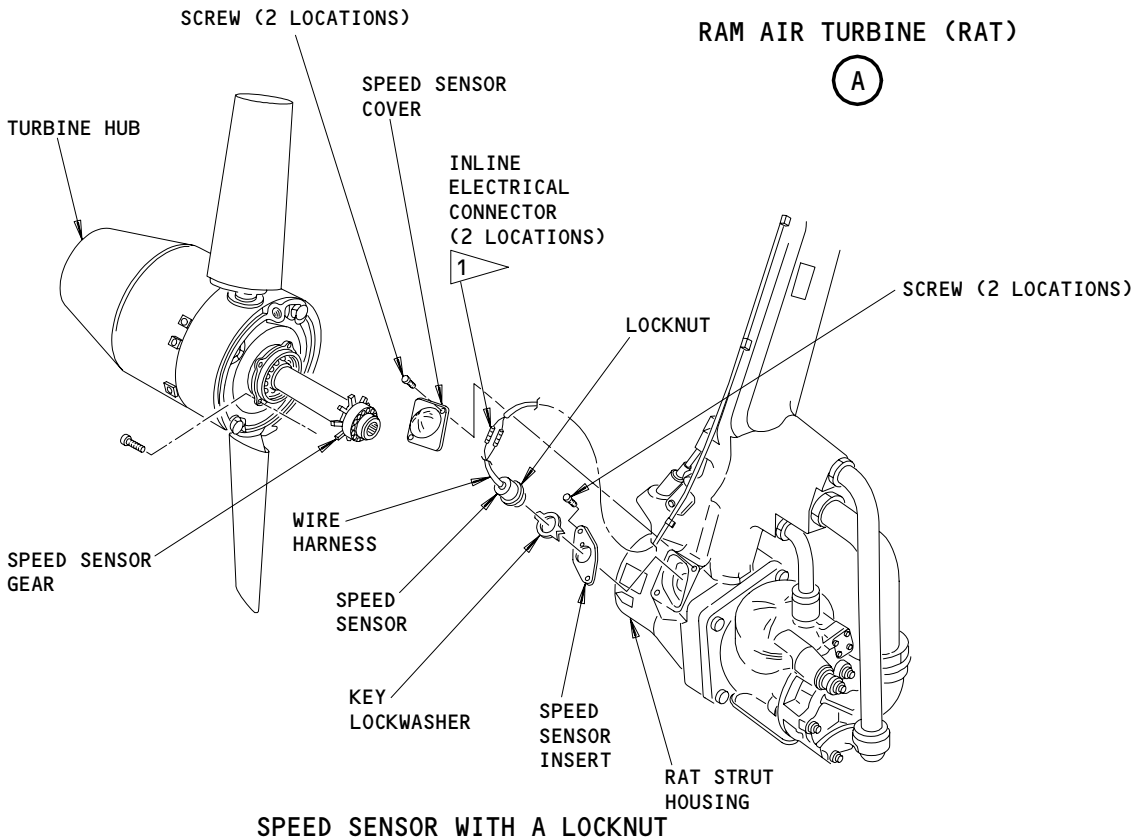
RAM AIR TURBINE (RAT)
SEE (A)



DOOR FOR THE
RAM AIR TURBINE
(RAT) COMPARTMENT

FWD

SPEED SENSOR
SEE (B) (C)



RAM AIR TURBINE (RAT)

(A)

SPEED SENSOR WITH A LOCKNUT

(A)

1 AIRPLANES WITH INLINE ELECTRICAL CONNECTORS

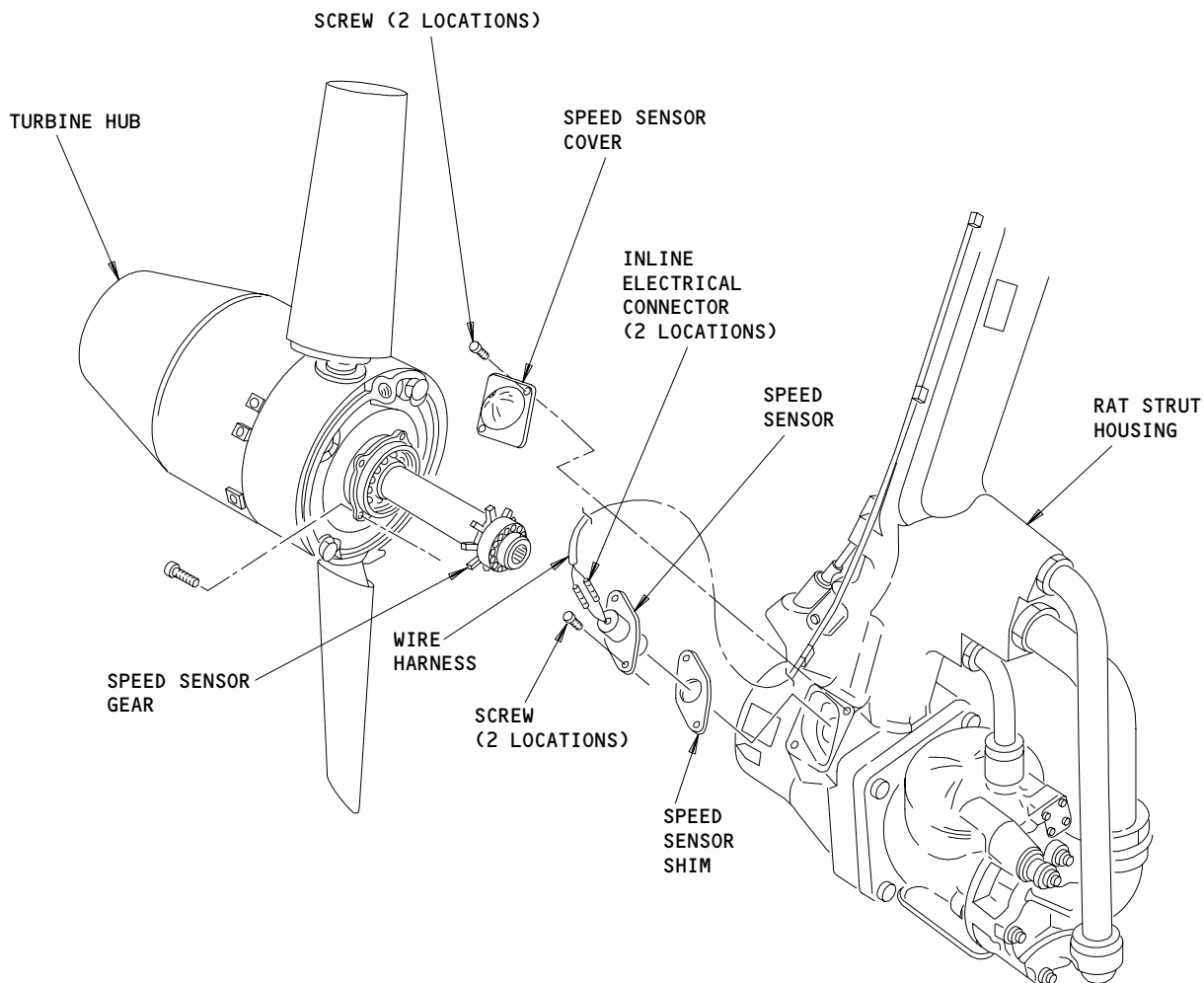
Tachometer Speed Sensor Installation
Figure 401 (Sheet 1)

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SPEED SENSOR WITH A SHIM

(C)

Tachometer Speed Sensor Installation
Figure 401 (Sheet 2)

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TASK 29-21-15-424-008

3. Install the Speed Sensor for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-15/501, Ram Air Turbine (RAT) Tachometer Speed Sensor

B. Access

- (1) Location Zones

198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel

198MR RAT Compartment

C. Install the Speed Sensor (Fig. 401)

S 434-009

- (1) If it is necessary, install in-line electrical connectors on the wires in the wire harness and on the speed sensor.

S 434-010

- (2) Connect the wires from the speed sensor to the electrical connectors on the wire harness.

S 434-011

- (3) Install heat shrink sleeves on the wires and connectors.

S 434-012

- (4) Install the screws to attach the speed sensor to the RAT strut housing and tighten the screws as follows:
(a) Tighten the screws to 19-21 pound-inches.

S 434-013

- (5) Install the screws that attach the speed sensor cover to the RAT strut housing and tighten the screws as follows:
(a) Tighten the screws to 32-36 pound-inches.

S 834-014

- (6) Adjust the speed sensor (AMM 29-21-15/501).

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RAM AIR TURBINE (RAT) TACHOMETER SPEED SENSOR – ADJUSTMENT/TEST

1. General

- A. This procedure contains one task to adjust the speed sensor on the tachometer for the ram air turbine (RAT).
- B. There are two types of speed sensors. One type is adjusted with an insert and locknut. The other type is adjusted with a shim. This procedure contains steps to adjust the two types of speed sensors.

TASK 29-21-15-835-001

2. Adjustment for the Speed Sensor for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) A00064 Sealant – RTV 732

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-00/501, Ram Air Turbine (RAT) System

C. Access

- (1) Location Zones
 - 198 Wing to Body – Aft Lower Half (Right)
- (2) Access Panel
 - 198MR RAT Compartment

D. Adjust the Speed Sensor

S 865-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 035-003

- (2) Remove the screws that attach the speed sensor cover to the RAT strut housing.

S 035-004

- (3) Remove the speed sensor cover.

S 035-005

- (4) Remove the screws that attach the speed sensor to the RAT strut housing.

S 035-006

- (5) Remove the speed sensor.

S 835-007

- (6) SPEED SENSORS WITH A LOCKNUT;

Do the steps that follow to adjust the speed sensor (Fig. 501):

- (a) Measure Dimension A and B (as shown in Views C and D).
- (b) Calculate Dimension C (as shown in Views C and D).
- (c) If the calculated Dimension C does not agree with the measured Dimension C on the speed sensor, do the steps that follow:
 - 1) Bend down the tabs on the key lockwasher.

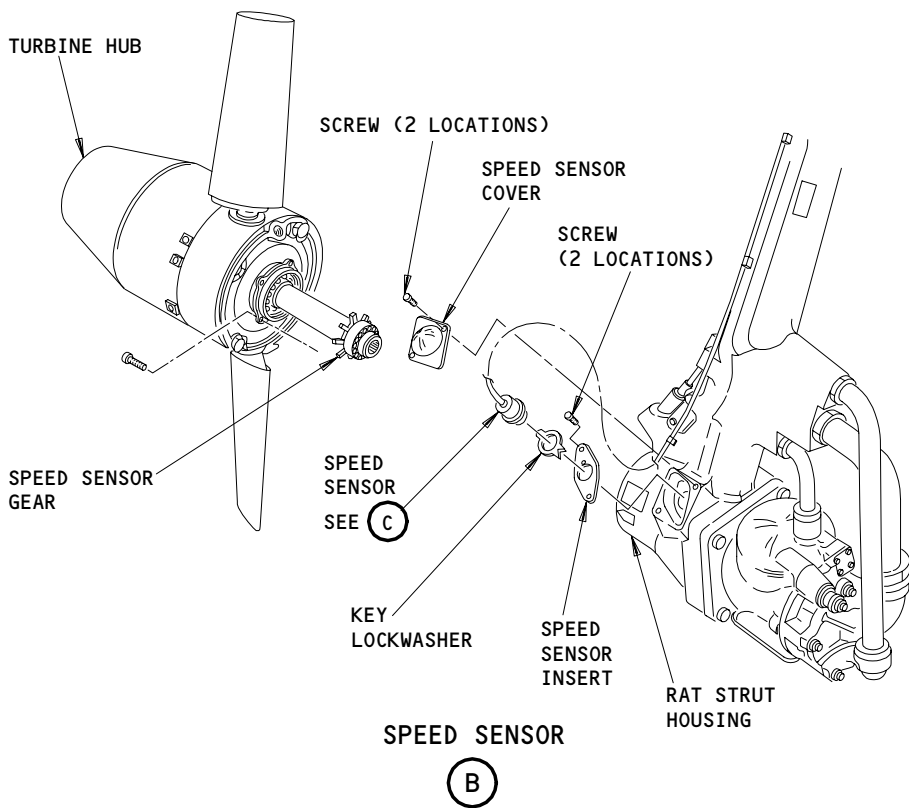
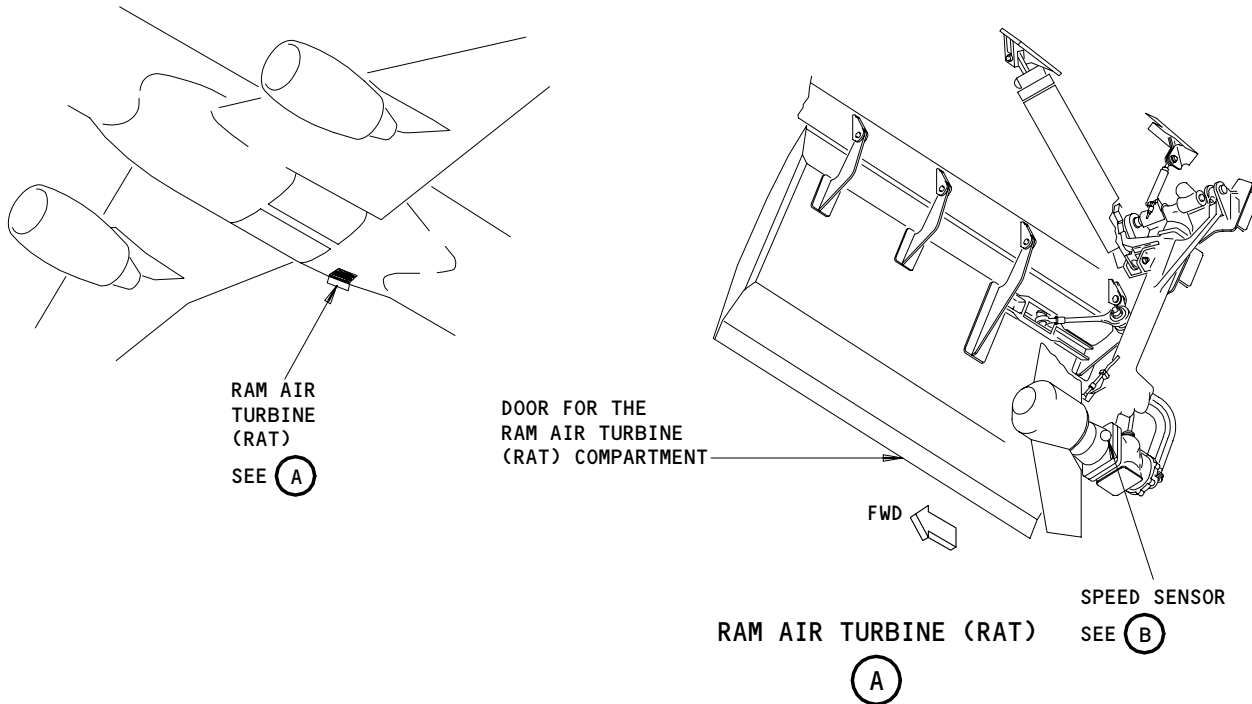
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Speed Sensor Adjustment with a Locknut
Figure 501 (Sheet 1)

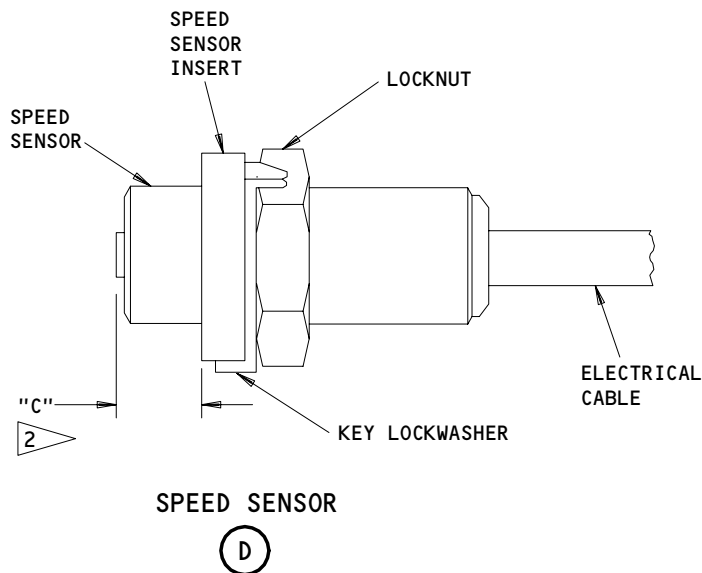
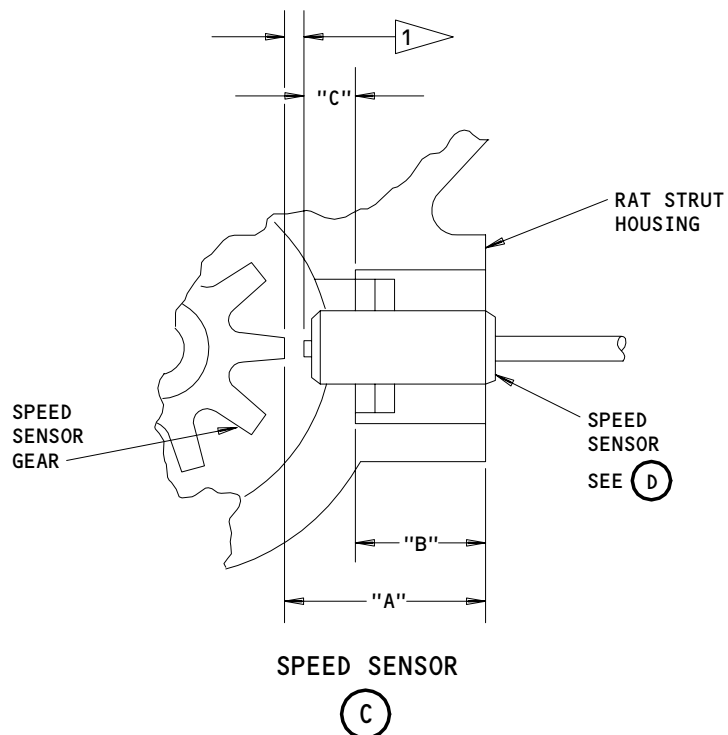
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- 1 THE CLEARANCE BETWEEN THE SPEED SENSOR AND THE GEAR IS 0.010 ±0.002 INCH
- 2 THE DEPTH OF THE SPEED SENSOR INTO THE RAT STRUT HOUSING (DIMENSION "C") IS CALCULATED AS FOLLOWS: "C" ±0.002 = ("A"- "B") -0.010

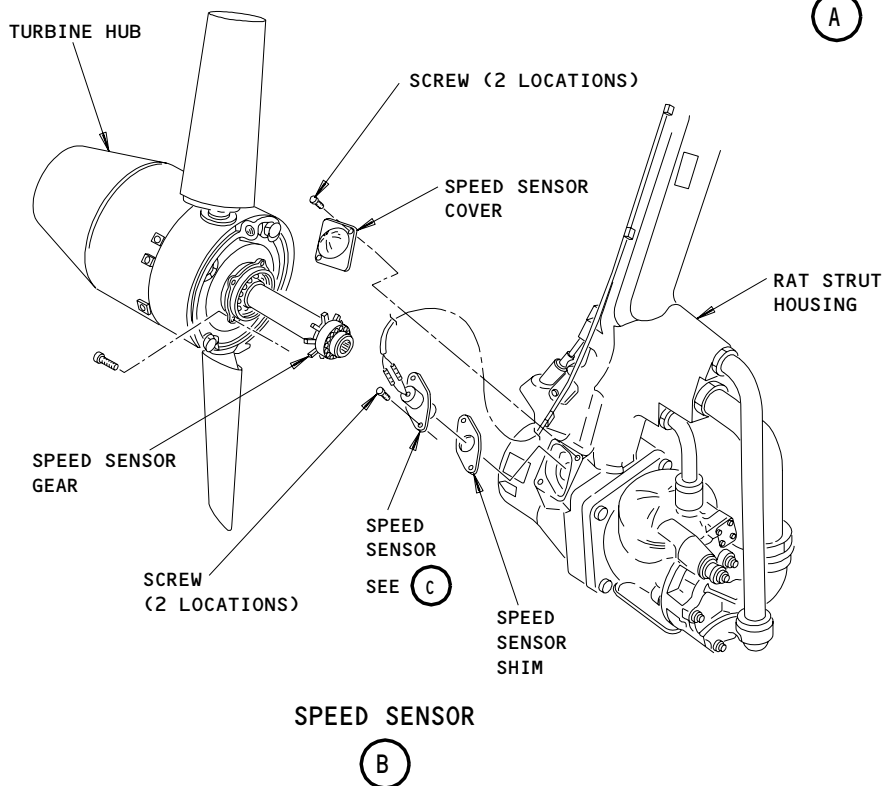
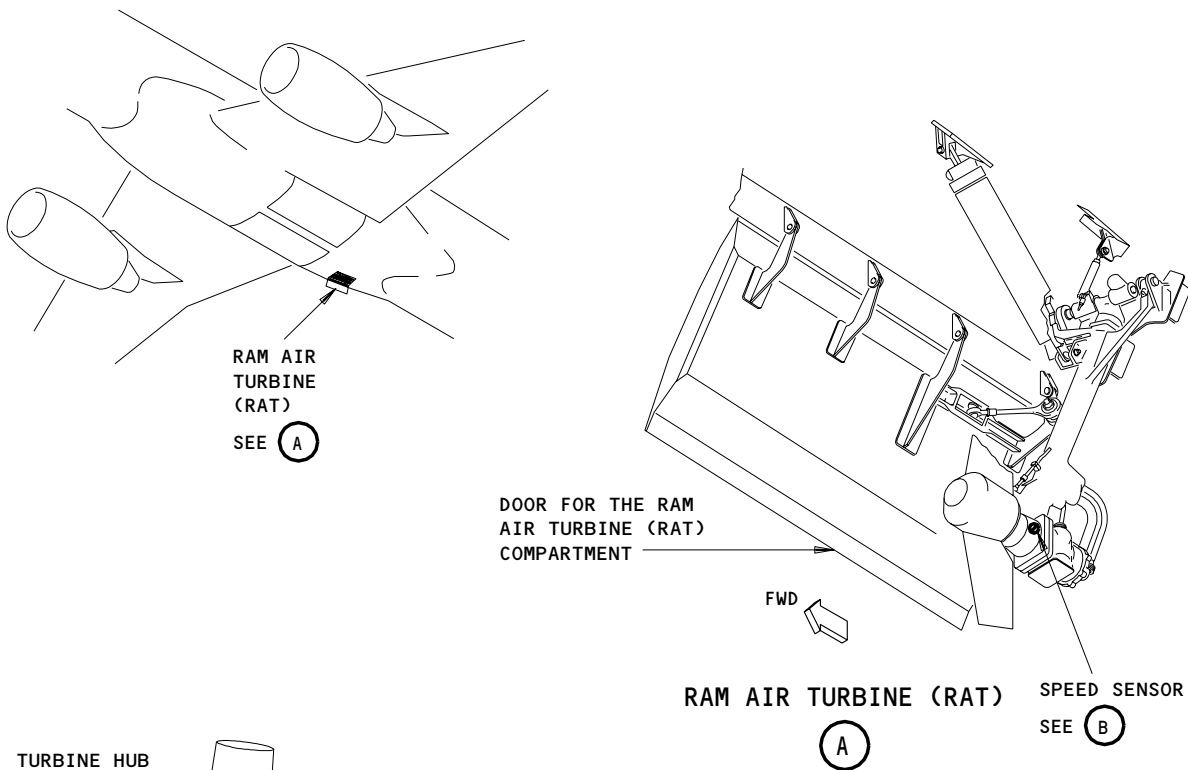
Speed Sensor Adjustment with a Locknut
Figure 501 (Sheet 2)

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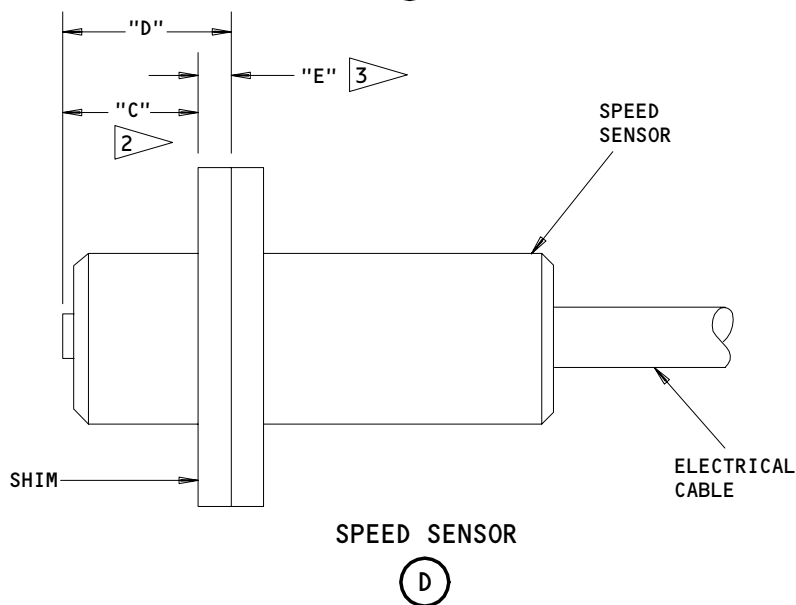
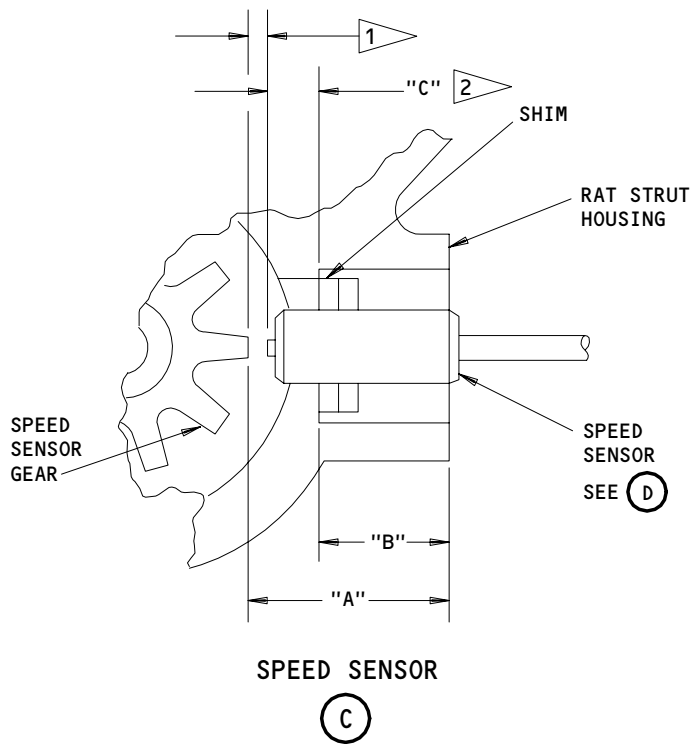
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Speed Sensor Adjustment with a Shim
Figure 502 (Sheet 1)

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- 1 THE CLEARANCE BETWEEN THE SPEED SENSOR AND THE GEAR IS 0.010 ± 0.002 INCH
- 2 THE DEPTH OF THE SPEED SENSOR INTO THE RAT STRUT HOUSING (DIMENSION "C") IS CALCULATED AS FOLLOWS: $"C" = ("A" - "B") - 0.010$
- 3 THE SHIM THICKNESS (DIMENSION "E") IS CALCULATED AS FOLLOWS:
 $"E" \pm 0.002 = "D" - "C"$

Speed Sensor Adjustment with a Shim
Figure 502 (Sheet 2)

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- 2) Remove the speed sensor insert and the lockwasher from the speed sensor.
- 3) Install a speed sensor insert and a new key lockwasher on the speed sensor.

NOTE: Do not bend the tabs on the lockwasher at this time.

- 4) Adjust the speed sensor insert and the locknut until Dimension C on the speed sensor is correct, then tighten the locknut as follows:
 - a) Tighten the locknut to 10-15 pound-inches.
- 5) Do a check to make sure Dimension C is correct after you tighten the locknut.
- 6) When Dimension C is correct with the locknut tightened, do the step that follows:
 - a) Bend up the tabs on the key lockwasher against the flats on the locknut.

S 835-008

(7) SPEED SENSORS WITH A SHIM;

Do the steps that follow to adjust the speed sensor (Fig. 502):

- (a) Measure Dimensions A and B (as shown in View C).
- (b) Calculate Dimension C (as shown in View C).
- (c) Measure Dimension D (as shown in View D).
- (d) Calculate the shim thickness, Dimension E (as shown in View D).
- (e) Install a shim with the correct thickness, Dimension E, on the speed sensor.

S 435-009

- (8) Install the screws to attach the speed sensor to the RAT strut housing and tighten the screws as follows:
 - (a) Tighten the screws to 19-21 pound-inches.

S 215-010

- (9) Slowly turn the hub to make sure there is sufficient clearance between the speed sensor gear and speed sensor.

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S 835-011

- (10) If the speed sensor touches the speed sensor gear, do the adjustment for the speed sensor again.

S 435-012

- (11) Install the screws to attach the speed sensor cover to the RAT strut housing and tighten the screws as follows:
(a) Tighten the screws to 32-36 pound-inches.

S 625-013

- (12) Apply the sealant at the speed sensor wire to fill the groove in the RAT strut housing.

S 715-014

- (13) Do the test for the RAT tachometer (AMM 29-21-00/501).

S 865-015

- (14) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) STOWED LIMIT SWITCH – MAINTENANCE PRACTICES

1. General

- A. This procedure contains three tasks, one to remove, one install, and one to adjust the limit switch for the stowed position of the ram air turbine (RAT).

TASK 29-21-17-022-001

2. Remove the Limit Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body – Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

C. Remove the Limit Switch (Fig. 201)

S 862-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 032-003

- (2) Disconnect the electrical wires at the nearest splice.

S 032-004

- (3) Remove the lockwire and the nut on the limit switch.

S 022-005

- (4) Remove the limit switch.

TASK 29-21-17-422-006

3. Install the Limit Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

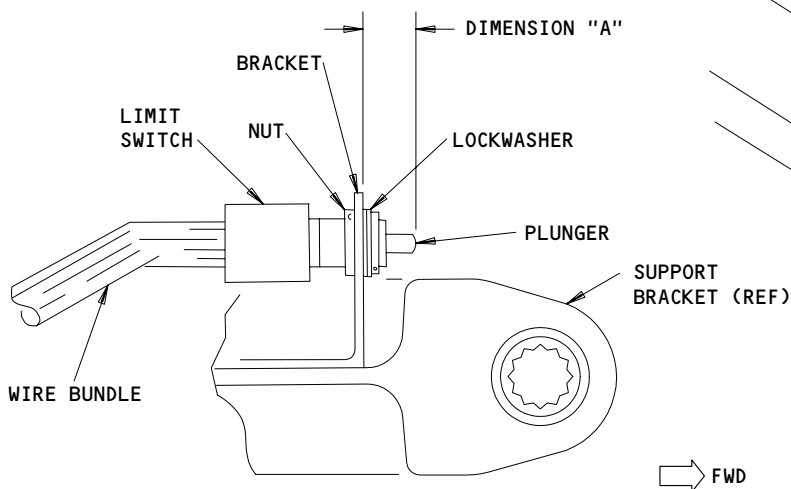
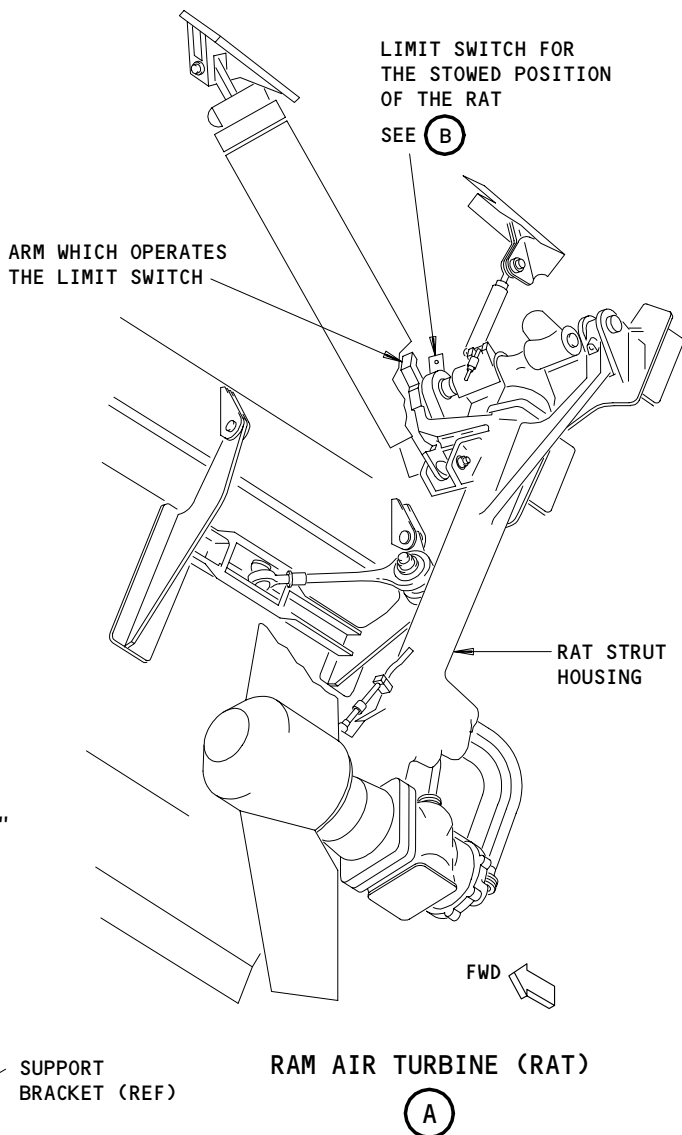
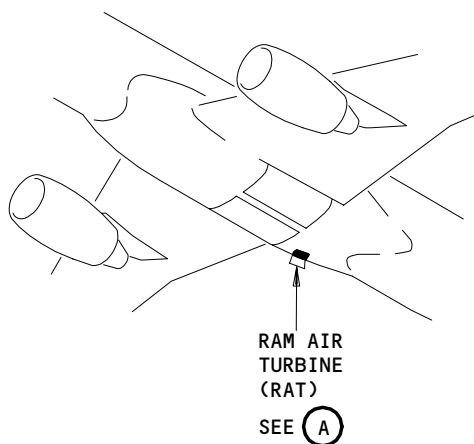
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LIMIT SWITCH

(B)

Limit Switch Installation
Figure 201

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B. Access

(1) Location Zones
198 Wing to Body - Aft Lower Half (Right)

(2) Access Panel
198MR RAT Compartment

C. Install the Limit Switch (Fig. 201)

S 822-007

(1) Hold the limit switch in the bracket.

S 432-008

(2) Install the nuts and tighten them by hand.

S 432-009

(3) Connect the electrical wires at the splice.

S 832-010

(4) Do the adjustment procedure for the limit switch.

S 862-011

(5) Retract the RAT (AMM 29-21-00/201).

TASK 29-21-17-832-012

4. Adjustment for the Limit Switch

A. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (3) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuation Link

B. Access

(1) Location Zones
198 Wing to Body - Aft Lower Half (Right)
211/212 Control Cabin

(2) Access Panel
198MR RAT Compartment

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C. Adjust the Limit Switch (Fig. 201)

S 862-013

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

S 862-014

- (2) Extend the RAT (AMM 29-21-00/201).

S 032-015

- (3) Remove the lockwire on the limit switch.

S 832-016

- (4) Adjust the limit switch until Dimension A is 0.60 ± 0.03 inch.

S 032-017

- (5) Disconnect the door link from the RAT strut housing (AMM 29-21-10/401).

S 862-018

- (6) Retract the RAT (AMM 29-21-00/201).

S 222-019

WARNING: HOLD THE RAT GROUND SWITCH IN THE STOW POSITION WHILE YOU MEASURE THE NECESSARY DISTANCE. ACCIDENTAL RAT DEPLOYMENT CAN CAUSE INJURY TO PERSONS.

- (7) Measure the distance between the plunger and the arm which operates the limit switch.

S 862-020

- (8) Extend the RAT (AMM 29-21-00/201).

S 832-021

- (9) Adjust the limit switch closer to the arm, which operates the limit switch, by the distance that follows:
(a) The distance between the plunger and the arm plus 0.23 inch.

S 432-022

- (10) Tighten the nuts to 100-150 pound-inches.

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- S 432-023
(11) Install a lockwire on the nuts.
- S 432-024
(12) Connect the door link to the RAT strut housing (AMM 29-21-10/401).
- S 862-025
(13) Retract the RAT (AMM 29-21-00/201).
- S 212-026
(14) Make sure the RAT UNLOCKED light on the overhead panel, P5, is on while you retract the RAT.
- S 212-027
(15) Make sure the RAT UNLOCKED light on the P5 panel is off with the conditions that follow:
(a) The RAT is fully retracted.
(b) The RAT ground manual switch is in the neutral position.
- S 832-028
(16) If the RAT UNLOCKED light stays on, do the adjustment for the limit switch again.
- S 862-029
(17) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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RAM AIR TURBINE (RAT) WIRE HARNESS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the wire harness for the ram air turbine (RAT).
- B. You can remove the wire harness with the speed sensor and the limit switches, for the RAT blade lock and the RAT strut position, attached. You can also remove the wire harness without these components attached.

TASK 29-21-18-424-001

2. Remove the Wire Harness for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body – Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

C. Remove the Wire Harness

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 034-003

- (2) Disconnect the airplane wire bundle at the electrical connector at the top of the RAT strut housing (Fig. 401).

S 034-004

- (3) Remove the screws from the bracket for the electrical connector, at the top of the RAT strut housing.

S 034-005

- (4) Remove the electrical connector and the bracket from the RAT strut housing.

S 034-006

- (5) If you will remove the limit switches and the speed sensor with the wire harness, do these steps (Fig. 402):
 - (a) Remove the screws to remove the speed sensor cover from the RAT strut housing.
 - (b) Remove the screws to remove the speed sensor from the RAT strut housing.
 - (c) Remove the screws to remove the limit switch, for the strut position, at the top of the RAT strut housing.
 - (d) Remove the screws from the switch cover, for the limit switch for the blade lock, at the bottom of the RAT strut housing.

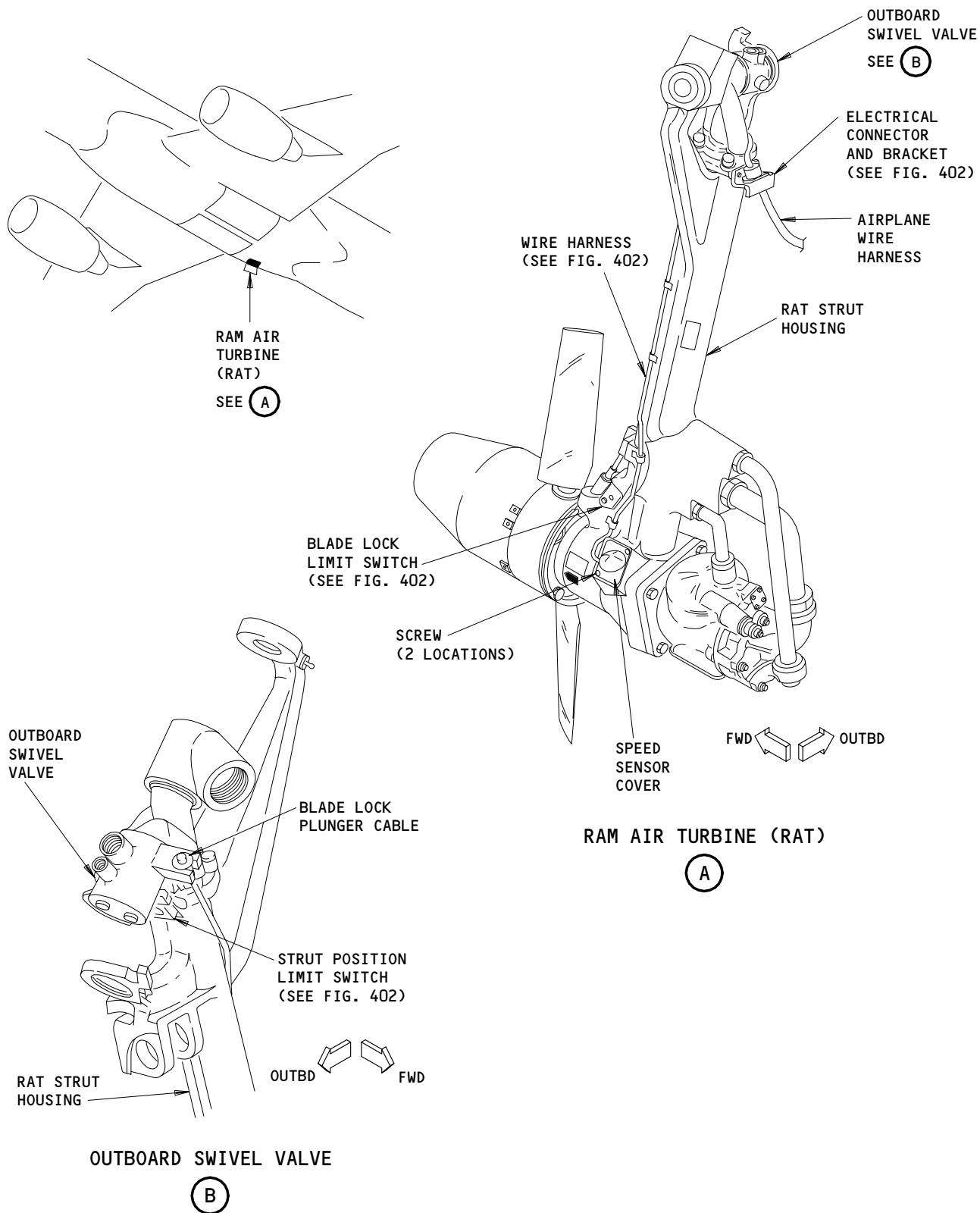
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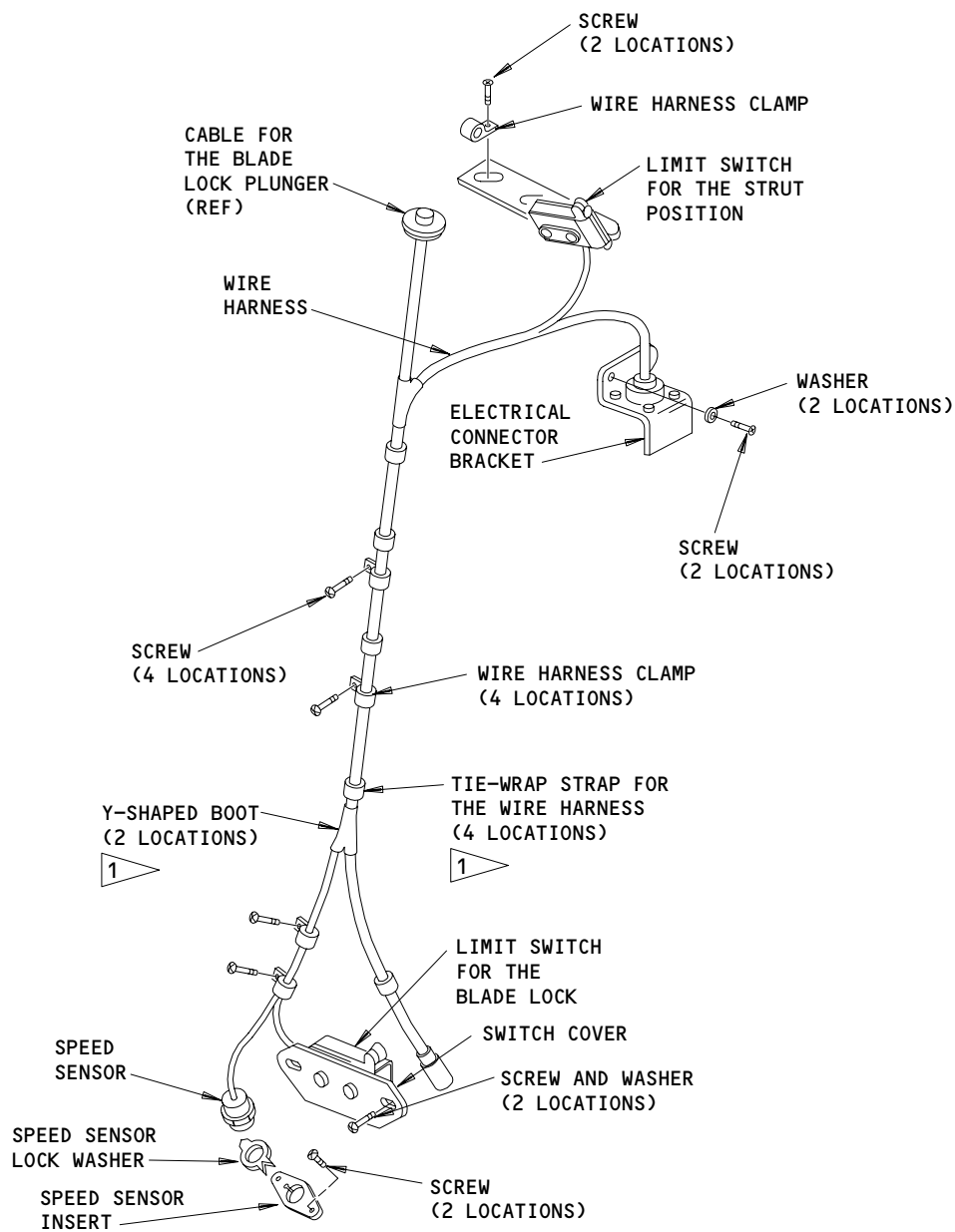
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Ram Air Turbine (RAT)
Figure 401

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WIRE HARNESS WITHOUT
INLINE ELECTRICAL CONNECTORS

1 IF Y-SHAPED BOOTS ARE INSTALLED, REPLACE THEM WITH THE TIE-WRAP STRAPS WHEN YOU INSTALL THE WIRE HARNESS

Wire Harness Installation
Figure 402 (Sheet 1)

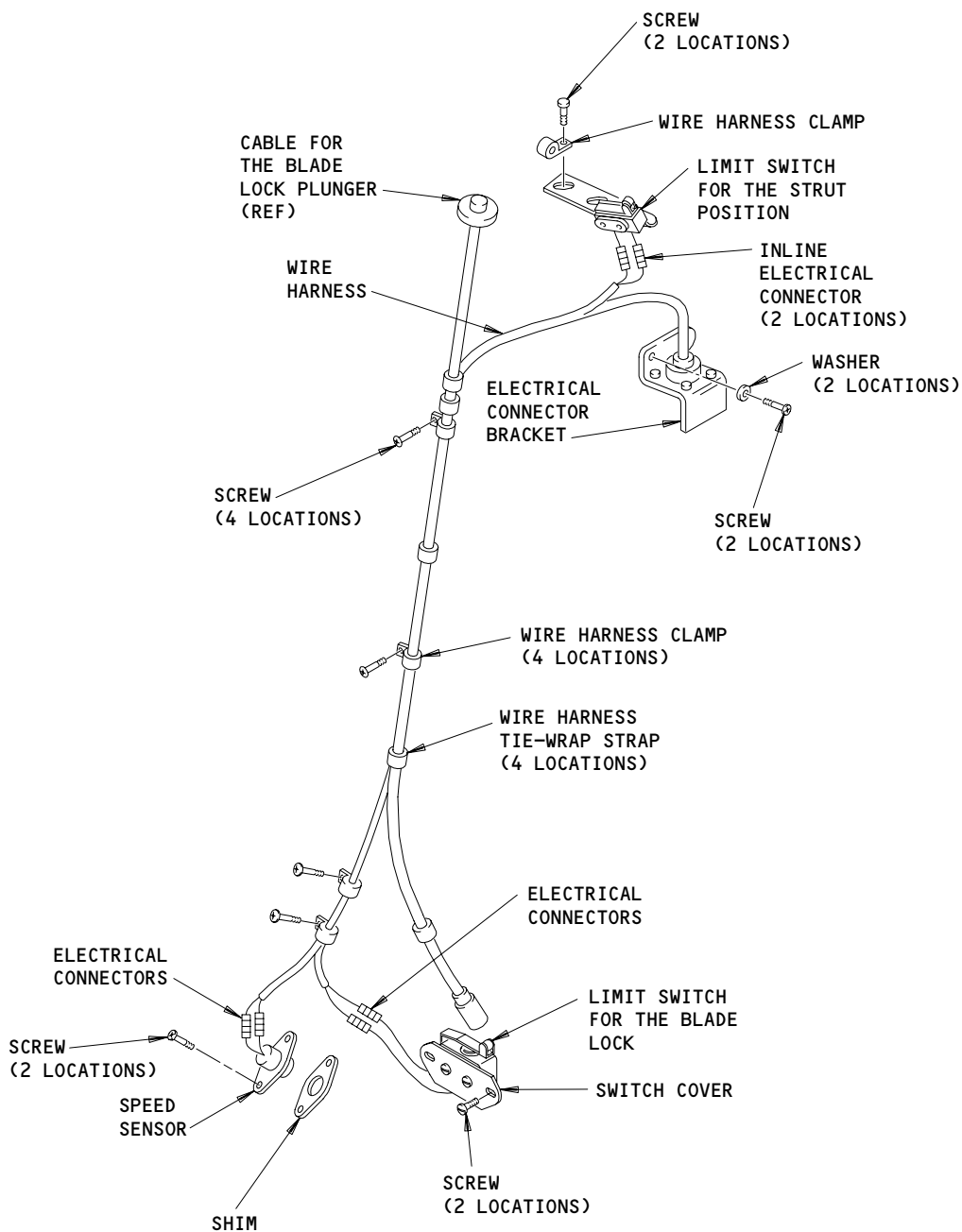
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WIRE HARNESS WITH
INLINE ELECTRICAL CONNECTORS

Wire Harness Installation
Figure 402 (Sheet 2)

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- (e) Remove the switch cover and the limit switch, for the blade lock, at the bottom of the RAT strut housing.

S 034-007

- (6) If you will not remove the limit switches and the speed sensor with the wire harness, do these steps:
 - (a) If the wire harness has inline electrical connector, do these steps:
 - 1) Cut the heat-shrink tube from the inline electrical connectors.
 - 2) Disconnect the inline electrical connectors.
 - 3) If the wire harness does not have inline electrical connectors, cut the wires at these locations:
 - a) At the limit switch, for the blade lock, cut the two wires approximately 3.75 inches from the switch.
 - 4) At the limit switch, for the strut position, cut the wire from the terminal C approximately 3.25 inches from the switch.
 - 5) At the limit switch, for the strut position, cut the wire from the terminal NC approximately 5 inches from the switch.
 - 6) At the speed sensor, cut the two wires about 1.75 inches from the speed sensor.

S 034-008

- (7) Remove the screws to remove the clamps that attach the wire harness to the RAT strut housing.

S 034-009

- (8) If the wire harness is attached to the cable, for the blade lock plunger, with Y-shaped boots, do this step:
 - (a) Carefully cut the Y-shaped boot from the wire harness and the cable for the blade lock plunger.

S 034-010

- (9) If the wire harness is attached to the cable, for the blade lock plunger, with tie-wrap straps, do this step:
 - (a) Cut and remove the tie-wrap straps from the wire harness and the cable for the blade lock plunger.

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S 024-011

- (10) Remove the wire harness from the RAT strut housing.

TASK 29-21-18-424-012

3. Install Wire Harness for the Ram Air Turbine (RAT)

A. Consumable Materials

- (1) A00064 Sealant - RTV 732

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-15/501, Ram Air Turbine (RAT) Tachometer Speed Sensor
- (3) AMM 29-21-20/201, Ram Air Turbine (RAT) Strut Position Limit Switch
- (4) AMM 29-21-21/201, Ram Air Turbine (RAT) Blade Lock Limit Switch

C. Access

- (1) Location Zones
 - 198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
 - 198MR RAT Compartment

D. Install the Wire Harness

S 424-013

- (1) Put the wire harness on the RAT strut housing (Fig. 401).

S 434-014

- (2) Put the electrical connector and bracket on the top to the RAT strut housing.

S 434-015

- (3) Install the screws to attach the bracket to the top of the RAT strut housing.

NOTE: Use the outboard screw to attach the ground connection for the wire harness.

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- S 434-016
- (4) Tighten the screws to 20-22 pound-inches.
- S 434-017
- (5) Put the wire harness clamps on the wire harness.
- S 434-018
- (6) Install the screws to attach the clamps to the RAT strut housing.
- S 434-019
- (7) Tighten the screw 32-36 pound-inches.
- S 434-020
- (8) Install the four tie-wrap straps to attach the wire harness to the cable for the blade lock plunger.
- S 434-021
- (9) If you removed the limit switches and the speed sensor with the wire harness, do these steps (Fig. 402):
- (a) Put the limit switch, for the strut position, and the bracket on the top of the RAT strut housing.
 - (b) Put the clamp on the wire harness.
 - (c) Align the clamp with the aft hole in the bracket for the limit switch for the strut position.
 - (d) Install the screws to attach the clamp and the bracket, for the limit switch for the strut position, to the RAT strut housing.
 - (e) Tighten the screws by hand until you adjust the limit switch for the strut position.
 - (f) Put the limit switch, for the blade lock, and the switch cover in the hole at the bottom of the RAT strut housing.
 - (g) Install the screws to attach the switch cover to the RAT strut housing.
 - (h) Tighten the screws by hand until you adjust the limit switch for the blade lock.
 - (i) Install the speed sensor in the RAT strut housing and adjust the speed sensor (AMM 29-21-15/501).
 - (j) Put the speed sensor cover in its position.
 - (k) Install the screws to attach the speed sensor cover to the RAT strut housing.
 - (l) Tighten the screws to 32-36 pound-inches.
 - (m) Adjust the limit switch for the strut position (AMM 29-21-20/201).
 - (n) Adjust the limit switch for the blade lock (AMM 29-21-21/201).
 - (o) Apply the sealant at the speed sensor wire to fill the groove in the RAT strut housing.
 - (p) Apply the sealant around the wires of the limit switch, for the blade lock, in the hole in the RAT strut housing.

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S 434-022

- (10) If you did not remove the limit switches and the speed sensor with the wire harness, do these steps:
- (a) If the wire harness does not have inline electrical connectors, do this step:
 - 1) Install the electrical connectors on the wires in the wire harness for the limit switches and the speed sensor.
 - (b) Connect the electrical connectors of the limit switches and the speed sensor to the electrical connectors on the wire harness.
 - (c) Install the heat-shrink tubing on the wires and electrical connectors.

S 434-023

- (11) Connect the airplane wire bundle to the connector near the top of the RAT strut housing.

S 864-024

- (12) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) BLADE LOCK PLUNGER AND CABLE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the blade lock plunger and cable for the ram air turbine (RAT).

TASK 29-21-19-024-001

2. Remove the Blade Lock Plunger and Cable for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-01/401, Ram Air Turbine (RAT) Assembly

B. Access

- (1) Location Zones
198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel
198MR RAT Compartment

C. Remove the Blade Lock Plunger and Cable (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 864-003

- (2) Remove the turbine hub on the RAT (AMM 29-21-01/401).

S 864-004

- (3) Remove the screws that attach the wire harness clamps to the RAT strut housing.

S 864-005

- (4) Remove the wire harness clamps.

S 864-006

- (5) If the wire harness attaches to the cable, for the blade lock plunger, with Y-shaped boots, do this step:
 - (a) Carefully cut the Y-shaped boot from the wire harness and the cable for the blade lock plunger.

S 864-007

- (6) If the wire harness attaches to the cable, for the blade lock plunger, with tie-wrap straps, do this step:
 - (a) Cut and remove the tie-wrap straps from the wire harness and the cable for the blade lock plunger.

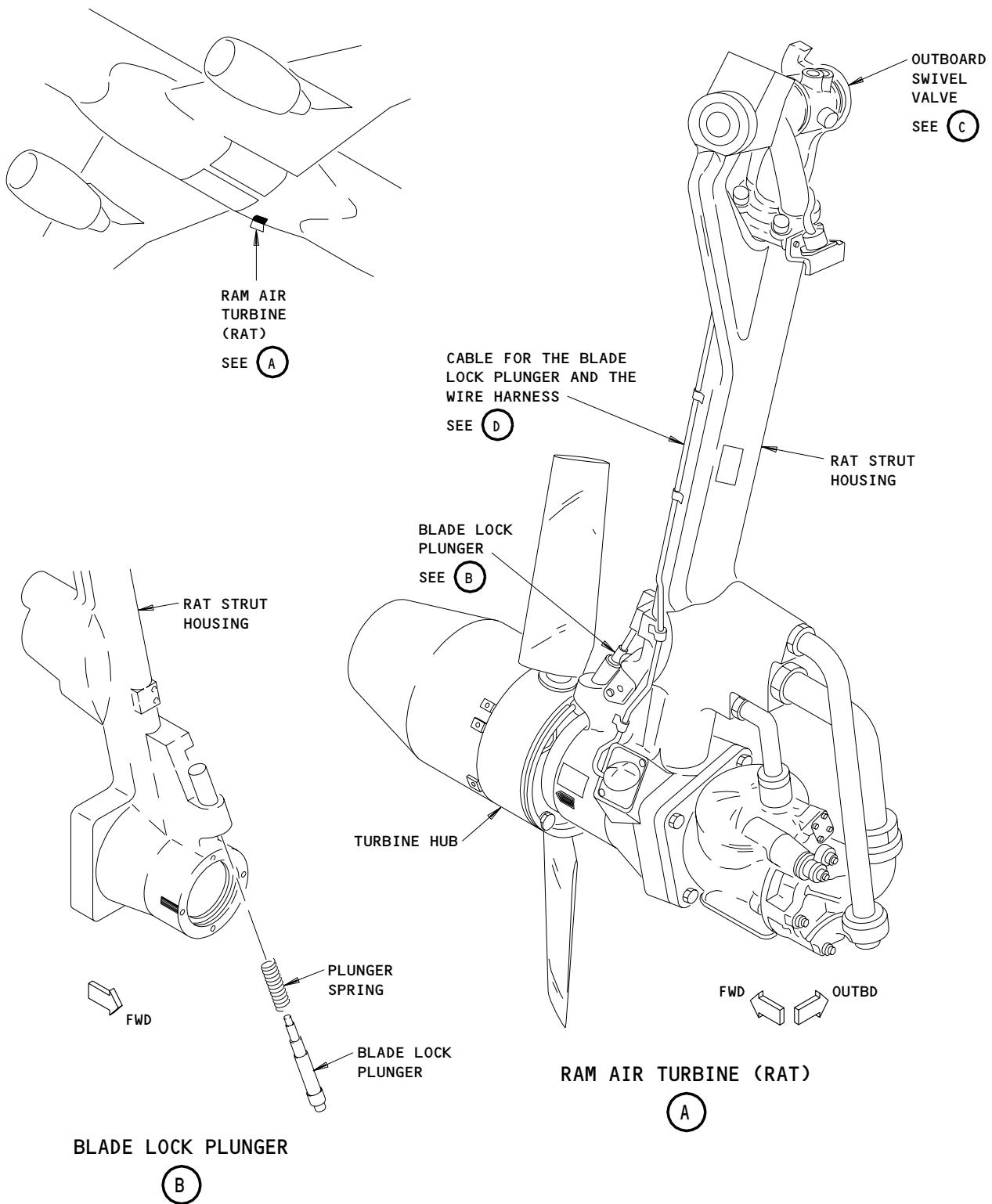
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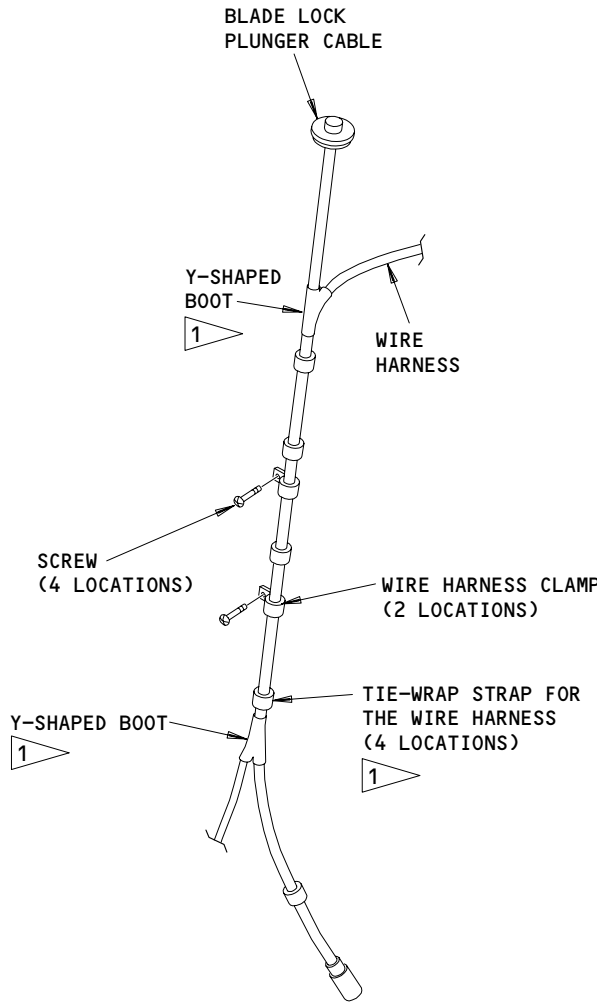
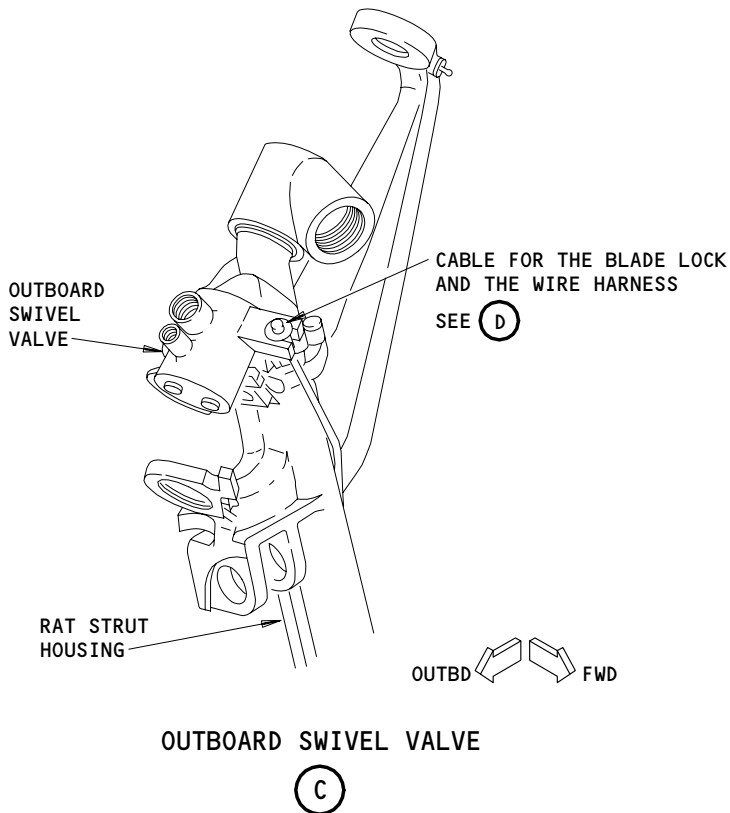
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RAT Blade Lock Plunger and Cable Installation
Figure 401 (Sheet 1)

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CABLE FOR THE BLADE LOCK AND THE WIRE HARNESS (D)

1 IF Y-SHAPED BOOTS ARE INSTALLED, REPLACE WITH THE TIE-WRAP STRAPS WHEN YOU INSTALL THE WIRE HARNESS

RAT Blade Lock Plunger and Cable Installation
Figure 401 (Sheet 2)

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S 034-008

CAUTION: DO NOT CAUSE DAMAGE TO THE THREADS OF THE BLADE LOCK PLUNGER WHEN YOU USE A FILE ON THE CUP WASHER. IF YOU CAUSE DAMAGE TO THE THREADS OF THE BLADE LOCK PLUNGER, YOU MUST REPLACE IT.

- (7) Use a file to remove material from the crimped surface of the cup washer until this condition is correct:
(a) The surface is thin and you can turn the cup washer.

S 034-009

- (8) Turn the cup washer to get access to the tab washer.

S 034-010

- (9) Disengage the tab, of the tab washer, from the slot in the cable end fitting.

S 034-011

- (10) Turn the blade lock plunger to remove it from the cable end fitting.

S 034-012

- (11) Remove the tab washer and the cup washer from the blade lock plunger.

S 024-013

- (12) Remove the blade lock plunger and the plunger spring from the RAT strut housing.

S 024-014

- (13) Disengage the cable, for the blade lock plunger, from the bracket on the RAT strut housing.

S 024-015

- (14) Disengage the cable, for the blade lock plunger, from the outboard swivel valve at the top of the RAT strut housing.

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TASK 29-21-19-424-016

3. Install the Blade Lock Plunger and Cable for the Ram Air Turbine (RAT)

A. Equipment

- (1) Crimping Tool - AKS-36331
Sundstrand Corp.
Rockford, Illinois
- (2) Protractor - Commercially Available

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-01/401, Ram Air Turbine (RAT) Assembly
- (3) AMM 29-21-05/401, Ram Air Turbine (RAT) Deployment Actuator
- (4) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuator Link

C. Access

- (1) Location Zones
198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

D. Install the Blade Lock Plunger and Cable (Fig. 401)

S 424-017

- (1) Engage the top of the cable, for the blade lock plunger, with the slot in the outboard swivel valve.

S 424-018

- (2) Engage the cable, for the blade lock plunger, with the bracket which is near the bottom of the RAT strut housing.

S 424-019

- (3) Put the two wire harness clamps on the wire harness and the cable for the blade lock plunger.

S 424-020

- (4) Install a screw to attach each clamp to the RAT strut housing.

S 434-021

- (5) Tighten the screws, which attach the clamps to the RAT strut housing, to 32-36 pound-inches.

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- S 424-022
- (6) Install the four tie-wrap straps to attach the wire harness to the cable for the blade lock plunger.
- S 424-023
- (7) Install the blade lock plunger and the plunger spring in the RAT strut housing.
- S 434-024
- (8) Install the cup washer and the tab washer on the blade lock plunger (Fig. 402).
- S 424-025
- (9) Turn the blade lock plunger into the cable end fitting.

NOTE: Do not bend the tab of the tab washer at this time.

- S 434-026
- (10) Install the turbine hub on the RAT (AMM 29-21-01/401).
- S 034-027
- (11) Disconnect the RAT deployment arm from the RAT strut housing (AMM 29-21-05/401).
- S 034-028
- (12) Disconnect the RAT door link from the door or from the RAT strut housing (AMM 29-21-10/401).
- S 984-029
- (13) Turn the turbine hub until the blade lock plunger aligns with one of the holes in the lock collar.
- S 984-030
- (14) Push on the end of the hydraulic pump (to move the RAT in the direction of the retracted position) until the RAT strut housing is in this position:
- (a) The RAT strut housing is 10 1/2 degrees from the fully extended position.

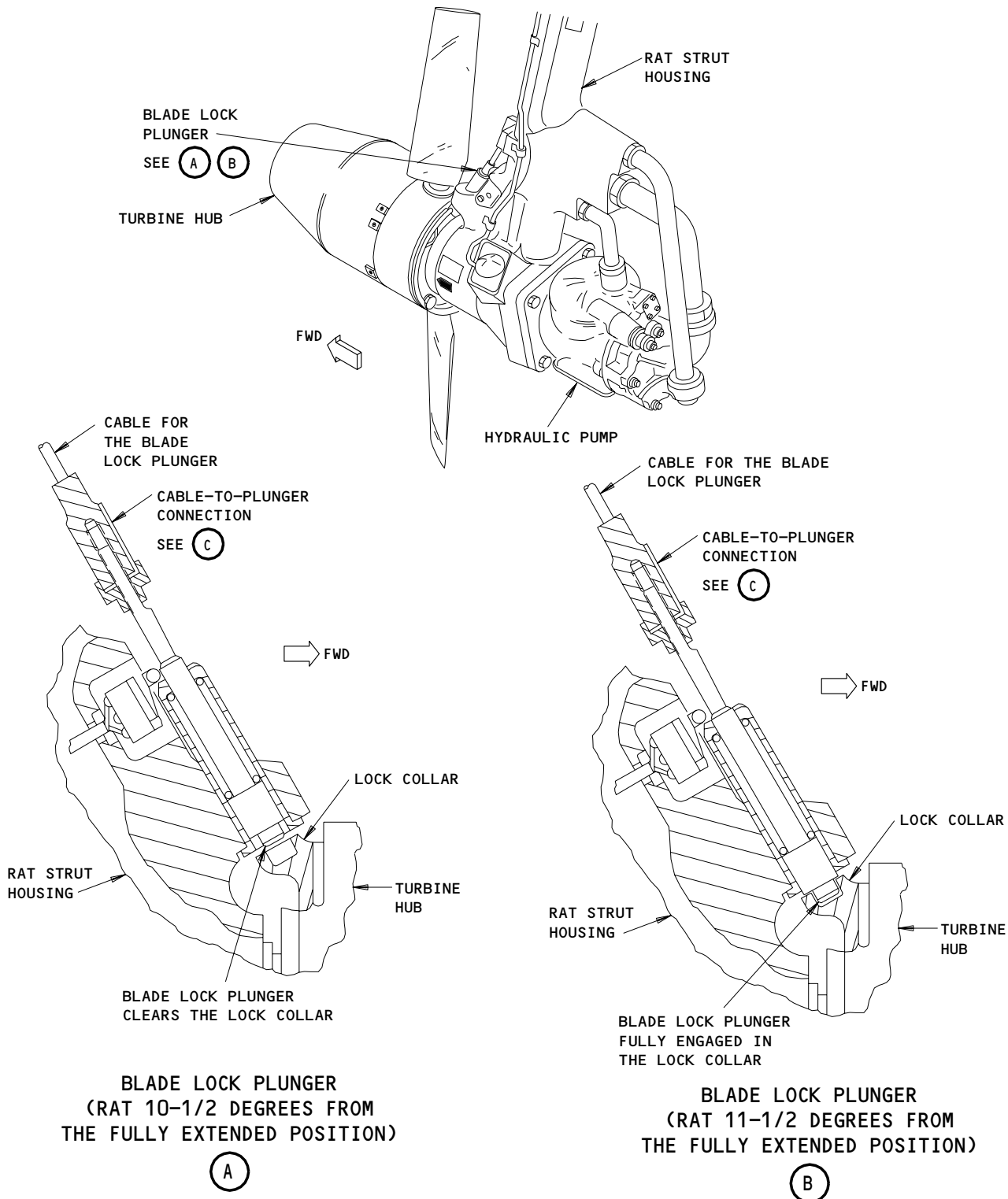
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Blade Lock Plunger and Cable Connection
Figure 402 (Sheet 1)

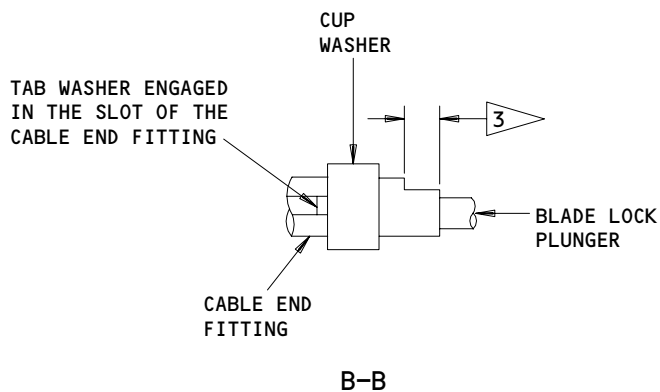
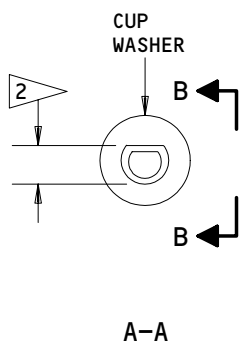
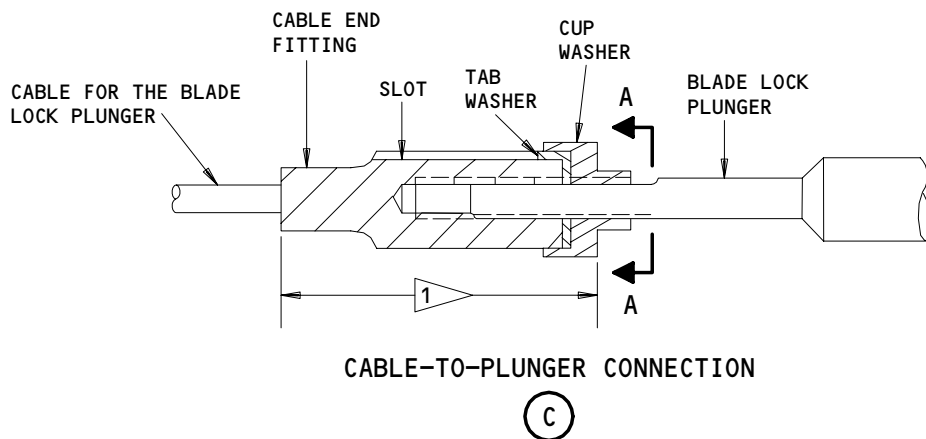
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


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-  1.34 INCHES MAXIMUM
-  0.235 INCH MAXIMUM AFTER YOU CRIMP THE CUP WASHER
-  0.050 INCH MINIMUM LENGTH OF THE AREA WHICH YOU CRIMP ON THE CUP WASHER

Blade Lock Plunger and Cable Connection
Figure 402 (Sheet 2)

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S 824-031

- (15) Turn the blade lock plunger until there is clearance between it and the lock collar on the turbine hub.

S 984-032

- (16) Push on the end of the hydraulic pump (to move the RAT in the direction of the retracted position) until the RAT strut housing is in this position:
- (a) The RAT strut housing is 11 1/2 degrees from the fully extended position.

S 214-033

- (17) Make sure the blade lock plunger fully engages the lock collar.

S 984-034

- (18) Manually move the RAT to the extended position.

S 984-035

- (19) Turn the turbine hub 1/2 turn to align the opposite hole in the lock collar with the blade lock plunger.

S 984-036

- (20) Manually move the RAT in the direction of the retracted position and do the checks that follow:
- (a) Make sure there is clearance between the blade lock plunger and the lock collar for this condition:
- 1) The RAT is 10 1/2 degrees from the fully extended position.
- (b) Make sure the blade lock plunger fully engages the lock collar when the RAT is 11 1/2 degrees from the fully extended position.

S 984-037

- (21) Turn the blade lock plunger, no more than 1/2 turn, until the condition that follows is correct:
- (a) The tab of the tab washer aligns with the slot in the cable end fitting.

S 434-038

- (22) Bend the tab of the tab washer to engage the slot in the cable end fitting.

S 434-039

- (23) Tighten the cup washer by hand, against the tab washer.

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S 434-040

(24) Crimp the cup washer on the blade lock plunger (Fig. 402).

NOTE: Make sure you can see the tab washer and it is engaged in the slot of the cable end fitting, before you crimp the cup washer.

S 434-041

(25) Connect the RAT door link (AMM 29-21-10/401).

S 434-042

(26) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-05/401).

S 864-043

(27) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) STRUT POSITION LIMIT SWITCH - MAINTENANCE PRACTICES

1. General

- A. This procedure contains three tasks, one to remove, one to install, and one to adjust the limit switch for the strut position of the ram air turbine (RAT).
- B. This procedure replaces the limit switch without the removal of the RAT wire harness. You can also remove the limit switch with the RAT wire harness (AMM 29-21-18/401).

TASK 29-21-20-022-001

2. Remove the Limit Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones

198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel

198MR RAT Compartment

C. Remove the Limit Switch (Fig. 201)

S 862-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 022-003

- (2) Remove the screws that attach the limit switch to the switch support bracket.

S 022-004

- (3) Remove the limit switch and the switch plate from the switch support bracket.

S 032-005

- (4) If the switch has inline electrical connectors, do these steps:

- (a) Cut the heat-shrink tube from the inline electrical connectors.

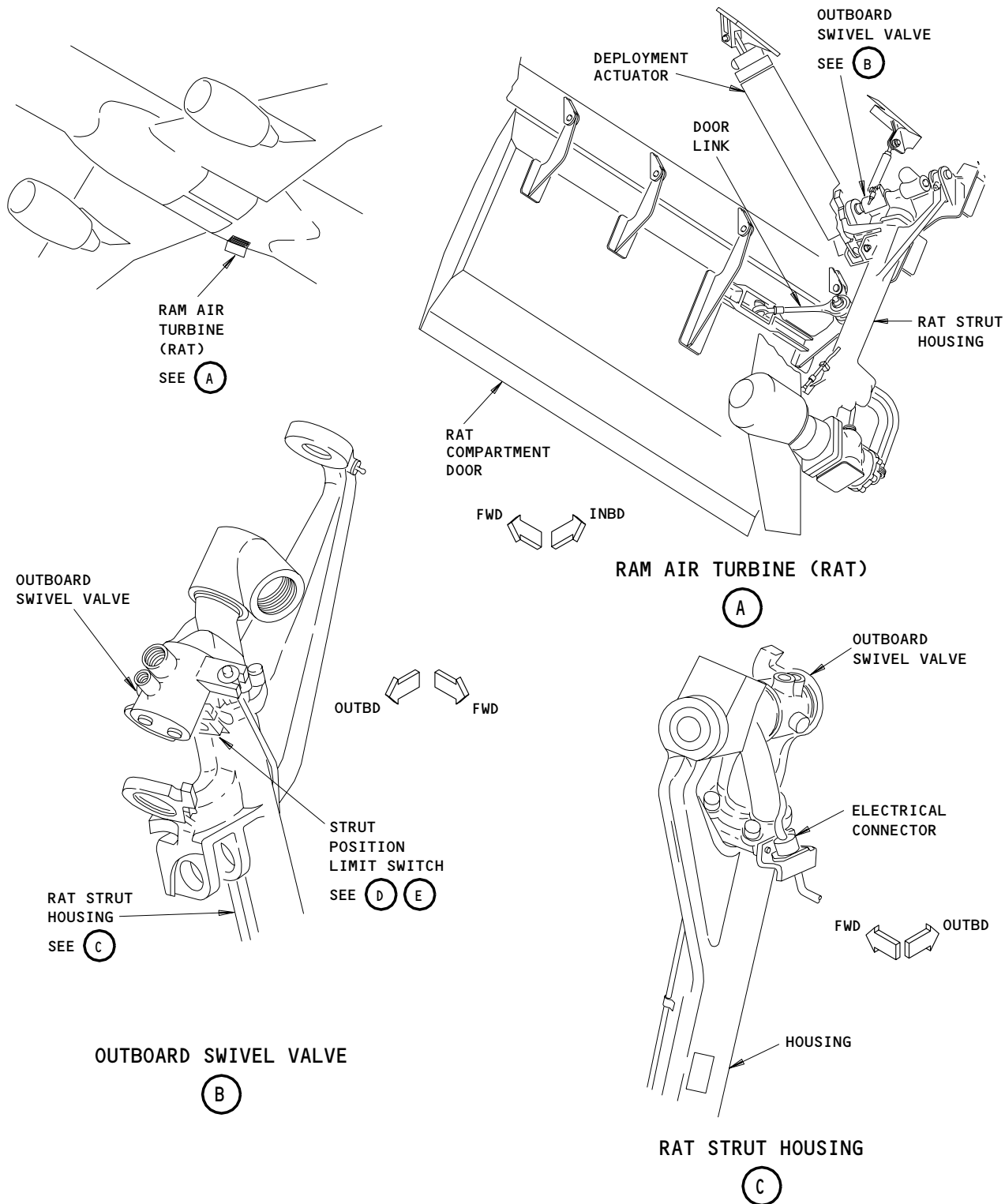
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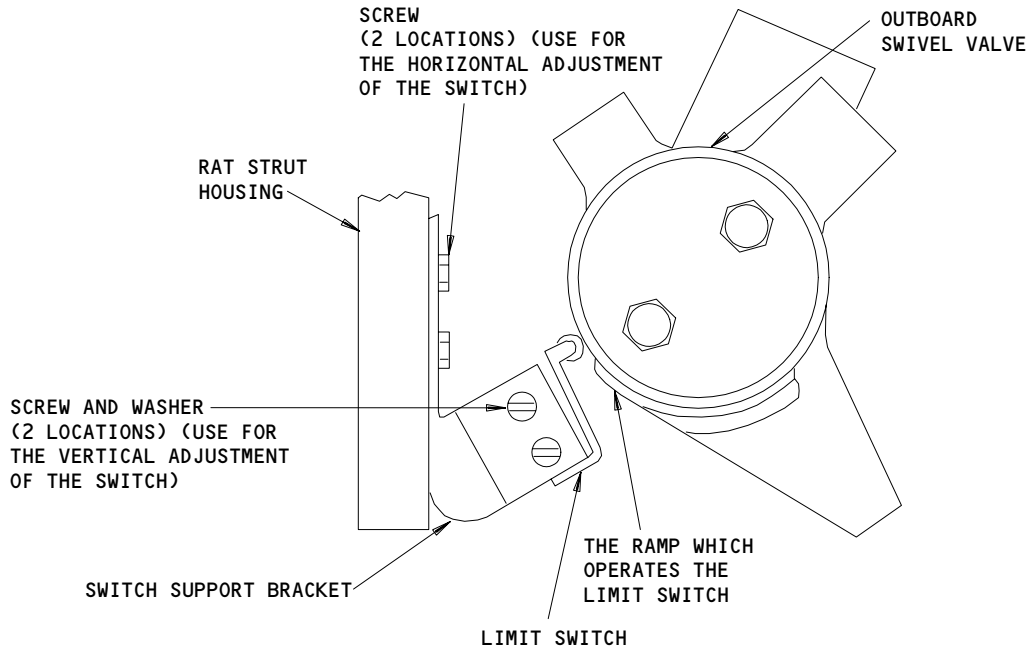
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RAT Strut Position Limit Switch Installation
Figure 201 (Sheet 1)

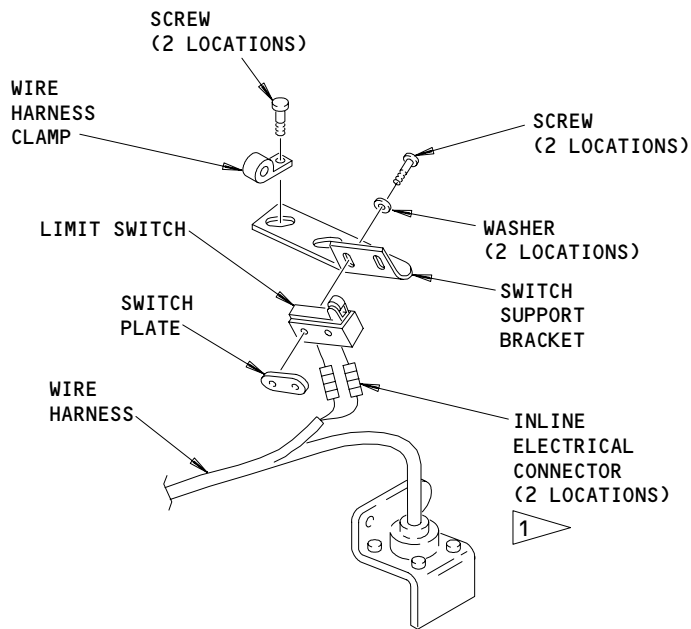
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STRUT POSITION LIMIT SWITCH

(D)



STRUT POSITION LIMIT SWITCH

(E)

1 AIRPLANES WITH INLINE ELECTRICAL CONNECTORS

RAT Strut Position Limit Switch Installation
Figure 201 (Sheet 2)

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(b) Disconnect the inline electrical connectors.

S 032-006

- (5) If the limit switch does not have inline electrical connectors, do these steps:
- (a) Cut the wire from the switch terminal C, approximately 3.25 inches from the limit switch.
 - (b) Cut the wire from the switch terminal NC, approximately 5 inches from the limit switch.

TASK 29-21-20-422-007

3. Install the Limit Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
 - 198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
 - 198MR RAT Compartment

C. Install the Limit Switch (Fig. 201)

S 422-008

- (1) Put the limit switch on the outboard side of the switch support bracket.

S 422-009

- (2) Put the switch plate on the inboard side of the switch support bracket.

S 422-010

- (3) Install the screws and washers to attach the limit switch to the support bracket.

S 432-011

- (4) Tighten the screws by hand until you adjust the limit switch.

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- S 432-012
- (5) If the limit switch does not have inline electrical connectors, do this step:
- (a) Install the electrical connectors on the wires in the wire harness and on the limit switch.
- S 432-013
- (6) Connect the wires from the limit switch to the electrical connectors on the wire harness.
- S 432-014
- (7) Install the heat-shrink tubing on the electrical connectors.
- S 832-015
- (8) Do the Limit Switch Adjustment.
- S 862-016
- (9) Retract the RAT (AMM 29-21-00/201).

TASK 29-21-20-832-028

4. Limit Switch Adjustment

A. Equipment

- (1) Protractor - Commercially Available

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
(2) AMM 29-21-05/401, Ram Air Turbine (RAT) Deployment Actuator
(3) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuator Link

C. Access

- (1) Location Zones
198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

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D. Adjust the Limit Switch (Fig. 201)

S 862-017

- (1) If it is not in the extended position, extend the RAT (AMM 29-21-00/201).

S 032-018

- (2) Disconnect the lower end of the RAT deployment arm from the RAT strut housing (AMM 29-21-05/401).

S 032-019

- (3) Disconnect the RAT door link from the RAT compartment door or from the RAT strut housing (AMM 29-21-10/401).

S 032-020

- (4) Disconnect the electrical connector at the top of the RAT strut housing, on the aft side.

S 982-021

- (5) Push on the end of the hydraulic pump to move the RAT in the direction of the retracted position.

S 222-022

- (6) Make sure the limit switch opens when the RAT strut housing is $15 \pm 1/2$ degrees from the fully extended position.

NOTE: You can do a check for continuity, between the electrical connector pins 6 and 7, to find when the switch opens.

S 822-023

- (7) If it is necessary to adjust the limit switch, do the steps that follow:
(a) Loosen the screws which attach the limit switch to the switch support bracket.

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- (b) Move the limit switch vertically, until it is in the open position, when it touches the ramp on the swivel valve.
- (c) Tighten the screws, which attach the limit switch to the switch support bracket, to 2.5-3.5 pound-inches.
- (d) Loosen the screws that attach the support bracket to the RAT strut housing.
- (e) Move the limit switch horizontally until it opens when the RAT strut is $15 \pm 1/2$ degrees from the fully extended position.
- (f) Tighten the screws, which attach the switch support bracket to the RAT strut housing to 51-56 pound-inches.

S 432-024

- (8) Connect the electrical connector at the top of the RAT strut housing.

S 432-025

- (9) Connect the RAT door link (AMM 29-21-10/401).

S 432-026

- (10) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-05/401).

S 862-027

- (11) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) BLADE LOCK LIMIT SWITCH – MAINTENANCE PRACTICES

1. General

- A. This procedure contains three tasks, one to remove, one to install, and one to adjust the limit switch for the blade lock of the ram air turbine (RAT).
- B. This procedure replaces the limit switch for the RAT blade lock without the removal of the RAT wire harness. You can also remove the limit switch for the RAT blade lock with the RAT wire harness (AMM 29-21-18/401).

TASK 29-21-21-022-001

2. Remove the Limit Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body – Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

C. Remove the Limit Switch (Fig. 201)

S 862-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 022-003

- (2) Remove the screws from the switch cover.

S 022-004

- (3) Remove the switch cover and the limit switch from the RAT strut housing.

S 022-005

- (4) Remove the screws from the limit switch.

S 022-006

- (5) Remove the limit switch and the switch plate from the switch cover.

S 032-007

- (6) If the switch has inline electrical connectors, do these steps:
 - (a) Cut the heat-shrink tube from the inline electrical connectors.

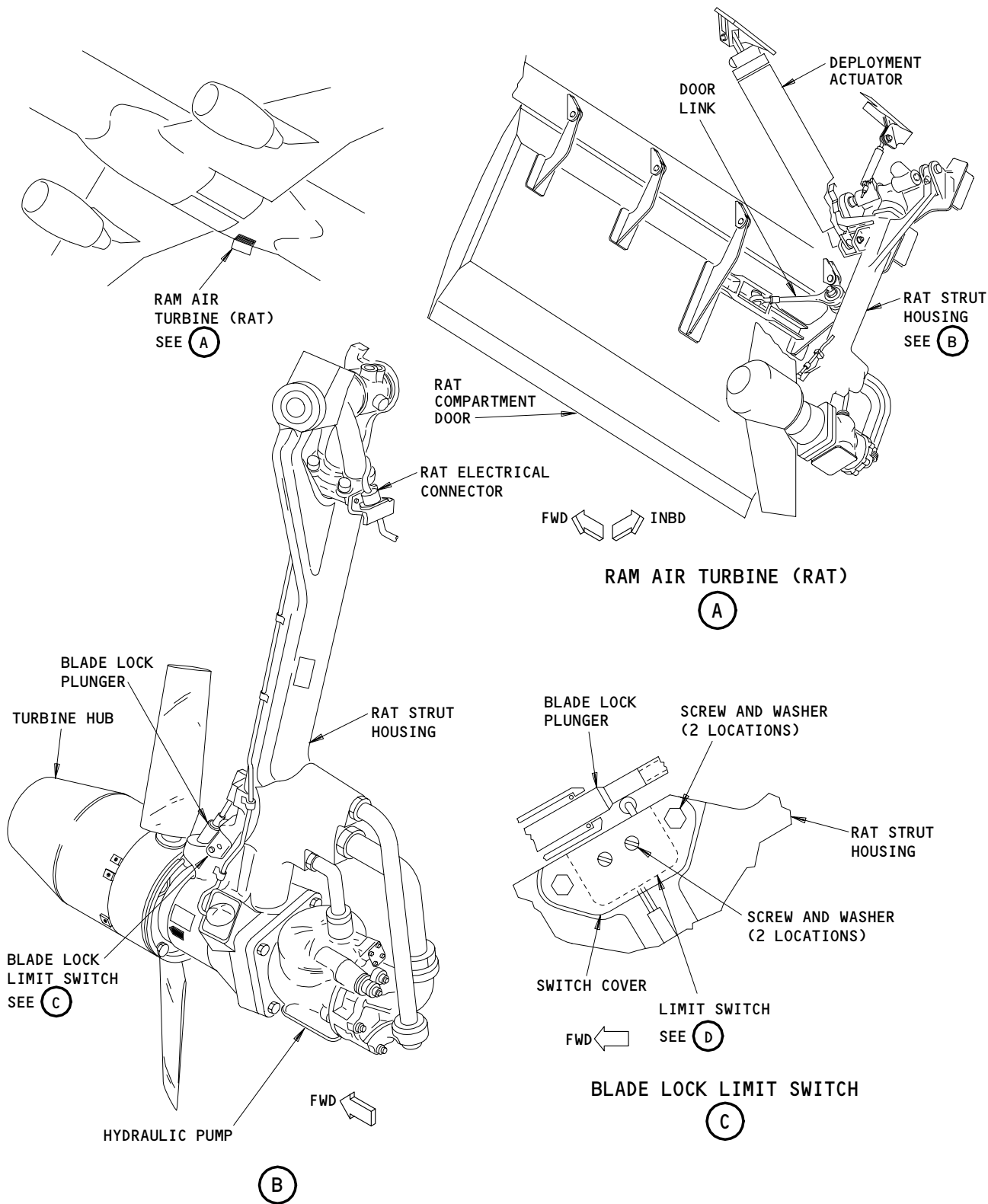
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RAT Blade Lock Limit Switch Installation
Figure 201 (Sheet 1)

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(b) Disconnect the inline electrical connectors.

S 032-008

(7) If the limit switch does not have inline electrical connectors, do this step:

(a) Cut the two wires approximately 3.75 inches from the limit switch.

TASK 29-21-21-422-009

3. Install the Limit Switch for the Ram Air Turbine (RAT)

A. Consumable Materials

(1) A00064 Sealant - RTV 732

B. References

(1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

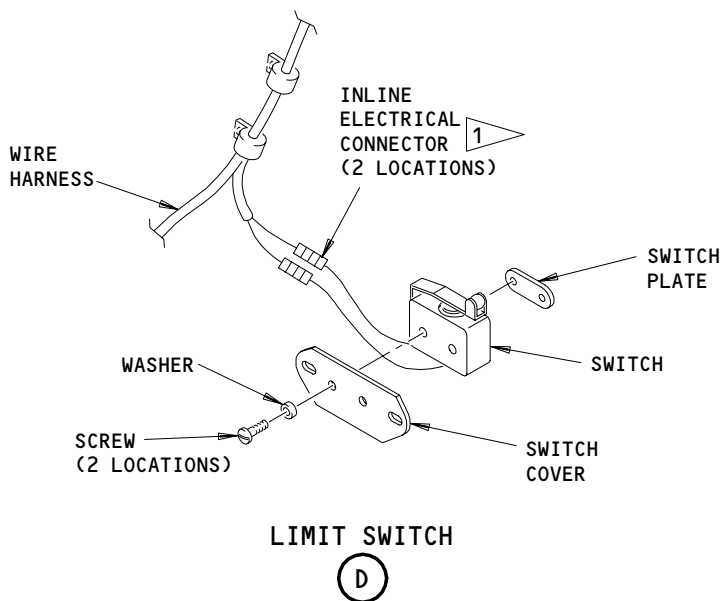
C. Access

(1) Location Zones

198 Wing to Body - Aft Lower Half (Right)

(2) Access Panel

198MR RAT Compartment



1 AIRPLANES WITH INLINE ELECTRICAL CONNECTORS

RAT Blade Lock Limit Switch Installation
Figure 201 (Sheet 2)

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D. Install the Limit Switch (Fig. 201)

S 162-010

- (1) Remove the sealant which stays in the hole in the strut housing.

S 422-011

- (2) Put the limit switch and the switch plate on the switch cover.

NOTE: The switch plate must be on the side of the limit switch which is against the RAT strut housing.

S 422-012

- (3) Install the screws and washers which attach the limit switch and the switch plate to the switch cover.

S 432-016

- (4) Tighten the screws by hand until you adjust the switch.

S 422-013

- (5) Put the limit switch and the switch cover in the hole in the RAT strut housing.

S 422-014

- (6) Install the screws and washers which attach the switch cover to the RAT strut housing.

S 432-015

- (7) Tighten the screws by hand until you adjust the switch.

S 432-017

- (8) If the limit switch does not have inline electrical connectors, do this step:
(a) Install the electrical connectors on the wires in the wire harness and on the limit switch.

S 432-018

- (9) Connect the wires from the limit switch to the electrical connectors on the wire harness.

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- S 432-019
- (10) Install the heat-shrink tubing on the electrical connectors.
- S 832-020
- (11) Do the Limit Switch Adjustment.
- S 622-021
- (12) Apply the sealant on the electrical leads on the limit switch.
- S 862-022
- (13) Retract the RAT (AMM 29-21-00/201).

TASK 29-21-21-832-023

4. Limit Switch Adjustment

A. Equipment

- (1) Protractor - Commercially Available

B. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-05/401, Ram Air Turbine (RAT) Deployment Actuator
- (3) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Actuator Link

C. Access

- (1) Location Zones
 - 198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
 - 198MR RAT Compartment

D. Adjust the Limit Switch (Fig. 201)

- S 862-024
- (1) If it is not in the extended position, extend the RAT (AMM 29-21-00/201).
- S 032-025
- (2) Disconnect the lower end of the RAT deployment arm from the RAT strut housing (AMM 29-21-05/401).

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- S 032-026
- (3) Disconnect the RAT door link from the door or from the RAT strut housing (AMM 29-21-10/401).

- S 032-027
- (4) Disconnect the electrical connector at the top of the RAT strut housing, on the aft side.

- S 982-028
- (5) Push on the end of the hydraulic pump to move the RAT in the direction of the retracted position.

- S 222-029
- (6) Make sure the limit switch closes when the RAT strut housing is $13 \pm 1/2$ degrees from the fully extended position.

NOTE: Do a check for continuity, between the electrical connector pins 5 and 7, to find when the switch closes.

- S 822-030
- (7) If it is necessary, do these steps to adjust the limit switch:
- (a) Loosen the screws which attach the limit switch to the switch cover.
 - (b) Move the limit switch vertically until it closes when it touches the larger diameter of the blade lock plunger.
 - (c) Tighten the screws which attach the limit switch to the switch cover to 2.5-3.5 pound-inches.
 - (d) Loosen the screws which attach the switch cover to the RAT strut housing.
 - (e) Move the limit switch horizontally until it closes when the RAT strut housing is $13 \pm 1/2$ degrees from the fully extended position.
 - (f) Tighten the screws which attach the switch cover to the RAT strut housing to 32-36 pound-inches.

- S 432-031
- (8) Connect the electrical connector at the top of the RAT strut housing.

- S 432-032
- (9) Connect the RAT door link (AMM 29-21-10/401).

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S 432-033

- (10) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-05/401).

S 862-034

- (11) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) TACHOMETER AND GROUND MANUAL SWITCH -
REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the tachometer and ground manual switch for the ram air turbine (RAT).

TASK 29-21-51-024-001

2. Remove the Tachometer and Ground Manual Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body - Aft Lower Half (Right)

- (2) Access Panel
198MR RAT Compartment

C. Remove the Tachometer and Ground Manual Switch (Fig. 401)

S 864-002

- (1) Extend the RAT (AMM 29-21-00/201).

S 034-003

- (2) Remove the screws for the fairing panel.

S 034-004

- (3) Remove the fairing panel.

S 034-005

- (4) Disconnect the electrical connectors from tachometer and ground manual switch.

S 034-006

- (5) Install caps on the electrical connectors.

S 034-007

- (6) Remove the bolts from the tachometer and ground manual switch.

S 024-008

- (7) Remove the tachometer and ground manual switch from the mounting bracket.

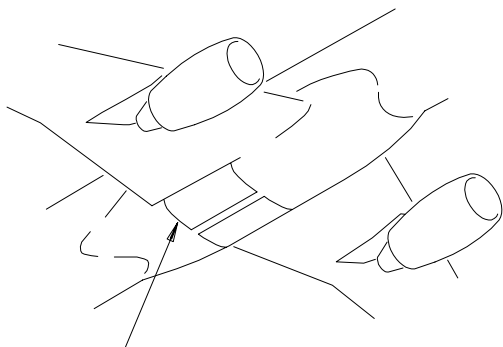
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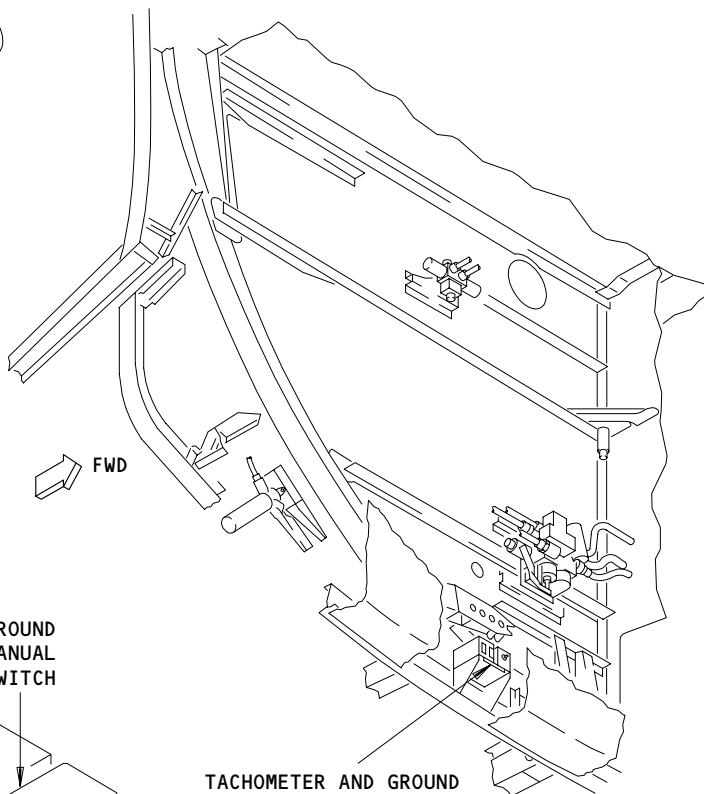
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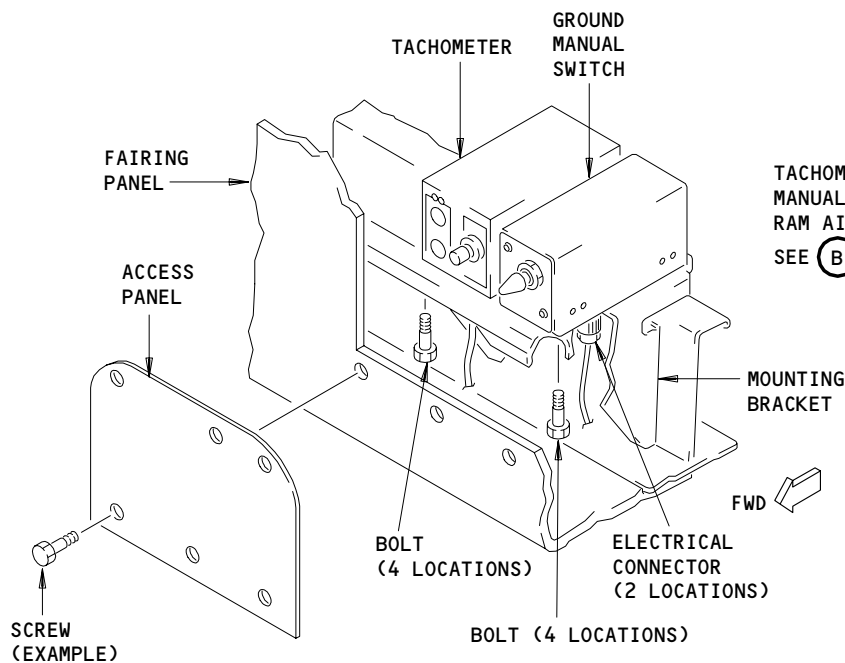


AFT BULKHEAD OF THE
RIGHT WHEEL WELL
SEE (A)



TACHOMETER AND GROUND
MANUAL SWITCH FOR THE
RAM AIR TURBINE (RAT)
SEE (B)

AFT BULKHEAD OF THE
RIGHT WHEEL WELL
(A)



TACHOMETER AND GROUND MANUAL SWITCH

(B)

Tachometer and Ground Manual Switch Installation
Figure 401

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TASK 29-21-51-424-009

3. Install the Tachometer and Ground Manual Switch for the Ram Air Turbine (RAT)

A. References

- (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
- (2) AMM 29-21-00/501, Ram Air Turbine (RAT) System

B. Access

- (1) Location Zones
198 Wing to Body - Aft Lower Half (Right)
- (2) Access Panel
198MR RAT Compartment

C. Install the Tachometer and Ground Manual Switch (Fig. 401)

S 424-010

- (1) Put the tachometer and ground manual switch on the mounting bracket.

S 434-011

- (2) Install the bolts for the tachometer and ground manual switch.

S 434-012

- (3) Connect the electrical connectors to the tachometer and the ground manual switch.

S 434-013

- (4) Install the screws to attach the fairing panel.

S 714-014

- (5) Do the test for the RAT hydraulic pump to make sure the tachometer operates correctly (AMM 29-21-00/501).

S 864-015

- (6) Retract the RAT (AMM 29-21-00/201).

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RAM AIR TURBINE (RAT) AIRSPEED SWITCH – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the airspeed switch on the ram air turbine (RAT).
- B. The airspeed switch is installed on a stanchion on the outboard side of the E1 rack in the main equipment bay.

TASK 29-21-53-024-001

2. Remove the Airspeed Switch for the Ram Air Turbine (RAT)

A. Equipment

- (1) RAT Circuit Breaker Lock Set – B27065-9 or Equivalent

B. Access

- (1) Location Zones

119	Main Equipment Center
211/212	Control Cabin

- (2) Access Panel

119BL	Main Equipment Center
-------	-----------------------

C. Remove the Airspeed Switch (Fig. 401)

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach circuit breaker locks:
 - (a) 11D26, HYDRAULIC RAT CONT OR HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO, or HYDRAULIC RAT AUTO PWR

S 864-004

- (2) Open these circuit breakers on the main power distribution panel, P6, and attach circuit breaker locks:
 - (a) 6F1, RAT MAN, or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT (if installed)

S 034-005

- (3) Disconnect the electrical connector from the airspeed switch.

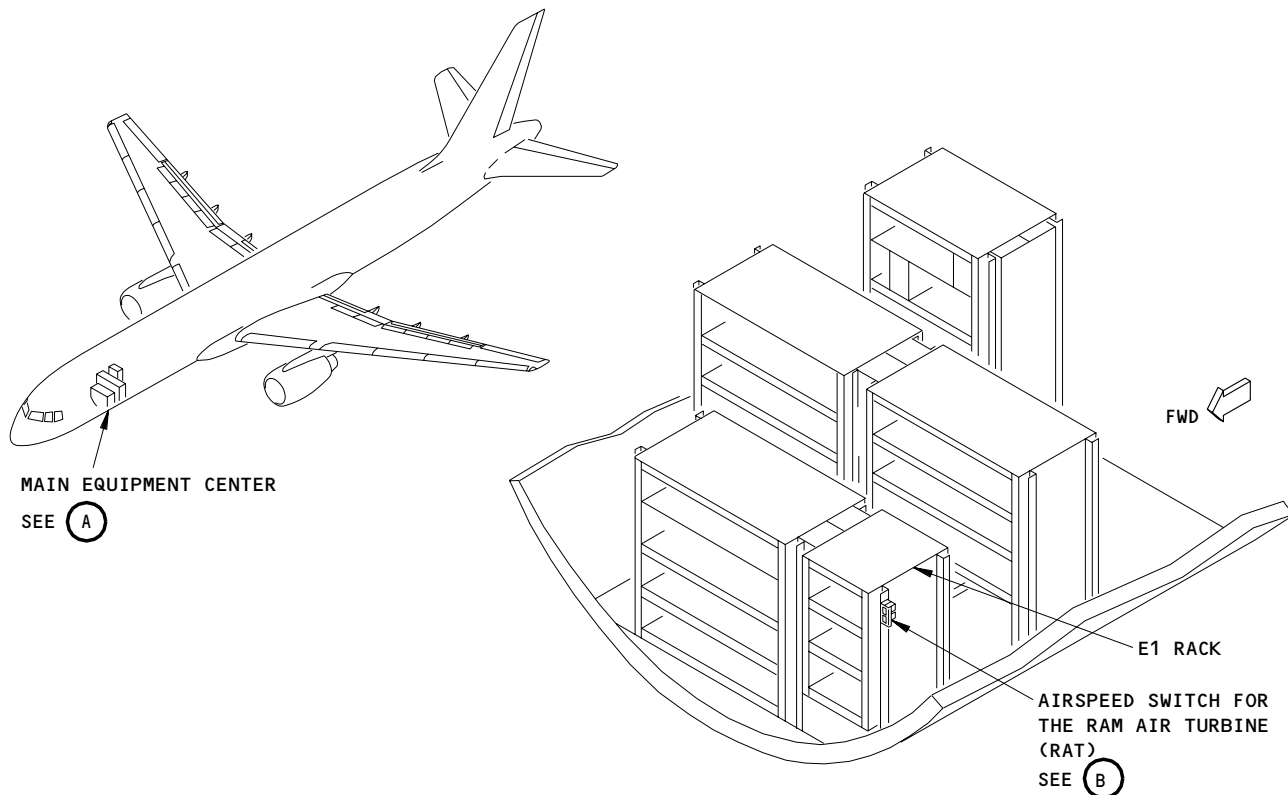
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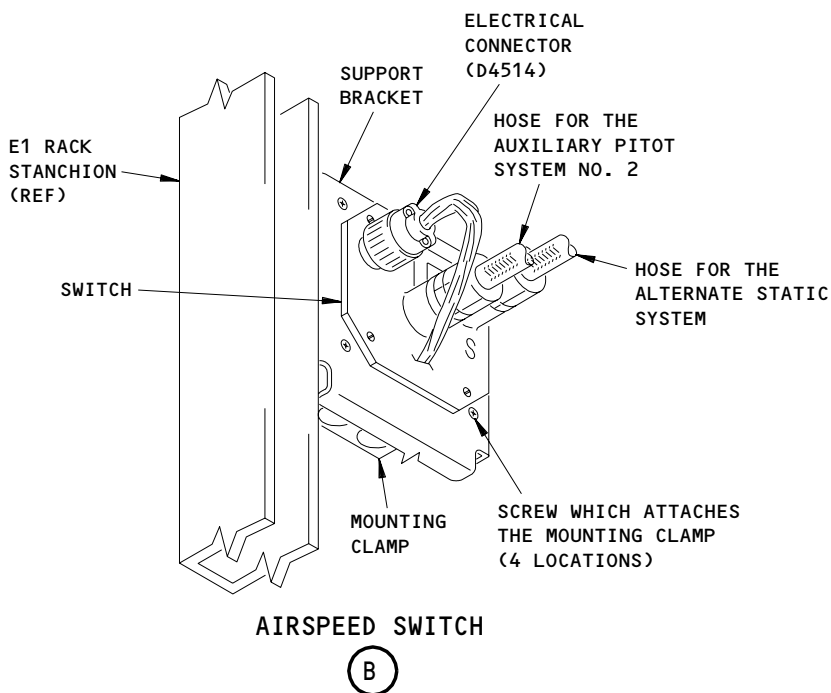
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MAIN EQUIPMENT CENTER
(EXAMPLE)



RAT Airspeed Switch Installation
Figure 401

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- S 034-006
- (4) Disconnect the pitot-static lines from the airspeed switch.
- S 034-007
- (5) Loosen the four screws on the support bracket near the corners of the airspeed switch.
- S 024-008
- (6) Remove the airspeed switch from the support bracket.

TASK 29-21-53-424-009

3. Install the Airspeed Switch for the Ram Air Turbine (RAT)

A. Equipment

- (1) RAT Circuit Breaker Lock Set - B27065-9 or Equivalent

B. References

- (1) AMM 29-21-00/501, Ram Air Turbine (RAT) System
- (2) AMM 34-11-00/501, Pitot-Static System

C. Access

- (1) Location Zones
 - 119 Main Equipment Center
 - 211/212 Control Cabin
- (2) Access Panel
 - 119BL Main Equipment Center

D. Install the Airspeed Switch (Fig. 401)

- S 424-010
- (1) Put the airspeed switch in the switch mounting clamp on the support bracket.
- S 434-011
- (2) Tighten the screws on the support bracket, near the corners of the airspeed switch, to 5-8 pound-inches.
- S 434-012
- (3) Connect the pitot-static lines to the airspeed switch.
- S 434-013
- (4) Connect the electrical connector to the airspeed switch.

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- S 864-014
- (5) Remove the circuit breaker locks and close these circuit breakers on the overhead panel, P11:
- (a) 11D26, HYDRAULIC RAT CONT OR HYDRAULIC RAT AUTO CONT
 - (b) 11D27, HYDRAULIC RAT AUTO, or HYDRAULIC RAT AUTO PWR
- S 864-016
- (6) Remove the lock set for the circuit breakers and close these circuit breakers on the main power distribution panel, P6:
- (a) 6F1, RAT MAN, or RAT MAN PWR
 - (b) 6F2, RAT MAN CONT (if installed)
- S 794-027
- (7) Do the leakage test for the auxiliary pitot system No. 2 and the alternate static system (AMM 34-11-00/501).
- S 714-028
- (8) Do the test for the RAT auto deployment system (AMM 29-21-00/501).

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HYDRAULIC POWER TRANSFER UNIT (PTU) SYSTEM – DESCRIPTION AND OPERATION

1. General

- A. The power transfer unit (PTU) system provides an alternate power source for the left hydraulic system, if left engine power or left EDP pressure is lost. This system powers the flaps, slats, landing gear, nose gear steering, and hydraulic motor-driven generator. The PTU uses right system pressure to provide left system pressure without transferring fluid between the two systems. The PTU contains in one housing a hydraulic motor and a hydraulic pump joined by a driveshaft.
- B. The left engine-out relay No. 2 turns the PTU on if power is lost in the left engine.
- C. The PTU is also turned on by the left EDP pressure switch if left EDP pressure falls below approximately 1275 psi.
- D. The PTU can be turned on with the PTU manual control switch on right side panel P61.

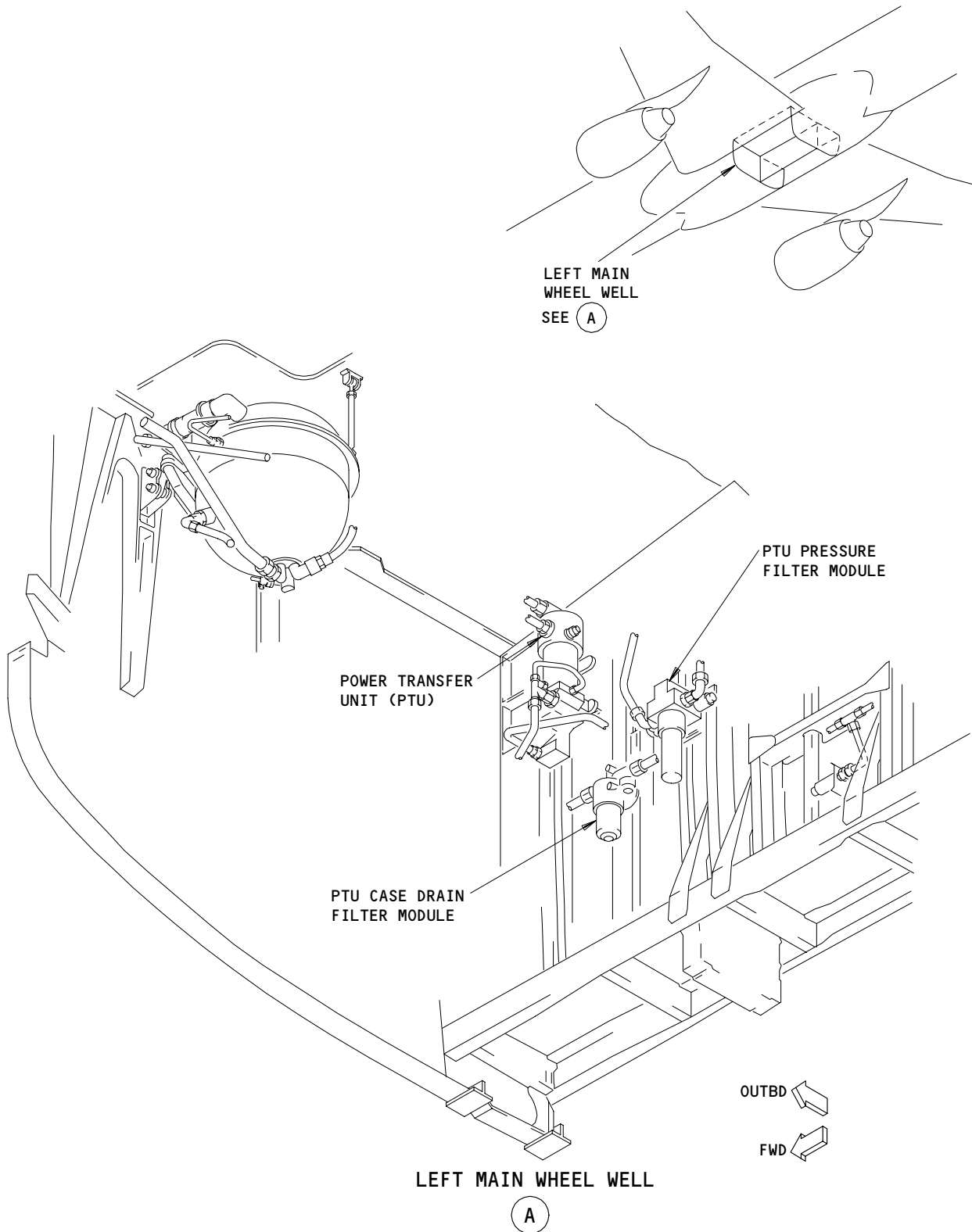
2. Component Details (Fig. 1)

- A. Power Transfer Unit (PTU) (Fig. 2)
 - (1) The power transfer unit consists of a hydraulic motor and a hydraulic pump in one housing. The motor and pump are joined by a driveshaft inside the housing. The hydraulic motor uses 28 gpm at 3000 psi to provide a pump output of 22.5 gpm at 2175 psi. As pump output pressure increases, pump delivery flow decreases until flow is near zero at 2600 psi. The PTU is on the inboard wall of the left main wheel well.
 - (2) The hydraulic motor is a fixed displacement piston type. Fluid enters the motor through a hydraulic fuse and a flow regulator. The flow regulator controls motor speed by limiting the fluid flow to the motor to about 28 gpm. The hydraulic fuse prevents overspeed of the motor if the regulator fails. If the supply flow exceeds about 35 gpm, the fuse closes to shutoff all flow to the motor. The fuse reopens when inlet pressure drops to about 100 psi. The motor moves fluid through the motor case to lubricate and cool the motor. The case drain fluid flows into the right system return line.
 - (3) The pump is an inline piston type with a fixed displacement. The pump has a centrifugal boost pump to supply fluid under pressure to the inline pump. This allows the PTU pump to operate at low supply pressure. The pump moves fluid through the pump case to lubricate and cool the pump. The case drain fluid flows into the left system return line.

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Power Transfer Unit (PTU) System
Figure 1 (Sheet 1)

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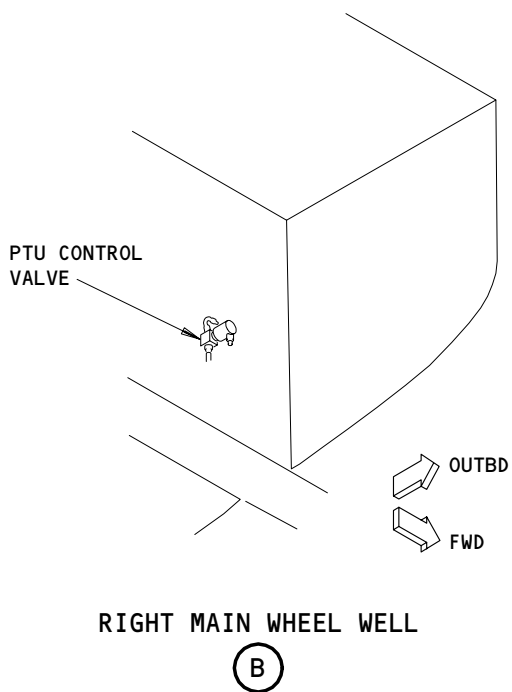
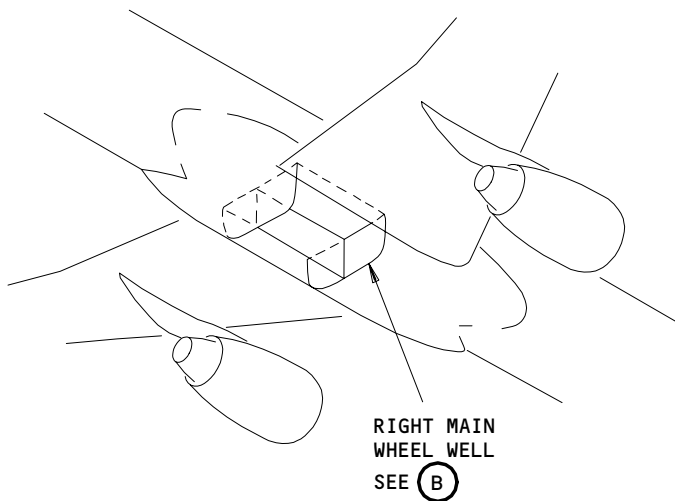
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Power Transfer Unit (PTU) System
Figure 1 (Sheet 2)

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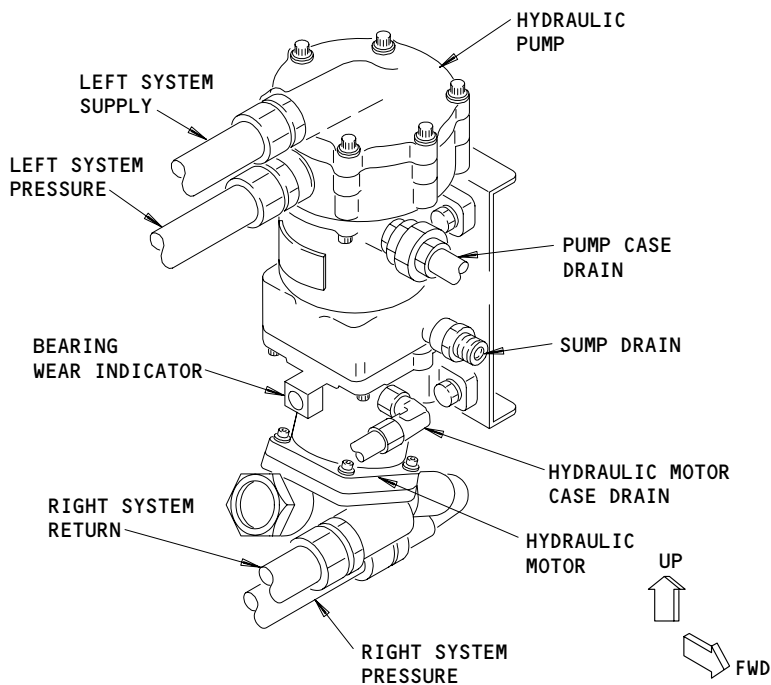
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- (4) A bearing wear indicator is on the motor portion of the PTU. A red button on the indicator will pop out to give a visual warning if the main pump bearing wear exceeds limits.
- B. PTU Pressure Filter Module (Fig. 3)
- (1) The PTU module filters the pump pressure flow before the fluid enters the left system. The filter module is next to the PTU, in the left wheel well. The module has a disposable filter element. A differential pressure indicator shows when the filter is blocked. A spring-loaded valve in the module prevents fluid draining when the filter element is removed. The module has a check valve, a control pressure switch, and an indication pressure switch.



Power Transfer Unit (PTU)
Figure 2

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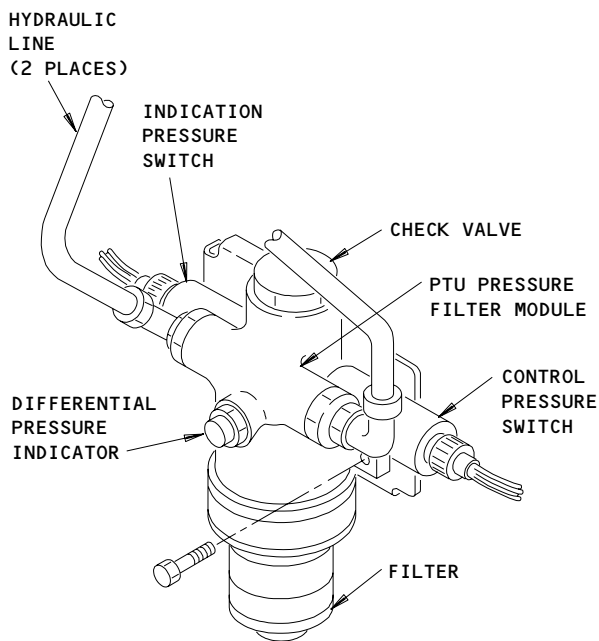
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C. PTU Case Drain Filter Module (Fig. 3)

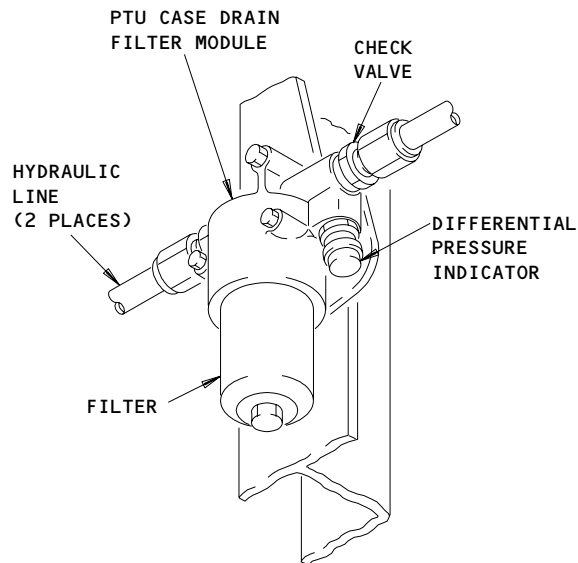
(1) The PTU case drain filter module consists of a disposable filter element, a differential pressure indicator, a check valve, a relief valve, and a spring-loaded shutoff valve. The element filters case drain fluid from the PTU pump. The differential pressure indicator shows when the filter is blocked. The check valve prevents reverse flow when the left system is pressurized. The relief valve opens to allow fluid to bypass the filter, if the filter becomes plugged. When the filter case is removed, the shutoff valve and check valve prevent loss of fluid. The filter module is in the left main wheel well, next to the PTU.

D. PTU Control Valve (Fig. 4)

(1) The control valve is a shutoff valve in the PTU motor supply line. The valve is on the inboard wall of the right wheel well. The two-position valve is operated by a 28 volt dc motor. In the ON position, the valve supplies right system pressure to operate the hydraulic motor. In the OFF position, the valve shuts off pressure to the motor.



PTU PRESSURE FILTER



PTU CASE DRAIN FILTER MODULE

PTU Filter Modules
Figure 3

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E. Left EDP Pressure Switch

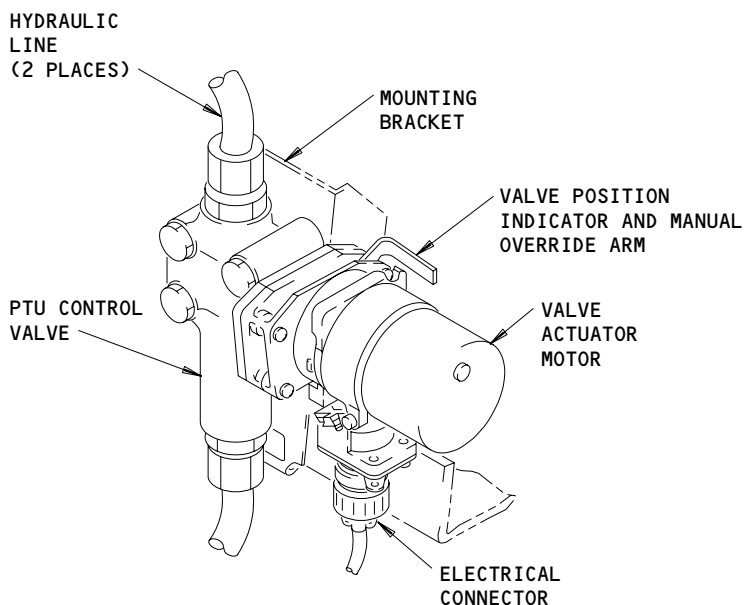
- (1) The left EDP pressure switch, which controls left EDP low pressure indication, also turns on the PTU if left EDP pressure drops below approximately 1275 psi. (Ref 29-11-00 for EDP pressure switch location and more information.)

3. Operation

A. Functional Description

(1) Automatic Operation

- (a) In automatic (normal) operation, 28 volt dc power is provided through the PTU manual switch OFF position to the left engine-out relay No. 2. This relay closes if power is lost in the left engine. If the right engine is still running, power is routed to the PTU control valve through the right engine-out relay No. 4 and the PTU ON relay. If the left engine is running, but the left EDP pressure drops below approximately 1275 psi, 28 volt dc power is routed through the left EDP pressure switch, right engine-out relay NO. 4, and PTU ON relay to the PTU control valve. The valve motor drives the PTU control valve to the open position. This supplies right system pressure to operate the PTU hydraulic motor which drives the pump.



PTU Control Valve
Figure 4

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- (b) Fluid is supplied to the PTU pump from the reserve supply outlet on the left system reservoir. The reserve supply outlet draws fluid from the bottom of the reservoir to allow use of a reserve amount of fluid retained there for use only by the PTU pump, by a standpipe on the EDP and ACMP supply outlet.
 - (c) The PTU pump is normally supplied fluid from the left system reservoir. However, if reservoir pressure and fluid level are low, fluid could be trapped in the reservoir. If this happens, the PTU pump can take fluid directly from the left system return line, bypassing the reservoir. A hydraulic line and check valve connects the PTU pump supply line to the left system return line at the reservoir for this purpose.
 - (d) The pump output flows through a filter in the PTU module before entering the left system. Fluid flows through the pump case for cooling and lubrication. This case drain fluid is filtered by the PTU case drain filter before returning to the left system.
 - (e) If the PTU pump does not supply at least 400 psi within three seconds, the PTU control pressure switch will actuate the PTU on relay. This closes the PTU control valve to remove right system pressure from the PTU and stop the motor.
 - (f) The PTU indication circuit will supply a ground signal to the EICAS computers if the PTU system does not operate properly. This signal causes a POWER XFER UNIT message to be displayed in the EICAS status and maintenance modes.
 - (g) The PTU indication circuit supplies a ground signal to EICAS under the following conditions:
 - 1) PTU pump output less than 400 psi with the right engine running and the left engine not running or the left EDP pressure below 1275 psi.
 - 2) PTU pump output more than 400 psi with the left engine running and the left EDP pressure above 1275 psi.
 - 3) PTU pump output more than 400 psi with the right engine not running and the left engine not running or the left EDP pressure below 1275 psi.
- (2) Manual Operation
- (a) In manual operation, 28 volt dc power is provided to the PTU manual switch. The PTU can be operated by moving the manual switch on the right side panel P61 to the ON position. This provides power to the PTU control valve by-passing the left and right engine-run/out logic and the left EDP pressure switch. The valve then opens to operate the PTU the same as automatic operation.
 - (b) The manual switch is moved to the OFF position to shut off the PTU. This provides power to reverse the PTU control valve motor and close the valve. With the valve closed, right system pressure is removed from the PTU motor.

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- (c) In manual operation, the POWER XFER UNIT message will be displayed on EICAS if the PTU pump output is less than 400 psi.
- B. For more details on the Hydraulic Power Transfer Unit system, refer to this wiring diagram and functional schematic:
- (1) WDM 29-22-11: Hydraulic Power Transfer Unit Control and Indication
 - (2) SSM 29-00-05: Hydraulic Power Transfer Unit System

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HYDRAULIC POWER TRANSFER UNIT (PTU) SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKER HYDRAULICS PTU CONT, C4054	1	1	FLIGHT COMPARTMENT, P11 PANEL 11D31	
COMPUTER - (REF 31-41-00, FIG. 101)				
EICAS L, M10181				
EICAS R, M10182				
DIODE - (REF 31-01-33, FIG. 101)				
R10240				
DIODE - (REF 31-01-37, FIG. 101)				
R10153				
MODULE - PTU CASE DRAIN FILTER	1	1	LEFT WHEEL WELL	29-22-05
MODULE - PTU PRESSURE FILTER	1	1	LEFT WHEEL WELL	29-22-02
PANEL - (REF 24-22-00, FIG. 101)				
GENERATOR FIELD AND HYDRAULIC CONTROL, M10191				
RELAY - (REF 31-01-33, FIG. 101)				
PTU ON, K10051				
RELAY - (REF 77-12-00, FIG. 101)				
LEFT ENGINE OUT 2, K10338				
RIGHT ENGINE OUT 4, K10339				
RIGHT ENGINE OUT 5, K10444				
SWITCH - (REF 29-31-00, FIG. 101)				
LEFT ENGINE-DRIVEN PUMP PRESSURE, S10540				
SWITCH - PTU CONTROL PRESSURE, S10129	2	1	LEFT WHEEL WELL, PTU PRESSURE FILTER MODULE	29-22-02
SWITCH - PTU INDICATION PRESSURE, S10246	2	1	LEFT WHEEL WELL, PTU PRESSURE FILTER MODULE	29-22-02
SWITCH - PTU MANUAL, YQZS7	1	1	FLIGHT COMPARTMENT, P61 PANEL, GENERATOR FIELD AND HYDRAULIC CONTROL PANEL, M10191	*
TIME DELAY - (REF 31-01-33, FIG. 101)				
PTU INDICATION, M10146				
PTU ON, M10145				
UNIT - POWER TRANSFER (PTU)	1	1	LEFT WHEEL WELL	29-22-01
VALVE - PTU CONTROL, V10007	3	1	RIGHT WHEEL WELL	29-22-03

* SEE THE WDM EQUIPMENT LIST

Hydraulic Power Transfer Unit (PTU) System - Component Index
Figure 101

EFFECTIVITY

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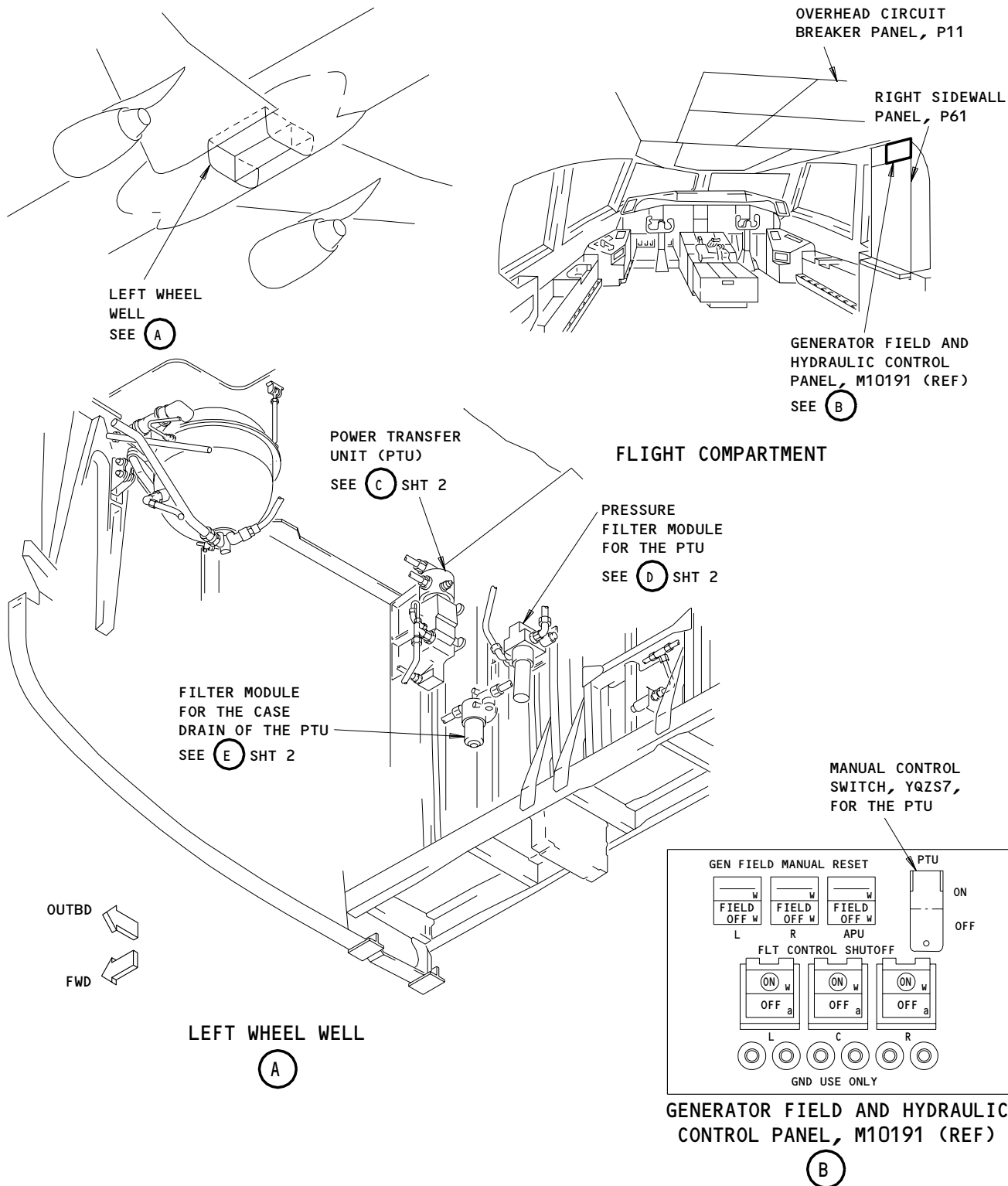
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247954

BOEING
757
FAULT ISOLATION/MAINT MANUAL



Hydraulic Power Transfer Unit (PTU) System - Component Location
Figure 102 (Sheet 1)

EFFECTIVITY

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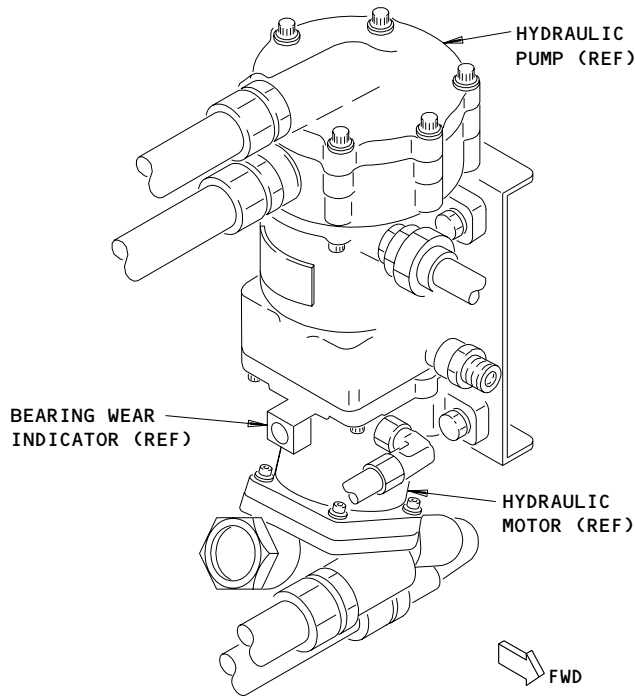
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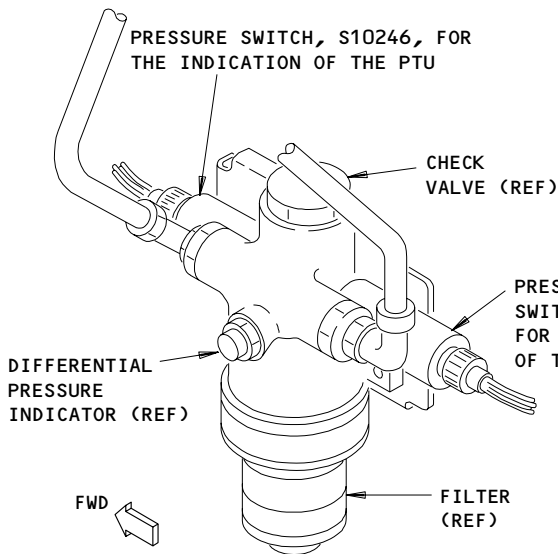
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BOEING
757
FAULT ISOLATION/MAINT MANUAL



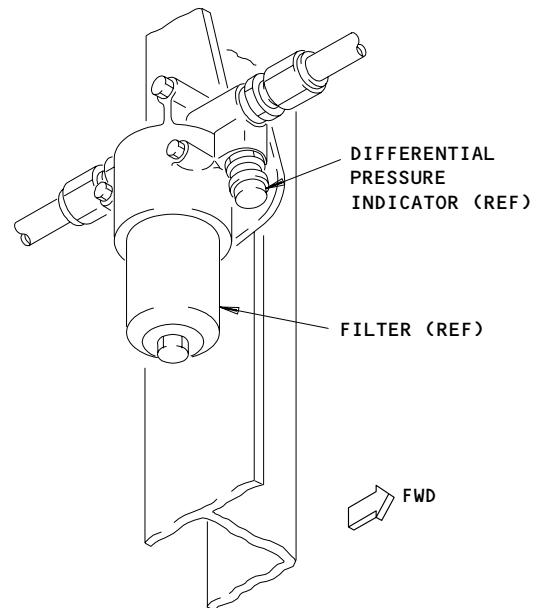
POWER TRANSFER UNIT (PTU)

(C)



PRESSURE FILTER MODULE FOR THE PTU

(D)



FILTER MODULE FOR THE CASE DRAIN OF THE PTU

(E)

Hydraulic Power Transfer Unit (PTU) System - Component Location
(Details from Sht 1)
Figure 102 (Sheet 2)

EFFECTIVITY

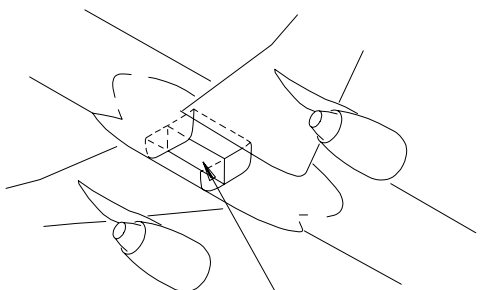
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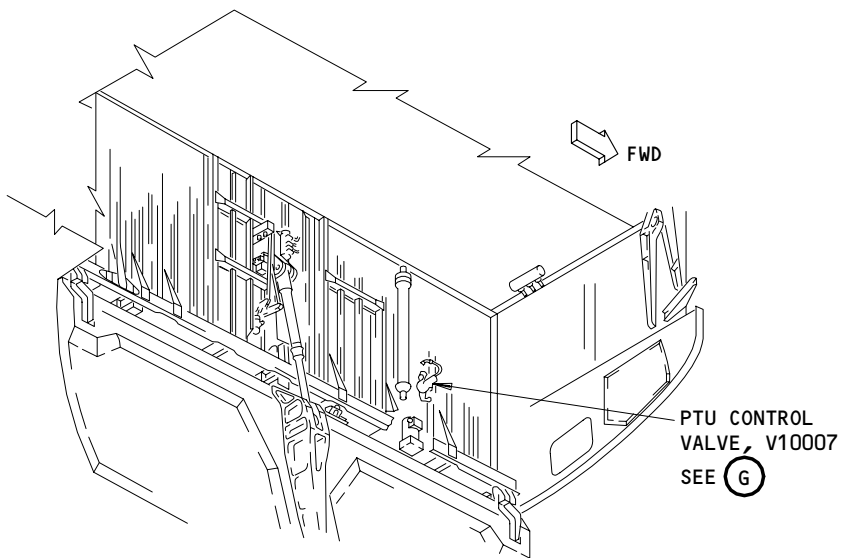
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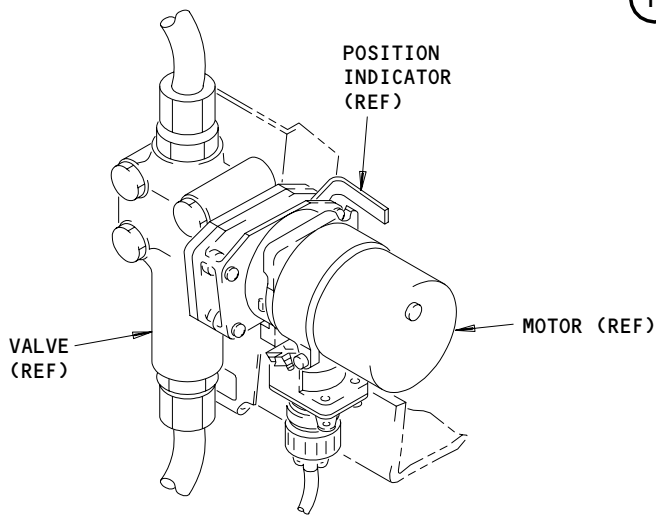
229607



RIGHT WHEEL WELL
SEE (F)



RIGHT WHEEL WELL
(F)



PTU CONTROL VALVE, V10007
(G)

Hydraulic Power Transfer Unit (PTU) System - Component Location
Figure 102 (Sheet 3)

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HYDRAULIC POWER TRANSFER UNIT (PTU) – ADJUSTMENT/TEST

1. General

A. This procedure has these tasks:

- (1) Operational test of the power transfer unit (PTU) system.
- (2) System test of the power transfer unit (PTU) system.

TASK 29-22-00-715-001

2. Operational Test – Power Transfer Unit System (PTU) (Fig. 501)

A. General

(1) This test contains the procedures which follow:

- (a) Operational Test of the PTU, the PTU Control Valve, and the Auto Control and Indicating System
- (b) Operational Test of the Manual Ground Control System for the PTU

B. Equipment

- (1) Hydraulic Service Cart, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, BMS 3-11
- (2) Stop Watch, Commercially Available

C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 24-22-00/201, Electrical Power
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 32-00-15/201, Main Gear Door Locks
- (5) AMM 32-00-20/201, Landing Gear Downlocks
- (6) AMM 32-09-02/201, Air/Ground Relays

D. Access

(1) Location Zones

119	Main Equipment Center
143/144	MLG Wheel Well
211/212	Control Cabin
730/740	Main Landing Gear and Doors

(2) Access Panels

119BL	Main Equipment Center
-------	-----------------------

E. Prepare for the Operational Test

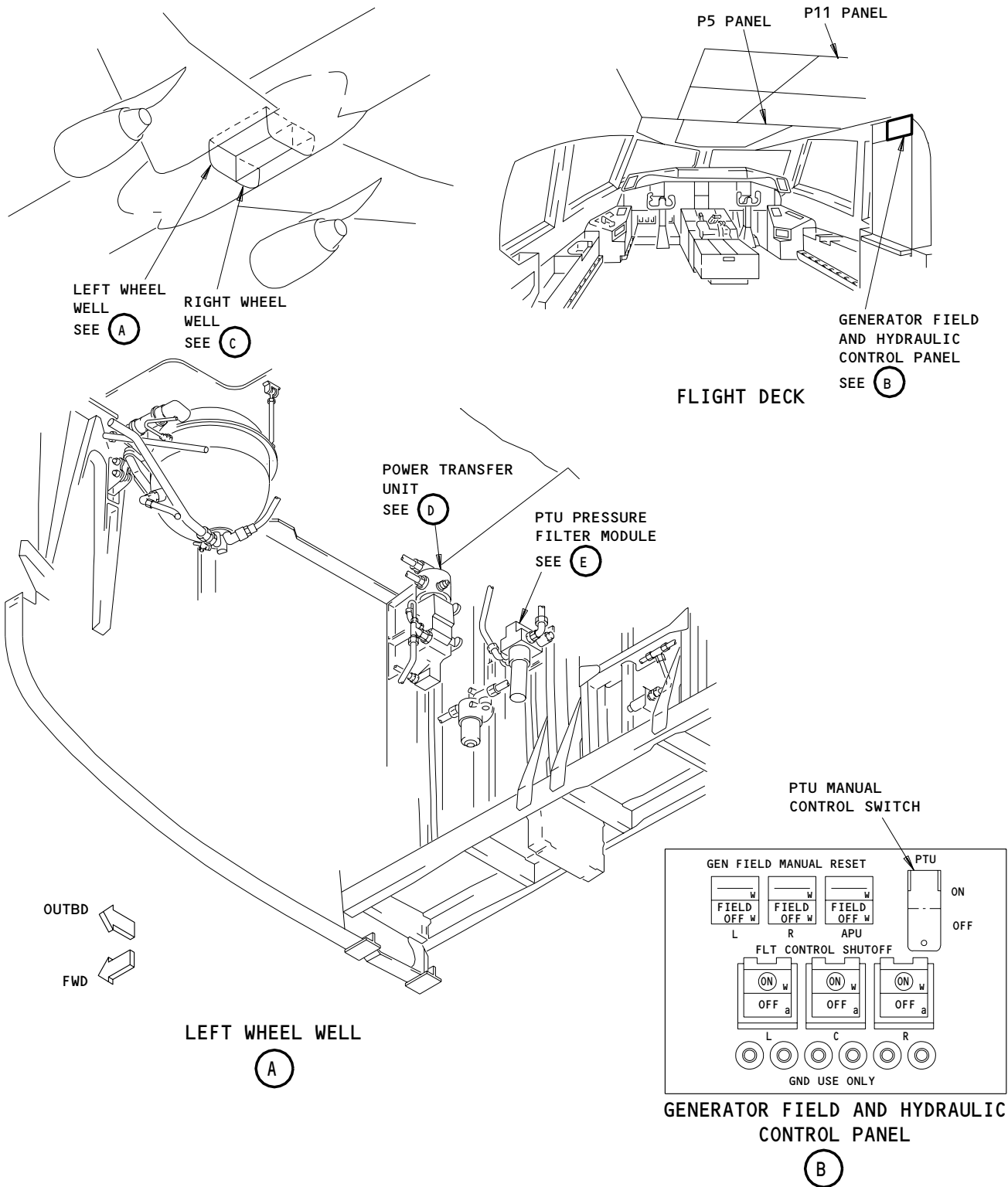
EFFECTIVITY

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03

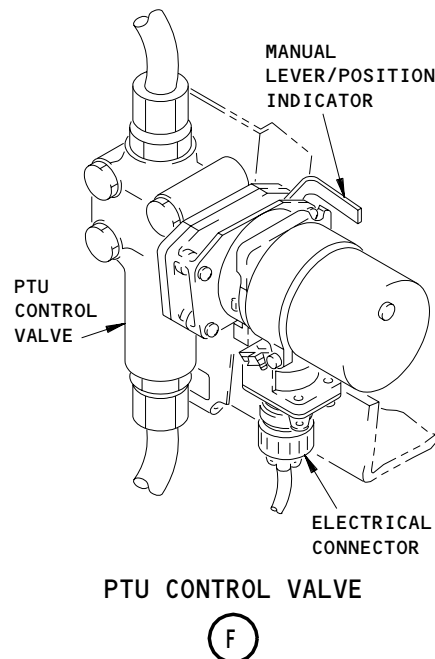
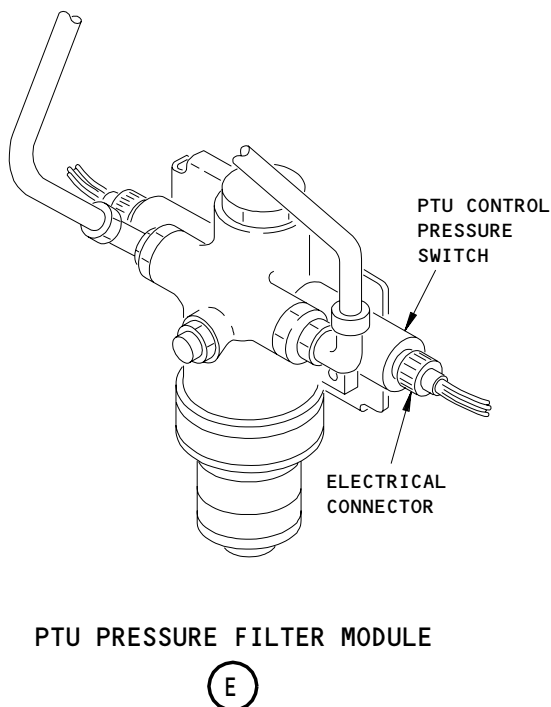
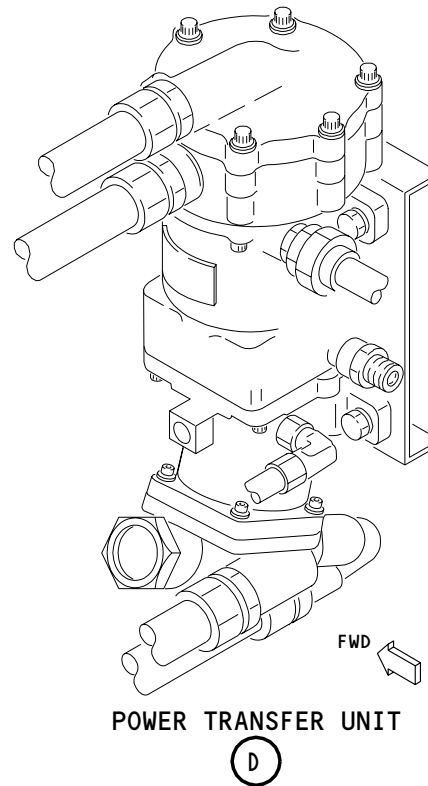
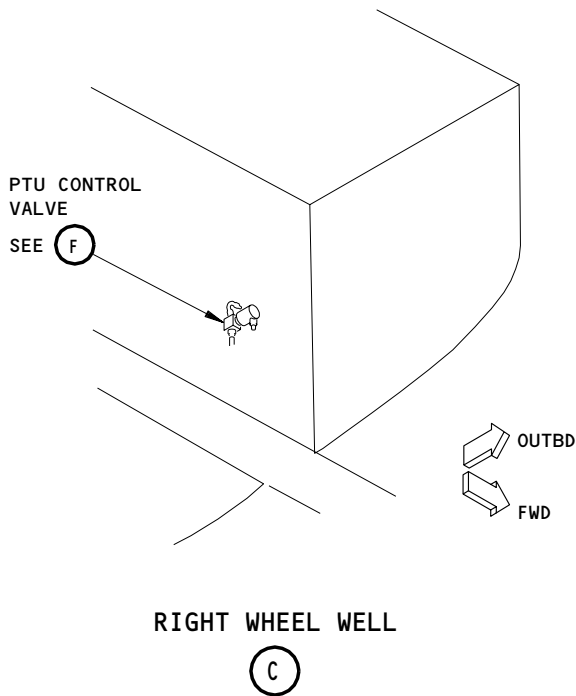
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Power Transfer Unit (PTU) System
Figure 501 (Sheet 1)

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Power Transfer Unit (PTU) System
Figure 501 (Sheet 2)

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S 865-348

CAUTION: DO NOT APPLY ELECTRICAL POWER WITHOUT REMOVING THE PITOT, ANGLE OF ATTACK, AND ENGINE PITOT COVERS. THE HEATERS CAN MELT THE COVERS AND CAUSE AIRPLANE DAMAGE.

- (1) Make sure the pitot, angle of attack, and the engine pitot covers are removed prior to applying electrical power.

S 865-002

- (2) Supply electrical Power (AMM 24-22-00/201).

S 495-003

- (3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-004

WARNING: DO 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 215-005

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS WITHOUT A MINIMUM QUANTITY OF FUEL IN THE TANKS OR AFTER THE OVERHEAT LIGHT COMES ON. IF THE HEAT EXCHANGERS OF THE HYDRAULIC SYSTEM ARE NOT FULLY INTO THE FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

- (5) Make sure the left and right main fuel tanks each contain 600 gallons (4020 pounds/1827 kilograms) of fuel.

S 865-007

- (6) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

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F. Do the Operational Test of the PTU, the PTU Control Valve, and the Auto Control and Indicating System

S 865-010

- (1) Pressurize the right hydraulic system with either a hydraulic service cart, engine-driven pump, or alternating current motor pump (AMM 29-11-00/201).

NOTE: The right system ACMP (AC Motor Pump) may not provide sufficient flow to drive the PTU to extend the flaps or they may move very slowly, depending on the internal leakage of the hydraulic system.

S 495-287

- (2) In the electrical systems card file, P50, do this step if you use a service cart or alternating current motor pump (ACMP):

NOTE: The card is accessed through the 119BL access panel (AMM 06-41-00/201).

- (a) Place the toggle switch on the end of the right engine speed card (M10311) in the test mode position or install a jumper between a ground and the test point J1 on the end of the right engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. Either the toggle switch or the jumper provides a signal that the right engine is in operation.

S 215-012

- (3) Listen to the PTU in the left main wheel well to make sure it operates smoothly.

S 215-341

- (4) Make sure the Manual lever/position indicator on the PTU Control Valve is in the open position.

S 215-013

- (5) Make sure the POWER XFER UNIT message is not shown on EICAS after five seconds.

S 215-014

- (6) Make sure the pressure indication for the left hydraulic system on EICAS is not less than 2600 psi.

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- S 865-015
- (7) Put the flap lever on the control stand to the 30 degree position and make sure the flaps move to the fully extended position.
- S 865-016
- (8) Put the flap lever in the ZERO detent position and make sure the flaps move to the fully retracted position.
- S 865-017
- (9) Remove the hydraulic power from the right hydraulic system (AMM 29-11-00/201).
- S 865-342
- (10) Make sure the Manual Lever/Position indicator on the PTU Control Valve moves to the closed position three seconds after removal of hydraulic power from the right system.
- S 095-289
- (11) In the electrical systems card file, P50, do this step if you use a service cart or alternating current motor pump:

NOTE: Close access panel 119BL (AMM 06-41-00/201) after returning the card to normal configuration.

- (a) Return the toggle switch on the end of the right engine speed card (M10311) to the normal position or remove the jumper from the ground and test point J1 on the end of the right engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. This removes the signal that the right engine is in operation.

G. Do the Operational Test of the Manual Ground-Control System for the PTU

- S 865-034
- (1) Pressurize the right hydraulic system with a hydraulic service cart or the alternating current motor pump (ACMP) (AMM 29-11-00/201).

NOTE: You cannot test the manual ground-control system for the PTU if the you pressurize the right hydraulic system with the EDP. Operation of the right EDP with the left engine off will permit the automatic mode of the PTU to operate and bypass the manual ground-control system.

- S 865-035
- (2) Put the manual control switch for the PTU on the right side panel, P61, to the ON position.

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- S 215-037
- (3) Listen to the PTU in the left wheel well to make sure it operates.
- S 865-038
- (4) Put the manual control switch for the PTU on the P61 panel to the OFF position.
- S 865-040
- (5) Remove the hydraulic power from the right hydraulic system (AMM 29-11-00/201).
- H. Put the Airplane Back to Its Usual Condition

S 495-308

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 865-309

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

TASK 29-22-00-735-078

3. System Test – Power Transfer Unit (PTU) System (Fig. 501)

A. General

- (1) This procedure does a test of the PTU system to make sure the system performance is satisfactory.

B. Equipment

- (1) Hydraulic Service Cart, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, BMS 3-11.
- (2) Stop Watch, Commercially Available

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 24-22-00/201, Electrical Power
- (3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
- (4) AMM 29-11-05/401, Engine-Driven Pump
- (5) AMM 32-00-15/201, Main Gear Door Locks
- (6) AMM 32-00-20/201, Landing Gear Downlocks
- (7) AMM 32-09-02/201, Air/Ground Relays

D. Access

- (1) Location Zones
- | | |
|---------|----------------|
| 143/144 | MLG Wheel Well |
| 211/212 | Control Cabin |

E. Prepare for the System Test

S 865-079

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

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- S 865-080
- (2) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).
- S 495-081
- (3) Connect a hydraulic service cart to the ground power connections for the right hydraulic system (AMM 29-11-00/201).
- S 865-292
- (4) Set the service cart pressure at zero psi.
- S 035-082
- (5) Disconnect the self-seal fitting on the pressure hose from the left engine-driven pump (AMM 29-11-05/401).
- S 495-083
- (6) Connect the pressure line of the hydraulic service cart to the self-seal fitting on the pressure hose of the engine-driven pump (AMM 29-11-00/201).
- S 495-084
- (7) Connect the return line of the service cart to the ground power return connection of the left hydraulic system (AMM 29-11-00/201).
- NOTE:** The hydraulic service cart must have a shutoff valve in the pressure line which can isolate the cart from the airplane hydraulic system.
- S 865-085
- (8) Set the hydraulic service cart connected to the left system to zero psi.
- S 865-293
- (9) Make sure the shutoff valve in the pressure line from the service cart is in the closed position.
- S 865-294
- (10) Pressurize the reservoir in the left hydraulic system (AMM 29-11-00/201).
- S 865-086
- (11) Remove the pressure from the reservoirs in the right and center hydraulic systems (AMM 29-11-00/201).
- S 865-089
- (12) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

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S 215-090

- (13) Make sure the quantity indication on EICAS for the left and right hydraulic systems is 0.80 or more.

S 215-091

- (14) Make sure the POWER XFER UNIT message is not shown on EICAS.

S 495-092

- (15) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-093

WARNING: DO 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) Deleted.
(b) Deleted.

F. System Test for the Power Transfer Unit

S 865-158

- (1) Make sure the manual lever/position indicator on the PTU control valve is in the CLOSED position.

S 865-159

- (2) Pressurize the right hydraulic system with a hydraulic service cart to 3000 psi with 30 gpm capacity (AMM 29-11-00/201).

S 865-160

- (3) Open this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT

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S 495-299

- (4) In the electrical systems card file, P50, do this step:
- (a) Place the toggle switch on the end of the right engine speed card (M10311) in the test mode position or install a jumper between a ground and the test point J1 on the end of the right engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. Either the toggle switch or the jumper provides a signal that the right engine is in operation. You must do the step which follows no more than three seconds after the above step. If you do not do this, the POWER XFER UNIT message will show on EICAS.

S 865-162

- (5) Close this circuit breaker on the P11 panel:
- (a) 11D31, HYDRAULICS PTU CONT

S 215-163

- (6) Make sure you can hear the operation of the PTU in the left main wheelwell.

NOTE: After the PTU starts, it will stop and then continue to operate at a slower speed and a lesser sound level.

S 215-164

- (7) Make sure the POWER XFER UNIT message is not shown on EICAS.

S 215-165

- (8) Make sure the pressure indication for the left hydraulic system on EICAS is not less than 2600 psi.

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- S 865-166
- (9) Make sure the manual lever/position indicator on the PTU control valve is in the OPEN position.
- S 865-167
- (10) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
- (a) 11D31, HYDRAULICS PTU CONT
- S 865-168
- (11) Operate the hydraulic service cart to reduce the pressure in the right hydraulic system to zero.
- S 035-169
- (12) Disconnect the electrical connector from the PTU control valve.
- S 495-300
- (13) In the electrical systems card file, P50, do these steps:
- (a) Return the toggle switch on the end of the right engine speed card (M10311) to the normal position or remove the jumper from the ground and test point J1 on the end of the right engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. This removes the signal that the right engine is in operation.

- (b) Place the toggle switch on the end of the left engine speed card (M10298) in the test mode position or install a jumper between a ground and the test point J1 on the end of the left engine speed card (M10298).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. Either the toggle switch or the jumper provides a signal that the left engine is in operation.

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- S 865-173
- (14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
- (a) 11D31, HYDRAULICS PTU CONT
- S 865-335
- (15) Pressurize the right hydraulic system with the hydraulic service cart to 3000 psi
- S 215-174
- (16) Make sure you can hear the operation of the PTU.
- S 215-175
- (17) Make sure the POWR XFER UNIT message is shown on EICAS.
- S 865-176
- (18) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
- (a) 11D31, HYDRAULICS PTU CONT
- S 495-301
- (19) In the electrical systems card file, P50, do this step:
- (a) Place the toggle switch on the end of the right engine speed card (M10311) in the test mode position or install a jumper between a ground and the test point J1 on the end of the right engine speed card (M10311).
- NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. Either the toggle switch or the jumper provides a signal that the right engine is in operation.
- S 865-178
- (20) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
- (a) 11D31, HYDRAULICS PTU CONT

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S 215-179

(21) Make sure the POWER XFER UNIT message is shown on EICAS.

S 865-180

(22) Push the ECS/MSG switch on the EICAS maintenance panel on the P61 panel. Push the AUTO EVENT READ switch, then push and hold the ERASE switch for approximately 3 seconds for each page of messages.

S 215-181

(23) Make sure the POWER XFER UNIT message is not shown on EICAS.

S 215-182

(24) Make sure you can hear the operation of the PTU.

S 865-183

(25) Operate the hydraulic service cart which is connected to the left hydraulic system to supply at least 2000 psi.

S 865-302

(26) Open the shutoff valve in the pressure line of the service cart.

S 215-184

(27) Make sure the POWER XFER UNIT message is shown on EICAS.

S 215-185

(28) Make sure you can hear the operation of the PTU.

S 865-186

(29) Operate the hydraulic service cart to decrease the pressure in the right hydraulic system to zero.

S 865-187

(30) Open this circuit breaker on the P11 panel:

(a) 11D31, HYDRAULICS PTU CONT

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- S 435-188
(31) Connect the electrical connector to the PTU control valve.
- S 865-189
(32) Pressurize the right hydraulic system with the hydraulic service cart to 3000 psi.
- S 215-190
(33) Make sure the POWER XFER UNIT message is shown on EICAS.
- S 865-191
(34) Close this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT
- S 865-192
(35) Push the ECS/MSG switch on the EICAS maintenance panel on the P61 panel. Push the AUTO EVENT READ switch, then push and hold the ERASE switch for approximately 3 seconds for each page of messages.
- S 215-193
(36) Make sure you can not hear the operation of the PTU.
- S 215-194
(37) Make sure the POWER XFER UNIT message is not shown on EICAS.
- S 865-195
(38) Open this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT
- S 865-338
(39) Return the toggle switch on the end of the left engine speed card (M10298) to the normal position or remove the jumper from the ground and test point J1 on the end of the left engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. This removes the signal that the left engine is in operation.

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S 865-197

- (40) Operate the hydraulic service cart to decrease the pressure in the right hydraulic system to zero.

S 865-198

- (41) Close this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT

S 215-199

- (42) Make sure the PTU control valve moves from the OPEN to the CLOSED position. The valve must move to the CLOSED position in less than 5 seconds after you close the circuit breaker.

S 215-200

- (43) Make sure the POWER XFER UNIT message is shown on EICAS.

S 215-201

- (44) Make sure you can not hear the operation of the PTU.

S 865-202

- (45) Pressurize the right hydraulic system to 3000 psi.

S 215-203

- (46) Make sure the POWER XFER UNIT message is shown on EICAS.

S 215-204

- (47) Make sure you can not hear the operation of the PTU.

S 865-205

- (48) Put the manual control switch for the PTU on the right side panel, P61, in the ON position.

S 215-207

- (49) Make sure you can hear the operation of the PTU.

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S 865-208

- (50) Push the ECS/MSG switch on the EICAS maintenance panel on the P61 panel. Push the AUTO EVENT READ switch, then push and hold the ERASE switch for approximately 3 seconds for each page of messages.

S 215-209

- (51) Make sure the POWER XFER UNIT message is not shown on EICAS.

S 865-210

- (52) Operate the hydraulic service cart to decrease the pressure in the right hydraulic system to zero.

S 215-211

- (53) Make sure the PTU control valve moves to the CLOSED position. The valve must move to the CLOSED position in less than 5 seconds after the right system pressure decreases to the 0 to 200 psi range.

S 215-212

- (54) Make sure the POWER XFER UNIT message is shown on EICAS.

S 865-213

- (55) Pressurize the right hydraulic system with the hydraulic service cart to 3000 psi.

S 215-214

- (56) Make sure you can not hear the operation of the PTU.

S 865-215

- (57) Put the manual control switch for the PTU on the right side panel, P61, in the OFF position.

S 215-217

- (58) Make sure you can hear the operation of the PTU.

S 865-218

- (59) Push the ECS/MSG switch on the EICAS maintenance panel on the P61 panel. Push the AUTO EVENT READ switch, then push and hold the ERASE switch for approximately 3 seconds for each page of messages.

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S 215-219

- (60) Make sure the POWER XFER UNIT message is not shown on EICAS.

S 865-220

- (61) Open this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT

S 865-339

- (62) Return the toggle switch on the end of the right engine speed card (M10311) to the normal position or remove the jumper from the ground and test point J1 on the end of the right engine speed card (M10311).

NOTE: Depending on the model of the speed card being used, the new cards have the toggle switch, older cards have a test point. This removes the signal that the right engine is in operation.

S 865-330

- (63) Operate the hydraulic service cart to decrease the pressure in the right system to zero.

S 865-222

- (64) Operate the hydraulic service cart to decrease the pressure in the left system to zero.

S 095-223

- (65) Disconnect the pressure line of the service cart from the pressure hose of the left EDP.

S 435-224

- (66) Connect the pressure hose to the EDP (AMM 29-11-05/401).

S 865-331

- (67) Pressurize the right hydraulic system with the service cart to 3000 psi.

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- S 865-225
- (68) Close this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT
- S 215-226
- (69) Make sure the manual lever/position indicator on the PTU control valve moves to the CLOSED position.
- S 215-227
- (70) Make sure you can not hear the operation of the PTU.
- S 215-228
- (71) Make sure the POWER XFER UNIT message is shown on EICAS.
- S 865-229
- (72) Push the ECS/MSG switch on the EICAS maintenance panel on the P61 panel. Push the AUTO EVENT READ switch, then push and hold the ERASE switch for approximately 3 seconds for each page of the EICAS messages.
- S 215-230
- (73) Make sure the POWER XFER UNIT message is not shown on EICAS.
- S 865-231
- (74) Operate the hydraulic service cart to decrease the pressure in the right hydraulic system to zero.
- S 865-336
- (75) Make sure that the hydraulic ground service connections are removed from the left hydraulic system.
- S 865-337
- (76) Make sure that the left reservoir quantity reads between 0.75 to 1.00 on EICAS.
- G. System Test for the Left Hydraulic System Flow Limiter
- S 865-232
- (1) Make sure the flight controls are in the neutral position.
- S 865-233
- (2) Make sure the flap lever on the control stand is in the ZERO detent position and the flaps are in the fully retracted position.
- S 865-234
- (3) Make sure the arming switches for the flap and slat alternate drive on the pilots' main instrument panel, P3, are in the off position.

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- S 865-235
- (4) Make sure the position selector switch for the flap and slat alternate drive on the pilot's main instrument panel, P3, is in the NORM position.
- S 865-236
- (5) Make sure the landing gear selector handle on the pilot's main instrument panel, P3, is in the OFF position.
- S 865-237
- (6) Make sure the control switches for the left and right yaw dampers on the overhead panel, P5, are in the INOP position.
- S 865-238
- (7) Make sure these switches on the right side panel, P61, are in the ON position:
- (a) Flight control shutoff valves for the left system
 - (b) Flight control shutoff valves for the right system
- S 215-303
- (8) Make sure the switch indicator lights are not on.
- S 865-239
- (9) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
- (a) 11G12, FSEU-1 PWR, FLAP SLAT ELEC UNIT 1 PWR OR FLAP SLAT ELEC UNIT 1 POWER
 - (b) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
- S 865-250
- (10) Move the bypass valve for the leading edge (LE) slat drive to POSITION 1 with the manual valve handle.

NOTE: The bypass valve is in the left forward wing/body fairing.

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S 865-251

- (11) Pressurize the right hydraulic system with the hydraulic service cart to 3000 psi with a flow of 30 gpm.

S 865-252

- (12) Put the manual control switch for the PTU on the P61 panel in the ON position.

S 865-254

- (13) Move the flap handle on the control stand to the 30 degree position.

S 215-255

- (14) Make sure the flaps move to the fully extended position in less than 35 seconds.

S 865-256

WARNING: KEEP PERSONS AND EQUIPMENT CLEAR OF THE LE SLATS. MOVEMENT OF THE LE SLATS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT. LE SLATS WILL MOVE WHEN YOU PUT THE BYPASS VALVE IN POSITION 2.

- (15) Put the bypass valve for the leading edge (LE) slat drive in POSITION 2 (normal mode) with the manual valve handle.

NOTE: The bypass valve is in the left forward wing/body fairing.

S 215-257

- (16) Make sure the LE slats move to the fully extended position. The LE slats must move to this position in no more than 12 to 14 seconds from the time they start to move.

S 865-258

- (17) Put the flap handle in the ZERO detent position to retract the flaps.

S 865-259

- (18) Put the bypass valve for the leading edge slat drive to POSITION 1 (bypass mode) with the manual valve handle.

S 865-260

- (19) Open this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULICS PTU CONT

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S 865-263

- (20) Set the hydraulic service cart to supply 1500 ± 100 psi at full flow to the right hydraulic system.

S 215-264

- (21) Make sure the pressure indication for the right hydraulic system on EICAS is at least 1400 psi.

S 865-265

- (22) Put the flap handle on the control stand in the 30 degree position.

S 215-266

- (23) Make sure the flaps move to the fully extended position in not less than 70 and no more than 120 seconds.

S 865-267

- (24) Put the flap handle in the ZERO detent position to retract the flaps.

S 865-268

- (25) Put the manual control switch for the PTU on the P61 panel in the OFF position.

S 615-280

- (26) Fill the reservoir in the left hydraulic system (AMM 12-12-01/301).

S 865-281

- (27) Put the depressurization valve on the left system reservoir in the closed position (AMM 29-11-00/201).

H. Put the Airplane Back to Its Usual Condition

S 415-282

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).

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- S 865-283
- (2) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).
- S 865-284
- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11D31, HYDRAULICS PTU CONT.
 - (b) 11G12, FSEU-1 PWR, FLAP SLAT ELEC UNIT 1 PWR OR FLAP SLAT ELEC UNIT 1 POWER
 - (c) 11G12, FLAP SLAT ELEC UNIT 1 POWER
 - (d) 11H23, FLAP/SLAT ALTN DR SHUTOFF ARM
- S 615-285
- (4) Fill the reservoirs in the left and right hydraulic systems (AMM 12-12-01/301).
- S 865-286
- (5) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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HYDRAULIC POWER TRANSFER UNIT (PTU) – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the power transfer unit (PTU) for the hydraulic system. The other task installs the PTU.

TASK 29-22-01-004-001

2. Remove the Power Transfer Unit (PTU) (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zone
143 Left MLG Wheel Well

C. Procedure

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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 pressure from the left and the right hydraulic systems and the reservoirs (AMM 29-11-00/201).

S 864-037

- (4) Open the drain valve on the left hydraulic reservoir.

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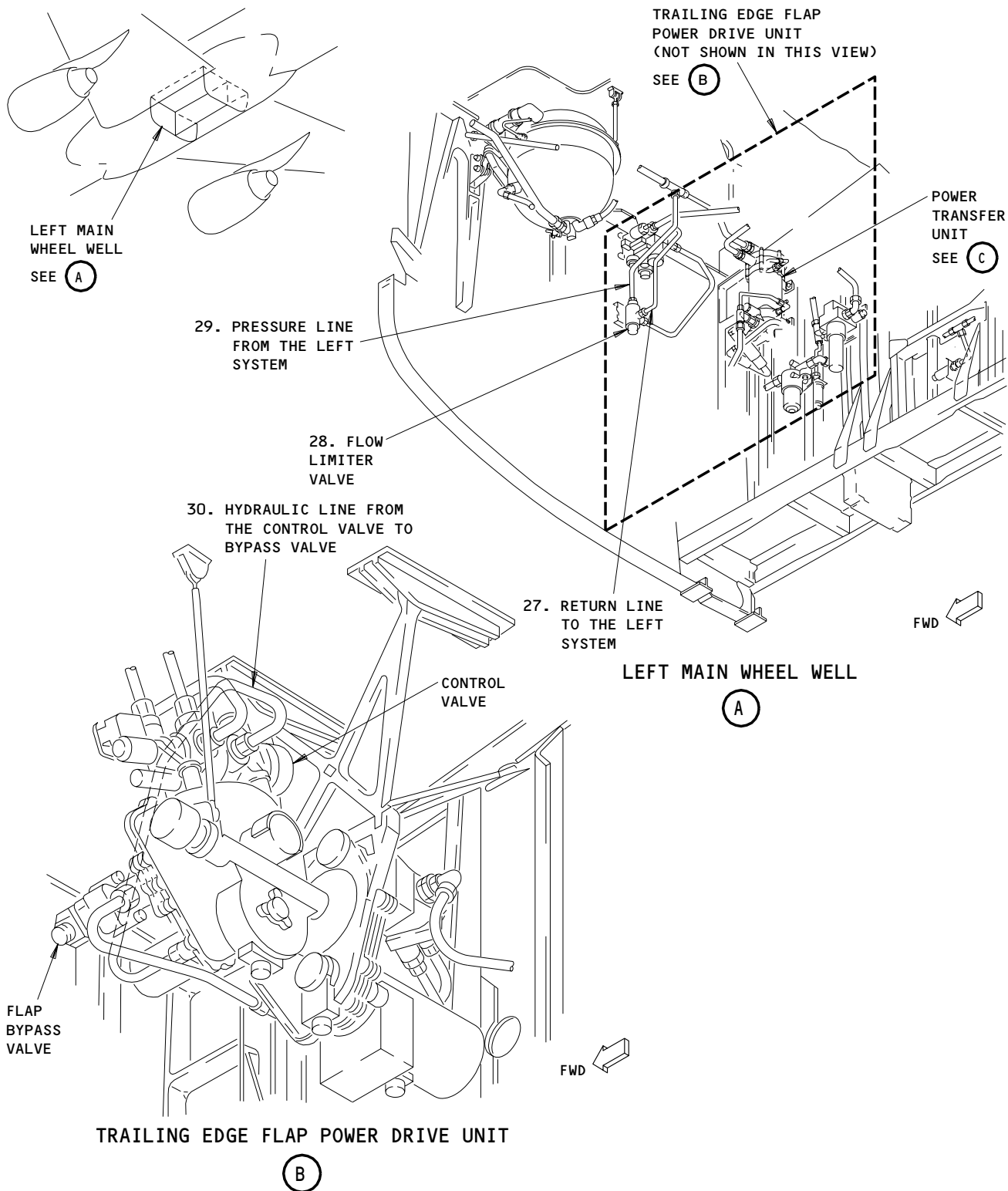
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Power Transfer Unit (PTU) Installation
Figure 401 (Sheet 1)

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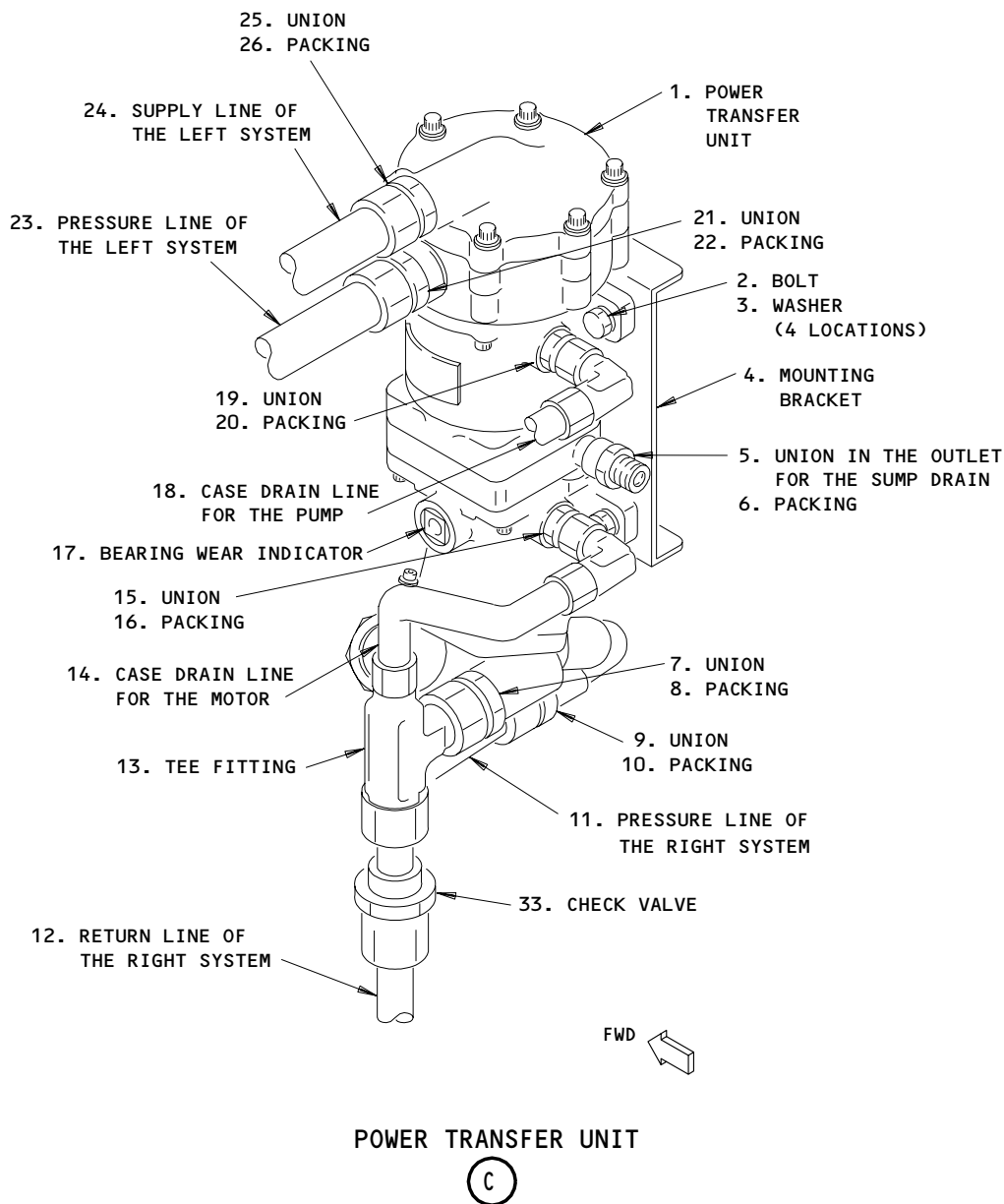
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Power Transfer Unit (PTU) Installation
Figure 401 (Sheet 2)

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- S 874-038
- (5) Drain the fluid from the left reservoir into a container.
- S 864-039
- (6) Close the drain valve when all the fluid is drained from the reservoir.
- S 014-007
- (7) Remove these hydraulic lines to make the clearance for the removal of the PTU:
- (a) Remove the hydraulic lines (27 and 29) from the flow limiter valve, on the forward bulkhead of the left wheel well.
- NOTE:** If it is necessary to permit the removal of the hydraulic lines (28 and 29), loosen the bolts which hold the flow limiter valve.
- (b) Remove the hydraulic line (30) between the control valve and the flap bypass valve.
- NOTE:** These valves are on the power drive unit for the trailing edge flaps.
- S 034-006
- (8) Disconnect the hydraulic lines (11, 12, 14, 18, 23, and 24) from the PTU.
- S 034-008
- (9) Install caps on the hydraulic lines (11, 12, 14, 18, 23, and 24).
- S 024-010
- (10) Hold the PTU (1) while you remove the bolts (2) and the washers (3).
- S 024-011
- (11) Remove the PTU (1) through the space supplied by the removal of the hydraulic lines (27, 29, and 30).
- NOTE:** This is the space between the forward bulkhead of the wheel well and the power drive unit for the trailing edge flaps.

TASK 29-22-01-404-012

3. Install the Power Transfer Unit (PTU) (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

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B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Power Transfer Unit	29-22-01	01	70
	6	Packing			65
	8	Packing			30
	10	Packing			45
	16	Packing			55
	20	Packing			55
	22	Packing			45
	26	Packing			30

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 24-22-00/201, Electrical Power
- (4) AMM 27-51-00/201, Trailing Edge Flap System
- (5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (6) AMM 32-00-15/201, Main Gear Door Locks

D. Access

- (1) Location Zone
143 Left MLG Wheel Well

E. Procedure

S 644-013

- (1) Apply hydraulic lubricant or hydraulic fluid to the threads of the unions (5, 7, 9, 15, 19, 21, and 25), and the packings (0-rings) (6, 8, 10, 16, 20, 22, and 26).

S 434-014

- (2) Install the unions (5, 7, 9, 15, 19, 21, and 25), and the packings (0-rings) (6, 8, 10, 16, 20, 22, and 26).

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S 424-015

- (3) Move the PTU (1) to its position through the space supplied by the removal of hydraulic lines (27, 29, and 30).

NOTE: This is the space between the forward bulkhead of the wheel well and the power drive unit for the trailing edge flaps.

S 424-016

- (4) Hold the PTU (1) on the mounting bracket (4).

S 424-017

- (5) Install the bolts (2) and the washers (3).

S 434-019

- (6) Connect the hydraulic lines (11, 12, 14, 18, 23, and 24) to the PTU.

S 414-020

- (7) Install these hydraulic lines which you removed to supply clearance:
(a) Install the hydraulic line (30) between the control valve and the flap bypass valve.

NOTE: These valves are on the power drive unit for the trailing edge flaps.

(b) Install the hydraulic lines (27 and 29) on the flow limiter valve, on the forward bulkhead of the left wheel well.

(c) If it is necessary, tighten the bolts which hold the flow limiter valve.

S 864-040

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

NOTE: EICAS must be operable to do the test of the PTU.

S 864-021

- (9) Make sure these circuit breakers on the overhead panel, P11, are closed:

(a) 11D31, HYDRAULIC PTU CONT

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S 864-041

(10) Make sure the drain valve for the left reservoir is closed.

S 434-042

(11) Install lockwire on the drain valve for the left reservoir.

S 614-043

(12) Fill the left hydraulic reservoir (AMM 12-12-01/301).

S 864-044

(13) Make sure the hydraulic quantity display on EICAS maintenance shows between 0.75 and 1.00 for the left and right hydraulic reservoirs.

S 864-045

(14) Pressurize the left and right hydraulic reservoirs to 25-50 psig (AMM 29-11-00/201).

S 864-046

CAUTION: DO NOT OPERATE THE ACMP FOR MORE THAN 2 MINUTES UNLESS BOTH NO. 1 AND NO. 2 FUEL TANKS EACH CONTAIN AT LEAST 600 GALLONS OF FUEL. IF YOU OPERATE THE PUMP 2 MINUTES WITHOUT SUFFICIENT FUEL, TURN OFF THE PUMP AND LET THE RESERVOIR TEMPERATURE DECREASE TO AMBIENT TEMPERATURE. THE ACMP WILL BE DAMAGED IF YOU OPERATE IT WHEN IT IS HOT.

(15) Set the L ELEC PUMP switch, on the overhead panel, P5, to ON.

S 864-047

(16) Set the R ELEC PUMP switch on the overhead panel, P5, to ON.

S 864-048

(17) Make sure the left and right hydraulic system pressures on EICAS maintenance are between 2850 and 3150 psi when there is no flow.

S 864-049

(18) Make sure the EICAS message POWER XFER UNIT does not show on the status or maintenance display.

S 724-050

WARNING: WEAR EAR PROTECTION WHEN THE PTU OPERATES. HIGH FREQUENCY NOISE CAN CAUSE DAMAGE TO THE EARS.

(19) Set the PTU manual control switch on the right side panel, P61, to the ON position.

S 724-051

(20) Make sure the PTU operates.

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- S 724-070
(21) Make sure there is no hydraulic leakage at the PTU fittings.
- S 724-052
(22) If the PTU stops, open then close this circuit breaker on the overhead panel, P11:
(a) 11D31, HYDRAULIC PTU CONT
- S 724-053
(23) Make sure the PTU operates for at least 1 minute.
- S 864-054
(24) Set the L ELEC PUMP switch on the overhead panel, P5, to OFF.
- S 724-055
(25) Set the PTU manual control switch on the right side panel, P61, to the OFF position.
- S 724-056
(26) When the left hydraulic system pressure on the EICAS maintenance display is less than 1000 psi, set the PTU manual control switch to the ON position.
- S 724-058
(27) Make sure the Left Hydraulic System pressure on the EICAS maintenance display shows at least 2600 psig.
- S 864-072
(28) Place the Leading Edge slats in bypass mode (AMM 27-81-00/201).
- S 874-059
(29) Extend and then retract the flaps (AMM 27-51-00/201).
- S 794-069
(30) Make sure there is no leakage at the connections for the hydraulic lines (27, 29, and 30).
- S 864-061
(31) Set the PTU manual control switch on the right side panel, P61, to the OFF position.
- S 724-062
(32) Make sure the PTU does not operate.

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S 864-063

- (33) Set the R ELEC PUMP switch, on the overhead panel, P5, to the OFF position.

S 724-064

- (34) Make sure the EICAS message POWER XFER UNIT does not show on the status or maintenance display.

S 864-065

- (35) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 164-066

CAUTION: QUICKLY CLEAN ALL OF THE HYDRAULIC FLUID FROM THE INSTALLATION AREA. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (36) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 614-067

- (37) Fill the reservoirs in the left and right hydraulic systems (AMM 12-12-01/301).

S 094-036

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.

- (38) Remove door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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POWER TRANSFER UNIT (PTU) PRESSURE FILTER MODULE AND COMPONENTS –
REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the filter module and the components for the pressure of the power transfer unit (PTU). The other task installs the filter module and the components.

TASK 29-22-02-004-001

2. Remove the Filter Module and the Components (Fig. 401)

A. General

- (1) This task contains procedures which remove the components which follow:
- (a) Filter module for the pressure of the power transfer unit
 - (b) Filter element
 - (c) Pressure switches
 - (d) Check valve
 - (e) Differential pressure indicator.
- (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

- (1) Location Zone
143 MLG Wheel Well

D. Prepare for Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11D31, HYDRAULIC PTU CONT

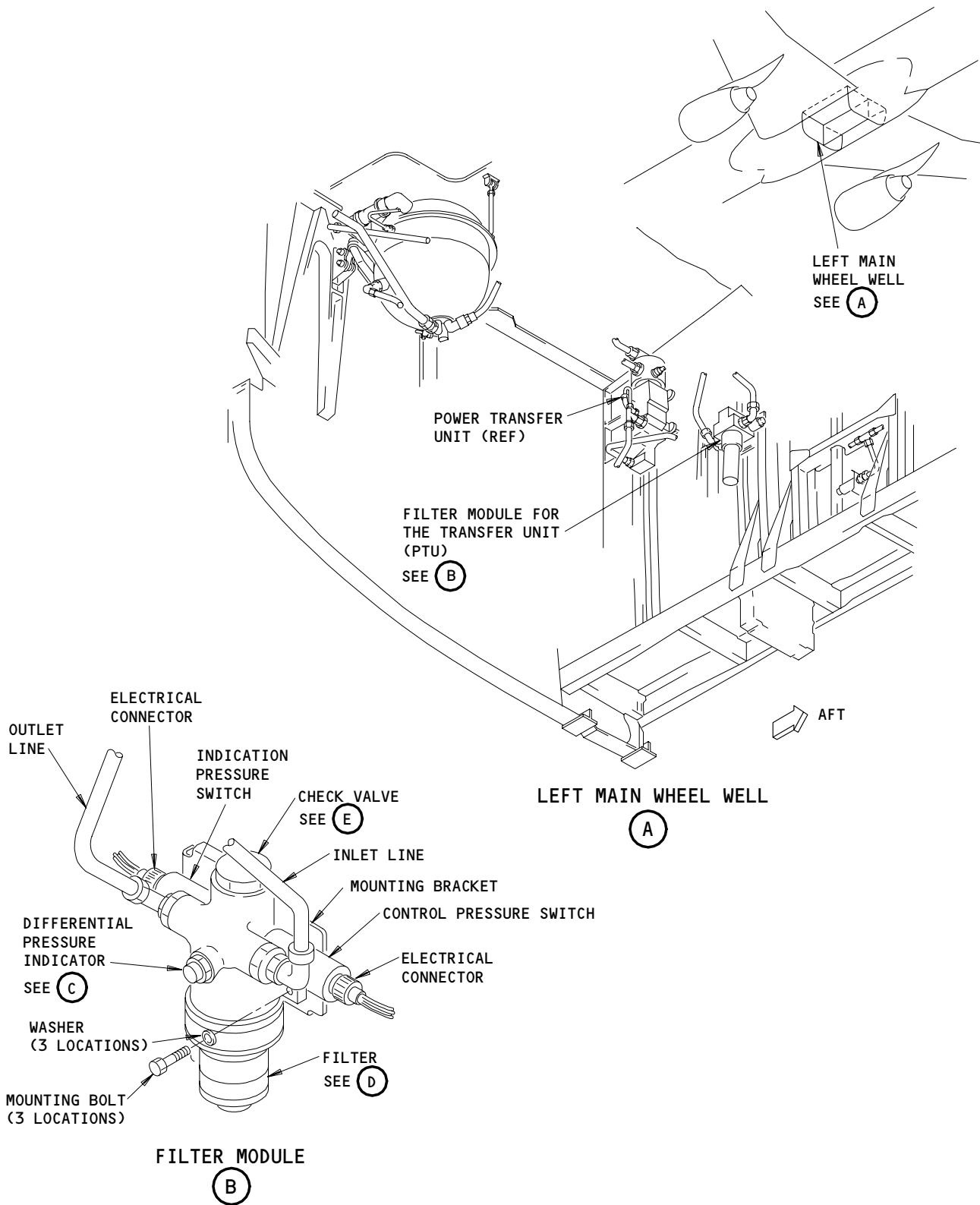
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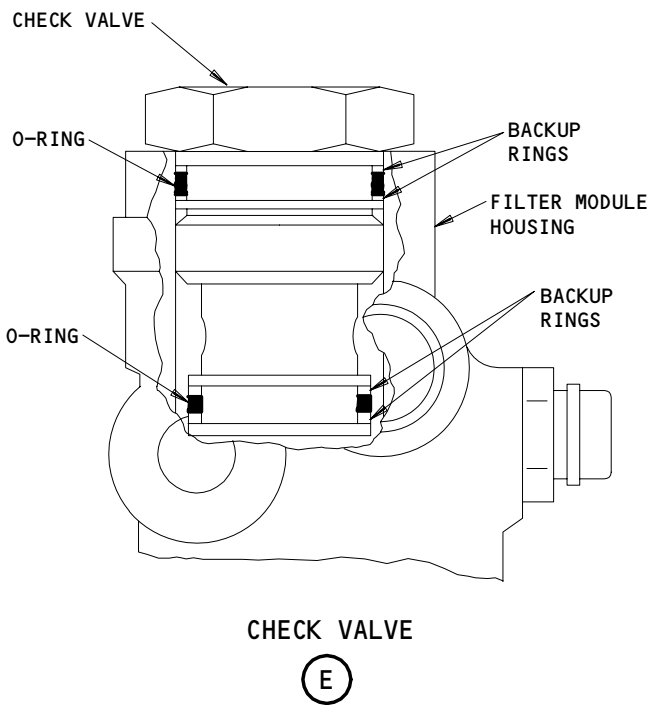
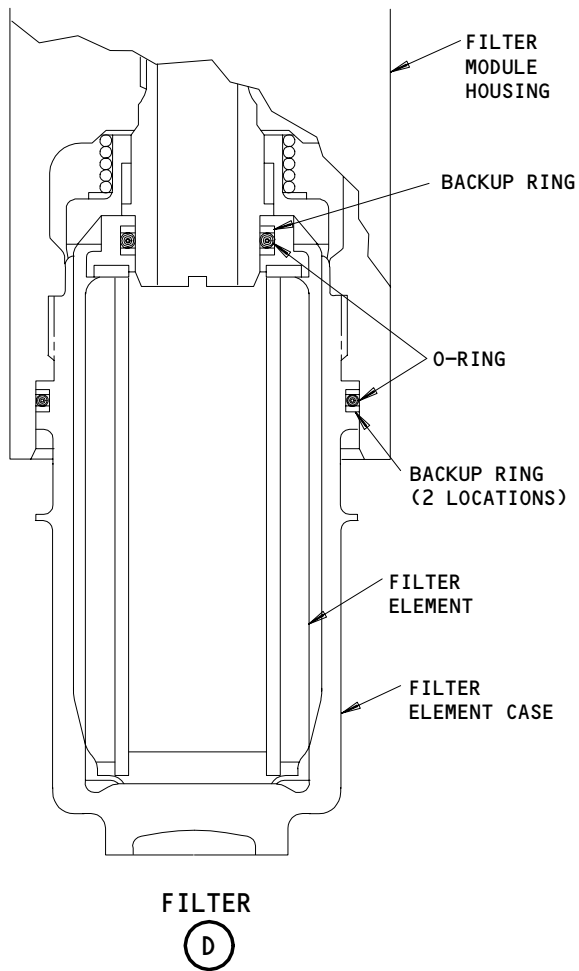
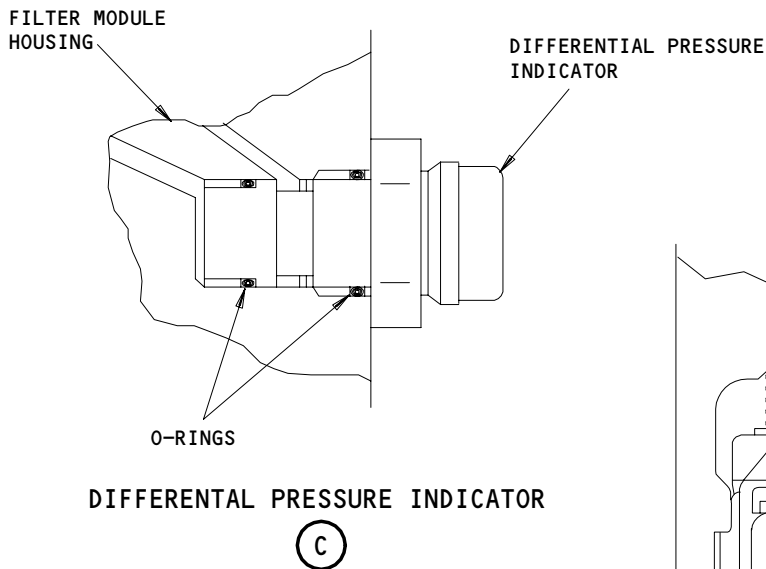
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Filter Module Installation
Figure 401 (Sheet 1)

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Filter Module Installation
Figure 401 (Sheet 2)

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S 864-005

- (4) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).

E. Remove the Filter Module

S 034-006

- (1) Disconnect the electrical connectors from the pressure switches on the filter module.

S 034-007

- (2) Disconnect the hydraulic lines from the filter module.

S 024-008

- (3) Remove the bolts and the washers which hold the filter module.

S 034-009

- (4) Remove the unions from the filter module.

S 034-010

- (5) Remove the O-rings from the unions.

F. Remove the Filter Element

S 034-062

CAUTION: DO NOT PRESSURIZE THE HYDRAULIC SYSTEM AFTER YOU REMOVE THE FILTER ELEMENT CASE. THIS CAN CAUSE DAMAGE TO THE FILTER MODULE OR THE CHECK VALVE.

- (1) Remove the filter element case from the filter module.

S 024-012

- (2) Remove the filter element from the filter module.

S 034-013

- (3) Remove the O-rings and the backup rings from the filter element case.

G. Remove the Pressure Switches

S 034-014

- (1) Disconnect the electrical connector from the pressure switch.

S 024-015

- (2) Remove the pressure switch from the filter module.

S 034-016

- (3) Install a cap on the opening in the filter module.

S 034-017

- (4) Remove the O-ring from the pressure switch.

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H. Remove the Check Valve or the Differential Pressure Indicator

S 024-018

- (1) Remove the check valve or the differential pressure indicator from the filter module.

S 034-019

- (2) Install a cap on the opening in the filter module.

TASK 29-22-02-404-020

3. Install the Filter Module and the Components (Fig. 401)

A. General

- (1) This task contains procedures which remove the components which follow:
 - (a) Filter module for the pressure of the power transfer unit
 - (b) Filter element
 - (c) Pressure switches
 - (d) Check valve
 - (e) Differential pressure indicator.
- (2) To start one of these procedures, do the applicable 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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 24-22-00/201, Electrical Power
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (5) AMM 32-00-15/201, Main Gear Door Locks

D. Access

- (1) Location Zones
143 MLG Wheel Well

E. Install the Filter Module

S 644-021

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.

S 434-022

- (2) Install the new O-rings on the unions.

S 434-023

- (3) Install the unions on the filter module.

S 144-024

- (4) Clean the surface of the filter module that touches the mounting bracket.

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S 424-025
(5) Hold the filter on the mounting bracket.

S 424-026
(6) Install the bolts and the washers to hold the filter module on the mounting bracket.

S 434-027
(7) Connect the hydraulic lines to the filter module.

S 434-028
(8) Install the electrical connectors on the pressure switches, on the filter module.

F. Install the Filter Element

S 644-029
(1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings, the backup rings, and the threads of the filter element case.

S 434-030
(2) Install the new O-rings and the backup rings on the filter element case.

S 434-031
(3) If it is necessary, install the O-rings and the backup rings in the filter element.

S 424-032
(4) Install the filter element and the filter element case on the filter module.

S 434-033
(5) Tighten the filter element case to 20-25 pound-feet.

S 434-034
(6) Safety the filter element case with a lockwire.

G. Install the Pressure Switches

S 644-035
(1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the pressure switch.

S 434-036
(2) Install the new O-ring on the pressure switch.

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- S 434-037
- (3) Remove the cap from the opening on the filter module.
- S 424-038
- (4) Install the pressure switch on the filter module.
- S 434-039
- (5) Tighten the pressure switch to 12-14 pound-feet.
- S 434-040
- (6) Safety the pressure switch with a lockwire.
- S 434-041
- (7) Connect the electrical connector to the pressure switch.
- H. Install the Check Valve or the Differential Pressure Indicator
- S 644-042
- (1) Apply hydraulic system lubricant or hydraulic fluid to the O-rings, the backup rings, and the threads on the component.
- S 434-043
- (2) Install the new O-rings on the differential pressure indicator.
- S 434-044
- (3) Install the new O-rings and the backup rings on the check valve.
- S 434-045
- (4) Remove the cap from the opening on the filter module.
- S 424-046
- (5) Install the check valve or the differential pressure indicator on the filter module.
- S 434-047
- (6) Tighten the check valve to 45-50 pound-feet.
- S 434-048
- (7) Tighten the differential pressure indicator to 15-20 pound-feet.

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I. Put the Airplane Back to Its Usual Condition

S 864-049

- (1) Push the indicator button, on the differential pressure indicator, until it aligns with the adjacent surface.

S 864-050

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC PTU CONT

S 864-051

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

S 864-052

- (4) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 864-053

- (5) Put the manual control switch for the PTU on the right side panel, P61, to the ON position.

S 794-055

- (6) Make sure there are no leaks at the filter module.

S 864-056

- (7) Put the manual control switch to the OFF position.

S 114-057

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (8) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 614-058

- (9) Fill the reservoir in the left hydraulic system (AMM 12-12-01/301).

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S 094-059

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.

(10) Remove door locks from the landing gear doors and close the doors
(AMM 32-00-15/201).

S 864-060

(11) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-061

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

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29-22-02

02

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POWER TRANSFER UNIT (PTU) CONTROL VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the control valve for the power transfer unit (PTU). The other task installs the control valve.

TASK 29-22-03-004-001

2. Remove the Control Valve (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Main Gear Door Locks
- (3) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

- (1) Location Zone
144 Right MLG Wheel Well

C. Procedure

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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 pressure from the right hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-005

- (4) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
 - (a) 11D31, HYDRAULIC PTU CONT

S 034-006

- (5) Disconnect the electrical connector from the motor on the control valve.

S 034-007

- (6) Disconnect the hydraulic lines from the control valve.

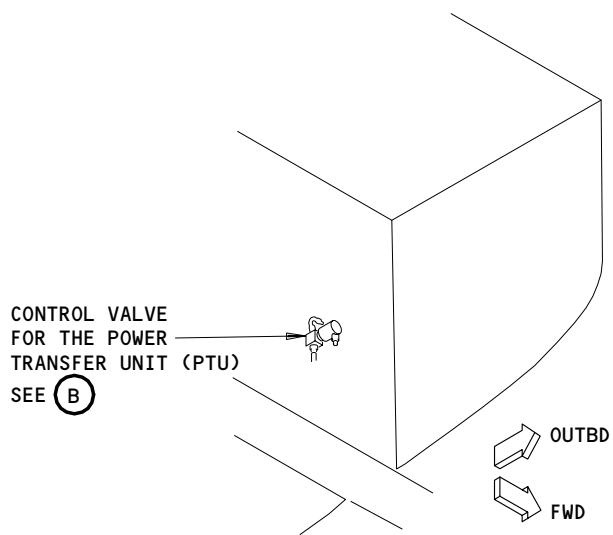
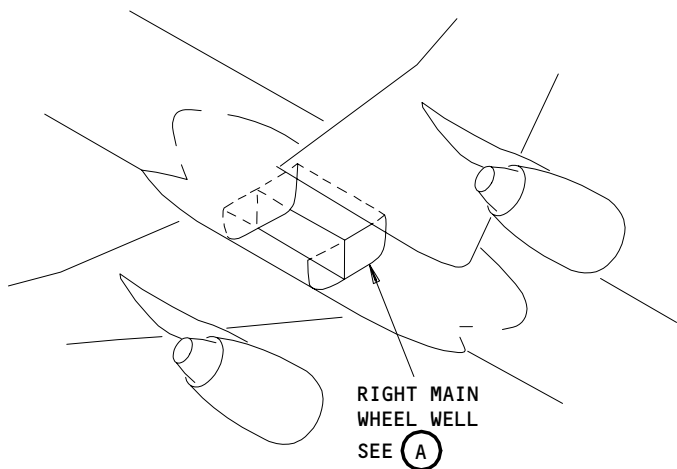
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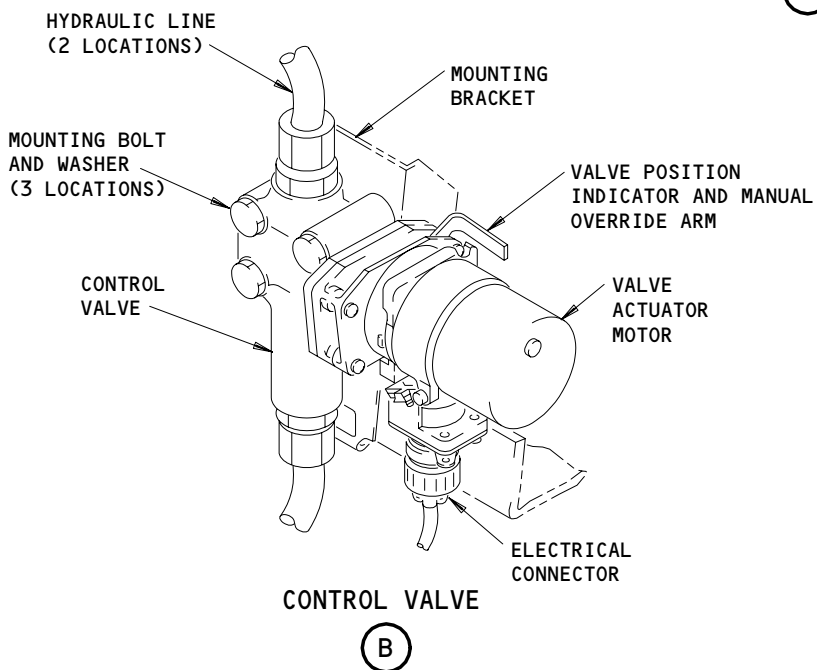
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RIGHT MAIN WHEEL WELL
(A)



Control Valve Installation
Figure 401

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- S 034-008
(7) Install caps on the hydraulic lines.

- S 024-009
(8) Remove the bolts which hold the control valve.

TASK 29-22-03-404-010

3. Install the Control Valve (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 12-12-01/301, Hydraulic Systems
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 24-22-00/201, Electrical Power
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Main Gear Door Locks

C. Access

- (1) Location Zone
144 Right MLG Wheel Well

D. Procedure

- S 214-032
(1) ON AIRPLANES POST SB29A0049;
(a) ensure that a replacement valve with one of the following part numbers is used:
1) S270T010-14, or S271N501-2 or -3
- S 424-011
(2) Hold the control valve on the mounting bracket.
- S 424-012
(3) Install the bolts and washers which hold the control valve.
- S 434-013
(4) Connect the hydraulic lines to the control valve.
- S 434-014
(5) Connect the electrical connector to the motor on the control valve.
- S 864-015
(6) Supply electrical power (AMM 24-22-00/201).

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S 864-016

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC PTU CONT

S 864-017

- (8) Pressurize the right hydraulic system (AMM 29-11-00/201).

S 864-018

- (9) Put the manual control switch for the PTU on the right side panel, P61, to the ON position.

S 214-020

- (10) Make sure the PTU operates.

S 794-021

- (11) Make sure there are no leaks at the control valve.

S 864-022

- (12) Put the manual control switch for the PTU to the OFF position.

S 214-023

- (13) Make sure the valve position indicator moves to the CLOSE position.

S 114-024

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (14) Clean all hydraulic fluid from the installation area
(AMM 12-25-01/301).

S 614-025

- (15) Fill the reservoir in the right hydraulic system (AMM 12-12-01/301).

S 094-026

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.

- (16) Remove door locks from the landing gear doors and close the doors
(AMM 32-00-15/201).

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S 864-027

(17) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-028

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

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POWER TRANSFER UNIT (PTU) CASE DRAIN FILTER MODULE AND COMPONENTS –
REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. One task removes the filter module for the case drain of the power transfer unit (PTU). The other task installs the filter module.

TASK 29-22-05-004-001

2. Remove the Filter Module and Components (Fig. 401)

A. General

- (1) This task contains procedures which remove the components which follow:
- (a) Filter module
 - (b) Filter element
 - (c) Check valve
 - (d) Differential Pressure Indicator
- (2) To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

B. 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 Downlocks

C. Access

- (1) Location Zone
143 Left MLG Wheel Well

D. Prepare for the Removal

S 494-002

- (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-003

WARNING: DO 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) Open these circuit breakers on the overhead panel, P11, and install DO-NOT-CLOSE tags:
- (a) 11D31, HYDRAULIC PTU CONT

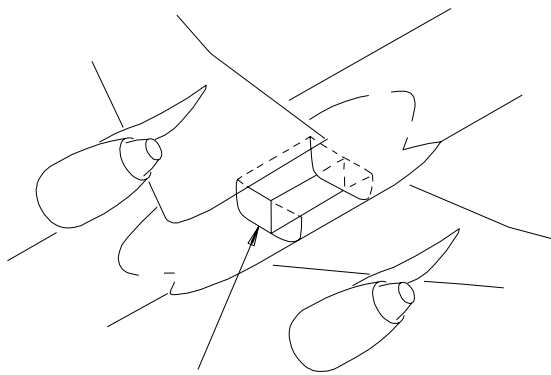
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ALL

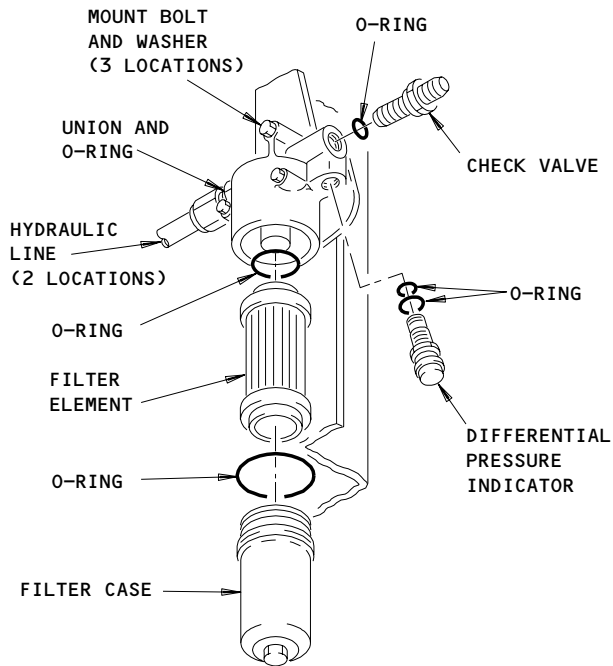
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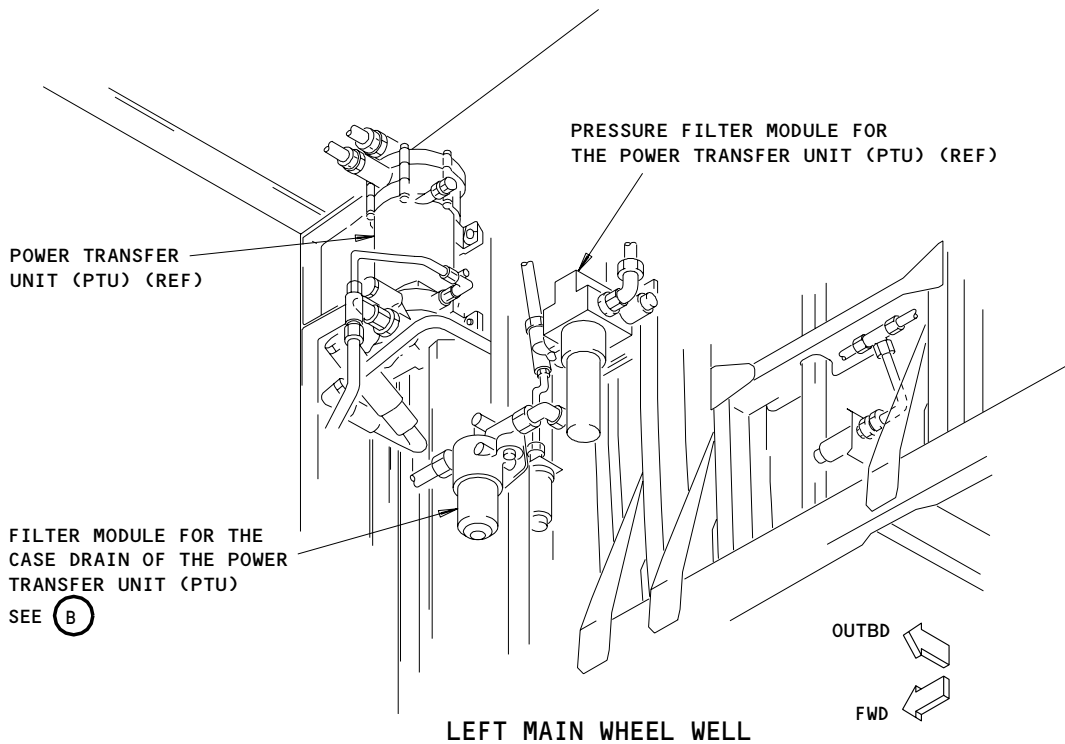


LEFT MAIN
WHEEL WELL
SEE (A)



FILTER MODULE

(B)



(A)

Filter Module Installation
Figure 401

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- S 864-005
- (4) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).
- E. Remove the Filter Module
 - S 034-006
 - (1) Disconnect the hydraulic lines from the filter module.
 - S 034-007
 - (2) Install caps on the hydraulic lines.
 - S 024-008
 - (3) Remove the bolts which hold the filter module.
 - S 024-009
 - (4) Remove the filter module.
 - S 034-010
 - (5) Remove the union and the O-ring from the inlet port of the filter module.
- F. Remove the Filter Element
 - S 024-011
 - (1) Remove the filter case from the filter module.
 - S 024-012
 - (2) Remove the filter element from the filter module.
 - S 164-013
 - (3) Clean the filter case.
- G. Remove the Check Valve or the Differential Pressure Indicator
 - S 024-014
 - (1) Remove the check valve or the differential pressure indicator from the filter module.
 - S 034-015
 - (2) Install a cap on the opening on the filter module.

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S 034-016

- (3) Remove the O-rings from the check valve or the differential pressure indicator.

TASK 29-22-05-404-017

3. Install the Filter Module and Components (Fig. 401)

A. General

- (1) This task contains procedures which install the components which follow:
 - (a) Filter module
 - (b) Filter element
 - (c) Check valve
 - (d) Differential Pressure Indicator
- (2) To start one of these procedures, do the applicable 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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

- (1) AMM 12-12-01/301, Hydraulic Systems
- (2) AMM 12-25-01/301, Exterior Cleaning
- (3) AMM 24-22-00/201, Electrical Power
- (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (5) AMM 32-00-15/201, Landing Gear Door Locks

D. Access

- (1) Location Zone
143 Left MLG Wheel Well

E. Install the Filter Module

S 644-018

- (1) Apply hydraulic lubricant or hydraulic fluid to the new O-ring and the threads of the union.

S 434-019

- (2) Install the new O-ring on the union.

S 434-020

- (3) Install the union in the inlet port of the filter module.

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- S 144-021
- (4) Clean the surfaces of the filter module which touch the structure which holds the filter module.
- S 424-022
- (5) Hold the filter module on the structure.
- S 424-023
- (6) Install the bolts and the washers which hold the filter module.
- S 434-024
- (7) Remove the caps from the hydraulic lines.
- S 434-025
- (8) Connect the hydraulic lines to the filter module.
- F. Install the Filter Element
 - S 644-026
 - (1) Apply hydraulic lubricant or hydraulic fluid to the new 0-rings and the threads of the filter case.
 - S 434-027
 - (2) Install the new 0-rings on the filter element and the filter case.
 - S 424-028
 - (3) Install the filter element on the filter module.
 - S 424-029
 - (4) Install the filter case on the filter module.
 - S 434-030
 - (5) Tighten the filter case to 270-300 pound-inches.
- G. Install the Check Valve or the Differential Pressure Indicator
 - S 644-031
 - (1) Apply hydraulic lubricant or hydraulic fluid on the 0-rings and the threads of the check valve or the differential pressure indicator.

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- S 434-032
- (2) Install the new O-ring(s) on the check valve or the differential pressure indicator.
- S 424-033
- (3) Install the check valve or the differential pressure indicator on the filter module.
- S 434-034
- (4) Tighten the check valve or the differential pressure indicator to 50-75 pound-inches.
- S 434-035
- (5) Safety the check valve or the differential pressure indicator with a lockwire.
- H. Put the Airplane Back to Its Usual Condition
- S 864-036
- (1) Push the indicator button on the differential pressure indicator until it aligns with the adjacent surface.
- S 864-037
- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11D31, HYDRAULIC PTU CONT
- S 864-038
- (3) Supply electrical power (AMM 24-22-00/201).
- S 864-039
- (4) Pressurize the right hydraulic system (AMM 29-11-00/201).
- S 864-040
- (5) Put the manual control switch for the PTU on the pilot's right side panel, P61, to the ON position.

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S 794-042

- (6) Make sure there are no leaks at the filter module.

S 864-043

- (7) Put the manual control switch for the PTU to the OFF position.

S 114-044

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID.
HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (8) Clean all hydraulic fluid from the installation area
(AMM 12-25-01/301).

S 614-045

- (9) Fill the reservoir in the left hydraulic system (AMM 12-12-01/301).

S 094-046

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.

- (10) Remove door locks from the landing gear doors and close the doors
(AMM 32-00-15/201).

S 864-047

- (11) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-048

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

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HYDRAULIC PRESSURE INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General

A. A hydraulic pressure indicating system is provided for each main hydraulic system. This system provides indication of fluid pressure and low pressure warning for each hydraulic system. Low pressure warning lights are on the hydraulic control panel in the flight compartment. A pressure indicating light for the RAT is on the engine start/RAT control panel in the flight compartment. The EICAS display contains a digital readout of hydraulic system pressure. This display also provides low pressure warning messages. The pressure indicating system inputs to the EICAS computer are powered by 28 volts dc from circuit breakers on overhead panel P11. The low pressure warning lights are powered by 28 volts dc from master dim and test circuit breakers on panel P11.

2. Component Details

A. EICAS Display

(1) The EICAS display shows a digital readout of pressure in each system when the status mode or the ELEC/HYD maintenance mode is selected. Messages which describe problems relating to low pressure warning lights automatically appear on the EICAS display. The messages for the pressure indicating system consist of the following:

L HYD SYS PRESS
R HYD SYS PRESS
C HYD SYS PRESS
L HYD ENG PUMP
R HYD ENG PUMP
C HYD ELEC 1
C HYD ELEC 2
L HYD ELEC PUMP
R HYD ELEC PUMP
L HYD SYS MAINT
R HYD SYS MAINT
C HYD SYS MAINT

For information on the EICAS, refer to 31-41-00.

B. Low Pressure Lights (Fig. 1)

(1) Three system low pressure lights are on the hydraulic control panel. The system light turns on when activated by the low pressure switch. In the left and right systems, the switch is on the EDP pressure/case drain filter module. In the center system, the switch is on the ACMP pressure/case drain filter module.

(2) A low pressure light is provided on the hydraulic control panel for each pump. The lights are in the pump select switches. A pump low pressure light illuminates if the output of a pump in operation becomes low. The low pressure switches are on the pump pressure/case drain filter modules.

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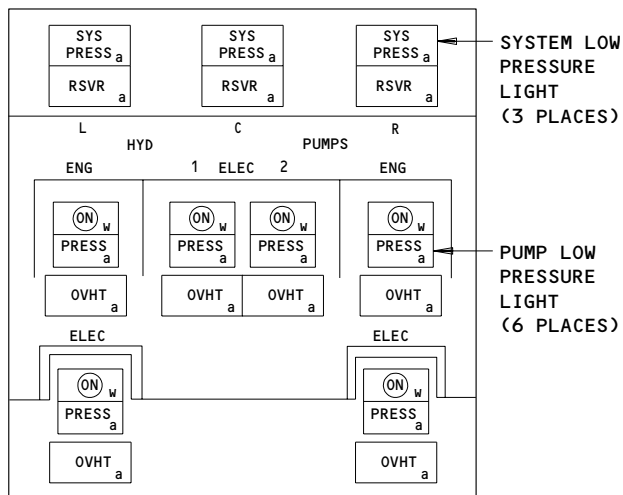
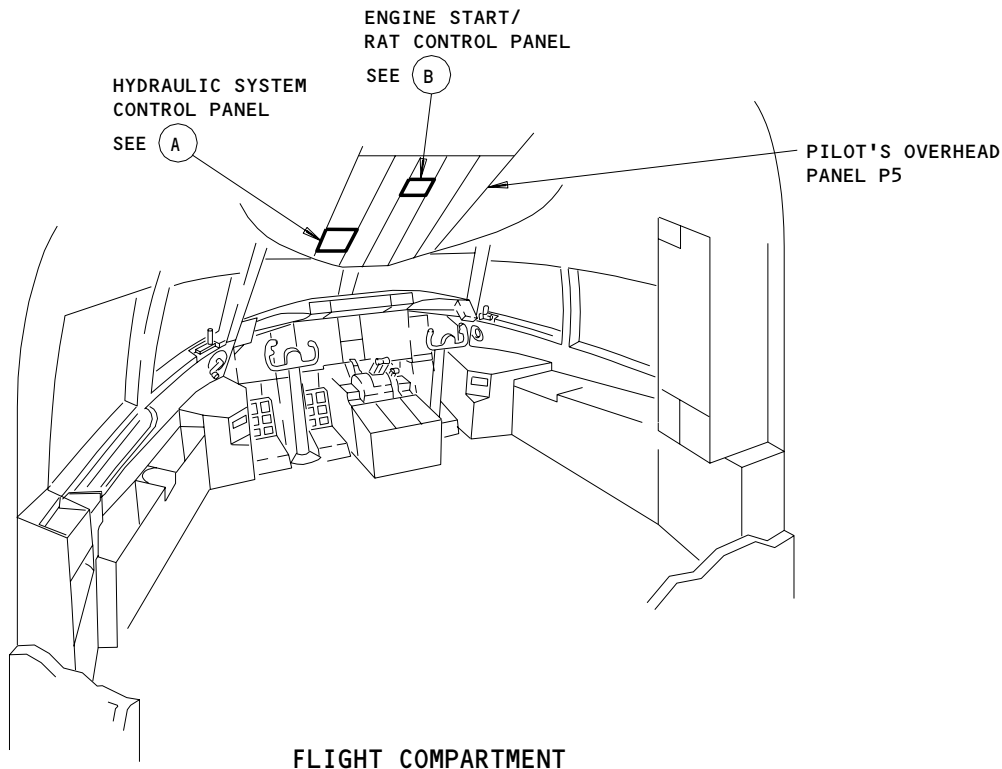
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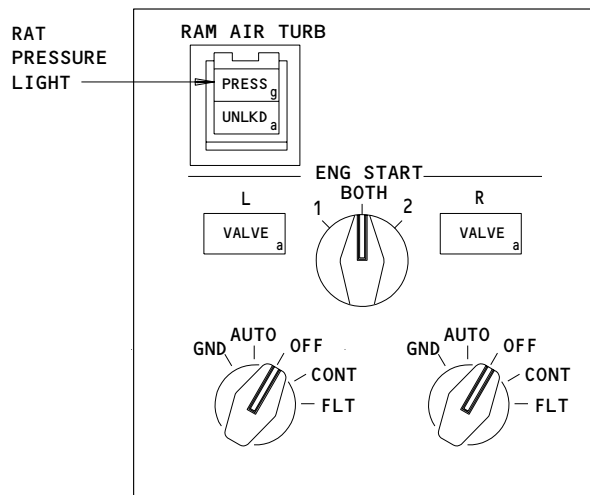
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HYDRAULIC SYSTEM CONTROL PANEL

(A)



ENGINE START/RAT CONTROL PANEL

(B)

Low Pressure Lights
Figure 1

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C. RAT Pressure Light (Fig. 1)

- (1) A pressure indicating light for the RAT hydraulic pump is in the manual deployment switch on the engine start/RAT control panel. This light turns on when the RAT pump is supplying pressure. The pump pressure switch is on the RAT checkout module.

D. Pressure Transmitters (Fig. 2)

- (1) A pressure line mounted transmitter in each system converts pressure to an electrical signal. The transmitters provide a voltage proportional to system pressure. The EICAS computer changes voltage signals from the transmitters into pressure readings on the EICAS display. The transmitters for the left and center systems are in the left wheel well. The right system transmitter is in the right wheel well.

3. Operation

A. Functional Description (Fig. 3, 4, and 5)

(1) Pressure Indicating

- (a) A digital readout of pressure in each system is displayed in the status mode and the maintenance mode of EICAS. A pressure transmitter sends a voltage signal proportional to system pressure to the EICAS computer. The computer changes the voltage signal into a digital reading on the EICAS display.

(2) Low System Pressure Warning

- (a) If system pressure becomes low the low pressure switch closes to turn on the system low pressure light. A signal is also sent to the EICAS computer. This causes a low system pressure message to appear on the EICAS display.
- (b) If the output pressure of a pump becomes low a pressure switch closes to turn on the pump low pressure light. A signal is also sent to the EICAS computer. This causes a low pump pressure message to appear on the EICAS display.
- (c) If system pressure falls below 2800 psi for more than 60 seconds with both engines running, a (L, R, C) HYD SYS MAINT message will be displayed in the EICAS status and maintenance modes.

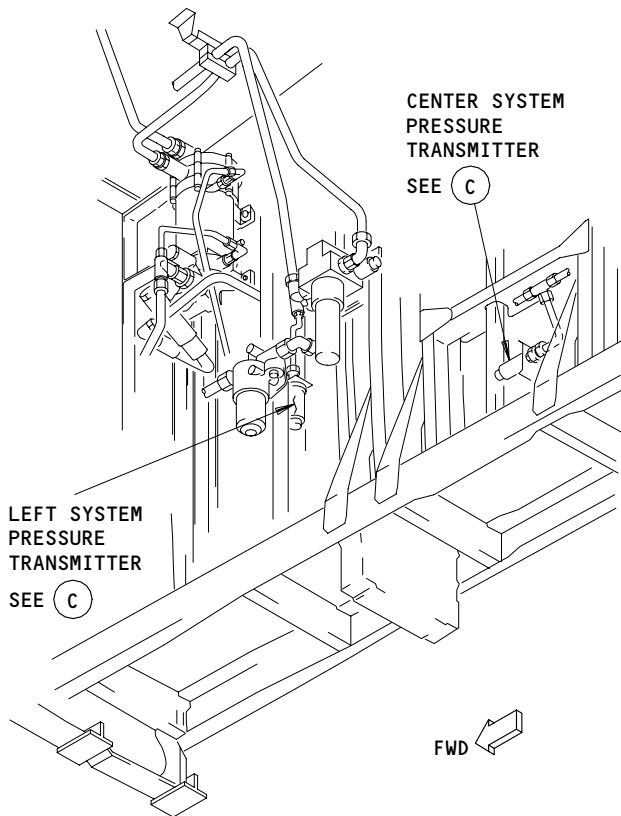
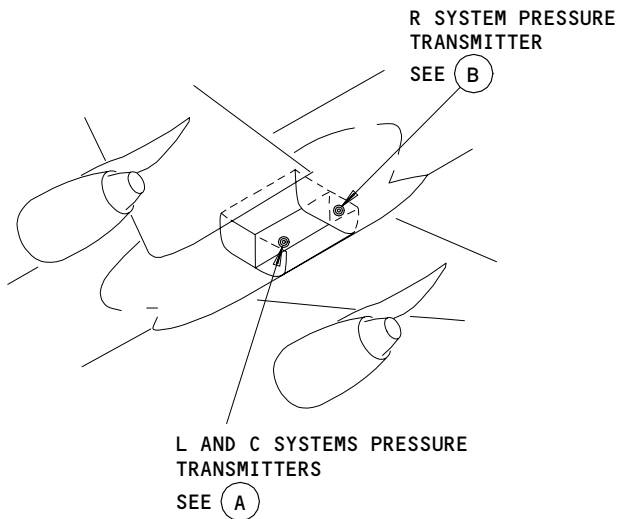
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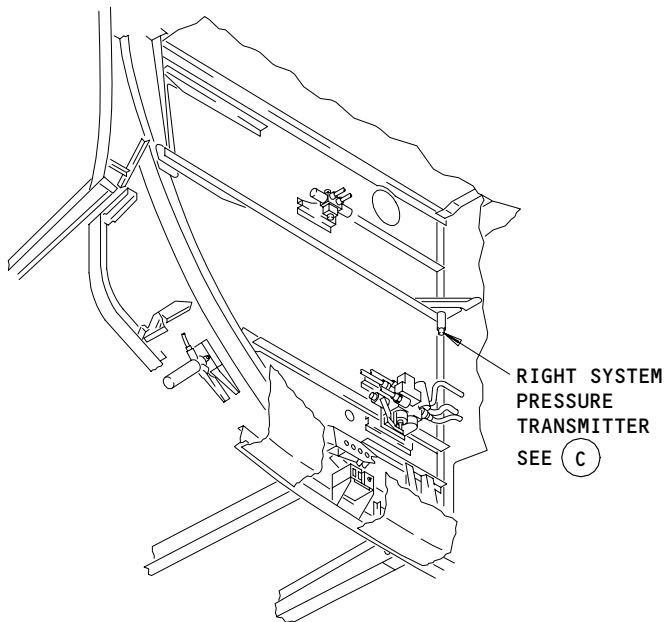
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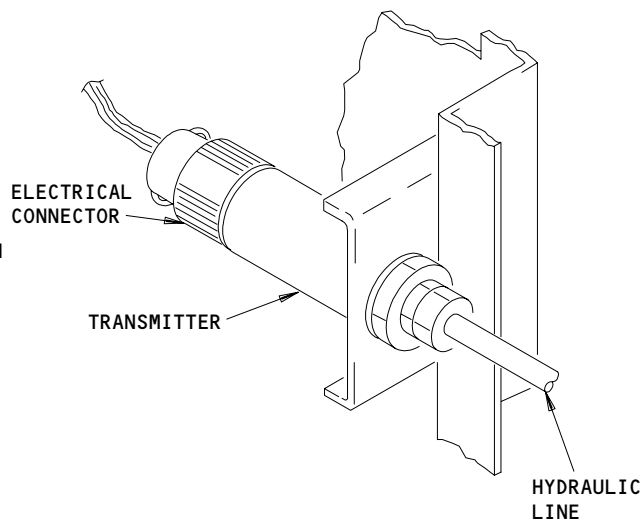
LEFT WHEEL WELL INBOARD BULKHEAD

(A)



RIGHT WHEEL WELL AFT BULKHEAD

(B)



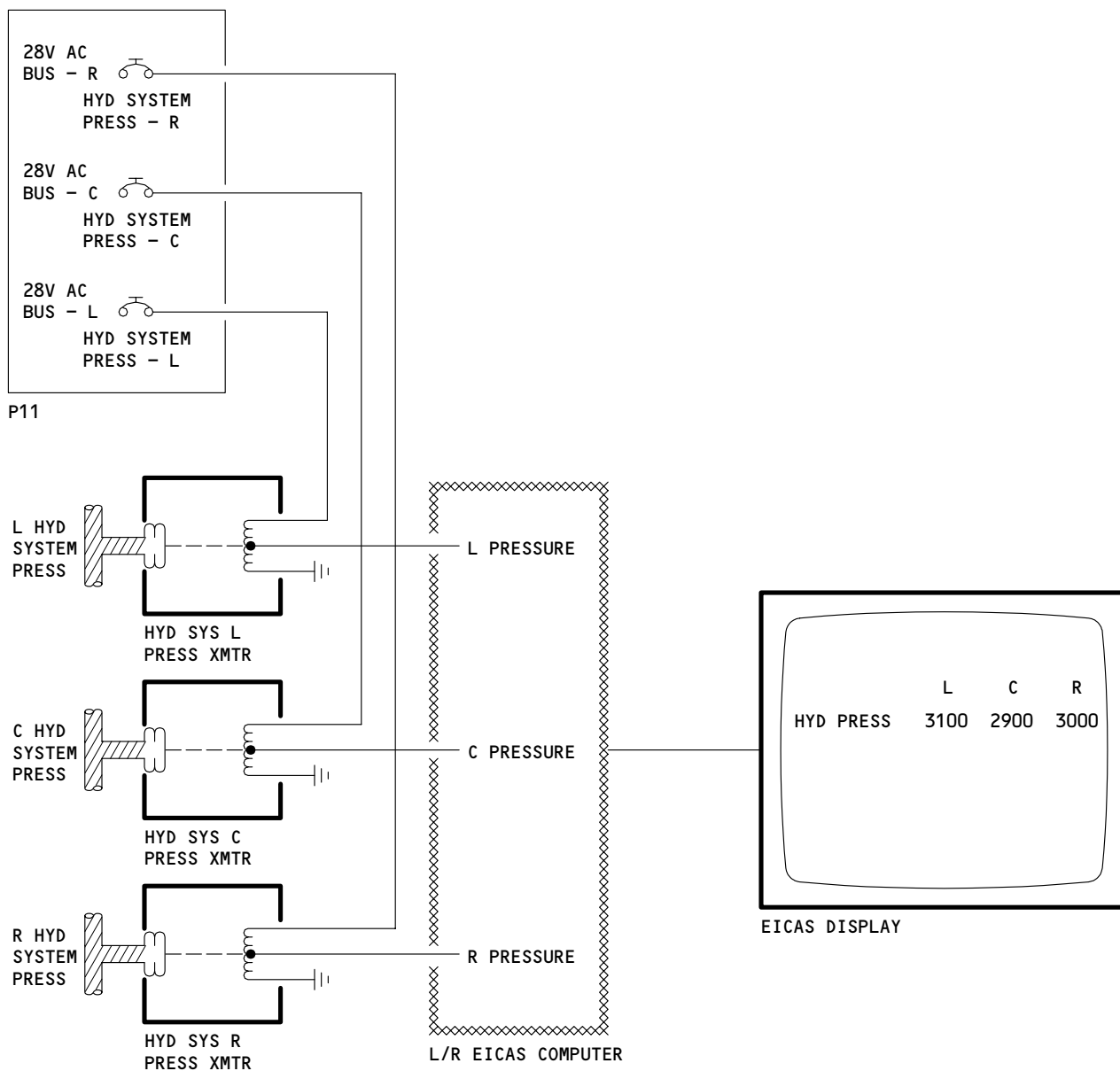
TYPICAL PRESSURE TRANSMITTER

(C)

Pressure Transmitters
Figure 2

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Hydraulic Quantitative Pressure Indication System Schematic
Figure 3

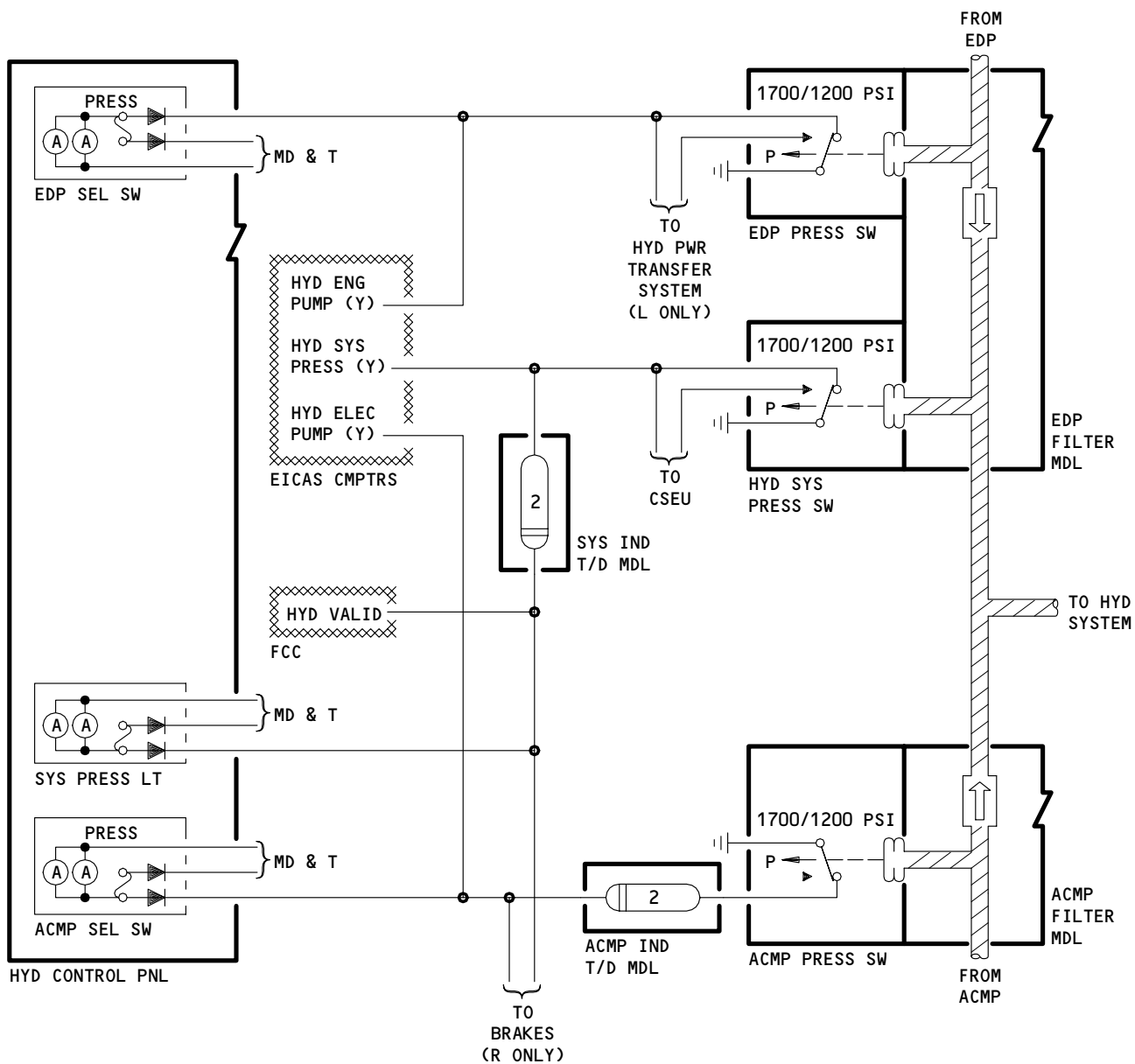
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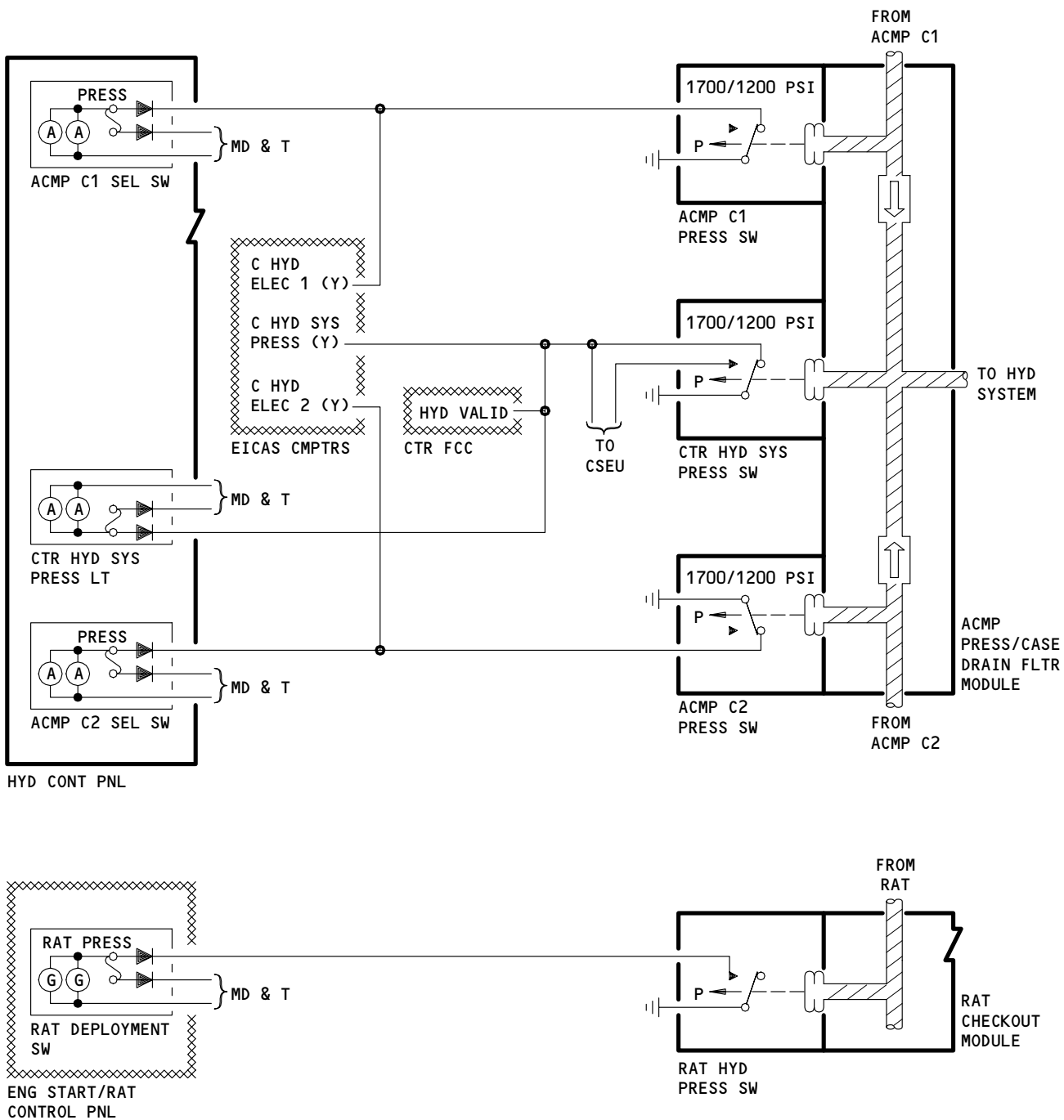
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Left and Right Hydraulic System Pressure Caution Lights Schematic
Figure 4

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Center Hydraulic System Pressure Caution Lights Schematic
Figure 5

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 FAULT ISOLATION/MAINT MANUAL

HYDRAULIC PRESSURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS SYSTEM PRESS CENTER, C1082 SYSTEM PRESS LEFT, C1080 SYSTEM PRESSURE RIGHT, C1081	1	1 1 1	FLIGHT COMPARTMENT, P11 PANEL 11K18 11K17 11K26	* * *
COMPUTER - (REF 31-41-00, FIG. 101) EICAS L, M10181 EICAS R, M10182				
LIGHT - CENTER SYSTEM LOW PRESSURE INDICATOR, YQTL5	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - LEFT SYSTEM LOW PRESSURE INDICATOR, YQTL1	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - RIGHT SYSTEM LOW PRESSURE INDICATOR, YQTL3	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
MODULE - (REF 29-11-00, FIG. 101) CENTER SYSTEM ACMP PRESSURE/CASE DRAIN FILTER LEFT SYSTEM ACMP PRESSURE/CASE DRAIN FILTER LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER RIGHT SYSTEM ACMP PRESSURE/CASE DRAIN FILTER RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER				
PANEL - (REF 29-11-00, FIG. 101) HYDRAULIC CONTROL, M10050				
SWITCH - CENTER SYSTEM ACMP C1 PRESSURE, S10003	5	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM ACMP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - CENTER SYSTEM ACMP C2 PRESSURE, S10016	5	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM ACMP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - CENTER SYSTEM PRESSURE, S10002	5	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM ACMP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - LEFT SYSTEM ACMP PRESSURE, S25	4	1	LEFT WHEEL WELL, LEFT SYSTEM ACMP PRESSURE/CASE DRAIN FILTER MODULE	*

* SEE THE WDM EQUIPMENT LIST

Hydraulic Pressure Indicating System - Component Index
 Figure 101 (Sheet 1)

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COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - LEFT SYSTEM EDP PRESSURE, S10540	3	1	434AL, LEFT NACELLE STRUT - AFT FAIRING, LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - LEFT SYSTEM PRESSURE, S27	3	1	434AL, LEFT NACELLE STRUT - AFT FAIRING, LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - RIGHT SYSTEM ACMP PRESSURE, S30	4	1	RIGHT WHEEL WELL, RIGHT SYSTEM PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - RIGHT SYSTEM EDP PRESSURE, S10541	3	1	444AL, RIGHT NACELLE STRUT - AFT FAIRING, RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH - RIGHT SYSTEM PRESSURE, S32	3	1	444AL, RIGHT NACELLE STRUT - AFT FAIRING, RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	*
SWITCH/LIGHT - (REF 29-11-00, FIG. 101) CENTER SYSTEM ACMP C1, YQTS2 CENTER SYSTEM ACMP C2, YQTS3 LEFT SYSTEM ACMP, YQTS5 LEFT SYSTEM EDP, YQTS1 RIGHT SYSTEM ACMP, YQTS6 RIGHT SYSTEM EDP, YQTS4				
TIME DELAY - (REF 31-01-33, FIG. 101) LEFT SYSTEM ACMP PRESSURE LIGHT, M10557		1		*
LEFT SYSTEM PRESSURE LIGHT, M10558		1		*
TIME DELAY - (REF 31-01-36, FIG. 101) RIGHT SYSTEM ACMP PRESSURE LIGHT, M10559		1		*
RIGHT SYSTEM PRESSURE LIGHT, M10560		1		*
TRANSMITTER - CENTER SYSTEM PRESSURE, M342	2	1	LEFT WHEEL WELL	29-31-01
TRANSMITTER - LEFT SYSTEM PRESSURE, M341	2	1	LEFT WHEEL WELL	29-31-01
TRANSMITTER - RIGHT SYSTEM PRESSURE, M343	2	1	RIGHT WHEEL WELL	29-31-01

* SEE THE WDM EQUIPMENT LIST

Hydraulic Pressure Indicating System - Component Index
Figure 101 (Sheet 2)

EFFECTIVITY

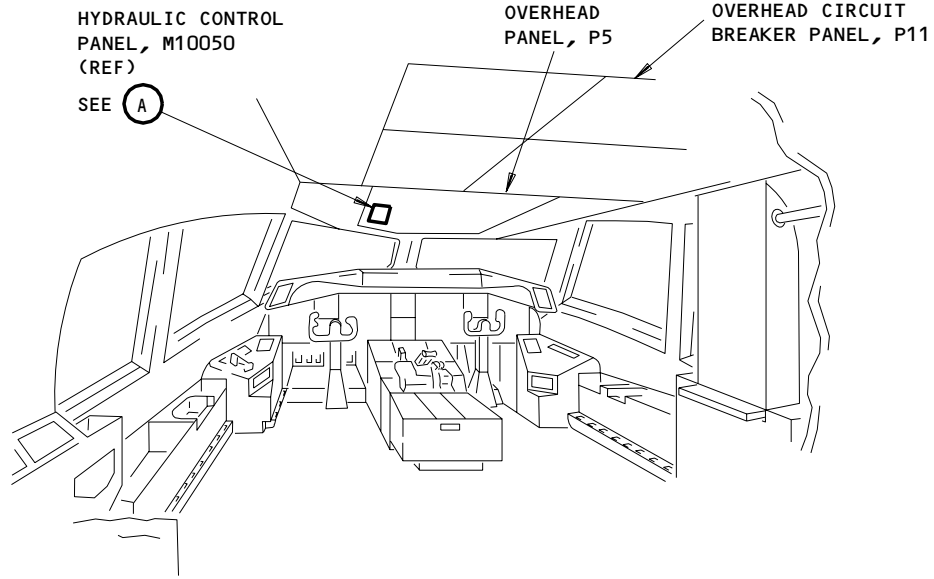
ALL

29-31-00

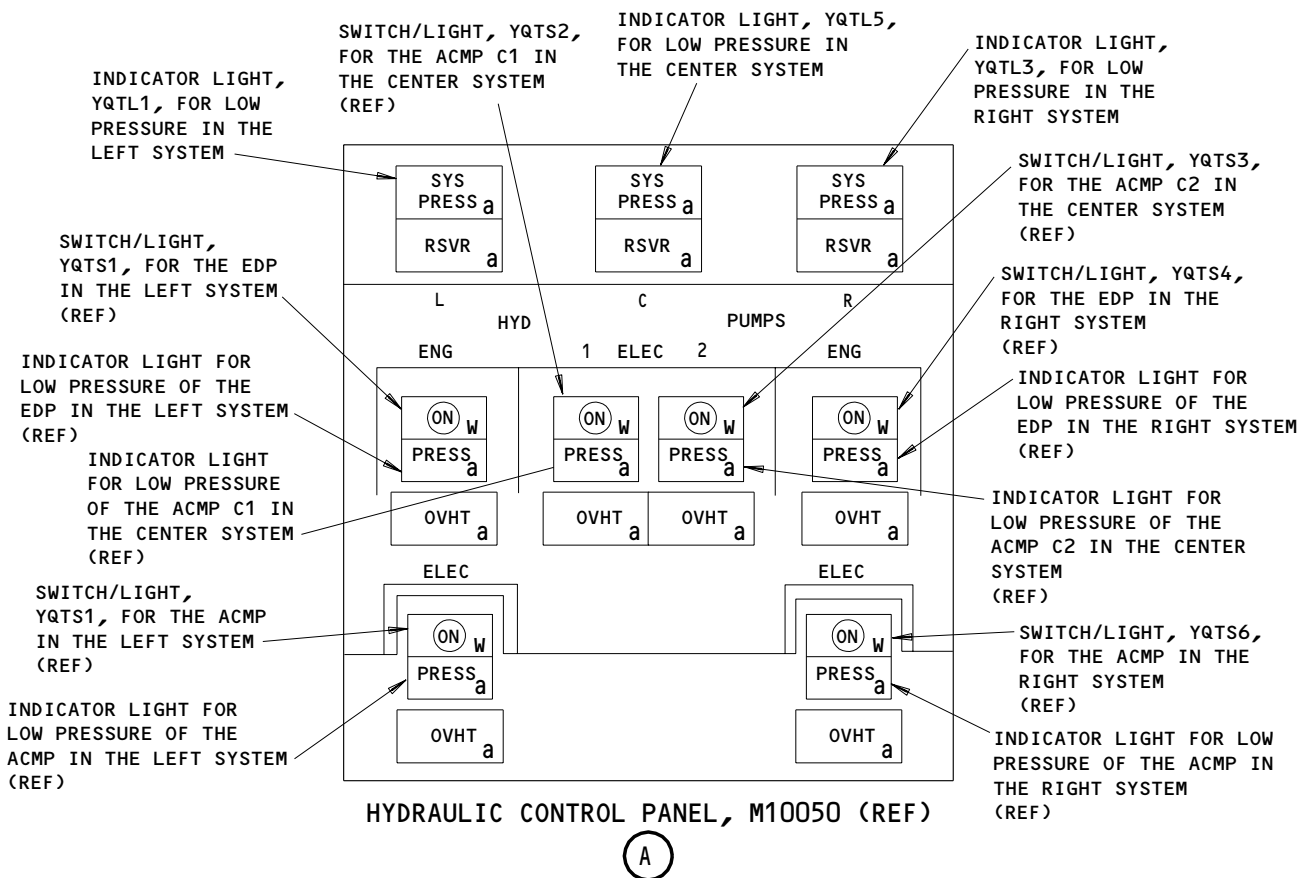
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FLIGHT COMPARTMENT



HYDRAULIC CONTROL PANEL, M10050 (REF)

**Hydraulic Pressure Indicating System - Component Location
Figure 102 (Sheet 1)**

EFFECTIVITY

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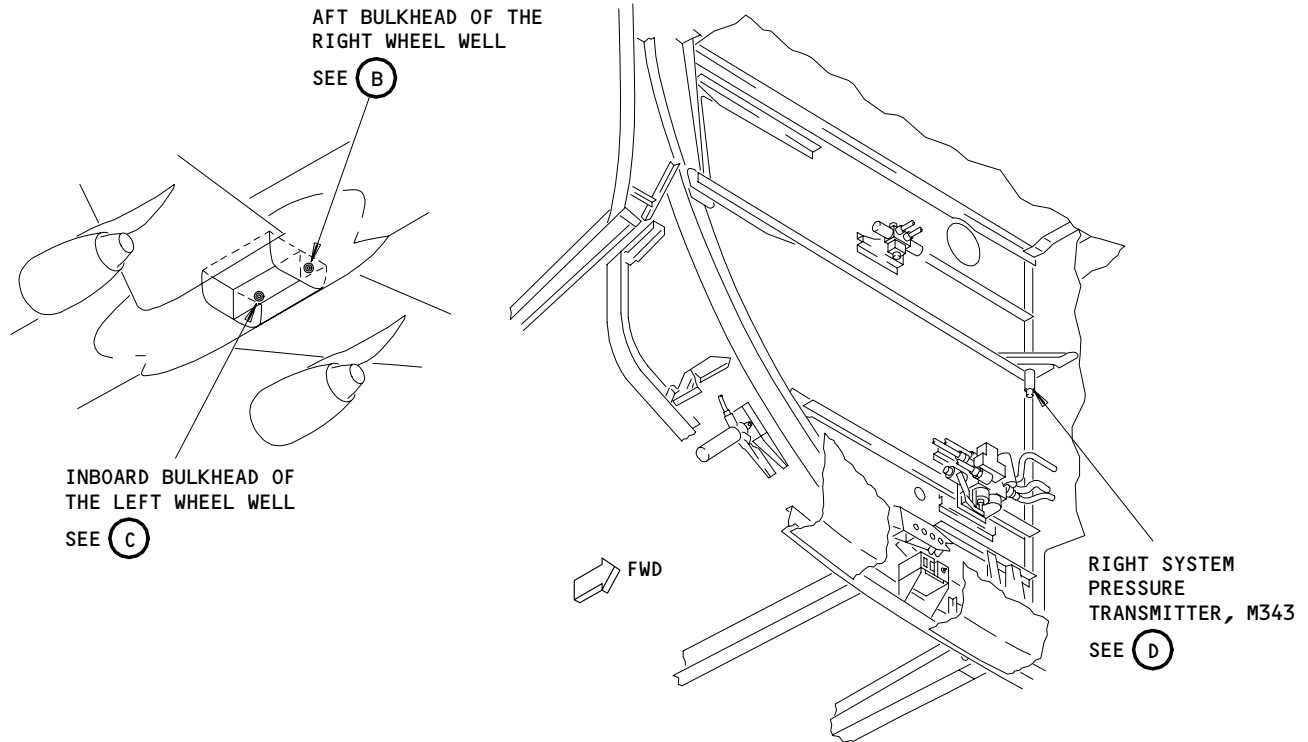
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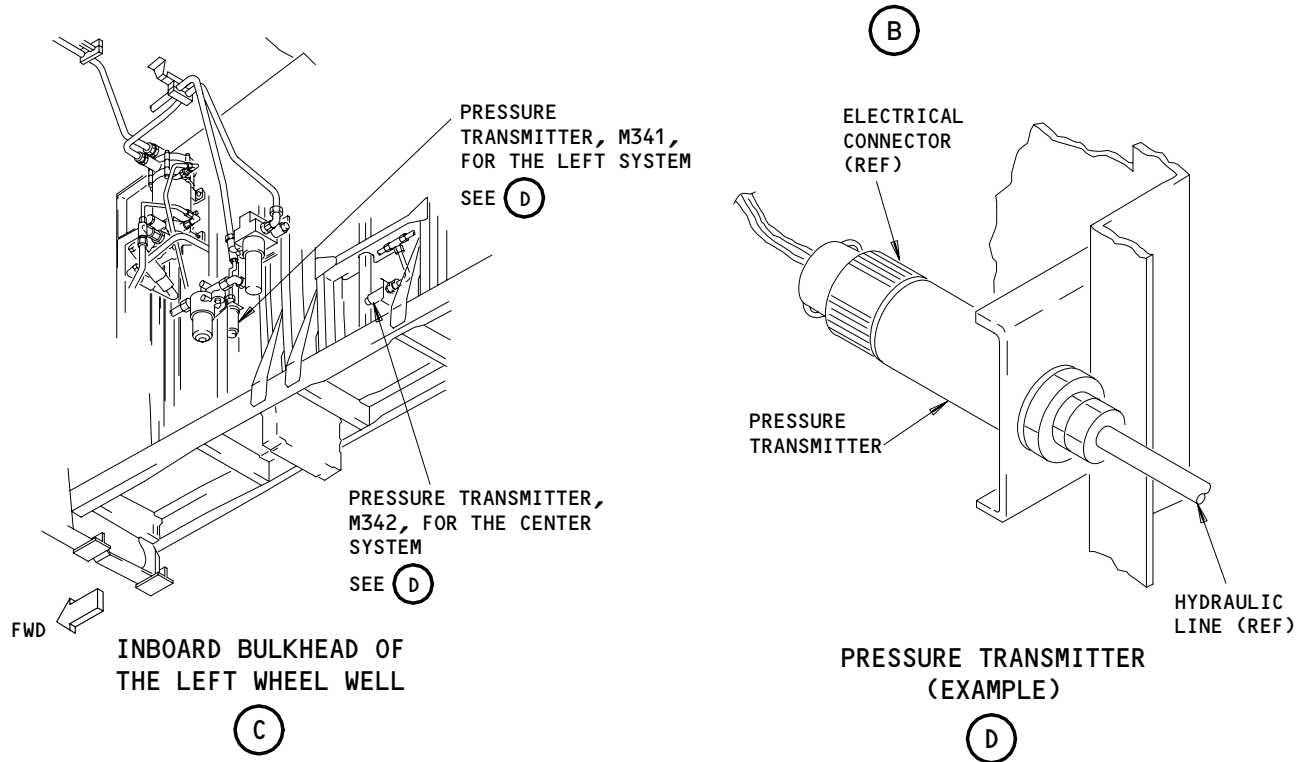
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AFT BULKHEAD OF THE RIGHT WHEEL WELL

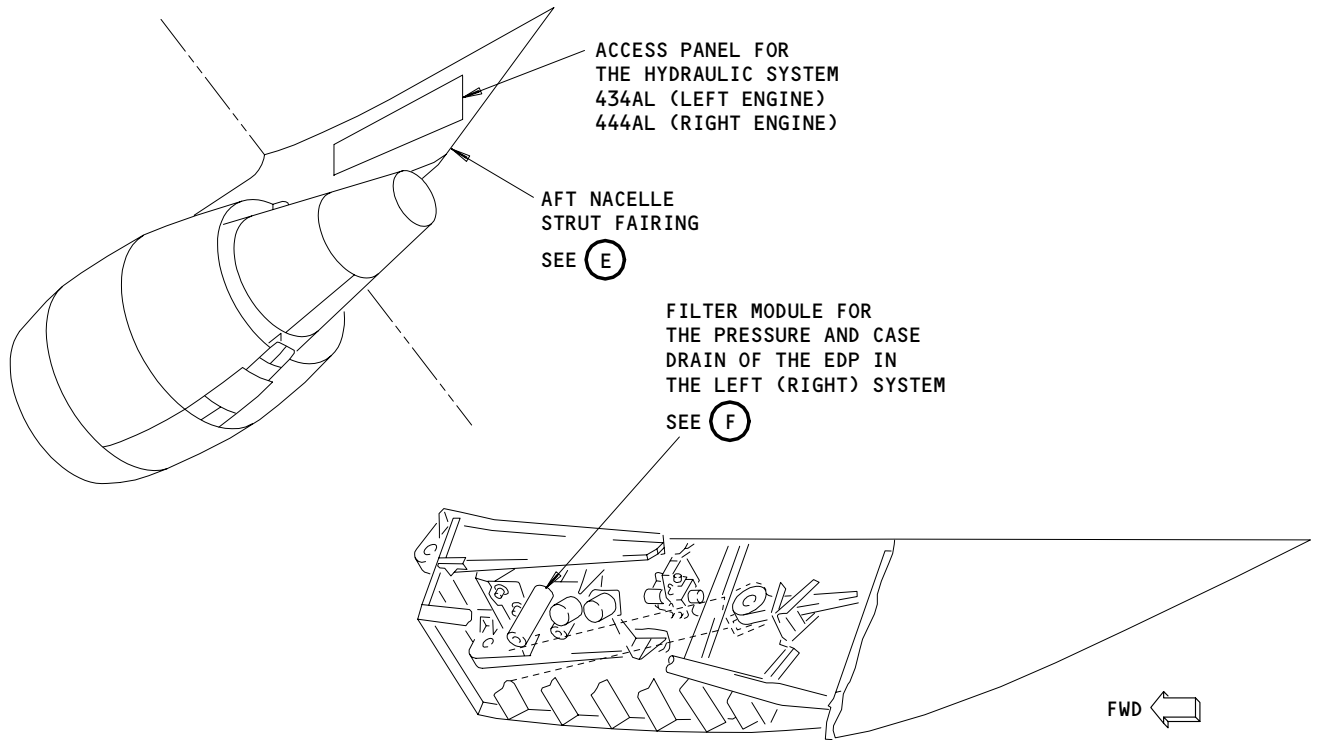


Hydraulic Pressure Indicating System - Component Location
Figure 102 (Sheet 2)

EFFECTIVITY	ALL
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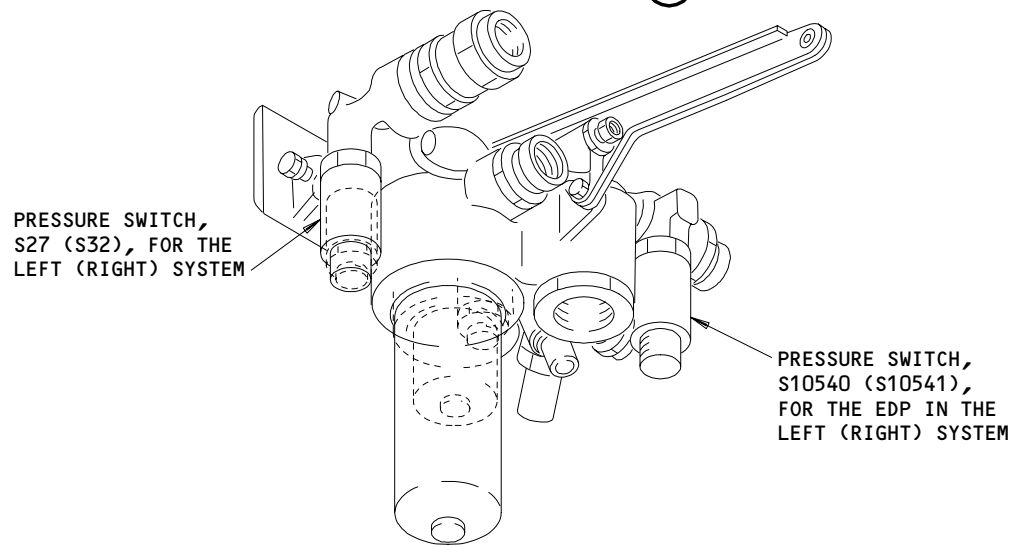
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AFT NACELLE STRUT FAIRING (EXAMPLE)

(E)



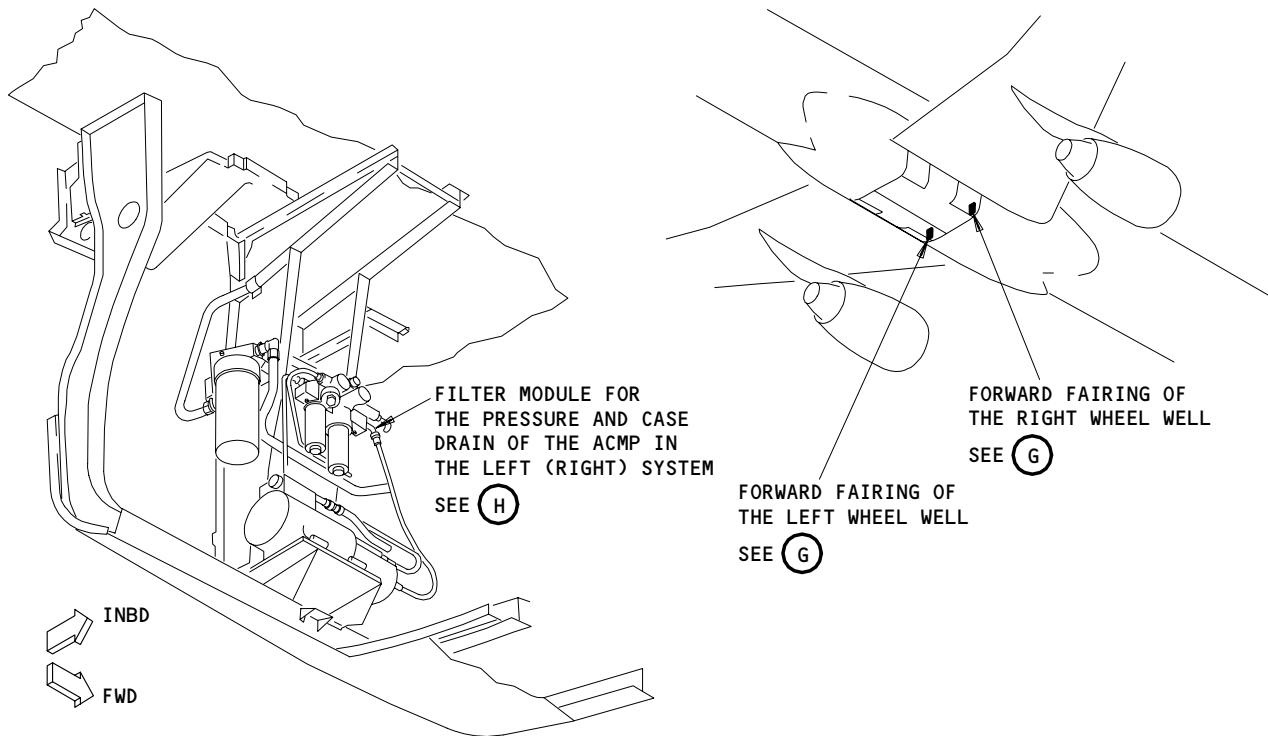
FILTER MODULE FOR THE PRESSURE AND CASE DRAIN OF THE EDP IN THE LEFT (RIGHT) SYSTEM

(F)

Hydraulic Pressure Indicating System - Component Location
Figure 102 (Sheet 3)

EFFECTIVITY	ALL
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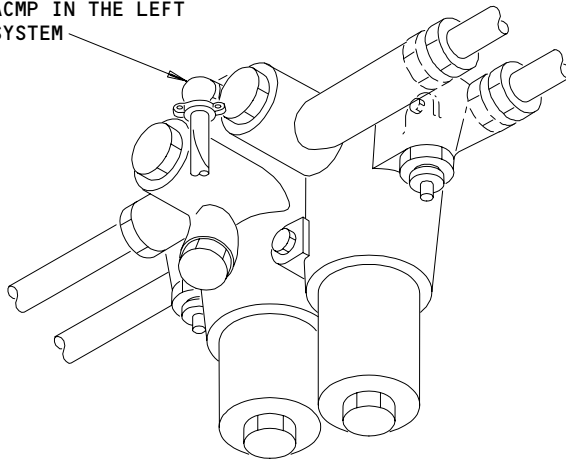
29-31-00



FORWARD FAIRING OF THE LEFT WHEEL WELL
(THE FORWARD FAIRING OF THE RIGHT WHEEL WELL IS OPPOSITE)

(G)

PRESSURE SWITCH, S25 (S30),
FOR THE ACMP IN THE LEFT
(RIGHT) SYSTEM



FILTER MODULE FOR THE PRESSURE AND
CASE DRAIN OF THE ACMP IN THE LEFT (RIGHT) SYSTEM

(H)

Hydraulic Pressure Indicating System - Component Location
Figure 102 (Sheet 4)

EFFECTIVITY

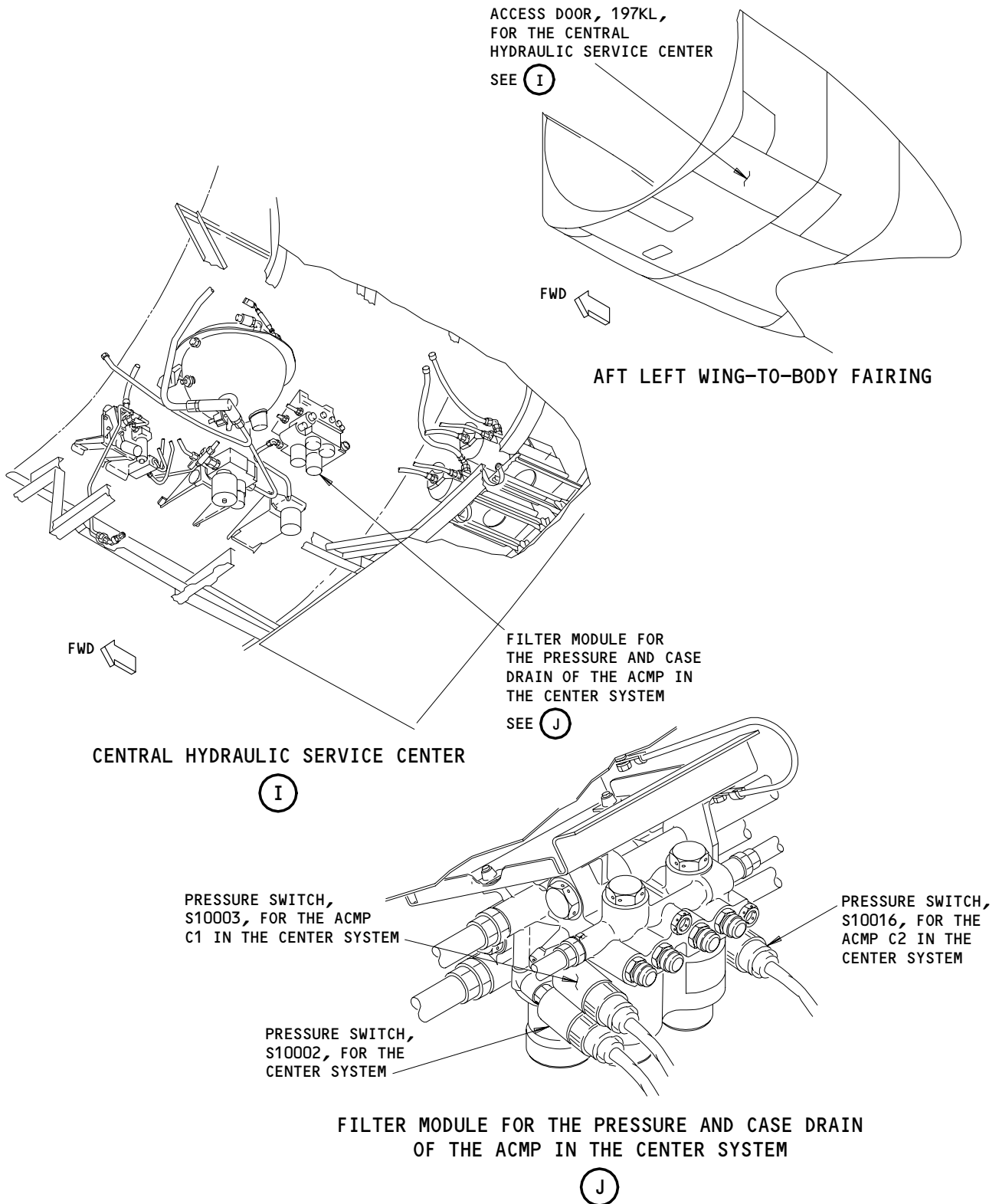
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Hydraulic Pressure Indicating System - Component Location
Figure 102 (Sheet 5)

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HYDRAULIC PRESSURE INDICATING SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure has two tasks. One task is a system test of the pressure indicating system for the left or right hydraulic system. The other is a system test of the pressure indicating system for the center hydraulic system.

TASK 29-31-00-735-001

2. System Test – Pressure Indicating System for the Left or Right Hydraulic System

A. Equipment

- (1) Hydraulic Service Cart, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, per BMS 3-11

B. References

- (1) AMM 12-25-01/301, Exterior Cleaning
(2) AMM 24-22-00/201, Electrical Power – Control
(3) AMM 29-11-00/201, Main (Left, Right, or Center) Hydraulic Systems
(4) AMM 29-11-05/401, Engine-Driven Pump (EDP)
(5) AMM 31-41-00/201, Engine Indicating and Crew Alerting System
(6) AMM 71-00-00/201, Power Plant
(7) AMM 71-11-04/201, Fan Cowl Panels
(8) AMM 78-31-00/201, Thrust Reverser System

C. Access

- (1) Location Zones
211/212 Control Cabin

D. Procedure

S 865-002

- (1) Remove the pressure from the left and right hydraulic systems and reservoirs (AMM 29-11-00/201).

S 865-003

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

S 865-005

- (3) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11K16, ELEC PUMP RIGHT
(b) 11K25, ELEC PUMP LEFT

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S 865-006

- (4) Remove the engine shutdown inhibit in the EICAS computers (AMM 31-41-00/201).

S 215-007

- (5) Make sure the L (R) SYS PRESS, L (R) ENG PRESS and L (R) ELEC PRESS lights on the hydraulic control panel are on.

S 215-008

- (6) Make sure the L (R) HYD SYS PRESS message is shown on the EICAS.

S 215-009

- (7) Make sure the L (R) HYD ELEC PUMP message is not shown on the EICAS.

S 865-010

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

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

S 015-011

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

- (9) Open the fan cowl panels (AMM 71-11-04/201).

S 035-013

- (10) Disconnect the self-seal fitting of the pressure hose from the left (right) engine-driven pump (EDP) (AMM 29-11-05/401).

S 495-014

- (11) Connect the supply line of the service cart to the self-seal fitting of the EDP pressure hose.

S 495-015

- (12) Connect the return line of the service cart to the ground power return connection for the left (right) hydraulic system (AMM 29-11-00/201).

S 865-016

- (13) Slowly pressurize the left (right) system with the hydraulic service cart.

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S 215-017

- (14) Make sure the L (R) SYS PRESS and the L (R) ENG PRESS lights go off when the system pressure is between 1300-1800 psi.

S 865-018

- (15) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

S 215-019

- (16) Make sure the pressure shown on EICAS for the left (right) hydraulic system is the same as the pressure on the service cart (+/- 150 psi).

S 215-020

- (17) Make sure the L (R) HYD SYS PRESS message is not shown on EICAS.

S 215-021

- (18) Make sure the L (R) HYD ELEC PUMP message is shown on EICAS.

S 865-022

- (19) Slowly decrease the pressure in the left (right) hydraulic system to 1200 +/- 150 psi.

S 215-023

- (20) Make sure the L (R) SYS PRESS and the L (R) ENG PRESS lights are on.

S 865-024

- (21) For the right hydraulic system, push the RESERVE BRAKE switch on the captains main instrument panel, P1, to ON.

NOTE: This isolates the time delay for the right system indication from reserve brake circuits.

S 865-025

- (22) Open this circuit breaker on the P11 panel:
(a) 11A34, IND LIGHTS 3

S 215-026

- (23) Make sure the L (R) SYS PRESS light on the hydraulic control panel goes off.

S 865-027

- (24) Close this circuit breaker on the P11 panel:
(a) 11A34, IND LIGHTS 3

S 215-028

- (25) Make sure the L (R) SYS PRESS light on the hydraulic control panel comes on after 2 seconds.

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- S 865-029
- (26) For the right hydraulic system, push the RESERVE BRAKE switch on the P1 panel to OFF.
- S 865-030
- (27) Increase the pressure in the left (right) hydraulic system to 3000 psi.
- S 865-031
- (28) Push the ELEC/HYD and then the AUTO-EVENT READ switches on the EICAS maintenance panel on the P61 panel. Push and hold the ERASE switch for approximately three seconds.
- S 215-032
- (29) Make sure the L (R) HYD SYS MAINT message is not shown on EICAS.
- S 865-033
- (30) Decrease the pressure in the left (right) hydraulic system to 2750 psi.
- S 215-034
- (31) Make sure the L (R) HYD SYS MAINT message is shown on EICAS after approximately 60 seconds.
- S 865-083
- (32) Increase the pressure in the left (right) hydraulic system to 3000 psi.
- S 865-035
- (33) Push the ELEC/HYD and then the AUTO-EVENT READ switches on the EICAS maintenance panel on the P61 panel. Push and hold the ERASE switch for approximately three seconds.
- S 215-036
- (34) Make sure the L (R) HYD SYS MAINT message is not shown on EICAS.
- S 865-037
- (35) Put back the engine shutdown inhibit in the EICAS computers (AMM 31-41-00/201).
- S 865-038
- (36) Decrease the pressure in the left (right) hydraulic system to zero.
- S 095-039
- (37) Disconnect the service cart from the airplane (AMM 29-11-00/201).
- S 435-040
- (38) Connect the pressure line to the engine-driven pump (AMM 29-11-05/401).

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S 865-041

- (39) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
- (a) 11K16, ELEC PUMP RIGHT
 - (b) 11K25, ELEC PUMP LEFT

S 865-042

- (40) Motor the left (right) engine (AMM 71-00-00/201).

S 215-043

- (41) Make sure there are no leaks at the pressure line on the engine-driven pump.

S 115-044

CAUTION: QUICKLY CLEAN THE AREA AROUND THE ENGINE-DRIVEN PUMP OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (42) Clean all hydraulic fluid from the area of the engine-driven pump (AMM 12-25-01/301).

S 415-045

- (43) Close the fan cowl panels (AMM 71-11-04/201).

S 865-046

- (44) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 865-047

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

S 865-048

- (46) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

TASK 29-31-00-735-049

3. System Test - Pressure Indicating System for the Center Hydraulic System

A. Equipment

- (1) Hydraulic Service Cart, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, per BMS 3-11

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels

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- (2) AMM 24-22-00/201, Electrical Power – Control
- (3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (4) AMM 31-41-00/201, Engine Indicating and Crew Alerting System

C. Access

- (1) Location Zones
211/212 Control Cabin

D. Procedure

S 865-050

- (1) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 865-051

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

S 865-052

- (3) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

S 865-054

- (4) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
 - (a) 11K15, ELEC PUMP C1
 - (b) 11K24, ELEC PUMP C2

S 865-055

- (5) Remove the engine shutdown inhibit in the EICAS computers (AMM 31-41-00/201).

S 215-056

- (6) Make sure the C SYS PRESS, C ELEC 1 PRESS and C ELEC 2 PRESS lights on the hydraulic control panel are on.

S 215-057

- (7) Make sure the C HYD SYS PRESS message is shown on EICAS.

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S 015-058

- (8) Make sure the C HYD ELEC 1 and C HYD ELEC 2 messages are not shown on EICAS.

NOTE: The C HYD SYS PRESS message stops the display of the C HYD ELEC 1 and C HYD ELEC 2 messages on EICAS.

S 015-059

- (9) Open the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).

S 495-060

- (10) Connect the hydraulic service cart to the ground power connections for the center hydraulic system (AMM 29-11-00/201).

S 865-061

- (11) Slowly pressurize the center hydraulic system with the service cart.

S 215-062

- (12) Make sure the C SYS PRESS light on the hydraulic control panel goes off at a pressure between 1300 and 1800 psi.

NOTE: The C ELEC 1 PRESS and C ELEC 2 PRESS warning lights will stay on during this test. They stay on because the center system electric pumps are not in operation.

S 215-063

- (13) Make sure the C HYD SYS PRESS message is not shown on EICAS.

S 215-064

- (14) Make sure the C HYD ELEC 1 and C HYD ELEC 2 messages are shown on EICAS.

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- S 215-065
- (15) Make sure the hydraulic pressure indication is the same as the service cart pressure (+/- 150 psi).
- S 865-066
- (16) Slowly decrease the pressure in the center hydraulic system to 1200 psi.
- S 215-067
- (17) Make sure the C SYS PRESS light on the hydraulic control panel is on.
- S 215-068
- (18) Make sure the C HYD SYS PRESS message is shown on EICAS.
- S 215-069
- (19) Make sure the C HYD ELEC 1 and C HYD ELEC 2 messages are not shown on EICAS.
- S 865-070
- (20) Increase the pressure in the center hydraulic system to 3000 psi.
- S 865-071
- (21) Push the ELEC/HYD and then the AUTO-EVENT READ switches on the EICAS maintenance panel on the P61 panel. Push and hold the ERASE switch for approximately three seconds.
- S 215-072
- (22) Make sure the C HYD SYS MAINT message is not shown on EICAS.
- S 865-073
- (23) Decrease the pressure in the center hydraulic system to 2750 psi.
- S 215-074
- (24) Make sure the C HYD SYS MAINT message is shown on EICAS after approximately 60 seconds.

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- S 865-084
(25) Increase the pressure in the center hydraulic system to 3000 psi.
- S 865-075
(26) Push the ELEC/HYD and then the AUTO-EVENT READ switches on the EICAS maintenance panel on the P61 panel. Push and hold the ERASE switch for approximately three seconds.
- S 215-076
(27) Make sure the C HYD SYS MAINT message is not shown on EICAS.
- S 865-077
(28) Put back the engine shutdown inhibit in the EICAS computers (AMM 31-41-00/201).
- S 865-078
(29) Decrease the pressure in the center hydraulic system to zero.
- S 095-079
(30) Disconnect the hydraulic service cart from the ground power connections for the center system (AMM 29-11-00/201).
- S 415-080
(31) Close the access panel 197KL for the central hydraulic service center (AMM 06-41-00/201).
- S 865-081
(32) Remove electrical power if it is not necessary (AMM 24-22-00/201).
- S 865-082
(33) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11K15, ELEC PUMP C1
(b) 11K24, ELEC PUMP C2

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HYDRAULIC PRESSURE TRANSMITTER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the hydraulic pressure transmitters.
- B. The pressure transmitter in each hydraulic system (left, right, and center) is equivalent.

TASK 29-31-01-024-001

2. Remove the Pressure Transmitter

A. References

- (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
- (2) AMM 32-00-15/201, Landing Gear Door Locks

B. Access

(1) Location Zones

211/212	Control Cabin
143/144	MLG Wheel Well

(2) Access Panels

731/741	Main Landing Gear
---------	-------------------

C. Prepare for the Removal

S 494-002

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.

- (1) Open the doors for the landing gear and install the door locks for access to the pressure transmitters (AMM 32-00-15/201).

S 864-003

- (2) Remove the pressure from the hydraulic system and reservoir that contains the pressure transmitter that you will remove (AMM 29-11-00/201).

S 864-004

- (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K17, HYDRAULICS SYSTEM PRESS LEFT
 - (d) 11K18, HYDRAULICS SYSTEM PRESS CENTER
 - (e) 11K24, HYDRAULICS ELEC PUMP C2
 - (f) 11K25, HYDRAULICS ELEC PUMP LEFT
 - (g) 11K26, HYDRAULICS SYSTEM PRESS RIGHT

D. Remove the Pressure Transmitter (Fig. 401)

S 034-005

- (1) Disconnect the electrical connector from the pressure transmitter.

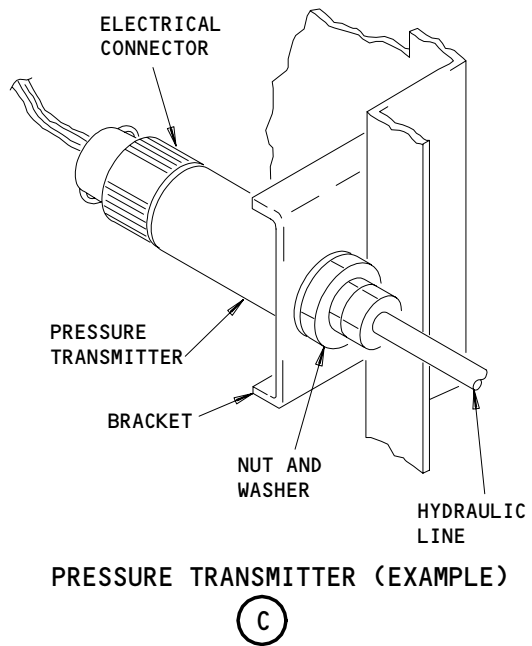
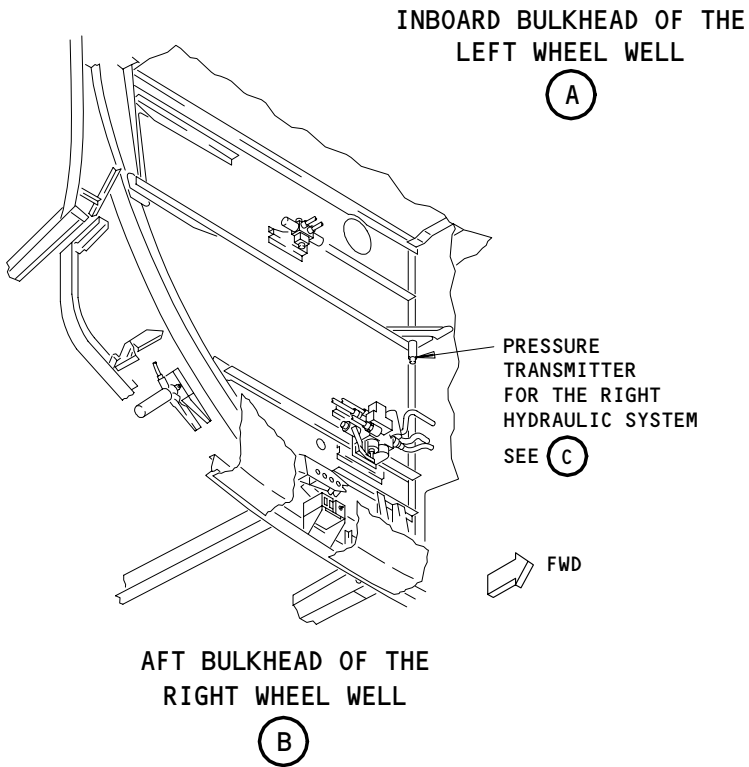
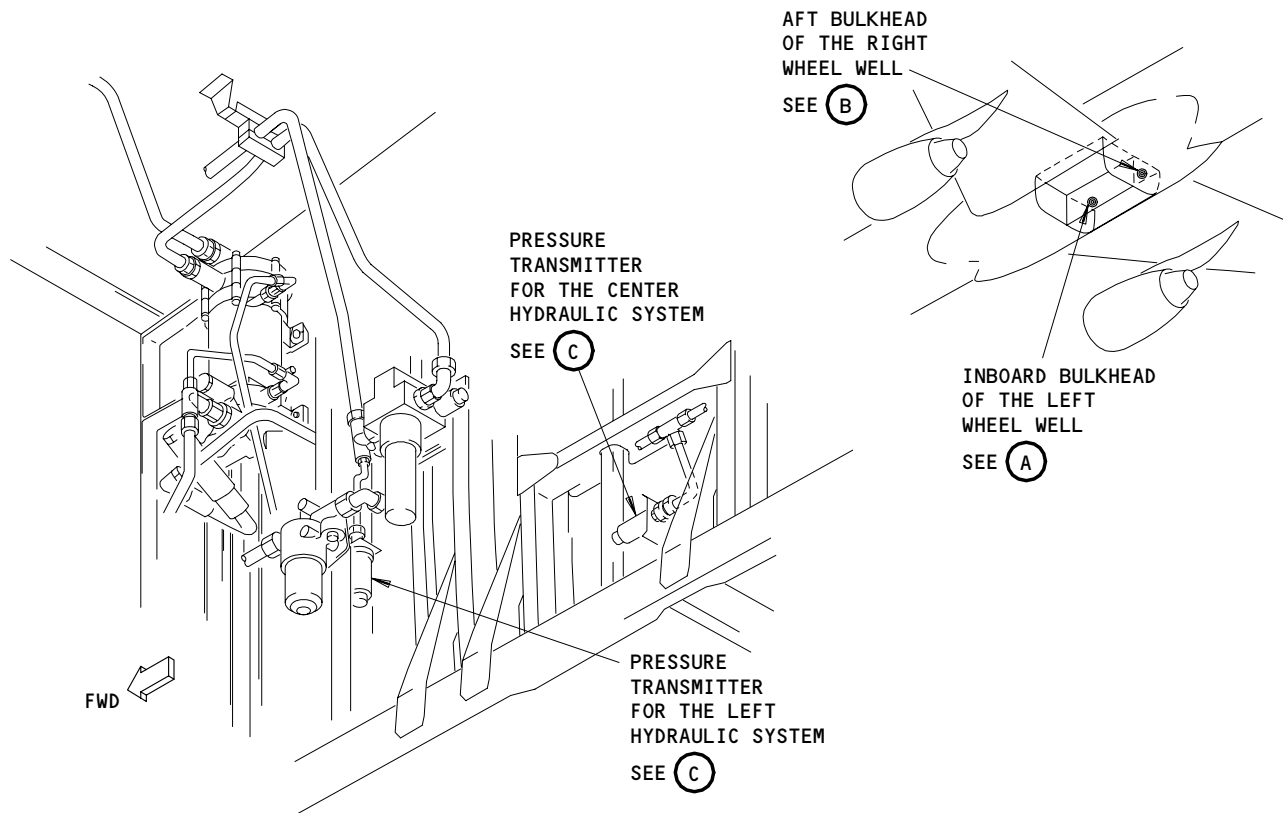
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Hydraulic Pressure Transmitter Installation
Figure 401

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- S 034-006
- (2) Disconnect the hydraulic line from the pressure transmitter.
- S 034-007
- (3) Put a cap on the hydraulic line.
- S 034-008
- (4) Remove the nut that attaches the pressure transmitter to the bracket.
- S 024-009
- (5) Remove the pressure transmitter.

TASK 29-31-01-424-010

3. Install the Pressure Transmitter

A. References

- (1) AMM 12-25-01/301, Exterior Cleaning
- (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. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. Access

- (1) Location Zones
 - 211/212 Control Cabin
 - 143/144 MLG Wheel Well
- (2) Access Panels
 - 731/741 Main Landing Gear

D. Install the Pressure Transmitter (Fig. 401)

- S 434-011
- (1) Install the nut to attach the pressure transmitter to the bracket.
- S 434-012
- (2) Remove the cap on the hydraulic line.

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- S 434-013
- (3) Connect the hydraulic line to the pressure transmitter.
- S 434-014
- (4) Connect the electrical connector to the pressure transmitter.
- S 864-015
- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K17, HYDRAULICS SYSTEM PRESS LEFT
 - (d) 11K18, HYDRAULICS SYSTEM PRESS CENTER
 - (e) 11K24, HYDRAULICS ELEC PUMP C2
 - (f) 11K25, HYDRAULICS ELEC PUMP LEFT
 - (g) 11K26, HYDRAULICS SYSTEM PRESS RIGHT
 - (h) EICAS (6 locations)
- S 864-016
- (6) Supply electrical power (AMM 24-22-00/201).
- S 864-017
- (7) Pressurize the hydraulic system that contains the new pressure transmitter (AMM 29-11-00/201).
- S 864-018
- (8) Make sure these circuit breakers on the P11 are closed:
- (a) 11K9, LEFT ENGINE OIL PRESS
 - (b) 11K35, RIGHT ENGINE OIL PRESS
- S 714-019
- (9) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.
- S 214-020
- (10) Make sure the (L, R, C) HYD PRESS indication on the EICAS display shows between 2850 and 3150 psi.

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S 214-021

- (11) Do a check for leakage in the hydraulic line at the pressure transmitter.

S 944-027

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (12) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 094-023

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.

- (13) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-024

- (14) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-025

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

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HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General

A. A hydraulic fluid temperature indicating system is provided for each main hydraulic system. This system indicates fluid temperature in each reservoir and overheat in each pump. The pump overheat warning lights are on the hydraulic control panel in the flight compartment. The fluid temperature in each reservoir is shown as a digital readout on the EICAS display. The EICAS display also provides overheat warning messages. The overheat warning lights are powered by 28 volts dc from master dim and test circuit breakers on overhead panel P11.

2. Component Details (Fig. 1 and 2)

A. EICAS display.

(1) The EICAS display shows a digital readout of fluid temperature in each reservoir when the ELEC/HYD maintenance mode is selected. Messages which describe problems relating to pump overheat warning lights automatically appear on the display. The messages consist of the following:

L ELEC HYD OVHT
R ELEC HYD OVHT
C HYD 1 OVHT
C HYD 2 OVHT
L ENG HYD OVHT
R ENG HYD OVHT

For information on the EICAS, refer to 31-41-00.

B. Overheat Lights

(1) An overheat warning light for each pump is on the hydraulic control panel. Each light is below the related pump select switch.

C. Overheat Light Temperature Switches

(1) The overheat temperature switch for each ACMP is inside the pump. The switch for each EDP is on the EDP pressure/case drain filter module.

D. Temperature Transmitters

(1) Each reservoir temperature transmitter is installed on the system reservoir.

3. Operation

A. Functional Description (Fig. 3 and 4)

(1) The fluid transmitters change resistance as fluid temperature varies. The EICAS computer converts the resistance of the temperature transmitter into a digital readout of fluid temperature on the EICAS display.

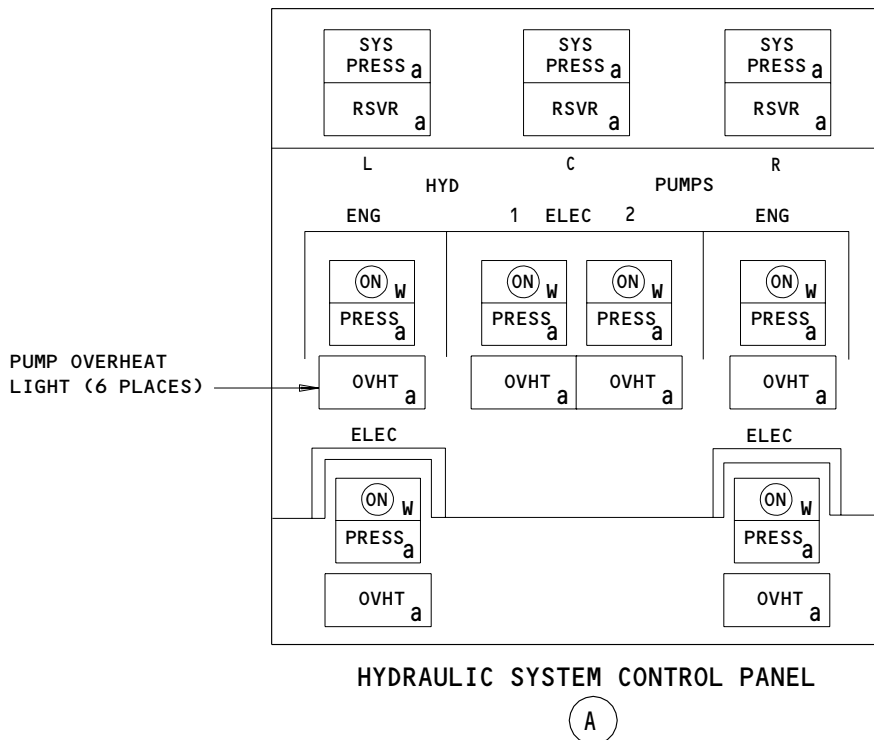
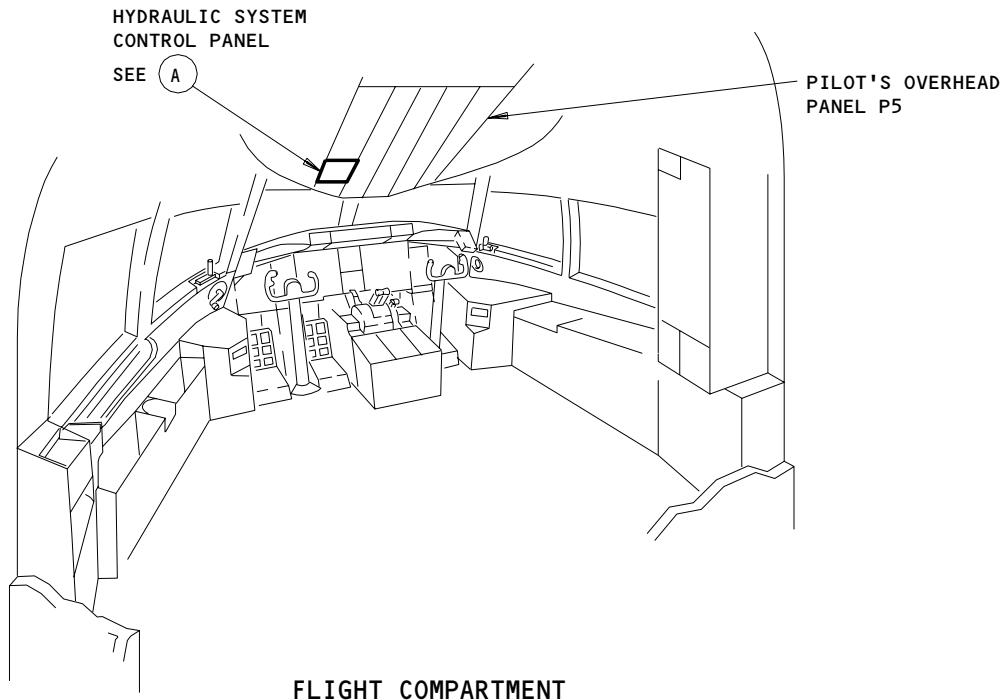
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Overheat Lights
Figure 1

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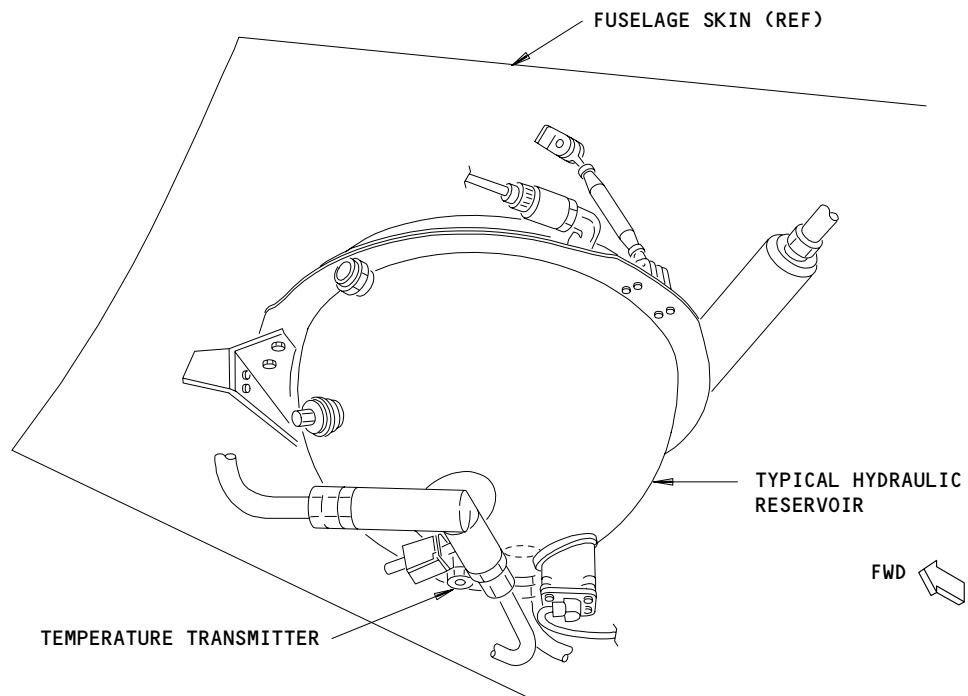
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- (2) The overheat switches close at a preset temperature. This causes the related pump overheat light on the hydraulic control panel to turn on. When an overheat switch closes, an electrical signal is also sent to the EICAS computer. This signal causes a pump overheat message to appear on the EICAS display.



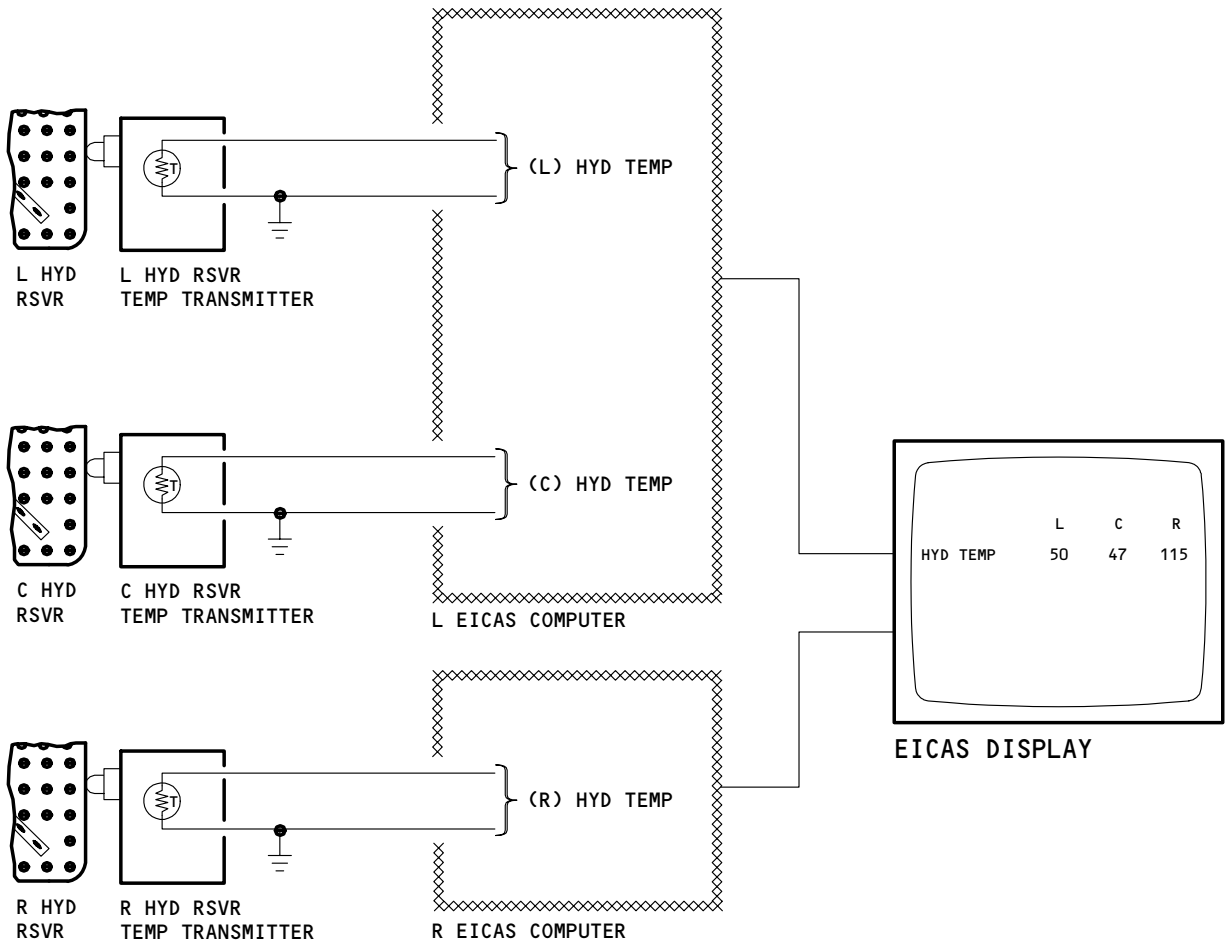
Reservoir Temperature Transmitter
Figure 2

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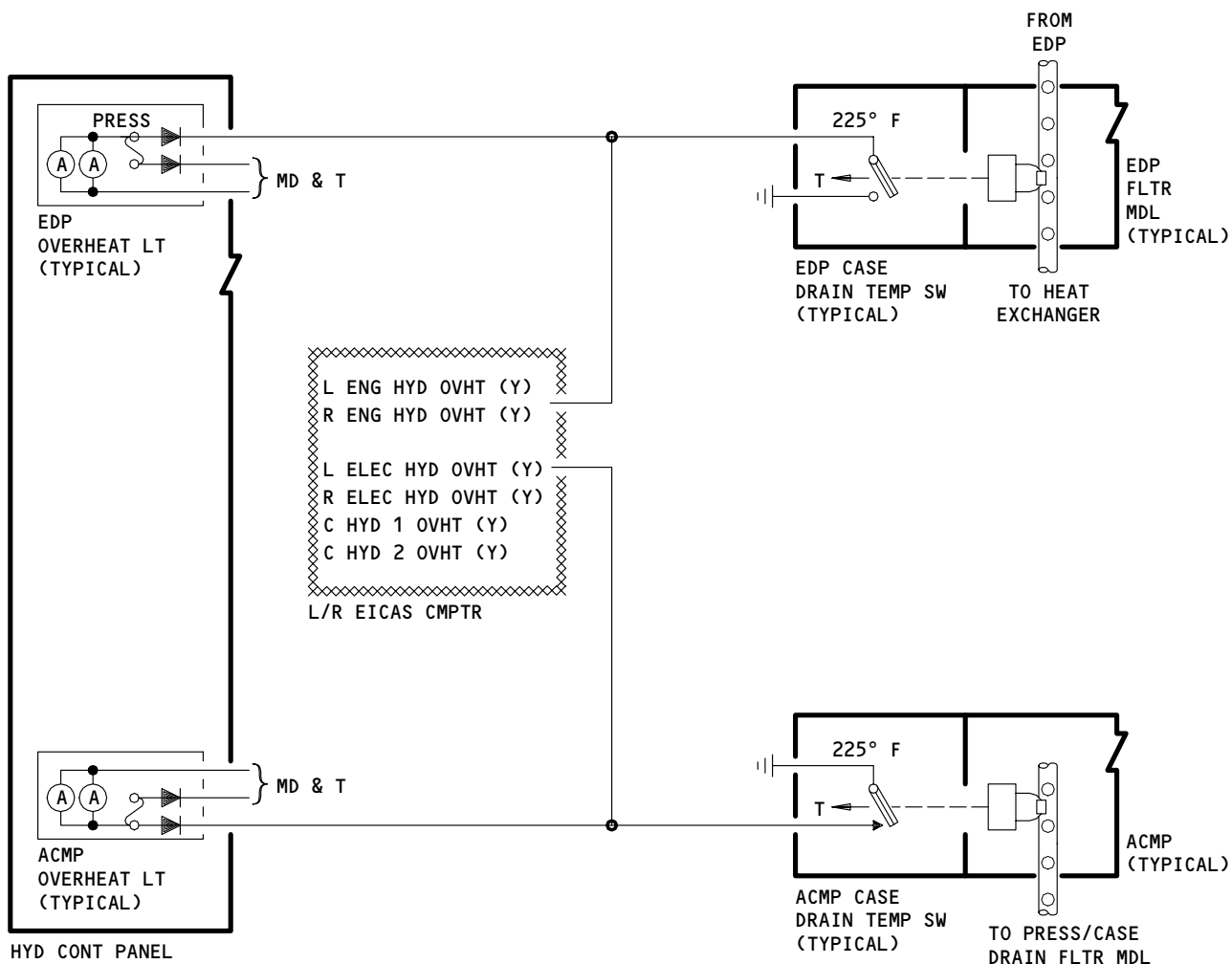
Hydraulic Reservoir Temperature Indicating System
Figure 3

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Hydraulic Pump Overheat Indication Schematic
Figure 4

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HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
COMPUTER - (REF 31-41-00, FIG. 101) EICAS L, M10181 EICAS R, M10182				
LIGHT - CENTER SYSTEM ACMP C1 OVERHEAT INDICATOR, YQTL8	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - CENTER SYSTEM ACMP C2 OVERHEAT INDICATOR, YQTL9	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - LEFT SYSTEM ACMP OVERHEAT INDICATOR, YQTL11	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - LEFT SYSTEM EDP OVERHEAT INDICATOR, YQTL7	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - RIGHT SYSTEM ACMP OVERHEAT INDICATOR, YQTL12	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - RIGHT SYSTEM EDP OVERHEAT INDICATOR, YQTL10	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
MODULE - (REF 29-11-00, FIG. 101) LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER				
PANEL - (REF 29-11-00, FIG. 101) HYDRAULIC CONTROL, M10050				
PUMP (ACMP) - (REF 29-11-00, FIG. 101) CENTER SYSTEM ALTERNATING CURRENT MOTOR C1, M10029 CENTER SYSTEM ALTERNATING CURRENT MOTOR C2, M10030 LEFT SYSTEM ALTERNATING CURRENT MOTOR, M231 RIGHT SYSTEM ALTERNATING CURRENT MOTOR, M234				
RESERVOIR - (REF 29-11-00, FIG. 101) CENTER SYSTEM HYDRAULIC LEFT SYSTEM HYDRAULIC RIGHT SYSTEM HYDRAULIC				

* SEE THE WDM EQUIPMENT LIST

Hydraulic Fluid Temperature Indicating System - Component Index
 Figure 101 (Sheet 1)

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COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - CENTER SYSTEM ACMP C1 CASE DRAIN TEMPERATURE		1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM ACMP C1, M10029	*
SWITCH - CENTER SYSTEM ACMP C2 CASE DRAIN TEMPERATURE		1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM ACMP C2, M10030	*
SWITCH - LEFT SYSTEM ACMP CASE DRAIN TEMPERATURE		1	LEFT WHEEL WELL, LEFT SYSTEM ACMP, M231	*
SWITCH - LEFT SYSTEM EDP CASE DRAIN TEMPERATURE, S10006	2	1	434AL, LEFT NACELLE STRUT - AFT FAIRING, LEFT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	29-32-01
SWITCH - RIGHT SYSTEM ACMP CASE DRAIN TEMPERATURE		1	RIGHT WHEEL WELL, RIGHT SYSTEM ACMP, M234	*
SWITCH - RIGHT SYSTEM EDP CASE DRAIN TEMPERATURE, S10007	2	1	444AL, RIGHT NACELLE STRUT - AFT FAIRING, RIGHT SYSTEM EDP PRESSURE/CASE DRAIN FILTER MODULE	29-32-01
TRANSMITTER - CENTER SYSTEM FLUID TEMPERATURE, TS5194	4	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM HYDRAULIC RESERVOIR	29-32-03
TRANSMITTER - LEFT SYSTEM FLUID TEMPERATURE, TS5193	3	1	LEFT WHEEL WELL, LEFT SYSTEM HYDRAULIC RESERVOIR	29-32-03
TRANSMITTER - RIGHT SYSTEM FLUID TEMPERATURE, TS5195	3	1	RIGHT WHEEL WELL, RIGHT SYSTEM HYDRAULIC RESERVOIR	29-32-03

* SEE THE WDM EQUIPMENT LIST

Hydraulic Fluid Temperature Indicating System - Component Index
Figure 101 (Sheet 2)

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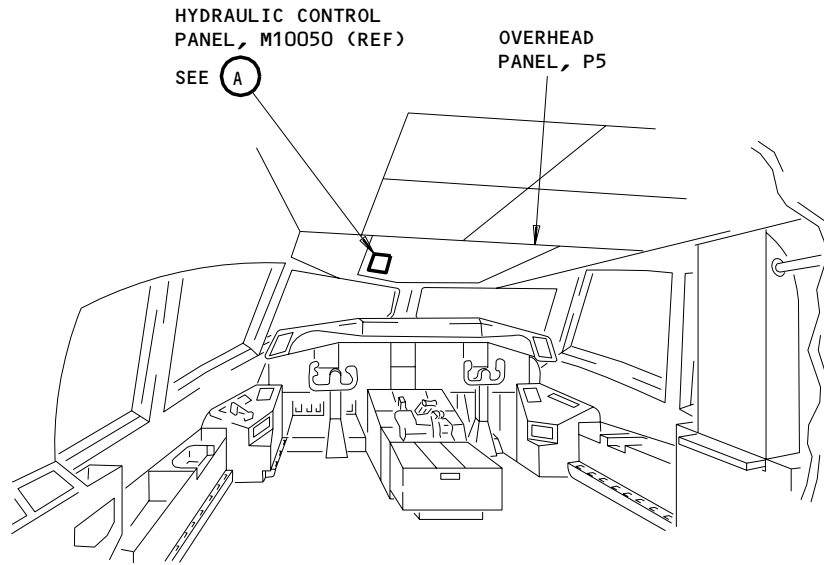
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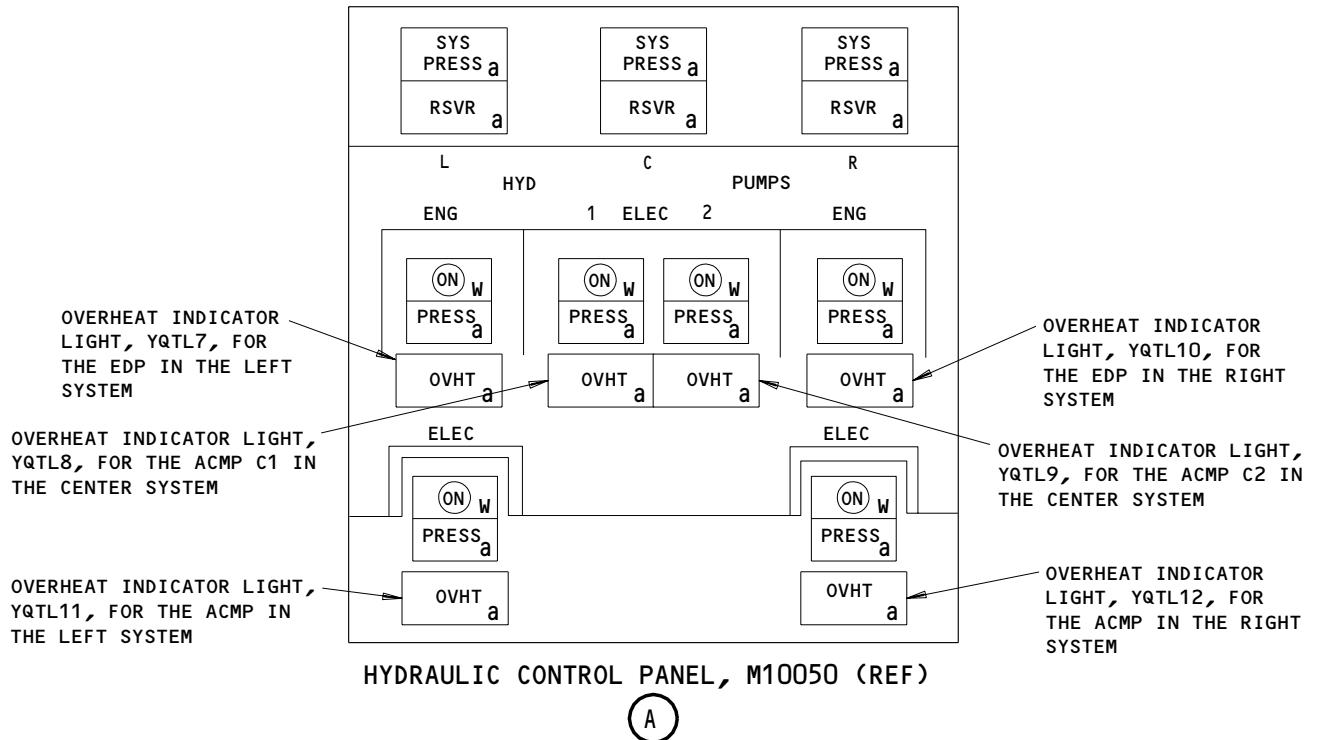
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FLIGHT COMPARTMENT



Hydraulic Fluid Temperature Indicating System - Component Location
Figure 102 (Sheet 1)

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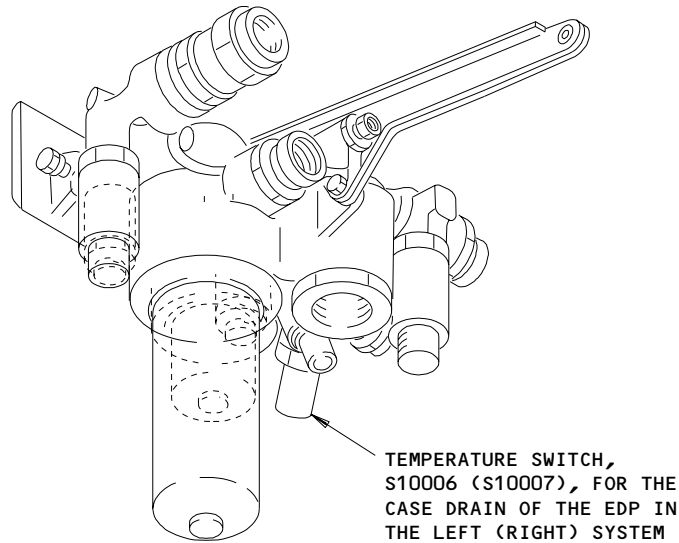
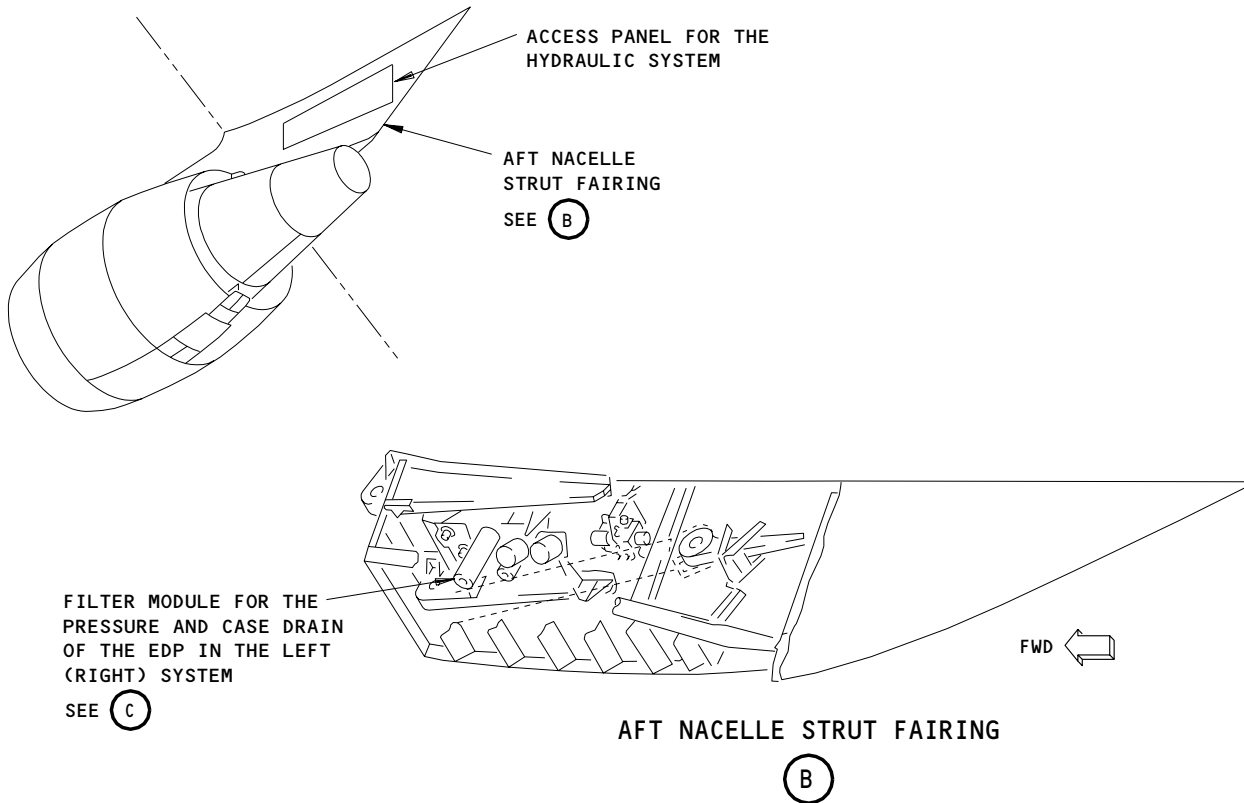
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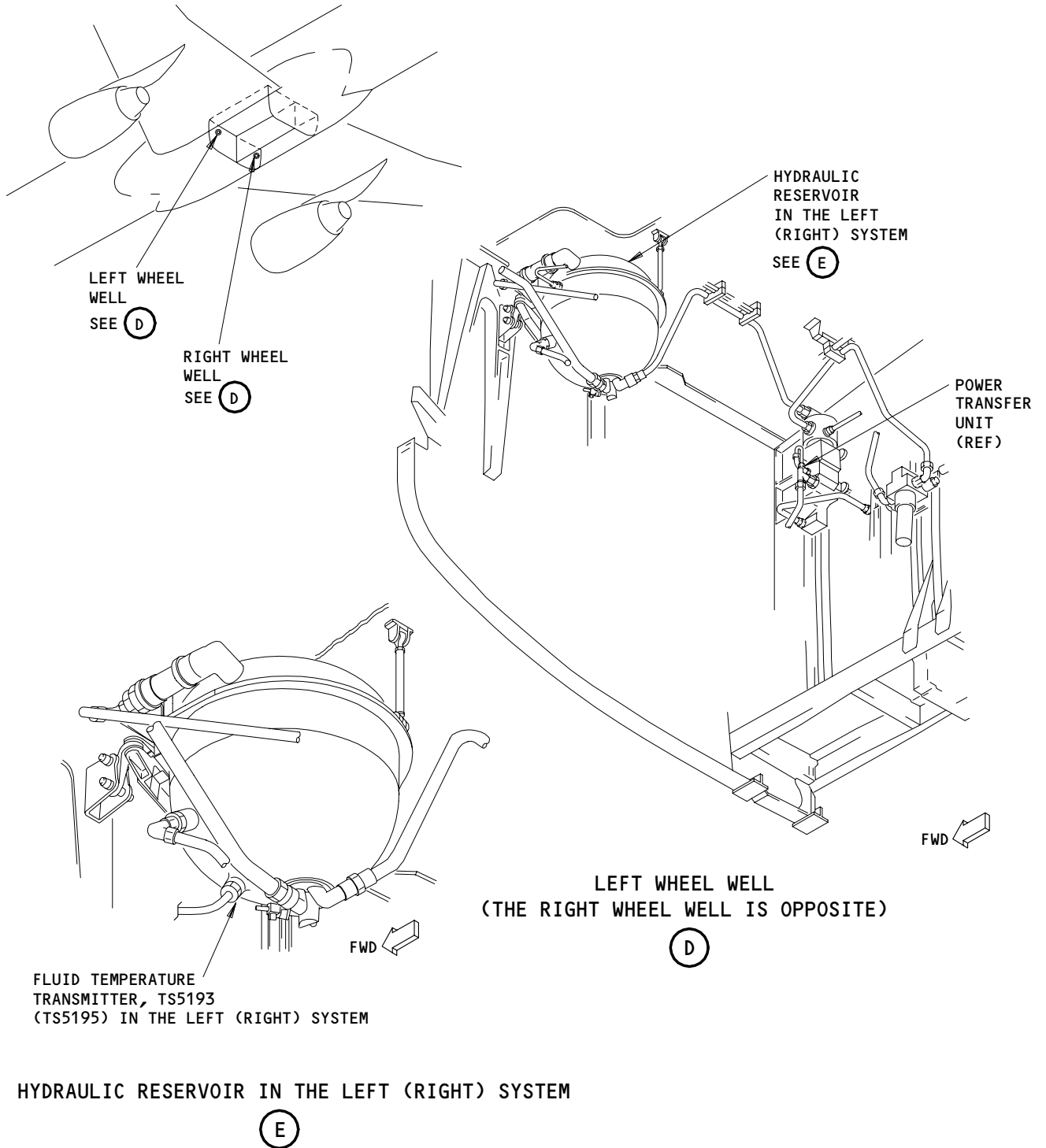


FILTER MODULE FOR THE PRESSURE AND CASE DRAIN OF THE EDP IN THE LEFT (RIGHT) SYSTEM
(C)

Hydraulic Fluid Temperature Indicating System - Component Location
Figure 102 (Sheet 2)

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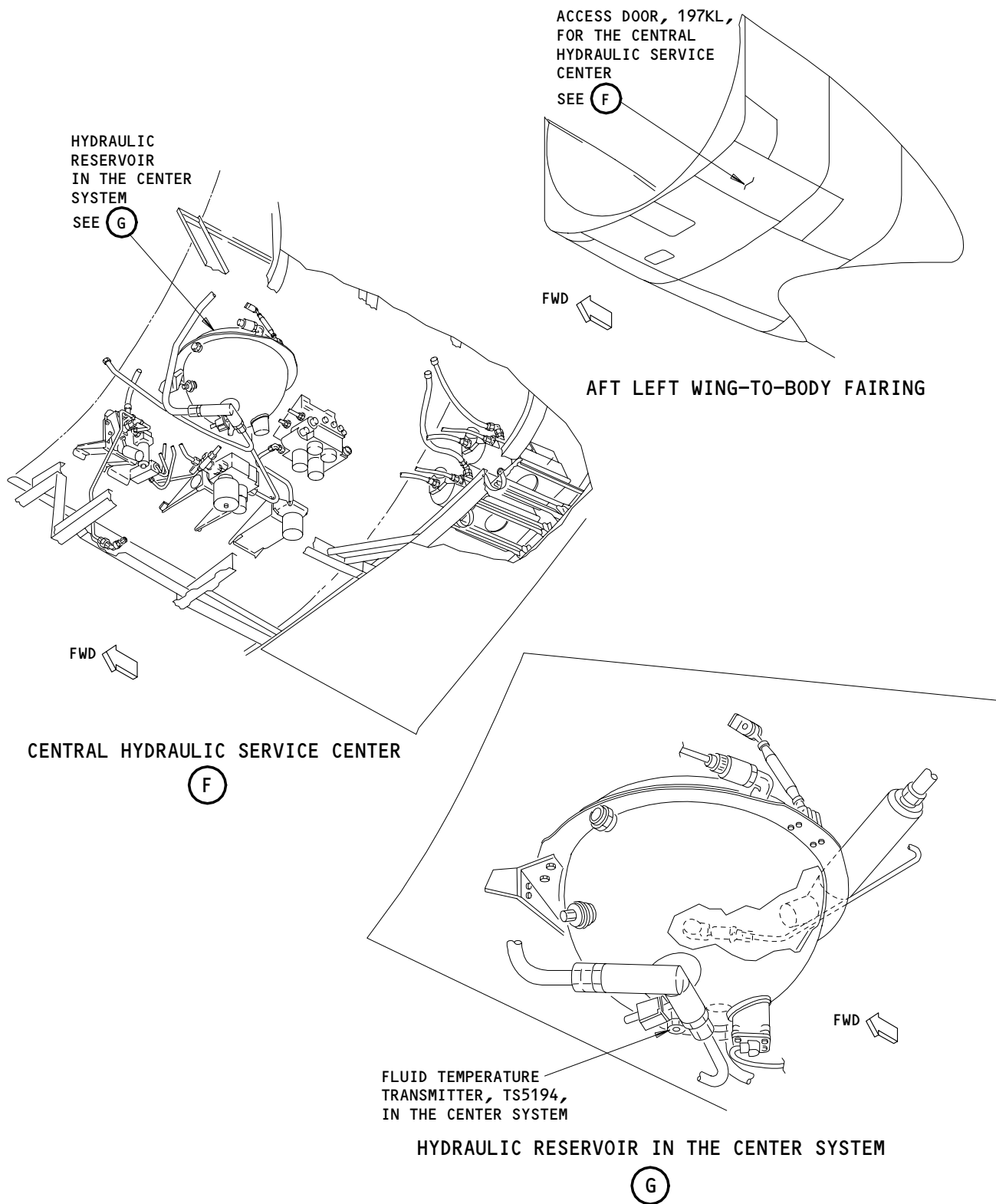
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Hydraulic Fluid Temperature Indicating System - Component Location
Figure 102 (Sheet 3)

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Hydraulic Fluid Temperature Indicating System - Component Location
Figure 102 (Sheet 4)

EFFECTIVITY	
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HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure has two tasks. One task is a system test of the overheat lights for the hydraulic pumps. The other task is a system test of the temperature indication system for the hydraulic reservoir.

TASK 29-32-00-735-001

2. System Test – Overheat Lights for the Hydraulic Pumps

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (3) AMM 24-22-00/201, Electrical Power
- (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

B. Access

(1) Location Zones

- 143/144 MLG Wheel Well
- 197 Wing to Body-Aft Lower Half (Left)
- 211/212 Control Cabin
- 434/444 Nacelle Strut – Aft Fairing

(2) Access Panels

- 197KL Central Hydraulic Service Center
- 434AL/444AL Hydraulics Installation

C. Prepare for the System Test

S 865-002

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

S 495-003

- (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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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.

- (3) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 865-005

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

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

S 015-006

- (5) Open the access panels for the hydraulic bay in the left and right aft struts (AMM 06-43-00/201).

S 015-008

- (6) Open the access panel for the central hydraulic service center (AMM 06-41-00/201).

S 865-057

- (7) Make sure these circuit breakers on the overhead panel, P11 are closed:
(a) EICAS (6 locations)

S 865-058

- (8) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11P1, L IND LTS 1

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- (b) 11P28, R IND LTS 1
D. Do the System Test of the Overheat Lights for the Hydraulic Pumps

S 035-059

- (1) Disconnect the electrical connectors for the temperature switches from the left, right, and center alternating current motor pumps (ACMPS).

S 495-060

- (2) Connect a jumper between the pins 1 and 3 on each of the ACMP connectors.

S 035-061

- (3) Disconnect the electrical connector from the temperature switch on the left and right pressure/case drain filter modules for the engine-driven pumps (EDPs).

S 495-062

- (4) Connect a jumper between the pins 1 and 2 of the electrical connector for the temperature switch on each EDP filter module.

S 865-063

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel.

(a) 11P1, L IND LTS 1

(b) 11P28, R IND LTS 1

S 215-064

- (6) Make sure these lights on the hydraulic control panel come on:

(a) L ENG OVHT and L ELEC OVHT.

(b) C1 ELEC OVHT and C2 ELEC OVHT.

(c) R ENG OVHT and R ELEC OVHT.

S 215-065

- (7) Make sure these messages show on the EICAS:

(a) L ELEC HYD OVHT and R ELEC HYD OVHT

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- (b) C HYD 1 OVHT and C HYD 2 OVHT
- (c) L ENG HYD OVHT and R ENG HYD OVHT

S 865-009

- (8) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - (a) R IND LTS 1

S 095-010

- (9) Remove the jumper from the pins 1 and 3 of the electrical connector for the left ACMP.

S 435-011

- (10) Connect the electrical connector to the left ACMP.

S 865-012

- (11) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
 - (a) R IND LT

S 215-013

- (12) Make sure the L ELEC HYD OVHT message does not show on the EICAS.

S 215-014

- (13) Make sure the L ELEC OVHT light on the hydraulic control panel is not on.

S 865-015

- (14) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
 - (a) L IND LTS 1

S 095-016

- (15) Remove the jumper from the pins 1 and 3 of the electrical connector for the right ACMP.

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- S 435-017
(16) Connect the electrical connector to the right ACMP.
- S 865-018
(17) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) L IND LTS 1
- S 215-019
(18) Make sure the R ELEC HYD OVHT message does not show on the EICAS.
- S 215-020
(19) Make sure the R ELEC OVHT light on the hydraulic control panel is not on.
- S 865-021
(20) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) R IND LTS 1
- S 095-022
(21) Remove the jumper from the pins 1 and 3 of the electrical connector for the center ACMP C1.
- S 435-023
(22) Connect the electrical connector to the center ACMP C1.
- S 865-024
(23) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) R IND LTS 1
- S 215-025
(24) Make sure the C HYD 1 OVHT message does not show on the EICAS.
- S 215-026
(25) Make sure the C1 ELEC OVHT light on the hydraulic control panel is not on.
- S 865-027
(26) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) L IND LTS 1
- S 095-028
(27) Remove the jumper from the pins 1 and 3 of the electrical connector for the center ACMP C2.
- S 435-029
(28) Connect the electrical connector to the center ACMP C2.

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- S 865-030
- (29) Remove the D0-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) L IND LTS 1
- S 215-031
- (30) Make sure the C HYD 2 OVHT message does not show on the EICAS.
- S 215-032
- (31) Make sure the C2 ELEC OVHT light on the hydraulic control panel is not on.
- S 865-033
- (32) Open this circuit breaker on the P11 panel and attach a D0-NOT-CLOSE tag:
(a) R IND LTS 1
- S 095-034
- (33) Remove the jumper from the pins 1 and 2 of the electrical connector for the left EDP.
- S 435-035
- (34) Connect the electrical connector to the left EDP.
- S 865-036
- (35) Remove the D0-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) R IND LTS 1
- S 215-037
- (36) Make sure the L ENG HYD OVHT message does not show on the EICAS.
- S 215-038
- (37) Make sure the L ENG OVHT light on the hydraulic control panel is not on.
- S 865-039
- (38) Open this circuit breaker on the P11 panel and attach a D0-NOT-CLOSE tag:
(a) L IND LTS 1
- S 095-040
- (39) Remove the jumper from the pins 1 and 2 of the electrical connector for the right EDP.
- S 435-041
- (40) Connect the electrical connector to the right EDP.

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S 865-042

- (41) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) L IND LTS 1

S 215-043

- (42) Make sure the R ENG HYD OVHT message does not show on the EICAS.

S 215-044

- (43) Make sure the R ENG OVHT light on the hydraulic control panel is not on.

E. Put the Airplane Back to Its Usual Condition

S 415-045

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 415-046

- (2) Close the access panels for the hydraulic bay in the left and right aft struts (Ref 06-43-00/201).

S 865-048

- (3) Close the access panel for the central hydraulic service center (AMM 06-41-00/201).

S 865-049

- (4) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 865-050

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

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TASK 29-32-00-735-077

3. System Test-Temperature Indication for the Hydraulic Reservoir Fluid

A. Equipment

- (1) Decade Box, Variable Resistance - 10 to 150 \pm 0.5 ohms - commercially available

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 32-00-15/201, Landing Gear Door Locks
(4) AMM 32-00-20/201, Landing Gear Downlocks

C. Access

(1) Location Zones

- | | |
|---------|------------------------------------|
| 143/144 | MLG Wheel Well |
| 197 | Wing to Body-Aft Lower Half (Left) |
| 211/212 | Control Cabin |

(2) Access Panels

- | | |
|-------|----------------------------------|
| 197KL | Central Hydraulic Service Center |
|-------|----------------------------------|

D. Prepare for the System Test

S 865-051

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

S 495-052

- (2) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-083

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 015-053

- (4) Open the access panel for the central hydraulic service center (AMM 06-41-00/201).

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E. Do the System Test of the Temperature Indication for the Hydraulic Reservoir Fluid.

S 865-066

- (1) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

S 975-067

- (2) Make a record of the L (R, C) HYD TEMP indication shown on EICAS.

S 035-068

- (3) Disconnect the electrical connector from the temperature transmitter on the left (right, center) hydraulic reservoir.

S 485-069

- (4) Connect the electrical connector for the left (right, center) temperature transmitter to a decade box.

S 865-070

- (5) Set the resistance of the decade box to 108.39 ± 0.40 ohms.

S 215-071

- (6) Make sure the L (R, C) HYD TEMP indication shown on EICAS is $50 \pm 1^\circ\text{C}$.

S 865-072

- (7) Set the resistance of the decade box to 128.85 ± 0.50 ohms.

S 215-073

- (8) Make sure the L (R, C) HYD TEMP indication shown on EICAS is $100 \pm 2^\circ\text{C}$.

S 095-074

- (9) Disconnect the decade box from the electrical connector.

S 435-075

- (10) Install the electrical connector on the temperature transmitter on the left (right, center) hydraulic reservoir.

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S 215-076

(11) Make sure the L (R, C) HYD TEMP indication is the same as the record you made before ($\pm 1^{\circ}\text{C}$).

F. Put the Airplane Back to Its Usual Condition

S 415-054

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 415-055

(2) Close the access panel for the central hydraulic service center (AMM 06-41-00/201).

S 865-056

(3) Remove electrical power, if it is necessary (AMM 24-22-00/201).

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LEFT (L) AND RIGHT (R) ENGINE-DRIVEN PUMP (EDP) CASE DRAIN
TEMPERATURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the Engine-Driven Pump (EDP) temperature switch.

TASK 29-32-01-024-001

2. Remove the Engine-Driven Pump (EDP) Temperature Switch

A. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
- (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 Zones

211/212	Control Cabin
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

434AL	Hydraulic Bay
444AL	Hydraulic Bay

C. Remove the EDP Temperature Switch (Fig. 401)

S 864-002

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K14, L ENG PUMP VLV DEPRESS or
LEFT ENGINE PUMP DEPRESS
 - (b) 11K23, R ENG PUMP VLV DEPRESS or
R ENG PUMP DEPRESS

S 044-003

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.

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

S 014-004

- (3) Open the access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).

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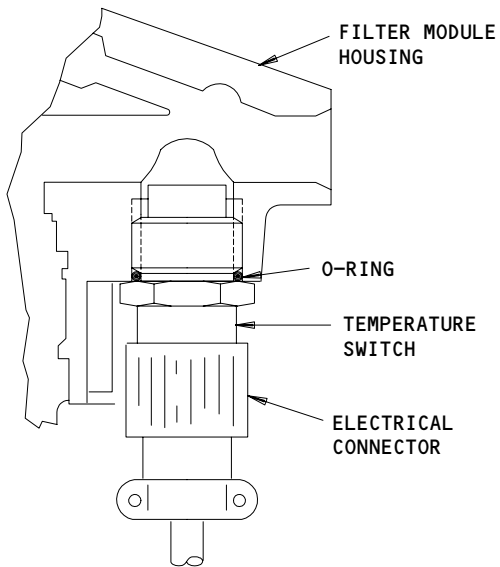
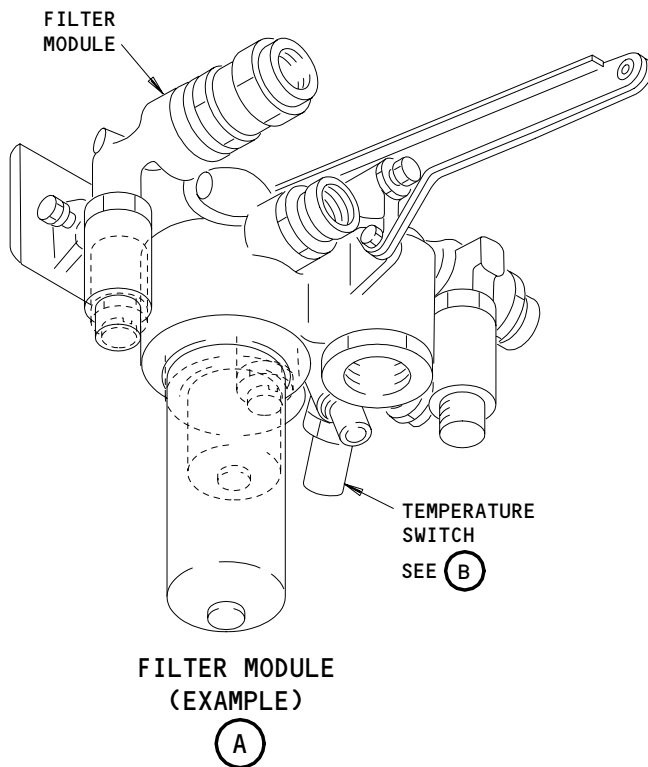
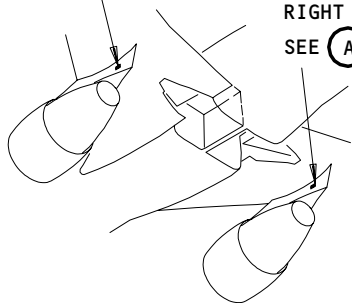
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FILTER MODULE FOR THE
ENGINE-DRIVEN PUMP IN THE
LEFT HYDRAULIC SYSTEM

SEE (A)

FILTER MODULE FOR THE
ENGINE-DRIVEN PUMP IN THE
RIGHT HYDRAULIC SYSTEM

SEE (A)



TEMPERATURE SWITCH

(B)

Temperature Switch Installation
Figure 401

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- S 864-006
- (4) Remove the pressure from the hydraulic system and reservoir that contains the EDP temperature switch that you will remove (AMM 29-11-00/201).

- S 034-007
- (5) Remove the electrical connector from the switch.

- S 024-008
- (6) Remove the temperature switch from the filter module.

TASK 29-32-01-424-009

3. Install the EDP Temperature Switch

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

- (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

211/212	Control Cabin
434/444	Nacelle Strut - Aft Fairing

(2) Access Panels

434AL	Hydraulic Bay
444AL	Hydraulic Bay

D. Install the EDP Temperature Switch (Fig. 401)

- S 644-010
- (1) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-ring.

- S 434-011
- (2) Install the O-ring on the temperature switch.

- S 424-012
- (3) Install the temperature switch in the filter module and tighten the temperature switch as follows:
- (a) Tighten the temperature switch to 75-100 pound inches.

- S 434-013
- (4) Connect the electrical connector.

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S 864-014

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K14, L ENG PUMP VLV DEPRESS or
LEFT ENGINE PUMP DEPRESS
 - (b) 11K23, R ENG PUMP VLV DEPRESS or
R ENG PUMP DEPRESS

S 864-015

- (6) Pressurize the hydraulic system that contains the new EDP temperature switch (AMM 29-11-00/201).

S 214-016

- (7) Make sure there is no hydraulic leakage at the temperature switch.

S 164-017

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (8) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-027

- (9) Close the access panel for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 444-020

- (10) Do the activation procedure for the isolation valve for the thrust reverser (AMM 78-31-00/201).

S 864-021

- (11) Remove the power from the left, right, and center hydraulic systems if it is not necessary (AMM 29-11-00/201).

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RESERVOIR TEMPERATURE TRANSMITTER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the temperature transmitter on the hydraulic reservoirs.

TASK 29-32-03-024-001

2. Remove the Temperature Transmitter

A. References

- (1) AMM 06-41-00/201, Fuselage 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

B. Access

(1) Location Zones

- 197 Wing to Body – Aft Lower Half (Left)
- 211/212 Control Cabin
- 732/742 MLG Body Door

(2) Access Panel

- 197KL Hydraulic Service Bay

C. Prepare for the Removal

S 014-002

- (1) To remove the temperature transmitter from the center system reservoir, open the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

S 494-003

WARNING: USE THE PROCEDURE IN 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.

- (2) To remove the temperature transmitter from the left or right system reservoir, 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 hydraulic system that contains the reservoir with the temperature transmitter that you will remove (AMM 29-11-00/201).

S 864-005

- (4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K24, HYDRAULICS ELEC PUMP C2

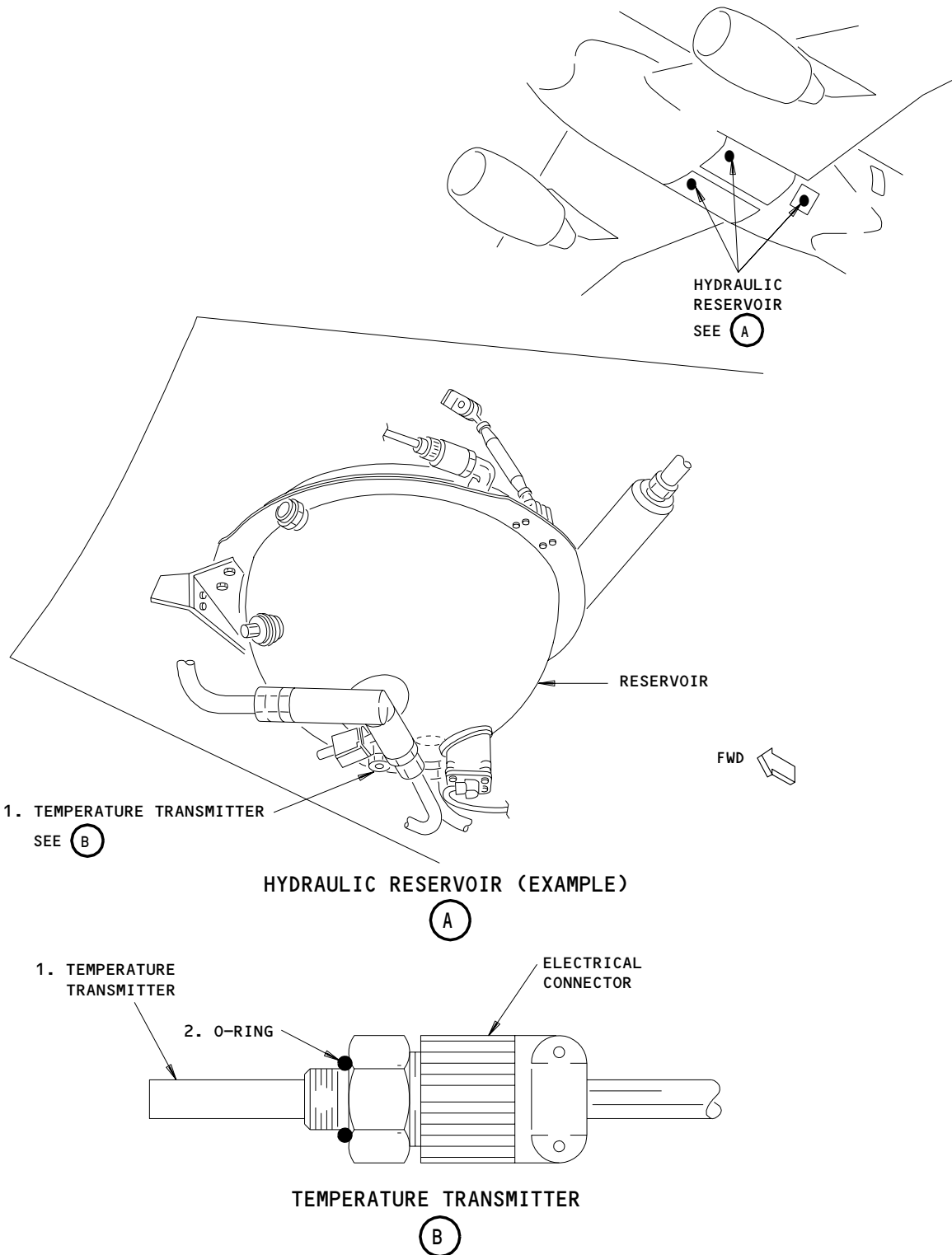
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Temperature Transmitter Installation
Figure 401

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- (d) 11K25, HYDRAULICS ELEC PUMP LEFT
- (e) EICAS (6 locations)

S 684-006

- (5) Open the drain valve to drain the reservoir.

S 684-007

- (6) Close the drain valve when the reservoir is empty.

D. Remove the Temperature Transmitter (Fig. 401)

S 034-008

- (1) Remove the electrical connector.

S 024-009

- (2) Remove the transmitter (1) from the reservoir and discard the O-ring (2).

S 034-010

- (3) Install a cap on the open reservoir port.

TASK 29-32-03-404-027

3. Install the Temperature Transmitter

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Temperature Transmitter	29-11-20	04	157
					145
	2	Packing (O-ring)			107
					160
					150
					109

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C. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 12-25-01/301, Exterior Cleaning
- (4) AMM 24-22-00/201, Electrical Power
- (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
 - 197 Wing to Body - Aft Lower Half (Left)
 - 211/212 Control Cabin
 - 732/742 MLG Body Door
- (2) Access Panel
 - 197KL Hydraulic Service Bay

E. Install the Temperature Transmitter (Fig. 401)

- S 644-011
 - (1) Apply a layer of hydraulic lubricant or hydraulic fluid on the new O-ring (2) and the temperature transmitter threads.
- S 434-012
 - (2) Remove the cap from the reservoir port.
- S 424-013
 - (3) Install the O-ring (2) and the transmitter (1) in the reservoir.
- S 434-014
 - (4) Connect the electrical connector.
- S 614-015
 - (5) Fill the hydraulic reservoir (AMM 12-12-01/301).
- S 864-016
 - (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
 - (a) 11K15, HYDRAULICS ELEC PUMP C1

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- (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
- (c) 11K24, HYDRAULICS ELEC PUMP C2
- (d) 11K25, HYDRAULICS ELEC PUMP LEFT
- (e) EICAS (6 locations)

S 864-017

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

S 864-018

- (8) Pressurize the hydraulic reservoir that contains the new temperature transmitter (AMM 29-11-00/201).

S 214-019

- (9) Make sure there is no hydraulic leakage at the temperature transmitter.

S 164-020

CAUTION: QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.

- (10) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 714-021

- (11) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.

S 214-022

- (12) Make sure the (L, R, C) HYD TEMP indication on the EICAS display shows the approximate fluid temperature.

S 414-023

- (13) If you replaced the temperature switch for the center system reservoir, close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

S 094-024

WARNING: USE THE PROCEDURE IN 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.

- (14) If you replaced the temperature switch for the left or right system reservoir, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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S 864-025

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

S 864-026

(16) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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HYDRAULIC FLUID QUANTITY INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General

- A. A hydraulic fluid quantity indicating system is provided for each main hydraulic system. This system indicates fluid quantity in each hydraulic reservoir. Low quantity warning lights are on the hydraulic control panel in the flight compartment. The EICAS display contains a digital readout of fluid quantity in each reservoir. The display also provides low quantity messages. A remote quantity indicator is at the central ground servicing station (AMM 29-18-00). The quantity indicating system is powered by 115 volts ac from overhead circuit breaker panel P11. The low quantity warning lights are powered by 28 volts dc from master dim and test circuit breakers on panel P11.
- B. There is standpipe at the bottom of the reservoir, the quantities of fluid not accessible to indication (the fluid level in EICAS reading is zero) are 0.7 gallon for the center reservoir and 1.2 gallons for the left and right reservoir.

2. Component Details (Fig. 1 and 2)

A. EICAS Display

- (1) The EICAS display shows a digital readout of fluid quantity in each reservoir in both the status and maintenance modes. The quantity readout is a decimal number indicating a fraction of full.
- (2) An OF (overfull) indication is displayed next to the digital readout of fluid quantity in the EICAS maintenance mode for readings above 1.22. The OF indication is generated in the EICAS computer. In addition, a (L, R, C) HYD QTY 0/FULL message is displayed on the EICAS maintenance page.
- (3) A RF (refill) indication is displayed next to the digital readout of fluid quantity in the EICAS status and maintenance modes for readings below 0.75. The RF indication is generated in the EICAS computer.
- (4) A (L, R, C) HYD QTY level C message is displayed on EICAS to indicate a low fluid level in the system reservoir.
- (5) For information on the EICAS, refer to AMM 31-41-00.

B. Quantity Warning Lights

- (1) A low quantity warning light for each hydraulic system is on the hydraulic control panel. The warning light illuminates to indicate low fluid level in the system reservoir. This light will also illuminate if reservoir air pressure is low (AMM 29-35-00).

C. Remote Quantity Indicator

- (1) A quantity gage is at the central ground servicing station. This gage shows the fluid level in the reservoir being serviced. For information on this quantity gage, refer to AMM 29-18-00.

D. Sight Glasses

- (1) One sight glass is on each reservoir to visually check the full fluid level.

E. Quantity Transmitter

- (1) The quantity transmitter is a variable capacitor inside each reservoir. The capacitance of the transmitter varies with the change of depth of fluid within the reservoir.

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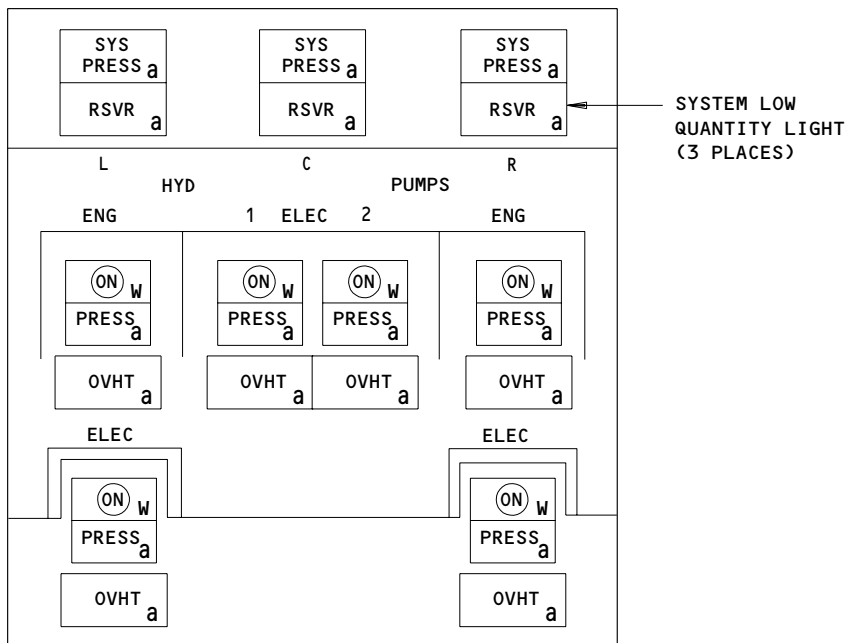
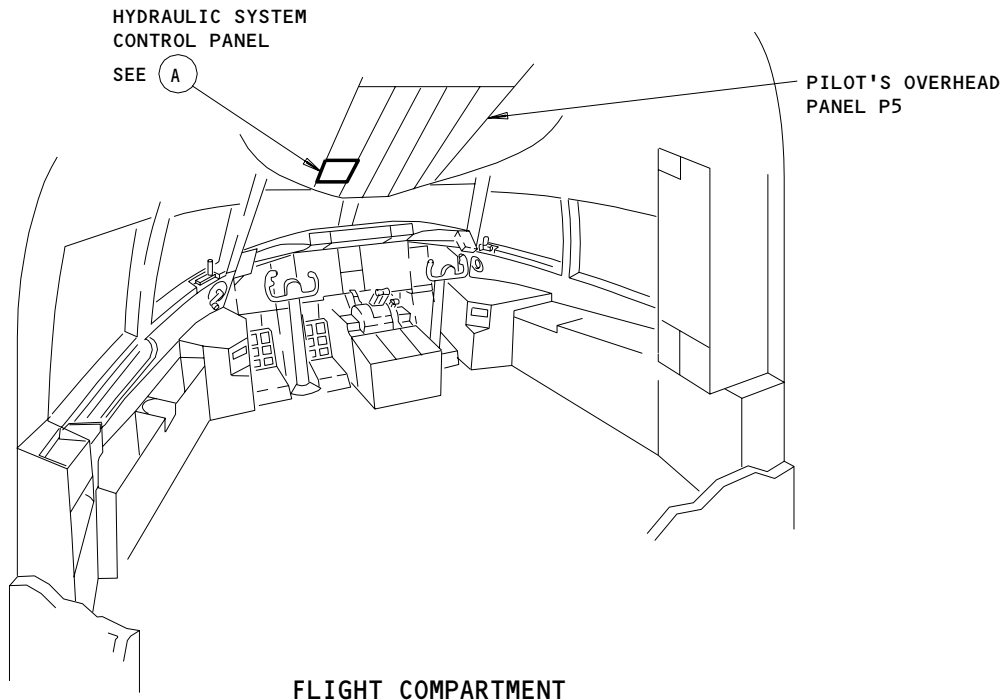
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HYDRAULIC SYSTEM CONTROL PANEL

(A)

Low Quantity Lights
Figure 1

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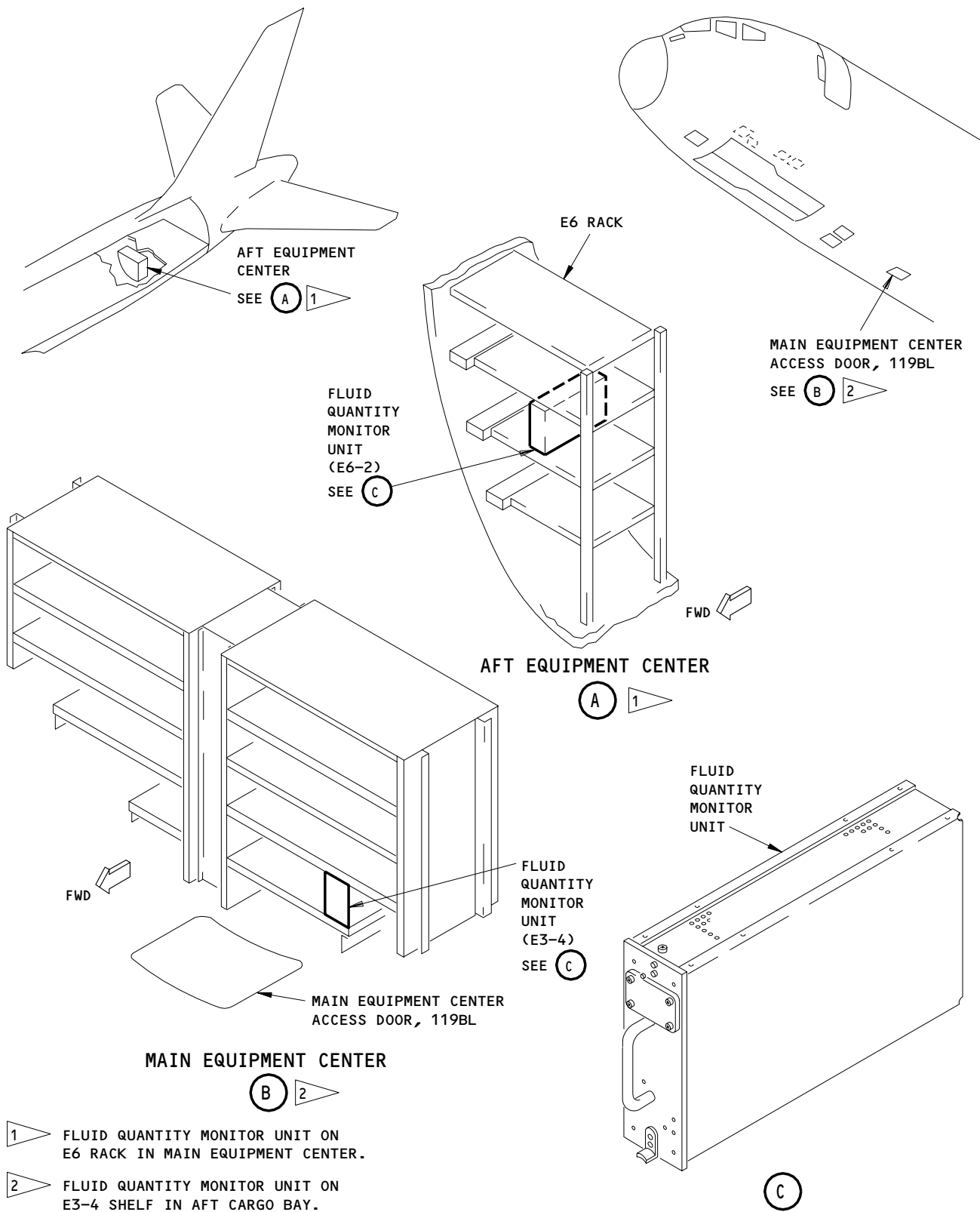
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Quantity Monitor Unit and Transmitter Locations
Figure 2 (Sheet 1)

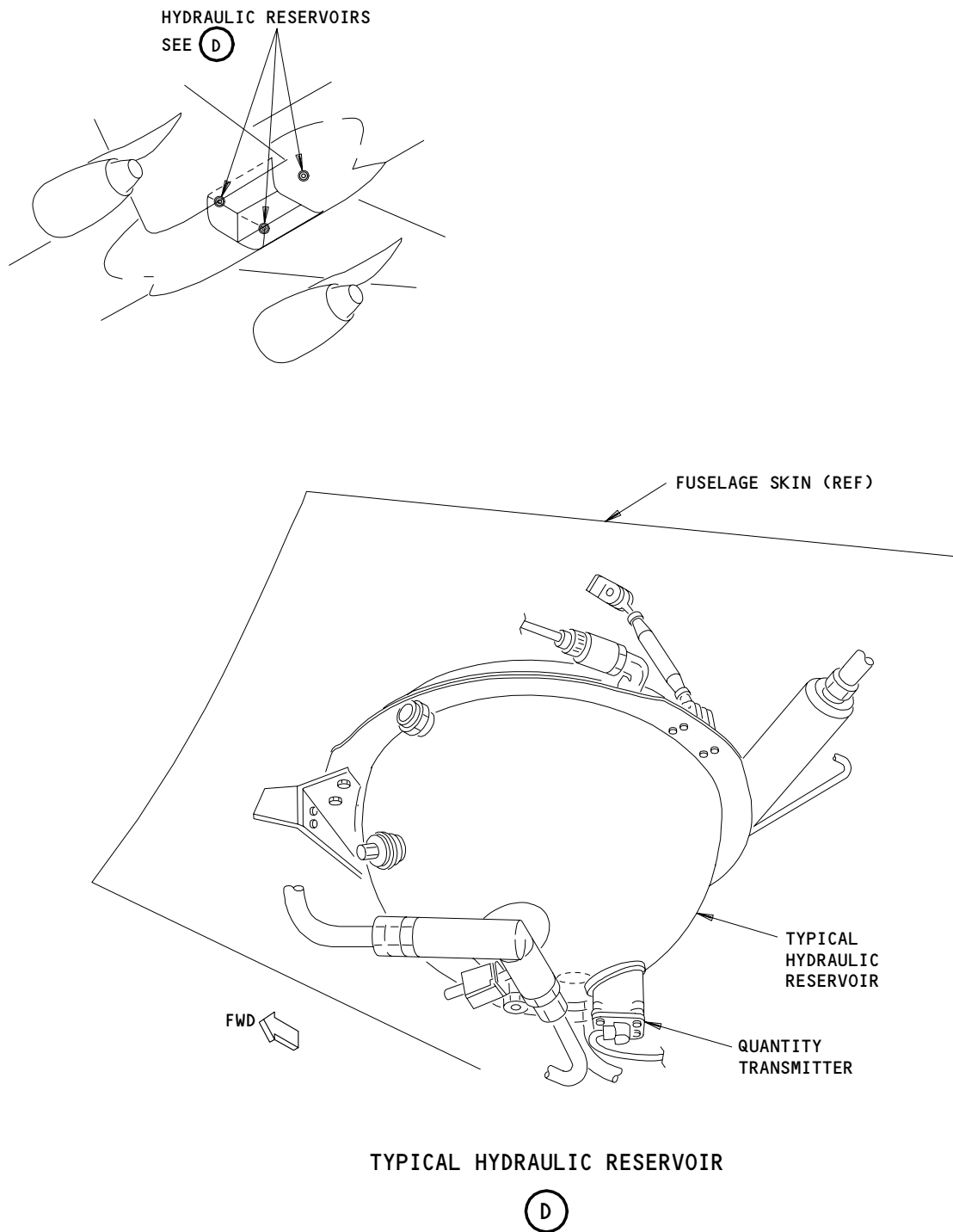
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Quantity Monitor Unit and Transmitter Locations
Figure 2 (Sheet 2)

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F. Quantity Monitor Unit

- (1) The monitor unit changes the signal from the quantity transmitters into voltage signals to the EICAS computer, the low quantity lights, and the remote quantity gage.

3. Operation

A. Functional Description (Fig. 3)

- (1) A change in the reservoir fluid level causes a change in the capacitance of the quantity transmitter. The quantity monitor unit converts the change in capacitance into a voltage signal to the EICAS computer. The computer causes a digital readout of the system quantity (in percent of full) to appear on the EICAS display. The EICAS will display system quantity in the status and maintenance modes. The monitor unit also sends a voltage signal through the reservoir fill selector valve switch to the remote quantity indicator. This moves the indicator needle to a fluid quantity reading. The reservoir fill valve switch selects the system quantity to be displayed on the remote indicator.
- (2) When the capacitance of the transmitter corresponds to a fluid level of 0.45 or less, the monitor unit activates a fluid quantity warning light. The monitor unit also signals the EICAS computer to display a (L, R, C) HYD QTY low quantity message.
- (3) A refill indication is generated in the EICAS computer if the EICAS quantity readout is at .75 or below. A RF (refill) indication next to the digital readout of fluid quantity is displayed in the EICAS status and maintenance modes.
- (4) An overfull indication is generated in the EICAS computer if the EICAS quantity readout is at 1.22 or above. An OF (overfull) indication next to the digital readout of fluid quantity is displayed in the EICAS maintenance mode. In addition, a (L, R, C) HYD SYS 0/FULL message is displayed on the EICAS maintenance page.
- (5) For additional information on the EICAS, refer to AMM 31-41-00.

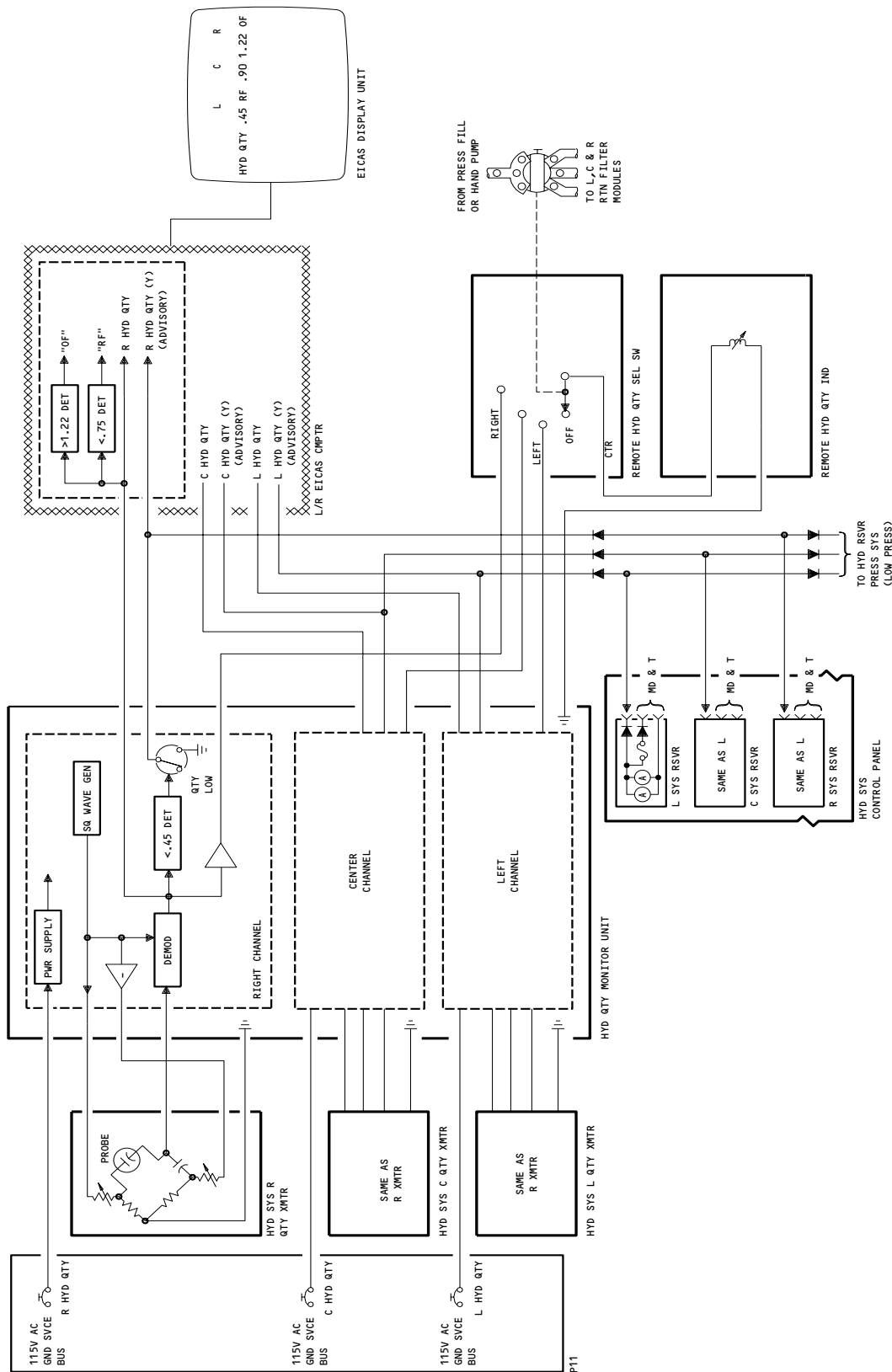
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Hydraulic Quantity Indicating System Schematic
Figure 3

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

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
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HYDRAULIC FLUID QUANTITY INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER/- HYDRAULICS QTY CTR, C4192 HYDRAULICS QTY LEFT, C1101 HYDRAULICS QTY RIGHT, C4193	1	1 1 1	FLIGHT COMPARTMENT, P11 PANEL 11K19 11K20 11K21	* * *
COMPUTER - (FIM 31-41-00/101) EICAS L, M10181 EICAS R, M10182				
DIODE - (FIM 31-01-36/101) CENTER SYSTEM - HYDRAULIC QUANTITY ISOLATION, R10195 LEFT SYSTEM - HYDRAULIC QUANTITY ISOLATION, R10194 RIGHT SYSTEM - HYDRAULIC QUANTITY ISOLATION, R10196				
INDICATOR - (FIM 29-18-00/101) RESERVOIR FILL, N29				
LIGHT - CENTER SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL6	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - LEFT SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL2	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - RIGHT SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL4	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
PANEL - (FIM 29-11-00/101) HYDRAULIC CONTROL, M10050				
RESERVOIR - (FIM 29-11-00/101) CENTER SYSTEM HYDRAULIC LEFT SYSTEM HYDRAULIC RIGHT SYSTEM HYDRAULIC				
SIGHT GLASS - CENTER SYSTEM RESERVOIR	3	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - LEFT SYSTEM RESERVOIR	3	1	LEFT WHEEL WELL, LEFT SYSTEM HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - RIGHT SYSTEM RESERVOIR	3	1	RIGHT WHEEL WELL, RIGHT SYSTEM HYDRAULIC RESERVOIR	29-33-00
SWITCH - (FIM 29-18-00/101) HYDRAULIC QUANTITY, S341				
TRANSMITTER - CENTER SYSTEM HYDRAULIC FLUID QUANTITY, M339	3	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM HYDRAULIC RESERVOIR	29-33-01
TRANSMITTER - LEFT SYSTEM HYDRAULIC FLUID QUANTITY, M338	3	1	LEFT WHEEL WELL, LEFT SYSTEM HYDRAULIC RESERVOIR	29-33-01
TRANSMITTER - RIGHT SYSTEM HYDRAULIC FLUID QUANTITY, M340	3	1	RIGHT WHEEL WELL, RIGHT SYSTEM HYDRAULIC RESERVOIR	29-33-01
UNIT - HYDRAULIC FLUID QUANTITY MONITOR, M122 	3	1	NO. 2 (AFT) CARGO DOOR, 822, AFT CARGO COMPARTMENT, AFT EQUIPMENT CENTER, E6	29-33-51
UNIT - HYDRAULIC FLUID QUANTITY MONITOR, M122 	4	1	119BL, MAIN EQUIPMENT CENTER, E3	29-33-51

* SEE THE WDM EQUIPMENT LIST

 THE FLUID QUANTITY MONITOR UNIT IS INSTALLED
IN THE AFT EQUIPMENT CENTER OR THE MAIN
EQUIPMENT CENTER.

Hydraulic Fluid Quantity Indicating System - Component Index
Figure 101

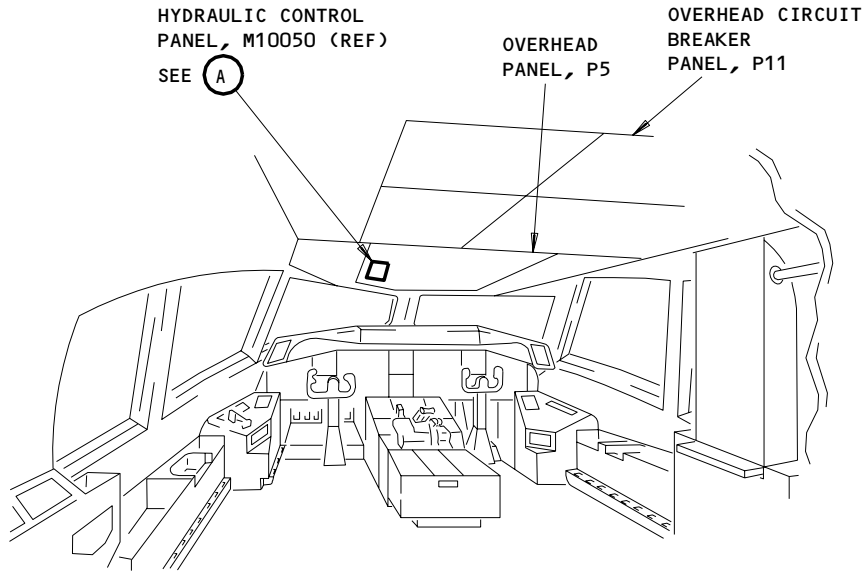
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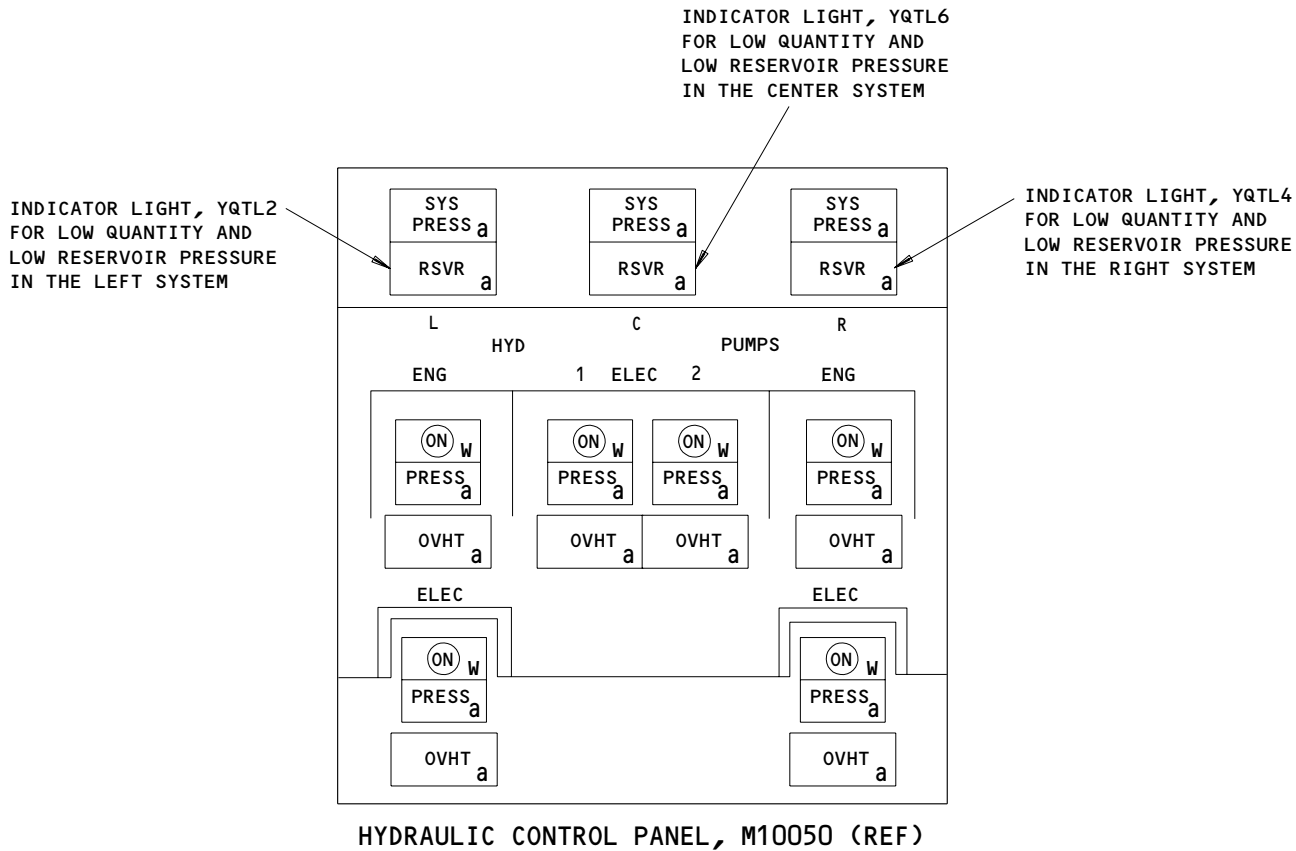
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FLIGHT COMPARTMENT



(A)

Hydraulic Fluid Quantity Indicating System - Component Location
Figure 102 (Sheet 1)

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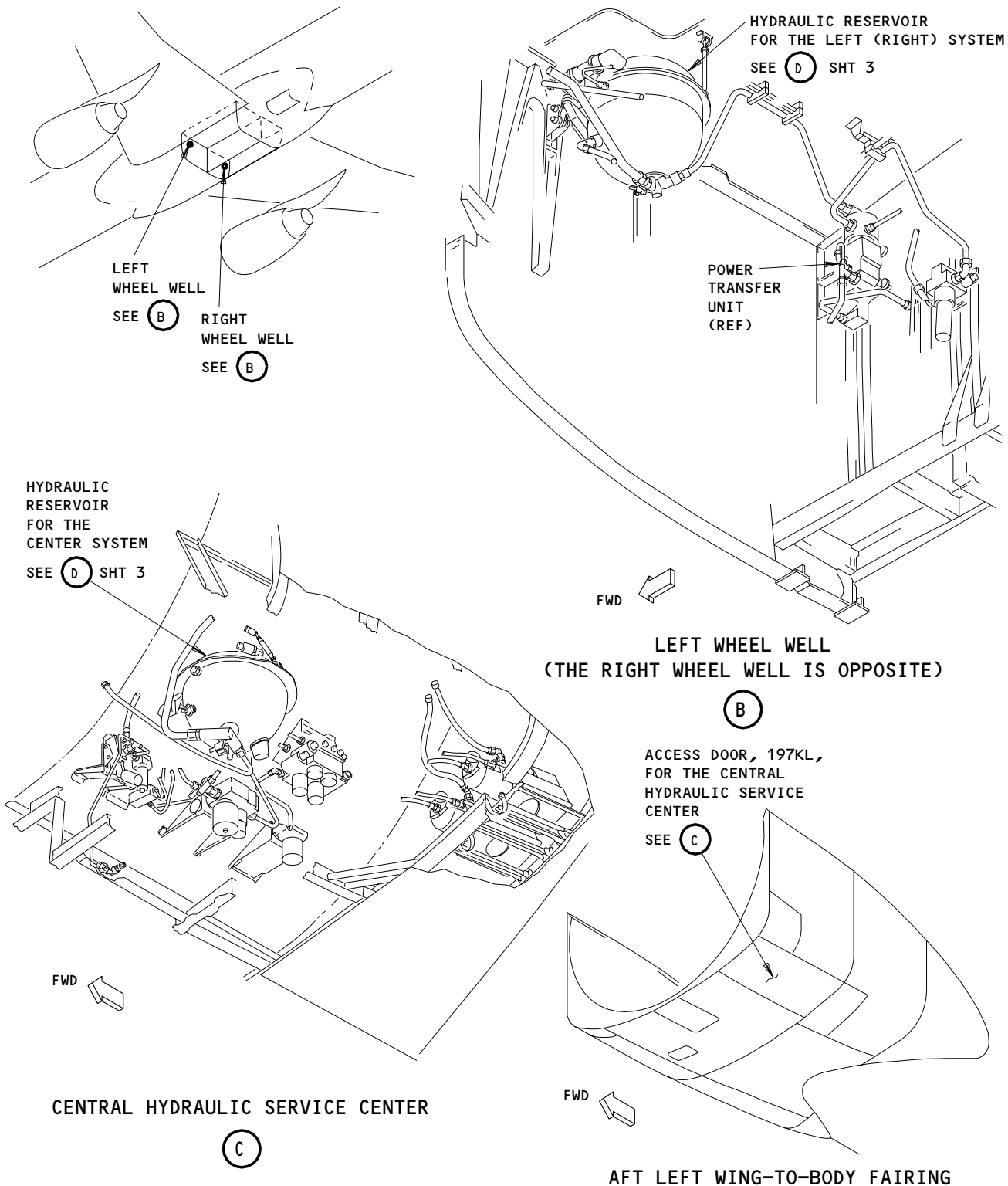
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Hydraulic Fluid Quantity Indicating System - Component Location
Figure 102 (Sheet 2)

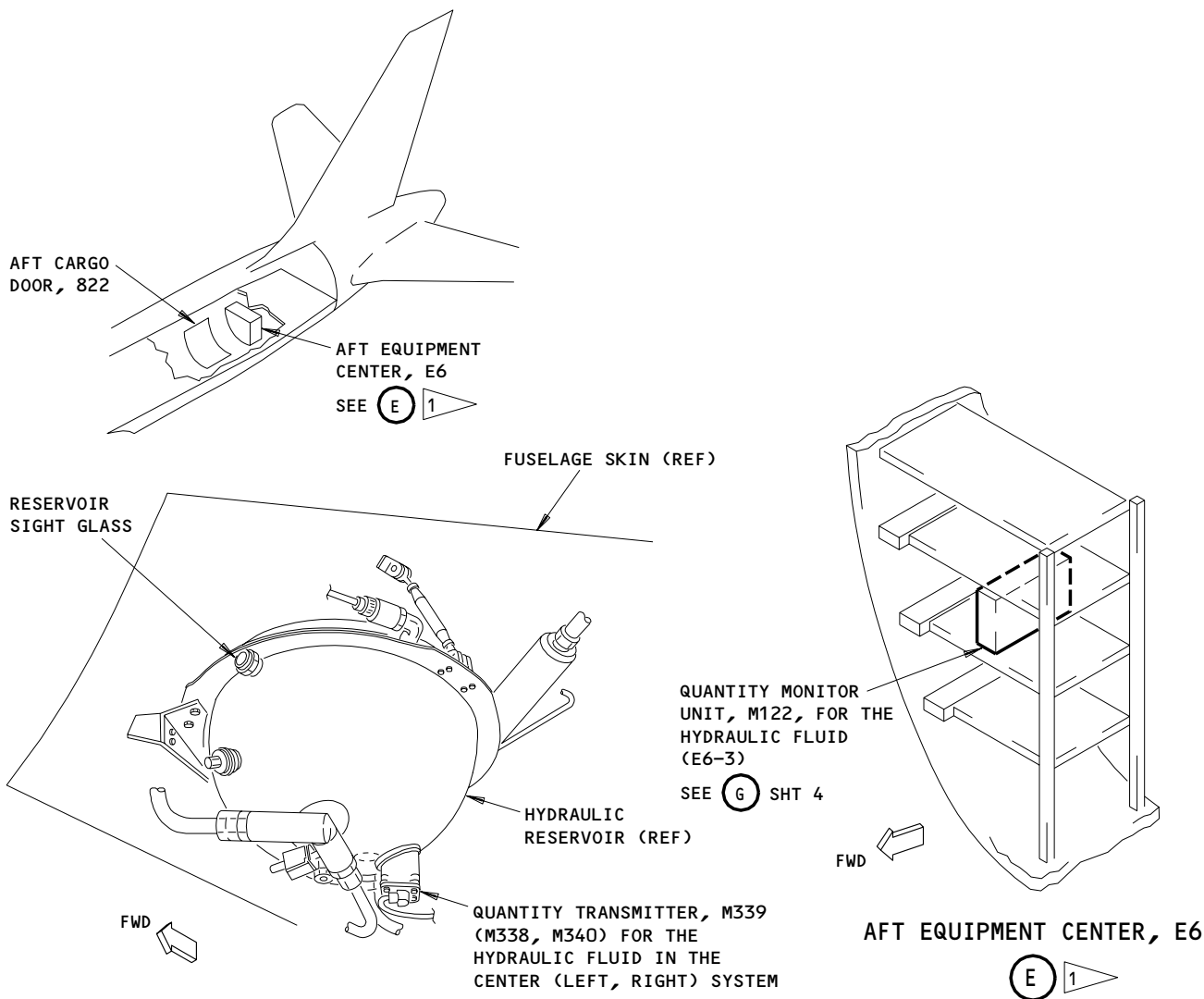
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HYDRAULIC RESERVOIR IN THE CENTER SYSTEM IS SHOWN
(THE HYDRAULIC RESERVOIRS IN THE LEFT AND RIGHT SYSTEMS ARE ALMOST THE SAME)

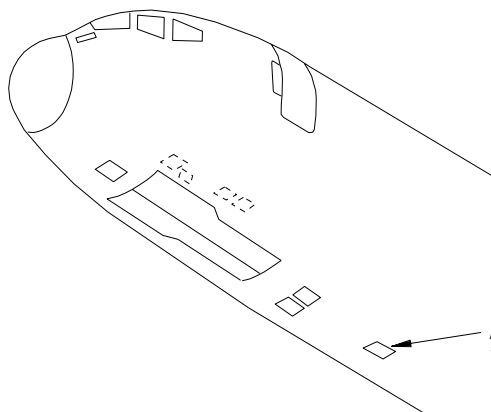
(D) FROM SHT 2

1 IT IS POSSIBLE THE QUANTITY MONITOR UNIT IS INSTALLED IN THE MAIN EQUIPMENT CENTER.

Hydraulic Fluid Quantity Indicating System - Component Location
Figure 102 (Sheet 3)

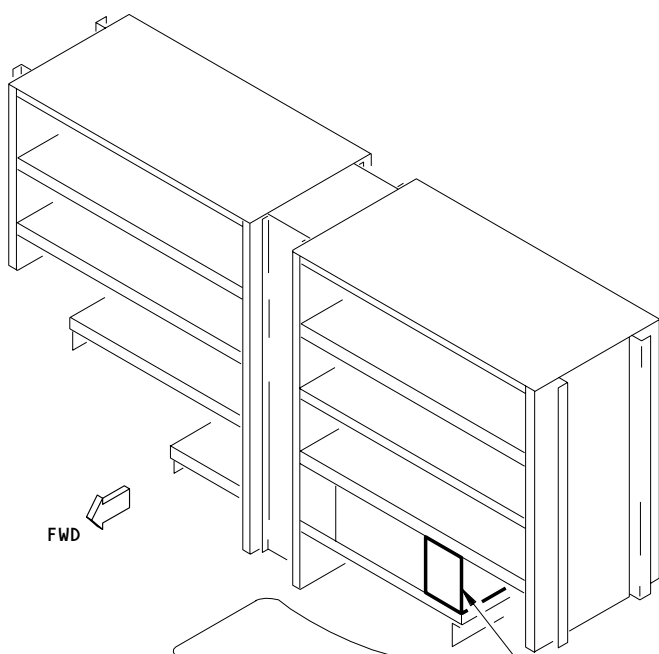
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ACCESS DOOR, 119BL, FOR THE MAIN EQUIPMENT CENTER

SEE (F) 2

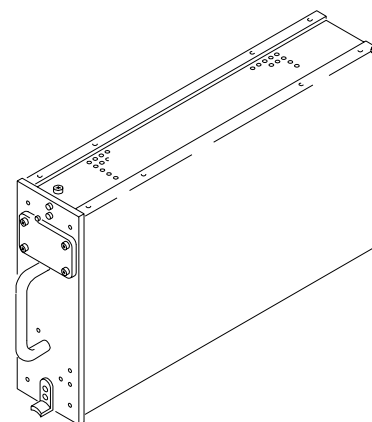


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ACCESS DOOR, 119BL, FOR THE MAIN EQUIPMENT CENTER

QUANTITY MONITOR UNIT, M122, FOR THE HYDRAULIC FLUID (E3-4)

SEE (G)



QUANTITY MONITOR UNIT, M122, FOR THE HYDRAULIC FLUID

(G)

MAIN EQUIPMENT CENTER

(F) 2

2 IT IS POSSIBLE THE QUANTITY MONITOR UNIT IS INSTALLED IN THE AFT EQUIPMENT CENTER.

Hydraulic Fluid Quantity Indicating System - Component Location
Figure 102 (Sheet 4)

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HYDRAULIC FLUID QUANTITY INDICATING SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure has one task which is a system test of the quantity indicating system for the hydraulic fluid.

TASK 29-33-00-735-001

2. System Test – Quantity Indicating System for the Hydraulic Fluid

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 12-12-01/301, Hydraulic Systems
- (3) AMM 24-22-00/201, Electrical Power
- (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

B. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well
 - 197 Wing to Body – Aft Lower Half (Left)
 - 211/212 Control Cabin
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

C. Prepare for the System Test

S 865-002

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

S 495-003

- (2) 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 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).

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- S 015-005
- (4) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).
- S 865-009
- (5) Remove the pressure from the left, right or center hydraulic systems and the reservoirs (AMM 29-11-00/201).
- S 035-010
- (6) Disconnect the electrical connector from the pressure switch on the reservoir of the left, right, or center system.
- S 685-011
- (7) Open the drain valve and drain the reservoir of the left, right or center system.
- S 685-012
- (8) Close the drain valve when the reservoir is empty.
- D. Do the System Test of the Quantity Indicating System for the Hydraulic Fluid
- S 865-013
- (1) At the reservoir fill station, put the fill selector valve to the system (L, R or C) on which you do the test.
- S 215-014
- (2) Make sure the fill indicator shows empty: 0.0 ±0.5 gallons (0.0 ±1.9 liters).
- S 215-016
- (3) Make sure the RSVR light on the hydraulic control panel is on.
- S 215-017
- (4) Make sure the message L, R, or C HYD QTY shows on the EICAS.

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- S 865-018
- (5) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.
- S 215-019
- (6) Make sure the hydraulic quantity shown on the EICAS is 0.00 to 0.08 (L and R system) or 0.00 to 0.14 (C system), with an RF message.
- S 615-020
- (7) Slowly add fluid to the hydraulic reservoir (AMM 12-12-01/301).
- S 615-021
- (8) Stop when the RSVR light on the hydraulic control panel goes off and the EICAS message L, R, or C HYD QTY does not show.
- S 215-022
- (9) Make sure the fill indicator at the reservoir fill station shows the applicable values:
- (a) L and R system: 3.0 ±0.5 gallons (11.4 ±1.9 liters)
 - (b) C system: 1.6 ±0.5 gallons (6.1 ±1.9 liters)
- S 215-024
- (10) Make sure the hydraulic quantity shown on the EICAS is 0.45 ±0.08 (L and R system) or 0.45 ±0.14 (C system).
- S 615-025
- (11) Continue to slowly add fluid to the reservoir.
- S 615-026
- (12) Stop when the RF message does not show adjacent to the hydraulic quantity indication on the EICAS.
- S 215-027
- (13) Make sure the fill indicator at the reservoir fill station shows the applicable values:

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- S 215-028
(14) L and R system: 5.0 ±0.5 gallons (18.9 ±1.9 liters)
- S 215-047
(15) C system: 2.6 ±0.5 gallons (10.2 ±1.9 liters)
- S 215-029
(16) Make sure the hydraulic quantity shown on the EICAS is 0.75 ±0.08 (L and R system) or 0.75 ±0.14 (C system).
- S 615-030
(17) Continue to add fluid to the reservoir until you can see the fluid level in the center of the sight glass on the reservoir.
- S 215-031
(18) Make sure the fill indicator shows the applicable values:
- S 215-032
(19) L and R systems: 6.6 ±0.5 gallons (25.0 ±1.9 liters)
- S 215-048
(20) C system: 3.5 ±0.5 gallons (13.2 ±1.9 liters)
- S 215-033
(21) Make sure the hydraulic quantity shown on the EICAS is 1.00 ±0.08 (L and R system) or 1.00 ±0.14 (C system).
- S 615-034
(22) Continue to add fluid to the reservoir until the OF indication shows adjacent to the hydraulic indicator on the EICAS (OF equals overfull).
- S 215-035
(23) Make sure the hydraulic quantity shown on the EICAS is 1.22 OF ±0.02.
- S 215-036
(24) Make sure the L, R or C HYD QTY 0/FULL message shows on the EICAS.
- S 215-037
(25) Make sure the fill indicator at the reservoir fill station shows the applicable values:
- S 215-038
(26) L and R systems: 8.1 ±0.5 gallons (31.2 ±1.9 liters)
- S 215-049
(27) C system: 4.3 ±0.5 gallons (16.5 ±1.9 liters)

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S 685-039

- (28) Open the drain valve and drain the reservoir until you can see the fluid level in the center of the sight glass.

S 685-040

- (29) Close the drain valve on the reservoir.

S 435-041

- (30) Safety the drain valve with lockwire.

S 865-044

- (31) At the reservoir fill station, put the fill selector valve to the OFF position.

E. Put the Airplane Back to Its Usual Condition

S 435-042

- (1) Connect the electrical connector to the pressure switch on the reservoir of the left, right, or center system.

S 495-043

- (2) Disconnect the hydraulic ground servicing cart (AMM 12-12-01/301).

S 415-006

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 (AMM 32-00-15/201).

S 415-007

- (4) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 865-045

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

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HYDRAULIC FLUID QUANTITY TRANSMITTER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains steps to remove and install the fluid quantity transmitter in the hydraulic reservoirs.
- B. There is a fluid quantity transmitter in the reservoir of each hydraulic system.

TASK 29-33-01-024-001

2. Remove the Fluid Quantity Transmitter

A. References

- (1) AMM 06-41-00/201, Fuselage Access Door 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

B. Access

(1) Location Zones

- | | |
|---------|--------------------------------------|
| 197 | Wing to Body – Aft Lower Half (Left) |
| 211/212 | Control Cabin |
| 732/742 | MLG Body Door |

(2) Access Panel

- | | |
|-------|-----------------------|
| 197KL | Hydraulic Service Bay |
|-------|-----------------------|

C. Prepare for the Removal

S 494-002

WARNING: USE THE PROCEDURE IN 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.

- (1) To remove the fluid quantity transmitter from the left or right reservoir, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 014-003

- (2) To remove the fluid quantity transmitter from the center reservoir, open the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

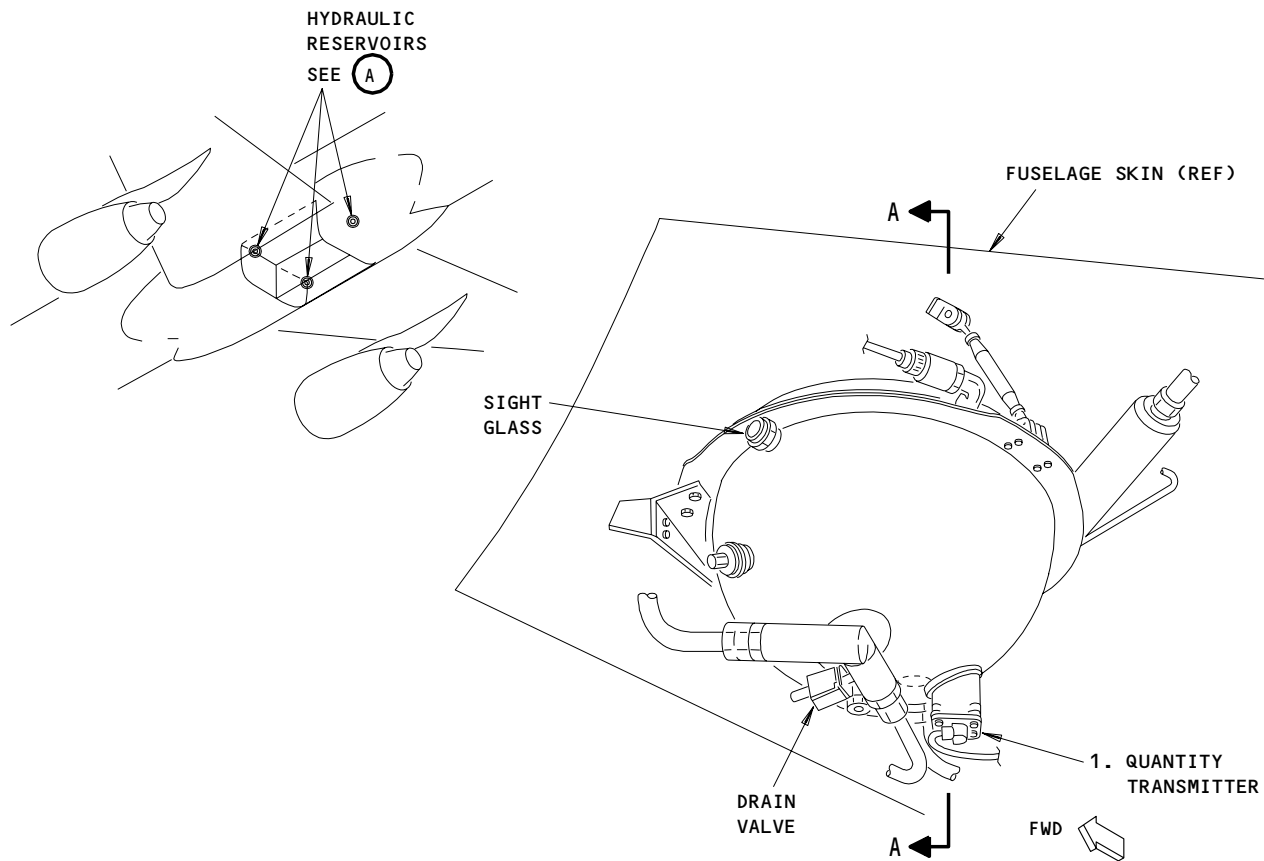
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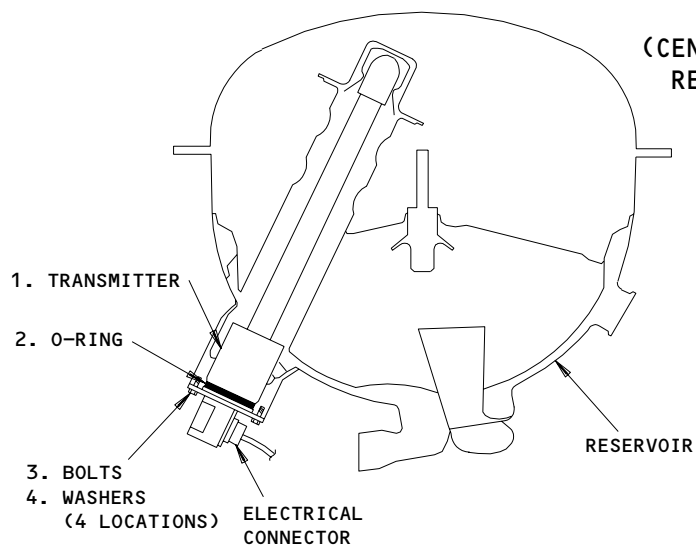
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HYDRAULIC RESERVOIR
(CENTER RESERVOIR IS SHOWN, LEFT AND RIGHT RESERVOIRS ARE APPROXIMATELY THE SAME)

(A)



A-A

Fluid Quantity Transmitter Installation
Figure 401

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S 864-004

- (3) Remove the pressure from the hydraulic system and reservoir that contains the fluid quantity transmitter that will be removed (AMM 29-11-00/201).

S 864-033

WARNING: DO NOT CLOSE THE DRAIN VALVE UNTIL YOU REPLACE THE TRANSMITTER. IF YOU CLOSE THE DRAIN VALVE, THE FLUID CAN COLLECT IN THE RESERVOIR AND FLOW ON YOU WHEN YOU REMOVE THE TRANSMITTER.

- (4) Open the drain valve and drain the reservoir.

S 864-006

- (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K19, HYDRAULICS QTY CTR
 - (d) 11K20, HYDRAULICS QTY LEFT
 - (e) 11K21, HYDRAULICS QTY RIGHT
 - (f) 11K24, HYDRAULICS ELEC PUMP C2
 - (g) 11K25, HYDRAULICS ELEC PUMP LEFT

D. Remove the Fluid Quantity Transmitter (Fig. 401)

S 034-007

- (1) Disconnect the electrical connector from the fluid quantity transmitter.

S 034-008

CAUTION: BE CAREFUL NOT TO CAUSE DAMAGE TO THE FLUID QUANTITY TRANSMITTER OR THE RESERVOIR WHEN YOU REMOVE THE FLUID QUANTITY TRANSMITTER.

- (2) Remove the bolts (3) to remove the fluid quantity transmitter (1) from the reservoir.

NOTE: Before you remove the transmitter, make a note of where the electrical connector is located. You must install the fluid quantity transmitter with the electrical connector in the same position during the subsequent installation procedure.

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S 034-009

- (3) Discard the O-ring (2).

TASK 29-33-01-424-010

3. Install the Fluid Quantity Transmitter

A. References

- (1) AMM 06-41-00/201, Fuselage Access Door and Panels
- (2) AMM 12-12-01/301, Hydraulic Servicing
- (3) AMM 12-25-01/301, Exterior Cleaning
- (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

B. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

C. Parts

- (1) Use this table for the left system:

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Transmitter Packing (O-ring)	29-11-20	04	130
	2				139

- (2) Use this table for the right system:

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Transmitter Packing (O-ring)	29-31-01	03	15
	2				20

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(3) Use this table for the center system:

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Transmitter Packing (O-ring)	29-31-01	02	15
	2				20

D. Access

(1) Location Zones

197 Wing to Body - Aft Lower Half (Left)
 211/212 Control Cabin
 732/742 MLG Body Door

(2) Access Panel

197KL Hydraulic Service Bay

E. Install the Fluid Quantity Transmitter (Fig. 401)

S 644-011

(1) Apply a layer of hydraulic lubricant or hydraulic fluid on a new o-ring (2).

S 434-012

(2) Install the new O-ring (2) on the fluid quantity transmitter (1).

S 164-013

(3) Clean the mounting flange.

S 424-014

CAUTION: BE CAREFUL NOT TO CAUSE DAMAGE TO THE FLUID QUANTITY TRANSMITTER OR RESERVOIR WHEN YOU INSTALL THE FLUID QUANTITY TRANSMITTER.

(4) Put the fluid quantity transmitter (1) in the reservoir.

S 034-015

(5) Install the bolts (3) and washers (4) to attach the fluid quantity transmitter to the reservoir and tighten the bolts as follows:
 (a) Tighten the bolts to 25-30 pound-inches.

S 434-016

(6) Install a lockwire on the bolts (3).

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- S 434-017
- (7) Connect the electrical connector to the fluid quantity transmitter (1).
- S 864-018
- (8) Close the drain valve.
- S 434-019
- (9) Put a lockwire on the valve handle.
- S 864-020
- (10) Supply electrical power (AMM 24-22-00/201).
- S 864-021
- (11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K15, HYDRAULICS ELEC PUMP C1
 - (b) 11K16, HYDRAULICS ELEC PUMP RIGHT
 - (c) 11K19, HYDRAULICS QTY CTR
 - (d) 11K20, HYDRAULICS QTY LEFT
 - (e) 11K21, HYDRAULICS QTY RIGHT
 - (f) 11K24, HYDRAULICS ELEC PUMP C2
 - (g) 11K25, HYDRAULICS ELEC PUMP LEFT
 - (h) EICAS (6 locations)
- S 714-022
- (12) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.
- S 614-024
- (13) Fill the hydraulic reservoir with the new fluid quantity transmitter (AMM 12-12-01/301).
- S 864-025
- (14) Pressurize the reservoir with the new fluid quantity transmitter (AMM 29-11-00/201).
- S 214-026
- (15) Make sure there is no hydraulic leakage at the fluid quantity transmitter.
- S 164-027
- CAUTION:** QUICKLY CLEAN THE INSTALLATION AREA OF ALL HYDRAULIC FLUID. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE EQUIPMENT.
- (16) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

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S 214-023

- (17) Make sure the (L, R, C) HYD QTY indication on the EICAS display is the same as the quantity of hydraulic fluid in the reservoir.

S 414-028

- (18) If you replaced the fluid quantity transmitter in the center reservoir, close the access door for the hydraulic service bay, 197KL (AMM 06-41-00/201).

S 094-029

WARNING: USE THE PROCEDURE IN 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.

- (19) If you replaced the fluid quantity transmitter in the left or right reservoir, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-030

- (20) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-031

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

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HYDRAULIC FLUID QUANTITY MONITOR UNIT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks, one to remove and one to install the monitor unit for the hydraulic fluid quantity.

TASK 29-33-51-024-002

2. Remove the Monitor Unit

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-46-00/201, Entry, Service, and Cargo Doors, Access Door and Panels
- (3) AMM 20-10-01/401, E/E Rack Mounted Components

B. Access

(1) Location Zones

- 119 Main Equipment Center (Left)
- 211/212 Control Cabin
- 822 No. 2 Cargo Door

(2) Access Panel

- 119BL Main Equipment Center

C. Remove the Monitor Unit (Fig. 401)

S 864-001

- (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
 - (a) 11K19, HYDRAULICS QTY CTR
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT
 - (d) EICAS (6 locations)

S 014-053

- (2) AIRPLANES WITH QUANTITY MONITOR UNITS ON THE E6 RACK IN THE AFT EQUIPMENT CENTER;
Open the aft cargo door for access to the E6 rack in the aft equipment center (AMM 06-46-00/201).

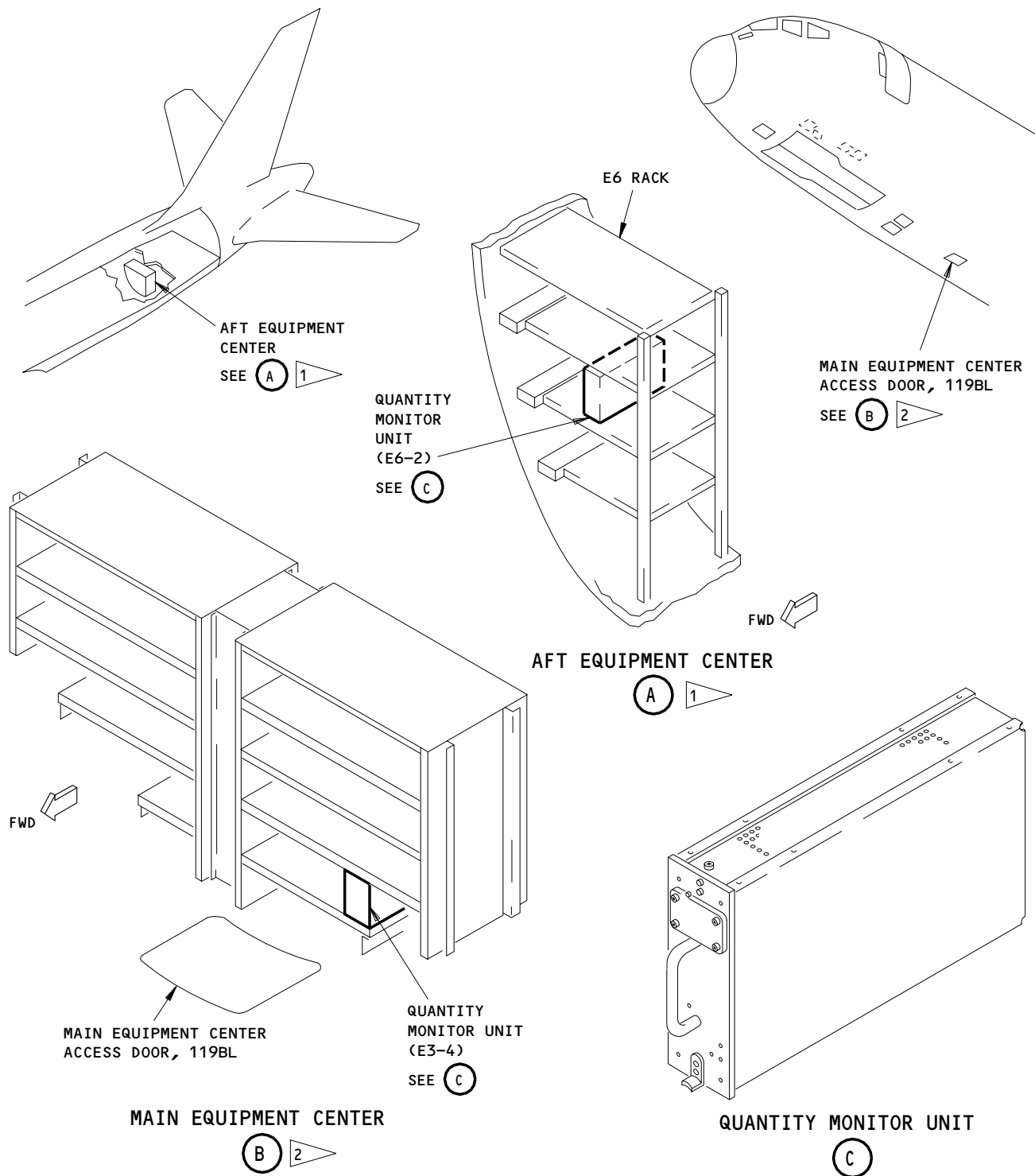
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- 1 AIRPLANES WITH QUANTITY MONITOR UNIT ON THE E6 RACK IN THE AFT EQUIPMENT CENTER.
- 2 AIRPLANES WITH QUANTITY MONITOR UNIT ON THE E3-4 SHELF IN THE MAIN EQUIPMENT CENTER.

Fluid Quantity Monitor Unit Installation
Figure 401

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- S 014-054
- (3) AIRPLANES WITH QUANTITY MONITOR UNITS ON THE E3-4 SHELF IN THE MAIN EQUIPMENT CENTER;
 Open the access door for the main equipment center, 119BL, for access to the E3 rack (AMM 06-41-00/201).

- S 024-019
- (4) Remove the monitor unit (AMM 20-10-01/401).

TASK 29-33-51-424-020

3. Install the Monitor Unit

A. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
- (2) AMM 06-46-00/201, Entry, Service, and Cargo Doors, Access Door and Panels
- (3) AMM 12-12-01/301, Hydraulic Systems
- (4) AMM 20-10-01/401, E/E Rack Mounted Components
- (5) AMM 24-22-00/201, Electrical Power - Control

B. Access

- (1) Location Zones
 - 119 Main Equipment Center (Left)
 - 211/212 Control Cabin
 - 822 No. 2 Cargo Door
- (2) Access Panel
 - 119BL Main Equipment Center

C. Install the Monitor Unit (Fig. 401)

- S 424-021
- (1) Install the monitor unit (AMM 20-10-01/401).
- S 864-022
- (2) Supply electrical power (AMM 24-22-00/201).
- S 864-023
- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
- (a) 11K19, HYDRAULICS QTY CTR
 - (b) 11K20, HYDRAULICS QTY LEFT
 - (c) 11K21, HYDRAULICS QTY RIGHT
 - (d) EICAS (6 locations)
- S 714-024
- (4) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.

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- S 614-025
- (5) Move the valve handle for the reservoir fill selector to the reservoir that will be filled.
- S 614-026
- (6) Fill the reservoir until you can see the fluid level in the center of the reservoir sight glass (AMM 12-12-01/301).
- S 214-027
- (7) Make sure the EICAS HYD QTY display shows 1.00 ± 0.08 (for the left or right system) or 1.00 ± 0.14 (for the center system).
- S 414-055
- (8) AIRPLANES WITH QUANTITY MONITOR UNIT ON THE E6 RACK IN THE AFT EQUIPMENT CENTER;
Close the aft cargo door for access to the E6 rack in the aft equipment center (AMM 06-46-00/201).
- S 414-056
- (9) AIRPLANES WITH QUANTITY MONITOR UNIT ON THE E3-4 SHELF IN THE MAIN EQUIPMENT CENTER;
Close the access door for the main equipment center, 119BL, for access to the E3 rack (AMM 06-41-00/201).
- S 864-044
- (10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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HYDRAULIC RESERVOIR PRESSURE INDICATION SYSTEM – DESCRIPTION AND OPERATION

1. General

A. Each hydraulic reservoir is pressurized by the pneumatic system. The pressure indication system monitors the air pressure in each system reservoir. Messages for high or low air pressure are shown on the EICAS display.

2. Component Details

A. EICAS Display

(1) System indication consists of messages on the EICAS display. If both engines are running and reservoir pressure is less than 17 psi, the EICAS will automatically display a (L, R, C) HYD RSVR PRES message and the RSVR light on the hydraulic control panel will illuminate.

(2) A reservoir pressure indication for each system is displayed in the EICAS maintenance mode. The pressure indication is LOW if the reservoir pressure is below 17 psi. The pressure indication reads NORM if the reservoir pressure is between 17 and 56 psi. The pressure indication reads HIGH if the reservoir is above 56 psi.

(3) For information on the EICAS, refer to AMM 31-41-00.

B. Reservoir Pressure Warning Light

(1) A reservoir low pressure warning light for each hydraulic system is on the hydraulic control panel. This RSVR light illuminates to indicate low air pressure on the system reservoir. This light will also illuminate if hydraulic fluid quantity is low (AMM 29-33-00).

C. Reservoir Pressure Switch (Fig. 1)

(1) A reservoir pressure switch is located near the top of each reservoir. The pressure switch contains a high and a low pressure switch. These switches provide a signal to EICAS when reservoir pressure is below 17 psi or above 56 psi. This switch also activates the reservoir pressure warning light when reservoir pressure is below 17 psi.

D. For more details on the Hydraulic Reservoir Pressure Indication System, refer to these wiring diagrams and system schematics:

(1) WDM 29-35-11: Hydraulic Reservoir Pressure Indication System

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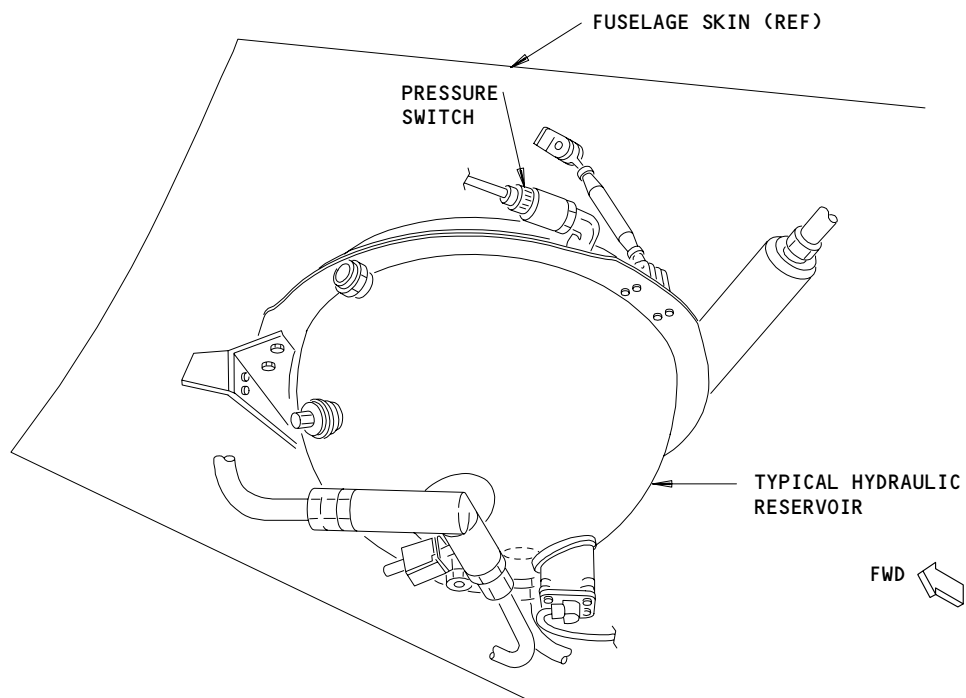
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- (2) SSM 29-00-00: Hydraulic System Simplified
- (3) SSM 29-00-01: Hydraulic Supply Fill and Monitoring
- (4) SSM 29-00-02: Left Hydraulic Power
- (5) SSM 29-00-02: Right Hydraulic Power
- (6) SSM 29-00-04: Center Hydraulic Power



Typical Hydraulic Reservoir Pressure Switch
Figure 1

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HYDRAULIC RESERVOIR PRESSURE INDICATION SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
COMPUTER - (REF 31-41-00, FIG. 101) EICAS L, M10181 EICAS R, M10182 DIODE - (REF 31-01-37, FIG. 101) CENTER SYSTEM - RESERVOIR PRESSURE ISOLA- TION, R10198 LEFT SYSTEM - RESERVOIR PRESSURE ISOLATION, R10197 RIGHT SYSTEM - RESERVOIR PRESSURE ISOLA- TION, R10199				
LIGHT - CENTER SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL6	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - LEFT SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL2	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
LIGHT - RIGHT SYSTEM LOW QUANTITY/RESERVOIR PRESSURE INDICATOR, YQTL4	1	1	FLIGHT COMPARTMENT, P5 PANEL, HYDRAULIC CONTROL PANEL, M10050	*
SWITCH - CENTER SYSTEM HYDRAULIC RESERVOIR PRESSURE, S10033	3	1	197KL, AFT LEFT WING-TO-BODY FAIRING, CENTER SYSTEM HYDRAULIC RESERVOIR	29-35-01
SWITCH - LEFT SYSTEM HYDRAULIC RESERVOIR PRESSURE, S10032	3	1	LEFT WHEEL WELL, LEFT SYSTEM HYDRAULIC RESERVOIR	29-35-01
SWITCH - RIGHT SYSTEM HYDRAULIC RESERVOIR PRESSURE, S10034	3	1	RIGHT WHEEL WELL, RIGHT SYSTEM HYDRAULIC RESERVOIR	29-35-01

* SEE THE WDM EQUIPMENT LIST

Hydraulic Reservoir Pressure Indication System - Component Index
Figure 101

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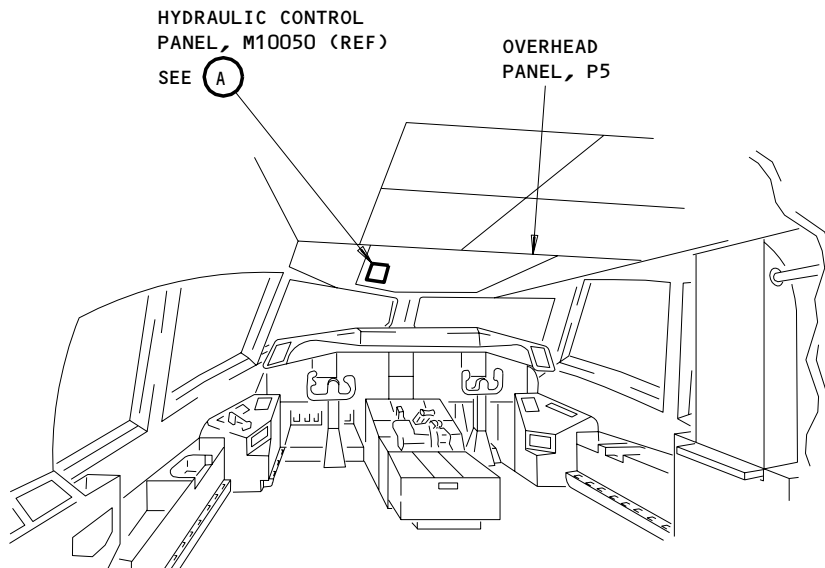
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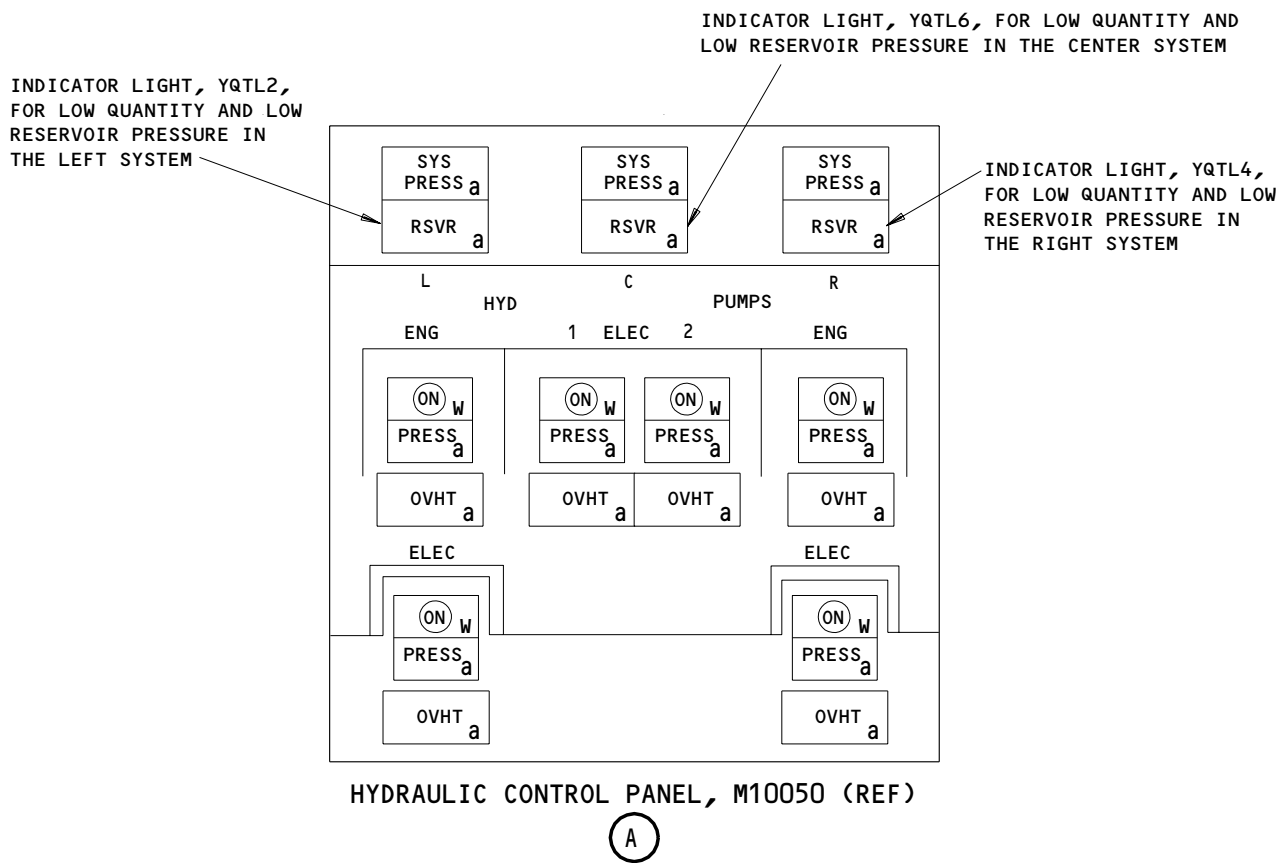
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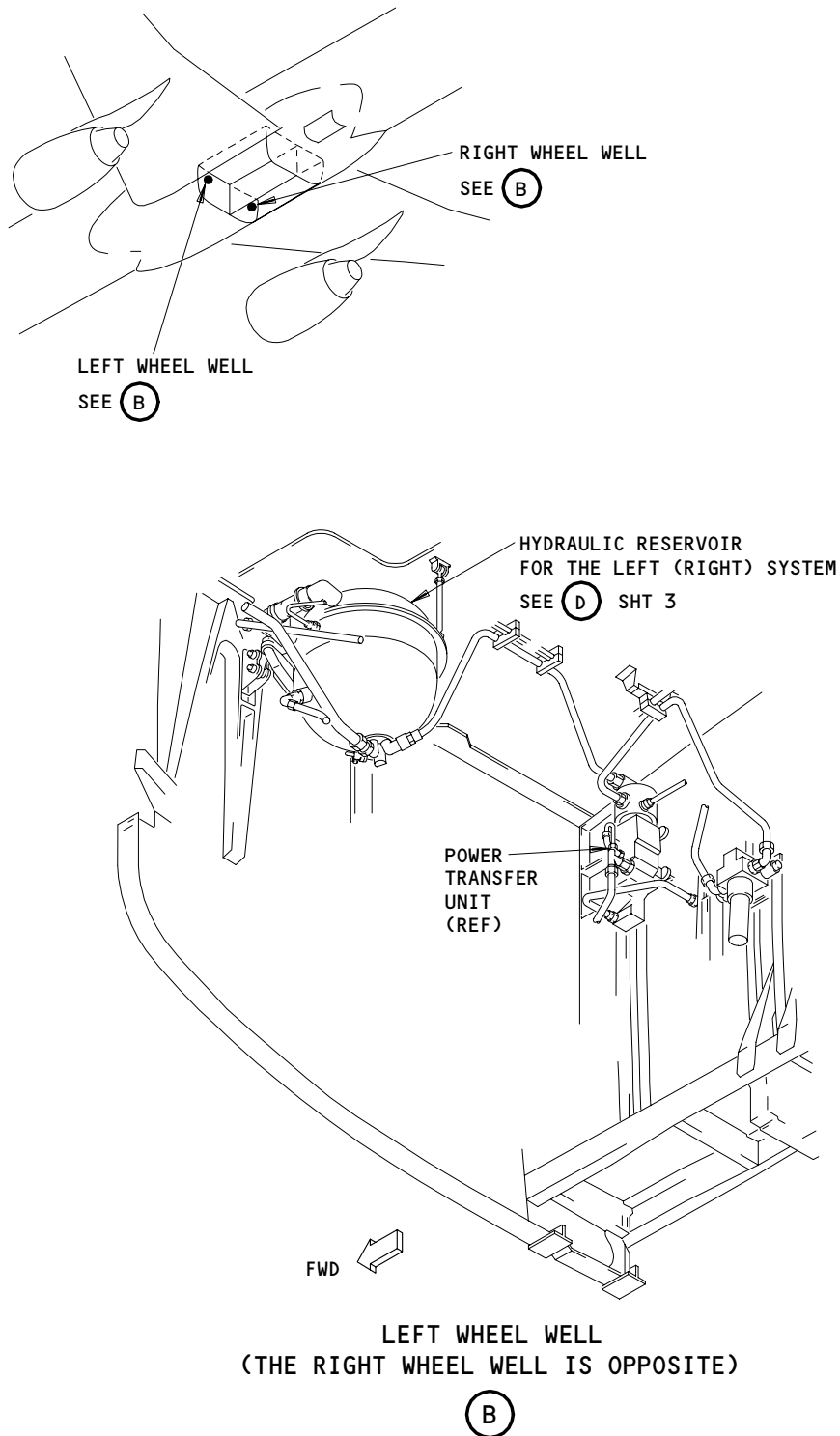
FLIGHT COMPARTMENT



Hydraulic Reservoir Pressure Indication System - Component Location
Figure 102 (Sheet 1)

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Hydraulic Reservoir Pressure Indication System - Component Location
Figure 102 (Sheet 2)

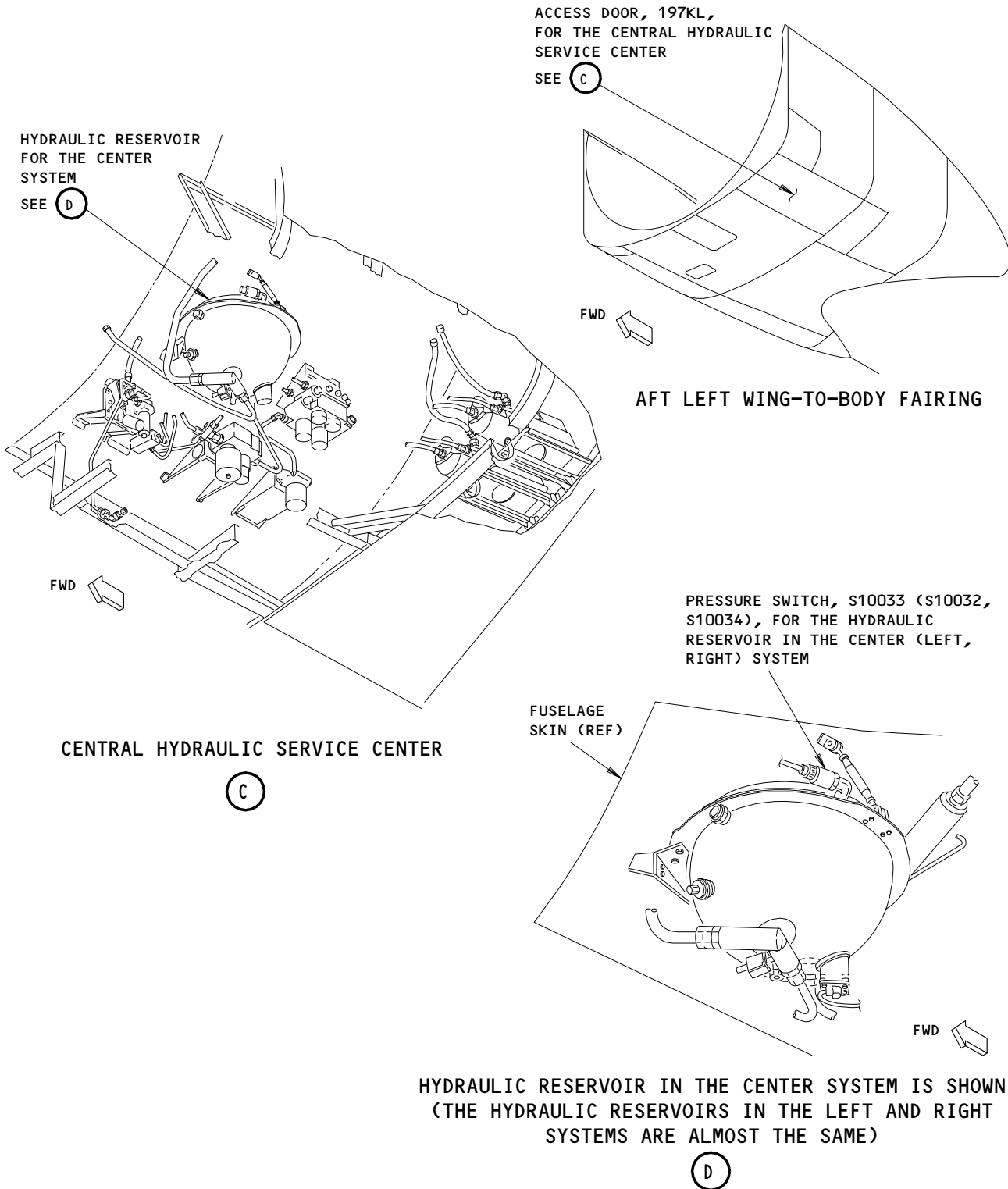
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Hydraulic Reservoir Pressure Indication System - Component Location
Figure 102 (Sheet 3)

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HYDRAULIC RESERVOIR PRESSURE INDICATION SYSTEM – ADJUSTMENT/TEST

1. General

- A. This procedure has one task. This task is a system test of the pressure indication for the hydraulic reservoir.

TASK 29-35-00-735-001

2. System Test – Pressure Indication for the Hydraulic Reservoir

A. Equipment

- (1) Controlled Source of Clean, Dry Air or Nitrogen, with 0 to 100 psi maximum pressure
(2) Plug – BACC14AD06JL (3 Necessary)

B. References

- (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power – Control
(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 36-00-00/201, Pneumatic Control

C. Access

(1) Location Zone

- | | |
|---------|-------------------------------------------|
| 143/144 | MLG Wheel Well |
| 193 | Wing to Body – Forward Lower Half (Left) |
| 194 | Wing to Body – Forward Lower Half (Right) |
| 197 | Wing to Body – Aft Lower Half (Left) |
| 211/212 | Control Cabin |

(2) Access Panels

- | | |
|-------|----------------------------------|
| 193HL | ECS Components (Left) |
| 194ER | ECS Components (Right) |
| 197KL | Central Hydraulic Service Center |

D. Prepare for the System Test

S 865-002

- (1) Remove the pneumatic power (AMM 36-00-00/201).

S 865-003

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

(a) 11K19, HYDRAULICS QTY CTR

S 865-005

- (3) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

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S 865-006

- (4) Do this procedure: Engine Shutdown Input Removal (AMM 31-41-00/201).

S 215-007

- (5) Make sure the (L, C, R) HYD QTY indication on the EICAS display is is not less than 0.75.

S 015-008

- (6) If you will do a test of the pressure indication for the center hydraulic system, do this step:
(a) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 495-009

- (7) If you will do a test of the pressure indication for the left or right hydraulic system, do these steps:
(a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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.

- (b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 015-010

- (8) Open the left and right access doors, 193HL and 194ER, for the ECS components (AMM 06-41-00/201).

E. Do a Test of the Pressure Indication for the Hydraulic Reservoir

NOTE: The three reservoirs must be vented separately to ensure independent reservoir pressure indications.

S 865-011

- (1) Do these steps to remove the air pressure from the hydraulic reservoirs:
(a) Put the manual depressurization valve on each reservoir in the open position.
(b) Hold the manual depressurization valve in the open position until you can not hear the flow of air.
(c) Let the spring put the manual depressurization valve in the closed position.

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- S 215-012
- (2) Make sure the RSVR lights for the left, right, and center hydraulic systems on the hydraulic control panel are on.
- S 215-013
- (3) Make sure the EICAS messages, (L, C, R) HYD RSVR PRES, show on the EICAS display.
- S 215-014
- (4) Make sure the (L, R, C) RSVR PRESS indication on the EICAS display shows LOW.
- S 035-021
- (5) Remove the plug from the gage port, GA, on the reservoir pressurization module.
- S 485-022
- (6) Connect a controlled air source to the gage port, GA, on the reservoir pressurization module.
- NOTE: The air source must have a shutoff valve.
- S 085-023
- (7) Replace the vent in the air pressure line, for each hydraulic reservoir, with a plug (BACC14AD06JL).
- NOTE: The vent in the air pressure line to the left hydraulic reservoir is on the forward bulkhead of the left wheel well.
- The vent in the air pressure line to the right hydraulic reservoir is on the forward bulkhead of the right wheel well.
- The vent in the air pressure line to the center hydraulic reservoir is in the hydraulic bay, in the aft left wing/body fairing.
- S 865-024
- (8) Slowly increase the pressure of the air source to 26 ±3 psi.
- S 215-025
- (9) Make sure the RSVR lights for the left, right, and center hydraulic systems, on the hydraulic control panel are off.
- S 215-026
- (10) Make sure the EICAS messages, (L, C, R) HYD RSVR PRES, do not show on the EICAS display.

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S 215-027
(11) Make sure the (L, R, C) RSVR PRESS indication on the EICAS display shows NORM.

S 865-028
(12) Slowly increase the pressure of the air source.

S 215-029
(13) Make sure the (L, R, C) RSVR PRESS indication on the EICAS display changes to HIGH at a pressure of 56 ± 3 psi.

S 865-030
(14) Slowly increase the pressure of the air source.

S 215-031
(15) Make sure the pressure relief valve on each hydraulic reservoir opens at a pressure of 60 to 65 psi.

NOTE: You can hear the air flow from the pressure relief valve when it opens.

S 865-032
(16) Close the shutoff valve on the air source.

S 865-033
(17) Push on the manual bleed valve, on the reservoir pressurization module, to remove the pressure from the air supply line of the air source.

S 865-034
(18) Decrease the pressure of the air source to zero.

S 865-035
(19) On the left system reservoir, hold the manual depressurization valve in the open position until the RSVR light for the left system, on the hydraulic control panel, comes on.

S 215-036
(20) Make sure the EICAS message, L HYD RSVR PRES, shows on the EICAS display.

S 215-037
(21) Make sure the L RSVR PRESS indication on the EICAS display shows LOW.

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- S 865-044
- (22) On the right system reservoir, hold the manual depressurization valve in the open position until the RSVR light for the right system, on the hydraulic control panel, comes on.
- S 215-045
- (23) Make sure the EICAS message, R HYD RSVR PRES, shows on the EICAS display.
- S 215-046
- (24) Make sure the R RSVR PRESS indication on the EICAS display shows LOW.
- S 865-053
- (25) On the center system reservoir, hold the manual depressurization valve in the open position until the RSVR light for the center system, on the hydraulic control panel, comes on.
- S 215-054
- (26) Make sure the EICAS message, C HYD RSVR PRES, shows on the EICAS display.
- S 215-055
- (27) Make sure the C RSVR PRESS indication on the EICAS display shows LOW.
- S 865-062
- (28) Slowly increase the pressure of the air source to 33 ±1 psi.
- S 215-063
- (29) Make sure the (L, C, R) RSVR PRESS indication on the EICAS display shows NORM.
- S 885-064
- (30) Let the temperature of the reservoir decrease for a minimum of 10 minutes.
- S 865-065
- (31) Decrease the pressure of the air source to zero.
- S 865-066
- (32) Close the shutoff valve on the air source.
- S 865-067
- (33) Push on the manual bleed valve, on the reservoir pressurization module, to remove the pressure from the air supply line of the air source.

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S 485-068

- (34) Remove the air source from the gage port, GA, on the reservoir pressurization module.

S 435-069

- (35) Install the plug and the O-ring in the gage port, GA, on the reservoir pressurization module.

S 485-070

- (36) Replace the plug (BACC14AD06JL) in the air pressure line, for each hydraulic reservoir, with a vent.

NOTE: The vent in the air pressure line to the left hydraulic reservoir is on the forward bulkhead of the left wheel well.

The vent in the air pressure line to the right hydraulic reservoir is on the forward bulkhead of the right wheel well.

The vent in the air pressure line to the center hydraulic reservoir is in the hydraulic bay, in the aft left wing/body fairing.

S 215-071

- (37) Make sure the (L, R, C) RSVR PRESS indication on the EICAS display does not change from NORM to LOW for a minimum of one hour.

S 865-079

- (38) On the reservoir in each hydraulic system, hold the manual depressurization valve in the open position to remove the air pressure.

S 215-080

- (39) Make sure the (L, R, C) RSVR PRESS indication on the EICAS display shows LOW.

S 865-087

- (40) Let the spring put the manual depressurization valve in the closed position.

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F. Put the Airplane Back to Its Usual Condition

S 865-135

- (1) Put the engine shutdown input to EICAS back to its usual condition (AMM 31-41-00/201).

S 415-136

- (2) Close the left and right access doors, 193HL and 194ER, for the ECS components (AMM 06-41-00).

S 215-137

- (3) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 095-138

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.

- (4) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-139

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

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HYDRAULIC RESERVOIR PRESSURE SWITCH – REMOVAL/INSTALLATION

1. General

- A. This procedure has two tasks. The first task removes the pressure switch on the reservoir in the left, right, and center hydraulic systems. The second task installs the pressure switch.

TASK 29-35-01-004-001

2. Remove the Pressure Switch (Fig. 401)

A. References

- (1) AMM 06-41-00/201, Fuselage 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 Downlocks

B. Access

(1) Location Zones

- 143/144 MLG Wheel Well
- 197 Wing to Body – Aft Lower Half (Left)

(2) Access Panel

- 197KL Central Hydraulic Service Center

C. Procedure

S 014-002

- (1) If you will remove the pressure switch (1) on the reservoir in the center hydraulic system,
do this step:
 - (a) Open the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 494-003

- (2) If you will remove the pressure switch (1) on the reservoir in the left or right hydraulic system,
do these steps:
 - (a) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

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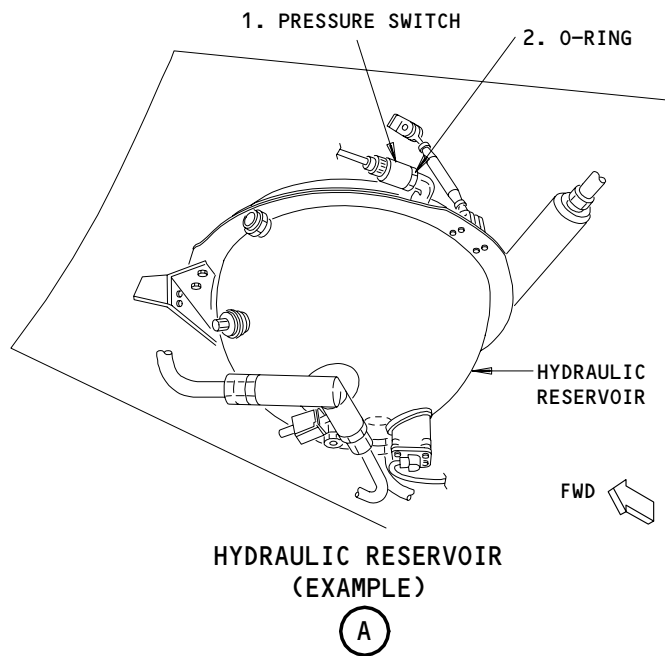
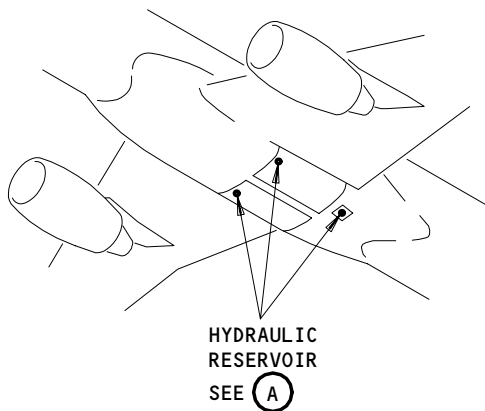
WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-004

(3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:

(a) EICAS (6 locations)



Hydraulic Reservoir Pressure Switch Installation
Figure 401

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- S 864-005
- (4) Remove the pressure from the hydraulic reservoir from which you will remove the pressure switch (1) (AMM 29-11-00/201).
- S 034-006
- (5) Remove the electrical connector from the pressure switch (1).
- S 024-007
- (6) Remove the pressure switch (1) from the reservoir.
- S 034-008
- (7) Remove the O-ring (2) from the pressure switch (1).
- S 034-009
- (8) Install a cap in the opening of the reservoir.

TASK 29-35-01-404-010

3. Install the Pressure Switch (Fig. 401)

A. Consumable Materials

- (1) D00054 Hydraulic System Lubricant - MCS 352B

B. Parts

MM		NOMENCLATURE	IPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Pressure Switch	29-11-20	04	79
				05	77
	2	Packing (O-ring)	29-11-22	05	65
			29-11-20	04	82
				05	75
			29-11-22	05	66

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C. References

- (1) AMM 06-41-00/201, Fuselage 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

D. Access

- (1) Location Zones
 - 143/144 MLG Wheel Well
 - 197 Wing to Body - Aft Lower Half (Left)
- (2) Access Panel
 - 197KL Central Hydraulic Service Center

E. Procedure

- S 434-011
 - (1) Remove the cap from the opening in the reservoir.
- S 644-012
 - (2) Apply hydraulic lubricant or hydraulic fluid to the new O-ring (2) and the threads on the pressure switch.
- S 434-013
 - (3) Install the new O-ring (2) on the pressure switch (1).
- S 424-014
 - (4) Install the pressure switch (1) in the opening in the reservoir.
- S 434-015
 - (5) Safety the pressure switch (1) with a lockwire.
- S 434-016
 - (6) Connect the electrical connector to the pressure switch (1).
- S 864-017
 - (7) Pressurize the hydraulic reservoir on which you installed the pressure switch (1) (AMM 29-11-00/201).

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S 794-018

- (8) Make sure there are no leaks of air at the pressure switch (1).

S 864-019

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) EICAS (6 locations)

S 414-020

- (10) If you installed the pressure switch (1) on the reservoir in the center hydraulic system,
do this step:
(a) Close the access panel, 197KL, for the central hydraulic service center (AMM 06-41-00/201).

S 094-021

- (11) If you installed the pressure switch on the reservoir in the left or right hydraulic system,
do this step:

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.

- (a) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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