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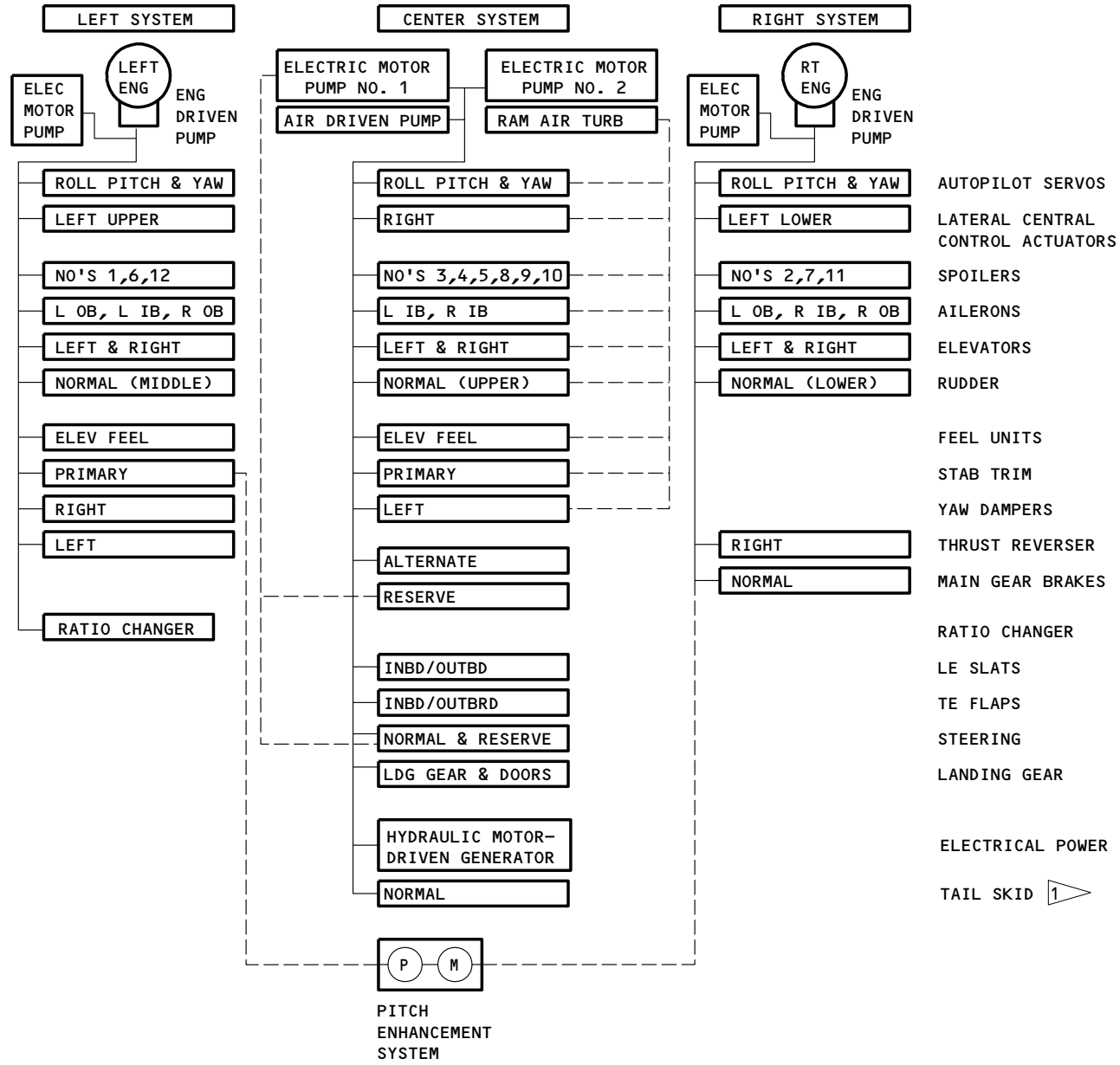
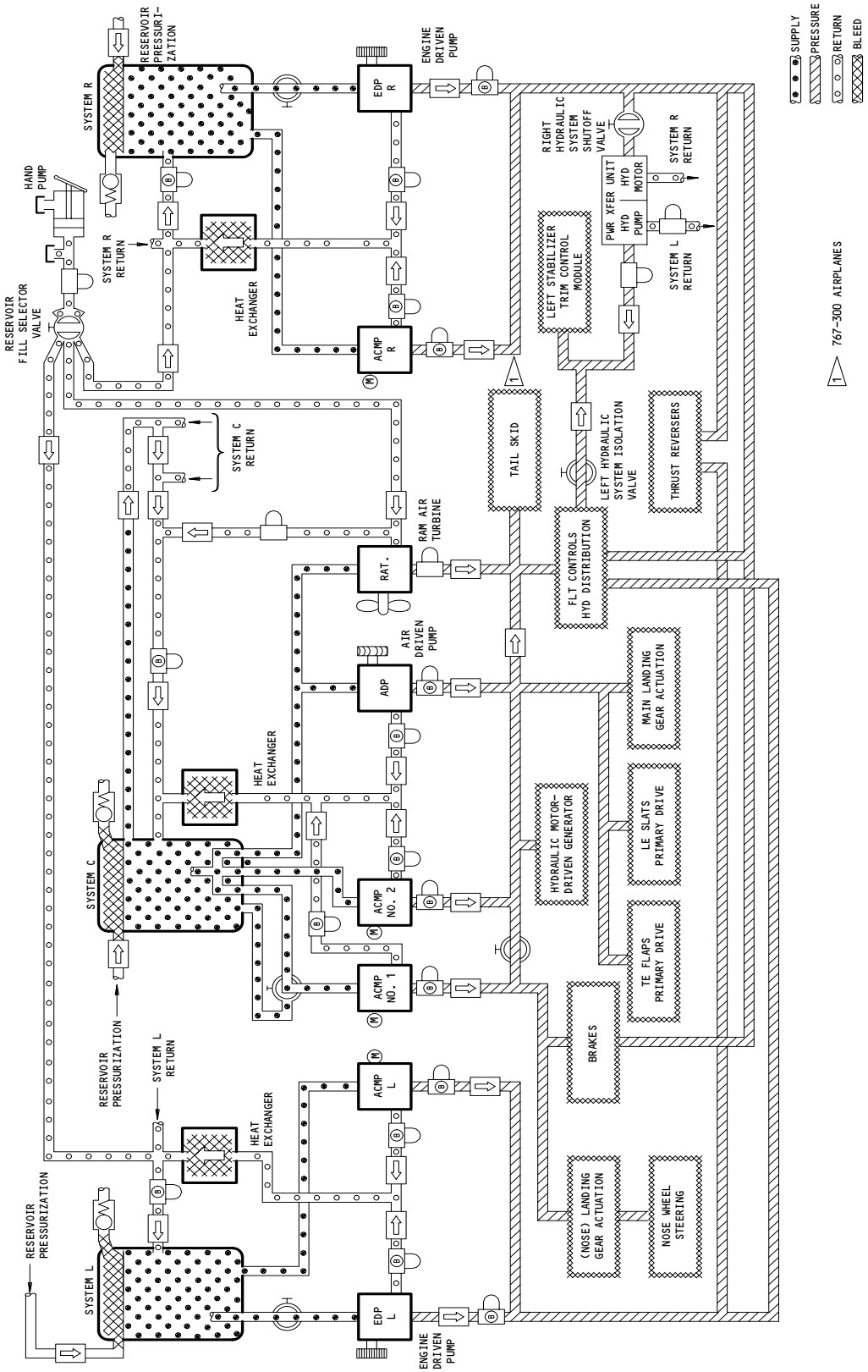
HYDRAULIC POWER - DESCRIPTION AND OPERATION

1. General
   A. Three separate hydraulic systems provide fluid at 3000 psi to operate the airplane systems shown in Fig. 1. The hydraulic systems are identified as left (L), right (R), and center (C).
   B. High pressure and critical return lines are made from titanium. Aluminum is used for non-critical return lines, and stainless steel tubing is used in designated fire zones. The tubing runs are color coded by system. Left is red, right is green, and the center system is coded blue.
   C. These are the usual approximate pressures which occur in the hydraulic lines:
      (1) 3000 psi in the pressure lines
      (2) 600 psi in the return lines
      (3) 65 psi in the supply lines.
   D. A ram air turbine provides reserve center system hydraulic power during emergency flight conditions.
   E. A pitch enhancement system (PES) provides reserve left system hydraulic power to operate the stabilizer trim system if failure of the left and center systems occurs.
   F. A ground servicing system fills all hydraulic reservoirs from one location in the right aft wing to body fairing.
   G. 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 right wheel well and the aft left wing/body fairing. The primary pressure sources for the center system are two alternating current motor pumps (ACMPs). The center system demand pump is an air driven pump (ADP). The two ACMPs run continuously when the ELEC pump switches are ON and electrical power is available. The air driven pump is powered by engine bleed air and can be run in the ON or AUTO mode. In the ON mode, the pump runs continuously. In the AUTO mode, the ADP remains off until system demand exceeds the output of the two ACMPs.
   B. The left and right system components are located on each engine and in each engine fairing area. The primary pressure source for each of these systems is an engine driven pump (EDP). The demand pump for each system is an ACMP. The EDP runs continuously when the engine is running. An EDP depressurization valve, controlled by the ENG pump switch, stops fluid flow from the pump. The ACMP can be run in the ON or AUTO mode. In the ON mode, the pump runs continuously. In the AUTO mode, the pump remains off until system demand exceeds the output of the EDP. However, the right ACMP will run continuously in the AUTO mode when on the ground with flaps in takeoff position. On the ground, the left system ACMP is inhibited during starting of either engine to reduce electrical loads on the APU generator.
   C. Each hydraulic system has a fluid reservoir which is pressurized by air from the pneumatic system. Filter modules clean the pressurized fluid, the pump case drain fluid, and the return fluid from the operating systems. Heat exchangers in the fuel tanks cool the pump case drain fluid before it returns to the reservoir.



1 767-300 AIRPLANES

Hydraulic System Block Diagram
Figure 1



Hydraulic System Schematic
Figure 2

D. Ground power connections are in each engine strut and on the keel beam between the main wheel wells. These connections are the attachment points for an external hydraulic pressure source.

3. Auxiliary Hydraulic System

A. The ram air turbine (RAT) is an auxiliary pressure source for the center system. The 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 automatically deploys if engine speed (N2) drops below 50% in both engines. The RAT can be deployed manually with RAT manual select switch in the flight compartment. When deployed, the RAT supplies pressure to the center system for operation of the flight controls.

B. The pitch enhancement system (PES) automatically supplies hydraulic power to the stabilizer trim control system if failure of the left and center hydraulic system occurs. The PES system uses the right hydraulic system to pressurize an isolated portion of the left hydraulic system without transferring fluid between the two systems. The isolated portion of the left hydraulic system contains a stabilizer trim module which provides stabilizer trim motion. The PES system components are installed in the stabilizer compartment at the aft end of the airplane.

4. Ground Servicing System

A. A central ground servicing station is in the aft right 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 fluid quantity gage located by the fill selector valve shows fluid quantity in the reservoir selected. Fluid is added under pressure from a ground service cart connection or with the manual fill pump located at the servicing station.

5. Indicating Systems

A. The indicating system consists of amber caution and advisory lights on the hydraulic system control panel and messages on the engine indicating and crew alerting system (EICAS). The indicating systems monitor fluid pressure, temperature, and quantity.

B. Caution and advisory lights and EICAS messages show low fluid pressure and low fluid quantity in each system respectively. Indication is provided for low pressure and high temperature for each pump.

C. Digital readout of fluid pressure, temperature, and quantity is provided in certain modes of EICAS. For information on fluid pressure, temperature, and quantity systems refer to AMM 29-31-00/001, AMM 29-32-00/001, and AMM 29-33-00/001, respectively.

TASK 29-00-00-912-006

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:

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 canbe 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).

(b) Inspection tasks that are ALIs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and canbe 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

500 Left Wing
600 Right Wing

C. Critical Design Configuration Control Limitations (CDCCLs)

S 912-007

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 912-008

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.

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 hydraualic 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 specification limits shown on Table 601, replace some quantity of fluid until the fluid properties agree with the limits shown. You make a decision on the quantity of fluid to be replaced.
   C. A polyethylene bottle or a glass bottle can be used to collect the hydraulic fluid.

TASK 29-00-00-206-030

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 one fluid sample from each hydraulic reservoir. Get the samples in either a polyethylene bottle, or 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) - Commercially Available
      (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) - Commercially Available
   C. Consumable Materials
      (1) B00129 Isopropyl Alcohol, approximately 1-pint, put through a micronic filter membrane

(2) E00011 Nitric Acid (20% by volume), approximately 1-pint
(3) G01061 Distilled Deionized Water, approximately 1-pint

D. 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 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks
(6) AMM 78-31-00/201, Thrust Reverser System

E. Access
(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

TABLE 601
Hydraulic Fluid, BMS 3-11, Property Limits

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 Infared
Neutralization No. mg KOH/gm	1.5 max.	ASTM D974
Viscosity, cs at 100°F	6.0 to 12.5	ASTM D445
Organic Contamination	Not Found by Infrared	Infrared *[1] *[5]
Elemental Contamination *[2] *[5]		A Procedure with the Precision that Follows:
Calcium	50 ppm max.	± 4 ppm
Potassium	50 ppm max.	± 2 ppm
Sodium	50 ppm max.	± 3 ppm
Chlorine	200 ppm max.	± 20 ppm
Sulfur	500 ppm max.	± 10 ppm *[3]

TABLE 601
Hydraulic Fluid, BMS 3-11, Property Limits

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

*[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 base stock or the group of items which you add. Compare the data from the fluid analysis with the limits put on the new fluid.

*[3] 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.

*[4] These are the maximum contamination limits based on a 100 milliliter sample size.

*[5] For routine hydraulic fluid analysis, it is not necessary to test for organic or elemental contaminants.

F. Prepare for the Check

S 116-001

(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.

(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 116-002

(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 866-003
(3) Pressurize all the hydraulic systems and the reservoirs (AMM 29-11-00/201).

S 496-004
(4) For the center hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 496-005

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

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

S 046-006

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.

(6) For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 016-028
(7) For the left hydraulic system, open the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 016-029
(8) For the right hydraulic system, open the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 866-009
(9) 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 866-010
(10) Remove the pressure from all the hydraulic systems and the reservoirs (AMM 29-11-00/201).

G. Hydraulic Fluid Check

S 686-011
(1) Open the sampling valve on the reservoir to supply a smooth flow of fluid.

S 686-012
(2) Drain a minimum of one pint of hydraulic fluid before you get a sample.

S 686-013
(3) Remove the cap from the polyethylene bottle or glass bottle.

S 686-014
(4) Put the bottle in the fluid flow but do not touch the sampling valve.

S 686-015
(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 and cause it to get into the sample.

S 686-017
(6) Install the cap on the bottle.

S 686-018
(7) Close the sampling valve.

S 436-019
(8) Safety the sampling valve with a lockwire.

S 936-020
(9) Identify the bottles with this data:
(a) Airplane model
(b) Airplane number
(c) Hydraulic system number
(d) Date
(e) Location.

S 616-021
(10) Fill the hydraulic reservoirs (AMM 12-12-01/301).

S 096-022

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.

(11) For the center hydraulic system,
remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 416-023

(12) For the left hydraulic system,
close the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 416-024

(13) For the right hydraulic system,
close the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 446-025

(14) For the left or right hydraulic system,
do the activation procedure for the thrust reverser (AMM 78-31-00/201).

HYDRAULICS - DDG MAINTENANCE PROCEDURES

1. General

A. This procedure contains maintenance tasks that are necessary for the operation of the airplane as shown in the Minimum Equipment List (MEL). The procedure also contains maintenance tasks to put the airplane back in its usual condition after operation under MEL specifications.

B. These are the maintenance tasks for the components in the Hydraulic System.

(1) DDG 29-31-1 Preparation Procedure - Hydraulic Low SYS PRESS Lights Inoperative

SAS (2) DDG 29-11-3 Air Driven Pump - Maintenance Practices

(3) DDG 29-31-1 Restoration Procedure - Hydraulic Low SYS PRESS Lights Inoperative

(4) DDG 29-31-2 Preparation Procedure - Hydraulic Pump Low PRESS Lights Inoperative

(5) DDG 29-31-2 Restoration Procedure - Hydraulic Pump Low PRESS Lights Inoperative

(6) DDG 29-32-1 Preparation Procedure - Hydraulic Pump OVHT Lights Inoperative

(7) DDG 29-32-1 Restoration Procedure - Hydraulic Pump OVHT Lights Inoperative

(8) DDG 29-33-1 Preparation Procedure - Hydraulic System Low QTY or RSVR Lights Inoperative

(9) DDG 29-33-1 Restoration Procedure - Hydraulic System Low QTY or RSVR Lights Inoperative

(10) DDG 29-33-2 Preparation Procedure - HYD QTY Indications Inoperative

(11) DDG 29-33-2 Restoration Procedure - HYD QTY Indications Inoperative

SAS

SAS TASK 29-00-00-009-134

SAS 2. DDG 29-11-3 Air Driven Pump - Maintenance Practices

SAS A. General

SAS (1) AMM 29-11-03/401 Air Driven Pump (ADP)

SAS (2) Placard ADP selector - "INOP".

SAS B. Maintenance (M)

SAS

SAS S 869-135

SAS (1) Procedure

SAS (a) Install all nose and main gear ground lock pins (AMM 32-00-20/201)

SAS (b) Open the Main gear doors using ground door release handle.

SAS (c) Install door locks (AMM 32-00-15/201).

SAS (d) Pressurize the Center Hydraulic System, using one electric driven pump (ACMP) (AMM 29-11-00/201).

SAS (e) Place gear lever in the UP position.

SAS

SAS NOTE: The Gear lever override is required.

SAS

SAS (f) Make sure that the center hydraulic system pressure is a
SAS minimum of 2800 PSI.
SAS (g) Return the gear lever to the DOWN position.
SAS (h) If the system pressure is less than 2800 PSI, dispatch is not
SAS recommended.
SAS (i) Put the airplane back to its usual condition.
SAS
SAS S 869-136
SAS (2) Make sure the ADP Bleed Valve is in the closed position with the ADP
SAS Controller selected to OFF, by doing the following:
SAS (a) Place the ADP selector to the OFF position.
SAS (b) Pull and collar circuit breaker C1099.
SAS (c) Pressurize the Center Pneumatic System (AMM 36-00-00/201).
SAS (d) Make sure that no air is being exhausted from the ADP exhaust
SAS louvers. If exhuast air is found, dispatch is not recommended.

TASK 29-00-00-009-048

3. DDG 29-31-1 Preparation Procedure - Hydraulic Low SYS PRESS Lights Inoperative

A. General

(1) This task contains maintenance instructions to prepare the airplane for flight with the Hydraulic SYS PRESS Lights Inoperative.

(2) AIRPLANES WITHOUT POWER TRANSFER UNIT (PTU);
One of the three Low SYS PRESS lights can be inoperative if these conditions hold:

(a) The applicable pump low PRESS lights and all HYD PRESS indications for the related systems operates normally.

(3) AIRPLANES WITH A PTU;
The left or the right low SYS PRESS light can be inoperative if these conditions hold:

(a) The applicable pump low PRESS lights and all HYD PRESS indications for the related systems operates normally.

(b) If the left Low SYS PRESS Light is inoperative you must also cap and stow the low pressure signal wire from the PTU.

B. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels

(2) AMM 24-22-00/201, Manual Control
(3) AMM 29-11-00/201, Main Hydraulic Supply System
(4) AMM 36-00-00/201, Pneumatic
(5) AMM 71-00-00/201, Power Plant

C. Access
(1) Location Zone
119 Main Equipment Center, Left

D. Operational Test of the Related Hydraulic System pump Low PRESS Lights and HYD PRESS EICAS Indications (Left or Right Low SYS PRESS Lights Inoperative)

NOTE: When you do the test for the pump, it must be the only pump in operation in its applicable hydraulic system.

NOTE: Refer to Main (Left, Right, and Center) Hydraulic Systems, AMM 29-11-00/201.

S 869-097

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

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

(1) Put the PRIMARY and the DEMAND HYD PUMPS switches to the OFF position.
(a) Make sure the pump low PRESS lights come on.

(b) Verify that the associated L (C or R) HYD SYS PRESS caution message is displayed on EICAS.

S 869-099

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

S 869-103

(3) For the alternating current motor pump, do these steps:
(a) Supply electrical power (AMM 24-22-00/201).
(b) For the applicable pump, push the L , R, or C HYD PUMPS - ELEC pump switch to the ON position.
(c) Make sure the applicable pump PRESS light goes off.
(d) Verify that the associated L (C or R) HYD SYS PRESS caution message is not displayed on EICAS.
(e) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(f) Put the airplane back to its usual condition.

S 719-090

(4) For the engine driven pump, do these steps:
(a) Push the applicable L or R PRIMARY HYD PUMPS - ENG pump switch on the hydraulic control panel to the ON position.
(b) Motor the engine or operate it at minimum power (AMM 71-00-00/201).
(c) Make sure the applicable pump PRESS light goes off.
(d) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(e) Put the airplane back to its usual condition.

S 719-091

(5) For the air driven pump, do these steps:
(a) Supply electrical power (AMM 24-22-00/201).
(b) Pressurize the pneumatic system with a ground air source or with the APU (AMM 36-00-00/201).
(c) Make sure the applicable pump PRESS light goes off.
(d) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(e) Put the airplane back to its usual condition.

E. Cap and Stow the Low Pressure Signal Wire for the Left Hydraulic System (Left Low SYS PRESS Light Inoperative Only)

S 019-093

(1) Open the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

S 029-094

(2) On the miscellaneous equipment panel, P37 disconnect the wire from terminal block 192, terminal Z17 and wire 20C-20.

S 039-095
(3) Put a cap on the terminal block 192.

S 039-096
(4) Put the wire from terminal block 192, in a safe location.

TASK 29-00-00-409-054

4. DDG 29-31-1 Restoration Procedure - Hydraulic Low SYS PRESS Lights Inoperative

A. General
(1) This task contains instructions to put the airplane back in its usual condition after operation with one of the Hydraulic Low SYS PRESS Lights Inoperative.

B. Hydraulic Low SYS PRESS Light Restoration

S 019-101
(1) Open the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

S 029-100
(2) Remove the cap from the wire that was disconnected from TB192, terminal Z17 and wire 20C-20.

S 869-102
(3) On the miscellaneous equipment panel, P37 connect wire 20C-20 to terminal Z17 on terminal block TB192.

C. Hydraulic Low SYS PRESS Lights Repair

S 819-055
(1) Refer to the Fault Isolation Manual for trouble-shooting information.

TASK 29-00-00-009-057

5. DDG 29-31-2 Preparation Procedure - Pump Low PRESS Lights Inoperative

A. General
(1) This task contains maintenance instructions to prepare the airplane for flight with a maximum of one pump low PRESS light in each system inoperative.
(2) One pump low PRESS light in each system can be inoperative if these conditions hold:
(a) The hydraulic low SYS PRESS light for the related hydraulic system, operates satisfactorily.
(b) The related pump operates satisfactorily before the flight dispatch.

B. References
(1) AMM 24-22-00/201, Manual Control
(2) AMM 29-11-00/201, Main Hydraulic Supply System
(3) AMM 36-00-00/201, Pneumatic
(4) AMM 71-00-00/201, Power Plant

C. Operational Test of the Related Hydraulic System pump and the Low SYS PRESS Lights (AMM 29-11-00/201)

NOTE: When you do the test for the pump, it must be the only pump in operation in its applicable hydraulic system.

S 869-058

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION: DO NOT OPERATE THE PUMPS IN A HYDRAULIC SYSTEM WHEN THE SYSTEM IS TOO HOT. DAMAGE TO THE PUMPS CAN OCCUR.

CAUTION: THE HEAT EXCHANGERS IN THE HYDRAULIC SYSTEM USE FUEL TO REMOVE HEAT FROM THE HYDRAULIC FLUID. DO NOT OPERATE A HYDRAULIC PUMP FOR MORE THAN 15 MINUTES IF THERE IS NOT SUFFICIENT FUEL FOR THE OPERATION. DAMAGE TO THE PUMP CAN OCCUR.

CAUTION: DO NOT OPERATE A HYDRAULIC SYSTEM FOR 20 MINUTES AFTER A SYSTEM BECOMES TOO HOT. OPEN THE FAIRING DOORS ON THE TRAILING EDGE OF THE STRUT IF THE AIR TEMPERATURE IS MORE THAN 100°F (38°C). DAMAGE TO THE SYSTEM CAN OCCUR IF YOU DO NOT LET IT BECOME COOL.

(1) Put the PRIMARY and the DEMAND HYD PUMPS switches to the OFF position.
   (a) Make sure the low SYS PRESS lights come on.
   (b) Verify that the associated L (C or R) HYD SYS PRESS caution message is displayed on EICAS.

S 869-105

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

S 719-106

(3) For the alternating current motor pump, do these steps:
   (a) Supply electrical power (AMM 24-22-00/201).
   (b) Push the applicable L, C or R HYD PUMPS - ELEC pump switch to the ON position.
   (c) Make sure the low SYS PRESS light for the applicable system goes off.

(d) Verify that the associated L (C or R) HYD SYS PRESS caution message is not displayed on EICAS.
(e) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(f) Put the airplane back to its usual condition.

S 719-107

(4) For the engine driven pump, do these steps:
(a) Push the applicable L or R PRIMARY HYD PUMPS - ENG pump switch on the hydraulic control panel to the ON position.
(b) Motor the engine or operate it at minimum power (AMM 71-00-00/201).
(c) Make sure the applicable low SYS PRESS light goes off.
(d) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(e) Put the airplane back to its usual condition.

S 719-108

(5) For the air driven pump, do these steps:
(a) Supply electrical power (AMM 24-22-00/201).
(b) Pressurize the pneumatic system with a ground air source or with the APU (AMM 36-00-00/201).
(c) Put the AIR DEMAND PUMP SELECTOR switch on the overhead panel to ON.
(d) Make sure the low SYS PRESS light for the center system goes off.
(e) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(f) Put the airplane back to its usual condition.

TASK 29-00-00-409-061

6. DDG 29-31-2 Restoration Procedure - Hydraulic Pump Low PRESS Lights Inoperative

A. General
(1) This task contains maintenance steps to put the airplane back to its usual condition after operation with a maximum of one pump low PRESS light in each system inoperative.

B. Hydraulic Low SYS PRESS Lights Repair

S 819-109

(1) Refer to the Fault Isolation Manual for trouble-shooting information.

TASK 29-00-00-009-064

7. DDG 29-32-1 Preparation Procedure - Hydraulic Pump OVHT Light(s) Inoperative

A. General
(1) This task contains maintenance steps to prepare the airplane for flight with a maximum of one pump OVHT Light(s) in each system Inoperative.

(2) One pump OVHT light in each system can be inoperative if these conditions hold:
  (a) The related low SYS PRESS light or pump low PRESS light operates satisfactorily.
  (b) The related pumps satisfactory operation is verified before each dispatch.

B. References
(1) AMM 24-22-00/201, Manual Control
(2) AMM 29-11-00/201, Main Hydraulic Supply System
(3) AMM 36-00-00/201, Pneumatic
(4) AMM 71-00-00/201, Power Plant

C. Operational Test of the Related Hydraulic System Pump OVHT Light(s) (AMM 29-11-00/201)

NOTE: When you do the test for the pump, it must be the only pump in operation in its applicable hydraulic system.

S 869-065

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL THE CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. THE AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION: DO NOT OPERATE THE PUMPS IN A HYDRAULIC SYSTEM WHEN THE SYSTEM IS TOO HOT. DAMAGE TO THE PUMPS CAN OCCUR.

CAUTION: THE HEAT EXCHANGERS IN THE HYDRAULIC SYSTEM USE FUEL TO REMOVE HEAT FROM THE HYDRAULIC FLUID. DO NOT OPERATE A HYDRAULIC PUMP FOR MORE THAN 15 MINUTES IF THERE IS NOT SUFFICIENT FUEL FOR THE OPERATION. DAMAGE TO THE PUMP CAN OCCUR.

CAUTION: DO NOT OPERATE A HYDRAULIC SYSTEM FOR 20 MINUTES AFTER A SYSTEM BECOMES TOO HOT. OPEN THE FAIRING DOORS ON THE TRAILING EDGE OF THE STRUT IF THE AIR TEMPERATURE IS MORE THAN 100°F (38°C). DAMAGE TO THE SYSTEM CAN OCCUR IF YOU DO NOT LET IT BECOME COOL.

(1) Put the PRIMARY and the DEMAND HYD PUMPS switches to the OFF position.
  (a) Make sure the low SYS PRESS lights come on.
  (b) Make sure the pump low PRESS lights come on.

S 869-112
(2) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.

S 719-113
(3) For the alternating current motor pump, do these steps:
(a) Supply electrical power (AMM 24-22-00/201).
(b) For the applicable pump, push the L , R, or C HYD PUMPS - ELEC pump switch to the ON position.
(c) Make sure the applicable low SYS PRESS light goes off.
(d) Make sure the applicable pump low PRESS light goes off.
(e) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(f) Make sure the HYD TEMP indication on the EICAS is below 176°F (80°C).
(g) Put the airplane back to its usual condition.

S 719-114
(4) For the engine driven pump, do these steps:
(a) Push the applicable L or R PRIMARY HYD PUMPS - ENG pump switch on the hydraulic control panel to the ON position.
(b) Motor the engine or operate it at minimum power (AMM 71-00-00/201).
(c) Make sure the applicable low SYS PRESS light goes off.
(d) Make sure the applicable pump low PRESS light goes off.
(e) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.
(f) Make sure the HYD TEMP indication on the EICAS is below 176°F (80°C).
(g) Put the airplane back to its usual condition.

S 719-115
(5) For the air driven pump, do these steps:
(a) Supply electrical power (AMM 24-22-00/201).
(b) Pressurize the pneumatic system with a ground air source or with the APU (AMM 36-00-00/201).
(c) Put the AIR DEMAND PUMP SELECTOR switch on the overhead panel to ON.
(d) Make sure the low SYS PRESS light for the center system goes off.
(e) Make sure the pump low PRESS light for the center system goes off.
(f) Make sure the pressure in the hydraulic system becomes stable at 2900 to 3200 psi.

(g) Make sure the HYD TEMP indication on the EICAS is below 176°F (80°C).
(h) Put the airplane back to its usual condition.

TASK 29-00-00-409-068

8. DDG 29-32-1 Restoration Procedure - Hydraulic Pump OVHT Lights Inoperative

A. General

(1) This task contains instructions to put the airplane back in its usual condition after operation with a maximum of one hydraulic pump OVHT light in each system inoperative.

B. Hydraulic Pump OVHT Light(s) Repair

S 819-116

(1) Refer to the Fault Isolation Manual for trouble-shooting information.

TASK 29-00-00-009-071

9. DDG 29-33-1 Preparation Procedure - Hydraulic System Low QTY or RSVR Lights Inoperative

A. General

(1) This task contains maintenance tasks that are necessary to operate the airplane when the Hydraulic System Low QTY or RSVR Lights are inoperative.
(2) The hydraulic system low QTY or RSVR lights can be inoperative under these conditions:
(a) The HYD QTY indication(s) operates normally.
(b) The Reservoir level(s) is verified normal before each takeoff.
(c) The associated SYS PRESS lights operate normally.
(d) Airplanes with Power Transfer Unit (PTU), the left low quantity signal wire of the PTU system is capped and stowed.

B. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 12-12-01/301, Hydraulic Systems
(3) WDM 29-11-14

C. Hydraulic Fluid Quantity Indication Check

S 219-117

(1) Compare the HYD QTY indication on the EICAS status page and the reservoir level indication on the remote quantity indicator at the fill station.
(a) If it is necessary, service the hydraulic reservoir(s) (AMM 12-12-01/301).

D. Hydraulic Reservoir Level Check

S 219-118

(1) Use the remote quantity indicator at the fill station to examine the quantity of hydraulic fluid in the applicable reservoir.

NOTE: If the remote quantity indicator at the fill station does not operate, you can use the sight gage on the applicable reservoir.

S 619-119

(2) If it is necessary, service the applicable reservoir (AMM 12-12-01/301).

E. Cap and Stow the Power Transfer Unit (PTU) Signal Wire for the Left Hydraulic System
(left hydraulic system low QTY or RSVR lights inoperative only)

S 019-120

(1) Open the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

S 049-121

(2) On the miscellaneous equipment panel, P37 disconnect the wire from diode R397 terminal C (TB274) (WDM 29-11-14).

S 049-122

(3) Cap and Stow the wire.

TASK 29-00-00-409-084

10. DDG 29-33-1 Restoration Procedure - Hydraulic System Low QTY or RSVR Lights Inoperative

A. General

(1) This task contains steps to put the airplane back in its usual condition after operation with the hydraulic system low QTY or RSVR lights inoperative.

B. References

(1) AMM 06-41-00/201, Fuselage (Major Zones 100 and 200) Access Doors and Panels
(2) AMM 12-12-01/301, Hydraulic Systems
(3) WDM 29-11-14

C. Power Transfer Unit (PTU) Signal Wire for the Left Hydraulic System Restoration
(left hydraulic system low QTY or RSVR lights inoperative only)

S 019-127
(1) Open the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

S 439-124
(2) Remove the cap from the wire that was disconnected from the diode R397 terminal C (TB274) at the miscellaneous equipment panel, P37 (WDM 29-11-14).

S 439-125
(3) On the miscellaneous equipment panel, P37 connect the wire to the diode R397 terminal C (TB274) (WDM 29-11-14).

S 219-128
(4) Use the remote quantity indicator at the fill station to examine the quantity of hydraulic fluid in the applicable reservoir.

NOTE: If the remote quantity indicator at the fill station does not operate, you can use the sight gage on the applicable reservoir.

D. Hydraulic System Low QTY or RSVR Lights Repair

S 819-126
(1) Refer to the Fault Isolation Manual for trouble-shooting information.

TASK 29-00-00-009-132

11. DDG 29-33-2 Preparation Procedure - HYD QTY Indications Inoperative

A. General
(1) This task contains maintenance tasks that are necessary to operate the airplane when the HYD QTY indications are inoperative.
(2) The HYD QTY indications can be inoperative under these conditions:
(a) The Reservoir level(s) is verified normal before each takeoff.
(b) The associated SYS PRESS lights operate normally.

B. References
(1) AMM 12-12-01/301, Hydraulic Systems

C. Hydraulic Reservoir Level Check

S 219-129

(1) Use the remote quantity indicator at the fill station to examine the quantity of hydraulic fluid in the applicable reservoir.

NOTE: If the remote quantity indicator at the fill station does not operate, you can use the sight gage on the applicable reservoir.

S 619-130

(2) If it is necessary, service the applicable reservoir (AMM 12-12-01/301).

TASK 29-00-00-409-133

12. DDG 29-33-2 Restoration Procedure - HYD QTY Indications Inoperative

A. General

(1) This task contains steps to put the airplane back in its usual condition after operation with the HYD QTY Indications inoperative.

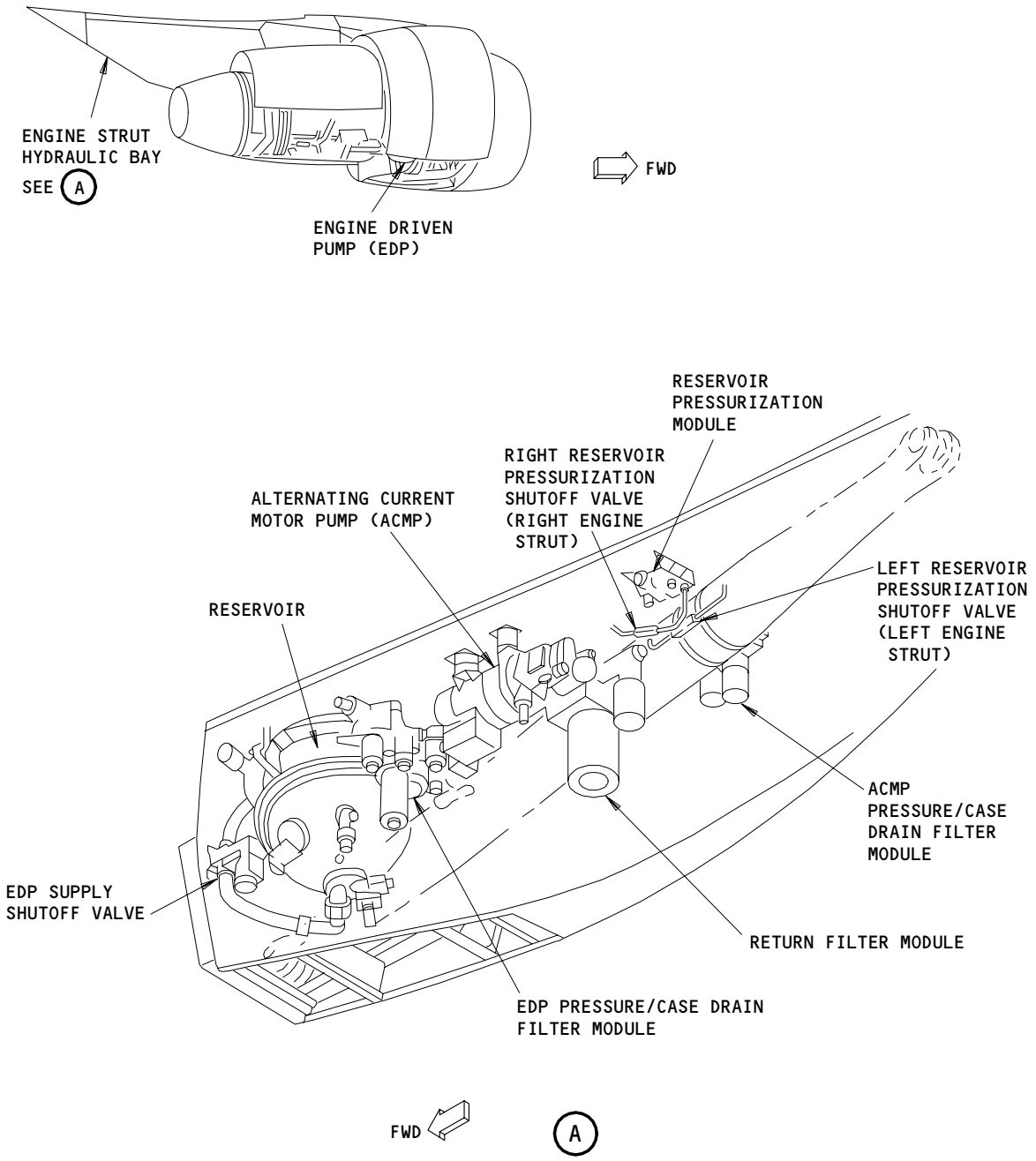
B. HYD QTY Indications Repair

S 819-131

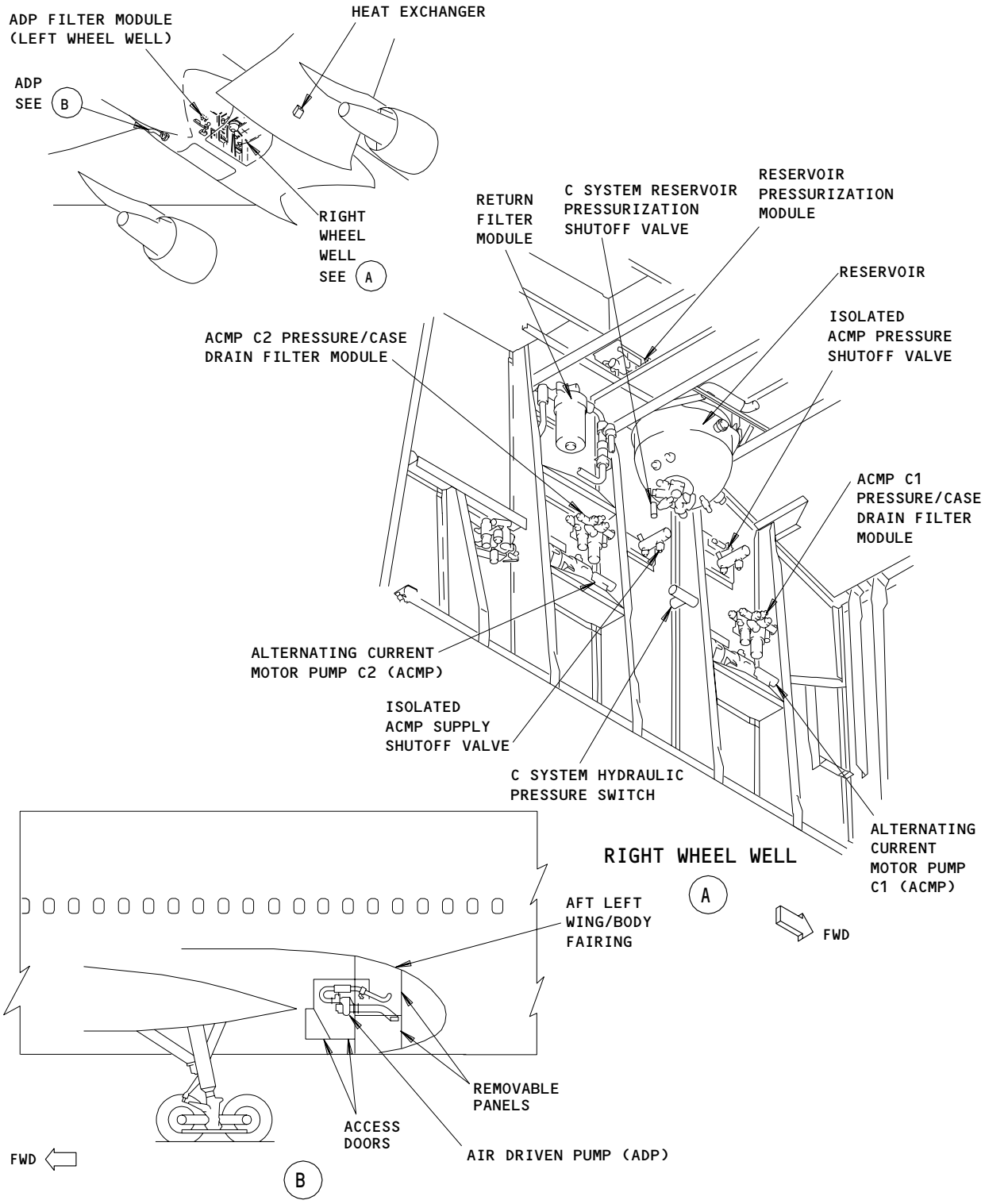
(1) Refer to the Fault Isolation Manual for trouble-shooting information.

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

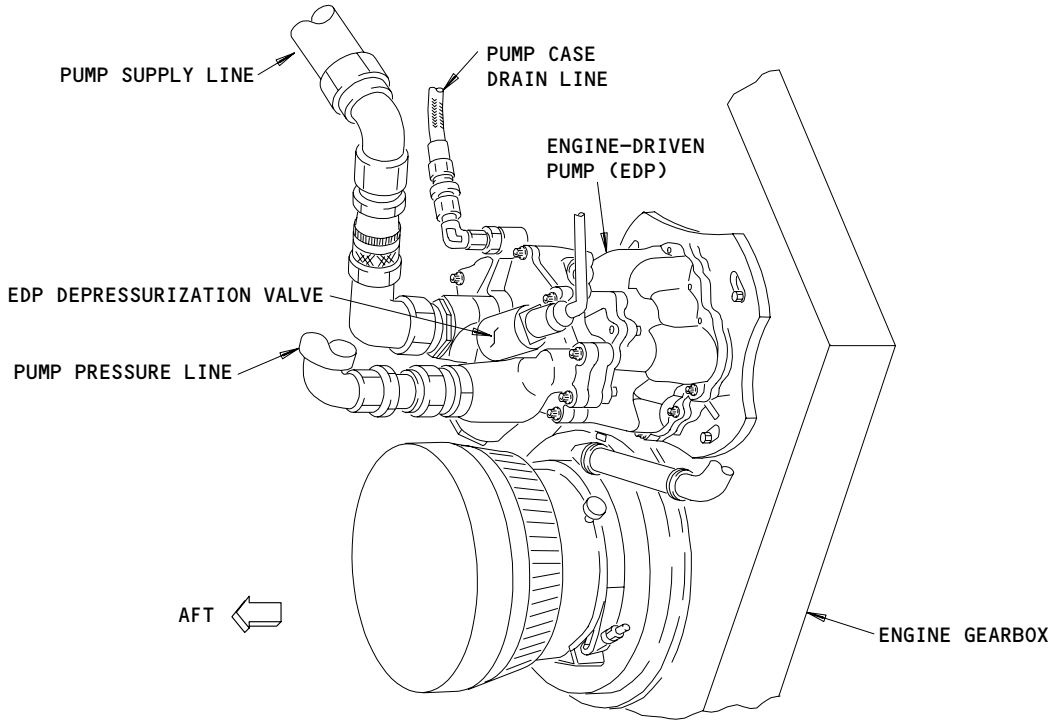
1. General (Fig. 1 and 2)
   A. Hydraulic power is provided by the left (L), right (R), and center (C), systems. Each system provides fluid at 3000 psi to the flight control systems. The center system also supplies power to the landing gear systems. These systems have been color coded for identification: left - red, right - green, and center - blue. The components of the three hydraulic systems are shown in Figures 1 and 2.
   B. Engine driven pumps (EDP) are the primary pressure sources on the left and right systems. The left and right systems each use one alternating current motor pump (ACMP) as a secondary pump. The center system uses two ACMPs as primary pumps. An air-driven pump (ADP) is the secondary pump for the center system.
2. Component Details
   A. Engine Driven Pumps (EDP) (Fig. 3)
      (1) The EDP's are on the accessory drive gearbox of each engine. They provide primary power for the left and right hydraulic systems. The EDP's are rated at 2850 psi with a maximum flow of 37 gpm. Between 0 and 2850 psi, the EDPs provide 37 gpm. When system pressure exceeds 2975 psi, flow drops to 0 gpm. A depressurization valve shuts off output flow and circulates fluid through the pump. A compensation valve controls pump output flow based on system pressure.
   B. Alternating Current Motor Pumps (ACMP) (Fig. 4)
      (1) An ACMP is the secondary pump for both the left and right systems. The ACMPs have a "soft" cutoff point at 1200 psi. At pressures below 1200 psi, the ACMPs will deliver 12 gpm. At pressure above 1200 psi the flow rate decreases first to 6.0 gmp at 2850 psi then to 0 gpm at 2975 psi. Two ACMPs are the primary source of power for the center system. On the ground, the left system ACMP is inhibited during starting of either engine to reduce electrical loads on the APU generator.
      (2) The ACMP is mounted on vibration isolators. An unloading valve reduces starting current. The ACMP has positive case drain flow. A booster pump circulates cooling oil through the motor. The ACMPs for the left and right systems are in the aft strut hydraulic bay. The center system ACMPs, are on the keel beam in the right wheel well.
   C. Air Driven Pump (ADP) (Fig. 5)
      (1) The air driven pump is the secondary source for the center system. The ADP is rated at 37 gpm, 2850 psi, at 5700 rpm. Pump turbine speed is reduced during low flow demand. The pump shuts off when turbine speed decreases to 2500 rpm. Case drain fluid cools the gearbox oil through a heat exchanger.



L and R System Component Location
Figure 1



C System Component Location
Figure 2

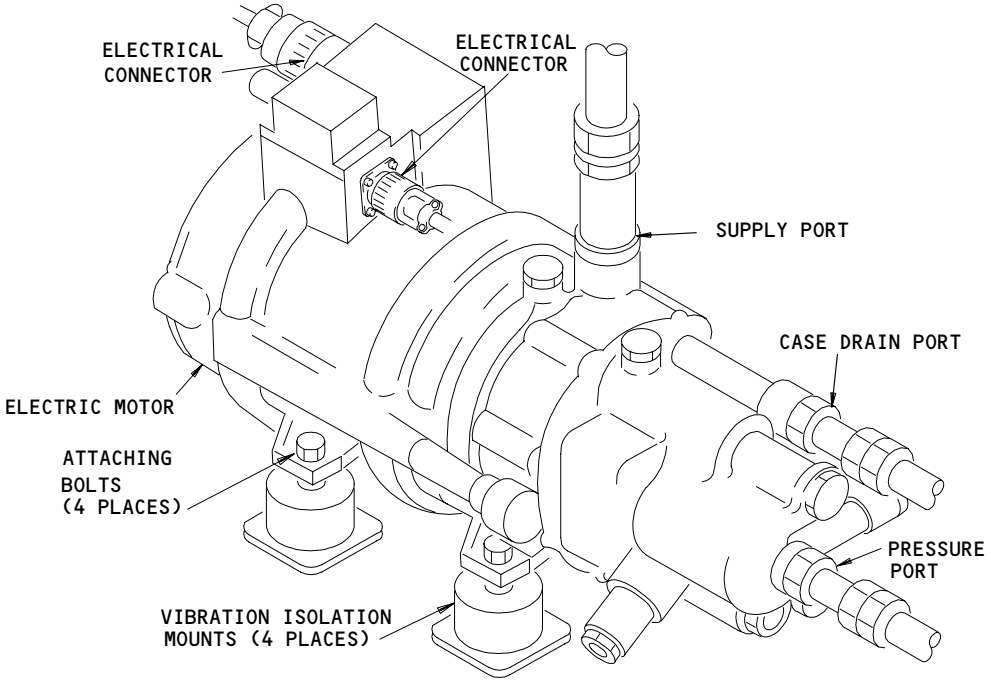


Engine Driven Pump (EDP)
Figure 3

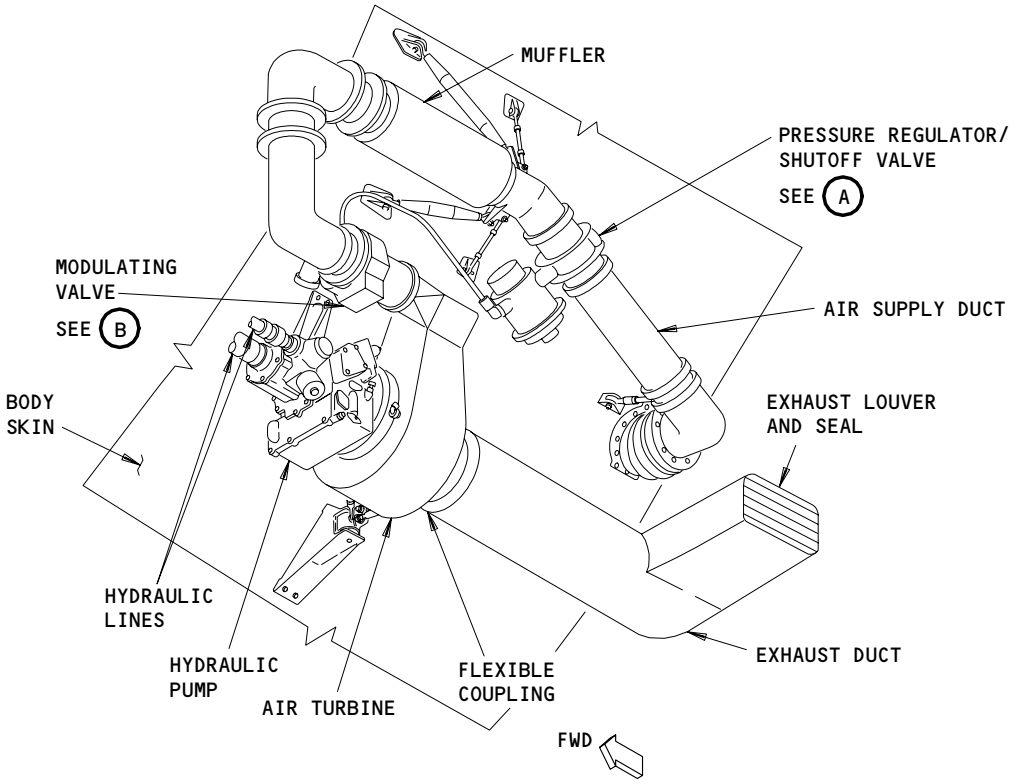
(2) The ADP is in the aft left wing-to-body fairing. A hinged door in the fairing provides access to the ADP. Air from the pneumatic system flows through a regulator/shutoff valve, a muffler, and a modulating valve before entering the ADP. The exhaust duct is vented overboard through a louver and seal.

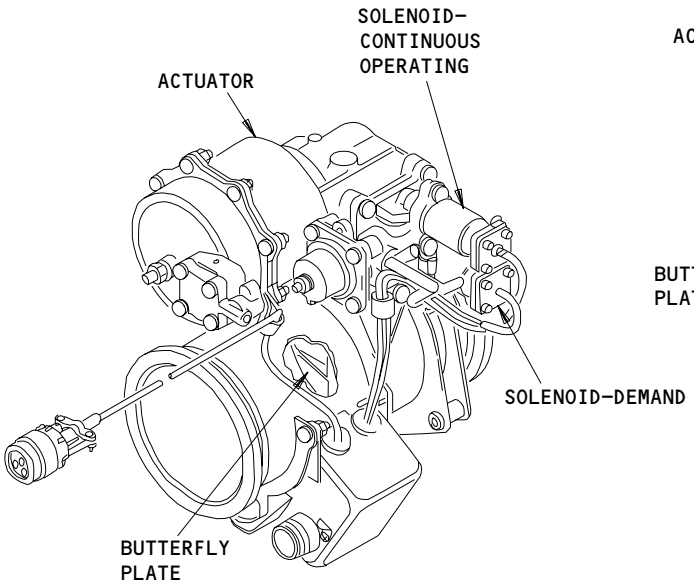
(3) The pump, turbine, and modulating valve of the ADP are mounted as a unit. The ADP is attached to structure with vibration isolating mounts.

(4) The pressure regulator and shutoff valve is a solenoid-controlled and air pressure actuated butterfly valve. This valve regulates flow of air to provide a constant pressure to the ADP modulating valve. When the solenoid is de-energized, the valve shuts off air flow to the ADP.



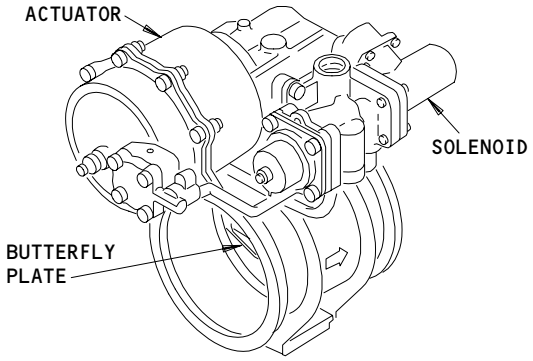
Alternating Current Motor Pump (ACMP)
Figure 4





MODULATING VALVES

B

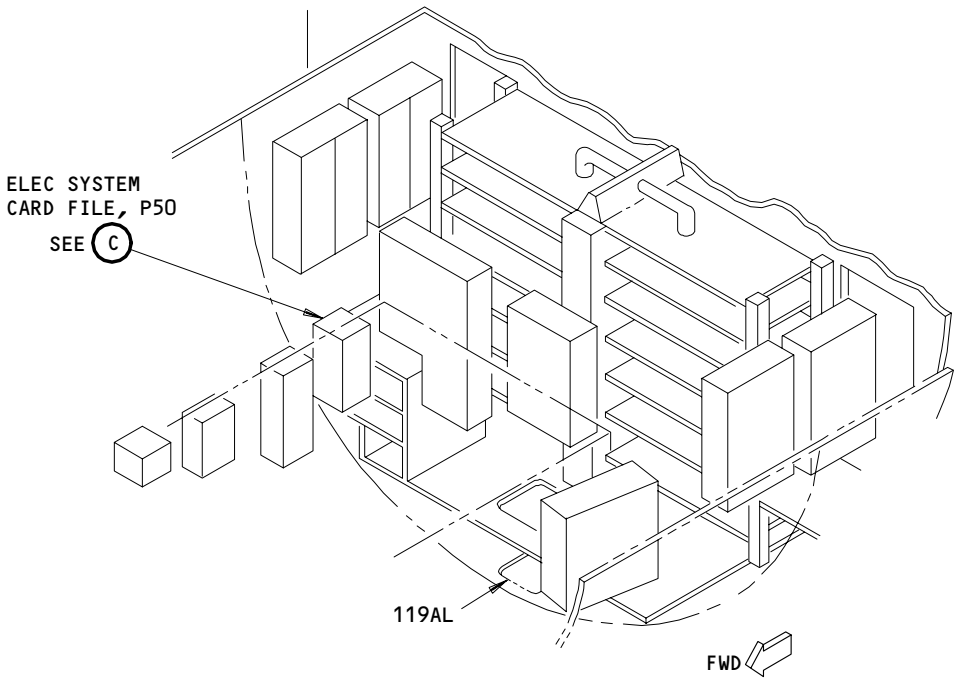


PRESSURE REGULATOR
AND SHUTOFF VALVE

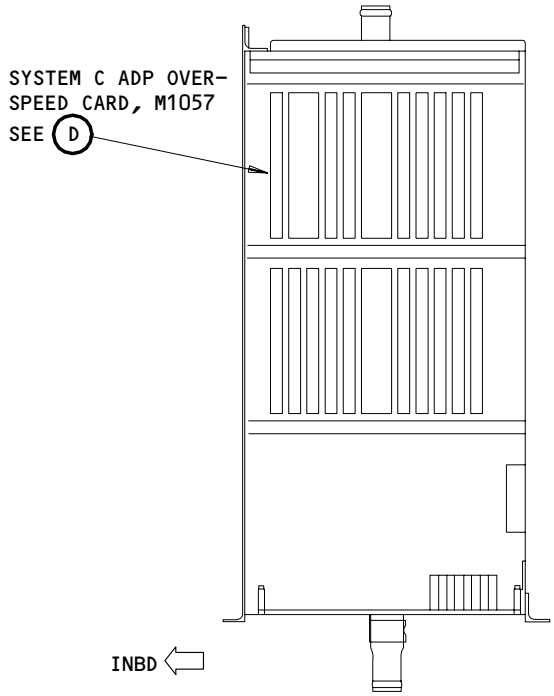
A

Air Driven Pump (ADP)
Figure 5 (Sheet 1)

34839

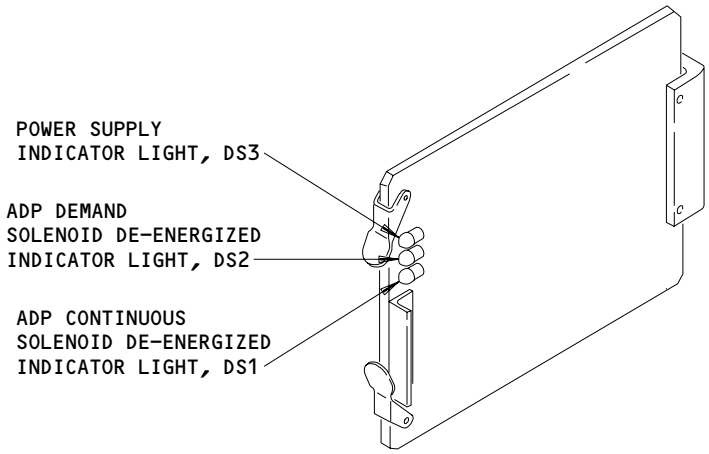


MAIN EQUIP CENTER



ELEC SYS CARD FILE, P50

C



ADP OVERSPEED CARD

D

Air Driven Pump (ADP)
Figure 5 (Sheet 2)

(5) The modulating valve is also a solenoid-controlled and air-pressure-actuated butterfly valve. This valve controls air pressure to the turbine drive, regulating turbine speed. This valve opens when either the demand run or the continuous run solenoid is energized.

(6) The ADP overspeed card in the P50 card file monitors turbine speed with magnetic sensors on the ADP gearbox. If the ADP is in the 'AUTO' mode, and the turbine speed becomes too high, power is interrupted to the demand solenoid, which limits the modulating valve opening. If the ADP is switched to the 'ON' position, and the turbine speed becomes too high, power is interrupted to the continuous solenoid. This also limits the modulating valve opening. When turbine speed drops, power is restored to the valve solenoids, opening the valve and restoring air pressure to the turbine.

(7) The ADP overspeed card contains three indicator lights; the power supply, the demand solenoid de-energized, and the continuous solenoid de-energized. The power supply light illuminates when a 28v dc run signal from the AUTO or ON position of the ADP select switch is applied to the overspeed card. The demand and continuous solenoids de-energized lights are normally extinguished. With the 28v dc run signal available, the demand or continuous solenoid de-energized light illuminates if the overspeed card deactivates the corresponding solenoid on the ADP modulating valve. The overspeed card deactivates the modulating valve solenoids if the magnetic sensor signal indicates the turbine speed is above the normal operating range.

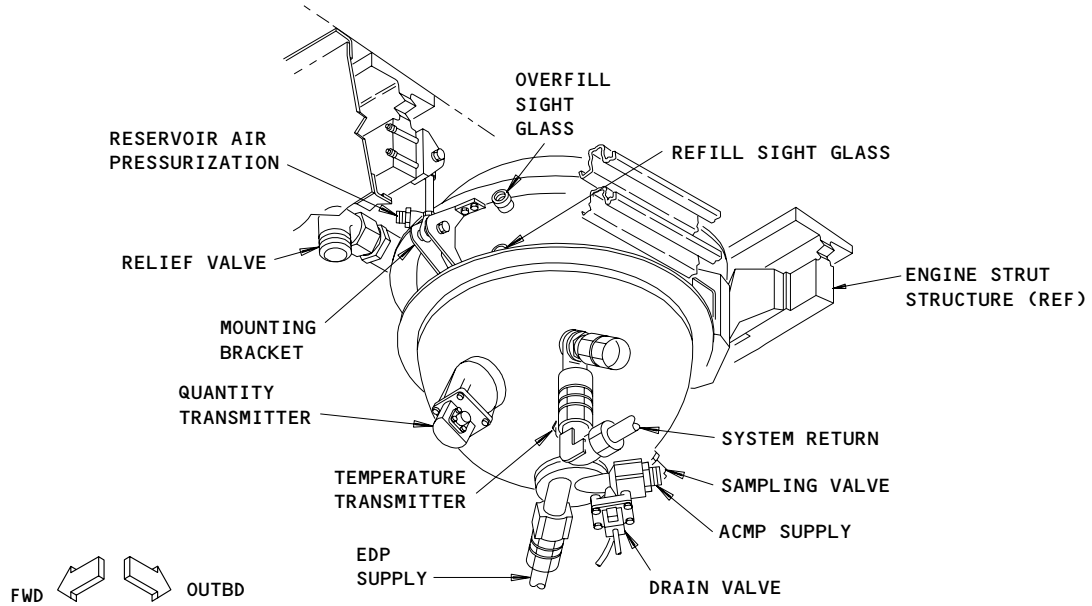
(8) A centrifugal overspeed switch on the turbine provides a backup to the overspeed circuit. If turbine speed rises above the level normally controlled by the overspeed circuit, the centrifugal overspeed switch closes to de-energize the shutoff valve solenoid. This closes the shutoff valve, shuts off the ADP air supply, and stops the ADP. The ADP cannot be restarted until the ADP TEST/RESET switch is placed in the RESET position. The ADP TEST/RESET switch is on the left miscellaneous electrical equipment panel P36 in the electronics compartment.

D. L and R System Reservoirs (Fig. 6)

(1) The left and right reservoirs are identical 8.3 gallon containers which hold 4.8 gallons of hydraulic fluid when full. They are spherical weldments which are bleed air pressurized for positive flow. Each contains a trap to ensure fluid supply during negative-G conditions. Each also has two sight glasses, a quantity transmitter, a sampling valve, a reservoir relief valve, a temperature tramsmitter, and a drain valve. The reservoirs are located in the aft strut bays.

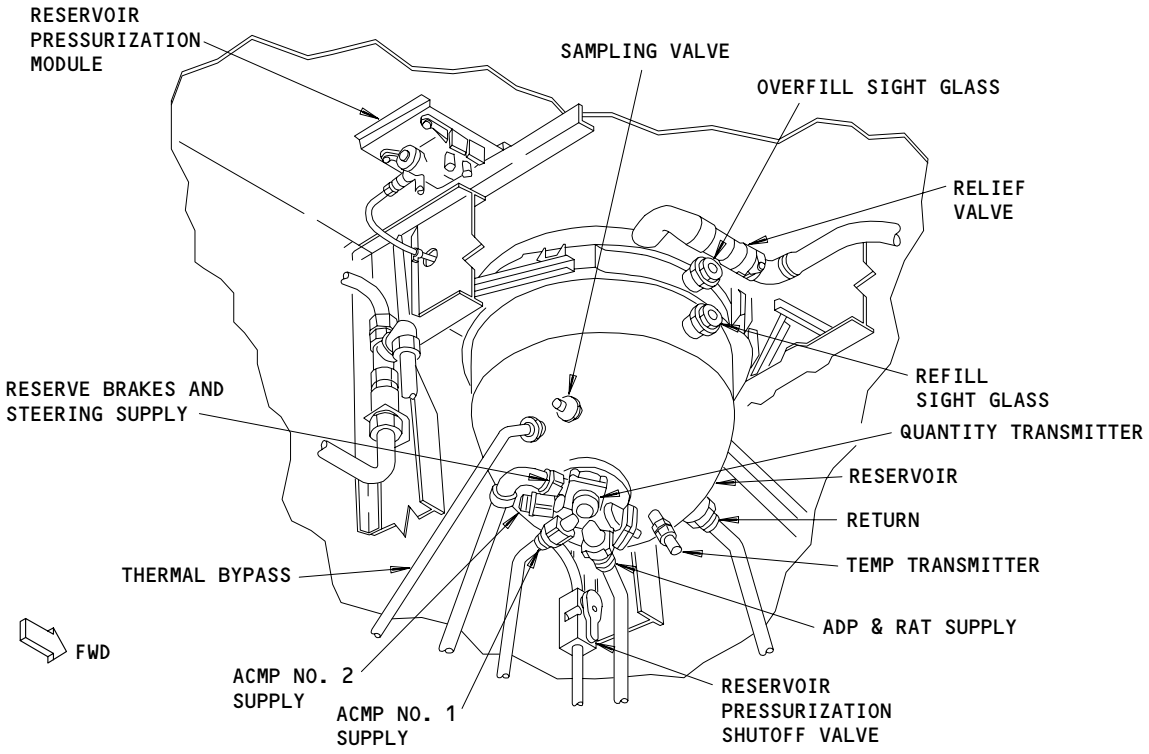
E. C System Reservoir (Fig. 7)
   (1) The center system reservoir is a 14.7 gallon container holding 8.6 gallons of hydraulic fluid when full. It consists of a spherical weldment which is bleed air pressurized for positive flow. The reservoir contains a trap to ensure fluid supply during negative-G conditions. The reservoir also has two sight glasses, a quantity transmitter, a sampling valve, a reservoir relief valve, a temperature transmitter, and a drain valve. The reservoir is on the keel beam in the right wheel well.

F. Reservoir Pressurization Module (Fig. 8)
   (1) Each reservoir is pressurized to ensure fluid supply to the pumps. The pressure is held at 40 psi with air from the pneumatic system. The air passes through the pressurization module which contains two filters, two check valves, a manual bleed valve, and a capped test port.



R SYSTEM RESERVOIR SHOWN (L SYSTEM RESERVOIR SIMILAR)

L and R System Reservoir
Figure 6



C System Reservoir
Figure 7

(2) There is one module for each reservoir. Left and right system modules are located in the aft end of their respective engine aft fairing hydraulic bay. The center system module is aft of the reservoir in the right wheel well.

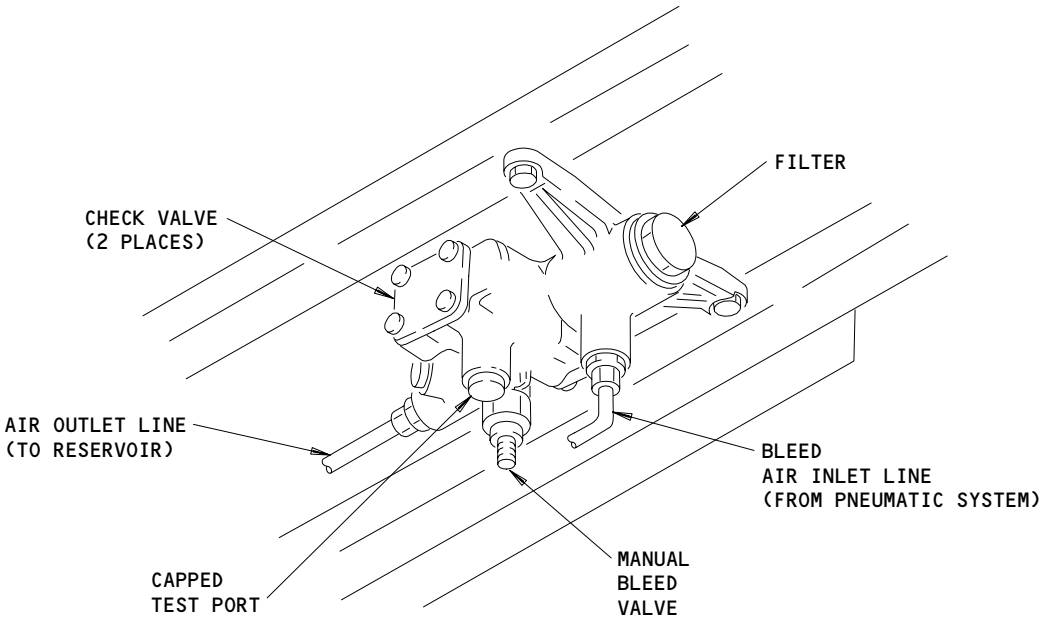
G. Reservoir Pressurization Shutoff Valve

(1) The reservoir pressurization shutoff valve is a manually operated valve in the air pressure line to the reservoir pressurizaton module. This valve is used during maintenance to shutoff air supply to the reservoir while the pneumatic system remains pressurized. With this valve in the closed position, the reservoir can be depressurized with the bleed valve on the pressurization module. The shutoff valve must be returned to the open position when maintenance is complete to allow the reservoir to be pressurized by the pneumatic system.

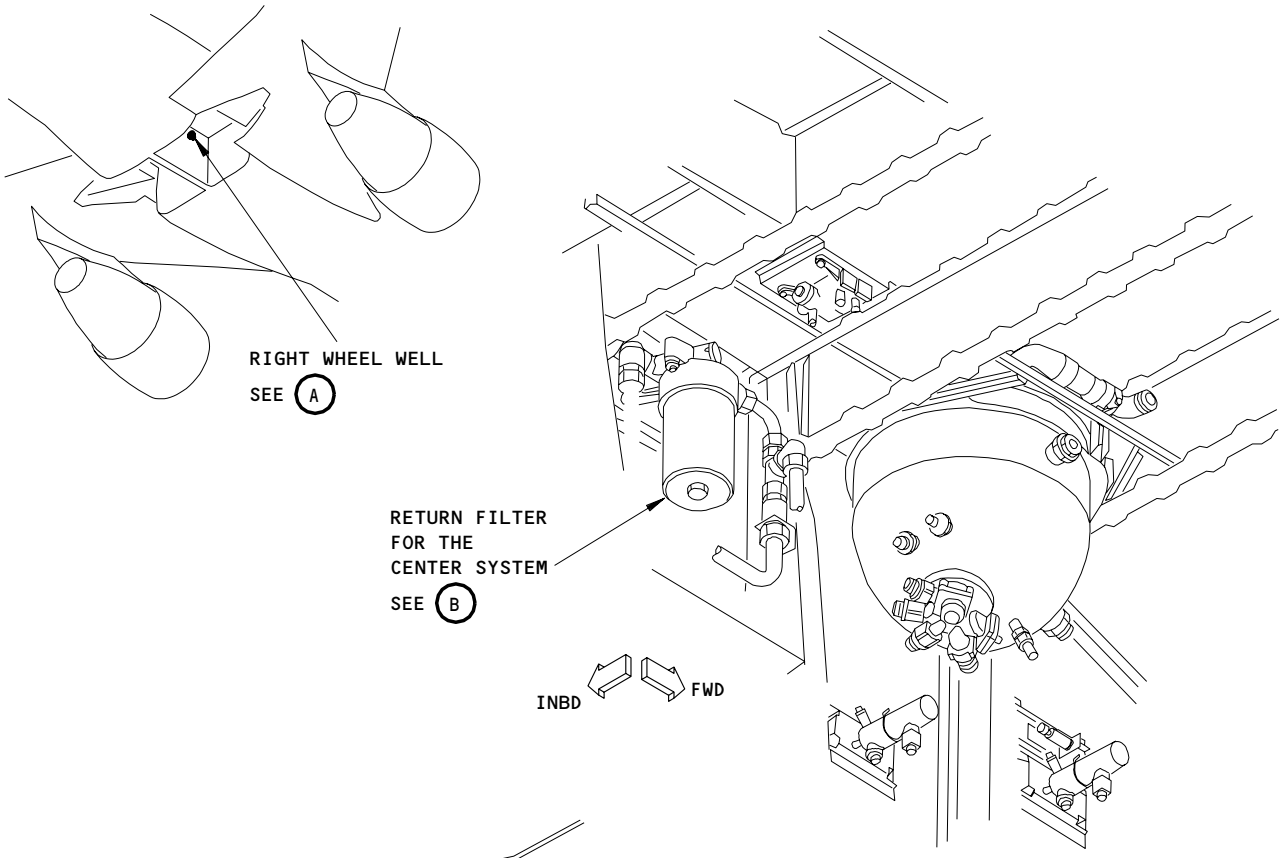
(2) The center system shutoff valve is adjacent to the reservoir on the keel beam in the right wheel well.

(3) The left/right system shutoff valves are adjacent to the reservoir pressurization modules in the left/right engine strut hydraulic bays.

H. Return Filter Module (Fig. 9)

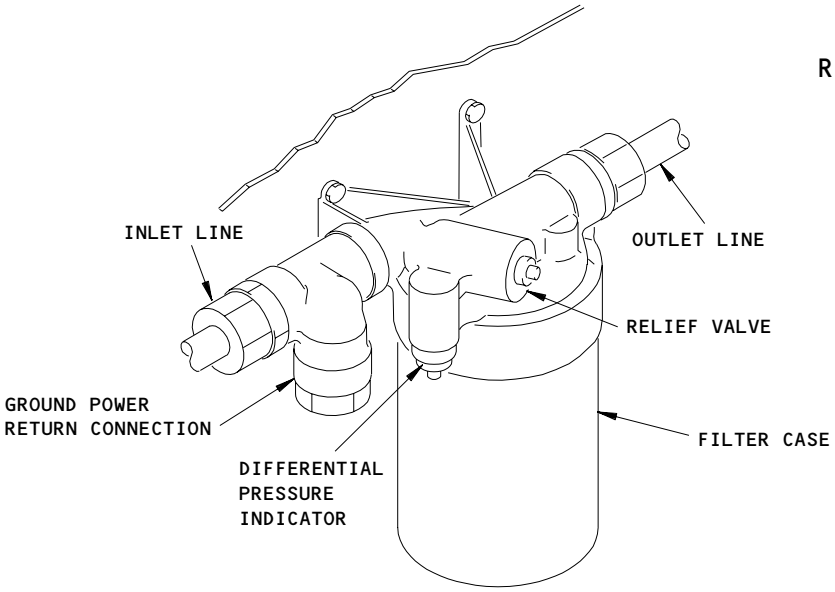


Reservoir Pressurization Module
Figure 8



RIGHT WHEEL WELL

A



RETURN FILTER FOR THE CENTER SYSTEM

B

Return Filter Module
Figure 9

(1) The return module filters fluid returning from user components to the reservoirs. Similar return modules are used in each system and contain a throw-away filter. A spring-loaded shutoff valve prevents spills during filter change. A differential pressure indicator shows when the filter is saturated and ready for replacement. Check valves prevent backflow through the filter. If the filter element becomes plugged, a bypass valve opens to provide full flow. A ground service connection is provided upstream of the filter.

(2) Left and right return filter modules are in the middle of the engine aft fairing hydraulic bay, inboard of the diagonal brace. The center system module is aft of the reservoir on the keel beam in the right wheel well.

I. EDP and ADP Pressure/Case Drain Filter Module (Fig. 10)

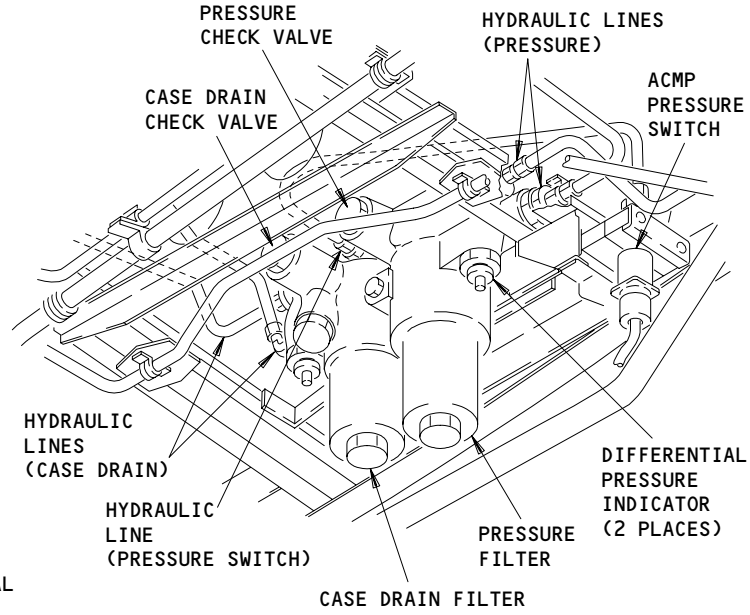
(1) The left and right system EDP filter modules are in the left and right engine aft fairing hydraulic bays. The ADP filter module is on the keel beam in the left wheel well. The filter modules have both pressure and case drain components in the same unit. The EDP's and the ADP use identical modules. Each module contains throw-away type filters. Each module also contains a differential pressure indicator, pump pressure and system pressure switches, a case drain temperature switch, a system pressure relief valve, two check valves, and a ground service pressure connections. Two shutoff valves prevent fluid spills when the filter bowls are removed.

J. ACMP Pressure/Case Drain Filter Modules (Fig. 10)

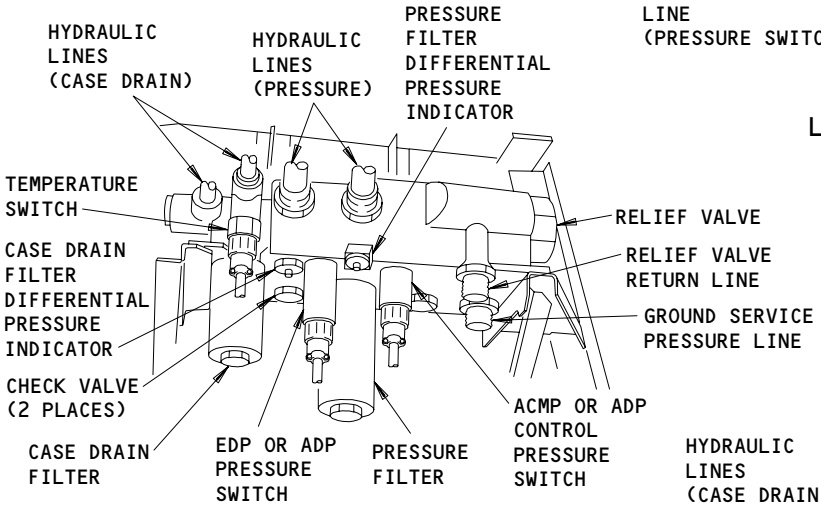
(1) The ACMP module contains pressure and case drain filters of the same type as in the EDP and ADP modules. It also has two shutoff valves to shutoff fluid during filter removal, two check valves, a pressure switch and two differential pressure indicators.

(2) The pressure filter cleans fluid which has been pressurized by the pumps and is on its way to the hydraulic actuators. The case drain filter cleans the fluid which cools the pump before it returns to the reservoir.

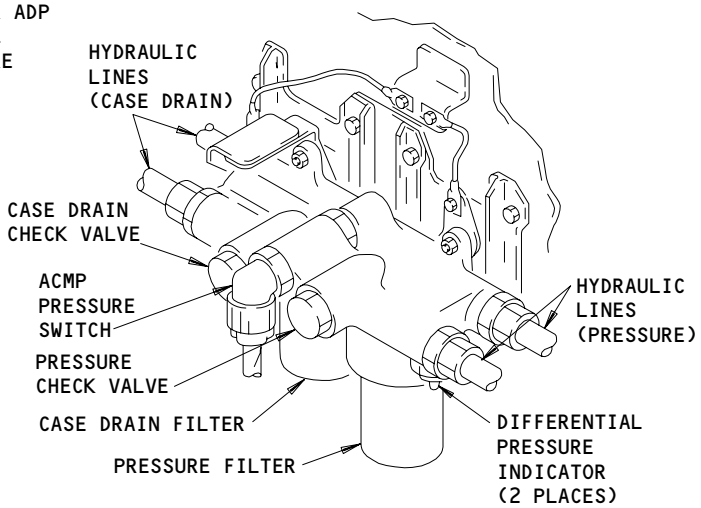
(3) The ACMP modules for the left and right systems are in the engine aft fairing hydraulic bays. The two center system ACMP modules are in the right wheel well.



LEFT AND RIGHT SYSTEM
ACMP FILTER MODULE



EDP AND ADP FILTER MODULE
(ADP INSTL SHOWN)

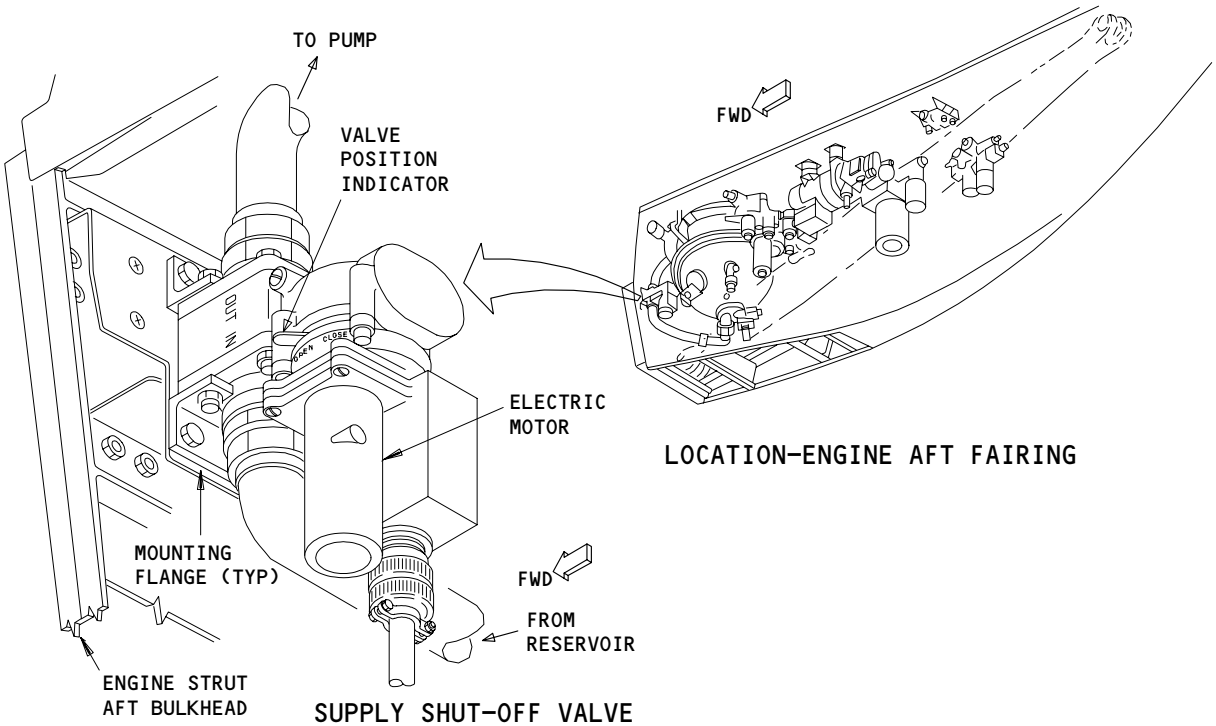


CENTER SYSTEM ACMP FILTER MODULE

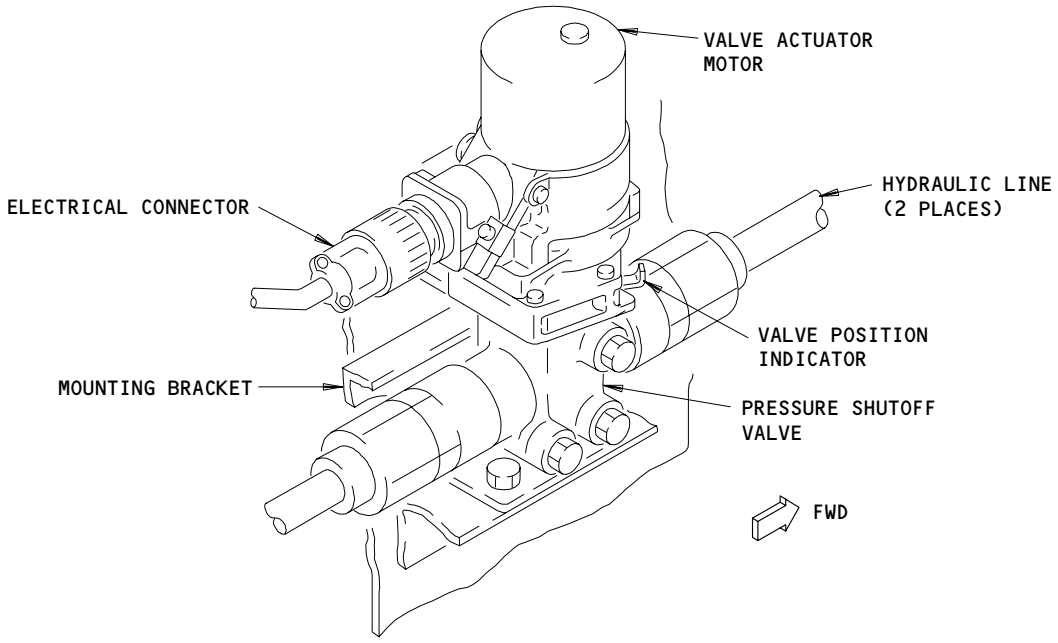
Pressure/Case Drain Filter Modules
Figure 10

K. EDP Supply Shutoff Valve (Fig. 11)
   (1) The supply shutoff valve controls fluid supply to the EDP and is normally in the open position. The valve is closed by a 28 volts dc electric motor which is activated by the fire handle switch. A valve position indicator shows valve position. The shutoff valve is on the engine aft fairing bulkhead at the forward end of the hydraulic bay.

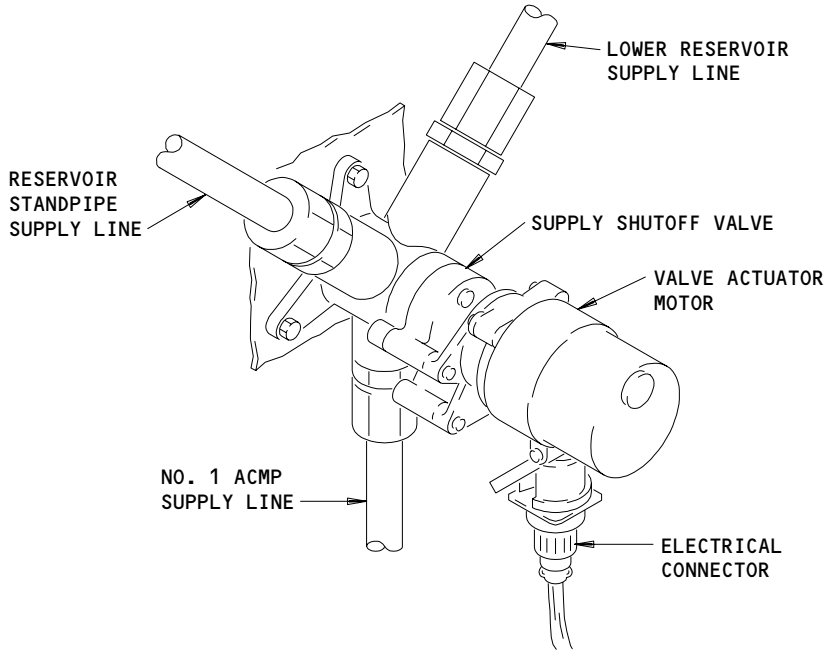
L. Isolated ACMP Shutoff Valves (Fig. 12)
   (1) The isolated ACMP valves are in the C system. These valves consist of a supply and a pressure shutoff valve. They provide a reserve system to power the brakes and nose wheel steering if C system pressure is lost. Each valve is operated by a 28 volts dc electric motor.



EDP Supply Shutoff Valve
Figure 11



PRESSURE SHUTOFF VALVE



SUPPLY SHUTOFF VALVE

Isolated ACMP Shutoff Valves
Figure 12

(2) The valves are controlled by relays on the reserve brakes and steering panel. These relays are actuated by the RESERVE BRAKES AND STEERING select switch on main instrument panel P1, by the RESERVE BRAKE AND STEERING RESET switch on the reserve brakes and steering panel, and by a center system low fluid level signal from the hydraulic quantity monitor unit (Ref 29-33-00).

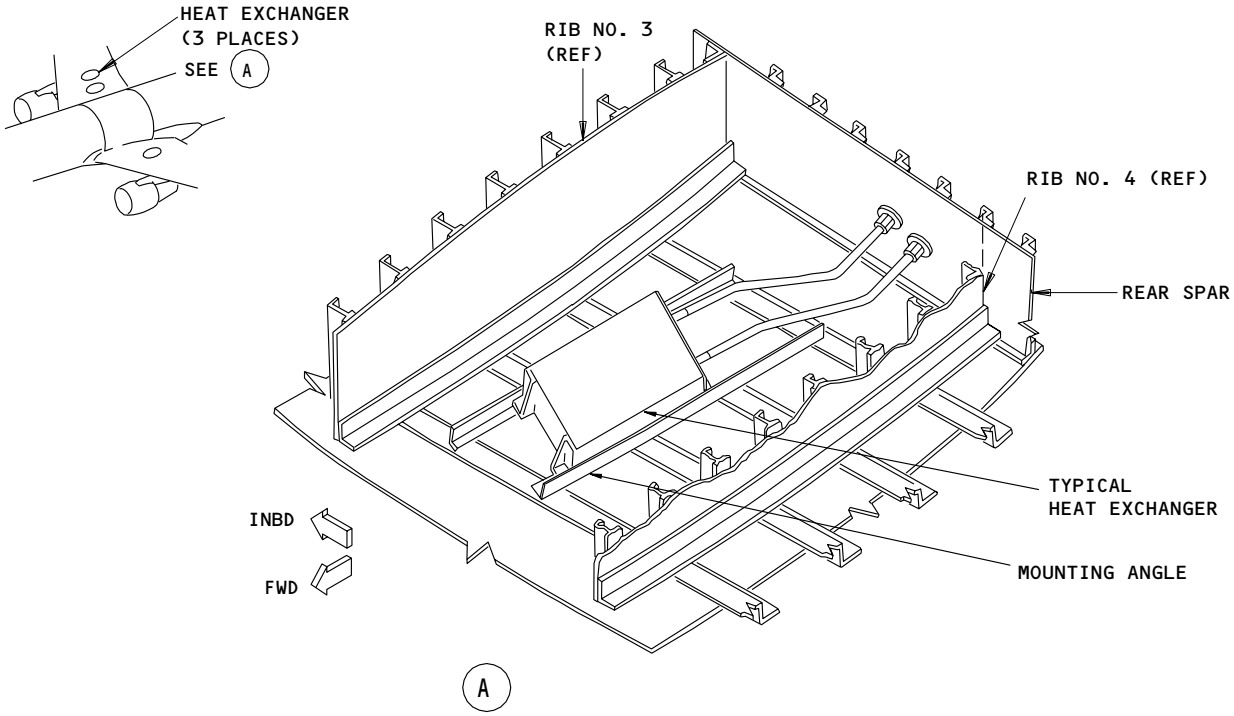
(3) The C system pumps draw fluid from the reservoir through a standpipe. When the supply shutoff valve is activated, fluid is supplied to ACMP C1 from the bottom of the reservoir. When the pressure shutoff valve is closed, pressure from ACMP C1 is routed only to the nose gear and the brakes.

M. Heat Exchangers (Fig. 13)

(1) A heat exchanger in each system cools case drain hydraulic fluid as the fluid returns to the reservoir. The heat exchangers are mounted in the wing fuel tanks and use fuel as a coolant. All three heat exchangers are identical.

(2) The L and R system heat exchangers are at the inboard end of the left and right main fuel tanks, respectively. The C system heat exchanger is adjacent to and inboard of the R system exchanger.

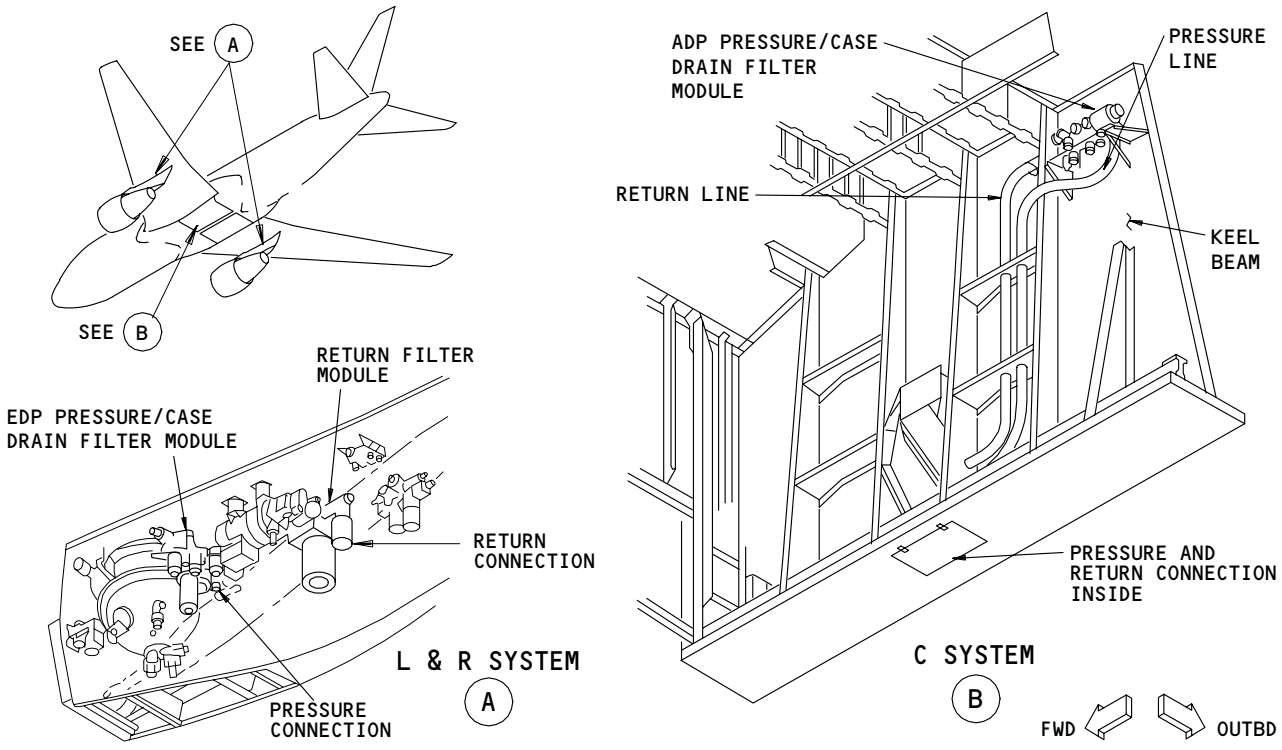
(3) The heat exchangers are plumbed directly to the rear spar and related fittings are welded to the units. A minimum of 600 gallons (4020 pounds/1827 kilograms) of fuel in each main tank are required to provide hydraulic fluid cooling.



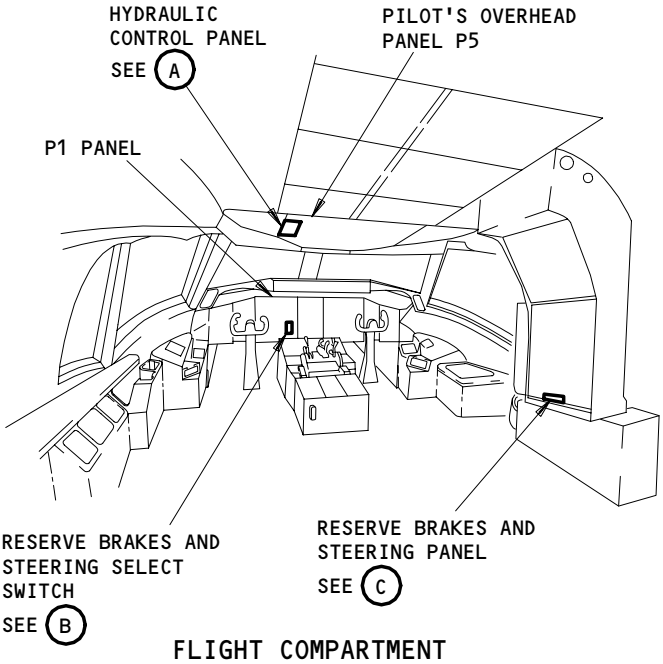
Heat Exchangers
Figure 13

N. Ground Power Connections (Fig. 14)
   (1) The L and R systems ground power connections are in the engine hydraulic bays. The pressure connection is on the EDP filter module and the return connection is on the return filter module. The C system ground power connections are on the keel beam.

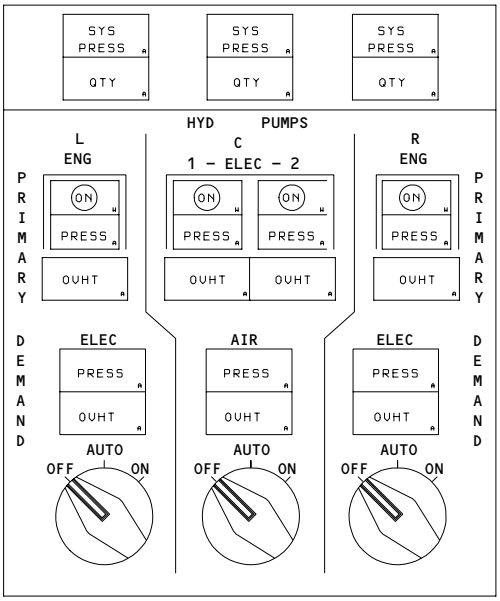
O. Hydraulic Control Panel (Fig. 15)
   (1) The hydraulic control panel is on the pilots' overhead panel P5 and contains the pump switches and system warning lights.
   (2) On the control panel each system's components are arranged in a vertical row. Each system row contains primary and secondary pump control switches and warning lights (amber).
   (3) Pump indicators include low pressure lights and overheat lights. The low pressure lights are connected to switches that operate independently of the low pressure transducers. One overheat light is provided for each pump (7 total).
   (4) Primary pump switches are the press-to-activate type and contain integral ON lights and low PRESS lights. The left and right system switches act as EDP depressurization switches when in the OFF position. The center system switches turn off the ACMPs when in the OFF position.



Hydraulic Ground Power Connections
Figure 14



FLIGHT COMPARTMENT



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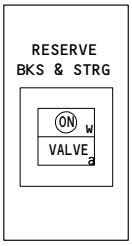

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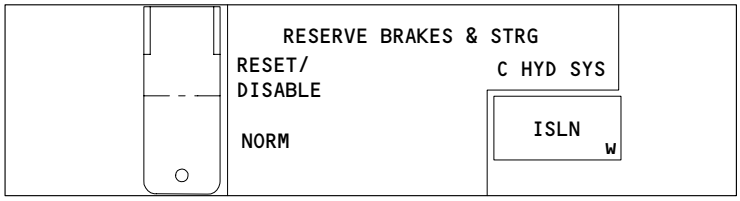


C

Hydraulic Control Panels
Figure 15

(5) The secondary pumps are controlled by three-position rotary switches. The three positions are ON, OFF, and AUTO. The ON position is for continuous operation, the OFF position allows no operation and the AUTO position allows the secondary pumps to run on a demand basis. Secondary pump low pressure lights are located immediately above their rotary switches.

3. Operation

A. Functional Description, L and R System (Fig. 16 and 17)

(1) The fluid flow path originates at the system reservoir. The reservoir supplies the engine driven pump (EDP) and the alternating current motor pump (ACMP). The fluid to the EDP may be terminated by the ENG FIRE CONT switch thru the EDP supply shutoff valve. Pressurized fluid from the ACMP passes through a filter module containing a filter, a pressure switch and a check valve. Case drain fluid from the ACMP passes through the same filter module and through a filter and a check valve.

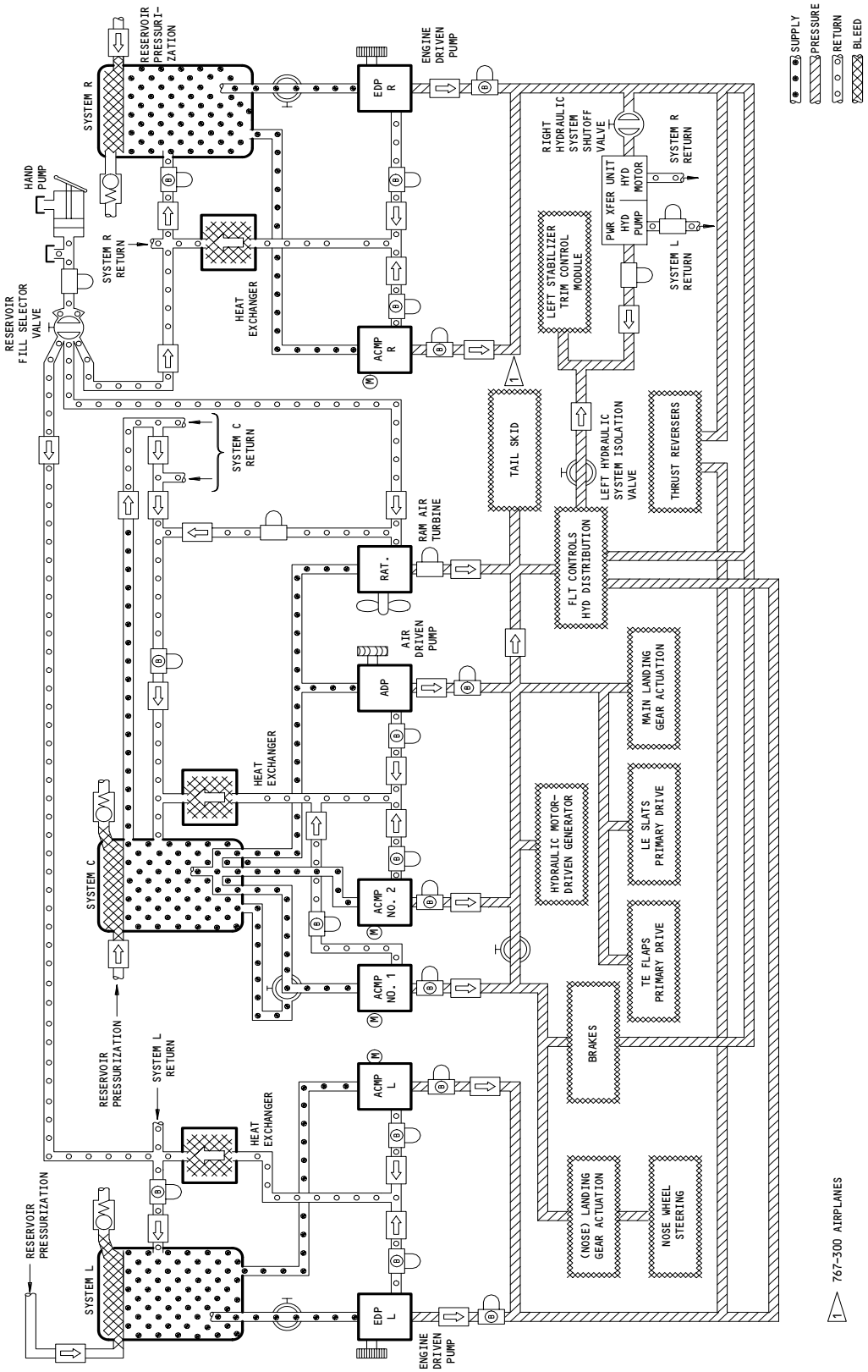
(2) Pressurized fluid from the EDP passes through a module containing a pressure switch, a filter and a check valve. EDP case drain fluid passes through the same filter module containing a pressure switch, a check valve, and a filter.

(3) Pressurized fluid from the EDP and ACMP provides power to the operating systems as shown in Fig. 16. Case drain fluid is routed through a wing mounted heat exchanger. All return fluid flows through a return module which contains check valves and a filter to ensure clean fluid return to the reservoirs.

(4) EDPs are activated by placing L ENG or R ENG switches on the center portion of the hydraulic control panel to ON. The ACMPs which are the demand pumps for the right and left systems, are activated by turning an ELEC DEMAND PUMPS rotary switch from OFF to the ON or AUTO position.

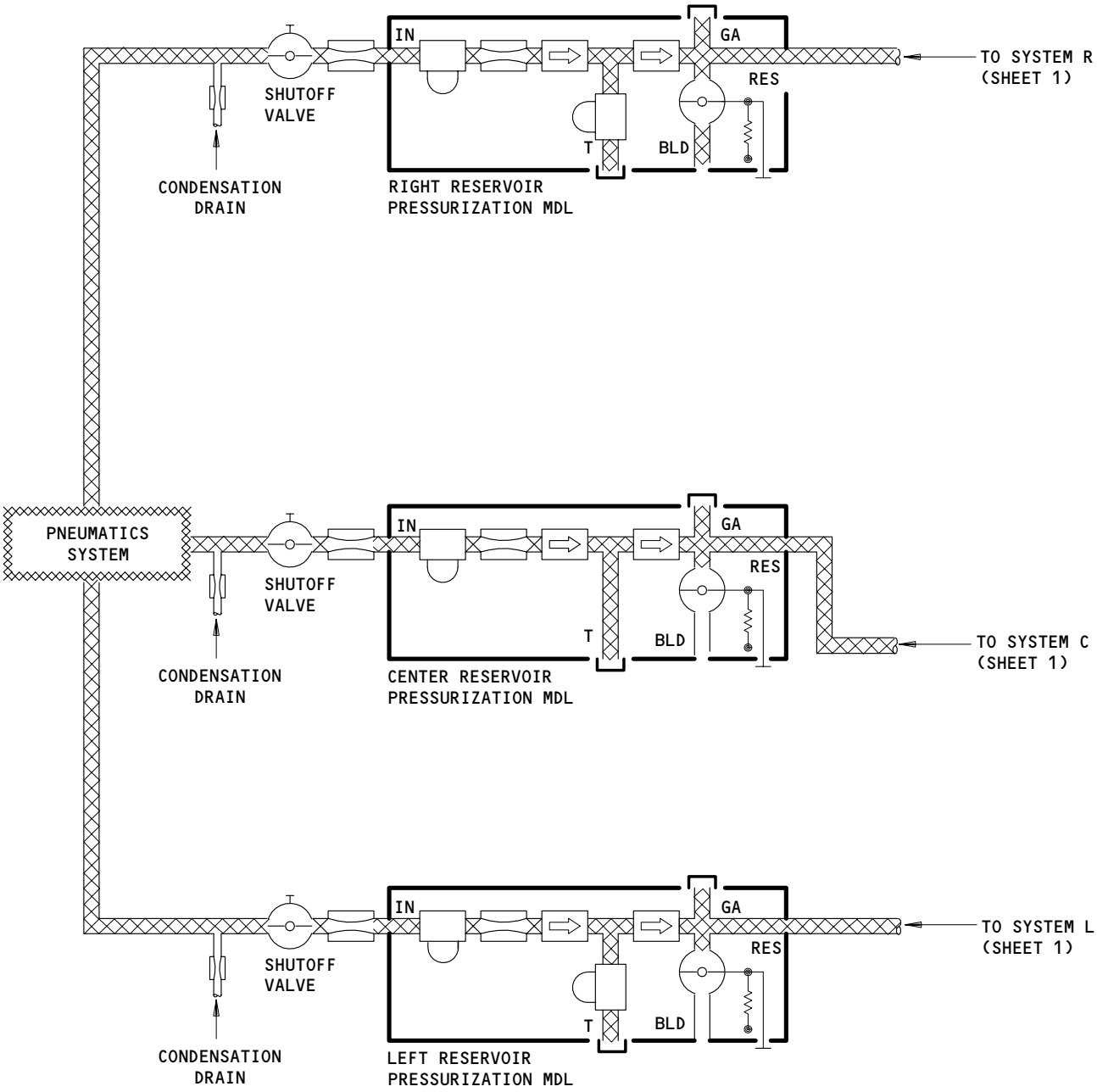
B. Functional Description, Center System (Fig. 16, 19, and 20)

(1) The fluid flow path originates at the system reservoir. The reservoir supplies the alternating current motor pumps (ACMPs) and the air driven pump (ADP). After entering the ACMPs, both the pressurized and case drain fluid flow through the same filter module. The module contains a filter and a check valve for the case drain fluid, and a filter, pressure switch, and check valve for the pressurized fluid.

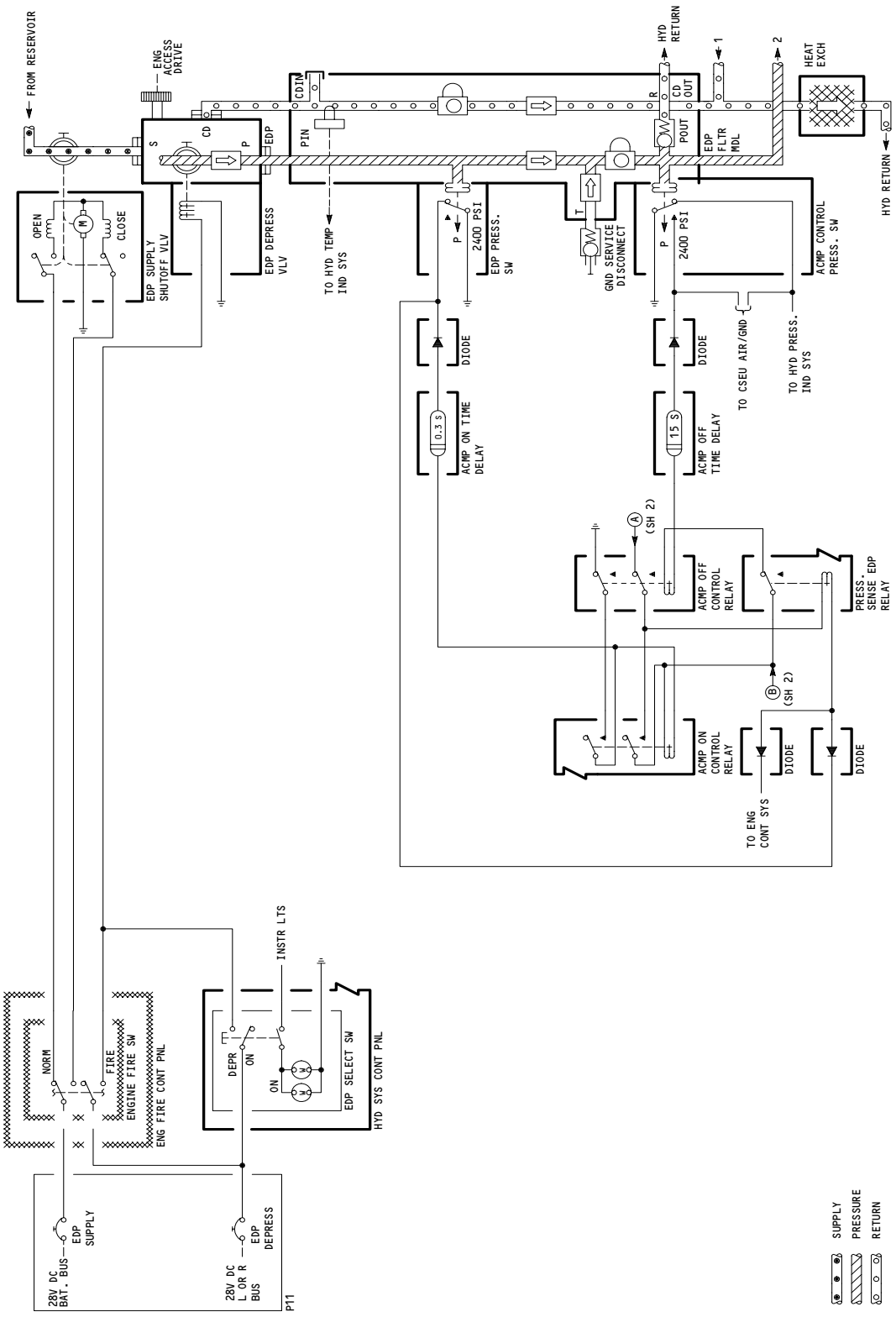


Hydraulic System Schematic
Figure 16 (Sheet 1)

694611

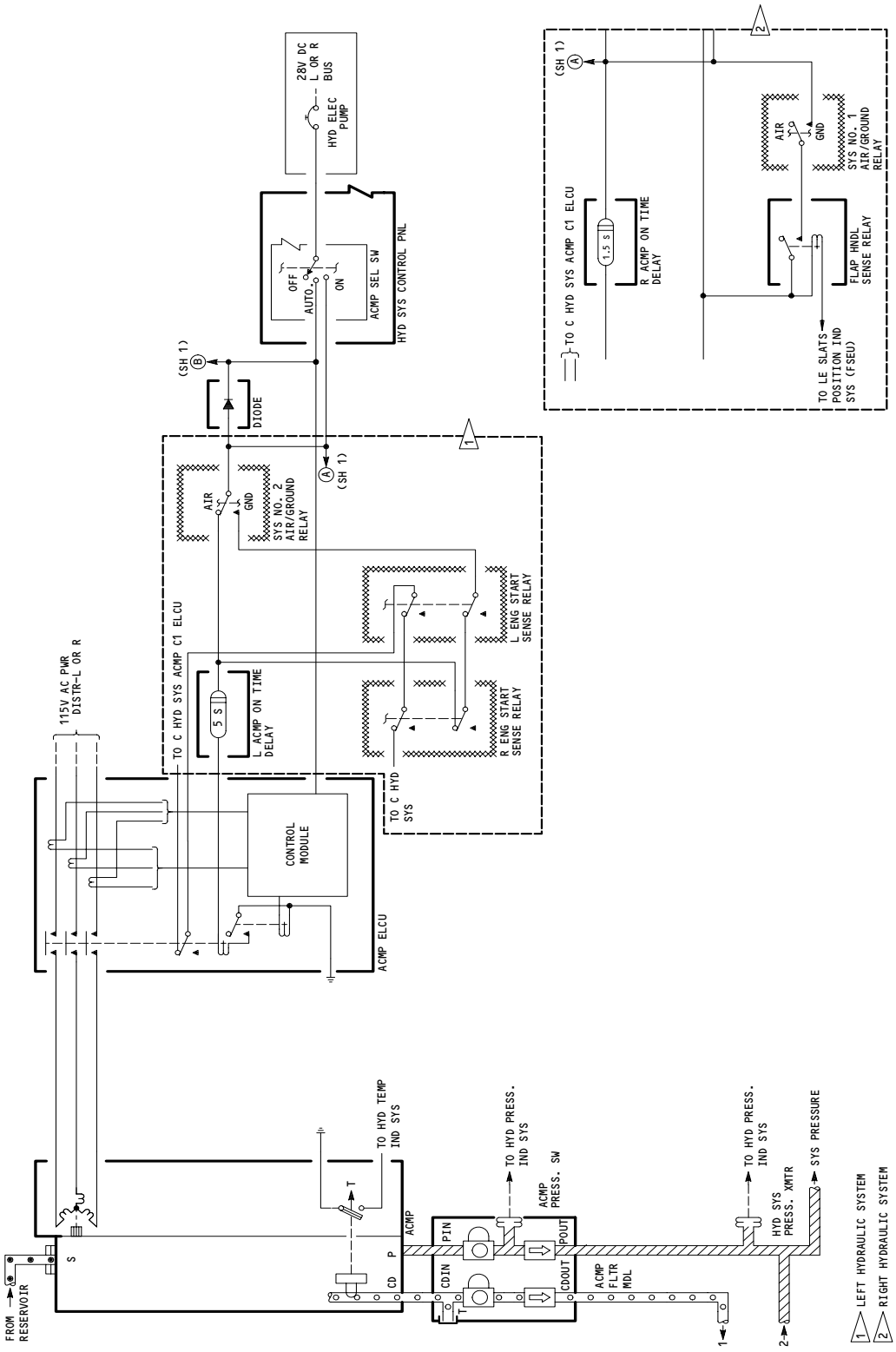


Hydraulic System Schematic
Figure 16 (Sheet 2)



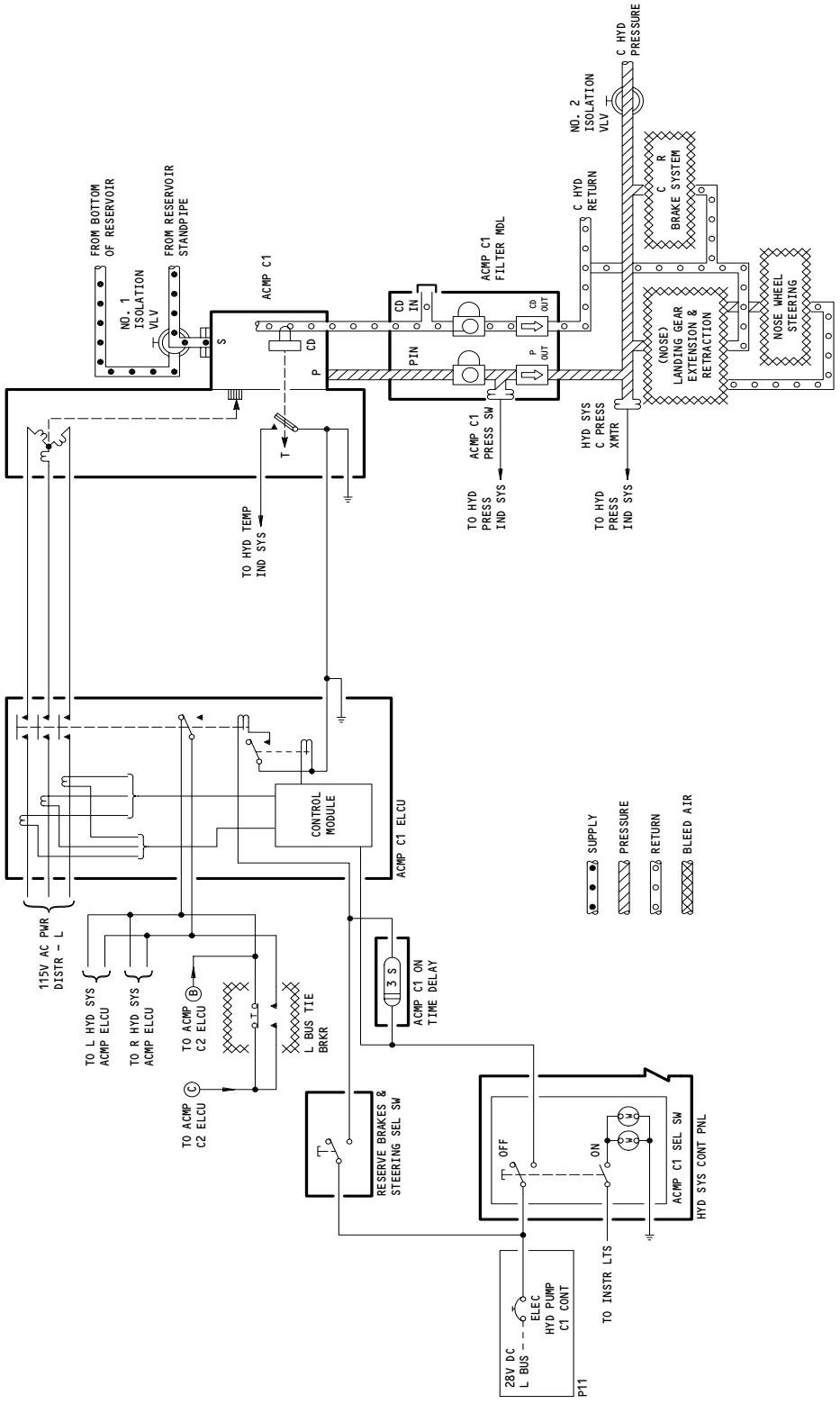
Left or Right Hydraulic System Schematic
Figure 17 (Sheet 1)

222645

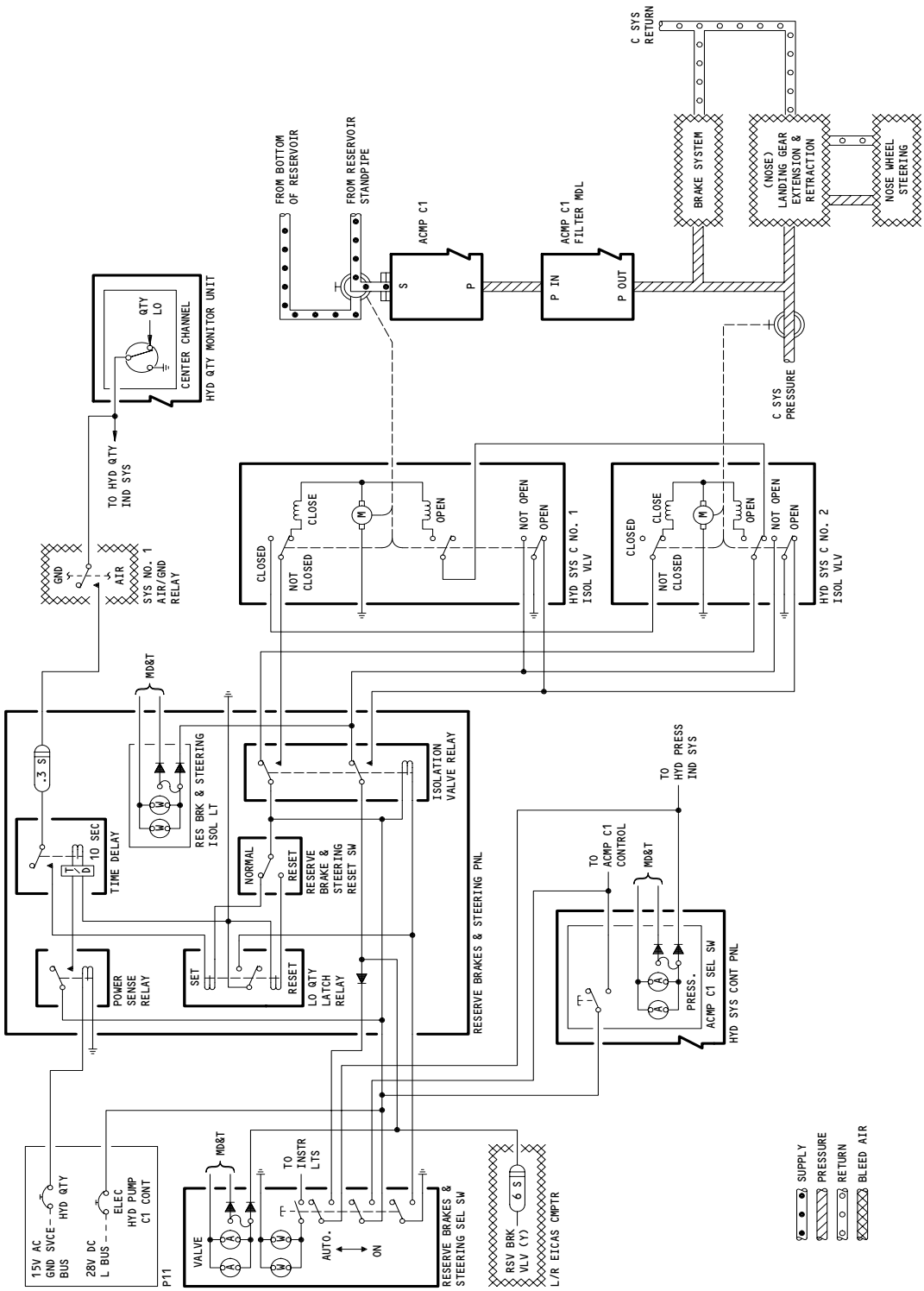


Left or Right Hydraulic System Schematic
Figure 17 (Sheet 2)

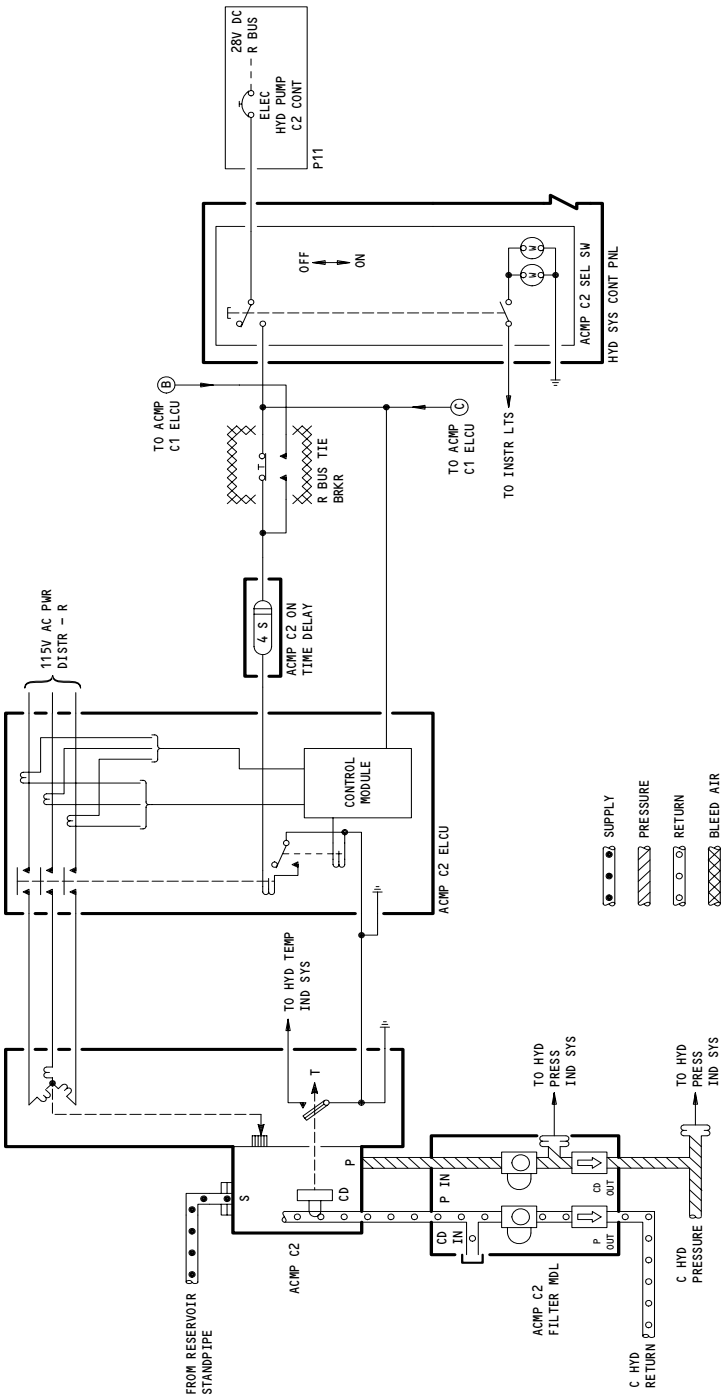
Not Used
Figure 18



Center Hydraulic System Schematic
Figure 19 (Sheet 1)

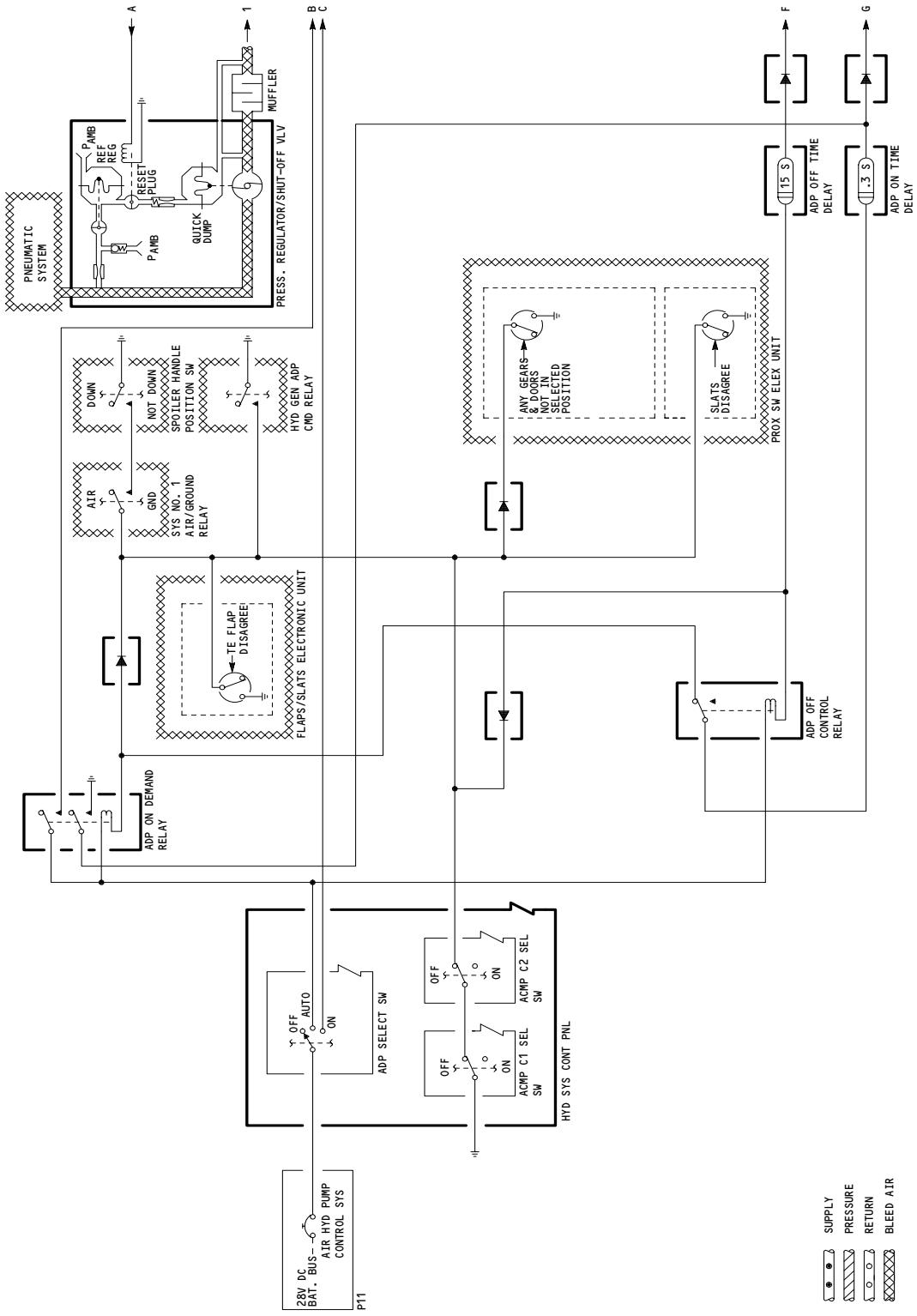


Center Hydraulic System Schematic
Figure 19 (Sheet 2)

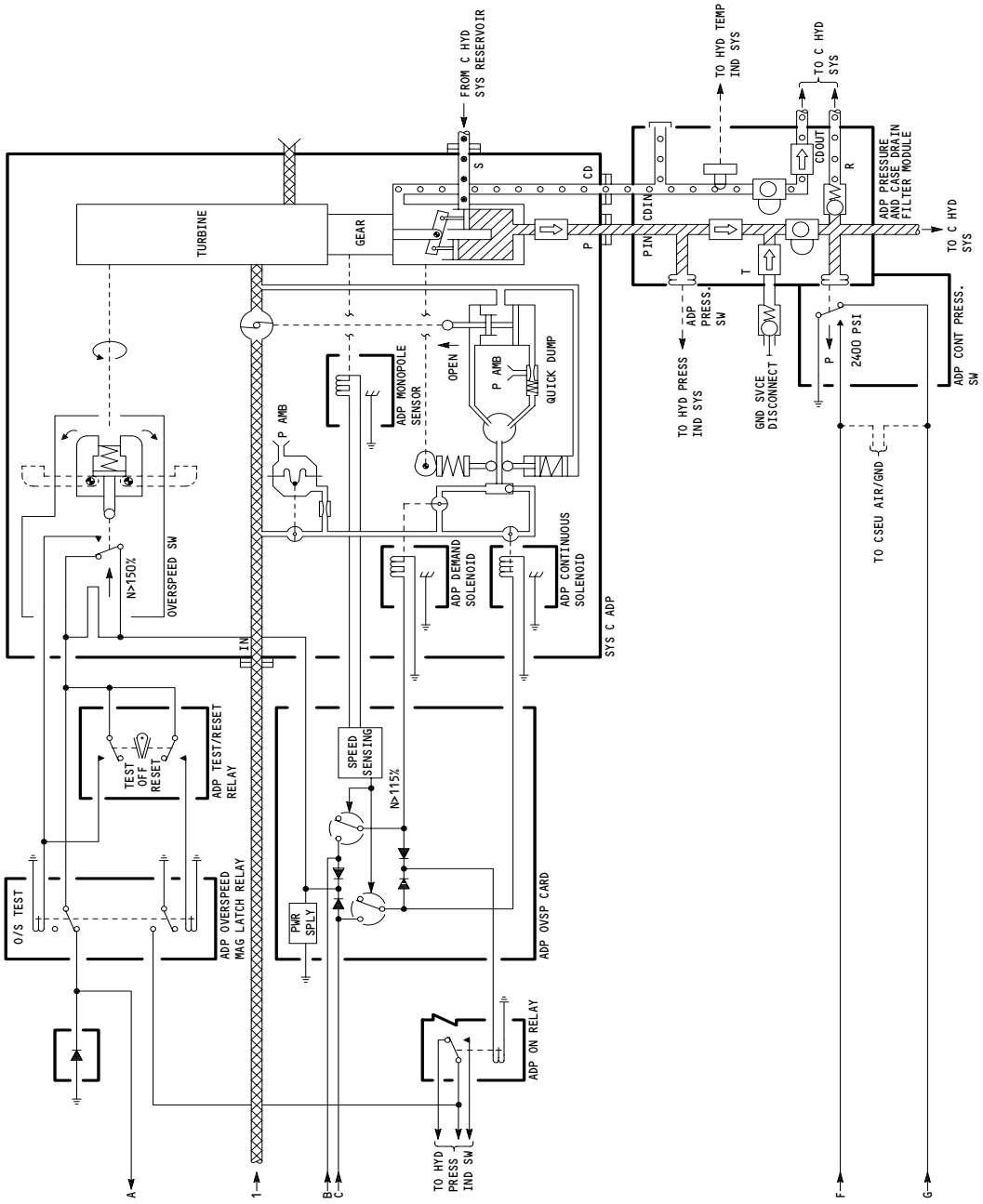


Center Hydraulic System Schematic
Figure 19 (Sheet 3)

174885



Air Driven Pump Schematic
Figure 20 (Sheet 1)



Air Driven Pump Schematic
Figure 20 (Sheet 2)

(2) Case drain and pressurized fluid leaving the ADP flows through a common filter module. The pressure side of the filter module contains a filter, a pressure switch, and a check valve. The case drain side of the module contains a filter and a check valve.
(3) The center system reservoir also supplies the ram air turbine (RAT) which is discussed in 29-21-00.
(4) Pressurized fluid from C system pumps provides power to the operating systems as shown in Fig. 16.
(5) Case drain fluid flows through a wing mounted heat exchanger before returning to the reservoir. Fluid returning from user components flows through a return filter module before entering the reservoir.
(6) The ACMPs are activated by placing the C ELEC 1 and ELEC 2 switches on the center portion of the hydraulic control panel to ON. The air driven pump, which is the demand pump for the center system is activated by turning the AIR DEMAND PUMP rotary switch from OFF to the ON or AUTO position. Refer to Fig. 21 for ADP operation diagram.
(7) Reserve Brakes and Steering System
    (a) The isolated ACMP C1 shutoff valves are automatically actuated to the reserve position if the center system reservoir fluid level is low. With a low C system fluid level, the hydraulic quantity monitor unit provides a ground through system No. 1 air/ground relays in the air mode to a low quantity latch relay on the reserve brakes and steering panel. With the RESERVE BRAKE AND STEERING RESET switch in the NORM position the low quantity latch relay closes providing a ground to actuate the isolation valve relay on the reserve brakes and steering panel. When the isolation valve relay actuates it provides 28 volts dc to the ACMP C1 pressure shutoff valve. The pressure shutoff valve motor drives the valve to the closed position. This isolates the ACMP C1 output to power only the brakes and nose wheel steering. In the closed position, the pressure shutoff valve switches power to the supply shutoff valve. The supply shutoff valve motor drives the valve to the reserve position. This switches ACMP C1 supply from the reservoir standpipe to the bottom of the reservoir.
    (b) The power sense relay and the time delay relay on the reserve brakes and steering panel interrupt the ground signal from the quantity system if power is removed from the quantity system. This prevents the reserve brakes and steering system from latching to the reserve position during power interruptions.

(c) The RESERVE BRAKES AND STEERING select switch on panel P1 is used to manually actuate the system to the reserve position. If the C ELEC 1 select switch on the hydraulic control panel is off, placing the RESERVE BRAKES AND STEERING select switch to the ON position will supply 28 volts dc to the ACMP C1 ELCU. The ELCU closes to supply 115/200 volt, 400 Hz, 3-phase power to operate ACMP C1. In the ON position, the RESERVE BRAKES AND STEERING select switch also provides a ground to actuate the isolation valve relay. This operates the ACMP C1 shutoff valves to the reserve position if they have not been automatically actuated by the hydraulic quantity monitor unit. If the system was manually actuated to the reserve position, it can be reset by placing the RESERVE BRAKES AND STEERING switch on panel P1 to the auto position (condition) position.

(d) The reserve system is reset after being automatically actuated by placing the RESERVE BRAKES AND STEERING switch to auto position (condition) and the RESERVE BRAKE AND STEERING RESET switch to the RESET position. This actuates the low quantity latch relay to the reset position removing a ground from the isolation valve relay. With ground removed, the isolation valve relay switches 28 volts dc to operate the ACMP C1 pressure and supply shutoff valves to the normal position. With the RESERVE BRAKE AND STEERING RESET switch in the RESET position, the automatic switching of the reserve system is deactivated and the ACMP C1 pressure and supply shutoff valves cannot be operated to the reserve position by a ground signal from the quantity monitor unit. The reserve system can still be operated manually with the RESERVE BRAKES AND STEERING switch on panel P1. Placing the RESERVE BRAKE AND STEERING RESET switch to the NORM position arms the low quantity latch relay to allow automatic operation of the reserve system.

(e) A VALVE light on the RESERVE BRAKES AND STEERING switch illuminates while the ACMP C1 shutoff valves are in transit and when the position of either valve does not agree with the switch position. The VALVE light will also remain illuminated if ACMP C1 does not pressurize the reserve system with the RESERVE BRAKES AND STEERING switch in the ON position. A RSV BRAKE VAL message is displayed on EICAS if the conditions that illuminate the VALVE light exist after six seconds.

C. Control

NOTE: Prior to operating the hydraulic systems, verify that each main tank has 600 gal. (4020 pounds; 1827 kilograms) or more of fuel and that EICAS display does not indicate low hydraulic quantity.

(1) To operate hydraulic systems, verify electric power is ON. Operation of the air driven pump requires pressurization of the pneumatic system.

(2) For left and right systems, at hydraulic control panel:

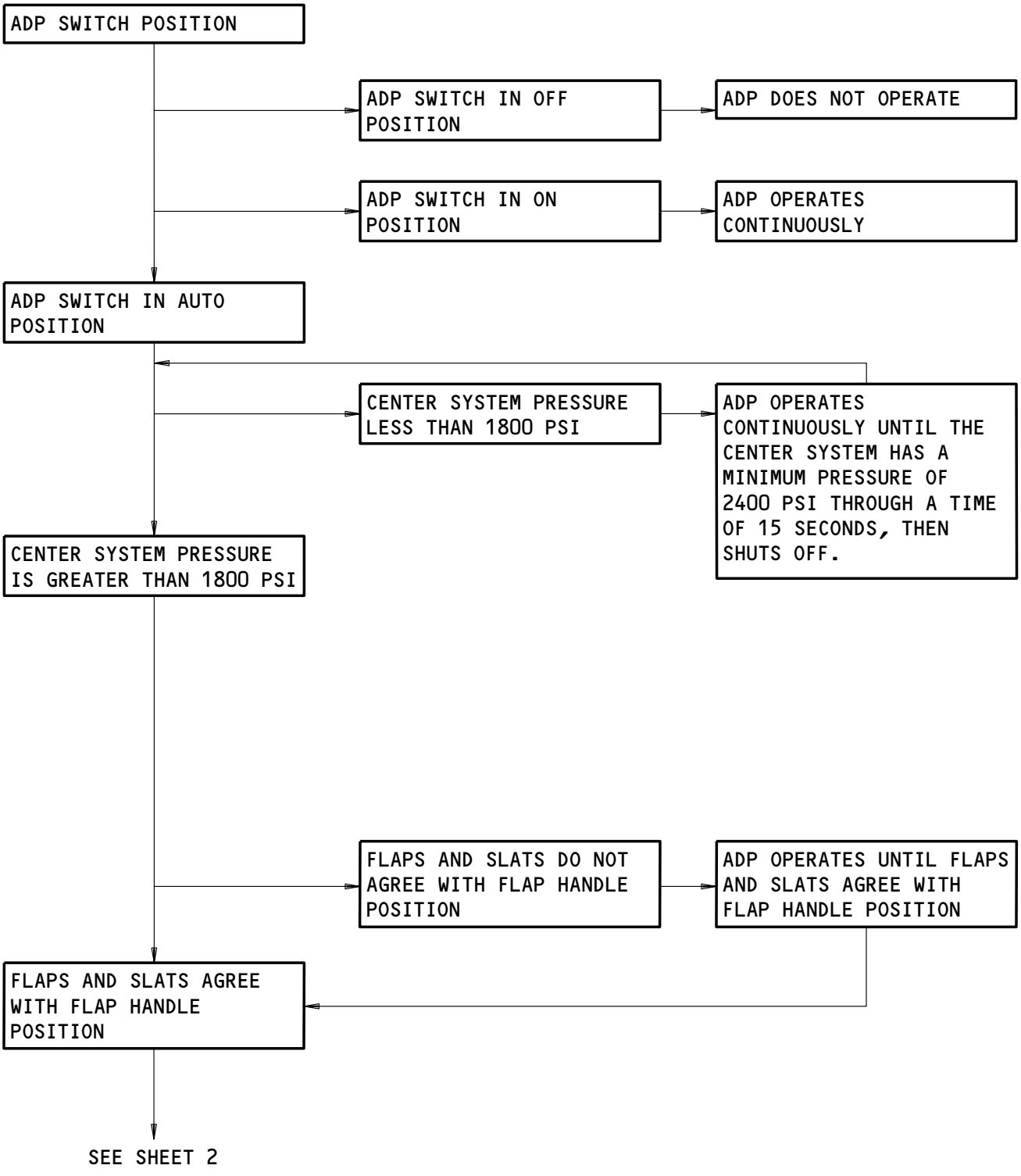
(a) Place L ENG and R ENG PRIMARY HYD PUMPS switches to ON prior to engine start.

(b) Place left and right ELEC DEMAND PUMP switches to ON or AUTO.

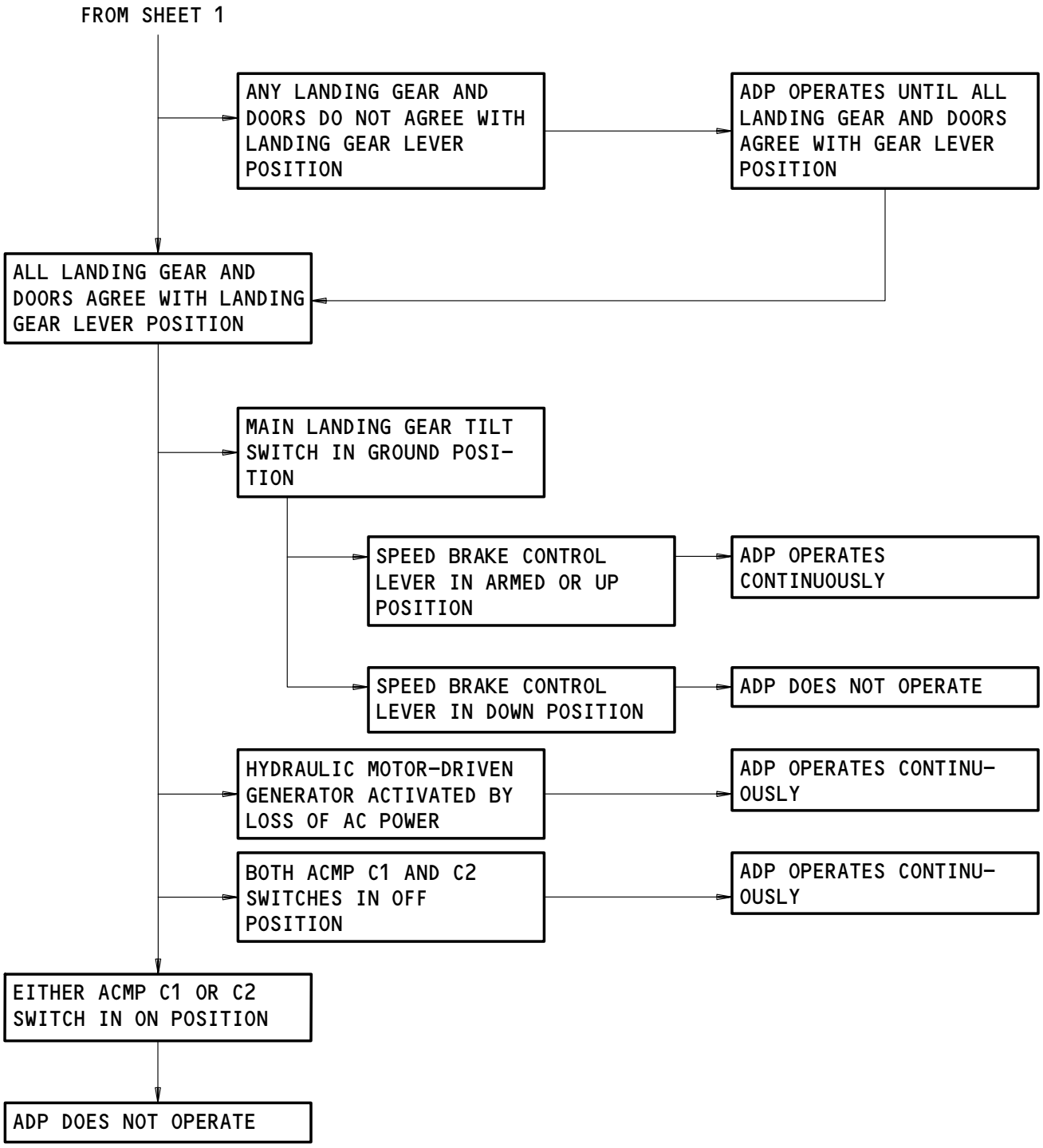
(3) For center system,
(a) Place C ELEC 1 and C ELEC 2 PRIMARY HYD PUMPS switches to ON.
(b) Place AIR DEMAND PUMP to AUTO or ON.

NOTE: If demand pump switches are placed in AUTO for ground test, they will not run under low demand conditions when system pressure is greater than 2000 psi. Related pump pressure lights will not illuminate. Refer to Fig. 21 for ADP operation diagram.

(4) Verify that EICAS display indicates L, C, and R system pressure at 3050 ±150 psig.
(5) Left and right systems with engines not running will have alternating current motor pumps running continuously in either AUTO or ON position.
(6) To shut down the hydraulic systems, position all switches to OFF.



Air-Driven Pump (ADP) Operation Diagram
Figure 21 (Sheet 1)



Air-Driven Pump (ADP) Operation Diagram
Figure 21 (Sheet 2)

148420

MAIN (LEFT, RIGHT, AND CENTER) HYDRAULIC SYSTEMS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
BREAKER - L BUS TIE, C902 (REF 24-22-00, FIG. 101)				
BREAKER - R BUS TIE, C904 (REF 24-22-00, FIG. 101)				
CARD - SYS C ADP OVERSPEED, M1057	11	1	119AL, MAIN EQUIP CTR, P50	29-11-69
CIRCUIT BREAKER - LEFT GENERATOR, C901 (REF 24-22-00, FIG. 101)				
CIRCUIT BREAKER - RIGHT GENERATOR, C903 (REF 24-22-00, FIG. 101)				
CIRCUIT BREAKERS			FLT COMPT, P11	
BRAKE PRESS, C1180		1	11U13	*
FLIGHT CONTROL SHUTOFF TAIL - C, C1013		1	11H18	*
FLIGHT CONTROL SHUTOFF TAIL - L, C1011		1	11H17	*
FLIGHT CONTROL SHUTOFF TAIL - R, C1012		1	11H27	*
HYDRAULIC AIR PUMP, C1099		1	11D31	*
HYDRAULIC ELEC PUMP C1, C1085		1	11L15	*
HYDRAULIC ELEC PUMP C2, C1086		1	11L24	*
HYDRAULIC ELEC PUMP L, C1084		1	11L25	*
HYDRAULIC ELEC PUMP R, C1087		1	11L16	*
HYDRAULIC L ENG PUMP DEPRESS, C1095		1	11L14	*
HYDRAULIC R ENG PUMP DEPRESS, C1096		1	11L23	*
HYDRAULIC ENG PUMP SUPPLY L, C1097		1	11D29	*
HYDRAULIC ENG PUMP SUPPLY R, C1098		1	11D30	*
HYDRAULIC QTY, C1101		1	11L20	*
HYDRAULIC SYSTEM PRESS - C, C1082		1	11L18	*
HYDRAULIC SYSTEM PRESS - L, C1080		1	11L17	*
HYDRAULIC SYSTEM PRESS - R, C1081		1	11L26	*
LIGHTING - INSTRUMENT & PANEL - CAPT, C1237		1	11P2	*
WING FLT CONTROL SHUTOFF - C, C1016		1	11H16	*
WING FLT CONTROL SHUTOFF - L, C1014		1	11H14	*
WING FLT CONTROL SHUTOFF - R, C1015		1	11H26	*
COMPUTER - EICAS L, M10181 (REF 31-41-00, FIG. 101)				
COMPUTER - EICAS R, M10182 (REF 31-41-00, FIG. 101)				
CONNECTION - SYS C HYDRAULIC GROUND POWER PRESSURE	7	1	149BL, KEEL BEAM	29-11-00
CONNECTION - SYS L HYDRAULIC GROUND POWER PRESSURE	5	1	437BL, 437BR, LEFT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-00
CONNECTION - SYS R HYDRAULIC GROUND POWER PRESSURE	5	1	447BL, 447BR, RIGHT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-00
CONNECTION - SYS C HYDRAULIC GROUND POWER RETURN	7	1	149BL, KEEL BEAM	29-11-00
CONNECTION - SYS L HYDRAULIC GROUND POWER RETURN	5	1	437BL, 437BR, LEFT ENGINE STRUT, RETURN FILTER MODULE	29-11-00

* SEE WM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 1)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CONNECTION - SYS R HYDRAULIC GROUND POWER RETURN	5	1	447BL,447BR, RIGHT ENGINE STRUT, RETURN FILTER MODULE, EDP PRESS/ CASE DRAIN FILTER MODULE	29-11-00
DIODE - SYS C, R276	14	1	119AL, MAIN EQUIP CTR, E1-2	*
DIODE - (REF 31-01-36, FIG. 101) SYS C, R22,R28,R132,R163,R164				
DIODE - (REF 31-01-37, FIG. 101) SYS L, R42,R160,R174,R246 SYS R, R43				
DIODE - (REF 31-01-33, FIG. 101) SYS L, R45 SYS R, R44,R68,R162,R175,R247				
DIODE - (REF 27-88-00, FIG. 101) SYS R ISOLATION, R176				
EXCHANGER - SYSTEM C HEAT	6	1	632BB RIGHT WING	29-11-27
EXCHANGER - SYSTEM L HEAT	6	1	532BB LEFT WING	29-11-27
EXCHANGER - SYSTEM R HEAT	6	1	632BB RIGHT WING	29-11-27
LIGHT - ADP CONTINUOUS SOLENOID DE-ENERGIZED INDICATOR, DS1	11	1	119AL, MAIN EQUIP CTR, P50, ADP OVERSPEED CARD, M1057	29-11-69
LIGHT - ADP DEMAND SOLENOID DE-ENERGIZED INDICATOR, DS2	11	1	119AL, MAIN EQUIP CTR, P50, ADP OVERSPEED CARD, M1057	29-11-69
LIGHT - POWER SUPPLY INDICATOR, DS3	11	1	119AL, MAIN EQUIP CTR, P50, ADP OVERSPEED CARD, M1057	29-11-69
MODULE - ADP PRESS/CASE DRAIN FILTER	7	1	LEFT WHEEL WELL	29-11-19
MODULE - SYS C ACMP C1,C2 PRESS/CASE DRAIN FILTER	8	2	RIGHT WHEEL WELL	29-11-18
MODULE - SYS C RESERVOIR PRESSURIZATION	8	1	RIGHT WHEEL WELL	29-11-26
MODULE - SYS C RETURN FILTER	8	1	RIGHT WHEEL WELL	29-11-16
MODULE - SYS L ACMP PRESS/CASE DRAIN FILTER	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-18
MODULE - SYS L EDP PRESS/CASE DRAIN FILTER	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-17
MODULE - SYS L RESERVOIR PRESSURIZATION	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-25
MODULE - SYS L RETURN FILTER	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-15
MODULE - SYS R ACMP PRESS/CASE DRAIN FILTER	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-18
MODULE - SYS R EDP PRESS/CASE DRAIN FILTER	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-17
MODULE - SYS R RESERVOIR PRESSURIZATION	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-25
MODULE - SYS R RETURN FILTER	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-15
PANEL - (REF 26-21-00, FIG. 101) FIRE CONTROL, M10443				
PANEL - HYDRAULIC CONTROL, M10	1	1	FLT COMPT, P5	29-11-00
PANEL - RESERVE BRAKES AND STEERING, M1216	1	1	FLT COMPT, P61	29-11-00
PUMP (ACMP) - SYS C ALTERNATING CURRENT MOTOR C1, M232	8	1	RIGHT WHEEL WELL	29-11-02
PUMP (ACMP) - SYS C ALTERNATING CURRENT MOTOR C2, M233	8	1	RIGHT WHEEL WELL	29-11-02
PUMP (ACMP) - SYS L ALTERNATING CURRENT MOTOR, M231	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-01

* SEE WM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 2)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
PUMP (ACMP) - SYS R ALTERNATING CURRENT MOTOR, M234	2	1	447BL,447BR, LEFT ENGINE STRUT	29-11-01
PUMP (ADP) - SYS C AIR DRIVEN, M235	5	1	195RL,195SL, AFT LEFT WING/BODY FAIRING	29-11-03
PUMP (EDP) - SYS L ENGINE DRIVEN	2	1	415AL,416AR, LEFT ENGINE	29-11-05
PUMP (EDP) - SYS R ENGINE DRIVEN	2	1	425AL,426AR, RIGHT ENGINE	29-11-05
RELAY - (24-25-00/101) HYD GEN ADP COMMAND, K865				
RELAYS - (31-01-33/101) ACMP R OFF CONTROL, K128 EDP R PRESS SENSE, K127 FLAP HANDLE SENSE, K717 SYS R ACMP ON CONTROL, K126				
RELAYS - (31-01-36/101) ADP OFF CONTROL, K153 ADP ON DEMAND, K684 ADP OVERSPEED MAG LATCH, K603				
RELAYS - (31-01-37/101) ACMP L OFF CONTROL, K134 EDP L PRESS SENSE, K131 SYS L ACMP ON CONTROL, K130				
RELAYS - (32-09-00/101) SYS NO. 1 AIR/GND, K178,K552 SYS NO. 2 AIR/GND, K204				
RELAYS - (80-11-00/101) L ENGINE START SENSE, K680 R ENGINE START SENSE, K681				
RESERVOIR - SYS C HYDRAULIC	8	1	RIGHT WHEEL WELL	29-11-21
RESERVOIR - SYS L HYDRAULIC	2	1	437BL, 437BR, LEFT ENGINE STRUT	29-11-20
RESERVOIR - SYS R HYDRAULIC	2	1	447BL, 447BR, RIGHT ENGINE STRUT	29-11-20
SENSOR - MONOPOLE, YBVTS1	5	1	195RL, 195SL, AFT LEFT WING/BODY FAIRING, ADP, M235	*
SOLENOID - CONTINUOUS, YBVV1	5	1	195RL, 195SL, AFT LEFT WING/BODY FAIRING, ADP, M235	*
SOLENOID - DEMAND, YBVV2	5	1	195RL, 195SL, AFT LEFT WING/BODY FAIRING, ADP, M235	*
SWITCHES - (26-21-00/101) L ENGINE FIRE, S37 R ENGINE FIRE, S38				
SWITCH - ADP CONTROL PRESSURE, S29	7	1	LEFT WHEEL WELL, ADP PRESS/CASE DRAIN FILTER MODULE	29-11-19
SWITCH - ADP TEST/RESET, S572	10	1	119AL, MAIN EQUIP CTR, P36	*

* SEE THE WDM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 3)

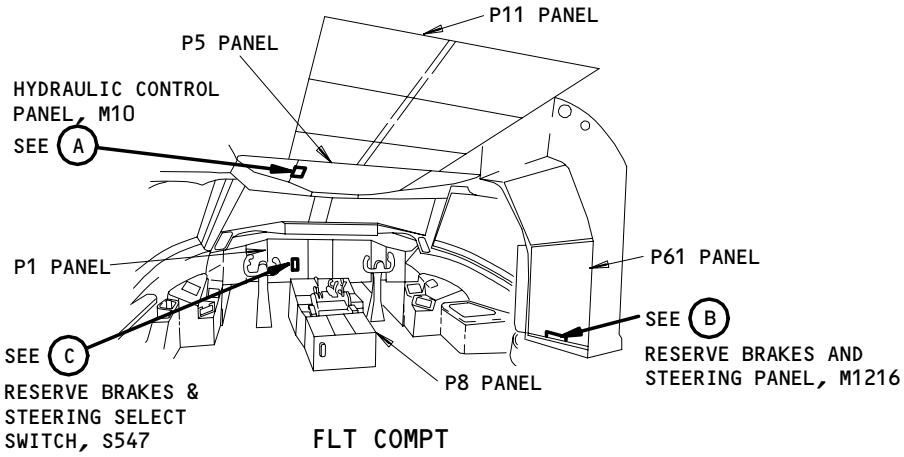
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - SPEEDBRAKE LEVER POSITION, S493 (REF 27-61-00, FIG. 101)				
SWITCH - SYS C ACMP C2 PRESSURE, S34	9	1	RIGHT WHEEL WELL, ACMP C2 PRESS/ CASE DRAIN FILTER MODULE	29-11-18
SWITCH - SYS C ADP SELECT, YCYS6	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH - SYS L ACMP CONTROL PRESSURE, S27	5	1	437BL,437BR, LEFT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-17
SWITCH - SYS L ACMP PRESSURE, S25	3	1	437BL,437BR, LEFT ENGINE STRUT, ACMP PRESS/CASE DRAIN FILTER MODULE	29-11-18
SWITCH - SYS L ACMP SELECT, YCYS5	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH - SYS L EDP PRESSURE, S26	5	1	437BL,437BR, LEFT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-17
SWITCH - SYS R ACMP CONTROL PRESSURE, S32	5	1	447BL,447BR, RIGHT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-17
SWITCH - SYS R ACMP PRESSURE, S30	3	1	447BL,447BR, RIGHT ENGINE STRUT, ACMP PRESS/CASE DRAIN FILTER MODULE	29-11-18
SWITCH - SYS R ACMP SELECT, YCYS7	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH - SYS R EDP PRESSURE, S31	5	1	447BL,447BR, RIGHT ENGINE STRUT, EDP PRESS/CASE DRAIN FILTER MODULE	29-11-17
SWITCH/LIGHT - RESERVE BRAKES AND STEERING SELECT, S547	1	1	FLT COMPT, P1	29-11-00
SWITCH/LIGHT - SYS C ACMP C1 SELECT, YCYS2	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH/LIGHT - SYS C ACMP C2 SELECT, YCYS3	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH/LIGHT - SYS L EDP SELECT, YCYS1	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
SWITCH/LIGHT - SYS R EDP SELECT, YCYS4	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
TIME DELAY - (REF 31-01-31, FIG. 101) SYS C ACMP C1 ON, M303				
TIME DELAY - (REF 31-01-32, FIG. 101) SYS C ACMP C2 ON, M304				
TIME DELAY - (REF 31-01-33, FIG. 101) SYS R ACMP OFF, M300 SYS R ACMP ON, M299,M500				
TIME DELAY - (REF 31-01-36, FIG. 101) SYS C ADP OFF, M497 SYS C ADP ON, M305				
TIME DELAY (REF 31-01-37, FIG. 101) SYS L ACMP OFF, M302 SYS L ACMP ON, M301,M499				

* SEE WM EQUIPMENT LIST

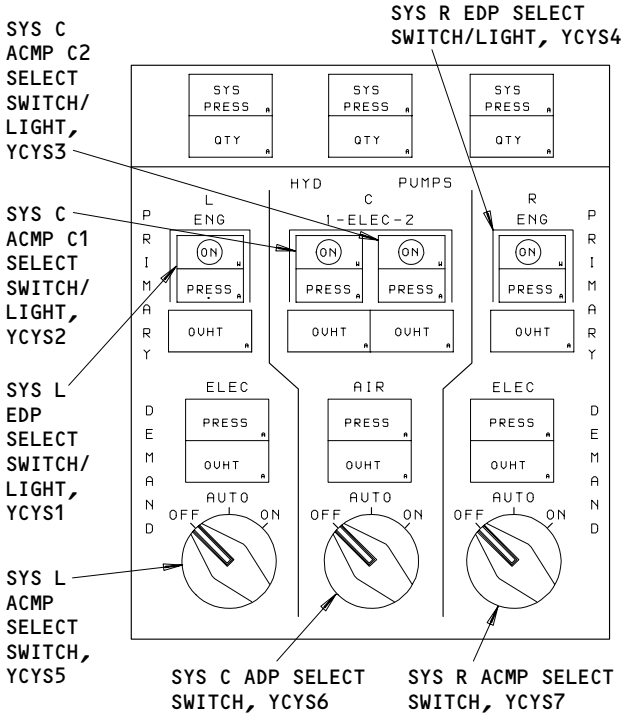
Component Index
Figure 101 (Sheet 4)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
UNIT - (27-51-00/101) FLAP/SLATS ELEC, M545 UNIT - (32-09-03/101) PROX SW ELEC, M162 UNITS - ELECTRICAL LOAD CONTROL (31-01-31/101) SYS C ACMP C1, M897 SYS R ACMP, M896 UNITS - ELECTRICAL LOAD CONTROL (31-01-32/101) SYS C ACMP C2, M898 SYS L ACMP, M895				
VALVE - ADP PRESS REGULATOR AND SHUTOFF, V129	5	1	195RL,195SL, AFT LEFT WING/BODY FAIRING, ADP, M235	29-11-30
VALVE - ISOLATED ACMP PRESSURE SHUTOFF, V110	8	1	RIGHT WHEEL WELL	29-11-08
VALVE - ISOLATED ACMP SUPPLY SHUTOFF, V111	8	1	RIGHT WHEEL WELL	29-11-07
VALVE - SYS C RESERVOIR DRAIN	9	1	RIGHT WHEEL WELL, HYD RESVR	29-11-22
VALVE - SYS C RESERVOIR PRESSURE RELIEF	9	1	RIGHT WHEEL WELL, HYD RESVR	29-11-24
VALVE - SYS C RESERVOIR PRESSURIZATION SHUTOFF	8	1	RIGHT WHEEL WELL	29-11-28
VALVE - SYS C RESERVOIR SAMPLING	9	1	RIGHT WHEEL WELL, HYD RESVR	29-11-23
VALVE - SYS L EDP SUPPLY SHUTOFF, V6	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-06
VALVE - SYS L RESERVOIR DRAIN	3	1	437BL,437BR, LEFT ENGINE STRUT, HYD RESVR	29-11-22
VALVE - SYS L RESERVOIR PRESSURE RELIEF	3	1	437BL,437BR, LEFT ENGINE STRUT, HYD RESVR	29-11-24
VALVE - SYS L RESERVOIR PRESSURIZATION SHUTOFF	2	1	437BL,437BR, LEFT ENGINE STRUT	29-11-28
VALVE - SYS L RESERVOIR SAMPLING	3	1	437BL,437BR, LEFT ENGINE STRUT, HYD RESVR	29-11-23
VALVE - SYS R EDP SUPPLY SHUTOFF, V7	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-06
VALVE - SYS R RESERVOIR DRAIN	3	1	447BL,447BR, RIGHT ENGINE STRUT, HYD RESVR	29-11-22
VALVE - SYS R RESERVOIR PRESSURE RELIEF	3	1	447BL,447BR, RIGHT ENGINE STRUT, HYD RESVR	29-11-24
VALVE - SYS R RESERVOIR PRESSURIZATION SHUTOFF	2	1	447BL,447BR, RIGHT ENGINE STRUT	29-11-28
VALVE - SYS R RESERVOIR SAMPLING	3	1	447BL,447BR, RIGHT ENGINE STRUT, HYD RESVR	29-11-23

Main (Left, Right, and Center) Hydraulic Systems - Component Index
Figure 101 (Sheet 5)

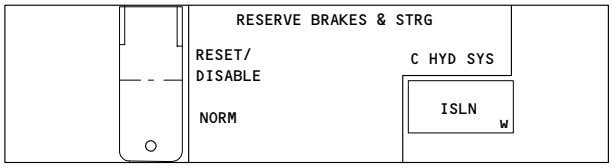


FLT COMPT



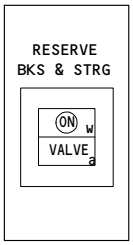
HYDRAULIC CONTROL PANEL, M10

A



RESERVE BRAKES AND STEERING PANEL, M1216

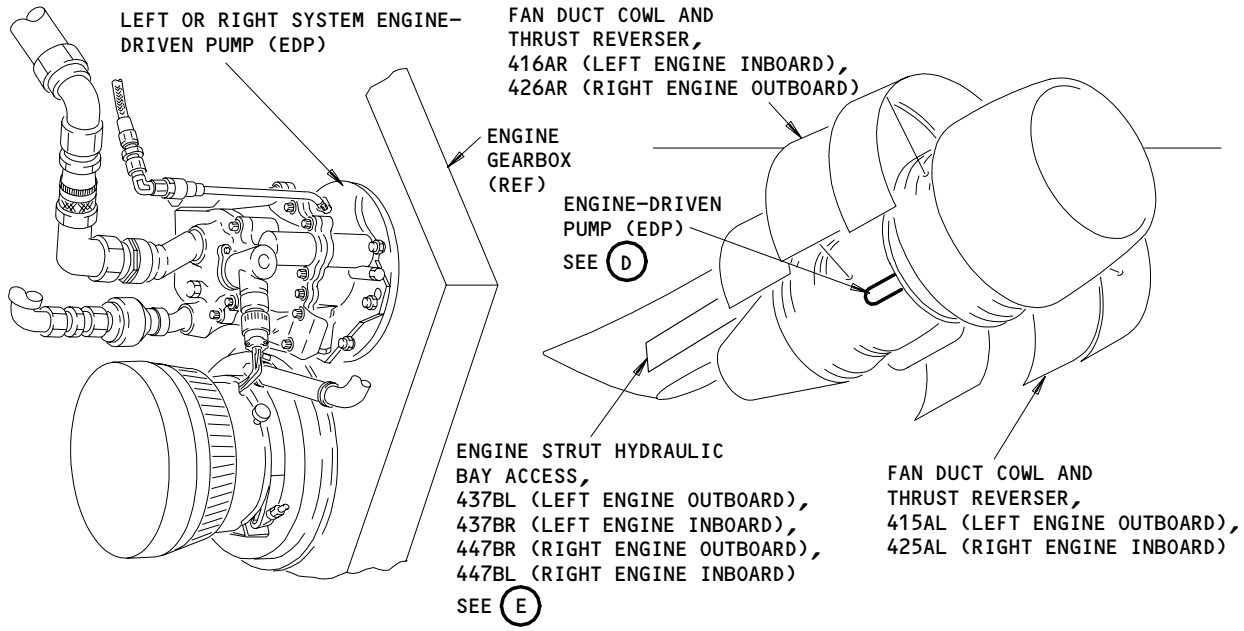
B



RESERVE BRAKES & STEERING SELECT SWITCH/LIGHT, S547

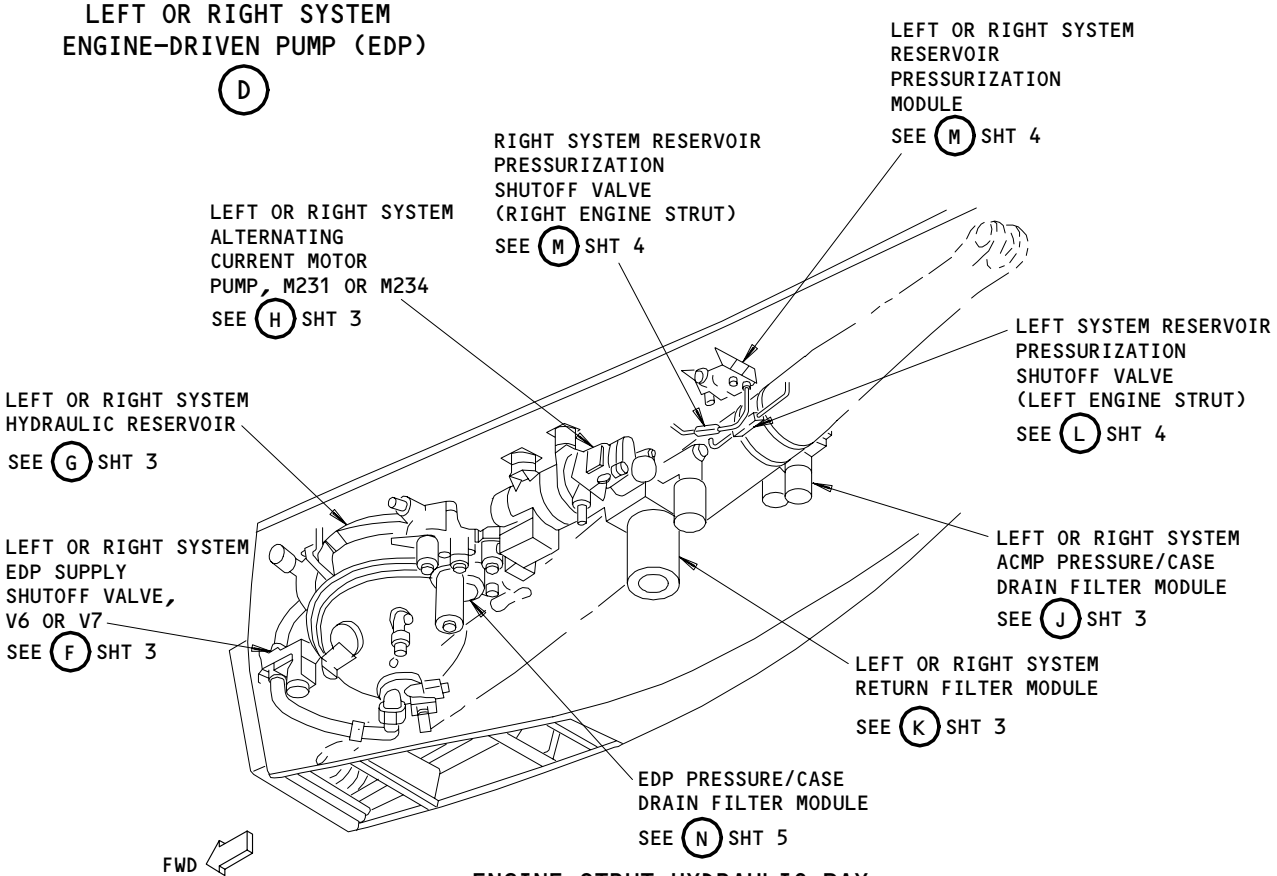
C

Component Location
Figure 102 (Sheet 1)



LEFT OR RIGHT SYSTEM ENGINE-DRIVEN PUMP (EDP)

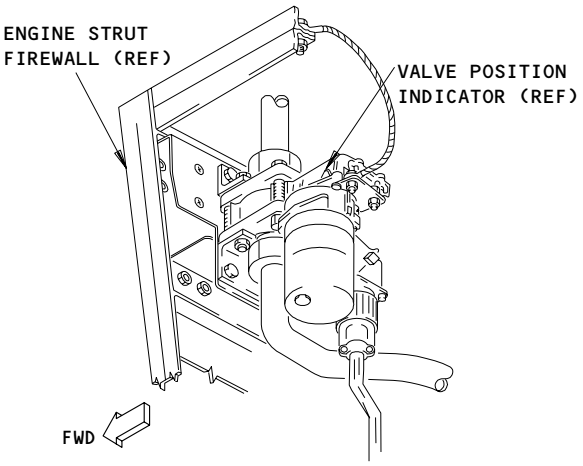
D



ENGINE STRUT HYDRAULIC BAY

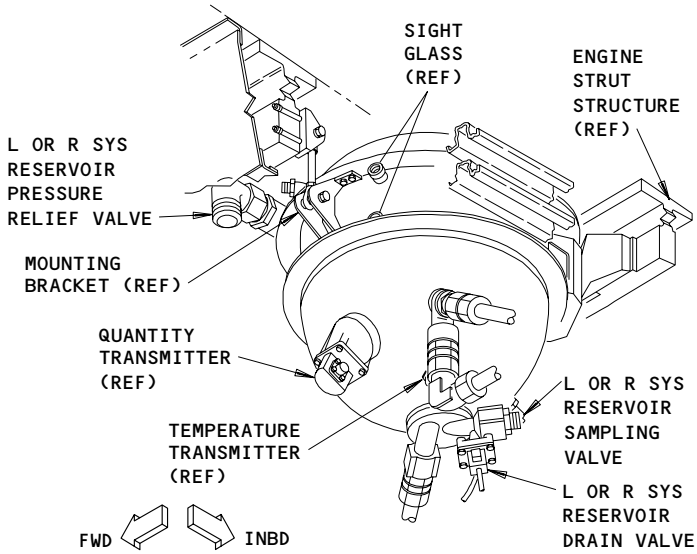
E

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



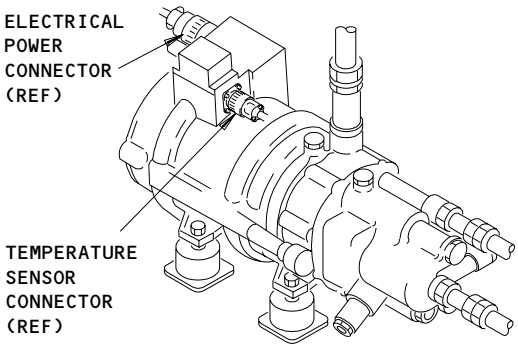
L OR R SYS EDP SUPPLY SHUTOFF VALVE, V6 OR V7

F



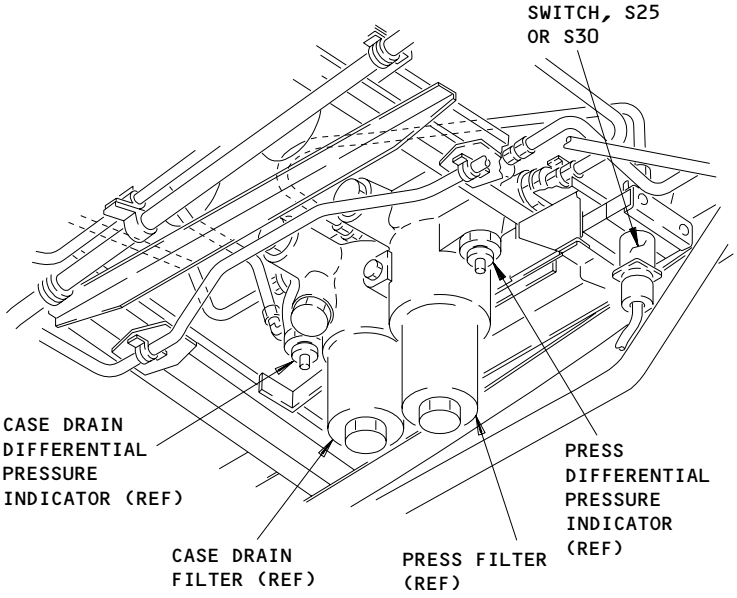
L OR R SYS RESERVOIR

G



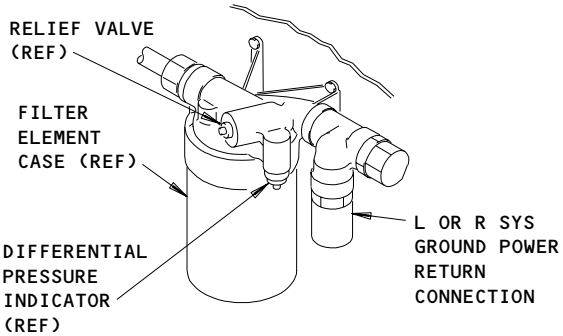
L OR R SYS ACMP ALTERNATING CURRENT MOTOR PUMP, M231 OR M234

H



L OR R SYS ACMP PRESSURE/CASE DRAIN FILTER MODULE

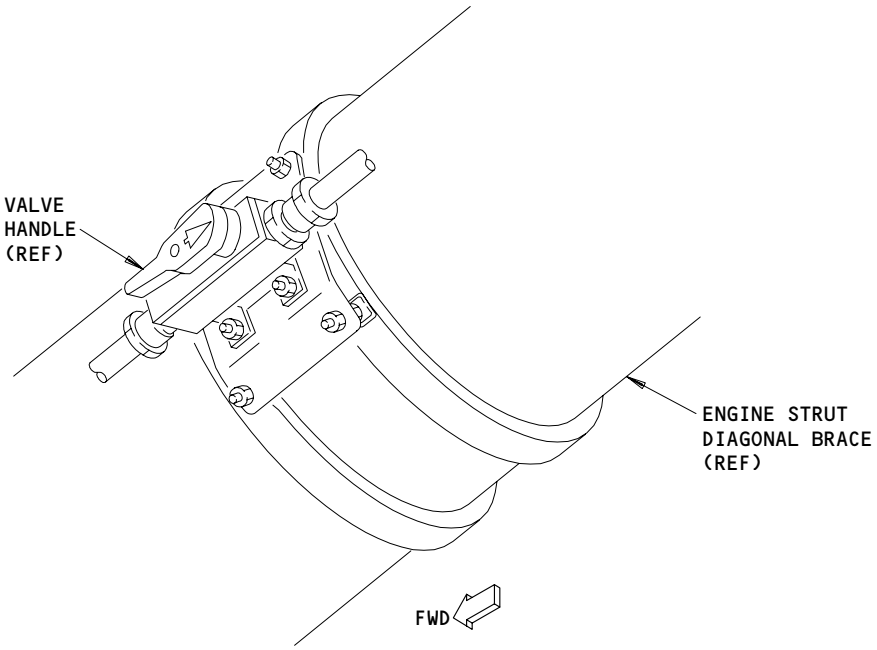
J



L OR R SYS RETURN FILTER MODULE

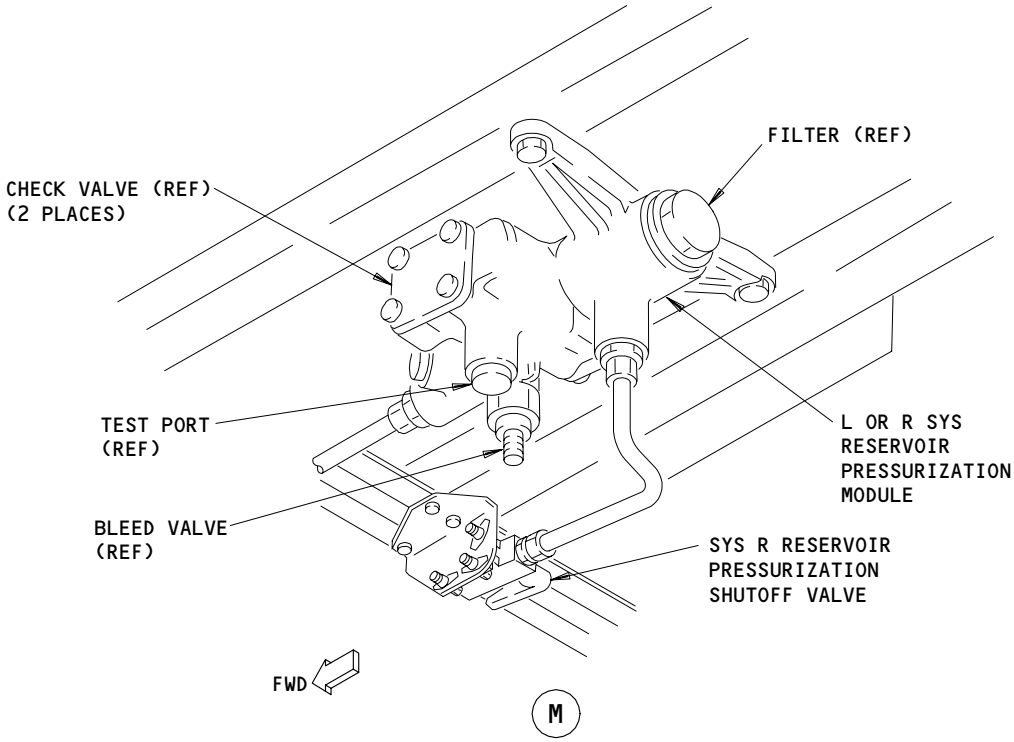
K

Component Location (Details from Sht 2)
Figure 102 (Sheet 3)



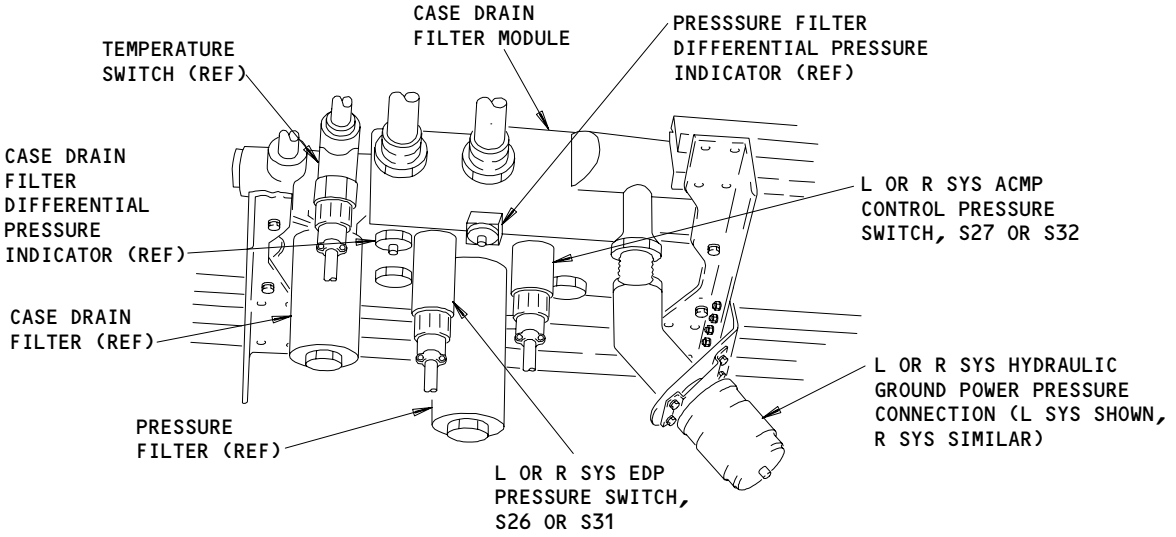
SYS L RESERVOIR PRESSURIZATION SHUTOFF VALVE

(L)



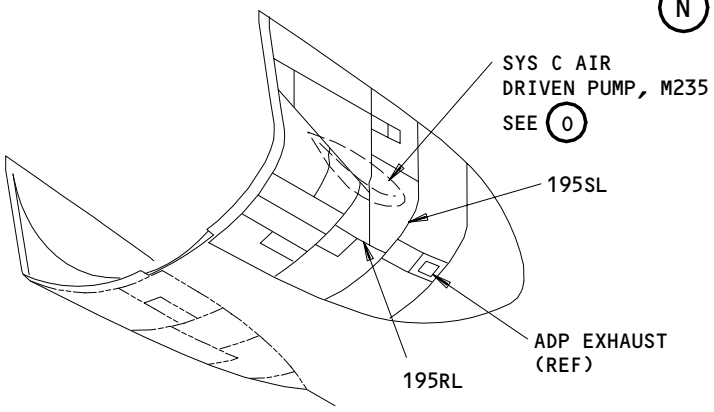
(M)

Component Location (Details from Sht 2)
Figure 102 (Sheet 4)

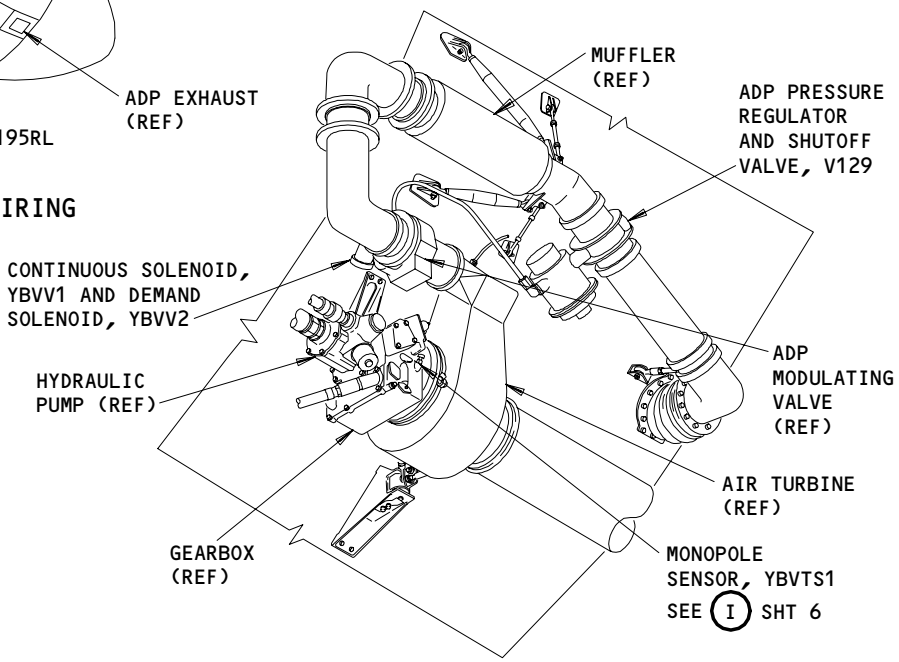


L OR R SYS EDP PRESSURE/CASE DRAIN FILTER MODULE

(N) FROM SHT 2



AFT LEFT WING/BODY FAIRING

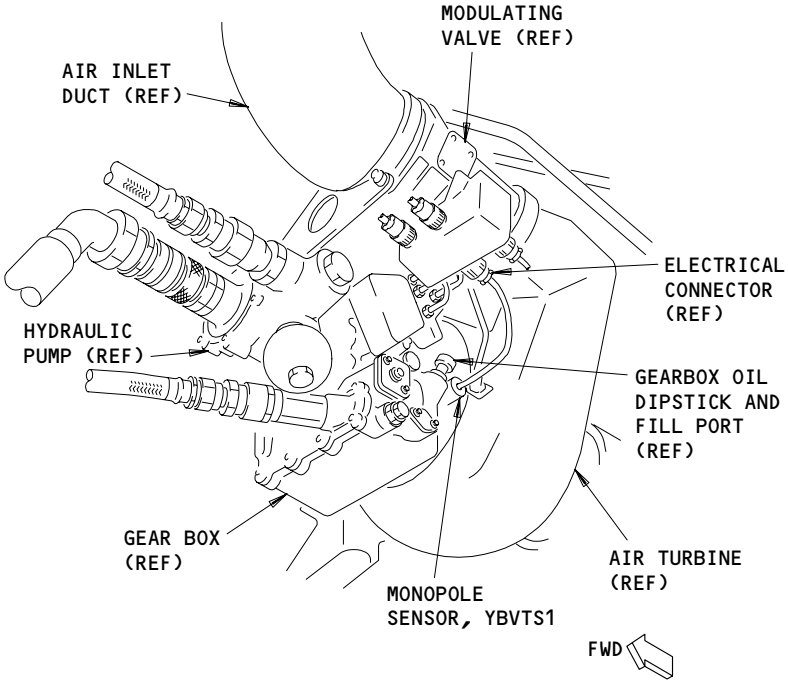


SYS C AIR DRIVEN PUMP, M235

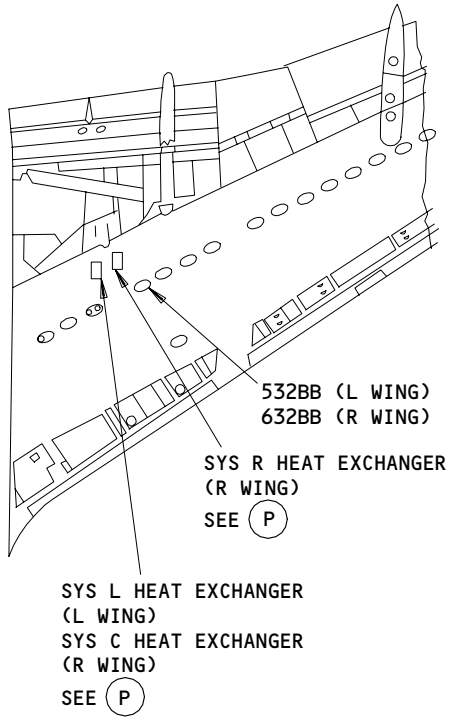
(O)

Component Location
Figure 102 (Sheet 5)

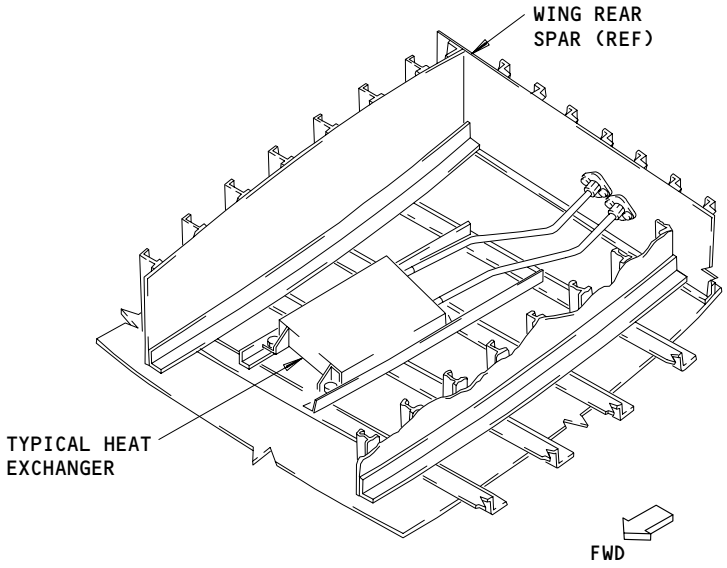
85662



I FROM SHT 5



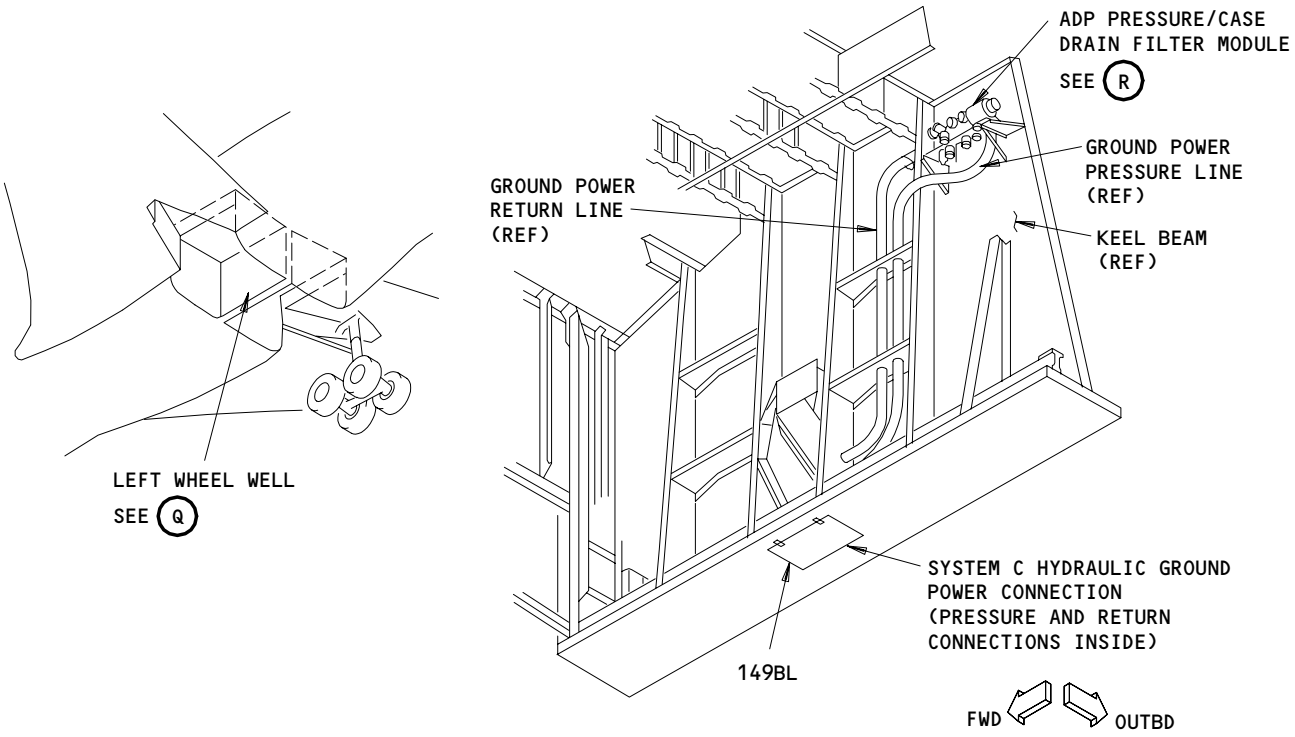
WING – BOTTOM VIEW



SYS L, R OR C HEAT EXCHANGER
(VIEW SHOWN WITH TOP SKIN REMOVED)

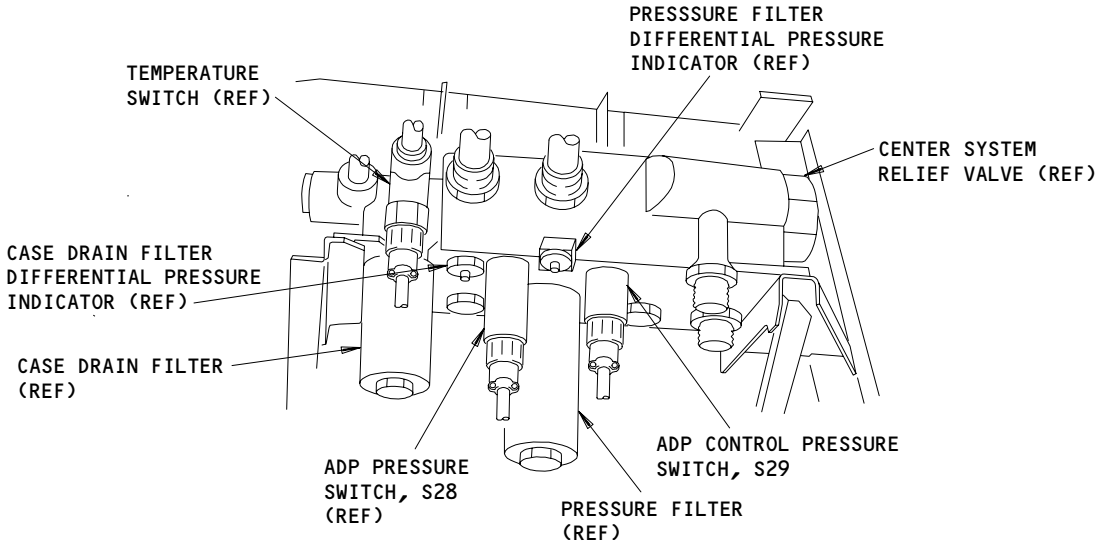
P

Component Location
Figure 102 (Sheet 6)



LEFT WHEEL WELL

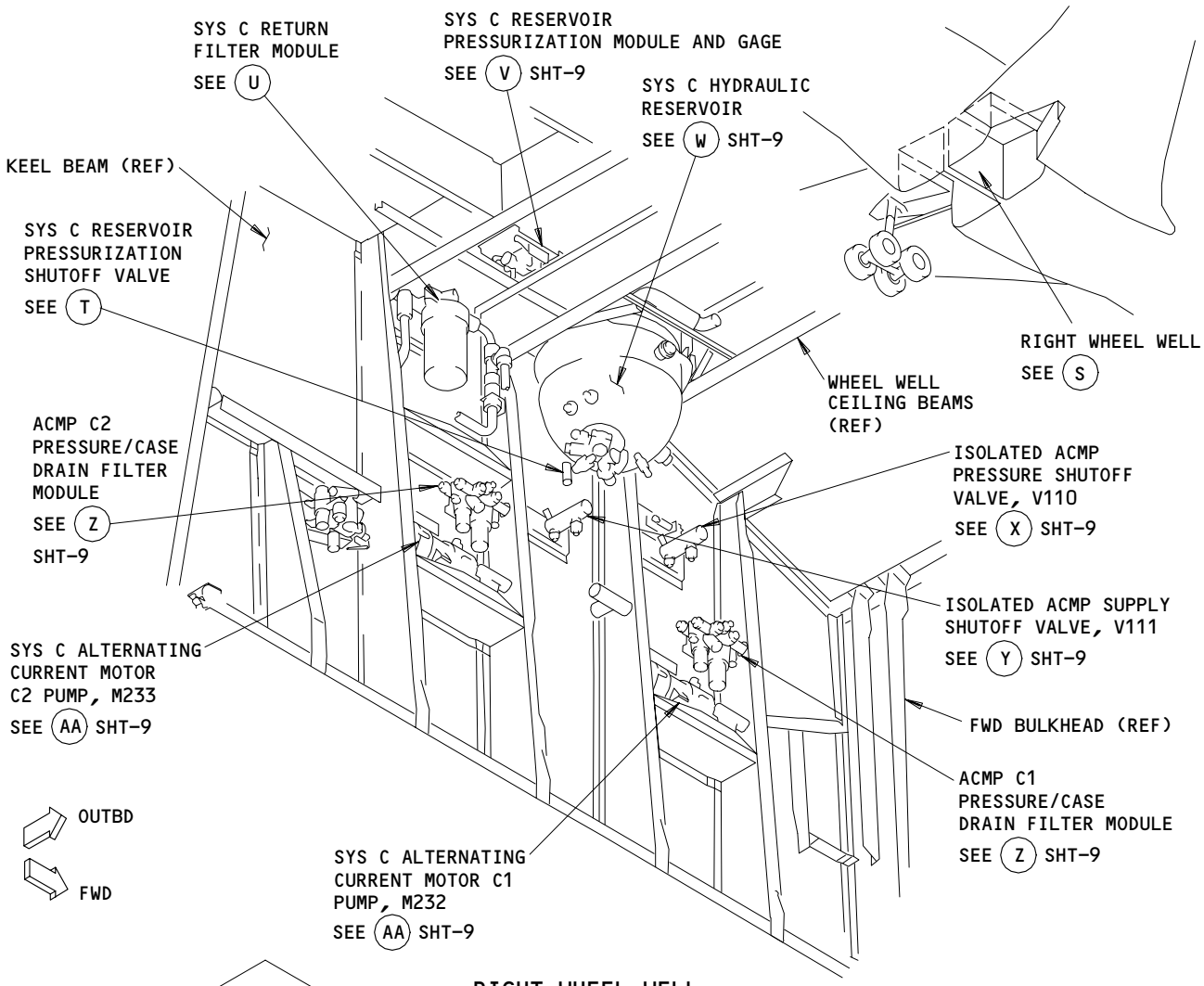
Q



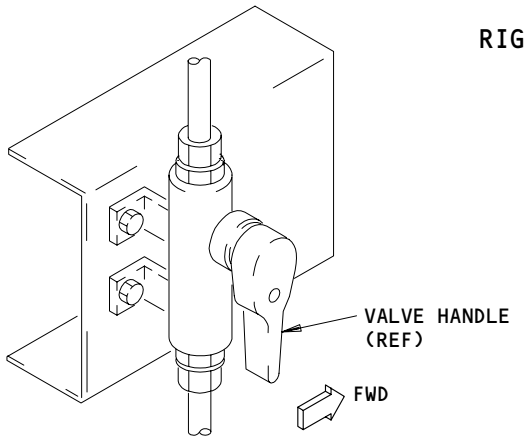
ADP PRESSURE/CASE DRAIN FILTER MODULE

R

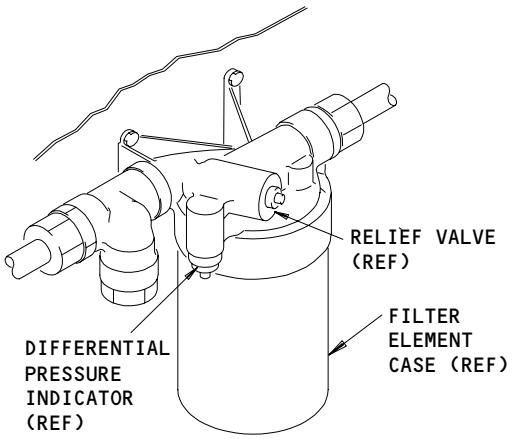
Component Location
Figure 102 (Sheet 7)



RIGHT WHEEL WELL
S

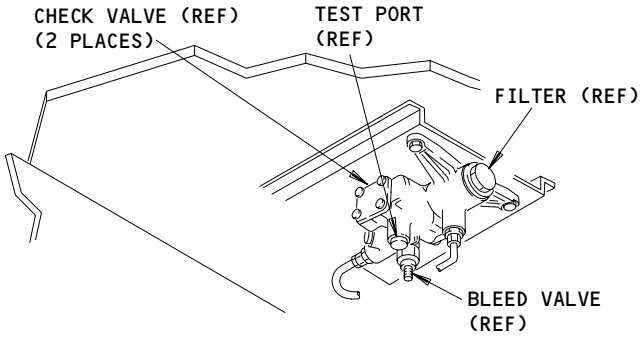


SYS C RESERVOIR PRESSURIZATION SHUTOFF VALVE
T



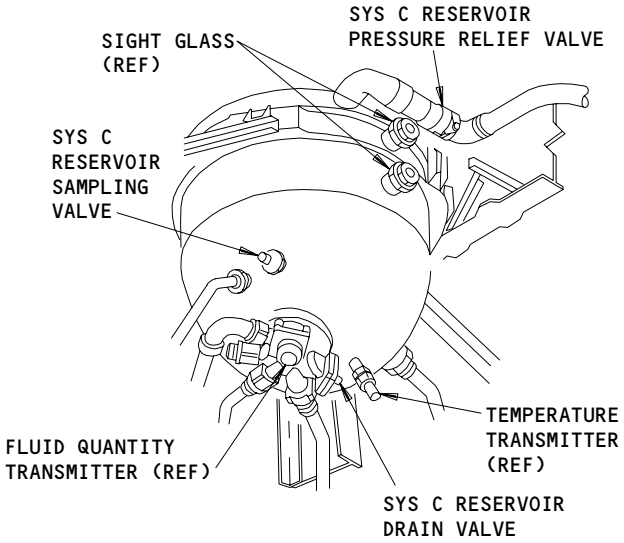
SYS C RETURN FILTER MODULE
U

Component Location
Figure 102 (Sheet 8)



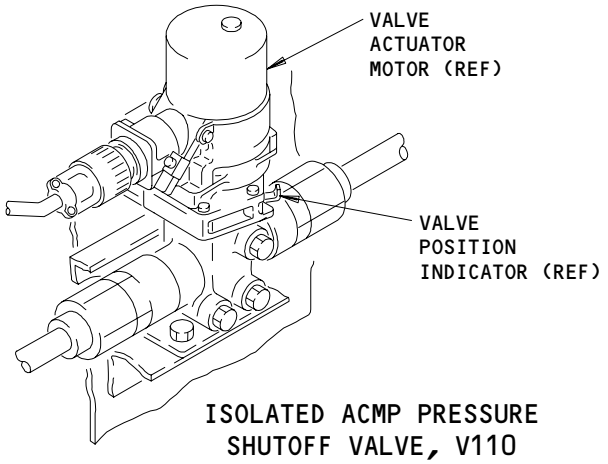
SYS C RESERVOIR PRESSURIZATION MODULE

V



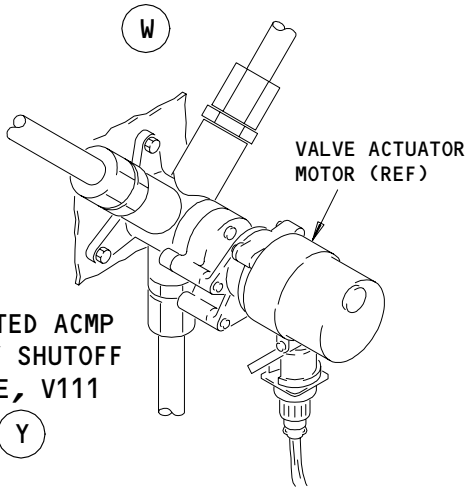
SYS C HYDRAULIC RESERVOIR

W



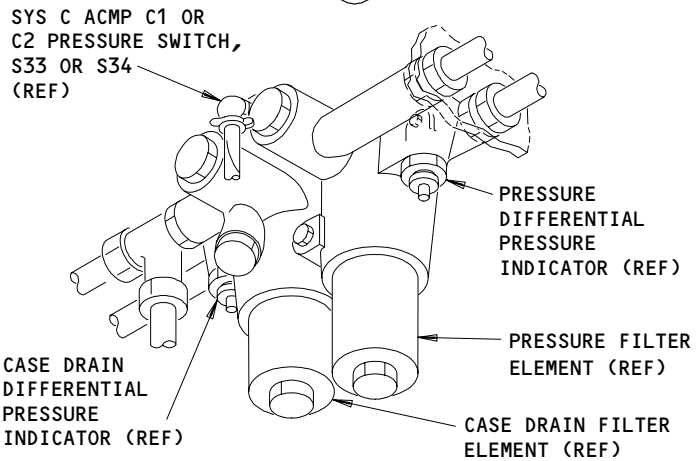
ISOLATED ACMP PRESSURE SHUTOFF VALVE, V110

X



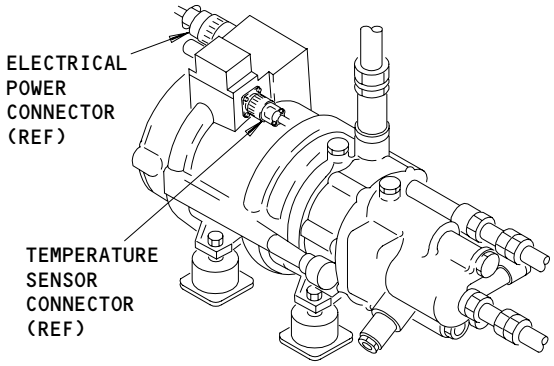
ISOLATED ACMP SUPPLY SHUTOFF VALVE, V111

Y



SYS C ACMP C1 OR C2 PRESSURE/CASE DRAIN FILTER MODULE

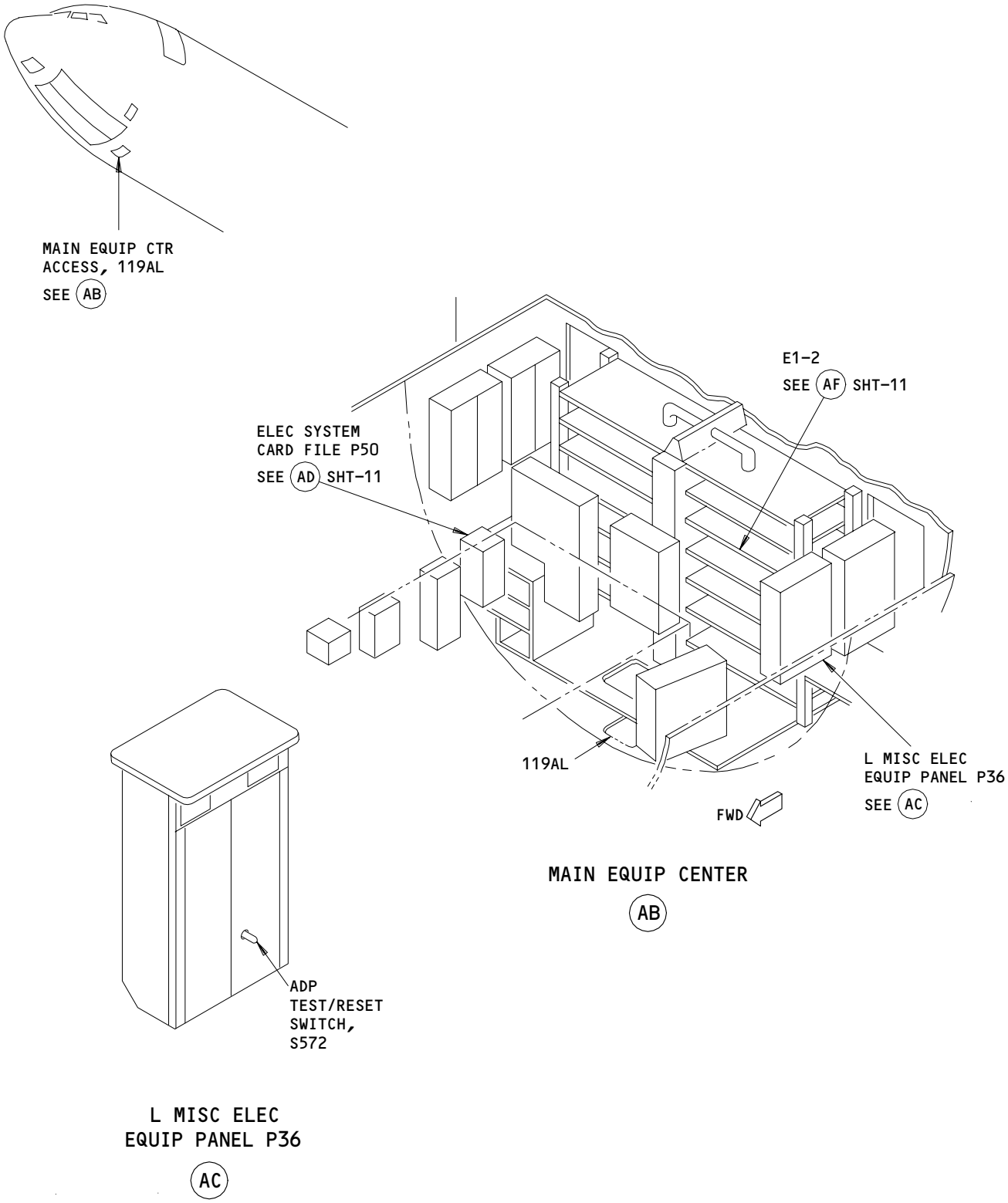
Z



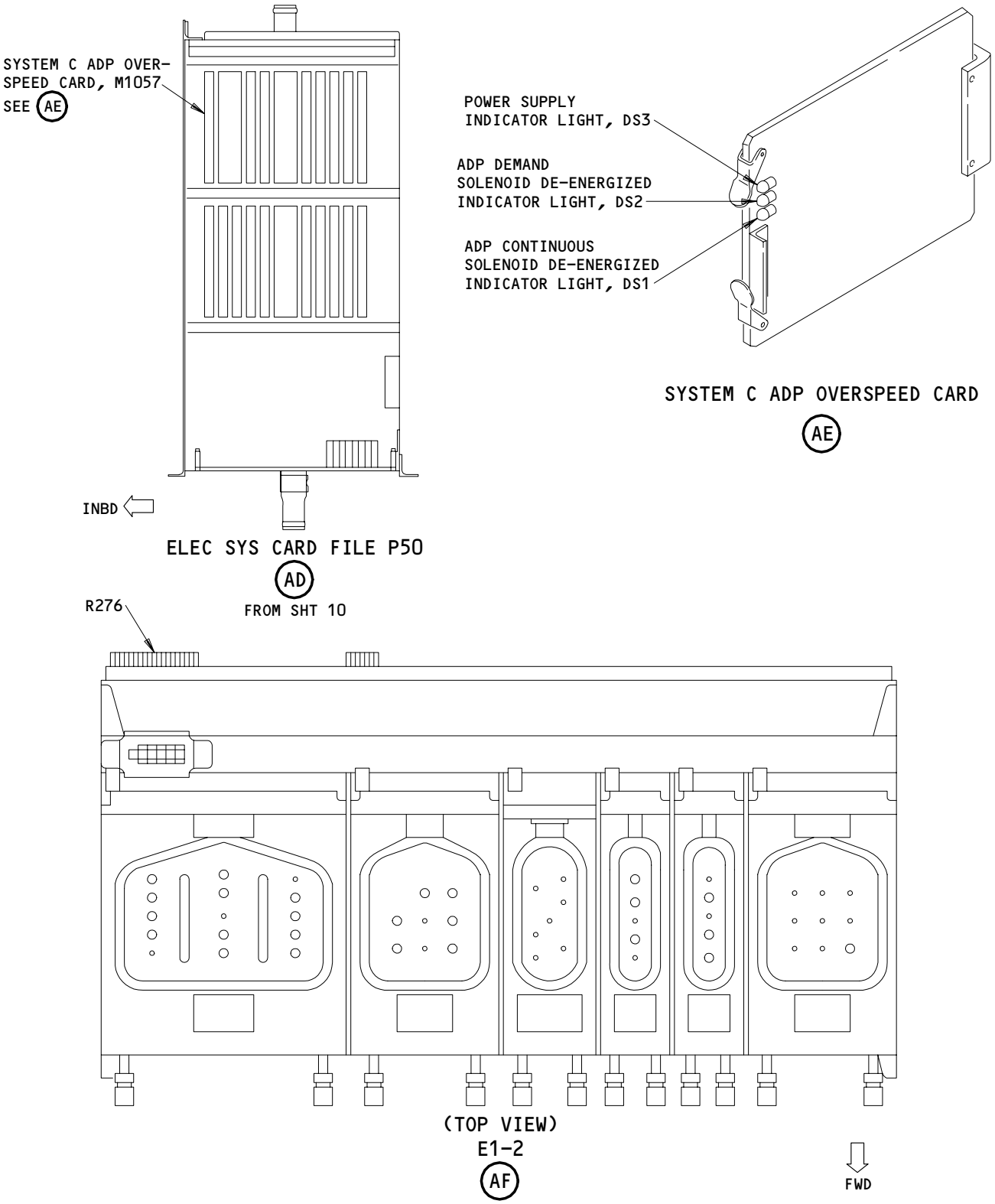
ALTERNATING CURRENT MOTOR C1 OR C2 PUMP, M232 OR M233

AA

Component Location (Details from Sht 8)
Figure 102 (Sheet 9)



Component Location
Figure 102 (Sheet 10)



Component Location
Figure 102 (Sheet 11)

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 Hydraulic System with an ADP.
      (5) Pressurize the Reservoirs in the Main Hydraulic Systems with an External Air Source
      (6) Remove the Pressure from the Main (Left, Right, Center) Hydraulic Systems and Reservoirs.
          (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 hydraulic system after you replace a defective hydraulic pump.
      (9) Bleed the hydraulic system.
          (a) This procedure bleeds the hydraulic system after removal and replacement of any hydraulic component, to remove air that has entered into the system, and to ensure that it does not cause non-normal system behavior.
      (10) Hydraulic System Fluid Replacement
      (11) Transfer Hydraulic Fluid from the Center to the Right System
          (a) This procedure transfers hydraulic fluid back from the center to the right system from inside the flight compartment.
   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 three procedures to pressurize the center hydraulic system: a hydraulic service cart, the system ACMPs, or the system ADP.

C. The sequence in which you pressurize or remove pressure from the hydraulic systems can cause fluid to move between the center and right systems. This can cause a high fluid level in one system and a low fluid level in the other system. If you set the parking brake in one of these conditions:
- the right and center hydraulic systems pressurized
- only the right hydraulic system pressurized
- no hydraulic system pressurized

and then release the brake with only the center system pressurized, the fluid can move to the center system. If you set the parking brake with only the center system pressurized and then release the brake in one of these conditions:
- the right and center hydraulic systems pressurized
- only the right hydraulic system pressurized
- no hydraulic system pressurized

the fluid can move to the right 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.

TASK 29-11-00-862-214

2. Pressurize the Main (Left, Right, Center) Hydraulic Systems with a Hydraulic Service Cart

A. General
(1) Ground power connections for the left and right hydraulic systems are in each engine strut. These connections are the attachment points for an external hydraulic pressure source.
(2) The connections for ground power in the center hydraulic system are on the keel beam between the wheel wells.

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

C. Consumable Materials
(1) D00153 Hydraulic Fluid, Fire Resistant, BMS 3-11

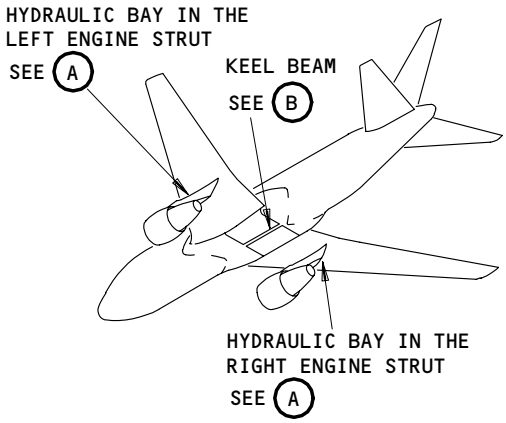
D. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 78-31-00/201, Thrust Reverser System

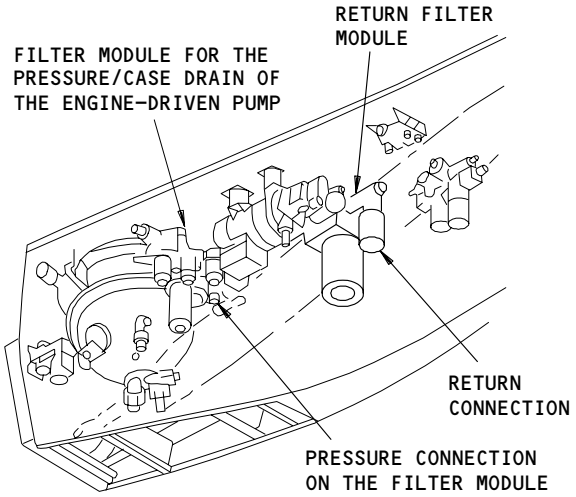
E. Access
(1) Location Zones

149	Aft Section of Keel Beam
437/447	Aft Nacelle Strut Fairing

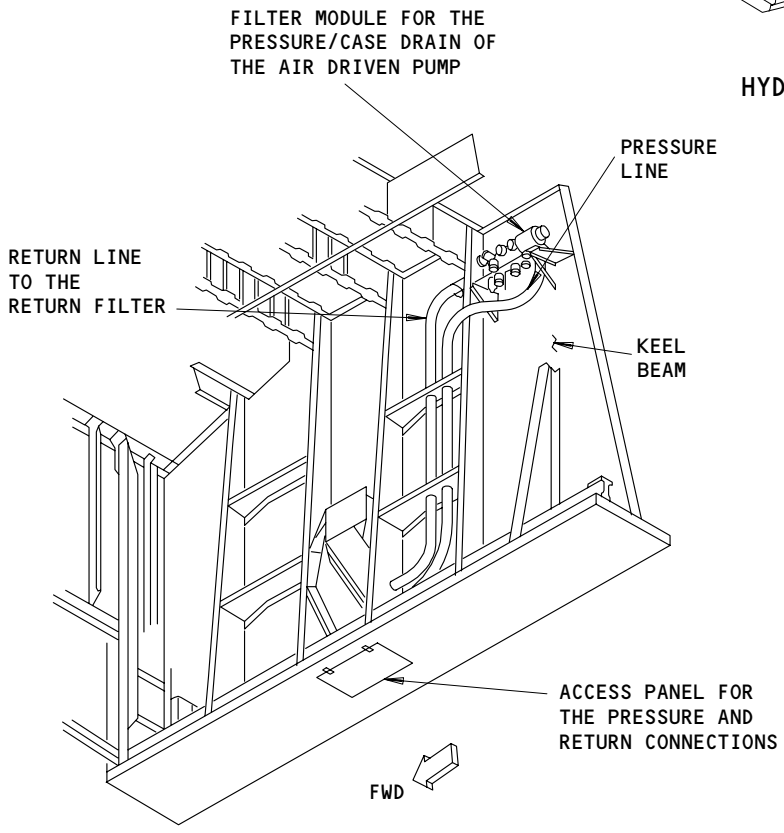
(2) Access Panels

149BL	Hydraulic Pressure/Return Connections
437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System





HYDRAULIC BAY IN THE ENGINE STRUT
(EXAMPLE)
A



KEEL BEAM
B

Connections for Ground Hydraulic Power
Figure 201

F. Procedure (Fig. 201)

S 042-121

WARNING: FOR HYDRAULICALLY OPERATED THRUST REVERSERS, 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) For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 012-003

(2) Open the access panels 437BL and 437BR for the connections for - ground power in the left system (AMM 06-43-00/201).

S 012-004

(3) Open the access panels 447BL and 447BR for the connections for ground power in the right system (AMM 06-43-00/201).

S 492-010

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

S 862-011

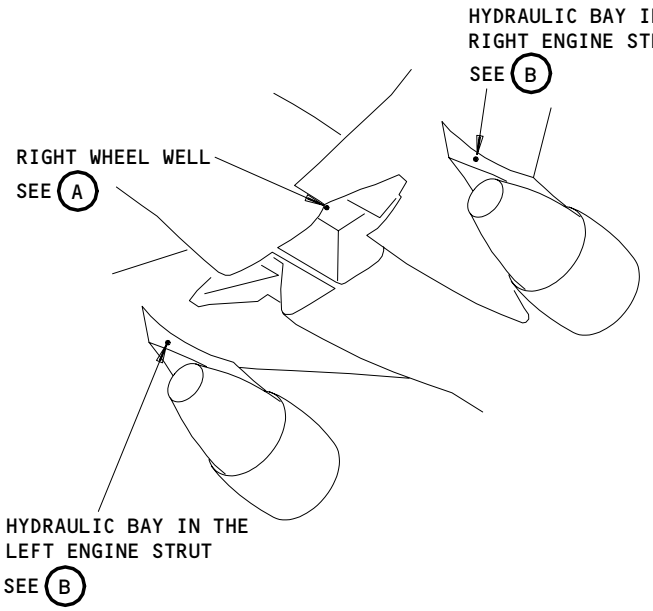
(5) Supply electrical power (AMM 24-22-00/201).

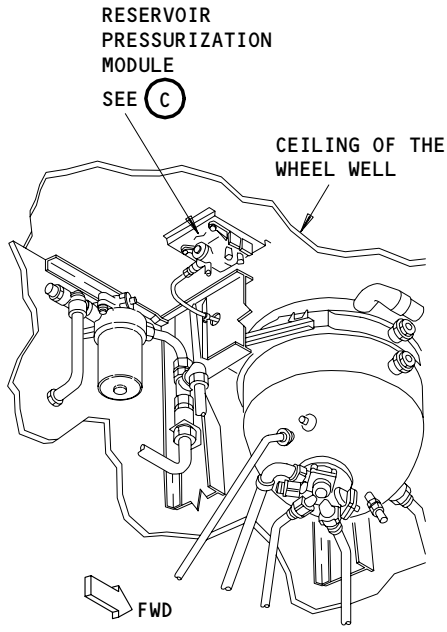
S 862-567

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM CAN SUPPLY POWER TO COMPONENTS OF THE AILERONS, ELEVATORS, RUDDER, SPOILERS, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. THE AILERONS AND ELEVATORS CAN MOVE TO THE NEUTRAL POSITION WHEN HYDRAULIC POWER IS SUPPLIED. THE FLAP/SLAT, SPOILER AND LANDING GEAR SYSTEMS CAN MOVE TO THE POSITION OF THE CONTROLS WHEN HYDRAULIC POWER IS SUPPLIED. UNEXPECTED MOTION OF HYDRAULICALLY POWERED COMPONENTS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

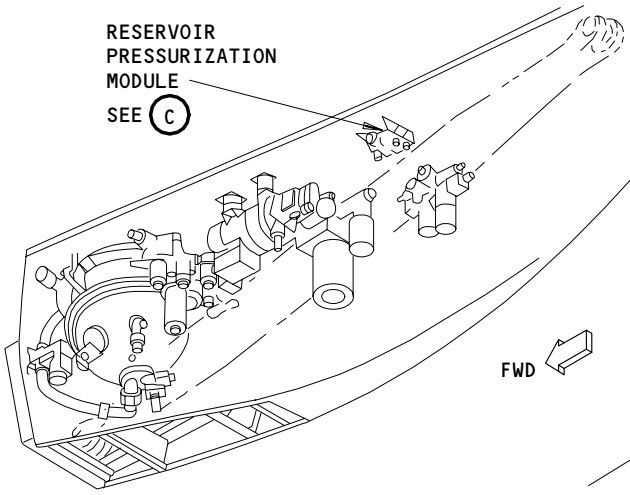
CAUTION: INTERNAL LEAKAGE CAN CAUSE THE HYDRAULIC RETURN SYSTEM TO HAVE TOO MUCH PRESSURE IF THE RETURN LINES ARE BLOCKED AND THE HYDRAULIC SYSTEM IS PRESSURIZED. RETURN SYSTEM PRESSURE THAT IS TOO HIGH CAN CAUSE DAMAGE TO EQUIPMENT.

(6) Do these steps to prepare for hydraulic system pressurization:
(a) Look at the flap/slat, spoiler, and landing gear handles to verify that they are in the desired position.

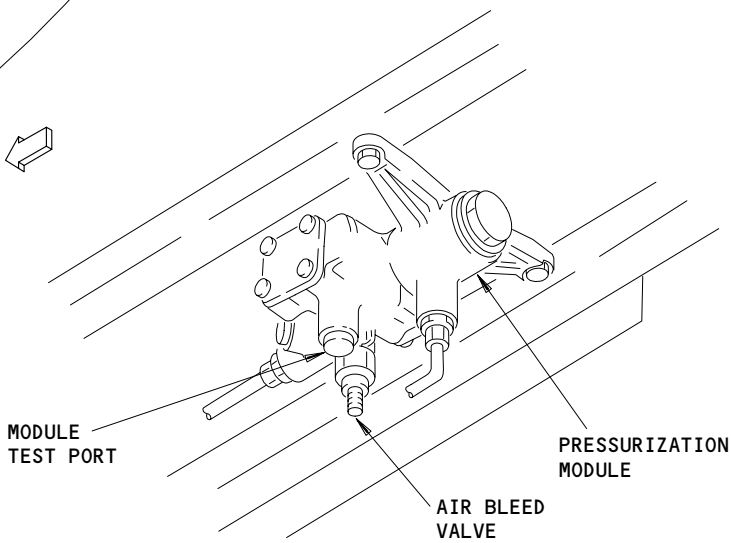




RIGHT WHEEL WELL
A



HYDRAULIC BAY IN THE ENGINE STRUT
(EXAMPLE)
B



RESERVOIR PRESSURIZATION MODULE
(EXAMPLE)
C

Reservoir Pressurization Modules
Figure 202

(b) Disable any systems or controls that must not operate when hydraulic power is supplied.
1) Put a DO-NOT-OPERATE tag on the controls of all disabled systems.
2) Identify any hydraulic lines or components that have been removed.
(c) Make sure that persons and equipment are clear of all hydraulically operated components.

S 862-566

WARNING: THE SPOILERS CAN MOVE IF THE THRUST LEVERS ARE REPOSITIONED, IF THE FLIGHT MODE SIMULATION PROCEDURE IS DONE, OR IF ELECTRICAL POWER IS REMOVED WITH A MAIN HYDRAULIC SYSTEM PRESSURIZED. UNEXPECTED MOTION OF THE SPOILERS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

TASK 29-11-00-862-013

3. Pressurize the Main (Left, Right, Center) Hydraulic Systems with an ACMP.

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

B. Access
(1) Location Zone
211/212 Control Cabin

C. Procedure

S 862-015
(1) Supply electrical power (AMM 24-22-00/201).

S 862-553

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM CAN SUPPLY POWER TO COMPONENTS OF THE AILERONS, ELEVATORS, RUDDER, SPOILERS, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. THE AILERONS AND ELEVATORS CAN MOVE TO THE NEUTRAL POSITION WHEN HYDRAULIC POWER IS SUPPLIED. THE FLAP/SLAT, SPOILER AND LANDING GEAR SYSTEMS CAN MOVE TO THE POSITION OF THE CONTROLS WHEN HYDRAULIC POWER IS SUPPLIED. UNEXPECTED MOTION OF HYDRAULICALLY POWERED COMPONENTS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE FUEL TANK HEAT EXCHANGERS ARE NOT COVERED BY FUEL. HYDRAULIC FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION: INTERNAL LEAKAGE CAN CAUSE THE HYDRAULIC RETURN SYSTEM TO HAVE TOO MUCH PRESSURE IF THE RETURN LINES ARE BLOCKED AND THE HYDRAULIC SYSTEM IS PRESSURIZED. RETURN SYSTEM PRESSURE THAT IS TOO HIGH CAN CAUSE DAMAGE TO EQUIPMENT.

(2) Do these steps to prepare for hydraulic system pressurization:
  (a) Look at the flap/slat, spoiler, and landing gear handles to verify that they are in the desired position.
  (b) Disable any systems or controls that must not operate when hydraulic power is supplied.
    1) Put a DO-NOT-OPERATE tag on the controls of all disabled systems.
    2) Identify any hydraulic lines or components that have been removed.
  (c) Make sure that persons and equipment are clear of all hydraulically operated components.
  (d) Make sure that the left and right main fuel tanks each contain at least 600 gallons (4020 pounds/1825 kg) of fuel to cover the hydraulic fluid heat exchangers.
    1) If the hydraulic system is pressurized without enough fuel to cover the heat exchangers, then operate the hydraulic system for short intervals and monitor the temperature.

(e) Make sure the hydraulic system return lines are not blocked.

S 862-550

WARNING: THE SPOILERS CAN MOVE IF THE THRUST LEVERS ARE REPOSITIONED, IF THE FLIGHT MODE SIMULATION PROCEDURE IS DONE, OR IF ELECTRICAL POWER IS REMOVED WITH A MAIN HYDRAULIC SYSTEM PRESSURIZED. UNEXPECTED MOTION OF THE SPOILERS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) Do one of these steps to pressurize the hydraulic system:
   (a) For the left or right system, push the L or R DEMAND HYD PUMPS - ELEC pump switch to the ON position.
   (b) For the center system, push the PRIMARY HYD PUMPS - C ELEC 1 and/or C ELEC 2 pump switches to the ON position.

S 862-017

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

S 212-020

(5) Make sure the pressure in the hydraulic system becomes stable at 2800 to 3200 psi.

S 212-561

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC SYSTEM TEMPERATURE INDICATION BECOMES MORE THAN 100°C (212°F). THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE PUMPS CONTINUE TO OPERATE. FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

(6) Monitor the hydraulic system temperature indication on the display.
   (a) Stop the hydraulic system if the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on.
   (b) If the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on, then let the temperature of the pump decrease for 20 minutes with the pump off before subsequent operation.

TASK 29-11-00-862-021

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

A. References

(1) AMM 71-00-00/201, Power Plant - General

B. Access

(1) Location Zone

211/212 Control Cabin

C. Procedure

S 042-541

WARNING: FOR HYDRAULICALLY OPERATED THRUST REVERSERS, 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 PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) HYDRAULICALLY OPERATED THRUST REVERSERS;
For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

NOTE: This step is only for hydraulically operated thrust reversers.

S 862-565

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

S 862-563

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM CAN SUPPLY POWER TO COMPONENTS OF THE AILERONS, ELEVATORS, RUDDER, SPOILERS, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. THE AILERONS AND ELEVATORS CAN MOVE TO THE NEUTRAL POSITION WHEN HYDRAULIC POWER IS SUPPLIED. THE FLAP/SLAT, SPOILER AND LANDING GEAR SYSTEMS CAN MOVE TO THE POSITION OF THE CONTROLS WHEN HYDRAULIC POWER IS SUPPLIED. UNEXPECTED MOTION OF HYDRAULICALLY POWERED COMPONENTS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE FUEL TANK HEAT EXCHANGERS ARE NOT COVERED BY FUEL. HYDRAULIC FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION: INTERNAL LEAKAGE CAN CAUSE THE HYDRAULIC RETURN SYSTEM TO HAVE TOO MUCH PRESSURE IF THE RETURN LINES ARE BLOCKED AND THE HYDRAULIC SYSTEM IS PRESSURIZED. RETURN SYSTEM PRESSURE THAT IS TOO HIGH CAN CAUSE DAMAGE TO EQUIPMENT.

(3) Do these steps to prepare for hydraulic system pressurization:
  (a) Look at the flap/slat, spoiler, and landing gear handles to verify that they are in the desired position.
  (b) Disable any systems or controls that must not operate when hydraulic power is supplied.
    1) Put a DO-NOT-OPERATE tag on the controls of all disabled systems.
    2) Identify any hydraulic lines or components that have been removed.
  (c) Make sure that persons and equipment are clear of all hydraulically operated components.
  (d) Make sure that the left and right main fuel tanks each contain at least 600 gallons (4020 pounds/1825 kg) of fuel to cover the hydraulic fluid heat exchangers.
    1) If the hydraulic system is pressurized without enough fuel to cover the heat exchangers, then operate the hydraulic system for short intervals and monitor the temperature.
  (e) Make sure the hydraulic system return lines are not blocked.

S 862-562

WARNING: THE SPOILERS CAN MOVE IF THE THRUST LEVERS ARE REPOSITIONED, IF THE FLIGHT MODE SIMULATION PROCEDURE IS DONE, OR IF ELECTRICAL POWER IS REMOVED WITH A MAIN HYDRAULIC SYSTEM PRESSURIZED. UNEXPECTED MOTION OF THE SPOILERS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Push the L or R PRIMARY HYD PUMPS - ENG pump switch on the hydraulic control panel to the ON position.

S 862-023
(5) Motor the engine or operate it at minimum power (AMM 71-00-00/201).

S 862-025
(6) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.

S 212-026
(7) Make sure the pressure in the hydraulic system becomes stable at 2800 to 3200 psi.

S 212-564

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC SYSTEM TEMPERATURE INDICATION BECOMES MORE THAN 100°C (212°F). THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE PUMPS CONTINUE TO OPERATE. FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

(8) Monitor the hydraulic system temperature indication on the display.
(a) Stop the hydraulic system if the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on.
(b) If the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on, then let the temperature of the pump decrease for 20 minutes with the pump off before subsequent operation.

TASK 29-11-00-862-216

5. Pressurize the Hydraulic System with an ADP

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 36-00-00/201, Pneumatic - General

B. Procedure

S 862-217
(1) Supply electrical power (AMM 24-22-00/201).

S 862-249
(2) Make sure this circuit breaker on the overhead panel, P11, is closed:
(a) 11D31, Hydraulic Air Pump

S 862-229

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON THE 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) If the fuel tank has less than 600 gallons (4020 pounds/1825 kg) 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) If the hydraulic temperature indication on EICAS is more than 100°C (212°F) or if the pump overheat light comes on, let the temperature of the pump decrease for 20 minutes with the pump off before subsequent operation.

S 862-250

(4) Pressurize the pneumatic system with a ground air source or with the APU (AMM 36-00-00/201).

S 862-555

WARNING: PRESSURIZATION OF A MAIN HYDRAULIC SYSTEM CAN SUPPLY POWER TO COMPONENTS OF THE AILERONS, ELEVATORS, RUDDER, SPOILERS, WING FLAPS, LANDING GEAR SYSTEMS AND WHEEL WELL DOORS. THE AILERONS AND ELEVATORS CAN MOVE TO THE NEUTRAL POSITION WHEN HYDRAULIC POWER IS SUPPLIED. THE FLAP/SLAT, SPOILER AND LANDING GEAR SYSTEMS CAN MOVE TO THE POSITION OF THE CONTROLS WHEN HYDRAULIC POWER IS SUPPLIED. UNEXPECTED MOTION OF HYDRAULICALLY POWERED COMPONENTS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE FUEL TANK HEAT EXCHANGERS ARE NOT COVERED BY FUEL. HYDRAULIC FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION: INTERNAL LEAKAGE CAN CAUSE THE HYDRAULIC RETURN SYSTEM TO HAVE TOO MUCH PRESSURE IF THE RETURN LINES ARE BLOCKED AND THE HYDRAULIC SYSTEM IS PRESSURIZED. RETURN SYSTEM PRESSURE THAT IS TOO HIGH CAN CAUSE DAMAGE TO EQUIPMENT.

(5) Do these steps to prepare for hydraulic system pressurization:
   (a) Look at the flap/slat, spoiler, and landing gear handles to verify that they are in the desired position.

(b) Disable any systems or controls that must not operate when hydraulic power is supplied.
1) Put a DO-NOT-OPERATE tag on the controls of all disabled systems.
2) Identify any hydraulic lines or components that have been removed.
(c) Make sure that persons and equipment are clear of all hydraulically operated components.
(d) Make sure that the left and right main fuel tanks each contain at least 600 gallons (4020 pounds/1825 kg) of fuel to cover the hydraulic fluid heat exchangers.
1) If the hydraulic system is pressurized without enough fuel to cover the heat exchangers, then operate the hydraulic system for short intervals and monitor the temperature.
(e) Make sure the hydraulic system return lines are not blocked.

S 862-556

WARNING: THE SPOILERS CAN MOVE IF THE THRUST LEVERS ARE REPOSITIONED, IF THE FLIGHT MODE SIMULATION PROCEDURE IS DONE, OR IF ELECTRICAL POWER IS REMOVED WITH A MAIN HYDRAULIC SYSTEM PRESSURIZED. UNEXPECTED MOTION OF THE SPOILERS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Put the AIR DEMAND PUMP SELECTOR switch on the overhead panel to ON.

S 862-557
(7) Push the ELEC/HYD switch on the EICAS MAINT panel on the right side panel, P61.

S 212-521
(8) Make sure the pressure in the hydraulic system becomes stable at 2800 to 3200 psi.

S 212-560

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC SYSTEM TEMPERATURE INDICATION BECOMES MORE THAN 100°C (212°F). THE HYDRAULIC FLUID CAN BECOME TOO HOT IF THE PUMPS CONTINUE TO OPERATE. FLUID THAT IS TOO HOT CAN CAUSE DAMAGE TO EQUIPMENT.

(9) Monitor the hydraulic system temperature indication on the display.
(a) Stop the hydraulic system if the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on.
(b) If the temperature becomes more than 100°C (212°F) or if the pump overheat light comes on, then let the temperature of the pump decrease for 20 minutes with the pump off before subsequent operation.

S 862-223
(10) When you complete the hydraulic power operation, put the AIR DEMAND PUMP SELECTOR switch on the overhead panel to OFF.

S 862-224
(11) Release the pressure in the hydraulic system (AMM 29-11-00/201).

S 862-225
(12) Release the pressure in the pneumatic system (AMM 36-00-00/201).

S 862-252
(13) Remove electrical power if it is not necessary for other operations (AMM 24-22-00/201).

TASK 29-11-00-862-027

6. Pressurize the Reservoirs in the Main (Left, Right, Center) Hydraulic Systems with an External Air Source.

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

B. References
(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 32-00-15/201, Landing Gear Door Locks
(3) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

D. Procedure (Fig. 202)

S 042-125

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

(1) For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 012-028

(2) For the left hydraulic system, open the access panels 437BL and 437BR (AMM 06-43-00/201).

S 012-030

(3) For the right hydraulic system, open the access panels 447BL and 447BR (AMM 06-43-00/201).

S 092-031

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

S 012-032

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.

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

S 032-033
(6) Remove the plug from the test port on the reservoir pressurization module.

S 492-034
(7) Connect the controlled air source to the test port on the reservoir pressurization module.

S 862-035
(8) Adjust the pressure of the air source to pressurize the reservoir to 45 ±5 psi.

S 092-037
(9) When pressurization is not necessary, remove the controlled air source from the reservoir pressurization module.

S 032-038
(10) Install the plug in the test port on the reservoir pressurization module.

S 412-039
(11) For the left hydraulic system, close the access panels 437BL and 437BR (AMM 06-43-00/201).

S 412-040
(12) For the right hydraulic system, close the access panels 447BL and 447BR (AMM 06-43-00/201).

S 412-041

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

(13) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 442-126

(14) For the left or right hydraulic system, do the activation procedure for the thrust reverser (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

TASK 29-11-00-862-055

7. Remove the Pressure From the Main (Left, Right, Center) Hydraulic Systems and Reservoirs

A. Equipment
(1) Hydraulic System Pressurization Valve Locking Pin - A29002-6

B. References
(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 32-00-15/201, Landing Gear Door Locks
(3) AMM 32-00-20/201, Landing Gear Downlocks
(4) AMM 36-00-00/201, Pneumatic - General
(5) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Right MLG Wheel Well
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

D. Remove the Pressure from the Main Hydraulic Systems

S 862-056

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

S 862-057
(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 862-058
(3) Make sure these circuit breakers on the P11 panel are closed:
(a) 11H15, FLT CONT SHUTOFF WING L
(b) 11H16, FLT CONT SHUTOFF WING CTR
(c) 11H17, FLT CONT SHUTOFF TAIL L
(d) 11H18, FLT CONT SHUTOFF TAIL CTR
(e) 11H26, FLT CONT SHUTOFF WING R
(f) 11H27, FLT CONT SHUTOFF TAIL R

S 862-059
(4) Make sure the WING and TAIL FLT CONTROL SHUTOFF L, C, and R switches on the right side panel, P61, are in the ON position.

S 212-060
(5) Make sure the WING and Tail FLT CONTROL SHUTOFF L, C, and R switch lights are not on.

S 862-061
(6) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 212-062
(7) Monitor the hydraulic pressure indication on the EICAS display to make sure the pressure decreased.

S 862-063
(8) Push the brake pedals fully down seven times to remove the pressure from the brake system and the accumulator.

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

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 092-064

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

S 012-065

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

S 042-129

WARNING: FOR HYDRAULICALLY OPERATED THRUST REVERSERS, 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.

(3) For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 012-067

(4) For the left hydraulic system, open the access panels 437BL and 437BR (AMM 06-43-00/201).

S 012-068
(5) For the right hydraulic system, open the access panels 447BL and 447BR (AMM 06-43-00/201).

S 862-069
(6) For the center hydraulic system, close the shutoff valve for reservoir pressurization which is adjacent to the reservoir.

S 492-070
(7) Put the locking pin in the handle of the shutoff valve.

S 862-071
(8) For the left or right hydraulic system, close the shutoff valve for reservoir pressurization which is in the hydraulic bay in the engine strut.

S 492-072
(9) Put the locking pin in the handle of the shutoff valve.

S 492-074

WARNING: PUT A RAG AROUND THE AIR BLEED VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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.

(10) Put a rag around the air bleed valve on the reservoir pressurization module to catch a spray of hydraulic fluid from the valve.

S 862-077
(11) Open the air bleed valve on the reservoir pressurization module to remove the pressure from the reservoir.

S 862-078

(12) Close the air bleed valve when you can not hear the flow of air from the valve.

S 492-081

WARNING: PUT A RAG AROUND THE BLEED VALVE ON THE PRESSURIZATION MODULE 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.

(13) Put a rag around the bleed valve, on the reservoir pressurization module, to catch a spray of the hydraulic fluid from the valve.

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 862-085

(1) For the center hydraulic system, do these steps:
(a) Remove the locking pin from the handle of the shutoff valve for reservoir pressurization which is adjacent to the reservoir.

CAUTION: MAKE SURE YOU PUT THE SHUTOFF VALVE FOR RESERVOIR PRESSURIZATION IN THE OPEN POSITION. THE PNEUMATIC SYSTEM CAN NOT PRESSURIZE THE RESERVOIR WITH THE SHUTOFF VALVE IN THE CLOSED POSITION.

(b) Put the shutoff valve in the open position.

S 862-086

(2) For the left or right hydraulic system, do these steps:
(a) Remove the locking pin from the handle of the shutoff valve for reservoir pressurization in the hydraulic bay in the engine strut.

CAUTION: MAKE SURE YOU PUT THE SHUTOFF VALVE FOR RESERVOIR PRESSURIZATION IN THE OPEN POSITION. THE PNEUMATIC SYSTEM CAN NOT PRESSURIZE THE RESERVOIR WITH THE SHUTOFF VALVE IN THE CLOSED POSITION.

(b) Put the shutoff valve in the open position.

S 412-088

(3) For the left hydraulic system, close the access panels 437BL and 437BR (AMM 06-43-00/201).

S 412-089

(4) For the right hydraulic system, close the access panels 447BL and 447BR (AMM 06-43-00/201).

S 412-091

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) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 862-093

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 442-131

(7) For the left or right hydraulic system, do the activation procedure for the thrust reverser (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

TASK 29-11-00-862-097

8. Remove the Hydraulic Power

A. General

(1) This procedure stops the main (Left, Right, Center) 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 78-31-00/201, Thrust Reverser System.

C. Access

(1) Location Zones

211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

D. Remove the Hydraulic Power from a Hydraulic Service Cart

S 862-098

(1) Stop the hydraulic service cart.

S 092-099

(2) Disconnect the service cart and install the caps on the ground power connections on the airplane.

S 612-100

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

S 412-101

(4) For the left hydraulic system, close the access panels 437BL and 437BR (AMM 06-43-00/201).

S 412-090
(5) For the right hydraulic system, close the access panels 447BL and 447BR (AMM 06-43-00/201).

S 412-102
(6) For the center hydraulic system, close the access panel on 149BL (AMM 06-41-00/201).

S 442-139
(7) For the left or right hydraulic system, do the activation procedure for the thrust reverser (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 862-108
(8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

E. Remove the Hydraulic Power from an ACMP

S 862-109
(1) For the left or right system, push the L or R DEMAND HYD PUMPS - ELEC pump switch to the OFF position.

S 862-110
(2) For the center system, push the PRIMARY HYD PUMPS - C ELEC 1 and C ELEC 2 pump switches to the OFF position.

S 862-111
(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 from an Engine-Driven Pump (EDP)

S 862-112
(1) Stop the engine (AMM 71-00-00/201).

TASK 29-11-00-172-113

9. Flush the Hydraulic System

A. General
(1) This procedure flushes the hydraulic system after you replace a defective hydraulic pump.

(2) When you do this procedure, if you find bad contamination because of a damaged pump, then replace the case drain filter element again, after one week of usual operation. After two months of operation, replace all filter elements in the system.
(3) If the contamination of the fluid is from a chemical source, replace the fluid and the filter elements.

B. References
(1) AMM 29-11-03/401, Center Hydraulic System Air-Driven Pump (ADP)
(2) AMM 29-11-05/401, Engine-Driven Pump (EDP)
(3) AMM 29-11-15/401, Left and Right System Return Filter Module and Components
(4) AMM 29-11-16/401, Center System Return Filter Module and Components
(5) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure/Case Drain Filter Module and Components
(6) AMM 29-11-18/401, Alternating Current Motor Pump (ACMP) Pressure/Case Drain Filter Module and Components
(7) AMM 29-11-19/401, Center System Air-Driven Pump (ADP) Pressure/Case Drain Filter Module and Components

C. Access
(1) Location Zones
211/212 Control Cabin

D. Procedure

S 862-114
(1) Do this procedure: Remove the Pressure from the Main Hydraulic Systems and the Reservoirs (AMM 29-11-00/201).

S 962-115
(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) Alternating current motor pump (ACMP) (AMM 29-11-18/401).
(c) Air-driven pump (ADP) (AMM 29-11-19/401).

S 962-116
(3) Replace the filter element in the return filter module of the applicable system:
(a) Left or right hydraulic system (AMM 29-11-15/401).

(b) Center hydraulic system (AMM 29-11-16/401).

S 862-117

(4) Pressurize the applicable hydraulic system with the hydraulic pump which you replaced.

S 862-118

(5) Operate all the systems which operate with hydraulic pressure (but not the landing gear) not less than six times at the maximum rate.

S 862-119

(6) Do this procedure: Remove the Pressure from the Main Hydraulic Systems and the Reservoirs (AMM 29-11-00/201).

S 962-120

(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) Alternating current motor pump (ACMP) (AMM 29-11-18/401).
(c) Air-driven pump (ADP) (AMM 29-11-19/401).

S 162-147

(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.

(a) Engine-driven pump (EDP) (AMM 29-11-17/401).
(b) Alternating current motor pump (ACMP) (AMM 29-11-18/401).
(c) Air-driven pump (ADP) (AMM 29-11-19/401).

S 162-146

(9) Remove, clean, and install the check valves at the pressure and case drain ports of the applicable hydraulic pump:

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

(a) Engine-driven pump (EDP) (AMM 29-11-05/401).
(b) Air-driven pump (ADP) (AMM 29-11-03/401).

TASK 29-11-00-292-463

10. Bleed the Hydraulic System

A. General

(1) When a hydraulic component or tubing is removed and replaced, care should be taken to minimize the loss of hydrauylic fluid and subsequent entry of air into the hydraulic system. When maintenance activities result in significant air entering a hydraulic system, the system must be bled to ensure the air does not cause non-normal system behavior. Some components have specific bleeding requirements that are included in their installation procedures. The operator should be aware of the existence of specific procedures in those areas affected by the maintenance activity performed. Boeing recommends that operators perform the specific bleeding procedures for a component if activities allow air into the pressure lines immediately upstream of that component. When large portions of the system are affeted, the following general procedure may be used to bleed the flight control portions of the hydraulic system. If the landing gear system has significant air trapped in its tubing, then the affected gear will need to be cycled to fully bleed the system. These procedures are contained in AMM 32-32-00/501 (Main Gear), and AMM 32-34-00/501 (Nose Gear).

B. Standard Tools and Equipment

(1) Hydraulic Service Cart - This cart must supply a flow of BMS 3-11 fire-resistant hydraulic fluid at 30-40 gpm at 3000 psig.

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, Manual Control
(5) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure/Case Drain Filter Module and Components
(6) AMM 29-11-18/401, Alternating Current Motor Pump (ACMP) Pressure/Case Drain Filter Module and Components
(7) AMM 29-11-19/401, Center System Air-Driven Pump (ADP) Pressure/Case Drain Filter Module and Components

(8) AMM 32-00-15/201, Landing Gear Door Locks
(9) AMM 32-00-20/201, Landing Gear Downlocks
(10) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

144	Right MLG Wheel Well
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

E. Procedure

S 862-464
(1) Supply electrical power (AMM 24-22-00/201).

S 862-465
(2) Release the pressure in the hydraulic system (AMM 29-11-00/201).

S 092-490
(3) For the center hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 012-491

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

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

S 042-492

WARNING: FOR HYDRAULICALLY OPERATED THRUST REVERSERS, 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.

(5) For the left or right hydraulic system, do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 012-493
(6) For the left hydraulic system, open the access panels 437BL and 437BR (AMM 06-43-00/201).

S 012-494
(7) For the right hydraulic system, open the access panels 447BL and 447BR (AMM 06-43-00/201).

S 872-474
(8) Bleed the hydraulic system:
(a) Disconnect the pressure hose from the Engine Driven Pump (EDP).

CAUTION: MAKE SURE YOU USE BMS 3-11 HYDRAULIC FLUID TO BLEED THE HYDRAULIC SYSTEM. HYDRAULIC FLUID WHICH DOES NOT AGREE WITH THE BMS 3-11 SPECIFICATION CAN CAUSE CONTAMINATION OF THE HYDRAULIC SYSTEM.

(b) Connect the pressure hose to the pressure hose of the hydraulic service cart.
(c) Connect the return hose of the hydraulic service cart to the ground service disconnect on the system return module.
(d) Operate the hydraulic service cart.
(e) Pressurize the system to 3000 psig.
(f) Operate all the systems which operate with hydraulic pressure (but not the landing gear) not less than six times at the maximum rate.

S 862-495
(9) Do this procedure: Remove the Pressure from the Main Hydraulic Systems and the Reservoirs (AMM 29-11-00/201).

S 962-496
(10) 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) Alternating current motor pump (ACMP) (AMM 29-11-18/401).
(c) Air-driven pump (ADP) (AMM 29-11-19/401).

S 092-477
(11) Disconnect the hydraulic service cart:
(a) Disconnect the return line on the service cart from the ground service disconnect on the return module.
(b) Disconnect the pressure line on the service cart from the EDP pressure hose.
(c) Connect the pressure hose to the EDP pressure port.

S 862-478
(12) Pressurize the hydraulic system with the EDP (AMM 29-11-00/201)

S 862-479
(13) Operate all the flight controls.

S 792-480
(14) When you complete the flight control operation, do a check for leakage:
(a) Examine all connections that were disconnected, either for maintenance or while performing the bleeding procedures.
(b) Examine the installations of the hydraulic power filters.
(c) Examine the EDP connections.
(d) If you find leakage, repair the cause of it.

S 862-481
(15) Release the hydraulic system pressure if it is not necessary (AMM 29-11-00/201).

S 612-482
(16) Do this task: "Hydraulic Reservoir Servicing" (AMM 12-12-01/301).

S 412-502
(17) For the left hydraulic system, close the access panels 437BL and 437BR (AMM 06-43-00/201).

S 412-498
(18) For the right hydraulic system, close the access panels 447BL and 447BR (AMM 06-43-00/201).

S 412-501

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) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 442-499

(20) For the left or right hydraulic system, do the activation procedure for the thrust reverser (AMM 78-31-00/201).

NOTE: This step applies only for hydraulically operated thrust reversers.

S 862-497

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

TASK 29-11-00-602-206

11. Hydraulic System Fluid Replacement

A. Equipment

(1) Hydraulic Service Cart - This cart must supply a flow of BMS 3-11 fire-resistant hydraulic fluid at 10-20 gpm at 3000 psig.

(2) Container - 80 U.S. Gallon (303 Liter) capacity, for hyrdraulic fluid

B. Consumable Materials

(1) D00153 Fluid-Hydraulic, Fire Resistant, BMS 3-11
Center System - 43 gallons
Left System - 19 gallons
Right System - 20 gallons

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

D. Access

(1) Location Zones

211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

E. Procedure

S 862-207
(1) Supply electrical power (AMM 24-22-00/201).

S 862-208
(2) Depressurize the hydraulic system reservoir.

S 012-209
(3) Gain access to the Left and Right EDP and the Center System ACMP2.

S 422-227
(4) Connect quick diconnects and drain hoses to the pump supply hoses so that the reservoir drains in the container.

NOTE: Connections can be made at the pump or at the strut disconnects.

S 492-225
(5) Connect the pressure hose on the hydraulic service cart to the pump pressure hose.

S 032-223
(6) Disconnect the torsion links on the nose landing gear for Center System.

S 862-241
(7) Adjust the hydraulic service cart to supply a flow of 10-20-gpm at 3000 psig.

S 612-211
(8) Replace the hydraulic fluid in the center system:

NOTE: The Center System uses approximately 43 gallons (163 liters) of new hydraulic fluid. The steps that follow replace approximately 60% of the total fluid volume.

(a) Pressurize the Center Hydraulic System with the service cart at the ACMP2 pressure line.

(b) Operate the spoilers through 10 complete cycles.
(c) Put the STAB TRIM in the 8 position.
(d) Make sure the stabilizer motion stops, then put the STAB TRIM in the 0 position.
(e) Operate the rudder through 5 complete cycles (Rudder full left to Rudder full right.)
(f) Operate the elevators through 20 complete up/down cycles.
(g) Operate the nose gear steering through 4 full cycles.

S 612-212
(9) Replace the fluid in the left hydraulic sytem:

NOTE: The left uses approximately 18 gallons (68 liters) of new hydraulic fluid. The steps that follow replace approximately 90% of the left system total fluid volume.

(a) Pressurize the left hydraulic system with the service cart at the EDP pressure line.
(b) Operate the spoilers through 12 complete cycles.
(c) Operate the ailerons through 6 complete cycles.
(d) Operate the spoilers through 2 complete cycles.
(e) Put the STAB TRIM in the 8 position.
(f) Make sure that the stabilizer motion stops, then put the STAB TRIM in the 0 position.
(g) Operate the rudder through 3 complete cycles (rudder full left to rudder full right).
(h) Operate the elevators through 15 complete up/down cycles.

S 612-213
(10) Replace the fluid in the right hydraulic system:

NOTE: The right system uses approximately 20 gallons (78 liters) of new hydraulic fluid. The steps that follow replace approximately 80% of the right system total fluid volume.

(a) Pressurize the right hydraulic system with the service cart at the EDP pressure line.

(b) Operate the spoilers through 12 complete cycles.
(c) Operate the aileroms through 8 complete cycles.
(d) Operate the spoilers through 8 complete cycles.
(e) Operate the elevators throiugh 15 complerte up/down cycles.
(f) Operate the rudder through 15 complete cycles (rudder full left to rudder full right

F. Put the Airplane Back to its Usual Condition

S 862-214
(1) Turn off the hydraulic service cart

S 102-228
(2) If additional flushing is required it is optional to operate additional control systems. The percentage of fluid flushed from each system can be increased according to Table 201.

Table 201: Hydraulic Fluid Replacement

AFFECTED SYSTEM	CONTROL SYSTEM	COMMAND	FLUID VOLUME	FLUID INCREASE
Center	Flaps/Slats	0 to 5 degrees flaps	7.6 gallons	5%
Center	Landing Gear Extend/Retract	2 extend/retract cycles	15.9 gallons	26%
Center	RAT	back drive for 17 seconds	3.4 gallons	7%
Center	Brakes	crack the lines, drain the fluid, and bleed the system	1.2 gallons	3%
Right	Brakes	crack the lines, drain the fluid, and bleed the system	2.0 gallons	10%

S 862-242
(3) Operate the rudder to release the pressure in the hydraulic system.

S 432-216
(4) For the center system, connect the torsion links on the nose landing gear.

S 092-217
(5) Disconnect the hydraulic service cart.

S 612-236
(6) Do this task if it is necessary: "Hydraulic Reservoir Servicing" (AMM 12-12-01/301).

S 862-243
(7) Pressurize the hydraulic systems using the respective EDP and ACMP2.

S 792-219
(8) Examine the hose connections for leakage.
(a) If you find leakage, repair the cause of it.

S 862-244
(9) Operate the rudder to release the hydraulic system pressure.

S 862-245
(10) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 862-246
(11) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 29-11-00-862-230

12. Transfer Hydraulic Fluid From the Center to the Right System

A. General

(1) The 767 has a tendency for hydraulic fluid to gradually transfer from the right system to the center system through the anti-skid shuttle valve. This procedure provides a procedure for transferring hydraulic fluid back from the center to the right system from the flight compartment.

B. References
(1) AMM 29-11-00/201, Hydraulics
C. Access
(1) Location Zones
211/212 Control Cabin

D. Procedure

S 862-231

WARNING: PRESSURIZATON OF THE CENTER OR RIGHT HYDRAULIC SYSTEM WILL SUPPLY POWER TO THE AILERON, ELEVATOR, RUDDER AND SPOILER SYSTEMS. MAKE SURE THE AREA IS CLEAR TO AVOID INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT.

(1) Apply center hydraulic system pressure (AMM 29-11-00/201).

S 862-232
(2) While you push and hold the brake pedals, do the steps that follow:
(a) Remove the center hydraulic system pressure (AMM 29-11-00/201).
(b) Apply right hydraulic system pressure (AMM 29-11-00/201).

S 862-233
(3) Release the brake pedals.

S 022-234
(4) Remove the right hydraulic system pressure.

NOTE: The center hydraulic quantity will decrease and the right hydraulic quantity will increase.

S 862-235
(5) Repeat this procedure as many times as necessary to extinguish the 0/FULL and RF messages from the EICAS hydraulic system quantity indication.

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

1. General
   A. This procedure contains two tasks. The first task is an operational test of the main (left, right, and center) hydraulic systems. The second task is a system test of the main (left, right, and center) hydraulic systems.

TASK 29-11-00-715-896

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

   A. References
      (1) AMM 12-12-01/301, Hydraulic Systems
      (2) AMM 24-22-00/201, Electrical Power
      (3) AMM 27-61-00/201, Spoiler/Speedbrake Control System
      (4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (5) AMM 31-41-00/201, EICAS
      (6) AMM 36-00-00/201, Pneumatic - General
      (7) 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-A17
      (1) Supply electrical power (AMM 24-22-00/201).

      S 215-005

      CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION ON THE FLIGHT DECK DISPLAY 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 not less than 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 865-A19

(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 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-A14

(4) Make sure these circuit breakers on the overhead panel, P11, are closed:
   (a) 11D29, ENG HYD PUMP L SUPPLY
   (b) 11D30, ENG HYD PUMP R SUPPLY
   (c) 11D31, HYDRAULIC AIR PUMP
   (d) 11L14, HYDRAULIC L ENG PUMP DEPRESS
   (e) 11L15, HYDRAULIC ELEC PUMP CTR1
   (f) 11L16, HYDRAULIC ELEC PUMP R
   (g) 11L17, HYDRAULIC SYSTEM PRESS L
   (h) 11L18, HYD SYS CTR PRESS
   (i) 11L20, HYDRAULIC QTY
   (j) 11L23, HYDRAULIC R ENG PUMP DEPRESS
   (k) 11L24, HYDRAULIC ELEC PUMP CTR2
   (l) 11L25, HYDRAULIC ELEC PUMP L
   (m) 11L26, HYDRAULIC SYSTEM PRESS R

S 865-A16

(5) Do the EICAS Message Display Procedure to show alert, status, and maintenance message lists (AMM 31-41-00/201).

   NOTE: The above referenced procedure will provide instructions on how to show EICAS messages and hydraulic quantity, pressure and temperature on data on EICAS.

S 215-010

(6) Make sure the reservoir in each hydraulic system is full (AMM 12-12-01/301).

S 215-B41
(7) Make sure the reservoir in each hydraulic system is pressurized (AMM 29-11-00/201)

S 865-A18
(8) Make sure these switches on the hydraulic control panel are in the OFF position:
(a) L DEMAND HYD PUMPS ELEC
(b) C DEMAND HYD PUMPS AIR
(c) R DEMAND HYD PUMPS ELEC

S 865-834
(9) Do these steps:
(a) Make sure the control lever for the landing gear is in the DN position.
(b) Make sure the landing gear doors are closed (Ref 32-00-15).

S 865-835
(10) Make sure the flap control lever, on the control stand panel, P10, is in the 0-unit (FLAPS UP) detent.

S 865-836
(11) Make sure the flaps and the slats are in the fully retracted position.

S 865-837
(12) Make sure the SPEEDBRAKE handle, on the control stand, is in the DOWN position.

S 865-838
(13) Make sure the speedbrakes are in the full down position.

D. Do a Test of the Hydraulic System for the Switch/Lights.

S 215-012
(1) Do the steps which follow for these switches on the hydraulic control panel:

- L and R PRIMARY HYD PUMPS ENG
- C PRIMARY HYD PUMPS ELEC 1 and 2.

(a) Push the switch/lights to the ON position.
(b) Make sure the switch/lights come on.
(c) Push the switch/lights to the OFF position.

S 215-013

(2) Do these steps for the RESERVE BKS & STRG switch/light on the main instrument panel, P1:
   (a) Push the switch/light to the ON position.
   (b) Make sure the switch/light comes on.
   (c) Push the switch/light to the OFF position.

S 215-864

(3) Make sure the QTY or RSVR light for each system, on the hydraulic control panel, is off.

NOTE: The label RSVR is optional to QTY.

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

S 865-897

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) On the hydraulic control panel, push the L (R) PRIMARY HYD PUMPS ENG switch to the ON position.

S 865-017

(2) Pressurize the left (right) hydraulic system with the engine-driven pump (EDP) (AMM 29-11-00/201).

S 215-018

(3) Make sure the L (R) HYD PRESS indication is 2800 to 3200 psi.

S 215-019

(4) Make sure these lights on the hydraulic control panel are off:
   (a) SYS PRESS 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
(5) Make sure the HYD TEMP indication for the left (right) system is less than 100°C.

S 215-021
(6) Make sure the L (R) HYD DEM PUMP EICAS message shows.

S 865-022
(7) On the hydraulic control panel, put the L (R) DEMAND HYD PUMPS ELEC switch in the AUTO position.

S 215-023
(8) On the hydraulic control panel, make sure the PRESS light for the left (right) alternating current motor pump (ACMP) is off.

S 215-024
(9) Make sure the L (R) HYD DEM PUMP EICAS message does not show.

S 865-025
(10) On the hydraulic control panel, push the L (R) PRIMARY HYD PUMPS ENG switch to the OFF position.

NOTE: When the right system pressure drops to a minimum of 1900 psi before the ACMP starts and the pressure increases to 2800 to 3200 psi, the ACMP will start after a delay of 0.5 to 2.5 seconds.

When the left system pressure drops, the ACMP will start after four to six seconds and the pressure will increase to 2800 to 3200 psi. During this delay the pressure may bleed down well below the 1900 psi pressure switch setting. Since pressure decay is a function of many parameters that vary between airplanes a minimum system pressure is not useful for the left system.

If the pressure decreases to approximately 2800 psi for more than 60 seconds while the two engines operate, an L or R HYD SYS MAINT EICAS message can show. You can ignore this message, if it shows, while only an ACMP operates.

S 215-026
(11) On the hydraulic control panel, make sure the PRESS light for the left (right) EDP is on.

S 215-027
(12) On the hydraulic control panel, make sure these lights 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 215-028
(13) Make sure the L (R) HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 215-029
(14) Make sure the L (R) HYD PRIM PUMP EICAS message shows.

S 865-030
(15) On the hydraulic control panel, put the L (R) DEMAND HYD PUMPS ELEC switch to the OFF position.

S 865-031
(16) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 215-032
(17) On the hydraulic control panel, make sure these lights 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) system.

S 215-033
(18) Make sure the L (R) HYD SYS PRESS EICAS message shows.

S 865-034
(19) On the hydraulic control panel, put the L (R) DEMAND HYD PUMPS ELEC switch in the ON position.

S 215-035
(20) On the hydraulic control panel, make sure these lights are off:
(a) PRESS light for the left (right) ACMP
(b) SYS PRESS light for the left (right) hydraulic system.

S 215-036
(21) Make sure the L (R) HYD PRESS indication is 2800 to 3200 psi.

S 215-037
(22) Make sure the L (R) HYD SYS PRESS EICAS message does not show.

S 215-038
(23) Make sure the L (R) HYD PRIM PUMP EICAS message shows.

S 865-039
(24) On the hydraulic control panel, push the L (R) PRIMARY HYD PUMPS ENG switch to the ON position.

S 215-040
(25) On the hydraulic control panel, make sure the PRESS light for the left (right) EDP is off.

S 215-041
(26) Make sure the L (R) HYD PRIM PUMP EICAS message does not show.

S 865-042
(27) Stop the left (right) engine (AMM 71-00-00/201).

S 865-043
(28) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

F. Do a Test of the Center Hydraulic System

S 865-044
(1) Supply pneumatic power (AMM 36-00-00/201).

S 215-045
(2) On the hydraulic control panel, make sure these lights are on:
(a) SYS PRESS light for the center hydraulic system
(b) PRESS lights for the ACMP C1 and C2
(c) PRESS light for the air driven pump (ADP).

S 215-046
(3) Make sure the C HYD SYS PRESS EICAS message shows.

S 865-047
(4) On the hydraulic control panel, push the C PRIMARY HYD PUMPS ELEC 1 switch to the ON position.

S 215-048
(5) On the hydraulic control panel, make sure these lights are off:
(a) SYS PRESS light for the center hydraulic system
(b) PRESS light for the ACMP C1

S 215-049
(6) On the hydraulic control panel, make sure these lights are on:
(a) PRESS light for the ACMP C2
(b) PRESS light for the ADP.

S 215-050
(7) Make sure the C HYD PRESS indication is 2800 to 3200 psi.

NOTE: If the pressure decreases to approximately 2800 psi, for more than 60 seconds, while the two engines operate, an L, R, or C HYD SYS MAINT EICAS message can show. You can ignore this message, if it shows while only one ACMP operates.

S 215-051
(8) Make sure the C HYD DEM PUMP and the C HYD PRIM 2 EICAS messages show.

S 215-052
(9) On the hydraulic control panel, make sure the OVHT light for the ACMP C1 is off.

S 215-053
(10) Make sure the C HYD 1 OVHT EICAS message does not show.

S 865-054
(11) On the hydraulic control panel, push the C PRIMARY HYD PUMPS ELEC 1 switch to the OFF position.

S 865-055
(12) Operate the primary flight controls or let the internal leakage decrease the system pressure.

S 865-056
(13) On the hydraulic control panel, push the C PRIMARY HYD PUMPS ELEC 2 switch to the ON position.

S 215-057
(14) On the hydraulic control panel, make sure these lights are off:
(a) SYS PRESS light for the center hydraulic system
(b) PRESS light for the ACMP C2

S 215-058
(15) On the hydraulic control panel, make sure these lights are on:
(a) PRESS light for the ACMP C1
(b) PRESS light for the ADP.

S 215-059
(16) Make sure the C HYD PRESS indication is 2800 to 3200 psi.

S 215-060
(17) Make sure the C HYD DEM PUMP and the C HYD PRIM 1 EICAS messages show.

S 215-061
(18) On the hydraulic control panel, make sure the OVHT light for the ACMP C2 in the center system is off.

S 215-062
(19) Make sure the C HYD 2 OVHT EICAS message does not show.

S 865-063
(20) On the hydraulic control panel, put the C DEMAND HYD PUMPS AIR switch in the AUTO position.

S 865-904
(21) Make sure the ADP is not running.

S 215-064
(22) On the hydraulic control panel, make sure the PRESS light for the ADP is off.

S 215-065
(23) Make sure the C HYD DEM PUMP EICAS message does not show.

S 865-066
(24) On the hydraulic control panel, push the C PRIMARY HYD PUMPS ELEC 2 switch to the OFF position.

S 865-905
(25) Make sure the ADP is running.

S 215-067
(26) On the hydraulic control panel, make sure the PRESS light for the ACMP C2 is on.

S 865-068
(27) Do these steps:
(a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11L24, HYDRAULIC ELEC PUMP CTR 2
(b) On the hydraulic control panel, put the C PRIMARY HYD PUMPS ELEC 2 switch to the ON position.

S 215-081
(28) Let the pressure in the center hydraulic system decrease while you monitor the C HYD PRESS indication on the flight deck display.

S 215-082
(29) Make sure the ADP starts when the pressure decreases to 1800 to 2000 psi.

NOTE: The pressure will increase to 2800-3200 psi when the ADP starts. The ADP will operate for approximately 15 seconds and then stop.

S 215-083
(30) Make sure the ADP starts again when the pressure decreases to 1800 to 2000 psi.

NOTE: The pressure will increase to 2800-3200 when the ADP starts.

S 215-084
(31) On the hydraulic control panel, make sure the PRESS light for the ADP does not come on.

S 215-085
(32) Make sure the C HYD DEM PUMP EICAS message does not show.

S 865-086
(33) On the hydraulic control panel, put the C DEMAND HYD PUMPS AIR switch to the ON position.

S 215-087
(34) Make sure the C HYD PRESS indication on the flight deck display becomes stable at 2800 to 3200 psi.

S 215-088
(35) On the hydraulic control panel, make sure the OVHT light for the ADP is off.

S 215-089
(36) Make sure the C DEM HYD OVHT EICAS message does not show.

S 865-090
(37) On the hydraulic control panel, put the C DEMAND HYD PUMPS AIR switch to the OFF position.

S 865-091
(38) Do these steps:
(a) Place C PRIMARY HYD PUMPS ELEC 2 switch to OFF position.
(b) Remove the DO-NOT-CLOSE identifier and close this circuit breaker on the P11 panel:
1) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 865-104
(39) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 865-105
(40) Remove pneumatic power, if it is not necessary (AMM 36-00-00/201).

TASK 29-11-00-715-839

3. Operational Test - Air-Driven Pump (ADP) Speed Topping Shutdown (Fig. 501)

A. Equipment

(1) Generator - Signal, Sinewave, Adjustable from 5 Hz to 2 MHz - HP3325B
Hewlett Packard (Recommended)

Generator - Adjustable from 5 Hz to 2 Mhz - Commercially Available (Alternative)

(2) Digital Multi-meter (True RMS reading,5Hz to 10 KHz)

B. 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 31-41-00/201, EICAS
(5) AMM 36-00-00/201, Pneumatic - General

C. Access

(1) Location Zones

195	Wing to Body - Aft Upper half
211/212	Control Cabin

(2) Access Panel

195SL	Air-Driven Pump

D. Prepare for the Operational Test

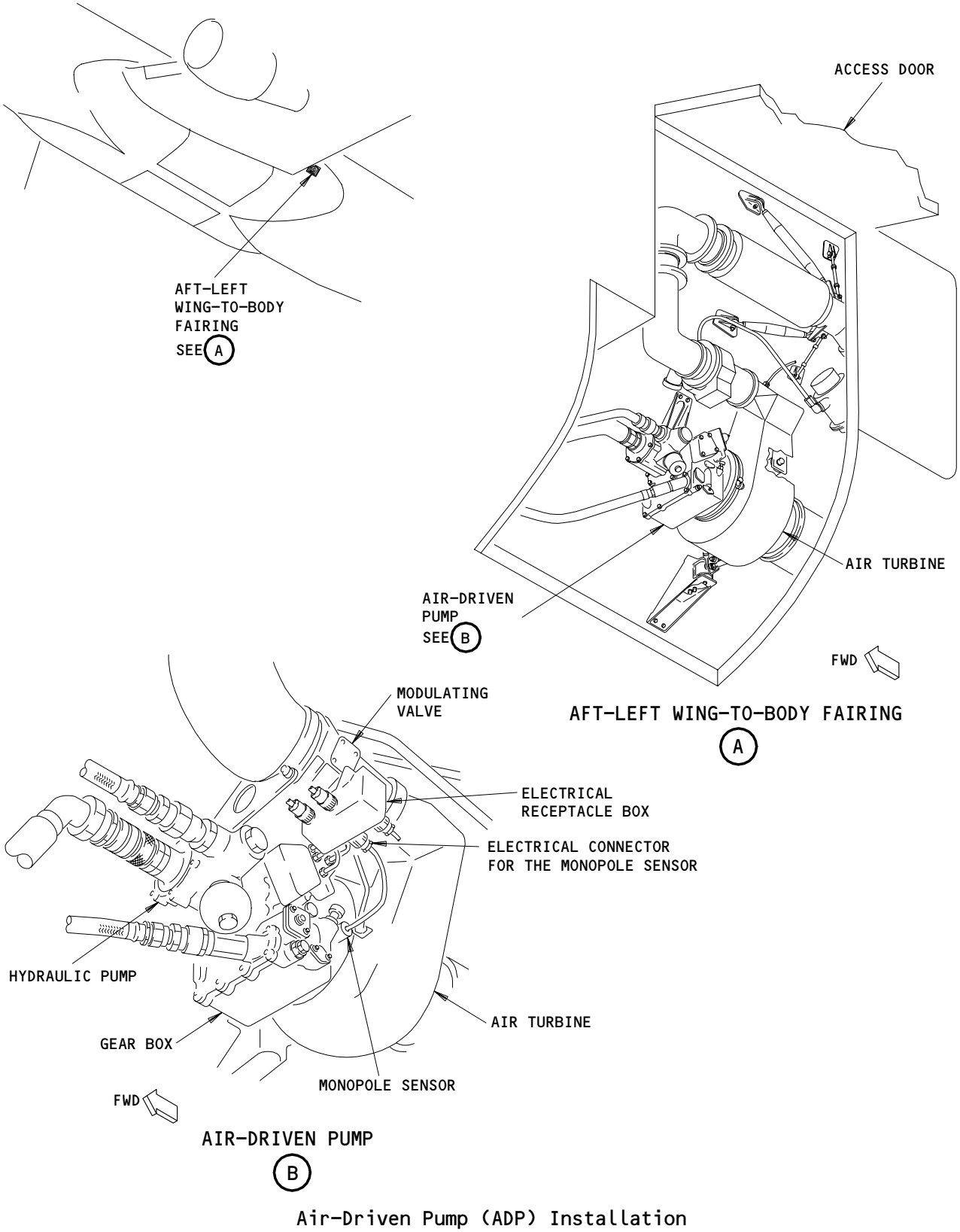
S 865-840
(1) Supply electrical power (AMM 24-22-00/201).

S 865-841
(2) Push the ELEC/HYD switch on the EICAS maintenance panel on the right side panel, P61.

S 215-842
(3) Make sure the reservoir in each hydraulic system is full (AMM 12-12-01/301).

E. Air-Driven Pump (ADP) Speed Topping Shutdown Test (Not to be confused with Overspeed Shutdown Test).

S 865-106
(1) Supply pneumatic power (AMM 36-00-00/201).



Air-Driven Pump (ADP) Installation
Figure 501

S 015-847
(2) Open the access panel, 195SL, for the air-driven pump (AMM 06-41-00/201).

S 035-107
(3) Remove the electrical connector for the monopole sensor at the electrical receptacle box on the ADP modulating valve.

S 485-108
(4) Connect the signal generator to the pins 1 and 3 on the electrical receptacle box on the ADP modulating valve.
(a) Connect a True RMS reading volt meter to monitor the signal generator output amplitude.

S 865-109
(5) Set the signal generator to produce a 0.90 volt RMS 4000 Hz sine wave; ensure that the signal generator is not set for a DC offset nor has an output terminal that is connected to chassis ground.

NOTE: 0.90 volts RMS is equivalent to 2.55 volts peak-to-peak or 1.27 volts zero-to-peak.

S 715-110
(6) Do the steps which follow with the C DEMAND HYD PUMPS AIR switch in the ON position and then do these steps again with this switch in the AUTO position:
(a) Make sure these lights, on the hydraulic control panel, are off:
1) SYS PRESS light for the center system
2) PRESS light for the ADP.
(b) Slowly increase the frequency of the signal generator to 5150 Hz while maintaining the amplitude within 0.75 to 0.95 volts RMS (2.12 to 2.70 volts peak-to-peak).
(c) Make sure the ADP stops at a frequency between 4400 and 5150 Hz.
(d) Make sure the air-driven pump PRESS light is on.
(e) Slowly decrease the frequency of the signal generator to 4400 Hz while maintaining the amplitude within 0.75 to 0.95 volts RMS (2.12 to 2.70 volts peak-to-peak).
(f) Make sure the ADP starts and operates at a frequency between 4400 and 5150 Hz.

S 865-111
(7) Put the C DEMAND HYD PUMPS AIR switch to the OFF position.

S 085-112

(8) Remove the signal generator from the electrical receptacle box on the ADP modulating valve.

S 435-113

(9) Install the electrical connector, for the monopole sensor, on the electical receptacle box on the ADP modulating valve.

S 415-848

(10) Close the access panel, 195SL, for the air-driven pump (AMM 06-41-00/201).

S 865-B91

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM ALL CONTROL SURFACES AND WHEEL WELLS WHEN HYDRAULIC POWER IS SUPPLIED. AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, AND STABILIZER ARE FULLY POWERED SURFACES. WHEN YOU MOVE THE FLAP CONTROL LEVER WITH THE HYDRAULIC SYSTEM PRESSURIZED, THE FLAPS AND FLAP DRIVE MECHANISMS WILL MOVE QUICKLY. INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(11) Put the C DEMAND HYD PUMP AIR switch in the AUTO position.

NOTE: This will ensure that the flap position and the flap control lever (commanded position) agree.

S 865-114

(12) Remove pneumatic power, if it is not necessary (AMM 36-00-00/201).

S 865-115

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

TASK 29-11-00-735-116

4. System Test - Main (Left, Right, and Center) Hydraulic Systems

A. General

(1) If the pressure decreases to approximately 2800 psi, for more than 60 seconds, while the two engines operate, an L, R or C HYD SYS MAINT message can show on the EICAS display. You can ignore this message, if it shows on the EICAS display, while only one ACMP operates in this test.

B. Equipment

(1) Hydraulic Service Cart with 15 Micron Absolute Filter, 0 to 3000 psi, with Hydraulic Fluid, Fire Resistant, BMS 3-11

(2) Controlled source of clean dry air or nitrogen, 100 PSI maximum pressure.

(3) Stop Watch - Commercially Available

(4) Generator - Square or Sinewave Signal, Adjustable from 5 Hz to 2 MHz, - HP3325B Hewlett Packard (Recommended)

Generator - Adjustable from 5 Hz to 2 MHz - Commercially Available (Alternative)

(5) Proximity Sensor Actuator/Deactuator Set - A27092-84 (4 rectangular sensor actuators and 5 rectangular sensor deactuators are necessary)

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
(5) AMM 27-51-00/201, Trailing Edge Flap System
(6) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(7) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) AMM 29-11-05/401, Engine-Driven Pump
(9) AMM 31-41-00/201, EICAS
(10) AMM 32-00-15/201, Landing Gear Door Locks
(11) AMM 32-00-20/201, Landing Gear Downlocks
(12) AMM 32-09-02/201, Air/Ground Relays
(13) AMM 36-00-00/201, Pneumatic - General
(14) AMM 71-00-00/201, Power Plant - General
(15) AMM 71-11-04/201, Fan Cowl Panels
(16) AMM 71-11-06/201, Core Cowl Panels
(17) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

144	Right MLG Wheel Well
149	Keel Beam - Aft Section
195	Wing to Body - Aft Upper half (Left)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

149BL	Hydraulic Pressure/Return Ground Connection
195SL	Air Driven Hydraulic Pump
437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

E. Prepare for the System Test

S 865-117

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

S 215-118

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 not less than 600 gallons (4020 pounds/1827 kilograms) of fuel in each main fuel tank.

S 865-119

(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 the flight deck display 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 865-120

WARNING: FOR HYDRAULICALLY OPERATED THRUST REVERSERS, 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).

   NOTE: This step applies only for hydraulically operated thrust reversers.

S 865-124

(5) Make sure these circuit breakers on the overhead panel, P11, are closed:
   (a) 11D25, ENGINE FUEL CONT VLV/RESET A L
   (b) 11D26, ENGINE FUEL CONT VLV/RESET A R
   (c) 11D29, HYDRAULIC L ENG PUMP SUPPLY
   (d) 11D30, HYDRAULIC R ENG PUMP SUPPLY
   (e) 11D31, HYDRAULIC AIR PUMP
   (f) 11L14, HYDRAULIC L ENG PUMP DEPRESS
   (g) 11L16, HYDRAULIC ELEC PUMP R
   (h) 11L17, HYDRAULIC SYSTEM PRESS L
   (i) 11L18, HYDRAULIC SYSTEM PRESS CTR
   (j) 11L20, HYDRAULIC QTY
   (k) 11L23, HYDRAULIC R ENG PUMP DEPRESS
   (l) 11L24, HYDRAULIC ELEC PUMP CTR 2
   (m) 11L25, HYDRAULIC ELEC PUMP L

(n) 11L26, HYDRAULIC SYSTEM PRESS R

S 215-865
(6) Make sure the QTY light for each system, on the hydraulic control panel, is off.

S 215-127
(7) Make sure the reservoir in each hydraulic system is full (AMM 12-12-01/301).

S 865-129
(8) If the ISLN light on the reserve brakes and steering panel, on the right side panel, P61, is on, do these steps:
(a) Put the RESERVE BRAKES AND STEERING switch to the RESET/DISABLE position.
(b) Put the RESERVE BRAKES AND STEERING switch to the NORM position.
(c) Make sure the ISLN light is off.

NOTE: The ISLN light must stay off during this test, unless it is necessary to be on in a test step.

S 865-130
(9) Do this procedure: EICAS Message Erase Procedure (AMM 31-41-00/201).

S 865-131
(10) Do the EICAS Message Display Procedure to show alert, status, and maintenance message lists (AMM 31-41-00/201).

NOTE: The above referenced procedure will provide instructions on how to show EICAS messages and hydraulic quantity, pressure and temperature on data on EICAS.

S 865-132
(11) Make sure these switches, on the generator field and hydraulic control panel, on the right side panel, P61, are in the ON position:
(a) L, C, AND R TAIL
(b) L, C, AND R WING.

S 495-133
(12) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 495-134

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.

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

F. Do a Test of the Alternating Current Motor Pump (ACMP), in the Left (Right) Hydraulic System, in the ON (or Continuous) Mode

S 045-001

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

(1) If you do a test of the left hydraulic system, do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 865-A20

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF YOU DO THE PROCEDURE INCORRECTLY, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) If you do a test of the left hydraulic system, do the Flight Mode Simulation procedure for the No. 2 air/ground system (AMM 32-09-02/201).

S 865-135

(3) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the ON position.

S 215-136

(4) If you do a test of the left hydraulic system, make sure the left ACMP starts in 5 ±1 seconds.

S 215-137

(5) If you do a test of the right hydraulic system, make sure the right ACMP starts in 1.5 ±1 seconds.

S 215-138

(6) Make sure the PRESS light for the left (right) ACMP, on the hydraulic hydraulic control panel, is off.

S 215-139
(7) Make sure the SYS PRESS light for the left (right) system, on the hydraulic control panel, is off.

S 215-140
(8) Make sure the L (R) HYD SYS PRESS EICAS message does not show.

S 215-141
(9) Make sure the L (R) HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 215-142
(10) Make sure the PRESS light for the left (right) engine-driven pump (EDP), on the hydraulic control panel, is on.

S 215-143
(11) Make sure the OVHT light for the left (right) ACMP, on the hydraulic control panel, is off.

S 215-863
(12) Make sure the QTY light for the left (right) system, on the hydraulic control panel, is off.

S 735-146
(13) If you do a test of the left hydraulic system, do these steps:
(a) Put the airplane back to the ground mode (AMM 32-09-02/201).

NOTE: The ACMP in the left hydraulic system may stop for 5 ±1 seconds and start again.

(b) Do the activation procedure for the spoilers, if you did the deactivation procedure (AMM 27-61-00/201).
(c) Put the left ENG START switch, on the pilots' overhead panel, P5, to the GND position.
(d) Make sure the ACMP in the left hydraulic system stops.
(e) Make sure these lights on the hydraulic control panel come on in approximately 7.5 ±1 seconds after you put the left ENG START switch to the GND position:
1) SYS PRESS light for the left hydraulic system
2) PRESS light for the left ACMP.
(f) Put the left ENG START switch, on the P5 panel, to the OFF position.
(g) Make sure the ACMP in the left hydraulic system starts after 5 ±1 seconds.
(h) Put the right ENG START switch, on the P5 panel, to the GND position.

(i) Make sure the ACMP in the left hydraulic system stops.
(j) Make sure these lights on the hydraulic control panel come on approximately 7.5 ±1 seconds after you put the right ENG START switch to the GND position:
1) SYS PRESS light for the left hydraulic system
2) PRESS light for the left ACMP.
(k) Put the right ENG START switch, on the P5 panel, to the OFF position.
(l) Make sure the ACMP in the left hydraulic system starts in 5 ±1 seconds.

S 865-147
(14) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the OFF position.

S 215-148
(15) Make sure these lights, on the hydraulic control panel, are on:
(a) SYS PRESS for the left (right) hydraulic system
(b) PRESS light for the left (right) ACMP.

S 215-149
(16) Make sure the L (R) HYD SYS PRESS message shows on the EICAS display.

S 215-150
(17) Make sure the L (R) HYD PRESS indication on the flight deck display is less than 160 psi.

G. Do a Test of the Alternating Current Motor Pump, in the Left (Right) Hydraulic System, in the AUTO Mode

S 865-151
(1) Remove the pressure from the left, right, and center hydraulic system and reservoirs (AMM 29-11-00/201).

S 015-153
(2) Open the fan cowl panels (AMM 71-11-04/201).

S 015-154
(3) Open the core cowl panels (AMM 71-11-06/201).

S 015-157

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Open the thrust reverser (AMM 78-31-00/201).

S 035-158

(5) Disconnect the pressure hose from the left (right) engine-driven pump (EDP) (AMM 29-11-05/401).

S 495-159

(6) Connect the pressure line from the hydraulic service cart to the left (right) EDP pressure hose.

S 015-160

(7) If you do a test of the left hydraulic system, open the access panels, 437BL and 437BR, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 015-161

(8) If you do a test of the right hydraulic system, open the access panels, 447BL and 447BR, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 495-162

(9) Connect the return line of the hydraulic service cart to the ground service connection on the left (right) return filter module.

S 045-163

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

(10) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 865-164

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF YOU DO THE PROCEDURE INCORRECTLY, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(11) If you do test of the right hydraulic system, do the Flight Mode Simulation procedure for the No. 1 air/ground sytem (AMM 32-09-02/201).

S 865-165
(12) If you do a test of the left hydraulic system, do the Flight Mode Simulation procedure for the No. 2 air/ground system (AMM 32-09-02/201).

S 865-166
(13) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E1, FUEL VALVES R SPAR

S 865-167
(14) Put the L (R) FUEL CONTROL SWITCH, on the control stand panel, P10, to the RUN position.

S 865-168
(15) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the AUTO position.

S 215-169
(16) If you do a test of the left hydraulic system, make sure the left ACMP starts in 5 ±1 seconds.

S 215-170
(17) If you do a test of the right hydraulic system, make sure the right ACMP starts in 1.5 ±1 seconds.

S 215-171
(18) Make sure these lights, on the hydraulic control panel, are off:
(a) SYS PRESS for the left (right) system
(b) PRESS light for the left (right) ACMP.

S 215-172
(19) Make sure the reservoir fill indicator at the central hydraulic service center is between 1/2 and FULL for the left (right) system.

S 615-173
(20) If the movement of fluid from the airplane to the hydraulic service cart occurs too quickly to do this test, do these steps:
(a) Remove the pressure from the left (right) hydraulic system (AMM 29-11-00/201).
(b) Disconnect the return line of the hydraulic service cart from the ground service connection on the return filter module of the left (right) hydraulic system.
(c) Install a cap on the return line of the hydraulic service cart.
(d) Add or drain the fluid in the left (right) reservoir until the reservoir fill indicator, at the central hydraulic service center, shows at the bottom of the green area (AMM 12-12-01/301).

CAUTION: YOU MUST CONTINUOUSLY MONITOR THE RESERVOIR QUANTITY DURING THIS TEST. THE RESERVOIR CAN BECOME TOO FULL WITH THE RETURN LINE OF THE HYDRAULIC SERVICE CART DISCONNECTED.

(e) Continuously monitor the quantity of fluid in the reservoir of the left (right) hydraulic system during the steps with the return line of the hydraulic service cart disconnected.
(f) If the quantity becomes less than 0.5 or more than 1.1, do these steps:
1) Stop the test.
2) Add or drain the fluid in the left (right) reservoir until the fill indicator, at the central hydraulic service center, shows at the bottom of the green area (AMM 12-12-01/301).
3) Continue to do the test.
(g) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the AUTO position.

S 865-174
(21) Slowly increase the pressure of the hydraulic service cart to 2550 psi.

S 215-175
(22) Make sure the PRESS light for the left (right) EDP, on the hydraulic control panel, goes off at a pressure of 1750 to 2550 psi.

S 215-176
(23) Make sure the left (right) ACMP stops in 15 ±2 seconds after the PRESS light for the left (right) EDP goes off.

NOTE: The L (R) DEMAND PUMPS ELEC switch must stay in the AUTO position.

S 215-177
(24) Make sure the PRESS light for the left (right) ACMP, on the hydraulic control panel, does not come on.

S 865-178
(25) Slowly decrease the pressure of the hydraulic service cart to 1750 psi.

S 215-179
(26) Make sure the left (right) ACMP starts.

S 215-180
(27) Make sure the PRESS light for the left (right) EDP, on the hydraulic control panel, comes on.

S 735-181

(28) If you do a test of the right hydraulic system, do these steps:

(a) Increase the pressure of the hydraulic service cart to 3000 psi.

(b) Move the flap control lever, on the P10 panel, to the 5-unit detent position.

(c) Put the airplane back to the ground mode (AMM 32-09-02/201).

(d) Do the activation procedure for the spoilers, if you did the deactivation procedure (AMM 27-61-00/201).

(e) Make sure the right ACMP starts in 1.5 ±1 seconds and operates continuously.

(f) Monitor the right ACMP for not less than 45 seconds to make sure the operation is continuous.

(g) Move the flap control lever, on the P10 panel, to the zero (FLAPS UP) detent position.

(h) Make sure the right ACMP stops.

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

(i) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF YOU DO THE PROCEDURE INCORRECTLY, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(j) If you do test of the left hydraulic system, do the Flight Mode Simulation procedure for the No. 1 air/ground system (AMM 32-09-02/201).

S 865-182

(29) Decrease the pressure of the hydraulic service cart to zero.

S 865-183
(30) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the OFF position.

S 865-184
(31) Put the L (R) FUEL CONTROL switch, on the P10 panel, to the CUTOFF position.

S 865-185
(32) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6E1, FUEL VALVES L SPAR
(b) 6E2, FUEL VALVES R SPAR

S 865-186
(33) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the AUTO position.

S 865-187
(34) Increase the pressure of the hydraulic service cart to 3000 psi.

S 215-188
(35) Monitor the left (right) ACMP for not less than 45 seconds to make sure the operation is continuous.

S 865-189
(36) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the OFF position.

S 865-190
(37) Decrease the pressure of the hydraulic service cart to zero.

S 215-191
(38) Make sure the PRESS light for the left (right) EDP, on the hydraulic control panel, is on.

S 865-192
(39) Put the airplane back to the ground mode (AMM 32-09-02/201).

S 445-193
(40) Do the activation procedure for the spoilers, if you did the deactivation procedure (Ref 27-61-00).

S 495-194
(41) Disconnect the pressure hose of the hydraulic service cart from the pressure hose for the EDP.

S 435-195
(42) Connect the pressure hose to the left (right) EDP (AMM 29-11-05/401).

S 865-196
(43) Supply hydraulic power with the left (right) EDP (AMM 29-11-00/201).

S 795-197
(44) Make sure there is no leakage at the pressure hose connection to the left (right) EDP.

S 865-198
(45) Remove the hydraulic power (AMM 29-11-00/201).

S 415-199
(46) If you do a test of the left hydraulic system, close the access panels, 437BL and 437BR, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 415-200
(47) If you do a test of the right hydraulic system, close the access panels, 447BL and 447BR, for the hydraulic bay in the aft strut (AMM 06-43-00/201).

S 415-201

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(48) Close the thrust reverser (AMM 78-31-00/201).

S 415-202
(49) Close the core cowl panels (AMM 71-11-06/201).

S 415-205
(50) Close the fan cowl panels (AMM 71-11-04/201).

H. Do a Test of the Engine-Driven Pump (EDP) in the Left (Right) Hydraulic System

S 865-207
(1) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the OFF position.

S 865-208
(2) Put the L (R) PRIMARY HYD PUMPS ENG switch, on the hydraulic control panel, to the ON position.

S 865-209
(3) Pressurize the left (right) hydraulic system with the EDP (AMM 29-11-00/201).

S 215-210
(4) Make sure the L (R) HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 215-211
(5) 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
(d) QTY light for the left (right) hydraulic system.

S 215-212
(6) Make sure the L (R) HYD DEM PUMP EICAS message shows.

S 865-213
(7) Put the L (R) PRIMARY HYD PUMPS ENG switch, on the hydraulic control panel, to the OFF position.

S 215-214
(8) Make sure the L (R) HYD PRESS indication on the flight deck display decreases to less than 1000 psi.

S 215-215
(9) Make sure these lights on the hydraulic control panel are on:
(a) SYS PRESS light for the left (right) hydraulic system
(b) PRESS light for the left (right) EDP.

S 865-216
(10) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the ON position.

S 215-217
(11) Make sure the SYS PRESS light for the left (right) system, on the hydraulic control panel, is off.

S 215-218
(12) Make sure the L (R) HYD PRIM PUMP EICAS message shows.

S 865-219
(13) Put the L (R) DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, to the OFF position.

S 865-220
(14) Put the L (R) PRIMARY HYD PUMPS ENG switch, on the hydraulic control panel, to the ON position.

S 215-221
(15) Make sure the L (R) HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 865-222
(16) Stop the left (right) engine (AMM 71-00-00/201).

I. Do a Test of the Alternating Current Motor Pumps (ACMP C1 and C2) in the Center Hydraulic System

S 215-B79

CAUTION: MAKE SURE THERE IS SUFFICIENT FLUID IN THE RESERVOIR DURING THIS TEST. IF THE RESERVOIR QUANTITY IS LOW, THE PUMPS CAN BECOME DAMAGED OVER TIME.

(1) Make sure the QTY light for the center hydraulic system is off.

S 865-223
(2) Push the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, to the ON position.

S 215-224
(3) Make sure the ACMP C1 starts in 3 ±1 seconds.

S 215-225
(4) Make sure the C HYD PRESS indication, on the flight deck display, is 2800 to 3200 psi.

S 215-226
(5) Make sure these lights on the hydraulic control panel are off:
(a) SYS PRESS for the center hydraulic system
(b) PRESS light for the ACMP C1
(c) OVHT light for the ACMP C1
(d) QTY light for the center hydraulic system.

S 215-227
(6) Make sure these lights on the hydraulic control panel are on:
(a) PRESS light for the ACMP C2
(b) PRESS light for the ADP.

S 215-228
(7) Make sure these EICAS messages show:
(a) C HYD DEM PUMP
(b) C HYD PRIM 2.

S 865-229
(8) Push the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, to the OFF position.

S 215-230
(9) 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.

S 215-231
(10) Make sure the C HYD SYS PRESS message shows on the EICAS display.

S 865-232
(11) Energize the right main ac bus with the right generator power (AMM/24-22-00 201).

S 865-233
(12) Put the R GEN CONT switch, on the pilots' overhead panel P5, to the ON position.

S 865-234
(13) Put the two BUS TIE switches, on the P5 panel, to the ISLN position.

S 215-235
(14) Make sure the ISLN light in each of the two BUS TIE switches comes on.

S 865-236
(15) Push the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the ON position.

S 215-237
(16) Make sure the ACMP C2 starts in 4 ±1 seconds.

S 215-238
(17) Make sure the C HYD PRESS indication, on the flight deck display, is 2800 to 3200 psi.

S 215-239
(18) Make sure these lights on the hydraulic control panel are off:
(a) PRESS light for the ACMP C2
(b) SYS PRESS light for the center hydraulic system
(c) OVHT light for the ACMP C2.

S 215-240
(19) Make sure these lights on the hydraulic control panel are on:
(a) PRESS light for the ACMP C1
(b) PRESS light for the ADP.

S 215-241
(20) Make sure these EICAS messages show:
(a) C HYD DEM PUMP
(b) C HYD PRIM 1.

S 865-242
(21) Push the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the OFF position.

S 865-243
(22) Put the R BUS TIE switch on the P5 panel in the AUTO position.

S 215-244
(23) Make sure the AUTO light in the R BUS TIE switch comes on.

S 865-245
(24) Push the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the ON position.

S 215-246
(25) Make sure the OVHT light for the ACMP C2, on the hydraulic control panel, goes off in 4 ±1 seconds.

S 865-247
(26) Put the L BUS TIE switch on the P5 panel in the AUTO position.

S 215-248
(27) Make sure the ACMP C2 operates continuously.

NOTE: The ACMP possibly will stop one time for approximately 4 seconds and then start again.

S 215-249
(28) Make sure the C HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 215-250
(29) Make sure these EICAS messages show:
(a) C HYD DEM PUMP
(b) C HYD PRIM 1.

S 865-251
(30) Push the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the OFF position.

S 215-252
(31) 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.

S 215-253
(32) Make sure the C HYD SYS PRESS EICAS message shows.

S 215-254
(33) Make sure these EICAS messages do not show:
(a) C HYD DEM PUMP
(b) C HYD PRIM 1.

J. Do a test of the Reserve Brakes and Steering System for Automatic Operation with Low Fluid Quantity

S 685-255
(1) Open the drain valve on the reservoir for the center hydraulic system, in the right wheel well.

S 685-256
(2) Drain fluid from the reservoir in the center hydraulic system.

S 685-866
(3) Close the drain valve when the QTY light for the center system, on the hydraulic control panel, comes on.

S 865-259
(4) Make sure the RESERVE BKS & STRG switch, on the main instrument panel, P1, is in the OFF position.

S 865-260
(5) Put the RESERVE BRAKES & STRG switch, on the P61 panel, in the RESET/DISABLE position and then in the NORM position.

S 215-261
(6) Make sure the ISLN light for the center hydraulic system, on the P61 panel, is off.

S 865-262
(7) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L20, HYDRAULIC QTY

S 045-267

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

(8) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 865-268

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF YOU DO THE PROCEDURE INCORRECTLY, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(9) Do the Flight Mode Simulation procedure for the No. 1 air/ground system (AMM 32-09-02/201).

S 735-269
(10) Do these steps:
(a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11L20, HYDRAULIC QTY

(b) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, comes on approximately 9 to 12 seconds after you close the circuit breaker.

S 215-274

(11) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, is on until the isolated ACMP shutoff valves close.

S 215-275

(12) Make sure the VALVE light goes off when the isolated ACMP shutoff valves close.

S 215-276

(13) Make sure the ISLN light on the reserve brakes and steering panel, on the P61 panel, is on.

S 215-277

(14) Make sure the isolated ACMP pressure and supply shutoff valves, in the right wheel well, move to POSITION 2.

S 615-278

(15) Fill the reservoir in the center hydraulic system (AMM 12-12-01/301).

S 865-279

(16) Put the RESERVE BRAKES & STRG switch, on the P61 panel, in the RESET/DISABLE position and then in the NORM position.

S 215-280

(17) Make sure the VALVE light on the RESERVE BRKS & STRG switch, on the P1 panel, is on until isolated ACMP shutoff valves open.

S 215-281

(18) Make sure the VALVE light goes off when the isolated ACMP shutoff valves open.

S 215-282

(19) Make sure the ISLN light on the reserve brakes and steering panel, on the P61 panel, is off.

S 215-283

(20) Make sure the isolated ACMP pressure and supply shutoff valves, in the right wheel well, move to POSITION 1.

S 865-284
(21) Put the airplane back to the ground mode (AMM 32-09-02/201).

S 445-285
(22) Do the activation procedure for the spoilers, if you did the deactivation procedure (AMM 27-61-00/201).

S 215-286
(23) Make sure the ISLN light on the reserve brakes and steering panel, on the P61 panel, stays off.

K. Do a Test to Isolate the ACMP C1 in the Center System

S 865-319
(1) Put the RESERVE BRAKES & STRG switch, on the P61 panel, in the RESET/DISABLE position and then in the NORM position.

S 215-320
(2) Make sure the ISLN light for the center hydraulic system, on the P61 panel, is off.

S 865-321
(3) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 215-322
(4) Make sure the BRAKE SOURCE light, on the P1 panel, is on.

S 865-323
(5) Put the RESERVE BKS & STRG switch, on the P1 panel, in the ON position.

S 215-324
(6) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, is on.

S 865-325
(7) Put the RESERVE BRKS & STRG switch, on the P1 panel, to the off position.

S 215-326
(8) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, is off.

S 865-327
(9) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 865-328
(10) Put the RESERVE BRKS & STRG switch, on the P1 panel, to the ON position.

S 215-329
(11) Make sure these lights come on and then go off in 2 to 4 seconds:
(a) PRESS light for the ACMP C1, on the hydraulic control panel
(b) VALVE light on the RESERVE BKS & STRG switch, on the P1 panel.

S 865-330
(12) Operate the brake pedals until the C HYD PRESS indication on the flight deck display becomes stable at 2800 to 3200 psi.

S 215-331
(13) Make sure the BRAKE SOURCE light, on the P1 panel is off.

S 865-332
(14) Put the RESERVE BRKS & STRG switch, on the P1 panel, in the OFF position.

S 215-333
(15) Make sure the VALVE light on the RESERVE BRKS & STRG switch, on the P1 panel, is on until the isolated ACMP shutoff valves open.

S 215-334
(16) Make sure the VALVE light goes off when the isolated ACMP shutoff valves open.

S 215-335
(17) Make sure the BRAKE SOURCE light, on the P1 panel, is on.

NOTE: If the BRAKE SOURCE light comes on slowly, operate the brake pedals to release the pressure caught in the reserve system.

S 865-336
(18) Put the RESERVE BRAKES & STRG switch, on the P61 panel, to the RESET/DISABLE position and then to the NORM position.

S 865-337
(19) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 985-338
(20) Manually move the position indicator on the isolated ACMP pressure shutoff valve, in the right wheel well, to POSITION 2.

S 215-339
(21) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, is on.

S 215-340
(22) Make sure the ISLN light for the center hydraulic system, on the P61 panel, is on.

S 215-341
(23) Make sure the RSV BRAKE VAL EICAS message shows after 6 seconds.

S 865-342
(24) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 215-343
(25) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, goes off.

S 215-344
(26) Make sure the ISLN light for the center hydraulic system, on the P61 panel, is off.

S 215-345
(27) Make sure the isolated ACMP pressure and supply shutoff valves, in the right wheel well, move to POSITION 1.

S 215-346
(28) Make sure the RSV BRAKE VAL EICAS message does not show.

S 865-347
(29) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 985-348
(30) Manually move the position indicator on the isolated ACMP supply shutoff valve, in the right wheel well, to POSITION 2.

S 215-349
(31) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, is on.

S 215-350
(32) Make sure the RSV BRAKE VAL message shows on the EICAS display after 6 seconds.

S 865-351
(33) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 215-352
(34) Make sure the VALVE light on the RESERVE BKS & STRG switch, on the P1 panel, goes off.

S 215-353
(35) Make sure the isolated ACMP pressure and supply shutoff valves, in the right wheel well, move to POSITION 1.

S 215-354
(36) Make sure the RSV BRAKE VAL EICAS message does not show.

L. Do a Test of the Alternating Current Motor Pumps (ACMPs), in the Left, Right, and Center Hydraulic Systems, for Operation on One Power Source

S 865-355
(1) Supply electrical power (AMM 24-22-00/201).

S 865-356
(2) Make sure the two AC POWER BUS TIE switches on the electrical system control panel are in the AUTO position.

S 865-357
(3) Put the L and R DEMAND HYD PUMPS ELEC switches, on the hydraulic control panel, in the ON position.

S 215-358
(4) Make sure the PRESS lights for the left and right ACMPs, on the hydraulic control panel, are off.

S 865-359
(5) Put the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the ON position.

S 215-360
(6) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-361
(7) Put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, to the ON position.

S 215-362
(8) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, is off.

S 215-363
(9) Make sure the ACMP C2 stops.

S 215-364
(10) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-365
(11) Put the L DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

S 215-366
(12) Make sure the ACMP C2 starts.

S 215-367
(13) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 215-368
(14) Make sure the SYS PRESS light for the left hydraulic system, on the hydraulic control panel, comes on at least three seconds after you put the L DEMAND HYD PUMPS ELEC switch in the OFF position.

S 215-369
(15) Make sure the PRESS light for the left ACMP, on the hydraulic control panel, comes on at least 7.5 seconds after you put the L DEMAND HYD PUMPS ELEC switch in the OFF position.

S 865-370
(16) Put the L DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-371
(17) Make sure the ACMP C2 stops.

S 215-372
(18) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-373
(19) Put the R DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, in the OFF position.

S 215-374
(20) Make sure the SYS PRESS light for the right system, on the hydraulic control panel, comes on at least three seconds after you put the R DEMAND HYD PUMPS ELEC switch in the OFF position.

S 215-375
(21) Make sure the PRESS light for the right ACMP, on the hydraulic control panel, comes on at least four seconds after you put the R DEMAND HYD PUMPS ELEC switch in the OFF position.

S 215-376
(22) Make sure the ACMP C2 starts.

S 215-377
(23) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-378
(24) Put the R DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, in the ON position.

S 215-379
(25) Make sure the PRESS light for the right system, on the hydraulic control panel, goes off.

S 215-380
(26) Make sure the ACMP C2 stops.

S 215-381
(27) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-382
(28) Put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.

S 215-383
(29) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, comes on.

S 215-384
(30) Make sure the ACMP C2 starts.

S 215-385
(31) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-386
(32) Put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.

S 215-387
(33) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, goes off.

S 215-388
(34) Make sure the ACMP C2 stops.

S 215-389
(35) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-390
(36) Put the L DEMAND HYD PUMPS ELEC switch, on the hydraulic control panel, in the off position.

S 215-391
(37) Make sure the PRESS light for the left ACMP, on the hydraulic control panel, comes on in 7.5 ±1 seconds.

S 215-392
(38) Make sure the ACMP C2 starts.

S 215-393
(39) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-394
(40) Put the left ENG START switch, on the P5 panel, in the GND position.

S 215-395
(41) Make sure the ACMP C2 stops.

S 215-396
(42) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-397
(43) Put the left ENG START switch, on the P5 panel, in the OFF position.

S 215-398
(44) Make sure the ACMP C2 starts.

S 215-399
(45) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-400
(46) Put the right ENG START switch, on the P5 panel, in the GND position.

S 215-401
(47) Make sure the ACMP C2 stops.

S 215-402
(48) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, comes on.

S 865-403
(49) Put the right ENG START switch, on the P5 panel, in the OFF position.

S 215-404
(50) Make sure the ACMP C2 starts.

S 215-405
(51) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

M. Prepare for the Test of the Air Driven Pump (ADP)

S 865-805
(1) Do these steps:

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.

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

NOTE: If the main gear doors are not closed during the ADP test, the ADP will operate continuously when the C DEMAND HYD PUMPS AIR switch is in the AUTO position.

S 865-012
(2) Make sure the control lever for the landing gear is in the DN position.

S 865-806
(3) Make sure the flap control lever, on the control stand panel, P10, is in the 0-unit (FLAPS UP) detent.

S 865-807
(4) Make sure the flaps and the slats are in the fully retracted position.

S 865-808
(5) Make sure the SPEEDBRAKE handle, on the control stand, is in the DOWN position.

S 865-809
(6) Make sure the speedbrakes are in the full down position.

N. Do a Test of the Air Driven Pump (ADP) in the ON or Continuous Mode

S 865-408
(1) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the ON position.

S 215-409
(2) Make sure the C HYD PRESS indication on the flight deck display is 2800 to 3200 psi.

S 215-410
(3) Make sure these lights on the hydraulic control panel are off:
(a) SYS PRESS light for the center system
(b) PRESS light for the ADP
(c) OVHT light for the ADP
(d) QTY light for the center system.

S 215-411
(4) Make sure these lights on the hydraulic control panel are on:
(a) PRESS light for the ACMP C1
(b) PRESS light for the ACMP C2.

S 215-412
(5) Make sure these EICAS messages show:
(a) C HYD PRIM 1
(b) C HYD PRIM 2

S 865-413
(6) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.

S 215-414
(7) Make sure these lights on the hydraulic control panel are on:
(a) SYS PRESS light for the center system
(b) PRESS light for the ADP.

S 215-415
(8) Make sure the C HYD SYS PRESS EICAS message shows.

O. Air Driven Pump (ADP) Overspeed Shutdown Test (Not to be confused with Speed Topping Shutdown Test).

S 865-B80
(1) Supply pneumatic pressure (AMM 36-00-00/201).

S 215-452
(2) Make sure these switches on the hydraulic control panel are in the OFF position:
(a) C PRIMARY HYD PUMPS ELEC 1
(b) C PRIMARY HYD PUMPS ELEC 2.

S 865-453
(3) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the ON position.

S 215-A29
(4) Make sure the C HYD PRESS indication on the EICAS display is 2800-3200 psi.

S 215-454
(5) Make sure these lights on the hydraulic control panel are off:
(a) PRESS light for the ADP
(b) SYS PRESS for the center system.

S 865-455
(6) Put the ADP TEST/RESET switch on the left miscellaneous equipment panel, P36, in the TEST position.

S 865-456
(7) Release the ADP TEST/RESET switch to the NORMAL position.

S 215-457
(8) Make sure the ADP stops and does not start again.

S 215-458
(9) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.

S 865-B81
(10) Make sure the C HYD DEM PUMP EICAS message shows.

S 865-459
(11) Put the ADP TEST/RESET switch in the RESET position.

S 865-460
(12) Release the ADP TEST/RESET switch to the NORMAL position.

S 215-461
(13) Make sure the ADP starts and continues to operate.

S 215-462
(14) Make sure the PRESS light for the ADP, on the hydraulic control panel, is off.

S 865-463
(15) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the AUTO position.

S 215-464
(16) Make sure the C HYD PRESS indication on the EICAS display is 2800-3200 psi.

S 865-465
(17) Put the ADP TEST/RESET switch in the TEST position.

S 865-466
(18) Release the ADP TEST/RESET switch to the NORMAL position.

S 215-467
(19) Make sure the ADP stops and does not start again.

S 215-468
(20) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.

S 865-469
(21) Put the ADP TEST/RESET switch in the RESET position.

S 865-470
(22) Release the ADP TEST/RESET switch to the NORMAL position.

S 215-471
(23) Make sure the ADP starts and operates continuously.

S 215-472
(24) Make sure the PRESS light for the ADP, on the hydraulic control panel, is off.

S 865-473
(25) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the OFF position.

P. Air Driven Pump (ADP) Speed Topping Shutdown Test (Not to be confused with the Overspeed Shutdown Test). (Fig. 501)

S 035-498
(1) Disconnect the electrical connector for the monopole sensor at the electrical receptacle box on the ADP modulating valve.

S 485-499
(2) Connect the signal generator to pins 1 and 3 on the electrical receptacle box for the ADP modulating valve.

S 865-500
(3) Set the signal generator at 4000 Hz and 1.0 volt zero to peak (and equipped with RMS voltmeter).

S 865-501
(4) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the ON position.

S 215-502
(5) Make sure these lights on the hydraulic control panel are off:
(a) SYS PRESS light for the center system
(b) PRESS light for the ADP.

S 865-503
(6) Slowly increase the frequency of the signal generator to 5000 Hz.

S 215-504
(7) Make sure the ADP stops at a frequency between 4400 and 5000 Hz.

S 215-505
(8) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.

S 865-506
(9) Slowly decrease the frequency of the signal generator to 4400 Hz.

S 215-507
(10) Make sure the ADP starts at a frequency between 4400 and 5000 Hz and continues to operate.

S 865-534
(11) Set the signal generator at 4000 Hz and 1.0 volt zero to peak (and equipped with RMS voltmeter).

S 865-533
(12) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 215-535
(13) Make sure these lights on the hydraulic control panel are off:
(a) SYS PRESS light for the center system
(b) PRESS light for the ADP.

S 865-536
(14) Slowly increase the frequency of the signal generator to 5000 Hz.

S 215-537
(15) Make sure the ADP stops at a frequency between 4400 and 5000 Hz.

S 215-538
(16) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.

S 865-539
(17) Slowly decrease the frequency of the signal generator to 4400 Hz.

S 215-540
(18) Make sure the ADP starts at a frequency between 4400 and 5000 Hz and continues to operate.

S 865-541
(19) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.

S 085-554
(20) Remove the signal generator from the electrical receptacle box for the ADP modulating valve.

S 435-555
(21) Install the electrical connector for the monopole sensor on the electrical receptacle box, on the ADP modulating valve.

Q. Do a Test of the Control Pressure Switch for the Air Driven Pump (ADP).

NOTE: This test simulates a low pressure condition to verify that the ADP starts when the center system pressure decreases and stops when the pressure is restored. You can use either a hydraulic service cart or the Primary Center No. 1 Alternating Current Motor Pump (C1 ACMP) to provide the system pressure during the test.

S 865-C54
(1) Do these steps to make the ADP operate in pressure demand mode:
(a) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11L24, HYDRAULIC ELEC PUMP CTR 2
(b) Put the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the ON position.

S 715-C64

(2) To do the test with center system pressure supplied from the C1 ACMP, do the following steps:
   (a) place the center hydraulic system wing and tail flight control shutoff valves in the OFF position.
   (b) Pressurize the center hydraulic system to 3000 psi by pressing the PRIMARY C1 - ELEC HYD PUMP switch to the ON position.
   (c) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.
   (d) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.
   (e) Make sure the ADP does not start.
   (f) Make sure the PRESS light for the ADP, on the hydraulic control panel, is off.
   (g) Put the PRIMARY C1 - ELEC HYD PUMP switch to the OFF position.
   (h) Make sure the ADP starts when the system pressure decreases to 1800 to 2000 psi.
   (i) Make sure the ADP operates for 15 ±2 seconds and then stops.
   (j) Make sure the ADP starts again when the pressure in the center hydraulic system decreases to 1800 to 2000 psi.
   (k) Pressurize the center hydraulic system to 3000 psi by pressing the PRIMARY C1 - ELEC HYD PUMP switch to the ON position.
   (l) Make sure the ADP stops in 15 ±2 seconds after the pressure in the center hydraulic system is more than 1800 to 2000 psi.
   (m) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.
   (n) Put the PRIMARY C1 - ELEC HYD PUMP switch to the OFF position .

   WARNING: OPENING OF FLIGHT CONTROL SHUTOFF VALVES TO THE "ON" POSITION CAN CAUSE MOVEMENT OF THE FLIGHT CONTROL SURFACES. TO PREVENT INJURY TO PERSONNEL, MAKE SURE CONTROL SURFACES ARE CLEAR.

   (o) Return the center system wing and tail flight control shutoff valves to the ON position.

S 715-C65

(3) To do the test with center system pressure supplied from a hydraulic service cart, do the following steps:

CAUTION: YOU MUST CONTINUOUSLY MONITOR THE RESERVOIR QUANTITY IN THE CENTER SYSTEM DURING THIS TEST TO MAKE SURE THE FLUID LEVEL STAYS WITHIN THE SERVICEABLE LIMITS. THE ADP AND THE HYDRAULIC SERVICE CART PRESSURIZE THE CENTER HYDRAULIC SYSTEM AT THE SAME TIME IN THIS TEST. THIS CAN CAUSE THE FLUID LEVEL IN THE CENTER HYDRAULIC SYSTEM TO BECOME TOO HIGH OR TOO LOW.

(a) Monitor the quantity of fluid in the reservoir of the center hydraulic system while the ADP and the hydraulic service cart pressurize the system at the same time.
(b) If the quantity becomes less than 0.5 or more than 1.1, do these steps:
    1) Stop the test.
    2) Add or drain fluid from the reservoir until the fluid level is at the center of the lower sight glass (AMM 12-12-01/301).
    3) Continue the test.
(c) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

NOTE: To keep the fluid movement between the airplane system and the hydraulic service cart to a minimum, do this test with pressure removed from the center reservoir.

(d) Open the access panel, 149BL, for the ground service connections in the center hydraulic system (AMM 06-41-00/201).
(e) Connect the pressure and return lines from the hydraulic service cart to the ground service connections for the center hydraulic system (AMM 29-11-00/201).
(f) Pressurize the center hydraulic system by slowly increasing the pressure of the hydraulic service cart to 3000 psi.
(g) Make sure the PRESS light for the ADP, on the hydraulic control panel, is on.
(h) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.
(i) Make sure the ADP does not start.
(j) Make sure the PRESS light for the ADP, on the hydraulic control panel, is off.
(k) Slowly decrease the pressure of the hydraulic service cart.
(l) Make sure the ADP starts when the system pressure decreases to 1800 to 2000 psi.
(m) Make sure the ADP operates for 15 ±2 seconds and then stops.
(n) If the movement of the fluid between the airplane system and the hydraulic service cart occurs too quickly to do this test, do these steps:
    1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

2) Disconnect the return line of the hydraulic service cart from the ground power connection of the center hydraulic system (AMM 29-11-00/201).
3) Install a cap on the return line of the hydraulic service cart.
4) Add fluid to the center system reservoir until the fluid level is at the center of the lower sight glass (AMM 12-12-01/301).

(o) Monitor the quantity of fluid in the reservoir of the center hydraulic system during the steps with the return line of the hydraulic service cart disconnected.
(p) If the quantity becomes less than 0.5 or more than 1.1, do these steps:
1) Stop the test.
2) Add or drain fluid from the reservoir until the fluid level is at the center of the lower sight glass (AMM 12-12-01/301).
3) Continue the test.
(q) Make sure the ADP starts again when the pressure in the center hydraulic system decreases to 1800 to 2000 psi.
(r) Slowly increase the pressure of the hydraulic service cart to 3000 psi.
(s) Make sure the ADP stops in 15 ±2 seconds after the pressure in the center hydraulic system is more than 1800 to 2000 psi.
(t) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.
(u) Decrease the pressure of the hydraulic service cart to zero.

S 865-C68

(4) Do these steps to complete the test:
(a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11L24, HYDRAULIC ELEC PUMP CTR 2
(b) Put the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, to the OFF position.

R. Do a Test of the Air Driven Pump (ADP) Operation with the Speed Brake Handle

S 865-618

(1) Make sure the speed brakes are in the full down position.

S 865-619

(2) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11C10, SLAT POS IND
(b) 11C15, FLAP SLAT ELEC UNIT 1 SENSOR
(c) 11C16, FLAP SLAT ELEC UNIT 1 CONT
(d) 11G15, FLAP SLAT ELEC UNIT 2 SENSOR
(e) 11G16, FLAP SLAT ELEC UNIT 2 CONT
(f) 11G22, FLAP SLAT ELEC UNIT 3 SENSOR
(g) 11G23, FLAP SLAT ELEC UNIT 3 CONT

S 865-620

(3) Pressurize the center hydraulic system with a service cart to 3000 psi.

S 865-621

(4) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 215-622

(5) Make sure the ADP does not start.

S 865-623

WARNING: MAKE SURE THE TOP WING SURFACE IS CLEAR OF ALL PERSONS AND EQUIPMENT BEFORE YOU OPERATE THE SPEEDBRAKES. THE MOVEMENT OF THE SPEEDBRAKES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Put the SPEEDBRAKE handle, on the control stand, in the UP position.

S 215-624

(7) Make sure the ADP starts and continues to operate.

S 865-625

WARNING: MAKE SURE THE TOP WING SURFACE IS CLEAR OF ALL PERSONS AND EQUIPMENT BEFORE YOU OPERATE THE SPEEDBRAKES. THE MOVEMENT OF THE SPEEDBRAKES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(8) Put the SPEEDBRAKE handle, on the control stand, in the DOWN position.

S 215-626
(9) Make sure the ADP stops.

S 215-627
(10) 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 ADP.

S. Do a Test of the Air Driven Pump (ADP) for the Landing Gear Disagree Operation

S 865-721
(1) Make sure the landing gear lever, on the pilot's center instrument panel, P3, is in the DOWN position.

S 865-722
(2) Pressurize the center hydraulic system with a hydraulic service cart or the ACMP C1 to 3000 psi (Ref 29-11-00/201).

S 865-723
(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11D31, HYDRAULIC AIR PUMP

S 865-724
(4) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 215-725
(5) Make sure the ADP starts and continues to operate.

S 485-726
(6) Remove the aluminum proximity-switch deactuator from the nose-gear down switch, S232, in the wheel well above the trunnion.

S 215-727
(7) Make sure the ADP stops.

S 865-728
(8) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.

T. Do a Test of the Air Driven Pump (ADP) for the Slat/Flap Disagree Operation

S 865-729

(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
   (a) 11C10, SLAT POS IND
   (b) 11C15, FLAP SLAT ELEC UNIT 1 SENSOR
   (c) 11C16, FLAP SLAT ELEC UNIT 1 CONT
   (d) 11G15, FLAP SLAT ELEC UNIT 2 SENSOR
   (e) 11G16, FLAP SLAT ELEC UNIT 2 CONT
   (f) 11G22, FLAP SLAT ELEC UNIT 3 SENSOR
   (g) 11G23, FLAP SLAT ELEC UNIT 3 CONT

S 865-730

(2) Make sure the flaps and slats are in the fully retracted position.

S 865-731

(3) Make sure the speed brakes are in the full down position.

S 865-732

(4) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 215-733

(5) Make sure the ADP does not start.

S 215-734

(6) Make sure the PRESS light for the ADP, on the hydraulic control panel, is off.

S 865-735

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE FLAPS AND SLATS BEFORE YOU MOVE THE FLAP CONTROL LEVER. THE MOVEMENT OF THE FLAPS AND SLATS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: MAKE SURE THE ACCESS DOOR FOR THE ENGINE STRUT, THE INBOARD FAN COWLING, AND THE THRUST REVERSER COWLING ARE CLEAR OF THE MOVEMENT OF THE SLATS. IF THE MOVEMENT OF THE SLATS IS BLOCKED, IT CAN CAUSE DAMAGE TO THE AIRPLANE.

(7) Move the flap control lever, on the P10 panel, to the 1-unit detent position.

S 215-736

(8) Make sure the ADP starts and continues to operate.

S 215-737
(9) Make sure the ADP stops when the slats stop.

S 865-738
(10) Move the flap control lever, on the P10 panel, in the 5-unit detent position.

S 215-739
(11) Make sure the ADP starts and continues to operate.

S 215-740
(12) Make sure the ADP stops when the flaps stop.

S 865-741
(13) Move the flap control lever, on the P10 panel, to the 0-unit (FLAPS UP) detent to retract the flaps.

S 865-742
(14) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position, after the flaps are in the fully retracted position.

S 215-743
(15) Make sure the SYS PRESS light for the center system, on the hydraulic control panel, is off.

S 865-744
(16) If you use the hydraulic service cart to pressurize the system, decrease the pressure of the cart to zero.

S 865-745
(17) If you use the ACMP C1 to pressurize the system, put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.

S 095-746
(18) If it is installed, disconnect the pressure and return lines of the hydraulic service cart from the ground power connections of the center hydraulic system (AMM 29-11-00/201).

S 415-747
(19) Close the access panel, 149BL, for the ground service connections in the center hydraulic system (AMM 06-41-00/201).

S 215-748
(20) Make sure the SYS PRESS light for the center system, on the hydraulic control panel, is on.

U. Do a Test of the Air Driven Pump (ADP) for the Continuous Operation in AUTO with the Two Alternating Current Motor Pumps (ACMPs) in the Center System Off

S 865-749
(1) Make sure this circuit breaker on the P11 panel is closed:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

S 865-750
(2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11l24, HYDRAULIC ELEC PUMP CENTER 2

S 865-751
(3) Put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the ON position.

S 215-752
(4) Make sure the ACMP C1 starts.

S 215-753
(5) Make sure the PRESS light for the ACMP C1, on the hydraulic control panel, goes off.

S 865-754
(6) Put the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, in the ON position.

S 215-755
(7) Make sure the ACMP C2 starts.

S 215-756
(8) Make sure the PRESS light for the ACMP C2, on the hydraulic control panel, goes off.

S 865-758
(9) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 215-759
(10) Make sure the ADP does not start.

S 865-760
(11) Put the C PRIMARY HYD PUMPS ELEC 1 switch, on the hydraulic control panel, in the OFF position.

S 215-761
(12) Make sure the ADP does not start.

S 865-762
(13) Put the C PRIMARY HYD PUMPS ELEC 2 switch, on the hydraulic control panel, in the OFF position.

S 215-763
(14) Make sure the ADP starts and continues to operate.

S 865-764
(15) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the OFF position.

S 215-765
(16) Make sure the ADP stops.

S 085-766
(17) Remove the steel proximity-switch actuators from these sensor switches:

Switch No.	Switch Name and Location
S234	Left Nose Door Closed Switch (In the Forward Nose Wheel Well)
S235	Right Nose Door Closed Switch (In the Forward Nose Wheel Well)
S238	Left Latch Locked Switch (In the Left Main Wheel Well on the Up Latch Mechanism)
S242	Right Latch Locked Switch (In the Right Main Wheel Well on the Up Latch Mechanism)

V. Do a Test of the Reservoir Pressurization System

S 015-867
(1) For the left hydraulic system, open the access panels 437BL and 437BR (AMM 06-43-00/201).

S 015-868
(2) For the right hydraulic system, open the access panels 447BL and 447BR (AMM 06-43-00/201).

S 865-876

(3) Remove the pressure from the pneumatic system (AMM 36-00-00/201).

S 495-873

WARNING: PUT A RAG AROUND THE AIR BLEED VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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 air bleed valve on the reservoir pressurization module to catch a spray of hydraulic fluid from the valve.

S 865-874

(5) Open the air bleed valve on the reservoir pressurization module to remove the pressure from the reservoir.

S 865-875

(6) Close the air bleed valve when you can not hear the flow of air from the air bleed valve.

S 865-877

(7) Pressurize the pneumatic system (AMM 36-00-00/201).

S 795-879

(8) Do a check for air leakage from the pneumatic tubes and the components between the duct of the environment control system and the reservoir.

NOTE: There must be no air leakage from these pneumatic tubes and components except from the orifice cap. The orifice cap constantly bleeds air from the pneumatic tube to remove moisture. The orifice cap is in the pneumatic tube between the duct of the environmental control system and the reservoir pressurization module.

S 865-878

(9) Remove the pressure from the pneumatic system (AMM 36-00-00/201).

S 495-881

WARNING: PUT A RAG AROUND THE AIR BLEED VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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.

(10) Put a rag around the air bleed valve on the reservoir pressurization module to catch a spray of hydraulic fluid from the valve.

S 865-882

(11) Open the air bleed valve on the reservoir pressurization module to remove the pressure from the reservoir.

S 755-884

(12) Make sure you can hear the air flow from the air bleed valve for a minimum of 60 to 70 seconds.

S 865-883

(13) Close the air bleed valve when you can not hear the flow of air from the air bleed valve.

S 035-885

(14) Remove the plug from the test port on the reservoir pressurization module.

S 495-886

(15) Connect the controlled air or nitrogen source to the test port on the reservoir pressurization module.

S 865-887
(16) Set the regulator on the air or nitrogen source to a maximum of 100 psi.

S 865-888
(17) Slowly pressurize the reservoir until the pressure relief valve on the reservoir opens.

S 215-889
(18) Make sure the pressure gage on the controlled air or nitrogen source shows 60 to 70 psi when the pressure relief valve opens.

S 865-890
(19) Decrease the pressure of the air or nitrogen source to zero.

S 495-893

WARNING: PUT A RAG AROUND THE AIR BLEED VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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.

(20) Put a rag around the air bleed valve on the reservoir pressurization module to catch a spray of hydraulic fluid from the valve.

S 865-894
(21) Open the air bleed valve on the reservoir pressurization module to remove the pressure from the reservoir and the supply line of the air or nitrogen source.

S 865-895
(22) Close the air bleed valve when you can not hear the flow of air from the air bleed valve.

S 095-891
(23) Remove the air or nitrogen source from the test port on the reservoir pressurization module.

S 035-892
(24) Install the plug in the test port on the reservoir pressurization module.

S 415-870
(25) For the left hydraulic system, close the access panels 437BL and 437BR (AMM 06-43-00/201).

S 415-C80
(26) For the right hydraulic system, close the access panels 447BL and 447BR (AMM 06-43-00/201).

W. Put the Airplane Back to Its Usual Condition

S 615-767
(1) Fill the reservoirs in each hydraulic system (AMM 12-12-01/301).

S 095-768

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.

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

S 865-769
(3) Remove the pneumatic power if it is not necessary (AMM 36-00-00/201).

S 865-770
(4) Remove the electrical power if it is not necessary (AMM 24-22-00/201).

S 445-771

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

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 Engine-Driven Pump (EDP), Alternating Current Motor Pump (ACMP), and Air-Driven Pump (ADP) and For the Return Filters in the Left, Right, and Center Hydraulic Systems.
      (3) Differential Pressure Indicators Inspection For the Case Drain Filters of the Engine-Driven Pump (EDP), Alternating Current Motor Pump (ACMP), and Air-Driven Pump (ADP) in the Left, Right, and Center Hydraulic Systems.
      (4) Hydraulic System External Leakage Check.
      (5) Hydraulic System Internal Leakage Check of Elevator and Rudder Power Control Actuators.
      (6) Hydraulic System Gross Internal Leakage Check.
      (7) Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage.

TASK 29-11-00-206-031

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 12-13-05/301, Air Driven Pump
      (4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (5) AMM 29-11-25/401, System L and R Reservoir Pressurization Module and Components
      (6) AMM 29-11-26/401, System C Reservoir Pressurization Module and Components
      (7) AMM 29-11-31/401, ADP Oil Filter and Screen
      (8) AMM 29-21-00/201, Ram Air Turbine (RAT) System
      (9) AMM 29-21-11/401, RAT Checkout Module and Components

(10) AMM 32-00-15/201, Landing Gear Door Locks
(11) AMM 32-00-20/201, Landing Gear Downlocks
(12) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

143/144	MLG Wheel Well
195	Wing to Body - Aft Upper Half (Left)
411/421	Engine
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

195RL/195SL	Air Driven Hydraulic Pump
437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

C. Examine the Main Hydraulic Systems

S 496-286
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 496-287

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 landing gear door locks (AMM 32-00-15/201).

S 016-033

WARNING: BE SURE THE FAN COWL PANELS ARE OPENED BEFORE YOU OPEN THE THRUST REVERSER. FAILURE TO DO THE PROCEDURE TO CLOSE THE THRUST REVERSERS (AMM 78-31-00/201) CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO THE THE CORE COWL PANELS AND THRUST REVERSER.

(3) Open the thrust reverser (AMM 78-31-00).

S 016-034
(4) Open the aft strut hydraulic access panels, 437BL, 437BR, 447BL, and 447BR (AMM 06-43-00/201).

S 016-035
(5) Open the air turbine driven hydraulic pump (ADP) access panels, 195RL and 195SL (AMM 06-41-00/201).

S 866-036
(6) Extend the ram air turbine (RAT) (AMM 29-21-00/201).

S 866-038
(7) Pressurize the hydraulic systems and reservoirs (AMM 29-11-00/201).

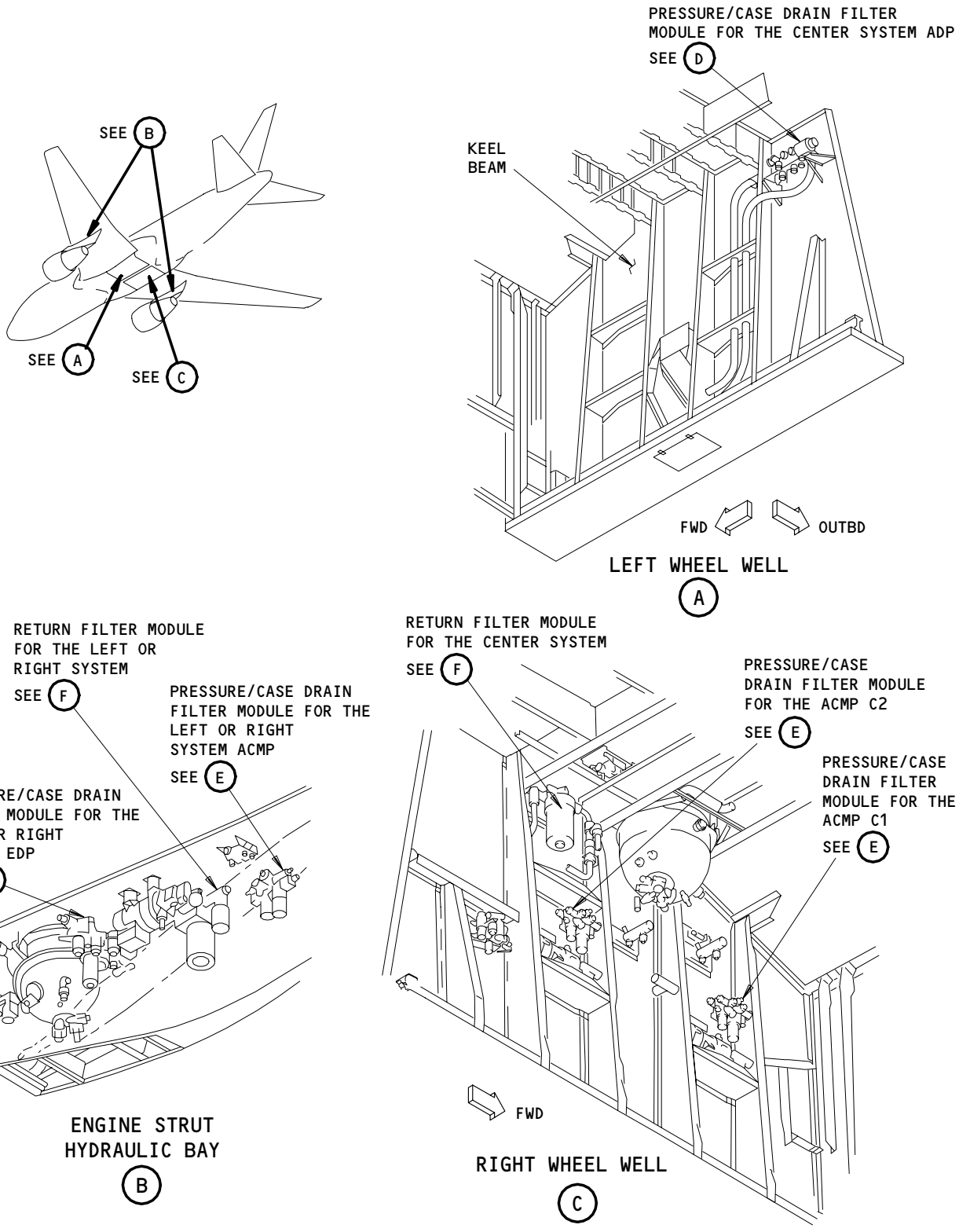
S 216-039
(8) Examine all hydraulic line connections, hydraulic fittings, and hydraulic components for signs of external leakage.

S 866-040
(9) Remove the pressure from the hydraulic systems and reservoirs (AMM 29-11-00/201).

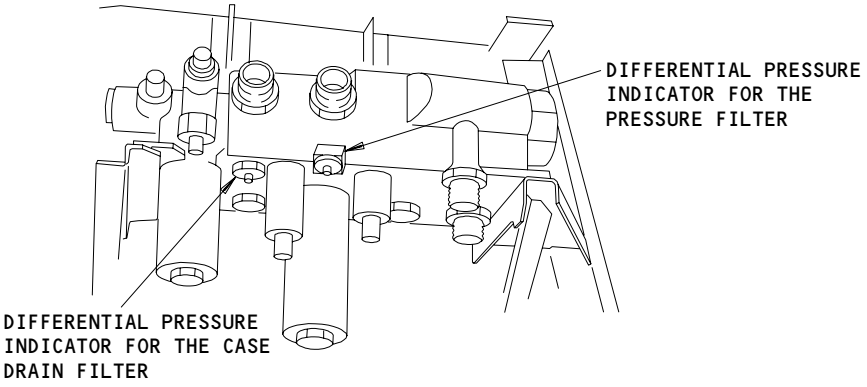
S 366-041
(10) Replace or repair the hydraulic components which leak or are damaged.

S 216-044
(11) Do these steps to examine the reservoir pressurization module filters.
  (a) Examine the filter element for a dirty condition.
  (b) If necessary, clean the left or right system filter (AMM 29-11-25/401).
  (c) If necessary, clean the center system filter (AMM 29-11-26/401).

S 216-045
(12) Do these steps to examine the ADP gearbox oil filter.
  (a) Make sure the red button on the differential pressure indicator on the ADP oil filter did not come out.
  (b) If the indicator button came out, replace the filter element and clean the oil screen (AMM 29-11-31/401).

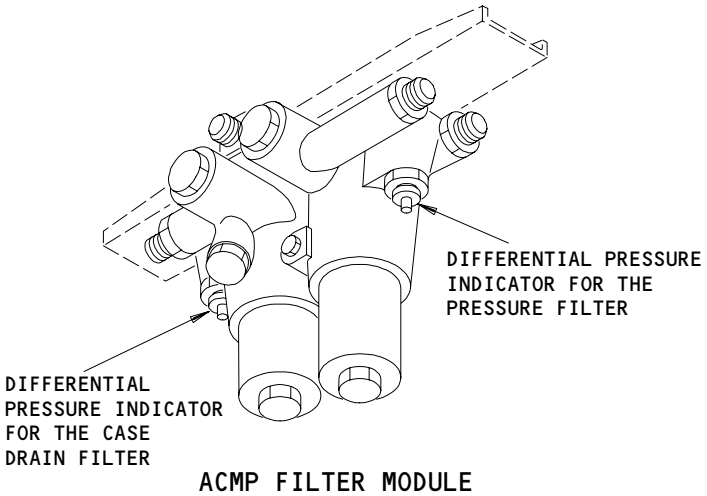


Differential Pressure Indicators on the Filter Modules
Figure 601 (Sheet 1)



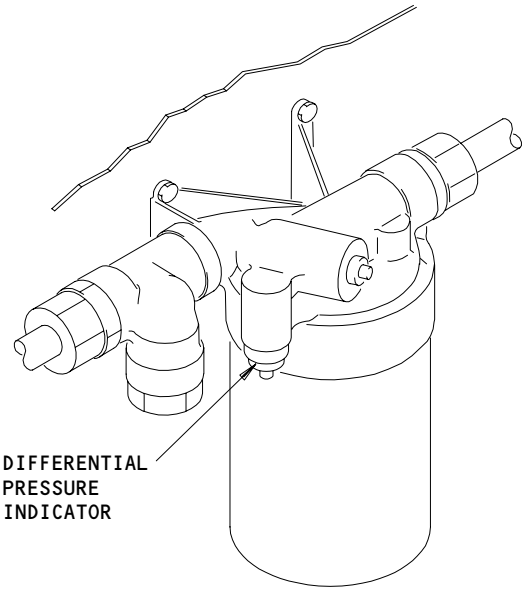
EDP OR ADP FILTER MODULE

(D)



ACMP FILTER MODULE
(EXAMPLE)

(E)



RETURN FILTER MODULE
(EXAMPLE)

(F)

Differential Pressure Indicators on the Filter Modules
Figure 601 (Sheet 2)

S 216-046
(13) Examine the oil level in the ADP gearbox and add oil, if necessary (AMM 12-13-05/301).

S 216-047
(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 many metal particles are found, replace the filter element (AMM 29-21-11/401).

S 866-048
(15) Retract the RAT (AMM 29-21-00/201).

S 416-049
(16) Close the ADP access panels, 195RL and 195SL (AMM 06-41-00/201).

S 416-050

WARNING: FAILURE TO DO THE PROCEDURE TO CLOSE THE THRUST REVERSER (AMM 78-31-00/201) CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO THE FAN COWL, CORE COWL, AND THRUST REVERSER.

(17) Close the thrust reverser (AMM 78-31-00/201).

S 416-051
(18) Close the aft strut hydraulic access panels, 437BL, 437BR, 447BL, and 447BR (AMM 06-43-00/201).

S 096-288

WARNING: USE THE PROCEDURE TO REMOVE THE DOOR LOCKS (AMM 32-00-15/201). THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

TASK 29-11-00-206-289

3. Differential Pressure Indicators Inspection For the Pressure Filters of the Engine-Driven Pump (EDP), Alternating Current Motor Pump (ACMP), and Air-Driven Pump (ADP) and For the Return Filters in the Left, Right, and Center Hydraulic Systems

A. References

(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 29-11-15/401, Left and Right System Return Filter Module and Components
(3) AMM 29-11-16/401, Center System Return Filter Module and Components
(4) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure/Case Drain Filter Module and Components
(5) AMM 29-11-18/401, Alternating Current Motor Pump (ACMP) Pressure/Case Drain Filter Module and Components
(6) AMM 29-11-19/401, Center System Air-Driven Pump (ADP) Pressure/Case Drain Filter Module and Components
(7) AMM 32-00-15/201, Landing Gear Door Locks
(8) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

(1) Location Zones

143/144	MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

C. Procedure

S 496-290

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

S 496-291

WARNING: USE THE PROCEDURE TO INSTALL THE DOOR LOCKS (AMM 32-00-15/201). THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 016-292
(3) For the left hydraulic system,
open the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 016-293
(4) For the right hydraulic system,
open the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 216-294
(5) Make sure the red indicator button did not come out on each differential pressure indicator.

S 866-295
(6) If the indicator button came out, replace the filter element and reset the indicator button as follows:
(a) EDP filter element (AMM 29-11-17/401).
(b) ACMP filter element (AMM 29-11-18/401)
(c) ADP filter element (AMM 29-11-19/401)
(d) Return filter in the left and right system (AMM 29-11-15/401)
(e) Return filter in the center system (AMM 29-11-16/401)

S 416-296
(7) For the left hydraulic system,
close the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 416-297
(8) For the right hydraulic system,
close the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 096-298

WARNING: USE THE PROCEDURE TO REMOVE THE DOOR LOCKS (AMM 32-00-15/201). THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) For the center hydraulic system,
remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

TASK 29-11-00-206-299

4. Differential Pressure Indicators Inspection For the Case Drain Filters of the Engine-Driven Pump (EDP), Alternating Current Motor Pump (ACMP), and Air-Driven Pump (ADP) in the Left, Right, and Center Hydraulic Systems

A. References

(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 29-11-01/401, Left and Right System Alternating Current Motor Pump (ACMP)
(3) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)
(4) AMM 29-11-03/401, Center System Air-Driven Pump (ADP)
(5) AMM 29-11-17/401, Left and Right System Engine-Driven Pump (EDP) Pressure/Case Drain Filter Module and Components
(6) AMM 29-11-18/401, Alternating Current Motor Pump (ACMP) Pressure/Case Drain Filter Module and Components
(7) AMM 29-11-19/401, Center System Air-Driven Pump (ADP) Pressure/Case Drain Filter Module and Components
(8) AMM 32-00-15/201, Landing Gear Door Locks
(9) AMM 32-00-20/201, Landing Gear Downlocks

B. Access

(1) Location Zones

143/144	MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

C. Prepare for Inspection

S 496-300

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

S 496-301

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

S 016-302
(3) For the left hydraulic system,
open the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 016-303
(4) For the right hydraulic system,
open the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

D. Inspect the Differential Pressure Indicator for the Case Drain Filter

S 216-418
(1) Examine the position of the red indicator button on the differential pressure indicator for each pump's case drain filter.

S 906-419
(2) If the red indicator button has extended out of the differential pressure indicator for a pump's case drain filter, do these steps:
(a) Remove the case drain filter element for the applicable pump:
1) EDP case drain filter element (AMM 29-11-17/401)
2) ACMP case drain filter element (AMM 29-11-18/401)
3) ADP case drain filter element (AMM 29-11-19/401)
(b) Examine the case drain filter element, filter bowl and the fluid in the filter bowl for metal contamination to determine if you also need to replace the applicable hydraulic pump.

NOTE: The criteria for determination of hydraulic pump replacement is in each pump's case drain filter element removal procedure (see previous step).

(c) Install a new serviceable case drain filter element for the applicable pump.
1) EDP case drain filter element (AMM 29-11-17/401)
2) ACMP case drain filter element (AMM 29-11-18/401)

3) ADP case drain filter element (AMM 29-11-19/401)

(d) Push the red indicator button to reset its position into the differential pressure indicator for the case drain filter.

E. Return the Airplane to Normal Configuration

S 416-308

(1) For the left hydraulic system, close the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 416-309

(2) For the right hydraulic system, close the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 096-310

WARNING: USE THE PROCEDURE TO REMOVE THE DOOR LOCKS (AMM 32-00-15/201). THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(3) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201)

TASK 29-11-00-796-053

5. 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. 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.

(2) The conditions which follow are important when you do a leakage check for the various components:

(a) The seal at the B-nut tube connections is made by metal-to-metal surfaces. If a leak can not be stopped when the B-nut is tightened to the correct torque, the joint is defective and must be repaired.

(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 is pressurized to make this decision.
(e) Fill all the reservoirs before the flight.
(f) 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.
(g) Large quantities of hydraulic fluid in the area of the leak must not cause damage to airplane equipment.

B. Do a Check of the Hydraulic System External Leakage (Table 601).

S 016-054
(1) Get access to the component which has a leak.

S 866-055
(2) Make sure the component is pressurized when you do a check of the leak rate.

S 866-056
(3) If possible, operate the component.

S 166-057
(4) Clean all surfaces of the component which has a leak.

S 796-058
(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.

Hydraulic System External Leakage Limits Table 601		
COMPONENTS	NORMAL OPERATION LIMITS *[1]	DISPATCH LIMITS TO AVOID DELAY *[2]
Engine Driven Pumps *[3]	5 Drops in a Minute	10 Drops in a Minute
All other Hydraulic Pumps *[3]	5 Drops in a Minute	20 Drops in a Minute
Hydraulic Motors	5 Drops in a Minute	20 Drops in a Minute
Dynamic Seals for Spoiler Actuators *[4]	8 Drops in a Minute (Stopped or in Operation)	30 Drops in a Minute (Stopped or in Operation)
Dynamic Seals for All Other Actuators (Including Swivel Glands) *[4] Except Brake Assemblies *[5]	8 Drops in a Minute (Stopped or in Operation)	60 Drops in a Minute (Stopped or in Operation)
Static Seals	1 Drop in 10 Minutes	2 Drops in 10 Minutes
B-Nuts, Tubing, Hoses	No leakage	No leakage
Landing Gear Brake Assemblies	No leakage	Refer to AMM 32-41-08/601 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 an hour. But, the total leakage from the components that are part of the Reserve Brakes and Steering System must not be more than 10 drops in a minute or 0.01 gallon in an 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 leaks 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. But, the total leakage from the components that are part of the Reserve Brakes and Steering System must not be more than 10 drops in a minute or 0.01 gallon in an hour.

*[3] Operate the pumps during the test. The center system ADP or ACMP C2 can be deactivated for dispatch as contained in the Minimum Equipment List (MEL) and the Dispatch Deviations Guide (DDG) procedures. The ABEX alternating current motor pump (ACMP) leakage must not be larger than the Static Seal leakage in Table 601.

*[4] If the leak is on an autopilot or yaw damper electrohydraulic servovalve, refer to the DDG Item 22-10-1 or DDG Item 22-21-1, respectively, if the leak is beyond limits.

*[5] These leakage limits do not apply to landing gear brake assemblies. Refer to AMM 32-41-08/601 for brake inspection details.

TASK 29-11-00-796-059

6. Hydraulic System Internal Leakage Check of Elevator and Rudder Power Control Actuators

A. General

(1) The leakage check procedure using the rudder actuator lock set calculates the sum of the leakages in the empennage with the rudder and elevator PCAs off null for each hydraulic system. The leakage rates must not be more than the approved leakage flow rates. If a system has more than the approved leakage flow rates, replace or repair components until the leakage is less than the approved limits. The sequence in which you do a test of the left, right, and center hydraulic systems is not important. When the leak check of a system is started, do not stop until the procedure is completed, to obtain correct results.

(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 powered components move.

(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 alternating current motor pumps (ACMP) to measure the hydraulic flow rate.
      2) A clamp-on ac current probe is installed around one wire at the ACMP ELCU in the P31 or P32 panel. The multimeter is then connected to the current probe to measure the current that flows in the wire to the pump motor. A graph shown in Fig. 607 changes the current 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. The flowmeter is installed in the pressure line between the pressure source and the pressure filter module (Fig 603A).
      2) If you use the flowmeter technique, write the flowmeter values as flow numbers and ignore the multimeter values specified in the procedure.

B. Equipment
   (1) This equipment is used with the multimeter technique:
      (a) Digital Multimeter - John Fluke Model 27 YEL, or equivalent
      (b) Clamp-on AC Current Probe - John Fluke Model 80i 600.

         NOTE: The ac current probe is used with the multimeter.

   (2) This equipment is used 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% of the indication, specified for operation at 3000 psi

(b) Hydraulic service cart - commercially available, with 15 micron absolute filter, which can supply 6 GPM at 3000 psi, with hydraulic fluid, fire resistant, BMS 3-11.

NOTE: The service cart is not necessary if the ACMP is used to pressurize the hydraulic system.

(3) Rudder Actuator Lock Set - A27003-23

NOTE: The rudder actuator lock set is used only in the left hydraulic system because the ratio changer, which is in series with the center rudder PCA, can not command the center rudder PCA control valve to an over travel position.

(4) 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 24-22-00/201, Electrical Power - Control
(5) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 32-00-20/201, Landing Gear Downlocks

D. Access

(1) Location Zones

119/120	Main Equipment Center
144	Right MLG Wheel Well
149	Aft Section of Keel Beam
211/212	Control Cabin
324	Vertical Stabilizer - Rear Spar to Trailing Edge
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

119AL	Main Equipment Center
149BL	Hydraulic Pressure/Return Ground Connections
324GL	Rudder PCA
324LL	Rudder Power Control Actuators
324JL	Rudder Power Control Actuators
437BR	Hydraulic System
447BR	Hydraulic System

E. Prepare for Internal Leakage Check

S 796-379

(1) Look at the nameplate on the ACMPs and make a record of the manufacturer.

NOTE: "Abex" pumps may have Abex, Parker or Parker/Abex on the nameplate. "Vickers" pumps may have Eaton or Eaton/Vickers on the nameplate.

S 866-060

(2) Make sure all hydraulic pump switches on the pilots' overhead panel, P5, are in the OFF position.

S 866-061

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

S 866-062

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

S 496-063

(5) Make sure the landing gear downlocks are installed (AMM 32-00-20/201).

S 496-064

(6) Put chocks on the main landing gear.

S 866-065
(7) Make sure the flaps and slats are fully retracted.

S 866-066
(8) Make sure the thrust reversers are retracted and the thrust reverser levers are in the retracted position.

S 866-005

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 HYDRAULIC SYSTEM HEAT EXCHANGERS ARE NOT COVERED WITH FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

(9) Before you pressurize the hydraulic systems with the ACMPs, make sure the left and right main fuel tanks each contain at least 600 gallons of fuel so that the heat exchangers in the fuel tanks do not become too hot.

NOTE: This minimum fuel requirement is not applicable when the hydraulic systems are pressurized with an external ground service cart.

S 866-067
(10) Make sure the brakes are released.

S 866-068
(11) Make sure the RESERVE BKS & STRG switch on the main instrument panel, P1, is in the OFF position and the amber VALVE light is off.

S 866-069
(12) Make sure the speedbrake handle on the control stand panel, P10, is in the DN position.

S 866-070
(13) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11C6, FLT CONT ELEC 1L AC
(b) 11C7, FLT CONT ELEC 1L DC
(c) 11C8, FLT CONT ELEC 2L AC

(d) 11C9, FLT CONT ELEC 2L DC
(e) 11G10, RUDDER RATIO
(f) 11G17, FLT CONT ELEC 1R AC
(g) 11G18, FLT CONT ELEC 1R DC
(h) 11G26, FLT CONT ELEC 2R AC
(i) 11G27, FLT CONT ELEC 2R DC
(j) 11H14, SLAT SHUTOFF
(k) 11J14, FLAP SHUTOFF
(l) EICAS (6 locations)

S 866-071
(14) Push the ELEC/HYD switch on the engine indicating and crew alerting system EICAS maintenance panel.

F. Left Hydraulic System Internal Leakage Check of Elevator and Rudder PCAs Using a Rudder Actuator Lock Set (Fig. 604)

NOTE: This procedure calculates the sum of the leakages in the empennage with the rudder and elevators off null. The off null leakage can change with the direction of surface movement.

S 016-072
(1) Open access panels 324LL, 324JL, and 324GL for the rudder PCAs (AMM 06-42-00/201).

S 416-316
(2) Install the locks on all three rudder power control actuators PCAs (Fig. 603) (AMM 27-21-02/201).

NOTE: You must use only PCA locks that have flanges at the two ends.

S 486-394
(3) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the left system ACMP ELCU M895 in the P32 panel.
3) Put the clamp-on ac current probe around one of the three wires which are connected to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 486-076

(4) If the flowmeter technique is used, do these steps:
(a) Remove the pressure from the left hydraulic system and reservoir (AMM 29-11-00/201).
(b) Open the aft strut hydraulic access panel, 437BR (AMM 06-43-00/201).
(c) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.
(d) If the hydraulic service cart will be used to pressurize the hydraulic system, then connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 866-312

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

CAUTION: PRESSURIZE ONLY THE LEFT HYDRAULIC SYSTEM WHILE THE RUDDER PCA LOCKS ARE INSTALLED TO DECREASE THE LOADS ON THE RUDDER PCA LOCKS.

(5) Pressurize the left hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the L HYD PUMP-ELEC pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the left system to 3000 psi.

S 866-078
(6) Put the YAW DAMPER L switch on the yaw damper control panel on overhead panel, P5, to the INOP position.

S 866-079
(7) Push the A/P DISENGAGE switch on the mode control panel on the center glareshield panel, P55.

S 866-080
(8) Put the WING FLT CONTROL SHUTOFF switch L on right side panel, P61, to OFF. Make sure the amber switch light is on.

S 866-081
(9) Make sure the TAIL FLT CONTROL SHUTOFF switch L on the P61 panel is ON.

S 866-082
(10) Put the LEFT STAB TRIM valve switch on the P10 panel to CUTOUT.

S 866-083
(11) Pull the control column fully aft.

S 976-084
(12) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-381
(13) For the flowmeter technique, write the flowmeter value as Flow No. 1.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 866-085
(14) Put the control column to the neutral position.

S 866-086
(15) Push the control column fully forward.

S 976-087
(16) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-382
(17) For the flowmeter technique, write the flowmeter value as Flow No. 2.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 866-088
(18) Put the control column to the neutral position.

S 866-089
(19) Open this circuit breaker on the P11 panel and attach DO-NOT-CLOSE tag:
(a) 11G10, RUDDER RATIO

S 866-090
(20) Put the TAIL FLT CONTROL SHUTOFF switch L on the P61 panel to OFF.

S 976-091
(21) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-383
(22) For the flowmeter technique, write the flowmeter value as Flow No. 3.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 976-092
(23) Calculate the empennage off null leakage for the elevators with the trailing edge down (Fig. 604, Step 1).

S 976-093

(24) Calculate the empennage off null leakage for the elevators with the trailing edge up (Fig. 604, Step 2).

NOTE: The calculated leakage is the sum of the leaks through these components:
- elevator feel unit
- rudder ratio changer actuator
- piston seals
- load relief valves
- anticavitation check valves of the elevator and rudder PCAs
- autopilot and yaw damper shutoff valves.

NOTE: A large negative value shows there are leaks through the tail flight control shutoff valves to the return line when they are closed. The location of the internal leak usually releases heat and/or flow noise when the elevators are off null.

S 816-094

(25) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
(a) Remove the pressure from the left hydraulic system and reservoir (AMM 29-11-00/201).
(b) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.
(c) Install a cap on the PCA pressure port.
(d) Do the left hydraulic system empennage off null leakage check again. This leakage value will be smaller than the leakage value which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.

S 866-397

(26) Remove the pressure from the hydraulic system:
(a) If the hydraulic system was pressurized with the ACMP, then put the L HYD PUMP-ELEC pump switch to the OFF position.
(b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-098

(27) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to remove the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P32 panel.

S 086-097
(28) If the flowmeter technique was used, do these steps:
(a) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.
(b) If the hydraulic system was pressurized with the cart, then disconnect the service cart and flowmeter and install the caps on the airplane ground power connections.
(c) Close the aft strut hydraulic access panel, 437BR (AMM 06-43-00/201).

S 866-099
(29) Put the YAW DAMPER L switch on the P5 panel to ON.

S 866-100
(30) Put the WING and TAIL FLT CONTROL SHUTOFF switches L on the P61 panel to ON.

S 866-101
(31) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11G10, RUDDER RATIO

S 866-102
(32) Put the LEFT STAB TRIM VALVE switch on the P10 panel to NORM.

S 096-103
(33) Remove the rudder lock set tool from all rudder PCAs (Fig. 603). (AMM 27-21-02/201).

S 416-104
(34) Install access panels 324LL, 324JL, and 324GL (AMM 06-42-00/201).

G. Center Hydraulic System Internal Leakage Check of Elevator and Rudder PCAs (Fig. 605)

NOTE: This procedure calculates the sum of the leakage in the empennage with the rudder and elevators off null. When you operate the rudder pedals, push at the pedal pivot points (The bottoms of the pedals) to prevent brake operation. The off null leakage can change with the direction of surface movement.

S 486-106

(1) If the flowmeter technique is used, do these steps:

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

(b) If the ACMP is used to pressurize the system, do these steps:

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

1) Open the right wheel well door and install the landing gear door lock (AMM 32-00-15/201).

2) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter module.

(c) If the hydraulic service cart is used, do these steps:

1) Open the access panel 149BL on the keel beam between the main wheel wells for access to the center system ground power connections (AMM 06-41-00/201).

2) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 486-107

(2) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the center system ACMP C1 ELCU M897 in the P31 panel.
3) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 866-395

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the center hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the C HYD PUMP-ELEC 1 pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the center system to 3000 psi.

S 866-108
(4) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-109
(5) Put the WING FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.

S 866-110
(6) Turn the control wheel fully left and then fully right through five cycles to bleed remaining pressure that is downstream of the shutoff valve.

S 216-011
(7) After you have bled the remaining pressure, make sure that the ailerons do not move when you move the control wheel.

S 866-111
(8) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to ON.

S 866-112
(9) Put the C STAB TRIM valve switch on the P10 panel to CUTOUT.

S 866-113
(10) Make sure the towing handle on the nose gear metering valve module is in the usual position. If necessary, put the nose landing gear wheels in the center position.

S 866-114
(11) Push the left rudder pedal fully forward and pull the control column fully aft and hold.

S 976-115
(12) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-384
(13) For the flowmeter technique, write the flowmeter value as Flow No. 1.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 866-116
(14) Put the rudder pedal and the control column to the neutral position.

S 866-117
(15) Push the right rudder pedal fully forward and push the control column fully forward and hold.

S 976-118
(16) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-385
(17) For the flowmeter technique, write the flowmeter value as Flow No. 2.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 866-119
(18) Put the rudder pedal and the control column to the neutral position.

S 866-120
(19) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.

S 866-121
(20) Move the control column forward and then aft to bleed remaining pressure that is downstream of the shutoff valve.

S 216-013
(21) After you have bled the pressure, make sure the elevators do not move while you move the control column.

S 976-122
(22) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

S 976-386
(23) For the flowmeter technique, write the flowmeter value as Flow No. 3.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

S 976-123
(24) Calculate the empennage off null down/right leakage (Fig. 605, Step 1).

S 976-283
(25) Calculate the empennage off null up/left leakage (Fig. 605, Step 2).

NOTE: The calculated leakages are the sum of the leakages through these components:
- elevator feel computer
- piston seals
- load relief and anticavitation check valves of the rudder and elevator PCAs
- autopilot and yaw damper shutoff valves.

NOTE: The location of the internal leak usually releases heat and/or flow noise when the tail flight control surfaces are off null. A large negative value shows that there are leaks through the tail flight control shutoff valves to the return line when they are closed.

S 816-124
(26) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate of more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
(a) Remove the pressure from the center hydraulic system and reservoirs (AMM 29-11-00/201).
(b) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.
(c) Install a cap on the PCA pressure port.
(d) Do the center hydraulic system empennage off null leakage check again. This leakage value will be smaller than the leakage value which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.

S 866-398
(27) Remove the pressure from the hydraulic system:
(a) If the hydraulic system was pressurized with the ACMP, then put the C HYD PUMP-ELEC 1 pump switch to the OFF position.
(b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-127
(28) If the flowmeter technique was used, do these steps:
(a) If the ACMP was used to pressurize the system, do these steps:
1) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK REMOVAL PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

2) Remove the landing gear door lock and close the right wheel well door (AMM 32-00-15/201).

(b) If the hydraulic service cart was used to pressurize the system, do these steps:

1) Disconnect the service cart and install the caps on the airplane ground power connections.
2) Close the access panel 149BL on the keel beam between the main wheel wells (AMM 06-41-00/201).

S 086-128

(29) If the multimeter technique was used, do these steps:

(a) Do these steps to remove the clamp-on ac current probe:

1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P31 panel.

S 866-129

(30) Put the YAW DAMPER R switch on the P5 panel to ON.

S 866-130

(31) Put the WING and TAIL FLIGHT CONTROL SHUTOFF switches C on the P61 panel to ON.

S 866-131

(32) Put the C STAB TRIM valve switch on the P10 panel to NORM.

H. Right Hydraulic System Internal Leakage Check of Elevator and Rudder PCAs

NOTE: This procedure calculates the sum of the leakages in the empennage with the rudders and elevators off null. When you operate the rudder pedals, push at the pedal pivot points (the bottoms of the pedals) to prevent brake operation. The off null leakage can change with the direction of surface movement.

S 486-133

(1) If the flowmeter technique is used, do these steps:

(a) Remove the pressure from the right hydraulic system and reservoir (AMM 29-11-00/201).
(b) Open the aft strut hydraulic access panel 447BR (AMM 06-43-00/201).
(c) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.

(d) If the hydraulic service cart will be used to pressurize the system, then connect the service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 486-134

(2) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the right system ACMP ELCU M896 in the P31 panel.
3) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 866-396

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the R HYD PUMP-ELEC pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the right system to 3000 psi.

S 866-135

(4) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-136

(5) Put the WING FLT CONTROL SHUTOFF switch R on the P61 panel to OFF.

S 866-137

(6) Turn the control wheel fully left and then fully right.

S 216-012

(7) Make sure the ailerons do not move.

S 866-138
(8) Make sure the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel is ON.

S 866-139
(9) Push the left rudder pedal fully forward and pull the control column fully aft and hold.

S 976-140
(10) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.

S 976-387
(11) For the flowneter technique, write the flowmeter value as Flow No. 1.

S 866-141
(12) Put the rudder pedals and the control column to the neutral position.

S 866-142
(13) Push the right rudder pedal fully forward and push the control column fully forward and hold.

S 976-143
(14) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.

S 976-389
(15) For the flowneter technique, write the flowmeter value as Flow No. 2.

S 866-144
(16) Put the rudder pedals and the control column to the neutral position.

S 866-145
(17) Put the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to OFF.

S 866-146
(18) Push one rudder pedal and then the other and make sure the rudder does not move.

S 976-147
(19) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.

S 976-392
(20) For the flowneter technique, write the flowmeter value as Flow No. 3.

S 976-148

(21) Calculate the empennage off null down/right leakage (Fig. 606, Step 1).

S 976-149

(22) Calculate the empennage off null up/left leakage (Fig. 606, Step 2).

NOTE: The calculated leakages are the sum of the leakages through these components:
- piston seals
- load relief and anticavitation check valves of the rudder and elevator PCAs
- autopilot servos and shutoff valves.

NOTE: A large negative value shows that there are leaks through the tail flight control valves to the return line when they are closed. The location of the internal leak usually releases heat and/or flow noise when the tail flight control surfaces are off null.

S 816-150

(23) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate of more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
(a) Remove the pressure from the right hydraulic system and reservoirs (AMM 29-11-00/201).
(b) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.
(c) Install a cap on the PCA pressure port.
(d) Do the right hydraulic system empennage off null leakage check again. This leakage value will be smaller than the leakage value which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.
(e) Push the A/P DISENGAGE Switch on the mode control panel, on the P55 panel, to return the A/P DISENGAGE switch to the normal position.

S 866-151

(24) Remove the pressure from the hydraulic system:
(a) If the hydraulic system was pressurized with the ACMP, then put the R HYD PUMP-ELEC pump switch to the OFF position.
(b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-153
(25) If the flowmeter technique was used, do these steps:
(a) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.
(b) If the hydraulic system was pressurized with the cart, then disconnect the hydraulic service cart and flowmeter and install the caps on the airplane ground power connections.
(c) Close the aft strut hydraulic access panel, 447BR (AMM 06-41-00/201).

S 086-154
(26) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to remove the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P31 panel.

S 866-155
(27) Put the WING and TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to ON.

S 866-284
(28) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 29-11-00-796-156
7. 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. If a system has more than the approved leakage flow rates replace or repair components until the leakage is less than the approved limits. The sequence in which you do a test of the left, center, and right hydraulic systems is not important. When the leak check of a system is started, do not stop until the procedure is completed, to get correct results.
(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 alternating current motor pumps (ACMP) to measure the hydraulic flow rate.

2) A clamp-on ac current probe is installed around one wire at the ACMP ELCU in the P31 or P32 panel. The multimeter is then connected to the current probe to measure the current that flows in the wire to the pump motor. A graph shown in Fig. 607 changes the current 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. The flowmeter is installed in the pressure line between the pressure source and the pressure filter module (Fig. 603A).

2) If you use the flowmeter technique, write the flowmeter values and ignore the multimeter values specified in the procedure steps.

B. Equipment

(1) This equipment is used with the multimeter technique:

(a) Digital Multimeter - John Fluke Model 27 YEL, or equivalent

(b) Clamp-on AC Current Probe - John Fluke Model 80i 600

NOTE: The ac current probe is used with the multimeter.

(2) This equipment is used 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% of the indication, specified for operation at 3000 psi

(b) Hydraulic service cart - commercially available, with 15 micron full filter, which can supply 6 GPM at 3000 psi, with hydraulic fluid, fire resistant, BMS 3-11.

NOTE: The service cart is not necessary if the ACMP is used 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 24-22-00/201, Electrical Power - Control
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks
(7) AMM 32-44-00/501, Parking Brake System
(8) AMM 34-21-00/201, Inertial Reference System

D. Access

(1) Location Zones

119/120	Main Equipment Center
144	Right MLG Wheel Well
149	Aft Section of Keel Beam
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

119AL	Main Equipment Center
149BL	Hydraulic Pressure/Return Ground Connections
437BR	Hydraulic System
447BR	Hydraulic System

E. Prepare for Gross Internal Leakage Check

S 796-380

(1) Look at the nameplate on the ACMPs and make a record of the manufacturer.

NOTE: "Abex" pumps may have Abex, Parker or Parker/Abex on the nameplate. "Vickers" pumps may have Eaton or Eaton/Vickers on the nameplate.

S 866-157

(2) Make sure all hydraulic pump switches on the pilots' overhead panel, P5, are in the OFF position.

S 866-158

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

S 866-159

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

S 496-160

(5) Make sure landing gear downlocks are installed (AMM 32-00-20/201).

S 496-161

(6) Put chocks on the main landing gear.

S 866-162

(7) Make sure the flaps and slats are fully retracted.

S 866-163

(8) Make sure the thrust reversers are retracted and the thrust reverser levers are in the retracted position.

S 866-015

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 HYDRAULIC SYSTEM HEAT EXCHANGERS ARE NOT COVERED WITH FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

(9) Make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-164

(10) Make sure the brakes are released.

S 866-165

(11) Make sure the RESERVE BKS & STRG switch on the main instrument panel, P1, is in the OFF position and the amber VALVE light is off.

S 866-166

(12) Make sure the speedbrake handle on the control stand panel, P10, is in the DN position.

S 866-167

(13) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 866-168

(14) Do the EICAS Message Display Procedure to show alert, status, and maintenance message lists (AMM 31-41-00/201).

NOTE: The above referenced procedure will provide instructions on how to show EICAS messages and hydraulic quantity, pressure and temperature on data on EICAS.

S 866-169

(15) Align the inertial reference system to permit the autopilot to be engaged during some leak check procedures (AMM 34-21-00/201).

S 866-170

(16) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6J8, RAM AIR TURBINE PWR

F. Left Hydraulic System Gross Internal Leakage Check

S 486-173

(1) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the left system ACMP ELCU M895 in the P32 panel.
3) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 486-172

(2) If the flowmeter technique is used, do these steps:
(a) Remove the pressure from the left hydraulic system and reservoir (AMM 29-11-00/201).
(b) Open the aft strut hydraulic access panel, 437BR (AMM 06-43-00/201).
(c) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.
(d) If the hydraulic service cart will be used to pressurize the hydraulic system, then connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 866-399

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the left hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the L HYD PUMP-ELEC pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the left system to 3000 psi.

S 866-174

(4) Put the LEFT STAB TRIM valve switch on the P10 panel to CUTOUT.

S 866-176

(5) Put the YAW DAMPER R switch on the P5 panel to ON.

S 866-177
(6) Put the WING and TAIL FLT CONTROL SHUTOFF switches L on the P61 panel to ON.

S 866-178
(7) Push the A/P ENGAGE L CMD switch on the mode control panel on the P55 panel.

S 866-179
(8) Put the LEFT STAB TRIM VALVE switch on the P10 panel to NORM.

S 866-181
(9) Make sure the left thrust reverser is retracted and the thrust reverser lever is in the retract position.

S 976-182
(10) For the multimeter technique, write the multimeter value and find the equivalent flow from figure 607.

NOTE: This multimeter value is eqivalent to the total left system leakage.

S 976-393
(11) For the flowmeter technique, write the flowmeter value.

NOTE: The flowmeter value is the total left system leakage.

S 866-184
(12) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-185
(13) Put the YAW DAMPER R switch on the P5 panel to OFF.

S 796-017
(14) If the total left system leakage is more than 4.5 GPM, do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 426-018
(15) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

S 796-019

(16) After the components are replaced, do the Left Hydraulic System Gross Internal Leakage Check again to make sure the leakage rate is less than 4.5 GPM.

S 866-400

(17) Remove the pressure from the hydraulic system:
  (a) If the hydraulic system was pressurized with the ACMP, then put the L HYD PUMP-ELEC pump switch to the OFF position.
  (b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-188

(18) If the flowmeter technique was used, do these steps:
  (a) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.
  (b) If the hydraulic system was pressurized with the cart, then disconnect the service cart and flowmeter and install the caps on the airplane ground power connections.
  (c) Close the aft strut hydraulic access panel, 437BR (AMM 06-43-00/201).

S 086-189

(19) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

  (a) Do these steps to remove the clamp-on ac current probe:
    1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
    2) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P32 panel.

G. Center Hydraulic System Gross Internal Leakage Check

S 486-191

(1) If the flowmeter technique is used, do these steps:
  (a) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).
  (b) If the ACMP is used to pressurize the system, do these steps:

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

1) Open the right wheel well door and install the landing gear door lock (AMM 32-00-15/201).
2) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter module.

(c) If the hydraulic service cart is used, do these steps:
1) Open the access panel 149BL on the keel beam between the main wheel wells for access to the center system ground power connections (AMM 06-41-00/201).
2) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 486-192

(2) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:
1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the center system ACMP ELCU M897 in the P31 panel.
3) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 866-401

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the center hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the C HYD PUMP-ELEC 1 pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the center system to 3000 psi.

S 866-193
(4) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-194
(5) Put the WING FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.

S 866-195
(6) Turn the control wheel fully left and then fully right.

S 866-020
(7) Make sure the ailerons do not move.

S 866-196
(8) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to ON.

S 866-198
(9) Put the C STAB TRIM valve switch on the P10 panel to CUT OUT.

S 866-199
(10) Make sure the towing handle on the nose gear metering valve module is in the bypass position. If necessary, put the nose gear wheels in the center position.

S 866-200
(11) Put the YAW DAMPER L switch on the P5 panel to ON.

S 866-201
(12) Put the WING FLIGHT CONTROL SHUTOFF switch C on the P61 panel to ON.

S 866-202
(13) Push the A/P ENGAGE C CMD switch on the mode control panel on the P55 panel.

S 866-203
(14) Put the C STAB TRIM valve switch on the P10 panel to NORM.

S 976-206
(15) For the multimeter technique, write the multimeter value and find the equivalent flow from figure 607.

NOTE: This multimeter value is eqivalent to the total center system leakage.

S 976-391
(16) For the flowmeter technique, write the flowmeter value.

NOTE: The flowmeter value is the total center system leakage.

S 866-208
(17) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-209
(18) Put the YAW DAMPER L switch to OFF on the P5 panel to OFF.

S 796-022
(19) If the total center system leakage is more than 4.5 GPM, do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 426-023
(20) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

S 796-024
(21) After the components are replaced, do the Center Hydraulic System Gross Internal Leakage Check again to make sure the leakage rate is less than 4.5 GPM.

S 866-402
(22) Remove the pressure from the hydraulic system:
(a) If the hydraulic system was pressurized with the ACMP, put the C HYD PUMPS-ELEC 1 pump switch to the OFF position.
(b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-212
(23) If the flowmeter technique was used, do these steps:
(a) If the ACMP was used to pressurize the system, do these steps:
1) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.

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.

2) Remove the landing gear door lock and close the right wheel door (AMM 32-00-15/201).

(b) If the hydraulic service cart was used to pressurize the system, do these steps:

1) Disconnect the service cart and install the caps on the airplane ground power connections.
2) Close access panel 149BL on the keel beam between the main wheel wells (AMM 06-41-00/201).

S 086-213

(24) If the multimeter technique was used, do these steps:

(a) Do these steps to remove the clamp-on ac current probe:

1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P31 panel.

H. Right Hydraulic System Gross Internal Leakage Check

S 486-215

(1) If the flowmeter technique is used, do these steps:

(a) Remove the pressure from the right hydraulic system and reservoir (AMM 29-11-00/201).
(b) Open the aft strut hydraulic access panel 447BR (AMM 06-43-00/201).
(c) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.
(d) If the hydraulic service cart will be used to pressurize the hydraulic system, then connect the service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

S 486-216

(2) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to install the multimeter and the clamp-on ac current probe:

1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
2) Get access to the right system ACMP ELCU M896 in the P31 panel.

3) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
4) Connect the multimeter to the clamp-on ac current probe.
5) If necessary, supply electrical power (AMM 24-22-00/201).

S 866-404

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(3) Pressurize the right hydraulic system:
(a) To pressurize the hydraulic system with the ACMP, put the R HYD PUMP-ELEC pump switch to the ON position.
(b) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the right system to 3000 psi.

S 866-218
(4) Put the WING and TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to ON.

S 866-219
(5) Push the A/P ENGAGE R CMD switch on the mode control panel on the P55 panel.

S 866-220
(6) Make sure the right thrust reverser is retracted and the thrust reverser lever on the pilots control stand is in the retract position.

S 976-221
(7) For the multimeter technique, write the multimeter value and find the equivalent flow from figure 607.

NOTE: This multimeter value is eqivalent to the total right system leakage.

S 976-390
(8) For the flowmeter technique, write the flowmeter value.

NOTE: The flowmeter value is the total right system leakage.

S 796-026
(9) If the total right system leakage is more than 4.5 GPM, do the Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage procedure.

S 426-027
(10) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

S 796-028
(11) After the components are replaced, do the Right Hydraulic System Gross Internal Leakage Check again to make sure the leakage rate is less than 4.5 GPM.

S 866-222
(12) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

S 866-405
(13) Remove the pressure from the hydraulic system:
(a) If the hydraulic system was pressurized with the ACMP, then put the R HYD PUMP-ELEC pump switch to the OFF position.
(b) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.

S 086-225

(14) If the flowmeter technique was used, do these steps:

(a) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.

(b) If the hydraulic system was pressurized with the cart, then disconnect the hydraulic service cart and install the caps on the airplane ground power connections.

(c) Close the aft strut hydraulic access panel, 447BR (AMM 06-43-00/201).

S 086-226

(15) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

(a) Do these steps to remove the clamp-on ac current probe:

1) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).

(b) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P31 panel.

S 866-227

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

S 866-228

(17) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:

(a) 6J8, RAM AIR TURBINE PWR

TASK 29-11-00-796-229

8. Full Hydraulic System Internal Leakage Check and Isolation of Components with High Leakage

A. General

(1) This procedure does an empennage leakage off null check and a total system leakage check and isolates components which have too much leakage. The sequence in which you do a test of the left, center, and right hydraulic systems is not important. When the leak check of a system is started, do not stop until the procedure is completed, to get correct results.

(2) The empennage off null leakage check calculates the total leakage in the empennage for each hydraulic system when the rudder and elevator power control actuators PCAs are off null. If a system has more than the approved leakage flow rate, replace or repair components until the leakage is less than the approved limits.

(3) The total system leakage check calculates the gross internal leakage for each hydraulic system. If a system has more than the approved leakage flow rate, replace or repair components until the leakage is less than the approved limits.

(4) If the gross internal leakage of a system is too high, the isolation procedures will find the components which have too much leakage. The isolation procedures consist of these:
   (a) Left System Relief, EDP Check, Shutoff, and Isolation Valves Leakage Check
   (b) Center System Relief, Pumps Check, Shutoff and Main Gear Selector Valve Leakage Check
   (c) Right System Relief Valve and EDP Check Valve Leakage Check
   (d) Center System Flaps/Slats Subsystem Leakage Check
   (e) Lateral Group Leakage Check
   (f) Tail Group Detail Check.

(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, make sure persons will not be injured or equipment will not be damaged when the powered components move.

(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 alternating current motor pumps (ACMP) to measure the hydraulic flow rate.
      2) A clamp-on ac current probe is installed around one wire at the ACMP ELCU in the P31 or P32 panel. The multimeter is then connected to the current probe to measure the current that flows in the wire to the pump motor. A graph shown in Fig. 607 changes the current 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. The flowmeter is installed in the pressure line between the pressure source and the pressure filter module (Fig. 603A).

2) If you use the flowmeter technique, write the flowmeter values as flow numbers and ignore the multimeter values specified in the procedure.

B. Equipment

(1) This equipment is used with the multimeter technique:

(a) Digital Multimeter - John Fluke Model 27 YEL, or equivalent

(b) Clamp-on AC Current Probe - John Fluke Model 80i 600.

NOTE: The ac current probe is used with the multimeter.

(2) This equipment is used 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% of the indication, specified for operation at 3000 psi

(b) Hydraulic Service Cart - commercially available with 15 micron full filter, which can supply 6 GPM at 3000 psi, with hydraulic fluid, fire resistant, BMS 3-11.

NOTE: The service cart is not necessary if the ACMP is used to pressurize the hydraulic system.

(3) Protractor - 1 each A27021-30 (from the A27021-29 kit) or 4MIT65B80307-1

(4) Control Wheel Adapter Equipment, A27021-98
(5) Rudder Actuator Lock Set - A27003-23

NOTE: The rudder actuator lock set is used only in the left hydraulic system internal leakage check.

(6) Mechanic's Stethoscope, GA 111 D, Snap-On-Tools Corporation, Kenosha, Wisconsin, or equivalent.

C. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 06-42-00/201, Empennage (Major Zone 300) Access Doors and Panels
(3) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(4) AMM 24-22-00/201, Electrical Power - Control
(5) AMM 27-09-00/201, Flight Control System Electronics Unit
(6) AMM 27-21-15/201, Rudder Ratio Changer Actuator
(7) AMM 27-51-48/201, Flap/Slat Shutoff Valve Module
(8) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(9) AMM 29-11-08/401, Isolated ACMP Pressure Shutoff Valve
(10) AMM 29-11-17/401, System L and R EDP Pressure/Case Drain Filter Module and Components
(11) AMM 29-11-18/401, ACMP Pressure/Case Drain Filter Module and Components
(12) AMM 29-11-19/401, System C ADP Pressure/Case Drain Filter Module and Components
(13) AMM 29-21-18/401, RAT Relief Valve
(14) AMM 32-00-15/201, Landing Gear Door Locks
(15) AMM 32-00-20/201, Landing Gear Downlocks
(16) AMM 32-44-00/501, Parking Brake System
(17) AMM 34-11-00/201, Pitot-Static System
(18) AMM 34-21-00/201, Inertial Reference System
(19) AMM 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones

119/120	Main Equipment Center
144	Right MLG Wheel Well
149	Aft Section of Keel Beam
211/212	Control Cabin
324	Vertical Stabilizer - Rear Spar to Trailing Edge
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

119AL	Main Equipment Center
149BL	Hydraulic Pressure/Return Ground Connections
324LL	Rudder Power Control Actuators
324JL	Rudder Power Control Actuators
437BR	Hydraulic System
447BR	Hydraulic System

E. Prepare for Internal Leakage Check

S 866-230
(1) Make sure all hydraulic pump switches on the pilots' overhead panel, P5, are in the OFF position.

S 866-231
(2) Supply electrical power (AMM 24-22-00/201).

S 866-232
(3) Make sure the persons on the ground can speak with those in the control cabin.

S 496-233
(4) Make sure the landing gear downlocks are installed (AMM 32-00-20/201).

S 496-234
(5) Put chocks on the main landing gear.

S 866-235
(6) Make sure the flaps and slats are fully retracted.

S 866-236
(7) Make sure the thrust reversers are retracted and the thrust reverser levers are in the retracted position.

S 866-030

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 HYDRAULIC SYSTEM HEAT EXCHANGERS ARE NOT COVERED WITH FUEL, THE HYDRAULIC FLUID CAN BECOME TOO HOT.

(8) Make sure the left and right main fuel tanks each contain at least 600 gallons of fuel.

S 866-237
(9) Make sure the brakes are released.

S 866-238
(10) Make sure the RESERVE BKS & STRG switch on the main instrument panel, P1, is in the OFF position and the amber VALVE light is off.

S 866-239
(11) Make sure the speedbrake handle on the P10 panel is in the DN position.

S 486-240
(12) Install the protractor on the control column.

NOTE: The control column protractor measures the control wheel positions. As an alternative to this protractor, the aileron trim indicator on top of the control column can measure control wheel positions. Five and one-half degrees of control wheel movement is equal to one unit on the aileron trim indicator.

S 866-241
(13) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) EICAS (6 locations)

S 866-242
(14) Push the ELEC/HYD switch on the engine indicating and crew alerting system (EICAS) maintenance panel.

S 866-243
(15) Align the inertial reference system to permit the autopilot to be engaged during some leak check procedures (AMM 34-21-00/201).

S 866-244
(16) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
(a) 6J8, RAM AIR TURBINE PWR

F. Left Hydraulic System Internal Leakage Check (Fig. 604)

S 866-245

(1) Prepare for the Internal Leakage Check

(a) Remove access panels 324LL and 324JL for the rudder PCAs (AMM 06-42-00/201).

(b) Install the rudder locks on all three rudder PCAs (Fig. 603).

NOTE: You must use only PCA locks that have flanges at the two ends.

(c) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to install the multimeter and the clamp-on ac current probe:

a) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).

b) Get access to the left system ACMP ELCU M895 in the P32 panel.

c) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.

d) Connect the multimeter to the clamp-on ac current probe.

(d) If the flowmeter technique is used, do these steps:

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

2) Open the aft strut hydraulic access panel, 437BR (AMM 06-43-00/201).

3) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the left system ACMP and the ACMP pressure/case drain filter module.

4) If the hydraulic service cart will be used to pressurize the system, then connect the service cart pressure and return lines to the left system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

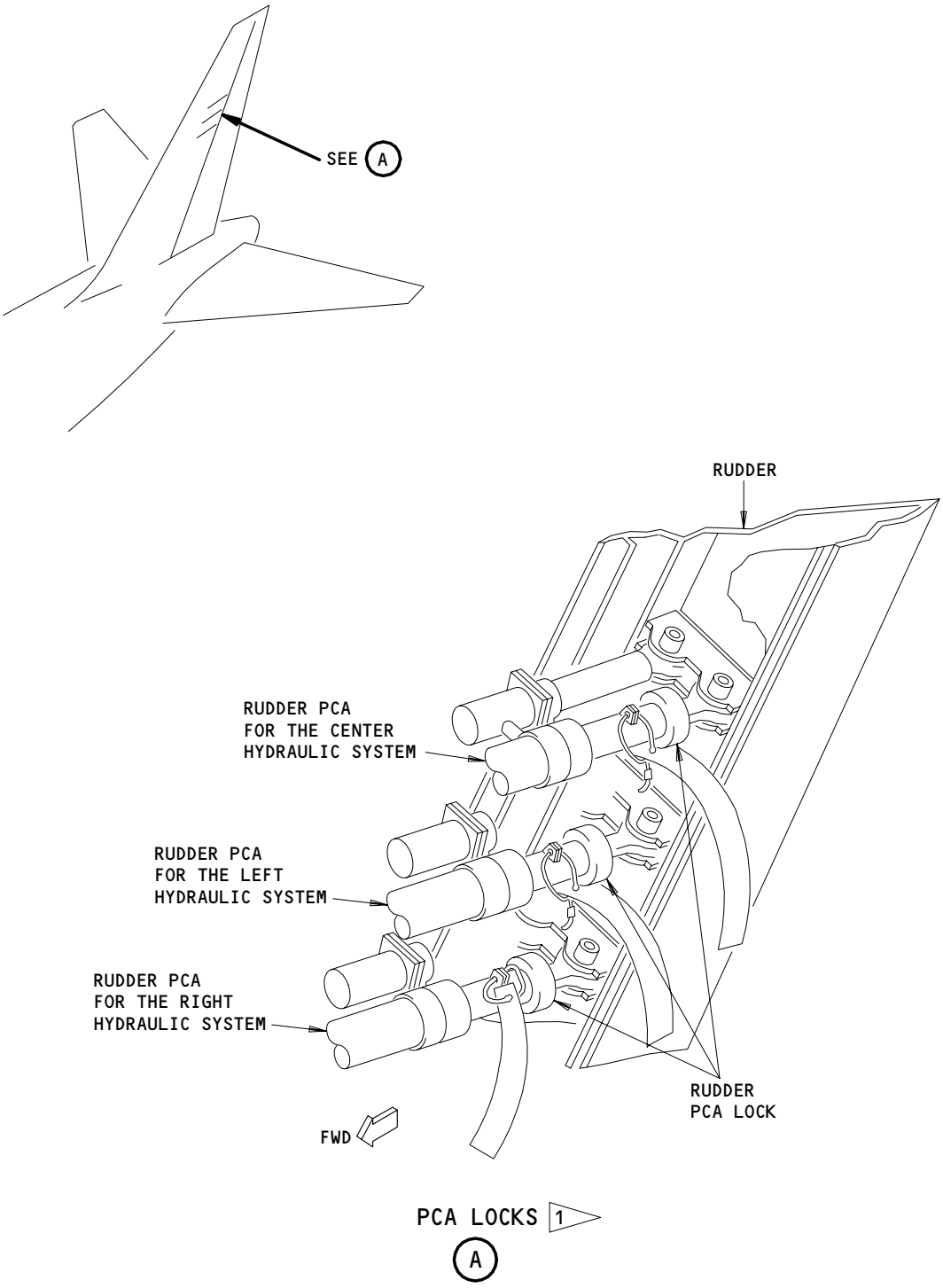
CAUTION: PRESSURIZE ONLY THE LEFT HYDRAULIC SYSTEM WHILE THE RUDDER PCA LOCKS ARE INSTALLED TO DECREASE THE LOADS ON THE RUDDER PCA LOCKS.

(e) Pressurize the left hydraulic system:
1) To pressurize the hydraulic system with the ACMP, put the L HYD PUMP-ELEC pump switch to the ON position.
2) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the left system to 3000 psi.

(f) Put the YAW DAMPER L switch on the yaw damper control panel on overhead panel, P5, to the INOP position.

(g) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

Not Used
Figure 602



1 YOU MUST USE PCA LOCKS THAT HAVE FLANGES AT THE TWO ENDS.

Lock Set for the Rudder Actuator
Figure 603

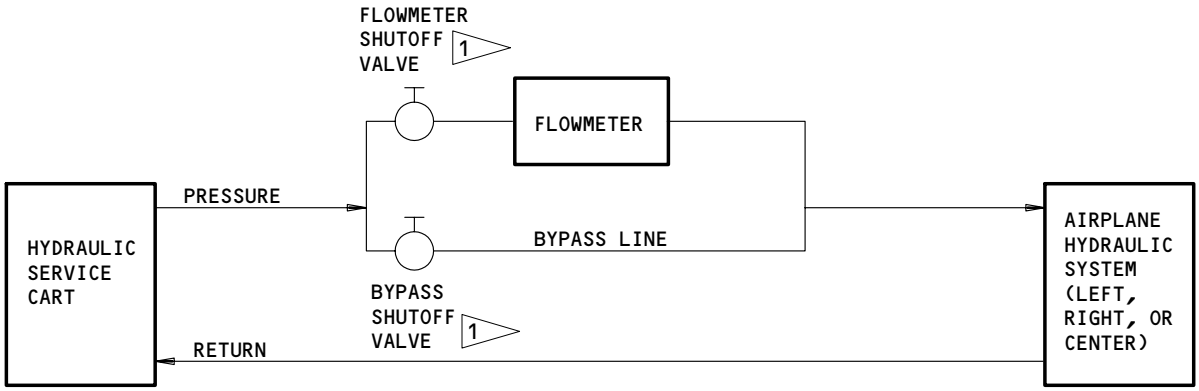
(h) Put the WING FLT CONTROL SHUTOFF switch L on right side panel, P61, to OFF. Make sure the amber switch light is on.
(i) Make sure the TAIL FLT CONTROL SHUTOFF switch L on the P61 panel is ON.
(j) Put the LEFT STAB TRIM valve switch to CUTOUT on the P10 panel to CUTOUT.
(k) Make sure the pitot static system is not pressurized.

S 976-246

(2) Empennage Leakage Off Null Check

NOTE: This procedure calculates the sum of the leakages in the empennage with the rudder and elevators off null. The off null leakage can change with the direction of surface movement.

(a) Pull the control column fully aft.
(b) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.



1 OPEN THE BYPASS SHUTOFF VALVE AND CLOSE THE FLOWMETER SHUTOFF VALVE WHEN THE FLIGHT CONTROL SURFACES ARE MOVED. THIS WILL PREVENT A FLOW THROUGH THE FLOWMETER WHICH IS MORE THAN ITS CAPACITY. OPEN THE FLOWMETER SHUTOFF VALVE AND CLOSE THE BYPASS SHUTOFF VALVE BEFORE YOU MEASURE A FLOW RATE

Hydraulic Flowmeter and Bypass Circuit
Figure 603A

(c) For the flowmeter technique, write the flowmeter value as Flow No. 1.
(d) Put the control column to the neutral position.
(e) Push the control column fully forward.
(f) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.
(g) For the flowmeter technique, write the flowmeter value as Flow No. 2.
(h) Put the control column to the neutral position.
(i) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11G10, RUDDER RATIO
(j) Put the TAIL FLT CONTROL SHUTOFF switch L on the P61 panel to OFF.
(k) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.
(l) For the flowmeter technique, write the flowmeter value as Flow No. 3.
(m) Calculate the empennage off null leakage for the elevators with the trailing edge down (Fig. 604, Step 1).
(n) Calculate the empennage off null leakage for the elevators with the trailing edge up (Fig. 604 Step 2).

NOTE: The calculated leakage is the sum of the leaks through these components:
- elevator feel unit actuator, elevator feel computer, and elevator feel shift module
- rudder ratio changer actuator
- piston seals
- load relief valves
- anticavitation check valves of the elevator and rudder PCAs
- autopilot and yaw damper shutoff valves.

NOTE: A large negative value shows there are leaks through the tail flight control shutoff valves to the return line when they are closed. The location of the internal leak usually releases heat and/or flow noise when the elevators are off null.

(o) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate of more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
1) Remove the pressure from the left hydraulic system and reservoir (AMM 29-11-00/201).
2) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.
3) Do the left hydraulic system empennage off null leakage check again. This leakage value will be smaller than the leakage value which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.

(p) Remove the rudder lock set tool from all rudder PCAs (Fig. 603).

(q) Install the access panels 324LL and 324JL (AMM 06-42-00/201).

S 976-247

(3) Total Left System Leakage Check
(a) Put the YAW DAMPER R switch on the P5 panel to ON.
(b) Put the WING and TAIL FLT CONTROL SHUTOFF switches L on the P61 panel to ON.
(c) Push the A/P ENGAGE L CMD switch on the mode control panel on the P55 panel.
(d) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11G10, RUDDER RATIO
(e) Put the LEFT STAB TRIM VALVE switch on the P10 panel to NORM.

(f) Make sure the left thrust reverser is retracted and the thrust reverser lever is in the retract position.
(g) For the multimeter technique, write the multimeter value as Value No. 4 and find the equivalent Flow No. 4 from figure 607.
(h) For the flowmeter technique, write the flowmeter value as Flow No. 4.

(i) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(j) Put the YAW DAMPER R switch to OFF on the P5 panel to OFF.
(k) Calculate the total left system leakage (Fig. 604, Step 3).
(l) If the total left system leakage is more than 4.5 GPM, do the left hydraulic system isolation procedures which follow.
(m) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

(n) After the components are replaced, do the Total Left System Leakage Check procedure again to make sure the leakage rate is less than 4.5 GPM.
(o) If the test is not to continue, do the Put the Left Hydraulic System Back to Its Usual Condition procedure.

S 976-313
(4) System Relief, Engine Driven Pump (EDP) Check, Shutoff, and Isolation Valves Leakage Check
(a) Make sure the left EDP pressure/case drain filter module is not hot.
(b) If the filter module is hot, do these steps:
1) Replace the EDP check valve or the left system relief valve on the filter module (AMM 29-11-17/401).
2) Do the Total Left System Leakage Check procedure again.
(c) Make sure the L ENG EDP select switch PRESS light is on.
(d) If the EDP PRESS light is not on, do these steps:
1) Remove the pressure from the left hydraulic system (AMM 29-11-00/201).
2) If the EDP PRESS light is not on, replace the EDP pressure switch on the left EDP pressure/case drain filter module (AMM 29-11-17/401).
3) If the EDP PRESS light is on, replace the EDP check valve on the left EDP pressure/case drain filter module (AMM 29-11-17/401).
4) Do the Total Left System Leakage Check procedure again.

(e) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11G10, RUDDER RATIO
(f) Put the WING and TAIL FLT CONTROL SHUTOFF switches L on the P61 panel to OFF.
(g) For the multimeter technique, write the multimeter value as Value No. 5 and find the equivalent Flow No. 5 from figure 607.

NOTE: Make sure the recorded multimeter value is the stabilized value, and not the transitional value.

(h) For the flowmeter technique, write the flowmeter value as Flow No. 5.

NOTE: Make sure the recorded flowmeter value is the stabilized value, and not the transitional value.

(i) Calculate the shutoff and isolation valve leakage (Fig. 604, Step 4).

NOTE: This flow is the leakage to the return line through the wing, tail, and stab trim shutoff valves, the thrust reverser isolation valve and the EDP pressure/case drain filter module.

(j) If the leakage is more than 1.0 GPM, replace the defective components and do the Total Left System Leakage Check procedure again.

S 976-248
(5) Lateral Group Leakage Check
(a) Put the WING FLT CONTROL SHUTOFF switch L on the P61 panel to ON.
(b) Put the LEFT STAB TRIM valve switch on the P10 panel to CUTOUT.
(c) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
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) 11G26, FLT CONT ELEC 2R AC
8) 11G27, FLT CONT ELEC 2R DC
(d) Put the control wheel to the neutral position.
(e) For the multimeter technique, write the multimeter value as Value No. 6 and find the equivalent Flow No. 6 from figure 607.

(f) For the flowmeter technique, write the flowmeter value as Flow No. 6.
(g) Turn the control wheel to 37 ±2 degrees counterclockwise (6 3/4 units of aileron trim).
(h) For the multimeter technique, write the multimeter value as Value No. 7 and find the equivalent Flow No. 7 from figure 607.
(i) For the flowmeter technique, write the flowmeter value as Flow No. 7.
(j) Calculate the left inboard aileron leakage (Fig. 604, Step 5).
(k) Turn the control wheel to 47 ±2 degrees counterclockwise (8 1/2 units of aileron trim).
(l) For the multimeter technique, write the multimeter value as Value No. 8 and find the equivalent Flow No. 8 from figure 607.
(m) For the flowmeter technique, write the flowmeter value as Flow No. 8.
(n) Calculate the right outboard aileron null leakage (Fig. 604, Step 6).
(o) Turn the control wheel to 55 ±2 degrees counterclockwise (10 units of aileron trim).
(p) For the multimeter technique, write the multimeter value as Value No. 9 and find the equivalent Flow No. 9 from figure 607.
(q) For the flowmeter technique, write the flowmeter value as Flow No. 9.
(r) Calculate the left outboard aileron null leakage (Fig. 604, Step 7).
(s) Turn the control wheel to the full counterclockwise position.
(t) For the multimeter technique, write the multimeter value as Value No. 10 and find the equivalent Flow No. 10 from fig. 607.
(u) For the flowmeter technique, write the flowmeter value as Flow No. 10.
(v) Calculate the lateral central control actuator null leakage with the left wing down (Fig. 604, Step 8).

NOTE: A large negative value shows there is leakage through the LCCA check and relief valves, and the piston seals.

(w) Turn the control wheel clockwise to 55 ±2 degrees (10 units of aileron trim).
(x) For the multimeter technique, write the multimeter value as Value No. 11 and find the equivalent Flow No. 11 from fig. 607.
(y) For the flowmeter technique, write the flowmeter value as Flow No. 11.
(z) Turn the control wheel to the full clockwise position.
(aa) For the multimeter technique, write the multimeter value as Value No. 12 and find the equivalent Flow No. 12 from fig. 607.
(ab) For the flowmeter technique, write the flowmeter value as Flow No. 12.

(ac) Calculate the lateral central control actuator null leakage with the right wing down (Fig. 604, Step 9).

NOTE: A large negative value shows there is leakage through the LCCA check and relief valves, and the piston seals.

(ad) Put the control wheel to the neutral position.
(ae) Remove the spoiler control module, 3R, to prevent the extension of spoiler No. 6 (AMM 27-09-00/201).
(af) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC
(ag) Turn the control wheel to the full clockwise position.
(ah) For the multimeter technique, write the multimeter value as Value No. 13 and find the equivalent Flow No. 13 from fig. 607.
(ai) For the flowmeter technique, write the flowmeter value as Flow No. 13.
(aj) Put the control wheel to the neutral position.
(ak) Calculate the spoiler No. 12 null leakage (Fig. 604, Step 10).
(al) Turn the control wheel to the full counterclockwise position.
(am) For the multimeter technique, write the multimeter value as Value No. 14 and find the equivalent Flow No. 14 from fig. 607.
(an) For the flowmeter technique, write the flowmeter value as Flow No. 14.
(ao) Put the control wheel to the neutral position.
(ap) Calculate the spoiler No. 1 null leakage (Fig. 604, Step 11).
(aq) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC
(ar) Install the spoiler control module, 3R, to let spoiler No. 6 extend (AMM 27-09-00/201).
(as) Remove the spoiler control module, 1R, to prevent the extension of spoilers No. 1 and 12 (AMM 27-09-00/201).
(at) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC
(au) Move the speedbrake lever on the P10 panel to extend spoiler No. 6 approximately one-half of full travel.
(av) For the multimeter technique, write the multimeter value as Value No. 15 and find the equivalent Flow No. 15 from fig. 607.

(aw) For the flowmeter technique, write the flowmeter value as Flow No. 15.
(ax) Move the speedbrake lever to the DOWN position.
(ay) Calculate the spoiler No. 6 null leakage (Fig. 604, Step 12).
(az) Remove the DO-NOT-CLOSE tags and open these circuit breakers on the P11 panel:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC
(ba) Push the A/P ENGAGE L CMD switch on the mode control panel on the P55 panel.
(bb) Put the control wheel to the neutral position.
(bc) For the multimeter technique, write the multimeter value as Value No. 16 and find the equivalent Flow No. 16 from fig. 607.
(bd) For the flowmeter technique, write the flowmeter value as Flow No. 16.
(be) Calculate the lateral autopilot leakage (Fig. 604, Step 13).

NOTE: A large negative value shows there is leakage in the lateral central control actuator servo valve.

(bf) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(bg) Install the spoiler control module 1R (AMM 27-09-00/201).
(bh) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
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) 11G26, FLT CONT ELEC 2R AC
8) 11G27, FLT CONT ELEC 2R DC
(bi) Move the speedbrake handle on the P10 panel to the UP position.
(bj) For the multimeter technique, write the multimeter value as Value No. 17 and find the equivalent Flow No. 17 from fig. 607.
(bk) For the flowmeter technique, write the flowmeter value as Flow No. 17.
(bl) Move the speedbrake handle to the DOWN position.
(bm) Calculate the sum of the leakages through the extension check and relief valve seals of spoilers No. 1, 6, and 12 (Fig. 604, Step 14).
(bn) Put the WING FLT CONTROL SHUTOFF switch L on the P61 panel to OFF.

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(6) Tail Group Detail Check
(a) Put the LEFT STAB TRIM valve switch on the P10 panel to NORM.
(b) Operate the control wheel stab trim switches to set the horizontal stabilizer in a TAKEOFF CG range of 2 to 8 units of trim.

(c) Make sure the stab trim lever is in the NORMAL detent position.
(d) Release the control wheel stab trim switches.
(e) For the multimeter technique, write the multimeter value as Value No. 18 and find the equivalent Flow No. 18 from fig. 607.
(f) For the flowmeter technique, write the flowmeter value as Flow No. 18.
(g) Put the LEFT STAB TRIM valve switch on the P10 panel to CUTOUT.
(h) For the multimeter technique, write the multimeter value as Value No. 19 and find the equivalent Flow No. 19 from fig. 607.
(i) For the flowmeter technique, write the flowmeter value as Flow No. 19.
(j) Calculate the stabilizer control module null leakage (Fig. 604, Step 15).

NOTE: A large negative value shows there is leakage in the stab trim control module shutoff valve.

(k) Put the TAIL FLT CONTROL SHUTOFF switch L on the P61 panel to ON.
(l) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11G10, RUDDER RATIO
(m) Put the LEFT STAB TRIM valve switch on the P10 panel to NORM.
(n) Operate the stab trim switches to set the horizontal stabilizer to full APL NOSE DN position.
(o) Release the control wheel stab trim switches.
(p) Pressurize the auxiliary pitot No. 1 system to 340 ±15 knots (AMM 34-11-00/201).

NOTE: The auxiliary pitot No. 1 system probe is the lower probe on the left side of the airplane.

(q) For the multimeter technique, write the multimeter value as Value No. 20 and find the equivalent Flow No. 20 from fig. 607.
(r) For the flowmeter technique, write the flowmeter value as Flow No. 20.
(s) Operate the control wheel wheel stab trim switches to set the horizontal stabilizer to the full APL NOSE UP position.
(t) Release the control wheel stab trim switches.
(u) For the multimeter technique, write the multimeter value as Value No. 21 and find the equivalent Flow No. 21 from fig. 607.

(v) For the flowmeter technique, write the flowmeter value as Flow No. 21.
(w) Calculate the elevator feel computer null leakage (Fig. 604, Step 16).

NOTE: A large negative value shows the elevator feel computer has high leakage for low pressure conditions.

(x) Decrease the auxiliary pitot No. 1 system pressure to zero.
(y) Set the horizontal stabilizer to a TAKEOFF CG range of 2 to 8 units of trim.
(z) Push the A/P ENGAGE L CMD switch on the mode control panel on the P55 panel.
(aa) Put the rudder pedals in the center position and put the control column in the neutral position.
(ab) Put the YAW DAMPER switch L on the yaw damper panel on the P5 panel to INOP.
(ac) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11G10, RUDDER RATIO
(ad) Put the LEFT STAB TRIM valve switch on the P10 panel to CUTOUT.
(ae) For the multimeter technique, write the multimeter value as Value No. 22 and find the equivalent Flow No. 22 from fig. 607.
(af) For the flowmeter technique, write the flowmeter value as Flow No. 22.
(ag) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(ah) For the multimeter technique, write the multimeter value as Value No. 23 and find the equivalent Flow No. 23 from fig. 607.
(ai) For the flowmeter technique, write the flowmeter value as Flow No. 23.
(aj) Calculate the sum of the leakages through the elevator and directional control autopilots (Fig. 604, Step 17).

NOTE: The location of the leakage will be hot and/or will have flow noise. A large negative value shows there is leakage in the shutoff valve of the elevator autopilot servo and/or directional control autopilot servo.

(ak) Put the YAW DAMPER switch L on the P5 panel to ON.
(al) For the multimeter technique, write the multimeter value as Value No. 24 and find the equivalent Flow No. 24 from fig. 607.
(am) For the flowmeter technique, write the flowmeter value as Flow No. 24.
(an) Calculate the yaw damper null leakage (Fig. 604, Step 18).

NOTE: A large negative value shows there is leakage in the yaw damper servo solenoid valve.

(ao) Put the YAW DAMPER switch L on the P5 panel to INOP.
(ap) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11G10, RUDDER RATIO
(aq) Make sure the RUDDER RATIO light on the P5 panel is off.
(ar) For the multimeter technique, write the multimeter value as Value No. 25 and find the equivalent Flow No. 25 from fig. 607.
(as) For the flowmeter technique, write the flowmeter value as Flow No. 25.
(at) Put the BITE test switch on the left rudder ratio changer module (RRCM) to the TEST position.
(au) Make sure the RUDDER RATIO light on the P5 panel is ON.
(av) For the multimeter technique, write the multimeter value as Value No. 26 and find the equivalent Flow No. 26 from fig. 607.
(aw) For the flowmeter technique, write the flowmeter value as Flow No. 26.
(ax) Calculate the rudder ratio changer actuator (RRCA) piston seal leakage (Fig. 604, Step 19).

NOTE: A large negative value shows the RRCA electro-hydraulic servo valve (EHSV) has high leakage.

(ay) If the RRCA EHSV has high leakage, then replace it (AMM 27-21-15/201).
(az) Put the BITE test switch on the left rudder ratio changer module to the NORM position.

(ba) Make sure the RUDDER RATIO light on the P5 panel is off.
(bb) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
1) 11G10, RUDDER RATIO
(bc) For the multimeter technique, write the multimeter value as Value No. 27 and find the equivalent Flow No. 27 from fig. 607.
(bd) For the flowmeter technique, write the flowmeter value as Flow No. 27.
(be) Calculate the rudder null leakage (Fig. 604, Step 20).
(bf) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
1) 11G10, RUDDER RATIO
(bg) Make sure the RUDDER RATIO light on the P5 panel is off.
(bh) Push the control column to the fully forward position.
(bi) For the multimeter technique, write the multimeter value as Value No. 28 and find the equivalent Flow No. 28 from fig. 607.
(bj) For the flowmeter technique, write the flowmeter value as Flow No. 28.
(bk) Pull the control wheel column to the fully aft position.
(bl) For the multimeter technique, write the multimeter value as Value No. 29 and find the equivalent Flow No. 29 from fig. 607.
(bm) For the flowmeter technique, write the flowmeter value as Flow No. 29.
(bn) Write the smaller of the two values 28 and 29 as Flow No. 30.
(bo) Calculate the sum of the two elevator null leakages (Fig. 604, Step 21).

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(7) Put the Left Hydraulic System Back to Its Usual Condition
(a) Remove the pressure from the hydraulic system:
1) If the hydraulic system was pressurized with the ACMP, then put the L HYD PUMP-ELEC pump switch to the OFF position.
2) If the hydraulic system was pressurized with the service cart, then operate the hydraulic service cart to decrease the pressure in the system to zero.
(b) If the flowmeter technique was used, do these steps:
1) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.

2) If the hydraulic system was pressurized with the cart, then disconnect the hydraulic service cart and flowmeter and install the caps on the airplane ground power connections.
3) Close the aft strut hydraulic access panel, 437BR, (AMM 06-43-00/201).

(c) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to remove the clamp-on ac current probe:
   a) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
   b) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P32 panel.

Write the Multimeter Value and the Flow Data:

Value No.	Flow No.	Value No.	Flow No.
1 _____	1 _____	16 _____	16 _____
2 _____	2 _____	17 _____	17 _____
3 _____	3 _____	18 _____	18 _____
4 _____	4 _____	19 _____	19 _____
5 _____	5 _____	20 _____	20 _____
6 _____	6 _____	21 _____	21 _____
7 _____	7 _____	22 _____	22 _____
8 _____	8 _____	23 _____	23 _____
9 _____	9 _____	24 _____	24 _____
10 _____	10 _____	25 _____	25 _____
11 _____	11 _____	26 _____	26 _____
12 _____	12 _____	27 _____	27 _____
13 _____	13 _____	28 _____	28 _____
14 _____	14 _____	29 _____	29 _____
15 _____	15 _____	30 _____	30 _____

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
1.	Empennage Off Null TE Down Leakage (Flow No. 2 _____) - (Flow No. 3 _____) =	_____	1.0 GPM
2.	Empennage Off Null TE Up Leakage (Flow No. 1 _____) - (Flow No. 3 _____) =	_____	1.0 GPM
3.	Total Left System Leakage Flow No. 4 =	_____	4.5 GPM 1
4.	System Relief, EDP Check, Shutoff and Isolation Valves Leakage Flow No. 5 =	_____	1.0 GPM

1 The 4.5 GPM gives an allowance which permits the leakage to increase before a subsequent check and not become more than the 6.0 GPM approved limit.

Left Hydraulic System Leakage Check
Figure 604 (Sheet 1)

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
5.	Left Inboard Aileron Null Leakage (Flow No. 6 _____) - (Flow No. 7 _____) =	_____	0.8 GPM
6.	Right Outboard Aileron Null Leakage (Flow No. 7 _____) - (Flow No. 8 _____) =	_____	0.66 GPM
7.	Left Outboard Aileron Null Leakage (Flow No. 8 _____) - (Flow No. 9 _____) =	_____	0.66 GPM
8.	Lateral Central Control Actuator Null Leakage, Left Wing Down (Flow No. 9 _____) - (Flow No. 10_____) =	_____	
9.	Lateral Central Control Actuator Null Leakage, Right Wing Down (Flow No. 11_____) - (Flow No. 12_____) =	_____	
10.	Spoiler No. 12 Null Leakage (Flow No. 13_____) - (Flow No. 12_____) =	_____	0.5 GPM
11.	Spoiler No. 1 Null Leakage (Flow No. 14_____) - (Flow No. 10_____) =	_____	0.5 GPM
12.	Spoiler No. 6 Null Leakage (Flow No. 15_____) - (Flow No. 6 _____) =	_____	0.5 GPM
13.	Lateral Autopilot Leakage (Flow No. 16_____) - (Flow No. 6 _____) =	_____	
14.	Extension Check and Relief Valve Seals Leakages of Spoilers No. 1, 6, and 12 (Flow No. 6 _____) - (Flow No. 17_____) =	_____	
15.	Stabilizer Control Module Null Leakage (Flow No. 18_____) - (Flow No. 19_____) =	_____	
16.	Elevator Feel Computer Null Leakage (Flow No. 20_____) - (Flow No. 21_____) =	_____	

Left Hydraulic System Leakage Check
Figure 604 (Sheet 2)

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
17.	Elevator and Differential Control Autopilots Leakage (Flow No. 22_____) - (Flow No. 23_____) = _____		
18.	Yaw Damper Null Leakage (Flow No. 24_____) - (Flow No. 23_____) = _____		
19.	Rudder Ratio Changer Actuator Piston Seal Leakage (Flow No. 25_____) - (Flow No. 26_____) = _____		
20.	Rudder Null Leakage (Flow No. 25_____) - (Flow No. 27_____) = _____		
21.	Sum of the Null Leakages for the two Elevators (Flow No. 25_____) - (Flow No. 30_____) = _____		

Left Hydraulic System Leakage Check
Figure 604 (Sheet 3)

G. Center Hydraulic System Internal Leakage Check (Fig. 605)

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(1) Prepare for the Internal Leakage Check

(a) If the flowmeter technique is used, do these steps:

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

2) If the ACMP will be used to pressurize the system, then do these steps:

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

a) Open the right wheel well door and install the door lock (AMM 32-00-15/201).

b) Install the flowmeter in the pressure line between the center system ACMP C1 and the ACMP C1 pressure/case drain filter module.

3) If the hydraulic service cart will be used to pressurize the system, then do these steps:

a) Open access panel 149BL on the keel beam between the main wheel wells for access to the center system ground power connections (AMM 06-41-00/201).

b) Connect the service cart pressure and return lines to the center system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

(b) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to install the multimeter and the clamp-on ac current probe:

2) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
   a) Get access to the center system ACMP C1 ELCU M897 in the P31 panel.
   b) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.
   c) Connect the multimeter to the clamp-on ac current probe.

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO PERSONNNEL OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the center hydraulic system:
   1) To pressurize the hydraulic system with the ACMP, Put the C HYD PUMP-ELEC 1 pump switch to the ON position.
   2) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the center system to 3000 psi.
(d) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(e) Put the WING FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.
(f) Turn the control wheel fully left and then fully right.
(g) Make sure the ailerons do not move.
(h) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to ON.

(i) Put the C STAB TRIM valve switch on the P10 panel to CUTOUT.
(j) Make sure the towing handle on the nose gear metering valve module is in the bypass position. If necessary, put the nose gear wheels in the center position.

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(2) Empennage Off Null Leakage Check

NOTE: This procedure calculates the sum of the leakage in the empennage with the rudder and elevators off null. When you operate the rudder pedals, push at the pedal pivot points (the bottoms of the pedals) to prevent brake operation. The off null leakage can change with the direction of surface movement.

(a) Push the left rudder pedal fully forward and pull the control column fully aft and hold.

(b) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.
(c) For the flowmeter technique, write the flowmeter value as Flow No. 1.
(d) Put the rudder pedal and the control column to the neutral position.
(e) Push the right rudder pedal fully forward and push the control column fully forward and hold.
(f) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.
(g) For the flowmeter technique, write the flowmeter value as Flow No. 2.
(h) Put the rudder pedal and the control column to the neutral position.
(i) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.
(j) To make sure the center hydraulic system shutoff valve is closed, move the control column forward and then aft. Make sure the elevators do not move.
(k) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.
(l) For the flowmeter technique, write the flowmeter value as Flow No. 3.
(m) Calculate the empennage off null down/right leakage (Fig. 605, Step 1).
(n) Calculate empennage off null up/left leakage (Fig. 605, Step 2).

NOTE: The calculated leakages are the sum of the leakages through these components:
- elevator feel computer and elevator feel unit actuator
- piston seals
- load relief and anticavitation check valves of the rudder and elevator PCAs
- autopilot and yaw damper shutoff valves.

NOTE: The location of the internal leak usually releases heat and/or flow noise when the tail flight control surfaces are off null. A large negative value shows that there are leaks through the tail flight control shutoff valves to the return line when they are closed.

(o) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
1) Remove the pressure from the center hydraulic system and reservoirs (AMM 29-11-00/201).
2) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.
3) Install a cap on the PCA pressure port.
4) Do the center hydraulic system empennage off null leakage check again. This leakage value will be smaller than the leakage which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.

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(3) Total Center System Leakage Check
(a) Put the YAW DAMPER L switch on the P5 panel to ON.
(b) Put the WING and TAIL FLIGHT CONTROL SHUTOFF switch C on the P61 panel to ON.
(c) Push the A/P ENGAGE C CMD switch on the mode control panel on the P55 panel.
(d) Put the C STAB TRIM valve switch on the P10 panel to NORM.
(e) Make sure the horizontal stabilizer is in the usual range for takeoff (2 to 8 units of trim on the stab trim indicator on the P10 panel).

(f) For the multimeter technique, write the multimeter value as Value No. 4 and find the equivalent Flow No. 4 from figure 607.
(g) For the flowmeter technique, write the flowmeter value as Flow No. 4.

(h) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.

(i) Put the YAW DAMPER L switch on the P5 panel to OFF.
(j) Calculate the total center system leakage (Fig. 605, Step 3).
(k) If the total center system leakage is more than 4.5 GPM, do the center hydraulic system isolation procedures which follow.
(l) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

(m) After the components are replaced, do the Total Center System Leakage Check procedure again to make sure the leakage rate is less than 4.5 GPM.
(n) If the test is not to continue, do the Put the Center Hydraulic System Back to Its Normal Condition procedure.

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(4) System Relief, Pumps Check, Shutoff and Main Gear Selector Valve Leakage Check

WARNING: REFER TO AMM 32-00-15/201 FOR THE LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

(a) Open the left and right wheel well doors and install the door locks (AMM 32-00-15/201).
(b) Make sure the air driven hydraulic pump (ADP) pressure/case drain filter module is not hot.
(c) If the filter module is hot, do these steps:
(d) Replace the ADP check valve or the center system relief valve on the filter module (AMM 29-11-19/401).
(e) Do the Total Center System Leakage Check procedure again.
(f) Make sure the amber AIR PRESS light (ADP) is on.

(g) If the AIR PRESS light (ADP) is not on, do these steps:
1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
2) If the AIR PRESS light (ADP) is not on, replace the ADP pressure switch on the ADP filter module (AMM 29-11-19/401).
3) If the AIR PRESS light (ADP) is on, replace the ADP check valve on the ADP filter module (AMM 29-11-19/401).
4) Do the Total Center System Leakage Check procedure again.

(h) Make sure the ram air turbine (RAT) relief valve in the right wheel well is not hot.

(i) If the RAT relief valve is hot, do these steps:
1) Replace the RAT relief valve (AMM 29-21-18/401).
2) Do the Total Center System Internal Leakage Check procedure again.

(j) Make sure the alternating current motor pump (ACMP) C2 pressure/case drain filter module is not hot.

(k) If the filter module is hot, do these steps:
1) Replace the check valve on the ACMP C2 filter module (AMM 29-11-18/401).
2) Do the Total Center System Leakage Check procedure again.

(l) Make sure the ACMP C2 select switch PRESS light is on.

(m) If the ACMP C2 select switch PRESS light is not on, do these steps:
1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
2) If the ACMP C2 PRESS light is not on, replace the pressure switch on the ACMP C2 filter module (AMM 29-11-18/401).
3) If the ACMP C2 PRESS light is on, replace the check valve on the ACMP C2 filter module (AMM 29-11-18/401).
4) Do the Total Center System Leakage Check procedure again.

(n) If the ACMP C1 is used to pressurize the center system for this test, do these steps:
1) Put the C HYD PUMPS - ELEC 2 pump switch to the ON position.

2) Put the C HYD PUMPS - ELEC 1 pump switch to the OFF position.
3) Let the ACMP C2 operate for 1 minute.

(o) Make sure the alternating current motor pump (ACMP) C1 pressure/case drain filter module is not hot.

(p) If the filter module is hot, do these steps:
1) Replace the check valve on the ACMP C1 filter module (AMM 29-11-18/401).
2) Do the Total Center System Leakage Check procedure again.

(q) Make sure the ACMP C1 select switch PRESS light is on.

(r) If the ACMP C1 select switch PRESS light is not on, do these steps:
1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
2) If the ACMP C1 PRESS light is not on, replace the pressure switch on the ACMP C1 filter module (AMM 29-11-18/401).
3) If the ACMP C1 PRESS light is on, replace the check valve on the ACMP C1 filter module (AMM 29-11-18/401).
4) Do the Total Center System Leakage Check procedure again.

(s) If the ACMP C1 is used to pressurize the center system for this test, do these steps:
1) Put the C HYD PUMPS - ELEC 1 pump switch on the P5 panel to the ON position.
2) Put the C HYD PUMPS - ELEC 2 pump switch on the P5 panel to the OFF position.

(t) Put the WING and TAIL FLT CONTROL SHUTOFF valves switches to the OFF position.

(u) For the multimeter technique, write the multimeter value as Value No. 5 and find the equivalent Flow No. 5 from figure 607.

(v) For the flowmeter technique, write the flowmeter value as Flow No. 5.

(w) Put the RESERVE BKS & STRG switch on the P1 panel to the ON position.

(x) For the multimeter technique, write the multimeter value as Value No. 6 and find the equivalent Flow No. 6 from figure 607.

(y) For the flowmeter technique, write the flowmeter value as Flow No. 6.

(z) Calculate the system relief and pump check valve leakage (Fig. 605, Step 4).

NOTE: The calculated leakage is the sum of the leakages through these center hydraulic system components:
- RAT relief valves
- ACMP C2 pump
- ADP check valves.

NOTE: This leakage includes the flow through the RAT which keeps it warm. Also, leakage to the system return line is possible through these components:
- main gear selector valve
- wing and tail shutoff valves
- flap and slat shutoff valves
- stab trim shutoff valves.

(aa) If the system relief and pump check valve leakage is more than 1.0 GPM, do these steps:
1) If the leakage is a large negative value, replace the isolated ACMP pressure shutoff valve (AMM 29-11-08/401).
2) Listen for flow noise and do a check for components which are hot to find components with high leakage.
3) Replace the components with high leakage and do the Total Center System Leakage Check procedure again.

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(5) Flaps/Slats Subsystem Leakage Check
(a) Put the RESERVE BKS & STEERING select switch on the P1 panel to OFF.
(b) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11H14, SLAT SHUTOFF

(c) For the multimeter technique, write the multimeter value as Value No. 7 and find the equivalent Flow No. 7 from figure 607.
(d) For the flowmeter technique, write the flowmeter value as Flow No. 7.
(e) Calculate the leading edge slat subsystem leakage (Fig. 605, Step 5).
(f) If the leading edge slat subsystem leakage is more than 1.0 GPM, replace the trailing edge flaps shutoff valve module (AMM 27-51-48/201).

NOTE: Listen for flow noise or do a check for components which are hot to find components with high leakage. Do this with the SLAT SHUTOFF circuit breaker open.

(g) Open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
1) 11J14, FLAP SHUTOFF
(h) For the multimeter technique, write the multimeter value as Value No. 8 and find the equivalent Flow No. 8 from figure 607.
(i) For the flowmeter technique, write the flowmeter value as Flow No. 8.
(j) Calculate the trailing edge flaps subsystem leakage (Fig. 605, Step 6).
(k) If the trailing edge flaps subsystem leakage is more than 1.0 GPM, replace the trailing edge flaps shutoff valve module (AMM 27-51-48/201).

NOTE: Listen for flow noise or do a check for components which are hot to find components with high leakage. Do this with the FLAP SHUTOFF circuit breaker open.

(l) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11H14, SLAT SHUTOFF
2) 11J14, FLAP SHUTOFF

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(6) Lateral Group Leakage Check

(a) Put the WING FLT CONT SHUTOFF switch C on the P61 panel to ON.

(b) Put the C HYD PUMPS - ELEC 1 and ELEC 2 pump switches to the ON position.

(c) Put the flap lever in the 30-unit detent and let the flaps and slats move to that position.

(d) Put the C HYD PUMPS - ELEC 2 pump switch to the OFF position.

(e) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

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) 11G26, FLT CONT ELEC 2R AC
8) 11G27, FLT CONT ELEC 2R DC

(f) Put the TAIL FLT CONT SHUTOFF switch C on the P61 panel to OFF.

(g) Make sure the control wheel is at the neutral position.

(h) For the multimeter technique, write the multimeter value as Value No. 9 and find the equivalent Flow No. 9 from figure 607.

(i) For the flowmeter technique, write the flowmeter value as Flow No. 9.

(j) Turn the control wheel to 30 ±5 degrees clockwise (5-1/2 units of aileron trim).

(k) For the multimeter technique, write the multimeter value as Value No. 10 and find the equivalent Flow No. 10 from fig. 607.

(l) For the flowmeter technique, write the flowmeter value as Flow No. 10.

(m) Put the control wheel to the neutral position.

(n) Calculate the left inboard aileron null leakage (Fig. 605, Step 7).

(o) Turn the control wheel to 30 ±5 degrees counterclockwise (5-1/2 units of aileron trim).

(p) For the multimeter technique, write the multimeter value as Value No. 11 and find the equivalent Flow No. 11 from fig. 607.

(q) For the flowmeter technique, write the flowmeter value as Flow No. 11.
(r) Put the control wheel to the neutral position.
(s) Calculate the right inboard aileron null leakage (Fig. 605, Step 8).
(t) Put the C HYD PUMPS - ELEC 2 pump switch to the ON position.
(u) Put the flap lever to the zero (FLAPS UP) detent and let the flaps and slats move to that position.
(v) Put the C HYD PUMPS - ELEC 2 pump switch to the OFF position.
(w) Turn the control wheel to the full counterclockwise position.
(x) For the multimeter technique, write the multimeter value as Value No. 12 and find the equivalent Flow No. 12 from fig. 607.
(y) For the flowmeter technique, write the flowmeter value as Flow No. 12.
(z) Turn the control wheel to the full clockwise position.
(aa) For the multimeter technique, write the multimeter value as Value No. 13 and find the equivalent Flow No. 13 from fig. 607.
(ab) For the flowmeter technique, write the flowmeter value as Flow No. 13.
(ac) Remove the spoiler control module 3L (AMM 27-09-00/201).
(ad) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11C6, FLT CONT ELEC 1L AC
2) 11C7, FLT CONT ELEC 1L DC
(ae) Turn the control wheel to the full counterclockwise position.
(af) For the multimeter technique, write the multimeter value as Value No. 14 and find the equivalent Flow No. 14 from fig. 607.
(ag) For the flowmeter technique, write the flowmeter value as Flow No. 14.
(ah) Put the control wheel to the neutral position.
(ai) Calculate the spoiler No. 3 null leakage (Fig. 605, Step 9).
(aj) Turn the control wheel to the full clockwise position.
(ak) For the multimeter technique, write the multimeter value as Value No. 15 and find the equivalent Flow No. 15 from fig. 607.
(al) For the flowmeter technique, write the flowmeter value as Flow No. 15.

(am) Put the control wheel to the neutral position.
(an) Calculate the spoiler No. 10 null leakage (Fig. 605, Step 10).
(ao) Put the speedbrake control lever to the UP position.
(ap) Make sure spoilers No. 3 and 10 are in the full position.
(aq) For the multimeter technique, write the multimeter value as Value No. 16 and find the equivalent Flow No. 16 from fig. 607.
(ar) For the flowmeter technique, write the flowmeter value as Flow No. 16.
(as) Put the speedbrake control lever to the DOWN position.
(at) Calculate the extension check and relief valve seals leakage for spoilers No. 3 and 10 (Fig. 605, Step 11).
(au) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11C6, FLT CONT ELEC 1L AC
2) 11C7, FLT CONT ELEC 1L DC
(av) Install the spoiler control module 3L (AMM 27-09-00/201).
(aw) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11C6, FLT CONT ELEC 1L AC
2) 11C7, FLT CONT ELEC 1L DC
(ax) Turn the control wheel to the full counterclockwise position and make sure spoilers No. 3 and 4 move.
(ay) For the multimeter technique, write the multimeter value as Value No. 17 and find the equivalent Flow No. 17 from fig. 607.
(az) For the flowmeter technique, write the flowmeter value as Flow No. 17.
(ba) Put the control wheel to the neutral position.
(bb) Calculate the spoiler No. 4 null leakage (Fig. 605, Step 12).
(bc) Turn the control wheel to the full clockwise position and make sure spoilers No. 9 and 10 move.
(bd) For the multimeter technique, write the multimeter value as Value No. 18 and find the equivalent Flow No. 18 from fig. 607.
(be) For the flowmeter technique, write the flowmeter value as Flow No. 18.
(bf) Put the control wheel to the neutral position.

(bg) Calculate the spoiler No. 9 null leakage (Fig. 605, Step 13).
(bh) Put the speedbrake control lever to the UP position and make sure spoilers No. 3, 4, 9 and 10 move to the full up position.
(bi) For the multimeter technique, write the multimeter value as Value No. 19 and find the equivalent Flow No. 19 from fig. 607.
(bj) For the flowmeter technique, write the flowmeter value as Flow No. 19.
(bk) Put the speedbrake control lever to the DOWN position.
(bl) Calculate the extension check and relief valve seals leakage for spoilers No. 4 and 9 (Fig. 605, Step 14).
(bm) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC
(bn) Turn the control wheel to the full counterclockwise position and make sure spoilers No. 3, 4 and 5 move.
(bo) For the multimeter technique, write the multimeter value as Value No. 20 and find the equivalent Flow No. 20 from fig. 607.
(bp) For the flowmeter technique, write the flowmeter value as Flow No. 20.
(bq) Put the control wheel to the neutral position.
(br) Calculate the spoiler No. 5 null leakage (Fig. 605, Step 15).
(bs) Turn the control wheel to the full clockwise position and make sure spoilers No. 8, 9 and 10 move.
(bt) For the multimeter technique, write the multimeter value as Value No. 21 and find the equivalent Flow No. 21 from fig. 607.
(bu) For the flowmeter technique, write the flowmeter value as Flow No. 21.
(bv) Calculate the spoiler No. 8 null leakage (Fig. 605, Step 16).
(bw) Put the speedbrake control lever to the UP position and make sure spoilers No. 3, 4, 5, 8, 9 and 10 move to the full up position.
(bx) For the multimeter technique, write the multimeter value as Value No. 22 and find the equivalent Flow No. 22 from fig. 607.
(by) For the flowmeter technique, write the flowmeter value as Flow No. 22.

(bz) Put the speedbrake control lever to the DOWN position.
(ca) Calculate the extension check and relief valve seals leakage for spoilers No. 5 and 8 (Fig. 605, Step 17).
(cb) Push the A/P ENGAGE C CMD switch on the mode control panel on the P55 panel.
(cc) Put the control wheel to the neutral position.
(cd) For the multimeter technique, write the multimeter value as Value No. 23 and find the equivalent Flow No. 23 from fig. 607.
(ce) For the flowmeter technique, write the flowmeter value as Flow No. 23.
(cf) Calculate the lateral autopilot leakage (Fig. 605, Step 18).

NOTE: A large negative value shows there is leakage in the center system wing flight control shutoff valve.

(cg) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
1) 11C6, FLT CONT ELEC 1L AC
2) 11C7, FLT CONT ELEC 1L DC
3) 11G26, FLT CONT ELEC 2R AC
4) 11G27, FLT CONT ELEC 2R DC
(ch) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(ci) Turn the control wheel counterclockwise to 55 ±2 degrees (10 units of aileron trim).
(cj) For the multimeter technique, write the multimeter value as Value No. 24 and find the equivalent Flow No. 24 from fig. 607.
(ck) For the flowmeter technique, write the flowmeter value as Flow No. 24.
(cl) Put the control wheel to the neutral position.
(cm) Calculate the lateral central control actuator (LCCA) null leakage, with the left wing down (Fig. 605, Step 19).

NOTE: A large negative value shows there is leakage through the LCCA check and relief valves, and the piston seals.

(cn) Turn the control wheel clockwise to 55 ±2 degrees (10 units of aileron trim).
(co) For the multimeter technique, write the multimeter value as Value No. 25 and find the equivalent Flow No. 25 from fig. 607.

(cp) For the flowmeter technique, write the flowmeter value as Flow No. 25.
(cq) Put the control wheel to the neutral position.
(cr) Calculate the lateral central control actuator null leakage, with the right wing down (Fig. 605, Step 20).

NOTE: A large negative value shows there is leakage through the LCCA check and relief valves and the piston seals.

(cs) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
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) 11G26, FLT CONT ELEC 2R AC
8) 11G27, FLT CONT ELEC 2R DC
(ct) Put the WING FLT CONTROL SHUTOFF switch C on the P61 panel to OFF.

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(7) Tail Group Detail Leakage Check
(a) Put the C STAB TRIM valve switch on the P10 panel to NORM.
(b) Operate the control wheel stab trim switches to set the horizontal stabilizer in a TAKEOFF CG range of 2 to 8 units of trim.
(c) Make sure the stab trim lever is in the NORMAL detent position.
(d) Release the control wheel stab trim switches.
(e) For the multimeter technique, write the multimeter value as Value No. 26 and find the equivalent Flow No. 26 from fig. 607.
(f) For the flowmeter technique, write the flowmeter value as Flow No. 26.
(g) Put the STAB TRIM valve switch on the P10 panel to CUTOUT.

(h) For the multimeter technique, write the multimeter value as Value No. 27 and find the equivalent Flow No. 27 from fig. 607.
(i) For the flowmeter technique, write the flowmeter value as Flow No. 27.
(j) Calculate the stabilizer trim control module null leakage (Fig. 605, Step 21).

NOTE: A large negative value shows there is leakage in the stab trim control module shutoff valve.

(k) Put the C STAB TRIM valve switch on the P10 panel to NORM.
(l) Put the TAIL FLT CONTROL SHUTOFF switch C on the P61 panel to ON.
(m) Operate the control wheel stab trim switches to put the horizontal stabilizer to the full APL NOSE DN position.
(n) Pressurize the auxiliary pitot No. 2 system to 340 ±15 knots (AMM 34-11-00/201).

NOTE: The auxiliary pitot No. 2 system probe is the lower probe on the right side of the airplane.

(o) For the multimeter technique, write the multimeter value as Value No. 28 and find the equivalent Flow No. 28 from fig. 607.
(p) For the flowmeter technique, write the flowmeter value as Flow No. 28.
(q) Operate the control wheel stab trim switches to put the horizontal stabilizer to the full APL NOSE UP position.
(r) For the multimeter technique, write the multimeter value as Value No. 29 and find the equivalent Flow No. 29 from fig. 607.
(s) For the flowmeter technique, write the flowmeter value as Flow No. 29.
(t) Calculate the elevator feel null leakage (Fig. 605, Step 22).

NOTE: A large negative value shows the elevator feel computer has high leakage for low pressure conditions.

(u) Set the horizontal stabilizer to a TAKEOFF CG range of 2 to 8 units of trim.
(v) Push the A/P ENGAGE C CMD switch on the mode control panel on the P55 panel.
(w) Make sure the rudder pedals and the control column are in the neutral positions.
(x) Put the YAW DAMPER switch R on the P5 panel to INOP.
(y) Put the C STAB TRIM valve switch on the P10 panel to CUTOUT.
(z) For the multimeter technique, write the multimeter value as Value No. 30 and find the equivalent Flow No. 30 from fig. 607.
(aa) For the flowmeter technique, write the flowmeter value as Flow No. 30.
(ab) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(ac) For the multimeter technique, write the multimeter value as Value No. 31 and find the equivalent Flow No. 31 from fig. 607.
(ad) For the flowmeter technique, write the flowmeter value as Flow No. 31.
(ae) Calculate the elevator and directional control autopilot engagement leakage (Fig. 605, Step 23).

NOTE: The location of the leakage will be hot and/or will have flow noise. A large negative value shows there is leakage in the center hydraulic system tail flight control shutoff valve.

(af) Put the YAW DAMPER switch R on the P5 panel to ON.
(ag) For the multimeter technique, write the multimeter value as Value No. 32 and find the equivalent Flow No. 32 from fig. 607.
(ah) For the flowmeter technique, write the flowmeter value as Flow No. 32.
(ai) Put the YAW DAMPER switch R on the P5 panel to INOP.
(aj) For the multimeter technique, write the multimeter value as Value No. 33 and find the equivalent Flow No. 33 from fig. 607.

(ak) For the flowmeter technique, write the flowmeter value as Flow No. 33.
(al) Calculate the yaw damper null leakage (Fig. 605, Step 24).

NOTE: A large negative value shows there is leakage in the yaw damper servo solenoid valve.

(am) Push the left rudder pedal fully forward.
(an) For the multimeter technique, write the multimeter value as Value No. 34 and find the equivalent Flow No. 34 from fig. 607.
(ao) For the flowmeter technique, write the flowmeter value as Flow No. 34.
(ap) Put the rudder pedals to the neutral position.
(aq) Calculate the rudder null leakage (Fig. 605, Step 25).
(ar) Push the control column fully forward.
(as) For the multimeter technique, write the multimeter value as Value No. 35 and find the equivalent Flow No. 35 from fig. 607.
(at) For the flowmeter technique, write the flowmeter value as Flow No. 35.
(au) Put the control column to the neutral position.
(av) Pull the control column fully aft.
(aw) For the multimeter technique, write the multimeter value as Value No. 36 and find the equivalent Flow No. 36 from fig. 607.
(ax) For the flowmeter technique, write the flowmeter value as Flow No. 36.
(ay) Put the control column to the neutral position.
(az) Write the smaller of the two values 35 and 36 as Flow No. 37.
(ba) Calculate the elevators null leakage (Fig. 605, Step 26).

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(8) Put the Center Hydraulic System Back to Its Usual Condition
(a) Remove the pressure from the hydraulic system:
1) If the hydraulic system was pressurized with the ACMP, put the C HYD PUMP-ELEC 1 pump switch to the OFF position.
2) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero
(b) If the flowmeter technique was used, do these steps:
1) If the ACMP was used to pressurize the system, do these steps:
a) Remove the flowmeter from the ACMP pressure line and connect the ACMP pressure line.

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.

b) Remove the door lock and close the right wheel well door (AMM 32-00-15/201).

2) If the hydraulic service cart was used to pressurize the system, do these steps:
   a) Disconnect the service cart and install the caps on the airplane ground power connections.
   b) Close access panel 149BL on the keel beam between the main wheel wells (AMM 06-41-00/201).

(c) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to remove the clamp-on ac current probe:
   a) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
   b) Remove the clamp-on ac current probe from the wire at the ACMP ELCU and close up the P31 panel.

Write the Multimeter Value and Flow Data:

Value No.	Flow No.	Value No.	Flow No.
1 _____	1 _____	21 _____	21 _____
2 _____	2 _____	22 _____	22 _____
3 _____	3 _____	23 _____	23 _____
4 _____	4 _____	24 _____	24 _____
5 _____	5 _____	25 _____	25 _____
6 _____	6 _____	26 _____	26 _____
7 _____	7 _____	27 _____	27 _____
8 _____	8 _____	28 _____	28 _____
9 _____	9 _____	29 _____	29 _____
10 _____	10 _____	30 _____	30 _____
11 _____	11 _____	31 _____	31 _____
12 _____	12 _____	32 _____	32 _____
13 _____	13 _____	33 _____	33 _____
14 _____	14 _____	34 _____	34 _____
15 _____	15 _____	35 _____	35 _____
16 _____	16 _____	36 _____	36 _____
17 _____	17 _____	37 _____	37 _____
18 _____	18 _____		
19 _____	19 _____		
20 _____	20 _____		

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
1.	Empennage Off Null Dn/Right Leakage (Flow No. 2 _____) - (Flow No. 3 _____) =	_____	1.0 GPM
2.	Empennage Off Null Up/Left Leakage (Flow No. 1 _____) - (Flow No. 3 _____) =	_____	1.0 GPM

Center Hydraulic System Leakage Check
Figure 605 (Sheet 1)

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
3.	Total Center System Leakage Flow No. 4 _____ =	_____	4.5 GPM 1
4.	System Relief and Pump Check Valve Leakage (Flow No. 5 _____) – (Flow No. 6 _____) =	_____	1.0 GPM
5.	Leading Edge Slat Subsystem Leakage (Flow No. 7 _____) – (Flow No. 5 _____) =	_____	1.0 GPM
6.	Trailing Edge Flaps Subsystem Leakage (Flow No. 8 _____) – (Flow No. 7 _____) =	_____	1.0 GPM
7.	Left Inboard Aileron Null Leakage (Flow No. 9 _____) – (Flow No. 10_____) =	_____	0.8 GPM
8.	Right Inboard Aileron Null Leakage (Flow No. 9 _____) – (Flow No. 11_____) =	_____	0.8 GPM
9.	Spoiler No. 3 Null Leakage (Flow No. 14_____) – (Flow No. 12_____) =	_____	0.5 GPM
10.	Spoiler No. 10 Null Leakage (Flow No. 15_____) – (Flow No. 13_____) =	_____	0.5 GPM
11.	Extension Check and Relief Valve Seals Leakage for Spoilers No. 3 and 10 (Flow No. 9 _____) – (Flow No. 16_____) =	_____	
12.	Spoiler No. 4 Null Leakage (Flow No. 17_____) – (Flow No. 14_____) =	_____	0.5 GPM
13.	Spoiler No. 9 Null Leakage (Flow No. 18_____) – (Flow No. 15_____) =	_____	0.5 GPM
14.	Extension Check and Relief Valve Seals Leakage for Spoilers No. 4 and 9 (Flow No. 16_____) – (Flow No. 19_____) =	_____	

1 The 4.5 GPM gives an allowance which permits the leakage to increase before a subsequent check and not become more than the 6.0 GPM approved limit.

Center Hydraulic System Leakage Check
Figure 605 (Sheet 2)

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
15.	Spoiler No. 5 Null Leakage (Flow No. 20 _____) – (Flow No. 17 _____) =	_____	0.5 GPM
16.	Spoiler No. 8 Null Leakage (Flow No. 21 _____) – (Flow No. 18 _____) =	_____	0.5 GPM
17.	Extension Check and Relief Valve Seals Leakage for Spoilers No. 5 and 8 (Flow No. 19 _____) – (Flow No. 22 _____) =	_____	
18.	Lateral Autopilot Leakage (Flow No. 23 _____) – (Flow No. 9 _____) =	_____	
19.	Lateral Central Control Actuator Null Leakage for Left Wing Down (Flow No. 24 _____) – (Flow No. 12 _____) =	_____	
20.	Lateral Central Control Actuator Null Leakage for Right Wing Down (Flow No. 25 _____) – (Flow No. 13 _____) =	_____	
21.	Stabilizer Trim Control Module Null Leakage (Flow No. 26 _____) – (Flow No. 27 _____) =	_____	
22.	Elevator Feel Null Leakage (Flow No. 28 _____) – (Flow No. 29 _____) =	_____	
23.	Elevator Autopilot plus Directional Control Autopilot Engagement Leakage (Flow No. 30 _____) – (Flow No. 31 _____) =	_____	
24.	Yaw Damper Null Leakage (Flow No. 32 _____) – (Flow No. 33 _____) =	_____	
25.	Rudder Null Leakage (Flow No. 33 _____) – (Flow No. 34 _____) =	_____	
26.	Elevators Null Leakage (Flow No. 33 _____) – (Flow No. 37 _____) =	_____	

Center Hydraulic System Leakage Check
Figure 605 (Sheet 3)

H. Right Hydraulic System Internal Leakage Check (Fig. 606)

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(1) Prepare for the Internal Leakage Check

(a) If the flowmeter technique is used, do these steps:

1) Open the aft strut hydraulic access panel 447BR (AMM 06-43-00/201).

2) If the ACMP will be used to pressurize the system, then install the flowmeter in the pressure line between the right system ACMP and the ACMP pressure/case drain filter module.

3) If the service cart will be used to pressurize the system, then connect the hydraulic service cart pressure and return lines to the right system ground power connections with a flowmeter installed in the cart pressure line (Fig. 603A).

(b) If the multimeter technique is used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS INSTALLED INTO THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to install the multimeter and the clamp-on ac current probe:

a) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).

b) Get access to the right system ACMP ELCU M896 in the P31 panel.

c) Put the clamp-on ac current probe around one of the three wires which connect to the load side of the ELCU.

d) Connect the multimeter to the clamp-on ac current probe.

2) If necessary, supply electrical power (AMM 24-22-00/201).

WARNING: KEEP PERSONS AND EQUIPMENT AWAY FROM HYDRAULIC COMPONENTS THAT CAN MOVE. INJURY TO A PERSON OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN HYDRAULIC POWER IS SUPPLIED.

(c) Pressurize the right hydraulic system:

1) To pressurize the hydraulic system with the ACMP, put the R HYD PUMP-ELEC pump switch to the ON position.

2) To pressurize the hydraulic system with the service cart, operate the hydraulic service cart to pressurize the right system to 3000 psi.

(d) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(e) Put the WING FLT CONTROL SHUTOFF switch R to the OFF position on the P61 panel.
(f) Turn the control wheel fully left and then fully right.
(g) Make sure the ailerons do not move.
(h) Make sure the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel is in the ON position.
(i) Make sure the pitot-static system is not pressurized.

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(2) Empennage Off Null Leakage Check

NOTE: This procedure calculates the sum of the leakages in the empennage with the rudder and elevators off null. When you operate the rudder pedals, push at the pedal pivot points (the bottoms of the pedals) to prevent brake operation. The off null leakage can change with the direction of surface movement.

(a) Push the left rudder pedal fully forward and pull the control column fully aft and hold.
(b) For the multimeter technique, write the multimeter value as Value No. 1 and find the equivalent Flow No. 1 from figure 607.
(c) For the flowmeter technique, write the flowmeter value as Flow No. 1.
(d) Put the rudder pedals and the control column to the neutral position.
(e) Push the right rudder pedal fully forward and push the control column fully forward and hold.
(f) For the multimeter technique, write the multimeter value as Value No. 2 and find the equivalent Flow No. 2 from figure 607.

(g) For the flowmeter technique, write the flowmeter value as Flow No. 2.
(h) Put the rudder pedals and the control column to the neutral position.
(i) Put the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to OFF.
(j) Push the rudder pedals and make sure the rudder does not move.
(k) For the multimeter technique, write the multimeter value as Value No. 3 and find the equivalent Flow No. 3 from figure 607.
(l) For the flowmeter technique, write the flowmeter value as Flow No. 3.
(m) Calculate the empennage off null down/right leakage (Fig. 606, Step 1).
(n) Calculate the empennage off null up/left leakage (Fig. 606, Step 2).

NOTE: The calculated leakages are the sum of the leakages through these components:
- piston seals
- load relief and anticavitation check valves of the rudder and elevator PCAs
- autopilot servos and shutoff valves.

NOTE: A large negative value shows that there are leaks through the tail flight control valves to the return line when they are closed. The location of the internal leak usually releases heat and/or flow noise when the tail flight control surfaces are off null.

(o) If the empennage off null leakage is more than 1.0 GPM, a test of each of the PCAs is necessary. If a PCA has a leakage rate more than 1.0 GPM, the PCA must be replaced. Component leakage can be isolated by the procedure which follows:
1) Remove the pressure from the right hydraulic system and reservoirs (AMM 29-11-00/201).
2) Disconnect the hydraulic pressure line from a PCA and install a plug which can hold 3000 psi in the pressure line.

3) Install a cap on the PCA pressure port.
4) Do the right hydraulic system off null leakage check again. This leakage value will be smaller than the leakage value which was calculated before. The difference between these leakage values is the leakage rate of the PCA which is disconnected.

S 976-261

(3) Total Right System Leakage Check
(a) Put the WING and TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to ON.
(b) Push the A/P ENGAGE R CMD switch on the mode control panel on the P55 panel.
(c) Make sure the right thrust reverser is retracted and the thrust reverser lever on the pilots control stand is in the retract position.
(d) For the multimeter technique, write the multimeter value as Value No. 4 and find the equivalent Flow No. 4 from figure 607.
(e) For the flowmeter technique, write the flowmeter value as Flow No. 4.
(f) Calculate the total right system leakage (Fig. 606, Step 3).
(g) If the total right system leakage is more than 4.5 GPM, do the right hydraulic system isolation procedures which follow.
(h) Replace components as necessary to decrease the gross system leakage below 4.5 GPM.

NOTE: This leakage rate permits the leakage to increase before a subsequent leakage check and not become more than the 6.0 GPM approved limit.

(i) After the components are replaced, do the Total Right System Leakage Check procedure again to make sure the leakage rate is less than 4.5 GPM.
(j) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(k) If the test is not to continue, do the Put the Right Hydraulic System Back to Its Usual Condition procedure.

S 976-285

(4) System Relief Valve and EDP Check Valve Leakage Check
(a) Make sure the right EDP pressure/case drain filter module is not hot.

(b) If the filter module is hot, do these steps:
1) Replace the EDP check valve or the right system relief valve on the filter module (AMM 29-11-17/401).
2) Do the Total Right System Leakage Check procedure again.
(c) Make sure the R ENG EDP select switch PRESS light is on.
(d) If the EDP PRESS light is not on, do these steps:
1) Remove the pressure from the right hydraulic system (AMM 29-11-00/201).
2) If the EDP PRESS light is not on, replace the EDP pressure switch on the right EDP pressure/case drain filter module (AMM 29-11-17/401).
3) If the EDP PRESS light is on, replace the EDP check valve on the right EDP pressure/case drain filter module (AMM 29-11-17/401).
4) Do the Total Right System Leakage Check procedure again.
(e) Put the WING and TAIL FLT CONTROL SHUTOFF switches R on the P61 panel to OFF.
(f) For the multimeter technique, write the multimeter value as Value No. 5 and find the equivalent Flow No. 5 from figure 607.
(g) For the flowmeter technique, write the flowmeter value as Flow No. 5.
(h) Calculate the shutoff and isolation valve leakage (Fig. 606, Step 4).

NOTE: The calculated leakage is the sum of the leakages through these right hydraulic system components:
- EDP filter module relief and check valves
- wing and tail shutoff valves
- stab trim shutoff valves
- thrust reverser isolation valve
- EDP and ACMP filter modules to the case drain line.

(i) If the leakage is more than 1.0 GPM, replace the defective components and do the Total Right System Leakage Check procedure again.

S 976-262
(5) Lateral Group Leakage Check
(a) Put the WING FLT CONTROL SHUTOFF switch R on the P61 panel to ON.

(b) Put the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to OFF.
(c) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
    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) 11G26, FLT CONT ELEC 2R AC
    8) 11G27, FLT CONT ELEC 2R DC
(d) Put the control wheel to the neutral position.
(e) For the multimeter technique, write the multimeter value as Value No. 6 and find the equivalent Flow No. 6 from figure 607.
(f) For the flowmeter technique, write the flowmeter value as Flow No. 6.
(g) Turn the control wheel to 37 ±2 degrees clockwise (6-3/4 units of aileron trim).
(h) For the multimeter technique, write the multimeter value as Value No. 7 and find the equivalent Flow No. 7 from figure 607.
(i) For the flowmeter technique, write the flowmeter value as Flow No. 7.
(j) Calculate the right inboard aileron null leakage (Fig. 606, Step 5).
(k) Turn the control wheel to 47 ±2 degrees clockwise (8-1/2 units of aileron trim).
(l) For the multimeter technique, write the multimeter value as Value No. 8 and find the equivalent Flow No. 8 from figure 607.
(m) For the flowmeter technique, write the flowmeter value as Flow No. 8.
(n) Calculate the left outboard aileron null leakage (Fig. 606, Step 6).
(o) Turn the control wheel to 55 ±2 degrees clockwise (10 units of aileron trim).
(p) For the multimeter technique, write the multimeter value as Value No. 9 and find the equivalent Flow No. 9 from figure 607.

(q) For the flowmeter technique, write the flowmeter value as Flow No. 9.
(r) Calculate the right outboard aileron null leakage (Fig. 606, Step 7).
(s) Turn the control wheel to the full clockwise position.
(t) For the multimeter technique, write the multimeter value as Value No. 10 and find the equivalent Flow No. 10 from fig. 607.
(u) For the flowmeter technique, write the flowmeter value as Flow No. 10.
(v) Calculate the lateral central control actuator null leakage for the right wing down (Fig. 606, Step 8).

NOTE: A large negative value shows there is leakage in the check and relief valves, and the piston seals of the LCCA.

(w) Turn the control wheel counterclockwise to 55 ±2 degrees (10 units of aileron trim).
(x) For the multimeter technique, write the multimeter value as Value No. 11 and find the equivalent Flow No. 11 from fig. 607.
(y) For the flowmeter technique, write the flowmeter value as Flow No. 11.
(z) Turn the control wheel to the full counterclockwise position.
(aa) For the multimeter technique, write the multimeter value as Value No. 12 and find the equivalent Flow No. 12 from fig. 607.
(ab) For the flowmeter technique, write the flowmeter value as Flow No. 12.
(ac) Calculate the lateral central control actuator null leakage for the left wing down (Fig. 606, Step 9).

NOTE: A large negative value shows there is leakage in the check and relief valves, and the piston seals of the LCCA.

(ad) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
1) 11C6, FLT CONT ELEC 1L AC

2) 11C7, FLT CONT ELEC 1L DC

(ae) Turn the control wheel to the full clockwise position.

(af) For the multimeter technique, write the multimeter value as Value No. 13 and find the equivalent Flow No. 13 from fig. 607.

(ag) For the flowmeter technique, write the flowmeter value as Flow No. 13.

(ah) Calculate the spoiler No. 11 null leakage (Fig. 606, Step 10).

(ai) Turn the control wheel to the full counterclockwise position.

(aj) For the multimeter technique, write the multimeter value as Value No. 14 and find the equivalent Flow No. 14 from fig. 607.

(ak) For the flowmeter technique, write the flowmeter value as Flow No. 14.

(al) Put the control wheel to the neutral position.

(am) Calculate the spoiler No. 2 null leakage (Fig. 606, Step 11).

(an) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11C6, FLT CONT ELEC 1L AC
2) 11C7, FLT CONT ELEC 1L DC

(ao) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:

1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC

(ap) Move the speedbrake lever on the P10 panel to extend spoiler No. 7 approximately one-half of full travel.

(aq) For the multimeter technique, write the multimeter value as Value No. 15 and find the equivalent Flow No. 15 from fig. 607.

(ar) For the flowmeter technique, write the flowmeter value as Flow No. 15.

(as) Move the speedbrake lever on the P10 panel to the DOWN position.

(at) Calculate the spoiler No. 7 null leakage (Fig. 606, Step 12).

(au) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11G17, FLT CONT ELEC 1R AC
2) 11G18, FLT CONT ELEC 1R DC

(av) Push the A/P ENGAGE R CMD switch on the mode control panel on the P55 panel.
(aw) Make sure the control wheel is in the neutral position.
(ax) For the multimeter technique, write the multimeter value as Value No. 16 and find the equivalent Flow No. 16 from fig. 607.
(ay) For the flowmeter technique, write the flowmeter value as Flow No. 16.
(az) Calculate the lateral autopilot leakage (Fig. 606, Step 13).

NOTE: A large negative value shows there is leakage in the lateral central control actuator servo valve.

(ba) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(bb) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
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) 11G26, FLT CONT ELEC 2R AC
8) 11G27, FLT CONT ELEC 2R DC
(bc) Move the speedbrake lever on the P10 panel to the UP position.
(bd) For the multimeter technique, write the multimeter value as Value No. 17 and find the equivalent Flow No. 17 from fig. 607.
(be) For the flowmeter technique, write the flowmeter value as Flow No. 17.
(bf) Calculate the extension check and relief valve seals leakage for spoilers No. 2, 7 and 11 (Fig. 606, Step 14).
(bg) Put the WING FLT CONTROL SHUTOFF switch R on the P61 panel to OFF.

S 976-263
(6) Tail Group Detail Leakage Check
(a) Put the TAIL FLT CONTROL SHUTOFF switch R on the P61 panel to ON.

(b) Push the A/P ENGAGE R CMD switch on the mode control panel on the P55 panel.
(c) Make sure the rudder pedals and the control column are in the neutral position.
(d) For the multimeter technique, write the multimeter value as Value No. 18 and find the equivalent Flow No. 18 from fig. 607.
(e) For the flowmeter technique, write the flowmeter value as Flow No. 18.
(f) Push the A/P DISENGAGE switch on the mode control panel on the P55 panel.
(g) For the multimeter technique, write the multimeter value as Value No. 19 and find the equivalent Flow No. 19 from fig. 607.
(h) For the flowmeter technique, write the flowmeter value as Flow No. 19.
(i) Calculate the elevator and directional autopilot null leakage (Fig. 606, Step 15).

NOTE: A large negative value shows there is leakage in the shutoff valve of the elevator autopilot servo and/or the directional control autopilot servo.

(j) Push the left rudder pedal fully forward.
(k) For the multimeter technique, write the multimeter value as Value No. 20 and find the equivalent Flow No. 20 from fig. 607.
(l) For the flowmeter technique, write the flowmeter value as Flow No. 20.
(m) Calculate the rudder null leakage (Fig. 606, Step 16).
(n) Put the rudder pedals to the neutral position.
(o) Push the control column fully forward.
(p) For the multimeter technique, write the multimeter value as Value No. 21 and find the equivalent Flow No. 21 from fig. 607.
(q) For the flowmeter technique, write the flowmeter value as Flow No. 21.
(r) Pull the control column fully aft.
(s) For the multimeter technique, write the multimeter value as Value No. 22 and find the equivalent Flow No. 22 from fig. 607.

(t) For the flowmeter technique, write the flowmeter value as Flow No. 22.
(u) Write the smaller of the two values 21 and 22 as Flow No. 23.
(v) Calculate the elevators null leakage (Fig. 606, Step 17).

S 866-264
(7) Put the Right Hydraulic System Back to Its Usual Condition.
(a) Remove the pressure from the hydraulic system:
1) If the hydraulic system was pressurized with the ACMP, put the R HYD PUMP-ELEC pump switch to the OFF position.
2) If the hydraulic system was pressurized with the service cart, operate the hydraulic service cart to decrease the pressure in the system to zero.
(b) If the flowmeter technique was used, do these steps:
1) If the hydraulic system was pressurized with the ACMP, then remove the flowmeter from the ACMP pressure line and reconnect the ACMP pressure line.
2) If the hydraulic system was pressurized with the cart, then disconnect the hydraulic service cart and install the caps on the airplane ground power connections.
3) Close the aft strut hydraulic access panel, 447BR (AMM 06-43-00/201).
(c) If the multimeter technique was used, do these steps:

WARNING: BE CAREFUL WHEN THE CLAMP-ON AC CURRENT PROBE IS REMOVED FROM THE POWER PANEL. HIGH VOLTAGES CAN BE PRESENT IN THE POWER PANELS. CONTACT WITH HIGH VOLTAGE CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

1) Do these steps to remove the clamp-on ac current probe:
a) If practical, remove electrical power while you access the power panel (AMM 24-22-00/201).
b) 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

S 976-265
(1) When the component flows have been written, find where there is excessive leakage.

S 426-266
(2) Replace components which have high leakage to decrease the system gross internal leakage below the approved limits.

S 866-267
(3) Make sure the RESERVE BKS & STRG switch on the P1 panel is OFF.

S 866-268
(4) Put the WING and TAIL FLT CONTROL SHUTOFF switches L, C, and R on the P61 panel to the ON position.

S 866-269
(5) Put the YAW DAMPER switches L and R on the P5 panel to ON.

S 866-270
(6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P6 panel:
(a) 6J8, RAM AIR TURBINE PWR

S 866-272
(7) Remove the hydraulic power from the left, right, and center hydraulic systems (AMM 29-11-00/201).

S 866-273
(8) Remove electrical power if it is not necessary.

Write the Multimeter Value and Flow Data:

Value No.	Flow No.	Value No.	Flow No.
1 _____	1 _____	13 _____	13 _____
2 _____	2 _____	14 _____	14 _____
3 _____	3 _____	15 _____	15 _____
4 _____	4 _____	16 _____	16 _____
5 _____	5 _____	17 _____	17 _____
6 _____	6 _____	18 _____	18 _____
7 _____	7 _____	19 _____	19 _____
8 _____	8 _____	20 _____	20 _____
9 _____	9 _____	21 _____	21 _____
10 _____	10 _____	22 _____	22 _____
11 _____	11 _____	23 _____	23 _____
12 _____	12 _____		

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
1.	Empennage Off Null Dn/Right Leakage (Flow No. 2 _____) – (Flow No. 3 _____) =	_____	1.0 GPM
2.	Empennage Off Null Up/Left Leakage (Flow No. 1 _____) – (Flow No. 3 _____) =	_____	1.0 GPM
3.	Total Right System Leakage Flow No. 4 =	_____	4.5 GPM 1
4.	Shutoff and Isolation Valve Leakage Flow No. 5 =	_____	1.0 GPM
5.	Right Inboard Aileron Null Leakage (Flow No. 6 _____) – (Flow No. 7 _____) =	_____	0.8 GPM
6.	Left Outboard Aileron Null Leakage (Flow No. 7 _____) – (Flow No. 8 _____) =	_____	0.66 GPM

1 The 4.5 GPM gives an allowance which permits the leakage to increase before a subsequent check and not become more than the 6.0 GPM approved limit.

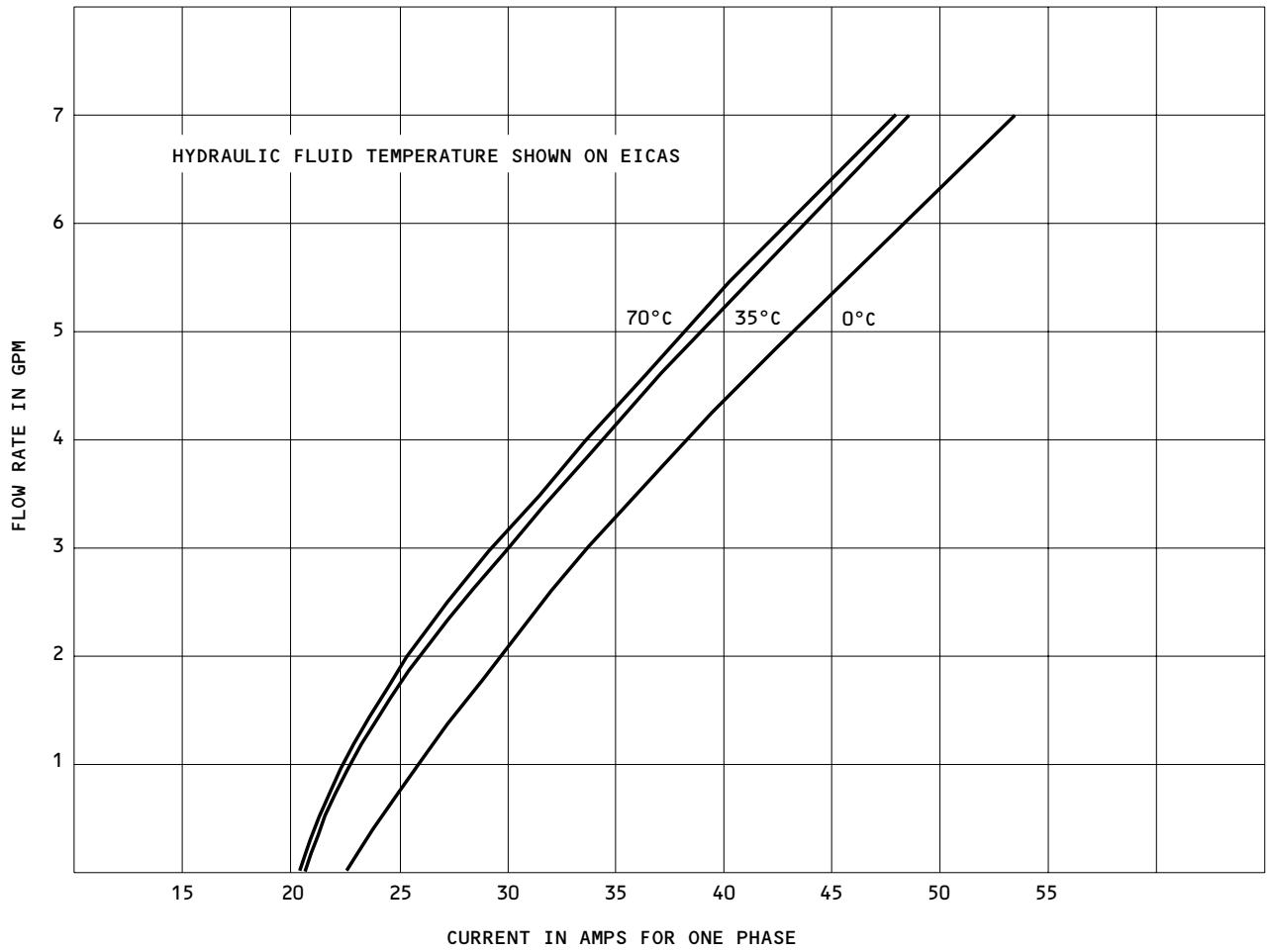
Right Hydraulic System Leakage Check
Figure 606 (Sheet 1)

Calculate the Component Leakage Values:

Step No.		Leakage Flow	Approved Leakage Flow Limit
7.	Right Outboard Aileron Null Leakage (Flow No. 8 _____) - (Flow No. 9 _____) = _____		0.66 GPM
8.	Lateral Central Control Actuator Null Leakage for Right Wing Down (Flow No. 9 _____) - (Flow No. 10_____) = _____		
9.	Lateral Central Control Actuator Null Leakage for Left Wing Down (Flow No. 11_____) - (Flow No. 12_____) = _____		
10.	Spoiler No. 11 Null Leakage (Flow No. 13_____) - (Flow No. 10_____) = _____		0.5 GPM
11.	Spoiler No. 2 Null Leakage (Flow No. 14_____) - (Flow No. 12_____) = _____		0.5 GPM
12.	Spoiler No. 7 Null Leakage (Flow No. 15_____) - (Flow No. 6 _____) = _____		0.5 GPM
13.	Lateral Autopilot Leakage (Flow No. 16_____) - (Flow No. 6 _____) = _____		
14.	Extension Check and Relief Valve Seals Leakage for Spoilers No. 2,7, and 11 (Flow No. 6 _____) - (Flow No. 17_____) = _____		
15.	Elevator Autopilot and Directional Control Autopilot Leakage (Flow No. 18_____) - (Flow No. 19_____) = _____		
16.	Rudder Null Leakage (Flow No. 19_____) - (Flow No. 20_____) = _____		
17.	Elevators Null Leakage (Flow No. 19_____) - (Flow No. 23_____) = _____		

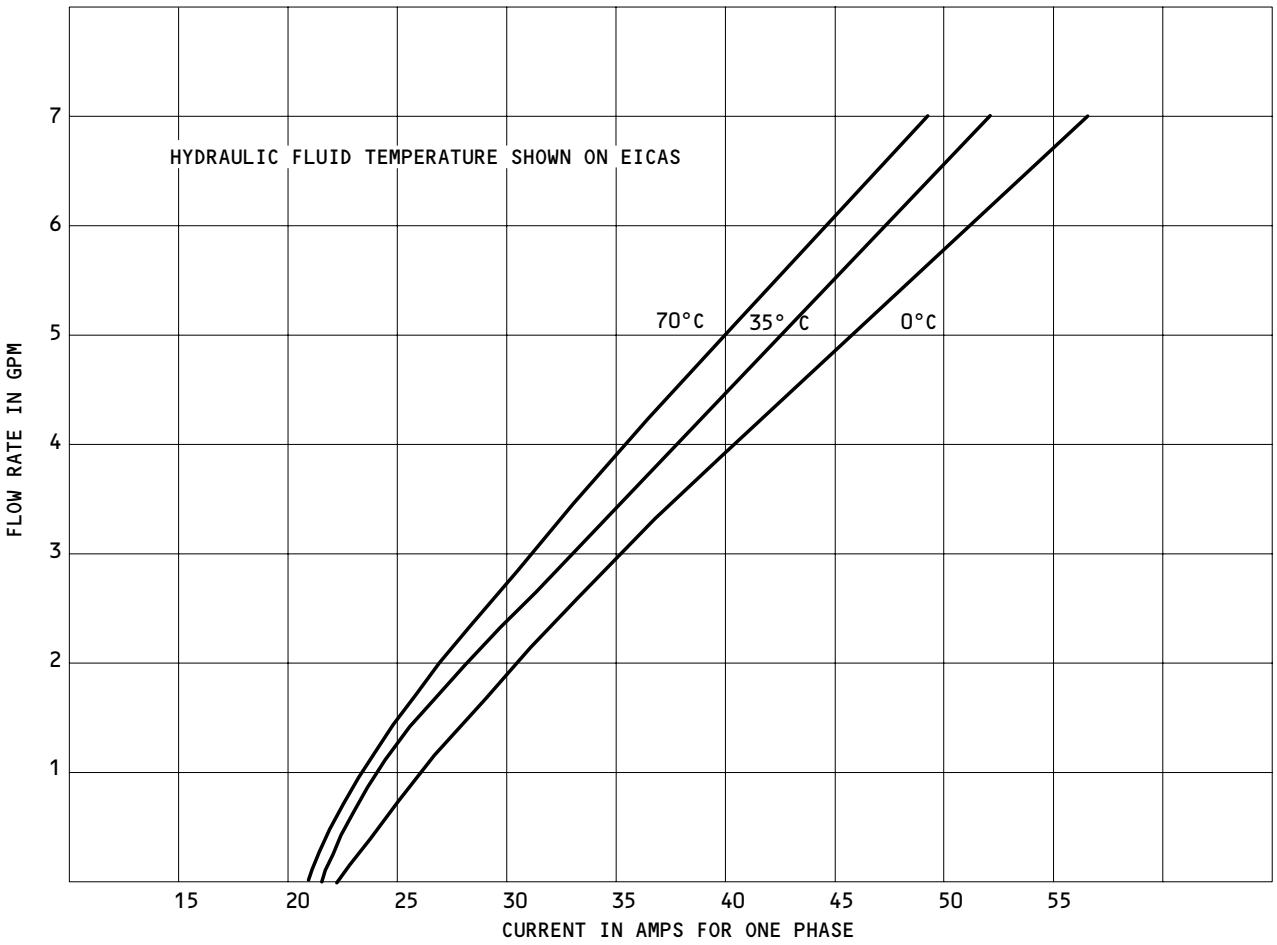
Right Hydraulic System Leakage Check
Figure 606 (Sheet 2)

74359



(VICKERS PUMPS)

Electric Pump Flow and Multimeter Value
Figure 607 (Sheet 1)



(ABEX PUMPS)
Electric Pump Flow and Multimeter Value
Figure 607 (Sheet 2)

LEFT AND RIGHT HYDRAULIC SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the alternating current motor pumps (ACMPs) for the left and right systems. The other task installs the ACMPs for the left and right systems.
   B. If you replace an ACMP because of a mechanical failure or other condition which could add contamination, you must flush the hydraulic system (AMM 29-11-00/201).

TASK 29-11-01-024-001

2. Remove the Alternating Current Motor Pump (ACMP)
   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
          437/447 Aft Nacelle Strut Fairing

      (2) Access Panels
          437BL/437BR Engine Strut Hydraulic Bay (Left)
          447BL/447BR Engine Strut Hydraulic Bay (Right)

   C. Remove the ACMP (Fig. 401)

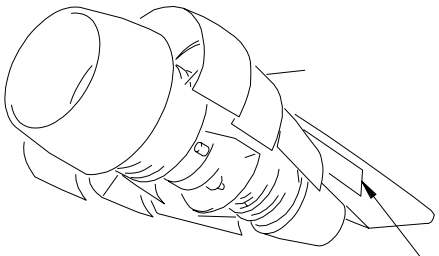
      S 864-002
      (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L16, HYDRAULIC ELEC PUMP R
          (b) 11L25, HYDRAULIC ELEC PUMP L

      S 044-003

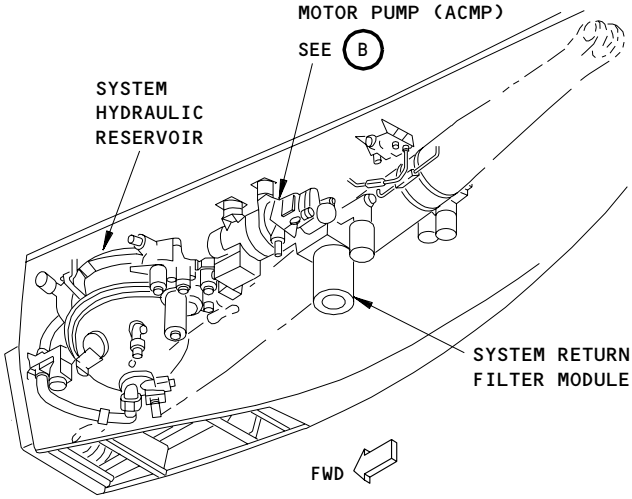
      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

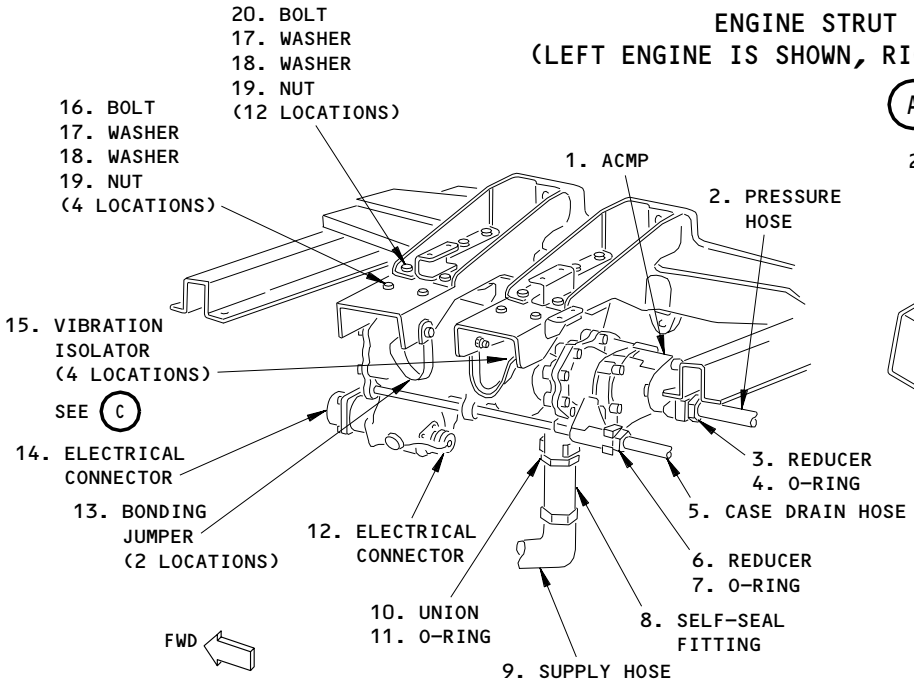
      S 014-004
      (3) To replace the right ACMP, open the access doors for the engine strut hydraulic bay, 447BL and 447BR (AMM 06-43-00/201).



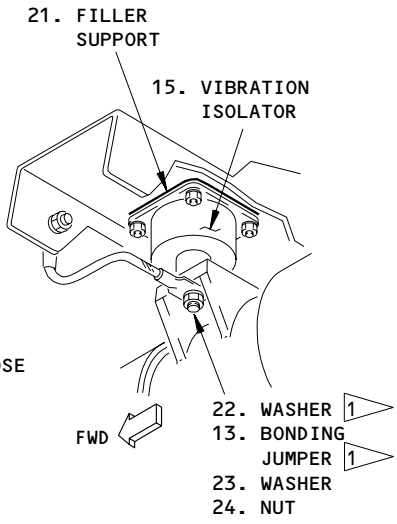
ENGINE STRUT HYDRAULIC BAY,
437BL (LEFT ENGINE OUTBOARD),
437BR (LEFT ENGINE INBOARD),
447BR (RIGHT ENGINE OUTBOARD),
447BL (RIGHT ENGINE INBOARD)
SEE (A)



ENGINE STRUT HYDRAULIC BAY
(LEFT ENGINE IS SHOWN, RIGHT ENGINE IS EQUIVALENT)
(A)



ALTERNATING CURRENT MOTOR PUMP (ACMP)
(B)



VIBRATION ISOLATOR
(EXAMPLE, 4 LOCATIONS)
(C)

1 INSTALLED ON OUTBOARD VIBRATION ISOLATORS

Alternating Current Motor Pump (ACMP) Installation
Figure 401

S 014-005
(4) To replace the left ACMP,
open the access doors for the engine strut hydraulic bay, 437BL and 437BR (AMM 06-43-00/201).

S 864-006
(5) Remove the pressure from the left, right, and center hydraulic systems and reservoirs (AMM 29-11-00/201).

S 024-053
(6) Remove the electrical connector (12) and the electrical connector (14) from the ACMP.

S 214-051
(7) Inspect the electrical contacts on each connector, on the airplane side of the wiring. If the contacts appear burned or damaged, then replace them.

S 024-054
(8) Disconnect the self-seal fitting (8) from the ACMP (1).

S 024-055
(9) Disconnect the case drain hose (5) and the pressure hose (2) from the ACMP (1).

S 024-056
(10) Catch the hydraulic fluid, from the ACMP and the hydraulic hoses, in a container.

S 424-057
(11) Install plugs in the hydraulic hoses.

S 424-058
(12) Install caps on the ACMP hydraulic ports.

S 024-052

WARNING: HOLD THE ACMP WHEN YOU REMOVE THE NUTS. THE ACMP CAN FALL WHEN THE NUTS ARE REMOVED. THE ACMP WEIGHS 46 POUNDS AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF IT FALLS.

(13) Hold the ACMP while you remove the nuts (24) and the washers (23) that hold the ACMP to the studs on the vibration isolators (15).
   (a) If the isolator stud has a hex, use a wrench to keep the stud from turning while you loosen the nut (24).
   (b) If the isolator stud does not have a hex but does have a hole or a slot in the stud, use a 0.12-inch diameter pin to keep the stud from turning while you loosen the nut (24).
   (c) If the isolator stud does not have a hex or a hole or a slot, it may be possible to grip the stud below the threaded portion with a suitable tool to keep the stud from turning while you loosen the nut (24).
   (d) If the isolator stud is difficult to hold when you try to loosen the nut (24), the shock mount should then be removed together with the ACMP.

S 024-059

(14) Remove the bonding jumper (13) and the washer (22) from each of the outboard vibration isolators.

S 024-014

(15) Remove the ACMP (1) from the vibration isolators.

S 024-060

(16) Remove the reducer (3), the O-ring (4), the reducer (6), the O-ring (7), the union (10), and the O-ring (11) from the ACMP ports.

NOTE: Keep the reducers and the union for the installation.

S 214-016

(17) Do a check for damage on each of the vibration isolators.

S 024-061

(18) If it is necessary to replace a vibration isolator, do the steps that follow to remove it:
   (a) To remove an inboard vibration isolator,
   Remove the nuts (19), the washers (18), the bolts (20), and the washers (17) that hold the vibration isolator to the airplane structure.

(b) To remove an outboard vibration isolator, Remove the nuts (19), the washers (18), the bolts (16), the bolts (20), and the washers (17) that hold the vibration isolator to the airplane structure.
(c) Remove the vibration isolator (15) and the filler support (21).

NOTE: Keep the filler support for the installation.

TASK 29-11-01-424-019

3. Install the Alternating Current Motor Pump (ACMP)

A. 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 20-10-21/401, Electrical Bonding
(5) AMM 20-10-21/601, Electrical Bonding
(6) AMM 20-10-22/701, Metal Surfaces
(7) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(8) AMM 78-31-00/201, Thrust Reverser System

B. Equipment
(1) Bonding Meter, (SWPM 20-20-00)

C. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B
(2) A00247 Sealant - BMS 5-95

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	AC Motor-Driven Hydraulic Pump	29-11-01	01	150
				04	80
	4	O-Ring		01	125
				04	100
	7	O-Ring		01	135
				04	105
	11	O-Ring		01	145
				04	102

E. Access

(1) Location Zones

211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Engine Strut Hydraulic Bay (Left)
447BL/447BR	Engine Strut Hydraulic Bay (Right)

F. Install the ACMP (Fig. 401)

S 424-062

(1) If it is necessary, do the steps that follow to install a vibration isolator (15):

(a) Put the filler support (21) and the vibration isolator (15) in their correct position.

NOTE: All four vibration isolators must be the same part number and must be from the same vendor as the ACMP.

(b) To install an inboard vibration isolator, install the washers (17), the bolts (20), the washers (18), and the nuts (19) that hold the vibration isolator to the airplane structure (AMM 20-10-21/401).

(c) To install an outboard vibration isolator, install the washers (17), the bolts (16), the bolts (20), the washers (18), and the nuts (19) that hold the vibration isolator to the airplane structure.

S 124-063

(2) To clean the ACMP at the bonding jumper locations, do this task: Hand Clean Metal Surfaces with Abrasives (AMM 20-10-22/701).

S 164-075

(3) To clean the bonding jumper lugs, do this task: Clean Bare, Clad, or Plated Metal with Solvent (AMM 20-10-22/701).

S 024-074
(4) Remove the caps, if installed, from the ACMP ports.

S 644-021
(5) Put a thin layer of hydraulic lubricant or hydraulic fluid on the O-rings and the threads of the ACMP fittings.

S 424-064
(6) Install the reducer (3), the O-ring (4), the reducer (6), the O-ring (7), the union (10), and the O-ring (11) in the ACMP ports.

S 214-023
(7) Make sure the new ACMP is full of hydraulic fluid.

S 424-024
(8) Put the ACMP (1) in its position on the vibration isolators.

S 424-065
(9) Loosely install the washers (23) and the nuts (24) that hold the ACMP (1) to the inboard vibration isolators.

S 424-066
(10) Put the washers (22) and the bonding jumpers (13) on the outboard vibration isolators.

NOTE: The washer (22) is installed between the bonding jumper and the ACMP.

S 424-067
(11) Loosely install the washers (23) and the nuts (24) that hold the ACMP (1) to the two outboard vibration isolators.

S 424-068
(12) Tighten the nuts that connect the ACMP to the vibration isolator as follows:

NOTE: If the isolator stud has a hex,
hold the stud with a wrench while you tighten the nut.
If the isolator stud does not have a hex,
install a 0.12 inch diameter pin through the hole in the stud
while you tighten the nut.

(a) Tighten each nut 65 to 90 pound-inches
(7.4 to 10.1 newton-meters).

S 764-069
(13) Use the bonding meter to measure the bonding resistance between each bonding jumper lug and the ACMP case (SWPM 20-20-00).

NOTE: If necessary, you can remove a small area of the surface finish to make the measurement.

(a) If the bonding resistance is greater than 0.0002 ohms, then disassemble the bonding jumper connection, repeat the cleaning and assembly steps, and measure the resistance again.
(b) If you removed any of the surface finish to make the resistance measurement, then repair the area where the finish was removed.

S 644-031
(14) Put a thin layer of hydraulic lubricant or hydraulic fluid on the O-rings and the threads of the hose fittings.

S 024-070
(15) Remove the plugs, if installed, from the hydraulic hoses.

S 434-032
(16) Reconnect the case drain hose (5) and the pressure hose (2) to the ACMP (1).

S 424-071
(17) Reconnect the self-seal fitting (8) to the ACMP (1).

S 424-072
(18) Reconnect the electrical connector (12) and the electrical connector (14) to the ACMP.

S 424-073
(19) Put a lockwire on the electrical connectors.

S 164-033

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

(20) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 864-036
(21) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L16, HYDRAULIC ELEC PUMP R
(b) 11L25, HYDRAULIC ELEC PUMP L

S 614-037
(22) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 174-048
(23) If you replaced the ACMP because of a mechanical failure or other condition which could add contamination, flush the hydraulic system (AMM 29-11-00/201).

S 864-049
(24) Pressurize the hydraulic reservoir for the applicable system (AMM 29-11-00/201).

S 864-038
(25) Use the ACMP to pressurize the applicable hydraulic system (AMM 29-11-00/201).

S 214-039
(26) Do a check for leaks at the ACMP connections while the ACMP is in operation.

S 864-040
(27) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

S 414-041
(28) If you replaced the right ACMP,
close the access doors for the engine strut hydraulic bay, 447BL and 447BR (AMM 06-43-00/201).

S 414-042
(29) If you replaced the left ACMP,
close the access doors for the engine strut hydraulic bay, 437BL and 437BR (AMM 06-43-00/201).

S 444-043
(30) Do the activation procedure for the thrust reverser
(AMM 78-31-00/201).

CENTER SYSTEM ALTERNATING CURRENT MOTOR PUMP (ACMP) - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the alternating current motor pump. The other task installs the alternating current motor pump.
   B. If you replace an ACMP because of mechanical failure or other condition which could add contamination, you must flush the hydraulic system (Ref 29-11-00/201).

TASK 29-11-02-004-001

2. Remove the Alternating Current Motor Pump (ACMP) for the Center System
   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 (Fig. 401)

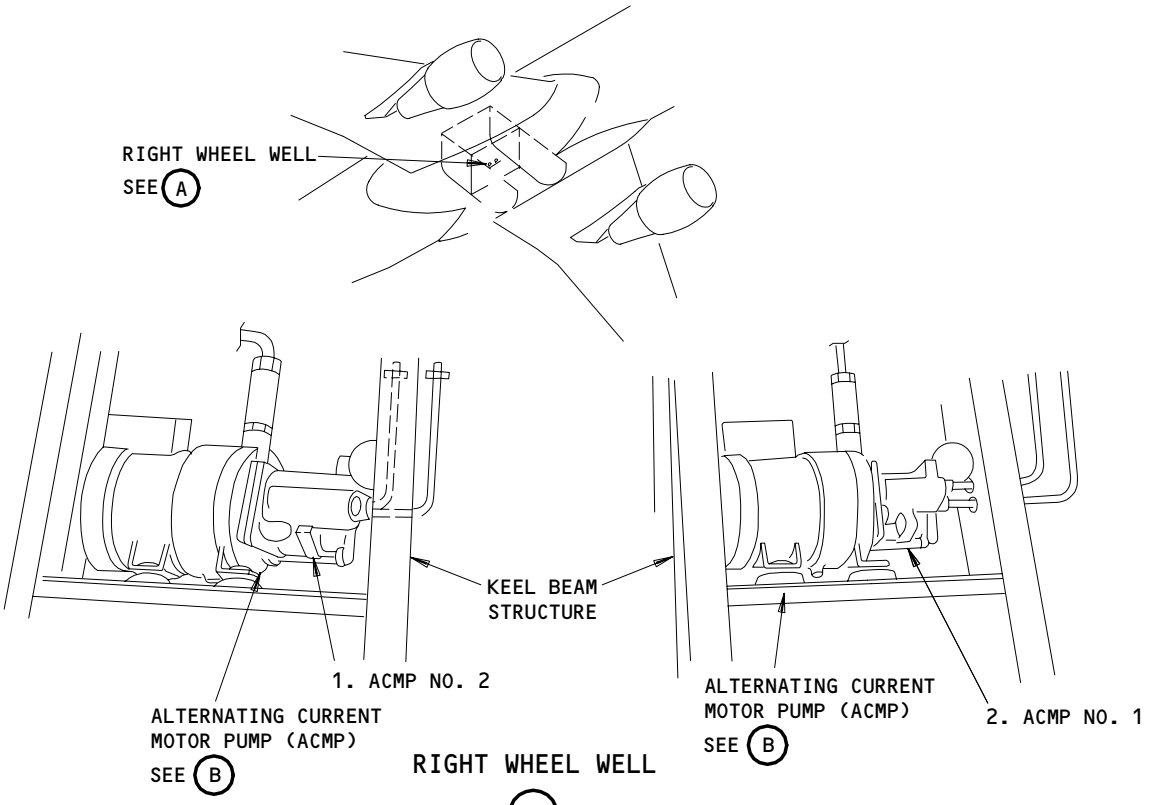
      S 494-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

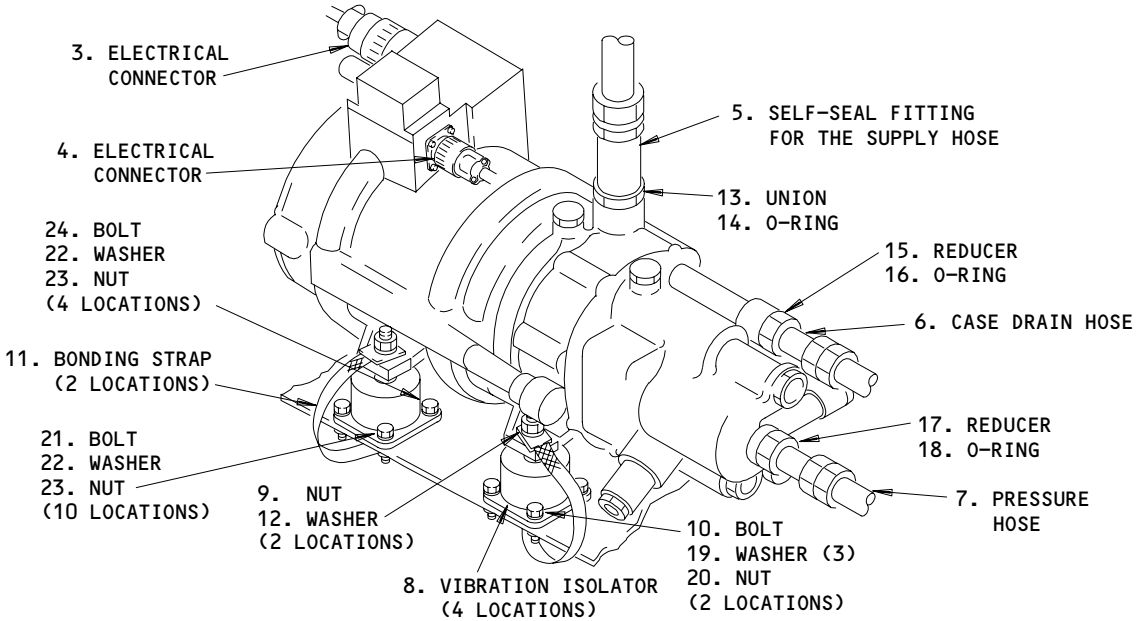
      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-004
      (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).



RIGHT WHEEL WELL

A



ALTERNATING CURRENT MOTOR PUMP (ACMP)

B

Alternating Current Motor Pump (ACMP) Installation
Figure 401

S 864-005
(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1
(b) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 034-006
(5) Disconnect the electrical connectors (3, 4) from the pump (1, 2).

S 214-058
(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 self-seal fitting (5) of the supply hose from the pump (1, 2).

S 034-008
(8) Disconnect the case drain and pressure hoses (6, 7) from the pump (1, 2).

S 684-009
(9) Catch the fluid from the pump (1, 2) and the hoses (6, 7) in a bucket.

S 034-010
(10) Install plugs in the hydraulic lines (5, 6, 7).

S 024-059
(11) Hold the ACMP while you remove the nuts (9) and the washers (12) that hold the ACMP to the studs on the vibration isolators (8).
(a) If the isolator stud has a hex, use a wrench to keep the stud from turning while you loosen the nut (9).

(b) If the isolator stud does not have a hex but does have a hole or a slot in the stud, use a 0.12-inch diameter pin to keep the stud from turning while you loosen the nut (9).
(c) If the isolator stud does not have a hex or a hole or a slot, it may be possible to grip the stud below the threaded portion with a suitable tool to keep the stud from turning while you loosen the nut (9).
(d) If the isolator stud is difficult to hold when you try to loosen the nut (9), the shock mount should then be removed together with the ACMP.

S 024-013
(12) Lift the pump (1, 2) above the studs on the vibration isolators (8) and remove the pump.

NOTE: The weight of the pump is 46 1/2 pounds.

S 024-056
(13) Do a check of each vibration isolator (8) for damage. If there is damage, do the following steps to remove the vibration isolator(s):
(a) Remove the nuts (23) from the outboard vibration isolator(s) (8).
(b) Remove the nuts (23) from the inboard vibration isolator(s) (8).

NOTE: On the inboard side of the inboard vibration isolators, hold the bolts (21) with the crow-foot type socket and an extension. On the outboard side of the inboard vibration isolators, hold the bolts (21) with an open or box-end wrench below the pump (1, 2).

(c) Remove the vibration isolators (8) and the bonding straps (11).

S 034-016
(14) Remove the unions (13), the reducers (15, 17), and the O-rings (14, 16, 18) from the openings in the pump (1, 2).

S 034-017
(15) Install plugs in the openings in the pump (1, 2).

TASK 29-11-02-404-018
3. Install the Alternating Current Motor Pump (ACMP) for the Center System
A. Consumable Materials
(1) D00153 Hydraulic Fluid - BMS 3-11
(2) D00054 Hydraulic System Lubricant - MCS 352B
(3) A00247 Sealant - BMS 5-95
B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1,2	AC Motor-Driven Hydraulic Pump	29-11-02	01	155
	14	O-Ring	29-11-02	01	140
	16	O-Ring	29-11-02	01	145
	18	O-Ring	29-11-02	01	150

C. 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
(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

D. Access
(1) Location Zone
144 Right MLG Wheel Well

E. Procedure (Fig. 401)

S 434-019
(1) Remove the plugs from the openings in the pump (1, 2) for the hydraulic line connections.

S 644-020
(2) Apply hydraulic lubricant or hydraulic fluid to the O-rings (14, 16, 18) and to the threads on the unions (13) and the reducers (15, 17).

S 434-021
(3) Install the unions (13), the reducers (15, 17), and the O-rings (14, 16, 18) in the openings in the pump (1, 2).

S 214-022
(4) If it was necessary to replace the vibration isolator(s), do these steps to install the vibration isolator(s) (8) on the keel beam:

NOTE: All four vibration isolators must be the same part number.

(a) Put the outboard vibration isolators (8) in position.

NOTE: All four vibration isolators must be the same part number.

(b) Clean the surfaces for an electrical bond at the location of each bonding strap (AMM 20-10-22/701).
(c) Install the bolts (10, 21, 24), the washers (19, 22), and the nuts (20, 23) at each vibration isolator (8).
(d) Put one washer (19) on each side of the bonding strap (11).
(e) Use one bolt on the vibration isolator (8) to connect the bonding strap (11).

S 614-024
(5) Fill the pump with hydraulic fluid.

S 424-025
(6) Put the inboard vibration isolators (8) on the pump (1, 2).

NOTE: All four vibration isolators (8) must be the same part number.

S 424-026
(7) Install the nuts (9) and the washers (12) on the vibration isolators (8).

S 824-027
(8) Turn the two inboard vibration isolators (8) to align the holes in the vibration isolators with the holes in the keel beam.

S 434-028
(9) Tighten the nuts (9) to 65-90 pound-inches.

NOTE: If the vibration isolator stud has a hex, hold the stud with a wrench while you tighten the nut. On the vibration isolator studs without a hex, put a 0.12 inch diameter pin through the hole in the stud while you tighten the nut.

S 424-029
(10) Put the pump (1, 2) on the keel beam.

S 424-030
(11) Put the pump (1, 2) on the studs of the outboard vibration isolators (8).

S 824-031
(12) Align the holes on the inboard vibration isolators (8) with the holes in the keel beam.

S 424-032
(13) Put the bolts (21) in position at the inboard vibration isolators (8).

NOTE: Use a mechanical finger tool of the flexible shaft type to make the installation of the bolts (21) easier.

S 424-033
(14) Install the nuts (23) and the washers (22) on the bolts (21) at the inboard vibration isolators (8).

NOTE: On the inboard side of the inboard vibration isolators, hold the bolts (21) with a crow-foot type socket and an extension. On the outboard side of the inboard vibration isolators, hold the bolts (21) with an open or box-end wrench below the pump.

S 144-034
(15) Clean the surfaces for an electrical bond at the location of each bonding strap (11) (AMM 20-10-22/701).

S 434-035
(16) Put one washer (12) on each side of the bonding straps (11) (AMM 20-10-21/401).

S 424-036
(17) Install the nuts (9) and the washers (12) on the outboard vibration isolators (8).

S 434-037
(18) Tighten the nuts (9) to 65-90 pound-inches.

NOTE: If the vibration isolator stud has a hex, hold the stud with a wrench while you tighten the nut (9). On the vibration isolator studs without a hex, put a 0.12 inch diameter pin through the hole in the stud while you tighten the nut (9).

S 764-038
(19) Do a test of the electrical resistance for the bonding strap (AMM 20-10-21/601). The maximum resistance is 0.0002 ohm.

S 394-039
(20) At the two ends of each bonding strap (11), apply the sealant on all of the end of the bonding strap (AMM 20-10-21/401).

S 644-040
(21) Apply hydraulic lubricant or hydraulic fluid to the threads of the union (13) and the reducers (15, 17).

S 434-044
(22) Connect the hydraulic hoses to the pump (1, 2).

S 114-042

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

(23) Clean all the hydraulic fluid from the installation area (AMM 12-25-01/301).

S 434-043
(24) Install the electrical connectors (3, 4) on the pump (1, 2).

S 434-045
(25) Safety the electrical connectors (3, 4) with wire.

S 864-046
(26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

(b) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 614-047
(27) Fill the reservoir in the center hydraulic system (AMM 12-12-01).

S 174-053
(28) If you replaced the ACMP because of a mechanical failure or other condition which could add contamination, flush the hydraulic system (AMM 29-11-00/201).

S 864-048
(29) Pressurize the center hydraulic reservoir (AMM 29-11-00).

S 864-054
(30) Pressurize the center hydraulic system with an ACMP (AMM 29-11-00).

S 794-049
(31) Make sure there are no leaks at the hydraulic hose connections while the pump (1, 2) is in operation.

S 414-050

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.

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

S 864-051
(33) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

CENTER HYDRAULIC SYSTEM AIR DRIVEN PUMP (ADP) - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the air-driven pump (ADP) for the center hydraulic system. The other task installs the ADP for the center hydraulic system.
   B. The ADP has three primary components: the pump, the turbine, and the modulating valve. To remove and install these components, remove and install the ADP as one unit.
   C. When you replace an ADP because of a mechanical failure or other condition which could add contamination, flush the hydraulic system (AMM 29-11-00/201).

TASK 29-11-03-024-062

2. Remove the ADP for the Center Hydraulic System
   A. Equipment
      (1) General Boom Hoist - A20001-79 (Recommended)
      (2) Hoist Adapter - A29001-1
   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 32-00-15/201, Main Gear Door Locks
      (5) AMM 36-00-00/201, Pneumatic - General
   C. Access
      (1) Location Zones

195	Wing to Body - left aft upper half
211/212	Control Cabin
730	Right Main Landing Gear and Doors

      (2) Access Panel

195SL	Air Turbine Driven Hydraulic Pump

   D. Remove the ADP (Fig. 402)

S 014-001

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

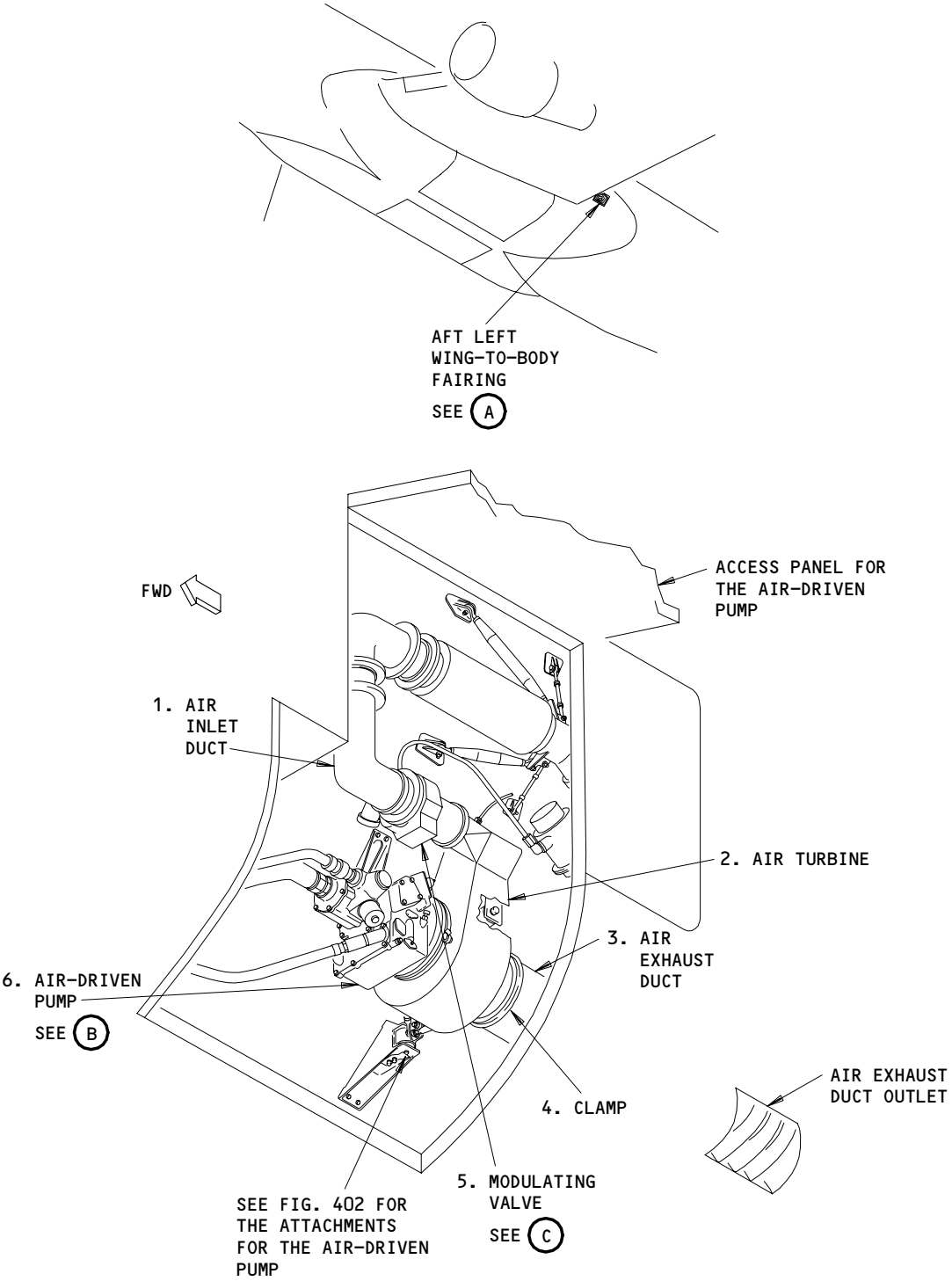
(1) Open the door for the right wheel well and install a door lock (AMM 32-00-15/201).

S 864-002

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

S 864-003

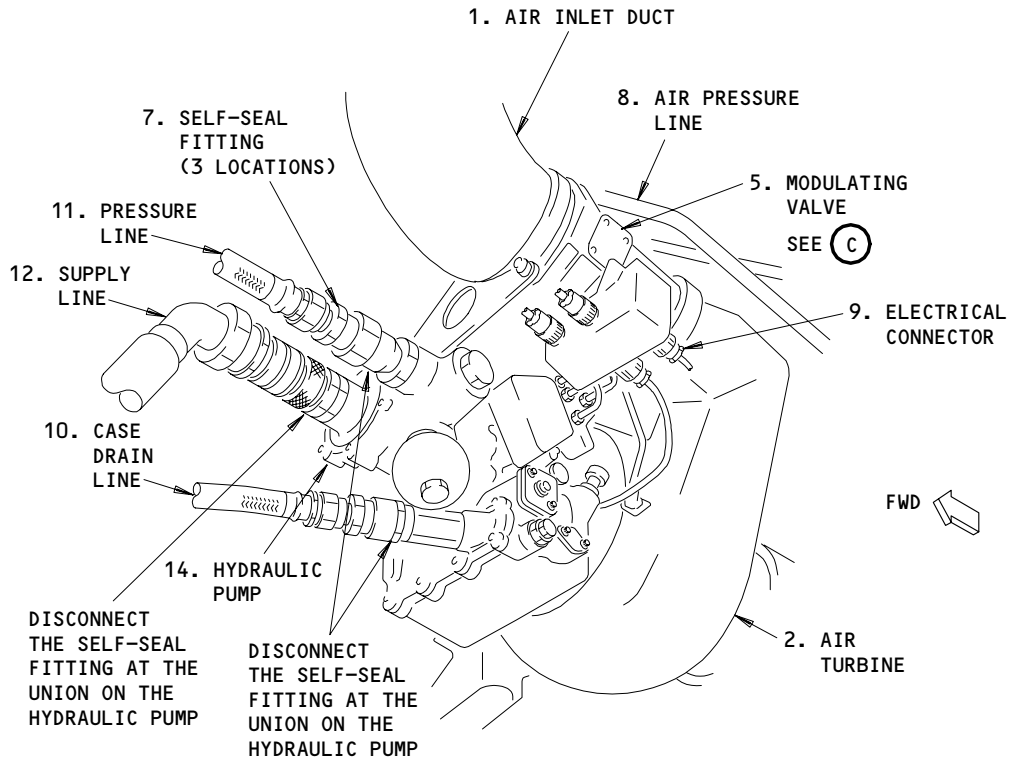
(3) Remove the pneumatic power (AMM 36-00-00/201).



AFT LEFT WING-TO-BODY FAIRING

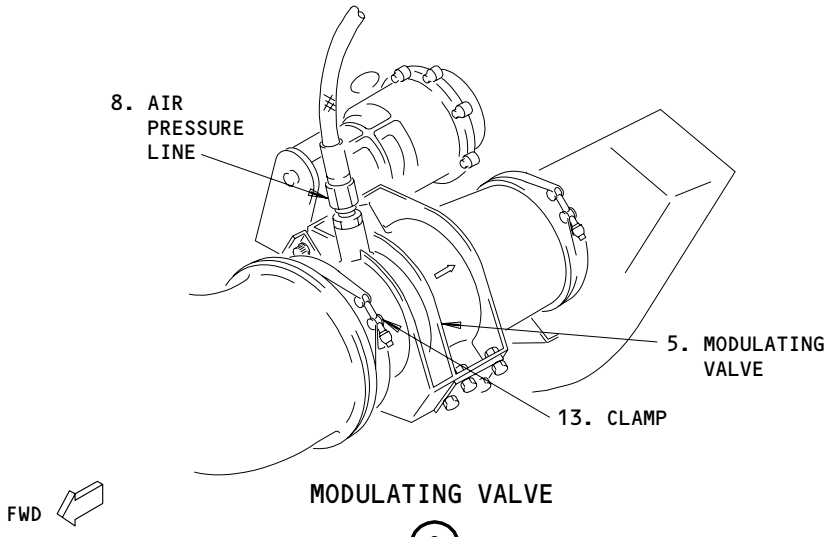
(A)

Air-Driven Pump (ADP) Installation
Figure 401 (Sheet 1)



AIR-DRIVEN PUMP

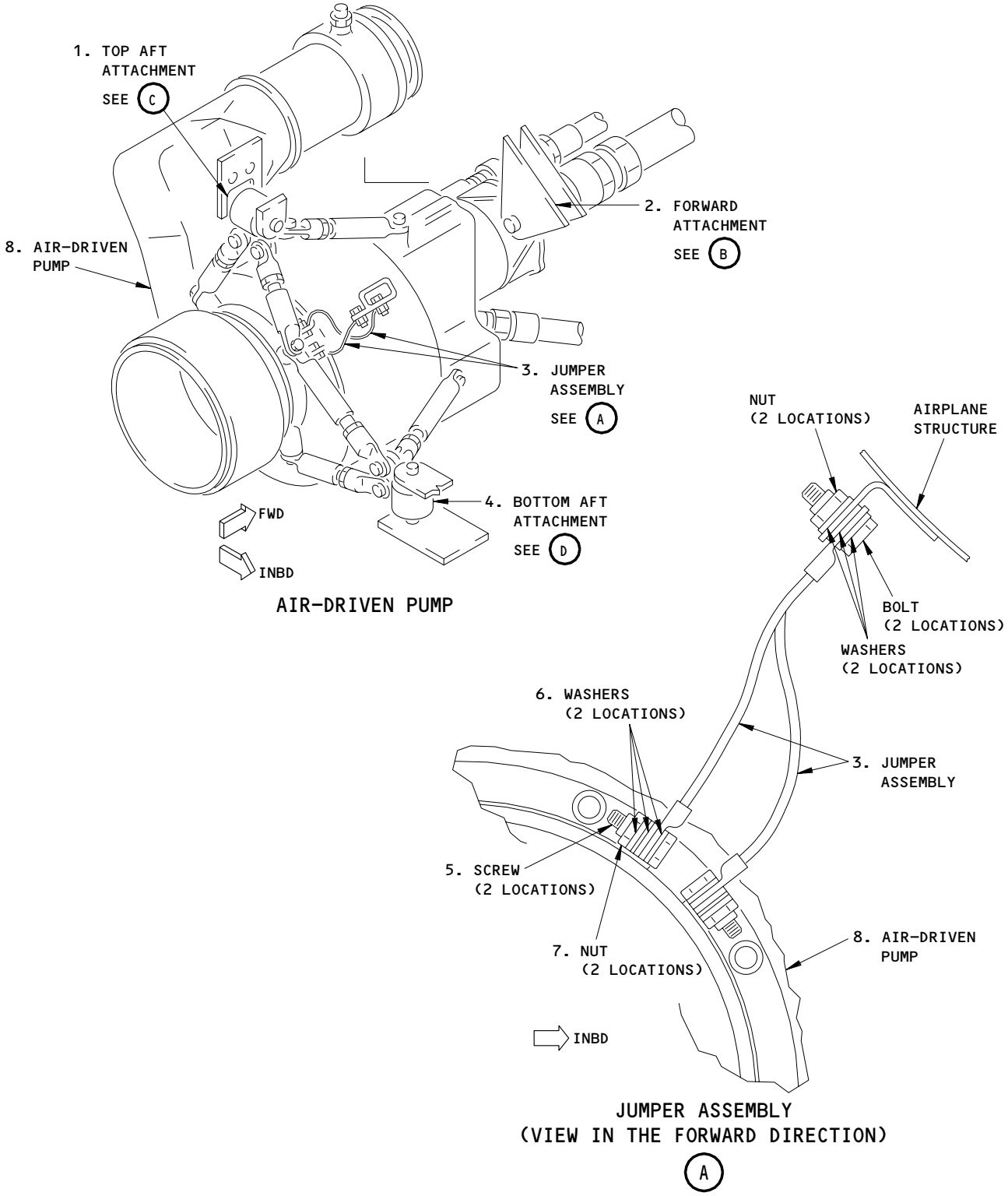
B



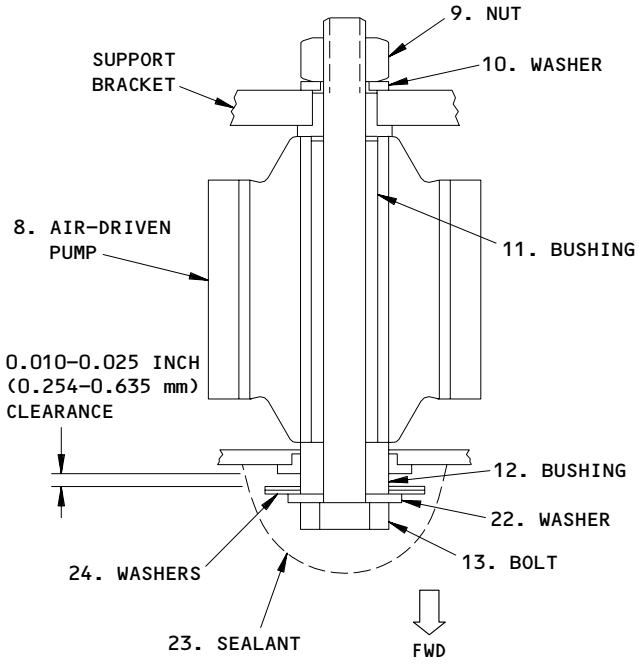
MODULATING VALVE

C

Air-Driven Pump (ADP) Installation
Figure 401 (Sheet 2)

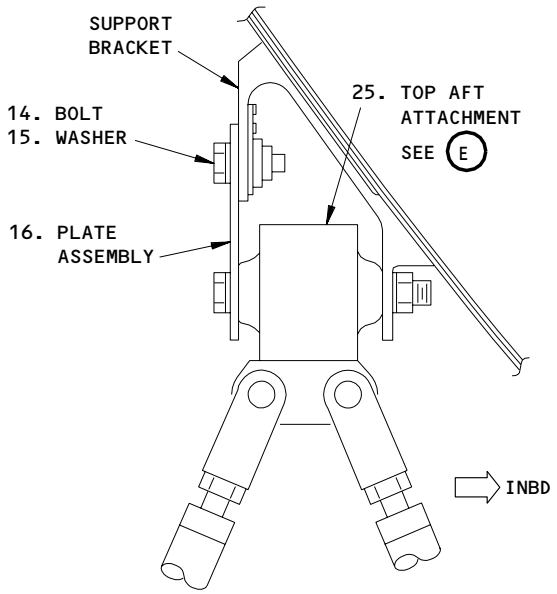


Air-Driven Pump (ADP) Attachments
Figure 402 (Sheet 1)



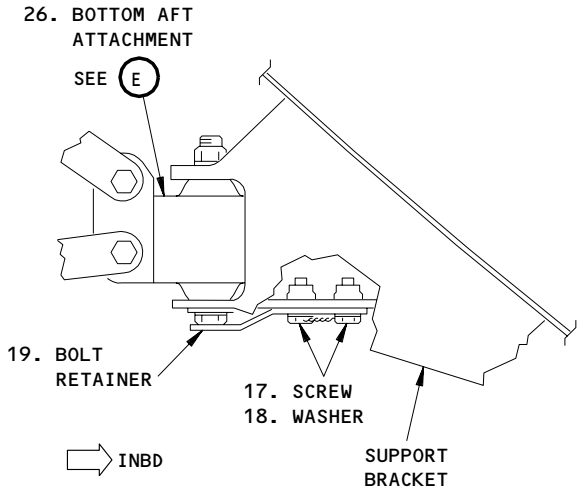
FORWARD ATTACHMENT

B



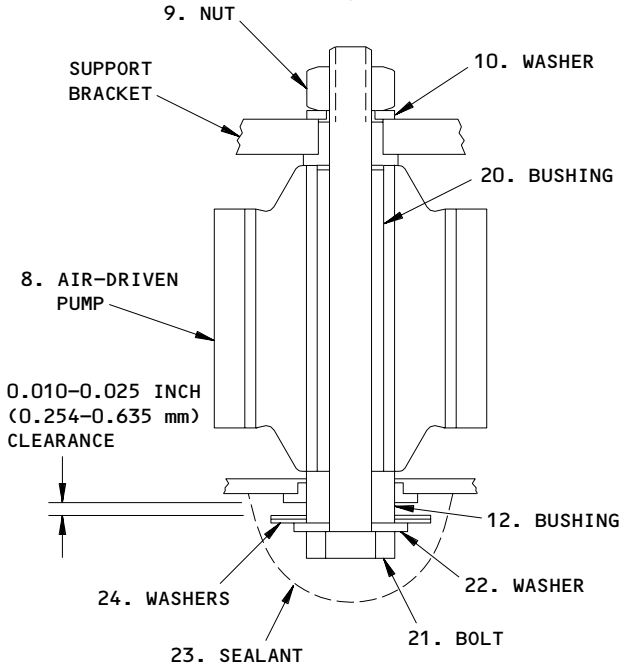
TOP AFT ATTACHMENT

C



BOTTOM AFT ATTACHMENT

D



TOP AND BOTTOM AFT ATTACHMENT

E

Air-Driven Pump (ADP) Attachments
Figure 402 (Sheet 2)

S 864-004
(4) Open this circuit breaker on the overhead panel, P11, and install a DO-NOT-CLOSE tag:
(a) 11D31, HYDRAULIC AIR PUMP

S 014-005
(5) At the aft, left wing-body fairing, open the ADP access panel, 195SL (AMM 06-41-00/201).

S 034-006
(6) Disconnect the air pressure line (8) from the ADP modulating valve (5) (Fig. 401).

S 034-007
(7) Disconnect the electrical connector (9).
(a) To prevent inadvertent damage, disconnect the wire bundles and clamps that are connected to the ADP and tubing.
1) Inspect the ADP wiring for external chafing as recommended in Service Letter 767-SL-29-28-A.

S 024-080
(8) Remove the nuts (7), the screws (5), and the washers (6) that connect the bonding jumper assemblies (3) to the ADP.

S 034-063
(9) Loosen the clamp (13) on the air inlet side of the ADP and remove the clamp (13).

S 034-008
(10) Loosen the clamp (4) on the exhaust duct (3) and slide the clamp (4) to one side.

S 034-009
(11) Disconnect the self-seal fittings (7) at the ADP and install caps on the ADP ports.

NOTE: To prevent fluid loss, do not disconnect the hydraulic lines (10, 11, 12) from the self-seal fittings (7). Disconnect the self-seal fittings only where they attach to the unions on the ADP. Do not disconnect the fittings at the B-nut near the hydraulic line.

S 494-010
(12) Install the hoist with the adapter under the ADP.

NOTE: The ADP weighs approximately 110 pounds.

S 494-011
(13) Use a strap to hold the ADP (8) to the hoist adapter (Fig. 402).

S 024-012
(14) Move the hoist up a small distance to remove the weight of the ADP from the mounting bolts.

S 034-013
(15) At the bottom aft attachment,
remove the two screws (17) from the bolt head retainer (19) and remove the retainer (19).

S 024-081
(16) At the top and bottom aft attachments,
remove the bolt (21), nut (9), washers (10), and bushings (12, 20).

NOTE: Identify the bolts (21), nuts (9), washers (10), and bushings (12, 20) for the installation procedure.

S 034-016
(17) Remove the two bolts (14), washers (15), and plate assembly (16) at the top aft attachment.

S 024-017
(18) Lower the ADP a small distance to get better access to the forward attachment.

S 034-019
(19) At the forward attachment,
remove the bolt (13), nut (9), washers (10), and bushings (11, 12).

S 024-020
(20) Lower the ADP away from the airplane and remove it from the hoist.

S 494-021
(21) Install plugs in the ADP ports.

TASK 29-11-03-424-023

3. Install the ADP for the Center Hydraulic System

A. Equipment

(1) General Boom Hoist - A20001-79 (Recommended)
(2) Hoist Adapter - A29001-1
(3) Bonding Meter

B. Consumable Materials

(1) D00633 Grease - BMS 3-33 (Preferred)
(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(3) D00015 Grease - BMS 3-24 (Alternate)
(4) A00247 Sealant - BMS 5-95
(5) B00316 Solvent - Aliphatic Naphtha
(6) G00034 Cotton Wiper - Cheesecloth BMS 15-5

C. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	6	Pump Assembly	29-11-03	01	240
	13	Clamp	36-11-01	60	140
402	3	Jumper Assembly	29-11-03	01	4
	5	Screw			12
	6	Washer			14
	7	Nut			16
	9	Nut			80
	10	Washer			75,78
	11	Bushing			95
	12	Bushing			85
	13	Bolt			60
	14	Bolt			53
	15	Washer			65
	16	Plate Assembly			100
	17	Screw			54
	18	Washer			70
	19	Retainer			110
	20	Bushing			90
	21	Bolt			55
	22	Washer			68
	24	Washers			73

D. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 12-12-01/301, Hydraulic Systems
(3) AMM 12-13-05/301, Air Driven Pump
(4) AMM 12-25-01/301, Exterior Cleaning

(5) AMM 20-10-21/601, Electrical Bonding
(6) AMM 20-10-22/701, Metal Surfaces -Cleaning/Painting
(7) AMM 24-22-00/201, Electrical Power - Control
(8) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(9) AMM 29-11-00/501, main (Left, Right and Center) Hydraulic Systems
(10) AMM 32-00-15/201, Main Gear Door Locks
(11) AMM 36-00-00/201, Pneumatic - General

E. Access

(1) Location Zones

195	Wing to Body - aft upper half
211/212	Control Cabin
730	Right Main Landing Gear and Doors

(2) Access Panel

195SL	Air Turbine Driven Hydraulic Pump

F. Install the ADP (Fig. 402)

S 494-024
(1) Put the ADP on the lift adapter of the hoist.

S 494-025
(2) Use a strap to hold the ADP to the hoist adapter (Fig. 402).

S 424-026
(3) Move the ADP into the mounting position with the hoist.

S 644-027
(4) Apply a thin layer of grease to all mating surfaces of the bolt (13) and bushings (11, 12).

S 434-028
(5) Install the bushing (12) with grease.

S 434-029
(6) At the forward attachment, put the bushings (11, 12) and washers (10, 22) in the correct position.

S 434-031
(7) Install washers (24) to get the gap shown.

S 434-032
(8) Insert a bolt (13) and tighten the nut (9) to 95-135 pound-inches more than the torque necessary to turn the nut on the bolt.

S 824-033
(9) Adjust the hoist to align the ADP to the top and bottom aft attachments.

S 434-034
(10) At the top aft attachment, install the plate assembly (16) with two washers (15) and bolts (14) and install new safety wire (AMM 20-10-23/401).

S 644-035
(11) Apply a thin layer of grease to all mating surfaces of the bolt (21) and bushings (12, 20).

S 434-036
(12) Install a bushing (12) with grease.

S 434-037
(13) At the top and bottom aft attachments, put the bushings (12, 20) and washers (10, 22) in the correct position.

S 434-039
(14) Install washers (24) to get the gap shown.

S 434-040
(15) Insert a bolt (21) and tighten the nut (9) to 95-135 pound-inches more than the torque necessary to turn the nut on the bolt.

S 624-041
(16) Apply a fillet seal at the head end of the bolts (13, 21).

S 434-042
(17) At the bottom aft attachment, put the bolt retainer (19) in its position and install with washers (18) and screws (17) and install new safety wire (AMM 20-10-23/401).

S 094-043
(18) Remove the strap that holds the ADP to the hoist adapter and remove the hoist.

S 434-044
(19) Connect the self-seal fittings (7), to the ADP (6) (Fig. 401).
  (a) Torque the pressure line self-seal fitting (11) to the ADP (6) 500-700 pound-inches.

(b) Torque the supply line self-seal fitting (12) to the ADP (6) 400-500 pound-inches.
(c) Torque the case drain line self-seal fitting (10) to the ADP (6) 250-300 pound inches.

S 104-045

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

(20) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 434-046
(21) Connect the air pressure line (8) to the ADP modulating valve (5).

S 424-079
(22) To connect the bonding jumpers to the ADP, do these steps:
(a) Use the solvent and the cheesecloth to clean and dry the bonding surfaces (AMM 20-10-22/701).

NOTE: The bonding surfaces must be clean and dry to provide a good electrical ground path.

(b) Install the washers (6), the screws (5), and the nuts (7) that connect the bonding jumpers to the ADP.
(c) Use the bonding meter to measure the resistance between each bonding jumper terminal and the ADP near the bonding jumper connection. (AMM 20-10-21/601).

NOTE: If necessary, you can remove a small area of the surface finish to make the measurement.

(d) If the resistance is greater than 0.0025 ohms, then disassemble the bonding jumper connection, repeat the cleaning and assembly steps, and measure the resistance again.
(e) If you removed some of the surface finish from the ADP, then repair the surface finish.

S 434-047
(23) Connect the electrical connector (9) to the modulating valve (5).
(a) Reconnect the wire bundles and clamps to the ADP and tubing.
1) Reroute ADP wiring to prevent external chafing as recommended in Service Letter 767-SL-29-28-A. Make sure to keep wires at least 0.5-inch from the ADP assembly and supporting structure.

S 434-048
(24) Put the exhaust duct (3) in its position and install the clamp (4).

S 434-049
(25) Move the inlet duct clamp (13) to the inlet joint and tighten the clamp (13).

S 214-050
(26) Examine the oil level in the ADP gearbox and add oil if it is necessary (AMM 12-13-05/301).

S 614-051
(27) Do the servicing steps to the reservoir for the center hydraulic system (AMM 12-12-01/301).

S 864-052
(28) Pressurize the reservoir for the center hydraulic system (AMM 29-11-00/201).

S 864-053
(29) Supply electrical power (AMM 24-22-00/201).

S 864-054
(30) Supply pneumatic power (AMM 36-00-00/201).

S 704-055
(31) Do the ADP Overspeed Shutdown Test (AMM 29-11-00/501).

NOTE: If the ADP does not operate, reset the ADP TEST/RESET switch (AMM 29-11-00/501).

S 214-056
(32) Make sure there are no leaks at the hydraulic connections to the ADP.

S 864-066
(33) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, in the AUTO position.

S 864-067
(34) Make sure these circuit breakers on the P11 overhead panel are closed:
(a) 11C10, L/E SLAT POS IND
(b) 11C15, FLAP SLAT ELEC UNIT POS SENSOR 1
(c) 11C16, FLAP SLAT ELEC UNIT 1 CONT
(d) 11G15, FLAP SLAT ELEC UNIT POS SENSOR 2
(e) 11G16, FLAP SLAT ELEC UNIT 2 CONT
(f) 11G22, FLAP SLAT ELEC UNIT POS SENSOR 3
(g) 11G23, FLAP SLAT ELEC UNIT 3 CONT

S 864-068
(35) Make sure the slats and flaps are in the fully retracted (zero degree) position.

S 864-069
(36) Make sure the speed brakes are stowed.

S 864-070
(37) Make sure the L, R, and C AIR SUPPLY ISLN valves are open.

S 864-077
(38) Make sure air conditioning packs, cargo heat, and anti-ice are off.

S 864-071

WARNING: SLATS AND FLAPS WILL EXTEND WHEN THE FLAP HANDLE IS REPOSITIONED. TO AVOID INJURY TO PERSONNEL, MAKE SURE THE SLAT AND FLAP AREAS ARE CLEAR BEFORE MOVING THE FLAP HANDLE.

(39) Put the FLAP handle to the 5-30 position, on the P10 control stand.

S 864-073
(40) Make sure system pressure remains above 2500 psi throughout flap motion.

NOTE: A momentary pressure drop does not indicate test failure.

S 864-082
(41) Put the FLAP handle in the zero (FLAPS UP) detent position.

S 864-074
(42) Put the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the OFF position.

S 214-075
(43) Make sure the PRESS light for the ADP, on the hydrualic control panel, is illuminated for 1 to 3 seconds after the ADP switch is placed in the OFF position.

S 214-076
(44) Make sure the C HYD PRESS indication on EICAS ELEC/HYD display reads 0 to 160 psi.

S 174-064
(45) If you replaced the ADP because of a mechanical failure or other condition which could add contamination, you must flush the hydraulic system (AMM 29-11-00/201).

S 104-057

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

(46) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-058

(47) Close the ADP access panel, 195SL, at the aft, left wing-body fairing (AMM 06-41-00/201).

S 414-059

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(48) Remove the door lock for the landing gear door and close the door for the right wheel well (AMM 32-00-15/201).

S 864-060

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

S 864-061

(50) Remove the pneumatic power if it is not necessary (AMM 36-00-00/201).

AIR DRIVEN PUMP (ADP) MODULATING VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the modulating valve for the air driven pump (ADP). The other task installs the modulating valve for the ADP.

TASK 29-11-04-024-001

2. Remove the Modulating Valve for the Air Driven Pump (ADP)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 36-00-00/201, Pneumatics - General
   B. Access
      (1) Location Zones
          195 Wing to Body - Aft Upper Half (Left)
          211/212 Control Cabin

      (2) Access Panel
          195SL Air Driven Pump

   C. Prepare for the Removal

      S 864-002
      (1) Move the HYD PUMP C AIR switch on the hydraulic control panel to the OFF position.

      S 864-003
      (2) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11L9, LEFT ENGINE OIL PRESS
              or LEFT ENGINE OIL PRESS EICAS REF
          (c) 11L36, RIGHT ENGINE OIL PRESS
              or RIGHT ENGINE OIL PRESS EICAS REF

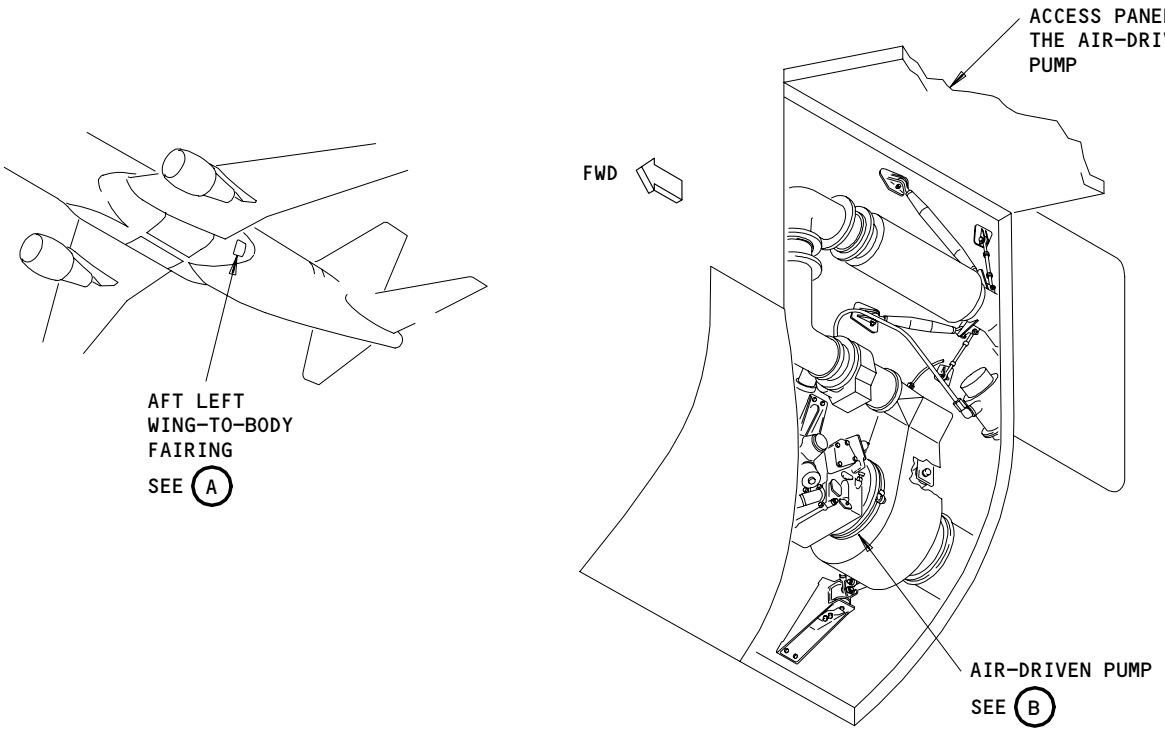
      S 864-004
      (3) Remove the power from the pneumatic system (AMM 36-00-00/201).

      S 014-005
      (4) Open the access panel for the ADP, 195SL (AMM 06-41-00/201).
   D. Remove the Modulating Valve (Fig. 401)

      S 034-006
      (1) Disconnect the electrical connectors, for the ADP and the monopole sensor, at the receptacle box on the modulating valve.

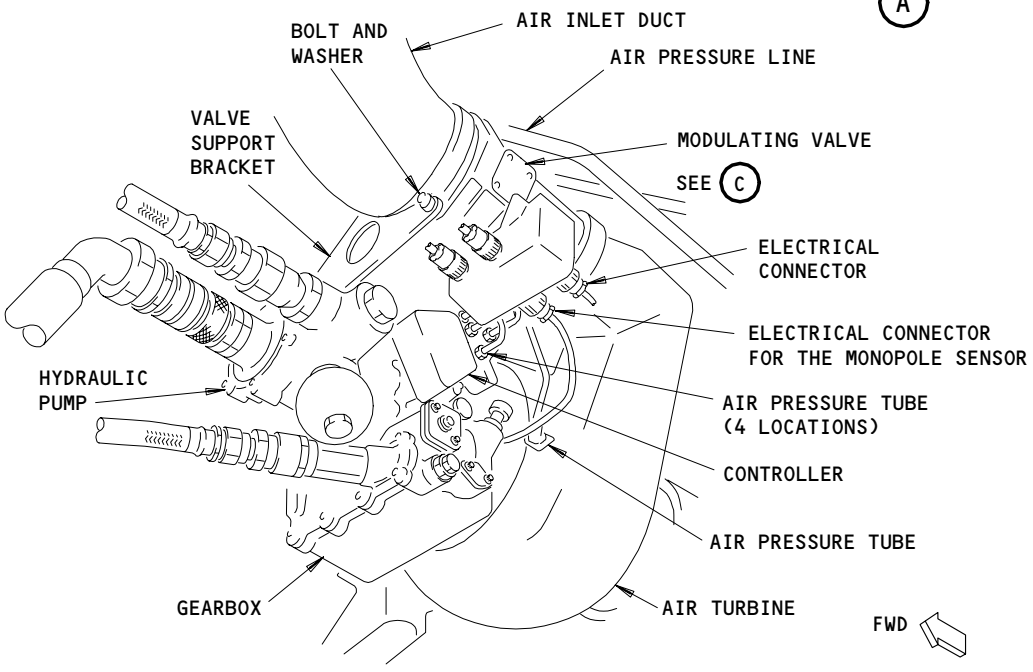
      S 034-007
      (2) Disconnect the electrical connector for the ADP overspeed switch.

          NOTE: The electrical connector is on the top of the air turbine.



AFT LEFT WING-TO-BODY FAIRING

A



AIR-DRIVEN PUMP

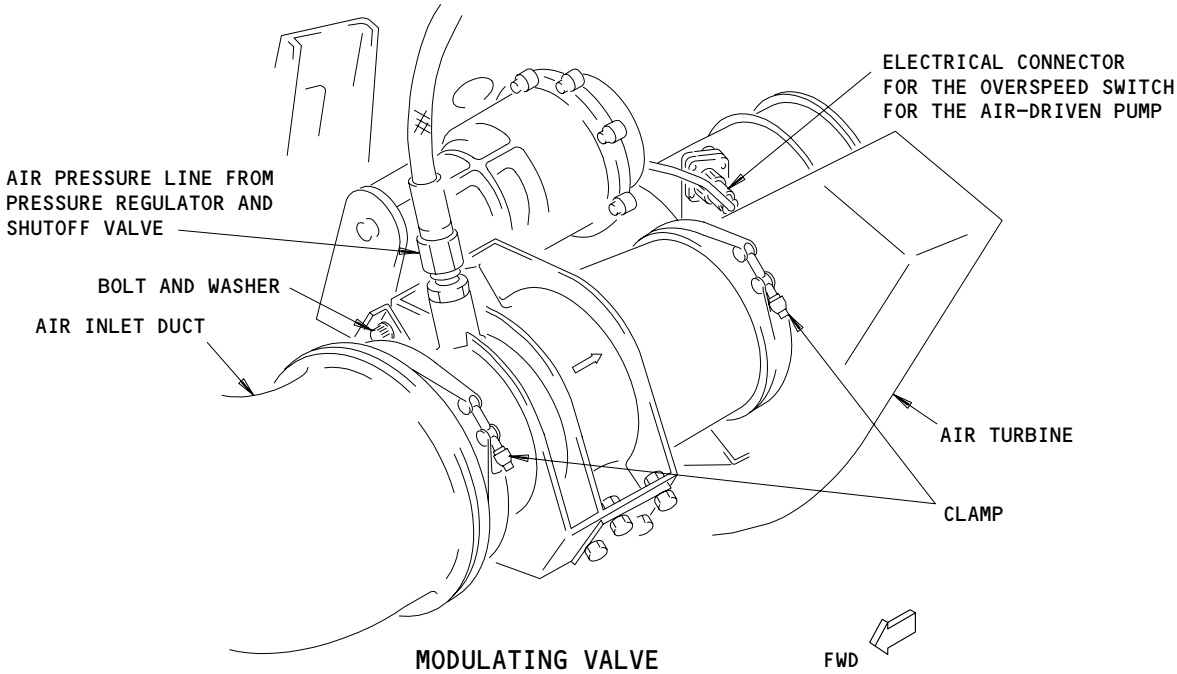
B

Modulating Valve Installation
Figure 401 (Sheet 1)

S 034-008
(3) Remove the wire bundle clamp, from the valve support bracket, at the joint between the gearbox and the air turbine.

S 034-009
(4) Disconnect the air pressure tube, at the connection, on the forward side of the air turbine.

S 034-010
(5) Disconnect the four air pressure tubes, at the controller, on the side of the gearbox.



C

Modulating Valve Installation
Figure 401 (Sheet 2)

S 034-011
(6) Remove the clamp that holds the air inlet duct to the modulating valve.

S 034-012
(7) Remove the bolts that hold the valve support bracket to the modulating valve.

S 034-013
(8) Remove the clamp that holds the modulating valve to the air turbine.

S 024-014
(9) Remove the modulating valve.

S 034-015
(10) Remove the bolts and retainers that hold the air pressure tubes to the modulating valve.

S 034-016
(11) Remove the air pressure tubes.

TASK 29-11-04-424-017

3. Install the Modulating Valve for the Air Driven Pump (ADP)

A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 36-00-00/201, Pneumatic

B. Access
(1) Location Zones

195	Wing to Body - Aft Upper Half (Left)
211/212	Control Cabin

(2) Access Panel

195SL	Air Driven Pump

C. Install the Modulating Valve (Fig. 401)

S 434-018
(1) Install the O-rings on the modulating valve end of the air pressure tubes.

S 434-019
(2) Install the end of each air pressure tube in a port in the modulating valve.

S 434-020
(3) Put the retainer on the end of each air pressure tube.

S 434-021
(4) Loosely install the bolt in the retainer.

S 434-022
(5) Set the modulating valve in its position.

S 434-047
(6) Loosely install the clamp at the joint between the modulating valve and the air turbine.

S 434-023
(7) Install the washers between the valve support bracket and the modulating valve at the attach points.

NOTE: This will give a 0.005 inch distance between the valve support bracket and the modulating valve body.

S 434-024
(8) Install the bolts to attach the modulating valve to the valve support bracket.

S 434-025
(9) Connect the four air pressure tubes, at the controller, on the side of the gearbox.

S 434-026
(10) Connect the air pressure tube at the forward side of the air turbine.

S 434-027
(11) Tighten the bolt in the retainer on the modulating valve end of each air pressure tube.

S 434-028
(12) Tighten the clamp at the joint between the modulating valve and the air turbine.

S 434-029
(13) Install the clamp to hold the air inlet duct to the modulating valve.

S 434-030
(14) Connect the electrical connector for the ADP overspeed switch.

NOTE: The electrical connector is on the top of the air turbine.

S 434-031
(15) Install the wire bundle clamp, on the valve support bracket, at the joint between the gearbox and the air turbine.

S 434-032
(16) Connect the electrical connectors, for the ADP and monopole sensor, at the receptacle box on the modulating valve.

D. Put the Airplane Back to Its Usual Condition

S 864-033
(1) Supply electrical power (AMM 24-22-00/201).

S 864-034
(2) Supply pneumatic power (AMM 36-00-00/201).

S 864-035
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L9, LEFT ENGINE OIL PRESS
or LEFT ENGINE OIL PRESS EICAS REF

(c) 11L36, RIGHT ENGINE OIL PRESS
or RIGHT ENGINE OIL PRESS EICAS REF
(d) EICAS (6 locations)

S 864-036
(4) Push the ELEC/HYD switch on the EICAS maintenance panel that is on the right side panel, P61.

S 864-037
(5) Move the HYD PUMPS C ELEC 1 and 2 switches on the hydraulic control panel to the OFF position.

S 864-038
(6) Move the HYD PUMPS C AIR switch on the hydraulic control panel to the AUTO position.

S 214-040
(7) Make sure the ADP starts and the center system pressure goes to 2800-3200 psi.

S 864-041
(8) Move the HYD PUMPS C AIR switch on the hydraulic control panel to the ON position.

S 214-042
(9) Make sure the center system pressure becomes stable at 2800 to 3200 psi.

S 864-043
(10) Move the HYD PUMPS C AIR switch on the hydraulic control panel to the OFF position.

S 414-044
(11) Close the access panel for the ADP, 195SL (AMM 06-41-00/201).

S 864-045
(12) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 864-046
(13) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).

ENGINE-DRIVEN PUMP (EDP) - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:
      (1) Remove the engine-driven pump (EDP).
      (2) Install the engine-driven pump (EDP).

      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. Pump operation for more than 5 minutes without hydraulic fluid requires pump replacment due to likely damage.
   C. 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 29-11-00/201).

      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 Table 601 limits, AMM 29-00-00/601.

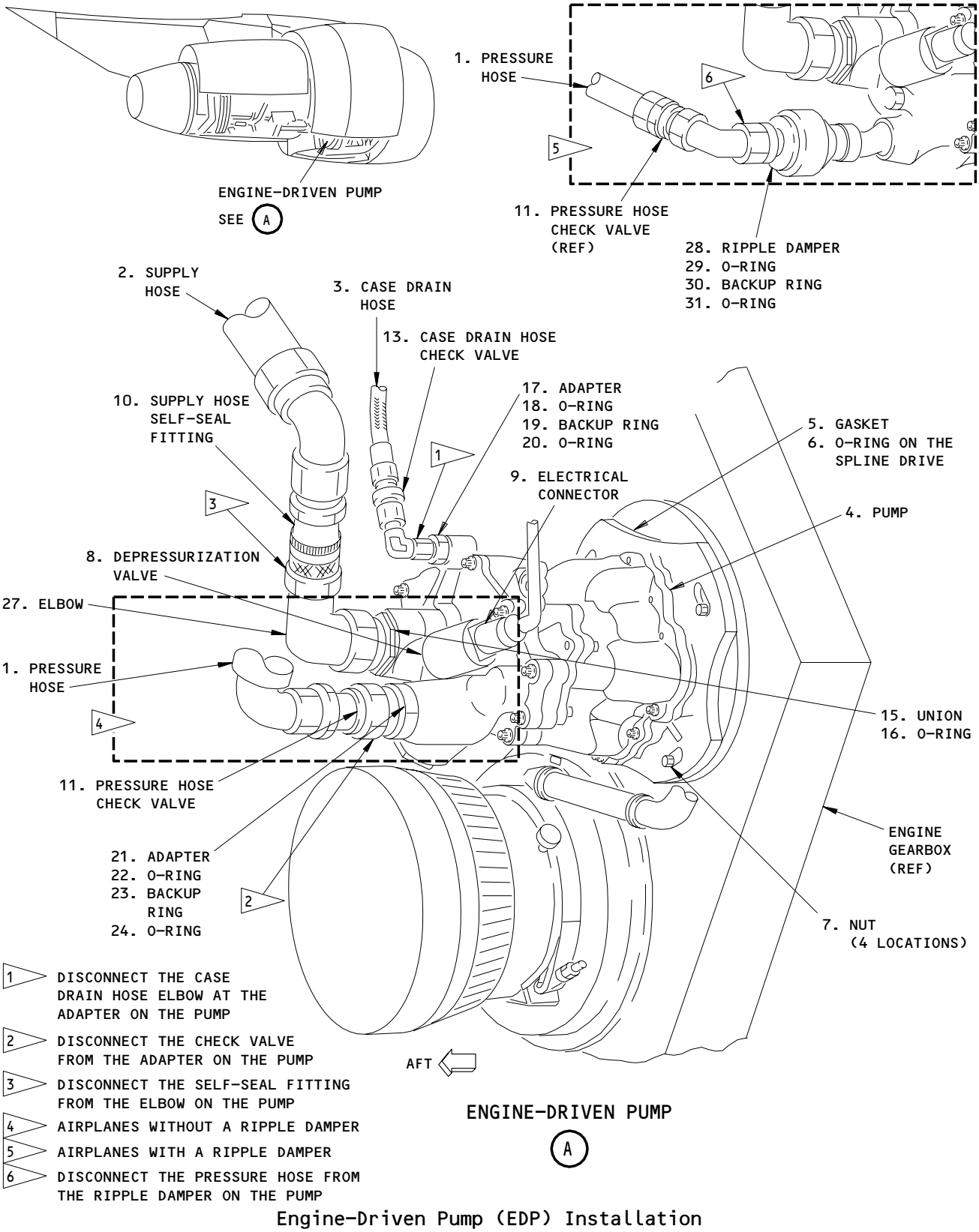
TASK 29-11-05-004-006

2. Remove the Engine-Driven Pump (EDP) (Fig. 401)
   A. Equipment
      (1) Container (for hydraulic fluid), 1-gallon capacity - Commercially Available
   B. References
      (1) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (2) AMM 71-11-04/201, Fan Cowl Panels
      (3) AMM 71-11-06/201, Core Cowl Panels
      (4) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones
          411/421 Engine

   D. Procedure

      S 864-001
      (1) Remove the pressure from the left and right hydraulic systems and reservoirs (AMM 29-11-00/201).

      S 864-002
      (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L14, HYDRAULIC L ENG PUMP DEPRESS
          (b) 11L23, HYDRAULIC R ENG PUMP DEPRESS



Engine–Driven Pump (EDP) Installation
Figure 401

S 014-008
(3) Open the fan cowl panels (AMM 71-11-04/201).

S 864-009

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.

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

S 014-010
(5) Open the core cowl panels (AMM 71-11-06/201).

S 014-013

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Open the thrust reverser (AMM 78-31-00/201).

S 034-003
(7) Disconnect the electrical connector (9) from the depressurization valve (8).

S 094-004
(8) Hold a container below the pump (4) to catch the hydraulic fluid if it drains from the pump hydraulic connections.

S 034-005

CAUTION: BE CAREFUL WHEN YOU DISCONNECT THE SUPPLY HOSE TO PREVENT KINKS AND A CLOSED HOSE. DO NOT COIL THE HOSE. A CLOSED HOSE CAN CAUSE FAILURE OF THE PUMP.

(9) AIRPLANES WITHOUT A RIPPLE DAMPER;
Disconnect the check valve (11) from the adapter (21) on the pump (4).

S 024-116
(10) AIRPLANES WITH A RIPPLE DAMPER;
Disconnect the check valve (11) from the ripple damper (28) on the pump.

NOTE: Do not disconnect the hydraulic hoses (1, 2, 3) from the check valves (11, 13) or the self-seal fitting (10). If you disconnect these hoses, hydraulic fluid can drain from the hoses.

S 034-114
(11) Disconnect the self-seal fitting (10) from the elbow (27) on the pump (4).

S 034-017
(12) Disconnect the case drain hose (3) from the adapter (17) on the pump (4).

S 024-022

CAUTION: DO NOT LET THE HYDRAULIC FLUID FLOW INTO THE GEARBOX. CONTAMINATION BY HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE GEARBOX.

(13) Loosen the four nuts (7) which attach the pump (4) to the engine gearbox approximately three turns.

NOTE: If you must loosen the nuts (7) more than three turns, hit the shell of the nut to release the self-locking property of the nut.

S 024-023
(14) Turn the pump (4) clockwise until the nuts (7) can go through the larger ends of the slots on the pump.

S 024-025
(15) Remove the pump (4) from the engine gearbox.

S 034-026
(16) Remove the elbow (27) at the supply port of pump (4).

S 034-105

(17) AIRPLANES WITH A RIPPLE DAMPER;
Remove the ripple damper (28) from the pressure port of the pump (4).

S 034-106

(18) AIRPLANES WITHOUT A RIPPLE DAMPER;
Remove the adapter (21) from the pressure port of the pump (4).

S 034-031

(19) Remove the union (15) from the supply port on the pump (4).

S 034-032

(20) Remove the adapter (17) at the case drain port of the pump (4).

TASK 29-11-05-404-024

3. Install the Engine-Driven Pump (EDP) (Fig. 401)

A. Consumable Materials

(1) D00148 Hydraulic Fluid, BMS3-11, Type IV, Class I

(2) Engine Lubricating Oil:

(a) D00071 Lubricating Oil - MIL-L-7808

(b) D00068 Lubricating Oil - MIL-L-23699

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Pump	29-11-05	02	75
	5	Gasket			10
	6	Packing			40
	15	Union			20
	16	Packing (O-Ring)			35
	17	Adapter			25
	18	Packing (O-Ring)			45
	19	Ring			65
	20	Packing (O-Ring)			50
	21	Adapter			30
	22	Packing (O-Ring)			55
	23	Ring			70
	24	Packing (O-Ring)			60
	27	Elbow	29-11-51	25	110
	28	Dampener	29-11-05	02	120
	29	Packing (O-Ring)			55
	30	Ring			70
	31	Packing (O-Ring)			60

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 71-00-00/501, Power Plant - General
(5) AMM 71-11-04/201, Fan Cowl Panels
(6) AMM 71-11-06/201, Core Cowl Panels
(7) AMM 78-31-00/201, Thrust Reverser System,

D. Access
(1) Location Zones
411/421 Engine

E. Procedure

S 644-034
(1) Lubricate the components which follow with hydraulic lubricant or hydraulic fluid:
(a) AIRPLANES WITHOUT A RIPPLE DAMPER;
O-rings (16, 18, 20, 22, 24)
(b) AIRPLANES WITH A RIPPLE DAMPER;
O-rings (16, 18, 20, 29, 31)
(c) AIRPLANES WITHOUT A RIPPLE DAMPER;
Backup rings (19, 23)
(d) AIRPLANES WITH A RIPPLE DAMPER;
Backup rings (19, 30)
(e) The threads on the union (15)
(f) AIRPLANES WITHOUT A RIPPLE DAMPER;
The threads on the adapter (21)
(g) AIRPLANES WITH A RIPPLE DAMPER;
The threads on the ripple damper (28)

S 434-035
(2) Install the O-ring (16) on the union (15).

S 434-107
(3) AIRPLANES WITHOUT A RIPPLE DAMPER;
Install the O-rings (22, 24) and backup ring (23) on the adapter (21).

S 424-117
(4) AIRPLANES WITH A RIPPLE DAMPER;
Install the O-rings (29, 33) and backup ring (30) on the ripple damper (28).

S 434-038
(5) Install the O-rings (18, 20) and backup ring (19) on the adapter (17).

S 434-042
(6) Install the union (15) in the supply port of the pump (4). Tighten the union (15) to 855-945 pound-inches (95-106 N.-m.).

S 434-043
(7) Install the adapter (21) in the pressure port of the pump (4). Tighten the adapter (21) to 713-787 pound-inches (79-88 N.-m.).

S 434-108
(8) AIRPLANES WITHOUT A RIPPLE DAMPER;
Install the adapter (21) in the pressure port of the pump (4). Tighten the adapter (21) to 713-787 pound-inches (79-88 N.-m.).

S 434-109
(9) AIRPLANES WITH A RIPPLE DAMPER;
Install the ripple damper (28) in the pressure port of the pump (4). Tighten the ripple damper (28) to 713-787 pound-inches (79-88 N.-m.)

S 434-049
(10) Install the elbow (27) on the union (15) in the supply port of the pump (4). Tighten the elbow (27) to 855-945 pound-inches (95-106 N.-m.).

S 644-050
(11) Lubricate the O-ring (6) with engine oil.

S 434-051

CAUTION: MAKE SURE YOU INSTALL THE O-RING ON THE PUMP DRIVE SPLINE. THE O-RING PREVENTS LEAKAGE OF OIL FROM THE ENGINE GEARBOX.

(12) Install a new O-ring (6) on the pump drive spline.

NOTE: Do not put grease on the pump drive shaft, the engine oil lubricates the drive shaft spline.

S 214-052
(13) Make sure the seal drain adjacent to the pump (4) on the engine gearbox is clear.

S 144-053
(14) If necessary, clean the seal drain on the engine gearbox.

S 644-054
(15) Lubricate the surfaces of the pump (4) and the engine gearbox with silicone grease.

NOTE: The grease will prevent a bond between the gasket (5) and the surfaces of the pump (4) and the engine gearbox.

S 214-055
(16) Make sure the gasket (5) is in good condition.

S 434-056
(17) If necessary, install a new gasket (5) on the engine gearbox.

S 614-057
(18) If the pump (4) is not filled with hydraulic fluid, add fluid through the case drain port.

S 424-062
(19) Put the pump (4) on the engine gearbox and carefully engage the pump drive shaft with the engine drive shaft.

S 424-059
(20) Turn the pump (4) to let the nuts (7) go through the larger ends of the slots on the pump.

S 424-060
(21) Turn the pump (4) counterclockwise until the small ends of the slots in the pump are hard against the studs on the engine gearbox.

S 434-061
(22) Tighten the nuts (7) to 260-320 pound-inches (29-36 N.-m).

S 434-063

CAUTION: DO A CHECK OF THE EDP SUPPLY HOSE FOR A KINKED OR CLOSED CONDITION. DAMAGE TO THE HOSE IS NOT EASY TO FIND BECAUSE OF THE SHEATHING WHICH COVERS THE HOSE. A KINKED OR CLOSED HOSE CAN CAUSE FAILURE OF THE EDP.

MAKE SURE THE SELF-SEAL FITTINGS ON THE HYDRAULIC HOSES ARE TIGHTENED CORRECTLY. FITTINGS WHICH DO NOT HAVE SUFFICIENT TORQUE CAN LIMIT THE FLOW OF HYDRAULIC FLUID.

(23) Do the steps that follow to connect the hydraulic hoses (1, 2, 3) to the pump (4).

CAUTION: MAKE SURE THAT THE HYDRAULIC HOSES DO NOT RUB ON THE ADJACENT ENGINE COMPONENTS. IF THE HOSES RUB ON THE ENGINE COMPONENTS, THE WEAR CAN CAUSE LEAKAGE OF HYDRAULIC FLUID.

(a) Put each hydraulic hose (1, 2, 3) in a position which gives the maximum clearance between the hoses and the adjacent engine components.

NOTE: Make sure the minimum clearance between the EDP hoses and the engine components is 0.50 inches.

(b) Hold the hydraulic hoses (1, 2, 3) in position until you tighten the hose fittings.
(c) Tighten the self-seal fitting (10) on the supply hose (2) to 855-945 pound-inches (95-106 N.-m.).
(d) Tighten the elbow on the case drain hose (3) to 266-294 pound-inches (29-33 N.-m.).

NOTE: When you replace the case drain line together with the case drain check valve, please make sure the case drain check valve is installed near the EDP connection so that the flow direction arrow shows the flow out of the EDP. Otherwise the case drain check valve installed in the wrong place can block the fluid flow in the case drain and cause the EDP fault.

(e) AIRPLANES WITH A RIPPLE DAMPER;
Tighten the elbow on the pressure hose (1) to 713-787 pound-inches (79-88 N.-m.)
(f) AIRPLANES WITHOUT A RIPPLE DAMPER;
Tighten the check valve (11) on the pressure hose (1) to 713-787 pound-inches (79-88 N.-m.).

S 434-064
(24) Connect the electrical connector (9) to the pump depressurization valve (8).

S 614-067
(25) Make sure the hydraulic reservoir is full (AMM 12-12-01/301).

S 864-068
(26) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L14, HYDRAULIC L ENG PUMP DEPRESS
(b) 11L23, HYDRAULIC R ENG PUMP DEPRESS

S 114-069

CAUTION: QUICKLY CLEAN ALL HYDRAULIC FLUID FROM THE GEARBOX SURFACES. HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE ENGINE GEARBOX HOUSING.

(27) Clean all hydraulic fluid from the engine and the engine area (AMM 12-25-01/301).

S 864-070

(28) Run the engine (AMM 71-00-00/501).

S 864-071

(29) Make sure these circuit breakers on the P11 panel are closed:
(a) 11L9, LEFT ENGINE OIL PRESS
or LEFT ENGINE OIL PRESS EICAS REF
(b) 11L36, RIGHT ENGINE OIL PRESS
or RIGHT ENGINE OIL PRESS EICAS REF
(c) EICAS (6 locations)

S 864-203

(30) Push the ELEC/HYD switch on the EICAS maintenance panel (P61) to show the ELEC/HYD Maintenance page on the lower EICAS display unit (P2 panel).

S 214-073

(31) Make sure the hydraulic system becomes stable at 2800 to 3200 psi.

S 214-079

(32) Make sure there are no leaks at the hydraulic hose or engine gearbox connections to the pump (4).

S 864-080

(33) Push the L (R) PRIMARY HYD PUMPS ENG switch to the OFF position.

S 864-074

(34) Let the hydraulic system pressure decrease.

S 214-075

(35) Make sure the engine driven pump PRESS indicator light comes on.

S 864-076

(36) Push the L (R) PRIMARY HYD PUMPS ENG switch to the ON position.

S 214-077

(37) Make sure the hydraulic pressure becomes stable at 2800 to 3200 psi.

S 214-078

(38) Make sure the engine driven pump PRESS indicator light goes off.

S 864-081
(39) If operation is not necessary, stop engine run (AMM 71-00-00/501).

S 414-119

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(40) Close the thrust reverser (AMM 78-31-00/201).

S 414-082
(41) Close the core cowl panels (AMM 71-11-06/201).

S 864-085
(42) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 414-088
(43) Close the fan cowl panels (AMM 71-11-04/201).

S 174-090
(44) If you replace the pump (4) because of mechanical failure, flush the left or right hydraulic system (AMM 29-11-00/201).

ENGINE-DRIVEN PUMP (EDP) SUPPLY SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the EDP supply shutoff valve. The second task installs the EDP supply shutoff valve.

TASK 29-11-06-004-001

2. Remove the EDP Supply Shutoff Valve (Fig. 401)
   A. Equipment
      (1) Container for hydraulic fluid - commercially available, approximately 5-gallon capacity
   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 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones
          437/447 Aft Nacelle Strut Fairing

      (2) Access Panels
          437BL/437BR Hydraulic System
          447BL/447BR Hydraulic System

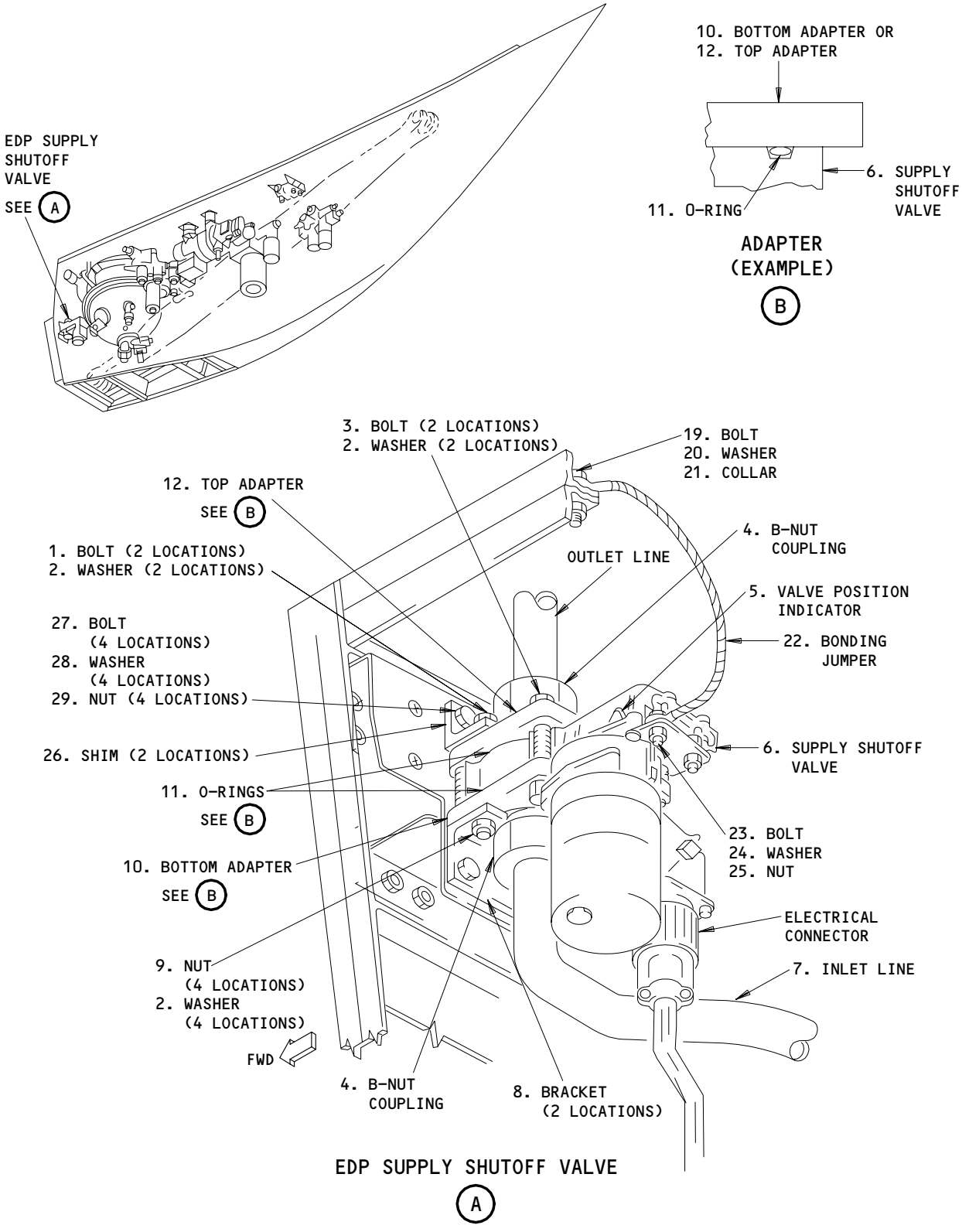
   D. Prepare for Removal

      S 864-002

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

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

      S 014-003
      (2) For the shutoff valve in the left system, open hydraulic system access panels, 437BL and 437BR (AMM 06-43-00/201).



Engine-Driven Pump (EDP) Supply Shutoff Valve Installation
Figure 401

S 014-004
(3) For the shutoff valve in the right system, open hydraulic system access panels, 447BL and 447BR (AMM 06-43-00/201).

S 864-005
(4) For the shutoff valve in the left system, remove pressure from the left hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-006
(5) For the shutoff valve in the right system, remove pressure from the right hydraulic system and the reservoir (AMM 29-11-00/201).

S 684-007
(6) Do the steps which follow to drain the left reservoir for the left shutoff valve or the right reservoir for the right shutoff valve:
(a) Remove the lockwire from the handle on the drain valve at the bottom of the reservoir.
(b) Open the drain valve and drain the fluid into a container of approximately 5 gallons.
(c) Close the drain valve and safety the handle of the drain valve with wire.

S 864-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D29, HYDRAULIC L ENG PUMP SUPPLY
(b) 11D30, HYDRAULIC R ENG PUMP SUPPLY

E. Remove the Shutoff Valve for the EDP Supply

S 034-009
(1) Disconnect the electrical connector from the shutoff valve.

S 034-010
(2) Remove the bolt (23) to disconnect the bonding jumper (22) from the shutoff valve (6).

S 034-011
(3) Disconnect the hydraulic coupling (4) on the inlet line (7) from the bottom adapter (10).

NOTE: The hydraulic coupling (4) on the outlet line can stay on the top adapter (12).

S 024-012
(4) Remove the bolts (1) and (3).

S 024-013
(5) Remove the bolts (27) from the bottom bracket (8) and remove the bottom bracket (8).

S 024-014
(6) Remove the bottom adapter (10) and the shutoff valve (6).

S 034-015
(7) Install plugs in the hydraulic lines.

TASK 29-11-06-404-016

3. Install the EDP Supply Shutoff Valve (Fig. 401)
   A. Consumable Materials
      (1) D00054 Hydraulic System Lubricant - MCS 352B
   B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bolt	29-11-06	01	20
	2	Washer			30
	3	Bolt			25
	6	Shutoff Valve			6
	7	Inlet Line (Left System)	29-11-75	01	407
	7	Inlet Line (Right System)		05	433
	8	Bracket	29-11-06	01	40
	9	Nut		01	35
	10	Adapter			47,48
	11	O-Ring			50
	12	Adapter		01	48,49
	23	Bolt		01	90
	24	Washer		01	95
	25	Nut		01	100
	26	Shim		01	80,85
	27	Bolt		01	10,12, 14
	28	Washer		01	17
	29	Nut		01	18,19

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 24-22-00/201, Electrical Power - Control
(4) AMM 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones
437/447 Aft Nacelle Strut Fairing

(2) Access Panels
437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

E. Install the Shutoff Valve for the EDP Supply

S 434-017
(1) Remove the plugs from the hydraulic lines.

S 644-018
(2) Apply hydraulic lubricant or hydraulic fluid to O-rings (11), adapter flanges (10) and (12), and the surfaces of the valve before installation.

S 434-019
(3) Install the O-rings in the grooves of the shutoff valve.

S 424-020
(4) Put the shutoff valve (6) on the top adapter (12).

S 424-021
(5) Put the bottom adapter (10) and the bottom bracket (8) on the shutoff valve (6).

S 424-022
(6) Install the bolts (1) and (3), the washers (2), and the nuts (9).

S 434-024
(7) Install the shims (26) below the brackets (8) if necessary to remove a load on the outlet line.

NOTE: The maximum thickness of the shim is 0.15 inch.

S 424-031
(8) Install the bolts (27), the washer (28), and the nuts (29).

S 434-036
(9) Connect the flexible inlet hose (7) to the bottom adapter (10).

S 214-054
(10) Make sure all surfaces that touch on the bonding jumper (22) and the shutoff valve (6) are clean.

S 434-037
(11) Connect the bonding jumper (22) to the shutoff valve (6) with the bolt (23), the washer (24), and the nut (25).

NOTE: The maximum resistance between the valve and the structure is 0.005 ohm.

S 434-038
(12) Connect the electrical connector to the valve (6). Tighten the electrical connector with your hand plus 1/8 turn.

S 434-039
(13) Safety the electrical connector with wire.

S 864-055
(14) Supply electrical power (AMM 24-22-00/201).

S 614-041
(15) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 864-042
(16) Pressurize the applicable hydraulic reservoir (AMM 29-11-00/201).

S 864-043
(17) Make sure the applicable engine fire switch on the pilot's aft control stand panel, P8, is in the usual position.

S 864-040
(18) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11.
(a) 11D29, HYDRAULIC L ENG PUMP SUPPLY
(b) 11D30, HYDRAULIC R ENG PUMP SUPPLY

S 864-056
(19) For the left shutoff valve, open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
(a) 6H1, FIRE EXTINGUISHING ENG L BTL 1
(b) 6H2, FIRE EXTINGUISHING ENG L BTL 2

S 864-057
(20) For the right shutoff valve, open these circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags:
(a) 6H3, FIRE EXTINGUISHING ENG R BTL 1
(b) 6H4, FIRE EXTINGUISHING ENG R BTL 2

S 864-044
(21) Push the manual unlock pushbutton behind the fire switch handle.

S 864-045

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

(22) Pull fire switch on the P8 panel to the armed position.

S 214-047
(23) Make sure the position indicator on the shutoff valve for the EDP supply moves to the CLOSE position.

S 864-048
(24) Push the fire switch in to put the system to back its usual condition.

S 214-049
(25) Make sure the position indicator on the shutoff valve moves to the OPEN position.

S 214-050
(26) Make sure there are no leaks at the shutoff valve and the hydraulic line connections.

S 864-051
(27) For the shutoff valve in the left system, close the hydraulic system access panels, 437BL and 437BR (AMM 06-43-00/201).

S 414-058
(28) For the shutoff valve in the right system, close the hydraulic system access panels, 447BL and 447BR (AMM 06-43-00/201).

S 864-059
(29) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).
Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 864-060
(30) For the left shutoff valve, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6H1, FIRE EXTINGUISHING ENG L BTL 1
(b) 6H2, FIRE EXTINGUISHING ENG L BTL 2

S 864-061
(31) For the right shutoff valve, remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
(a) 6H3, FIRE EXTINGUISHING ENG R BTL 1
(b) 6H4, FIRE EXTINGUISHING ENG R BTL 2

S 864-062
(32) Remove electrical power if it is not necessary (AMM 24-22-00/201).

ISOLATED ALTERNATING CURRENT MOTOR PUMP (ACMP) SUPPLY SHUTOFF VALVE REMOVAL/INSTALLATION

1. General
   A. This procedure contains three tasks. The first task removes the supply shutoff valve. The second task installs the supply shutoff valve. The third task is an operational test of the supply shutoff valve.

TASK 29-11-07-004-001

2. Remove the Supply Shutoff Valve (Fig. 401)
   A. Equipment
      (1) Container for hydraulic fluid - commercially available, approximately 10 gallon capacity
   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 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zone
          144 Right MLG Wheel Well

   D. Procedure

      S 494-017
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-018

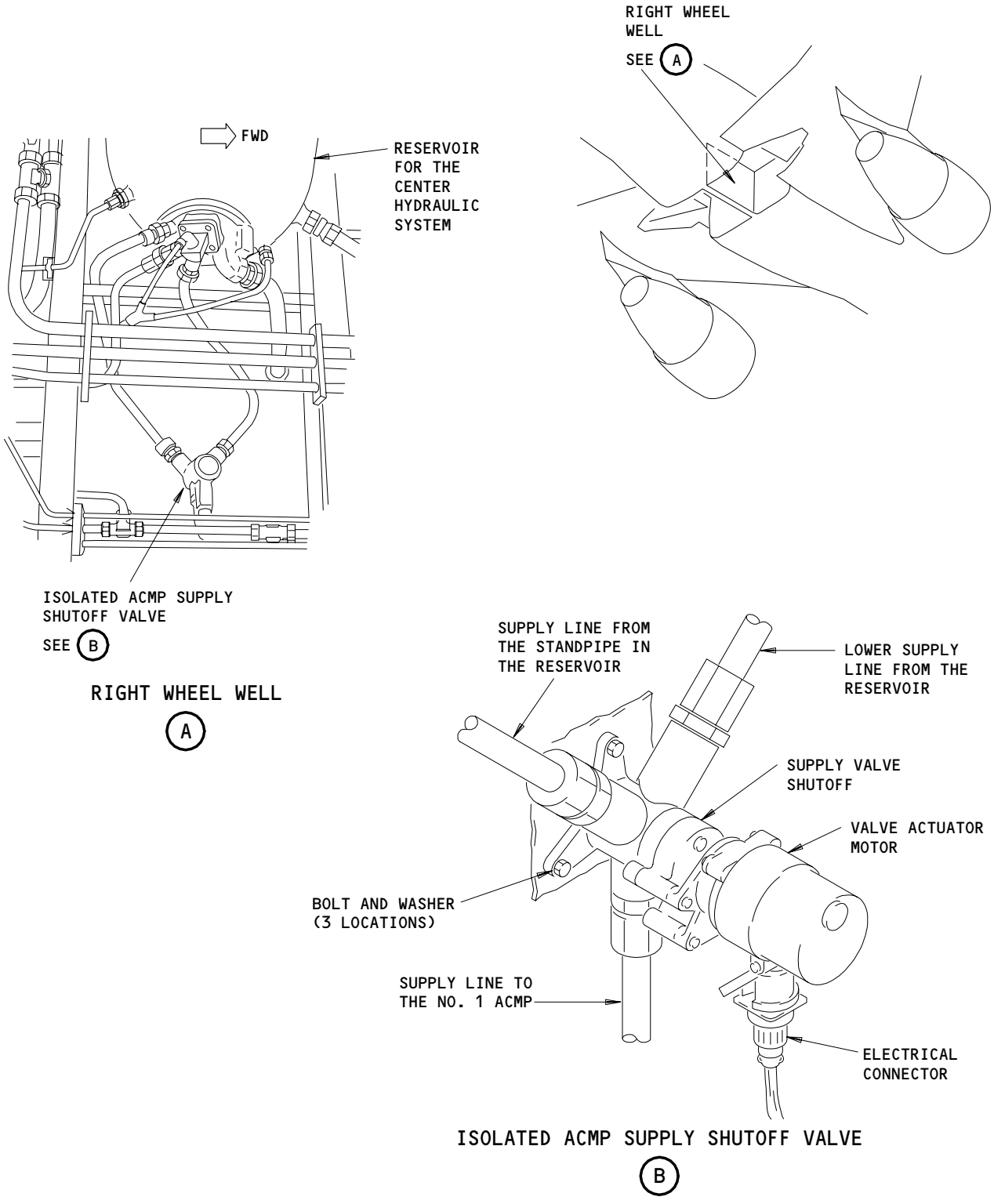
      WARNING: USE THE PROCEDURE IN (AMM 32-00-15) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

      S 864-002
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11L15, HYDRAULIC ELEC PUMP CTR 1
          (c) 11L24, HYDRAULIC ELEC PUMP CTR 2

      S 864-003
      (4) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

      S 034-004
      (5) Disconnect the electrical connector from the valve.



Isolated ACMP Supply Shutoff Valve
Figure 401

S 684-005

(6) Do the steps which follow to drain the reservoir of the center hyraulic system:
   (a) Remove the lockwire from the handle on the drain valve at the bottom of the reservoir.
   (b) Open the drain valve and drain the fluid into a container (approximately 10 gallons).
   (c) Close the drain valve and safety the handle of the valve with wire.

S 034-006

(7) Disconnect the three hydraulic lines from the valve.

S 034-007

(8) Install caps on the hydraulic lines and the ports of the valve.

S 014-008

(9) Remove the bolts and remove the valve.

S 114-009

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

(10) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

TASK 29-11-07-404-010

3. Install the Supply Shutoff Valve (Fig. 401)

A. References
   (1) AMM 12-12-01/301, Hydraulic Systems
   (2) AMM 24-22-00/201, Electrical Power - Control
   (3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems

B. Access
   (1) Location Zone
      144 Right MLG Wheel Well

C. Procedure

S 424-019
(1) Put the valve in position.

S 424-011
(2) Install the three bolts and washers.

S 434-012
(3) Connect the hydraulic lines to the valve.

S 434-013
(4) Connect the electrical connector to the valve.

S 864-021
(5) Supply electrical power (AMM 24-22-00/201).

S 864-022
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 614-023
(7) Fill the reservoir of the center hydraulic system (AMM 12-12-01/301).

S 864-024
(8) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 214-025
(9) Make sure there are no leaks at the hydraulic line connections to the valve.

S 864-015

(10) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 734-038

(11) Do the Operational Test - Supply Shutoff Valve procedure.

TASK 29-11-07-714-026

4. Operational Test - Supply Shutoff Valve (Fig. 401)

A. References

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

(2) AMM 32-00-15/201, Landing 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 864-027

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

S 494-028

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

S 494-029

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

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

S 214-030

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION 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.

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

S 864-031

(5) 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 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 864-032

(6) Put the RESERVE BKS & STRG switch on the P1 panel to the ON (closed) position.

NOTE: When the switch is in the ON position position, the ACMP C1 in the center hydraulic system will operate.

S 214-033

(7) Make sure the position indicators on the supply and pressure shutoff valves, for the isolated ACMP, move to position 2.

S 864-034

(8) Put the RESERVE BKS & STRG switch to the off (open) position.

S 214-035

(9) Make sure the position indicators on the supply and pressure shutoff valves, for the isolated ACMP, move to position 1.

S 094-036

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.

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

S 864-037

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

ISOLATED ALTERNATING CURRENT MOTOR PUMP (ACMP) PRESSURE SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains three tasks. The first task removes the pressure shutoff valve. The second task installs the pressure shutoff valve. The third task is an operational test of the pressure shutoff valve.

TASK 29-11-08-004-005

2. Remove the Pressure Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 12-25-01/301, Exterior Cleaning
      (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
          144 Right MLG Wheel Well

   C. Procedure

      S 494-001
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-002

      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.

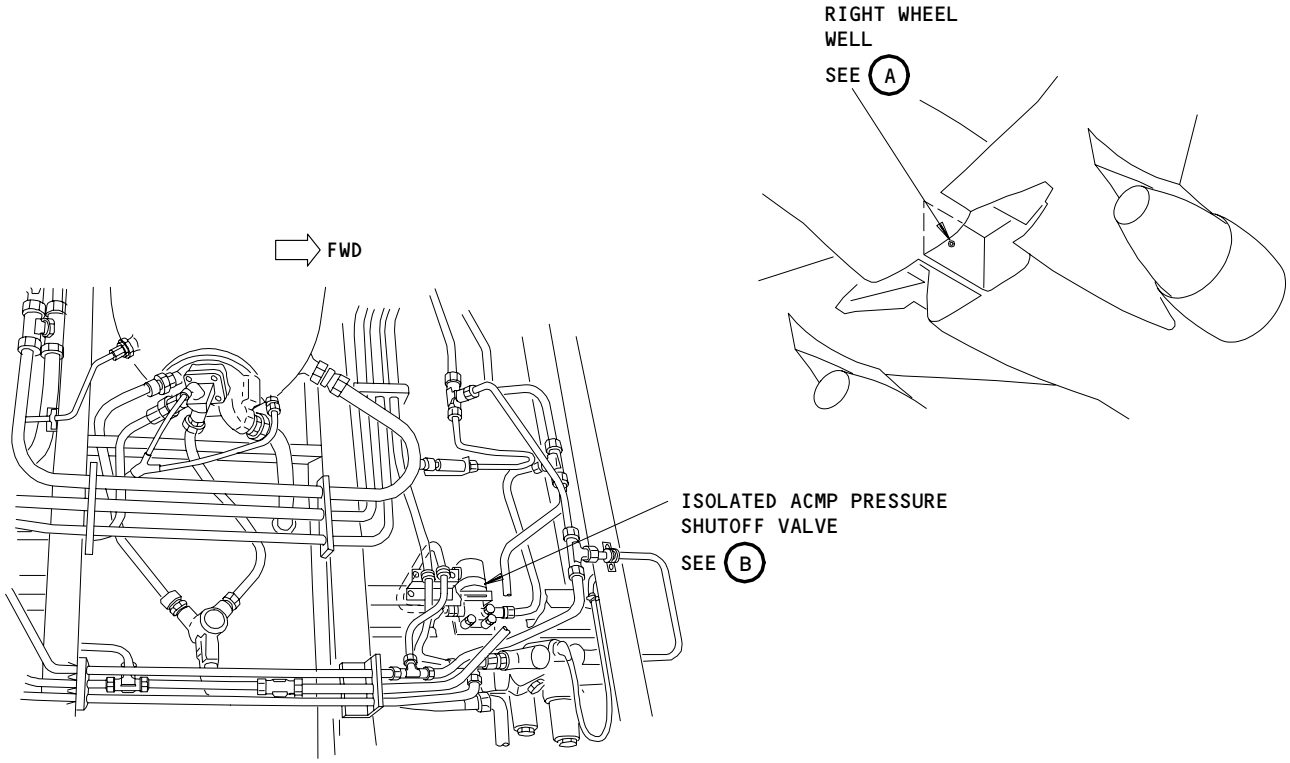
      (2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

      S 864-006
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11L15, HYDRAULIC ELEC PUMP CTR 1
          (c) 11L24, HYDRAULIC ELEC PUMP CTR 2

      S 864-007
      (4) Remove the pressure from the center system hydraulic system and the reservoir (AMM 29-11-00/201).

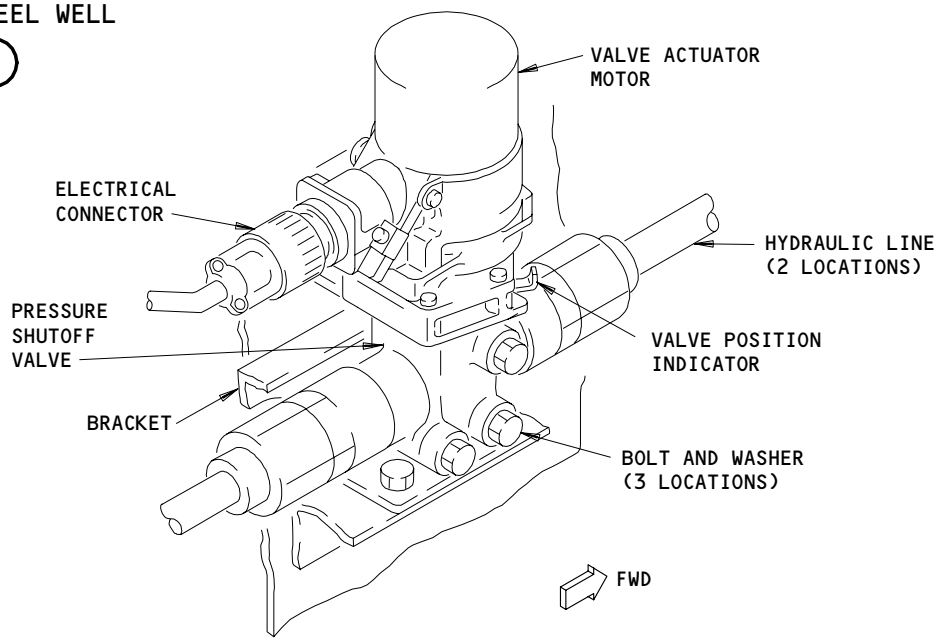
      S 034-008
      (5) Disconnect the electrical connector from the valve.

      S 034-009
      (6) Disconnect the hydraulic lines from the valve.



RIGHT WHEEL WELL

A



ISOLATED ACMP PRESSURE SHUTOFF VALVE

B

Isolated ACMP Pressure Shutoff Valve Installation
Figure 401

S 034-011
(7) Install caps on the hydraulic lines and on the ports of the valve.

S 024-010
(8) Remove the bolts and remove the valve.

S 114-012

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

(9) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

TASK 29-11-08-404-013

3. Install the Pressure Shutoff Valve (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 Zone
144 Right MLG Wheel Well

C. Procedure

S 424-003
(1) Put the valve in position.

S 424-014
(2) Install the three bolts and washers.

S 434-015
(3) Connect the hydraulic lines to the valve.

S 434-016
(4) Connect the electrical connector to the valve.

S 864-033
(5) Supply electrical power (AMM 24-22-00/201).

S 864-034
(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11 panel:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 864-035
(7) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 214-036
(8) Make sure there are no leaks at the hydraulic line connections to the valve.

S 864-018
(9) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 734-037
(10) Do the Operational Test - Pressure Shutoff Valve procedure.

TASK 29-11-08-714-020

4. Operational Test - Pressure Shutoff Valve (Fig. 401)
A. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 32-00-15/201, Landing 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 494-021

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

S 494-022

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 864-023

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

S 864-048

(4) Do the EICAS Message Display Procedure to show alert, status, and maintenance message lists (AMM 31-41-00/201).

NOTE: The above referenced procedure will provide instructions on how to show EICAS messages and hydraulic quantity, pressure and temperature data on EICAS.

S 214-024

CAUTION: DO NOT OPERATE THE HYDRAULIC PUMPS AFTER THE HYDRAULIC TEMPERATURE INDICATION SHOWS 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 864-025

(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 shows 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 864-026

(7) Put the RESERVE BKS & STRG switch on the P1 panel to the ON (closed) position.

NOTE: When the switch is in the ON position position, the ACMP C1 in the center hydraulic system will operate.

S 214-027

(8) Make sure the position indicators on the supply and pressure shutoff valves, for the isolated ACMP, move to POSITION 2.

S 864-029

(9) Put the RESERVE BKS & STRG switch to the off (open) position.

S 214-030

(10) Make sure the position indicators on the supply and pressure shutoff valves, for the isolated ACMP, move to POSITION 1.

S 094-031

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.

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

S 864-032

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

CENTER HYDRAULIC SYSTEM PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the pressure switch for the center hydraulic system. The other task installs the pressure switch for the center hydraulic system.

TASK 29-11-09-024-001

2. Remove the Pressure Switch for the Center Hydraulic System
   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
   B. Access
      (1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin

   C. Remove the Pressure Switch (Fig. 401)

S 494-026

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Open the door for the right wheel well and install the door locks (AMM 32-00-15/201).

S 864-003

(2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
   (a) 11D31, HYDRAULIC AIR PUMP
   (b) 11L15, HYDRAULIC ELEC PUMP C1
   (c) 11L24, HYDRAULIC ELEC PUMP C2

S 864-004

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

S 034-005

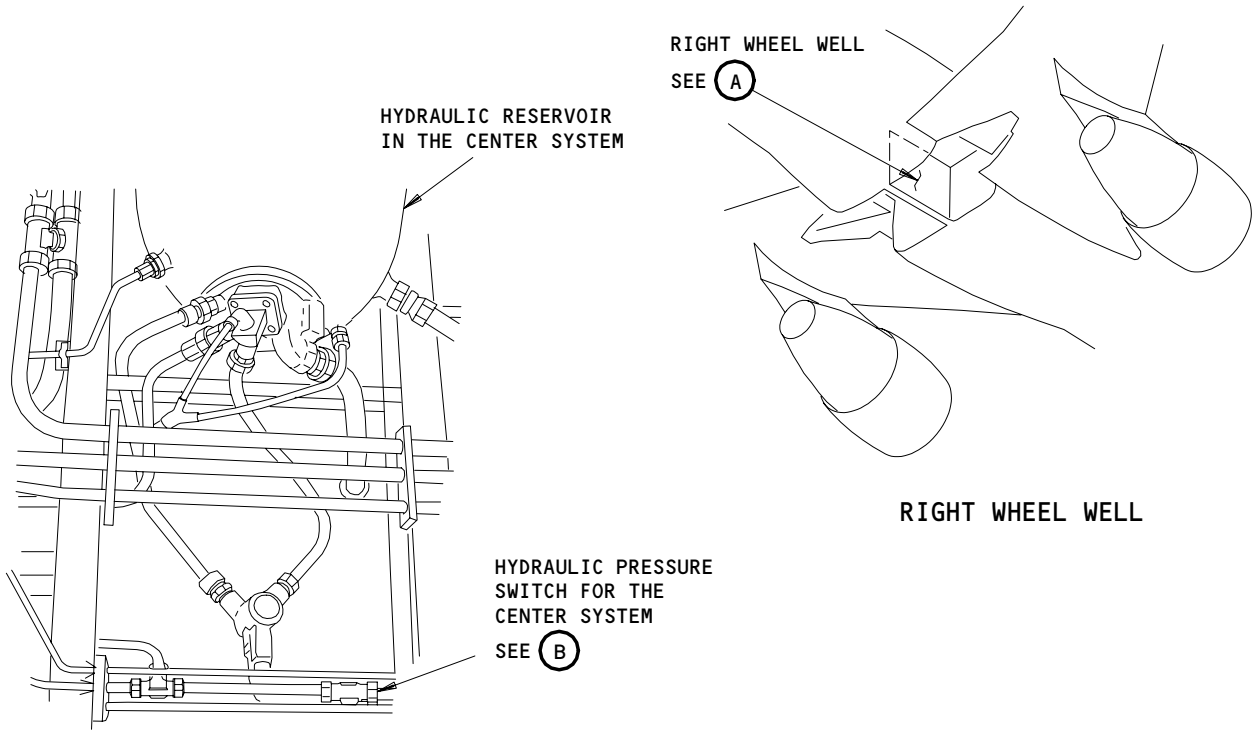
(4) Remove the electrical connector from the pressure switch.

S 034-006

(5) Remove the bolts from the switch clamp plate.

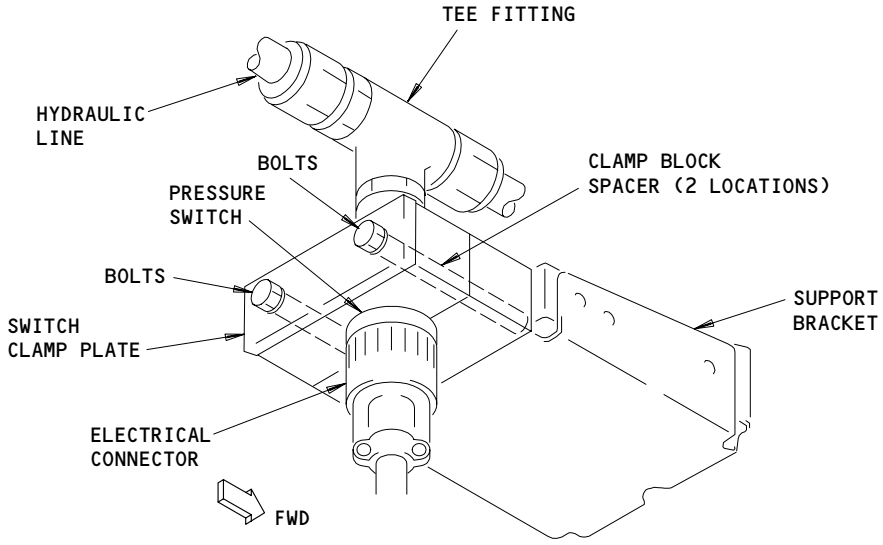
S 034-007

(6) Remove the pressure switch from the tee fitting.



RIGHT WHEEL WELL

RIGHT WHEEL WELL
A



HYDRAULIC PRESSURE SWITCH
FOR THE CENTER SYSTEM
B

Hydraulic Pressure Switch Installation
Figure 401

S 034-008
(7) Install plugs in the tee fitting.

TASK 29-11-09-424-009

3. Install the Pressure Switch for the Center Hydraulic System

A. References
(1) AMM 12-25-01/301, Exterior Cleaning
(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 Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin

C. Install the Pressure Switch (Fig. 401)

S 644-010
(1) Apply hydraulic lubricant or hydraulic fluid to a new O-ring and to the threads of the pressure switch.

S 434-011
(2) Install the new O-ring on the pressure switch.

S 434-012
(3) Install the pressure switch in the tee fitting.
(a) Tighten the pressure switch 160 to 175 inch-pounds (18.1 to 19.7 newton-meters).

S 434-013
(4) Put a lockwire on the pressure switch.

S 434-014
(5) Install the electrical connector on the pressure switch.

S 434-015
(6) Set the clamp blocks around the switch.

S 434-016
(7) Install the clamp plate, spacers, bolts, and washers.

S 864-017

(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L24, HYDRAULIC ELEC PUMP C2

S 214-018

(9) Make sure the low pressure light for the center hydraulic system is on.

S 864-019

(10) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 214-020

(11) Make sure the low pressure light for the center hydraulic system is off.

S 214-021

(12) Do a check for leaks in the pressure switch installation.

S 164-022

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 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.

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

S 864-024

(15) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

ALTERNATING CURRENT MOTOR PUMP (ACMP) ELECTRICAL LOAD CONTROL UNIT (ELCU) - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task remove the electrical load control units (ELCUs) for the alternating current motor pump (ACMP). The other task installs the ELCUs for the ACMP.
   B. The ELCUs for the right hydraulic system and the center hydraulic system (C1) are in the left generator power panel, P31. The ELCUs for the left hydraulic system and the center hydraulic system (C2) are in the right generator power panel, P32.

TASK 29-11-14-024-001

2. Remove the Electrical Load Control Unit (ELCU) for the Alternating Current Motor Pump (ACMP)
   A. References
      (1) AMM 24-22-00/201, Electrical Power
   B. Access
      (1) Location Zones
          119/120 Main Equipment Center
          211/212 Control Cabin

   C. Remove the ELCU (Fig. 401)

      S 864-002
      (1) To remove the ELCU in the left hydraulic system, open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11L25, HYDRAULIC ELEC PUMP L

      S 864-003
      (2) To remove the ELCU in the right hydraulic system, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
          (a) 11L16, HYDRAULIC ELEC PUMP R

      S 864-004
      (3) To remove the C1 ELCU in the center hydraulic system, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
          (a) 11L15, HYDRAULIC ELEC PUMP CTR 1

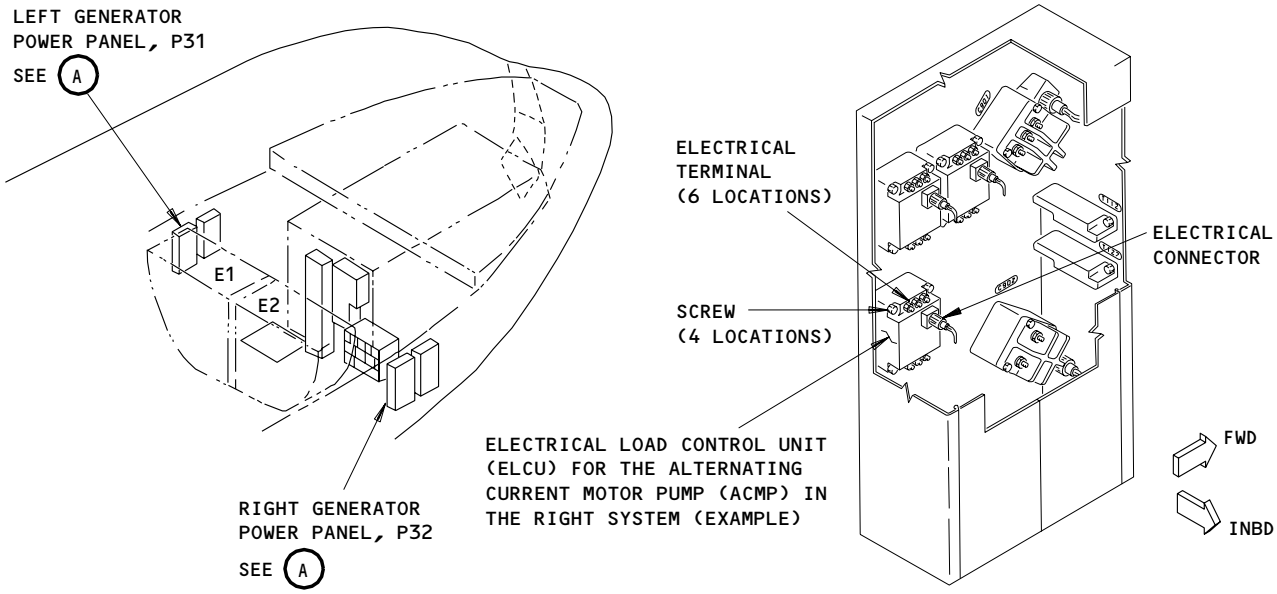
S 864-005

(4) To remove the C2 ELCU in the center hydraulic system, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 864-006

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.

(5) Remove electrical power (AMM 24-22-00/201).



Electrical Load Control Unit (ELCU) Installation
Figure 401

S 014-007
(6) Open the power panel, P31 (P32), for the left (right) generator, to get access to the ELCU you will remove.

S 034-008
(7) Disconnect the wires from the ELCU and identify the wires for the subsequent installation.

S 024-009
(8) Remove the ELCU.

TASK 29-11-14-424-010

3. Install the Electrical Load Control Unit (ELCU) for the Alternating Current Motor Pump (ACMP)

A. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

B. Access
(1) Location Zones
119/120 Main Equipment Center
211/212 Control Cabin

C. Install the ELCU (Fig. 401)

S 434-011
(1) Install the wires to the ELCU and tighten the terminal lug nuts to between 115 to 125 inch pounds of torque.

S 414-012
(2) Close the power panel, P31 (P32), for the left (right) generator.

S 864-013
(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1

(b) 11L16, HYDRAULIC ELEC PUMP R
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2
(d) 11L25, HYDRAULIC ELEC PUMP L

S 214-014
(4) Make sure these circuit breakers on the P11 panel are closed:
(a) 11L9, LEFT ENGINE OIL PRESS
or LEFT ENGINE OIL PRESS EICAS REF
(b) 11L36, RIGHT ENGINE OIL PRESS
or RIGHT ENGINE OIL PRESS EICAS REF
(c) EICAS (6 locations)

S 864-015
(5) Supply electrical power (AMM 24-22-00/201).

S 714-016
(6) Pressurize the applicable hydraulic system with the ACMP to do a check that the ELCU operates (AMM 29-11-00/201).

S 864-017
(7) Push the ELEC/HYD switch on the EICAS maintenance panel that is on the right side panel, P61.

S 864-022
(8) Push the ELEC/HYD switch on the EICAS maintenance panel (P61) to show the ELEC/HYD Maintenance page on the lower EICAS display unit (P2 panel).

S 214-018
(9) Make sure the hydraulic pressure indication on the EICAS display becomes stable at 2800 to 3200 psi.

S 864-019
(10) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-020
(11) Remove electrical power if it is not necessary (AMM 24-22-00/201).

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, return filter element, and differential pressure indicators for the left and right systems. The other task installs the return filter module, return filter element, and differential pressure indicators for the left and right systems.

   TASK 29-11-15-024-001

2. Remove the Return Filter Module, Return Filter Element, and Differential Pressure Indicator for the Left and Right Systems
   A. General
      (1) This task contains three procedures, one to remove the return filter module, one to remove the return filter element, and one to remove the differential pressure indicator.
      Because this task contains three procedures, only the applicable group of steps must be done.

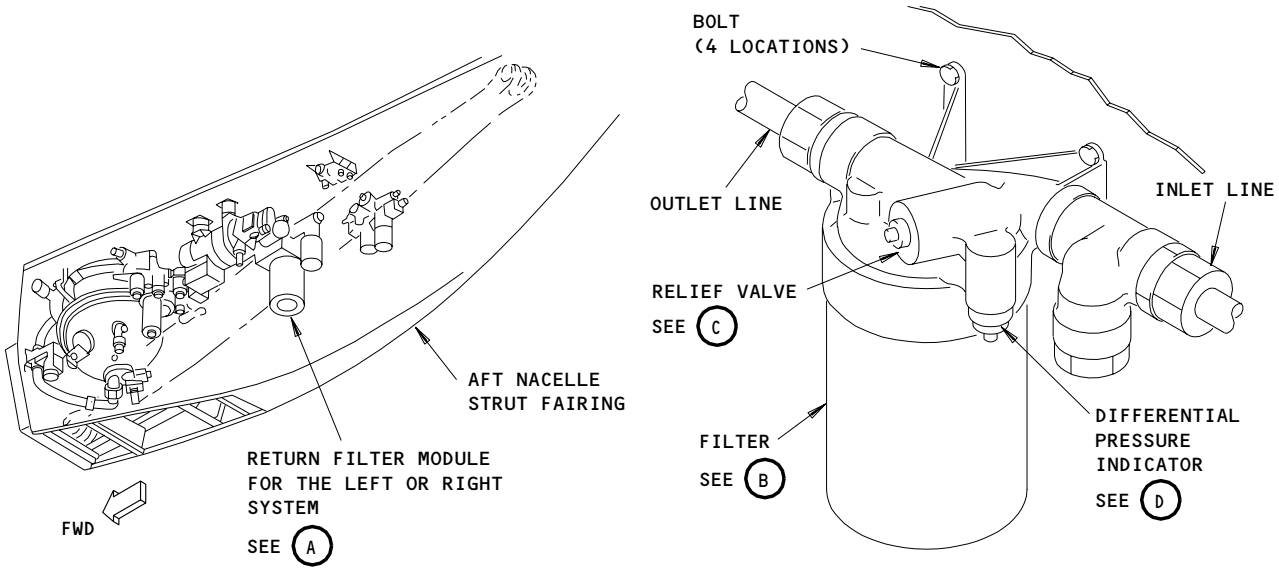
      To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. 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
          437/447 Aft Nacelle Strut Fairing

      (2) Access Panels
          437BL/437BR Return Filter Module (Left)
          447BL/447BR Return Filter Module (Right)

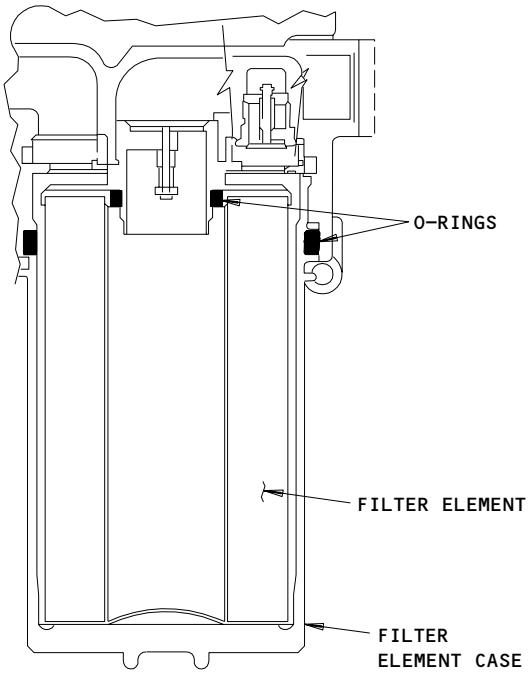
   D. Prepare for the Removal

      S 864-002
      (1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
      (a) 11L16, HYDRAULIC ELEC PUMP R



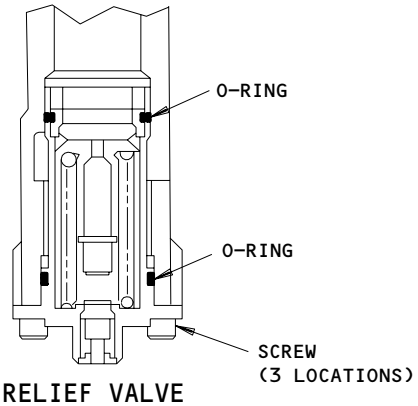
RETURN FILTER MODULE

A



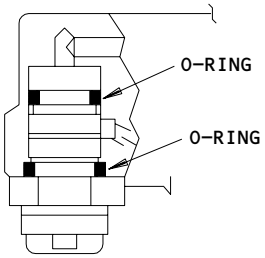
FILTER

B



RELIEF VALVE

C



DIFFERENTIAL PRESSURE INDICATOR

D

Module Installation
Figure 401

(b) 11L25, HYDRAULIC ELEC PUMP L

S 044-003

WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO 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 panels, 437BL and 437BR, for access to the return filter module in the left system (AMM 06-43-00/201).

S 014-005

(4) Open the access panels, 447BL and 447BR, for access to the return filter module in the right system (AMM 06-43-00/201).

S 864-006

(5) 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 034-007

(1) Disconnect the inlet and outlet lines.

S 034-008

(2) Put caps on the inlet and outlet lines.

S 034-009

(3) Remove the bolts and washers from the return filter module.

S 024-010

(4) Remove the return filter module.

S 164-011

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

(5) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

F. Remove the Return Filter Element (Fig. 401)

S 034-012

(1) Remove the filter element case from the filter return module.

S 024-013

(2) Remove the return filter element.

G. Remove the Differential Pressure Indicators (Fig. 401)

S 024-014

(1) Remove the differential pressure indicator.

S 034-015

(2) Put a cover on the opening.

TASK 29-11-15-424-016

3. Install the Return Filter Module, Return Filter Element, and Differential Pressure Indicator for the Left and Right Systems

A. General

(1) This task contains three procedures, one to install the return filter module, one to install the return filter element, and one to install the differential pressure indicator.
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. 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 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   (4) AMM 78-31-00/201, Thrust Reverser System
D. Access
   (1) Location Zones

211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

   (2) Access Panels

437BL/437BR	Return Filter Module (Left)
447BL/447BR	Return Filter Module (Right)

E. Install the Return Filter Module (Fig. 401)

   S 424-017
   (1) Set the return filter module in its correct position.

   S 434-018
   (2) Install the bolts and washers.

   S 434-019
   (3) Connect and tighten the inlet and outlet lines.
F. Install the Return Filter Element (Fig. 401)

   S 164-020
   (1) Clean the filter element case.

   S 644-021
   (2) Apply a layer of hydraulic fluid on the new O-rings.

   S 424-023
   (3) Assemble the return filter element, O-ring, and filter element case.

S 434-022
(4) Install the filter.

S 434-024
(5) Tighten the filter to 420-480 pound-inches.

S 434-025
(6) Put a lockwire on the filter element case.

G. Install the Differential Pressure Indicator (Fig. 401)

S 644-026
(1) Apply a layer of hydraulic fluid on the new O-rings and the threads on the differential pressure indicator.

S 424-027
(2) Install the differential pressure indicator.

S 424-029
(3) Put a lockwire on the differential pressure indicator.

H. Put the Airplane Back to Its Usual Condition

S 864-030
(1) Push the buttons on the differential pressure indicator and the relief valve until they align with adjacent surfaces.

S 864-031
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L16, HYDRAULIC ELEC PUMP R
(b) 11L25, HYDRAULIC ELEC PUMP L

S 614-032
(3) Fill the left or right hydraulic system (AMM 12-12-01/301).

S 864-033
(4) Pressurize the left or right hydraulic system and reservoir (AMM 29-11-00/201).

S 214-034
(5) Do a check for leaks on the return filter module.

S 414-035

(6) Close the access panels, 437BL and 437BR, if you replaced the return filter module in the left system (AMM 06-43-00/201).

S 414-036

(7) Close the access panels, 447BL and 447BR, if you replaced the return filter module in the right system (AMM 06-43-00/201).

S 864-037

(8) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 444-038

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

CENTER SYSTEM RETURN FILTER MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:
      (1) Remove the center system return filter module and components.
      (2) Install the center system return filter module and components.

   TASK 29-11-16-004-028

2. Remove the Center System Return Filter Module and Components
   A. General
      (1) This task contains four procedures which remove the components which follow:
         (a) Return filter module for the center system
         (b) Filter element
         (c) Indicator for differential pressure
         (d) Relief 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 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
          144 Right MLG Wheel Well

   D. Prepare for Removal

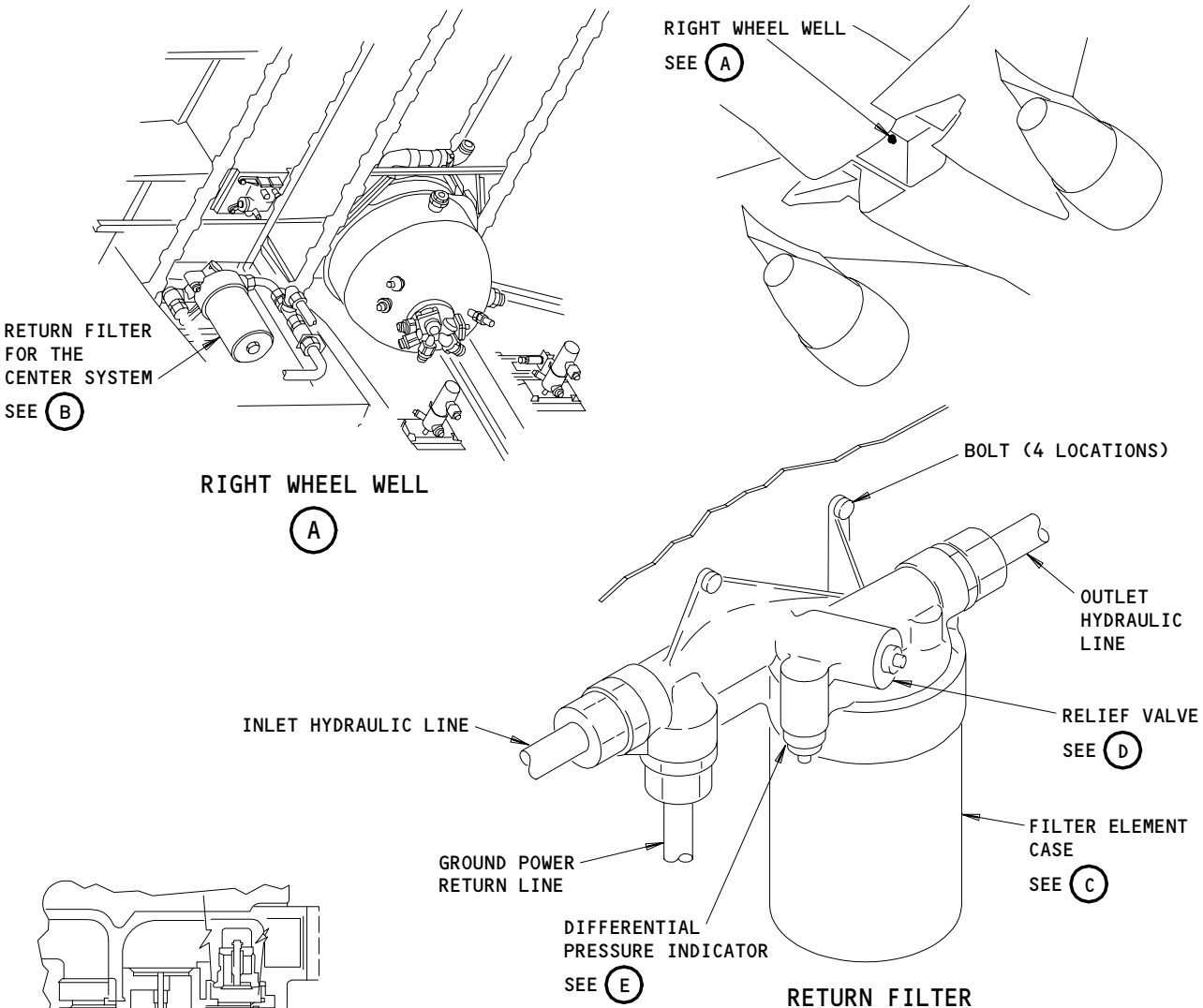
      S 494-029
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-030

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

      S 864-001
      (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).



RIGHT WHEEL WELL
A

RETURN FILTER
B

FILTER ELEMENT AND CASE
C

RELIEF VALVE
D

DIFFERENTIAL PRESSURE INDICATOR
E

Center System Return Filter Module Installation
Figure 401

S 864-002

(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L15, HYDRAULIC ELEC PUMP CTR 1
(b) 11L24, HYDRAULIC ELEC PUMP CTR 2
(c) 11D31, HYDRAULIC AIR PUMP
(d) 11L18, HYDRAULIC SYSTEM PRESS CENTER

E. Remove the Return Filter Module for the Center System (Fig. 401)

S 034-003

(1) Disconnect the hydraulic lines from the return filter module.

S 034-004

(2) Install caps on the hydraulic lines and on the ports of the return filter module.

S 024-005

(3) Remove the four bolts from the module and remove the return filter module.

F. Remove the Filter Element (Fig. 401)

S 034-048

(1) Remove lockwire.

S 034-011

(2) Remove the filter case from return filter module.

S 024-012

CAUTION: DO NOT PRESSURIZE THE CENTER HYDRAULIC SYSTEM WITHOUT THE FILTER ELEMENT INSTALLED. THIS CAN CAUSE DAMAGE TO THE MODULE OR THE CHECK VALVE.

(3) Remove the filter element from the return filter module.

S 034-049
(4) Remove the o-rings and backup rings.

G. Remove the Indicator for Differential Pressure (Fig. 401)

S 034-050
(1) Remove lockwire.

S 024-019
(2) Loosen and remove the indicator.

S 034-020
(3) Install a plug in the port of the return filter module.

S 034-051
(4) Remove o-rings.

H. Remove the Relief Valve (Fig. 401)

S 024-031
(1) Remove the three screws which attach the relief valve to the return filter module.

S 024-032
(2) Remove the relief valve from the return filter module.

S 034-033
(3) Install a plug in the port of the return filter module.

TASK 29-11-16-404-034

3. Install the Center System Return Filter Module and Components

A. General
(1) This task contains four procedures which install the components which follow:
(a) Return filter module for the center system
(b) Filter element
(c) Indicator for differential pressure
(d) Relief 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 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, Landing Gear Down Locks

D. Access
(1) Location Zone
144 Right MLG Wheel Well

E. Install the Return Filter Module for the Center System (Fig. 401)

S 644-006
(1) Apply hydraulic system lubricant or hydraulic fluid to the O-rings and the threads of the hydraulic fittings.

S 434-007
(2) If they are not installed, install the fittings in the ports of the return filter module.

S 424-008
(3) Put the return filter module in position.

S 424-009
(4) Install the four bolts and washers which attach the return filter module.

S 434-052
(5) Remove caps from hydraulic lines and module parts.

S 434-010
(6) Connect the hydraulic lines to the return filter module.

F. Install the Filter Element (Fig. 401)

S 164-013
(1) Clean the filter element case.

S 644-014
(2) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads on the filter element case.

S 434-015
(3) Assemble the filter element, the O-ring, and the filter case.

S 424-016
(4) Install the filter element and case assembly into the return filter module.

S 434-017
(5) Tighten the filter element case to 420-480 pound-inches (47.5=54.2 newton-meters).

S 434-018
(6) Safety the filter element case with lockwire.

G. Install the Indicator for Differential Pressure (Fig. 401)

S 644-021
(1) Apply hydraulic system lubricant or hydraulic fluid to the O-rings and the threads on the indicator.

S 434-022
(2) Install the new O-rings on the indicator.

S 434-023
(3) Remove the plug from the port of the return filter module.

S 424-024
(4) Install the indicator in the return filter module.

S 434-025
(5) Tighten the indicator to 80-100 pound-inches (9-11 N.-m.).

S 434-055
(6) Safety the differential pressure indicator with a lockwire.

H. Install the Relief Valve (Fig. 401)

S 434-035
(1) Remove the plug from the port of the return filter module.

S 644-036
(2) Apply hydraulic system lubricant or hydraulic fluid to the new O-rings.

S 434-037
(3) Install the new O-rings on the relief valve.

S 424-038
(4) Put the relief valve in the return filter module.

S 424-039
(5) Install the three screws to attach the relief valve to the return filter module.

S 434-040
(6) Tighten the three screws to 20-30 pound-inches (2.3-3.4 newton-meters).

I. Put the Airplane Back to Its Usual Condition

S 864-026
(1) Push the indicator button on the differential pressure indicator and the relief valve in until it aligns with the adjacent surface.

S 864-041

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
   (a) 11L15, HYDRAULIC ELEC PUMP CTR 1
   (b) 11L24, HYDRAULIC ELEC PUMP CTR 2
   (c) 11D31, HYDRAULIC AIR PUMP
   (d) 11L18, HYDRAULIC SYSTEM PRESS CENTER

S 614-042

(3) Fill the center hydraulic system reservoir (AMM 12-12-01/301).

S 864-043

(4) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 214-044

(5) Make sure there are no leaks on the filter module.

S 114-045

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

(6) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-046

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 864-027

(8) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

LEFT AND RIGHT SYSTEM ENGINE-DRIVEN PUMP (EDP) PRESSURE/CASE DRAIN FILTER MODULE AND COMPONENTS - REMOVAL/INSTALLATION

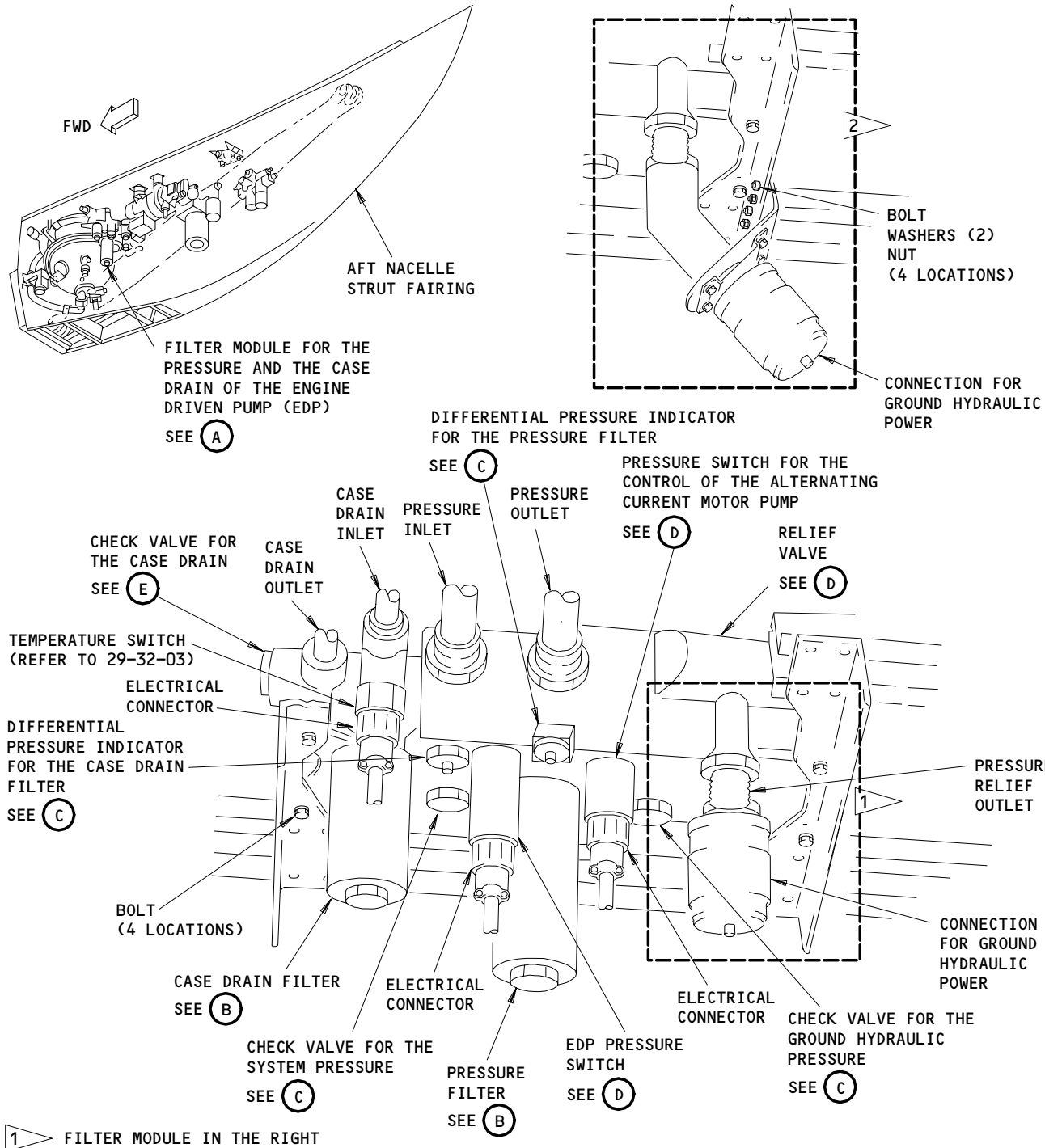
1. General
   A. This procedure has two tasks. One task removes the filter module and components for the pressure and case drain of the engine-driven pump in the left and right systems. The other task installs the filter module and components.

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
         (f) Relief 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
         437/447 Aft Nacelle Strut Fairing

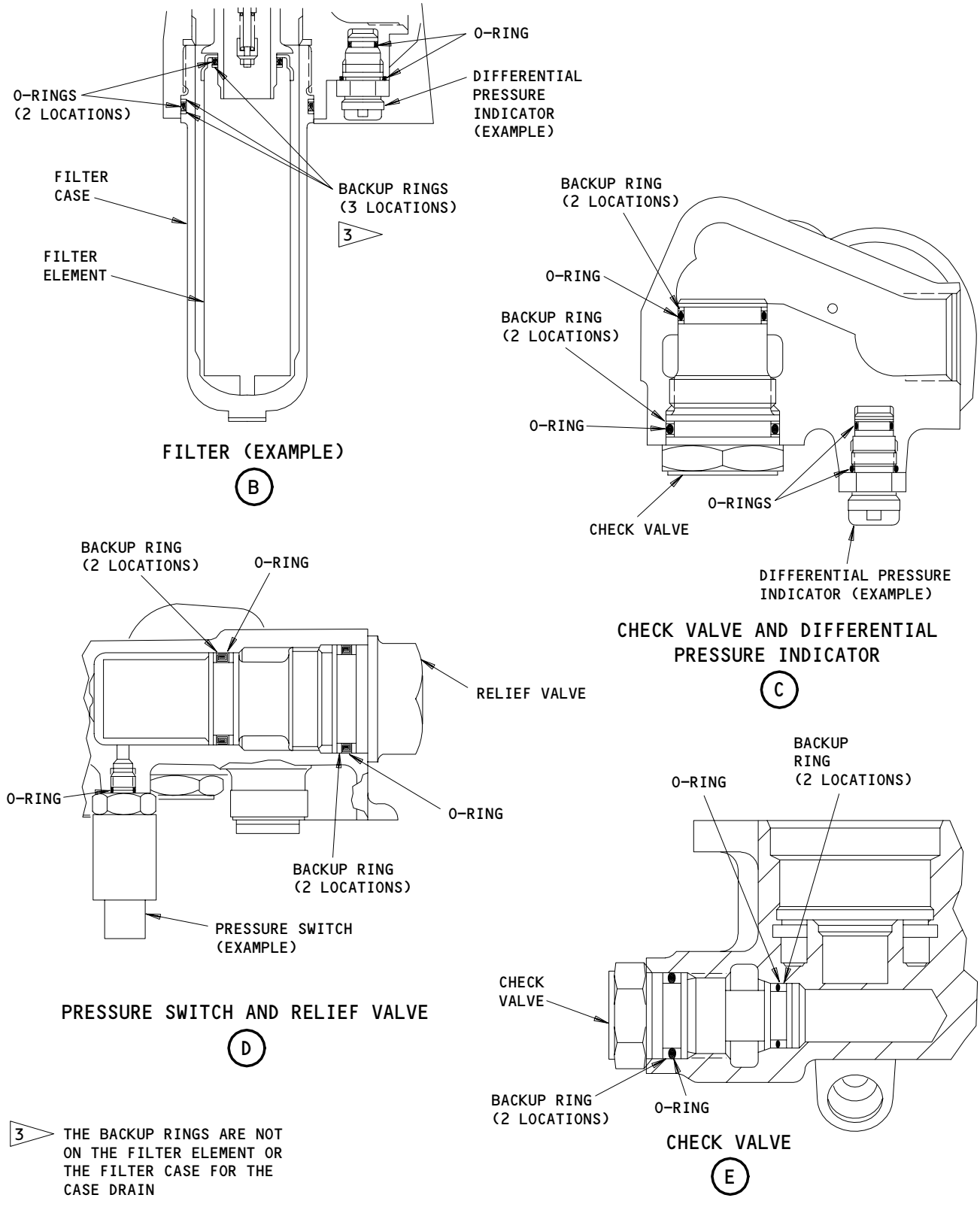
      (2) Access Panels
         437BL/437BR Hydraulic System
         447BL/447BR Hydraulic System



FILTER MODULE

A

Filter Module Installation
Figure 401 (Sheet 1)



Filter Module Installation
Figure 401 (Sheet 2)

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) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L25, HYDRAULIC ELEC PUMP L
(e) 11R1, LEFT IND LIGHTS 1
(f) 11R28, RIGHT IND LIGHTS 1

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 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) For the left hydraulic system,
open the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 014-005
(4) For the right hydraulic system,
open the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 864-006
(5) Remove the pressure from the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

E. Remove the Filter Module (Fig. 401)

S 034-007
(1) Disconnect the electrical connectors from the pressure switches and the temperature switch on the filter module.

S 034-008
(2) Put the electrical connectors in a position that is clear of the filter module.

S 034-009

(3) Do this procedure to remove the filter element and the filter case for the pressure and the case drain: Remove the Filter Element.

NOTE: The removal of the filter cases and the filter elements will decrease the dimension of the filter module for easier removal from the aft nacelle strut fairing.

S 034-010

(4) Disconnect the hydraulic lines from the filter module.

S 024-011

(5) Remove the bolts which attach the filter module.

S 034-012

(6) For the left filter module,
remove the bolts to disconnect the connection for ground hydraulic power from the structure.

S 034-013

(7) Install caps on the hydraulic lines and on the ports of the filter module.

F. Remove the Filter Element (Fig. 401)

S 024-014

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 024-015

(2) Remove the filter element from the filter case.

S 214-087

(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 29-11-05/401).

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).

S 034-016

(4) Remove the O-ring from the filter case.

S 034-017

(5) On the pressure filter case, remove the backup rings.

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 034-020

(1) Remove the electrical connector from the pressure switch.

S 024-021

(2) Remove the pressure 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)

NOTE: You must remove the filter module before you remove the check valve for the case drain.

S 024-023

(1) Remove the check valve from the filter module.

S 024-024

(2) Install a cap on the opening in the filter module.

J. Remove the Relief Valve (Fig. 401)

NOTE: You must remove the filter module before you remove the relief valve.

S 024-025
(1) Remove the relief valve from the filter module.

S 034-027
(2) Install a cap on the opening on the filter module.

TASK 29-11-17-404-028

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
(f) Relief 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
437/447 Aft Nacelle Strut Fairing

(2) Access Panels
437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

E. Install the Filter Module (Fig. 401)

S 164-029
(1) Clean the surfaces of the filter module that touch the structure which holds the filter module.

S 034-030
(2) If the filter cases and the filter elements are on the filter module,
do this procedure: Remove the Filter Element.

S 434-031
(3) Remove the caps from the hydraulic lines and the ports on the filter module.

S 424-032
(4) Put the filter module on the structure.

S 424-033
(5) Install the bolts to attach the filter module to the structure.

S 434-034
(6) For the left filter module,
install the bolts, the washers, and the nuts to attach the connection for the ground hydraulic power to the structure.

S 434-035
(7) Connect the hydraulic lines to the filter module.

S 434-036
(8) Do this procedure: Install the Filter Element.

S 434-037
(9) Install the electrical connectors on the pressure switches and the temperature switch.

F. Install the Filter Element (Fig. 401)

S 644-038
(1) Apply hydraulic lubricant or hydraulic fluid to the threads on each filter case and to the O-rings and the backup rings.

S 434-039
(2) For the case drain filter,
install the O-rings on the filter element and the filter case.

S 434-040
(3) For the pressure filter,
install the O-rings and the backup rings on the filter element and the filter case.

S 424-041
(4) Install the filter element and the filter case in the filter module.

S 434-042
(5) Tighten the filter case to 270-300 pound-inches.

S 434-043
(6) Safety the filter case with a lockwire.

G. Install the Differential Pressure Indicator (Fig. 401)

S 644-044
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the differential pressure indicator.

S 434-045
(2) Install the new O-rings on the differential pressure indicator.

S 434-046
(3) Remove the cap from the opening on the filter module.

S 424-047
(4) Install the differential pressure indicator on the filter module.

S 434-048
(5) Tighten the differential pressure indicator to 160-175 pound-inches.

S 434-049
(6) Safety the differential pressure indicator with a lockwire.

H. Install the Pressure Switch (Fig. 401)

S 644-050
(1) Apply hydraulic lubricant or hydraulic fluid to the O-ring and the threads of the pressure switch.

S 434-051
(2) Remove the cap from the opening on the filter module.

S 424-052
(3) Install the pressure switch on the filter module.

S 434-053
(4) Tighten the pressure switch to 160-175 pound-inches.

S 434-054
(5) Safety the pressure switch with a lockwire.

S 434-055
(6) Connect the electrical connector to the pressure switch.

I. Install the Check Valve (Fig. 401)

S 644-056
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings, the backup rings, and the threads of the check valve.

S 434-057
(2) Install the O-rings and the backup rings on the check valve.

S 424-058
(3) Install the check valve on the filter module.

NOTE: When you replace the case drain line together with the case drain check valve, please make sure the case drain check valve is installed near the EDP connection so that the flow direction arrow shows the flow out of the EDP. Otherwise the case drain check valve installed in the wrong place can block the fluid flow in the case drain and cause the EDP fault.

S 434-059
(4) Tighten the check valve for the case drain to 100-125 pound-inches.

S 434-060
(5) Tighten the check valve for the system pressure or the ground hydraulic pressure to 125-150 pound-inches.

S 434-061
(6) Safety the check valve with a lockwire.

J. Install the Relief Valve (Fig. 401).

S 644-062
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings, backup rings, and the threads of the relief valve.

S 434-063
(2) Install the O-rings and the backup rings on the relief valve.

S 424-064
(3) Install the relief valve on the filter module.

S 434-065
(4) Tighten the relief valve to 125-150 pound-inches.

S 434-066
(5) Safety the relief valve with a lockwire.

K. Put the Airplane Back to Its Usual Condition

S 864-067
(1) Push the button on the differential pressure indicator until it aligns with the adjacent surface.

S 864-068
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L25, HYDRAULIC ELEC PUMP L
(e) 11R1, LEFT IND LIGHTS 1
(f) 11R28, RIGHT IND LIGHTS 1

S 614-069
(3) Fill the reservoir in the left or right hydraulic system (AMM 12-12-01/301).

S 864-070
(4) Pressurize the applicable hydraulic system and the reservoir with an EDP (AMM 29-11-00/201).

S 794-071
(5) Make sure there are no leaks on the filter module.

S 114-072

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 414-073
(7) For the left hydraulic system, close the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 414-074
(8) For the right hydraulic system, close the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 864-075
(9) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 444-076
(10) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

ALTERNATING CURRENT MOTOR PUMP (ACMP) PRESSURE/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 the case drain of the alternating current motor pump (ACMP). The other task installs the filter module and components.

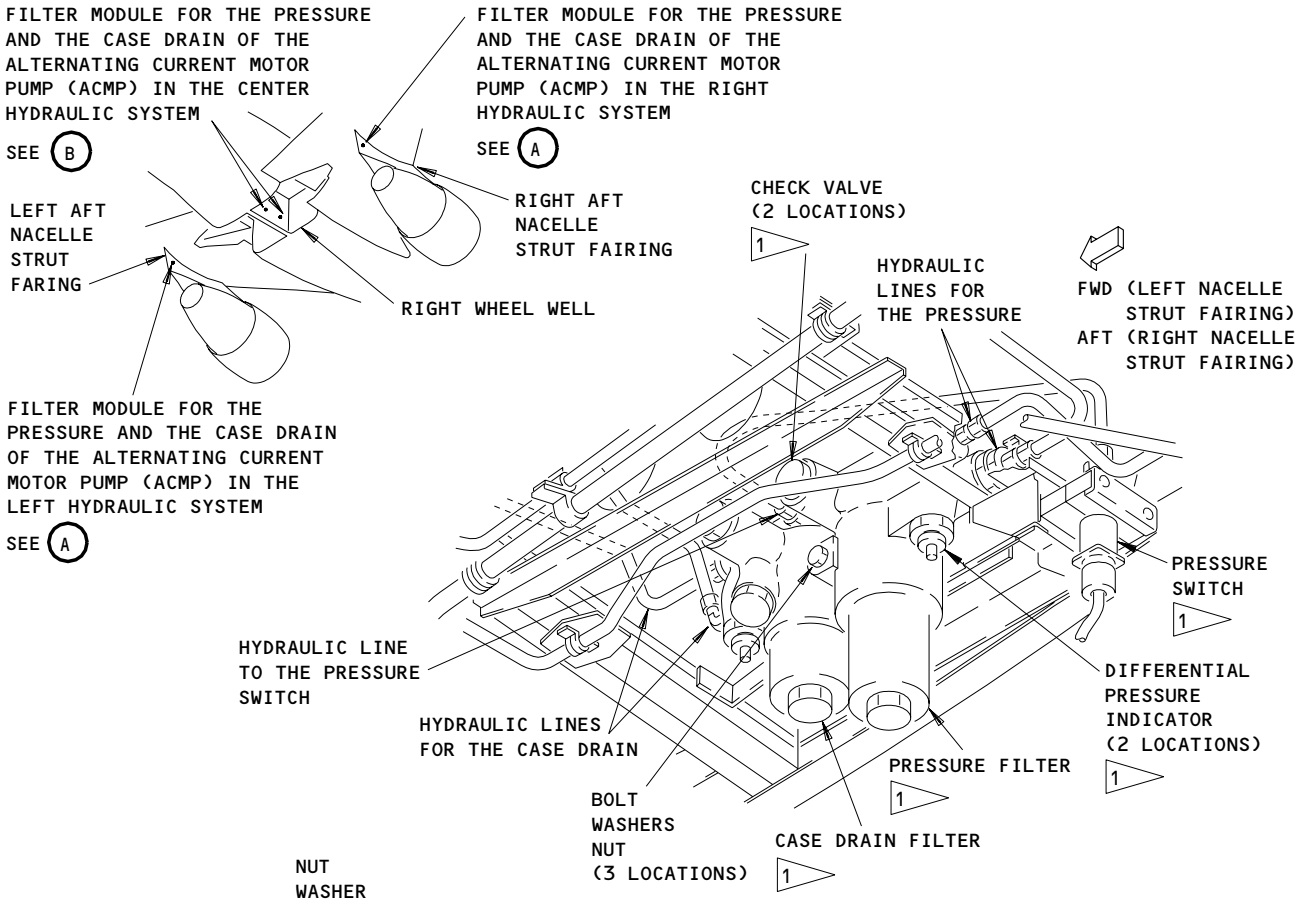
TASK 29-11-18-004-001

2. Remove the Filter Module and Components for the Pressure and the Case Drain of the Alternating Current Motor Pump (ACMP)
   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.

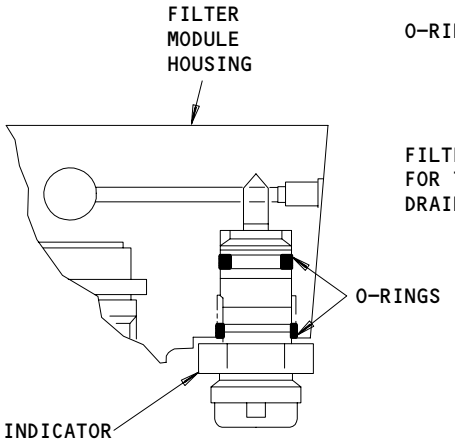
      (2) To start one of these procedures, do the "Prepare for Removal" group of steps. Then, do the applicable group of steps that is necessary to remove the component.

   B. References
      (1) AMM 06-43-00/201, 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 29-11-01/401, Left and Right Hydraulic System Alternating Current Motor Pump (ACMP)
      (5) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)
      (6) AMM 32-00-15/201, Landing Gear Door Locks
      (7) AMM 32-00-20/201, Landing Gear Downlocks
      (8) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

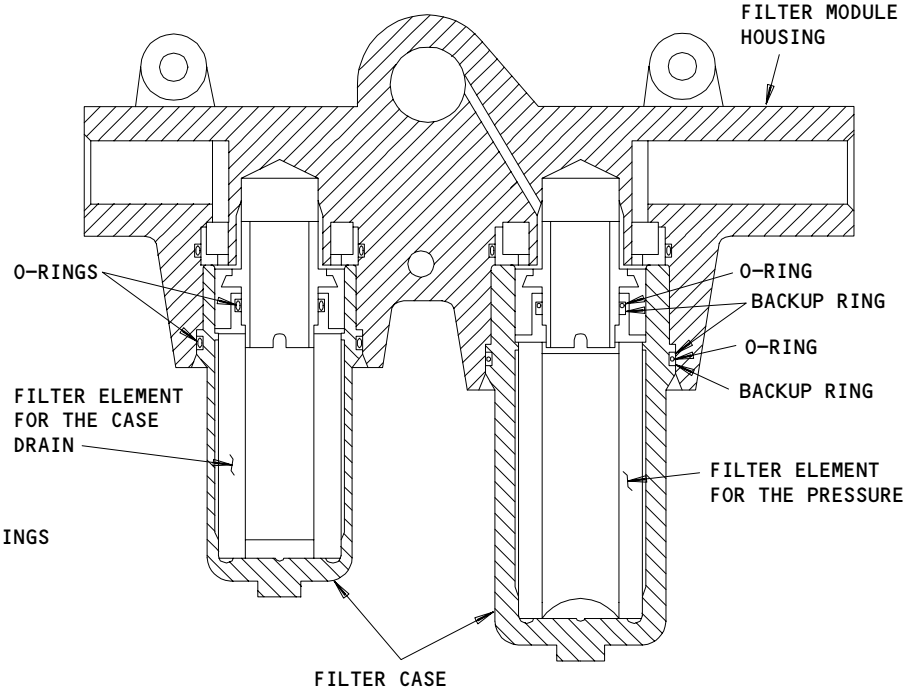
144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing



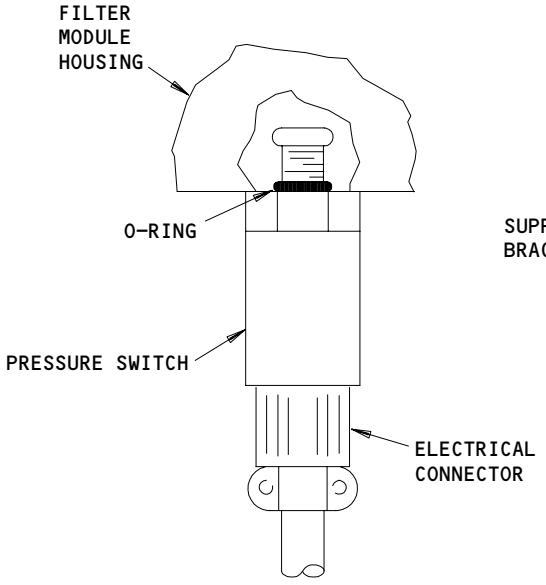
Filter Module Installation
Figure 401



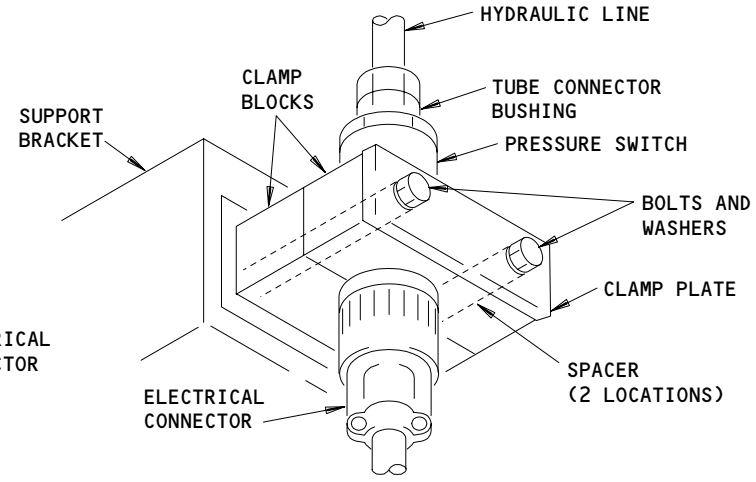
DIFFERENTIAL PRESSURE INDICATOR



FILTERS

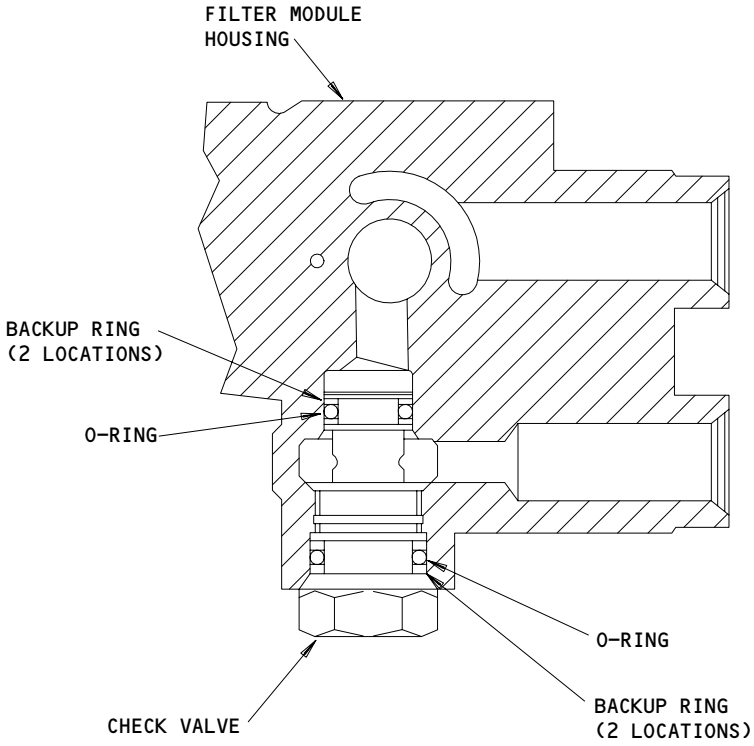


PRESSURE SWITCH ON THE FILTER MODULE



PRESSURE SWITCH IN A CLAMP ADJACENT TO THE FILTER MODULE

Filter Module Components
Figure 402 (Sheet 1)



CHECK VALVE

Module Components
Figure 402 (Sheet 2)

(2) Access Panels

437BL/437BR	Aft Nacelle Strut Fairing
447BL/447BR	Aft Nacelle Strut Fairing

D. For the Left or Right Hydraulic System,
Do these Steps to Prepare for the Removal

S 864-002
(1) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L16, HYDRAULIC ELEC PUMP R
(b) 11L25, HYDRAULIC ELEC PUMP L

S 044-003

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

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

S 014-004
(3) For the left hydraulic system,
open the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 014-005
(4) For the right hydraulic system,
open the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 864-006
(5) Remove the pressure from the left or right hydraulic system and the reservoir (AMM 29-11-00/201).

E. For the Center Hydraulic System,
Do these Steps to Prepare for the Removal

S 494-007
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-008

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 AND DAMAGE TO EQUIPMENT.

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

S 864-009
(3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-010
(4) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

F. Remove the Filter Module (Fig. 401)

S 034-013
(1) For the filter module in the center hydraulic system, do these steps:
(a) Remove the electrical connector from the pressure switch.
(b) Put the wire harness in a position that is clear of the filter module.

S 034-014
(2) Disconnect the hydraulic lines from the filter module.

S 034-015
(3) Install caps on the hydraulic lines.

S 024-016
(4) For the filter module in the left or right hydraulic system, do these steps:
(a) Remove the bolts which attach the filter module.
(b) Remove the filter module.

S 024-017
(5) For the filter module in the center hydraulic system, do these steps to remove the filter module:
(a) Disconnect the bonding jumpers from the structure.

(b) Remove the bolts which attach the isolator plate.
(c) Remove the isolator plate from the structure.
(d) Remove the bolts which attach the filter module to the isolator plate.

S 034-018

(6) Remove the unions and the O-rings from the ports on the filter module.

S 024-094

CAUTION: DO NOT PRESSURIZE THE HYDRAULIC SYSTEM AFTER YOU REMOVE THE FILTER ELEMENT. THIS CAN CAUSE DAMAGE TO THE FILTER MODULE OR THE CHECK VALVE.

(7) Remove the filter case from the filter module.

S 024-020

(8) Remove the filter element from the filter case.

S 214-102

(9) 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 29-11-01/401) or (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.

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).

S 034-021

(10) Remove the O-ring from each filter case.

S 034-022
(11) Remove the backup rings from the pressure filter case.

G. Remove the Differential Pressure Indicator (Fig. 402)

S 024-023
(1) Remove the differential pressure indicator from the filter module.

S 034-024
(2) Install a cap on the opening on the filter module.

H. Do these Steps to Remove a Pressure Switch that Attaches to the Filter Module (Fig. 402)

S 034-025
(1) Disconnect the electrical connector from the pressure switch.

S 024-026
(2) Remove the pressure switch from the filter module.

S 034-027
(3) Install a cap on the opening in the filter module.

I. Do these Steps to Remove a Pressure Switch That Does Not Attach to the Filter Module (Fig. 402)

S 034-028
(1) Remove the electrical connector from the pressure switch.

S 034-029
(2) Remove the bolts from the clamp plate.

S 034-030
(3) Remove the clamp plate, the clamp blocks, and the spacers.

S 034-031
(4) Disconnect the hydraulic line from the pressure switch.

S 034-032
(5) Remove the tube connector bushing and the O-ring from the pressure switch.

S 034-033
(6) Install caps on the pressure switch and the hydraulic line.

J. Remove the Check Valve (Fig. 402)

S 024-034
(1) Remove the check valve from the filter module.

S 034-035
(2) Install a cap on the opening on the filter module.

TASK 29-11-18-404-036

3. Install the Filter Module and Components for the Pressure and the Case Drain of the Alternating Current Motor Pump (ACMP)

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) 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 06-43-00/201, 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 32-00-15/201, Landing Gear Door Locks
(6) AMM 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Aft Nacelle Strut Fairing
447BL/447BR	Aft Nacelle Strut Fairing

E. Install the Filter Module (Fig. 401)

S 644-037
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the unions.

S 434-038
(2) Install a new O-ring on each union.

S 434-039
(3) Install the unions in the ports of the filter module.

S 164-040
(4) Clean the surfaces of the filter module which touch the structure or the isolator plate.

S 424-041
(5) For the filter module in the left or right hydraulic system, do these steps:
(a) Put the filter module in its position on the structure.

(b) Install the bolts, washers, and nuts to hold the filter module on the structure.

S 424-042

(6) For the filter module in the center hydraulic system, do these steps:
(a) Put the filter module on the isolator plate.
(b) Install the bolts, washers, and nuts to attach the filter module to the isolator plate.
(c) Put the filter module and the isolator plate on the structure.
(d) Install the bolts, washers, and nuts to attach the isolator plate to the structure.
(e) Connect the bonding jumpers to the structure.

S 434-043

(7) Remove the caps from the hydraulic lines.

S 434-044

(8) Connect the hydraulic lines to the filter module.

S 434-046

(9) On the filter module in the center hydraulic system, do this step:
(a) Install the electrical connector on the pressure switch.

F. Install the Filter Element (Fig. 402)

S 164-048

(1) Clean the filter case.

S 644-049

(2) Apply hydraulic lubricant or hydraulic fluid to the threads on each filter case and to the O-rings and the backup rings.

S 434-050

(3) Install the O-rings on the filter element and the filter case for the case drain filter.

S 434-051
(4) Install the O-rings and the backup rings on the filter element and the filter case for the pressure filter.

S 424-052
(5) Install the filter element and the filter case on the filter module.

S 434-053
(6) Tighten the filter case to 270-300 pound-inches.

S 434-054
(7) Safety the filter case with a lockwire.

G. Install the Differential Pressure Indicator (Fig. 402)

S 644-055
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads on the differential pressure indicator.

S 434-056
(2) Remove the cap from the opening on the filter module.

S 424-057
(3) Install the differential pressure indicator on the filter module.

S 434-058
(4) Tighten the differential pressure indicator to 160-175 pound-inches.

S 434-059
(5) Safety the differential pressure indicator with a lockwire.

H. Do these Steps to Install a Pressure Switch That Attaches to the Filter Module (Fig. 402)

S 644-060
(1) Apply hydraulic lubricant or hydraulic fluid to a new O-ring and to the threads of the pressure switch.

S 434-061
(2) Install a new O-ring on the pressure switch.

S 434-062
(3) Remove the cap from the opening on the filter module.

S 424-063
(4) Install the pressure switch on the filter module.

S 434-064
(5) Tighten the pressure switch to 160-175 pound-inches.

S 434-065
(6) Safety the pressure switch with a lockwire.

S 434-066
(7) Connect the electrical connector to the pressure switch.

I. Do these Steps to Install a Pressure Switch That Does Not Attach to the Filter Module (Fig. 402)

S 644-067
(1) Apply hydraulic lubricant or hydraulic fluid to a new O-ring and to the threads of the pressure switch.

S 434-068
(2) Install a new O-ring on the pressure switch.

S 434-069
(3) Install the tube connector bushing on the pressure switch.
(a) Tighten the tube connector bushing 160 to 175 inch-pounds (18.1 to 19.7 newton-meters).

S 434-070
(4) Connect the hydraulic line to the pressure switch.
(a) Tighten the hydraulic line fitting 130 to 150 inch-pounds (14.7 to 16.9 newton-meters).

S 434-071
(5) Put the clamp blocks around the pressure switch.

S 434-072
(6) Install the clamp plate, the spacers, the bolts, and the washers.

S 434-073
(7) Install the electrical connector on the pressure switch.

J. Install the Check Valve (Fig. 402)

S 644-074
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings, the backup rings, and the threads of the check valve.

S 434-075
(2) Install new O-rings and backup rings on the check valve.

S 434-076
(3) Remove the cap from the opening on the filter module.

S 424-077
(4) Install the check valve on the filter module.

S 434-078
(5) Tighten the check valve to 100-125 pound-inches.

S 434-079
(6) Safety the check valve with a lockwire.

K. Put the Airplane Back to Its Usual Condition

S 864-080
(1) Push the button on the differential pressure indicator until it aligns with the adjacent surface.

S 864-081
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP

(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 614-082
(3) Fill the reservoir in the applicable hydraulic system (AMM 12-12-01/301).

S 864-083
(4) Pressurize the applicable hydraulic system and the reservoir (AMM 29-11-00/201).

S 794-084
(5) Make sure there are no leaks at the filter module.

S 114-085

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 414-086
(7) For the left hydraulic system, close the access panels, 437BL and 437BR (AMM 06-43-00/201).

S 414-087
(8) For the right hydraulic system, close the access panels, 447BL and 447BR (AMM 06-43-00/201).

S 094-088

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

(9) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 864-089
(10) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 444-090
(11) For the left or right hydraulic system, do the activation procedure for the thrust reverser (AMM 78-31-00/201).

CENTER SYSTEM AIR DRIVEN PUMP (ADP) PRESSURE/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 air driven pump (ADP) 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 Case Drain of the Air Driven Pump (ADP) 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 case drain of the air driven pump (ADP), referred to in this procedure as the filter module
         (b) Filter Elements
         (c) Differential Pressure Indicators
         (d) Pressure Switches
         (e) Check Valve
         (f) Relief 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 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 29-11-03/401, Center Hydraulic System Air Driven Pump (ADP)
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
   C. Access
      (1) Location Zone
          143 Left MLG Wheel Well

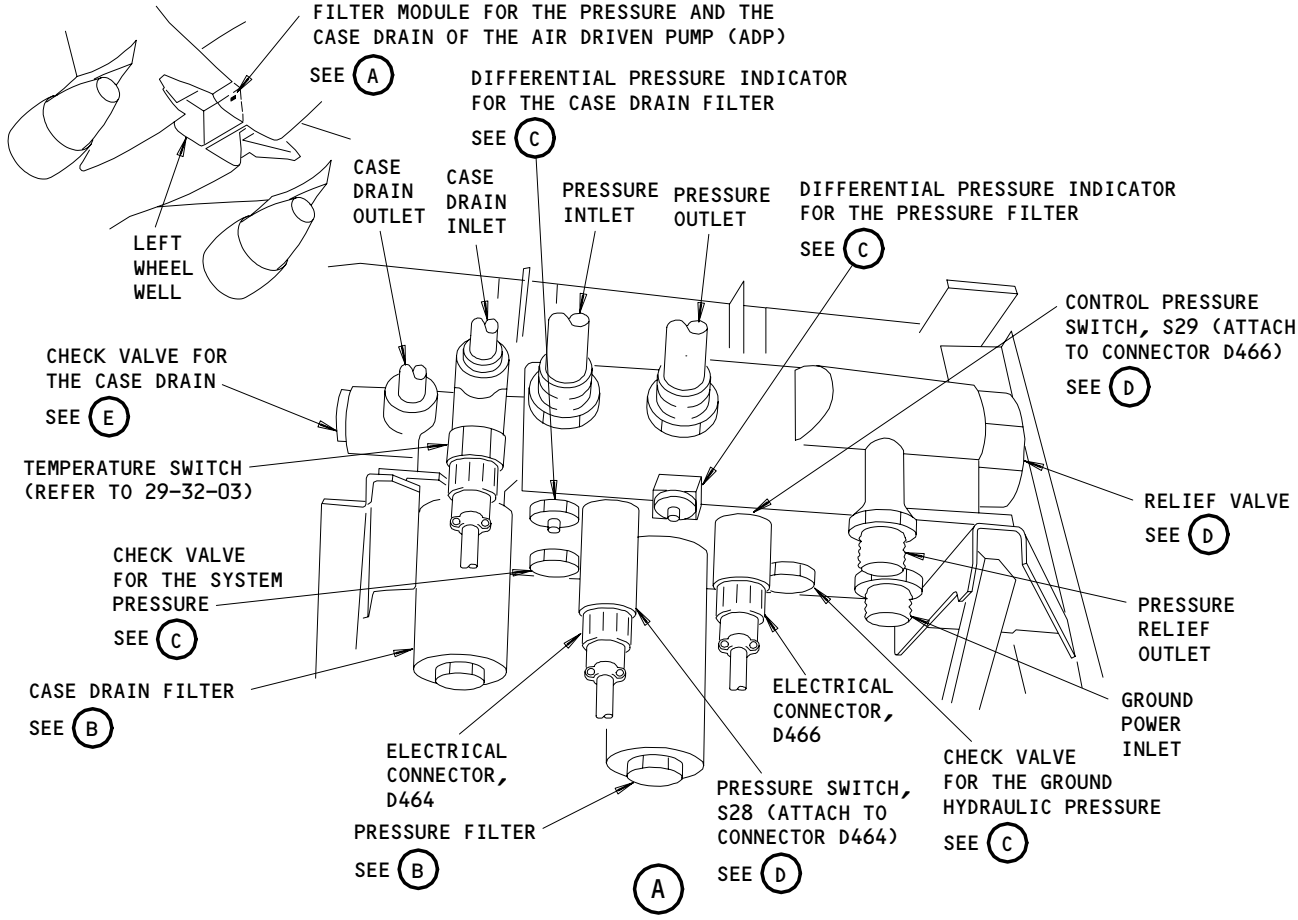
   D. Prepare For the Removal

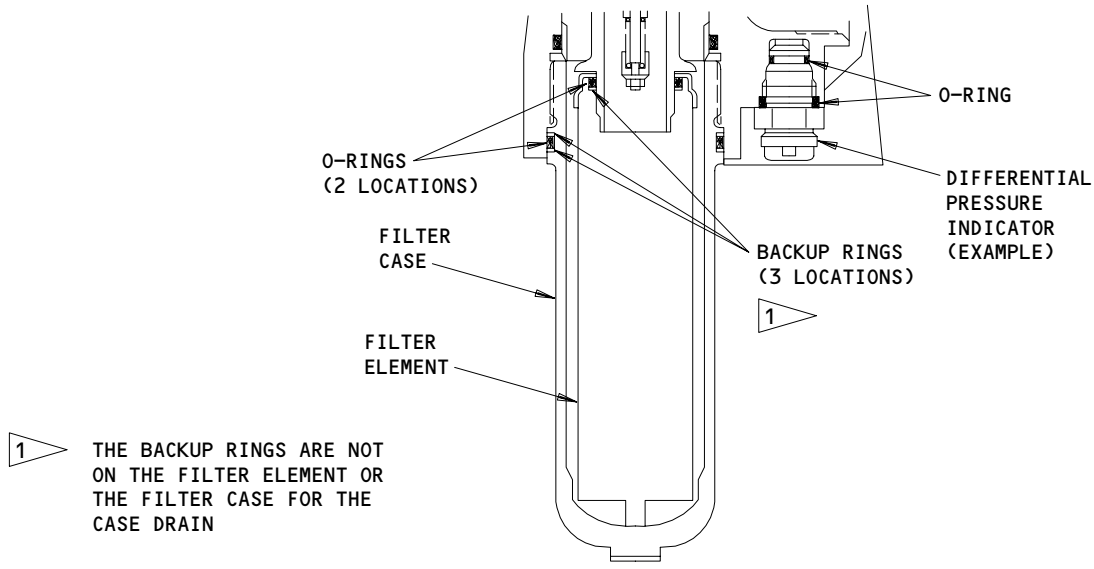
      S 494-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 494-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN 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).

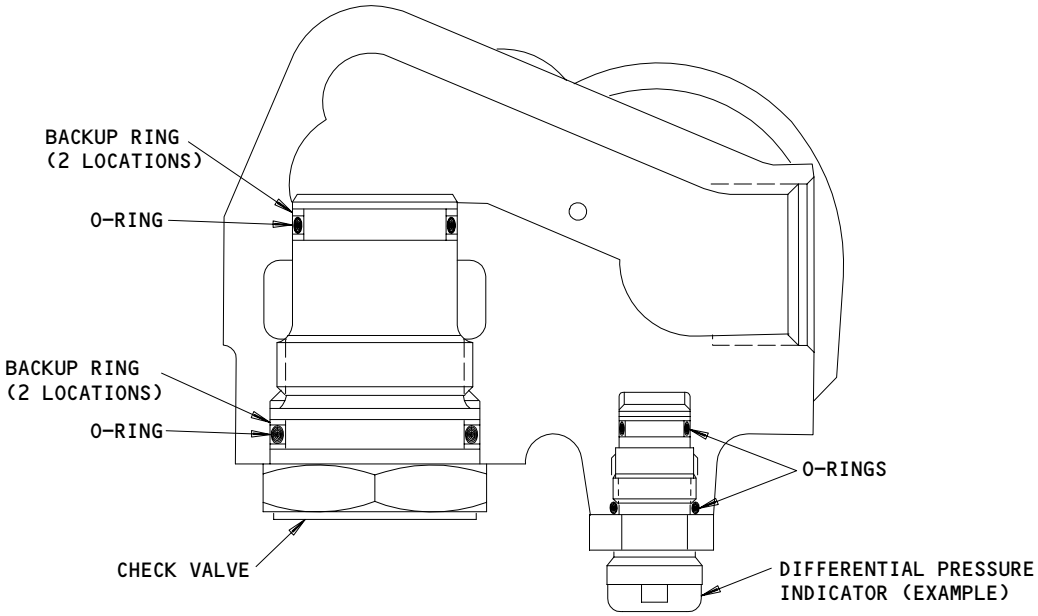




FILTER (EXAMPLE)

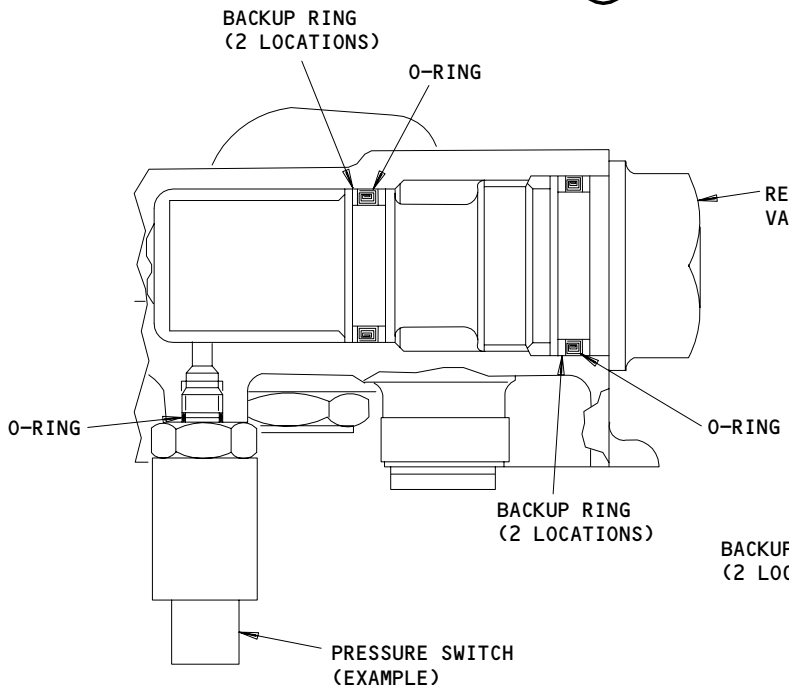
B

Filter Module Installation
Figure 401 (Sheet 1)



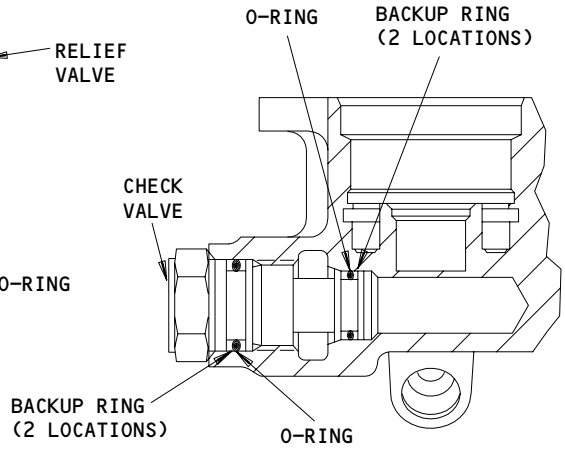
CHECK VALVE AND
DIFFERENTIAL
PRESSURE INDICATOR

C



PRESSURE SWITCH AND RELIEF VALVE

D



CHECK VALVE

E

Filter Module Installation
Figure 401 (Sheet 2)

S 864-004
(3) Remove the pressure from the center 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) 11A33, IND LIGHTS 1
(b) 11D31, HYDRAULIC AIR PUMP
(c) 11J2, EICAS CMPTR L
(d) 11J29, EICAS CMPTR R
(e) 11L15, HYDRAULIC ELEC PUMP CTR 1
(f) 11L24, HYDRAULIC ELEC PUMP CTR 2

E. Remove the Filter Module (Fig. 401)

S 034-006
(1) Disconnect the electrical connectors from the pressure switches and the temperature switch on the filter module

S 034-007
(2) Put the electrical connectors in a position that is clear of the filter module.

S 034-008
(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 attach the filter module.

S 024-011
(6) Remove the filter module.

F. Remove the Filter Element (Fig. 401)

S 034-012

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 024-013
(2) Remove the filter element from the filter module.

S 214-089

(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 29-11-03/401).

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).

S 034-014

(4) Remove the O-ring from each filter case.

S 034-015

(5) Remove the backup rings from the pressure filter case.

G. Remove Differential Pressure Indicator (Fig. 401)

S 024-016

(1) Remove the differential pressure indicator from the filter module.

S 034-017

(2) Install a cap on the opening on the filter module.

S 034-018

(3) Remove the O-rings from the differential pressure indicator.

H. Remove the Pressure Switch (Fig. 401)

S 034-019

(1) Remove the electrical connector from the pressure switch.

S 024-020

(2) Remove the pressure switch from the filter module.

S 034-021

(3) Install a cap on the opening on the filter module.

S 034-022

(4) Remove the O-ring from the pressure switch.

I. Remove the Check Valve (Fig. 401)

S 024-023

(1) Remove the check valve from the filter module.

S 034-024

(2) Install a cap on the opening on the filter module.

S 034-025
(3) Remove the O-rings and the backup rings from the check valve.

J. Remove the Relief Valve (Fig. 401)

NOTE: It is necessary to remove the Filter Module to remove the Relief Valve.

S 024-078
(1) Remove the Relief Valve from the filter module.

S 034-079
(2) Install a cap in the opening on the filter module.

S 024-080
(3) Remove the O-rings and backup rings from the Relief Valve.

TASK 29-11-19-404-029

3. Install the Filter Module and Components for the Pressure and Case Drain of the Air Driven Pump (ADP) 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 case drain of the air driven pump (ADP), referred to in this procedure as the filter module.
(b) Filter Elements
(c) Differential Pressure Indicators
(d) Pressure Switches
(e) Check Valve
(f) Relief 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 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 29-11-00/501, 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 (Fig. 401)

   S 114-030
   (1) Clean the surfaces of the filter module that touch the structure.

   S 424-033
   (2) Hold the filter module on the structure.

   S 424-034
   (3) Install the bolts, the washers, and the nuts which hold the filter module on the structure.

   S 434-035
   (4) Remove the caps from the hydraulic lines.

   S 434-036
   (5) Connect the hydraulic lines to the filter module.

   S 434-037
   (6) Install the electrical connectors on the pressure switches and the temperature switch.

   NOTE: The connector D464 connects to the pressure switch S28. The connector D466 connects to the pressure switch S29.

F. Install the Filter Element (Fig. 401)

S 114-038
(1) Clean the filter element case.

S 644-039
(2) Apply hydraulic lubricant or hydraulic fluid to the threads on each filter case and to the O-rings and the backup rings.

S 434-040
(3) Install the O-rings on the filter element and the filter case for the case drain.

S 434-041
(4) Install the O-rings and the backup rings on the pressure filter element and the pressure filter case.

S 424-042
(5) Install the filter element and the filter case on the filter module.

S 434-043
(6) Tighten each filter case to 270-300 pound-inches.

S 434-044
(7) Safety each filter case with a lockwire.

G. Install the Differential Pressure Indicator (Fig. 401)

S 644-045
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the differential pressure indicator.

S 434-046
(2) Install the O-rings on the differential pressure indicator.

S 434-047
(3) Remove the cap from the opening on the filter module.

S 424-048
(4) Install the differential pressure indicator on the filter module.

S 424-049
(5) Tighten the differential pressure indicator to 160-175 pound-inches.

S 434-087
(6) Safety the differential pressure indicator with a lockwire.

H. Install the Pressure Switch (Fig. 401)

S 644-050
(1) Apply hydraulic lubricant or hydraulic fluid to the O-ring and to the threads of the pressure switch.

S 434-051
(2) Install a new O-ring on the pressure switch.

S 434-052
(3) Remove the cap from the opening on the filter module.

S 424-053
(4) Install the pressure switch on the filter module.

S 434-054
(5) Tighten the pressure switch to 160-175 pound-inches.

S 434-055
(6) Install the electrical connector on the pressure switch.

NOTE: The connector D464 connects to the pressure switch S28. The connector D466 connects to the pressure switch S29.

S 434-088
(7) Safety the pressure switch with a lockwire.

I. Install the Check Valve (Fig. 401)

S 644-056
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings, the backup rings, and the threads on the check valve.

S 434-057
(2) Install new O-rings and backup rings on the check valve.

S 434-058
(3) Remove the cap from the opening on the filter module.

S 424-059
(4) Install the check valve on the filter module.

S 434-060
(5) Tighten the check valve for the case drain to 100-125 pound-inches.

S 434-061
(6) Tighten the check valve for the system pressure or for the ground service pressure to 125-150 pound-inches.

S 434-062
(7) Safety the check valve with a lockwire.

J. Install the Relief Valve (Fig. 401).

NOTE: It is necessary to install the relief valve in the filter module prior to installing the filter module in the airplane.

S 644-080
(1) Apply hydraulic lubericant or hydraulic fluid to the O-rings, the backup rings and the threads of the rlief valve.

S 434-081
(2) Install the new O-rings and the backup rings on the relief valve.

S 434-082
(3) Remove the cap from the opening on the filter module.

S 424-083
(4) Install the relief valve in the filter module.

S 434-084
(5) Tighten the relief valve to a torque of 125-150 pound inches

S 434-085
(6) Safety the relief valve with a lockwire.

K. Put the Airplane Back to Its Usual Condition

S 864-069
(1) Push the button on the differential pressure indicator until it aligns with the adjacent surface.

S 864-070
(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11A33, IND LIGHTS 1
(b) 11D31, HYDRAULIC AIR PUMP
(c) 11J2, EICAS CMPTR L
(d) 11J29, EICAS CMPTR R
(e) 11L15, HYDRAULIC ELEC PUMP CTR 1
(f) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 614-071
(3) Fill the hydraulic reservoir in the center hydraulic system (AMM 12-12-01/301).

S 864-072
(4) Pressurize the center hydraulic system and the reservoir with an ADP (AMM 29-11-00/201).

S 724-073
(5) Make sure the pressure switches for the air driven pump operate correctly (AMM 29-11-00/501)

NOTE: It is not necessary to do a check of the operation of the pressure switches if the electrical connectors for the switches have not been disconnected.

S 794-074
(6) Make sure there are no leaks at the filter module.

S 114-075

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

(7) Clean all hydraulic fluid from the installation area (AMM 12-12-01/301).

S 094-076

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

S 864-077

(9) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

LEFT AND RIGHT HYDRAULIC SYSTEM RESERVOIRS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the reservoir in the left and right hydraulic systems. The second task installs the reservoir in the left and right hydraulic systems.

TASK 29-11-20-024-001

2. Remove the Reservoirs for the Left and Right Hydraulic Systems
   A. 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 29-11-06/401, Engine Driven Pump (EDP) Supply Shutoff Valve
      (5) AMM 29-33-02/401, Hydraulic Fluid Quantity Transmitters
      (6) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          211/212 Control Cabin
          437/447 Hydraulic Reservoirs

      (2) Access Panels
          437BL/437BR Hydraulic Reservoir (Left)
          447BL/447BR Hydraulic Reservoir (Right)

   C. Prepare for the Removal

      S 864-002
      (1) Remove the pressure from the left or right hydraulic system (AMM 29-11-00/201).

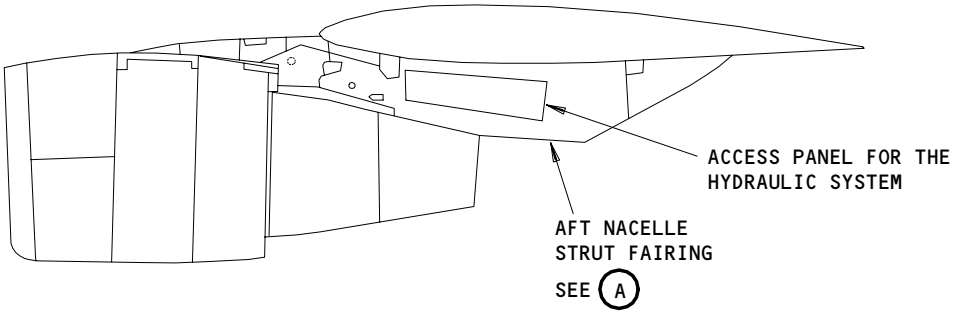
      S 044-003

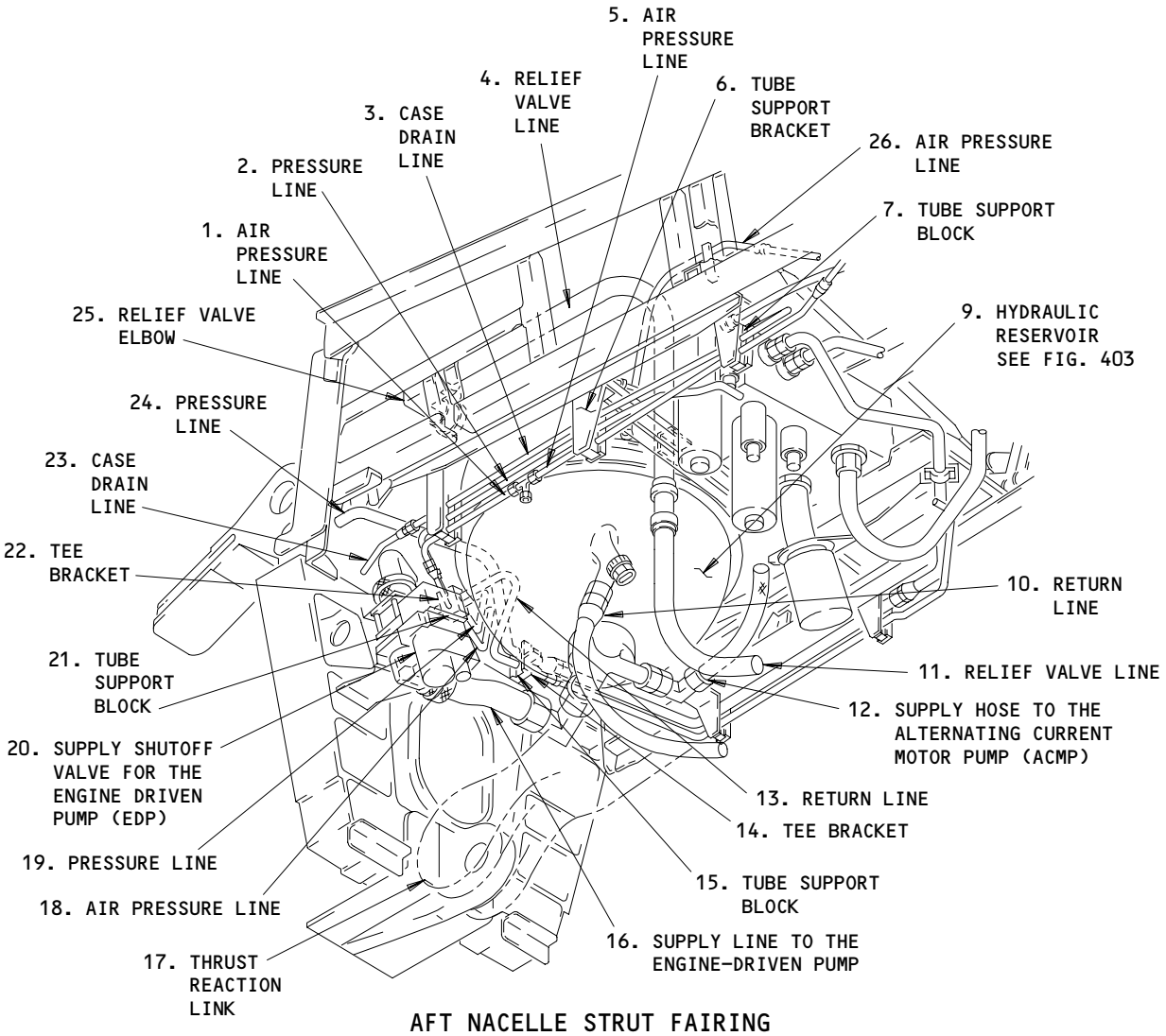
      WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

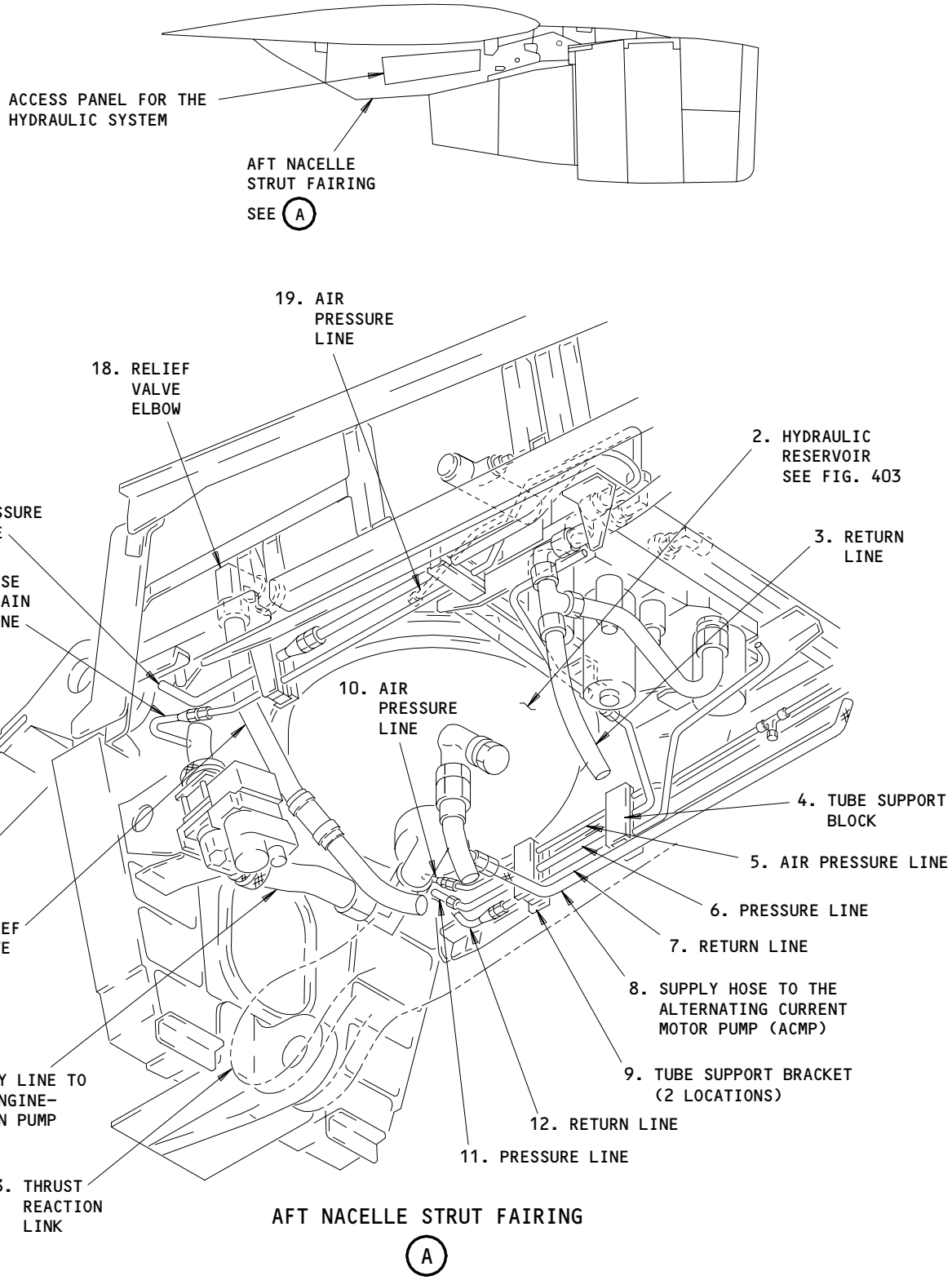
      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11L20, HYDRAULIC QTY
          (b) EICAS (6 locations)

      S 014-005
      (4) Open the access panels, 437BL and 437BR, to remove the left reservoir (AMM 06-43-00/201).

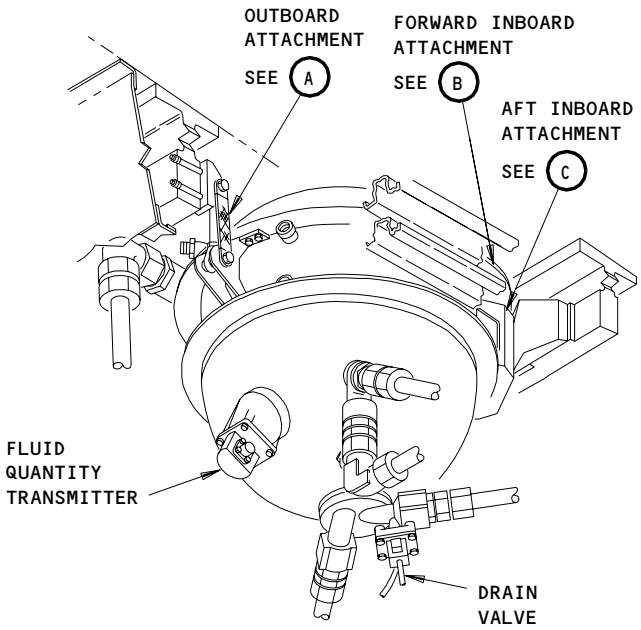


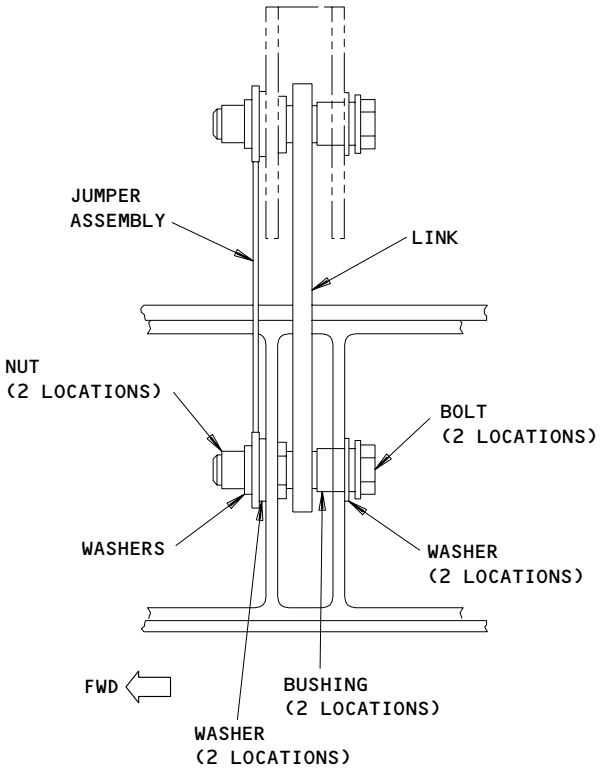


Hydraulic Reservoir Installation for the Left System
Figure 401

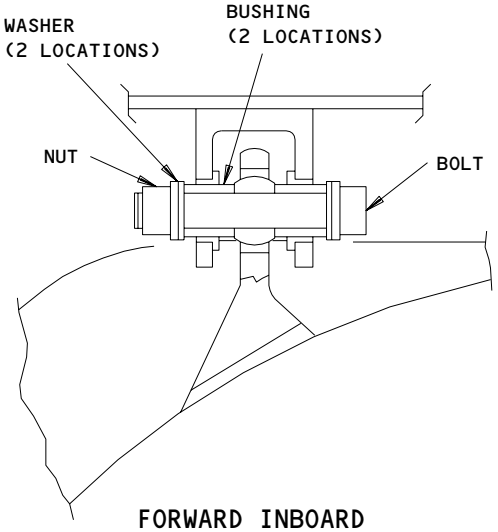


Hydraulic Reservoir Installation for the Right System
Figure 402

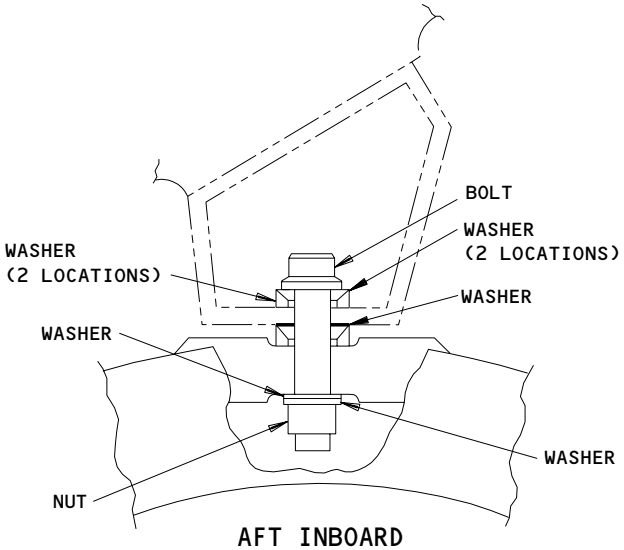




OUTBOARD ATTACHMENT
A



FORWARD INBOARD ATTACHMENT
B



AFT INBOARD ATTACHMENT
C

Hydraulic Reservoir Attachments
Figure 403

S 014-006
(5) Open the access panels, 447BL and 447BR, to remove the right reservoir (AMM 06-43-00/201).

S 024-107
(6) If necessary, remove the forward-most inboard nutplate stand fittings (IPC 54-53-02) to make it easier to remove the hydraulic reservoirs.
NOTE: Set the hardware aside. You will need it when reinstalling the nutplate stand fitting.

S 014-007
(7) Remove the structural panel immediately forward of the access panel for the reservoir.

S 014-008
(8) Remove the strut aft fairing access panel lower seal.

S 684-009
(9) Open the drain valve on the reservoir and drain the reservoir.

S 684-010
(10) Close the drain valve when the reservoir is empty.

S 164-011

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

(11) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

D. Remove the Reservoir for the Left Hydraulic System (Fig. 401)

S 034-012
(1) Remove the supply line to the engine-driven pump (16).

S 034-013
(2) Remove the supply shutoff valve for the engine-driven pump (20) (AMM 29-11-06/401).

S 034-014
(3) Remove the tube support blocks (15, 21).

S 034-015
(4) Remove the tube support blocks (7) and the clamps for all of the tubes that you will remove.

S 034-016
(5) Remove the tee brackets (14, 22).

S 034-017
(6) Remove these tube assemblies and put plugs in the lines and caps on the ports:
(a) Air pressure line (18, 26)
(b) Return line (13)
(c) Pressure line (19, 24)
(d) Case drain line (23).

S 034-018
(7) Remove the tube support brackets (6) (2 locations).

S 034-019
(8) Remove these tube assemblies and put plugs in the lines and caps on the ports:
(a) Air pressure line (1, 5)
(b) Pressure line (2)
(c) Return line (10)
(d) Relief valve line (4, 11)
(e) Case drain line (3).

S 034-021
(9) Remove the fluid quantity transmitter for the reservoir (AMM 29-33-02/401).

S 034-022
(10) Remove the wire clamps for the reservoir temperature transmitter.

S 034-023
(11) Disconnect the pigtail plug for the reservoir temperature transmitter.

S 034-024
(12) Disconnect the supply hose(s) (12) and put a plug in the line and a cap in the port.

S 034-025
(13) Loosen the band clamps (3 locations) on the thrust reaction link (17).

S 034-026
(14) Loosen the wire bundle clamps (3 locations) and turn the wire bundle to the lower side of the thrust reaction link (17).

S 034-027
(15) Remove the attachment bolts, nuts, washers, and bushings (3 locations) (Fig. 403).

S 024-028
(16) Remove the reservoir (9) through the outboard access opening.

S 034-020
(17) Remove the relief valve elbow (25) and put plugs in the elbow and reservoir openings.

E. Remove the Reservoir for the Right Hydraulic System (Fig. 402)

S 034-029
(1) Remove the tube support blocks (4) and the clamps for all of the tubes that you will remove.

S 034-030
(2) Disconnect the air pressure line (19) and put a plug in the line and a cap in the port.

S 034-031
(3) Remove these tube assemblies:
(a) Air pressure line (5)
(b) Pressure line (6)
(c) Return lines (3, 7)
(d) Relief valve line (15)
(e) Supply line (14).

S 034-032
(4) Remove the elbow from the supply line to the engine-driven pump (14).

NOTE: An elbow is not used with the flexible hose type supply line.

S 034-033
(5) Remove the elbow from the return lines (1, 3).

S 034-034
(6) Put plugs in all of the lines and caps on all of the ports.

S 034-035
(7) Disconnect these tube assemblies and put plugs in the lines and caps on the ports:
(a) Return line (12)
(b) Pressure line (11, 17)
(c) Air pressure line (10)
(d) Case drain line (16).

S 034-036
(8) Remove the tube support brackets (9).

S 034-038
(9) Disconnect the electrical connector for the fluid quantity transmitter for the reservoir.

S 034-039
(10) Remove the wire clamps from the reservoir temperature transmitter.

S 034-040
(11) Disconnect the pigtail plug from the reservoir temperature transmitter.

S 034-041
(12) Disconnect the supply hose(s) (8).

S 034-042
(13) Remove the attachment bolts, nuts, washers, and bushings (3 locations) (Fig. 403).

S 024-043
(14) Remove the reservoir (2) through the outboard access opening.

S 034-037
(15) Remove the relief valve elbow (18) and put plugs in the elbow and reservoir openings.

TASK 29-11-20-424-044

3. Install the Reservoirs for the Left and Right Hydraulic Systems

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 12-12-01/301, Hydraulic Systems
(3) AMM 20-10-21/601, Electrical Bonding
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 29-11-06/401, Engine Driven Pump (EDP) Supply Shutoff Valve
(6) AMM 29-11-22/401, Reservoir Drain Valve
(7) AMM 29-11-23/401, Reservoir Sampling Valve
(8) AMM 29-11-24/401, Reservoir Pressure Relief Valve
(9) AMM 29-32-01/401, Hydraulic Fluid Temperature Transmitter
(10) AMM 29-33-02/401, Hydraulic Fluid Quantity Transmitters
(11) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

211/212	Control Cabin
437/447	Hydraulic Reservoirs

(2) Access Panels

437BL/437BR	Hydraulic Reservoir (Left)
447BL/447BR	Hydraulic Reservoir (Right)

D. Prepare for the Installation

S 434-045
(1) Install these components in the new reservoir:
(a) Sampling valve (AMM 29-11-23/401).
(b) Drain valve (AMM 29-11-22/401).
(c) Pressure relief valve (AMM 29-11-24/401).
(d) Fluid temperature transmitter (AMM 29-32-01/401).

S 644-046
(2) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-rings and unions.

S 434-047
(3) Install the O-rings and unions in the reservoir ports.

S 124-048
(4) Clean the area around the attachment bolt holes on the reservoir for a good electrical bond as follows (Fig. 403):
(a) Clean the mating surfaces at the attachment bolt holes.
(b) Make sure the maximum resistance across the bond is 0.0025 ohms (AMM 20-10-21/601).

E. Install the Left Reservoir (Fig. 401)

S 434-055
(1) Install the relief valve elbow (25), but leave it loose to allow for repositioning/clocking later.

S 434-049
(2) Hold the reservoir in its position and install the jumper assembly, attachment bolts, washers, nuts and bushings as follows (Fig. 403):

NOTE: Tighten the aft inboard attachment bolt before you tighten the other attachment bolts.

(a) Tighten the aft inboard attachment bolt to 700-800 pound-inches (79.1-90.4 newton-meters).

S 434-050
(3) Connect the supply hose (12).

S 434-051
(4) Install and tighten the wire clamps that you loosened during the removal procedure.

S 434-052
(5) Connect the pigtail plug to the reservoir temperature transmitter.

S 434-053
(6) Install the wire clamps for the reservoir temperature transmitter.

S 434-054
(7) Install the fluid quantity transmitter for the reservoir (AMM 29-33-02/401).

S 434-056
(8) Install the tube support brackets and blocks (6, 7).

S 434-057
(9) Connect these tube assemblies:
(a) Air pressure line (18, 26).
(b) Return line (13)

(c) Pressure line (19, 24)
(d) Case drain line (23).
(e) Air pressure line (1, 5)
(f) Pressure line (2)
(g) Return line (10)
(h) Relief valve line (4, 11)
(i) Case drain line (3).

S 434-096
(10) Tighten the relief valve elbow.

S 434-058
(11) Tighten these tube assembly connections as follows:

NOTE: Hold the union or fitting on the reservoir with a wrench while you tighten the connections. This will prevent damage to the reservoir.

(a) the air pressure line (26) to 256-284 pound-inches (28.9-32.1 newton-meters).
(b) the return line (2) to 712-788 pound-inches (80.4-89.0newton-meters).
(c) the relief valve line (4) to 855-945 pound-inches (96.6-106.8 newton-meters).
(d) the supply hose (12) to 427-473 pound-inches (48.2-53.4 newton-meters).

S 434-059
(12) Install the tee brackets (14, 22).

S 434-060
(13) Install the tube support brackets (15, 21).

S 434-061
(14) Install the supply shutoff valve (20) (AMM 29-11-06/401).

S 434-062
(15) Install the supply line (16) and tighten the connection to 855-945 pound-inches (96.6-106.8 Newton-meters).

S 434-063
(16) Close the reservoir drain valve.

S 434-064
(17) Put a lockwire on the drain valve handle.

S 424-105
(18) Install the nutplate fitting if it was removed in the reservoir removal procedure.

S 614-065
(19) Fill the reservoir (AMM 12-12-01/301).

S 864-066
(20) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L20, HYDRAULIC QTY
(b) EICAS (6 locations)

S 864-067
(21) Pressurize the left hydraulic system and reservoir (AMM 29-11-00/201).

S 214-068
(22) Do a check for leakage on the reservoir.

F. Install the Right Reservoir (Fig. 401)

S 434-074
(1) Install the relief valve elbow (18), but leave it loose to allow for repositioning/clocking later.

S 434-069
(2) Hold the reservoir in its position and install the jumper assembly, attachment bolts, washers, nuts and bushings as follows (Fig. 403):

NOTE: Tighten the aft inboard attachment bolt before you tighten the other attachment bolts.

(a) Tighten the aft inboard attachment bolt to 700-800 pound-inches (79.1-90.4 newton-meters).

S 434-070
(3) Connect the supply hose (8).

S 434-071
(4) Install and tighten the wire clamps that you loosened during the removal procedure.

S 434-072
(5) Connect the pigtail plug to the reservoir temperature transmitter.

S 434-073
(6) Install the fluid quantity transmitter for the reservoir (AMM 29-33-02/401).

S 434-075
(7) Install the tube support brackets and blocks (4, 9).

S 434-076
(8) Connect these tube assemblies:
(a) Air pressure line (19)
(b) Air pressure line (5)
(c) Pressure line (6)
(d) Return lines (3, 7)
(e) Relief valve line (15)
(f) Supply line (14)
(g) Return line (12)
(h) Pressure line (11, 17)
(i) Air pressure line (10)
(j) Case drain line (16).

S 434-097
(9) Tighten the relief valve elbow (18).

S 434-077
(10) Tighten these tube assembly connections as follows:

NOTE: Hold the union or fitting on the reservoir with a wrench while you tighten the connections. This will prevent damage to the reservoir.

(a) The air pressure line (19) to 256-284 pound-inches (28.9-32.1 newton-meters).
(b) The return line (3) to 712-788 pound-inches (80.4-89.0 newton-meters).
(c) The relief valve line (15) to 855-945 pound-inches (96.6-106.8 newton-meters).
(d) The supply hose (8) to 427-473 pound-inches (48.2-53.7 newton-meters).

S 434-078
(11) Install the elbow in the supply line to the engine-driven pump (14).

NOTE: An elbow is not used with the flexible hose type supply line.

S 434-079
(12) Install the elbow in the return lines (1, 3).

S 434-080
(13) Install the supply line (14) and tighten the connection to 855-945 pound-inches.(96.6-106.8 newton-meters).

S 434-081
(14) Close the reservoir drain valve.

S 434-082
(15) Install a lockwire on the drain valve handle.

S 424-106
(16) Install the nutplate fitting if it was removed in the reservoir removal procedure.

S 614-083
(17) Fill the reservoir (AMM 12-12-01/301).

S 864-084
(18) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L20, HYDRAULIC QTY
(b) EICAS (6 locations)

S 864-085
(19) Pressurize the right hydraulic system and reservoir (AMM 29-11-00/201).

S 214-086
(20) Do a check for leakage on the reservoir.

G. Put the Airplane Back to Its Usual Condition

S 864-087
(1) Remove the power from the left or right hydraulic system (AMM 29-11-00/201).

S 414-088
(2) Install the lower seal.

S 414-089
(3) Install the structural panel immediately forward of the access panel for the reservoir.

S 414-090
(4) Close the access panels, 437BL and 437BR, if you replaced the left reservoir (AMM 06-43-00/201).

S 414-091
(5) Close the access panels, 447BL and 447BR, if you replaced the right reservoir (AMM 06-43-00/201).

S 444-092
(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

CENTER SYSTEM HYDRAULIC RESERVOIR - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:.
      (1) Remove the reservoir in the center hydraulic system.
      (2) Install the reservoir in the center hydraulic system.

TASK 29-11-21-024-001

2. Remove the Reservoir in the Center Hydraulic System
   A. References
      (1) AMM 12-25-01/301, Exterior Cleaning
      (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 Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin

   C. Remove the Reservoir (Fig. 401)

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.

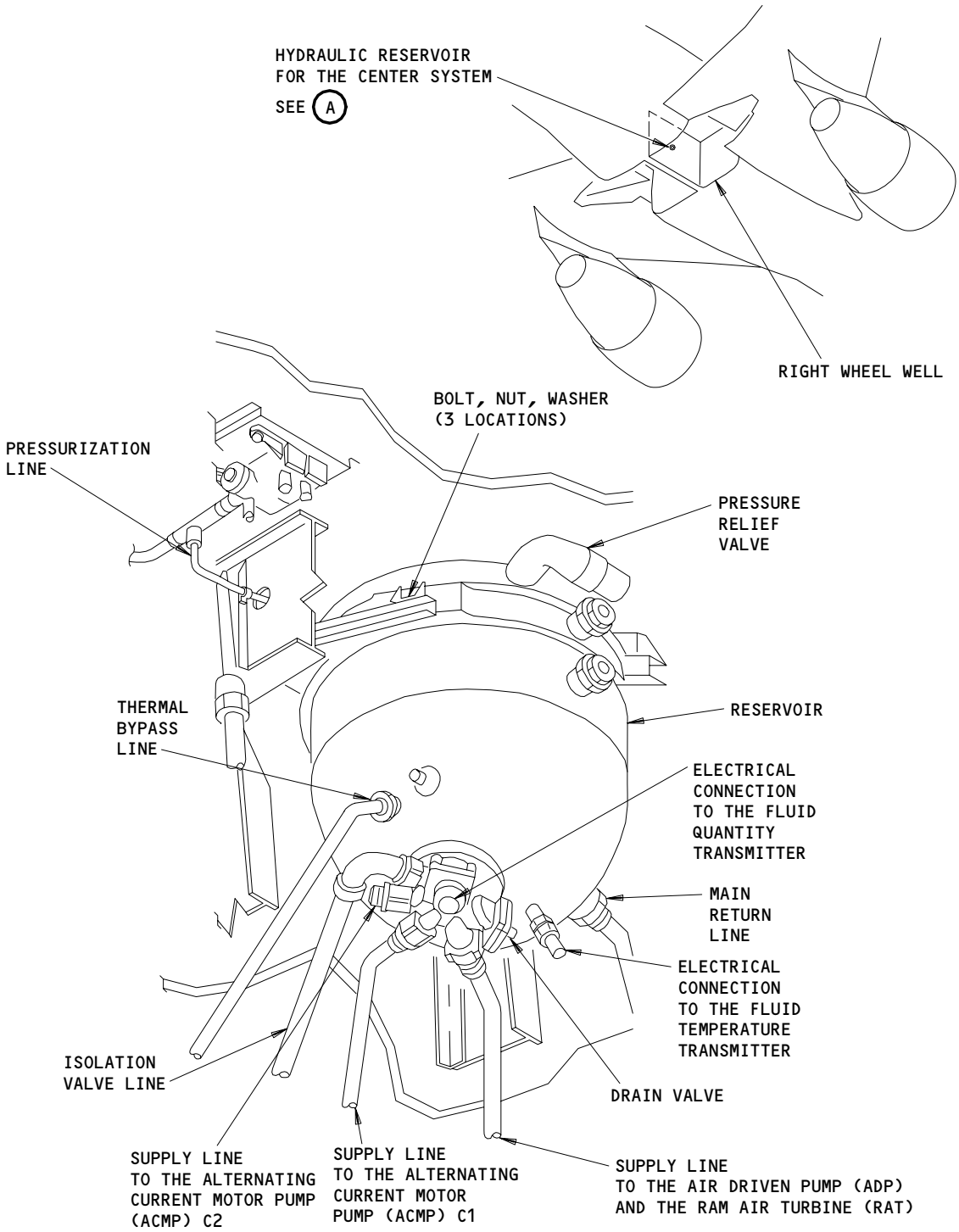
(1) Open the door for the right wheel well and install the door locks (AMM 32-00-15/201).

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) 11D31, HYDRAULIC AIR PUMP



HYDRAULIC RESERVOIR

(A)

Hydraulic Reservoir Installation for the Center System
Figure 401

(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L24, HYDRAULIC ELEC PUMP C2

S 034-005
(4) Remove the lockwire from the drain valve handle.

S 684-006
(5) Open the drain valve on the reservoir.

S 684-007
(6) Drain the fluid from the reservoir into a container.

NOTE: The reservoir contains approximately 10 gallons of hydraulic fluid.

S 684-008
(7) Close the drain valve after the fluid drains from the reservoir.

S 034-009
(8) Disconnect the hydraulic supply lines and the hydraulic return lines from the reservoir.

S 034-010
(9) Install plugs on the hydraulic lines and caps on openings in the reservoir.

S 034-011
(10) Disconnect the electrical connector from the fluid quantity transmitter.

S 034-012
(11) Disconnect the electrical connector from the fluid temperature transmitter.

S 034-013
(12) Remove the three bolts that attach the reservoir to the support bracket.

S 164-014

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 installation area (Ref 12-25-01).

TASK 29-11-21-424-015

3. Install the Reservoir in the Center Hydraulic System

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

(1) AMM 12-12-01/301, Hydraulic Systems
(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 29-32-01/401, Hydraulic Fluid Temperature Transmitter
(7) AMM 29-33-02/401, Hydraulic Fluid Quantity Transmitters
(8) AMM 32-00-15/201, Main Gear Door Locks

C. Access

(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin

D. Install the Reservoir (Fig. 401)

S 434-016

(1) Install the sampling valve (AMM 29-11-23/401).

S 434-017

(2) Install the drain valve (AMM 29-11-22/401).

S 434-018

(3) Install the pressure relief valve (AMM 29-11-24/401).

S 434-019

(4) Install the fluid temperature transmitter (AMM 29-32-01/401).

S 434-020

(5) Install the fluid quantity transmitter (AMM 29-33-02/401).

S 644-021

(6) Apply a layer of hydraulic lubricant or hydraulic fluid on the o-rings and threads of the unions.

S 434-022
(7) Install the o-rings and unions in the reservoir ports.

S 124-023
(8) Clean the surfaces of the reservoir to make a good electrical bond.

S 424-024
(9) Hold the reservoir on the support bracket.

S 424-025
(10) Install the three bolts to attach the reservoir to the support bracket.

S 434-026
(11) Connect the electrical connector to the fluid quantity transmitter.

S 434-027
(12) Connect the electrical connector to the fluid temperature transmitter.

S 434-028
(13) Connect the hydraulic lines to the reservoir.

S 434-029
(14) Tighten the connections that follow:
   (a) the pressure relief valve to 855-945 pound-inches (95-106 N.-m.).
   (b) the isolation valve line to 855-945 pound-inches (95-106 N.-m.).
   (c) the supply line to the air driven pump (ADP) and the ram air turbine (RAT) to 855-945 pound-inches (95-106 N.-m.).
   (d) the main return line to 712-788 pound-inches (79-88 N.-m.).
   (e) the supply line to the alternating current motor pump (ACMP) C1 to 427-473 pound-inches (48-53 N.-m.).
   (f) the supply line to the alternating current motor pump (ACMP) C2 to 427-473 pound-inches (48-53 N.-m.).
   (g) the thermal bypass line to 161-179 pound-inches (18-20 N.-m.).
   (h) the reservoir pressurization line to 256-284 pound-inches (29-32 N.-m.).

(i) the return line for the case drain to 342-378 pound-inches (38-43 N.-m.).

S 434-030
(15) Close the reservoir drain valve.

S 434-031
(16) Put a lockwire on the drain valve handle.

S 614-032
(17) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 864-033
(18) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L24, HYDRAULIC ELEC PUMP C2

S 864-034
(19) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 214-035
(20) Do a check for leakage at the reservoir.

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 INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(21) Remove the door locks from the landing gear door and close the door for the right wheel well (AMM 32-00-15/201).

S 864-037
(22) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

RESERVOIR DRAIN VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure contains 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 on the reservoirs in the left, right, or center hydraulic systems.

TASK 29-11-22-424-001

2. Remove the Drain Valve on the Reservoir

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 32-00-15/201, Main Gear Door Locks
(4) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

C. Remove the Drain Valve (Fig. 401)

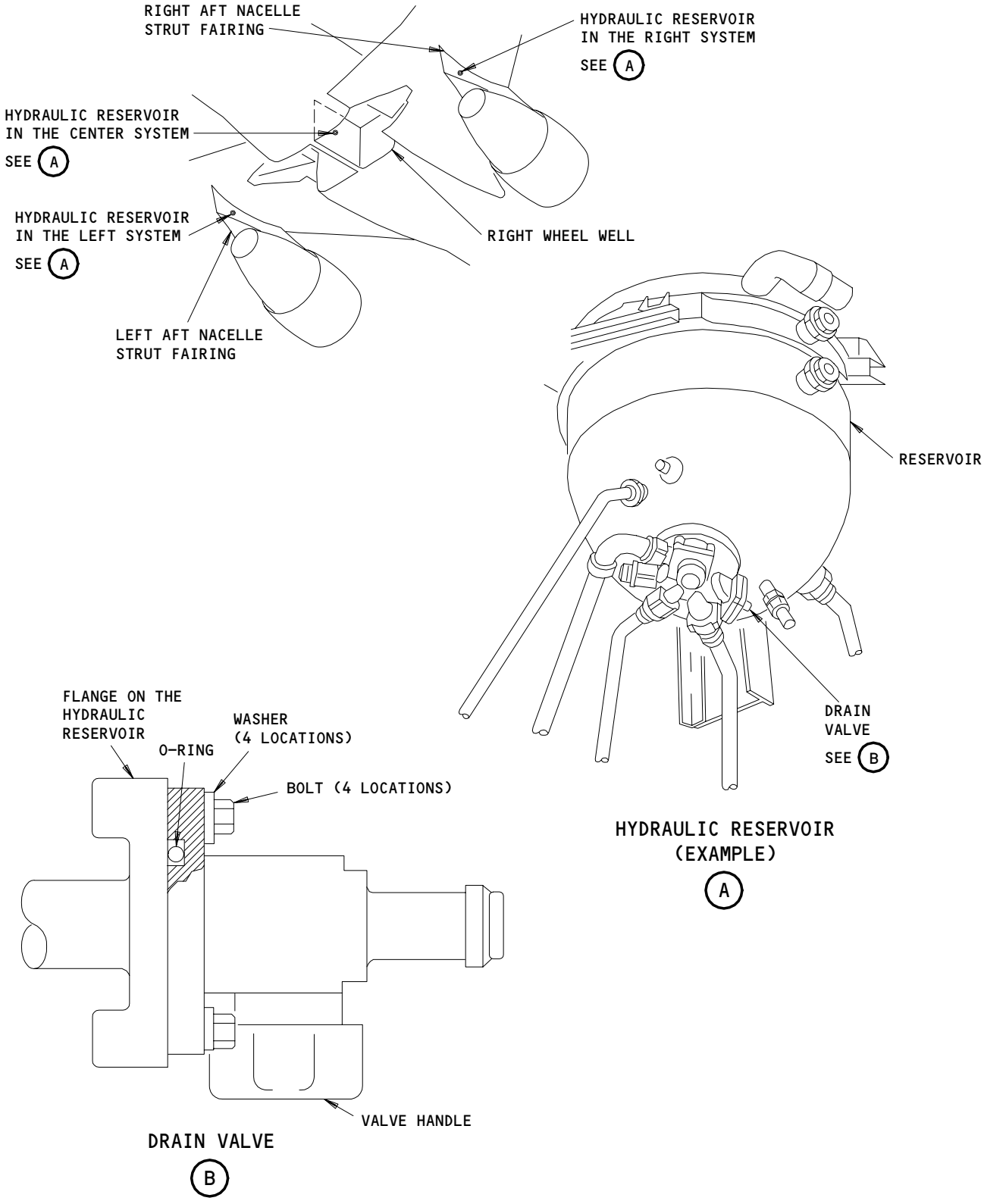
S 044-002

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

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

S 014-003

(2) Open the access panels, 437BL and 437BR, to remove the drain valve from the left system reservoir (AMM 06-43-00/201).



Reservoir Drain Valve Installation
Figure 401

S 014-004
(3) Open the access panels, 447BL and 447BR, to remove the drain valve from the right system reservoir (AMM 06-43-00/201).

S 494-005

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.

(4) Open the door for the right wheel well and install the door lock to remove the drain valve from the center system reservoir (AMM 32-00-15/201).

S 864-006
(5) Remove the pressure from the applicable hydraulic system and reservoir (AMM 29-11-00/201).

S 864-007
(6) For the center system,
close the pressurization shutoff valve for the reservoir.

S 864-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D13, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP C2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 684-009
(8) Open the drain valve and drain the reservoir.

S 034-010
(9) Remove the four bolts that attach the drain valve to the reservoir.

S 024-011
(10) Remove the drain valve.

S 034-012
(11) Install a plug in the reservoir port.

TASK 29-11-22-424-013

3. Install the Drain Valve in the Reservoir

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 12-12-01/301, 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, Main Gear Door Locks
(6) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

D. Install the Drain Valve (Fig. 401)

S 644-014
(1) Apply a layer of hydraulic lubricant on the O-ring.

S 434-015
(2) Install the O-ring in the groove of the flange on the drain valve.

S 424-016
(3) Hold the drain valve on the reservoir.

S 424-017
(4) Install the four bolts to attach the drain valve to the reservoir and tighten the bolts as follows:
(a) Tighten the bolts to 25-30 pound-inches.

S 434-018
(5) Put a lockwire wire on the bolts.

S 434-019
(6) Close the drain valve.

S 434-020
(7) Put a lockwire on the drain valve handle.

S 614-021
(8) Fill the applicable reservoir (Ref 12-12-01).

S 864-022
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D13, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP C2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 864-023
(10) If you replaced the drain valve in the center system, open the pressurization valve for the center system reservoir.

S 864-024
(11) Pressurize the applicable hydraulic system and reservoir (AMM 29-11-00/201).

S 214-025
(12) Do a check for leakage at the drain valve.

S 164-026

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 installation area (AMM 12-25-01/301).

S 414-027

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) Remove the door lock and close the door for the right wheel well, if you replaced the drain valve for the center system reservoir (AMM 32-00-15/201).

S 414-028

(15) Close the access panels, 437BL and 437BR, if you replaced the drain valve for the left system reservoir (AMM 06-43-00/201).

S 414-029

(16) Close the access panels, 447BL and 447BR, if you replaced the drain valve for the right system reservoir (AMM 06-43-00/201).

S 864-030

(17) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 444-031

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

RESERVOIR SAMPLING VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the sampling valve on the reservoirs in the left, right, or center hydraulic systems. The other task installs the sampling valve on the reservoirs in the left, right, or center hydraulic systems.

TASK 29-11-23-024-001

2. Remove the Sampling Valve on the Reservoir
   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 32-00-15/201, Main Gear Door Locks
      (4) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

   C. Remove the Sampling Valve (Fig. 401)

S 044-002

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

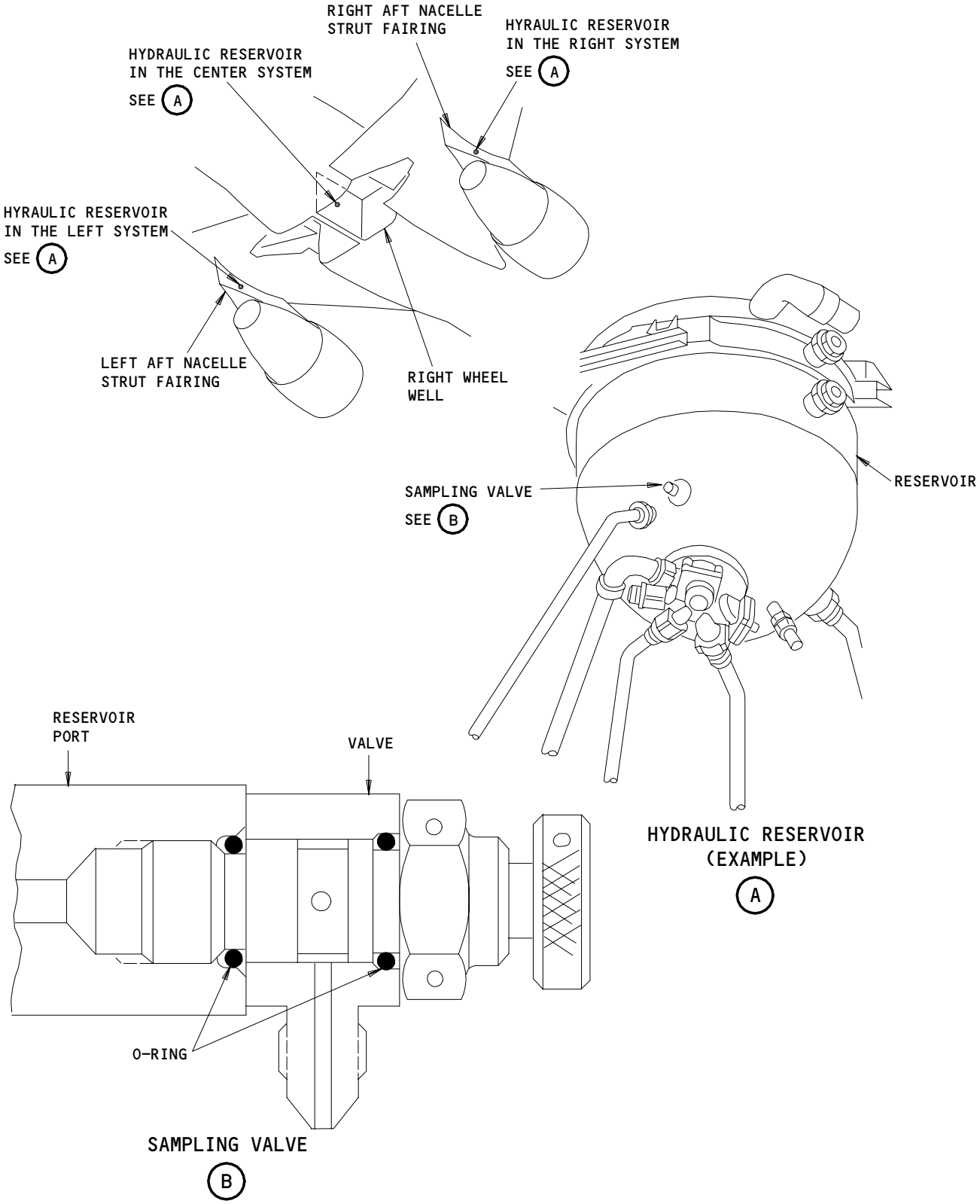
(1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 014-003

(2) Open the access panels, 437BL and 437BR, to remove the sampling valve from the left system reservoir (AMM 06-43-00/201).

S 014-004

(3) Open the access panels, 447BL and 447BR, to remove the sampling valve from the right system reservoir (AMM 06-43-00/201).



Reservoir Sampling Valve Installation
Figure 401

S 494-005

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Open the door for the right wheel well and and install the door lock to remove the sampling valve from the center system reservoir (AMM 32-00-15/201).

S 864-006

(5) Remove the pressure from the applicable hydraulic system and reservoir (AMM 29-11-00/201).

S 864-007

(6) To remove the sampling valve on the center system reservoir, open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L15, HYDRAULIC ELEC PUMP C1
(b) 11L24, HYDRAULIC ELEC PUMP C2
(c) 11D31, HYDRAULIC AIR PUMP

S 864-008

(7) To remove the sampling valve from the left system reservoir, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L25, HYDRAULIC ELEC PUMP L

S 864-009

(8) To remove the sampling valve from the right system reservoir, open this circuit breaker on the P11 panel and attach a DO-NOT-CLOSE tag:
(a) 11L16, HYDRAULIC ELEC PUMP R

S 684-010

(9) Open the drain valve and drain the reservoir to a level below the sampling valve.

S 024-011

(10) Remove the sampling valve from the reservoir port.

S 034-012

(11) Install a plug in the reservoir port.

TASK 29-11-23-424-013

3. Install the Sampling Valve on the Reservoir

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 12-12-01/301, 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, Main Gear Door Locks
(6) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

D. Install the Sampling Valve (Fig. 401)

S 644-014
(1) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-rings and the threads on the fittings.

S 434-015
(2) Put the O-rings in the sampling valve.

S 424-016
(3) Install the sampling valve on the reservoir.

NOTE: The valve outlet must point down.

S 434-017
(4) Close the valve bleed screw until it is finger-tight.

S 434-018
(5) Install a lockwire between the reservoir port, valve housing, and valve knob.

S 434-019
(6) Install a cap on the sampling valve outlet.

S 614-020
(7) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 864-021
(8) If you replaced the sampling valve on the center system reservoir, remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L15, HYDRAULIC ELEC PUMP C1
(b) 11L24, HYDRAULIC ELEC PUMP C2
(c) 11D31, HYDRAULIC AIR PUMP

S 864-022
(9) If you replaced the sampling valve on the left system reservoir, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L25, HYDRAULIC ELEC PUMP L

S 864-023
(10) If you replaced the sampling valve on the right system reservoir, remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L16, HYDRAULIC ELEC PUMP R

S 864-024
(11) Pressurize the applicable hydraulic system and reservoir (AMM 29-11-00/201).

S 214-025
(12) Do a check for leakage at the sampling valve on the reservoir.

S 164-026

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 installation area (AMM 12-25-01/301).

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 INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(14) Remove the door lock and close the door for the right wheel well, if you replaced the sampling valve for the center system reservoir (AMM 32-00-15/201).

S 414-028

(15) Close the access panels, 437BL and 437BR, if you replaced the sampling valve for the left system reservoir (AMM 06-43-00/201).

S 414-029

(16) Close the access panels, 447BL and 447BR, if you replaced the sampling valve for the right system reservoir (AMM 06-43-00/201).

S 864-030

(17) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

S 444-031

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

RESERVOIR PRESSURE RELIEF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:
      (1) Remove the pressure relief valve on the reservoirs in the left, right, or center hydraulic systems.
      (2) Install the pressure relief valve on the reservoirs in the left, right, or center hydraulic systems.

TASK 29-11-24-024-001

2. Remove the Pressure Relief Valve on the Reservoir
   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 32-00-15/201, Main Gear Door Locks
      (4) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

   C. Remove the Pressure Relief Valve (Fig. 401)

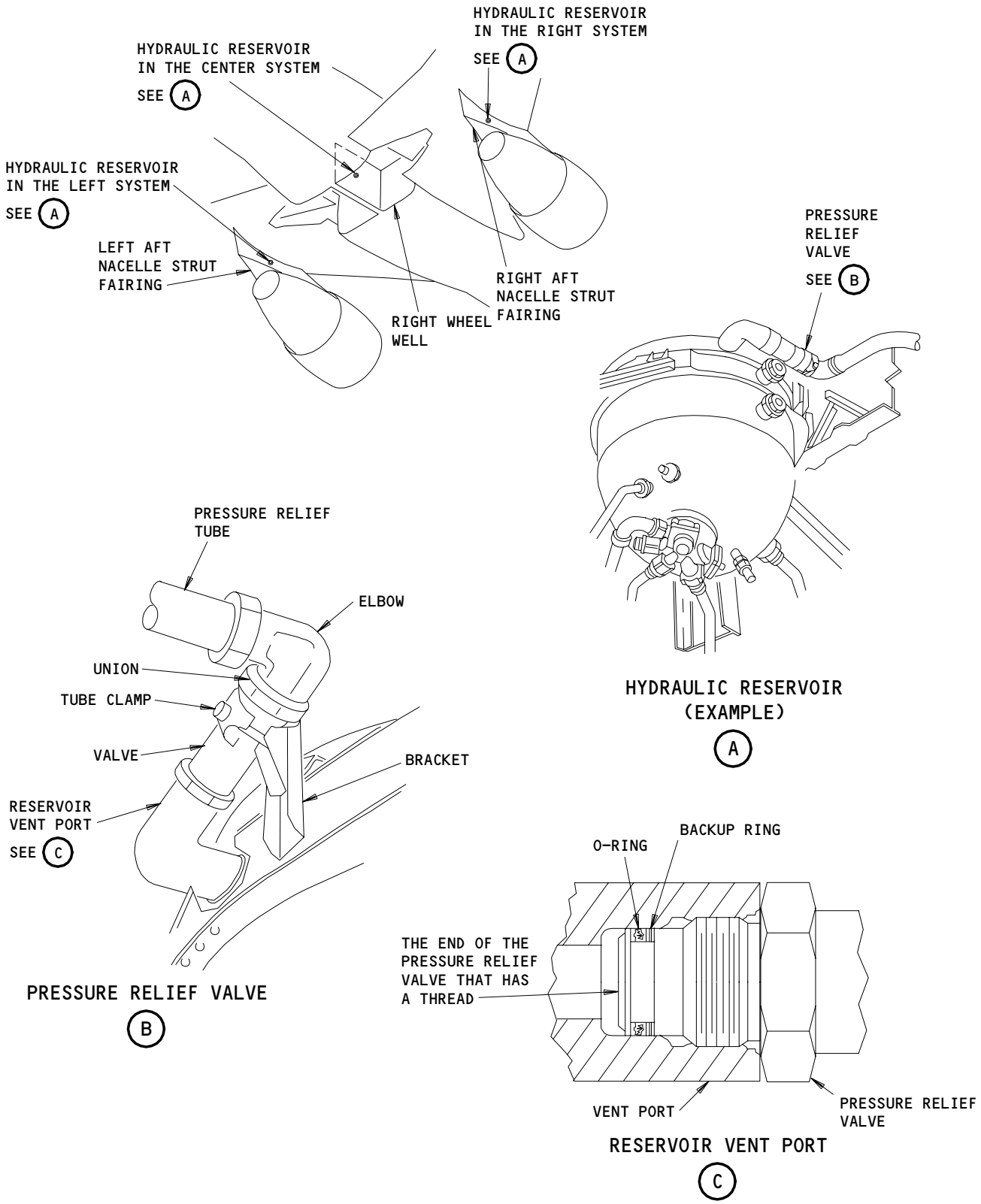
S 044-002

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

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

S 014-003

(2) Open the access panels, 437BL and 437BR, to remove the pressure relief valve from the left system reservoir (AMM 06-43-00/201).



Reservoir Pressure Relief Valve Installation
Figure 401

S 014-004
(3) Open the access panels, 447BL and 447BR, to remove the pressure relief valve from the right system reservoir (AMM 06-43-00/201).

S 014-005
(4) Remove the structural panel immediately forward of the access panel on each engine aft fairing.

S 494-006

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Open the door for the right wheel well and and install the door lock to remove the pressure relief valve from the center system reservoir (AMM 32-00-15/201).

S 864-007
(6) For the applicable hydraulic system,
close the pressurization shutoff valve for the reservoir.

S 864-008
(7) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D13, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP C2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 864-009
(8) Remove the pressure from the applicable hydraulic system and reservoir (AMM 29-11-00/201).

S 034-010
(9) Disconnect the reservoir vent line from the relief valve.

S 034-011
(10) Put a cap on the vent line.

S 034-012
(11) Remove the clamp that attaches the pressure relief valve to the bracket.

S 024-013
(12) Remove the pressure relief valve from the reservoir vent port.

S 034-014
(13) Install a plug in the reservoir vent port.

TASK 29-11-24-424-015

3. Install the Pressure Relief Valve on the Reservoir

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 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Main Gear Door Locks
(4) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Left Hydraulic System Reservoir
447BL 447BR	Right Hydraulic System Reservoir

D. Install the Pressure Relief Valve (Fig. 401)

S 644-016
(1) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-rings and the threads on the fittings.

S 434-017
(2) Install the O-rings and the elbow fittings on the pressure relief valve.

S 424-018
(3) Install the pressure relief valve in the reservoir vent port.

S 434-037
(4) Torque the pressure relief valve to 855-945 pound-inches (95-106 N.-m.).

S 434-019
(5) Install a clamp to attach the pressure relief valve to the bracket.

S 434-020
(6) Connect the reservoir vent line to the pressure relief valve.

S 864-021
(7) Remove the DO-NOT-CLOSE tag and close these circuit breakers on the overhead panel, P11:
(a) 11D13, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP C1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP C2
(e) 11L25, HYDRAULIC ELEC PUMP L

S 864-022
(8) For the applicable hydraulic system, open the reservoir pressurization shutoff valve.

S 864-023
(9) Pressurize the applicable hydraulic system reservoir (AMM 29-11-00/201).

S 214-024
(10) Do a check for leakage at the pressure relief valve.

S 094-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(11) Remove the door lock and close the door for the right wheel well, if you replaced the pressure relief valve in the center system reservoir (AMM 32-00-15/201).

S 414-026
(12) Close the access panels, 437BL and 437BR, if you replaced the pressure relief valve in the left system reservoir (AMM 06-43-00/201).

S 414-027
(13) Close the access panels, 447BL and 447BR, if you replaced the pressure relief valve in the right system reservoir (AMM 06-43-00/201).

S 414-028
(14) Install the structural panel immediately forward of the access panel on each engine aft fairing.

S 864-029
(15) Remove the hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-038
(16) Do this procedure: Thrust Reverser Activation for Ground Maintenance (AMM 78-31-00/201).

LEFT AND RIGHT SYSTEM RESERVOIR PRESSURIZATION MODULE AND COMPONENTS - 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 check valve 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 check valve in the reservoir pressurization module.

TASK 29-11-25-004-001

2. Remove the Reservoir Pressurization Module
   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 36-00-00/201, Pneumatic - General
      (4) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          437/447 Aft Nacelle Strut Fairing

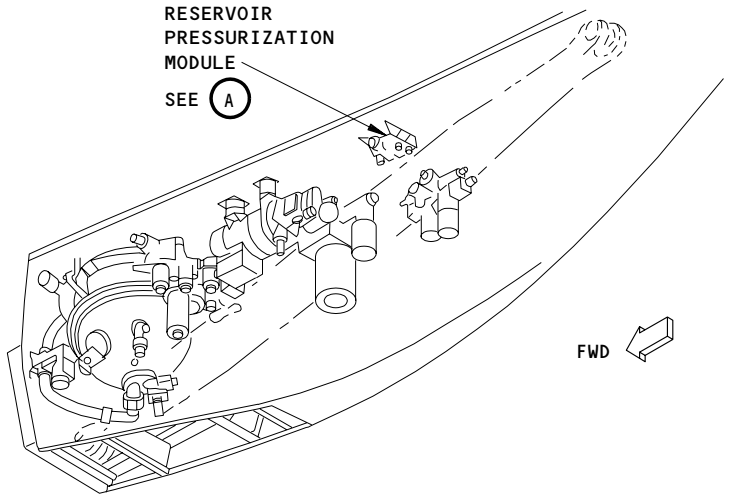
      (2) Access Panels
          437BL/437BR Hydraulic System
          447BL/447BR Hydraulic System

   C. Prepare for Removal

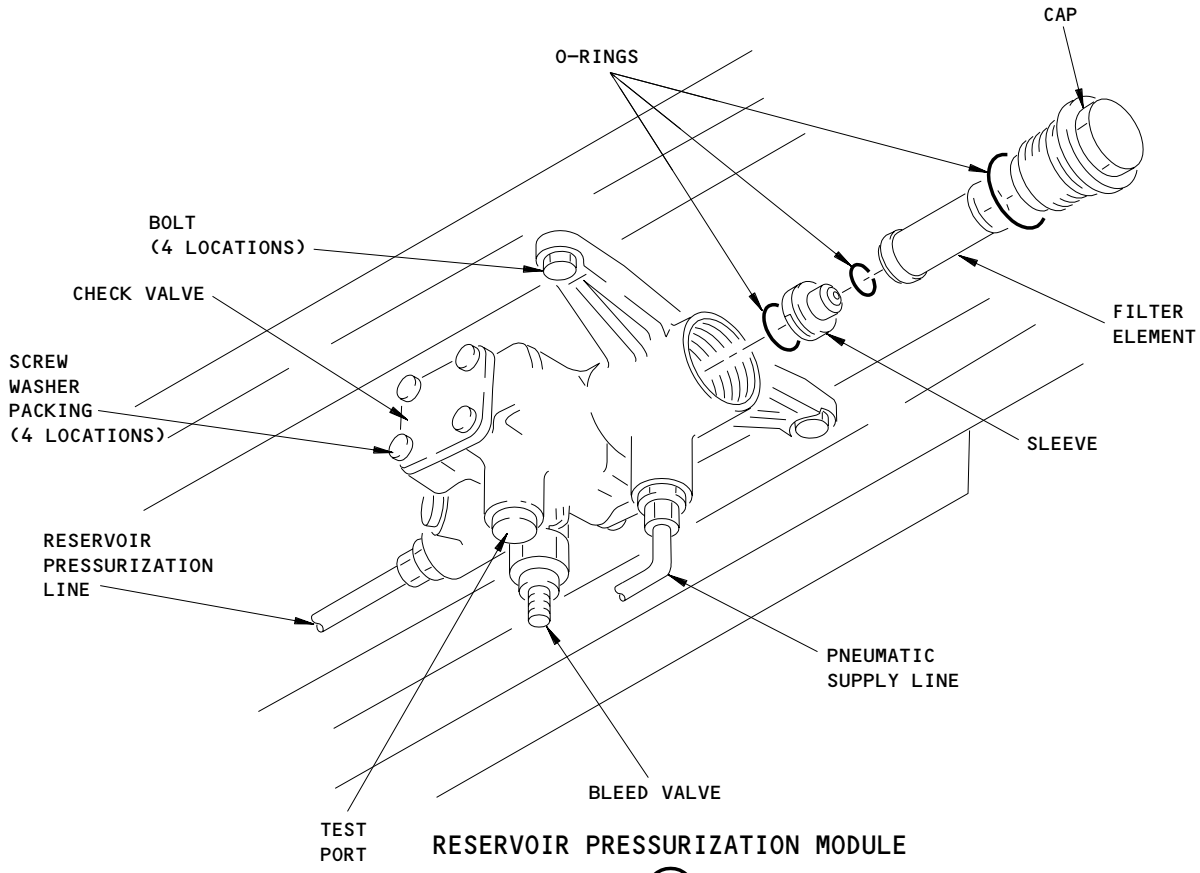
      S 864-002

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

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



HYDRAULIC BAY OF THE ENGINE STRUT (EXAMPLE)



RESERVOIR PRESSURIZATION MODULE
A

Reservoir Pressurization Module Installation
Figure 401

S 864-003
(2) Remove pneumatic power (AMM 36-00-00/201).

S 014-004
(3) For the left system, open the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 014-005
(4) For the right system, open the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-006
(5) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).

D. Remove the Reservoir Pressurization Module (Fig. 401)

S 034-007
(1) Disconnect the air lines from the reservoir pressurization module.

S 024-008
(2) Remove the four bolts and remove the reservoir pressurization module.

TASK 29-11-25-004-036

3. Remove the Filter Element from the Reservoir Pressurization Module

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 36-00-00/201, Pneumatic - General
(4) AMM 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zones
437/447 Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

C. Prepare for Removal

S 864-037

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

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

S 864-038

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

S 014-039

(3) For the left system, open the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 014-040

(4) For the right system, open the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-041

(5) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).

D. Remove the Filter Element (Fig. 401)

S 034-042

(1) Remove the cap from the reservior pressurization module.

S 024-043

(2) Remove the filter element.

TASK 29-11-25-004-079

4. Check Valve Removal

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 36-00-00/201, Pneumatic - General
(4) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

437/447 Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

C. Prepare for Removal

S 864-081

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

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

S 864-082

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

S 014-083

(3) For the left system, open the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 014-085

(4) For the right system, open the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-087

(5) Remove the pressure from the left and right hydraulic systems and the reservoirs (AMM 29-11-00/201).

D. Remove the check valve (Fig. 401)

S 034-096

(1) Remove the four screws and washers from the check valve.

S 024-097

(2) Remove the check valve from the module.

S 034-098
(3) Remove and discard the packings from the check valve.

TASK 29-11-25-404-031

5. Install the Reservoir Pressurization Module

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 36-00-00/201, Pneumatic - General
(4) AMM 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zones
437/447 Aft Nacelle Strut Fairing

(2) Access Panels
437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

C. Install the Reservoir Pressurization Module (Fig. 401)

S 144-009
(1) Clean the area around the mounting holes.

S 424-010
(2) Put the reservoir pressurization module in position.

S 424-044
(3) Install the four bolts and washers.

S 434-011
(4) Connect the air lines to the reservoir pressurization module.

D. Put the Airplane Back to Its Usual Condition

S 864-022
(1) Pressurize the reservoir in the left or right system (Ref 29-11-00).

S 214-023
(2) Make sure there are no air pressure leaks at the ports of the reservoir pressurization module.

S 864-030
(3) Remove the air source which you used to pressurize the reservoir (AMM 29-11-00/201).

S 414-024
(4) For the left system, close the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 414-032
(5) For the right system, close the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-025
(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

TASK 29-11-25-404-046

6. Install the Filter Element in the Reservoir Pressurization Module

A. Consumable Materials
(1) D00054 Hydraulic System Lubricant, MCS 352B
(2) B01003 Solvent - General Cleaning of Composites (Series 83)
(3) A00363 Sealant - RTV 162

B. References
(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 20-30-83/201, Airplane Structure Cleaning Solvents (Series 83)
(3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(4) AMM 36-00-00/201, Pneumatic - General
(5) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones
437/447 Aft Nacelle Strut Fairing

(2) Access Panels
437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

D. Install the Filter Element (Fig. 401)

S 144-047
(1) Remove the sealant remaining on the filter cap and the adjacent surface of the reservoir pressurization module.

S 164-048
(2) Clean the hole in the reservoir pressurization module for the filter element.

S 114-049
(3) Clean the filter element with solvent, Series 83 (AMM 20-30-83/201) and fully dry the filter element.

S 644-050
(4) Apply hydraulic lubricant to the new O-rings and the threads of the cap.

S 434-051
(5) Assemble the filter element, the O-ring, and the filter sleeve.

S 424-052
(6) Install the filter assembly into the reservoir pressurization module.

S 434-053
(7) Install the cap on the reservoir pressurization module.

S 434-054
(8) Tighten the cap to 75-95 pound-inches.

S 434-055
(9) Safety the cap with wire.

S 394-056
(10) Apply a bead of sealant to the joint between the cap and the reservoir pressurization module.

E. Put the Airplane Back to Its Usual Condition

S 864-057
(1) Pressurize the reservoir in the left or right system (AMM 29-11-00/201).

S 214-058
(2) Make sure there are no air pressure leaks at the cap on the reservoir pressurization module.

S 864-059
(3) Remove the air source which you used to pressurize the reservoir (AMM 29-11-00/201).

S 414-060
(4) For the left system, close the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 414-061
(5) For the right system, close the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-062
(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

TASK 29-11-25-404-080

7. Check Valve Installation

A. Consumable Materials
(1) A00386 Adhesive - Silicone RTV Sealant

(2) D00054 Hydraulic System Lubricant, MCS 352B
(3) D00633 Grease - General
(4) G00095 Detector - Leak, Leak-Tek (160X)

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 36-00-00/201, Pneumatic - General
(4) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones
437/447 Aft Nacelle Strut Fairing

(2) Access Panels
437BL/437BR Hydraulic System
447BL/447BR Hydraulic System

D. Install the Check Valve (Fig. 401)

S 644-099
(1) Apply some lubricant, D00054, to the packings.

S 434-100
(2) Install the packings on the check valve.

S 424-101
(3) Install the check valve in the reservoir pressurization module.

S 434-102
(4) Apply grease, D00633, to the threads of the screws and install the four screws and washers.

S 434-103
(5) Tighten the screws to 20-25 pound-inches (2-3 Newton-meters).

S 794-104
(6) Apply some leak detector to the check valve.

S 864-105
(7) Pressurize the pneumatic system (AMM 36-00-00/201).

S 794-106
(8) Examine the check valve for leakage:
(a) If bubbles come slowly into view, the quantity of leakage is satisfactory.
(b) If you find a high concentration of leakage, you must repair the cause of the leakage.

S 864-107
(9) De-Pressurize the pneumatic system (AMM 36-00-00/201).

S 434-108
(10) Safety the screws with a lockwire.

S 394-109
(11) Apply Adhesive, A00386, to the screws and to the joing between the check valve and the module assembly.

E. Put the Airplane Back to Its Usual Condition

S 864-088
(1) Pressurize the reservoir in the left or right system (AMM 29-11-00/201).

S 214-089
(2) Make sure there are no air pressure leaks at the ports of the reservoir pressurization module.

S 864-090
(3) Remove the air source which you used to pressurize the reservoir (AMM 29-11-00/201).

S 414-091
(4) For the left system, close the access panels, 437BL and 437BR, for the hydraulic system (AMM 06-43-00/201).

S 414-093
(5) For the right system, close the access panels, 447BL and 447BR, for the hydraulic system (AMM 06-43-00/201).

S 864-095
(6) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

CENTER SYSTEM RESERVOIR PRESSURIZATION MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task removes the reservoir pressurization module. The second task removes the filter element from the reservoir pressurization module. The third task installs the reservoir pressurization module. The fourth task installs the filter element in the reservoir pressurization module.

TASK 29-11-26-004-001

2. Remove the Reservoir Pressurization Module
   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 Zone
          144 Right MLG Wheel Well

   C. Prepare for Removal

      S 094-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 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 center hydraulic system and the reservoir (AMM/29-11-00/201).
   D. Remove the Reservoir Pressurization Module (Fig. 401)

      S 034-005
      (1) Disconnect the air lines from the reservoir pressurization module.

      S 024-006
      (2) Remove the bolts and remove the reservoir pressurization module.

TASK 29-11-26-004-025

3. Remove the Filter Element from the Reservoir Pressurization Module

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 Zone
144 Right MLG Wheel Well

C. Prepare for Removal

S 494-026
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-027

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

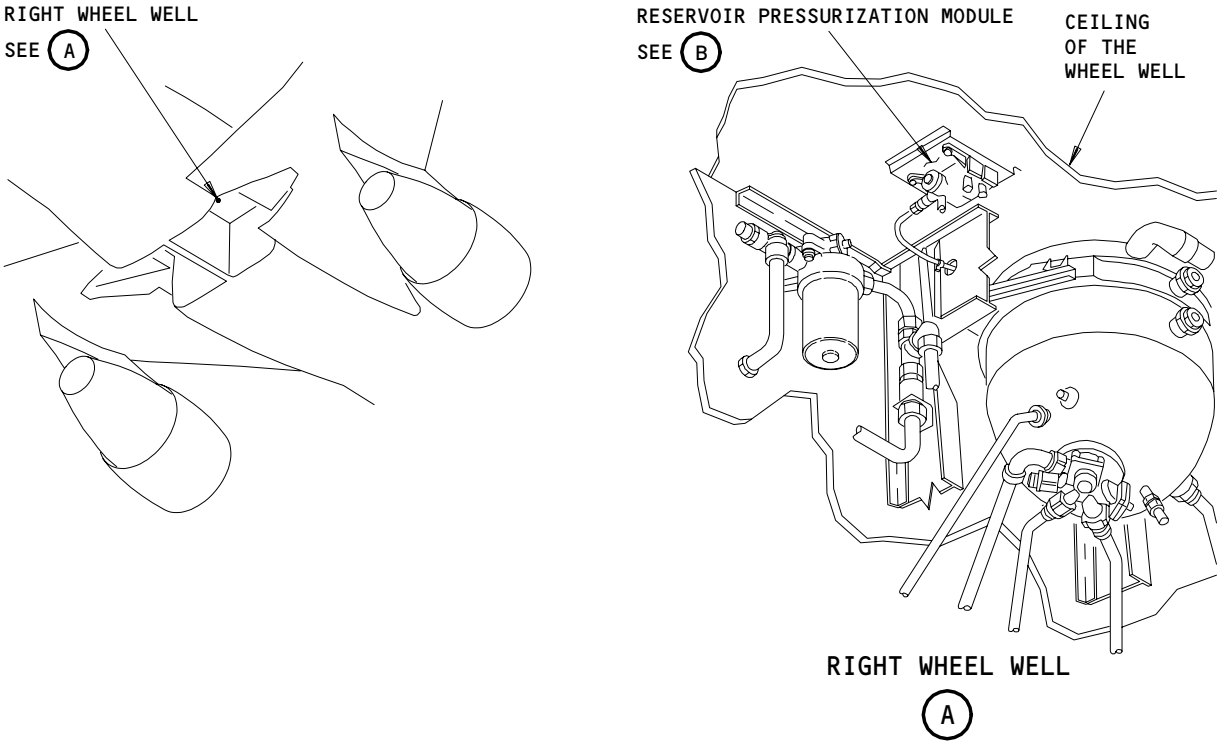
(2) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-028
(3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

D. Remove the Filter Element (Fig. 401)

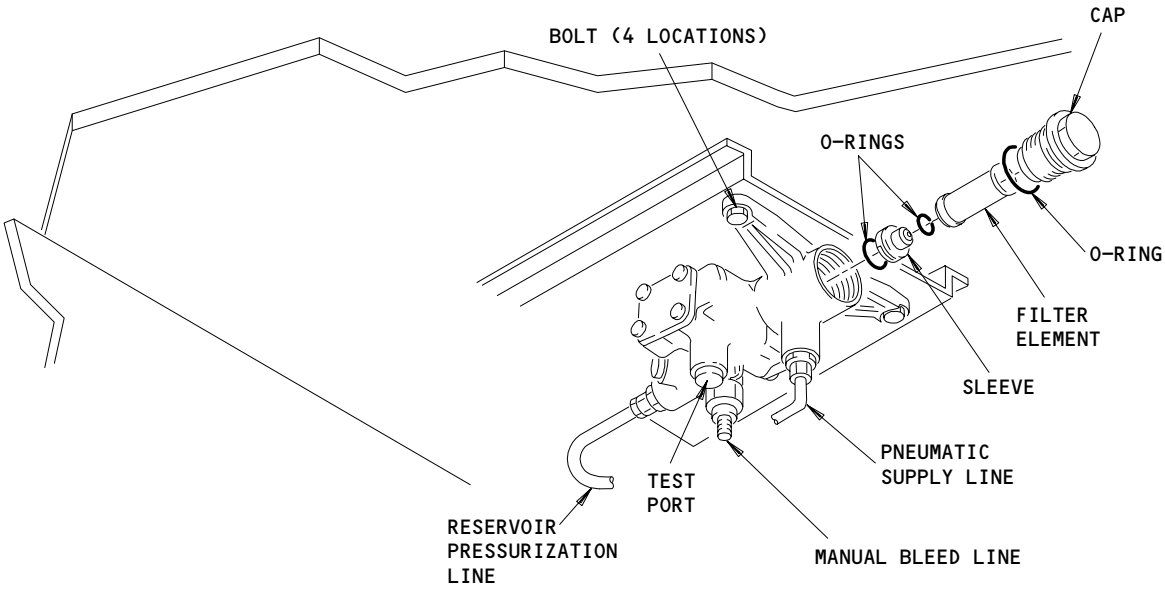
S 034-029
(1) Remove the cap from the reservoir pressurization module.

S 024-030
(2) Remove the filter element.



RIGHT WHEEL WELL

A



RESERVOIR PRESSURIZATION MODULE

B

Reservoir Pressurization Module Installation
Figure 401

TASK 29-11-26-404-011

4. Install the Reservoir Pressurization Module

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 Zone

144 Right MLG Wheel Well

C. Install the Reservoir Pressurization Module (Fig. 401).

S 424-007

(1) Put the reservoir pressurization module in position.

S 424-045

(2) Install the four bolts and washers.

S 434-008

(3) Connect the air lines to the reservoir pressurization module.

D. Put the Airplane Back to Its Usual Condition

S 864-021

(1) Pressurize the reservoir in the center system (AMM 29-11-00/201).

S 214-022

(2) Make sure there are no air pressure leaks at the ports of the reservoir pressurization module.

S 864-046

(3) Remove the air source which you used to pressurize the center reservoir (AMM 29-11-00/201).

S 414-024

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).

TASK 29-11-26-404-031

5. Install the Filter Element in the Reservoir Pressurization Module

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B
(2) B01003 Solvent - General Cleaning of Composites (Series 83)
(3) A00363 Sealant - RTV 162

B. References

(1) AMM 20-30-83/201, Airplane Structure Cleaning Solvents (Series 83)
(2) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Landing Gear Door Locks

C. Access

(1) Location Zone
144 Right MLG Wheel Well

D. Install the Filter Element (Fig. 401)

S 144-032
(1) Remove the sealant remaining on the cap and the adjacent surface of the reservoir pressurization module.

S 164-033
(2) Clean the hole in the reservoir pressurization module for the filter element.

S 114-034
(3) Clean the filter element with solvent, Series 83 (AMM 20-30-83/201) and fully dry the filter element.

S 644-035
(4) Apply hydraulic lubricant to the new O-rings and the threads of the cap.

S 434-036
(5) Assemble the filter element, the O-ring and the filter sleeve.

S 424-037
(6) Install the filter unit assembly into the reservoir pressurization module.

S 434-038
(7) Install the cap on the reservoir pressurization module.

S 434-039
(8) Tighten the cap to 75-95 pound-inches.

S 864-042
(9) Pressurize the reservoir in the center system (AMM 29-11-00/201).

S 214-043
(10) Make sure there are no air pressure leaks at the cap on the reservoir pressurization module.

S 434-040
(11) Safety the cap with a lockwire.

S 394-041
(12) Apply a bead of sealant to the joint between the cap and the reservoir pressurization module.

E. Put the Airplane Back to Its Usual Condition

S 864-047
(1) Remove the air source which you used to pressurize the center reservoir (AMM 29-11-00/201).

S 414-044

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

HEAT EXCHANGER - REMOVAL/INSTALLATION

1. General
   A. This procedure has these tasks:
      (1) Remove the heat exchanger.
      (2) Install the heat exchanger.

TASK 29-11-27-024-001

2. Remove the Heat Exchanger
   A. References
      (1) AMM 20-10-09/401, Flareless Tubing Assembly
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-01/401, Main Tank Access Door
      (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
          211/212 Control Cabin
          532/632 Main Tank (Inboard of Rib No. 10)

      (2) Access Panels
          632BB Heat Exchanger (Right and Center Hydraulic Systems)
          532BB Heat Exchanger (Left Hydraulic System)

   C. Remove the Heat Exchanger (Fig. 401)

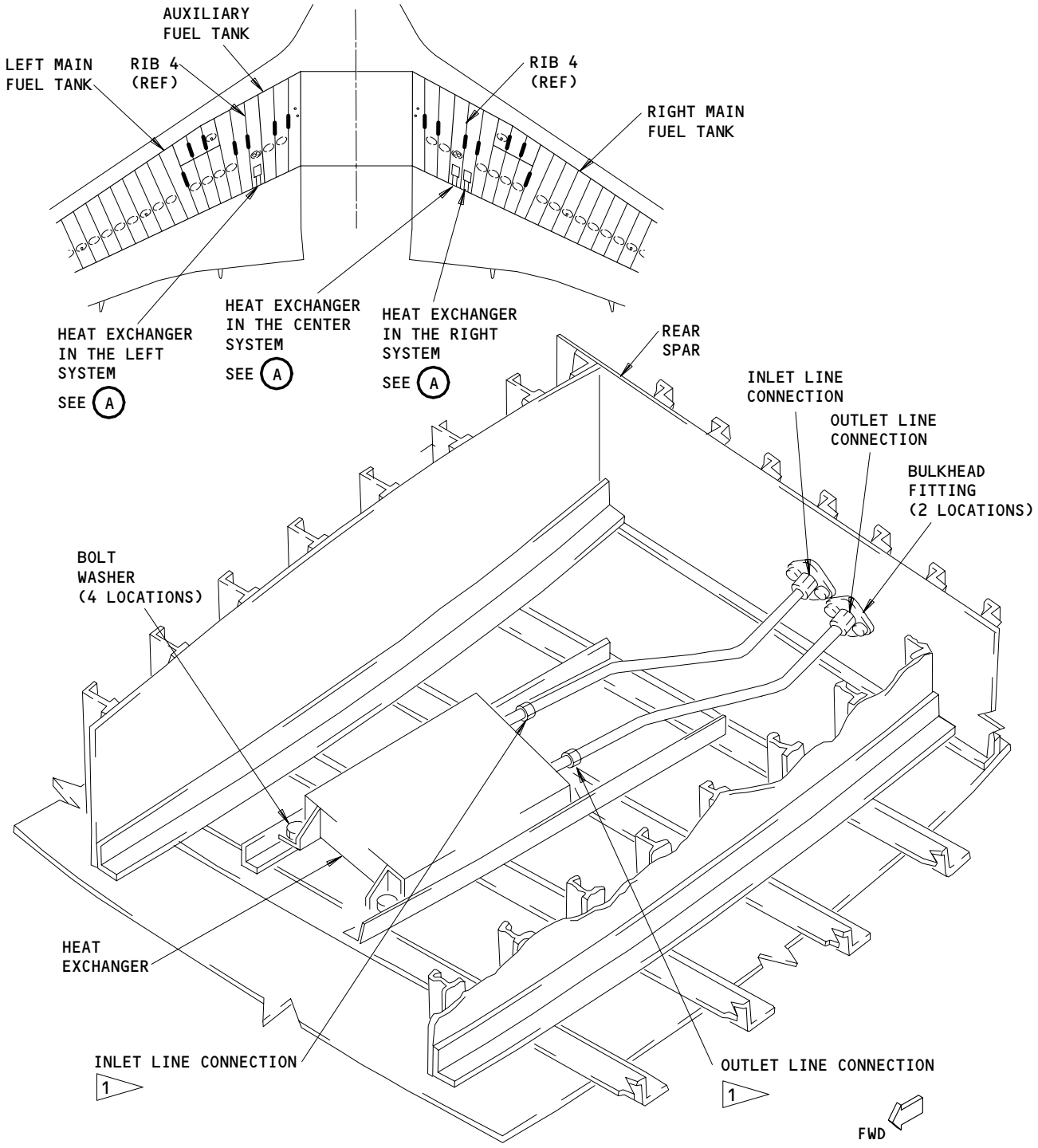
      S 864-002
      (1) Remove the pressure from the applicable hydraulic system and reservoir (AMM 29-11-00/201).

      S 864-003
      (2) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11L15, HYDRAULIC ELEC PUMP CTR 1
          (c) 11L16, HYDRAULIC ELEC PUMP R
          (d) 11L24, HYDRAULIC ELEC PUMP CTR 2
          (e) 11L25, HYDRAULIC ELEC PUMP L

      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, 532BB or 632BB, for the main fuel tank (AMM 28-11-01/401).

      S 864-006
      (5) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).



HEAT EXCHANGER
(EXAMPLE)
A

1 NOT INSTALLED ON AIRPLANES WITH TUBES WELDED TO HEAT EXCHANGERS

Heat Exchanger Installation
Figure 401

S 034-007
(6) Disconnect the inlet and outlet lines for the heat exchanger (AMM 20-10-09/401).

S 034-008
(7) Put caps on the inlet and outlet lines.

S 034-013
(8) Remove the bolts and washers that hold the heat exchanger to the bracket.

S 024-014
(9) Remove the heat exchanger from the fuel tank.

TASK 29-11-27-424-015

3. Install the Heat Exchanger

A. Equipment

(1) Bonding Meter - Model T477W
Avtron Manufacturing, Inc.
Cleveland, Ohio
(a) Bonding Meter - Model M1
(Serial Number A0000112 and subsequent)
BCD Electronics Ltd.
Vancouver, Canada

B. References

(1) AMM 20-10-09/401, Flareless Tubing Assembly
(2) AMM 20-10-22/701, Metal Surfaces
(3) AMM 28-11-00/201, Fuel Tanks
(4) AMM 28-11-01/401, Main Tank Access Door
(5) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

C. Access

(1) Location Zones

211/212	Control Cabin
532/632	Main Tank (Inboard of Rib No. 10)

(2) Access Panels

632BB	Heat Exchanger (Right and Center Hydraulic Systems)
532BB	Heat Exchanger (Left Hydraulic System)

D. Install the Heat Exchanger (Fig. 401)

S 124-016
(1) Clean the mating surfaces of the heat exchanger and the airplane structure for a good electrical bond (AMM 20-10-22/701).

NOTE: Clean these surfaces with a rotary stainless steel brush only.

S 644-017
(2) Apply a layer of hydraulic fluid to the threads on the fittings.

S 434-018
(3) Hold the heat exchanger in its correct position and loosely connect the inlet and outlet lines.

S 434-019
(4) Install the bolts and washers to attach the heat exchanger to the airplane structure.

S 434-020
(5) Tighten the inlet and outlet lines as follows (AMM 20-10-09/401):

NOTE: On airplanes with lines that are not welded to the heat exchanger, hold the fitting on the heat exchanger line with a wrench while you tighten the B-nut on the hydraulic line.

(a) Tighten the connections to 342-378 pound-inches (38.6-42.7 Nm).
(b) Loosen the nuts then tighten the nuts to 540 pound-inches (62.0 Nm).

S 284-021

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.

(6) Use a bonding meter to make sure the resistance of the electrical bond is as follows (AMM 20-10-09/401):
(a) The resistance between the mating surfaces of the heat exchanger and the airplane structure is less than 0.001 ohm (1 milliohm).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-04.

(b) The fay surface bond resistance between the inlet and outlet lines and the bulkhead fitting is less than 0.005 ohm (5 milliohms).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-04.

(c) On airplanes with in-line fittings, the resistance across the in-line fittings (tube-to-tube) is less than 0.005 ohm (5 milliohms).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-04.

(d) The resistance between the bulkhead fitting and the bulkhead in and out of the fuel tank is less than 0.010 ohm (10 milliohms).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-04.

S 284-031

(7) Do this task: Bonding Resistance Check of the Heat Exchanger Lines (AMM 29-11-27/601).

NOTE: CDCCL - Refer to the task: Airworthiness Limitation Precautions (AMM 29-00-00/201), for important information on Critical Design Configuration Control Limitations (CDCCLs).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-04.

S 414-022

(8) Install the access door, 532BB or 632BB, for the main fuel tank (AMM 28-11-01/401).

S 864-023

(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L16, HYDRAULIC ELEC PUMP R
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11L25, HYDRAULIC ELEC PUMP R

S 864-024

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.

(10) Pressurize the applicable hydraulic system with the alternating current motor pump (ACMP) (AMM 29-11-00/201).

S 864-025

(11) Remove hydraulic power (AMM 29-11-00/201).

S 014-026

(12) Remove the access panel, 532BB or 632BB, for the main fuel tank (AMM 28-11-01/201).

S 864-027

(13) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).

S 214-028

(14) Do a check for leakage at the heat exchanger.

S 414-029

(15) Install the access panel, 532BB or 632BB, for the main fuel tank (AMM 28-11-01/401).

HEAT EXCHANGER - INSPECTION/CHECK

1. General
   A. This procedure has this task:
      (1) Bonding resistance check of the heat exchanger lines.

TASK 29-11-27-026-001

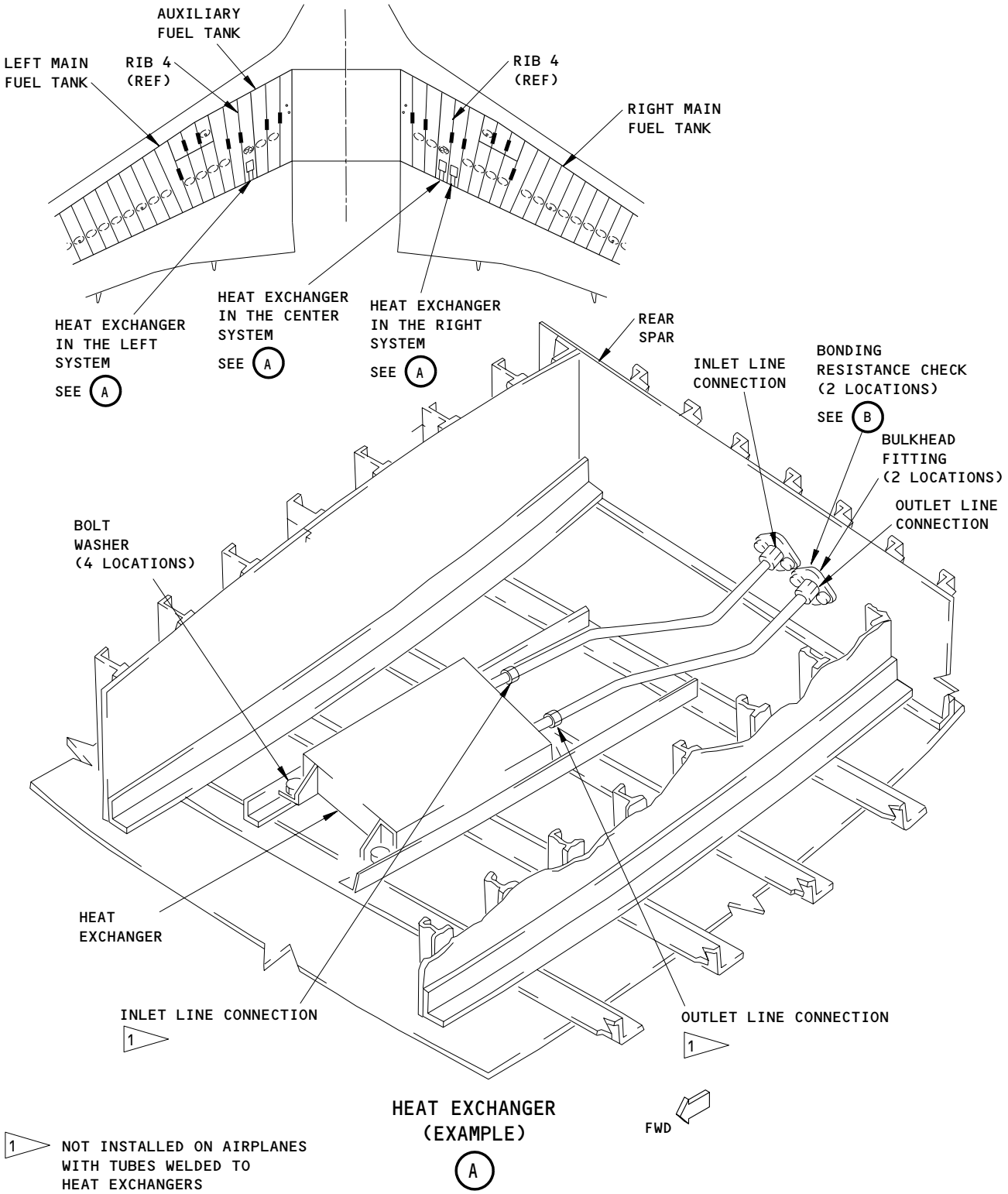
2. Bonding Resistance Check of the Heat Exchanger Lines (Fig. 601)
   A. General
      (1) ALI - Refer to the task: Airworthiness Limitations Precautions (AMM 29-00-00/201), for important information airworthiness limitation instructions (ALIs).
      (2) Do this task to do the requirements of 28-AWL-05.
   B. References
      (1) AMM 06-44-00/201, Wings (Major Zones 500 and 600) Access Doors and Panels
      (2) AMM 28-11-00/201, Fuel Tanks
      (3) AMM 28-11-01/401, Main Tank Access Door
      (4) AMM 28-26-00/201, Defueling
      (5) SWPM 20-20-00, Electrical Bonds and Grounds
   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
          532 Main Tank (Inboard of Rib No. 10) (Left)
          632 Main Tank (Inboard of Rib No. 10) (Right)
          651 Rear Spar to MLG Support Beam (Right)

      (2) Access Panels
          532BB Main Tank Access Door (Left)
          632BB Main Tank Access Door (Right)
          532AZ Fuel Tank Baffle (Left)
          632AZ Fuel Tank Baffle (Right)

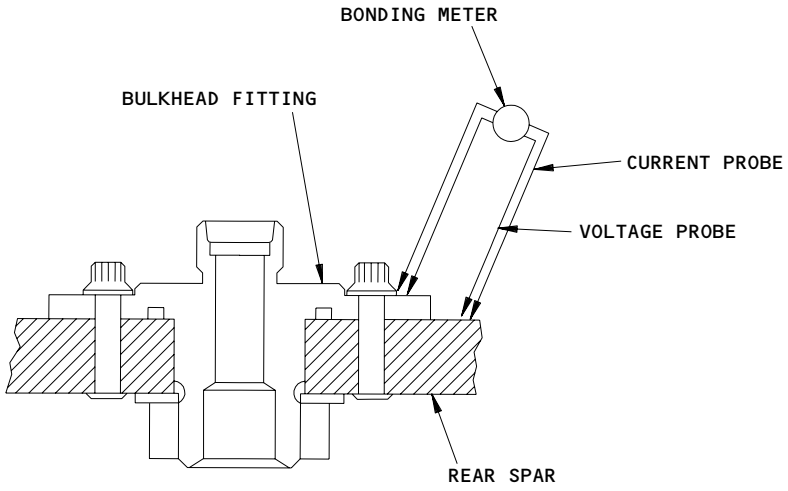
   E. Bonding Resistance Check in the Main Fuel Tanks

      S 656-004
      (1) Defuel the main fuel tanks (AMM 28-26-00/201).

      S 016-005
      (2) Remove the access door, 532BB (632BB), for the left (right) main fuel tank (AMM 28-11-01/401).



Heat Exchanger Bonding Resistance Check
Figure 601 (Sheet 1)



BONDING RESISTANCE CHECK
(EXAMPLE)
B

Heat Exchanger Bonding Resistance Check
Figure 601 (Sheet 2)

S 016-033

(3) AIRPLANES WITH FUEL TANK BAFFLE AT RIB 5;
Remove the fuel tank baffle panel, 532AZ (632AZ), at rib 5 in the left (right) main fuel tank.

S 866-027

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.

(4) Do this procedure: Purging and Fuel Tank Entry (AMM 28-11-00/201).

S 766-031

WARNING: MAKE SURE THE BONDING RESISTANCE IS LESS THAN THE LIMITS. THE RESISTANCE OF THE ELECTRICAL BOND IS VERY IMPORTANT IF 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 the checks of the bonding resistance in the main tanks for each heat exchanger as follows (SWPM 20-20-00):
(a) Make sure the resistance between the bulkhead fitting and the rear spar for the inlet line is 0.005 ohms (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).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-05.

(b) Make sure the resistance between the bulkhead fitting and the rear spar for the outlet line is 0.005 ohms (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).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-05.

S 766-032

(6) If the bonding resistance is more than 0.005 ohms (5 milliohms), rework the 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).

NOTE: This is applicable to Airworthiness Limitation 28-AWL-05.

S 416-034

(7) AIRPLANES WITH FUEL TANK BAFFLE AT RIB 5;
Install the fuel tank baffle panel, 532AZ (632AZ), at rib 5 in the left (right) main fuel tank.

S 416-018

(8) Install the access door, 532BB or 632BB, for the main fuel tank (AMM 28-11-01/401).

RESERVOIR PRESSURIZATION SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the pressurization shutoff valve for the left, right and center system reservoirs. The other task installs the pressurization shutoff valve for the left, right, and center system reservoirs.

   TASK 29-11-28-024-001

2. Remove the Pressurization Shutoff Valves
   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 32-00-15/201, Main Gear Door Locks
      (4) AMM 36-00-00/201, Pneumatic
      (5) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Main Landing Gear Wheel Well (Right)
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Left System Shutoff Valve
447BL/447BR	Right System Shutoff Valve

   C. Remove the Shutoff Valve (Fig. 401)

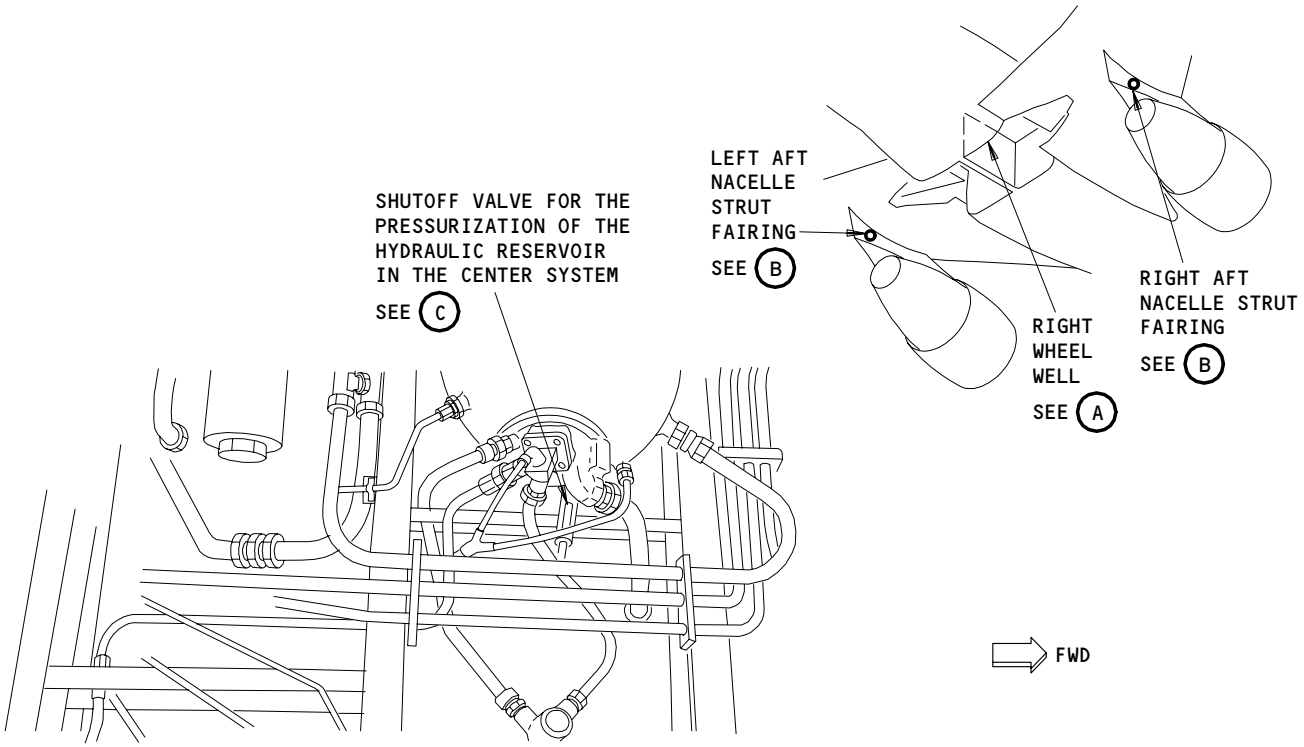
      S 044-002

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

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

      S 014-003

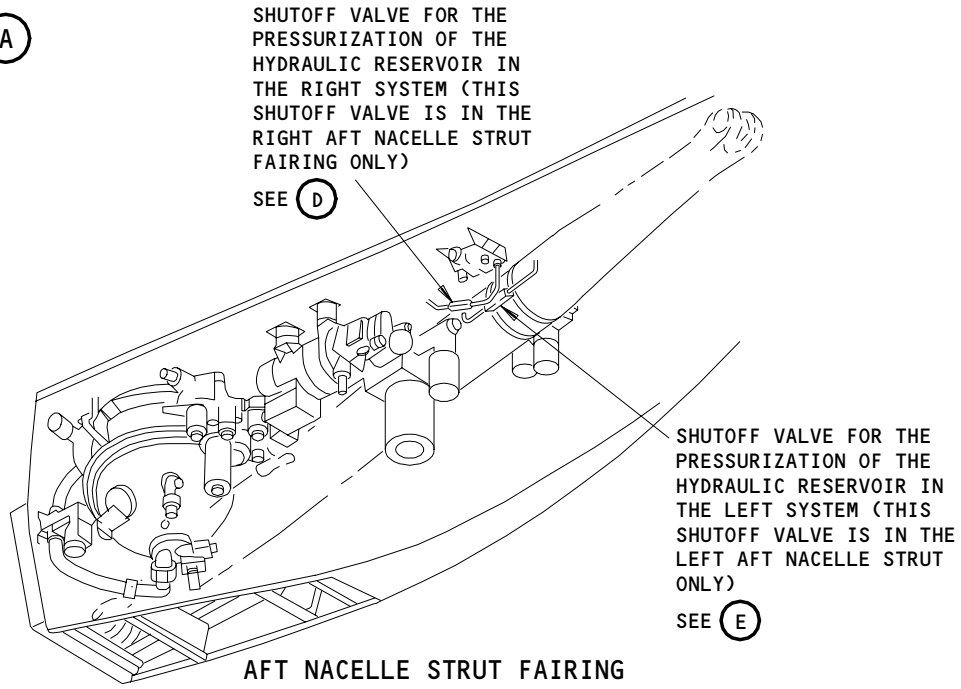
      (2) Open the access panels, 437BL and 437BR, to remove the shutoff valve from the left system (AMM 06-43-00/201).



RIGHT WHEEL WELL

A

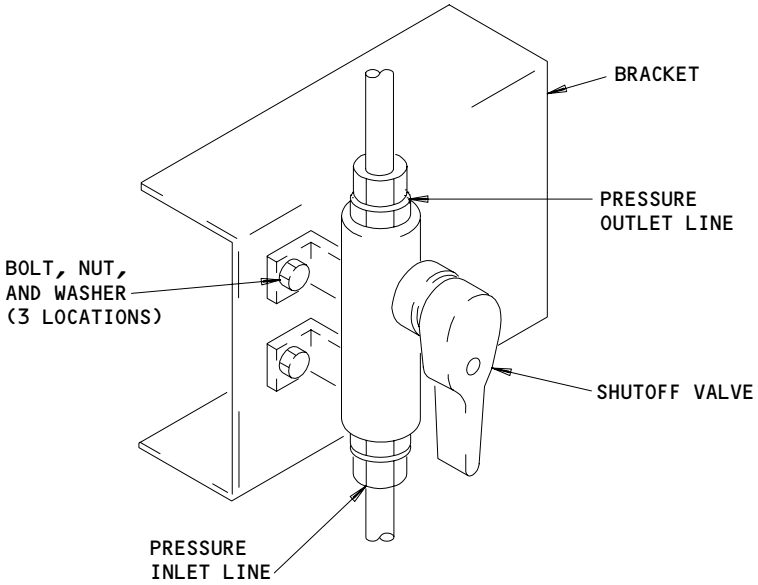
FWD



AFT NACELLE STRUT FAIRING
(EXAMPLE)

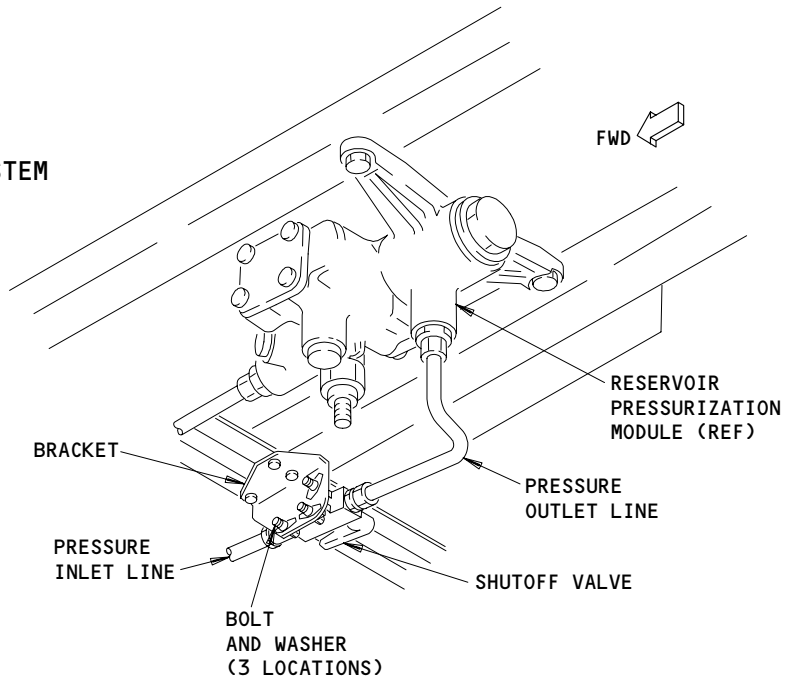
B

Shutoff Valve Installation for the Reservoir Pressurization
Figure 401 (Sheet 1)



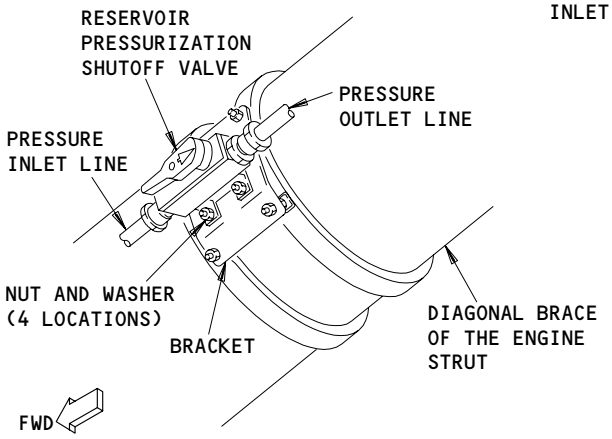
SHUTOFF VALVE IN THE CENTER SYSTEM

C



SHUTOFF VALVE IN THE RIGHT SYSTEM

D



SHUTOFF VALVE IN THE LEFT SYSTEM

E

Shutoff Valve Installation for the Reservoir Pressurization
Figure 401 (Sheet 2)

85776

S 014-004

(3) Open the access panels, 447BL and 447BR, to remove the shutoff valve from the right system (AMM 06-43-00/201).

S 494-006

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.

(4) Open the door for the right wheel well and install the door lock to remove the shutoff valve from the center system (AMM 32-00-15/201).

S 864-007

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

S 864-008

(6) Remove the pressure from the applicable reservoir (AMM 29-11-00/201).

S 034-009

(7) Disconnect the inlet and outlet lines.

S 034-010

(8) Put caps on the inlet and outlet lines.

S 034-011

(9) Remove the fasteners that attach the shutoff valve to the support bracket.

TASK 29-11-28-424-012

3. Install the Pressurization Shutoff Valve

A. References

(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels

(2) AMM 29-11-00/501, Main (Left, Right and Center) Hydraulic Systems
(3) AMM 32-00-15/201, Main Gear Door Locks
(4) AMM 36-00-00/201, Pneumatic
(5) AMM 78-31-00/201, Thrust Reverser System

B. Access

(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Left System Shutoff Valve
447BL/447BR	Right System Shutoff Valve

C. Install the Shutoff Valve (Fig. 401)

S 434-013
(1) If not installed, install the unions and new o-rings in the shutoff valve ports.

S 434-014
(2) Hold the shutoff valve in the support bracket and install the fasteners.

S 434-015
(3) Install the inlet and outlet lines.

S 864-016
(4) Supply pneumatic power (AMM 36-00-00/201).

S 864-017
(5) Move the handle for the shutoff valve to the open position.

S 714-030
(6) Do a Test of the Reservoir Pressurization System (AMM 29-11-00/501).

S 214-018
(7) Do a check for leakage at the shutoff valve.

S 094-019

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.

(8) Remove the door lock and close the door for the right wheel well, if you replaced the shutoff valve for the center system (AMM 32-00-15/201).

S 414-020
(9) Close the access panels, 437BL and 437BR, if you replaced the shutoff valve for the left system (AMM 06-43-00/201).

S 414-021
(10) Close the access panels, 447BL and 447BR, if you replaced the shutoff valve for the right system (AMM 06-43-00/201).

S 864-022
(11) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).

S 444-023
(12) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

RESERVOIR PRESSURIZATION SHUTOFF VALVE - ADJUSTMENT/TEST

1. General
   A. This procedure has the following task:
      (1) Center Hydraulic Reservoir Pressurization Shutoff Valve Operational Test

   TASK 29-11-28-705-001

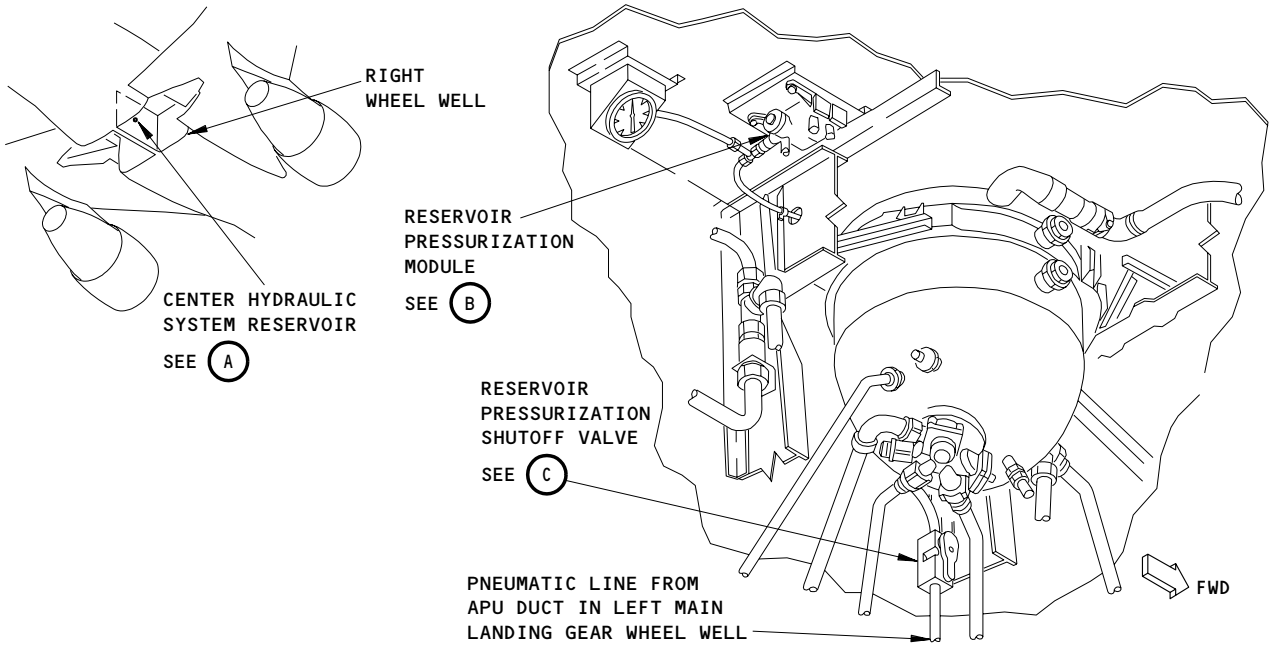
2. Center Hydraulic Reservoir Pressurization Shutoff Valve Operational Test
   A. General
      (1) This procedure will make sure the center hydraulic system reservoir can be pressurized when the reservoir pressurization shutoff valve is in the normal 'open' position.
   B. References
      (1) AMM 36-00-00/201, Pneumatics
   C. Access
      (1) Location Zones
          143 Main Landing Gear Wheel Well (Left)
          144 Main Landing Gear Wheel Well (Right)

   D. Procedure

      S 865-006
      (1) Depressurize the pneumatic system (AMM 36-00-00/201).

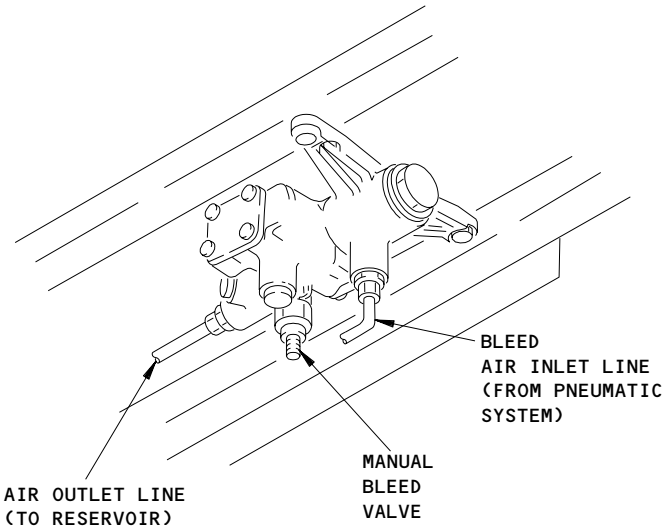
      S 865-007
      (2) Depressurize the center hydraulic system reservoir:
          (a) Locate the reservoir pressurization module in the right main landing gear wheel well.

              NOTE: A depressurization valve (manual bleed valve) is in the bleed 'BLD' port on the pressurization module. The pressurized air in the reservoir will vent out thru the depressurization valve when it is pushed.



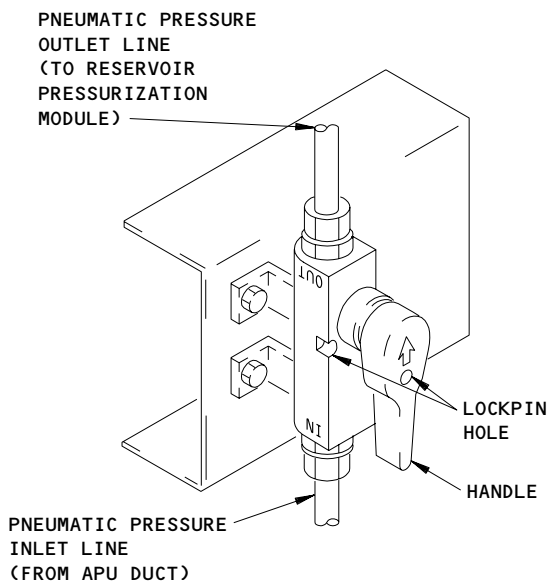
CENTER HYDRAULIC SYSTEM RESERVOIR

A



RESERVOIR PRESSURIZATION MODULE

B



RESERVOIR PRESSURIZATION SHUTOFF VALVE

C

Center Hydraulic System Reservoir Pressurization Shutoff Valve
Figure 501

WARNING: PUT A RAG OVER THE RESERVOIR DEPRESSURIZATION VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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.

(b) Put a rag over the reservoir depressurization valve to catch a spray of hydraulic fluid before you depressurize the reservoir.
(c) Push the reservoir depressurization valve until the reservoir is fully depressurized (no longer hear sound of venting air).

S 015-003

(3) Locate the reservoir pressurization shutoff valve in the right main landing gear wheel well.
(a) Manually turn the handle of the reservoir pressurization shutoff valve to the actuated 'closed' position.
(b) Release the handle and make sure it returns to the fully normal 'open' position under spring action.
(c) Make sure the handle operates smoothly with no tendency to stick or bind.

S 865-005

(4) Pressurize the pneumatic system (AMM 36-00-00/201).
(a) Make sure there are no external air leaks in the pneumatic line between the reservoir pressurization module and the shutoff valve (in the right main landing gear wheel well) and the APU pneumatic duct (in the left main landing gear wheel well).

NOTE: There should be no air leaks in the pneumatic lines except at the bleed orifice cap located in the left main landing gear wheel well. The cap has a small diameter hole (orifice) to constantly drain any water in the pneumatic lines.

(b) Manually turn the handle on the reservoir pressurization shutoff valve to the actuated 'closed' position and engage the lockpin.
(c) Depressurize the center hydraulic system reservoir again:

WARNING: PUT A RAG AROUND THE RESERVOIR DEPRESSURIZATION VALVE ON THE RESERVOIR PRESSURIZATION MODULE 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.

1) Put a rag over the reservoir depressurization valve to catch a spray of hydraulic fluid before you depressurize the reservoir.
2) Push the reservoir depressurization valve (manual bleed valve) for 60-70 seconds, and make sure the manual bleed valve vents air to the ambient.

NOTE: If the reservoir pressurization shutoff valve was open prior to pneumatic system pressurization, the manual bleed valve should vent air which indicates the reservoir was pressurized. If the manual bleed valve does not vent air, then the shutoff valve was closed prior to pneumatic system pressurization which indicates the reservoir was not pressurized.

(d) Release the lockpin and the handle on the reservoir pressurization shutoff valve and make sure the handle returns to the fully normal 'open' position under spring action.

S 865-008

(5) Depressurize the pneumatic system (AMM 36-00-00/201).

AIR DRIVEN PUMP (ADP) PRESSURE REGULATOR AND SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the regulator and shutoff valve. The other task installs the regulator and shutoff valve.
   B. The regulator and shutoff valve has a solenoid, an actuator, and a butterfly plate. This procedure removes and installs these components as one unit.

TASK 29-11-30-004-038

2. Remove the Regulator and Shutoff Valve (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 36-00-00/201, Pneumatic - General
   B. Access
      (1) Location Zone
          195 Wing to Body - Aft Upper Half (Left)

      (2) Access Panels
          195SL Air Driven Hydraulic Pump
          195TL ADP Pressure Regulator and Shutoff Valve

   C. Procedure

      S 864-001
      (1) Supply electrical power (AMM 24-22-00/201).

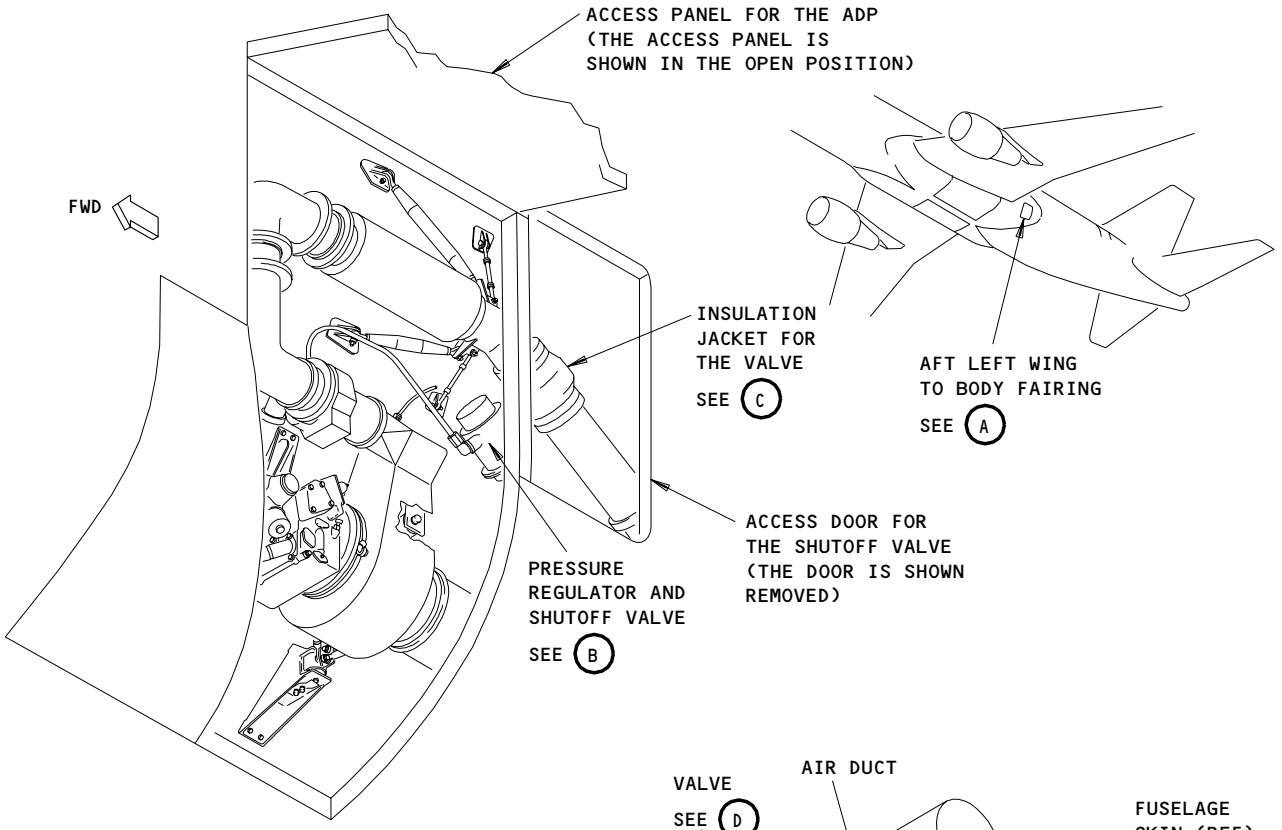
      S 864-002
      (2) Put the C ISLN valve and the APU valve switches on the pilots' overhead panel, P5, to the OFF position.

      S 864-003
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11S14, ISOL VALVE PWR C
          (c) 11S23, APU BLEED POWER

      S 864-004
      (4) Remove pneumatic power (AMM 36-00-00/201).

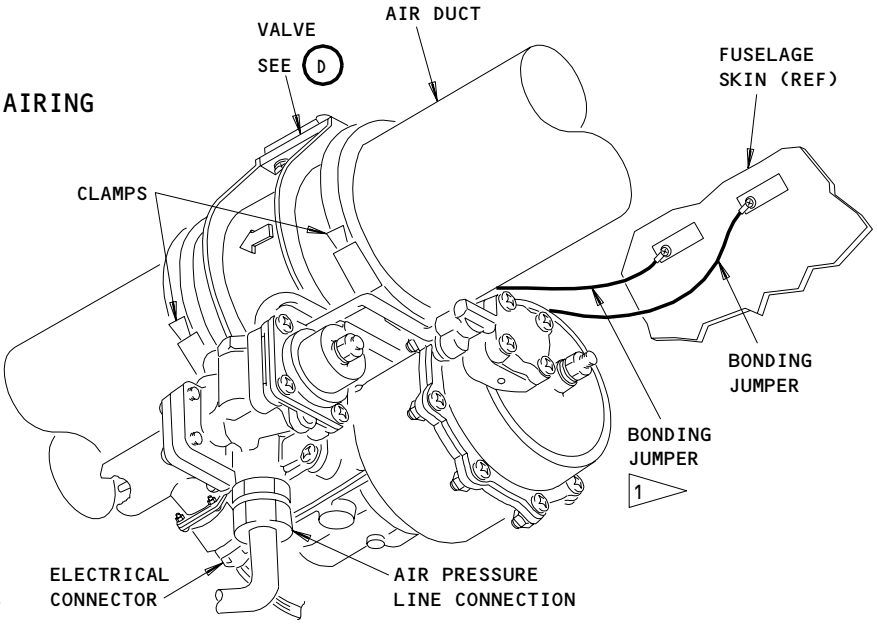
      S 014-005
      (5) Remove the access panel, 195TL, for the regulator and shutoff valve (AMM 06-41-00/201).

      S 014-006
      (6) Open the access panel, 195SL, for the air driven pump (AMM 06-41-00/201).



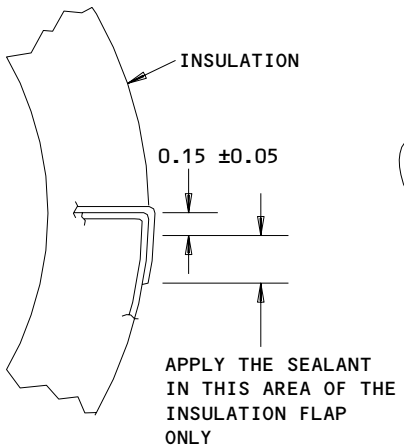
AFT LEFT WING TO BODY FAIRING

A



PRESSURE REGULATOR AND SHUTOFF VALVE

B



SIDE AND END JOINTS
IN THE INSULATION JACKET
(EXAMPLE)

C

1 ON AIRPLANES WITH TWO BONDING JUMPERS

ADP Pressure Regulator and Shutoff Valve Installation
Figure 401 (Sheet 1)

S 034-007
(7) Pull the insulation flaps loose from the adhesive to remove the insulation jacket from the valve.

S 034-008
(8) Disconnect the electrical connector from the valve.

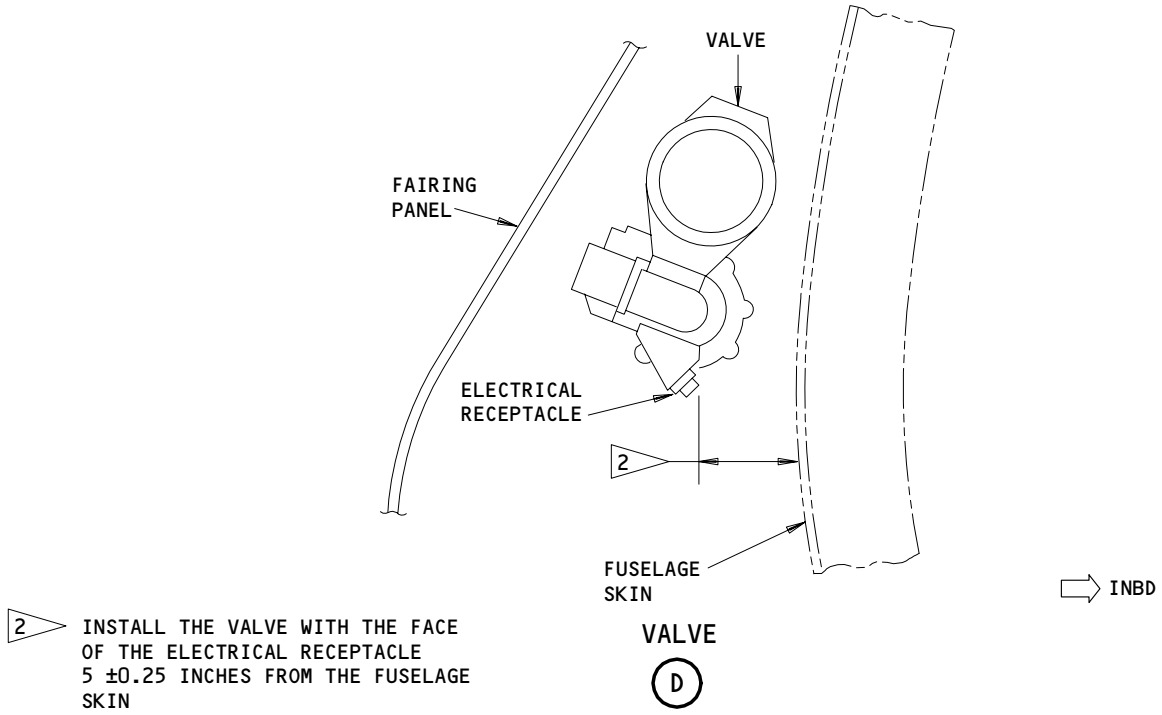
S 034-009
(9) Disconnect the bonding jumper(s) from the valve.

S 034-010
(10) Disconnect the air pressure line from the valve.

S 024-011
(11) Loosen the clamps at each end of the valve and remove the valve.

TASK 29-11-30-404-012

3. Install the Regulator and Shutoff Valve (Fig. 401)
   A. Consumable Materials
      (1) Adhesive (optional):
         (a) A00087 Adhesive - RTV 102



ADP Pressure Regulator and Shutoff Valve Installation
Figure 401 (Sheet 2)

(b) AOO303 Adhesive - RTV 174

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 36-00-00/201, Pneumatic

C. Access
(1) Location Zone
195 Wing to Body - Aft Upper Half (left)

(2) Access Panels
195SL Air Driven Hydraulic Pump
195TL ADP Pressure Regulator and Shutoff Valve

D. Procedure

S 424-013
(1) Put the regulator and shutoff valve in the position shown in Fig. 401, Detail D.

S 434-014
(2) Install the clamps at each end of the valve and tighten the clamps to 45-55 pound-inches.

S 434-015
(3) Connect the bonding jumper(s) to the valve.

S 434-016
(4) Connect the electrical connector to the valve.

S 434-017
(5) Connect the air pressure line to the valve.

S 434-018
(6) Put the insulation jacket around the valve with the insulation flap down.
(a) Attach the insulation jacket by pressing the hook and loop of the velcro tape together.

(b) If the insulation jacket does not have velcro tape, apply the adhesive to the flap along the joints in the insulation as shown in Fig. 401, Detail C.

S 864-019
(7) Supply pneumatic power (AMM 36-00-00/201).

S 864-020
(8) Supply electrical power (AMM 24-22-00/201).

S 864-021
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11S14, ISOL VALVE PWR C
(c) 11S23, APU BLEED POWER

S 864-023
(10) Push the ELEC/HYD switch on the EICAS maintenance panel.

S 864-024
(11) Put the C HYD PUMPS ELEC 1 and 2 switches on the hydraulic control panel to OFF.

S 864-025
(12) Put the C ISLN valve and the APU valve switches on the pilots' overhead panel, P5, to ON.

S 864-026
(13) Put the C HYD PUMPS AIR switch on the hydraulic control panel to ON.

S 214-027
(14) Make sure the center system pressure is 2800 to 3200 psi.

S 864-028
(15) Put the ADP TEST/RESET switch on the left miscellaneous equipment panel, P36, to the TEST position. Release the switch and let it go back to the NORMAL position.

S 214-029
(16) Make sure the ADP stops and does not start again.

S 864-030
(17) Put the ADP TEST/RESET switch on the P36 panel to the RESET position. Release the switch and let it go back to the NORMAL position.

S 214-031
(18) Make sure the center system pressure is 2800 to 3200 psi.

S 864-032
(19) Put the C HYD PUMPS AIR switch to OFF.

S 414-033
(20) Install the access panel, 195TL, for the regulator and shutoff valve (AMM 06-41-00/201).

S 414-034
(21) Close the ADP access panel, 195SL, for the air driven pump (AMM 06-41-00/201).

S 864-035
(22) Remove electrical power if it is not necessary (AMM 06-41-00/201).

S 864-036
(23) Remove pneumatic power if it is not necessary (AMM 06-41-00/201).

AIR DRIVEN PUMP (ADP) OIL FILTER AND SCREEN - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the oil and filter screen for the air driven pump (ADP). The other task installs the oil and filter screen for the ADP.

TASK 29-11-31-024-001

2. Remove the Oil Filter and Screen for the Air Driven Pump (ADP)
   A. References
      (1) 06-41-00/201, Fuselage Access Doors and Panels
      (2) 12-22-04/301, Air Driven Pump
   B. Access
      (1) Location Zone
          195 Wing to Body - Aft Upper Half (Left)

      (2) Access Panel
          195SL Air Driven Pump

   C. Remove the Oil Filter and Screen (Fig. 401)

      S 864-023
      (1) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11D31, HYDRAULIC AIR PUMP

      S 014-002
      (2) Open the access panel for the ADP, 195SL (AMM 06-41-00/201).

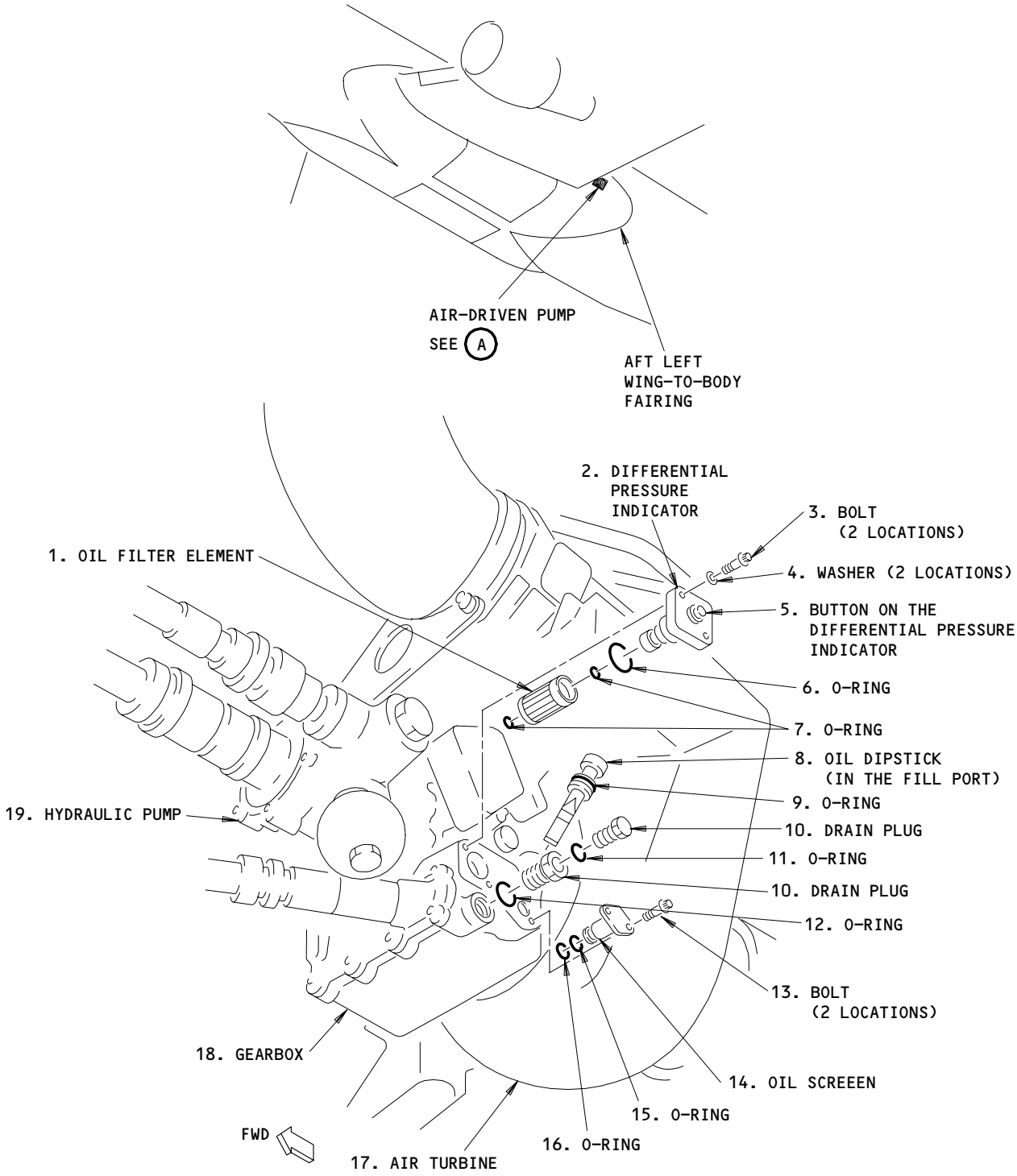
      S 684-003
      (3) Drain the oil from the gearbox (18) (AMM 12-22-04/301).

      S 034-004
      (4) Remove the bolts (3) that hold the differential pressure indicator (2).

      S 024-005
      (5) Remove the differential pressure indicator (2) and the filter element (1) from the gearbox (18).

      S 034-006
      (6) Remove the bolts (13) that hold the oil screen (14).

      S 024-007
      (7) Remove the oil screen (14) from the gearbox (18).



AIR-DRIVEN PUMP

(A)

Oil Filter and Screen Installation
Figure 401

TASK 29-11-31-424-008

3. Install the Oil Filter and Screen for the Air Driven Pump (ADP)

A. Equipment

(1) Ultrasonic Cleaner - Commercially Available

B. Consumable Materials

(1) B00130 Isopropyl Alcohol - Solvent Spec TT-1-735

C. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Filter - Fluid	29-11-03	01	310
	2	Indicator - Differential Pressure			295
	3	Bolt			297
	4	Washer			298
	6	O-Ring			300
	7	O-Ring			305
	8	Dipstick			345
	9	O-Ring			350
	10	Plug Drain			330
	11	O-Ring			335
	12	O-Ring			340
	13	Bolt			355,360
	14	Screen - Oil			365
	15	O-Ring			370
	16	O-Ring			375

D. References

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

(2) 12-22-04/301, Air Driven Pump

E. Access
(1) Location Zone
195 Wing to Body - Aft Upper Half (Left)

(2) Access Panel
195SL Air Driven Pump

F. Install the Oil Filter and Screen (Fig. 401)

S 214-009
(1) Make sure the oil screen (14) is not clogged.

S 134-010
(2) If the oil screen (14) is clogged, use an ultrasonic cleaner, that contains isopropyl alcohol, to clean the screen.

S 644-011
(3) Apply a layer of gearbox oil on the O-rings (6, 7, 15, 16).

S 434-012
(4) Install the new O-rings (6, 7, 15, 16) on the differential pressure indicator (2) and the oil screen (14).

S 424-013
(5) Put the oil screen (14) in the gearbox (18).

S 434-014
(6) Install the bolts (13).

S 424-015
(7) Put the oil filter element (1) and the differential pressure indicator (2) in the gearbox (18).

S 434-016
(8) Install the washers (4) and bolts (3).

S 864-017
(9) Push the indicator button (5) on the differential pressure indicator (2) until it aligns with the adjacent surfaces.

S 614-018
(10) Fill the ADP gearbox with oil (AMM 12-22-04).

S 864-024
(11) Remove the DO-NOT-CLOSE tag, and close this circuit breaker on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP

S 864-019
(12) Operate the ADP (AMM 29-11-00/201).

S 864-025
(13) Stop the ADP (AMM 29-11-00/201).

S 214-020
(14) Do a check for leakage on the ADP.

S 414-021
(15) Close the access panel for the ADP, 195SL (Ref 06-41-00).

AIR DRIVEN PUMP (ADP) INLET DUCT - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the inlet duct for the air driven pump (ADP). The other task installs the inlet duct for the ADP.

   TASK 29-11-34-024-001

2. Remove the Inlet Duct for the Air Driven Pump (ADP)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power
      (3) AMM 36-00-00/201, Pneumatic - General
   B. Access
      (1) Location Zones
          195 Wing to Body - Aft Upper Half
          211/212 Control Cabin

      (2) Access Panels
          195SL Air Driven Pump
          195TL Air Driven Pump Shutoff Valves

   C. Remove the Inlet Duct (Fig. 401)

      S 864-002
      (1) Supply electrical power (AMM 24-22-00/201).

      S 864-003
      (2) Move the C ISLN valve and the APU valve switches on the captain's overhead panel, P5, to the OFF position.

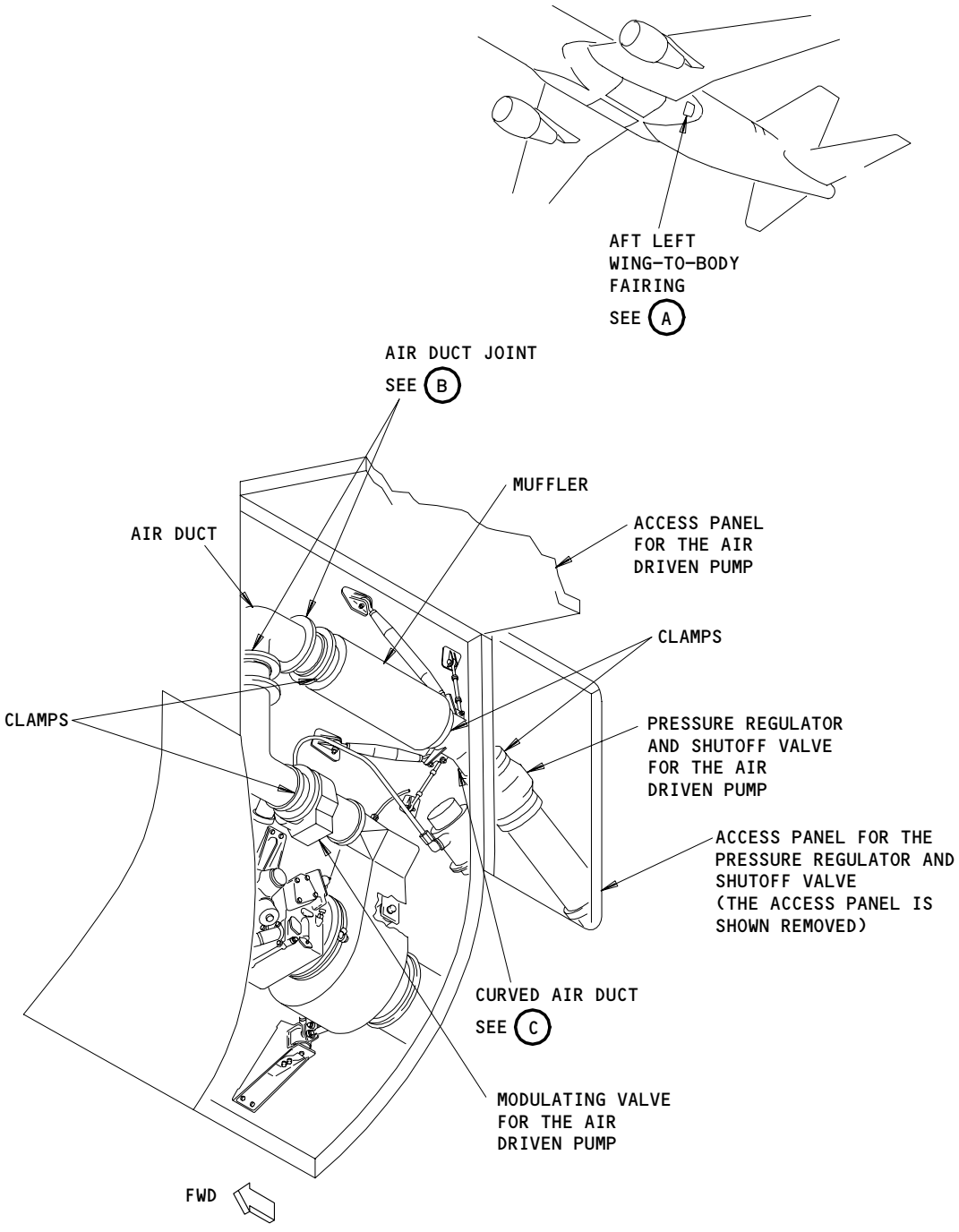
      S 864-004
      (3) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
          (a) 11D31, HYDRAULIC AIR PUMP
          (b) 11S14, ISOL VLV PWR C
          (c) 11S23, APU BLEED POWER

      S 864-005
      (4) Remove pneumatic power (AMM 36-00-00/201).

      S 014-006
      (5) Remove the access panel for the ADP shutoff valve, 195TL (AMM 06-41-00/201).

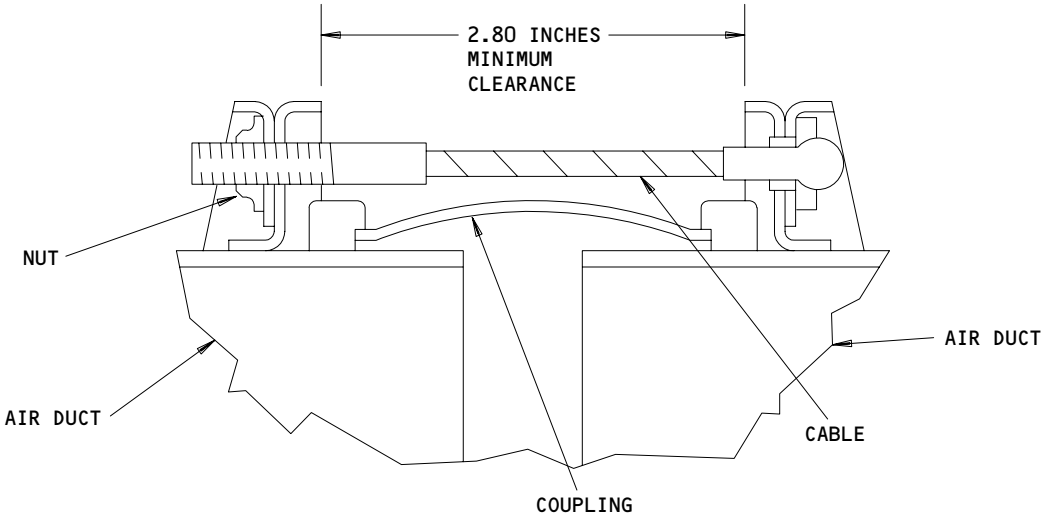
      S 014-007
      (6) Remove the access panel for the ADP, 195SL (AMM 06-41-00/201).

      S 034-008
      (7) Remove the duct clamp at the forward end of the ADP modulating valve and at the forward end of the muffler.



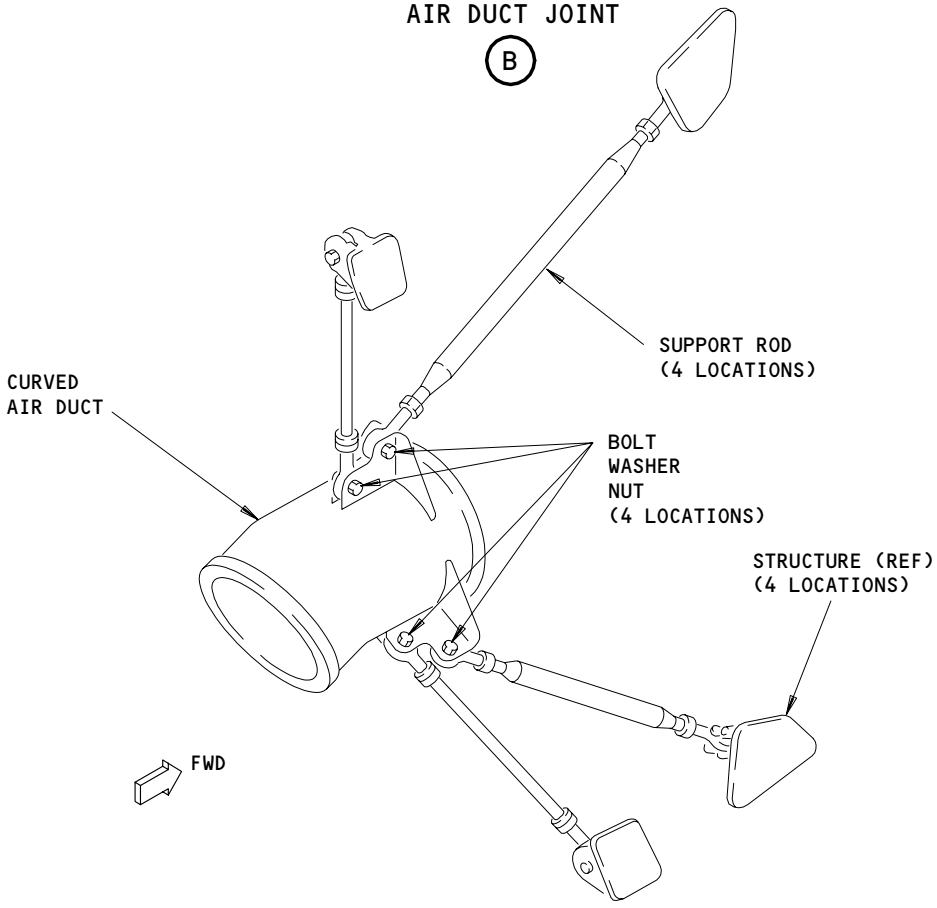
AFT LEFT WING-TO-BODY FAIRING
A

Inlet Duct Installation
Figure 401 (Sheet 1)



AIR DUCT JOINT

B



CURVED AIR DUCT

C

Inlet Duct Installation
Figure 401 (Sheet 2)

S 034-009
(8) Remove the air duct between the ADP modulating valve and the muffler.

S 034-010
(9) Remove the duct clamp at the aft end of the muffler.

S 034-011
(10) Remove the muffler.

S 034-012
(11) Remove the duct clamp at the forward end of the ADP pressure regulator and the shutoff valve.

S 494-013
(12) Install a support for the ADP pressure regulator and the shutoff valve while the duct is not installed.

S 034-014
(13) Remove the bolts that hold the curved duct to the support rods.

S 034-015
(14) Remove the curved duct.

TASK 29-11-34-424-016

3. Install the Inlet Duct for the Air Driven Pump (ADP)

A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 36-00-00/201, Pneumatic - General

B. Access
(1) Location Zones

195	Wing to Body - Aft Upper Half
211/212	Control Cabin

(2) Access Panels

195SL	Air Driven Pump
195TL	Air Driven Pump Shutoff Valves

C. Install the Inlet Duct (Fig. 401)

S 434-017
(1) Hold the curved duct and install the bolt, washer, and nut at each support rod.

S 434-018
(2) Install the duct clamp at the forward end of the ADP pressure regulator and the shutoff valve.

S 434-019
(3) Tighten the clamp to 45-55 pound-inches.

S 434-020
(4) Hold the muffler and install the duct clamp at the aft end of the muffler.

S 434-021
(5) Tighten the clamp to 45-55 pound-inches.

S 434-022
(6) Set the air duct between the muffler and the ADP modulating valve.

S 434-023
(7) Install duct clamps at the forward end of the muffler and at the forward end of the ADP modulating valve.

S 434-024
(8) Tighten the clamps to 45-55 pound-inches.

S 434-025
(9) At the forward end of the muffler, move the air duct elbow until it aligns with the adjacent duct and the muffler.

S 434-026
(10) Tighten the nuts on the cables, as necessary, to remove the slack from the cables.

NOTE: The duct joint clearance must be a minimum of 2.80 inches. This will make sure the coupling does not get clamped between the duct flanges.

S 864-027
(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP

(b) 11S14, ISOL VLV PWR C
(c) 11S23, APU BLEED POWER

S 414-028
(12) Install the access panel for the ADP shutoff valve, 195TL (AMM 06-41-00/201).

S 414-029
(13) Install the access panel for the ADP, 195SL (AMM 06-41-00/201).

S 864-030
(14) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 864-031
(15) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).

AIR-DRIVEN PUMP (ADP) AIR FILTER - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task removes the air filter from the air-driven pump. The second task installs the air filter on the air-driven pump.
   B. There are two air filters on the air-driven pump. One air filter is on the modulating valve. The other is on the pressure regulator and shutoff valve (referred to as the shutoff valve). The air filter is in the valve body where the pneumatic tube from the servo housing connects.

TASK 29-11-35-004-001

2. ADP Air Filter Removal (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 29-11-03/401, Air-Driven Pump (ADP) Modulating Valve
      (3) AMM 29-11-30/401, Air-Driven Pump (ADP) Pressure Regulator and Shutoff Valve
      (4) AMM 36-00-00/201, Pneumatic - General
   B. Access
      (1) Location Zones
          195 Wing to Body - aft upper half

      (2) Access Panel
          195SL ADP Modulating Valve
          195TL ADP Pressure Regulator and Shutoff Valve

   C. Prepare for Removal

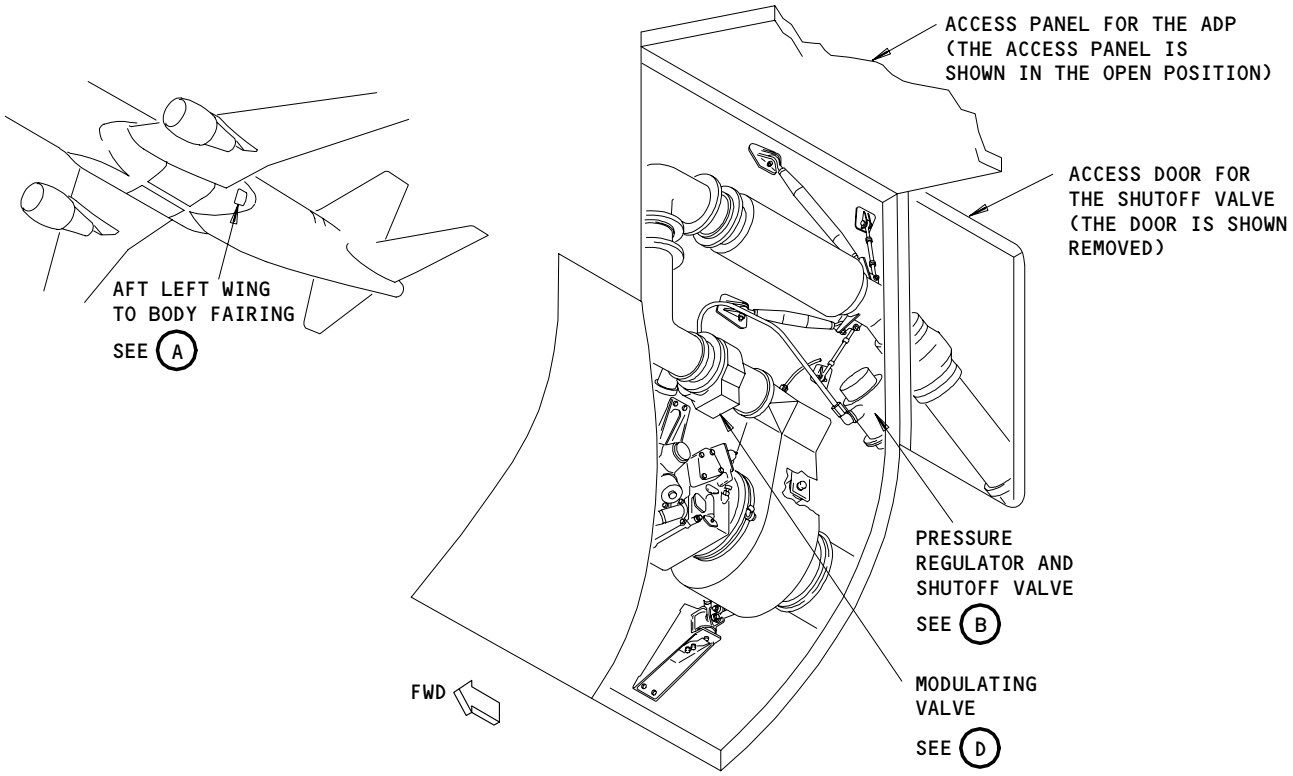
      S 864-002
      (1) Put the HYD PUMP C AIR switch on the hydraulic control panel in the OFF position.

      S 864-003
      (2) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11D31, HYDRAULIC AIR PUMP

      S 864-004
      (3) Do the Depressurize the Pneumatic System procedure (AMM 36-00-00/201).

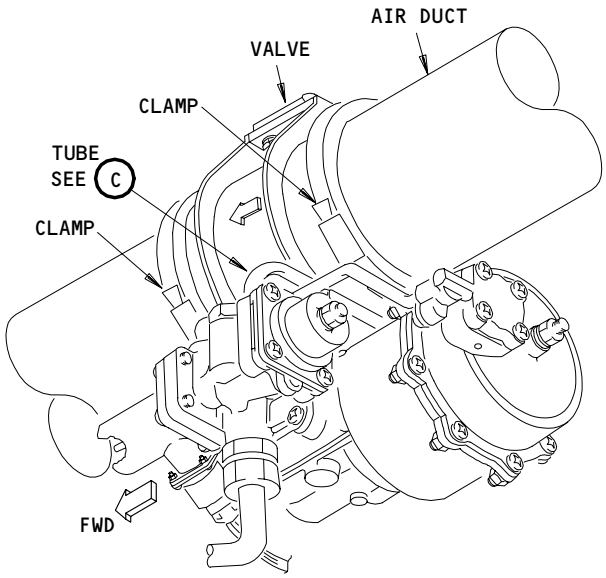
      S 014-005
      (4) Open the access panel 195SL (AMM 06-41-00/201).

      S 014-006
      (5) For the air filter in the shutoff valve, remove the access panel 195TL (AMM 06-41-00/201).



AFT LEFT WING TO BODY FAIRING

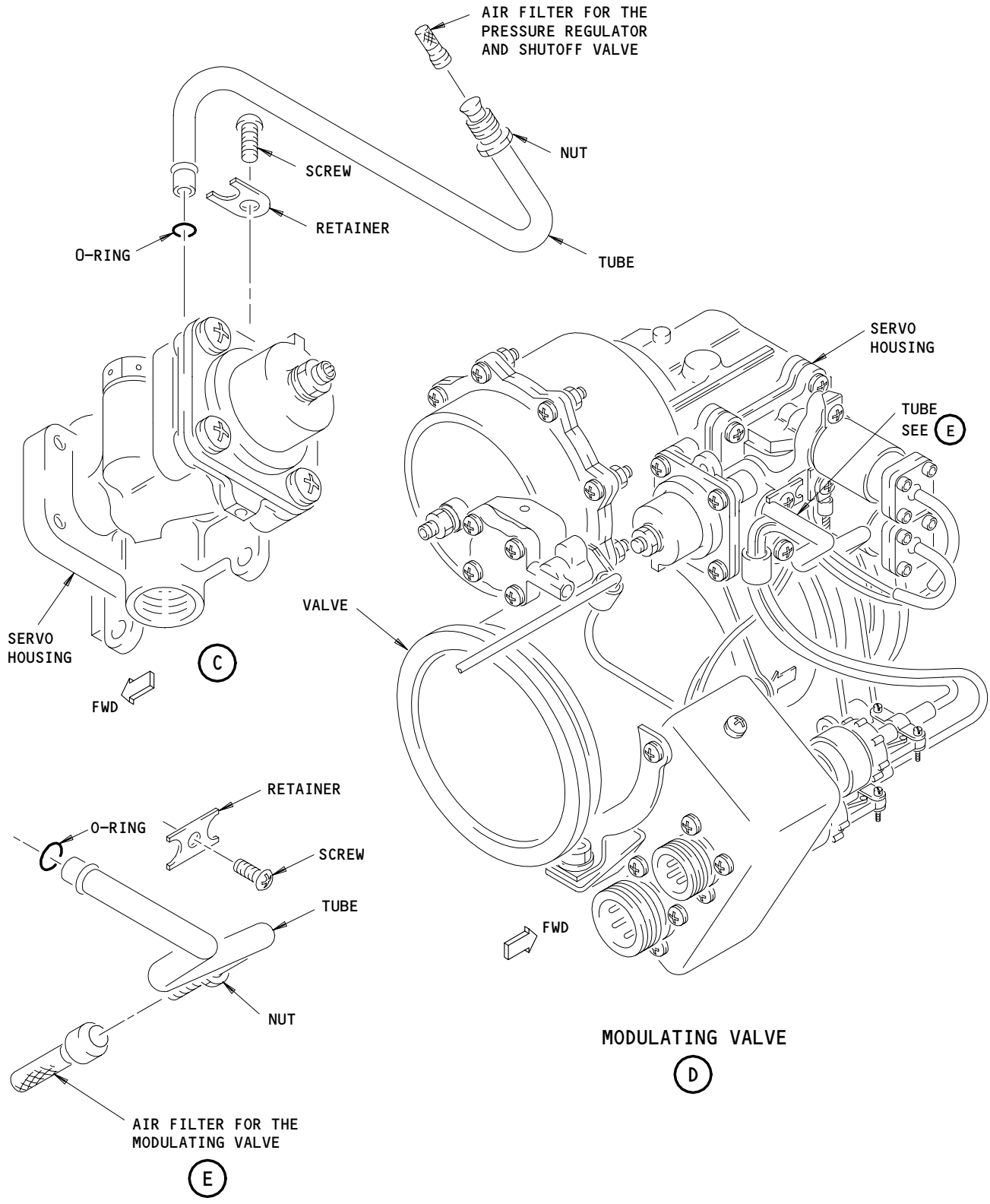
A



PRESSURE REGULATOR AND SHUTOFF VALVE

B

Air-Driven Pump (ADP) Air Filter Installation
Figure 401 (Sheet 1)



Air-Driven Pump (ADP) Air Filter Installation
Figure 401 (Sheet 2)

D. ADP Air Filter Removal

S 024-007
(1) For the air filter in the modulating valve, remove the modulating valve from the ADP (AMM 29-11-03/401).

S 034-008
(2) For the air filter in the shutoff valve, do the steps which follow to get access to the air filter (AMM 29-11-30/401).
(a) Loosen the clamps at each end of the shutoff valve.
(b) Pull back the insulation jacket on the shutoff valve.
(c) Turn the shutoff valve to move the bottom of the valve away from the fuselage skin.

S 034-019
(3) Remove the screw and the retainer which attaches the tube to the servo housing.

S 034-020
(4) Loosen the nut which attaches the end of the tube to the valve body.

S 034-021
(5) Remove the tube from the servo housing and the valve body.

S 024-012
(6) Remove the air filter from the valve body.

S 034-013
(7) Remove the O-ring from the tube.

TASK 29-11-35-404-014

3. ADP Air Filter Installation (Fig. 401)
A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Manual Control
(3) AMM 29-11-03/401, Air-Driven Pump (ADP) Modulating Valve
(4) AMM 29-11-30/401, Air-Driven Pump (ADP) Pressure Regulator and Shutoff Valve
(5) AMM 36-00-00/201, Pneumatic - General
B. Access
(1) Location Zones
195 Wing to Body - aft upper half

(2) Access Panel

195SL	ADP Modulating Valve
195TL	ADP Pressure Regulator and Shutoff Valve

C. ADP Air Filter Installation

S 214-015
(1) Examine the air filter to make sure it is not clogged or damaged.
  (a) If the air filter is clogged or damaged, replace the air filter.

S 434-016
(2) Install a new O-ring on the tube.

S 424-017
(3) Install the air filter in the opening in the valve body.

S 434-022
(4) Install the tube in the openings in the valve body and the servo housing.

S 434-023
(5) Tighten the nut to attach the tube to the valve body.

S 434-024
(6) Install the retainer and the screw to attach the tube to the servo housing.

S 864-025
(7) For the air filter in the shutoff valve, do the steps which follow to put the shutoff valve back to its usual position (AMM 29-11-30/401).
  (a) Install the insulation jacket on the shutoff valve.
  (b) Turn the valve to put it in the correct position.
  (c) Tighten the clamp on each end of the shutoff valve.

S 434-026
(8) For the air filter in the modulating valve, install the modulating valve on the ADP (AMM 29-11-03/401).

S 714-027
(9) Do the steps which follow to do a test of the ADP:
  (a) Supply electrical power (AMM 24-22-00/201).
  (b) Supply pneumatic power (AMM 36-00-00/201).
  (c) Remove the DO-NOT-CLOSE tags and close this circuit breaker on the overhead panel, P11:
    1) 11D31, HYDRAULIC AIR PUMP

(d) Make sure these circuit breakers on the overhead panel, P11 are closed:
1) 11L9, LEFT ENGINE OIL PRESS
or LEFT ENGINE OIL PRESS EICAS REF
2) 11L36, RIGHT ENGINE OIL PRESS
or RIGHT ENGINE OIL PRESS EICAS REF
3) EICAS (6 locations)
(e) Push the ELEC/HYD switch on the EICAS maintenance panel that is on the right side panel, P61.
(f) Put the HYD PUMPS C ELEC 1 and 2 switches on the hydraulic control panel to the OFF position.
(g) Put the HYD PUMPS C AIR switch on the hydraulic control panel to the AUTO position.
(h) Make sure the ADP starts and the center system pressure becomes stable at 2800-3200 psi.
(i) Put the HYD PUMPS C AIR switch on the hydraulic control panel to the ON position.
(j) Make sure the center system pressure becomes stable at 2800 to 3200 psi.
(k) Put the HYD PUMPS C AIR switch on the hydraulic control panel to the OFF position.

S 414-028
(10) Close the access panel 195SL (AMM 06-41-00/201).

S 414-029
(11) For the air filter in the shutoff valve, close the access panel 195TL (AMM 06-41-00/201).

S 864-030
(12) Remove the pneumatic power if it is not necessary (AMM 36-00-00/201).

S 864-031
(13) Remove the electrical power if it is not necessary (AMM 36-00-00/201).

HYDRAULIC CONTROL MODULE M10 - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the M10 hydraulic control module. The second task installs the M10 hydraulic control panel.
   B. The M10 Hydraulic Control Module (2) is located on the Pilot's Overhead Panel, P5.

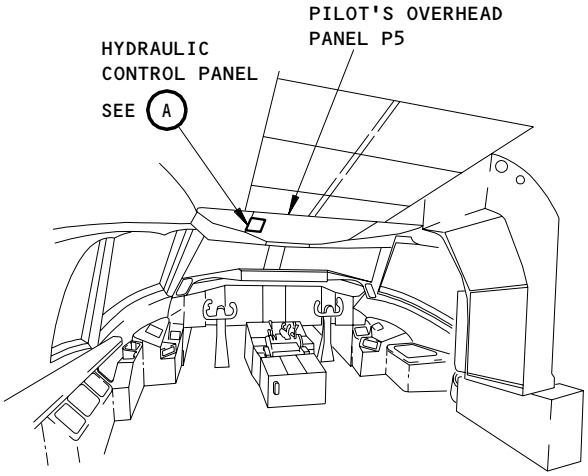
TASK 29-11-40-004-001

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

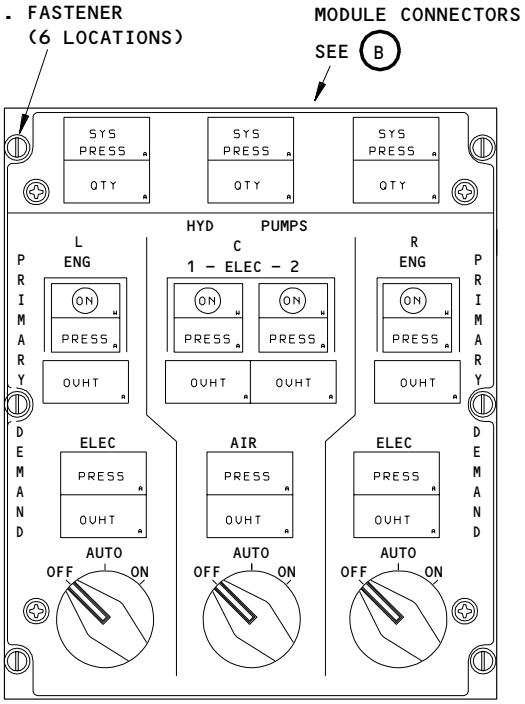
   C. Procedure

      S 864-037
      (1) Remove Electrical Power (AMM 24-22-00/201).

      S 864-052
      (2) Make sure these circuit breakers on the overhead panel, P11, are open:
          (a) 11A33, IND LIGHTS
          (b) 11A34, IND LIGHT 2
          (c) 11B7, LIGHTS STBY INSTR
          (d) 11L14, HYDRAULIC L ENG PUMP DEPRESS
          (e) 11L15, HYDRAULIC ELEC PUMP CTR 1
          (f) 11L16, HYDRAULIC ELEC PUMP R
          (g) 11L23, HYDRAULIC R ENG PUMP DEPRESS
          (h) 11L24, HYDRAULIC ELEC PUMP CTR 2
          (i) 11L25, HYDRAULIC ELEC PUMP L
          (j) 11P3, OVHD INSTR & PNL LTS
          (k) 11R1, LEFT IND LTS 1
          (l) 11R28, RIGHT IND LTS 1

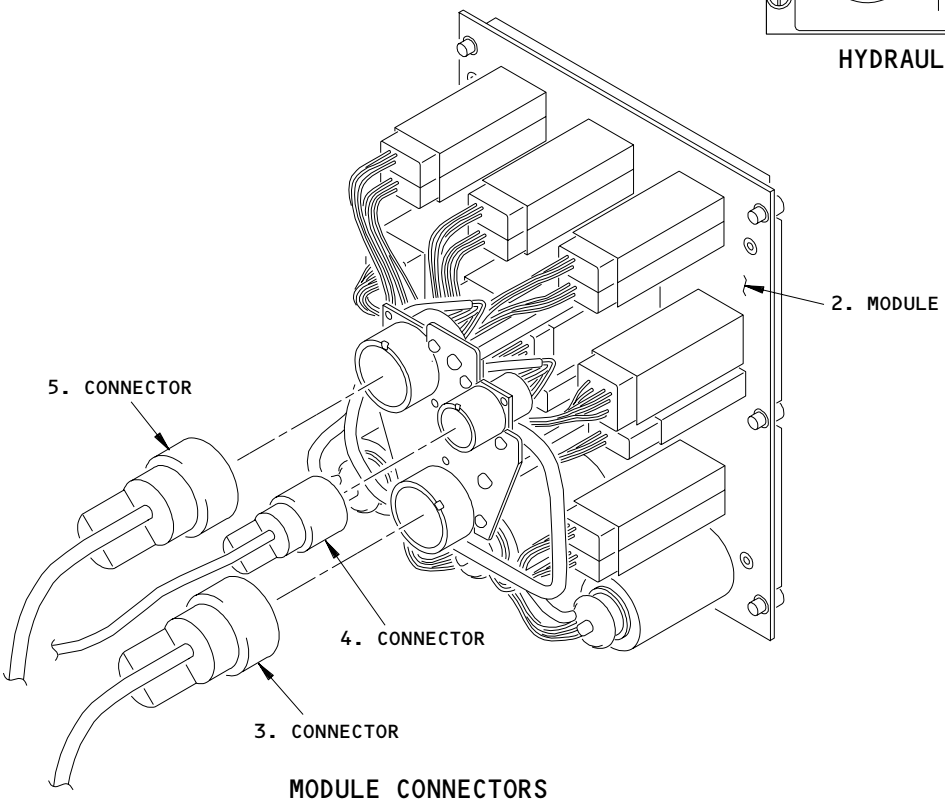


FLIGHT COMPARTMENT



HYDRAULIC CONTROL PANEL

A



MODULE CONNECTORS

B

Hydraulic Control Panel, M10 Installation
Figure 401

(m) 11S5, 5KVA INSTR
(n) 11D31, HYDRAULIC AIR PUMP

S 034-010
(3) Hold the M10 Hydraulic Control Module (2) and loosen the six fasteners (1) which hold the module (2) to the Pilot's Overhead Panel, P5.

S 024-011
(4) Carefully lower the M10 Hydraulic Control Module (2) out of the Pilot's overhead panel, P5, to get access to the electrical connectors.

S 034-012
(5) Disconnect the electrical connectors (3), (4), and (5).

S 024-013
(6) Remove the M10 Hydraulic Control Module (2).

S 024-016
(7) Install protective caps on the electrical connectors (3), (4), and (5) and on the module (2) to pevent damage or contamination.

TASK 29-11-40-404-015

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 434-017
(1) Remove the protective caps from the electrical connectors (3), (4), (5), and the module (2).

S 434-018
(2) Reconnect the electrical connectors (3, (4) and (5).

S 424-017
(3) Put the Hydraulic Control Module (2) into the Pilot's overhead panel, P5.

S 414-018
(4) Tighten the six fasteners (1) which hold the module (2) to the Pilot's overhead panel, P5.

S 214-019
(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 864-026
(7) Close these circuit breakers on the overhead panel, P11:
(a) 11A33, IND LIGHTS
(b) 11A34, IND LIGHT 2
(c) 11B7, LIGHTS STBY INSTR
(d) 11L14, HYDRAULIC L ENG PUMP DEPRESS
(e) 11L15, HYDRAULIC ELEC PUMP CTR 1
(f) 11L16, HYDRAULIC ELEC PUMP R
(g) 11L23, HYDRAULIC R ENG PUMP DEPRESS
(h) 11L24, HYDRAULIC ELEC PUMP CTR 2
(i) 11L25, HYDRAULIC ELEC PUMP L
(j) 11P3, OVHD INSTR & PNL LTS
(k) 11R1, LEFT IND LTS 1
(l) 11R28, RIGHT IND LTS 1
(m) 11S5, 5KVA INSTR
(n) 11D31, HYDRAULIC AIR PUMP

S 714-041
(8) Do an operational test on the following (AMM 29-11-00/501):
(a) L (R) EDP HYD PUMP
(b) C1 ACMP ELEC PUMP
(c) C2 ACMP ELEC PUMP
(d) L (R) ACMP Demand Pump
(e) C ADP Demand Pump

S 864-049
(9) Put the airplane back to its usual condition.

S 864-050
(10) Remove electrical power if it is not necessary (AMM 24-22-00/201).

AIR DRIVEN PUMP (ADP) OVERSPEED CONTROL CARD - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the overspeed control card for the air driven pump (ADP). The other task installs the overspeed control card for the ADP.

TASK 29-11-69-024-001

2. Remove the Overspeed Control Card for the Air Driven Pump (ADP)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-41-01/201, Electrostatic Sensitive Devices
      (3) AMM 24-22-00/201, Electrical Power
   B. Access
      (1) Location Zones
          119 Main Equipment Center (Left)
          211/212 Control Cabin

      (2) Access Panel
          119AL Main Equipment Center

   C. Remove the Overspeed Control Card (Fig. 401)

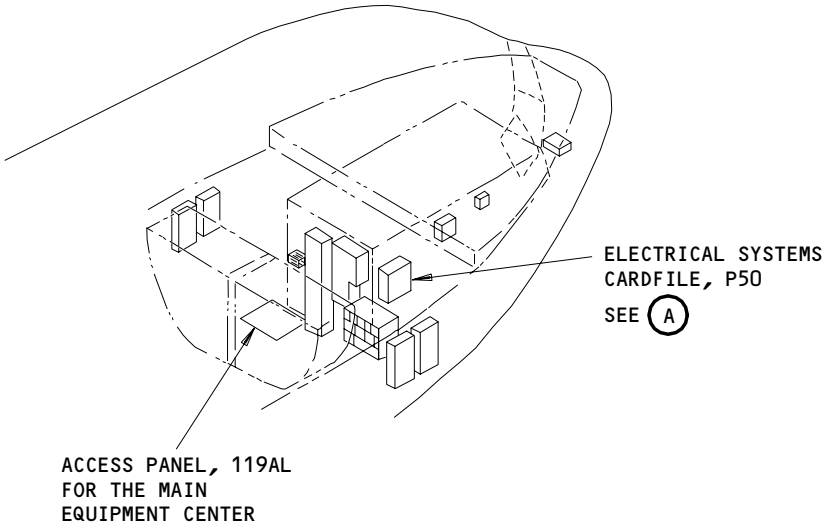
      S 864-020
      (1) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11D31, HYDRAULIC AIR PUMP

      S 014-003
      (2) Open the access panel for the main equipment center, 119AL (AMM 06-41-00/201).

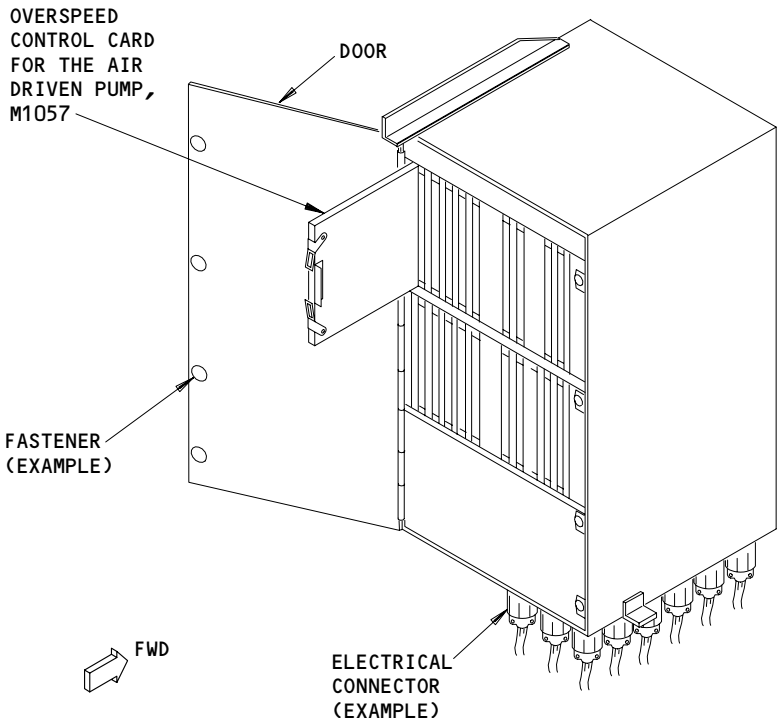
      S 914-004

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

      (3) Remove the overspeed control card from the electrical systems cardfile, P50 (AMM 20-41-01/201).



MAIN EQUIPMENT CENTER



ELECTRICAL SYSTEMS CARDFILE, P50

(A)

Overspeed Control Card Installation
Figure 401

TASK 29-11-69-424-005

3. Install the Overspeed Control Card for the Air Driven Pump (ADP)

A. References

(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 20-41-01/201, Electrostatic Sensitive Devices
(3) AMM 24-22-00/201, Electrical Power
(4) AMM 36-00-00/201, Pneumatic

B. Access

(1) Location Zones

119	Main Equipment Center (Left)
211/212	Control Cabin

(2) Access Panel

119AL	Main Equipment Center

C. Install the Overspeed Control Card (Fig. 401)

S 914-006

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

(1) Install the overspeed control card in the electrical systems cardfile, P50 (AMM 20-41-01/201).

S 864-007

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

S 864-008

(3) Supply pneumatic power (AMM 36-00-00/201).

S 864-009

(4) Close this circuit breaker on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP

(b) EICAS (6 locations)

S 864-010
(5) Push the ELEC/HYD switch on the EICAS maintenance panel, that is on the right side panel, P61.

S 864-011
(6) Move the C PRIMARY HYD PUMPS ELEC 1 and 2 switches, on the hydraulic control panel, to the OFF position.

S 864-012
(7) Move the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the AUTO position.

S 214-013
(8) Make sure the center system pressure goes to 2800-3200 psi.

S 864-014
(9) Move the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the ON position.

S 214-015
(10) Make sure the ADP operates.

S 864-016
(11) Move the C DEMAND HYD PUMPS AIR switch, on the hydraulic control panel, to the OFF position.

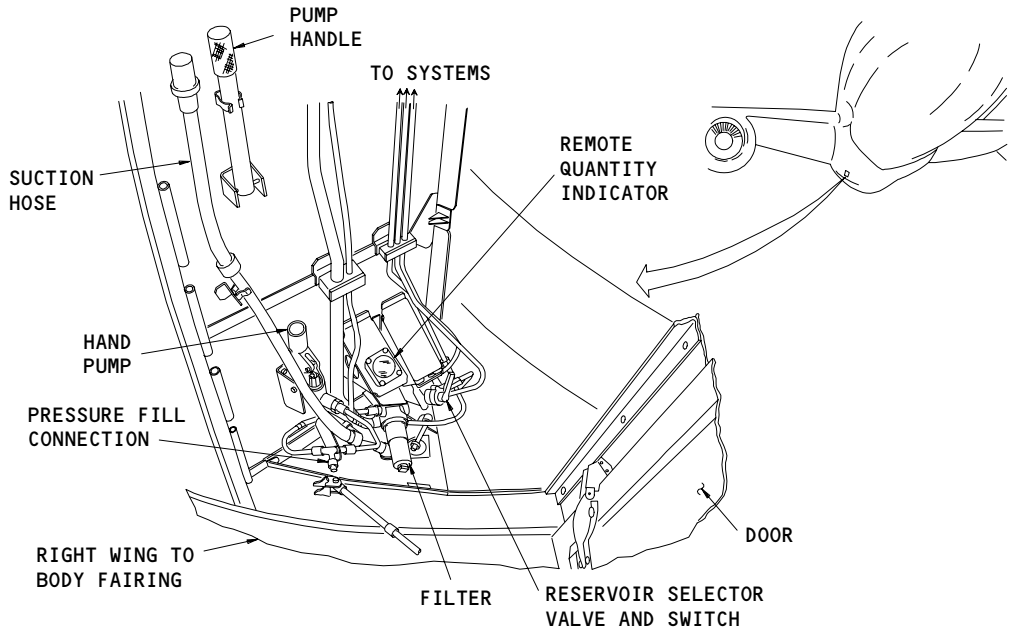
S 864-017
(12) Remove pneumatic power if it is not necessary (AMM 36-00-00/201).

S 864-018
(13) Remove electrical power if it is not necessary (AMM 24-22-00/201).

S 014-019
(14) Close the access door for the main equipment center, 119AL (AMM 06-41-00/201).

GROUND SERVICING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. A central servicing station for filling all three reservoirs is located in the aft right wing-to-body fairing. A four-way, four position valve allows selection of the reservoir to be filled. A remote quantity indicator shows the fluid level of the reservoir selected by the four-way valve.
   B. A hand pump and suction hose are available to transfer fluid from a hydraulic container if a pressure cart is not available.
   C. A ground cart pressure fill port is provided for normal fluid replenishment.
   D. A filter unit is installed at the service station to prevent impurities from entering the hydraulic systems during fluid replenishment.
2. Component Details
   A. Hand Pump (Fig. 1)
      (1) A hand pump is provided to transfer fluid from a hydraulic fluid supply container to the selected reservoir. The pump handle is stowed adjacent to the pump.
   B. Suction Hose (Fig. 1)
      (1) One end of the suction hose is connected to the hand pump. The other end is unconnected and is available for immersion in a hydraulic fluid supply container. When not in use, the suction hose is stowed in a protective sheath inside the service bay.



Hydraulic Reservoir Service Station
Figure 1

C. Pressure Fill Connection (Fig. 1)
   (1) A ground service cart pressure fill connection port is mounted in the service bay. The fill port is mounted in the fluid line between the hand pump and the fluid filter. The port has a screw cap with safety chain.

D. Filter (Fig. 1)
   (1) All fluid entering reservoir fill ports is passed through a filter unit. The filter has inlet and outlet ports, a filter element case, and a removable and noncleanable filter element.

E. Selector Valve (Fig. 1)
   (1) A four-way selector valve is mounted in the fill line. The valve handle may be manually positioned to route fluid to the left, right, or center reservoirs. The selector valve is placed in the OFF position after servicing.

F. Quantity Gage (Fig. 1)
   (1) A quantity gage shows the fluid level of each reservoir. The reservoir monitored by the gage is determined by the position of the selector valve handle. When the selector valve handle is in the OFF position, the quantity gage is deactivated.

3. Operation - Reservoir Servicing

A. To attain a proper fluid level in the hydraulic reservoirs, the reservoirs must be serviced with all landing gears down, gear doors closed, and steering and flight controls neutral. When servicing right system, the brake accumulator pressure gage must read at least 2500 psi.

B. With Ground Service Cart
   (1) Open service bay access door and uncap pressure fill port. Attach ground cart fill hose to pressure fill port. Select reservoir to be serviced with selector valve handle. Start fluid flow from service cart while monitoring reservoir level visually using quantity gage. When full level "F" level is reached, stop flow from service cart and disconnect fluid line from pressure fill port. Place selector valve handle to OFF position. Cap fill port and secure service bay access door.

C. Without Ground Service Cart
   (1) Open service bay access door, remove suction hose from protective sheath and place into hydraulic fluid container. Select reservoir to be serviced with selector valve handle. Remove pump handle and insert into pump handle receptacle. Start manual pump action and continue until quantity gage indicates full level "F" level has been reached. Stop pump action, remove handle from pump, and stow in retaining clips. Remove suction hose from container, wipe dry, and stow in protective sheath. Place selector valve handle to OFF position. Close service bay access door.

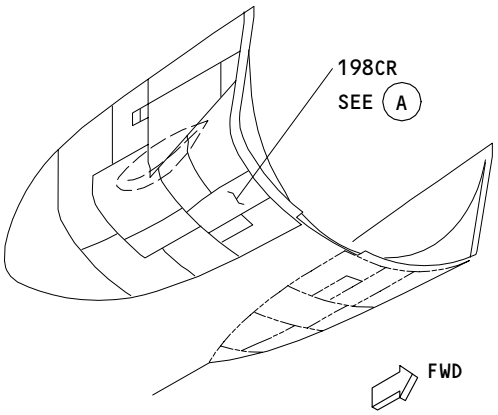
GROUND SERVICING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS			FLT COMPT, P11	
HYDRAULIC QTY, C1101		1	11L20	*
CONNECTION - PRESSURE FILL	---	1	198CR, AFT RIGHT WING/BODY FAIRING, RESERVOIR FILL STATION	29-18-00
INDICATOR - RESERVOIR FILL, N29	---	1	198CR, AFT RIGHT WING/BODY FAIRING, HYDRAULIC RESERVOIR FILL STATION	29-18-06
MODULE - RESERVOIR FILL FILTER	---	1	198CR, AFT RIGHT WING/BODY FAIRING, HYDRAULIC RESERVOIR FILL STATION	29-18-03
PUMP - RESERVOIR MANUAL FILL	---	1	198CR, AFT RIGHT WING/BODY FAIRING, HYDRAULIC RESERVOIR FILL STATION	29-18-01
SWITCH - REMOTE HYDRAULIC QUANTITY SELECT, S341	---	1	198CR, AFT RIGHT WING/BODY FAIRING, HYDRAULIC RESERVOIR FILL STATION	*
TRANSMITTER - SYS C HYDRAULIC FLUID QUANTITY, M339 (REF 29-33-00, FIG. 101)				
TRANSMITTER - SYS L HYDRAULIC FLUID QUANTITY, M338 (REF 29-33-00, FIG. 101)				
TRANSMITTER - SYS R HYDRAULIC FLUID QUANTITY, M340 (REF 29-33-00, FIG. 101)				
UNIT - HYDRAULIC FLUID QUANTITY MONITOR UNIT, M122 (REF 29-33-00, FIG. 101)				
VALVE - RESERVOIR FILL SELECTOR	---	1	198CR	29-18-02

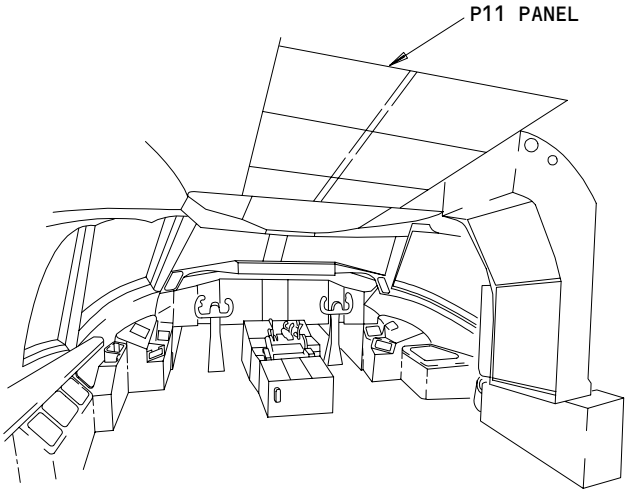
*SEE WM EQUIPMENT LIST

Component Index
Figure 101

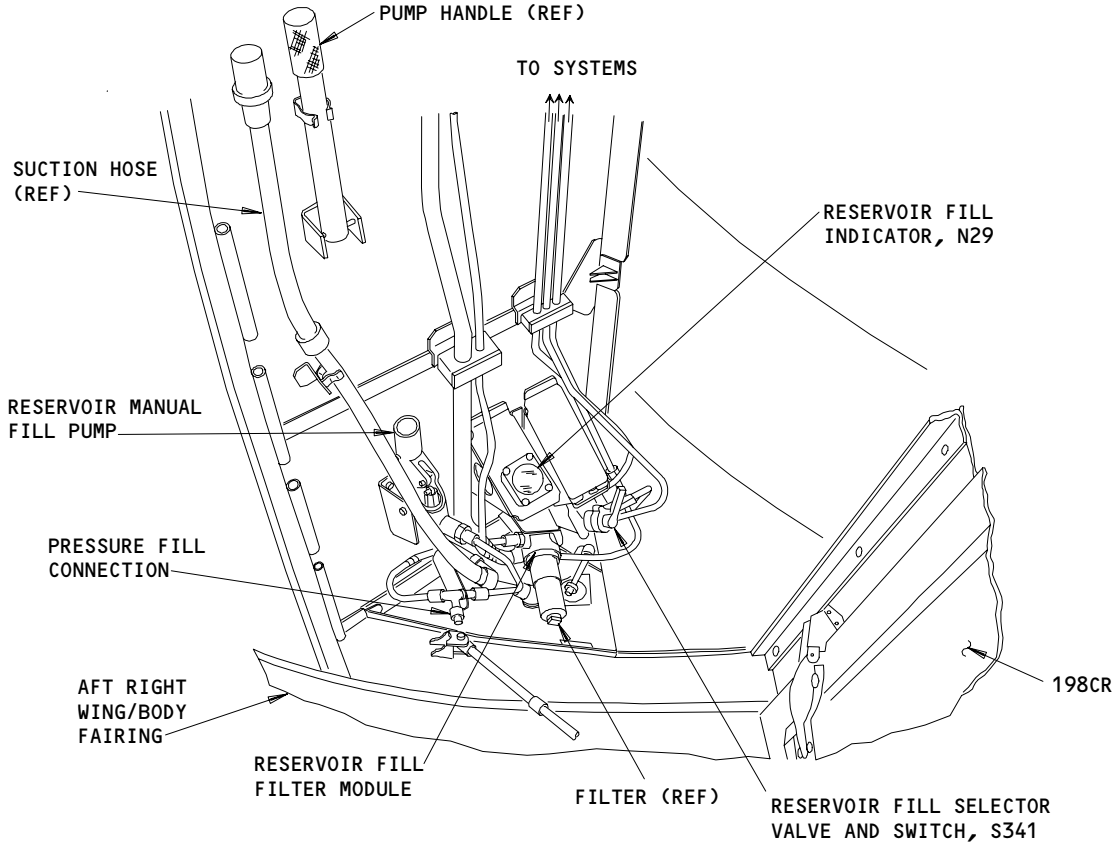
33637



AFT RIGHT WING/BODY FAIRING



FLT COMPT



HYDRAULIC RESERVOIR FILL STATION

(A)

Component Location
Figure 102

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
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access Panel
          198CR Central Hydraulic Service Center

   C. Remove the Manual Fill Pump (Fig. 401)

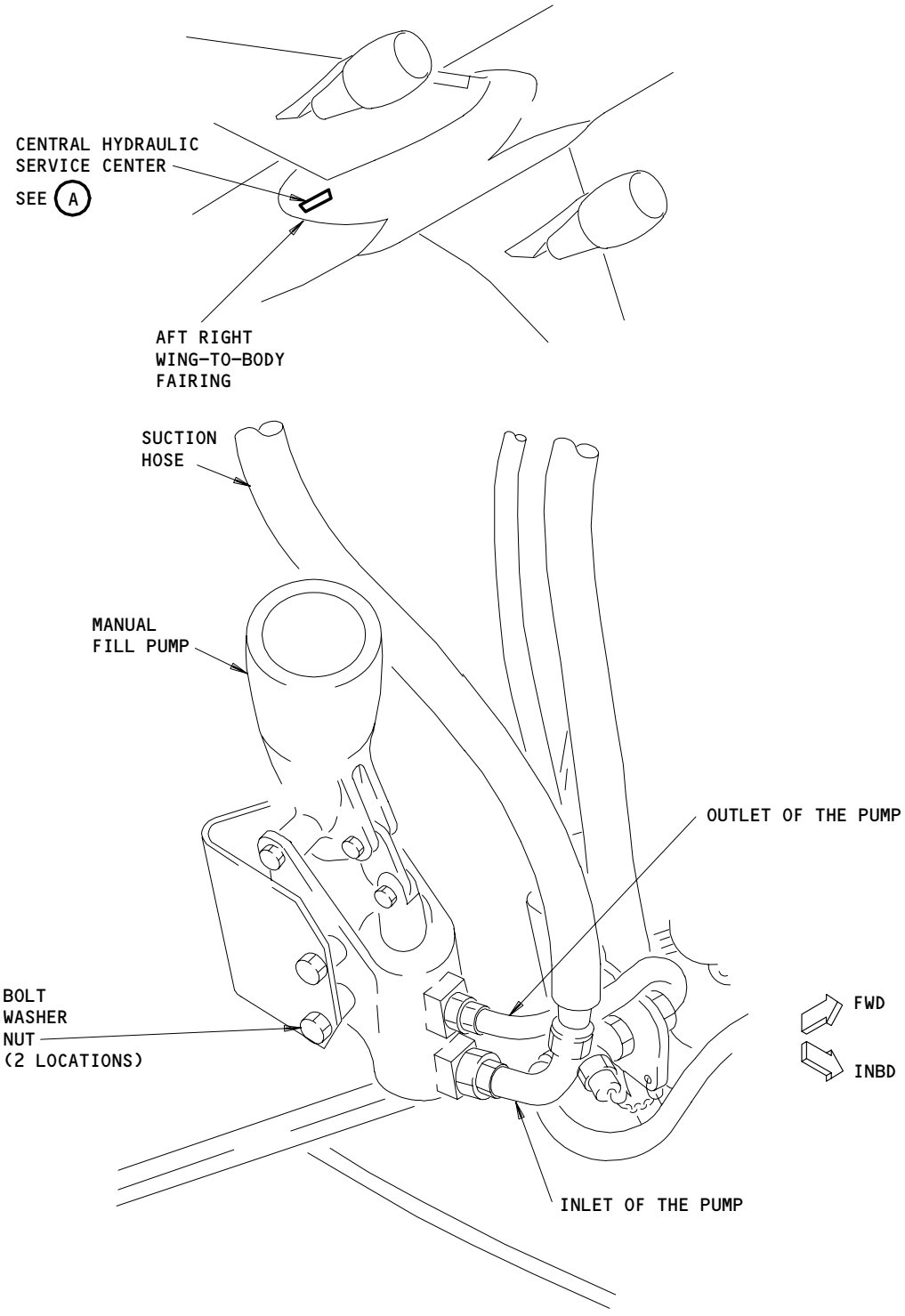
      S 014-002
      (1) Open the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

      S 034-003
      (2) Disconnect the inlet and outlet lines from the manual fill pump.

      S 034-004
      (3) Install caps on the hydraulic lines.

      S 034-005
      (4) Remove the bolts, nuts, and washers that hold the manual fill pump in the bracket.

      S 024-006
      (5) Remove the manual fill pump from the bracket.



CENTRAL HYDRAULIC SERVICE CENTER

A

Manual Fill Pump Installation
Figure 401

TASK 29-18-01-424-007

3. Install the Manual Fill Pump for the Reservoir

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 Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access Panel
198CR Central Hydraulic Service Center

D. Install the Manual Fill Pump (Fig. 401)

S 644-008
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads on the fittings.

S 434-009
(2) Install the new O-rings on the fittings.

S 434-010
(3) Install the fittings in the ports on the manual fill pump.

S 424-011
(4) Put the manual fill pump in the bracket.

S 424-012
(5) Install the bolts, washers, and nuts to hold the manual fill pump in the bracket.

S 434-013
(6) Remove the caps from the hydraulic lines.

S 434-014
(7) Connect the inlet and outlet lines to the manual fill pump.

S 864-015

(8) Pressurize the reservoir fill system with the manual fill pump (AMM 12-12-01/301).

S 214-016

(9) Make sure there are no leaks at the connection points to the manual fill pump.

S 164-017

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

(10) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-018

(11) Close the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

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
   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
          198 Wing to Body - Aft Lower Half (Right)
          211/212 Control Cabin

      (2) Access Panel
          198CR Central Hydraulic Service Center

   C. Remove the Selector Valve (Fig. 401)

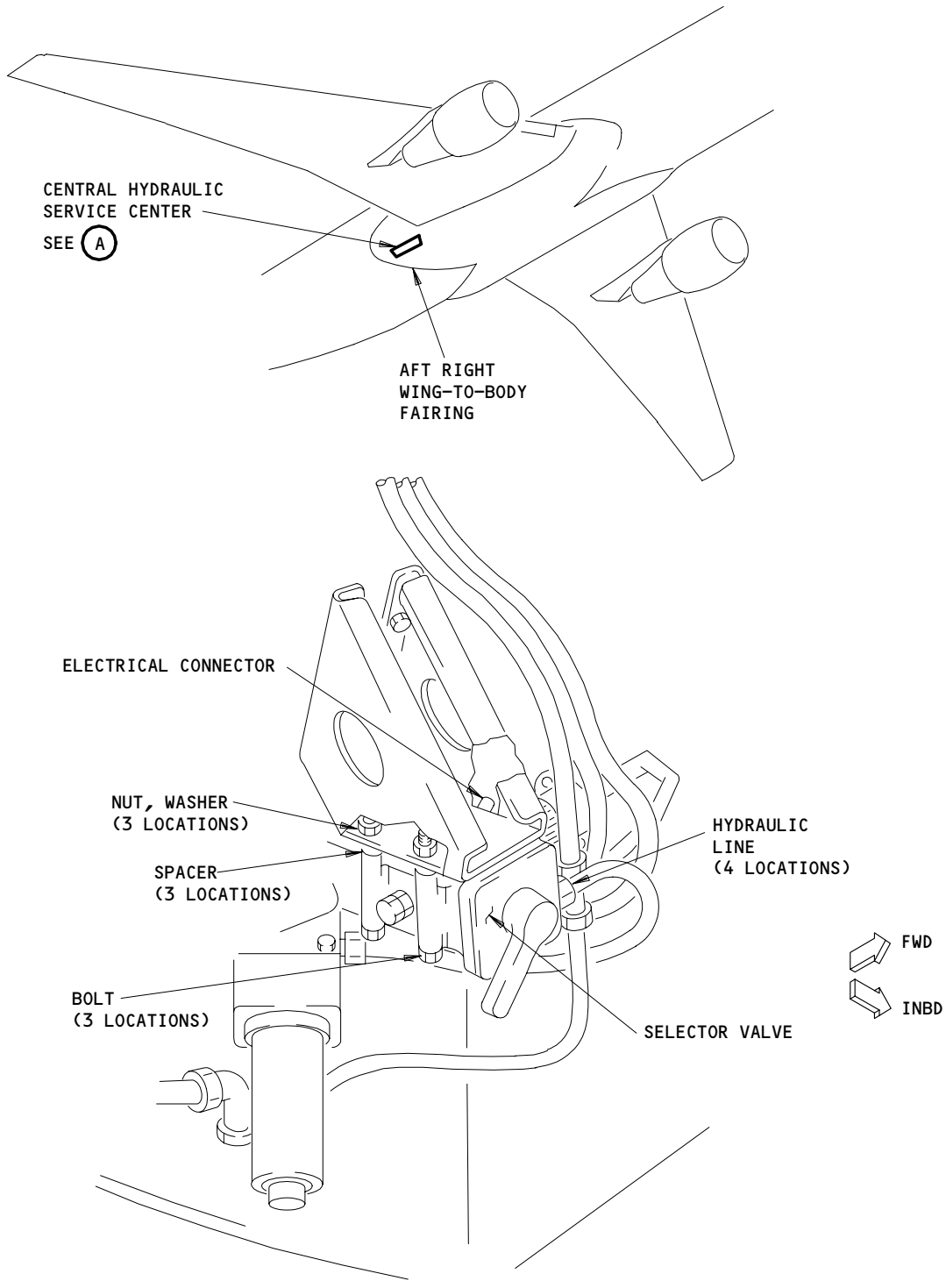
      S 014-002
      (1) Open the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

      S 864-003
      (2) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11L20, HYDRAULIC QTY

      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.

      S 034-006
      (5) Remove the inlet hydraulic line from the selector valve.



CENTRAL HYDRAULIC SERVICE CENTER

A

Fill Selector Valve Installation
Figure 401

S 034-007
(6) Put a cap on the inlet hydraulic line.

S 034-008
(7) Remove the three outlet hydraulic lines from the selector valve.

S 034-009
(8) Put caps on the outlet hydraulic lines.

S 024-010
(9) Remove the bolts, nuts, spacers, and washers that hold the selector valve in its position.

TASK 29-18-02-424-011

3. Install the Selector Valve

A. 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

B. Access
(1) Location Zones

198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin

(2) Access Panel

198CR	Central Hydraulic Service Center

C. Install the Selector Valve (Fig. 401)

S 424-012
(1) Install the bolts, nuts, spacers, and washers to hold the selector valve in its position.

S 434-013
(2) Remove the caps and connect the three outlet hydraulic lines to the selector valve.

S 434-014
(3) Remove the cap and connect the inlet hydraulic line to the selector valve.

S 434-015
(4) Connect the electrical connector to the selector valve.

S 864-016
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L20, HYDRAULIC QTY

S 864-017
(6) Supply electrical power if it is necessary (AMM 24-22-00/201).

S 864-018
(7) Pressurize the reservoir fill system (AMM 12-12-01/301).

S 214-019
(8) Do a check for leaks in the connections on the fill selector valve.

S 164-020

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

(9) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-021
(10) Close the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

RESERVOIR FILL FILTER MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the filter module and the filter element for reservoir fill. The other task installs the filter module and the filter element for reservoir fill.

TASK 29-18-03-024-001

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 for reservoir fill. 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.

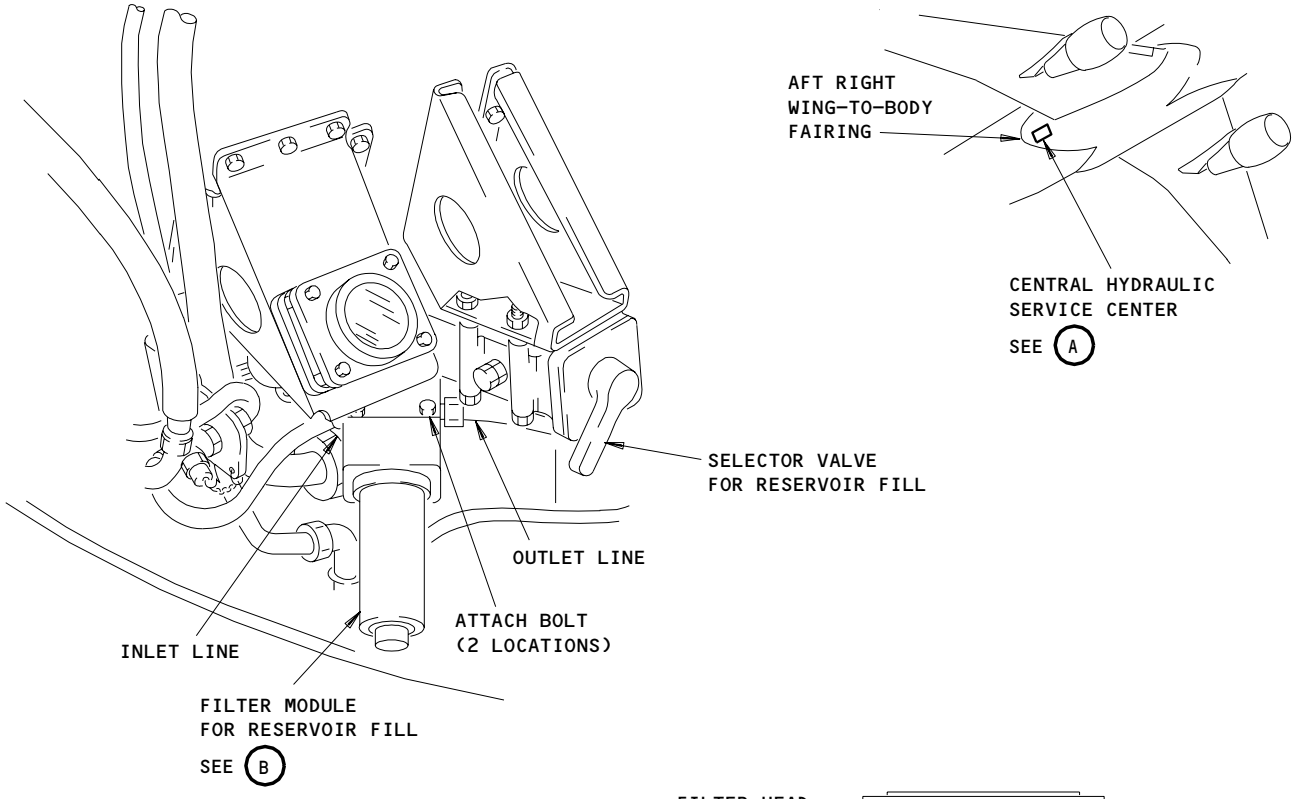
   B. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
   C. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access Panel
          198CR Central Hydraulic Service Center

   D. Prepare for the Removal

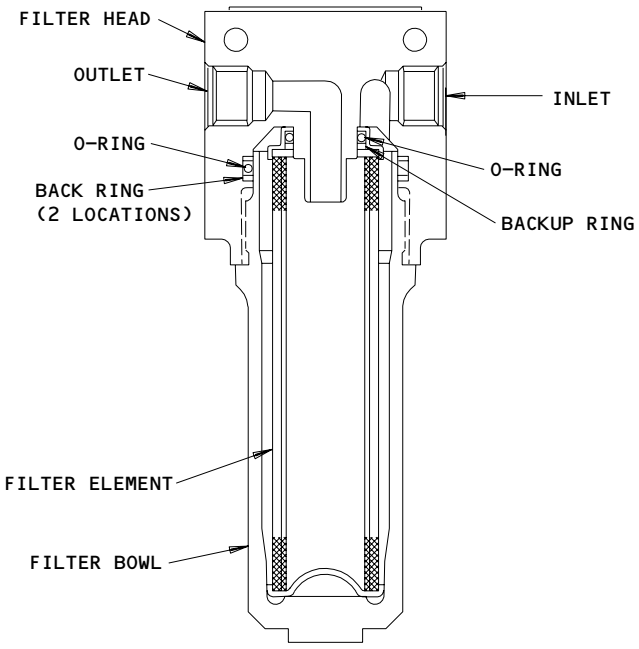
          S 014-002
      (1) Open the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

          S 214-003
      (2) Make sure the reservoir fill system is not pressurized by the ground service cart connected to the pressure fill connection.



CENTRAL HYDRAULIC SERVICE CENTER

A



FILTER MODULE

B

Filter Module Installation for Reservoir Fill
Figure 401

S 214-004
(3) Make sure the selector valve for reservoir fill is in the OFF position.

E. Remove the Filter Module (Fig. 401)

S 034-005
(1) Disconnect the inlet and outlet lines on the selector valve.

S 034-006
(2) Put caps on the inlet and outlet lines.

S 034-007
(3) Remove the bolts, nuts, and washers that attach the filter module to the mounting bracket.

S 024-008
(4) Remove the filter module.

F. Remove the Filter Element (Fig. 401)

S 034-009
(1) Remove the filter bowl from the filter head.

S 024-010
(2) Remove and discard the filter element from the filter bowl.

TASK 29-18-03-424-011

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 for reservoir fill. 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 Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access Panel
198CR Central Hydraulic Service Center

E. Install the Filter Module (Fig. 401)

S 424-012
(1) Set the filter module in the mounting bracket.

S 434-013
(2) Install the bolts, nuts, and washers to attach the filter module to the mounting bracket.

S 434-014
(3) Remove the caps and connect the inlet and outlet lines.

F. Install the Filter Element (Fig. 401)

S 644-015
(1) Apply a layer of hydraulic lubricant or hydraulic fluid on the O-rings.

S 434-016
(2) Install the backup ring, O-ring, and backup ring in the groove in the filter head.

S 434-017
(3) Install the O-ring and backup ring in the groove in the filter element.

S 424-018
(4) Install the filter element on the fitting in the filter head.

S 164-019
(5) Clean the filter bowl.

S 434-020
(6) Install the filter bowl and tighten it as follows:
(a) Tighten the filter bowl to 50-75 pound-inches.

S 434-021
(7) Install a lockwire on the filter bowl.

G. Put the Airplane Back to Its Usual Condition

S 864-022

(1) Pressurize the reservoir fill system (AMM 12-12-01/301).

S 214-023

(2) Do a check for leaks at the connections on the filter module.

S 164-024

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

(3) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-025

(4) Close the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

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 29-18-06-024-001

2. Remove the Fill Indicator
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
   B. Access
      (1) Location Zones

198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin

      (2) Access Panel

198CR	Central Hydraulic Service Center

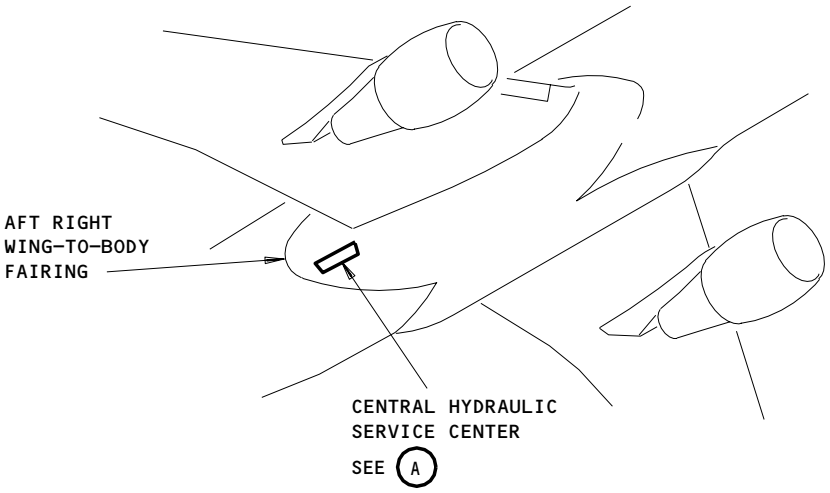
   C. Remove the Fill Indicator (Fig. 401)

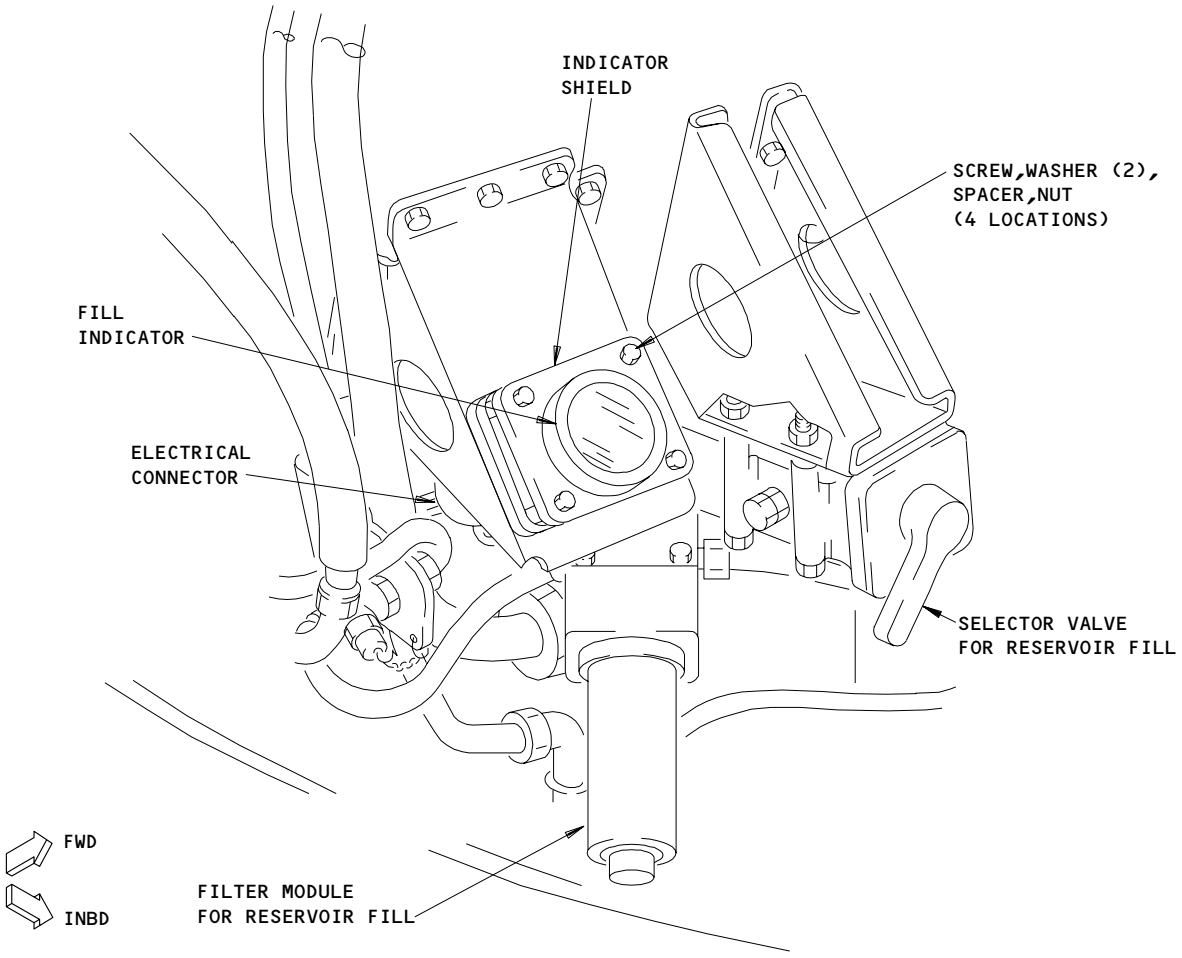
S 864-002
(1) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L20, HYDRAULIC QTY

S 014-003
(2) Open the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

S 034-004
(3) Remove the electrical connector from the fill indicator.

S 034-005
(4) Remove the screws that hold the fill indicator to the mounting bracket.





CENTRAL HYDRAULIC SERVICE CENTER

A

Fill Indicator Installation
Figure 401

S 024-006
(5) Remove the indicator shield and the fill indicator.

TASK 29-18-06-424-007

3. Install the Fill Indicator

A. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power

B. Access
(1) Location Zones

198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin

(2) Access Panel

198CR	Central Hydraulic Service Center

C. Install the Fill Indicator (Fig. 401)

S 424-008
(1) Set the fill indicator on the mounting bracket.

S 434-009
(2) Hold the spacers, washers, and indicator shield on the fill indicator.

S 424-010
(3) Tighten the screws and nuts that attach the fill indicator to the mounting bracket.

S 434-011
(4) Connect the electrical connector to the fill indicator.

S 864-012
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L20, HYDRAULIC QTY

S 864-013
(6) Supply electrical power (AMM 24-22-00/201).

S 864-014
(7) Move the selector valve to the left, right, or center system.

S 864-020
(8) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 214-015
(9) Make sure the gage shows approximately the same fluid quantity in the reservoir as the HYD QTY indication on the display.

S 864-016
(10) Move the selector valve to the OFF position.

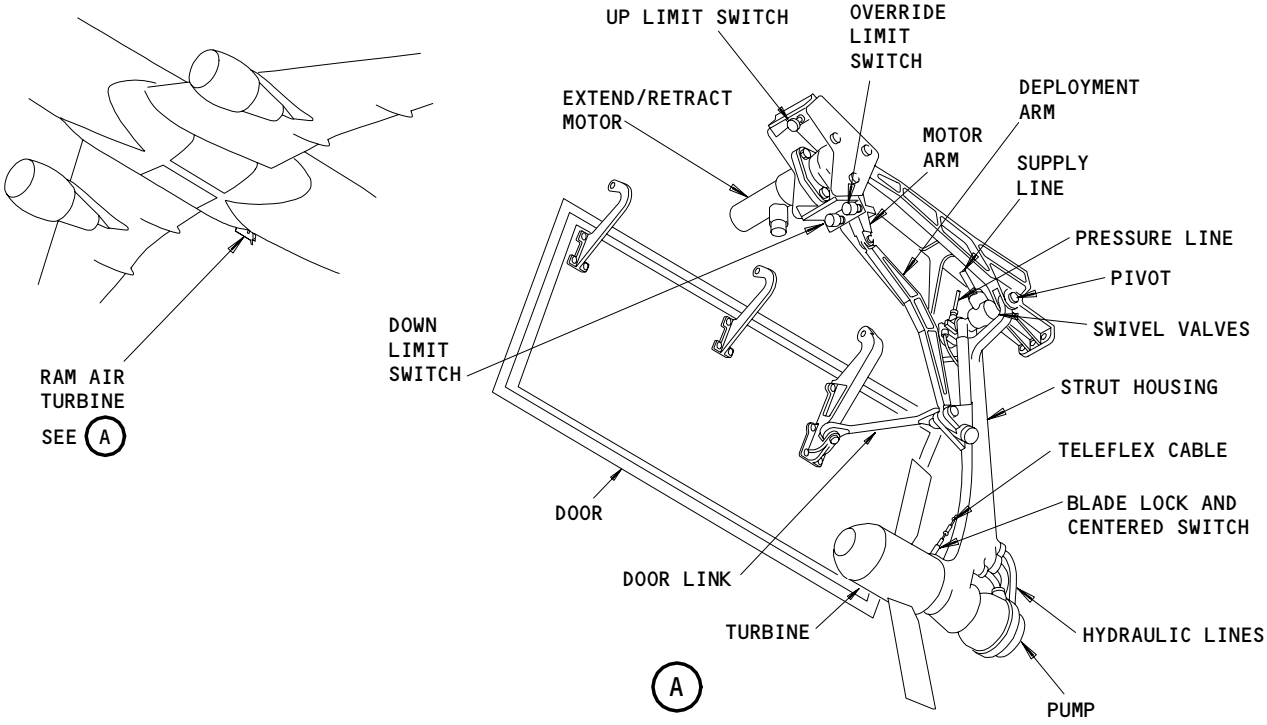
S 414-017
(11) Close the access door for the central hydraulic service center, 198CR (AMM 06-41-00/201).

S 864-018
(12) Remove electrical power if it is not necessary (AMM 24-22-00/201).

RAM AIR TURBINE (RAT) SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The ram air turbine (RAT) provides reserve hydraulic power to the center system for operation of the primary flight controls.
   B. The ram air turbine (RAT) is stowed inside the aft right wing-to-body fairing. When deployed, the RAT swings out into the airstream and remains extended until retracted on the ground. The RAT automatically deploys if engine speed (N2) drops below 50% in both engines. The RAT can be deployed manually with the RAT manual select switch in the flight compartment.
   C. When the airplane is on the ground, the RAT can be retracted with the RAT retract select switch in the right wheel well. Prior to retracting the RAT, the propeller blades must be moved to align index marks on the hub and strut.
   D. The RAT consists of a turbine and a hydraulic pump mounted on a hinged strut housing. The turbine consists of a hub with two propeller blades which are driven by the airstream. The RAT is deployed and retracted by the electric motor-driven rotary actuator.
2. Component Details
   A. RAT Strut (Fig. 1)
      (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 (Fig. 1)
      (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.

C. Turbine (Fig. 1)
   (1) The turbine consists of a hub with two propeller 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. Rotary Actuator (Fig. 1)
   (1) The rotary actuator DC electric motor (Fig. 1) powers deployment and retraction of the RAT assembly. Power for deployment will be provided automatically under certain flight conditions. Power for deployment may also be provided through use of an override switch on the pilot's overhead panel P5.
E. Deployment Arm (Fig. 1)
   (1) The force required to deploy and retract the RAT is transfered through a deployment arm. The deployment arm upper attach point is the crank arm of the rotary actuator motor. The lower end of the deployment arm is attached to the midpoint of the RAT strut housing.
F. RAT Compartment Door (Fig. 1)
   (1) The RAT compartment door opens as the RAT is deployed. The door assembly contains a seal which isolates the compartment when the RAT is in the retracted position.
G. Door Actuation Link (Fig. 1)
   (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.



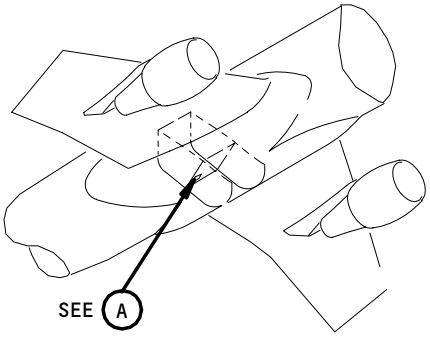
Ram Air Turbine (RAT) Installation
Figure 1

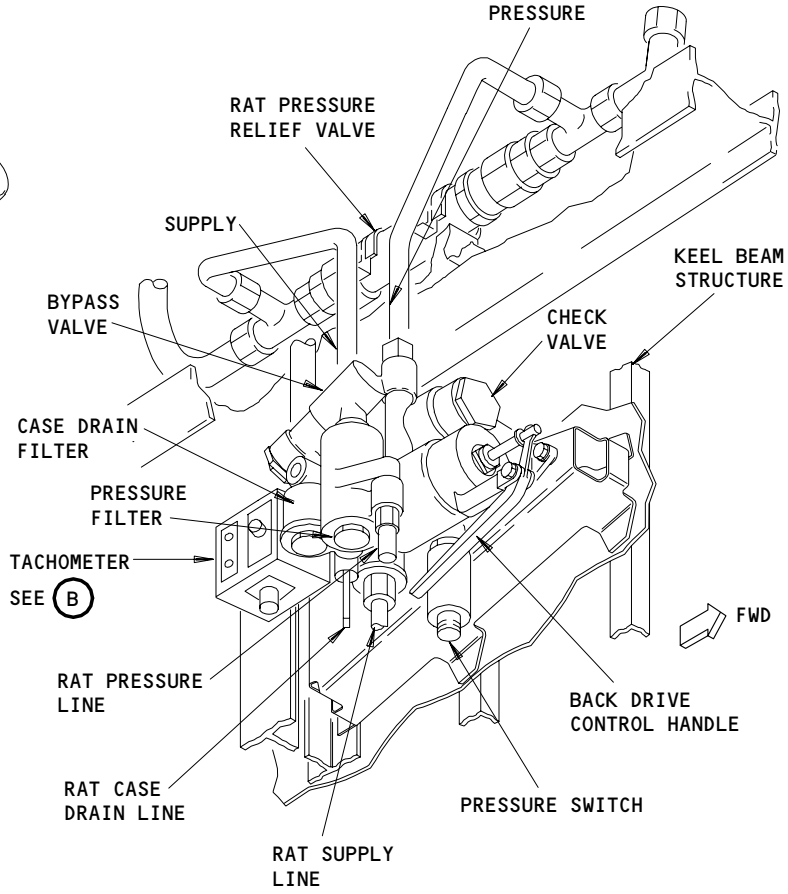
H. Pressure Relief Valve
   (1) A pressure relief valve is in the RAT hydraulic pump pressure output line. If the RAT pump output pressure becomes too high, the relief valve opens to direct fluid flow into the system return line thus relieving excess pressure.

I. Checkout Module (Fig. 2)
   (1) The checkout module is in the right main wheel at the aft end of the keel beam. 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.
   (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.

J. RAT Isolation Check Valve (Fig. 3)
   (1) The check valve isolates the output of the RAT hydraulic pump to power only the primary flight controls. This valve is an in-line check valve installed in the center system pressure line. The check valve is below the ADP pressure/case drain filter module on the inboard wall of the left wheel well.

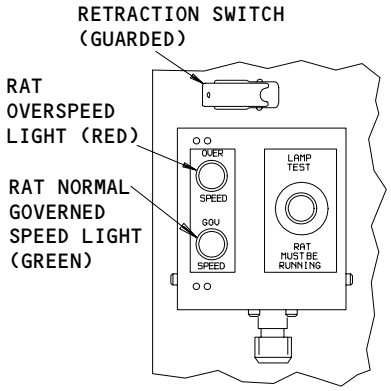
K. Tachometer
   (1) The tachometer provides a visual indication of the operating status of the RAT during ground test. The tachometer indicator is next to the checkout module in the right wheel well.
   (2) The tachometer indicator has two indicator lights and a lamp test switch. A green light indicates 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.





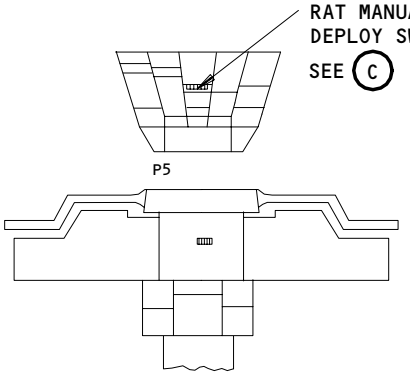
CHECKOUT MODULE

A

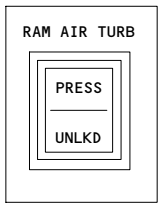


TACHOMETER MODULE

B



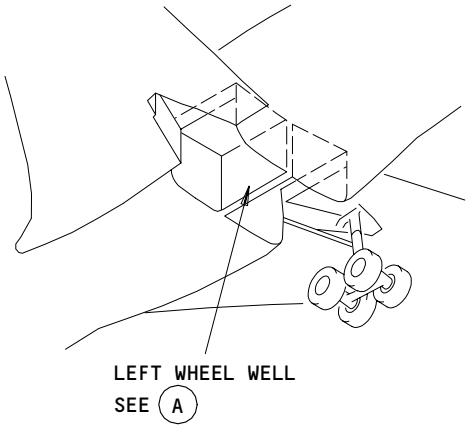
COCKPIT CONTROLS

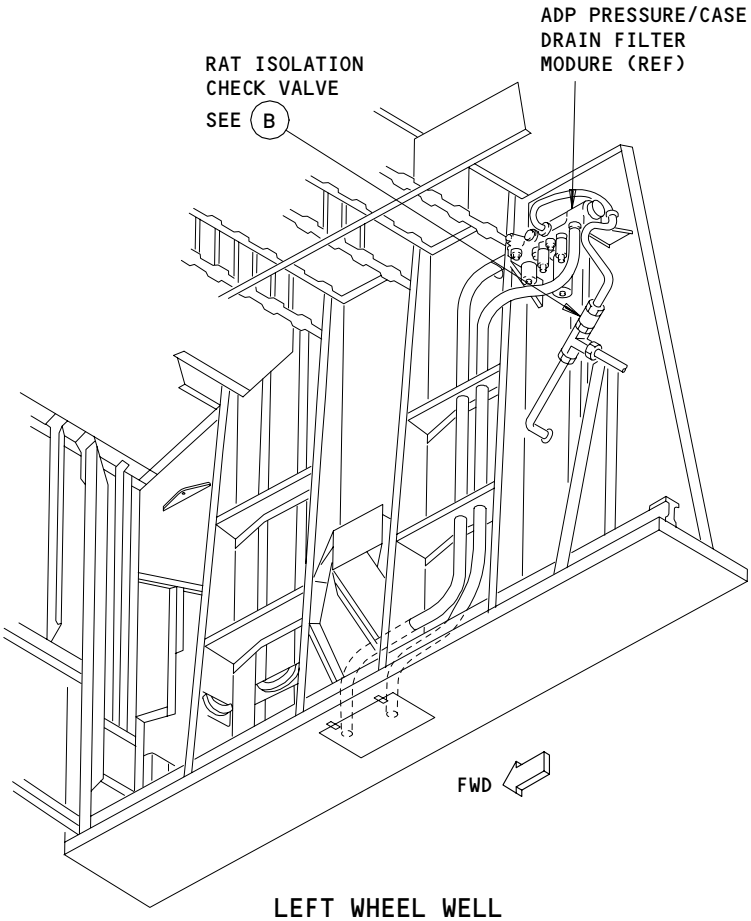


P5 PANEL
(MANUAL DEPLOY)

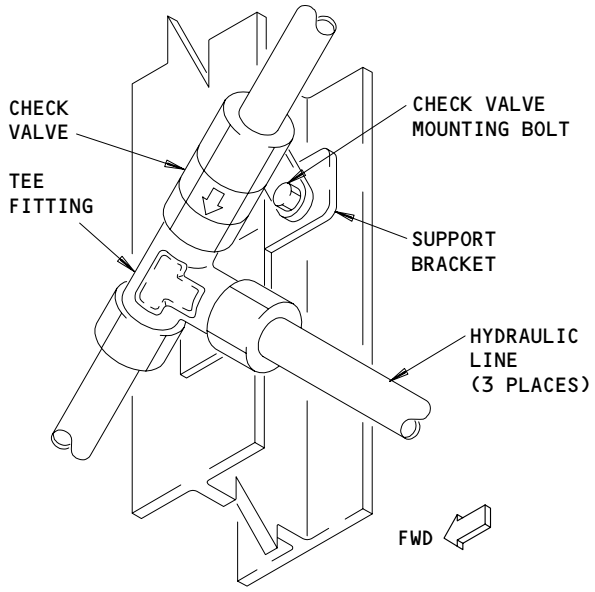
C

Ram Air Turbine Controls
Figure 2





LEFT WHEEL WELL
A

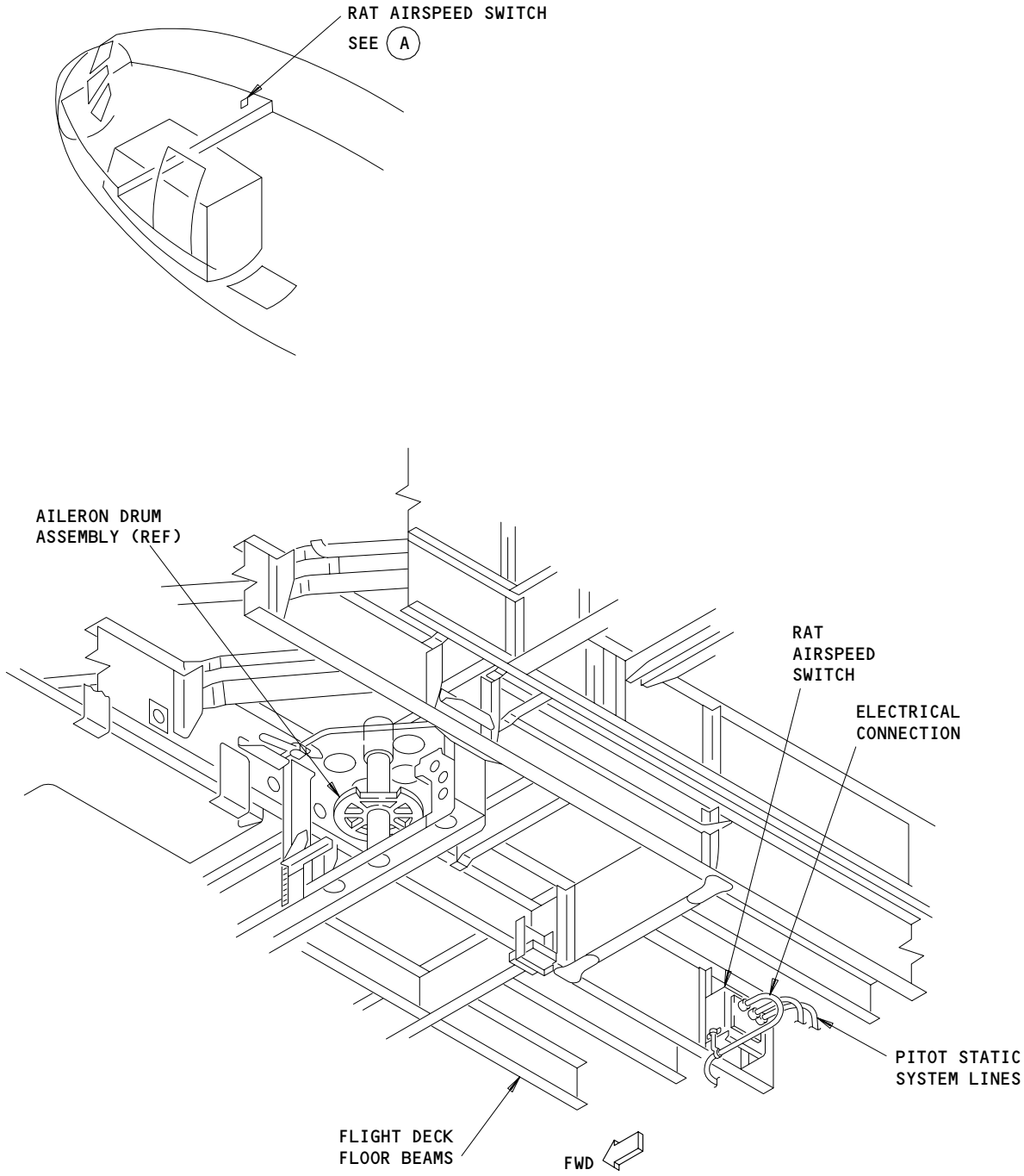


RAT ISOLATION CHECK VALVE
B

Ram Air Turbine Isolation Check Valve
Figure 3

L. RAT Airspeed Switch (Fig. 4)
(1) The airspeed switch arms the RAT automatic deployment circuit when airspeed reaches 80 KIAS. The switch contains a diaphram sensitive to pressure differential, a switch contact, and a holding relay. The airspeed switch is connected to the pitot static system to sense airspeed. This switch is on the flight deck floor beams on the right side and outboard of the nose wheel well.

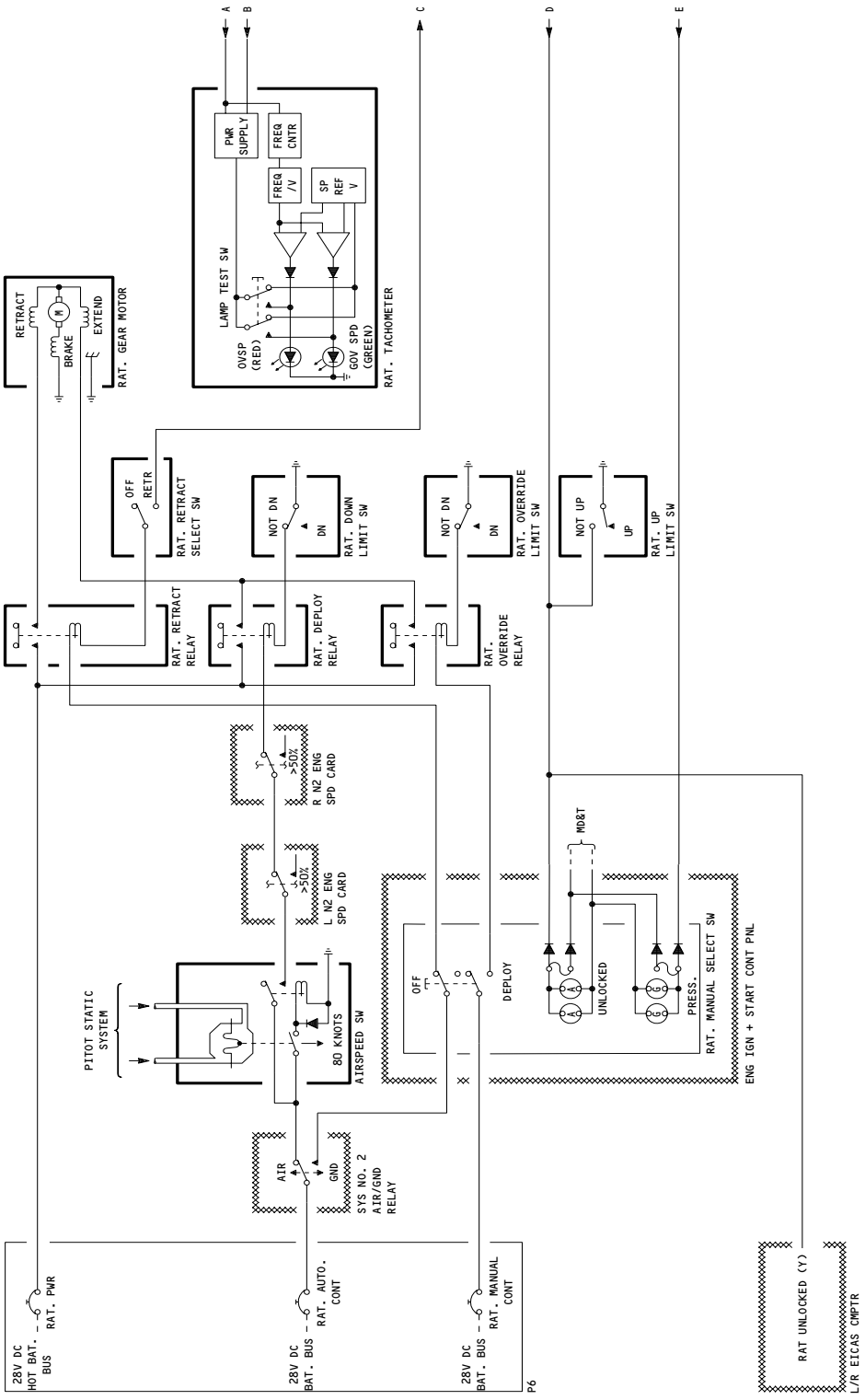
3. Operation
A. Functional Description (Fig. 5)
(1) In-Flight Deployment
(a) In the air mode, the air/ground system No. 2 relay provides 28 volt dc power from the battery bus to the airspeed switch. The airspeed switch is actuated by the pitot/static system and closes when airplane speed reaches 80 KIAS. This arms the automatic deployment circuit.
(b) If engine speed (N2) in both engines drops below 50%, the left and right engine speed cards energize the RAT deploy relay. The RAT deploy relay provides 28 volt dc power from the hot battery bus to the actuator motor. The motor extends the RAT until the down limit switch is actuated. The RAT up limit switch closes to illuminate the RAT UNLOCKED light on the engine ignition/start control panel. A RAT UNLOCKED message also appears on the EICAS display.
(c) The RAT can also be deployed with the RAT manual select switch on the engine ignition/start control panel. This switch provides 28 volt dc power from the battery bus to the RAT override relay. The override relay provides 28 volt dc power from the hot battery bus to the actuator motor. The motor extends the RAT until the RAT override limit switch is actuated.
(d) The blade-lock plunger releases the turbine hub as the RAT nears the fully deployed position. 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. Fluid is supplied to the hydraulic pump from the center system reservoir. Pressure and case drain flow from the pump enters the center system through filters in the checkout module. The RAT isolation check valve allows pressurized fluid from the pump to flow only to the primary flight controls. Pump pressure closes the checkout module pressure switch and turns on the RAT PRESS light on the engine ignition/start control panel.



RAT AIRSPEED SWITCH

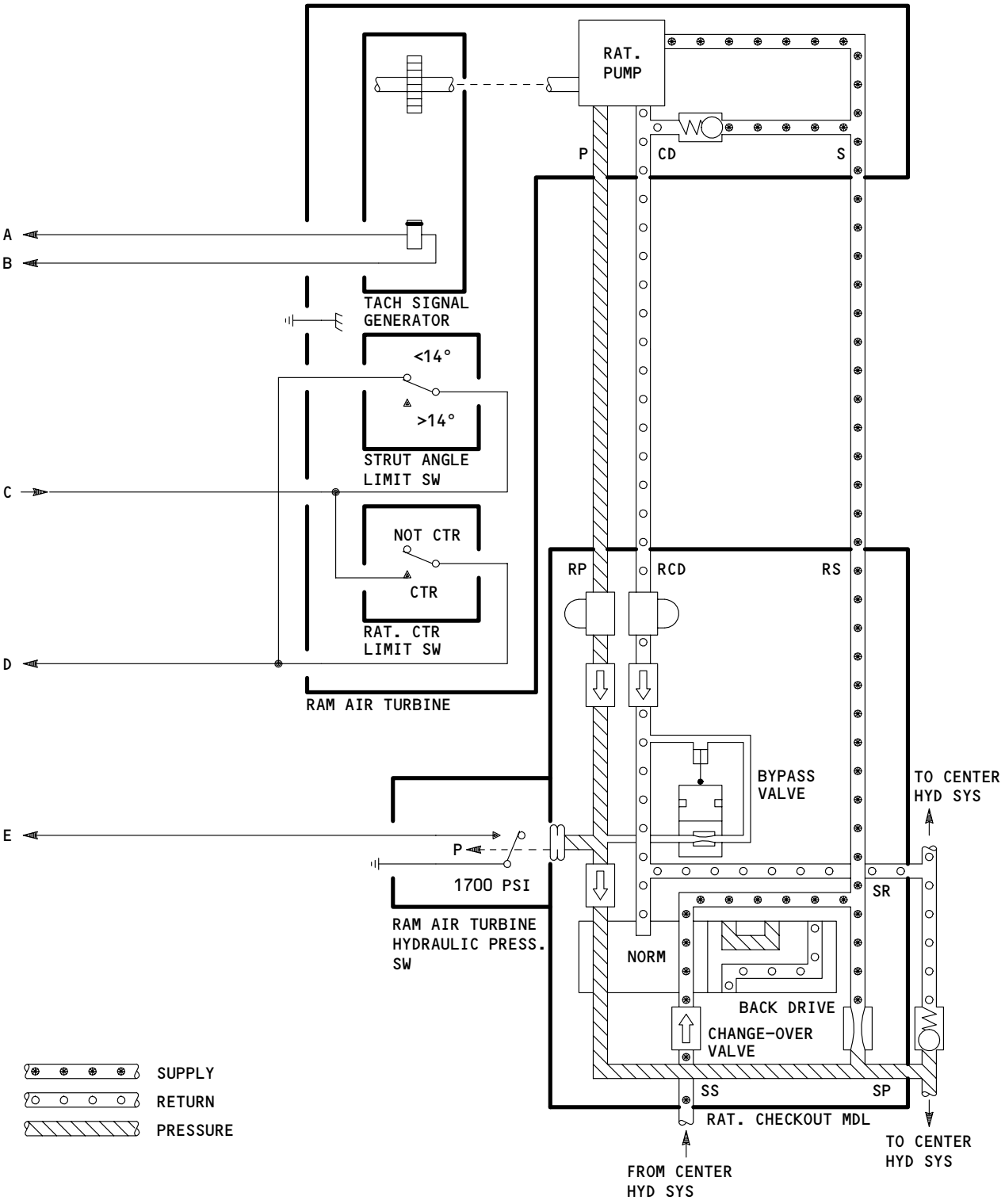
A

Ram Air Turbine Airspeed Switch
Figure 4



Ram Air Turbine System Schematic
Figure 5 (Sheet 1)

184075



Ram Air Turbine System Schematic
Figure 5 (Sheet 2)

175337

(2) Retraction

(a) The RAT can be retracted only while the airplane is on the ground. The turbine hub must be moved to align index marks on the hub and strut prior to starting retraction. With the RAT manual select switch in the OFF position, 28 volt dc power is available to the RAT retract select switch. Moving the RAT retract select switch to the RETRACT position energizes the RAT retract relay to provide 28 volt dc power from the hot battery bus to the actuator motor. The motor retracts the RAT until the up limit switch is actuated.

(b) The blade centered limit switch will de-energize the RAT retract relay if the blade-lock plunger does not engage the hub before the RAT retracts about 15°. This removes power from the actuator motor and stops retraction of the RAT. The RAT cannot be retracted until the index hole in the turbine hub is manually aligned with the blade-lock plunger.

RAM AIR TURBINE (RAT) SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR – RAT ROTARY	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-06
ARM – RAT DEPLOYMENT	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-07
ASSEMBLY – RAT, M614	2	1	198GR, AFT RIGHT WING/BODY FAIRING	29-21-01
CARD – (FIM 73-21-00/101, FIG. 101) L N2 ENGINE SPEED, M1093 R N2 ENGINE SPEED, M1092				
CIRCUIT BREAKERS			FLT COMPT, P6	
RAM AIR TURB AUTO, C1100		1	6C2	*
RAM AIR TURB MAN, C1089		1	6C1	*
RAM AIR TURBINE PWR, C1088		1	6J8	*
DOOR AND MOVEABLE DEPRESSOR – RAT COMPARTMENT	2	1	198GR, AFT RIGHT WING/BODY FAIRING	29-21-09
HUB – RAT	3	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-01
LINK – RAT DOOR ACTUATION	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-10
MODULE – RAT CHECKOUT	4	1	RIGHT WHEEL WELL	29-21-11
MOTOR – RAT ROTARY ACTUATOR ELECTRIC, M613	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-05
PANEL – (FIM 80-11-00/101, FIG. 101) ENG IGN & START CONT, M49				
PUMP – RAT HYDRAULIC	3	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-01
RELAY – RAT DEPLOY, K235	2	1	198GR, AFT RIGHT WING/BODY FAIRING	*
RELAY – RAT OVERRIDE, K236	2	1	198GR, AFT RIGHT WING/BODY FAIRING	*
RELAY – RAT RETRACT, K234	2	1	198GR, AFT RIGHT WING/BODY FAIRING	*
RELAY – (FIM 32-09-00/101, FIG. 101) SYS NO. 2, AIR/GND, K213				
SENSOR – RAT TACHOMETER SPEED	3	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-15
SWITCH – AIRSPEED, S614	5	1	119AL, MAIN EQUIP CTR, FLT DECK FLOOR BEAMS	29-21-24
SWITCH – RAT CTR LIMIT, YENS2	3	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-23
SWITCH – RAT DOWN LIMIT, S365	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-17
SWITCH – RAT HYDRAULIC PRESSURE, S367	4	1	RIGHT WHEEL WELL, RAT CHECKOUT MODULE	29-21-11

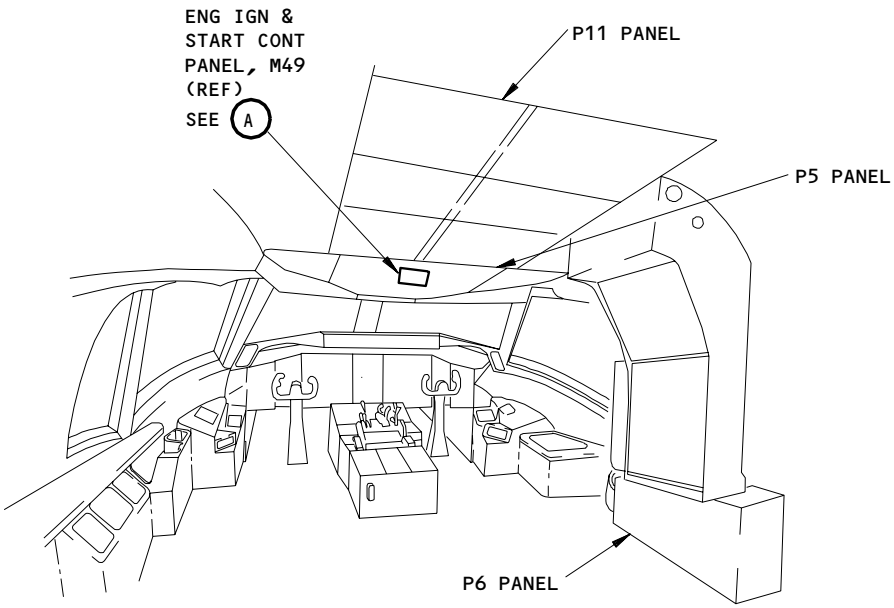
* SEE THE WDM EQUIPMENT LIST

Ram Air Turbine (RAT) System – Component Index
Figure 101 (Sheet 1)

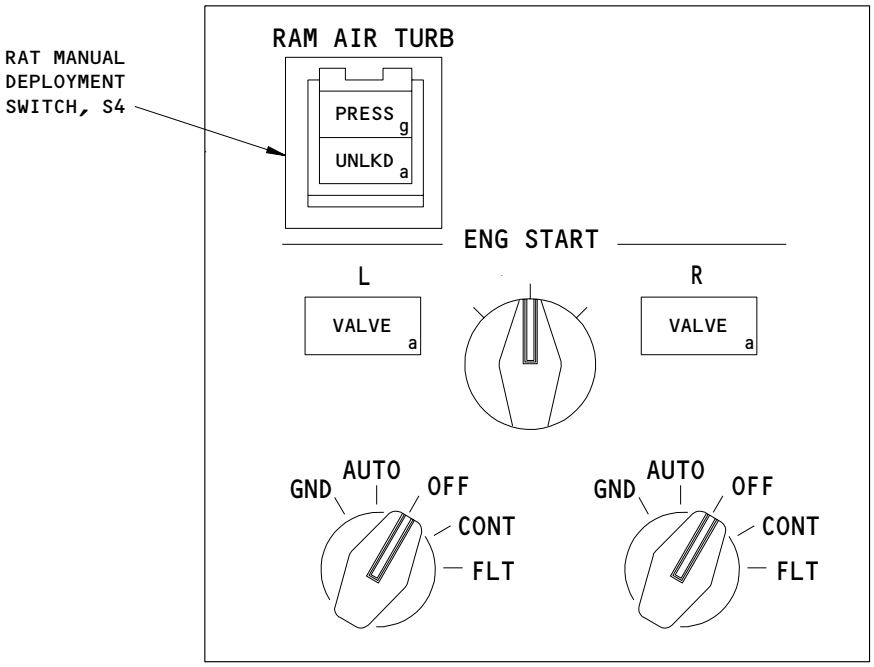
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
SWITCH - RAT MANUAL DEPLOYMENT, S4	1	1	FLT COMPT, P5	*
SWITCH - RAT OVERRIDE LIMIT, S501	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-17
SWITCH - RAT RETRACTION, S366	4	1	RIGHT WHEEL WELL	*
SWITCH - RAT STRUT ANGLE, YENS1	3	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-22
		1		
SWITCH - RAT UP LIMIT, S369	2	1	198GR, AFT RIGHT WING/BODY FAIRING, RAT ASSY, M614	29-21-17
TACHOMETER - RAT, N72	4	1	RIGHT WHEEL WELL	29-21-16
VALVE - RAT ISOLATION CHECK	6	1	LEFT WHEEL WELL	29-21-00
VALVE - RAT PRESSURE RELIEF	4	1	RIGHT WHEEL WELL	29-21-18

* SEE WM EQUIPMENT LIST

Component Access
Figure 101 (Sheet 2)



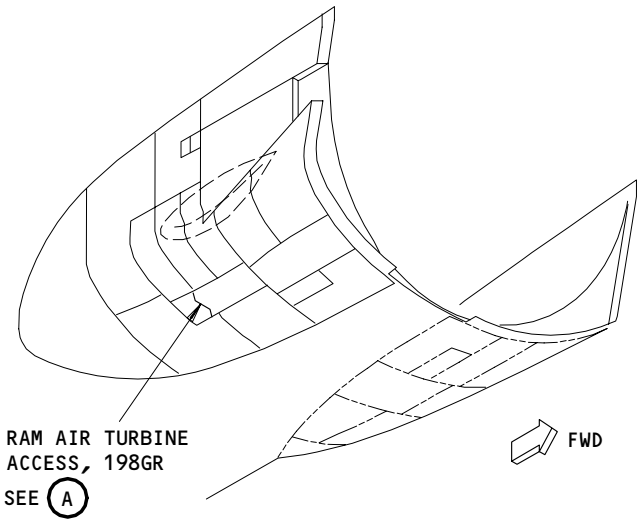
FLIGHT COMPARTMENT



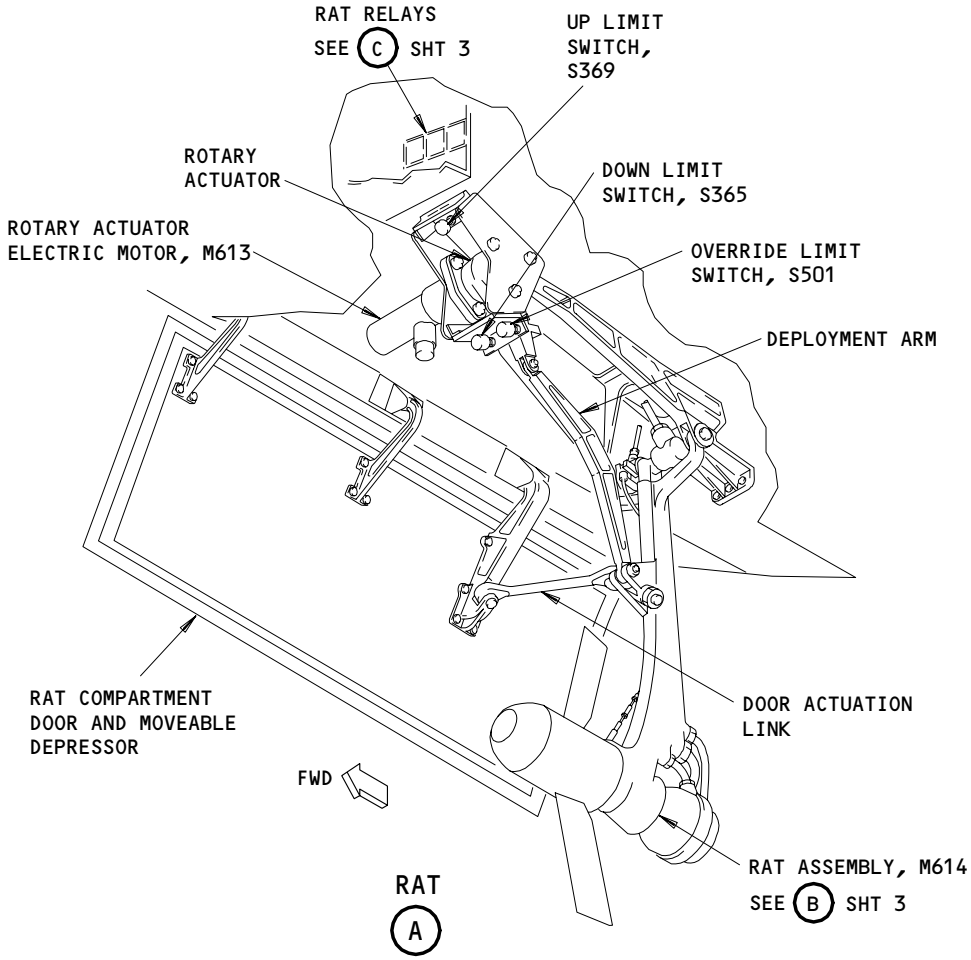
ENG IGN & START CONT PANEL, M49 (REF)

A

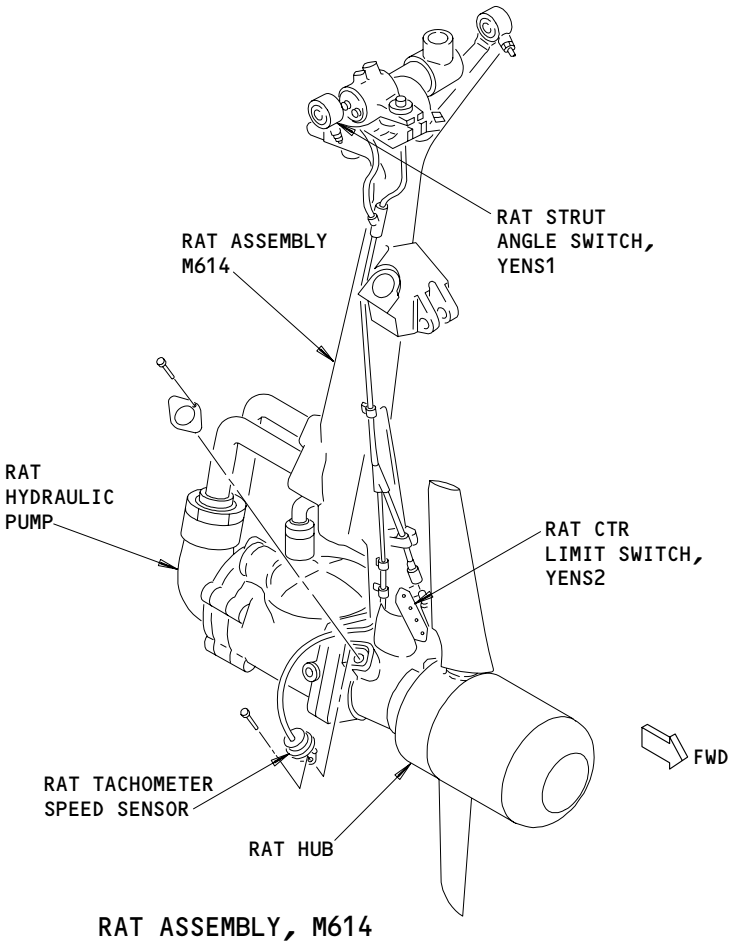
Ram Air Turbine (RAT) System – Component Location
Figure 102 (Sheet 1)



AFT RIGHT WING/BODY FAIRING

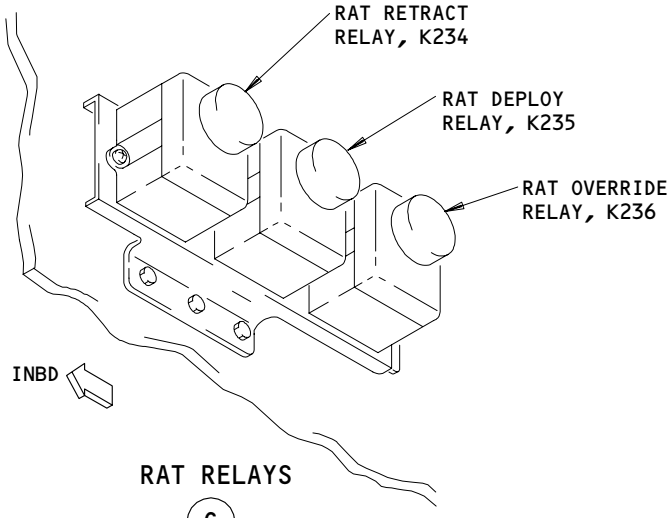


Component Location
Figure 102 (Sheet 2)



RAT ASSEMBLY, M614

B

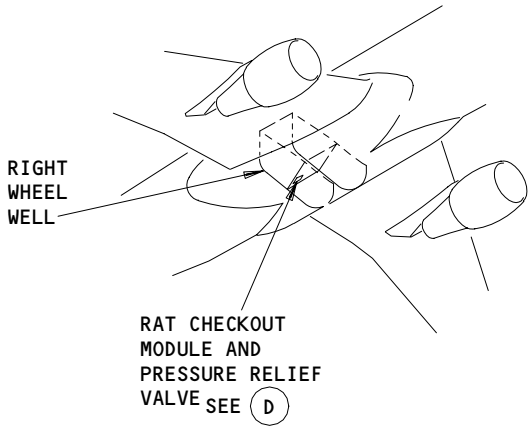


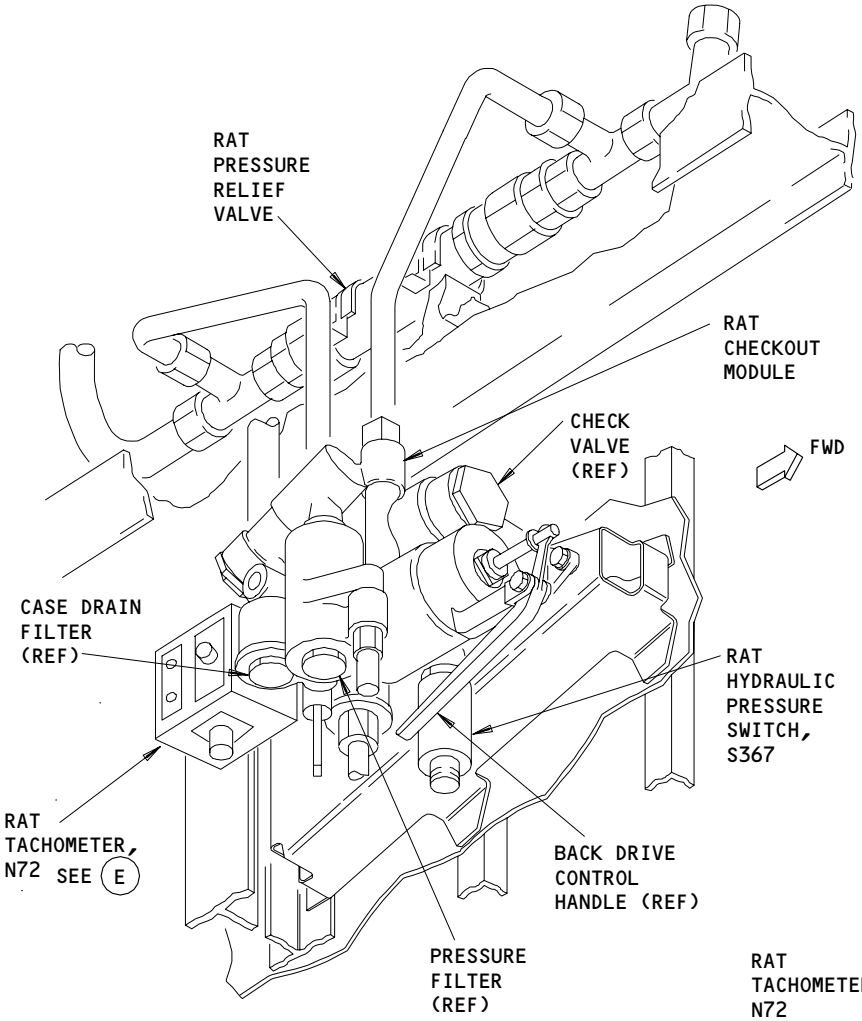
RAT RELAYS

C

Component Location (Details From Sht-2)
Figure 102 (Sheet 3)

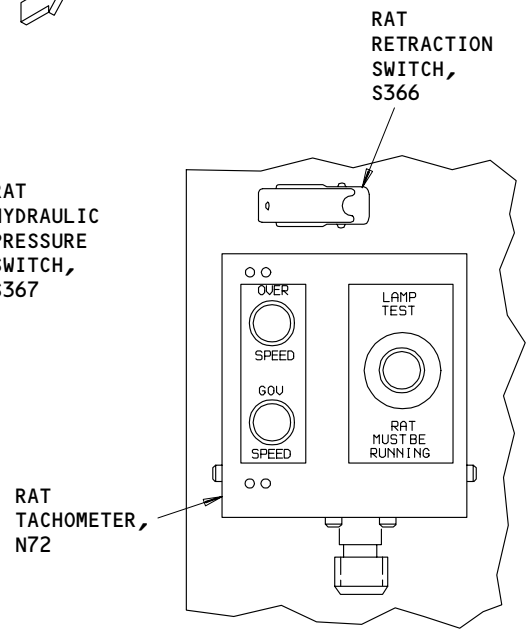
94821





RAT CHECKOUT MODULE AND
PRESSURE RELIEF VALVE

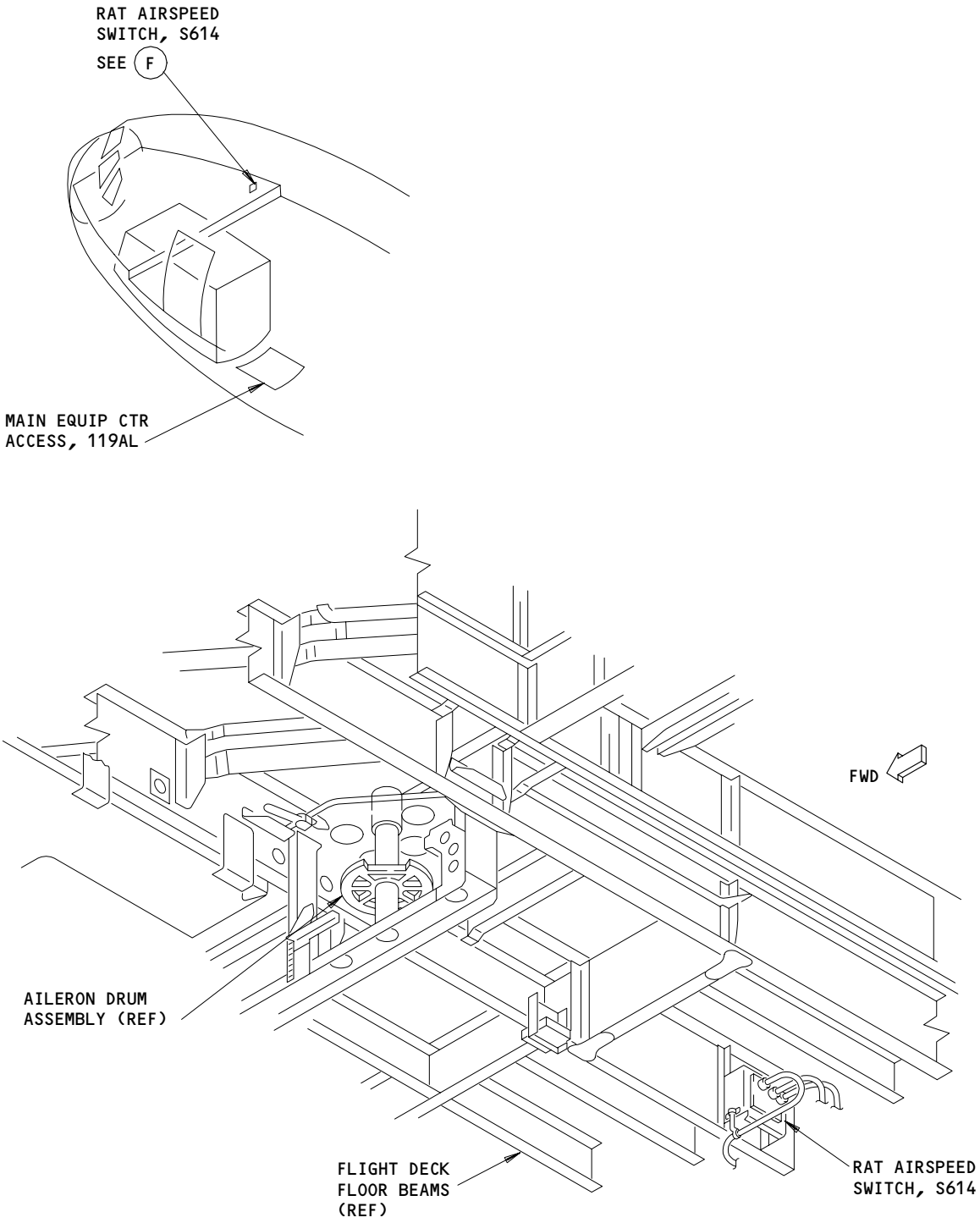
D



E

Component Location
Figure 102 (Sheet 4)

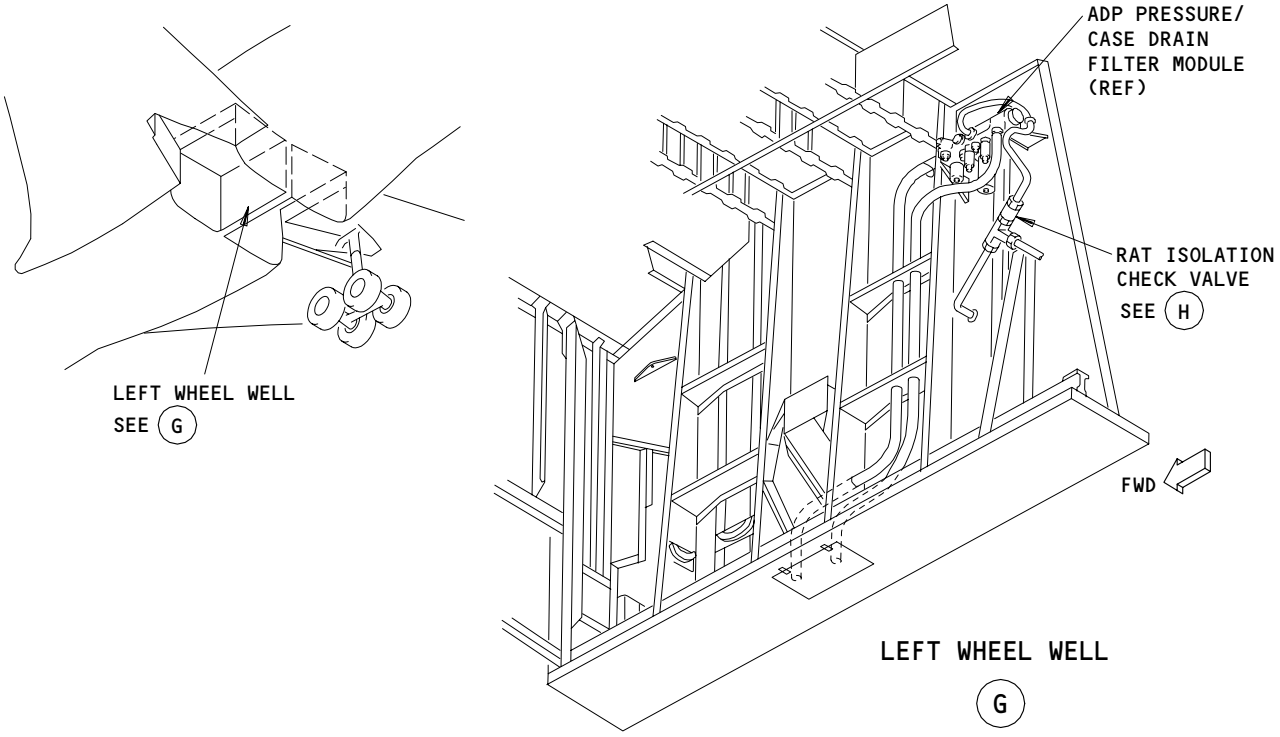
33879



RAT AIRSPEED SWITCH, S614

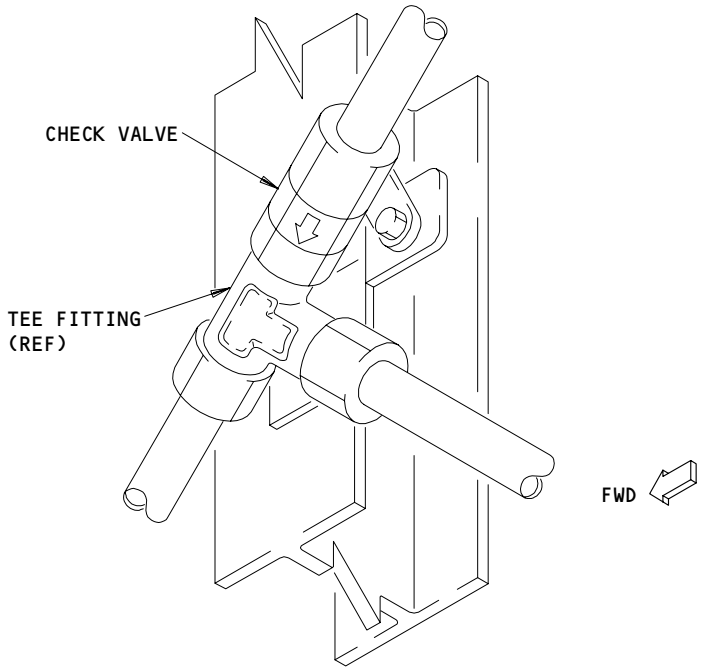
(F)

Component Location
Figure 102 (Sheet 5)



LEFT WHEEL WELL

G



RAT ISOLATION CHECK VALVE

H

Component Location
Figure 102 (Sheet 6)

RAT PRESSURE LIGHT DID NOT ILLUMINATE WHEN BACK-DRIVE CONTROL HANDLE WAS RETURNED TO NORMAL

PREREQUISITES

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION:
- ELECTRICAL POWER IS ON (AMM 24-22-00/201)
- CENTER HYDRAULIC SYSTEM PRESSURIZED (AMM 29-11-00/201)

1 HOLD CONTROL HANDLE ON RAT CHECKOUT MODULE IN BACK-DRIVE POSITION. WHEN RAT TURBINE HUB SPEED HAS STABILIZED RELEASE HANDLE.
DOES RAT TURBINE HUB COAST TO A STOP WHEN BACK-DRIVE CONTROL HANDLE IS RELEASED?

NO → 5 REPLACE RAT CHECKOUT MODULE (AMM 29-21-11/401).

YES → 6 REPLACE RAT PRESSURE SWITCH S367 ON CHECKOUT MODULE (AMM 29-21-11/401).
IF THE PROBLEM CONTINUES, REPLACE RAT HYDRAULIC PUMP (AMM 29-21-01/401).

RAT Pressure Light Did Not Illuminate When Back-Drive Control Handle Was Returned to Normal
Figure 103

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 Ram Air Turbine (RAT).

TASK 29-21-00-862-001

2. Extend the Ram Air Turbine (RAT)
   A. Equipment
      (1) Ram Air Turbine Circuit Breaker Lockout clips
          (Commercially available)
      (2) Ram Air Turbine Blade Protective Cover - 732021
          Sundstrand Aviation Corp.
          4747 Harrison Ave.
          Rockford, Illinois
      (3) Ram Air Turbine Hub Protective Cover - 734734
          Sundstrand Aviation Corp.
          4747 Harrison Ave.
          Rockford, Illinois
   B. References
      (1) AMM 24-22-00/201, Electrical Power
   C. Access
      (1) Location Zones
          198 Wing to Body - Aft Lower Half (Right)
          211/212 Control Cabin

      (2) Access Panel
          198GR RAT Compartment

   D. Extend the RAT (Fig. 201)

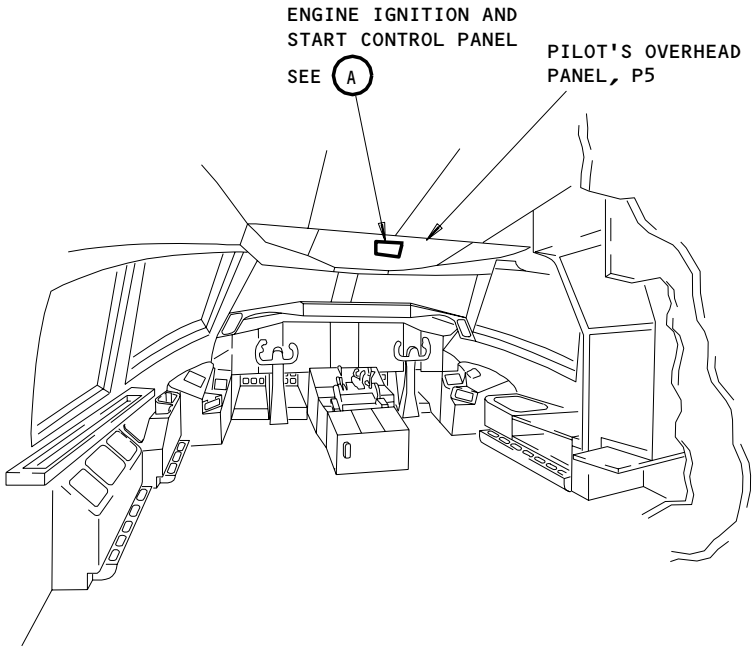
      S 862-002
      (1) Close these circuit breakers on the main power distribution panel, P6:
          (a) 6C1, RAM AIR TURB MAN
          (b) 6C2, RAM AIR TURB AUTO
          (c) 6J8, RAM AIR TURBINE PWR

      S 862-003
      (2) Supply electrical power (AMM 24-22-00/201).

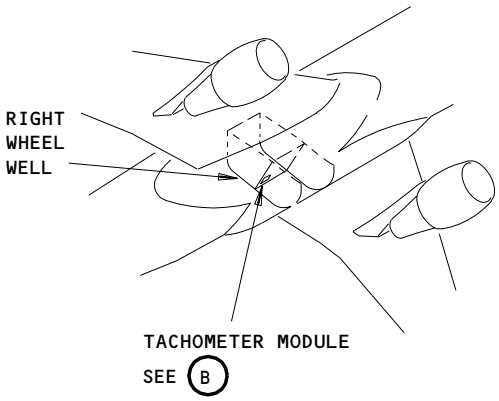
      S 862-004

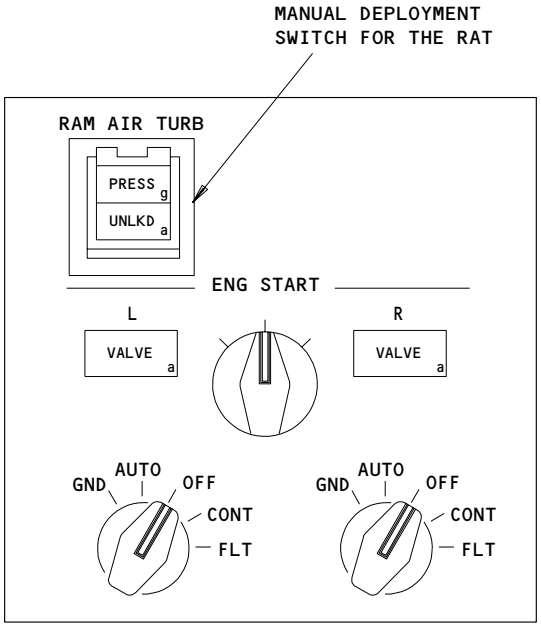
      CAUTION: KEEP PERSONS AND EQUIPMENT AWAY FROM THE PATH OF THE RAT AND THE RAT COMPARTMENT DOOR. THE RAT AND THE RAT COMPARTMENT DOOR MOVE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

      (3) Push the RAM AIR TURB switch on the pilot's overhead panel, P5 to extend the RAT.



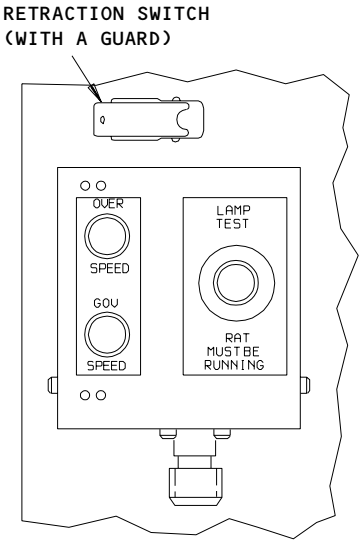
FLIGHT COMPARTMENT





ENGINE IGNITION AND START CONTROL PANEL

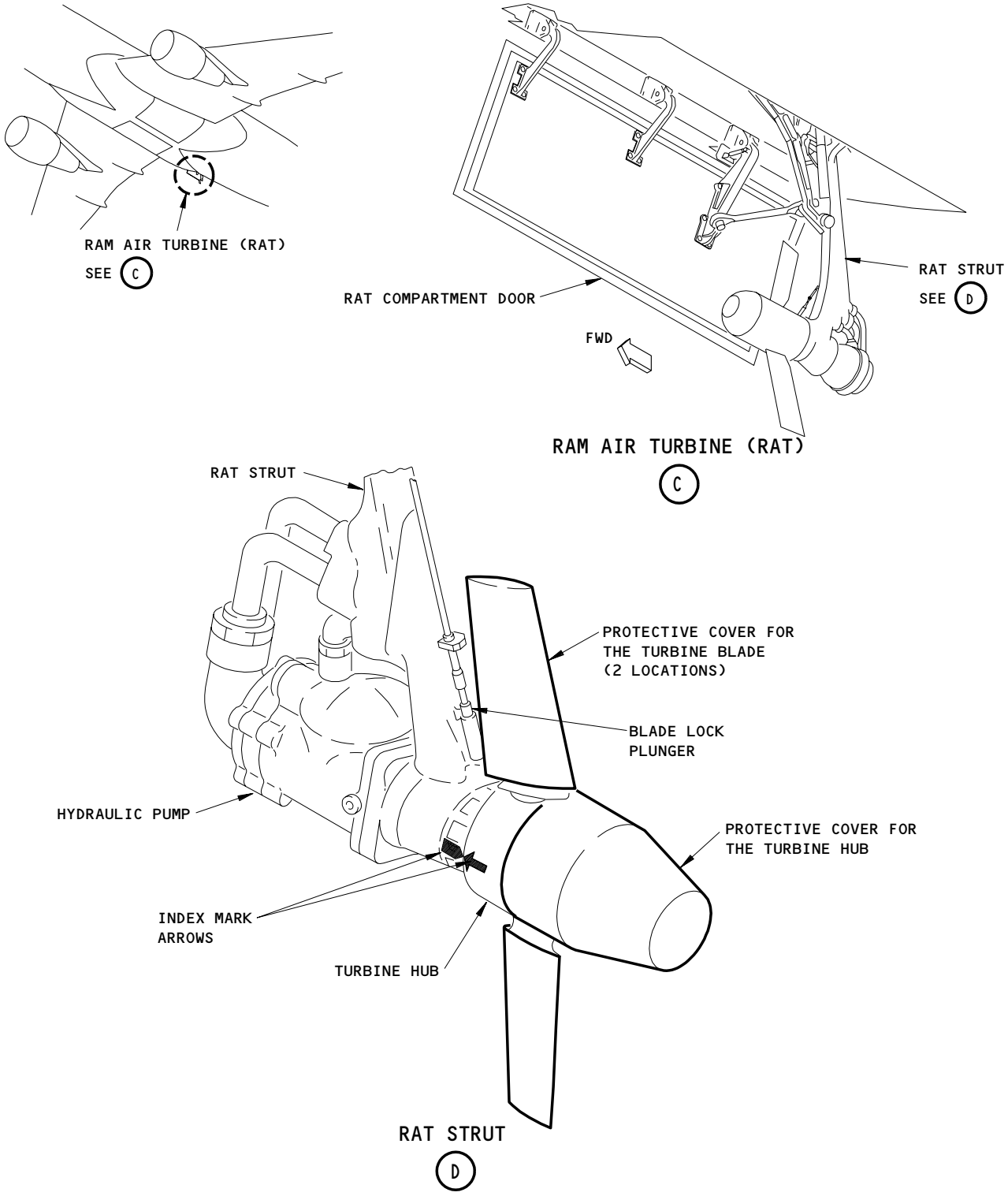
A



TACHOMETER MODULE

B

Ram Air Turbine (RAT) System
Figure 201 (Sheet 1)



Ram Air Turbine (RAT) System
Figure 201 (Sheet 2)

S 862-005
(4) When the RAT is fully extended, push the RAM AIR TURB switch to put it to the OFF position.

S 862-006
(5) Open these circuit breakers on the P6 panel and attach the lock set for the RAT circuit breakers:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 492-007
(6) Install the protective covers on the RAT turbine blades and hub.

TASK 29-21-00-862-008

3. Retract the Ram Air Turbine (RAT)

A. Equipment
(1) Ram Air Turbine Circuit Breaker Lockout clips (Commercially available)

B. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 29-21-00/501, Ram Air Turbine (RAT) System
(3) AMM 32-00-15/201, Landing Gear Door Locks

C. Access
(1) Location Zones

144	Main Landing Gear Wheel Well (Right)
198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin

(2) Access Panel

198GR	RAT Compartment

D. Retract the RAT (Fig. 201)

NOTE: Two persons are necessary to do the RAT retraction procedure. One person operates the RAT retraction switch. The other person monitors the RAT movement to make sure the RAT blades do not touch the airplane structure.

S 862-009
(1) Remove the lock set for the RAT circuit breakers and close these circuit breakers on the main power distribution panel, P6:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 492-010

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(2) Open the right wheel well door and install the door lock (AMM 32-00-15/201).

S 092-011

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.

(3) If it is installed, remove the RAT safety screen (AMM 29-21-00/501).

S 092-012

(4) Remove the protective covers from the RAT turbine blades and hub.

S 982-013

CAUTION: 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.

(5) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.

S 862-014

(6) Retract the RAT with the RAT retraction switch in increments of approximately 1/4 to 1/2 second.

NOTE: The RAM AIR TURB switch on the pilot's overhead panel, P5, must be in the OFF position before you can retract the RAT.

If the blade lock plunger does not engage the hub lock collar, the RAT will not retract more than approximately 16 degrees.

S 862-015

(7) Stop the RAT retraction when the RAT is approximately 15 degrees from the fully extended position.

S 212-016

(8) Make sure the blade lock plunger locks the turbine hub.

S 862-017

(9) Retract the RAT with the retraction switch until the RAT is fully retracted.

S 092-018

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.

(10) Close the door for the right wheel well and remove the door lock (AMM 32-00-15/201).

S 862-019

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

RAM AIR TURBINE (RAT) SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure has three tasks. The first task is a RAT hydraulic pump system test. The second task is a RAT deployment system test. The third task is a RAT down-limit switch and blade lock plunger test.

TASK 29-21-00-735-001

2. System Test - RAT Hydraulic Pump System
   A. Equipment
      (1) RAT Safety Screen - B29001-46
      (2) RAT Safety Screen Adapter - B29001-23
          (Necessary when lifting fixture - A71015 is used).
      (3) Lifting Fixture - Engine Accessory, A71015-87; or
          Lifting Fixture, Hein-Werner Model 74; or
          Lifting Fixture, Black Hawk Model 67554.
      (4) RAT Circuit Breaker Lock Set A27010-11 (or Commercially Available)
      (5) Stroboscopes (Optional)
          (a) Digital Stroboscope - Type 4913
              Bruel and Kjaer Instruments, Inc.,
              185 Forest Street
              Marlborough, Ma., 01752 (Recommended)

              Digital Stroboscope - Commercially Available
              (Alternative)
          (b) Electronic Stroboscope - Type 1531-AB
              Genrad, Inc.,
              EMT Electronic Test Mfg. Group
              300 Barker Ave., Concord Ma., 01742 (Recommended)

              Electronic Stroboscope - Commercially Available
              (Alternative)
          (c) Slip-Sync Stroboscope - Strobex Model 109
              Chadwick-Helmuth Co., Inc.,
              111 East Railroad Ave., Monrovia, Ca. 91016
              (Recommended)

              Slip-Sync Stroboscope - Commercially Available
              (Alternative)

(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 Tape - Scotch Flatback Masking Tape 250
(2) Masking Tape - local purchase

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, Landing Gear Door Locks
(4) AMM 32-00-20/201, Landing Gear Downlocks

D. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

E. Prepare for Test

S 865-023
(1) Supply electrical power (AMM 24-22-00/201)

S 865-024
(2) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 865-166
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-025

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

F. Do the RAT Hydraulic Pump System Test

S 865-026

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION OR EXTENSION. MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Push the RAM AIR TURB manual select switch on the pilot's overhead panel, P5, to extend the RAT.

S 865-002

(2) After the RAT is fully extended, push the RAM AIR TURB manual select switch to the OFF position.

S 865-027

(3) Open these circuit breakers on the P6 panel and insert the RAT circuit breaker lock set:
   (a) 6C1, RAM AIR TURB MAN
   (b) 6C2, RAM AIR TURB AUTO
   (c) 6J8, RAM AIR TURBINE PWR

S 985-158

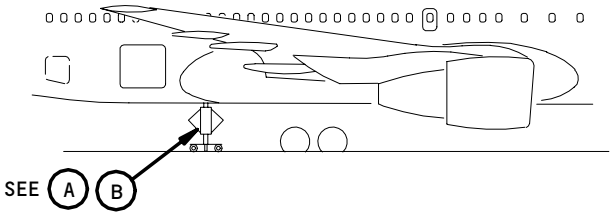
(4) Push forward on the RAT with your hand to make sure the RAT is locked in the extended position.

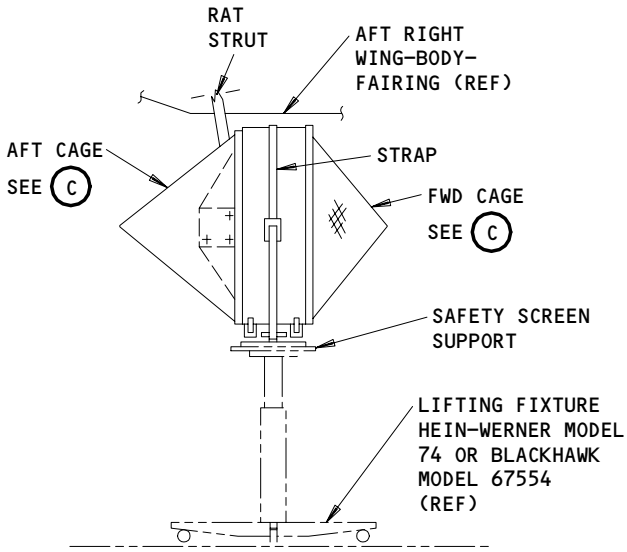
NOTE: To back-drive the RAT, the preferred method is to use the safety screen around the RAT blades. However, an optional, alternate method may be used in place place of the safety screen. This method uses rope to secure the area below the RAT compartment, by roping off with a 20-foot (6 meter) diameter area. This will keep personnel from entering area close to RAT blades.

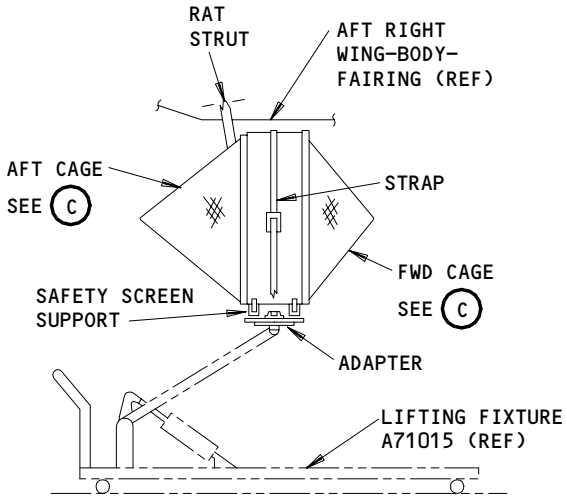
S 495-029

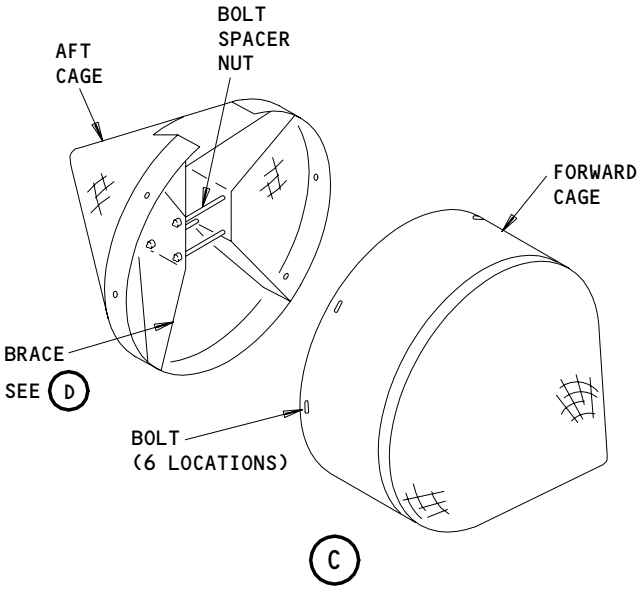
WARNING: BEFORE THE RAT IS BACK-DRIVEN, INSTALL THE SAFETY SCREEN (PREFERRED), OR PUT A 20-FOOT (6 METER) DIAMETER SECURED/ROPED-OFF AREA (ALTERNATE) BELOW THE RAT COMPARTMETN DOOR TO PREVENT PERSONNEL ENTRY. THE FAST MOVEMENT OF THE TURBINE BLADES CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) If your 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. 501):
   (a) If the lifting fixture A71015 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.







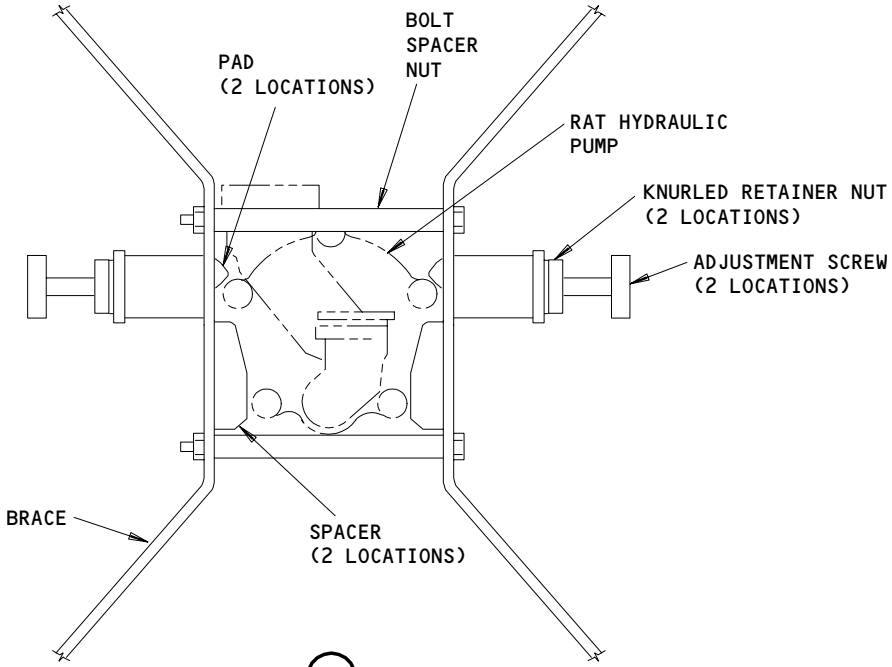


Ram Air Turbine Safety Screen
Figure 501 (Sheet 1)

(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.
(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.



Ram Air Turbine Safety Screen
Figure 501 (Sheet 2)

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.

(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 865-030

(6) Pressurize the center hydraulic system (AMM 29-11-00/201).

NOTE: Do not use the ACMP's to pressurize the center system. The ACMP's do not supply sufficient capacity to backdrive the RAT.

S 865-033

CAUTION: QUICKLY RELEASE THE GROUND-CHECKOUT-MODULE HANDLE IF THE TACHOMETER OVER-SPEED LIGHT COMES ON. IF THE SPEED BECOMES TOO HIGH, DAMAGE TO EQUIPMENT CAN OCCUR.

(7) Move the control handle on the RAT checkout module in the right wheel well to the back-drive position.

S 865-003

(8) Push and hold the lamp test switch on the RAT tachometer.

S 215-034

(9) Make sure the red and green lights on the RAT tachometer are both on.

S 865-004

(10) Release the lamp test switch on the RAT tachometer.

S 215-035

(11) 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 215-164

(12) If the RAT tachometer red 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 735-095

(13) 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) Put the strap around the safety screen and tighten the strap.
   (f) 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.

   (g) Move the forward cage away from the RAT with the lifting fixture.
   (h) 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.

   (i) Raise the forward cage to the correct height with the lifting fixture.
   (j) Carefully move the forward cage into position around the RAT so that the cage does not hit the turbine blades.
   (k) Install the bolts to connect the forward and aft cages of the safety screen.
   (l) Loosen the strap and remove it from around the safety screen.
   (m) Lower the lifting fixture and move the fixture away from the safety screen.
   (n) Pressurize the center hydraulic system (AMM 29-11-00/201).

      NOTE: Do not use the ACMP's to pressurize the center system. The ACMP's do not supply sufficient capacity to backdrive the RAT.

(o) Move the control handle on the RAT checkout module, in the right wheel well, to the back-drive position.
(p) Set the stroboscope to less than 1500 rpm.
(q) Monitor the speed of the RAT turbine blades while you increase the adjustment of the stroboscope from 1500 rpm to 9440 rpm.
(r) Make a record of the highest speed at which the strip of tape shows as one stable mark in the light of the stroboscope.
(s) Make sure this speed is between 3980 and 4720 rpm.

NOTE: If the governor in the RAT hub does not control the speed corectly, a speed in the range of 1500 to 7500 rpm can occur.

S 215-083

(14) Do these steps as quickly as possible to do an accurate check of the RAT pressure light:
(a) Release the control handle from the back-drive position.
(b) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).
(c) Make sure the RAT green pressure light on the P5 panel is on until the center system pressure decreases to 1200 +/-300 psi.

S 715-167

(15) 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 215-037

(16) If the RAT blades and hub continue to turn slowly when the handle is not in the back-drive position, do these steps:
(a) Keep the center hydraulic system without pressure for not less than 2 minutes to permit the pressure to bleed from the RAT.
(b) Do these steps:
1) Pressurize the center hydraulic system (AMM 29-11-00/201).
2) Make sure 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.
(c) Do the above steps until the RAT turbine blades and hub do not turn when the center hydraulic system is pressurized.
(d) Remove power from the center hydraulic system (AMM 29-11-00/201).

S 865-038

(17) Move the back-drive handle to the back-drive position and then release the handle.

S 215-005

(18) Make sure the spring puts the handle back in the usual position, quickly and smoothly, without binding or flutter.

S 435-088

(19) Safety the handle with wire.

S 215-039

(20) Make sure there is no leakage at the RAT swivel valves or hydraulic connections on the RAT and the checkout module.

S 225-006

(21) Make sure the RAT shaft seal leakage is no more than one drop in 30 minutes with the RAT not in operation.

S 095-041

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.

(22) 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 safety screen (Fig. 501):
   (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 GOVERNER 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 attach bolts.

S 865-165
(23) Remove RAT circuit breaker lock set and close these circuit breakers on the P6 panel:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 085-096
(24) If you installed tape on the hub or blade of the RAT turbine, remove the tape.

S 985-097
(25) 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 985-007

(26) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.

NOTE: Two persons are necessary to do the RAT retraction procedure. One person operates the RAT retraction switch. The other person monitors the RAT movement to make sure the RAT blades do not touch the airplane structure.

S 865-042

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION. MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(27) Retract the RAT with the RAT retraction switch in increments of approximately 1/4 to 1/2 second.

NOTE: The RAM AIR TURB switch on the P5 panel must be in the OFF position before the RAT can be retracted.

If the blade-lock plunger does not engage the hub-lock collar, the RAT will not retract more than approximately 16 degrees.

S 865-008

(28) Stop the RAT retraction when the RAT is approximately 15 degrees from the fully extended position.

S 215-010

(29) Make sure the blade-lock plunger has locked the turbine hub.

S 865-009

(30) Retract the RAT with the retraction switch until the RAT is fully retracted.

S 215-044

(31) Make sure the RAT unlocked light on the P5 panel is off.

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.

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

S 865-047
(33) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 29-21-00-735-048

3. System Test-RAT Deployment System

A. Equipment
(1) Protractor, commercially available

(2) Proximity Sensor Actuator/Deactuator Set - A27092-84 (2 rectangular sensor actuators are necessary)

B. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(3) AMM 29-21-17/201, Ram Air Turbine (RAT) Proximity Switches
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks
(6) AMM 32-09-02/201, Air/Ground Relays
(7) AMM 34-11-00/201, Pitot-Static System

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

D. Prepare for Test

S 865-049
(1) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 865-050
(2) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11U23 or 11U24, LANDING GEAR POSITION AIR/GND SYS 2

NOTE: When more than one grid location is provided, you must find the named circuit breaker at one of these locations.

S 865-051
(3) Supply electrical power (AMM 24-22-00/201).

S 495-098
(4) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 095-052

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 215-065

(6) Make sure the engines are not in operation.

E. Do the RAT Deployment System Test

S 485-066

CAUTION: MAKE SURE THAT THE PITOT LINE PRESSURE IS EQUIVALENT OR MORE THAN THE STATIC LINE PRESSURE. KEEP THE PITOT PRESSURE CHANGE BELOW 300 KNOTS FOR EACH MINUTE. MAKE SURE THAT DIFFERENTIAL PRESSURE STAYS BETWEEN 0 AND 10.19 INCHES OF MERCURY. YOU CAN CAUSE DAMAGE TO THE PITOT-STATIC SYSTEM.

(1) Connect the pitot test set to the right auxiliary pitot probe (AMM 34-11-00/201).

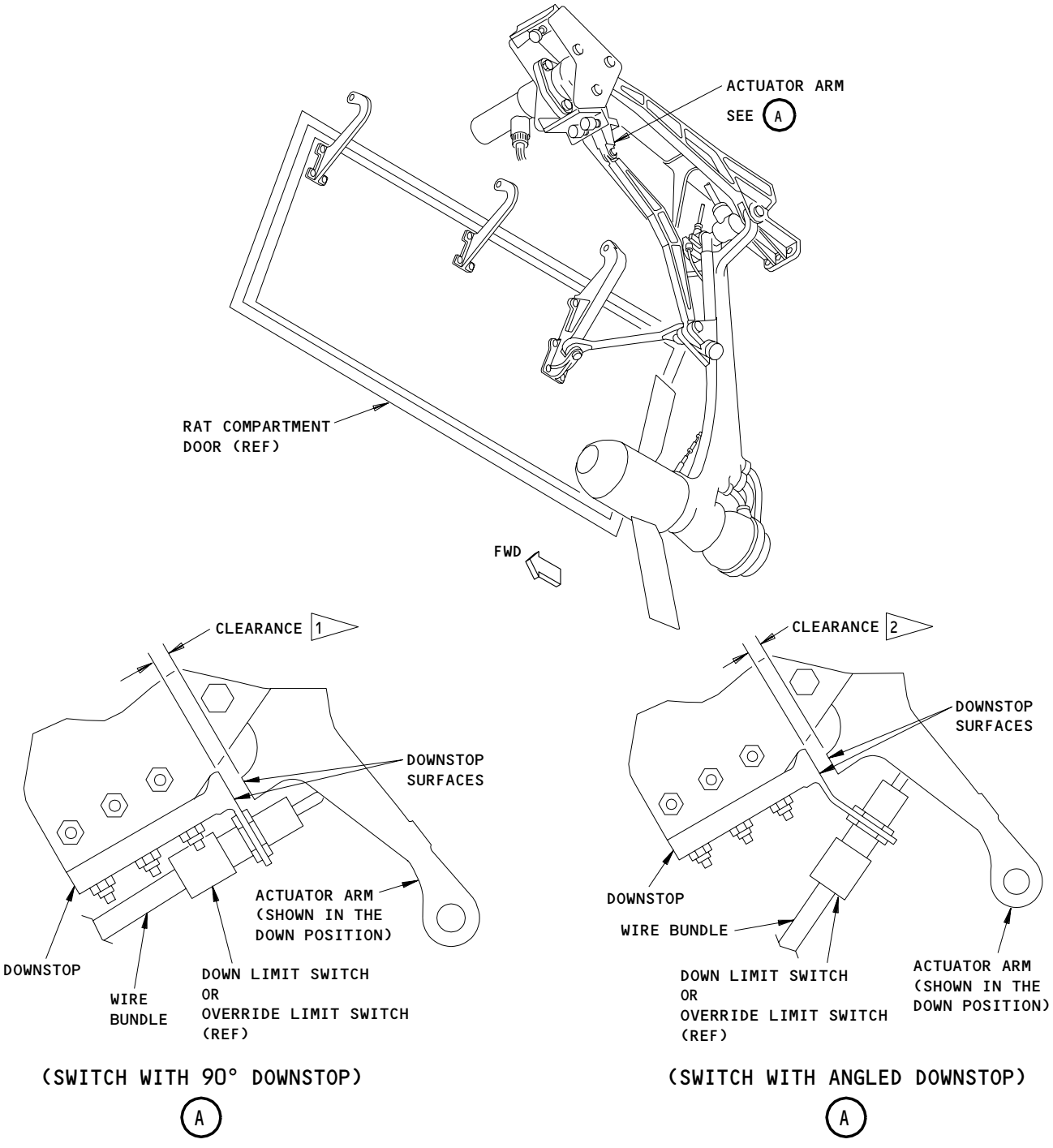
S 865-013

(2) Adjust the pitot test set to a pressure equivalent to 50 ±10 knots (AMM 34-11-00/201).

S 045-085

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

(3) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.



1 FOR SWITCH P/N 1EN61-6, CLEARANCE IS 0.06-0.20 INCH.
FOR SWITCH P/N 1EN575-6 WITH 90 DEGREE DOWNSTOP, CLEARANCE IS 0.15-0.25 INCH.

2 FOR SWITCH P/N 1EN575-6 WITH ANGLED DOWNSTOP, CLEARANCE IS 0.06-0.50 INCH.

RAT Actuator Arm Downstop Clearance
Figure 502

S 865-086

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF THE PROCEDURE IS NOT DONE CORRECTLY, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do the Flight Mode Simulation procedure for the No. 2 air/ground system. Use the technique which puts actuators on the main gear tilt sensors and the nose gear not-compressed sensors (AMM 32-09-02/201).

S 865-177

(5) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 215-067

(6) Make sure that the RAT does not extend.

S 865-068

(7) Remove the proximity switch actuators from these landing gear sensors:
(a) S267, Left Main Gear Tilt Sensor
(b) S268, Right Main Gear Tilt Sensor

S 865-069

(8) Adjust the pitot test set to a pressure equivalent to an airspeed of 100 ±10 knots (AMM 34-11-00/201).

S 865-070

(9) Put the proximity switch actuator on this landing gear sensor:
(a) S267, Left Main Gear Tilt Sensor

S 215-089

(10) Make sure the RAT extends in less than two seconds.

S 865-090

(11) Remove the proximity switch actuator from this landing gear sensor:
(a) S267, Left Main Gear Tilt Sensor

S 985-091

(12) Manually turn the turbine hub to align the index mark arrow on the hub with the index mark arrow on the strut.

S 865-092

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION. THE MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Retract the RAT with the RAT retraction switch in increments of approximately 1/4 to 1/2 second.

NOTE: The RAM AIR TURB switch on the P5 panel must be in the OFF position before the RAT can be retracted.

If the blade-lock plunger does not engage the hub-lock collar, the RAT will not retract more than approximately 16 degrees.

S 865-179

(14) Stop the RAT retraction when the RAT is approximately 15 degrees from the fully extended position.

S 215-180

(15) Make sure the blade-lock plunger has locked the turbine hub.

S 865-181

(16) Retract the RAT with the retraction switch until the RAT is fully retracted.

S 865-093

(17) Put the proximity switch actuator on this landing gear sensor:
(a) S268, Right Main Gear Tilt Sensor

S 215-094

(18) Make sure the RAT extends in less than two seconds.

S 225-071

(19) Make sure the clearance between the RAT actuator arm and the downstop is as shown in Fig. 502.

S 825-156

(20) If the clearance is not correct, adjust the RAT downlimit switch (AMM 29-21-17/201).

S 085-073

(21) Disconnect the pitot test set (AMM 34-11-00/201).

S 865-074

(22) Put the airplane back to the ground mode (AMM 32-09-02/201).

S 865-087
(23) Do the activation procedure for the spoilers if you did the deactivation procedure (AMM 27-61-00/201).

S 825-168
(24) Manually move the turbine hub to align the index mark arrow on the hub with the index mark arrow on the strut.

S 865-020
(25) Retract the RAT with the RAT retraction switch in increments of approximately 1/4 to 1/2 second.

NOTE: The RAM AIR TURB switch on the P5 panel must be in the OFF position before the RAT can be retracted.

If the blade-lock plunger does not engage the hub-lock collar, the RAT will not retract more than approximately 16 degrees.

S 865-019
(26) Stop the RAT retraction when the RAT is approximately 15 degrees from the fully extended position.

S 215-021
(27) Make sure the blade-lock plunger has locked the turbine hub.

S 865-022
(28) Retract the RAT with the retraction switch until the RAT is fully retracted.

S 215-079
(29) Make sure the RAT UNLOCKED light on the P5 panel is off.

S 415-080

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.

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

S 865-081
(31) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 29-21-00-735-099

4. System Test - RAT Down-Limit Switch and Blade Lock Plunger

A. Equipment

(1) Protractor, commercially available

B. References
(1) AMM 24-22-00/201, Electrical Power
(2) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(3) AMM 29-21-17/201, Ram Air Turbine (RAT) Proximity Switches
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-00-20/201, Landing Gear Downlocks

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

D. Prepare for Test

S 865-100
(1) Make sure these circuit breakers on the main power distribution panel, P6, are closed:
(a) 6C1, RAM AIR TURB MAN
(b) 6C2, RAM AIR TURB AUTO
(c) 6J8, RAM AIR TURBINE PWR

S 865-102
(2) Supply electrical power (AMM 24-22-00/201).

S 495-155
(3) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 495-103

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

E. Do the Test of the RAT Down-Limit Switch and the Blade Lock Plunger

S 865-104

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION OR EXTENSION. MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) Push the RAM AIR TURB switch on the pilot's overhead panel, P5, to extend the RAT.

S 865-105
(2) When the RAT is fully extended, press the RAM AIR TURB switch to the OFF position.

S 215-106
(3) Make sure the RAT UNLOCKED light on the P5 panel comes on.

S 225-107
(4) Make sure the clearance between the RAT actuator arm and the downstop is as shown in Fig. 502.

S 825-157
(5) If the clearance is not correct, adjust the override limit switch for the RAT (AMM 29-21-17/201).

S 215-109
(6) Make sure the RAT UNLOCKED message is shown.

S 225-110
(7) Do these steps for the blade lock plunger test:
(a) Make sure the RAT turbine hub can be turned manually.
(b) Manually turn the turbine hub to align the index mark on the hub with the index mark on the strut.

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION. MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(c) Hold the RAT retraction switch in the RETRACT position and release the switch when the RAT has retracted approximately 16 ± 3 degrees.
(d) Try to manually turn the turbine hub to make sure that the blade-lock plunger has locked the turbine hub.
(e) Pull inboard on the lower blade end with a hand force of 10 to 20 pounds and extend the RAT with the RAM AIR TURB switch.
(f) Make sure the turbine hub is free to turn when the RAT is approximately 9 +4/-1 degrees from the fully extended position.
(g) Push the RAM AIR TURB switch to the OFF position.
(h) Manually turn the hub 180 degrees and do the blade-lock plunger test again.

S 865-111
(8) Push the RAM AIR TURB switch to the OFF position.

S 985-139
(9) Manually turn the turbine hub until the index mark on the hub is 0.09 ±0.03 inch from the index mark on the strut.

NOTE: In this position, the plunger will not engage and the RAT-centered limit-switch will not close. The turbine blades will hit the structure if the limit switch does not stop the RAT retraction.

S 865-140

CAUTION: MAKE SURE THAT THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE RAT RETRACTION. MOVEMENT OF THE RAT AND DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(10) Hold the RAT retraction switch in the RETRACT position.

S 225-142

(11) Make sure the RAT retraction stops at 14 to 17 degrees from the extended position.

S 215-143

(12) Release the RAT retraction switch and make sure the spring puts the switch back to the off position.

S 865-144

(13) Push the RAM AIR TURB switch on the P5 panel to fully extend the RAT.

S 865-145

(14) Push the RAM AIR TURB switch to the OFF position.

S 985-147

(15) Manually move the turbine hub to align the index mark on the hub with the index mark on the strut.

S 865-148

(16) Retract the RAT with the RAT retraction switch in increments of approximately 1/4 to 1/2 second.

NOTE: The RAM AIR TURB switch on the P5 panel must be in the OFF position before the RAT can be retracted.

If the blade-lock plunger does not engage the hub-lock collar, the RAT will not retract more than approximately 16 degrees.

S 865-149
(17) Stop the RAT retraction when the RAT is approximately 15 degrees from the fully extended position.

S 215-150
(18) Make sure the blade-lock plunger has locked the turbine hub.

S 865-151
(19) Retract the RAT with the retraction switch until the RAT is fully retracted.

S 215-152
(20) Make sure the RAT UNLOCKED light on the P5 panel is off.

S 215-116
(21) Make sure the RAT UNLOCKED message is not shown.

S 215-117
(22) Make sure the RAT compartment door is fully closed.

S 415-153

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.

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

S 865-154
(24) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

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 and Components
   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.

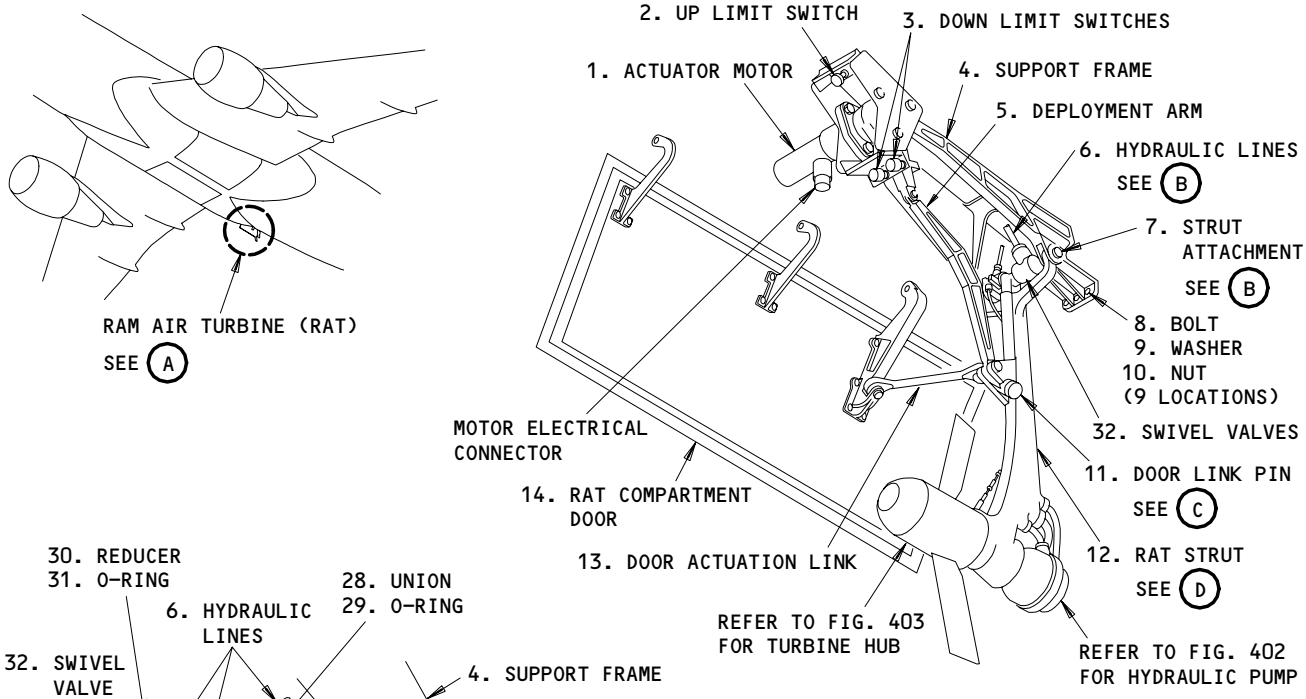
          To start one of these procedures, do the "Prepare for the Removal" group of steps. Then, do the group of steps that is necessary to remove the component.

   B. Equipment
      (1) Wrench (Optional):
          (a) Wrench - WAS-33662
              Sundstrand Corp.
              4747 Harrison Ave.
              Rockford, Illinois
          (b) Wrench, 7/16-inch Thin-wall Socket - Commercially Available
   C. Consumable Materials
      (1) B00518 Acetone, O-A-51
   D. 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 29-21-00/201, Ram Air Turbine (RAT) System
      (4) AMM 32-00-15/201, Main Gear Door Locks
      (5) AMM 53-66-01/401, Aft Wing/Body Fairing
   E. Access
      (1) Location Zones

198	Wing to Body - Aft Lower Half (Right)
211/212	Control Cabin

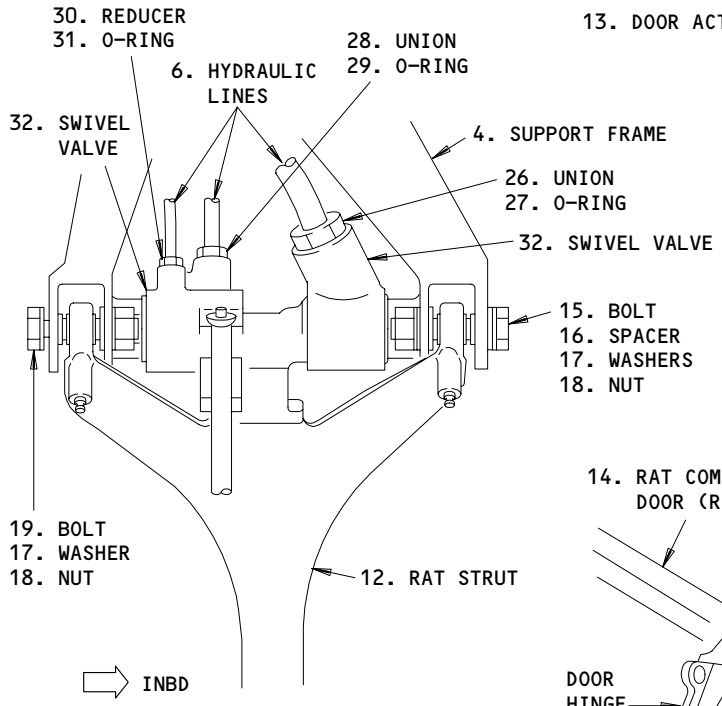
      (2) Access Panel

198GR	RAT Compartment



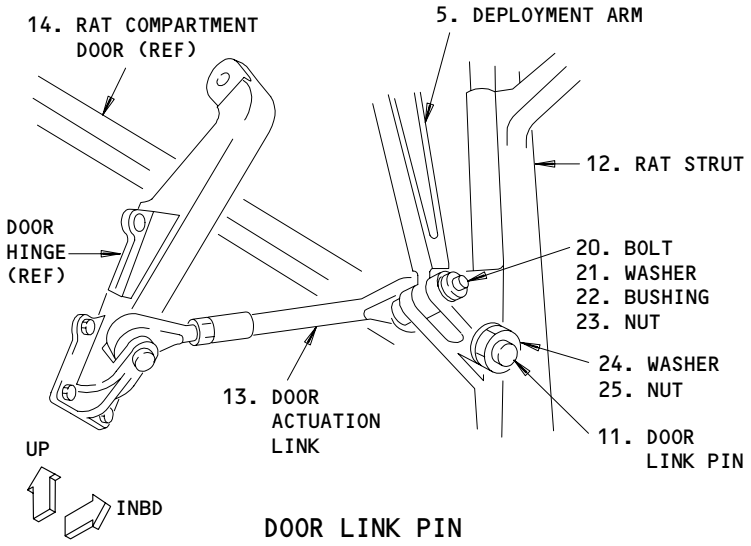
RAM AIR TURBINE (RAT)

A



HYDRAULIC LINES AND STRUT ATTACHMENT

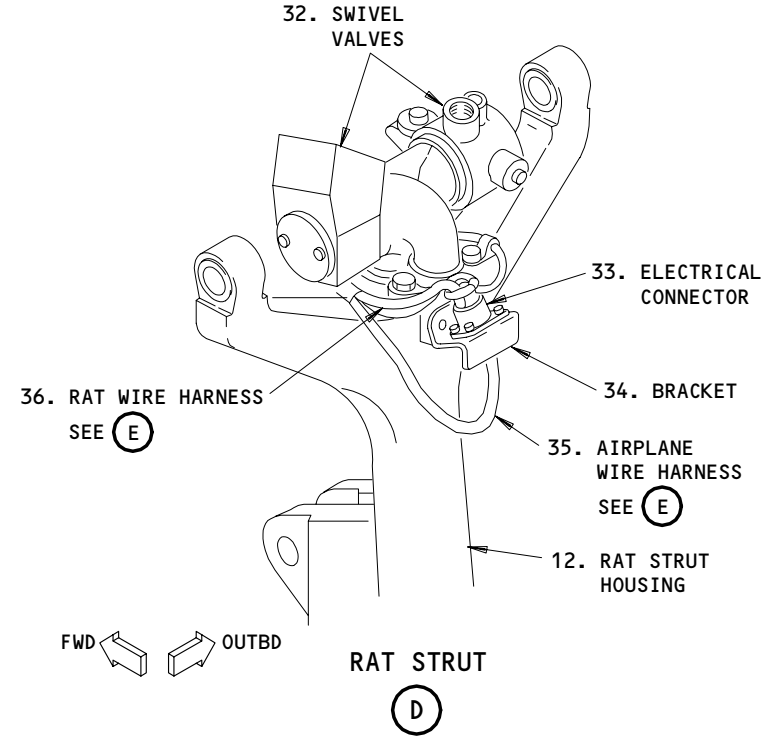
B



DOOR LINK PIN

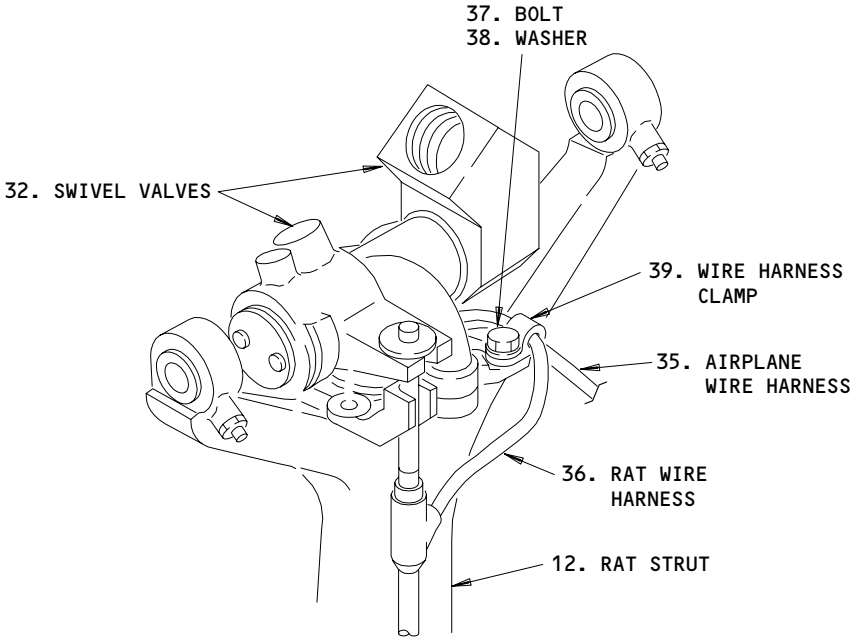
C

Ram Air Turbine (RAT) Installation
Figure 401 (Sheet 1)



RAT STRUT

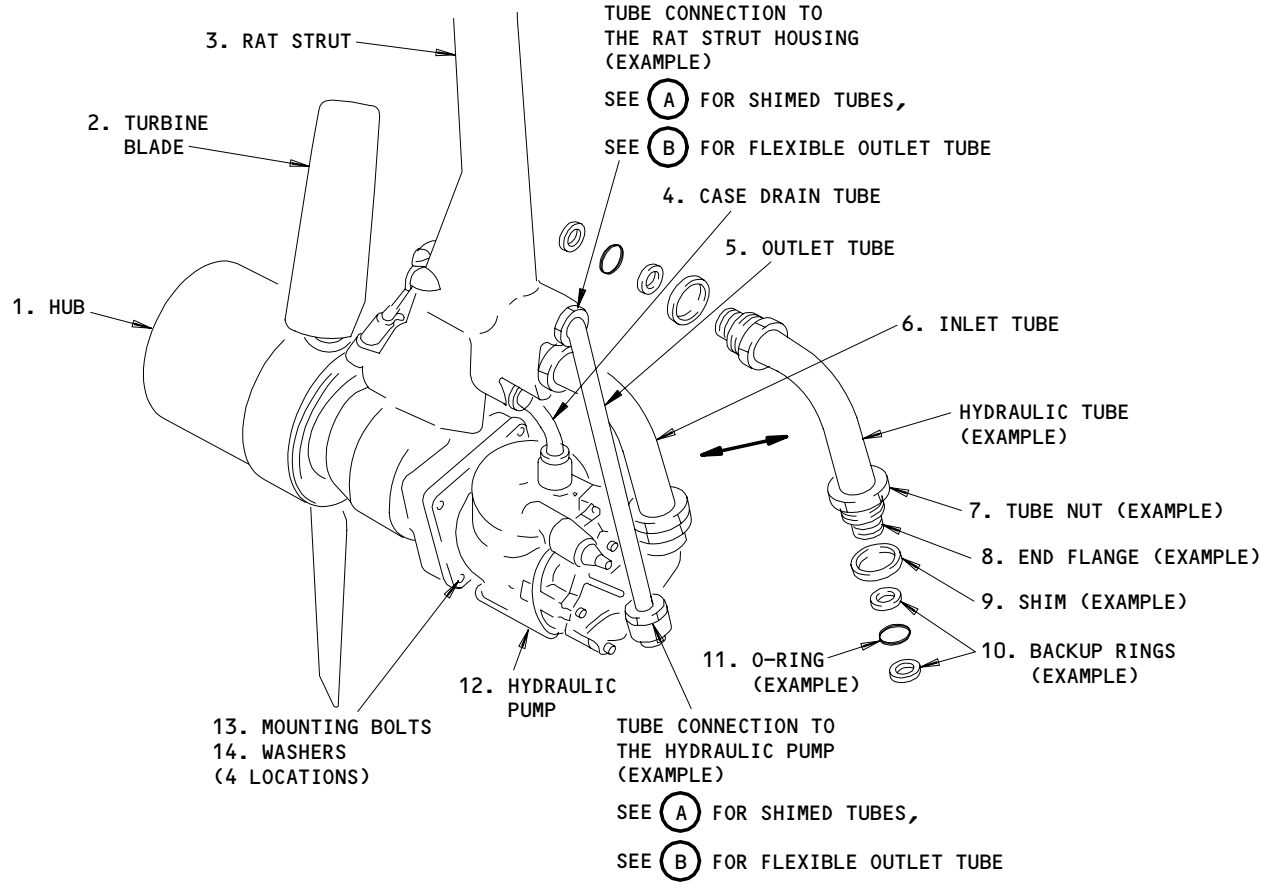
D

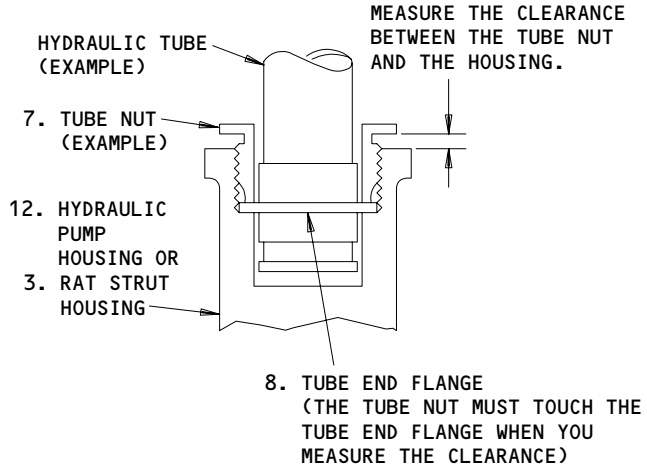


AIRPLANE WIRE HARNESS

E

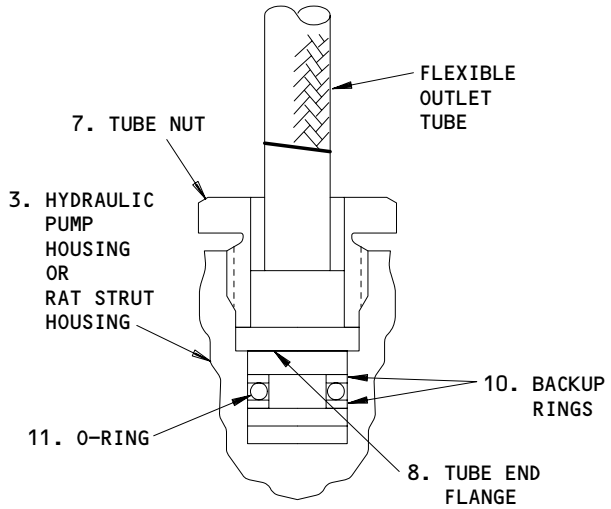
Ram Air Turbine (RAT) Installation
Figure 401 (Sheet 2)





TUBE CONNECTION (EXAMPLE)

(A) 1



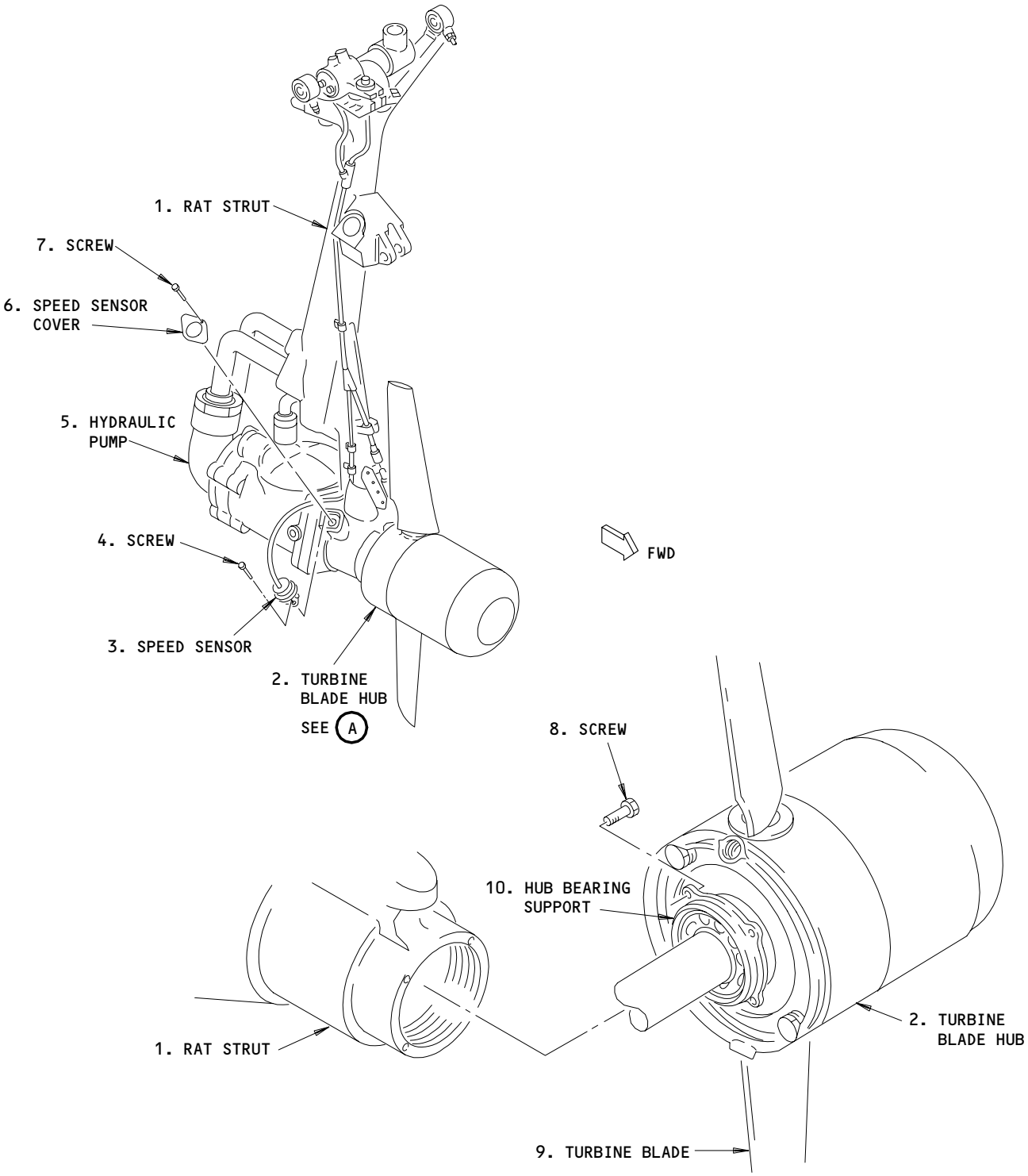
FLEXIBLE OUTLET TUBE CONNECTION (EXAMPLE)

(B) 2

1 THE O-RINGS, BACK-UP RINGS, AND SHIMS ARE NOT SHOWN

2 AIRPLANES WITH SB 29A77

Hydraulic Pump Installation
Figure 402



TURBINE BLADE HUB

A

RAT Hub Installation
Figure 403

F. Prepare for the Removal

S 014-002
(1) Open the right wheel well door.

S 494-003

WARNING: REFER TO (AMM 32-00-15) FOR THE LOCK INSTALLATION PROCEDURE. FAST MOVEMENT OF THE DOORS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE LOCKS ARE NOT INSTALLED CORRECTLY.

(2) Install the door lock (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 AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 864-005
(4) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

S 864-006
(5) If you will remove the RAT assembly or hydraulic pump, do the steps that follow:
(a) Open the drain valve on the center system reservoir.
(b) Drain the hydraulic fluid into a container.
(c) After you drain the fluid, close the drain valve.
(d) Put a lockwire on the drain valve.

S 864-007
(6) Extend the RAT (AMM 29-21-00/201).

G. Remove the RAT Assembly (Fig. 401)

S 014-008
(1) Remove the access panels for the wing/body fairing, 198JR and 196RR (AMM 06-41-00/201) for access to the bolts for the support frame (AMM 53-66-01/401).

NOTE: The access panels are aft and above the RAT compartment door.

S 034-009
(2) Disconnect the electrical connector on the top of the RAT strut on the aft side.

S 034-010
(3) Put a cap on the electrical connector.

S 034-011
(4) AIRPLANES WITHOUT A FLIP-OPEN TYPE CLAMP ON THE WIRE HARNESS;
Do the steps that follow:
(a) Remove the bolt (37).
(b) Remove the airplane wire harness (35) from the clamp (39).

S 034-012
(5) AIRPLANES WITH A FLIP-OPEN TYPE CLAMP ON THE WIRE HARNESS;
Do the steps that follow:
(a) Open the wire clamp (39).
(b) Remove the wire harness (35) from the wire clamp (39).

S 034-013
(6) Remove the clamps that hold the hydraulic lines and wire bundles to the support frame.

S 034-014
(7) Disconnect the three hydraulic lines (6) at the swivel valves on the top of the RAT strut (12).

S 034-015
(8) Install caps on the hydraulic lines.

S 034-016
(9) Remove the nut (25) that attaches the door link assembly (13) to the RAT strut (12).

S 034-017
(10) Remove the door link pin (11) from the RAT strut (12).

S 034-018
(11) Remove the bolt (20) that attaches the deployment arm (5) to the RAT strut (12).

S 034-019

CAUTION: DO NOT HOLD THE RAT BY ITS TURBINE BLADES OR NOSE CONE. DO NOT PUT THE RAT DOWN ON ITS TURBINE BLADES OR NOSE CONE. THE WEIGHT OF THE RAT CAN CAUSE DAMAGE TO THE TURBINE BLADES, NOSE CONE, OR GOVERNOR MECHANISM.

(12) Hold the RAT strut (12) and the RAT support frame (4).

NOTE: The RAT weighs approximately 70 pounds.

S 034-020
(13) Remove the bolts (8), but do not remove the bolt at the top inboard location.

S 034-021
(14) Loosen the bolt (8) at the top inboard location sufficiently to permit the support frame to turn around the bolt.

S 034-022
(15) Remove the bolt (15) and spacer (16).

S 034-023
(16) Turn the RAT strut (12) and support frame (4) inboard, around the top inboard bolt (8).

NOTE: This will give clearance for the removal of the bolt (19).

S 034-024
(17) Remove the bolt (19).

S 024-025
(18) Remove the RAT strut (12) from the support frame (4).

H. Remove the Hydraulic Pump (Fig. 402)

S 024-100
(1) Loosen the tube nuts (7) at the top of the three hydraulic tubes (4, 5, 6) until the tube nuts (7) disengage from the RAT strut housing (3).

NOTE: On airplanes with a flexible outlet tube (5) there will be no shims on the flexible outlet tube (5).

S 934-090
(2) Make a mark on the top of the three hydraulic tubes (4, 5, 6) with a felt-tip marker to make the installation easier.

S 024-102
(3) Loosen the tube nuts (7) at the bottom of the three hydraulic tubes (4, 5, 6) until the tube nuts (7) disengage from the RAT strut housing (3).

NOTE: Do not remove the three hydraulic tubes (4, 5 ,6) from the hydraulic pump. On airplanes with a flexible outlet tube (5) there will be no shims on the flexible outlet tube (5).

S 034-092

(4) Remove the bolts (13) and washers (14) (4 locations) that hold the hydraulic pump to the RAT strut housing (3).

S 024-093

CAUTION: PULL ON THE HYDRAULIC PUMP TO REMOVE IT. DO NOT USE TOO MUCH FORCE IF YOU PULL ON THE HYDRAULIC TUBES (4, 5, 6). THIS CAN CAUSE DAMAGE TO THE HYDRAULIC TUBES (4, 5, 6) OR THE SHIMS (9).

(5) Remove the hydraulic pump (12) with the hydraulic tubes (4, 5, 6) attached to it.
   (a) Pull on the hydraulic pump (12) to remove it from the RAT strut housing (3).
   (b) If it is necessary, pull lightly on the hydraulic tube (6) which has the largest diameter.
   (c) If it is necessary, lightly shake the hydraulic tube (6) to release the O-ring (11).

S 034-094

(6) Remove the hydraulic tubes (4, 5, 6) from the hydraulic pump (12).

S 024-104

(7) Remove the backup rings (10), o-rings (11) and shims (9) from the hydraulic tubes.

NOTE: On airplanes with a flexible outlet tube (5) there will be no shims on the flexible outlet tube (5).

S 144-096

CAUTION: KEEP THE OLD SEALANT OUT OF THE RAT STRUT HOUSING (3), THE HYDRAULIC PUMP (12), AND THE TUBES (4, 5, 6). THE SEALANT CAN CAUSE THESE COMPONENTS TO BECOME CLOGGED.

(8) Remove the sealant from the RAT strut housing (3), the RAT hydraulic pump (12), and the tube nuts (7) with a plastic or wood scraper.

S 114-097

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. 403)

S 034-032

(1) Remove the screws (7) and the speed sensor cover (6) from the RAT strut (1).

S 034-033

(2) Remove the screws (4) and the speed sensor (3) from the RAT strut (1) housing.

S 034-034

CAUTION: DO NOT LIFT THE HUB BY THE TURBINE BLADES OR NOSE CONE. DO NOT PUT THE HUB DOWN ON THE TURBINE BLADES. THE WEIGHT OF THE HUB CAN CAUSE DAMAGE TO THE TURBINE BLADES, NOSE CONE, OR GOVERNOR MECHANISM.

(3) Use a WAS-33662 or a thin-wall socket wrench to remove the screws (8) that hold the hub bearing support to the strut housing.

S 024-035

(4) Move the hub (2) forward and remove it from the RAT strut (1) housing.

TASK 29-21-01-424-036

3. Install the Ram Air Turbine (RAT) Assembly and Components

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.
4747 Harrison Ave.
Rockford, Illinois

(b) Wrench, 7/16-inch Thin-wall Socket - Commercially Available

C. 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
(4) A50083 Adhesive - Dow Corning 732 MIL-A-46106
(5) D00054 Fluid - Hydraulic Assembly Lubricant, Monsanto MCS 352B

D. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	4	Frame - Support	29-21-06	01	83
	5	Arm - Deployment			420
	8	Bolt			10
	9	Washer			15
	10	Nut			20
	11	Pin - Door Link			240
	12	Turbine Assembly - Ram Air			86
	13	Link - Door Actuation			205
	15	Bolt			49
	16	Spacer			70
	17	Washers			56
	17	Washers			61
	18	Nut			81
	19	Bolt			51
	20	Bolt			390
	21	Washer			395
	21	Washer			400
	21	Washer			405
	22	Bushing			415
	23	Nut			410
	24	Washer			203
	25	Nut			202
	37	Bolt			176
	38	Washer			176A
402	4	Tube	29-21-06	01	145
	5	Tube			125
	6	Tube			105
	9	Shim			120
	9	Shim			140
	9	Shim			160
	10	Retainer - Backup			110
	10	Retainer - Backup			130
	10	Retainer - Backup			150
	11	O-ring			115
	11	O-ring			135
	11	O-ring			155
	12	Pump			90
	13	Bolt			95
	14	Washer			100
403	2	Hub	29-21-06	01	190
	4	Screw			180
	6	Cover			165
	7	Screw			170
	8	Screw			195

E. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 12-12-01/301, Hydraulic Systems
(3) AMM 12-21-30/301, Ram Air Turbine (RAT)
(4) AMM 12-25-01/301, Exterior Cleaning
(5) AMM 24-22-00/201, Electrical Power
(6) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(7) AMM 29-21-00/201, Ram Air Turbine (RAT) System
(8) AMM 29-21-00/501, Ram Air Turbine (RAT) System
(9) AMM 29-21-09/401, Ram Air Turbine (RAT) Compartment Door and Moveable Depressor
(10) AMM 29-21-15/501, Ram Air Turbine (RAT) Tachometer Speed Sensor

F. Access
(1) Location Zones
198 Wing to Body - Aft Lower Half (Right)
211/212 Control Cabin

(2) Access Panel
198GR RAT Compartment

G. Install the RAT Assembly (Fig. 401)

S 434-037

CAUTION: DO NOT HOLD THE RAT BY ITS TURBINE BLADES OR NOSE CONE. DO NOT PUT THE RAT DOWN ON ITS TURBINE BLADES OR NOSE CONE. THE WEIGHT OF THE RAT CAN CAUSE DAMAGE TO THE TURBINE BLADES, NOSE CONE, OR THE GOVERNOR MECHANISM.

(1) Hold the RAT strut (12) in the support frame (4).

S 434-038
(2) Engage the pin on the outboard swivel valve with the support frame (4).

S 434-039
(3) Hold the inboard swivel valve in its position to connect the hydraulic lines.

S 644-040
(4) Apply a layer of grease to the spacer (16) and bolt (15).

S 434-041
(5) Install the bolt (15), spacer (16), washer (17), and nut (18) on the inboard side of the RAT strut (12).

S 434-042
(6) Turn the RAT strut (12) and support frame (4) inboard, around the top inboard bolt (8).

NOTE: This will give clearance for the installation of the bolt (19).

S 644-043
(7) Apply a layer of grease on the bolt (19).

S 434-044
(8) Install the bolt (19), washer (17), and nut (18) on the outboard side of the RAT strut (12).

S 434-045
(9) Turn the RAT strut (12) and support frame (4) outboard to its correct installation position.

S 434-046
(10) Install the bolts (8), washers (9), and nuts (10) to attach the RAT strut (12) to the support frame (4).

S 624-047
(11) Put a fillet of BMS 5-95 sealant around each end of the bolts (8) and around the joint between the bulkhead and the support frame.

S 434-048
(12) Tighten the bolt (15) to 400-500 pound-inches.

S 434-049
(13) Tighten the bolt (19) to 400-500 pound-inches.

S 624-050
(14) Apply a layer of grease to the bolt (20).

S 434-051
(15) Install bolt (20), nut (23), bushing (22), and washer (21), to connect the deployment arm (5) to the RAT strut (12).

S 434-052
(16) Tighten the bolt (20) to 500-575 pound-inches.

S 644-053
(17) Apply a layer of grease on the door link pin (11).

S 434-054
(18) Put the door link pin (11) through the RAT strut (12).

S 434-055
(19) Install the washer (24) and nut (25) on the door link pin (11).

S 434-056
(20) Tighten the nut (25) to 2000-2400 pound-inches.

S 644-057
(21) Apply a layer of hydraulic lubricant or hydraulic fluid to the new O-rings (27, 29, 31) and the threads on the hydraulic line fittings.

S 434-058
(22) Install the O-rings (27, 29, 31) on the hydraulic line fittings (26, 28, 30).

S 434-059
(23) Connect the three hydraulic lines (6) to the strut swivel valves (32).

S 164-060
(24) Clean all hydraulic fluid from the installation area (AMM 12-25-01).

S 434-061
(25) Install the electrical connector for the airplane wire harness (35) to the electrical connector (33) on the top of the RAT strut (12) on the aft side.

S 434-062
(26) AIRPLANES WITHOUT FLIP-OPEN TYPE CLAMPS ON THE WIRE HARNESS;
Do the steps that follow:
(a) Put the airplane wire harness (35) and the RAT wire harness (36) in the wire harness clamp (39).
(b) Install the bolt (37) and washer (38) to hold the wire harness clamp (39) to the RAT strut (12).
(c) Tighten the bolt (37) to 51-56 pound-inches.

S 434-063
(27) AIRPLANES WITH FLIP-OPEN TYPE CLAMPS ON THE WIRE HARNESS;
Do the steps that follow:
(a) Put the airplane wire harness (35) and the RAT wire harness (36) in the wire harness clamp (39).
(b) Close the wire harness clamp (39).

S 434-064
(28) Install the clamps to hold the hydraulic lines and wire bundles to the support frame.

S 414-065
(29) Install the access panels for the wing/body fairing, 198JR and 196RR (AMM 06-41-00/201).

S 644-066
(30) Lubricate the RAT (AMM 12-21-30/301).

S 824-067
(31) Adjust the RAT compartment door (AMM 29-21-09/401).

H. Install the Hydraulic Pump (Fig. 402)

S 424-106
(1) Do the steps that follow to find the thickness of the shims (9) for each of the hydraulic tubes (4, 5, 6):

NOTE: Some airplanes have incorporated SB29A77 which replaces the hydraulic tube (5) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (5), 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 (4, 5, 6):
1) Install the hydraulic tubes (4, 5, 6) in the RAT strut housing (3).
2) Tighten the tube nut (7), on each hydraulic tube (4, 5, 6), by hand until it touches the end flange (8).
3) Measure the clearance, on each hydraulic tube (4, 5, 6), between the surface of the RAT strut housing (3) and the inner face of the tube nut (7).
4) For each hydraulic tube (4, 5, 6), 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 (4, 5, 6) from the RAT strut housing (3).

(b) Do the steps that follow to measure dimension B on each of the hydraulic tubes (4, 5, 6):

NOTE: Some airplanes have incorporated SB29A77 which replaces the hydraulic tube (5) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (5), 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 (4, 5, 6) in the hydraulic pump housing (12).
2) Tighten the tube nut (7), on each hydraulic tube (4, 5, 6), by hand until it touches the end flange (8).

3) Measure the clearance, on each hydraulic tube (4, 5, 6), between the surface of the hydraulic pump housing (12) and the inner face of the tube nut (7).
4) For each hydraulic tube (4, 5, 6), write this clearance as dimension B in Table II.

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 (7) on each hydraulic tube (4, 5, 6).

NOTE: Do not remove the tube nuts (7) from the hydraulic pump housing (3).

(d) Do the steps that follow to measure dimensions C and D on each hydraulic tube (4, 5, 6).
1) Put the hydraulic pump (12) in its position on the RAT strut housing (3) and engage the hydraulic tubes (4, 5, 6) with the RAT strut housing (3).
2) Make sure the hydraulic pump (12) is flat against the RAT strut housing (3).
3) Make sure all the tube nuts (7) on all the hydraulic tubes (4, 5, 6) are loose.

4) Install the four bolts (13) to hold the hydraulic pump (12) on the RAT strut housing (3).
5) Tighten the bolts (13) by hand until they touch the self-locking property of the threads in the RAT strut housing (3).
6) Tighten the tube nuts (7), on the two ends of each hydraulic tube (4, 5, 6), by hand until they lightly touch the tube end flanges.

NOTE: The hydraulic pump (12) must remain flat against the RAT strut housing (3). Do not tighten the tube nuts (7) too much. This will cause the hydraulic pump (12) and the RAT strut housing (3) to move apart. If this occurs, the calculated thickness for the shims (9) will not be correct.

7) Measure the clearance, on each hydraulic tube (4, 5, 6), between the surface of the hydraulic pump housing (12) and the inner face of the tube nut (7).
8) For each hydraulic tube (4, 5, 6), write this clearance as dimension C in the Table II.
9) Measure the clearance, on each hydraulic tube (4, 5, 6), between the surface of the RAT strut housing (3) and the inner face of the tube nut (7).
10) For each hydraulic tube (4, 5, 6), write this clearance as dimension D in Table I.

(e) For each hydraulic tube (4, 5, 6), subtract dimension B from dimension C to calculate the shim thicknes for the end of the tube at the hydraulic pump housing (3).
(f) Write this shim thickness for each hydraulic tube (4, 5, 6,) in Table II.
(g) For each hydraulic tube (4, 5, 6), subtract dimension A from dimension D to calculate the shim thickness for the end of the tube at the RAT strut housing (3).
(h) Write this shim thickness for each hydraulic tube (4, 5, 6) in Table I.

(i) Get shims (9) that have the thickness which was calculated in Table I and Table II.

NOTE: The shim thickness must be within ±0.003 inch of the calculated thickness.

(j) Identify the shims (9) for the correct location for subsequent installation.
(k) Loosen the tube nuts (7) at the top of the three hydraulic tubes (4, 5, 6) until the tube nuts (7) disengage from the RAT strut housing (3).
(l) Loosen the tube nuts (7) at the bottom of the three hydraulic tubes (4, 5, 6) .

NOTE: Do not remove the three hydraulic tubes (4, 5, 6) from the hydraulic pump (12).

(m) Remove the bolts (13) that hold the hydraulic pump (12) to the RAT strut housing (3).
(n) Remove the hydraulic pump (12) with the hydraulic tubes (4, 5, 6) attached to it.
(o) Remove the hydraulic tubes (4, 5, 6) from the hydraulic pump (12).

S 424-099

(2) Do the steps that follow to install the hydraulic pump (12):
(a) Apply a layer of hydraulic lubricant or hydraulic fluid on the new O-rings.
(b) Install the shims (9), backup rings (10), and O-rings (11) on the end of each of the hydraulic tubes (4, 5, 6).

NOTE: Some airplanes have incorporated SB29A77 which replaces the hydraulic tube (5) with a flexible tube. The flexible tube does not require shims. For the flexible hydraulic tube (5), disregard the steps that follow for the installation of the shims.

(c) Connect the hydraulic tubes (4, 5, 6) to the hydraulic pump (12).
(d) Tighten the tube nuts (7) on each hydraulic tube (4, 5, 6) by hand.
(e) Put the hydraulic pump (12) in its position on the RAT strut housing (3) and engage the hydraulic tubes (4, 5, 6) with the RAT strut housing (3).
(f) Make sure the hydraulic pump (12) is flat against the RAT strut housing (3).
(g) Install the washers (14) and bolts (13) to attach the hydraulic pump (12) to the RAT strut.
(h) Tighten the bolts (13) by hand until they touch the self-locking property of the threads in the RAT strut housing (3).
(i) Tighten the tube nuts (7) as follows:
1) Tighten the tube nuts (7) on the case drain tube (4) to 30-40 pound-feet.
2) Tighten the tube nuts (7) on the outlet tube (5) to 40-50 pound-feet.

NOTE: On airplanes with flexible outlet tube restrain the outlet tube from rotation during tightening of tube nuts.

3) Tighten the tube nuts (7) on the inlet tube (6) to 40-50 pound-feet.
(j) Measure the clearance between the hydraulic pump housing (12) and the RAT strut housing (3).
(k) If the clearance is more than 0.060 inch, do the steps to find the thickness of the shims (9) again.
(l) If the clearance is 0.00 to 0.060 inch, tighten the bolts (13) to 20-22 pound-feet.
(m) Apply a layer of sealant, RTV732, on these surfaces:
1) The mating surfaces around the tube nuts (7).
2) The surface around the joint between the hydraulic pump (12) and the RAT strut housing (3).
(n) Safety the tube nuts (7) with a lockwire.

I. Install Hub (Fig. 402)

S 434-077

CAUTION: DO NOT LIFT THE HUB BY THE TURBINE BLADES OR NOSE CONE. DO NOT PUT THE HUB DOWN ON THE TURBINE BLADES. THE WEIGHT OF THE HUB CAN CAUSE DAMAGE TO THE TURBINE BLADES, NOSE CONE, OR GOVERNOR MECHANISM.

(1) Set the hub (2) in the RAT strut (1) housing.

S 434-078

(2) Use a WAS-33662 or thin-wall socket wrench to install the screws (8) to attach the hub bearing support (10) to the RAT strut (1) housing.

S 434-079

(3) Tighten the screws as follows:
(a) screws (8) to 51-56 pound-inches.

S 824-080

(4) Adjust the speed sensor (3) (AMM 29-21-15/501).

S 434-081

(5) Install the speed sensor cover (6) and tighten the screw as follows:
(a) screw (7) to 32-36 pound-inches.

J. Put the Airplane Back to Its Usual Condition

S 614-082

(1) Fill the reservoir for the center hydraulic system (AMM 12-12-01/301).

S 864-083

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 714-084
(3) Do the test for the RAT to make sure it operates correctly (AMM 29-21-00/501).
(a) If necessary, replace the RAT.

S 214-085
(4) Do a check for leaks in the RAT assembly.

S 864-086
(5) Retract the RAT (AMM 29-21-00/201).

S 864-087
(6) Remove the power from the hydraulic systems if it is not necessary (AMM 29-11-00/201).

S 864-088
(7) Remove electrical power if it is not necessary (AMM 24-22-00/201).

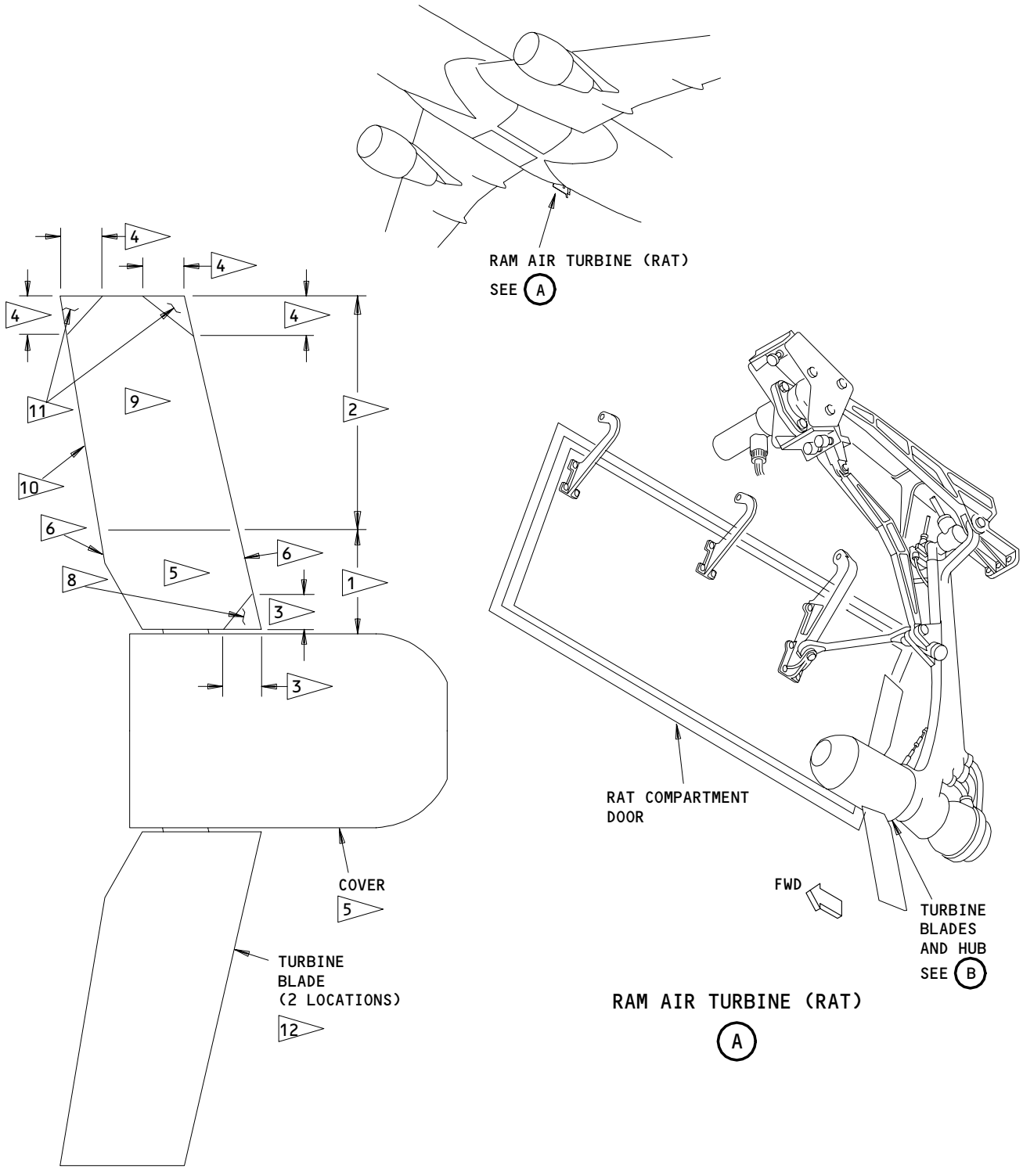
RAM AIR TURBINE (RAT) - INSPECTION/CHECK

1. General
   A. This procedure only has an illustration and a wear limit table which show the data for wear limits. There are no procedures for access, removal, or installation of the parts. Refer to 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 (Fig. 601)
   A. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access Panel
          198GR RAT Compartment



RAM AIR TURBINE (RAT)

A

TURBINE BLADES AND HUB

B

Ram Air Turbine (RAT) Inspection
Figure 601 (Sheet 1)

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.

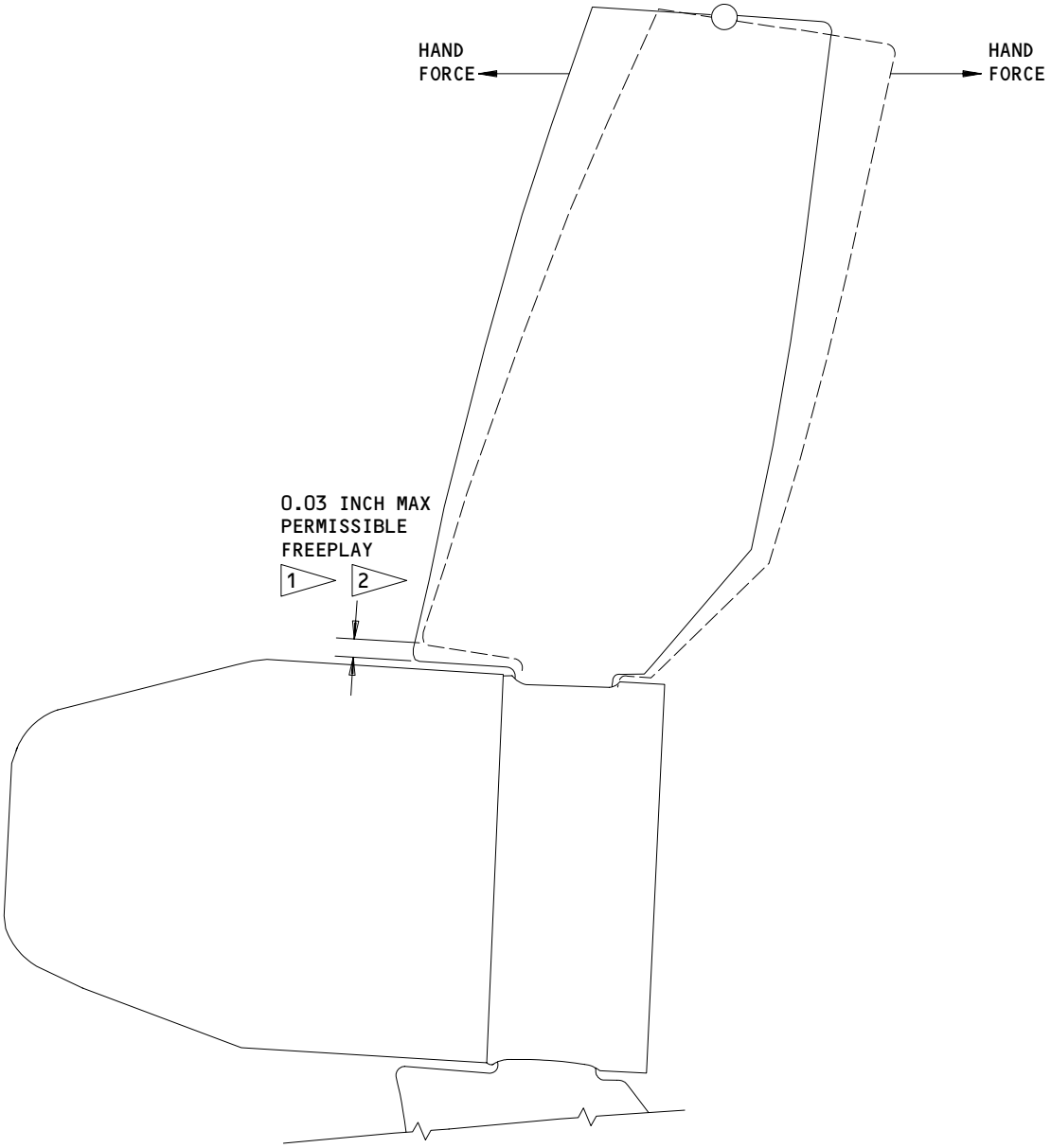
9 DENTS THAT ARE MORE THAN 5% OF TURBINE BLADE THICKNESS OR LARGER THAN 0.040 INCH IN AREA 2 ARE NOT PERMITTED.

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 WITH NICKS OR BENDS WHERE DAMAGE IS MORE THAN AREA 4 IS NOT PERMITTED.

12 BENDS ARE NOT PERMITTED.

Ram Air Turbine (RAT) Inspection
Figure 601 (Sheet 2)



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

RAM AIR TURBINE (RAT) ROTARY ACTUATOR ELECTRIC MOTOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the actuator electric motor for the ram air turbine (RAT). The other task installs the actuator electric motor for the RAT.

TASK 29-21-05-024-001

2. Remove the Actuator Electric Motor for the Ram Air Turbine (RAT)
   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 29-21-00/201, Ram Air Turbine (RAT) System
      (4) AMM 32-00-15/201, Main Gear Door Locks
   B. Access
      (1) Location Zone
          196 Wing to Body - Aft Upper Half (Right)

      (2) Access Panel
          196RR Ram Air Turbine

   C. Remove the Motor (Fig. 401)

      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) Open the door for the right wheel well and install the door locks (AMM 32-00-15/201).

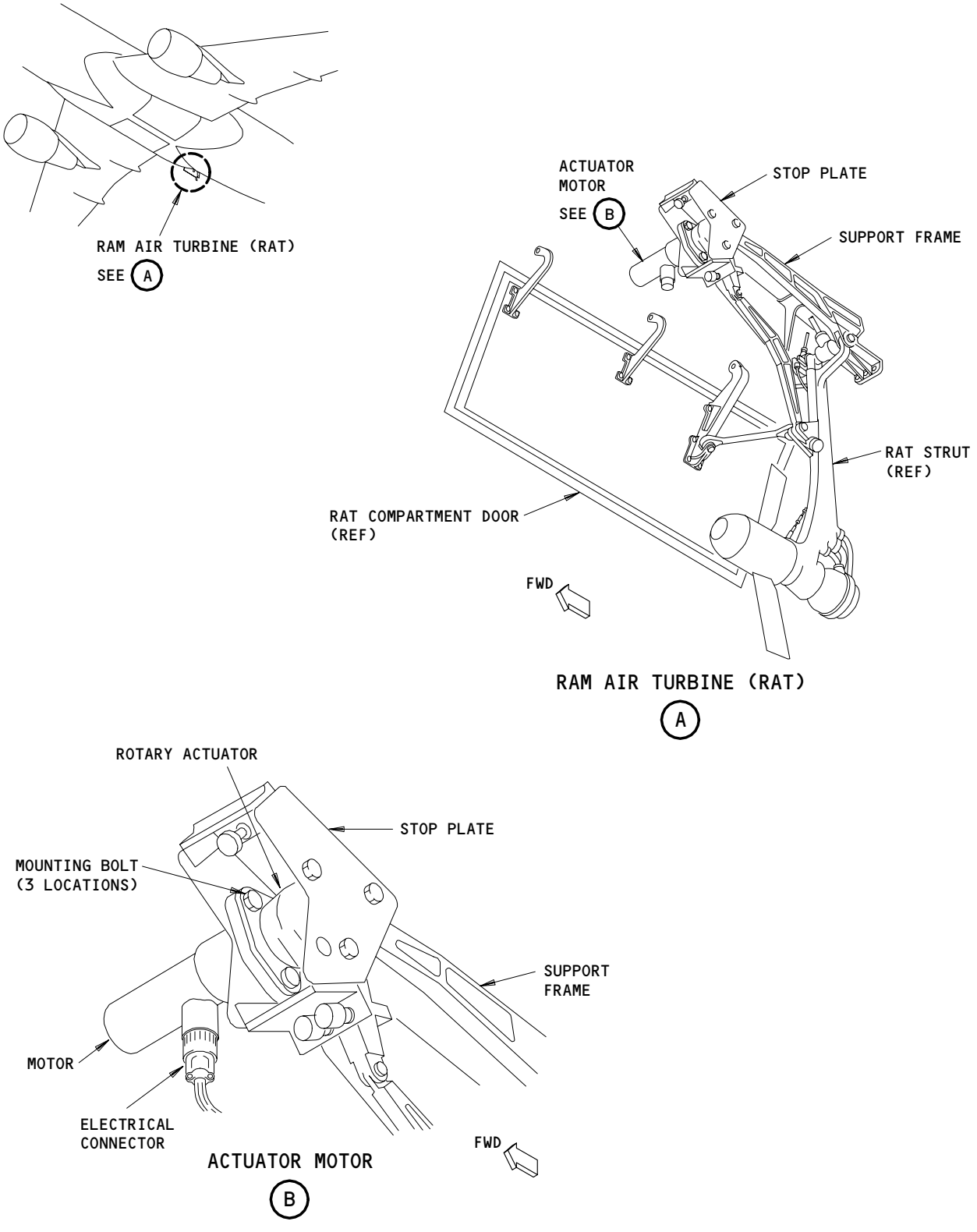
      S 864-003
      (2) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

      S 864-004
      (3) Extend the RAT (AMM 29-21-00/201).

      NOTE: If the RAT will not extend, then continue with the next step.

      S 014-005
      (4) Remove the access door for the RAT, 196RR (AMM 06-41-00/201).

      S 034-006
      (5) Disconnect the electrical connector from the motor.



Actuator Electric Motor Installation
Figure 401

S 034-007
(6) Remove the mounting bolts on the motor.

S 864-008
(7) Move the motor outboard until the motor shaft is away from the rotary actuator.

S 024-009
(8) Remove the motor.

TASK 29-21-05-424-010

3. Install the Actuator Electric Motor for the Ram Air Turbine (RAT)

A. Consumable Materials
(1) A00247 Sealant, Chromate Type - BMS 5-95
(2) D00633 Grease - BMS 3-33 (Preferred)
(3) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)

B. References
(1) AMM 06-41-00/201, Fuselage Access Doors and Panels
(2) AMM 29-21-00/201, Ram Air Turbine (RAT) System
(3) AMM 29-21-17/201, Ram Air Turbine (RAT) Proximity Switches

C. Access
(1) Location Zone
196 Wing to Body - Aft Upper Half (Right)

(2) Access Panel
196RR Ram Air Turbine

D. Install the Motor (Fig. 401)

S 644-011
(1) Apply a layer of grease on the splines for the motor drive.

S 434-012
(2) Hold the motor on the support frame.

S 424-013
(3) Install the mounting bolts on the motor.

S 394-014
(4) Apply a fillet of sealant at these locations:
(a) On each end of the mounting bolts
(b) On the joint between the motor and the stop plate.

S 434-015
(5) Connect the electrical connector from the motor.

S 824-018
(6) Adjust the RAT proximity switches (AMM 29-21-17/201).

NOTE: The RAT must be extended to accomplish this step (AMM 29-21-00/201).

S 864-016
(7) Retract the RAT (AMM 29-21-00/201).

S 414-017
(8) Install the access panel for the RAT, 196RR (AMM 06-41-00/201).

RAM AIR TURBINE (RAT) ROTARY ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the rotary actuator for the ram air turbine (RAT). The other task installs the rotary actuator for the RAT.

TASK 29-21-06-024-001

2. Remove the Rotary Actuator for the Ram Air Turbine (RAT)
   A. References
      (1) AMM 29-21-05/401, Ram Air Turbine (RAT) Rotary Actuator Electric Motor
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)
   C. Remove the Rotary Actuator (Fig. 401)

      S 034-002
      (1) Remove the actuator motor (AMM 29-21-05/401).

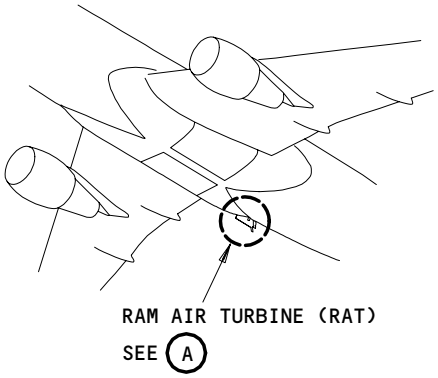
      S 034-003
      (2) Remove the bolt that attaches the deployment arm to the actuator arm.

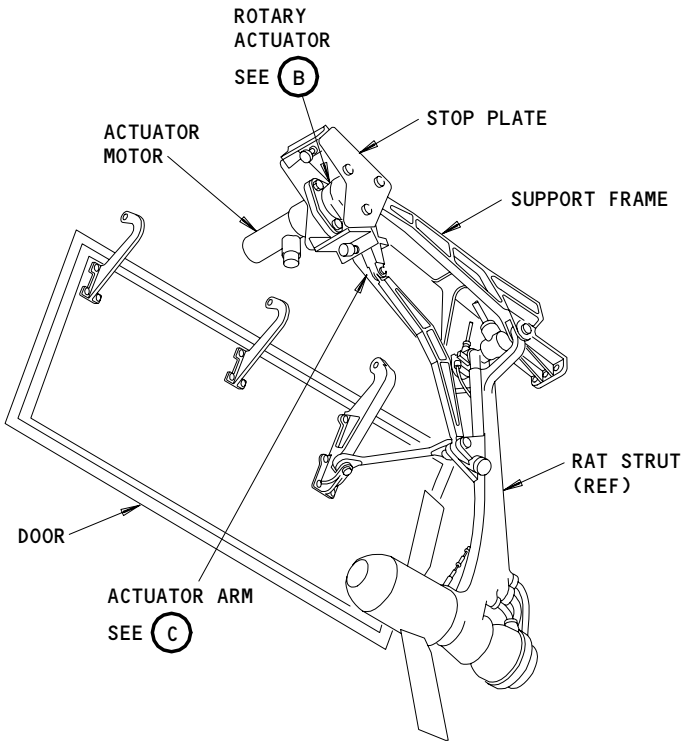
      S 034-004
      (3) Remove the bolts that hold the rotary actuator to the support frame.

      S 024-005
      (4) Hold the stop plate and remove the rotary actuator from the support frame.

TASK 29-21-06-424-006

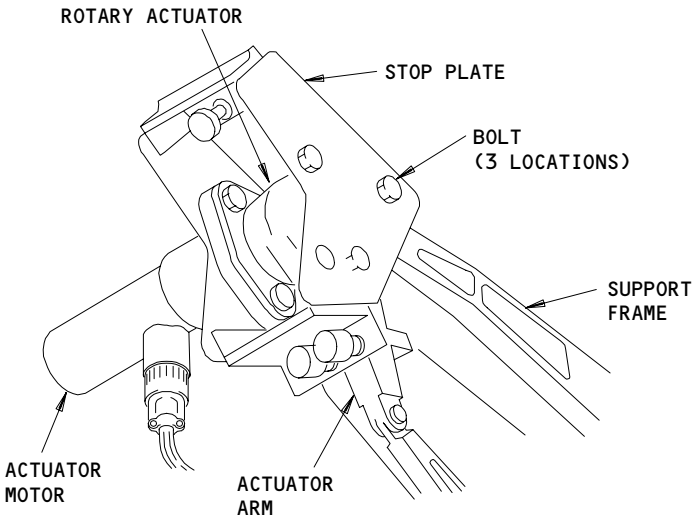
3. Install the Rotary Actuator for the Ram Air Turbine (RAT)
   A. Consumable Materials
      (1) D00633 Grease - BMS 3-33 (Preferred)





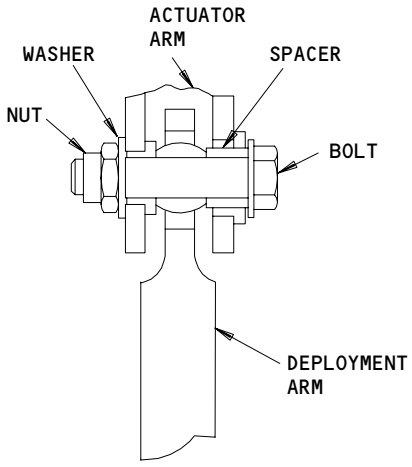
RAM AIR TURBINE (RAT)

A



ROTARY ACTUATOR

B



ACTUATOR ARM

C

Rotary Actuator Installation
Figure 401

20894

(2) D00013 Grease - MIL-PRF-23827 (Supersedes MIL-G-23827) (Alternate)
(3) A00247 Sealant - BMS 5-95

B. References
(1) AMM 29-21-05/401, Ram Air Turbine (RAT) Rotary Actuator Electric Motor

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

D. Install the Rotary Actuator (Fig. 401)

S 434-007
(1) Set the rotary actuator and the stop plate in the support frame.

S 434-008
(2) Install the bolts to attach the rotary actuator to the support frame.

S 644-009
(3) Apply a layer of grease on the bolt that attaches the deployment arm to the actuator arm.

S 434-010
(4) Install the bolt through the deployment arm and the actuator arm.

S 434-011
(5) Tighten the bolt to 160-180 pound-inches.

S 434-012
(6) Install the actuator motor (AMM 29-21-05/401).

RAM AIR TURBINE (RAT) DEPLOYMENT ARM - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One procedure removes the deployment arm for the ram air turbine (RAT). The other procedure installs the deployment arm for the RAT.

TASK 29-21-07-024-001

2. Remove the Deployment Arm 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
      (3) AMM 32-00-15/201, Main Gear Door Locks
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

   C. Remove the Deployment Arm (Fig. 401)

      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.

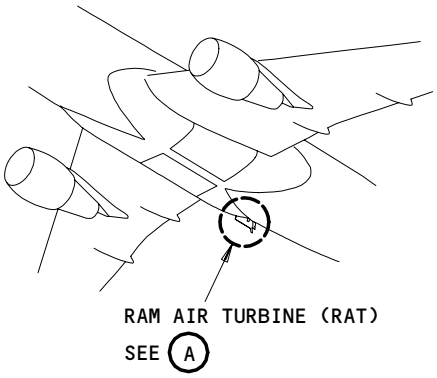
      (1) Open the door for the right wheel well and install the door lock (AMM 32-00-15/201).

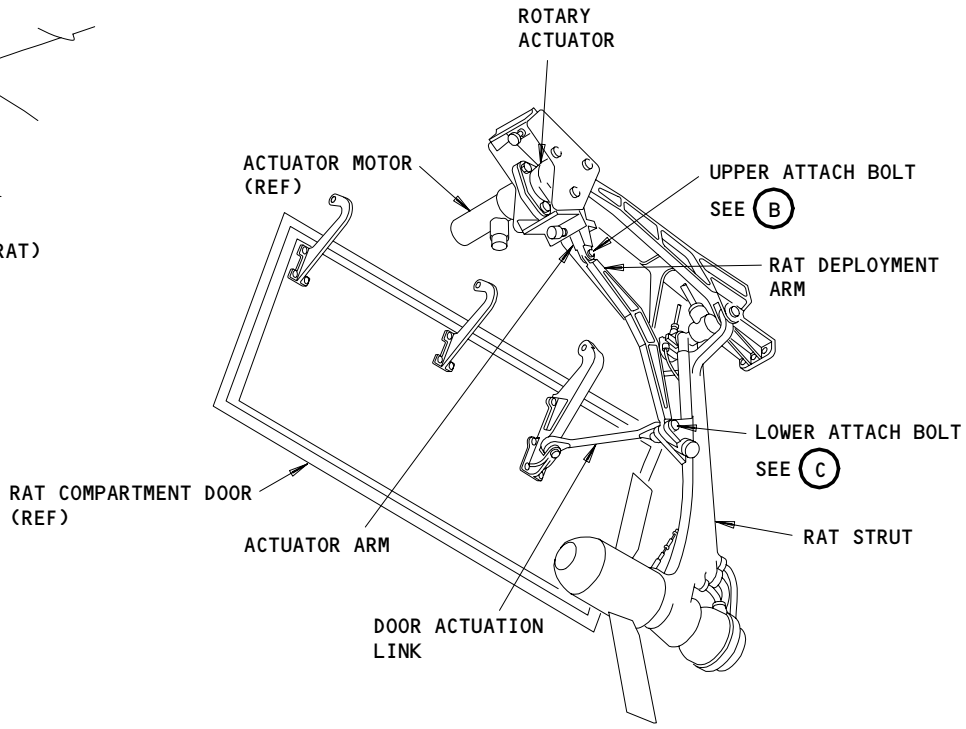
      S 864-003
      (2) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

      S 864-004
      (3) Extend the RAT (AMM 29-21-00/201).

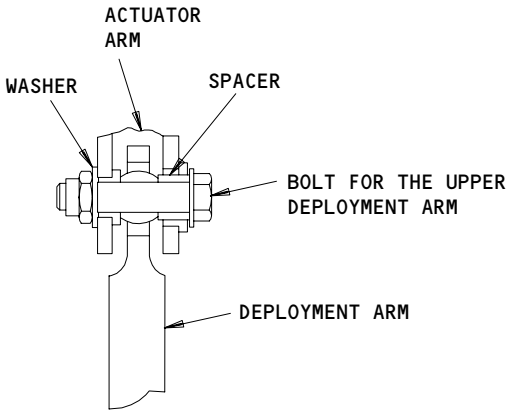
      S 034-005
      (4) Remove the bolt and spacer at each end of the deployment arm.

      S 024-006
      (5) Remove the deployment arm.

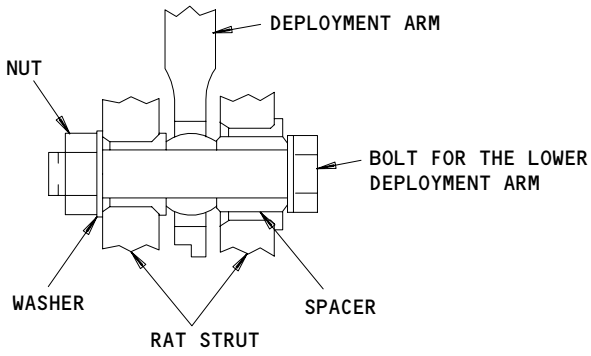




RAM AIR TURBINE (RAT)
A



UPPER ATTACH BOLT
B



LOWER ATTACH BOLT
C

Deployment Arm Installation
Figure 401

TASK 29-21-07-424-007

3. Install the Deployment Arm 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)

B. References

(1) AMM 12-21-30/301, Ram Air Turbine (RAT)

(2) AMM 29-21-00/201, Ram Air Turbine (RAT) System

C. Access

(1) Location Zone

198 Wing to Body - Aft Lower Half (Right)

D. Install the Deployment Arm (Fig. 401)

S 644-008

(1) Apply a layer of grease to the bolts and spacers.

S 434-009

(2) Hold the deployment arm and install the bolt and spacer at each end of the deployment arm.

S 434-010

(3) Tighten the upper attach bolt to 160-180 pound-inches.

S 434-011

(4) Tighten the lower attach bolt to 500-575 pound-inches.

S 644-012

(5) Lubricate the arm (AMM 12-21-30/301).

S 864-013

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

RAM AIR TURBINE (RAT) COMPARTMENT DOOR AND MOVEABLE DEPRESSOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the compartment door and moveable depressor for the ram air turbine (RAT). The other task installs the compartment door and moveable depressor for the RAT.

TASK 29-21-09-024-001

2. Remove the Compartment Door and Moveable Depressor 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
      (3) AMM 32-00-15/201, Main Gear Door Locks
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

   C. Remove the Compartment Door and Moveable Depressor (Fig. 401)

      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 door for the right wheel well and install the door lock (AMM 32-00-15/201).

      S 864-003
      (2) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

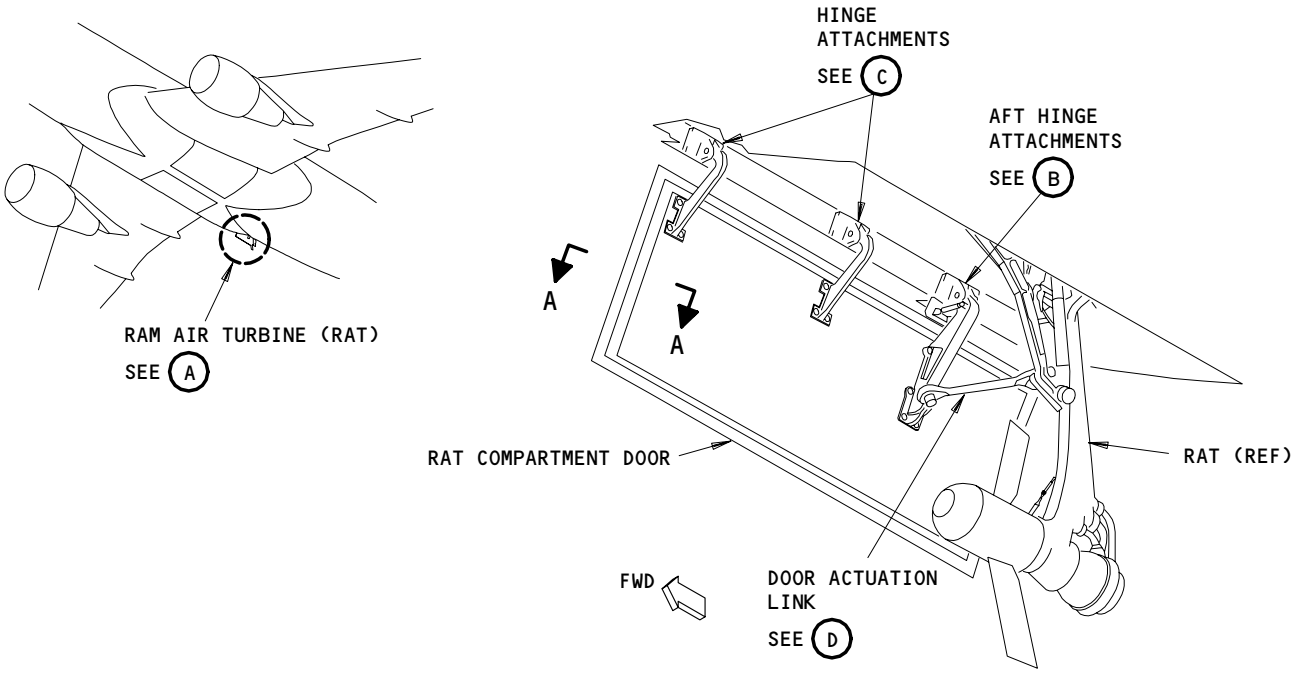
      S 864-004
      (3) Extend the RAT (AMM 29-21-00/201).

      S 034-005
      (4) Remove the bolt that attaches the door actuation link to the compartment door.

      S 034-006
      (5) Remove the bolt that holds the moveable depressor springs to the door aft hinge.

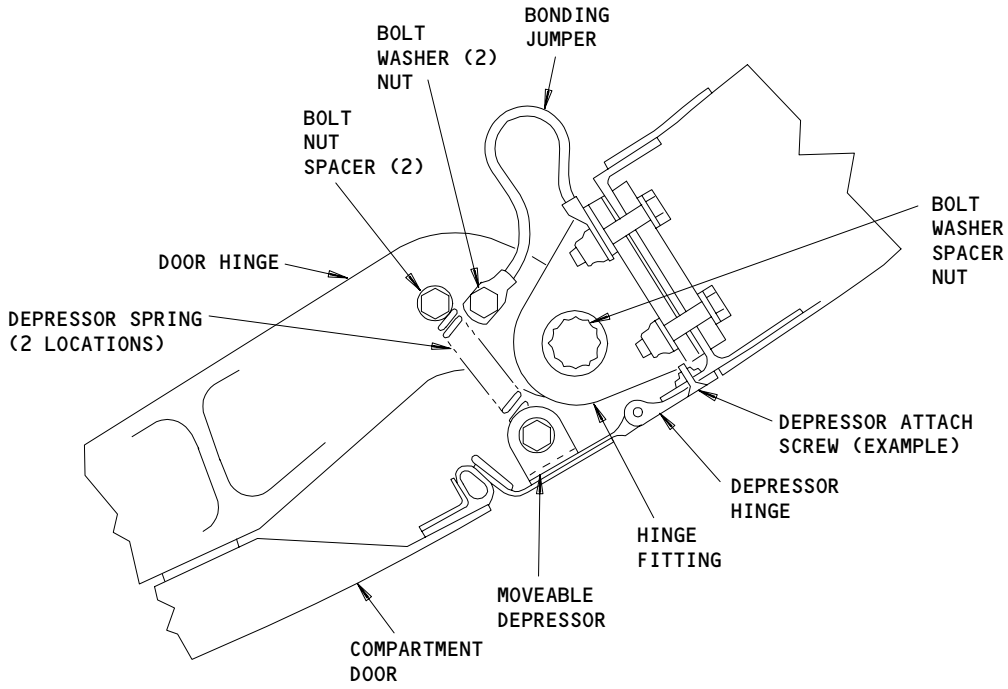
      S 034-007
      (6) Remove the bolt that holds each bonding jumper to the door hinge.

      S 034-008
      (7) Hold the compartment door and remove the bolts from the door hinges.



RAM AIR TURBINE (RAT)

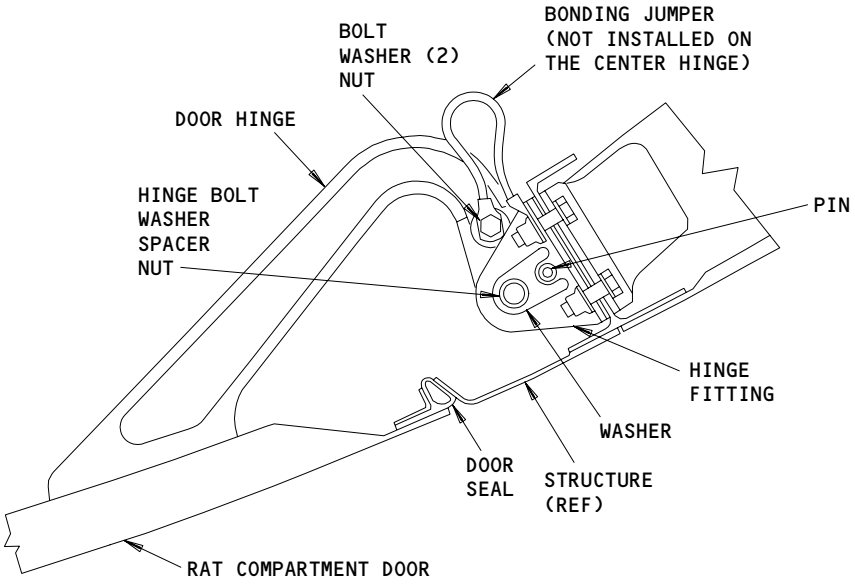
A



AFT HINGE ATTACHMENTS

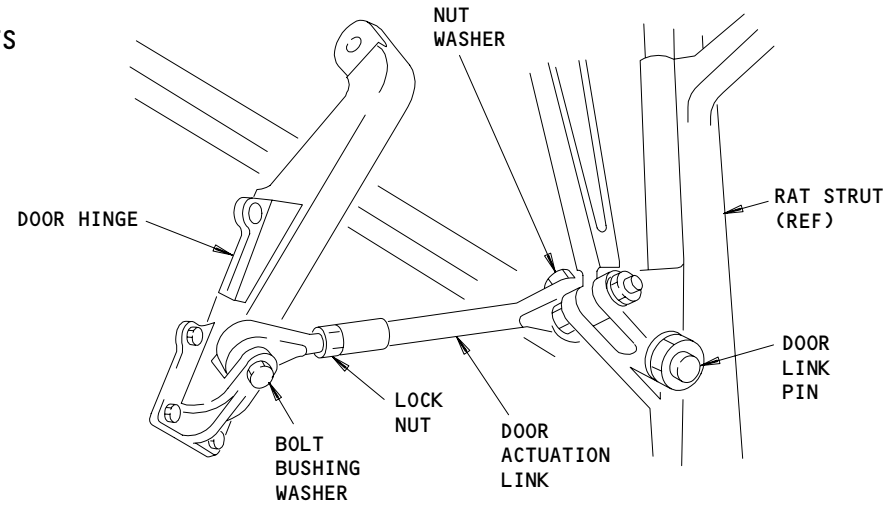
B

Compartment Door and Moveable Depressor Installation
Figure 401 (Sheet 1)



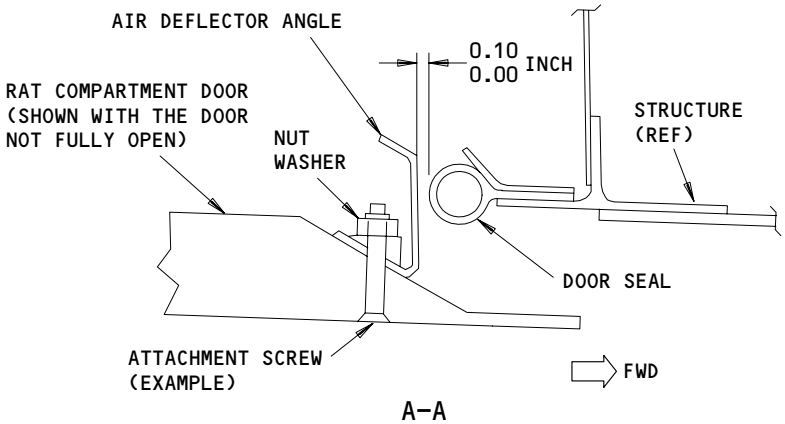
HINGE ATTACHMENTS

C



DOOR ACTUATION LINK

D



A–A

Compartment Door and Moveable Depressor Installation
Figure 401 (Sheet 2)

S 024-009
(8) Remove the door.

S 034-010
(9) Remove the screws from the moveable depressor hinge.

S 024-011
(10) Remove the moveable depressor.

TASK 29-21-09-424-012

3. Install the Compartment Door and Moveable Depressor 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) D00091 Oil - General Purpose, Low Temperature MIL-PRF-7870 (Supersedes MIL-L-7870)
(4) A00247 Sealant - BMS 5-95

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)

D. Install the Compartment Door and Moveable Depressor (Fig. 401)

S 644-013
(1) Lubricate the hinge pin for the moveable depressor with oil.

S 434-014
(2) Install the screws with wet sealant to hold the depressor hinge to the airplane structure.

S 394-015
(3) Fill the space at each end of the depressor hinge with sealant.

S 644-016
(4) Apply a layer of grease on the door hinge bolts, spacers, and bearings.

S 434-017
(5) Hold the compartment door and install the bolts in the door hinges.

S 434-018
(6) Install the washers on the door hinges with the bevel side away from the hinge fitting.

S 434-019
(7) Tighten the bolt in the forward and center hinges to 85-110 pound-inches.

S 434-020
(8) Tighten the bolt in the aft hinge to 700-950 pound-inches.

S 164-021
(9) Clean the mating surfaces of the bonding jumpers and the door hinges.

S 434-022
(10) Install the bolts to attach the bonding jumpers to the door hinges.

S 394-023
(11) Put sealant on the end of the bonding jumper and the bolt.

S 434-024
(12) Install the bolt to attach the moveable depressor springs to the aft door hinge.

S 824-025
(13) Do the steps that follow to adjust the air deflector angle at the forward edge of the door:
   (a) Remove the nut that holds the door actuation link to the link pin.
   (b) Remove the actuation link.
   (c) Retract the RAT (AMM 29-21-00/201).

(d) Manually push the compartment door near the closed position.
(e) Loosen the nuts that hold the air deflector angle.
(f) Move the air deflector angle until the space between the air deflector angle and the door seal is correct.
(g) Tighten the nuts.
(h) Extend the RAT (AMM 29-21-00/201).
(i) Hold the door actuation link on the link pin and install the nut.
(j) Tighten the nut to 800-1000 pound-inches.

S 644-026
(14) Apply a layer of grease on the bushing for the door actuation link.

S 434-027
(15) Install the bolt and bushing to connect the door actuation link to the door.

S 434-028
(16) Tighten the bolt to 200-250 pound-inches.

S 824-029
(17) Adjust the length of the door actuation link until the compartment door almost closes at the aft side (AMM 29-21-00/201).

S 434-030
(18) Tighten the locknut and install a lockwire.

S 864-031
(19) Retract the RAT to the stowed position (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) DOOR ACTUATION LINK - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One procedure removes the door actuation link for the ram air turbine (RAT). The other task installs the door actuation link for the RAT.

TASK 29-21-10-024-001

2. Remove the Door Actuation 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
      (3) AMM 32-00-15/201, Main Gear Door Locks
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

   C. Remove the Door Actuation Link (Fig. 401)

      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 door for the right wheel well and install the door lock (AMM 32-00-15/201).

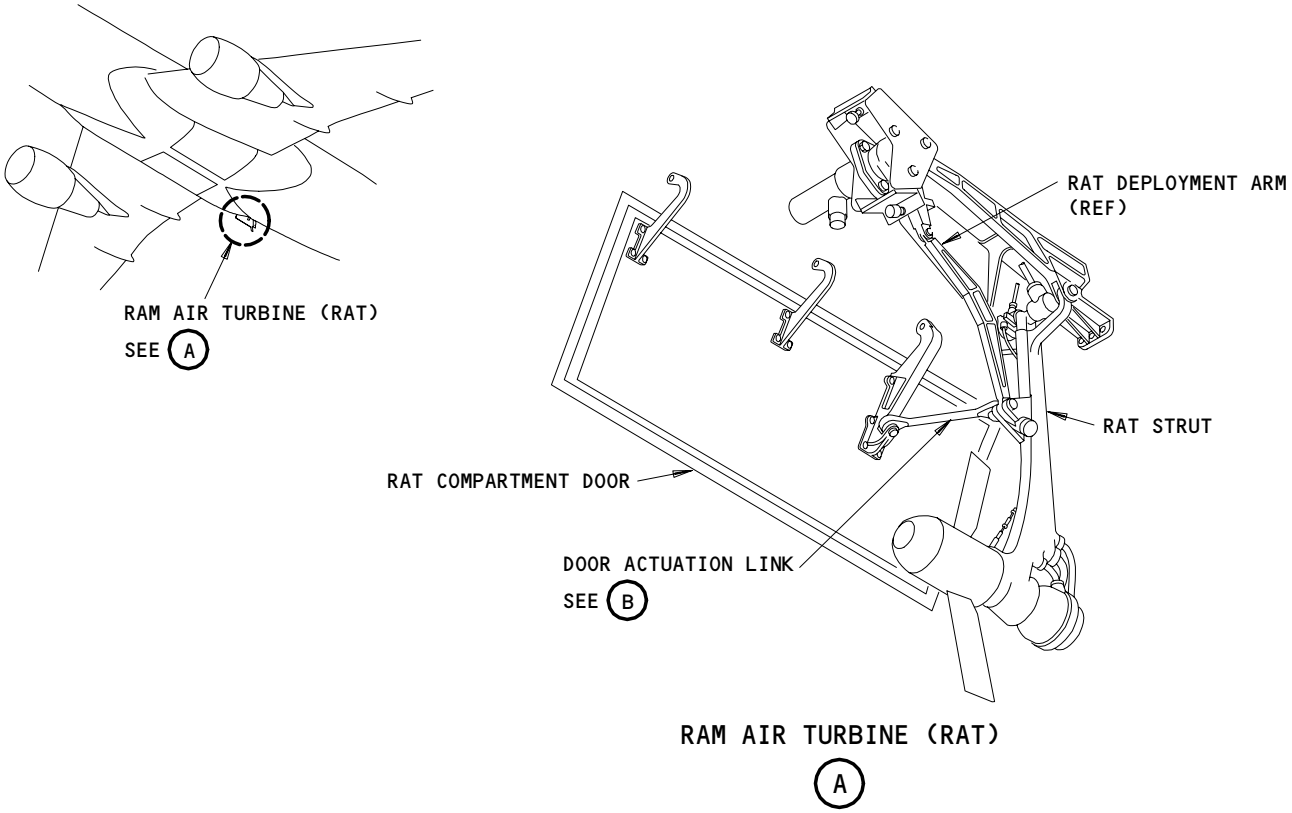
      S 864-003
      (2) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

      S 864-004
      (3) Extend the RAT (AMM 29-21-00/201).

      S 034-005
      (4) Remove the bolt, washer, and bushing at the door end of the actuation link.

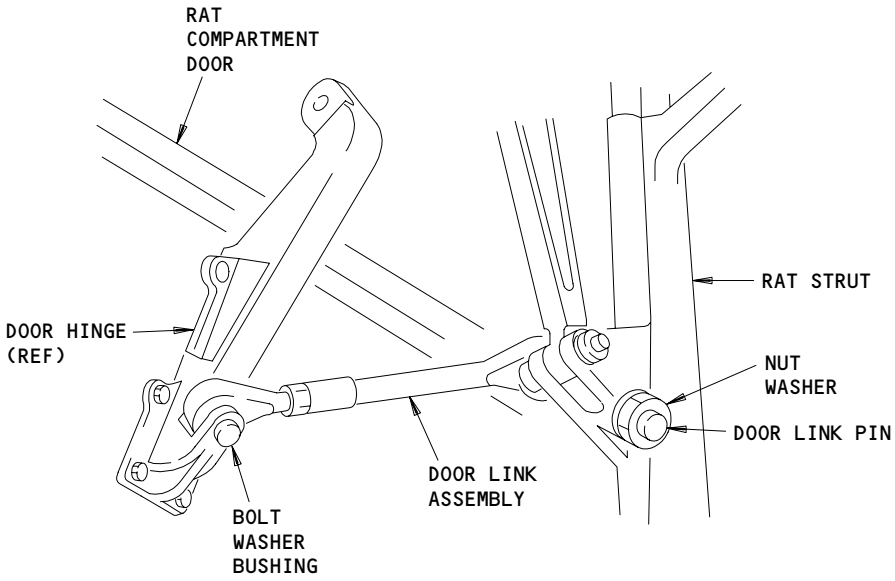
      S 034-006
      (5) Remove the nut and washer from the door link pin at the RAT strut.

      S 034-007
      (6) Remove the door link pin from the RAT strut.



RAM AIR TURBINE (RAT)

A



DOOR ACTUATION LINK

B

Door Actuation Link Installation
Figure 401

S 034-008
(7) Remove the door link assembly.

TASK 29-21-10-424-009

3. Install the Door Actuation 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)

B. References
(1) AMM 12-21-30/301, Ram Air Turbine (RAT)
(2) AMM 29-21-00/201, Ram Air Turbine (RAT) System
(3) AMM 29-21-09/401, Ram Air Turbine (RAT) Compartment Door and Moveable Depressor

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

D. Install the Door Actuation Link (Fig. 401)

S 644-010
(1) Apply a layer of grease on the door link pin.

S 434-011
(2) Install the door link pin in the RAT strut.

S 434-012
(3) Install the washer and nut on the door link pin.

S 434-013
(4) Tighten the nut to 2000-2400 pound-inches.

S 644-014
(5) Apply a layer of grease on the bushing.

S 434-015
(6) Install the bolt, washer, and bushing at the door end of the actuation link.

S 434-016
(7) Tighten the bolt to 200-250 pound-inches.

S 644-017
(8) Lubricate the actuation link (AMM 12-21-30/301).

S 824-018
(9) Adjust the length of the door link (AMM 29-21-09/401).

S 864-019
(10) Retract the RAT (AMM 29-21-00/401).

RAM AIR TURBINE (RAT) CHECKOUT MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task removes the RAT checkout module and pressure switch. The second task removes the filter element from the RAT checkout module. The third task installs the RAT checkout module and pressure switch. The fourth task installs the filter element in the RAT checkout module.

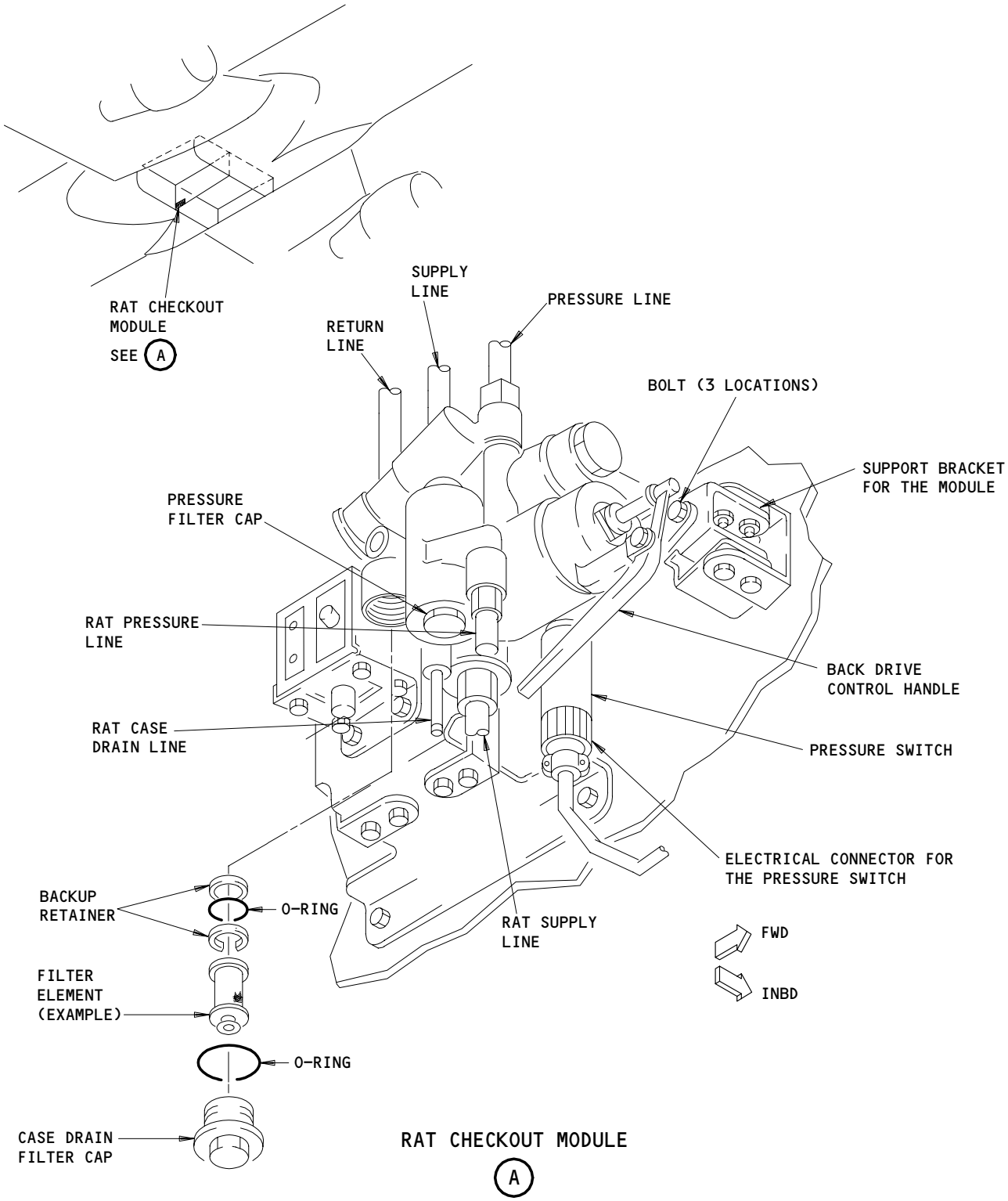
TASK 29-21-11-004-042

2. Remove the RAT Checkout Module and Pressure Switch
   A. General
      (1) This task contains two procedures which remove the components which follow:
          (a) RAT checkout module

          (b) 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. Equipment
      (1) Container for Hydraulic Fluid - Commercially Available, Approximately 10-Gallon Capacity
   C. References
      (1) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (2) AMM 32-00-15/201, Landing Gear Door Locks
      (3) AMM 32-00-20/201, Landing Gear Downlocks
   D. Access
      (1) Location Zone
          144 Right MLG Wheel Well

   E. Prepare For Removal

      S 094-043
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

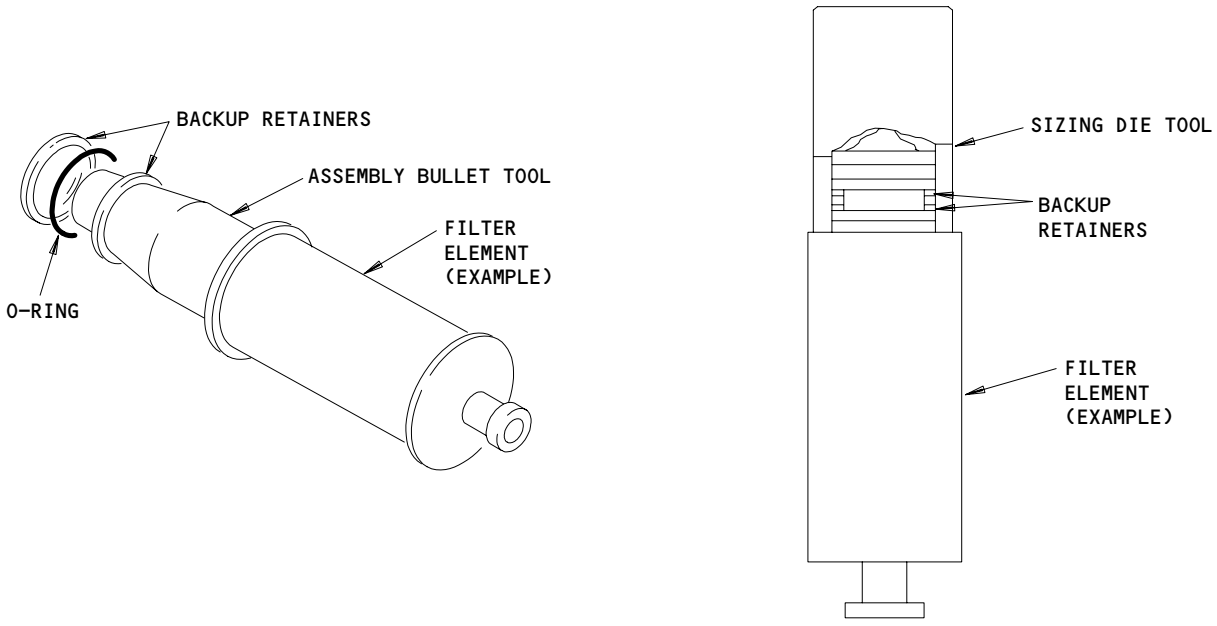


Ram Air Turbine (RAT) Checkout Module Installation
Figure 401

S 014-044

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).



Filter Element O-Ring and Backup Retainers Installation
Figure 402

S 864-001
(3) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).

S 864-002
(4) Close the pressurization shutoff valve for the center system reservoir.

S 034-003
(5) Remove the lockwire from the reservoir drain valve handle.

S 684-045
(6) Open the drain valve and drain the fluid from the hydraulic reservoir for the center system into a container.

NOTE: The capacity of the reservoir is approximately 10 gallons.

S 864-004
(7) After you fully drain the reservoir, close the drain valve.

S 434-046
(8) Safety the drain valve handle with wire.

S 864-005
(9) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

F. Remove the RAT Checkout Module (Fig. 401)

S 034-006
(1) Disconnect the hydraulic lines from the module.

S 034-007
(2) Install caps on the hydraulic lines and on the ports of the module.

S 034-008
(3) Disconnect the electrical connector from the pressure switch on the module.

S 034-009
(4) Install a cap on the pressure switch.

S 024-010
(5) Hold the module and remove the bolts which hold the module to the support bracket.

S 024-011
(6) Remove the module from the support bracket.

G. Remove the Pressure Switch (Fig. 401)

S 034-027
(1) Disconnect the electrical connector from the pressure switch.

S 034-028
(2) Install a cap on the pressure switch.

S 024-029
(3) Remove the pressure switch from the checkout module.

S 034-030
(4) Install a cap in the port of the module.

TASK 29-21-11-004-087

3. Remove the Filter Element From the RAT Checkout Module

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 Zone
144 Right MLG Wheel Well

C. Prepare For Removal

S 494-058
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-059

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

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

S 864-060
(3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 864-061
(4) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

D. Remove the Filter Element (Fig. 401)

S 024-062
(1) Remove the filter cap from the checkout module.

S 024-063
(2) Remove the filter element from the module.

TASK 29-21-11-404-047

4. Install the RAT Checkout Module and Pressure Switch

A. General
(1) This task contains two procedures which install the components which follow:
(a) RAT checkout module

(b) 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 System
   (2) AMM 12-25-01/301, Exterior Cleaning
   (3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
   (4) AMM 29-21-00/501, Ram Air Turbine System

   (5) AMM 32-00-15/201, Landing Gear Door Locks
D. Access
   (1) Location Zone
       144 Right MLG Wheel Well

E. Install the RAT Checkout Module (Fig. 401)

   S 164-064
   (1) Clean the surfaces on the module and the support bracket for the module.

   S 424-065
   (2) Put the module on the support bracket.

   S 434-066
   (3) Install the bolts which hold the module to the support bracket. Tighten these bolts to 70-85 pound-inches.

   S 434-014
   (4) Install the electrical connector on the pressure switch on the module.

   S 434-015
   (5) Remove the caps from the ports on the module and from the hydraulic lines.

   S 644-016
   (6) Apply hydraulic system lubricant or hydraulic fluid to the threads of the hydraulic line connections.

   S 434-017
   (7) Connect the hydraulic lines to the module.

F. Install the Pressure Switch (Fig. 401).

   S 644-032
   (1) Apply hydraulic system lubricant or hydraulic fluid to the O-ring and the threads on the pressure switch.

   S 434-031
   (2) Install a new O-ring on the pressure switch.

S 424-033
(3) Install the pressure switch into the checkout module.

S 434-052
(4) Tighten the pressure switch to 75-100 pound-inches.

S 434-053
(5) Safety the pressure switch with wire.

S 034-057
(6) Connect the electrical connector to the pressure switch.

G. Put the Airplane Back to Its Usual Condition

S 864-034
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 864-035
(2) Open the pressurization shutoff valve for the center system reservoir.

S 614-036
(3) Fill the center hydraulic system reservoir (AMM 12-12-01/301).

S 864-037
(4) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 734-038
(5) Do the RAT hydraulic pump system test (AMM 29-21-00/501).

S 214-039
(6) Make sure there are no leaks at the pressure switch and the hydraulic line connections on the module.

S 114-040

(7) Clean all hydraulic fluid from the area of the module (AMM 12-25-01/301).

S 414-054

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.

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

S 864-041

(9) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

TASK 29-21-11-404-086

5. Install the Filter Element on the RAT Checkout Module

A. Equipment

(1) Ultrasonic Cleaner - Commercially Available
(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 - ASTM D4080 (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 System
(4) AMM 29-21-01/401, RAT Assembly and Components

(5) AMM 32-00-15/201, Landing Gear Door Locks

D. Access

(1) Location Zone

144 Right MLG Wheel Well

E. Install the Filter Element (Fig. 401)

S 214-067

(1) Do a check of the condition of the filter.

(a) Examine the filter 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 for pieces of the filter screen from the 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 element with an ultrasonic cleaner which contains solvent.

S 964-069

(3) If you cannot remove the contamination or if the filter element has damage, replace the filter element.

S 644-070

(4) Apply hydraulic system lubricant or hydraulic fluid to the O-rings, the backup retainers, and the threads on the filter cap.

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 element (Fig. 402).

(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.

S 434-073

(7) Use the sizing die as follows to compress the backup retainers into the groove of the filter element (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 element in the checkout module.

S 424-075
(9) Install the filter cap on the module.

S 434-076
(10) Tighten the pressure filter cap to 30-35 pound-feet.

S 434-077
(11) Tighten the case drain filter cap to 15-20 pound-feet.

S 434-078
(12) Safety the two filter caps with wire.

F. Put the Airplane Back to Its Usual Condition

S 864-079
(1) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11D31, HYDRAULIC AIR PUMP
(b) 11L15, HYDRAULIC ELEC PUMP CTR 1
(c) 11L24, HYDRAULIC ELEC PUMP CTR 2

S 864-083
(2) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 734-080
(3) Do the RAT hydraulic pump system test (AMM 29-21-00/501).

S 214-081
(4) Make sure there are no leaks at the filter caps and the hydraulic line connections on the module.

S 164-088
(5) Clean all hydraulic fluid from the area of the module (AMM 12-25-01/301).

S 094-082

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

S 864-084
(7) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

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 on 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 Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access Panel
          198GR RAT Compartment

   C. Remove the Speed Sensor (Fig. 401)

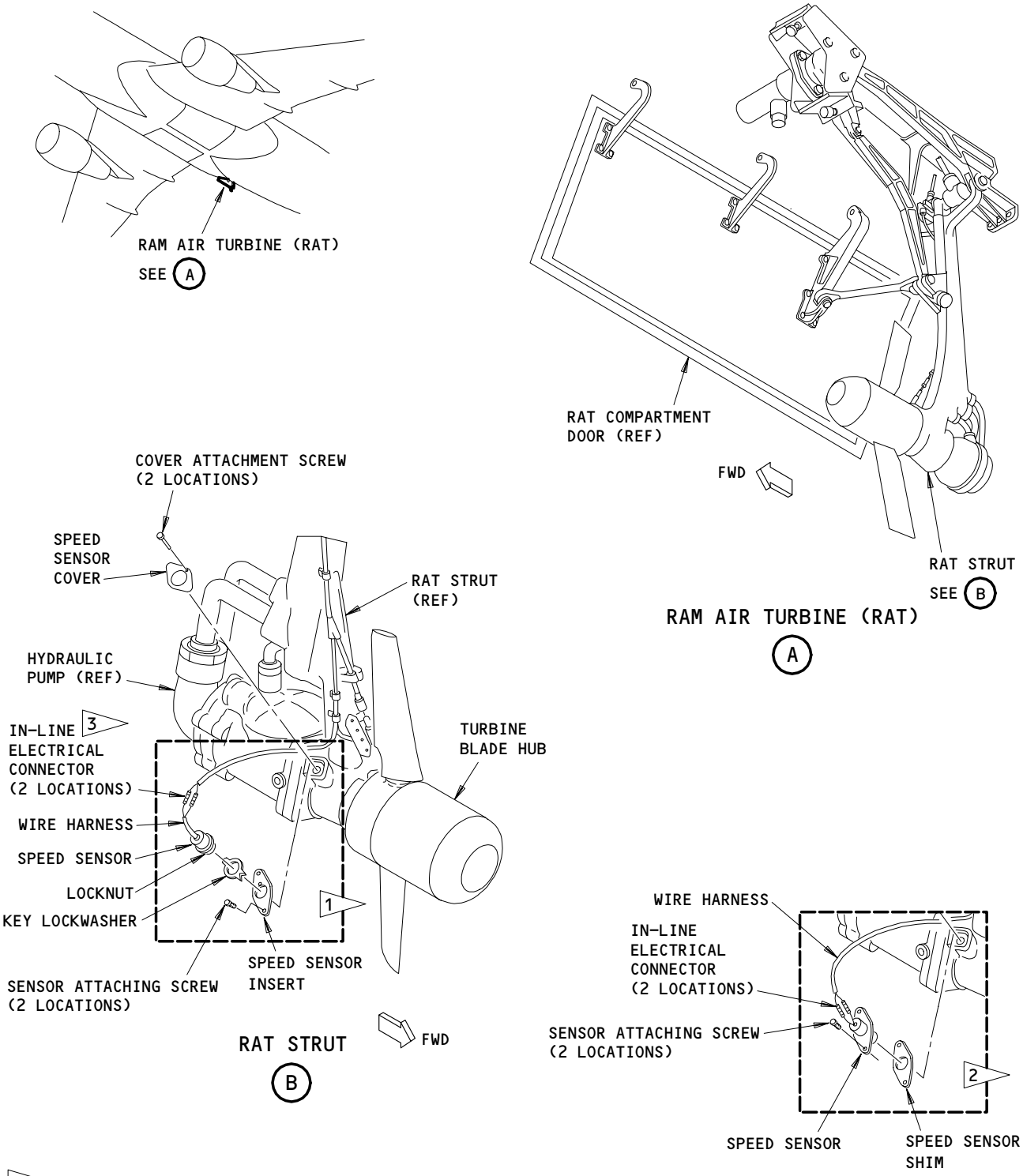
      S 864-002
      (1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

      S 864-003
      (2) Extend the RAT (AMM 29-21-00/201).

      S 034-004
      (3) Remove the screws that attach the speed sensor cover to the RAT strut housing.

      S 034-005
      (4) Remove the speed sensor cover.

      S 034-006
      (5) Remove the screws that attach the speed sensor to the RAT strut housing.



Tachometer Speed Sensor Installation
Figure 401

S 024-007
(6) Remove the speed sensor.

S 034-008
(7) SPEED SENSOR 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 034-009
(8) SPEED SENSOR WITHOUT IN-LINE ELECTRICAL CONNECTORS;
Cut the wires about 1.75 inches away from the speed sensor.

TASK 29-21-15-424-010

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 Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access Panel
198GR RAT Compartment

C. Install the Speed Sensor (Fig. 401)

S 434-011
(1) If it is necessary, install in-line electrical connectors on the wires in the wire harness and on the speed sensor.

S 434-012
(2) Connect the wires from the speed sensor to the electrical connectors on the wire harness.

S 434-013
(3) Install heat shrink sleeves on the wires and connectors.

S 434-014
(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 434-015
(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 834-016

(6) Adjust the speed sensor (AMM 29-21-15/501).

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. The 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 on the Ram Air Turbine (RAT)
   A. Consumable Materials
      (1) A00064 Sealant - RTV 732
   B. References
      (1) 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (2) 29-21-00/201, Ram Air Turbine (RAT) System
      (3) 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
          198GR RAT Compartment

   D. Adjust the Speed Sensor

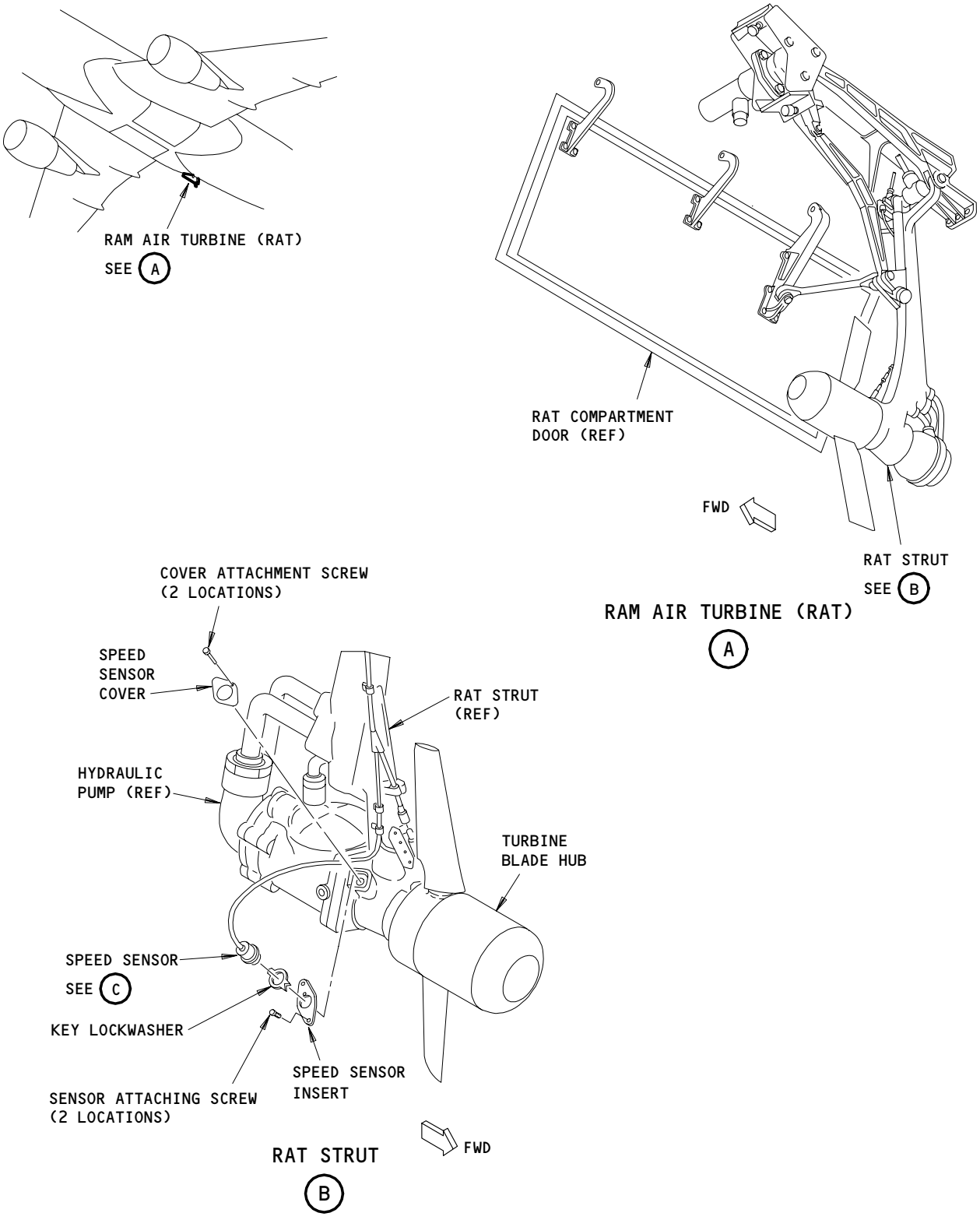
      S 865-002
      (1) Remove the pressure from the center hydraulic system (Ref 29-11-00).

      S 865-003
      (2) Extend the RAT (Ref 29-21-00/201).

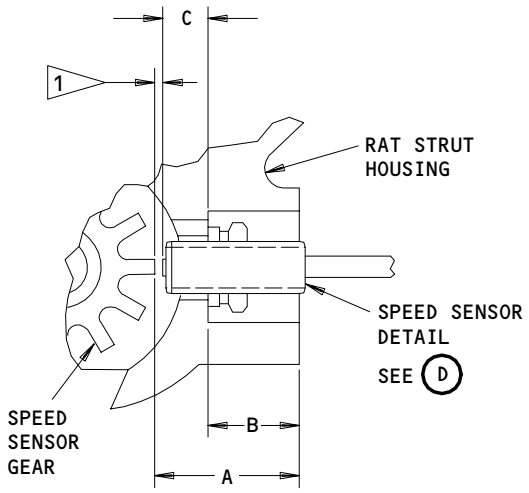
      S 035-004
      (3) Remove the screws that attach the speed sensor cover to the RAT strut housing.

      S 035-005
      (4) Remove the screws that attach the speed sensor to the RAT strut housing.

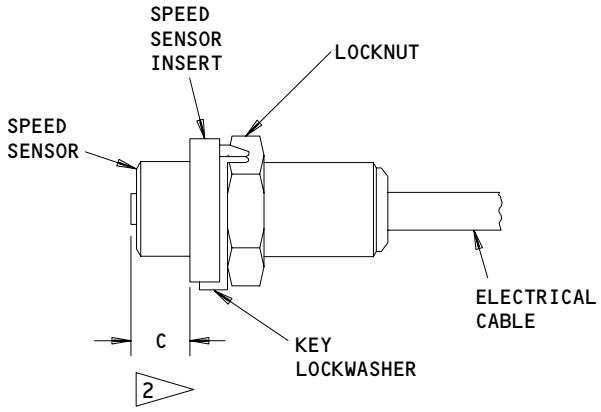
      S 835-006
      (5) SPEED SENSOR WITH A LOCKNUT;
      Do the steps that follow to adjust the speed sensor (Fig. 501):
      (a) Measure Dimension A and B (as shown in Views C and D).



Speed Sensor Adjustment with a Locknut
Figure 501 (Sheet 1)



SPEED SENSOR
C

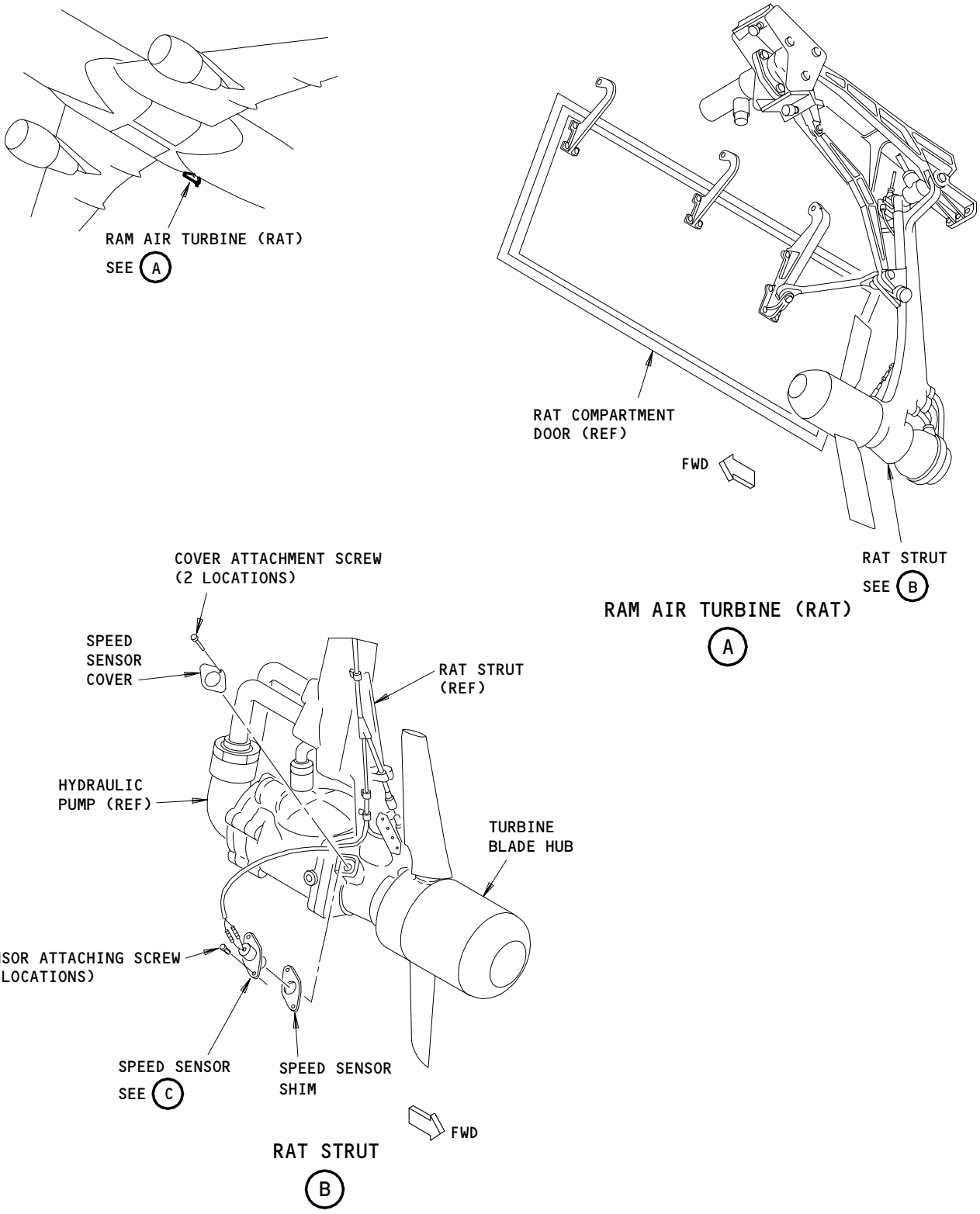


SPEED SENSOR DETAIL
D

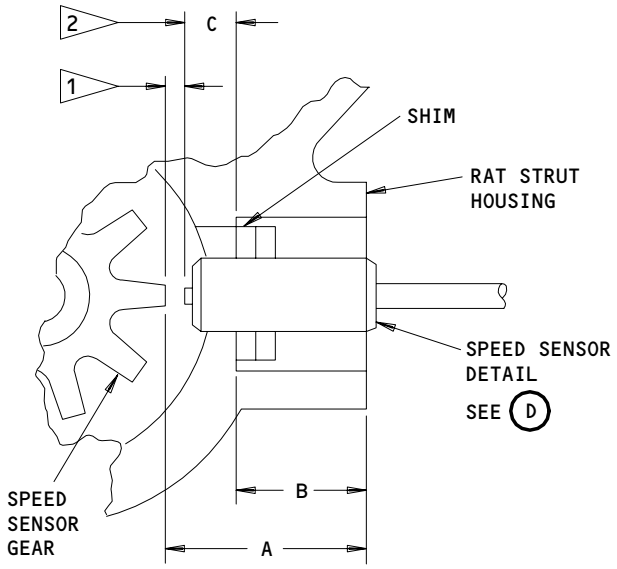
1 THE CLEARANCE BETWEEN THE SPEED SENSOR AND THE GEAR IS 0.010 ±0.002 INCH

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

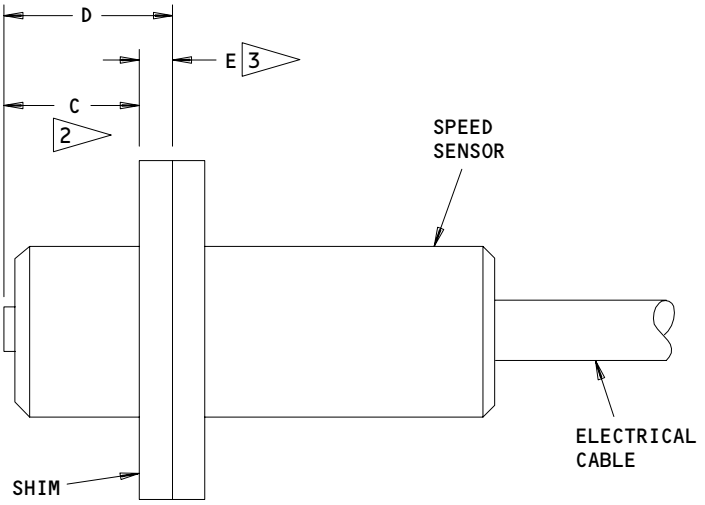
Speed Sensor Adjustment with a Locknut
Figure 501 (Sheet 2)



Speed Sensor Adjustment with a Shim
Figure 502 (Sheet 1)



SPEED SENSOR
C



SPEED SENSOR DETAIL
D

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 SHIM THICKNESS (DIMENSION E) IS CALCULATED AS FOLLOWS: E ±0.002 = D–C

Speed Sensor Adjustment with a Shim
Figure 502 (Sheet 2)

(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.
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 835-007
(6) SPEED SENSOR WITH A SHIM;
Do the steps that follow to adjust the speed sensor (Fig. 502):
(a) Measure Dimension A and B (as shown in View C).
(b) Measure 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 435-008
(7) 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 215-009
(8) Slowly turn the hub to make sure there is sufficient clearance between the speed sensor gear and the speed sensor.

S 835-010
(9) If the speed sensor touches the speed sensor gear, do the adjustment for the speed sensor again.

S 435-011
(10) 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 625-012
(11) Apply the sealant at the speed sensor wire to fill the groove in the RAT strut housing.

S 715-013
(12) Do the test for the RAT tachometer (Ref 29-21-00/501).

S 865-014
(13) Retract the RAT (Ref 29-21-00/201).

RAM AIR TURBINE (RAT) TACHOMETER - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the tachometer for the ram air turbine (RAT). The second task installs the tachometer for the ram air turbine (RAT).

TASK 29-21-16-004-001

2. Remove the Tachometer for the Ram Air Turbine (RAT) (Fig. 401)
   A. References
      (1) AMM 32-00-15/201, Main Gear Door Locks
      (2) 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: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

      S 034-004
      (3) Disconnect the electrical connector from the tachometer.

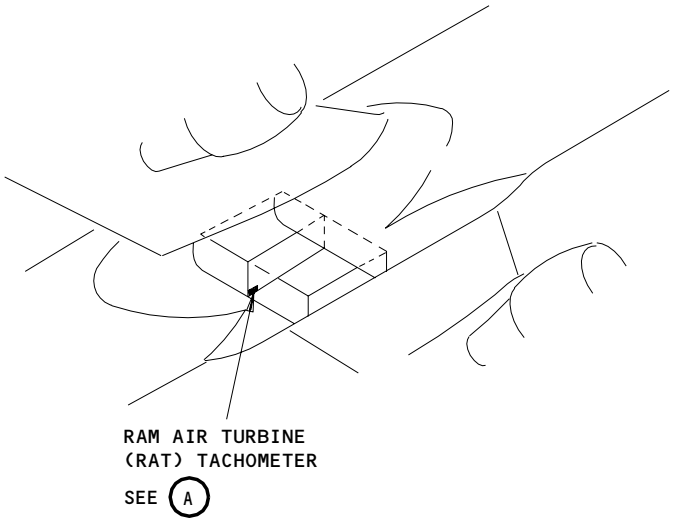
      S 034-005
      (4) Install a cap on the electrical connector.

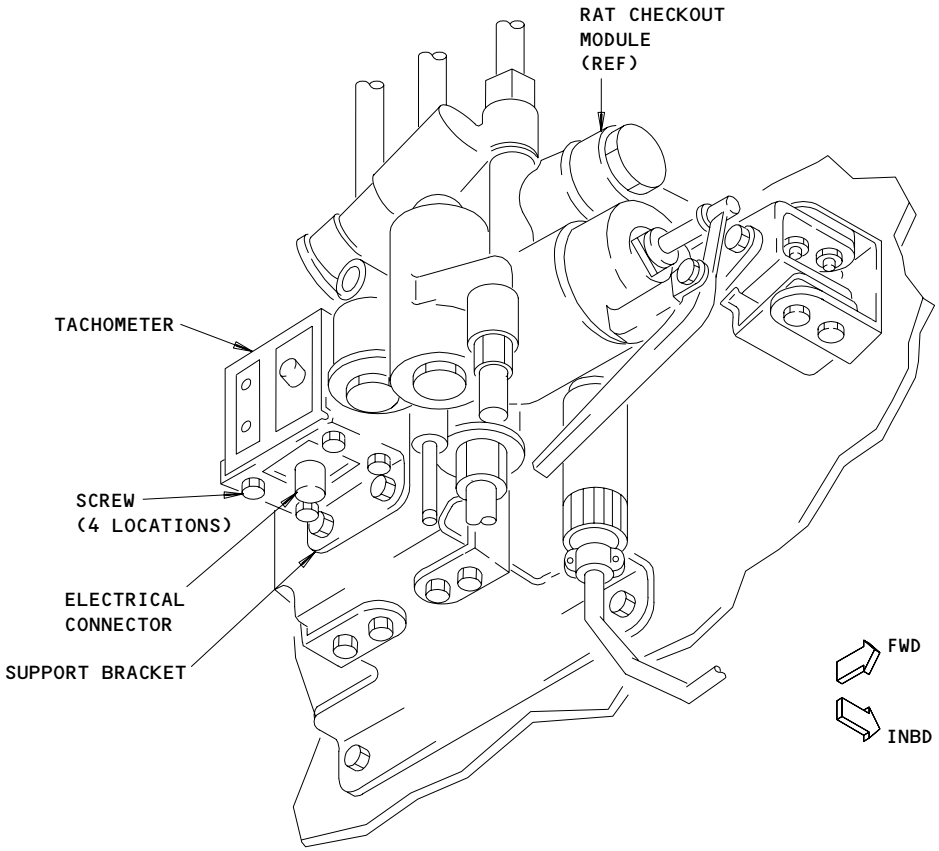
      S 024-006
      (5) Remove the screws which attach the tachometer to the support bracket.

      S 024-007
      (6) Remove the tachometer from the support bracket.

TASK 29-21-16-404-008

3. Install the Tachometer for the Ram Air Turbine (Fig. 401)
   A. References
      (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System





RAM AIR TURBINE (RAT)
TACHOMETER
(A)

RAT Tachometer Installation
Figure 401

(2) AMM 29-21-00/501, Ram Air Turbine (RAT) System
(3) AMM 32-00-15/201, Main Gear Door Locks

B. Access
(1) Location Zone
144 Right MLG Wheel Well

C. Procedure

S 424-009
(1) Put the tachometer on the support bracket.

S 424-010
(2) Install the screws to attach the tachometer to the support bracket.

S 434-011
(3) Safety the screws with a lockwire.

S 434-012
(4) Remove the cap from the electrical connector.

S 434-013
(5) Connect the electrical connector to the tachometer.

S 864-014
(6) Extend the RAT (AMM 29-21-00/201).

S 734-015
(7) Do the System Test- RAT Hydraulic Pump System procedure (AMM 29-21-00/501).

S 094-016

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

RAM AIR TURBINE (RAT) PROXIMITY SWITCHES - MAINTENANCE PRACTICES

1. General
   A. This procedure has three tasks. The first task removes the proximity switches for the ram air turbine (RAT). The second task installs the proximity switches. The third task adjusts the proximity switches.
   B. There are three proximity switches for the RAT:
      (1) Uplimit switch (S369)
      (2) Override limit switch (S501)
      (3) Downlimit switch (S365).

TASK 29-21-17-002-001

2. Remove the Proximity Switches for the Ram Air Turbine (RAT) (Fig. 201)
   A. References
      (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access panel
          198GR Ram Air Turbine

   C. Procedure

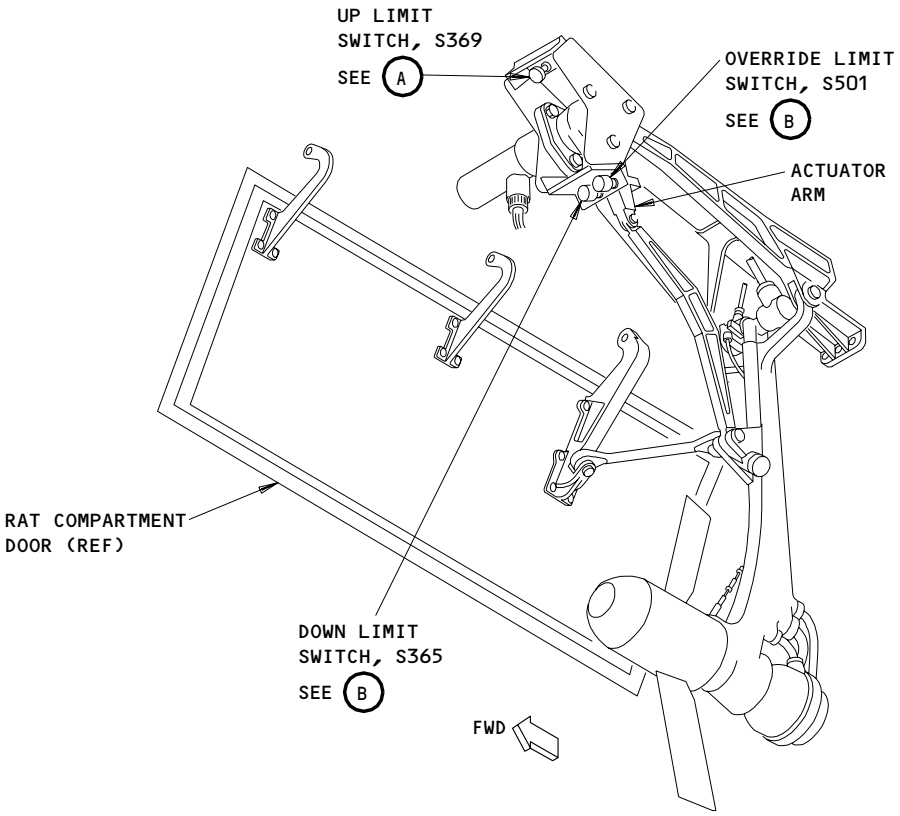
      S 862-002
      (1) Extend the RAT (AMM 29-21-00/201).

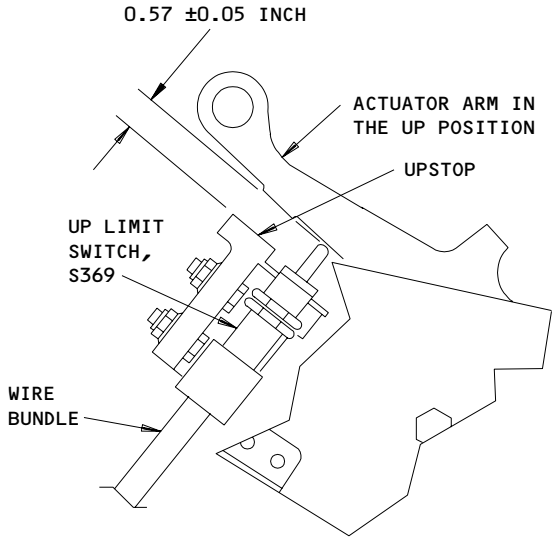
      S 032-003
      (2) Disconnect the wires at the nearest splice to the proximity switch.

      S 032-004
      (3) Remove the lockwire from the nut on the proximity switch.

      S 022-005
      (4) Remove the nut from the proximity switch.

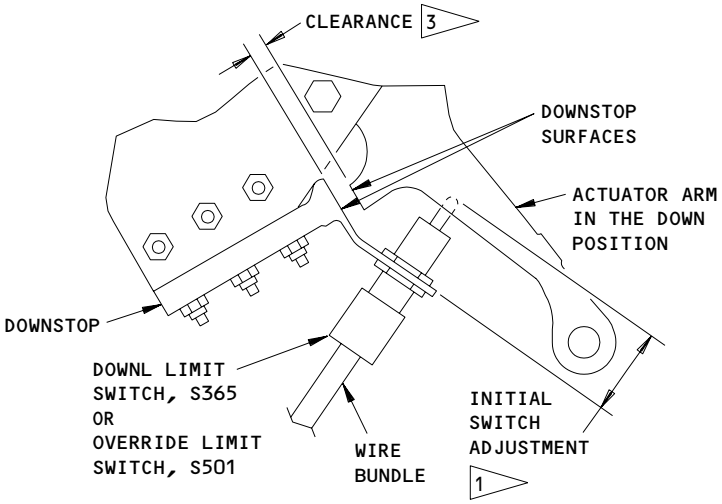
      S 022-006
      (5) Remove the proximity switch.





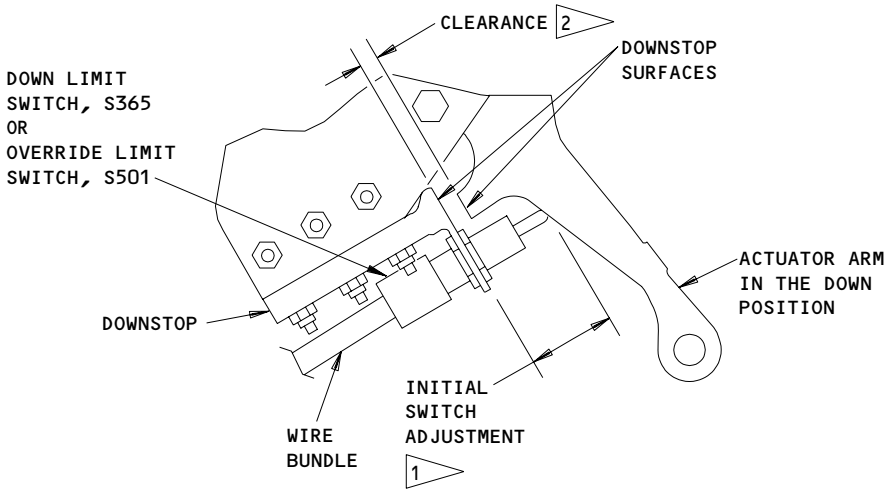
A

RAT Proximity Switch Installation
Figure 201 (Sheet 1)



(SWITCH WITH ANGLED DOWNSTOP)

B



(SWITCH WITH 90° DOWNSTOP)

B

1 THIS IS THE INITIAL SWITCH ADJUSTMENT. A SUBSEQUENT ADJUSTMENT OF THE SWITCH WILL GIVE THE CORRECT CLEARANCE BETWEEN THE ACTUATOR ARM AND THE DOWNSTOP

FOR SWITCH P/N 1EN61-6, ADJUSTMENT IS 1.61 ±0.05 INCH; FOR SWITCH P/N 1EN575-6 WITH 90 DEGREE DOWNSTOP, ADJUSTMENT IS 1.70 ±0.05 INCH; FOR SWITCH P/N 1EN575-6 WITH ANGLED DOWNSTOP, ADJUSTMENT IS 1.56 +0.00/-0.01 INCH.

2 FOR SWITCH P/N 1EN61-6, CLEARANCE IS 0.06-0.20 INCH; FOR SWITCH P/N 1EN575-6 WITH 90 DEGREE DOWNSTOP, CLEARANCE IS 0.15-0.25 INCH.

3 FOR SWITCH P/N 1EN575-6 WITH ANGLED DOWNSTOP, CLEARANCE IS 0.06-0.50 INCH.

RAT Proximity Switch Installation
Figure 201 (Sheet 2)

TASK 29-21-17-402-007

3. Install the Proximity Switches for the Ram Air Turbine (RAT) (Fig. 201)

A. References

(1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

B. Access

(1) Location Zone

198 Wing to Body - Aft Lower Half (Right)

(2) Access panel

198GR Ram Air Turbine

C. Procedure

S 422-008

(1) Put the proximity switch in its position on the RAT.

S 422-009

(2) Install the nut on the proximity switch.

S 432-010

(3) Connect the wires at the nearest splice to the proximity switch.

S 822-011

(4) Do the Adjust the Proximity Switches for the Ram Air Turbine procedure.

S 862-012

(5) Do the Retract the RAT procedure (AMM 29-21-00/201).

TASK 29-21-17-822-013

4. Adjust the Proximity Switches for the Ram Air Turbine (RAT) (Fig. 201)

A. General

(1) If the electric motor for the RAT rotary actuator has a defective brake, you possibly cannot get the correct clearances when you adjust the proximity switches. If this occurs, replace the electric motor for the RAT rotary actuator (Ref 29-21-05).

B. Equipment

(1) Ram Air Turbine Circuit Breaker Lockout Clips (Commercially available)

C. References

(1) AMM 29-21-00/201, Ram Air Turbine (RAT) System

(2) AMM 29-21-05/401, Ram Air Turbine (RAT) Rotary Actuator Electric Motor

(3) AMM 29-21-10/401, Ram Air Turbine (RAT) Door Link

D. Access

(1) Location Zone

198 Wing to Body - Aft Lower Half (Right)

(2) Access panel
198GR Ram Air Turbine

E. Prepare for the Adjustment

S 862-014
(1) If the RAT is not in the extended position, extend the RAT (AMM 29-21-00/201).

S 032-015
(2) Remove the ram air turbine door link (AMM 29-21-10/401).

F. Adjust the Uplimit Switch (S369)

S 032-016
(1) Loosen the nut on the uplimit switch.

S 822-017
(2) Turn the nuts on the uplimit switch to set the free position of the switch plunger to the dimension in View A, Fig. 201.

S 432-018
(3) Tighten the nuts on the uplimit switch.

S 862-019
(4) Do the Retract the RAT procedure (AMM 29-21-00/201).

S 862-020
(5) Open this circuit breaker on the main power distribution panel, P6, and install the lock set for the RAT circuit breakers:
(a) 6J8, RAM AIR TURBINE PWR

S 212-021
(6) Make sure the actuator arm does not touch the upstop.

S 822-022
(7) If the actuator arm touches the upstop, do this step:
(a) Adjust the uplimit switch in the direction of the upstop, until the actuator arm does not touch the upstop when you retract the RAT.

S 432-023
(8) Safety the nuts on the uplimit switch with a lockwire.

G. Adjust the Override Limit Switch (S501)

S 822-024
(1) If it is necessary, do these steps to set the initial position of the override limit switch.
(a) If the RAT is not in the retracted position, do the Retract the RAT procedure (AMM 29-21-00/201).

(b) Open this circuit breaker on the P6 panel and install the lock set for the RAT circuit breakers:
1) 6J8, RAM AIR TURBINE PWR
(c) Loosen the nut on the override limit switch.
(d) Turn the nuts to set the free position of the switch plunger to the dimension in View B, Fig. 201.
(e) Tighten the nuts on the override limit switch.
(f) Extend the RAT (AMM 29-21-00/201).

S 222-025
(2) Make sure the clearance between the actuator arm and the downstop is the same as the dimension in View B, Fig. 201.

S 822-026
(3) If the clearance is not correct, do these steps to adjust the override limit switch:
(a) Loosen the nut on the override limit switch.
(b) Turn the nuts to set the switch position.
1) Move the override limit switch in the direction of the actuator arm to increase the clearance.
2) Move the override limit switch in the direction away from the actuator arm to decrease the clearance.
(c) Tighten the nuts on the override limit switch.
(d) Do the Retract the RAT procedure (AMM 29-21-00/201).
(e) Extend the RAT (AMM 29-21-00/201).
(f) Make sure the clearance between the actuator arm and the downstop is the same as the dimension in View B, Fig. 201.
(g) If the clearance is not correct, adjust the override limit switch again.

S 432-027
(4) Safety the nuts on the override limit switch with a lockwire.

H. Adjust the Downlimit Switch (S365)

S 822-028
(1) If it is necessary, do these steps to set the initial position of the downlimit switch.
(a) If the RAT is not in the retracted position, do the Retract the RAT procedure (AMM 29-21-00/201).
(b) Open this circuit breaker on the P6 panel and install the lock set for the RAT circuit breakers:
1) 6J8, RAM AIR TURBINE PWR
(c) Loosen the nut on the downlimit switch.
(d) Turn the nuts to set the free position of the switch plunger to the dimension in View B, Fig. 201.
(e) Tighten the nuts on the downlimit switch.

S 862-029
(2) Do these steps to extend the RAT:
(a) Install a jumper between the terminals A1 and X1 of the relay K235, in the RAT compartment.

CAUTION: MAKE SURE THERE ARE NO PERSONS OR EQUIPMENT IN THE RAT AREA BEFORE YOU EXTEND THE RAT. THE MOVEMENT OF THE RAT AND THE DOOR CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Remove the lock set for the RAT circuit breakers and close this circuit breaker on the P6 panel, to extend the RAT:
1) 6J8, RAM AIR TURBINE PWR
(c) When the RAT stops in the extended position, open these circuit breakers on the P6 panel and install the lock set for the RAT circuit breakers:
1) 6C1, RAM AIR TURB MAN
2) 6C2, RAM AIR TURB AUTO
3) 6J8, RAM AIR TURBINE PWR
(d) Remove the jumper between the terminals A1 and X1 of the relay K235, in the RAT compartment.

S 222-030
(3) Make sure the clearance between the actuator arm and the downstop is the same as the dimension in View B, Fig. 201.

S 822-031
(4) If the clearance is not correct, do these steps to adjust the downlimit switch:
(a) Loosen the nut on the downlimit switch.
(b) Turn the nuts to set the switch position.
1) Move the downlimit switch in the direction of the actuator arm to increase the clearance.
2) Move the downlimit switch in the direction away from the actuator arm to decrease the clearance.
(c) Tighten the nuts on the downlimit switch.
(d) Do the Retract the RAT procedure (AMM 29-21-00/201).
(e) Open this circuit breaker on the P6 panel and install the lock set for the RAT circuit breakers:
1) 6J8, RAM AIR TURBINE PWR
(f) Do the steps to extend the RAT again.
(g) Make sure the clearance between the actuator arm and the downstop is the same as the dimension in View B, Fig. 201.
(h) If the clearance is not correct, adjust the downlimit switch again.

S 432-032
(5) Safety the nuts on the downlimit switch with a lockwire.

I. Put the Airplane Back to Its Usual Condition

S 862-033
(1) If the RAT is not in the extended position, extend the RAT (AMM 29-21-00/201).

S 432-034
(2) Install the RAT door link (AMM 29-21-10/401).

S 862-035
(3) Do the Retract the RAT procedure (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) RELIEF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the relief valve for the ram air turbine (RAT). The second task installs the relief valve for the ram air turbine (RAT).

TASK 29-21-18-004-001

2. Remove the Relief Valve for the Ram Air Turbine (RAT) (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. 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).

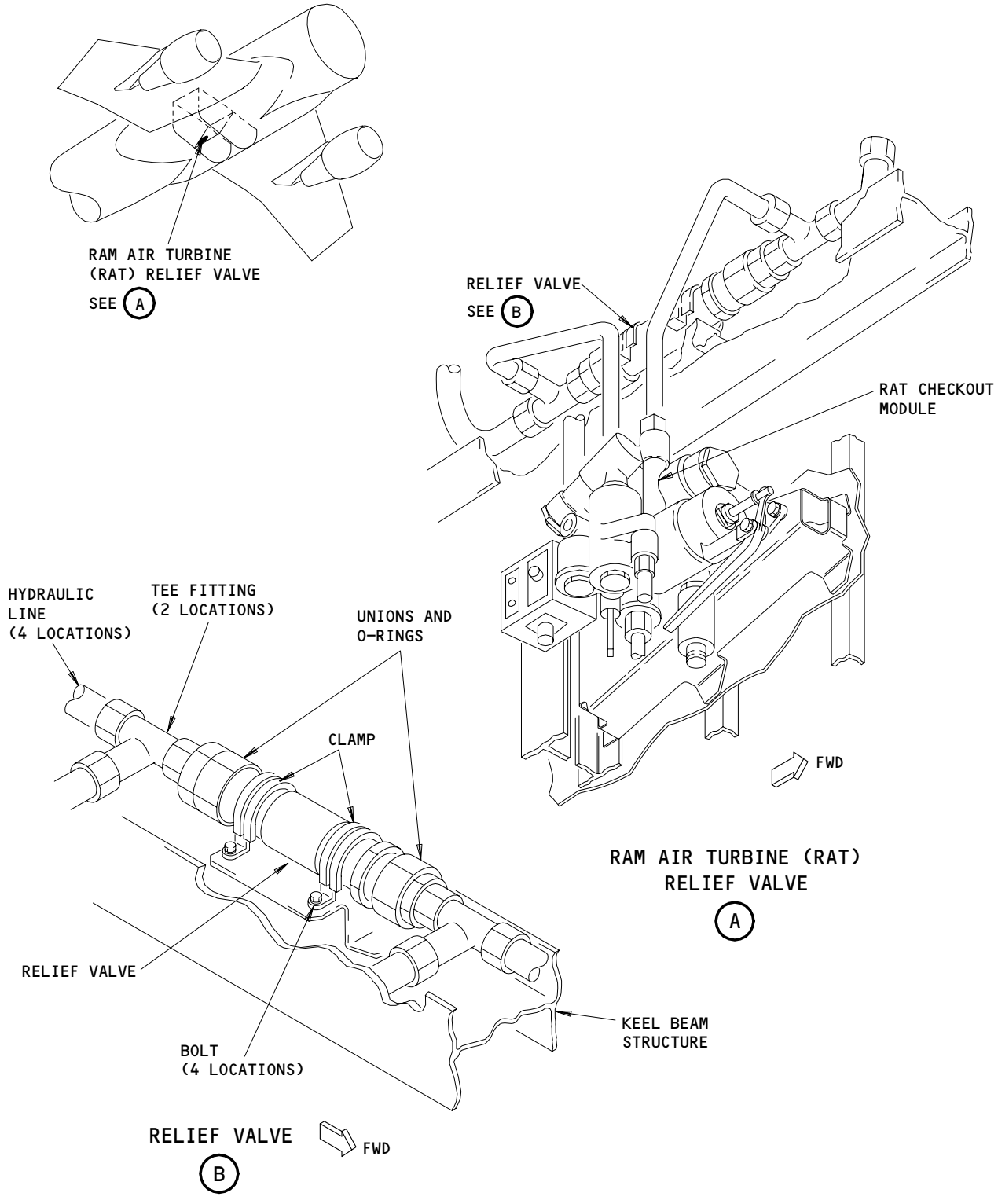
      S 494-003

      WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

      S 864-004
      (3) Remove the pressure from the center hydraulic system and the reservoir (AMM 29-11-00/201).

      S 684-005
      (4) Do these steps to drain the reservoir in the center hydraulic system.
          (a) Open the drain valve on the reservoir in the center hydraulic system.



RAT Relief Valve Installation
Figure 401

(b) Drain the hydraulic fluid into a container.
(c) After the fluid drains from the reservoir, close the drain valve.
(d) Safety the drain valve with a lockwire.

D. Remove the Relief Valve

S 034-006
(1) Disconnect the tee fitting of the hydraulic line from each end of the relief valve.

S 024-007
(2) Remove the bolts from the clamps.

S 024-008
(3) Remove the relief valve from the bracket.

S 034-009
(4) Remove the clamps from the relief valve.

TASK 29-21-18-404-010

3. Install the Relief Valve for the Ram Air Turbine (Fig. 401)

A. Equipment
(1) Container (for hydraulic fluid), 10 gallon capacity - Commercially Available

B. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

C. References
(1) AMM 12-12-01/301, Hydraulic System
(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
144 Right MLG Wheel Well

E. Install the Relief Valve

S 644-011
(1) Apply hydraulic system lubricant or hydraulic fluid to the O-rings and to the threads of the unions.

S 434-012
(2) Install the O-rings on the unions.

S 434-013
(3) Install the unions in the relief valve.

S 434-014
(4) Put the clamps on the relief valve.

S 424-015
(5) Put the relief valve on the bracket.

S 424-016
(6) Install the bolts to attach the clamps to the bracket.

S 434-017
(7) Connect the tee fitting of the hydraulic line to each end of the relief valve.

F. Put the Airplane Back to Its Usual Condition

S 614-018
(1) Fill the reservoir in the center hydraulic system (AMM 12-12-01/301).

S 864-019
(2) Pressurize the center hydraulic system and the reservoir (AMM 29-11-00/201).

S 214-020
(3) Make sure there are no leaks at the relief valve.

S 114-021

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

(4) Clean all hydraulic fluid from the area of the relief valve (AMM 12-25-01/301).

S 094-022

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 864-023

(6) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

RAM AIR TURBINE (RAT) ISOLATION-CHECK VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. One task removes the RAT isolation-check valve. The other task installs the RAT isolation-check valve.

TASK 29-21-19-004-001

2. Remove the RAT Isolation-Check Valve
   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 Zone
          143 Left MLG Wheel Well

   C. Prepare For Removal

      S 094-002
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

      S 014-003

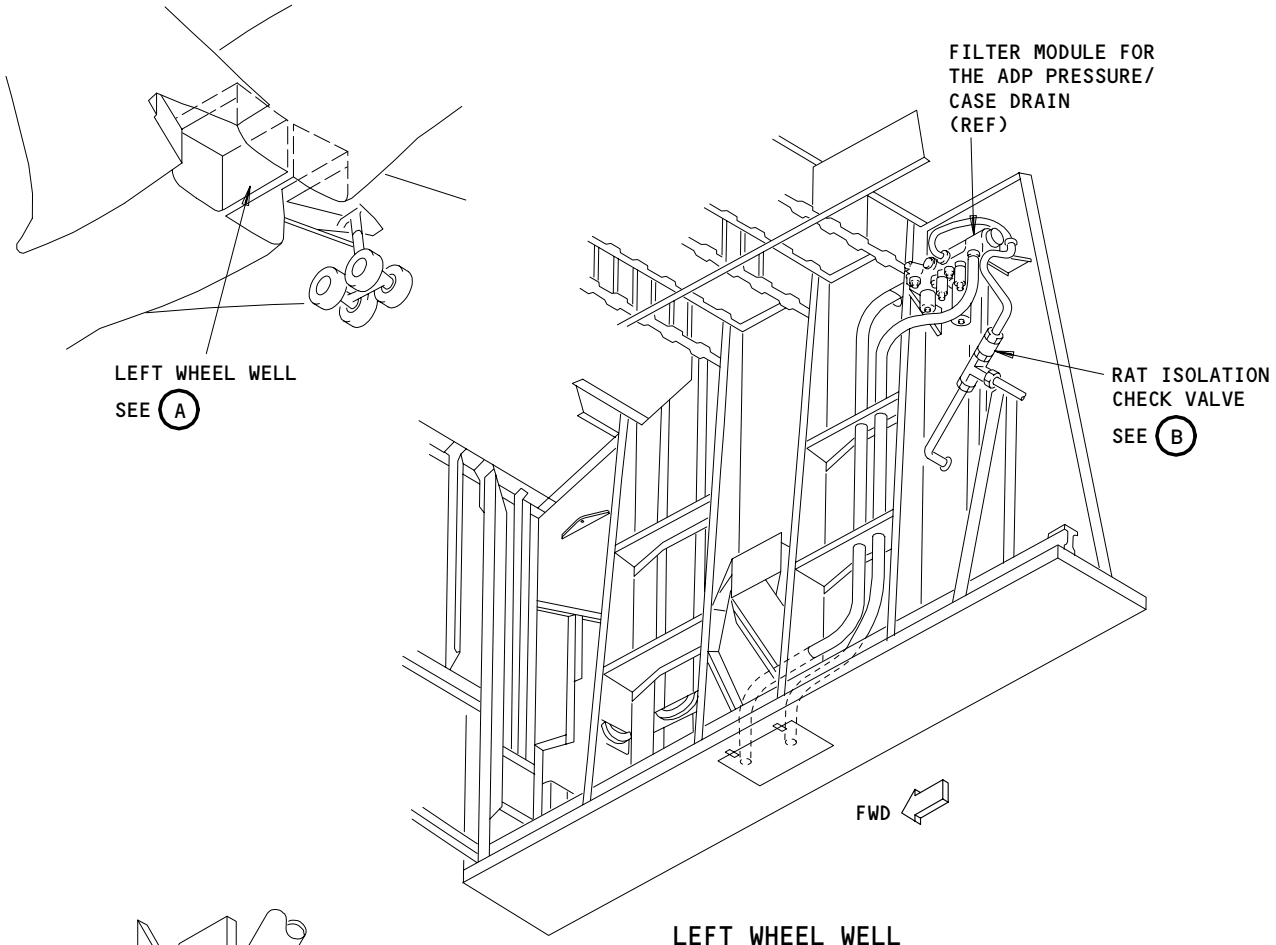
      WARNING: USE THE PROCEDURE IN (AMM 32-00-15) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

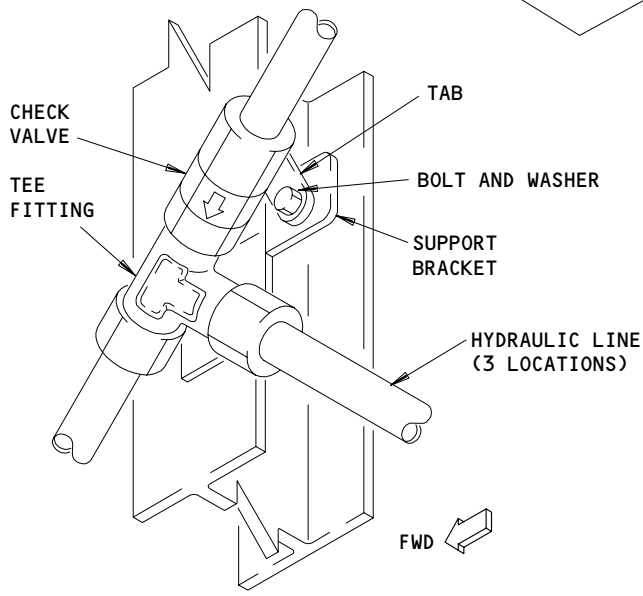
      S 864-006
      (3) Remove the pressure from the center hydraulic system and reservoir (AMM 29-11-00/201).
   D. Remove the RAT Isolation-Check Valve (Fig. 401)

      S 034-007
      (1) Disconnect the hydraulic line and the tee fitting from the check valve.

      S 024-008
      (2) Remove the bolt from the tab on the check valve and remove the check valve.



LEFT WHEEL WELL
A



RAT ISOLATION CHECK VALVE
B

Ram Air Turbine (Rat) Isolation-Check Valve
Figure 401

TASK 29-21-19-404-004

3. Install the RAT Isolation-Check Valve

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 - Control
(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 Zone
143 Left MLG Wheel Well

D. Install the RAT Isolation-Check Valve (Fig. 401)

S 644-009
(1) Apply hydraulic system lubricant or hydraulic fluid to the check valve threads before installation.

S 424-010
(2) Put the check valve in position on the support bracket.

S 424-011
(3) Install the bolt and washer in the tab on the check valve.

S 434-012
(4) Connect the hydraulic line and the tee fitting to the check valve.

E. Put the Airplane Back to Its Usual Condition

S 864-013
(1) Supply electrical power (AMM 24-22-00/201).

S 614-014
(2) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 864-015

(3) Pressurize the center hydraulic system and reservoir (AMM 29-11-00/201).

S 214-016

(4) Make sure there are no leaks at the check valve connections.

S 114-017

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

(5) Clean all hydraulic fluid from the area of the relief valve (AMM 12-25-01/301).

S 414-005

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.

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

S 864-018

(7) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-019

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

RAM AIR TURBINE (RAT) WIRE HARNESS - REMOVAL/INSTALLATION

1. General
   A. This task has two tasks. The first task removes the wire harness for the ram air turbine (RAT). The second task installs 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 29-21-20-004-001

2. Remove the Wire Harness for the Ram Air Turbine (RAT) (Fig. 401)
   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 Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access panel
          198GR Ram Air Turbine

   C. Procedure

      S 864-002
      (1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

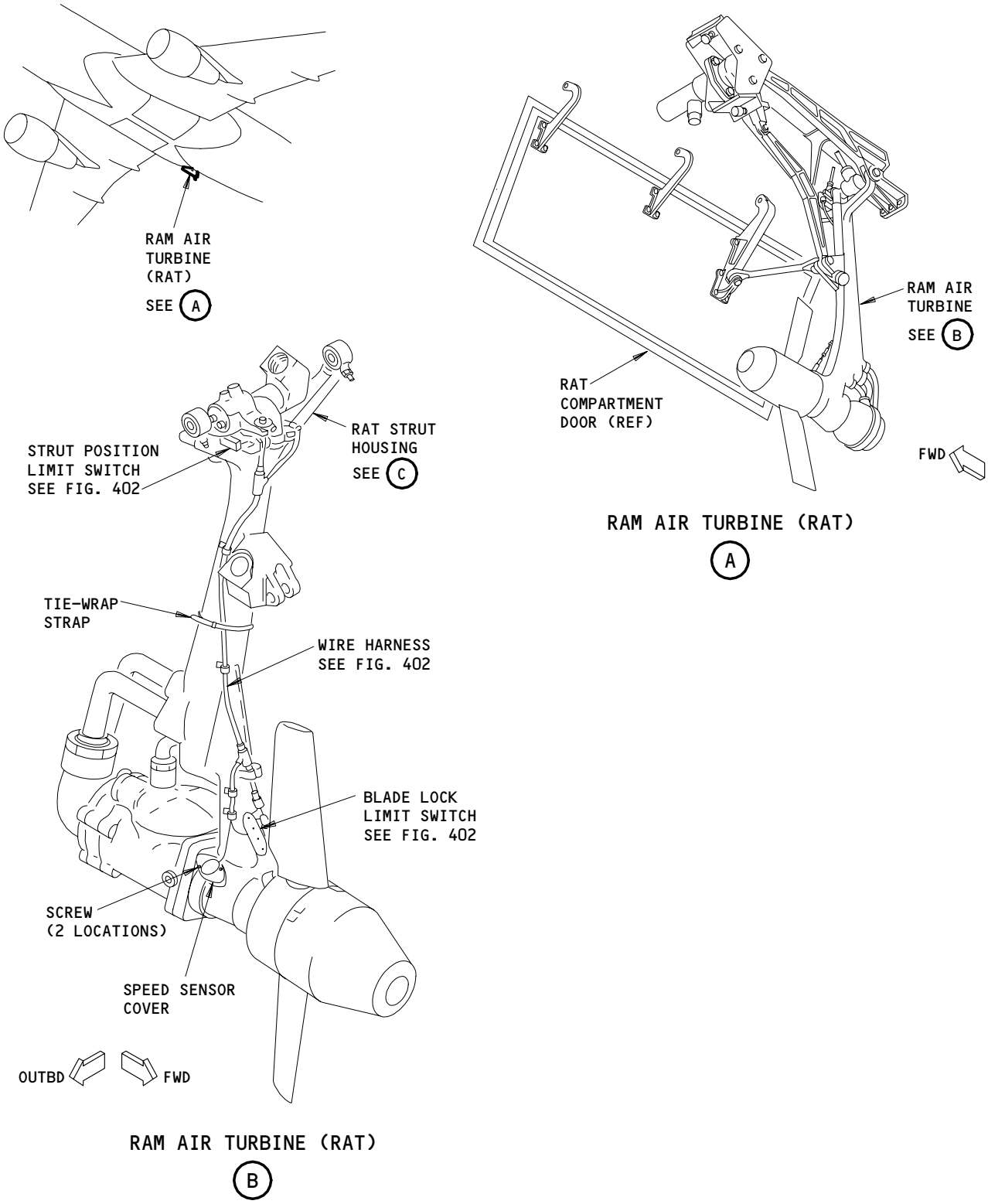
      S 864-003
      (2) Extend the RAT (AMM 29-21-00/201).

      S 034-004
      (3) Disconnect the connector for the airplane wire harness at the top of the RAT strut housing.

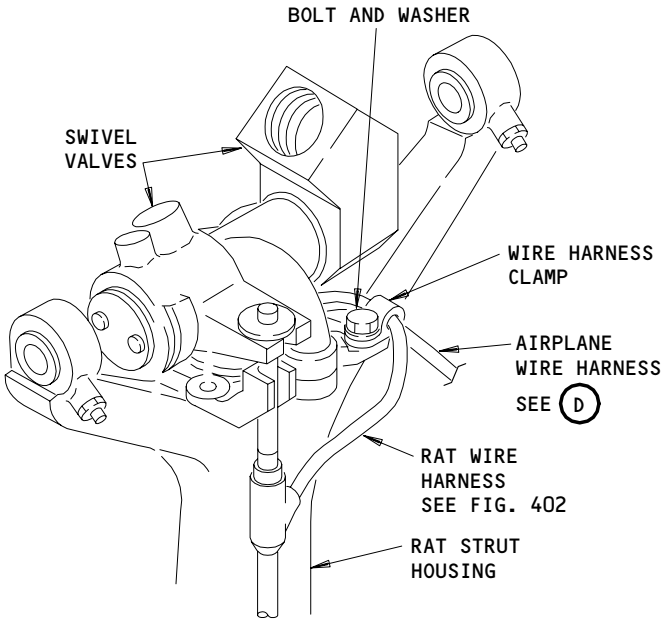
      S 024-005
      (4) Remove the screws from the bracket for the electrical connector, near the top of the RAT strut housing (Fig. 402).

      S 024-006
      (5) Remove the electrical connector and the bracket from the RAT strut housing.

      S 024-007
      (6) If you will remove the limit switches and the speed sensor with the wire harness, do these steps:
          (a) Remove the screws from the speed sensor cover.
          (b) Remove the speed sensor cover.
          (c) Remove the screws from the speed sensor.

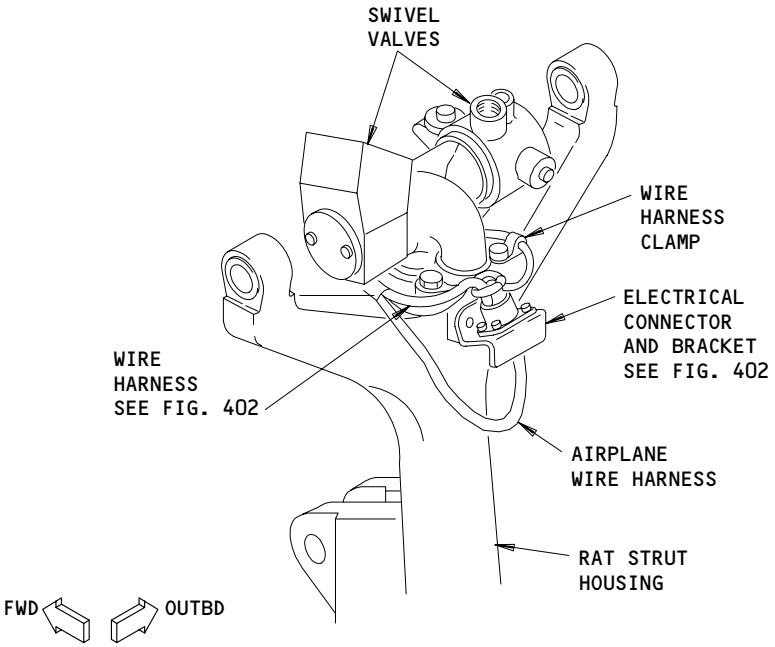


Ram Air Turbine (RAT)
Figure 401 (Sheet 1)



RAT STRUT HOUSING

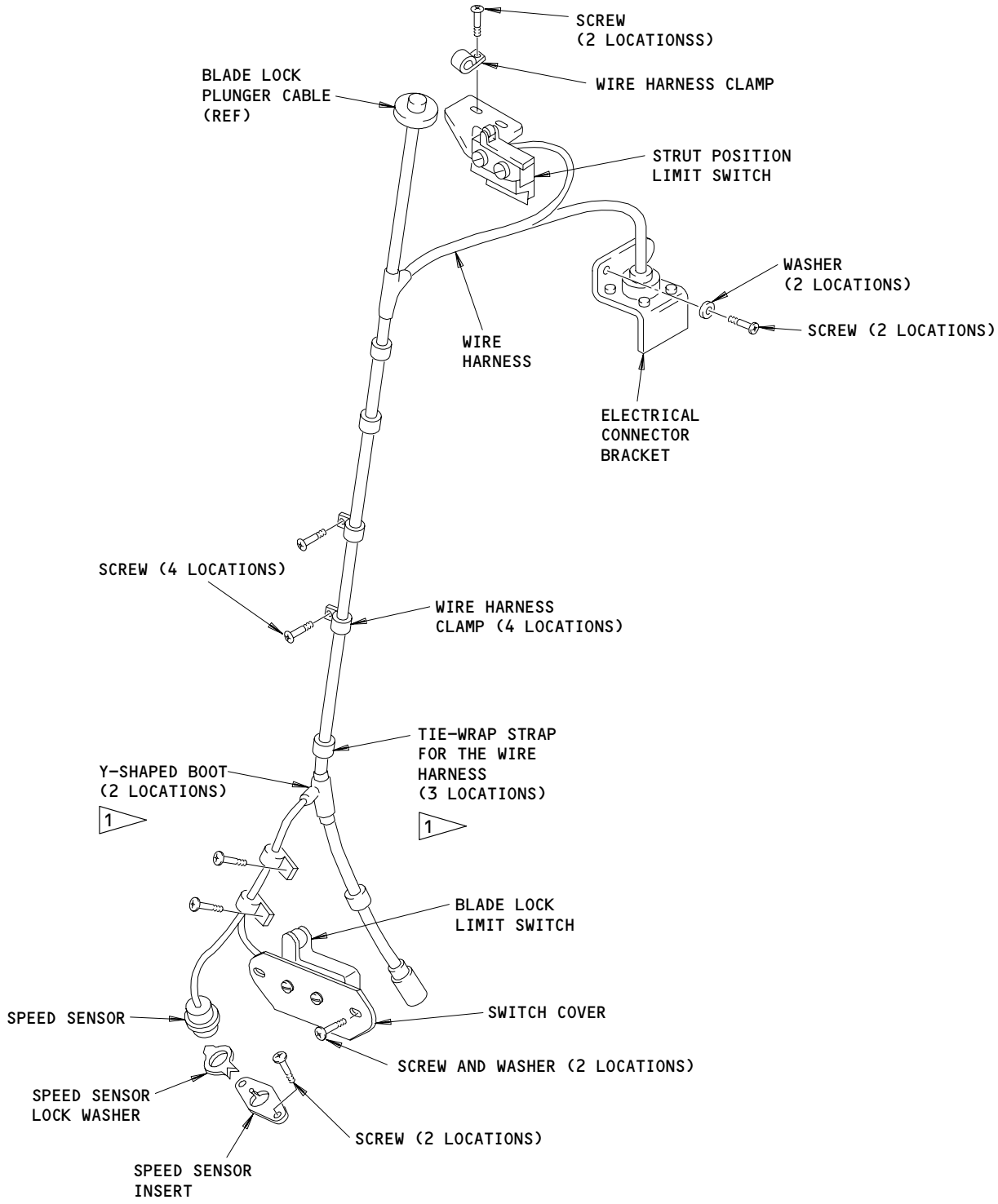
C



RAT STRUT HOUSING

D

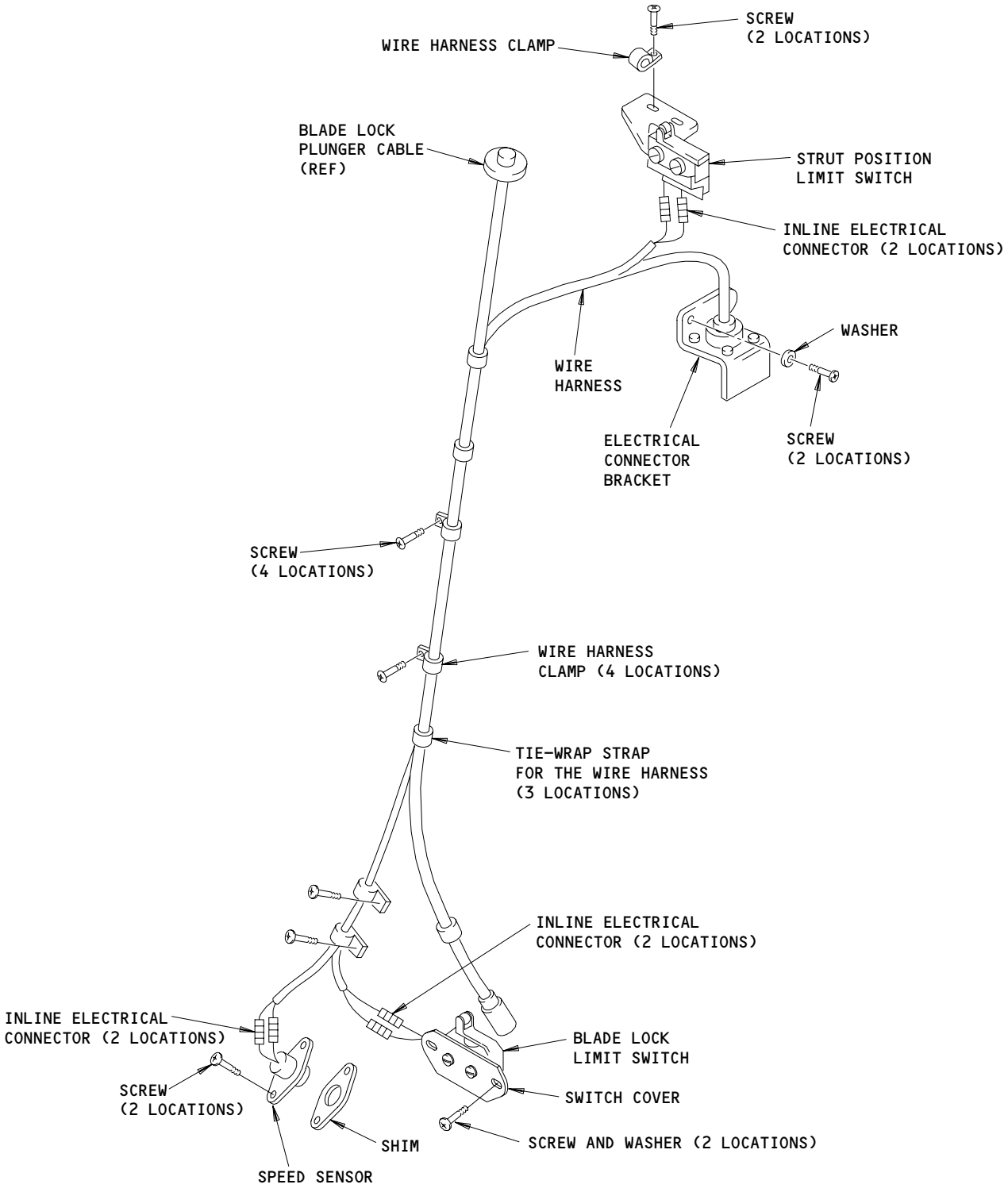
Ram Air Turbine (RAT)
Figure 401 (Sheet 2)



WIRE HARNESS WITHOUT IN-LINE ELECTRICAL CONNECTORS

1 IF Y-SHAPED BOOTS ARE INSTALLED, REPLACE THEM WITH THE TIE-WRAPS WHEN YOU INSTALL THE WIRE HARNESS

RAT Wire Harness Installation
Figure 402 (Sheet 1)



WIRE HARNESS WITH INLINE ELECTRICAL CONNECTORS

RAT Wire Harness Installation
Figure 402 (Sheet 2)

(d) Remove the speed sensor.
(e) Remove the screws from the bracket, for the strut position limit switch, near the top of the RAT strut housing.
(f) Remove the bracket and the strut position limit switch, near the top of the RAT strut housing.
(g) Remove the screws from the switch cover, for the blade lock limit switch, near the bottom of the RAT strut housing.
(h) Remove the switch cover and the blade lock limit switch, near the bottom of the RAT strut housing.

S 024-008
(7) 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 connectors, do these steps:
1) Cut the heat-shrink tube from the inline electrical connectors.
2) Disconnect the inline electrical connectors.
(b) If the wire harness does not have inline electrical connectors, cut the wires at these locations:
1) At the blade lock limit switch, cut the two wires approximately 3.75 inches from the switch.
2) At the strut position limit switch, cut the wire from the terminal C approximately 3.75 inches from the switch.
3) At the strut position limit switch, cut the wire from the terminal NC approximately 5.00 inches from the switch.
4) At the speed sensor, cut the two wires approximately 1.75 inches from the speed sensor.

S 024-009
(8) If the wire harness does not have a flip-open type clamp, do these steps:
(a) Remove the bolt from the wire harness clamp, at the top of the RAT strut housing.
(b) Remove the wire harness clamp at the top of the RAT strut housing:

S 024-010
(9) If the wire harness has a flip-open type clamp, do these steps:
(a) Open the wire harness clamp at the top of RAT strut housing.
(b) Remove the wire harness from the wire harness clamp, at the top of the RAT strut housing.

S 024-011
(10) Remove the tie-wrap strap which attaches the wire harness and the cable for the blade lock plunger to the RAT strut housing.

S 024-012
(11) Remove the screws which attach the wire harness clamps to the RAT strut housing.

S 024-013
(12) Remove the wire harness clamps from the wire harness.

S 024-014
(13) 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 024-015
(14) 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.

S 024-016
(15) Remove the wire harness from the RAT strut housing.

TASK 29-21-20-404-017
3. Install the Wire Harness for the Ram Air Turbine (RAT) (Fig. 401)
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 29-21-22/401, Ram Air Turbine (RAT) Strut Position Limit Switch
(4) AMM 29-21-23/401, Ram Air Turbine (RAT) Blade Lock Limit Switch
C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access panel
198GR Ram Air Turbine

D. Procedure

S 424-022
(1) Put the wire harness on the RAT strut housing.

S 424-021
(2) Install the screws and washers to attach the electrical connector bracket to the top of the RAT strut housing (Fig. 402).

S 434-020
(3) Tighten the screws to 20-22 pound-inches.

S 424-023
(4) If the wire harness does not have a flip-open type clamp, do these steps:
  (a) Put the airplane wire harness and the RAT wire harness in the clamp.
  (b) Install the bolt and washer to attach the clamp to the top of the RAT strut housing.
  (c) Tighten the bolt to 51-56 pound-inches.

S 424-024
(5) If the wire harness has a flip-open type clamp, do these steps:
  (a) Put the airplane wire harness and the RAT wire harness in the clamp, at the top of the RAT strut housing.
  (b) Close the clamp.

S 424-025
(6) Put the wire harness clamps on the wire harness.

S 424-026
(7) Install the screws which attach the wire harness clamps to the RAT strut housing.

S 434-027
(8) Tighten the screws to 32-36 pound-inches.

S 424-028
(9) Install the three tie-wrap straps to attach the wire harness to the blade lock plunger cable.

S 424-029
(10) Install the tie-wrap strap to attach the wire harness and the blade lock plunger cable to the RAT strut housing.

S 424-030
(11) If you removed the limit switches and the speed sensor with the wire harness, do these steps:
  (a) Put the strut position limit switch 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 strut position limit switch.
  (d) Install the screws to attach the clamp and the bracket, for the strut position limit switch, to the RAT strut housing.
  (e) Tighten the screws by hand until you adjust the strut position limit switch.
  (f) Put the blade lock limit switch and the switch cover in the hole at the bottom of the RAT strut housing.
  (g) Install the screws and washers to attach the switch cover to the RAT strut housing.

(h) Tighten the screws by hand until you adjust the blade lock limit switch.
(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 strut position limit switch (AMM 29-21-22/401).
(n) Adjust the blade lock limit switch (AMM 29-21-23/401).
(o) Apply the sealant at the speed sensor wire to fill the groove in RAT strut housing.
(p) Apply the sealant around the wires of the blade lock limit switch, in the hole in the RAT strut housing.

S 424-031
(12) 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, on the limit switches, and on 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 electrical connectors.

S 434-032
(13) Connect the electrical connector at the top of the RAT strut housing.

S 864-033
(14) Do the RAT retraction procedure (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) BLADE LOCK PLUNGER AND CABLE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the plunger and the cable for the blade lock of the ram air turbine (RAT). The second task installs the plunger and the cable for the blade lock of the RAT.

TASK 29-21-21-004-001

2. Remove the Plunger and the Cable for the Blade Lock of the Ram Air Turbine (RAT) (Fig. 401)
   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
      (3) AMM 29-21-01/401, Ram Air Turbine (RAT) and Components
   B. Access
      (1) Location Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access panel
          198GR Ram Air Turbine

   C. Procedure

      S 864-002
      (1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

      S 864-003
      (2) Extend the RAT (AMM 29-21-00/201).

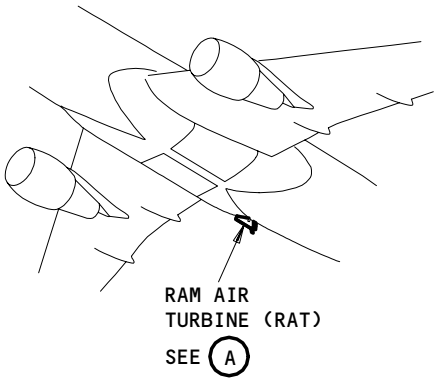
      S 014-004
      (3) Remove the hub of the RAT (AMM 29-21-01/401).

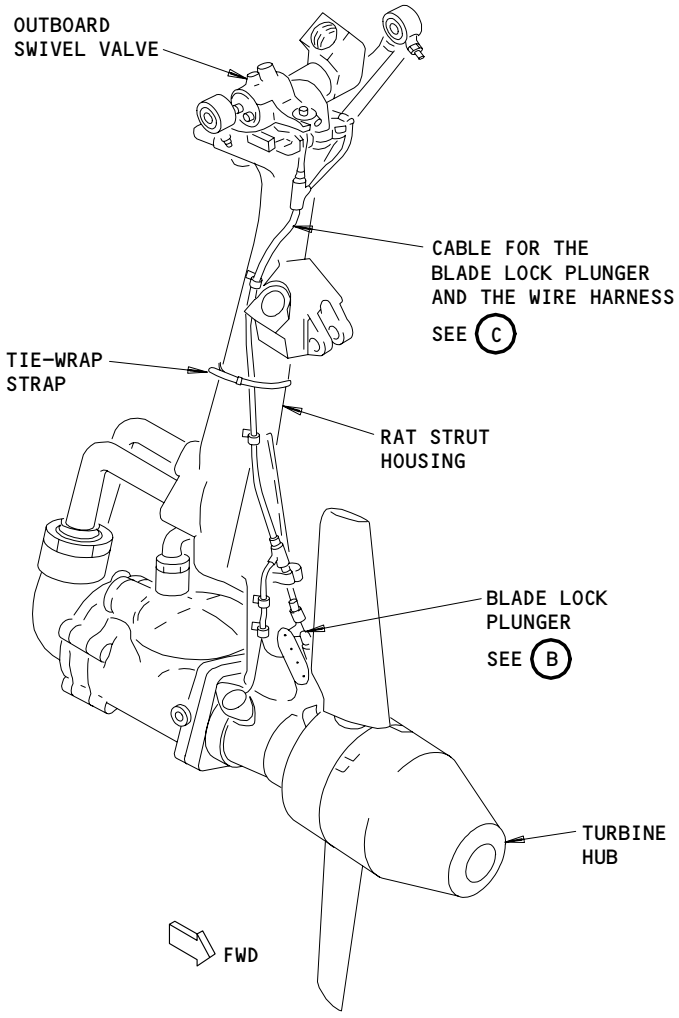
      S 024-005
      (4) Remove the tie-wrap strap which attaches the wire harness and the cable to the RAT strut housing.

      S 024-006
      (5) Remove the screws from the two wire harness clamps.

      S 024-007
      (6) Remove the two wire harness clamps.

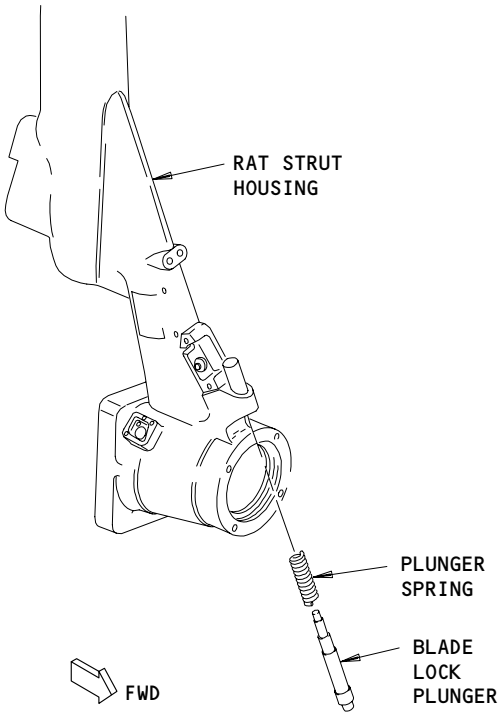
      S 024-008
      (7) If the wire harness attaches to the cable, for the blade lock plunger, with Y-shaped boots, do this step:
          (a) Carefully cut the Y-shaped boot from the wire harness and the cable for the blade lock plunger.





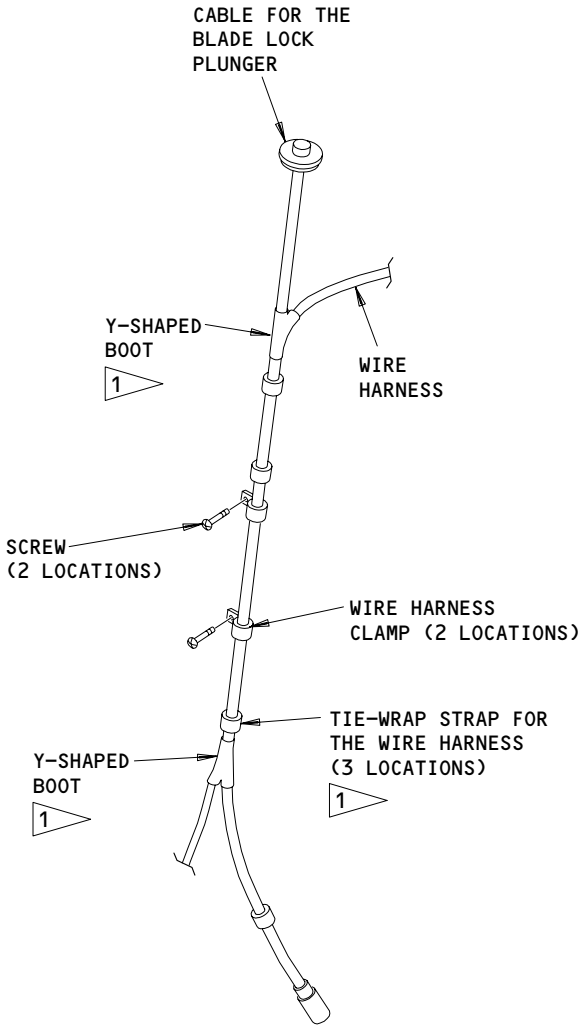
RAM AIR TURBINE (RAT)
A

RAT Blade Lock Plunger and Cable Installation
Figure 401 (Sheet 1)



BLADE LOCK PLUNGER

B



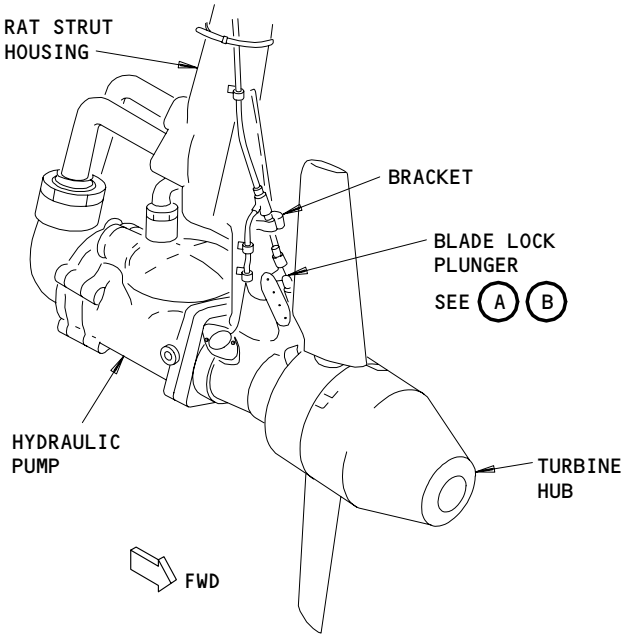
CABLE FOR THE BLADE LOCK
AND WIRE HARNESS

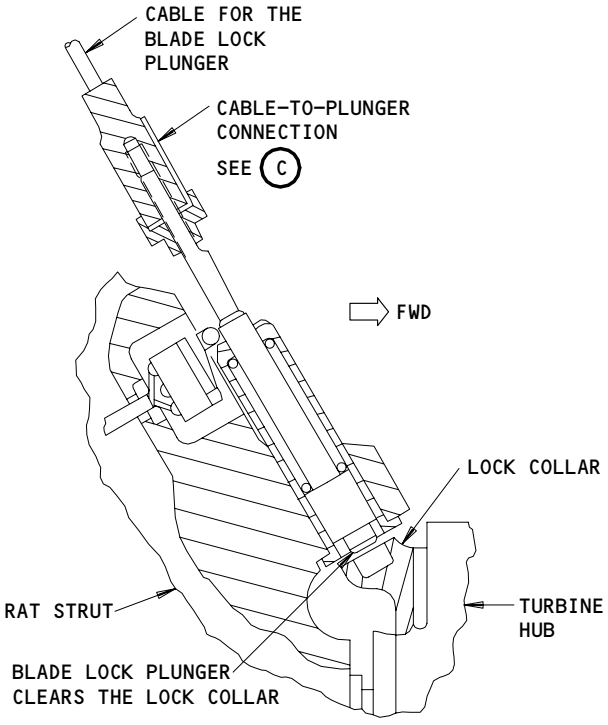
C

1 IF Y–SHAPED BOOTS ARE INSTALLED, REPLACE THEM WITH THE TIE–WRAP STRAPS WHEN YOU INSTALL THE WIRE HARNESS

RAT Blade Lock Plunger and Cable Installation
Figure 401 (Sheet 2)

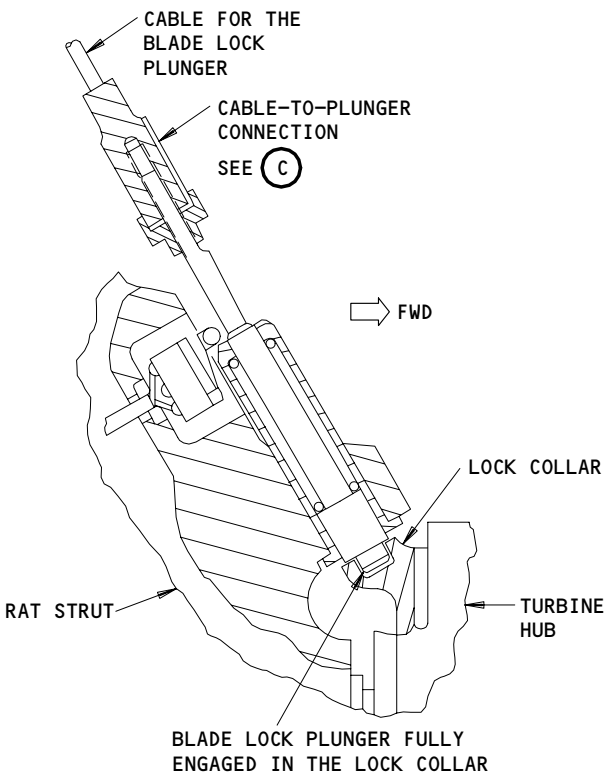
183338





RAT (10 1/2 DEGREES FROM
THE FULLY EXTENDED POSITION)

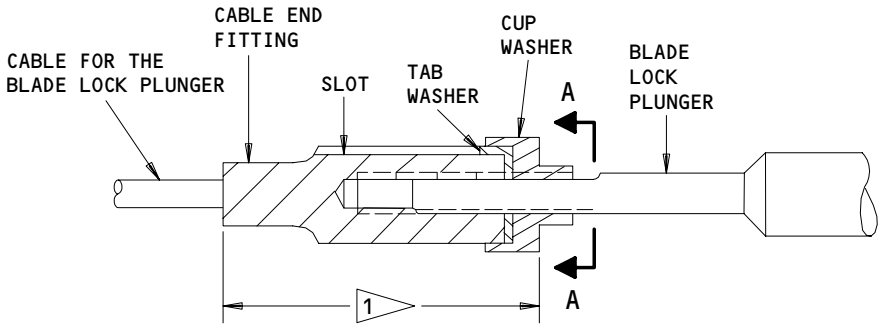
A



RAT (18 DEGREES FROM
THE FULLY EXTENDED POSITION)

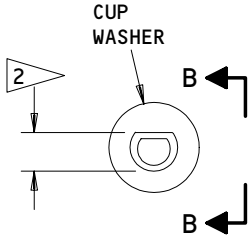
B

Blade Lock Plunger and Cable Connection
Figure 402 (Sheet 1)

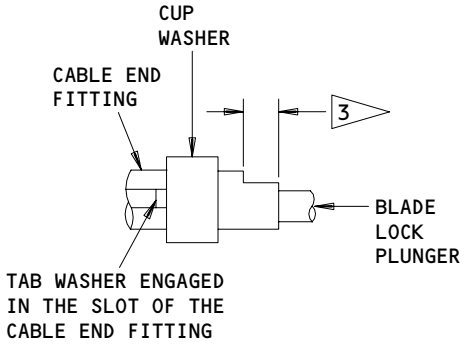


CABLE-TO-PLUNGER CONNECTION

C



A-A



B-B

1 1.34 INCHES MAXIMUM

2 0.235 INCH MAXIMUM AFTER YOU CRIMP THE CUP WASHER

3 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)

S 024-009

(8) 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.

S 034-050

CAUTION: BE CAREFUL TO 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.

(9) Remove material with a file, from the crimped surface of the cup washer, until the surface is thin and you can turn the cup washer (Fig. 402).

S 034-011

(10) Turn the cup washer to get access to the tab washer.

S 034-012

(11) Disengage the tab, of the tab washer, from the slot in the cable end fitting.

S 034-013

(12) Turn the blade lock plunger to remove it from the cable end fitting.

S 034-014

(13) Remove the tab washer and the cup washer from the blade lock plunger.

S 024-015

(14) Remove the blade lock plunger and the plunger spring from the RAT strut housing.

S 024-016

(15) Disengage the cable, for the blade lock plunger, from the bracket on the RAT strut housing.

S 024-017

(16) Disengage the cable, for the blade lock plunger, from the outboard swivel valve at the top of the RAT strut housing.

TASK 29-21-21-404-018

3. Install the Plunger and the Cable for the Blade Lock of the Ram Air Turbine (RAT) (Fig. 401)
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) and Components
(3) AMM 29-21-07/401, RAT Deployment Arm
(4) AMM 29-21-10/401, RAT Door Link

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access panel
198GR Ram Air Turbine

D. Procedure

S 424-019
(1) Engage the top of the cable, for the blade lock plunger, with the slot in the outboard swivel valve.

S 424-020
(2) Engage the cable, for the blade lock plunger, with the bracket which is near the bottom of the RAT strut housing.

S 424-021
(3) Put the two wire harness clamps on the wire harness and the cable for the blade lock plunger.

S 424-022
(4) Install a screw to attach each clamp to the RAT strut housing.

S 434-023
(5) Tighten the screws, which attach the clamps to the RAT strut housing, to 32-36 pound-inches.

S 424-024
(6) Install the four tie-wrap straps to attach the wire harness to the cable for the blade lock plunger.

S 424-025
(7) Install the tie-wrap strap to attach the wire harness and the cable for the blade lock plunger to the RAT strut housing.

S 424-026
(8) Install the blade lock plunger and the plunger spring in the RAT strut housing.

S 434-027
(9) Install the cup washer and the tab washer on the blade lock plunger (Fig. 402).

S 424-028
(10) Turn the blade lock plunger into the cable end fitting.

NOTE: Do not bend the tab of the tab washer, to engage it with the slot in the cable end fitting, at this time.

S 434-029
(11) Install the hub of the RAT (AMM 29-21-01/401).

S 034-030
(12) Disconnect the RAT deployment arm from the RAT strut housing (AMM 29-21-07/401).

S 034-031
(13) Disconnect the RAT door link from the door or from the RAT strut housing (AMM 29-21-10/401).

S 984-032
(14) Turn the turbine hub until the blade lock plunger aligns with one of the holes in the lock collar.

S 984-033
(15) 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 10 1/2 degrees from the fully extended position.

S 824-034
(16) Turn the blade lock plunger until there is clearance between it and the lock collar on the turbine hub.

S 984-035
(17) 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 18 degrees from the fully extended position.

S 214-036
(18) Make sure the blade lock plunger fully engages the lock collar.

S 984-037
(19) Manually move the RAT to the extended position.

S 984-038
(20) Turn the turbine hub 1/2 turn to align the opposite hole in the lock collar with the blade lock plunger.

S 984-039
(21) 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 10 1/2 degrees from the fully extended position.

S 214-040
(22) Make sure there is clearance between the blade lock plunger and the lock collar on the turbine hub.

S 984-041
(23) 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 18 degrees from the fully extended position.

S 214-042
(24) Make sure the blade lock plunger fully engages the lock collar.

S 984-043
(25) Turn the blade lock plunger no more than 1/2 turn to align the tab of the tab washer with the slot in the cable end fitting.

S 434-044
(26) Bend the tab of the tab washer to engage the slot in the cable end fitting.

S 434-045
(27) Tighten the cup washer by hand, against the tab washer.

S 434-046
(28) Crimp the cup washer on the blade lock plunger.

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 434-047
(29) Connect the RAT door link (AMM 29-21-10/401).

S 434-048
(30) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-07/401).

S 864-049
(31) Do the RAT retraction procedure (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) STRUT POSITION LIMIT SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the limit switch for the strut position of the ram air turbine (RAT). The second task installs the limit switch.
   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 (Ref 29-21-20/401).

TASK 29-21-22-004-001

2. Remove the Limit Switch for the Strut Position of the Ram Air Turbine (RAT) (Fig. 401)
   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 Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access panel
          198GR Ram Air Turbine

   C. Procedure

      S 864-002
      (1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

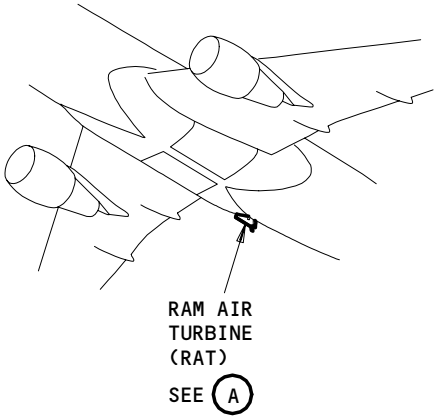
      S 864-003
      (2) Extend the RAT (AMM 29-21-00/201).

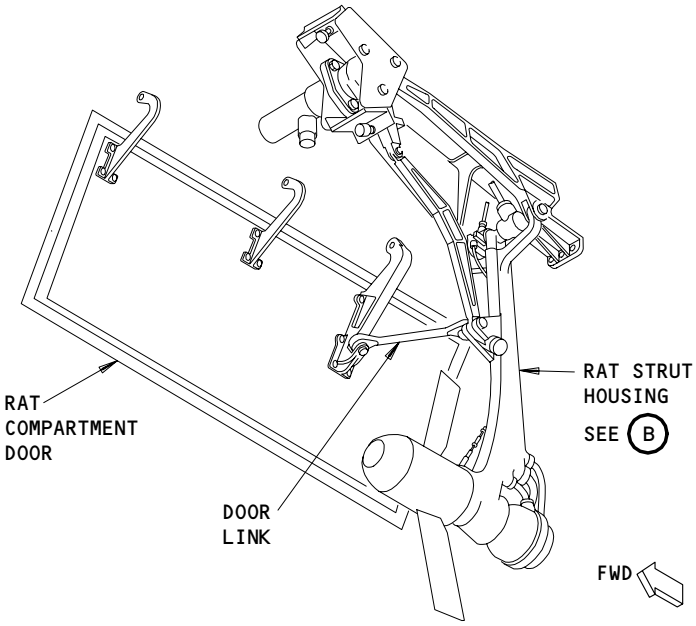
      S 024-005
      (3) Remove the bolts which attach the switch extension bracket to the RAT strut housing.

      S 024-006
      (4) Remove the screws which attach the limit switch to the switch support bracket.

      S 024-007
      (5) Remove the limit switch and the switch plate from the switch support bracket.

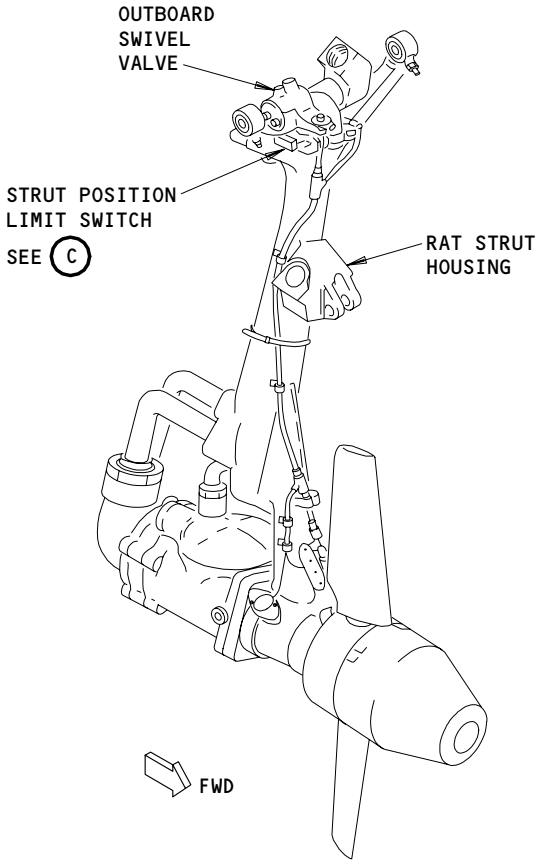
      S 034-008
      (6) If the switch has inline electrical connectors, do these steps:
          (a) Cut the heat-shrink tube from the inline electrical connectors.





RAM AIR TURBINE (RAT)

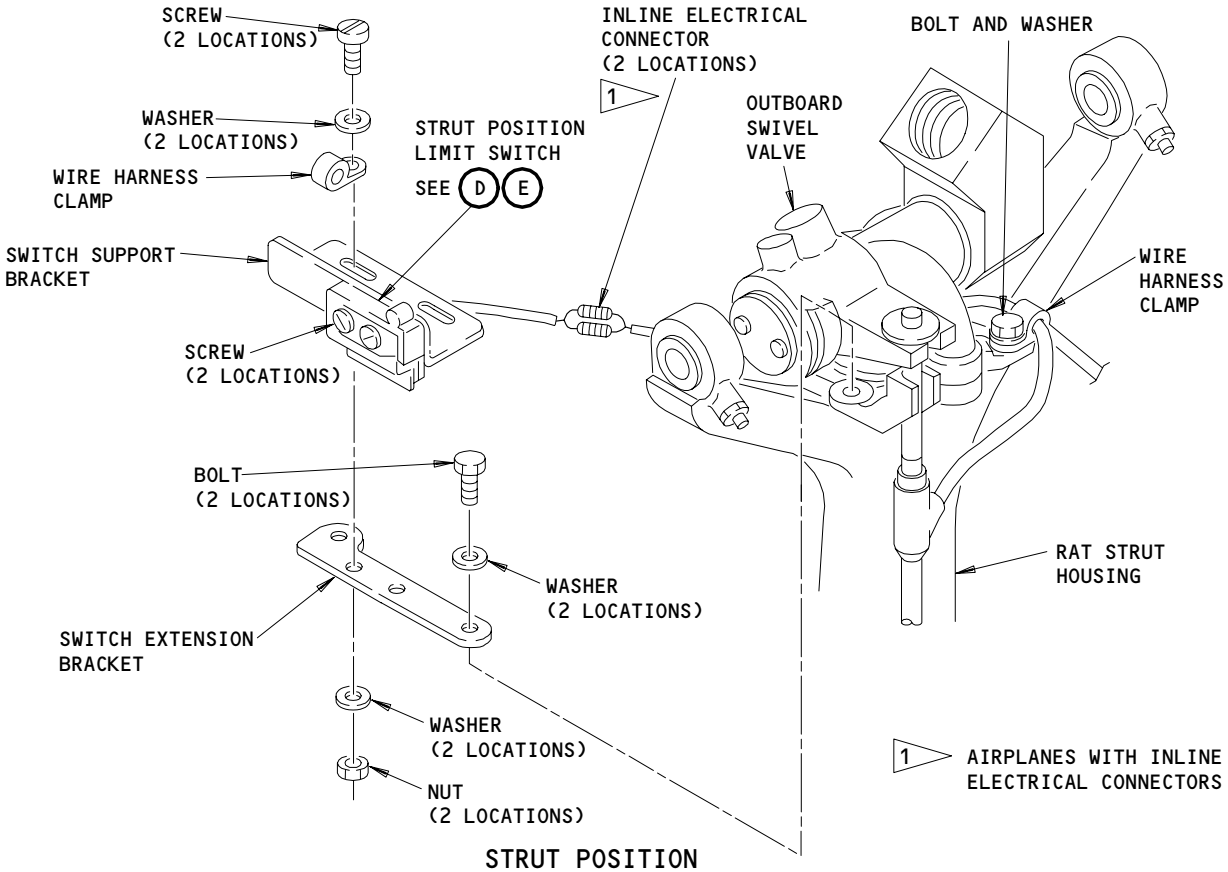
A



RAT STRUT HOUSING

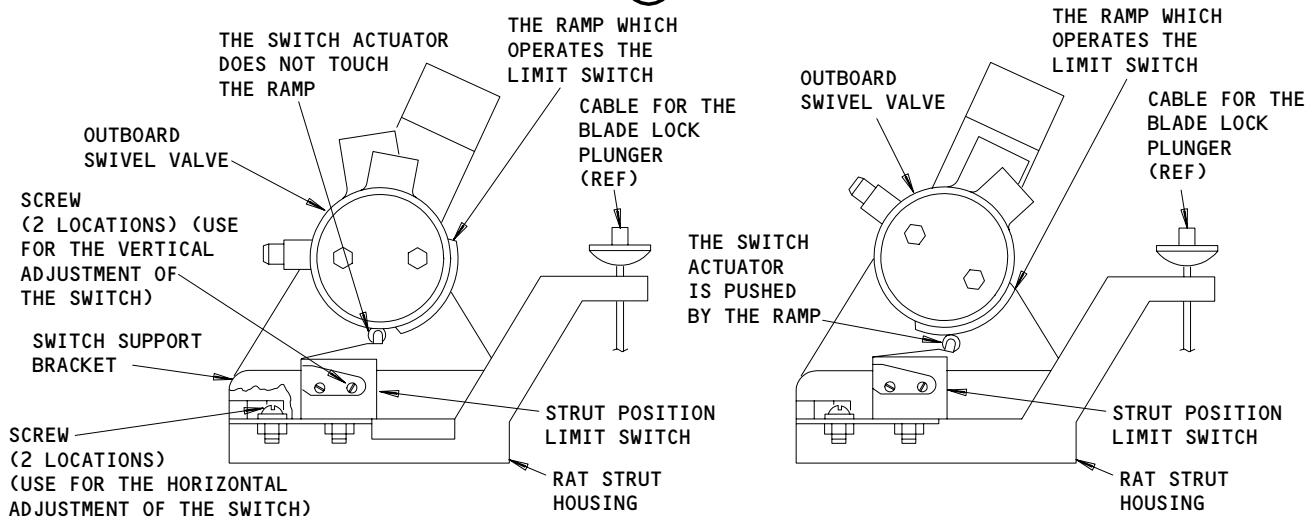
B

RAT Strut Position Limit Switch Installation
Figure 401 (Sheet 1)



STRUT POSITION
LIMIT SWITCH

C



RAT (14 1/2 DEGREES FROM
THE FULLY EXTENDED POSITION)

D

RAT (15 1/2 DEGREES
FROM THE FULLY EXTENDED POSITION)

E

RAT Strut Position Limit Switch Installation
Figure 401 (Sheet 2)

183356

(b) Disconnect the inline electrical connectors.

S 034-009

(7) If the limit switch does not have inline electrical connectors, do these steps:
(a) Cut the wire from the switch terminal C, approximately 3.75 inches from the limit switch.
(b) Cut the wire from the switch terminal NC, approximately 5 inches from the limit switch.

TASK 29-21-22-404-010

3. Install the Limit Switch for the Strut Position of the Ram Air Turbine (RAT) (Fig. 401)

A. Equipment
(1) Protractor - Commercially Available

B. References
(1) AMM 29-21-00/201, Ram Air Turbine System
(2) AMM 29-21-07/401, RAT Deployment Arm
(3) AMM 29-21-10/401, RAT Door Link

C. Access
(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access panel
198GR Ram Air Turbine

D. Install the Limit Switch

S 424-011

(1) If the switch support bracket is not on the extension bracket, install the screws and washers to attach these two brackets together.

S 434-012

(2) Tighten the screws by hand until you adjust the limit switch.

S 424-013

(3) Put the limit switch on the outboard side of the switch support bracket.

S 424-014

(4) Put the switch plate on the inboard side of the switch support bracket.

S 424-015
(5) Install the screws and washers to attach the limit switch to the support bracket.

S 434-016
(6) Tighten the screws by hand until you adjust the limit switch.

S 424-017
(7) Put the switch extension bracket on the RAT strut housing.

S 424-018
(8) Install the bolts and washers to attach the switch extension bracket to the RAT strut.

S 434-019
(9) Tighten the bolts to 51-56 pound-inches.

S 434-020
(10) 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 434-021
(11) Connect the wires from the limit switch to the electrical connectors on the wire harness.

S 434-022
(12) Install the heat-shrink tubing on the electrical connectors.

E. Adjust the Limit Switch.

S 864-023
(1) If it is not in the extended position, extend the RAT (AMM 29-21-00/201).

S 034-024
(2) Disconnect the lower end of the RAT deployment arm from the RAT strut housing (AMM 29-21-07/401).

S 034-025
(3) Disconnect the RAT door link from the Rat compartment door or from the RAT strut housing (AMM 29-21-10/401).

S 034-026
(4) Disconnect the electrical connector at the top of the RAT strut housing, on the aft side.

S 984-027
(5) Push on the end of the hydraulic pump to move the RAT in the direction of the retracted position.

S 224-028
(6) Make sure the limit switch opens when the RAT strut housing is 15 ±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 824-029
(7) If it is necessary to adjust the limit switch, do these steps:
(a) Loosen the screws which attach the limit switch to the switch support bracket.
(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 support bracket, to 2.5-3.5 pound-inches.
(d) Loosen the screws which attach the switch support bracket to the switch extension bracket.
(e) Move the limit switch horizontally until it opens when the RAT strut is 15 ±1/2 degrees from the fully extended position.
(f) Tighten the screws, which attach the switch support bracket to the switch extension bracket, to 19-21 pound-inches.

S 434-030
(8) Connect the RAT door link (AMM 29-21-10/401).

S 434-031
(9) Connect the electrical connector at the top of the RAT strut housing.

S 434-032
(10) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-07/401).

S 864-033
(11) Do the RAT retraction procedure (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) BLADE LOCK LIMIT SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the limit switch for the blade lock of the ram air turbine (RAT). The second task installs 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 (Ref 29-21-20/401).

TASK 29-21-23-004-001

2. Remove the Limit Switch for the RAT Blade Lock (Fig. 401)
   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 Zone
          198 Wing to Body - Aft Lower Half (Right)

      (2) Access panel
          198GR Ram Air Turbine

   C. Procedure

      S 864-002
      (1) Remove the pressure from the center hydraulic system (AMM 29-11-00/201).

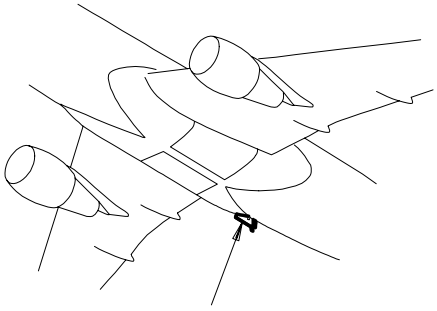
      S 864-003
      (2) Extend the RAT (AMM 29-21-00/201).

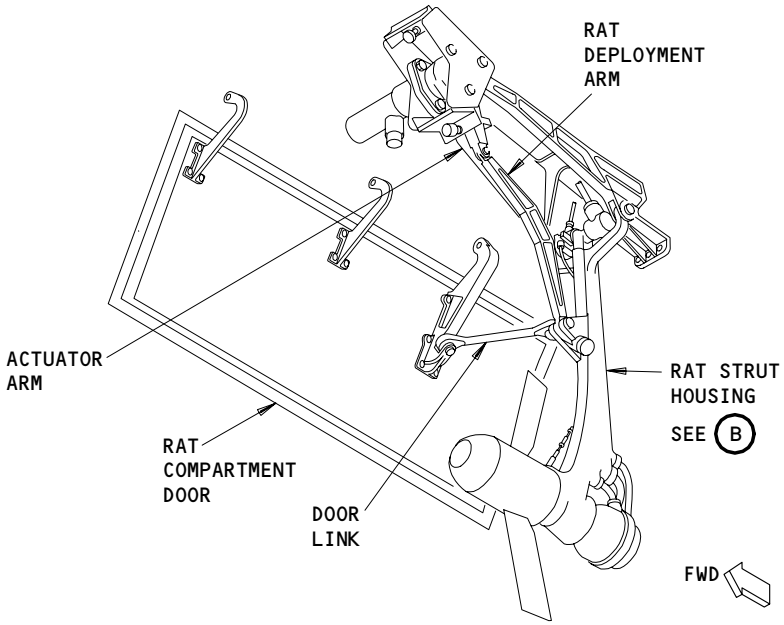
      S 024-004
      (3) Remove the screws from the switch cover.

      S 024-005
      (4) Remove the switch cover and the limit switch from the RAT strut housing.

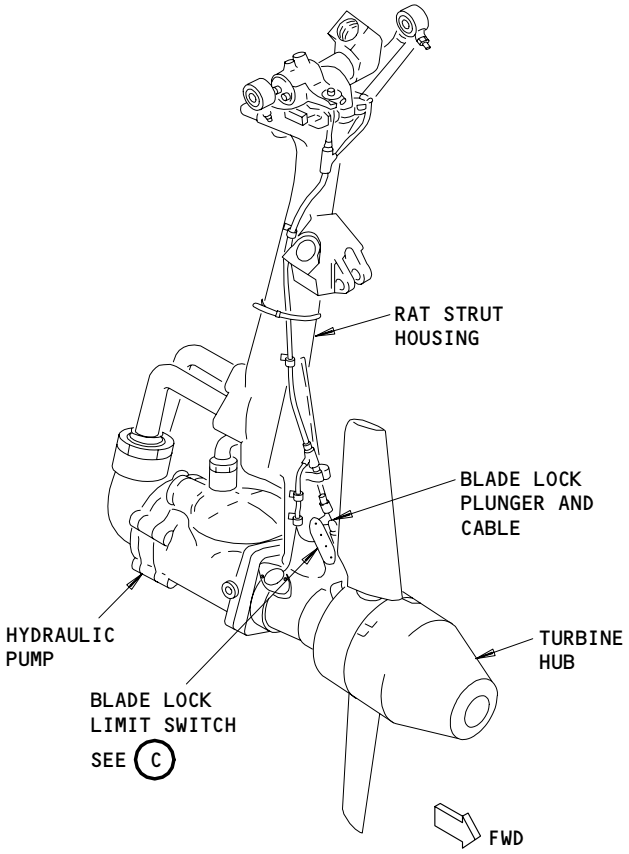
      S 024-006
      (5) Remove the screws from the limit switch.

      S 024-007
      (6) Remove the limit switch and the switch plate from the switch cover.

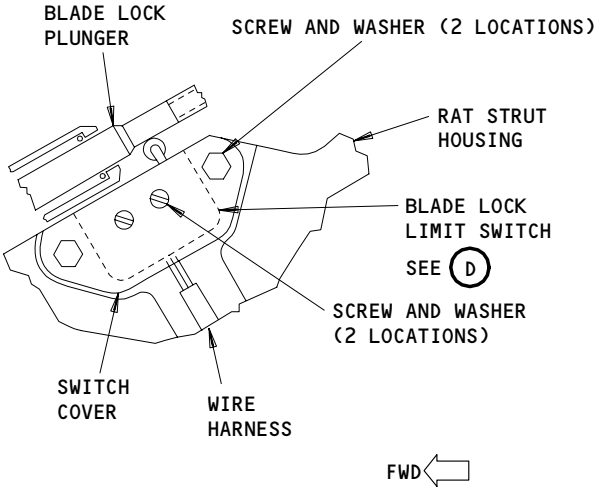




RAM AIR TURBINE (RAT)
A



RAT STRUT HOUSING
B



BLADE LOCK LIMIT SWITCH
C

RAT Blade Lock Limit Switch Installation
Figure 401 (Sheet 1)

S 034-008

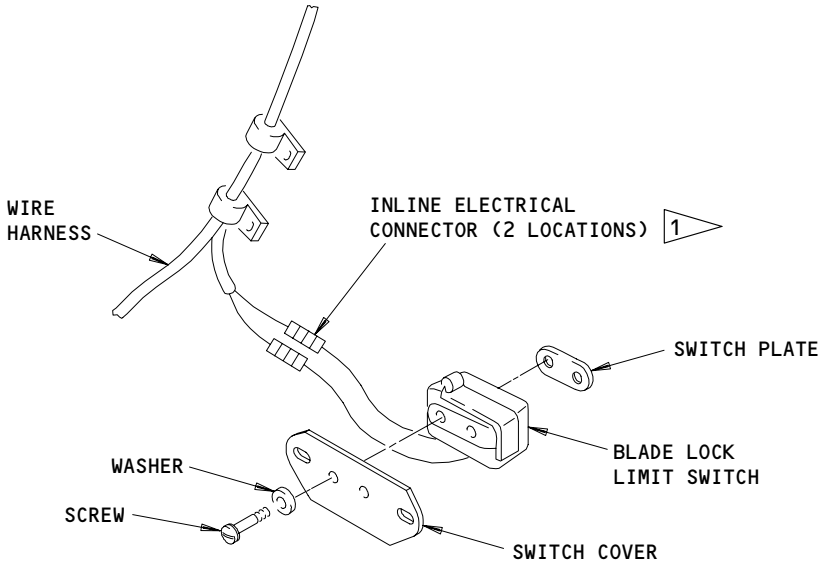
(7) If the switch has inline electrical connectors, do these steps:
  (a) Cut the heat-shrink tube from the inline electrical connectors.
  (b) Disconnect the inline electrical connectors.

S 034-009

(8) 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 29-21-23-404-010

3. Install the Limit Switch for the RAT Blade Lock (Fig. 401)
  A. Equipment
    (1) Protractor - Commercially Available
  B. Consumable Materials
    (1) A00064 Sealant - RTV 732
  C. References
    (1) AMM 29-21-00/201, Ram Air Turbine (RAT) System



1 AIRPLANES WITH INLINE ELECTRICAL CONNECTORS

BLADE LOCK LIMIT SWITCH

D

RAT Blade Lock Limit Switch Installation
Figure 401 (Sheet 2)

(2) AMM 29-21-07/401, RAT Deployment Arm
(3) AMM 29-21-10/401, RAT Door Link

D. Access

(1) Location Zone
198 Wing to Body - Aft Lower Half (Right)

(2) Access panel
198GR Ram Air Turbine

E. Install the Limit Switch

S 164-011
(1) Remove the sealant which stays in the hole in the strut housing.

S 424-012
(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 424-013
(3) Install the screws and washers which attach the limit switch and the switch plate to the switch cover.

S 434-014
(4) Tighten the screws by hand until you adjust the switch.

S 424-015
(5) Put the limit switch and the switch cover in the hole in the RAT strut housing.

S 424-016
(6) Install the screws and washers which attach the switch cover to the RAT strut housing.

S 434-017
(7) Tighten the screws by hand until you adjust the switch.

S 434-018
(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 434-019
(9) Connect the wires from the limit switch to the electrical connectors on the wire harness.

S 434-020
(10) Install the heat-shrink tubing on the electrical connectors.

F. Adjust the Limit Switch

S 864-021
(1) If it is not in the extended position, extend the RAT (AMM 29-21-00/201).

S 034-022
(2) Disconnect the lower end of the RAT deployment arm from the RAT strut housing (AMM 29-21-07/401).

S 034-023
(3) Disconnect the RAT door link from the Rat compartment door or from the RAT strut housing (AMM 29-21-10/401).

S 034-024
(4) Disconnect the electrical connector at the top of the RAT strut housing, on the aft side.

S 984-025
(5) Push on the end of the hydraulic pump to move the RAT in the direction of the retracted position.

S 224-026
(6) Make sure the limit switch closes when the RAT strut housing is 13 ±1/2 degrees from the fully extended position.

NOTE: You can do a check for continuity, between the electrical connector pins 5 and 7, to find when the switch closes.

S 824-027
(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 (40-50 ounce-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 ±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.
(g) Apply the sealant around the wires of the limit switch, in the hole in the RAT strut housing.

S 434-028
(8) Connect the electrical connector at the top of the RAT strut housing.

S 434-029
(9) Connect the RAT door link (AMM 29-21-10/401).

S 434-030
(10) Connect the RAT deployment arm to the RAT strut housing (AMM 29-21-07/401).

S 864-031
(11) Do the RAT retraction procedure (AMM 29-21-00/201).

RAM AIR TURBINE (RAT) AIRSPEED SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the airspeed switch for the ram air turbine. The second task installs the airspeed switch for the ram air turbine.

TASK 29-21-24-004-001

2. Remove the Airspeed Switch for the Ram Air Turbine (RAT) (Fig. 401)
   A. Access
      (1) Location Zone
          118 Area Outboard and Above NLG Wheel Well (Right)

      (2) Access Panel
          119AL Main Equipment Center

   B. Procedure

      S 864-002
      (1) Open this circuit breaker on the main power distribution panel, P6, and attach a DO-NOT-CLOSE tag:
          (a) 6C2, RAM AIR TURB AUTO

      S 034-003
      (2) Disconnect the electrical connector from the airspeed switch.

      S 034-004
      (3) Disengage the quick-disconnect fittings of the pitot-static system from the airspeed switch.

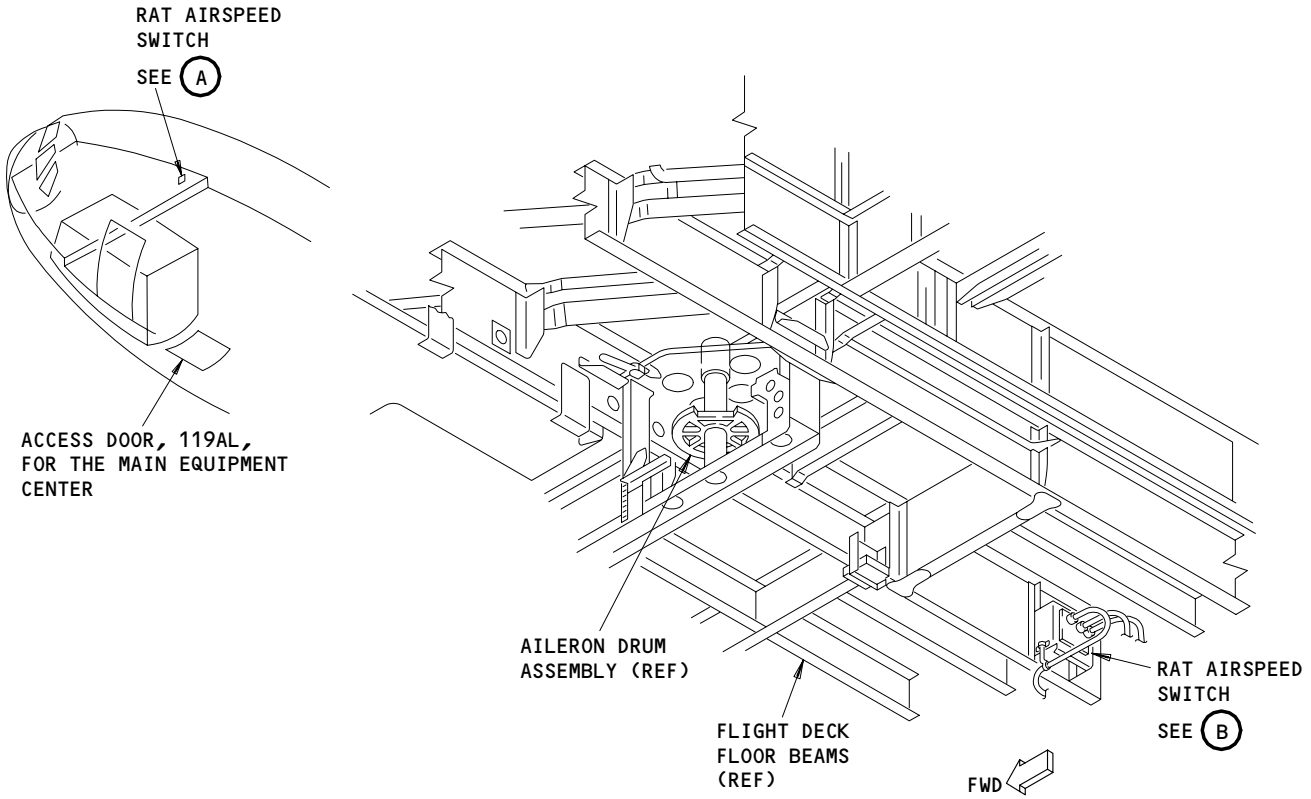
          NOTE: Make a note of the connections to aid in the installation.

      S 024-005
      (4) Loosen the four screws for the mounting clamp, on the support bracket near the corners of the airspeed switch.

      S 024-006
      (5) Pull the airspeed switch from the support bracket and the mounting clamp.

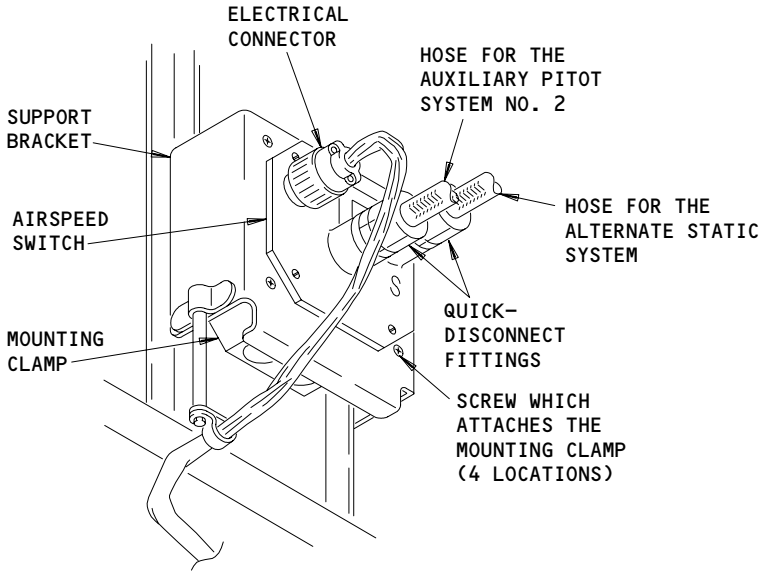
TASK 29-21-24-404-007

3. Install the Airspeed Switch for the Ram Air Turbine (RAT) (Fig. 401)
   A. References
      (1) AMM 29-21-00/501, Ram Air Turbine (RAT) System
      (2) AMM 34-11-00/501, Pitot-Static System
   B. Access
      (1) Location Zone
          118 Area Outboard and Above NLG Wheel Well (Right)



RAT AIRSPEED SWITCH

A



RAT AIRSPEED SWITCH

B

RAT Airspeed Switch Installation
Figure 401

(2) Access Panel
119AL Main Equipment Center

C. Procedure

S 424-008
(1) Put the airspeed switch through the support bracket and into the mounting clamp.

S 434-009
(2) Tighten the four screws for the mounting clamp to 5-8 pound-inches.

NOTE: These screws are on the support bracket near the corners of the airspeed switch.

S 434-010
(3) Connect the quick-disconnect fittings of the pitot-static system to the airspeed switch.
(a) Make sure the quick-disconnects are connected and locked in a sealed position.
(b) Do a visual inspection of the quick-disconnect fittings.
1) Make sure that the actuation ring of the quick-disconnect fitting is fully engaged on the lock pins and make sure that you see the colored lock ring indicator that shows a correct connection of the quick-disconnect fitting.
2) You do not have to do a leak test when you connect a quick-disconnect fitting. A visual inspection of the quick-disconnect for a complete seal is necessary. You must do a leak test when you cannot make sure that the quick-disconnect has a complete seal.

S 434-011
(4) Connect the electrical connector to the airspeed switch.

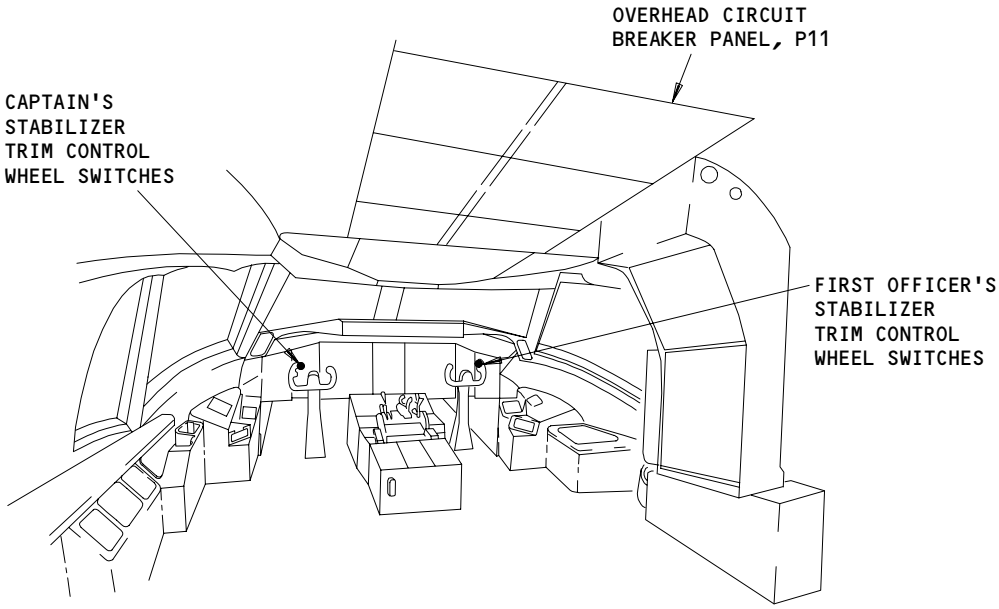
S 864-012
(5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the main power distribution panel, P6:
(a) 6C2, RAM AIR TURB AUTO

S 734-014

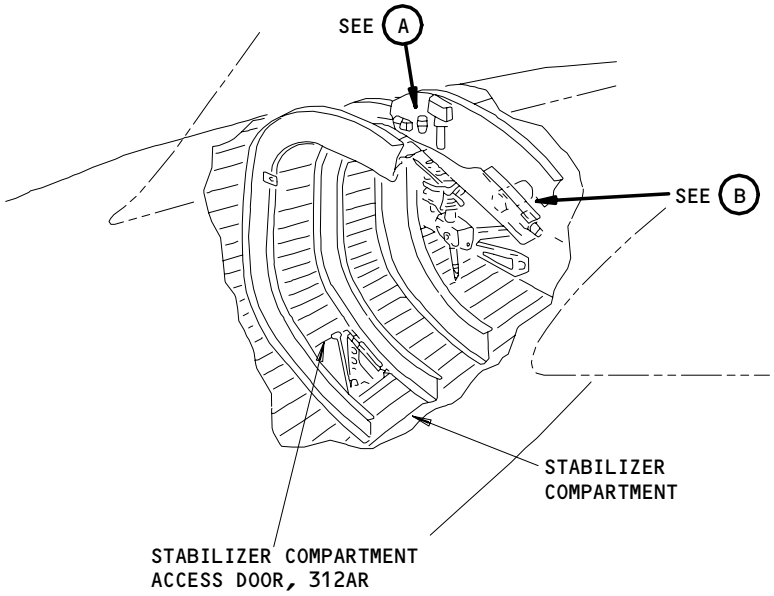
(6) Do the system test of the RAT deployment system (AMM 29-21-00/501).

PITCH ENHANCEMENT SYSTEM (PES) - DESCRIPTION AND OPERATION

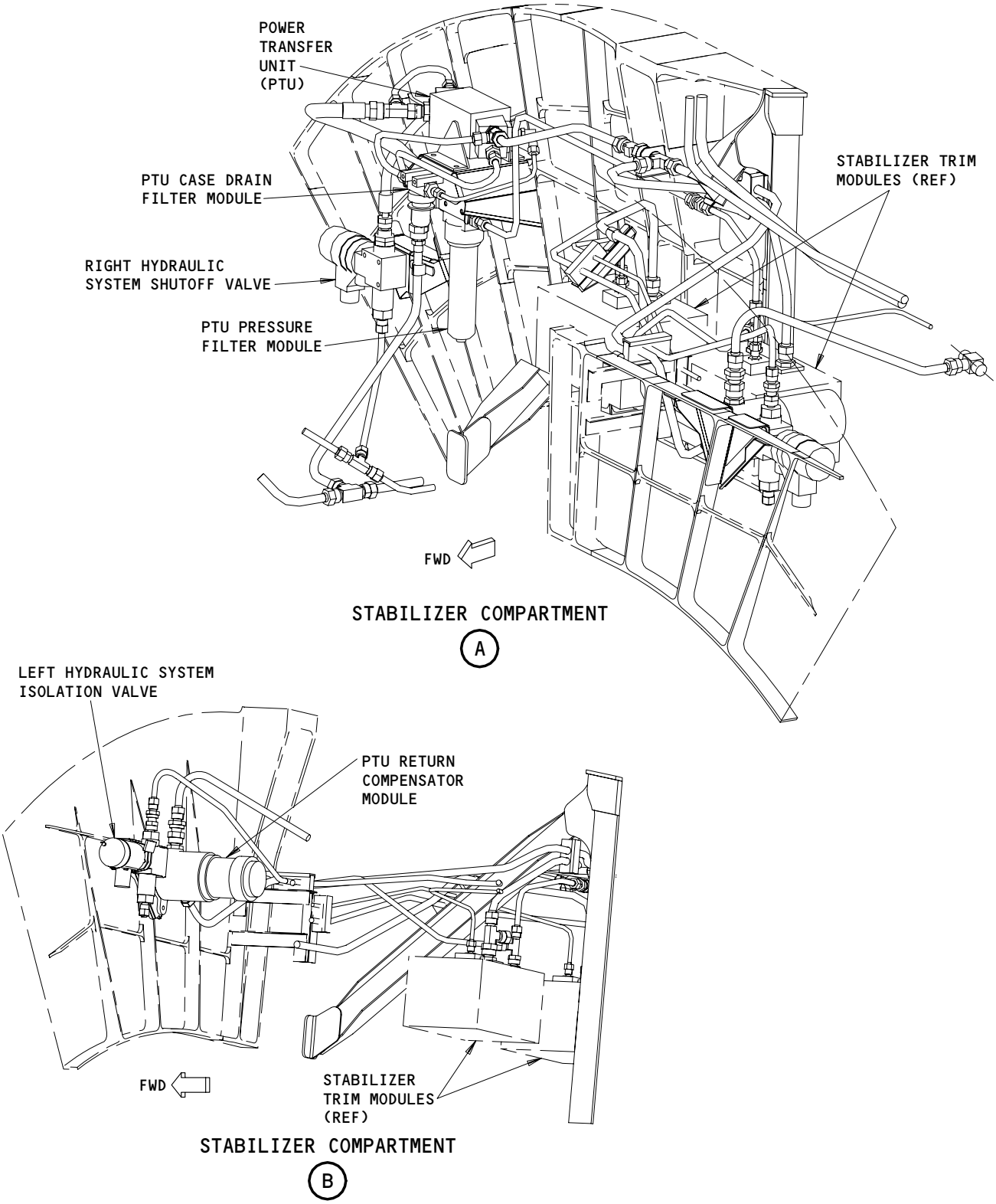
1. General (Fig. 1)
   A. The pitch enhancement system (PES) automatically supplies hydraulic power to the stabilizer trim control system if failure of the left and center hydraulic system occurs. The PES system uses the right hydraulic system to pressurize an isolated portion of the left hydraulic system without transferring fluid between the two systems. The isolated portion of the left hydraulic system contains the left system stabilizer trim module which provides stabilizer trim motion.
   B. The PES system components are installed in the stabilizer compartment at the aft end of the airplane. The system contains a power transfer unit (PTU), a pressure and a case drain filter module, a left system isolation valve, a right system shutoff valve, and a PTU return compensator module.
   C. If the left system pressure falls below 1275 psi, or if left system quantity falls below 0.48 in flight, the left system isolation valve will close. This isolates the portion of the left system that contains the PTU pump and the stabilizer trim module. Then, if the pressure in the center system also falls below 1275 psi, the right system shutoff valve will open when the stabilizer trim control wheel switches are operated. This permits the right system to supply power to the PTU motor when the stabilizer trim control wheel switches are operated. The PTU motor turns the PTU pump which pressurizes the fluid in the isolated portion of the left system. The PES system will operate only when the stabilizer trim control wheel switches are operated.
2. Component Details (Fig. 1)
   A. Power Transfer Unit (PTU) (Fig. 2)
      (1) The power transfer unit (PTU) is an assembly that contains a constant-displacement hydraulic motor which is connected to a constant-displacement pump by a driveshaft.
      (2) The hydraulic motor uses 3.2 gpm of fluid at 1600 psi from the right hydraulic system to turn the hydraulic pump which supplies 2.7 gpm of fluid at 1250 psi to the left hydraulic system.
      (3) Fluid flows through the motor and the pump to lubricate them and keep them cool. The motor case drain fluid flows into the right system return line. The pump case drain fluid flows in to a case drain filter and then back to the pump inlet.
      (4) The power transfer unit is on the right side of a bulkhead to the right of the stabilizer trim modules in the stabilizer compartment.
      (5) A flow restrictor is installed in the inlet line to the PTU motor, at the right system shutoff valve (Fig. 4). The flow restrictor limits fluid flow to the PTU motor to about 4.1 gpm. This keeps maximum speed of the PTU to about 10,000 rpm if a failure occurs which allows the pump to operate under a no-load condition or without an adequate supply of fluid.



FLIGHT COMPARTMENT



Pitch Enhancement System (PES)
Figure 1 (Sheet 1)

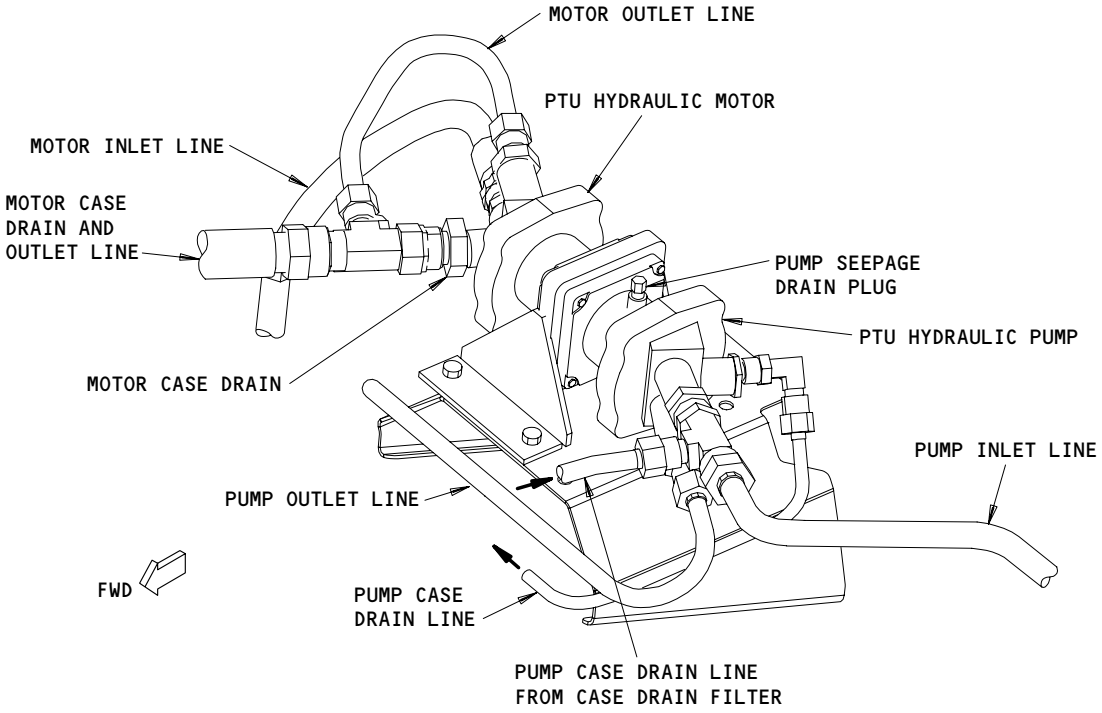


Pitch Enhancement System (PES)
Figure 1 (Sheet 2)

B. PTU Pressure Filter Module (Fig. 3)
   (1) Fluid that is pressurized by the PTU pump is sent through the pressure filter module before it enters the left system. The filter module is installed below the PTU in the stabilizer compartment. The filter module does not allow any fluid to go around the filter. The filter can not be cleaned; it must be replaced.

C. PTU Case Drain Filter module (Fig. 3)
   (1) Fluid from the PTU pump case drain is sent through the case drain filter module before the fluid re-enters the PTU pump inlet. The filter module is installed below the PTU in the stabilizer compartment. The filter module does not allow any fluid to go around the filter. The filter can be cleaned.

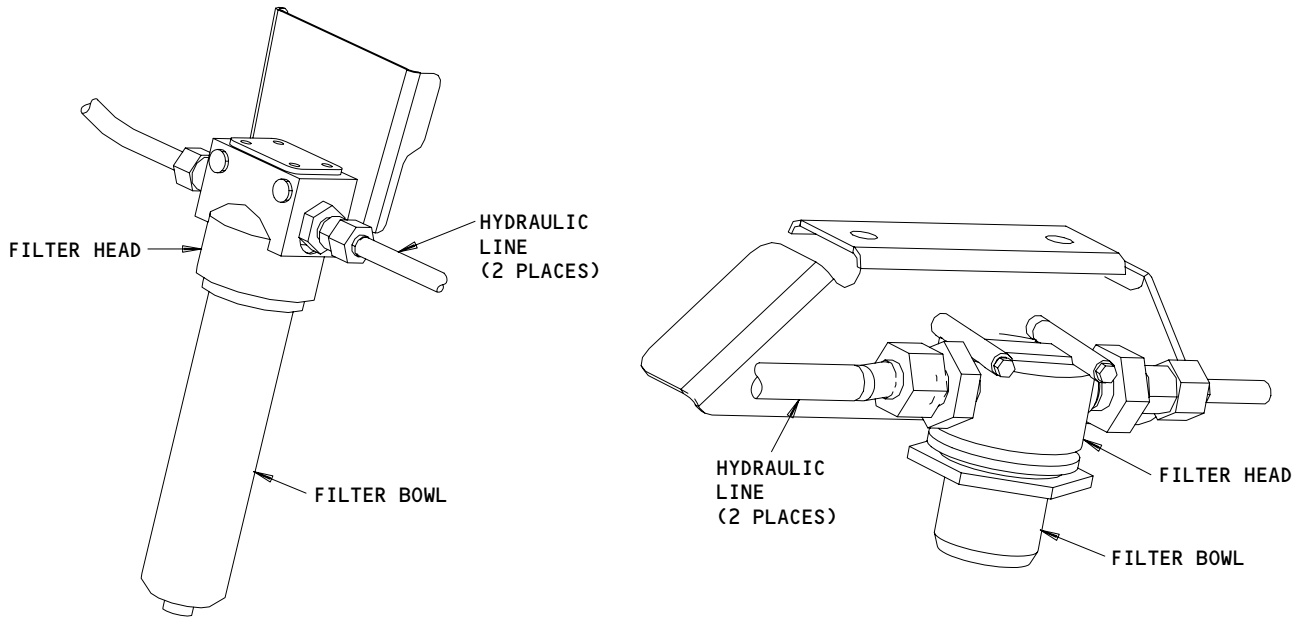
D. Left Hydraulic System Isolation Valve (Fig. 4)



Power Transfer Unit (PTU)
Figure 2

(1) The isolation valve is installed in the left system pressure line to the stabilizer trim module. It is installed on the left side of a bulkhead above and forward of the stabilizer trim modules in the stabilizer compartment.
(2) The valve has two positions, and is operated by a 28v dc motor. When the valve is in the OFF (closed) position, it helps to isolate the part of the left hydraulic system which contains the PTU pump and the stabilizer trim module. When the valve is in the ON (open) position, it permits the usual flow of left system pressure to the stabilizer trim module.
(3) The isolation valve has a position indicator and a manual override lever. The lever tells which position the valve is in, and can be used to manually move the valve from one position to the other.

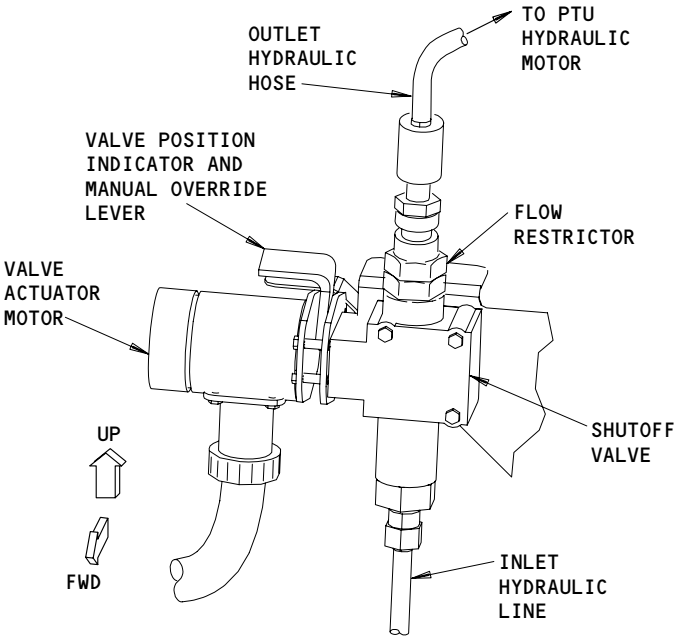
E. Right Hydraulic System Shutoff Valve (Fig. 4)
(1) The shutoff valve is installed in the right system pressure line to the PTU motor. It is installed below and to the right of the PTU in the stabilizer compartment.



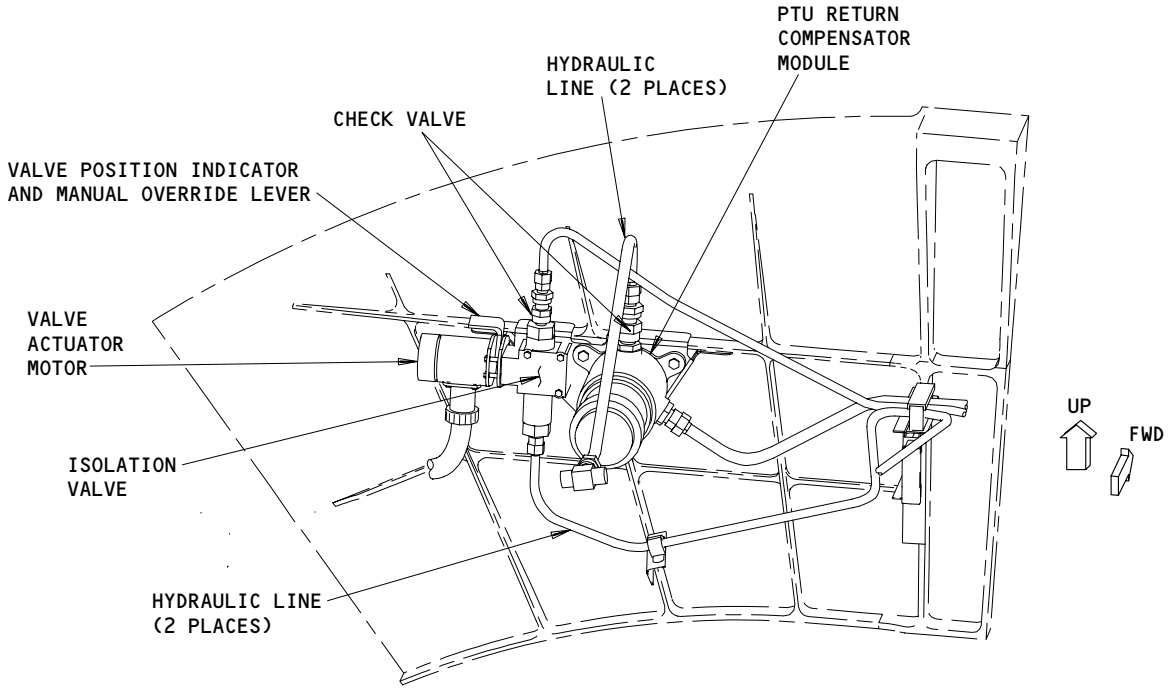
PTU PRESSURE FILTER MODULE

PTU CASE DRAIN FILTER MODULE

PTU Filter Modules
Figure 3



RIGHT HYDRAULIC SYSTEM SHUTOFF VALVE



LEFT HYDRAULIC SYSTEM ISOLATION VALVE
AND PTU RETURN COMPENSATOR MODULE

PTU Valves and Return Compensator
Figure 4

(2) The valve has two positions and is operated by a 28v dc motor. When the valve is in the ON (open) position, it supplies right hydraulic system pressure to operate the PTU motor. When the valve is in the OFF position, it removes right system pressure to the PTU motor.

(3) The shutoff valve has a position indicator and manual override lever. The lever tells which position the valve is in, and can be used to manually move the valve from one position to the other.

F. PTU Return Compensator Module (Fig. 4)

(1) The return compensator module is installed in the left system return line from the stabilizer trim module. It is installed on the left side of a bulkhead above and forward of the stabilizer trim modules, in the stabilizer compartment. The return compensator module includes a bypass valve and an accumulator that contains about five cubic inches of fluid.

(2) The compensator bypass valve is held closed by a spring, and opens only when the force of fluid on the opposite end is larger than the force of the spring.

(3) The compensator accumulator contains a piston and spring, which push fluid out of the accumulator. Fluid is forced into the accumulator when the force of fluid on the piston is larger than the force of the spring.

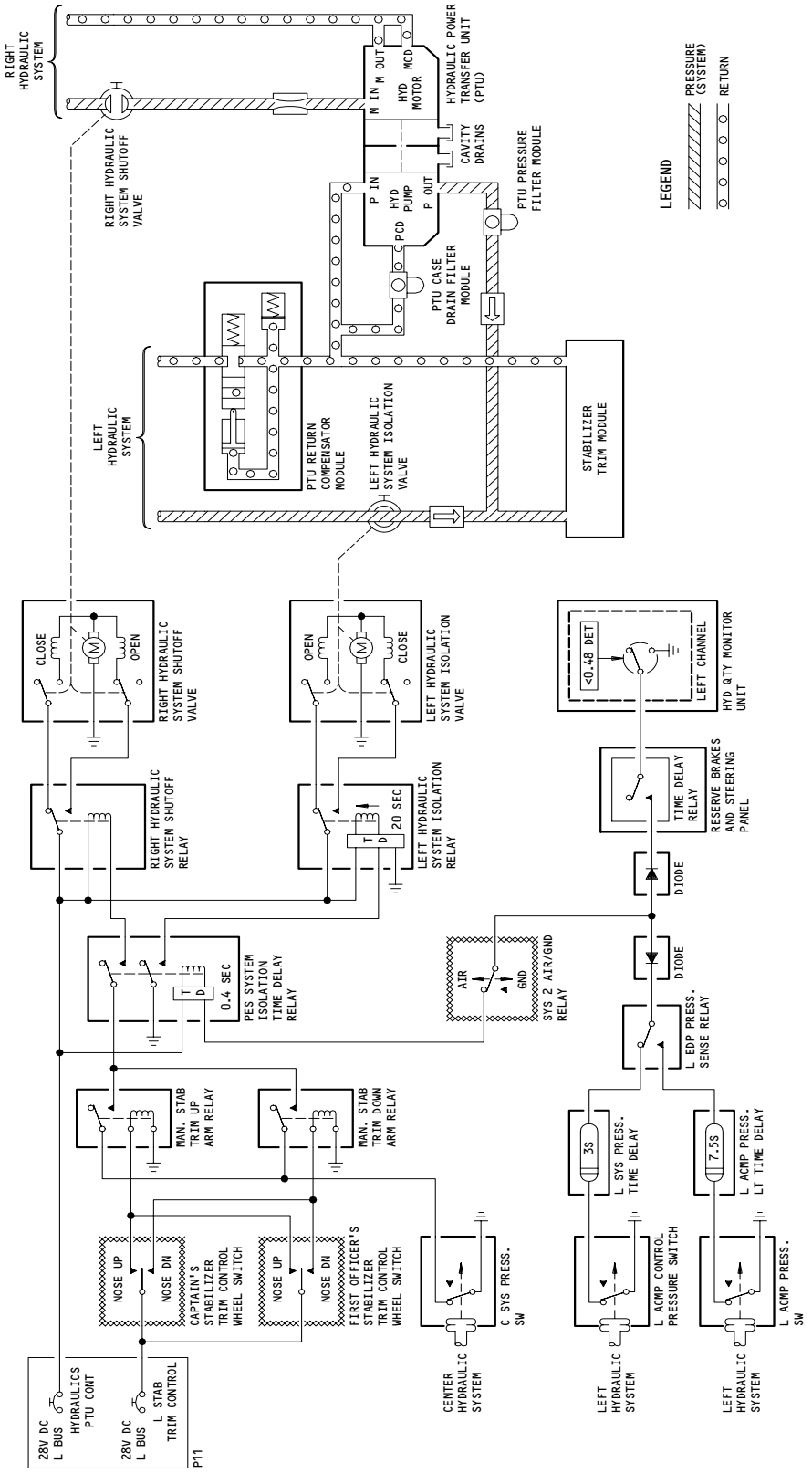
(4) When the left hydraulic system is operating correctly, fluid that flows from the stabilizer trim module through the left system return line to the resevoir must flow through the return compensator. Flow through the compensator is initially blocked by the bypass valve. This causes fluid to be pushed into the accumulator. When the accumulator is full, the fluid pressure in the line increases until it opens the bypass valve to permit flow of fluid through the compensator to the left return system.

(5) When a failure in the left hydraulic system causes the PES system to operate, the left system isolation valve closes. This removes left system pressure from the stabilizer trim module. When the pressure in the stabilizer trim module return line decreases to 100 to 105 psi, the bypass vlave in the compensator closes to isolate the PES system from the left return system. The fluid that is in the accumulator and pushed out by the piston and spring, becomes a source of pressurized fluid for the PTU pump inlet.

3. Operation

A. Functional Description (Fig. 5)

(1) The 28v dc left bus provides power to operate the PES control circuit relays, the right system shutoff valve and the left system isolation valve.



Pitch Enhancement System (PES) Schematic
Figure 5

(2) When the airplane is in the air, the air/ground system No. 2 relay is de-energized. This connects the PES system isolation time delay relay to the left hydraulic system pressure indicating and quantity indicating systems. The PES system will be put into the isolated mode when either of the following conditions in the left hydraulic system occur:
   (a) If left hydraulic system pressure falls below 1275 psi, both the left ACMP control pressure switch on the EDP filter module and the left ACMP pressure switch on the ACMP filter module will close. This will provide a ground to energize the PES system isolation time delay relay.
   (b) If left hydraulic system quantity decreases below 0.48, the left channel of the hydraulic quantity monitor unit will provide a ground to energize the PES system isolation time delay relay.

(3) When the PES isolation time delay relay is energized, one set of relay contacts connects the right hydraulic system shutoff relay to the center system pressure switch through the manual stabilizer trim up and down arm relays. The other set of relay contacts provides a ground to energize the left hydraulic system isolation relay. When the left hydraulic system isolation relay is energized, it provides power to move the left hydraulic system isolation valve to the OFF (closed) position. This isolates the part of the left hydraulic system which contains the stabilizer trim module and the PTU pump.

(4) When the PES system is in the isolated mode, if the center hydraulic system pressure also falls below 1275 psi, the center system pressure switch closes. This provides a ground to the circuit for the right hydraulic system shutoff relay which will not be completed until the captain's and/or first officer's stabilizer trim control wheel switches are operated.

(5) When either the captain's or the first officer's stabilizer trim control wheel switch is moved to APL NOSE UP or APL NOSE DN, power is supplied to energize the manual stabilizer trim up arm or down arm relay. When either of these relays is energized, the circuit to provide a ground to energize the right hydraulic system shutoff relay is completed, from the center hydraulic system pressure switch through the manual stabilizer up arm or down arm relay and the PES system isolation relay. When the right hydraulic system shutoff relay is energized, power is provided to open the right hydraulic system shutoff valve. This supplies right hydraulic system pressure to operate the PTU motor which drives the PTU pump.

(6) The accumulator in the return compensator module holds a supply of fluid for the isolated part of the left hydraulic system. This supply of fluid is forced under pressure to the PTU pump by the accumulator piston and spring. The pump output flows through the PTU pressure filter before entering the stabilizer trim module. The case drain fluid flows through the PTU case drain filter before it mixes with return fluid from the stabilizer trim module and goes back to the PTU pump inlet.

(7) When the captain's and first officer's stabilizer trim control wheel switches are released, the manual stabilizer trim up or down arm relay is de-energized. This removes the center hydraulic system pressure switch ground from the right hydraulic system shutoff relay, and the relay de-energizes. This provides power to move the right hydraulic system shutoff valve to the closed position. When the shutoff valve is closed, right hydraulic system pressure is removed from the PTU motor.

(8) When the airplane is on the ground, the air/ground system No. 2 relay is energized. This removes the ground signal for the PTU system isolation time delay relay, which is supplied by the left hydraulic system pressure switches or the quantity monitor unit. When the ground signal is removed, the PES system isolation time delay relay is de-energized, and the left hydraulic system isolation relay becomes de-energized after 20 seconds. The time delay keeps the operation cycle of the isolation valve in the left hydraulic system to a limit of one time in 20 seconds. Thus, the isolation valve will not operate again and again, if the signal from the pressure switch or the quantity monitor unit in the left hydraulic system changes quickly. The right hydraulic system shutoff relay will de-energize without a time delay. This provides power to close the right hydraulic system shutoff valve and open the left hydraulic system isolation valve. When the right hydraulic system shutoff valve is closed, right system pressure is removed from the PTU motor. When the left hydraulic system isolation valve is opened, the PES system is removed from the isolated mode.

B. Control (Fig. 5)

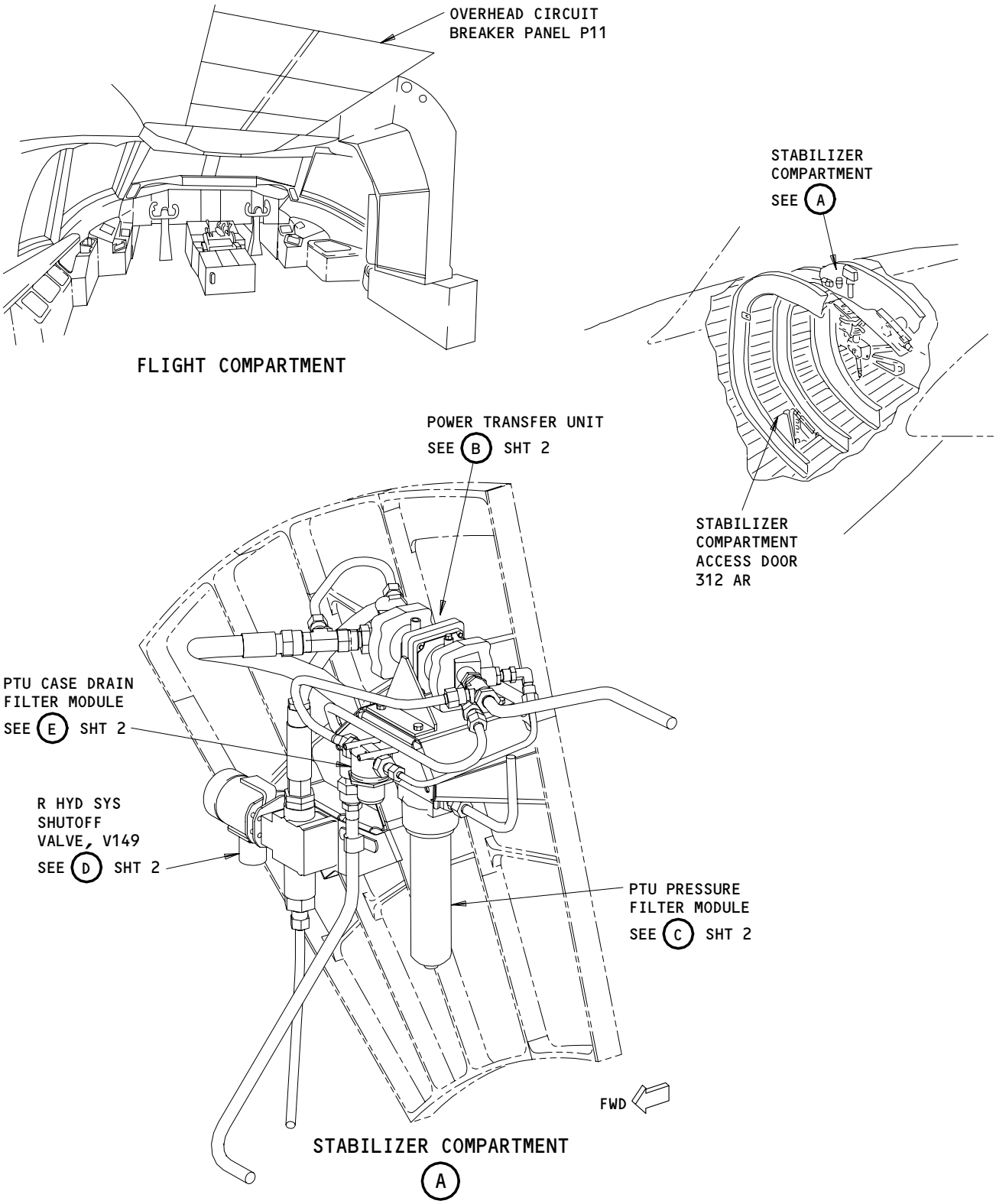
(1) Control of the PES system is automatic when the airplane is in the flight mode, left hydraulic pressure is below 1275 psi and/or left hydraulic system quantity is below 0.48, and center hydraulic system pressure is below 1275 psi. If these conditions are present, the PES system will operate when the captain's or first officer's stabilizer trim control wheel switches are moved to APL NOSE UP or APL NOSE DN. The PES system will continue to operate until the stabilizer trim control wheel switches are released.

PITCH ENHANCEMENT SYSTEM (PES)

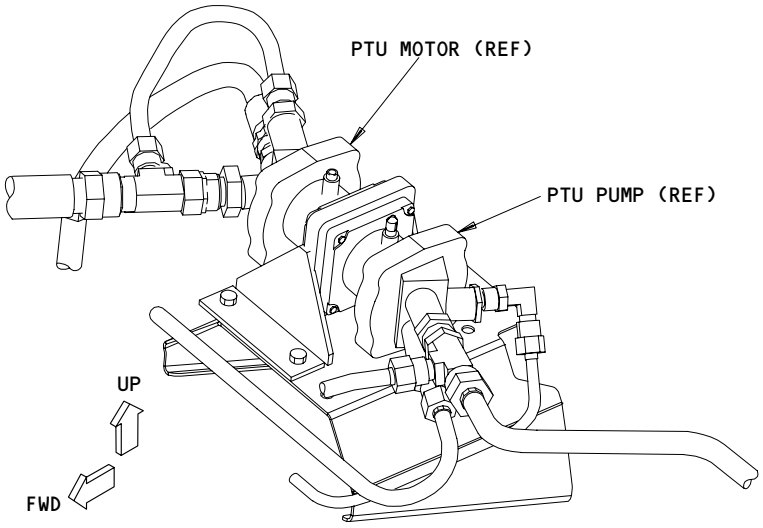
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKER			FLT COMPT, P11	
HYDRAULICS PTU CONT, C1090		1	11L10	*
LEFT STAB TRIM CONT, C1017		1	11H11	*
STAB TRIM CONT R, C1018		1	11H20	*
DIODE - (REF 31-01-37, FIG. 101) R397,R398				
MODULE - PTU CASE DRAIN FILTER	1	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-03
MODULE - PTU PRESSURE FILTER	1	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-04
MODULE - PTU RETURN COMPENSATOR	3	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-02
PANEL - (REF 29-11-00, FIG. 101) RESERVE BRAKES AND STEERING, M1216				
RELAY - (REF 31-01-33, FIG. 101) L HYD SYS ISOL, K1149				
MAN STAB TRIM DOWN ARM, K1153				
MAN STAB TRIM UP ARM, K1154				
PES TIME DELAY, K1150				
R HYD SYS SHUTOFF, K1148				
RELAY - (REF 31-01-37, FIG. 101) SYS NO. 2 AIR/GND, K1064				
SWITCH - (REF 27-41-00, FIG. 101) CAPT STAB TRIM CONT WHEEL, S80				
F/O STAB TRIM CONT WHEEL, S81				
UNIT - POWER TRANSFER	1	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-01
VALVE - L HYD SYS ISOLATION, V150	3	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-05
VALVE - R HYD SYS SHUTOFF, V149	1	1	312AR, FORWARD STABILIZER COMPARTMENT	29-22-06

* SEE THE WDM EQUIPMENT LIST

Pitch Enhancement System (PES) - Component Index
Figure 101

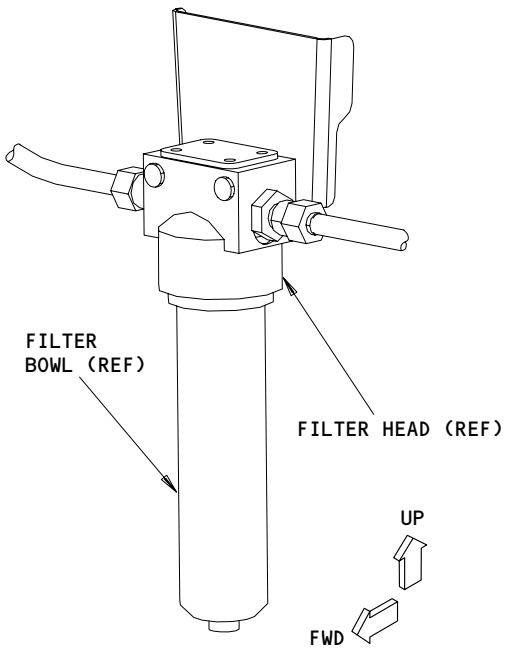


Component Location
Figure 102 (Sheet 1)



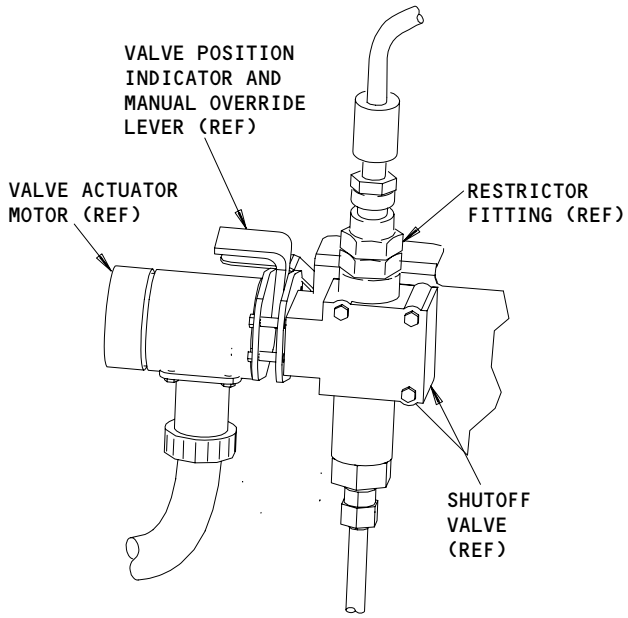
POWER TRANSFER UNIT

B



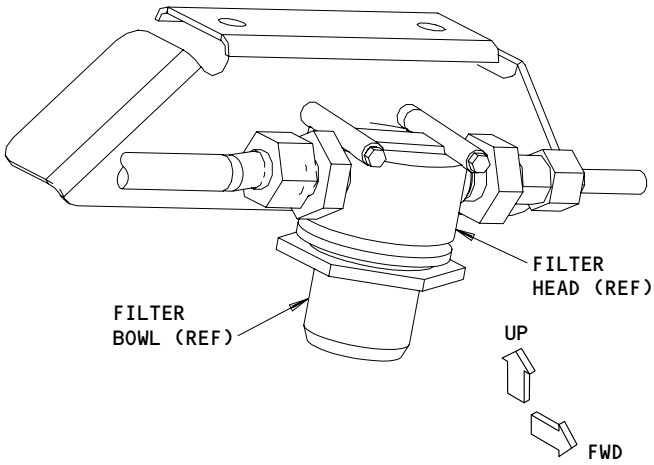
PTU PRESSURE FILTER MODULE

C



R HYD SYS SHUTOFF VALVE, V149

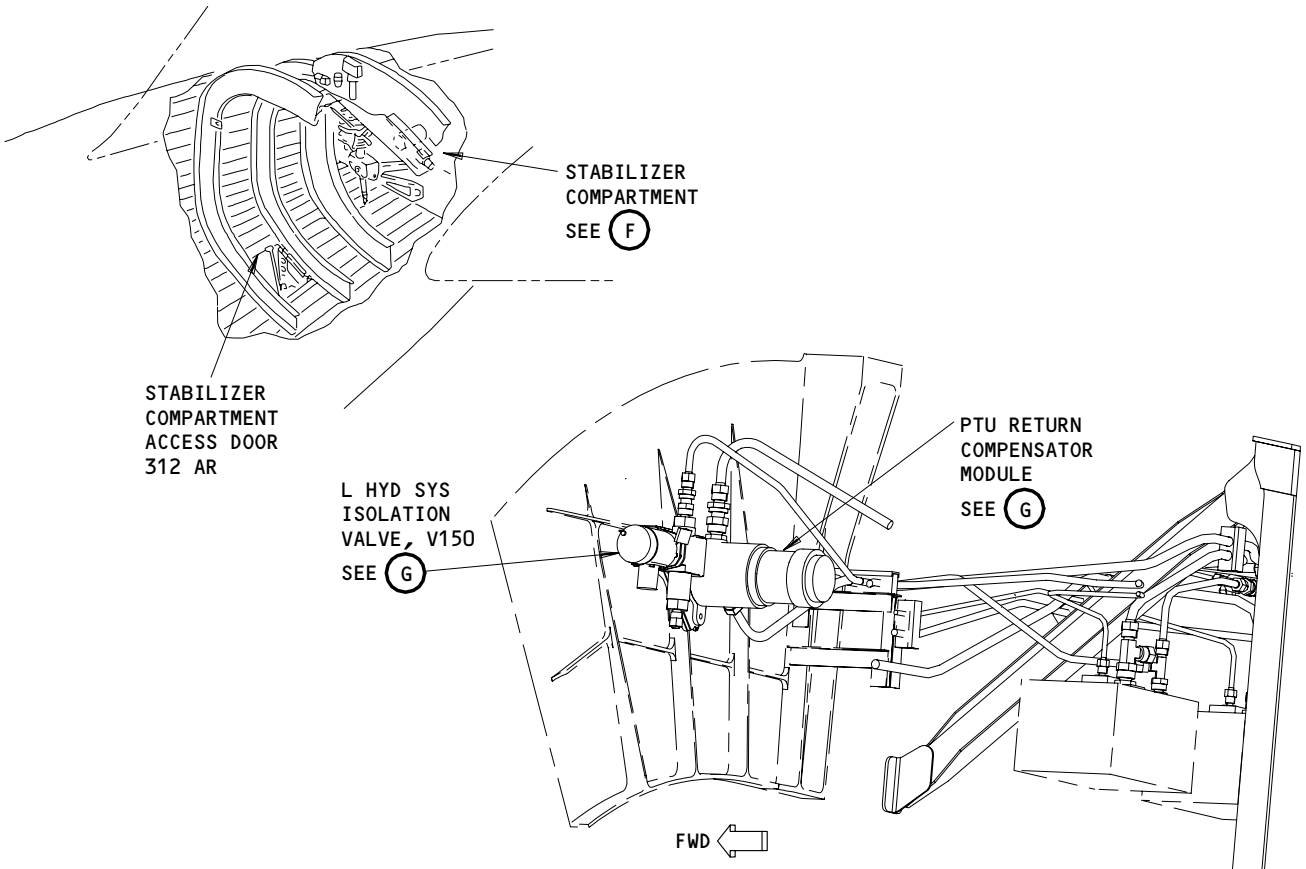
D



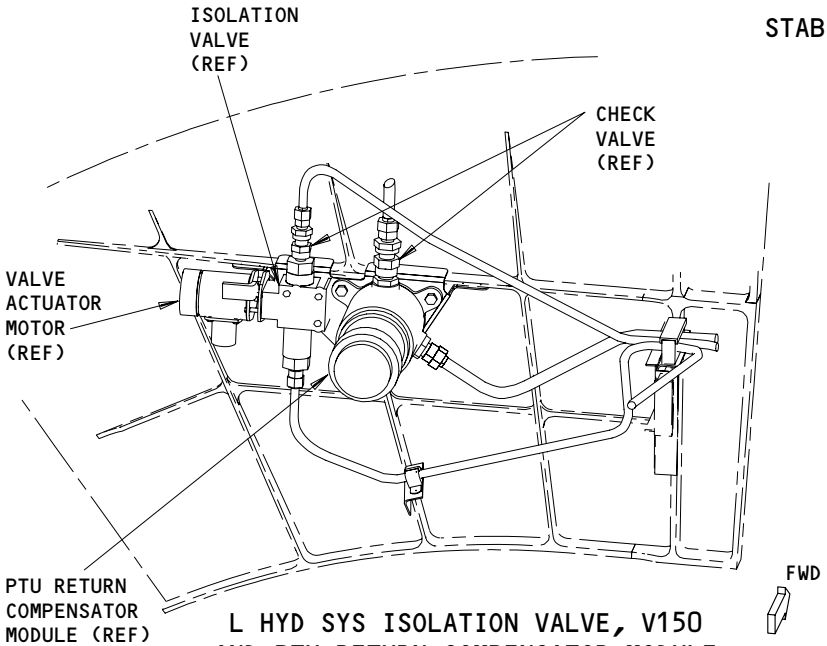
PTU CASE DRAIN FILTER MODULE

E

Component Location (Details From Sht 1)
Figure 102 (Sheet 2)



STABILIZER COMPARTMENT
F



L HYD SYS ISOLATION VALVE, V150
AND PTU RETURN COMPENSATOR MODULE
G

Component Location
Figure 102 (Sheet 3)

PITCH ENHANCEMENT SYSTEM (PES) - MAINTENANCE PRACTICES

1. General
   A. This procedure has one task. This task is a fill and bleed procedure for the pitch enhancement system (PES).

   TASK 29-22-00-872-001

2. Pitch Enhancement System (PES) Fill and Bleed (Fig. 201)
   A. General
      (1) This procedure fills the pitch enhancement system (PES) with hydraulic fluid. It also bleeds all of the air which stays in the PES system after you replace a component or a filter.
   B. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (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
   C. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   D. Procedure

      S 862-002
      (1) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11L10, HYDRAULICS PTU CONT

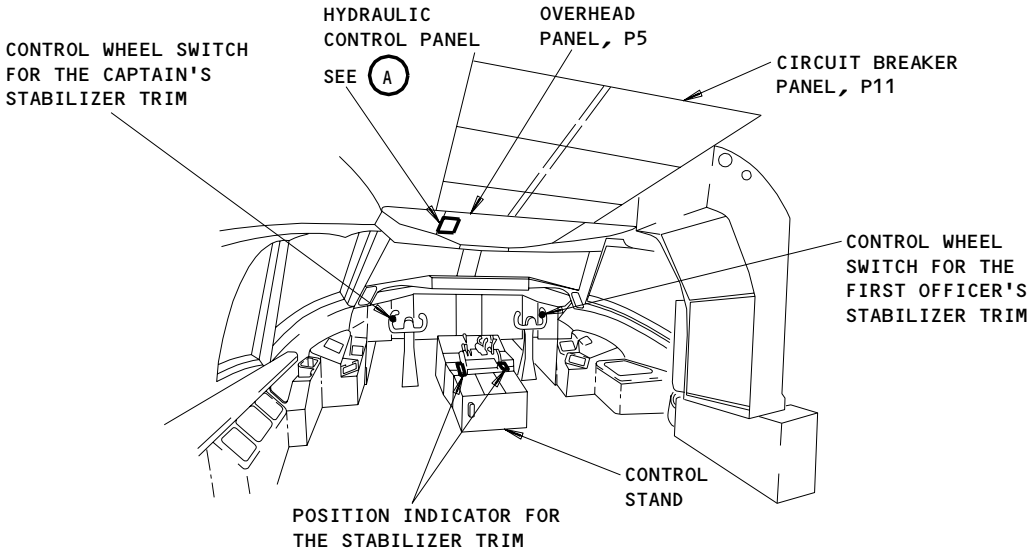
      S 012-003

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

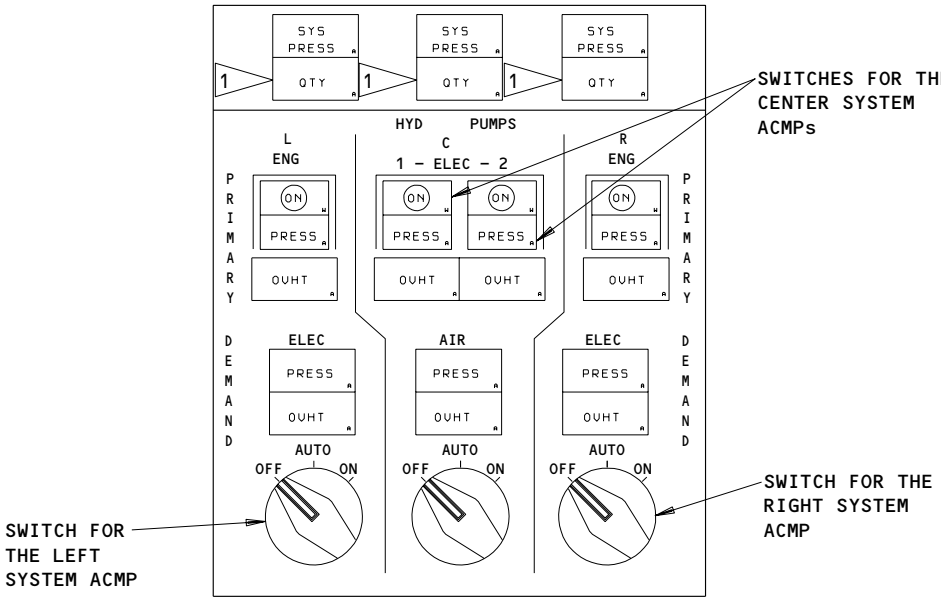
      (2) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

      S 982-004
      (3) Move the position indicator and manual override lever on the shutoff valve, in the right hydraulic system, to the position 1 (open position) (Fig. 202).

      S 982-005
      (4) Make sure that the position indicator and manual override lever on the isolation valve, in the left hydraulic system, is in the position 1 (open position).



FLIGHT COMPARTMENT

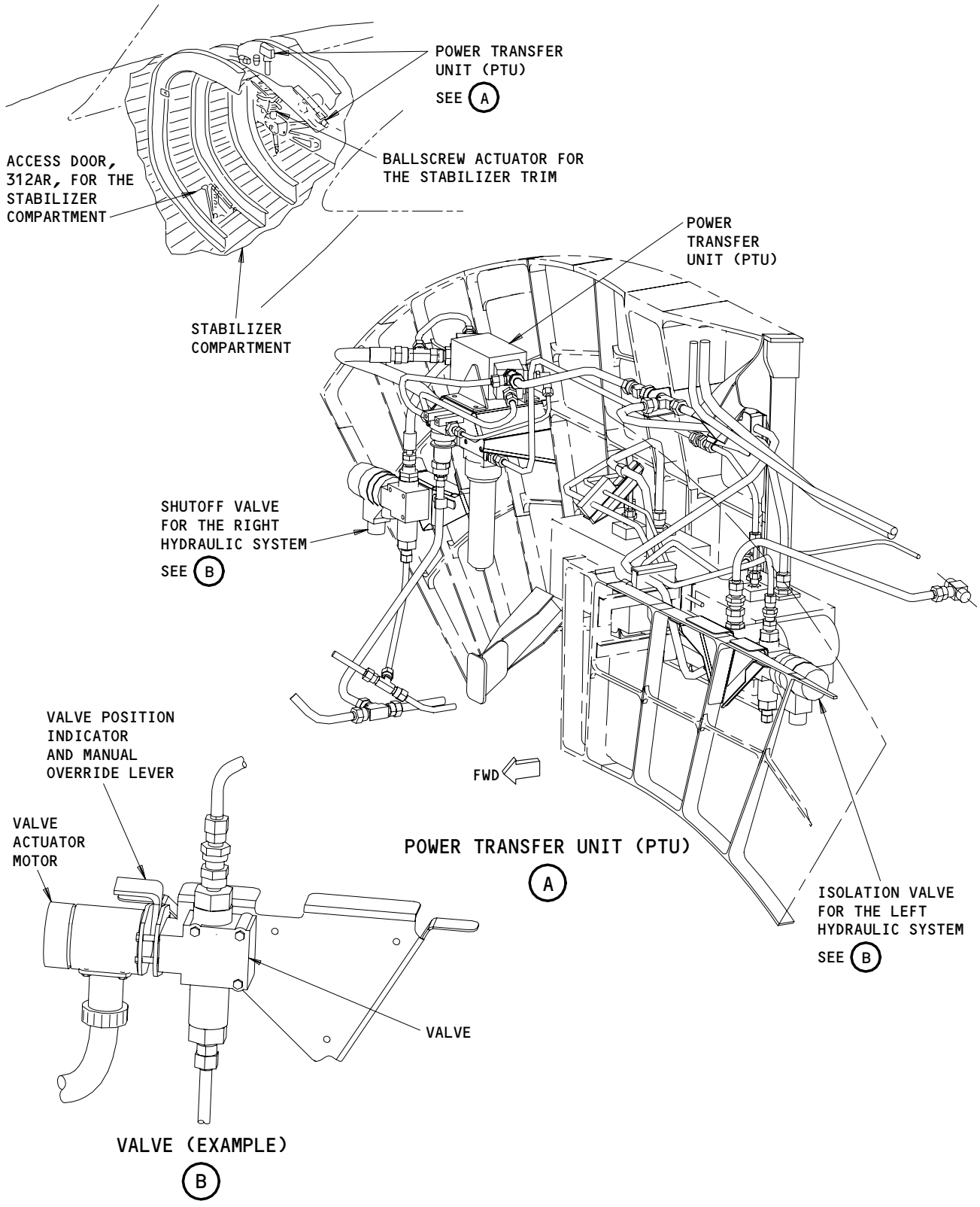


HYDRAULIC CONTROL PANEL

A

1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

Flight Compartment Components
Figure 201



Valves in the Pitch Enhancement System
Figure 202

S 862-006
(5) Supply electrical power (AMM 24-22-00/201).

S 862-007
(6) Pressurize the left hydraulic system with an alternating current motor pump (ACMP) (AMM 29-11-00/201).

S 862-018

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE TRIM SWITCH. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Operate the stabilizer through three full cycles with the trim switches on the control wheel.

NOTE: One cycle is a stabilizer movement from 1 unit of trim to 12 units of trim and back to 1 unit of trim. The stabilizer position indicator is on the control stand panel, P10.

S 862-009
(8) Pressurize the right hydraulic system with an ACMP (AMM 29-11-00/201).

NOTE: Air in the hydraulic system can cause cavitation of the PTU, until the air fully bleeds from the system.

S 862-010
(9) Do the steps that follow until one of these conditions occur:
- The stabilizer moves through ten full cycles
- The PTU operates smoothly for two full cycles of the stabilizer.

(a) Operate the trim switches on the control wheel, to continuously move the stabilizer up and down through full cycles.
(b) While the stabilizer moves, continuously put the ACMP, in the the left hydraulic system, to ON for 5 to 10 seconds and then to OFF for 5 to 10 seconds.

S 862-011
(10) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L10, HYDRAULICS PTU CONT

S 862-012
(11) Remove hydraulic power (AMM 29-11-00/201).

S 212-013
(12) Make sure the position indicator and manual override lever on the shutoff valve, in the right hydraulic system, is in the position 2 (closed position).

S 212-014
(13) Make sure the position indicator and manual override lever on the isolation valve, in the left hydraulic system, is in the position 1 (open position).

S 412-015
(14) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

S 612-016
(15) Fill the reservoirs in the left and right hydraulic systems (AMM 12-12-01/301).

S 862-017
(16) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

PITCH ENHANCEMENT SYSTEM (PES) - ADJUSTMENT/TEST

1. General
   A. This procedure contains four tasks. The first task is an operational test of the Power Transfer Unit (PTU). The second task is an operational test of the PTU return compensator module. The third task is an operational test of the isolation valve for the left hydraulic system. The fourth test is an operational test of the right hydraulic system shut off valve.

   TASK 29-22-00-715-001
2. Operational Test - Hydraulic Power Transfer Unit (PTU) System
   A. General
      (1) This procedure does an operational test of the Hydraulic Power Transfer Unit (PTU).
   B. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 24-22-00/201, Electrical Power
      (3) AMM 27-61-00/201, Spoiler/Speedbrake Control System
      (4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
      (5) AMM 32-09-02/201, Air/Ground Relays
      (6) WDM 29-33-11
   C. Access
      (1) Location Zones

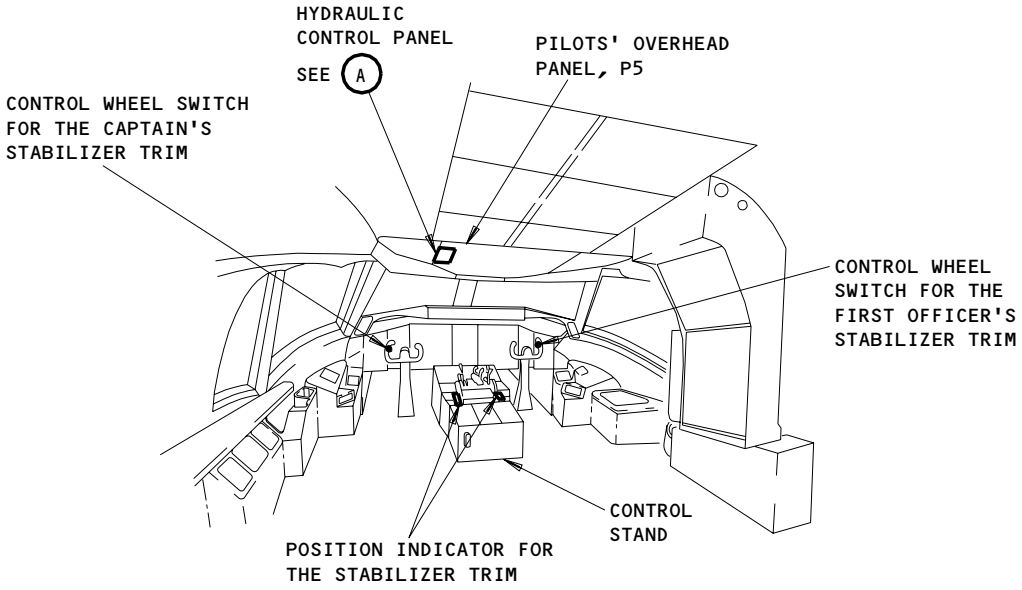
120	Main Equipment Center (RH side)
211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panels

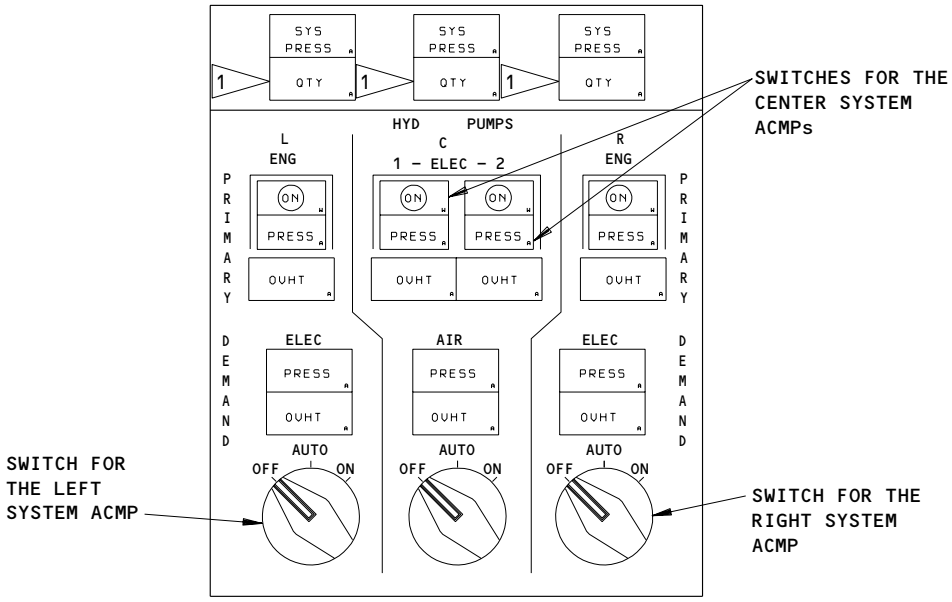
119AL	Main Equipment Center
312AR	Pitch Enhancement System

   D. PTU Operation Test (Method 1)

      S 865-133
      (1) Supply electrical power (AMM 24-22-00/201).



FLIGHT COMPARTMENT

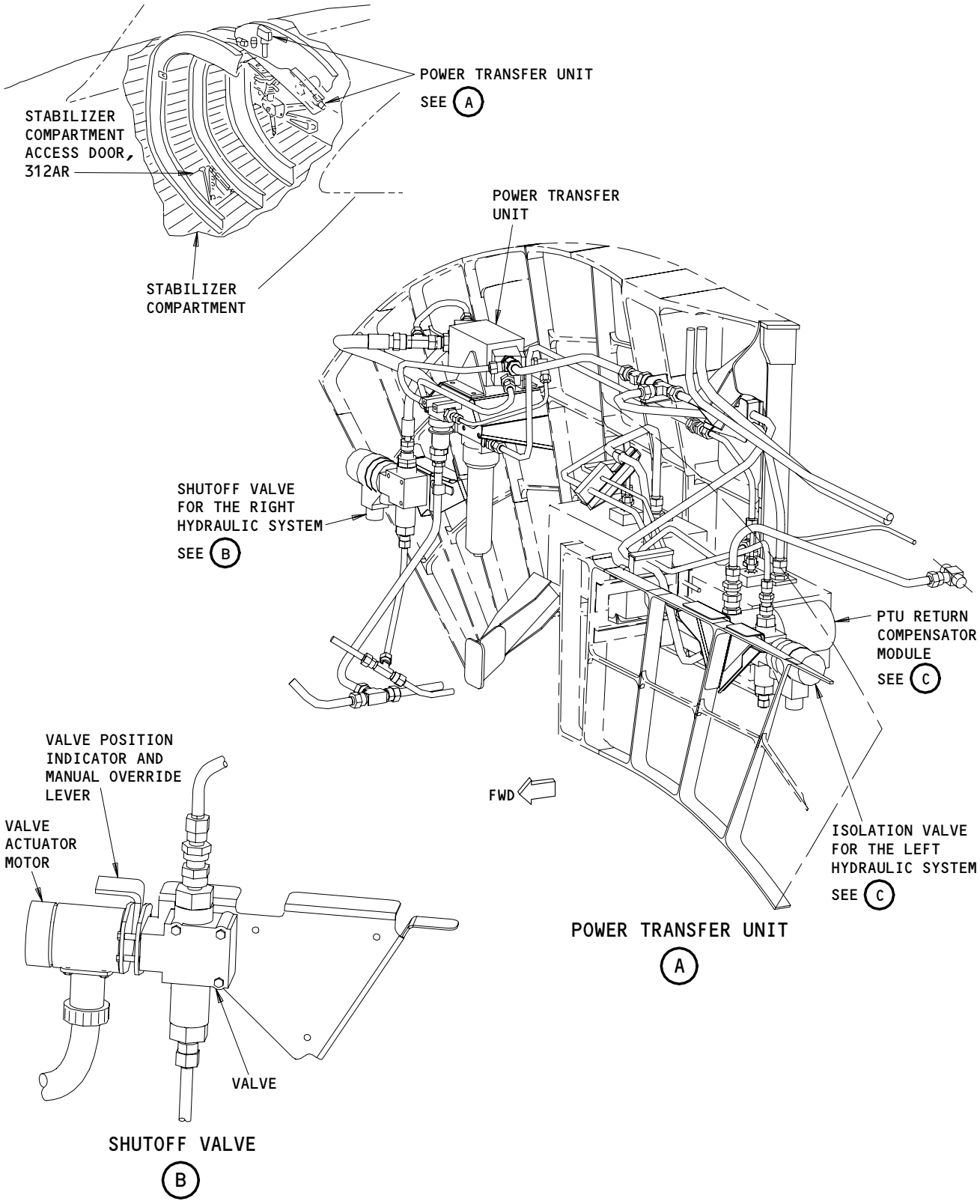


HYDRAULIC CONTROL PANEL

A

1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

Flight Compartment Components
Figure 501



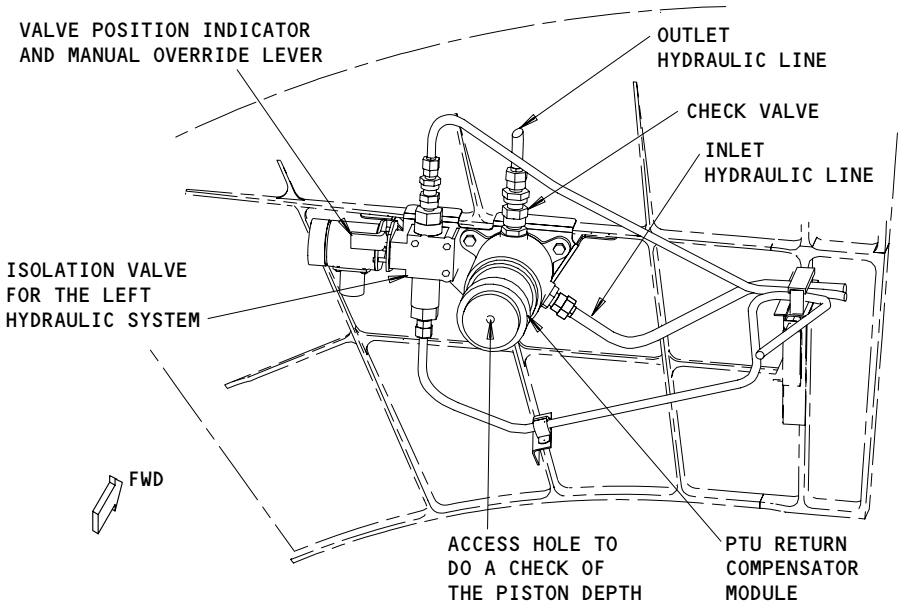
Pitch Enhancement System (PES) Components
Figure 502 (Sheet 1)

S 865-134
(2) Close the following circuit breakers:
(a) 11L10, HYDRAULICS PTU CONT
(b) 11H11, LEFT STAB TRIM CONT

S 865-135
(3) Pressurize the left, center and right hydraulic systems (AMM 29-11-00/201).

S 865-136
(4) Set the following switches on the P61 panel to "ON":
(a) L FLT CONT SHUTOFF - TAIL
(b) C FLT CONT SHUTOFF - TAIL
(c) R FLT CONT SHUTOFF - TAIL

S 865-137
(5) Set the "STAB TRIM L" and the "STAB TRIM C" switches to "NORM".



Pitch Enhancement System (PES) Components
Figure 502 (Sheet 2)

S 865-138

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) Position the Stabilizer at 6 to 7 units of trim.

S 865-139

(7) Open the following circuit breakers:
(a) 11U23 or 11U24, LDG GR POS AIR/GND SYS 2
(b) 11C29,GR POS AIR/GND SYS 2 ALT

S 865-140

(8) Depressurize the left and center hydraulic systems (AMM 29-11-00/201).

S 865-141

(9) Verify that the left system Isolation Shutoff Valve (V150) is in the closed position - "POS 2"

S 865-142

(10) Operate the Captain's Stabilizer Trim Switch for 5 seconds in the Nose Down direction and then for 5 seconds in the Nose Up direction and verify that the PTU operates.

NOTE: PTU operation is verified by Stabilizer movement. If there is no Stabilizer motion, PTU does not operate!

S 865-143

(11) Verify that the following light on the Hydraulic System Control panel M10 is not illuminated:
(a) HYD SYS L RESVR QTY (L10)

S 865-144
(12) If the light is illuminated, open the following circuit breaker:
(a) 11L20, HYDRAULIC QTY

S 865-145
(13) Pressurize the left hydraulic system and wait 20 seconds for the Isolation Valve to open (AMM 29-11-00/201).

S 865-146
(14) Operate the Captain's Stabilizer Trim Switch for 5 seconds in the Nose Down direction and then for 5 seconds in the Nose Up direction and verify that the Stabilizer operates but the PTU does not operate.

NOTE: PTU operation can be detected by listening to the noise of the PTU motor and pump.

S 865-147
(15) Close the following circuit breaker:
(a) 11L15, HYDRAULIC ELEC PUMP CTR1

S 865-148
(16) Install a temporary ground wire from Terminal G154 of TB176 in the E2-4 Shelf (WDM 29-33-11 sh2).

S 865-149
(17) Close this circuit breaker if it is open:
(a) 11L20, HYDRAULIC QTY

S 865-150
(18) Operate the Captain's Stabilizer Trim Switch for 5 seconds in the Nose Down direction and then for 5 seconds in the Nose Up direction and verify that the PTU operates.

S 865-151
(19) Open the following circuit breakers:
(a) 11H11, LEFT STAB TRIM CONT
(b) 11H20, STAB TRIM CONT R

S 865-152
(20) Operate the Captain's Stabilizer Trim Switch for 5 seconds in the Nose Down direction and the for 5 seconds in the nose up direction and verify that the PTU does not operate.

S 865-153
(21) Close the following circuit breakers:
(a) 11H11, LEFT STAB TRIM CONT
(b) 11H20, STAB TRIM CONT R

S 865-154
(22) Open the following circuit breaker:
(a) 11L10, HYDRAULIC PTU CONT

S 865-155
(23) Operate the Captain's Stabilizer Trim Switch for 5 seconds in the Nose Down direction and the for 5 seconds in the nose up direction and verify that the PTU does not operate.

S 865-156
(24) Close the following circuit breakers:
(a) 11L10, HYDRAULIC PTU CONT
(b) 11U23 or 11U24, LDG GR POS AIR/GND SYS 2

S 865-157
(25) Remove the temporary ground wire from Terminal G154 of TB176 in the E2-4 shelf (if installed).

E. PTU Operation Test (Method 2)

S 865-158
(1) Close the following circuit breakers.
(a) 11L10 HYDRAULICS PTU CONT
(b) 11H11 LEFT STAB TRIM CONT

S 865-002
(2) Supply electrical power (AMM 24-22-00/201).

S 015-051

WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(3) Open the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-003
(4) Pressurize the left, right and center hydraulic systems (AMM 29-11-00/201).

S 865-054

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(5) Operate the stabilizer trim through two full cycles with the Captain's or First Officer's stabilizer trim control wheel switches (Fig. 501) and do the steps which follow:

NOTE: One cycle is a stabilizer movement from 1 unit of trim to 12 units of trim and back to 1 unit of trim on the stabilizer position indicator on the control stand panel, P10.

(a) Make sure the stabilizer trim position indicator on the P10 panel moves.
(b) Listen to the PTU in the stabilizer compartment to make sure it does not operate.

S 865-004

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

NOTE: Keep the right hydraulic system pressurized.

S 865-055

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(7) Operate the Captains stabilizer trim control wheel switches and make sure the stabilizer position indicator on the P10 panel does not move.

S 865-074

(8) Operate the First Officers stabilizer trim control wheel switches and make sure the stabilizer position indicator on the P10 panel does not move.

S 865-075

(9) Operate the stabilizer trim levers or the alternate stabilizer trim switches on the control stand and make sure that the stabilizer position indicator on the P10 panel does not move.

S 865-076

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

NOTE: Keep the right hydraulic system pressurized.

S 865-065

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

(11) Do the deactivation procedure for the spoilers (AMM 27-61-00/201) or move all persons and equipment away from the spoilers.

S 865-066

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF THE PROCEDURE IS NOT DONE CORRECTLY, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(12) Do the Flight Mode Simulation procedure for the No. 2 air/ground system (AMM 32-09-02/201).

TABLE 501
Captain's stabilizer trim control wheel switches First Officer's stabilizer trim control wheel switches Stabilizer trim levers or the alternate stabilizer trim switches on the control stand

S 865-056

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(13) Operate the stabilizer trim through 2 units of trim with each of the switches in Table 501, one at a time, and do the steps which follow:
(a) Make sure the stabilizer position indicator on the control stand P10 panel moves.
(b) Listen to the PTU in the stabilizer compartment to make sure it does not operate.

S 865-005

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

NOTE: Keep the right hydraulic system pressurized.

S 865-057

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(15) Operate the Captains stabilizer trim control wheel switches and make sure the stabilizer position indicator on the P10 panel moves.

S 865-077

(16) Operate the First Officers stabilizer trim control wheel switches and make sure the stabilizer position indicator on the P10 panel moves.

S 865-006

(17) Operate the stabilizer trim levers or the alternate stabilizer trim switches on the control stand and make sure that the stabilizer position indicator on the P10 panel does not move.

S 865-007

(18) Pressurize the left hydraulic system (AMM 29-11-00/201).

NOTE: Keep the right hydraulic system pressurized.

S 865-058

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(19) Operate the stabilizer trim through 2 units of trim with each of the switches in Table 501, one at a time, and do the steps which follow:
(a) Make sure the stabilizer trim indicator on the P10 panel moves.
(b) Listen to the PTU in the stabilizer compartment to make sure it does not operate.

S 865-008

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

NOTE: Keep the right hydraulic system pressurized.

S 865-059

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(21) Operate the stabilizer trim through 2 units of trim with each of the switches in Table 501, one at a time, and do the steps which follow:
(a) Make sure the stabilizer trim indicator on the P10 panel moves.
(b) Listen to the PTU in the stabilizer compartment to make sure it does not operate.

S 865-060

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(22) Operate the stabilizer trim with the Captain's or First Officer's stabilizer trim control wheel switches. While you operate the stabilizer trim, remove power from the center hydraulic system (AMM 29-11-00/201).

S 215-009

(23) After a short time for the center system pressure to decrease, do the steps which follow:
  (a) Listen to the PTU in the stabilizer compartment to make sure it operates.
  (b) Monitor the movement of the stabilizer trim position indicator on the P10 panel to make sure the stabilizer trim rate decreases.

S 865-010

(24) Release the Captain's and First Officer's stabilizer trim control wheel switches.

S 215-011

(25) Listen to the PTU in the stabilizer compartment to make sure it stops when you release the stabilizer trim switches.

S 865-012

(26) Pressurize the left hydraulic system (AMM 29-11-00/201).

NOTE: Keep the right hydraulic system pressurized.

S 215-080

(27) Stop for a minimum of 20 seconds, then do this step:
  (a) Make sure the position indicator and manual override lever on the left system isolation valve, in the stabilizer compartment, is in the position 1 (open position).

S 865-061

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(28) Operate the stabilizer trim with the Captain's or First Officer's stabilizer trim control wheel switches. While you operate the stabilizer trim, remove power from the left hydraulic system (AMM 29-11-00/201).

S 215-013

(29) After a short time for the left hydraulic system pressure to decrease, do the steps which follow:
  (a) Listen to the PTU in the stabilizer compartment to make sure it operates.
  (b) Monitor the movement of the stabilizer trim position indicator on the P10 panel to make sure the stabilizer trim rate decreases.

S 865-014
(30) Release the Captain's or First Officer's stabilizer trim control wheel switches.

S 215-015
(31) Listen to the PTU in the stabilizer compartment to make sure it stops when you release the stabilizer trim switches.

S 865-016
(32) Pressurize the left hydraulic system (AMM 29-11-00/201).

NOTE: Keep the right hydraulic system pressurized.

S 865-062

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(33) Operate the stabilizer trim with the Captain's or First Officer's stabilizer trim control wheel switches. While you operate the stabilizer trim, do the steps which follow:
(a) Disconnect the connector D38 at the Quantity Transmitter for the left hydraulic system, M338 (WDM 29-33-11).

NOTE: This gives a signal of a left reservoir low quantity.

(b) Listen to the PTU in the stabilizer compartment to make sure it operates.

S 865-017
(34) Release the Captain's or First Officer's stabilizer trim control wheel switches.

S 215-018
(35) Listen to the PTU in the stabilizer compartment to make sure it stops when you release the stabilizer trim switches.

S 865-019
(36) Remove power from the left and right hydraulic systems (AMM 29-11-00/201)

S 495-020
(37) Connect the Connector D38 for the Quantity Transmitter, M338, for the left hydraulic system (WDM 29-33-11).

S 865-132
(38) After at least 20 seconds, make sure the position indicator and manual override lever on the left system isolation valve in the stabilizer compartment is in position 2 (closed position).

S 865-067
(39) Put the airplane back to the ground mode (AMM 32-09-02/201).

S 865-068
(40) Do the activation procedure for the spoilers if you did the deactivation procedure (AMM 27-61-00/201).

S 415-021
(41) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-022
(42) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

TASK 29-22-00-715-023

3. Operational Test - PTU Return Compensator Module

A. Equipment
(1) Metal rod - commercially available, 0.125-inch diameter, 6 inches long

B. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic System
(4) AMM 29-22-00/201, Pitch Enhancement System (PES)

C. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

D. Procedure (Fig 502)

NOTE: The pitch enhancement system must be at ambient temperature before you start this test. If the operation of the system increases the temperature of the hydraulic fluid, thermal contraction of the fluid when the temperature decreases can cause failure of this test.

S 865-024
(1) Supply electrical power (AMM 24-22-00/201).

S 015-052

WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-025

(3) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-063

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) Operate the stabilizer trim from 1 unit of trim to 12 units of trim and back to 1 unit of trim on the stabilizer position indicator on the control stand panel, P10 (Fig. 501). Use the Captain's or First Officer's control wheel switches.

S 865-026

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

S 485-027

(6) Put a metal rod into the access hole in the center of the housing of the PTU return compensator.

S 975-028

(7) Keep a record of the depth of the piston in the housing.

S 865-029
(8) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 865-030
(9) Move the position indicator and manual override lever on the left hydraulic system isolation valve to position 2 (closed position).

S 865-031
(10) Do not operate the hydraulic system or the stabilizer trim for one hour.

S 485-032
(11) Put a metal rod into the access hole in the center of the housing of the PTU return compensator.

S 975-069
(12) Keep a record of the depth of the piston in the housing.

S 975-070
(13) Compare this piston depth with the depth you wrote one hour before.

S 975-072
(14) The piston depth must not increase more than 0.25 inch.
(a) If the piston depth increases more than 0.25 inch, replace the PTU Return Compensator Module per AMM 29-22-02/401 or repair it per CMM 29-10-24.

S 865-033
(15) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P11 panel:
(a) 11L10, HYDRAULICS PTU CONT

S 865-034
(16) Pressurize the left hydraulic system (AMM 29-11-00/201).

S 865-064

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(17) Operate the stabilizer trim through two full cycles with the Captain's or First Officer's stabilizer trim control wheel switches.

NOTE: One cycle is a stabilizer movement from 1 unit of trim to 12 units of trim and back to 1 unit of trim on the stabilizer position indicator on the P10 panel.

S 865-035

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

S 485-036

(19) Put a metal rod into the access hole in the center of the housing of the PTU return compensator.

S 975-078

(20) Keep a record of the depth of the piston in the housing.

S 035-037

WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

(21) Slowly loosen the hydraulic line connection at the inlet port of the return compensator module to let the fluid, which is pressurized, bleed from the PTU system.

S 435-038

(22) After the hydraulic fluid drains, tighten the hydraulic line connection at the inlet port of the return compensator module.

S 485-039

(23) Put a metal rod into the access hole in the center of the housing of the PTU return compensator.

S 975-079

(24) Keep a record of the depth of the piston in the housing.

S 975-071
(25) Compare this piston depth with the depth you wrote before you bled the fluid from the compensator. The piston depth must increase by 1.0 ±0.1 inches.
(a) If the piston depth does not increase by 1.0 ± 0.1 inches, replace the PTU Return Compensator Module per AMM 29-22-02/401 or repair it per CMM 29-10-24.

S 875-040
(26) Do the PES system fill and bleed procedure (AMM 29-22-00/201).

S 415-041
(27) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-042
(28) Remove electrical power if it is not necessary (AMM 24-22-00/201).

TASK 29-22-00-715-043

4. Operational Test - Left Hydraulic System Isolation Valve

A. General
(1) This procedure manually positions the PTU isolation valve to the closed positon, to make sure that it moves to the open position when the 11L10 HYD PTU CONT circuit breaker is closed. It also makes sure that the valve moves from the open to the closed, and from closed to the open positions when commanded.

B. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 32-09-02/201, Air/Ground Relay System

C. Access
(1) Location Zones
211/212 Control Cabin
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

D. Procedure (Fig. 502)

S 865-044
(1) Supply electrical power (AMM 24-22-00/201).

S 865-102
(2) Make sure the left hydraulic system is depressurized (AMM 29-11-00/201).

S 865-105
(3) Do the procedure to prepare the safety-sensitive systems for air mode simulation (AMM 32-09-02/201).

S 865-045

(4) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11L10, HYDRAULICS PTU CONT
(b) 11U23 or 11U24, LDG GR POS AIR/GND SYS 2.

S 015-053

WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(5) Open the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 215-048

(6) Make sure the position indicator and manual override lever on the left hydraulic system isolation valve is in position 1 (OPEN position).

S 865-047

(7) Open these circuit breakers on the overhead panel, P11 and attach a DO-NOT-CLOSE tag:
(a) 11U23 or 11U24 LDG GR POS AIR/GND SYS 2
(b) 11C29 GR POS AIR/GND SYS 2 ALT

S 215-106

(8) Make sure the position indicator and the manual override lever on the left hydraulic system isolation valve moves to position 2 (CLOSED).
(a) Listen to the valve motor and make sure it stops when the valve is in the fully closed position.

S 865-098

(9) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 865-107
(10) Move the position indicator and the manual override lever on the left hydraulic system isolation valve to a position midway between the OPEN and CLOSED position.

NOTE: When you move the position indicator to the middle position, the actuator must be directed to the middle position with one direction of movement only. For example when you go from position 1 to position 2, do not go past the middle position and then change direction to move to the middle position. This can cause the valve switches to reset.

S 865-108
(11) Close this circuit breaker on the overhead panel, P11, and remove the DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 215-109
(12) Make sure the position indicator and the manual override lever on the left hydraulic system isolation valve moves to position 2 (CLOSED).

NOTE: The valve position indicator will initally move towards the uncommanded position 1 (OPEN). This is due to the time delay relay. The valve position indicator will move to and stay in the commanded position 2 (CLOSED) after the intial movement towards position 1 (OPEN).

(a) Listen to the valve motor and make sure it stops when the valve is in the fully closed position.

S 865-111
(13) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11C29 GR POS AIR/GND SYS 2 ALT
(b) 11U23 or 11U24 LDG GR POS AIR/GND SYS 2.

S 215-099
(14) After at least 20 seconds, make sure the position indicator and manual override lever on the left hydraulic system isolation valve moves to position 1 (OPEN).
(a) Listen to the valve motor and make sure it stops when the valve is in the fully open position.

S 865-112
(15) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 865-113

(16) Move the position indicator and the manual override lever on the left hydraulic system isolation valve to a position midway between the OPEN and CLOSED position.

NOTE: When you move the position indicator to the middle position, the actuator must be directed to the middle position with one direction of movement only. For example when you go from position 1 to position 2, do not go past the middle position and then change direction to move to the middle position. This can cause the valve switches to reset.

S 865-114

(17) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L10, HYDRAULICS PTU CONT

S 215-115

(18) Make sure the position indicator and the manual override lever on the left hydraulic system isolation valve moves to position 1 (OPEN).
(a) Listen to the valve motor and make sure it stops when the valve is in the fully open position.

S 415-049

(19) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-116

(20) Do the procedure to put the safety-sensitive systems back to their initial conditions (AMM 32-09-02/201).

S 865-050

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

TASK 29-22-00-705-082

5. Operational Test - Right Hydraulic System Shutoff Valve

A. General

(1) This procedure does an operational test of the right hydraulic system shut off valve.

B. References

(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 24-22-00/201, Electrical Power
(3) AMM 27-61-00/201, Spoiler/Speedbrake Control System
(4) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
(5) AMM 32-09-02/201, Air/Ground Relays

C. Access

(1) Location Zones

120	Main Equipment Center (RH side)
211/212	Control Cabin
311/312	Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panels

119AL	Main Equipment Center
312AR	Pitch Enhancement System

D. Procedure (Fig. 502)

S 865-083

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

S 865-117

(2) Do the procedure to prepare the safety-sensitive systems for air mode simulation (AMM 32-09-02/201).

S 865-118

(3) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11L10, HYDRAULICS PTU CONT

(b) 11U23 or 11U24, LDG GR POS AIR/GND SYS 2.

S 015-084

WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(4) Open the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 215-119

(5) Make sure the position indicator and the manual override lever on the valve is in position 2 (CLOSED).

S 865-085

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

S 865-086

WARNING: MAKE SURE YOU DO THE FLIGHT MODE SIMULATION CORRECTLY. IF THE PROCEDURE IS NOT DONE CORRECTLY, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(7) Open these circuit breakers on the overhead panel, P11 and attach a DO-NOT-CLOSE tag:
(a) 11U23 or 11U24 LDG GR POS AIR/GND SYS 2
(b) 11C29 GR POS AIR/GND SYS 2 ALT

S 865-087

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

S 865-088

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE AWAY FROM THE STABILIZER IN THE STABILIZER COMPARTMENT BEFORE YOU OPERATE THE STABILIZER TRIM. MOVEMENT OF THE STABILIZER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(9) Operate the stabilizer trim with the Captain's or First Officer's stabilizer trim control wheel switches and hold until the valve fully opens. While you operate the stabilizer trim, remove power from the center hydraulic system (AMM 29-11-00/201).

S 865-097
(10) After a short time for the center system pressure to decrease, do the step that follows:
(a) Make sure the valve position indicator moves to position 1 (OPEN). Listen to make sure the valve motor stops when the valve is fully open.

S 865-121
(11) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 865-122
(12) Move the position indicator and the manual override lever on the valve to a position midway between the OPEN and CLOSED position.

NOTE: When you move the position indicator to the middle position, the actuator must be directed to the middle position with one direction of movement only. For example when you go from position 1 to position 2, do not go past the middle position and then change direction to move to the middle position. This can cause the valve switches to reset.

S 865-123
(13) Close this circuit breaker on the overhead panel, P11, and remove the DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 215-124
(14) Make sure the position indicator and the manual override lever on the valve moves to position 1 (OPEN).

NOTE: The valve position indicator will initally move towards the uncommanded position 2 (CLOSED). This is due to the time delay relay. The valve position indicator will move to and stay in the commanded position 1 (OPEN) after the intial movement towards position 2 (CLOSED).

(a) Make sure the valve position indicator moves to position 1 (OPEN). Listen to make sure the valve motor stops when the valve is fully open.

S 865-090
(15) Release the Captain's and First Officer's stabilizer trim control wheel well switches.

S 215-125
(16) Make sure the position indicator and the manual override lever on the valve moves to position 2 (CLOSED). Listen to the valve motor to make sure it stops when the valve is fully closed.

S 865-126
(17) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11C29 GR POS AIR/GND SYS 2 ALT
(b) 11U23 or 11U24 LDG GR POS AIR/GND SYS 2.

S 865-127
(18) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
(a) 11L10, HYDRAULICS PTU CONT

S 865-128
(19) Move the position indicator and the manual override lever on the valve to a position midway between the OPEN and CLOSED position.

NOTE: When you move the position indicator to the middle position, the actuator must be directed to the middle position with one direction of movement only. For example when you go from position 1 to position 2, do not go past the middle position and then change direction to move to the middle position. This can cause the valve switches to reset.

S 865-129
(20) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L10, HYDRAULICS PTU CONT

S 215-130
(21) Make sure the position indicator and the manual override lever on the valve moves to position 2 (CLOSED).
(a) Listen to the valve motor and make sure it stops when the valve is in the fully closed position.

S 865-092
(22) Remove power from the right hydraulic system (AMM 29-11-00/201).

S 865-131
(23) Do the procedure to put the safety-sensitive systems back to their initial conditions (AMM 32-09-02/201).

S 415-094
(24) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

S 865-095
(25) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

HYDRAULIC POWER TRANSFER UNIT (PTU) - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the hydraulic power transfer unit (PTU). The second task installs the PTU.

TASK 29-22-01-004-001

2. Remove the Hydraulic Power Transfer Unit (PTU) (Fig. 401)
   A. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   C. Procedure

      S 864-002
      (1) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

      S 864-003
      (2) Remove the pressure from the reservoirs in the left and right hydraulic systems (AMM 29-11-00/201).

      S 014-004

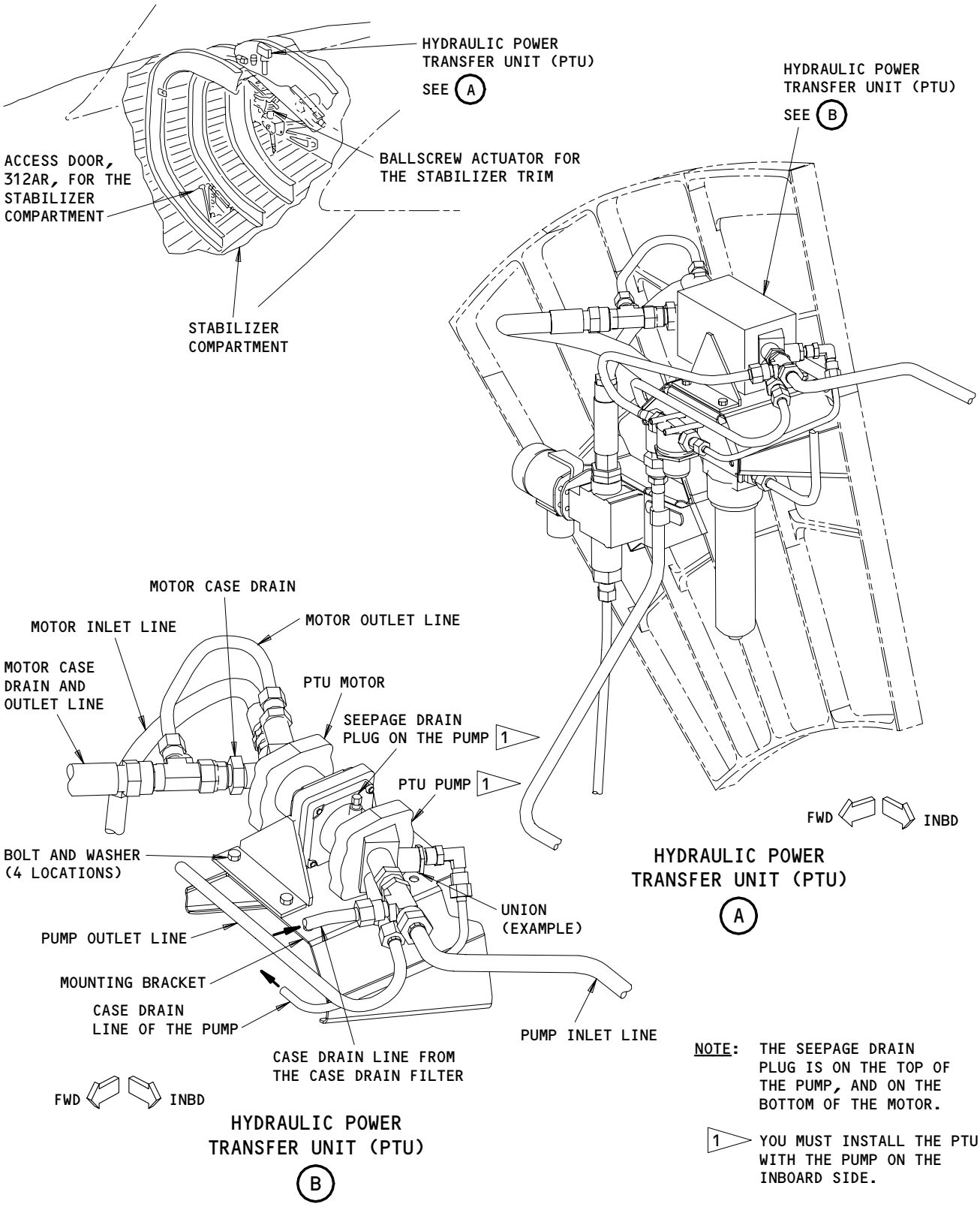
      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (3) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

      S 874-005

      WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

      (4) Slowly loosen the pump inlet line on the PTU to bleed the pressure from the PES system.



Hydraulic Power Transfer Unit (PTU) Installation
Figure 401

S 034-006
(5) Disconnect all the hydraulic lines from the unions on the PTU motor and on the (PTU) pump.

S 034-007
(6) Install caps on the hydraulic lines and the unions.

S 024-008
(7) Remove the bolts that attach the PTU to the mounting bracket.

S 024-009
(8) Remove the PTU from the mounting bracket.

S 034-010
(9) Remove the unions from the PTU motor and the PTU pump.

S 034-011
(10) Remove the seepage drain plug from the PTU pump.

TASK 29-22-01-404-012

3. Install the Hydraulic Power Transfer Unit (PTU) (Fig. 401)
   A. Consumable Materials
      (1) D00054 Hydraulic System Lubricant - MCS 352B
   B. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 12-25-01/301, Exterior Cleaning
      (3) AMM 29-22-00/201, Pitch Enhancement System (PES)
   C. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

D. Procedure

S 644-013

(1) Apply hydraulic lubricant or hydraulic fluid to these parts:
    (a) O-rings
    (b) Threads of the unions.

S 434-014

(2) Install the new O-rings on the unions.

S 434-015

(3) Install the unions on the PTU motor and the PTU pump.

S 434-016

(4) Install the seepage drain plug in the PTU pump.

S 424-017

CAUTION: MAKE SURE YOU INSTALL THE PTU WITH THE PUMP ON THE INBOARD SIDE. IF YOU DO NOT INSTALL THE PUMP CORRECTLY, IT WILL NOT GIVE A SUFFICIENT OUTPUT.

DO NOT USE FORCE TO CONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC LINES DO NOT ALIGN CORRECTLY WITH THE UNIONS ON THE PTU, THE PTU IS NOT IN THE CORRECT POSITION.

(5) Put the PTU on the mounting bracket with the pump on the inboard side.

NOTE: You can incorrectly install the PTU on the mounting bracket with the motor on the inboard side. If you do this, the hydraulic lines and the unions will not align correctly. Then, if you use force to connect the hydraulic lines, the PTU will not give sufficient output.

You can identify the PTU pump as follows:
- The seepage drain plug is on top of the PTU pump.
- The identification tag on the bottom of the pump shows a displacement of 0.080 cubic inches for each revolution. (The motor has a different displacement).

S 424-018
(6) Install the bolts and the washers to attach the PTU to the mounting bracket.

S 434-019
(7) Remove the caps from the hydraulic lines.

S 434-020
(8) Connect the hydraulic lines to the unions on the PTU pump and on the PTU motor.

S 874-021
(9) Do the PES system fill and bleed procedure (AMM 29-22-00/201).

S 794-022
(10) Make sure there are no leaks at the hydraulic line connections to the PTU.

S 114-023

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

(11) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-024
(12) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

POWER TRANSFER UNIT (PTU) RETURN COMPENSATOR MODULE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the return compensator module for the PTU. The second task installs the return compensator module for the PTU.

TASK 29-22-02-004-001

2. Remove the Return Compensator Module for the PTU (Fig. 401)
   A. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   C. Procedure

      S 864-002
      (1) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

      S 864-003
      (2) Remove the pressure from the reservoir in the left hydraulic system (AMM 29-11-00/201).

      S 014-004

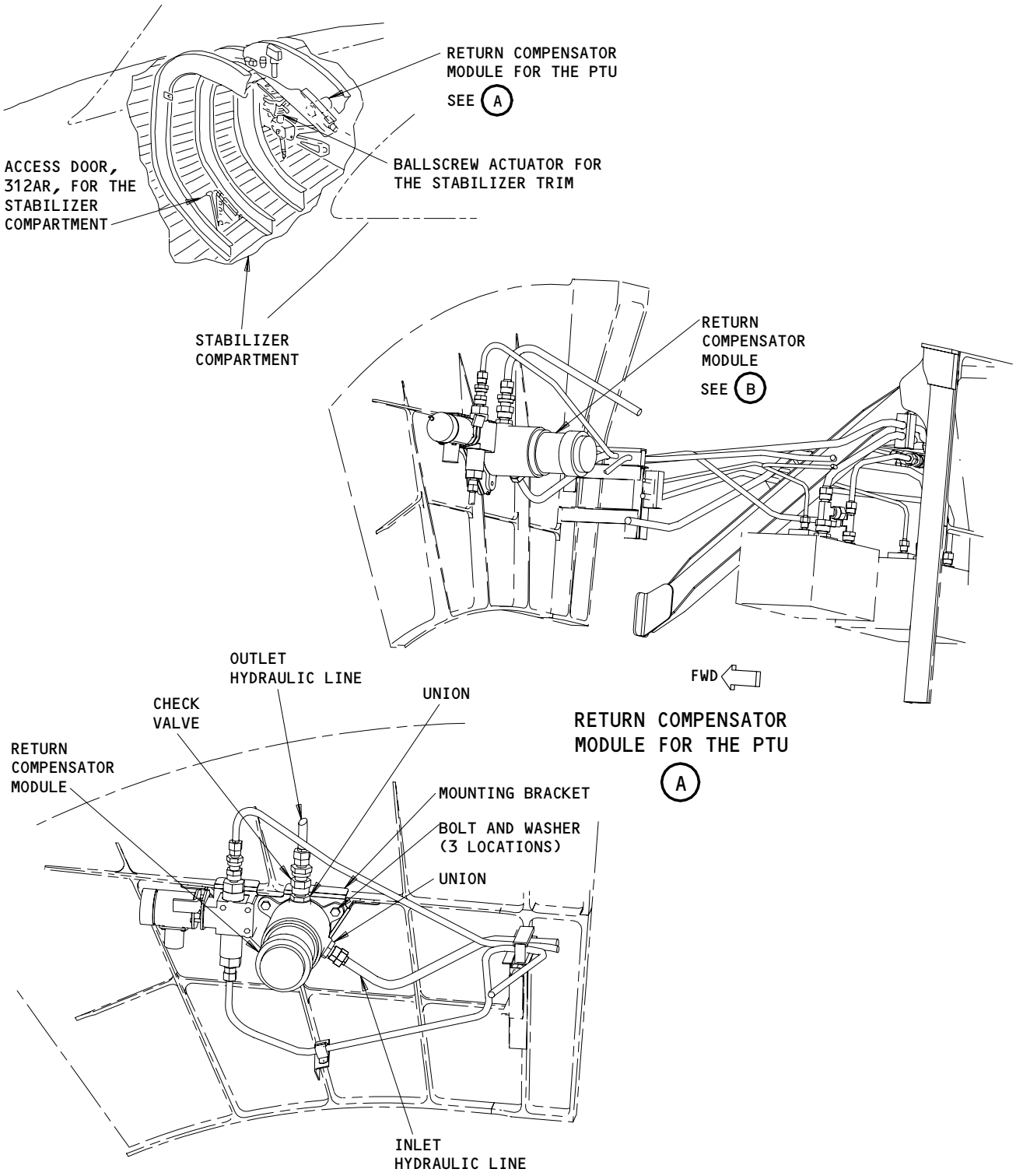
      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (3) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

      S 874-005

      WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

      (4) Slowly loosen the hydraulic line connection at the inlet of the return compensator module, to bleed the pressure from the pitch enhancement system.



RETURN COMPENSATOR MODULE FOR THE PTU

A

RETURN COMPENSATOR MODULE

B

PTU Return Compensator Module Installation
Figure 401

S 034-006

(5) Remove the check valve, in the outlet hydraulic line, from the union in the outlet of the return compensator module.

NOTE: Do not remove the check valve from the hydraulic line.

S 034-007

(6) Remove the inlet hydraulic line from the union, in the inlet of the return compensator module.

S 034-008

(7) Install caps on the hydraulic lines, the check valve, and the inlet and the outlet of the return compensator.

S 024-009

(8) Remove the bolts that attach the return compensator module to the mounting bracket.

S 024-010

(9) Remove the return compensator module from the mounting bracket.

S 034-011

(10) Remove the union from the inlet and the outlet of the return compensator module.

TASK 29-22-02-404-012

3. Install the Return Compensator Module for the PTU (Fig. 401)

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 29-22-00/201, Pitch Enhancement System (PES)

C. Access

(1) Location Zones

311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel

312AR Pitch Enhancement System

D. Procedure

S 644-013

(1) Apply hydraulic lubricant or hydraulic fluid to these parts:

(a) O-rings

(b) Threads of the union.

S 434-014

(2) Install the new O-rings on the unions.

S 434-015

(3) Install the unions in the inlet and the outlet of the return compensator module.

S 424-016

(4) Put the return compensator module on the mounting bracket.

S 424-017

(5) Install the bolts and washers to attach the return compensator module to the mounting bracket.

S 434-018

(6) Remove the caps from the hydraulic lines, the check valve, and the unions.

S 434-019

(7) Connect the inlet hydraulic line to the union in the inlet of the return compensator module.

S 434-020

(8) Connect the check valve, in the outlet hydraulic line, to the union in the outlet of the return compensator module.

S 874-021

(9) Do the fill and bleed procedure for the pitch enhancement system (AMM 29-22-00/201).

S 794-022

(10) Make sure there are no leaks at the hydraulic line connections on the return compensator module.

S 114-023

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

(11) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-024

(12) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

POWER TRANSFER UNIT (PTU) CASE DRAIN FILTER MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task removes the filter module for the case drain of the PTU. The second task removes the case drain filter element. The third task installs the filter module for the case drain of the PTU. The fourth task installs the case drain filter element.

TASK 29-22-03-004-001

2. Remove the PTU Case Drain Filter Module
   A. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

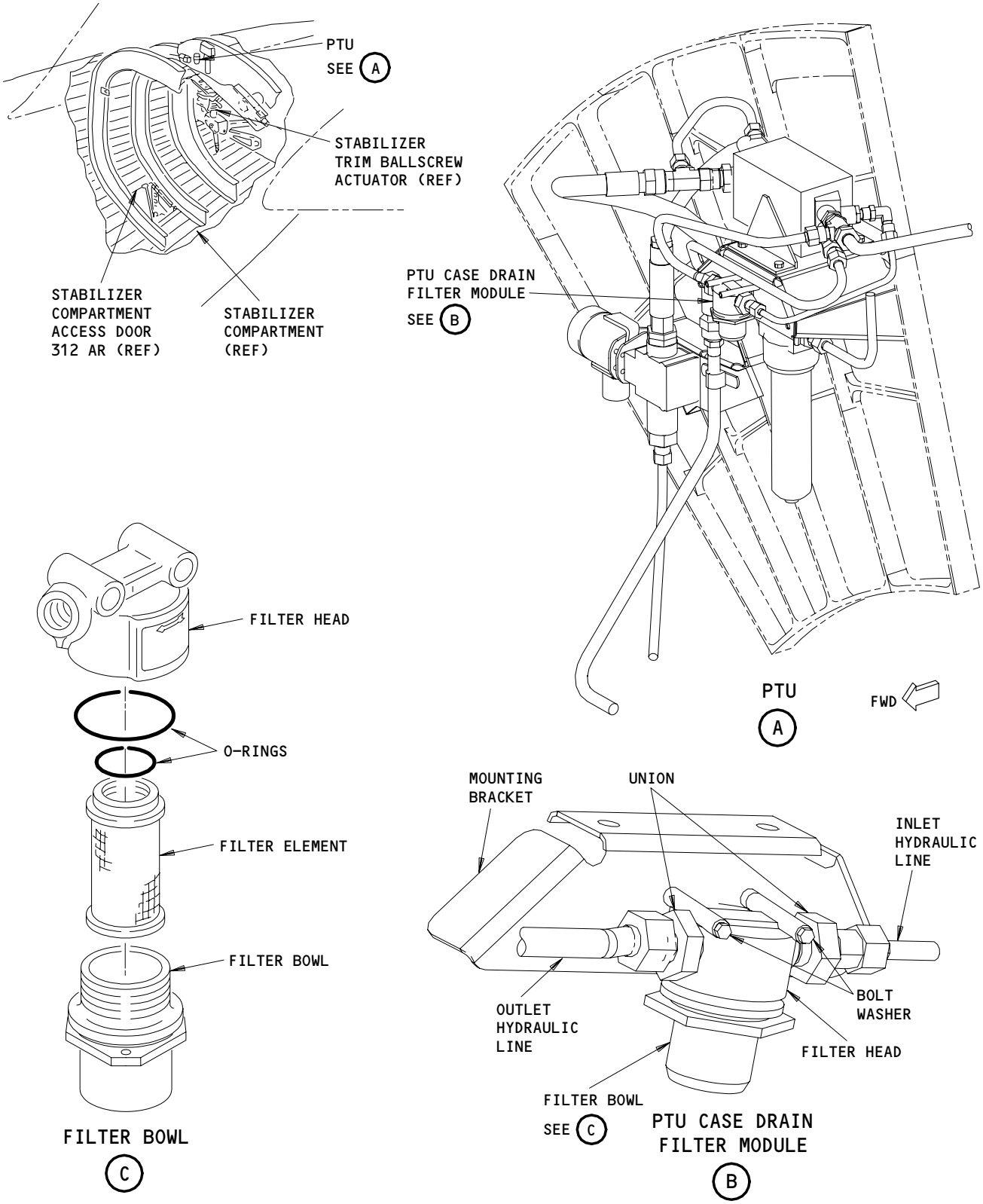
   C. Prepare for Removal

      S 864-004
      (1) Remove the pressure from the left, right, and center hydraulic systems and the left system reservoir (AMM 29-11-00/201).

      S 014-002

      WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

      (2) Open the access door, 312AR, for the pitch enhancement system (PES) (AMM 06-42-00/201).
   D. Remove the PTU Case Drain Filter Module (Fig. 401)



Power Transfer Unit (PTU) Case Drain Filter Module Installation
Figure 401

S 024-038

WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

(1) Slowly loosen the hydraulic line connection at the outlet port of the filter module for the case drain of the PTU to let the pressurized fluid bleed from the PES.

S 034-006

(2) Disconnect the inlet and outlet hydraulic lines from the unions on the filter module.

S 034-007

(3) Install caps on the hydraulic lines and on the unions in the ports of the filter module.

S 024-008

(4) Remove the two bolts, and remove the filter module.

S 034-009

(5) Remove the union from each port of the filter module.

S 034-010

(6) Install caps on the ports of the filter module.

TASK 29-22-03-004-039

3. Remove the Case Drain Filter Element

A. References

(1) AMM 06-42-00/201, Empennage Access Panels and Doors

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

B. Access

(1) Location Zones

311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

C. Prepare for Removal

S 864-031
(1) Remove the pressure from the left, right, and center hydraulic systems and the left system reservoir (AMM 29-11-00/201).

S 014-032

WARNING: STAY OFF THE SERVICE ACCESS DOOR 312AR AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

(2) Open the access door, 312AR, for the pitch enhancement system (PES) (AMM 06-42-00/201).

D. Remove the Case Drain Filter Element (Fig. 401)

S 874-015

WARNING: BE CAREFUL WHEN YOU LOOSEN THE FILTER BOWL. THE REMAINING PRESSURE IN THE PES CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM THE FILTER BOWL CONNECTION CAN CAUSE INJURY TO PERSONS.

(1) Slowly loosen the filter bowl to let the fluid, which is pressurized, bleed from the PES.

S 434-016
(2) Remove the filter bowl from the filter head.

S 424-017
(3) Remove the filter element.

TASK 29-22-03-404-003

4. Install the PTU Case Drain Filter Module

A. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 29-22-00/201, Pitch Enhancement System (PES)

C. Access
(1) Location Zones
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

D. Install the PTU Case Drain Filter Module (Fig. 401)

S 644-011
(1) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the union.

S 434-012
(2) Install new O-rings on the unions.

S 434-037
(3) Install the unions in the ports of the filter module for the case drain of the PTU.

S 424-013
(4) Install the filter module on the mounting bracket with bolts and washers and tighten the bolts.

S 434-030
(5) Remove the caps and connect the inlet and outlet hydraulic lines to the filter module.

E. Put the Airplane Back to Its Usual Condition

S 874-033
(1) Do the fill and bleed procedure for the pitch enhancement system (Ref 29-22-00).

S 214-034
(2) Make sure there are no leaks at the hydraulic line and filter bowl connections to the filter head.

S 114-035

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

(3) Clean all hydraulic fluid from the area of the filter module (AMM 12-25-01/301).

S 414-036
(4) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

TASK 29-22-03-404-040

5. Install the Case Drain Filter Element

A. Equipment
(1) Ultrasonic Cleaner - Commercially Available

B. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

C. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 29-22-00/201, Pitch Enhancement System (PES)

D. Access
(1) Location Zones
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

E. Install the Case Drain Filter Element (Fig. 401)

S 134-018
(1) Clean the filter element, for the case drain, in an ultrasonic cleaner.

S 214-019
(2) Examine the filter element for damage.

S 964-020
(3) If you can not remove the contamination or if the filter element has damage, replace the filter element.

S 644-021
(4) Apply hydraulic lubricant or hydraulic fluid to the O-rings and the threads of the filter bowl and the filter head before installation.

S 434-022
(5) Install new O-rings in the filter element and on the filter bowl.

S 424-023
(6) Install the filter element in the filter head.

S 434-024
(7) Install the filter bowl in the filter head, and tighten the filter bowl to 75-100 pound-inches.

S 434-025
(8) Safety the filter bowl with wire.

F. Put the Airplane Back to Its Usual Condition

S 874-026
(1) Do the fill and bleed procedure for the pitch enhancement system (AMM 29-22-00/201).

S 214-027
(2) Make sure there are no leaks at the hydraulic line and filter bowl connections to the filter head.

S 114-028

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

(3) Clean all hydraulic fluid from the area of the filter module (AMM 12-25-01/301).

S 414-029
(4) Close the access door, 312AR, for the pitch enhancement system (AMM 06-42-00/201).

POWER TRANSFER UNIT (PTU) PRESSURE FILTER MODULE AND COMPONENTS - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the pressure filter module and components for the PTU. The second task installs the pressure filter module and components for the PTU.

   TASK 29-22-04-004-001

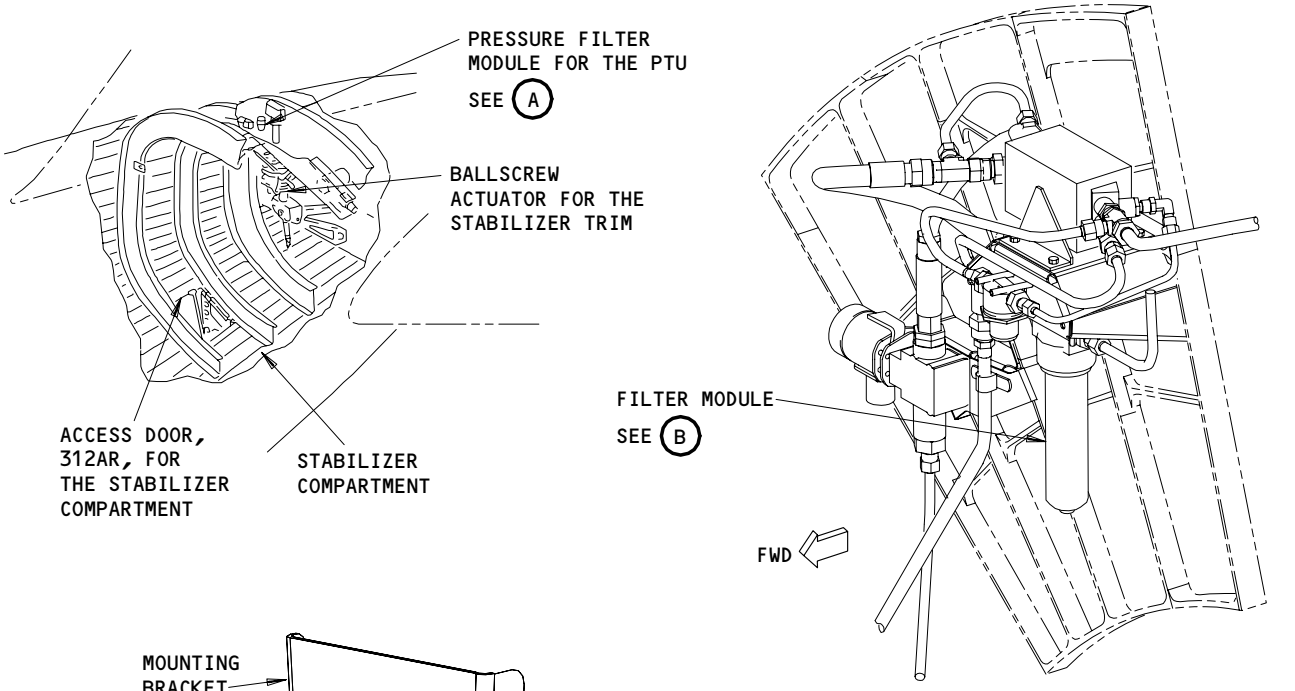
2. Remove the Pressure Filter Module and Components for the Power Transfer Unit (PTU) System
   A. General
      (1) This task contains two procedures which remove the components which follow:
          (a) Pressure Filter module
          (b) Filter element
      (2) To start one of these procedures, 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 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   C. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   D. Prepare for Removal

      S 864-002
      (1) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

      S 864-003
      (2) Remove the pressure from the reservoir in the left hydraulic system (AMM 29-11-00/201).



PRESSURE FILTER MODULE FOR THE PTU
A

FILTER MODULE
B

FILTER BOWL
C

PTU Pressure Filter Module and Components
Figure 401

S 014-004

WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

(3) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

E. Remove the Pressure Filter Module (Fig. 401)

S 874-005

WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

(1) Slowly loosen one hydraulic line connection at the pressure filter module, to bleed the pressure from the PES.

S 034-006

(2) Disconnect the two hydraulic lines from the unions on the pressure filter module.

S 034-007

(3) Install caps on the hydraulic lines and the unions on the pressure filter module.

S 024-008

(4) Remove the two bolts which attach the pressure filter module to the mounting bracket.

S 024-009

(5) Remove the pressure filter module from the mounting bracket.

S 034-010

(6) Remove the two unions from the pressure filter module.

F. Remove the Filter Element (Fig. 401)

S 874-011

WARNING: BE CAREFUL WHEN YOU LOOSEN THE FILTER BOWL. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

(1) Slowly loosen the filter bowl to bleed the pressure from the PES.

S 024-012

(2) Remove the filter bowl from the filter head.

S 024-013

(3) Remove the filter element.

TASK 29-22-04-404-014

3. Install the Pressure Filter Module and Components for the Power Transfer Unit (PTU) System

A. General

(1) This task contains two procedures which install the components which follow:

(a) Pressure Filter Module

(b) Filter Element

B. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

C. References

(1) AMM 06-42-00/201, Empennage Access Panels and Doors

(2) AMM 12-25-01/301, Exterior Cleaning

(3) AMM 29-22-00/201, Pitch Enhancement System (PES)

D. Access

(1) Location Zones

311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel

312AR Pitch Enhancement System

E. Install the Pressure Filter Module (Fig. 401)

S 644-015
(1) Apply hydraulic lubricant or hydraulic fluid to the new O-rings and the threads of the unions.

S 434-016
(2) Install the new O-rings on the unions.

S 434-017
(3) Install the unions on the pressure filter module.

S 424-018
(4) Put the pressure filter module on the mounting bracket.

S 424-019
(5) Install the two bolts and washers which attach the pressure filter module to the mounting bracket.

S 434-020
(6) Remove the caps from the two hydraulic lines and the unions.

S 434-021
(7) Connect the two hydraulic lines to the unions on the pressure filter module.

F. Install the Filter Element (Fig. 401)

S 644-022
(1) Apply hydraulic lubricant or hydraulic fluid to these parts:
(a) O-rings
(b) Backup rings
(c) Threads of the filter bowl
(d) Threads of the filter head.

S 434-023
(2) Install a new backup ring and a new O-ring in the filter element.

S 424-024
(3) Install the filter element in the filter head.

S 434-025
(4) Install new backup rings and a new O-ring on the filter bowl.

S 424-026
(5) Install the filter bowl in the filter head.

S 434-027
(6) Tighten the filter bowl to 75-100 pound-inches.

S 434-028
(7) Safety the filter bowl with a lockwire.

G. Put the Airplane Back to Its Usual Condition

S 874-029
(1) Do the fill and bleed procedure for the pitch enhancement system (AMM 29-22-00/201).

S 794-030
(2) Make sure there are no leaks at the hydraulic line connections and the filter bowl connection to the filter head.

S 114-031

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

(3) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-032
(4) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

LEFT HYDRAULIC SYSTEM ISOLATION VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the isolation valve for the left hydraulic system. The second task installs the isolation valve for the left hydraulic system.

TASK 29-22-05-004-001

2. Remove the Isolation Valve for the Left Hydraulic System (Fig. 401)
   A. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   C. Procedure

      S 864-002
      (1) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

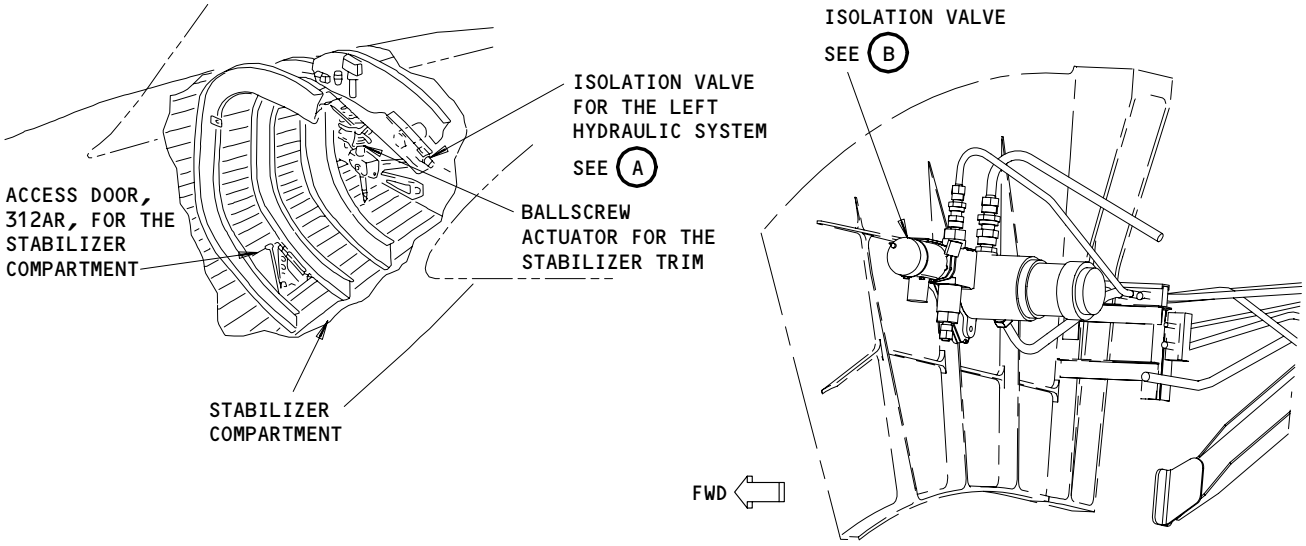
      S 864-003
      (2) Remove the pressure from the reservoir in the left hydraulic system (AMM 29-11-00/201).

      S 864-004
      (3) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11L10, HYDRAULICS PTU CONT

      S 014-005

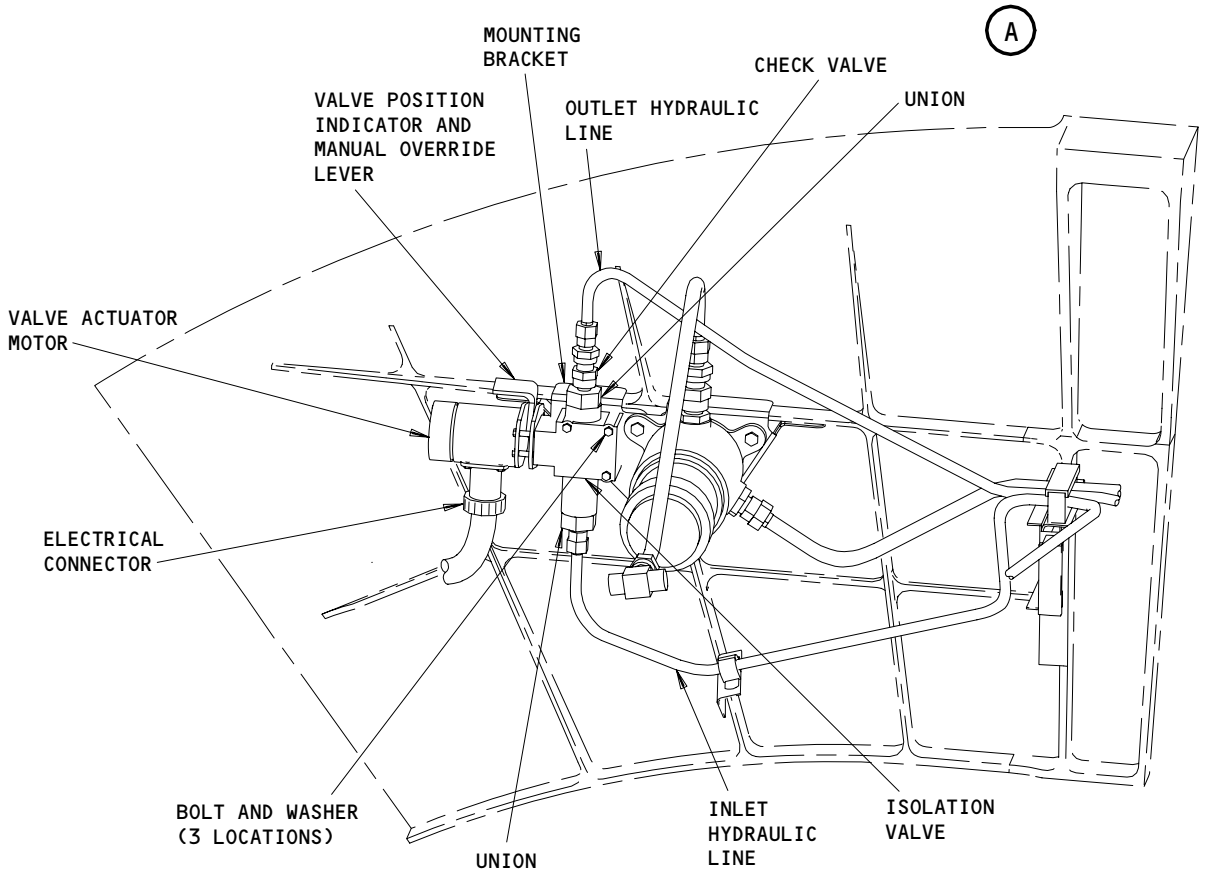
      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (4) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).



ISOLATION VALVE FOR THE
LEFT HYDRAULIC SYSTEM

A



ISOLATION VALVE

B

Isolation Valve Installation for the Left Hydraulic System
Figure 401

S 874-006

WARNING: BE CAREFUL WHEN YOU LOOSEN THE HYDRAULIC LINE CONNECTIONS. THE REMAINING PRESSURE IN THE PITCH ENHANCEMENT SYSTEM (PES) CAN BE AS HIGH AS 100 PSI AND HAVE A FLUID VOLUME OF AS MUCH AS 5 CUBIC INCHES. A SPRAY OF FLUID FROM A CONNECTION CAN CAUSE INJURY TO PERSONS.

(5) Slowly loosen the outlet hydraulic line at the check valve, in the outlet of the isolation valve, to bleed the pressure from the PES.

S 434-007
(6) Tighten the outlet hydraulic line at the check valve, in the outlet of the isolation valve, after you bleed the pressure from the PES.

S 034-008
(7) Disconnect the check valve, in the outlet hydraulic line, from the union in the outlet of the isolation valve.

S 034-009
(8) Disconnect the inlet hydraulic line from the union, in the inlet of the isolation valve.

S 034-010
(9) Install caps on the hydraulic lines and the unions in the inlet and outlet of the isolation valve.

S 034-011
(10) Disconnect the electrical connector from the actuator motor on the isolation valve.

S 024-012
(11) Remove the bolts which attach the isolation valve to the mounting bracket.

S 024-013
(12) Remove the isolation valve from the mounting bracket.

S 034-014
(13) Remove the union from the inlet and the outlet of the isolation valve.

TASK 29-22-05-404-015

3. Install the Isolation Valve for the Left Hydraulic System (Fig. 401)

A. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 20-10-21/601, Electrical Bonding
(4) AMM 20-10-22/701, Metal Surfaces
(5) AMM 29-22-00/201, Pitch Enhancement System (PES)
(6) AMM 29-22-00/501, Pitch Enhancement System (PES)

C. Access
(1) Location Zones
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

D. Procedure

S 644-016
(1) Apply hydraulic lubricant or hydraulic fluid to these parts:
(a) O-rings
(b) Threads of the unions.

S 434-017
(2) Install the new O-rings on the unions.

S 434-018
(3) Install the unions in the inlet and the outlet of the isolation valve.

S 164-019
(4) Clean the surfaces of the mounting bracket and the isolation valve, at the locations of the bolts, to make a good electrical bond (Ref 20-10-22/701).

S 424-020
(5) Put the isolation valve on the mounting bracket.

S 424-021
(6) Install the bolts and washers to attach the isolation valve to the mounting bracket.

S 764-022
(7) Measure the electrical resistance between the isolation valve and the mounting bracket (Ref 20-10-21/601).

S 764-023
(8) Make sure the electrical resistance is less than 0.0025 ohm.

S 434-024
(9) Connect the electrical connector to the actuator motor on the isolation valve.

S 434-025
(10) Remove the caps from the hydraulic lines, the check valve, and the unions.

S 434-026
(11) Connect the inlet hydraulic line to the union, in the inlet of the isolation valve.

S 434-027
(12) Connect the check valve, in the outlet hydraulic line, to the union in the outlet of the isolation valve.

S 864-028
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L10, HYDRAULICS PTU CONT

S 874-029
(14) Do the fill and bleed procedure for the pitch enhancement system (AMM 29-22-00/201).

S 794-030
(15) Make sure there are no leaks at the hydraulic line connections to the isolation valve.

S 114-031

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

(16) Clean all hydraulic fluid from the installation area (Ref 12-25-01).

S 874-034
(17) Do the operational test for the left hydraulic system isolation valve (AMM 29-22-00/501).

S 414-032
(18) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

RIGHT HYDRAULIC SYSTEM SHUTOFF VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the shutoff valve for the right hydraulic system. The second task installs the shutoff valve for the right hydraulic system.

TASK 29-22-06-004-001

2. Remove the Shutoff Valve for the Right Hydraulic System (Fig. 401)
   A. References
      (1) AMM 06-42-00/201, Empennage Access Panels and Doors
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          311/312 Area Aft of Pressure Bulkhead to BS 1725

      (2) Access Panel
          312AR Pitch Enhancement System

   C. Procedure

      S 864-002
      (1) Remove the pressure from the left, right, and center hydraulic systems (AMM 29-11-00/201).

      S 864-003
      (2) Remove the pressure from the reservoir in the right hydraulic system (AMM 29-11-00/201).

      S 864-004
      (3) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
      (a) 11L10, HYDRAULICS PTU CONT

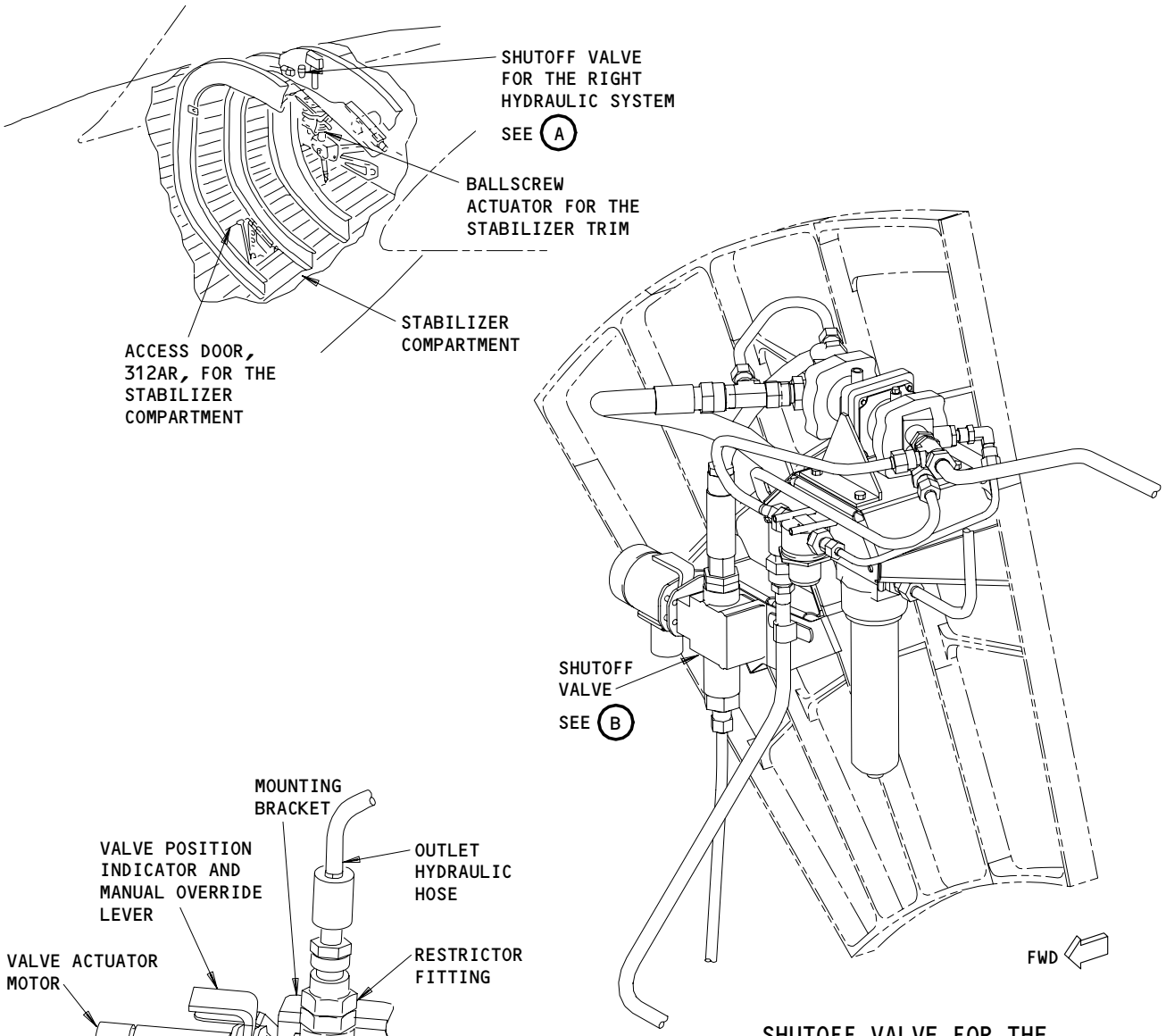
      S 014-005

      WARNING: STAY OFF THE SERVICE ACCESS DOOR, 312AR AND THE CONTROLS BAY ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

      (4) Open the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

      S 034-006
      (5) Disconnect the hydraulic lines from the union and the restrictor fitting on the shutoff valve.

      S 034-007
      (6) Install caps on the hydraulic lines, the union, and the restrictor fitting.



SHUTOFF VALVE FOR THE RIGHT HYDRAULIC SYSTEM

A

SHUTOFF VALVE

B

Shutoff Valve Installation for the Right Hydraulic System
Figure 401

S 034-008
(7) Disconnect the electrical connector from the actuator motor on the shutoff valve.

S 024-009
(8) Remove the bolts from the shutoff valve.

S 024-010
(9) Remove the shutoff valve from the mounting bracket.

S 034-011
(10) Remove the restrictor fitting from the outlet of the shutoff valve.

S 034-012
(11) Remove the union from the inlet of the shutoff valve.

TASK 29-22-06-404-013

3. Install the Shutoff Valve for the Right Hydraulic System (Fig. 401)

A. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References
(1) AMM 06-42-00/201, Empennage Access Panels and Doors
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 20-10-21/601, Electrical Bonding
(4) AMM 20-10-22/701, Metal Surfaces
(5) AMM 29-22-00/201, Pitch Enhancement System (PES)

C. Access
(1) Location Zones
311/312 Area Aft of Pressure Bulkhead to BS 1725

(2) Access Panel
312AR Pitch Enhancement System

D. Procedure

S 644-014
(1) Apply hydraulic lubricant or hydraulic fluid to these parts:
(a) O-rings

(b) Threads of the union
(c) Threads of the restrictor fitting.

S 434-015
(2) Install the new O-rings on the union and the restrictor fitting.

S 434-016
(3) Install the restrictor fitting in the outlet of the shutoff valve.

S 434-017
(4) Install the union in the inlet of the shutoff valve.

S 164-018
(5) Clean the surfaces of the mounting bracket and the shutoff valve at the locations of the bolt locations, to make a good electrical bond (AMM 20-10-22/701).

S 424-019
(6) Put the shutoff valve on the mounting bracket.

S 424-020
(7) Install the bolts and washers to attach the shutoff valve to the mounting bracket.

S 764-021
(8) Measure the electrical resistance between the shutoff valve and the mounting bracket (AMM 20-10-21/601).

S 764-022
(9) Make sure the electrical resistance is less than 0.0025 ohm.

S 434-023
(10) Connect the electrical connector to the actuator motor on the shutoff valve.

S 434-024
(11) Remove the caps from the hydraulic lines, the union and the restrictor fitting on the shutoff valve.

S 434-025
(12) Connect the hydraulic lines to the union and the restrictor fitting on the shutoff valve.

S 864-026
(13) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L10, HYDRAULICS PTU CONT

S 874-027

(14) Do the fill and bleed procedure for the pitch enhancement system (AMM 29-22-00/201).

S 794-028

(15) Make sure there are no leaks at the hydraulic line connections on the shutoff valve.

S 114-029

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

(16) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 864-032

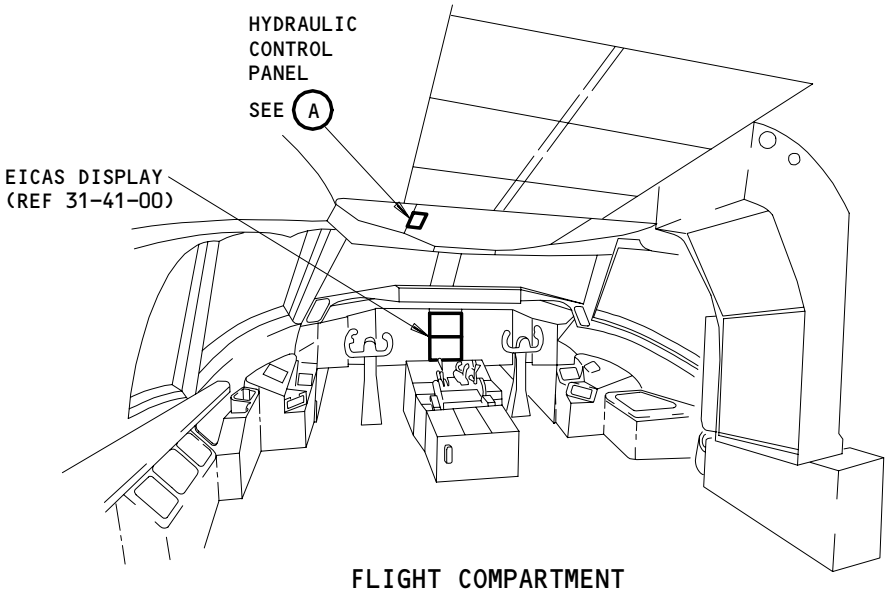
(17) Do the operational test for the right hydraulic system shutoff valve (AMM 29-22-00/501).

S 414-030

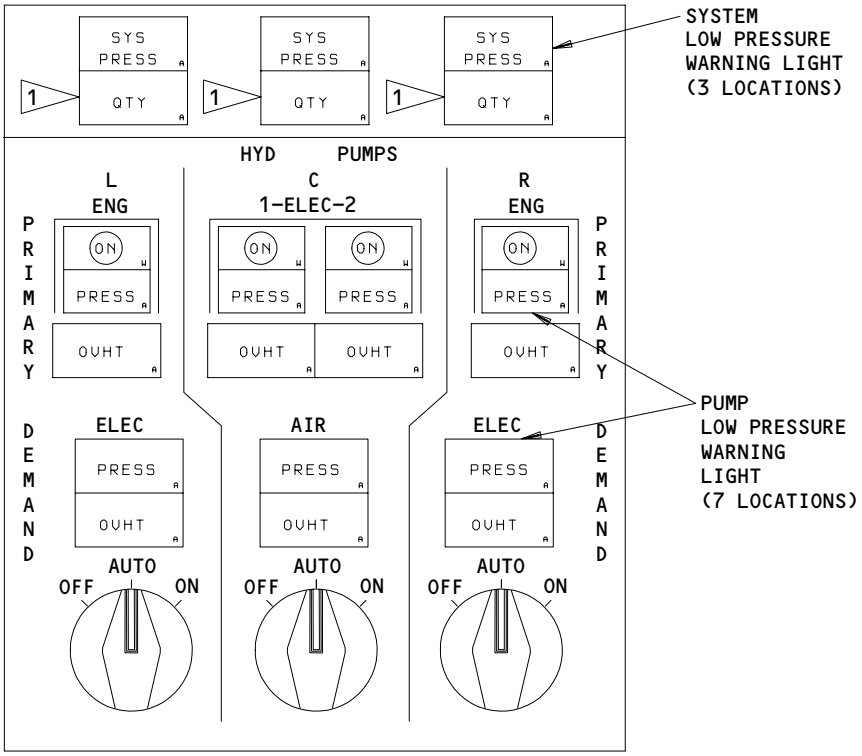
(18) Close the access door, 312AR, for the forward stabilizer compartment (AMM 06-42-00/201).

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 caution for each hydraulic system. Low pressure caution lights are on the hydraulic control panel in the flight compartment. A pressure indicating light for the RAT is on the engine ignition and start control panel. The engine indicating and crew alerting system (EICAS) display contains a digital readout of hydraulic system pressure. This display also provides low pressure caution messages. The pressure indicating system inputs to the EICAS computer are powered by 28 volts dc from circuit breakers on overhead circuit breaker panel P11. The low pressure caution lights are powered by 28 volts dc from master dim and test circuit breakers on panel P11.
   B. The EICAS display shows a digital readout of pressure in each hydraulic system. The EICAS messages which describe problems relating to low pressure caution lights automatically appear on the EICAS display (AMM 31-41-00/201).
2. System Low Pressure Warning Lights (Fig. 1)
   A. Three system low pressure lights are on the hydraulic control panel. A system low pressure light illuminates when activated by low pressure switches. In the left and right systems, the pressure switches are on the EDP and ACMP filter modules. In the center system, a pressure switch is in a hydraulic line in the right wheel well.
3. Pump Low Pressure Warning Lights (Fig. 1)
   A. A low pressure light is provided on the hydraulic control panel for each pump. Primary pump low pressure lights are in the pump select switches. Demand pump low pressure lights are adjacent to each demand pump switch. A pump low pressure light illuminates when the output of a pump in operation becomes low. Pressure switches are in the pump filter modules.
4. RAT Pressure Light
   A. A pressure indicating light for the RAT hydraulic pump is in the manual deployment switch on the engine ignition and start control panel. This light turns on when the RAT pump is supplying pressure. The pump pressure switch is in the RAT checkout module.



FLIGHT COMPARTMENT

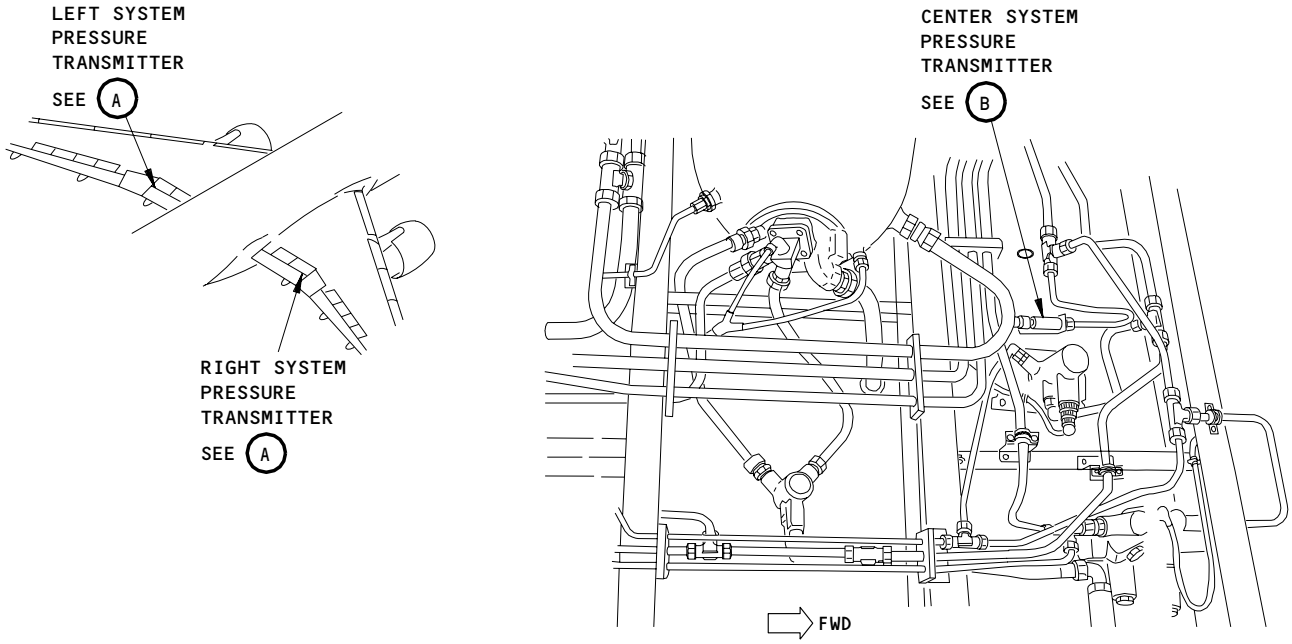


HYDRAULIC CONTROL PANEL

1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

A

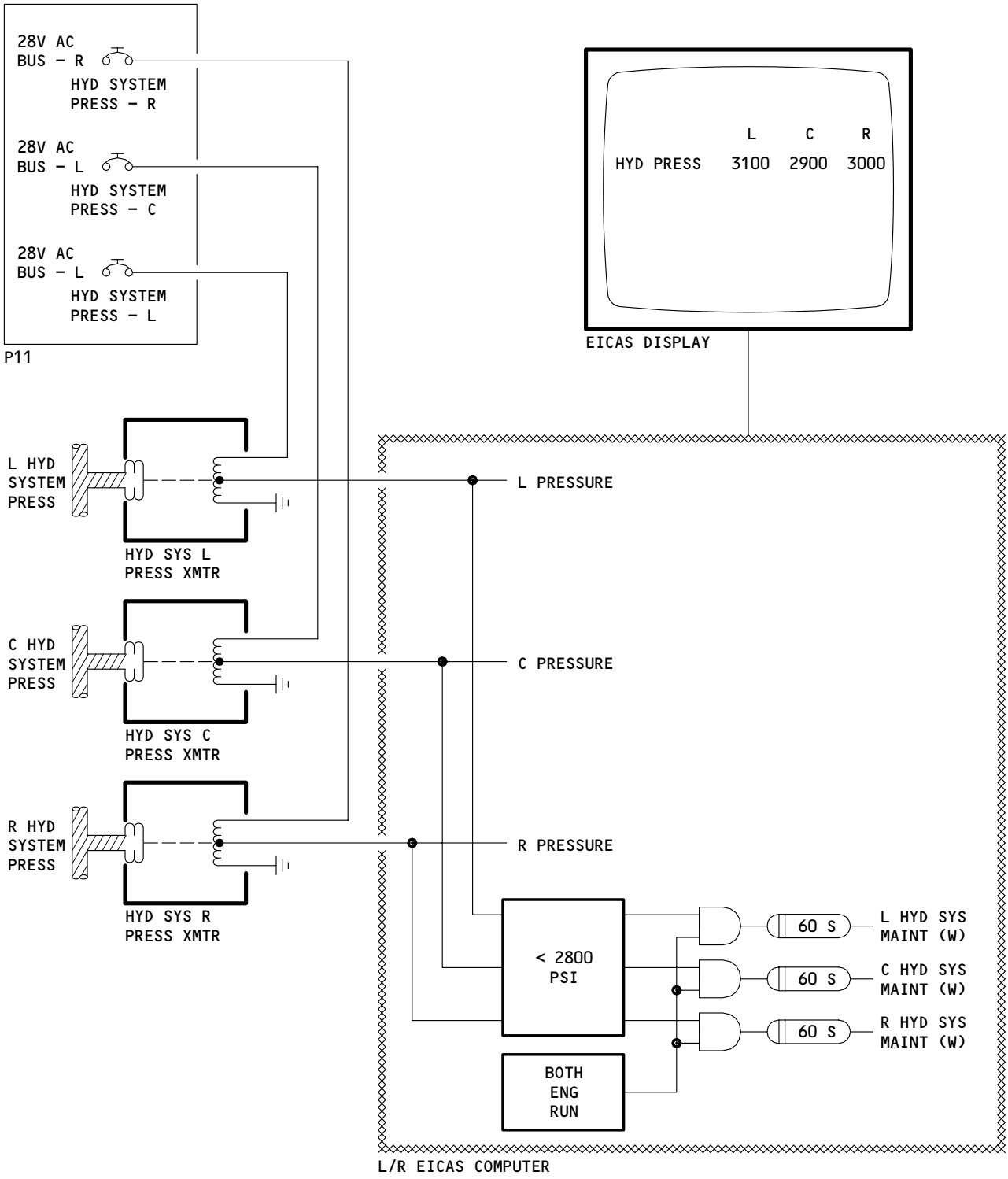
Pressure Indicating System
Figure 1



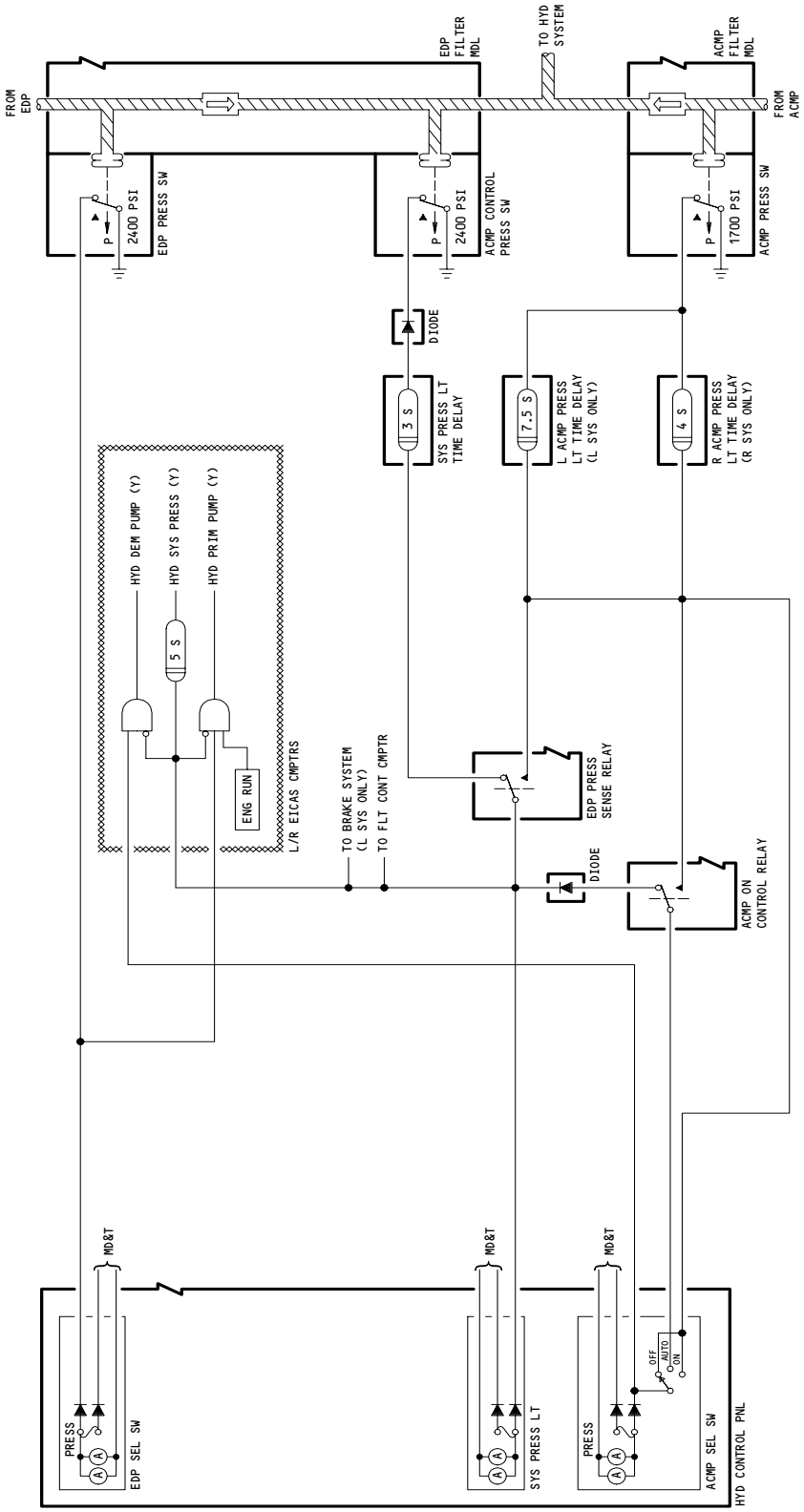
Pressure Transmitter Locations
Figure 2

E91717

5. Pressure Transmitters (Fig. 2)
   A. Three pressure line-mounted transmitters convert hydraulic system pressure to electrical signals. The transmitters provide a voltage proportional to the system pressure. The EICAS computer changes voltage signals from the transmitters into pressure readings on the EICAS display.
6. Operation
   A. Functional Description (Fig. 3 thru 5)
      (1) Pressure Indicating
         (a) A digital readout of pressure in each main hydraulic system is provided on the EICAS display. A pressure transmitter sends a voltage signal proportional to system pressure to the EICAS computer. The computer changes the voltage signal into a pressure readout on the EICAS display.
         (b) 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.
         (c) The RAT pressure indicating light turns on when activated by the RAT pressure switch on the RAT checkout module.
      (2) Low Pressure Caution - Left and Right Systems.
         (a) ACMP Select Switch in OFF or ON.
            1) The ACMP low pressure light is controlled by the ACMP pressure switch on the ACMP filter module. The system low pressure light illuminates when activated by the ACMP control pressure switch on the EDP filter module.
         (b) ACMP Select Switch in AUTO.
            1) The EDP pressure switch actuates when EDP pressure is low to energize the ACMP on control relay and the EDP pressure sense relay. When energized, these relays switch control of the ACMP low pressure light and the system low pressure light from the ACMP control pressure switch on the EDP module to the ACMP pressure switch on the ACMP module.
         (c) The EDP low pressure light is controlled by the EDP pressure switch on the EDP module regardless of the ACMP select switch position.

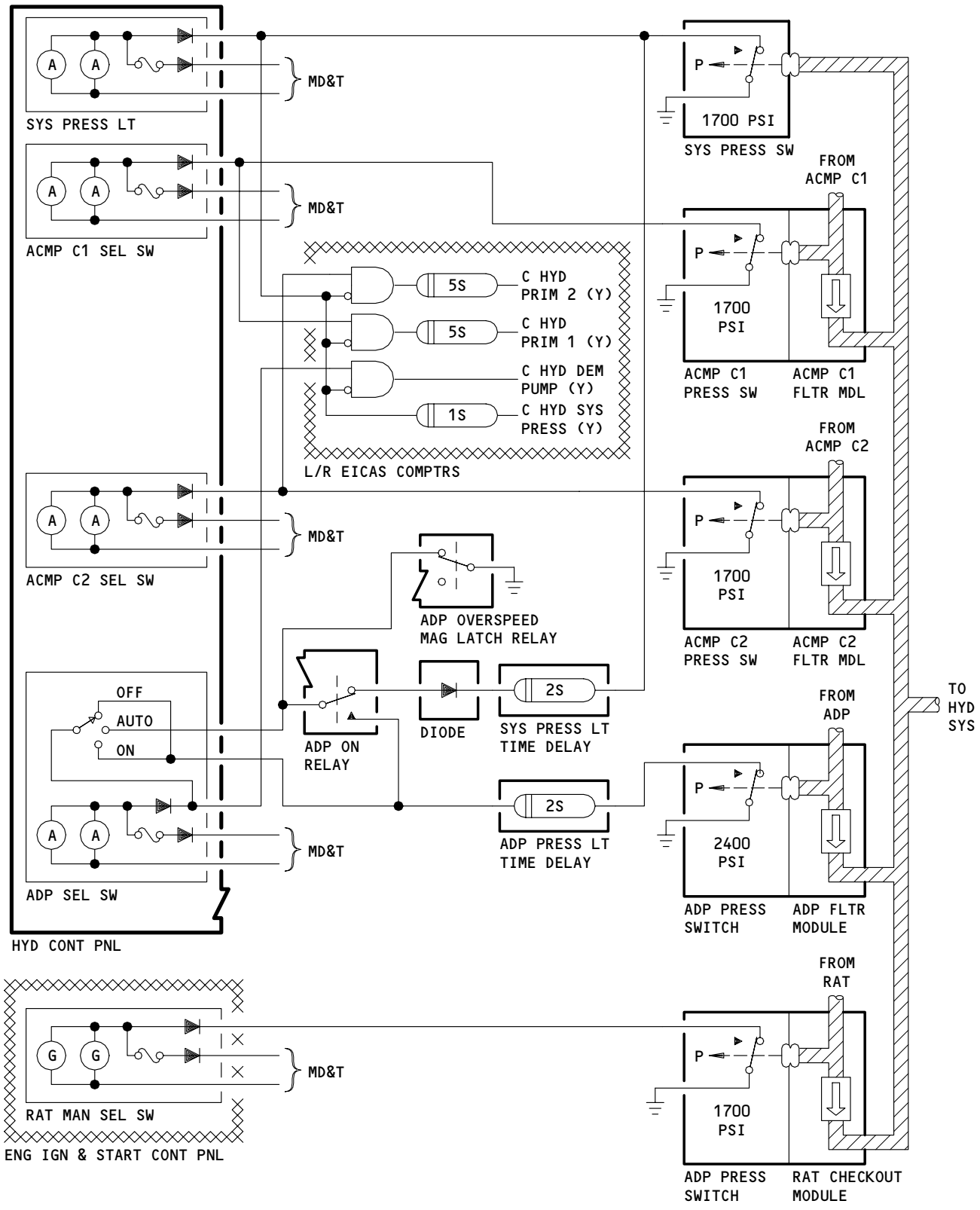


Hydraulic Quantitative Pressure Indication System Schematic
Figure 3



Left and Right Hydraulic System Pressure Caution Lights Schematic
Figure 4

199250



Center Hydraulic System Pressure Caution Lights Schematic
Figure 5

(d) When the system low pressure light or a pump low pressure light illuminates, the corresponding advisory message appears on the EICAS display.

(3) Low Pressure Caution - Center System

(a) The ACMP C1 or C2 low pressure light is controlled by the ACMP pressure switch on the ACMP C1 or C2 filter module, respectively.

(b) ADP Select Switch in OFF or ON.

1) The ADP low pressure light is controlled by the ADP pressure switch on the ADP filter module.

(c) ADP Select Switch in AUTO.

1) When the ADP is not running, the ADP low pressure light is controlled by the system pressure switch.

2) When the ADP is commanded on, the ADP on demand relay switches control of the ADP low pressure light from the system pressure switch to the ADP pressure switch on the ADP filter module.

3) If the mag latch relay is actuated by an ADP overspeed or by placing the ADP test/reset switch in TEST position, the ADP low pressure light will illuminate.

(d) The low system pressure light is controlled by the center system low pressure switch. This switch is in the center system pressure line in the right wheel well.

(e) When the system low pressure light or a pump low pressure light illuminates, the corresponding advisory message appears on the EICAS display.

HYDRAULIC PRESSURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKERS			FLT COMPT, P11	
HYDRAULIC SYSTEM PRESS C, C1082		1	11L18	*
HYDRAULIC SYSTEM PRESS L, C1080		1	11L17	*
HYDRAULIC SYSTEM PRESS R, C1081		1	11L26	*
DIODE - (FIM 31-01-36/101, FIG. 101) SYS C, R19				
DIODE - (FIM 31-01-37/101, FIG. 101) SYS L, R26,R159				
DIODE - (FIM 31-01-33/101, FIG. 101) SYS R, R27,R161				
LIGHT - SYS C ACMP C1 LOW PRESSURE INDICATOR	1	1	FLT COMPT, P5, HYD CONT PNL M10, SYS C ACMP C1 SELECT SWITCH/ LIGHT, YCYS2	*
LIGHT - SYS C ACMP C2 LOW PRESSURE INDICATOR	1	1	FLT COMPT, P5, HYD CONT PNL M10, SYS C ACMP C2 SELECT SWITCH/ LIGHT, YCYS3	*
LIGHT - SYS C ADP LOW PRESSURE INDICATOR, YCYL8	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS C LOW PRESSURE INDICATOR, YCYL2	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS L ACMP LOW PRESSURE INDICATOR, YCYL7	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS L EDP LOW PRESSURE INDICATOR	1	1	FLT COMPT, P5, HYD CONT PNL, M10, SYS L EDP SELECT SWITCH/ LIGHT, YCYS1	*
LIGHT - SYS L LOW PRESSURE INDICATOR, YCYL1	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS R ACMP LOW PRESSURE INDICATOR, YCYL9	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS R EDP LOW PRESSURE INDICATOR	1	1	FLT COMPT, P5, HYD CONT PNL, M10, SYS R EDP SELECT SWITCH/ LIGHT, YCYS4	*
LIGHT - SYS R LOW PRESSURE INDICATOR, YCYL3	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*

* SEE THE WDM EQUIPMENT LIST

Hydraulic Pressure Indicating System - Component Index
Figure 101 (Sheet 1)

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
MODULES - (29-11-00/101)				
SYS C ACMP C1 PRESSURE/CASE DRAIN FILTER				
SYS C ACMP C2 PRESSURE/CASE DRAIN FILTER				
SYS C ADP PRESSURE/CASE DRAIN FILTER				
PANEL - (29-11-00/101)				
HYDRAULIC CONTROL, M10				
RELAYS - (29-11-00/101)				
EDP L PRESS SENSE, K131				
EDP R PRESS SENSE, K127				
SYS L ACMP ON CONTROL, K130				
SYS R ACMP ON CONTROL, K126				
RELAY - (31-01-36/101)				
ADP ON, K443				
SWITCHES - (29-11-00/101)				
SYS C ADP SELECT, YCYS6				
SYS L ACMP CONTROL PRESSURE, S27				
SYS L ACMP PRESSURE, S25				
SYS L ACMP SELECT, YCYS5				
SYS L EDP PRESSURE, S26				
SWITCH - ADP PRESSURE, S28	3	1	LEFT WHEEL WELL, ADP PRESS/CASE DRAIN FILTER MODULE	*
SWITCH - SYS C ACMP C1 PRESSURE, S33	4	1	RIGHT WHEEL WELL, ACMP C1 PRESS/ CASE DRAIN FILTER MODULE	*
SWITCH - SYS C ACMP C2 PRESSURE, S34	4	1	RIGHT WHEEL WELL, ACMP C2 PRESS/ CASE DRAIN FILTER MODULE	*
SWITCH - SYS C HYDRAULIC PRESSURE, S35	4	1	RIGHT WHEEL WELL	29-11-09

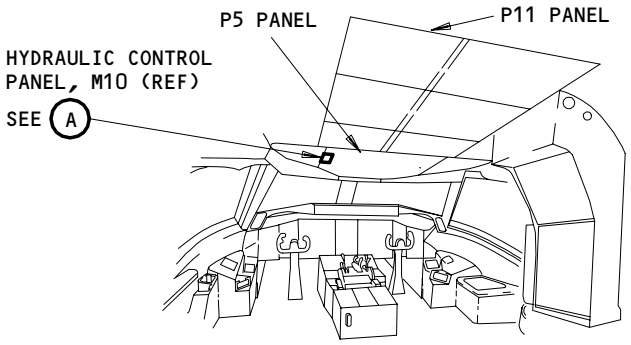
* SEE THE WDM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 2)

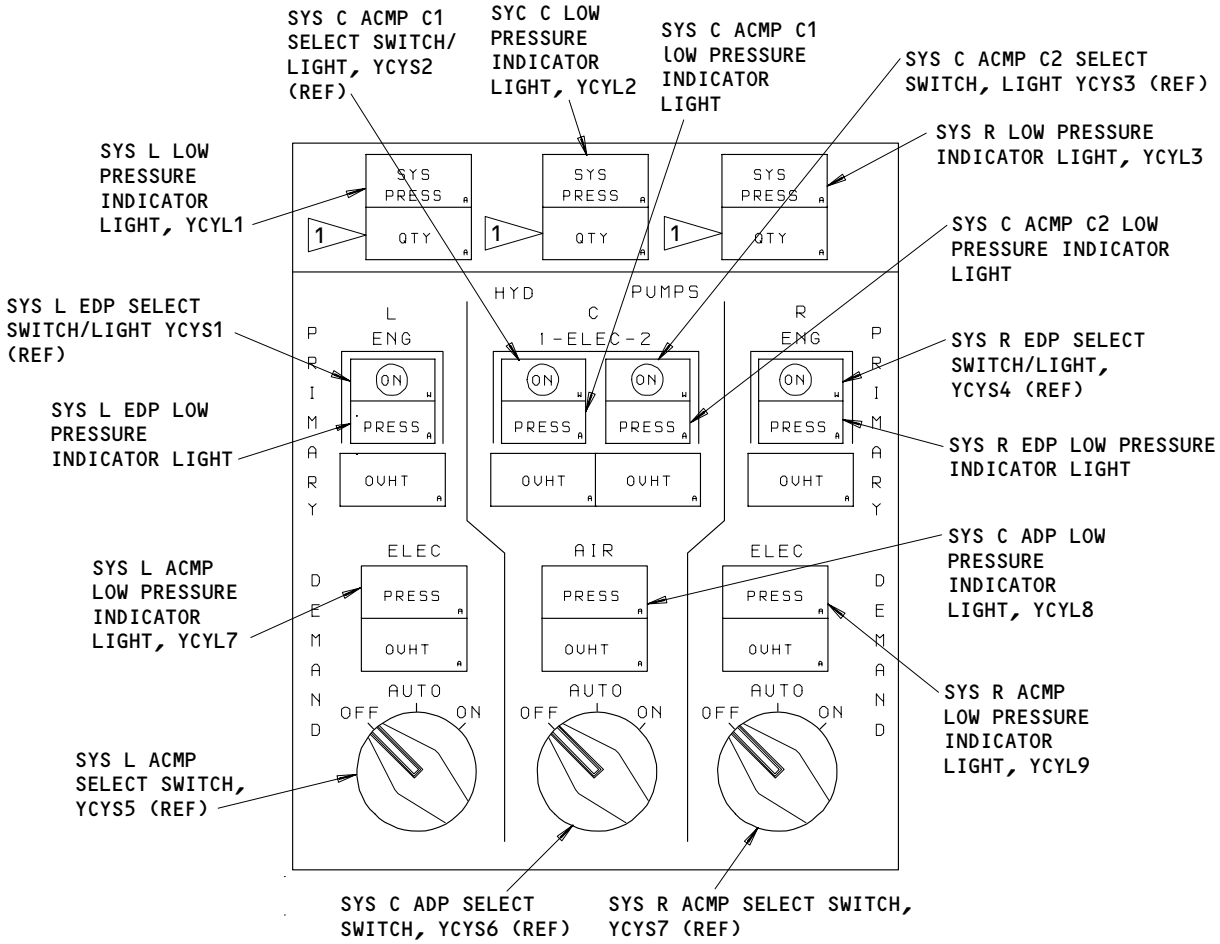
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SWITCH - (FIM 29-11-00/101, FIG. 101)				
SYS R ACMP CONTROL PRESSURE, S32				
SYS R ACMP PRESSURE, S30				
SYS R ACMP SELECT, YCYS7				
SYS R EDP PRESSURE, S31				
SWITCH/LIGHT - (FIM 29-11-00/101, FIG. 101)				
SYS C ACMP C1 SELECT, YCYS2				
SYS C ACMP C2 SELECT, YCYS3				
SYS L EDP SELECT, YCYS1				
SYS R EDP SELECT, YCYS4				
TIME DELAY - (FIM 31-01-36/101, FIG. 101)				
SYS C ADP PRESSURE LIGHT, M919				
SYS C PRESSURE LIGHT, M922				
TIME DELAY - (FIM 31-01-37/101, FIG. 101)				
SYS L ACMP PRESSURE LIGHT, M925				
SYS L PRESSURE LIGHT, M921				
TIME DELAY - (FIM 31-01-33/101, FIG. 101)				
SYS R PRESSURE LIGHT, M920				
SYS R ACMP PRESSURE LIGHT, M924				
TRANSMITTER - SYS C HYDRAULIC PRESSURE, M342	4	1	RIGHT WHEEL WELL	29-31-01
TRANSMITTER - SYS L HYDRAULIC PRESSURE, M341	2	1	522HB, LEFT WING	29-31-01
TRANSMITTER - SYS R HYDRAULIC PRESSURE, M343	2	1	652HB, RIGHT WING	29-31-01

* SEE THE WDM EQUIPMENT LIST

Hydraulic Pressure Indicating System - Component Index
Figure 101 (Sheet 3)



FLIGHT COMPARTMENT

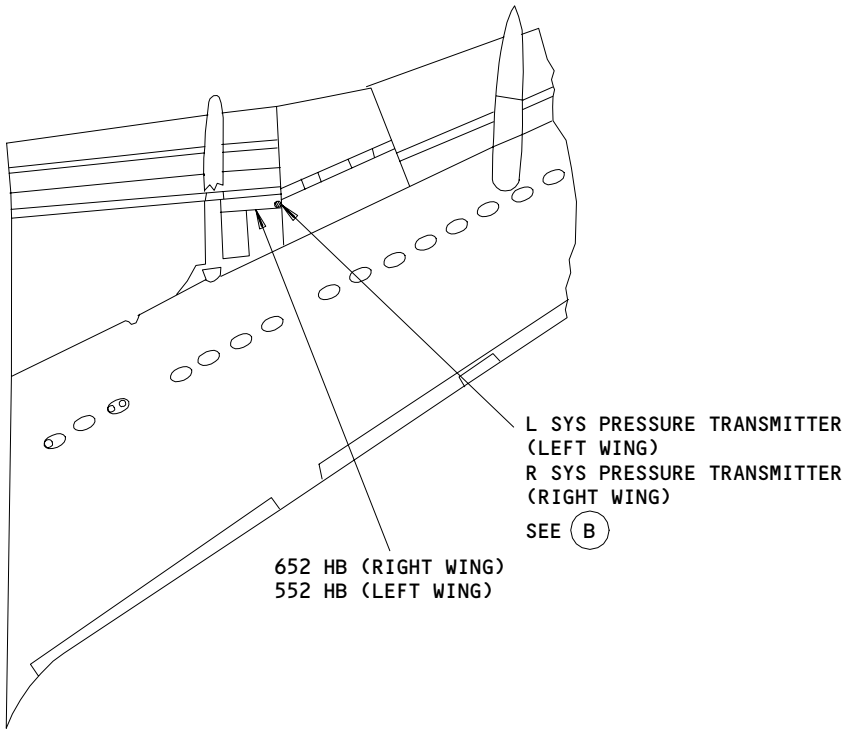


HYDRAULIC CONTROL PANEL, M10 (REF)

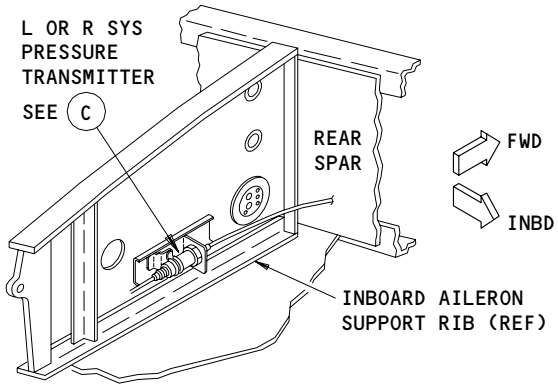
1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

A

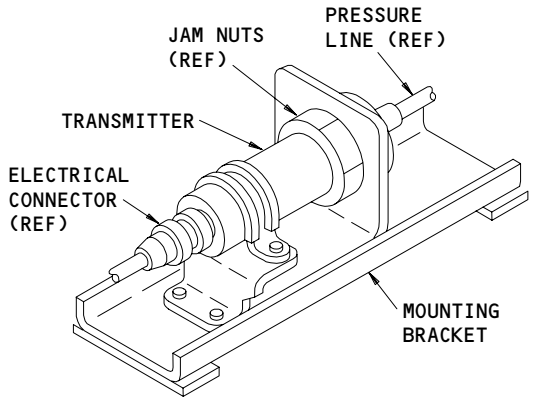
Component Location
Figure 102 (Sheet 1)



WING BOTTOM VIEW



B

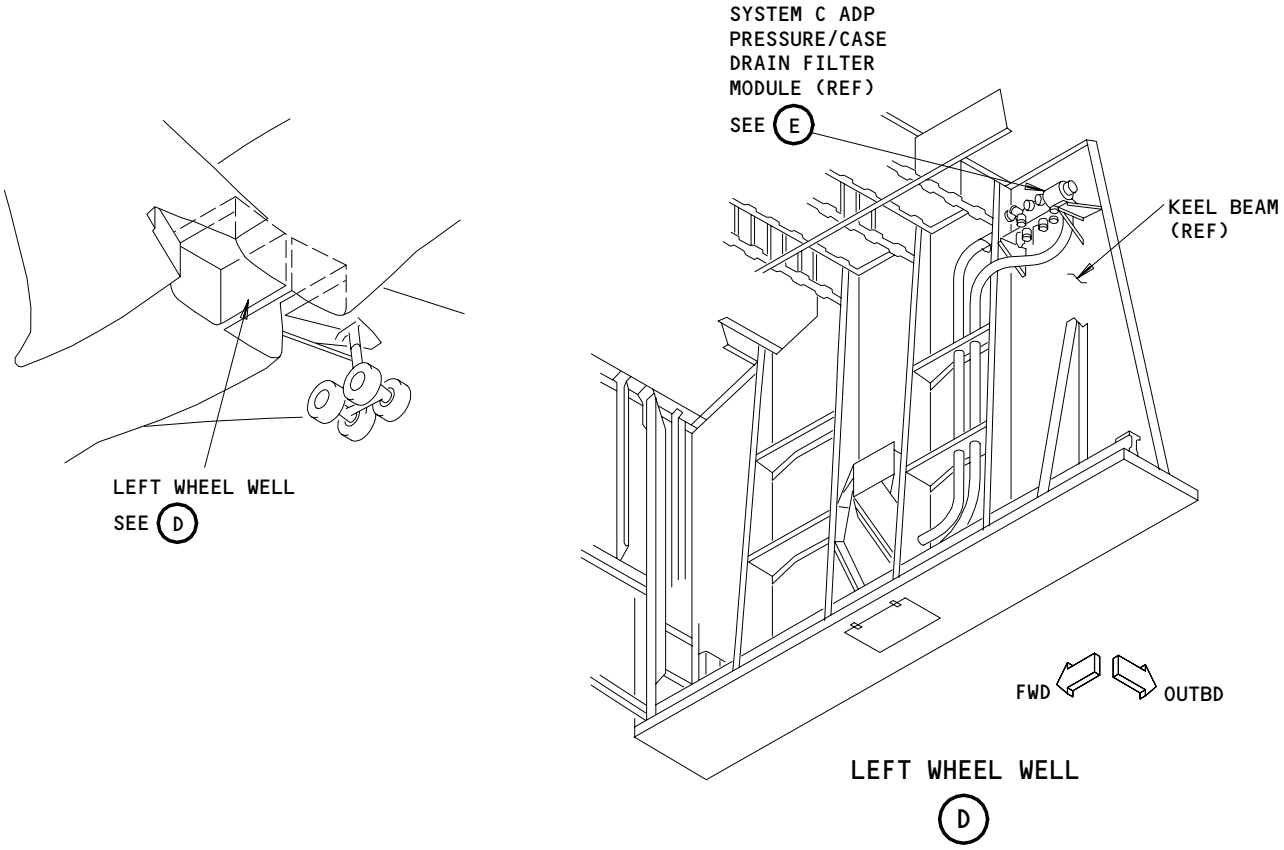


PRESSURE TRANSMITTER

C

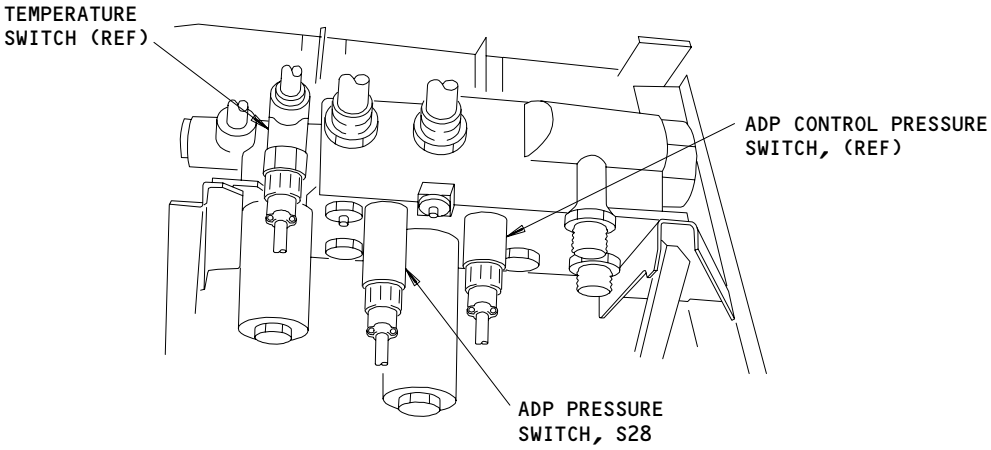
Component Location
Figure 102 (Sheet 2)

33893



LEFT WHEEL WELL

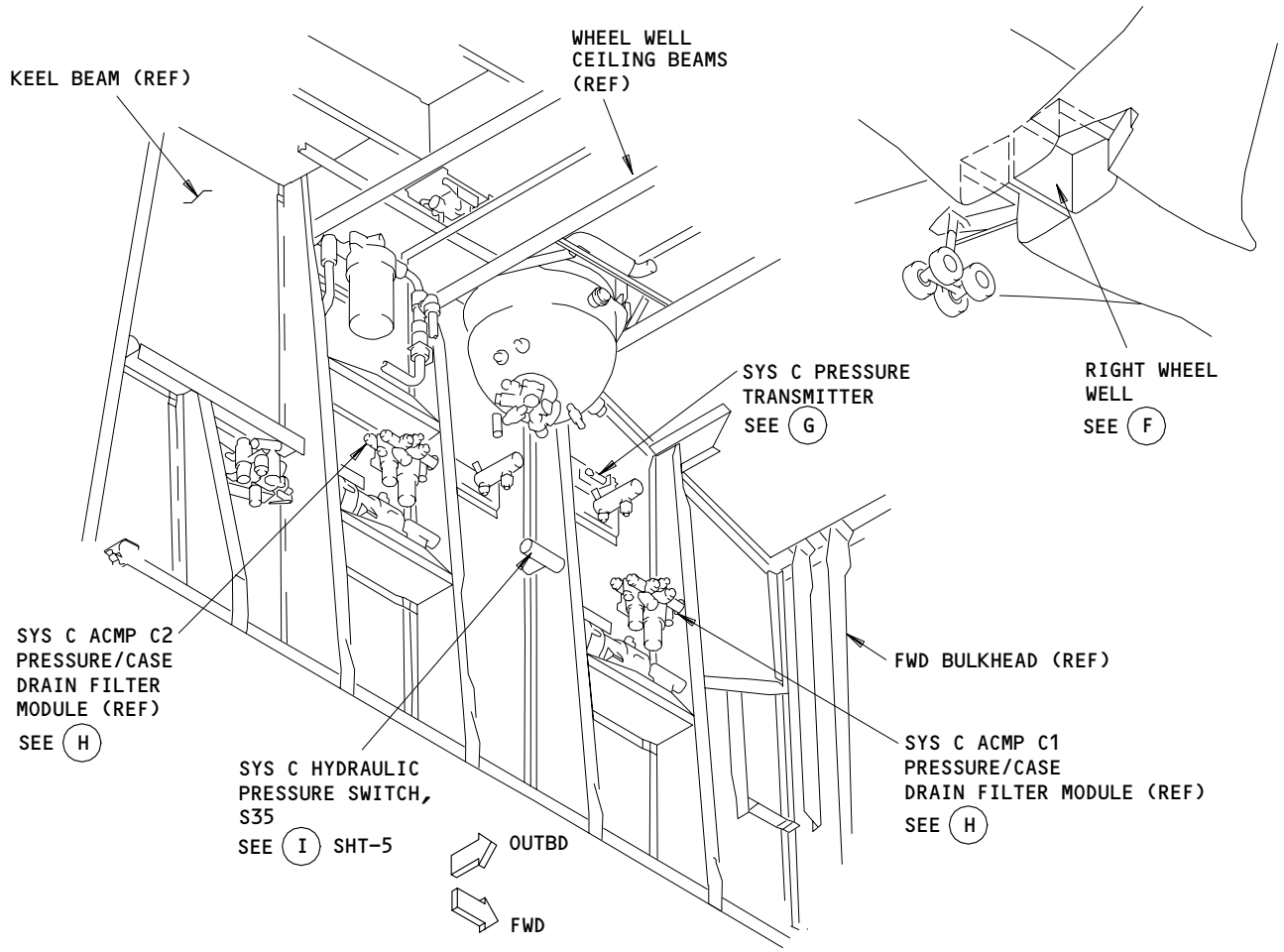
D



SYSTEM C ADP PRESSURE/CASE DRAIN FILTER MODULE (REF)

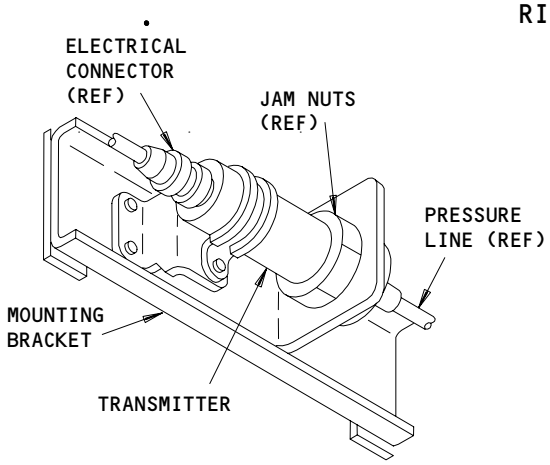
E

Component Location
Figure 102 (Sheet 3)



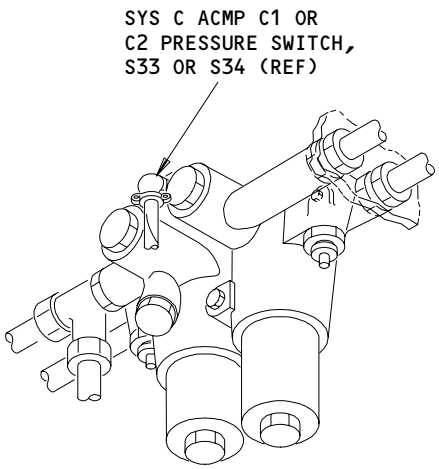
RIGHT WHEEL WELL

F



PRESSURE TRANSMITTER

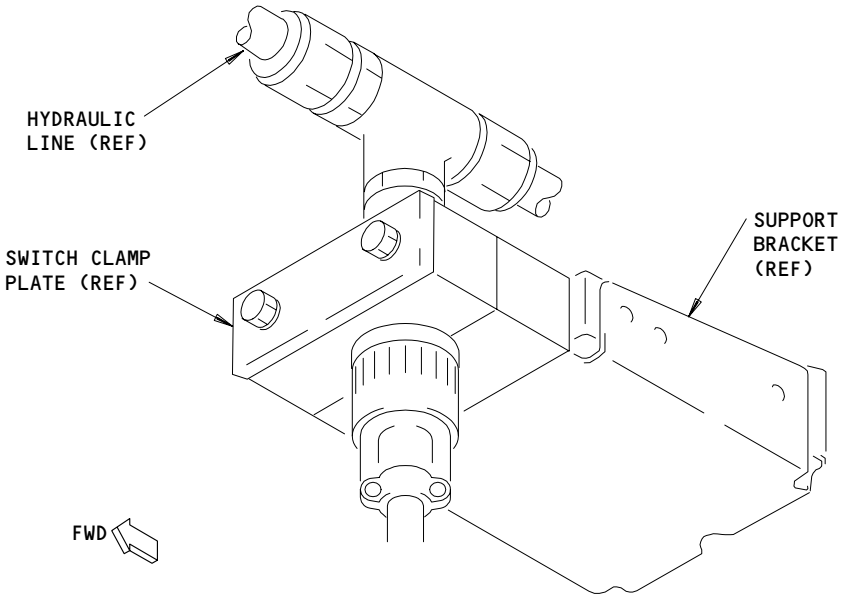
G



SYS C ACMP C1 OR C2 PRESSURE/CASE DRAIN FILTER MODULE (REF)

H

Component Location
Figure 102 (Sheet 4)



SYS C HYDRAULIC PRESSURE SWITCH, S35

I

FROM SHT 4

Component Location
Figure 102 (Sheet 5)

HYDRAULIC PRESSURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure has one task. This task is a system test of the indicating system for the hydraulic pressure.

   TASK 29-31-00-735-001

2. System Test - Indicating System for the Hydraulic Pressure
   A. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
   B. Access
      (1) Location Zones
          211/212 Control Cabin

   C. Procedure

      S 865-003
      (1) Supply electrical power (AMM 24-22-00/201).

      S 865-004
      (2) Make sure the L, R, and C FLT CONTROL SHUTOFF valve switches for the WING and TAIL, on the right side panel, P61, are in the ON position.

      S 865-005
      (3) Pressurize the left (center, right) hydraulic system with a hydraulic service cart (AMM 29-11-00/201).

      S 865-006
      (4) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

      S 215-007
      (5) Make sure the L (C, R) HYD PRESS indication on the EICAS display is the same as the pressure indication on the hydraulic service cart ±100 psig.

      S 865-008
      (6) Remove the pressure from the main hydraulic systems (AMM 29-11-00/201).

S 215-009
(7) Make sure the L (C, R) HYD PRESS indication on the EICAS display is 0-160 psig.

S 865-010
(8) Remove electrical power, if it is not necessary (AMM 24-22-00/201).

S 865-011
(9) Remove hydraulic power, if it is not necessary (AMM 29-11-00/201).

HYDRAULIC PRESSURE TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the hydraulic pressure transmitter. The second task installs the hydraulic pressure transmitter.

TASK 29-31-01-004-014

2. Remove the Hydraulic Pressure Transmitter (Fig. 401)
   A. References
      (1) AMM 06-44-00/201, Wing Access Doors and Panels
      (2) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
      (3) AMM 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
   B. Access
      (1) Location Zones

144	Right MLG Wheel Well
552/652	MLG Support Beam to Trailing Edge

      (2) Access Panels

552HB	Hydraulic Pressure Transmitter
652HB	Hydraulic Pressure Transmitter

   C. Prepare for Removal

S 014-001
      (1) Open the access panel, 552HB, for the hydraulic pressure transmitter in the left hydraulic system (AMM 06-44-00/201).

S 014-002
      (2) Open the access panel, 652HB, for the hydraulic pressure transmitter in the right hydraulic system (AMM 06-44-00/201).

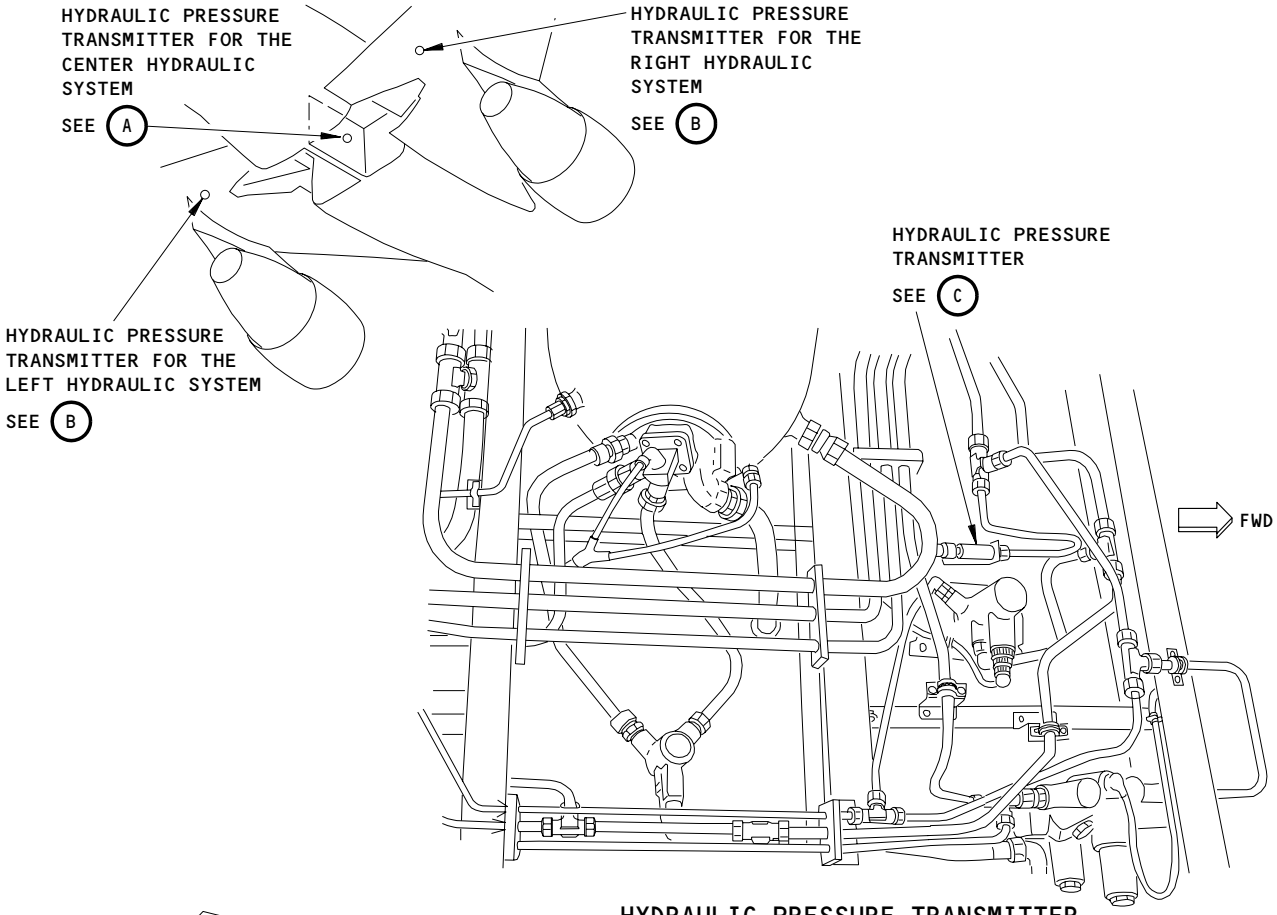
S 494-003
      (3) For the center hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 014-004

      WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

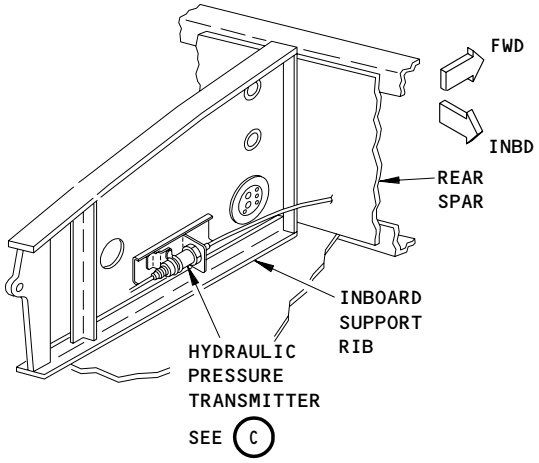
      (4) For the center hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-005
      (5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
         (a) 11L17, HYDRAULIC SYSTEM PRESS L
         (b) 11L18, HYDRAULIC SYSTEM PRESS CENTER
         (c) 11L26, HYDRAULIC SYSTEM PRESS R



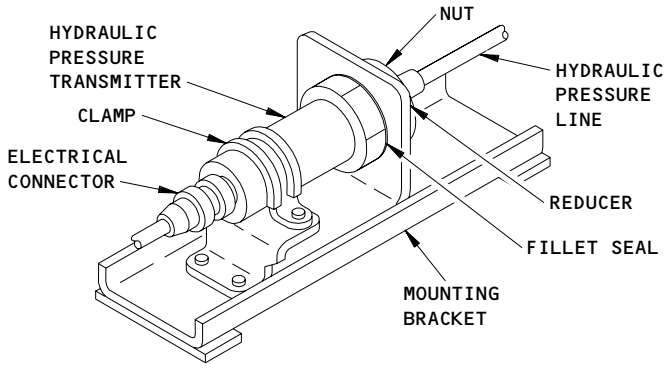
HYDRAULIC PRESSURE TRANSMITTER
FOR THE CENTER HYDRAULIC SYSTEM

A



HYDRAULIC PRESSURE TRANSMITTER
(LEFT HYDRAULIC SYSTEM SHOWN,
RIGHT HYDRAULIC SYSTEM OPPOSITE)

B



HYDRAULIC PRESSURE TRANSMITTER
(EXAMPLE)

C

Hydraulic Pressure Transmitter
Figure 401

S 864-006
(6) Remove the pressure from the main hydraulic systems and reservoirs (AMM 29-11-00/201).

D. Remove the Hydraulic Pressure Transmitter

S 034-007
(1) Disconnect the electrical connector from the hydraulic pressure transmitter.

S 034-008
(2) Disconnect the hydraulic pressure line from the hydraulic pressure transmitter.

S 034-009
(3) Install a cap on the hydraulic pressure line.

S 024-044
(4) Remove sealant between the hydraulic pressure transmitter and mounting bracket.

S 024-010
(5) Remove the clamp and the nut from the hydraulic pressure transmitter.

S 024-036
(6) Remove the hydraulic pressure transmitter from the mounting bracket.

S 034-011
(7) Remove the reducer from the hydraulic pressure transmitter.

S 034-012
(8) Install a cap on the hydraulic pressure transmitter.

TASK 29-31-01-404-013

3. Install the Hydraulic Pressure Transmitter (Fig. 401)

A. Consumable Materials
(1) D00054 Hydraulic System Lubricant - MCS 352B

(2) AOO247 Sealant - BMS 5-95

B. References

(1) AMM 06-44-00/201, Wing Access Doors and Panels
(2) AMM 12-25-01/301, Exterior Cleaning
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) SWPM 20-20-001, Electrical Bonds and Grounds

C. Access

(1) Location Zones

144	Right MLG Wheel Well
552/652	MLG Support Beam to Trailing Edge

(2) Access Panels

552HB	Hydraulic Pressure Transmitter
652HB	Hydraulic Pressure Transmitter

D. Procedure

S 164-045
(1) Clean the surface for an electrical bond at opening of the hydraulic pressure transmitter mounting bracket (SWPM 20-20-001).

S 644-015
(2) Apply hydraulic system lubricant or hydraulic fluid to the new O-ring.

S 434-016
(3) Install the new O-ring on the reducer.

S 434-017
(4) Remove the cap from the hydraulic pressure transmitter.

S 434-018
(5) Install the O-ring and the reducer on the hydraulic pressure transmitter.

S 424-019
(6) Put the transmitter on the mounting bracket.

S 424-020
(7) Install the clamp and the nut on the hydraulic pressure transmitter.

S 764-046
(8) Do a check of the electrical resistance between the case of the transmitter and the airplane structure (SWPM 20-20-001).

NOTE: The resistance must be less than 0.0025 ohms.

S 434-021
(9) Remove the cap from the hydraulic pressure line.

S 434-022
(10) Connect the hydraulic pressure line to the hydraulic pressure transmitter.

S 434-023
(11) Connect the electrical connector to the hydraulic pressure transmitter.

S 394-047
(12) Apply fillet seal using BMS 5-95 sealant to the faying surface of the hydraulic transmitter and mounting bracket.

S 864-024
(13) Supply electrical power (AMM 24-22-00/201).

S 864-025
(14) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the overhead panel, P11:
(a) 11L17, HYDRAULIC SYSTEM PRESS L
(b) 11L18, HYDRAULIC SYTEM PRESS CENTER
(c) 11L26, HYDRAULIC SYSTEM PRESS R

S 864-026
(15) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 864-027
(16) Pressurize the main hydraulic systems and reservoirs (AMM 29-11-00/201).

S 794-028
(17) Make sure there are no leaks at the hydraulic pressure transmitter.

S 214-029
(18) Make sure the L (C, R) HYD PRESS indication on the EICAS display becomes stable at 2800-3200 psi.

NOTE: If you pressurize a hydraulic system with one ACMP, the pressure range is 2800-3200 psi.

S 114-030

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

(19) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 414-031

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) For the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 414-032

(21) Close the access panel, 552HB, for the hydraulic pressure transmitter in the left hydraulic system (AMM 06-44-00/201).

S 414-033

(22) Close the access panel, 652HB, for the hydraulic pressure transmitter in the right hydraulic system (AMM 06-44-00/201).

S 864-034

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

S 864-035

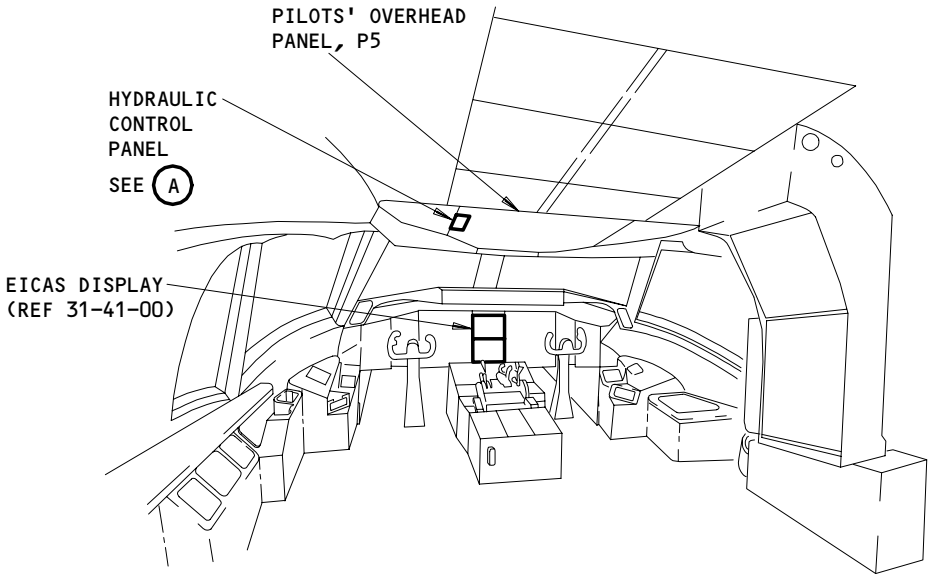
(24) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

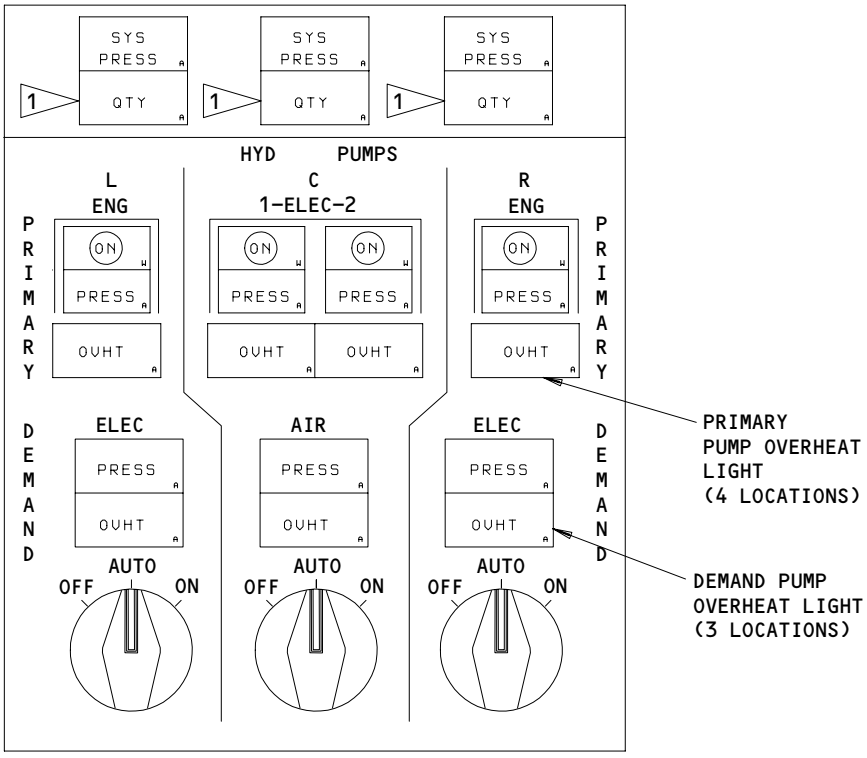
1. General
   A. A hydraulic fluid temperature indicating system is provided for each main hydraulic system. This system indicates fluid temperature in each reservoir and overheat in each hydraulic pump. The pump overheat caution lights are on the hydraulic control panel in the flight compartment. The EICAS display provides overheat caution messages for each hydraulic pump's respective caution light. The overheat caution lights are powered by 28 volts dc from master dim and test circuit breakers on overhead panel P11.
   B. The EICAS display shows a digital readout of fluid temperature in each hydraulic reservoir when the ELEC/HYD maintenance mode is selected for ground use only. Messages which describe problems relating to pump overheat caution lights automatically appear on the display. The messages for the fluid temperature indicating system consist of the following:

      L PRIM HYD OVHT
      R PRIM HYD OVHT
      C HYD 1 OVHT
      C HYD 2 OVHT
      L DEM HYD OVHT
      R DEM HYD OVHT
      C DEM HYD OVHT

      For information on the EICAS, refer to 31-41-00.
2. Component Details (Fig. 1 and 2)
   A. Each system is equipped with a temperature transmitter. The transmitters are located in the fluid reservoirs.
   B. Overheat switches are provided for each pump. The four electric pumps (ACMPs) have the switches mounted inside the pump case. The engine driven pumps and air driven pump have overheat switches in their respective case drain filter modules.
   C. An overheat light is provided for each pump. The overheat lights are located on the hydraulic control panel.
3. Operation
   A. Functional Description (Fig. 3)
      (1) The system fluid temperature transmitters change resistance as the system reservoir fluid temperature changes. The EICAS computer converts the changing resistance of the temperature transmitter into a digital readout of fluid temperature on the EICAS display.



FLIGHT COMPARTMENT



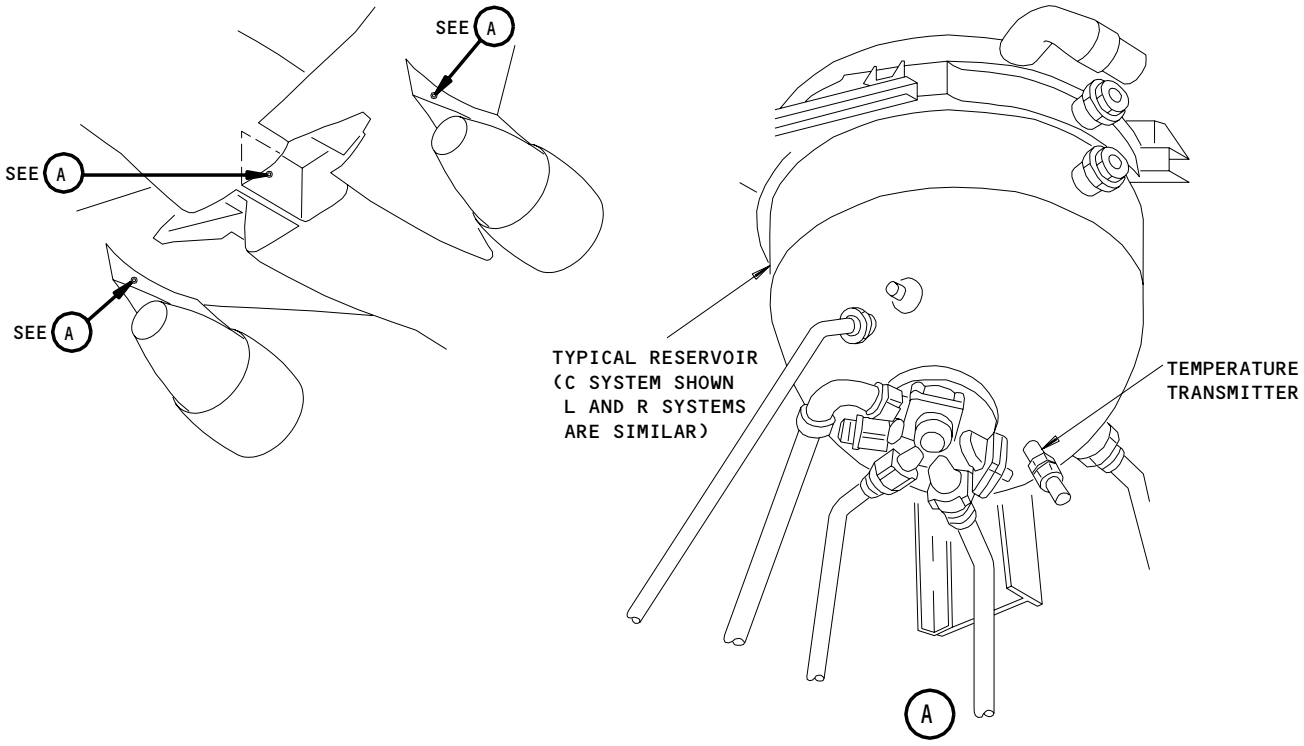
HYDRAULIC CONTROL PANEL

1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

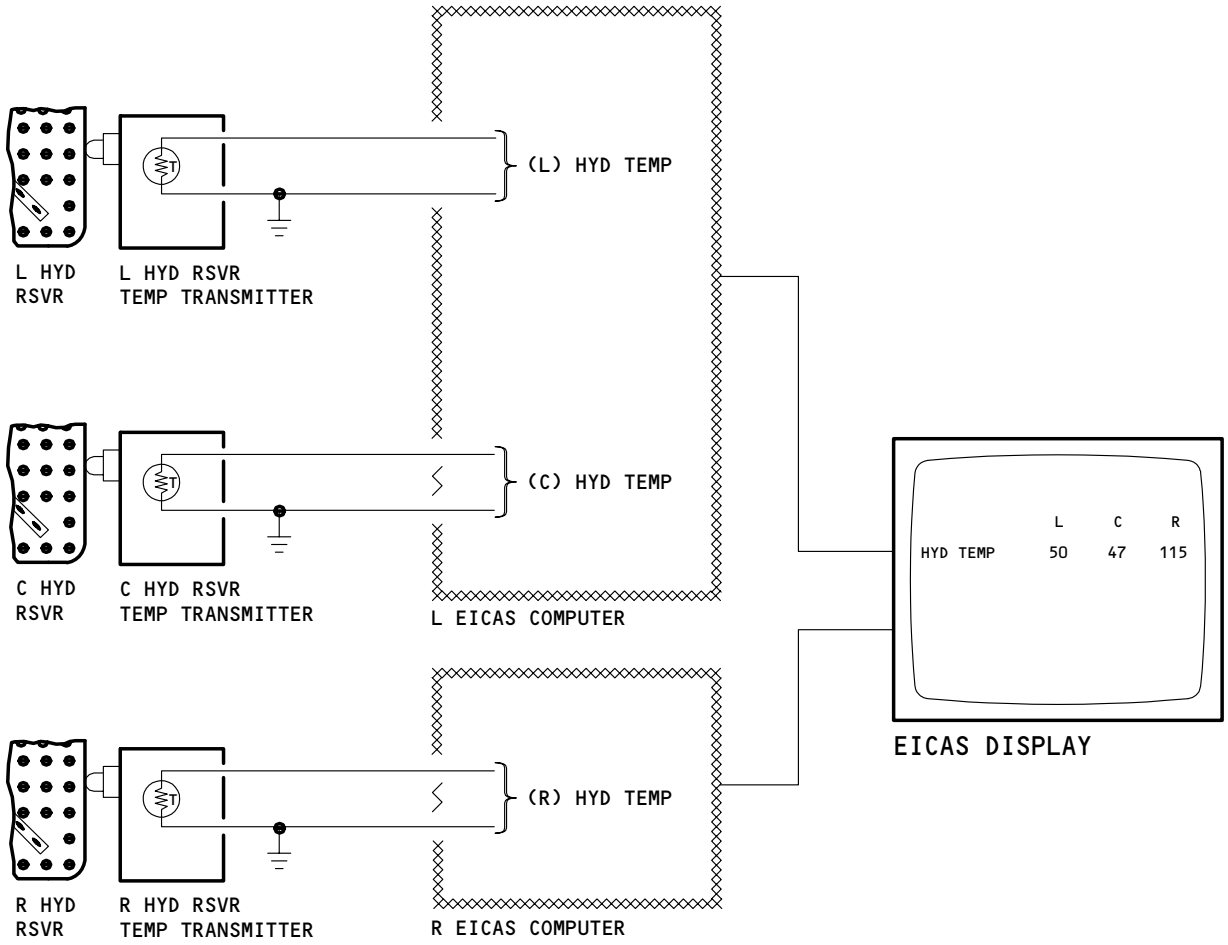
A

Reservior Temperature Indication
Figure 1

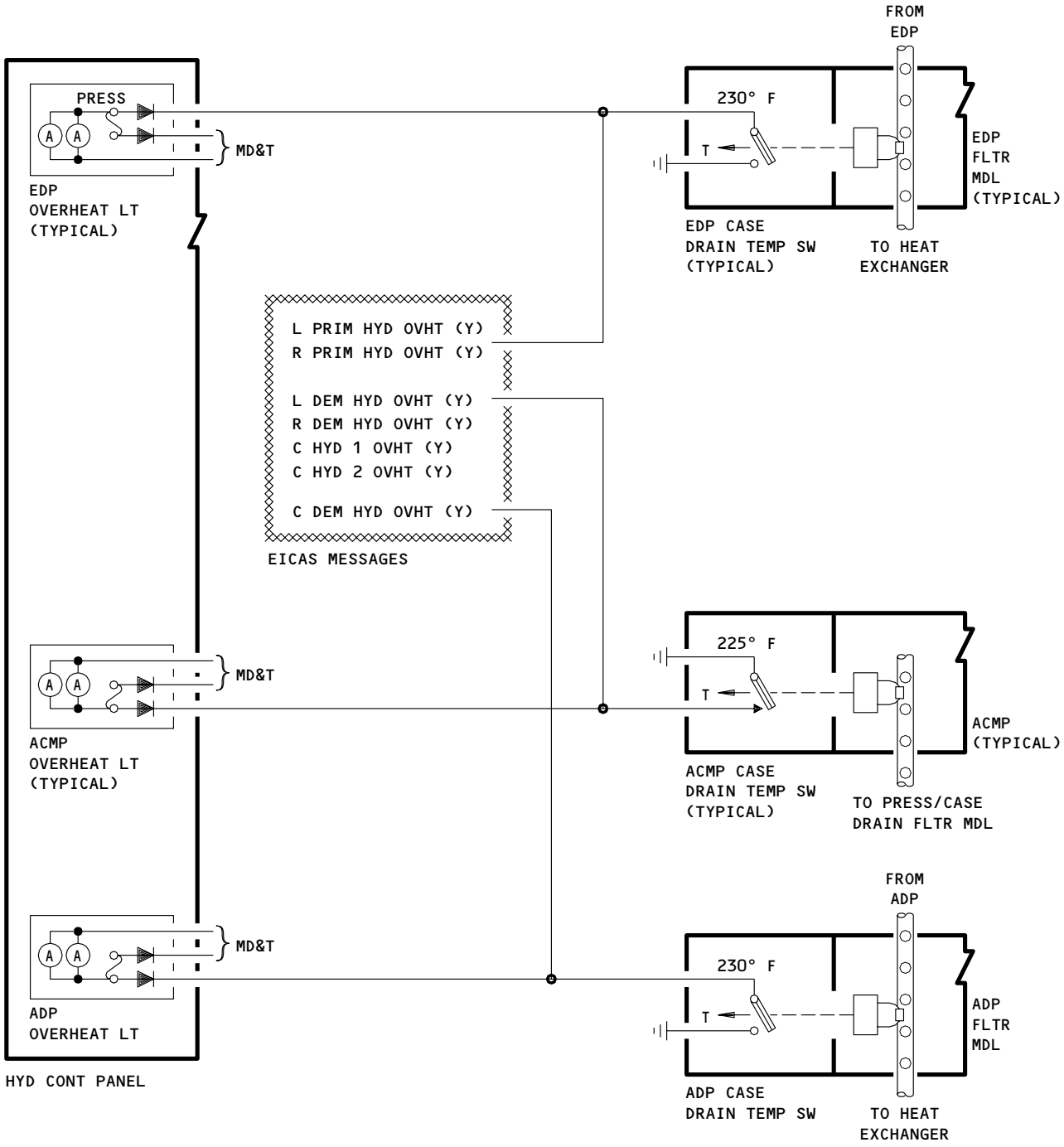
(2) An overheat switch is provided for each pump. An overheat condition at any one pump will cause its overheat light to illuminate on the hydraulic control panel.
(3) When a pump overheat switch closes an electrical signal is sent to the EICAS computer. This signal causes a pump overheat message to appear on the EICAS display and a pump overheat light to illuminate.



Temperature Transmitter Locations
Figure 2



Hydraulic Reservoir Temperature Indicating System
Figure 3



Hydraulic Pump Overheat Indication Schematic
Figure 4

HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
COMPUTER - EICAS L, M10181 (REF 31-41-00, FIG. 101)				
COMPUTER - EICAS R, M10182 (REF 31-41-00, FIG. 101)				
LIGHT - SYS C ACMP C1 OVERHEAT INDICATOR, YCYL5	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS C ACMP C2 OVERHEAT INDICATOR, YCYL13	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS C ADP OVERHEAT INDICATOR, YCYL15	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS L ACMP OVERHEAT INDICATOR, YCYL14	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS L EDP OVERHEAT INDICATOR, YCYL4	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS R ACMP OVERHEAT INDICATOR, YCYL16	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS R EDP OVERHEAT INDICATOR, YCYL6	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
MODULE - SYS C ADP PRESSURE/CASE DRAIN FILTER (REF 29-11-00, FIG. 101)				
MODULE - SYS L EDP PRESSURE/CASE DRAIN FILTER (REF 29-11-00, FIG. 101)				
MODULE - SYS R EDP PRESSURE/CASE DRAIN FILTER (REF 29-11-00, FIG. 101)				
PANEL - HYDRAULIC CONTROL, M10 (REF 29-11-00, FIG. 101)				
PUMP (ACMP) - SYS C ALTERNATING CURRENT MOTOR C1, M232 (REF 29-11-00, FIG. 101)				
PUMP (ACMP) - SYS C ALTERNATING CURRENT MOTOR C2, M233 (REF 29-11-00, FIG. 101)				
PUMP (ACMP) - SYS L ALTERNATING CURRENT MOTOR, M231 (REF 29-11-00, FIG. 101)				
PUMP (ACMP) - SYS R ALTERNATING CURRENT MOTOR, M234 (REF 29-11-00, FIG. 101)				

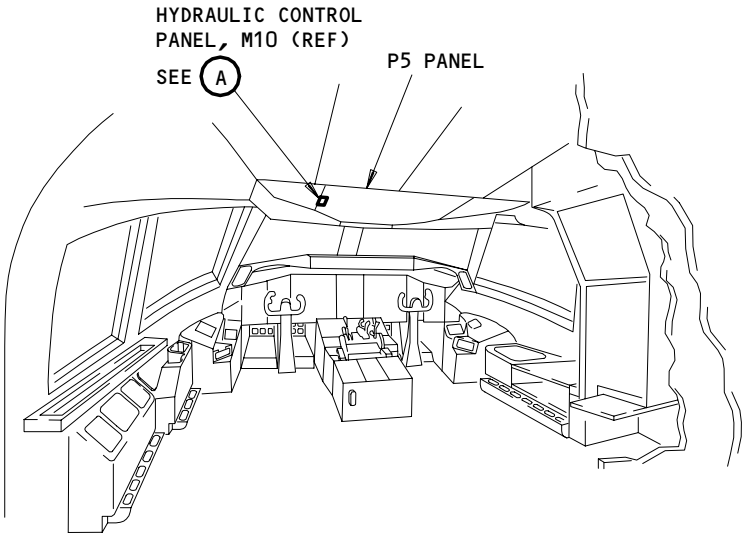
* SEE WM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 1)

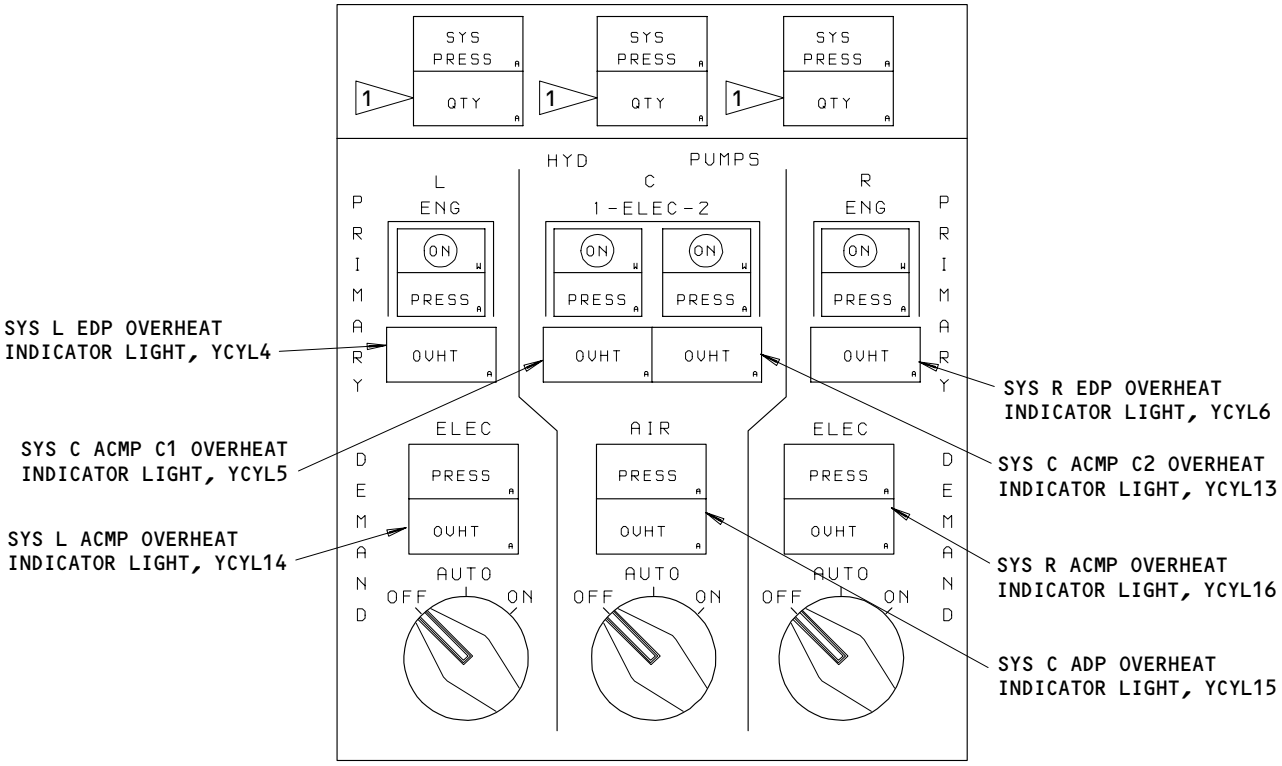
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
RESERVOIR - SYS C HYDRAULIC (REF 29-11-00, FIG. 101)				
RESERVOIR - SYS L HYDRAULIC (REF 29-11-00, FIG. 101				
RESERVOIR - SYS R HYDRAULIC (REF 29-11-00, FIG. 101)				
SWITCH - SYS C ACMP C1 TEMPERATURE		1	RIGHT WHEEL WELL, SYS C ACMP C1, M232	*
SWITCH - SYS C ACMP C2 TEMPERATURE		1	RIGHT WHEEL WELL, SYS C ACMP C2, M233	*
SWITCH - SYS C ADP FILTER MODULE TEMPERATURE, S317	3	1	LEFT WHEEL WELL, ADP PRESS/CASE DRAIN FILTER MODULE	29-32-03
SWITCH - SYS L ACMP TEMPERATURE		1	437BL,437BR, LEFT ENGINE STRUT, SYS L ACMP, M231	*
SWITCH - SYS L EDP FILTER MODULE TEMPERATURE, S316	2	1	437BL,437BR, LEFT ENGINE STRUT, SYS L EDP PRESS/CASE DRAIN FILTER MODULE	29-32-03
SWITCH - SYS R ACMP TEMPERATURE		1	447BL,447BR, RIGHT ENGINE STRUT, SYS R ACMP, M234	*
SWITCH - SYS R EDP FILTER MODULE TEMPERATURE, S315	2	1	447BL,447BR, RIGHT ENGINE STRUT, SYS R EDP PRESS/CASE DRAIN FILTER MODULE	29-32-03
TRANSMITTER - SYS C FLUID TEMPERATURE, M345	4	1	RIGHT WHEEL WELL, SYS C HYDRAULIC RESERVOIR	29-32-01
TRANSMITTER - SYS L FLUID TEMPERATURE, M344	2	1	437BL,437BR, LEFT ENGINE STRUT, SYS L HYDRAULIC RESERVOIR	29-32-01
TRANSMITTER - SYS R FLUID TEMPERATURE, M346	2	1	447BL,447BR, RIGHT ENGINE STRUT, SYS R HYDRAULIC RESERVOIR	29-32-01
UNIT - EICAS LOWER DISPLAY (REF 31-41-00, FIG. 101)				

* SEE WM EQUIPMENT LIST

Component Index
Figure 101 (Sheet 2)



FLIGHT COMPARTMENT

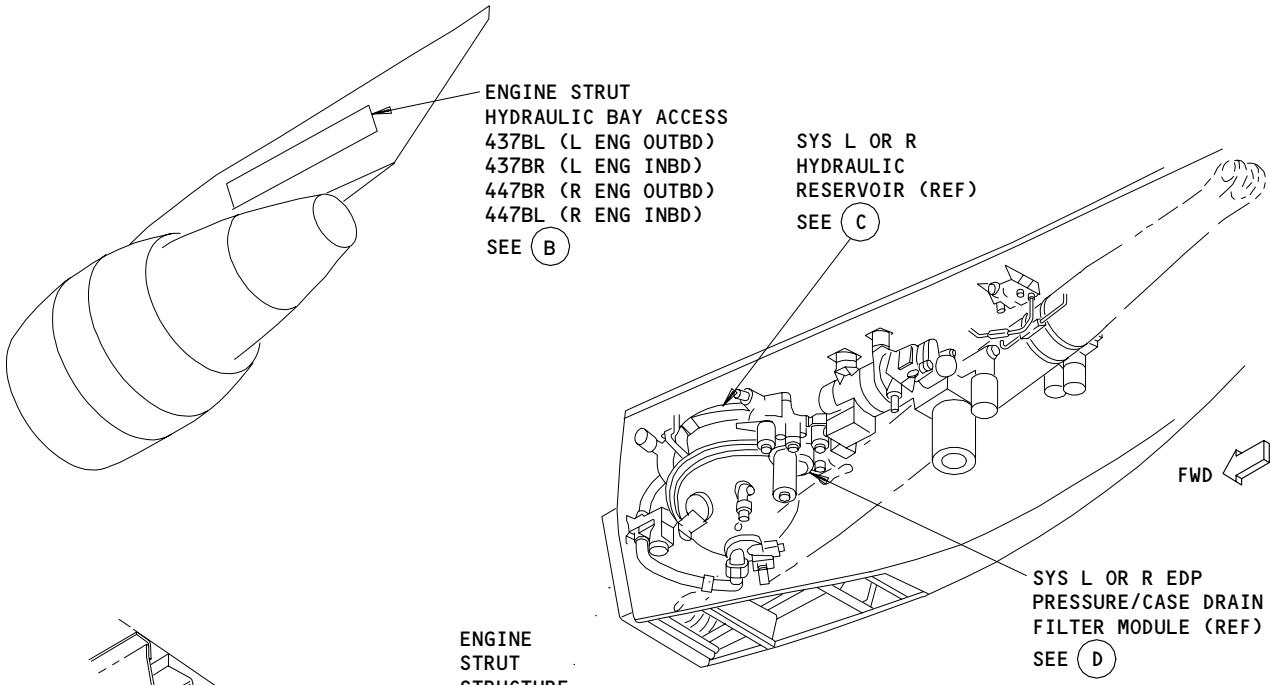


HYDRAULIC CONTROL PANEL, M10 (REF)

A

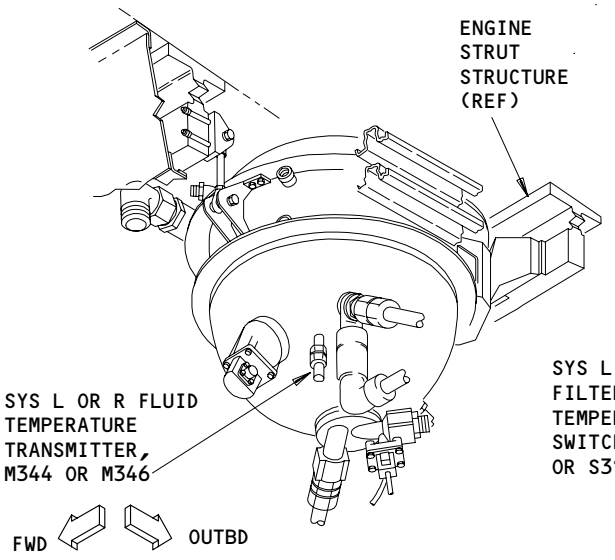
1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

Component Location
Figure 102 (Sheet 1)



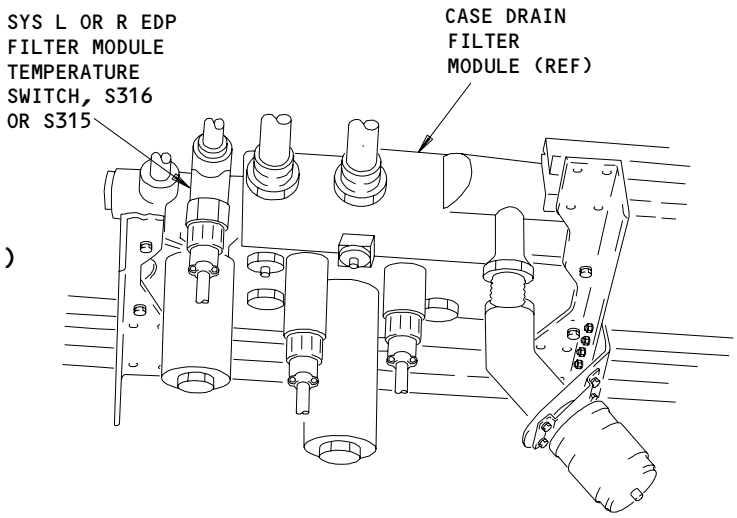
ENGINE STRUT HYDRAULIC BAY

B



L OR R SYS HYDRAULIC RESERVOIR (REF)

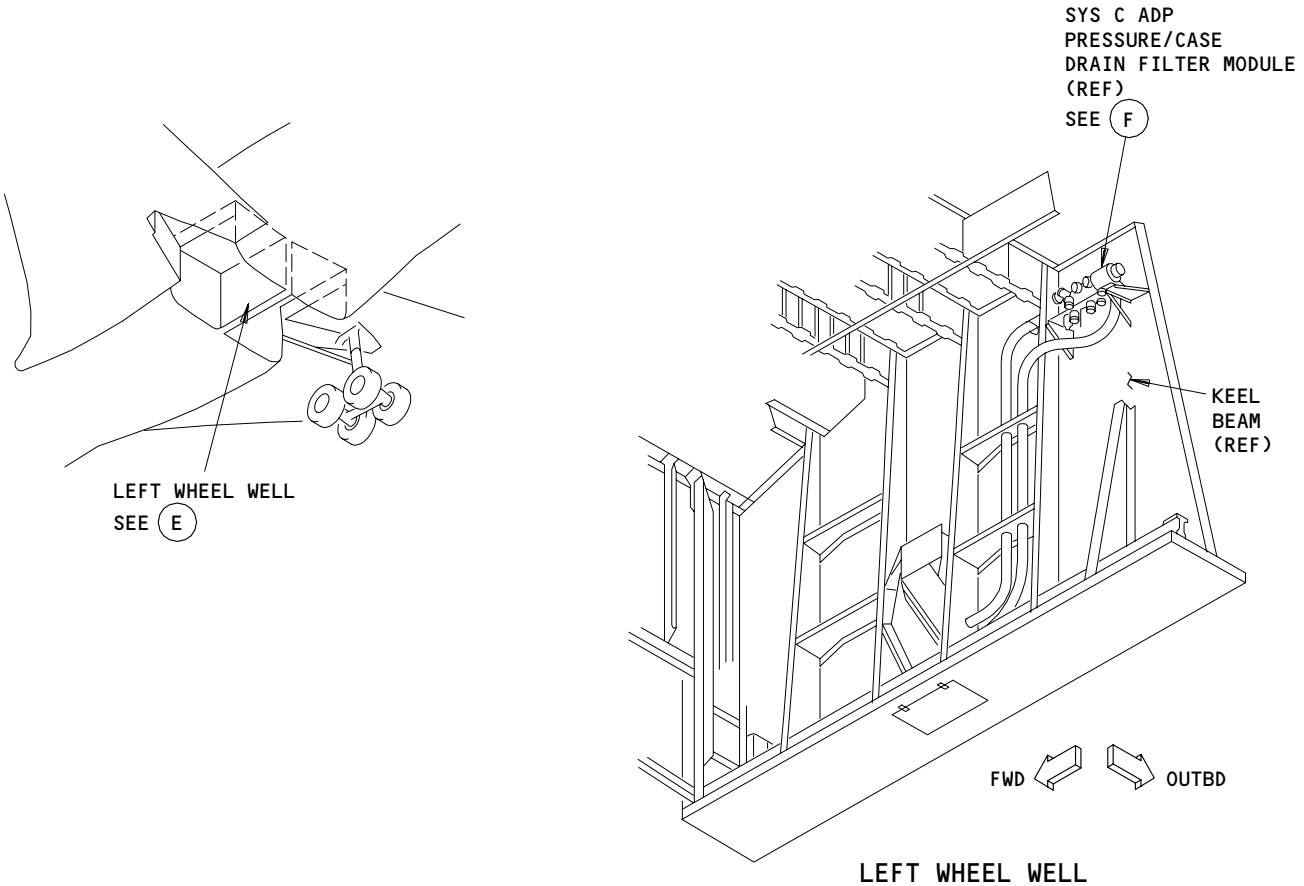
C



SYS L OR R EDP PRESSURE/CASE DRAIN FILTER MODULE (REF)

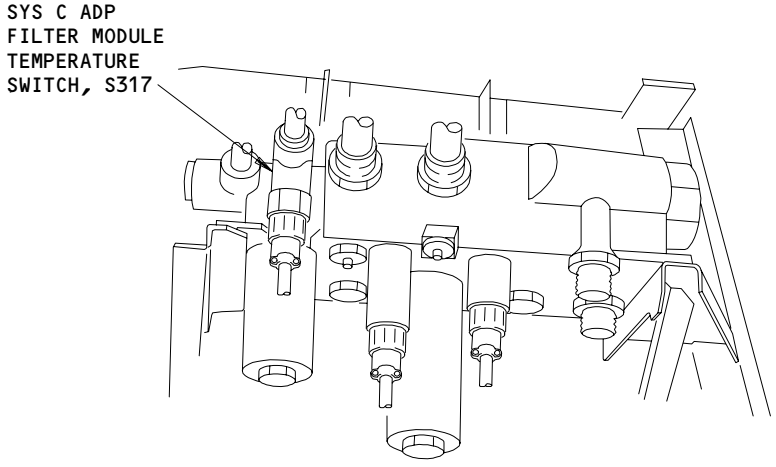
D

Component Location
Figure 102 (Sheet 2)



LEFT WHEEL WELL

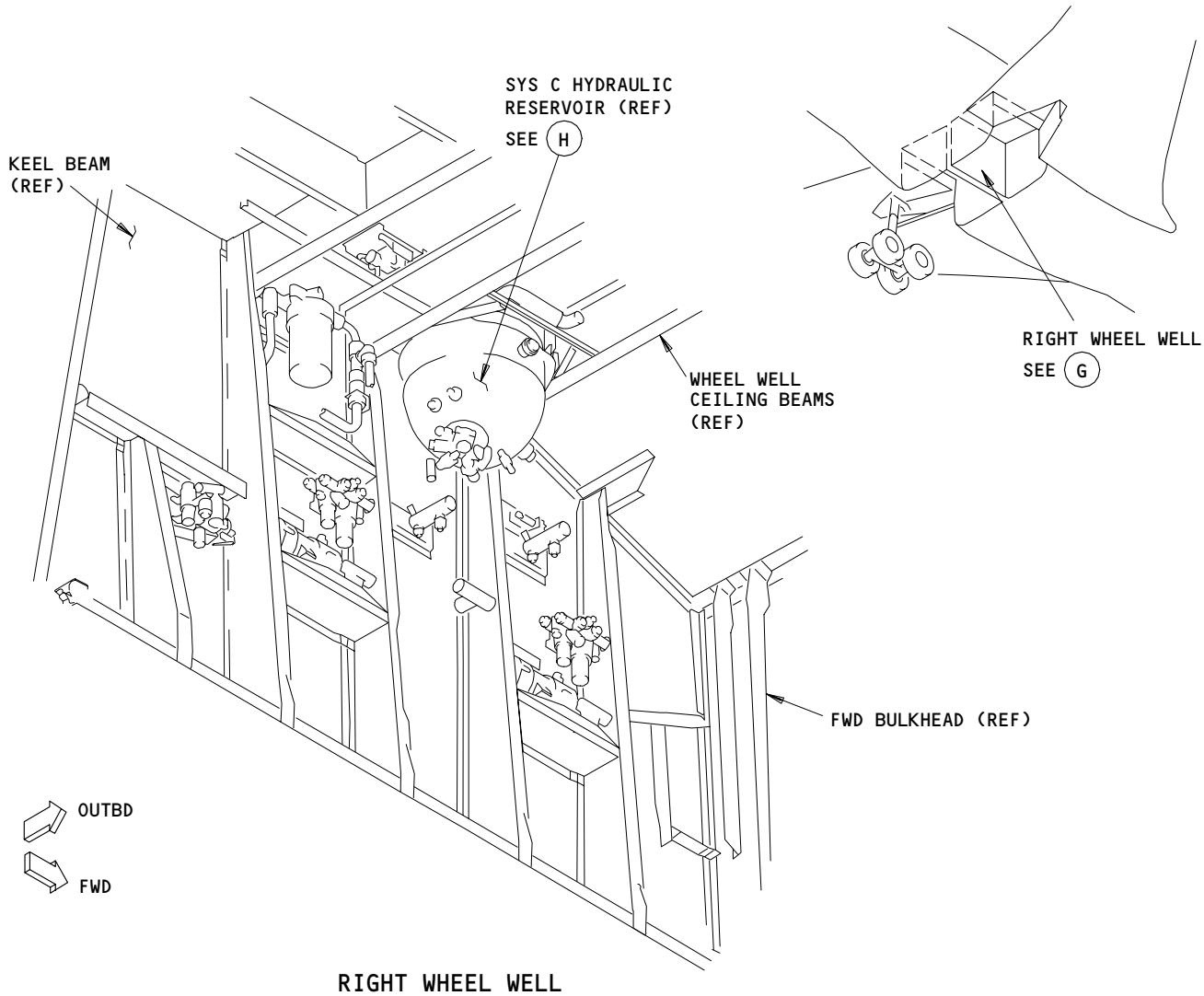
E



ADP PRESSURE/CASE DRAIN FILTER MODULE (REF)

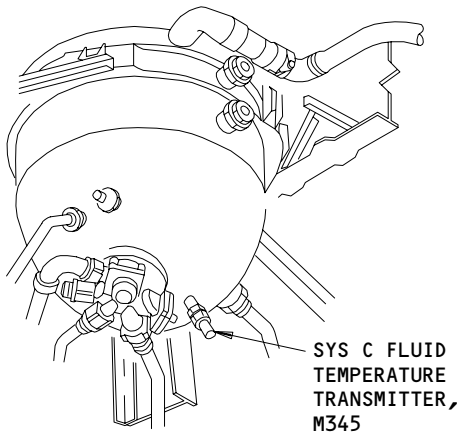
F

Component Location
Figure 102 (Sheet 3)



RIGHT WHEEL WELL

G



SYS C HYDRAULIC RESERVOIR (REF)

H

Component Location
Figure 102 (Sheet 4)

HYDRAULIC FLUID TEMPERATURE INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure has three tasks. The first task is a system test of the overheat lights for the hydraulic pumps in the left and right hydraulic systems. The second task is a system test of the overheat lights for the hydraulic pumps in the center hydraulic system. The third task is a system test of the temperature indication for the hydraulic reservoir fluid.

TASK 29-32-00-735-001

2. System Test - Overheat Lights for the Hydraulic Pumps in the Left and Right Hydraulic Systems
   A. References
      (1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
      (2) AMM 24-22-00/201, Electrical Power - Control
      (3) AMM 29-11-01/401, Left and Right System Alternating Current Motor Pump (ACMP)
      (4) AMM 29-11-05/401, Engine-Driven Pump (EDP)
      (5) AMM 29-11-17/401, Left and Right System Engine Driven Pump (EDP) Pressure/Case Drain Filter Module
      (6) AMM 31-41-00/201, EICAS
      (7) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

211/212	Control Cabin
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

   C. Procedure

      S 045-002

      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 015-003
(2) Open the access panels 437BL and 437BR for the left hydraulic system (AMM 06-43-00/201).

S 015-004
(3) Open the access panels 447BL and 447BR for the right hydraulic system (AMM 06-43-00/201).

S 865-005
(4) Supply electrical power (AMM 24-22-00/201).

S 865-094
(5) Do this task, EICAS Message Display Procedure to show EICAS messages and to view the ELEC/HYD page (AMM 31-41-00/201).

S 865-006
(6) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L16, HYDRAULIC ELEC PUMP R
(b) 11L25, HYDRAULIC ELEC PUMP L
(c) 11R1, LEFT IND LIGHTS 1
(d) 11R28, RIGHT IND LIGHTS 1

S 035-007
(7) Disconnect the electrical connector for the temperature switch on the alternating current motor pump (ACMP) in the left and right hydraulic systems (AMM 29-11-01/401).

S 495-008
(8) Connect a jumper between the pins 1 and 3 on each of the ACMP electrical connectors.

S 865-009
(9) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11R1, LEFT IND LIGHTS 1
(b) 11R28, RIGHT IND LIGHTS 1

S 215-010
(10) Make sure these lights on the hydraulic control panel come on:
(a) OVHT light for the left ACMP
(b) OVHT light for the right ACMP.

S 215-011
(11) Make sure these EICAS messages show:
(a) L DEM HYD OVHT
(b) R DEM HYD OVHT

S 865-012
(12) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11R1, LEFT IND LIGHTS 1
(b) 11R28, RIGHT IND LIGHTS 1

S 035-013
(13) Disconnect the electrical connector from the temperature switch on the pressure and case drain filter module for the left and right engine driven pumps (EDP) (AMM 29-11-17/401).

S 495-014
(14) Connect a jumper between the pins 1 and 2 on the electrical connector.

S 865-015
(15) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11R1, LEFT IND LIGHTS 1
(b) 11R28, RIGHT IND LIGHTS 1

S 215-016
(16) Make sure these lights on the hydraulic control panel come on:
(a) OVHT light for the left EDP
(b) OVHT light for the right EDP.

S 215-017
(17) Make sure these EICAS messages show:
(a) L PRIM HYD OVHT
(b) R PRIM HYD OVHT

S 865-018
(18) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11R1, LEFT IND LIGHTS 1
(b) 11R28, RIGHT IND LIGHTS 1

S 095-019
(19) Remove the jumpers from the electrical connectors for the temperature switches on the left and right ACMPs.

S 435-020
(20) Install the electrical connectors on the temperature switches on the left and right ACMPs (AMM 29-11-01/401).

S 095-021
(21) Remove the jumpers from the electrical connectors for the temperature switches on the pressure/case drain filter modules for the left and right EDPs.

S 435-022
(22) Install the electrical connectors on the temperature switches on the pressure/case drain filter modules for the left and right EDPs (AMM 29-11-05/401).

S 865-023
(23) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11L16, HYDRAULIC ELEC PUMP R
(b) 11L25, HYDRAULIC ELEC PUMP L
(c) 11R1, LEFT IND LIGHTS 1
(d) 11R28, RIGHT IND LIGHTS 1

S 415-024
(24) Close the access panels 437BL and 437BR for the left hydraulic system (AMM 06-43-00/201).

S 415-025
(25) Close the access panels 447BL and 447BR for the right hydraulic system (AMM 06-43-00/201).

S 445-026
(26) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

TASK 29-32-00-735-084

3. System Test - Overheat Lights for the Hydraulic Pumps in the Center Hydraulic System

A. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 29-11-02/401, Center System Alternating Current Motor Pump (ACMP)
(3) AMM 29-11-19/401, Air Driven Pump Pressure/Case Drain Filter Module
(4) AMM 31-41-00/201, EICAS
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks

B. Access
(1) Location Zone
144 Right MLG Wheel Well

C. Procedure

S 495-030
(1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-031

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 865-032
(3) Supply electrical power (AMM 24-22-00/201).

S 865-098
(4) Do this task, EICAS Message Display Procedure to show EICAS messages and to view the ELEC/HYD page (AMM 31-41-00/201).

S 865-033
(5) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11A33, IND LIGHTS 1
(b) 11D31, HYDRAULIC AIR PUMP
(c) 11L15, HYDRAULIC ELEC PUMP CTR 1
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11R1, LEFT IND LIGHTS 1
(f) 11R28, RIGHT IND LIGHTS 1

S 035-034
(6) Disconnect the electrical connector for the temperature switch on each ACMP, in the center hydraulic system (AMM 29-11-02/401).

S 495-035
(7) Connect a jumper between the pins 1 and 3 on each electrical connector.

S 865-036
(8) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11A33, IND LIGHTS 1
(b) 11R1, LEFT IND LIGHTS 1
(c) 11R28, RIGHT IND LIGHTS 1

S 215-037
(9) Make sure these lights on the hydraulic control panel come on:
(a) OVHT light for the ACMP C1
(b) OVHT light for the ACMP C2.

S 215-038
(10) Make sure these EICAS messages show:
(a) C HYD 1 OVHT
(b) C HYD 2 OVHT

S 865-039
(11) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11A33, IND LIGHTS 1
(b) 11R1, LEFT IND LIGHTS 1
(c) 11R28, RIGHT IND LIGHTS 1

S 035-040
(12) Disconnect the electrical connector from the temperature switch on the pressure/case drain filter module for the air driven pump (ADP) (AMM 29-11-19/401).

S 495-041
(13) Connect a jumper between the pins 1 and 2 on the electrical connector.

S 865-042
(14) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11A33, IND LIGHTS 1
(b) 11R1, LEFT IND LIGHTS 1
(c) 11R28, RIGHT IND LIGHTS 1

S 215-043
(15) Make sure this light on the hydraulic control panel comes on:
(a) OVHT light for the ADP.

S 215-044
(16) Make sure the EICAS message, C DEM HYD OVHT shows.

S 865-045
(17) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11A33, IND LIGHTS 1
(b) 11R1, LEFT IND LIGHTS 1
(c) 11R28, RIGHT IND LIGHTS 1

S 095-046
(18) Disconnect the jumper from the electrical connector for each ACMP in the center hydraulic system.

S 435-047
(19) Connect the electrical connector for the temperature switch on each ACMP, in the center hydraulic system (AMM 29-11-02/401).

S 095-048
(20) Disconnect the jumper from the electrical connector for the temperature switch of the ADP.

S 435-049
(21) Connect the electrical connector to the temperature switch on the pressure/case drain filter module for the ADP (AMM 29-11-19/401).

S 865-050
(22) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11A33, IND LIGHTS 1
(b) 11D31, HYDRAULIC AIR PUMP
(c) 11L15, HYDRAULIC ELEC PUMP CTR 1
(d) 11L24, HYDRAULIC ELEC PUMP CTR 2
(e) 11R1, LEFT IND LIGHTS 1

(f) 11R28, RIGHT IND LIGHTS 1

S 415-051

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.

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

TASK 29-32-00-735-052

4. System Test - Temperature Indication for the Hydraulic Reservoir Fluid

A. Equipment

(1) Deca-Meter, Variable Resistance - 10 to 150 ±0.5 ohms - Commercially Available

B. References

(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 24-22-00/201, Electrical Power - Control
(3) AMM 29-32-01/401, Hydraulic Fluid Temperature Transmitter
(4) AMM 31-41-00/201, EICAS
(5) AMM 32-00-15/201, Landing Gear Door Locks
(6) AMM 32-00-20/201, Landing Gear Downlocks
(7) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zone

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

D. Procedure

S 495-053

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

S 015-054

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 045-055

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.

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

S 015-056

(4) Open the access panels 437BL and 437BR for the left hydraulic system (AMM 06-43-00/201).

S 015-057

(5) Open the access panels 447BL and 447BR for the right hydraulic system (AMM 06-43-00/201).

S 865-058

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

S 865-097

(7) Do this task, EICAS Message Display Procedure to show EICAS messages and to view the ELEC/HYD page (AMM 31-41-00/201).

S 865-059

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

S 975-060

(9) Make a record of the L (C,R) HYD TEMP indication on the display.

S 865-061
(10) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R

S 035-062
(11) Disconnect the electrical connector from the temperature transmitter on the hydraulic reservoir, in the left (center, right) hydraulic system (AMM 29-32-01/401).

S 485-063
(12) Connect the pins 1 and 2 of the electrical connector to a Deca-Meter.

S 865-064
(13) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R

S 865-065
(14) Set the resistance of the Deca-Meter to 108.39 ohms.

S 215-066
(15) Make sure the L (C, R) HYD TEMP indication on the display is approximately 50 (±6)°C.

S 865-067
(16) Set the resistance of the Deca-Meter to 128.85 ohms.

S 215-068
(17) Make sure the L (C, R) HYD TEMP indication on the display is approximately 100 (±6)°C.

S 865-069
(18) Set the resistance of the Deca-Meter to 108.39 ohms.

S 215-070
(19) Make sure the L (C, R) HYD TEMP indication on the display is approximately 50°C.

S 865-071
(20) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:
(a) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R

S 085-072
(21) Remove the Deca-Meter from the electrical connector.

S 435-073
(22) Connect the electrical connector to the temperature transmitter in the left (center, right) hydraulic system (AMM 29-32-01/401).

S 865-074
(23) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P11 panel:
(a) 11J2, EICAS CMPTR L
(b) 11J29, EICAS CMPTR R

S 215-075
(24) Make sure the L (C, R) HYD TEMP indication on the display is the same as that at the start of this test.

S 415-076
(25) Close the access panels 437BL and 437BR for the left hydraulic system (AMM 06-43-00/201).

S 415-077
(26) Close the access panels 447BL and 447BR for the right hydraulic system (AMM 06-43-00/201).

S 445-078

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

S 415-082

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.

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

S 865-083

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

HYDRAULIC FLUID TEMPERATURE TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. One task removes the transmitter for the hydraulic fluid temperature. The other task installs the transmitter for the hydraulic fluid temperature.

TASK 29-32-01-004-001

2. Remove the Transmitter for the Hydraulic Fluid Temperature (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 32-00-15/201, Landing Gear Door Locks
      (4) AMM 32-00-20/201, Landing Gear Downlocks
      (5) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic system

   C. Prepare for Removal

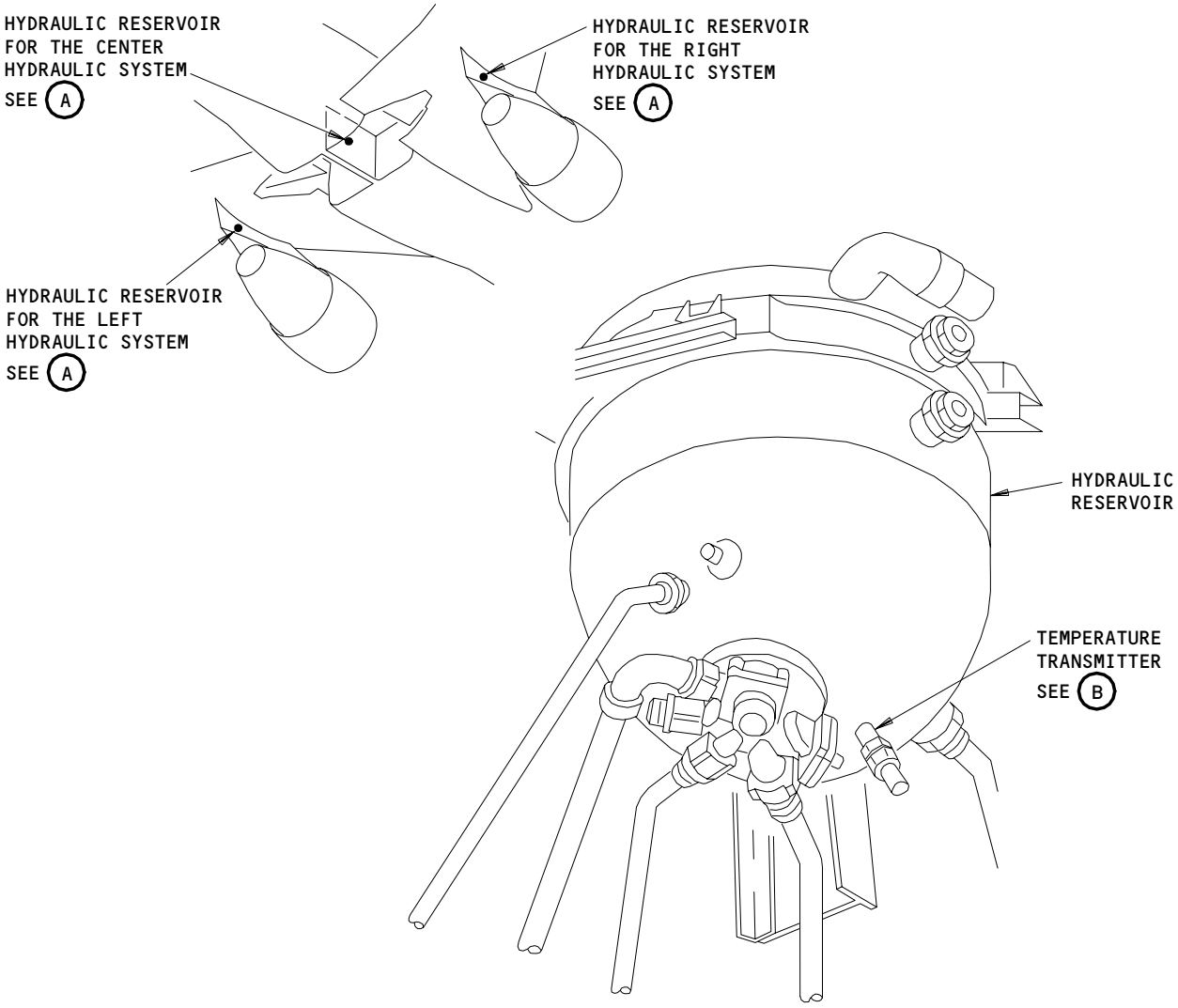
S 044-002

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

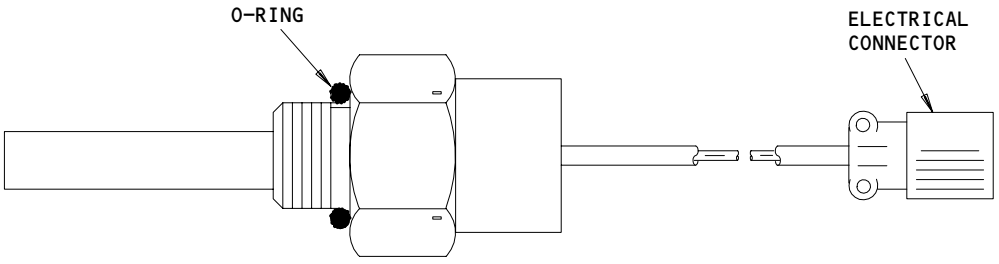
      (1) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).

S 014-003

      (2) Open the access panels, 437BL and 437BR, for the transmitter in the left hydraulic system (AMM 06-43-00/201).



HYDRAULIC RESERVOIR
(EXAMPLE)
A



TEMPERATURE TRANSMITTER
B

Temperature Transmitter Installation
Figure 401

S 014-004

(3) Open the access panels, 447BL and 447BR, for the transmitter in the right hydraulic system (AMM 06-43-00/201).

S 494-005

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

S 494-006

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 864-008

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

S 684-009

(7) Open the drain valve to drain the hydraulic reservoir.

D. Remove the Transmitter for the Hydraulic Fluid Temperature

S 034-010

(1) Disconnect the electrical connector from the transmitter.

S 024-011

(2) Remove the transmitter from the hydraulic reservoir.

TASK 29-32-01-404-012

3. Install the Transmitter for the Hydraulic Fluid Temperature (Fig. 401)

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 12-12-01/301, Hydraulic Systems
(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
(7) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic system

D. Procedure

S 644-013
(1) Apply hydraulic system lubricant or hydraulic fluid to the new O-ring.

S 434-014
(2) Install the new O-ring on the transmitter.

S 424-015
(3) Install the transmitter on the hydraulic reservoir.

S 434-016
(4) Connect the electrical connector to the transmitter.

S 864-017
(5) Close the drain valve on the hydraulic reservoir.

S 434-018
(6) Safety the drain valve with a lockwire.

S 864-019
(7) Supply electrical power (AMM 24-22-00/201).

S 614-020
(8) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 864-022
(9) Push the ELEC/HYD switch on the EICAS MAINT panel, on the right side panel, P61.

S 214-023
(10) Make sure the L (C, R) HYD TEMP indication, on the display, shows the approximate temperature of the fluid, in the hydraulic reservoir.

S 864-024
(11) Pressurize the main hydraulic systems and reservoirs (AMM 29-11-00/201).

S 794-025
(12) Make sure there are no leaks at the transmitter.

S 114-026

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

(13) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

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 transmitter in the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 414-028
(15) Close the access panels, 437BL and 437BR, for the transmitter in the left hydraulic system (AMM 06-43-00/201).

S 414-029
(16) Close the access panels, 447BL and 447BR, for the transmitter in the right hydraulic system (AMM 06-43-00/201).

S 444-030
(17) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 864-034
(18) Remove hydraulic power if it is not necessary (AMM 29-11-00/201).

S 864-035
(19) Remove electrical power if it is not necessary (AMM 24-22-00/201).

ENGINE DRIVEN PUMP (EDP) AND AIR DRIVEN PUMP (ADP) FILTER MODULE TEMPERATURE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the temperature switch on the filter module for the EDP or the ADP. The second task installs the temperature switch on the filter module for the EDP or the ADP.

TASK 29-32-03-004-001

2. Remove the Temperature Switch on the Filter Module for the Engine-Driven Pump (EDP) or the Air Driven Pump (ADP)
   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
      (4) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

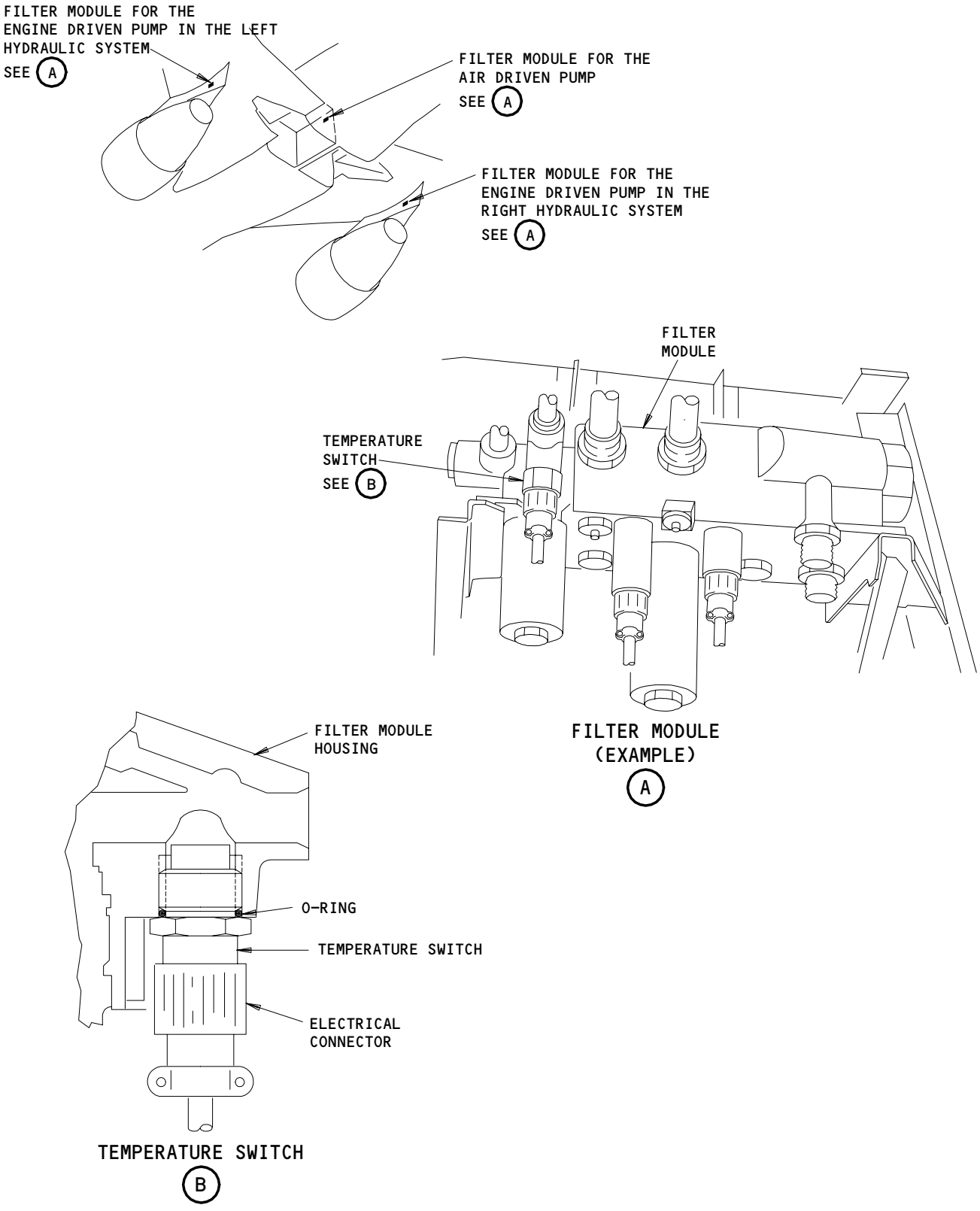
437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

   C. Prepare for the Removal

      S 044-002
      (1) If you will remove the temperature switch on the filter module for the EDP, do these steps:
         (a) Open these circuit breakers on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
            1) 11R1, LEFT IND LIGHTS 1
            2) 11R28, RIGHT IND LIGHTS 1

         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.

         (b) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).
         (c) Open the access panels, 437BL and 437BR, for the temperature switch in the left hydraulic system.



Temperature Switch Installation
Figure 401

(d) Open the access panels, 447BL and 447BR, for the temperature switch in the right hydraulic system.

S 494-003

(2) If you will remove the temperature switch on the filter module for the ADP, do these steps:

(a) Open these circuit breakers on the P11 panel and attach DO-NOT-CLOSE tags:

1) 11A33, IND LIGHTS 1

(b) 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.

(c) 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 main hydraulic systems and reservoirs (AMM 29-11-00/201).

D. Remove the Temperature Switch (Fig. 401)

S 034-005

(1) Remove the electrical connector from the temperature switch.

S 024-006

(2) Remove the temperature switch from the filter module.

S 034-007

(3) Install a plug in the opening in the filter module.

TASK 29-32-03-404-008

3. Install the Temperature Switch on the Filter Module for the Engine-Driven Pump (EDP) or the Air Driven Pump (ADP)

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 12-12-01/301, 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
(6) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic system

D. Install the Temperature Switch (Fig. 401)

S 644-009
(1) Apply hydraulic fluid or hydraulic system lubricant to a new O-ring.

S 434-010
(2) Install the new O-ring on the temperature switch.

S 434-025
(3) Remove the plug from the opening in the filter module.

S 424-011
(4) Install the temperature switch in the filter module.

S 424-012
(5) Tighten the temperature switch to 75-100 inch pounds.

S 434-013
(6) Safety the temperature switch with a lockwire.

S 434-014
(7) Connect the electrical connector to the temperature switch.

E. Put the Airplane Back to Its Usual Condition

S 864-016
(1) If you installed the temperature switch on the filter module for the EDP, remove the DO-NOT- CLOSE tags and open these circuit breakers on the overhead panel, P11:
(a) 11R1, LEFT IND LIGHTS 1
(b) 11R28, RIGHT IND LIGHTS 1

S 864-017
(2) If you installed the temperature switch on the filter module for the ADP, remove the DO-NOT- CLOSE tags and open these circuit breakers on the overhead panel, P11:
(a) 11A33, IND LIGHTS 1

S 614-018

(3) Fill the reservoir in the left, right, or center hydraulic system (AMM 12-12-01/301).

S 864-019

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

S 214-020

(5) Make sure there are no leaks at the temperature switch.

S 114-026

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

(6) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 444-022

(7) If you installed the temperature switch on the filter module for the EDP, do these steps:
   (a) Close the access panels, 437BL and 437BR, for the transmitter in the left hydraulic system (AMM 06-43-00/201).
   (b) Close the access panels, 447BL and 447BR, for the transmitter in the right hydraulic system (AMM 06-43-00/201).
   (c) Do the activation procedure for the thrust reverser (AMM 78-31-00/201).

S 094-023

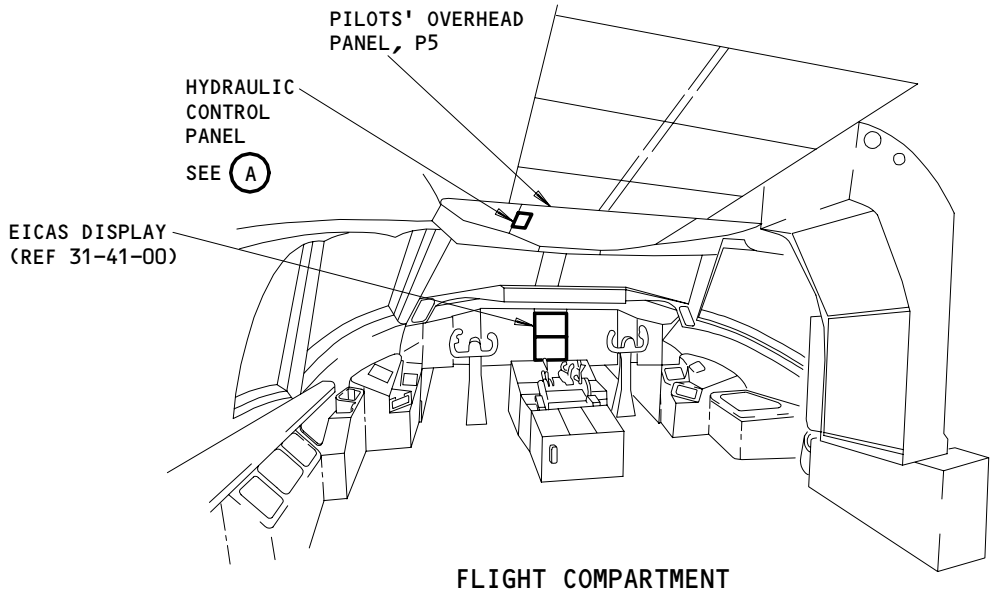
(8) If you installed the temperature switch on the filter module for the ADP, do these steps:

   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.

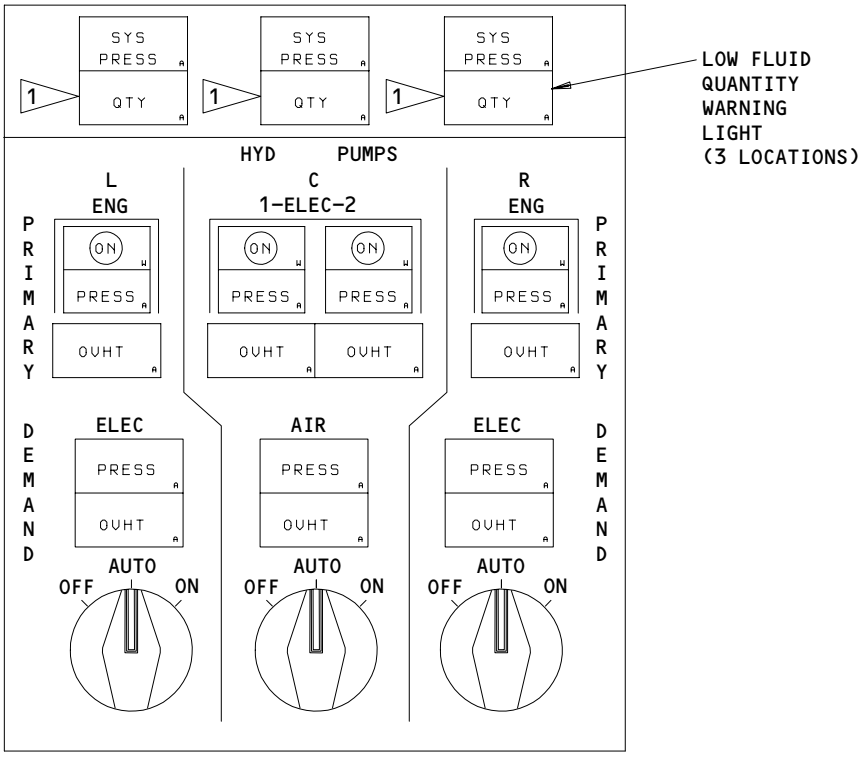
   (a) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

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 engine indicating and crew alerting system (EICAS) display contains a digital readout of fluid quantity in each system reservoir. The display also provides low quantity messages. A remote quantity indicator is at the central ground servicing station (Ref 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 1.21 gallons for the center reservoir and 0.73 gallons for the left and right reservoir.
2. Component Details (Fig. 1 and 2)
   A. Quantity Transmitter
      (1) The quantity transmitter is a variable capacitor probe inside each reservoir. The capacitance of the transmitter varies with the change of depth of fluid within the reservoir.
   B. 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.
   C. EICAS Display
      (1) Quantity Reading
         (a) 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) Overfull Indication
         (a) An OF (overfull) indication is displayed next to the digital readout of fluid quantity in the EICAS maintenance mode if the reservoir is overfull. The OF indication is generated in the EICAS computer and is displayed adjacent to quantity readings of 1.22 or above. In addition, a (L, R, C) HYD SYS O/FULL message is displayed on the EICAS maintenance page.
      (3) Refill Indication
         (a) An RF (refill) indication is displayed next to fluid quantity readings of 0.75 or less in both the status and maintenance modes. The RF indication is generated in the EICAS computer.
      (4) Low Fluid Level Indication
         (a) A (L, R, C) HYD QTY level C EICAS message is displayed to indicate a low fluid level in the system reservoir.
      (5) For information on the EICAS, refer to AMM 31-41-00/201.



FLIGHT COMPARTMENT

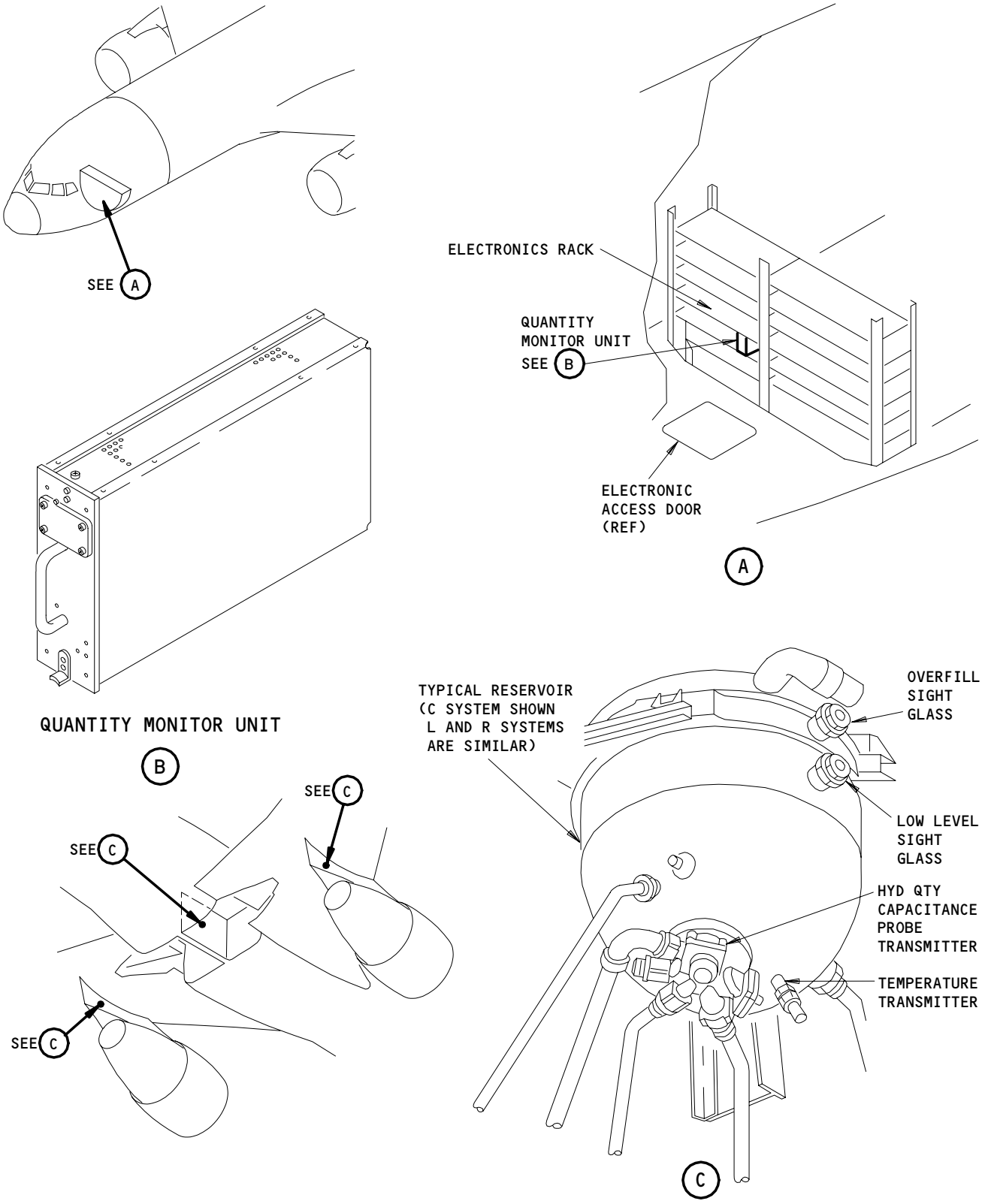


HYDRAULIC CONTROL PANEL

A

1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

Reservoir Quantity Indication
Figure 1



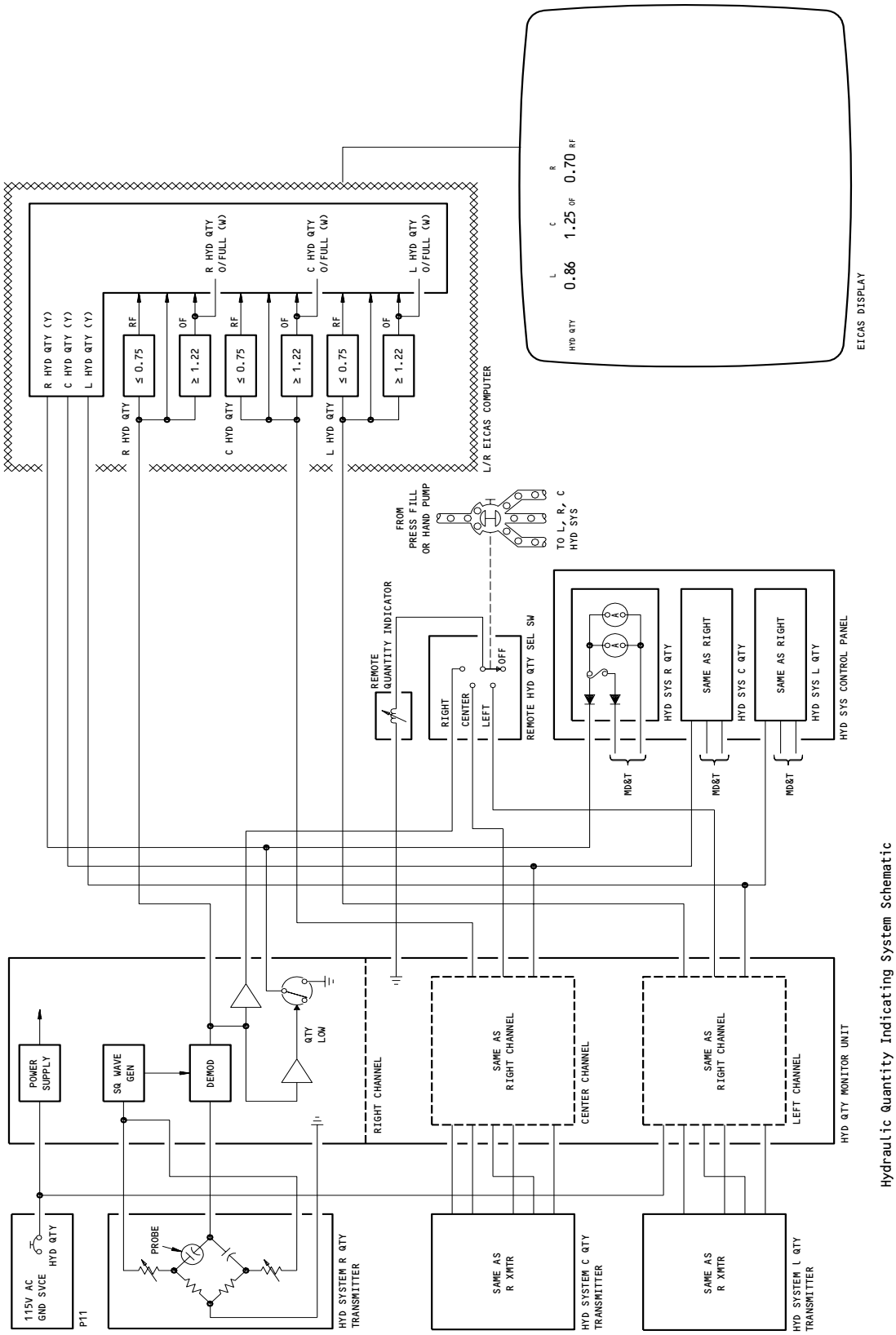
Quantity Transmitter and Monitor Unit Locations
Figure 2

D. Quantity Caution Lights
(1) A QTY (or RSVR) caution light for each hydraulic system is on the hydraulic control panel (Fig. 1). The QTY (or RSVR) caution light illuminates to indicate a low fluid level in the system reservoir.

E. Remote Quantity Indicator
(1) A quantity gage is located at the central ground servicing station. This gage shows the fluid quantity in the reservoir being serviced. For information on this quantity gage, refer to AMM 29-18-00/001.

F. Sight Glasses
(1) Two sight glasses are on each reservoir to visually check the fluid level. The upper glass checks for an abnormally high fluid level and the lower glass checks for an abnormally low fluid level.

3. Operation (Fig. 3)
A. Functional Description
(1) Quantity Reading.
(a) A change in the reservoir fluid level in each hydraulic system causes a change in the capacitance of the system quantity transmitter. The quantity monitor unit converts the change in capacitance into a voltage signal for each system to the EICAS computer. The computer causes a digital readout of the system quantity 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) Overfull Indication
(a) 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 O/FULL message is displayed on the EICAS maintenance page.
(3) Refill Indication
(a) 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) Low Fluid Level Indication
(a) The quantity monitor unit generates a low level signal at fluid levels equivalent to an EICAS readout of approximately 0.50 or below. This signal illuminates the system QTY (or RSVR) caution light on the hydraulic control panel. In addition, a (L, R, C) HYD QTY level C message is displayed on EICAS.
(5) For additional information on the EICAS, refer to 31-41-00/201



Hydraulic Quantity Indicating System Schematic
Figure 3

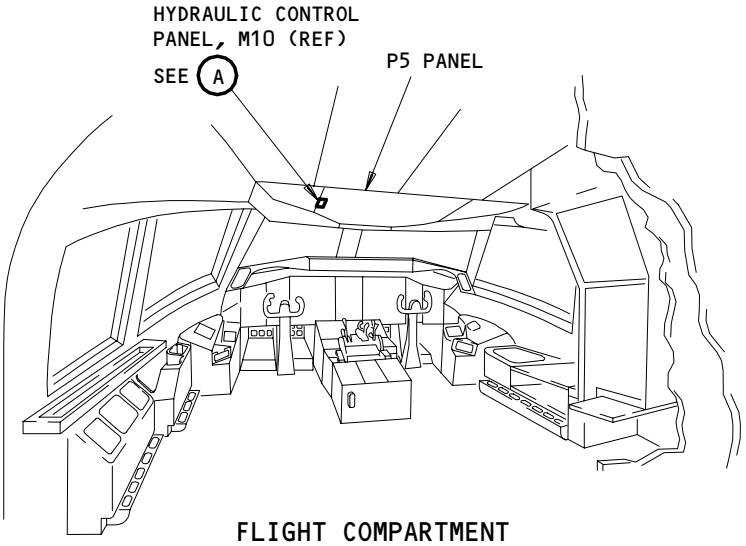
199216

HYDRAULIC FLUID QUANTITY INDICATING SYSTEM

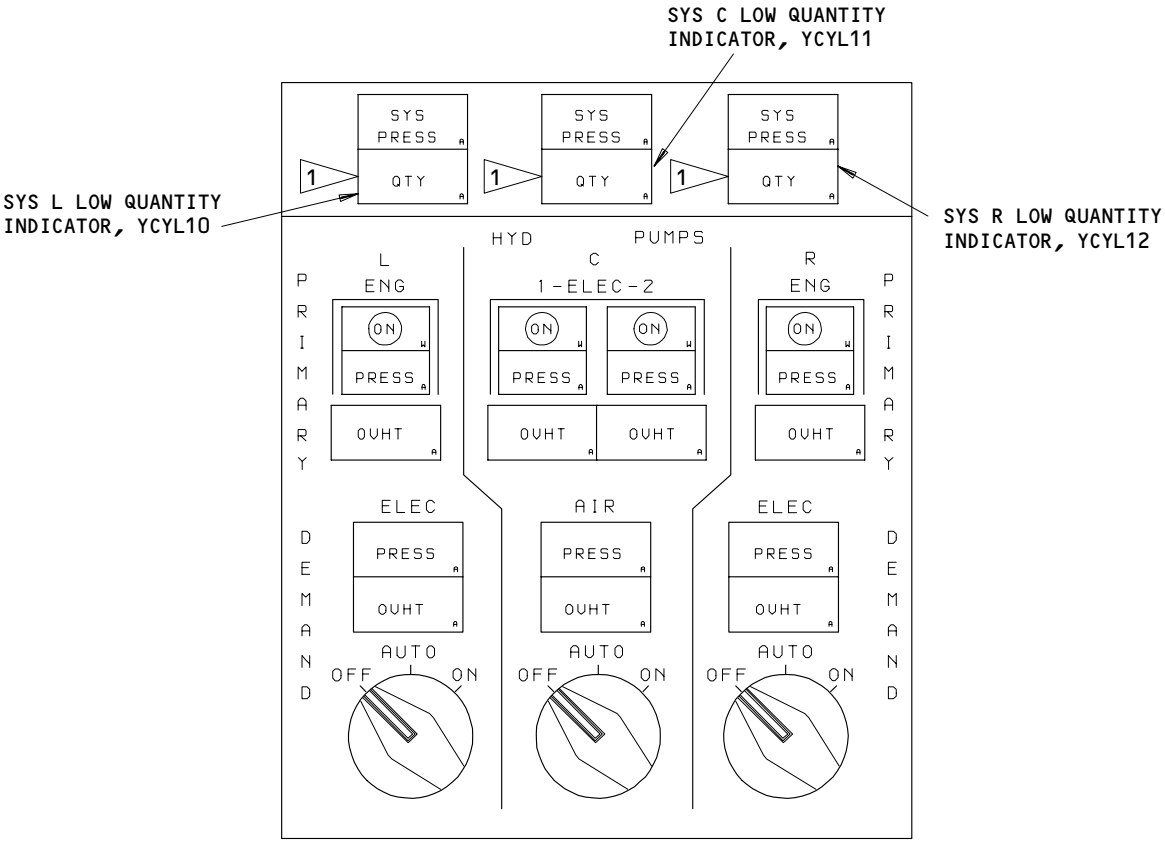
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKER		1	FLT COMPT, P11	
HYDRAULIC QTY, C1101		1	11L20	*
COMPUTER - EICAS L, M10181 (REF 31-41-00, FIG. 101)				
COMPUTER - EICAS R, M10182 (REF 31-41-000, FIG. 101)				
INDICATOR - RESERVOIR FILL, N29 (REF 29-18-00, FIG. 101)				
LIGHT - SYS C LOW QUANTITY INDICATOR, YCYL11	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS L LOW QUANTITY INDICATOR, YCYL10	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
LIGHT - SYS R LOW QUANTITY INDICATOR, YCYL12	1	1	FLT COMPT, P5, HYD CONT PNL, M10	*
PANEL - HYDRAULIC CONTROL M10 (REF 29-11-00, FIG. 101)				
RESERVOIR - SYS C HYDRAULIC (REF 29-11-00, FIG. 101)				
RESERVOIR - SYS L HYDRAULIC (REF 29-11-00, FIG. 101)				
RESERVOIR - SYS R HYDRAULIC (REF 29-11-00, FIG. 101)				
SIGHT GLASS - SYS C LOW LEVEL	3	1	RIGHT WHEEL WELL, SYS C HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - SYS C OVERFILL	3	1	RIGHT WHEEL WELL, SYS C HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - SYS L LOW LEVEL	2	1	437BL,437BR, LEFT ENGINE STRUT, SYS L HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - SYS L OVERFILL	2	1	437BL,437BR, LEFT ENGINE STRUT, SYS L HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - SYS R LOW LEVEL	2	1	447BL,447BR, RIGHT ENGINE STRUT, SYS R HYDRAULIC RESERVOIR	29-33-00
SIGHT GLASS - SYS R OVERFILL	2	1	447BL,447BR, RIGHT ENGINE STRUT, SYS R HYDRAULIC RESERVOIR	29-33-00
SWITCH - REMOTE HYDRAULIC QUANTITY SELECT, S341 (REF 29-18-00, FIG. 101)				
TRANSMITTER - SYS C HYDRAULIC FLUID QUANTITY, M339	3	1	RIGHT WHEEL WELL, SYS C HYDRAULIC RESERVOIR	29-33-02
TRANSMITTER - SYS L HYDRAULIC FLUID QUANTITY, M338	2	1	437BL,437BR, LEFT ENGINE STRUT, SYS L HYDRAULIC RESERVOIR	29-33-02
TRANSMITTER - SYS R HYDRAULIC FLUID QUANTITY, M340	2	1	447BL,447BR, RIGHT ENGINE STRUT, SYS R HYDRAULIC RESERVOIR	29-33-02
UNIT - EICAS LOWER DISPLAY N10014 (REF 31-41-00, FIG. 101)				
UNIT - HYDRAULIC FLUID QUANTITY MONITOR, M122	4	1	119AL, MAIN EQUIP CTR, E2-4	29-33-01

* SEE WM EQUIPMENT LIST

Component Index
Figure 101



FLIGHT COMPARTMENT

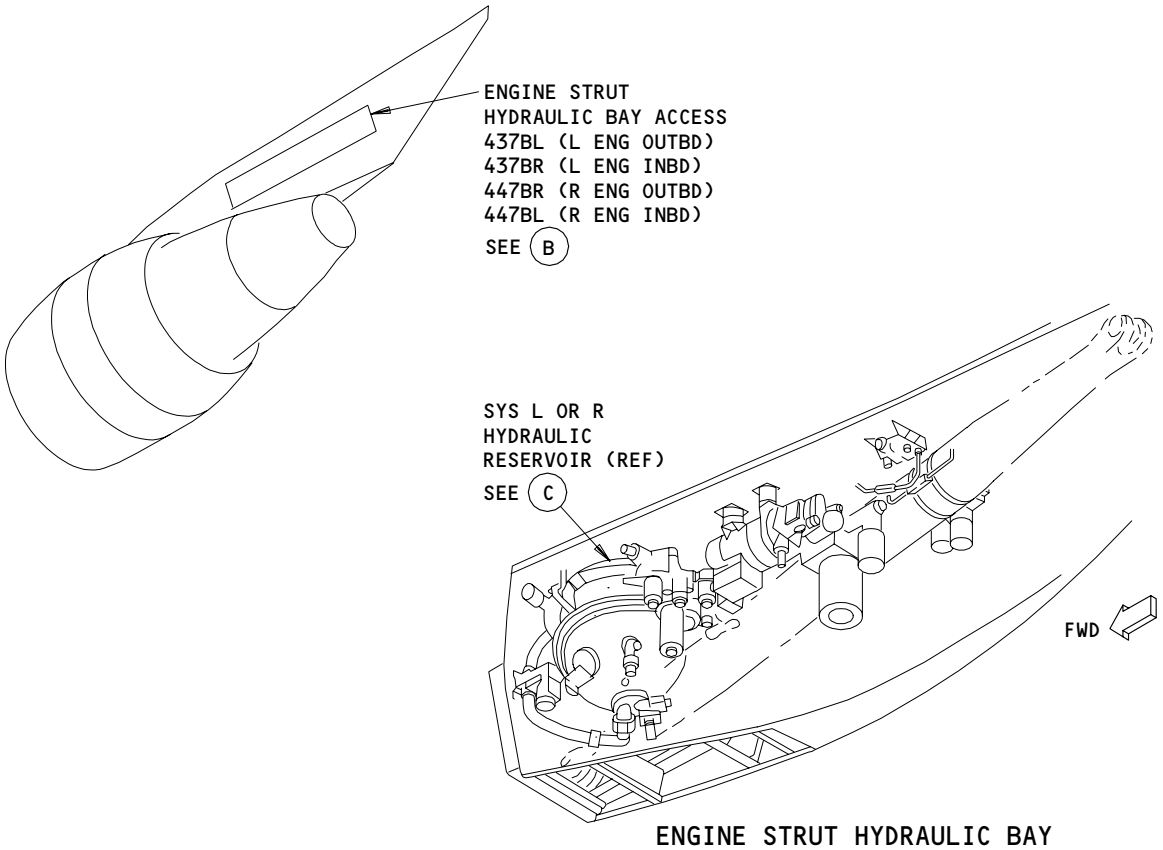


HYDRAULIC CONTROL PANEL, M10 (REF)

A

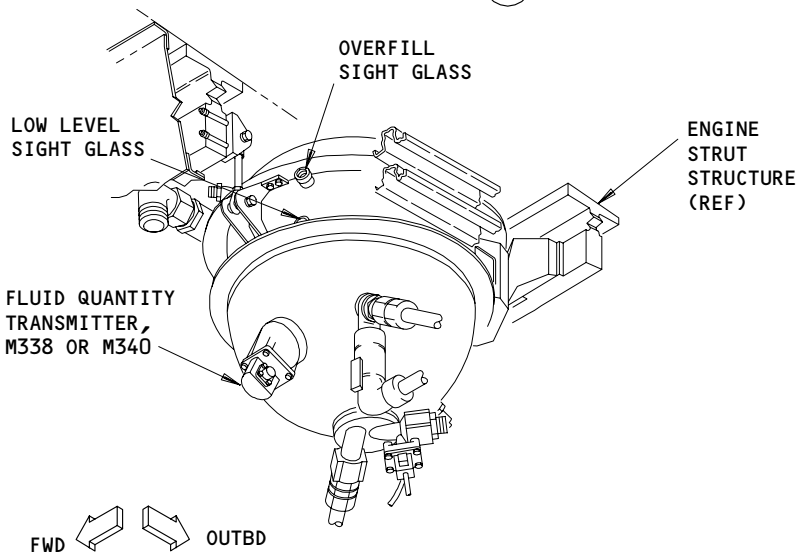
1 THE LABEL "RSVR" IS OPTIONAL TO "QTY"

Component Location
Figure 102 (Sheet 1)



ENGINE STRUT HYDRAULIC BAY

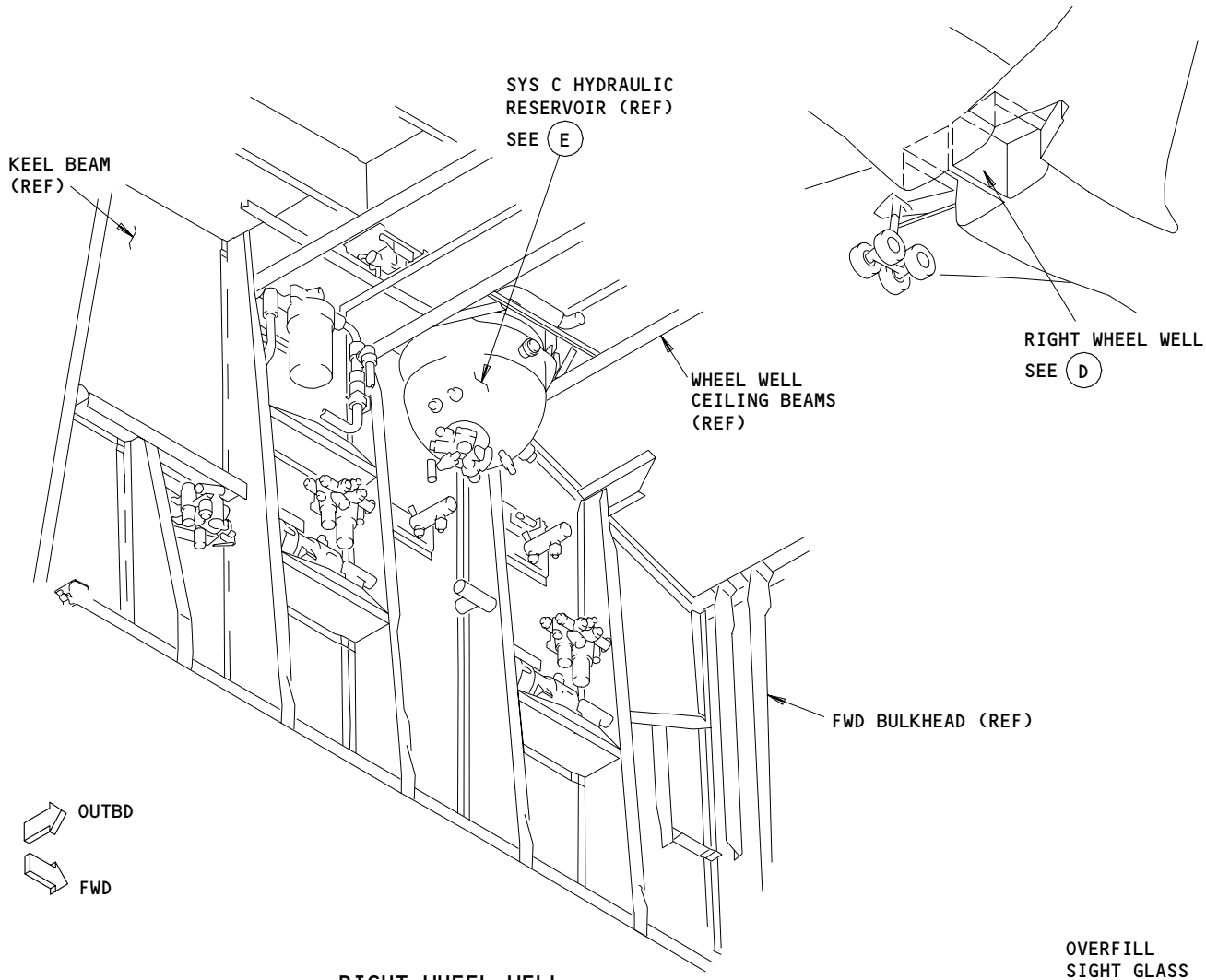
B



L OR R SYS HYDRAULIC RESERVOIR (REF)

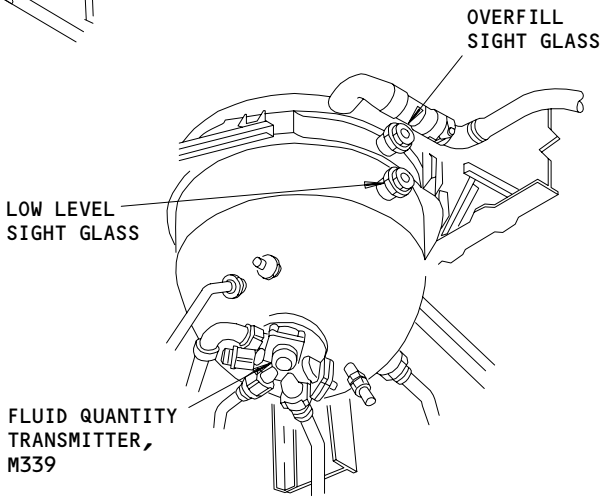
C

Component Location
Figure 102 (Sheet 2)



RIGHT WHEEL WELL

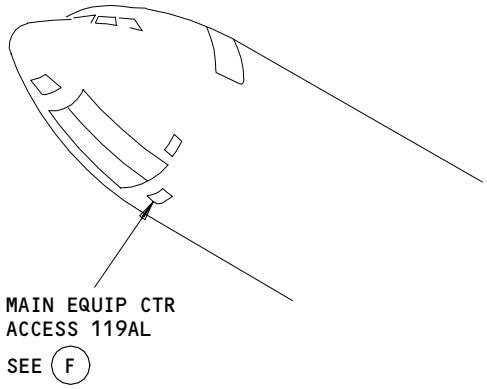
D

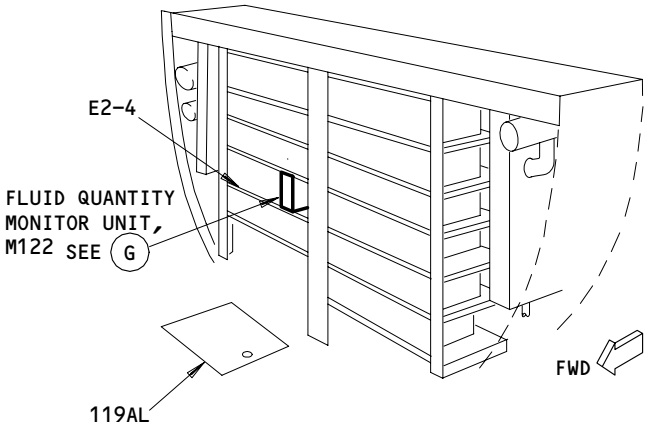


SYS C HYDRAULIC RESERVOIR (REF)

E

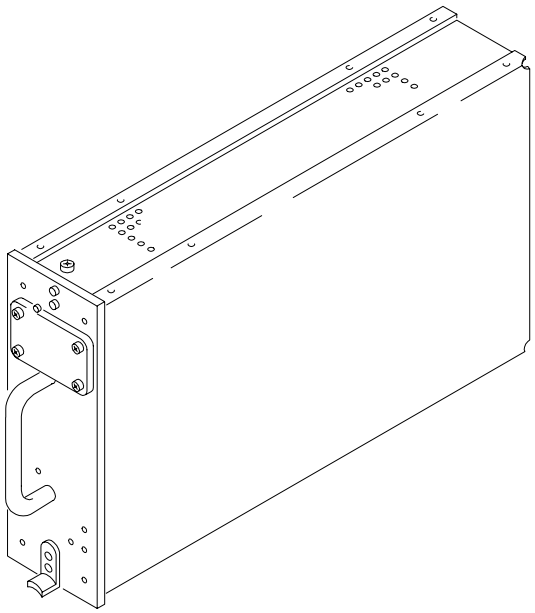
Component Location
Figure 102 (Sheet 3)





MAIN EQUIP CTR

F



HYDRAULIC FLUID QUANTITY
MONITOR UNIT, M122

G

Component Location
Figure 102 (Sheet 4)

HYDRAULIC FLUID QUANTITY INDICATING SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure contains two tasks. The first task is an operational test of the indicating system for the fluid quantity in the hydraulic reservoir. The second task is a system test of the indicating system for the fluid quantity in the hydraulic reservoir.

TASK 29-33-00-715-009

2. Operational Test - Hydraulic Fluid Quantity Indicating System
   A. General
      (1) This procedure does a fast check of the quantity indicating system. This procedure uses the sight glasses on the reservoir to do a check of the fluid level. The procedure compares this fluid level to the indication on the flight deck displays and the quantity gage on the service panels.
   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 24-22-00/201, Electrical Power - Control
      (4) AMM 32-00-15/201, Landing Gear Door Locks
      (5) AMM 32-00-20/201, Landing Gear Downlocks
      (6) AMM 78-31-00/201, Thrust Reverser System
   C. Access
      (1) Location Zones

144	Right MLG Wheel Well
198	Wing to Body - Aft Lower Half
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

198CR	Hydraulic Service Center
437BL	Hydraulic System
447BR	Hydraulic System

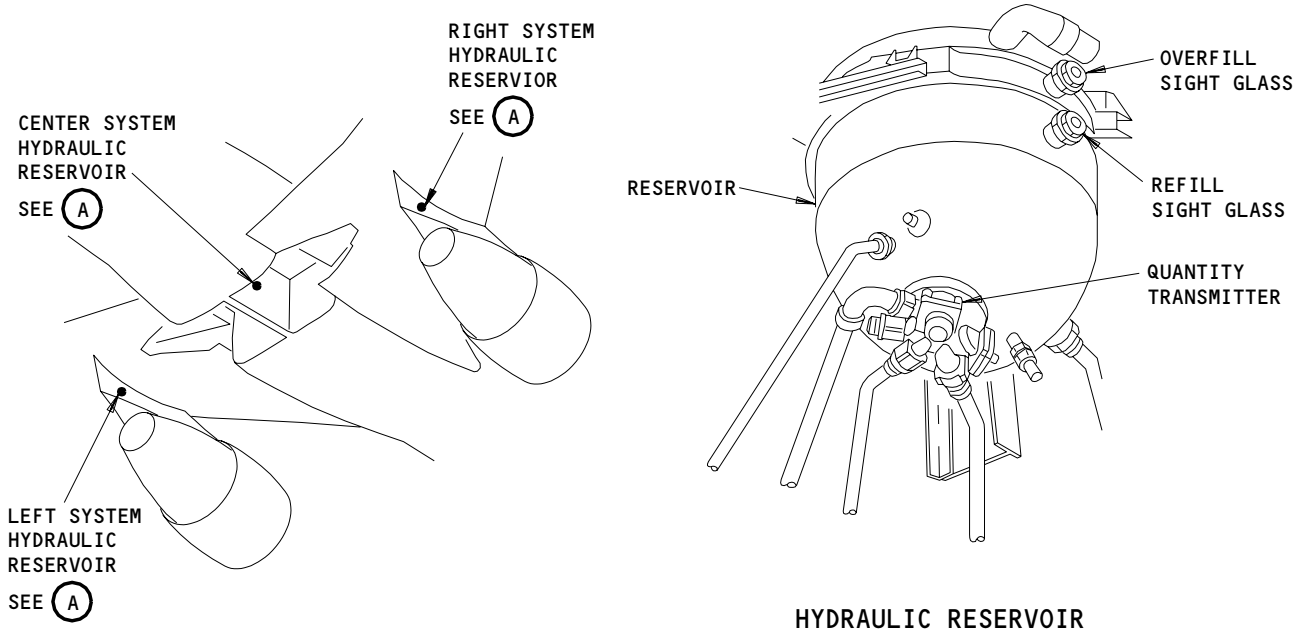
   D. Prepare for Operational Test

      S 865-010
      (1) Supply electrical power (AMM 24-22-00/201).

S 865-001

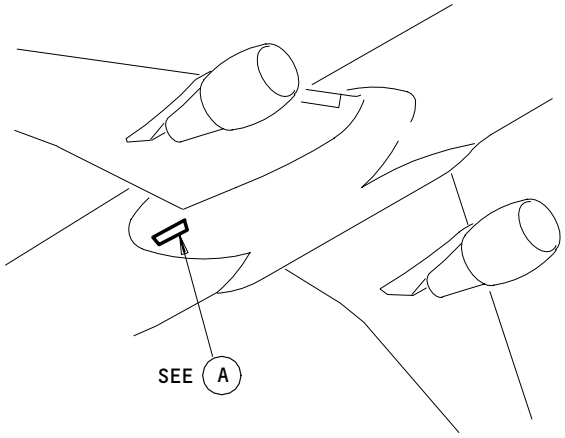
WARNING: DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

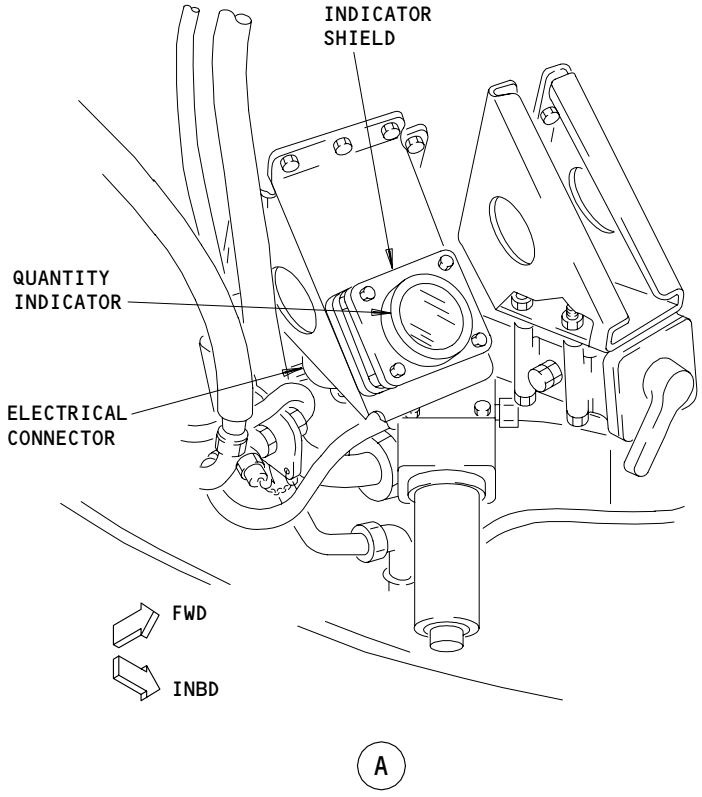
(2) Do this procedure: Thrust Reverser Deactivation for Ground Maintenance (AMM 78-31-00/201).



Sight Glasses for the Hydraulic Reservoir
Figure 501

146362





Reservoir Quantity Indicator
Figure 502

S 015-011
(3) For the left system, open the hydraulic system access panel, 437BL (AMM 06-43-00/201).

S 015-012
(4) For the right system, open the hydraulic system access panel, 447BR (AMM 06-43-00/201).

S 495-002
(5) For the center system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 015-003

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) For the center system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 015-013
(7) Open the hydraulic service center door, 198CR (AMM 06-41-00/201).

S 865-014
(8) Make sure these circuit breakers on the overhead panel, P11, are closed:
(a) 11L20, HYDRAULIC QTY

E. Do the Hydraulic Fluid Quantity Indicating System Operational Test.

S 865-015
(1) Push the ELEC/HYD switch on the EICAS maintenance panel.

S 865-016
(2) Move the fill selector valve to the position for the hydraulic system (L, R, or C) on which you do the test.

S 215-017
(3) Make sure you can see the fluid level in the reservoir at the refill sight glass. Make sure you can not see the fluid level at the overfill sight glass.

S 225-018
(4) Make sure the HYD QTY (L, R, or C) indication on the flight deck display is between 0.65 and 1.24.

S 225-020
(5) Make sure the indication on the hydraulic quantity indicator on the service panel is between 0.65 and 1.20.

S 865-023
(6) Move the fill selector valve to the OFF position.

F. Put the Airplane back to Its Initial Condition.

S 415-024
(1) Close the hydraulic service center door, 198CR (AMM 06-41-00/201).

S 415-025
(2) For the right system, close the hydraulic system access panel, 447BR (AMM 06-43-00/201).

S 415-026
(3) For the left system, close the hydraulic system access door, 437BL (AMM 06-43-00/201).

S 025-099

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO REMOVE THE DOOR LOCKS. THE DOORS CAN OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(4) For the center system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 865-027

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

S 865-030

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

TASK 29-33-00-735-031

3. System Test - Hydraulic Fluid Quantity Indicating System

A. General

(1) This procedure does a full test of the quantity indicating system. You can not adjust the components while they are installed in the airplane.

B. Equipment

(1) Hydraulic Service Cart - commercially available, with hydraulic fluid, fire-resistant, BMS 3-11

C. Consumable Materials

(1) D00153 Hydraulic Fluid - BMS 3-11

D. References

(1) AMM 06-43-00/201, Engine and Nacelle Strut Access Doors and Panels
(2) AMM 12-12-01/301, Hydraulic Servicing
(3) AMM 24-22-00/201, Electrical Power - Control
(4) AMM 32-00-15/201, Landing Gear Door Locks
(5) AMM 32-09-02/201, Air/Ground Relays
(6) AMM 78-31-00/201, Thrust Reverser System

E. Access

(1) Location Zones

144	Right MLG Wheel Well
198	Wing to Body - Aft Lower Half
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

198CR	Hydraulic Service Center
437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

F. Prepare for System Test

S 865-032
(1) Supply electrical power (AMM 24-22-00/201).

S 865-005

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

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

S 015-033
(3) For the left system, open the hydraulic system access panels, 437BL and 437BR (AMM 06-43-00/201).

S 015-034
(4) For the right system, open the hydraulic system access panels, 447BL and 447BR (AMM 06-43-00/201).

S 495-006
(5) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 415-007

WARNING: USE THE PROCEDURE IN (AMM 32-00-15/201) TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

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

S 865-035
(7) Make sure this circuit breakers on the overhead panel, P11, is closed:
(a) 11L20, HYDRAULIC QTY

S 015-038
(8) Open the hydraulic service center door, 198CR (AMM 06-41-00/201).

S 015-039
(9) Remove the cap from the pressure fill connection.

S 495-040
(10) Connect the hydraulic service cart to the pressure fill connection (AMM 12-12-01/301).

S 865-041
(11) Push the ELEC/HYD switch on the EICAS maintenance panel.

G. Do the Hydraulic Fluid Quantity Indicating System Test

S 865-064
(1) Move the fill selector valve to the position for the hydraulic system (L, R, or C) on which you do the test.

S 215-102
(2) Make sure the QTY light on the hydraulic control panel is on.

S 225-067
(3) Do these steps until the HYD QTY (L, C, or R) indication on the EICAS display shows, 0.00 to 0.30 RF.
(a) Open the drain valve and drain all fluid from the reservoir.
(b) Monitor the HYD QTY (L, C, or R) indication on the EICAS display.
(c) Close the drain valve, but do not install lockwire on the valve.

S 615-103
(4) Add hydraulic fluid with the hydraulic service cart until the QTY light on the hydraulic control panel goes off.

S 225-070
(5) Make sure the flight deck display shows HYD QTY L, R, or C 0.40 to 0.57 RF. Make sure the L, R or C HYD QTY message is not shown.

S 225-071
(6) Make sure the hydraulic quantity indicator on the service panel shows between 0.45 and 0.55.

S 615-072
(7) Add hydraulic fluid with the service cart until you can see the fluid level at approximately the center of the refill sight glass on the reservoir.

S 225-073
(8) Make sure the flight deck display shows HYD QTY (L, R, or C) 0.65 to 0.87. Make sure an RF message is adjacent to the HYD QTY indication when the indication is between 0.00 and 0.75.

NOTE: An RF message will show adjacent to the HYD QTY indication between 0.00 and 0.75 for each hydraulic system.

S 225-075
(9) Make sure the hydraulic quantity indicator on the service panel is between 0.65 and 0.90.

S 615-077
(10) For the left or right system, add hydraulic fluid with the service cart until the flight deck display shows HYD QTY L or R 1.22 to 1.28 OF.

NOTE: An OF message will show adjacent to the HYD QTY indication of 1.22 or more for each hydraulic system.

S 615-078
(11) For the center system, add hydraulic fluid with the service cart until the EICAS maintenance display shows HYD QTY C 1.22 to 1.35 OF.

S 215-079
(12) Make sure the EICAS ECS/MSG display shows (L, R, C) HYD QTY 0/FULL.

S 615-080
(13) Add or drain hydraulic fluid until you can see the fluid level is at approximately the center of the overfill sight glass on the reservoir.

S 225-082
(14) Make sure the flight deck display shows HYD QTY (L, R, or C) 1.02 to 1.24.

S 685-084
(15) Drain fluid from the reservoir until the hydraulic quantity indicator on the service panel is at the F (full) mark.

S 225-085
(16) Make sure the display shows HYD QTY L, R, or C 0.90 to 1.10.

H. Put the Airplane Back to Its Initial Condition.

S 865-086
(1) Make sure the reservoir drain valve is closed and safety the valve with wire.

S 095-087
(2) Disconnect the hydraulic service cart and install the cap on the pressure fill fitting (AMM 12-12-01/301).

S 865-088
(3) Put the fill selector valve to the OFF position.

S 415-089
(4) Close the hydraulic service center door, 198CR (AMM 06-41-00/201).

S 415-090
(5) For the right system, close the hydraulic system access panels, 447BL and 447BR (AMM 06-43-00/201).

S 415-091
(6) For the left system, close the hydraulic system access panels, 437BL and 437BR (AMM 06-43-00/201).

S 415-008

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

S 865-092

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

S 865-095

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

HYDRAULIC FLUID QUANTITY MONITOR UNIT - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the quantity monitor unit for the hydraulic fluid. The second task installs the quantity monitor unit for the hydraulic fluid.

TASK 29-33-01-004-001

2. Remove the Quantity Unit for the Hydraulic Fluid (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack Mounted Components
   B. Access
      (1) Location Zone
          120 Main Equipment Center (Right)

      (2) Access Panel
          119AL Main Equipment Center

   C. Procedure

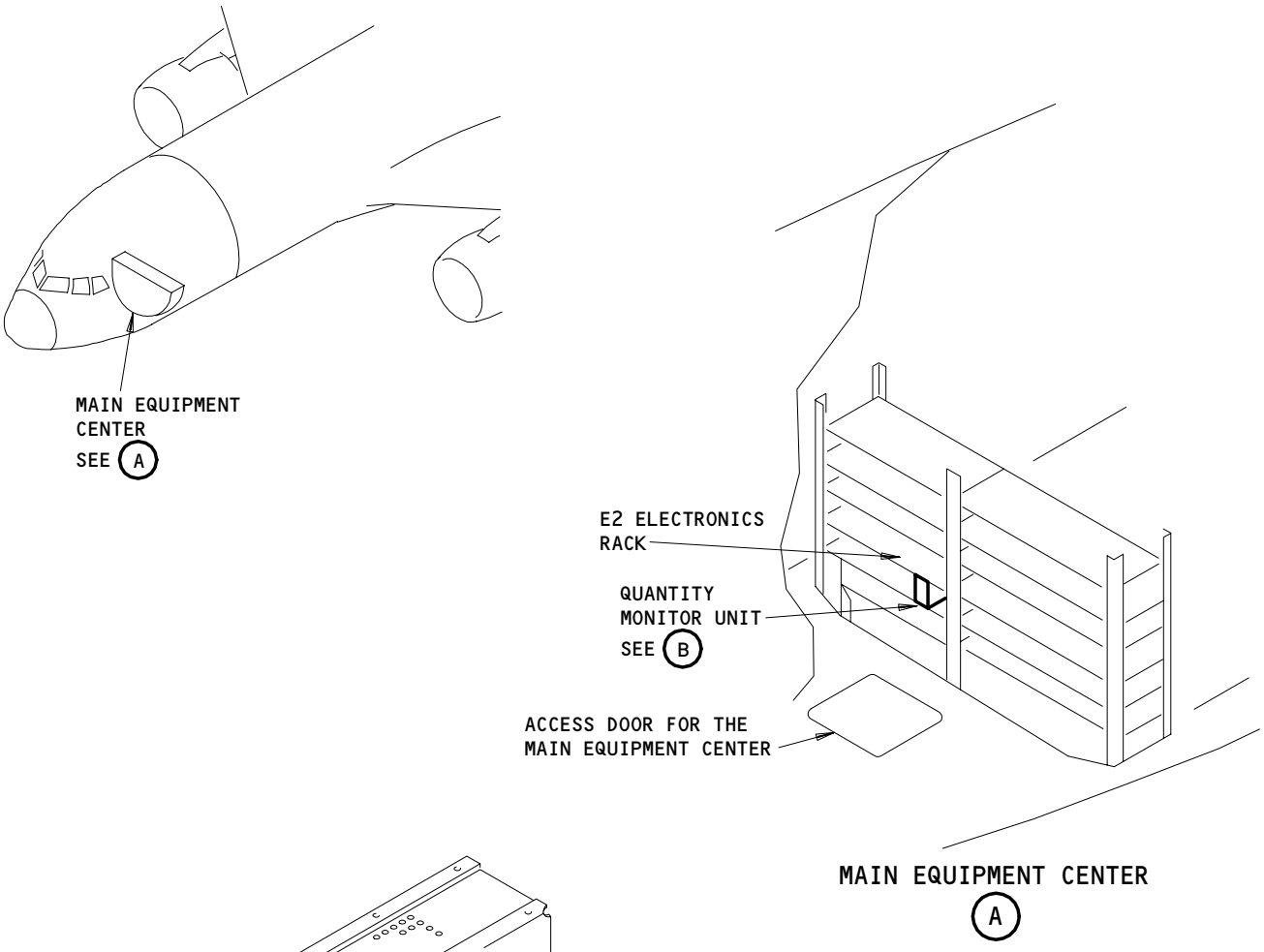
      S 864-002
      (1) Open this circuit breaker on the overhead panel, P11, and attach a DO-NOT-CLOSE tag:
          (a) 11L20, HYDRAULIC QTY

      S 014-003
      (2) Open the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

      S 024-004
      (3) Remove the quantity monitor unit for the hydraulic fluid (AMM 20-10-01/401).

TASK 29-33-01-404-005

3. Install the Quantity Monitor Unit for the Hydraulic Fluid (Fig. 401)
   A. References
      (1) AMM 06-41-00/201, Fuselage Access Doors and Panels
      (2) AMM 20-10-01/401, E/E Rack Mounted Components
      (3) AMM 24-22-00/201, Electrical Power - Control



Quantity Monitor Unit Installation
Figure 401

B. Access

(1) Location Zone

120 Main Equipment Center (Right)

(2) Access Panel

119AL Main Equipment Center

C. Procedure

S 424-006

(1) Install the quantity monitor unit for the hydraulic fluid, on the shelf E2-4 (AMM 20-10-01/401).

S 864-007

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

S 864-008

(3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L20, HYDRAULIC QTY

S 864-009

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

S 214-010

(5) Make sure the L (C, R) HYD QTY indication on the display is approximately the same as the fluid in the reservoir.

S 214-011

(6) If the reserve brakes and steering system operated because of a low fluid level signal from the quantity monitor unit, do these steps to put the system back to its usual condition:
(a) Make sure the RESERVE BKS & STRG switch on the pilots' center instrument panel, P1, is auto position (condition) and put the RESERVE BRAKES & STRG switch on the side panel, P61, to the RESET/DISABLE position.
(b) Make sure the VALVE switch light comes on while the shutoff Make sure the VALVE switch light comes on while the shutoff valves for the isolated ACMP move.

(c) Make sure the VALVE switch light goes off when the shutoff valves for the isolated ACMP stop.
(d) Put the RESERVE BRAKES & STRG switch on the right side panel, P61, to the NORM position.
(e) Make sure the ISLN light on the P61 panel goes off.

S 414-012
(7) Close the access door, 119AL, for the main equipment center (AMM 06-41-00/201).

S 864-013
(8) Remove electrical power if it is not necessary (AMM 24-22-00/201).

HYDRAULIC FLUID QUANTITY TRANSMITTER - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks. The first task removes the transmitter for the hydraulic fluid quantity. The second task installs the transmitter for the hydraulic fluid quantity.

TASK 29-33-02-004-001

2. Remove the Transmitter for the Hydraulic Fluid Quantity (Fig. 401)
   A. References
      (1) AMM 06-43-00/201, Engine Nacelle 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
      (5) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

      (2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

   C. Prepare for Removal

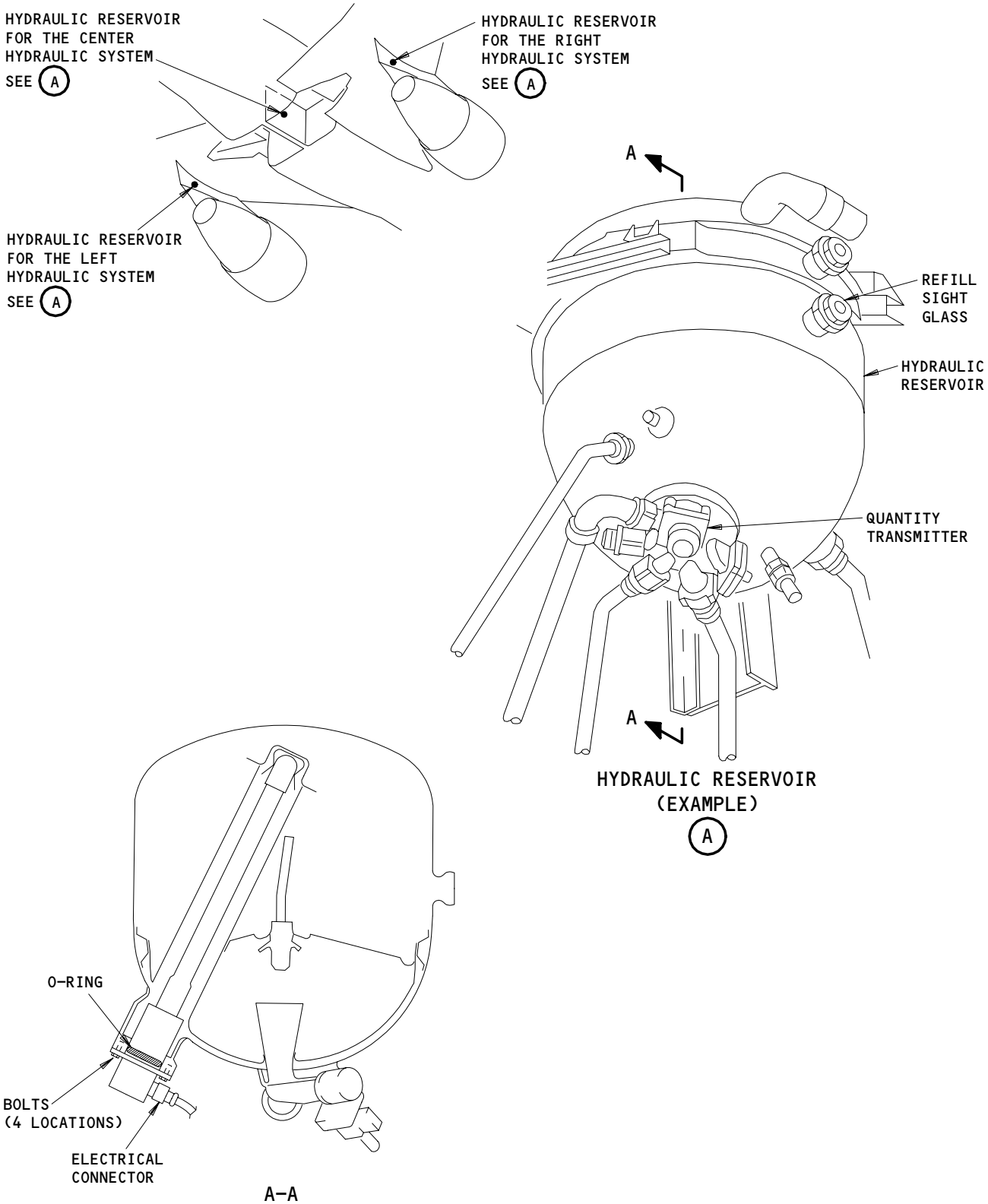
S 044-002

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

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

S 014-003

(2) Open the access panels, 437BL and 437BR, for the transmitter in the left hydraulic system (AMM 06-43-00/201).



Quantity Transmitter Installation
Figure 401

S 014-004
(3) Open the access panels, 447BL and 447BR, for the transmitter in the right hydraulic system (AMM 06-43-00/201).

S 024-047
(4) If necessary, remove the forward-most inboard nutplate stand fitting (IPC 54-53-02) to make it easier to remove the fluid transmitter.

NOTE: Set aside the hardware. You will need it when reinstalling the nutplate stand fitting.

S 494-005
(5) For the transmitter in the center hydraulic system, make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-20/201).

S 494-006

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(6) For the transmitter in the center hydraulic system, open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

S 864-007
(7) Open this circuit breaker on the overhead panel, P11, and attach DO-NOT-CLOSE tags:
(a) 11L20, HYDRAULIC QTY

S 864-008
(8) Remove the pressure from the main hydraulic systems and reservoirs (AMM 29-11-00/201).

S 684-009

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.

(9) Open the drain valve to drain the hydraulic reservoir.

D. Remove the Transmitter for the Hydraulic Fluid Quantity

S 034-010
(1) Disconnect the electrical connector from the transmitter.

S 024-011
(2) Remove the bolts from the transmitter.

S 024-012

CAUTION: BE CAREFUL WHEN YOU REMOVE THE TRANSMITTER TO PREVENT DAMAGE TO THE TRANSMITTER OR THE RESERVOIR.

(3) Remove the transmitter from the hydraulic reservoir.

S 034-013

(4) Remove the O-ring from the transmitter.

TASK 29-33-02-404-014

3. Install the Transmitter for the Hydraulic Fluid Quantity (Fig. 401)

A. Consumable Materials

(1) D00054 Hydraulic System Lubricant - MCS 352B

B. References

(1) AMM 06-43-00/201, Engine Nacelle Access Doors 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 System
(6) AMM 32-00-15/201, Landing Gear Door Locks
(7) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones

144	Right MLG Wheel Well
437/447	Aft Nacelle Strut Fairing

(2) Access Panels

437BL/437BR	Hydraulic System
447BL/447BR	Hydraulic System

D. Procedure

S 644-015

(1) Apply hydraulic system lubricant or hydraulic fluid to a new O-ring.

S 164-016

(2) Clean the mating surface on the reservoir.

S 424-017

CAUTION: BE CAREFUL WHEN YOU INSTALL THE TRANSMITTER TO PREVENT DAMAGE TO THE TRANSMITTER OR THE RESERVOIR.

(3) Put the transmitter into the opening in the reservoir.

S 424-018
(4) Install the bolts and washers to attach the transmitter to the reservoir.

S 434-019
(5) Tighten the bolts to 25-30 pound-inches.

S 434-020
(6) Safety the bolts with a lockwire.

S 434-021
(7) Connect the electrical connector to the transmitter.

S 864-022
(8) Close the drain valve on the hydraulic reservoir.

S 434-023
(9) Safety the drain valve with a lockwire.

S 424-048
(10) Install the nutplate stand fitting if it was removed in the fluid transmitter removal procedure.

S 864-024
(11) Supply electrical power (AMM 24-22-00/201).

S 864-025
(12) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel, P11:
(a) 11L20, HYDRAULIC QUANTITY

S 614-026
(13) Fill the hydraulic reservoir (AMM 12-12-01/301).

S 214-027

(14) Make sure the indicator for the hydraulic quantity, at the hydraulic service center, shows a change when you add fluid to the reservoir.

S 864-028

(15) Pressurize the hydraulic reservoir (AMM 29-11-00/201).

S 214-029

(16) Make sure there are no leaks at the hydraulic reservoir.

S 114-030

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

(17) Clean all hydraulic fluid from the installation area (AMM 12-25-01/301).

S 094-031

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) For the transmitter in the center hydraulic system, remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 414-032

(19) Close the access panels, 437BL and 437BR, for the transmitter in the left hydraulic system (AMM 06-43-00/201).

S 414-033

(20) Close the access panels, 447BL and 447BR, for the transmitter in the right hydraulic system (AMM 06-43-00/201).

S 444-034

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

S 214-038

(22) If the reserve brakes and steering system operated because of a low fluid level signal from the quantity transmitter, do these steps to put the system back to its usual condition:
   (a) Put the RESERVE BKS & STRG switch on the pilots' center instrument panel, P1, to the off position.
   (b) Make sure the VALVE switch light comes on while the shutoff valves for the isolated ACMP move.
   (c) Make sure the VALVE switch light goes off when the shutoff valves for the isolated ACMP stop.
   (d) Put the RESERVE BRAKES & STRG switch on the right side panel, P61, to the RESET/DISABLE position and then to the NORM position.
   (e) Make sure the ISLN light on the P61 panel goes off.

S 864-039

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