

**B757 MANUAL SUPPLEMENT - ATP 3510  
SECTION 1 CHAPTER 49  
CONTROL PAGE INITIAL ISSUE**

- A. File the attached Temporary Revision/Alerts in the Manual Supplement in ATA Chapter/Section/Subject/Page sequence
- B. File this Control Page in front of the Chapter TRs/Alerts.
- C. The following list shows active TRs/Alerts together with TRs/Alerts added by this control page.

Chapter Section Subject	Page	TR/Alert No.
49-CONTENTS	13/14	* BA 49-528
49-94-03	201	* BA 49-529
49-94-04	201	* BA 49-530

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

\* Indicates TRs/Alerts issued with this control page

**ATP  
TEMPORARY  
REVISION**

**AIRPLANE**

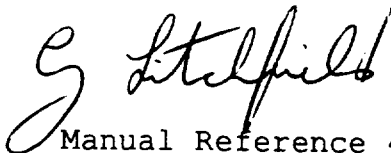
NB322

TR Page 1 of 1  
5 December, 1997

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 49-528

THIS TEMPORARY REVISION IS ISSUED BY BRITISH AIRWAYS ENGINEERING (TECHNICAL INFORMATION SERVICES, G2, TBA, S401, P. O. BOX 10, HEATHROW AIRPORT, HOUNSLOW, MIDDLESEX TW6 2JA) AND COMPLIES WITH BCAR'S CHAPTER A5-3, B5-3 AND/OR TSS No. 0-2 AS REQUIRED. CAA DESIGN APPROVAL No. DAI/8566/78.



For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 49-CONTENTS Page 13/14

REASON FOR REVISION

To advise commonality of BA fleet.

ACTION

Post Mod EOC-757-049G278

SWITCH - LOW OIL LEVEL 49-94-03  
is not applicable to airplane 002

TRANSMITTER - OIL QUANTITY 49-94-04  
is applicable to airplane 002

Originator: M.HANIM  
Reference: EOC-757-049G278  
Workbook: 49-165

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**ATP  
TEMPORARY  
REVISION**

**AIRPLANE**

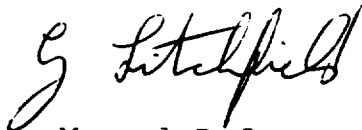
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TR Page 1 of 1  
5 December, 1997

757 MAINTENANCE MANUAL

TEMPORARY REVISION No. 49-529

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For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 49-94-03 Page 201

REASON FOR REVISION

To advise commonality of BA fleet.

ACTION

Post Mod EOC-757-049G278

LOW OIL LEVEL SWITCH - MAINTENANCE PRACTICES  
is not applicable to airplane 002

Originator: M.HANIM  
Reference: EOC-757-049G278  
Workbook: 49-165

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TEMPORARY REVISION No. 49-530

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For CHIEF ENGINEER QUALITY AND TRAINING

Manual Reference 49-94-04 Page 201

REASON FOR REVISION

To advise commonality of BA fleet.

ACTION

Post Mod EOC-757-049G278

OIL QUANTITY TRANSMITTER - MAINTENANCE PRACTICES  
is applicable to airplane 002

Originator: M.HANIM  
Reference: EOC-757-049G278  
Workbook: 49-165

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8	MAY 28/07	GUI	225	JAN 28/05	01	433	SEP 28/03	09
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[*] APU WITH THE OIL QUANTITY TRANSMITTER			

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AUXILIARY POWER UNIT - DESCRIPTION AND OPERATION

1. General

A. Auxiliary Power Unit - APU (Fig. 1)

- (1) The auxiliary power unit is a gas turbine engine with one shaft, located in section 48, in the rear of the airplane. The unit provides electrical and pneumatic power for in-flight and ground operations.
- (2) The APU provides electrical power to the airplane by an oil cooled generator. The APU provides pneumatic power by an engine-driven load compressor. The supply of APU electrical power is given priority over APU pneumatic power.
- (3) The APU control panel on the overhead panel P5 contains the APU start/shutdown (master control) switch and some APU indicators. Other APU indication is displayed on the Engine Indication and Crew Alerting System (EICAS) panel (P2). The aft control panel P8 of the pilot contains the APU fire handle and the bottle discharge light. The APU control panel P62, on the nose landing gear, contains an APU shutdown switch and a discharge switch for the fire bottle. The E6 rack of the the aft equipment center holds the APU control unit, battery, and battery charger.

2. Component Details

A. Auxiliary Power Unit

- (1) The auxiliary power unit is a constant speed unit that provides electrical and pneumatic power during airplane ground and in-flight operations. The engine runs at one of two speeds, depending upon airplane system demands (Fig. 2). The APU consists of a gas turbine engine with one shaft, a variable-output load compressor, an ac electrical generator driven by the accessory drive gearbox, and controls for safe, automatic, and continuous operation. The ac generator supplies electrical power to the airplane electrical systems (AMM 24-20-00/001). The APU also provides bleed air to the airplane pneumatic systems (AMM 36-11-00/501).
- (2) Two APU access doors are located directly below the APU. The APU is attached to the air intake plenum by three support and vibration isolator mounts. The mounts support the APU vertically, horizontally and axially.
- (3) The APU air intake system provides air to the engine, cooling fan and load compressor through a door located on the right side of the fuselage between the horizontal and vertical stabilizers. Ducting leads aft to the APU. The door is opened by an electrical actuator during APU starting and is closed when the APU is shutdown.
- (4) The APU engine consists of three independent, adjoining modules: power section, load compressor, and gearbox. The power section contains a 2-stage centrifugal compressor, an annular combustor, and a 3-stage axial turbine. The main power shaft drives the load compressor, ac generator, and accessory gearbox.

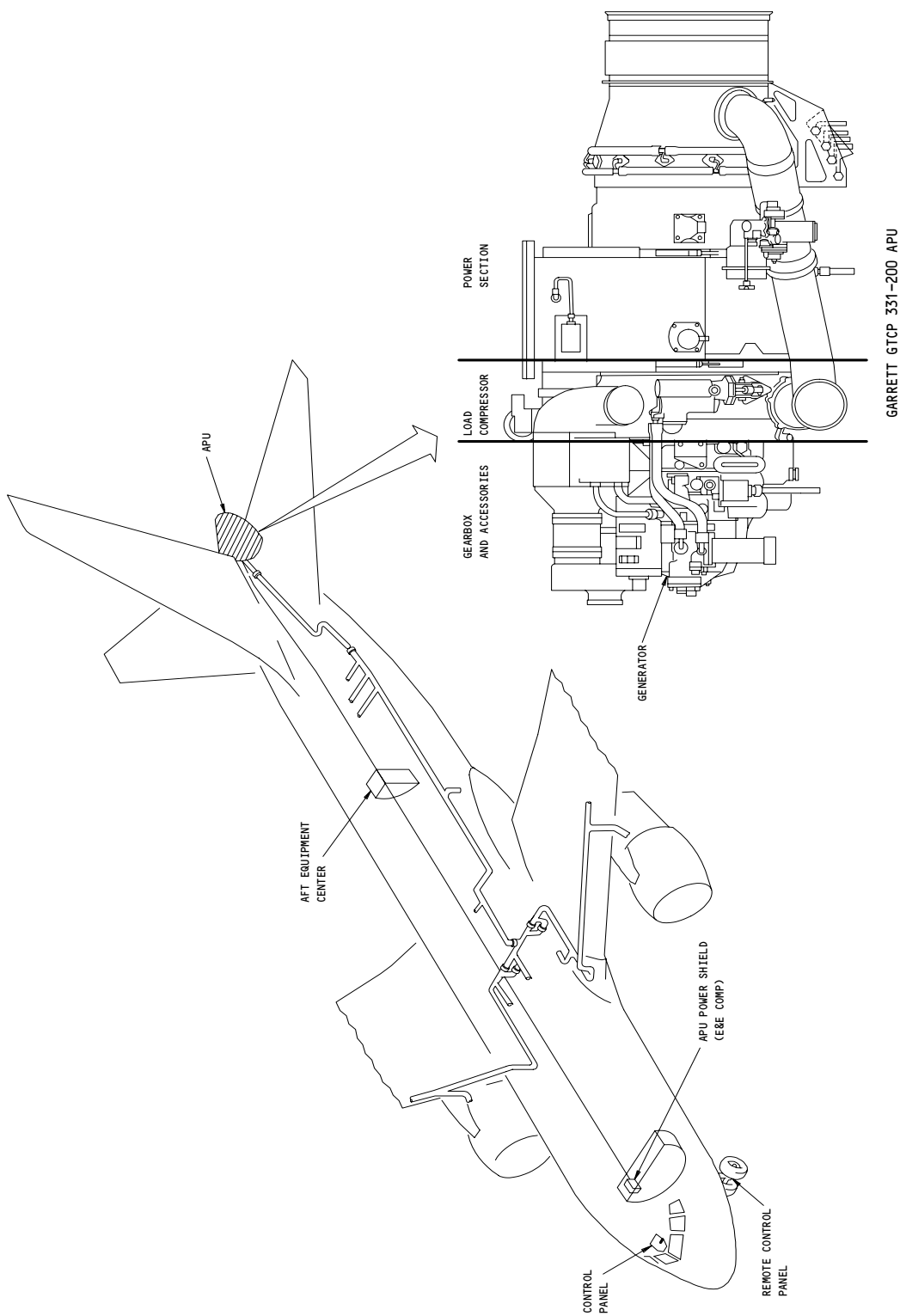
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Auxiliary Power Unit Location  
Figure 1

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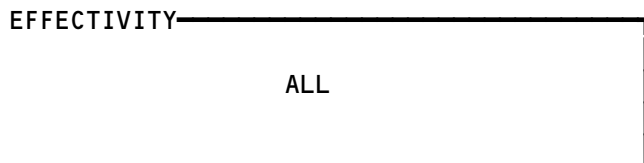
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PNEUMATIC DEMAND MODE	SPEED (RPM)	ELECTRICAL POWER (KVA)	BLEED AIR (lb/min)	BLEED AIR PRESSURE (PSIG AT SEA LEVEL)	AMBIENT TEMPERATURE (°F)/(°C)
IDLE	39,850	90	0	0	59/15
DUCT PRESSURIZATION	39,850	90	VARIABLE	33	59/15
ENVIRONMENTAL CONTROL SYSTEM (ECS)(2 PACKS)	39,850	52	180	18	59/15
MAIN ENGINE START (MES)	40,400	60	250	35	59/15
INFLIGHT (INFLT)	40,400	VARIABLE	VARIABLE	VARIABLE	59/15

**NOTE:** THE DATA IN THIS TABLE IS FOR NEW APUs. THIS DATA CAN BE DIFFERENT FOR APUs THAT ARE IN SERVICE. DO NOT USE THE DATA IN THIS TABLE TO FIND IF AN APU OPERATES CORRECTLY.

APU RPM Specifications  
Figure 2



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- (5) The APU engine is lubricated by a wet sump system which is a closed and pressurized system that lubricates and cools the electrical generator and all bearings and gears in the engine. The oil is pressurized in the oil pump, routed through the oil cooler, filtered in the oil pump assembly, and distributed to the generator, gearbox and engine bearings. The oil indicating system of the APU monitors oil temperature, low oil pressure, and low oil level.
- (6) The engine fuel system of the APU provides pressurized metered fuel to the combustion chamber and pressurized fuel to the actuator for the inlet guide vanes. The fuel control unit filters, pumps, and meters fuel before it flows to the fuel flow divider and nozzles.
- (7) The APU ignition and starting system accelerates the APU engine and ignites the air-fuel mixture in the engine combustor. The APU control unit automatically de-energizes the starter motor and ignition circuits during the APU starting cycle.
- (8) The APU cooling air system provides forced air cooling for the APU engine compartment and APU lubricating oil. Cooling air is forced through the oil cooler while the rest exhausts into the APU engine compartment.
- (9) The bleed air system of the APU provides compressed air for airplane air conditioning and main engine start. The pneumatic supply of the APU load compressor is controlled by the position of the inlet guide vanes at the compressor inlet. The guide vane position is electronically controlled by the APU control unit based on airplane pneumatic demand. The surge bleed valve opens to relieve unwanted discharge pressure of the load compressor. The surge bleed air is discharged into the exhaust duct downstream of the turbine section. The total pressure transducer and differential pressure transducer transmit discharge pressures of the load compressor to the APU control unit. The APU control unit electronically controls the surge valve based on these pressures.
- (10) The APU controls consist of manual and automatic controls for starting, stopping, and maintaining the APU within safe limits of operation. Once the APU is commanded to start, further control of the unit is fully automatic. The APU can only be started from the overhead panel P5. Shutdown can be accomplished from either the overhead panel P11, the aft control panel P8 of the pilot, or the control panel P62.
- (11) The APU engine operation is indicated by the exhaust gas indicating system and tachometer system. The temperature indicating system of the APU exhaust gas and tachometer system provide EGT and RPM indication to the APU control unit and EICAS.
- (12) The exhaust duct system of the APU carries the APU exhaust out through the tail cone of the airplane. It provides a thermal barrier to shield the APU compartment from exhaust heat.

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B. APU Ground Safety Precautions

(1) General

- (a) Operating characteristics of the APU are such that potential injury to personnel and damage to property exists. Personnel must not only avoid the engine intake ducts, but also the exhaust and discharge ducts of the oil cooler where hot, high-velocity exhaust gases are discharged.
- (b) Following are some of the general safety items which shall be supplemented according to the needs of the job to prevent accidents.

(2) Air Inlet

- (a) All personnel must avoid areas on top and at rear of APU during ground running operations. When approaching any type of engine, precaution must be taken to keep clear of the intake air stream. The suction near the intake can pull in hats, glasses, loose clothing and wipe-rags from pockets. Any loose articles must be made secure or removed before working around the engine.

(3) Exhaust characteristics

(a) Velocity

- 1) With APU operating, a minimum clearance of approximately 40 feet to the rear of the airplane must be allowed to avoid injury to persons or damage to property.

(b) Temperature

- 1) High temperature will be found up to 40 feet from the exhaust nozzle depending on wind conditions. Occasionally when APU is started, excess fuel that has accumulated in the tailpipe ignites and long flames are blown out of the exhaust nozzle. Starts must not be attempted within range of flammable material or fumes.

(c) Toxicity

- 1) Tests have indicated that the carbon monoxide content is low but other gases are present which have a disagreeable odor and are irritating in effect. Exposure will usually cause watering or a burning sensation of the eyes. Less noticeable but important is the respiratory irritation which may be caused. For both these reasons exposure must be avoided, particularly in confined spaces or pockets where the concentration may build up.

(4) APU Cool Down

- (a) After APU operation, care must be taken to ensure that the exhaust and pneumatic ducting have cooled before any work is performed in this area. All other parts may usually be worked on without danger of burn.

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- (5) APU Noise
  - (a) The APU produces noise capable of causing temporary, as well as permanent, loss of hearing. Even short exposures to extreme noise may result in damage to the ears. All personnel must use some means of protection. Noise can effect the ear mechanism in such a way as to cause unsteadiness or inability to walk or stand without resting. The use of cup-type ear protection is recommended.
- (6) APU Ignition
  - (a) The APU ignition system contains high voltage components. The system is a hazardous, possibly fatal, source of electrical shock.
- (7) Fuels and Lubricating Oils
  - (a) All fuel and lubricating oils tend to dry the skin, care should be taken to avoid contact with these fluids.
  - (b) Do not operate APU unit within 50 feet of fuel vents. Explosions may result.
- (8) APU Location
  - (a) The distance from the APU to the ground is such that a fall from a workstand could be fatal. Aerostands or platforms must have adequate working space for freedom of movement, and must be equipped with protective railings.
- (9) APU Pneumatic Pressure
  - (a) Removal of any component installed in the pneumatic ducts forward of the shutoff valve for the APU bleed air near the APU firewall must be done with the APU shutdown. Ensure that the pneumatic system is depressurized to eliminate possible residual duct pressure.

### 3. Operation

#### A. Functional Description

- (1) APU fuel is pumped from the left main tank of the airplane. Electrical power for APU starter cranking, APU control circuit, and the actuator operation for the air intake door is 28 volts dc, supplied by the APU TRU. With a faulty APU TRU, a backup power source of 28 volts dc is supplied by the APU battery/charger. The main battery supplies airplane power of 28 volts dc.
- (2) The main battery switch on the P5 overhead panel must be ON for an APU start. The APU control switch on the P5 overhead panel is set to the START position, hold at the START position for one second and manually set to the ON position. The fuel shutoff valve for the APU opens and the APU FAULT light illuminates while in transit. If ac power is available, the ac boost pump of the left main tank is used. Otherwise, the dc fuel pump operates from the airplane main battery. The actuator for the air intake door is energized. When the intake door reaches the full open position, the APU control unit receives a ground start/on signal and energizes the start relay supplying 28-volt dc power to the starter motor.

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- (3) At 7% engine speed, the APU control unit energizes the ignition unit. For a more complete description of the controls (AMM 49-61-00/001). The fuel shutoff valve for the APU opens allowing fuel to flow to the combustor (AMM 49-31-00/001). With the igniter plug firing, the fuel ignites and the APU begins to accelerate to governed speed.
- (4) AIRPLANES WITH THE APU CONTROL UNIT -17 AND BEFORE;  
At 50% engine speed, the APU control unit de-energizes the starter motor for ground and in-flight starts.
- (5) AIRPLANES WITH THE APU CONTROL UNIT -18 AND SUBSEQUENT;  
At 42% engine speed, the APU control unit de-energizes the starter motor for ground starts. At 55% engine speed, the APU control unit de-energizes the starter motor for in-flight starts.
- (6) At 95% speed the control unit de-energizes the ignition unit. The heat of combustion sustains operation and the engine accelerates until 100% speed is reached. After 95% speed is reached, electrical and pneumatic loading is allowed. Electrical loading is always given priority over pneumatic loading when the exhaust temperature limit of the engine is reached.
- (7) APU normal shutdown is initiated by placing the master control switch of the APU from ON to OFF. If the APU was pneumatically loaded, a 60-second delay time occurs before actual shutdown. Shutdown occurs immediately if not loaded. Switching to OFF causes closure of the inlet guide vanes and initiation of the 60 second shutdown time delay. The shutdown time delay is also initiated by closure of the air supply valve. After completion of the 60 second delay, the APU control unit runs a self test of its overtemperature protection logic. A fault is stored in BITE memory if the test fails. Shutdown is accomplished by injecting a 109% test speed signal to the overspeed shutdown circuit for the primary hardware. This de-energizes the fuel solenoid valve. If after 20 seconds the APU speed is above 85%, the APU will shutdown using the protective shutdown (software).
- (8) For an APU shutdown below 95% speed the APU control unit initiates a normal overspeed shutdown immediately. If the exhaust gas temperature is above 400°F 10 seconds after the overspeed shutdown is initiated, the APU control unit initiates a redundant protective shutdown and stores a failure for overspeed protective shutdown. A breaker is tripped in the control unit requiring its replacement before restarting the APU. The redundant shutdown de-energizes or closes the same components as the normal overspeed shutdown and in addition de-energizes the torque-motor metering valve of the fuel control.

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- (9) A normal protective shutdown is initiated by a 107% overspeed or an overtemperature condition. The APU FAULT light on panel P5 is illuminated and the APU control unit stores the cause of the shutdown in its memory. A redundant protective shutdown is initiated by one of the following conditions: 109% overspeed, ultimate overtemperature, or a circuit failure for normal overspeed shutdown. The APU will also automatically shutdown at any time due to the following: reverse flow signaled by high inlet temperature of the load compressor, high oil temperature (above 305°F), low oil pressure (below 35 psi), delta pressure switch for the generator filter (above 35 psid), loss of EGT detection, loss of speed detection, fire emergency, air inlet door failed closed, loss of dc power, slow start, no acceleration, overspeed, overtemperature, and no flame.
- (a) When the APU control unit gets a signal for a protective shutdown, the shutdown occurs as follows: The APU shutdown occurs, the fuel shutoff valve for the APU closes, the air supply valve for the APU closes, and the APU generator circuit goes off.
- (b) You can do the APU shutdown for a fire emergency from the aft control stand P8 of the pilot or from the control panel P62 of the nose landing gear. When you pull the fire handle on the P8 panel (or push the shutdown switch on the P62 panel), the protective shutdown occurs. This also prepares the fire extinguisher to operate and stops the audible fire signal.
- (c) For more information on the protective shutdown, refer to the APU Control System - Description and Operation (AMM 49-61-00/001).

**B. BITE**

- (1) The APU control unit has a Built-In Test Equipment (BITE) capability which aids line maintenance in isolating faults. The control unit continuously monitors APU operation and stores any faults encountered. For more detailed information, see APU Control System (AMM 49-61-00/001).

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AUXILIARY POWER UNIT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
AUXILIARY POWER UNIT	--	1	316AR,315AL, APU COMPT	49-11-01

Auxiliary Power Unit - Component Index  
Figure 101

EFFECTIVITY  
 AIRPLANES WITH THE APU  
 CONTROL UNIT -18 AND BEFORE

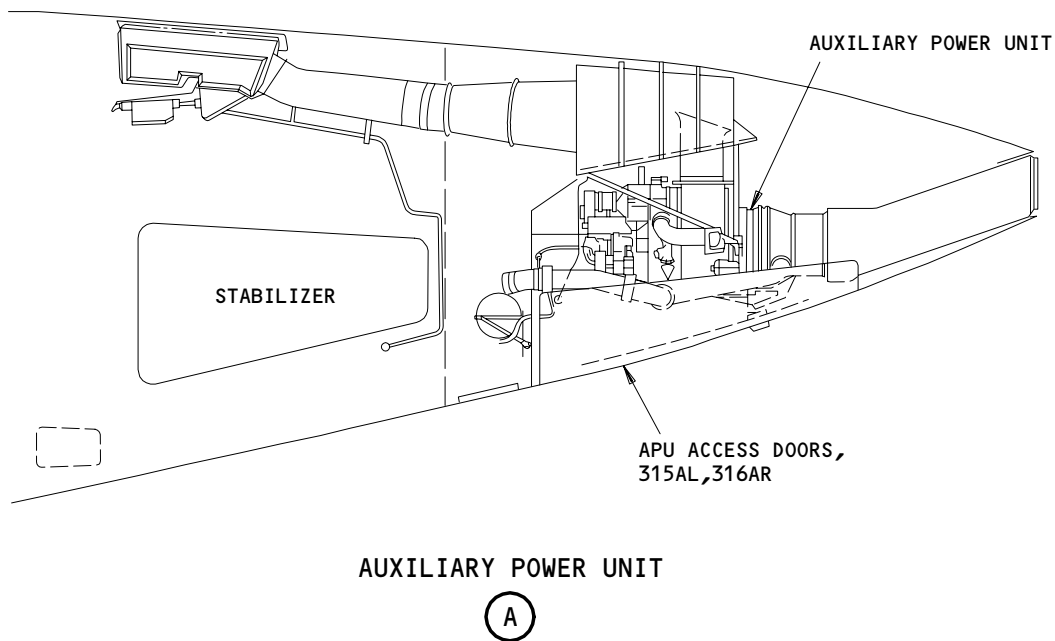
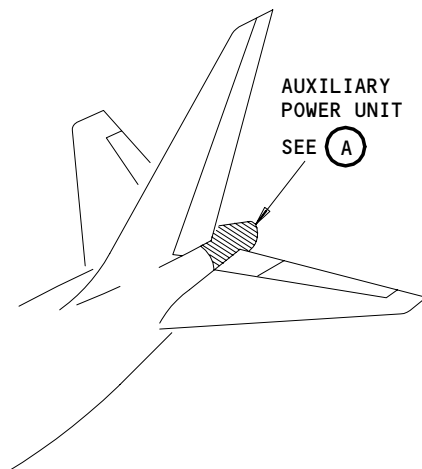
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Auxiliary Power Unit - Component Location  
Figure 102

EFFECTIVITY  
AIRPLANES WITH THE APU  
CONTROL UNIT -18 AND BEFORE

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AUXILIARY POWER UNIT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
AUXILIARY POWER UNIT	--	1	316AR,315AL, APU COMPT	49-11-01

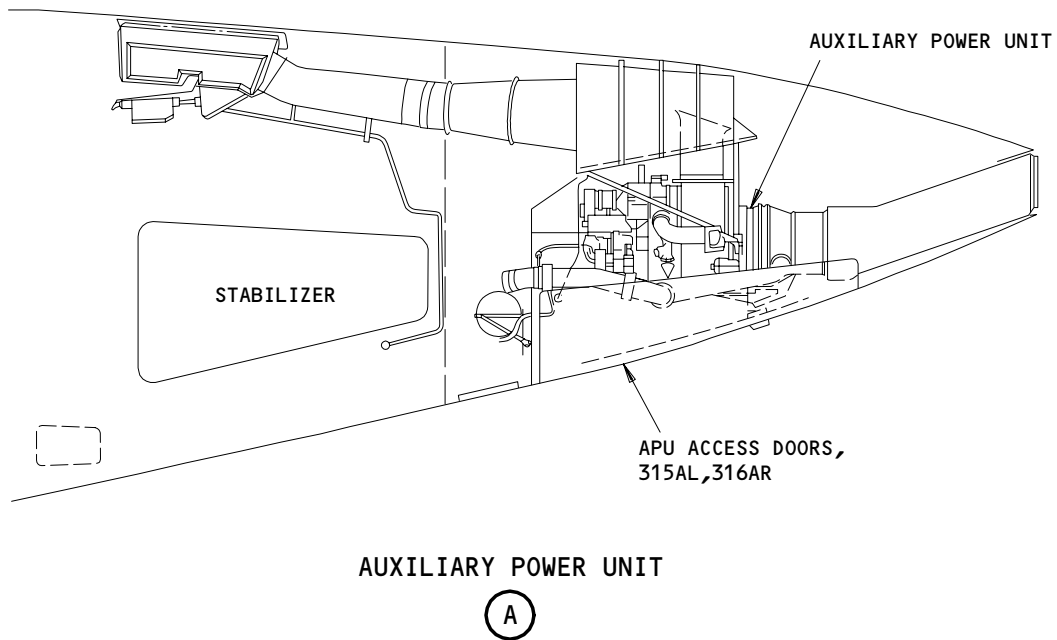
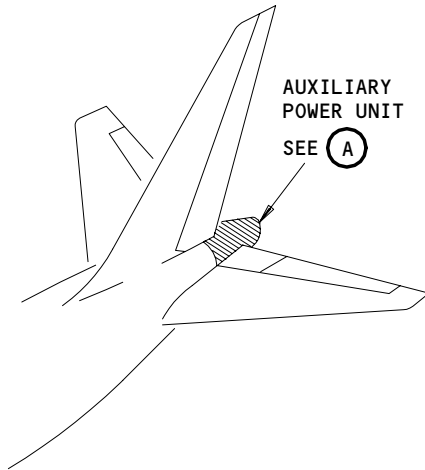
Auxiliary Power Unit - Component Index  
Figure 101

EFFECTIVITY  
 AIRPLANES WITH THE APU CONTROL  
 UNIT -19 AND SUBSEQUENT

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Auxiliary Power Unit - Component Location  
 Figure 102

EFFECTIVITY  
 AIRPLANES WITH THE APU CONTROL  
 UNIT -19 AND SUBSEQUENT

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AUXILIARY POWER UNIT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these ten tasks:
  - (1) APU Operation Limits
  - (2) APU Starting and Operation
  - (3) APU Shutdown Procedures
  - (4) Motor the APU
  - (5) APU Preservation (Less Than 45 Days)
  - (6) APU Depreservation (Less Than 45 Days)
  - (7) APU Preservation (45 to 180 Days)
  - (8) APU Depreservation (45 to 180 Days)
  - (9) APU Preservation (More Than 180 Days)
  - (10) APU Depreservation (More Than 180 Days).
- B. Use the APU Operation Limits when you operate or motor the APU. If the APU operation is not in the specified limits, you can cause damage to the APU.
- C. Use the APU starting and operation procedure to start and operate the APU.
- D. Use the APU Shutdown Procedures to do the shutdowns for the APU.
- E. The APU Motoring Procedure operates the APU without fuel and without the ignition system energized.
- F. The APU Preservation Procedures give protection to the APU when it is not used. The preservation can be done for up to 45 days, 45 to 180 days, or more than 180 days. The APU starting and operation and APU motoring procedures are used in the APU Preservation Procedures.
- G. The Depreservation Procedures put the APU back to a serviceable condition after it has been in storage.

TASK 49-11-00-802-001

2. APU Operation Limits

- A. General
  - (1) The APU operation limits and conditions are shown in the table that follows:

**NOTE:** The main fuel tank on the left side must have 650 pounds (295 kg) of fuel to operate the APU for one hour. 500 pounds (227 kg) of fuel is necessary for each hour the APU operates after the first hour.

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Operation Limits for the Auxiliary Power Unit  
Table 201

Condition	Operation Mode	Limit
Temperatures: Compressor Inlet	Any Operation Mode	54°C (130°F) maximum
Oil Temperature	Any Operation Mode Overtemperature Shutdown	135°C (275°F) maximum 152°C (305°F)
Fuel Temperature	Any Operation Mode	-54°C (-65°F) to 49°C (120°F)
Oil Consumption:	Any Operation Mode	Ref Fig. 201
Oil/Fuel Leakage:	Any Operation Mode	AMM 49-16-00/601
Air Leakage:	Any Operation Mode	Air leakage is permitted at the fuel nozzle. Air leakage is also permitted at the circumferential seal for the turbine heat shield if the air leakage is not pointed at the ignition unit. Air leakage at the circumferential seal, pointed at the ignition unit, is permitted if SB GTC331-49-7119 is incorporated. SB GTC331-49-7119 replaces the ignition exciter insulator to protect the ignition exciter from damage. Air pressure from the heat shield can cause high airflow out of the drain mast during usual operation.

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Operation Limits for the Auxiliary Power Unit Table 201		
Condition	Operation Mode	Limit
Oil Pressure: At the Gearbox	Continuous Operation Low Oil Pressure Shutdown	65 ± 5 psig 35 ± 5 psig
Fuel Pressure: Inlet Pressure	Any Operation Mode	10 to 55 psig
Starter Duty Cycle:	Starter Operation	Three tries to start (maximum) followed by 60 minutes to let the temperature of the starter decrease.
Operating Ranges or Limits for the Auxiliary Power Unit – Conditions That Are Seen on the EICAS Maintenance Page:		
Exhaust Gas Temperature:	Main Engine Start (MES) Mode	471°C (880°F) to 571°C (1060°F) max
	Special MES Mode	471°C (880°F) to 588°C (1090°F) max
	Environmental Control System (ECS) Mode	343°C (650°F) to 538°C (1000°F)
	Maximum Operation Limit	581°C (1078°F) to 588°C (1090°F)

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Operation Limits for the Auxiliary Power Unit  
Table 201

Condition	Operation Mode	Limit
Engine Speed:	Continuous Operation in MES Mode	101%
	Continuous Operation in ECS Mode	99%
	Overspeed Shutdown	107%
	Backup Overspeed Shutdown	109%

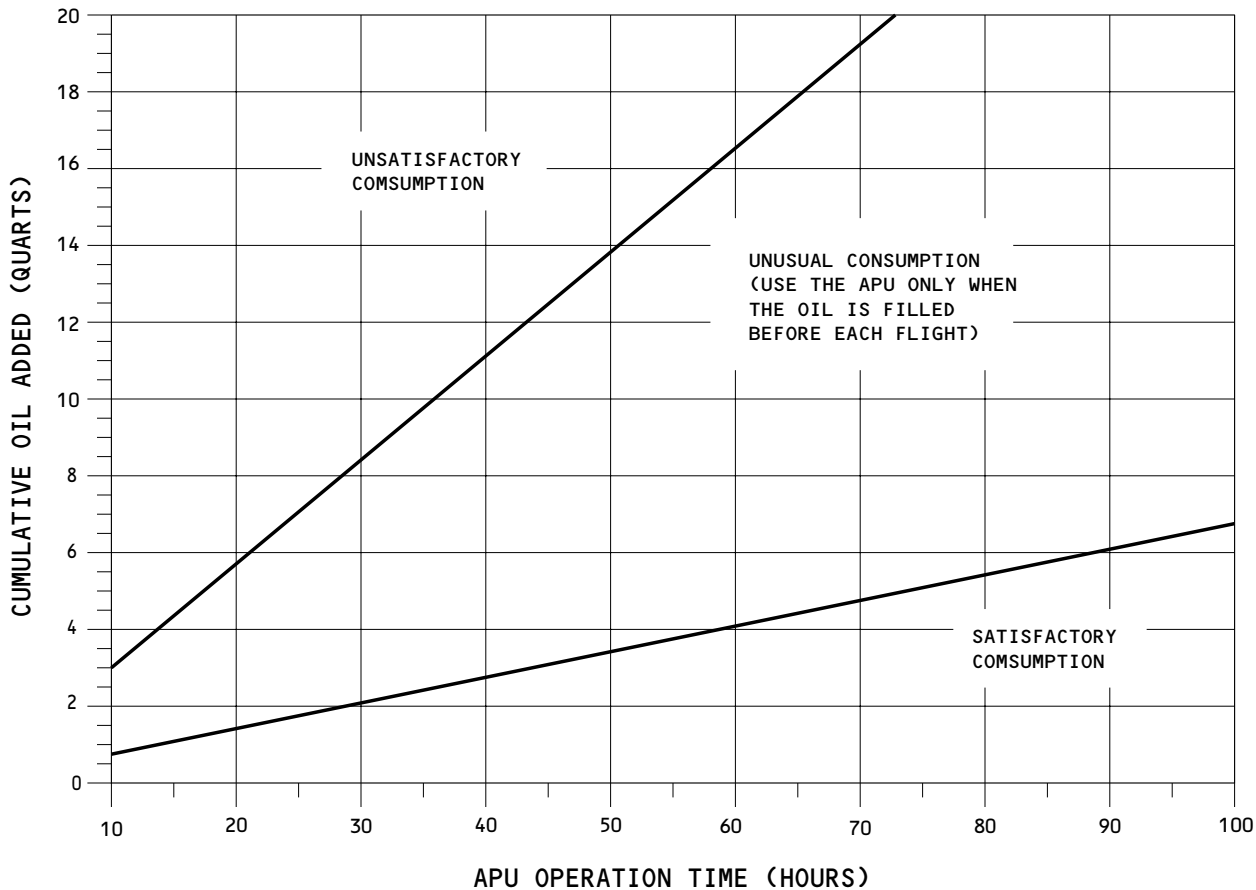
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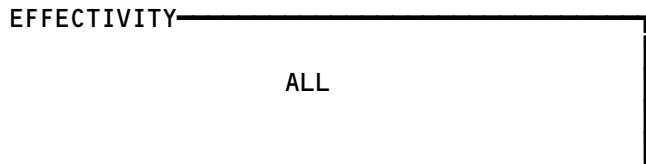
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**NOTE:** THIS GRAPH IS USED TO MONITOR THE APU OIL CONSUMPTION THROUGH TIME FOR INSTALLED APU'S. THE OIL CONSUMPTION FOR A NEW OR NEWLY OVERHAULED APU IN A TEST CELL IS 10 CC/HR.

USABLE OIL QUANTITY WHEN FILLED = 4.0 QUARTS (3.8 LITERS)  
USABLE OIL QUANTITY WITH LOQ INDICATION = 1.5 TO 2.0 QUARTS (1.4 TO 1.9 LITERS)

Oil Consumption Limit Graph  
Figure 201



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TASK 49-11-00-802-002

3. APU Starting and Operation Procedure

A. General

- (1) It is recommended that you do an APU starting and operation procedure at a minimum of one time in a 7 day (weekly) interval if the airplane has not operated and you did not do the APU preservation procedure during this time. You must operate the APU for a minimum of five minutes under a "no-load" condition and then do the APU shutdown procedure. In most conditions, the operation of the APU during this 7 day (weekly) interval will prevent internal/external corrosion and damage to the fuel and oil seals/components.

B. References

- (1) AMM 12-11-01/301, Fuel Tank
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 36-00-00/201, Pneumatic - General
- (4) AMM 49-61-05/201, APU Control Unit (ECU)

C. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |

(2) Access Panels

- |     |                |
|-----|----------------|
| 822 | Aft Cargo Door |
|-----|----------------|

D. Procedure

S 862-139

**WARNING:** IF A REFUELING OPERATION IS IN THE AREA, OBEY THE WARNINGS AND CAUTIONS IN THE PRESSURE FUELING PROCEDURE BEFORE YOU DO THE APU STARTING AND OPERATION PROCEDURE. IF YOU DO NOT OBEY THE WARNINGS AND CAUTIONS, INJURY TO PERSONS CAN OCCUR.

- (1) If there is a refueling operation in the area, make sure you obey the WARNINGS and CAUTIONS in the pressure fueling procedure (AMM 12-11-01/301).

S 862-140

**CAUTION:** STOP THE APU IF IT DOES NOT OPERATE IN THE LIMITS SPECIFIED IN TABLE 201. IF YOU DO NOT STOP THE APU, DAMAGE TO THE APU ENGINE CAN OCCUR.

- (2) When you operate the APU, make sure it is in the specified limits shown above.

S 212-004

- (3) Make sure there are no free objects near the APU air inlet.

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S 862-005

- (4) Make sure these circuit breakers are closed:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU BAT BUS
    - 2) APU INLET DR ACT
    - 3) APU START
    - 4) APU CONT
    - 5) APU BAT CHGR
    - 6) APU TRU FAN
  - (b) P11 Overhead Panel
    - 1) 11A35, INDICATOR LIGHTS 4
    - 2) 11B16, AURAL WARN SPKR L
    - 3) 11B18, WARN ELEX B
    - 4) 11B24, FIRE DETECTION APU 1
    - 5) 11B25, FIRE DETECTION APU 2
    - 6) 11B33, APU REMOTE FIRE IND
    - 7) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 8) 11C33, FUEL DC PUMP APU or FUEL DC PUMP PWR
    - 9) 11D35, FUEL DC PUMP CONT
    - 10) 11H35, AURAL WARN SPKR RIGHT
    - 11) 11J25, FIRE DET ALTN PWR APU
    - 12) 11J33, WARN ELEX A
    - 13) 11P28, R IND LTS 1
    - 14) 11Q22, APU BLEED PWR
    - 15) 11Q23, APU BLEED CONT
  - (c) P6 Circuit Breaker Panel
    - 1) 6E3, FUEL VALVES APU
    - 2) 6G1, FIRE EXT APU
    - 3) 6H12, APU START TRU CONT
    - 4) 6H23, L FWD FUEL BOOST PUMP
  - (d) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU POWER
  - (e) P34(C) APU External Power Panel
    - 1) 34A2(c), GND SVCE BUS APU
    - 2) 34B2(c), GND HDLG APU

S 862-012

- (5) Set the switches:
- (a) Set the main battery switch on the P5 Overhead Panel to ON.
  - (b) Set the APU BLEED AIR VALVE switch on the P5 Overhead Panel to ON.

S 712-014

- (6) Do a test of the fire detection system for the APU:
- (a) Push the ENG/APU/CARGO switch on the FIRE/OVHT TEST panel, which is on the P8 control stand panel.

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- (b) Make sure these messages show on EICAS:

NOTE: AC power must be supplied to get the EICAS messages.

- 1) The APU FIRE message on the main EICAS display.
  - 2) The APU FIRE LP1 message on the STATUS and MAINTENANCE displays.
  - 3) The APU FIRE LP2 message on the STATUS and MAINTENANCE displays.
- (c) Make sure the fire alarms in the control cabin and on the P62 nose gear panel come on.
- (d) Make sure the light comes on for the APU switch on the P8 control stand panel.
- (e) Make sure the FIRE light on the captains instrument panel P1 comes on and is red.
- (f) Make sure the master warning lights on the P7 glare shield panel come on.
- (g) Make sure all of the lights in the above steps go off.

NOTE: When all of the lights go off, the system operates correctly.

S 712-144

- (7) Do a test of the APU squib test circuit:
- (a) Make sure this circuit breaker is closed:
    - 1) P61 Pilot's Right Sidewall Panel
      - a) 6H1, BTL 1 ENG L FIRE EXTINGUISHING
  - (b) Push and hold the TEST switch on the P61 squib test panel.
    - 1) Make sure the green APU squib test light comes on.
  - (c) Release the TEST switch.
    - 1) Make sure the green APU squib test light goes off.

S 212-141

WARNING: DO NOT OPERATE ANY FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

- (8) Look at the fuel quantity indicator.

NOTE: The main fuel tank in the left wing must have 650 pounds (295 kg) of fuel to operate the APU for one hour. After the first hour of APU operation, 500 pounds (227 kg) of fuel is necessary for each hour of APU operation.

- (a) If you must use the fuel boost pumps and the quantity of fuel is less than these limits, you must have a maintenance person or observer in the flight compartment to continuously monitor the LOW PRESSURE lights and the fuel quantity indicator.

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- (b) If the quantity of fuel is more than these limits, do one of these two alternatives:
  - 1) It is permitted to not have a maintenance person or observer in the flight compartment if you calculate the time that you must go back to the flight compartment when the quantity of fuel is less than these limits.
  - 2) A maintenance person or observer is in the flight compartment to continuously monitor the LOW PRESSURE lights and fuel quantity indicator.
- (c) If the quantity of fuel is less than these limits and the LOW PRESSURE light comes on and stays on, shut down the APU.

S 862-079

- (9) Start and operate the APU:

**CAUTION:** AN UNDETECTED FIRE COULD OCCUR IN THE APU COMPARTMENT WITH THE APU ACCESS DOORS OPEN. THE APU FIRE DETECTION SYSTEM MAY NOT SENSE A SMALL FIRE AND MOST OF THE FIRE EXTINGUISHING AGENT WILL GO OUT FROM THE OPEN APU ACCESS DOORS. DAMAGE TO THE APU AND THE AIRPLANE CAN OCCUR.

- (a) Make sure there is an observer near the APU compartment to watch for a fire if the APU access doors are open during the APU operation.

**NOTE:** The observer should be in voice contact with aircraft personnel to report if a fire condition occurs. Aircraft personnel can do the emergency APU shutdown procedure with the pilots fire switch on the P8 control stand panel or APU shutdown switch on the P62 nose landing gear panel and other corrective actions (include the use of fire extinguishers).

- (b) Set the APU control switch on the P5 overhead panel to the START position, hold the switch at the START position for one second and manually move the switch to the ON position.

**NOTE:** It is recommended that you do not release the APU control switch from the START position to the ON position. Damage to the internal contacts in the APU control switch can cause an APU no start problem.

- 1) Make sure the RUN light flashes twice.

**NOTE:** The RUN light flashes when the self-test for the APU control unit is complete.

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2) Make sure the FAULT light comes on and goes off.

NOTE: The FAULT comes on when the APU fuel valve opens.

(c) Monitor the EGT and the RPM on the EICAS MAINTENANCE display.

NOTE: AC power must be supplied to get the EICAS indications.

1) Make sure the EGT increases at 7% rpm when the igniters energize.

2) Make sure the RUN light comes on when the APU is at 95% rpm.

NOTE: You can supply pneumatic and electrical loads when the APU rpm is more than 95%.

3) If the APU acceleration times are not in the specified limits, the APU will have a shutdown and the APU FAULT light will come on.

(d) If the APU does not start, do these steps:

CAUTION: MAKE SURE YOU OBEY THE STARTER DUTY CYCLE IN THE APU OPERATION LIMITS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE APU.

1) Turn the APU control switch on the P5 panel to OFF.

2) Stop for 1 minute to let the fuel drain.

3) Turn the APU control switch to START and release it to ON.

4) If it does not start a third time, look for the APU BITE message on the EICAS MAINTENANCE display.

5) If the APU BITE message was on EICAS, do the APU Control Unit BITE procedure (AMM 49-61-05/201).

NOTE: If the APU has a shutdown a third time 15 seconds after it gets to 95% rpm, look for the LOP light during the BITE procedure.

ECU WITH LOW OIL PRESSURE PROTECTION;

The start will be prevented if there was low oil pressure after two starts.

If the LOP light was on, make sure the LOP failure is corrected before you try to start the APU again.

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TASK 49-11-00-802-080

4. APU Shutdown Procedures

A. General

- (1) There are four different types of APU shutdowns. These shutdowns are as follows:
  - (a) A usual APU shutdown which uses the APU control switch.
  - (b) An emergency APU shutdown which uses the pilots fire switch on the P8 control stand panel.
  - (c) An emergency APU shutdown which uses the APU shutdown switch on P62 panel on the nose landing gear.
  - (d) A protection shutdown which is done by the APU control unit.
- (2) This task gives the steps to do the first three types of shutdowns. The APU control unit automatically does the protection shutdown.

B. References

- (1) AMM 49-11-00/601, Auxiliary Power Unit

C. Access

- (1) Location Zones

211	Flight Compartment - Left
212	Flight Compartment - Right
711	Nose Landing Gear

D. Procedure

S 862-138

- (1) Do a usual APU shutdown with the APU control switch:
  - (a) Turn the APU control switch on the P5 panel to OFF.
    - 1) If the APU has a pneumatic load, the shutdown will occur after 60 seconds.
    - 2) If the APU does not have a pneumatic load, the shutdown will occur immediately.
    - 3) When the APU is at 15% rpm, the inlet door and the fuel valve will close.

NOTE: The FAULT light will come on while the fuel valve closes.

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S 862-081

**CAUTION:** USE THIS EMERGENCY SHUTDOWN PROCEDURE CAREFULLY. DO NOT TURN THE FIRE SWITCH UNLESS THERE IS A FIRE. IF YOU TURN THE FIRE SWITCH, THE FIRE BOTTLE CONTENTS WILL BE RELEASED.

- (2) Do an emergency shutdown with the APU fire switch on the P8 control stand panel:
- (a) Pull the fire switch out to do the APU shutdown.
  - (b) If there is a fire, turn the fire switch to release the fire bottle contents.
  - (c) When the APU stops, turn the APU control switch on the P5 panel to OFF.
  - (d) Turn and push the fire switch to put the switch back in its usual position.
  - (e) Do this task: Inspection After an APU Fire (AMM 49-11-00/601).

S 862-082

- (3) Do an emergency shutdown with the APU autosutdown switch on the P62 panel which is on the nose landing gear:
- (a) Push the APU shutdown switch on the P62 panel to do the shutdown.

**NOTE:** The ARM light on the P62 panel will come on. This shows that the fire bottles are prepared to release their contents.

- (b) If there is a fire, push the APU BOTTLE DISCHARGE switch or switches on the P62 panel to release the fire bottle contents.

**NOTE:** AIRPLANES WITH DUAL FIRE BOTTLES;  
There are two switches on the P62 panel.

- (c) When the APU stops, turn the APU control switch on the P5 panel to OFF.
- (d) Set the main battery switch to OFF and then to ON.

**NOTE:** This will set the emergency shutdown system again. You can also open and close the APU REMOTE FIRE IND (11B33) on the P11 overhead panel to set the shutdown system.

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(e) Do this task: Inspection After an APU Fire (AMM 49-11-00/601).

TASK 49-11-00-802-023

5. Motor the APU

A. References

(1) AMM 49-61-05/201, APU Control Unit

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-024

(1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-025

(2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Open the latches on the APU access doors.
- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 032-026

(3) Disconnect the primary cable from the ignition unit (Fig. 202).

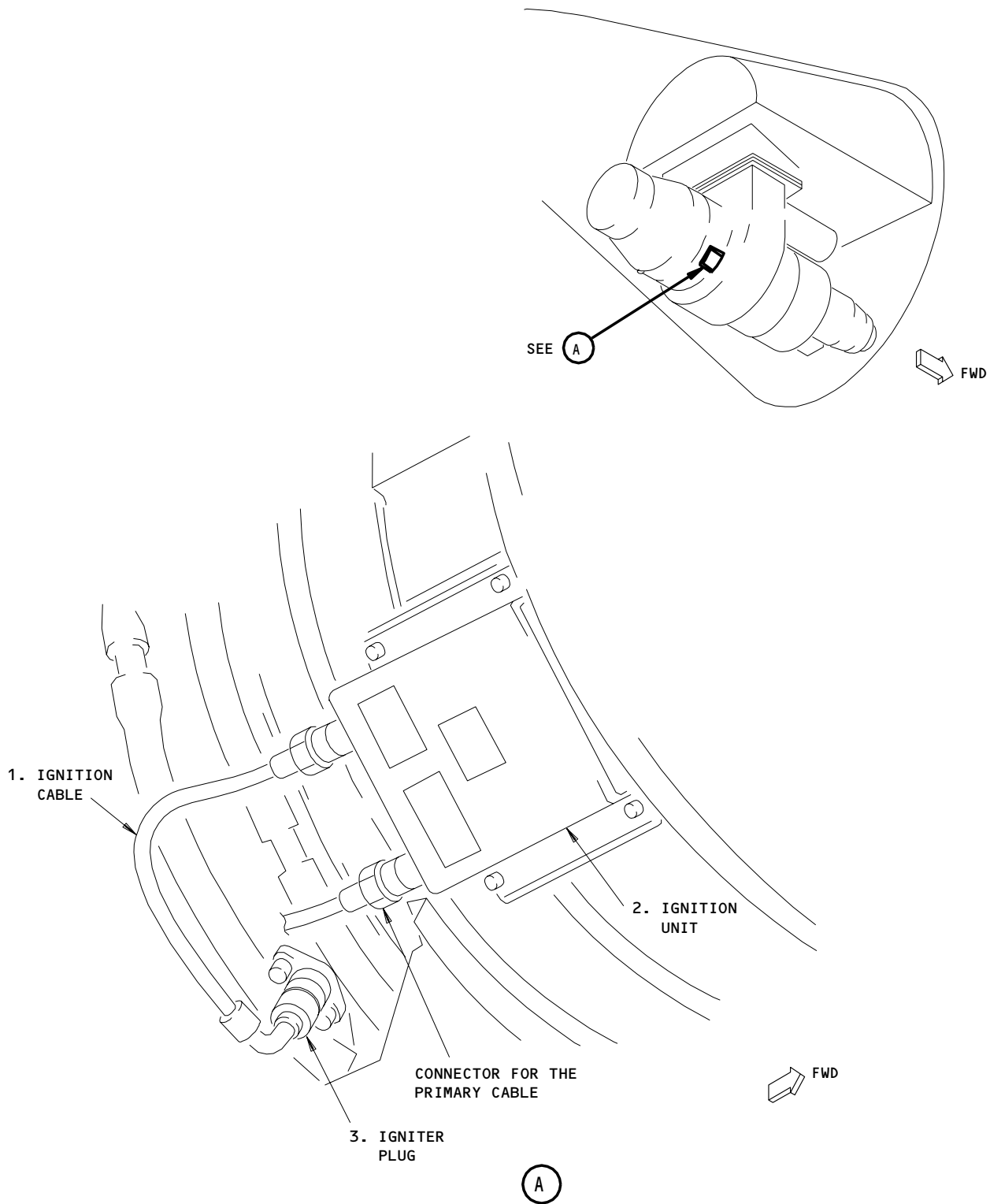
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APU Motoring - Primary Cable Connector for the Ignition Unit  
Figure 202

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S 862-027

- (4) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11C33, FUEL DC PUMP APU or FUEL DC PUMP PWR
    - 2) 11D35, FUEL DC PUMP CONT
  - (b) P6 Circuit Breaker Panel
    - 1) 6E3, FUEL VALVES APU
    - 2) 6H23, L FWD FUEL BOOST PUMP

S 862-029

- (5) Motor the APU:
- (a) Set the main battery switch on the P5 overhead panel to ON.
  - (b) Remove the DO-NOT-OPERATE tag from the APU control switch.

**CAUTION:** MAKE SURE YOU OBEY THE DUTY CYCLE FOR THE STARTER MOTOR. IF YOU DO NOT OBEY THE DUTY CYCLE, DAMAGE TO THE STARTER MOTOR CAN OCCUR.

- (c) Set the APU control switch on the P5 overhead panel to the START position, hold the switch at the START position for one second and manually move the switch to the ON position.

**NOTE:** It is recommended that you do not release the APU control switch from the START position to the ON position. Damage to the internal contacts in the APU control switch can cause an APU no start problem.

- (d) Motor the APU until the APU has a protective shutdown.
- (e) Turn the APU control switch to OFF and attach a DO-NOT-OPERATE tag.

S 862-034

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P6 Circuit Breaker Panel
    - 1) 6E3, FUEL VALVES APU

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- 2) 6H23, L FWD FUEL BOOST PUMP
- (b) P11 Overhead Panel
  - 1) 11C33, FUEL DC PUMP APU or FUEL DC PUMP PWR
  - 2) 11D35, FUEL DC PUMP CONT

S 432-036

- (7) Connect the primary cable to the ignition unit (Fig. 202).

S 412-037

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-038

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 742-039

- (10) AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
Erase the NO FLAME message from the memory in the APU control unit (AMM 49-61-05/201).

S 742-134

- (11) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
Erase the NO LIGHTOFF message from the memory in the APU control unit (AMM 49-61-05/201).

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TASK 49-11-00-602-040

6. APU Preservation (Less Than 45 Days)

A. General

- (1) This task contains the steps that are necessary for the APU preservation less than 45 days.
- (2) Do the preservation task immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Access

(1) Location Zones

- |     |                         |
|-----|-------------------------|
| 315 | APU Compartment - Left  |
| 316 | APU Compartment - Right |

C. Procedure

S 862-041

- (1) Operate the APU:
  - (a) Start and operate the APU. Do this task: APU Starting and Operation.
  - (b) Let the APU operate for a minimum of 5 minutes.
  - (c) Do a usual shutdown of the APU. Do this task: APU Shutdown Procedures.

S 012-132

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 492-083

- (3) Install covers and plugs on these openings for protection (Fig. 203):
  - (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 412-133

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-105

- (5) Install an APU preservation tag on the APU control switch on the P5 panel.

TASK 49-11-00-602-115

7. APU Depreservation (Less Than 45 Days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for less than 45 days.

B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

C. Procedure

S 012-116

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 082-127

- (2) Remove the covers or plugs from these openings (Fig. 203):
  - (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 412-118

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-119

- (4) Remove the APU preservation tag from the APU control switch on the P5 panel.

S 862-120

- (5) Operate the APU:
  - (a) Start and operate the APU. Do this task: APU Starting and Operation.

**NOTE:** It can be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

- (b) Let the APU operate for a minimum of 5 minutes.
- (c) Do a shutdown of the APU. Do this task: APU Shutdown Procedures.

TASK 49-11-00-602-084

8. APU Preservation (45 to 180 Days)

A. General

- (1) This task contains the steps to do an APU preservation for 45 to 180 days.
- (2) Do the APU preservation immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Standard Tools and Equipment

- (1) Service Cart - 5-25 psi, to supply preservation oil at a minimum temperature of 60°F (16°C).
- (2) Drain Hose - to connect the primary fuel manifold to the container
- (3) Container - 5 U.S. Gallon (20 Liter) capacity, for fuel
- (4) Container - 2 U.S. Gallon (8 Liter) capacity, for oil

C. Consumable Materials

- (1) B00075 Solvent - P-D-680, Stoddard Type 1
- (2) D00096 Oil - Preservation, MIL-L-6081, Grade 1005 or Grade 1010

D. Access

- (1) Location Zones
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right

E. Procedure

S 862-085

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-086

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 622-043

- (3) Do the fuel system preservation (Fig. 203):
  - (a) Put the container below the fuel control unit.
  - (b) Disconnect the fuel inlet hose from the fuel control unit.
    - 1) Let the fuel fully drain from the fuel inlet hose and the fuel control unit.
  - (c) Put the container below the fuel flow divider.
  - (d) Disconnect the fuel supply tube from the fuel flow divider.
    - 1) Let the fuel fully drain from the fuel tube and the fuel flow divider.
  - (e) Put the container below the primary fuel manifold.
  - (f) Disconnect the fuel hose from the connector on the primary fuel manifold.
    - 1) Let the fuel fully drain from the fuel hose and the fuel manifold.

**CAUTION:** DO NOT USE HYDROCARBON MATERIALS OR OIL IN THE COMPRESSOR SECTION. THESE MATERIALS CAN BURN AND CAUSE DAMAGE TO THE APU.

- (g) Connect the oil service cart to the fuel inlet connection on the fuel control unit.

**NOTE:** It is not necessary to use a corrosion prevention oil in the lubrication system. The APU oil has satisfactory corrosion prevention.

- (h) Connect the fuel supply tube to the fuel flow divider.
- (i) Use the oil cart to supply the preservation oil to the fuel system at a light pressure (10-25 psig).

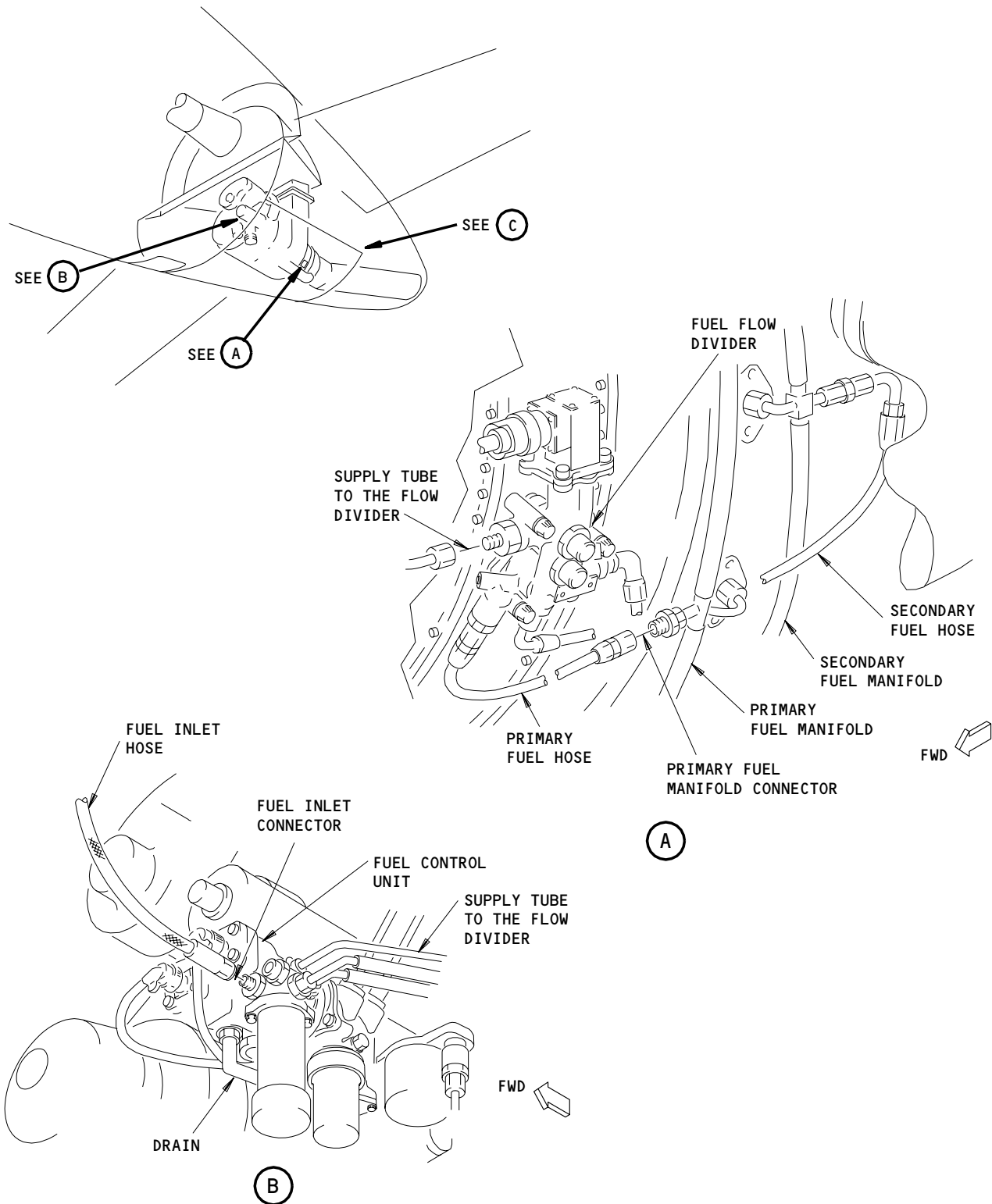
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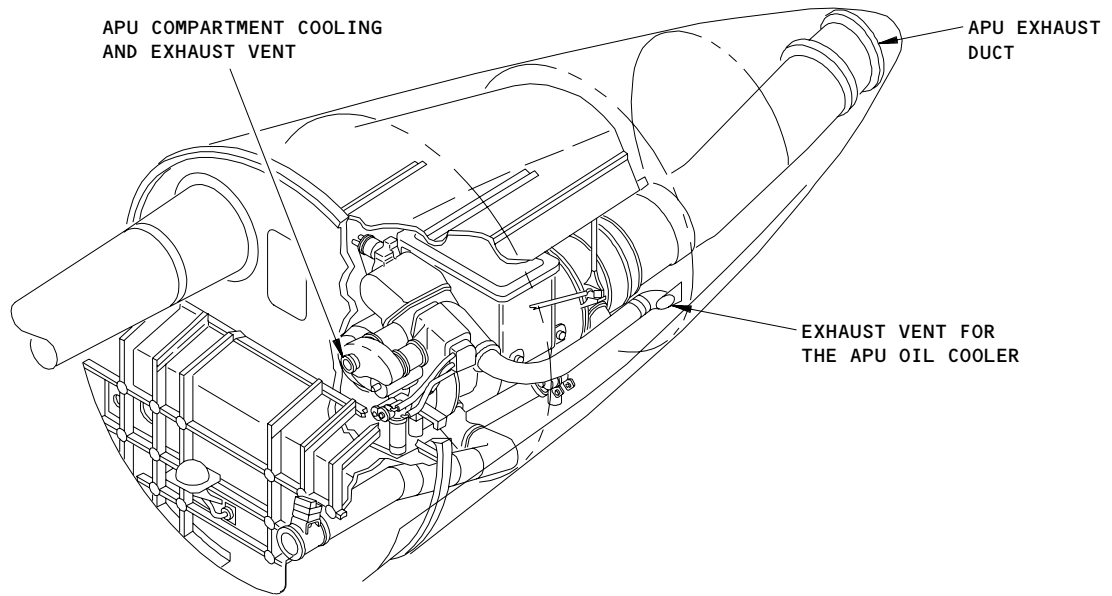
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APU Preservation and Depreservation  
Figure 203 (Sheet 1)

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COOLING AIR AND EXHAUST COVERS

(C)

APU Preservation and Depreservation  
Figure 203 (Sheet 2)

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- (j) Motor the APU until the oil comes out the fuel hose for the primary fuel manifold. Do this task: Motor the APU.

NOTE: If it is necessary, motor the APU again after the protection shutdown until the oil comes out the fuel hose.

- (k) Disconnect the oil service cart from the fuel inlet connection on the fuel control unit.
- (l) Connect the fuel hose to the primary fuel manifold.
  - 1) Tighten the fuel hose to 100-120 inch-pounds (11.3-13.6 newton-meters).
- (m) Install plugs and caps on all the external ports, fittings, and other openings on the APU.

NOTE: Make sure caps are installed on the fuel inlet port and the fuel and oil drain fittings.

S 112-142

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (4) Remove all the unwanted fuel and oil from the APU with the solvent.

S 622-091

- (5) Attach a warning tag to the APU to show that you did the APU preservation task.

S 492-044

- (6) Install covers or plugs on these APU openings (Fig. 203):
  - (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 412-092

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-093

- (8) Replace the DO-NOT-OPERATE tag on the APU control switch with an APU preservation tag.

TASK 49-11-00-602-121

9. APU Depreservation (45 to 180 Days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for 45 to 180 days.

B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

C. Procedure

S 012-122

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches for the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 082-128

- (2) Remove the covers or plugs from these openings (Fig. 203):
  - (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 082-129

- (3) Remove the covers and the caps from all the APU fittings and ports.

S 862-131

- (4) Connect the fuel inlet hose to the fuel control unit (Fig. 203).

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S 412-124

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- Disengage the support rods for the APU access doors.
  - Put the support rods in the clips on the inner side of the APU access doors.
  - Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - Lift the left access door and align it with the right access door.
  - Close and latch the APU access doors.

S 862-125

- (6) Remove the APU preservation tag from the APU control switch on the P5 panel.

S 862-126

- (7) Operate the APU:
- Start and operate the APU. Do this task: APU Starting and Operation.

**NOTE:** It can be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

- Let the APU operate for a minimum of 5 minutes.
- Do a shutdown of the APU. Do this task: APU Shutdown Procedures.

TASK 49-11-00-602-094

10. APU Preservation (More Than 180 Days)

A. General

- This task contains the steps to do an APU preservation for more than 180 days.
- Do the APU preservation immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Standard Tools and Equipment

- Service Cart - 10-25 psig, to supply preservation oil at a minimum temperature of 60°F (16°C).
- Drain Hose - to connect the primary fuel manifold to the container
- Container - 5 U.S. Gallon (20 Liter) capacity, for fuel
- Container - 2 U.S. Gallon (8 Liter) capacity, for oil

C. Consumable Materials

- B00075 Solvent - P-D-680, Stoddard Type 1
- D00096 Oil - Preservation, MIL-L-6081, Grade 1005 or Grade 1010
- G00626 Dessicant - Dehumidifier, MIL-D-3464
- G01004 Indicator - Humidity, MS20003
- G02081 Material - Barrier, MIL-B-131

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D. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

E. Access

(1) Location Zones

- 315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right

F. Procedure

S 862-095

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-096

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 622-046

- (3) Do the fuel system preservation (Fig. 203):
- (a) Put the container below the fuel control unit.
  - (b) Disconnect the fuel inlet hose from the fuel control unit.
    - 1) Let the fuel fully drain from the fuel inlet hose and the fuel control unit.
  - (c) Put the container below the fuel flow divider.
  - (d) Disconnect the fuel supply tube from the fuel flow divider.
    - 1) Let the fuel fully drain from the fuel tube and the fuel flow divider.
  - (e) Put the container below the primary fuel manifold.
  - (f) Disconnect the fuel hose from the connector on the primary fuel manifold.
    - 1) Let the fuel fully drain from the fuel hose and the fuel manifold.

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**CAUTION:** DO NOT USE HYDROCARBON MATERIALS OR OIL IN THE COMPRESSOR SECTION. THESE MATERIALS CAN BURN AND CAUSE DAMAGE TO THE APU.

- (g) Connect the oil service cart to the fuel inlet connection on the fuel control unit.

**NOTE:** It is not necessary to use a corrosion prevention oil in the lubrication system. The APU oil has satisfactory corrosion prevention.

- (h) Connect the fuel supply tube to the fuel flow divider.  
(i) Use the oil cart to supply the preservation oil to the fuel system at a light pressure (10–25 psig).  
(j) Motor the APU until the oil comes out the fuel hose for the primary fuel manifold. Do this task: Motor the APU.

**NOTE:** If it is necessary, motor the APU again after the protection shutdown until the oil comes out the fuel hose.

- (k) Disconnect the oil service cart from the fuel inlet connection on the fuel control unit.  
(l) Connect the fuel hose to the primary fuel manifold.  
1) Tighten the fuel hose to 100–120 inch-pounds (11.3–13.6 newton-meters).  
(m) Install plugs and caps on all the external ports, fittings, and other openings on the APU.

**NOTE:** Make sure caps are installed on the fuel inlet port and the fuel and oil drain fittings.

S 112-143

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (4) Remove all the unwanted fuel and oil from the APU with the solvent.

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- S 622-101
- (5) Attach a warning tag to the APU to show that you did the APU preservation.
- S 022-047
- (6) Remove the APU (AMM 49-11-01/401).
- S 492-102
- (7) Install covers or plugs on these openings:
- (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.
- S 862-104
- (8) Replace the DO-NOT-OPERATE tag on the APU control switch with an APU preservation tag.
- S 552-048
- (9) Prepare the APU for storage:
- (a) Put the APU in a moisture proof bag with the dessicant and a humidity indicator.
  - (b) Put the APU in a storage container.
  - (c) Make sure the APU is put in a location with a humidity of 40% or less and a temperature between 4°C (40°F) and 48°C (120°F).
  - (d) Make sure the APU is in a clean location with no fumes that can cause corrosion.
  - (e) Make sure the APU does not get damaged.
- S 212-049
- (10) Examine the humidity indicator in the storage container each 30 days:
- (a) Compare the color of the humidity indicator with the chart that came with the indicator.
  - (b) If the humidity in the storage container is less than 40%, the APU is sufficiently dry.

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- (c) If the humidity is more than 40%, examine the APU:
  - 1) Remove the APU from the bag.
  - 2) Examine the APU internally for corrosion.
  - 3) If the APU has corrosion in it, send the APU to the engine shop.
  - 4) If you do not find corrosion, do the above steps under Prepare the APU for Storage.

TASK 49-11-00-602-103

11. APU Depreservation (More Than 180 Days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for more than 180 days.

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

C. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 012-051

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

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S 632-052

- (2) Do the APU depreservation:
- (a) Remove the covers or plugs from these openings:
    - 1) The APU exhaust duct
    - 2) The APU compartment cooling and exhaust vent
    - 3) The exhaust vent for the APU oil cooler.
  - (b) Install the APU:
    - 1) Remove the APU from the storage container.
    - 2) Remove the dessicant and the humidity indicators from the APU.
    - 3) Install the APU (AMM 49-11-01/401).
  - (c) Remove the covers and the caps from all the APU fittings and ports.

S 412-075

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-107

- (4) Remove the APU preservation tag from the APU control switch on the P5 panel.

S 862-106

- (5) Operate the APU:
- (a) Start and operate the APU. Do this task: APU Starting and Operation.

NOTE: It can be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

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- (b) Let the APU operate for a minimum of 5 minutes.
- (c) Do a shutdown of the APU. Do this task: APU Shutdown Procedures.

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AUXILIARY POWER UNIT - ADJUSTMENT/TEST

1. General

- A. It is not necessary to make adjustments to the APU or to the APU control unit when the APU is installed on the airplane. But, you can use this procedure to do a check of the APU systems with the APU installed on the airplane.

TASK 49-11-00-725-001

2. Do the Auxiliary Power Unit - Adjustment/Test

A. Equipment

- (1) Fuel Manifold Tester - 833563-6 (recommended),  
289544-6 (optional)  
Supplied by Garrett Turbine Engine,  
ATTN: Ground Support Equipment, Dept. 66,  
P.O. Box 29003, Phoenix, Arizona 85038.

B. Consumable Materials

- (1) G00018 Nitrogen, Gaseous - BB-N-411, Type 1, Class 1, Grade A

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit (APU)  
(2) AMM 49-16-00/601, APU Drains and Vents  
(3) AMM 49-27-04/201, Magnetic Chip Detectors  
(4) AMM 49-31-06/401, Fuel Manifolds and Nozzles  
(5) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

E. Do a Check of the APU Control Unit

S 745-002

- (1) Do the APU Control Unit - BITE procedure (AMM 49-61-05/201).

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F. Examine the Condition of the APU Oil

S 225-003

- (1) Use a spectrographic oil analysis program (SOAP) to examine the APU oil.

**NOTE:** The SOAP is the recommended procedure to examine the APU oil. This procedure finds the amount of metal (parts per million) that is chemically bonded or mixed with the oil. Metal particles do not have an effect on this procedure.

S 215-004

- (2) Examine the magnetic chip detectors (AMM 49-27-04/201).

G. Do the Fuel Manifold Test (Fig. 501)

S 865-005

- (1) Prepare to do the fuel manifold tests.
  - (a) Put the APU master control switch in the OFF position and attach a DO-NOT-OPERATE tag.
  - (b) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (c) Open this circuit breaker on the E6 rack in the aft equipment center and attach a DO-NOT-CLOSE tag:
    - 1) APU CONT

S 485-006

- (2) Install the fuel manifold tester as follows:
  - (a) Make sure all of the valves and restrictors on the tester are fully closed.
  - (b) Connect a nitrogen bottle (or a filtered air source with a pressure of 160-170 psig) and a pressure regulator to the INLET AIR connector on the tester.
  - (c) Disconnect the fuel supply hoses from the primary and secondary manifolds at the connection points (Fig. 501).
  - (d) Connect the tester hose to the OUTLET AIR connection on the tester.

S 785-007

- (3) Do the fuel manifold test as follows:

**NOTE:** This test is done for one manifold first. When that part of the test is complete, do the test again for the other manifold.

- (a) Connect the free end of the tester hose to one of the manifold assemblies (primary or secondary).
- (b) Adjust the pressure regulator on the source to show 150.0 psig on the INLET PRESSURE gage.

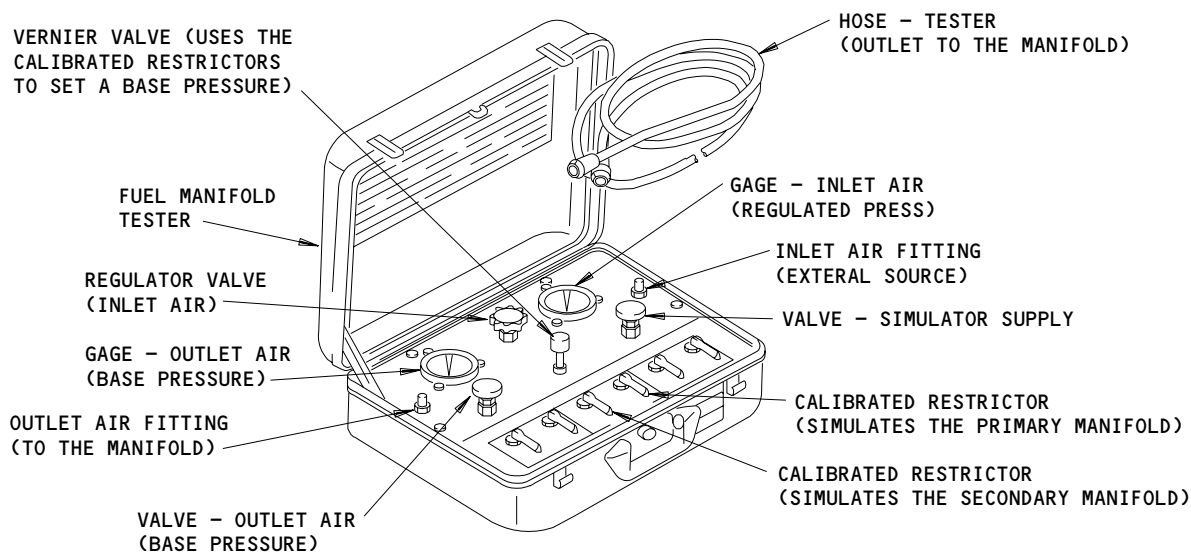
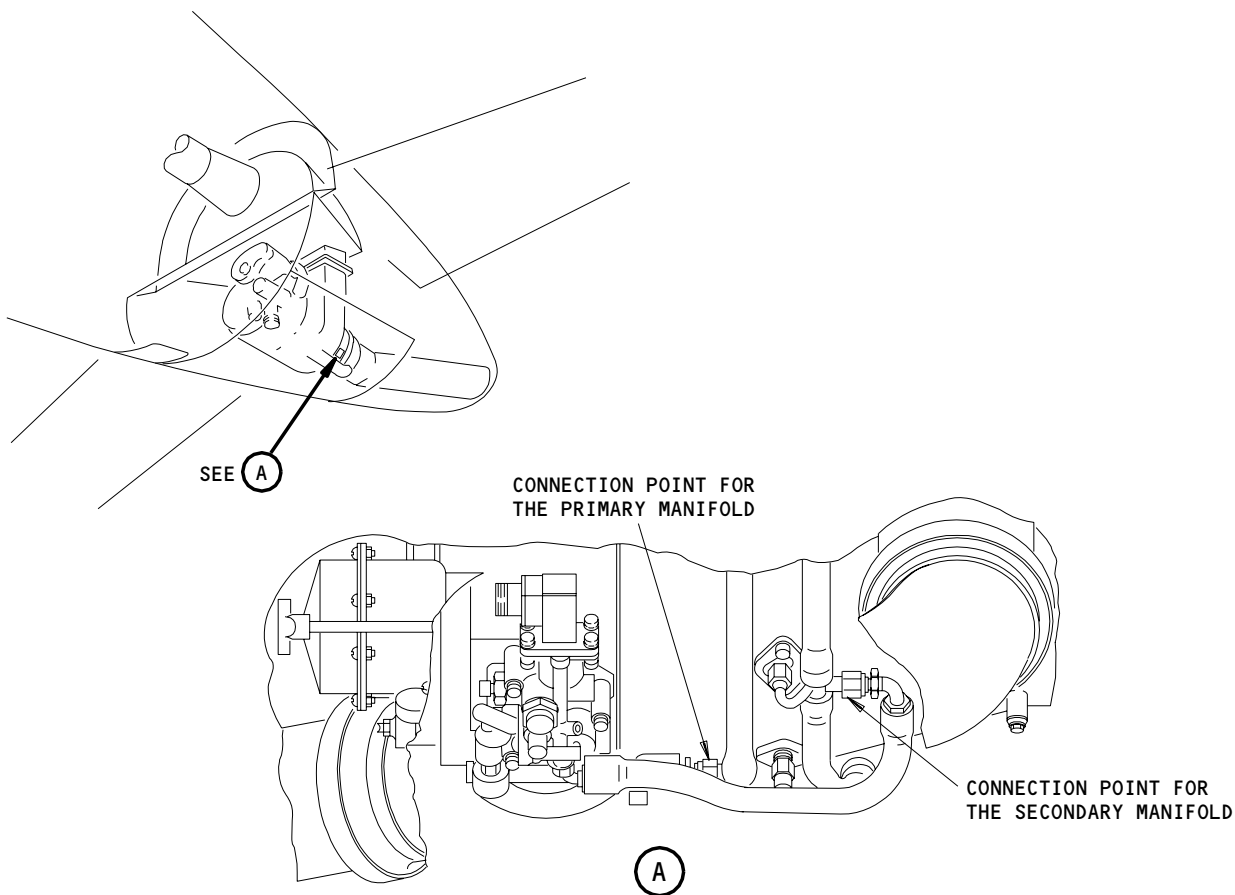
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Fuel Manifold Test  
Figure 501

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- (c) Open the SIMULATOR SUPPLY valve and the CALIBRATED RESTRICTOR (primary or secondary for the manifold that is examined) valve.

**NOTE:** This permits you to adjust the air pressure for fuel nozzles that are new. You then supply this pressure to the manifolds as the base pressure. The base pressure can be compared to the outlet pressure to the manifolds to find the condition of the manifolds.

- (d) Adjust the VERNIER VALVE to show 100.0 psig on the OUTPUT PRESSURE gage.
- (e) Close the CALIBRATED RESTRICTOR (primary or secondary) valve and the SIMULATOR valve.
- (f) Open the OUTLET AIR valve to supply a base pressure of 100.0 psig to the manifold assembly.
- (g) Make a record of the data that follows:
- 1) Manifold assembly
  - 2) The Pressure on the OUTLET PRESSURE gage.
- (h) Close the OUTLET AIR valve.
- (i) Do the test again for the other fuel manifold (primary or secondary).

S 435-008

- (4) Connect the fuel supply hoses to the primary and secondary manifold assemblies.
- (a) Tighten the fuel supply hoses to 100-120 inch-pounds (11.3-13.5 newton meters).

S 785-009

- (5) The limits for the fuel manifold test are in the table that follows:

**NOTE:** For every 10.0 psig of pressure more than the base pressure (100.0 psig), one fuel nozzle has a blockage.

Pressure (psig)	Limit
131 and more	Fuel nozzles have a blockage. Replace the nozzles (AMM 49-31-06/401).
111 to 130	Fuel nozzles can have a blockage. Monitor the fuel system and do this procedure again after 500 hours.
100 to 110	The fuel manifold assembly is O.K.

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Pressure (psig)	Limit
99 and less	Examine for leaks or for a wrong fuel nozzle in the manifold assembly.

S 865-010

- (6) Put the airplane back to its usual condition.
- (a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
    - 1) APU CONT
  - (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (c) Remove the DO-NOT-OPERATE tag from the APU master control switch.

S 865-011

- (7) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 215-012

- (8) Examine the APU for leakage.

S 865-013

- (9) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).
- H. Do a check of the APU emergency shutdown switch on the P62 panel on the nose landing gear.

S 865-014

**CAUTION:** OPEN THE P6 PANEL CIRCUIT BREAKER THAT FOLLOWS. IF THE CIRCUIT BREAKER IS NOT OPENED, THE FIRE BOTTLE CAN RELEASE ITS CONTENTS.

- (1) Open this circuit breaker on the power distribution panel P6 and attach a DO-NOT-CLOSE tag:
- (a) 6G1, FIRE EXT APU 1

S 865-018

- (2) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 865-019

- (3) Push the APU emergency shutdown switch on the landing gear panel P62 and hold for a minimum of 5 seconds.

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S 865-020

- (4) After the shutdown, put the APU master control switch in the OFF position.

S 865-021

- (5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the power distribution panel P6:
  - (a) 6G1, FIRE EXT APU 1

S 865-023

- (6) Put the main battery switch on the overhead panel P5 in the OFF position and then in the ON position.

NOTE: You can also open and close the APU REMOTE FIRE (11B33) circuit breaker to set the emergence switch again.

I. Do a Check of the APU fire switch on the pilot's aft control panel P8

S 865-024

CAUTION: OPEN THE P6 PANEL CIRCUIT BREAKER THAT FOLLOWS. IF THE CIRCUIT BREAKER IS NOT OPENED, THE FIRE BOTTLE CAN RELEASE ITS CONTENTS.

- (1) Open this circuit breaker on the power distribution panel P6 and attach a DO-NOT-CLOSE tag:
  - (a) 6G1, FIRE EXT APU 1

S 865-028

- (2) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 865-029

CAUTION: DO NOT TURN THE FIRE SWITCH. IF YOU TURN THE FIRE SWITCH, THE FIRE BOTTLE WILL RELEASE ITS CONTENTS.

- (3) Pull the APU fire switch straight out.
  - (a) Make sure the APU stops operation when the fire switch is pulled out.

S 865-030

- (4) After the shutdown, put the APU master control switch in the OFF position.

S 865-031

- (5) Put the main battery switch on the overhead panel P11 in the OFF position and then in the ON position.

NOTE: This will make sure the fire system can operate.

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- S 865-032
- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the power distribution panel P6:
- (a) 6G1, FIRE EXT APU 1

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AUXILIARY POWER UNIT - INSPECTION/CHECK

1. General

A. This procedure has the task to inspect the APU after an APU fire.

TASK 49-11-00-206-021

2. Inspection After an APU Fire

A. References

(1) AMM 49-11-01/401, Auxiliary Power Unit

B. Equipment

(1) Vacuum - Source, 24 inch Hg minimum

C. Consumable Materials

- (1) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) - BMS15-5
- (2) G02439 Brush, Nylon Bristle
- (3) G00110 Sponge, Silicone Rubber, Closed-Cell, General Purpose, Non-Solvent Use - BMS1-23
- (4) G50140 Gloves, Protective - Latex or Nitrile
- (5) B01023 Cleaner, Primary - Ardrex 6025

D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Prepare for the Inspection

S 866-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and install a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and install DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

F. Procedure

S 216-022

- (1) Visually examine the APU for the cause of the APU fire or an APU that became too hot.
  - (a) If you find external damage to the APU, replace the APU (AMM 49-11-01/401).
  - (b) If you do not find external damage to the APU, refer to the fault isolation manual for the APU fire detection system to find the cause of the high temperature indication.

S 216-023

- (2) Do these steps to visually examine the APU compartment and its structural components for signs of fire damage:
  - (a) Visually examine the APU compartment and its structural components for signs of fire damage.
  - (b) Visually examine the three APU mounts for signs of fire damage.
  - (c) If you find signs of fire damage in the APU compartment and its structural components, contact Boeing Service Engineering for the disposition of the APU and APU compartment due to a fire condition.

NOTE: An APU fire will affect the safety and structural components integrity of the airplane. Boeing engineering and structural repair personnel will review airline operator-supplied information and provide recommendations on a case-by-case basis.

S 166-024

- (3) Do these steps to remove and/or clean the fire extinguishing agent used for the APU fire from the external surfaces of the APU and APU compartment:
  - (a) Do these steps if foam was the fire extinguishing agent:

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**CAUTION:** DO NOT LET THE FOAM GO IN THE HOLES ON THE APU. FOAM THAT STAYS IN THE APU CAN CAUSE CORROSION OF THE ENGINE INTERNAL COMPONENTS.

- 1) Clean the areas of the APU and APU compartment where the foam was used with clean water, cleaning cloth, brush, sponge, gloves or other equivalent equipment.
  - 2) Make sure you remove all signs of the foam from the APU and APU compartment.
- (b) Do these steps if dry chemical powder was the fire extinguishing agent:

**CAUTION:** DO NOT USE WATER TO REMOVE THE DRY CHEMICAL POWDER FROM THE APU. THE DRY AGENTS IN THE CHEMICAL POWDER, WHEN MIX WITH WATER, WILL MAKE A COMPOUND THAT CAN CAUSE CORROSION. DO NOT LET THE DRY CHEMICAL POWDER GO IN THE HOLES ON THE APU. DRY CHEMICAL POWDER THAT STAY IN THE APU CAN CAUSE CORROSION OF THE ENGINE INTERNAL COMPONENTS.

- 1) Clean the areas of the APU and APU compartment where the dry chemical powder was used with a vacuum or other equivalent tool to remove the powder.
  - 2) If the dry chemical powder was changed to a glaze-like formation due to high temperatures, clean the areas with the cleaner, cleaning cloth, brush, sponge, gloves or other equivalent equipment.
  - 3) Make sure you remove all signs of the dry chemical powder from the APU and APU compartment.
- (c) Do these steps if halogen or halon was the fire extinguishing agent:
- 1) In-flight use of the fire extinguishing system is permitted with no special cleaning procedure.

**CAUTION:** DO NOT BREATHE THE GAS FROM THE FIRE EXTINGUISHING AGENT IN THE APU COMPARTMENT AFTER IT IS USED. DO NOT LET THE FIRE EXTINGUISHING AGENT TOUCH YOUR SKIN. YOU MUST HAVE A GOOD FLOW OF AIR AT THE LOCATION WHERE THE AGENT WAS USED. IF YOU DO NOT OBEY THESE PRECAUTIONS, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 2) Ground use of the fire extinguishing system is permitted but make sure the APU access doors are opened for a minimum of 30 minutes to remove all halogen or halon gases. No special cleaning procedure is necessary.

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- 3) If it is necessary, clean the external surfaces of the APU from the power section to the turbine exhaust port with clean water, cleaning cloth, brush, sponge, gloves or other equivalent equipment.

G. Put the Airplane Back to Its Usual Condition

S 866-010

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 866-011

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 416-009

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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AUXILIARY POWER UNIT – REMOVAL/INSTALLATION

1. General

- A. There are two procedures available for the removal and installation of the APU. Each procedure is optional to the other. The procedure that is used is determined by the ground equipment that is available.
- (1) Fishpole hoist procedure:
    - (a) This procedure uses two fishpole hoists and either the APU cradle or frame to lower and lift the APU.
  - (2) Hydraulic jack procedure:
    - (a) This procedure uses a hydraulic jack assembly, APU cradle, cradle adapter and a maintenance stand to lower and lift the APU. The maintenance stand is used to lift the APU, APU cradle, cradle adapter and hydraulic jack assembly to the APU compartment.

TASK 49-11-01-004-001

2. APU Removal (Fishpole Hoist Procedure) (Fig. 401)

A. References

- (1) AMM 21-00-01/201, Air Conditioning System Oil Contamination (Removal)
- (2) AMM 36-11-01/701, Pneumatic Duct

B. Special Tools and Equipment

- (1) APU Frame Assy – B49001-1
- (2) APU Maintenance and Transportation Stand – B49002-64 preferred; B49002-1 optional
- (3) APU Support Equip – B49004-1 Includes the following items:
  - (a) APU Generator Ballast – B49004-2
  - (b) APU Exhaust Duct Support Equip – B49004-11
  - (c) Support Retainers – B49004-8
  - (d) APU Cone Bolt Thread Protector – B49004-7
- (4) PF51-011-1 or PF51 Series Hoist – Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
- (5) 10/3641 Hoist – Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ
- (6) AP6108 Hoist – Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products 2719 Pacific Avenue,  
Everett, WA 98201

C. Standard Tools and Equipment

- (1) Container – 1.5 U.S. Gallon (6 Liter) capacity, for fuel

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D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Prepare to Remove the Auxiliary Power Unit

S 864-002

- (1) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
- (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-004

- (3) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:
- (a) APU CONT

S 014-005

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods from the APU access doors.

F. Remove the Auxiliary Power Unit

S 034-006

- (1) Remove the APU harness, the generator cables, and the starter motor cables from clamps on the APU and firewall.

S 034-007

- (2) Disconnect the APU harness, the generator cables, and the starter motor cables at the firewall.

**NOTE:** You can disconnect the starter motor cables at the starter motor.

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- S 034-008
- (3) Remove the nuts (8), the bolts (8A), and the washers (7) at the firewall to disconnect the bonding jumpers (6).
- S 034-009
- (4) Disconnect the generator control connector from the generator.
- S 034-010
- (5) Loosen the clamp (1) and move it onto the flex duct (2).  
(a) Pull the flex duct (2) up and away from the oil cooler.
- S 034-011
- (6) Remove the clamp (5) from the air supply duct on the left side of the APU.
- S 024-178
- (7) Loosen the other clamp (5) at the firewall and remove the air supply duct (4).
- S 034-013
- (8) Put dust caps on the air supply duct and on the oil-cooler exhaust duct.
- S 034-014
- (9) Disconnect the air purge hose from the drain tank.
- S 494-016
- (10) Install the support saddle for the APU exhaust duct.
- S 034-017
- (11) Loosen the V-band to disconnect the exhaust duct.  
(a) Move the exhaust duct aft.
- S 494-083
- (12) Put the container below the fuel control unit.

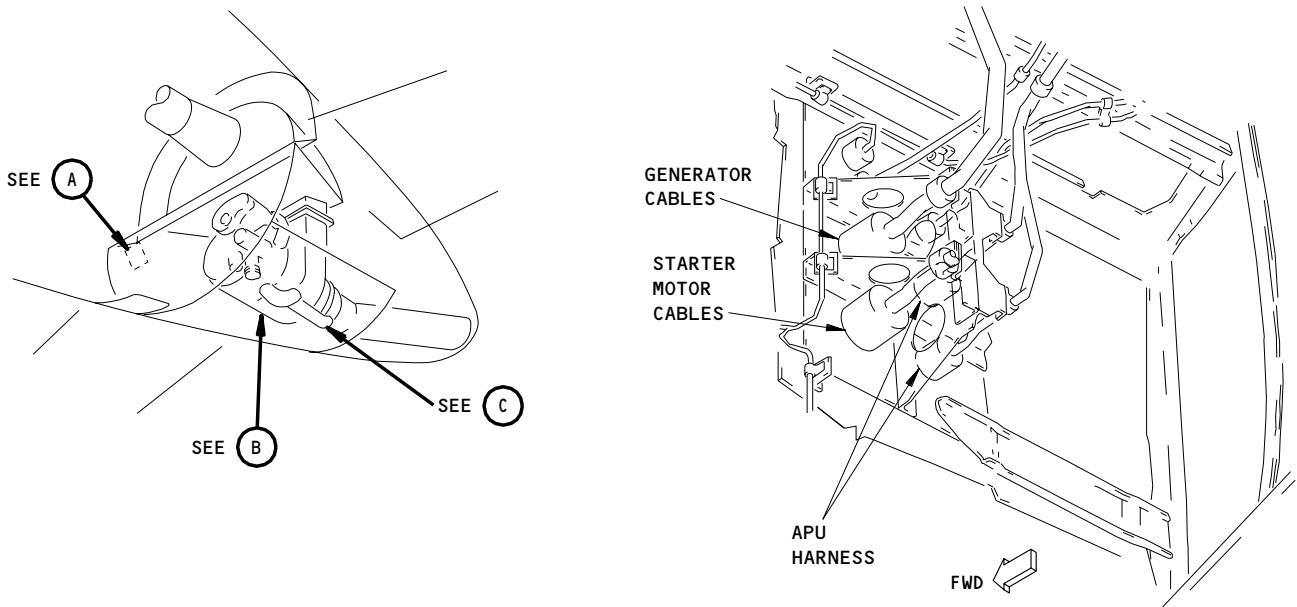
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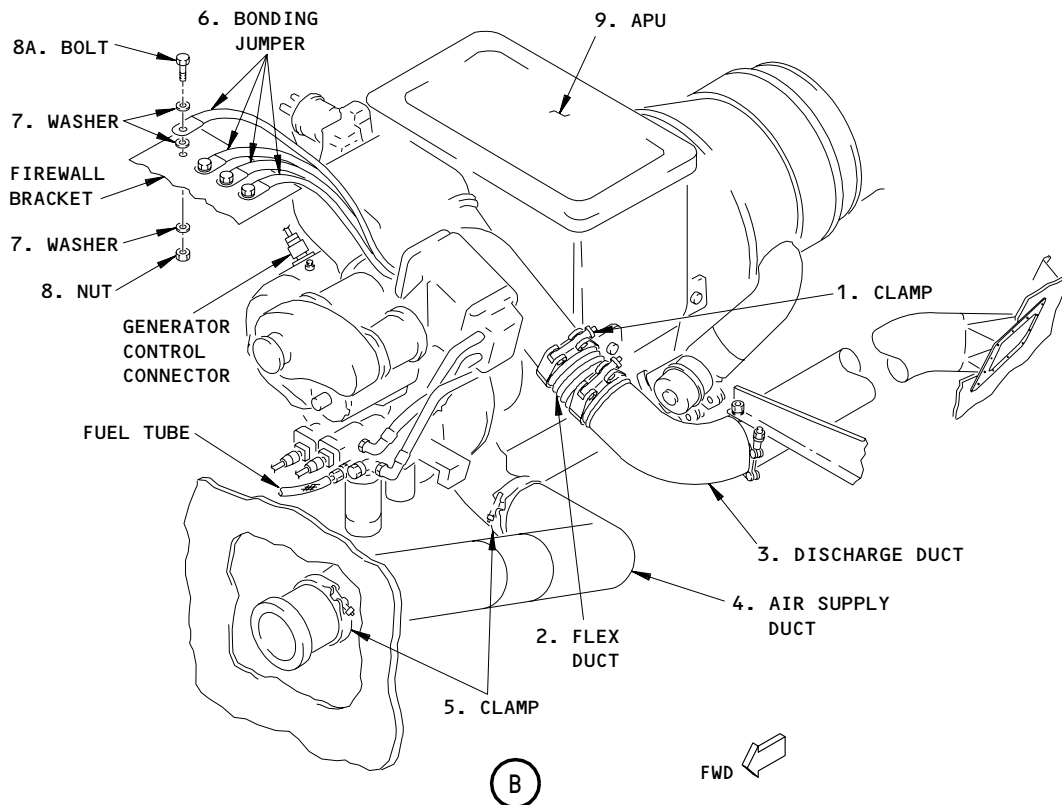
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APU FIREWALL CONNECTIONS

(A)



(B)

APU Installation (Fishpole Hoist Procedure)  
Figure 401 (Sheet 1)

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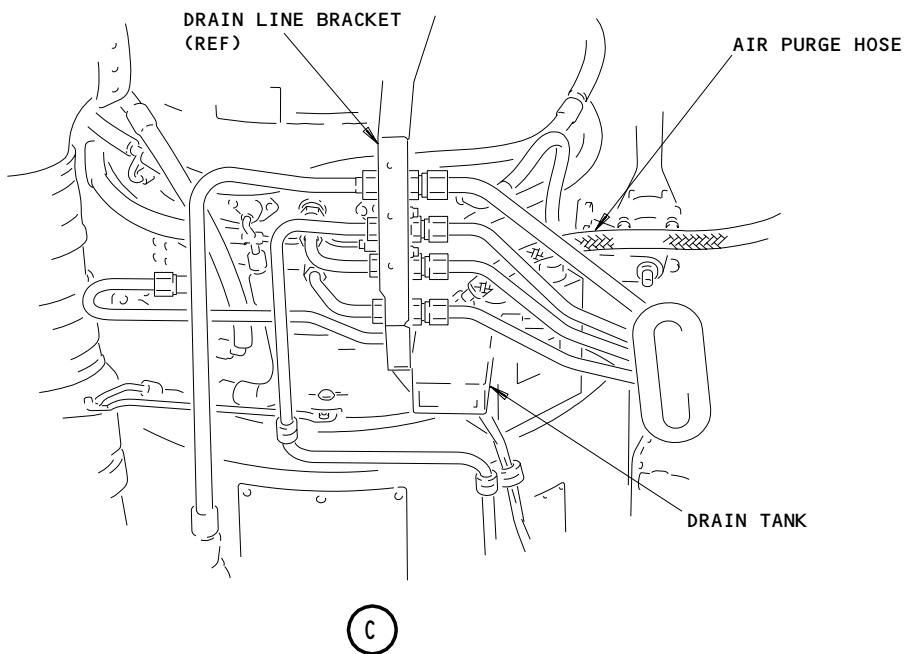
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APU Installation (Fishpole Hoist Procedure)  
Figure 401 (Sheet 2)

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S 034-018

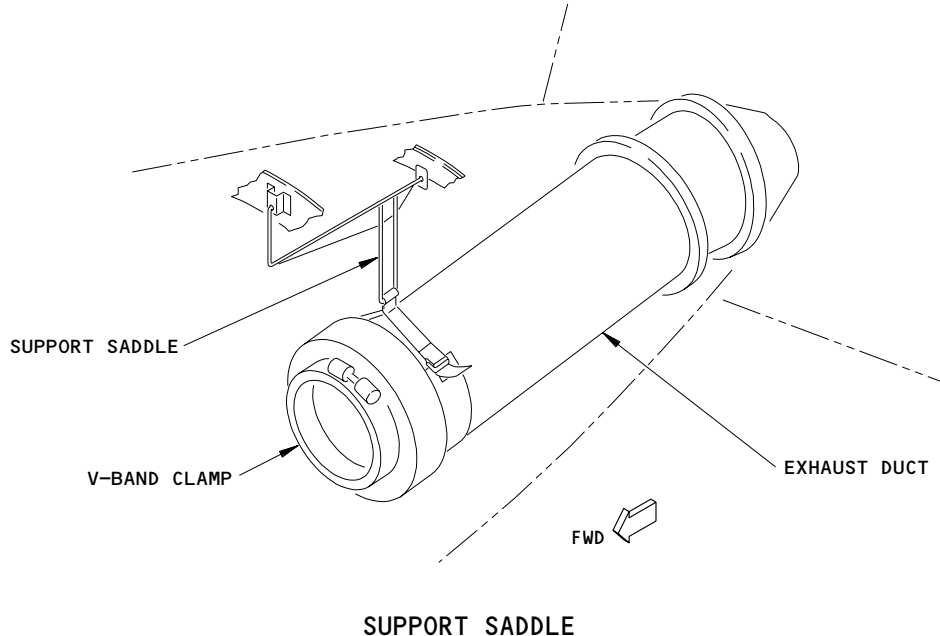
- (13) Disconnect the fuel tube at the fuel control unit.  
(a) Drain the fuel from the fuel tube.  
(b) Put caps on the fuel tube.

S 484-173

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU. A CABLE THAT IS NOT EQUALLY WOUND CAN CAUSE THE APU TO FALL SUDDENLY. THIS CAN CAUSE DAMAGE TO THE APU.

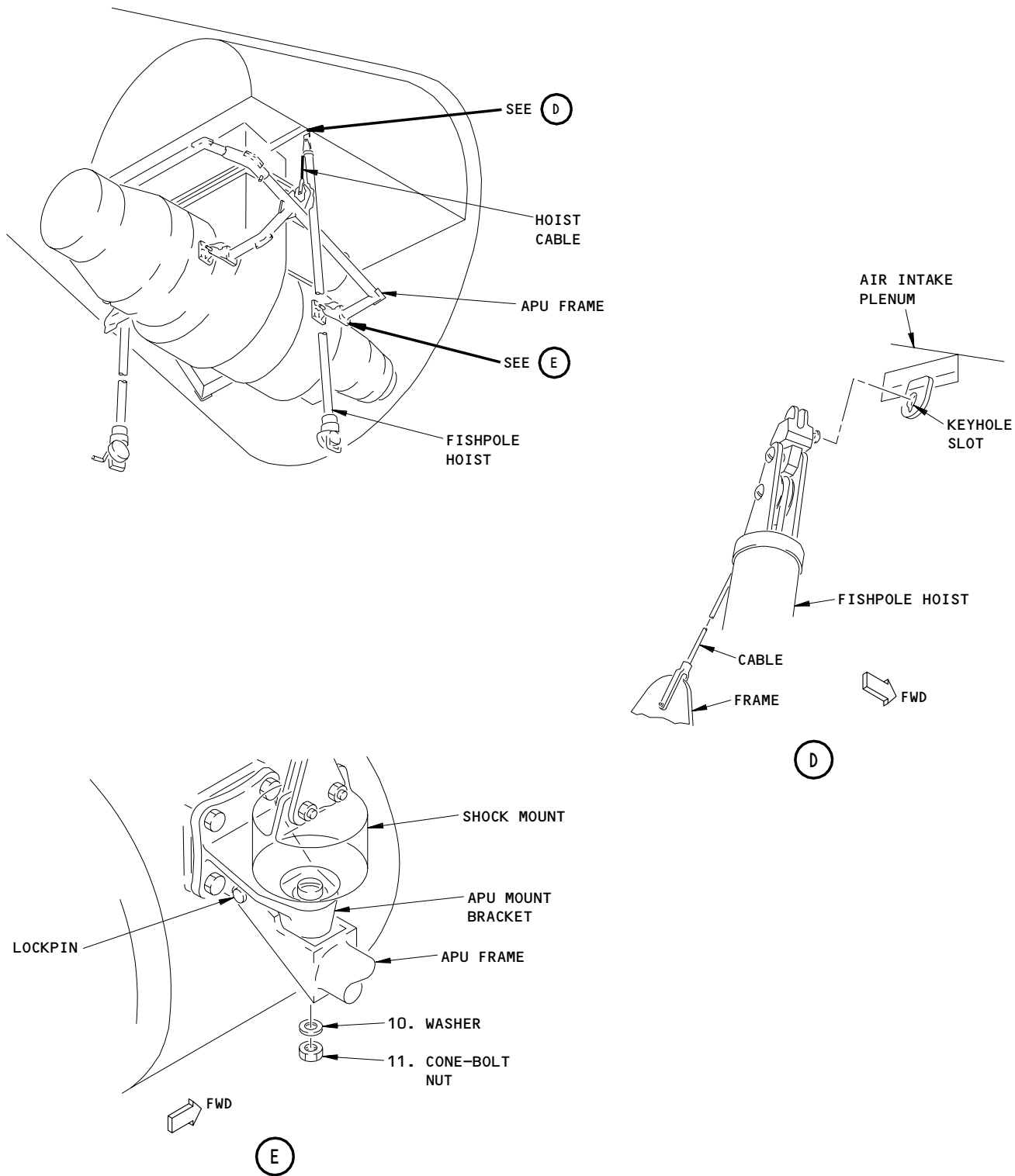
- (14) Install the fishpole hoists:  
(a) Examine the keyhole slot area for any damage before you install the fishpole hoist.  
(b) Install the fishpole hoists in the keyhole slots on the plenum.  
(c) Make sure the fishpole hoists are correctly installed.



APU Installation (Fishpole Hoist Procedure)  
Figure 401 (Sheet 3)

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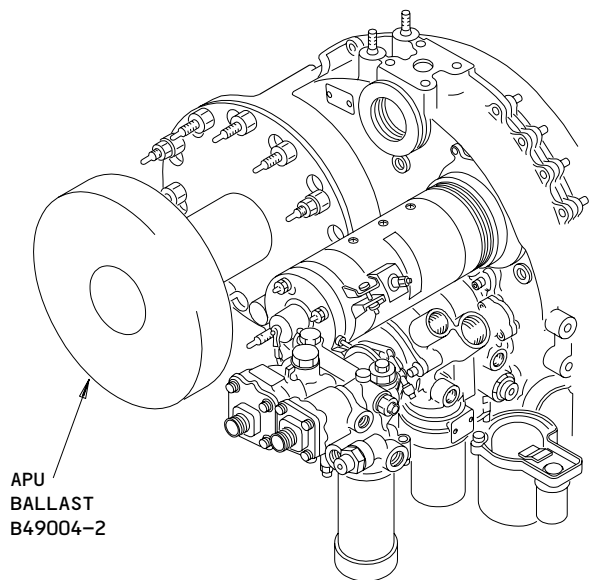
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APU Installation (Fishpole Hoist Procedure)  
Figure 401 (Sheet 4)

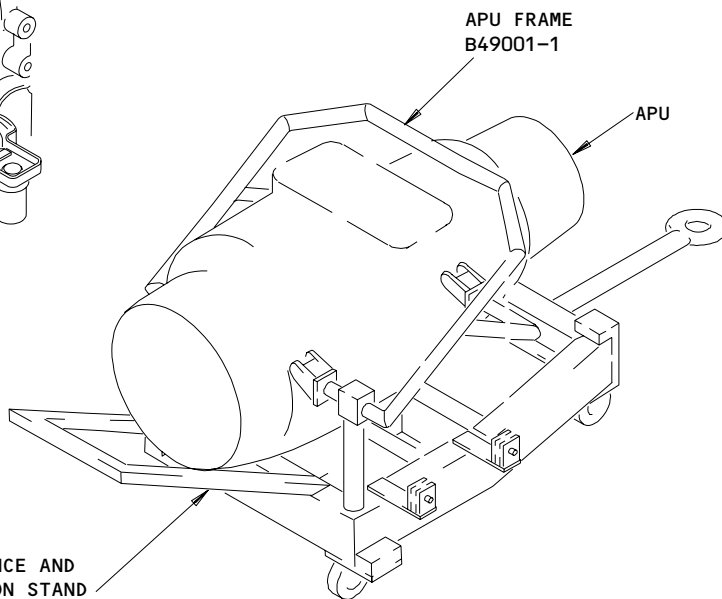
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APU BALLAST  
B49004-2

APU BALLAST

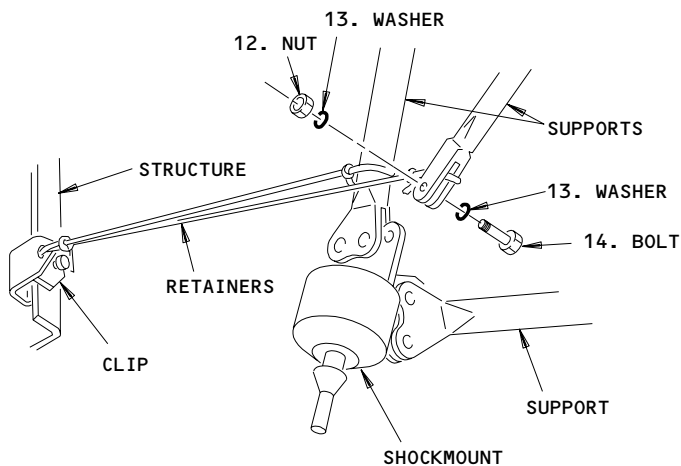


APU FRAME  
B49001-1

APU

APU MAINTENANCE AND  
TRANSPORTATION STAND

APU MAINTENANCE  
AND TRANSPORTATION STAND



SUPPORT RETAINER

APU Installation (Fishpole Hoist Procedure)  
Figure 401 (Sheet 5)

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(d) Extend the fishpole hoists to a length that is easy to use.

S 494-020

- (15) Install the frame on the APU.  
(a) Align the frame on the APU and install the lockpins.  
(b) Attach the fishpole hoist cables to the frame.

S 494-021

**WARNING:** INSTALL THE BALLAST ON THE CRADLE IF THE GENERATOR IS REMOVED. WITHOUT THE GENERATOR, THE APU IS NOT BALANCED AND CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

- (16) If the generator is removed, install the ballast on the cradle before you remove the APU.

S 824-024

- (17) Tighten the cables a sufficient amount to take the weight off of the APU mounts.

**NOTE:** The weight of an APU with oil in it and the support equipment is approximately 700 pounds (320 Kg).

S 024-208

- (18) Remove the cone bolt nuts (11) and the washers (10) from the forward and aft mounts.

**NOTE:** Use an open end wrench on the shaft flats between the mount bracket and the shockmount. This holds the shaft while you remove the cone bolt nuts.

S 824-026

- (19) Lower the APU (9) until the mount brackets are free of the cone bolts.

S 024-210

- (20) Remove the nut (12), the washers (13), and the bolt (14) to disconnect the lateral support from the left aft shockmount.

S 494-028

- (21) Move both of the aft shockmounts outboard and install the B49004-8 retainers on the supports.

S 824-029

- (22) Lower the APU (9) onto the maintenance and transportation stand.  
(a) Disconnect the fishpole hoist cables from the frame.

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S 094-031

- (23) If you do not install a new APU immediately, remove the fishpole hoists from the airplane.

S 214-238

- (24) Visually examine the air supply duct for signs of oil and other contamination.
- (a) If you find signs of oil and other contamination, then do these tasks:
- 1) Clean the air supply duct. To clean it, do this task: Clean the Titanium Ducts (AMM 36-11-01/701).
  - 2) Remove the oil contamination from the air conditioning and pneumatic systems. To remove it, do this task: Removal of Oil Contamination from the Air Conditioning and Pneumatic Systems (AMM 21-00-01/201).

TASK 49-11-01-404-032

3. APU Installation (Fishpole Hoist Procedure) (Fig. 401)

**NOTE:** If you install a new APU, install the bonding jumper (6), the generator cables (10), and the starter motor cables (11) with the APU on the ground. Also, do the APU - Servicing procedure (AMM 12-13-04/301) before you install the APU.

A. Equipment

- (1) APU Frame Assy - B49001-1
- (2) APU Maintenance and Transportation Stand - B49002-64 preferred; B49002-1 optional
- (3) APU Support Equip - B49004-1 Includes the following items:
  - (a) APU Generator Ballast - B49004-2
  - (b) APU Exhaust Duct Support Equip - B49004-11
  - (c) Support Retainers - B49004-8
  - (d) APU Cone Bolt Thread Protector - B49004-7
- (4) PF51-011-1 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
- (5) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ
- (6) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products 2719 Pacific Avenue,  
Everett, WA 98201

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301)

C. Parts

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AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	Auxiliary Power Unit Assembly	49-11-01	01	150, 151 or 155

D. References

- (1) AMM 12-13-04/301, Servicing (Oil Replenishing)
- (2) AMM 24-21-01/401, APU Generator
- (3) AMM 49-11-00/201, Auxiliary Power Unit
- (4) AMM 49-13-00/601, APU Mounts
- (5) AMM 49-61-05/201, APU Control Unit
- (6) AMM 49-94-04/201, Oil Quantity Transmitter

E. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

- (2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

F. Install the Auxiliary Power Unit

S 214-033

- (1) Before you install the APU, visually examine both the airplane and the APU mount assemblies for cracks, wear, or damage (AMM 49-13-00/601).

S 434-081

- (2) If it is necessary, remove the protective covers from the APU inlet plenum and from the APU exhaust duct.

S 214-140

- (3) Examine the APU inlet plenum and air inlet ducts for foreign objects, chips and cracks.

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S 214-176

- (4) Do a check for the oil quantity transmitter on the new APU (AMM 49-94-04/201):

**NOTE:** The part number for the oil quantity transmitter is 8TJ99GGE1 (Boeing part number S351N101-1).

- (a) If the oil quantity transmitter is not installed, then do these steps if you want to replace with an oil quantity transmitter:

**NOTE:** The low oil level switch or the oil quantity transmitter can be installed on the new APUs.

- 1) Remove the low oil level switch from the new APU.
- 2) Do this task: Oil Quantity Transmitter Installation (AMM 49-94-04/201).

S 484-175

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU. A CABLE THAT IS NOT EQUALLY WOUND CAN CAUSE THE APU TO FALL SUDDENLY. THIS CAN CAUSE DAMAGE TO THE APU.

- (5) Install the fishpole hoists:
- (a) Examine the keyhole slot area for any damage before you install the fishpole hoist.
  - (b) Install the fishpole hoists in the keyhole slots.
  - (c) Make sure the fishpole hoists are correctly installed.

S 494-035

- (6) Align the frame on the APU and install the lockpins.

S 824-036

- (7) Put the APU in position below the APU compartment.

S 494-037

- (8) Attach the hoist cables to the frame.

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S 494-038

**WARNING:** INSTALL THE BALLAST ON THE CRADLE IF THE GENERATOR IS REMOVED. WITHOUT THE GENERATOR, THE APU IS NOT BALANCED AND CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

- (9) Install the ballast on the cradle if the generator is removed.

S 824-042

- (10) Lift the APU with the fishpole hoists until the mount brackets are just below the cone bolts.

**NOTE:** The weight of an APU with oil and the support equipment is approximately 700 pounds (320 Kg).

S 094-043

- (11) Remove the B49004-8 support retainers.

S 424-211

- (12) Connect the lateral support to the left aft shockmount with the bolt (14), the washers (13), and the nut (12).

S 824-045

**CAUTION:** MAKE SURE YOU OPERATE THE HOIST MANUALLY AND CAREFULLY LIFT THE APU SO YOU DO NOT DAMAGE THE CONE SURFACE ON THE MOUNT BRACKET.

- (13) If the hoist has a pneumatic motor, set the hoist to manual operation.

S 824-104

- (14) Lift the APU until the cone bolts are engaged.

S 434-046

- (15) Remove the thread protectors from the cone bolts.

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S 424-213

- (16) Install new cone bolt washers (10) and nuts (11) or use washers and nuts that had a dye penetrant inspection.

NOTE: Use an open-end wrench on the shaft flats between the mount bracket and the shockmount to hold the shaft.

- (a) Do the torque limit test for the nuts (11):
- 1) Tighten the nuts to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

NOTE: Use an open-end wrench on the shaft flats between the APU mounting bracket and shockmount to hold the shaft.

- 2) Make sure the washers do not touch the bottom this point surface of the APU mounting brackets.
  - 3) Make sure the break-away torque necessary to turn the three nuts from this position is more than 14 inch-pounds (1.6 newton-meters).
  - 4) Replace the nut(s) that do not meet the torque limits in the above steps.
- (b) Tighten the nuts completely to 475-525 inch-pounds (53.7-59.3 newton-meters).

S 094-048

- (17) Remove the frame from the APU.
- (a) Disconnect the hoist cables from the frame.
  - (b) Remove the lockpins and the frame.

S 094-050

- (18) Remove the fishpole hoists from the airplane.

S 424-193

- (19) Attach the bonding jumpers (6) to the firewall with the washers (7), the bolts (8A), and the nuts (8).

S 424-194

- (20) Remove the dust caps from all of the air ducts.

S 424-195

- (21) Install the air supply duct (4) and tighten the clamps (5) to 50-70 inch-pounds (5.7-7.9 newton-meters).

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S 424-196

**CAUTION:** MAKE SURE THE COOLING AIR DUCT IS ALIGNED CORRECTLY AND IS NOT DAMAGED. THE COOLING AIR DUCT MUST BE CORRECTLY INSTALLED OR THE OIL TEMPERATURE CAN NOT BE SUFFICIENTLY DECREASED.

(22) Install the duct (2) on the oil cooler and tighten the clamp (1) to 10-20 inch-pounds (1.1-2.3 newton-meters).

S 424-197

**CAUTION:** DO NOT TWIST THE FUEL TUBE OR YOU CAN CAUSE A BLOCKAGE AND THE APU CAN NOT GET ENOUGH FUEL.

(23) Remove the caps from the fuel tube.

S 424-198

(24) Install the fuel tube.

S 424-199

(25) Connect the generator control to the APU.

S 424-200

(26) Connect the air purge hose to the drain tank.

S 424-202

(27) Remove the caps from the electrical connectors.

S 424-203

(28) Connect the APU harness, the generator cables, and the starter motor cables at the firewall.

**NOTE:** Connect the starter motor cables at the starter motor, if they were disconnected.

S 424-204

(29) Put the APU harness, the generator cables, and the starter motor cables in the clamps on the APU and on the firewall.

S 424-205

(30) Connect the exhaust duct to the APU and tighten the V-band clamp to 70-90 inch-pounds (7.9-10.2 newton-meters).

S 094-064

(31) Remove the saddle for the exhaust duct.

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S 424-206

- (32) Make sure the protective cover on the oil cooler vent is removed.

NOTE: The oil cooler vent is downstream of the APU oil cooler.

S 614-066

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

CAUTION: DO NOT MIX OIL OF DIFFERENT TYPES OR BRAND NAMES UNLESS YOU ARE SURE THEY ARE CHEMICALLY THE SAME. SOME OILS WILL CHEMICALLY CHANGE WHEN YOU MIX THEM. THIS CAN CAUSE DAMAGE TO THE APU.

- (33) Do the APU - Servicing procedure if it is necessary (AMM 12-13-04/301).

S 214-067

- (34) Make sure the drain tubes are within the drain mast assembly.

S 214-262

- (35) Make sure the PCD2 tube has a minimum clearance of 0.2 inch (5.0 mm) from the aft right side vertical and diagonal support rods. You can adjust the p-clamps that hold the PDC2 line to the APU inlet plenum to obtain the correct clearance.

S 424-068

- (36) If necessary, install the generator (AMM 24-21-01/401).

S 864-069

- (37) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:  
(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-070

- (38) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:  
(a) APU CONT

S 864-071

- (39) Remove the DO-NOT-OPERATE tag from the APU master control switch.

S 864-072

- (40) Erase the BITE memory (AMM 49-61-05/201).

S 864-075

- (41) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).  
(a) Make sure the APU operates correctly.  
(b) Examine the APU for leakage.

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S 864-076

- (42) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).

S 744-077

- (43) Do the APU Control Unit BITE procedure (AMM 49-61-05/201).

S 414-078

- (44) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access door.

TASK 49-11-01-004-107

4. APU Removal (Hydraulic Jack Procedure) (Fig. 402)

A. References

- (1) AMM 21-00-01/201, Air Conditioning System Oil Contamination (Removal)
- (2) AMM 36-11-01/701, Pneumatic Duct

B. Special Tools and Equipment

- (1) APU Support Equip - B49004-1 Includes the following items:
  - (a) APU Generator Ballast - B49004-2
  - (b) APU Exhaust Duct Support Equip - B49004-11
  - (c) Support Retainers - B49004-8
  - (d) APU Cone Bolt Thread Protector - B49004-7
- (2) APU Cradle Jack Equip - A49001-73 (optional to A49001-78) or A49001-83 (optional to A49001-84)
- (3) APU Cradle Ballast - A49001-3
- (4) Cradle Adapter J20009-70 (Includes Rod Assembly, Clamp Plate and Plate)
- (5) APU Transportation Dolly - A49003-12
- (6) Hydraulic Jack Assembly - J20009-78
- (7) Exhaust Duct Support Equipment - A49004-1 (Includes Two Clip Assemblies, Two Ropes, Saddle Assembly and Three Thread Protectors)

C. Standard Tools and Equipment

- (1) Container - 1.5 U.S. Gallon (6 Liter) capacity, for fuel

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D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Prepare to Remove the Auxiliary Power Unit

S 864-109

- (1) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-110

- (2) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:  
(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-111

- (3) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:  
(a) APU CONT

S 014-112

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Open the latches on the APU access door.  
(b) Open the left access door.  
(c) Push the right access door up and pull the spring latch aft until the latch disengages.  
(d) Open the right access door.  
(e) Engage the support rods for the APU access door.

F. Prepare for the APU Cradle and Hydraulic Jack Installation

S 484-113

- (1) Do these steps to install the APU cradle on the jack assembly:  
(a) Make sure the cradle adapter is installed on the jack assembly.  
(b) Put the APU cradle above the cradle adapter and jack assembly.  
(c) Slowly lower and put the baseplate of the APU cradle between the four pegs of the cradle adapter.  
(d) Make sure the APU cradle is centered on the cradle adapter.

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(e) Put the clamp plate on the rod assembly.

NOTE: The rod assembly, clamp plate and plate are three parts of the cradle adapter.

(f) Put the rod assembly with the clamp plate below the hole on the cradle adapter.

(g) Put the rod assembly through the hole on the cradle adapter and the hole on the baseplate of the APU cradle.

(h) Install the plate on the rod assembly.

(i) Tighten the rod assembly until the clamp plate and plate can hold the APU cradle and cradle adapter together.

(j) Make sure the APU cradle is correctly attached to the plate and cradle adapter.

G. Remove the Auxiliary Power Unit

S 034-126

(1) Remove the APU harness, the generator cables, and the starter motor cables from clamps on the APU and firewall.

S 034-127

(2) Disconnect the APU harness, the generator cables, and the starter motor cables at the firewall.

NOTE: You can disconnect the starter motor cables at the starter motor.

S 034-128

(3) Remove the nuts (8), the bolts (8A), and the washers (7) at firewall to disconnect the bonding jumpers (6).

S 034-129

(4) Disconnect the generator control connector from the generator.

S 034-130

(5) Loosen the clamp (1) and move it onto the flex duct (2).

(a) Pull the flex duct (2) up and away from the oil cooler.

S 034-131

(6) Remove the clamp (5) from the air supply duct on the left side of the APU.

S 034-132

(7) Loosen the other clamp (5) at the firewall and remove the air supply duct (4).

S 034-133

(8) Put dust caps on the air supply duct and on the oil-cooler exhaust duct.

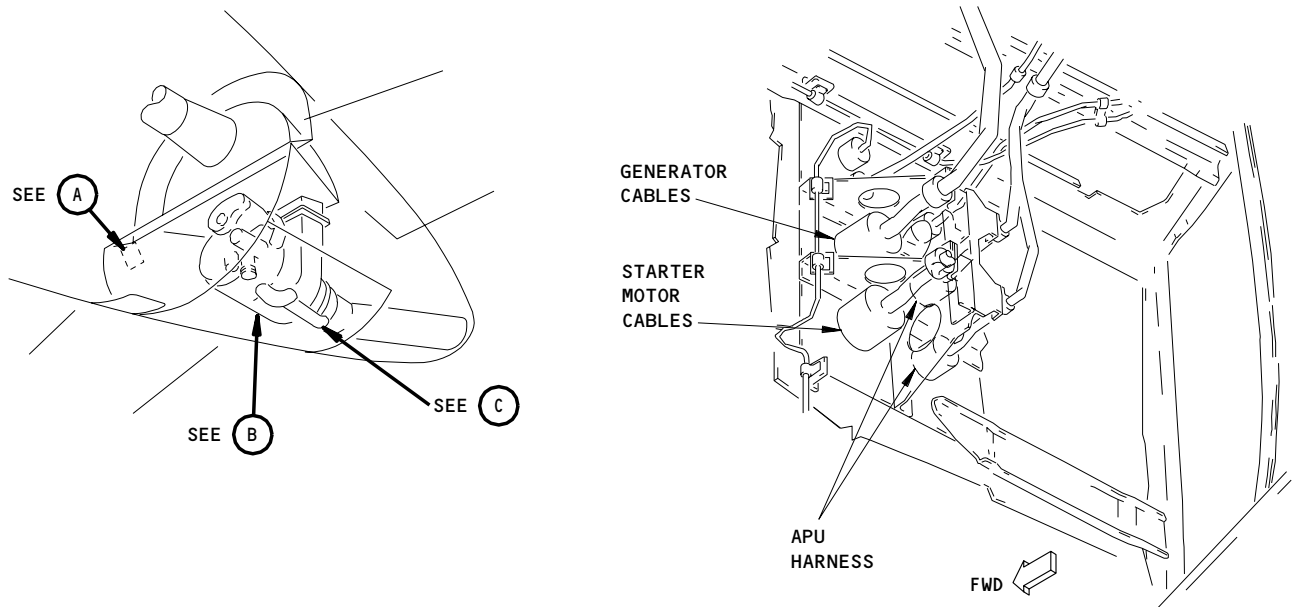
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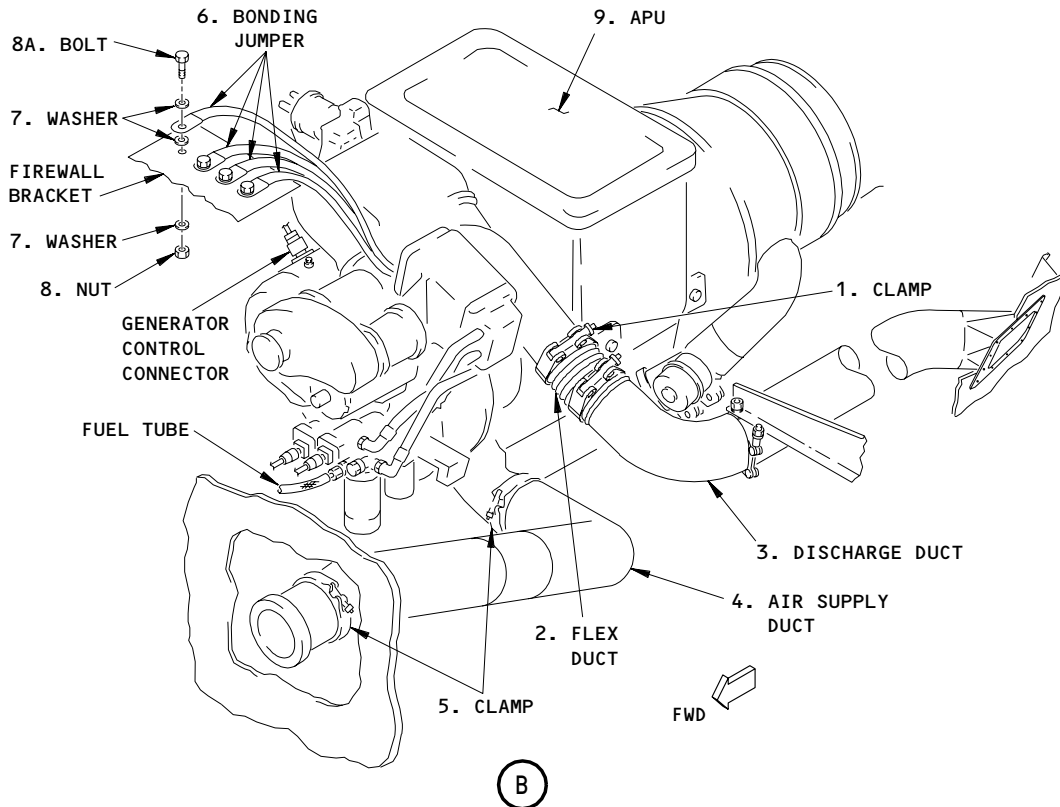
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APU FIREWALL CONNECTIONS

(A)



APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 1)

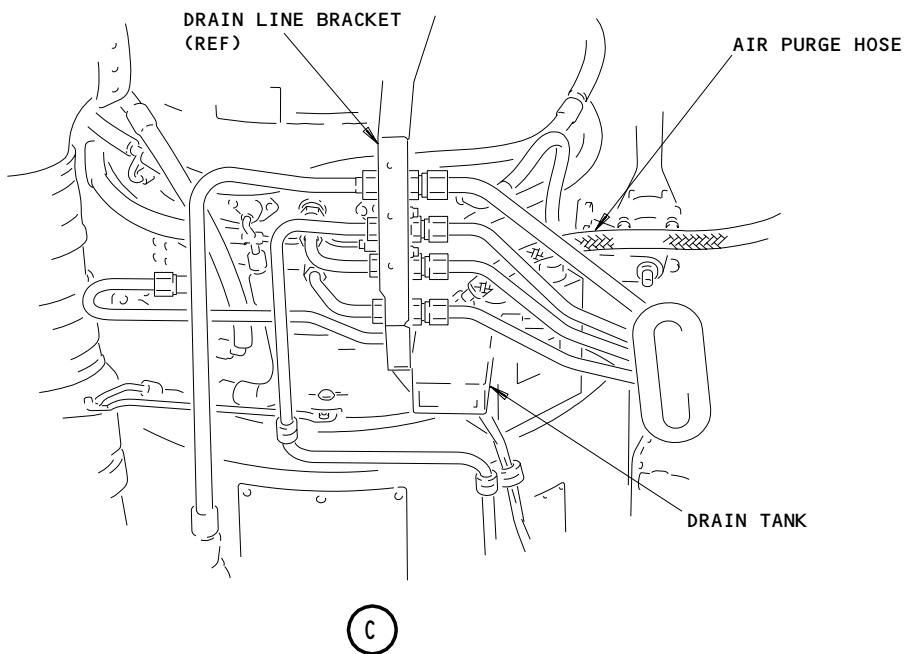
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APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 2)

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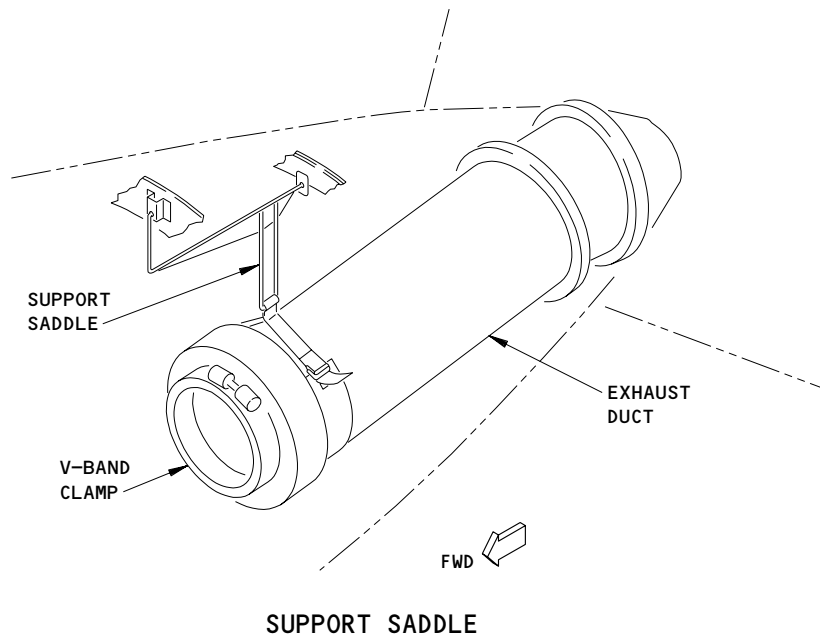
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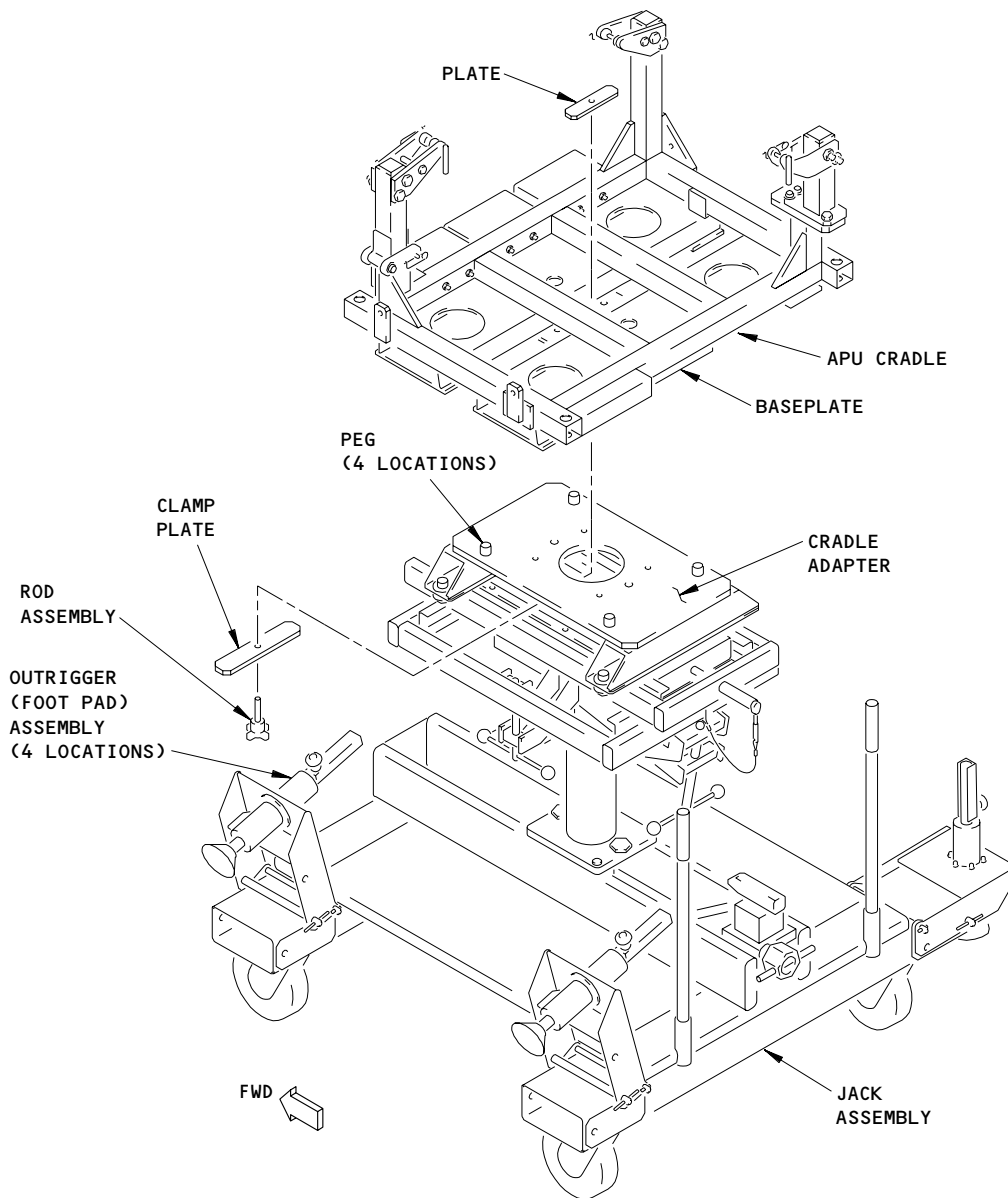
- S 024-215  
(9) Disconnect the air purge hose from the drain tank.
- S 494-136  
(10) Install the support saddle for the APU exhaust duct.
- S 034-137  
(11) Loosen the V-band to disconnect the exhaust duct.  
(a) Move the exhaust duct aft.
- S 494-138  
(12) Put the container below the fuel control unit.



APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 3)

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JACK ASSEMBLY

APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 4)

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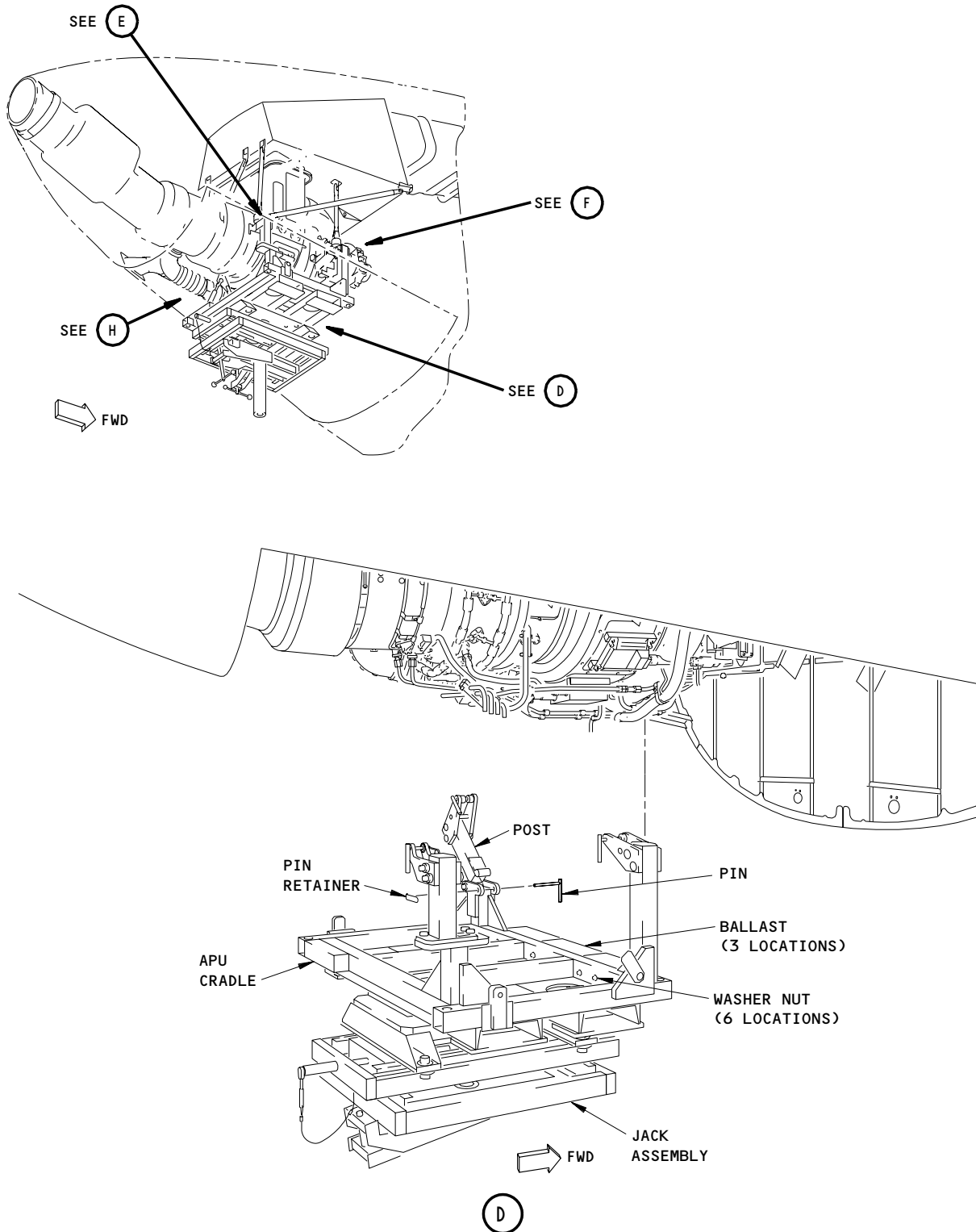
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APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 5)

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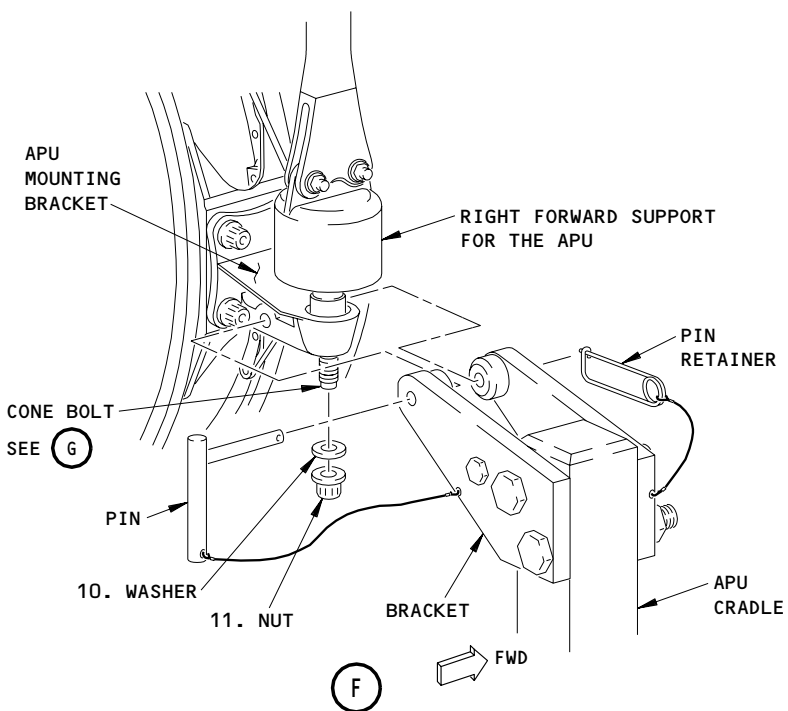
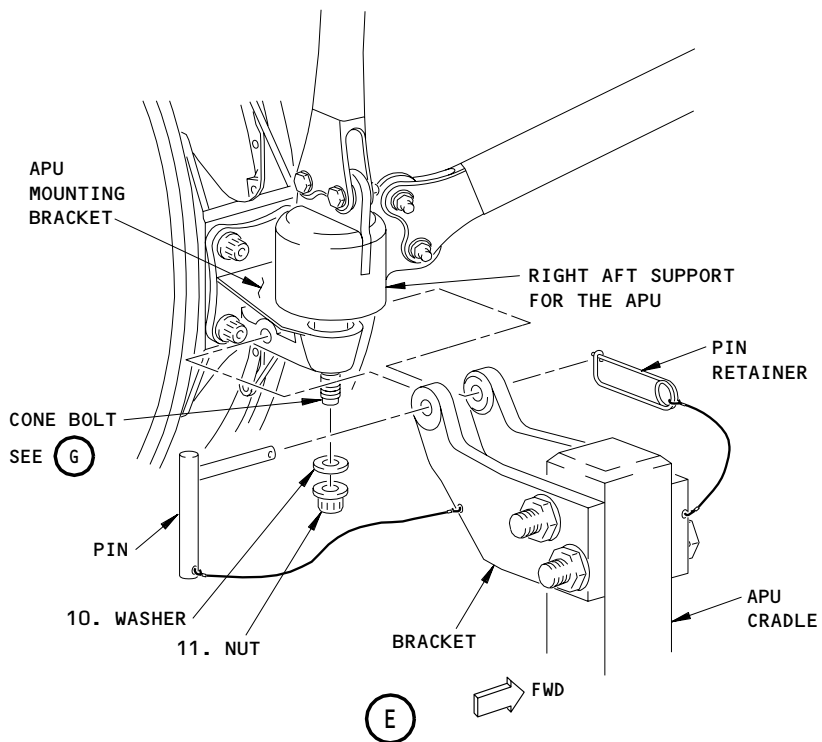
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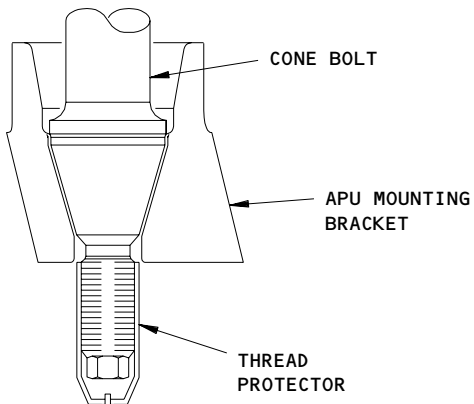




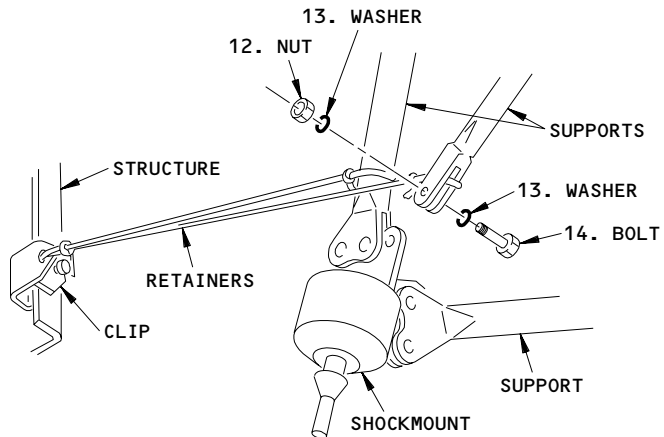
APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 6)

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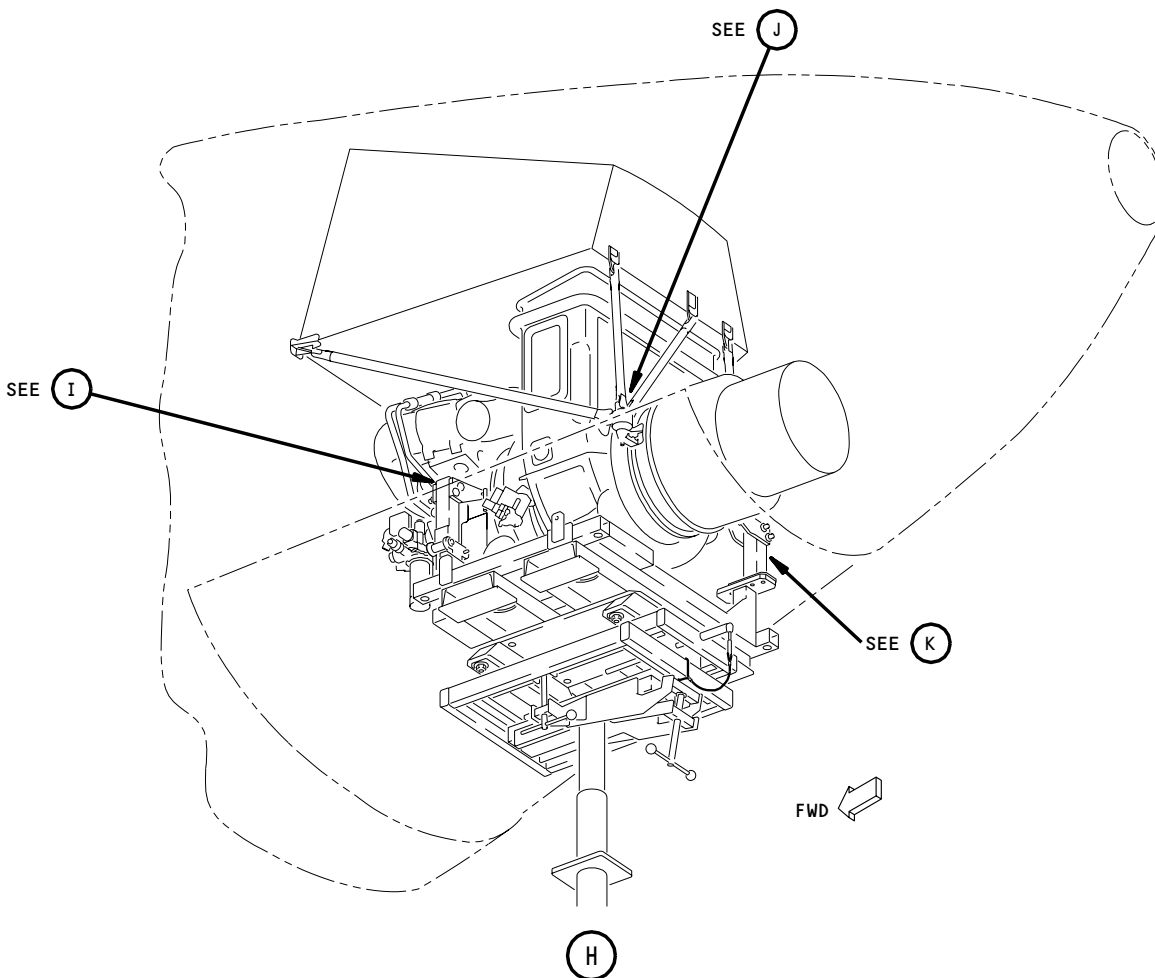
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G



SUPPORT RETAINER



APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 7)

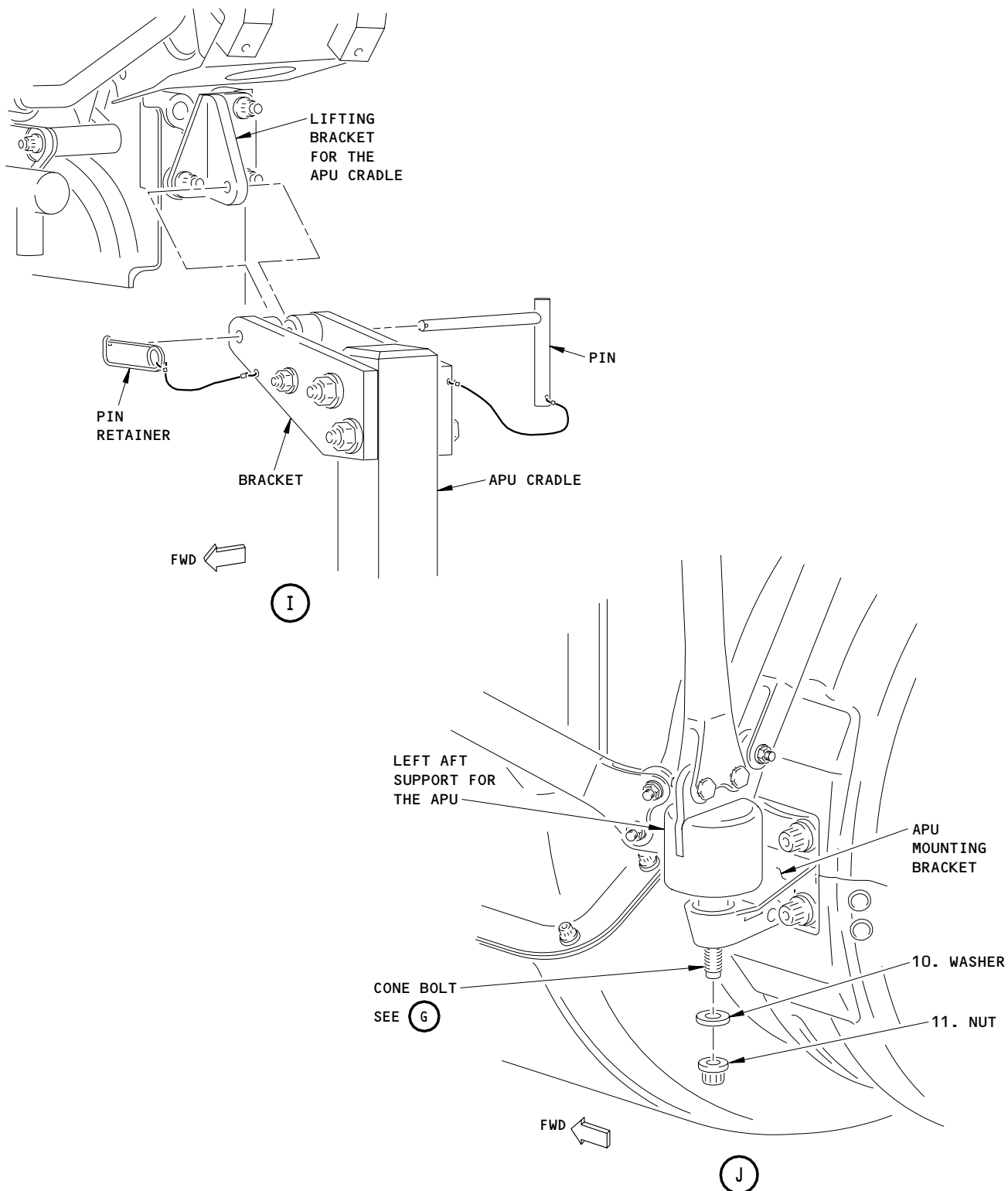
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APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 8)

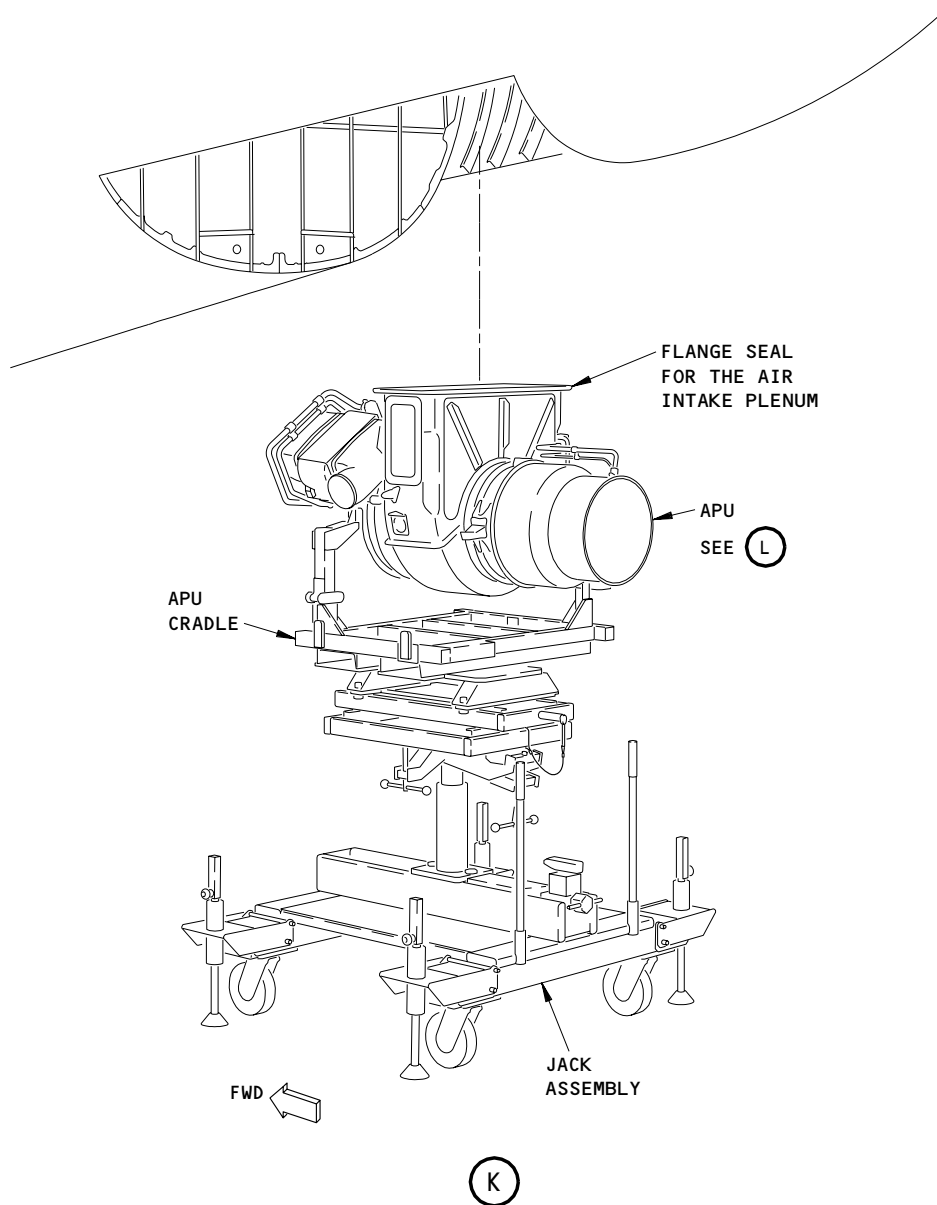
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APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 9)

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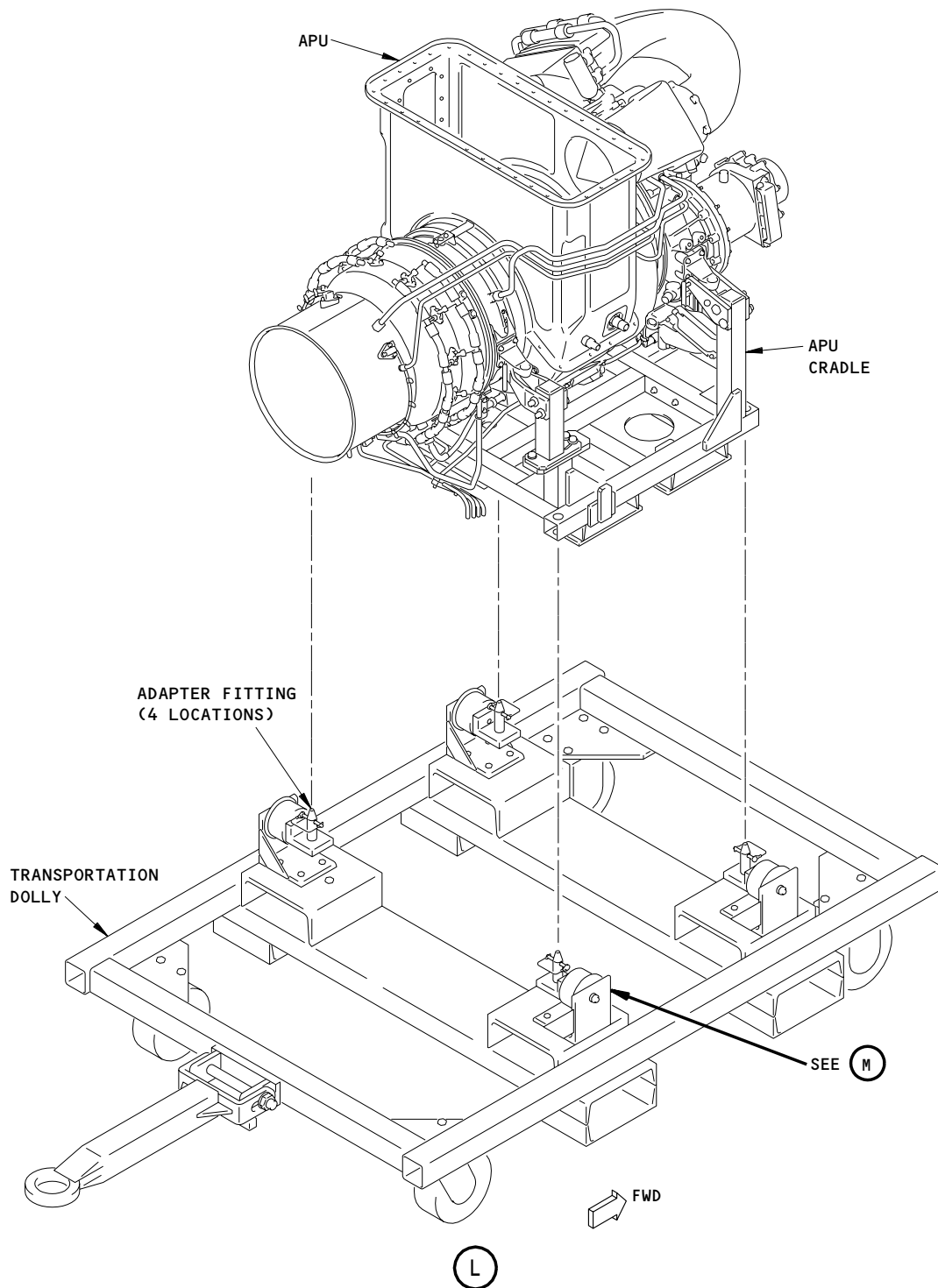
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APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 10)

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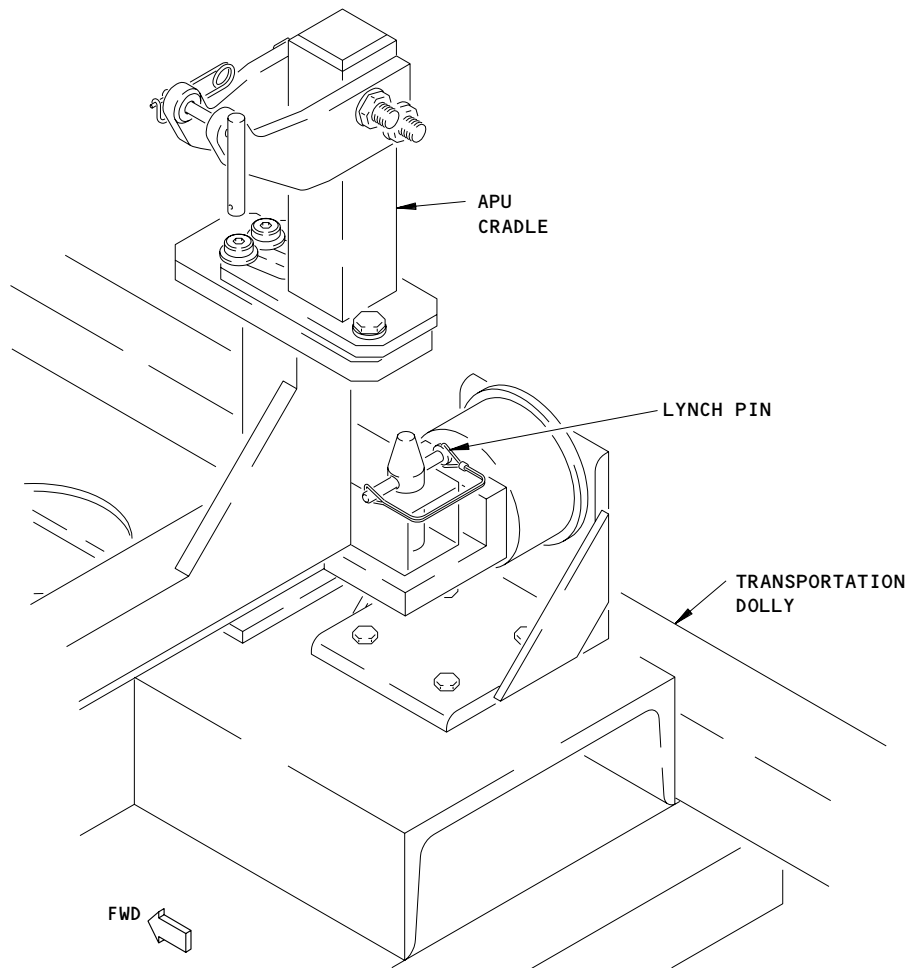
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TRANSPORTATION DOLLY INSTALLATION  
(4 LOCATIONS)



APU Installation (Hydraulic Jack Procedure)  
Figure 402 (Sheet 11)

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S 034-139

- (13) Disconnect the fuel tube at the fuel control unit.
  - (a) Drain the fuel from the fuel tube.
  - (b) Put caps on the fuel tube.

H. APU Cradle and Jack Assembly Installation

S 484-114

- (1) Do these steps to attach the APU cradle to the APU:
  - (a) Put the APU cradle and jack assembly on the maintenance stand.
  - (b) Make sure the jack assembly is centered below the APU.
  - (c) Put the four outrigger (foot pad) assemblies in the down position.
  - (d) Turn the knob on each of the four outrigger (foot pad) assemblies clockwise until the bottom of each foot pad touches the maintenance stand.
  - (e) Remove the pin retainer and pin from the post.
  - (f) Turn the post outboard from the APU cradle to make sure there is no interference between the post and the APU.

**WARNING:** MAKE SURE THE THREE BALLASTS ARE INSTALLED ON THE APU CRADLE IF THE APU GENERATOR IS REMOVED FROM THE APU. THE APU IS NOT BALANCED IN THE APU CRADLE WITHOUT THE THREE BALLASTS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (g) If the APU generator is not installed on the APU, install the three ballasts on the APU cradle with the six washers and six nuts.

**NOTE:** One ballast weighs approximately 26 pounds (11.8 kilograms).

- (h) If the APU generator is installed on the APU and the three ballasts are installed on the APU cradle, remove the six nuts, six washers and the three ballasts.
- (i) Lift the maintenance stand to the APU compartment.
- (j) Lift the jack assembly until the two brackets on the APU cradle align with the two APU mounting brackets on the right aft support and right forward support for the APU.
- (k) Turn the post inboard and install the pin and pin retainer.
- (l) Make sure the bracket on the APU cradle aligns with the lifting bracket for the APU cradle.
- (m) Install the three pins in the two APU mounting brackets and lifting bracket for the APU cradle.
- (n) Install the three pin retainers in the three pins.

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- (o) Use the jack assembly to lift the APU sufficiently to remove the weight of the APU from the two APU mounting brackets and the lifting bracket for the APU cradle.

NOTE: The weight of an APU with no APU generator is approximately 588 pounds (267 kilograms). The weight of an APU with the APU generator is approximately 651 pounds (296 kilograms).

S 024-169

- (2) Do these steps to remove the APU:
  - (a) Remove the cone bolt nuts (11) and the washers (10) from the forward and aft mounts.

NOTE: Use an open end wrench on the shaft flats between the mount bracket and the shockmount. This holds the shaft while you remove the cone bolt nuts.

- (b) Slowly lower the APU until the three cone bolts are clear from the three APU mounting brackets.
- (c) Remove the nut (12), the washers (13), and the bolt (14) to disconnect the lateral support from the left aft shockmount.
- (d) Move both of the aft shockmounts outboard and install the B49004-8 retainers on the supports.
- (e) Attach one end of the rope and clip assembly on the airplane stringer near the right aft support for the APU.

NOTE: The rope and clip assembly are a part of the exhaust duct support equipment.

- (f) Move the right aft support for the APU as far outboard as possible and attach the other end of the rope to it.

CAUTION: BE CAREFUL WHEN YOU MOVE THE APU IN THE APU COMPARTMENT. YOU MUST MOVE THE APU AND JACK ASSEMBLY APPROXIMATELY 3 INCHES (7.6 CM) TO THE RIGHT OUTBOARD SIDE OF THE APU COMPARTMENT AFTER THE THREE CONE BOLTS ARE CLEAR FROM THE THREE APU MOUNTING BRACKETS. DAMAGE TO THE APU, AIR INTAKE PLENUM AND THE LEFT AFT SUPPORT FOR THE APU CAN OCCUR.

- (g) Move the APU and jack assembly approximately 3 inches (7.6 cm) to the right outboard side of the APU compartment.
- (h) Use the jack assembly to slowly lower the APU out of the APU compartment.
- (i) Use the maintenance stand to lower the APU and jack assembly to the ground.
- (j) Move the APU and jack assembly away from the APU compartment and the maintenance stand.

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- (k) Remove the plate, clamp plate and rod assembly from the APU cradle and jack assembly.
- (l) Use the forklift to lift the APU and APU cradle from the jack assembly.
- (m) Put the four outrigger (foot pad) assemblies in the up position and remove the jack assembly from the area.
- (n) If the transportation dolly is not available, remove the APU and APU cradle from the area.
- (o) Do these steps if the transportation dolly is available:
  - 1) Put the transportation dolly near the APU and APU cradle.
  - 2) Slowly lower the APU and APU cradle until the four holes on the APU cradle align with the four adapter fittings on the transportation dolly.
  - 3) Install the APU and APU cradle on the transportation dolly.
  - 4) Install the four lynch pins in the four adapter fittings on the transportation dolly.
  - 5) Remove the APU, APU cradle and transportation dolly from the area.

S 214-239

- (3) Visually examine the air supply duct for signs of oil and other contamination.
  - (a) If you find signs of oil and other contamination, then do these tasks:
    - 1) Clean the air supply duct. To clean it, do this task: Clean the Titanium Ducts (AMM 36-11-01/701).
    - 2) Remove the oil contamination from the air conditioning and pneumatic systems. To remove it, do this task: Removal of Oil Contamination from the Air Conditioning and Pneumatic Systems (AMM 21-00-01/201).

S 944-116

- (4) Make sure you install all the necessary protection covers.

TASK 49-11-01-404-108

5. APU Installation (Hydraulic Jack Procedure) (Fig. 402)

A. Special Tools and Equipment

- (1) APU Support Equip - B49004-1 Includes the following items:
  - (a) APU Generator Ballast - B49004-2
  - (b) APU Exhaust Duct Support Equip - B49004-11
  - (c) Support Retainers - B49004-8
  - (d) APU Cone Bolt Thread Protector - B49004-7
- (2) APU Cradle Jack Equip - A49001-73 (optional to A49001-78) or A49001-83 (optional to A49001-84)
- (3) APU Cradle Ballast - A49001-3
- (4) Cradle Adapter J20009-70 (Includes Rod Assembly, Clamp Plate and Plate)
- (5) APU Transportation Dolly - A49003-12
- (6) Hydraulic Jack Assembly - J20009-78

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- (7) Exhaust Duct Support Equipment - A49004-1 (Includes Two Clip Assemblies, Two Ropes, Saddle Assembly and Three Thread Protectors)
- B. Consumable Materials
  - (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301)
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	9	Auxiliary Power Unit Assembly	49-11-01	01	150, 151 or 155

- D. References
  - (1) AMM 12-13-04/301, Servicing (Oil Replenishing)
  - (2) AMM 24-21-01/401, APU Generator
  - (3) AMM 49-11-00/201, Auxiliary Power Unit
  - (4) AMM 49-13-00/601, APU Mounts
  - (5) AMM 49-61-05/201, APU Control Unit
  - (6) AMM 49-94-04/201, Oil Quantity Transmitter

- E. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

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F. Procedure

S 214-117

- (1) Before you install the APU, visually examine both the airplane and the APU mount assemblies for cracks, wear, or damage (Ref 49-13-00).

G. Prepare for the Installation

S 214-177

- (1) Do a check for the oil quantity transmitter on the new APU (AMM 49-94-04/201):

**NOTE:** The part number for the oil quantity transmitter is 8TJ99GGE1 (Boeing part number S351N101-1).

- (a) If the oil quantity transmitter is not installed, then do these steps if you want to replace with an oil quantity transmitter:

**NOTE:** The low oil level switch or the oil quantity transmitter can be installed on the new APUs.

- 1) Remove the low oil level switch from the new APU.
- 2) Do this task: Oil Quantity Transmitter Installation (AMM 49-94-04/201).

S 484-118

- (2) Do these steps to install the APU and APU cradle on the jack assembly:
  - (a) Put the jack assembly near the APU and APU cradle.
  - (b) Make sure the cradle adapter is installed on the jack assembly.

**WARNING:** MAKE SURE THE THREE BALLASTS ARE INSTALLED ON THE APU CRADLE IF THE APU GENERATOR IS REMOVED FROM THE APU. THE APU IS NOT BALANCED IN THE APU CRADLE WITHOUT THE THREE BALLASTS. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (c) If the APU generator is not installed on the APU, install the three ballasts on the APU cradle with the six washers and six nuts.

**NOTE:** One ballast weighs approximately 26 pounds (11.8 kilograms).

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 **BOEING**  
757  
MAINTENANCE MANUAL

- (d) If the generator is installed on the APU and the three ballasts are installed on the cradle, remove the six nuts, six washers and the three ballasts.
- (e) If the transportation dolly is not installed with the APU and APU cradle, use a forklift to lift the APU and APU cradle from the ground.

NOTE: The weight of an APU, APU cradle and the three ballasts with no APU generator is approximately 882 pounds (401 kilograms). The weight of an APU, APU cradle and APU generator is approximately 868 pounds (395 kilograms).

- (f) Do these steps if the transportation dolly is installed with the APU and APU cradle:
  - 1) Remove the four lynch pins from the four adapter fittings on the transportation dolly.
  - 2) Use a forklift to lift the APU and APU cradle from the transportation dolly.

NOTE: The weight of an APU, APU cradle and the three ballasts with no APU generator is approximately 882 pounds (401 kilograms). The weight of an APU, APU cradle and APU generator is approximately 868 pounds (395 kilograms).

- 3) Remove the transportation dolly from the area.
- (g) Put the APU and APU cradle above the cradle adapter and jack assembly.
- (h) Slowly lower and put the baseplate of the APU cradle between the four pegs of the cradle adapter.
- (i) Make sure the APU cradle is centered on the cradle adapter.
- (j) Put the clamp plate on the rod assembly.

NOTE: The rod assembly, clamp plate and plate are three parts of the cradle adapter.

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- (k) Put the rod assembly with the clamp plate below the hole on the cradle adapter.
- (l) Put the rod assembly through the hole on the cradle adapter and the hole on the baseplate of the APU cradle.
- (m) Install the plate on the rod assembly.
- (n) Tighten the rod assembly until the clamp plate and plate can hold the APU cradle and cradle adapter together.
- (o) Make sure the APU cradle is correctly attached to the plate and cradle adapter.
- (p) Put the APU, APU cradle, and cradle adapter and jack assembly on the maintenance stand.

H. APU Installation

S 944-170

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Remove the protection covers from the compressor inlet plenum, exhaust duct muffler and any other openings.

S 424-120

- (2) Do these steps to install the APU in the APU compartment:
  - (a) Make sure the APU is centered below the APU compartment and approximately 3 inches (7.6 cm) to the right outboard side of the APU compartment.
  - (b) Put the four outrigger (foot pad) assemblies on the jack assembly in the down position.
  - (c) Turn the knob on each of the four outrigger (foot pad) assemblies clockwise until the bottom of each foot pad touches the maintenance stand.
  - (d) Make sure the three thread protectors are installed on the three cone bolts.
  - (e) Do these steps to lift the APU into position:
    - 1) Hold the right forward support and left aft support for the APU in position.

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**CAUTION:** BE CAREFUL WHEN YOU MOVE THE APU IN THE APU COMPARTMENT. YOU MUST MOVE THE APU APPROXIMATELY 3 INCHES (7.6 CM) TO THE RIGHT OUTBOARD SIDE OF THE APU COMPARTMENT BEFORE YOU CONNECT THE THREE APU MOUNTING BRACKETS TO THE THREE CONE BOLTS. DAMAGE TO THE APU, AIR INTAKE PLENUM AND THE LEFT AFT SUPPORT FOR THE APU CAN OCCUR.

- 2) Slowly lift and put the APU in position until the three APU mounting brackets are below the three cone bolts and approximately 3 inches (7.6 cm) to the right outboard side of the APU compartment.
- 3) Move the APU and jack assembly approximately 3 inches (7.6 cm) to the left inboard side of the APU compartment until the three APU mounting brackets are below the three cone bolts.
- 4) Remove the rope and clip assembly from the airplane stringer and the right aft support for the APU.
- 5) Put the right aft support for the APU in position.
- 6) Make sure the three APU mounting brackets are engaged at the same time.

**CAUTION:** CAREFULLY LIFT THE APU SO THAT YOU DO NOT DAMAGE THE CONED SURFACES OF THE THREE APU MOUNTING BRACKETS.

- 7) Lift the APU until the three cone bolts are engaged.
- (f) Do these steps to install the APU to the airplane:
- 1) Remove the thread protectors from the cone bolts.
  - 2) Install new cone bolt washers (10) and nuts (11) or use washers and nuts that had a dye penetrant inspection.

**NOTE:** Use an open-end wrench on the shaft flats between the mount bracket and the shockmount to hold the shaft.

- 3) Do the torque limit test for the nuts (11):

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- 4) Tighten the nuts to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

**NOTE:** Use an open-end wrench on the shaft flats between the APU mounting bracket and shockmount to hold the shaft.

- 5) Make sure the washers do not touch the bottom this point surface of the APU mounting brackets.
- 6) Make sure the break-away torque necessary to turn the three nuts from this position is more than 14 inch-pounds (1.6 newton-meters).
- 7) Replace the nut(s) that do not meet the torque limits in the above steps.
- 8) Tighten the nuts completely to 475-525 inch-pounds (53.7-59.3 newton-meters).

#### I. APU Cradle and Jack Assembly Removal

##### S 084-121

- (1) Do these steps to remove the APU cradle and jack assembly:
  - (a) Remove the three pin retainers from the three pins on the three brackets.
  - (b) Remove the three pins from the three brackets on the APU cradle.
  - (c) Remove the pin retainer and pin from the post near the lifting bracket for the APU cradle.
  - (d) Turn the post outboard from the APU cradle to make sure there is no interference between the post and the APU.
  - (e) Use the jack assembly to slowly lower the APU cradle out of the APU compartment.
  - (f) Use the maintenance stand to lower the APU cradle and jack assembly to the ground.
  - (g) Turn the post inboard and install the pin and pin retainer on the APU cradle.
  - (h) Move the APU cradle and jack assembly away from the APU compartment and the maintenance stand.
  - (i) Remove the plate, clamp plate and rod assembly from the APU cradle and cradle adapter.
  - (j) Use the forklift to lift the APU cradle from the jack assembly.
  - (k) Put the four outrigger (foot pad) assemblies on the jack assembly in the up position.
  - (l) Remove the APU cradle and jack assembly from the area.

##### S 424-179

- (2) Attach the bonding jumpers (6) to the firewall with the washers (7), the bolts (8A), and the nuts (8).

##### S 424-180

- (3) Remove the dust caps from all of the air ducts.

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S 424-181

- (4) Install the air supply duct (4) and tighten the clamps (5) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 424-182

**CAUTION:** MAKE SURE THE COOLING AIR DUCT IS ALIGNED CORRECTLY AND IS NOT DAMAGED. THE COOLING AIR DUCT MUST BE CORRECTLY INSTALLED OR THE OIL TEMPERATURE CAN NOT BE SUFFICIENTLY DECREASED.

- (5) Install the duct (2) on the oil cooler and tighten the clamp (1) to 10-20 inch-pounds (1.1-2.3 newton-meters).

S 424-183

**CAUTION:** DO NOT TWIST THE FUEL TUBE OR YOU CAN CAUSE A BLOCKAGE AND THE APU CAN NOT GET ENOUGH FUEL.

- (6) Remove the caps from the fuel tube.

S 424-184

- (7) Install the fuel tube.

S 424-185

- (8) Connect the generator control to the APU.

S 424-186

- (9) Connect the air purge hose to the drain tank.

S 424-188

- (10) Remove the caps from the electrical connectors.

S 424-189

- (11) Connect the APU harness, the generator cables, and the starter motor cables at the firewall.

**NOTE:** Connect the starter motor cables at the starter motor, if they were disconnected.

S 424-190

- (12) Put the APU harness, the generator cables, and the starter motor cables in the clamps on the APU and on the firewall.

S 424-191

- (13) Connect the exhaust duct to the APU and tighten the V-band clamp to 70-90 pound inches (7.9-10.2 newton-meters).

S 094-154

- (14) Remove the saddle for the exhaust duct.

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S 424-192

- (15) Make sure the protective cover on the oil cooler vent is removed.

NOTE: The oil cooler vent is downstream of the APU oil cooler.

S 614-156

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

CAUTION: DO NOT MIX OIL OF DIFFERENT TYPES OR BRAND NAMES UNLESS YOU ARE SURE THEY ARE CHEMICALLY THE SAME. SOME OILS WILL CHEMICALLY CHANGE WHEN YOU MIX THEM. THIS CAN CAUSE DAMAGE TO THE APU.

- (16) Do the APU - Servicing procedure if it is necessary (AMM 12-13-04/301).

S 214-157

- (17) Make sure the drain tubes are within the drain mast assembly.

S 214-263

- (18) Make sure the PCD2 tube has a minimum clearance of 0.2 inch (5.0 mm) from the aft right side vertical and diagonal support rods. You can adjust the p-clamps that hold the PDC2 line to the APU inlet plenum to obtain the correct clearance.

S 424-158

- (19) If necessary, install the generator (AMM 24-21-01/401).

S 864-159

- (20) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:  
(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-160

- (21) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:  
(a) APU CONT

S 864-161

- (22) Remove the DO-NOT-OPERATE tag from the APU master control switch.

S 864-162

- (23) Erase the BITE memory (AMM 49-61-05/201).

S 864-165

- (24) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).  
(a) Make sure the APU operates correctly.  
(b) Examine the APU for leakage.

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S 864-166

- (25) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).

S 744-167

- (26) Do the APU Control Unit BITE procedure (AMM 49-61-05/201).

S 414-168

- (27) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage.
  - (d) Left the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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AUXILIARY POWER UNIT – MAINTENANCE PRACTICES (SYSTEM DEACTIVATION)

1. General

- A. There are two tasks in this procedure. The first task is used to do the APU system deactivation so the airplane can be used without an APU. The second task is used to do the APU system activation.
- B. It is necessary to do these steps to do the APU system deactivation: Remove the APU, safety the APU mounts, remove the exhaust duct, remove the fuel hose. It is also necessary to put caps on the electrical connectors, the pneumatic ducts, and the exhaust duct. INOP tags are also put on switches and circuit breakers in the control cabin and on the E6 rack in the Aft Equipment Center.
- C. The removal of the APU reduces the weight of the airplane by 565 pounds (257 kilograms). Refer to the Weight and Balance Manual to adjust the operational characteristics for the airplane. The APU weighs 571 pounds (260 kilograms). The APU compartment deactivation kit weighs 6 pounds (2.7 kilograms).

TASK 49-11-02-042-001

2. Do the APU System Deactivation

A. Equipment

- (1) Conversion Kit Installation – APU Removal 012N8302-1
  - (a) Placards – Switch (3)
  - (b) Placards – Circuit Breakers (9)
  - (c) Collars – Circuit Breakers (9)
  - (d) Caps – Electrical Connector (5)
  - (e) Kit, APU Removal – Compartment Deactivation 351N1011-1
    - 1) Support Assembly
    - 2) Plug Assembly, exhaust duct port
    - 3) Cap Assembly, oil cooling port
    - 4) Cap, APU bleed air duct
    - 5) Cap, fuel line
    - 6) Washers (6)
    - 7) Bolts (6)

B. References

- (1) AMM 32-00-15/201, Landing Gear Door Locks
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-11-01/401, Auxiliary Power Unit
- (4) WDM 49-61-11

C. Access

(1) Location Zones

- 149 Keel Beam (Aft Section)
- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 311 Stabilizer Compartment
- 315 APU Compartment – Left
- 316 APU Compartment – Right

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(2) Access Panels

311AL Stabilizer Compartment Door  
315AL APU Access Door - Left  
316AR APU Access Door - Right  
732AL Main Landing Gear Door  
822 Aft Cargo Door

- D. Do the APU system deactivation for the control cabin, the fuel shutoff valve, and the APU shutoff valve (Fig. 201 and 202).

S 862-002

- (1) Put the main battery switch on the overhead panel P5 in the ON position.

S 862-056

- (2) Make sure the air intake door and the fuel shutoff valve are closed as follows:  
(a) Put the APU master control switch on the overhead panel P5 in the ON position.

NOTE: The FAULT light will come on while the fuel shutoff valve opens.

WARNING: USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (b) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).  
(c) Find the fuel shutoff valve for the APU in the left wheel well for the main landing gear.  
1) Make sure the fuel shutoff valve for the APU is open.  
(d) Make sure the air intake door for the APU is open.  
(e) Put the APU master control switch in the OFF position.

NOTE: The FAULT light will come on when the fuel shutoff valve closes.

- (f) Make sure the fuel shutoff valve for the APU is closed.

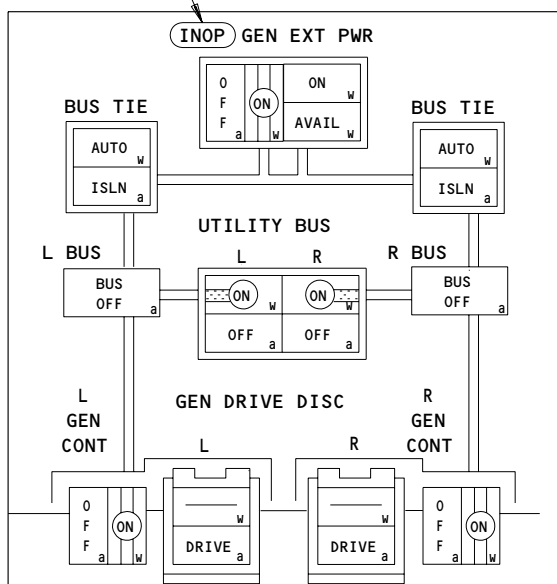
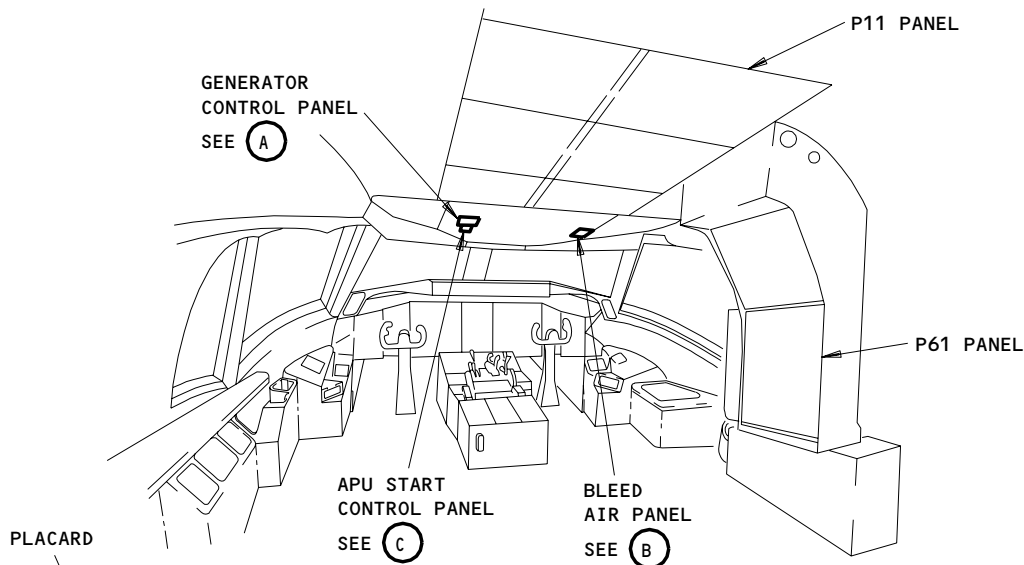
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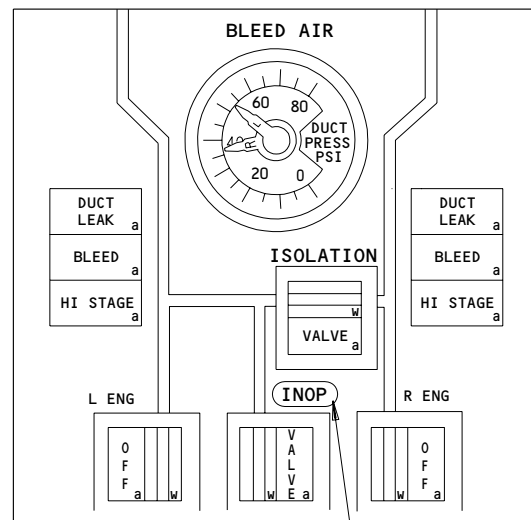
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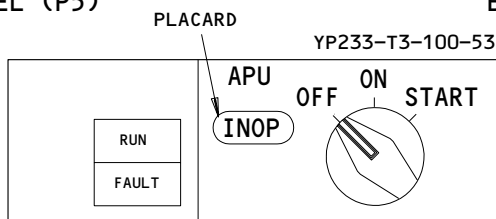
GENERATOR CONTROL PANEL (P5)

(A)



BLEED AIR PANEL (P5)

(B)



APU START CONTROL PANEL (P5)

(C)

APU System Deactivation - Control Cabin  
Figure 201

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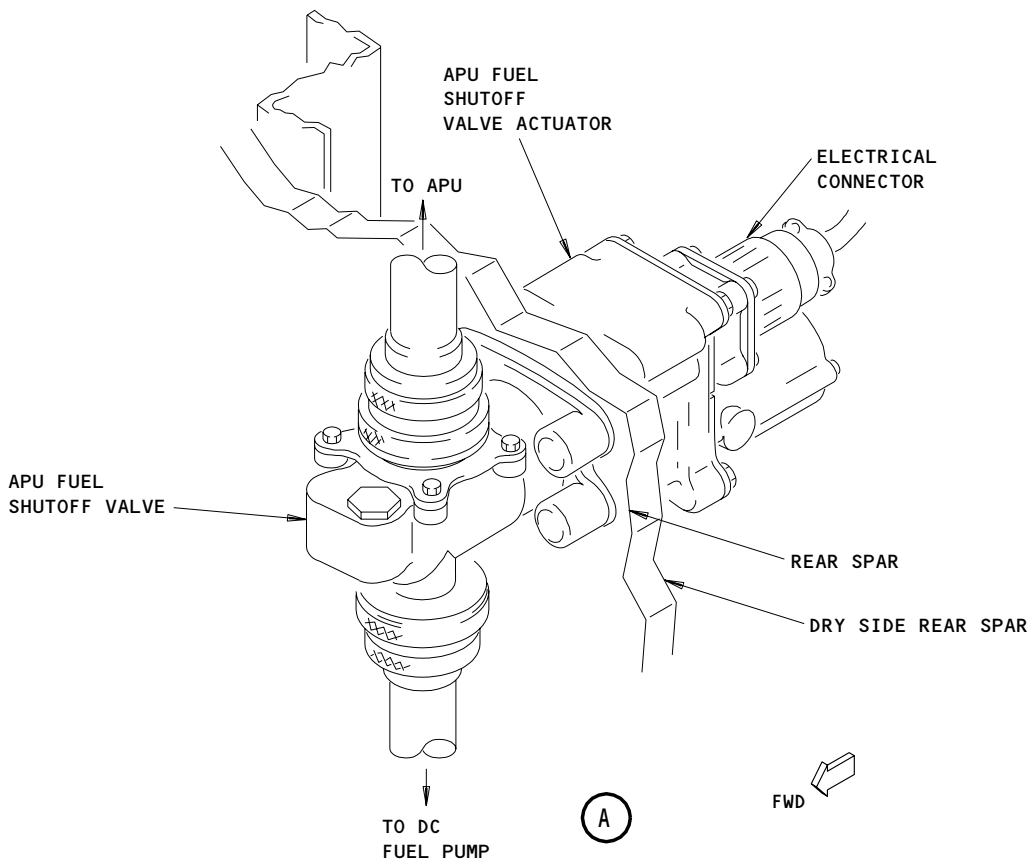
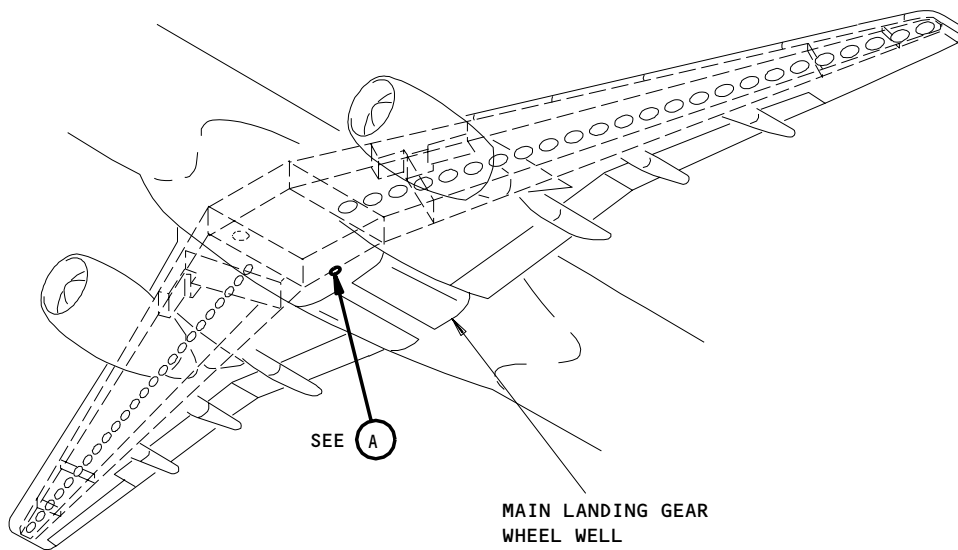
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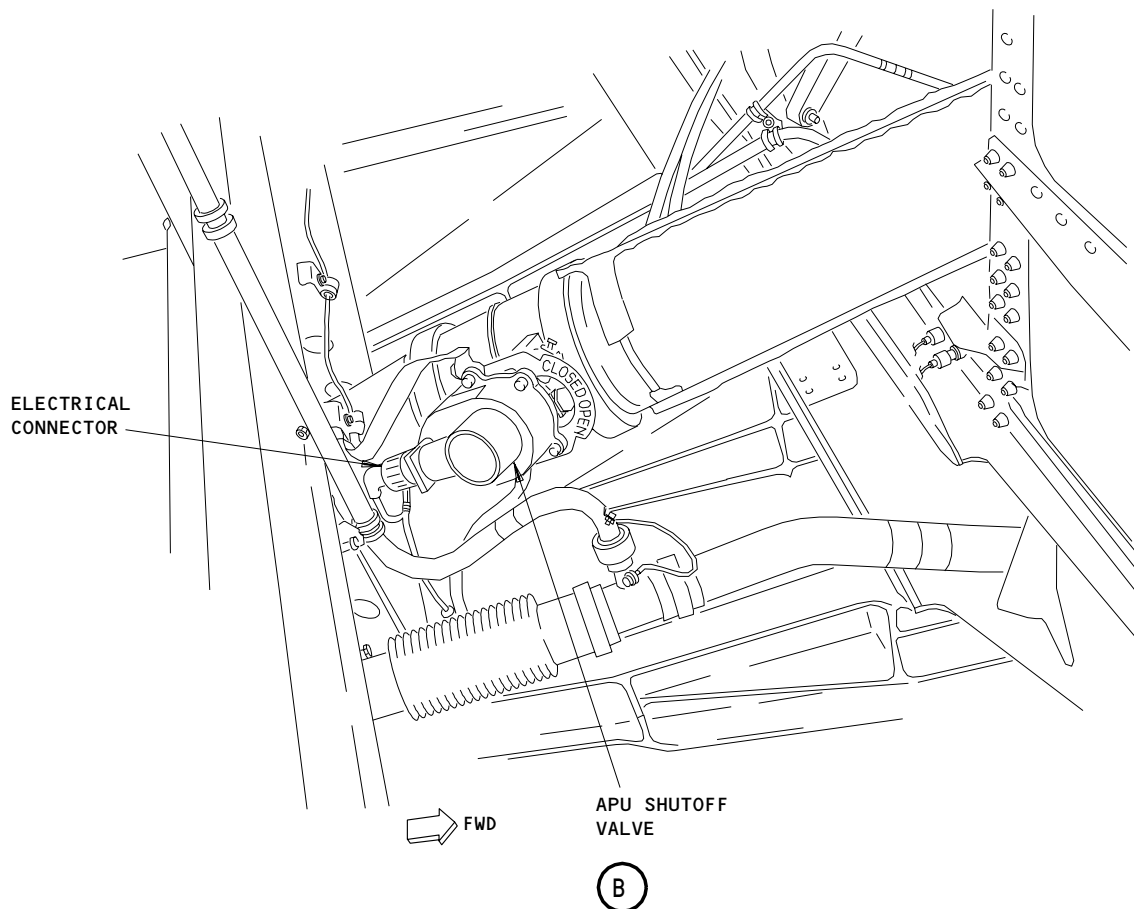
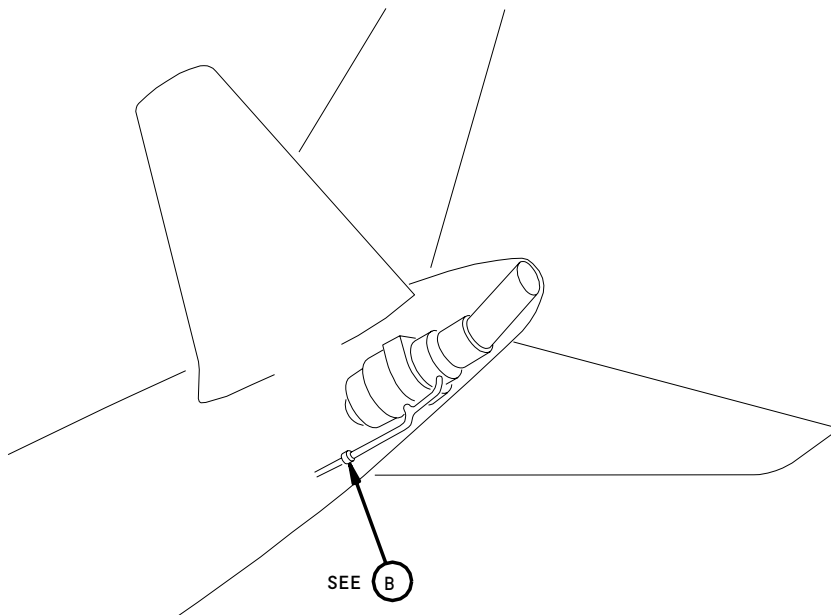
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APU System Deactivation - APU Fuel Shutoff and APU Shutoff Valves  
Figure 202 (Sheet 1)

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APU System Deactivation - APU Fuel Shutoff and APU Shutoff Valves  
Figure 202 (Sheet 2)

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- (g) Make sure the air intake door for the APU is closed.
- (h) Disconnect the electrical connector from the fuel shutoff valve.
  - 1) Put caps on the electrical connector and on the fuel shutoff valve.

**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.

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

S 862-055

- (3) Close the APU shutoff valve for the airplane pneumatic system.
  - (a) Make sure the bleed air switch on the overhead panel P5 is in the closed position.

**NOTE:** The light for the APU bleed air should be off.

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (b) Open the service access door to the stabilizer compartment.
- (c) Make sure the APU shutoff valve in the stabilizer compartment is closed.
- (d) Remove the electrical connector from the APU shutoff valve.
  - 1) Put caps on the electrical connector and on the APU shutoff valve.
- (e) Close the service access door to the stabilizer compartment.

S 862-005

- (4) Put the main battery switch on the overhead panel P5 in the OFF position.

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S 862-006

- (5) Open these circuit breakers on overhead panel P11 and attach collars and INOP tags:
- (a) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) 11C33, FUEL DC PUMP APU or FUEL DC PUMP PWR
  - (c) 11D35, FUEL DC PUMP CONT
  - (d) 11D32, FUEL DISAGREE ENABLE APU
  - (e) 11Q22, APU BLEED PWR
  - (f) 11Q23, APU BLEED CONT

S 862-007

- (6) Install INOP tags on these switches on the overhead panel P5: The APU master control, the APU bleed air, and the APU generator control.

S 862-008

- (7) Open this circuit breaker on the right side panel P6 and attach a collar and an INOP tag:
- (a) 6E3, APU FUEL VALVES
- E. Do the APU system deactivation for the E6 Rack in the aft equipment center (Fig. 203).

S 862-009

- (1) Open these circuit breakers on the E6 rack in the aft equipment center, and attach collars and INOP tags:
- (a) APU START
  - (b) APU INLET DOOR ACT

S 022-054

- (2) Disconnect wire 0424-22 on the E6 rack from one of these two locations (WDM 49-61-11):
- (a) Disconnect the wire from pin 4 of the APU SOV DISAGREE RELAY (K10160).
  - (b) Disconnect the wire from the ground (GD1880).

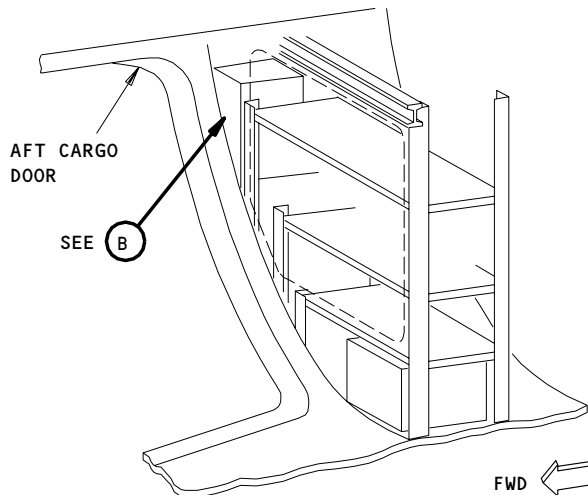
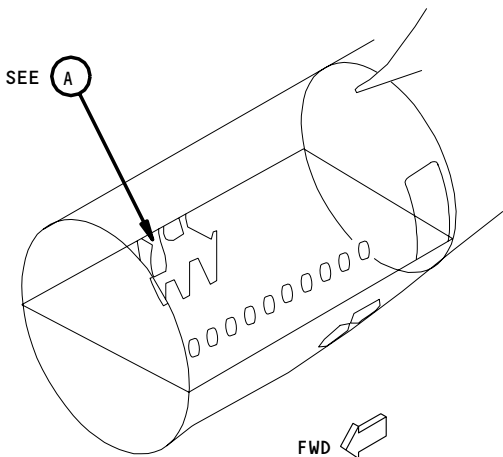
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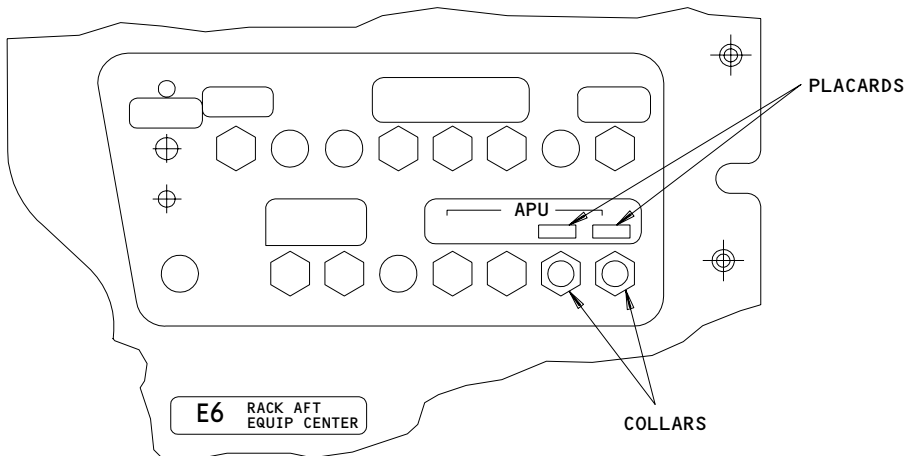
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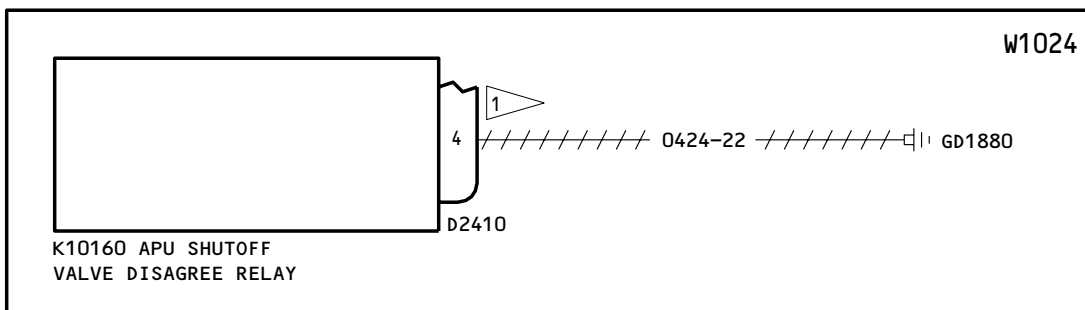
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**E6 - AFT EQUIPMENT RACK**



**B**



**E6 RACK - AFT EQUIPMENT CENTER**  
(REF WM 49-61-11)

**1** DISCONNECT WIRE AT D2410 OR GD1880.  
CAP AND STOW WIRE LOOSE END.

**APU System Deactivation - E6 Rack**  
**Figure 203**

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F. Do the APU system deactivation for the APU Compartment (Fig. 204).

S 022-053

- (1) Remove the APU (AMM 49-11-01/401).

**NOTE:** The electrical harness for the starter motor must be disconnected from the firewall when you do the APU system deactivation.

S 022-049

- (2) Put caps on the firewall connectors for the APU harness, the starter motor, and the generator.

S 022-050

- (3) Remove the fuel hose at the firewall.  
(a) Put a cap on the connector for the fuel hose at the firewall.  
1) Tighten the cap to 340-380 inch-pounds (38.4-42.9 newton meters).

S 022-051

- (4) Put a cap on the air discharge duct.  
(a) Tighten the cap to 10-20 inch-pounds (1.13-2.26 newton meters).

S 022-052

- (5) Put a cap on the air supply duct at the firewall with the clamp.  
(a) Tighten the clamp to 50-70 inch-pounds (5.65-7.91 newton meters).

S 022-048

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (6) Remove the APU exhaust duct as follows:  
(a) Move the APU exhaust duct forward and lower the duct through the APU access doors.  
(b) Remove the support saddle for the APU exhaust duct.  
(c) Remove the six bolts and washers from the support ring.  
1) Put the six bolts with the APU.  
(d) Put the plug assembly on the support ring.  
1) Install the bolts and washers in the plug assembly.

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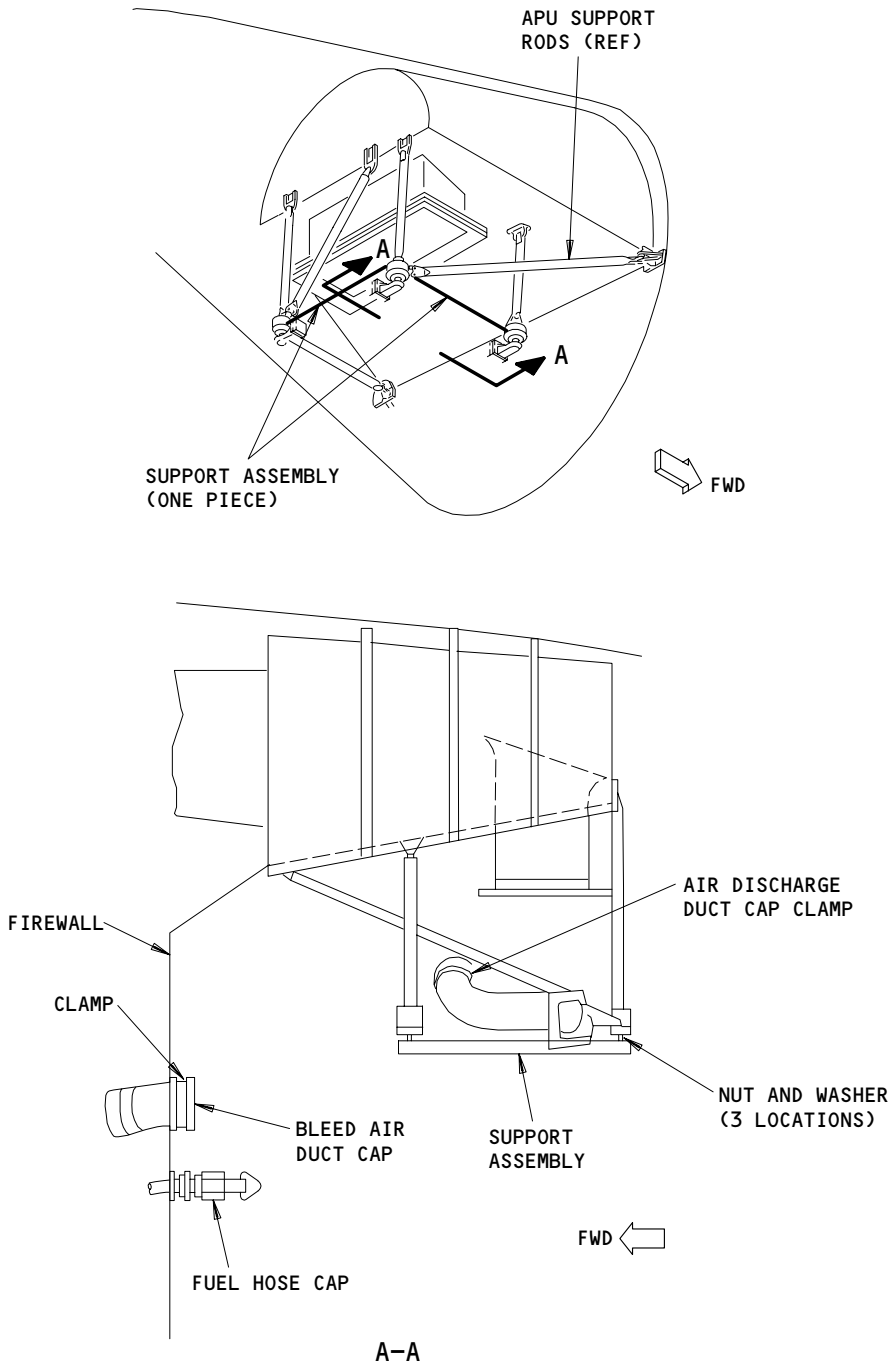
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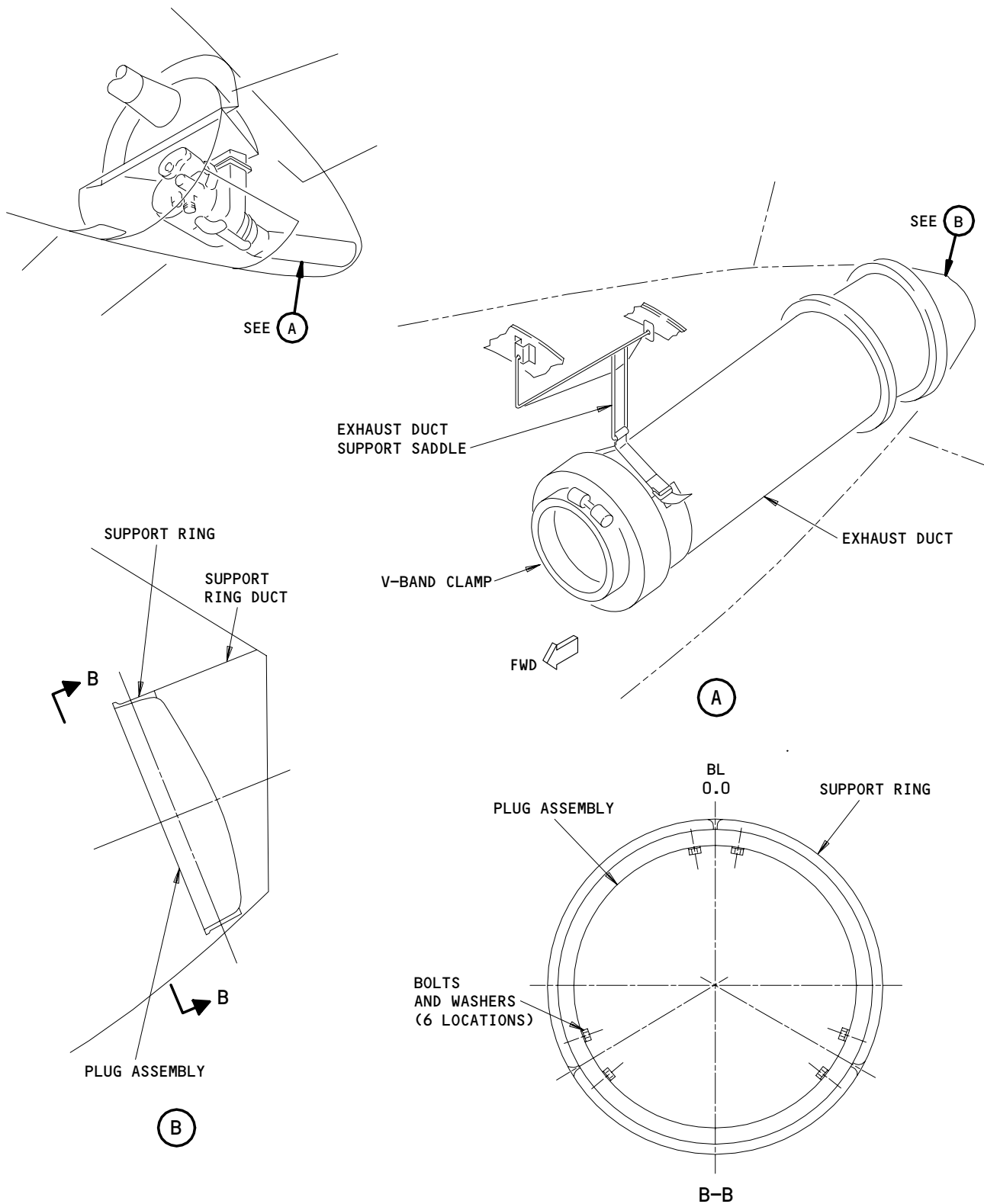
APU System Deactivation - APU Compartment  
Figure 204 (Sheet 1)

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APU System Deactivation - APU Compartment  
Figure 204 (Sheet 2)

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- S 022-047
- (7) Put the support assembly on the APU mounts.  
(a) Install the cone bolt nuts and washers.  
(b) Tighten the cone bolt nuts to 5-8 inch-pounds (0.56-0.90 newton meters).
- S 412-016
- (8) Disengage the hold-open rods and close the APU access panels.
- S 212-017
- (9) Make an inspection of the APU compartment after the first flight and then every 100 hours until you do the APU System Activation.

TASK 49-11-02-442-018

3. Do the APU System Activation

A. References

- (1) AMM 32-00-15/201, Landing Gear Door Locks  
(2) AMM 49-11-00/201, Auxiliary Power Unit  
(3) AMM 49-11-01/401, Auxiliary Power Unit  
(4) AMM 49-61-05/201, APU Control Unit  
(5) WDM 49-61-11

B. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 149 | Keel Beam (Aft Section)       |
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 311 | Stabilizer Compartment        |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                             |
|-------|-----------------------------|
| 311AL | Stabilizer Compartment Door |
| 315AL | APU Access Door - Left      |
| 316AR | APU Access Door - Right     |
| 732AL | Main Landing Gear Door      |
| 822   | Aft Cargo Door              |

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C. Do the APU system activation for the APU compartment (Fig. 204).

S 012-019

- (1) Open the APU access panels and engage the hold-open rods.

S 022-046

- (2) Remove the nuts and washers from the cone bolts to remove the support assembly.

S 422-037

- (3) Install the APU exhaust duct as follows:

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (a) Remove the bolts and washers that attach the plug assembly to the support ring for the APU exhaust duct.  
(b) Remove the plug assembly.  
(c) Install the six bolts and washers to the support ring.  
(d) Put the APU exhaust duct in the tail cone support and install the support saddle.

S 422-038

- (4) Remove the cap from the air supply duct.

S 422-039

- (5) Remove the cap from the air discharge duct.  
(a) Loosen the clamp.  
(b) Move the clamp onto the air discharge duct.  
(c) Remove the cap from the air discharge duct.

S 422-040

- (6) Remove the cap from the fuel hose at the firewall.  
(a) Install the fuel hose to the firewall connector.

S 422-041

- (7) Remove the caps from these connectors on the firewall: The APU harness, the starter motor, and the generator.

S 422-045

- (8) Install the APU (AMM 49-11-01/401).

**NOTE:** Do the APU operation, the BITE procedure, and the leakage check at the end of this procedure.

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- D. Do the APU system activation to the E6 Rack of the aft equipment center (Fig. 203).

S 422-044

- (1) Connect the loose end of wire 0424-22 to one of these locations (WDM 49-61-11):
- (a) Connect the wire to pin 4 of the APU SOV DISAGREE RELAY (K10160).
  - (b) Connect the wire to the ground (GD1880).

S 862-024

- (2) Remove the INOP tags and the collars, and close these circuit breakers on the E6 rack in the aft equipment center:
- (a) APU START
  - (b) APU INLET DR ACT

- E. Do the APU system activation for the control cabin, the fuel shutoff valve, and the APU shutoff valve (Fig. 201 and 202).

S 422-043

- (1) Connect the electrical connector to the APU fuel shutoff valve as follows:

**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.

- (a) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
- (b) Find the fuel shutoff valve for the APU in the left wheel well.
- (c) Remove the caps from the electrical connector and from the fuel shutoff valve.
- (d) Connect the electrical connector to the fuel shutoff valve.

**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.

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

S 422-042

- (2) Connect the electrical connector to the APU shutoff valve for the pneumatic system.

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (a) Open the service access door to the stabilizer compartment.

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- (b) Remove the caps from the electrical connector and from the shutoff valve.
- (c) Connect the electrical connector to the shutoff valve.
- (d) Close the service access door to the stabilizer compartment.

S 862-027

- (3) Remove the INOP tag and the collar, and close this circuit breaker on the right side panel P6:
  - (a) 6E3, APU FUEL VALVES

S 862-028

- (4) Remove the INOP tags from these switches on the overhead panel P5: The APU master control, the APU bleed air, and the APU generator control.

S 862-029

- (5) Remove the INOP tags and the collars, and close these circuit breakers on overhead panel P11:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) 11C33, FUEL DC PUMP APU or FUEL DC PUMP PWR
  - (c) 11D35, FUEL DC PUMP CONT
  - (d) 11D32, FUEL DISAGREE ENABLE APU
  - (e) 11Q22, APU BLEED PWR
  - (f) 11Q23, APU BLEED CONT

S 862-030

- (6) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 212-031

- (7) Examine the APU for leakage.

S 862-032

- (8) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).

S 742-033

- (9) Do the APU Control Unit BITE procedure (AMM 49-61-05/201).

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AUXILIARY POWER UNIT DRAIN TANK AND TUBE ASSEMBLIES -  
MAINTENANCE PRACTICES

1. General

A. There are two tasks in this procedure:

- (1) Replace the Tube Assemblies and Drain Tank with Tube Assemblies without Drain tank - This task is used to remove the drain tank and existing tube assemblies from the APU and install the new tube assemblies without drain tank.
- (2) Replace the Tube Assemblies without Drain Tank with Tube Assemblies and Drain Tank - This task is used to remove the existing tube assemblies from the APU and install the new tube assemblies with drain tank.

TASK 49-11-03-902-105

2. Replace the Tube Assemblies and Drain Tank with Tube Assemblies without Drain Tank (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Prepare to Replacement

S 862-002

- (1) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-004

- (3) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:
  - (a) APU CONT

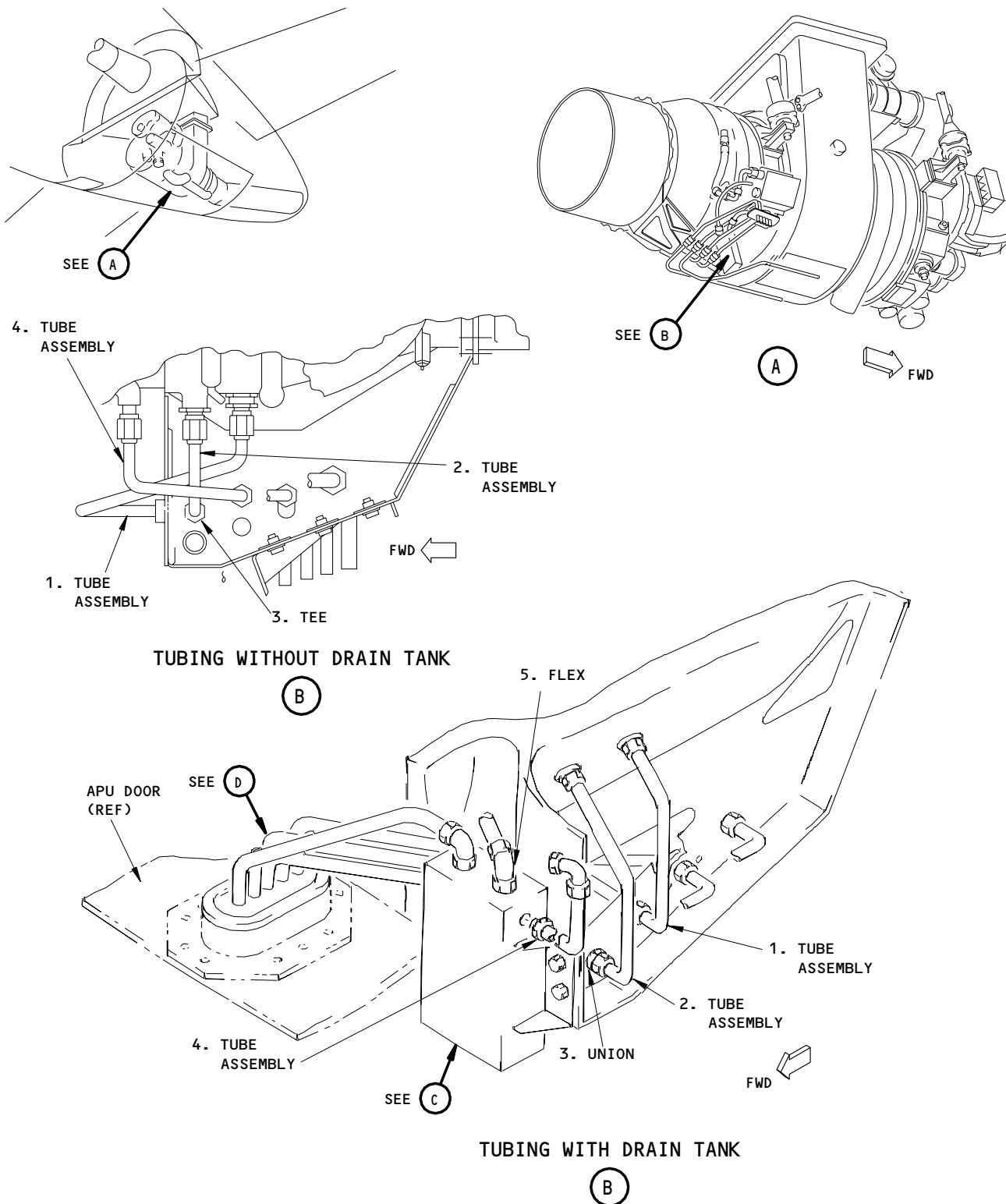
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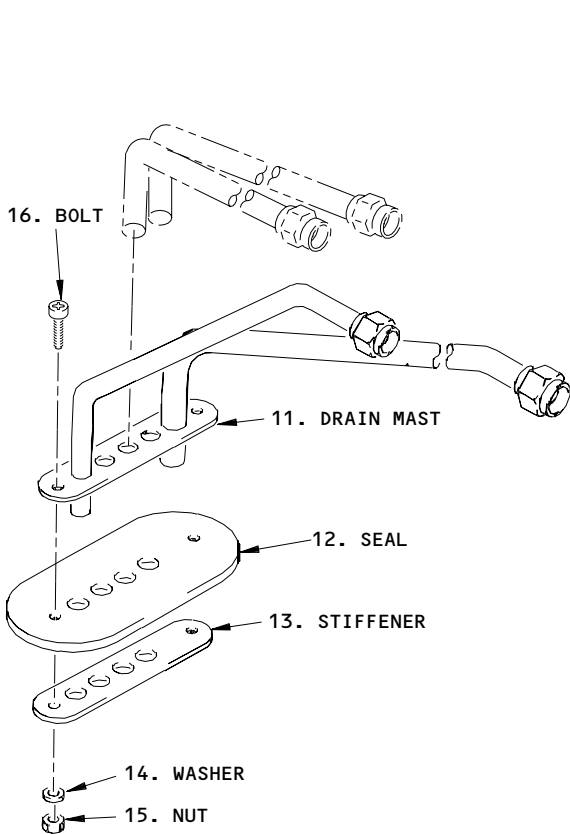
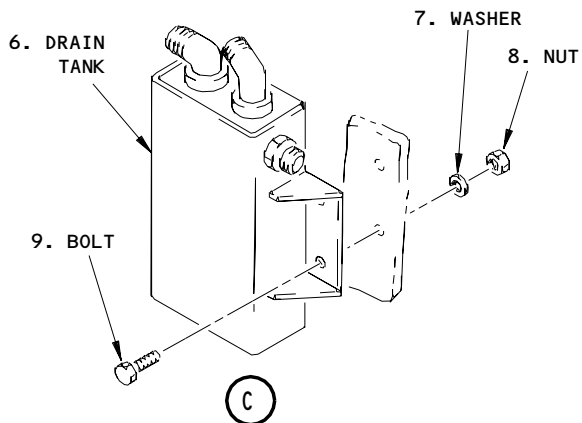
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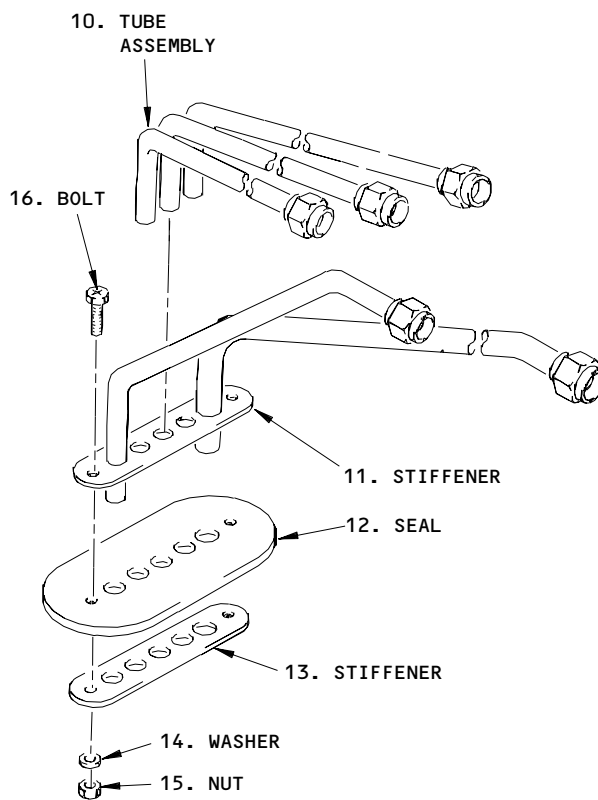
Auxiliary Power Unit - Drain Tank and Tube Assemblies  
Figure 201 (Sheet 1)

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TUBING WITHOUT DRAIN TANK



TUBING WITH DRAIN TANK

(D)

Auxiliary Power Unit - Drain Tank and Tube Assemblies  
Figure 201 (Sheet 2)

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HD8385

- S 012-142
- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
- Open the latches on the APU access doors.
  - Open the left access door.
  - Push the right access door up and pull the spring latch aft until the latch disengages.
  - Open the right access door.
  - Engage the support rods for the APU access door.
- C. Replace the Tube Assemblies and Drain Tank with Tube Assemblies without Drain Tank (Fig. 201)

- S 012-102
- (1) Remove the existing tube assemblies with drain tank:
- Remove the tube assemblies (1,2,and 4) and union (3).
  - Remove the flex (5) and install a plug.
  - Remove the drain mast (11).
  - Remove the tube assembly (10).
  - Remove the nuts (8), washers (7), and bolts (9) that attach the drain tank (6) to the APU.

- S 412-101
- (2) Install the tube assemblies without drain tank:

**NOTE:** See Table below for applicable part number.

- Install the tube assemblies (1,2, and 4) and tee (3) to the APU.
- Install the drain mast (11).
- Install the seal (12) and stiffener (13) with bolts (16), washers (14), and nuts (15).

AMM		NOMENCLATURE	APU WITHOUT DRAIN TANK	APU WITH DRAIN TANK
FIG	ITEM			
201	1	Tube Assembly	3883860-1	351N1101-14
	2	Tube Assembly	3883859-1	351N1101-13
	3	Union	---	MS21924-6S
		Tee	MS21912J6	---
	4	Tube Assembly	3883861-1	351N1101-6
	5	Flex	---	BACH7C0166CC
	6	Drain Tank Assembly	---	356N1003-1
	10	Tube Assembly	---	351N1101-3
	11	Drain Mast	356N1010-11	356N1010-16
	12	Seal	356N1002-2	356N1002-1
	13	Stiffener	356N1006-2	356N1006-1

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S 612-120

**WARNING:** DO NOT KEEP THE OIL ON YOUR SKIN FOR A LONG TIME. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

**CAUTION:** DO NOT MIX THE NAME BRAND OILS UNLESS YOU ARE SURE THEY AGREE.

- (3) Do the APU – Servicing procedure if it is necessary (AMM 12-13-04/301).

S 212-121

- (4) Make sure the drain tubes are within the drain mast assembly.

S 862-122

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

(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-123

- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:

(a) APU CONT

S 862-124

- (7) Remove the DO-NOT-OPERATE tag from the APU master control switch.

S 862-125

- (8) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

(a) Make sure the APU operates correctly.

(b) Examine the APU for leakage.

S 862-126

- (9) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).

S 412-127

- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

TASK 49-11-03-402-041

3. Replace the Tube Assemblies without Drain Tank with Tube Assemblies and Drain Tank (Fig. 201)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

B. Prepare for Replacement

S 862-106

- (1) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 862-107

- (2) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-108

- (3) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:
  - (a) APU CONT

S 012-141

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

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C. Replace the Tube Assemblies without Drain Tank with Tube Assemblies with Drain Tank (Fig. 201)

S 012-103

- (1) Remove existing assemblies with no drain tank:  
 (a) Remove tube assemblies (1,2,and 4), tee (3).  
 (b) Remove the drain mast (11).

S 412-104

- (2) Install the tube assemblies with drain tank:

NOTE: See Table below for applicable part number.

- (a) Install the drain tank (6) to the APU with bolts (9), washers (7), and nuts (8).  
 (b) Remove the plug and install the flex (5).  
 (c) Install the tube assemblies (1,2,and 4) and union (3).  
 (d) Install the tube assembly (10).  
 (e) Install the drain mast (11).  
 (f) Install the seal (12) and stiffener (13) with bolts (16), washer (14), and nut (15).

MM		NOMENCLATURE	APU WITHOUT DRAIN TANK	APU WITH DRAIN TANK
FIG	ITEM			
201	1	Tube Assembly	3883860-1	351N1101-14
	2	Tube Assembly	3883859-1	351N1101-13
	3	Union	---	MS21924-6S
		Tee	MS21912J6	---
	4	Tube Assembly	3883861-1	351N1101-6
	5	Flex	---	BACH7C0166CC
	6	Drain Tank Assembly	---	356N1003-1
	10	Tube Assembly	---	351N1101-3
	11	Drain Mast	356N1010-11	356N1010-16
	12	Seal	356N1002-2	356N1002-1
	13	Stiffener	356N1006-2	356N1006-1

S 612-112

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN FOR A LONG TIME. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

CAUTION: DO NOT MIX THE NAME BRAND OILS UNLESS YOU ARE SURE THEY AGREE.

- (3) Do the APU - Servicing procedure if it is necessary (Ref 12-13-04).

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- S 212-113
- (4) Make sure the drain tubes are within the drain mast assembly.
- S 862-114
- (5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:
- (a) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 862-136
- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
- (a) APU CONT
- S 862-137
- (7) Remove the DO-NOT-OPERATE tag from the APU master control switch.
- S 862-138
- (8) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).
- (a) Make sure the APU operates correctly.
- (b) Examine the APU for leakage.
- S 862-139
- (9) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).
- S 412-143
- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.

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- (d) Lift the left access door and align it with right access door.
- (e) Close and latch the APU access doors.

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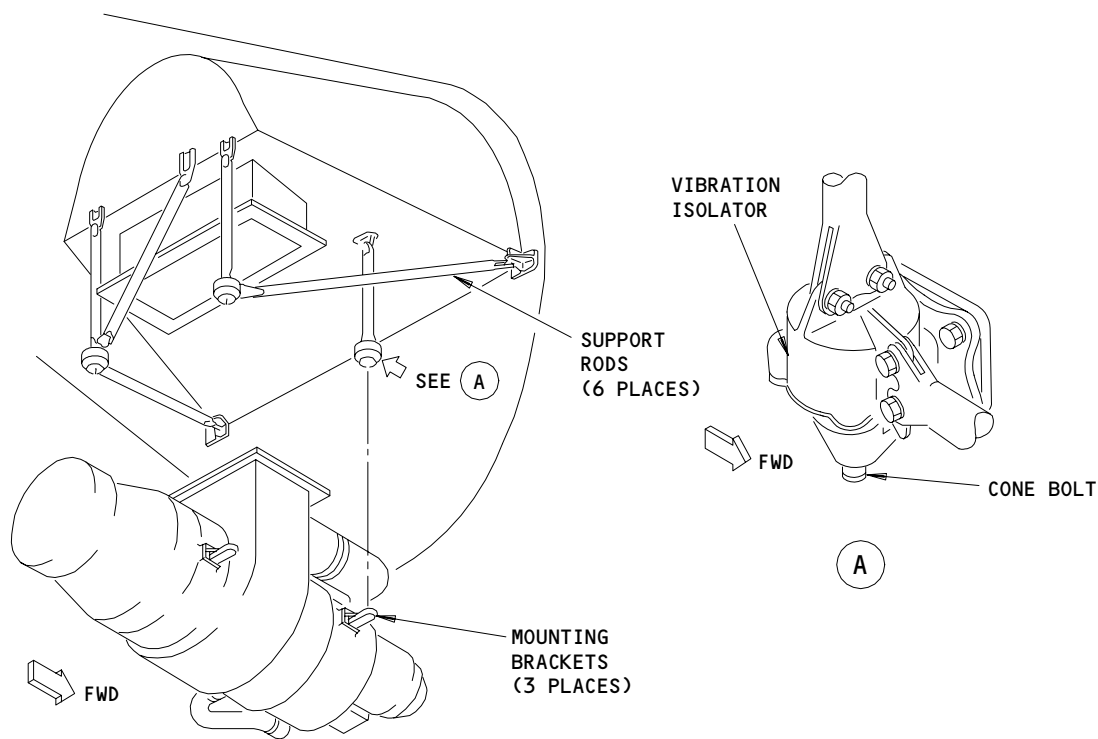
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APU MOUNTS - DESCRIPTION AND OPERATION

1. General (Fig. 1)

A. The APU mounts provide support and vibration isolation for the APU. The mounts attach the APU to the intake plenum with 6 support rods. The APU is supported by one forward mount and two aft mounts. Both aft mounts support the APU vertically and longitudinally. The left aft mount also supports the APU laterally while the forward mount supports the APU vertically. The APU engine is provided with hoisting points used in APU removal/installation procedures.



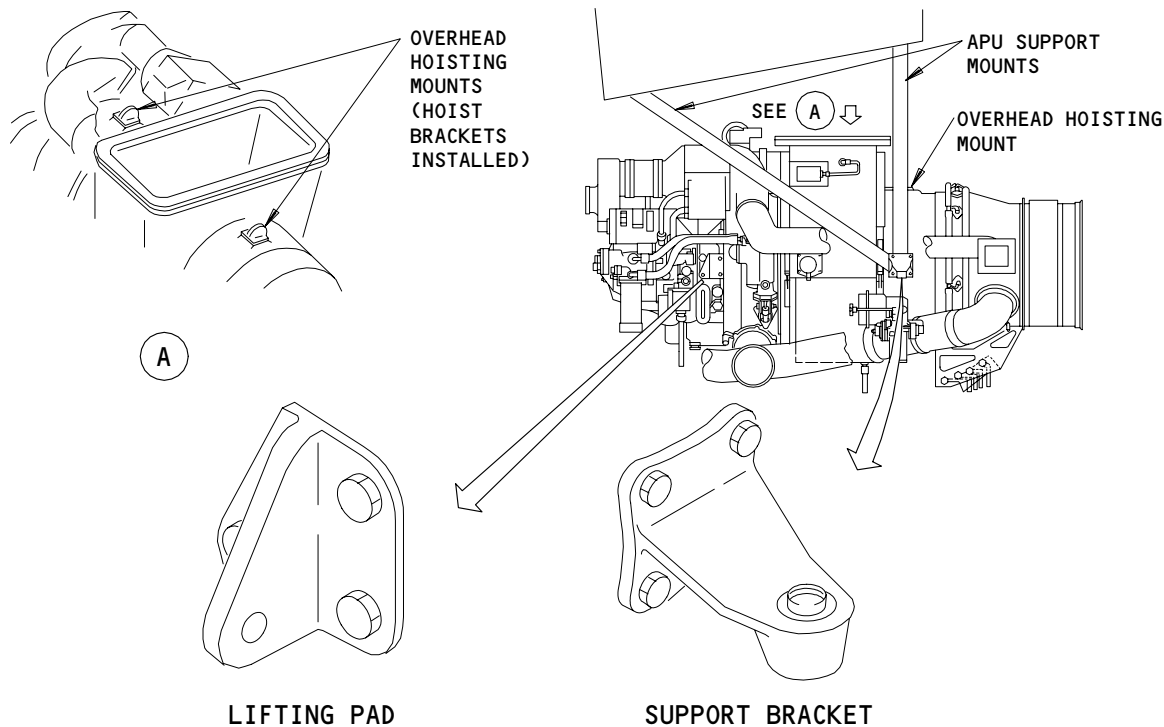
APU Shockmount Location  
Figure 1

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2. Component Details

- A. APU Support and Vibration Isolator Mounts (Shockmounts) (Fig. 1)
- (1) The mounts consist of tubular support rods, shockmounts, and brackets. The left aft shockmount is attached to fittings on the plenum through three support rods making it rigid. The right aft shockmount is attached to fittings on the plenum through two supports and is designed to swing laterally to the right to provide for thermal expansion of the APU and clearance for installation and removal of the APU. The forward mount is attached to fittings on the plenum through one support. When the APU is installed the cone bolts are secured to APU mount brackets with nuts.
- B. APU Mount Brackets (Fig. 2)
- (1) The APU support brackets provide mounting points for the shockmount cone bolts. The APU has two support brackets on the aft side and one support bracket on the right forward side. The brackets also provide connection points for the APU frame.
- C. Lifting Pad (Fig. 2)
- (1) The lifting pad is installed on the APU and provides one of the four connection points for the APU frame during APU removal and installation.



LIFTING PAD                      SUPPORT BRACKET  
APU Mount Bracket and Lifting Pad  
Figure 2

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- D. Overhead Hoisting Mounts (Fig. 2)  
(1) Two mount pads are installed on the APU to attach a shop handling hoist.

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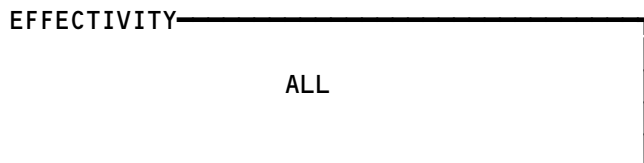
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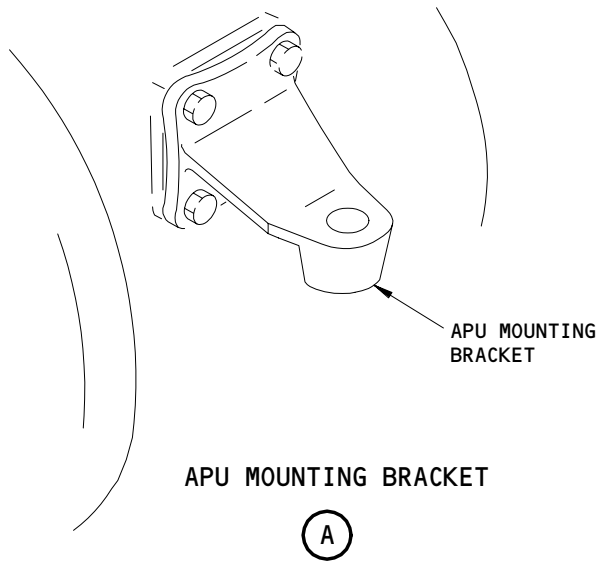
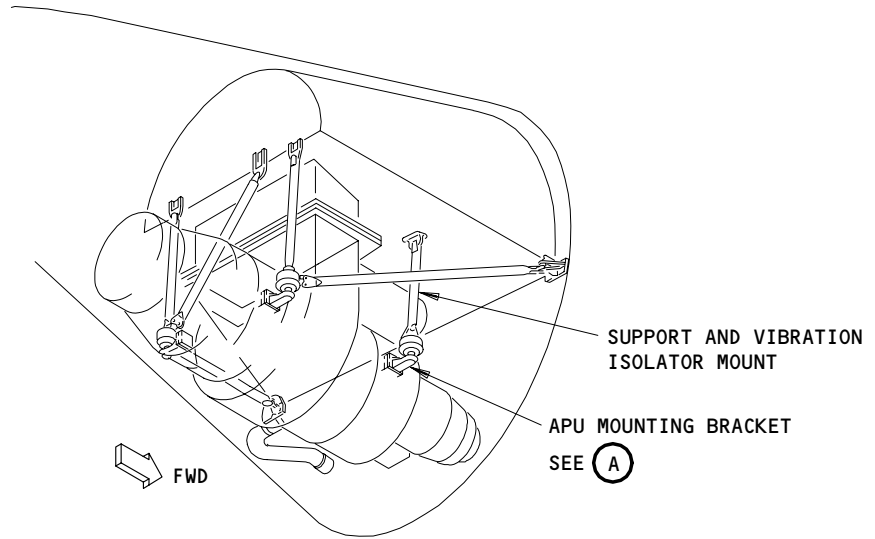
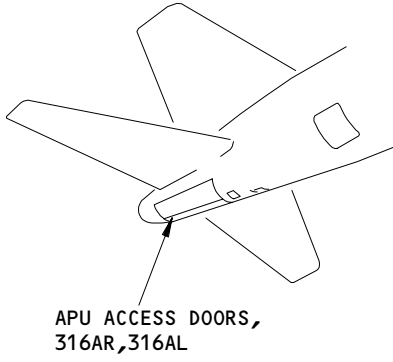
APU MOUNTS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
BRACKET - APU MOUNTING SUPPORT AND VIBRATION	--	3	316AR,315AL, APU COMPT	49-13-03
ISOLATOR MOUNT - APU AFT SUPPORT AND VIBRATION	--	2	316AR,315AL APU COMPT	49-13-02
ISOLATOR MOUNTS - APU FORWARD	--	1	316AR,315AL APU COMPT	49-13-01

APU Mounts - Component Index  
Figure 101



49-13-00



APU Mounts - Component Location  
Figure 102

EFFECTIVITY	
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APU SHOCKMOUNTS - INSPECTION/CHECK

1. General

- A. This procedure contains an inspection task for the APU shockmounts. This task visually examines the APU shockmounts and examines the dimensions of the attach points.
- B. This task must be done with the APU removed or with the load removed from the APU shockmounts. You can get access to the APU through the APU access doors.

TASK 49-13-00-216-001

2. APU Shockmount Inspection (Fig. 601)

A. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit
- (2) AMM 49-13-01/401, APU Forward Support and Vibration Isolator Mount
- (3) AMM 49-13-02/401, APU Aft Support and Vibration Isolator Mounts

B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

C. Procedure

S 016-002

- (1) Remove the APU (AMM 49-11-01/401).

S 216-003

- (2) Visually examine the APU shockmounts.
  - (a) Examine the attach points, for the support rods, on the intake plenum for cracks and tightness.
  - (b) Examine the cone bolt surfaces for scratches, nicks, grooves, fretting, pitting, and galling.
    - 1) Replace the shockmount if you find damage on 25% or more of the cone bolt surface (AMM 49-13-01/401 and AMM 49-13-02/401).

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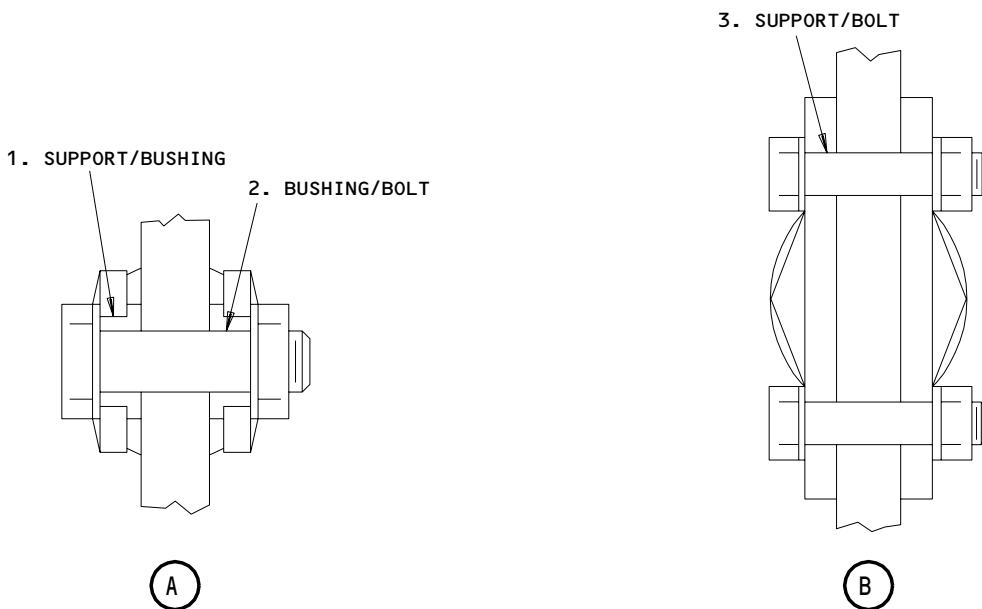
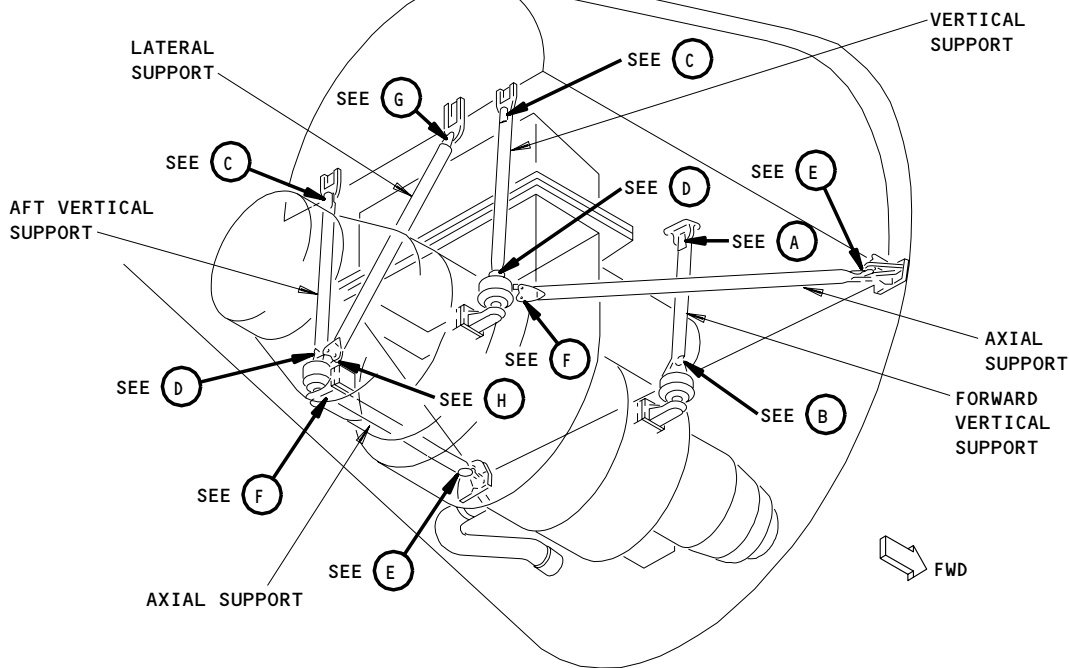
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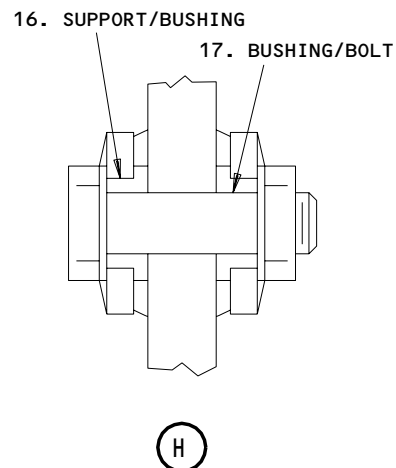
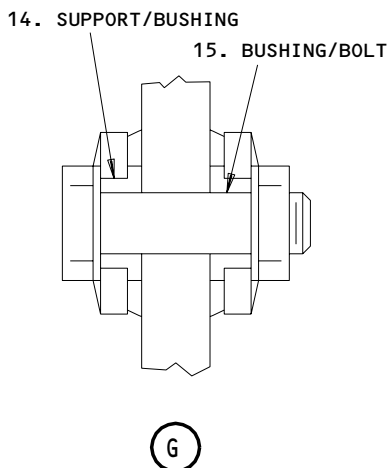
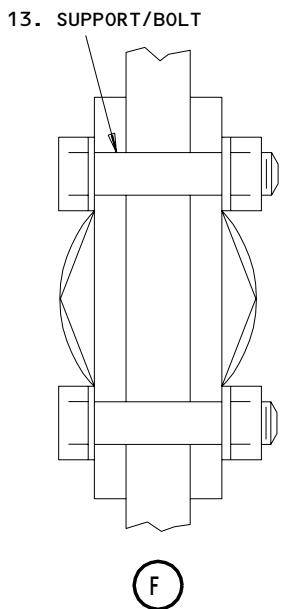
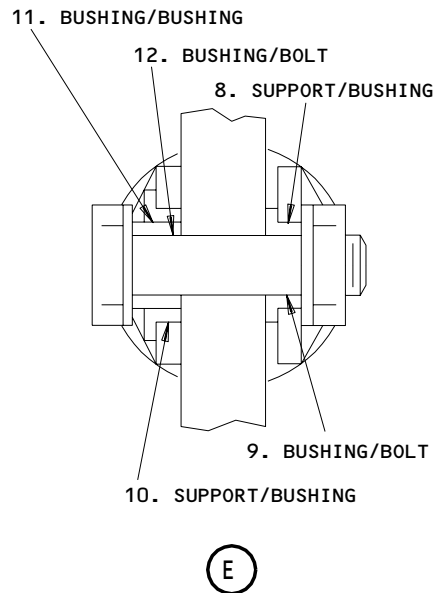
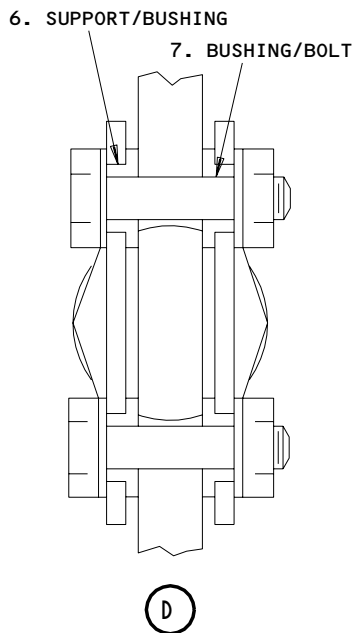
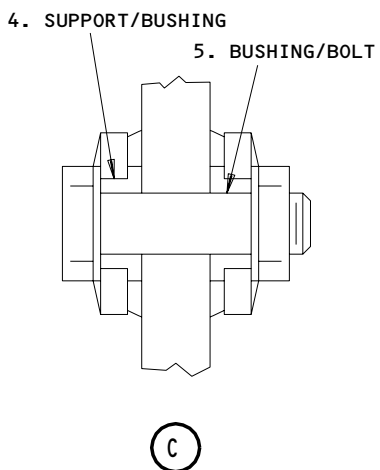
APU Mounts Wear Limits  
Figure 601 (Sheet 1)

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APU Mounts Wear Limits  
Figure 601 (Sheet 2)

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INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		MAX WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
1	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
2	BUSHING	ID	0.3125	0.3131	0.3194	0.0141	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
3	SUPPORT	ID	0.2525	0.2540	0.2591	0.0151		X	
	BOLT	OD	0.2490	0.2495	0.2440		X		
4	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
5	BUSHING	ID	0.3125	0.3131	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
6	SUPPORT	ID	0.3750	0.3756	0.000	0.000		X	
	BUSHING	OD	0.3759	0.3765	---		X		
7	BUSHING	ID	0.2525	0.2540	0.2591	0.0151	X		
	BOLT	OD	0.2490	0.2495	0.2440		X		
8	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
9	BUSHING	ID	0.3125	0.3140	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
10	SUPPORT	ID	0.5621	0.5625	0.000	0.000		X	
	BUSHING	OD	0.5636	0.5642	---		X		
11	BUSHING	ID	0.4375	0.4382	0.4470	0.0192	X		
	BUSHING	OD	0.4365	0.4370	0.4278		X		
12	BUSHING	ID	0.3125	0.3130	0.3193	0.0140	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
13	SUPPORT	ID	0.2525	0.2540	0.2591	0.0150		X	
	BOLT	OD	0.2490	0.2495	0.2440		X		

APU Mounts Wear Limits  
Figure 601 (Sheet 3)

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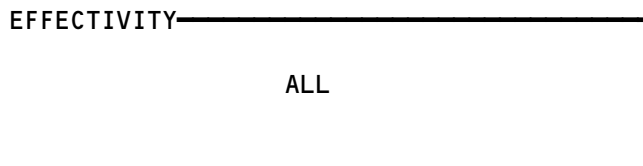
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INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		ALLOWED WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
14	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
15	BUSHING	ID	0.3125	0.3131	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
16	SUPPORT	ID	0.3750	0.3756	0.000	0.000		X	
	BUSHING	OD	0.3759	0.3765	---		X		
17	BUSHING	ID	0.2500	0.2505	0.2555	0.0115	X		
	BOLT	OD	0.2490	0.2495	0.2440		X		

APU Mounts Wear Limits  
Figure 601 (Sheet 4)



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- 2) Replace the shockmount if a worn area is more than 0.002 inches (0.05 mm) below the cone bolt surface (AMM 49-13-01/401 and AMM 49-13-02/401).
- (c) Examine the cone bolt and the cone bolt nut for threads that are damaged.

S 216-005

- (3) Examine the APU mount brackets.
  - (a) Make sure the APU mount brackets are not worn on the cone surface.
  - (b) Make sure the APU mount brackets do not have cracks or other damage.
  - (c) Make sure the APU mount brackets are tight.

S 226-008

- (4) Examine the attach point dimensions, for the support rods, for worn areas.

S 416-006

- (5) Install the APU (AMM 49-11-01/401).

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APU FORWARD SUPPORT AND SHOCKMOUNT – REMOVAL/INSTALLTION

1. General

- A. This procedure contains the removal and the installation tasks for the forward supports and the shockmounts for the APU.
- B. The forward shockmount attaches to the mounting bracket on the right side of the APU. The shockmount is connected to the plenum by the support. You can remove the shockmount or the support with the APU installed. The fishpole hoists or a hydraulic hoist hold the APU while you remove the shockmount or the support.
- C. You can get access to the forward supports and the shockmounts through the APU access doors.

TASK 49-13-01-004-001

2. Forward Support or Forward Shockmount Removal (Fig. 401 and 402)

- A. Special Tools and Equipment
  - (1) B49001-1 APU Frame Assy
- B. Standard Tools and Equipment
  - (1) PF51-011-1 or PF51 Series Hoist – Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (2) 10/3641 Hoist – Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door
- D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 024-027

- (4) Disconnect the air supply duct (Fig. 401):
- (a) Disconnect the clamps (14) that attach the air supply duct (15) to the APU and the firewall.
  - (b) Disconnect the air supply duct (15) from the APU.
  - (c) Move the air supply duct (15) until it is clear of the APU.

S 214-008

**WARNING:** MAKE SURE YOU DO THE FISHPOLE HOIST INSPECTION. A DAMAGED HOIST CAN INCORRECTLY HOLD THE APU. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (5) Visually examine the fishpole hoists:
- (a) Pull the cable out of the fishpole hoist and look for damage to the cable.
  - (b) Examine the keyhole slot area for damage before you install the fishpole hoist.

S 494-025

- (6) Install the APU removal equipment (Fig. 402):
- (a) Install the fishpole hoists in the keyhole slots on the APU plenum.
  - (b) Make sure the fishpole hoists are correctly installed.
  - (c) Extend the fishpole hoists to a length that is easy to use.
  - (d) Install the frame on the APU.
  - (e) Align the frame on the APU and install the lockpins.
  - (f) Attach the fishpole hoist cables to the frame.
  - (g) Tighten the fishpole hoist cables a sufficient quantity to take the weight off the APU shockmounts.

S 024-012

- (7) Remove the forward support (Fig. 401):

**NOTE:** It is only necessary to remove the forward support if it must be replaced.

- (a) Remove the two bolts (1), the washers (2 and 8), and the nuts (9) that attach the APU support (3) to the shockmount (13).

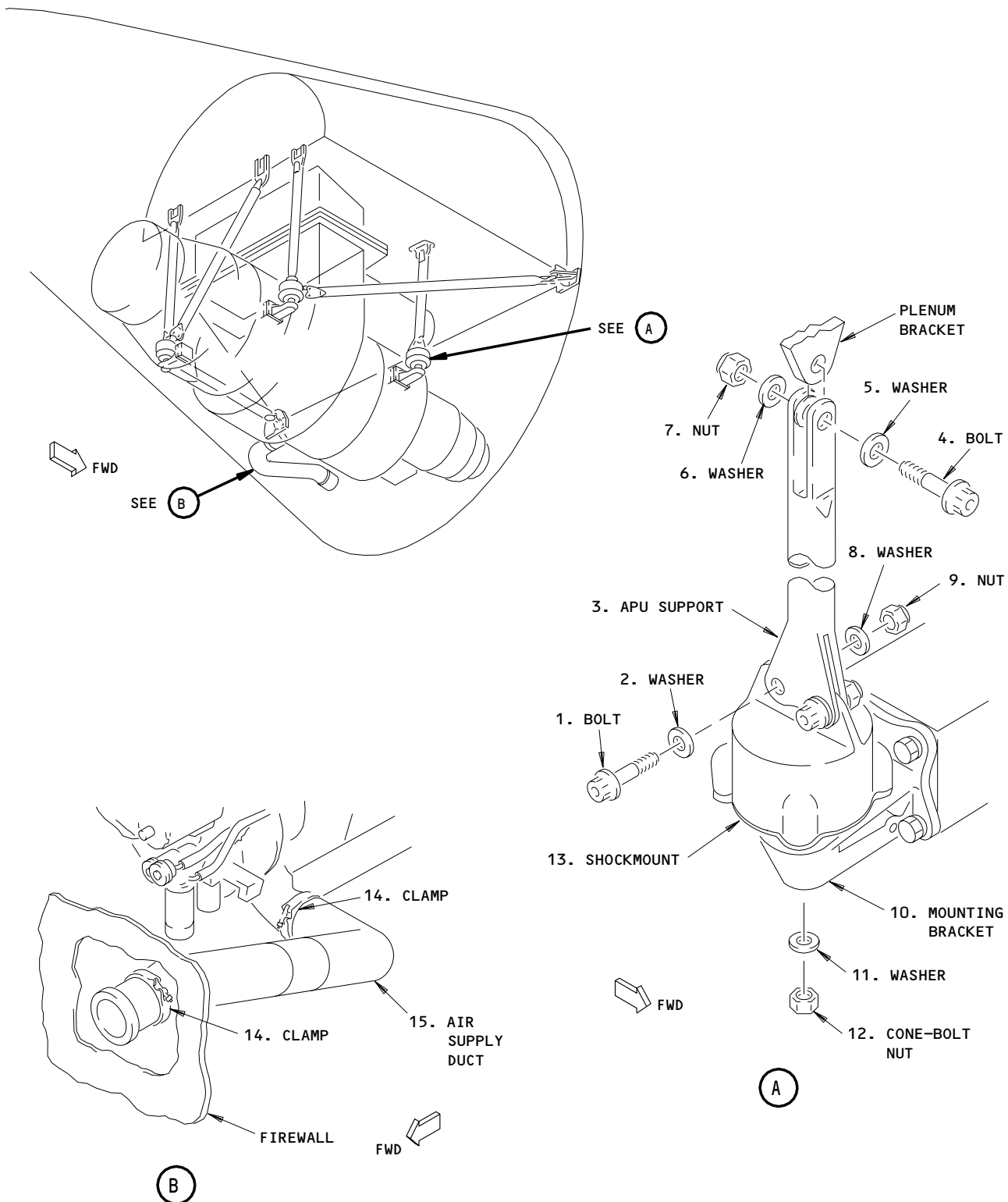
EFFECTIVITY

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APU Forward Support and Shockmount Installation  
Figure 401

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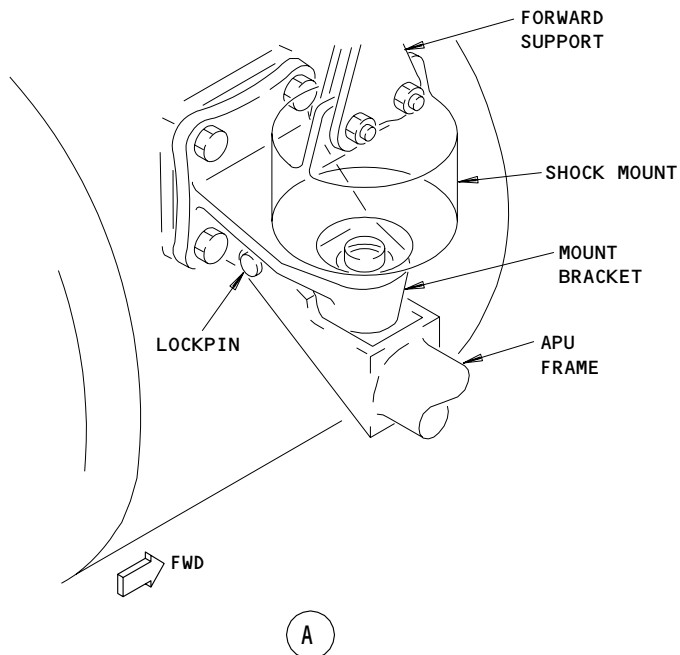
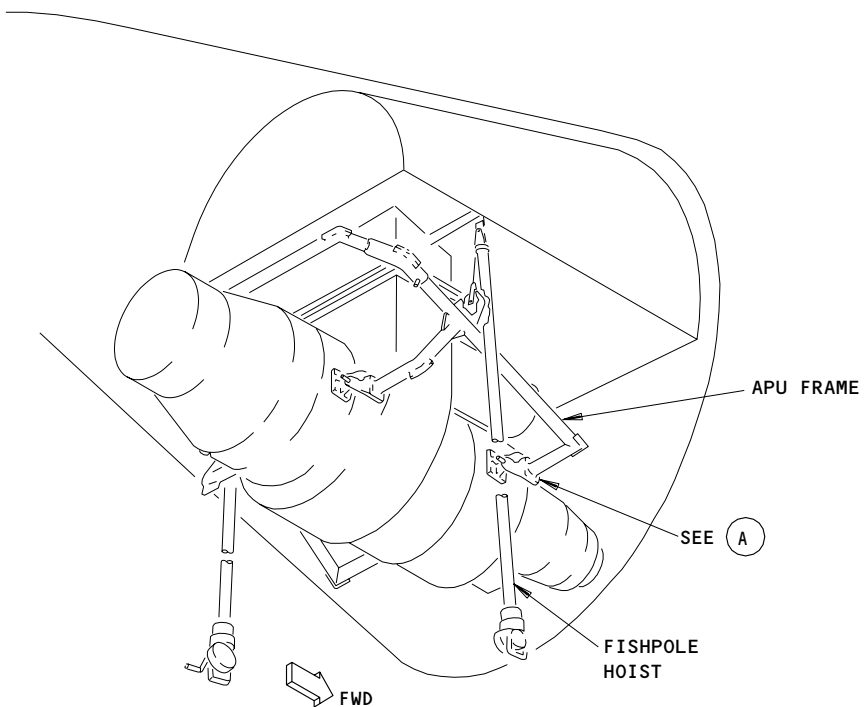
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Fishpole Hoist and Frame Installation  
Figure 402

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- (b) Remove the bolt (4), the washers (5 and 6), and the nut (7) that attach the APU support (3) to the plenum bracket.
- (c) Remove the forward support (3).

S 024-013

- (8) Remove the forward shockmount (Fig. 401):

**NOTE:** It is only necessary to remove the shockmount if it must be replaced.

- (a) Remove the two bolts (1), the washers (2 and 8), and the nuts (9) that attach the APU support (3) to the shockmount (13).
- (b) Remove the cone bolt nut (12) and the washers (11).

**CAUTION:** USE A RUBBER Mallet OR A PROTECTIVE COVERING IF YOU NEED TO HIT THE CONE BOLT TO LOOSEN IT FROM THE MOUNT. IF YOU DO NOT, DAMAGE TO THE CONE BOLT CAN OCCUR.

- (c) If it is necessary, lightly hit the end of the cone bolt to loosen the bolt.
- (d) Remove the shockmount (13).

TASK 49-13-01-404-014

3. Forward Support or Forward Shockmount Installation (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) B49001-1 APU Frame Assy
- (2) PF51-011-1 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
- (3) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ

B. Consumable Materials

- (1) D00015 Grease - Water Resistant, BMS 324

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3 13	APU Support Shockmount	49-13-03	01	90 85

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D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Procedure

S 424-015

- (1) Install the forward support (Fig. 401):
  - (a) Lubricate the bolts (1 and 4) with the grease.
  - (b) Attach the forward support (3) to the plenum bracket with the bolt (4), the washers (5 and 6), and the nut (7).
    - 1) Tighten the nut (7) to 165-225 inch-pounds (18.6-25.4 newton-meters).
  - (c) Attach the APU support (3) to the shockmount (13) with the bolts (1), the washers (2 and 8), and the nuts (9).
    - 1) Tighten the nuts (9) to 85-110 inch-pounds (9.6-12.4 newton-meters).

S 424-016

- (2) Install the forward shockmount (Fig. 401):
  - (a) Install the cone bolt in the APU mount bracket (10).
  - (b) Attach the shockmount (13) to the APU support (3) with the bolts (1), the washers (2 and 8), and the nuts (9).
    - 1) Tighten the nuts (9) to 85-110 inch-pounds (9.6-12.4 newton-meters).
  - (c) Install a new cone bolt washer (11) and nut (12) or use a washer and nut that had a dye penetrant inspection.
    - 1) Do the torque limit test for the nut (12):
      - a) Tighten the nut to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

**NOTE:** Use an open-end wrench on the shaft flats between the APU mounting bracket and the shockmount to hold the shaft.

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- b) Make sure the washer (11) does not touch the bottom surface of the APU mounting bracket.
  - c) Make sure the break-away torque necessary to turn the nut from this position is more than 14 inch-pounds (1.6 newton-meters).
  - d) Replace the nut that does not meet the torque limits in the above steps.
  - e) If you replaced the nut (12), do the torque test again for the new nut.
- 2) Fully tighten the nut (12) to 475-525 inch-pounds (53.7-59.3 newton-meters).

S 094-017

- (3) Remove the APU removal equipment (Fig. 402):
- (a) Disconnect the fishpole hoist cables from the frame.
  - (b) Remove the lockpins and the frame.
  - (c) Remove the fishpole hoists from the APU plenum.

S 434-020

- (4) Connect the air supply duct (Fig. 401):
- (a) Put the air supply duct (15) in its position between the APU and the firewall.
  - (b) Install the clamps (14) on the air supply duct (15).
  - (c) Tighten the clamps (14) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 414-021

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-022

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-024

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU AFT SUPPORTS AND SHOCKMOUNTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the aft supports and the aft shockmounts for the APU.
- B. The aft shockmounts attach to the mounting brackets on the sides of the APU. The aft shockmount on the left side attaches to fittings on the plenum by three supports. The aft shockmount on the right side attaches by two supports. The fishpole hoists (or a hydraulic hoist) hold the APU while you remove the supports or the shockmounts. The APU can be removed from the airplane to remove the shockmounts or supports.
- C. You can get access to the aft supports and the shockmounts through the APU access doors.

TASK 49-13-02-004-001

2. Aft Support and Aft Shockmount Removal (Fig. 401 and 402)

- A. Special Tools and Equipment
  - (1) B49001-1 APU Frame Assy
- B. Standard Tools and Equipment
  - (1) PF51-011-1 or PF51 Series Hoist – Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (2) 10/3641 Hoist – Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 034-006

- (4) Disconnect the air supply duct (Fig. 401):
- (a) Disconnect the clamps (1) that attach the air supply duct (2) to the APU and the firewall.
  - (b) Disconnect the air supply duct (2) from the APU.
  - (c) Move the air supply duct (2) until it is clear of the APU.

S 214-008

**WARNING:** MAKE SURE YOU DO THE FISHPOLE HOIST INSPECTION. A DAMAGED HOIST CAN INCORRECTLY HOLD THE APU. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (5) Visually examine the fishpole hoists:
- (a) Pull the cable out of the fishpole hoist and look for damage to the cable.
  - (b) Examine the keyhole slot area for damage before you install the fishpole hoists.

S 494-025

- (6) Install the APU removal equipment (Fig. 402):
- (a) Install the fishpole hoists in the keyhole slots on the APU plenum.
  - (b) Make sure the fishpole hoists are correctly installed.
  - (c) Extend the fishpole hoists to a length that is easy to use.
  - (d) Align the frame on the APU and install the lockpins.
  - (e) Attach the fishpole hoist cables to the frame.
  - (f) Tighten the cables a sufficient quantity to take the weight off the the APU shockmounts.

S 024-012

- (7) Remove the aft supports (Fig. 401):
- (a) Remove the bolts (15), the washers (11 and 12), and the nuts (13) that attach the vertical support (14) to the shockmount (16 or 22).

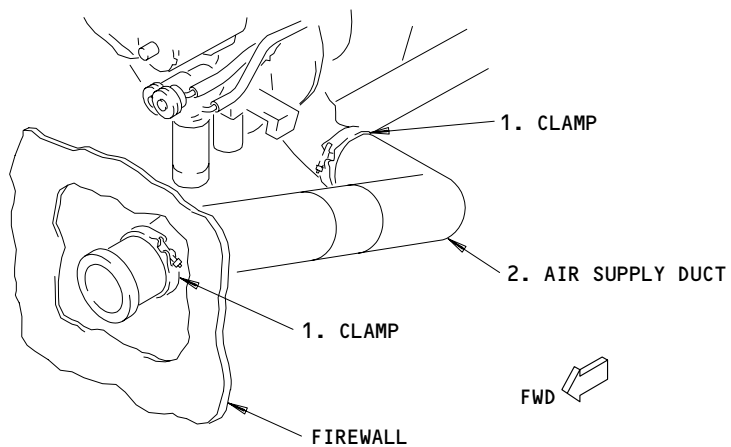
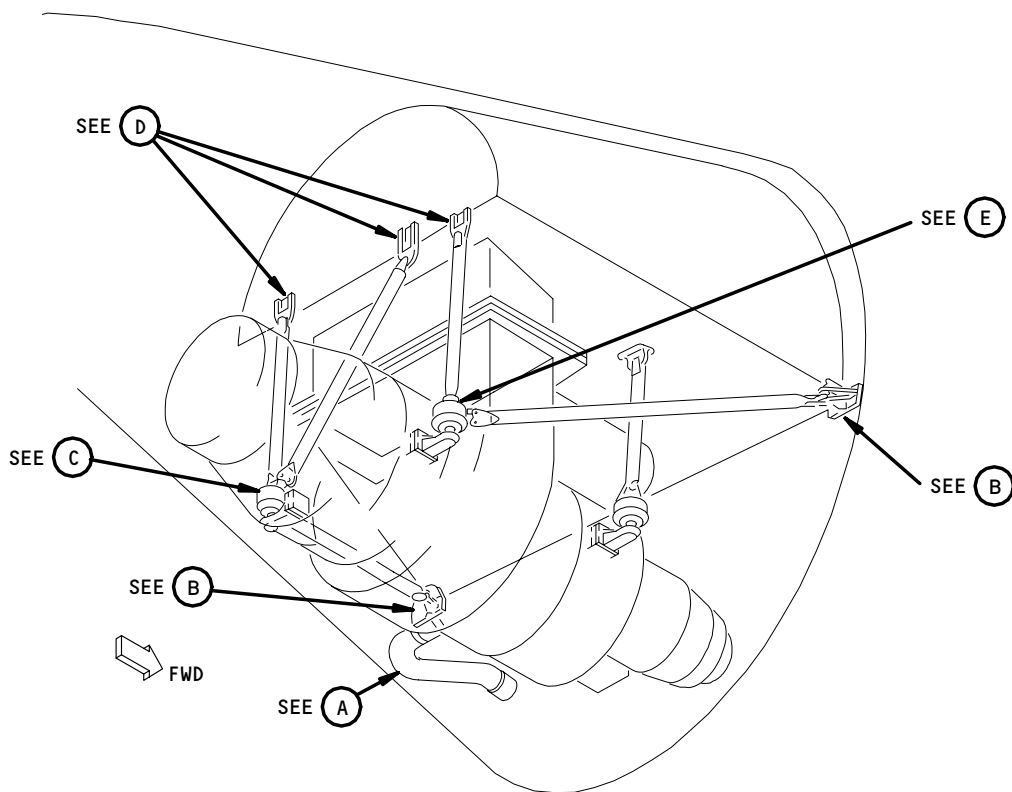
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(A)

APU Aft Support and Shockmount Installation  
Figure 401 (Sheet 1)

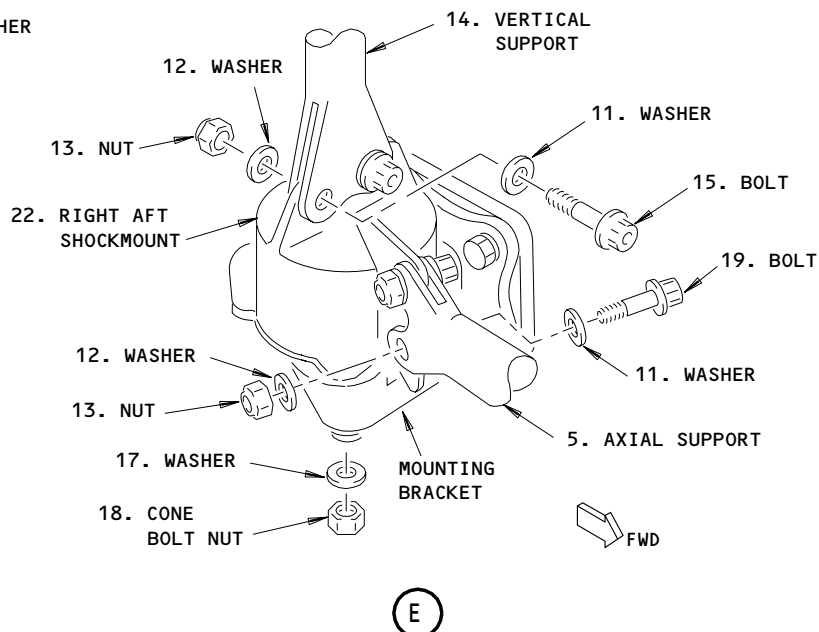
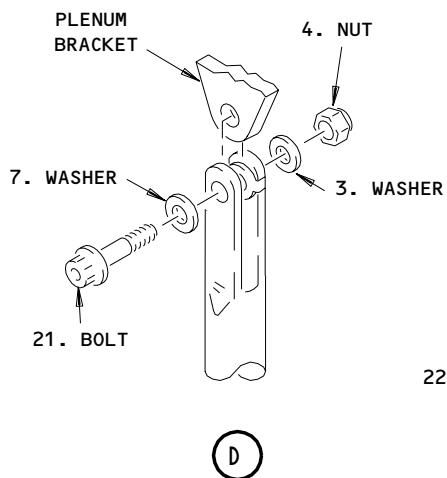
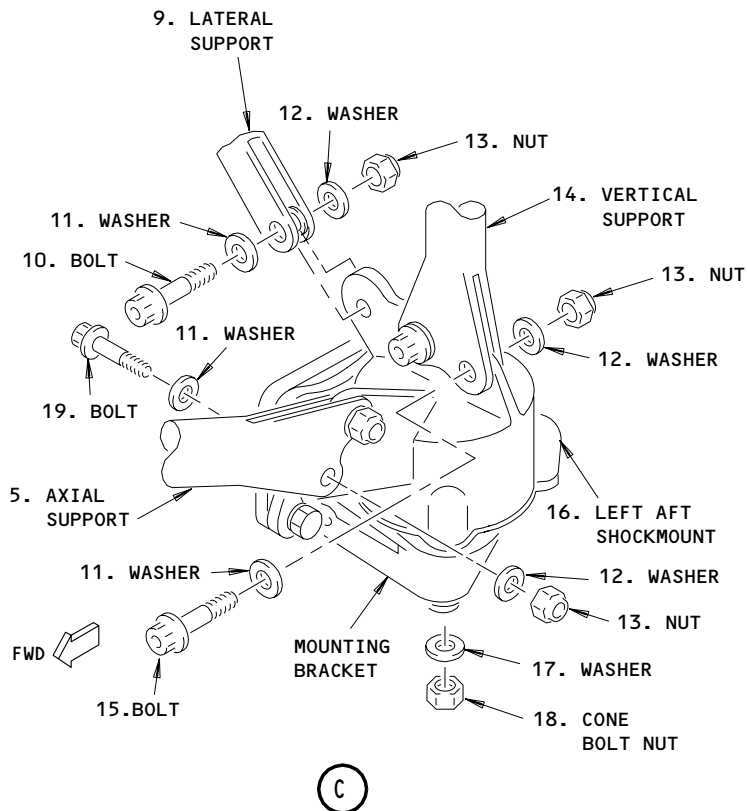
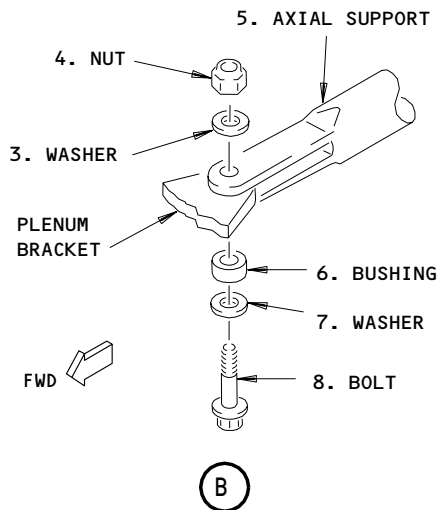
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APU Aft Support and Shockmount Installation  
Figure 401 (Sheet 2)

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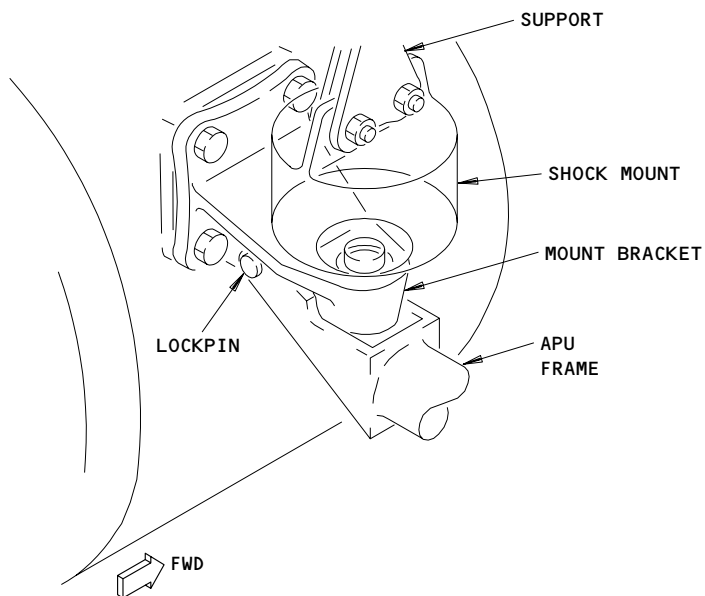
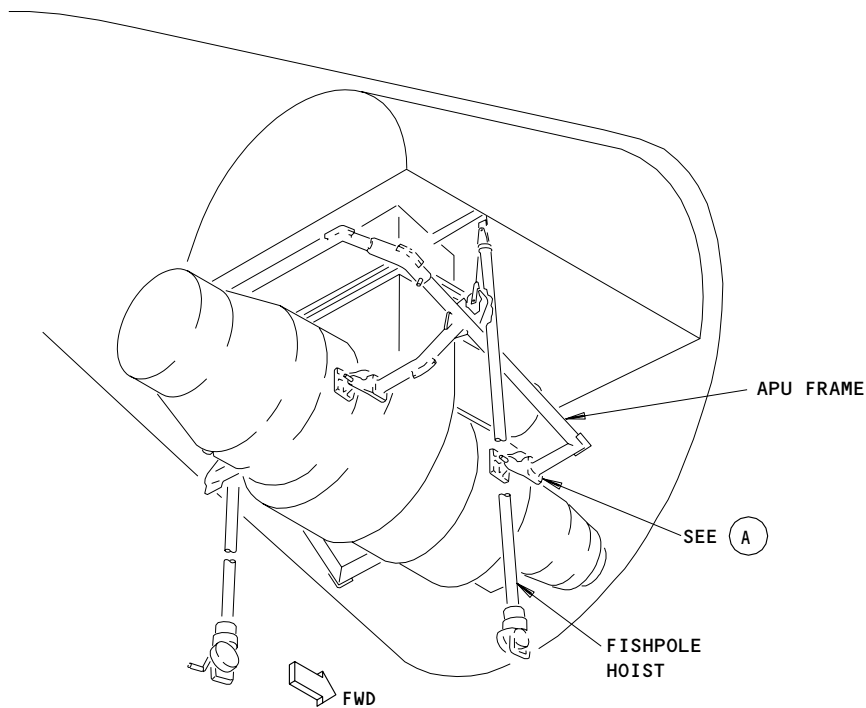
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Fishpole Hoist and Frame Installation  
Figure 402

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- (b) Remove the bolts (19), the washers (11 and 12), and the nuts (13) that attach the axial support (5) to the shockmount (16 or 22).
- (c) On the left shockmount (16), remove the bolt (10), the washers (11, 12), and the nut (13) that attach the lateral support (9) to the shockmount.
- (d) Remove the bolt (8), the washers (3 and 7), the bushing (6), and the nut (4) that attach the axial support (5) to the plenum bracket.
- (e) Remove the bolt (21), the washers (3 and 7), and the nut (4) that attach the vertical support (14) to the plenum bracket.
- (f) On the left shockmount (16), remove the bolt (21), the washers (3 and 7), and the nut (4) that attach the lateral support (9) to the plenum bracket.
- (g) Remove the vertical support (14), the axial support (5), and the lateral support (9) (left side only).

S 024-013

- (8) Remove the aft shockmounts (Fig. 401):
  - (a) Remove the bolts (15), the washers (11, 12), and the nuts (13) that attach the vertical support (14) to the shockmount (16 or 22).
  - (b) Remove the bolts (19), the washers (11, 12), and the nuts (13) that attach the axial support (5) to the shockmount (16 or 22).
  - (c) On the left shockmount (16), remove the bolt (10), the washers (11, 12), and the nut (13) that attach the lateral support (9) to the shockmount.
  - (d) Remove the cone bolt nut (18) and the washer (17).

**CAUTION:** USE A RUBBER MALLET OR A COVER WHEN YOU HIT THE CONE BOLT. DAMAGE TO THE CONE BOLT CAN OCCUR.

- (e) If it is necessary, lightly hit the end of the cone bolt to loosen the bolt.
- (f) Remove the shockmount (16 or 22) from the mounting bracket.

TASK 49-13-02-404-014

3. Aft Supports and Aft Shockmounts Installation (Fig. 401 and 402)

- A. Special Tools and Equipment
  - (1) B49001-1 APU Frame Assy

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**B. Standard Tools and Equipment**

- (1) PF51-011-1 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
- (2) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ

**C. Consumable Materials**

- (1) D00633 Grease (Aeroshell 33), Airplane Bearing  
- BMS 3-33

**D. Parts**

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Axial Support	49-13-03	01	100
	9	Lateral Support			105
	14	Vertical Support			95
	16	Left Shockmount			75
	22	Right Shockmount			80

**E. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

**F. Procedure**

S 424-015

(1) Install the aft supports (Fig. 401):

- (a) Lubricate the bolts (8, 10, 15, 19, and 21) and the bushing (6) with the grease.
- (b) Attach the axial support (5) to the plenum bracket with the bolt (8), the washers (3, 7), the bushing (6), and the nut (4).

**NOTE:** You must install the bolt and the bushing from the bottom side of the support.

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- (c) Attach the vertical support (14) to the plenum bracket with the bolt (21), the washers (3 and 7) and the nut (4).
- (d) On the left shockmount (16), attach the lateral support (9) to the plenum bracket with bolt (21), the washers (3 and 7), and the nut (4).
  - 1) Tighten all the nuts (4) to 165–225 inch-pounds (18.6–25.4 newton-meters).
- (e) Attach the axial support (5) to the shockmount (16 or 22) with the bolts (19), the washers (11 and 12), and the nuts (13).
- (f) Attach the vertical support (14) to the shockmount (16 or 22) with the bolts (15), the washers (11, 12), and the nuts (13).
- (g) On the left shockmount (16), attach the lateral support (9) to the shockmount with the bolt (10), the washers (11 and 12) and the nut (13).
  - 1) Tighten all the nuts (13) to 85–110 inch-pounds (9.6–12.4 newton-meters).

S 424-016

- (2) Install the aft shockmounts (Fig. 401):
  - (a) Install the cone bolt in the APU mounting bracket.
  - (b) Attach the axial support (5) to the shockmount (16 or 22) with the bolts (19), the washers (11 and 12), and the nuts (13).
  - (c) Attach the vertical support (14) to the shockmount (16 or 22) with the bolts (15), the washers (11, 12), and the nuts (13).
  - (d) On the left shockmount (16), attach the lateral support (9) to the shockmount with the bolt (10), the washers (11 and 12), and the nut (13).
    - 1) Tighten all the nuts (13) to 85–110 inch-pounds (9.6–12.4 newton-meters).
  - (e) Install new cone bolt washers (17) and nuts (18) or use washers and nuts that had a dye penetrant inspection.
    - 1) Do the torque limit test for the nut (18):
      - a) Tighten the nut to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

**NOTE:** Use an open-end wrench on the shaft flats between the APU mounting bracket and the shockmount to hold the shaft.

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- b) Make sure the washer (17) does not touch the bottom surface of the APU mounting bracket.
  - c) Make sure the break-away torque necessary to turn the nut from this position is more than 14 inch-pounds (1.6 newton-meters).
  - d) Replace the nut that does not meet the torque limits in the above steps.
  - e) If you replaced the nut (18), do the torque test again for the new nut.
- 2) Fully tighten the nut (18) to 475-525 inch-pounds (53.7-59.3 newton-meters).

S 094-017

- (3) Remove the APU installation equipment (Fig. 402):
- (a) Disconnect the fishpole hoist cables from the frame.
  - (b) Remove the lockpins and the frame.
  - (c) Remove the fishpole hoists from the APU plenum.

S 434-020

- (4) Connect the air supply duct (Fig. 401):
- (a) Put the air supply duct (2) in its position between the APU and the firewall.
  - (b) Install the clamps (1) on the air supply duct (2).
  - (c) Tighten the clamps (1) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 414-021

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.

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757  
MAINTENANCE MANUAL

(e) Close and latch the APU access doors.

S 864-022

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) E6 Rack, Aft Equipment Center

1) APU CONT

(b) P11 Overhead Panel

1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-024

(7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU MOUNT BRACKET – REMOVAL/INSTALLATION

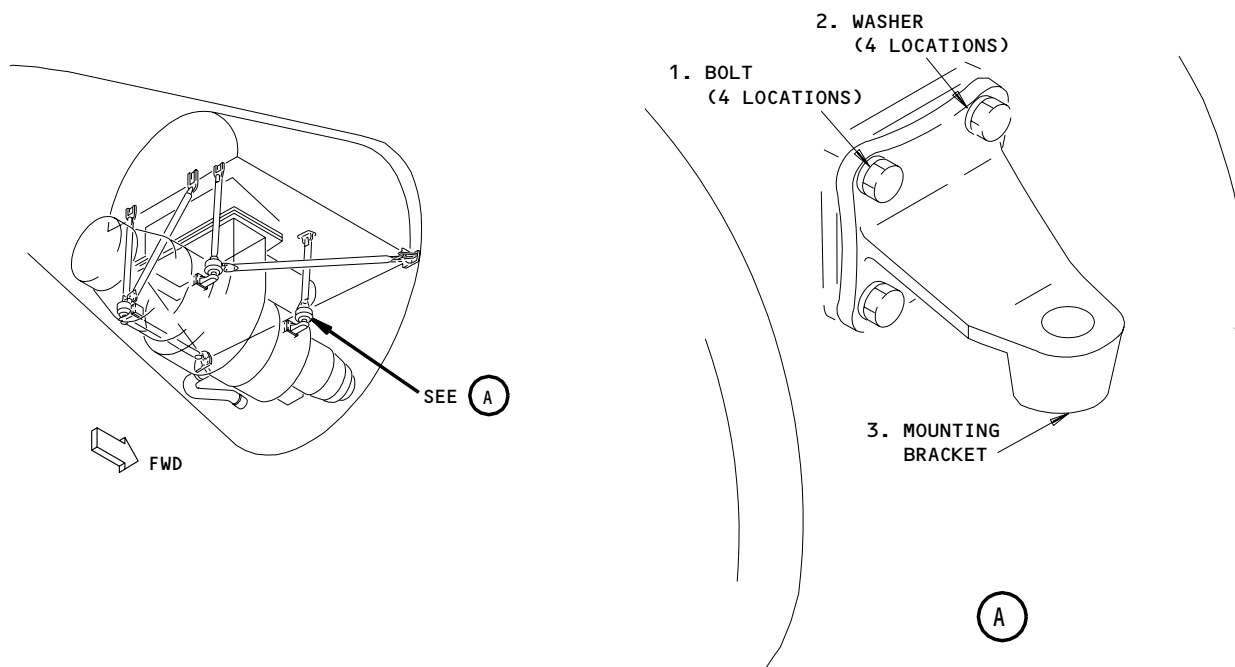
1. General

- A. This procedure contains the removal and the installation tasks for the APU mounting brackets.
- B. The mounting brackets attach the APU to the cone bolts of the shockmounts. Two mounting brackets are on the right side of the APU and one bracket is on the left side.
- C. You must remove the APU from the airplane to remove the mounting brackets. You can get access to the APU mounting brackets through the APU access doors.

TASK 49-13-03-004-001

2. APU Mounting Brackets Removal (Fig. 401)

- A. Special Tools and Equipment
  - (1) B49003-1 APU Shop Handling Sling
- B. References
  - (1) AMM 49-11-01/401, Auxiliary Power Unit.
  - (2) AMM 49-13-00/601, APU Mounts.



APU Mount Bracket Installation  
Figure 401

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**49-13-03**

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 014-006

- (1) Remove the APU (AMM 49-11-01/401).
  - (a) Make sure the APU is on a maintenance and transportation stand.

S 494-007

- (2) Install the APU sling:
  - (a) Install the APU sling to hold the APU while the mounting brackets are removed.
  - (b) Disconnect the APU frame from the mounting brackets (3).

S 024-009

- (3) Remove the APU mounting brackets:
  - (a) Remove the bolts (1) and the washers (2) that attach the mounting brackets (3) to the APU.
  - (b) Remove the mounting bracket (3) from the APU.

S 214-010

- (4) Examine the mounting bracket (3) (AMM 49-13-00/601).

TASK 49-13-03-404-011

3. APU Mounting Bracket Installation (Fig. 401)

A. Special Tools and Equipment

- (1) B49003-1 APU Shop Handling Sling

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Bracket	49-11-01	01	240

C. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

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D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Procedure

S 424-012

- (1) Install the APU mounting bracket:
  - (a) Put the mounting bracket (3) in its position on the APU.
  - (b) Install the bolts (1) and the washers (2).
    - 1) Tighten the bolts (1) to 250-300 inch-pounds (28.2-33.9 newton-meters).
  - (c) Install a lockwire on the bolts (1).

S 094-009

- (2) Remove the APU sling.

S 414-010

- (3) Install the APU (AMM 49-11-01/401).

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APU WIRE HARNESS – INSPECTION/CHECK

TASK 49-14-00-216-001

1. Do the Inspection of the APU Wire Harness

A. General

- (1) This procedure has a task to do an inspection of the APU wire harness.
- (2) The APU wire harness supplies power and transmits signals to the components on the APU. It is not necessary to remove the wire harness unless it has damage.

B. References

- (1) AMM 49-61-05/201, APU Control Unit (ECU)

C. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

D. Prepare for the Inspection of the APU Wire Harness.

S 866-002

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 866-004

- (3) Open this circuit breaker on the E6 rack in the aft equipment center and attach a DO-NOT-CLOSE tag:
  - (a) APU CONT

S 016-005

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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- (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- E. Do the Inspection of the APU Wire Harness.
- S 216-006
- (1) Visually examine the wire harness for insulation that is worn, wires that are broken, or connectors that have corrosion.
- S 216-007
- (2) Examine the connectors for the APU wire harness at the firewall.
    - (a) Examine the connectors for pins that are bent or broken.
    - (b) Examine the connectors for damaged threads.
- F. Put the Airplane Back to its Usual Condition.
- S 416-009
- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
    - (a) Disengage the support rods for the APU access doors.
    - (b) Put the support rods in the clips on the inner side of the APU access doors.
    - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
    - (d) Lift the left access door and align it with the right access door.
    - (e) Close and latch the APU access doors.
- S 866-010
- (2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
    - (a) APU CONT
- S 866-011
- (3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
    - (a) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 866-012
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch.
- S 746-013
- (5) Do the APU Control Unit - BITE procedure (AMM 49-61-05/201).

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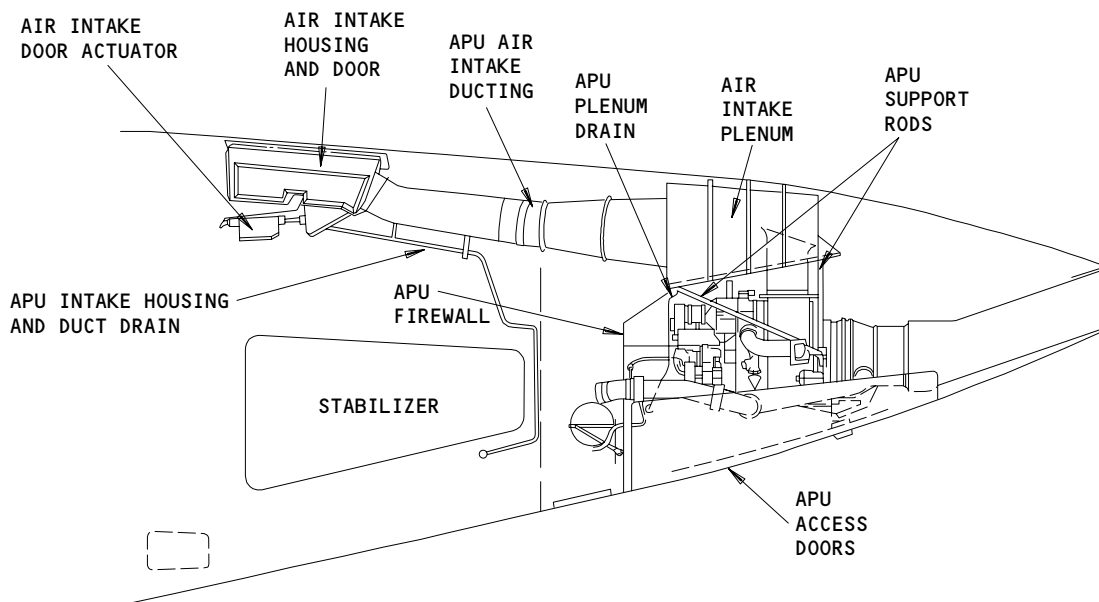
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APU AIR INTAKE SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The air intake system for the APU provides control and passage of air from the exterior of the airplane to the inlet plenum for the APU compressor. The intake door, intake door seal, intake door housing, intake door actuator, and intake ducts are located forward of the APU firewall on the right side above the horizontal stabilizer. The air intake plenum is mounted on the aft side of the APU firewall and serves as the major support of the APU. The intake door actuator opens the door outward to draw air through the ducts and plenum and into the inlet plenum for the APU compressor. The actuator is powered by the APU battery bus with 28 volts dc.
2. Component Details
  - A. Air Intake Door (Fig. 2)
    - (1) The door opens outward to draw air into the APU. It must be fully opened for APU operation. An electromechanical linear actuator operates the door. A switch mounted on the door housing indicates door open position to the APU control unit.

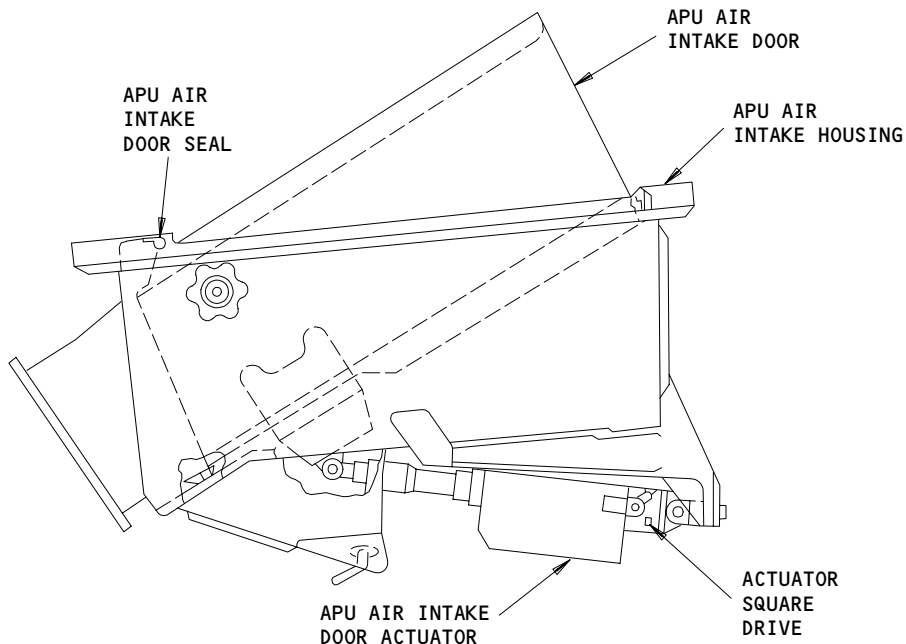


APU Air Intake System Location  
Figure 1

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- B. Air Intake Door Housing (Fig. 2)
  - (1) The housing surrounds the intake door and provides for the connection of the transition duct and the door actuator. It is bolted to the outer skin of the airplane between the vertical and right horizontal stabilizers. The housing is a composite of graphite-kevlar-fiberglass material.
- C. Air Intake Door Seal (Fig. 2)
  - (1) The seals are located inside the door housing around the door opening. The seal is in four sections bolted to the housing along the front, rear, and sides.
- D. Air Intake Door Actuator (Fig. 2)
  - (1) The door actuator mounts on the intake door housing with the rod end bolted to the door. It consists of an electric motor, actuator rod, jackscrew, reduction gear train, four limit switches, and a drive socket and clutch for manual operation. Mechanical stops are located beyond the limit switches in case of limit switch failure. The actuator square drive provides for manual operation of the actuator. The actuator is powered by the APU battery bus with 28 volts dc.
- E. Air Intake Ducts (Fig. 3)



APU Air Intake Door and Actuator  
Figure 2

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- (1) The duct forms an air passage from the intake housing to the intake plenum. The ducting consists of three sections: transition duct, elbow duct, and diffuser duct. The transition duct bolts to the intake door housing on the forward end and the elbow duct on the aft end. The elbow duct attaches to the pivot bulkhead and forms a slip-joint connection with the diffuser duct. The diffuser duct, in two sections, then bolts to the APU firewall.

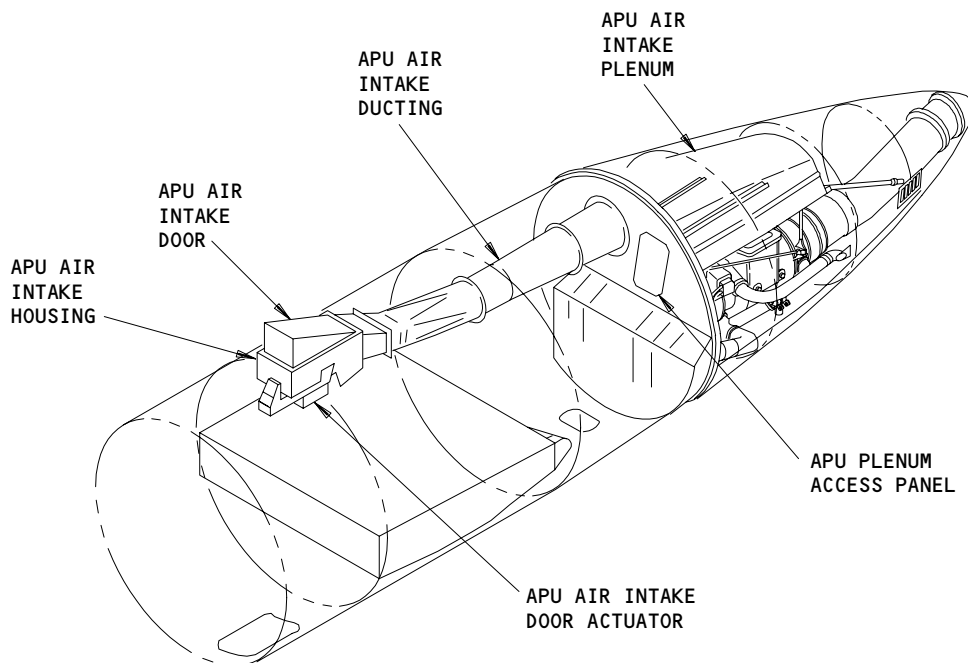
F. Air Intake Plenum (Fig. 3)

- (1) The intake plenum serves as the supporting structure of the APU. It is attached to the APU firewall around the forward end. The APU is hung from the plenum by tubular supports and vibration isolators. The plenum flange seal is a compressible seal between the compressor inlet plenum of the APU and the intake plenum. A removable access panel, located on the forward end, allows for inspection of the interior of the plenum.

3. Operation

A. Functional Description (Fig. 4)

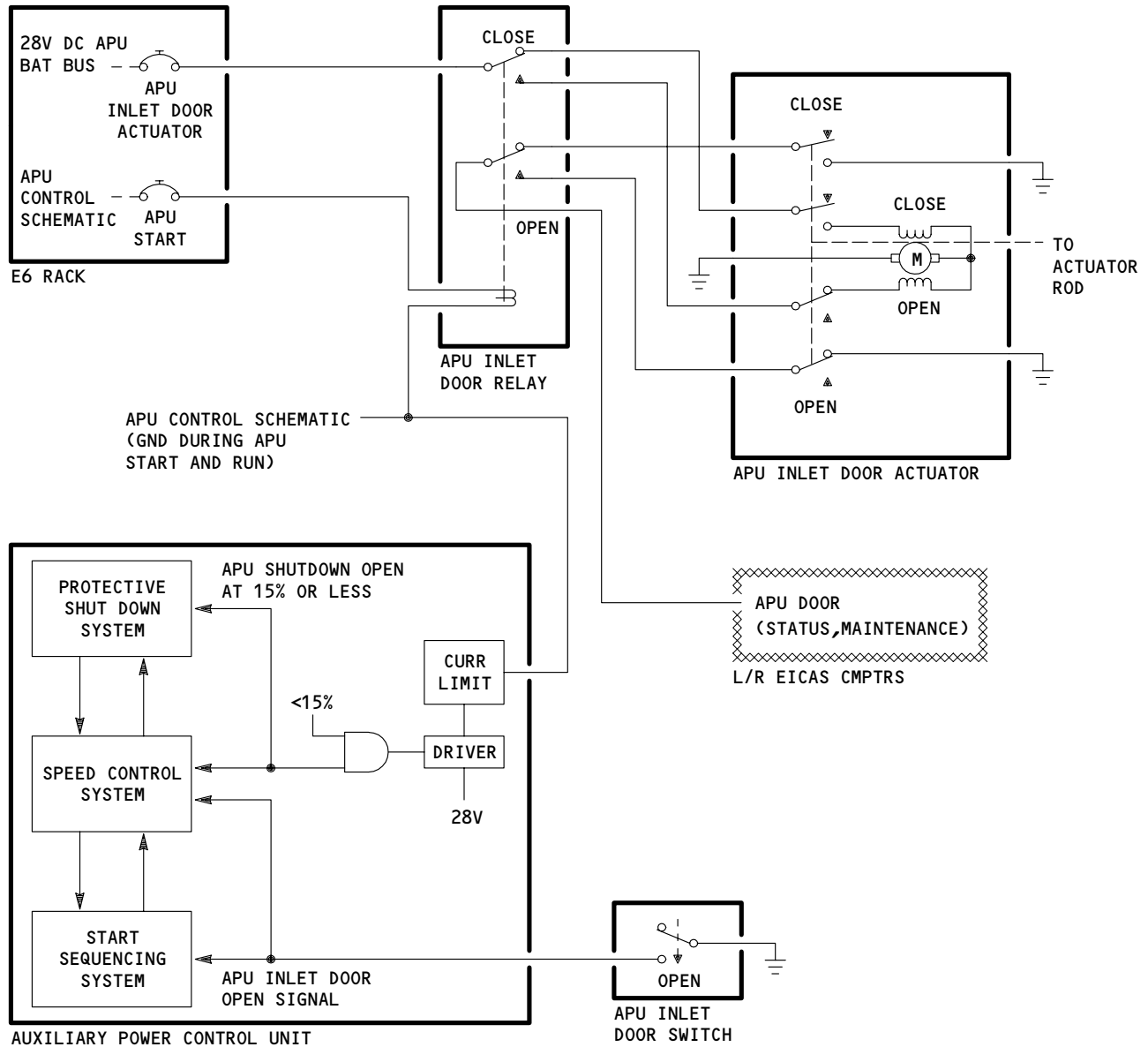
- (1) 28 volts dc power for the control circuit and the intake door actuator for the APU air is supplied by the APU battery bus and the main battery bus.



APU Air Intake Duct Location  
Figure 3

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APU Air Intake Door Control Schematic  
Figure 4

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- (2) The main battery switch must be on to initiate start of the APU engine. The APU start switch is placed to START and released to ON. This initiates APU automatic start and opens the air intake door automatically. If the switch is placed directly to ON, the air intake door opens but the APU will not start. EICAS displays APU DOOR on the maintenance and status modes when door isn't in scheduled position.
- (3) When the APU switch is placed to OFF, the APU control unit automatically shuts down the engine and closes the air intake door when the APU reaches 15% speed.

B. BITE

- (1) AIRPLANES WITH THE -18 APU CONTROL UNIT AND BEFORE;  
The APU control unit writes automatic shutdown causes in BITE memory. A shutdown because the door position is incorrect causes INLET DOOR to show on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE -19 THRU -999 APU CONTROL UNIT;  
The APU control unit writes automatic shutdown causes in BITE memory. A shutdown because the door position is incorrect causes DOOR SYSTEM to show on the REASON APU NOT OPERATING matrix. A short circuit on the inlet door relay causes INLET DOOR RLY to show on the FAULTY LRU matrix.

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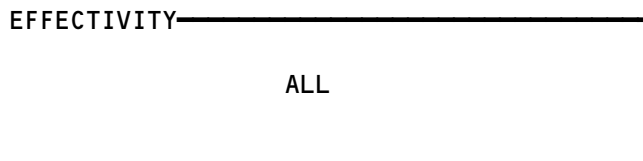



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 FAULT ISOLATION/MAINT MANUAL

APU AIR INTAKE

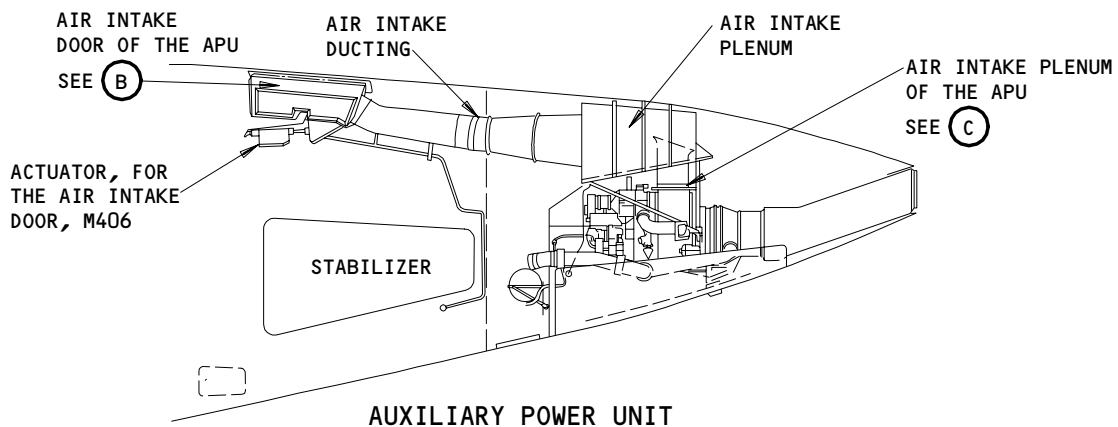
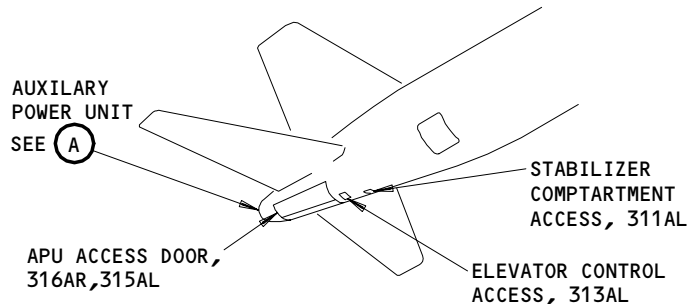
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - DOOR, M406		1	311AL, STABILIZER COMPT, AUXILIARY POWER UNIT	49-15-06
DOOR		1	311AL, STABILIZER COMPT, APU AIR INTAKE DOOR	49-15-05
DUCT		2	AUXILIARY POWER UNIT	49-15-01
HOUSING		1	311AL, STABILIZER COMPT, APU AIR INTAKE DOOR	49-15-08
PLENUM		1	313AL,315AL,316AR, APU COMPT, AUXILIARY POWER UNIT	49-15-03
RELAY - (31-01-06/101) APU INLET DOOR RELAY, K176		1	311AL, STABILIZER COMPT, APU AIR INTAKE DOOR	49-15-07
SEAL - DOOR		1	315AL,316AR, APU COMPT, APU AIR INTAKE PLENUM	49-15-04
SEAL - PLENUM FLANGE		1	311AL, STABILIZER COMPT, APU AIR INTAKE DOOR	49-15-02
SWITCH - DOOR, S10031		1		
UNIT - (49-61-00/101) APU CONTROL, M206				

APU Air Intake - Component Index  
Figure 101

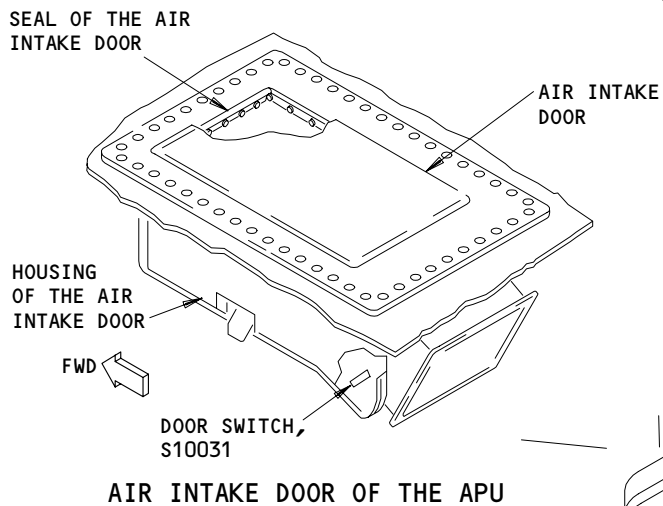


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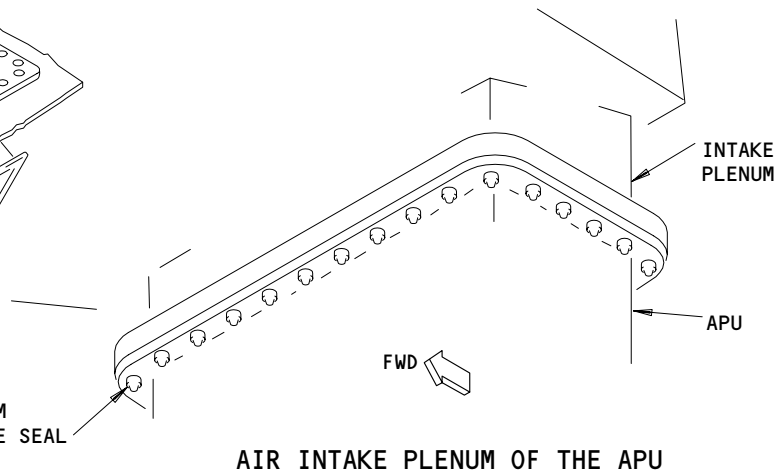


(A)



(B)

PLENUM  
FLANGE SEAL



(C)

APU Air Intake - Component Location  
Figure 102

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APU AIR INTAKE – ADJUSTMENT/TEST

1. General

- A. This procedure contains a task to do a system test of the air intake system for the APU.
- B. It is not necessary to do this task to do an operational test of the actuator for the air intake door. It is necessary to get access to the APU compartment to do this task.
- C. Use the APU operation procedure to start the APU for an operational test of the actuator for the air intake door.
- D. You can get access to the APU compartment through the APU access doors.

TASK 49-15-00-705-040

2. APU Air Intake System Test

A. References

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

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 865-002

- (1) Make sure the APU fire switch on the P8 control stand panel is pushed in.

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- S 865-006
- (2) Supply electrical power (AMM 24-22-00/201).
- S 865-007
- (3) Make sure the six EICAS circuit breakers on the P11 overhead panel are closed.
- S 015-041
- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- S 035-008
- (5) Disconnect the starter motor cables at the firewall to prevent the operation of the APU.
- S 865-009
- (6) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 865-010
- (7) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
- (a) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU POWER
- S 735-042
- (8) Do the system test of the air inlet:
- (a) Turn the APU control switch on the P5 panel to ON.
  - (b) Make sure the FAULT light on the APU control panel comes on for approximately six seconds and then goes off.
- NOTE: The FAULT light comes on when the APU fuel valve opens.
- (c) Make sure the air intake door is open.
  - (d) Turn the APU control switch on the P5 panel to OFF.
  - (e) Make sure the FAULT light comes on and then goes off.
  - (f) Open these circuit breakers on the E6 rack in the aft equipment center and attach DO-NOT-CLOSE tags:
    - 1) APU INLET DR ACT
    - 2) APU CONT

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- (g) Set the EICAS computer switch to L.
- (h) Push the EICAS STATUS switch on the P9 panel.
- (i) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
  - 1) P11 Overhead Panel
    - a) 11B34, APU MN BAT CONT or APU ALTN CONT
- (j) Turn the APU control switch on the P5 panel to ON.
- (k) Stop for 60 seconds.
- (l) Make sure the APU D00R message shows on the EICAS STATUS display.
- (m) Set the EICAS computer switch to R.
- (n) Make sure the APU D00R message shows on the EICAS STATUS display.
- (o) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
  - 1) APU INLET DR ACT
- (p) Make sure the air intake door opens in 10-35 seconds.
- (q) Make sure the APU D00R message does not show on the EICAS STATUS display when the door is open.
- (r) Turn the APU control switch on the P5 panel to OFF.

S 865-032

- (9) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
  - (a) APU CONT

S 865-033

- (10) Remove the DO-NOT-CLOSE tag and close this circuit breaker:
  - (a) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU POWER

S 435-036

- (11) Connect the starter motor cables at the firewall.

S 415-043

- (12) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 865-037

- (13) If it is not necessary, remove the electrical power (AMM 24-22-00/201).

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APU AIR INTAKE DUCT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the air intake duct for the APU.
- B. The air intake duct supplies air from the air intake door to the APU plenum. The air intake duct has four pieces. You get access to the air intake duct through the service access door and the elevator control access door on the bottom of the fuselage.

TASK 49-15-01-004-001

2. APU Air Intake Duct Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right
- 313 Stabilizer Torsion Box Compartment – Left
- 314 Stabilizer Torsion Box Compartment – Right

(2) Access Panels

- 311AL Service Access Door
- 313AL Elevator Control Access Door
- 822 Aft Cargo Door

C. Procedure

S 864-002

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

S 864-003

- (2) Set the switches and the circuit breakers:
  - (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - (b) Set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to OFF and attach DO-NOT-OPERATE tags.
  - (c) Set the C and R STAB TRIM switches on the control stand to CUTOUT and attach DO-NOT-OPERATE tags.
  - (d) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - 1) P11 Overhead Panel
      - a) 11B34, APU MN BAT CONT or APU ALTN CONT
      - b) 11C12, STAB TRIM SHUTOFF LEFT
      - c) 11C13, STAB TRIM SHUTOFF RIGHT

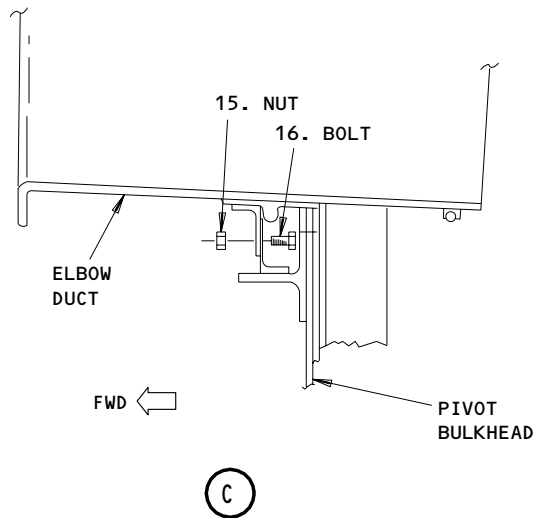
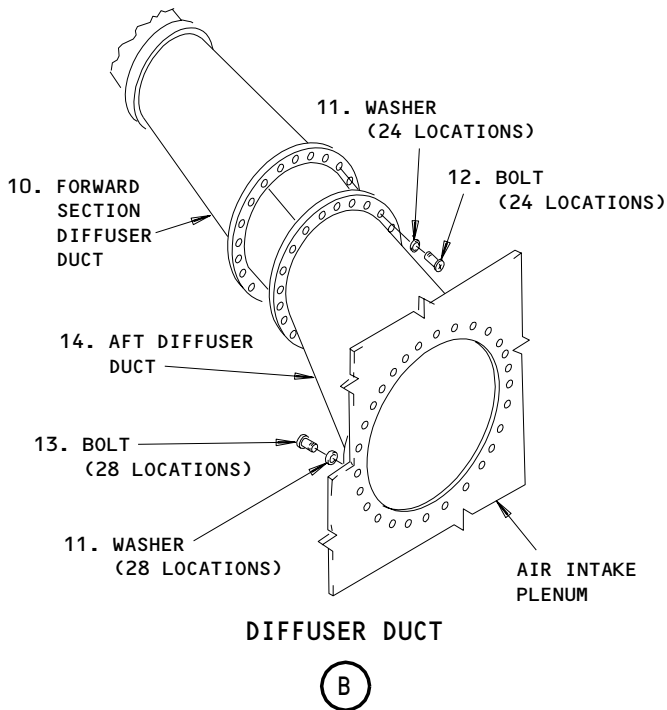
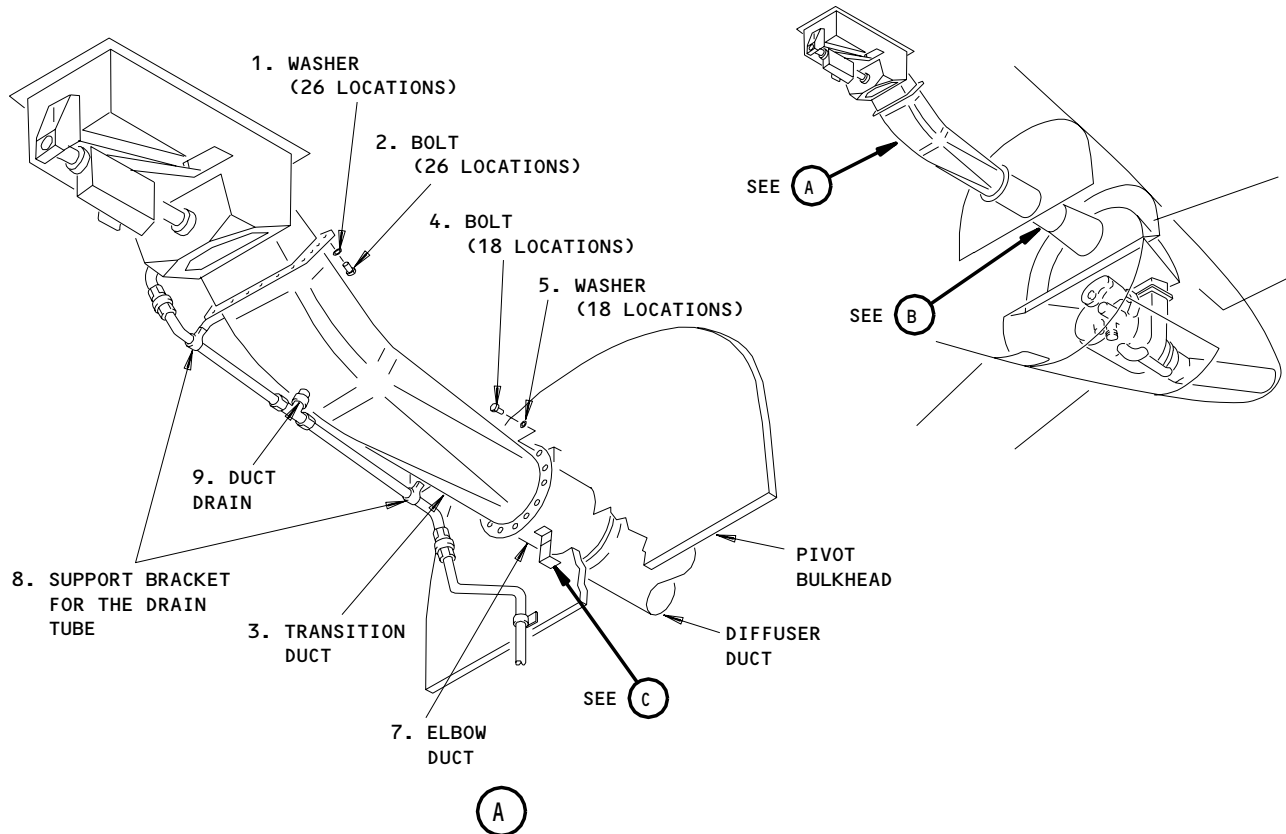
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Air Intake Duct Installation  
Figure 401

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- d) 11H17, FLT CONT SHUTOFF TAIL LEFT
- e) 11H18, FLT CONT SHUTOFF TAIL CENTER
- f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- 2) E6 Rack, Aft Equipment Center
  - a) APU CONT

S 014-008

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

- (3) Open the service access door, 311AL, and the elevator control access door, 313AL.

**NOTE:** The service access door permits the access to the transition duct and the elbow duct. The elevator control door permits the access to the diffuser ducts.

S 024-009

- (4) Remove the transition duct:
  - (a) Disconnect the drain tube from the support brackets (8) and from the duct drain (9).
  - (b) Remove the bolts (2) and the washers (1) from the forward end of the transition duct (3).
  - (c) Remove the bolts (4) and the washers (5) from the aft end of the transition duct (3).
  - (d) Remove the transition duct (3).

S 024-010

- (5) Remove the elbow duct:
  - (a) Remove the nuts (15) and the bolts (16) from the brackets that attach the elbow duct (7) to the bulkhead.
  - (b) Move the elbow duct (7) forward, away from the diffuser duct and the bulkhead.
  - (c) Remove the elbow duct (7).

S 024-011

- (6) Remove the diffuser duct:
  - (a) Remove the bolts (12) and the washers (11) that attach the forward diffuser duct (10) to the aft diffuser duct (14).

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- (b) Remove the forward diffuser duct (10).
- (c) Remove the bolts (13) and the washers (11) that attach the aft diffuser duct (14) to the intake plenum.
- (d) Remove the aft diffuser duct (14).

S 214-027

- (7) Visually examine the ducts:
  - (a) Examine ducts (3, 10, and 14) to make sure there are no unwanted objects in the ducts.
  - (b) Examine the ducts (3, 10, and 14) for cracks and chips.

TASK 49-15-01-404-014

3. APU Air Intake Duct Installation (Fig. 401)

A. Consumable Materials

- (1) A00247 Sealant - Chromate, BMS 5-95, Type 1, Class C-20

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Transition Duct	49-15-01	02	25
	7	Elbow Duct			65
	10	Forward Diffuser Duct	49-15-01	01	30, 105 or 110
	14	Aft Diffuser Duct			20

C. References

- (1) AMM 29-11-00/201, Main Hydraulic System

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Left
- 312 Area Aft of Pressure Bulkhead - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Compartment - Right

(2) Access Panels

- 311AL Service Access Door
- 313AL Elevator Control Access Door
- 822 Aft Cargo Door

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E. Procedure

S 424-015

- (1) Install the diffuser duct:
  - (a) Apply the sealant to the flange of the aft diffuser duct (14) that attaches the duct to the intake plenum.
  - (b) Put the aft diffuser duct (14) in its position on the intake plenum.
  - (c) Install the bolts (13) and the washers (11) that attach the aft diffuser duct (14) to the air intake plenum.
  - (d) Apply the sealant to the flange that attaches the forward diffuser duct (10) to the aft diffuser duct (14).
  - (e) Install the forward diffuser duct (10) with the bolts (12) and the washers (11).

S 424-016

- (2) Install the elbow duct:
  - (a) Put the aft end of the elbow duct (7) through the pivot bulkhead into the diffuser duct.
  - (b) Align the brackets that attach the elbow duct (7) to the bulkhead.
  - (c) Install the nuts (15) and bolts (16) in the brackets that attach the elbow duct (7) to the bulkhead.

S 424-017

- (3) Install the transition duct:
  - (a) Apply the sealant to the flanges on the two ends of the transition duct (3).
  - (b) Put the transition duct (3) in its position.
  - (c) Install the bolts (4) and the washers (5) in the aft end of the transition duct (3).
  - (d) Install the bolts (2) and the washers (1) in the forward end of the transition duct (3).
  - (e) Connect the drain tube to the support brackets (8) and the duct drain (9).

S 214-018

- (4) Visually examine all the connections of the air intake duct.
  - (a) Make sure all the connections are tight.
  - (b) Make sure all the connections are correctly sealed.

S 414-020

- (5) Close the service access door, 311AL, and the elevator control access door, 313AL.

S 864-021

- (6) Set the switches and the circuit breakers:
  - (a) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - 1) E6 Rack, Aft Equipment Center
      - a) APU CONT

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- 2) P11 Overhead Panel
- a) 11B34, APU MN BAT CONT or APU ALTN CONT
  - b) 11C12, STAB TRIM SHUTOFF LEFT
  - c) 11C13, STAB TRIM SHUTOFF RIGHT
  - d) 11H17, FLT CONT SHUTOFF TAIL LEFT
  - e) 11H18, FLT CONT SHUTOFF TAIL CENTER
  - f) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) Remove the DO-NOT-OPERATE tags and set the R and L STAB TRIM switches on the control stand to NORM.
- (c) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to ON.
- (d) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 864-026
- (7) If it is necessary, apply hydraulic pressure to the left system, the right system, and the center system (AMM 29-11-00/201).

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APU AIR INTAKE DOOR OPEN SWITCH AND SENSOR - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the door position switch and the sensor on the air intake door.
- B. The door position switch get a magnetic signal from the door open sensor when the air intake door is fully open. This signal is sent to the EICAS and the APU control unit.
- C. The door position switch is on a bracket which is attached to the door housing with rivets. The door open sensor is on the bottom of the air intake door. The air intake door must be open to see the switch and the sensor.
- D. You can get access to the door position switch and the door open sensor through the access door for the horizontal stabilizer compartment.

TASK 49-15-02-004-001

2. Air Intake Door Open Switch or Door Open Sensor Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-05/401, APU Air Intake Door
- (3) SSM 49-52-02
- (4) WDM 49-61-14

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Left
- 312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

C. Procedure

S 864-002

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

S 864-003

- (2) Set the switches:

- (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

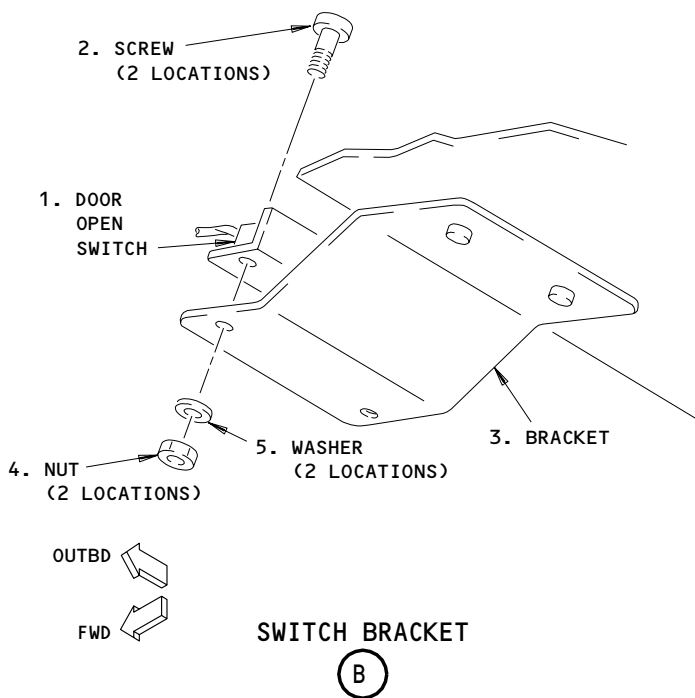
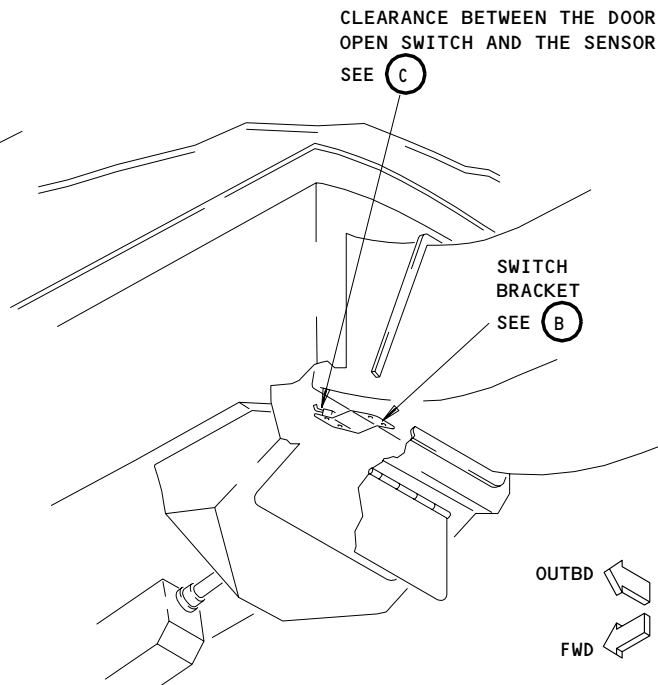
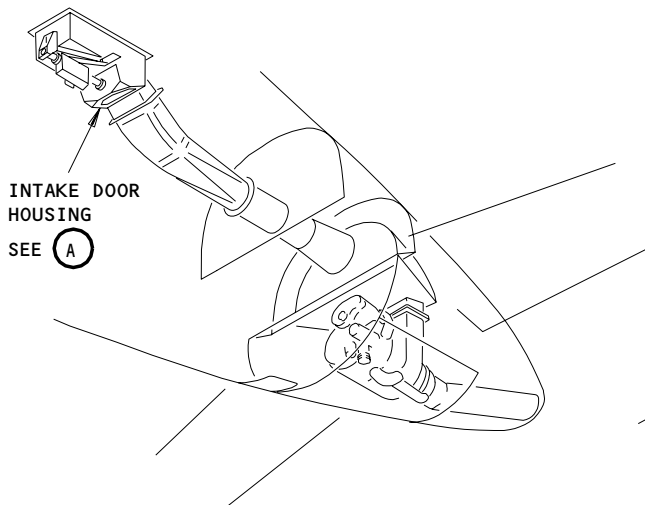
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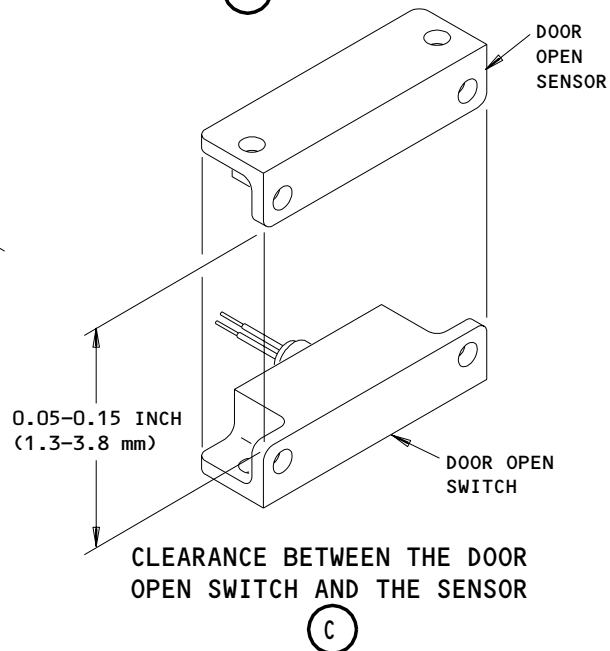
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INTAKE DOOR HOUSING (A)



Door Open Switch Installation  
Figure 401

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- (b) Set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to OFF and attach DO-NOT-OPERATE tags.
- (c) Set the C and R STAB TRIM switches on the control stand to CUTOUT and attach DO-NOT-OPERATE tags.

S 864-038

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
    - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-008

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (4) Open the service access door, 311AL for the stabilizer compartment.

S 024-009

- (5) Remove the door open switch:
  - (a) Open the access door, for the actuator rod, on the bottom of the intake door housing.
  - (b) Manually open the air intake door:

**CAUTION:** DO NOT USE TOO MUCH TORQUE ON THE MANUAL/ELECTRICAL SELECTOR SHAFT OR ON THE MANUAL DRIVE. IF TOO MUCH TORQUE IS USED, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE MANUAL OPERATION DECAL ON THE AIR INTAKE DOOR ACTUATOR.

- 1) Open the manual/electrical selector shaft on the front end of the actuator as follows:
  - a) Put a 1/4 inch square drive in the manual/electrical selector shaft.
  - b) Push the square drive in and turn it counterclockwise approximately 90° until you can see the manual drive socket.

**NOTE:** Do not use more than 10 inch-pounds (1.1 newton-meters) of torque.

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- 2) Turn the manual drive socket clockwise with the 1/4 inch square drive until you can see the door open switch.
  - a) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the manual drive.

**CAUTION:** MAKE SURE YOU DO NOT BEND THE BRACKET WHEN YOU REMOVE THE SWITCH. IT IS NECESSARY TO HAVE THE SWITCH IN THE CORRECT POSITION FOR THE SWITCH TO OPERATE. DAMAGE TO BRACKET CAN OCCUR.

- (c) Remove the screws (2), the washers (5), and the nuts (4) that attach the door open switch (1) to the bracket (3).
- (d) Cut the wires to the door open switch (1).
- (e) Remove the door open switch (1).

S 024-039

- (6) Remove the door open sensor:
  - (a) Remove the air intake door (AMM 49-15-05/401).

**NOTE:** Keep the air intake door with the airplane.

- (b) Remove the screws, the nuts, and the washers that attach the door open sensor to the air intake door.
- (c) Remove the door open sensor from the air intake door.

TASK 49-15-02-404-017

3. Air Intake Door Open Switch or Door Open Sensor Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Sensor (Door Open Switch)	49-15-02	01	35

B. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-15-05/401, APU Air Intake Door
- (4) SWPM 20-30-12

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- (5) SSM 49-52-02
- (6) WDM 49-61-14

C. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 311 Area Aft of Pressure Bulkhead - Left
  - 312 Area Aft of Pressure Bulkhead - Right
- (2) Access Panels
  - 311AL Stabilizer Compartment Door
  - 822 Aft Cargo Door

D. Procedure

S 424-040

- (1) Install the door open switch:
  - (a) Connect the new switch wires to the airplane wires with splices that are water proof (SWPM 20-30-12).
  - (b) Attach the door open switch (1) to the bracket (3) with the screws (2), the washers (5), and the nuts (4).
  - (c) Turn the manual drive socket clockwise with a 1/4 inch square drive until the door is fully open.
    - 1) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the socket.
  - (d) Make sure the door open switch aligns with the door open sensor.
  - (e) Make sure the door open switch and the door open sensor have the correct clearance between them.
  - (f) Manually close the air intake door:
    - 1) Turn the manual drive socket counterclockwise with a 1/4 inch square drive until the door is fully closed.
      - a) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the socket.
    - 2) Turn the manual/electrical selector shaft clockwise with a 1/4 inch square drive until you cannot see the manual drive socket.
      - a) Do not use more than 10 inch-pounds (1.1 newton-meters) to turn the shaft.

S 424-041

- (2) Install the door open sensor:
  - (a) Attach the door open sensor to the air intake door with the screws, the washers, and the nuts.
  - (b) Install the air intake door on the airplane (AMM 49-15-05/401).

S 984-025

- (3) Manually open the air intake door:

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**CAUTION:** DO NOT USE TOO MUCH TORQUE TO THE MANUAL/ELECTRICAL SELECTOR SHAFT OR TO THE MANUAL DRIVE. IF TOO MUCH TORQUE IS USED, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE MANUAL OPERATION DECAL ON THE AIR INTAKE DOOR ACTUATOR.

- (a) Open the manual/electrical selector shaft on the front end of the actuator as follows:
  - 1) Put a 1/4 inch square drive in the manual/electrical selector shaft.
  - 2) Push the square drive in and turn it counterclockwise approximately 90° until you can see the manual drive socket.
    - a) Do not use more than 10 inch-pounds (1.1 newton-meters) of torque to turn the shaft.
- (b) Turn the manual drive socket clockwise with a 1/4 inch square drive until the door is fully open.
  - 1) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the socket.

S 224-026

- (4) Make sure the door open switch aligns with the door open sensor and has the correct clearance.
  - (a) If the clearance is more than the limit, fabricate a shim from 7076-T6 aluminum or equivalent to match the outline of the bracket common to the door open switch (1).
  - (b) Install the shim between the bracket (3) and the door open switch (1) to restore the clearance.

S 984-027

- (5) Manually close the air intake door:
  - (a) Turn the manual drive socket counterclockwise with a 1/4 inch square drive until the door is fully closed.
    - 1) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the socket.
  - (b) Turn the manual/electrical shaft clockwise with a 1/4 inch square drive until you cannot see the manual drive socket.
    - 1) Do not use more than 10 inch-pounds (1.1 newton-meters) of torque to turn the shaft.

S 414-028

- (6) Close the access door for the actuator rod.

S 414-029

- (7) Close the service access door, 311AL for the horizontal stabilizer compartment.

S 864-030

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - 2) 11C12, STAB TRIM SHUTOFF LEFT
  - 3) 11C13, STAB TRIM SHUTOFF RIGHT
  - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
  - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
  - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-032

- (9) Set the switches:
  - (a) Remove the DO-NOT-OPERATE tags and set the C and R STAB TRIM switches on the control stand to NORM.
  - (b) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to ON.
  - (c) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 864-035

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

S 714-036

- (11) Do an operational test of the door open switch:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) Make sure the switch operates correctly.

NOTE: The APU will not start if the switch does not get the magnetic signal when the air intake door is fully open.

- (c) Do a shutdown of the APU (AMM 49-11-00/201).

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APU AIR INTAKE PLENUM – INSPECTION/CHECK

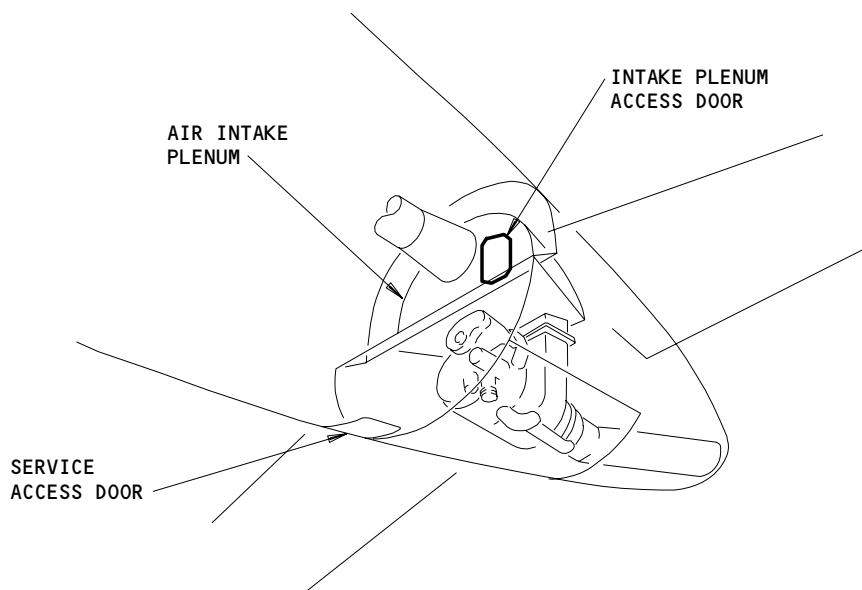
1. General

- A. This procedure contains an inspection task for the air intake plenum for the APU.
- B. To do the inspection of the air intake plenum, you must remove the plenum access door. You can get access to the plenum access door through the access door for the horizontal compartment.

TASK 49-15-03-206-001

2. APU Air Intake Plenum Inspection (Fig. 601)

- A. References
  - (1) AMM 29-11-00/201, Main Hydraulic Systems



APU Air-Intake Plenum Inspection/Check  
Figure 601

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B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
311	Area Aft of Pressure Bulkhead - Left
312	Area Aft of Pressure Bulkhead - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

311AL	Service Access Door
315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 866-002

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

S 866-003

- (2) Set the switches:
- (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - (b) Set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to OFF and attach DO-NOT-OPERATE tags.
  - (c) Set the C, and R STAB TRIM switches on the control stand to CUTOUT and attach DO-NOT-OPERATE tags.

S 866-006

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER

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- 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) E6 Rack, Aft Equipment Center
- 1) APU CONT

S 016-028

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (4) Open the service access door, 311AL for the horizontal stabilizer compartment.

S 016-029

- (5) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 216-026

- (6) Visually examine the air intake plenum:
  - (a) Remove the bolts from the plenum access door on the front side of the APU firewall to remove the door.
  - (b) Examine the inside of the intake plenum for debris.
    - 1) If it is necessary, clean the inner area of the intake plenum.
  - (c) Examine the plenum drain outlet to make sure there is no blockage.
  - (d) Examine the inner and the outer walls of the intake plenum for holes, dents, or cracks.
  - (e) Make sure all the fasteners that attach the intake plenum to the firewall are there and are tight.
  - (f) Make sure the APU support brackets on the intake plenum do not have damage or worn areas.
  - (g) Install the plenum access door on the intake plenum with the bolts.

S 416-030

- (7) Close the service access door, 311AL for the horizontal stabilizer compartment.

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S 416-031

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 866-019

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
    - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 866-021

- (10) Set the switches:
- (a) Remove the DO-NOT-OPERATE tags and set the C and R STAB TRIM switches on the control stand to NORM.
  - (b) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to ON.
  - (c) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU AIR INTAKE PLENUM FLANGE SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the flange seal on the air intake plenum for the APU.
- B. The seal for the air intake plenum is attached to the upper flange of the air inlet duct. You must remove the APU to get access to the seal.
- C. You can get access to the APU through the APU access doors.

TASK 49-15-04-004-001

2. Air Intake Plenum Flange Seal Removal (Fig. 401)

A. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 024-009

- (1) Remove the APU (AMM 49-11-01/401).

S 024-003

- (2) Remove the air intake seal:
  - (a) Remove the bolts (2) and the washers (1) that attach the air intake seal (4) to the intake flange (3).
  - (b) Remove the air intake seal (4) from the intake flange (3).

TASK 49-15-04-404-004

3. Air Intake Plenum Seal Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Seal	49-11-01	01	265

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

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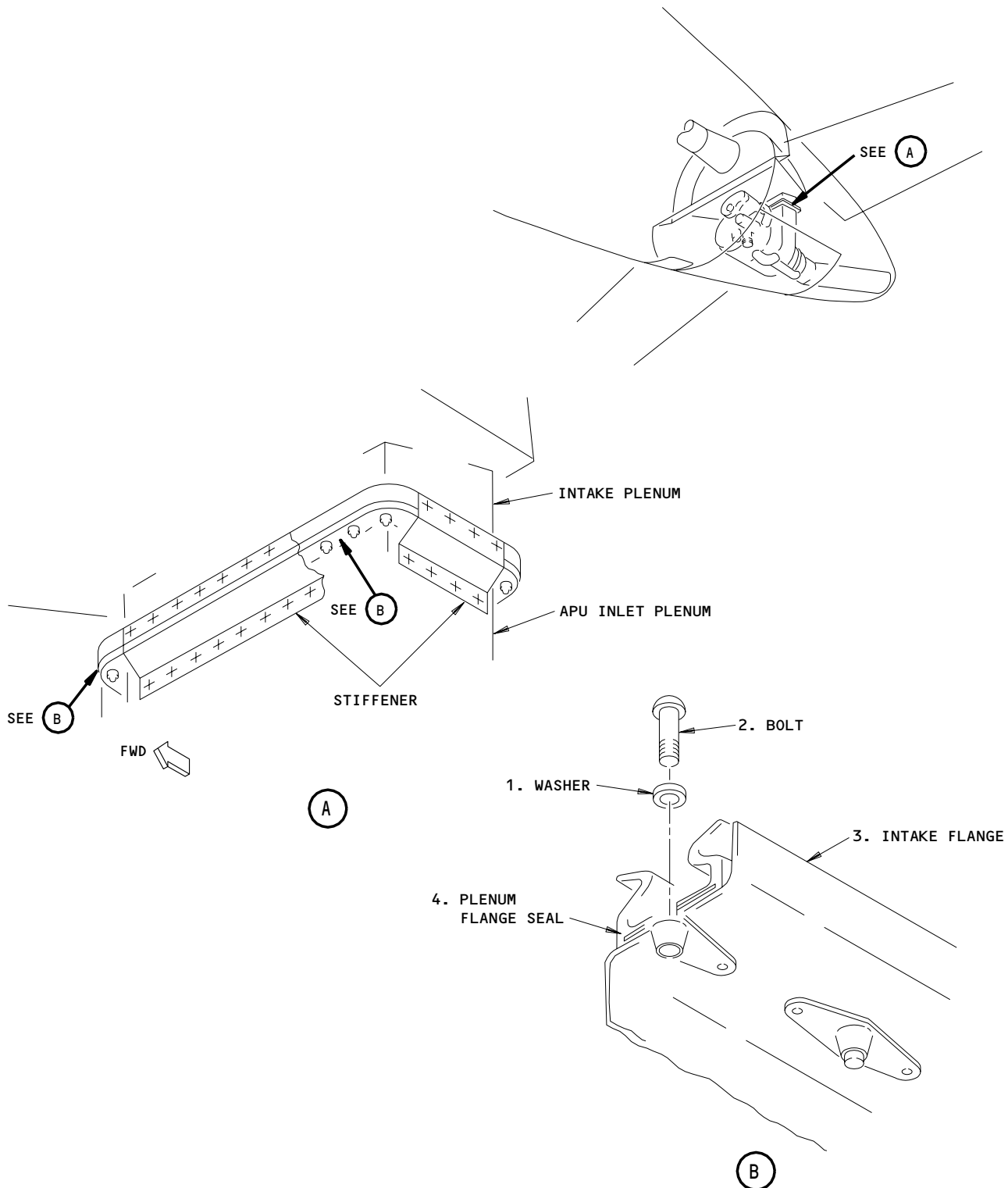
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APU Air Intake Plenum Seal Installation  
Figure 401

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C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

D. Procedure

S 424-005

(1) Install the air intake seal:

- (a) Put the air intake seal (4) in its position on the intake flange (3).
- (b) Install the bolts (2) and the washers (1) that attach the air intake seal (4) to the intake flange (3).

S 424-008

(2) Install the APU (AMM 49-11-01/401).

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APU AIR INTAKE DOOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for air intake door for the APU.
- B. The air intake door is on the right side of the fuselage between the vertical stabilizer and the horizontal stabilizer. You can get access to the intake door housing through the service access door for the stabilizer compartment.

TASK 49-15-05-004-001

2. APU Air Intake Door Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-02/401, APU Air Intake Door Open Switch

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

C. Procedure

S 864-002

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

S 864-003

- (2) Set the switches:
  - (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - (b) Set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to OFF and attach DO-NOT-OPERATE tags.
  - (c) Set the C and R STAB TRIM switches on the control stand to CUTOUT and attach DO-NOT-OPERATE tags.

S 864-006

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER

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# BOEING

## 757 MAINTENANCE MANUAL

DOOR FLUSHNESS

SEE (B)

SEE (A)

FRAME  
CONTOUR  
(REF)

DOOR FLUSHNESS  
 $\pm 0.03$  INCH

INTAKE DOOR  
AND HOUSING  
(LEADING EDGE,  
CENTERLINE)

(B)

- 1. BONDING WIRE
- 2. BOLT
- 3. WASHER
- 4. HINGE BOLT

9. BOLT

5. WASHER

INTAKE DOOR  
HOUSING

6. COTTER PIN

7. NUT

SEE (C)

8. ACCESS DOOR FOR  
THE ACTUATOR ROD

INTAKE DOOR  
ACTUATOR

(A)

APU Air Intake Door Installation  
Figure 401 (Sheet 1)

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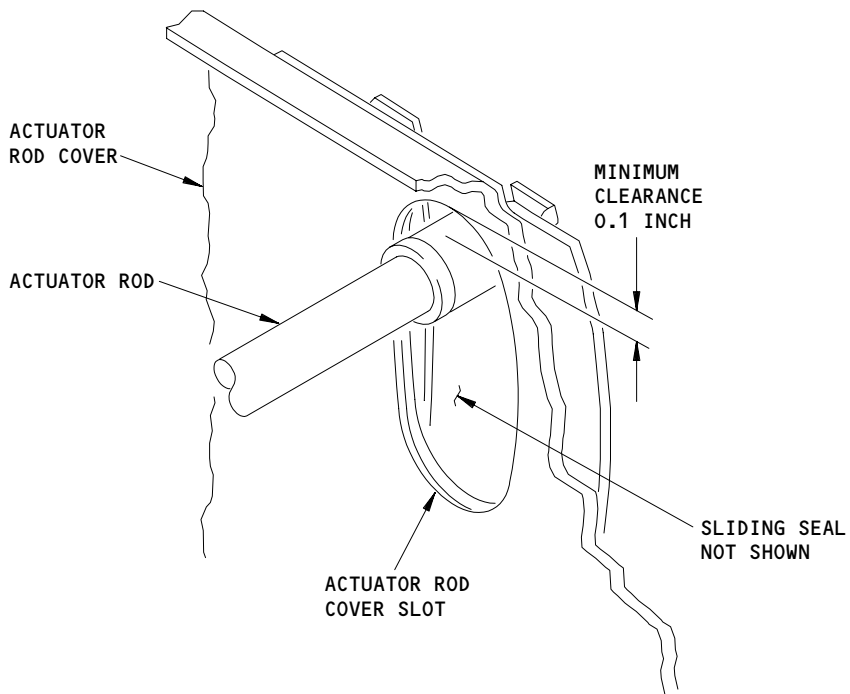
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ACTUATOR RETRACTED - DOOR OPEN

(C)

APU Air Inlake Door Installation  
Figure 401 (Sheet 2)

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- 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) E6 Rack, Aft Equipment Center
- 1) APU CONT

S 014-008

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (4) Open the service access door, 311AL for the stabilizer compartment.

S 024-034

- (5) Remove the air intake door:
  - (a) Open the access door (8) on the bottom of the intake door housing to get access to the actuator rod.
  - (b) Remove the cotter pin (6) and nut (7) from the actuator rod connection.

**NOTE:** You can manually open the air intake door a small quantity to make it easier to remove the door.

- (c) Remove the bolt (9) and washers (5) from the actuator rod connection.
- (d) Remove the bolts (2), the bonding wires (1), and the washers (3) from the hinge bolts (4).
- (e) Remove the hinge bolts (4) from the intake door housing.
- (f) From the external side of the airplane, lift the air intake door out of the housing.

S 034-015

- (6) Remove the door open sensor from the air intake door (AMM 49-15-02/401).

S 214-035

- (7) Visually examine the door open sensor.
  - (a) If the door open sensor has corrosion, replace the sensor.
  - (b) If the door open sensor is satisfactory, keep the sensor with the airplane.

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TASK 49-15-05-404-016

3. APU Air Intake Door Installation (Fig. 401)

A. Consumable Materials

- (1) Compound, Antiseize - Armité LF-AS 328

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Door Assembly (APU Air Intake Door)	49-15-05	01	451

C. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-02/401, APU Air Intake Door Open Switch
- (3) AMM 49-15-06/501, APU Air Intake Door Actuator
- (4) AMM 49-15-07/401, APU Air Intake Door Seal

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Left
- 312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

E. Procedure

S 434-017

- (1) Install the door open sensor on the air intake door (AMM 49-15-02/401).

S 964-018

- (2) Replace the intake door seals on the housing if they have cracks or damage (AMM 49-15-07/401).

S 424-019

- (3) Install the air intake door:
  - (a) Put the air intake door in the housing.

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- (b) Apply antiseize compound (ARMITE LF AS-328) to the threads and shank of the hinge bolts (4).
- (c) Install the hinge bolts (4) in the intake door housing.
  - 1) Tighten the hinge bolts (4) to 350 inch-pounds (39.6 newton-meters).
- (d) Install the bolts (2), the bonding wires (1), and the washers (3) in the hinge bolts (4).
- (e) Connect the actuator rod to the door with the bolt (9), the washers (5), the nut (7), and the cotter pin (6).
- (f) Close the access door (8) on the bottom of the intake door housing.

S 984-024

- (4) Manually operate the actuator to make sure the air intake door is fully closed:

**CAUTION:** DO NOT USE TOO MUCH TORQUE ON THE MANUAL/ELECTRICAL SELECTOR SHAFT OR THE MANUAL DRIVE. IF TOO MUCH TORQUE IS USED, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE MANUAL OPERATION DECAL ON THE AIR INTAKE DOOR ACTUATOR.

- (a) Open the manual/electrical selector shaft on the front end of the actuator as follows:
  - 1) Put a 1/4 inch square drive in the manual/electrical selector shaft.
  - 2) Push the square drive in and turn it counterclockwise approximately 90° until you can see the manual drive socket.
    - a) Do not use more than 10 inch-pounds (1.1 newton-meters) of torque to turn the shaft.
- (b) Turn the manual drive socket counter clockwise with the 1/4 inch square drive until the door is fully closed.
  - 1) Do not use more than 65 inch-pounds (7.3 newton-meters) of torque to turn the socket.
  - 2) When the torque suddenly increases, turn the manual drive socket 240 degrees in the opposite direction. This retracts the actuator to the electrical stop position.
- (c) Push and turn the manual/electrical selector shaft clockwise with the 1/4 inch square drive until you cannot see the manual drive socket.
  - 1) Do not use more than 10 inch-pounds (1.1 newton-meters) of torque to turn the shaft.

S 224-025

- (5) Make sure the external side of the air intake door is smooth with the fuselage to a tolerance of  $\pm 0.03$  inch. Measure at the leading edge centerline of the door.

S 824-026

- (6) If the door is not in the tolerance, adjust the intake door actuator (AMM 49-15-06/501).

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S 984-036

- (7) Manually operate the actuator to make sure the air intake door is fully open.
- (a) If it is necessary, use the instructions from the placard on the intake door actuator to manually open the air intake door.
  - (b) Turn the manual drive socket clockwise until the torque suddenly increases.
  - (c) Turn the transfer flag socket clockwise.

S 224-037

- (8) Measure the clearance between the actuator rod and the rod cover slot or the rod cover fasteners.
- (a) If the clearance is less than 0.1 inch, remove material from the rod end cover and the associated fasteners. Remove material until the clearance is sufficient.

S 984-038

- (9) Manually operate the actuator to make sure the air intake door is fully closed.

S 414-027

- (10) Close the service access door, 311AL for the stabilizer compartment.

S 864-028

- (11) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
    - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

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S 864-030

(12) Set the switches:

- (a) Remove the DO-NOT-OPERATE tags and set the C and R STAB TRIM switches on the control stand to NORM.
- (b) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to ON.
- (c) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU AIR INTAKE DOOR – INSPECTION/CHECK

1. General

- A. This procedure contains a task to do an inspection of the air intake door for the APU.
- B. You must remove the air intake door to do the full inspection of the door. You can get access to the air intake door through the access door for the stabilizer compartment.

TASK 49-15-05-206-001

2. Air Intake Door Inspection

A. References

- (1) AMM 49-15-05/401, APU Air Intake Door
- (2) AMM 49-15-06/501, APU Air Intake Door Actuator

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right

(2) Access Panels

- 311AL Stabilizer Compartment Door
- 822 Aft Cargo Door

C. Procedure

S 016-002

**WARNING:** STAY AWAY FROM THE ACCESS DOORS FOR THE STABILIZER COMPARTMENT. YOUR WEIGHT CAN CAUSE THE DOOR LATCHES TO RELEASE AND OPEN THE DOOR. INJURY TO YOUR BODY CAN OCCUR IF YOU FALL THROUGH THE ACCESS DOOR OPENING.

- (1) Open the service access door, 311AL for the stabilizer compartment to get access to the air intake door from the inner side of the airplane.

S 216-003

- (2) Examine the door attach point, for the actuator rod, for tightness, cracks, and worn areas.

S 216-004

- (3) Examine the hinges on the air intake door:
  - (a) Remove the air intake door for the APU (AMM 49-15-05/401).
  - (b) Visually examine the door hinge components for worn areas.
  - (c) Install the air intake door for the APU (AMM 49-15-05/401).
  - (d) Make sure the air intake door aligns correctly with the fuselage (AMM 49-15-06/501).

S 416-005

- (4) Close the service access door, 311AL for the stabilizer compartment.

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APU AIR INTAKE DOOR ACTUATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the actuator for the air intake door. There are two procedures to remove the actuator in the removal task. Use the standard procedure when you can move the APU air intake door actuator. Use the alternate procedure when the actuator is caught in the extended position.
- B. The intake door actuator is on a bracket which is attached to the intake door housing. You can get access to the actuator through the forward access door for the horizontal stabilizer compartment.

TASK 49-15-06-004-001

2. APU Air Intake Door Actuator – Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

C. Procedure

S 864-002

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

S 864-003

- (2) Set the switches:
  - (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - (b) Set the L, R, and C FLT CONT SHUTOFF valve switches on the P61 sidewall panel to OFF and attach DO-NOT-OPERATE tags.
  - (c) Set the C and R STAB TRIM switches on the control stand to CUTOUT and attach DO-NOT-OPERATE tags.

S 864-006

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT

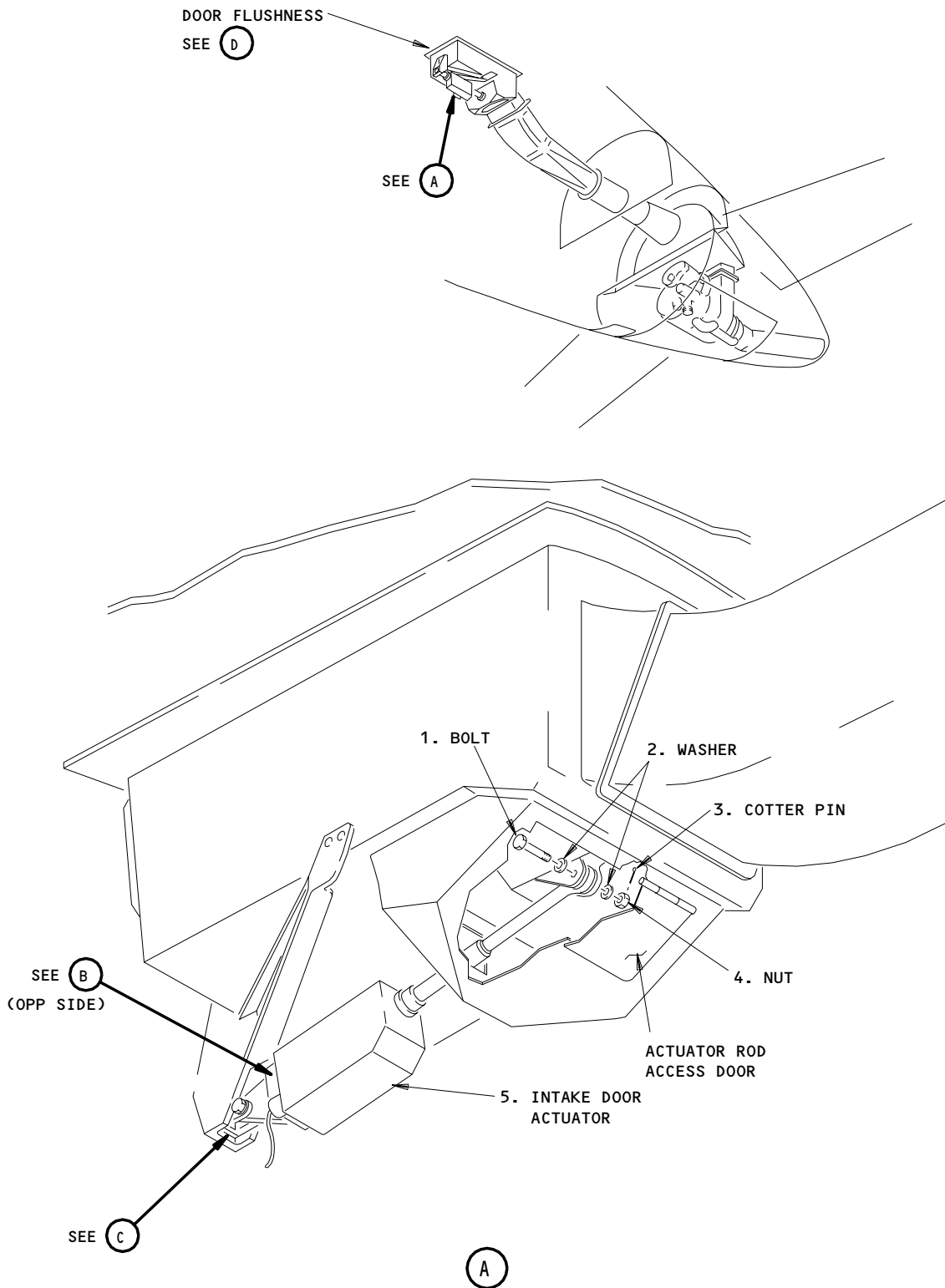
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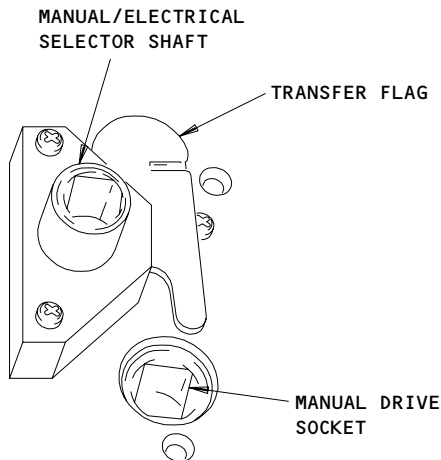
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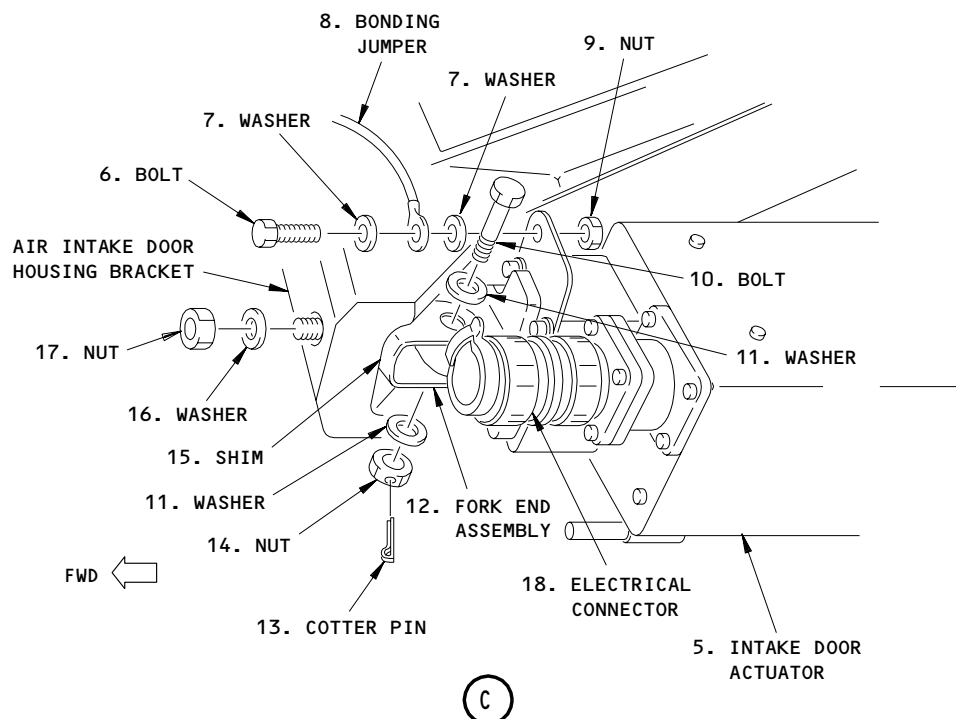
Air Intake Door Actuator Installation  
Figure 401 (Sheet 1)

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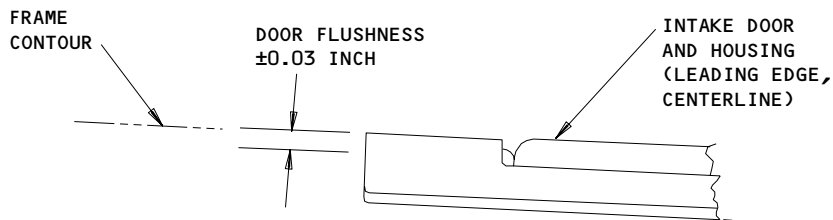
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(B)



(C)



(D)

Air Intake Door Actuator Installation  
Figure 401 (Sheet 2)

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- 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
- 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT
  - 2) APU INLET DOOR ACTUATOR

S 014-008

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR 311AL AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN CAUSE THE SPRING-LOADED LATCHES TO RELEASE. IF YOU FALL THROUGH THE DOOR, INJURY CAN OCCUR.

- (4) Open the service access door, 311AL for the horizontal stabilizer compartment.

S 024-043

- (5) Remove the air intake door actuator (standard procedure):

**NOTE:** Use this procedure if you can manually move the actuator rod.

- (a) Open the access door on the bottom of the intake door housing.
- (b) Remove the cotter pin (3), the nut (4), the washers (2), and the bolt (1) from the actuator rod connection.
- (c) Manually retract the actuator approximately 2 inches (51 mm) to disengage the actuator from the inlet door.

**NOTE:** See the operation placard on the actuator.

- (d) Disconnect the electrical connector (18) from the actuator.
  - 1) Put caps on the electrical connectors.
- (e) Remove the bolt (6), the washers (7), and the nut (9) that attach the bonding jumper (8) to the actuator.

**CAUTION:** CAREFULLY REMOVE THE ACTUATOR. DAMAGE TO THE INTAKE DOOR HOUSING OR THE HOUSING SEAL CAN OCCUR.

- (f) Remove the cotter pin (13), the nut (14), the washers (11), and the bolt (10) that attach the actuator (5) to the fork end assembly (12).

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(g) Remove the actuator (5).

S 024-044

(6) Remove the inlet door actuator (alternate procedure):

**NOTE:** Use this procedure if the actuator rod is caught in the extended position.

- (a) Open the access door on the bottom of the intake door housing.
- (b) Remove the cotter pin (3), the nut (4), the washers (2), and the bolt (1) from the rod end of the actuator.
- (c) Disconnect the electrical connector (18) from the actuator (5).
  - 1) Put caps on the electrical connectors.
- (d) Remove the bolt (6), the washers (7), and the nut (9) that attach the bonding jumper (8) to the actuator (5).
- (e) Remove the cotter pin (13), the nut (14), the washers (11), and the bolt (10) that attach the actuator (5) to the fork end assembly (12).
- (f) Push the actuator (5) to the door fitting as far as you can.
- (g) Remove the nut (17), the washer (16), the shim (15), and the fork end assembly (12).

**CAUTION:** CAREFULLY REMOVE THE ACTUATOR. DAMAGE TO THE INTAKE DOOR HOUSING OR THE HOUSING SEAL CAN OCCUR.

- (h) Remove the actuator (5):
  - 1) Pull the actuator forward as far as you can.
  - 2) Move the actuator at an angle with the rod end up.
  - 3) Pull the rod end of the actuator out of the housing.

TASK 49-15-06-404-024

3. APU Air Intake Door Actuator - Installation (Fig. 401)

A. Equipment

- (1) Bonding meter - Model T477W, Microhm Bridge, Avtron Manufacturing, Inc. Cleveland, Ohio

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301)

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C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Actuator (APU Air Intake Door Actuator)	49-15-06	01	50

D. References

- (1) SWPM 20-20-00, Electrical Bonding
- (2) AMM 12-13-04/301, APU Servicing
- (3) AMM 29-11-00/201, Main Hydraulic Systems
- (4) AMM 49-15-06/501, APU Air Intake Door Actuator

E. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 311 Area Aft of Pressure Bulkhead - Left
  - 312 Area Aft of Pressure Bulkhead - Right
- (2) Access Panels
  - 311AL Service Access Door
  - 822 Aft Cargo Door

F. Procedure

S 434-025

- (1) If it was removed, install the fork end assembly to the intake door housing:
  - (a) Lubricate the nut (17) with engine oil.
  - (b) Attach the fork end assembly (12) and the shim (15) to the housing bracket with the washer (16) and the nut (17).

NOTE: Do not tighten the nut at this time.

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S 424-045

- (2) Install the inlet door actuator:
- (a) Put the actuator (5) in its position and align the actuator in the fork end assembly (12).
  - (b) Install the bolt (10), the washers (11), the nut (14), and the cotter pin (13).
  - (c) Connect the bonding jumper (8) to the actuator (5) with the bolt (6), the washers (7), and the nut (9).
  - (d) Make sure the bonding resistance between the housing and the airplane structure is not more than 0.001 ohm (SWPM 20-20-00).
  - (e) Remove the caps from the electrical connectors.
  - (f) Connect the electrical connector (18) to the actuator (5).
  - (g) Install a lockwire on the electrical connector.
  - (h) Connect the actuator rod to the intake door with the bolt (1), the washers (2), the nut (4), and the cotter pin (3).

S 224-031

- (3) Make sure the intake door is smooth with the fuselage to a tolerance of  $\pm 0.03$  inch. Measure at the leading edge centerline of the door.

S 824-032

- (4) If the intake door is not in the tolerance, adjust the intake door actuator (AMM 49-15-06/501).

S 434-033

- (5) Tighten the nut (17) to 500 inch-pounds (56.5 newton-meters).

S 754-034

- (6) Do a manual check of the actuator operation:

**CAUTION:** MAKE SURE THE TRANSFER FLAG IS COMPLETELY IN THE MANUAL POSITION OR YOU CAN DAMAGE THE ACTUATOR.

DO NOT TURN THE MANUAL/ELECTRICAL SELECTOR SHAFT OR THE MANUAL DRIVE IF THERE IS TOO MUCH TORQUE. IF THERE IS TOO MUCH TORQUE, YOU CAN DAMAGE THE ACTUATOR. SEE THE OPERATION PLACARD ON THE ACTUATOR.

- (a) Put a 1/4 inch square drive in the manual/electrical selector shaft on the front of the actuator.

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- (b) Push the square drive in and turn counterclockwise approximately 90° until you can see the manual drive socket.
  - 1) Do not use more than 10 inch-pounds (1.1 newton-meters) of torque to turn the shaft.
- (c) Remove the 1/4 inch square drive from the manual/electrical selector shaft.
- (d) Put the 1/4 inch square drive in the manual drive socket.
- (e) Turn the manual drive socket clockwise with the 1/4 inch square drive until the torque suddenly increases. The air inlet door is fully open.
  - 1) Do not use more than 65 inch-pounds (7.3 newton-meters) or torque to turn the socket.
- (f) Turn the manual drive socket counterclockwise until the torque suddenly increases. The air inlet door is fully closed.
- (g) Remove the 1/4 inch square drive from the manual drive socket.
- (h) Put the square drive in the manual/electrical selector shaft.
- (i) Push the square drive in and turn it clockwise until you cannot see the manual drive socket.

NOTE: The actuator selector shaft is in the electrical drive position.

S 414-035

- (7) Close the service access door, 311AL for the horizontal stabilizer compartment.

S 864-036

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center:
    - 1) APU CONT
    - 2) APU INLET DOOR ACTUATOR
  - (b) P11 Overhead Panel:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
    - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-038

- (9) Set the switches:
  - (a) Remove the DO-NOT-OPERATE tags and set the C and R STAB TRIM switches on the control stand to NORM.

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- (b) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 sidewall panel to ON.
- (c) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-042

- (10) Do an operational test of the air inlet door:
  - (a) Turn the APU control switch on the P5 panel to ON.

NOTE: Do not turn the switch to START.

- (b) Make sure the air inlet door fully opens.
- (c) Turn the APU control switch on the P5 panel to OFF.
- (d) Make sure the air inlet door fully closes.

S 864-041

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

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APU AIR INTAKE DOOR ACTUATOR - ADJUSTMENT/TEST

TASK 49-15-06-225-001

1. Air Intake Door Actuator - Adjustment

A. General

- (1) This procedure has a task to adjust the air intake door actuator. This procedure is necessary if the external surface of the intake door is not smooth with the fuselage. The limit for the intake door is shown on Fig. 501.

B. References

- (1) AMM 29-11-00/201, Main Hydraulic System  
(2) AMM 49-15-06/401, APU Air Intake Door Actuator

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
311 Area Aft of Pressure Bulkhead - Left  
312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 311AL Service Access Door  
822 Aft Cargo Door

D. Prepare to Adjust the Intake Door Actuator.

S 865-002

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

S 865-003

- (2) Put the APU control switch in the OFF position and attach a DO-NOT-OPERATE tag.

S 865-004

- (3) Put the L, R, and C FLT CONT SHUTOFF switches on the right sidewall panel, P61, to the OFF position and attach DO-NOT-OPERATE tags.

S 865-005

- (4) Put the C and R STAB TRIM on the control stand to the CUTOUT position and attach DO-NOT-OPERATE tags.

S 865-006

- (5) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) P11 Overhead Panel:

- 1) 11B34, APU MN BAT CONT or APU ALTN CONT  
2) 11C12, STAB TRIM SHUTOFF LEFT  
3) 11C13, STAB TRIM SHUTOFF RIGHT  
4) 11H17, FLT CONT SHUTOFF TAIL LEFT  
5) 11H18, FLT CONT SHUTOFF TAIL CENTER

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- 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT
  - 2) APU INLET DOOR ACT

S 015-008

**WARNING:** STAY OFF THE SERVICE ACCESS DOOR, 311AL, AND THE ELEVATOR CONTROL ACCESS DOOR, 313AL. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES ON THE DOOR. IF YOU FALL THROUGH THE DOOR, INJURIES CAN OCCUR.

- (6) Open the service access door, 311AL to get access to the actuator.
- E. Adjust the Intake Door Actuator (Fig. 501).

S 215-009

- (1) Make sure the intake door is fully closed.
  - (a) If it is necessary, use the instructions from the placard on the intake door actuator to manually close the air intake door.
  - (b) When the torque suddenly increases, turn the manual drive socket 240 degrees in the opposite direction. This retracts the actuator to the electrical stop position.
  - (c) Turn the transfer flag socket clockwise.

S 225-010

**CAUTION:** DO NOT ADJUST THE INTAKE DOOR ACTUATOR AT THE ROD END. YOU CAN CAUSE DAMAGE TO THE INTAKE DOOR ACTUATOR IF YOU ADJUST IT AT THE ROD END.

- (2) Remove or add shims to the fork end assembly of the intake door actuator until the door is in the limit shown on Fig. 501.
  - (a) Remove the intake door actuator (AMM 49-15-06/401).
  - (b) Remove the nut and the washer that attach the fork end assembly to the bracket on the intake door housing.
  - (c) Add or remove shims until the door is in the limit on Fig. 501.
  - (d) Put the fork end assembly and the shims in their position at the bracket on the intake door housing.
  - (e) Install the nut and washer at the fork end assembly, but do not tighten the nut at this time.
  - (f) Install the intake door actuator (AMM 49-15-06/401).
  - (g) Tighten the nut at the fork end assembly to 500 inch-pounds (56.5 newton meters).
- F. Put the Airplane Back to its Usual Condition.

S 415-011

- (1) Close the service access door.

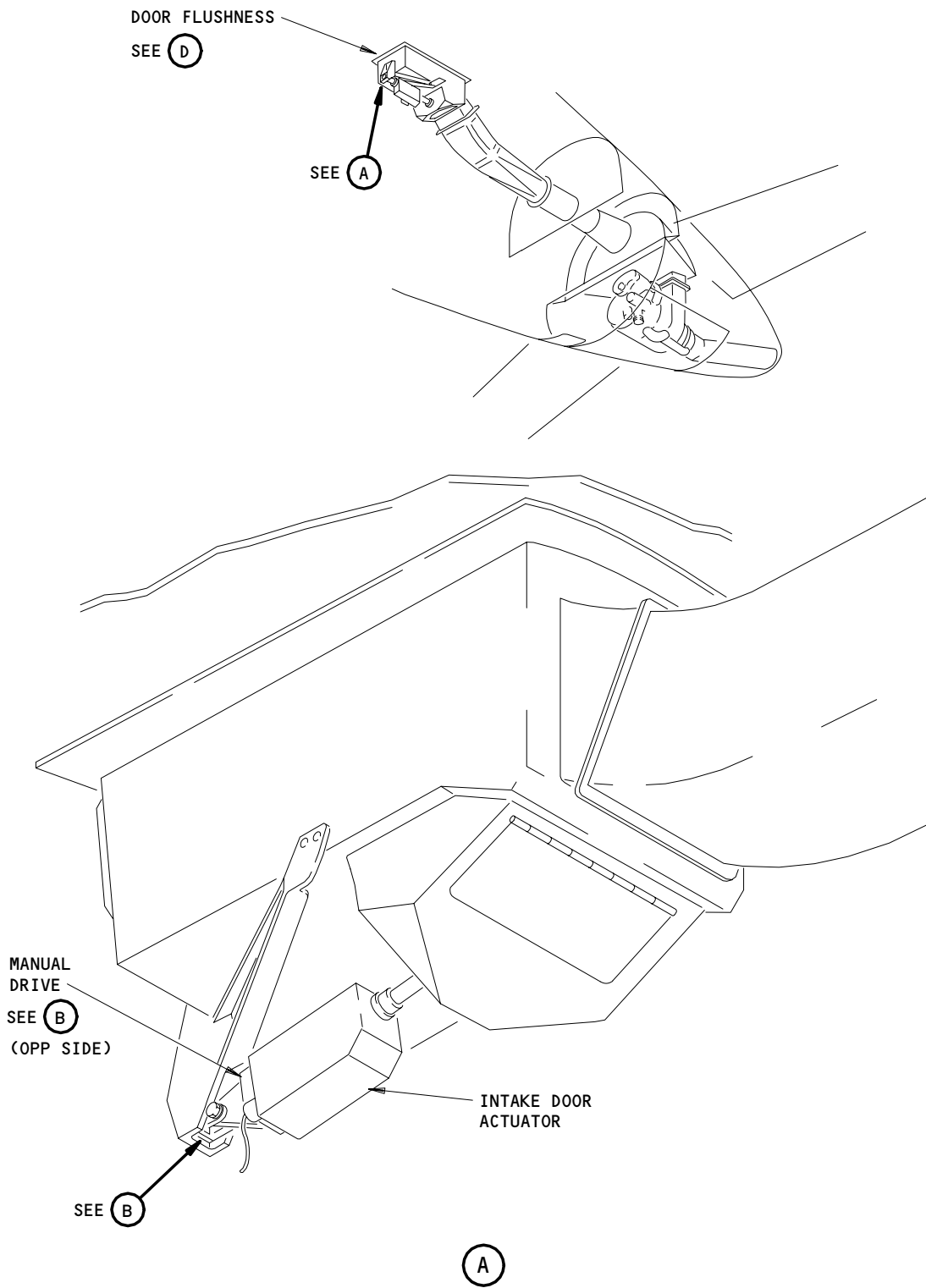
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Air Intake Door Actuator Adjustment  
Figure 501 (Sheet 1)

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MANUAL/ELECTRICAL  
SELECTOR SHAFT

TRANSFER  
FLAG

MANUAL DRIVE  
SOCKET

(B)

BOLT

WASHER

WASHER

NUT

AIR INTAKE DOOR  
HOUSING BRACKET

SHIM

NUT

COTTER PIN

WASHER

FORK END  
ASSEMBLY

ACTUATOR

FWD ←

(C)

FRAME  
CONTOUR

DOOR FLUSHNESS  
 $\pm 0.03$  INCH

INTAKE DOOR  
AND HOUSING  
(LEADING EDGE,  
CENTERLINE)

(D)

Air Intake Door Actuator Adjustment  
Figure 501 (Sheet 2)

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S 865-012

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center:
    - 1) APU CONT
    - 2) APU INLET DOOR ACT
  - (b) P11 Overhead Panel:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - 2) 11C12, STAB TRIM SHUTOFF LEFT
    - 3) 11C13, STAB TRIM SHUTOFF RIGHT
    - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
    - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
    - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 865-014

- (3) Remove the DO-NOT-OPERATE tags and put the C and R STAB TRIM switches on the control stand to the NORM position.

S 865-015

- (4) Remove the DO-NOT-OPERATE tag and put the L, R, and C FLT CONT SHUTOFF switches on the right sidewall panel, P61, to the ON position.

S 865-016

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch.

S 865-017

- (6) If it is necessary, pressurize the left, the right, and the center hydraulic systems (AMM 29-11-00/201).

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APU AIR INTAKE DOOR SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the seal for the air intake door.
- B. You must remove the air intake door to remove the seals. You can get access to the air intake door through the forward access door for the stabilizer compartment.

TASK 49-15-07-004-001

2. Air Intake Door Seal Removal (Fig. 401)

A. References

- (1) AMM 49-15-05/401, APU Air Intake Door

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

C. Procedure

S 014-002

- (1) Remove the air intake door for the APU (AMM 49-15-05/401).

S 024-003

- (2) Remove the seals from the air intake door:
  - (a) Remove the bolts (2), the washers (3), and the angle assembly (4) from the front seal (1).
  - (b) Remove the front seal (1) from the air intake door.
  - (c) Remove the bolts (6) and the angle assembly (8) from the side seal (9).
  - (d) Remove the side seal (9) for the air intake door.
  - (e) Remove the bolts (6) and the angle assembly (7) from the rear seal (5).
  - (f) Remove the rear seal (5) from the air intake door.

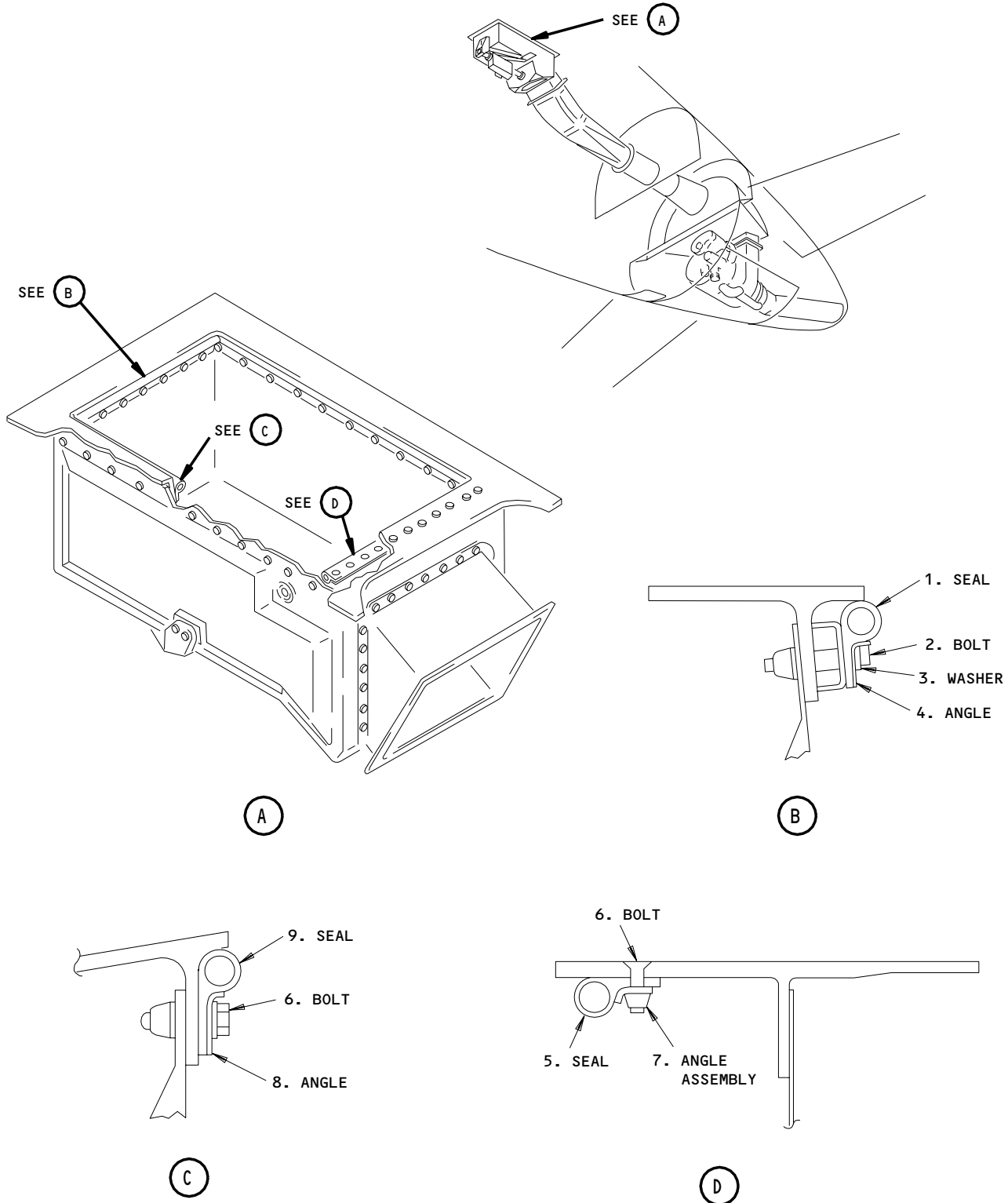
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Intake Door Seal Installation  
Figure 401

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TASK 49-15-07-404-004

3. Air Intake Door Seal Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1 5 9	Seal Seal Seal	49-15-07	01	145 60 100 or 105

B. References

- (1) AMM 49-15-05/401, APU Air Intake Door

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
311 Area Aft of Pressure Bulkhead - Left  
312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 311AL Service Access Door  
822 Aft Cargo Door

D. Procedure

S 424-005

- (1) Install the seals on the air intake door:
- (a) Put the rear seal (5) in its position on the air intake door.
  - (b) Install the angle assembly (7) and the bolts (6) that attach the rear seal (5) to the air intake door.
  - (c) Install the side seal (9) in its position on the air intake door.

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- (d) Install the bolts (6) and the angle (8) that attach the side seal (9) to the air intake door.
- (e) Put the front seal (1) in its position on the air intake door.
- (f) Install the bolts (2), the washers (3), and the angle (4) that attach the front seal (1) to the air intake door.

S 414-006

- (2) Install the air intake door for the APU (AMM 49-15-05/401).

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APU AIR INTAKE DOOR HOUSING – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation for the housing of the air intake door for the APU.
- B. The housing goes around the sides of the air intake door and connects the air inlet duct to the door actuator.
- C. You can get access to the door housing through the forward access door for the stabilizer compartment.

TASK 49-15-08-004-001

2. Air Intake Door Housing Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-01/401, APU Air Intake Duct
- (3) AMM 49-15-06/401, APU Air Intake Door Actuator
- (4) SSM 49-52-02
- (5) WDM 49-61-14

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 311 Area Aft of Pressure Bulkhead – Left
- 312 Area Aft of Pressure Bulkhead – Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Remove the hydraulic power from all the systems (AMM 29-11-00/201).

S 864-003

- (2) Set the switches:

- (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- (b) Set the L, R, and C FLT CONT SHUTOFF switches on the P61 panel to OFF and attach DO-NOT-OPERATE tags.
- (c) Set the C and R STAB TRIM switches on the P10 panel to CUTOUT and attach DO-NOT-OPERATE tags.

S 864-004

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - 2) 11C12, STAB TRIM SHUTOFF LEFT
  - 3) 11C13, STAB TRIM SHUTOFF RIGHT
  - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
  - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER

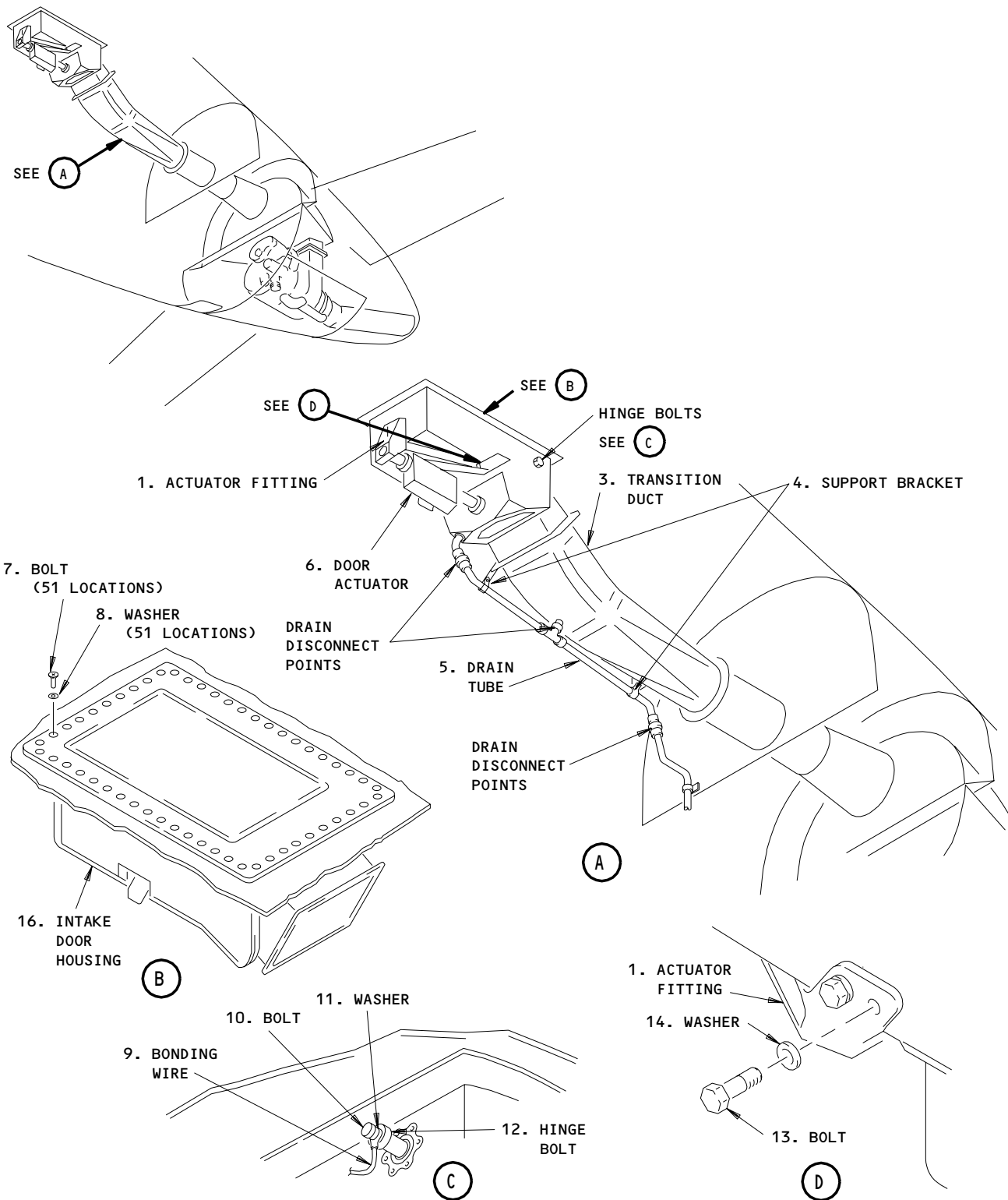
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APU Air Intake Door Housing  
Figure 401

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- 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT
- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT
  - 2) APU INTAKE DOOR ACTUATOR

S 014-005

**WARNING:** STAY AWAY FROM THE ACCESS DOORS FOR THE STABILIZER COMPARTMENT. YOUR WEIGHT CAN CAUSE THE DOOR LATCHES TO RELEASE AND OPEN THE DOOR. INJURY TO YOUR BODY CAN OCCUR IF YOU FALL THROUGH THE ACCESS DOOR OPENING.

- (4) Open the service access door, 311AL to get access to the intake door housing.

S 034-017

- (5) Disconnect the drain line (5) from the support brackets (4) and the drain outlets.

S 014-018

- (6) Remove the transition duct (3) (AMM 49-15-01/401).

S 034-019

- (7) Remove the intake door actuator (6) (AMM 49-15-06/401).

S 024-020

- (8) Remove the intake door housing:
  - (a) Remove the bolts (13) and the washers (14) that attach the actuator fitting (1) to the intake door housing (16).

**NOTE:** The bolts that attach the fitting to the housing have different lengths. Make a note of the bolt positions during the removal.

- (b) Remove the actuator fitting (1) from the intake door housing (16).
- (c) Remove the bolts (10), the bonding wires (9), and the washers (11) from the hinge bolts (12).
- (d) Disconnect the electrical connector from the proximity switch.
- (e) Remove the bolts (7) and the washers (8) that attach the intake door housing (16) to the airplane skin.

**NOTE:** To make the housing removal easier, two persons can be used, one in and one out of the airplane.

- (f) Remove the intake door housing (16) from the airplane.

S 034-007

- (9) Remove the air intake door from the housing:
  - (a) Remove the hinge bolts (12) for the door.

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(b) Remove the air intake door from the air intake housing.

TASK 49-15-08-404-008

3. Intake Door Housing Installation (Fig. 401)

A. Consumable Materials

- (1) A00247 Sealant - Chromate, BMS 5-95, Type 1, Class C-20
- (2) B00148 Solvent - Methyl Ethyl Ketone
- (3) G01043 Cloth - Lintfree
- (4) A00648 Compound, Retaining - Loctite 242, MIL-S-46163A

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	16	Intake Door Housing	49-15-08	01	5

C. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-01/401, APU Air Intake Duct
- (3) AMM 49-15-06/401, APU Air Intake Door Actuator
- (4) SSM 49-52-02
- (5) WDM 49-61-14

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Left
- 312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 311AL Service Access Door
- 822 Aft Cargo Door

E. Procedure

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S 164-027

**WARNING:** DO NOT GET SOLVENTS IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE HAZARDOUS MATERIALS. REFER TO PRODUCT MATERIAL SAFETY DATA SHEETS (MSDS) AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

- (1) Clean all the flange joints on the intake door housing with the lintfree cloth made moist with the Aliphatic Naphtha or MEK.

S 394-016

- (2) Apply the sealant to all the flange joints on the air intake housing.

S 434-009

- (3) Install the air intake door in the air intake housing:
- (a) Put the air intake door in its position in the housing.
  - (b) Apply retaining compound (Loctite 242) to the threads of the hinge bolts (12).
  - (c) Install the hinge bolts (12) for the door.
  - (d) Tighten the bolts (12) to 300-500 inch-pounds (33.9-56.5 newton-meters).

S 424-010

- (4) Install the intake door housing:
- (a) From the outer side of the airplane, put the intake housing assembly (16) in its position in the fuselage.
  - (b) Install the washers (8) and the bolts (7) around the air intake door.
  - (c) Connect the electrical connector to the proximity switch.
  - (d) Attach the bonding wires (9) to the hinge bolts (12) with the bolts (10) and the washers (11).
  - (e) Put the actuator fitting (1) in its position on the intake door housing (16).
  - (f) Install the washers (14) and the bolts (13) that attach the actuator fitting (1) to the intake door housing (16).

S 434-021

- (5) Install the intake door actuator (6) (AMM 49-15-06/401).

S 414-022

- (6) Install the transition duct (3) (AMM 49-15-01/401).

S 434-023

- (7) Connect the drain line (5) to the drain outlets and the support brackets (4).

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S 414-011

- (8) Close the service access door, 311AL.

S 864-012

- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) E6 Rack, Aft Equipment Center
  - 1) APU CONT
  - 2) APU INTAKE DOOR ACTUATOR
- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - 2) 11C12, STAB TRIM SHUTOFF LEFT
  - 3) 11C13, STAB TRIM SHUTOFF RIGHT
  - 4) 11H17, FLT CONT SHUTOFF TAIL LEFT
  - 5) 11H18, FLT CONT SHUTOFF TAIL CENTER
  - 6) 11H28, FLT CONT SHUTOFF TAIL RIGHT

S 864-013

- (10) Set the switches:

- (a) Remove the DO-NOT-OPERATE tags and set the C and R STAB TRIM switches on the P10 panel to NORM.
- (b) Remove the DO-NOT-OPERATE tags and set the L, R, and C FLT CONT SHUTOFF switches on the P61 panel to ON.
- (c) Remove the DO-NOT-OPERATE from the APU control switch on the P5 panel.

S 864-014

- (11) Supply hydraulic power to all of the systems (AMM 29-11-00/201).

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APU DRAINS AND VENTS - DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. This section describes the system of drains and vents for the removal of waste fluids that accumulate in the APU.
2. Component Details (Fig. 2)
  - A. APU Drains and Vents
    - (1) Waste fuel, oil, and water are removed from the APU by gravity-fed drains and vents:
      - (a) Rainwater seepage into the intake plenum drains overboard on the left side of the APU compartment through the APU plenum drain.
      - (b) Rainwater seepage from the air intake housing and duct drains overboard on the right side of the airplane.
      - (c) Oil from the manual fill port drains into the APU compartment through the oil scupper drain.
      - (d) Water accumulating in the inlet plenum drains into the APU compartment through the inlet plenum drain.
      - (e) Five drains discharge through the drain mast mounted on the APU access door. Fuel and oil drain from the fuel pump, oil pump, and IGV actuator. Excess fuel from aborted or wet starts drains through the turbine plenum drain. The drain for the bearing seal cavity drains the redundant seals of the APU engine. Water drains from the heatshield. Fuel from the fuel divider flows into the drain tank; then inflight air pressure purges the tank through the drain mast.
      - (f) Tell tale drains are installed on the fuel control unit/oil pump/IGV actuator and drain lines for the bearing seal cavity. Tell tale drains are fluid traps which can be used to isolate drain line leakage and to determine the leakage rates of these drains.

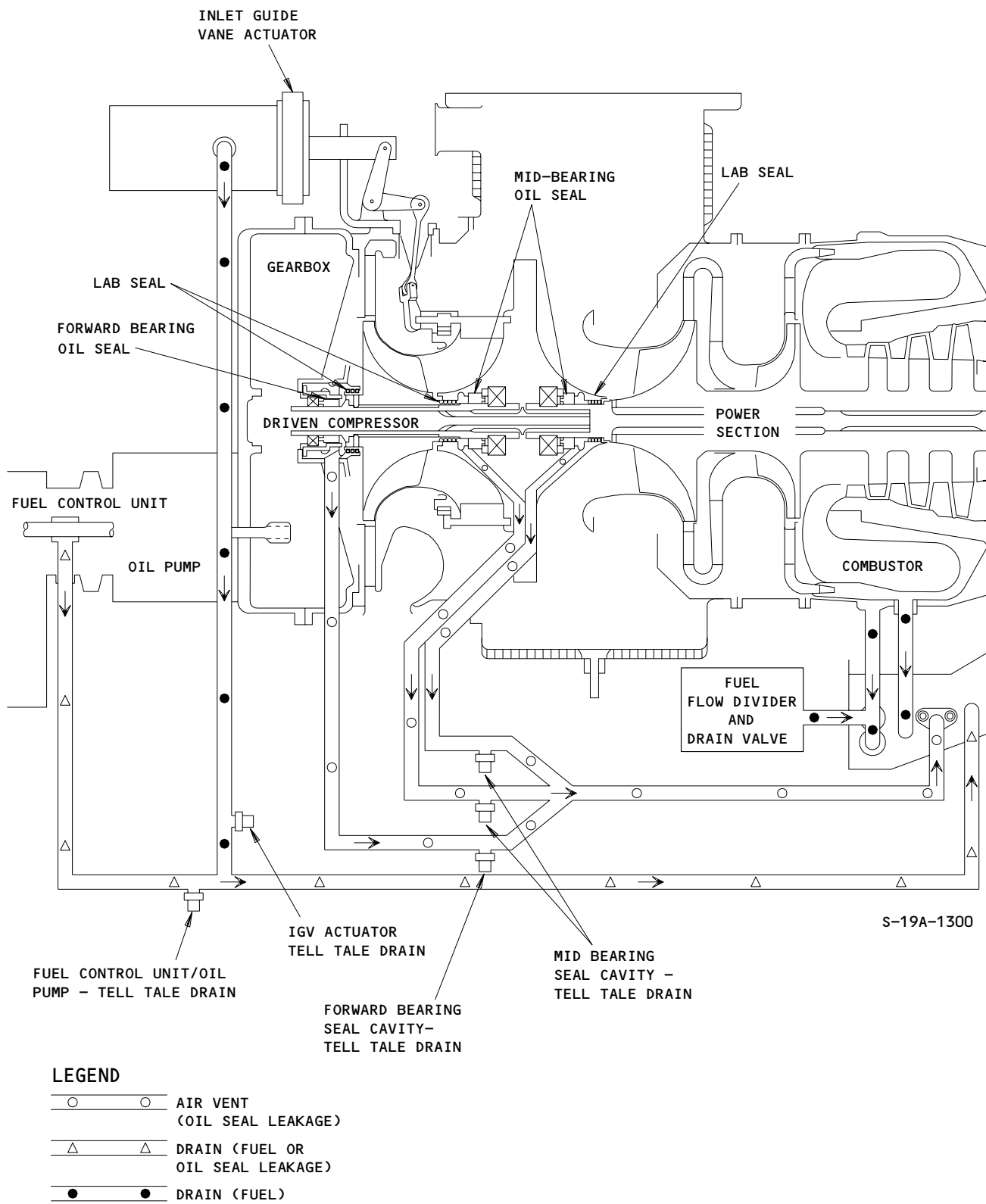
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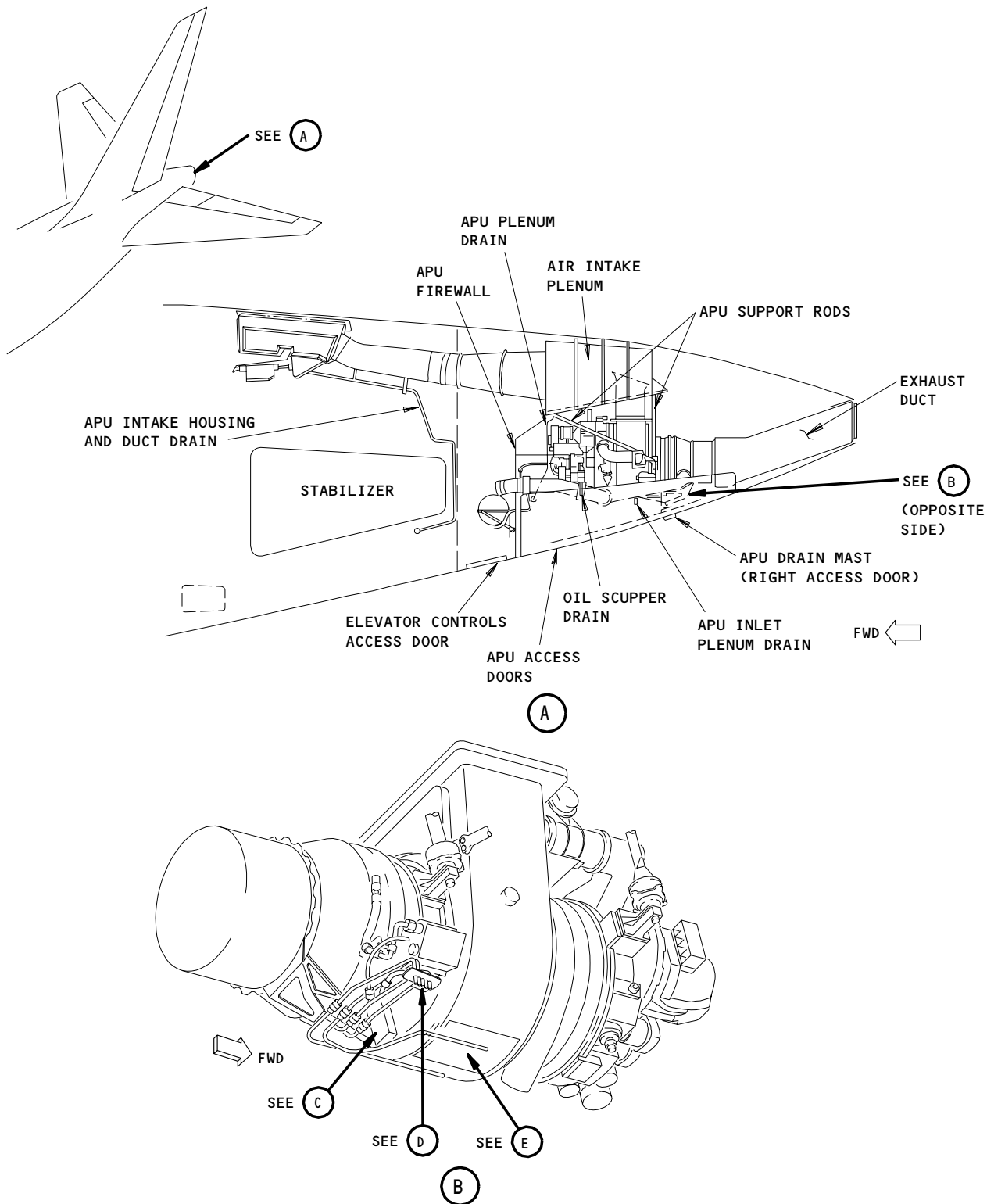
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APU Drains and Vents System  
Figure 1

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APU Drain Locations  
Figure 2 (Sheet 1)

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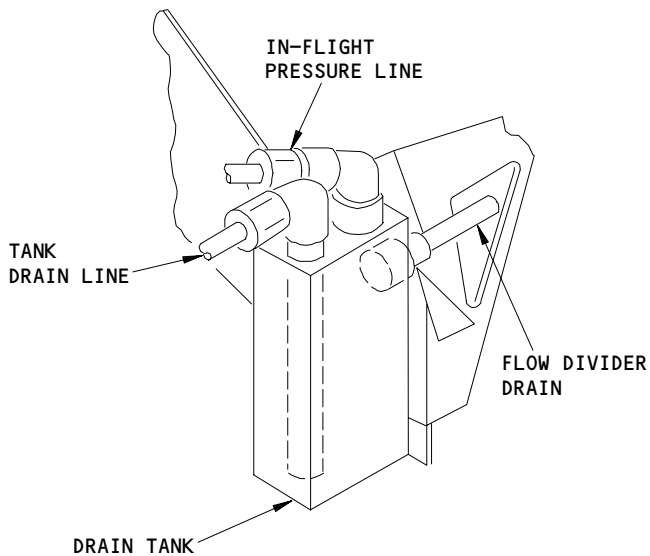
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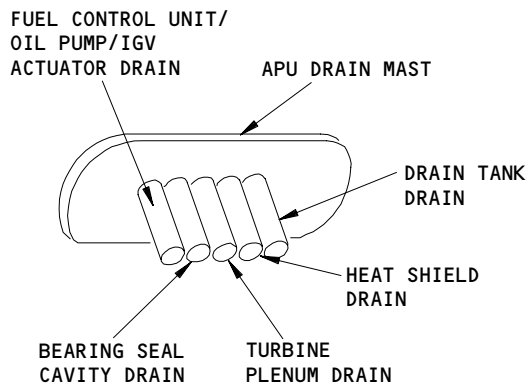
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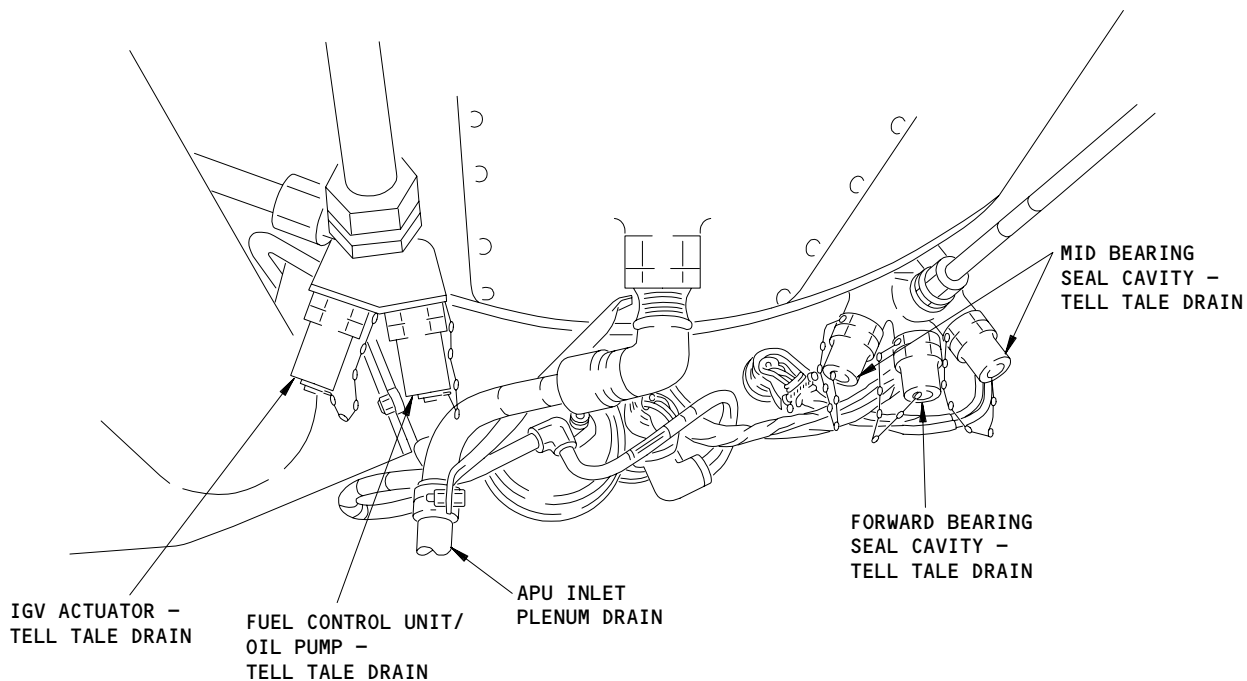
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(C)



(D)



VIEW IN THE FORWARD DIRECTION

(E)

APU Drain Locations  
Figure 2 (Sheet 2)

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FAULT ISOLATION/MAINT MANUAL

APU DRAINS AND VENTS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
DRAIN - AIR INTAKE HOUSING AND DUCT	1	1	311AL, STABILIZER COMPT	49-15-00
DRAIN - APU INLET PLENUM	2	1	315AL,316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - APU PLENUM	1	1	315AL,316AR, APU COMPT, LEFT FORWARD CORNER	49-16-03
DRAIN - BEARING SEAL CAVITY	2	1	315AL,316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - FORWARD BEARING SEAL CAVITY - TELL TALE	2	1	315AL,316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - FUEL CONTROL UNIT/OIL PUMP/IGV ACTUATOR	2	1	315AL,316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - FUEL CONTROL UNIT/OIL PUMP - TELL TALE	2	1	315AL,316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - FUEL FLOW DIVIDER	2	1	315AL,316AR, APU COMPT, BOTTOM OF COMBUSTOR	49-16-00
DRAIN - HEAT SHIELD	2	1	315AL,316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - IGV ACTUATOR - TELL TALE	2	1	315AL,316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - MID-BEARING SEAL CAVITY - TELL TALE	2	2	315AL,316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - OIL SCUPPER	1	1	315AL,316AR, APU COMPT, LOWER LEFT SIDE OF APU	49-27-00
DRAIN - TURBINE PLENUM	2	1	315AL,316AR, APU COMPT, DRAIN MAST	49-16-00
LINE - INFLIGHT PRESSURE	2	1	315AL,316AR, APU COMPT, BOTTOM OF COMBUSTOR	49-16-00
MAST - APU DRAIN	2	1	315AL,316AR, APU COMPT, DRAIN MAST	49-16-00
TANK - APU DRAIN	2	1	315AL,316AR, APU COMPT, BOTTOM OF COMBUSTOR	49-16-00

APU Drains and Vents - Component Index  
Figure 101

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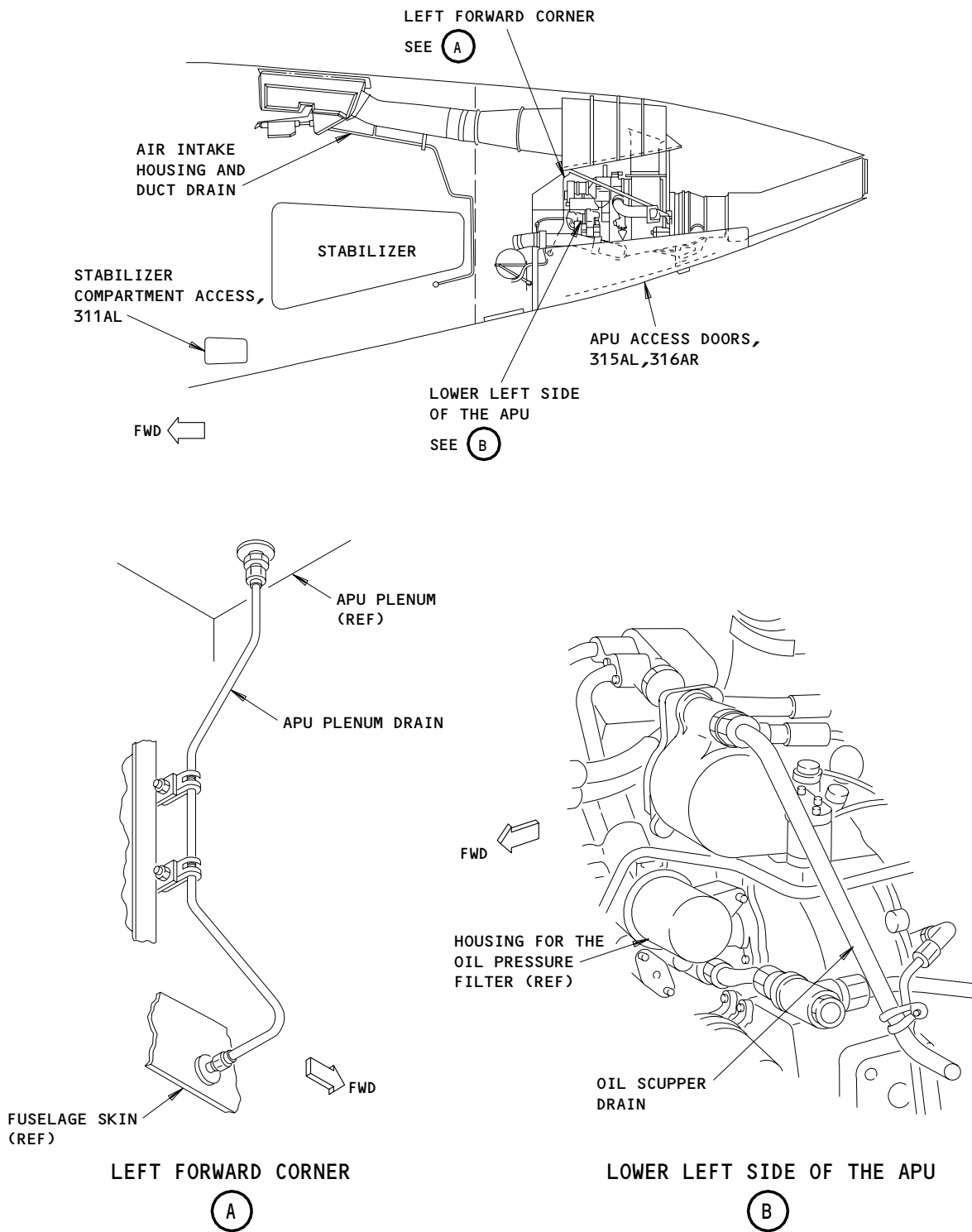
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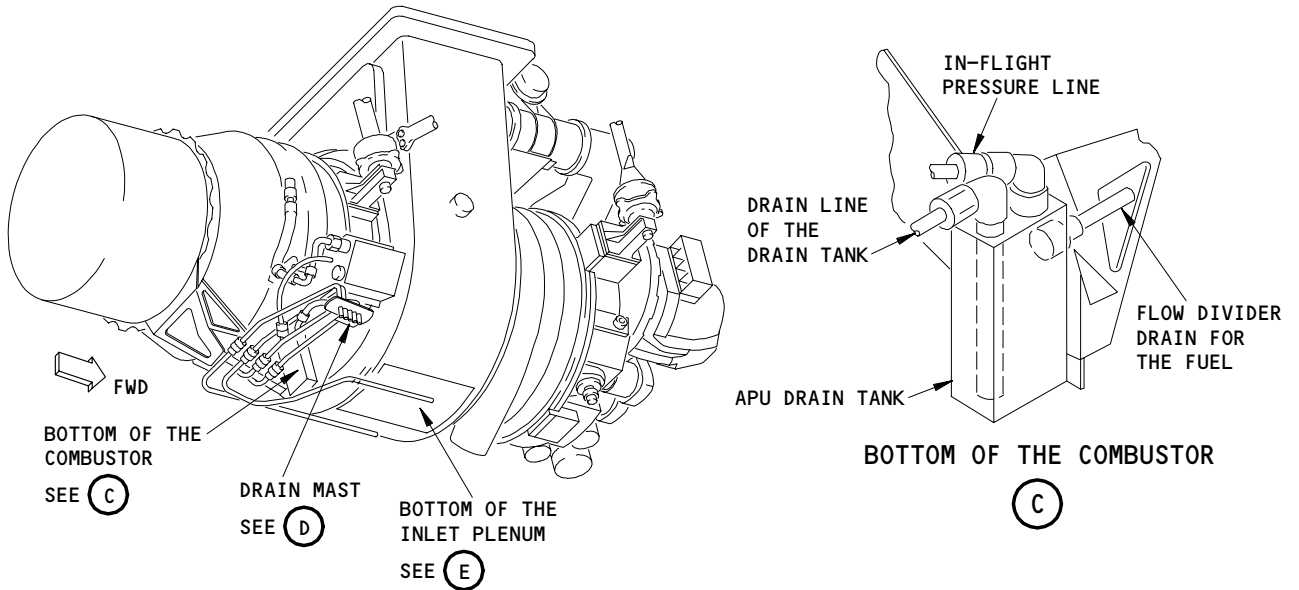
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FAULT ISOLATION/MAINT MANUAL



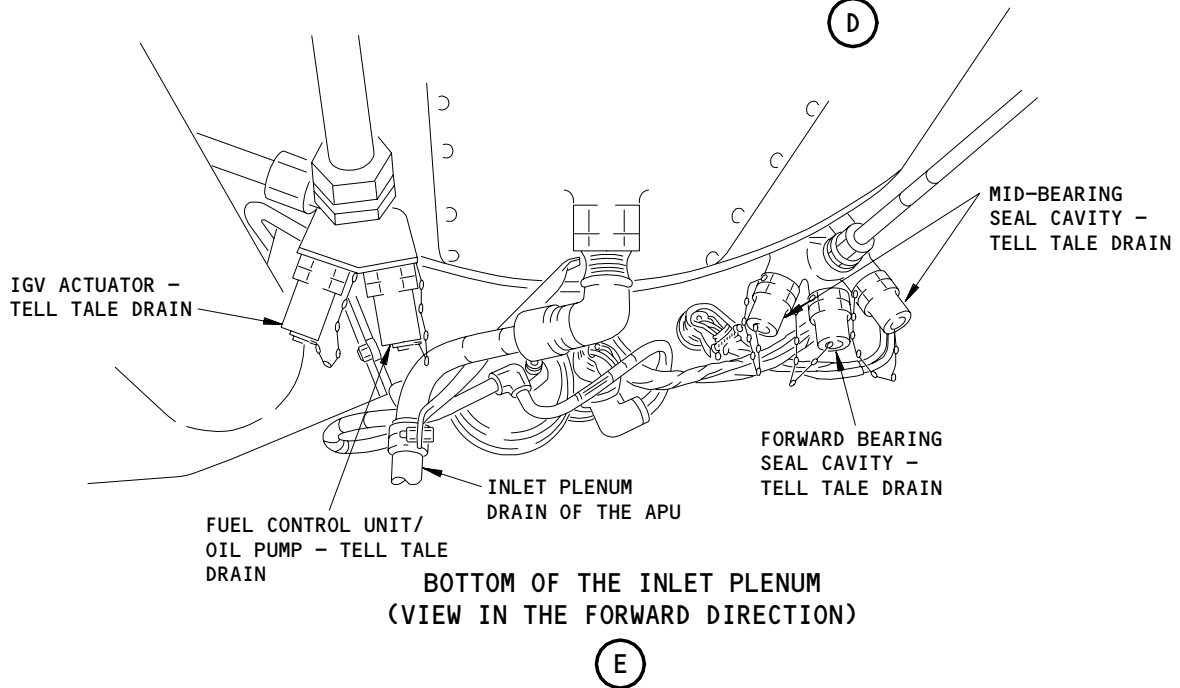
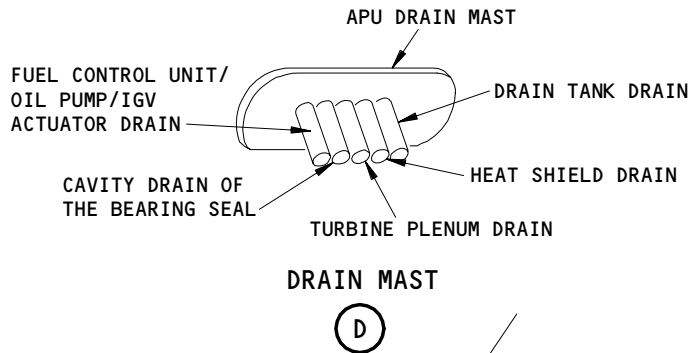
APU Drains and Vents - Component Location  
Figure 102 (Sheet 1)

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APU - RIGHT SIDE



APU Drains and Vents - Component Location  
Figure 102 (Sheet 2)

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APU DRAINS AND VENTS – INSPECTION/CHECK

1. General

- A. This procedure contains these two tasks:
  - (1) APU Drain System Inspection
  - (2) APU Leakage Check.
- B. The drain system inspection visually examines the drain lines and their parts for damage.
- C. The APU leakage check operates the APU and examines the drain mast for drops of fuel and oil.
- D. The components that can cause leakage from the drain mast are as follows:
  - (1) The oil pump
  - (2) The fuel control unit
  - (3) The IGV actuator
  - (4) The bearing seal areas
  - (5) The turbine plenum case.
- E. Measure the leakage by how many drops of fluid drain out each minute during the usual APU operation. The leakage check task contains the leakage limits for each component drain outlet. The repair steps for too much leakage are also given for each component drain outlet.
- F. You can get access to the drain lines for the drain system through the APU access doors.

TASK 49-16-00-206-001

2. APU Drain System Inspection (Fig. 601)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

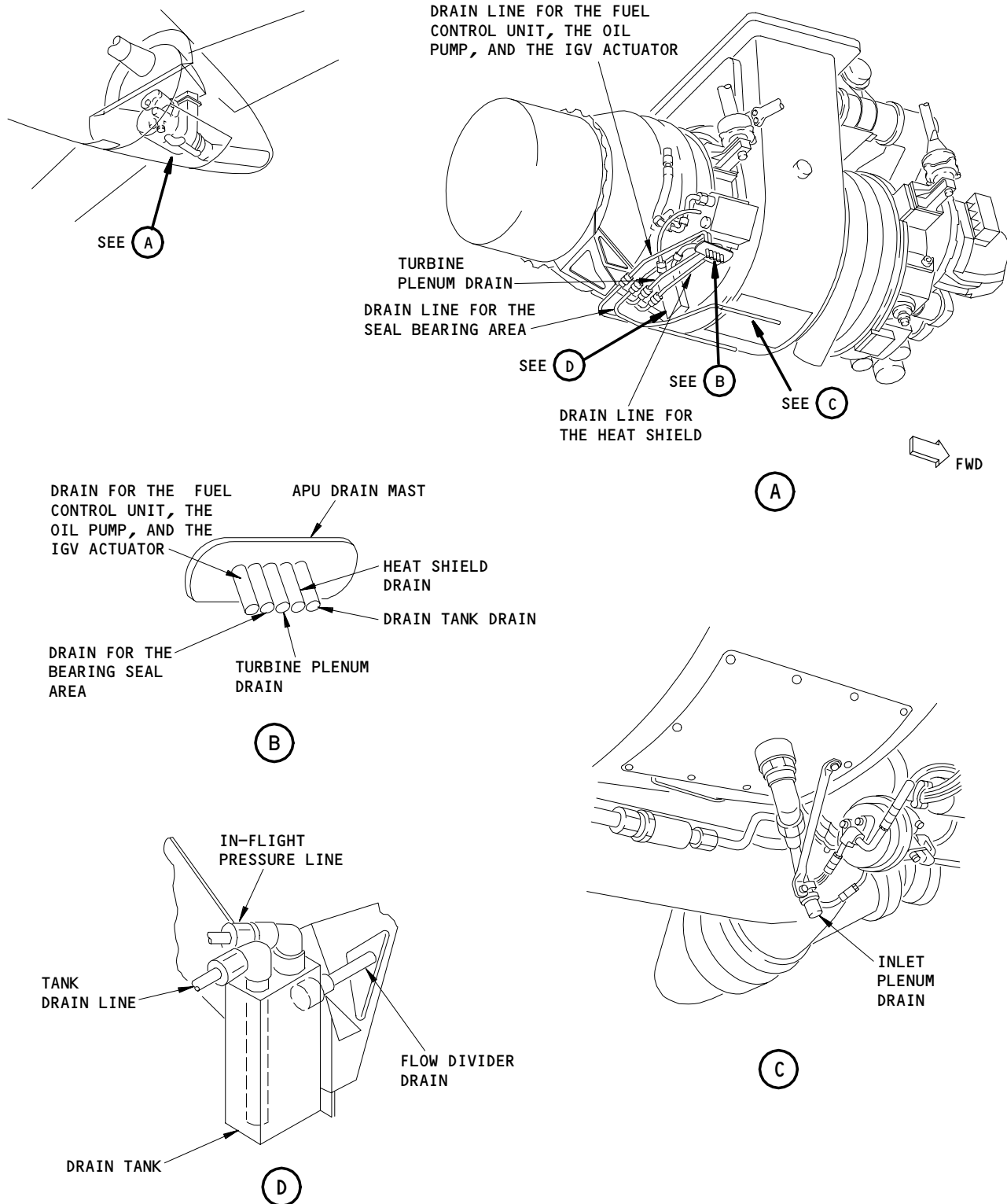
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APU Drain System Inspection  
Figure 601

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- S 866-003
- (2) Open these circuit breakers and install DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT
- S 016-004
- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- S 216-005
- (4) Visually examine the APU drain lines:
- (a) Examine the tubes for cracks, worn areas, and corrosion.
  - (b) Examine the tube connections for damaged threads and cracks.
  - (c) Examine the clamps and the brackets for distortion and cracks.
  - (d) If you find damage in the drain lines, repair the damage.
- S 216-006
- (5) Visually examine the drain mast in the APU access door to make sure it correctly aligns with the drain lines.
- S 216-008
- (6) Visually examine the drain tank and the drain line for cracks, worn areas, and corrosion.
- S 416-010
- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 866-009

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 866-011

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-16-00-706-012

3. APU Leakage Check (Fig. 602)

A. General

- (1) This task examines the quantity of fluid that drains from the APU drain system. The drain outlets examined in this task are as follows:
  - (a) The Fuel Flow Divider
  - (b) The Bearing Seal Areas
  - (c) The IGV Actuator
  - (d) The Turbine Plenum
  - (e) The Fuel Control Unit
  - (f) The Oil Pump.

B. Standard Tools and Equipment

- (1) Container - 1 cup (250 cc) capacity, for fuel (quantity necessary for the drains without the tell-tale drains)
- (2) Cylinder - With graduations, 250 cc capacity, 1 cc divisions, for fuel and oil

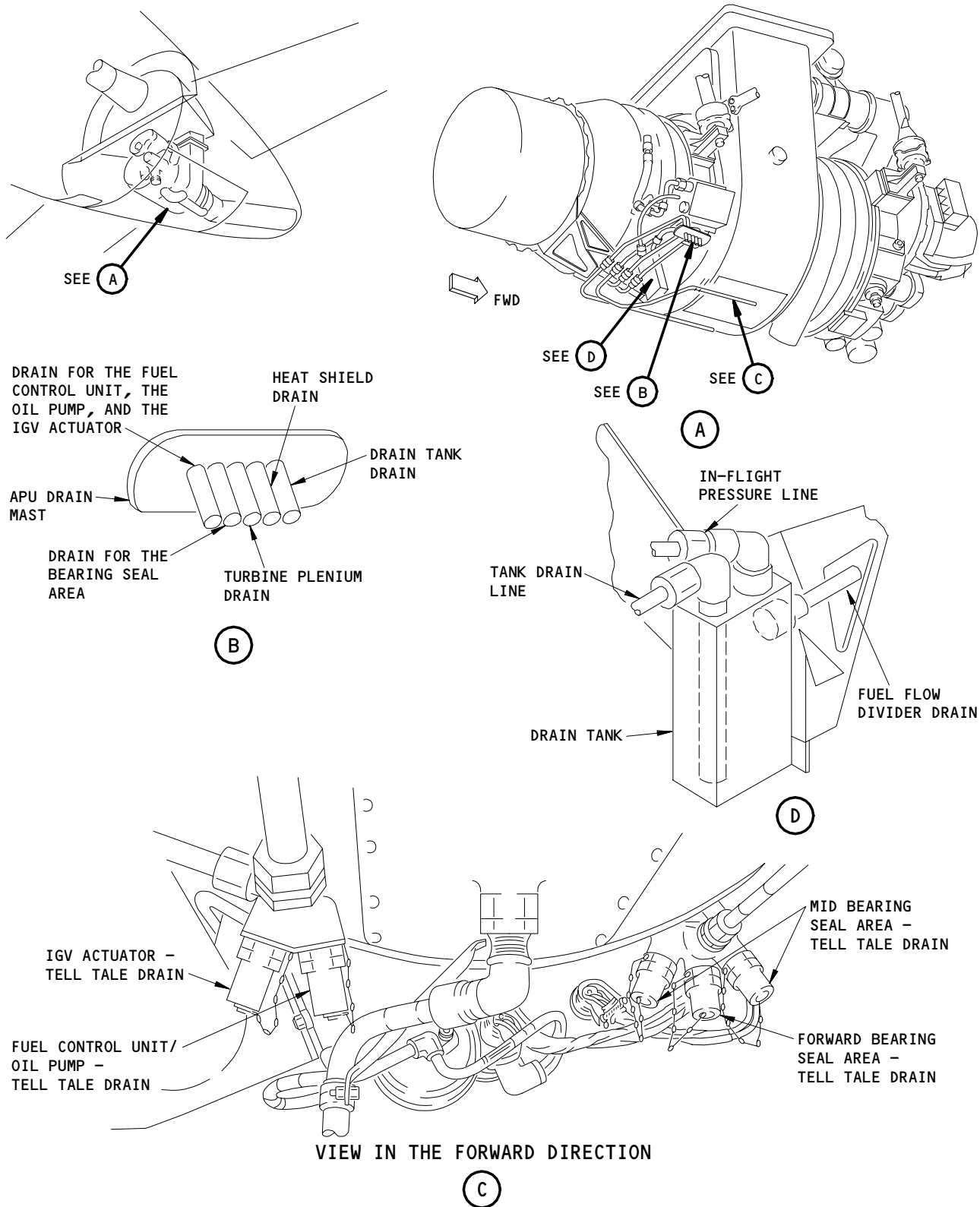
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APU Leakage Check  
Figure 602 (Sheet 1)

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C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-11-01/401, Auxiliary Power Unit
- (3) AMM 49-27-01/401, Oil Pump
- (4) AMM 49-31-01/401, Fuel Control Unit
- (5) AMM 49-31-03/401, Fuel Flow Divider and Solenoid Valve
- (6) AMM 49-52-02/401, Inlet Guide Vane Actuator

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 866-013

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

DRAIN/COMPONENT	LIQUID	PERMITTED LEAKAGE (DURING APU OPERATION)	PROCEDURE TO CORRECT THE LEAKAGE
FUEL FLOW DIVIDER/	FUEL	DURING APU OPERATION: 2.5 CC/HR (1 DROP/MINUTE) AFTER APU SHUTDOWN: 60CC	REPLACE THE FUEL FLOW DIVIDER (AMM 49-31-01/401).
BEARING SEAL AREAS	OIL	NO LIMIT	NO CORRECTIVE STEPS ARE NECESSARY, PROVIDED THE APU OIL CONSUMPTION RATE IS NOT MORE THAN THE LIMIT (AMM 49-11-00/201).
OIL PUMP/FUEL CONTROL UNIT DRAIN	OIL FUEL	NONE 0.3 CC/HR (8 DROPS/HOUR)	REPLACE THE FUEL CONTROL UNIT (AMM 49-31-01/401).
IGV ACTUATOR DRAIN	FUEL	2.5 CC/HR (1 DROP/MINUTE)	REPLACE THE IGV ACTUATOR (AMM 49-52-02/401).
TURBINE PLENUM DRAIN	FUEL	DURING APU OPERATION: NONE THERE IS NO LIMIT DURING AN APU SHUTDOWN OR AFTER A NO START CONDITION OCCURS.	NO CORRECTIVE STEPS ARE NECESSARY.

TABLE 601

APU Leakage Check  
Figure 602 (Sheet 2)

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- S 866-014
- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT
- S 016-017
- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- S 216-018
- (4) Visually examine the tell-tale drains:
- (a) One at a time, remove the drain traps from the five tell-tale drains and examine them for fluid.
  - (b) If you find fluid in a drain trap, do these steps:
    - 1) Identify and make a note of which component drain trap has the fluid in it.
    - 2) Remove the fluid from the drain trap.
  - (c) Install the drain traps on the tell-tale drains.
  - (d) Install lockwires on the drain traps that did not have fluid in them.
- S 286-019
- (5) Do the check of the APU drain system:
- (a) Disconnect the drain line for the fuel flow divider from the drain tank.
  - (b) Put a container below the drain line outlet for the fuel flow divider.
  - (c) Put a container below the drain mast outlet for the turbine plenum.
  - (d) Make sure all the containers will not move during the APU operation.
  - (e) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - 1) E6 Rack, Aft Equipment Center
      - a) APU CONT
    - 2) P11 Overhead Panel
      - a) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (f) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
  - (g) Start and operate the APU (AMM 49-11-00/201).

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(h) Operate the APU for a minimum of five minutes.

NOTE: You must operate the APU for a minimum of five minutes to let the remaining fuel from the last APU shutdown drain from the fuel flow divider.

- (i) During the subsequent APU operation time, examine the containers below the drain outlets for drops of fluid.
- (j) Write down the length of time of the subsequent APU operation.
- (k) If you see drops of fluid, do these steps:
  - 1) Identify the drain line the fluid comes out of.
  - 2) Write down the number of drops of fluid that drain out during the engine operation.
- (l) Do a shutdown of the APU (AMM 49-11-00/201).

NOTE: When you do the APU shutdown, fuel can drain out the drain line for the fuel flow divider. This is a permitted shutdown condition.

- (m) Make sure the APU control switch is OFF and attach a DO-NOT-OPERATE tag.
- (n) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - 1) P11 Overhead Panel
    - a) 11B34, APU MN BAT CONT or APU ALTN CONT
  - 2) E6 Rack, Aft Equipment Center
    - a) APU CONT
- (o) Remove the containers that are below the drain outlets.
- (p) Connect the drain line for the fuel flow divider to the drain tank.

S 976-021

- (6) For the fluid in the containers, use the subsequent engine operation time and the quantity of fluid to find the leakage rate.

S 216-020

- (7) If it is applicable, examine the drain traps on the tell-tale drains you made a note of in step (4)(b)1):
  - (a) Do these steps for each tell-tale drain that does not have lockwire:
    - 1) Remove the drain trap from the tell-tale drain.
    - 2) If there is fluid in the drain trap, use the cylinder with graduations to measure the fluid quantity in the drain trap.
    - 3) Use the total engine operation time and the fluid quantity to find the leakage rate for the component.
    - 4) Install the drain trap on the tell-tale drain.
    - 5) Install a lockwire on the drain trap.

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- S 286-022
- (8) Make sure the leakage rates you measured are in the permitted limits shown in Table 601.
- S 366-023
- (9) If a leakage rate is not in the permitted limits, do the repair steps for the leak (See Table 601).
- S 416-026
- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.
- S 866-027
- (11) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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PRESSURE RELIEF VALVE, COMBUSTOR DRAIN – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) Combustor Drain Pressure Relief Valve Removal
  - (2) Combustor Drain Pressure Relief Valve Installation
  - (3) Combustor Drain Pressure Relief Valve Inspection.
- B. When you do an APU shutdown, fuel that is not burned drains through the pressure relief valve into the combustor drain. The pressure relief valve closes when the combustor pressure decreases.
- C. The pressure relief valve is on the bottom of the APU, aft of the air inlet plenum. You can get access to the valve through the APU access doors.

TASK 49-16-01-002-001

2. Combustor Drain Pressure Relief Valve Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

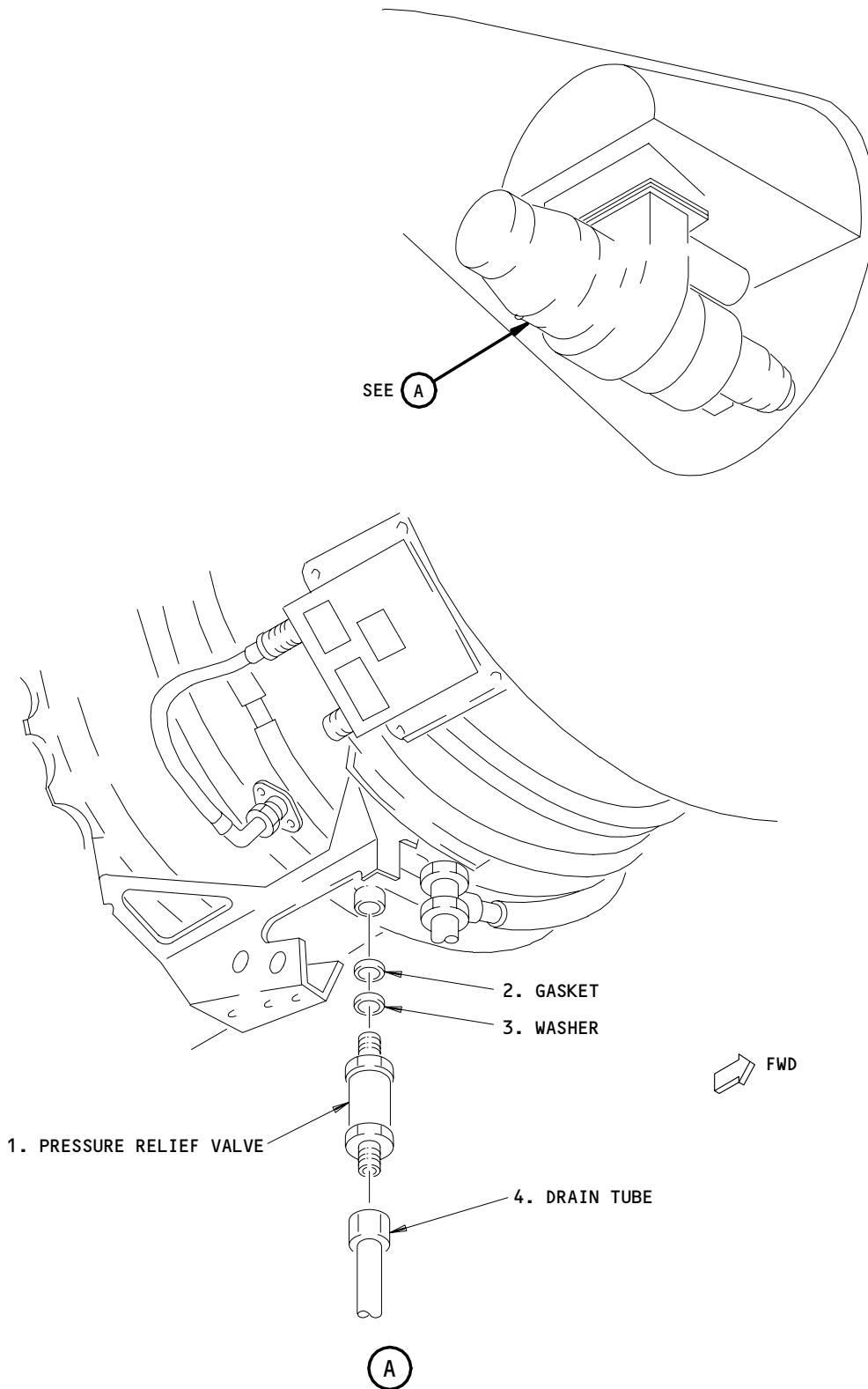
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Pressure Relief Valve - Combustor Drain Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-021

- (4) Remove the pressure relief valve:
  - (a) Disconnect the drain tube (4) from the pressure relief valve (1).
  - (b) Remove the pressure relief valve (1) from the combustor case.
  - (c) Remove the gasket (2) and the washer (3) from the pressure relief valve (1).
    - 1) Discard the gasket (2).

S 212-009

- (5) Do the inspection of the pressure relief valve (Ref par. 4).

TASK 49-16-01-402-010

3. Combustor Drain Pressure Relief Valve Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Pressure Relief Valve	49-16-01	01	145
	2	Gasket			150

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 422-011

- (1) Install the pressure relief valve:
  - (a) Install the washer (3) and a new gasket (2) on the pressure relief valve (1).

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- (b) Install the pressure relief valve (1) in the combustor case.
  - 1) Tighten the pressure relief valve (1) to 110-115 inch-pounds (12.4-13.0 newton-meters).
- (c) Connect the drain tube (4) to the pressure relief valve (1).

S 412-014

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-015

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-017

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-16-01-202-018

4. Combustor Drain Pressure Relief Valve Inspection

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 012-022

- (1) If it is installed, remove the pressure relief valve (Ref par. 2).

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S 212-019

- (2) Visually examine the pressure relief valve:
  - (a) Examine the pressure relief valve to make sure there is no blockage.
  - (b) Examine the drain tube to make sure it does not have blockage.

S 412-023

- (3) Install the pressure relief valve (Ref par. 3).

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APU PLENUM DRAIN – INSPECTION/CHECK

1. General

- A. This procedure contains a task to do an inspection of the drain fittings on the APU plenum and the fuselage.
- B. The drain fitting for the APU plenum is on the forward left corner of the air inlet plenum. The drain line connects to the fuselage drain fitting at the left.
- C. You can get access to the drain fittings through the APU access doors.

TASK 49-16-03-206-001

2. APU Plenum Drain Inspection (Fig. 601)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

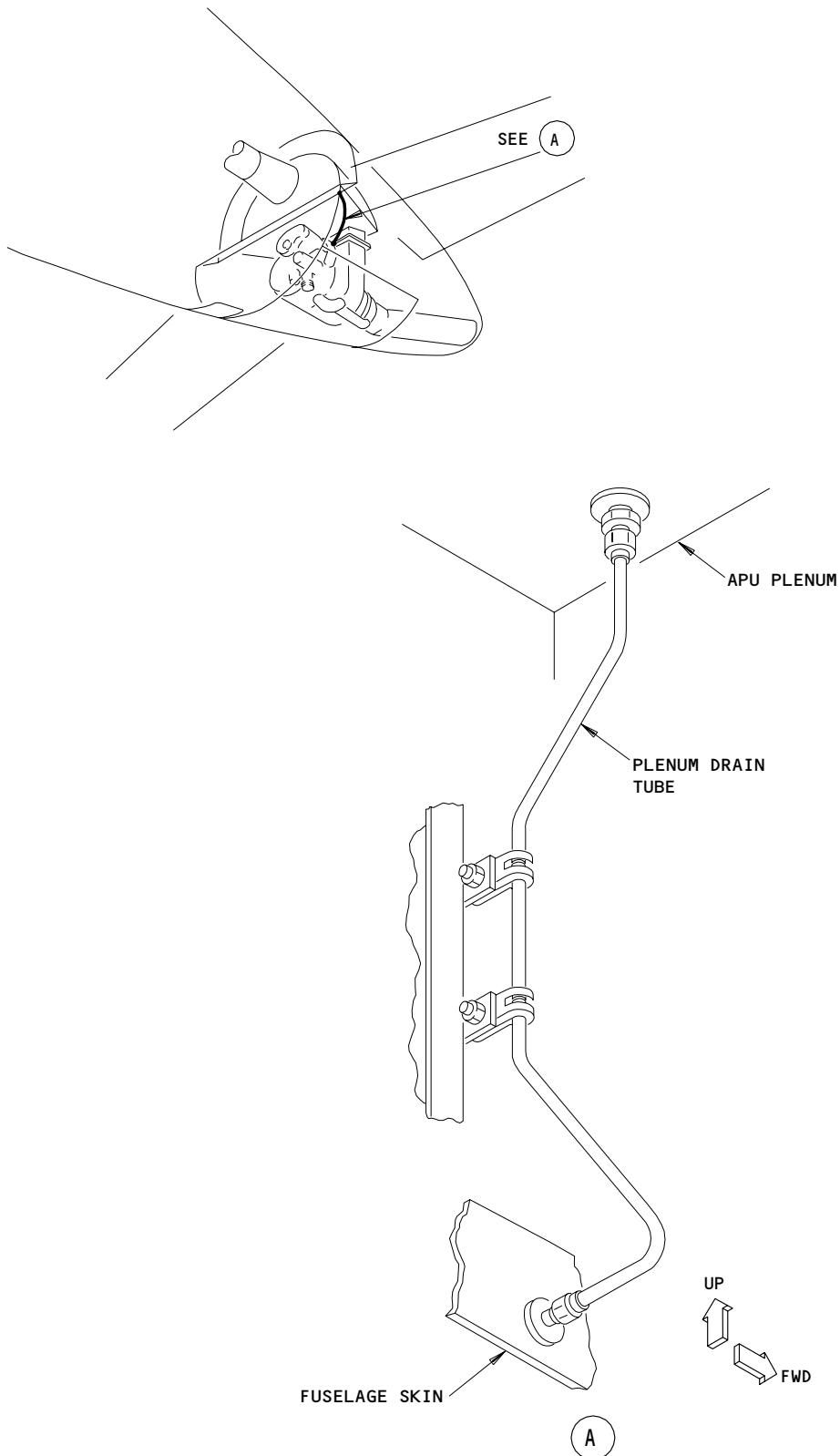
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APU Plenum Drain Inspection  
Figure 601

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 216-005

- (4) Examine the drain fittings:
  - (a) Disconnect the drain line from the fittings on the APU plenum and the fuselage.
  - (b) Push a wire through the fittings to make sure there is no blockage.
  - (c) Make sure the drain line for the APU plenum is clear.
  - (d) Connect the drain line to the fittings on the APU plenum and the fuselage.

S 416-006

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 866-007

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 866-008

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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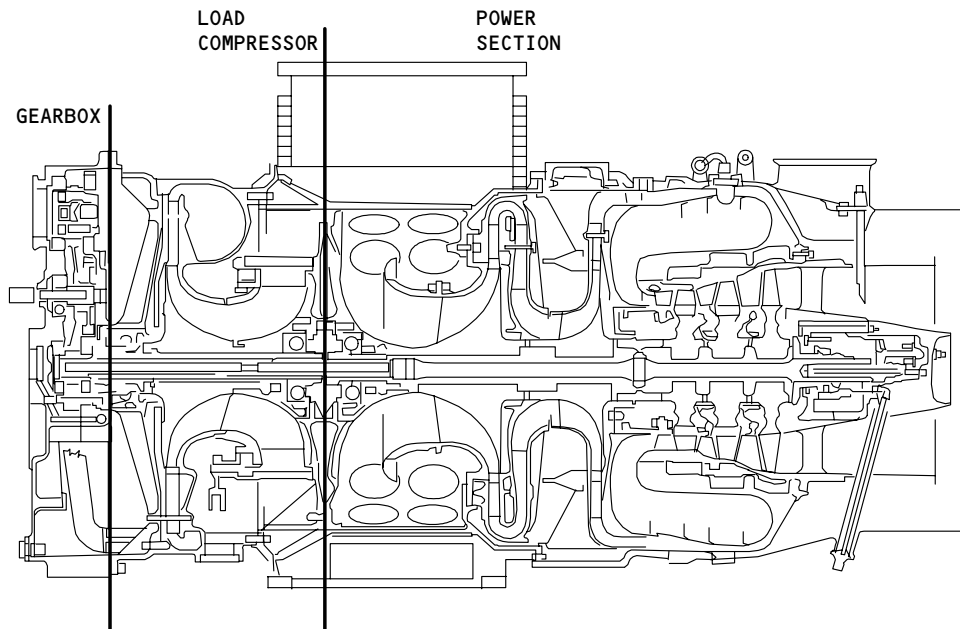
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APU ENGINE - DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The APU engine provides compressed air for the airplane pneumatic system, electrical power from a generator, and shaft power for driving the APU engine accessories. The engine consists of three independent, adjoining modules: the power section, the load compressor, and the accessory gearbox.
2. Component Details
  - A. Power Section (Fig. 2)



APU Engine  
Figure 1

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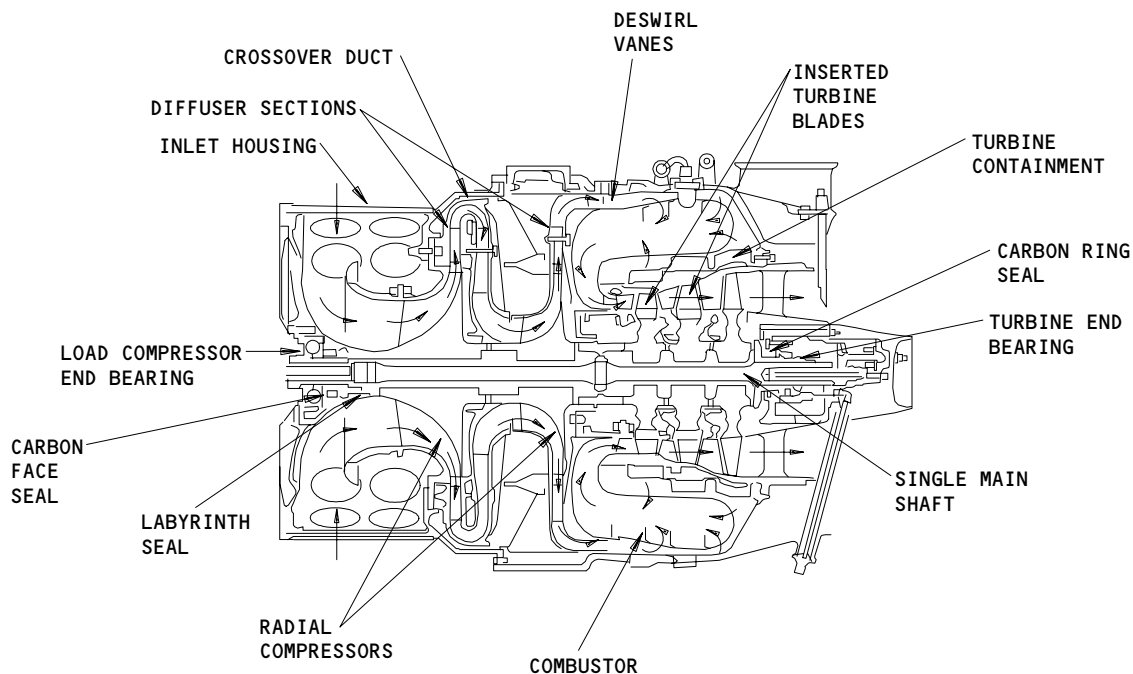
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(1) The power section converts compressed air and jet fuel into shaft horsepower. It consists of a two-stage centrifugal compressor, an annular combustor, and a three-stage axial turbine. All components are connected to a single shaft. This shaft drives the load compressor, electric generator, and engine accessories.

(a) Compressor

1) The compressor portion of the power section consists of an inlet housing, two centrifugal compressors, and two steel diffuser sections. The compressor rotors are titanium alloy forgings with integral rotor blades. Panels on the right and left sides of the compressor inlet plenum allow borescope inspection of the first-stage compressor blades for damage. Through couplings, the compressor rotors are mounted on and driven by the power section shaft. The compressor housing provides the mounting base for the load compressor section.



APU Engine Power Section  
Figure 2

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- (b) Combustor
  - 1) The combustion flame is contained within a reverse-flow annular combustor. Air enters through axial, deswirl vanes into a turbine plenum cavity area around the combustor. Orifices in the combustor shell allow air to cool the chamber and regulate gas temperature. Near the aft end of the combustion chamber, holes are provided for the ignitor plug and 12 fuel atomizers.
- (c) Turbine
  - 1) The turbine portion of the power section contains three axial-flow turbines with no cooling air, turbine plenum housing, and an exhaust port. The first two stages contain cast alloy blades with fir tree attachment to the disk. The third stage rotor is a one-piece forged configuration. The turbine rotors are mounted through couplings on the power section shaft. Full containment is provided for all rotor blades. The stator vanes are mounted between an inner and outer ring. The inner ring is riveted to a circular flange assembly around the inside of the stator ring. The exhaust port is an extension of the turbine plenum housing.
- (d) Bearings
  - 1) The power section shaft is supported by two antifriction type bearings. On the turbine end is a roller bearing with a carbon ring seal. The load compressor end has a ball bearing with a divided inner ring and a redundant double seal. The primary seal is a carbon face seal backed up by a secondary labyrinth seal. The annulus area between the two seals is vented overboard. The bearings are mounted in an annular oil film surrounding the bearing outer race. The oil is recirculated around the bearing to cool it and absorb some vibration.

B. Load Compressor (Fig. 3)

- (1) The load compressor provides compressed air for main engine starting and cabin air conditioning. The section consists of a centrifugal compressor, a diffuser, and an inlet housing. The load compressor is driven at engine shaft speed. The inlet guide vanes regulate airflow through the compressor.

(a) Load Compressor

- 1) The load compressor is a single-stage centrifugal compressor of forged titanium-alloy construction. The compressor rotor is mounted through couplings on its own shaft. An intermediate quill shaft connects the compressor shaft to the power section shaft and rotates it at power section speed. Access ports on the right and left sides of the intake plenum allow inspection of the load compressor blades for damage. Inlet guide vanes at the compressor inlet control the amount of airflow through the compressor. The load compressor housing provides the mounting base for the accessory drive gearbox.

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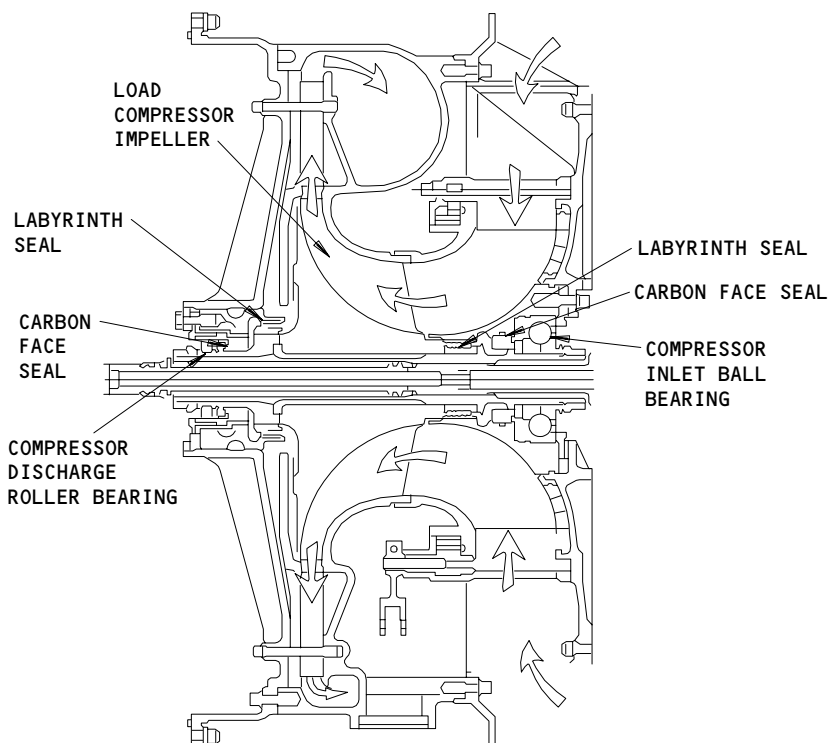
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- (b) Bearings
  - 1) The load compressor shaft is supported by two bearings. The intake end has a ball bearing with a divided inner ring. The discharge end has a roller bearing. Both bearings have hydraulic mounting.
- (c) Seals
  - 1) The load compressor bearings use a redundant double seal. The primary seal is a carbon face seal with a positive contact and a secondary labyrinth seal. The annulus between the seals is vented overboard.

C. Gearbox (Fig. 4)

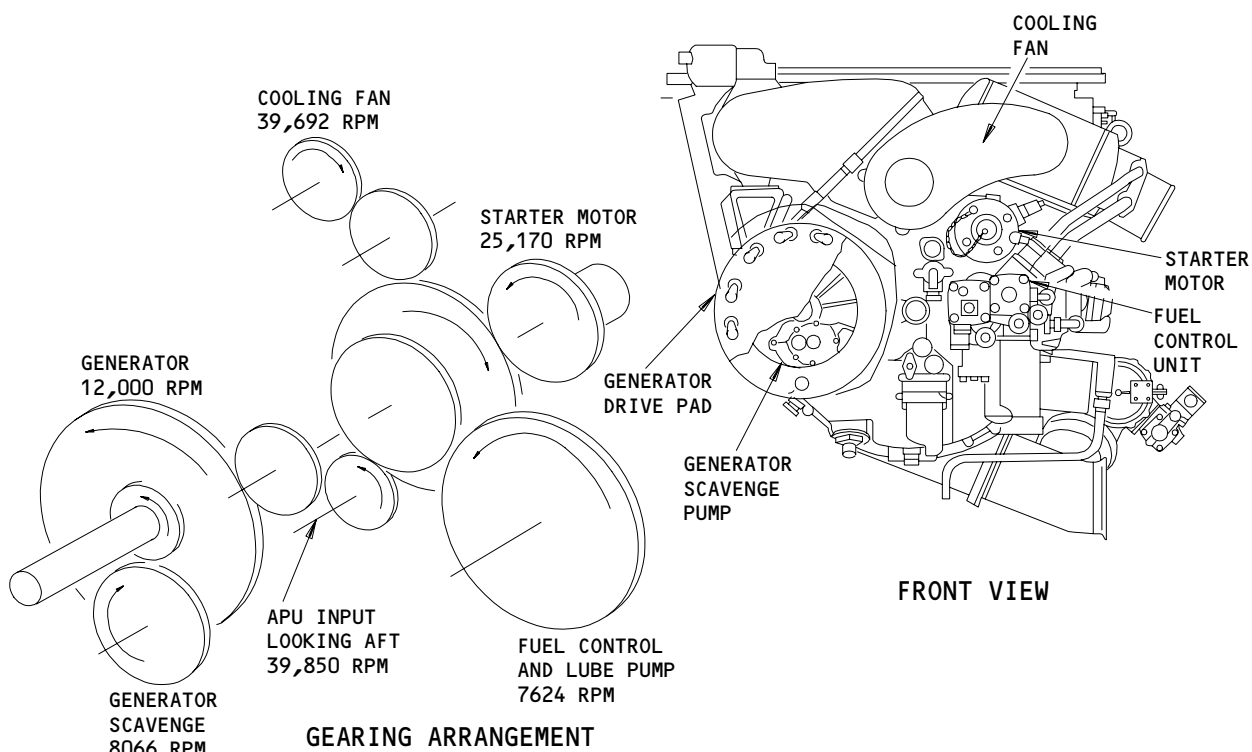


APU Engine Load Compressor  
Figure 3

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- (1) The accessory drive reduces the turbine speed to drive components necessary for engine operation and to drive the electrical generator. A flexible quill shaft connects the gear train to the load compressor shaft. The gear train consists of eight spur gears that are straddle mounted. A sprag clutch under the starter gear engages the starter motor. The gears are oil jet lubricated. An integral 6-quart capacity oil reservoir is located at the bottom of the gearbox. A sight gauge and oil level sensor are used to monitor the oil level. An air-oil separator in the gearbox removes any entrapped oil from the air before it is vented overboard. Accessories mounted on the gearbox include the lube pumps, fuel control unit, oil cooling fan, starter motor, and generator.



APU Engine Gearbox  
Figure 4

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3. Operation

A. Functional Description

- (1) Static or ram air is drawn into the power section compressor and load compressor through the air intake plenum. Air flows through two stages of power section compression and discharged through axial, deswirl vanes into a turbine plenum area. Finely atomized fuel is added to the air entering the combustor and the air-fuel mixture is ignited by the ignition unit. Ignition is required only during the starting cycle. The heat of combustion sustains the burning as long as the fuel supply is not interrupted. Only air entering the combustor at the upstream end is used for combustion. Air entering downstream of the combustion zone cools the combustion chamber and regulates gas temperature. The combustion gases flow through three turbine stages into the exhaust port. Gas flow through the turbine section imparts a torque on the power section shaft. The turbine converts the pneumatic energy in compressed air to mechanical shaft power.
- (2) Bleed air for the airplane pneumatic system is obtained from the load compressor (AMM 49-52-00/001). If bleed air is not being extracted or is reduced, the excess air is routed through the surge bleed valve and discharged into the exhaust port. During starting the inlet guide vanes are closed to eliminate any pneumatic load on the APU. The surge bleed valve prevents the load compressor from surging (AMM 49-53-00/001).

B. BITE

- (1) The APU control unit monitors APU operation, and stores any faults in BITE (AMM 49-61-00/001). An APU BITE display on the EICAS maintenance mode indicates a fault being stored in BITE memory.

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APU ENGINE - INSPECTION/CHECK

1. General

- A. This procedure has two tasks. One task is used for an external inspection of the APU. The second task is for an internal inspection of the APU.
- (1) The external inspection is used to examine the tubes and hoses that supply fluids to the APU components. These tubes and hoses can be examined for damage with the APU installed in the airplane.
  - (2) The internal inspection does a check for internal wear and damage. This inspection can also be done with the APU installed in the airplane. The load compressor and the first-stage power section compressor are examined with a borescope. You access the APU interior through an access panel on the APU inlet plenum and through the igniter port or a fuel nozzle port.

TASK 49-21-00-216-001

2. APU External Inspection

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 866-002

- (1) Put the airplane in the configuration necessary to inspect the APU.
  - (a) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.
  - (b) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (c) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:
    - 1) APU CONT

S 016-003

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 216-004

- (3) Visually examine the external tubes and hoses as follows:
  - (a) Examine the tube assemblies for cracks, wear, or corrosion.
  - (b) Examine the hose assemblies for kinks, wear, cuts and deterioration.
  - (c) Examine the connections for the fuel, oil, and pneumatic tubes and hoses for crossed threads and cracks.
  - (d) Examine all of the clamps and brackets for distortion and cracks.

S 216-005

- (4) Examine the gearbox and the gearbox mount for cracks or leakage.

S 216-006

- (5) Examine the outside of the exhaust case for cracks or damage.

S 216-007

- (6) Examine the heat shield on the combustor section for tears, loose fit, or burns.

S 866-008

- (7) Put the airplane in its usual condition.
  - (a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
    - 1) APU CONT
  - (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (c) Remove the DO-NOT-OPERATE tag from the APU master control switch.

S 866-009

- (8) Do this task: APU Start and Operation (AMM 49-11-00/201).

S 216-010

- (9) Examine the APU for any leakage.

S 866-011

- (10) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

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S 416-012

- (11) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

TASK 49-21-00-296-013

3. APU Internal Inspection

A. Equipment

- (1) Flexible Fiber Optic Borescope, and suitable light source, meeting the following criteria:
- (a) Outer Diameter - 6mm maximum
  - (b) Working Length - 27 inches minimum
  - (c) Direct View

B. Consumable Materials

- (1) D00006 Compound, Pure Nickel Special - Never Seez NSBT-8N (preferred alternative to anti-seize compound)
- (2) D00010 Compound, Anti-Seize - Fel-Pro C-5A

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Procedure

S 866-014

- (1) Put the airplane in the configuration necessary to inspect the APU.
- (a) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.
  - (b) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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- (c) Open this circuit breaker on the E6 rack in aft equipment center and attach a DO-NOT-CLOSE tag:  
1) APU CONT

S 016-015

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 216-016

- (3) Examine the APU inlet plenum for debris (Fig. 601).
- (a) Remove the access panels on the bottom and left side of the APU inlet plenum.
  - (b) Examine the screens for the compressor inlet and for the oil cooling fan.
  - (c) Remove any debris that you can see.

S 036-017

- (4) Disconnect the inlet guide vane (IGV) actuator pressure hoses (2 locations) and drain the fuel from the tubes.

S 036-018

- (5) Remove the IGV linkage cover and move the guide vanes to the open position.

S 496-019

- (6) Put the boroscope through the access panel on the bottom of the inlet plenum and into compressor section (Fig. 601).

**NOTE:** You can use a flexible boroscope to examine the load compressor and first stage of the compressor in the power section. If a flexible boroscope is not available, turn the engine (with a square drive on the end of the starter motor) as necessary to see all of the compressor blades.

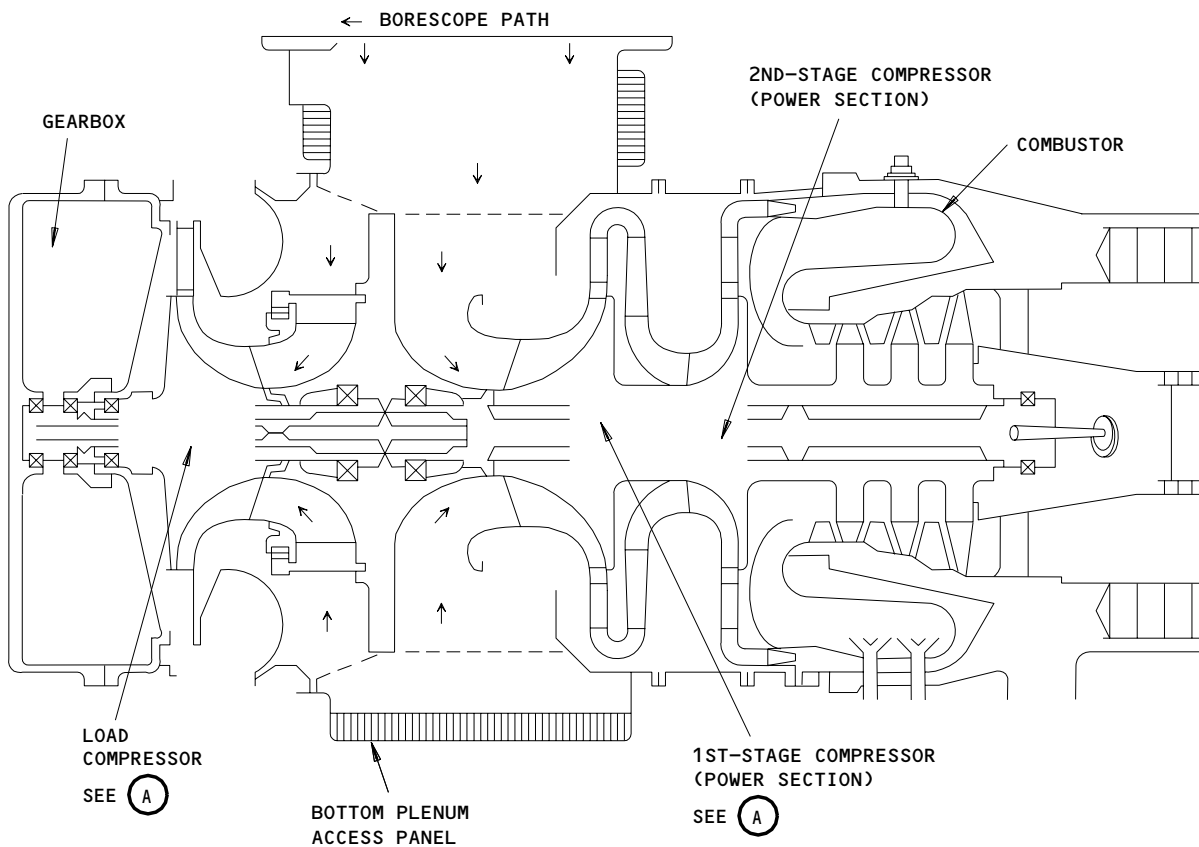
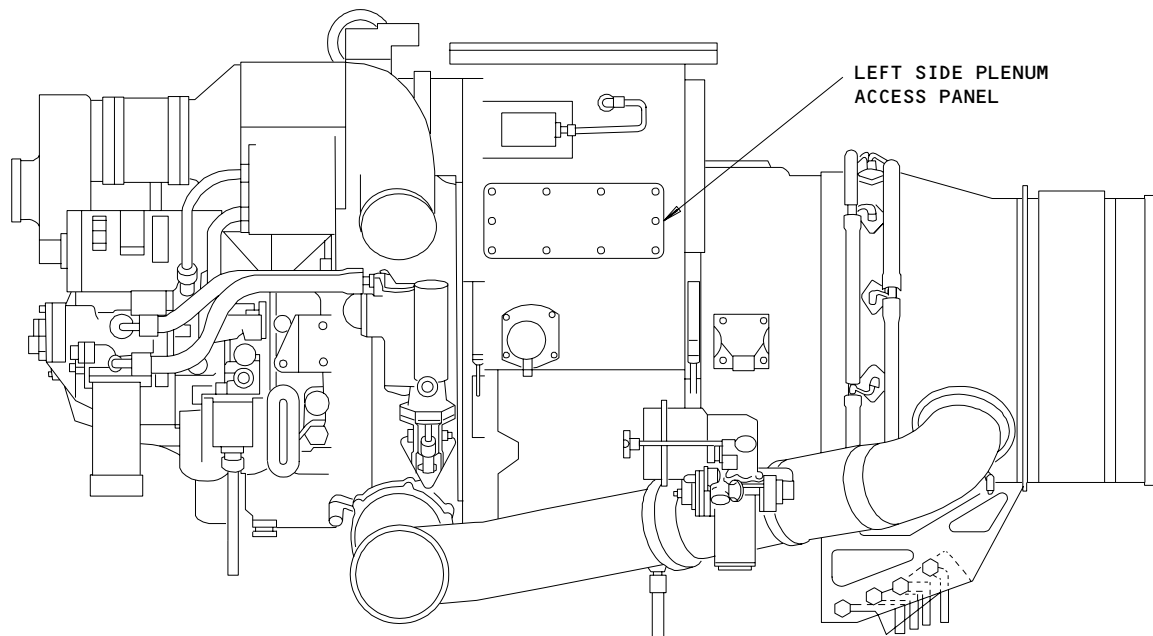
EFFECTIVITY

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APU Engine Inspection  
Figure 601 (Sheet 1)

EFFECTIVITY

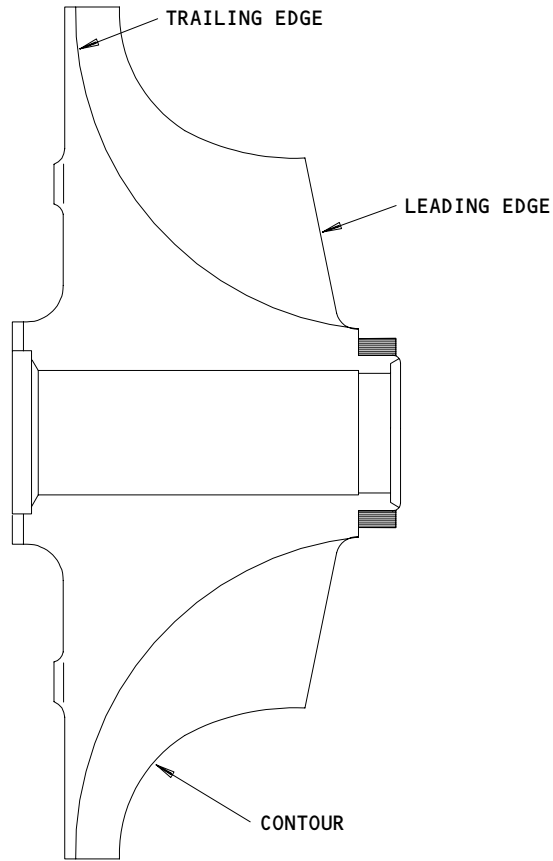
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COMPRESSOR CROSS SECTION

(A)

A3822080CK1

APU Engine Inspection  
Figure 601 (Sheet 2)

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832769

- S 296-020
- (7) Examine the compressor blades and use these inspection limits:
- (a) Leading edge erosion or corrosion more than 1/8 inch deep is not permitted.
  - (b) Trailing edge erosion or corrosion more than 1/2 inch is not permitted.
  - (c) Erosion or corrosion in the middle of the blades is not permitted.
  - (d) Leading edge cracks that intersect each other (or show that they could intersect) are not permitted.
  - (e) Trailing edge cracks that are more than three-eighths of the blade are not permitted (the number of blades with cracks is not limited).
  - (f) Blades with more than one crack that could cause a portion of the blade to break are not permitted.
  - (g) Bent blades are not permitted.
  - (h) Heat distress is not permitted.
  - (i) Nicks that are the result of foreign object damage (FOD) are permitted as long as these conditions are met:
    - 1) No significant vibration is evident.
    - 2) Aircraft airflow needs are being met.
  - (j) All other foreign object damage (FOD) is not permitted.
- S 096-021
- (8) Remove the borescope.
- S 416-020
- (9) Install the access panel(s) on the APU inlet plenum.
- S 436-022
- (10) Install the IGV linkage cover.
- S 436-023
- (11) Install the pressure hoses for the IGV actuator.
- S 866-024
- (12) If no more borescope inspections are necessary, put the airplane in its usual condition.
- (a) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center.
    - 1) APU CONT
  - (b) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead panel P11:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (c) Remove the DO-NOT-OPERATE tag from the APU master control switch.
- S 866-025
- (13) Do this task: APU Start and Operation (AMM 49-11-00/201).

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S 216-026

- (14) Examine the APU for any leakage.

S 866-027

- (15) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 416-028

- (16) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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APU AND GENERATOR LUBRICATION SYSTEM – DESCRIPTION AND OPERATION

1. General

A. ON GUI 001-114, 116-999;

The APU and generator lubrication system lubricates, cools, and scavenges the electrical generator and all bearings and gears in the engine. The system consists of the oil pump, generator scavenge pump, the scavenge pump for the rear bearing, magnetic chip detectors, drain plug, oil cooler, oil filters, and several valves. The lubrication system is monitored by the oil indicating system consisting of an oil temperature sensor, a switch for the low oil pressure, a switch for the low oil level, and a switch for the low oil temperature.

B. ON GUI 115;

The APU and generator lubrication system lubricates, cools, and scavenges the electrical generator and all bearings and gears in the engine. The system consists of the oil pump, generator scavenge pump, the scavenge pump for the rear bearing, magnetic chip detectors, drain plug, oil cooler, oil filters, and several valves. The lubrication system is monitored by the oil indicating system consisting of an oil temperature sensor, a switch for the low oil pressure, and an oil quantity transmitter.

2. Component Details

A. APU Lubrication (Fig. 1)

(1) The APU lubrication system includes an oil reservoir, an oil pump assembly, a de-oil solenoid valve, a switch for the low oil temperature, a gearbox pressurization system, an oil cooler, and a scavenge system for the turbine bearing.

(2) Oil Reservoir (Fig. 2)

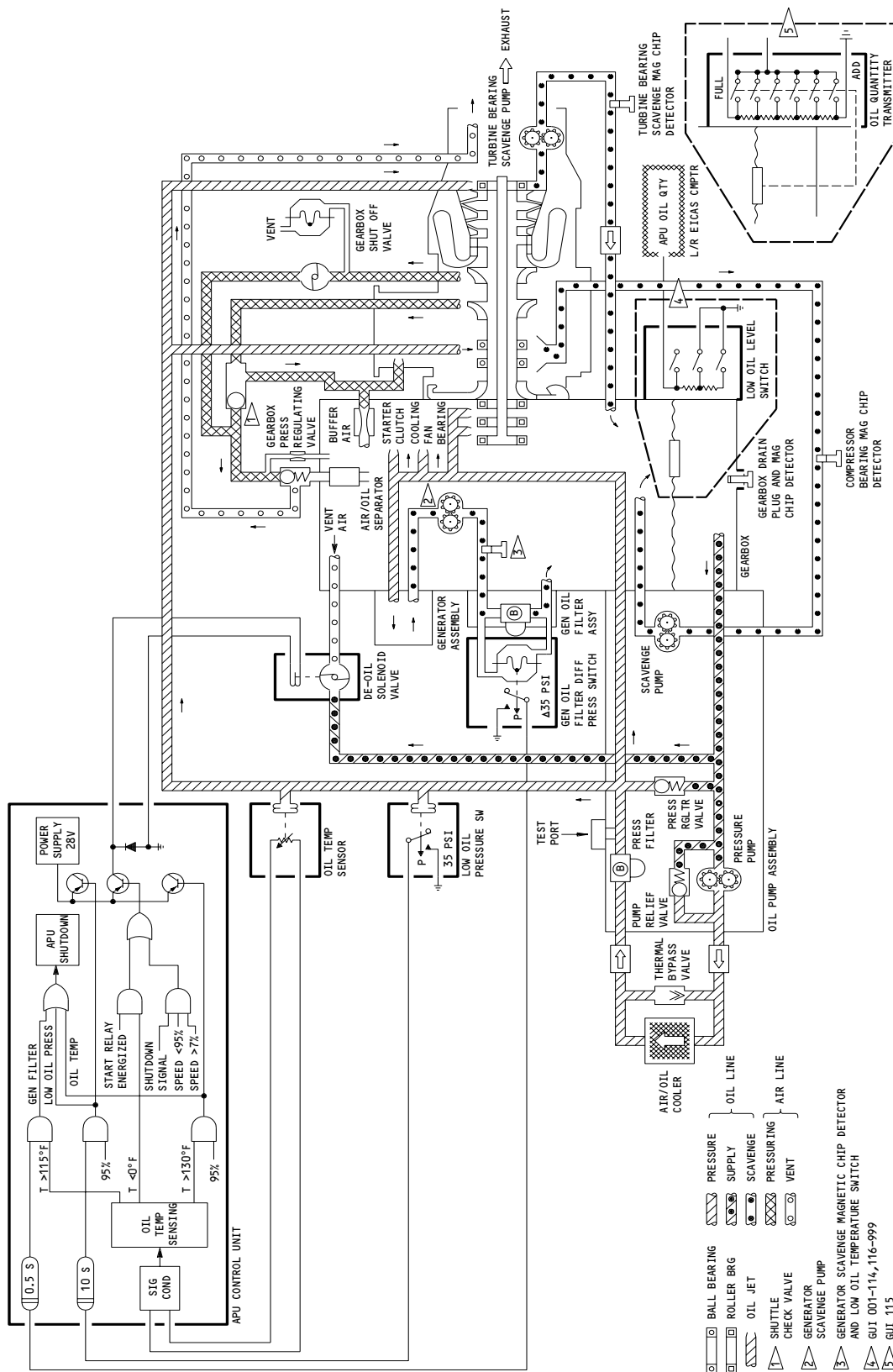
(a) ON GUI 001-114, 116-999;

the oil reservoir stores the oil supply for the system. It is located at the bottom of the gearbox and has a capacity of approximately 6.2 quarts. A manual fill port, with a scupper drain, and pressure fill provisions are included. An approximate oil reservoir level is read through a sight glass with markings indicating SAFE and ADD. A switch for the low oil level, located on the bottom of the gearbox, sends a signal to the Engine Indication and Crew Alerting System (EICAS), and stores an oil quantity indication in the status and maintenance modes. The reservoir drain plug is located on the bottom of the gear box. The plug contains a magnetic chip detector which can be inspected for possible gearbox damage without draining the reservoir. A magnetic chip detector for generator scavenge oil, and a switch for the low oil temperature, are on the right side of the gearbox.

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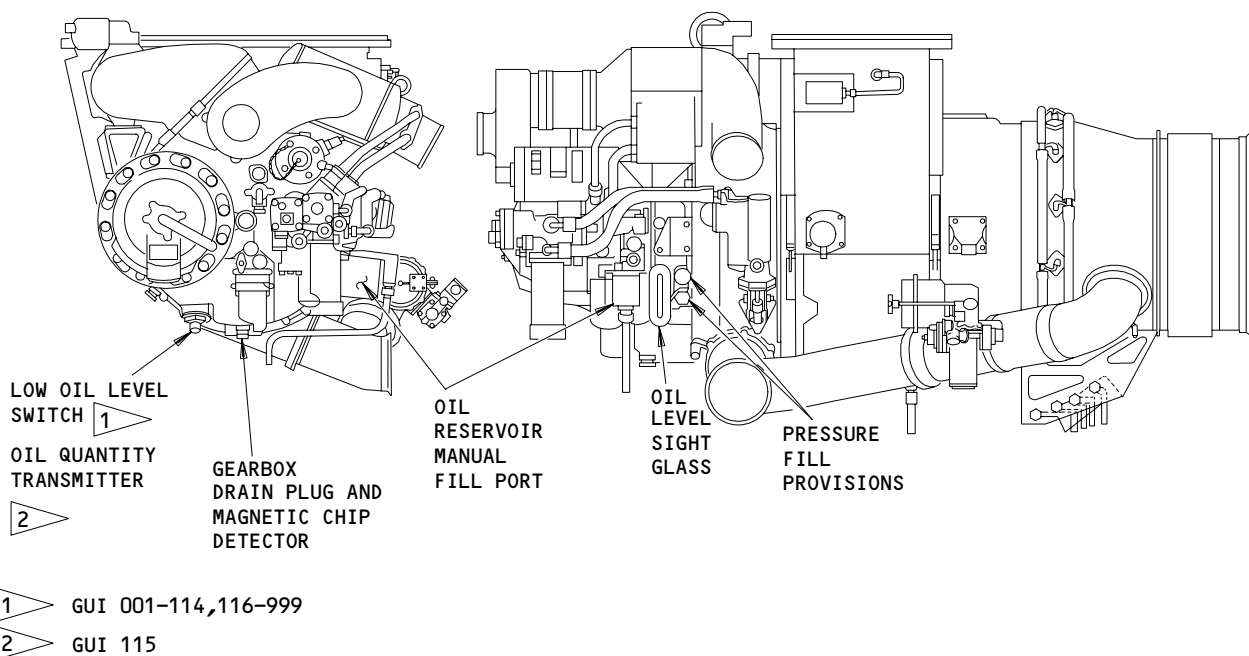


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- (b) ON GUI 115;  
the oil reservoir stores the oil supply for the system. It is located at the bottom of the gearbox and has a capacity of approximately 6.2 quarts. A manual fill port, with a scupper drain, and pressure fill provisions are included. An approximate oil reservoir level is read through a sight glass with markings indicating SAFE and ADD. An oil quantity transmitter, located on the bottom of the gearbox, sends a signal to the Engine Indication and Crew Alerting System (EICAS), and stores an oil quantity indication in the status and maintenance modes. The reservoir drain plug is located on the bottom of the gearbox. The plug contains a magnetic chip detector which can be inspected for possible gearbox damage without draining the reservoir. A magnetic chip detector for generator scavenge oil, and a switch for the low oil temperature, are on the right side of the gearbox.



APU Oil Reservoir  
Figure 2

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- (3) Oil Pump Assembly (Fig. 3)
  - (a) The oil pump supplies oil under pressure to the main rotor bearings, to the bearings and gears in the gearbox, and to the generator lubrication system. It also scavenges oil from the compressor bearings. The oil pump assembly contains a pressure pump, a scavenge pump, a filter element, a relief valve for the oil pressure, a regulating valve for the oil pressure, a differential pressure indicator and installation areas for the fuel control. The pump is pilot mounted and bolted to the gearbox on the left side. The pressure and scavenge gear pumps are driven by a common pump shaft from the accessory drive gearbox. The pressure pump has a pressure relief valve to prevent overpressurization beyond  $200 \pm 5$  psi. The oil pump filter filters the oil flowing to the APU and generator lubrication system. It is a disposable filter with pleated fiberglass in a screw-on housing. An indicator for the filter differential pressure pops out at  $20 \pm 5$  psid to indicate when the filter is clogged. The pressure regulator valve regulates the oil pressure to  $65 \pm 5$  psig. The oil pump housing provides a mounting base for the fuel control unit.
- (4) De-Oil Solenoid Valve (Fig. 4)
  - (a) The de-oil solenoid is an electrically-actuated pneumatic valve bolted to the gearbox case. The valve de-oils the oil pump to reduce viscous oil drag during cold starts.
  - (b) The switch for the low oil temperature activates the solenoid, through the starter motor, when the oil temperature in the gearbox is approximately  $25^{\circ}\text{F}$  ( $-4^{\circ}\text{C}$ ). The APU control unit also activates the solenoid during an APU shutdown or when the start relay is energized and the oil temperature at the oil temperature sensor is less than  $0^{\circ}\text{F}$  ( $-18^{\circ}\text{C}$ ). The solenoid is deactivated when the starter motor operation stops or when the APU speed is 50%.
- (5) Switch for the Low Oil Temperature
  - (a) The switch for the low oil temperature is installed on the bottom of the gearbox. The switch closes, to de-oil the system, when oil in the reservoir is below  $25 (\pm 7)^{\circ}\text{F}$ , and opens at  $40^{\circ}\text{F}$ . The low oil temperature switch is not monitored by the ECU BITE for condition or operation.

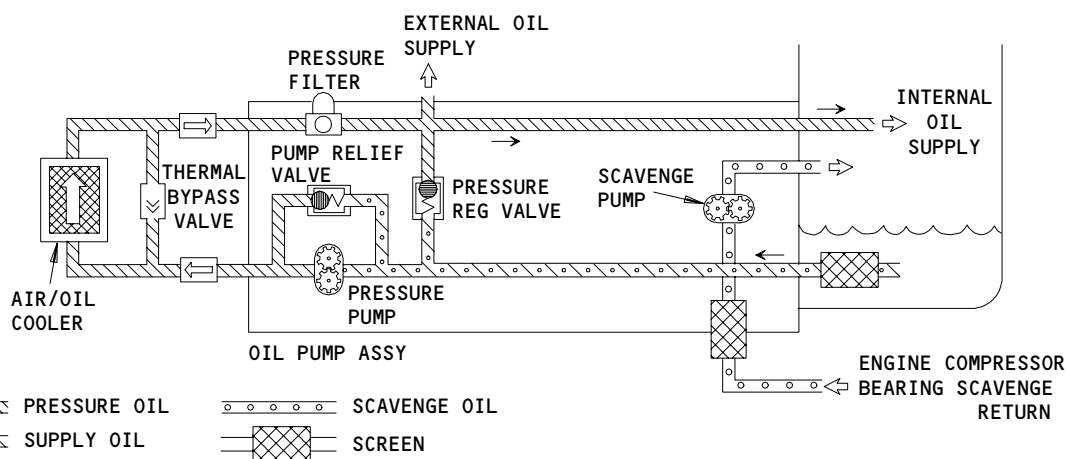
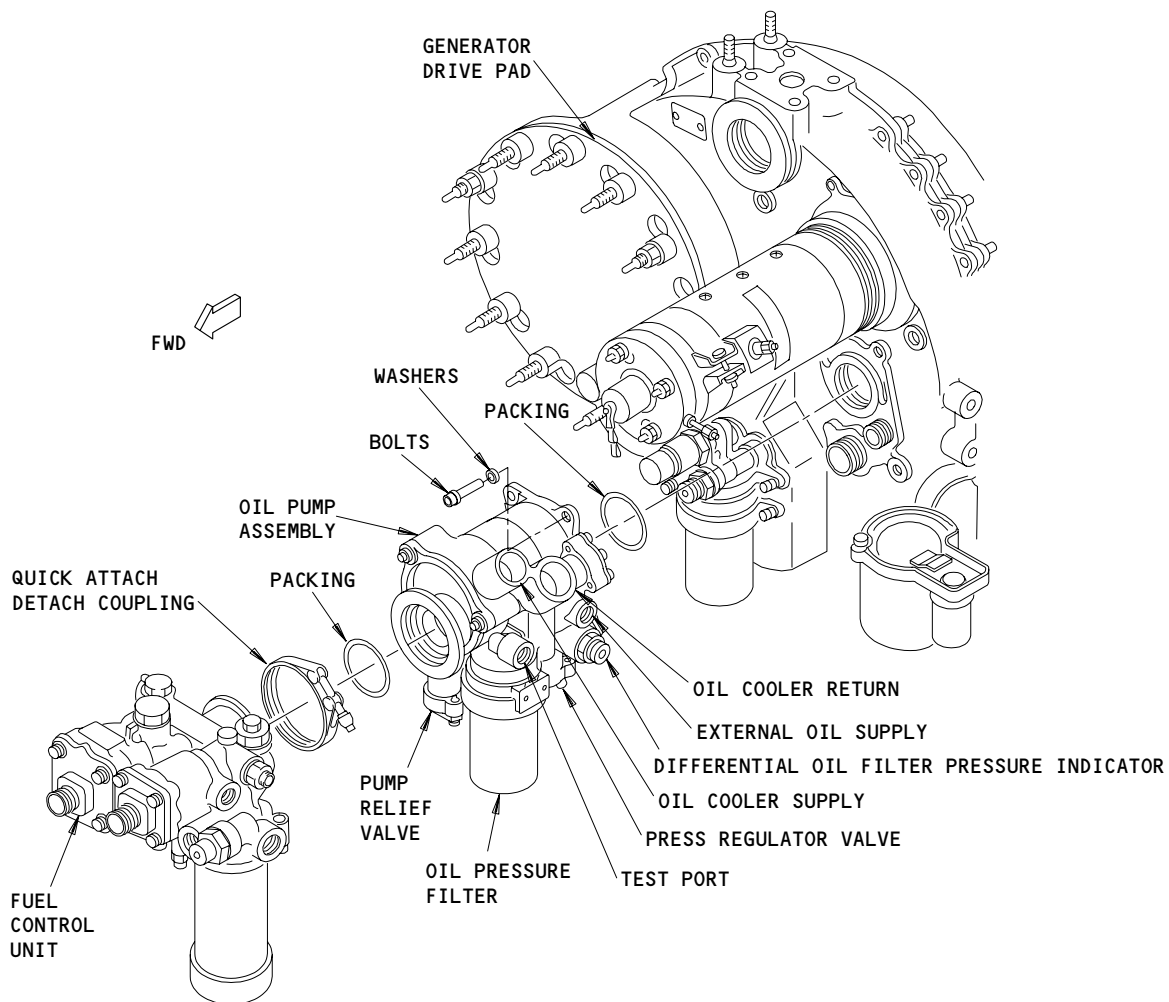
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APU Oil Pump Assembly  
Figure 3

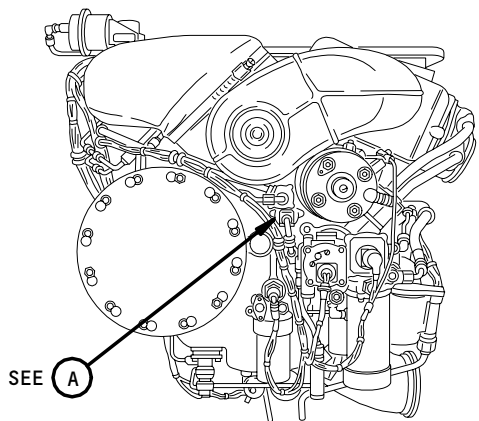
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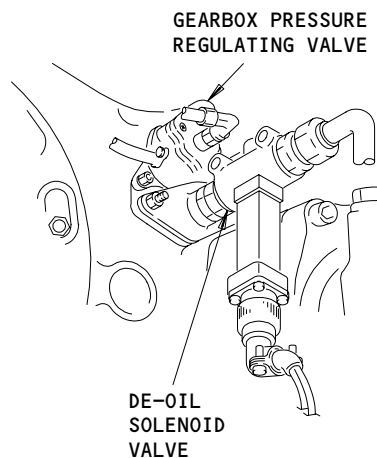
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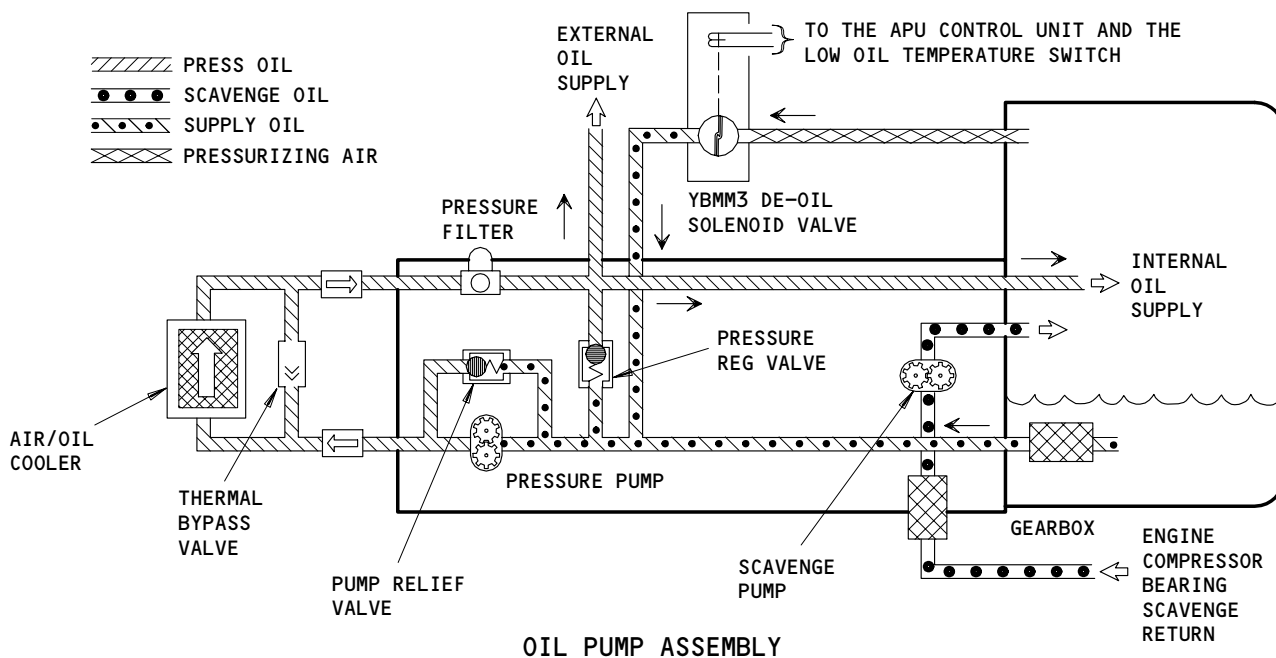


FRONT VIEW



DE-OIL SOLENOID VALVE

(A)



De-oil Solenoid Valve  
Figure 4

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- (6) Gearbox Pressurization System (Fig. 5)
  - (a) The gearbox pressurization system regulates the air flow which is a buffer for the seal and pressurizes the gearbox at varying altitudes to maintain oil pump performance. The air flow keeps oil from leaking past the primary seal into the load compressor. The shuttle check valve works with the gearbox shutoff valve to control the air supply. The air flow comes from first stage compression below 15,000 feet and second stage compression above 15,000 feet. Second stage compression supplies gearbox pressurization above 15,000 feet. The regulating valve for the gearbox pressure maintains the pressure at 4.5 psid. If the gearbox pressurization system fails to regulate at 4.5 psid, the regulating valve will vent the gearbox to ambient at a maximum of 10 psid.
  - (b) Gearbox ventilation is included in the gearbox pressurization system. An air-oil separator centrifugally separates the oil from the air. Gearbox pressure is vented to the APU exhaust through the regulating valve for the gearbox pressure at all altitudes, and at 90-40% during every rolldown.
- (7) Oil Cooler (Fig. 6)
  - (a) The oil cooler is an oil-air heat exchanger consisting of a rectangular core of plate-fin design. Air from the inlet plenum is blown through the oil cooler by a cooling fan that is operated by the gearbox. The bypass valve for the oil cooler is a thermally actuated and bolted to the oil cooler header. When the oil is below 170°F the valve is open allowing the oil to bypass the cooler.
- (8) Scavenge System for the Engine Bearing (Fig. 6)
  - (a) The APU compressor bearings are scavenged by the scavenge pump located in the oil pump assembly. The rear turbine bearing is scavenged by a gear pump, driven by a gear running on the main engine shaft. Scavenged oil is pumped back to the bottom of the gearbox. Magnetic chip detectors on the scavenge return lines for the turbine bearing and compressor bearing can be inspected for possible bearing damage.

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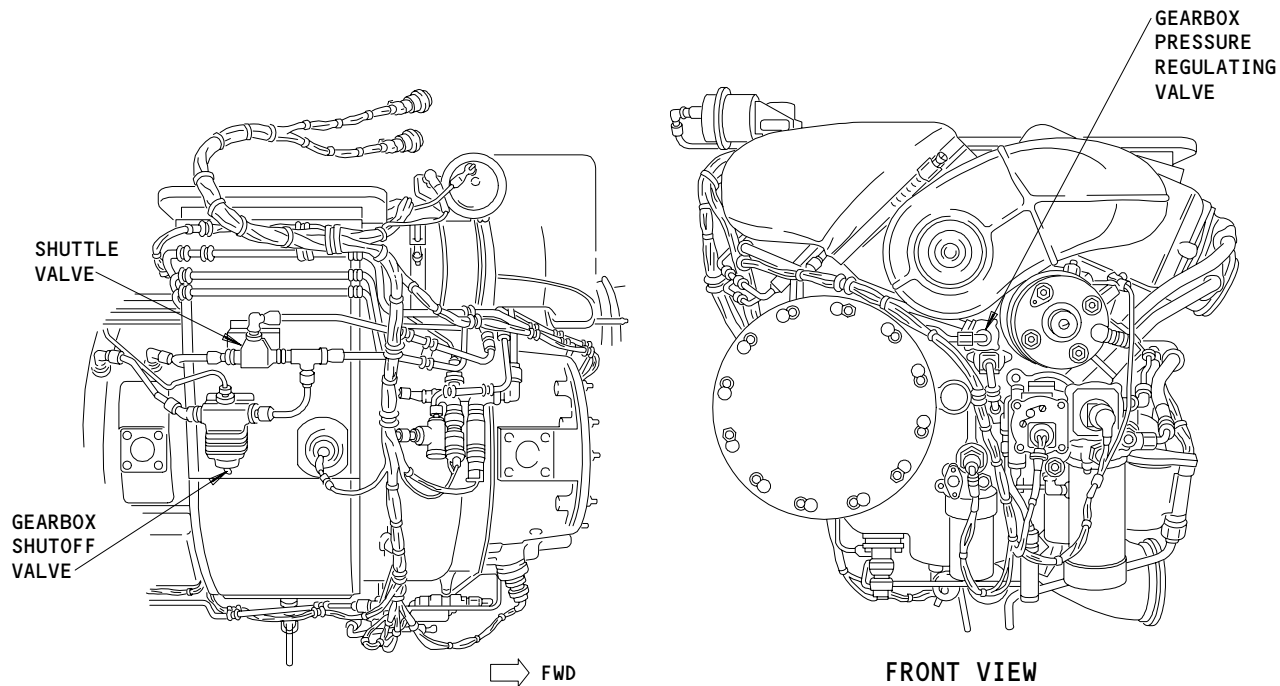
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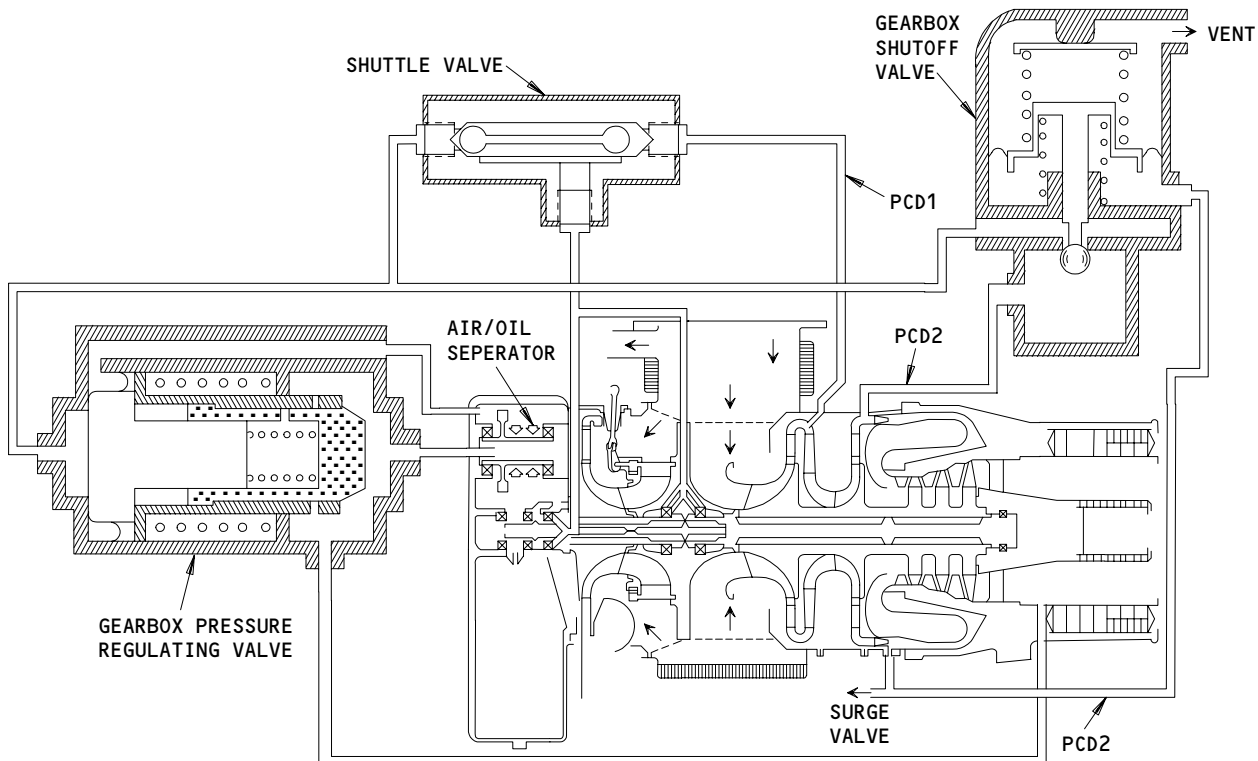
SHUTTLE VALVE

GEARBOX SHUTOFF VALVE

→ FWD

GEARBOX PRESSURE REGULATING VALVE

FRONT VIEW



SHUTTLE VALVE

GEARBOX SHUTOFF VALVE

→ VENT

AIR/OIL SEPERATOR

GEARBOX PRESSURE REGULATING VALVE

PCD1

PCD2

SURGE VALVE

PCD2

Gearbox Pressurization System  
Figure 5

EFFECTIVITY

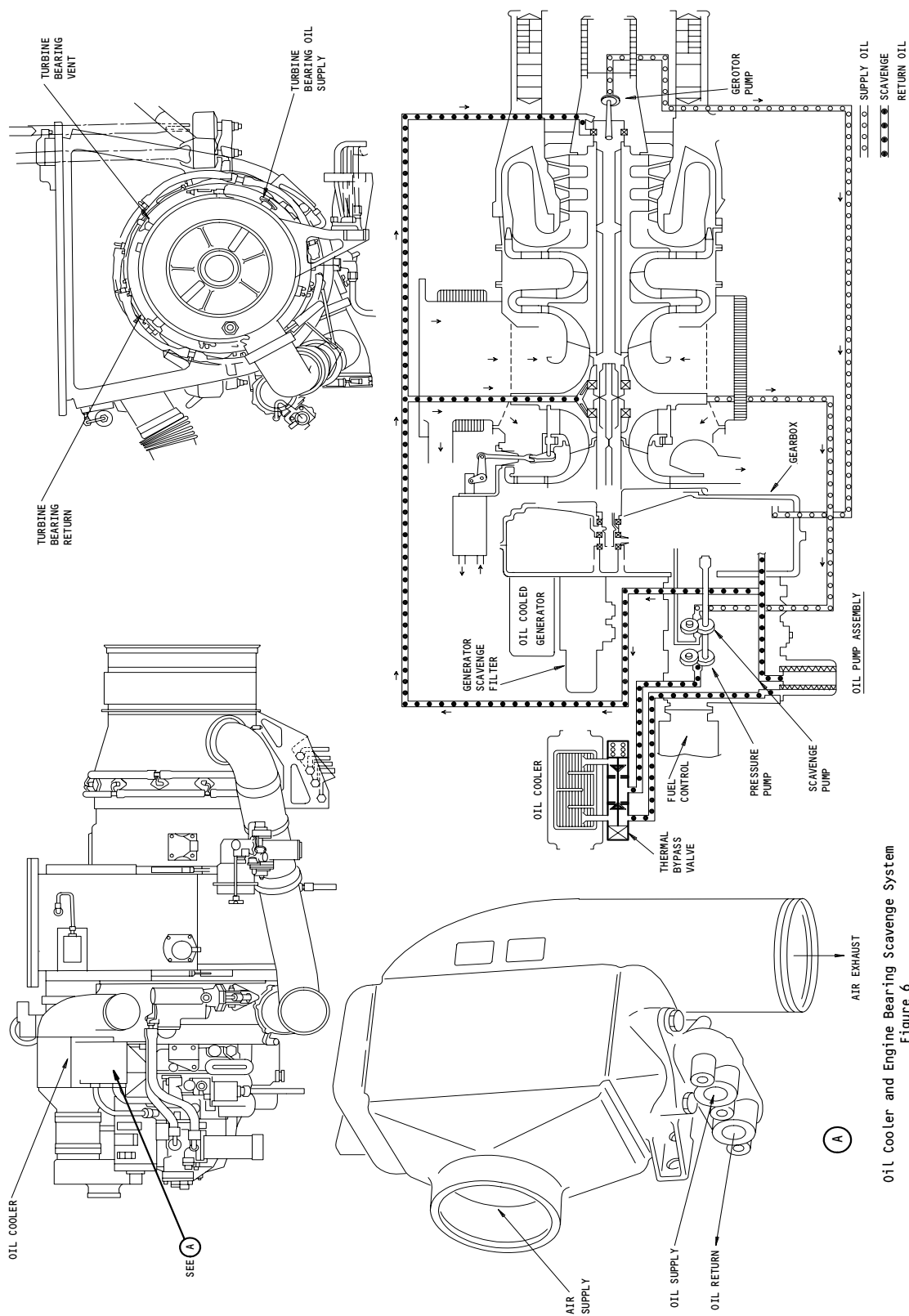
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Oil Cooler and Engine Bearing Scavenge System  
Figure 6

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B. Generator Lubrication (Fig. 1)

- (1) The oil-cooled generator system includes the generator scavenge pump and a filter assembly consisting of an oil filter element, a differential pressure switch for the generator oil filter, and a differential pressure indicator for the generator oil filter. The system is supplied with oil by the main APU oil pump. It has, however, a separate scavenge pump operated by the gearbox and a filter assembly. The double filter system isolates the APU and generator from each other in the event of a mechanical failure in one.
- (2) Generator Scavenge Pump (Fig. 7)
  - (a) The generator scavenge pump feeds generator cooling oil through the generator scavenge filter before the oil enters the oil reservoir. The pump is bolted to the gearbox case underneath the generator drive pad.
- (3) Filter Assembly for the Generator Scavenge Oil (Fig. 7)
  - (a) The filter for the generator scavenge oil is a disposable fiberglass filter of the same design as the oil pump filter. It has a differential pressure indicator which activates at  $20 \pm 5$  psid. An electrical switch for the differential pressure initiates an APU automatic shutdown when the differential pressure across the filter is  $35 \pm 5$  psid and the oil temperature is greater than  $115 \pm 25^\circ\text{F}$  ( $46 \pm 14^\circ\text{C}$ ).

3. Operation

A. Functional Description

- (1) During APU operation, oil is drawn from the oil reservoir by the oil pump. The oil pressure is regulated by the pressure regulating valve to  $65 (\pm 5)$  psig. The oil flows through the oil cooler and filter element before being delivered to the generator and APU bearings and gears.
- (2) Oil from the turbine rotor bearing is returned to the oil reservoir by a pump contained within the bearing cavity. Oil from the compressor rotor bearing is returned by the scavenge pump for the oil pump assembly by the force of gravity into the oil reservoir. The gearbox is vented by an air-oil separator providing separation of entrained oil from the air.

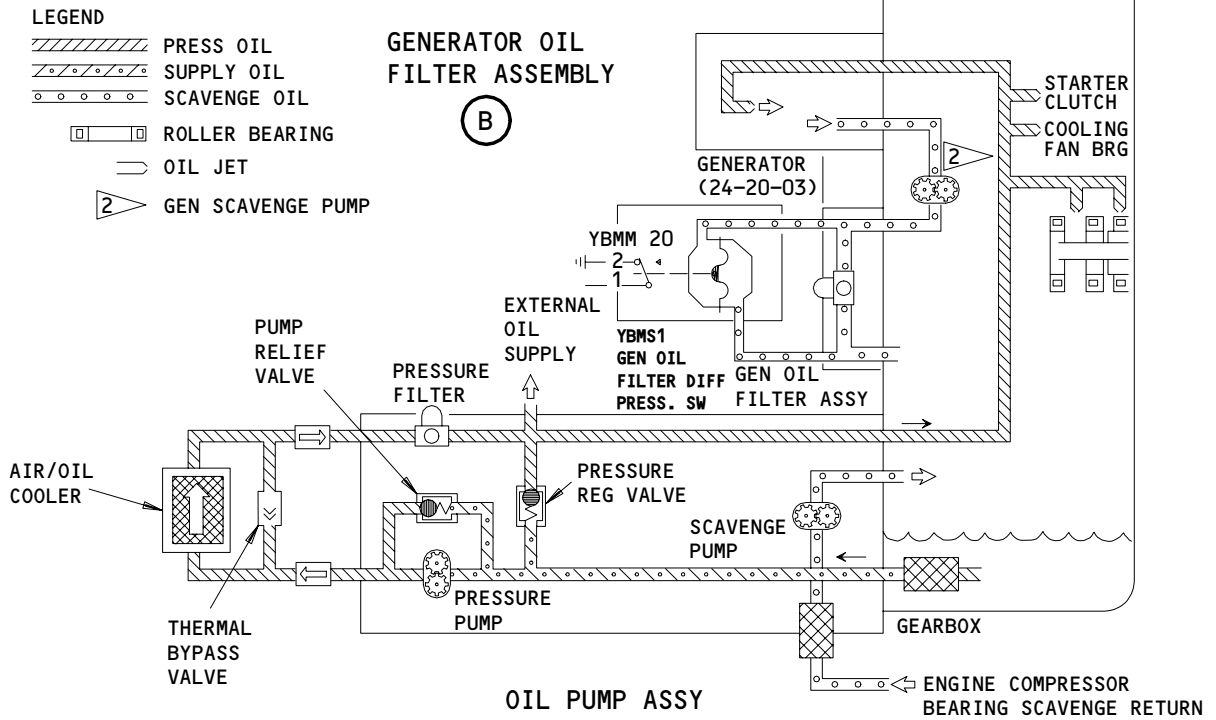
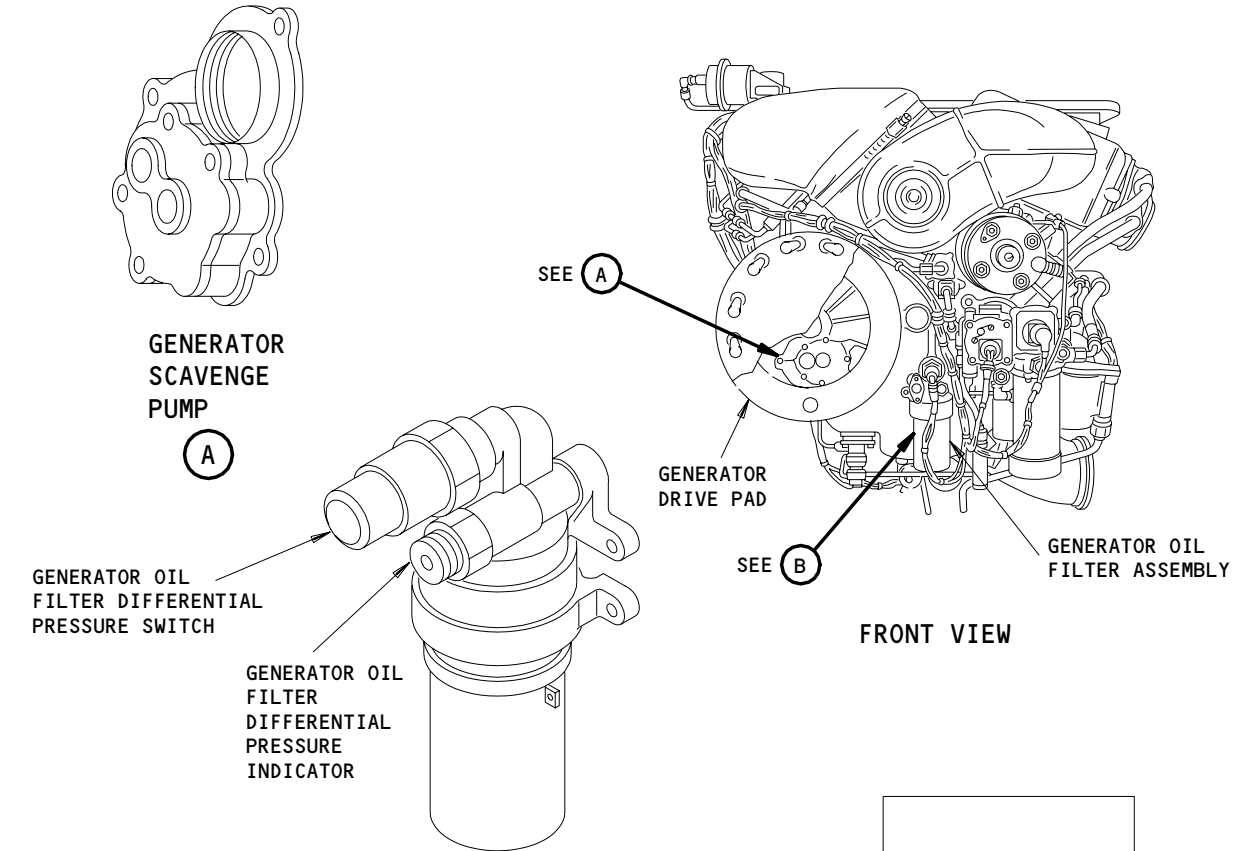
EFFECTIVITY

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Generator Oil Scavenge System  
Figure 7

EFFECTIVITY	ALL
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B. BITE

- (1) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The APU control unit monitors the lubrication system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the de-oil solenoid valve, the switch for the low oil pressure, the oil temperature sensor, or the differential pressure switch for the generator oil filter is shown on the FAULTY UNIT matrix. These failures are shown as DEOIL SOL, LOP SWITCH, HOT SENSOR, or FILTER SWITCH. An automatic shutdown because of high oil temperature (HOT), low oil pressure (LOP), or a clogged generator oil filter (GEN FILTER) is shown on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The APU control unit monitors the lubrication system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the de-oil solenoid valve, the switch for the low oil pressure, the oil temperature sensor, or the differential pressure switch for the generator oil filter is shown on the FAULTY LRU matrix. These failures are shown as DEOIL SOL, LOP SWITCH, HOT SENSOR, or FILTER SW(GEN). An automatic shutdown because of HIGH OIL TEMP, LOW OIL PRESSURE, or GEN FILTER (a clogged generator oil filter) is shown on the REASON APU NOT OPERATING matrix.

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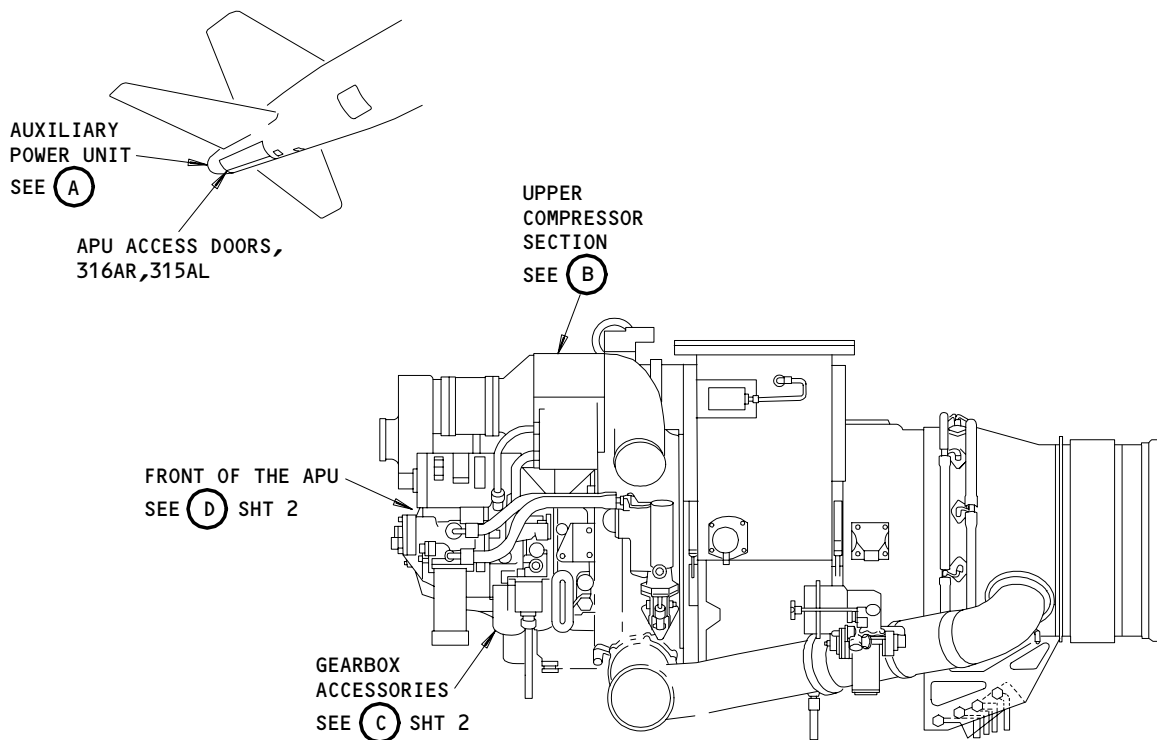
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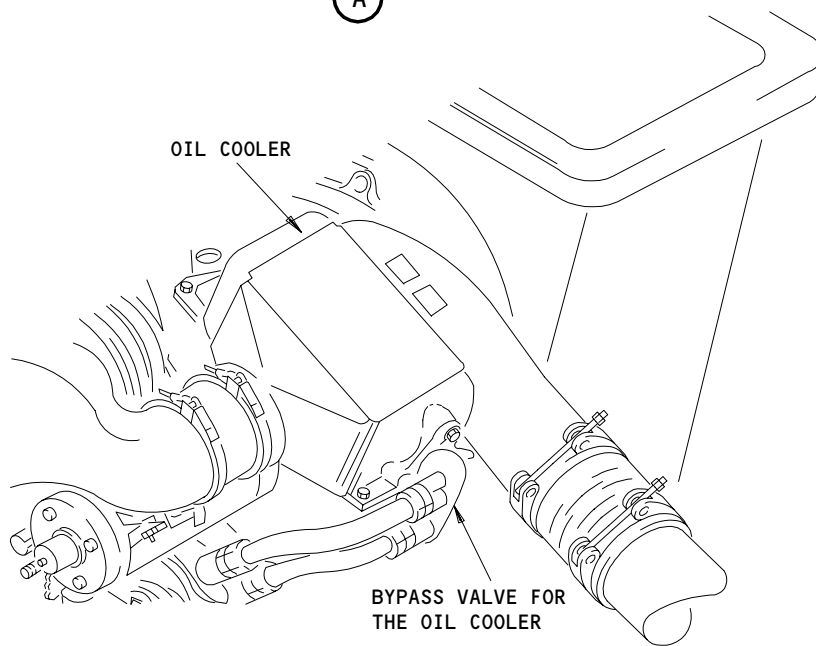
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AUXILIARY POWER UNIT

(A)



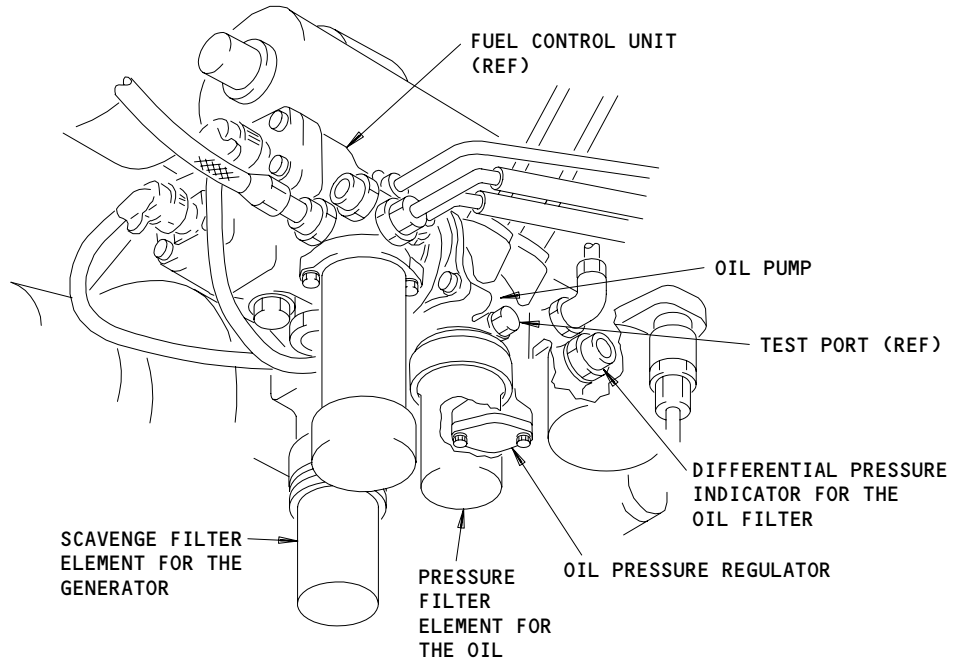
UPPER COMPRESSOR SECTION

(B)

APU and Generator Lubrication System - Component Location  
Figure 102 (Sheet 1)

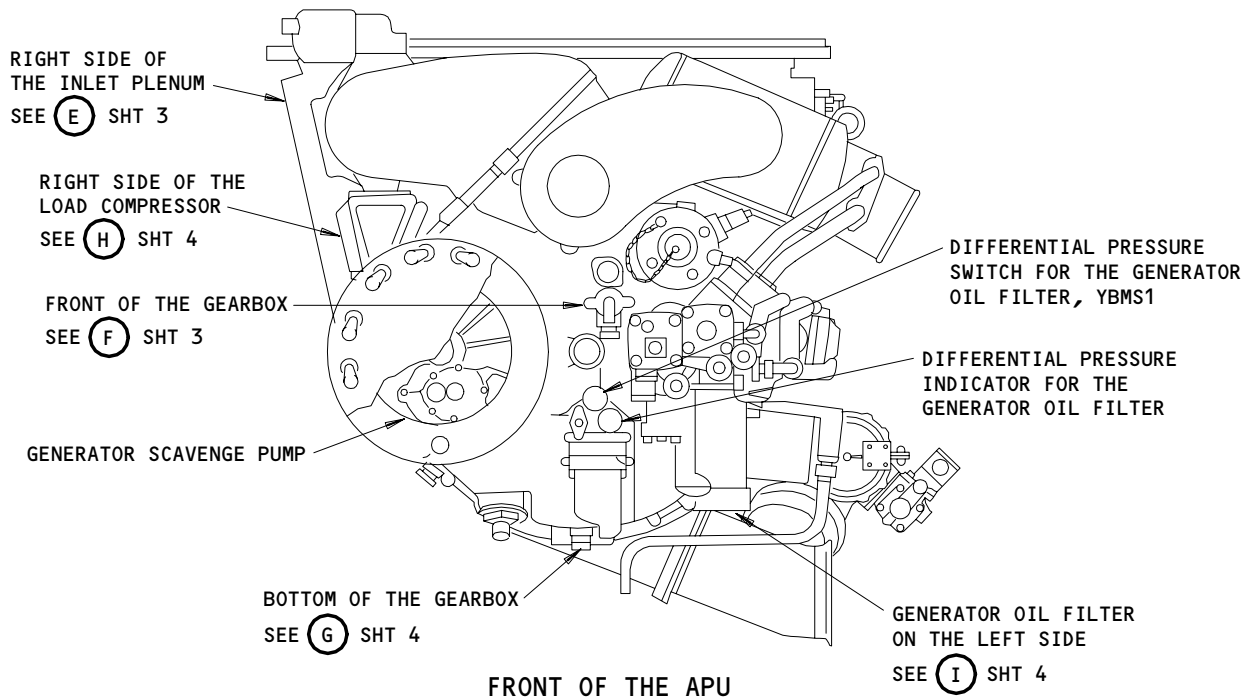
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**GEARBOX ACCESSORIES**

(C)



**FRONT OF THE APU**

(D)

APU and Generator Lubrication System - Component Location (Details from Sht 1)  
Figure 102 (Sheet 2)

EFFECTIVITY

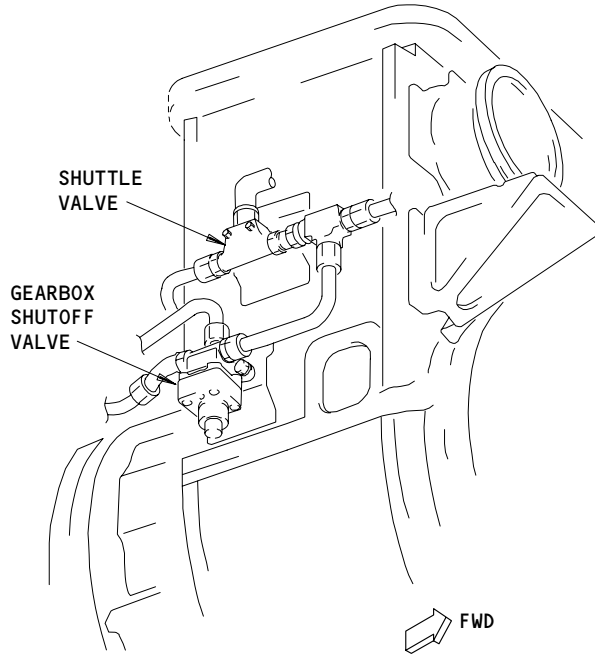
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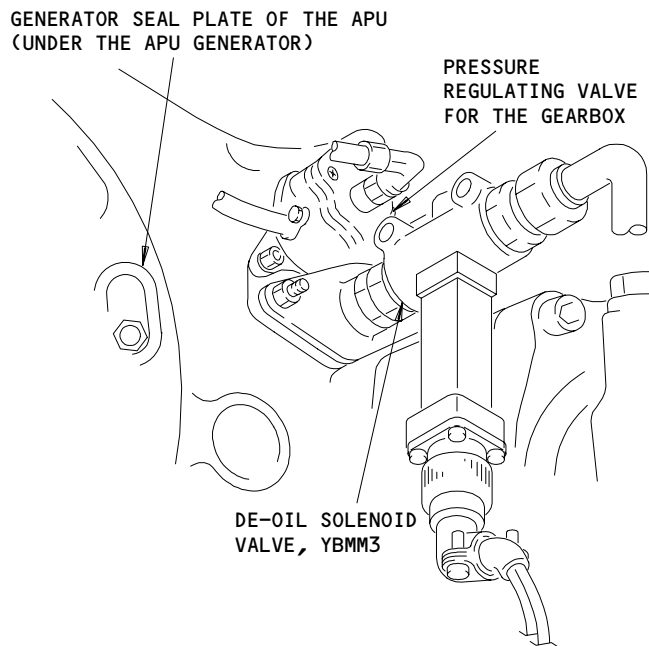
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RIGHT SIDE OF THE INLET PLENUM

(E)



FRONT OF THE GEARBOX

(F)

APU and Generator Lubrication System - Component Location (Details from Sht 2)  
Figure 102 (Sheet 3)

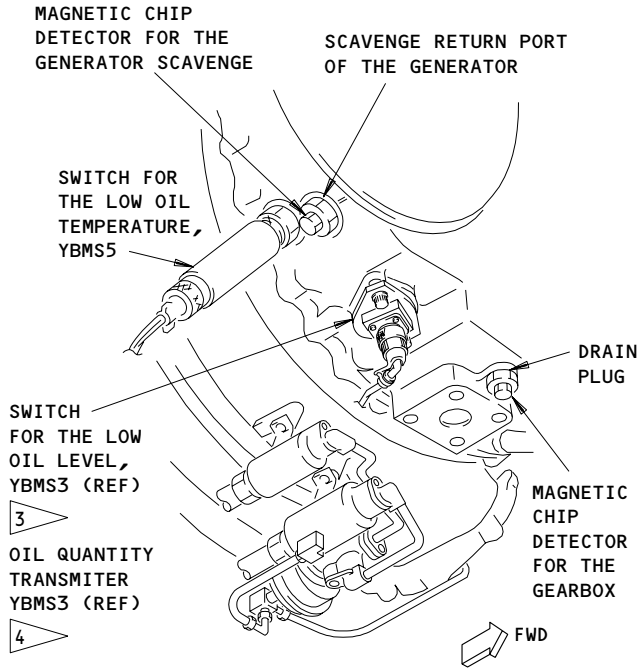
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# BOEING

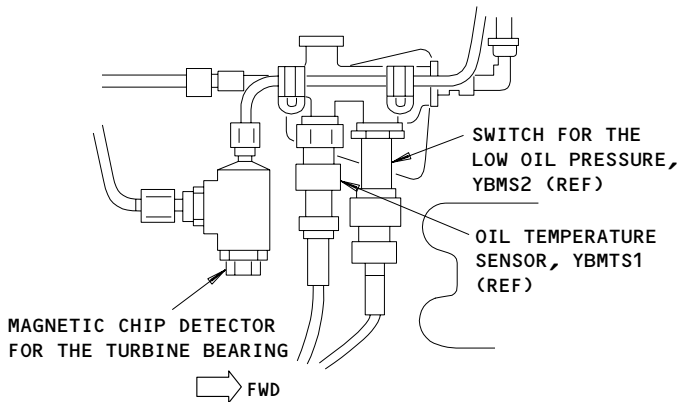
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### FAULT ISOLATION/MAINT MANUAL



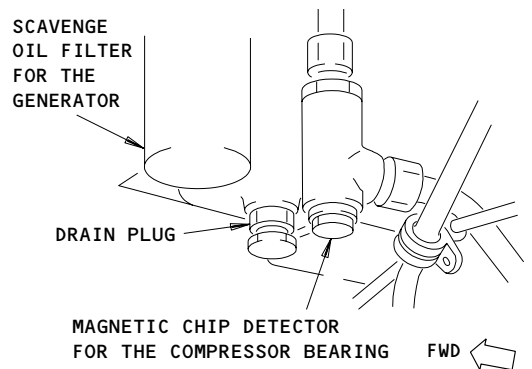
**BOTTOM OF THE GEARBOX**

(G)



**RIGHT SIDE OF THE LOAD COMPRESSOR**

(H)



**LEFT SIDE OF THE LOAD COMPRESSOR**

(I)

- 3 GUI 001-114,116-999
- 4 GUI 115

APU and Generator Lubrication System - Component Location (Details from Sht 2)  
Figure 102 (Sheet 4)

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APU AND GENERATOR LUBRICATION SYSTEM – SERVICING (OIL CHANGE)

1. General

- A. There are two tasks in this procedure. The first task changes the APU oil with the same or different brand name and same type of oil. The second task is to change the APU oil with a different type of oil.
- B. The oil reservoir is on the bottom of the gearbox. The reservoir has a quantity of 6.2 quarts. A manual fill port (with a scupper drain) is on the left side of the gearbox. There are also pressure fill fittings that are aft of the manual fill port.

TASK 49-27-00-613-001

2. APU Oil Change (Replace with the Same or Different Brand Name and Same Type of Oil)

- A. Equipment
  - (1) Container – Two Gallon Quantity
- B. Consumable Materials
  - (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
  - (2) D00341 Lubricant – Santovac 5
- C. References
  - (1) AMM 12-13-04/301, APU – Servicing (Fill the Oil)
  - (2) AMM 49-11-00/201, Auxiliary Power Unit
  - (3) AMM 49-27-03/201, Oil Filter Element
  - (4) AMM 49-27-04/201, Magnetic Chip Detectors and Drain Plugs
- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

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E. Prepare to Change the APU Oil.

NOTE: Drain the APU oil when the engine is hot. If it is necessary, operate the APU (AMM 49-11-00/201) until the APU is hot. Then do the APU shutdown before you change the APU oil.

S 863-002

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 863-003

- (2) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:  
(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 863-004

- (3) Open this circuit breaker on the E6 rack in the aft equipment center and attach a DO-NOT-CLOSE tag:  
(a) APU CONT

S 013-005

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Open the latches on the APU access doors.  
(b) Open the left access door.  
(c) Push the right access door up and pull the spring latch aft until the latch disengages.  
(d) Open the right access door.  
(e) Engage the support rods for the APU access doors.

F. Change the APU Oil (Fig. 301).

S 033-006

- (1) Loosen the oil fill cap.

S 613-007

- (2) Put the container below the drain plug.

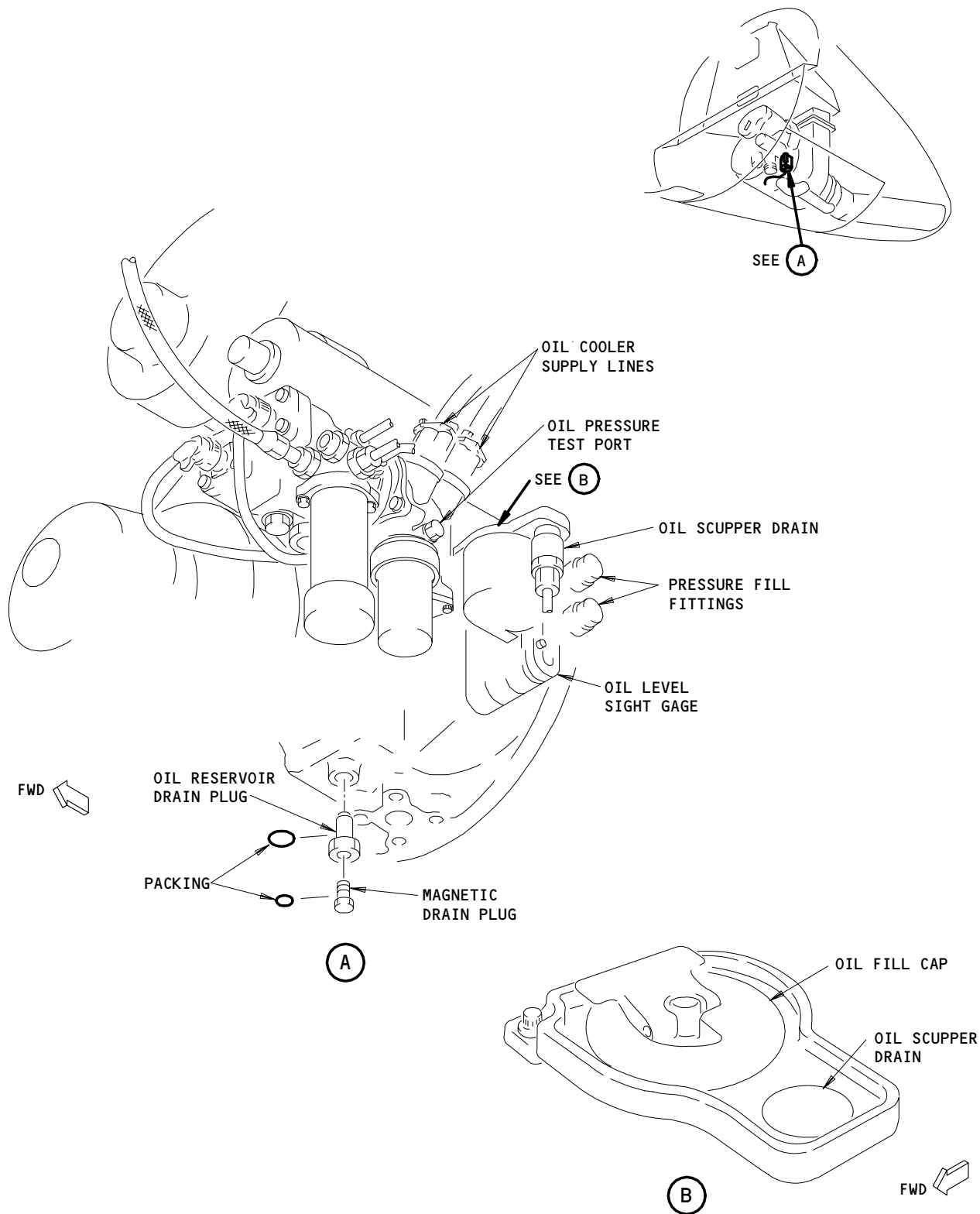
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APU Oil Servicing  
Figure 301

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S 683-008

**WARNING:** DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL OF THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS.

- (3) Remove the drain plug from the bottom of the gearbox to drain the oil into the container.  
(a) Make sure all of the oil drains from the gearbox.

S 023-065

- (4) Remove the packing from the drain plug.  
(a) Discard the packing.

S 213-009

- (5) Examine the drain plug for metal particles (AMM 49-27-04/201).

S 903-010

- (6) Install a new oil filter element (AMM 49-27-03/201).

S 643-066

- (7) Lubricate the new packing with a light coat of lubricant or oil.

S 423-068

- (8) Install the packing on the drain plug.

S 433-011

- (9) Install the drain plug in the gearbox.  
(a) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).  
(b) Install a lockwire on the drain plug.

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S 613-012

(10) Fill the APU oil (AMM 12-13-04/301).

G. Put the Airplane Back to Its Usual Condition.

S 863-013

(1) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:

(a) APU CONT

S 863-014

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

(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 863-015

(3) Remove the DO-NOT-OPERATE tag from the APU control switch.

S 863-016

(4) Do this task: APU Start and Operation (AMM 49-11-00/201).

(a) Make sure the APU operates correctly.

(b) Operate the APU for three to five minutes.

(c) Examine the APU for leakage.

S 863-017

(5) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 613-018

(6) Stop for five minutes.

S 613-019

(7) Make sure the APU oil is at the top of the fill port.

S 413-020

(8) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Disengage the support rods for the APU access doors.

(b) Put the support rods in the clips on the inner side of the APU access doors.

(c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.

(d) Lift the left access door and align it with the right access door.

(e) Close and latch the APU access doors.

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TASK 49-27-00-613-021

3. APU Oil Change (Replace With a Different Type of Oil)

A. Equipment

- (1) Container - 2 Gallon Quantity

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. References

- (1) AMM 12-13-04/301, APU - Servicing (Fill the Oil)
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-27-03/201, Oil Filter Element
- (4) AMM 49-27-04/201, Magnetic Chip Detectors and Drain Plug

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Prepare to Change the APU Oil.

**NOTE:** Drain the APU oil when the engine is hot. If it is necessary, operate the APU (AMM 49-11-00/201) until the APU is hot. Then do the APU shutdown before you change the APU oil.

S 863-022

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 863-023

- (2) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 863-024

- (3) Open this circuit breaker on the E6 rack in the aft equipment center and attach a DO-NOT-CLOSE tag:
  - (a) APU CONT

S 013-025

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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- (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- F. Change the APU Oil (Fig. 301).

S 683-026

- (1) Put the container below the oil cooler.

S 683-027

**WARNING:** DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS. OIL CAN PUT STAINS ON YOUR CLOTHING.

- (2) Remove the oil tubes from the oil cooler.
  - (a) Let the oil drain from the oil tubes that attach to the oil cooler.

S 023-069

- (3) Remove the packing from the drain plug.
  - (a) Discard the packing.

S 683-028

- (4) Install the oil tubes to the oil cooler.

S 683-029

- (5) Put the container below the drain plug on the bottom of the gearbox.

S 033-030

- (6) Loosen the oil fill cap.

S 863-031

- (7) Remove the drain plug on the bottom of the gearbox to drain the oil into the container.
  - (a) Make sure all of the oil drains from the gearbox.

S 903-032

- (8) Install a new oil filter element (AMM 49-27-03/201).

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- S 213-033
- (9) Examine the drain plug for metal particles (AMM 49-27-04/201).
- S 643-070
- (10) Lubricate the new packing with a light coat of lubricant or oil.
- S 423-072
- (11) Install the packing on the drain plug.
- S 033-035
- (12) Install the oil drain plug, but do not install the lockwire on the drain plug at this time.
- (a) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).
- S 613-036
- (13) Fill the APU oil (AMM 12-13-04/301).
- S 863-038
- (14) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
- (a) APU CONT
- S 863-039
- (15) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
- (a) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 863-040
- (16) Remove the DO-NOT-OPERATE tag from the APU control switch.
- S 863-041
- (17) Motor the APU for 30 seconds to fill all of the oil tubes (AMM 49-11-00/201).
- S 613-042
- (18) Make sure the oil level is at the top of the oil fill port.
- S 863-043
- (19) Do this task: APU Start and Operation (AMM 49-11-00/201).
- (a) Make sure the APU operates correctly.
- (b) Operate the APU for five minutes.
- (c) Examine the APU for leakage.
- S 863-044
- (20) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

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S 683-059

- (21) Do these steps to drain the oil from the gearbox:
- (a) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.
  - (b) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

**WARNING:** DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS. OIL CAN PUT STAINS ON YOUR CLOTHING.

- (c) Put the container below the drain plug on the bottom of the gearbox.
  - (d) Loosen the oil fill cap.
  - (e) Remove the drain plug on the bottom of the gearbox to drain the APU oil into the container.
    - 1) Make sure all of the oil drains from the gearbox.
  - (f) Install the drain plug in the bottom of the gearbox.
    - 1) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).
    - 2) Install a lockwire on the drain plug.
  - (g) Fill the APU oil (AMM 12-13-04/301).
- G. Put the Airplane Back to Its Usual Condition.

S 083-049

- (1) Remove the oil pressure gage from the test port.
- (a) Install the plug and a lockwire in the test port.

S 863-054

- (2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in the aft equipment center:
- (a) APU CONT

S 863-055

- (3) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:
- (a) 11B34, APU MN BAT CONT or APU ALTN CONT

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- S 863-056
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch.
- S 863-061
- (5) Do this task: APU Start and Operation (AMM 49-11-00/201).
- (a) Make sure the APU operates correctly.
  - (b) Operate the APU for three to five minutes.
  - (c) Examine the APU for leakage.
- S 863-062
- (6) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 613-063
- (7) Stop for five minutes.
- S 213-060
- (8) Do a check of the oil level.
- (a) Remove the oil fill cap.
  - (b) Make sure the oil level is at the top of the fill port.
  - (c) Install the oil fill cap.
- S 413-053
- (9) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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APU AND GENERATOR LUBRICATION SYSTEM – INSPECTION/CHECK

1. General

- A. This procedure contains a task to do a check of the APU oil quantity.  
This task is done in the flight compartment of the airplane.

TASK 49-27-00-206-001

2. APU Oil Quantity Check

A. References

- (1) AMM 12-13-04/301, APU – Servicing (Oil Replenishing)  
(2) AMM 24-22-00/201, Control

B. Procedure

S 866-002

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

S 216-003

- (2) Examine the APU oil quantity:
- (a) Make sure the six EICAS circuit breakers on the P11 panel are closed.
  - (b) Push the PERF/APU switch on the Maintenance Control Panel for the EICAS.
  - (c) Read the APU oil quantity shown on the EICAS display.
  - (d) If the oil quantity is low, do the servicing for the APU oil reservoir (AMM 12-13-04/301).

S 866-004

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

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OIL PUMP - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU oil pump.
- B. The oil pump is attached to the gearbox. The fuel control unit is attached to the oil pump. You must remove the fuel control unit to remove the oil pump.
- C. You can get access to the fuel control unit and the oil pump through the APU access doors.

TASK 49-27-01-004-001

2. Oil Pump Removal (Fig. 401)

- A. References
  - (1) AMM 49-31-01/401, Fuel Control Unit
- B. Equipment
  - (1) Container - Oil Resistant, 1 Gallon (4 Liters)
- C. Access
  - (1) Location Zones
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right

D. Procedure

S 024-045

- (1) Do this task: Fuel Control Unit Removal (AMM 49-31-01/401).

S 024-042

**CAUTION:** IF YOU REMOVE THE OIL PUMP BECAUSE OF A BROKEN SHAFT, MAKE SURE YOU EXAMINE THE OTHER OIL SYSTEM COMPONENTS. A BROKEN SHAFT IS USUALLY CAUSED BY METAL PARTICLES CAUGHT IN THE PUMP GEARS. IT IS POSSIBLE THAT THE METAL PARTICLES CAME FROM A DIFFERENT DEFECTIVE COMPONENT. YOU MUST REPLACE THE DEFECTIVE COMPONENT BEFORE YOU INSTALL THE NEW OR SERVICEABLE OIL PUMP. DAMAGE TO THE NEW OR SERVICEABLE OIL PUMP CAN OCCUR.

- (2) Do these steps to remove the oil pump (19):
  - (a) Put the container below the oil pump.

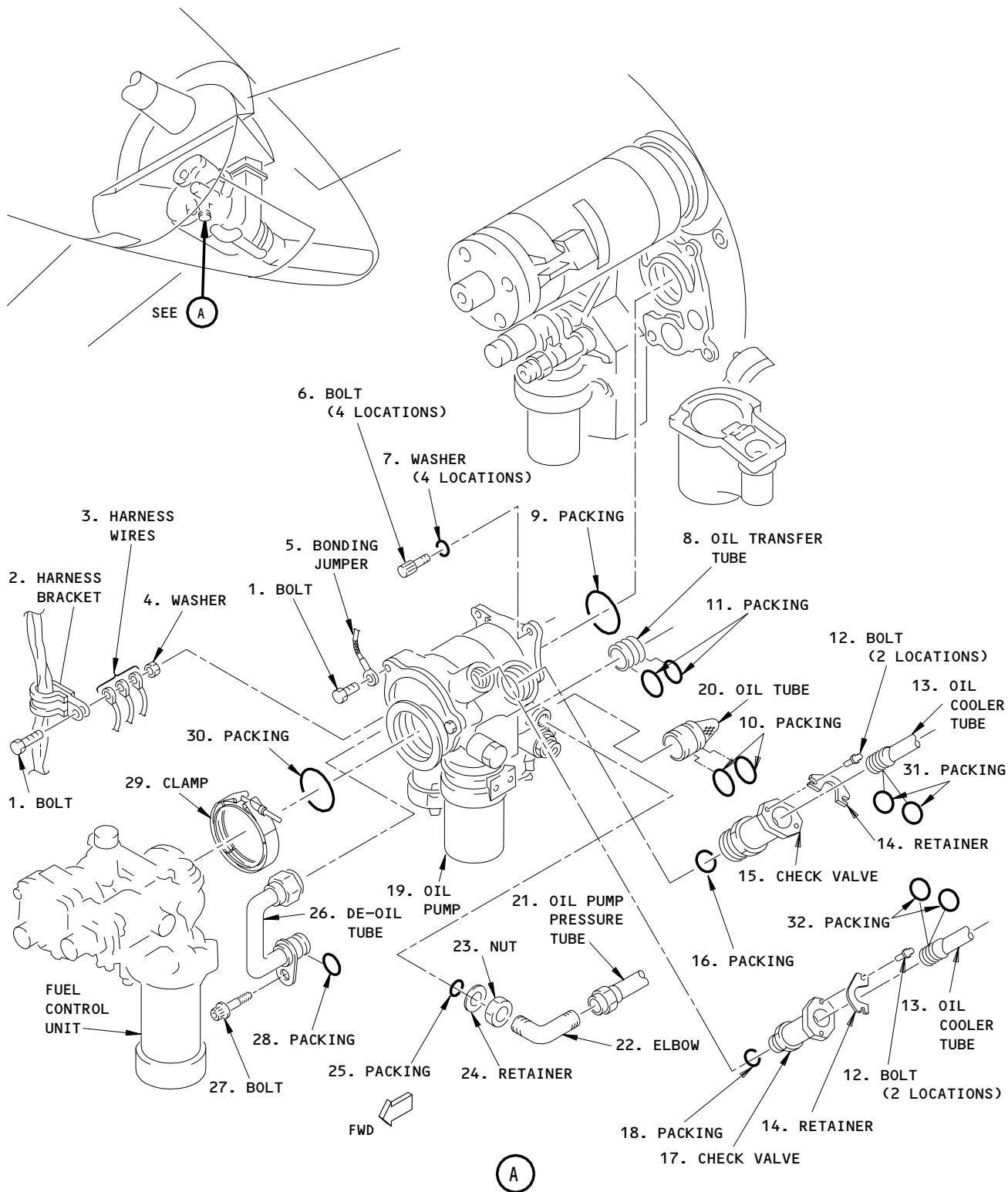
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Oil Pump Installation  
Figure 401

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**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (b) Disconnect the mid-bearing scavenge tube from the bottom of the oil pump (19).
- (c) Remove the four bolts (12) and two retainers (14) that attach the two oil cooler tubes (13) to the two check valves (15), (17).
- (d) Disconnect the two oil cooler tubes (13) from the two check valves (15), (17).
- (e) Remove the two packings (31) and two packings (32) from the two oil cooler tubes (13).
  - 1) Discard the two packings (31) and two packings (32).
- (f) Remove the two check valves (15), (17) and the two packings (16), (18) from the oil pump (19).
  - 1) Discard the two packings (16), (18).
- (g) Disconnect the oil pump pressure tube (21) from the elbow (22).
- (h) Remove the elbow (22), nut (23), retainer (24) and packing (25).
  - 1) Discard the packing (25).
- (i) Do these steps to remove the de-oil tube (26) from the de-oil solenoid valve and oil pump (19):
  - 1) Remove the bolt (27) that attaches the de-oil tube (26) to the oil pump (19).
  - 2) Remove the de-oil tube (26) from the de-oil solenoid valve.
  - 3) Remove and discard the packing (28).
- (j) Remove the bolt (1), disconnect the bonding jumper (5) from the oil pump (19) and re-install the bolt (1).
- (k) Remove the bolt (1) and washer (4) that attach the harness bracket (2) and three harness wires (3) to the oil pump (19).
- (l) Remove the four bolts (6) and four washers (7) that attach the oil pump (19) to the APU.
- (m) Remove the oil pump (19) and packing (9) from the APU.
  - 1) Discard the packing (9).
- (n) Remove the two oil transfer tubes (8), (20).
  - 1) Remove and discard the four packings (10), (11) from the two oil transfer tubes (8), (20).

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- (o) Install protective caps on the two oil cooler tubes (13).
- (p) Remove the container.

TASK 49-27-01-404-014

3. Oil Pump Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-31-01/401, Fuel Control Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	Packing	49-27-01	01	200
	10	Packing			195
	11	Packing			189
	16	Packing			350
	18	Packing			340
	19	Oil Pump			145
	25	Packing			49-21-51
	28	Packing	49-27-08	01	85
	30	Packing	49-31-01	01	62
	31	Packing	49-27-01	01	365
	32	Packing	49-27-01	01	365

D. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

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E. Procedure

S 424-043

- (1) Do these steps to install the oil pump (19):
  - (a) Lubricate the four new packings (10), (11) with a light coat of lubricant or oil.
  - (b) Install the four packings (10), (11) on the two oil transfer tubes (8), (20).
  - (c) Install the two oil transfer tubes (8), (20) in the APU gearbox.
  - (d) Lubricate the new packing (9) with a light coat of lubricant or oil.
  - (e) Install the packing (9) on the oil pump (19).
  - (f) Attach the oil pump (19) to the APU gearbox with the four bolts (6) and four washers (7).
    - 1) Tighten the four bolts (6) to 120-125 inch-pounds (13.6-14.1 newton-meters).
  - (g) Attach the harness bracket (2) and three harness wires (3) to the oil pump (19) with the bolt (1) and washer (4).
  - (h) Remove the bolt (1) from the oil pump (19), attach the bonding jumper (5) and re-install the bolt (1).
    - 1) Tighten the two bolts (1) to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (i) Remove the protective caps from the two oil cooler tubes (13).
  - (j) Do these steps to connect the de-oil tube (26) to the de-oil solenoid valve and oil pump (19):
    - 1) Lubricate the new packing (28) with a light coat of lubricant or oil.
    - 2) Install the packing (28) on the de-oil tube (26).
    - 3) Connect the de-oil tube (26) to the de-oil solenoid valve and oil pump (19).
    - 4) Install the bolt (27) that attaches the de-oil tube (26) to the oil pump (19).
  - (k) Do these steps to connect the oil pump pressure tube (21) to the oil pump (19):
    - 1) Lubricate the new packing (25) with a light coat of lubricant or oil.

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- 2) Install the packing (25) on the oil pump (19).
  - 3) Install the elbow (22) on the oil pump (19) with the nut (23) and retainer (24).
  - 4) Connect the oil pump pressure tube (21) to the elbow (22).
- (l) Do these steps to install the two check valves (15), (17) on the oil pump (19):
- 1) Lubricate the two new packings (16), (18) with a light coat of lubricant or oil.
  - 2) Install the two packings (16), (18) on the two check valves (15), (17).
  - 3) Install the two check valves (15), (17) on the oil pump (19).
  - 4) Tighten the two check valves (15), (17) to 300-460 inch-pounds (33.9-52.0 newton-meters).
- (m) Do these steps to connect the two oil cooler tubes (13) to the two check valves (15), (17):
- 1) Lubricate the two new packings (31) and two new packings (32) with a light coat of lubricant or oil.
  - 2) Install the two packings (31) on the oil cooler tube (13).
  - 3) Install the two packings (32) on the oil cooler tube (13).
  - 4) Connect the two oil cooler tubes (13) to the two check valves (15), (17) with the two retainers (14) and four bolts (12).
  - 5) Tighten the four bolts (12) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (n) Connect the mid-bearing scavenge tube to the bottom of the oil pump (19).

S 424-046

- (2) Do this task: Fuel Control Unit Installation (AMM 49-31-01/401).

S 794-034

- (3) Do a leakage check of the oil pump installation:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil pump for leakage.
  - (c) Do this task: APU Shutdown Procedures (AMM 49-11-00/201).
  - (d) If you found oil leakage, repair the cause of it.

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GENERATOR SCAVENGE OIL PUMP – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the generator scavenge oil pump. During this procedure, the generator scavenge oil pump is referred to as the oil pump.
- B. The oil pump is on the gearbox behind the generator. You must remove the generator to remove the oil pump.
- C. You can get access to the oil pump through the APU access doors.

TASK 49-27-02-004-001

2. Generator Scavenge Oil Pump Removal (Fig. 401)

A. References

- (1) AMM 24-21-01/401, APU Generator

B. Access

(1) Location Zones

- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right

C. Procedure

S 024-023

- (1) Do this task: Remove the APU Generator (AMM 24-21-01/401).

S 024-020

- (2) Do this steps to remove the oil pump (4):
  - (a) Remove the three bolts (5) and three washers (1) that attach the oil pump (4) to the gearbox.
  - (b) Remove the oil pump (4) and two packings (2), (3) from the gearbox.
    - 1) Discard the packings (2), (3).

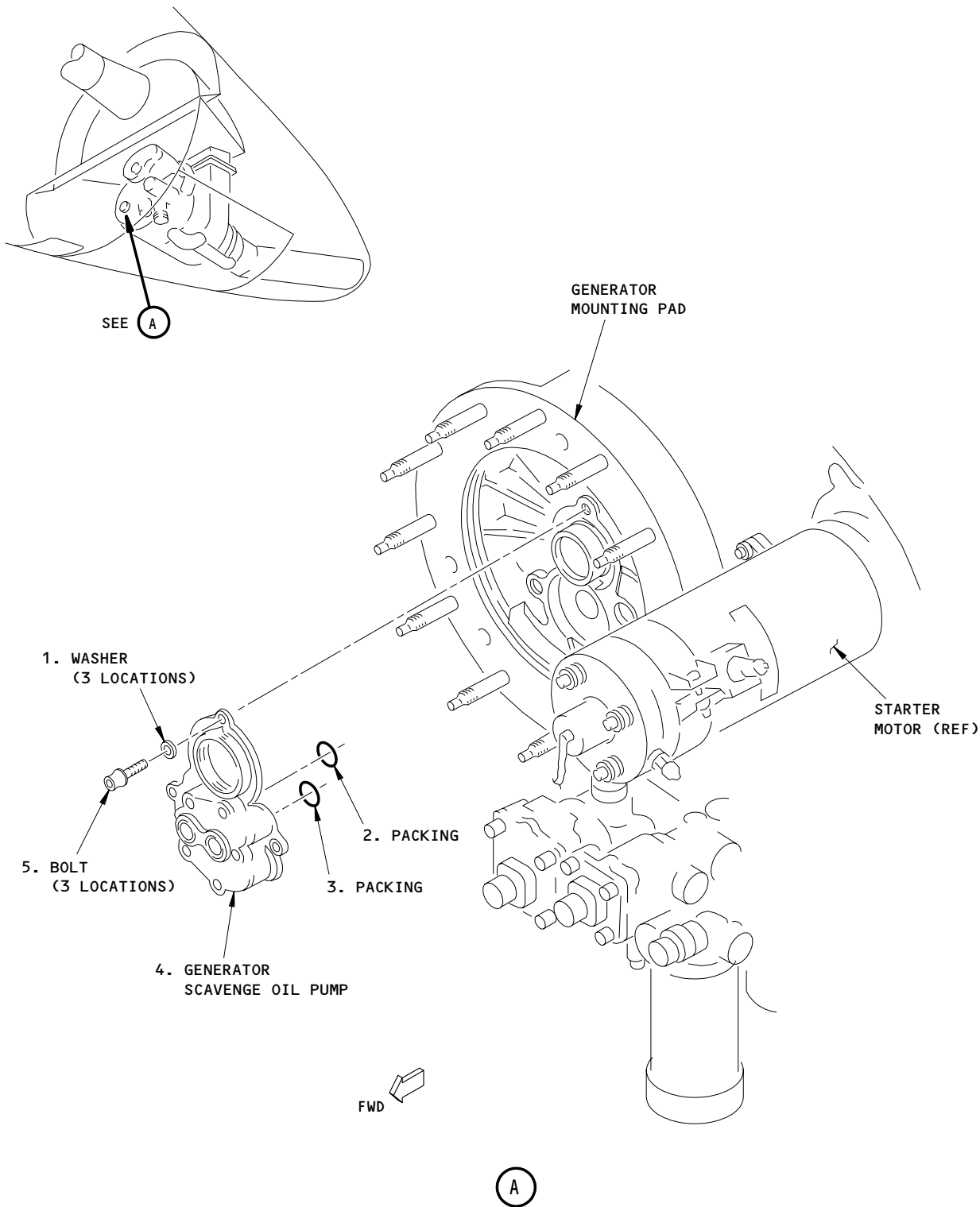
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Generator Scavenge Oil Pump Installation  
Figure 401

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TASK 49-27-02-404-009

3. Generator Scavenge Oil Pump Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 24-21-01/401, APU Generator
- (3) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing	49-27-02	01	25
	3	Packing			20
	4	Generator Scavenge Oil Pump			5

D. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

E. Procedure

S 424-021

- (1) Do these steps to install the oil pump (4):
  - (a) Lubricate the two new packings (2), (3) with a light coat of lubricant or oil.
  - (b) Install the two packings (2), (3) on the oil pump (4).

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- (c) Attach the oil pump (4) to the gearbox with the three washers (1) and three bolts (5).
  - 1) Tighten the three bolts (5) to 50 inch-pounds (5.7 newton-meters).

S 424-024

- (2) Do this task: Install the APU Generator (AMM 24-21-01/401).

S 794-016

- (3) Do these steps to examine the oil pump for oil leakage:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the APU generator for oil leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found oil leakage, repair the cause of it.

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OIL PRESSURE AND GENERATOR SCAVENGE FILTER ELEMENTS – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
- (1) Oil Pressure and Generator Scavenge Filter Elements Removal
  - (2) Oil Pressure and Generator Scavenge Filter Elements Installation
  - (3) Oil Pressure and Generator Scavenge Filter Elements Inspection
  - (4) Filter Element Differential Pressure Indicators Inspection.
- B. You can get access to the filter elements and the differential pressure indicators through the APU access doors.

TASK 49-27-03-002-001

2. Oil Pressure and Generator Scavenge Filter Elements Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.

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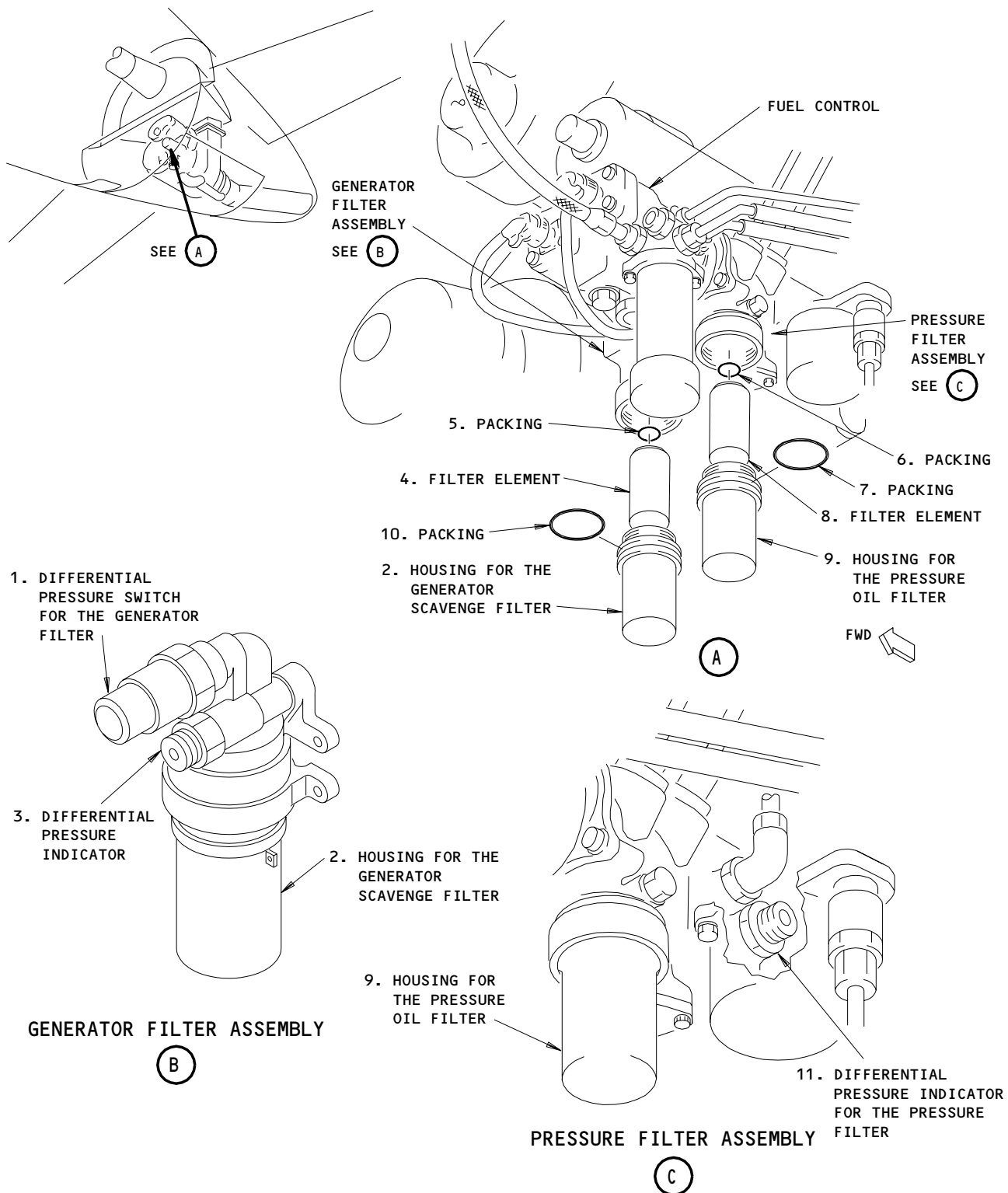
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Oil Pressure and Scavenge Filter Elements Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-033

- (4) Remove the filter elements:
  - (a) Remove the lockwire from the scavenge filter housing (2) and the pressure filter housing (9).

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

- (b) Remove the scavenge filter housing (2) and the pressure filter housing (9).
- (c) Remove the packings (7 and 10) from the scavenge filter housing (2) and the pressure filter housing (9).
  - 1) Discard the packings (7 and 10).
- (d) Remove the filter elements (4 and 8) and the packings (5 and 6) from the scavenge filter housing (2) and the pressure filter housing (9).
- (e) Do the inspection of the two filter elements (4), (8). To inspect them, do this task: Oil Pressure and Generator Scavenge Filter Elements Inspection (AMM 49-27-03/201).

**NOTE:** This will give you an indication of the condition of the generator.

- 1) Discard the packings (5 and 6) and the filter elements (4 and 8).

TASK 49-27-03-402-008

- 3. Oil Pressure and Generator Scavenge Filter Elements Installation (Fig. 201)
  - A. Consumable Materials
    - (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

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(2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	4	Filter Element	49-27-03	01	30
	5	Packing			35
	6	Packing			65
	7	Packing			55
	8	Filter Element			60
	10	Packing			25

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-034

- (1) Install the filter elements:
  - (a) Lubricate the new packings (5 and 6) with a light coat of lubricant or oil.
  - (b) Install the packings (5 and 6) on the filter elements (4 and 8).
  - (c) Momentarily put the filter elements (4 and 8) in a container of oil.
  - (d) Install the filter elements (4 and 8) in the scavenge filter housing (2) and the pressure filter housing (9).
  - (e) Lubricate the new packings (7 and 10) with a light coat of lubricant or oil.

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- (f) Install the packings (7 and 10) on the pressure filter housing (9) and the scavenge filter housing (2).
- (g) Install the scavenge filter housing (2) and the pressure filter housing (9) and tighten with your hands.
- (h) Install lockwires on the scavenge filter housing (2) and the pressure filter housing (9).

S 742-015

- (2) Do the self-test for the APU system (AMM 49-61-05/201).

S 862-016

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-018

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-019

- (5) Do a leakage test for the filter element installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the filter element housings for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 412-022

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

TASK 49-27-03-202-023

4. Oil Pressure and Generator Scavenge Filter Elements Inspection

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-11-01/401, Auxiliary Power Unit
- (3) AMM 49-27-00/301, APU and Generator Lubrication System Servicing (Oil Change)

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B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 022-044

- (1) If the two filter elements are installed, do this task: Oil Pressure and Generator Scavenge Filter Elements Removal (AMM 49-27-03/201).

S 212-024

- (2) Visually examine the filter element housings for nicks, dents, and cracks.

S 212-025

- (3) Do the visual inspection of the filter elements:
- (a) Examine the filter elements for metal particles or other unwanted materials that give an indication of internal engine damage.
  - (b) If you found metal particles or other unwanted materials, do these steps:
    - 1) Install the two new filter elements. To install them, do this task: Oil Pressure and Generator Scavenge Filter Elements Installation (AMM 49-27-03/201).
    - 2) Change the APU oil (AMM 49-27-00/301).
    - 3) Start and operate the APU (AMM 49-11-00/201).
    - 4) After the APU operates for 15 minutes, do a shutdown of the APU (AMM 49-11-00/201).
    - 5) Do the steps to examine the filter elements again.
  - (c) If you find more metal particles or unwanted materials, replace the APU (AMM 49-11-01/401).

S 422-045

- (4) Install the two filter elements. To install them, do this task: Oil Pressure and Generator Scavenge Filter Elements Installation (AMM 49-27-03/201).

TASK 49-27-03-202-032

5. Filter Element Differential Pressure Indicator Inspection (Fig. 201)

A. References

- (1) AMM 49-27-07/401, Oil Filter Differential Pressure Indicator

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- (2) AMM 49-27-16/401, Generator Oil Filter Differential Pressure Indicator
- (3) SSM 49-27-01
- (4) WDM 49-14-11

B. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

C. Procedure

S 862-037

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-038

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-039

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches for the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

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S 212-028

- (4) Do the visual inspection of the differential pressure indicators:
- (a) Look at the differential pressure indicator (3) on the generator filter assembly.
- 1) If the indicator (3) is pushed out, do an inspection of the generator scavenge filter element (4). To inspect it, do this task: Oil Pressure and Generator Scavenge Filter Elements Inspection (AMM 49-27-03/201).
- NOTE: This is an indication that the differential pressure is more than the limit and the generator scavenge filter element has blockage.
- 2) If the generator scavenge filter element (4) has blockage, replace it. To replace it, do these tasks: Oil Pressure and Generator Scavenge Filter Elements Removal and Oil Pressure and Generator Scavenge Filter Elements Installation (AMM 49-27-03/201).
  - 3) If the generator scavenge filter element (4) does not have blockage, push the differential pressure indicator (3) in to set it.
  - 4) If this is a continuous problem with this indicator, replace the differential pressure indicator (3) (AMM 49-27-16/401).
- (b) Look at the differential pressure indicator (11) on the oil filter assembly.
- 1) If the indicator (11) is pushed out, do an inspection of the oil pressure filter element (8). To inspect it, do this task: Oil Pressure and Generator Scavenge Filter Elements Inspection (AMM 49-27-03/201).
  - 2) If the oil pressure filter element (8) has blockage, replace it. To replace it, do these tasks: Oil Pressure and Generator Scavenge Filter Elements Removal and Oil Pressure and Generator Scavenge Filter Elements Installation (AMM 49-27-03/201).
  - 3) If the oil pressure filter element (8) does not have blockage, push the differential pressure indicator (11) in to set it.
  - 4) If this is a continuous problem with this indicator, replace the differential pressure indicator (11) (AMM 49-27-07/401).

S 412-040

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-041

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-042

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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MAGNETIC CHIP DETECTOR AND DRAIN PLUG – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) Magnetic Chip Detector Removal
  - (2) Magnetic Chip Detector Installation
  - (3) Oil Reservoir Drain Plug Removal
  - (4) Oil Reservoir Drain Plug Installation
  - (5) Magnetic Chip Detector Inspection.
- B. The drain plug for the oil reservoir is on the bottom of the gearbox. There are four magnetic chip detectors to examine the condition of the oil. A gearbox chip detector is installed in the drain plug. The generator scavenge chip detector is on the lower, right side of the gearbox. The turbine bearing chip detector is on the right side of the APU next to the oil temperature sensor and the low oil pressure switch. The compressor bearing chip detector is on the scavenge tube to the left of the generator scavenge oil filter.

TASK 49-27-04-002-001

2. Magnetic Chip Detector Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

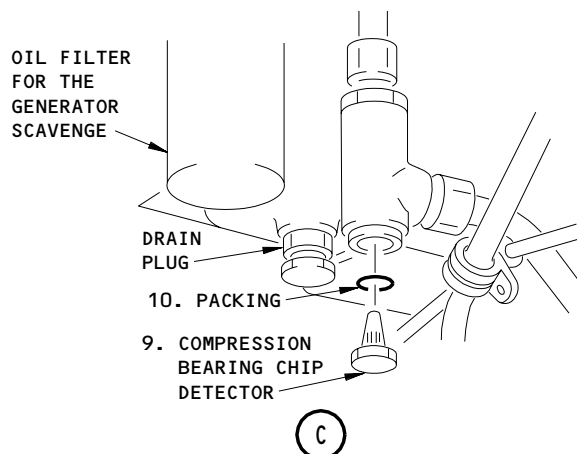
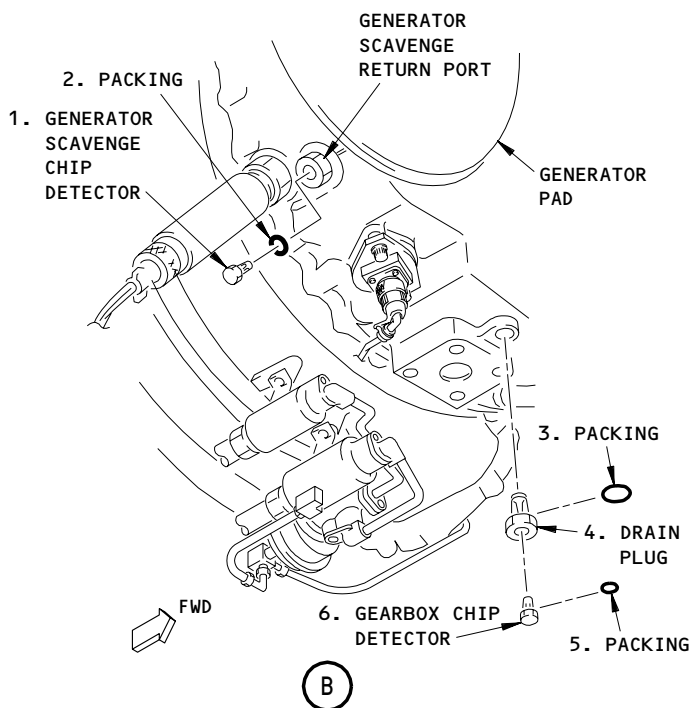
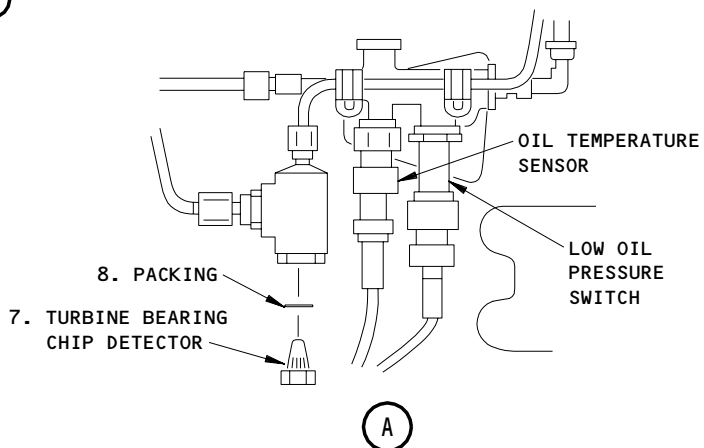
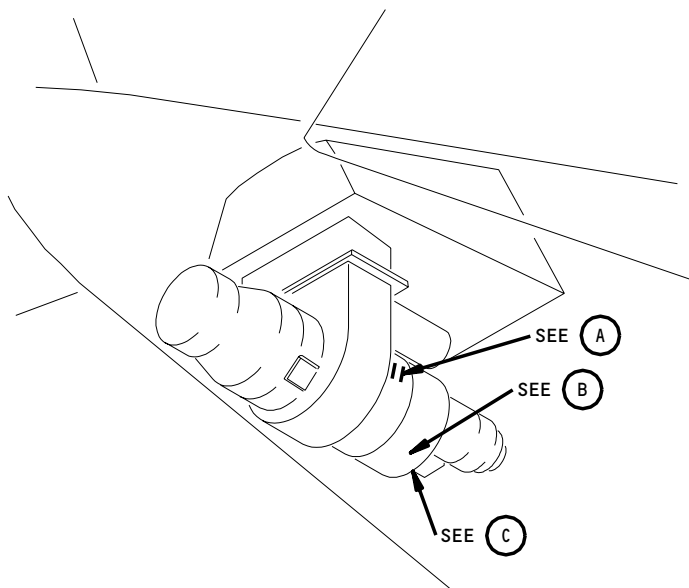
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Magnetic Chip Detector and Drain Plug Installation  
Figure 201

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S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 022-038

- (4) Remove the gearbox chip detector:

**NOTE:** It is not necessary to drain the oil when you examine the magnetic chip detector. The drain plug has a valve that closes when the chip detector is removed.

- (a) Remove the gearbox chip detector (6) from the drain plug (4).
- (b) Remove and discard the packing (5) from the gearbox chip detector (6).

S 022-039

- (5) Remove the generator scavenge chip detector:
- (a) Remove the generator scavenge chip detector (1) from the gearbox.
  - (b) Remove and discard the packing (2) from the scavenge chip detector (1).

S 022-041

- (6) Remove the turbine bearing chip detector:
- (a) Remove the turbine bearing chip detector (7) from the drain plug adjacent to the oil temperature sensor.
  - (b) Remove and discard the packing (8) from the bearing chip detector (7).

S 022-043

- (7) Remove the compressor bearing chip detector:
- (a) Remove the compressor bearing chip detector (9) from the drain plug adjacent to the oil filter for the generator scavenge.

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- (b) Remove and discard the packing (10) from the compressor bearing chip detector (9).

TASK 49-27-04-402-008

3. Magnetic Chip Detector Installation (Fig. 201)

A. References

- (1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or  
(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Generator Scavenge Chip Detector	49-27-04	01	80
	2	Packing			85
	5	Packing			10
	6	Gearbox Chip Detector			5
	7	Turbine Bearing Chip Detector			45
	8	Packing			50
	9	Compressor Bearing Chip Detector			45
	10	Packing			50

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 422-045

- (1) Install the gearbox chip detector:  
(a) Lubricate the new packing (5) with a light coat of lubricant or oil.

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- (b) Install the packing (5) on the gearbox chip detector (6).
- (c) Install the gearbox chip detector (6) in the drain plug (4).
- (d) Turn the gearbox chip detector (6) until the lockpins engage.

S 422-046

- (2) Install the chip detector for the generator scavenge:
  - (a) Lubricate the new packing (2) with a light coat of lubricant or oil.
  - (b) Install the packing (2) on the scavenge chip detector (1).
  - (c) Install the scavenge chip detector (1) in the drain plug adjacent to the oil temperature switch.
  - (d) Turn the scavenge chip detector (1) until the lockpins engage.

S 422-048

- (3) Install the chip detector for the turbine bearing:
  - (a) Lubricate the new packing (8) with a light coat of lubricant or oil.
  - (b) Install the packing (8) on the bearing chip detector (7).
  - (c) Install the bearing chip detector (7) in the drain plug adjacent to the oil temperature sensor.
  - (d) Turn the bearing chip detector (7) until the lockpins engage.

S 422-050

- (4) Install the chip detector for the compressor bearing:
  - (a) Lubricate the new packing (10) with a light coat of lubricant or oil.
  - (b) Install the packing (10) on the bearing chip detector (9).
  - (c) Install the bearing chip detector (9) in the drain plug adjacent to the oil filter for the generator scavenge.
  - (d) Turn the bearing chip detector (9) until the lockpins engage.

S 412-012

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-013

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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S 862-037

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-27-04-002-015

4. Oil Reservoir Drain Plug Removal (Fig. 201)

A. Standard Tools and Equipment

- (1) Container - 2 U.S. Gallons (8 Liters) capacity, for oil

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-016

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-017

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-019

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.

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- (d) Open the right access door.
- (e) Engage the support rods for the APU access door.

S 022-020

- (4) Remove the drain plug for the oil reservoir:
  - (a) Put the container below the drain plug (4) on the bottom of the gearbox.
  - (b) Remove the drain plug (4) from the gearbox.
  - (c) Remove and discard the packing (3) from the drain plug (4).

S 682-023

- (5) Let the oil drain from the gearbox into the container.

TASK 49-27-04-402-024

5. Oil Reservoir Drain Plug Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	3	Packing	49-27-04	01	25
	4	Drain Plug			5

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-27-00/301, APU and Generator Lubrication System Servicing (Oil Change)

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 422-025

- (1) Install the reservoir drain plug:
  - (a) Lubricate the new packing (3) with a light coat of lubricant or oil.
  - (b) Install the packing (3) on the drain plug (4).
  - (c) Install the drain plug (4) in the gearbox.
  - (d) Tighten the drain plug (4) to 25-35 inch-pounds (2.8-4.0 newton-meters).
  - (e) Install the lockwire on the drain plug.

S 612-028

- (2) Fill the APU oil reservoir (AMM 49-27-00/301).

S 412-029

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-030

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-032

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-27-04-202-033

6. Magnetic Chip Detector Inspection

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) B00075 Solvent - P-D-680, Stoddard Type 1
- (2) G01043 Cloth - Lint-free

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C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right

E. Procedure

S 012-034

- (1) Remove the magnetic chip detector as specified in the paragraph for the Magnetic Chip Detector Removal.

S 212-035

- (2) Visually examine the magnetic chip detector for metal particles.

**NOTE:** Metal particles on the chip detector give an indication of internal damage to the engine. If you see metal particles on the chip detector, examine the engine to find the cause and the quantity of the damage.

- (a) A small quantity of particles that are not silver are permitted.  
(b) Metal flakes or large pieces of metal are not permitted.  
(c) If you find a medium quantity of particles on the detector that are not silver, do these steps:

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- 1) Clean the magnetic chip detector with the lintfree cloth made moist with the solvent.  
2) Dry the chip detector with the compressed air.  
3) Install the magnetic chip detector as specified in the paragraph for the Magnetic Chip Detector Installation.  
4) Start and operate the APU (AMM 49-11-00/201).  
5) After 15 minutes, do a shutdown of the APU (AMM 49-11-00/201).  
6) Examine the chip detector again.  
7) More particles on the magnetic chip detector after the APU operation are not permitted.

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- (d) A large quantity of particles on the chip detector is not permitted.

NOTE: A large quantity of particles gives an indication of internal damage to the APU.

S 412-036

- (3) Install the magnetic chip detector as specified in the paragraph for the Magnetic Chip Detector Installation.

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OIL PRESSURE REGULATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the oil pressure regulator.
- B. The oil pressure regulator is a valve that is installed on the oil pump. The oil pump is on the bottom left side of the APU engine, forward of the air inlet plenum.
- C. You can get access to the oil pressure regulator through the APU access doors.

TASK 49-27-05-004-001

2. Oil Pressure Regulator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

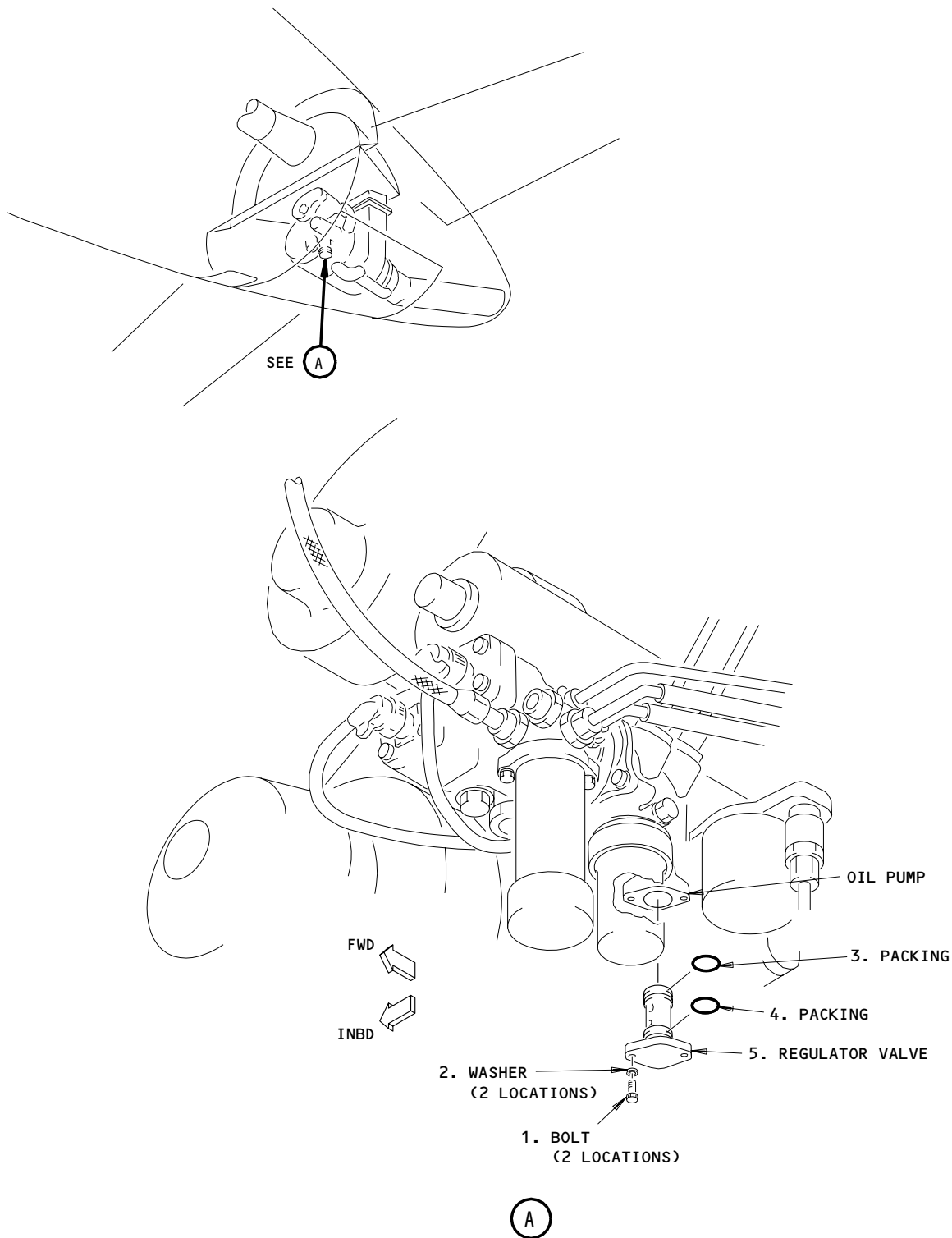
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Oil Pressure Regulator Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-021

- (4) Remove the oil pressure regulator:

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE AIRPLANE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (a) Remove the bolts (1) and the washers (2) that attach the regulator valve (5) to the oil pump.
- (b) Remove the regulator valve (5) from the oil pump.
- (c) Remove and discard the packings (3 and 4) from the regulator valve (5).

TASK 49-27-05-404-008

3. Oil Pressure Regulator Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Packing	49-27-05	01	115
	4	Packing			120
	5	Regulator Valve			100

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

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D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-022

- (1) Install the oil pressure regulator:
- (a) Lubricate the new packings (3 and 4) with a light coat of lubricant or oil.
  - (b) Install the packings (3 and 4) on the regulator valve (5).
  - (c) Install the regulator valve (5) in the oil pump with the bolts (1) and the washers (2).
    - 1) Tighten the bolts (1) to 25-30 inch-pounds (2.8-3.4 newton-meters).

S 864-011

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-013

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-014

- (4) Do a leakage test for the installation of the oil pressure regulator:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil pump for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-017

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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APU GENERATOR SEAL PLATE – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these three tasks:
  - (1) APU Generator Seal Plate Removal
  - (2) APU Generator Seal Plate Installation
  - (3) APU Generator Seal Plate Inspection.
- B. The generator seal plate is an aluminum plate that has a shape like a ring. The plate is installed between the APU generator and the gearbox. The plate makes a tight seal around the oil ports and the outer edge of the plate to prevent oil leakage.
- C. You must remove the APU generator to get access to the generator seal plate. The generator is on right side of the APU gearbox. You can get access to the generator and the seal plate through the APU access doors.

TASK 49-27-06-002-001

2. APU Generator Seal Plate Removal (Fig. 201)

- A. References
  - (1) AMM 24-21-01/401, APU Generator
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

C. Procedure

S 012-009

- (1) Remove the APU generator (AMM 24-21-01/401).

S 022-015

- (2) Remove the generator seal plate:
  - (a) Remove the screws (5) that attach the generator seal plate (4) to the APU.

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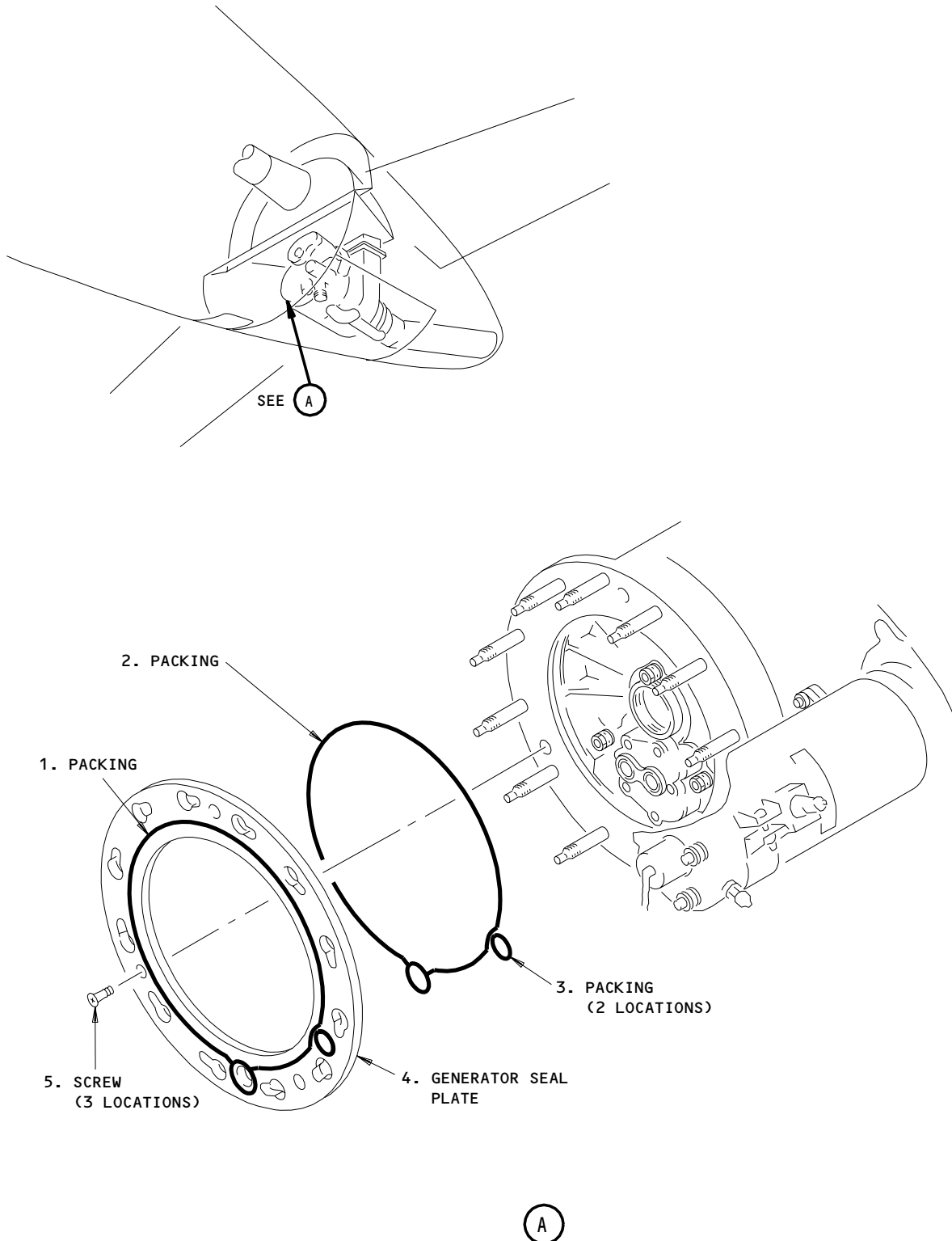
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APU Generator Seal Plate Installation  
Figure 201

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(b) Remove the generator seal plate (4) from the APU.

S 212-016

(3) Do the inspection of the generator seal plate (Ref par. 4).

TASK 49-27-06-402-017

3. APU Generator Seal Plate Installation (Fig. 201)

A. Consumable Materials

- (1) D00287 Lubricant - Acryloid HF866 or  
D00000 Lubricant - Royco HF825

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Packing	24-22-03	01	70
	2	Packing			75
	3	Packing			80
	4	Seal Plate			60

C. References

- (1) AMM 24-21-01/401, APU Generator

D. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 316 APU Compartment - Right
- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 422-018

- (1) Install the generator seal plate:
  - (a) Install the packings (1, 2, and 3), lubricated with the lubricant, on the generator seal plate (4).
  - (b) Install the generator seal plate (4) on the APU with the screws (5).

S 412-019

- (2) Install the APU generator (AMM 24-21-01/401).

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TASK 49-27-06-202-021

4. APU Generator Seal Plate Inspection (Fig. 201)

A. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

B. Procedure

S 012-004

- (1) If it is installed, remove the generator seal plate (Ref par. 2).

S 212-005

- (2) Do the visual inspection of the seal plate:
- (a) Examine the seal plate (4) to make sure it does not have cracks or other defects.
  - (b) Examine the packings (1, 2, and 3) to make sure they have no deterioration or damage.
  - (c) Replace the packings (1, 2, or 3) if you find damage.

S 412-022

- (3) Install the generator seal plate (Ref par. 3).

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OIL FILTER DIFFERENTIAL PRESSURE INDICATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure indicator for the oil filter.
- B. The differential pressure indicator is pushed out when the pressure difference across the oil filter is 20 ±5 psid. This is an indication that there is blockage in the oil filter.
- C. The differential pressure indicator is installed on the oil pump. The oil pump is on the left side of the APU gearbox, below the starter motor. You can get access to the differential pressure indicator through the APU access doors.

TASK 49-27-07-004-001

2. Oil Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-CLOSE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

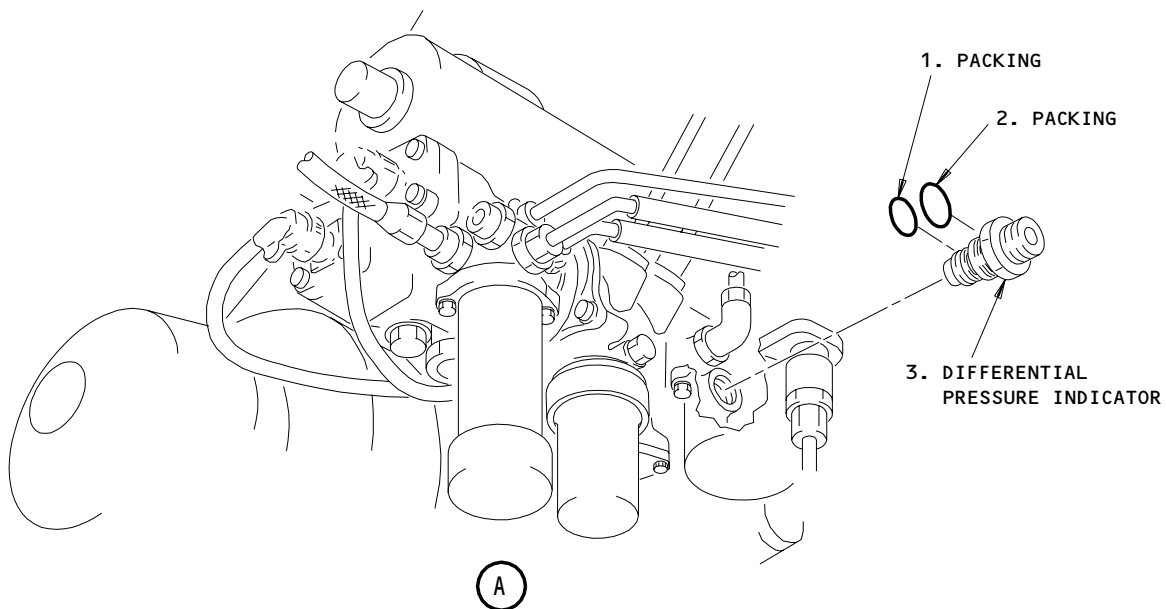
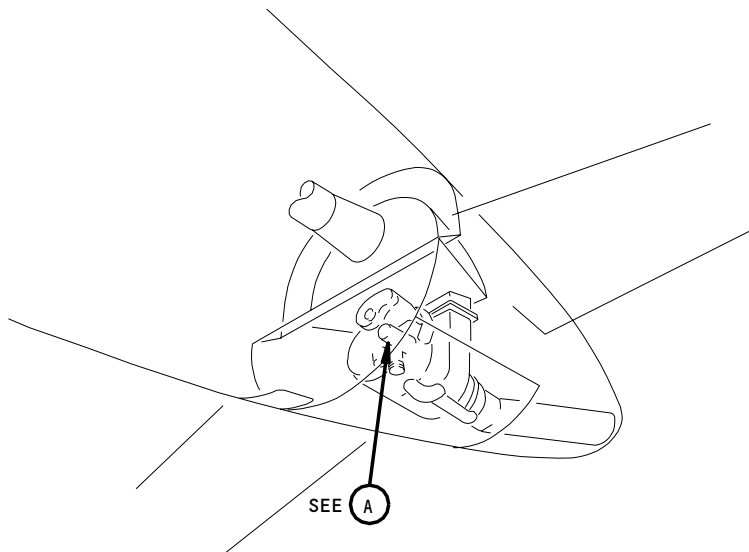
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Differential Pressure Indicator Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-019

- (4) Remove the differential pressure indicator:

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

- (a) Remove the differential pressure indicator (3) from the side of the oil pump.
- (b) Remove and discard the packings (1 and 2) from the differential pressure indicator (3).

TASK 49-27-07-404-008

3. Oil Filter Differential Pressure Indicator Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-27-07	01	15
	2	Packing			20
	3	Differential Pressure Indicator			10

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-020

- (1) Install the differential pressure indicator:
  - (a) Lubricate the new packings (1 and 2) with a light coat of lubricant or oil.
  - (b) Install the packings (1 and 2) on the differential pressure indicator (3).
  - (c) Install the differential pressure indicator (3) in the oil pump.
    - 1) Tighten the indicator (3) to 105-115 inch-pounds (11.9-12.9 newton-meters).
  - (d) Install a lockwire on the indicator (3).

S 864-012

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-014

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-015

- (4) Do a leakage test for the installation of the differential pressure indicator:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil pump for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-018

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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DE-OIL SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the de-oil solenoid valve.
- B. The de-oil solenoid valve is on the APU gearbox between the starter motor and the electrical generator. You can get access to the valve through the APU access doors.

TASK 49-27-08-004-026

2. De-Oil Solenoid Valve Removal (Fig. 401)

A. References

- (1) SSM 49-27-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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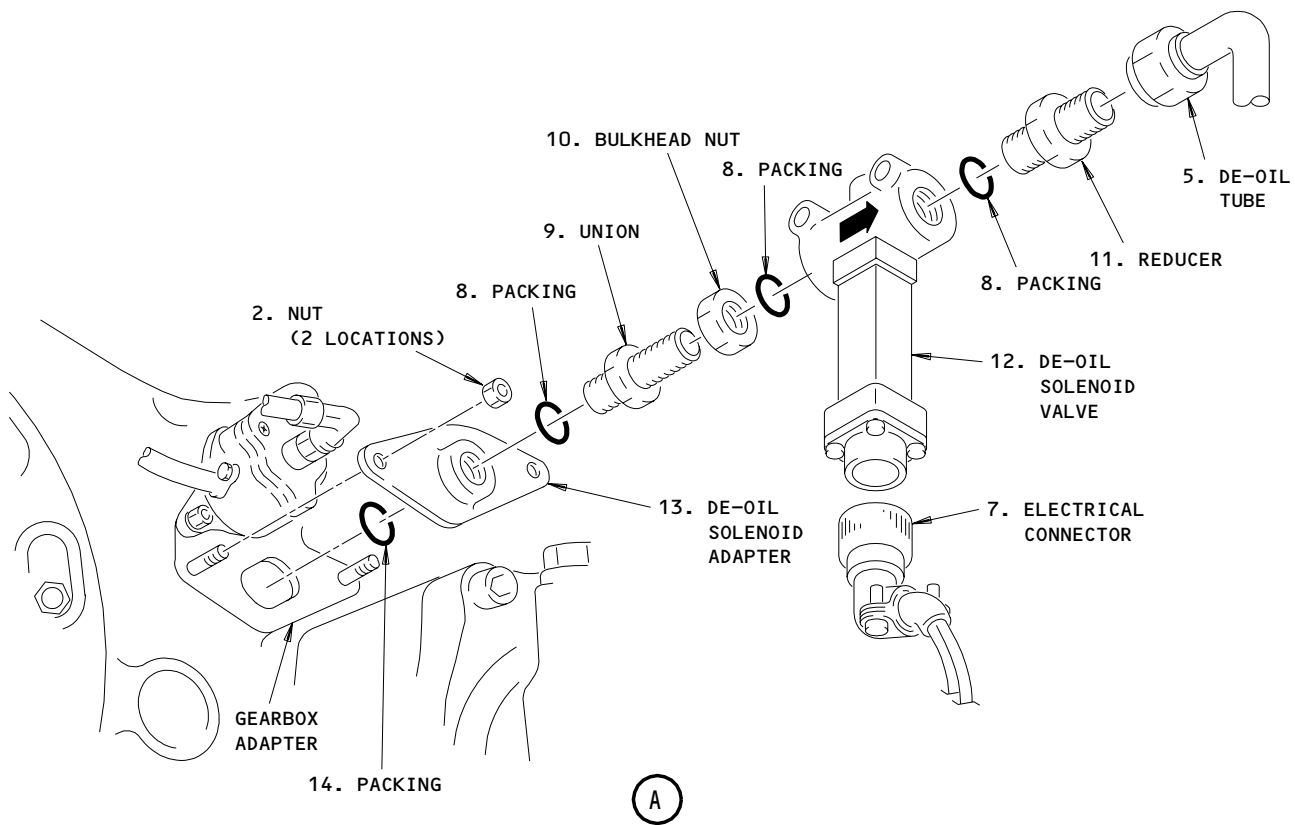
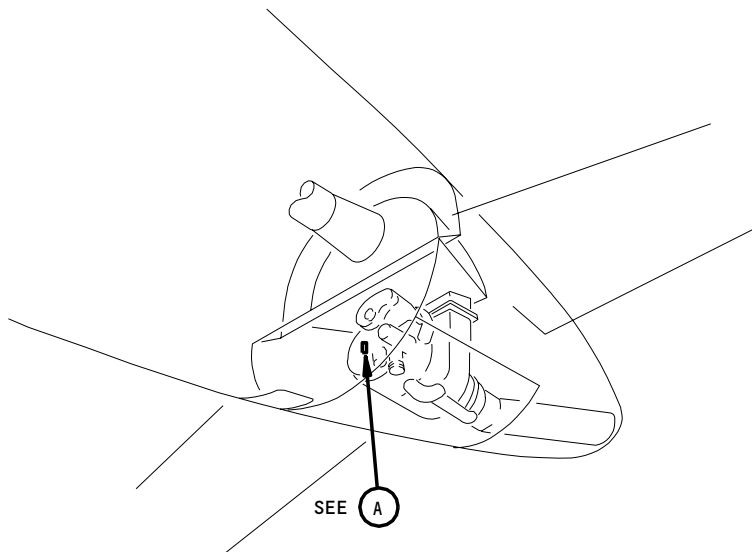
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De-oil Solenoid Valve Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 034-027

- (4) Disconnect the de-oil solenoid valve:
  - (a) Disconnect the electrical connector (7) from the de-oil solenoid valve (12).

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (b) Disconnect the de-oil tube (5) from the de-oil solenoid valve (12).

S 024-028

- (5) Remove the de-oil solenoid valve:
  - (a) Remove the nuts (2) that attach the de-oil solenoid valve (12) to the gearbox adapter.
  - (b) Remove the de-oil solenoid valve (12) from the gearbox adapter.
    - 1) Remove and discard the packing (14) from the gearbox adapter.
  - (c) Remove the reducer (11) and the packing (8) from the de-oil solenoid valve (12).
    - 1) Discard the packing (8).
  - (d) Loosen the bulkhead nut (10).
  - (e) Remove the de-oil solenoid valve (12) and the packing (8) from the union (9).
    - 1) Discard the packing (8).
  - (f) Remove the union (9) and the packing (8) from the de-oil solenoid adapter (13).
    - 1) Discard the packing (8).

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TASK 49-27-08-404-011

3. De-Oil Solenoid Valve Installation (Fig. 401)

A. Equipment

- (1) Series P-500K Gage - Pressure, 0-200 psig, 1/4 inch NPT connection, U.S. Gauge  
900 Clymer Avenue, Sellersville, PA 18960 (or equivalent gage)
- (2) MS9954-07 Plug (Part of De-oil Modification Kit PN 3876101-2: Honeywell SB 49-5438 or commercially available)
- (3) Thermometer, range between -20°F to 100°F (-29°C to 38°C) (commercially available)

B. Consumable Materials

- (1) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) - BMS15-5
- (2) D00508 Fluid, Hydraulic - MIL-H-5606
- (3) G01671 Ice, Dry - BB-C-104
- (4) Packing - S9413-557 (Part of De-oil Modification Kit PN 3876101-2: Honeywell SB 49-5438 or commercially available)
- (5) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (6) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	8	Packing	49-27-08	01	35
	12	De-oil Solenoid Valve			10
	14	Packing			50

D. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-27-14/401, Low Oil Temperature Switch

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- (4) AMM 49-61-05/201, APU Control Unit
- (5) SSM 49-27-01
- (6) WDM 49-14-11

E. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

F. Procedure

S 424-029

- (1) Install the de-oil solenoid valve:
  - (a) Lubricate the new packing (8) with a light coat of lubricant or oil.
  - (b) Install the packing (8) and the reducer (11) on the side of the de-oil solenoid valve (12) with the arrow point.
  - (c) Install the packing (8) on the end of the union (9) that attaches to the de-oil solenoid adapter (13).
  - (d) Install the union (9) in the de-oil solenoid adapter (13).
  - (e) Install the bulkhead nut (10) and the packing (8) on the union (9).
  - (f) Install the de-oil solenoid valve (12) on the union (9).

NOTE: Do not tighten the bulkhead nut at this time.

- (g) Lubricate the new packing (14) with a light coat of lubricant or oil.
- (h) Install the packing (14) on the gearbox adapter.
- (i) Attach the solenoid valve assembly to the gearbox adapter with the nuts (2).
  - 1) Tighten the nuts (2) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (j) Tighten the bulkhead nut (10) against the flange of the de-oil solenoid valve (12).

S 434-030

- (2) Connect the de-oil solenoid valve:
  - (a) Connect the electrical connector (7) to the de-oil solenoid valve (12).
  - (b) Connect the de-oil tube (5) to the de-oil solenoid valve (12).

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- S 864-016
- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 734-018
- (4) Do the self-test for the APU system (AMM 49-61-05/201).
- S 864-019
- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 794-020
- (6) Do a leakage test for the installation of the de-oil solenoid valve:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the de-oil solenoid valve for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.
- S 714-034
- (7) Do a performance check of the de-oil solenoid valve:
- (a) If the temperature is less than 21°F (-6°C), do the BITE test for the APU system (AMM 49-61-05/201).
- NOTE:** If the temperature is sufficiently cold, the de-oil solenoid valve operated when the APU started. If the BITE test shows no problems, then the valve operated correctly. If the temperature is not sufficiently cold (more than 21°F (-6°C)), you must do a ground test or do an inflight check of the de-oil solenoid valve.
- (b) If it is necessary, close the left APU access door, 315AL, and right APU access door, 316AR:
    - 1) Disengage the support rods for the APU access doors.
    - 2) Put the support rods in the clips on the inner side of the APU access doors.
    - 3) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
    - 4) Lift the left access door and align it with the right access door.
    - 5) Close and latch the APU access doors.

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- (c) If the temperature is more than 21°F (-6°C), you must do a ground test or do an inflight check of the de-oil solenoid valve:
- 1) Do these steps for a ground test of the de-oil solenoid valve (recommended method):
    - a) Remove the plug from the test port for the lube pump (oil pressure test port).
    - b) Connect the pressure gage to the oil pressure test port.

NOTE: Make sure you can get access to the pressure indications during the APU starting and operation.

- c) Do this task: Low Oil Temperature Switch Removal (AMM 49-27-14/401).
- d) Lubricate the new packing (PN S9413-557) with a light coat of lubricant or oil.
- e) Install the packing on the plug (PN MS9954-07).
- f) Install the plug in the port on the bottom of the APU gearbox.

NOTE: The low oil temperature switch was removed from the port on the bottom of the APU gearbox.

- g) Remove the caps from the low oil temperature switch and electrical connector P25.
- h) Connect the electrical connector P25 to the low oil temperature switch.
- i) Put the dry ice, hydraulic fluid and thermometer in an insulated container with insulated gloves.
- j) Make sure the temperature in the dry ice and hydraulic fluid solution is less than 21°F (-6°C).
- k) With insulated gloves, put the tip end of the low oil temperature switch in the insulated container with the dry ice and hydraulic fluid solution for a minimum of five minutes.

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- l) Make sure the electrical end of the low oil temperature switch and electrical connector P25 do not touch the dry ice and hydraulic fluid solution.
- m) A minimum of three persons is necessary to do the ground test of the de-oil solenoid valve. (1) One person holds the insulated container with the low oil temperature switch, thermometer, and dry ice and hydraulic fluid solution. (2) One person monitors the pressure gage at the start of the APU starting procedure. (3) One person is in the flight compartment for the APU starting procedure.
- n) Do this task: APU Starting and Operation (AMM 49-11-00/201).

NOTE: At the start of the APU starting procedure, make sure you monitor the pressure gage at the oil pressure test port. The oil pressure should be approximately zero during the initial start of the APU, increases slowly or no oil pressure during the APU starting until starter motor cutout at 50% engine speed and increases quickly after the starter motor cutout to 100% speed. The de-oiling system operates correctly when these oil pressure indications occur and the de-oil solenoid valve closes at the starter motor cutout.

- o) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - p) Remove the low oil temperature switch from the insulated container and clean with a cloth.
  - q) Remove the plug and packing from the port on the bottom of the APU gearbox and discard packing.
  - r) Do this task: Low Oil Temperature Switch Installation (AMM 49-27-14/401).
  - s) Remove the pressure gage from the oil pressure test port and install the plug.
  - t) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).
  - u) Make sure there are no problems related to the de-oil solenoid valve.
- 2) Do these steps for an inflight check of the de-oil solenoid valve (alternative method):
- a) After the airplane has been at an altitude of 30,000 feet or higher for one hour or more, start and operate the APU (AMM 49-11-00/201).

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- b) Do a shutdown of the APU (AMM 49-11-00/201).
- c) Do the APU BITE test (AMM 49-61-05/201) on the ground.  
Make sure that there are no problems related to the de-oil solenoid valve.

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OIL COOLER - MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) Oil Cooler Removal
  - (2) Oil Cooler Installation
  - (3) Oil Cooler Inspection
  - (4) Clean the Oil Cooler.
- B. The oil cooler is above the starter motor on the APU gearbox. You can get access to the oil cooler through the APU access doors.

TASK 49-27-09-002-060

2. Oil Cooler Removal (Fig. 201)

A. References

- (1) AMM 49-27-10/401, Oil Cooler Bypass Valve

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-004

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-005

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-007

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

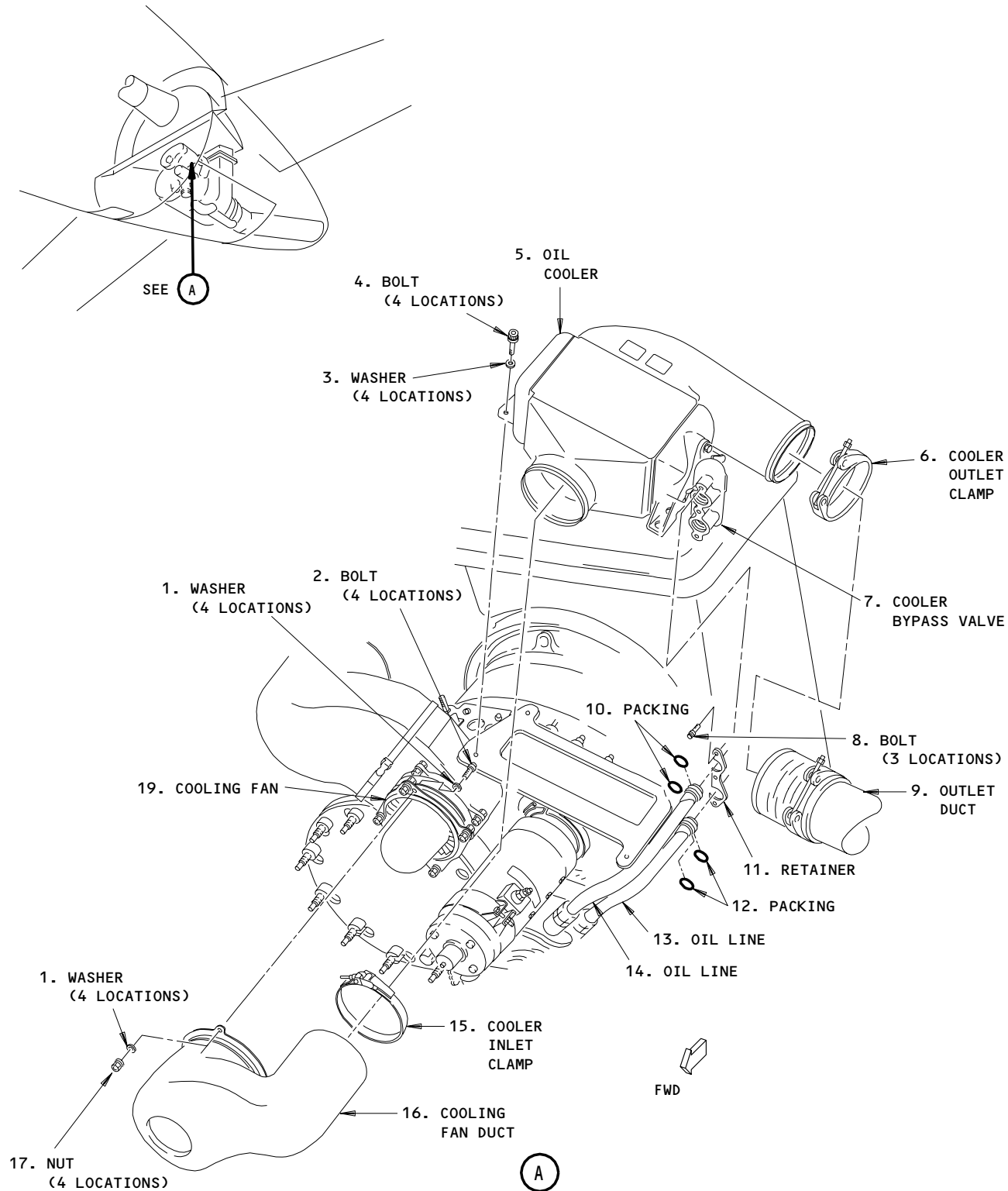
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Oil Cooler Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 032-037

- (4) Remove the inlet and the outlet ducts:
  - (a) Loosen the cooler inlet clamp (15).
  - (b) Remove the nuts (17), the washers (1), and the bolts (2) that attach the cooling fan duct (16) to the cooling fan (19).
  - (c) Remove the cooling fan duct (16) from the APU.
  - (d) Loosen the cooler outlet clamp (6).
  - (e) Disconnect the cooler outlet duct (9) from the oil cooler (5).

S 022-052

- (5) Remove the oil cooler:
  - (a) Remove the bolts (8) and the retainer (11) that attach the oil lines (13 and 14) to the bypass valve (7).
  - (b) Disconnect the oil lines (13 and 14) from the bypass valve (7).
  - (c) Remove and discard the packings (10 and 12) from the oil lines (13 and 14).
  - (d) Remove the bolts (4) and the washers (3) that attach the oil cooler (5) to the APU.
  - (e) Remove the oil cooler (5) from the APU.

S 032-015

- (6) If a new oil cooler is to be installed, remove the cooler bypass valve (7) from the oil cooler (5) (AMM 49-27-10/401).
  - (a) Keep the cooler bypass valve (7) for installation on the new oil cooler.

S 212-036

- (7) If the same oil cooler is to be installed, do the oil cooler inspection (Ref par. 4).

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TASK 49-27-09-402-061

3. Oil Cooler Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	5	Oil Cooler	49-27-09	01	55
	10	Packing	49-27-01	01	330
	12	Packing			365

C. References

- (1) AMM 12-13-04/301, APU-Servicing (Fill the Oil)
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-27-10/401, Oil Cooler Bypass Valve

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 432-017

- (1) If the cooler bypass valve (7) was removed, install it on the oil cooler (5) (AMM 49-27-10/401).

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S 422-053

- (2) Install the oil cooler:
- (a) Attach the oil cooler (5) to the APU bracket with the bolts (4) and the washers (3).
    - 1) Tighten the bolts (4) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (b) Lubricate the new packings (10 and 12) with a light coat of lubricant or oil.
  - (c) Install the packings (10 and 12) on the oil lines (13 and 14).
  - (d) Connect the oil lines (13 and 14) to the bypass valve (7) with the retainer (11) and the bolts (8).

S 432-054

- (3) Install the inlet and the outlet duct:
- (a) Connect the outlet duct (9) to the oil cooler (5).
    - 1) Tighten the cooler outlet clamp (6) to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (b) Put the cooling fan duct (16) in its position on the APU.
    - 1) Tighten the cooler inlet clamp (15) to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (c) Install the bolts (2), the washers (1), and the nuts (17) that attach the cooling fan duct (16) to the cooling fan (19).
    - 1) Tighten the nuts (17) to 40-50 inch-pounds (4.5-5.7 newton-meters).

S 862-023

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-025

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 612-026

- (6) Fill the APU oil reservoir (AMM 12-13-04/301).

S 792-027

- (7) Do a leakage test for the oil cooler installation:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil cooler for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

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- S 612-059  
(8) Make sure the APU oil level is full (AMM 12-13-04/301).

- S 412-031  
(9) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Disengage the support rods for the APU access doors.  
(b) Put the support rods in the clips on the inner side of the APU access doors.  
(c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.  
(d) Lift the left access door and align it with the right access door.  
(e) Close and latch the APU access doors.

TASK 49-27-09-202-038

4. Oil Cooler Inspection

A. General

- (1) You can do this inspection with the oil cooler installed or removed from the APU. If it is necessary to clean the oil cooler, you must remove the oil cooler from the APU.

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

- S 842-055  
(1) If the oil cooler is installed on the APU, do these steps to prepare for the oil cooler inspection:  
(a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-CLOSE tag.  
(b) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
1) P11 Overhead Panel  
a) 11B34, APU MN BAT CONT or APU ALTN CONT  
2) E6 Rack, Aft Equipment Center  
a) APU CONT

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- (c) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - 1) Open the latches on the APU access doors.
  - 2) Open the left access door.
  - 3) Push the right access door up and pull the spring latch aft until the latch disengages.
  - 4) Open the right access door.
  - 5) Engage the support rods for the APU access doors.
- (d) Remove the inlet and the outlet ducts from the oil cooler:
  - 1) Loosen the cooler inlet clamp (15).
  - 2) Remove the nuts (17), the washers (1), and the bolts (2) that attach the cooling fan duct (16) to the cooling fan (19).
  - 3) Remove the cooling fan duct (16).
  - 4) Loosen the cooler outlet clamp (6).
  - 5) Move the outlet duct (9) away from the oil cooler (5).

S 212-056

- (2) Do the visual inspection of the oil cooler:
  - (a) Examine the air ducts in the oil cooler (5) for contamination.
  - (b) If you find contamination, clean the oil cooler (Ref par. 5).
  - (c) Examine the internal and the external sides of the oil cooler (5) for cracks, dents, holes, and defective welds.
    - 1) If it is necessary, replace the oil cooler (5).

S 412-049

- (3) Do this task: Oil Cooler Installation (AMM 49-27-09/201).

**NOTE:** If the oil cooler was not removed from the APU, all of the steps to install the APU are not necessary.

TASK 49-27-09-102-030

5. Clean the Oil Cooler

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) B00722 Solvent - P-D-680, Stoddard Type 1

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C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

D. Procedure

S 012-031

- (1) If it is installed, remove the oil cooler (Ref par. 2).

S 112-057

- (2) Clean the oil cooler:  
(a) Install plugs on the oil cooler ports for protection.

**WARNING:** USE SAFETY GOGGLES WHEN YOU USE THE COMPRESSED AIR. IF YOU DO NOT, AN EYE INJURY CAN OCCUR.

- (b) Use the compressed air at 20 to 30 psig to remove the loose unwanted materials from the oil cooler ducts.

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. USE A SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND EQUIPMENT.

- (c) Use solvent in a spray booth to clean the air ducts of the oil cooler.  
(d) Dry the oil cooler ducts with the compressed air at a pressure of 20 to 30 psig.  
(e) Examine the oil cooler ducts with a strong light to make sure all the unwanted materials are gone.

S 412-058

- (3) Install the oil cooler (Ref par. 3).

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OIL COOLER BYPASS VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the bypass valve on the oil cooler. During this procedure the valve is referred to as the bypass valve.
- B. The bypass valve is installed on the oil cooler. The oil cooler is on the left side of APU, forward of the air inlet plenum and above the starter motor.
- C. You can get access to the bypass valve through the APU access doors.

TASK 49-27-10-004-013

2. Bypass Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-001

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-004

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

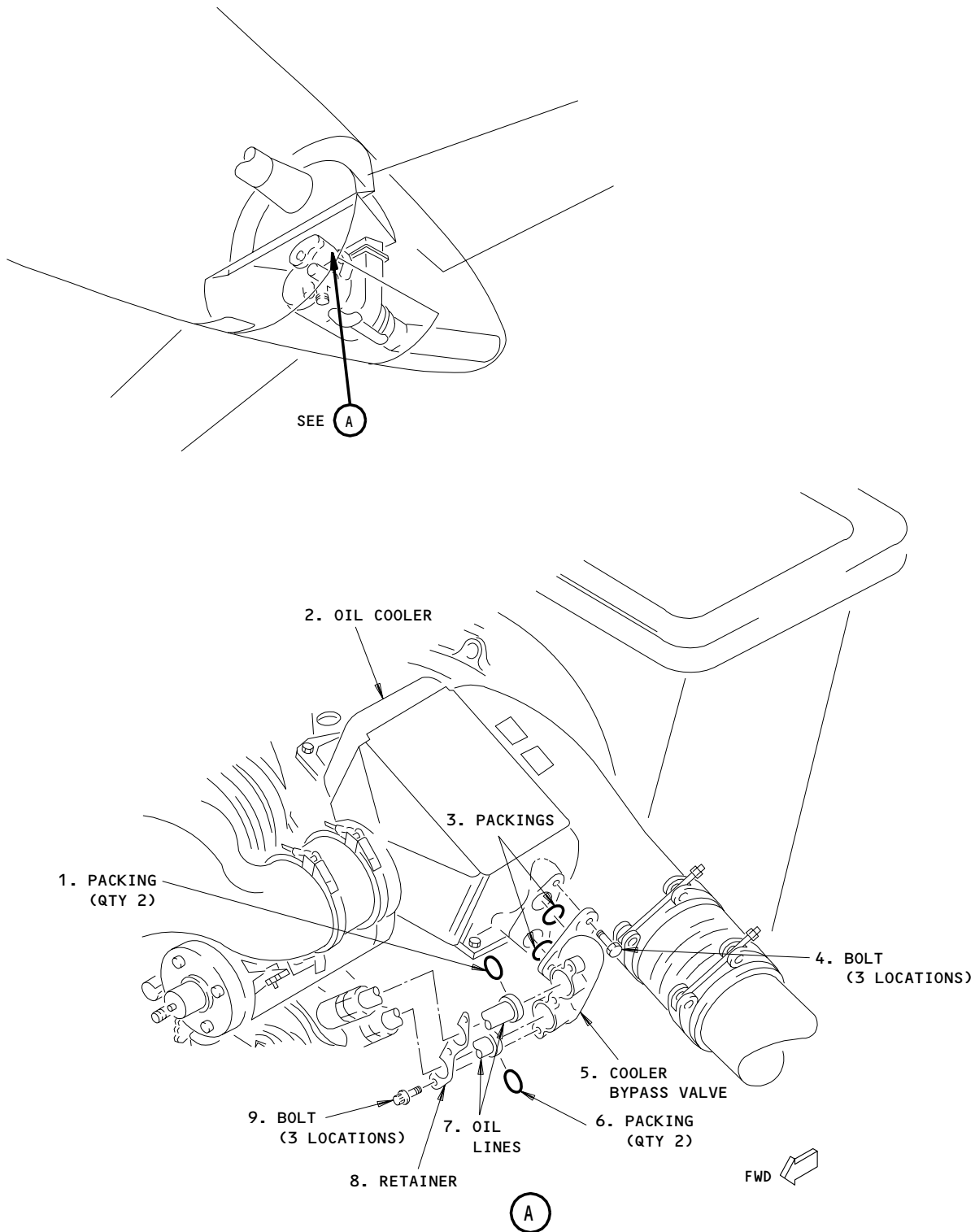
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Oil Cooler Bypass Valve Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-015

- (4) Remove the bypass valve:
  - (a) Remove the bolts (9) and the retainer (8) to disconnect the oil lines (7) from the bypass valve (5).
  - (b) Remove and discard the packings (1 and 6) from the oil lines (7).
  - (c) Remove the bolts (4) to disconnect the bypass valve (5) from the oil cooler (2).
  - (d) Remove and discard the packings (3) from the bypass valve (5).

TASK 49-27-10-404-014

3. Bypass Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-27-10	01	95
	3	Packing			165
	5	Bypass Valve			180
	6	Packing			80

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-016

- (1) Install the bypass valve:
  - (a) Lubricate the new packings (3) with a light coat of lubricant or oil.
  - (b) Install the packings (3) on the bypass valve (5).
  - (c) Attach the bypass valve (5) to the oil cooler (2) with bolts (4).
    - 1) Tighten the bolts (4).
  - (d) Lubricate the new packings (1 and 6) with a light coat of lubricant or oil.
  - (e) Install the packings (1 and 6) on the oil lines (7).
  - (f) Connect the oil lines (7) to the bypass valve (5) with the retainer (8) and the bolts (9).

S 864-025

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-027

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-011

- (4) Do a leakage test for the bypass valve installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the bypass valve for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-031

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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GEARBOX SHUTOFF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the gearbox shutoff valve.
- B. The gearbox shutoff valve is on a bracket which is installed on the right side of the air inlet plenum. You can get access to the valve through the APU access doors.

TASK 49-27-11-004-001

2. Gearbox Shutoff Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

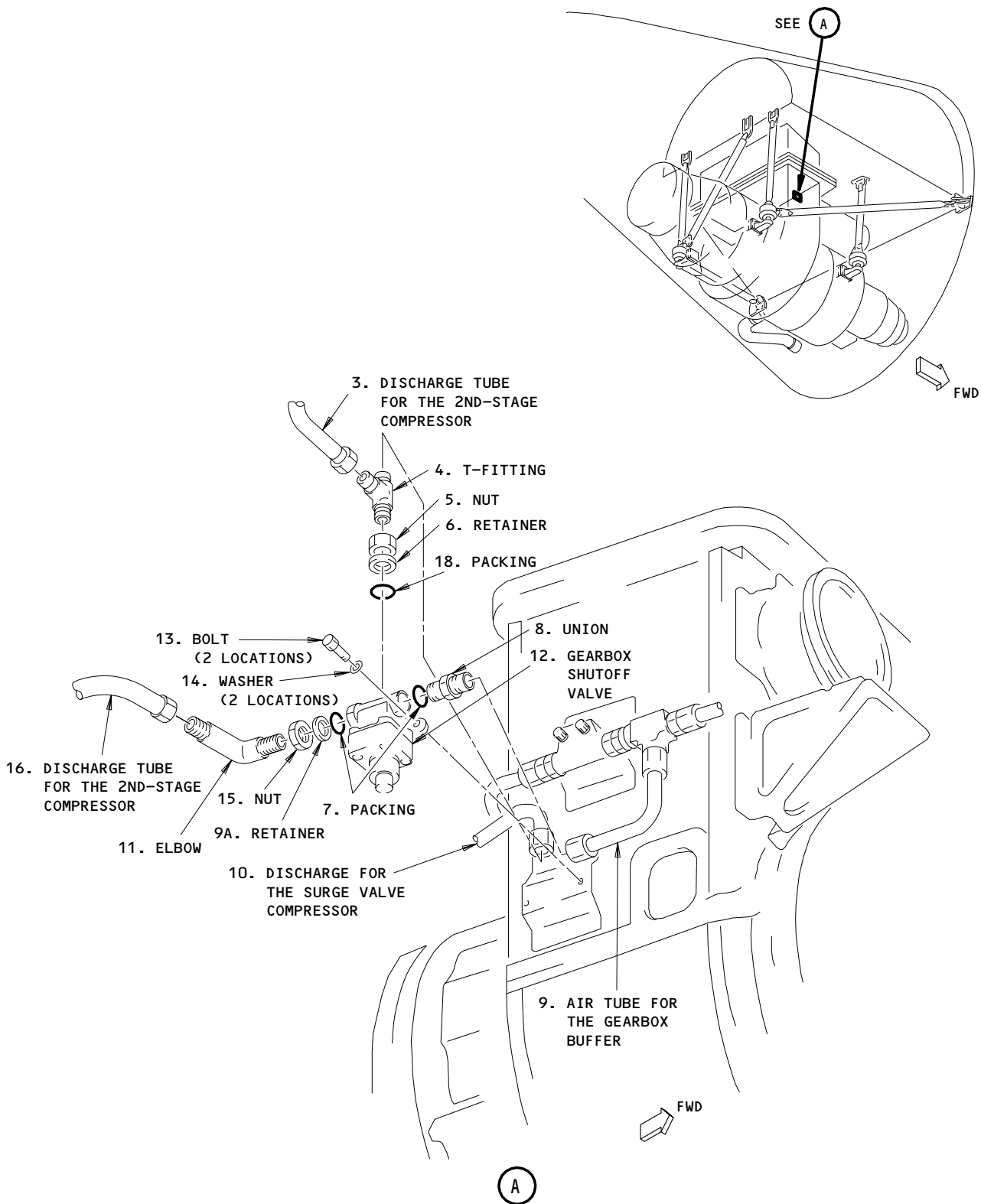
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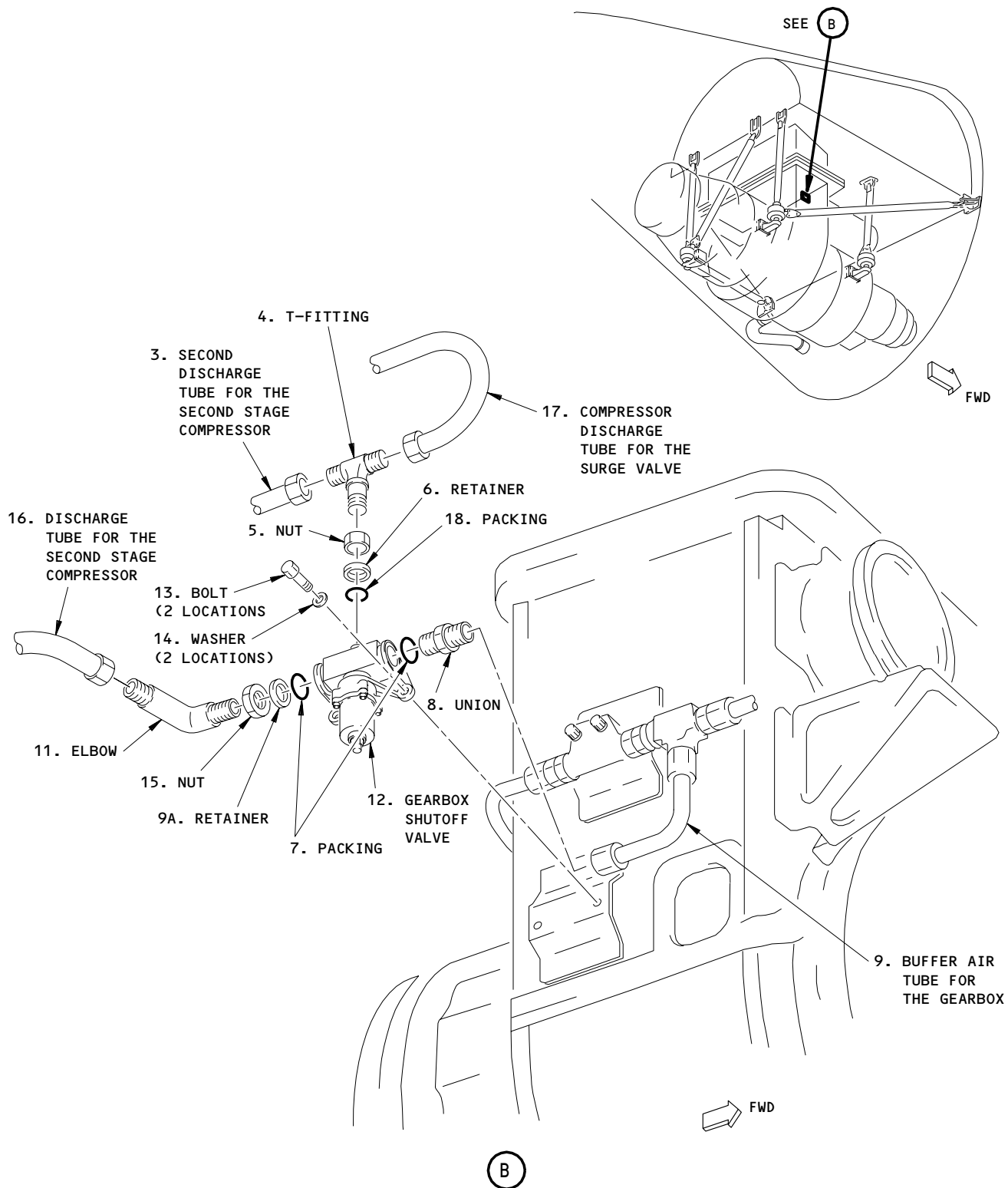
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Gearbox Shutoff Valve Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE SURGE VALVE

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Gearbox Shutoff Valve Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE FIRST STAGE COMPRESSOR

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-022

- (4) Remove the gearbox shutoff valve:
- (a) Disconnect the discharge tube (16) for the second stage compressor:
    - 1) Disconnect the discharge tube (16) from the elbow (11).
    - 2) Remove the elbow (11) the nut (15), the retainer (9A), and the packing (7) from the gearbox shutoff valve (12).
    - 3) Discard the packing (7) and the retainer (9A).
  - (b) Disconnect the discharge tube (3):
    - 1) Disconnect the discharge tube (3) from the T-fitting (4).
    - 2) Disconnect the discharge tube (10) for the surge valve compressor from the T-fitting (4).
    - 3) Loosen the nut (5).
    - 4) Remove the T-fitting (4), the nut (5), the retainer (6), and the packing (7) from the gearbox shutoff valve (12).
    - 5) Discard the packing (7) and the retainer (6).
  - (c) Disconnect the air tube (9) for the gearbox buffer from the union (8).
  - (d) Remove the union (8) and the packing (7) from the gearbox shutoff valve (12).
    - 1) Discard the packing (7).
  - (e) Remove the bolts (13) and the washers (14) to remove the gearbox shutoff valve (12) from the inlet plenum.

TASK 49-27-11-404-019

3. Gearbox Shutoff Valve Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	7	Packing	49-27-11	01	120
	12	Gearbox Shutoff Valve			5
	18	Packing			205

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B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

D. Procedure

S 424-023

(1) Install the gearbox shutoff valve:

- (a) Attach the gearbox shutoff valve (12) to the inlet plenum with the bolts (13) and the washers (14).
- 1) Tighten the bolts (13) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (b) Install a new packing (7) on the union (8).
- (c) Install the union (8) on the gearbox shutoff valve (12).
- (d) Connect the air tube (9) for the gearbox buffer to the union (8).
- (e) Connect the discharge tube (3):
- 1) Install a new packing (7), a new retainer (6), the nut (5), and the T-fitting (4) in the gearbox shutoff valve (12).
- 2) Tighten the nut (5).
- 3) Connect the discharge tube (3) for the second stage compressor to the T-fitting (4).
- 4) Connect the discharge tube (10) for the surge valve compressor to the T-fitting (4).

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- (f) Install the nut (15), a new retainer (9A), and a new packing (7) on the elbow (11).
- (g) Install the elbow (11) on the gearbox shutoff valve (12).

NOTE: Do not tighten the nut at this time.

- (h) Connect the discharge tube (16) for the second stage compressor to the elbow (11).
- (i) Tighten the nut (15) on the elbow (11).

S 864-025

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-027

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-017

- (4) Do a leakage test for the installation of the gearbox shutoff valve:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the gearbox shutoff valve for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-031

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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S 714-033

- (6) Do an inflight check of the gearbox shutoff valve:
- (a) Start and operate the APU (AMM 49-11-00/201) in flight at an altitude of 31,000 feet or higher.
  - (b) Do a shutdown of the APU (AMM 49-11-00/201).
  - (c) Do the APU BITE test (AMM 49-61-05/201) on the ground. Make sure that there are no problems related to the gearbox shutoff valve.

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GEARBOX PRESSURE REGULATOR VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the gearbox pressure regulator valve. During this procedure, the valve is referred to as the regulator valve.
- B. The regulator valve is installed on the APU gearbox above the de-oil solenoid valve. You can get access to the regulator valve through the APU access doors.

TASK 49-27-12-004-001

2. Gearbox Pressure Regulator Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

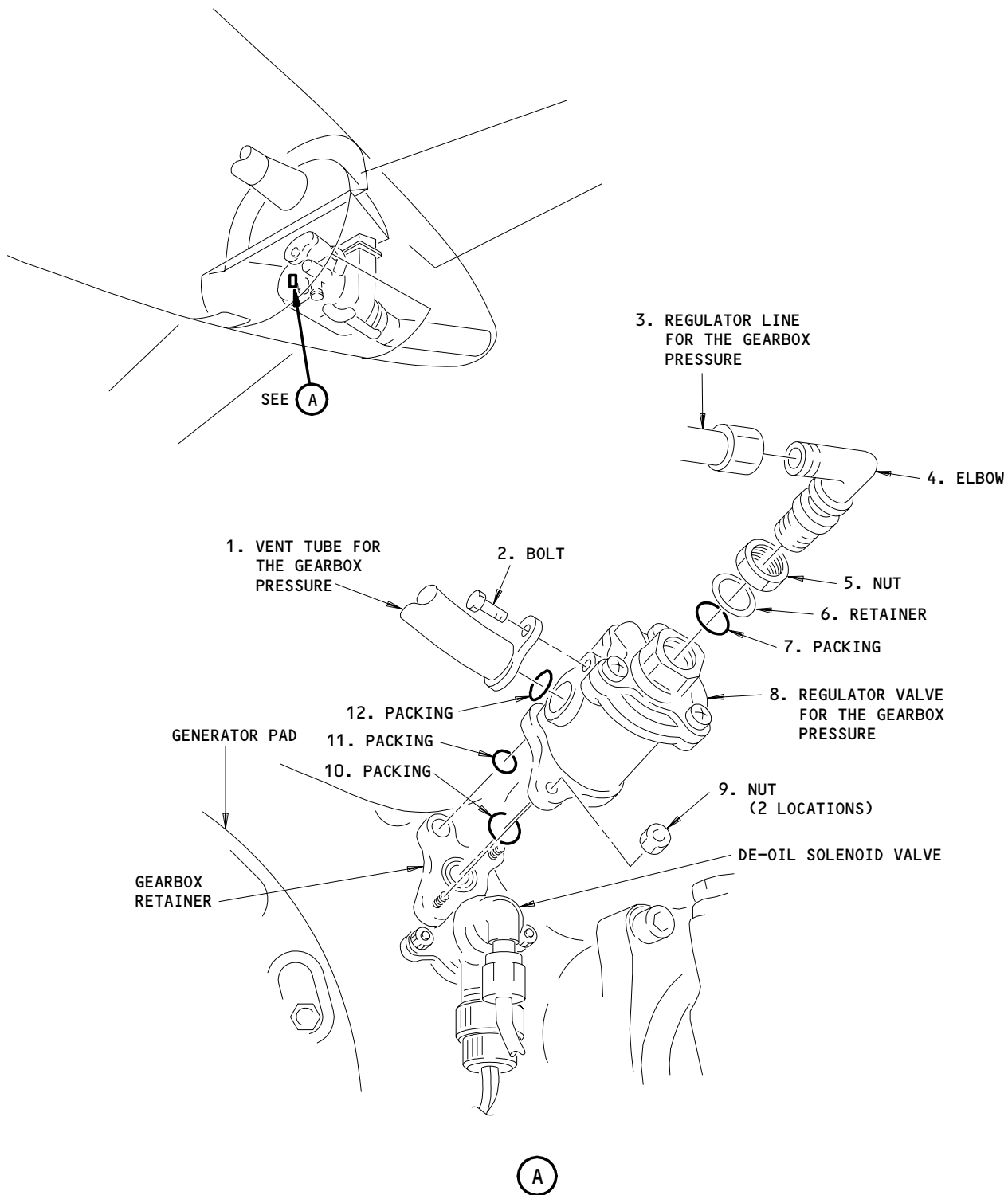
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Gearbox Pressure Regulator Valve Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-036

- (4) Remove the regulator valve:
  - (a) Remove the bolt (2) to remove the vent tube (1) for the gearbox pressure from the regulator valve (8).
  - (b) Discard the packing (12).
  - (c) Disconnect the regulator line (3) for the gearbox pressure from the elbow (4).
  - (d) Loosen the nut (5) on the elbow (4).
  - (e) Remove the elbow (4), the nut (5), the retainer (6), and the packing (7) from the regulator valve (8).
    - 1) Discard the packing (7) and the retainer (6).
  - (f) Remove the nuts (9) that attach the regulator valve (8) to the gearbox.
  - (g) Remove the regulator valve (8) and the packings (10 and 11) from the gearbox.
    - 1) Discard the packings (10 and 11).

TASK 49-27-12-404-011

3. Gearbox Pressure Regulator Valve Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	7	Packing	49-27-12	01	75
	8	Regulator Valve			5
	10	Packing			15
	11	Packing			25
	12	Packing			60

B. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

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C. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-037

(1) Install the regulator valve:

- (a) Lubricate the new packings (10 and 11) with a light coat of lubricant or oil.
- (b) Install the packings (10 and 11) on the regulator valve (8).
- (c) Attach the regulator valve (8) to the gearbox with the nuts (9).
  - 1) Tighten the nuts (9) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (d) Lubricate the new packing (12) with a light coat of lubricant or oil.
- (e) Install a packing (12) on the vent tube (1) for the gearbox pressure.
- (f) Attach the vent tube (1) for the gearbox pressure to the regulator valve (8) with the bolt (2).
  - 1) Tighten the bolt (2) to 100-150 inch-pounds (11.3-17.0 newton-meters).
- (g) Lubricate the new packing (7) with a light coat of lubricant or oil.
- (h) Install the nut (5), a new retainer (6), and packing (7) on the elbow (4).
- (i) Install the elbow (4) on the regulator valve (8).

NOTE: Do not tighten the nut at this time.

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- (j) Connect the regulator line (3) for the gearbox pressure to the elbow (4).
- (k) Tighten the nut (5) on the elbow (4).

S 864-025

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-027

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-034

- (4) Do a leakage test for the regulator valve installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the regulator valve for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-038

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner sides of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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SHUTTLE VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU shuttle valve.
- B. The shuttle valve is on the right side of the air inlet plenum, above the gearbox shutoff valve. You can get access to the shuttle valve through the APU access doors.

TASK 49-27-13-004-018

2. Shuttle Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-004

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-005

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-007

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

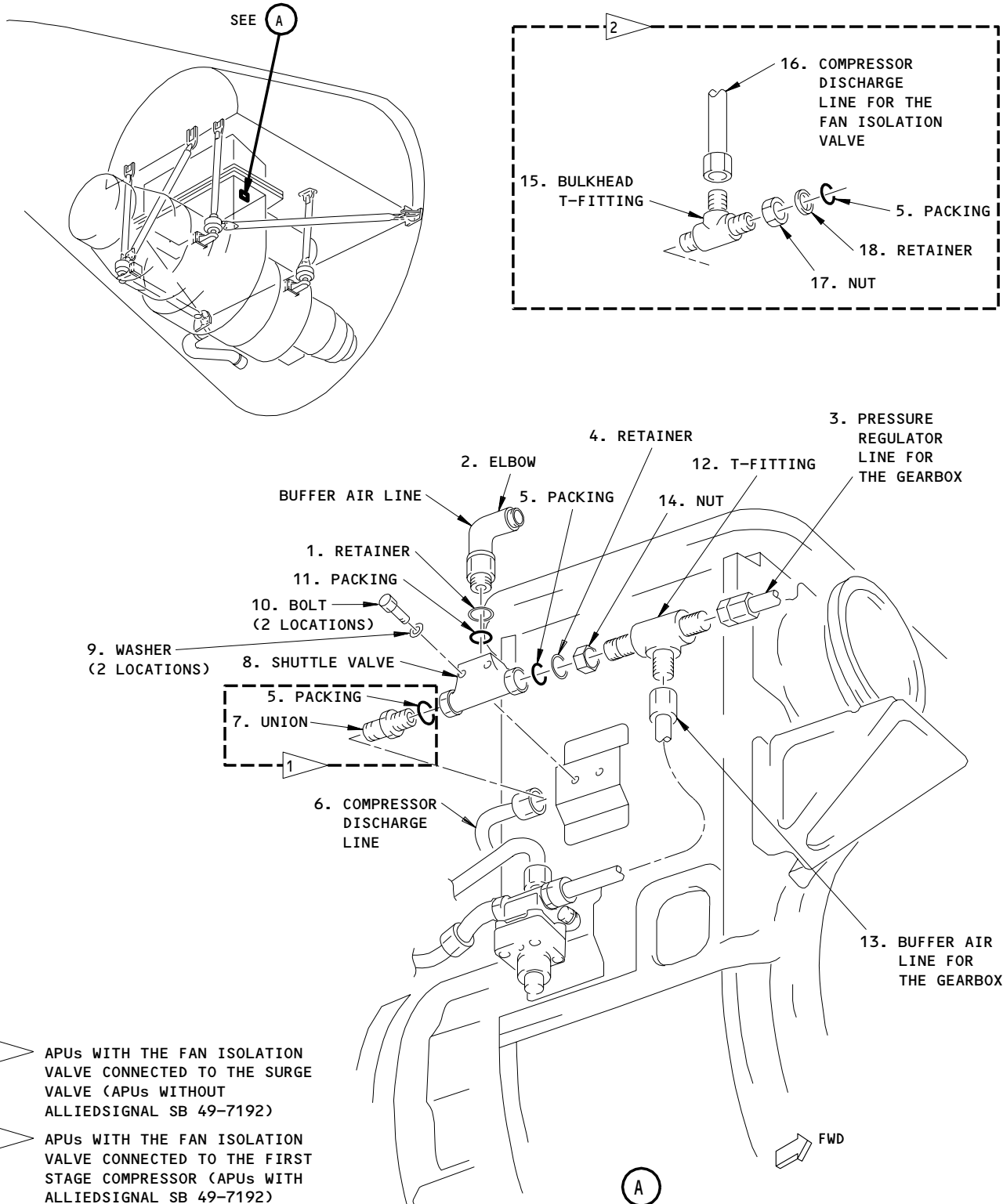
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- 1 APUs WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (APUs WITHOUT ALLIEDSIGNAL SB 49-7192)
- 2 APUs WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (APUs WITH ALLIEDSIGNAL SB 49-7192)

Shuttle Valve Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-020

- (4) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;

Remove the shuttle valve:

- (a) Disconnect the compressor discharge tube (6) from the union (7).
- (b) Remove the union (7) and the packing (5) from the shuttle valve (8).
  - 1) Discard the packing (5).
- (c) Disconnect the buffer air tube from the elbow (2).
- (d) Remove the elbow (2), the retainer (1), and the packing (11) from the shuttle valve (8).
  - 1) Discard the packing (11) and the retainer (1).
- (e) Disconnect the pressure regulator tube for the gearbox (3) from the T-fitting (12).
- (f) Disconnect the buffer air tube for the gearbox (13) from the T-fitting (12).
- (g) Remove the bolts (10) and the washers (9) that attach the shuttle valve (8) to the plenum bracket.
- (h) Remove the shuttle valve (8) and the T-fitting (12) from the APU.
- (i) Disconnect the shuttle valve (8) from the T-fitting (12).
- (j) Remove the packing (5), the retainer (4) and the nut (14) from the T-fitting (12).
  - 1) Discard the packing (5) and the retainer (4).

S 024-033

- (5) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;

Remove the APU shuttle valve:

- (a) Disconnect the compressor discharge tube (6) from the bulkhead T-fitting (15).

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- (b) Disconnect the compressor discharge tube for the fan isolation valve (16) from the bulkhead T-fitting (15).
- (c) Disconnect the buffer air tube from the elbow (2).
- (d) Remove the elbow (2), the retainer (1), and the packing (11) from the shuttle valve (8).  
1) Discard the packing (11) and the retainer (1).
- (e) Disconnect the pressure regulator tube for the gearbox (3) from the T-fitting (12).
- (f) Disconnect the buffer air tube for the gearbox (13) from the T-fitting (12).
- (g) Remove the bolts (10) and the washers (9) that attach the shuttle valve (8) to the APU inlet plenum.
- (h) Remove the shuttle valve (8), T-fitting (12) and bulkhead T-fitting (15) from the APU.
- (i) Disconnect the bulkhead T-fitting (15) from the shuttle valve (8).
- (j) Remove the nut (17), the retainer (18) and the packing (5) from the bulkhead T-fitting (15).  
1) Discard the packing (5) and the retainer (18).
- (k) Disconnect the shuttle valve (8) from the T-fitting (12).
- (l) Remove the packing (5), the retainer (4) and the nut (14) from the T-fitting (12).  
1) Discard the packing (5) and the retainer (4).

TASK 49-27-13-404-019

3. Shuttle Valve Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Packing	49-27-13	01	70 or
	8	Shuttle Valve			100
	11	Packing			205 115, 142 or 180

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B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

D. Procedure

S 424-021

(1) APU WITH FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;

Install the shuttle valve:

- Install the nut (14) with a new retainer (4) and a new packing (5) on the T-fitting (12).
- Connect the T-fitting (12) to the shuttle valve (8).
- Install the washers (9) and the bolts (10) that attach the shuttle valve (8) to the APU inlet plenum.
  - Tighten the bolts (10) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- Connect the buffer air tube for the gearbox (13) to the T-fitting (12).
- Connect the pressure regulator tube for the gearbox (3) to the T-fitting (12).
- Install a new retainer (1) and a new packing (11) on the elbow (2).
- Install the elbow (2) on the shuttle valve (8).
- Connect the buffer air tube to the elbow (2).
- Install a new packing (5) on the union (7).
- Install the union (7) in the shuttle valve (8).
- Connect the compression discharge tube (6) to the union (7).

S 424-034

(2) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;

Install the APU shuttle valve:

- Install the nut (14), a new retainer (4) and a new packing (5) on the T-fitting (12).

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- (b) Connect the T-fitting (12) to the shuttle valve (8).
- (c) Install the nut (17), a new retainer (18) and a new packing (5) on the bulkhead T-fitting (15).
- (d) Connect the bulkhead T-fitting (15) to the shuttle valve (8).
- (e) Install the washers (9) and the bolts (10) that attach the shuttle valve (8) to the APU inlet plenum.
  - 1) Tighten the bolts (10) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (f) Connect the buffer air tube for the gearbox (3) to the T-fitting (12).
- (g) Connect the pressure regulator tube for the gearbox (3) to the T-fitting (12).
- (h) Install the elbow (2) on the shuttle valve (8) with a new packing (11) and a new retainer (1).
- (i) Connect the buffer air tube to the elbow (2).
- (j) Connect the compressor discharge tube for the fan isolation valve (16) to the bulkhead T-fitting (15).
- (k) Connect the compressor discharge tube (6) to the bulkhead T-fitting (15).

S 864-023

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-025

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-016

- (5) Do a leakage test for the shuttle valve installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the shuttle valve for leakage.

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- (c) Do a shutdown of the APU (AMM 49-11-00/201).
- (d) If you found leakage, repair the cause of it.

S 414-031

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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LOW OIL TEMPERATURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the low oil temperature switch on the APU. During this procedure, the switch is referred to as the oil temperature switch.
- B. The oil temperature switch is installed in the bottom of the APU gearbox. The switch is in a port aft of the return port for the generator scavenge. The magnetic chip detector for the generator scavenge is installed in the scavenge return port.
- C. You can get access to the switch through the APU access doors.

TASK 49-27-14-004-001

2. Low Oil Temperature Switch Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container - 100 cc capacity, for oil
- B. References
  - (1) SSM 49-27-01
  - (2) WDM 49-14-11
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door
- D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

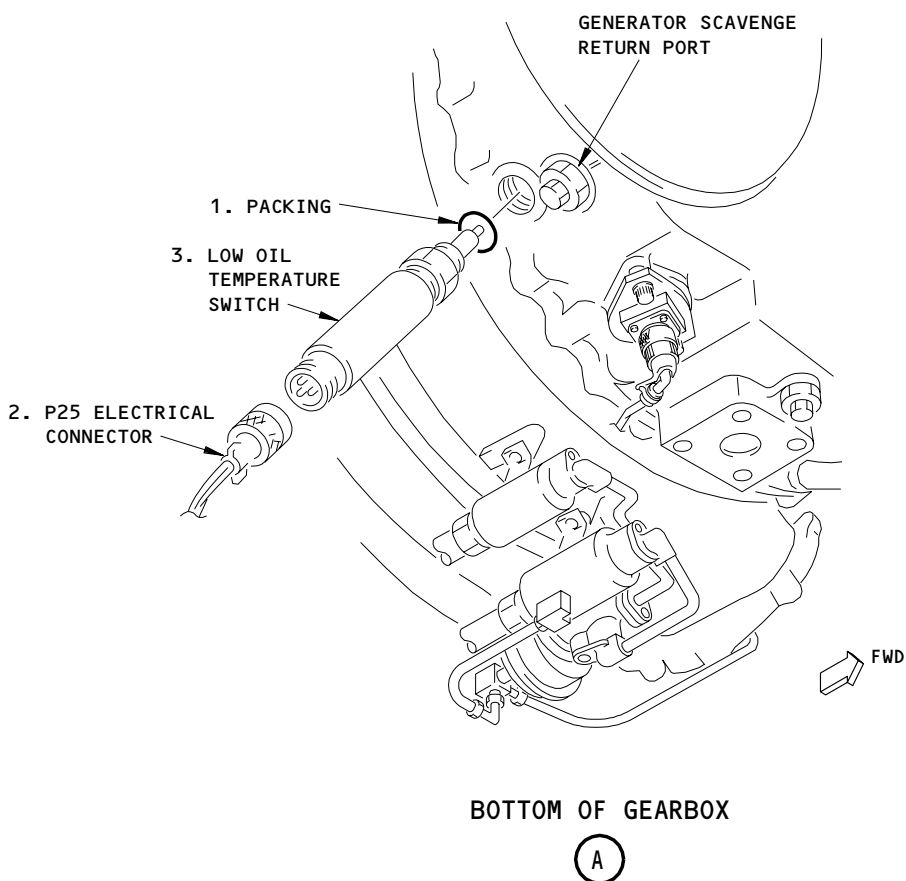
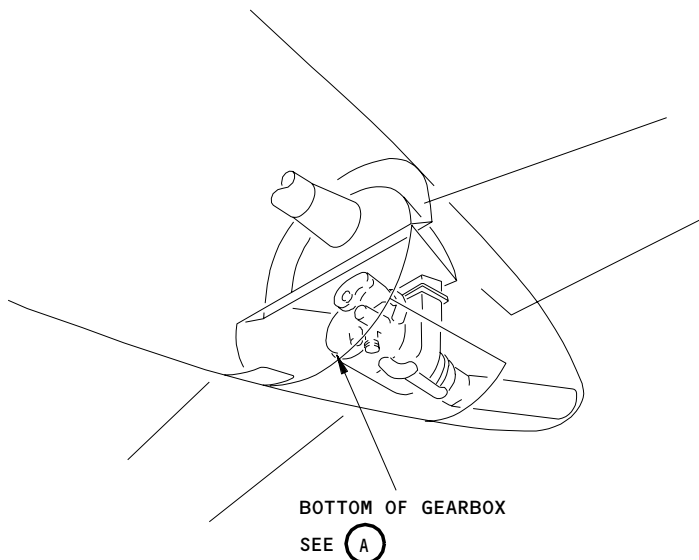
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Low Oil Temperature Switch Installation  
Figure 401

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- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 024-016

- (4) Remove the oil temperature switch:
  - (a) Disconnect the P25 electrical connector (2) from the oil temperature switch (3).
    - 1) Install caps on the electrical connector (2) and the oil temperature switch (3) for protection.
  - (b) Put the container below the oil temperature switch (3).
  - (c) Remove the oil temperature switch (3) and the packing (1) from the gearbox.
    - 1) Discard the packing (1).

TASK 49-27-14-404-017

3. Low Oil Temperature Switch Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-27-14	01	52 or 55
	3	Low Oil Temperature Switch			45 or 50

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C. References

- (1) AMM 12-13-04/301, APU Servicing (Fill the Oil)
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) SSM 49-27-01
- (4) WDM 49-14-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-018

- (1) Install the oil temperature switch:
  - (a) Lubricate the new packing (1) with a light coat of lubricant or oil.
  - (b) Install the packing (1) on the oil temperature switch (3).
  - (c) Install the oil temperature switch (3) in the gearbox.
    - 1) Tighten the oil temperature switch (3) to 60-63 inch-pounds (6.8-7.1 newton-meters).
  - (d) Install a lockwire on the oil temperature switch (3).
  - (e) Remove the caps from the oil temperature switch (3) and the electrical connector (2).
  - (f) Connect the P25 electrical connector (2) to the oil temperature switch (3).
  - (g) Install a lockwire on the P25 electrical connector (2).

S 614-013

- (2) Fill the APU oil reservoir (AMM 12-13-04/301).

S 864-023

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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- S 864-025
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 794-014
- (5) Do a leakage test for the installation of the oil temperature switch:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil temperature switch for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.
- S 414-031
- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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GENERATOR OIL FILTER DIFFERENTIAL PRESSURE SWITCH -  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure switch on the generator oil filter.
- B. The differential pressure switch is on the housing for the generator oil filter. The generator oil filter is on the APU gearbox. You can get access to the switch through the APU access doors.

TASK 49-27-15-004-001

2. Generator Oil Filter Differential Pressure Switch Removal (Fig. 401)

A. References

- (1) SSM 49-27-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

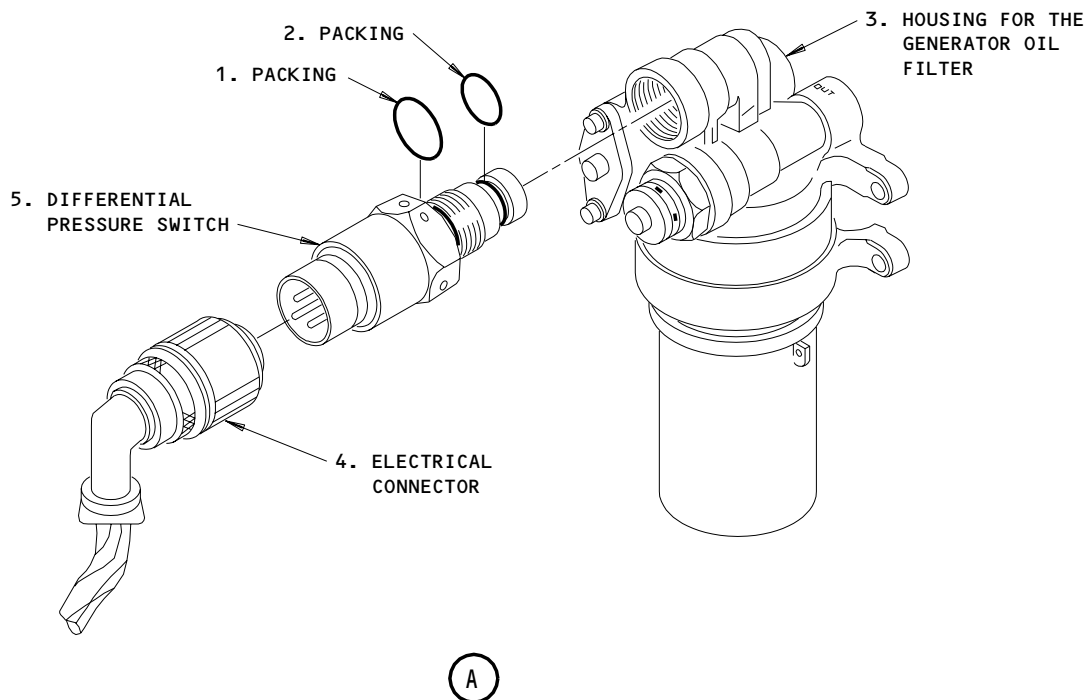
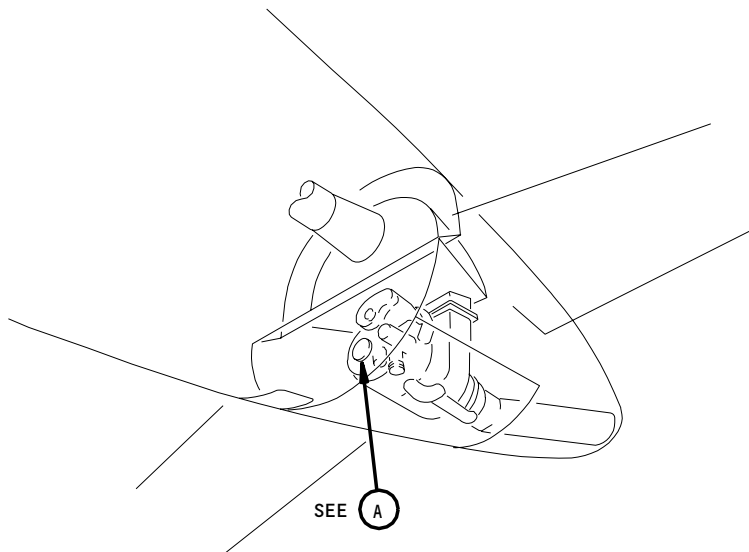
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Generator Oil Filter Differential Pressure Switch  
Figure 401

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- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 024-016

- (4) Remove the differential pressure switch:
  - (a) Disconnect the electrical connector (4) from the differential pressure switch (5).

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE AIRPLANE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (b) Remove the differential pressure switch (5) from the housing (3) for the generator oil filter.
- (c) Remove and discard the packings (1 and 2).

TASK 49-27-15-404-018

3. Generator Oil Filter Differential Pressure Switch Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

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B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-27-15	01	15
	2	Packing			25
	5	Differential Pressure Switch			10

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) SSM 49-27-01
- (4) WDM 49-14-11

D. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right
- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-017

- (1) Install the differential pressure switch:
  - (a) Lubricate the new packings (1 and 2) with a light coat of lubricant or oil.
  - (b) Install the packings (1 and 2) on the differential pressure switch (5).
  - (c) Install the differential pressure switch (5) in the housing (3) for the generator oil filter.
    - 1) Tighten the differential pressure switch (5) to 110-120 inch-pounds (12.4-13.6 newton-meters).
  - (d) Install a lockwire on the differential pressure switch (5).
  - (e) Connect the electrical connector (4) to the differential pressure switch (5).
  - (f) Install a lockwire on the electrical connector (4).

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S 864-023

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-025

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-012

- (4) Do a leakage test for the installation of the differential pressure switch:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the differential pressure switch for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-031

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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GENERATOR OIL FILTER DIFFERENTIAL PRESSURE INDICATOR -  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure indicator for the generator oil filter.
- B. The differential pressure indicator is on the housing for the generator oil filter. The generator oil filter is on the APU gearbox. You can get access to the indicator through the APU access doors.

TASK 49-27-16-004-001

2. Generator Oil Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

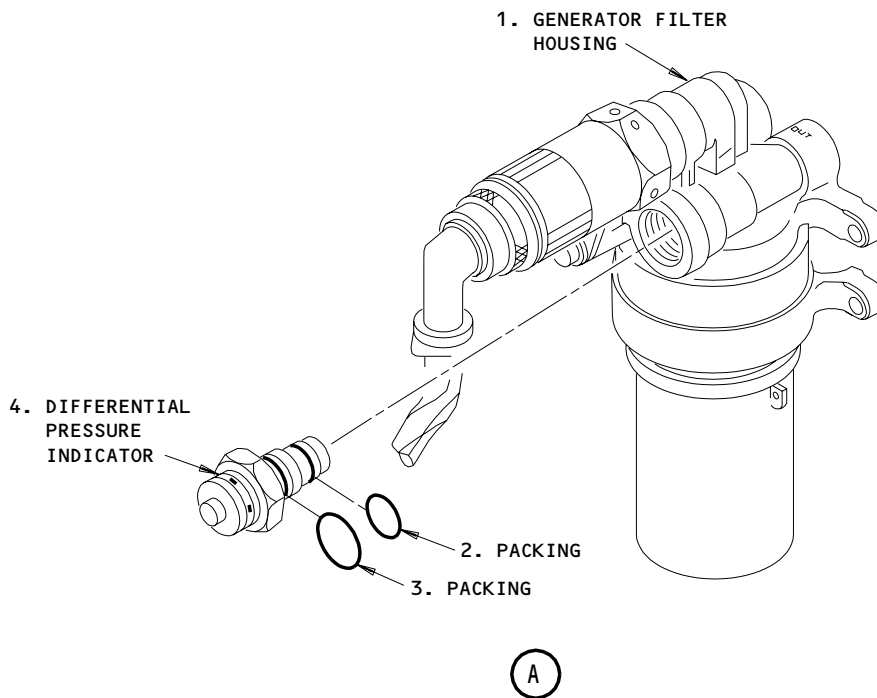
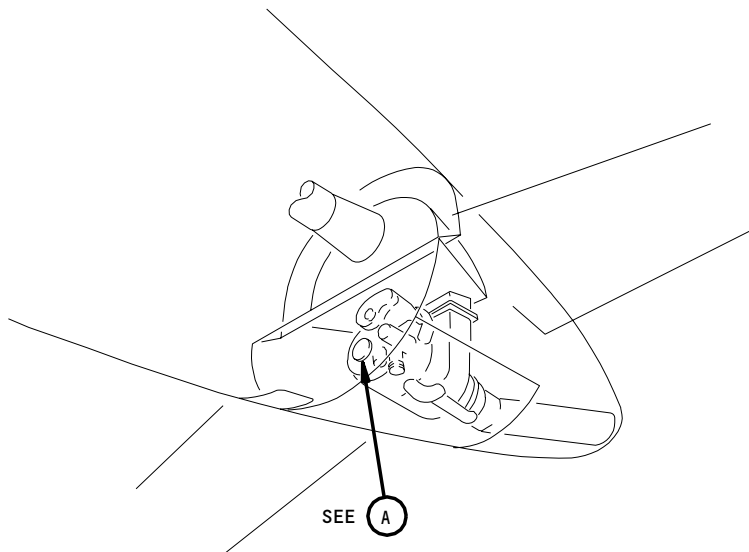
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Generator Oil Filter Differential Pressure Indicator Installation  
Figure 401

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S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 024-019

- (4) Remove the differential pressure indicator:
- (a) Remove the differential pressure indicator (4) from the generator filter housing (1).
  - (b) Remove and discard the packings (2 and 3) from the differential pressure indicator (4).

TASK 49-27-16-404-020

3. Generator Oil Filter Differential Pressure Indicator Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing	49-27-16	01	20
	3	Packing			15
	4	Differential Pressure Indicator			10

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

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D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-021

- (1) Install the differential pressure indicator:
  - (a) Lubricate the new packings (2 and 3) with a light coat of lubricant or oil.
  - (b) Install the packings (2 and 3) on the differential pressure indicator (4).
  - (c) Install the differential pressure indicator (4) in the generator filter housing (1).
    - 1) Tighten the differential pressure indicator (4) to 110-120 inch-pounds (12.4-13.6 newton-meters).
  - (d) Install a lockwire on the differential pressure indicator (4).

S 864-010

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-012

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-017

- (4) Do a leakage test for the installation of the differential pressure indicator:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the differential pressure indicator for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-016

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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APU ENGINE FUEL SYSTEM – DESCRIPTION AND OPERATION

1. General

A. Engine Fuel System (Fig. 1)

- (1) The engine fuel system of the APU provides pressurized metered fuel to the combustion chamber and pressurized fuel to the actuator for the inlet guide vanes. The main fuel tank on the left side of the airplane supplies the fuel. The system consists of a fuel control unit, a flow divider, nozzles and manifolds. Electrical power for the system is 28 volts dc.
- (2) Fuel is pumped to the fuel control unit of the APU by a primary or secondary fuel pump in the left airplane wing. The ac fuel boost pump on the left forward side is used when bus power for ac ground service is available. When no ac ground power is available, the dc fuel pump of the APU is used. The fuel shutoff valve for the APU, located in the left airplane wing, opens with an APU ON signal. Fuel flows back to the fuel control unit where it is pressurized and metered. The fuel passes through the fuel flow divider which directs the fuel to the primary and secondary fuel nozzles.

2. Component Details

A. Fuel Control Unit (Fig. 2)

- (1) The fuel control unit pressurizes and meters fuel going to the fuel flow divider. It also provides pressurized fuel to the actuator for the inlet guide vanes. The fuel control unit consists of the following in fuel flow order: inlet filter, fuel pump, high-pressure relief valve, high pressure filter, actuator pressure regulator, fuel metering assembly, pressurizing valve, and shutoff solenoid valve for the fuel. The unit is mounted to the front of the oil pump assembly by a QAD clamp. Fuel is drained from the unit through a drain tube connected to its underside.
- (2) Inlet Filter
  - (a) The inlet filter is located at the inlet of the fuel pump bolted to the fuel control unit. It is a 10 micron disposable filter element. A delta pressure indicator pops out at  $5 \pm 0.5$  psid to indicate when the fuel filter is clogged. A filter bypass valve activates to allow fuel to flow around a plugged inlet filter.

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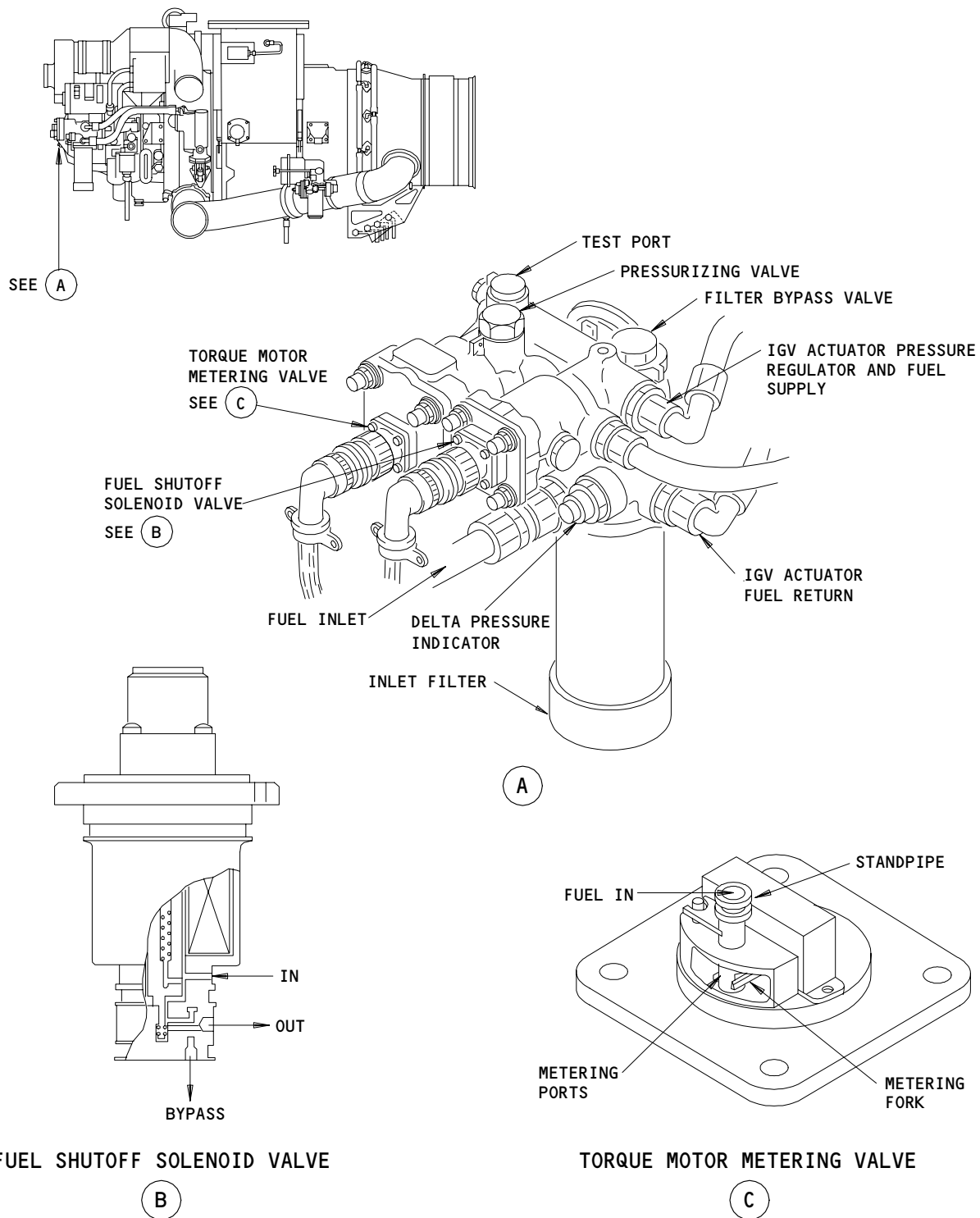
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APU Fuel Control Unit  
Figure 2

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- (3) Fuel Pump
  - (a) The fuel pump provides pressurized fuel to the metering valve. It consists of two spur gears, supported by spring-loaded carbon bushings. The pump bushings are spring-loaded against the gear sides to reduce internal leakage and maintain pump efficiency as wear occurs. The gears and bushings are lubricated and cooled by fuel flowing through the pump. The pump is driven by an oil lubricated splined coupling from the oil pump assembly. Double carbon face seals prevent contamination between oil and fuel. A drain between the seals allows a quick check of seal conditions.
- (4) High-Pressure Relief Valve
  - (a) The high-pressure relief valve is located at the fuel pump outlet. It is a spring-loaded ball design to protect against over-pressurization of the system.
- (5) High Pressure Filter
  - (a) The high pressure filter is located at the outlet port of the fuel pump. It protects the fuel metering valve and the actuator for the inlet guide vanes from minute particles due to normal pump wear. The filter is a stainless steel screen, which you can clean, and is attached to a removable plug.
- (6) Actuator Pressure Regulator
  - (a) Power to the actuator for the inlet guide vanes is supplied by pressurized fuel from the fuel control unit. The actuator pressure regulator provides hydraulic pressurized fuel for the IGV actuator.
- (7) Fuel Metering Assembly
  - (a) The fuel metering assembly meters the output of the fuel control unit to the engine for acceleration and governed speed operation. It consists of a torque-motor metering valve and a differential pressure regulator. These components are contained within the housing for the fuel control unit. The APU control unit electronically controls the torque-motor metering valve which adjusts the fuel flow rate for the required governed speed. The differential pressure regulator maintains a constant differential pressure across the metering valve.
- (8) Pressurizing Valve
  - (a) The pressurizing valve maintains the out-going fuel at a constant pressure during the early phase of the start cycle. It is located at the inlet to the shutoff solenoid valve.
- (9) Fuel Shutoff Solenoid Valve
  - (a) The shutoff solenoid valve for the fuel shuts off fuel to the flow divider. It is located at the outlet of the fuel control unit. It is a normally spring-loaded closed, direct acting, three-way valve. A 28-volt dc source energizes the valve open with a signal from the APU control unit. Fuel flow cools the valve.

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B. Flow Divider (Fig. 3)

- (1) The flow divider distributes fuel from the fuel control unit to the primary and secondary nozzles. It consists of a screen filter, run and start sequence valves, solenoid valve, primary drain valve, and secondary drain valve. The flow divider is mounted on the APU housing behind the surge control valve. At the inlet is a self-bypassing filter screen. The primary path for the fuel flow is open throughout APU start and run operation. The secondary fuel path, however, is restricted by start and run sequence valves which open at preset fuel pressures.
- (2) The run sequence valve allows additional fuel to enter the secondary manifold after the solenoid valve opens at 95% speed. The run sequence valve has a lower setting than the start sequence valve which allows proper fuel atomization at lower supply pressure. Primary and secondary drain valves allow fuel to drain from the hoses and nozzles after fuel flow to the divider has stopped.

C. Nozzles (Fig. 4)

- (1) The nozzles atomize and inject fuel into the engine combustor. There are six primary nozzles for starting and APU operation and six secondary nozzles for running and high altitude operation. The nozzles are connected to manifolds which receive fuel from the fuel metering valve. They are equally spaced around the engine periphery.
- (2) The primary nozzles are designed for high atomizing ability during the low pressures at low flow rate. This helps with engine light-off during the start cycle. The secondary nozzles are brought into use when a high flow rate exists.

D. Manifolds (Fig. 4)

- (1) The manifolds provide a fuel flow path from the flow divider to the fuel nozzles. The manifolds are insulated flexible lines.

3. Operation

A. Functional Description

(1) Fuel System (Fig. 1)

- (a) The APU fuel system is controlled automatically by the APU control unit. Positioning the master control switch of the APU to START, then relaxing to ON, initiates APU start. The fuel shutoff valve for the APU is opened and a fuel pump (ac boost pump or APU dc fuel pump) is energized. A FAULT light on the master control panel illuminates momentarily while valve is opening. Fuel is supplied to the pump for the fuel control unit which sends pressurized fuel to the actuator for the inlet guide vanes and torque-motor metering valve. The metering valve position is electronically controlled by the APU control unit. The fuel control solenoid is not opened until the starter motor rotates the engine above 7% speed.

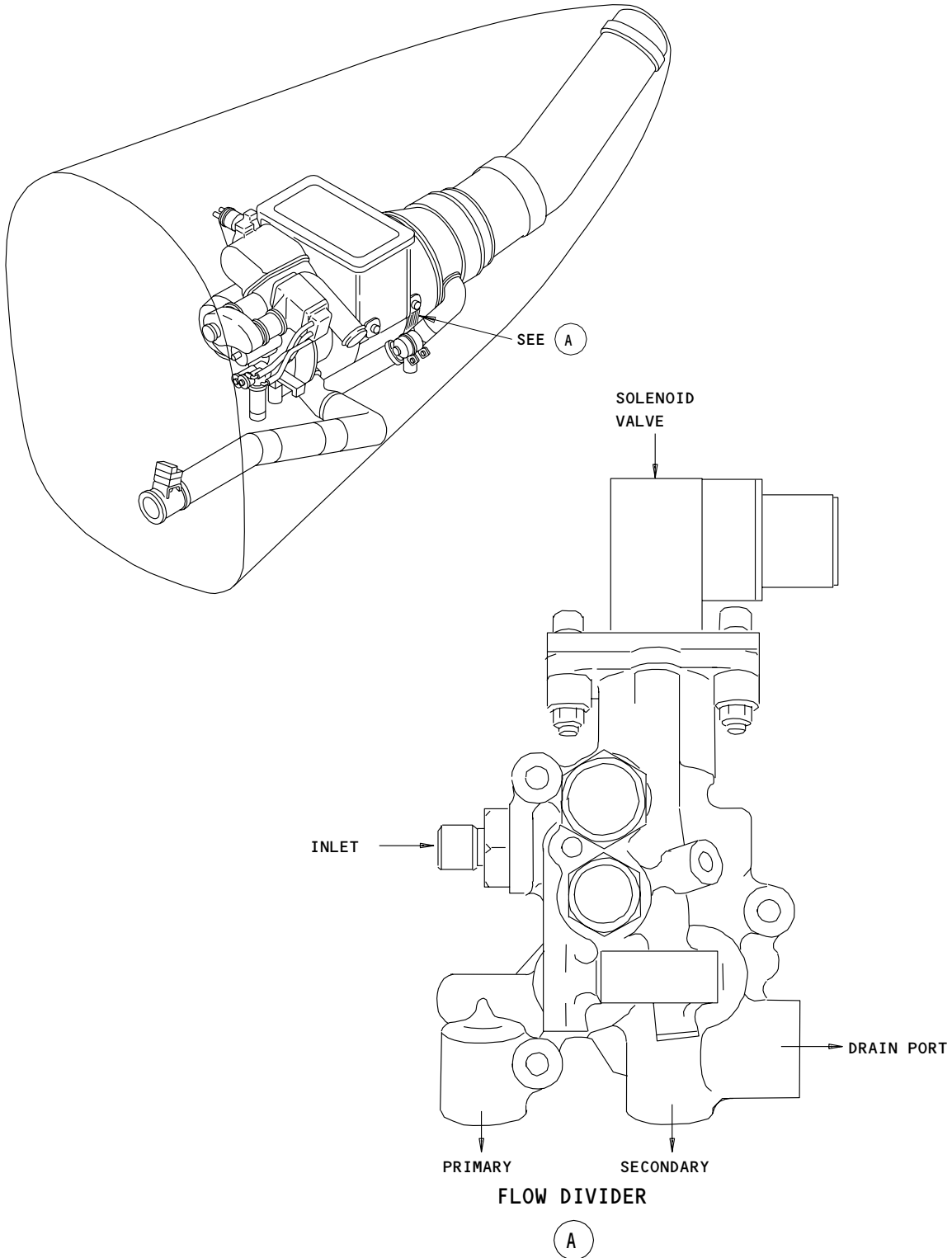
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APU Fuel Flow Divider  
Figure 3

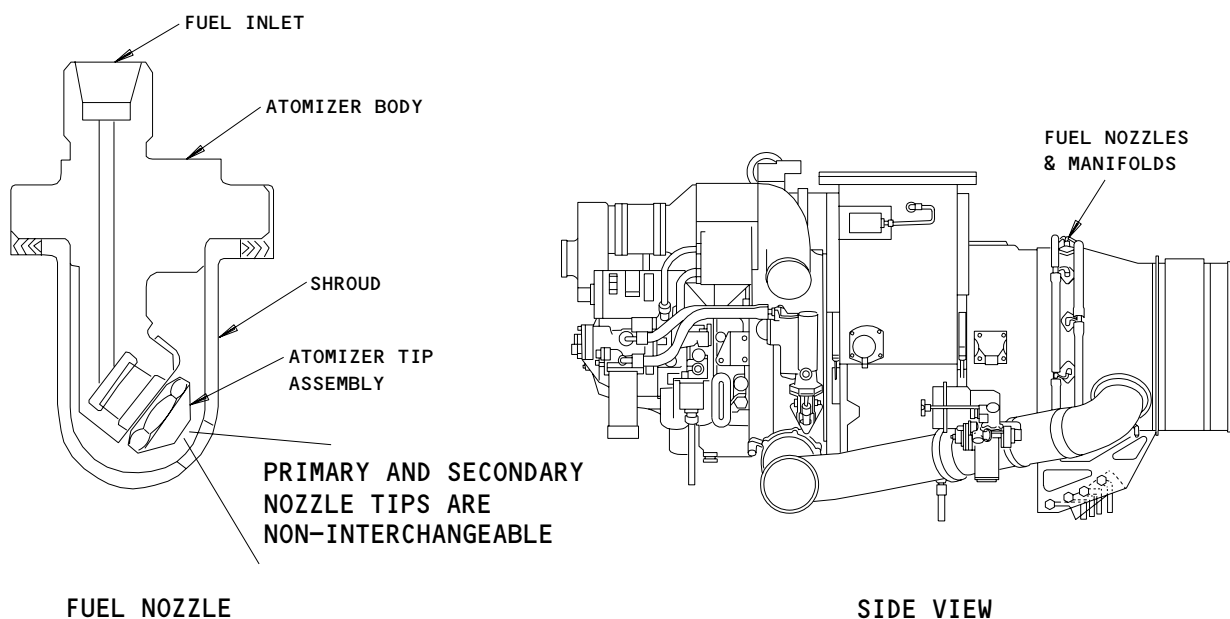
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- (b) At 7% governed speed, 28 volts dc is supplied to the fuel shutoff solenoid by the APU control unit. Fuel is allowed to flow through the flow divider and into the primary fuel nozzles. At the same time, ignition begins, combustion occurs, and the engine continues to accelerate.
- (c) At 50% speed the starter motor de-energizes, and the engine continues to accelerate under its own power. At 95% speed the ignition unit de-energizes and the solenoid valve for the flow divider opens to allow additional fuel to flow to the secondary fuel nozzles. When a load is applied to the APU, the APU speed is kept constant by the fine speed governor in the electronic control unit, which signals the torque motor for a greater or lesser fuel flow as load demand requires.



APU Fuel Nozzles and Manifolds  
Figure 4

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(d) When a shutdown is initiated by positioning the master control switch of the APU to OFF the fuel control unit sends out a shutdown signal. The shutoff solenoid valve for the fuel is closed, stopping fuel flow to the nozzles. During shutdown, the master control switch also closes the fuel shutoff valve. If other controls (automatic shutdown, fire or remote shutdown switch) are used to shutdown the APU, a signal is supplied to activate the fire relay to close the fuel shutoff valve for the airplane.

**B. BITE**

- (1) AIRPLANES WITH THE -18 APU CONTROL UNIT AND BEFORE;  
The APU control unit monitors fuel system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the fuel control unit, the solenoid valve for the fuel control, or the solenoid for the fuel flow divider is shown on the FAULTY UNIT matrix. These failures are shown as FUEL CONTROL, FUEL SOL, or FLOW DIV SOL. An automatic shutdown because of NO FLAME, SLOW START, or NO ACCEL is shown on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE -19 THRU -999 APU CONTROL UNIT;  
The APU control unit monitors fuel system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the fuel control unit, the solenoid valve for the fuel control, or the solenoid for the fuel flow divider is shown on the FAULTY LRU matrix. These failures are shown as FUEL CONTROL, FUEL SOL, or FLOW DIV SOL. An automatic shutdown because of NO LIGHTOFF, START ABORTED, or UNDERSPEED is shown on the REASON APU NOT OPERATING matrix.

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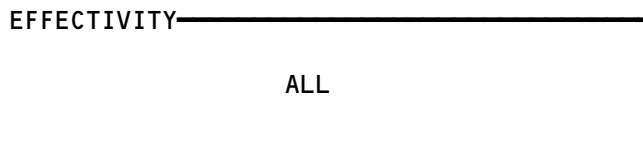
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APU ENGINE FUEL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ELEMENT - FUEL FILTER	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-04
ELEMENT - FUEL FLOW DIVIDER FILTER	1	1	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-08
FILTER - FUEL HIGH PRESSURE	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-07
HOSES - FUEL MANIFOLD	1	2	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-09
MANIFOLDS AND NOZZLES	1	12	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-06
MONOPOLE - (49-61-00/101) YBMTS8,YBMTS9				
SENSORS - (49-61-00/101) APU INLET PRESSURE, YBMTS4 APU INLET TEMPERATURE, YBMTS5				
THERMOCOUPLE ASSEMBLY - (49-71-00/101) YBMTS6,YBMTS7				
UNIT - (49-61-00/101) APU CONTROL, M206				
UNIT - FUEL CONTROL	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-01
VALVE - FUEL CONTROL SOLENOID, YBMV1	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-02
VALVE - FUEL FILTER BYPASS	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-05
VALVE - FUEL FLOW DIVIDER AND SOLENOID, YBMM2	1	1	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-03

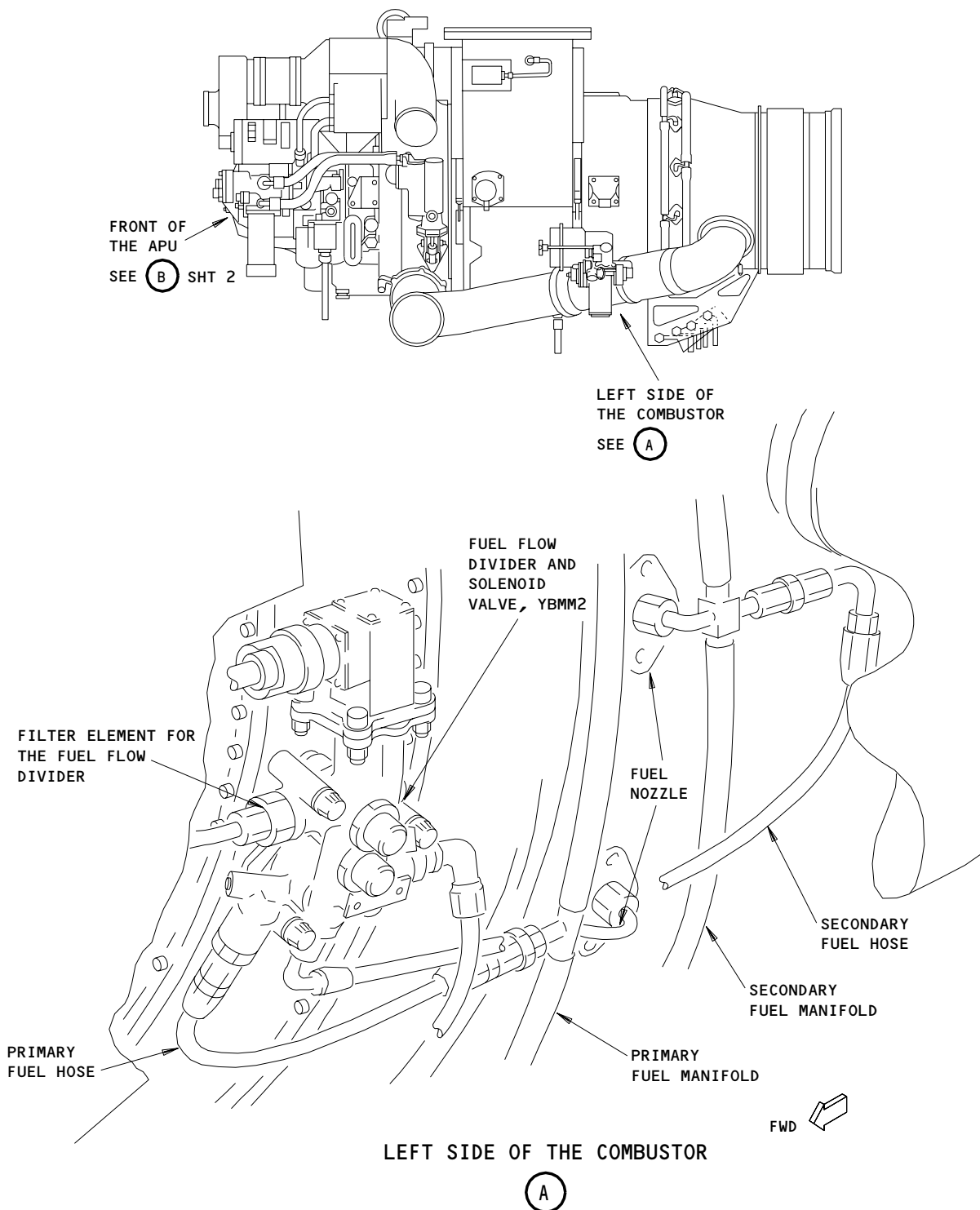
APU Engine Fuel System - Component Index  
Figure 101



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APU Engine Fuel System - Component Location  
Figure 102 (Sheet 1)

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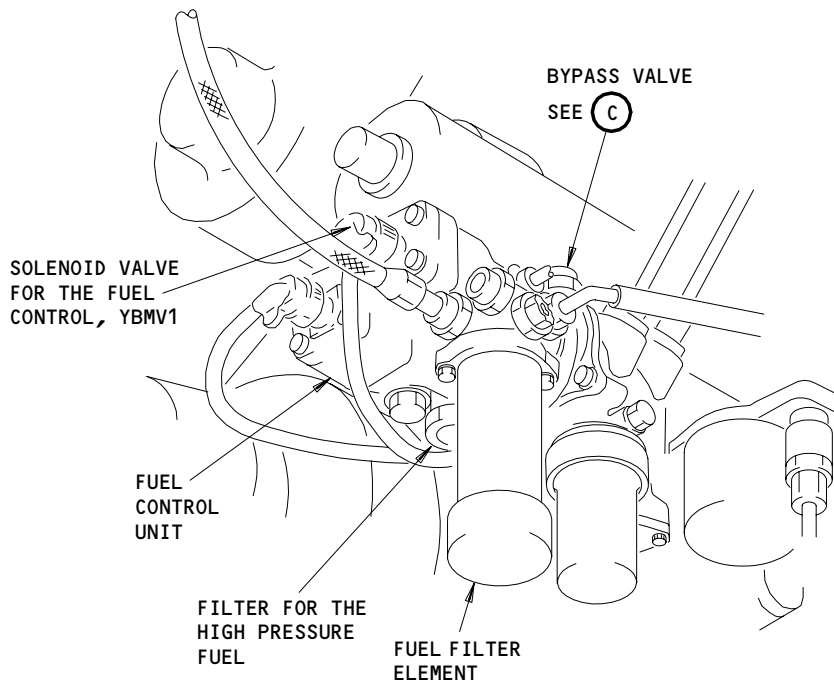
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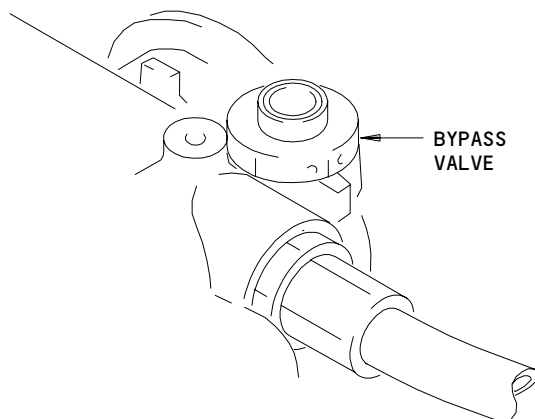
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FRONT OF THE APU

(B) FROM SHT 1



BYPASS VALVE

(C)

APU Engine Fuel System - Component Location  
Figure 102 (Sheet 2)

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APU ENGINE FUEL SYSTEM – MAINTENANCE PRACTICES

1. General

- A. This procedure contains a task to do an inspection of the APU fuel system for unwanted materials.
- B. To do the fuel system inspection you must remove the fuel from the system. You must also remove the low pressure filter and the high pressure filter.
- C. You can get access to the fuel system filters through the APU access doors.

TASK 49-31-00-202-001

2. APU Fuel System Inspection

A. References

- (1) AMM 28-25-00/201, APU Fuel Feed System
- (2) AMM 49-31-01/401, Fuel Control Unit
- (3) AMM 49-31-03/401, Fuel Flow Divider and Solenoid Valve
- (4) AMM 49-31-04/401, Fuel Filter Element
- (5) AMM 49-31-07/201, High Pressure Fuel Filter
- (6) AMM 49-52-02/401, Inlet Guide Vane Actuator

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 652-002

- (1) Remove the fuel from the fuel supply system (AMM 28-25-00/201).

S 282-003

- (2) Examine the APU fuel system for unwanted materials:
  - (a) Remove the low pressure filter (AMM 49-31-04/401).
  - (b) Remove the high pressure filter (AMM 49-31-07/201).

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- (c) Examine the two filters for signs of corrosion and unwanted materials.
- (d) Install the high pressure filter (AMM 49-31-07/201).
- (e) Install the low pressure filter (AMM 49-31-04/401).

S 962-004

- (3) If you found corrosion or unwanted materials in the filters, replace the fuel system components:
  - (a) Replace the fuel flow divider (AMM 49-31-03/401).
    - 1) Flush the fuel line between the fuel flow divider and the fuel control unit with clean fuel.
  - (b) Replace the IGV actuator (AMM 49-52-02/401).
    - 1) Flush the fuel lines between the IGV actuator and the fuel control unit with clean fuel.
  - (c) Replace the fuel control unit (AMM 49-31-01/401).

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APU FUEL CONTROL UNIT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel control unit on the APU.
- B. The fuel control unit is installed on the oil pump. The oil pump is on the bottom right side of the APU gearbox. You can get access to the fuel control unit through the APU access doors.

TASK 49-31-01-004-001

2. APU Fuel Control Unit Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
- B. References
  - (1) SSM 49-31-01
  - (2) WDM 49-14-11
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door
- D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

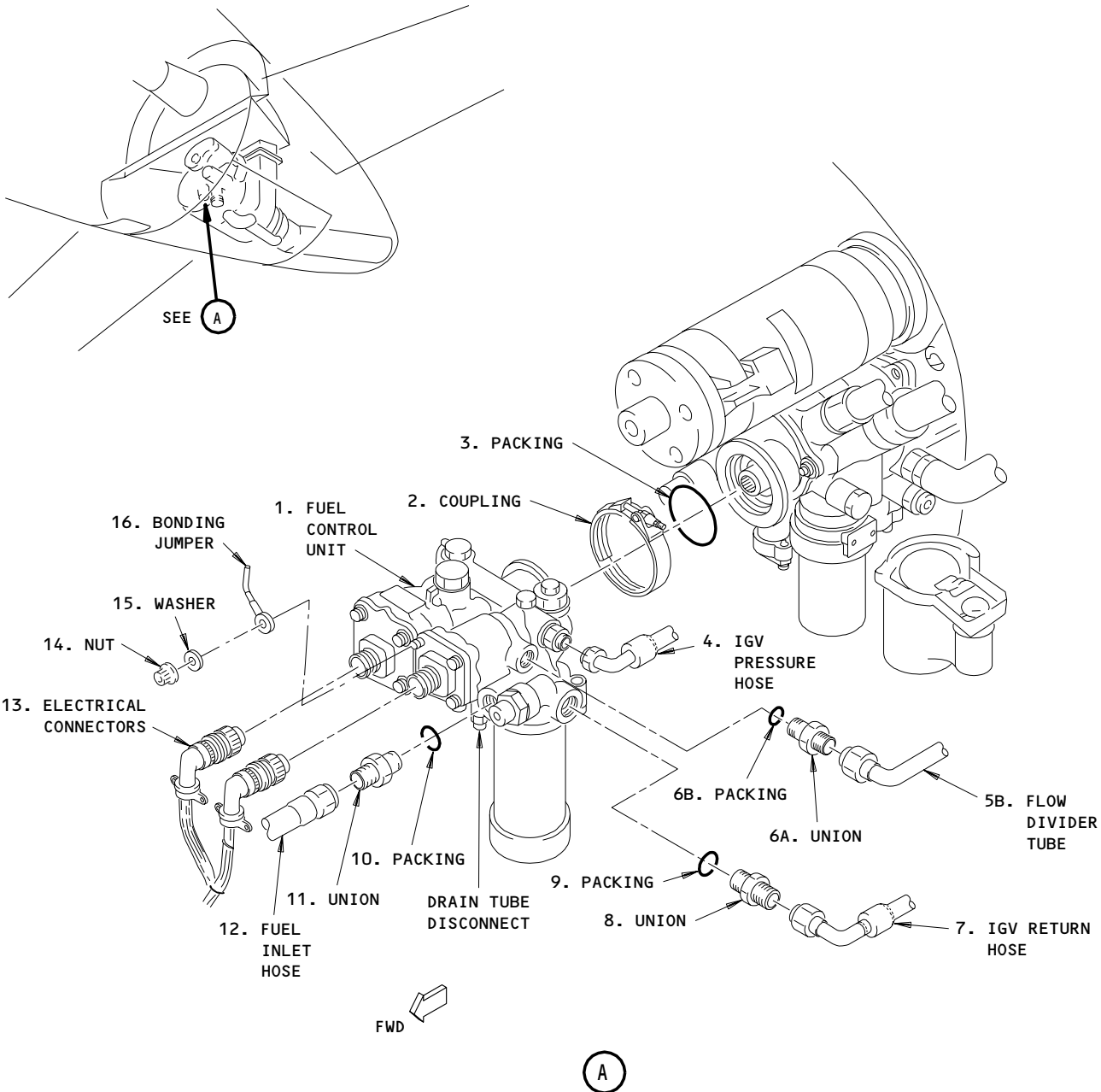
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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-038

- (4) Remove the fuel control unit:
  - (a) Put the container below the fuel control unit (1).
  - (b) Disconnect the electrical connectors (13) from the fuel control unit (1).
  - (c) Install caps on the electrical connectors (13) for protection.
  - (d) Remove the nut (14) and the washer (15) to disconnect the bonding jumper (16) from the fuel control unit (1).
  - (e) Disconnect the fuel inlet hose (12) from the union (11).
    - 1) Let the fuel fully drain from the fuel inlet hose (12).
  - (f) Remove the union (11) and the packing (10) from the fuel control unit (1).
    - 1) Discard the packing (10).
  - (g) Install caps on the fuel inlet hose (12) and on the fuel inlet port on the fuel control unit (1).
  
  - (h) Disconnect the flow divider tube (5B) from the union (6A).
    - 1) Let the fuel fully drain from the flow divider tube (5B).
  - (i) Put a cap on the flow divider tube (5B).
  - (j) Remove the union (6A) and the packing (6B) from the fuel control unit (1).
    - 1) Discard the packing (6B).
    - 2) Put a cap on the port of the fuel control unit (1).
  - (k) Disconnect the IGV pressure hose (4) from the fuel control unit (1).
    - 1) Let the fuel fully drain from the IGV pressure hose (4).
  - (l) Put caps on the IGV pressure hose (4) and the fuel control unit (1).
  - (m) Disconnect the IGV return hose (7) from the union (8).
    - 1) Let the fuel fully drain from the IGV return hose (7).
  - (n) Remove the union (8) and the packing (9) from the fuel control unit (1).
    - 1) Discard the packing (9).
  - (o) Put caps on the IGV return hose (7) and the fuel control unit (1).
  - (p) Disconnect the drain tube from the bottom of the fuel control unit (1).
  - (q) Put caps on the drain tube and the fuel control unit (1).
  - (r) Remove the coupling (2) to remove the fuel control unit (1) from the oil pump.

**NOTE:** A small quantity of oil will drain when you remove the fuel control unit.

- 1) Remove and discard the packing (3).

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TASK 49-31-01-404-015

3. APU Fuel Control Unit Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Fuel Control Assy	49-31-01	01	55
	3	Packing			62
	6B	Packing			45 or 105
	9	Packing	10, 53, 75 or 110		
	10	Packing	49-11-01	01	275

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-31-01
- (4) WDM 49-14-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-039

- (1) Install the fuel control unit:
  - (a) Remove all the caps from the fuel tubes and the ports on the fuel control unit (1).

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- (b) Lubricate the new packing (3) with a light coat of lubricant.
- (c) Install the packing (3), lubricated with the grease or the lubricant, on the oil pump flange.

**CAUTION:** CAREFULLY ALIGN THE SHAFT BETWEEN THE OIL PUMP AND THE FUEL CONTROL UNIT. IF THE SHAFT AND THE SHAFT COUPLING ARE NOT ALIGNED, YOU CAN DAMAGE THE FUEL CONTROL UNIT OR THE OIL PUMP.

- (d) Align the index pin and put the fuel control unit (1) in its position on the mounting flange.
- (e) Attach the fuel control unit (1) to the oil pump with the coupling (2).
  - 1) Tighten the coupling (2) to 20–22 inch-pounds (2.3–2.5 newton-meters).
- (f) Install the packing (6B), lubricated with a light coat of lubricant, on the union (6A).
- (g) Install the union (6A) on the fuel control unit (1).
- (h) Connect the flow divider tube (5B) to the union (6A).
- (i) Connect the drain tube to the bottom of the fuel control unit (1).
- (j) Connect the IGV pressure hose (4) to the fuel control unit (1).
- (k) Lubricate the new packing (9) with a light coat of lubricant.
- (l) Install the packing (9) on the union (8).
- (m) Install the union (8) on the fuel control unit (1).
- (n) Connect the IGV return hose (7) to the union (8).
- (o) Lubricate the new packing (10) with a light coat of lubricant.
- (p) Install the packing (10) on the union (11).
- (q) Install the union (11) on the fuel control unit (1).
- (r) Connect the fuel inlet hose (12) to the union (11).
- (s) Connect the bonding jumper (16) to the fuel control unit (1) with the nut (14) and washer (15).
  - 1) Tighten the nut (14) to 50–55 inch-pounds (5.7–6.2 newton-meters).
- (t) Connect the electrical connectors (13) to the fuel control unit (1).

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- S 864-030
- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 744-032
- (3) Do the self-test for the APU system (AMM 49-61-05/201).
- S 864-033
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 794-034
- (5) Do a leakage test for the installation of the fuel control unit:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.
- S 414-037
- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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FUEL CONTROL SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel control solenoid valve. During this procedure, the fuel control solenoid valve is referred to as the solenoid valve.
- B. The solenoid valve is on the fuel control unit. The fuel control unit is on the APU gearbox, adjacent to the generator.
- C. You can get access to the fuel control unit and the solenoid valve through the APU access doors.

TASK 49-31-02-004-001

2. Fuel Control Solenoid Valve Removal (Fig. 401)

A. References

- (1) SSM 49-31-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

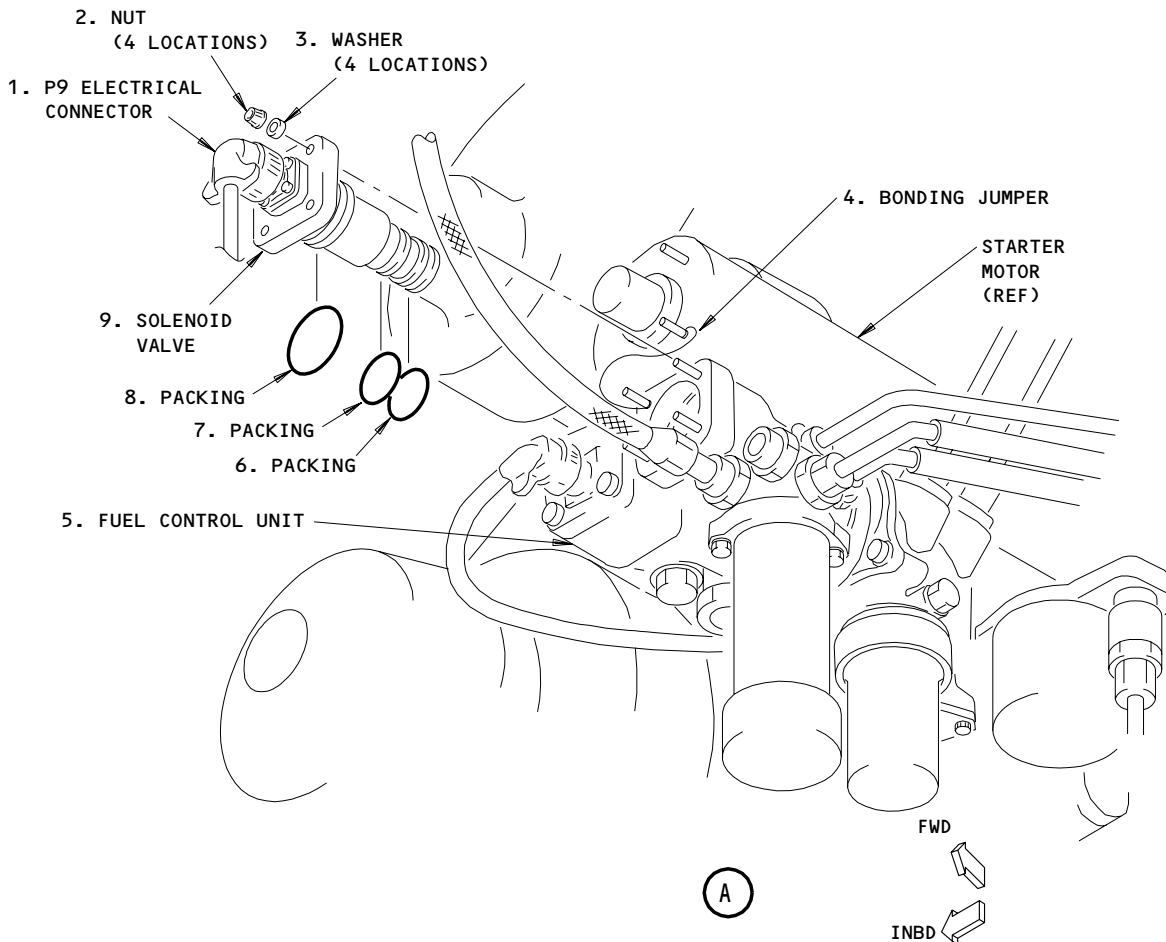
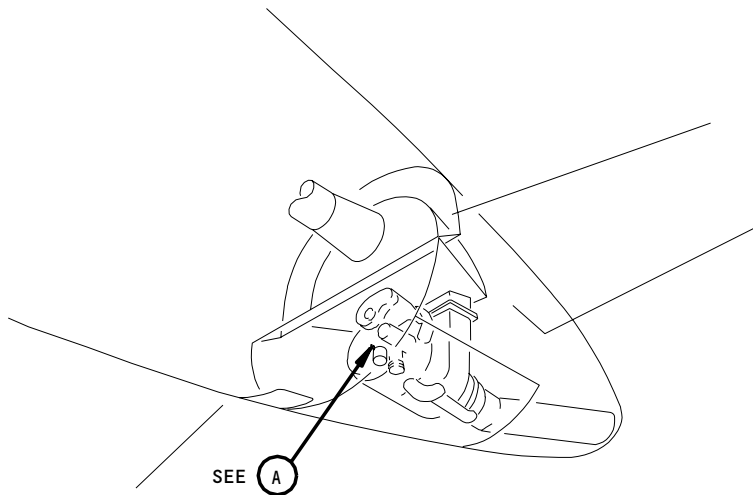
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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the solenoid valve:
  - (a) Disconnect the P9 electrical connector (1) from the solenoid valve (9).
  - (b) Remove the nuts (2) and the washers (3) that attach the solenoid valve (9) to the fuel control unit (5).
  - (c) Remove the solenoid valve (9) from the fuel control unit (5).
  - (d) Remove the packings (6, 7, and 8) from the solenoid valve (9).
    - 1) Discard the packings (6, 7, and 8).

TASK 49-31-02-404-009

3. Fuel Control Solenoid Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	6	Packing	49-31-02	01	35
	7	Packing			30
	8	Packing			25
	9	Solenoid Valve			10

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-31-01
- (4) WDM 49-14-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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E. Procedure

S 424-010

- (1) Install the solenoid valve:
  - (a) Lubricate the new packings (6, 7, and 8) with a light coat of lubricant.
  - (b) Install the packings (6, 7, and 8) on the solenoid valve (9).
  - (c) Install the solenoid valve (9) in the fuel control unit (5).
  - (d) Attach the bonding jumper (4) to the stud on the fuel control unit (5).
  - (e) Install the washers (3) and the nuts (2).
    - 1) Tighten the nuts (2) to 50-52 inch-pounds (5.7-5.9 newton-meters).
  - (f) Connect the P9 electrical connector (1) to the solenoid valve (9).

S 744-014

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 864-015

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-017

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-018

- (5) Do a leakage check for the fuel control unit:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).

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(d) If you found leakage, repair the cause of it.

S 414-021

(6) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Disengage the support rods for the APU access doors.
- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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FUEL FLOW DIVIDER AND SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel flow divider and the solenoid valve.
- B. The fuel flow divider and the solenoid valve are installed above the APU drain mast. The fuel flow divider has three fuel connections and a drain line. The solenoid valve has an electrical connection. The solenoid valve is on the fuel flow divider.
- C. You can get access to the fuel flow divider and the solenoid valve through the APU access doors.
- D. The fuel flow divider solenoid valve is referred to as "solenoid valve" in this procedure.

TASK 49-31-03-004-001

2. Solenoid Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 014-002

- (1) Remove the fuel flow divider (Ref par. 4).

S 024-003

- (2) Remove the solenoid valve:
  - (a) Remove the nuts (6), the washers (5), and the bolts (3).
  - (b) Remove the solenoid valve (2) from the fuel flow divider (4).
  - (c) Remove the packings (1) from the solenoid valve (2).
    - 1) Discard the packings (1).

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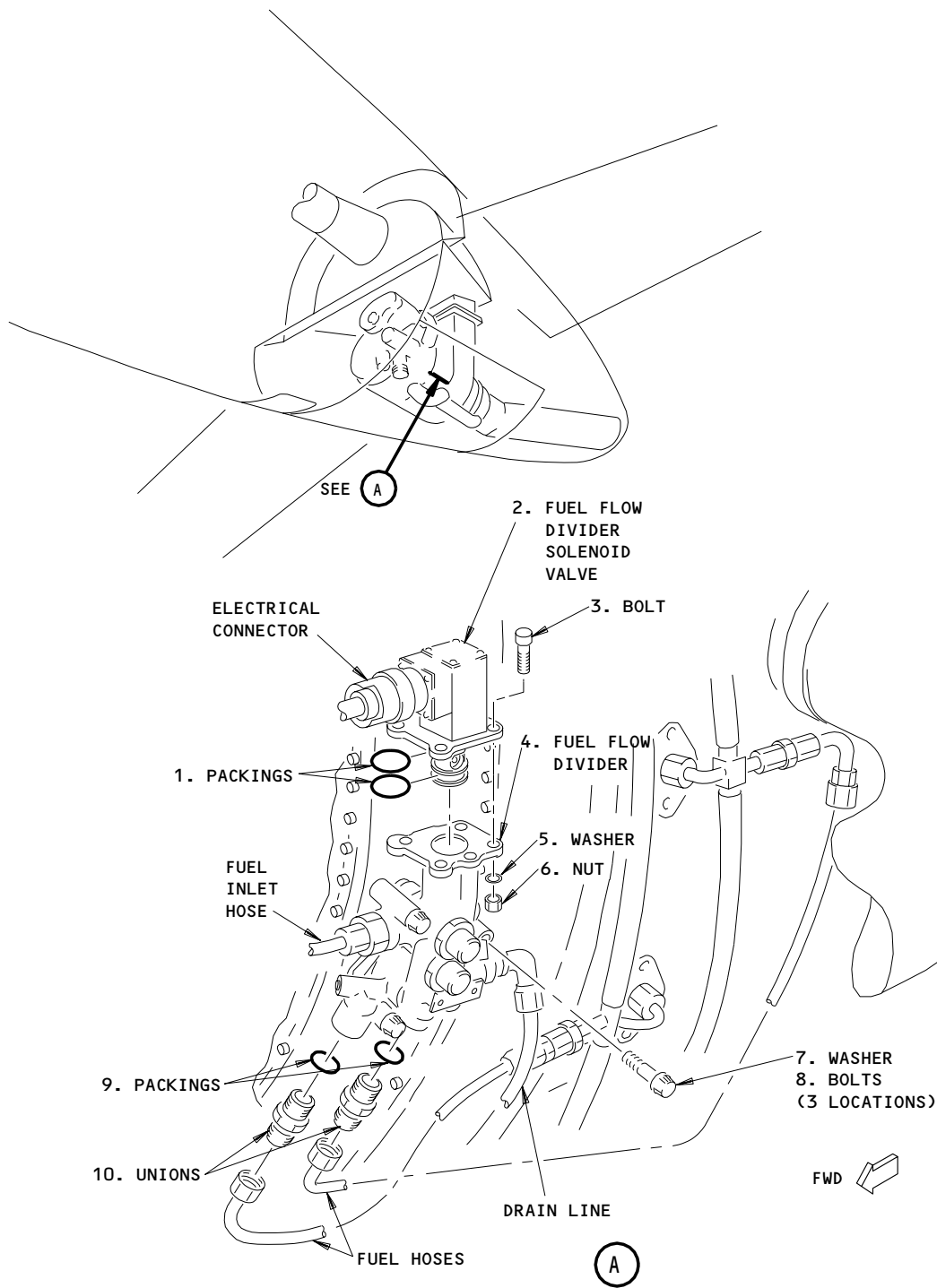
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Fuel Flow Divider and Solenoid Valve Installation  
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TASK 49-31-03-404-032

3. Solenoid Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-31-03	01	40
	2	Solenoid Valve			35

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-031

(1) Install the solenoid valve:

- (a) Lubricate the new packings (1) with a light coat of lubricant.
- (b) Install the packings (1) on the solenoid valve (2).
- (c) Put the solenoid valve (2) in its position on the fuel flow divider (4).

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- (d) Install the bolts (3), the washers (5), and the nuts (6).
  - 1) Tighten the nuts (6) to 40-50 inch-pounds (4.5-5.7 newton-meters).

S 414-033

- (2) Install the fuel flow divider (Ref par. 5).

TASK 49-31-03-004-034

4. Fuel Flow Divider Removal (Fig. 401)

A. Standard Tools and Equipment

- (1) Container - 1 U.S. Gallon (4 Liter) capacity, for fuel

B. References

- (1) SSM 49-31-01
- (2) WDM 49-14-11

C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

D. Procedure

S 864-035

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-036

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-037

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches for the APU access doors.
  - (b) Open the left access door.

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- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 034-041

- (4) Disconnect the electrical connector from the solenoid valve.

S 024-009

- (5) Remove the fuel flow divider:
  - (a) Put the container below the fuel flow divider.
  - (b) Disconnect the drain line (6) from the fuel flow divider (4).
  - (c) Disconnect the fuel inlet hose from the fuel flow divider (4).
  - (d) Disconnect the fuel hoses from the unions (10).
    - 1) Install caps on all the fuel hoses and the flow divider fittings for protection.
  - (e) Remove the bolts (8) and the washers (7).
  - (f) Remove the fuel flow divider (4) from the APU.
  - (g) Remove the unions (10) and the packings (9) from the fuel flow divider (4).
    - 1) Discard the packings (9).

S 034-038

- (6) If the fuel flow divider and the solenoid valve are not to be replaced as an assembly, remove the solenoid valve (Ref par. 2).

TASK 49-31-03-404-013

5. Fuel Flow Divider Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Fuel Flow Divider	49-31-03	01	5
	9	Packing	49-31-09	01	15

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C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-31-01
- (4) WDM 49-14-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 434-039

- (1) If the solenoid valve is not installed on the fuel flow divider, install the solenoid valve (Ref par. 3).

S 424-014

- (2) Install the fuel flow divider:
  - (a) Lubricate the new packings (9) with a light coat of lubricant.
  - (b) Install the packings (9) on the unions (10).
  - (c) Install the unions (10) in the fuel flow divider (4).
    - 1) Tighten the unions (10) to 95-105 inch-pounds (10.7-11.9 newton-meters).
  - (d) Attach the fuel flow divider (4) to the APU with the bolts (8) and the washers (7).
    - 1) Tighten the bolts (8) to 50-55 inch-pounds (5.7-6.2 newton-meters).

**CAUTION:** DO NOT LET THE FUEL HOSES TWIST WHILE YOU TIGHTEN THE NUTS. DAMAGE TO THE FUEL HOSES CAN OCCUR WHICH CAN CAUSE FUEL LEAKAGE OR AN INSUFFICIENT SUPPLY OF FUEL TO THE APU.

- (e) Connect the fuel hoses to the unions (10).
  - 1) Tighten the fuel hoses to 120-135 inch-pounds (13.6-15.3 newton-meters).

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(f) Connect the fuel inlet hose and the drain line to the fuel flow divider (4).

S 434-040

- (3) Connect the electrical connector to the solenoid valve.  
(a) Install a lockwire on the electrical connector.

S 744-023

- (4) Do the BITE test for the APU system (AMM 49-61-05/201).

S 864-024

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:  
(a) E6 Rack, Aft Equipment Center  
    1) APU CONT  
(b) P11 Overhead Panel  
    1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-026

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-027

- (7) Do a leakage check for the fuel flow divider:  
(a) Do this task: APU Start and Operation (AMM 49-11-00/201).  
(b) During the APU operation, examine the fuel flow divider and the solenoid valve for leakage.  
(c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).  
(d) If you found leakage, repair the cause of it.

S 414-030

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Disengage the support rods for the APU access doors.  
(b) Put the support rods in the clips on the inner side of the APU access doors.  
(c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.  
(d) Lift the left access door and align it with the right access door.  
(e) Close and latch the APU access doors.

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APU FUEL FILTER ELEMENT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel filter element for the APU.
- B. The fuel filter element is installed in a housing on the fuel control unit. The fuel control unit is on the APU gearbox. You can get access to the fuel control unit and the fuel filter through the APU access doors.

TASK 49-31-04-004-001

2. Fuel Filter Element Removal (Fig. 401)

A. Equipment

- (1) Container – Fuel Resistant, 1 Gallon (4 Liters)

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

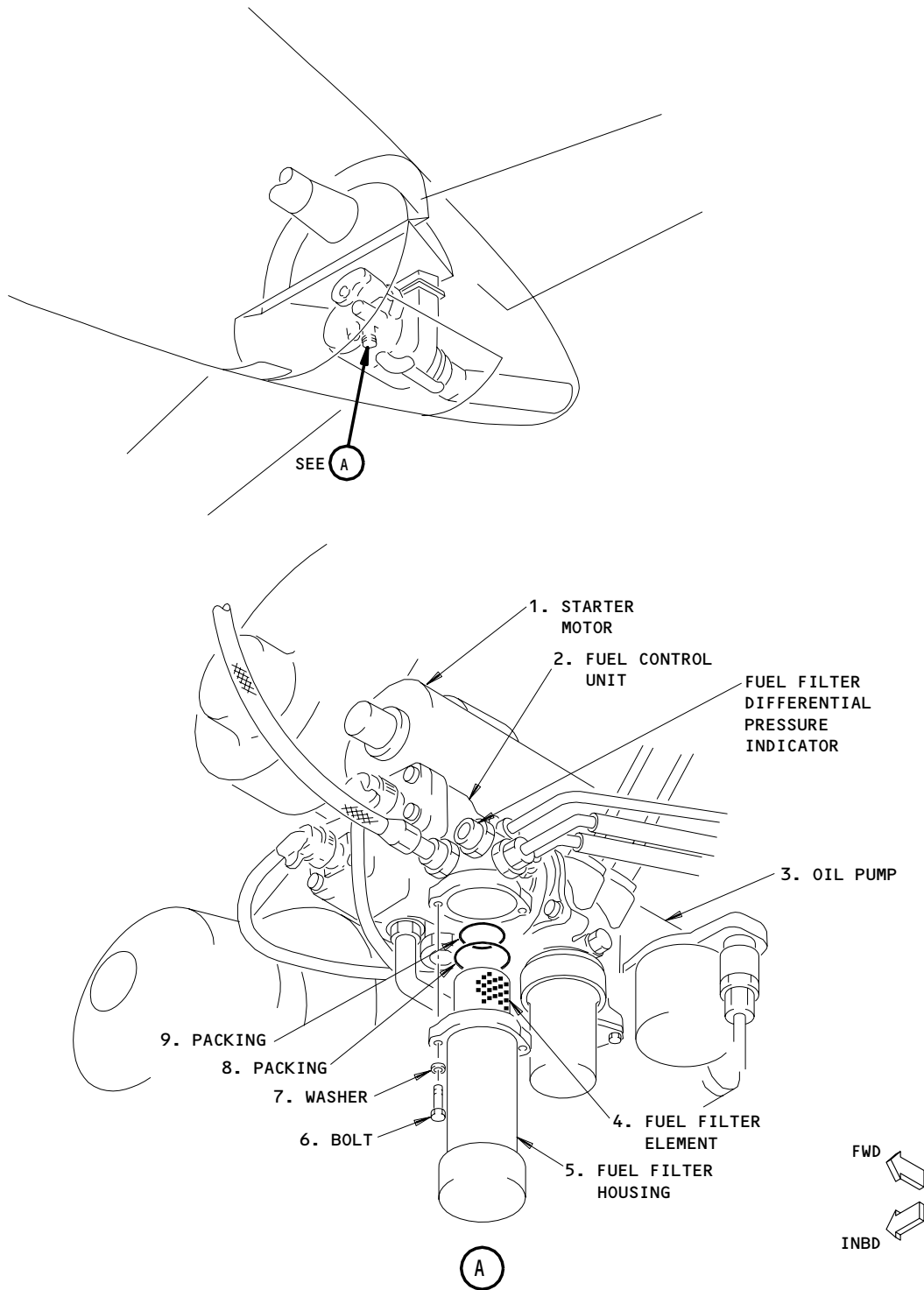
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APU Fuel Filter Element Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the fuel filter element:
  - (a) Put the container below the fuel filter housing (5).
  - (b) Remove the bolts (6) and the washers (7) from the fuel filter housing (5).
  - (c) Remove the fuel filter housing (5).
  - (d) Remove the fuel filter element (4) and the packings (8 and 9) from the fuel filter housing (5).
  - (e) Discard the fuel filter element (4) and the packings (8 and 9).
  - (f) Remove the container.

TASK 49-31-04-404-009

3. Fuel Filter Element Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	4	Fuel Filter Element	49-31-04	01	30
	8	Packing			25
	9	Packing			35

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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E. Procedure

S 424-021

- (1) Install the fuel filter element:
- (a) Lubricate the new packings (8 and 9) with a light coat of lubricant.

**CAUTION:** DO NOT REMOVE THE PERFORATED COVER FROM THE PUROLATOR FILTER ELEMENT. THE PERFORATED COVER IS PART OF THE FILTER ELEMENT.

- (b) Install the fuel filter element (4) and the packing (9) in the fuel filter housing (5).
- (c) Install the packing (8) on the fuel filter housing (5).
- (d) Attach the fuel filter housing (5) to the fuel control unit (2) with the bolts (6) and the washers (7).
  - 1) Tighten the bolts (6) to 50-52 inch-pounds (5.7-5.9 newton-meters).

S 864-014

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-016

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-017

- (4) Do a leakage check for the filter element installation:
- (a) Do this task: APU Start and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-020

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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APU FUEL FILTER ELEMENT – INSPECTION/CHECK

1. General

- A. This procedure contains the inspection task for the fuel filter element for the APU.
- B. The fuel filter element is installed in a housing on the fuel control unit. The fuel control unit is on the APU gearbox. You can get access to the fuel control unit and the fuel filter through the APU access doors.

TASK 49-31-04-206-017

2. Fuel Filter Element Inspection (Fig. 601)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-31-04/401, Fuel Filter Element
- (3) AMM 49-31-07/201, High Pressure Fuel Filter
- (4) AMM 49-31-08/201, Fuel Divider Filter Element
- (5) AMM 49-31-10/401, Fuel Filter Differential Pressure Indicator

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.

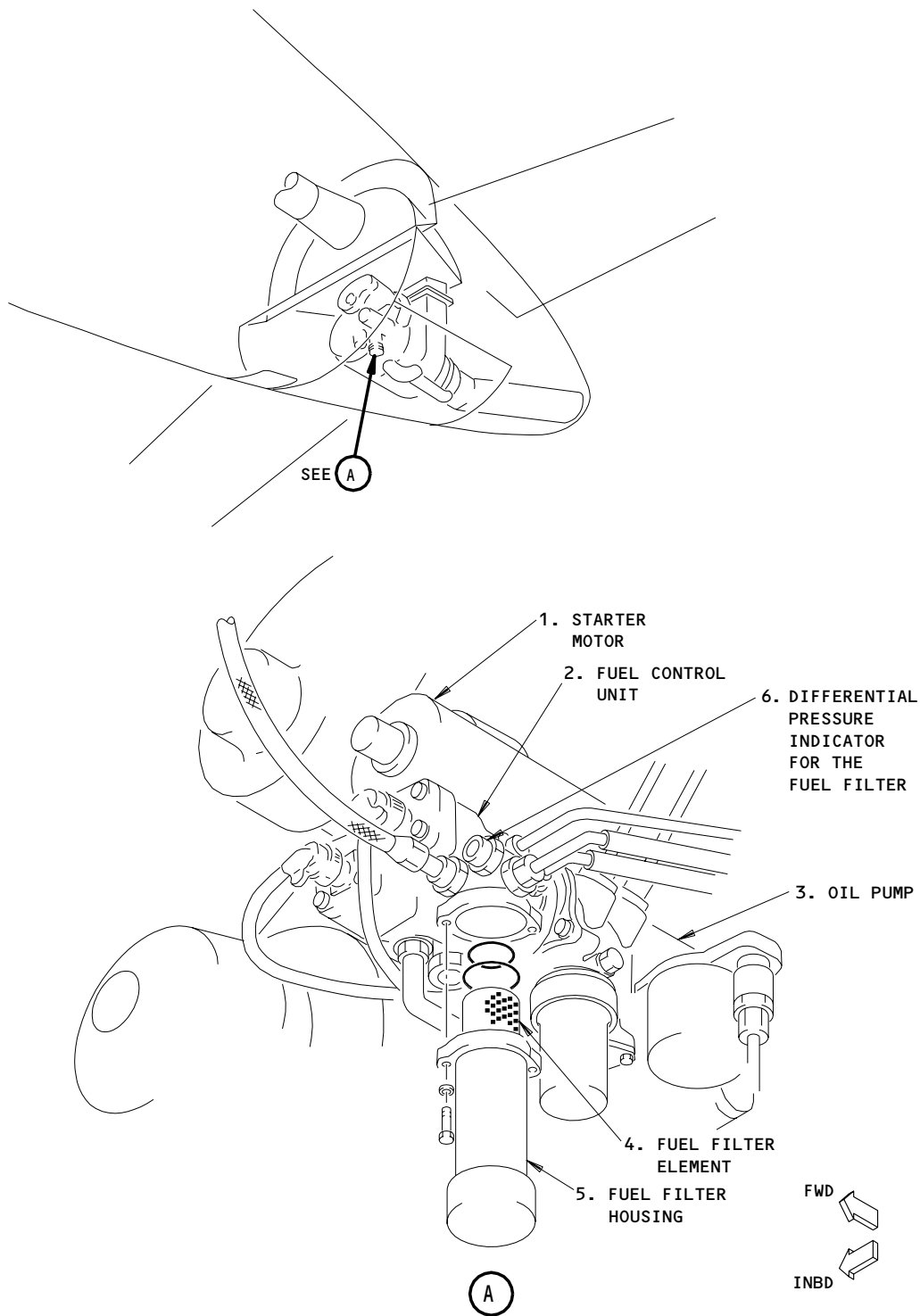
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APU Fuel Filter Element Inspection  
Figure 601

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- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 216-021

- (4) Do the visual inspection of the differential pressure indicator (6) for the fuel filter.
  - (a) Look at the differential pressure indicator (6) for the fuel filter.
  - (b) If the differential pressure indicator (6) is not pushed out, then do the steps below in the Put the Airplane Back to Its Usual Condition.

NOTE: The fuel filter element is OK and the APU can be returned to service.

- (c) If the differential pressure indicator (6) is pushed out, then push it in and continue.
- (d) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - 1) E6 Rack, Aft Equipment Center
    - a) APU CONT
  - 2) P11 Overhead Panel
    - a) 11B34, APU MN BAT CONT or  
APU ALTN CONT
- (e) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- (f) Start the APU (AMM 49-11-00/201) and operate at 100% RPM.
- (g) Do the APU shutdown procedure (AMM 49-11-00/201).
- (h) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- (i) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - 1) P11 Overhead Panel
    - a) 11B34, APU MN BAT CONT or  
APU ALTN CONT
  - 2) E6 Rack, Aft Equipment Center
    - a) APU CONT
- (j) Look at the differential pressure indicator (6).
- (k) If the differential pressure indicator (6) is not pushed out, replace it (AMM 49-31-10/401).
- (l) If the indicator (6) is pushed out, do an inspection of the element (4) for the fuel filter:

NOTE: This is an indication that the differential pressure is more than the limit and the fuel filter has blockage.

- 1) Remove the fuel filter element (AMM 49-31-04/401).
- 2) Examine the filter element (4) for contamination.
- 3) Install a new fuel filter element (AMM 49-31-04/401).

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- 4) If you saw contamination on the fuel filter element, do these steps:
  - a) Do the inspection of the high pressure fuel filter (AMM 49-31-07/201).
  - b) Do the inspection of the filter element for the fuel flow divider (AMM 49-31-08/201).
- D. Put the Airplane Back to Its Usual Condition

S 416-019

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 866-020

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or  
APU ALTN CONT

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FUEL FILTER BYPASS VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the bypass valve for the fuel filter. During this procedure, the bypass valve for the fuel filter is referred to as the bypass valve.
- B. The bypass valve is installed in the top of the fuel control unit. The fuel control unit is on the APU gearbox. You can get access to the fuel control unit and the bypass valve through the APU access doors.

TASK 49-31-05-004-001

2. Fuel Filter Bypass Valve Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

C. Procedure

- S 864-002
  - (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- S 864-003
  - (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - (a) P11 Overhead Panel
      - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
    - (b) E6 Rack, Aft Equipment Center
      - 1) APU CONT
- S 014-005
  - (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
    - (a) Open the latches on the APU access doors.

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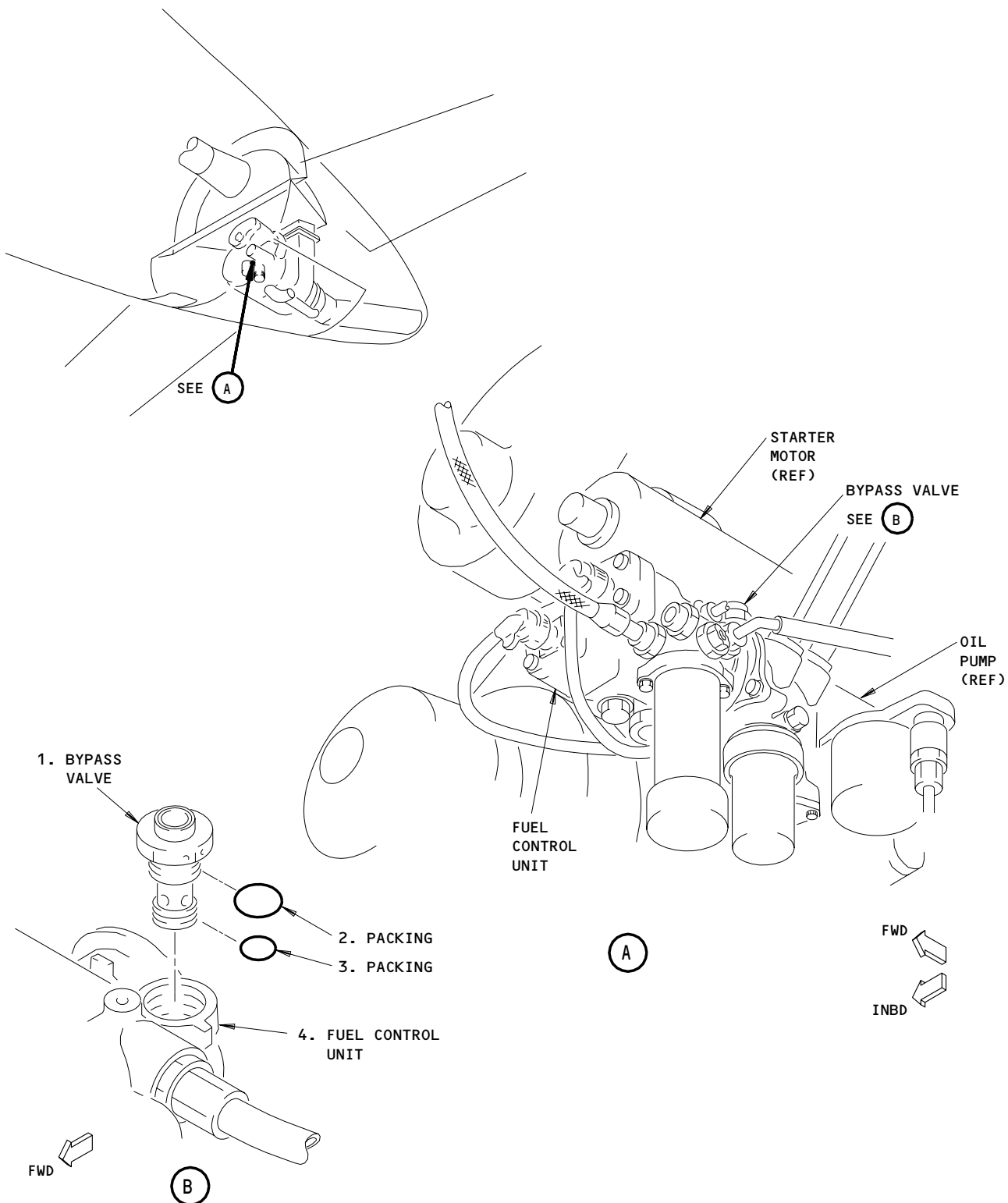
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Fuel Filter Bypass Valve Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-014

- (4) Remove the bypass valve:
  - (a) Put the container below the fuel filter.
  - (b) Remove the lockwire from the bypass valve (1).
  - (c) Remove the bypass valve (1) from the fuel control unit (4).
  - (d) Remove the packings (2 and 3) from the bypass valve (1).
    - 1) Discard the packings (2 and 3).

TASK 49-31-05-404-003

3. Fuel Filter Bypass Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Bypass Valve	49-31-05	01	10
	2	Packing			15
	3	Packing			20

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-015

- (1) Install the bypass valve:
  - (a) Lubricate the new packings (2 and 3) with a light coat of the lubricant.

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- (b) Install the packings (2 and 3) on the bypass valve (1).
- (c) Install the bypass valve (1) in the fuel control unit (4).
  - 1) Tighten the bypass valve (4) to 105-115 inch-pounds (11.9-13.0 newton-meters).
- (d) Install a lockwire to attach the bypass valve (1) to the fuel control unit (4).

S 864-007

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Do a leakage check for the bypass valve installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-013

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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FUEL MANIFOLDS AND NOZZLES – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel manifolds and the nozzles.
- B. There is a primary fuel manifold and a secondary fuel manifold. The fuel manifold assemblies are on the combustor housing.
- C. The fuel nozzles are part of the fuel manifold assembly, and the assembly will be removed as a unit. The fuel manifold assembly also contains the shrouds and the packing as well as the fuel nozzles.
- D. You can get access to the fuel manifold assemblies through the APU access doors.

TASK 49-31-06-004-001

2. Fuel Manifold Assembly Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel

- B. Access

- (1) Location Zones

- 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right

- (2) Access Panels

- 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

- C. Procedure

- S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

- S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
      - (a) P11 Overhead Panel
        - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
      - (b) E6 Rack, Aft Equipment Center
        - 1) APU CONT

- S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
      - (a) Open the latches on the APU access doors.

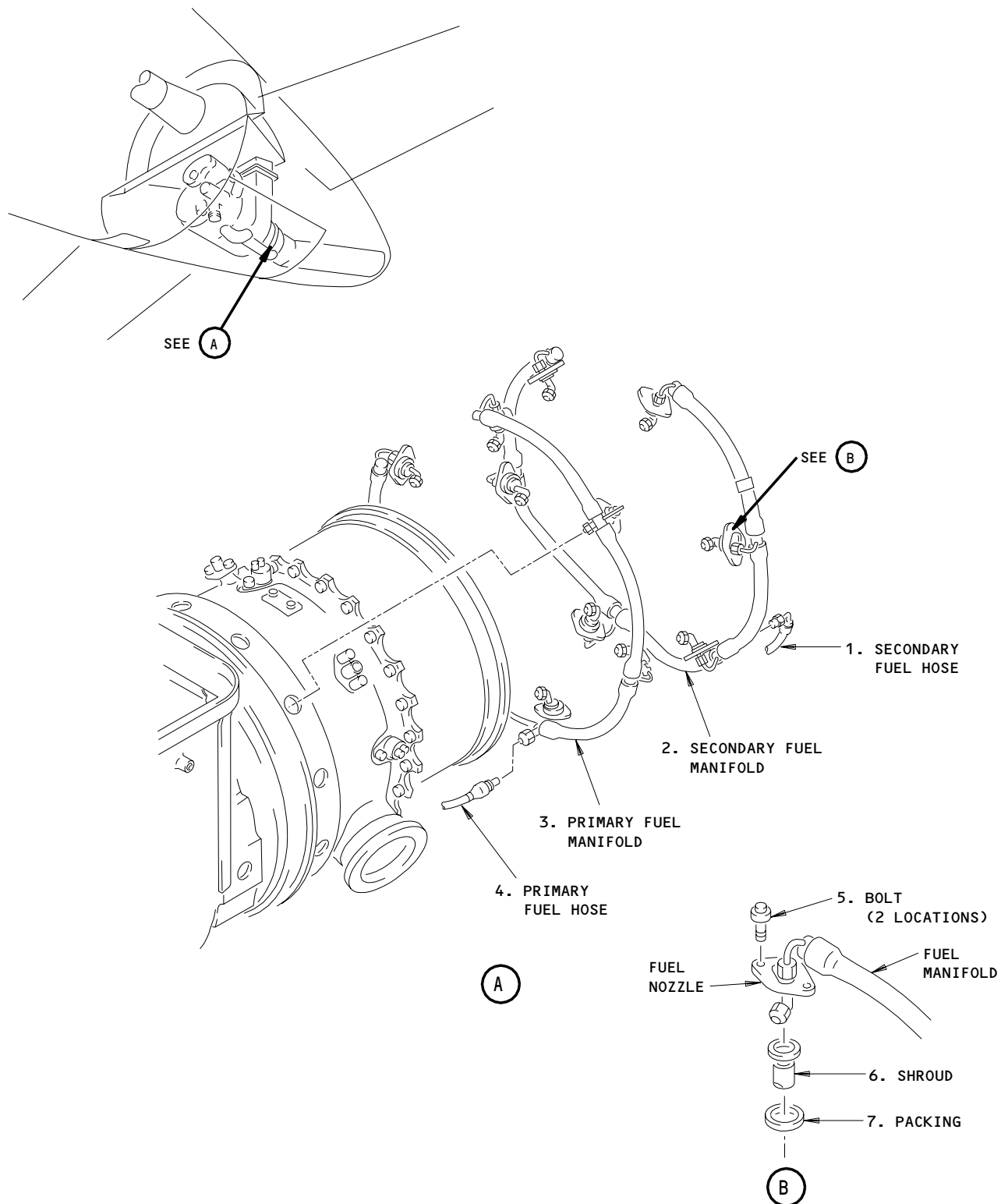
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Fuel Manifolds and Nozzles Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-026

- (4) Remove the fuel manifold assemblies:
  - (a) Put the container below the primary fuel hose.
  - (b) Disconnect the primary and the secondary fuel hoses (1 and 4) from the primary and the secondary fuel manifolds (2 and 3).
    - 1) Put protective caps on the ends of the fuel hoses and the fuel manifold connections.
  - (c) Remove the bolts (5) from the primary and the secondary fuel nozzle assemblies.
  - (d) Carefully lift the primary and secondary fuel nozzle assemblies from the engine.
  - (e) Remove the shrouds (6) and the packings (7) from the fuel manifold assemblies (2 and 3).
    - 1) Discard the packings (7).

TASK 49-31-06-404-010

3. Fuel Manifold Assembly Installation (Fig. 401)

A. Consumable Materials

- (1) D00010 Antiseize Compound - Fel-Pro C5-A

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Secondary Fuel Manifold	49-31-06	01	10
	3	Primary Fuel Manifold			5
	7	Packing			40

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

- (1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-011

- (1) Install the fuel manifold assemblies:
  - (a) Install the new packings (7) on the shrouds (6).
  - (b) Install the shrouds (6) on the fuel manifold assemblies (2 and 3).
  - (c) Install the fuel manifold assemblies (2 and 3) on the engine.
  - (d) Apply a layer of the antiseize compound to the bolts (5).
  - (e) Install the bolts (5) on the fuel manifold assemblies (2 and 3).
    - 1) Tighten the bolts (5) to 60-65 inch-pounds (6.8-7.3 newton-meters).
    - 2) Install lockwire on the bolts (5).
  - (f) Remove the protective caps from the fuel hoses and the fuel manifold connections.
  - (g) Connect the fuel hoses (1 and 4) to the fuel manifolds (2 and 3).
    - 1) Tighten the hoses (2 and 3) to 120-135 inch-pounds (13.6-15.3 newton-meters).

S 864-019

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-021

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-022

- (4) Do a leakage check of the fuel manifold installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel manifolds for leakage.

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- (c) Do a usual shutdown of the APU (AMM 49-11-00/201).
- (d) If you found leakage, repair the cause of it.

S 414-025

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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HIGH PRESSURE FUEL FILTER – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) High Pressure Fuel Filter Removal
  - (2) High Pressure Fuel Filter Installation
  - (3) High Pressure Fuel Filter Inspection
  - (4) Clean the High Pressure Fuel Filter.
- B. The filter for the high pressure fuel is installed in the fuel control unit. The fuel control unit is on the APU gearbox below the starter motor.
- C. You can get access to the high pressure fuel filter through the APU access doors.

TASK 49-31-07-002-001

2. High Pressure Fuel Filter Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

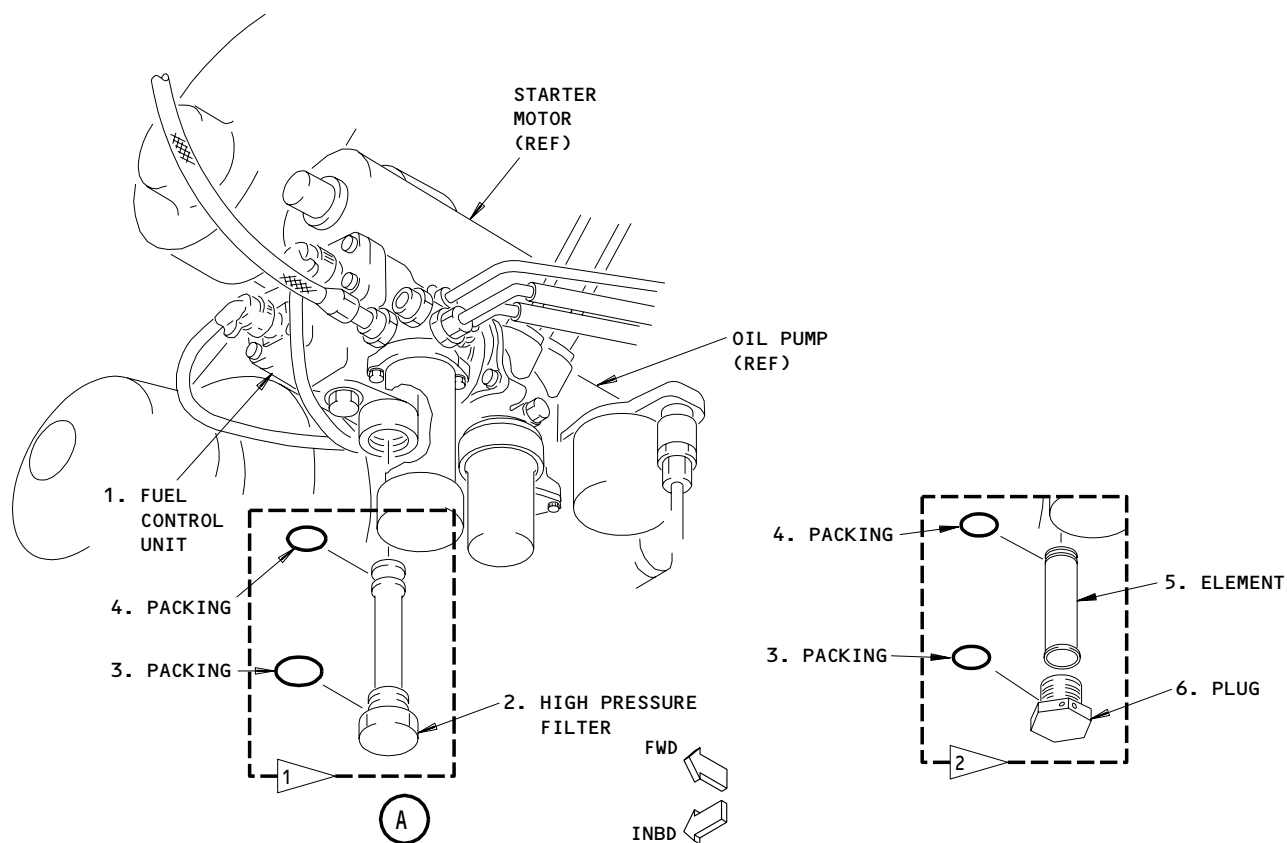
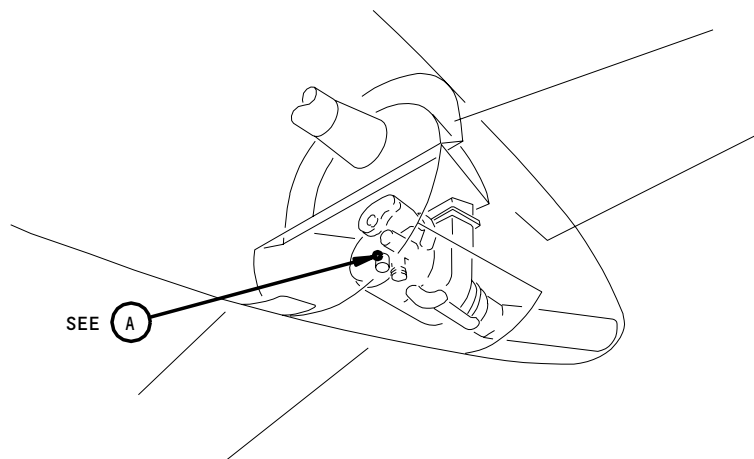
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1 APUs WITH A THREADED CAP THAT IS PART OF THE HIGH PRESSURE FILTER  
(APUs WITHOUT ALLIED SIGNAL SB 49-7156 OR SB 49-7157)

2 APUs THAT HAVE A HIGH PRESSURE FILTER WITH A SEPARATE THREADED PLUG  
(APUs WITH ALLIED SIGNAL SB 49-7156 OR SB 49-7157)

High Pressure Fuel Filter - Maintenance Practices  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-041

- (4) APU WITH A THREADED CAP THAT IS PART OF THE FILTER (PRE-GARRETT-SB 49-7156 OR SB 49-7157);  
Remove the filter for the high pressure fuel:
- (a) Remove the lockwire on the high pressure filter (2).
  - (b) Remove the high pressure filter (2) from the fuel control unit (1).
  - (c) Remove the packings (3 and 4) from the high pressure filter (2).
    - 1) Discard the packings (3 and 4).

S 022-049

- (5) APU THAT HAVE A FILTER WITH A SEPARATE THREADED PLUG (POST-GARRETT-SB 49-7156 OR SB 49-7157);  
Remove the filter for the high pressure fuel:
- (a) Remove the lockwire on the plug (6).
  - (b) Remove the plug (6) and the element (5) from the fuel control unit (1).
  - (c) Remove the element (5) from the plug (6).
  - (d) Remove the packings (3 and 4) from the element and plug.
    - 1) Discard the packings (3 and 4).

TASK 49-31-07-402-009

3. High Pressure Fuel Filter Installation (Fig. 201)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	High Pressure Filter	49-31-07	01	10
	3	Packing			25
	4	Packing			30
	5	Element			15

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

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D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-042

(1) APU WITH A THREADED CAP THAT IS PART OF THE FILTER

(POST-GARRETT-SB 49-7156 OR SB 49-7157);

Install the filter for the high pressure fuel:

- (a) Lubricate the new packings (3 and 4) with a light coat of lubricant.
- (b) Install the packings (3 and 4) on the high pressure filter (2).
- (c) Install the high pressure filter (2) in the fuel control unit (1).
  - 1) Tighten the high pressure filter (2) to 25-27 inch-pounds (2.8-3.1 newton-meters).
- (d) Install a lockwire on the high pressure filter (2).

S 422-050

(2) APU THAT HAVE A FILTER WITH A SEPARATE THREADED PLUG

(POST-GARRETT-SB 49-7156 OR SB 49-7157);

Install the filter for the high pressure fuel:

- (a) Lubricate the new packings (3 and 4) with a light coat of lubricant.
- (b) Install the packing (3) on the plug (6).
- (c) Install the packing (4) on the element (5).
- (d) Install the element (5) on the plug (6).
- (e) Install the plug and element in the fuel control unit (1).
  - 1) Tighten the plug (6) to 25-27 inch-pounds (2.8-3.1 newton-meters).
- (f) Install a lockwire on the plug (6).

S 862-013

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) E6 Rack, Aft Equipment Center
  - 1) APU CONT
- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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- S 862-015
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 792-016
- (5) Do a leakage test on the installation of the high pressure filter:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.
- S 412-021
- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

TASK 49-31-07-202-019

4. High Pressure Fuel Filter Inspection

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 012-043

- (1) If it is installed, remove the filter for the high pressure fuel.

S 212-020

- (2) Visually examine the filter for the high pressure fuel:
- (a) Examine the high pressure filter for cracks, torn areas, and deformation.
  - (b) Examine the openings of the high pressure filter for blockage.

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- (c) Examine the high pressure filter for too much finish.
- (d) Replace the high pressure filter if you find any of the above conditions.

S 412-044

- (3) Install the filter for the high pressure filter.

TASK 49-31-07-102-021

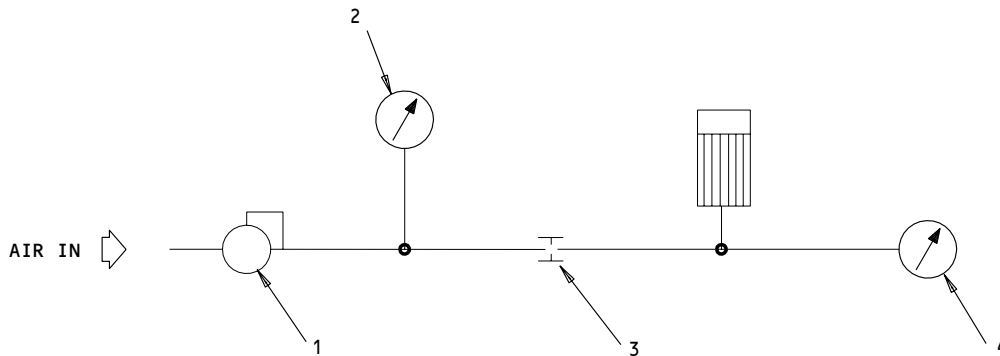
5. Clean the High Pressure Fuel Filter (Fig. 202)

A. Standard Tools and Equipment

- (1) Container - 1 U.S. Gallon (4 Liter) capacity, for solutions (3 are necessary)
- (2) Beaker - Sufficiently large to hold the high pressure filter
- (3) Compressed Air Source - 30 psig maximum
- (4) Ultrasonic Sump
- (5) Air Pressure Regulator - 0-30 psig
- (6) Air Pressure Gage - 0-30 psig (two are necessary)
- (7) Restrictor Unit - 0.042 inch diameter orifice

B. Consumable Materials

- (1) G00016 Acid - Hydrochloric, MIL-L-13528
- (2) B00096 Cleaner - Dowclene EC
- (3) B00549 Electrocleaner - Wyandotte FS
- (4) E00116 Stripper - Rust Stripper, Oakite
  
- (5) B00722 Solvent - P-D-680, Stoddard Type 1



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. AIR PRESSURE REGULATOR<br/>(0 TO 30 PSIG)</li> <li>2. INLET PRESSURE GAGE<br/>(0 TO 30 PSIG)</li> </ul> | <ul style="list-style-type: none"> <li>3. RESTRICTOR UNIT<br/>(0.042 INCH DIAMETER ORIFICE)</li> <li>4. DOWNSTREAM PRESSURE<br/>GAGE (0 TO 30 PSIG)</li> </ul> |
|---|--|

Filter Element Pressure Drop Check  
Figure 202

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C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 012-022

- (1) If it is installed, remove the filter for the high pressure fuel.

S 112-045

**WARNING:** MAKE SURE YOU CLEAN THE FILTER ELEMENT IN A CLEAN AREA THAT HAS A GOOD FLOW OF AIR. MAKE SURE YOU HAVE FIRE EXTINGUISHERS AND CONTAINER COVERS NEAR YOU WHILE YOU DO THIS TASK. THE FUMES FROM THE SOLVENTS AND THE CLEANERS CAN CAUSE INJURY TO PERSONS.

- (2) Clean the filter element with the solvent (P-D-680):

**NOTE:** To use the filter temporarily, you can clean the element in the rust stripper solution and dry it with the compressed air. But, you must do the steps that follow to fully clean the filter element.

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND EQUIPMENT.

- (a) Make sure the solvent is cold:
- (b) Clean the filter element in the cold solvent.

S 152-040

- (3) Remove the rust from the filter element:

- (a) Prepare a solution of the rust stripper:
  - 1) Mix 3-5 pounds (1.4-2.3 kilograms) of the rust stripper with each gallon (4 liters) of water.
  - 2) Keep the solution at a temperature of 72°-82°C (162°-180°F).
  - 3) Use the air source to keep the solution fully mixed.

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- (b) Soak the filter element in the solution for 30 minutes.
- (c) Remove the filter element from the solution.
- (d) Fully flush the filter element with clean water.

S 112-025

- (4) Clean the filter element with the electrocleaner:
  - (a) Prepare a solution of the electrocleaner:
    - 1) Mix 9 ounces (255 grams) of the electrocleaner to each gallon (4 liters) of water.
    - 2) Keep the solution at a temperature of 72°-93°C (160°-200°F).
  - (b) Soak the filter element in the solution for 4-6 minutes .

NOTE: During this time, the filter element will be a positive voltage source for 1-2 minutes with a voltage of 4-7 volts dc.

- (c) Flush the filter element with cold faucet water.

S 112-027

- (5) Clean the filter element with the hydrochloric acid:
  - (a) Mix equal quantities of the hydrochloric acid and water in a container.
  - (b) Soak the filter element in the solution at a temperature of 70°-75°F (21°-24°C) for 30-60 seconds.
  - (c) Flush the filter element with cold faucet water.

S 112-030

- (6) Soak the filter element in the electrocleaner solution prepared in step 4.(a) for 4-6 minutes.
  - (a) Flush the filter with cold faucet water.

S 172-046

- (7) Flush the inner areas and the outer areas of the filter element with clean, pressurized water.

S 132-032

- (8) Clean the filter element in the ultrasonic cleaner:
  - (a) Put the filter element in the beaker with the open end pointed down.
  - (b) Fill the beaker with the cleaner.
  - (c) Put the beaker in the ultrasonic cleaner tank.
  - (d) Fill the ultrasonic cleaner tank with clean water until the water level is 3/8 inch (10 mm) from the top of the tank.
  - (e) Operate the ultrasonic cleaner for 5 minutes.
  - (f) Remove the beaker from the ultrasonic cleaner tank.
  - (g) Discard the dirty cleaner.
  - (h) Use a plastic bottle to flush the filter element and the beaker with clean cleaner.
  - (i) Fill the beaker with clean cleaner.
  - (j) Put the beaker in the ultrasonic cleaner tank.

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- (k) Operate the ultrasonic cleaner for 5 minutes.
- (l) Continue to do the previous steps until the cleaner stays clean after the 5 minute ultrasonic cleaner operation.

S 172-034

- (9) Flush the filter element:
  - (a) Remove the filter element from the beaker.
  - (b) Flush the inner areas and the outer areas of the filter element with clean, pressurized water.
  - (c) Dry the filter element with the compressed air source.

S 782-037

- (10) Do a pressure check of the cleaned filter element:
  - (a) Install the filter element in a test fixture equivalent to the one shown in Fig. 202.
  - (b) Adjust the regulator (1) until the inlet pressure gage (2) shows an inlet air pressure of 20 psig.
  - (c) Examine the pressure indication on the downstream pressure gage (4).
    - 1) Make sure the pressure on the downstream pressure gage (4) is not less than 15 psig.
  - (d) Replace the filter element if the downstream pressure is too low.

S 552-039

- (11) If the cleaned filter element is not to be installed immediately, keep the element in a clean dry container.

S 412-047

- (12) Install the filter for the high pressure fuel.

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FUEL DIVIDER FILTER ELEMENT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) Fuel Flow Divider Filter Element Removal
  - (2) Fuel Flow Divider Filter Element Installation
  - (3) Fuel Flow Divider Filter Element Inspection
  - (4) Clean the Fuel Flow Divider Filter Element.
- B. The filter element for the fuel flow divider is in the fuel flow divider. The fuel flow divider is on the aft bottom section of the APU.
- C. You can get access to the fuel flow divider through the APU access doors.

TASK 49-31-08-002-037

2. Fuel Flow Divider Filter Element Removal (Fig. 201)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel

B. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

C. Procedure

S 862-038

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-039

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-041

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

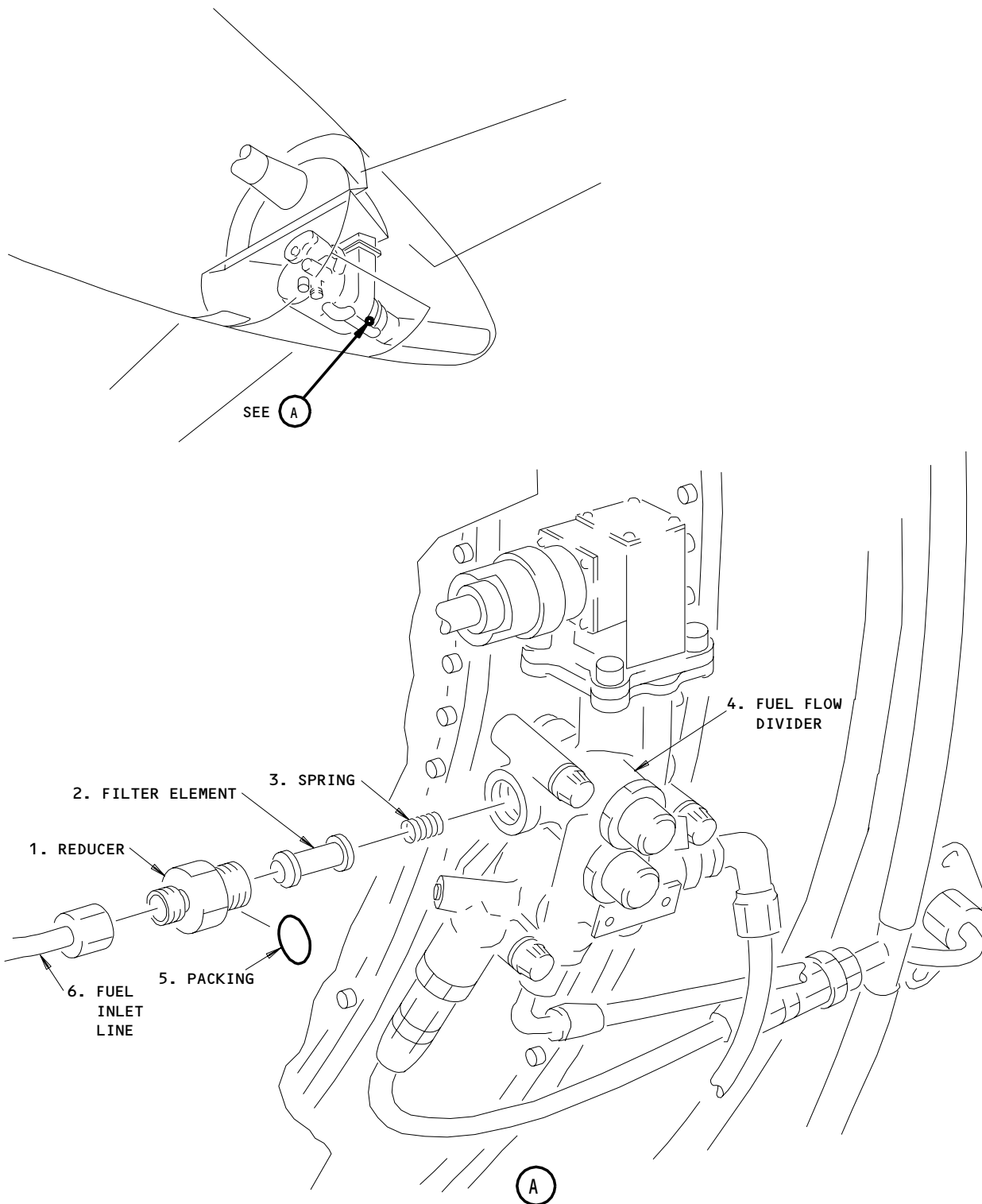
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Fuel Divider Filter Element Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-073

- (4) Remove the filter element for the fuel flow divider:
  - (a) Put the container below the fuel flow divider (4).
  - (b) Disconnect the fuel inlet line (6) from the reducer (1).
  - (c) Remove the reducer (1) and the packing (5) from the fuel flow divider (4).
    - 1) Discard the packing (5).
  - (d) Remove the filter element (2) and the spring (3) from the fuel flow divider (4).

TASK 49-31-08-402-044

3. Fuel Flow Divider Filter Element Installation (Fig. 201)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Filter Element	49-31-08	01	20
	5	Packing			15

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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E. Procedure

S 422-045

- (1) Install the filter element for the fuel flow divider:
  - (a) Install the spring (3) and the filter element (2) in the fuel flow divider (4).
  - (b) Lubricate the new packing (5) with a light coat of lubricant.
  - (c) Install the packing (5) on the reducer (1).
  - (d) Install the reducer (1) in the fuel flow divider (4).
    - 1) Tighten the reducer (1) to 75-80 inch-pounds (8.5-9.0 newton-meters).
  - (e) Connect the fuel inlet line (6) to the reducer (1).

S 862-047

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-049

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-050

- (4) Do a leakage test of the filter element installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel flow divider for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 412-053

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Close and latch the APU access doors.

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TASK 49-31-08-202-077

4. Fuel Flow Divider Filter Element Inspection

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 012-078

- (1) Remove the filter element for the fuel flow divider (Ref par. 2).

S 212-079

- (2) Visually examine the filter element for the fuel flow divider:
- (a) Examine the filter element for cracks, torn areas, and deformation.
  - (b) Examine the reducer for cracks, gouges, and damaged threads.
  - (c) Replace the filter element or the reducer if they have damage.

S 412-080

- (3) Install the filter element for the fuel flow divider (Ref par. 3).

TASK 49-31-08-102-054

5. Clean the Fuel Flow Divider Filter Element

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) E00116 Stripper - Rust Stripper, Oakite

C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

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D. Procedure

S 012-055

- (1) If it is installed, remove the filter element for the fuel flow divider (Ref par. 2).

S 112-075

- (2) Clean the filter element for the fuel flow divider:

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (a) Prepare a solution of the rust stripper:
- 1) Mix 3-5 pounds (1.4-2.3 kilograms) of the rust stripper with each gallon (4 liters) of water.
  - 2) Keep the solution at a temperature of 72°-82°C (162°-180°F).
  - 3) Use the air source to keep the solution fully mixed.
- (b) Soak the filter element in the solution for 5 minutes.
- (c) Remove the filter element from the solution and brush the element to remove the rust.
- (d) Flush the filter element with warm, soapy water.
- (e) Fully flush the filter element with clean water.
- (f) Dry the filter element with the compressed air.
- (g) If it is necessary, do steps (a) and (b) again until the filter element is clean.

S 412-076

- (3) Install the filter element for the fuel flow divider (Ref par. 3).

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FUEL MANIFOLD HOSES – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fuel manifold hoses.
- B. The fuel manifold hoses connect the fuel flow divider to the fuel manifolds. The hoses are on the left side of the APU, aft of the air inlet plenum.
- C. You can get access to the fuel manifold hoses through the APU access doors.

TASK 49-31-09-004-001

2. Fuel Manifold Hose Removal (Fig. 401)

A. Standard Tools and Equipment

- (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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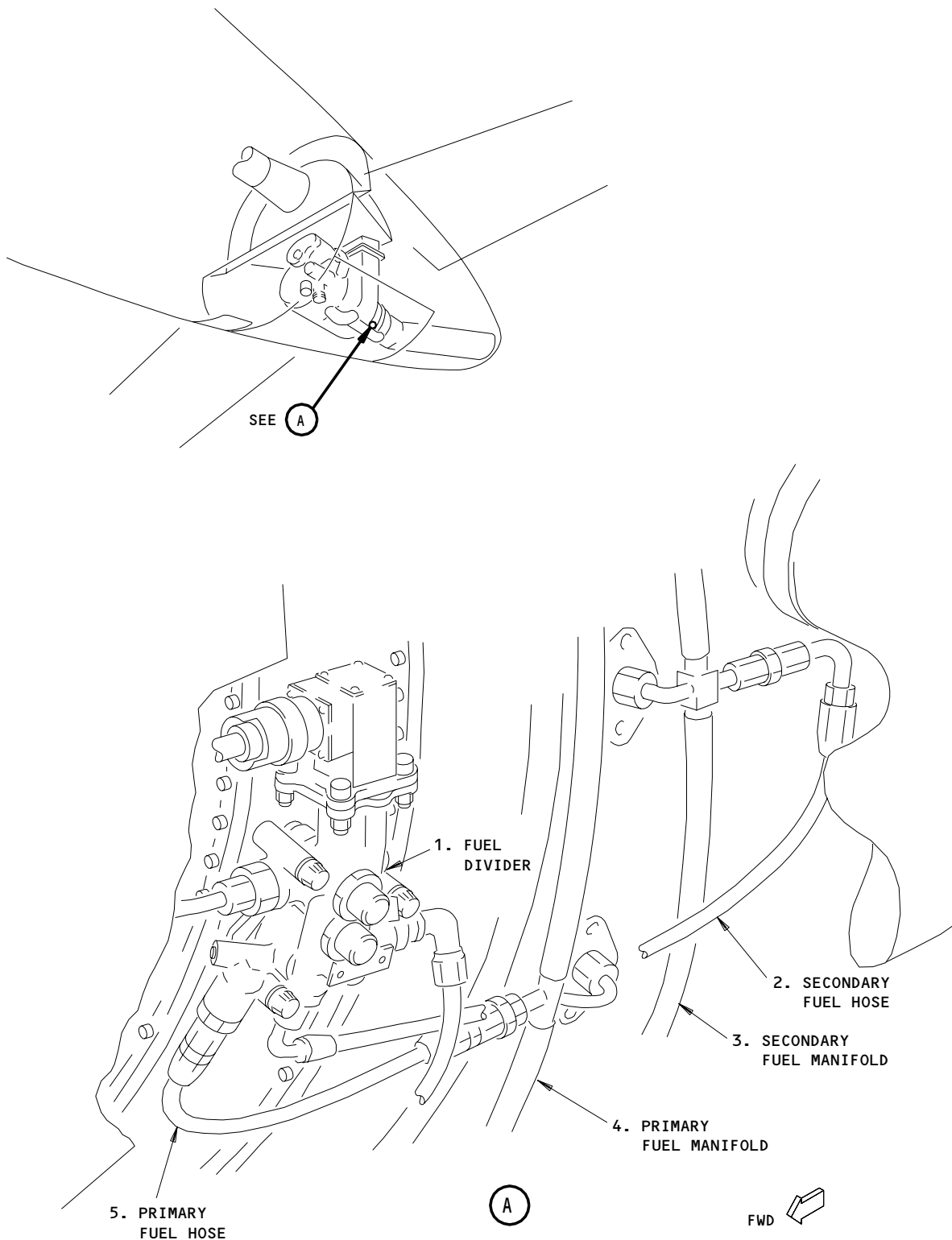
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Fuel Manifold Hoses Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-019

- (4) Remove the fuel manifold hoses:
  - (a) Put the container below the fuel manifolds.
  - (b) Disconnect the primary and secondary fuel hoses (2 and 5) from the fuel manifolds (3 and 4).
  - (c) Disconnect the primary and secondary fuel hoses (2 and 5) from the flow divider (1).
  - (d) Remove the fuel hoses (2 and 5).

TASK 49-31-09-404-008

3. Fuel Manifold Hose Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Secondary Fuel Hose	49-31-09	01	75
	5	Primary Fuel Hose			5

B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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D. Procedure

S 424-009

- (1) Install the fuel manifold hoses:

**NOTE:** The primary fuel hose has straight fittings on the two ends of the hose. The secondary fuel hose has 90 degree fittings on the two ends of the hose.

- (a) Connect the primary and the secondary fuel hoses (2 and 5) to the flow divider (1).
  - 1) Do not tighten the hoses (2 and 5) at this time.
- (b) Connect the primary fuel hose (5) to the primary fuel manifold (4).
  - 1) Align the hose (5) to remove any kinks in the hose.
- (c) Connect the secondary fuel hose (2) to the secondary fuel manifold (3).
  - 1) Align the hose (2) to remove any kinks in the hose.
- (d) Tighten all the primary and secondary hose fittings to 120-135 inch-pounds (13.6-15.3 newton-meters).
- (e) Install lockwires on all the fittings.

S 864-013

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-015

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-016

- (4) Do a leakage check of the fuel hose installation:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel manifold hoses for leakage.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-018

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.

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- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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FUEL FILTER DIFFERENTIAL PRESSURE INDICATOR –  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure indicator for the fuel filter. During this procedure, the indicator is referred to as the differential pressure indicator.
- B. The differential pressure indicator is installed on the fuel control unit. The fuel control unit is on the APU gearbox.
- C. You can get access to the fuel control unit and the differential pressure indicator through the APU access doors.

TASK 49-31-10-404-001

2. Fuel Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

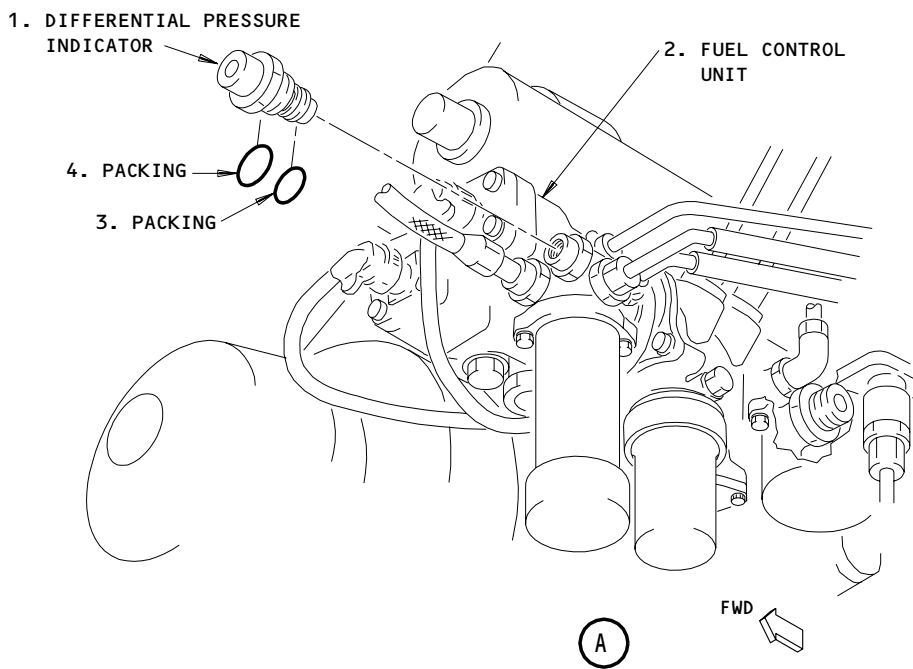
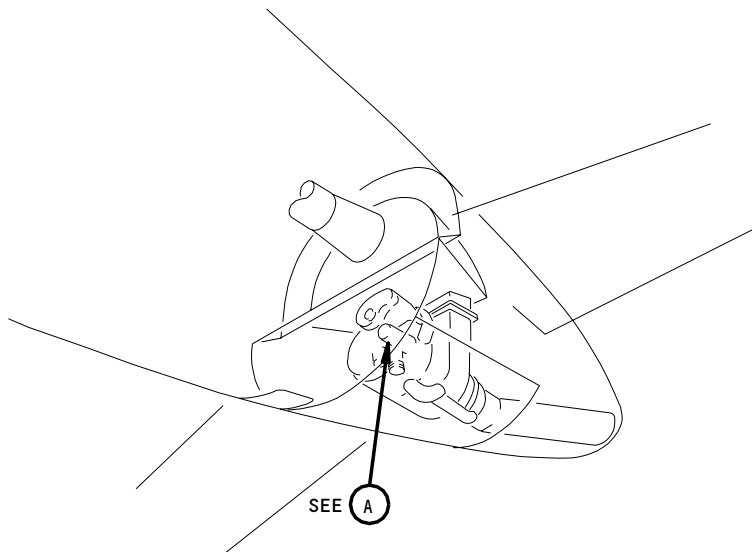
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Fuel Filter Differential Pressure Indicator Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the differential pressure indicator:
  - (a) Remove the differential pressure indicator (1) from the fuel control unit (2).
  - (b) Remove the packings (3 and 4) from the differential pressure indicator (1).
    - 1) Discard the packings (3 and 4).

TASK 49-31-10-404-017

3. Fuel Filter Differential Pressure Indicator Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Differential Pressure Indicator	49-31-10	01	10
	3	Packing			20
	4	Packing			15

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-018

- (1) Install the differential pressure indicator:
  - (a) Lubricate the new packings (3 and 4) with a light coat of lubricant.

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- (b) Install the packings (3 and 4) on the differential pressure indicator (1).
- (c) Install the differential pressure indicator (1) on the fuel control unit (2).
  - 1) Tighten the differential pressure indicator (1) to 105-115 inch-pounds (11.9-13.0 newton-meters).
  - 2) Install a lockwire on the differential pressure indicator (1).

S 864-010

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-012

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-013

- (4) Do a leakage check of the indicator installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-016

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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APU IGNITION/STARTING SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The APU ignition and starting provides the means of accelerating the APU engine to starting speed and igniting the fuel-air mixture in the combustor. The system consists of a starter motor, ignition unit, igniter plug, and an igniter lead. The Transformer Rectifier Unit (TRU) provides 28 volts dc to the system. The APU battery serves as a backup power source. The ignition and starting system is automatically controlled by the APU control unit.
2. Component Details
  - A. Ignition Unit (Fig. 1)
    - (1) The ignition unit converts battery power into high voltage current required to produce a capacitive spark at the igniter plug. It has a 28-volt dc input and an 18 kv output. The unit consists of a transformer, electronic vibrator, rectifier, booster coil, and series of capacitors all enclosed in a single case. It is located below the mounting bracket on the right rear side.
  - B. Ignition Lead (Fig. 1)
    - (1) The ignition lead conducts the output current of the ignition unit to the igniter plug. The lead consists of an insulated electrical conductor encased in a braided copper conduit with insulated, threaded connectors at each end. The lead and connectors are shielded to prevent radio interference.
  - C. Igniter (Fig. 1)
    - (1) The igniter provides a high energy spark for igniting the fuel-air mixture in the engine combustor. It consists of an outer casing, a center electrode made of tungsten alloy, a ceramic insulator, and a hastelloy X tip. It is located on the right side of the combustor case.
  - D. Starter Motor (Fig. 2)
    - (1) The starter motor has four brushes and four poles. The starter is powered by 28 volts dc from the TRU or the APU battery. An indicator peg for brush wear is located under a transparent window. The starter motor is mounted with a V-band clamp on the upper left side of the accessory gearbox.
3. Operation
  - A. Functional Description
    - (1) Start Sequence (Fig. 3)

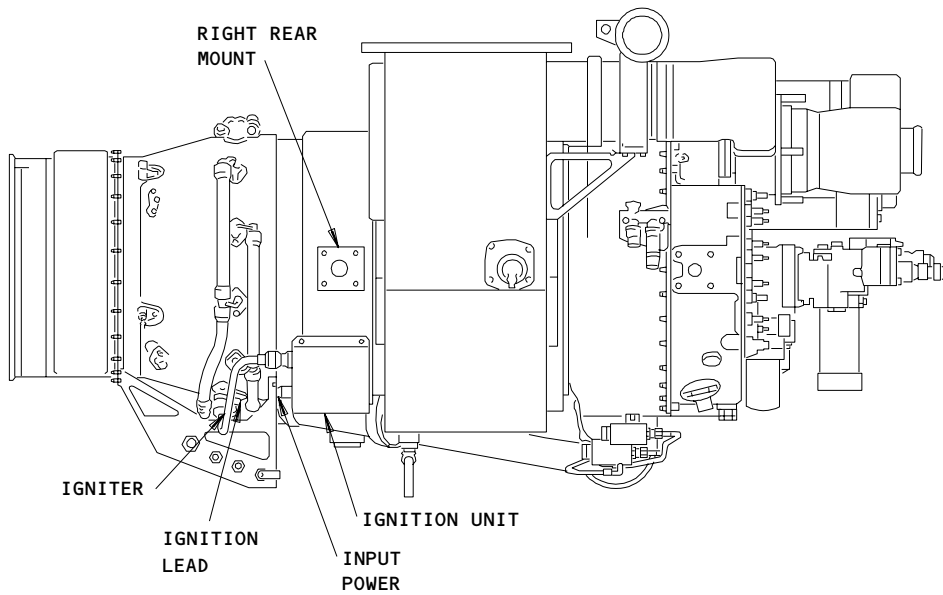
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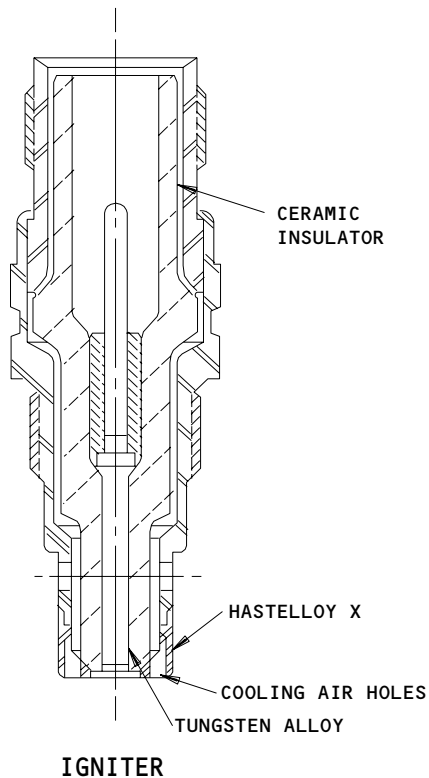
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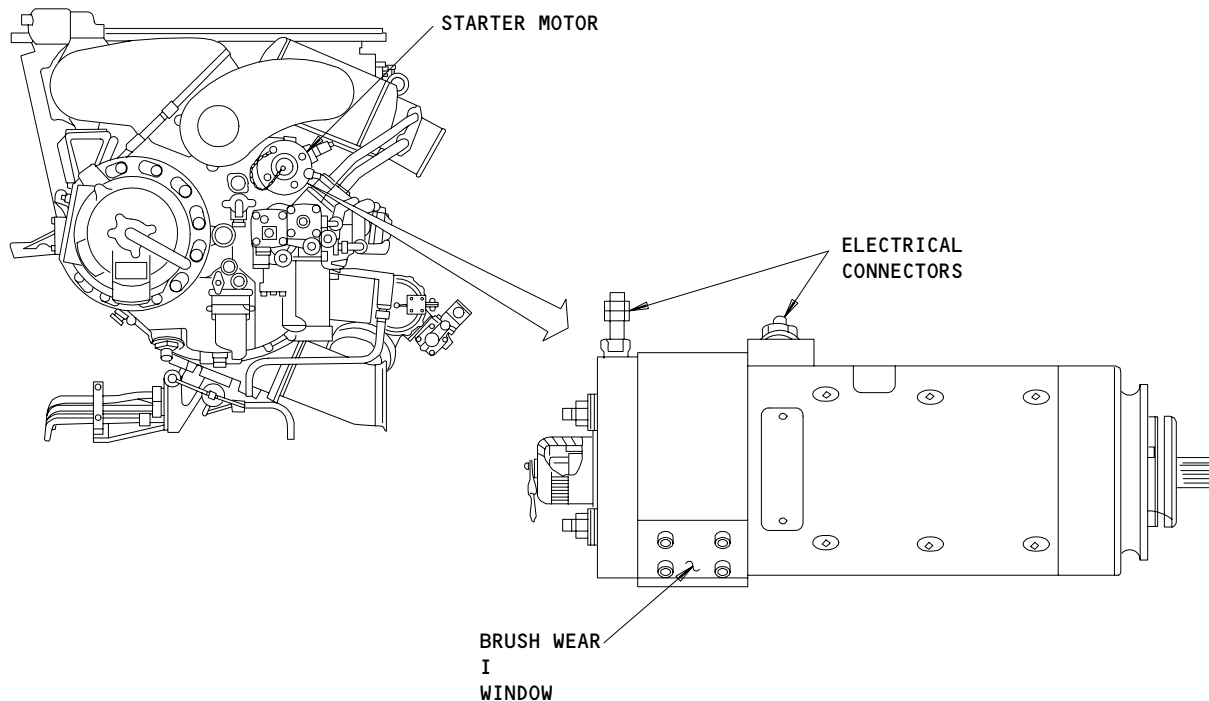


APU Ignition System Location  
Figure 1

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- (a) Positioning the APU start switch to START, then relaxing to ON, initiates the start sequence. The fuel shutoff valve for the APU opens allowing a fuel pump (APU dc fuel pump or ac boost pump) to supply fuel to the APU. The intake door actuator for the APU is energized and when the door is fully opened a ground start/on signal is supplied to the APU control unit. The TRU converts 115-volt ac power to 28-volt dc power and supplies it to the starter motor. When the TRU is not being used, the APU control unit energizes the start relay, which closes the crank contactor to complete the circuit to supply 28-volt dc power from the APU battery to the starter motor. When the engine reaches 7% speed the APU control unit energizes the ignition unit. The electronic vibrator in the ignition unit converts the 28-volt dc power to pulsating current. The voltage is stepped up and passed through a rectifier into storage capacitors. When the capacitors are fully charged, the capacitor air gap breaks down. High voltage current discharges into the primary coils of the booster coil. The secondary windings of the booster coil produce a surge current which is transmitted through the igniter lead to the center electrode of the igniter plug. At 50% engine speed the APU control unit de-energizes the starter motor. At 95% engine speed the APU control unit de-energizes the ignition unit. The heat of combustion sustains operation and the engine accelerates until 100% speed is reached.

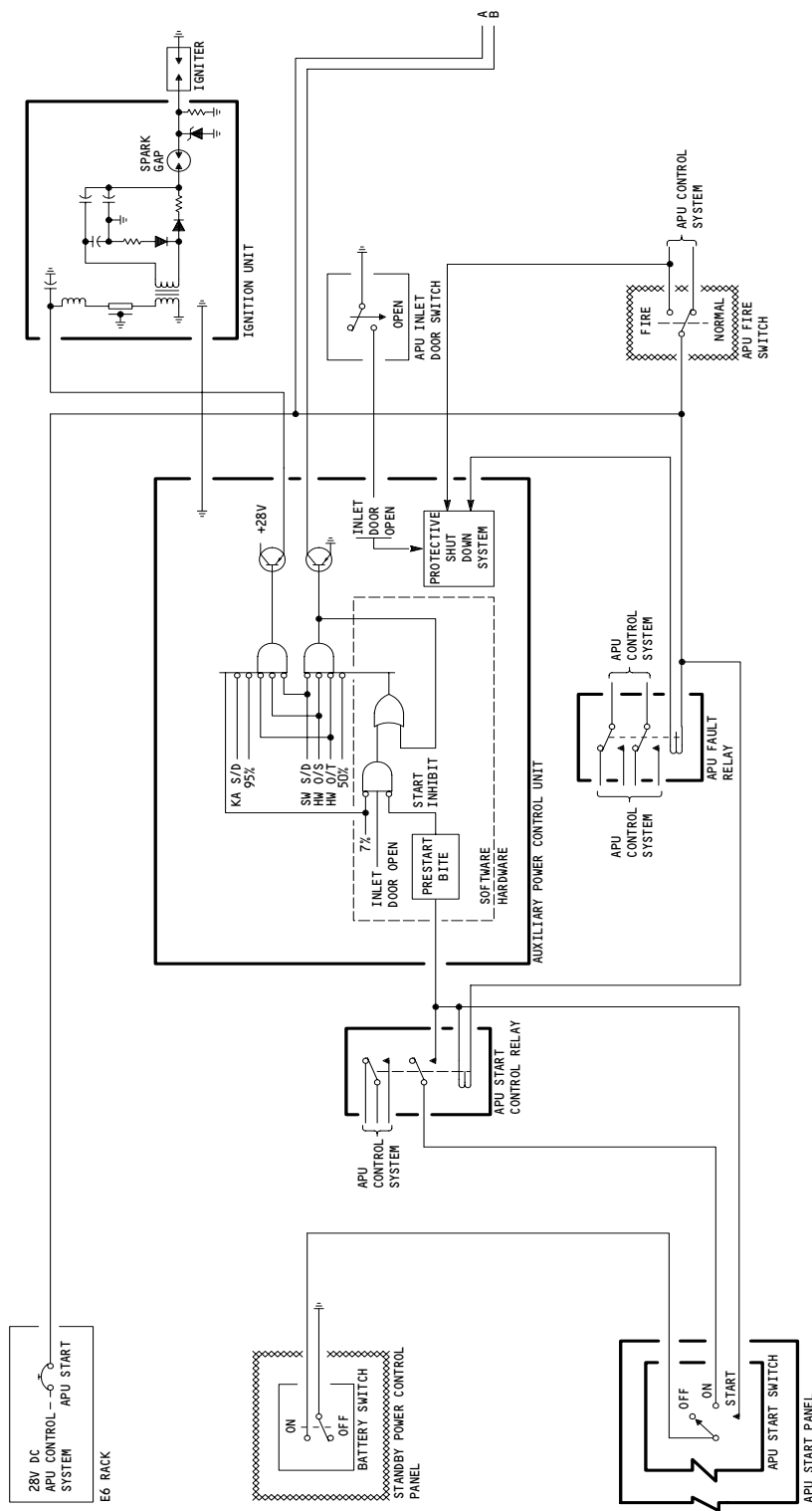


APU Starter Location  
Figure 2

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APU Ignition and Starting System Schematic  
Figure 3 (Sheet 1)

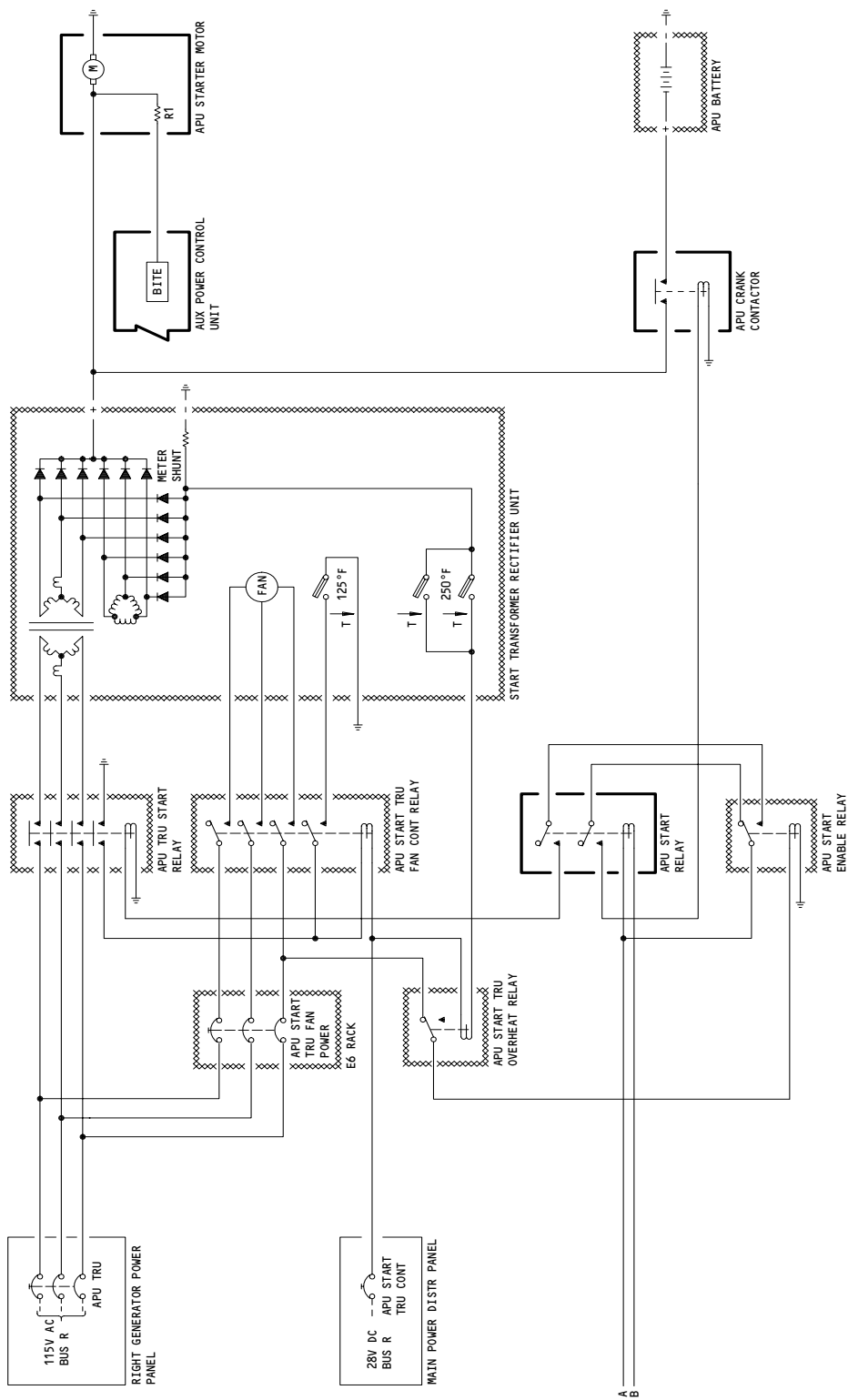
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APU Ignition and Starting System Schematic  
Figure 3 (Sheet 2)

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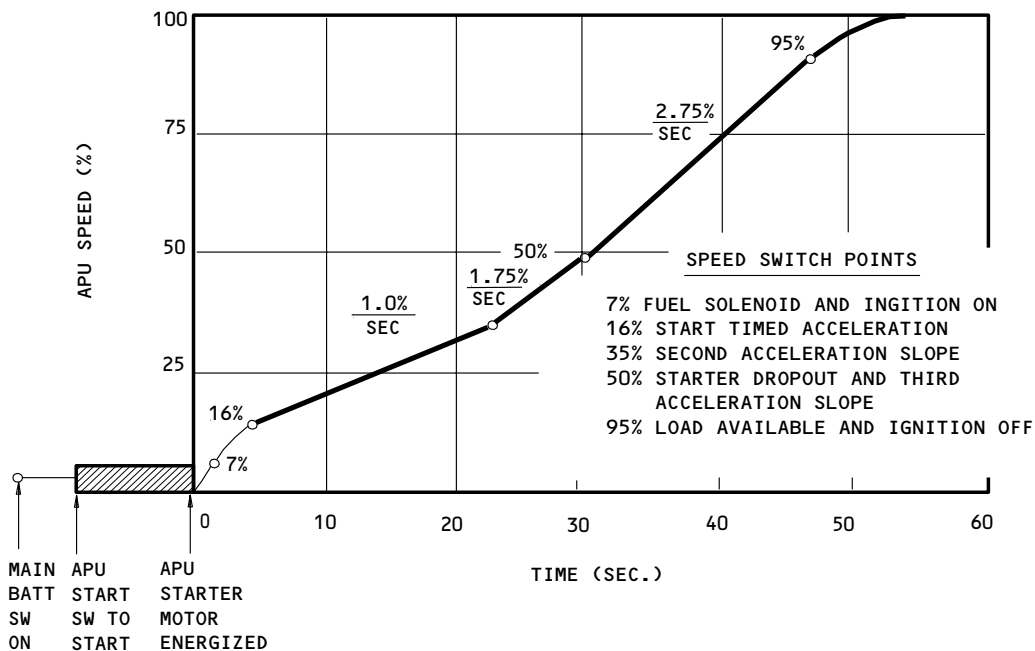
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- (2) APU Control Unit (Fig. 4)
- (a) The APU control unit provides control logic for APU start. It uses three logic programs: timed acceleration, speed sequencing, and ultimate temperature trim.
- (b) Timed Acceleration
- 1) The APU control unit selects set points for the governor reference to control fuel flow to the APU as it accelerates. It supplies only enough fuel to keep engine speed the same as the governor reference. Set points are increased as a function of time from an initial speed of 16%.
- (c) Speed Sequencing
- 1) After start is initiated, the APU control unit controls all APU engine components. At 7% speed it energizes the ignition unit and the solenoid valve for the fuel control. At 50% speed the starter motor is de-energized. At 95% speed the ignition unit is de-energized while the solenoid valve for the flow divider is opened. Beyond this point, APU electrical and pneumatic loading is allowed.



APU Start Acceleration  
Figure 4

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- (d) Ultimate Temperature Trim
  - 1) The APU control unit protects against engine overtemperature through fuel flow control.
- (e) Speed Governing
  - 1) The APU control unit has two separate points for 100% speed set for ground operations in a non-MES mode and for in-flight MES mode.

**B. BITE**

- (1) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The APU control unit monitors the ignition and starting system operation and components and writes the faults it finds in BITE memory (AMM 49-61-00/001). Failures of the ignition unit, starter contactor, and APU starter are shown on the FAULTY UNIT matrix. These failures are shown as IGN UNIT, STARTER CIRCUIT, or APU STARTER. Automatic shutdowns because of starting and ignition faults are shown in the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The APU control unit monitors the ignition and starting system operation and components and writes the faults it finds in BITE memory (AMM 49-61-00/001). Failures of the ignition unit, starter contactor, and APU starter are shown on the FAULTY LRU matrix. These failures are shown as IGN UNIT, A/C STRT CIRCUIT, or APU STARTER. Automatic shutdowns because of starting and ignition faults are shown in the REASON APU NOT OPERATING matrix.

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APU IGNITION/STARTING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
BATTERY - (24-31-00/101) APU, M208				
CIRCUIT BREAKER - APU START TRU CONT, C865		1	FLT COMPT, P6 6H12	*
CIRCUIT BREAKERS - APU CONT, C1382		1	822, AFT EQUIP CTR, E6 RACK	*
APU START, C20		1		*
APU START TRU FAN, C89		1		*
CIRCUIT BREAKER - APU ALTN CONT, C1390		1	FLT COMPT, P11 11B34	*
CIRCUIT BREAKER - APU START TRU POWER, C3000		1	119BL, MAIN EQUIP CTR, P32 32A6	*
CLUTCH - STARTER	--	1	316AR,315AL, APU COMP, FRONT OF APU	49-41-06
CONTACTOR - APU CRANK, K117	--	1	822, AFT EQUIP CTR, E6 RACK	*
LEAD - IGNITION	--	1	316AR,315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-04
MOTOR - STARTER, M893	--	1	316AR,315AL, APU COMP, FRONT OF APU	49-41-01
PANEL - (49-61-00/101) APU START, M10324				
PLUG - IGNITER, YBMM7	--	1	316AR,315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-02
RELAYS - (31-01-86/101) APU FAULT, K10033 APU START, K197 APU START CONTROL, K10030 APU START ENABLE, K10163 APU START TRU FAN CONT, K619 APU START TRU OVERHEAT, K616 APU TRU START, K10010				
SWITCH - (24-33-00/101) BATTERY (S2)				
SWITCH - (26-22-00/101) APU FIRE, S39				
SWITCH - (49-15-00/101) APU INLET DOOR, S10031				
UNIT - (24-32-00/101) APU START TRANSFORMER RECTIFIER, T189				
UNIT - (49-61-00/101) APU CONTROL, M206				
UNIT - IGNITION, M1	--	1	316AR,315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-03

\* SEE THE WDM EQUIPMENT LIST

APU Ignition/Starting System - Component Index  
Figure 101

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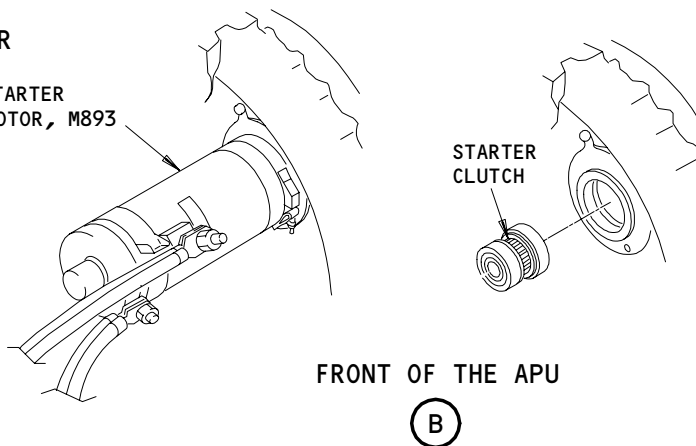
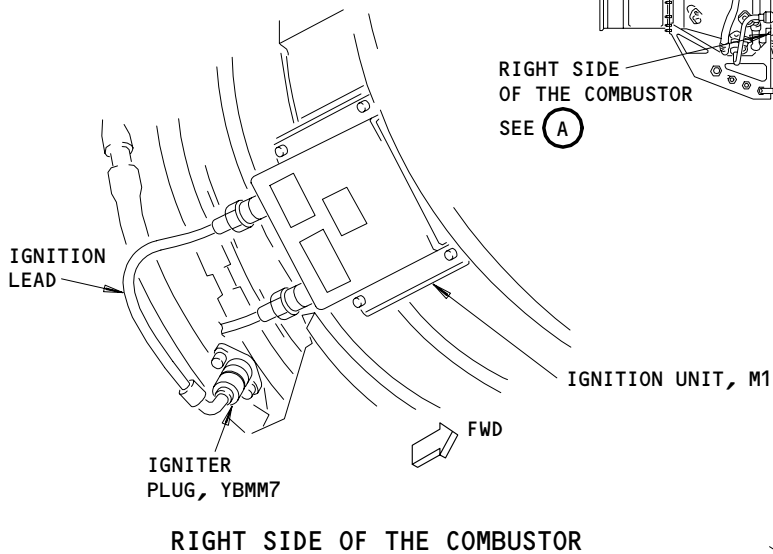
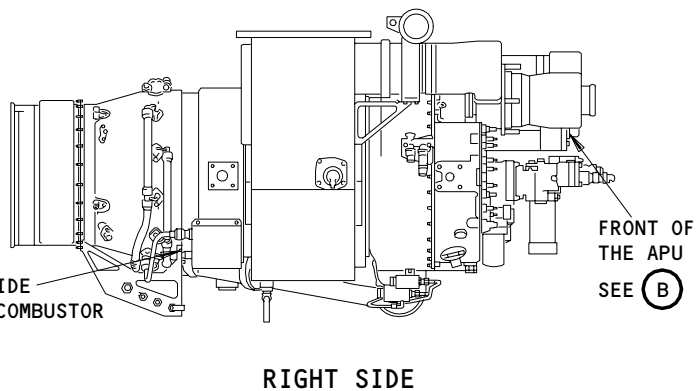
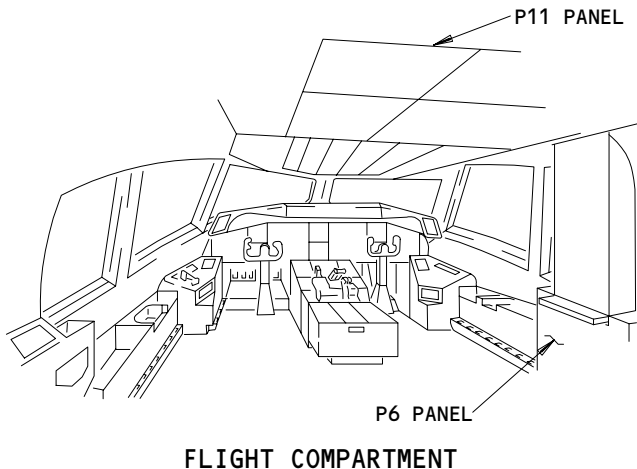
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APU Ignition/Starting System - Component Location  
Figure 102

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STARTER MOTOR - MAINTENANCE PRACTICES

1. General

- A. This procedure has these tasks:
  - (1) The removal of the starter motor
  - (2) The installation of the starter motor
  - (3) The inspection of the starter motor.
- B. The APU starter motor is on the APU gearbox. You can get access to the starter motor through the APU access doors.

TASK 49-41-01-002-001

2. Starter Motor Removal (Fig. 201)

A. References

- (1) AMM 49-41-05/401, APU Crank Contactor
- (2) AMM 49-41-06/601, Starter Clutch
- (3) SSM 49-41-01
- (4) WDM 49-41-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-047

**CAUTION:** OPEN THESE CIRCUIT BREAKERS IN THE SEQUENCE SHOWN TO PREVENT DAMAGE TO THE APU BATTERY CHARGER.

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

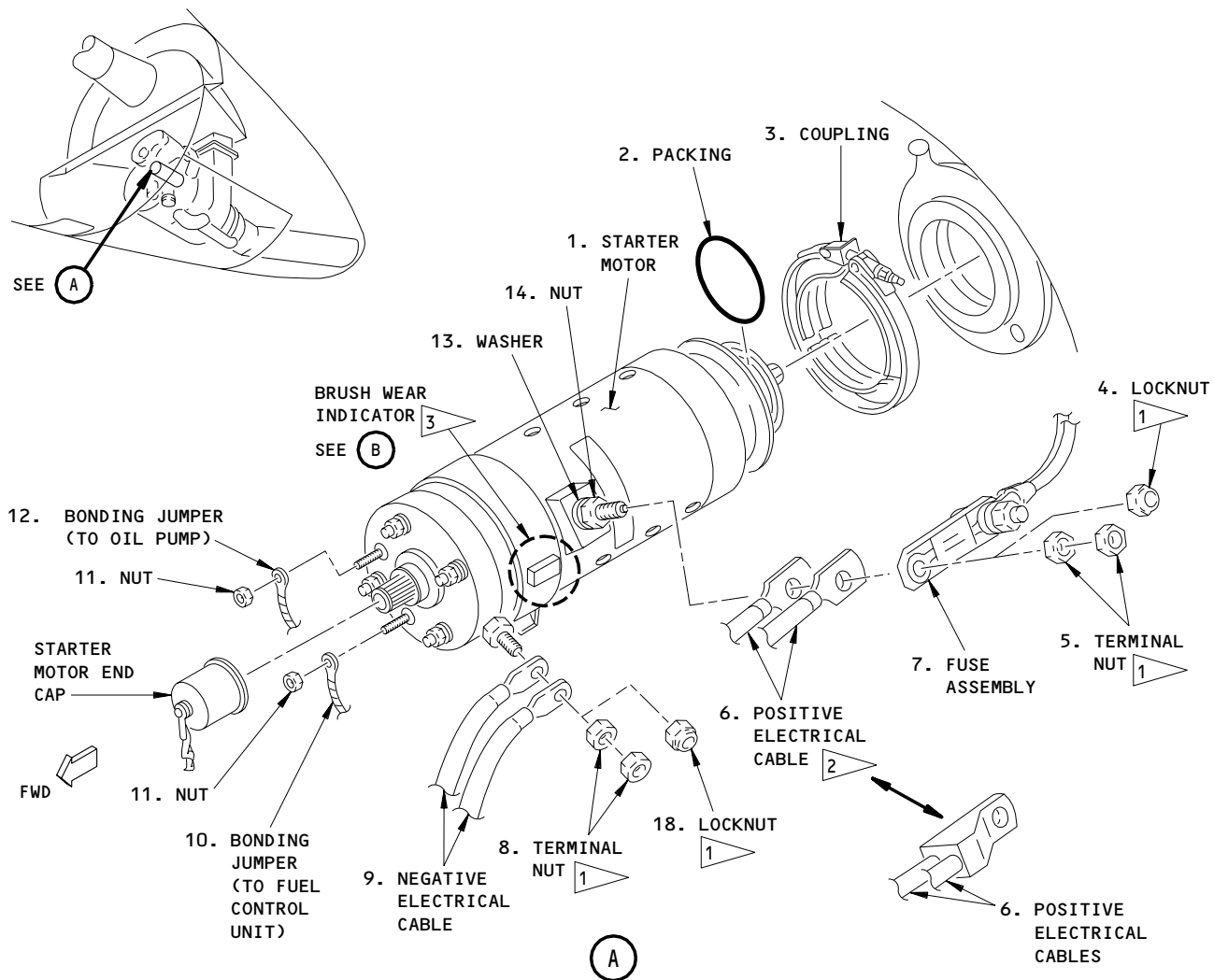
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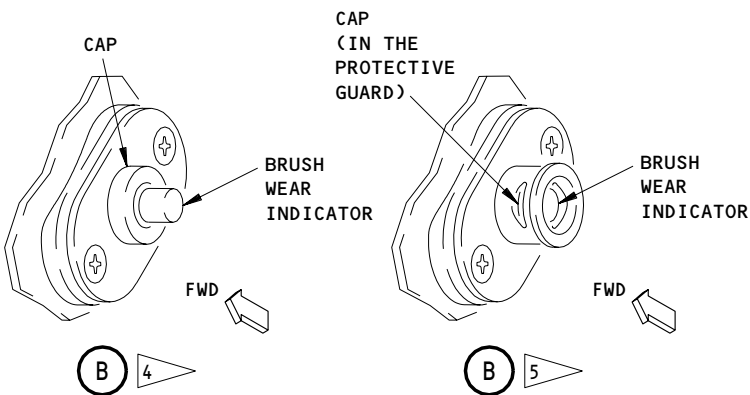
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- 1 TWO TERMINAL NUTS ARE OPTIONAL TO THE ONE LOCKNUT
- 2 A SINGLE POSITIVE TERMINAL CAN BE INSTALLED AT THIS LOCATION
- 3 APU WITH THE -5 AND -6 STARTER MOTORS
- 4 APU WITH THE -7 STARTER MOTORS
- 5 APU WITH THE -8 STARTER MOTORS



Starter Motor Installation  
Figure 201

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- (b) P37 Right Miscellaneous Electrical Equipment Panel
  - 1) 37B5 or 37K2, APU BATTERY CHARGER
- (c) E6 Rack, Aft Equipment Center
  - 1) APU CONT
  - 2) APU BAT CHGR
- (d) P32 Right Generator Power Panel
  - 1) 32A6, APU START TRU PWR

S 862-057

- (3) Do these steps to disconnect the electrical connector D1896 from the APU battery:
  - (a) Open the access door on the front side of the E6 aft equipment center rack to get access to the APU battery.
  - (b) Disconnect the electrical connector D1896 from the APU battery.

S 012-006

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 212-048

- (5) AIRPLANES WITH THE APU CRANK CONTACTOR (HARTMAN PART NUMBER A-703CD) (PRE-SB 49-19);  
Do these steps to inspect the APU crank contactor, K117:
  - (a) Remove the APU crank contactor, K117 (AMM 49-41-05/401).
  - (b) Make sure the APU crank contactor did not fail in the closed position or show signs of an overheated condition as follows:

**NOTE:** If you find discoloration on the terminal studs or the structural components of the starter motor, the starter motor was overheated because of a defective APU crank contactor.

- 1) Remove the screw, lockwasher and terminal shield from the APU crank contactor.
- 2) Get access to the internal parts of the APU crank contactor by removing the cover plate and cover assembly.
- 3) Examine the internal parts of the APU crank contactor:
  - a) Two main contactors show pitting on more than 75% of the total area.
  - b) Two main contactors for a shorted (welded) condition or show signs of burned or discoloration marks.
  - c) Two contact posts or two coil terminal posts for stripped studs or show signs of pitting and burned or discoloration marks.

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- d) Contactor coil shows signs of wrapping discoloration or a distorted bobbin.
  - e) If you find one or more of the above damage, replace the APU crank contactor.
  - f) If you find no damage, assemble the APU crank contactor by installing the cover assembly, cover plate and terminal shield.
- (c) Install the APU crank contactor, K117 (AMM 49-41-05/401).

S 022-046

**WARNING:** BE CAREFUL WHEN YOU DISCONNECT THE ELECTRICAL CABLES FROM THE STARTER MOTOR. IT IS POSSIBLE THAT THERE IS ELECTRICAL POWER AT THE TERMINAL POSTS EVEN WITH THE APU POWER CIRCUIT BREAKERS OPENED. PUT ON PROTECTIVE GLOVES AND USE INSULATED TOOLS. INJURY TO PERSONS CAN OCCUR BY AN ELECTRICAL SHOCK.

- (6) Remove the starter motor:
- (a) Remove the two terminal nuts (5) or the locknut (4) to disconnect the positive electrical cables (6) and the resistor assembly (7) from the terminal post.
  - (b) Remove the two terminal nuts (8) or the locknut (18) to disconnect the negative electrical cables (9) from the terminal post.
  - (c) Remove the nuts (11) and the bonding jumpers (10 and 12) from the starter motor (1).

**NOTE:** When the nut on the mounting stud is loosened, the mounting stud will move freely in the starter motor. It is not necessary to replace the starter because this is a usual condition.

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

- (d) Remove the coupling (3) and pull the starter motor (1) straight out of the gearbox.
  - 1) Remove and discard the packing (2).

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S 282-045

(7) Do the starter clutch inspection (AMM 49-41-06/601).

TASK 49-41-01-402-013

3. Starter Motor Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Starter Motor	49-41-01	01	5
	2	Packing			14

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-41-06/601, Starter Clutch Assembly
- (4) AMM 49-61-05/201, APU Control Unit
- (5) SSM 49-41-01
- (6) WDM 49-41-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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E. Procedure

S 422-041

- (1) Install the starter motor:
  - (a) Clean the gearbox mounting flange for the starter motor.
  - (b) Lubricate the new packing (2) with a light coat of lubricant or oil.
  - (c) Install the packing (2) on the starter motor (1).
  - (d) Lubricate the splines on the shaft of the starter motor (1) with oil.
  - (e) Align the index pin as you put the starter motor (1) in its position on the gearbox.
  - (f) Install the coupling (3) on the starter motor (1).
    - 1) Tighten the coupling (3) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (g) Loosen and tighten the coupling (3) as necessary to make sure it is installed correctly.
  - (h) Attach the bonding jumpers (10 and 12) to the starter motor (1) with the nuts (11).

NOTE: When the nut on the mounting stud is loosened, the mounting stud will move freely in the starter motor. It is not necessary to replace the starter because this is a usual condition.

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 1) Tighten the nuts (15) to 100 inch-pounds (11.3 newton meters).
- (i) Install the washer (13) if it was not done before:
  - 1) Remove the terminal nut (14).
  - 2) Install the washer (13) on the terminal.

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 3) Install the terminal nut (14) and tighten to 75-80 inch-pounds (8.5-9.0 newton-meters).
- (j) Attach the positive electrical cables (6) and the resistor assembly (7) to the starter motor (1):
  - 1) Put the positive electrical cables (6) and the resistor assembly (7) on the starter motor (1).

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- 2) Let the positive electrical cables (6) go to their free position.
- 3) Hold the positive electrical cables (6) in the free position and install the two terminal nuts (5) or the locknut (4).

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 4) If you installed the terminal nuts (5), tighten the nuts one at a time to 75-80 inch-pounds (8.5-9.0 newton-meters).

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 5) If you installed the locknut (4), tighten the locknut to 75-80 inch-pounds (8.5-9.0 newton-meters).
- (k) Attach the negative electrical cable (9) to the starter motor (1):
- 1) Put the negative electrical cables (9) on the starter motor (1).
  - 2) Let the negative electrical cables (9) go to their free position.
  - 3) Hold the negative electrical cables (9) in the free position and install the two terminal nuts (8) or the locknut (18).

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 4) If you installed the two terminal nuts (8), tighten the nuts one at a time to 50-55 inch-pounds (5.7-6.2 newton-meters).

CAUTION: OVER TORQUE CAN CAUSE DAMAGE TO THE STARTER BODY.

- 5) If you installed the locknut (18), tighten the locknut to 50-55 inch-pounds (5.7-6.2 newton-meters).

S 862-058

- (2) Do these steps to connect the electrical connector D1896 to the APU battery:
  - (a) Connect the electrical connector D1896 to the APU battery.
  - (b) Close the access door on the front side of the E6 aft equipment center rack.

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S 862-049

**CAUTION:** CLOSE THE CIRCUIT BREAKERS IN THE SEQUENCE SHOWN. IF YOU DO NOT CLOSE THE CIRCUIT BREAKERS IN THIS SEQUENCE, DAMAGE TO THE APU BATTERY CHARGER CAN OCCUR.

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU PWR
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT
    - 2) APU BAT CHGR
  - (c) P37 Right Miscellaneous Electrical Equipment Panel
    - 1) 37B5 or 37K2, APU BATTERY CHARGER
  - (d) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 742-027

- (4) Do the BITE test for the APU system (AMM 49-61-05/201).

S 862-028

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 712-029

- (6) Do an operational test of the starter motor clutch:
- (a) Remove the end cap on the starter motor.

**CAUTION:** IMMEDIATELY DO AN APU SHUTDOWN IF THE STARTER MOTOR DOES NOT DISENGAGE AT THE OPERATIONAL SPEED OF THE APU. DAMAGE TO THE STARTER MOTOR AND THE STARTER MOTOR CLUTCH CAN OCCUR.

- (b) Do this task: APU Start and Operation (AMM 49-11-00/201).
- (c) During the APU start procedure, look at the starter motor to make sure the shaft turns until the motor disengages.
- (d) If the starter motor does not disengage when the APU is at the operational speed, do these steps:
  - 1) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - 2) Do the starter clutch inspection (AMM 49-41-06/601).
- (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- (f) Install the end cap on the starter motor.

S 412-030

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

TASK 49-41-01-202-031

4. Starter Motor Inspection (Fig. 201)

A. Equipment

- (1) Air Source - Regulated, Dry Filtered, Compressed (Maximum of 20 psig) (138 kPa) (commercially available)

B. Consumable Materials

- (1) B50051 Cleaner, Alkaline - Arrow 198 (recommended) or
- (2) B50052 Cleaner, Alkaline - Ridoline 909 (alternative) or
- (3) B50053 Cleaner, Alkaline - Daraclean 212 (alternative) or
- (4) B50054 Cleaner, Alkaline - Daraclean 282 (alternative)
- (5) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) - BMS15-5

C. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 012-042

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

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S 212-032

- (2) APU WITH THE -5 AND -6 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

**NOTE:** The length of the brush wear indicator decreases as the brushes become worn. If the carbon dust does not permit you to see the indicator peg, clean or replace the indicator window.

- (a) If you cannot see the brush wear indicator, replace the starter motor.

S 212-051

- (3) APU WITH THE -7 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

**NOTE:** The brush wear indicator is an indicator button that retracts into the cap of the starter motor when the brushes become worn.

- (a) If the top of the indicator button on the brush wear indicator is flush or is flat with the top of the cap on the starter motor, replace the starter motor.

S 212-052

- (4) APU WITH THE -8 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

**NOTE:** The brush wear indicator is an indicator button that retracts into the cap of the starter motor when the brushes become worn. The location of the brush wear indicator and the cap of the starter motor is in the protective guard. There are two side windows on the protective guard to see the position of the brush wear indicator and the top of the cap. If grease, dirt or other contamination does not permit you to see the brush wear indicator, clean the area with an alkaline cleaner, water, cloth and air source.

- (a) If the top of the indicator button on the brush wear indicator is flush or is flat with the top of the cap on the starter motor, replace the starter motor.

S 412-043

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Disengage the support rods for the APU access doors.  
(b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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IGNITER PLUG - MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) Igniter Plug Removal
  - (2) Igniter Plug Installation
  - (3) Igniter Plug Inspection
  - (4) Clean the Igniter Plug.
- B. The APU igniter plug is on the lower right side of the APU, aft of the air inlet plenum. You can get access to the plug through the APU access doors.

TASK 49-41-02-002-001

2. Igniter Plug Removal (Fig. 201)

A. References

- (1) SSM 49-41-01
- (2) WDM 49-41-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

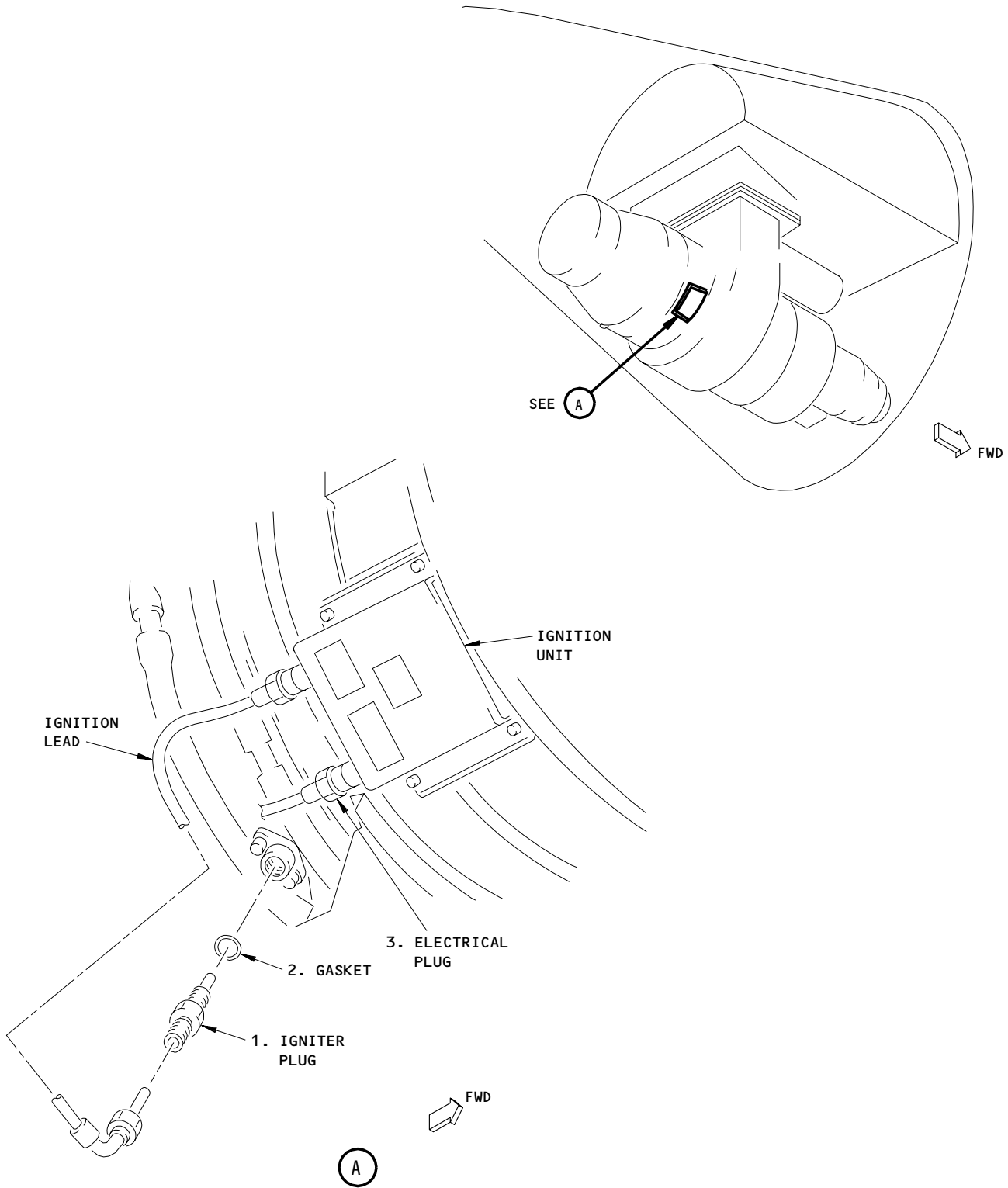
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Igniter Plug Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-029

- (4) Remove the igniter plug:

**WARNING:** DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (a) Release the high voltage from the ignition unit:
  - 1) Stop for a minimum of 5 minutes.
  - 2) Disconnect the electrical plug (3) from the ignition unit.
  - 3) Disconnect the ignition lead from the igniter plug (1).
  - 4) Ground the ignition lead terminal to the APU.
- (b) Remove the igniter plug (1) and the gasket (2) from the APU.
- (c) Discard the gasket (2).

TASK 49-41-02-402-008

3. Igniter Plug Installation (Fig. 201)

A. Consumable Materials

- (1) D00010 Antiseize Compound - Fel-Pro C5-A

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Igniter High Voltage Air Gap (Igniter Plug)	49-41-02	01	5
	2	Gasket			10

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) SSM 49-41-01
- (3) WDM 49-41-11

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D. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 422-009

(1) Install the igniter plug:

- (a) Apply the antisieze compound to the threads of the igniter plug (1).
- (b) Install the new gasket (2) on the igniter plug (1).
- (c) Install the igniter plug (1) in the APU.
  - 1) Tighten the igniter plug (1) to 360-470 inch-pounds (40.8-53.1 newton-meters).
- (d) Connect the ignition lead to the igniter plug (1).
  - 1) Tighten the lead to 100-105 inch-pounds (11.3-11.9 newton-meters).
- (e) Install a lockwire to connect the ignition lead to the mount for the igniter plug (1).
- (f) Connect the electrical plug (3) to the ignition unit.

S 412-030

(2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Disengage the support rods for the APU access doors.
- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-013

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) E6 Rack, Aft Equipment Center
  - 1) APU CONT
- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

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- S 862-015
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

- S 712-016
- (5) Do an operational test of the APU:
- (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) Make sure the APU started correctly.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).

TASK 49-41-02-202-017

4. Igniter Plug Inspection (Fig. 202)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

- S 012-031
- (1) If it is installed, remove the igniter plug (Ref par. 2).
- S 212-018
- (2) Examine the igniter plug:
- (a) Shake the igniter plug and listen for a rattle noise.
    - 1) If you heard a rattle noise, replace the igniter plug.
  - (b) Examine the center electrode and the outer shell of the igniter plug for erosion.
    - 1) Equal erosion on the electrode and the outer shell is permitted.
    - 2) Measure the distance from the edge of the electrode to the inner edge of the ground shell that has no erosion.

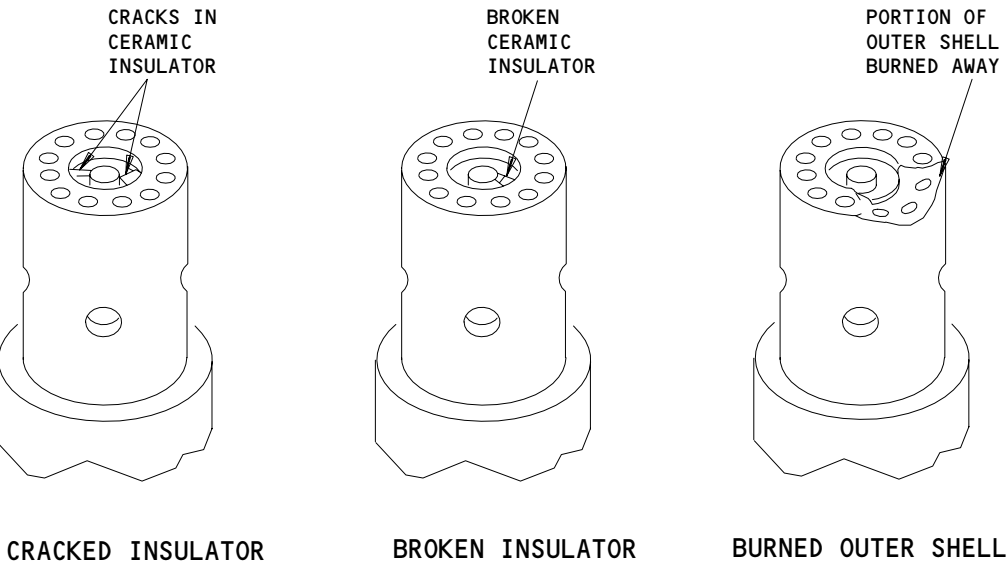
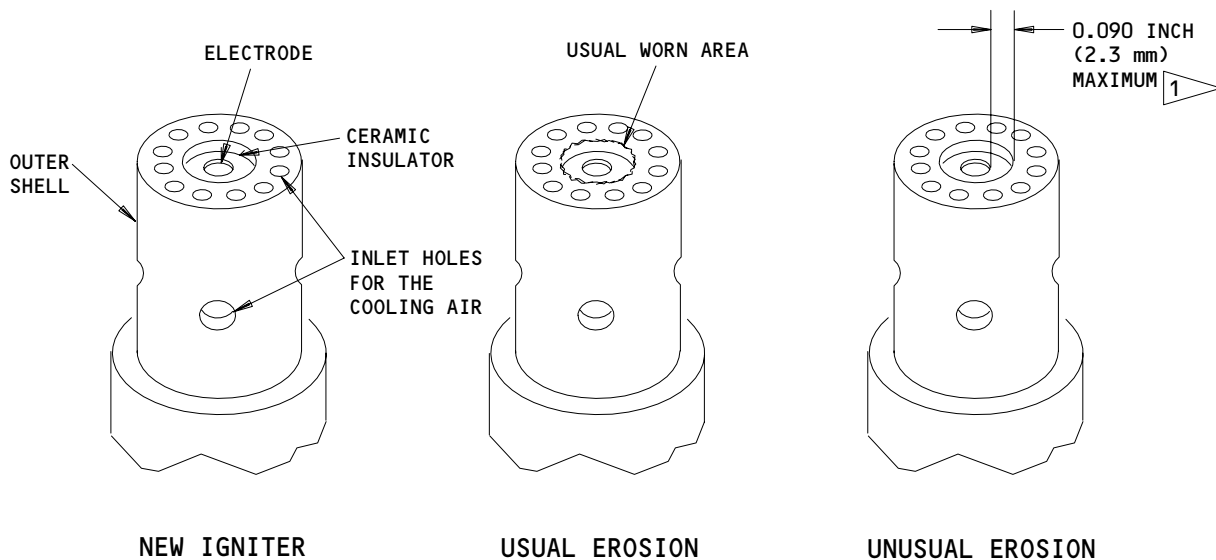
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1 THIS IS THE DISTANCE FROM THE EDGE OF THE ELECTRODE TO THE INNER EDGE OF THE GROUND SHELL THAT HAS NO EROSION.

Check of Igniter Plug  
Figure 202

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- 3) Replace the plug if the distance is more than 0.090 inch (2.3 mm).
- (c) Examine the ceramic insulator material of the igniter plug for cracks and chips.
  - 1) Replace the igniter plug if you find cracks or chips in the material.
- (d) Examine the outer shell of the igniter plug for heat damage.
  - 1) Replace the igniter plug if heat damage is found.
- (e) Examine the grommet of the mating flange on the igniter plug for grooves.
  - 1) If you find grooves that have a depth more than 0.03 inch (0.76 mm), replace the igniter plug.
- (f) Examine the empty space between the insulator and the outer shell of the igniter plug.
  - 1) If you find unwanted materials, clean the igniter plug (Ref par. 5).

S 412-032

- (3) Install the igniter plug (Ref par. 3).

TASK 49-41-02-102-024

5. Clean the Igniter Plug

A. Standard Tools and Equipment

- (1) Abrasive Cabinet Plug Cleaner - commercially available

B. Consumable Materials

- (1) B00075 Solvent - P-D-680, Stoddard Type 1
- (2) G02157 Brush - Stiff Bristled

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 012-033

- (1) If it is installed, remove the igniter plug (AMM 49-41-02/201).

S 122-025

(2) Clean the igniter plug:

- (a) Clean the igniter plug with a stiff bristled brush or place it in the abrasive cabinet for the specified time.

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**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENTS ARE FLAMMABLE AND CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

(b) Rub the igniter plug with a cloth moist with solvent until all the carbon deposits are removed.

S 412-034

(3) Install the igniter plug (AMM 49-41-02/201).

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APU IGNITION UNIT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU ignition unit.
- B. The APU ignition unit is on the lower right side of the APU, aft of the air inlet plenum. You can get access to the ignition unit through the APU access doors.

TASK 49-41-03-004-001

2. APU Ignition Unit Removal (Fig. 401)

A. References

- (1) SSM 49-41-01
- (2) WDM 49-41-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches for the APU access doors.

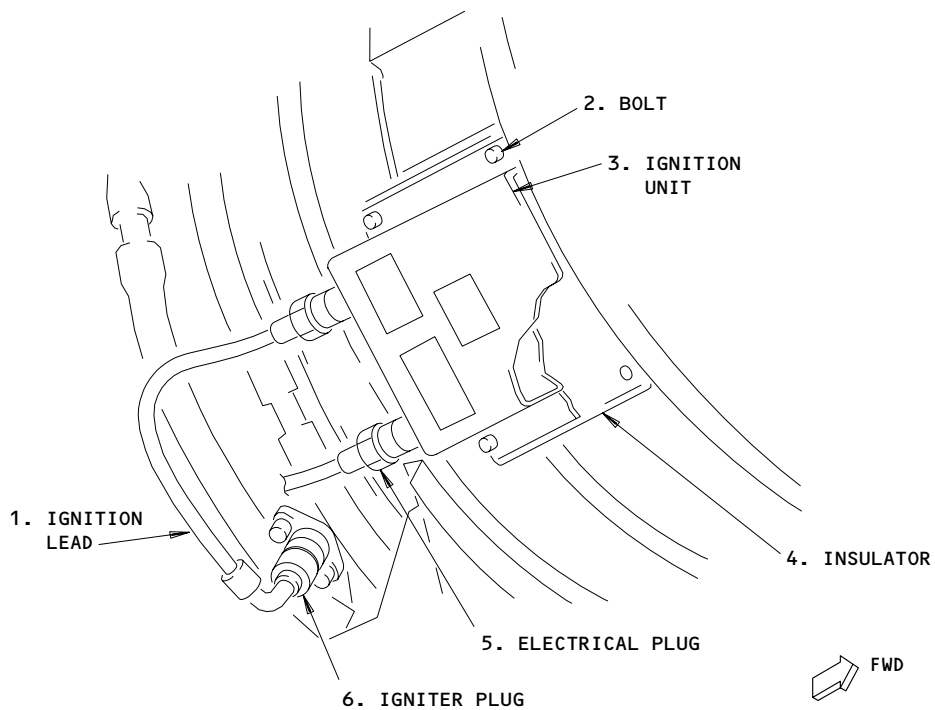
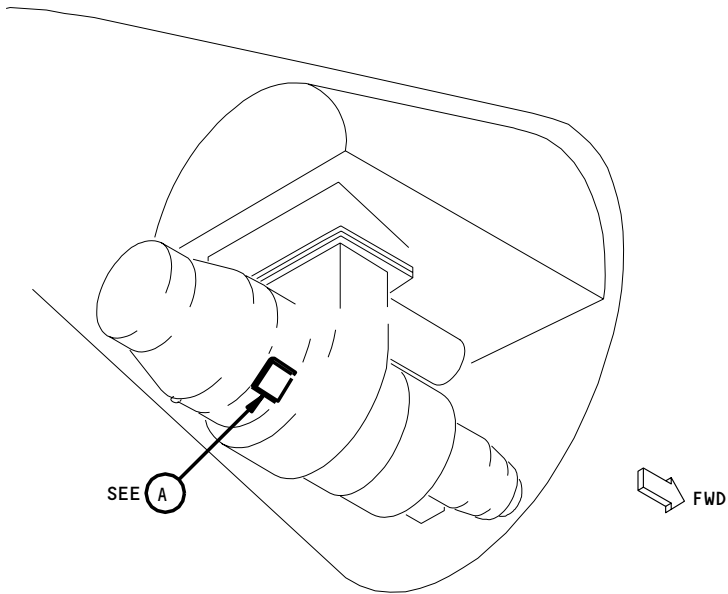
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(A)

Ignition Unit Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-024

- (4) Remove the ignition unit:

**WARNING:** MAKE SURE THE ELECTRICAL POWER IS REMOVED FROM THE IGNITION SYSTEM FOR FIVE MINUTES OR MORE. THE IGNITION SYSTEM VOLTAGE IS VERY DANGEROUS AND CAN CAUSE INJURY.

**WARNING:** WHEN THE IGNITION CABLE IS DISCONNECTED, GROUND THE CABLE TO MAKE SURE ALL OF THE ENERGY IS OUT OF THE SYSTEM. IF YOU DO NOT GROUND THE IGNITION CABLE, INJURY CAN OCCUR.

**WARNING:** DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (a) Release the high voltage from the ignition unit:
  - 1) Stop for a minimum of 5 minutes.
  - 2) Disconnect the electrical plug (5) from the ignition unit (3).
    - a) Put caps on the connectors.
  - 3) Disconnect the ignition cable (1) from the igniter plug (6).
  - 4) Ground the ignition cable (1) to the APU.
  - 5) Connect the ignition cable (1) to the igniter plug (6).
  - 6) Tighten the ignition cable (1) at the igniter plug (6) to 100-105 inch-pounds (11.3-11.9 newton-meters).
  - 7) Install a lockwire on the ignition cable (1).
- (b) Disconnect the ignition cable (1) from the ignition unit (3).
  - 1) Put caps on all of the connectors.
- (c) Remove the bolts (2) and the bonding jumpers.
- (d) Remove the ignition unit (3) and the insulator (4) from the APU.

TASK 49-41-03-404-011

3. Ignition Unit Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Ignition Unit	49-41-03	01	5

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B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-41-01
- (4) WDM 49-41-11

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-025

(1) Install the ignition unit:

- (a) Put the insulator (4) and the ignition unit (3) in position on the compressor case.
- (b) Install the bonding jumpers and the bolts (2).
  - 1) Tighten the bolts (2) to 50-55 inch-pounds (5.6-6.2 newton-meters).
- (c) Remove all of the caps on the electrical connectors.
- (d) Connect the electrical plug (5) and the ignition cable (1) to the ignition unit (3).
  - 1) Tighten the ignition cable (1) to 100-105 inch-pounds (11.3-11.9 newton-meters).
- (e) Install a lockwire between the ignition cable at the ignition unit.

S 744-016

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 414-017

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Disengage the support rods for the APU access doors.
- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.

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- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 864-018

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-020

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-021

- (6) Do an operational test of the APU:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) Make sure the APU started correctly.
  - (c) Do a usual shutdown of the APU (AMM 49-11-00/201).

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APU IGNITION CABLE – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) APU Ignition Cable Removal
  - (2) APU Ignition Cable Installation
  - (3) APU Ignition Cable Inspection.
- B. The APU ignition cable connects the ignition unit to the igniter plug. The ignition cable is on the aft, bottom right side of the APU engine.
- C. You can get access to the ignition cable through the APU access doors.

TASK 49-41-04-002-001

2. APU Ignition Cable Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

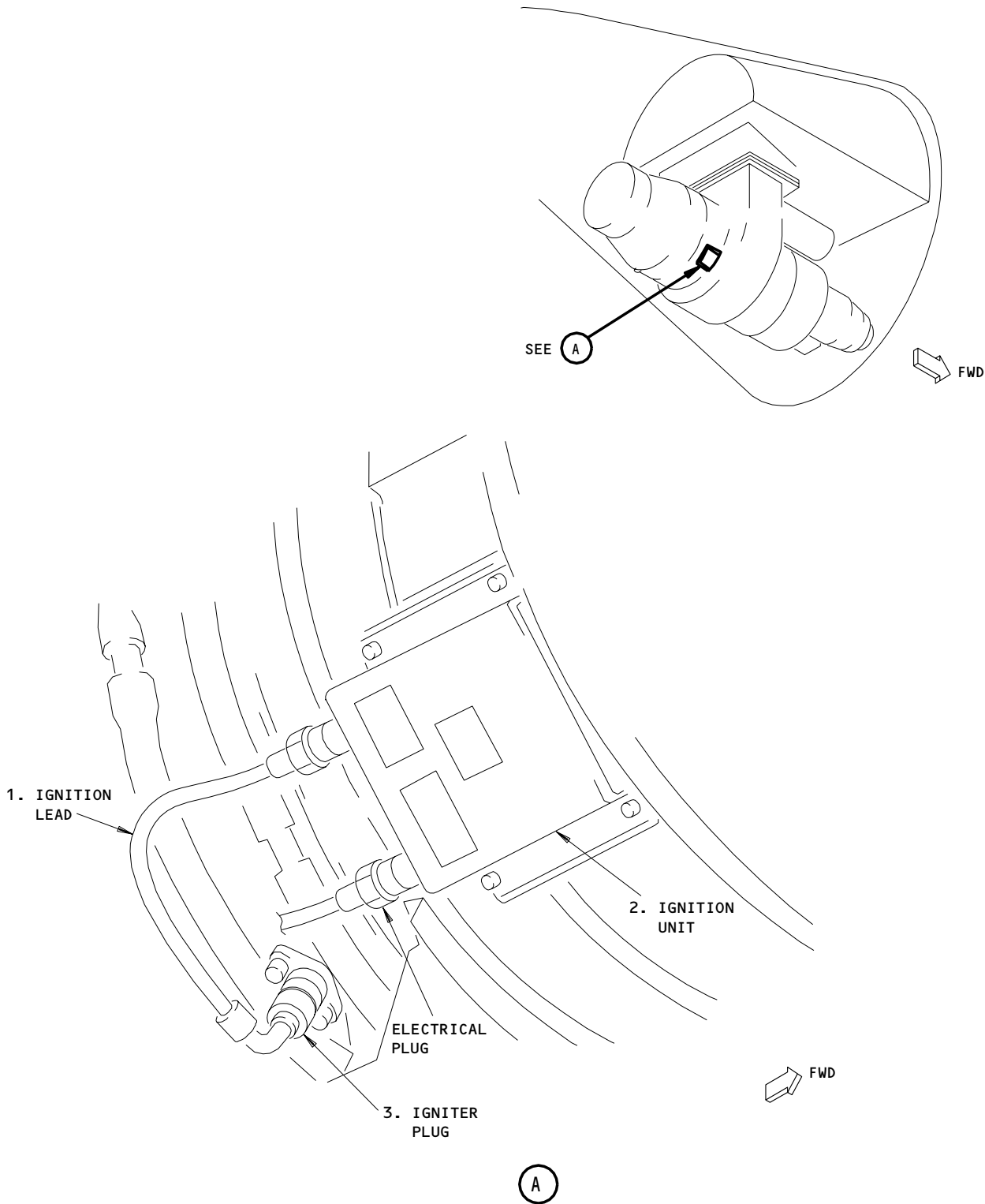
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Ignition Lead Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-024

- (4) Remove the APU ignition cable:

**WARNING:** DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (a) Release the high voltage from the ignition unit:
  - 1) Stop for a minimum of 5 minutes.
  - 2) Disconnect the ignition cable (1) from the igniter plug (3).
  - 3) Ground the ignition cable terminal to the APU engine.
- (b) Disconnect the ignition cable (1) from the ignition unit (2).
- (c) Remove the ignition cable (1).

TASK 49-41-04-402-008

3. APU Ignition Cable Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Ignition Cable	49-41-04	01	5

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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C. Procedure

S 422-025

- (1) Install the APU ignition cable:
  - (a) Connect the ignition cable (1) to the ignition unit (2) and the igniter plug (3).
    - 1) Tighten the coupling nuts on the ignition cable (1) to 100-105 inch-pounds (11.3-11.9 newton-meters).
  - (b) Install a lockwire on the two ends of the ignition cable (1).

S 412-026

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-011

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-013

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-41-04-202-015

4. APU Ignition Cable Inspection

A. Standard Tools and Equipment

- (1) Tester - Fish Scale Pull, 0-10 pounds range, commercially available

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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C. Procedure

S 862-016

- (1) Make sure the APU control switch is OFF and attach a DO-NOT-OPERATE tag.

S 862-017

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-019

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 862-031

**WARNING:** DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (4) Release the high voltage from the ignition unit:
- (a) Stop for a minimum of 5 minutes.
  - (b) Disconnect the igniter cable from the igniter plug.
  - (c) Ground the igniter cable terminal to the APU engine.
  - (d) Connect the igniter cable to the igniter plug.

S 282-020

- (5) Do a force test on the ignition cable:
- (a) Loosen the terminal on the ignition cable that connects to the igniter plug.
  - (b) Connect the tester to the terminal.
  - (c) While you disconnect the terminal from the igniter plug, measure the force that is necessary to disconnect it.
    - 1) The force that is necessary to disconnect the terminal from the igniter plug must be a minimum of 1.0 pounds.
  - (d) If the force used is less than 1.0 pounds, replace the ignition cable.

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S 212-027

- (6) Visually examine the ignition cable:
- (a) Examine the fittings with threads to make sure the threads are not damaged.
  - (b) Examine the fittings, the elbows, and the conduit for cracks, deformation, damage, and wrench flats that are round.
  - (c) Replace the ignition cable if you found damage.

S 412-028

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-029

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-030

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU CRANK CONTACTOR – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the APU crank contactor
  - (2) An installation of the APU crank contactor.
- B. The APU crank contactor is installed on the E6 relay panel. The E6 relay panel is in the E6 aft equipment center rack on the aft right side of the aft cargo compartment. You can get access to the APU crank contactor (K117) through the aft cargo door.

TASK 49-41-05-004-001

2. APU Crank Contactor Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

822	Aft Cargo Door
-----	----------------

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) P37 Right Miscellaneous Electrical Equipment Panel
    - 1) 37B5 or 37K2, APU BATTERY CHARGER
  - (c) E6 Rack, Aft Equipment Center
    - 1) APU CONT
    - 2) APU BAT CHGR

S 014-012

- (3) Open the aft cargo door.

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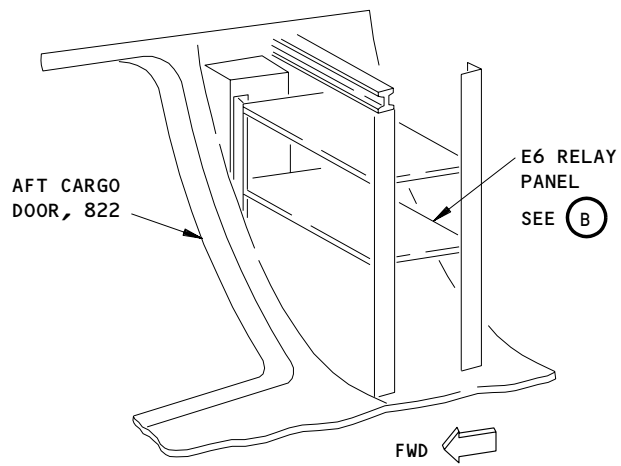
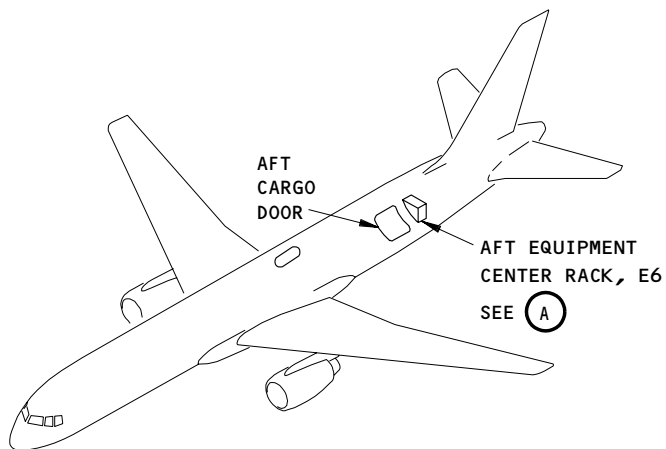
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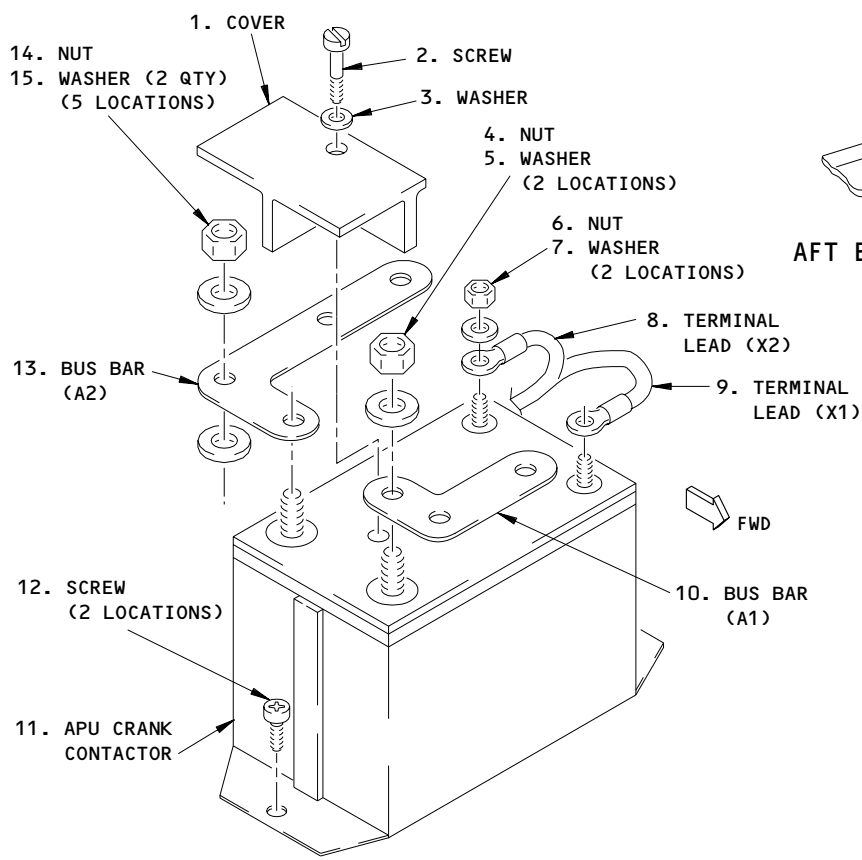
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AFT EQUIPMENT CENTER RACK, E6  
(A)



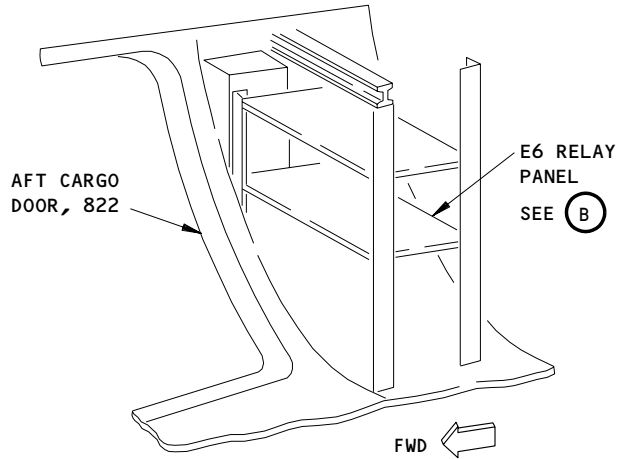
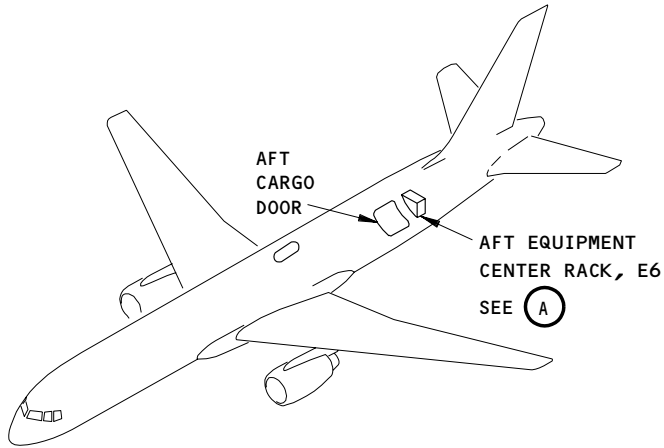
E6 RELAY PANEL  
(B)

APU Crank Contactor Installation  
Figure 401 (Sheet 1)

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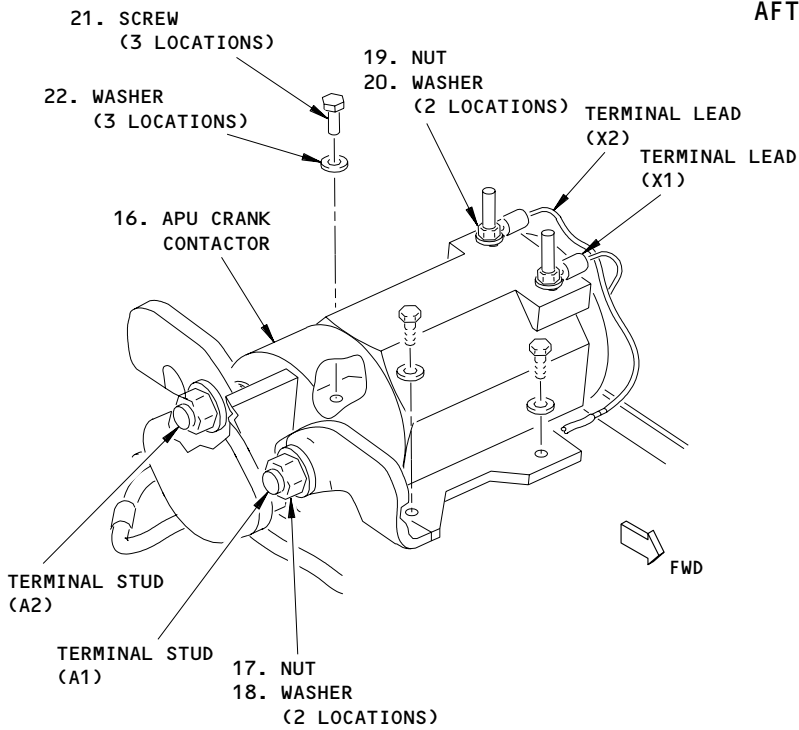
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AFT EQUIPMENT CENTER RACK, E6

(A)



E6 RELAY PANEL

(B)

APU Crank Contactor Installation  
Figure 401 (Sheet 2)

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C. APU Crank Contactor Removal

S 024-017

- (1) Do these steps to disconnect the electrical connector D1896 from the APU battery:

**NOTE:** If the starter motor is being removed, the APU battery has been disconnected.

- (a) Open the access door on the front side of the E6 aft equipment center rack to get access to the APU battery.  
(b) Disconnect the electrical connector D1896 from the APU battery.

S 024-019

- (2) AIRPLANES WITH THE APU CRANK CONTACTOR (HARTMAN PART NUMBER A-703CD) (PRE-SB 49-0019);

Do these steps to remove the APU crank contactor (11):

- (a) Remove the screw (2) , the washer (3) and the cover (1) from the APU crank contactor (11).  
(b) Remove the five nuts (14) and ten washers (15) that attach the bus bar (A1) (10) and bus bar (A2) (13) to the E6 relay panel.  
(c) Remove the two nuts (4) and two washers (5), bus bar (A1) (10) and bus bar (A2) (13) from the two terminal studs.  
(d) Remove the two nuts, two washers, terminal lead (X1) (9) X1 and terminal lead (X2) (8) from the two terminal studs.  
1) Tag the terminal lead X1 (9) and terminal lead X2 (8).  
(e) Remove the two screws (12) that attach the APU crank contactor (11) to the E6 relay panel.  
(f) Remove the APU crank contactor (11).

S 914-011

- (3) Make sure you install all necessary protection covers.

S 024-020

- (4) AIRPLANES WITH THE APU CRANK CONTACTOR (PART NUMBER CC0708I-MUA34B) (POST-SB 49-0019);

Do these steps to remove the APU crank contactor (16):

- (a) Remove the two nuts (17) and two washers (18) from the two terminal studs A1 and A2.  
(b) Remove the two nuts (19) and the two washers (20) from the two terminals X1 and X2.  
(c) Disconnect the two terminal lead cables from the two terminals X1 and X2.  
1) Tag the terminal lead X1 and terminal lead X2.  
(d) Remove the three screws (21) and the three washers (22) that attach the APU crank contactor (16) to the E6 relay panel.  
(e) Remove the APU crank contactor (16) from the E6 relay panel.

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TASK 49-41-05-404-005

3. APU Crank Contactor Installation (Fig. 401)

A. References

- (1) AMM 20-10-21/601, Electrical Bonding
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 822 Aft Cargo Compartment Door

C. Procedure

S 424-018

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY.

IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these steps to install the APU crank contactor:
  - (a) Clean the surfaces of the APU crank contactor and E6 relay panel with alcohol and a brush or cloth.
  - (b) Use a small amount of pressure on the brush or cloth while you clean the surfaces of the APU crank contactor and E6 relay panel.
  - (c) Continue to clean the surfaces until there are no visible residue on the surfaces.

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- (d) Put the crank contactor in its position on the E6 relay panel.
- (e) AIRPLANES WITH THE APU CRANK CONTACTOR (HARTMAN PART NUMBER A-703CD) (PRE-SB 49-0019);  
Install the APU crank contactor (11) on the E6 relay panel with the two screws (12).
- (f) Do a check of the bonding resistance between the APU crank contactor (11) and the E6 relay panel (AMM 20-10-21/601).  
1) The bonding resistance must be 0.0025 ohm or less.
- (g) Remove the tags from the terminal leads (X1) (9) and terminal lead (X2) (8).
- (h) Install the terminal lead (X1) (9), washer (7) and nut (6) on the terminal stud.
- (i) Install the terminal lead (X2) (8), washer (7) and nut (6) on the terminal stud.
- (j) Install the bus bar (A1) (10) with the washer (5) and nut (4) on the terminal stud.
- (k) Install the bus bar (A2) (13) with the washer (5) and nut (4) on the terminal stud.
- (l) Install the ten washers (15) and five nuts (14) that attach the bus bar (A1) (10) and bus bar (A2) (13) to the E6 relay panel.
- (m) Install the cover (1) on the APU crank contactor with the washer (3) and screw (2).
- (n) AIRPLANES WITH THE APU CRANK CONTACTOR (PART NUMBER CC0708I-MUA34B) (POST-SB 49-0019);  
Install the APU crank contactor (16) on the E6 relay panel with the three washers (22) and three screws (21).
- (o) Install the washer (18) and the nut (17) on the terminal stud A1.
- (p) Install the washer (18) and the nut (17) on the terminal stud A2.  
1) Tighten the two nuts (17) to 107-117 inch-pounds (12.1-13.2 newton-meters).
- (q) Connect the terminal lead cables to the X1 and the X2 terminals with the two washers (20) and two nuts (19).  
1) Remove the tags from the terminal lead X1 and terminal lead X2.  
2) Tighten the nuts (19) to 23-26 inch-pounds (2.6-2.9 newton-meters).

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S 424-014

- (2) Do these steps to connect the electrical connector D1896 to the APU battery:

NOTE: If the starter motor is being removed, do not connect the APU battery.

- (a) Connect the electrical connector D1896 to the APU battery.
- (b) Close the access door on the front side of the E6 aft equipment center rack.

D. APU Crank Contactor Installation Test

S 864-009

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
    - 2) APU BAT CHGR
  - (b) P37 Right Miscellaneous Electrical Equipment Panel
    - 1) 37B5 or 37K2, APU BATTERY CHARGER
  - (c) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-010

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-015

- (3) Do the installation test for the APU crank contactor:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).
  - (c) If it is not necessary to do other tasks, do this task: APU Shutdown Procedure (AMM 49-11-00/201).

E. Put the Airplane Back to Its Usual Condition

S 414-016

- (1) Close the aft cargo door.

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STARTER CLUTCH ASSEMBLY – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these two tasks:
  - (1) Starter Clutch Assembly Removal
  - (2) Starter Clutch Assembly Installation.
- B. You must remove the starter motor to get access to the starter clutch. The starter motor is on the APU gearbox. You can get access to the starter motor through the APU access door.

TASK 49-41-06-004-001

2. Starter Clutch Assembly Removal (Fig. 401)

A. References

- (1) AMM 49-41-01/201, Starter Motor

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU PRIME CONT

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

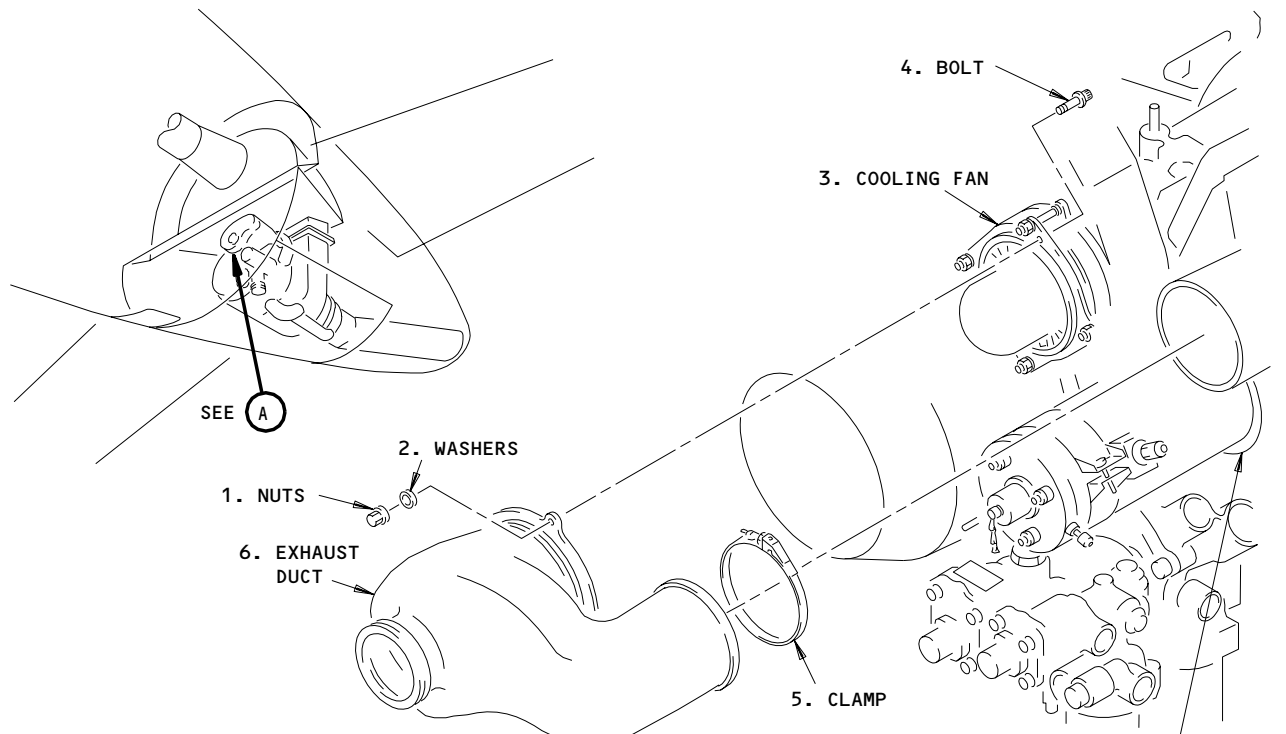
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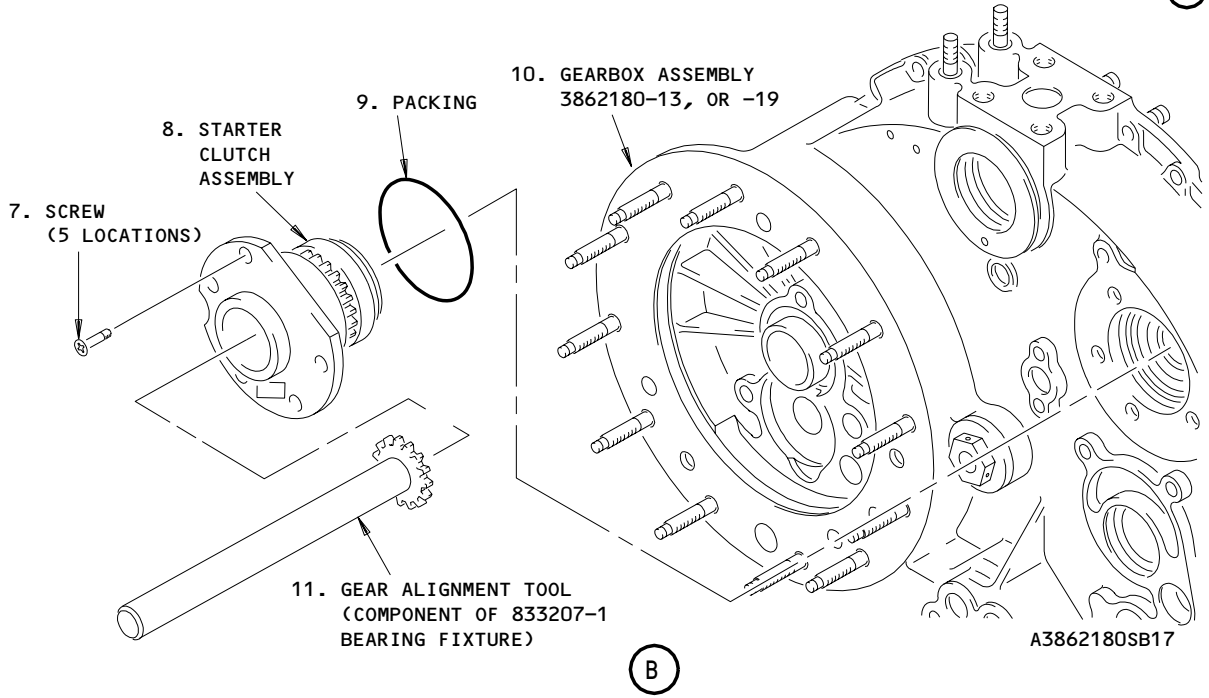
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FOR DETAILS OF STARTER CLUTCH ASSEMBLY SEE **(B)**



Starter Clutch Removal  
Figure 401

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S 014-005

- (4) Remove the exhaust duct from the cooling fan:
  - (a) Remove the clamp (5) from the exhaust duct (6).
  - (b) Remove the bolts (4), the nuts (1), and the washers (2) from the cooling fan (3).
  - (c) Remove the exhaust duct (6).

S 014-006

- (5) Remove the starter motor (AMM 49-41-01/201).

S 024-007

- (6) Remove the starter clutch assembly:
  - (a) Remove the screws (7) from the starter clutch assembly (8).
  - (b) Remove the starter clutch assembly (8) from the gearbox (10).
  - (c) Remove the packing (9) from the starter clutch assembly (8).
    - 1) Discard the packing (9).

TASK 49-41-06-404-008

3. Starter Clutch Assembly Installation (Fig. 401)

A. Special Tools and Equipment

- (1) Gear Alignment Tool - a component of Bearing Fixture 833207-1, Garrett Airline Services Division, A Division of the Garrett Corporation, P.O. Box 29003, Phoenix, AZ 85072

B. Consumable Materials

- (1) G01043 Cloth - Lint-free
- (2) B00309 Solvent - Alcohol-Isopropyl, commercial grade
- (3) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301)

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	8	Clutch Assembly	49-41-06	01	25
	9	Packing			115

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D. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-41-01/201, Starter Motor

E. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

F. Procedure

S 114-009

(1) Clean the starter clutch area:

- (a) Use a small magnet and a scribe to remove the metal particles from the starter clutch area.

NOTE: Make sure the metal particles are removed from the retainer ring groove and the oil annulus groove.

- (b) Clean the starter clutch area with the solvent.
- (c) Dry the starter clutch area with a clean cloth.

S 214-010

(2) Examine the inside of the starter clutch area for chips, pits, or other surface damage.

NOTE: Smooth surfaces are necessary for a long clutch life.

S 424-011

(3) Install the starter clutch assembly:

- (a) Lubricate the new packing (9) with a light coat of oil.
- (b) Install the packing (9) on the starter clutch assembly (8).
- (c) Use the gear alignment tool (11) to align the starter gear as you put the starter clutch assembly (8) into the gearbox (10).
- (d) Attach the starter clutch assembly (8) to the gearbox (10) with the screws (7).
  - 1) Tighten the screws (7) to 110-115 inch-pounds (12.4-13.0 newton-meters).
- (e) Turn the starter clutch clockwise.
  - 1) Make sure the clutch turns freely and smoothly.

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- S 414-012
- (4) Install the starter motor (AMM 49-41-01/201).
- S 414-013
- (5) Install the exhaust duct for the cooling fan:
- (a) Put the clamp (5) on the exit side of the exhaust duct (6).
  - (b) Put the exhaust duct (6) on the cooling fan (3).
    - 1) Tighten the clamp (5) to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (c) Install the bolts (4), the washers (2), and the nuts (1).
    - 1) Tighten the nuts (1) to 40-50 inch-pounds (4.5-5.6 newton-meters).

- S 864-014
- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU PRIME CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU ALTN CONT

- S 864-015
- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

- S 714-016
- (8) Do an operational test of the starter clutch:
- (a) Remove the cap from the end of the starter motor.

**CAUTION:** STOP THE APU IMMEDIATELY IF THE STARTER DOES NOT DISENGAGE WHEN THE APU IS AT OPERATION SPEED. INSPECT THE STARTER CLUTCH. THE STARTER CAN BE DAMAGED IF IT CONTINUES TO TURN AT HIGH SPEEDS.

- (b) Start and operate the APU (AMM 49-11-00/201).
- (c) During the start procedure, look at the starter motor and make sure it does not turn when the APU is at operational speed.
- (d) Do a usual shutdown of the APU (AMM 49-11-00/201).
- (e) Install the cap on the end of the starter motor.

- S 414-017
- (9) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

EFFECTIVITY

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**49-41-06**

01A

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STARTER CLUTCH ASSEMBLY – INSPECTION/CHECK

1. General

- A. This procedure contains the task to inspect the starter clutch assembly.
- B. You must remove the starter motor to get access to the starter clutch. The starter motor is on the APU gearbox. You can get access to the starter motor through the APU access door.

TASK 49-41-06-206-018

2. Starter Clutch Inspection

A. References

- (1) AMM 49-41-01/201, Starter Motor

B. Equipment

- (1) 833207-1 Fixture – Bearing, Gear Alignment Tool, a component of the fixture  
Garrett Airline Services Division, Garrett Corporation  
P.O. Box 29003  
Phoenix, AZ 85072

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

D. Procedure

S 016-019

- (1) Remove the starter motor (AMM 49-41-01/201).

S 216-020

- (2) Examine the starter clutch:

- (a) Examine the starter clutch and make sure it has sufficient lubrication.
- (b) Examine the starter clutch for chips, pits, or other damage on the surface of the starter clutch.
- (c) Use the gear alignment tool to turn the starter clutch clockwise and to make sure the clutch turns freely and smoothly.
- (d) Use the gear alignment tool to turn the starter clutch counterclockwise and to make sure the clutch engages.

S 416-021

- (3) Install the starter motor (AMM 49-41-01/201).

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APU CONTROL PANEL – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the APU control panel
  - (2) An installation of the APU control panel.
- B. The APU control panel, M10324 or M1, is installed on the P5 overhead panel. You can get access to the APU control panel in the flight compartment.

TASK 49-41-81-004-001

2. APU Control Panel Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right

(2) Access Panels

- 822 Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-013

- (2) Make sure the BAT switch on the P5 overhead panel is OFF.

S 864-003

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) P11 Overhead Panel

- 1) 11A35, IND LIGHTS 4
- 2) 11B34, APU MN BAT CONT or APU ALTN CONT

(b) E6 Rack, Aft Equipment Center

- 1) APU START
- 2) APU CONT

C. APU Control Panel Removal

S 024-014

- (1) Do these steps to remove the APU control panel (1):
  - (a) Loosen the four screws (2) until you can disengage the APU control panel (1) from the P5 overhead panel.
  - (b) Carefully pull the APU control panel (1) from the P5 overhead panel until you can see the electrical connector D3576 (3).

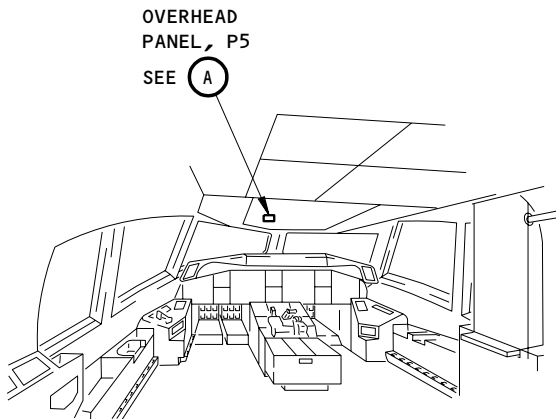
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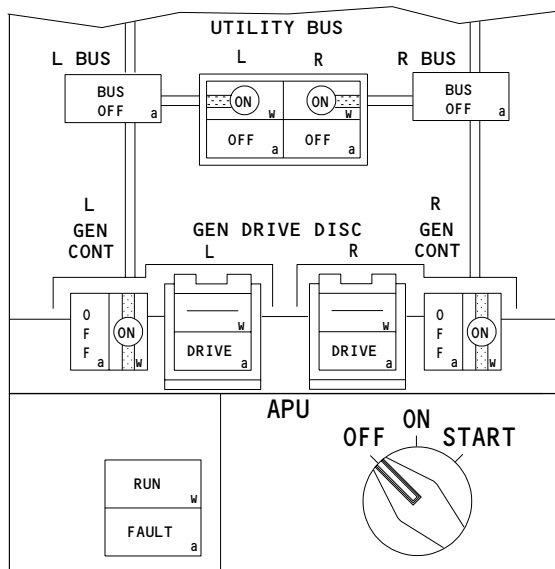
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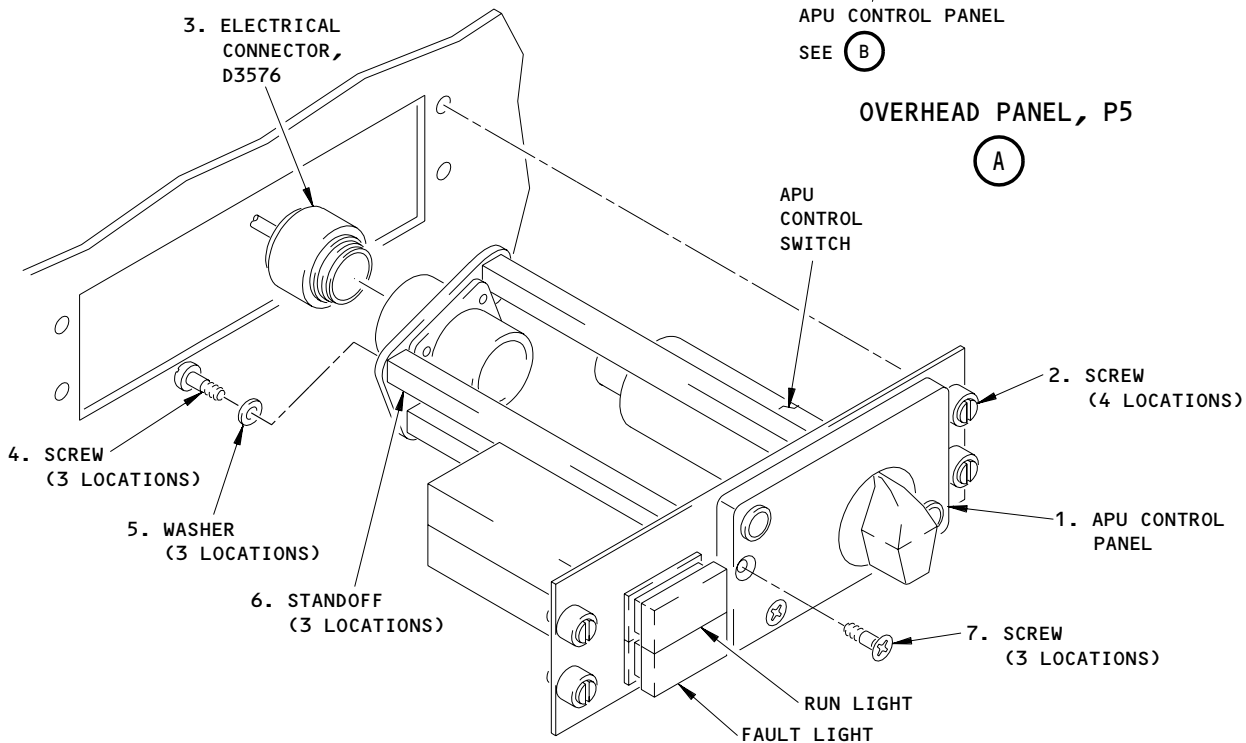
OVERHEAD  
PANEL, P5  
SEE (A)

FLIGHT COMPARTMENT



APU CONTROL PANEL  
SEE (B)

OVERHEAD PANEL, P5



APU CONTROL PANEL, M10324  
(INTERNAL WIRES NOT SHOWN)

1 AIRPLANES WITH THE APU  
CONTROL PANEL, M10324

(B) 1

APU Control Panel Installation  
Figure 401 (Sheet 1)

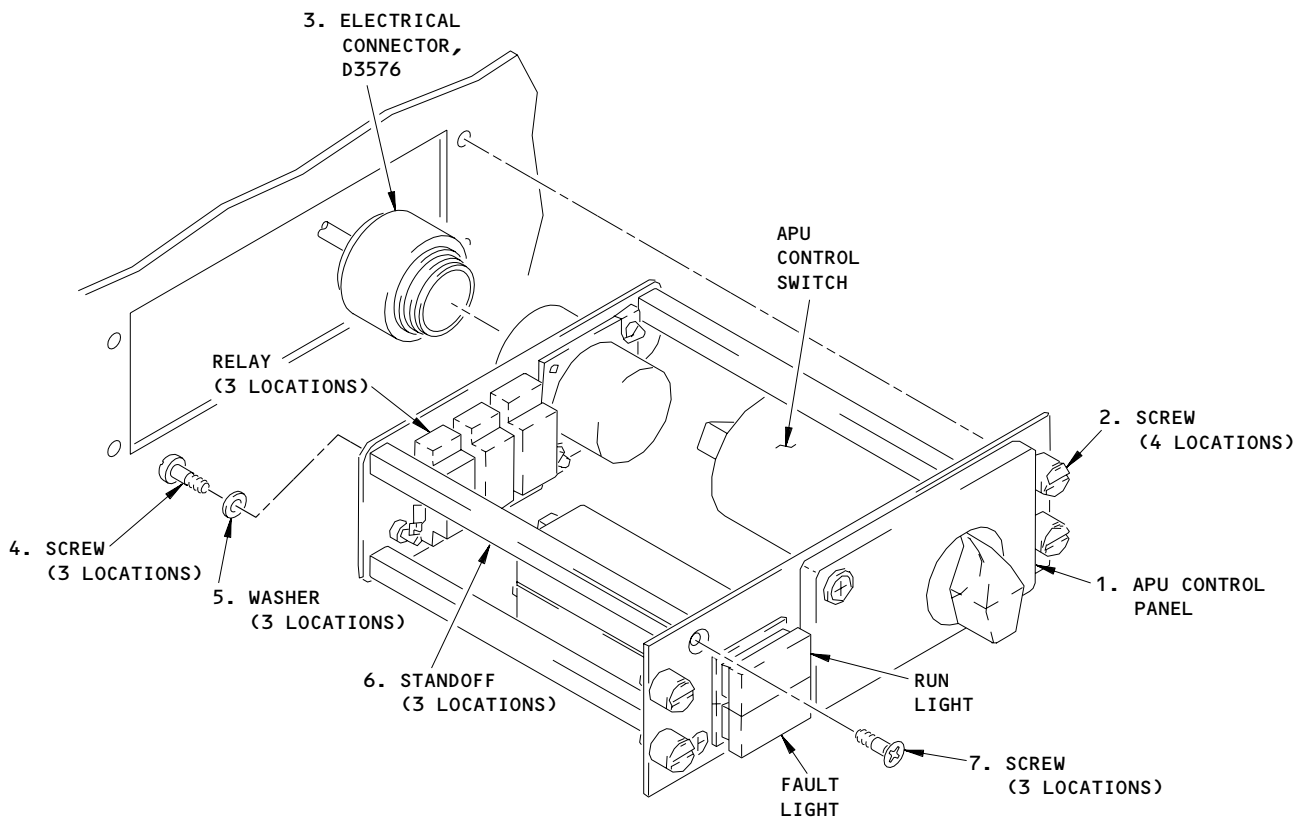
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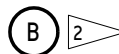
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APU CONTROL PANEL, M1  
(INTERNAL WIRES NOT SHOWN)



2 AIRPLANES WITH THE APU CONTROL PANEL, M1

APU Control Panel Installation  
Figure 401 (Sheet 2)

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- (c) Disconnect the electrical connector D3576 (3) from the APU control panel (1).
- (d) Remove the APU control panel (1).
- (e) Make sure you install all necessary protection covers.

TASK 49-41-81-404-006

3. APU Control Panel Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) A00313 Sealant - Thread Locking, Loctite

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	APU Control Panel	49-41-00	02	25 or 100
			49-41-00	03	15, 100 155 or 165
			49-41-00	04	5, 15, 100 or 110

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

E. Procedure

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S 424-015

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY.  
IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE  
EQUIPMENT CAN OCCUR.

- (1) Do these steps to install the APU control panel (1):
- (a) Loosely install the APU control panel (1) into the P5 overhead panel to make sure the front of the APU control panel is flush with the P5 overhead panel.

**NOTE:** There are two different standoffs (6) that can be installed on the APU control panel (1). The length of the first standoff (P/N 69B46200-10) is 4.25 inches. The length of the second standoff (P/N 69B46200-12) is 4.75 inches.

- (b) If the front of the APU control panel (1) is not flush with the P5 overhead panel, do these steps to replace the three standoffs (6) on the APU control panel:
- 1) Remove the APU control panel (1) from the P5 overhead panel.
  - 2) Remove the three screws (7) from the front panel of the APU control panel (1).
    - a) Discard the three screws (7).
  - 3) Remove the three screws (4) and three washers (5) from the rear of the APU control panel (1).
  - 4) Remove the three standoffs (6) and replace them with the other three standoffs.
  - 5) Install the replacement three standoffs (6) with the three washers (5) and three screws (4).
  - 6) Apply the thread locking sealant (loctite) to the threads of the three new screws (7).
  - 7) Install the three screws (7) on the front of the APU control panel (1).
- (c) If the front of the APU control panel (1) is flush with the P5 overhead panel, put the APU control panel (1) in position near the P5 overhead panel and connect the electrical connector D3576 (3) to the APU control panel.
- (d) Carefully put the APU control panel (1) in the P5 overhead panel.
- (e) Tighten the four screws (2).

F. APU Control Panel Installation Test

S 864-009

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
- 1) APU START
  - 2) APU CONT

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- (b) P11 Overhead Panel
  - 1) 11A35, IND LIGHTS 4
  - 2) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-010

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 724-016

- (3) Do the installation test for the APU control panel:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
    - 1) Make sure the RUN light flashes two times after you start the APU operation.

NOTE: The RUN light flashes two times when the APU control unit (ECU) completes its self-test.

- 2) Make sure the FAULT light comes on and goes off.

NOTE: The FAULT light comes on when the APU fuel valve opens.

- 3) Make sure the RUN light comes on when the APU is at 95% rpm.
- 4) Operate the APU for a minimum of five minutes.

- (b) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - 1) Make sure the FAULT light comes on when the APU fuel valve closes and goes off when the APU engine stops its operations.

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APU COOLING AIR SYSTEM – DESCRIPTION AND OPERATION

1. General

A. APU Cooling Air System (Fig. 1)

- (1) APUs PRE-ALLIEDSIGNAL-SB 48-7391;  
The cooling air system provides forced air cooling to the APU engine compartment and engine lubricating oil of the APU. The cooling air system consists of an isolation valve for the cooling fan, cooling fan, associated ducts, and an air/oil heat exchanger (oil cooler).
- (2) APU POST-ALLIEDSIGNAL-SB 48-7391;  
The cooling air system provides forced air cooling to the APU engine compartment and engine lubricating oil of the APU. The cooling air system consists of a cooling fan, associated ducts, and an air/oil heat exchanger (oil cooler).
- (3) APU PRE-ALLIEDSIGNAL-SB 49-7391;  
Cooling air is drawn from the APU inlet plenum through the fan isolation valve and the fan inlet duct by the cooling fan. The fan circulates some air through the oil cooler and vents the rest to the APU engine compartment. The oil cooler air is expelled overboard through the discharge duct for the oil cooling air.
- (4) APU POST-ALLIEDSIGNAL-SB 49-7391;  
Cooling air is drawn from the APU inlet plenum through the fan inlet duct by the cooling fan. The fan circulates some air through the oil cooler and vents the rest to the APU engine compartment. The oil cooler air is expelled overboard through the discharge duct for the oil cooling air.

2. Component Details

A. Fan Isolation Valve (Fig. 2)

- (1) APU PRE-ALLIEDSIGNAL-SB 49-7391;  
The isolation valve for the cooling fan is a butterfly valve that is pneumatically powered, spring-loaded closed, and opens when the APU is started. The valve is installed between the cooling air flange of the air inlet plenum and the cooling air fan. It consists of a shaft-mounted butterfly, a pneumatic actuator, and an open-position indicator switch enclosed in a housing.
- (2) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
The valve is pneumatically actuated when the pressure of the compressor discharge air (Pcd) rises above 7.5 psig. The position indicator switch supplies valve-open indication to the APU control unit. The pneumatic actuator consists of a cylinder, piston, piston rod, diaphragm, and spring. The actuator piston is spring-loaded to the retracted (valve closed) position.
- (3) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
The valve is pneumatically actuated when the pressure of the compressor discharge air (Pcd) rises above 5.0 psig. The position indicator switch supplies valve-open indication to the APU control unit. The pneumatic actuator consists of a cylinder, piston, piston rod, diaphragm, and spring. The actuator piston is spring-loaded to the retracted (valve closed) position.

B. Cooling Fan (Fig. 3)

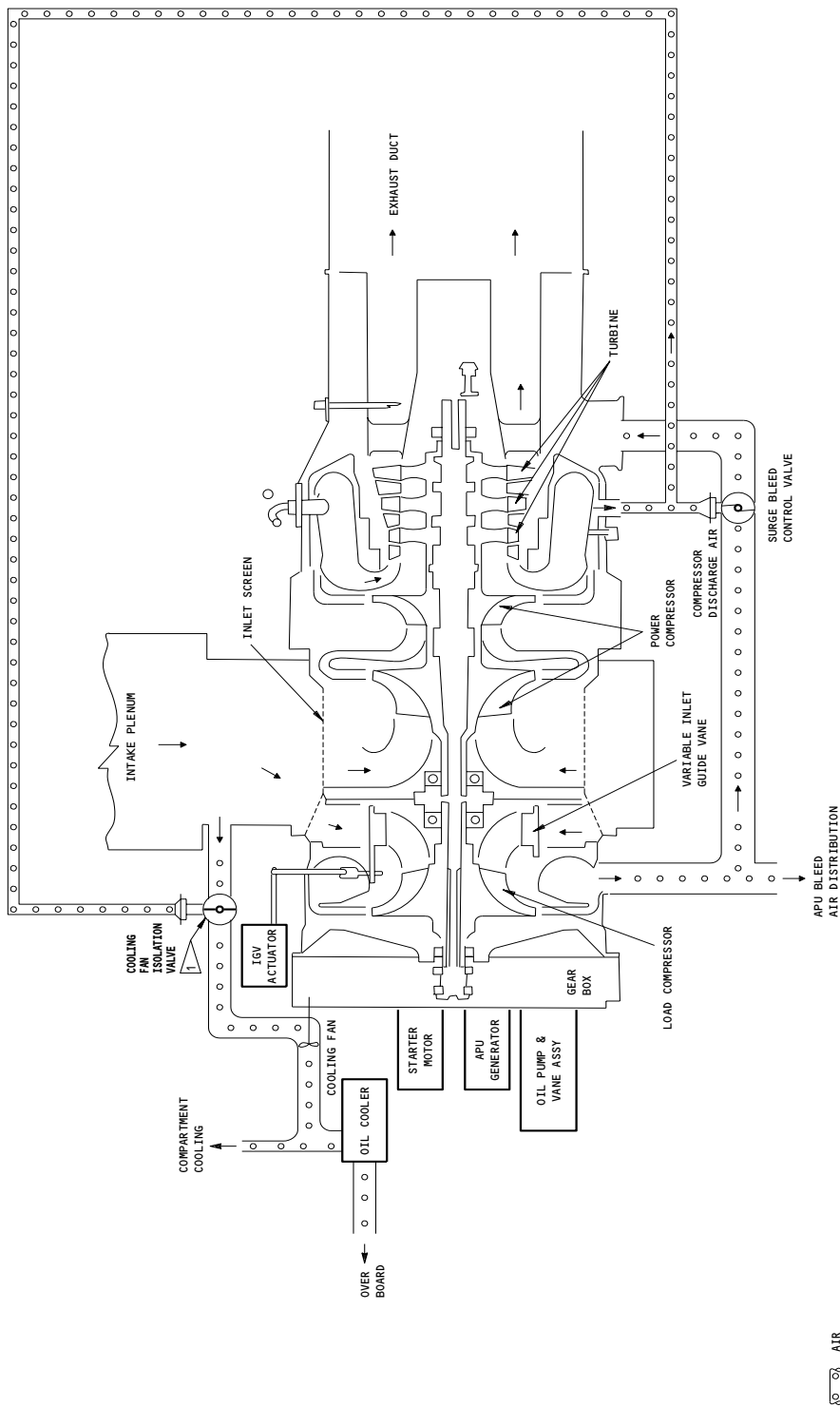
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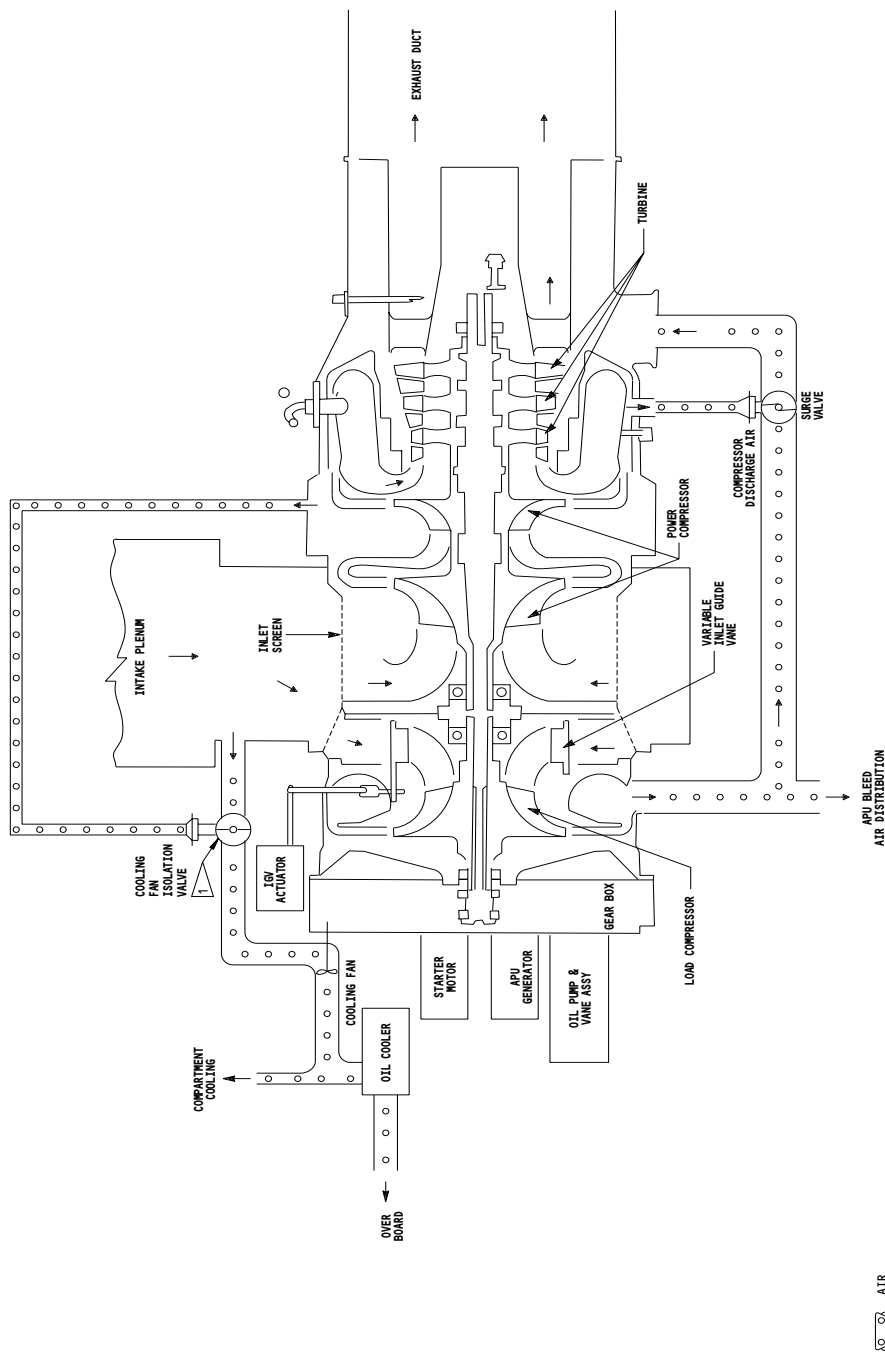
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APU Cooling Air System  
Figure 1 (Sheet 1)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE SURGE VALVE

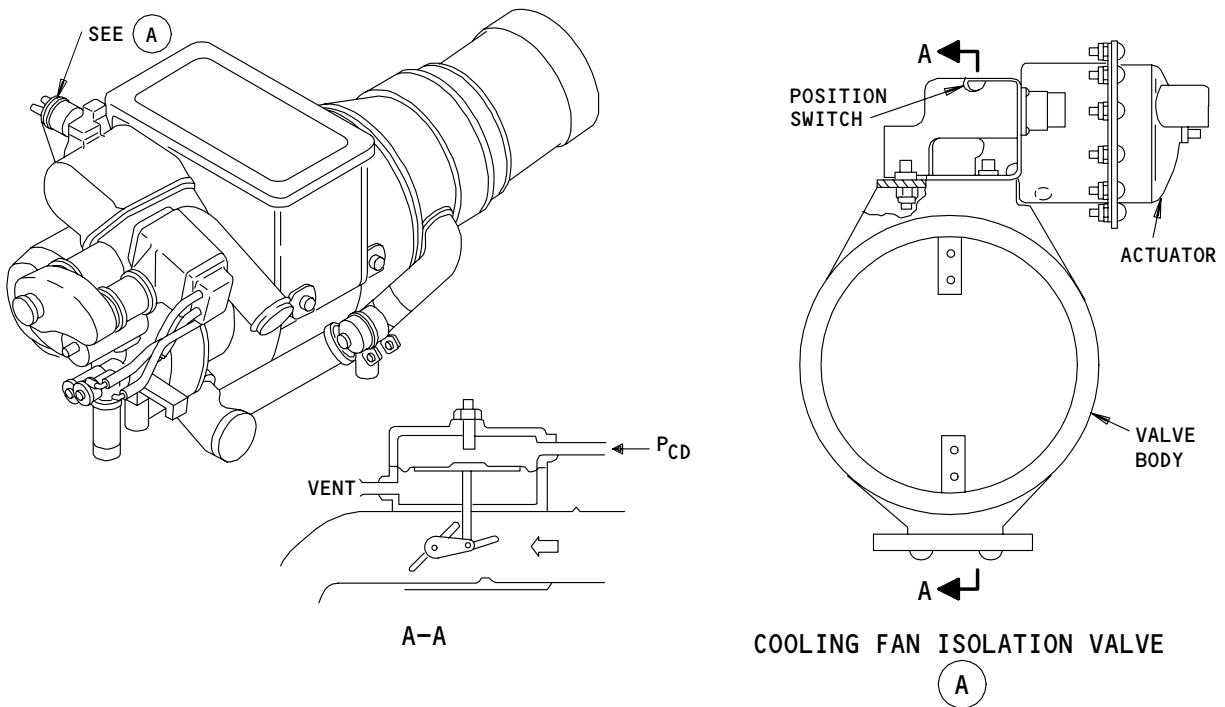
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APU Cooling Air System  
Figure 1 (Sheet 2)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE FIRST STAGE COMPRESSOR

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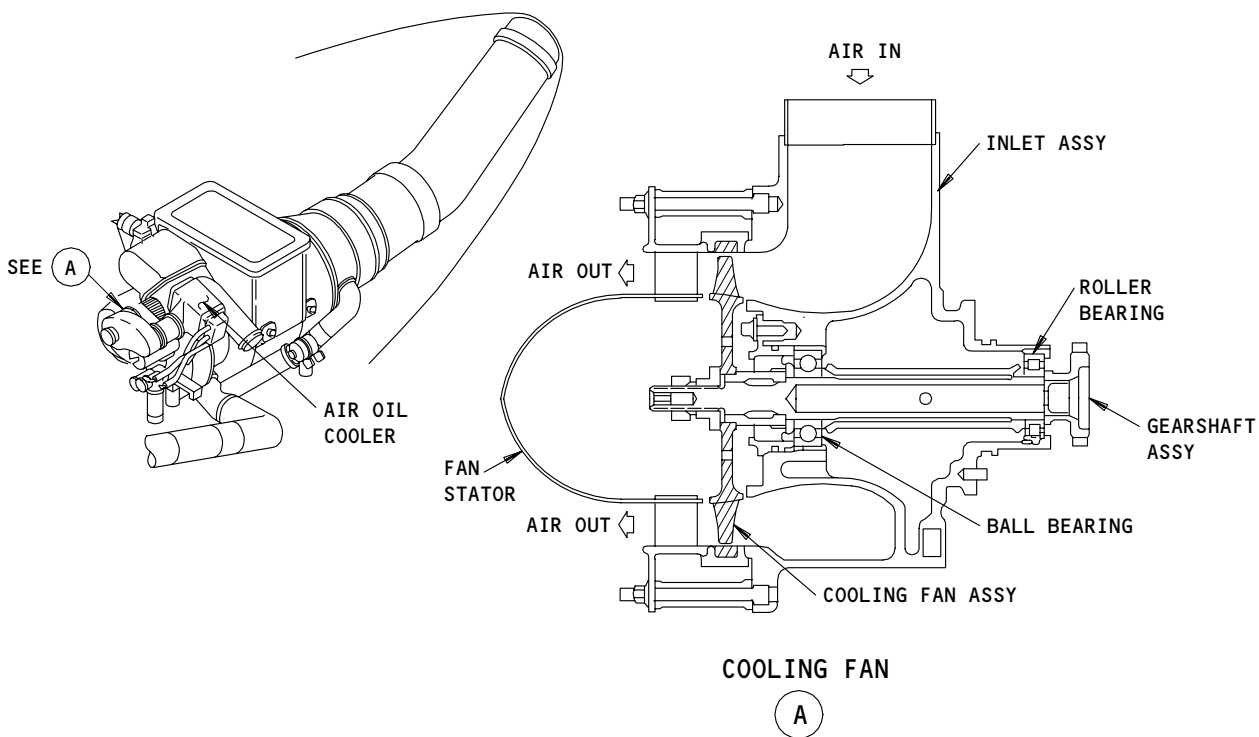


APU Cooling Fan Isolation Valve Location  
Figure 2

EFFECTIVITY  
APU PRE-ALLIEDSIGNAL-SB 49-7391

49-51-00

- (1) The cooling air fan provides cooling air to the oil cooler and the APU compartment. It consists of a fan inlet housing, fan rotor and a fan stator assembly. It has a 37 blade axial rotor with 31 stator vanes. It is powered by the APU gearbox and provides 90 lb/min of cooling air. It has forward ball bearings and aft roller bearings.
- C. Oil Cooling Air Duct (Fig. 4)
- (1) The engine oil is cooled in an air/oil heat exchanger. The duct for the oil cooling air exhausts the oil cooler air overboard through an opening on the left side of the airplane.



APU Cooling Fan Location  
Figure 3

EFFECTIVITY	
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D. Compartment Cooling and Ventilation (Fig. 4)

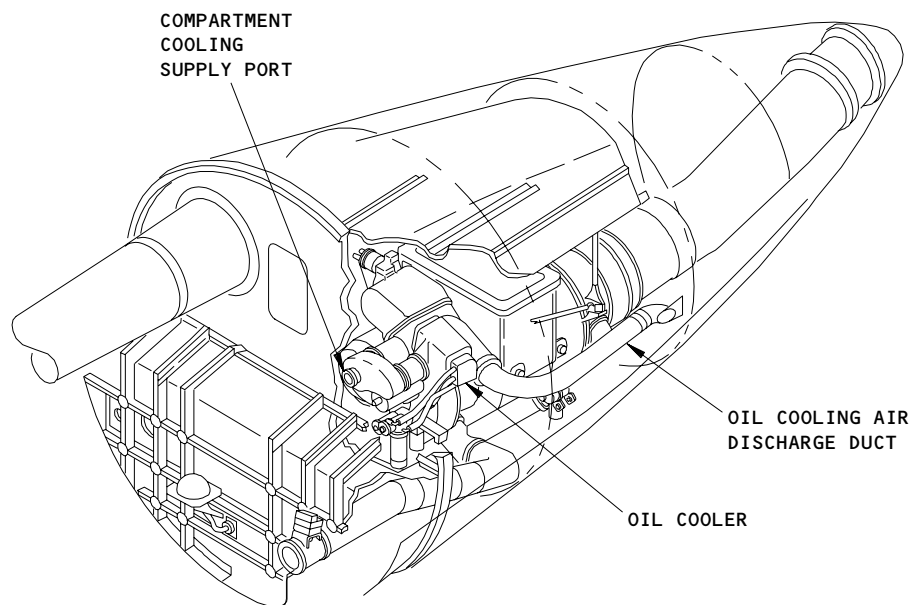
- (1) Compartment cooling air of the APU is discharged through a port located between the cooling fan and oil cooler. To prevent overpressurization of the compartment, a louvered vent door is located on the left APU access door. The vent door blows open at 2 psid.

3. Operation

A. Functional Description

(1) APU Cooling Air System (Fig. 1)

- (a) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE; During the APU start cycle, the isolation valve of the cooling fan opens when the compressor discharge pressure in the combustion chamber rises to 7.5 psig. The valve remains open during APU operation. When the APU is shut down, and the compressor discharge pressure drops to less than 7.5 psig, the valve returns to the closed position. If the valve does not open during the APU start cycle, a switch in the valve will cause the APU control unit to read "FAN VALVE" into BITE memory and an "APU BITE" message on EICAS maintenance page will occur. An eventual shutdown from High Oil Temperature (HOT) may occur due to the valve failure to open.



APU Compartment and Oil Cooling  
Figure 4

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- (b) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
During the APU start cycle, the isolation valve of the cooling fan opens when the compressor discharge pressure in the combustion chamber rises to 5.0 psig. The valve remains open during APU operation. When the APU is shut down, and the compressor discharge pressure drops to less than 5.0 psig, the valve returns to the closed position. If the valve does not open during the APU start cycle, a switch in the valve will cause the APU control unit to read "FAN VALVE" into BITE memory and an "APU BITE" message on EICAS maintenance page will occur. An eventual shutdown from High Oil Temperature (HOT) may occur due to the valve failure to open.
- (c) APU PRE-ALLIEDSIGNAL-SB 49-7391;  
Air is supplied to the cooling fan from the air inlet plenum through the isolation valve for the cooling fan and the air inlet duct. The cooling air is compressed by the fan and discharged into the fan stator assembly. From the fan stator assembly, the air is distributed to the oil cooler and the APU compartment. The air delivered to the oil cooler removes heat from the engine lubricating oil. The exhaust air from the oil cooler is discharged overboard through the cooling air discharge duct. The air delivered to the engine compartment is discharged through a louvered vent door on the left APU access door.
- (d) APU POST-ALLIEDSIGNAL-SB 49-7391;  
Air is supplied to the cooling fan from the air inlet plenum through the air inlet duct. The cooling air is compressed by the fan and discharged into the fan stator assembly. From the fan stator assembly, the air is distributed to the oil cooler and the APU compartment. The air delivered to the oil cooler removes heat from the engine lubricating oil. The exhaust air from the oil cooler is discharged overboard through the cooling air discharge duct. The air delivered to the engine compartment is discharged through a louvered vent door on the left APU access door.

B. BITE

- (1) AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
The APU control unit finds a failure of the isolation valve for the cooling fan and writes it in BITE memory (AMM 49-61-00/001). A failure of the fan isolation valve is shown on the FAULTY UNIT matrix as FAN VALVE. An automatic shutdown because of HOT is shown on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT PRE-ALLIEDSIGNAL-SB 49-7391;  
The APU control unit finds a failure of the isolation valve for the cooling fan and writes it in BITE memory (AMM 49-61-00/001). A failure of the fan isolation valve is shown on the FAULTY LRU matrix as FAN VALVE. An automatic shutdown because of HIGH OIL TEMP is shown on the REASON APU NOT OPERATING matrix.

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- (3) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT  
POST-ALLIEDSIGNAL-SB 49-7391;  
An automatic shutdown because of HIGH OIL TEMP is shown on the  
REASON APU NOT OPERATING matrix.


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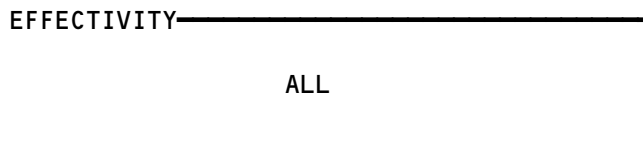
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**757**  
**FAULT ISOLATION/MAINT MANUAL**  
APU COOLING AIR SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
DUCT - OIL COOLING	--	1	315AL,316AR, APU COMPT, LEFT SIDE PLENUM	49-51-01
FAN - COOLING	--	1	315AL,316AR, APU COMPT, AUXILIARY POWER UNIT	49-51-03
VALVE - FAN ISOLATION <span style="font-size: small;">1</span>	--	1	315AL,316AR, APU COMPT, UPPER COMPRESSOR	49-51-02

1 APUs PRE-ALLIED SIGNAL -SB 49-7391

APU Cooling Air System - Component Index  
Figure 101

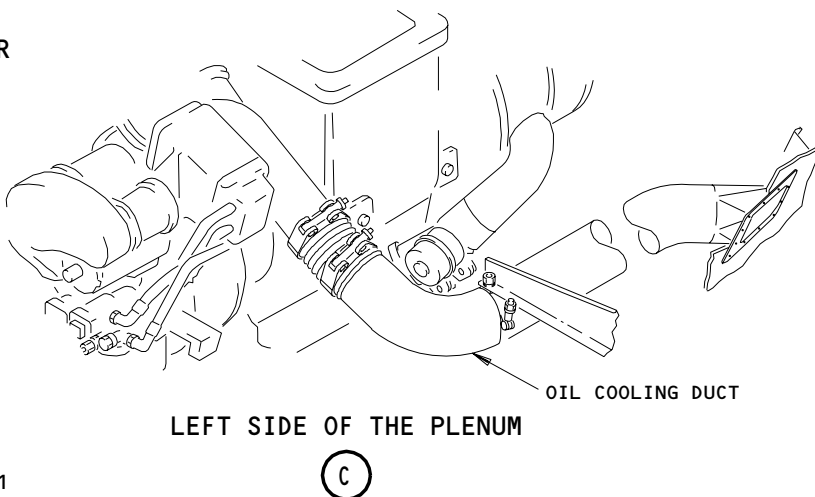
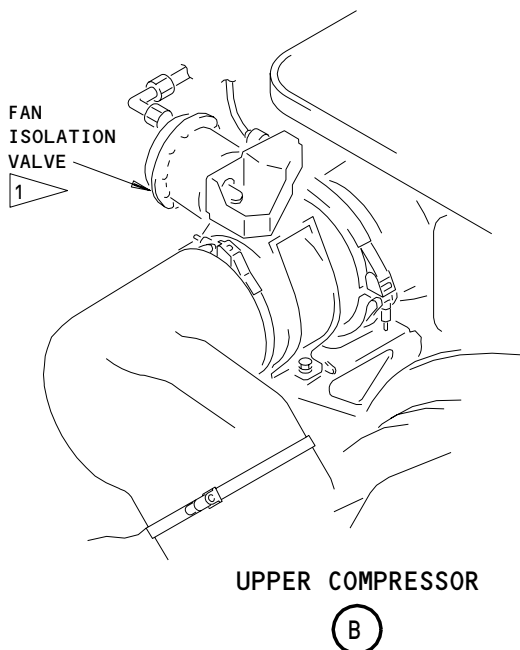
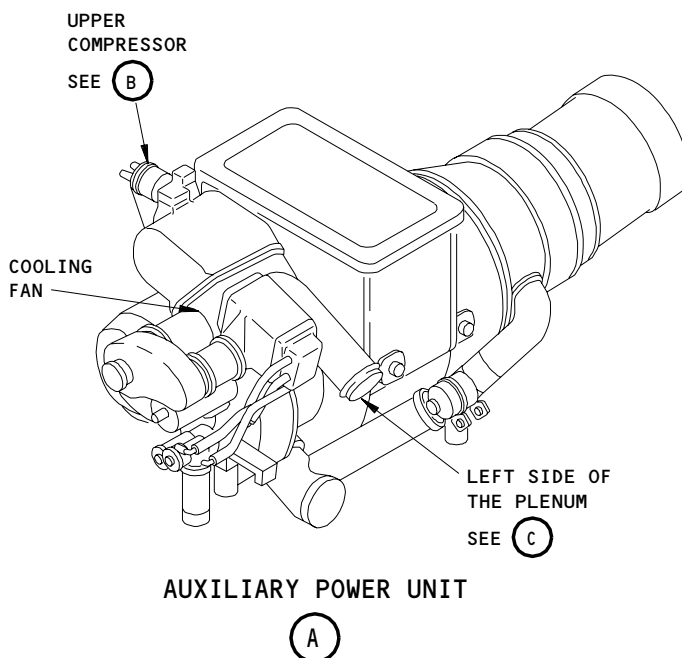
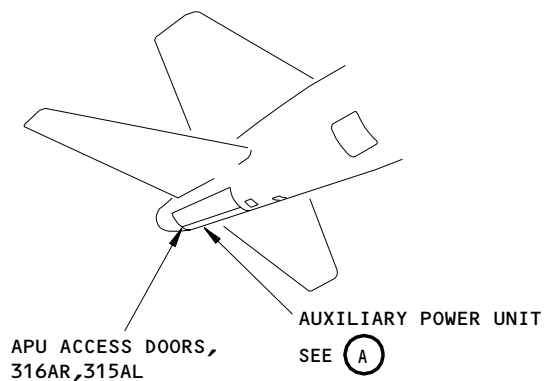


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1 APUs PRE-ALLIED SIGNAL-SB 49-7391

APU Cooling Air System - Component Location  
Figure 102

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OIL COOLING AIR DUCTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the oil cooling air ducts. In this procedure, the ducts are referred to as the cooling air ducts.
- B. The cooling air ducts connect the oil cooler to the fuselage vent. You can get access to the ducts through the APU access doors.

TASK 49-51-01-004-001

2. Oil Cooling Air Ducts Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

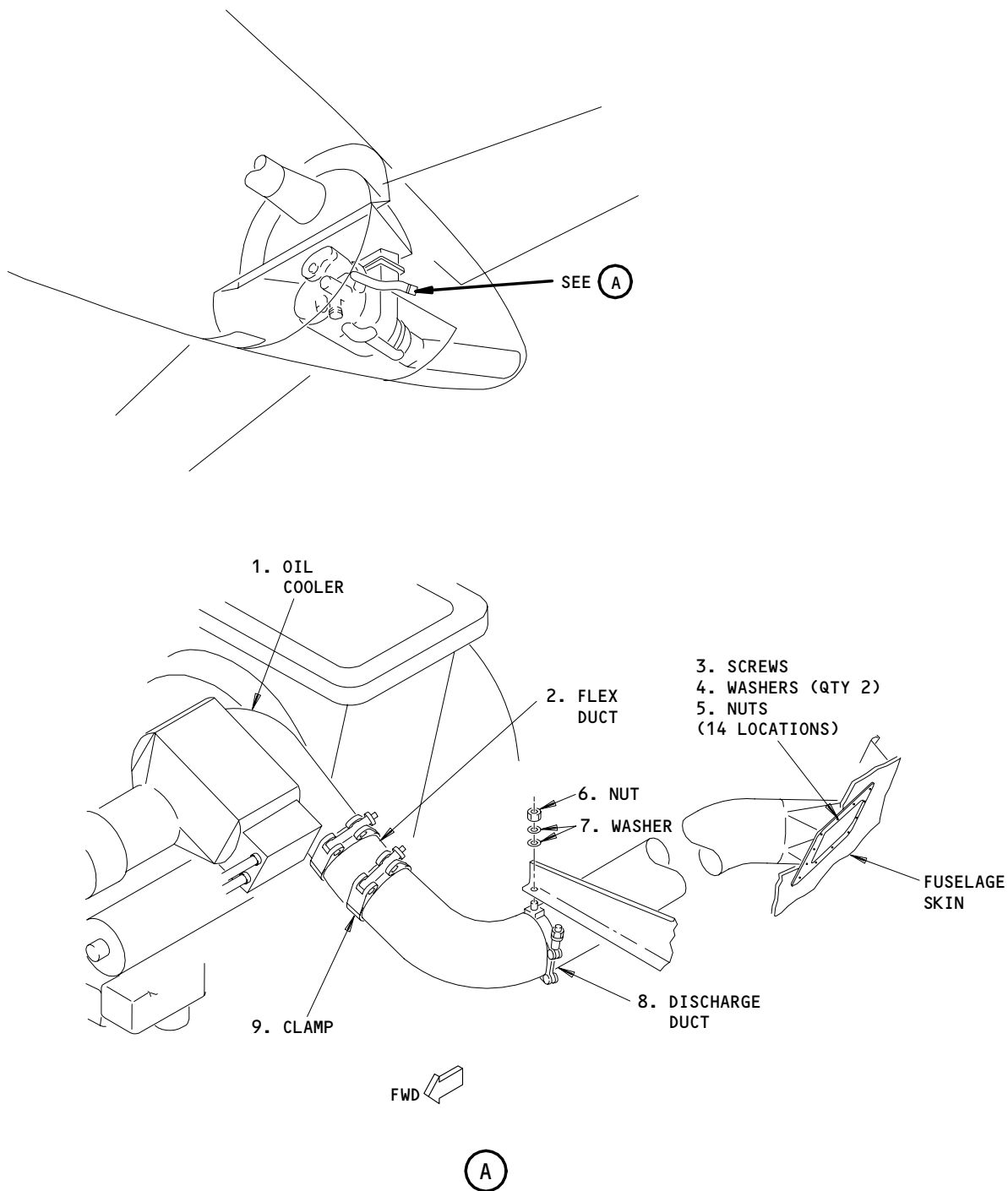
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Oil Cooling Air Ducts Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the cooling air ducts:
  - (a) Remove the screws (3), the washers (4), and the nuts (5) that attach the discharge duct (8) to the fuselage skin.
  - (b) Loosen the clamps (9).
  - (c) Remove the nut (6) and the washers (7) that attach the discharge duct (8) to the bracket.
  - (d) Remove the discharge duct (8) and the flex duct (2) from the oil cooler (1).

TASK 49-51-01-404-009

3. Oil Cooling Air Ducts Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Flex Duct	49-11-01	01	20
	8	Duct	49-51-01	01	40

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 424-010

- (1) Install the cooling air ducts:
  - (a) Attach the discharge duct (8) to the fuselage skin with the screws (3), the washers (4), and the nuts (5).
  - (b) Install the flex duct (2) between the oil cooler (1) and the discharge duct (8).

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- (c) Tighten the clamps (9) to 10-20 inch-pounds (1.1-2.6 newton-meters).
- (d) Attach the discharge duct (8) to the bracket with the nut (6) and the washers (7).

S 414-018

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-014

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-016

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

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FAN ISOLATION VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the fan isolation valve.
- B. The fan isolation valve is on the top right side of the APU, forward of the air inlet plenum. You can get access to the valve through the APU access doors.
- C. On some APUs, the elbow that connects the pneumatic line to the fan isolation valve has an aluminum nut. Other APUs have a stainless steel nut. AlliedSignal Service Bulletin No. GTCP331-49-5634 installs the stainless steel nut to prevent corrosion and galling.

TASK 49-51-02-004-001

2. Fan Isolation Valve Removal (Fig. 401)

A. References

- (1) SSM 49-52-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

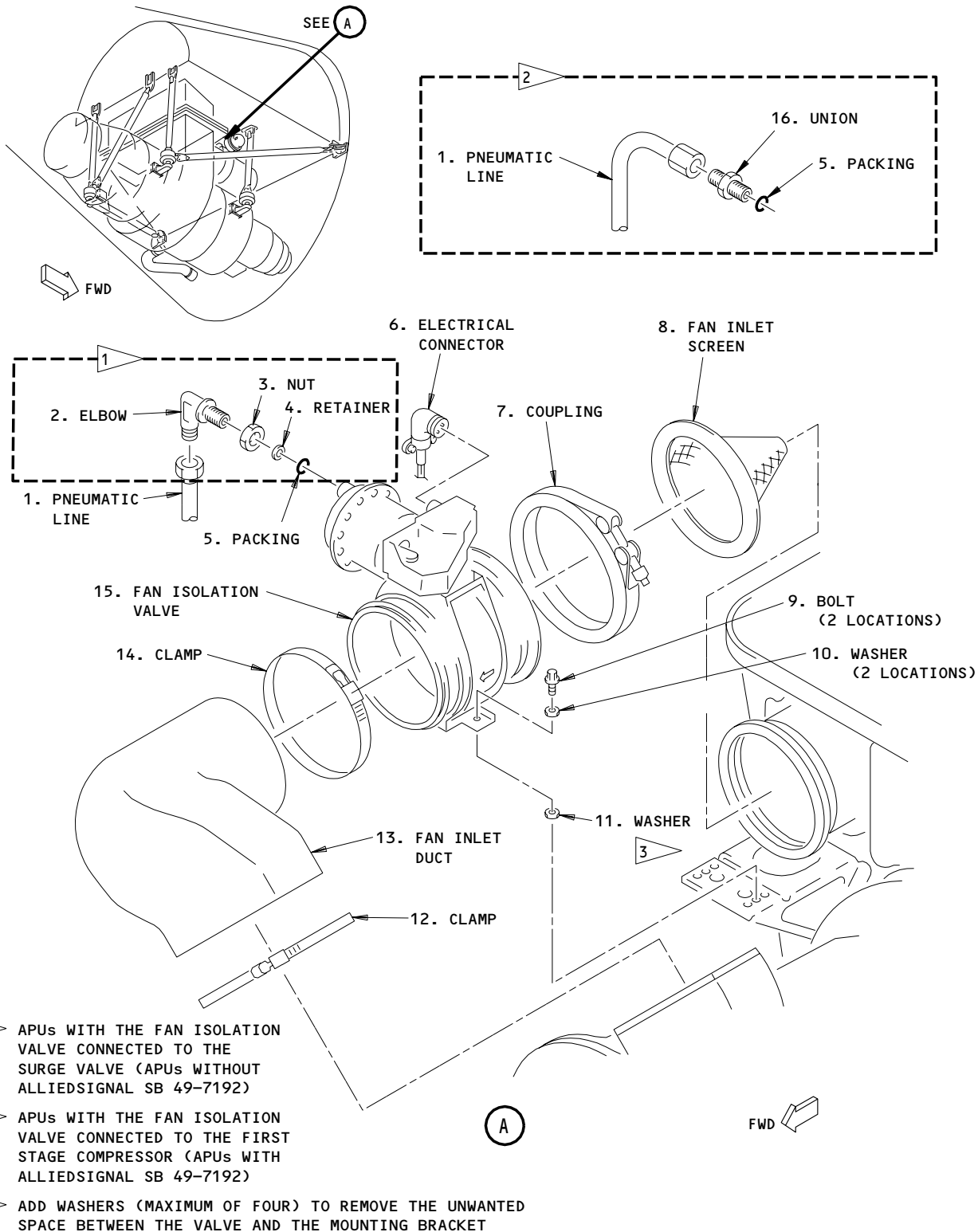
- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.



Fan Isolation Valve Installation  
Figure 401

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APU PRE-ALLIEDSIGNAL-SB 49-7391

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the fan isolation valve:
  - (a) Disconnect the P21 electrical connector (6) from the fan isolation valve (15).
  - (b) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (PRE-GARRETT SB 49-7192);  
Disconnect the pneumatic line (1) from the elbow (2).
    - 1) Loosen the nut (3).
    - 2) Remove the elbow (2), the nut (3), the retainer (4), and the packing (5) from the fan isolation valve (15).
      - a) Discard the packing (5).
  - (c) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (POST-GARRETT-SB 49-7192);  
Disconnect the pneumatic line (1):
    - 1) Disconnect the pneumatic line (1) from the union (16).
    - 2) Remove the union (16) and the packing (5) from the fan isolation valve (15).
      - a) Discard the packing (5).
  - (d) Remove the clamps (12 and 14) to remove the fan inlet duct (13).
  - (e) Remove the coupling (7).
  - (f) Remove the bolts (9) and the washers (10).
  - (g) Remove the fan isolation valve (15), the washers (11), and the inlet screen (8).

TASK 49-51-02-404-014

3. Fan Isolation Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

(2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5 15	Packing Fan Isolation Valve	49-51-02	01	95 35

C. References

- (1) AMM 49-61-05/201, APU Control Unit
- (2) SSM 49-52-01
- (3) WDM 49-14-11

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-015

(1) Install the fan isolation valve:

- (a) Install the fan inlet screen (8), the fan isolation valve (15), and the coupling (7) on the air inlet plenum.
  - 1) Do not tighten the coupling (7) at this time.
- (b) Install the fan inlet duct (13).
- (c) Install the clamps (12 and 14) on the fan inlet duct (13).
  - 1) Tighten the clamps (12 and 14) to 25-30 inch-pounds (2.8-3.4 newton-meters).
- (d) Install the washers (11) between the fan isolation valve (15) and the mounting bracket.
- (e) Put the jumper in position from 'HOT' to 'LOP' on the mounting bracket.

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- (f) Install the bolts (9) and the washers (10).
  - 1) Tighten the bolts (9) to 50–55 inch-pounds (5.7–6.2 newton-meters).
- (g) Tighten the coupling (7) to 60–65 inch-pounds (6.8–7.4 newton-meters).
  - 1) Make sure the coupling (7) is in the correct position.
  - 2) Tighten the coupling (7) again if it is necessary.
- (h) Connect the P21 electrical connector (6) to the fan isolation valve (15).
  - 1) Install a lockwire to the electrical connector (6).
- (i) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (PRE-GARRETT SB 49-7192);  
Connect the pneumatic line (1):
  - 1) Lubricate the new packing (5) with a light coat of lubricant.
  - 2) Install the packing (5), the retainer (4), and the nut (3) on the elbow (2).
  - 3) Install the elbow assembly on the fan isolation valve (15).
  - 4) Connect the pneumatic line (1) to the elbow (2).
  - 5) Tighten the nut (3) on the elbow (2).
    - a) If the nut (3) is aluminum, tighten the nut to 40–60 inch-pounds (4.5–6.8 newton-meters).
    - b) If the nut (3) is stainless steel, tighten the nut to 100–120 inch-pounds (11.3–13.6 newton-meters).
- (j) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (POST-GARRETT-SB 49-7192);  
Connect the pneumatic line (1):
  - 1) Lubricate the new packing (5) with a light coat of lubricant.
  - 2) Install a packing (5) on the union (6).
  - 3) Install the union (16) in the fan isolation valve (15).
  - 4) Connect the pneumatic line (1) to the union (16).

S 744-032

- (2) If there was a heat problem, examine the fan inlet duct for damage.

S 744-026

- (3) Do the BITE test for the APU system (AMM 49-61-05/201).

S 414-031

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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S 864-027

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-029

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU PRE-ALLIEDSIGNAL-SB 49-7391

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COOLING FAN - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the cooling air fan on the APU.
- B. The cooling air fan is on the upper left side of the APU gearbox.
- C. The cooling air fan has an air pressure tube installed between the fan and the APU compressor case. This pressure tube is installed to help decrease cooling fan faults.
- D. You can get access to the cooling air fan through the APU access doors.

TASK 49-51-03-004-001

2. Cooling Fan Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

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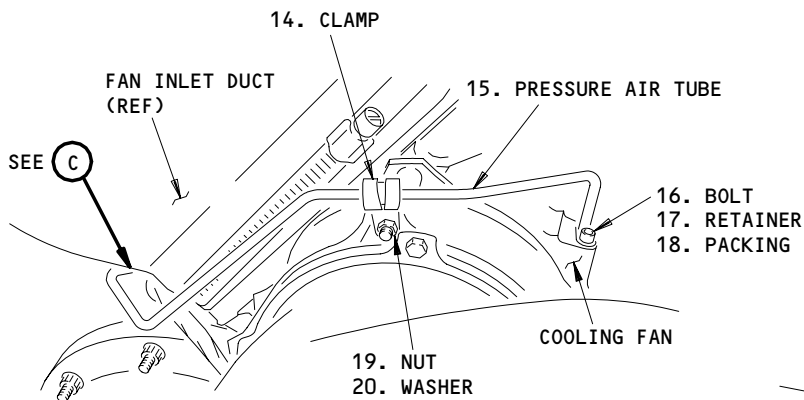
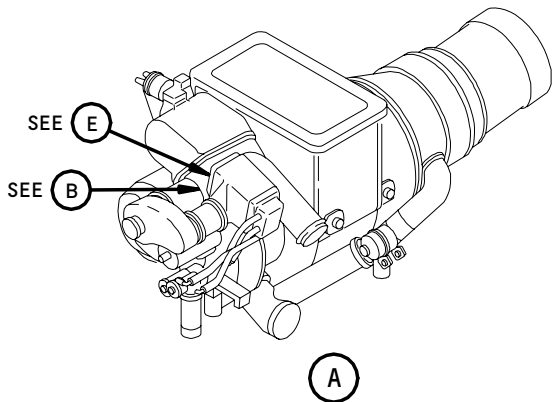
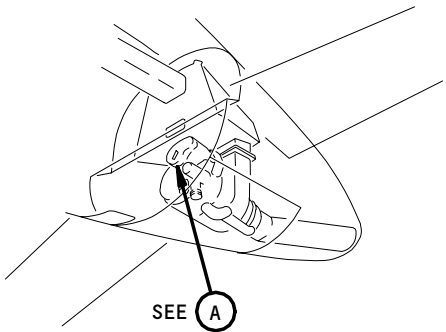
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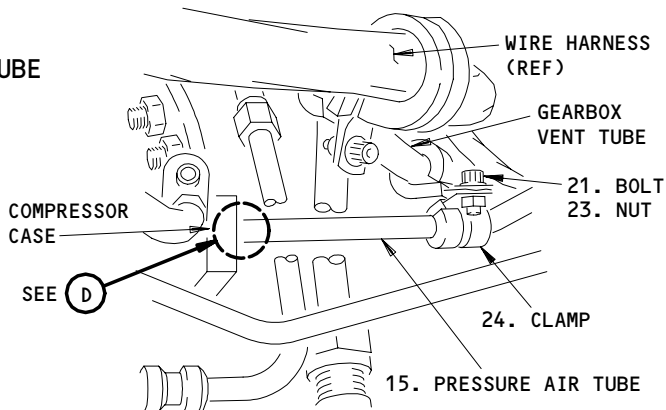
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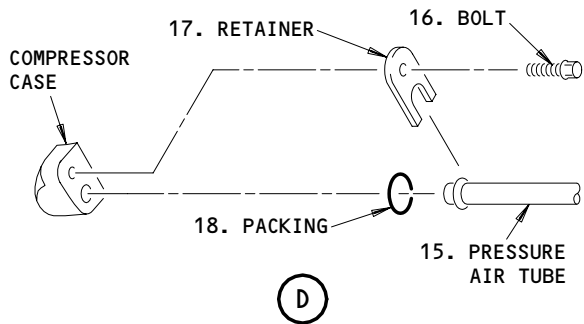
INSTALLATION OF THE PRESSURE AIR TUBE

(B)



INSTALLATION OF THE PRESSURE AIR TUBE

(C)



(D)

Cooling Fan Installation  
Figure 401 (Sheet 1)

EFFECTIVITY

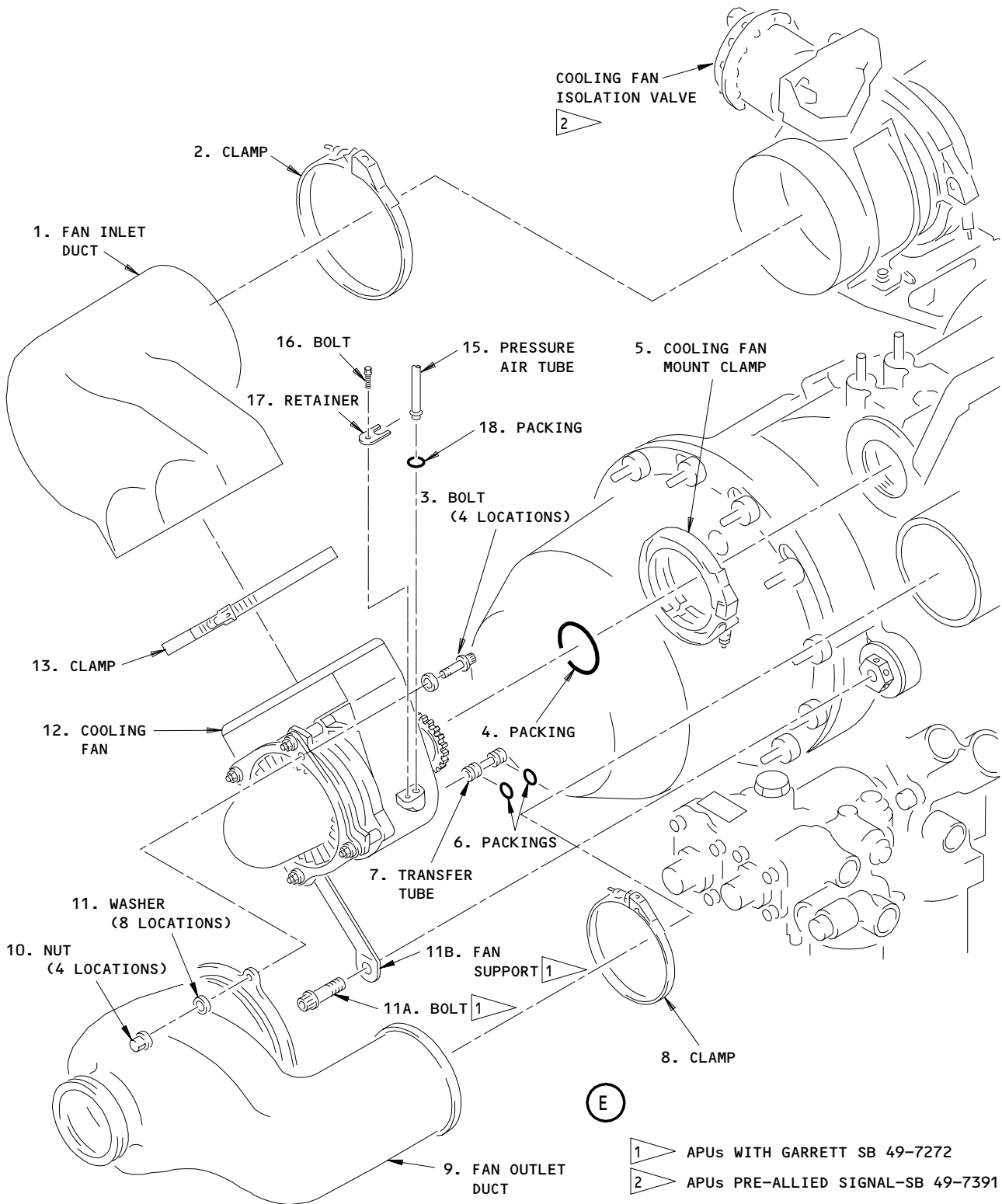
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Cooling Fan Installation  
Figure 401 (Sheet 2)

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 034-027

- (4) Remove the air pressure tube for the cooling fan:
  - (a) Remove the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the cooling fan.
  - (b) Remove the nut (19), the washer (20), and the pressure tube clamp (14) from the cooling fan stud.
  - (c) Install the washer (20) and the nut (19) on the cooling fan stud.
    - 1) Tighten the nut (19) to 75 inch-pounds (8.5 newton-meters).
  - (d) Remove the bolt (21) and the nut (23) that attaches the pressure tube clamp (24) to the clamp on the gearbox vent tube.
  - (e) Remove the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the APU compressor case.
  - (f) Remove the air pressure tube (15).
  - (g) Remove the packings (18) from the ends of the air pressure tube (15).
    - 1) Discard the packings (18).

S 024-030

- (5) Remove the APU cooling fan:
  - (a) Remove the clamp (8) from the fan outlet duct (9).
  - (b) Remove the nuts (10), the washers (11), and the bolts (3) that attach the fan outlet duct (9) to the cooling fan (12).
  - (c) Remove the fan outlet duct (9).
  - (d) Remove the clamps (2 and 13) from the fan inlet duct (1).
  - (e) Remove the fan inlet duct (1).
  - (f) APU POST-GARRETT-SB 49-7272;  
Remove the bolt (11A) that attaches the cooling fan support (11B) to the gearbox plug.
  - (g) Remove the clamp (5) that attaches the cooling fan (12) to the gearbox.
  - (h) Remove the cooling fan (12) and the packing (4).
    - 1) Discard the packing (4).

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- (i) Remove the transfer tube (7) from the cooling fan (12).
  - 1) Discard the packings (6).

TASK 49-51-03-404-011

3. Cooling Fan Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Packing	49-51-03	02	60
	6	Packing			55
	12	Cooling Fan			35, 40 or 45
	18	Packing			25

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-031

- (1) Install the APU cooling fan:
  - (a) Lubricate the new packings (6) with a light coat of lubricant or oil.

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- (b) Install the packings (6) on the transfer tube (7).
- (c) Install the transfer tube (7) in the cooling fan (12).
- (d) Lubricate the new packing (4) with a light coat of lubricant or oil.
- (e) Install the packing (4) on the cooling fan (12).

**CAUTION:** MAKE SURE YOU ALIGN THE GEARBOX GEARS AND THE COOLING FAN GEAR BEFORE YOU INSTALL THE FAN. DAMAGE TO THE COUPLING FAN CAN OCCUR IF YOU DO NOT ALIGN THE GEARS.

- (f) Install the cooling fan (12) on the gearbox.
- (g) Install the clamp (5):
  - 1) Install the clamp (5) that attaches the cooling fan (12) to the gearbox.
  - 2) APU POST-GARRETT-SB 49-7272;  
Do these steps:
    - a) Install the bolt (11A) that attaches the cooling fan support (11B) to the gearbox plug.
    - b) Tighten the bolt (11A) to 130 inch-pounds (14.7 newton-meters).
    - c) Tighten the nut that attaches the the cooling fan support (11B) to the cooling fan (12) to 125 inch-pounds (14.1 newton-meters).
  - 3) Adjust the clamp (5) until the flex duct overlaps the clamp by a minimum of 0.06 inch (1.5 mm).
  - 4) Tighten the clamp (5) to 50 inch-pounds (5.7 newton-meters).
- (h) Install the fan inlet duct (1).
- (i) Install the clamps (2 and 13) on the fan inlet duct (1).
  - 1) Tighten the clamps (2 and 13) to 25 inch-pounds (2.8 newton-meters).
- (j) Install the fan outlet duct (9).
- (k) Install the bolts (3), the washers (11), and the nuts (10).
  - 1) Tighten the nuts (10) to 40-50 inch-pounds (4.5-5.7 newton-meters).
- (l) Install the clamp (8) on the fan outlet duct (9).
  - 1) Tighten the clamp (8) to 25 inch-pounds (2.8 newton-meters).

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S 434-029

- (2) Install the air pressure tube for the cooling fan:
- (a) Lubricate the new packings (18) with a light coat of lubricant or oil.
  - (b) Install the packings (18) on the ends of the air pressure tube (15).
  - (c) Put the air pressure tube (15) in its position between the cooling fan (12) and the APU compressor case.
  - (d) Install the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the APU compressor case.
  - (e) Attach the pressure tube clamp (24) to the clamp on the gearbox vent tube with the bolt (21) and the nut (23).
  - (f) Remove the nut (19) and the washer (20) from the cooling fan stud.
  - (g) Install the pressure tube clamp (24), the washer (20), and the nut (19) on the cooling fan stud.
    - 1) Tighten the nut (19) to 75 inch-pounds (8.5 newton-meters).
  - (h) Install the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the cooling air fan (12).

S 414-022

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-032

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-024

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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COOLING FAN – INSPECTION/CHECK

1. General

- A. This procedure contains a task to do an inspection of the drive gear for the APU cooling fan. This task is done in the APU compartment.

TASK 49-51-03-216-005

2. Cooling Fan Drive Gear Inspection

A. References

- (1) AMM 49-51-03/401, Cooling Fan

B. Access

(1) Location Zones

- 315 APU Compartment – Left  
316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left  
316AR APU Access Door – Right

C. Procedure

S 026-009

- (1) Remove the cooling fan (AMM 49-51-03/401).

S 216-008

- (2) Visually examine the fan drive gear and idler gear teeth. Examine at least six adjacent teeth.

NOTE: You cannot get sufficient access to the idler gear (inside the gearbox) to examine the gear teeth on-wing. If you see wear on the drive gear (on the fan shaft), then the idler gear has the same quantity of wear. This inspection procedure is accurate only if the two gears have operated together since new or for so long that they have the same quantity of wear.

- (a) The overall surface of the gear should be even and continuous.  
(b) Any frosting or uneven wear is unsatisfactory.  
(c) You should be able to see the lateral grind marks from the original manufacture on the tooth face. The grind marks should be continuous on the tooth face. It can help to compare to a new gear.

S 216-010

- (3) Any unsatisfactory wear means that the two gears could fail. If you find unsatisfactory wear, it is recommended that you replace the APU (AMM 49-11-01/401) and the cooling fan (AMM 49-51-03/401).

NOTE: You must remove the APU to replace the idler gear.

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- S 426-011
- (4) If the gear teeth are satisfactory, install the cooling fan (AMM 49-51-03/401).

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APU BLEED AIR SYSTEM – DESCRIPTION AND OPERATION

1. General

A. APU Bleed Air System (Fig. 1)

- (1) The bleed air system for the APU provides compressed air for airplane air conditioning and main engine starting. The system consists of inlet guide vanes and the actuator for the inlet guide vanes.
- (2) When the APU engine reaches 95% speed, bleed air can be taken from the APU. The amount of bleed air is electronically controlled by the APU control unit. The control unit receives airplane pneumatic demands and sends a signal to the torque motor for the inlet guide vanes to position the guide vanes accordingly. The guide vane position controls the airflow through the load compressor.

2. Component Details

A. Inlet Guide Vanes (IGV) (Fig. 2)

- (1) The assembly of the inlet guide vanes consists of 28 guide vanes that are radially connected and located at the load compressor inlet. The vanes pivot about their leading edge and are supported at each end by sleeve bearings. Each vane has an individual sector gear on its front end which is meshed with a ring gear. The vane trailing edge swings to the open or closed position.

B. Inlet Guide Vane Actuator (Fig. 3)

- (1) The actuator for the inlet guide vanes positions the inlet guide vanes in response to signals from the APU control unit. The power source of the actuator is regulated fuel pressure from the fuel control unit. The actuator consists of a torque-motor driven servo, a second-stage servo spool, a hydraulic actuator piston, and a linear-variable differential transformer. The actuator is mounted to the left side of the load compressor case.

3. Operation

A. Functional Description

(1) APU Control Unit (Fig. 1)

- (a) The APU control unit electronically controls the inlet guide vanes by sending signals to the IGV torquemotor. The control unit receives pneumatic demands from the airplane and sets the guide vanes accordingly. The pneumatic demand signals from the airplane are: main engine start (28 vdc signal), bleed air (28 vdc signal), ECS enable (28 vdc signal), ECS demand (1-9 volt signal), and air/ground (ground signal indicates ground operation).

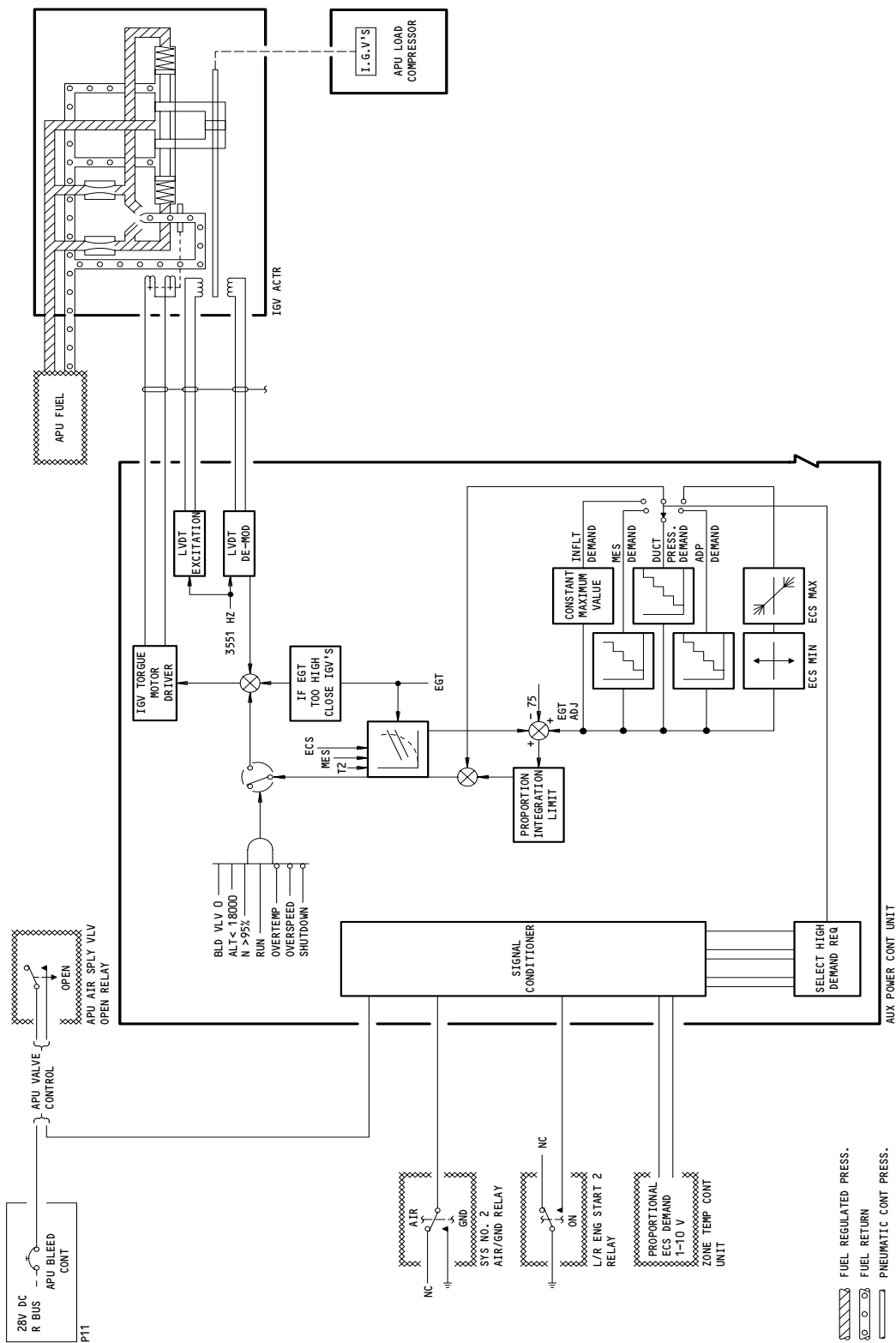
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APU Bleed Air System  
Figure 1

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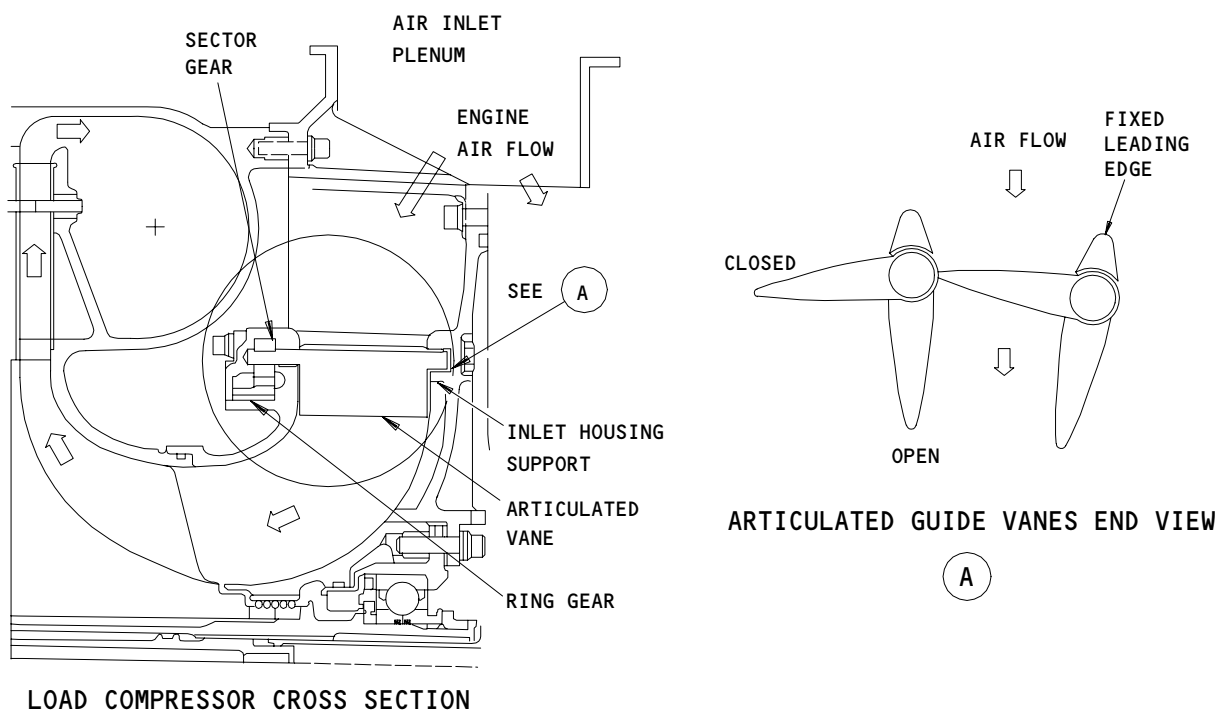
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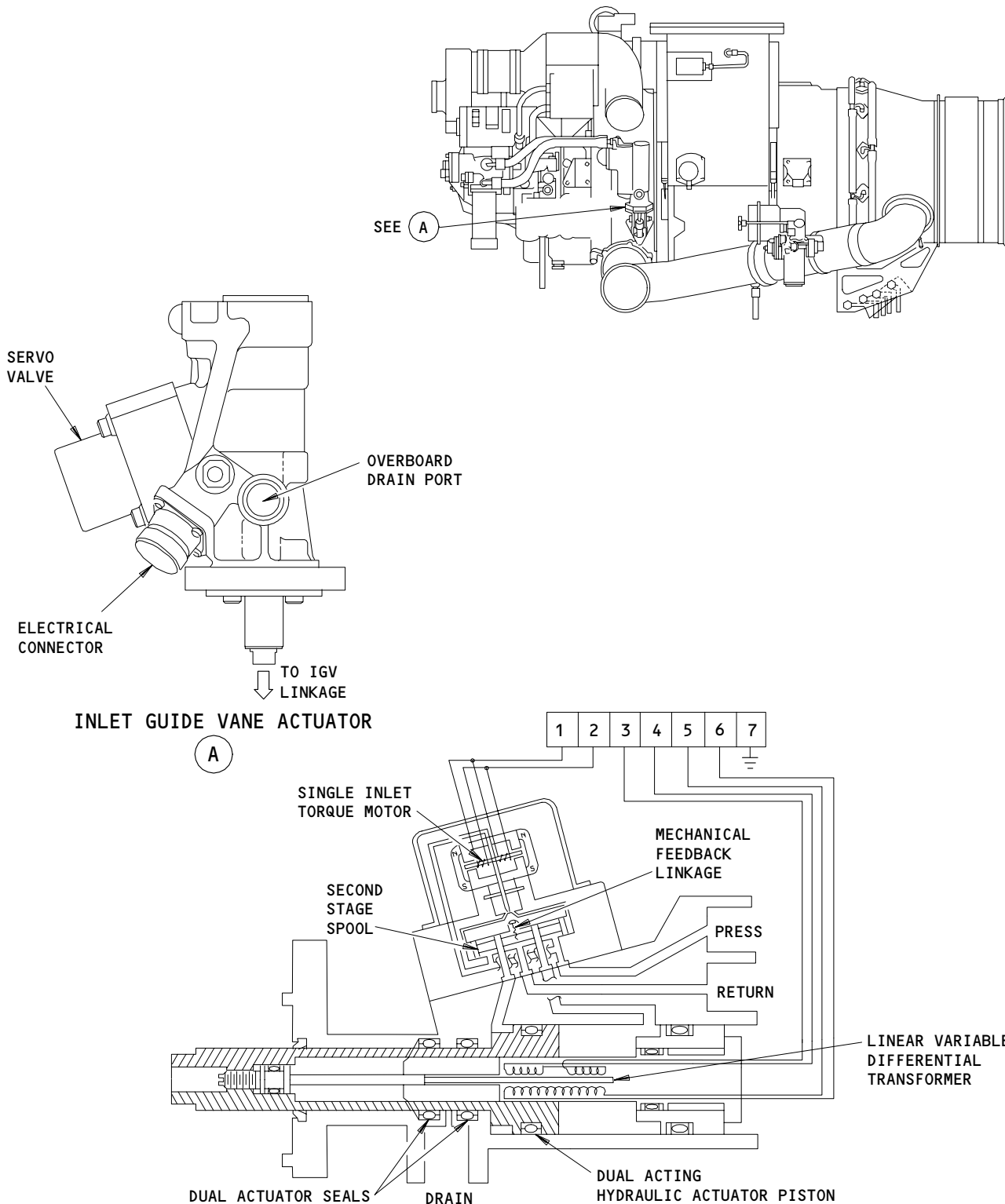
- (b) During the APU start sequence, the IGVs are held shut to minimize shaft loading. When 95% speed is reached, the APU control unit allows electric and pneumatic loading. If the loads cause the APU to exceed temperature limits, the control unit will reduce the pneumatic load and give priority to the electric load.
- (2) Inlet Guide Vane Actuator (IGVA) (Fig. 3)
- (a) The actuator for the inlet guide vanes is powered by high pressure fuel from the fuel control unit. It is controlled by the APU electronic control unit which generates a 0-140 ma analog signal as the position control. This signal energizes the torque motor to produce a pressure imbalance on the second-stage servo spool. Spool movement allows high pressure fuel to flow to the main actuator piston. The piston drives the ring gear and has a 1.0-inch stroke. A linear-variable differential transformer measures the position of the piston and sends a signal to the APU control unit. The control unit compares this feedback position to the command position and signals the actuator accordingly.
- (3) IGV Control (Fig. 4 and 5)



APU Inlet Guide Vanes  
Figure 2

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APU Inlet Guide Vane Actuator  
Figure 3

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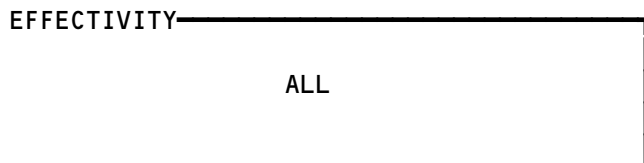
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- (a) The APU control unit performs the IGV control logic. It determines in which pneumatic mode the APU will operate based on the pneumatic demand signals received. There are five distinct pneumatic modes of operation: Idle, Duct Pressurization, Environmental Control System (ECS), Main Engine Start (MES), and Inflight.
- (b) IGV logic selects the highest demand mode if more than one is requested. The ECS pneumatic demand is a variable signal between 1-10 volts. The APU control unit controls the guide vanes according to the demand input of the variable ECS. The minimum and maximum limits are below 1 volt and above 9 volts respectively.
- (c) IGV Position Control Limited by EGT
  - 1) The APU control unit gives priority to the electrical shaft load in all operating modes. If exhaust gas temperature exceeds the temperature limit schedule, the control unit modulates the IGVs closed to reduce the pneumatic load.
- (d) Adjustable Position Switches for the IGV
  - 1) The IGV setpoint angle for selected pneumatic modes can be adjusted by switches located under a coverplate on the face of the APU control unit. The effect of switch settings (A through E) on IGV angle positioning by the APU control unit is shown in Fig. 4 and 5. Switch adjustment is not for line maintenance.

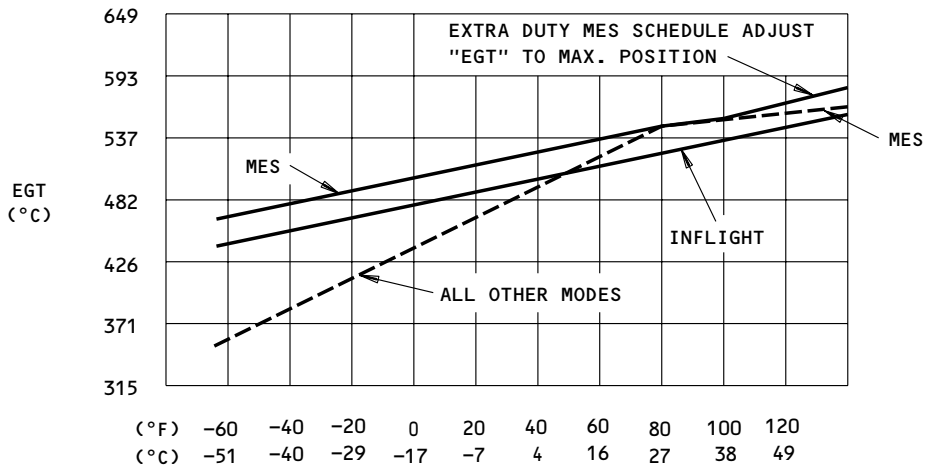
PNEUMATIC DEMAND SIGNALS				IGV POSITION (DEGREES)	PNEUMATIC MODE
AIR/GROUND	APU BLEED AIR VALVE	ECS PACK	MES		
---	CLOSED	---	---	85° (FULL CLOSED)	IDLE
GROUND	OPEN	OFF	OFF	79° TO 27°	DUCT PRESSURE
GROUND	OPEN	ON	OFF	74° TO -20 (ECS DEMAND)	ECS
GROUND	OPEN	---	ON	-20 (FULL OPEN)	MES
AIR	OPEN	---	---	-20 (FULL OPEN)	INFLT

**NOTE:** HIGH EGT CAUSES THE IGV TO MODULATE CLOSED IN ALL PNEUMATIC MODES.

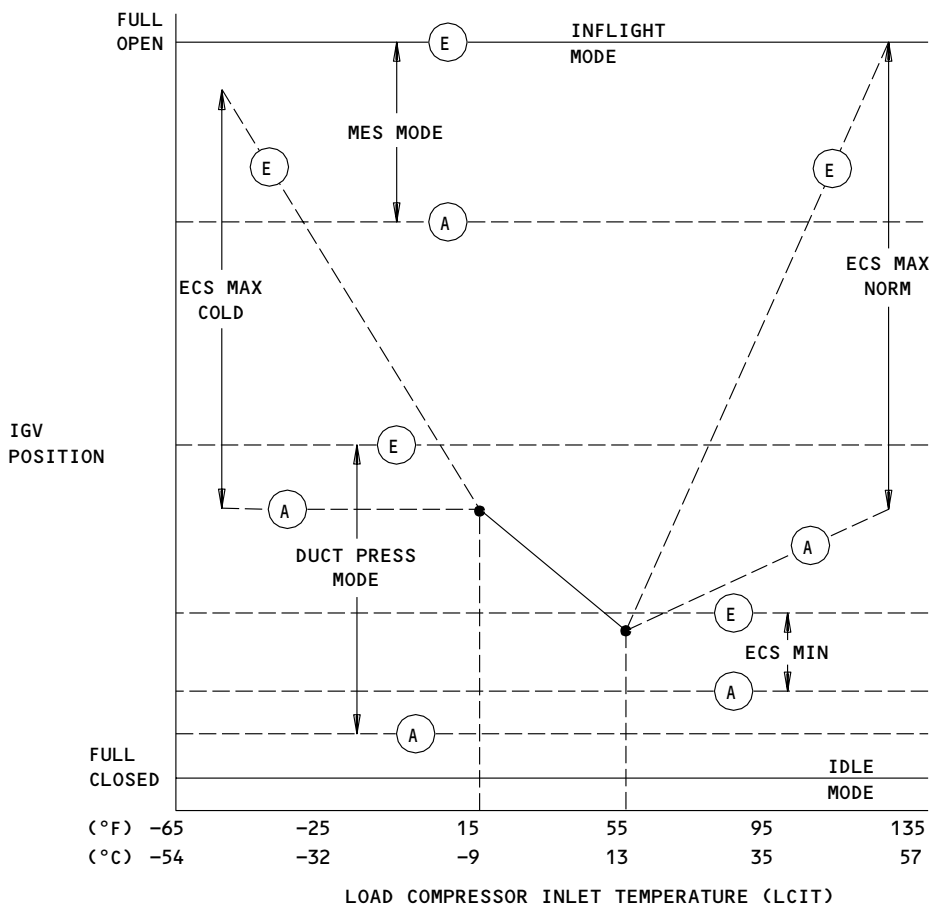
APU IGV Control Logic  
Figure 4



49-52-00



**MAXIMUM ALLOWABLE EGT VS LCIT SCHEDULE**



**IGV POSITION SCHEDULE**

**APU IGV Position Control  
Figure 5**

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B. BITE

- (1) AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
The APU control unit monitors the performance of the actuator for the inlet guide vanes and writes a fault in the BITE memory (AMM 49-61-00/001). A failure of the torque motor for the actuator of the inlet guide vanes is shown in the FAULTY UNIT matrix as IGV ACT. An automatic shutdown because of NO ACCEL is shown on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
The APU control unit monitors the performance of the actuator for the inlet guide vanes and writes a fault in the BITE memory (AMM 49-61-00/001). A failure of the torque motor for the actuator of the inlet guide vanes is shown in the FAULTY LRU matrix as IGV ACT. An automatic shutdown because of START ABORTED is shown on the REASON APU NOT OPERATING matrix.

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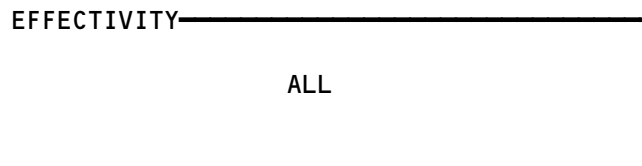
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**BOEING**  
 757  
 FAULT ISOLATION/MAINT MANUAL

APU BLEED AIR SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR - INLET GUIDE VANE	--	1	316AR,315AL, APU COMP, LEFT SIDE COMPRESSOR	49-52-02

APU Bleed Air System - Component Index  
Figure 101



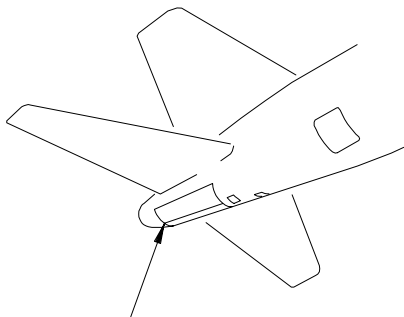
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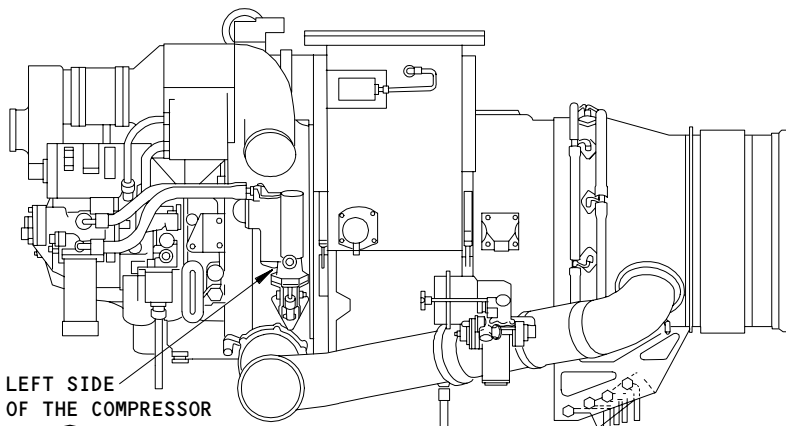
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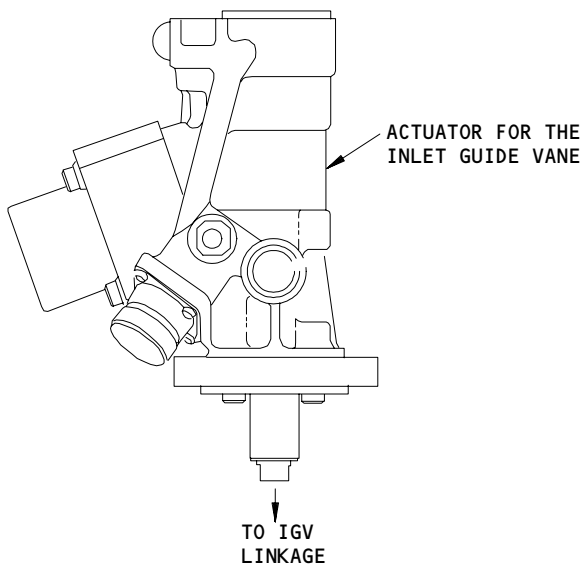


APU ACCESS DOORS,  
315AL,316AR



LEFT SIDE  
OF THE COMPRESSOR

SEE (A)



ACTUATOR FOR THE  
INLET GUIDE VANE

TO IGV  
LINKAGE

LEFT SIDE OF THE COMPRESSOR

(A)

APU Bleed Air System - Component Location  
Figure 102

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INLET GUIDE VANE LINKAGE ROD END BEARING – REMOVAL/INSTALLATION

1. General

- A. This procedure has the removal and the installation tasks for the inlet guide vane (IGV) linkage rod end bearing. The IGV linkage rod end bearing is referred to as the rod end bearing.
- B. The rod end bearing connects the IGV bellcrank to the IGV linkage rod.
- C. The rod end bearing is on the lower left side of the APU, forward of the air inlet plenum. You can get access to the bearing through the APU access doors.

TASK 49-52-01-004-001

2. Inlet Guide Vane Linkage Rod End Bearing Removal (Fig. 401)

A. References

- (1) AMM 49-52-02/401, Inlet Guide Vane Actuator

B. Equipment

- (1) Container – 1 U.S. Gallon (4 Liters) capacity, for fuel

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

D. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

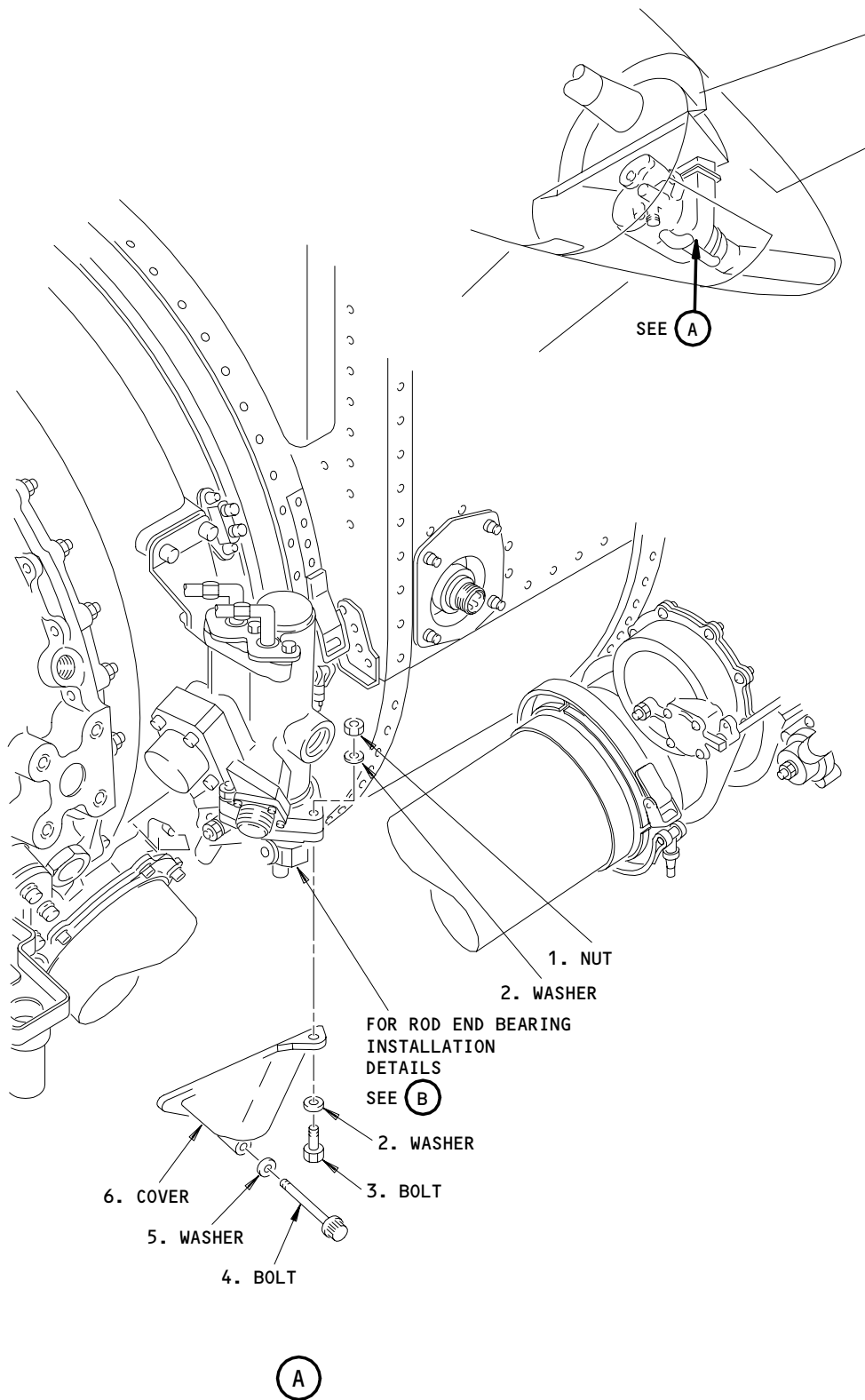
EFFECTIVITY

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IGV Linkage Rod End Bearing Installation  
Figure 401 (Sheet 1)

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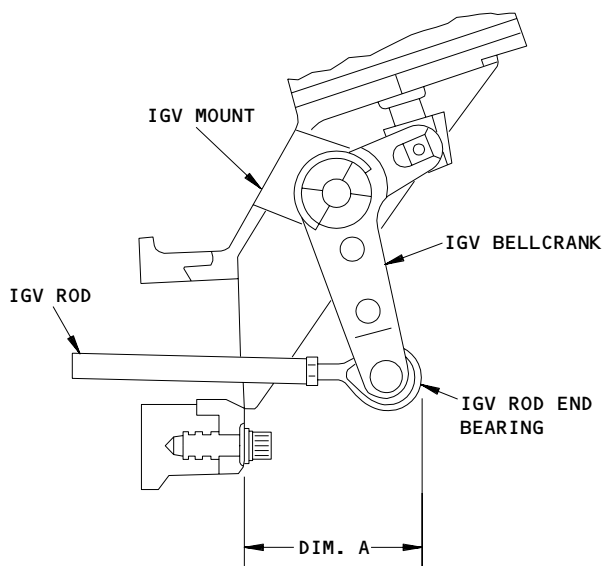
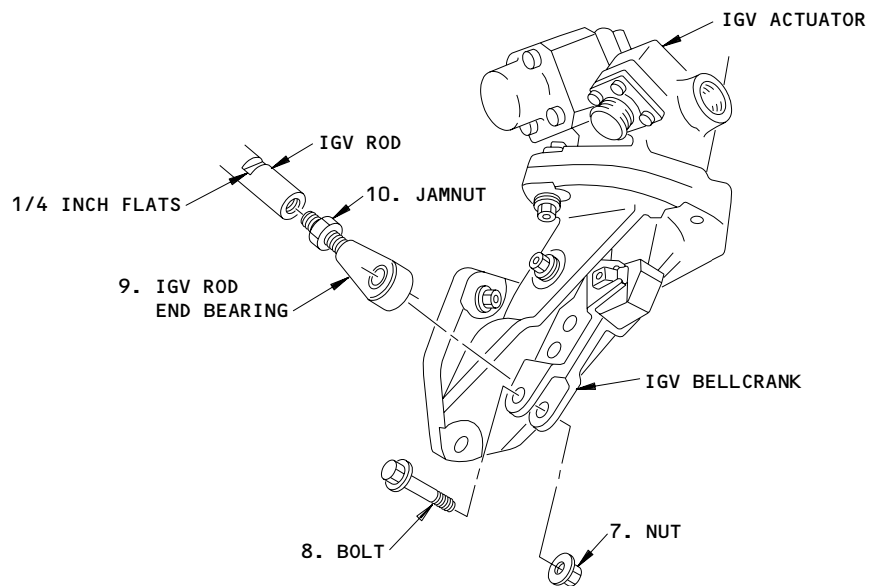
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(B)

IGV Linkage Rod End Bearing Installation  
Figure 401 (Sheet 2)

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-021

- (4) Remove the rod end bearing:
  - (a) Remove the bolts (3 and 4), the washers (2 and 5), and the nut (1) to remove the cover (6).
  - (b) Remove the Inlet Guide Vane (IGV) actuator (AMM 49-52-02/401).
  - (c) With the bellcrank connected, pull the rod end to open the inlet guide vanes.
  - (d) Move the IGV bellcrank linkage as far as possible.
  - (e) Measure dimension A from the IGV mount to the end of the rod end to use during the adjustment.
  - (f) Remove the nut (7) and the bolt (8) that attach the rod end bearing (9) to the IGV bellcrank.
  - (g) Put a wrench on the 1/4 inch flat on the IGV rod so it will not turn while you remove the rod end bearing (9).
  - (h) Remove the rod end bearing (9).

TASK 49-52-01-404-009

3. Inlet Guide Vane Linkage Rod End Bearing Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	IGV Rod End Bearing	49-52-01	01	285

B. References

- (1) AMM 49-52-01/501, Inlet Guide Vane Linkage Rod End Bearing

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- (2) AMM 49-52-02/401, Inlet Guide Vane Actuator  
C. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

D. Procedure

S 424-010

- (1) Install the rod end bearing:
- (a) Install the jamnut (10) on the rod end bearing (9).
  - (b) Install the rod end bearing (9) on the IGV rod.
  - (c) Adjust the rod end bearing for the IGV linkage (AMM 49-52-01/501).
  - (d) Attach the rod end bearing (9) to the bellcrank with the bolt (8) and the nut (7).
    - 1) Tighten the nut (8) to 40-42 inch-pounds (4.5-4.8 newton-meters).
    - 2) Tighten the jamnut (10) to 35-37 inch-pounds (4.0-4.2 newton-meters).
    - 3) Install lockwires on the nuts.
  - (e) Install the IGV actuator (AMM 49-52-02/401).
  - (f) Attach the cover (6) to the APU with the bolts (3 and 4), the washers (2 and 5), and the nut (1).
    - 1) Tighten the nut (1) to 100-120 inch-pounds (11.3-13.6 newton-meters).

S 414-022

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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S 864-017

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-019

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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INLET GUIDE VANE (IGV) LINKAGE ROD END BEARING - ADJUSTMENT/TEST

1. General

- A. This procedure contains a task to examine and adjust the linkage for the rod end bearing of the inlet guide vanes (IGVs).
- B. The test and the adjustment are done at the IGV actuator. The IGV actuator is on the bottom left side of the APU, forward of the air inlet plenum. You can get access to the actuator through the APU access doors.

TASK 49-52-01-805-001

2. IGV Linkage Rod End Bearing Adjustment (Fig. 501)

A. Standard Tools and Equipment

- (1) Container - 1 U.S. Gallon (4 Liter) capacity, for fuel

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit
- (2) AMM 49-52-02/401, Inlet Guide Vane Actuator

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 865-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 865-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

EFFECTIVITY

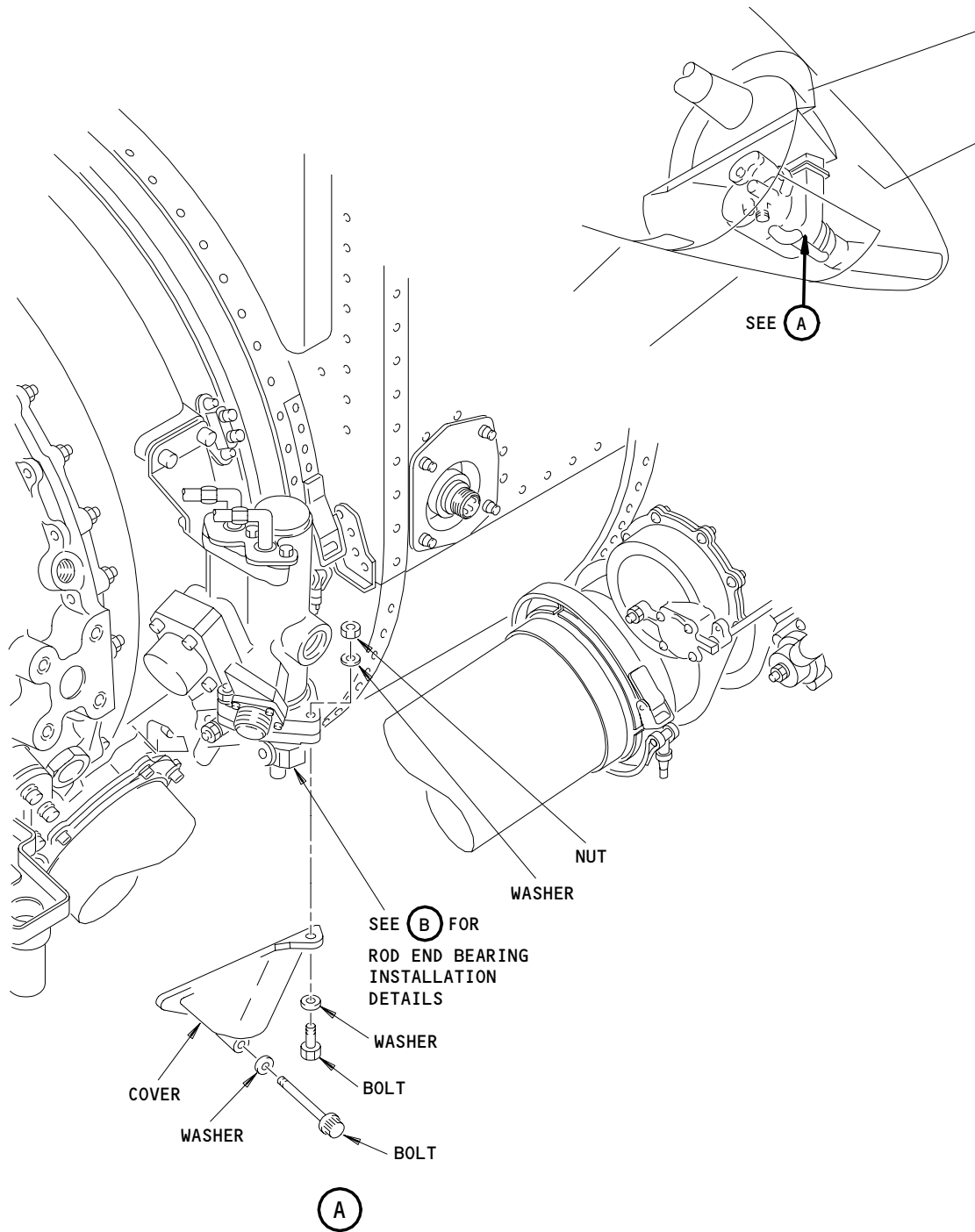
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IGV Linkage Rod End Bearing Adustment  
Figure 501 (Sheet 1)

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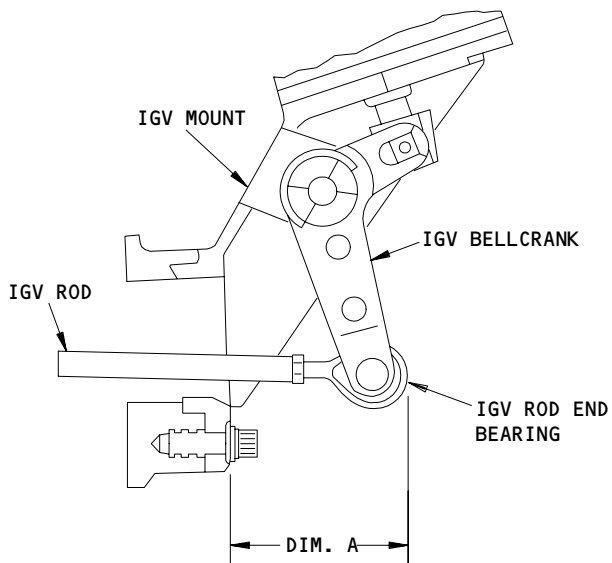
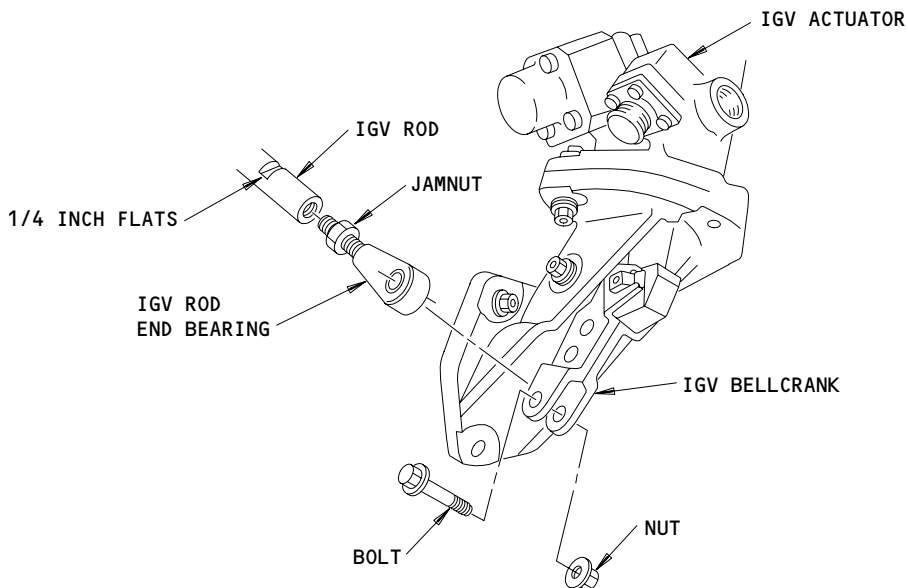
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(B)

IGV Linkage Rod End Bearing Adjustment  
Figure 501 (Sheet 2)

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- (b) E6 Rack, Aft Equipment Center
  - 1) APU CONT

S 015-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 015-018

- (4) Get access to the IGV rod end:
  - (a) Remove the bolts, the washers, and the nut that attach the IGV cover to the APU.
  - (b) Remove the IGV cover from the APU.
  - (c) Do the IGV force check and remove the IGV actuator (AMM 49-52-02/401).

S 825-019

- (5) Adjust the IGV Linkage:

**CAUTION:** MAKE SURE THE WORD "OUT" ON THE CHAMFER SIDE OF THE BLOCK ASSEMBLY IS OUTBOARD. IF THE BLOCK ASSEMBLY IS NOT INSTALLED CORRECTLY, YOU CAN CAUSE DAMAGE TO THE IGV LINKAGE.

- (a) Make sure the block assembly is installed with the word OUT on the outboard side.
- (b) Make sure the bolt is installed that attaches the IGV rod end to the IGV bellcrank.
- (c) Use a wrench on the flat areas of the IGV rod to hold the rod in its position.
- (d) While you hold the rod with the wrench, loosen the jamnut on the rod end bearing.

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- (e) With the bellcrank connected, pull the rod end to open the inlet guide vanes.
- (f) Move the IGV bellcrank linkage as far as possible.
- (g) Measure the dimension A from the IGV mount to the end of the rod end.
- (h) If the dimension A is not the same as the dimension measured during the bearing removal (AMM 49-52-01/401), adjust the linkage:
  - 1) Remove the nut and the bolt that attach the IGV rod to the IGV bellcrank.
  - 2) Turn the rod end bearing until the dimension A is correct.

S 435-010

- (6) Connect the IGV bellcrank:
  - (a) Align the attachment holes in the rod end bearing and the IGV bellcrank.
  - (b) Attach the rod end bearing to the bellcrank with the bolt and the nut.
    - 1) Tighten the nut to 40-42 inch-pounds (4.5-4.8 newton-meters).
  - (c) Hold the IGV rod with a wrench and tighten the jamnut on the rod end bearing to 35-37 inch-pounds (4.0-4.2 newton-meters).
    - 1) Install a lockwire on the jamnut.
  - (d) Install the IGV actuator (AMM 49-52-02/401).
  - (e) Attach the IGV cover to the APU with the bolts, the washers, and the nut.
    - 1) Tighten the bolt and the nut to 100-120 inch-pounds (11.3-13.6 newton-meters).

S 415-020

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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S 865-021

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 865-016

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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INLET GUIDE VANE ACTUATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the actuator for the inlet guide vanes (IGVs).
- B. The IGV actuator is on the bottom left side of the APU, forward of the air inlet plenum. You can get access to the actuator through the APU access doors.

TASK 49-52-02-004-001

2. Inlet Guide Vane (IGV) Actuator Removal (Fig. 401 and Fig. 402)

A. Equipment

- (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
- (2) DDP-75 Tester – Force Scale, Chatillion John and Sons, Scale and Spring Division, Kern Gardens, New York 11415

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

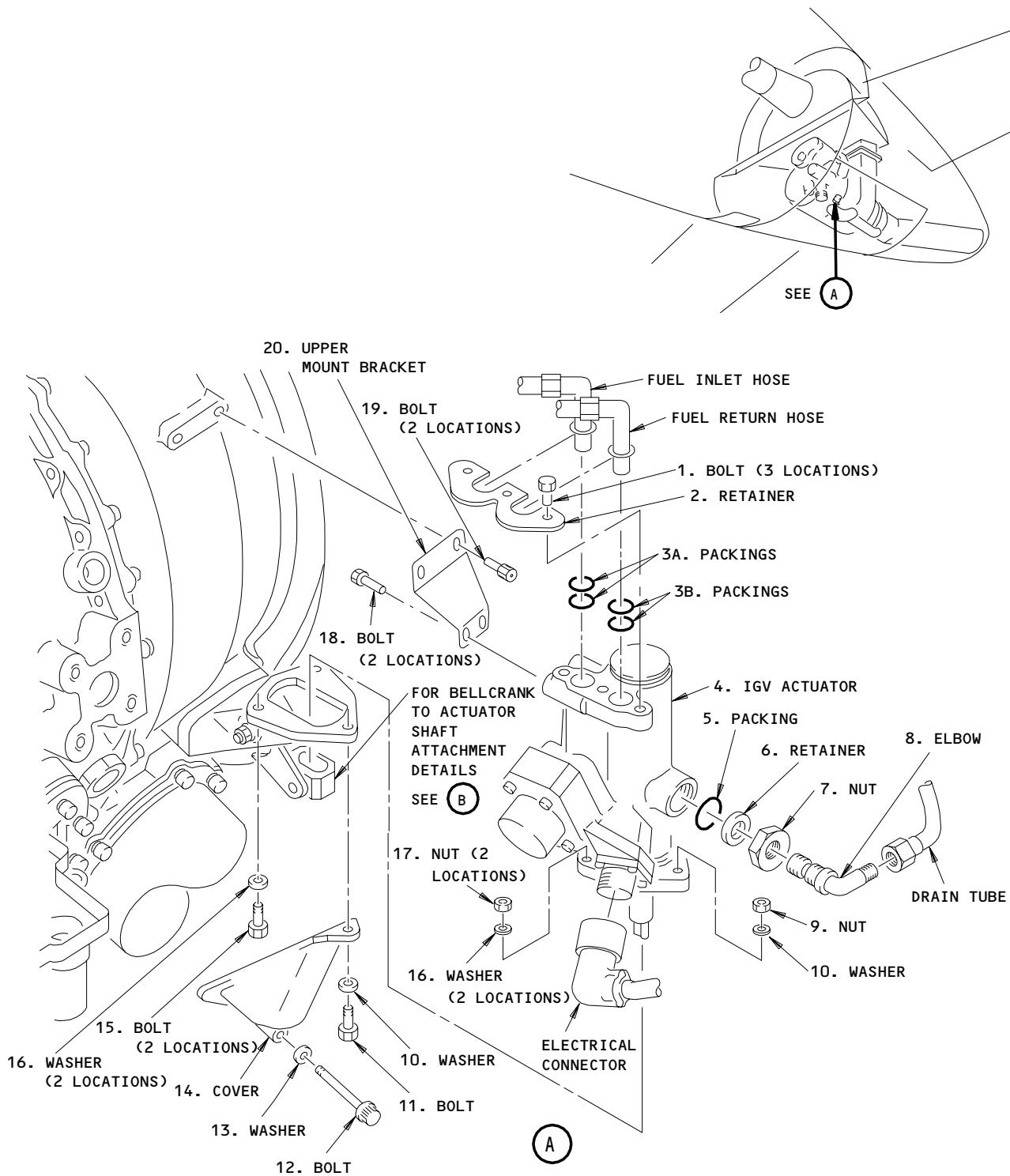
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Inlet Guide Vane Actuator Installation  
Figure 401 (Sheet 1)

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 014-035

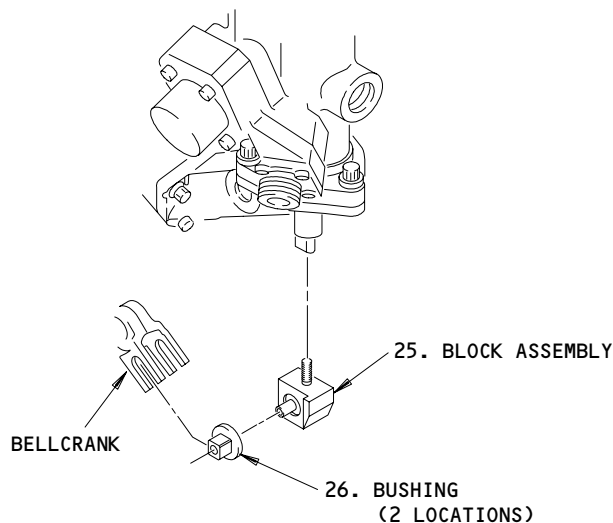
- (4) Get access to the IGV actuator:
  - (a) Put the container below the fuel control unit.

**WARNING:** BE CAREFUL WHEN YOU LOOSEN THE FUEL LINES AND MOVE THE IGV ACTUATOR. A SPRAY OF FUEL CAN COME FROM THE FUEL LINES. A SPRAY OF FUEL CAN CAUSE INJURY TO PERSONS.

- (b) Loosen the fuel inlet line and the return line on the fuel control unit.

**NOTE:** This will permit the movement of the IGV actuator shaft.

- 1) Let the fuel fully drain out of the fuel lines.
- (c) Remove the bolts (11 and 12), the washers (10 and 13), and the nut (9) that attach the IGV cover (14) to the APU.
- (d) Remove the IGV cover (14) from the APU.
- (e) Remove the nut and the bolt that attach the IGV rod to the IGV bellcrank.



BELLCRANK TO ACTUATOR SHAFT ATTACHMENT

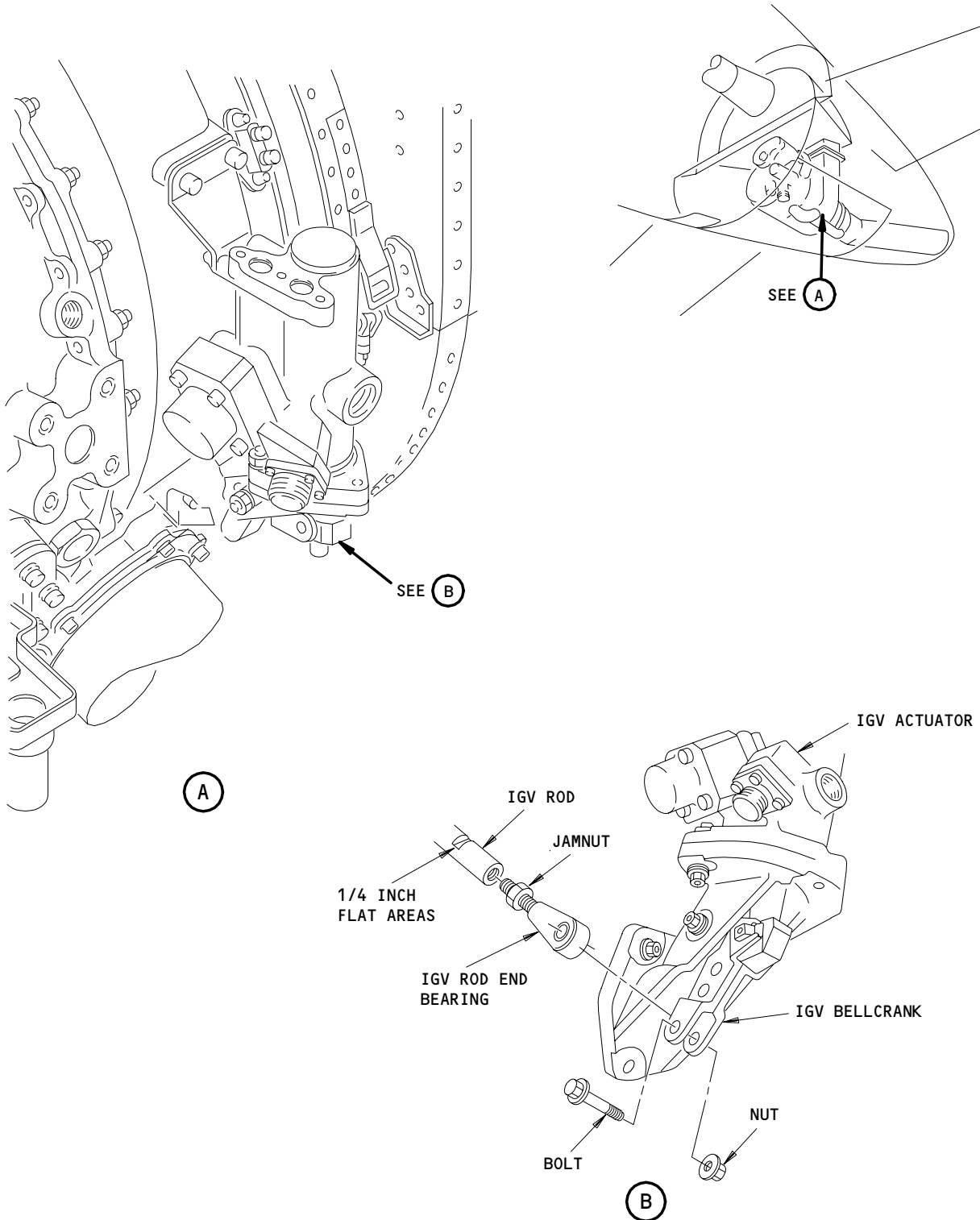
(B)

Inlet Guide Vane Actuator Installation  
Figure 401 (Sheet 2)

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IGV Opening Force Check  
Figure 402

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S 754-036

- (5) Do a check of the opening force that is necessary to open the inlet guide vanes:
- (a) Push the IGV linkage rod in until it stops.
    - 1) If the IGV linkage rod does not move, replace the APU (AMM 49-11-01/401).
  - (b) Connect the force scale tester to the rod end bearing.
  - (c) Pull the scale and measure the force that is necessary to open the inlet guide vanes.
    - 1) The opening force must not be more than 15 pounds (67 newtons).
    - 2) If the opening force is more than 15 pounds (67 newtons), replace the APU (AMM 49-11-01/401).
    - 3) If the opening force is 15 pounds (67 newtons) or less, the IGVs are satisfactory.
  - (d) Tighten the fuel inlet line and the return line on the fuel control unit.
  - (e) Attach the rod end bearing to the bellcrank with the bolt and the nut.
    - 1) Tighten the nut to 40-42 inch-pounds (4.5-4.8 newton-meters).

S 034-033

- (6) Disconnect the IGV actuator:
- (a) Disconnect the electrical connector from the IGV actuator (4).
  - (b) Remove the bolts (1) and the retainer (2) from the IGV actuator (4).

**WARNING:** STAY CLEAR WHEN YOU REMOVE THE FUEL HOSES OR MOVE THE IGV ACTUATOR SHAFT. FUEL WILL COME OUT OF THE FUEL HOSES AND ACTUATOR WHEN THE HOSES ARE DISCONNECTED AND CAN CAUSE INJURY.

- (c) Disconnect the fuel return hose and the fuel inlet hose from the IGV actuator (4).
  - 1) Remove and discard the packings (3A and 3B) from the fuel inlet hose and the fuel return hose.
- (d) Put caps on the fuel hoses and the IGV actuator (4).
- (e) Disconnect the drain tube from the elbow (8).
- (f) Remove the elbow (8), nut (7), retainer (6) and packing (5) from the IGV actuator (4).
  - 1) Discard the packing (5).

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(g) Put caps on the drain tube and the IGV actuator (4).

S 024-039

- (7) Remove the IGV actuator:
- (a) Remove the two bolts (15), two nuts (17) and four washers (16) from the bottom mounting bracket.
  - (b) Remove the two bolts (19) from the upper mount bracket (20).
  - (c) Push the IGV bellcrank back until it is clear of the block assembly (25) and remove the two bushings (26) from the block assembly.
    - 1) Discard the two bushings (26).
  - (d) Remove the IGV actuator (4) with the upper mount bracket (20).
  - (e) Remove the two bolts (18) and upper mount bracket (20) from the IGV actuator (4).

TASK 49-52-02-404-014

3. Inlet Guide Vane (IGV) Actuator Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3A	Packing	49-52-02	01	115
	3B	Packing			120
	4	Inlet Guide Vane Actuator			70
	5	Packing			190
	26	Bushing			65

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D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Procedure

S 424-043

(1) Install the IGV actuator:

**CAUTION:** MAKE SURE THE BUSHINGS TURN FREELY ON THE BLOCK ASSEMBLY. IF THE BUSHINGS DO NOT TURN FREELY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

(a) Install the two new bushings (26) on the block assembly (25).

**CAUTION:** MAKE SURE THE "OUT" ON THE CHAMFER SIDE OF THE BLOCK ASSEMBLY IS INSTALLED ON THE OUTBOARD SIDE. IF THE BLOCK ASSEMBLY IS NOT INSTALLED CORRECTLY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

(b) Install the block assembly (25) in the actuator shaft.

**NOTE:** Use a thin-wall, one-half inch, open-end wrench to hold the actuator shaft.

1) Tighten the block assembly (25) to 120-125 inch-pounds (13.5-14.1 newton-meters).

(c) Attach the upper mount bracket (20) to the IGV actuator (4) with the two bolts (18).

1) Tighten the two bolts (18) to 50-53 inch-pounds (5.7-6.0 newton-meters).

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- (d) Put the IGV actuator (4) and block assembly (25) in their position through the bottom mounting bracket.
- (e) Attach the block assembly (25) to the bellcrank.
  - 1) Make sure the "OUT" on the chamfer side of the block assembly is outboard of the APU.
  - 2) Turn the bellcrank as necessary to install the block assembly (25) in the arms of the bellcrank.
- (f) Attach the upper mount bracket (20) to the APU with the two bolts (19).
  - 1) Tighten the two bolts (19) to 50-53 inch-pounds (5.7-6.0 newton-meters).
- (g) Attach the IGV actuator (4) to the bottom mounting bracket with the two bolts (15), four washers (16) and two nuts (17).
  - 1) Tighten the two nuts (17) to 100-120 inch-pounds (11.3-13.5 newton-meters).

S 424-044

- (2) Attach the cover (14) to the IGV actuator (4) with the two bolts (11), (12), three washers (10), (13) and nut (9).
  - (a) Tighten the bolt (12) and nut (9) to 100-120 inch-pounds (11.3-13.5 newton-meters).

S 424-045

- (3) Connect the IGV actuator:
  - (a) Lubricate the new packing (5) with a light coat of lubricant.
  - (b) Install the elbow (8), the nut (7), the retainer (6), and the packing (5) on the IGV actuator (4).
  - (c) Connect the drain tube to the elbow (8).
  - (d) Lubricate the new packings (3A and 3B) with a light coat of lubricant.
  - (e) Install the fuel inlet hose and the fuel return hose, with the packings (3A and 3B), on the IGV actuator (4).
  - (f) Attach the retainer (2) to the IGV actuator (4) with the bolts (1).
  - (g) Connect the electrical connector to the IGV actuator (4).

S 864-024

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 744-026

- (5) Do the self-test for the APU system (AMM 49-61-05/201).

S 864-027

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-029

- (7) Do a leakage test of the IGV actuator installation:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) During the APU operation, examine the IGV actuator for leakage.
  - (c) Do a shutdown of the APU (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-032

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access door.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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INLET GUIDE VANE LINKAGE BELLCRANK – REMOVAL/INSTALLATION

1. General

- A. This procedure has the tasks for the removal and installation of the inlet guide vane (IGV) linkage bellcrank. During this procedure, the IGV linkage bellcrank is referred to as the IGV bellcrank.
- B. The IGV bellcrank is on the bottom of the IGV actuator. The IGV actuator is on the bottom left side of the APU, forward of the air inlet plenum.
- C. You can get access to the IGV bellcrank through the APU access doors.

TASK 49-52-03-004-001

2. IGV Linkage Bellcrank Removal (Fig. 401)

A. References

- (1) AMM 49-52-01/401, Inlet Guide Vane Linkage Rod End Bearing

B. Equipment

- (1) Container – Fuel Resistant, 1 U.S. Gallon (4 Liters)

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

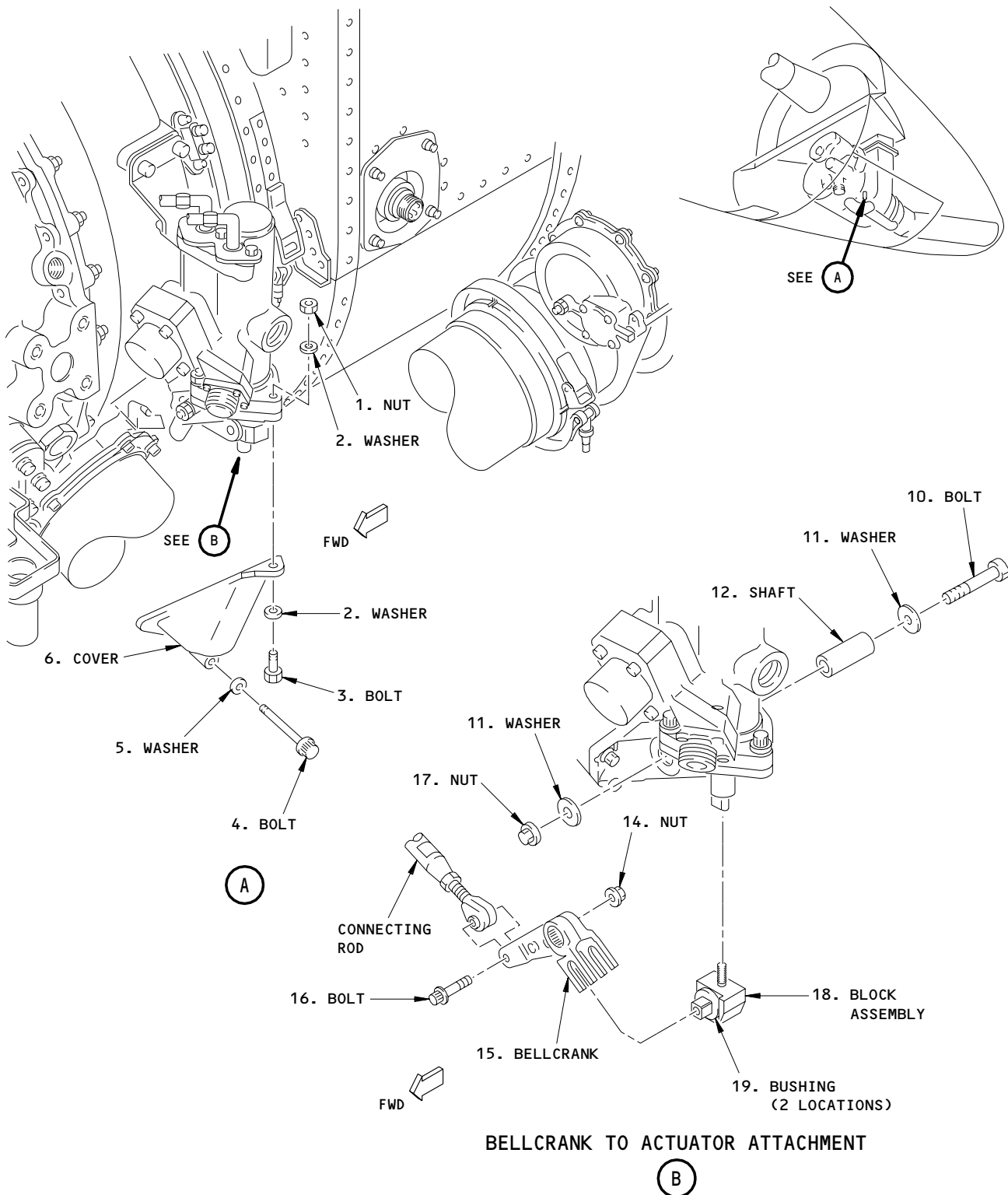
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IGV Linkage Bellcrank Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 014-028

- (4) Get access to the IGV bellcrank:
  - (a) Disconnect the electrical connector from the IGV actuator.
  - (b) Put the container below the fuel control unit.

**WARNING:** BE CAREFUL WHEN YOU LOOSEN THE FUEL LINES AND MOVE THE IGV ACTUATOR SHAFT. A SPRAY OF FUEL CAN COME FROM THE FUEL LINES. A SPRAY OF FUEL CAN CAUSE INJURY TO PERSONS.

- (c) Loosen the fittings for the fuel inlet line and fuel return line on the fuel control unit.

**NOTE:** This will permit the movement of the IGV actuator shaft.

- 1) Let the fuel fully drain from the fuel lines.
- (d) Remove the nut (1), two washers (2), bolt (3), washer (5) and bolt (4) that attach the cover (6) to the APU.
- (e) Remove the cover (6) from the APU.
- (f) Push the IGV actuator shaft (connecting rod) up until it stops.
- (g) Remove the nut (14) and bolt (16) that attach the connecting rod to the IGV bellcrank (15).
- (h) Do these steps to remove the IGV bellcrank (15):
  - 1) Remove the nut (17), two washers (11), shaft (12) and bolt (10) that attach the IGV bellcrank (15) to the IGV actuator.
  - 2) Remove the IGV bellcrank (15) and two bushings (19) from the IGV actuator and block assembly (18).

S 214-013

- (5) Visually examine the end bearing on the IGV connecting rod for worn areas and damage.
  - (a) Replace the connecting rod end bearing if it is necessary (AMM 49-52-01/401).

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TASK 49-52-03-404-014

3. IGV Linkage Bellcrank Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	15	IGV Linkage Bellcrank	49-52-03	01	25

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 424-029

(1) Install the IGV bellcrank:

(a) Do these steps to install the IGV bellcrank (15):

**CAUTION:** MAKE SURE THE BUSHINGS TURN FREELY ON THE BLOCK ASSEMBLY. IF THE BUSHINGS DO NOT TURN FREELY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

**CAUTION:** MAKE SURE THE WORD "OUT", ON THE CHAMFER SIDE OF THE BLOCK ASSEMBLY, FACES OUTBOARD OF THE APU. DAMAGE TO THE IGV LINKAGE CAN OCCUR IF THE BLOCK ASSEMBLY IS NOT CORRECTLY INSTALLED.

1) Install the two bushings (19) on the block assembly (18) and then attach the block assembly to the arms of the IGV bellcrank (15).

**NOTE:** If it is necessary, you can extend or retract the actuator shaft to align the bellcrank pivot point.

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- 2) Put the IGV bellcrank (15) in its position on the IGV actuator.
- 3) Install the shaft (12) through the IGV actuator and IGV bellcrank (15).
- 4) Attach the IGV bellcrank (15) to the IGV actuator with the bolt (10), two washers (11) and nut (17).
  - a) Tighten the nut (17) to 40-42 inch-pounds (4.5-4.7 newton-meters).
- 5) Turn the IGV bellcrank (15) until the IGV connecting rod aligns with the IGV bellcrank.
- 6) Attach the IGV bellcrank (15) to the IGV connecting rod with the bolt (16) and nut (14).
  - a) Tighten the nut (14) to 40-42 inch-pounds (4.5-4.7 newton-meters).
- (b) Attach the cover (6) to the APU with the bolt (4), washer (5), bolt (3), two washers (2) and nut (1).
  - 1) Tighten the bolt (4) and nut (1) to 100-120 inch-pounds (11.3-13.6 newton-meters).
- (c) Tighten the fittings for the fuel inlet line and fuel return line on the fuel control unit.
- (d) Connect the electrical connector to the IGV actuator.

S 414-030

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-020

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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MAINTENANCE MANUAL

- (b) P11 Overhead Panel
  - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-022

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU SURGE BLEED SYSTEM – DESCRIPTION AND OPERATION

1. General

A. APU Surge Bleed System (Fig. 1)

- (1) The surge bleed system for the APU keeps a sufficient airflow through the load compressor to prevent a stall or a surge. The surge valve opens to release the unwanted discharge pressure from the load compressor. The surge bleed system contains the surge valve and the flow sensing module.
- (2) The flow sensing module is an easily replaceable module which contains the remaining bleed system components. These components are as follows:
  - (a) The total pressure sensor
  - (b) The total pressure transducer
  - (c) The differential pressure transducer
  - (d) The variable volume chamber
  - (e) The static pressure sensor.
- (3) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711); The flow sensing module contains the total pressure transducer, differential pressure transducer and variable volume chamber. The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module.

2. Component Details

A. Surge Valve (Fig. 2)

- (1) The surge valve is 4.0 inches in diameter, is spring-loaded in the open position, and is a flow modulating valve. It consists of a butterfly, valve actuator, servo valve torque-motor, pressure regulator, relief valve, and quick dump element. The second stage compressor provides pressure to open the actuator which is regulated to 40 psi. The APU control unit electronically controls the surge valve torque-motor. The torque-motor action regulates the servo valve pressure that controls the close pressure to the actuator. The relief valve protects against overpressurization. The quick dump element opens the valve quickly. The surge valve is located on the surge bleed duct just aft of the tee duct for the bleed air.

B. Pressure Sensors (Fig. 3)

- (1) A static pressure sensor is installed in the pressure sensor assembly on the flow sensing module. This sensor gives an average static pressure to the differential pressure transducer.

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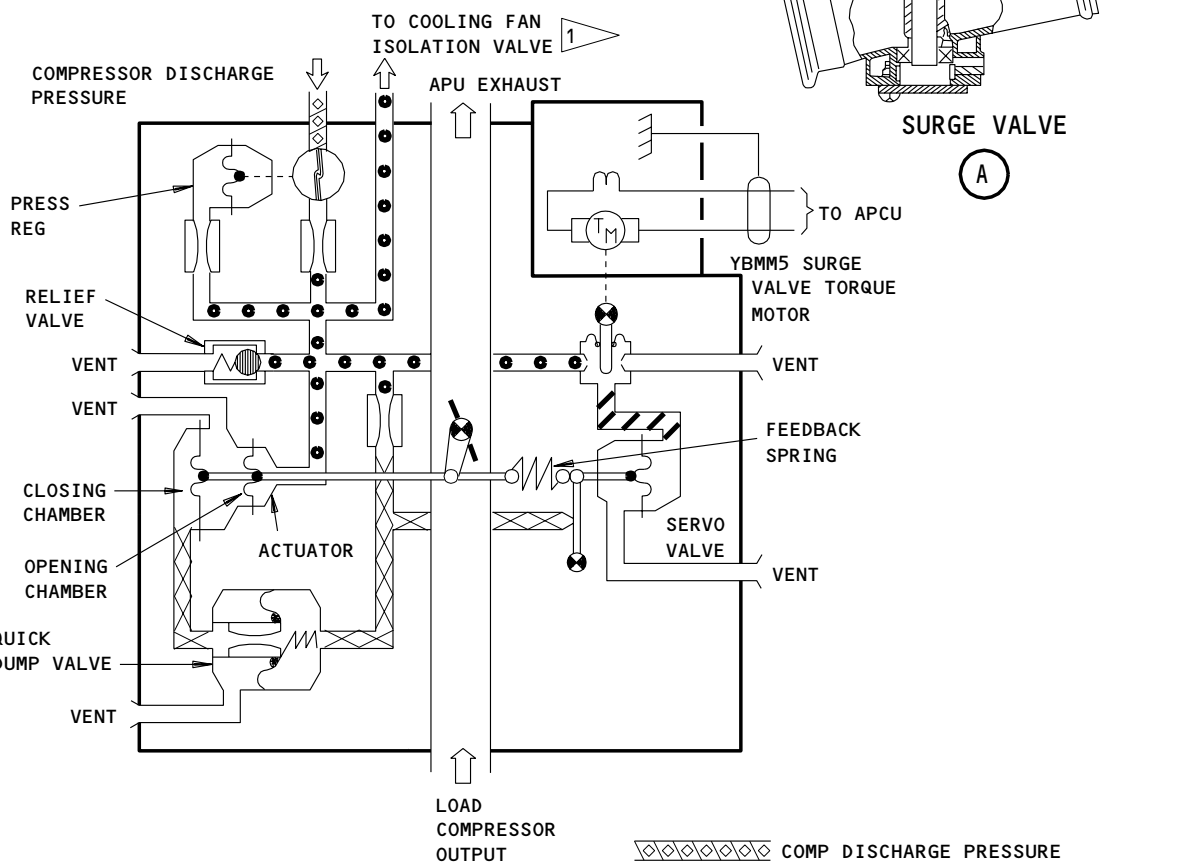
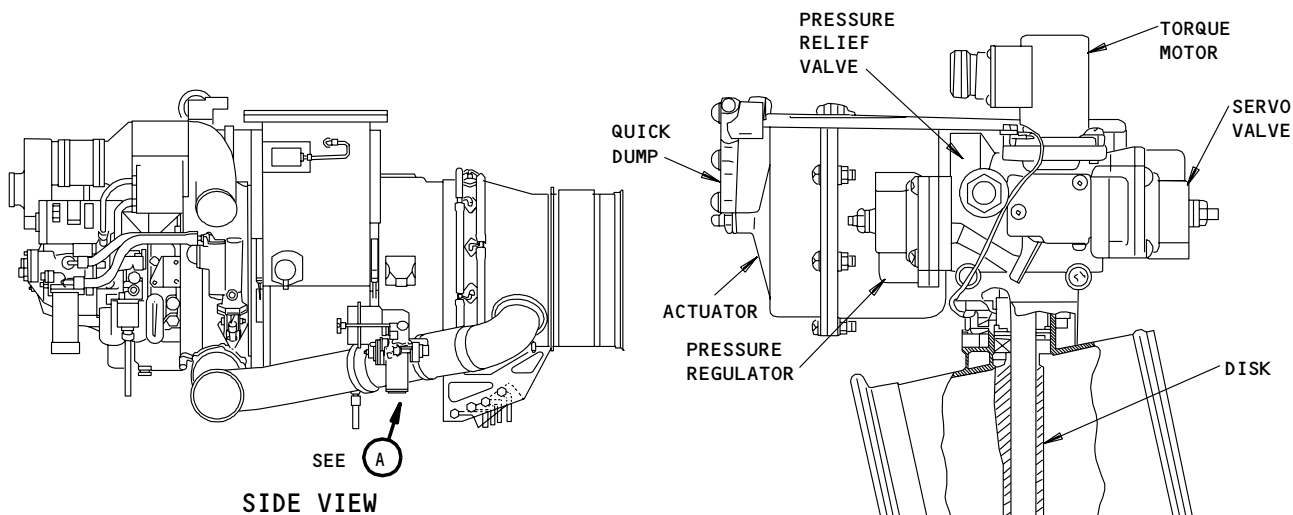
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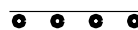


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1 NOT ON APUs WITH FAN ISOLATION VALVE CONNECTED TO FIRST STAGE COMPRESSOR (ALLIED SIGNAL SB 49-7192)

**SURGE VALVE**

-  COMP DISCHARGE PRESSURE
-  REGULATED COMP DISCHARGE PRESSURE
-  CLOSING CHAMBER ACTUATOR PRESSURE
-  SERVO PRESSURE

APU Surge Valve Location  
Figure 2

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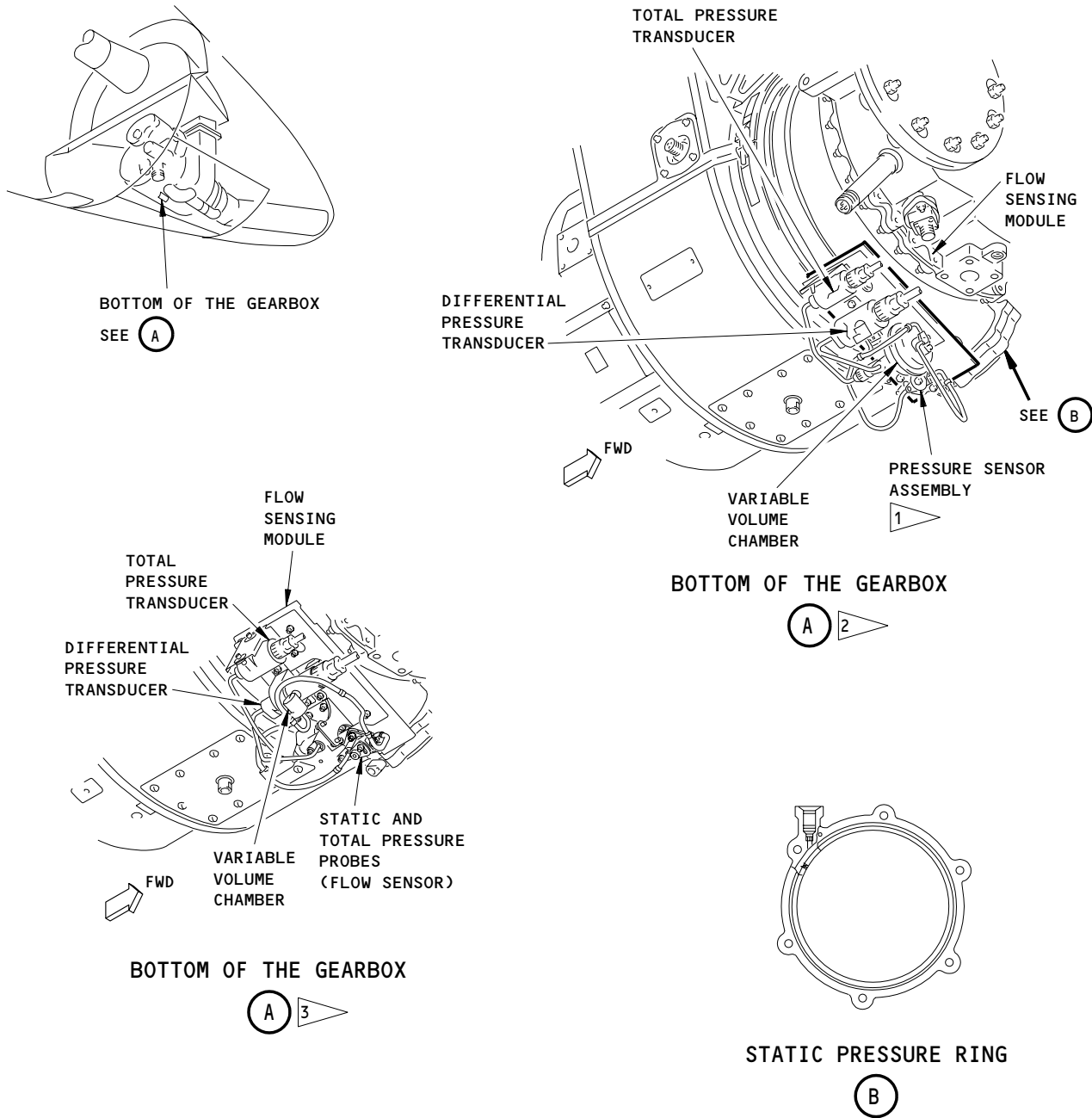
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- 1 THE ASSEMBLY CONTAINS THE TOTAL PRESSURE SENSOR AND THE STATIC PRESSURE PROBE
- 2 APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711)
- 3 APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711)

APU Surge Bleed Sensors and Transducers  
Figure 3

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- (2) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module. The static pressure sensor is adjustable under APU test cell conditions. The flow sensor is installed on the APU scroll housing and is adjusted to match the compressor characteristics of the APU (crack point of the surge valve). This adjustment will cause a reduction of the overall surge system tolerance and improve the transient response. The flow sensor must not be removed or replaced while the APU is installed on the airplane. You must replace the defective flow sensor in the APU test cell since an adjustment test of the flow sensor is necessary.
- (3) A total pressure sensor is installed in the pressure sensor assembly on the flow sensing module.
- (4) The total pressure sensor measures the total pressure of the bleed air. The sensor gives this pressure to the differential and the total pressure transducers.
- (5) The variable volume chamber is installed adjacent to the pressure sensor assembly on the flow sensing module.
- (6) The variable volume chamber prevents damage to the differential pressure transducer caused by a negative differential pressure during a reverse flow condition in the surge bleed system.

C. Pressure Transducers (Fig. 3)

- (1) The differential pressure transducer measures the difference between the total and static pressure inputs. It converts this pressure into an electrical signal supplied to the APU control unit.
- (2) The total pressure transducer transforms the total pressure into an electrical signal. The transducers are mounted side by side on the discharge scroll for the load compressor. Both transducers are of a piezoresistive, solid-state type.

3. Operation

A. Functional Description

- (1) Surge Bleed System (Fig. 1)
  - (a) The total and differential pressure transducers supply total pressure (Pt) of the load compressor and differential pressure ( $\Delta P$ ) values to the APU control unit. The control unit selects a  $\Delta P/P_t$  setpoint based on the position of the inlet guide vanes. It compares the actual value from the transducers to the setpoint and controls the surge valve accordingly. When the actual value is above the setpoint the valve is closed and when it is below the setpoint the valve is opened.
  - (b) When the engine is not operating, the surge bleed valve is open. During engine start, the inlet guide vanes are closed and the surge valve remains open. The surge valve will partially close for aircraft pneumatic requirements which are usual but will open when the aircraft system is not using pneumatic power.

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B. BITE

- (1) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The APU control unit monitors the operation of the surge bleed system, tests component circuits, and writes any failures found in BITE memory (AMM 49-61-00/001). A failure of the total pressure sensor, the differential pressure sensor, or the surge bleed valve is shown on the FAULTY UNIT matrix. These failures are shown as PT SENSOR,  $\Delta$ P SENSOR, or SURGE VALVE. An automatic shutdown because of REVERSE FLOW, SLOW START, NO ACCEL, or ECU is shown on the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The APU control unit monitors the operation of the surge bleed system, tests component circuits, and writes any failures found in BITE memory (AMM 49-61-00/001). A failure of the total pressure sensor, the differential pressure sensor, or the surge bleed valve is shown on the FAULTY LRU matrix. These failures are shown as PT SENSOR,  $\Delta$ P SENSOR, or SURGE VALVE. An automatic shutdown because of REVERSE FLOW, START ABORTED, or ECU is shown on the REASON APU NOT OPERATING matrix.

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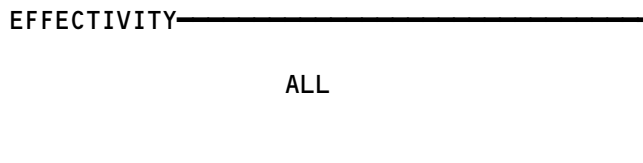
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 FAULT ISOLATION/MAINT MANUAL

APU SURGE BLEED SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ELEMENT - SURGE VALVE FILTER	--	1	315AL,316AR, APU COMPT, SURGE DUCT	49-53-06
MODULE - FLOW SENSING	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-08
VALVE - SURGE	--	1	315AL,316AR, APU COMPT, SURGE DUCT	49-53-01

APU Surge Bleed System - Component Index  
Figure 101

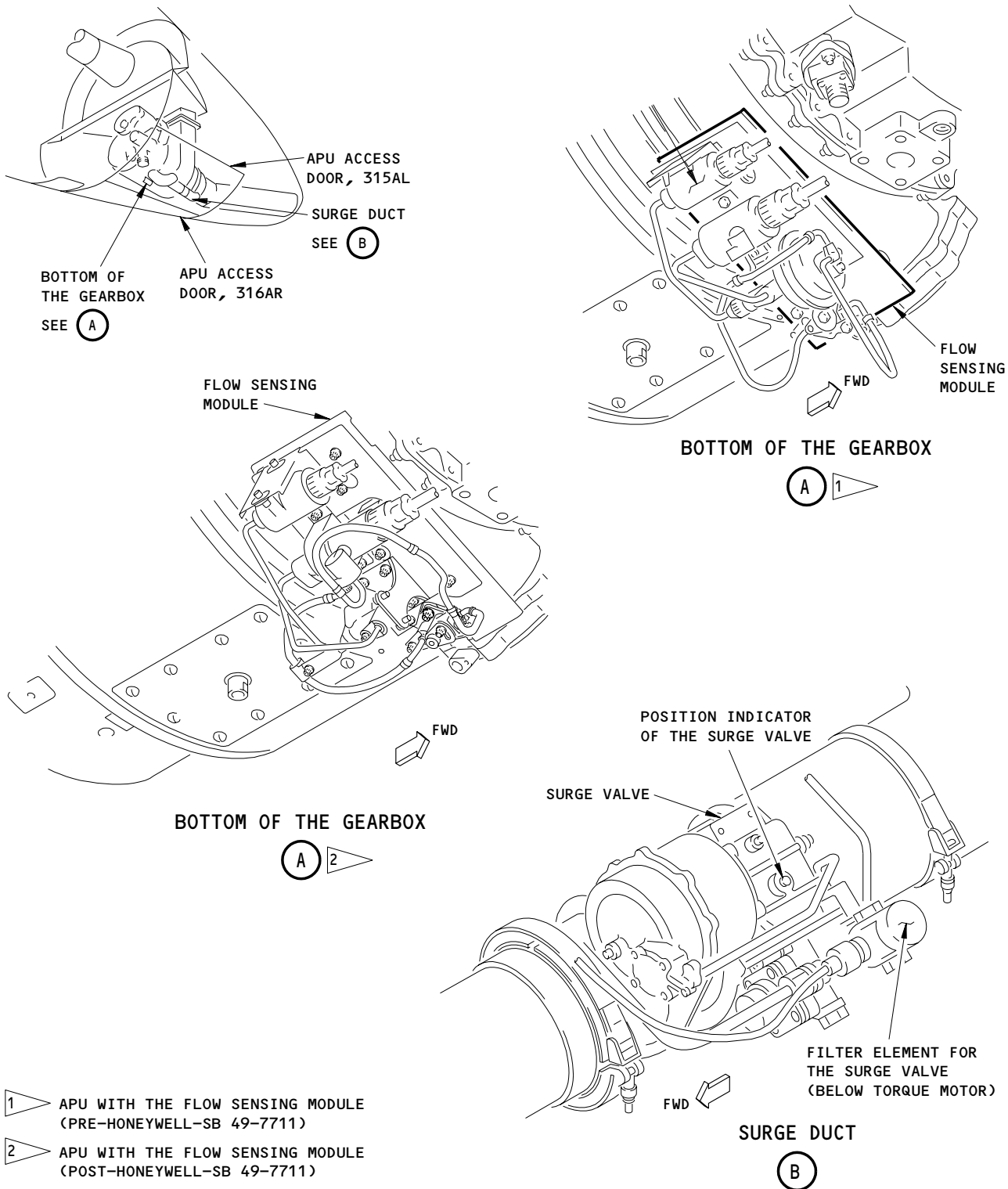


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APU Surge Bleed System - Component Location  
Figure 102

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APU SURGE VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU surge valve.
- B. The APU surge valve is on the left side of the APU compressor. You can get access to the valve through the APU access door.
- C. SURGE VALVES WITH A DRAIN HOLE ON THE PRESSURE SUPPLY TUBE (HONEYWELL POST-SB GTCP331-49-7496 OR HONEYWELL POST-SB GTCP331-49-7707);  
The pressure supply tube for the surge valve has a 0.030 inch (0.76 mm) drain hole at the lowest point on the tube. The drain hole will remove moisture or other fluids before it can collect and restrict the air necessary for correct operation of the surge valve. If there was no drain hole on the pressure supply tube and moisture or other fluids freeze when the APU is in cold temperature conditions, low duct pressure problems can occur.

TASK 49-53-01-004-001

2. APU Surge Valve Removal (Fig. 401)

A. References

- (1) SSM 49-52-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

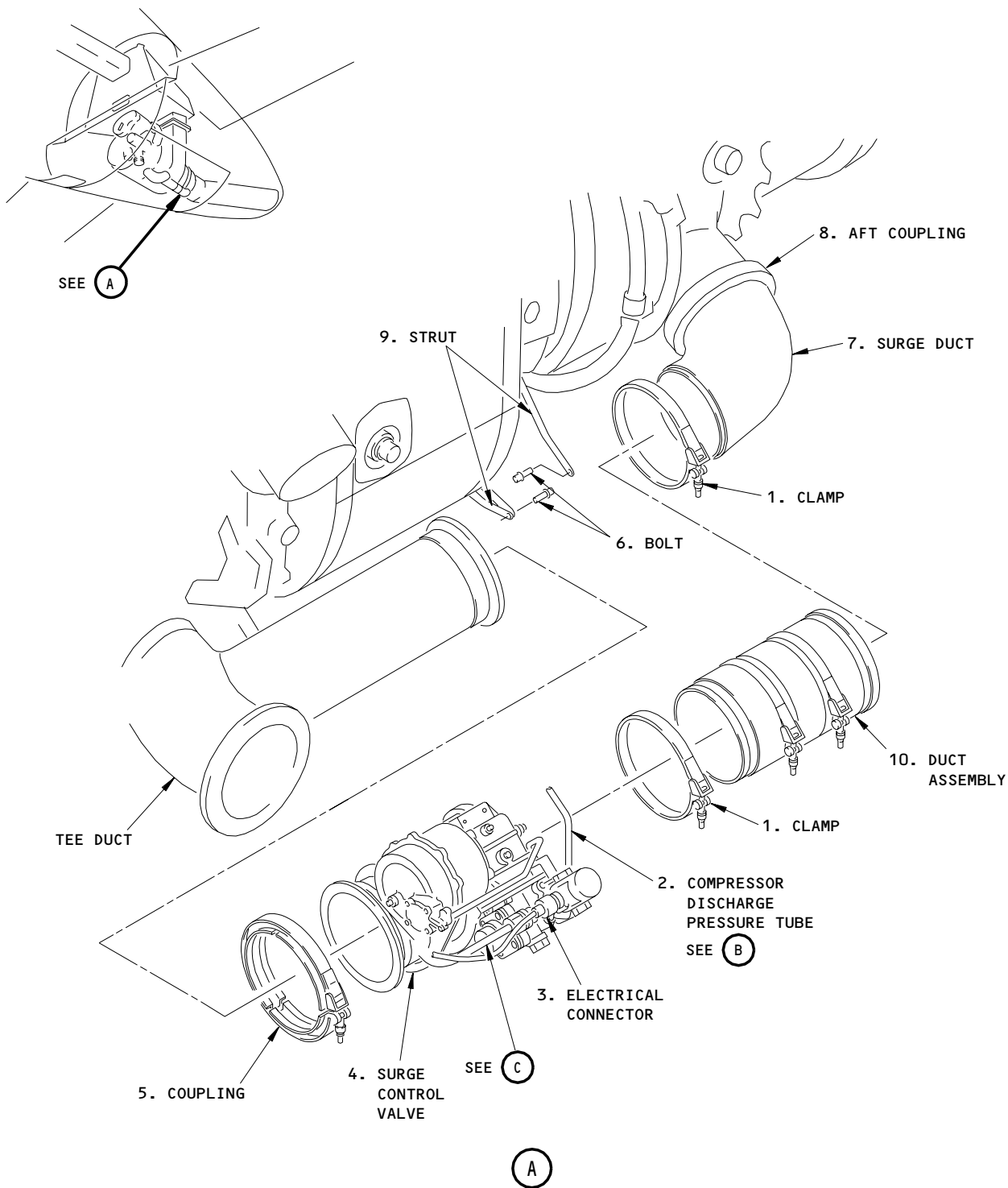
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APU Surge Valve Installation  
Figure 401 (Sheet 1)

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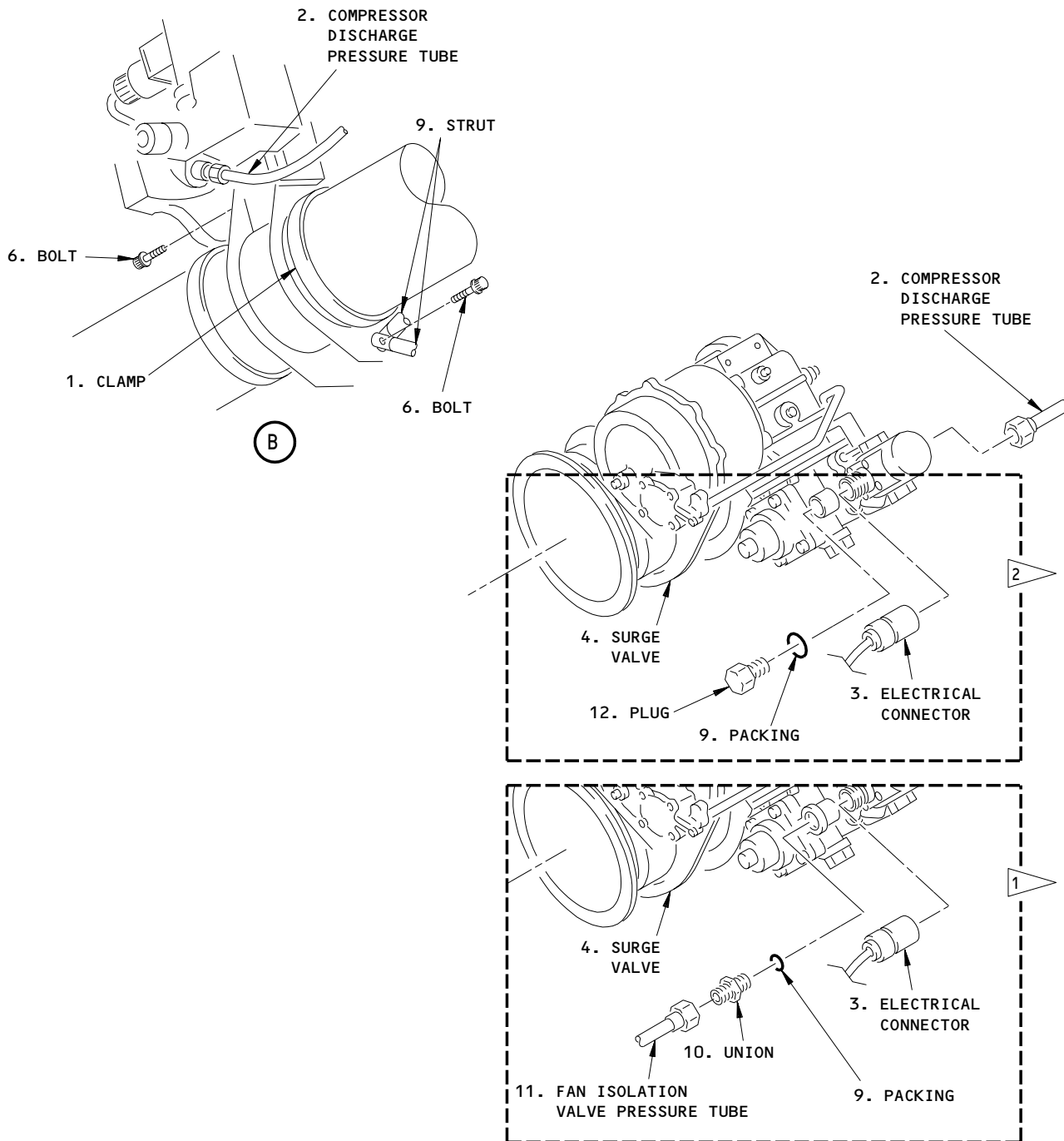
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1 APU's PRE-HONEYWELL-SB 49-7192;  
MAKE SURE THAT THE FAN ISOLATION VALVE  
PRESSURE TUBE IS CORRECTLY INSTALLED.

2 APU's POST-HONEYWELL-SB 49-7192 OR SB 49-7392;  
MAKE SURE THAT A PLUG WITH PACKING IS CORRECTLY  
INSTALLED ON THE SURGE CONTROL VALVE IN PLACE OF THE  
FAN ISOLATION VALVE PRESSURE TUBE.

APU Surge Valve Installation  
Figure 401 (Sheet 2)

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- S 014-005
- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- S 024-026
- (4) Remove the APU surge valve:
- (a) Disconnect the electrical connector (3) from the surge valve (4).
  - (b) Put the container below the surge control valve (4).
  - (c) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (PRE-HONEYWELL-SB 49-7192);  
Disconnect the pressure tube for the fan isolation valve (11):
    - 1) Disconnect the pressure tube for the fan isolation valve (11) from the union (10).
    - 2) Remove the union (10) and packing (9) from the surge valve (4).
      - a) Discard the packing (9).
  - (d) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR OR WITHOUT THE FAN ISOLATION VALVE (POST-HONEYWELL-SB 49-7192 OR POST-HONEYWELL-SB 49-7392);  
Remove the plug (12) and packing (9) from the surge valve (4).
    - 1) Discard the packing (9).
  - (e) Disconnect the discharge pressure tube for the compressor (2) from the surge valve (4).
  - (f) Put caps on the open end of the tube(s) and on the surge valve (4).
  - (g) Remove the two bolts (6) that attach the surge valve (5) to the struts.
  - (h) Loosen the aft coupling (6) that attach the surge duct (7) to the APU.
  - (i) Loosen the clamp (1) that holds the surge valve (4) to the surge duct (7).
  - (j) Remove the coupling (5) that attaches the surge valve (4) to the tee duct.
  - (k) While you hold the surge valve (4), turn the surge duct (7) counterclockwise to the down position until you can remove the surge valve (3).
  - (l) Remove the surge valve (4) and clamp (1).
  - (m) Use the container to drain the fuel from the surge valve (4).
  - (n) Make sure you install all necessary protection covers.
  - (o) Remove the container.

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TASK 49-53-01-404-011

3. APU Surge Valve Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-52-01
- (4) WDM 49-14-11

B. Consumable Materials

- (1) D00408 Lubricant \_ Graphite Dry Film, DGF 123

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Surge Control Valve (Surge Valve)	49-53-01	01	100
	9	Packing	49-21-51	01	485
	10	Union	49-21-51	01	480
	12	Plug	49-21-51	01	535

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-030

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

(1) Install the APU surge valve:

- (a) Lubricate the end of the surge duct (7) with a thin layer of the graphite dry film lubricant.
- (b) Put the clamp (1) loosely over the flange of the surge duct (7).
- (c) Carefully put the surge valve (4) on the surge duct (7).

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- (d) Install the clamp (1) over the flanges of the surge valve (4) and surge duct (7) but do not tighten the coupling.
- (e) Put the coupling (5) loosely over the flange of the tee duct.
- (f) While you hold the surge valve (4), turn the surge duct (7) clockwise to the up position until the flanges of the tee duct and surge valve are aligned.
- (g) Put the coupling (5) over the flanges of the tee duct and surge valve (4).
  - 1) Tighten the coupling (5) to 55–60 inch-pounds (6.2–6.8 newton-meters)
- (h) Connect the discharge pressure tube (2) to the surge valve (4).
- (i) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (PRE-HONEYWELL-SB 49-7192);  
Do these steps to connect the pressure tube for the fan isolation valve (11):
  - 1) Lubricate the new packing (9) with a light coat of lubricant.
  - 2) Remove the cap from the pressure tube for the fan isolation valve (11).
  - 3) Install the union (10) to the pressure tube for the fan isolation valve (11).
  - 4) Install the packing (7) and the pressure tube for the fan isolation valve (11) to the surge valve (4).
- (j) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR OR WITHOUT THE FAN ISOLATION VALVE (POST-HONEYWELL-SB 49-7192 OR POST-HONEYWELL-SB 49-7392);  
Install a plug (12) and packing (9) on the surge valve (4).
  - 1) Tighten the plug to 65 inch-pounds (7.35 N.m).
- (k) Tighten the two bolts (6) that attach the struts to the surge valve (4) to 50–55 inch-pounds (5.7–6.2 newton-meters).
- (l) Tighten the clamp (1) to 25–27 inch-pounds ( newton-meters).
- (m) Tighten the aft couplings (8) to 55–60 inch-pounds (6.2–6.8 newton-meters).
- (n) Connect the electrical connector (3) to the surge valve (4).
  - 1) Install the lockwire on the electrical connector (3).

S 414-028

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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- S 864-019
- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 864-022
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 864-023
- (5) Do this task: APU Start and Operation (AMM 49-11-00/201).
- S 864-024
- (6) After the APU operates for 5 minutes, do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 744-025
- (7) Do the BITE test for the APU system (AMM 49-61-05/201).

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TOTAL PRESSURE TRANSDUCER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the total pressure transducer
  - (2) An installation of the total pressure transducer.
- B. The total pressure transducer is on the bottom of the APU gearbox, forward of the air inlet plenum. You can get access to the transducer through the APU access door.

TASK 49-53-02-004-001

2. Total Pressure Transducer Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

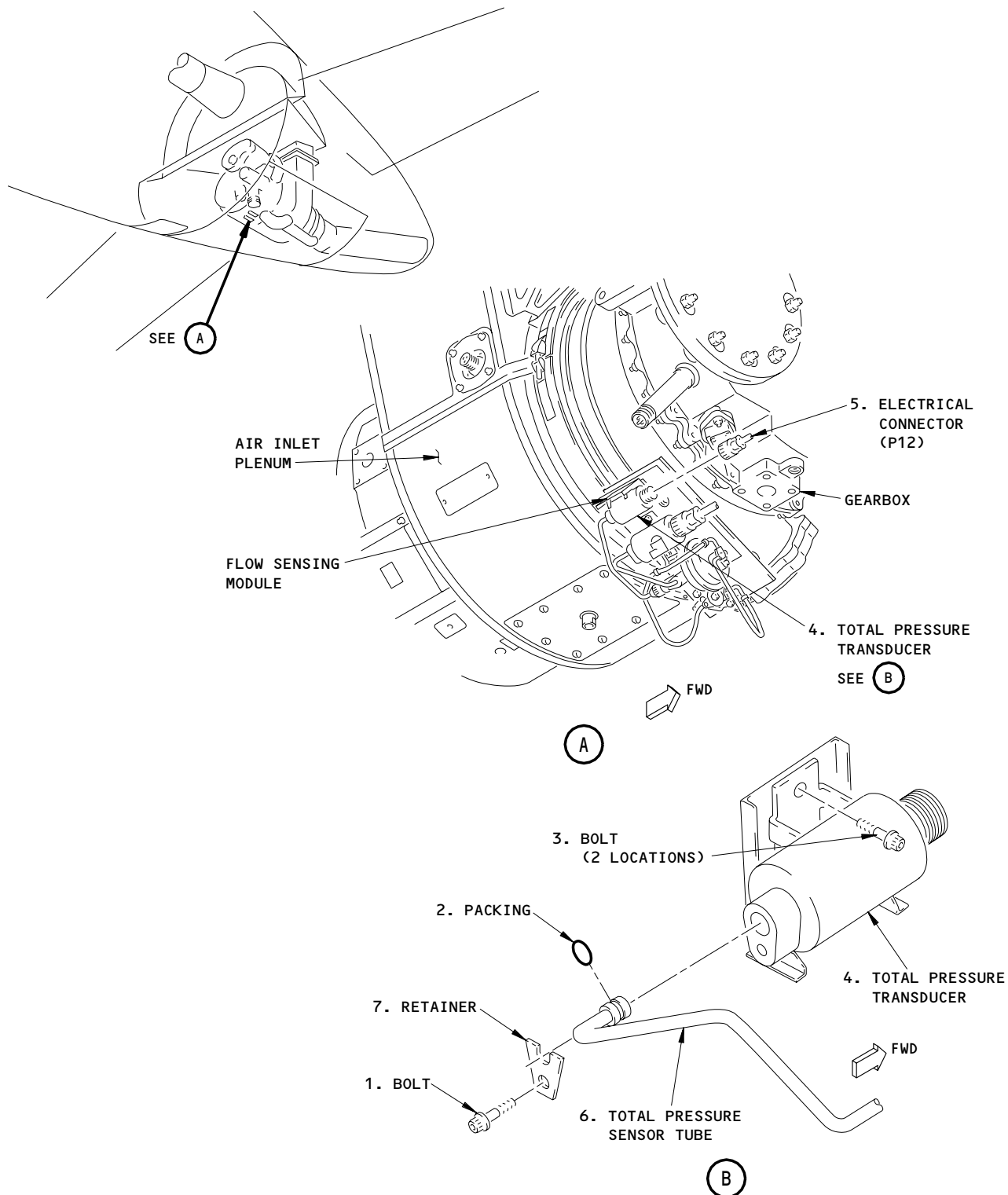
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Total Pressure Transducer Installation  
Figure 401

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C. Total Pressure Sensor Removal

S 024-022

- (1) Do these steps to remove the total pressure transducer (4):
  - (a) Disconnect the P12 electrical connector (5) from the total pressure transducer.
  - (b) Do these steps to remove the total pressure transducer (4) from the flow sensing module:
    - 1) Remove the bolt (1) and retainer (7) that attach the total pressure sensor tube (6) to the total pressure transducer (4).
    - 2) Disconnect the total pressure sensor tube (6) from the total pressure transducer (4).
    - 3) Remove the two bolts (3) that attach the total pressure transducer (4) to the flow sensing module.
    - 4) Remove the total pressure transducer (4).
    - 5) Remove the packing (2) from the total pressure transducer (4).
      - a) Discard the packing (2).
    - 6) Make sure you install all necessary protection covers.

TASK 49-53-02-404-009

3. Total Pressure Transducer Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236
- (3) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) - NASM20995C32

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2 4	Packing Total Pressure Transducer (Flow Sensing Module)	49-53-08	01	80 10

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-023

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the total pressure transducer (4):
  - (a) Do these steps to install the total pressure transducer (4) to the flow sensing module:
    - 1) Lubricate the new packing (2) with a light coat of lubricant.
    - 2) Install the packing (2) on the total pressure transducer (4).
    - 3) Install the total pressure transducer (4) on the flow sensing module with the two bolts (3).
      - a) Tighten the bolts (3) to 50-55 inch-pounds (5.7-6.2 newton-meters).
    - 4) Attach the total pressure sensor tube (6) to the total pressure transducer (4) with the retainer (7) and bolt (1).
  - (b) Connect the electrical connector P12 (1) to the total pressure transducer (4).
    - 1) Install the lockwire on the electrical connector P12 (1).

S 744-015

- (2) Do the self-test for the APU system (AMM 49-61-05/201).

S 864-016

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

F. Put the Airplane Back to Its Usual Condition

S 864-018

- (1) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 414-019

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.

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- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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DIFFERENTIAL PRESSURE TRANSDUCER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the differential pressure transducer
  - (2) An installation of the differential pressure transducer.
- B. The differential pressure transducer is on the bottom of the APU gearbox between the total pressure sensor and the total pressure transducer. You can get access to the differential pressure transducer through the APU access doors.

TASK 49-53-04-004-001

2. Differential Pressure Transducer Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

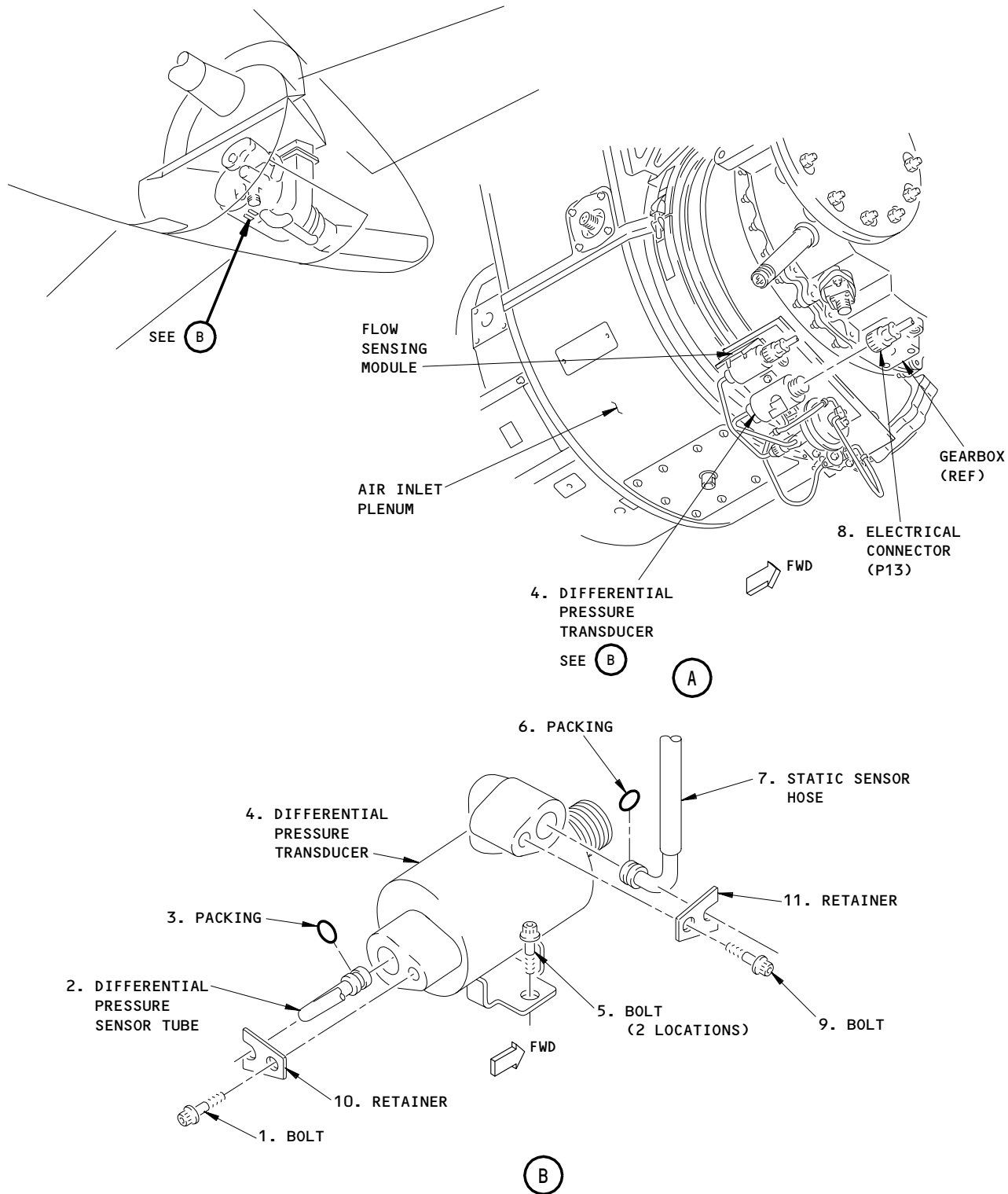
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Differential Pressure Transducer Installation  
Figure 401

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C. Differential Pressure Transducer Removal

S 024-027

**CAUTION:** CAREFUL DURING THE REMOVAL OF THE TRANSDUCER. DO NOT LET THE TRANSDUCER FALL TO THE GROUND. DO NOT CAUSE A ROUGH MOVEMENT OF THE TRANSDUCER. DAMAGE TO THE TRANSDUCER CAN OCCUR.

- (1) Do these steps to remove the differential pressure transducer (4):
  - (a) Disconnect the P13 electrical connector (8) from the differential pressure transducer (4).
  - (b) Do these steps to remove the differential pressure transducer (4) from the flow sensing module:
    - 1) Remove the bolt (1) and retainer (10) that attach the differential pressure sensor tube (2) to the differential pressure transducer (4).
    - 2) Disconnect the differential pressure sensor tube (2) from the differential pressure transducer (4).
    - 3) Remove the bolt (9) and retainer (11) that attach the static sensor hose (7) to the differential pressure transducer (4).
    - 4) Disconnect the static sensor hose (7) from the differential pressure sensor tube (2).
    - 5) Remove the two bolts (5) that attach the differential pressure transducer (4) to the flow sensing module.
    - 6) Remove the differential pressure transducer (4).
    - 7) Remove the two packings (3), (6) from the differential pressure transducer (4).
      - a) Discard the two packings (3), (6).
  - (c) Make sure you install all necessary protection covers.

TASK 49-53-04-404-009

3. Differential Pressure Transducer Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

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(3) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) - NASM20995C32

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Packing	49-53-08	01	65
	4	Differential Pressure Transducer (Flow Sensing Module)			10
	6	Packing			120

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-028

**CAUTION:** BE CAREFUL DURING THE DIFFERENTIAL PRESSURE TRANSDUCER INSTALLATION. DO NOT LET THE DIFFERENTIAL PRESSURE TRANSDUCER FALL TO THE GROUND. DO NOT CAUSE A ROUGH MOVEMENT OF THE DIFFERENTIAL PRESSURE TRANSDUCER. DAMAGE TO DIFFERENTIAL PRESSURE TRANSDUCER CAN OCCUR.

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the differential pressure transducer (4):
- (a) Do these steps to install the differential pressure transducer (4) on the flow sensing module:
    - 1) Lubricate the two new packings (3), (6) with a light coat of lubricant.
    - 2) Install the two packings (3), (6) on the differential pressure transducer (4).

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- 3) Install the differential pressure transducer (4) on the APU with the two bolts (5).
    - a) Tighten the bolts to 50–55 inch-pounds (5.7–6.2 newton-meters).
  - 4) Attach the static sensor hose (7) to the differential pressure transducer (4) with the bolt (9) and retainer (11).
  - 5) Attach the differential pressure sensor tube (2) to the differential pressure transducer (4) with the bolt (1) and retainer (10).
- (b) Connect the electrical connector P13 (8) to the differential pressure transducer (4).
- 1) Install the lockwire on the electrical connector P13 (8).

S 024-026

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-018

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 744-015

- (4) Do the self-test for the APU system (AMM 49-61-05/201).

S 864-024

- (5) Push the ERASE MEMORY switch on the ECU to erase the offset for the differential pressure transducer that was replaced.

**NOTE:** AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
The ECU writes the offset for the differential pressure transducer. This offset can be different for every differential pressure transducer. Erase the ECU memory to remove the offset for the removed transducer. The ECU will make an offset for the installed transducer.

**NOTE:** AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
The ECU writes the offset for the differential pressure transducer each time the APU starts. The ECU does not keep values from before the last time the APU was started.

F. Put the Airplane Back to Its Usual Condition

S 414-022

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

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SURGE VALVE FILTER ELEMENT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) Surge Valve Filter Element Removal
  - (2) Surge Valve Filter Element Installation
  - (3) Surge Valve Filter Element Test
  - (4) Clean the Surge Valve Filter Element.
- B. The filter element for the surge valve is in a housing below the torque motor of the surge valve. The surge valve is on the bottom of the APU engine. You can get access to the surge valve and the filter element through the APU access doors.

TASK 49-53-06-002-001

2. Surge Valve Filter Element Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

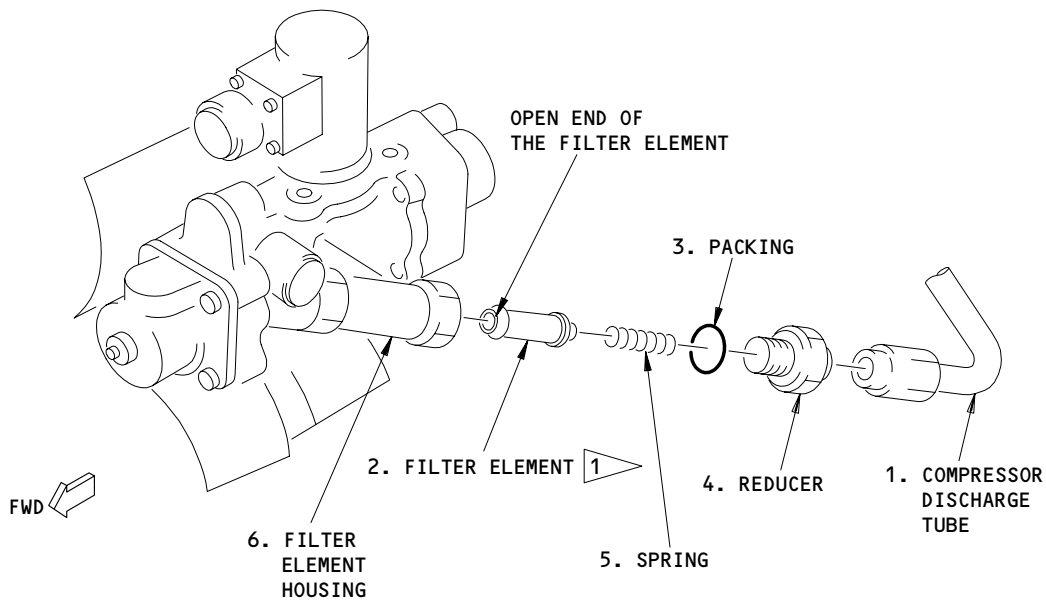
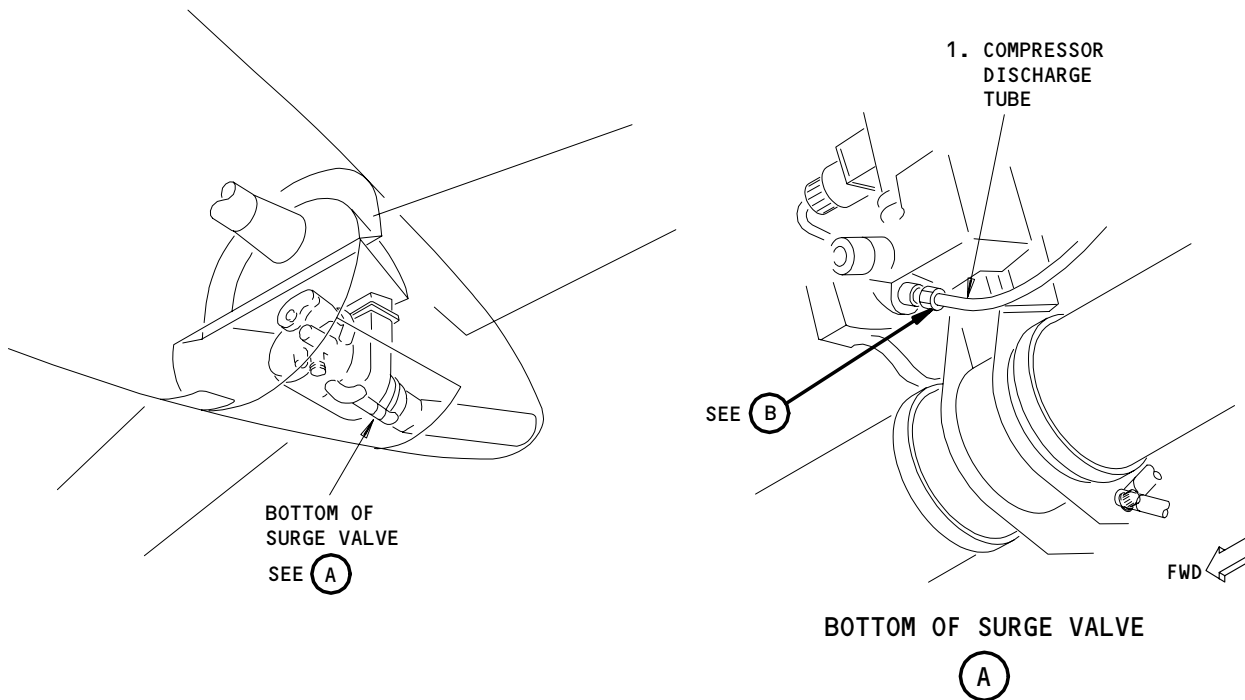
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1 SURGE VALVES WITH A SMALL FILTER ELEMENT HOUSING MUST USE A SMALL FILTER ELEMENT. SURGE VALVES WITH A LARGE FILTER ELEMENT HOUSING MUST USE A LARGE FILTER ELEMENT.

(B)

Surge Valve Filter Element Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-028

- (4) Remove the filter element for the surge valve:
  - (a) Disconnect the compressor discharge tube (1) from the reducer (4).
  - (b) Remove the reducer (4) and the packing (3) from the filter element housing (6).
    - 1) Discard the packing (3).
  - (c) Remove the spring (5) and the filter element (2) from the housing (6).

TASK 49-53-06-402-009

3. Surge Valve Filter Element Installation (Fig. 201)

A. Consumable Materials

- (1) D00550 Compound - Pure Nickel Special, Anti-Sieze
- (2) D00341 Lubricant - Santovac 5 or
- (3) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Filter Element	49-53-06	01	30 or 32
	3	Packing			20

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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E. Procedure

S 422-029

- (1) Install the filter element for the surge valve:
  - (a) Lubricate the filter housing (6) on the surge control valve and the reducer (4) threads with the compound.
  - (b) Lubricate the new packing (3) with a light coat of lubricant.
  - (c) Install the packing (3) on the reducer (4).

**CAUTION:** MAKE SURE YOU INSTALL THE OPEN END OF THE FILTER ELEMENT INTO THE HOUSING BEFORE YOU INSTALL THE SPRING. THE SPRING MUST TOUCH THE REDUCER WHEN THE FILTER ASSEMBLY IS INSTALLED. IF YOU DO NOT INSTALL THE FILTER CORRECTLY, A BLOCKAGE CAN OCCUR THAT CAN PREVENT SURGE VALVE OPERATION.

- (d) Install the filter element (2), the spring (5), and the reducer (4) in the filter element housing (6).
  - 1) Make sure the open end of the filter element (2) goes into the filter element housing (6).
  - 2) Tighten the reducer (4) to 100-120 inch-pounds (11.3-13.5 newton-meters).
- (e) Connect the compressor discharge tube (1) to the reducer (4).

S 862-030

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-016

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-017

- (4) Do a leakage test for the filter element installation:
  - (a) Do this task: APU Start and Operation (AMM 49-11-00/201).
  - (b) Operate the APU with a pneumatic load (AMM 36-00-00/201).
  - (c) Make sure the duct pressure increases.
  - (d) During the APU operation, examine the filter element housing for leakage.
  - (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (f) If the duct pressure did not increase, check the filter element for correct installation.
  - (g) If you found leakage, repair the cause of it.

S 412-020

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

TASK 49-53-06-702-021

4. Surge Valve Filter Element Test (Fig. 202)

A. Standard Tools and Equipment

- (1) Air Pressure Gage - 0-30 psig (two are necessary)
- (2) Air Pressure Regulator - 0-30 psig
- (3) Airflow Restrictor - 0.042 inch (1.07 mm) diameter orifice

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 012-031

- (1) If it is installed, remove the filter element for the surge control valve (Ref par. 2).

S 482-022

- (2) Install the filter element in test equipment as shown in Fig. 202.

S 782-023

- (3) Do the pressure test for the filter element:

- (a) Adjust the pressure regulator (1) to supply air at a pressure of 20 psig as shown on the pressure gage (2).

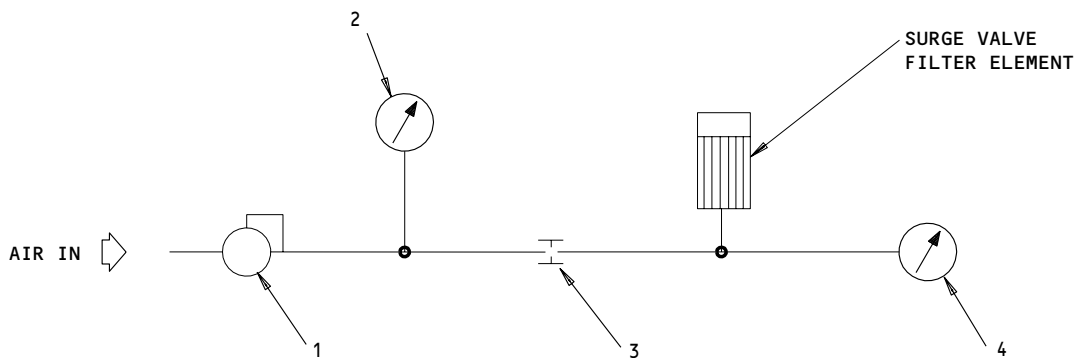
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- |  |   |
|--|---|
| <p>1. AIR PRESSURE REGULATOR<br/>(0 TO 30 PSIG)</p> <p>2. INLET PRESSURE GAGE<br/>(0 TO 30 PSIG)</p> | <p>3. RESTRICTOR UNIT<br/>(0.042 INCH DIAMETER ORIFICE)</p> <p>4. DOWNSTREAM PRESSURE<br/>GAGE (0 TO 30 PSIG)</p> |
|--|---|

Filter Element Pressure Drop Check  
Figure 202

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153703

- (b) Make sure the pressure on the pressure gage (4) is not more than 3.5 psig.
- (c) If the pressure on the gage (4) is more than 3.5 psig, clean the filter element (Ref par. 5).

S 412-032

- (4) Install the filter element for the surge control valve (Ref par. 3).

TASK 49-53-06-102-023

5. Clean the Surge Valve Filter Element

- A. Standard Tools and Equipment
  - (1) Compressed Air Source - 30 psig maximum
- B. Consumable Materials
  - (1) E00116 Oakite Rust Stripper
  - (2) G02158 Brush
- C. Procedure

S 842-024

- (1) Prepare the solution to clean the filter:

**WARNING:** YOU MUST USE A RESPIRATOR WHEN YOU MIX THE SOLUTION TO CLEAN THE FILTER ELEMENT. SLOWLY ADD THE RUST STRIPPER WHILE YOU MIX THE SOLUTION. WHEN YOU MIX THE SOLUTION, THE SOLUTION TEMPERATURE CAN BE MORE THAN THE BOILING POINT AND CAN CAUSE INJURY TO PERSONS.

- (a) Mix 3-5 pounds of rust stripper to each gallon of water.
- (b) Keep the solution at 71 to 93°C (160 to 200°F).
- (c) Use air movement in the solution to keep the solution mixed.

S 112-025

**WARNING:** CLEAN THE FILTER IN A CLEAN ROOM WITH A GOOD FLOW OF AIR. USE RUBBER GLOVES AND PROTECTIVE CLOTHING. MAKE SURE THERE ARE FIRE EXTINGUISHERS NEAR. THE SOLUTION IS FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Clean the filter element:
  - (a) Soak the filter element in the solution for 5 minutes.
  - (b) Remove the filter element from the solution.
  - (c) Use the brush to remove the scales on the filter.
  - (d) Flush the filter element with warm water that has soap in it.
  - (e) Thoroughly flush the filter element with clean water.
  - (f) Dry the filter element with the compressed air.
  - (g) If the clean filter element is not installed immediately, put the filter in a clean, dry container.

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VARIABLE VOLUME CHAMBER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the variable volume chamber
  - (2) An installation of the variable volume chamber.
- B. The variable volume chamber is attached to the total pressure sensor on the bottom of the APU gearbox. You can get access to the chamber through the APU access doors.

TASK 49-53-07-004-001

2. Variable Volume Chamber Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

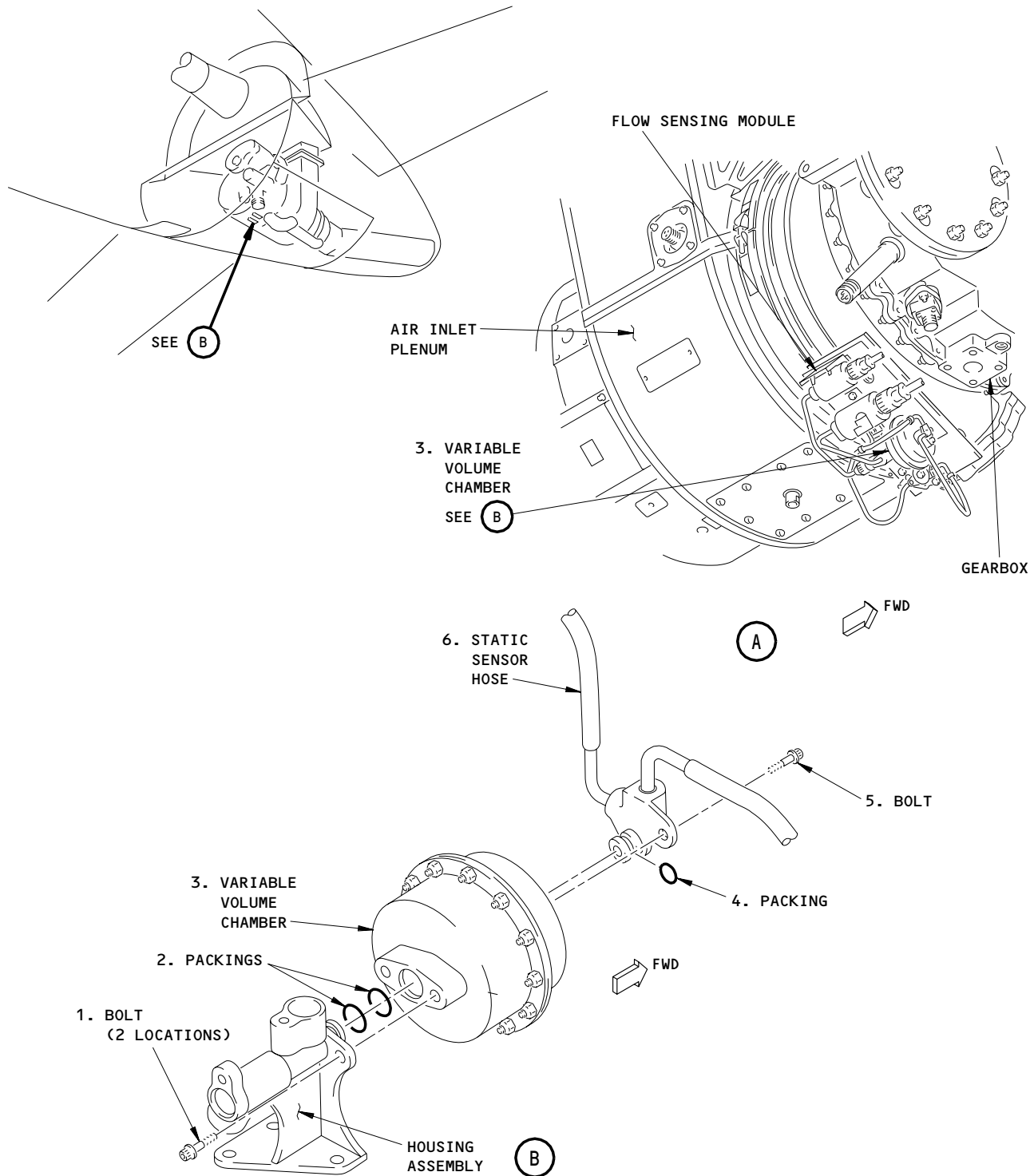
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Variable Volume Chamber Installation  
Figure 401

EFFECTIVITY	
	ALL

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C. Variable Volume Chamber Removal

S 024-022

- (1) Do these steps to remove the variable volume chamber (3):
  - (a) Remove the two bolts (5) that attach the static sensor hose (6) to the variable volume chamber (3).
  - (b) Disconnect the static sensor hose (6) from the variable volume chamber (3).
  - (c) Remove the two bolts (1) that attach the variable volume chamber (3) to the housing assembly.
  - (d) Remove the variable volume chamber (3).
  - (e) Remove the three packings (2), (4) from the variable volume chamber (3).
    - 1) Discard the three packings (2), (4).
  - (f) Make sure you install all necessary protection covers.

TASK 49-53-07-404-009

3. Variable Volume Chamber Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing	49-53-07	01A	55
	3	Variable Volume Chamber (Flow Sensing Module)	49-53-08	01	10
	4	Packing			120

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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D. Procedure

S 424-023

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the variable volume chamber (3):
  - (a) Lubricate the three new packings (2), (4) with a light coat of lubricant.
  - (b) Install the three packings (2), (4) on the variable volume chamber (3).
  - (c) Install the variable volume chamber (3) to the housing assembly with the two bolts (1).
    - 1) Tighten the two bolts (1) to 50-53 inch-pounds (5.7-6.0 newton-meters).
  - (d) Attach the static sensor hose (6) to the variable volume chamber (3) with the two bolts (5).

E. Put the Airplane Back to Its Usual Condition

S 414-020

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-014

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-016

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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49-53-07

02

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FLOW SENSING MODULE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the flow sensing module for the APU surge system. The module contains most of the components that are necessary for the surge bleed system on the APU.
- B. When you replace the flow sensing module, all of these surge system components are replaced:
  - (1) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
The total pressure sensor
  - (2) The total pressure transducer
  - (3) The differential pressure transducer
  - (4) The variable volume chamber
  - (5) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
The static pressure sensor.
- C. APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module. The static pressure sensor is adjustable under APU test cell conditions. The flow sensor must not be removed or replaced while the APU is installed on the airplane. You must replace the defective flow sensor in the APU test cell since an adjustment test of the flow sensor is necessary. The flow sensing module contains the total pressure transducer, differential pressure transducer and variable volume chamber. You must install the flow sensor first before you can install the flow sensing module.
- D. The flow sensing module is on the bottom of the APU between the gearbox and the air inlet plenum. You can get access to the module through the APU access doors.

TASK 49-53-08-004-001

2. Flow Sensing Module Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

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S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 024-005

- (4) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
Do these steps to remove the flow sensing module (1):
  - (a) Disconnect the P12 electrical connector (2) and the P13 electrical connector (3) from the flow sensing module (1).
    - 1) Install caps on the electrical connectors (2), (3) and the module components for protection.
  - (b) Remove the four bolts (5) that attach the flow sensing module (1) to the APU.

**CAUTION:** BE CAREFUL WHEN YOU REMOVE THE MODULE. THE TOTAL PRESSURE SENSOR AND THE STATIC PRESSURE SENSOR ARE INSTALLED ON THE BOTTOM OF THE MODULE. DAMAGE TO THESE SENSORS CAN OCCUR.

- (c) Carefully remove the flow sensing module (1) and the gasket (4) from the APU.
  - 1) Discard the gasket (4).

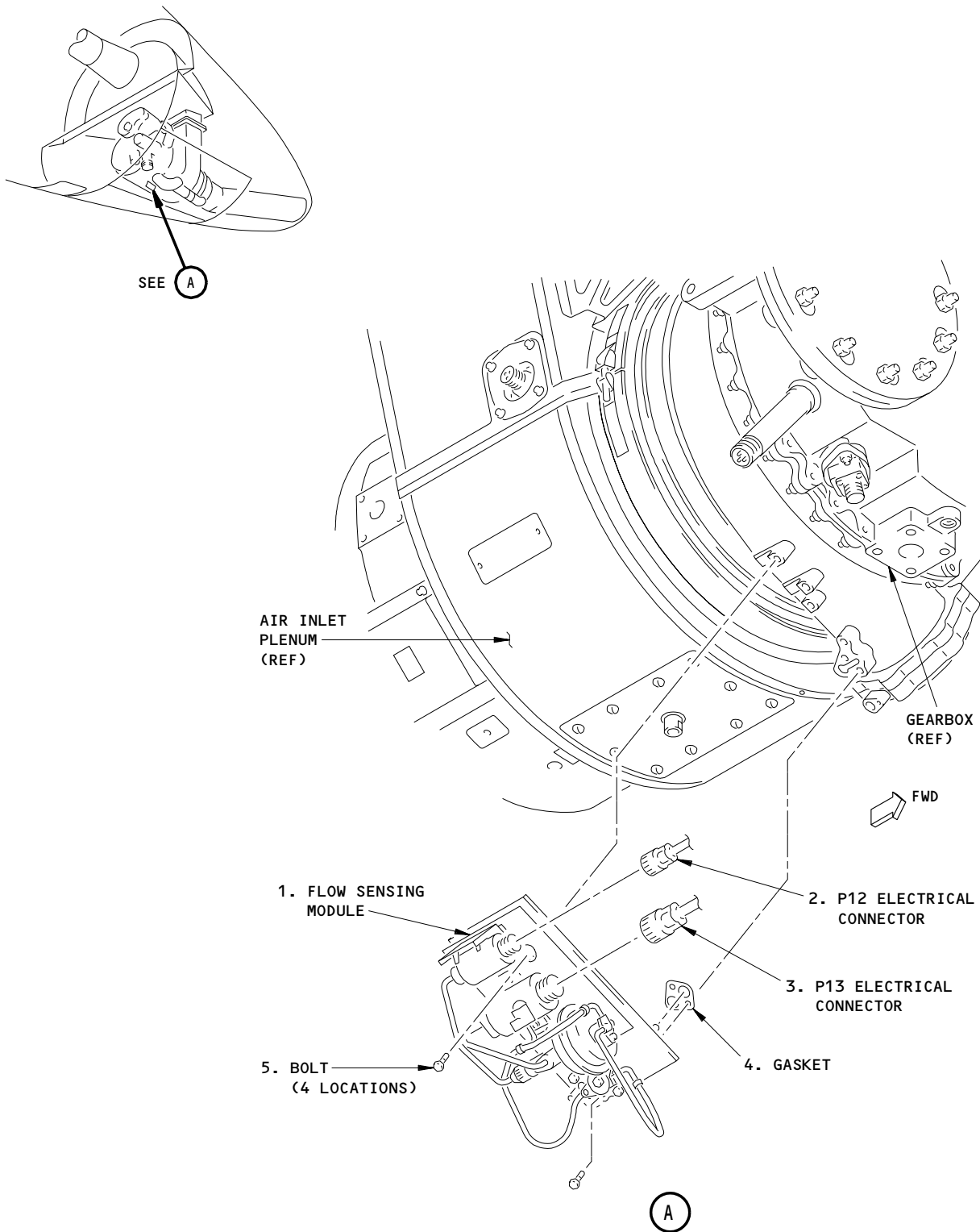
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03

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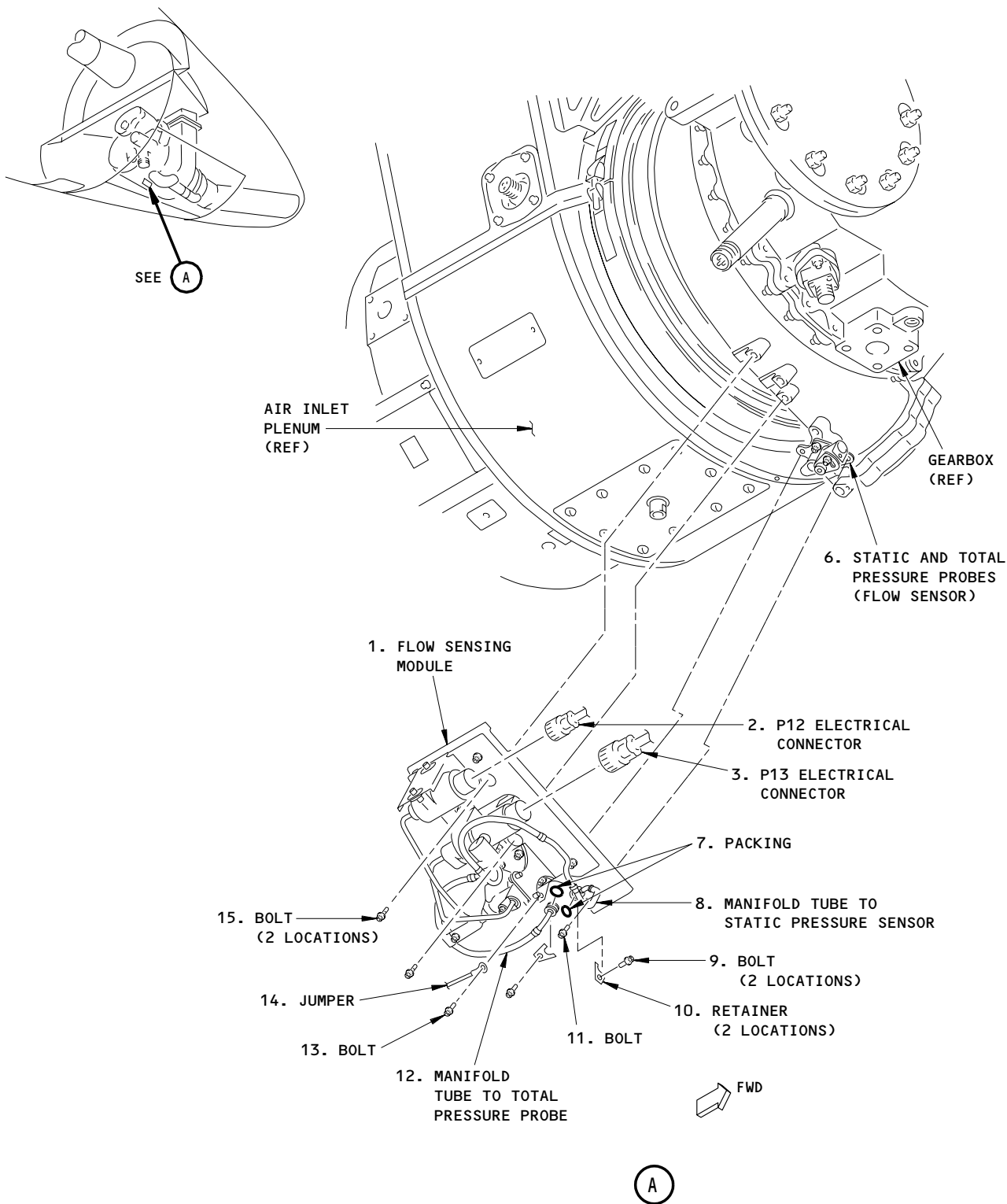
Flow Sensing Module Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(PRE-HONEYWELL-SB 49-7711)

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04

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Flow Sensing Module Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

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S 024-014

- (5) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
Do these steps to remove the flow sensing module (1):

**NOTE:** The flow sensor (6) must not be replaced while the APU is installed in the airplane. Adjustment test of the flow sensor is necessary with the APU in the test cell.

- (a) Disconnect the electrical connectors P12 (2) and P13 (3) from the flow sensing module (1).
- (b) Remove the two bolts (9) and two retainers (10) that attach the two manifold tubes (8), (12) to the flow sensing module (1) and flow sensor (6).
- (c) Disconnect the manifold tube (8) from the static pressure sensor (flow sensor) (6).
- (d) Disconnect the manifold tube (12) from the total pressure probe (flow sensor) (6).
- (e) Remove and discard the two packings (7) from the two manifold tubes (8), (12).
- (f) Remove the bolt (13) that attaches the jumper (14) to the flow sensing module (1).
- (g) Remove the bolt (11) that attaches the flow sensing module (1) to the flow sensor (6).
- (h) Remove the two bolts (15) that attach the flow sensing module (1) to the scroll housing.
- (i) Carefully remove the flow sensing module (1) from the flow sensor (6).

**NOTE:** The baseplate of the flow sensing module (1) is located below the flange of the flow sensor (6).

- (j) Make sure you install all necessary protection covers.

TASK 49-53-08-404-006

3. Flow Sensing Module Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing

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- (2) AMM 49-61-05/201, APU Control Unit
- B. Consumable Materials
  - (1) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) - NASM20995C32
  - (2) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
  - (3) D00341 Lubricant - Santovac 5
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Flow Sensing Module (PRE-HONEYWELL-SB 49-7711)	49-53-08	01	10
	1	Flow Sensing Module (POST-HONEYWELL-SB 49-7711)	49-53-08	01	260
	4	Gasket (PRE-HONEYWELL-SB 49-7711)	49-53-08	01	7
	7	Packing (POST-HONEYWELL-SB 49-7711)	49-53-08	01	255

- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
Do these steps to install the flow sensing module (1):
  - (a) Install a new gasket (4) on the flow sensing module (1).

**CAUTION:** BE CAREFUL WHEN YOU INSTALL THE MODULE. THE TOTAL PRESSURE SENSOR AND THE STATIC PRESSURE SENSOR ARE INSTALLED ON THE BOTTOM OF THE MODULE. DAMAGE TO THESE SENSORS CAN OCCUR.

- (b) Carefully install the flow sensing module (1), with the new gasket (4), on the APU with the four bolts (5).
  - 1) Tighten the bolts (5) to 50 inch-pounds (5.7 newton-meters).

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- (c) Remove the caps from the electrical connectors (2), (3) and the module components.
- (d) Connect the P12 electrical connector (2) and the P13 electrical connector (3) to the flow sensing module (1).
  - 1) Install a lockwire on the electrical connectors (2), (3).

S 424-015

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (2) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
Do these steps to install the flow sensing module (1):
  - (a) Install the flow sensing module (1) to the flow sensor (6) and scroll housing with the two bolts (15).

**NOTE:** The baseplate of the flow sensing module (1) must be installed below the flange of the flow sensor (6).

- (b) Install the jumper (14) to the flow sensing module (1) with the bolt (13).
- (c) Install the bolt (11) that attaches the flow sensing module (1) to the flow sensor (6).
- (d) Tighten the four bolts (11), (13), (15) to 35 inch-pounds (4.0 newton-meters).
- (e) Install a lockwire on the bolt (11).
- (f) Lubricate the two new packings (7) with a light coat of lubricant or oil.
- (g) Install the two packings (7) on the two manifold tubes (8), (12).
- (h) Connect the manifold tube (8) to the static pressure sensor (flow sensor) (6).
- (i) Connect the manifold tube (12) to the total pressure probe (flow sensor) (6).

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- (j) Install the two retainers (10) and two bolts (9) that attach the two manifold tubes (8), (12) to the flow sensing module (1) and flow sensor (6).
  - 1) Tighten the two bolts (9) to 35 inch-pounds (4.0 newton-meters).
- (k) Connect the electrical connectors P12 (2) and P13 (3) to the flow sensing module (1) and install a lockwire.

S 864-008

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 744-009

- (4) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).

S 444-012

- (5) Push the ERASE MEMORY switch on the ECU to erase the offset for the differential pressure transducer that was replaced.

NOTE: AIRPLANES WITH THE -18 CONTROL UNIT AND BEFORE;  
The ECU writes the offset for the differential pressure transducer. This offset can be different for every differential pressure transducer. Erase the ECU memory to remove the offset for the removed transducer. The ECU will make an offset for the installed transducer.

NOTE: AIRPLANES WITH THE -19 THRU -999 APU CONTROL UNIT;  
The ECU writes the offset for the differential pressure transducer each time the APU starts. The ECU does not keep values from before the last time the APU was started.

S 414-010

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 864-011

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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FLOW SENSING MODULE – CLEANING/PAINTING

1. General

- A. This procedure has the task to clean the flow sensor of the flow sensing module. The flow sensor has the total pressure probe and static pressure sensor.

TASK 49-53-08-107-016

2. Flow Sensor Cleaning (Fig. 701)

A. References

- (1) AMM 49-53-08/401, Flow Sensing Module

B. Equipment

- (1) Air Source – Regulated, Dry-Filtered, Compressed 60-105 psig (414-723.9 kPa) (22 SCFM) (commercially available)  
(2) Bit – Drill (0.020 to 0.040 Inch Diameter) (0.5 to 1.0 mm Diameter) (commercially available)

C. Consumable Materials

- (1) B00130 Alcohol, Isopropyl – TT-I-735 or  
(2) B00075 Solvent, Cleaning – MIL-PRF-680 Stoddard Type 1 (or equivalent)  
(3) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) – BMS15-5  
(4) G02330 Brush, Stiff Bristle, Non-Metallic – Tampico GA55-1  
(5) G00434 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) – NASM20995C32  
(6) G01674 Tape, Masking – VV-T-106

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment – Right |
| 211 | Flight Compartment – Left     |
| 212 | Flight Compartment – Right    |
| 315 | APU Compartment – Left        |
| 316 | APU Compartment – Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door – Left  |
| 316AR | APU Access Door – Right |
| 822   | Aft Cargo Door          |

E. Procedure

S 867-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

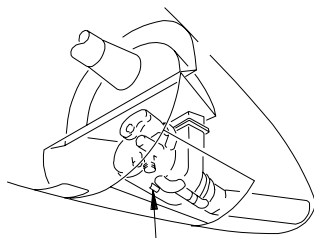
EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

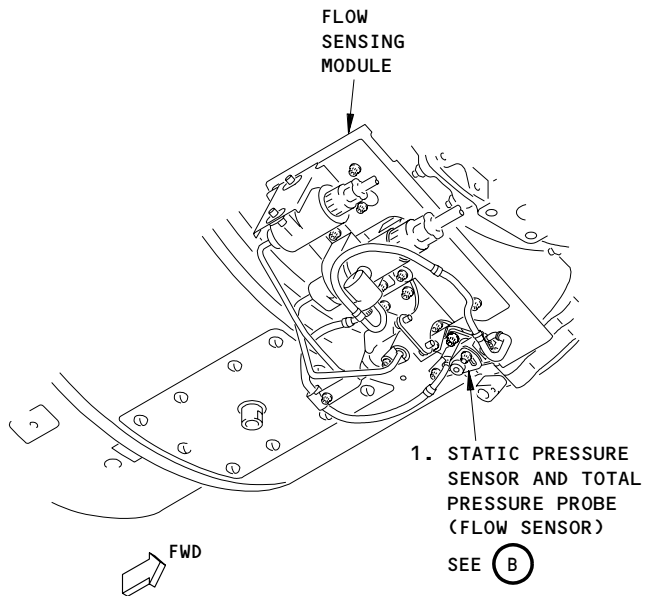
- S 867-003
- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT
- S 017-004
- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.
- S 027-005
- (4) Do these steps to remove the flow sensor (1) from the APU:
- (a) Remove the screw (2) that attaches the cover (3) to the flow sensor (1).
  - (b) Remove the cover (3).
  - (c) Remove the flow sensing module. To remove it, do this task: Flow Sensing Module Removal (AMM 49-53-08/401).
  - (d) Remove the two bolts (4) that attach the flow sensor (1) to the mounting boss on the APU.
  - (e) Carefully remove the flow sensor (1) and gasket (5) from the APU.
  - (f) Discard the gasket (5).
- S 117-017
- (5) Do these steps to clean the flow sensor (1):
- WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.
- CAUTION:** DO NOT DISASSEMBLE THE COMPONENTS OF THE FLOW SENSOR TO CLEAN THE INTERNAL PARTS. IF YOU LOOSEN THE ADJUSTMENT BOLT FOR THE STATIC PRESSURE SENSOR, YOU MUST RE-CALIBRATE AND DO AN ADJUSTMENT TEST OF THE FLOW SENSOR AGAIN IN THE TEST CELL. DAMAGE TO EQUIPMENT CAN OCCUR.
- (a) Clean the exterior surfaces of the flow sensor (1) with alcohol or cleaning solvent and a cloth or brush.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

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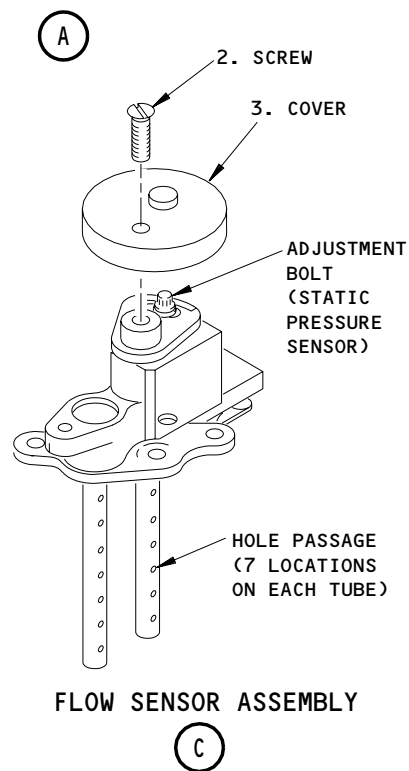
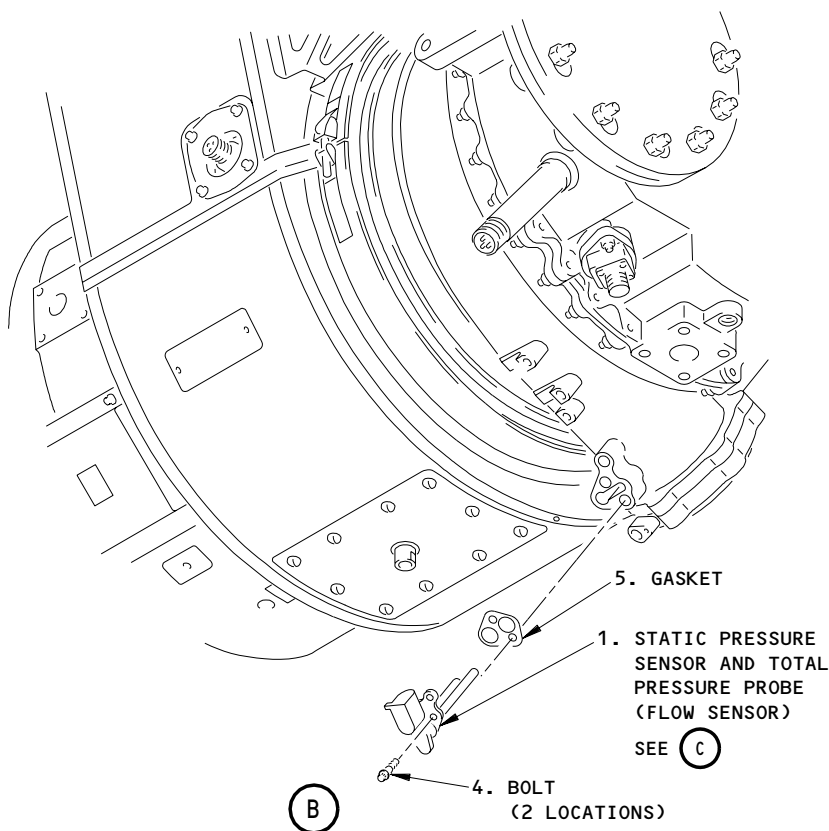


BOTTOM OF THE GEARBOX  
SEE (A)



1. STATIC PRESSURE  
SENSOR AND TOTAL  
PRESSURE PROBE  
(FLOW SENSOR)  
SEE (B)

BOTTOM OF THE GEARBOX



FLOW SENSOR ASSEMBLY

Flow Sensor Cleaning  
Figure 701

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

- (b) Use a drill bit, lockwire or equivalent tool to carefully clear the 14 hole passages on the static pressure sensor and total pressure probe of unwanted materials.

NOTE: The diameter of the hole passage is 0.046–0.051 inch (1.2–1.3 mm).

- (c) Flush the exterior surfaces of the flow sensor (1) and the 14 hole passages with water.
- (d) Use the cloth to dry the exterior surfaces of the flow sensor (1).
- (e) Use the masking tape to cover the 12 hole passages on the static pressure sensor and total pressure probe but keep the hole passage at the end of each tube open.
- (f) Use the air source to blow the air through the hole passage at the end of each tube and through each tube.

NOTE: It is recommended that you use a pressure of 60–90 psig (414–620 kPa) of air or nitrogen to blow the air through each tube of the static pressure sensor and total pressure probe.

- (g) Make sure the air flows through each tube.
- (h) Remove the masking tape and make sure there is no remaining tape or adhesive material on each tube.
- (i) Clean the mounting boss of the flow sensor (1) on the APU with alcohol or cleaning solvent and a cloth or brush.
- (j) Use the cloth with water to clean and then dry the mounting boss.

S 427-018

- (6) Do these steps to install the flow sensor (1) on the APU:
  - (a) Install a new gasket (5) on the flow sensor (1).
  - (b) Install the flow sensor (1) with the two bolts (4).
    - 1) Tighten the two bolts (4) to 50–55 inch-pounds (5.7–6.2 newton-meters).

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MAINTENANCE MANUAL

- (c) Install the lockwire on the two bolts (4).
- (d) Install the flow sensing module. To install it, do this task:  
Flow Sensing Module Installation (AMM 49-53-08/401).
- (e) Install the cover (3) on the flow sensor (1) with the screw (2).

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

**49-53-08**

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APU CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The APU controls consist of manual and automatic controls for starting, stopping, and maintaining the APU within safe limits during operation. Once an APU start is initiated, further control of the unit is fully automatic. The control system consists of the APU mounted sensors which feed inputs into the Electronic Control Unit for the APU. The controller, in turn, feeds signals to APU mounted torque-motors and information to the APU control panel in the flight compartment and EICAS. Electrical power for the system is 28 volts dc.
- B. If Airesearch SB 2117342-49-2195 has been done to the electronic control unit (ECU), the APU will have altitude start enhancements and start protection for low oil pressure. With the changed hardware, the starter will disengage at 42% RPM on the ground and 55% RPM at altitudes above 36,000 feet (10973 meters). Also, when the APU is initially started with low oil pressure, the APU will shutdown 15.5 seconds after it gets to 95% RPM (or one second if the APU oil temperature is greater than 20°F). The subsequent start with low oil pressure will cause a shutdown one second after the APU gets to 95% RPM. The APU will then not start if there is low oil pressure.

2. Component Details

- A. APU Control Panel - P5 Panel (Fig. 1)
  - (1) The APU control panel is located on the overhead panel and contains the master control switch for the APU, FAULT light, and RUN light. The master control switch is a three-position switch with a momentary START position. The amber FAULT light illuminates with a failure to start or a fault causing APU shutdown. FAULT also illuminates momentarily while the fuel valve is in transit. The white RUN light illuminates when APU reaches 95% speed.
- B. Power Controls - P5 Panel (Fig. 1)
  - (1) The bleed air switch for the APU is located on overhead panel P5. It opens the shutoff valve for the APU bleed air to allow APU bleed air to flow to the airplane cabin (AMM 36-10-00/001). The generator control switch for the APU is also located on overhead panel P5. It excites the APU generator field and supplies power to the generator control unit for the APU (AMM 24-22-00/001). The APU must be at 95% speed for either pneumatic or electrical loading.
- C. The APU Indications show on EICAS as follows:
  - (1) The APU FAULT message is shown as a level C alert message when the APU has a protection shutdown.
  - (2) The APU DOOR message is shown on the status and the maintenance displays of EICAS when the door is not in the commanded position.
  - (3) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The APU BITE message shows on the EICAS maintenance display when one or more of these faulty units is in the memory of the APU control unit (ECU): #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, #1 T/C RAKE, #2 T/C RAKE, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SWITCH.

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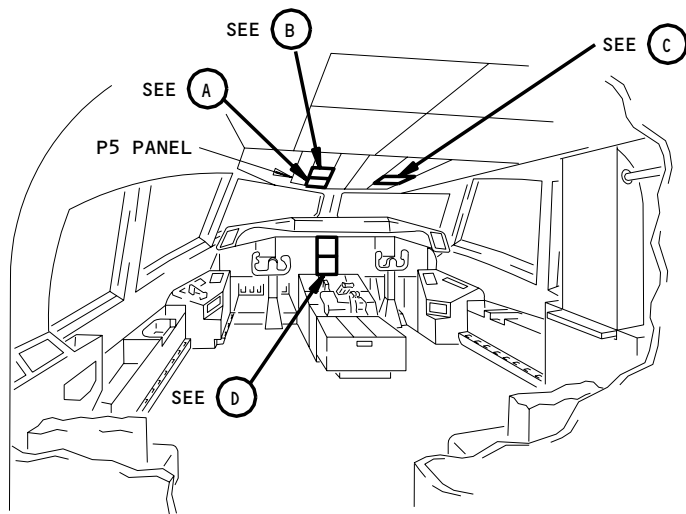
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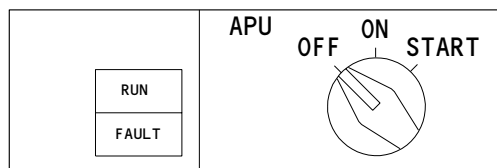
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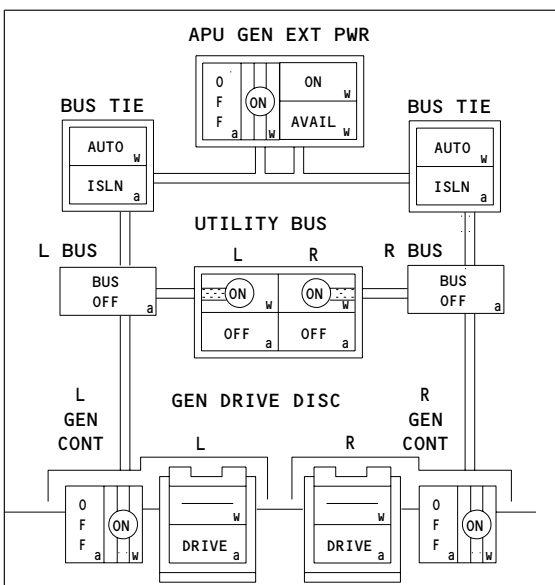


FLIGHT COMPARTMENT



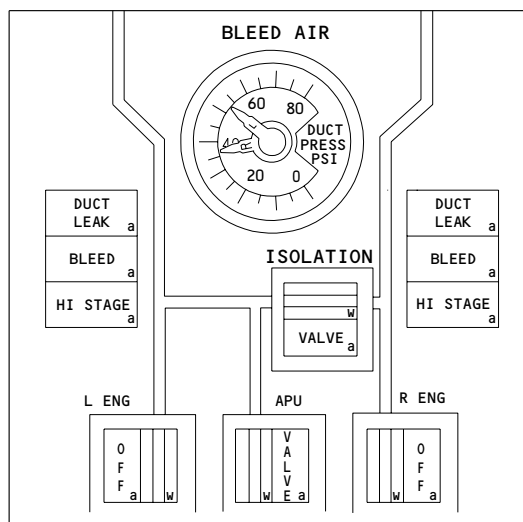
APU CONTROL PANEL, P5

(A)



ELEC SYS CONT PANEL, P5

(B)



BLEED AIR CONT PANEL, P5

(C)

APU Engine Controls Locations  
Figure 1 (Sheet 1)

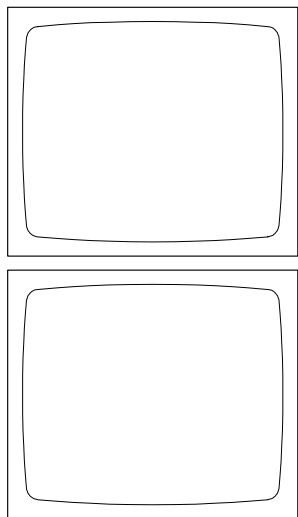
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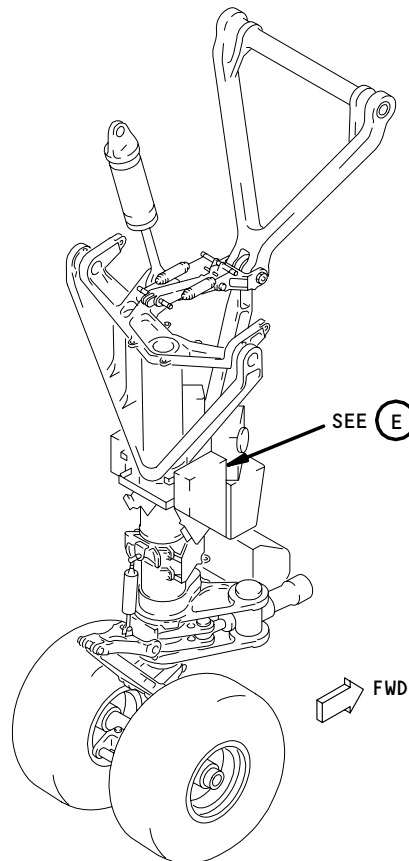
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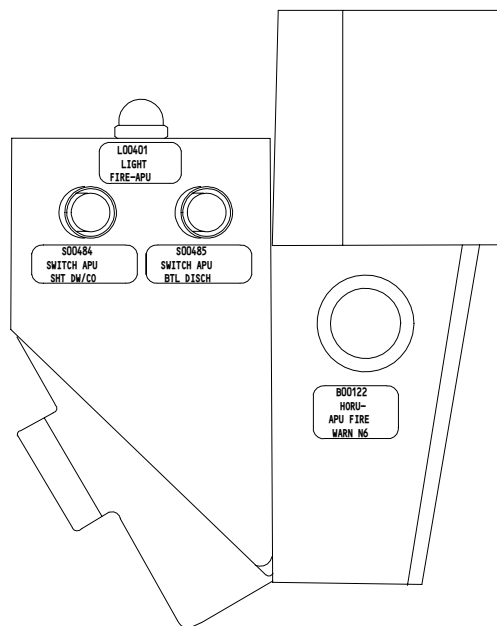


EICAS DISPLAY PANEL, P2

(D)



NOSE LANDING GEAR



APU REMOTE CONTROL PANEL, P62

(E)

APU Engine Controls Locations  
Figure 1 (Sheet 2)

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- (4) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The APU BITE message shows on the EICAS maintenance display when one or more of these faulty units is in the memory of the APU control unit (ECU): #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, EGT #1 CIRCUIT, EGT #2 CIRCUIT, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SW(GEN).
  - (5) The APU OIL QTY message shows when there are 4.25 quarts of oil in the APU gearbox (oil reservoir). The APU OIL QTY message shows on the status and the maintenance displays of EICAS.
  - (6) The APU RPM shows the engine speed on the maintenance and the status displays of EICAS.
  - (7) The APU EGT shows the exhaust gas temperature on the status and the maintenance displays of EICAS.
- D. P62 Control Panel for the APU (Fig. 1)
- (1) The APU control panel is on the right side of the outer cylinder for the nose landing gear. This is the only location from which you can do an APU shutdown other than the flight compartment. This panel can do an APU shutdown, arm the fire protection system, and operate the fire bottle (AMM 26-15-00/001). The APU fire shutdown switch is to be used during emergencies only.
- E. APU Control Unit (Fig. 2)
- (1) The electronic control unit (ECU) is a digital control system based on a microprocessor. It governs the engine starting sequence, acceleration, governed speed operation, operation within temperature limits, the control of the inlet guide vanes, surge valve control, and the engine shutdown. The input signals to the control unit are utilized by it to supply control signals to various accessories. The input signals from the APU are engine speed, exhaust gas temperature, air inlet temperature and pressure, high oil temperature, low oil pressure, the position of the fan isolation valve, the position of the air intake door, the actuator position of the inlet guide vanes, differential pressure switch for the generator filter, and transducer signals for the differential and total pressures. Signals from the aircraft are the shutoff valve for the bleed air, environmental control system (ECS), air/ground, and main engine start (MES). The control unit has two separate systems for automatic shutdown protection: normal shutdown logic (hardware shutdown) and redundant shutdown logic (software shutdown). The APU control unit is located on the aft equipment center in the E6 rack and panel type mounting.
  - (2) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The ECU supplies an integral BITE (Built-In Test Equipment) function to help the line maintenance technician do APU trouble-shooting. The ECU continuously monitors and stores data about APU shutdowns and failures of Line Replaceable Units (LRUs). The BITE memory can only be interrogated after APU shutdown on the ground. It recalls the stored data, shows the causes for up to five protective shutdowns and gives LRU failure indications.

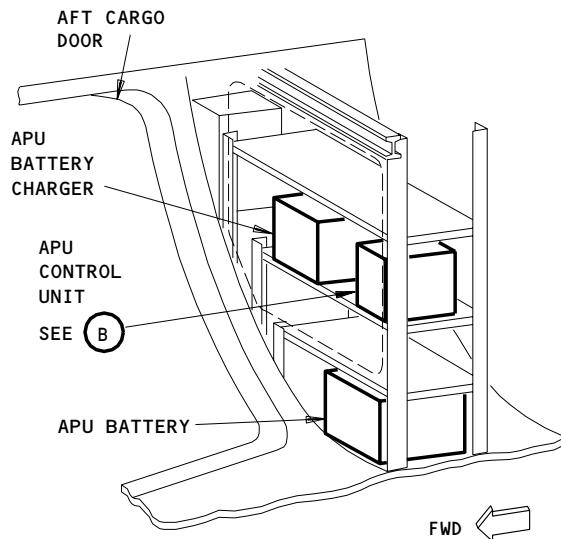
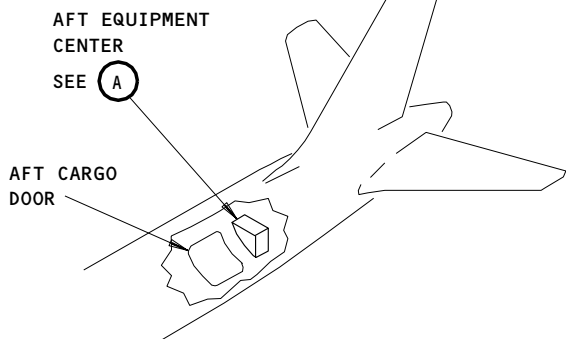
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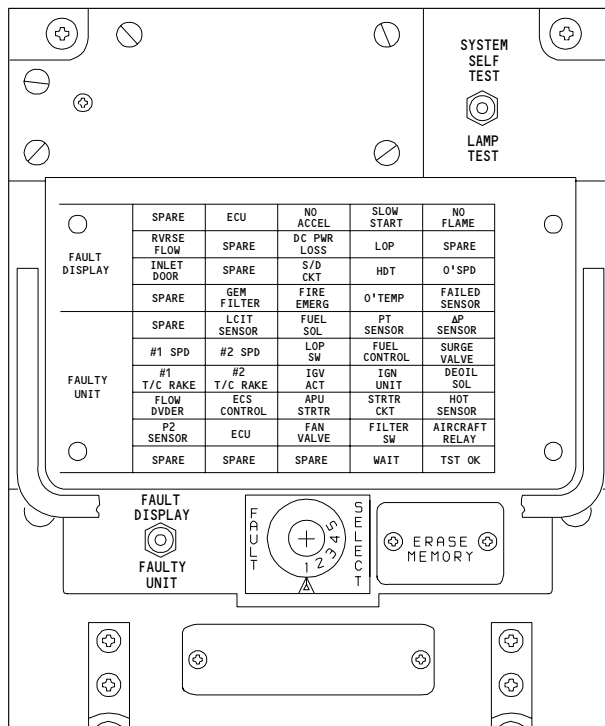
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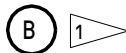
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AFT EQUIPMENT CENTER, E6



APU BITE PANEL



1 AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE

APU Control Unit  
Figure 2 (Sheet 1)

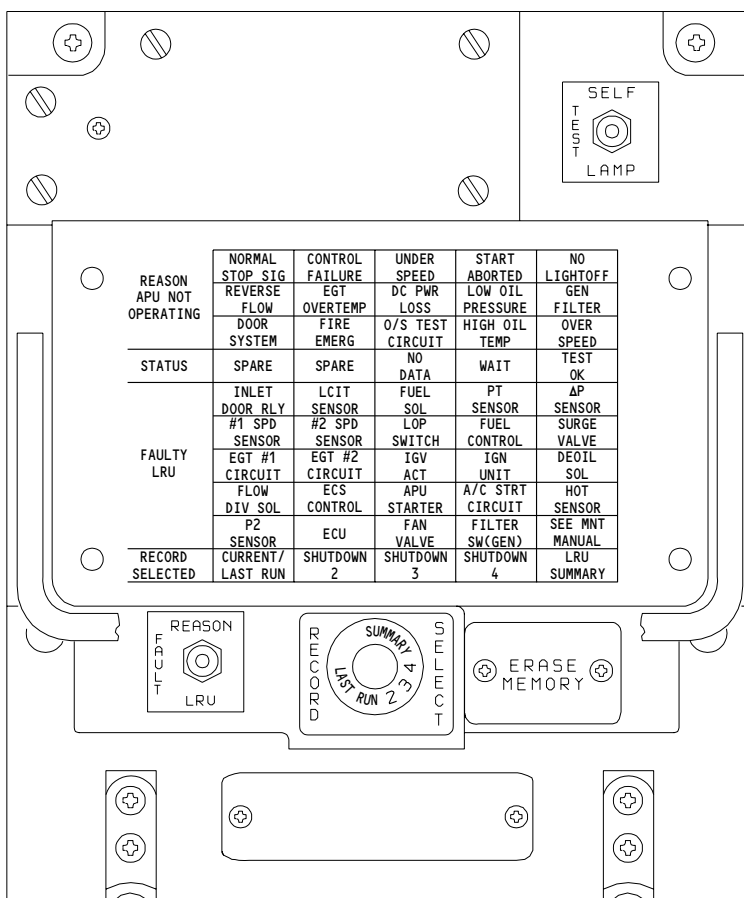
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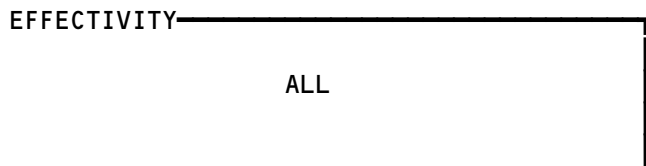


APU BITE PANEL



2 AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT

APU Control Unit  
Figure 2 (Sheet 2)



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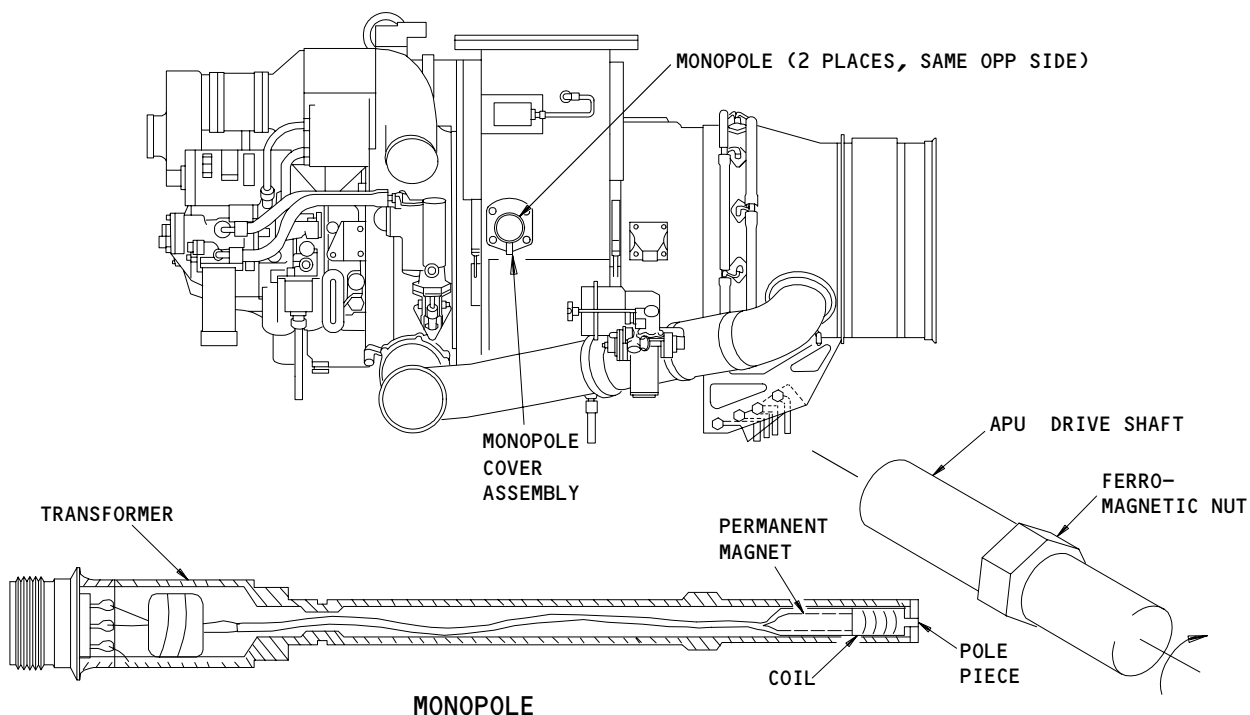
- (3) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The ECU supplies an integral BITE (Built-In Test Equipment) function to help the line maintenance technician do APU trouble-shooting. The ECU continuously monitors and stores data about APU shutdowns and failures of Line Replaceable Units (LRUs). The BITE memory can be interrogated while the APU operates or after shutdown. It recalls the stored data, shows the causes for up to four protective shutdowns and gives LRU failure indications. The APU must be shutdown for the ECU to perform the self test.

F. Monopole (Fig. 3)

- (1) The monopole is a variable reluctance transducer which is magnetic and does not touch the parts. It converts mechanical motion into an electrical signal. A ferromagnetic nut mounted on the APU drive shaft produces an electrical pulse in the monopole every time it passes. Monopole assemblies on the left and right sides of the inlet plenum transmit electrical signals to the APU control unit.

G. APU Inlet Temperature Sensor (Fig. 4)

- (1) The inlet temperature of the load compressor (LCIT) sensor is a chromel-alumel unit for rapid response to temperature changes. The thermocouple senses temperature increases associated with ambient changes, reverse flow conditions, and surges in the load compressor. The APU control unit will shut down the engine if the inlet temperature exceeds 210°F or increases more than 60°F in 1.1 seconds. The sensor is located forward of the inlet plenum by the actuator upper mount for the inlet guide vanes.



APU Monopole Location  
Figure 3

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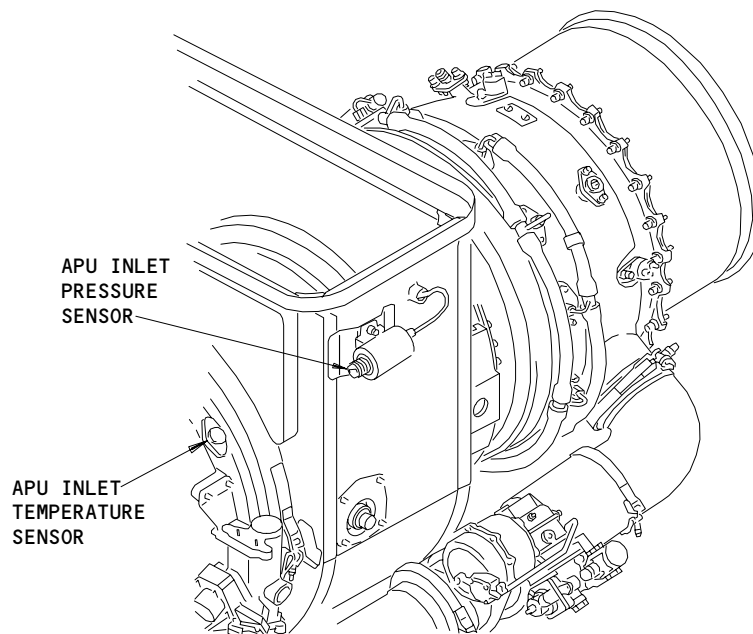
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H. APU Inlet Pressure Sensor (Fig. 4)

(1) The inlet pressure (P2) sensor is a solid state transducer which is piezo-resistive and has a sensing element which is a silicon strain gage. It provides a 0-5 volt dc signal proportional to the inlet pressure. The APU control unit uses its signal to modify the engine fuel schedule. The sensor is mounted on the left side near the top of the inlet plenum.

I. APU Control Relays

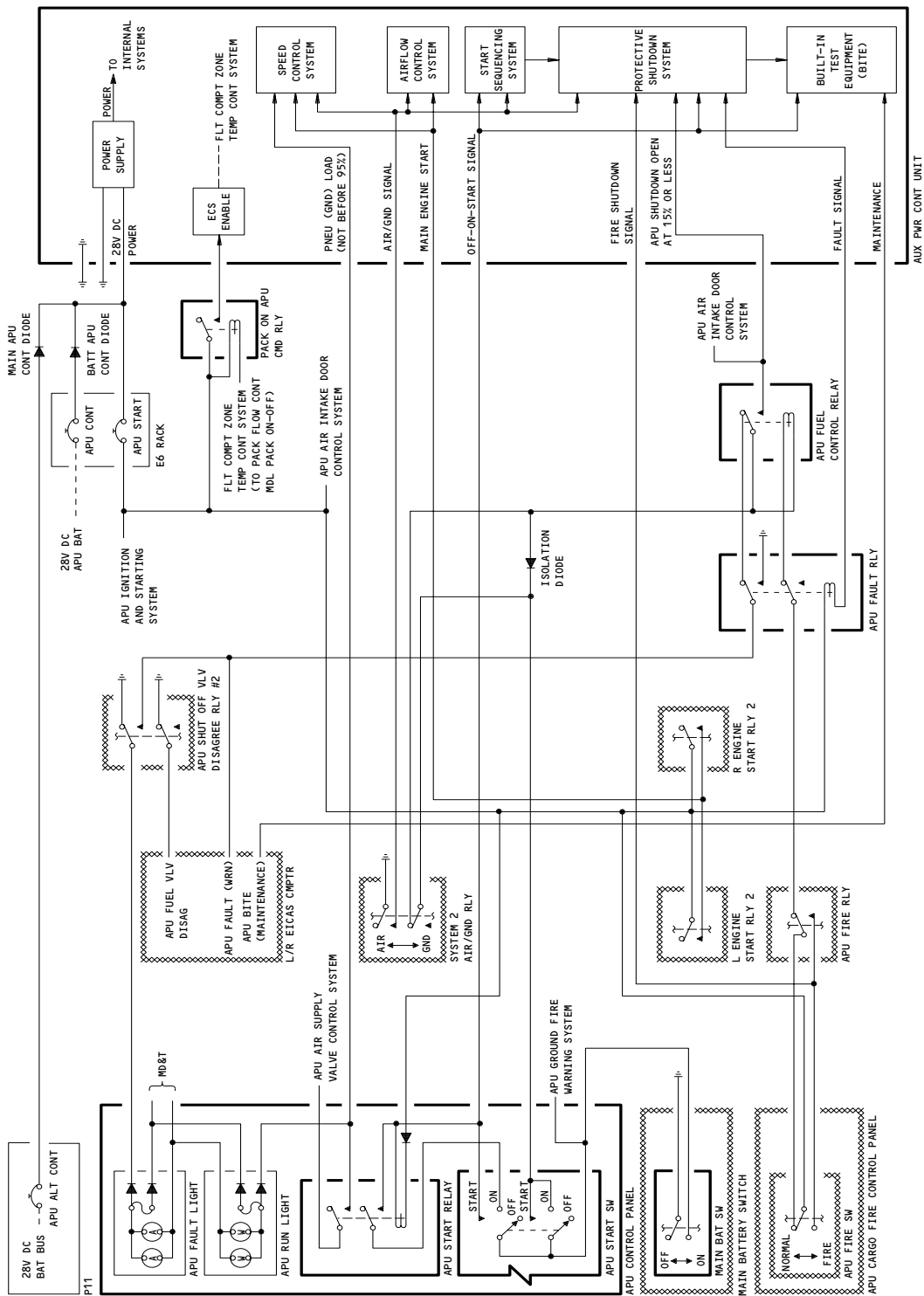
(1) The APU control relays and the APU control unit control APU starting and shutdown. The relays are located on three panels; the APU control panel P5, the panel P37 in the compartment for the main electrical equipment, and in the aft equipment center in the E6 rack.



APU Inlet Pressure and Temperature Sensors  
Figure 4

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APU Control System Schematic  
Figure 5

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3. Operation

A. APU Normal Shutdown (Fig. 5)

- (1) APU normal shutdown is initiated by placing the APU master control switch from ON to OFF. This immediately causes initiation of the shutdown time delay of 60 seconds. The shutdown time delay is also initiated by closure of the air supply valve for the APU. After the 60 second delay, the APU control unit runs a self test of its overtemperature shutdown logic. A fault is stored in BITE memory if the test fails. At the conclusion of the time delay, shutdown is accomplished by injecting a 109% test speed signal to the overspeed shutdown circuit for the primary hardware. This de-energizes the fuel solenoid valve. If, after 20 seconds, the APU speed is above 85%, the APU will shutdown using the protective shutdown (software).

B. APU Remote Shutdown (Fig. 5)

**CAUTION:** DO NOT USE THE APU FIRE SHUTDOWN SWITCH ON THE P62 REMOTE CONTROL PANEL FOR NORMAL APU SHUTDOWN. THIS ARMS THE FIRE BOTTLE AND BYPASSES THE APU COOLDOWN CYCLE.

- (1) APU remote shutdown is initiated by pressing the APU fire shutdown switch on the P62 remote control panel for the APU. The APU fire relay (K10344) is energized which removes power from the fuel control relay (K175) and sends a fire signal of 28 volts dc to the APU control unit. The APU control unit initiates a software protective shutdown. The de-energized relay for the APU fuel control closes the fuel shutoff valve for the APU. APU protective shutdown is recorded in BITE memory. The APU FAULT light (P5) and APU FAULT level C EICAS message provide shutdown indication on the flight deck.

**NOTE:** For more information on APU fire detection, see AMM 26-15-00/001.

- (2) When the APU is shut down at the P62 panel, APU restart is inhibited by a latched relay for the external shutdown (K421). In order to unlatch the system, two things must be done:
  - (a) The APU control switch (P5 panel) must be cycled to OFF.
  - (b) The main battery switch (P5 panel) must be cycled OFF then ON, or the circuit breakers that follow on the main distribution panel P6 must be cycled open then closed:
    - 1) 11B33, APU REMOTE FIRE IND

C. Protective Shutdown Systems

- (1) The APU control system will initiate a protective APU shutdown with the following conditions:
  - (a) Overspeed
  - (b) Overtemperature
  - (c) Circuit failure for a usual overspeed
  - (d) Reverse flow (signaled by high inlet temperature of the load compressor)
  - (e) High oil temperature (above 305°F)
  - (f) Low oil pressure (below 35 psi)

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- (g) Differential pressure switch for the generator filter (above 35 psid)
  - (h) Fire emergency
  - (i) Air intake door failed closed
  - (j) Loss of dc power
  - (k) No flame
  - (l) ECU internal failure
- (2) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The following conditions will also start a protective APU shutdown:
- (a) Loss of sensors
  - (b) Slow start
    - 1) Results when APU acceleration does not reach 7% in 30 seconds, 20% in 50 seconds or 50% in 70 seconds
  - (c) No acceleration
- (3) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The following conditions will also start a protective APU shutdown:
- (a) Start abort
    - 1) Loss of EGT during start
    - 2) No acceleration during start
  - (b) Underspeed
- (4) Protective Shutdown (Fig. 5)
- (a) When one of these conditions exists, the APU control unit performs the following: closes the fuel solenoid valve for the APU, de-energizes the ignition unit, closes the shutoff valve for the APU bleed air, opens the generator field, closes the inlet guide vanes and opens the surge bleed valve. In addition, the unit indirectly closes the air intake door for the APU and de-energizes the dc fuel pump for the APU. A protective shutdown illuminates the FAULT light on the master control panel and displays APU FAULT as a level C EICAS message. The shutdown is processed the same as a normal shutdown; a 109% overspeed shutdown is injected into the system. The APU control unit stores the cause of the shutdown and the associated faulty LRU in its memory. The APU can be restarted.
- (5) Redundant Protective Shutdown (Fig. 6)
- (a) If the protective shutdown for usual overspeed fails to shutdown the APU, the APU will shutdown using the redundant protective shutdown. A magnetic latch is tripped in the control unit requiring control unit replacement before restarting the APU. The shutdown de-energizes or closes the same components as the normal shutdown, and in addition de-energizes the torque metering valve for the fuel control.
- D. BITE (Fig. 2)
- (1) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The APU BITE panel is on the front of the APU control unit on the E6 rack in the aft equipment center. The BITE panel has two matrices of lights that come on to show APU system faults. The upper FAULT DISPLAY matrix shows reasons for protective shutdowns. The lower FAULTY UNIT matrix shows faulty system components.

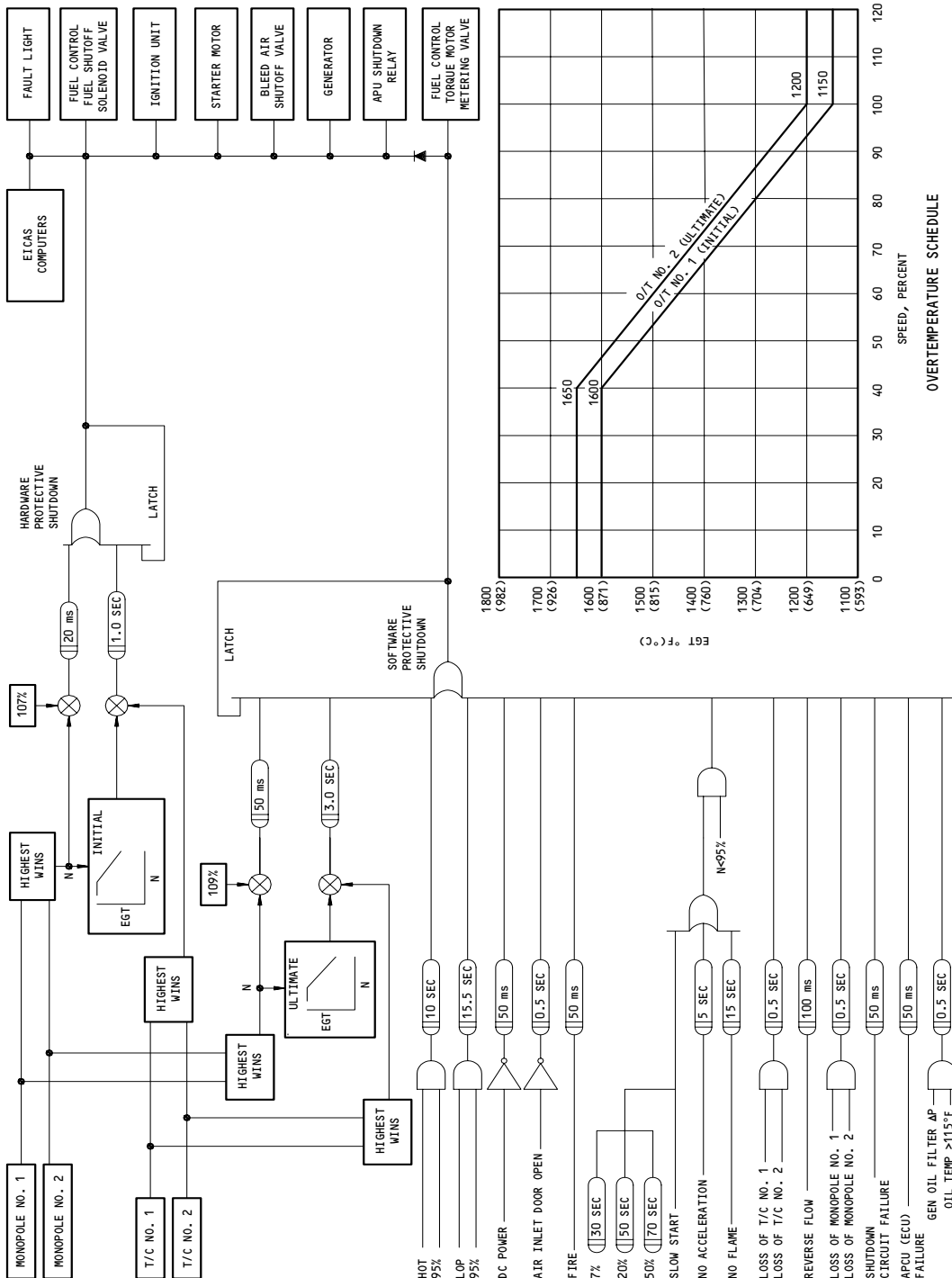
EFFECTIVITY

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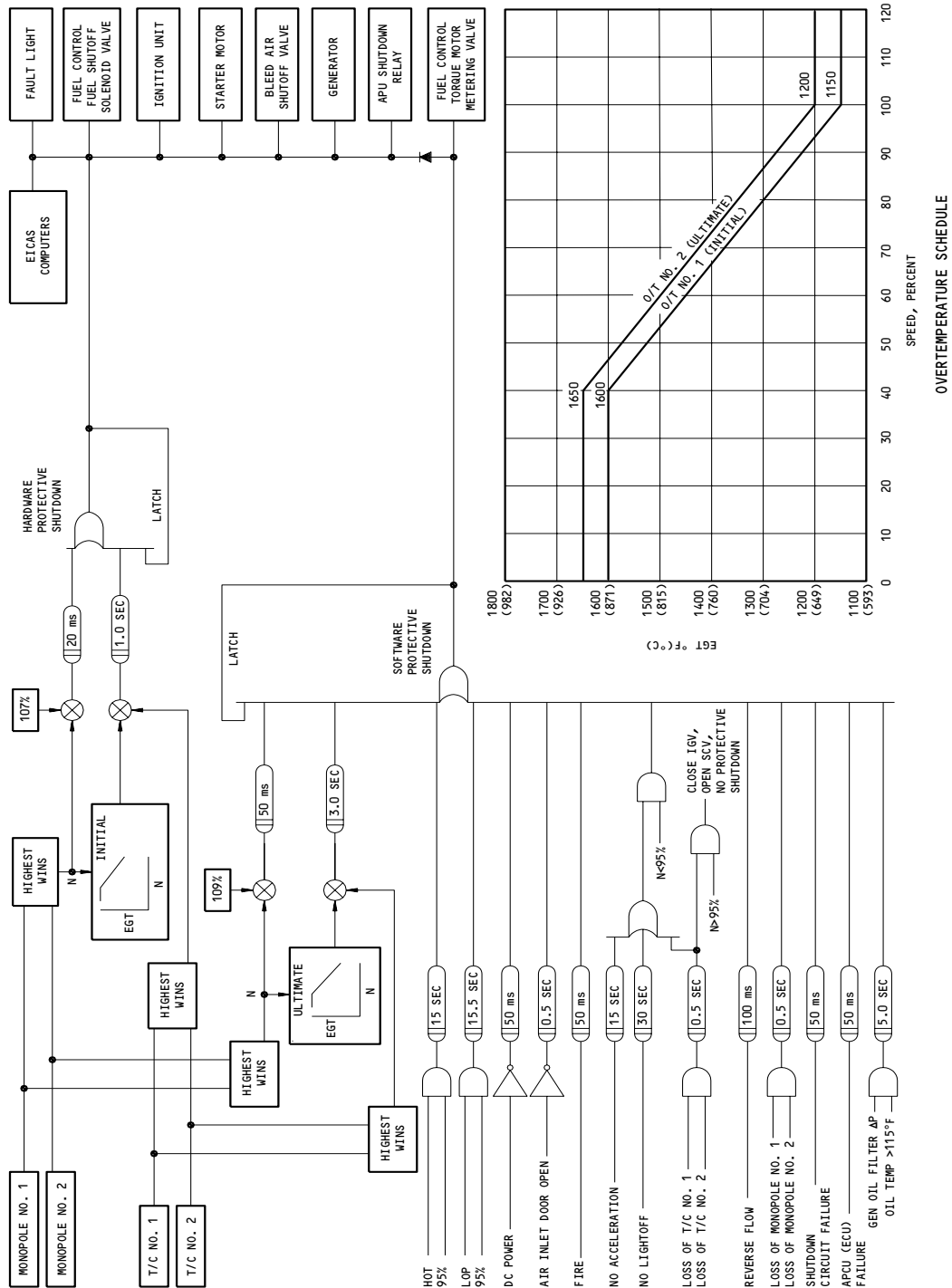
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APU Protective Shutdown  
 Figure 6 (Sheet 1)

EFFECTIVITY  
 AIRPLANES WITH THE APU  
 CONTROL UNIT -18 AND BEFORE

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APU Protective Shutdown  
Figure 6 (Sheet 2)

EFFECTIVITY  
AIRPLANES WITH THE APU  
CONTROL UNIT -19 AND SUBSEQUENT

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- (2) AIRPLANES WITH APU CONTROL UNIT -19 AND SUBSEQUENT;  
The APU BITE panel is on the front of the APU control unit on the E6 rack in the aft equipment center. The BITE panel has two matrices of lights that come on to show APU system faults. The upper REASON APU NOT OPERATING matrix shows reasons for protective shutdowns. The lower FAULTY LRU matrix shows faulty system components.
- (3) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The LAMP TEST and SELF TEST toggle switch is on the upper right corner of the BITE panel. When put in the LAMP TEST position, all of the panel lights come on, column by column from left to right, for 4 seconds each. The master control switch for the APU must be OFF to do the lamp test. When put in the SELF TEST position, the control unit automatically does a system self test. The WAIT lamp will come on during the test. The TST OK lamp comes on with a satisfactory test. Any units that are found to be faulty will come on in an unsatisfactory test. The APU must be off for this test.
- (4) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
The LAMP TEST and SELF TEST toggle switch is on the upper right corner of the BITE panel. When the switch is put in the LAMP TEST position, with the APU off, all of the panel lights come on, column by column from left to right, for 4 seconds each. When the switch is put in the LAMP TEST position while the APU operates, the lamp test does not occur. If the switch is held in the LAMP TEST position, miniflags are shown (FIM 49-11-00/101, Fig. 103). When the switch is put in the SELF TEST position, the control unit automatically does a system self test. The WAIT lamp will come on during the test. The TEST OK lamp comes on with a satisfactory test. Any units that have a failure will come on in an unsatisfactory test. The APU must be off to do the self test.
- (5) BITE memory.
- (a) AIRPLANES WITH THE APU CONTROL UNIT -18 OR BEFORE;  
Up to five faults for consecutive shutdowns can be stored in the BITE non-volatile memory. The faults are stored in a last-in, first-out basis. The FAULT SELECT switch selects which fault (1-5) is shown. The FAULT DISPLAY and FAULTY UNIT toggle is a momentary switch which controls the display of system faults. When put in the FAULT DISPLAY position, the selected system shutdown fault and its related faulty unit will come on. The lights stay on for 4 seconds. When put in the FAULTY UNIT position, all faulty components stored in BITE memory will come on one at a time for 4 seconds each. FAULTY UNIT switch is independent of FAULT SELECT position. If no FAULTY UNIT is stored, the TST OK lamp will come on. The ERASE MEMORY switch manually erases all stored memory.

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- (b) AIRPLANES WITH THE APU CONTROL UNIT -19 OR SUBSEQUENT;  
As many as four faults for consecutive shutdowns can be stored in the BITE non-volatile memory. The faults are stored in a last-in, first-out basis. The RECORD SELECT switch selects which fault (LAST RUN, 2, 3, or 4) is shown. The FAULT REASON and FAULT LRU toggle is a momentary switch which controls the display of system faults. When put in the FAULT REASON position, the selected system shutdown fault will come on. The lights stay on for 4 seconds. When put in the FAULT LRU position, all faulty components related to the system shutdown will come on for 4 seconds. If no FAULTY LRU is stored, the SEE MNT MANUAL light will come on. When the RECORD SELECT switch is in the SUMMARY position, and the FAULT switch is in the LRU position, FAULTY LRU lights will come on for four seconds. These lights show all of the FAULTY LRU's stored in BITE memory since the last time memory was erased. If no FAULTY LRU is stored, the NO DATA lamp will come on. The ERASE MEMORY switch manually erases all stored memory.
- (c) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
APU BITE shows on the EICAS maintenance page when one of the following faulty units is stored in memory: LCIT SENSOR, #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, #1 T/C RAKE, #2 T/C RAKE, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SWITCH.
- (d) AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT;  
APU BITE shows on the EICAS maintenance page when one of the following faulty units is stored in memory: LCIT SENSOR, #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, EGT #1 CIRCUIT, EGT #2 CIRCUIT, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SW(GEN).

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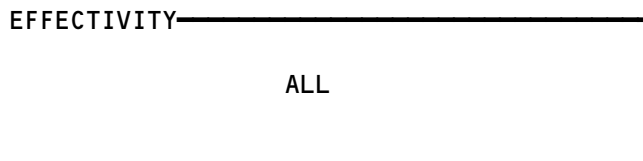

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 FAULT ISOLATION/MAINT MANUAL

APU CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
CIRCUIT BREAKERS -			FLT COMPT, P11	
APU ALTN CONT, C1390	-	1	11B34	*
APU CONT, C1382	-	1	822,E6, AFT EQUIP CENTER	*
MONOPOLE - APU	-	2	316AR,315AL	49-61-02
PANEL - APU CONTROL, M1	-	1	FLT COMPT, P5	*
SENSOR - APU INLET PRESSURE, YBMTS4	-	1	316AR,315AL, APU COMPT	49-61-04
SENSOR - APU INLET TEMPERATURE, YBMTS5	-	1	316AR,315AL, APU COMPT	49-61-03
UNIT - APU CONTROL, M206	-	1	822,E6, AFT EQUIP CENTER	49-61-05

\* SEE THE WDM EQUIPMENT LIST

APU Control System - Component Index  
Figure 101



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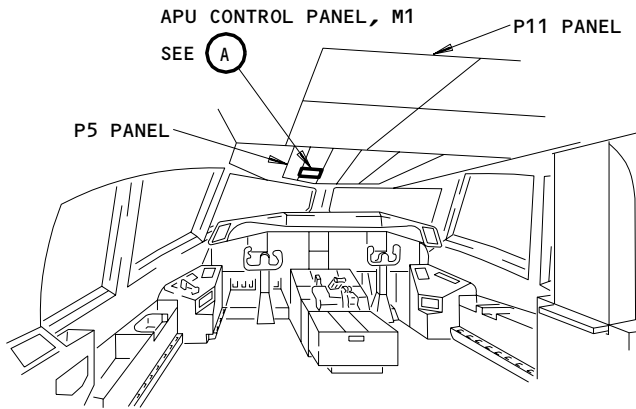
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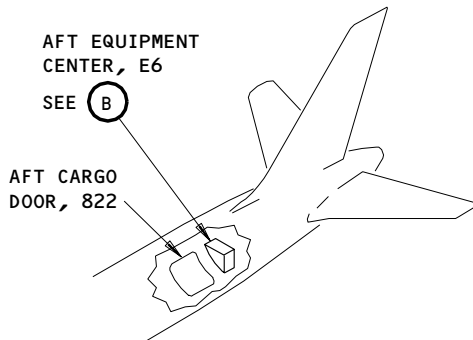
# BOEING

## 757

### FAULT ISOLATION/MAINT MANUAL



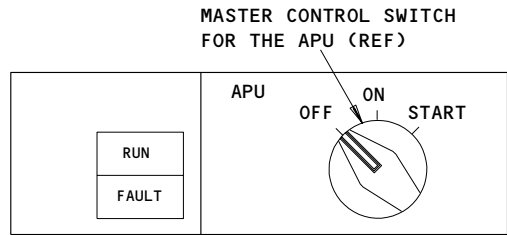
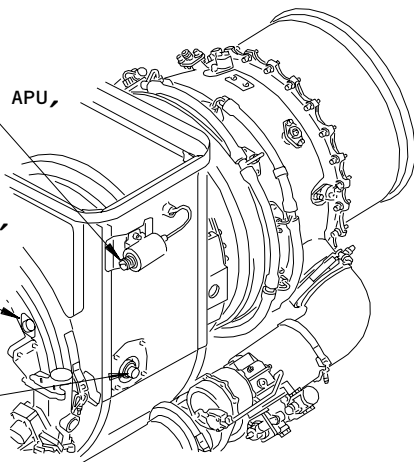
FLIGHT COMPARTMENT



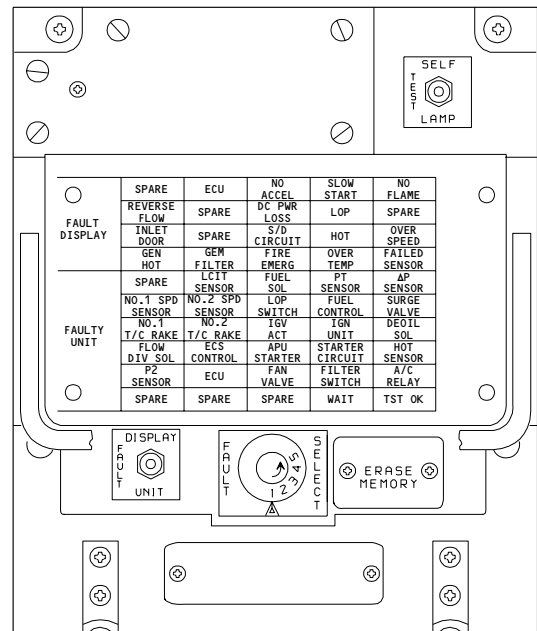
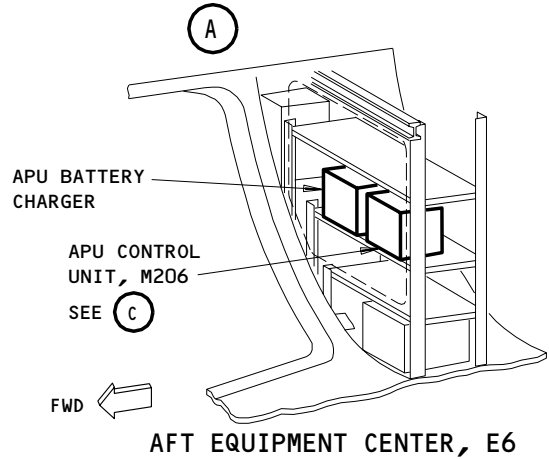
INLET PRESSURE SENSOR FOR THE APU, YBMTS4

INLET TEMPERATURE SENSOR FOR THE APU, YBMTS5

MONOPOLE, YBMTS8, YBMTS9



APU CONTROL PANEL, M1



APU CONTROL UNIT, M206

1 AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE

APU Control System - Component Location  
Figure 102 (Sheet 1)

EFFECTIVITY

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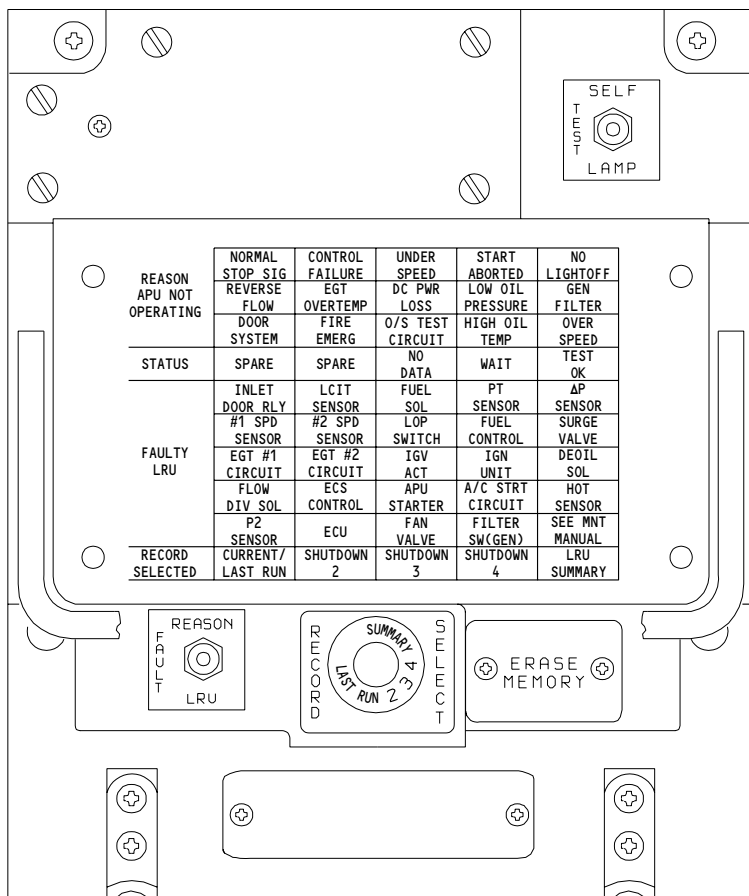
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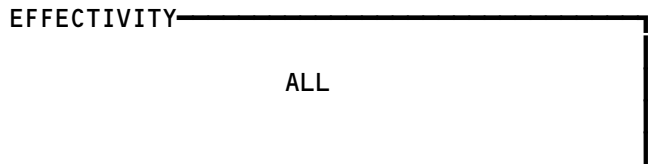


APU CONTROL UNIT, M206



2 AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT

APU Control System - Component Location  
Figure 102 (Sheet 2)



49-61-00

APU MONOPOLES (RPM) – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU monopoles.
- B. The monopoles give an indication of the APU speed. There are two monopoles on the APU. The monopoles are installed on the left and the right sides of the inlet plenum.
- C. You can get access to the APU monopoles through the APU access doors.

TASK 49-61-02-004-001

2. APU Monopole Removal (Fig. 401)

A. Special Tools and Equipment

- (1) 294864-1 Wrench – Monopole, Honeywell Aerospace Services, Ground Support Equipment, P.O. Box 29003, Phoenix, AZ 85038-2180

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

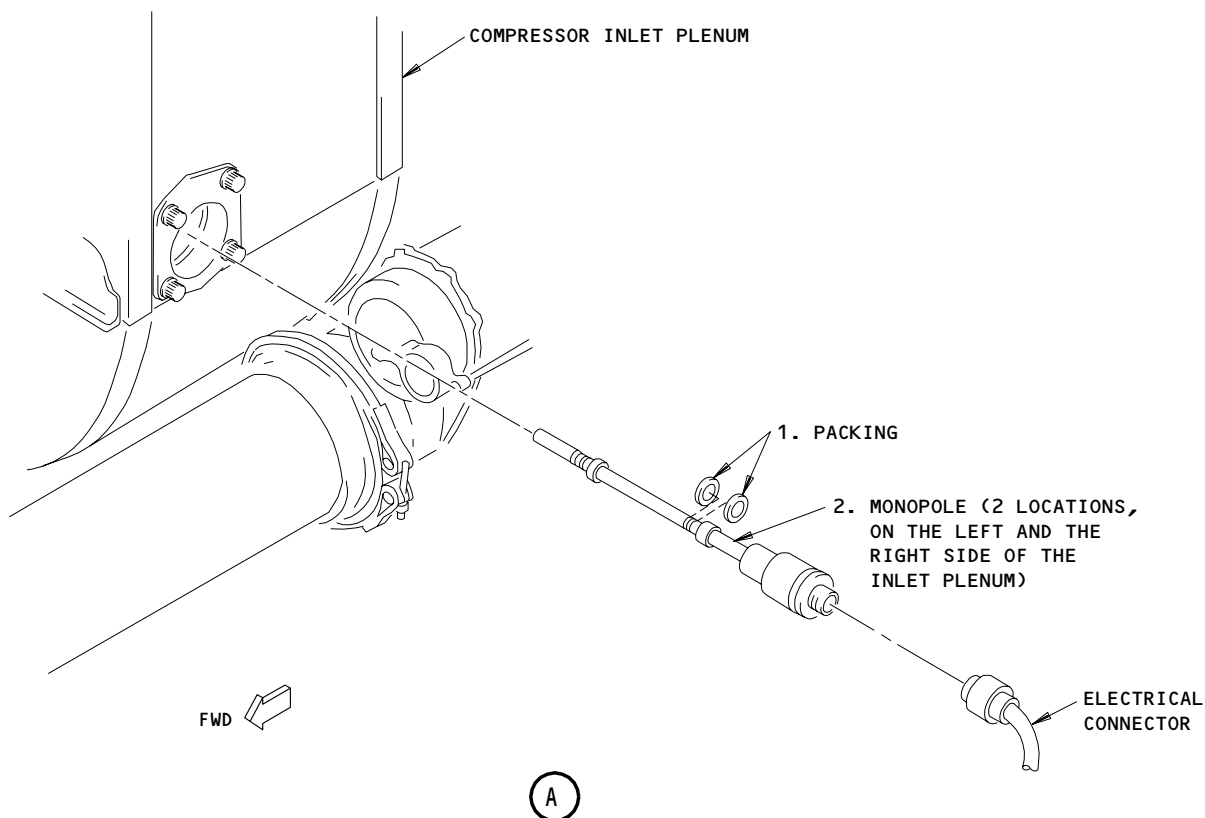
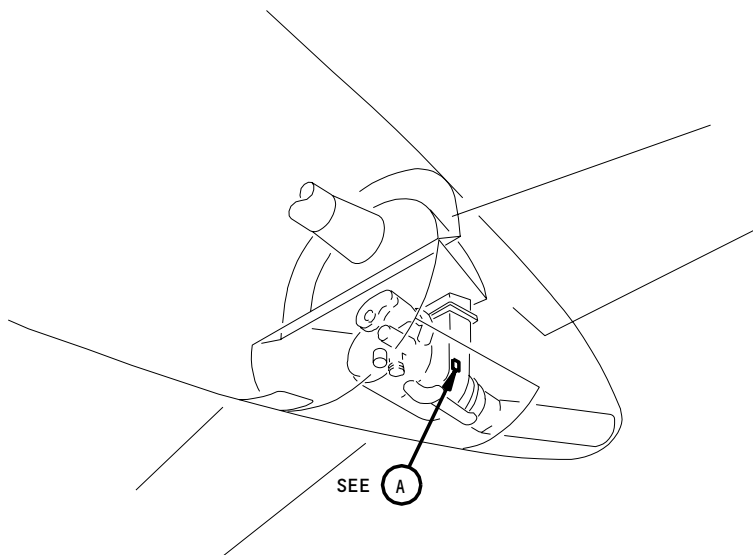
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APU Monopoles (RPM) Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-023

- (4) Remove the APU monopole:
  - (a) Disconnect the electrical connector from the monopole (2).
    - 1) Put caps on the electrical connector and on the receptacle.
  - (b) Use the monopole wrench to remove the monopole (2).
    - 1) Remove and discard the packings (1) from the monopole (2).
  - (c) Put a plug in the opening on the inlet plenum.

TASK 49-61-02-404-009

3. APU Monopole Installation (Fig. 401)

A. Special Tools and Equipment

- (1) 294864-1 Wrench - Monopole, Honeywell Aerospace Services, Ground Support Equipment, P.O. Box 29003, Phoenix, AZ 85038-2180

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5
- (3) G02166 Lockwire, Corrosion Resistant Steel (0.020 Inch Diameter) - NASM20995C20

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1 2	Packing Motional Transducer (Monopole)	49-61-02	01	20 5 or 15

D. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

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E. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

F. Procedure

S 424-024

- (1) Install the APU monopole:
- (a) Remove the plug from the opening in the inlet plenum.
  - (b) Lubricate the new packings (1) with a light coat of lubricant or oil.
  - (c) Install the packings (1) on the monopole (2).

**CAUTION:** DO NOT APPLY TOO MUCH TORQUE TO THE MONOPOLE. IF YOU TIGHTEN THE MONOPOLE TOO MUCH, YOU CAN CAUSE DAMAGE TO THE MONOPOLE.

- (d) Install the monopole (2) in the inlet plenum.
  - 1) Tighten the monopole (2) with your hand.
  - 2) Install a lockwire on the monopole (2).
- (e) Remove the caps from the electrical connector and from the receptacle.
- (f) Connect the electrical connector to the monopole (2).
  - 1) Install a lockwire on the electrical connector.

S 744-016

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 414-017

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

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S 864-018

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-020

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-021

- (6) Do an operational test of the APU monopole(s):
- (a) Do this task: APU Start and Operation (AMM 49-11-00/201).
  - (b) Look at the EICAS PERF/APU display to make sure the APU RPM is shown.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

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LOAD COMPRESSOR INLET TEMPERATURE SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the inlet temperature sensor on the load compressor.
- B. The inlet temperature sensor is installed on the lower left side of the inlet plenum. You can get access to the sensor through the APU access doors.

TASK 49-61-03-004-001

2. Load Compressor Inlet Temperature Sensor Removal (Fig. 401)

A. References

- (1) SSM 49-31-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

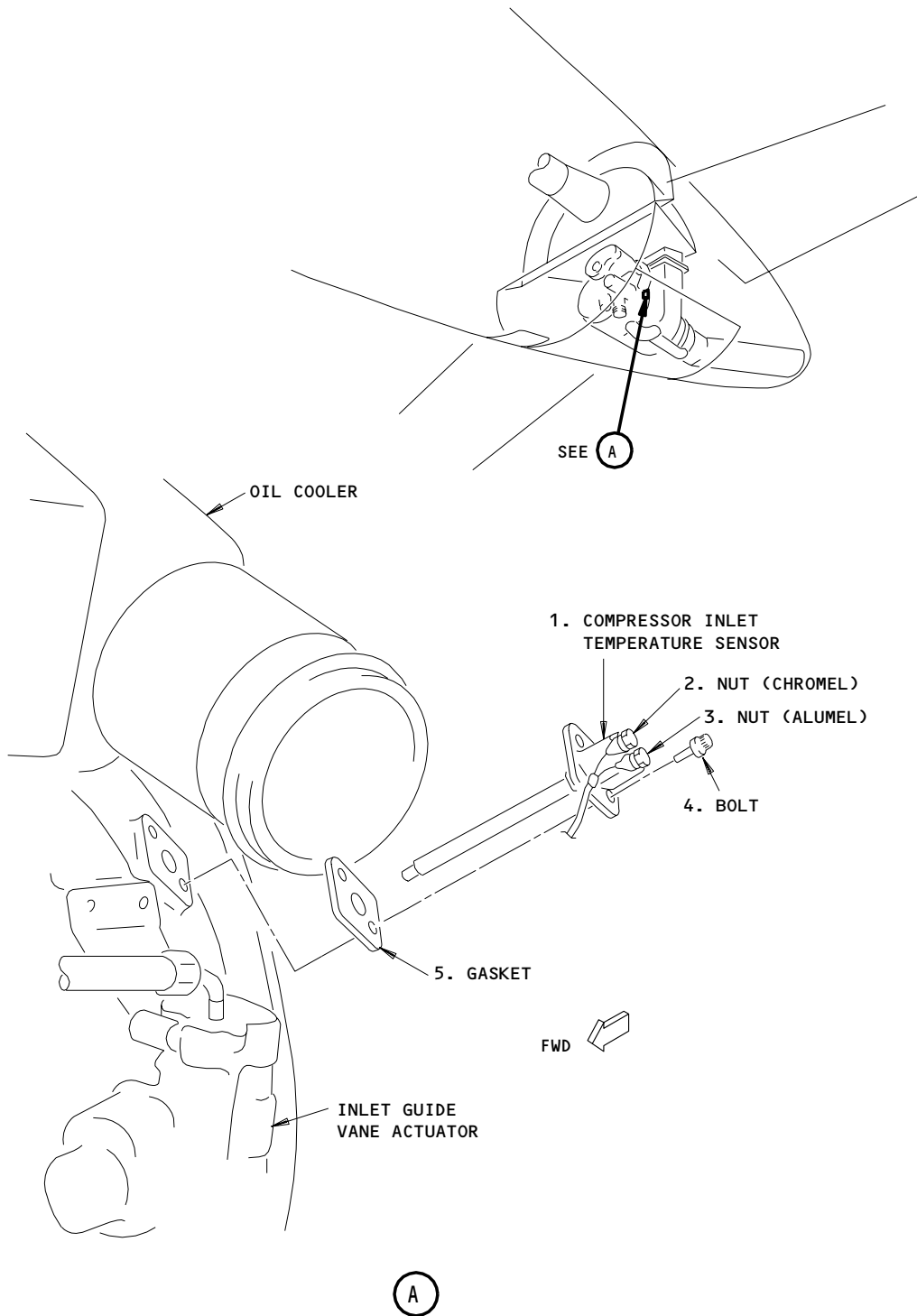
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APU Inlet Temperature Sensor Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-006

- (4) Remove the inlet temperature sensor:
  - (a) Put tags on the electrical wires to make sure you install the wires in the correct positions.
  - (b) Remove the nuts (2 and 3) and the electrical wires from the inlet temperature sensor (1).
  - (c) Remove the bolts (4).
  - (d) Remove the inlet temperature sensor (1) and the gasket (5) from the inlet plenum.
    - 1) Discard the gasket (5).

TASK 49-61-03-404-010

3. Load Compressor Inlet Temperature Sensor Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Compressor Inlet Temperature Sensor	49-61-03	01	5
	5	Gasket			25

B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit
- (3) SSM 49-31-01
- (4) WDM 49-14-11

C. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right
- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

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D. Procedure

S 424-013

- (1) Install the inlet temperature sensor:
  - (a) Install the inlet temperature sensor (1) and a new gasket (5) in the inlet plenum.
  - (b) Install the bolts (4) in the inlet plenum.
    - 1) Tighten the bolts (4) to 40-43 inch-pounds (4.5-4.9 newton-meters).
  - (c) Attach the electrical wires to the inlet temperature sensor (1) with the nuts (2 and 3).
  - (d) Make sure the two wires are installed correctly.
  - (e) Remove the tags that show the correct location for the two wires.
    - 1) Tighten the nut (2) to 25-27 inch-pounds (2.8-3.1 newton-meters).
    - 2) Tighten the nut (3) to 15-17 inch-pounds (1.7-1.9 newton-meters).

S 744-014

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 414-015

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 864-016

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-018

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-019

- (6) Do an operational test of the APU:
  - (a) Start and operate the APU (AMM 49-11-00/201).
  - (b) Make sure the APU operates correctly.

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(c) Do a usual shutdown of the APU (AMM 49-11-00/201).

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APU INLET PRESSURE (P2) SENSOR – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these three tasks:
  - (1) Inlet Pressure (P2) Sensor Removal
  - (2) Inlet Pressure (P2) Sensor Installation
  - (3) Inlet Pressure (P2) Sensor Inspection.
- B. The inlet pressure sensor is installed on the left side of the inlet plenum, below the plenum flange. You can get access to the sensor through the APU access doors.

TASK 49-61-04-002-001

2. Inlet Pressure (P2) Sensor Removal (Fig. 201)

A. References

- (1) SSM 49-31-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-023

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

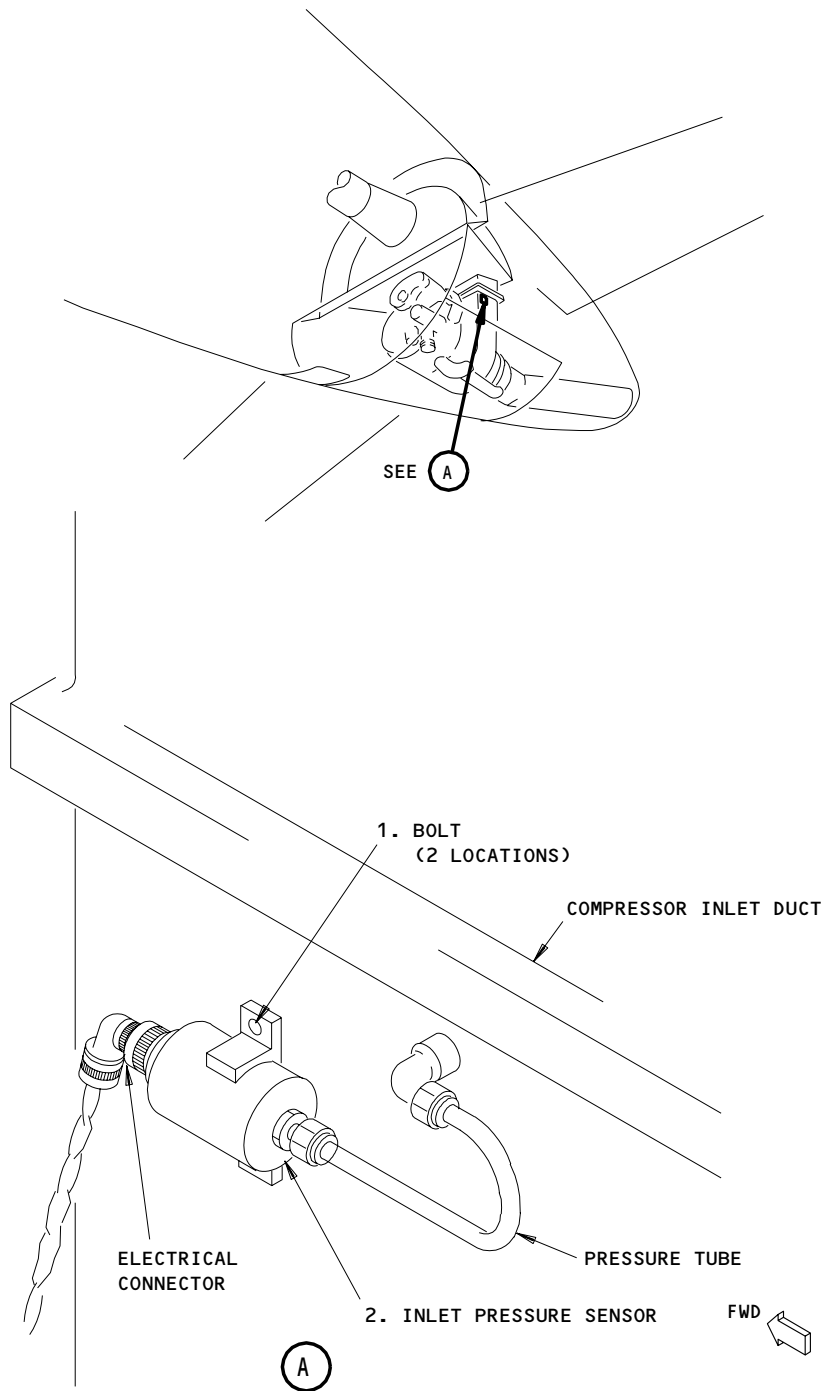
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APU Inlet Pressure Sensor Installation  
Figure 201

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27958

- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-024

- (4) Remove the inlet pressure sensor:
  - (a) Loosen the nut on the pressure tube to disconnect the tube from the inlet pressure sensor (2).
  - (b) Disconnect the P14 electrical connector from the inlet pressure sensor (2).
  - (c) Remove the screws (1) that attach the inlet pressure sensor (2) to the plenum.
  - (d) Remove the inlet pressure sensor (2).

TASK 49-61-04-402-010

3. Inlet Pressure (P2) Sensor Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Inlet Pressure Sensor	49-61-04	01	5

B. References

- (1) AMM 49-61-05/201, APU Control Unit
- (2) SSM 49-31-01
- (3) WDM 49-14-11

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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D. Procedure

S 422-025

- (1) Install the inlet pressure sensor:
  - (a) Attach the inlet pressure sensor (2) to the plenum with the bolts (1).
    - 1) Tighten the bolts (1) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (b) Connect the P14 electrical connector to the inlet pressure sensor (2).
  - (c) Connect the pressure tube to the inlet pressure sensor (2).

S 742-014

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 412-015

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-016

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-018

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-61-04-202-019

4. Inlet Pressure (P2) Sensor Inspection

A. Standard Tools and Equipment

- (1) Ohmmeter - 0-10 ohms range

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

EFFECTIVITY

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

C. Procedure

S 012-026

- (1) If it is installed, remove the inlet pressure sensor (Ref par. 2).

S 212-020

- (2) Examine the inlet pressure sensor for cracks and for chips.

S 282-021

- (3) Do a check of the resistance between pin 5 and the case of the sensor.
  - (a) Make sure the resistance is a maximum of 0.025 ohms.

S 212-022

- (4) Make sure the pressure tube and the port in the plenum do not have a blockage.

S 412-027

- (5) Install the inlet pressure sensor (Ref par. 3).

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APU CONTROL UNIT (ECU) – MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks:

- (1) Remove the APU Control Unit (ECU)
- (2) Install the APU Control Unit (ECU)
- (3) AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
APU Control Unit – BITE Test
- (4) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
Control Unit – BITE Test

B. The APU control unit is in the aft cargo compartment on the E6 electronic equipment rack. You can get to the APU control unit through the aft cargo doors.

TASK 49-61-05-002-001

2. APU Control Unit (ECU) Removal (Fig. 201)

A. Access

- (1) Location Zones  
154 Aft Cargo Compartment – Right
- (2) Access Panels  
822 Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open this circuit breaker on the overhead panel P11 and attach a DO-NOT-CLOSE tag:
  - (a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 012-004

- (3) Open the aft cargo door.

S 012-005

- (4) Open the E6 rack access doors.

S 862-006

- (5) Open this circuit breaker on the E6 rack in Aft Equipment Center and attach a DO-NOT-CLOSE tag:
  - (a) APU CONT

S 022-007

- (6) Remove the APU control unit (1).

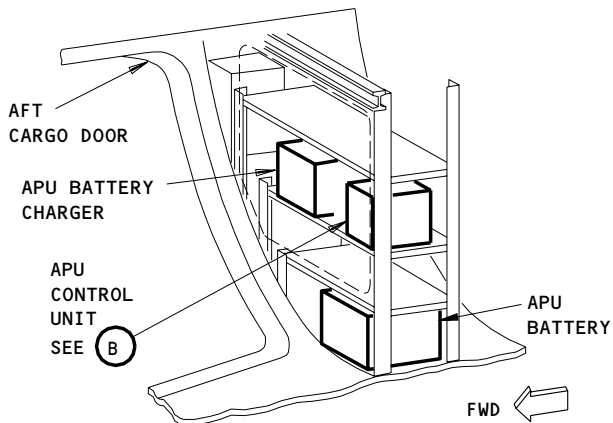
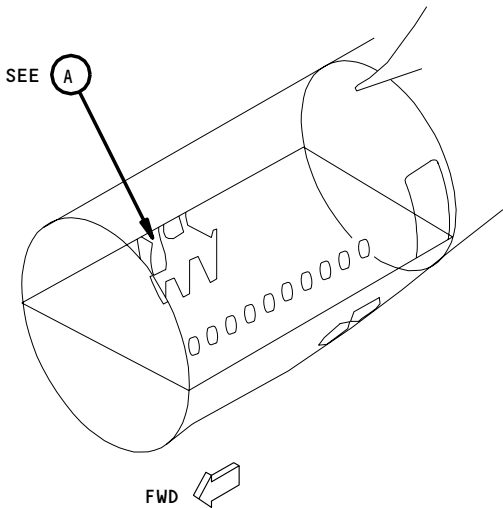
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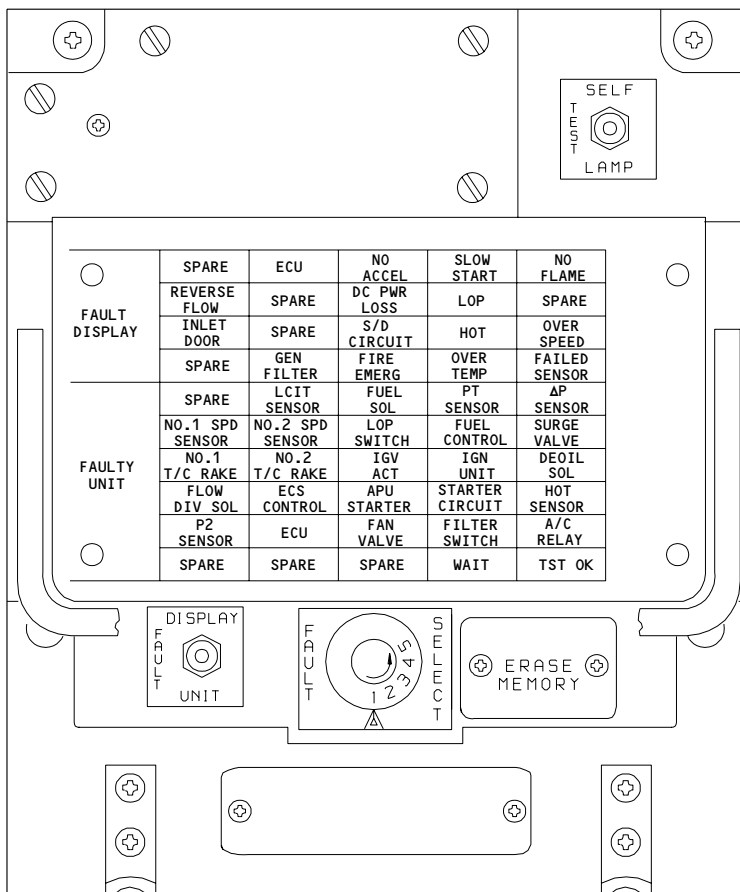
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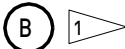
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**E6 - AFT EQUIPMENT CENTER RACK**



**APU CONTROL UNIT FRONT PANEL**



**1** AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE

**APU Control Unit (ECU) Installation  
Figure 201 (Sheet 1)**

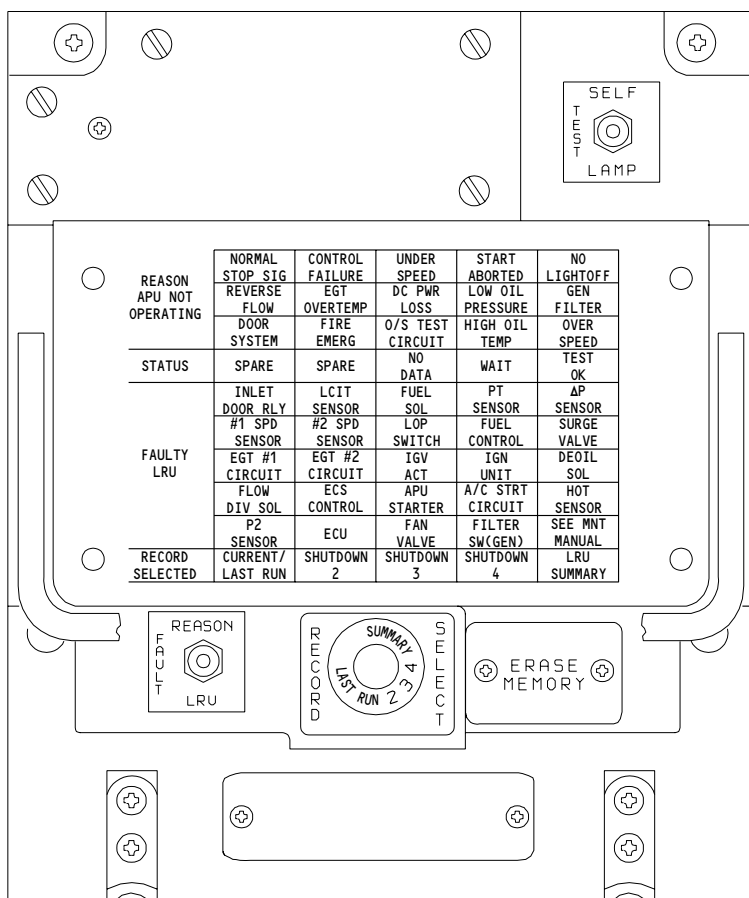
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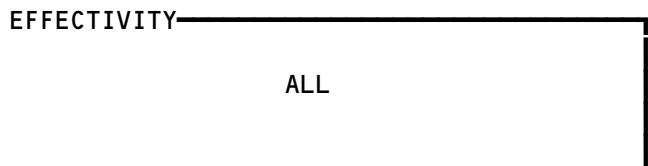


**APU CONTROL UNIT FRONT PANEL**

B 2

2 AIRPLANES WITH THE APU CONTROL UNIT -19 AND SUBSEQUENT

**APU Control Unit (ECU) Installation  
Figure 201 (Sheet 2)**



**49-61-05**

TASK 49-61-05-402-008

3. APU Control Unit (ECU) Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	APU Control Unit (ECU)	49-61-05	03	5

B. Access

(1) Location Zones

154 Aft Cargo Compartment - Right

(2) Access Panels

822 Aft Cargo Door

C. Procedure

S 422-009

(1) Install the APU control unit (1).

S 862-011

(2) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the E6 rack in Aft Equipment Center:

(a) APU CONT

S 742-010

(3) Do the APU Control Unit BITE procedure.

S 412-012

(4) Close the E6 rack access doors.

S 412-013

(5) Close the aft cargo door.

S 862-014

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

(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-015

(7) Remove the DO-NOT-OPERATE tag from the APU master control switch.

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TASK 49-61-05-742-016

4. AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;

APU Control Unit - BITE Test

A. Access

(1) Location Zones

154 Aft Cargo Compartment - Right

(2) Access Panels

822 Aft Cargo Door

B. Procedure

S 862-017

(1) Make sure this circuit breaker on the overhead panel P11 is closed:

(a) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-018

(2) Make sure the APU master control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 212-019

(3) Make sure the APU RPM is less than 7%.

S 742-020

(4) Set the test switch on the APU control unit in the LAMP position and release the switch.

(a) Make sure all of the lights come on column by column.

S 742-021

**WARNING:** DO NOT DO THE ECU SELF TEST AND IGNITION SYSTEM MAINTENANCE AT THE SAME TIME. THE IGNITER LEAD IS ENERGIZED DURING THE SELF TEST AND CAN CAUSE INJURY TO PERSONS.

(5) Set the test switch in the SELF TEST position and release the switch.

**NOTE:** This will do a check of the control unit software and of the APU hardware.

(a) The WAIT light will come on.

(b) The TEST OK light will come on if there are no units with problems.

(c) If a unit has a problem, its light will come on.

**NOTE:** The light for each unit that has a problem will come on one at a time for 4 seconds (from left to right and top to bottom).

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(d) Record each of the FAULTY UNIT lights that comes on.

S 742-022

- (6) Set the test switch to the FAULTY UNIT position and release the switch to do a check for intermittent hardware problems.
- (a) The TEST OK light will come on if the test is satisfactory.
  - (b) If a unit has a problem, its light will come on.

NOTE: The light for each unit that has a problem will come on one at a time for 4 seconds (from left to right and top to bottom).

- (c) Record each of the FAULTY UNIT lights that comes on.
- (d) For each FAULTY UNIT light that came on, repair the problem (FIM 49-11-00, Fig. 103).

S 742-023

- (7) Set the test switch in the FAULT DISPLAY position and make sure that no lights come on.

NOTE: The history of APU shutdowns is put in the non-volatile memory of the control unit. There should not be any shutdowns put in the memory of a new control unit. Also, a control unit with all of the defects corrected should not have any shutdowns in the memory.

S 742-024

- (8) Push the ERASE MEMORY switch to erase the defects from the memory.

TASK 49-61-05-742-025

5. AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;

APU Control Unit - BITE Test

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Access

(1) Location Zones

154 Aft Cargo Compartment - Right

(2) Access Panels

822 Aft Cargo Door

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C. Procedure

S 862-026

- (1) Make sure the APU is operating or do this task if the APU is not operating: APU Operation Procedure (AMM 49-11-00/201).

**NOTE:** It is necessary to start and operate the APU for the APU BITE test to show the current faults. If the APU is not operating, all the fault history for the past and current APU starts and operations will show.

S 742-051

- (2) Set the RECORD SELECT switch to the LAST RUN position.

S 742-052

- (3) Set the FAULT switch in the LRU position and release the switch to do a check for intermittent hardware defects.
- (a) The NO DATA light will come on if the check is satisfactory.
  - (b) If a unit has a problem, its FAULTY LRU light will come on for 6 seconds.
  - (c) Record each of the FAULTY LRU lights that comes on.
  - (d) For each FAULTY LRU light that came on, repair the problem (FIM 49-11-00/101, Fig. 103).

S 862-053

- (4) Do this task: APU Shutdown Procedures (AMM 49-11-00/201).

S 742-029

- (5) Set the TEST switch on the APU control unit in the LAMP position and release the switch.
- (a) Make sure all of the lights come on column by column.

S 742-030

**WARNING:** DO NOT DO THE ECU SELF TEST AND IGNITION SYSTEM MAINTENANCE AT THE SAME TIME. THE IGNITER LEAD IS ENERGIZED DURING THE SELF TEST AND CAN CAUSE INJURY TO PERSONS.

- (6) Set the TEST switch in the SELF position and release the switch.

**NOTE:** This will do a check of the control unit software and of the APU hardware.

- (a) The WAIT light will come on.
- (b) The TEST OK light will come on if there are no units with problems.
- (c) If a unit has a problem, its light will come on.
- (d) Record each of the FAULTY LRU lights that comes on.

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S 742-034

- (7) Set the RECORD SELECT switch to the SUMMARY position.

S 742-031

- (8) Set the FAULT switch in the LRU position and release the switch to do a check for intermittent hardware defects.
- (a) The NO DATA light will come on if the check is satisfactory.
  - (b) If a unit has a problem, its FAULTY LRU light will come on for 6 seconds.
  - (c) Record each of the FAULTY LRU lights that comes on.
  - (d) For each FAULTY LRU light that came on, repair the problem (FIM 49-11-00/101, Fig. 103).

S 742-035

- (9) Set the RECORD SELECT switch to the LAST RUN position.

S 742-032

- (10) Set the FAULT switch to the REASON position and make sure that NORMAL STOP SIG light comes on.

**NOTE:** The history of APU shutdowns is put in the non-volatile memory of the control unit. There should not be any shutdowns put in the memory of a new control unit. Also, a control unit with all of the defects corrected should not have any shutdowns in the memory.

A NO DATA light will come on for a new control unit.

S 742-033

- (11) Push the ERASE MEMORY switch to erase the defects from the memory.

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APU EXHAUST GAS TEMPERATURE INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General

A. The indicating system for the exhaust gas temperature (EGT) of the APU measures the temperature of the exhaust gas and provides EGT indication on the flight deck. The system consists of thermocouple probes, APU control unit, and EICAS indication. Power for the system is 28 volts dc from the main battery bus.

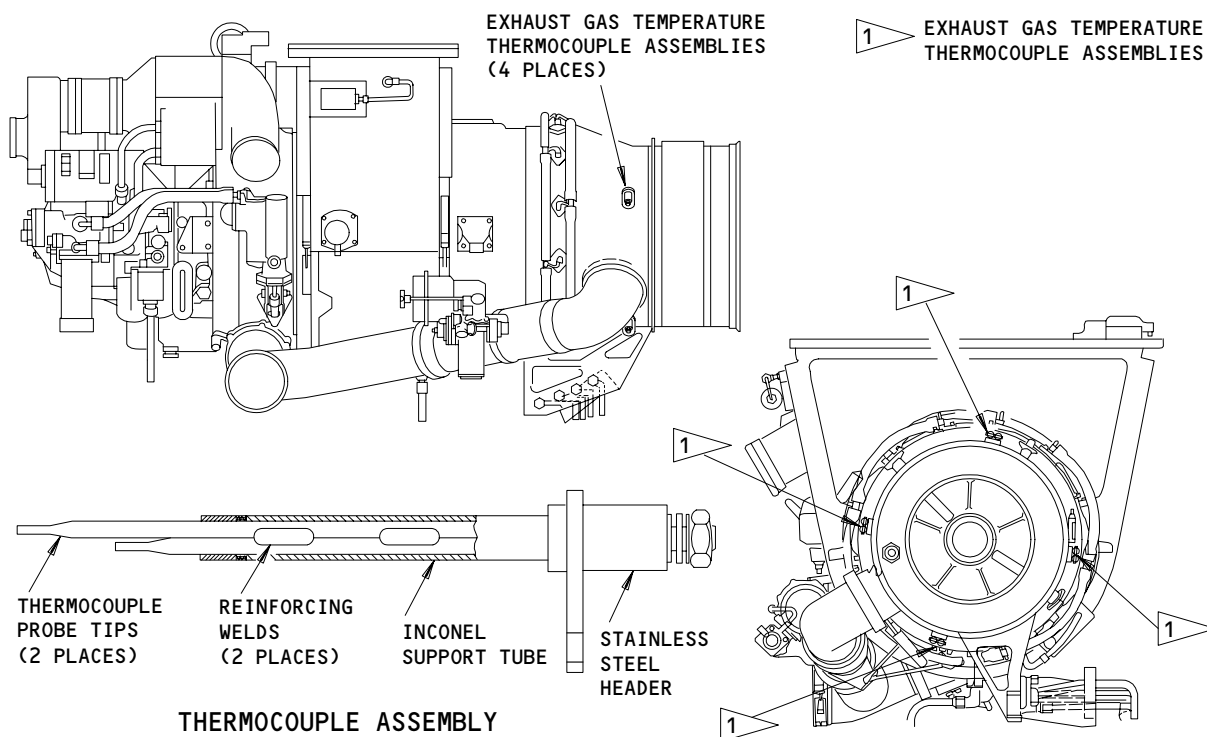
2. Component Details

A. Thermocouple Assemblies (Fig. 1)

(1) APU exhaust gas temperature is sensed by four thermocouple assemblies equally spaced aft of the power section. A pair of thermocouples, enclosed in an inonel support tube with a stainless steel header, make up each assembly. A pair of assemblies make up a rake.

3. Operation

A. Functional Description (Fig. 2)



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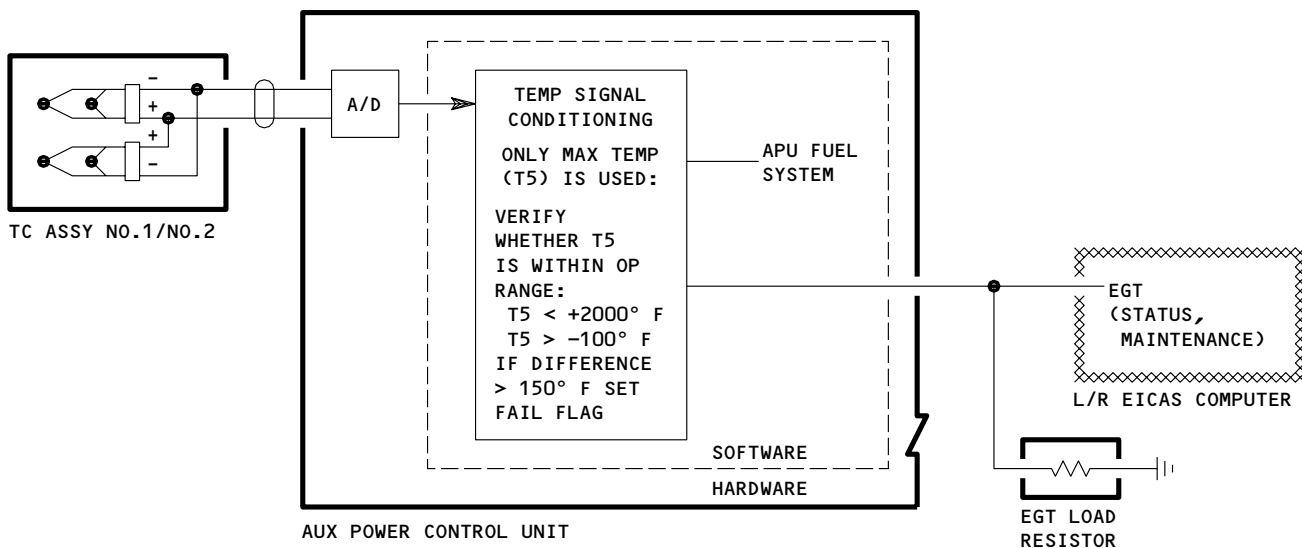
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- (1) The two thermocouple rakes supply EGT signals to the APU control unit. The control unit uses the higher signal for comparison to the trim schedule for the ultimate temperature. If EGT exceeds the schedule, fuel flow to the APU is reduced. The control unit provides for normal and redundant protective shutdowns for an overtemperature. A normal overtemperature shutdown occurs when a normal EGT schedule is exceeded for 0.5 second. A redundant overtemperature shutdown occurs when the ultimate EGT schedule is exceeded for 0.1 seconds. The higher EGT signal is supplied to the Engine Indication and Crew Alerting System (EICAS) where it can be called up in either the status or maintenance modes.

**B. BITE**

- (1) AIRPLANES WITH -18 APU CONTROL UNIT AND BEFORE;  
The APU control unit monitors the operation of the EGT indicating system, tests component circuits, and writes any failures in BITE memory (AMM 49-61-00/001). A failure of the thermocouple or the ECU is shown in the FAULTY UNIT matrix as No. 1 T/C RAKE, No. 2 T/C RAKE, or ECU. An automatic shutdown because of OVER TEMP or FAILED SENSOR is shown in the FAULT DISPLAY matrix.



APU Exhaust Gas Temperature Indicating System Schematic  
Figure 2

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- (2) AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
The APU control unit monitors the operation of the EGT indicating system, tests component circuits, and writes any failures in BITE memory (AMM 49-61-00/001). A failure of the thermocouple or the ECU is shown in the FAULTY LRU matrix as EGT #1 CIRCUIT, EGT #2 CIRCUIT or ECU. An automatic shutdown because of OVER TEMP or START ABORTED is shown in the REASON APU NOT OPERATING matrix.

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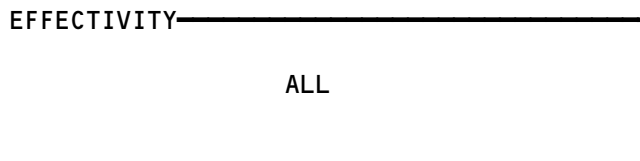
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 FAULT ISOLATION/MAINT MANUAL

APU EXHAUST GAS TEMPERATURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ASSEMBLY - APU EGT THERMOCOUPLE, YBMTS6,YBMTS7 UNIT - (FIM 49-61-00/101) AUXILIARY POWER CONTROL, M206	--	2	316AR,315AL, APU COMPT	49-71-01

APU Exhaust Gas Temperature Indicating System - Component Index  
Figure 101



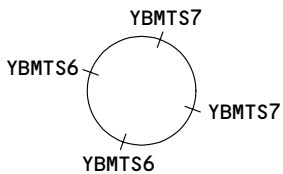
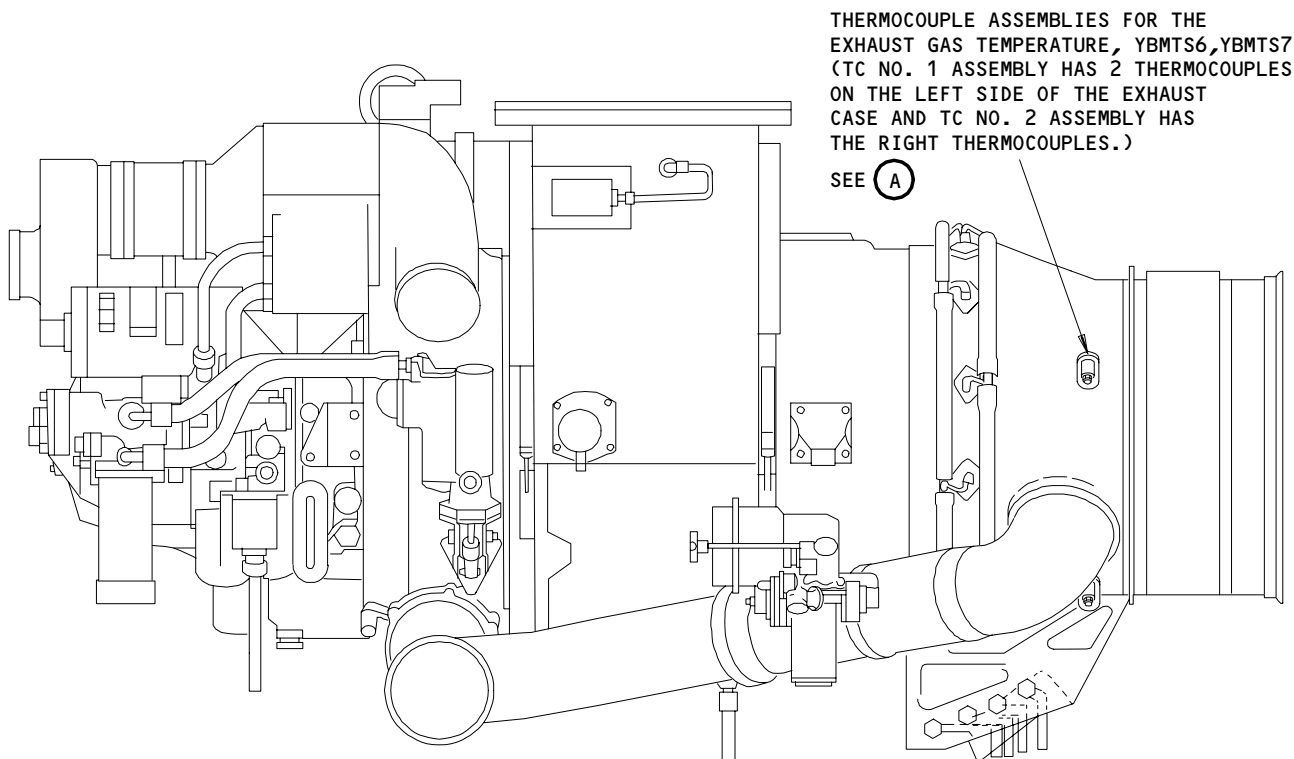
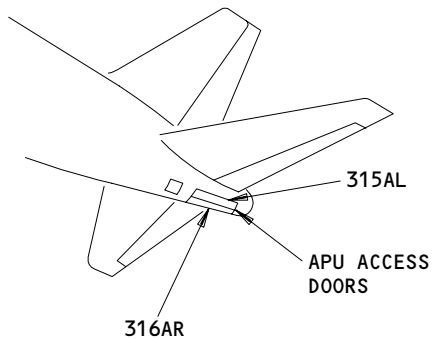
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VIEW IN THE  
FORWARD DIRECTION

(A)

APU Exhaust Gas Temperature Indicating System - Component Location  
Figure 102

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APU EXHAUST GAS TEMPERATURE (EGT) THERMOCOUPLES – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) EGT Thermocouple Removal
  - (2) EGT Thermocouple Installation
  - (3) EGT Thermocouple Inspection.
- B. The EGT thermocouples are installed on the exhaust housing. There are four thermocouples with equal spaces between them, around the exhaust housing.
- C. You can get access to the EGT thermocouples through the APU access doors.

TASK 49-71-01-002-001

2. EGT Thermocouple Removal (Fig. 201)

A. References

- (1) SSM 49-31-01
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

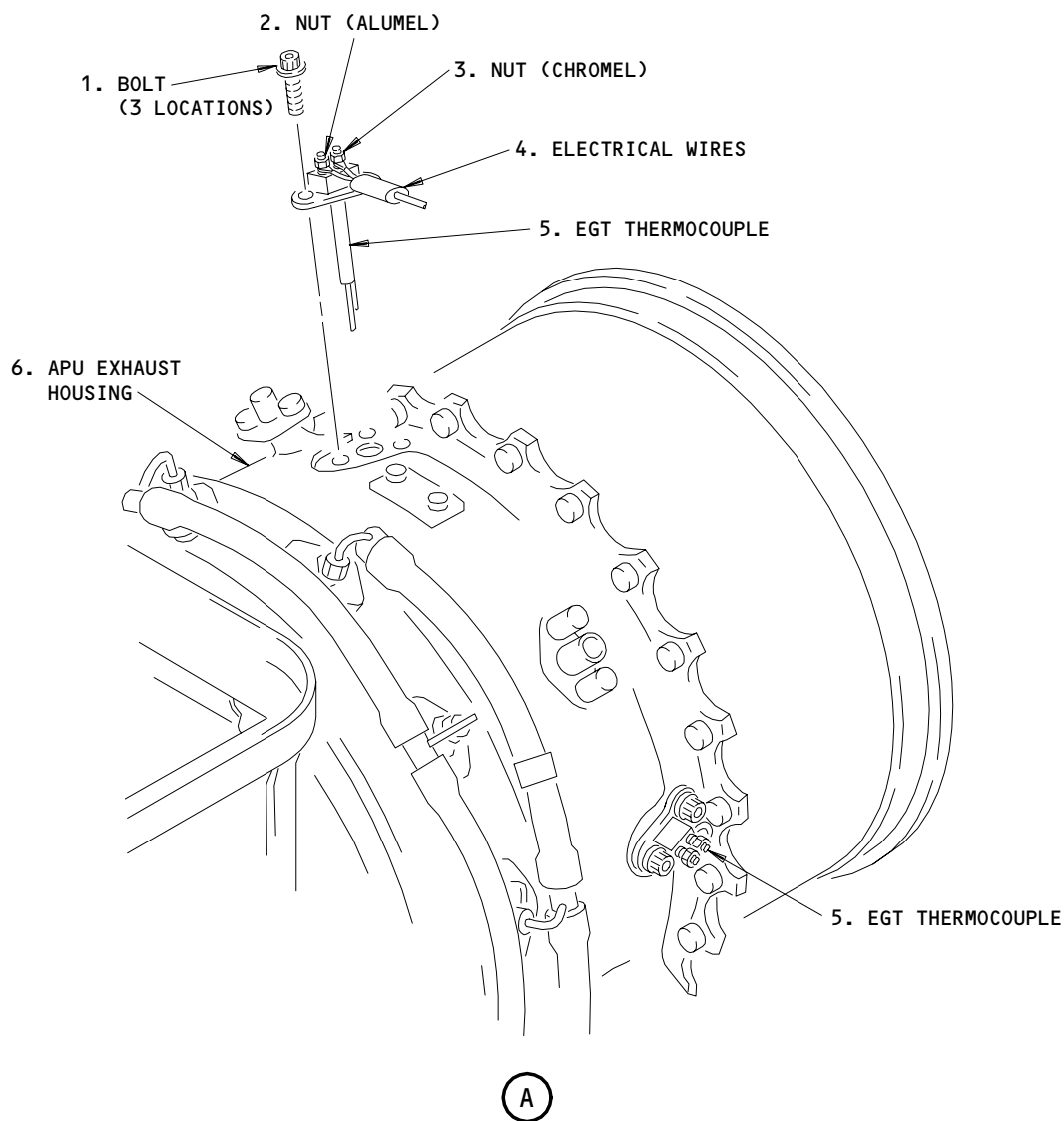
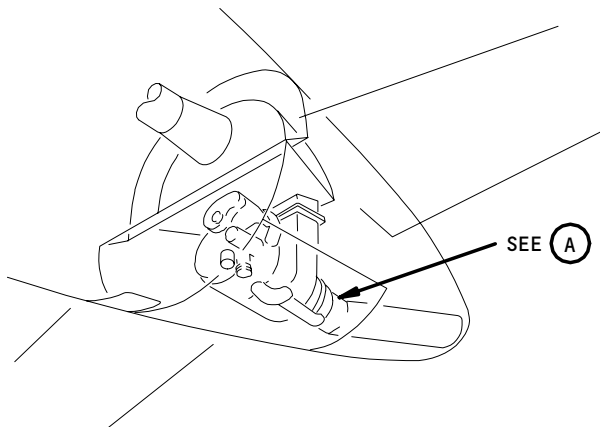
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APU Exhaust Gas Thermocouple Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-022

- (4) Remove the EGT thermocouple:
  - (a) Put tags on the electrical wires (4) to make sure you install them in the correct location.
  - (b) Remove the nuts (2 and 3) to disconnect the electrical wires (4).
  - (c) Remove the bolts (1) that attach the EGT thermocouple (5) to the exhaust housing (6).
  - (d) Remove the EGT thermocouple (5) from the exhaust housing (6).

TASK 49-71-01-402-010

3. EGT Thermocouple Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	5	EGT Thermocouple	49-71-01	01	5

B. References

- (1) AMM 49-61-05/201, APU Control Unit
- (2) SSM 49-31-01
- (3) WDM 49-14-11

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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D. Procedure

S 422-011

- (1) Install the EGT thermocouple:
  - (a) Attach the EGT thermocouple (5) to the exhaust housing (6) with the bolts (1).
    - 1) Tighten the bolts (1) to 50-55 inch-pounds (5.7-6.2 newton-meters).

**CAUTION:** MAKE SURE YOU INSTALL THE ELECTRICAL WIRES CORRECTLY. IF YOU DO NOT INSTALL THE WIRES CORRECTLY, THE APU WILL NOT OPERATE CORRECTLY.

- (b) Connect the electrical wires (4) to the EGT thermocouple (5).
  - 1) Tighten the alumel nut (2) to 25-27 inch-pounds (2.8-3.1 newton-meters).
  - 2) Tighten the chromel nut (3) to 15-17 inch-pounds (1.7-1.9 newton-meters).

S 742-013

- (2) Do the BITE test for the APU system (AMM 49-61-05/201).

S 412-014

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-015

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-017

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-71-01-702-018

4. EGT Thermocouple Inspection

A. Standard Tools and Equipment

- (1) Glass - Magnifying, 7X-10X magnification

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- (2) Ohmmeter - 0-10 ohms range
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door
- C. Procedure
  - S 862-023
    - (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - S 862-024
    - (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
      - (a) P11 Overhead Panel
        - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
      - (b) E6 Rack, Aft Equipment Center
        - 1) APU CONT
  - S 012-027
    - (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
      - (a) Open the latches for the APU access doors.
      - (b) Open the left access door.
      - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
      - (d) Open the right access door.
      - (e) Engage the support rods for the APU access doors.

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- S 022-030
- (4) If it is installed, do this task: EGT Thermocouple Removal (AMM 49-71-01/201).
- S 212-019
- (5) Examine the EGT thermocouple:
- (a) Use the magnifying glass to examine the thermocouple mounting flange for cracks and broken areas.
- S 282-021
- (6) Measure the resistance between the chromel and the alumel terminals with an ohmmeter.
- (a) Make sure the resistance is a maximum of 0.5 ohms at 77°F ± 20°F (25°C ± 11°C).
- S 422-031
- (7) Do this task: EGT Thermocouple Installation (AMM 49-71-01/201).
- S 412-025
- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.
- S 862-026
- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center  
1) APU CONT
- (b) P11 Overhead Panel  
1) 11B34, APU MN BAT CONT or APU ALTN CONT
- S 862-028
- (10) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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EXHAUST GAS TEMPERATURE THERMOCOUPLE – REPAIR

1. General

- A. This procedure contains this task:
  - (1) A repair of the exhaust gas temperature (EGT) thermocouple.
- B. The EGT thermocouples are on the aft part of the APU. There are four thermocouples installed at equal distances around the exhaust housing. You can get access to the EGT thermocouples through the APU access doors.

TASK 49-71-01-208-001

2. Exhaust Gas Temperature Thermocouples Repair

- A. References
  - (1) AMM 49-71-01/401, Exhaust Gas Temperature Thermocouple
  - (2) SWPM 20-00-11/101, Materials
  - (3) SWPM 20-10-11/101, Wiring Assembly Installation and Configuration
  - (4) SWPM 20-10-13/101, Repair of Electrical Wire and Cable
- B. Special Tools and Equipment
  - (1) 525693 or 49935 Crimp – Hand  
Tyco Electronics Corporation  
449 Eisenhower Boulevard Harrisburg, PA 17111-2302
- C. Consumables
  - (1) B00425 Alcohol – Isopropyl
- D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
801		Splice	49-14-00	05	738

E. Access

- (1) Location Zones
  - 315 APU Compartment – Left
  - 316 APU Compartment – Right
- (2) Access Panels
  - 315AL APU Access Door – Left
  - 316AR APU Access Door – Right

F. Procedure

- S 028-002
- (1) Do this task: Exhaust Gas Temperature Thermocouple Removal (AMM 49-71-01/401).

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- S 358-003
- (2) Determine length and smallest diameter of temperature grade D heat shrinkable sleeve required for splice (SWPM 20-10-13/101).
- (a) Cut the heat shrinkable sleeve to allow for 0.50 inch (13.0 mm) overlap on both ends of the splice.
- S 358-004
- (3) Remove the damaged length of wire.
- S 168-005
- (4) Clean the insulation a minimum of 3.0 inch (76.0 mm) from each end with isopropyl alcohol.
- S 358-006
- (5) Place the heat shrinkable sleeve over the wire.
- S 358-007
- (6) Remove 0.30 inch (8.0 mm) of insulation from each end of the wire.
- S 358-008
- (7) Insert the wire into the splice until it stops.
- S 358-009
- (8) Crimp the splice.
- S 358-010
- (9) Place two layers of temperature grade D, TFE tape or film strip over the splice (SWPM 20-10-13/101).
- (a) Make sure each layer extends a minimum of 0.38 inch (10.0 mm) from each end of the splice, the tape makes a 50 percent overlap, and the second layer is wound in the opposite direction of the first layer.
- S 358-011
- (10) Place two layers of temperature grade D, TFE tape or film strip over the splice assembly (SWPM 20-10-13/101).
- (a) Make sure each layer extends a minimum of 0.38 inch (10.0 mm) from each end of the splice, the tape makes a 50 percent overlap, and the second layer is wound in the opposite direction of the first layer.
- S 358-012
- (11) Assemble a temperature grade D lacing tape wire harness tie at each end and the middle of the tape over the splice assembly (SWPM 20-10-11/101).

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S 358-013

- (12) Align the center of the heat shrinkable sleeve with the center of the splice assembly.

S 358-014

- (13) Assemble a temperature grade D lacing tape wire harness tie at each end and the middle of the heat shrinkable sleeve (SWPM 20-10-11/101).

S 428-015

- (14) Do this task: Exhaust Gas Temperature Thermocouple Installation (AMM 49-71-01/401).

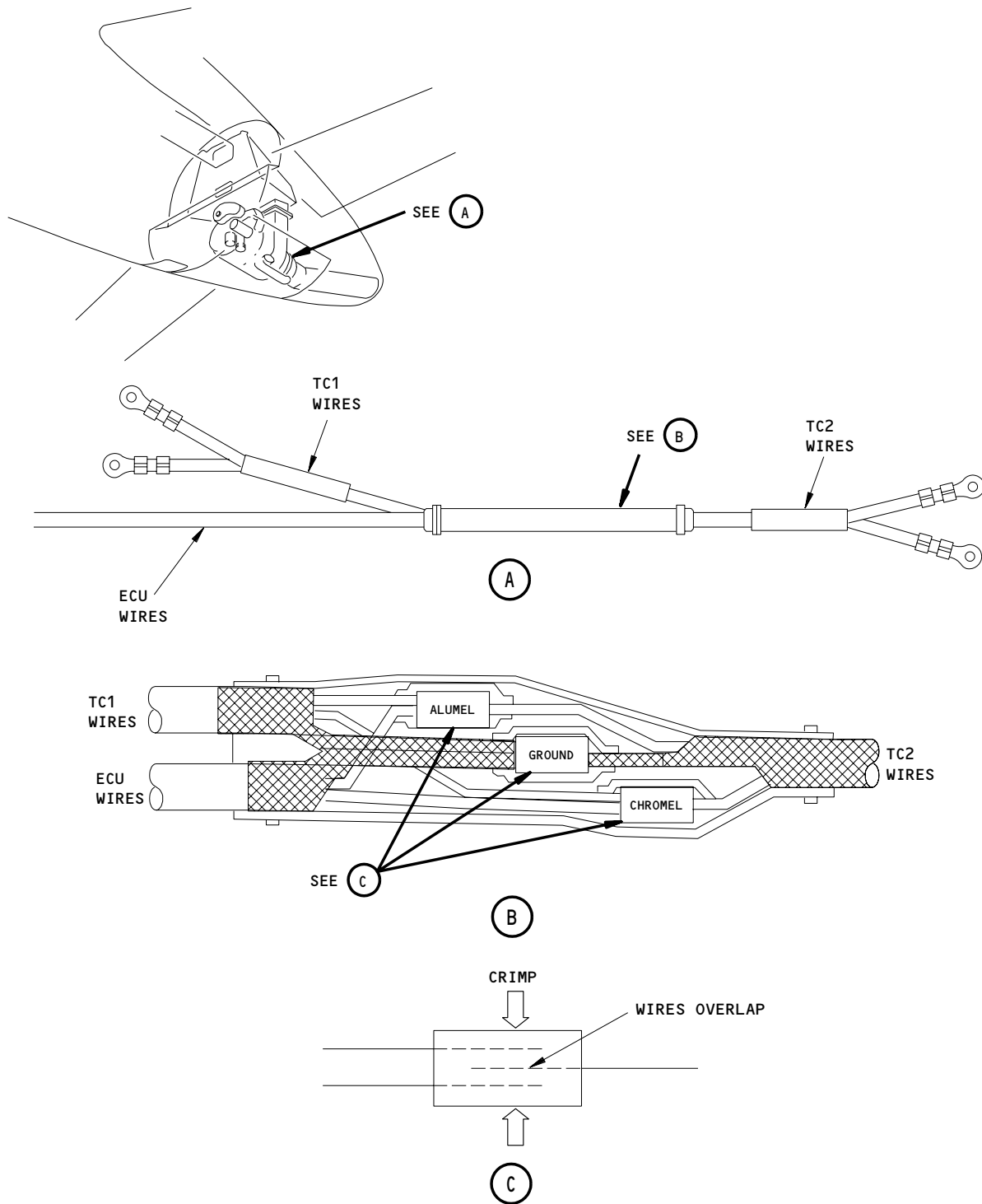
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Exhaust Gas Temperature Thermocouple Repair  
Figure 801

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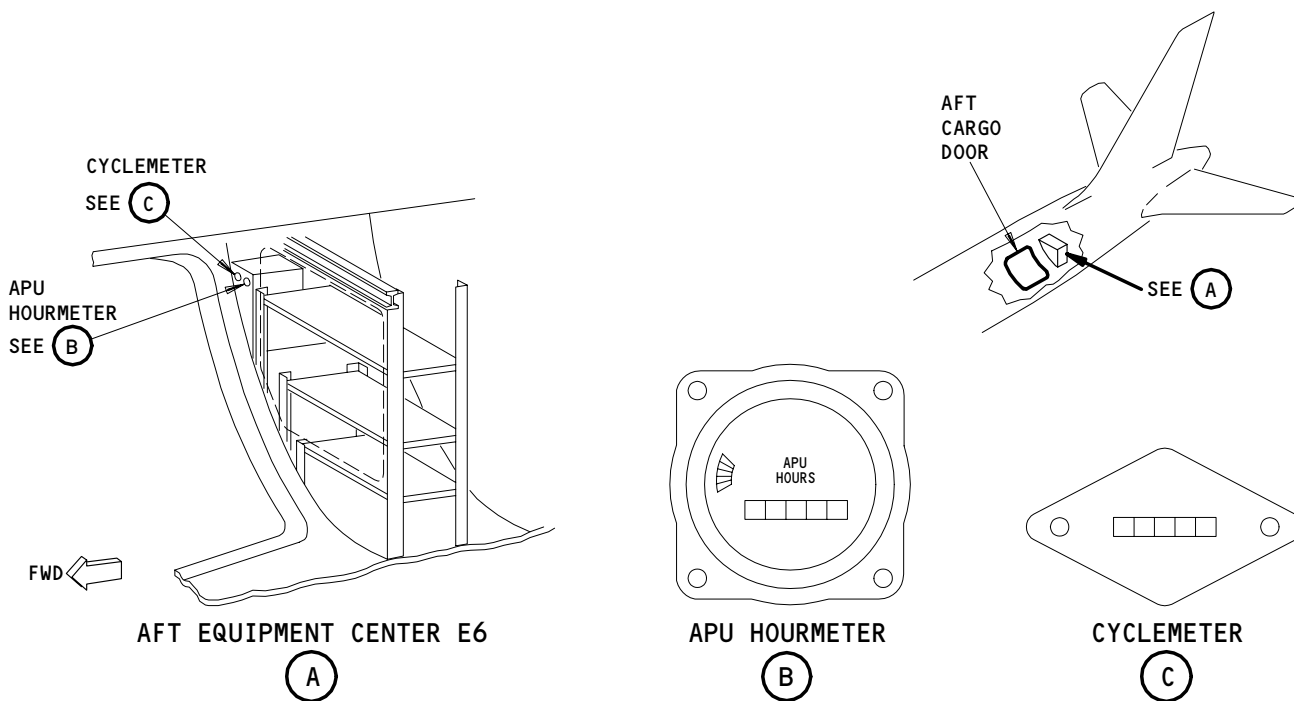
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APU TIME TOTALIZER - DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The time totalizer (hourmeter) and the cyclemeter measure the amount of APU operation. The meters are located in the aft equipment center on the E6 rack. Power is supplied to both indicators from the APU battery bus.
2. Operation (Fig. 2)
  - A. The hourmeter records the cumulative operation time of the APU. A ground is supplied to the hourmeter when the APU is operating above 95% speed.
  - B. The cyclemeter displays the number of run cycles of the APU. A ground is supplied to the cyclemeter when the APU start relay is energized.

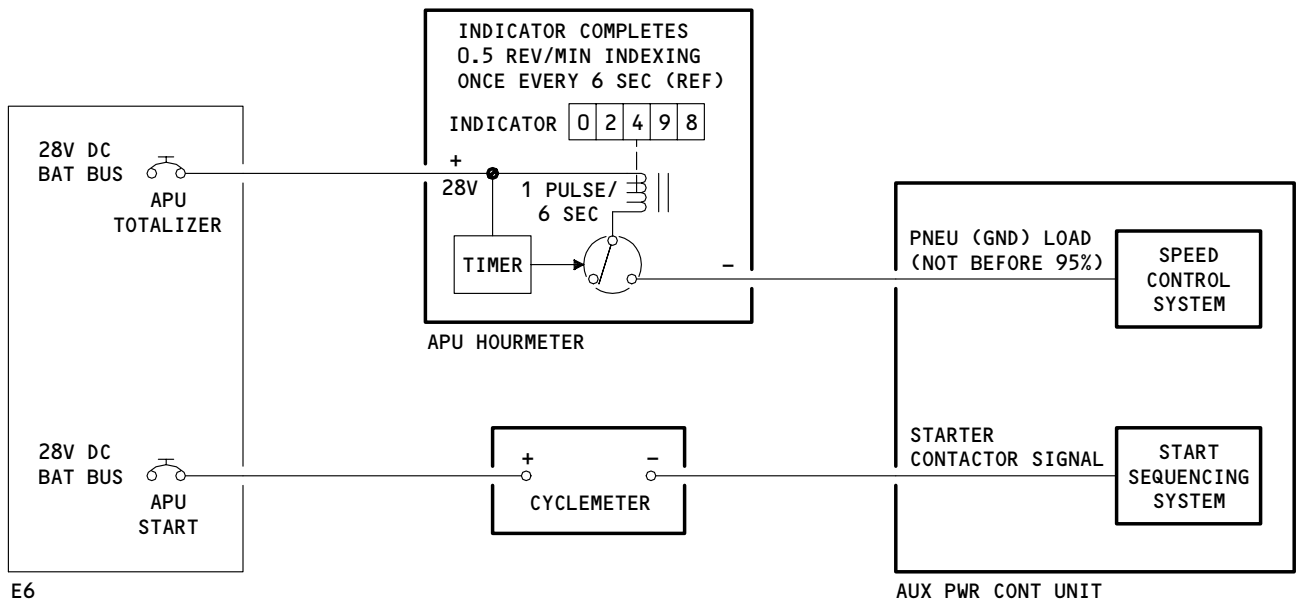


APU Time Totalizer  
Figure 1

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APU Time Totalizer Schematic  
Figure 2

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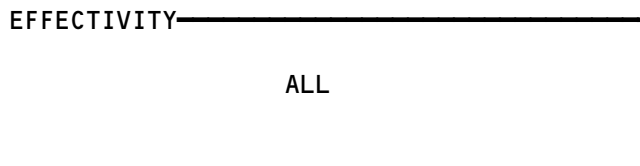
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APU TIME TOTALIZER AND CYCLEMETER

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CYCLEMETER, N10032	--	1	822, E6 AFT EQUIP CENTER	*
HOURLMETER, N10017	--	1	822, E6 AFT EQUIP CENTER	*

\* SEE THE WDM EQUIPMENT LIST

APU Time Totalizer and Cyclemeter - Component Index  
Figure 101

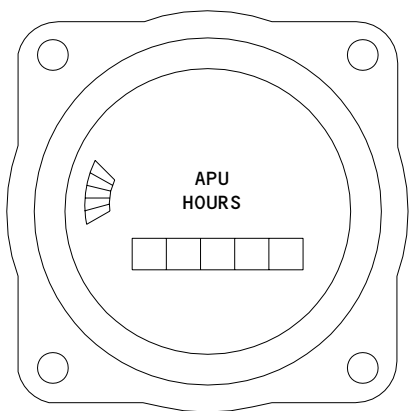
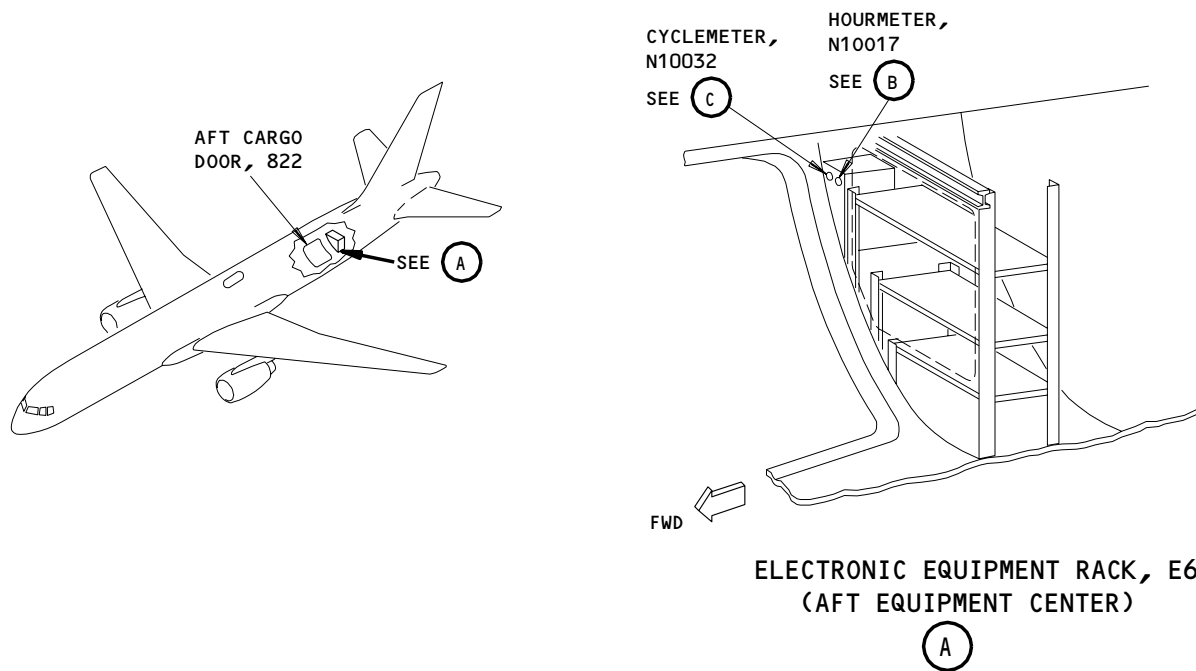


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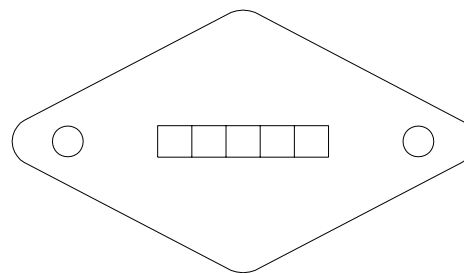
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HOURLMETER, N10017  
(B)



CYCLEMETER, N10032  
(C)

APU Time Totalizer and Cyclemeter - Component Location  
Figure 102

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APU TIME TOTALIZER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains two tasks. The first task removes the APU time totalizer. The second task installs the APU time totalizer.
- B. The APU time totalizer can be installed in either the P5 panel or the E6 rack, aft equipment center.
- C. The APU time totalizer is referred to as the APU hourmeter.

TASK 49-72-01-004-001

2. Remove the APU Time Totalizer (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

B. Procedure

S 864-002

- (1) Set the APU master switch on the P5 overhead panel to the OFF position and attach a DO-NOT-OPERATE tag.

S 864-004

- (2) Open this circuit breaker and attach a DO-NOT-CLOSE tag:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU TOTALIZER

S 024-005

- (3) Remove the APU hourmeter:
  - (a) Remove the four screws that secure the hourmeter.
    - 1) AIRPLANES WITH THE HOURMETER INSTALLED IN THE AFT EQUIPMENT CENTER, E6;  
Do these steps:
      - a) Remove the four nuts.
      - b) Remove the four washers.
  - (b) Carefully pull the hourmeter until you can get access to the wire terminals.
  - (c) Remove the two screws and two washers that secure the two wire terminals to the back of the hourmeter.
  - (d) Write down the APU HOURS from the hourmeter for the APU.

NOTE: You cannot set the new time totalizer with the APU hours. It is recommended that you keep a written record of the APU hours.

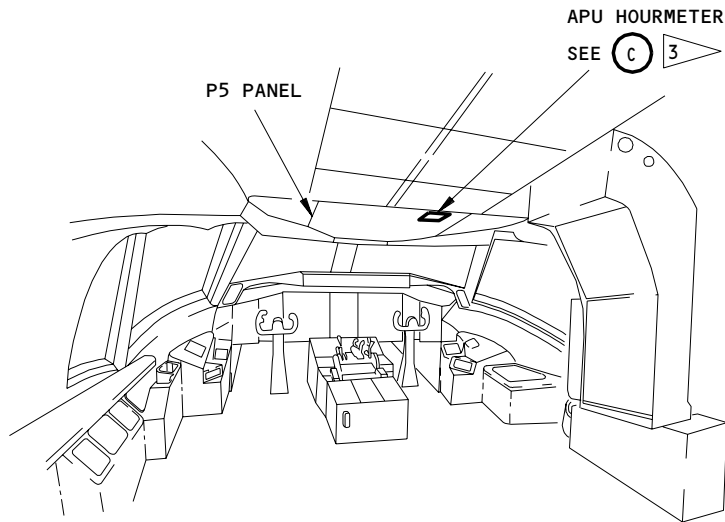
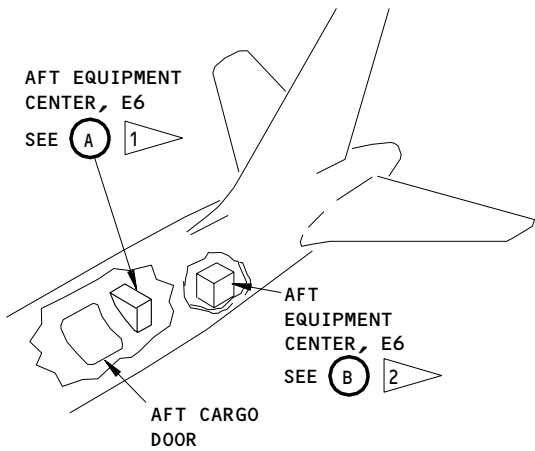
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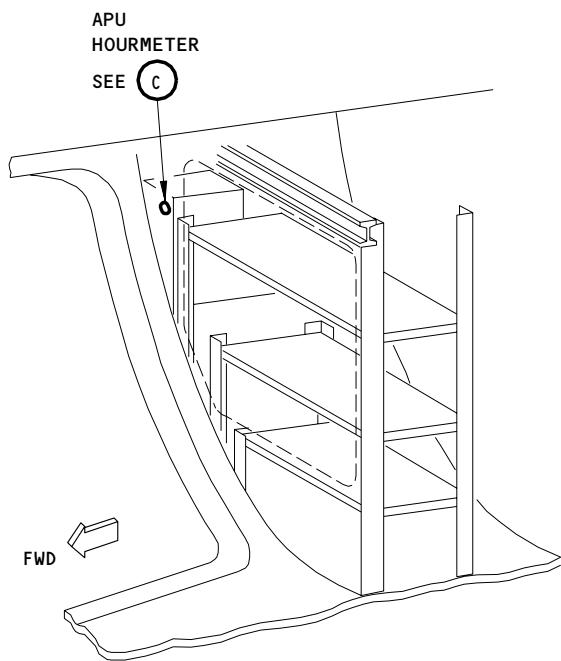
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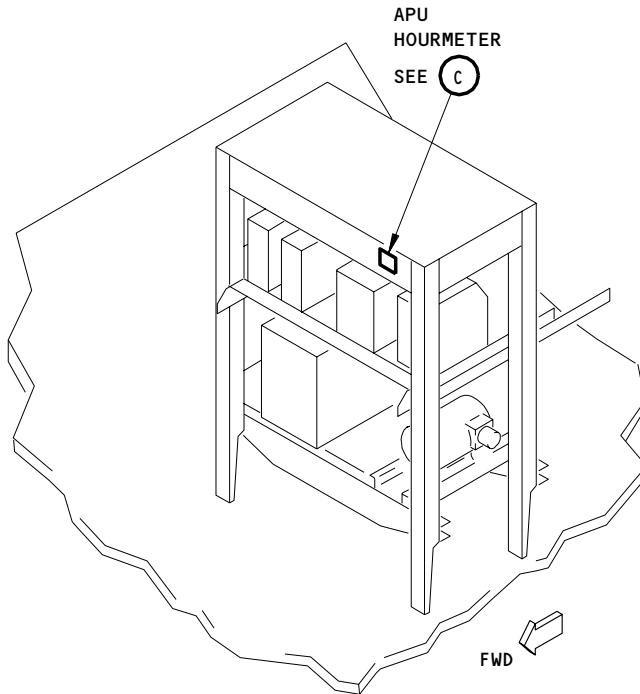
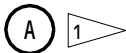
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FLIGHT COMPARTMENT



AFT EQUIPMENT CENTER, E6



AFT EQUIPMENT CENTER, E6



- 1 PASSENGER AIRPLANES
- 2 PACKAGE FREIGHTER AIRPLANES
- 3 AIRPLANES WITH THE HOURMETER INSTALLED IN THE P5 PANEL.

APU Time Totalizer (Hourmeter) - Removal/Installation  
Figure 401 (Sheet 1)

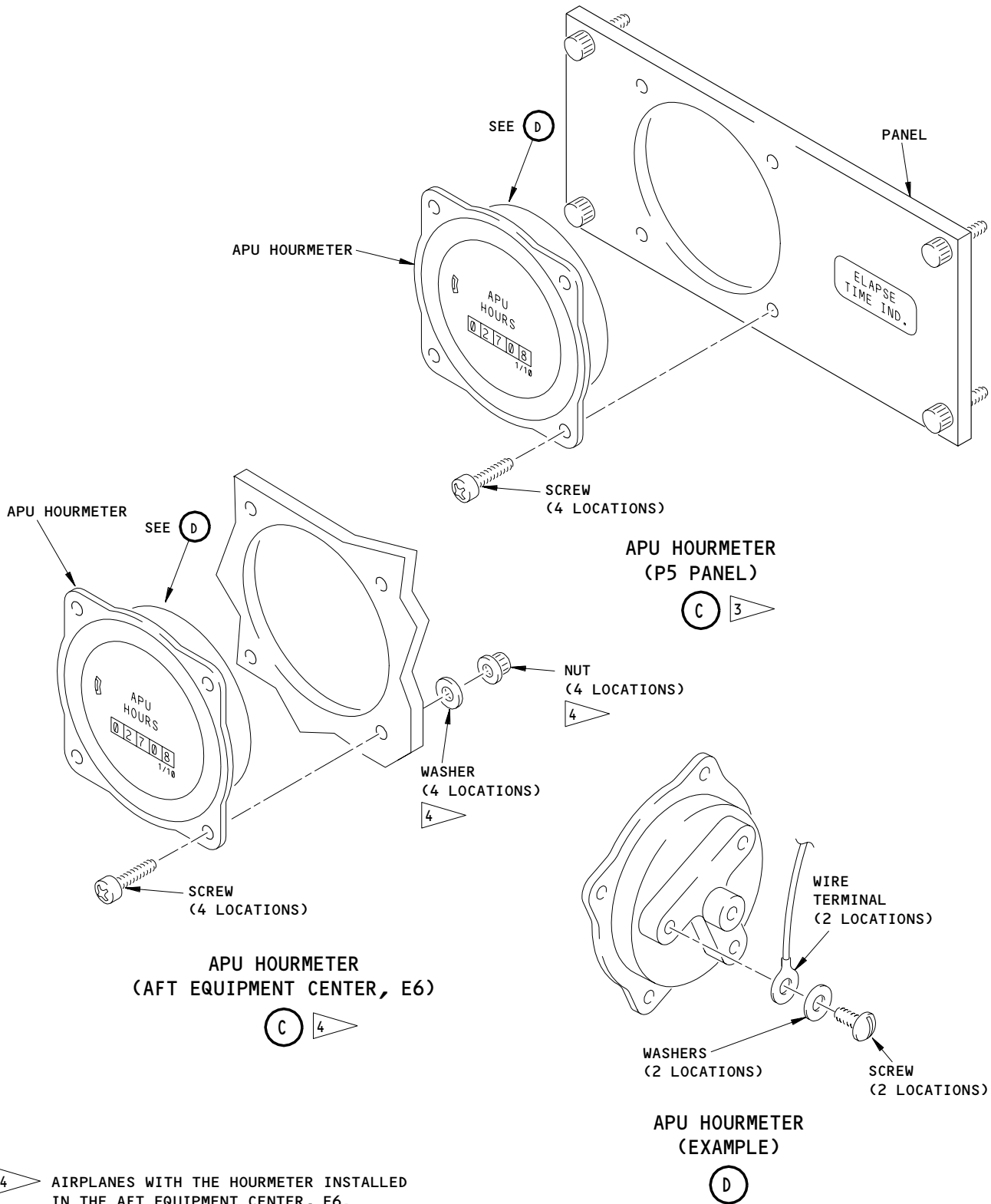
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APU Time Totalizer (Hourmeter) - Removal/Installation  
Figure 401 (Sheet 2)

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TASK 49-72-01-494-006

3. Install the APU Time Totalizer (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |

(2) Access Panels

- |     |                |
|-----|----------------|
| 822 | Aft Cargo Door |
|-----|----------------|

C. Procedure

S 864-007

- (1) Set the APU master switch on the P5 overhead panel to the OFF position and attach a DO-NOT-OPERATE tag.

S 864-009

- (2) Open this circuit breaker and attach a DO-NOT-CLOSE tag:  
(a) E6 Rack, Aft Equipment Center  
1) APU TIME TOTALIZER

S 424-010

- (3) Install the APU hourmeter:  
(a) Install the two screws and two washers that secure the wire terminals to the back of the hourmeter.  
(b) Carefully install the hourmeter.  
(c) Install the four screws that secure the hourmeter.  
1) AIRPLANES WITH THE HOURMETER INSTALLED IN THE AFT EQUIPMENT CENTER, E6;  
Do these steps:  
a) Install the four washers.  
b) Install the four nuts.

S 864-012

- (4) Remove the DO-NOT-CLOSE tag and close this circuit breaker:  
(a) E6 Rack, Aft Equipment Center  
1) APU TOTALIZER

S 864-013

- (5) Remove the DO-NOT-OPERATE tag from the APU master switch on the P5 overhead panel.

S 914-014

- (6) Start and operate the APU for a minimum of six minutes (AMM 49-11-00/201).

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- S 714-015
- (7) Look at the APU HOURS indication on the APU hourmeter.  
(a) The APU HOURS indication must increase by one on the 1/10 counter.
- S 914-016
- (8) Do the APU usual shutdown (AMM 49-11-00/201).

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APU TACHOMETER SYSTEM – DESCRIPTION AND OPERATION

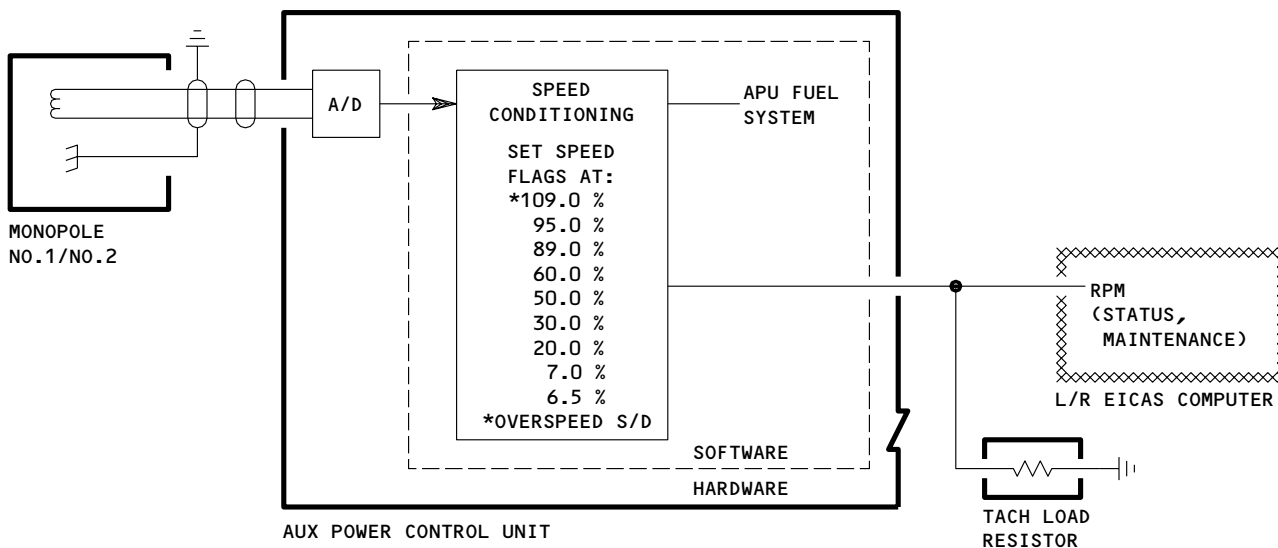
1. General

A. The tachometer system measures APU speed and provides speed indication on the flight deck. The system consists of two speed sensing transducers (monopoles), APU control unit, and RPM indication on the Engine Indication and Crew Alerting System (EICAS). Power for the system is 28 volts supplied from the main battery bus.

2. Operation

A. Functional Description (Fig. 1)

- (1) The two monopoles, located on each side of the compressor inlet plenum, convert mechanical motion into an electrical signal. A ferromagnetic nut on the rotating drive shaft passes through the magnetic fields of the monopoles, generating electrical signals.
- (2) During acceleration, the APU control unit compares the higher speed signal to a speed schedule. A current signal is supplied to the torque motor for the fuel control to achieve the required speed.



APU Tachometer System Schematic  
Figure 1

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- (3) The control unit provides normal and redundant overspeed shutdowns. Normal overspeed shutdown occurs when 107 percent rpm is exceeded for 0.025 seconds. Redundant overspeed shutdown occurs when 109 percent rpm is exceeded for 0.02 seconds.
- (4) The higher RPM signal is supplied to EICAS where it can be called up in the status and maintenance modes. EICAS rpm indication displays APU speed in percent of APU rated speed.

**B. BITE**

- (1) AIRPLANES WITH THE APU CONTROL UNIT -18 OR BEFORE;  
The APU control unit monitors tachometer system operation, tests component circuits, and writes any faults in BITE memory (AMM 49-61-00/001). A failure of the ECU or the monopoles is shown in the FAULTY UNIT matrix as ECU, NO. 1 SPD SENSOR or NO. 2 SPD SENSOR. An automatic shutdown because of OVERSPEED or FAILED SENSOR is shown in the FAULT DISPLAY matrix.
- (2) AIRPLANES WITH THE APU CONTROL UNIT -19 OR SUBSEQUENT;  
The APU control unit monitors tachometer system operation, tests component circuits, and writes any faults in BITE memory (AMM 49-61-00/001). A failure of the ECU or the monopoles is shown in the FAULTY LRU matrix as ECU, #1 SPD SENSOR or #2 SPD SENSOR. An automatic shutdown because of OVERSPEED, UNDERSPEED or START ABORTED is shown in the REASON APU NOT OPERATED matrix.

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APU EXHAUST SYSTEM - DESCRIPTION AND OPERATION

1. General

A. The APU exhaust system conveys APU exhaust gas out of the airplane. The system consists of an exhaust duct, an insulation blanket, and exhaust duct supports.

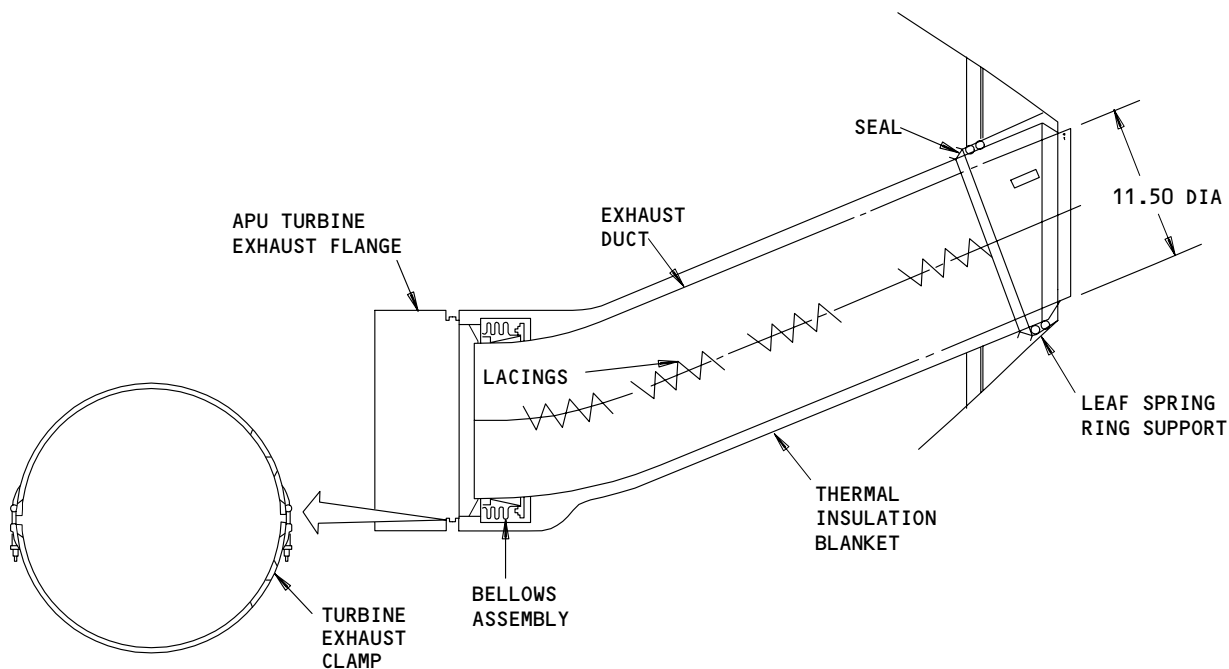
2. Component Details

A. Exhaust Duct (Fig. 1)

(1) The APU exhaust duct carries exhaust from the APU out through the airplane tail cone. It also provides a thermal barrier to shield the APU compartment from exhaust gases and reduces exhaust noise level.

B. Exhaust Duct Insulation Blanket (Fig. 1)

(1) A thermal insulation blanket (in three sections) is wrapped around the outside of the exhaust duct and retained by lacings. The blanket has sealed surfaces to prevent absorption of fluids. The blanket provides a thermal barrier to keep excess heat out of the APU compartment.



APU Exhaust System  
Figure 1

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C. Exhaust Duct Support (Fig. 1)

- (1) A V-band clamp attaches the exhaust duct to the turbine exhaust flange of the APU. A bellows assembly allows relative movement and thermal expansion between the APU and the exhaust duct. The aft end of the exhaust duct is supported and sealed by a leaf-spring ring support. The ring support, which fits around the end of the exhaust duct, is attached to the tail cone assembly that you can remove.

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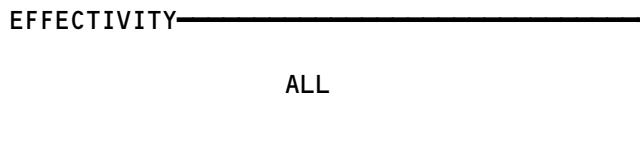
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**BOEING**  
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 FAULT ISOLATION/MAINT MANUAL

APU EXHAUST SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
DUCT - EXHAUST	--	1	316AR,315AL, APU ACCESS DOORS	49-81-01
INSULATION BLANKET - EXHAUST DUCT	--	1	316AR,315AL, APU ACCESS DOORS	49-81-02
SUPPORT - EXHAUST DUCT	--	1	316AR,315AL, APU ACCESS DOORS	49-81-03

APU Exhaust System - Component Index  
Figure 101



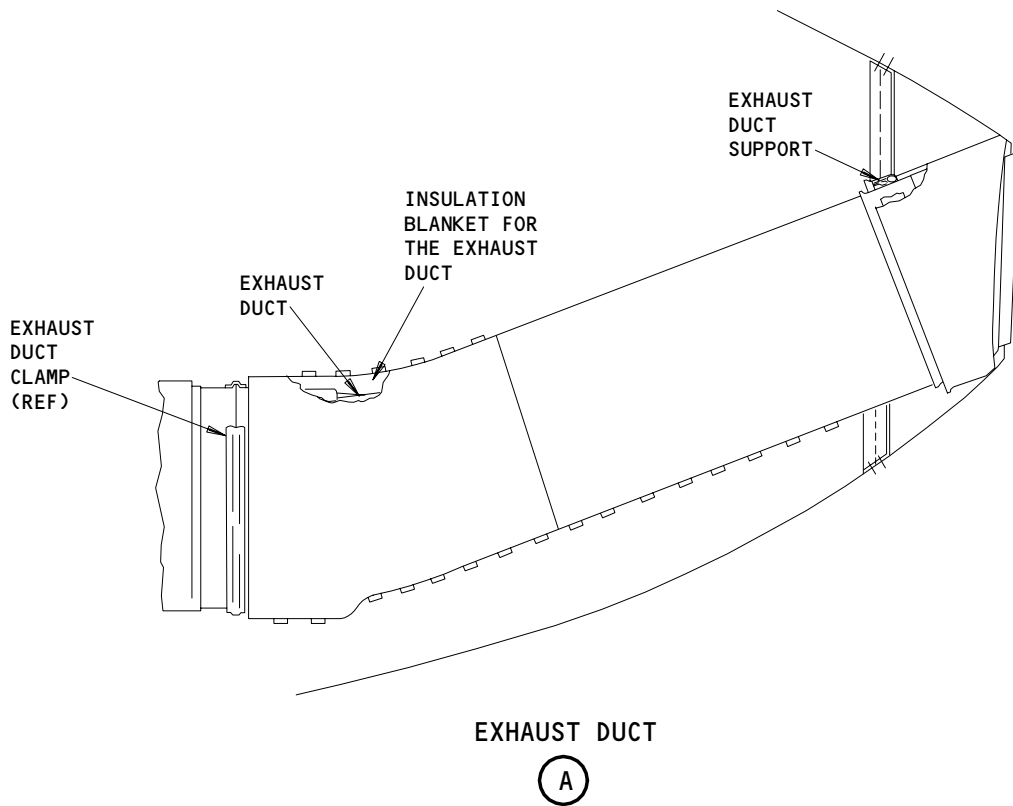
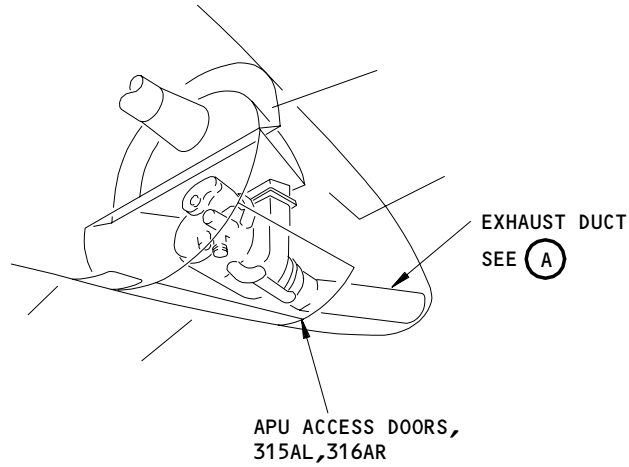
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APU Exhaust System - Component Location  
 Figure 102

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APU EXHAUST DUCT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) APU Exhaust Duct Removal
  - (2) APU Exhaust Duct Installation
  - (3) APU Exhaust Duct Inspection.
- B. The APU exhaust goes through the exhaust duct and out the tail cone of the airplane. A support ring in the tail cone holds the aft end of the exhaust duct. It is necessary to remove the tail cone to remove the exhaust duct. The forward end of the exhaust duct attaches to the APU with a V-band clamp.
- C. You can get access to the exhaust duct through the APU access doors.

TASK 49-81-01-002-001

2. APU Exhaust Duct Removal (Fig. 201)

- A. References
  - (1) AMM 49-81-02/401, APU Exhaust Duct Insulation Blanket.

B. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment – Right
  - 211 Flight Compartment – Left
  - 212 Flight Compartment – Right
  - 315 APU Compartment – Left
  - 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

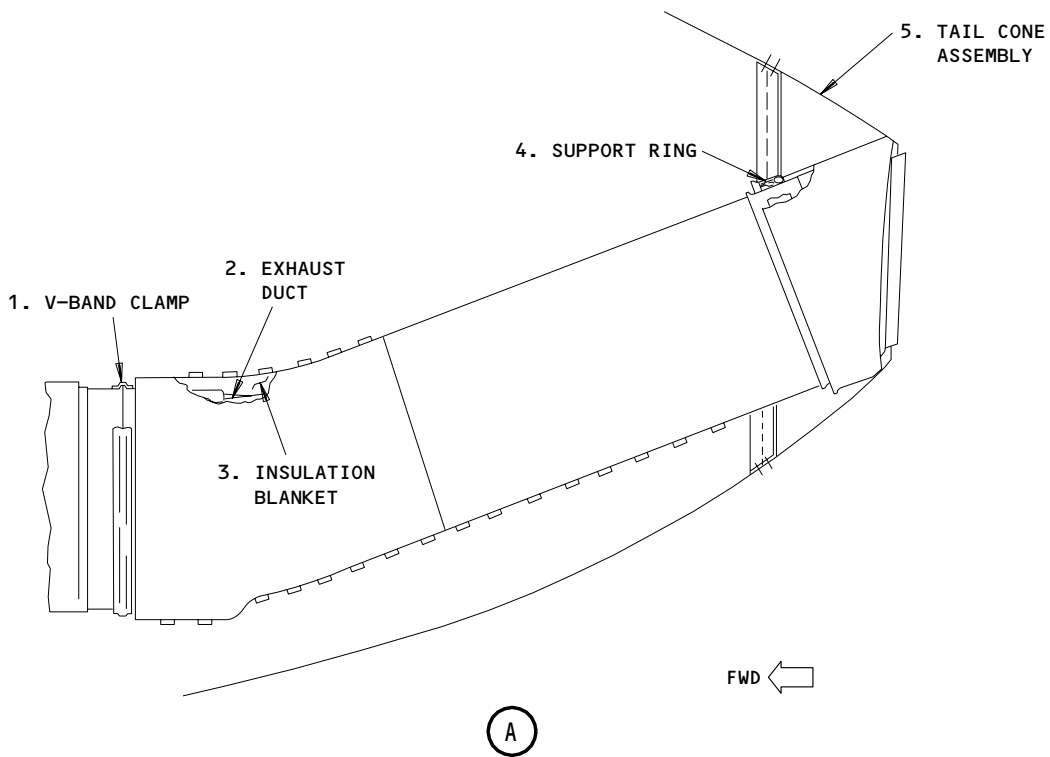
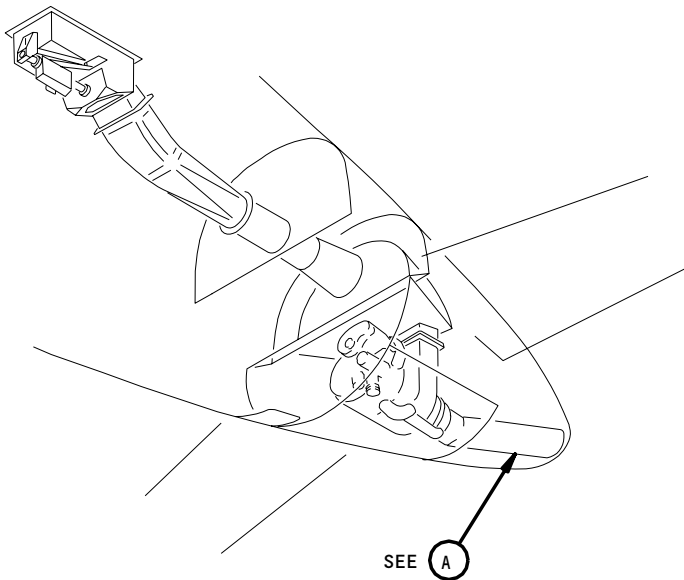
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APU Exhaust Duct Installation  
Figure 201

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-038

- (4) Remove the APU exhaust duct:
  - (a) Remove the bolts that attach the tail cone assembly (5) to the airplane.
  - (b) Remove the tail cone assembly (5) from the airplane.

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (c) Hold the APU exhaust duct (2) while you remove the V-band clamp (1).
- (d) Remove the APU exhaust duct (2) through the tail cone opening.

S 022-043

- (5) Remove the insulation blanket (AMM 49-81-02/401).

TASK 49-81-01-402-012

3. APU Exhaust Duct Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2	Exhaust Duct Assembly	49-81-01	01	30

B. References

- (1) AMM 49-81-02/401, APU Exhaust Duct Insulation Blanket.

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

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- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

D. Procedure

S 422-044

- (1) If it is necessary, install the insulation blanket (3) (AMM 49-81-02/401).

S 422-039

- (2) Install the APU exhaust duct (2) as follows:

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (a) Install the APU exhaust duct (2) through the tail cone opening.
- (b) Hold the forward end of the APU exhaust duct (2) at the APU.
- (c) Put the tail cone assembly (5) in its position around the aft end of the APU exhaust duct (2).
- (d) Install the bolts in the tail cone assembly (5).
- (e) Install the V-band clamp (1) on the APU exhaust duct (2).
  - 1) Tighten the V-band clamp (1) to 70-90 inch-pounds (7.9-10.2 newton-meters).

S 412-019

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.

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- (b) Put the support rods in the clips on the inner side of the APU access doors.
- (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
- (d) Lift the left access door and align it with the right access door.
- (e) Close and latch the APU access doors.

S 862-020

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-022

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-81-01-202-023

4. APU Exhaust Duct Inspection

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

B. Procedure

S 862-030

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-031

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

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S 012-033

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Open the latches on the APU access doors.
  - (b) Open the left access door.
  - (c) Push the right access door up and pull the spring latch aft until the latch disengages.
  - (d) Open the right access door.
  - (e) Engage the support rods for the APU access doors.

S 212-040

- (4) Examine the APU exhaust duct:
- (a) Examine the exhaust duct bellows for cracks, burns or missing parts.
    - 1) If you find cracks, burns or missing part on the exhaust duct bellows, replace the exhaust duct (AMM 49-81-01/401).
  - (b) Examine the exhaust duct for cracks or burns.
    - 1) If you find cracks or burns, replace the exhaust duct (AMM 49-81-01/401).
  - (c) Make sure the V-band clamp is in the correct position.
  - (d) Make sure the V-band clamp is tight around the APU exhaust duct.
  - (e) Examine the insulation blanket for burns, holes, and tears.
    - 1) If you find burns, holes or tears, replace the insulation blanket (AMM 49-81-02/401).
  - (f) Examine the exhaust duct lacings on the insulation blanket to make sure each lacing is not broken.
    - 1) Repair the lacing(s) if they are broken (AMM 49-81-02/401).

S 212-041

- (5) Examine the support ring on the tail cone:
- (a) Examine the support ring and seal on the exhaust duct for damage, gaps or area(s) where the seal does not touch the exhaust.
    - 1) If you find damage to the seal, replace the exhaust duct support seal (AMM 49-81-03/401).

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- 2) If you see gap(s) or area(s) where the seal does not touch the exhaust duct, repair the problems that you find (AMM 49-81-03/401).

S 412-034

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-035

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-037

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU EXHAUST DUCT INSULATION BLANKET – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the insulation blanket on the APU exhaust duct.
- B. You must remove the exhaust duct assembly from the airplane to remove the insulation blanket.
- C. You can get access to the APU exhaust duct through the APU access doors.

TASK 49-81-02-004-001

2. Exhaust Duct Insulation Blanket Removal (Fig. 401)

A. References

- (1) AMM 49-81-01/201, APU Exhaust Duct

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 024-012

- (1) Remove the APU exhaust duct (AMM 49-81-01/201).

S 024-004

- (2) Remove the insulation blanket from the exhaust duct:
  - (a) Remove the lacings (3) from the insulation blanket (1).

NOTE: The insulation blanket is in three sections, two forward and one aft. The lacings on the forward section are on the top and the bottom of the duct. The lacings for the aft section are only on the bottom of the duct.

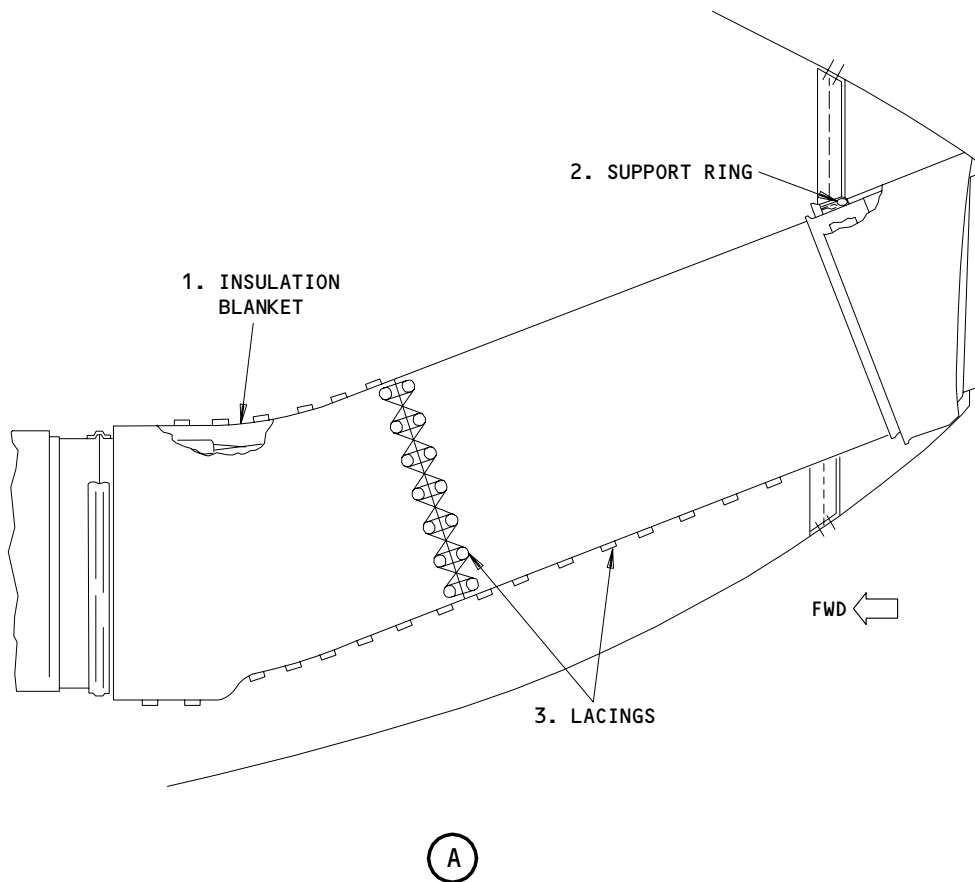
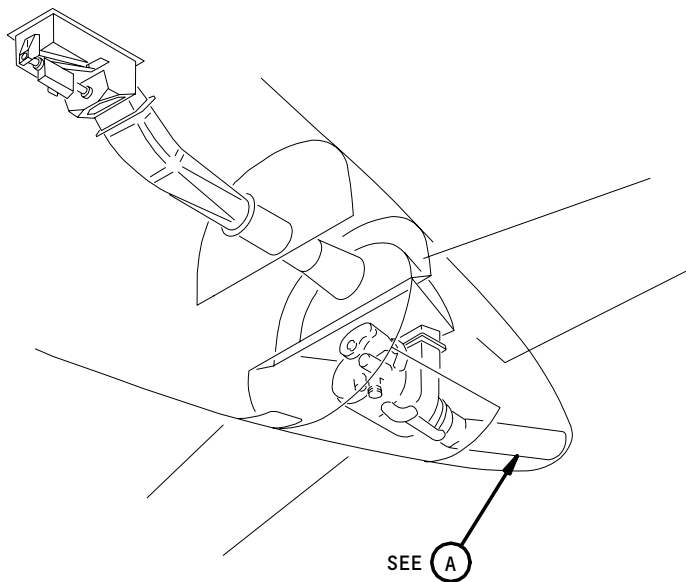
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APU Exhaust Duct Insulation Installation  
Figure 401

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(b) Remove the insulation blanket (1) from the exhaust duct.

TASK 49-81-02-404-006

3. Exhaust Duct Insulation Blanket Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Insulation Blanket (Aft Piece) Insulation Blanket (LH) Insulation Blanket (RH)	49-81-01	01	50 40 45

B. References

(1) AMM 49-81-01/201, APU Exhaust Duct

C. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

822 Aft Cargo Door

D. Procedure

S 424-007

(1) Install the insulation blanket on the exhaust duct:

**CAUTION:** DO NOT LET THE BLANKET TOUCH THE SHARP EDGES. DAMAGE TO THE BLANKET CAN OCCUR.

(a) Put the insulation blanket (1) in its position on the APU exhaust duct.

**NOTE:** The edge of the blanket goes below the support ring assembly at the aft end of the exhaust duct.

(b) Align the lacing studs along the top and the bottom of the blanket (1).

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**CAUTION:** DO NOT USE THE LACING TO MOVE THE INSULATION ENDS TOGETHER. DAMAGE TO THE LACING STUDS CAN OCCUR.

- (c) Install the lacings (3) to attach the insulation blanket (1) to the APU exhaust duct.

**NOTE:** It is necessary to use two persons to install the insulation blanket. One person must hold the blanket halves together and the other person must install the lacing.

S 424-011

- (2) Install the APU exhaust duct (AMM 49-81-01/201).

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APU EXHAUST DUCT SUPPORT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the support ring for the APU exhaust duct.
- B. To remove the support ring you must remove the tail cone assembly from the airplane.
- C. You can get access to the tail cone assembly from the outer side of the APU compartment.

TASK 49-81-03-004-001

2. Exhaust Duct Support Ring Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

822	Aft Cargo Door
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B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-004

- (3) Remove the tail cone assembly:
  - (a) Remove the bolts (5) that attach the external tail cone assembly (2) to the fuselage.

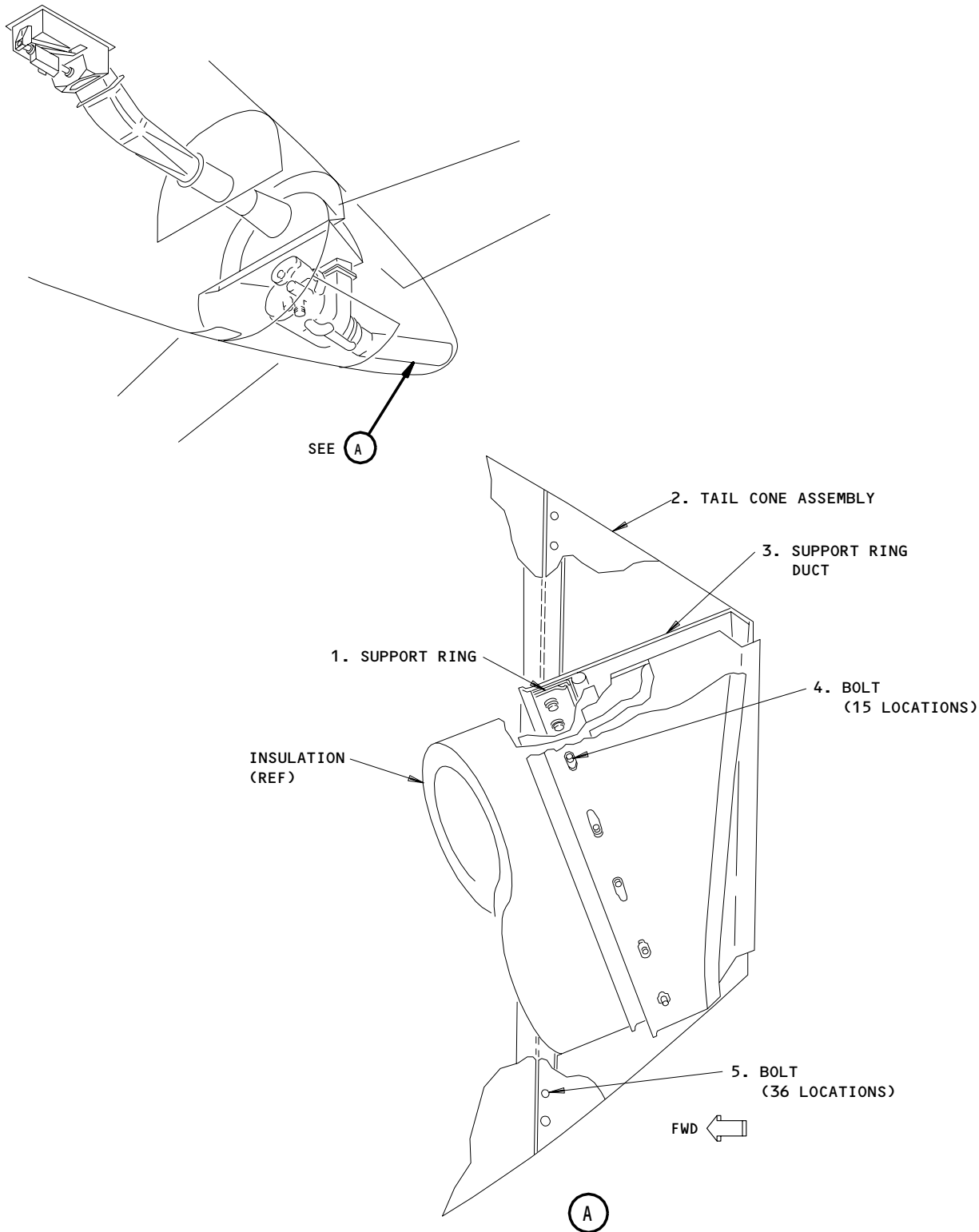
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APU Exhaust Duct Support Installation  
Figure 401

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(b) Remove the tail cone assembly (2) from the fuselage.

S 024-005

- (4) Remove the support ring from the tail cone assembly:
- (a) Remove the bolts (4) from the inner side of the support ring (1) that attach the ring to the support ring duct (3).

NOTE: The support ring and the support ring duct are part of the tail cone assembly.

(b) Remove the support ring (1) from the tail cone assembly (2).

TASK 49-81-03-404-006

3. Exhaust Duct Support Ring Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Support Ring	53-86-05	01	35

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

C. Procedure

S 424-007

- (1) Install the support ring in the tail cone assembly:
- (a) Point the seal on the support ring (1) aft.
- (b) Install the support ring (1) in the tail cone assembly (2).
- (c) Align the bolt holes in the support ring (1) with the holes in the support ring duct (3).
- (d) Install the bolts (4) that attach the support ring (1) to the support ring duct (3).

S 414-008

- (2) Install the tail cone assembly:
- (a) Put the tail cone assembly (2) in its position on the fuselage.

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- (b) Align the holes in the tail cone assembly (2) with the holes in the fuselage.
- (c) Install the bolts (5) that attach the tail cone assembly (2) to the fuselage.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

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APU OIL INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. ON GUI 001-114, 116-999;  
the oil indicating system of the APU monitors the engine lubrication system. The system consists of the oil temperature sensor, the switch for the low oil pressure, the differential pressure switch for the generator oil filter, and the switch for the low oil level. The oil indicating circuit obtains 28 volts dc for operation from the battery bus. The high oil temperature, low oil pressure, and the differential pressure circuits for the generator oil filter are part of the automatic shutdown circuit.
  - B. ON GUI 115;  
the oil indicating system of the APU monitors the engine lubrication system. The system consists of the oil temperature sensor, the switch for the low oil pressure, the differential pressure switch for the generator oil filter, and oil quantity transmitter. The oil indicating circuit obtains 28 volts dc for operation from the battery bus. The high oil temperature, low oil pressure, and the differential pressure circuits for the generator oil filter are part of the automatic shutdown circuit.
2. Component Details
  - A. Low Oil Pressure Switch (Fig. 2)
    - (1) The switch consists of a diaphragm, a belleville spring, a shunt disc, and an electrical connection. It is installed in a common housing with the oil temperature sensor located on the case for the APU load compressor. The APU control unit shuts down the APU when the switch signal is below  $35 \pm 5$  psig for more than 15 seconds at speeds greater than 95 percent. Automatic shutdowns due to low oil pressure are stored in BITE memory (Ref 49-61-00-0).
  - B. Differential Pressure Switch for the Generator Oil Filter (Fig. 2)
    - (1) The switch is located within the housing for the generator scavenge filter. It consists of a shunt disc, bellville spring, and a housing with electrical connection. The switch senses a differential pressure across the filter, which indicates a clogged filter. The control unit shuts down the APU when a signal is received for more than 0.5 second at speeds above 95 percent. A shutdown due to a clogged filter is stored in BITE memory (Ref 49-61-00-0).

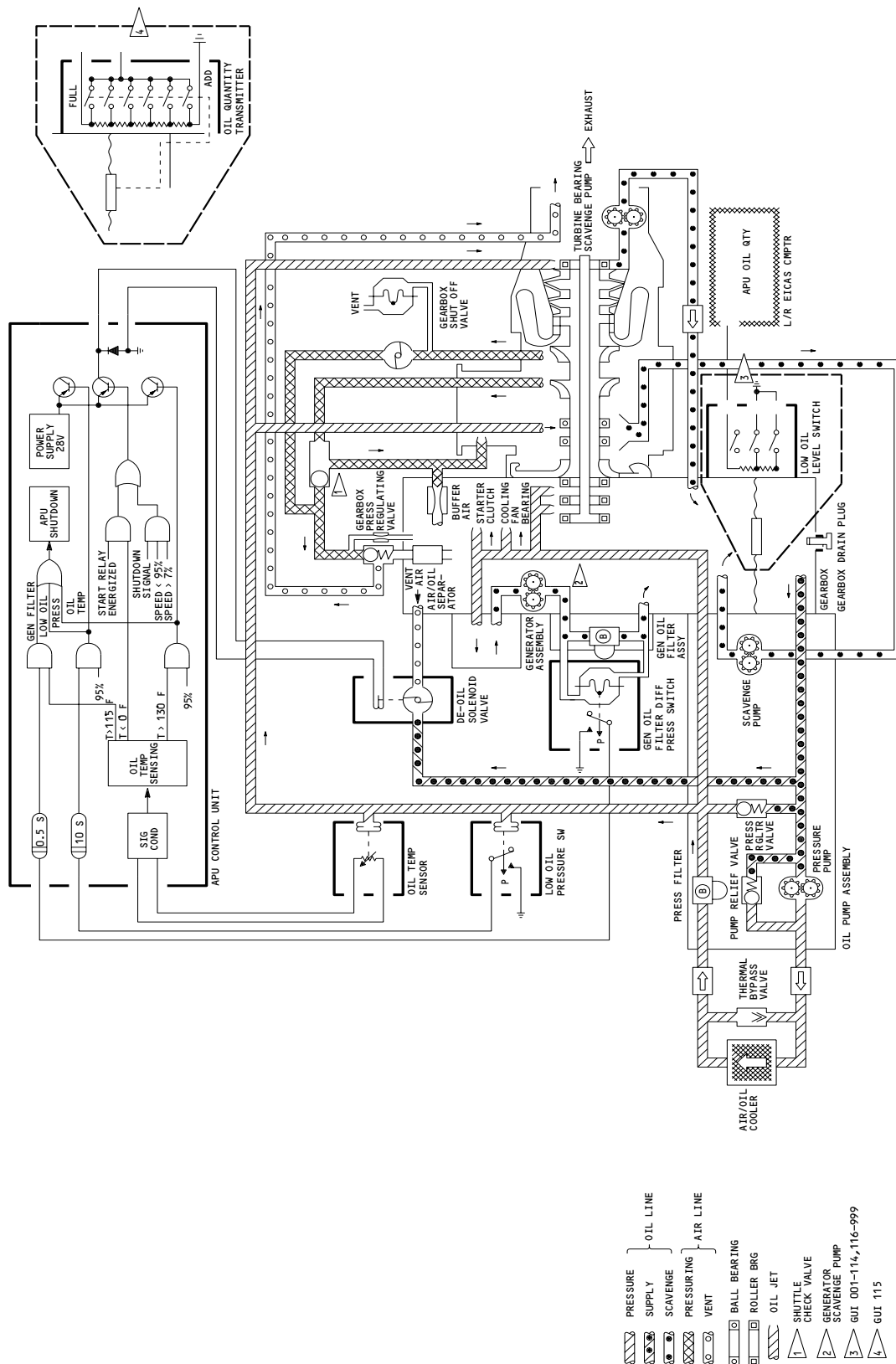
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APU and Generator Lubrication System Schematic  
Figure 1

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C. ON GUI 001-114, 116-999;

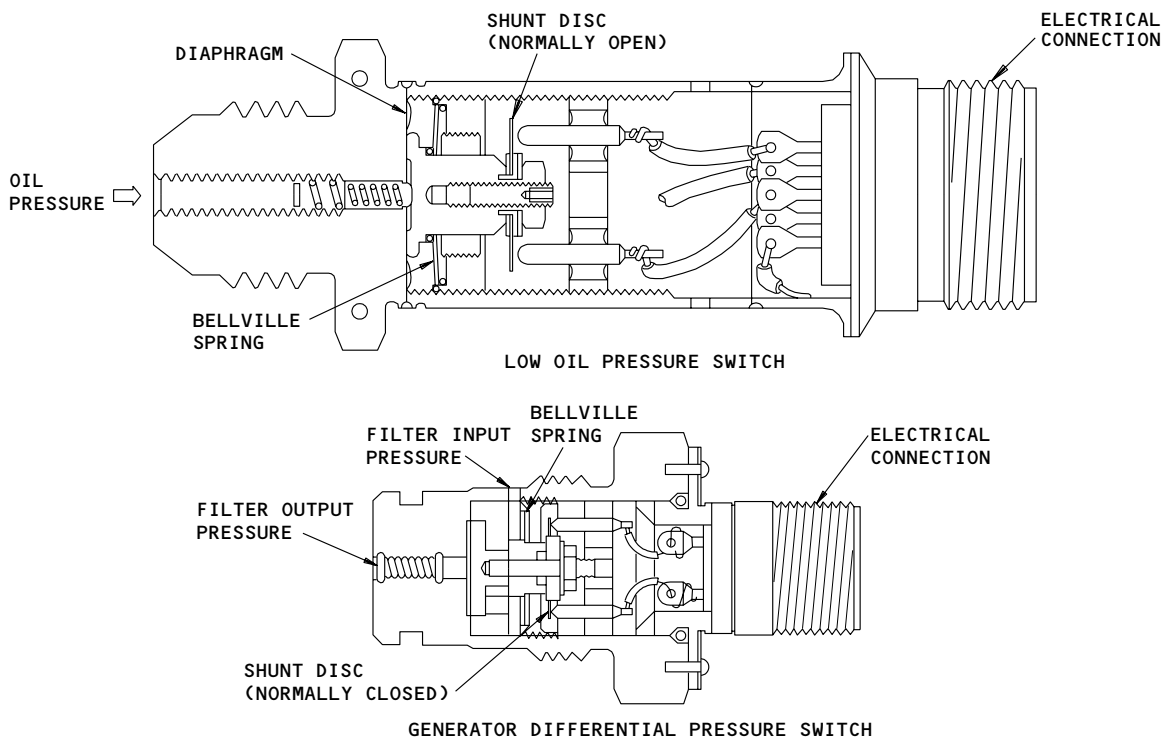
Low Oil Level Switch (Fig. 3)

(1) The switch consists of two parallel reed switches, a magnetic float and a housing with an electrical receptacle. It is installed through the bottom of the gearbox. After APU shutdown, the low oil level switch sends an APU OIL QTY signal to the EICAS if the oil level is 4.25 quarts or less. This signal is stored in memory and can be read on the status and maintenance pages of the EICAS.

D. ON GUI 115;

Oil Quantity Transmitter (Fig. 3)

(1) The transmitter consists of a magnet/float that triggers a series of magnetic proximity switches which gives a signal to EICAS. EICAS messages read "FULL", "0.75", "0.50", "0.25", and "ADD". The transmitter is installed through the bottom of the gearbox. When the quantity reaches "ADD" an additional EICAS "APU OIL QTY" message also appears.



APU Oil Pressure Switches  
Figure 2

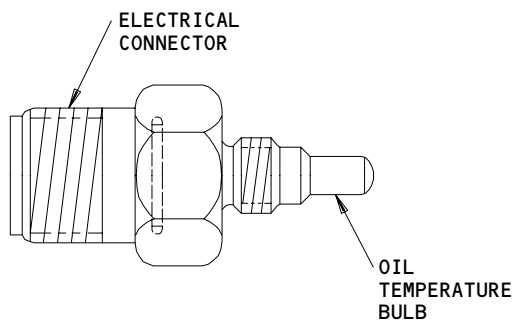
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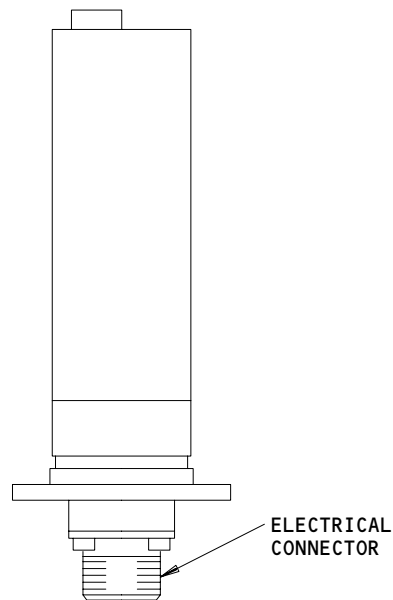
E. Oil Temperature Sensor (Fig. 3)

- (1) The sensor consists of a variable resistance bulb and an electrical connector. The switch is installed in a common housing with the switch for the low oil pressure located on the load compressor case. At speeds greater than 95 percent, an oil temperature signal to the APU control unit greater than 310° (± 10°)F for more than 10 seconds activates protective shutdown. The cause of shutdown is stored in BITE memory (Ref 49-61-00-0).



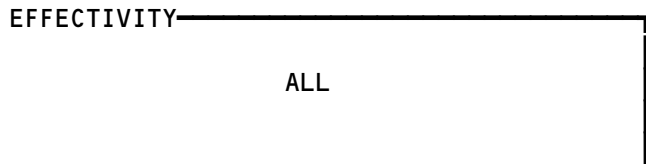
OIL TEMPERATURE SENSOR

- 1 GUI 001-114,116-999
- 2 GUI 115



LOW OIL LEVEL SWITCH 1  
OIL QUANTITY TRANSMITTER 2



APU Oil Indicators  
Figure 3





**49-94-00**

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APU OIL INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SENSOR - OIL TEMPERATURE, YBMTS1	--	1	315AL,316AR, APU COMPT, RIGHT SIDE LOAD COMPRESSOR	49-94-01
SWITCH - LOW OIL LEVEL, YBMS3 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-94-03
SWITCH - LOW OIL PRESSURE, YBMS2	--	1	315AL,316AR, APU COMPT, RIGHT SIDE LOAD COMPRESSOR	49-94-02
TRANSMITTER - OIL QUANTITY, YBMS3 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-94-04

 GUI 001-114,116-999

 GUI 115

APU Oil Indicating System - Component Index  
Figure 101

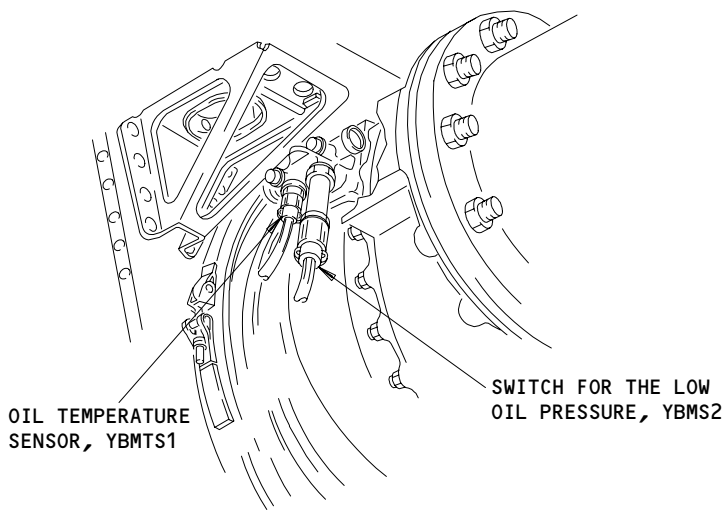
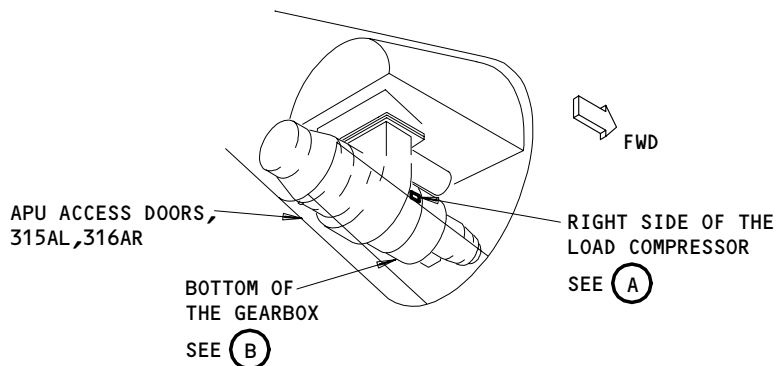
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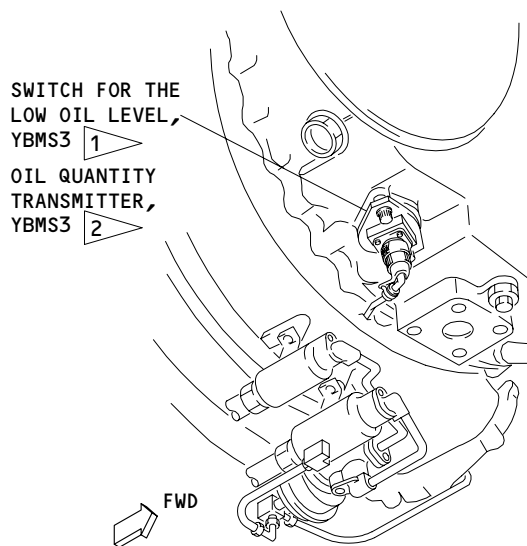
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RIGHT SIDE OF THE LOAD COMPRESSOR

(A)



BOTTOM OF THE GEARBOX

(B)

- 1 GUI 001-114,116-999
- 2 GUI 115

APU Oil Indicating System - Component Location  
Figure 102

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OIL TEMPERATURE SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the oil temperature sensor on the APU.
- B. The oil temperature sensor is on the top right side of the APU, forward of the air inlet plenum. You can get access to the sensor through the APU access doors.

TASK 49-94-01-004-001

2. Oil Temperature Sensor Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

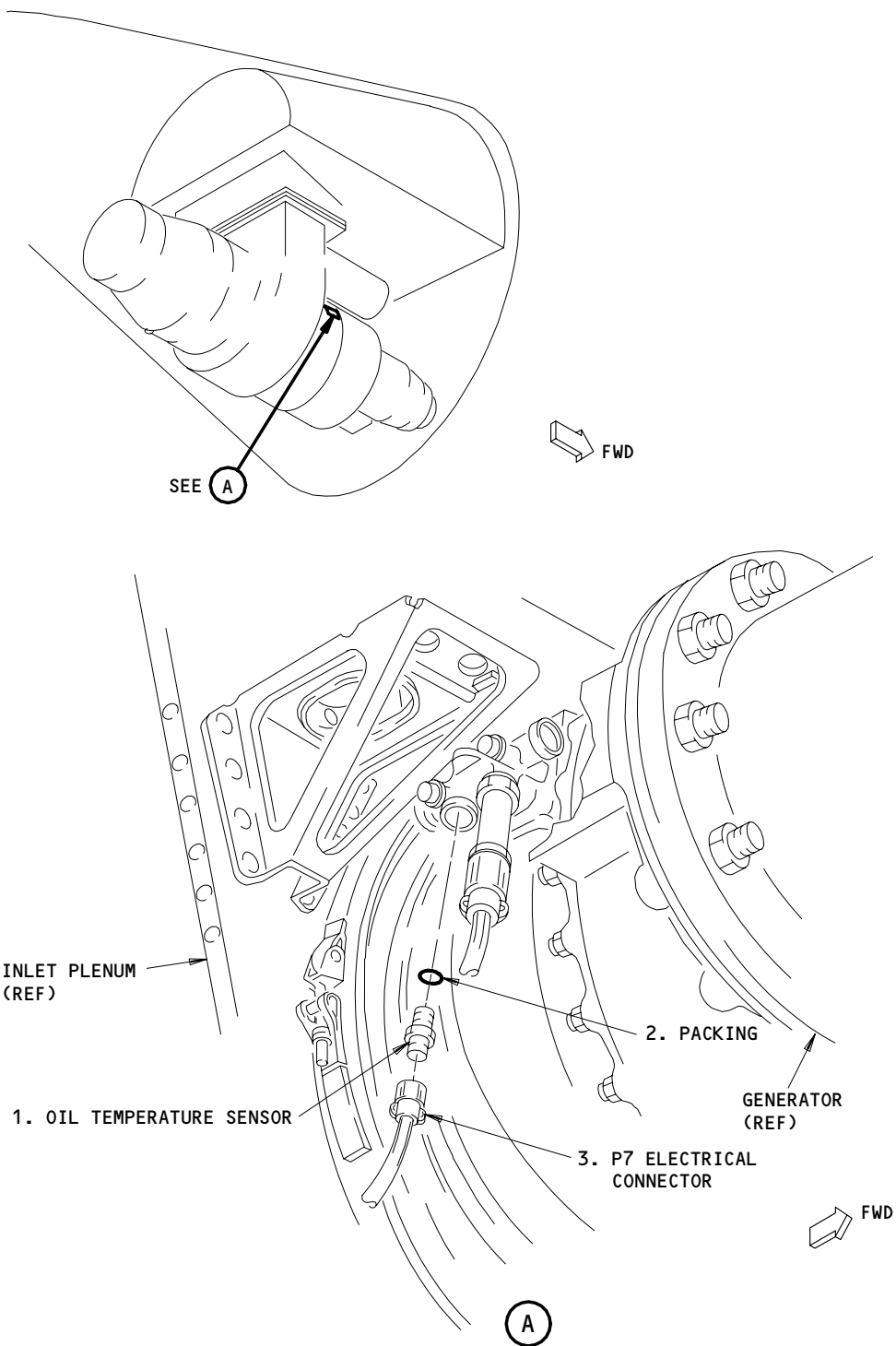
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Oil Temperature Sensor Installation  
Figure 401

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- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 024-020

**WARNING:** DO NOT TOUCH THE OIL SYSTEM PARTS IF THE APU IS HOT. THESE PARTS STAY HOTTER THAN OTHER ENGINE PARTS AFTER AN APU SHUTDOWN. IF YOU TOUCH AN OIL SYSTEM PART WHEN THE APU IS HOT, IT CAN BURN YOU.

- (4) Remove the oil temperature sensor:
  - (a) Disconnect the P7 electrical connector (3) from the oil temperature sensor (1).
  - (b) Put caps on the P7 electrical connector (3) and the oil temperature sensor (1) for protection.

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (c) Remove the oil temperature sensor (1) and the packing (2) from the APU.
  - 1) Discard the packing (2).

TASK 49-94-01-404-008

3. Oil Temperature Sensor Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

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- (2) D00341 Lubricant - Santovac 5
- (3) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter)-  
NASM20995C32

**B. Parts**

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Oil Temperature Switch (Oil Temperature Sensor)	49-94-01	02	50
	2	Packing			55

**C. References**

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

**D. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

**E. Procedure**

S 424-009

- (1) Install the oil temperature sensor:
  - (a) Lubricate the new packing (2) with a light coat of lubricant or oil.
  - (b) Install the packing (2) on the oil temperature sensor (1).
  - (c) Install the oil temperature sensor (1) in the APU.
    - 1) Tighten the oil temperature sensor (1) to 95-105 inch-pounds (10.7-11.9 newton-meters).
  - (d) Install a lockwire between the low oil pressure switch and the oil temperature sensor (1).
  - (e) Remove the caps from the P7 electrical connector (3) and the oil temperature sensor (1).
  - (f) Connect the P7 electrical connector (3) to the oil temperature sensor (1).

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(g) Install a lockwire on the P7 electrical connector (3).

S 734-013

(2) Do the self-test for the APU system (AMM 49-61-05/201).

S 864-014

(3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) E6 Rack, Aft Equipment Center

1) APU CONT

(b) P11 Overhead Panel

1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 864-016

(4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-017

(5) Do a leakage test for the installation of the oil temperature sensor:

(a) Start and operate the APU (AMM 49-11-00/201).

(b) During the APU operation, examine the oil temperature sensor for leakage.

(c) Do a shutdown of the APU (AMM 49-11-00/201).

(d) If you found leakage, repair the cause of it.

S 414-019

(6) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Disengage the support rods for the APU access doors.

(b) Put the support rods in the clips on the inner side of the APU access doors.

(c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.

(d) Lift the left access door and align it with the right access door.

(e) Close and latch the APU access doors.

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LOW OIL PRESSURE SWITCH – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these three tasks:
  - (1) Low Oil Pressure Switch Removal
  - (2) Low Oil Pressure Switch Installation
  - (3) Low Oil Pressure Switch Inspection.
- B. The low oil pressure switch is on the top right side of the APU, forward of the air inlet plenum. You can get access to the switch through the APU access doors.

TASK 49-94-02-002-001

2. Low Oil Pressure Switch Removal (Fig. 201)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.

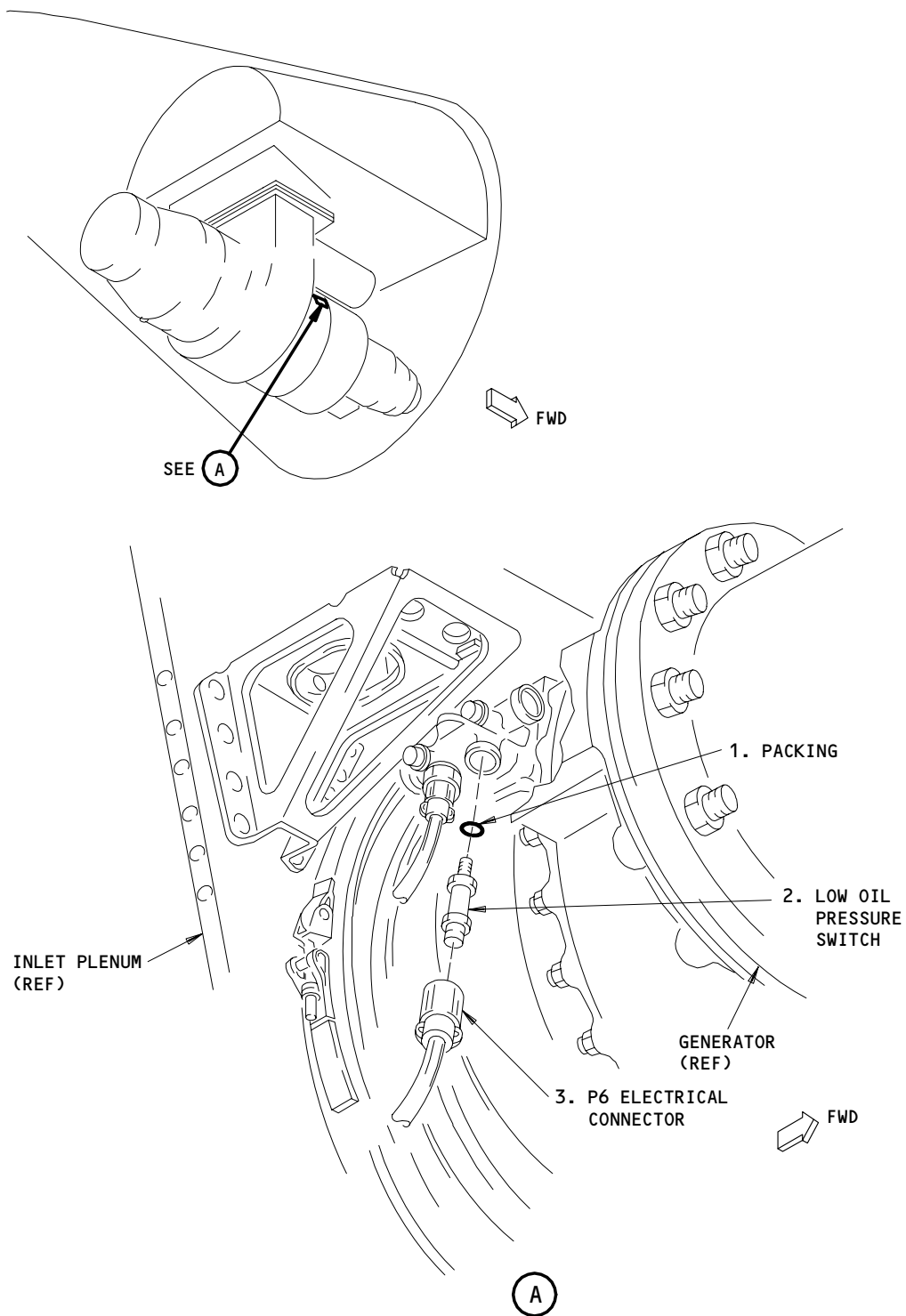
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Low Oil Pressure Switch Installation  
Figure 201

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49-94-02

- (b) Open the left access door.
- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 022-023

**WARNING:** DO NOT TOUCH THE OIL SYSTEM PARTS IF THE APU IS HOT. THESE PARTS STAY HOTTER THAN OTHER ENGINE PARTS AFTER AN APU SHUTDOWN. IF YOU TOUCH AN OIL SYSTEM PART WHEN THE ENGINE IS HOT, IT CAN BURN YOU.

- (4) Remove the low oil pressure (LOP) switch:
  - (a) Disconnect the P6 electrical connector (3) from the LOP switch (2).
  - (b) Install caps on the P6 electrical connector (3) and the LOP switch (2) for protection.

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (c) Remove the LOP switch (2) and the packing (1) from the APU.
  - 1) Discard the packing (1).

TASK 49-94-02-402-008

3. Low Oil Pressure Switch Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

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- (3) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) - NASM20995C32

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Packing	49-94-02	01	75
	2	Low Oil Pressure Switch			70

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power unit
- (3) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-009

- (1) Install the low oil pressure (LOP) switch:
  - (a) Lubricate the new packing (1) with a light coat of lubricant or oil.
  - (b) Install the packing (1) on the LOP switch (2).
  - (c) Install the LOP switch (2) in the APU.
    - 1) Tighten the LOP switch (2) to 125-135 inch-pounds (14.1-15.3 newton-meters).
  - (d) Install a lockwire between the oil temperature sensor and the LOP switch (2).
  - (e) Remove the caps from the P6 electrical connector (3) and the LOP switch (2).
  - (f) Connect the P6 electrical connector (3) to the LOP switch (2).
  - (g) Install a lockwire on the P6 electrical connector (3).

S 732-013

- (2) Do the self-test for the APU system (AMM 49-61-05/201).

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S 862-014

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-016

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-017

- (5) Do a leakage test for the LOP installation:
- (a) Do this task: APU Start and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the LOP for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 412-019

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

TASK 49-94-02-202-020

4. Low Oil Pressure Switch Inspection

A. Standard Tools and Equipment

- (1) Multimeter

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

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C. Procedure

S 012-021

- (1) If it is installed, remove the low oil pressure (LOP) switch (Ref par. 2).

S 212-024

- (2) Visually examine the LOP switch:
  - (a) Examine the welds and the solder joints to make sure there are no cracks.
  - (b) Examine the LOP switch for other damage.

S 972-025

- (3) Use the multimeter to measure the resistance between pin 3 and the case of the LOP switch.
  - (a) The resistance must not be more than 0.025 ohms.

S 422-028

- (4) Install the LOP switch (Ref par. 3).

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LOW OIL LEVEL SWITCH – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) Low Oil Level Switch Removal
  - (2) Low Oil Level Switch Installation
  - (3) Low Oil Level Switch Inspection.
- B. The low oil level switch is on the bottom of the APU gearbox. You can get access to the switch through the APU access doors.

TASK 49-94-03-002-001

2. Low Oil Level Switch Removal (Fig. 201)

A. References

- (1) AMM 49-27-00/301, APU and Generator Lubrication System – Servicing (Oil Change)

B. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

C. Procedure

S 682-024

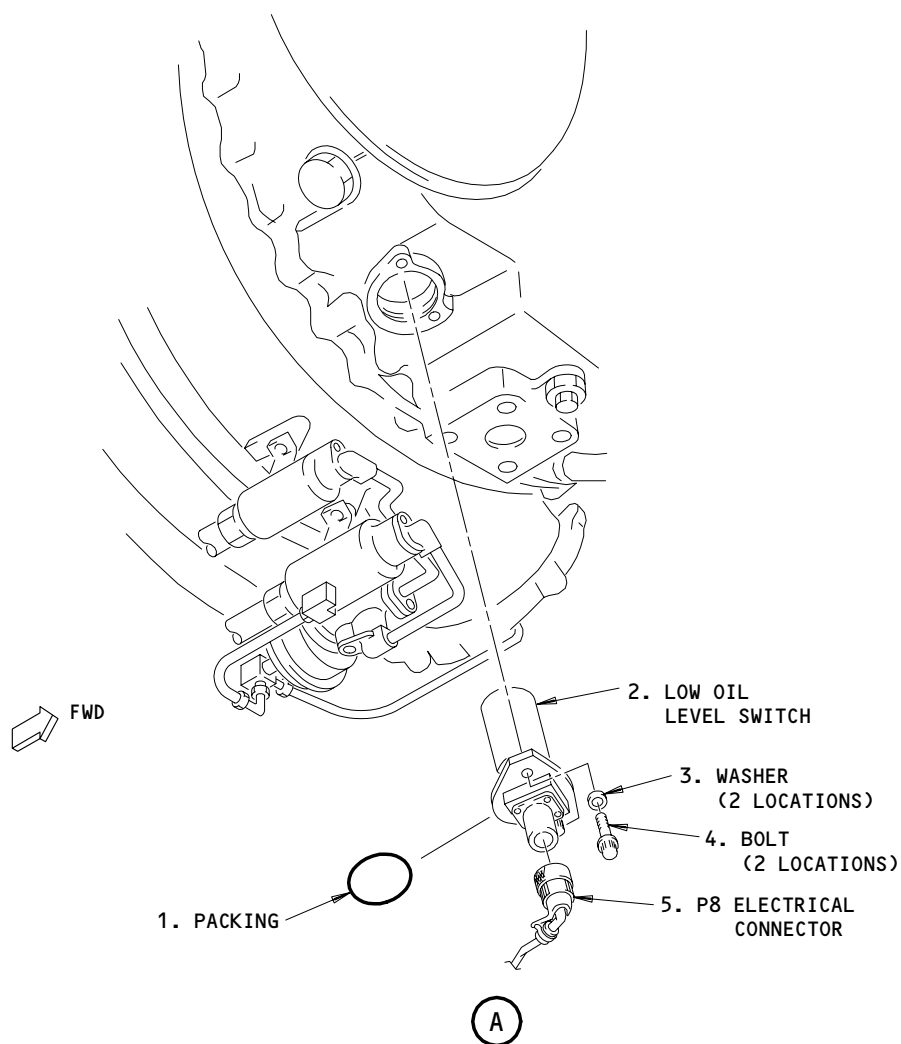
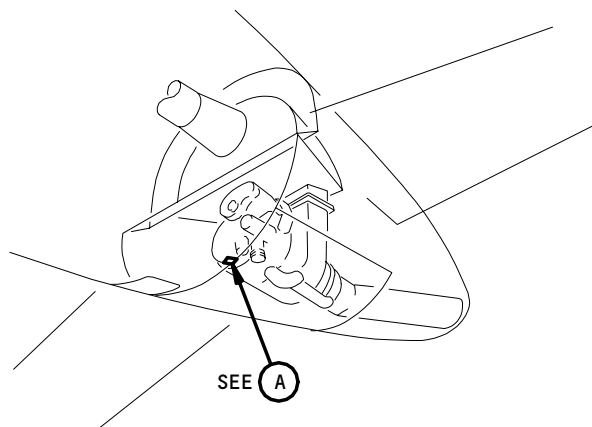
- (1) Drain the oil from the gearbox (AMM 49-27-00/301).

S 022-025

- (2) Remove the low oil level switch:
  - (a) Disconnect the P8 electrical connector (5) from the low oil level switch (2).

EFFECTIVITY  
APU WITH THE LOW OIL LEVEL SWITCH

**49-94-03**



Low Oil Level Switch Installation  
Figure 201

EFFECTIVITY  
APU WITH THE LOW OIL LEVEL SWITCH

49-94-03



- (b) Put caps on the P8 electrical connector (5) and the low oil level switch (2) for protection.
- (c) Remove the bolts (4) and the washers (3).
- (d) Remove the low oil level switch (2) from the gearbox.
- (e) Remove and discard the packing (1) from the low oil level switch (2).

TASK 49-94-03-402-010

3. Low Oil Level Switch Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Packing	49-94-03	01	45
	2	Oil Level Switch			40

C. References

- (1) AMM 12-13-04/301, APU Servicing (Fill the Oil)

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-011

- (1) Install the low oil level switch (2):
  - (a) Lubricate the new packing (1) with a light coat of lubricant or oil.
  - (b) Install the packing (1) on the low oil level switch (2).
  - (c) Install the low oil level switch (2) in the APU gearbox.

EFFECTIVITY  
APU WITH THE LOW OIL LEVEL SWITCH

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- (d) Install the bolts (4) and the washers (3).
  - 1) Tighten the bolts (4) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (e) Remove the caps from the P8 electrical connector (5) and the low oil level switch (2).
- (f) Connect the P8 electrical connector (5) to the low oil level switch (2).
- (g) Install a lockwire on the P8 electrical connector (5).

S 612-015

- (2) Fill the APU gearbox with oil (AMM 12-13-04/301).

TASK 49-94-03-202-020

4. Low Oil Level Switch Inspection

A. Standard Tools and Equipment

- (1) Ohmmeter - 0-10 ohm range maximum

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-027

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-028

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU CONT

S 012-029

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.

EFFECTIVITY  
APU WITH THE LOW OIL LEVEL SWITCH

49-94-03

- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 212-021

- (4) Examine the low oil level switch:
  - (a) Disconnect the P8 electrical connector from the low oil level switch.
  - (b) Examine the low oil level switch for cracks and damage on all the switch joints.
  - (c) If you find cracks or damage, replace the low oil level switch.

S 282-022

- (5) Measure the resistance between pin 7 and the case on the low oil level switch with the ohmmeter.
  - (a) Make sure the resistance is a maximum of 0.025 ohms.
  - (b) Connect the P8 electrical connector to the low oil level switch.

S 412-030

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-031

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-032

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY  
APU WITH THE LOW OIL LEVEL SWITCH

49-94-03

OIL QUANTITY TRANSMITTER – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these tasks:
  - (1) Oil Quantity Transmitter Removal
  - (2) Oil Quantity Transmitter Installation
  - (3) Oil Quantity Transmitter Inspection.
- B. The oil quantity transmitter is on the bottom of the APU gearbox. You can get access to the transmitter through the APU access doors.

TASK 49-94-04-002-001

2. Oil Quantity Transmitter Removal (Fig. 201)

A. References

- (1) AMM 49-27-00/301, APU and Generator Lubrication System – Servicing (Oil Change)

B. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

C. Procedure

S 682-023

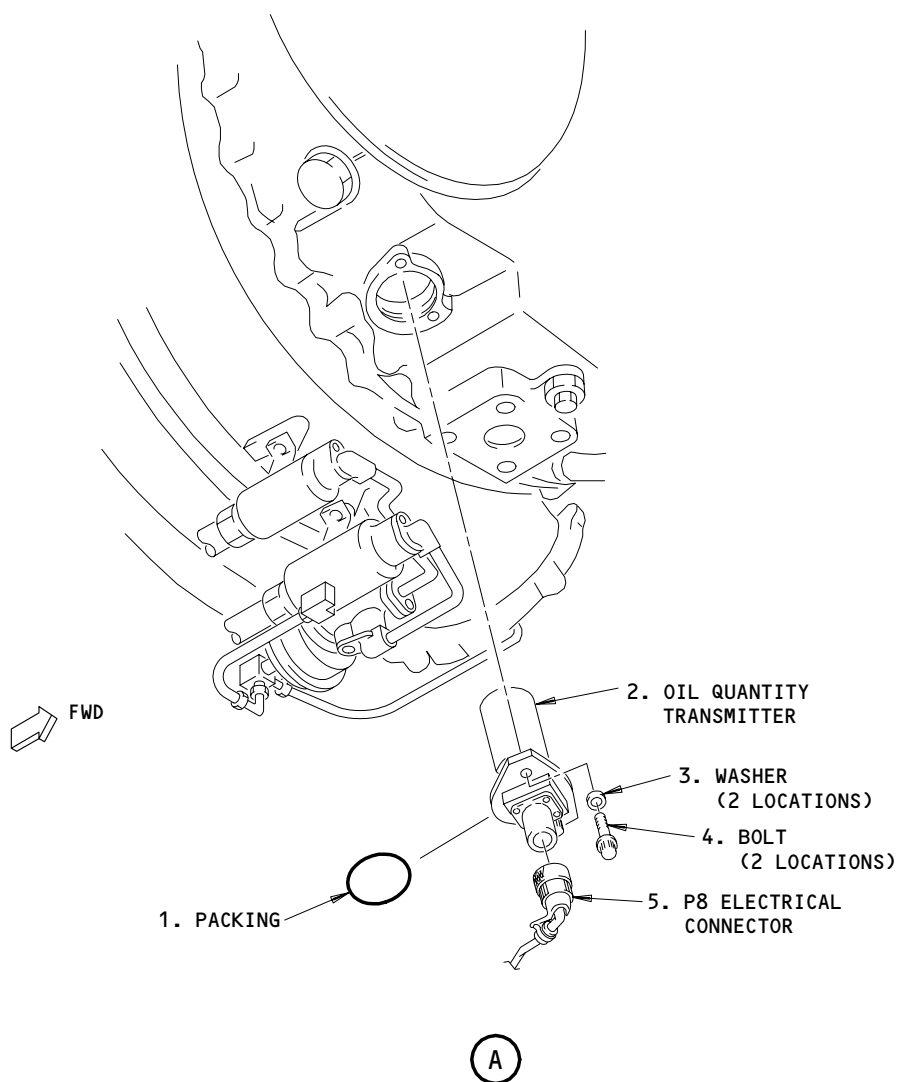
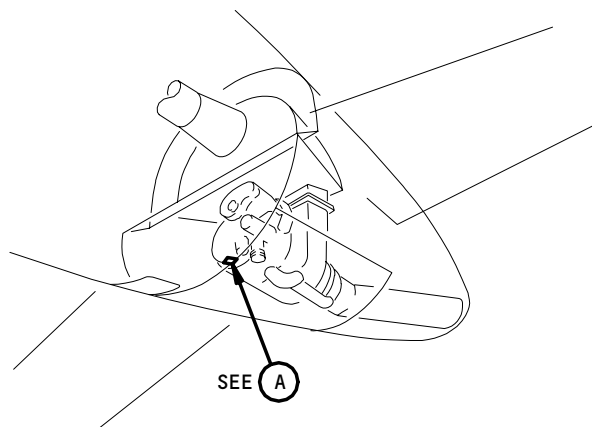
- (1) Drain the oil from the APU gearbox (AMM 49-27-00/301).

S 022-024

- (2) Remove the oil quantity transmitter (2):
  - (a) Disconnect the P8 electrical connector (5) from the oil quantity transmitter (2).
  - (b) Put caps on the electrical connector (5) and the oil quantity transmitter (2) for protection.

EFFECTIVITY  
APU WITH THE OIL QUANTITY TRANSMITTER

**49-94-04**



Oil Quantity Transmitter Installation  
Figure 201

EFFECTIVITY  
APU WITH THE OIL QUANTITY TRANSMITTER

49-94-04

- (c) Remove the bolts (4) and the washers (3).
- (d) Remove the oil quantity transmitter (2) from the APU gearbox.
- (e) Remove and discard the packing (1) from the oil quantity transmitter (2).

TASK 49-94-04-402-010

3. Oil Quantity Transmitter Installation (Fig. 201)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Packing	49-94-04	01	10
	2	Oil Quantity Transmitter			15

C. References

- (1) AMM 12-13-04/301, APU Servicing (Fill the Oil)

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-011

- (1) Install the oil quantity transmitter (2):
  - (a) Lubricate the new packing (1) with a light coat of lubricant or oil.
  - (b) Install the packing (1) on the oil quantity transmitter (2).
  - (c) Install the oil quantity transmitter (2) in the APU gearbox.

EFFECTIVITY \_\_\_\_\_  
APU WITH THE OIL QUANTITY TRANSMITTER

**49-94-04**

- (d) Install the bolts (4) and the washers (3).
  - 1) Tighten the bolts (4) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (e) Remove the caps from the oil quantity transmitter (2) and the electrical connector (5).
- (f) Connect the P8 electrical connector (5) to the oil quantity transmitter (2).
- (g) Install a lockwire on the P8 electrical connector (5).

S 612-016

- (2) Fill the APU gearbox with oil (AMM 12-13-04/301).

TASK 49-94-04-202-020

4. Oil Quantity Transmitter Inspection

A. Standard Tools and Equipment

- (1) Ohmmeter - 0-10 ohms range maximum

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-025

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-026

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT
  - (b) E6 Rack, Aft Equipment Center
    - 1) APU ALTN CONT

S 012-027

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Open the latches on the APU access doors.
  - (b) Open the left access door.

EFFECTIVITY  
APU WITH THE OIL QUANTITY TRANSMITTER

49-94-04

- (c) Push the right access door up and pull the spring latch aft until the latch disengages.
- (d) Open the right access door.
- (e) Engage the support rods for the APU access doors.

S 212-021

- (4) Examine the oil quantity transmitter:
  - (a) Disconnect the P8 electrical connector from the oil quantity transmitter.
  - (b) Examine the oil quantity transmitter for cracks and damage at the joints.
  - (c) If you find cracks or damage, replace the oil quantity transmitter.

S 282-022

- (5) Measure the resistance between pin 7 and the case of the oil quantity transmitter with the ohmmeter.
  - (a) Make sure the resistance is not more than 0.025 ohms.
  - (b) Connect the P8 electrical connector to the oil quantity transmitter.

S 412-028

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Disengage the support rods for the APU access doors.
  - (b) Put the support rods in the clips on the inner side of the APU access doors.
  - (c) Lift the right access door until the spring latch, at the forward end of the door, catches and holds the door on the fuselage frame.
  - (d) Lift the left access door and align it with the right access door.
  - (e) Close and latch the APU access doors.

S 862-029

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) E6 Rack, Aft Equipment Center
    - 1) APU ALTN CONT
  - (b) P11 Overhead Panel
    - 1) 11B34, APU MN BAT CONT or APU ALTN CONT

S 862-030

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY \_\_\_\_\_  
APU WITH THE OIL QUANTITY TRANSMITTER

**49-94-04**