

CHAPTER

80

STARTING

**737-600/700/800/900
AIRCRAFT MAINTENANCE MANUAL**

**CHAPTER 80
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STARTING - DDG MAINTENANCE PROCEDURES**1. General**

- A. This procedure has the maintenance tasks for the Master Minimum Equipment List (MMEL) maintenance requirements as shown in the Dispatch Deviations Procedures Guide (DDPG). These tasks prepare the airplane for flight with systems/components that are inoperative.
- B. This procedure also has the tasks to put the airplane back to its usual condition.
- C. These are the tasks for the components in the starting system:
 - (1) MMEL 80-3 (DDPG) Preparation - Start Valve Inoperative
 - (2) MMEL 80-3 (DDPG) Restoration - Start Valve Inoperative.

TASK 80-00-00-040-801-F00**2. MMEL 80-3 (DDPG) Preparation - Start Valve Inoperative**

- A. General
 - (1) This task prepares the airplane for flight with the start valve inoperative.
- B. References

Reference	Title
71-00-00-800-809-F00	Start the Engine Procedure (Manual Override of the Engine Start Valve) (P/B 201)

C. Procedure

SUBTASK 80-00-00-980-001-F00

- (1) Do this task: Start the Engine Procedure (Manual Override of the Engine Start Valve), TASK 71-00-00-800-809-F00.

————— END OF TASK —————

TASK 80-00-00-440-801-F00**3. MMEL 80-3 (DDPG) Restoration - Start Valve Inoperative**

- A. General
 - (1) This task puts the airplane back to its usual condition after operation with the start valve inoperative.
- B. Procedure
 - (1) Do the applicable fault isolation task in the FIM to correct the problem.

————— END OF TASK —————

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ENGINE STARTING SYSTEM - MAINTENANCE PRACTICES**1. General**

A. This procedure has two tasks:

- (1) The starter switch removal
- (2) The starter switch installation.

TASK 80-11-00-000-801-F00**2. Starter Switch Removal**

A. General

- (1) The task gives the instructions on how to remove the starter switch.
- (2) The starter switch is located on the P5 overhead panel.
- (3) The starter switch is referred to as the switch.

B. Location Zones

<u>Zone</u>	<u>Area</u>
211	Flight Compartment - Left
212	Flight Compartment - Right

C. Prepare for the Removal

SUBTASK 80-11-00-865-001-F00

- (1) Open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-00-865-002-F00

- (2) Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-00-860-006-F00

- (3) Make sure that the start lever is in the CUTOFF position and install a DO-NOT-OPERATE tag.

SUBTASK 80-11-00-860-007-F00

- (4) Make sure that the engine start switch is off and install a DO-NOT-OPERATE tag.

D. Start Switch Removal

SUBTASK 80-11-00-860-008-F00

- (1) Unlatch the P5 overhead panel and put it in the open position.

SUBTASK 80-11-00-030-001-F00

- (2) Disconnect the applicable wire from the switch [1].
 - (a) Remove each wire lug from the terminal.

SUBTASK 80-11-00-020-001-F00

- (3) Remove the knob from the switch [1].

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SUBTASK 80-11-00-020-002-F00

(4) Remove the spacer [2].

SUBTASK 80-11-00-020-003-F00

(5) Remove the nut [3] and washer [4] from the switch [1].

SUBTASK 80-11-00-020-004-F00

(6) Remove the switch [1].

————— **END OF TASK** —————

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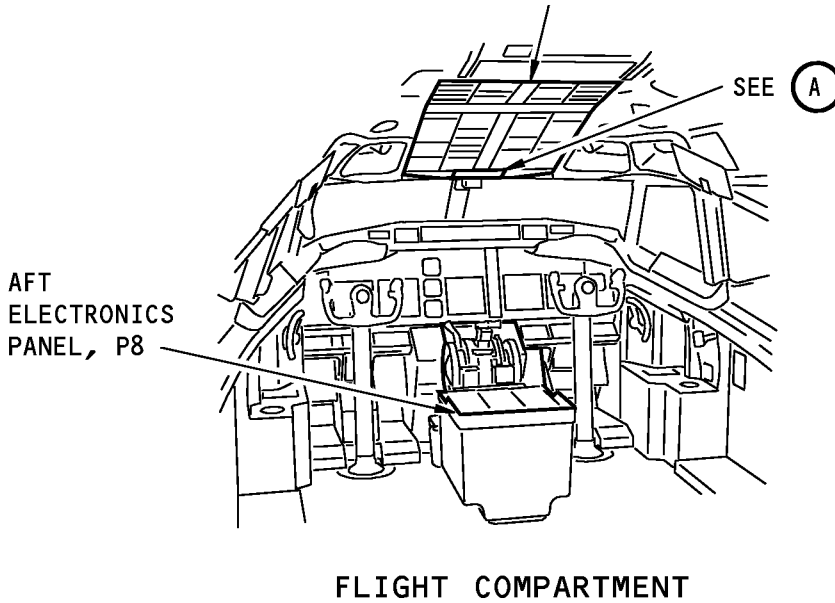
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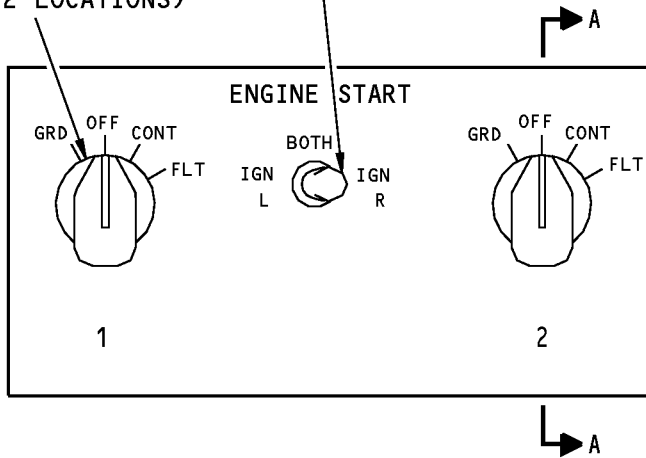
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OVERHEAD PANEL, P5

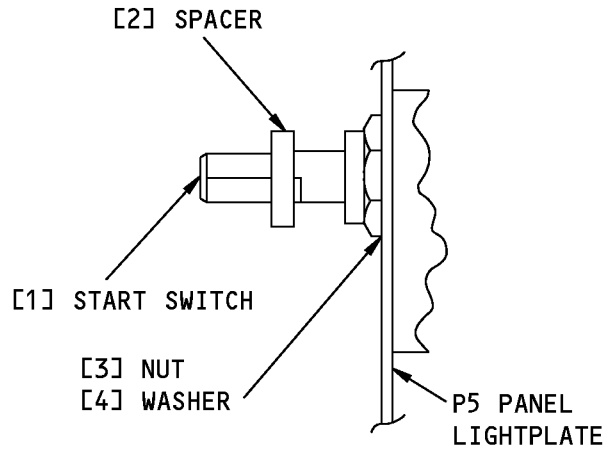


ENGINE START SWITCH
 (2 LOCATIONS)

IGNITION SELECT SWITCH, S858



(A)



Starter Switch Installation
 Figure 201/80-11-00-990-801-F00

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TASK 80-11-00-400-801-F00

3. Starter Switch Installation

A. General

- (1) The task gives the instructions on how to install the starter switch.
- (2) The starter switch is located on the P5 overhead panel.
- (3) The starter switch is referred to as the switch.

B. References

Reference	Title
80-11-00-730-801-F00	Start Switch Test (P/B 501)

C. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Switch	Not Specified	

D. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right

E. Start Switch Installation

SUBTASK 80-11-00-420-001-F00

- (1) Do these steps that follow to install the applicable switch [1]:
 - (a) Put the switch [1] switch in its position in the P5 overhead panel.
 - (b) Install the washer [4] and nut [3].
 - 1) Tighten the nut [3].
 - (c) Install the spacer [2] and the knob.

NOTE: The spacer part number is 69-59092-1.

 - 1) Tighten the knob.
 - (d) Connect the applicable wire back to the switch [1].
 - 1) Install each wire lug to its terminal.
 - (e) Close and latch the P5 overhead panel.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 80-11-00-865-003-F00

- (1) Remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-00-865-004-F00

- (2) Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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SUBTASK 80-11-00-860-009-F00

(3) Remove the DO-NOT-OPERATE tag from the applicable start lever.

SUBTASK 80-11-00-710-001-F00

(4) Do the task: Start Switch Test, TASK 80-11-00-730-801-F00.

————— **END OF TASK** —————

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ENGINE STARTING SYSTEM - ADJUSTMENT/TEST**1. General**

A. This procedure has one task to do a test of the engine start switch.

TASK 80-11-00-730-801-F00**2. Start Switch Test**

A. General

(1) This task is a test of the engine start switch with input monitoring and engine operation.

(a) You can use this test after the replacement of the engine start switch or to examine the operation of the switch.

(b) The engine start switch S266 (Eng 1) or S267 (Eng 2) is located on the P5 overhead panel.

B. References

Reference	Title
36-00-00-860-806	Remove Pressure from the Pneumatic System (P/B 201)
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-808-F00	Start the Engine Procedure (Normal Start) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
73-21-00-740-803-F00	EEC BITE TEST - RECENT FAULTS (P/B 501)
SSM 74-31-11	System Schematics Manual

C. Tools/Equipment

Reference	Description
STD-1231	Multimeter - Standard

D. Location Zones

Zone	Area
211	Flight Compartment - Left
212	Flight Compartment - Right

E. Procedure

SUBTASK 80-11-00-860-001-F00

(1) Make sure that pneumatic power is not available to the airplane.

(a) Do this task: Remove Pressure from the Pneumatic System, TASK 36-00-00-860-806.

SUBTASK 80-11-00-860-002-F00

(2) Move the applicable engine start switch to the GRD position and make sure the switch holds in this position.

(a) Move the switch back to the OFF position.

SUBTASK 80-11-00-860-003-F00

(3) Do these steps to get access to the Display Electronics Unit (DEU) input monitoring of discrete display:

(a) Get access to the applicable input monitoring screen on the FMCS CDU:

1) Push the INIT REF key two times.

2) Push the INDEX line select key (LSK).

NOTE: This causes the INIT REF INDEX to show.

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- 3) Push the MAINT LSK.

NOTE: This causes the MAINT BITE INDEX to show.

- 4) Push the CDS LSK.

NOTE: This causes the CDS BITE INDEX to show.

- 5) Push the line select key for one of the DEU's, DEU 1 or DEU 2.

- 6) Push the INPUT MONITORING LSK.

NOTE: This causes the CDS DEU X MAINT/BITE DISCRETE STATUS MENU to show.

SUBTASK 80-11-00-860-004-F00

- (4) Do these steps to examine the parameters for the applicable Engine Start Switch position on the applicable DEU:

- (a) For Engine 1, Push the SELECT B LSK.

NOTE: This causes the CDS DEU X MAINT/BITE DISCRETE STATUS, INSERT B screen to show.

- (b) For Engine 2, Push the SELECT E LSK.

NOTE: This causes the CDS DEU X MAINT/BITE DISCRETE STATUS, INSERT E screen to show.

- 1) Record the values that shows in column F, row 9.

- 2) Push the NEXT PAGE key.

- 3) Record the values that shows in column C, row 14.

- (c) Make sure that the values agree with this table for the noted switch positions:

Table 501/80-11-00-993-801-F00

ENGINE START SWITCH POSITION	COLUMN F ROW 9	COLUMN C ROW 14
OFF	0	0
GRD	G	O
CONT	G	O
FLT	O	G

- 1) Move the start switch to the other positions in the table and do the above steps again to record the values.

- 2) The CDU screen updates once per second. The status of the discrete may take as long as two seconds to update.

- 3) G is for ground, O is for open, V is for 28 VDC, X is for invalid and - is for no discrete.

- (d) Push the INDEX LSK until the CDS BITE INDEX shows.

- 1) Do the steps again to examine the other DEU, DEU 1 or DEU 2.

- (e) If the values agree, then the engine start switch circuit is satisfactory from the switch to the DEUs (SSM 74-31-11).

- (f) If the values do not agree and you find an O when a G is expected, then look for an open circuit in the switch, or the wire and connector between the engine start switch and the DEU.

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- (g) If the values do not agree and you find an G when an O is expected, then look for an short to ground in the switch, or the wire and connector between the engine start switch and the DEU.

SUBTASK 80-11-00-860-005-F00

- (5) Do one of the steps that follows (engine operation or wiring check) to do a check of the start switch.
- (a) Do this engine operation to examine the AIRINC parameters of the applicable engine start switch:
- 1) Start the applicable engine with the effected start switch. To start the engine, do this task: Start the Engine Procedure (Normal Start), TASK 71-00-00-800-808-F00.
 - 2) Operate the engine at idle.
 - 3) Move the effected start switch to the CONT position for at least ten seconds.
 - 4) Move the effected start switch to the FLT position for at least ten seconds.
 - 5) Move the start switch to the OFF position.
 - 6) Do this task: Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00.
- (b) Do a wiring check of the applicable engine start switch.
- 1) For engine 1, open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

- 2) For engine 2, open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

- 3) For the applicable engine, do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.
- 4) Disconnect EEC connector, DP0303.
- 5) With a multimeter, STD-1231, make sure there is continuity between pins W and r on the airplane side of connector DP0303 with the start switch in these positions:

NOTE: There should be no continuity with the start switch in the OFF or AUTO position.

 - a) GND
 - b) CONT
 - c) FLT.
- 6) Connect EEC Connector DP0303.

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- 7) For engine 1, remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	1	C00458	ENGINE 1 IGNITION RIGHT
A	3	C00153	ENGINE 1 IGNITION LEFT
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

- 8) For engine 2, remove the safety tags and close these circuit breakers:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	4	C00459	ENGINE 2 IGNITION RIGHT
D	6	C00151	ENGINE 2 IGNITION LEFT
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

SUBTASK 80-11-00-740-001-F00

- (6) For the applicable engine, do this task: EEC BITE TEST - RECENT FAULTS, TASK 73-21-00-740-803-F00.
- (a) Look in Flight Leg 0 for these maintenance messages for Start Switch Signals and AIRINC Bus Data Disagree:
- 1) 73-10311, 73-10312, 73-20311, 73-20312, 73-30311 or 73-30312.
- (b) If one of the above messages show, use the 73 FIM to correct the fault.
- 1) Find the fault code or description of the fault that occurred.
 - 2) Go to the applicable index or list in the FIM and find the FIM task number.
 - 3) Go to the task in the FIM and do the steps in the task.
- (c) If the above messages do not show, then the start switch is satisfactory.

SUBTASK 80-11-00-410-001-F00

- (7) If the fan cowl panels were opened, do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

————— **END OF TASK** —————

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STARTER - SERVICING**1. General**

A. This procedure has these tasks:

- (1) The task to drain the engine oil from the starter
- (2) The task to fill the starter with engine oil.

TASK 80-11-01-680-801-F00**2. Drain the Starter Oil**

(Figure 301)

A. General

- (1) This procedure uses a tool at the magnetic plug housing to drain the oil from the starter.
- (2) If you remove the starter, do this task before you remove the starter.
- (3) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
80-11-01-200-801-F00	Starter Magnetic Plug Inspection (P/B 601)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2464	Adapter - Drain, Starter, CFM56-7 Engine (Part #: DB-75, Supplier: 09790, A/P Effectivity: 737-600, -700, -700C, -700ER, -700QC, -800, -900, -900ER, -BBJ)
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Two packings	80-11-01-01-022	HAP ALL
2	Magnetic plug	80-11-01-01-020	HAP ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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G. Procedure

SUBTASK 80-11-01-860-017-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-018-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-010-F00

- (3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 80-11-01-020-005-F00

- (4) Do these steps to remove the magnetic plug [2]:

NOTE: The magnetic plug is a bayonet type. Do not remove the magnetic plug housing and the safety cable to drain the oil.

- Push the magnetic plug [2] with your hand and turn it counterclockwise until it stops.
- Pull the magnetic plug [2] from the magnetic plug housing.

SUBTASK 80-11-01-210-009-F00

- (5) Examine the magnetic plug [2] for the quantity and type of contamination (TASK 80-11-01-200-801-F00).

SUBTASK 80-11-01-680-003-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- Do these steps to drain the oil from the starter:
 - Put a 1 U.S.-gal (3.81 l) oil resistant container, STD-203 below the starter to catch the oil.
 - Put the hose end of the adapter, COM-2464 into the container.
 - Install the adapter into the magnetic plug housing.
 - Drain the oil into the container.
 - If you will not fill the starter immediately, remove the adapter from the magnetic plug housing.

NOTE: The fill procedure uses the tool to pressure fill the starter.

SUBTASK 80-11-01-420-007-F00

- Do these steps to install the magnetic plug [2]:
 - If not already done, remove and discard the two packings [1].
 - Apply clean oil, D00599 [CP2442], to the two packings [1].
 - Install the two new packings [1] on the magnetic plug [2].

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- (d) Put the magnetic plug [2] in the magnetic plug housing and align the bayonet pins with the slots.
- (e) Push the magnetic plug [2] until the pins touch the bottom of the slots and turn the plug clockwise until it locks.

————— **END OF TASK** —————

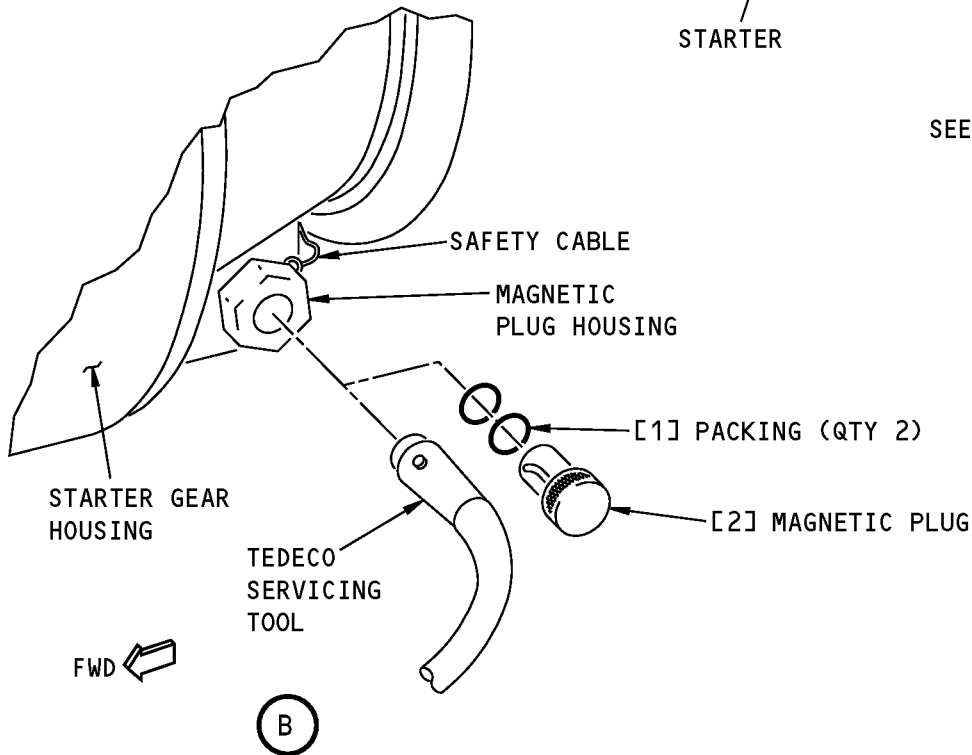
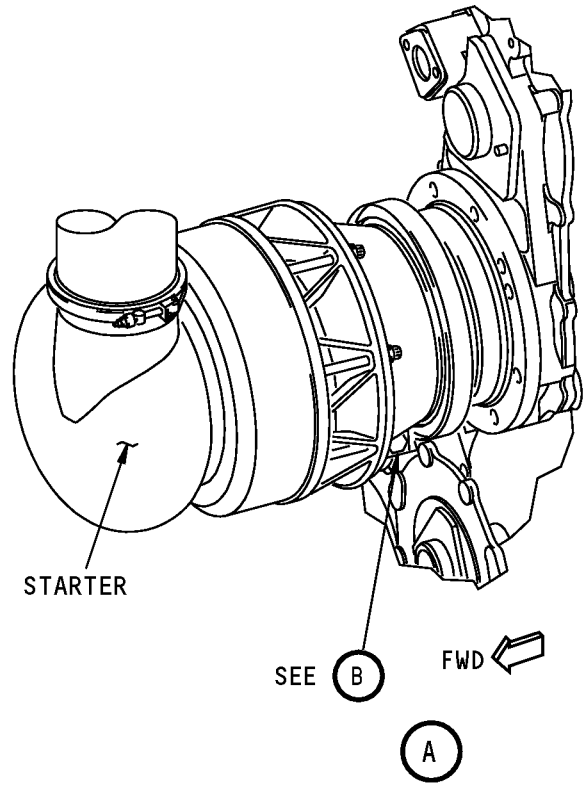
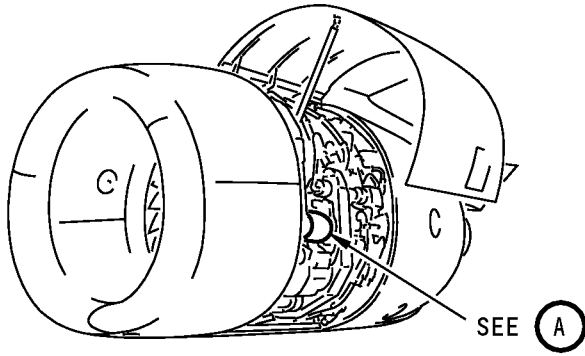
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Starter Servicing
Figure 301/80-11-01-990-805-F00

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TASK 80-11-01-610-801-F00

3. Fill the Starter With Engine Oil

(Figure 301)

A. General

- (1) This procedure has two methods to the starter with engine oil.
 - (a) The Preferred Method uses a tool installed in the magnetic plug housing.
 - 1) Do this procedure after you install the starter on the engine.
 - (b) The Alternate Method removes the magnetic plug housing to gravity fill the starter.
 - 1) If the tool is not available, do this procedure before you install the starter on the engine.
- (2) Use the same type of oil as the engine oil tank for this task.
- (3) After you do this task, it is not necessary to fill the starter again unless you remove the starter or drain the oil. The starter is supplied engine oil from the accessory gearbox.
- (4) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
80-11-01-360-801-F00	Replacement of the Packing on the Magnetic Plug Housing (P/B 801)
80-11-01-400-801-F00	Starter Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-2464	Adapter - Drain, Starter, CFM56-7 Engine (Part #: DB-75, Supplier: 09790, A/P Effectivity: 737-600, -700, -700C, -700ER, -700QC, -800, -900, -900ER, -BBJ)

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Two packings	80-11-01-01-022	HAP ALL
2	Magnetic plug	80-11-01-01-020	HAP ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

G. Procedure (Preferred Method)

SUBTASK 80-11-01-010-011-F00

- (1) Do these steps to prepare for servicing:

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- (a) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.
 (b) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (c) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-020-006-F00

CAUTION: DO NOT REMOVE THE MAGNETIC PLUG HOUSING OR THE SAFETY CABLE. THE REMOVAL OF THE MAGNETIC PLUG HOUSING WILL DRAIN THE OIL FROM THE STARTER.

- (2) If not already done, do these steps to remove the magnetic plug [2]:

NOTE: The magnetic plug is a bayonet type.

- (a) Push the magnetic plug [2] with your hand and turn it counterclockwise until it stops.
 (b) Pull the magnetic plug [2] from the magnetic plug housing.

SUBTASK 80-11-01-680-004-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- (3) Do these steps to fill the starter with oil, D00599 [CP2442]:
 (a) Install the adapter, COM-2464 into the magnetic plug housing.
 (b) Connect the hose of the adapter to the pressurized oil source.
 (c) Fill the starter with 10.1-16.9 fluid ounces (300-500 cc) of engine oil.
 1) Use the same type of engine oil as in the engine accessory gearbox.

NOTE: The accessory gearbox supplies engine oil to the starter.

- (d) Remove the adapter from the magnetic plug housing.

SUBTASK 80-11-01-420-008-F00

- (4) Do these steps to install the magnetic plug [2]:
 (a) If not already done, remove and discard the two packings [1].
 (b) Apply clean oil, D00599 [CP2442] to two new packings [1].
 (c) Install the two packings [1] on the magnetic plug [2].
 (d) Put the magnetic plug [2] in the magnetic plug housing and align the bayonet pins with the slots.
 (e) Push the magnetic plug [2] until the pins touch the bottom of the slots and turn the plug clockwise until it locks.

SUBTASK 80-11-01-010-013-F00

- (5) Do these steps to put the airplane back to its serviceable condition:
 (a) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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- (b) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (c) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

H. Procedure (Alternate Method)

SUBTASK 80-11-01-610-003-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- (1) Before you install the starter, do these steps to gravity fill the starter with oil, D00599 [CP2442]:
- (a) To remove the magnetic plug housing, do this task: Replacement of the Packing on the Magnetic Plug Housing, TASK 80-11-01-360-801-F00.
 - (b) Fill the starter with 10.1-16.9 fluid ounces (300-500 cc) of engine oil.
 - 1) Use the same type of engine oil as in the engine accessory gearbox.

NOTE: The accessory gearbox supplies engine oil to the starter.
 - (c) Re-install the magnetic plug housing with a new packing. Do this task: Replacement of the Packing on the Magnetic Plug Housing, TASK 80-11-01-360-801-F00.
 - (d) Continue with the steps to install the starter. Do this task: Starter Installation, TASK 80-11-01-400-801-F00.

————— **END OF TASK** —————

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STARTER - REMOVAL/INSTALLATION**1. General**

A. This procedure has two tasks:

- (1) The removal of the starter
- (2) The installation of the starter.

TASK 80-11-01-000-801-F00**2. Starter Removal**

(Figure 401)

A. General

- (1) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
80-11-01-200-801-F00	Starter Magnetic Plug Inspection (P/B 601)
80-11-01-680-801-F00	Drain the Starter Oil (P/B 301)
80-11-02-000-801-F00	QAD Adapter Removal (P/B 401)
80-11-02-400-801-F00	QAD Adapter Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 80-11-01-860-009-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-010-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-005-F00

- (3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

E. Starter Removal

SUBTASK 80-11-01-200-001-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

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(WARNING PRECEDES)

- (1) If you remove the starter for a cause, examine the starter magnetic plug to find if the engine oil has contamination. To examine it, do this task: Starter Magnetic Plug Inspection, TASK 80-11-01-200-801-F00.

SUBTASK 80-11-01-680-001-F00

- (2) Do this task: Drain the Starter Oil, TASK 80-11-01-680-801-F00.

SUBTASK 80-11-01-010-006-F00

- (3) Remove the coupling [2] to disconnect the starter duct [1] from the starter [9].

SUBTASK 80-11-01-020-002-F00

- (4) Do these steps to remove the starter [9] from the AGB [6]:

- (a) Remove the clamp [7] that attaches the starter [9] to the QAD adapter [5].
- (b) Pull the starter [9] forward until the splines of the shaft disengage from the AGB [6].

NOTE: You can lightly push the starter duct up to disengage the duct flanges.

- (c) Remove the seal [10] from the starter duct [1].

NOTE: Keep the seal for the installation.

- (d) Remove the packing [3] and packing [4] from the starter shaft and the starter flange.

- 1) Discard the packings [3] and [4].

- (e) Install the protective covers on all the pneumatic openings.

SUBTASK 80-11-01-020-007-F00

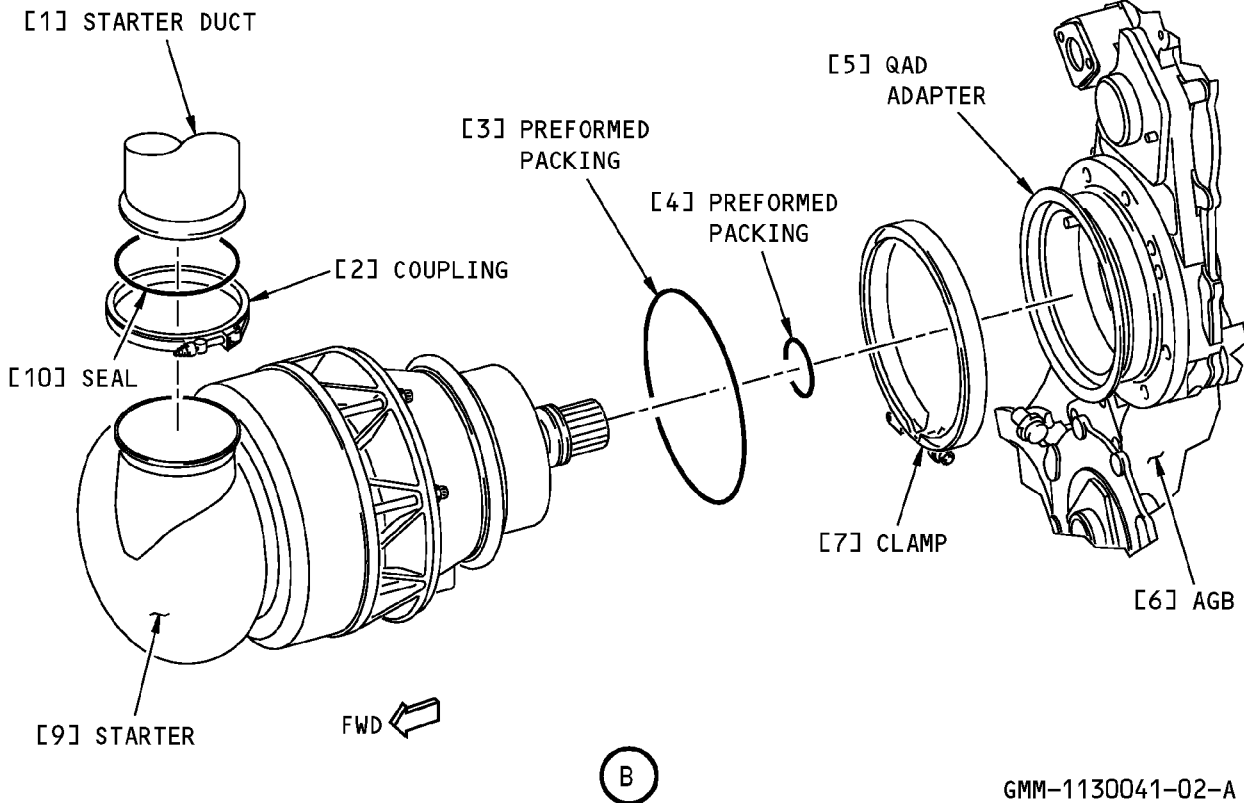
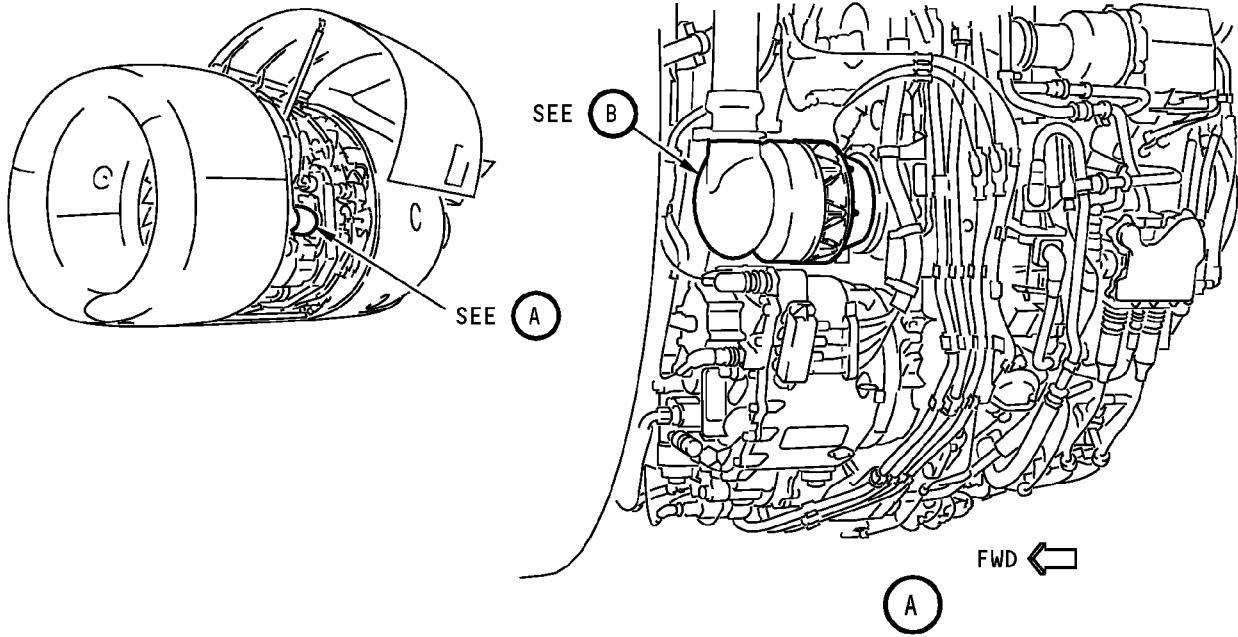
- (5) If you remove the starter for damage, leakage or the results of a starter magnetic plug inspection, do this task: QAD Adapter Removal, TASK 80-11-02-000-801-F00.
 - (a) If you find debris behind the QAD adapter, refer to the starter magnetic plug inspection.
 - (b) Do this task: QAD Adapter Installation, TASK 80-11-02-400-801-F00.

————— **END OF TASK** —————

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Starter Installation
Figure 401/80-11-01-990-803-F00

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TASK 80-11-01-400-801-F00

3. Starter Installation

(Figure 401)

A. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
80-11-01-610-801-F00	Fill the Starter With Engine Oil (P/B 301)

B. Tools/Equipment

Reference	Description
STD-3906	Mallet - Rubber

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	Packing	80-11-01-01-040	HAP ALL
4	Packing	80-11-01-01-035	HAP ALL
9	Starter	80-11-01-01-015	HAP ALL
		80-11-01-01-020	HAP ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Prepare for the Installation

SUBTASK 80-11-01-020-003-F00

- (1) Remove the protective cover from the starter [9] and the starter duct [1].

SUBTASK 80-11-01-210-008-F00

- (2) Examine the seal [10] to make sure it is serviceable.
 - (a) Replace the seal [10] if you find cracks, dents or other damage.

SUBTASK 80-11-01-610-004-F00

- (3) If the service tool is not available, do the Alternate Method to service the starter, do this task: Fill the Starter With Engine Oil, TASK 80-11-01-610-801-F00

NOTE: The Alternate Method fills the starter with oil before you install the starter.

G. Starter Installation

SUBTASK 80-11-01-420-002-F00

- (1) Install the seal [10] in the bottom flange of the starter duct [1].

NOTE: The seal [10] has an oval shape and will "snap" into its position.

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SUBTASK 80-11-01-420-003-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- (2) Do these steps to install the packing [3] and the packing [4] on the starter [9]:
- Lubricate the packings [3] and [4] with oil, D00599 [CP2442].
 - Install the packing [3] on the starter flange.
 - Install the packing [4] on the starter shaft.

SUBTASK 80-11-01-420-004-F00

- (3) Do these steps to install the starter [9] on the AGB [6]:

NOTE: The dowel pins of the QAD adapter and the pin holes of the starter will only align one way.

- Align the starter shaft with the splines of the AGB [6].
- Align the dowel pins on the QAD adapter [5] with the pin holes in the starter [9].
- Put the starter shaft into the AGB [6] until the starter flange engages the QAD adapter [5].

NOTE: You can lightly push the starter duct up to engage the duct flanges.

- Install the clamp [7] to attach the starter [9] to the QAD adapter [5].
 - Carefully examine the weld joints and adjacent metal of the clamp [7] for cracks. If you find cracks, remove and replace the clamp [7].
 - Make sure the clamp [7] is installed with its fastener at the bottom.

CAUTION: DO NOT TIGHTEN THE NUT TO MORE THAN THE MAXIMUM TORQUE. DAMAGE TO THE PARTS CAN OCCUR.

- Tighten the nut on the clamp [7] to 49-55 pound-inches (5.5-6.2 Newton meters).

SUBTASK 80-11-01-420-005-F00

- (4) Do these steps to connect the starter duct [1] to the starter [9]:
- Attach the starter duct [1] to the starter [9] with the coupling [2].
 - Tighten the nut on the coupling [2] to the torque given on the part.
 - Lightly hit the outer surface of the coupling [2] with a rubber mallet, STD-3906.
 - Tighten the nut on the coupling [2] again to the torque given on the part.

SUBTASK 80-11-01-610-001-F00

- (5) Do this task: Fill the Starter With Engine Oil, TASK 80-11-01-610-801-F00.

NOTE: This step is not necessary if you did the Alternate Method to service the starter in the Prepare For the Installation procedure.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 80-11-01-010-007-F00

- (1) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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SUBTASK 80-11-01-860-011-F00

- (2) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-012-F00

- (3) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

I. Starter Installation Test

SUBTASK 80-11-01-700-001-F00

- (1) Do the tests that are listed in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

————— **END OF TASK** —————

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STARTER - INSPECTION/CHECK**1. General**

- A. This procedure contains scheduled maintenance task data.
- B. This procedure has these tasks:
- (1) The inspection of the starter magnetic plug
 - (2) The inspection of the starter.

TASK 80-11-01-200-801-F00**2. Starter Magnetic Plug Inspection**

(Figure 601, Figure 602)

A. General

- (1) This procedure is a scheduled maintenance task.
- (2) Use this task to identify possible internal damage to the starter.
- (3) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-00-00-700-819-F00	Stop the Engine Procedure (Usual Engine Stop) (P/B 201)
71-00-00-800-807-F00	Start the Engine Procedure (Selection) (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
79-00-00-200-804-F00	Chip Detectors and Scavenge Screens Inspection (P/B 601)
80-11-01-000-801-F00	Starter Removal (P/B 401)
80-11-01-400-801-F00	Starter Installation (P/B 401)
80-11-02-000-801-F00	QAD Adapter Removal (P/B 401)
80-11-02-400-801-F00	QAD Adapter Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-1070	Lens - Magnifying, 10X, Hand Held

D. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Plug	80-11-01-01-020	HAP ALL
2	Packings	80-11-01-01-022	HAP ALL

F. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

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G. Procedure

SUBTASK 80-11-01-860-001-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-002-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-001-F00

- (3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 80-11-01-020-001-F00

CAUTION: DO NOT REMOVE THE MAGNETIC PLUG HOUSING OR THE SAFETY CABLE. THE REMOVAL OF THE MAGNETIC PLUG HOUSING WILL DRAIN THE OIL FROM THE STARTER. THE OPERATION OF THE STARTER WITHOUT OIL CAN CAUSE DAMAGE TO THE STARTER.

- (4) Do these steps to remove the magnetic plug [1] (Figure 601):

NOTE: The magnetic plug [1] is a bayonet type.

- (a) Push the magnetic plug [1] with your hand and turn it counterclockwise until it stops.
- (b) Pull the magnetic plug [1] from the magnetic plug housing.

SUBTASK 80-11-01-210-001-F00

- (5) Examine the magnetic plug for the quantity and type of contamination (Figure 602):

- (a) Examine the particles with a 10x hand held magnifying lens, STD-1070 for these conditions:
 - 1) One or more magnetic particles larger than 0.10 inch (2.54 mm) in any direction or an unacceptable amount of magnetic particles indicate possible internal starter damage. The starter must be replaced.
 - a) To remove the starter, do this task: Starter Removal, TASK 80-11-01-000-801-F00.
 - b) To remove the QAD adapter [3], do this task: QAD Adapter Removal, TASK 80-11-02-000-801-F00.
 - c) Look for debris behind the QAD adapter and carefully clean away all debris.
 - d) If magnetic particles are found, do this task (if not already done): Chip Detectors and Scavenge Screens Inspection, TASK 79-00-00-200-804-F00.
 - e) If magnetic particles are not found, continue to the next step.
 - f) To install the QAD adapter [3], do this task: QAD Adapter Installation, TASK 80-11-02-400-801-F00
 - g) To install or replace the starter, do this task: Starter Installation, TASK 80-11-01-400-801-F00
 - 2) If a moderate amount, or more, of magnetic particles smaller than 0.10 inch (2.54 mm) are found, then do these steps:

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- a) Do these steps for an engine ground run:
 - < 1 > Re-install the starter magnetic plug.
 - < 2 > Do this task, Start the Engine Procedure (Selection), TASK 71-00-00-800-807-F00
 - < 3 > Operate the engine at idle for five minutes.
 - < 4 > Do this task, Stop the Engine Procedure (Usual Engine Stop), TASK 71-00-00-700-819-F00
- b) Re-examine the starter magnetic plug after the engine run.
- c) If a moderate amount, or more, of particles smaller than 0.10 inch (2.54 mm) are found, then replace the starter:
 - < 1 > To remove the starter, do this task: Starter Removal, TASK 80-11-01-000-801-F00.
 - < 2 > To remove the QAD adapter [3], do this task: QAD Adapter Removal, TASK 80-11-02-000-801-F00.
 - < 3 > Look for debris behind the QAD adapter.
 - < 4 > If chips are found, do this task: Chip Detectors and Scavenge Screens Inspection, TASK 79-00-00-200-804-F00.
 - < 5 > If chips are not found, continue to the next step.
 - < 6 > To install the QAD adapter [3], do this task: QAD Adapter Installation, TASK 80-11-02-400-801-F00
 - < 7 > To install or replace the starter, do this task: Starter Installation, TASK 80-11-01-400-801-F00
- d) If the magnetic plug is either clean or there is less than a moderate amount of magnetic particles, re-examine the magnetic plug in the next 10-20 cycles.
 - < 1 > If the magnetic plug has a moderate amount of magnetic particles at the 10-20 cycles check, then replace the starter.
 - < a > Do these tasks, Starter Removal, TASK 80-11-01-000-801-F00 and Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 80-11-01-420-001-F00

- (6) Do these steps to install the magnetic plug [1]:
 - (a) Remove and discard the two packings [2] on the magnetic plug.
 - (b) Apply clean oil, D00599 [CP2442] to two packings [2].
 - (c) Install the two packings [2] on the magnetic plug [1].
 - (d) Put the magnetic plug [1] in the magnetic plug housing and align the bayonet pins with the slots.
 - (e) Push the magnetic plug until the pins touch the bottom of the slots and turn the plug clockwise until it locks.

SUBTASK 80-11-01-010-002-F00

- (7) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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SUBTASK 80-11-01-860-003-F00

(8) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-004-F00

(9) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

————— END OF TASK —————

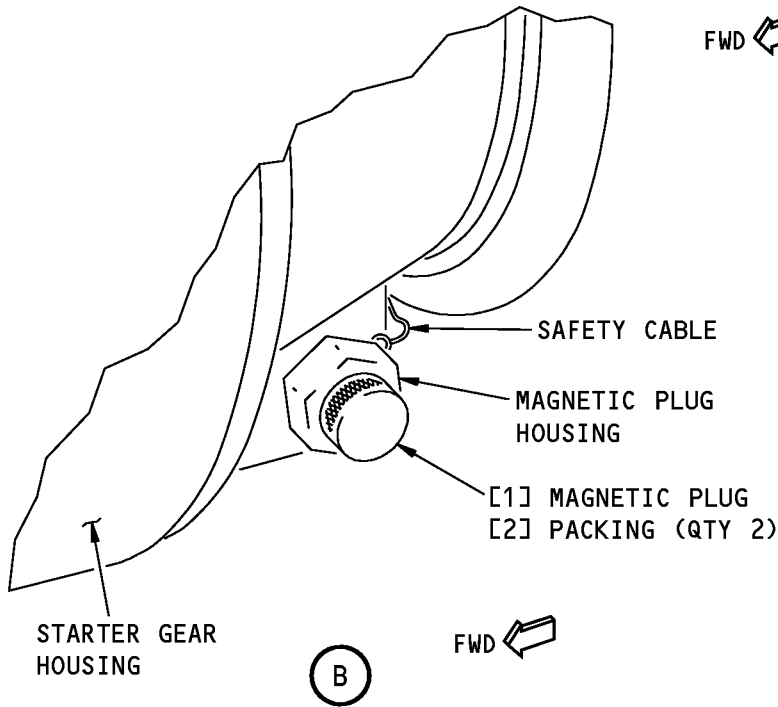
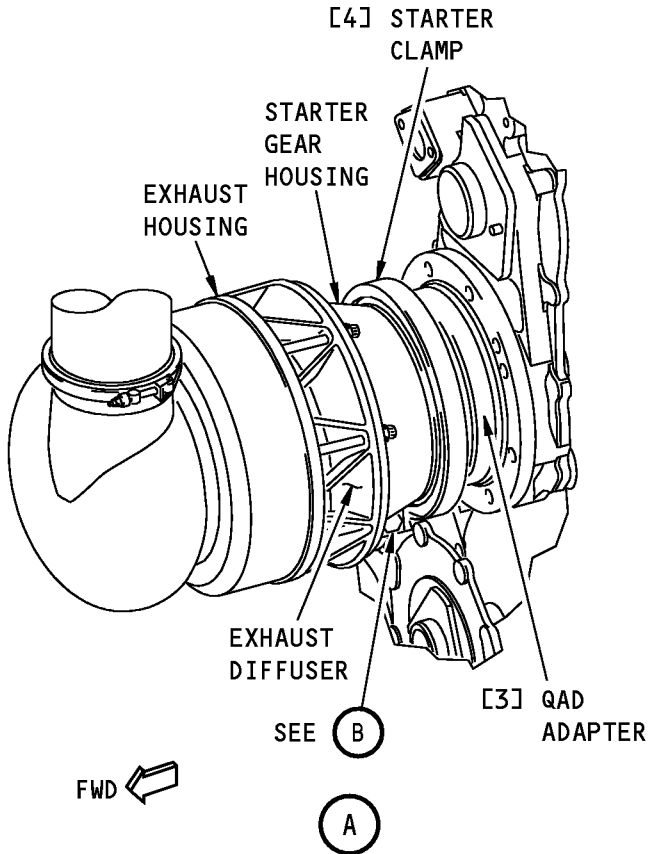
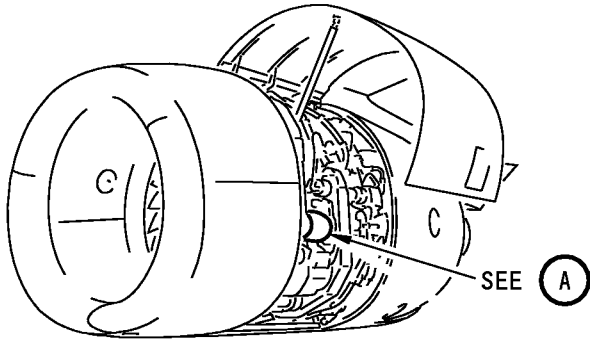
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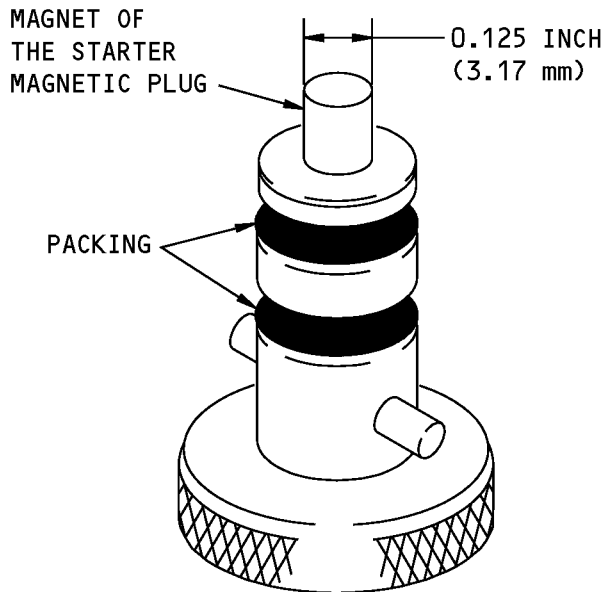


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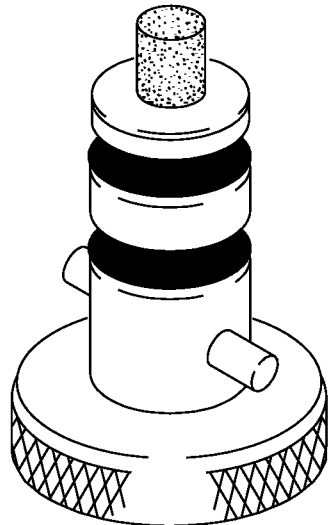
Starter Inspection
Figure 601/80-11-01-990-801-F00

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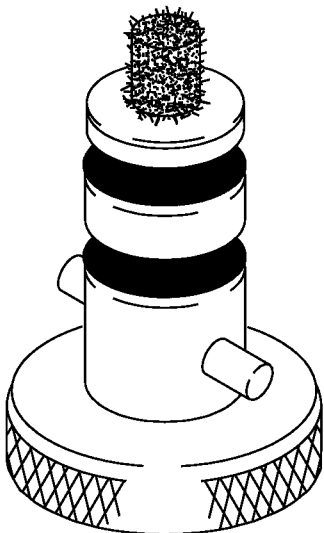
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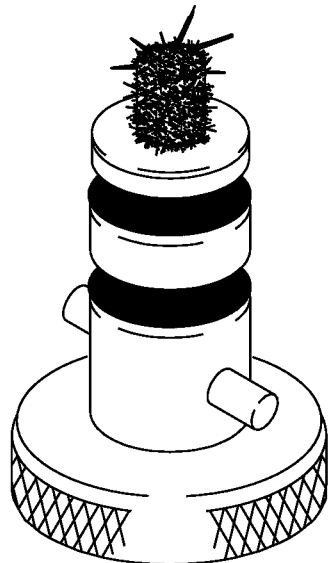
CLEAN
(NO MAGNETIC PARTICLES)



A SMALL AMOUNT OF MAGNETIC
PARTICLES SMALLER THAN
0.10 INCH (2.54 mm)



A MODERATE AMOUNT OF
MAGNETIC PARTICLES SMALLER
THAN 0.10 INCH (2.54 mm)



AN UNACCEPTABLE AMOUNT OF
MAGNETIC PARTICLES MORE
THAN 0.10 INCH (2.54 mm)

Starter Magnetic Plug Inspection
Figure 602/80-11-01-990-806-F00

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TASK 80-11-01-200-802-F00

3. Starter Inspection

(Figure 601)

A. General

- (1) This task examines the starter for oil leaks and also examines the magnetic plug on the starter.
- (2) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
80-11-01-000-801-F00	Starter Removal (P/B 401)
80-11-01-360-801-F00	Replacement of the Packing on the Magnetic Plug Housing (P/B 801)
80-11-01-400-801-F00	Starter Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Procedure

SUBTASK 80-11-01-860-005-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-006-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-003-F00

- (3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 80-11-01-210-002-F00

- (4) Examine the starter gear housing and the exhaust housing for oil leaks.
 - (a) Oil leaks are not serviceable, replace the starter. These are the tasks:
 - Starter Removal, TASK 80-11-01-000-801-F00.
 - Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 80-11-01-210-003-F00

- (5) Examine for oil leaks between the starter gear housing and the magnetic plug housing.
 - (a) Oil leaks are not serviceable, do this task: Replacement of the Packing on the Magnetic Plug Housing, TASK 80-11-01-360-801-F00.

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SUBTASK 80-11-01-210-004-F00

- (6) Examine for oil leaks between the starter gear housing and the QAD adapter.
- Carefully examine the weld joints and adjacent metal of the starter clamp [4] for cracks. If you find cracks, remove and replace the starter clamp [4].
 - Oil leaks are not serviceable, replace the packing on the starter flange. These are the tasks:
 - Starter Removal, TASK 80-11-01-000-801-F00,
 - Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 80-11-01-210-005-F00

- (7) Examine the exhaust housing diffuser for wet areas with oil.
- If the exhaust area is wet with oil, the turbine seal can be damaged.

NOTE: After so many cycles, the exhaust area will usually be dirty because of contamination in the air supply. Make sure that it is oil that you find and not dirt.
 - A damaged turbine seal is not serviceable, replace the starter. These are the tasks:
 - Starter Removal, TASK 80-11-01-000-801-F00,
 - Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 80-11-01-210-006-F00

- (8) Examine for oil leaks between the magnetic plug housing and the magnetic plug.
- Oil leaks are not serviceable, replace the packing on the magnetic plug (TASK 80-11-01-200-801-F00).

SUBTASK 80-11-01-210-007-F00

- (9) To look for internal damage of the starter, do this task: Starter Magnetic Plug Inspection, TASK 80-11-01-200-801-F00.

SUBTASK 80-11-01-010-004-F00

- (10) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

SUBTASK 80-11-01-860-007-F00

- (11) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-008-F00

- (12) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

————— **END OF TASK** —————

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STARTER - REPAIRS**1. General**

A. This procedure has one task to replace the packing on the magnetic plug housing on the starter.

TASK 80-11-01-360-801-F00**2. Replacement of the Packing on the Magnetic Plug Housing**

(Figure 801)

A. General

- (1) Do this task if you find an oil leak between the magnetic plug housing and the starter housing.
- (2) The starter is on the forward side of the accessory gearbox.

B. References

Reference	Title
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
80-11-01-610-801-F00	Fill the Starter With Engine Oil (P/B 301)
80-11-01-680-801-F00	Drain the Starter Oil (P/B 301)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	
G02345 [CP8001]	Lockwire - Inconel (0.032 inch Dia.)	NASM20995~ N32
G50065 [CP8006]	Cable, Safety, Stainless Steel, 0.8mm (0.032inch) Diameter	

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Packing	80-11-01-01-025	HAP ALL
3	Plug housing	80-11-01-01-020	HAP ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 80-11-01-860-013-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

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SUBTASK 80-11-01-860-014-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-008-F00

- (3) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 80-11-01-680-002-F00

- (4) Do this task: Drain the Starter Oil, TASK 80-11-01-680-801-F00.

SUBTASK 80-11-01-020-004-F00

- (5) Do these steps to remove the magnetic plug housing [3] from the starter [1]:
- Cut and remove the safety cable from the magnetic plug housing [3].
 - Remove the magnetic plug housing [3].
 - Remove and discard the packing [2].

SUBTASK 80-11-01-420-006-F00

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- (6) Do these steps to install the magnetic plug housing [3]:
- Apply clean oil, D00599 [CP2442] to a new packing [2].
 - Install the new packing [2] on the magnetic plug housing [3].
 - Install the magnetic plug housing [3] into the starter gear housing.
 - Tighten the magnetic plug housing [3] to 65-85 pound-inches (7.3-9.6 Newton meters).
 - Install the lockwire, G02345 [CP8001] or cable, G50065 [CP8006] on the magnetic plug housing [3].

SUBTASK 80-11-01-610-002-F00

- (7) Do this task: Fill the Starter With Engine Oil, TASK 80-11-01-610-801-F00.
- This task also installs the magnetic plug [4].

SUBTASK 80-11-01-860-015-F00

- (8) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-01-860-016-F00

- (9) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-01-010-009-F00

- (10) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

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SUBTASK 80-11-01-790-001-F00

- (11) Do the test that is listed for the magnetic plug housing of the starter in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

————— **END OF TASK** —————

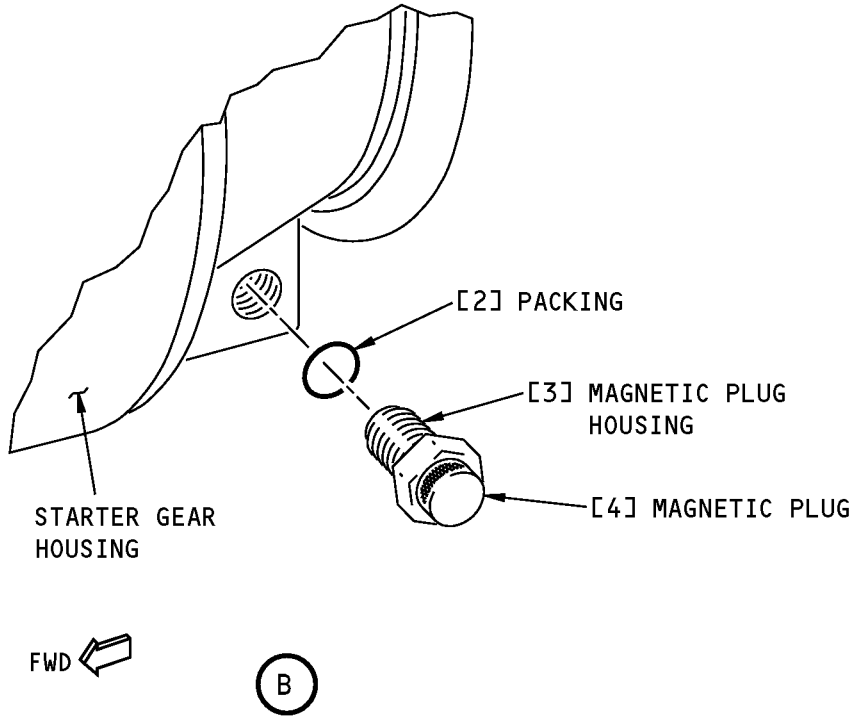
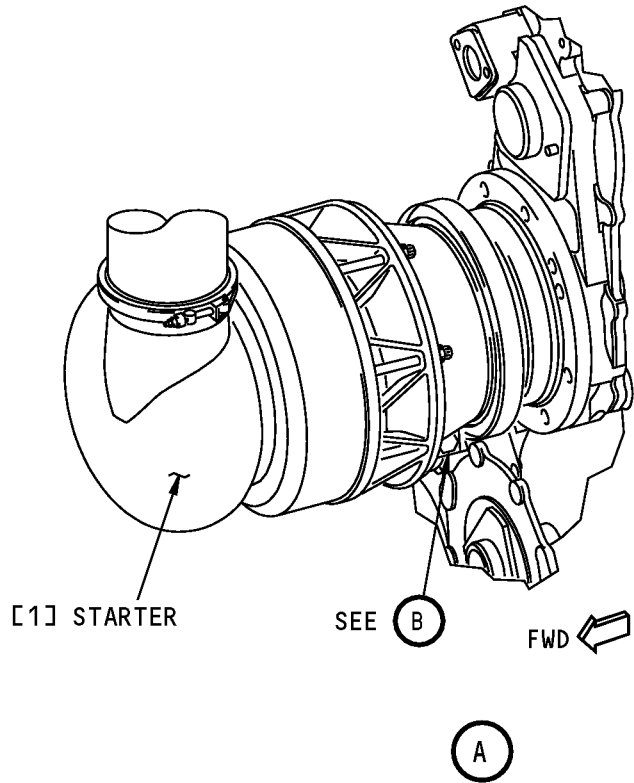
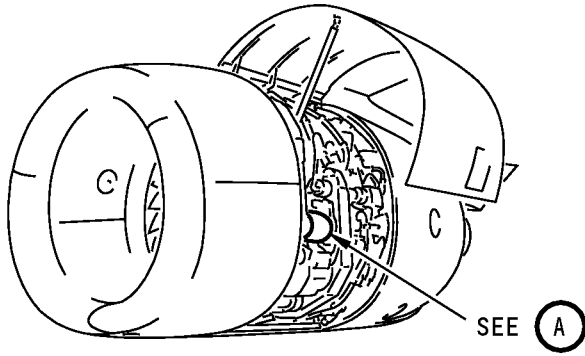
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GMM-1132343-01-A

Starter Repair
Figure 801/80-11-01-990-804-F00

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QAD ADAPTER - REMOVAL/INSTALLATION**1. General**

A. This procedure has two tasks:

- (1) The removal of the QAD adapter
- (2) The installation of the QAD adapter.

TASK 80-11-02-000-801-F00**2. QAD Adapter Removal**

(Figure 401)

A. General

- (1) For identification of a starter failure of alternator stator failure, do this task to remove the QAD adapter.

B. References

Reference	Title
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)
80-11-01-000-801-F00	Starter Removal (P/B 401)

C. Tools/Equipment

Reference	Description
STD-1280	Source - Air, Regulated, Dry Filtered, 0-30 PSIG

D. Consumable Materials

Reference	Description	Specification
B00682 [CP2011]	Solvent - Stoddard	P-D-680, Type I, II or III
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 80-11-02-010-001-F00

- (1) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

SUBTASK 80-11-02-020-001-F00

- (2) Do this task: Starter Removal, TASK 80-11-01-000-801-F00.

SUBTASK 80-11-02-000-001-F00

- (3) Do these steps to remove the QAD adapter [1]:
 - (a) Remove the eight bolts [4] and washers [3] that attach the QAD adapter to the AGB.
 - (b) Remove the QAD adapter [1] from the AGB.
 - (c) Remove and discard the packing [2].

SUBTASK 80-11-02-210-001-F00

- (4) Examine the QAD adapter area for metal chips:

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- (a) If particles are found, carefully remove and keep the particles with a cotton wiper, G00034 or thin sheet of paper.
- (b) Send the particles to the laboratory for analysis.

SUBTASK 80-11-02-110-001-F00

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 RESPIRATOR, PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (5) After you remove all of the particles, clean the QAD adapter with solvent, B00682 [CP2011].
 - (a) Dry the QAD adapter with an 0-30 psig dry filtered regulated air source, STD-1280.
 - (b) Make sure the QAD adapter is free of all particles.

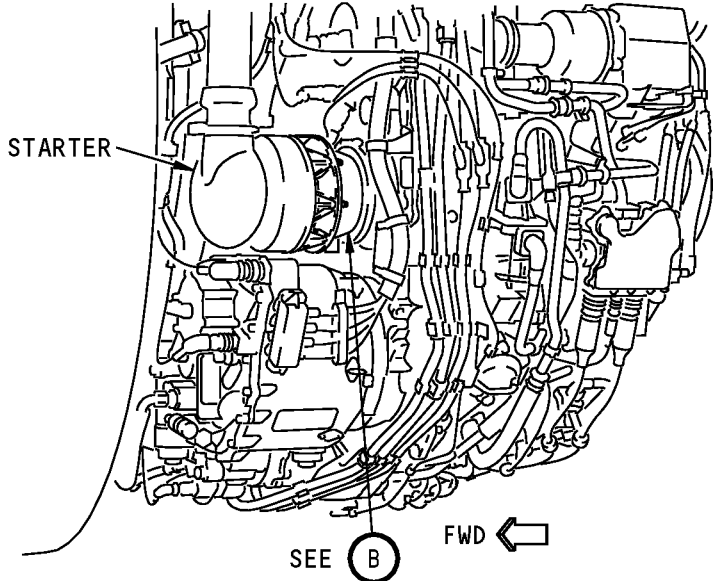
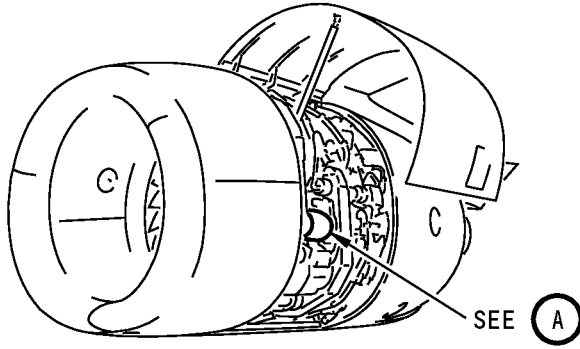
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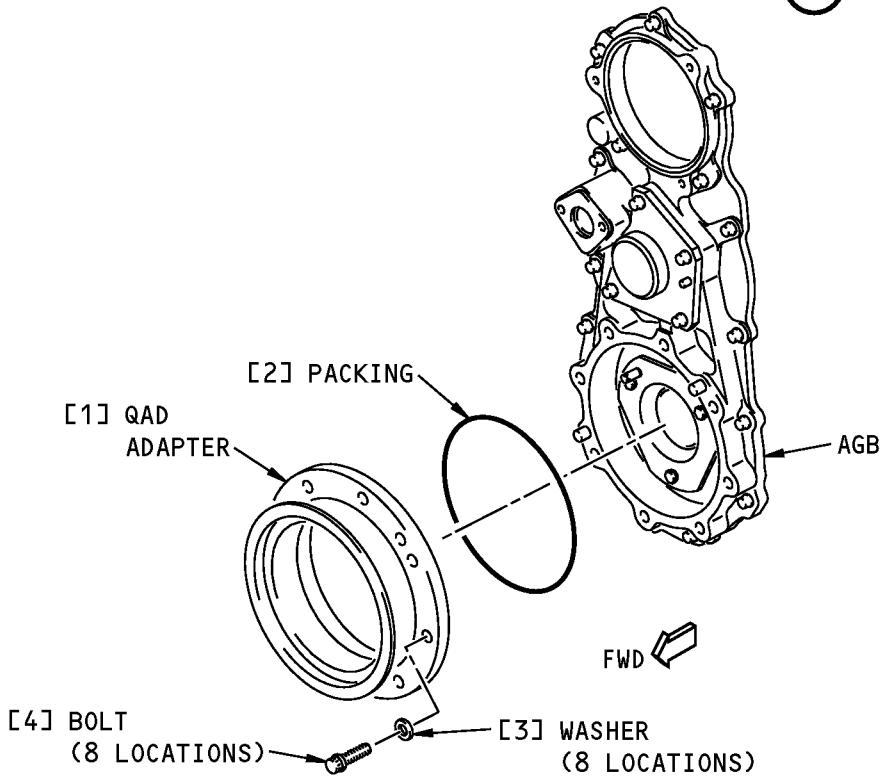
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(A)



(B)

QAD Adapter Installation
Figure 401/80-11-02-990-801-F00

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TASK 80-11-02-400-801-F00

3. QAD Adapter Installation

(Figure 401)

A. General

- (1) This task is to install the QAD adapter after inspection for metallic debris from the starter or alternator stator.

B. References

Reference	Title
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)
80-11-01-400-801-F00	Starter Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00599 [CP2442]	Oil - Engine (CFMI SB 79-001)	
D00601 [CP2101]	Grease - Graphite, High Temperature	SAE AMS 2518

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Adapter	80-11-01-01-055	HAP ALL
2	Packing	80-11-01-01-060	HAP ALL

E. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

F. Procedure

SUBTASK 80-11-02-400-001-F00

- (1) Do these steps to install the QAD adapter [1]:

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. USE THE OIL IN AN AREA WITH GOOD VENTILATION. THE OIL IS POISONOUS AND CAN BE ABSORBED THROUGH YOUR SKIN. THE OIL FUMES CAN IRRITATE YOUR RESPIRATORY TRACT.

- (a) Lightly coat a new packing [2] with oil, D00599 [CP2442].
- (b) Install the packing [2] in the QAD adapter [1].
- (c) Install the QAD adapter [1] in the AGB.
- (d) Lightly coat the threads of the bolts [4] with grease, D00601 [CP2101].
- (e) Install the eight bolts [4] and washers [3] in the AGB.
- (f) Tighten the bolts [4] to 95-110 inch-pounds (11-12.5 newton-meters).

SUBTASK 80-11-02-410-001-F00

- (2) Do this task: Starter Installation, TASK 80-11-01-400-801-F00.

SUBTASK 80-11-02-410-002-F00

- (3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

————— END OF TASK —————

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START VALVE - REMOVAL/INSTALLATION**1. General**

A. This procedure has two tasks:

- (1) The removal of the start valve
- (2) The installation of the start valve.

TASK 80-11-03-000-801-F00**2. Start Valve Removal**

(Figure 401)

A. General

- (1) The start valve is found on the left side of the fan case above the starter.
- (2) For this procedure the upper pneumatic starter duct will be referred to as the upper duct.
- (3) For this procedure the lower pneumatic starter duct will be referred to as the lower duct.

B. References

Reference	Title
70-10-02-910-801-F00	General Precautions During the Removal and Installation of Engine Components (P/B 201)
71-11-02-010-801-F00	Open the Fan Cowl Panels (P/B 201)

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Removal

SUBTASK 80-11-03-860-001-F00

- (1) For engine 1, open this circuit breaker and install safety tag:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-03-860-002-F00

- (2) For engine 2, open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-03-860-003-F00

- (3) Make sure that the start lever is in the CUTOFF position and install a DO-NOT-OPERATE tag.

SUBTASK 80-11-03-860-004-F00

- (4) Make sure that the engine start switch is off and install a DO-NOT-OPERATE tag.

SUBTASK 80-11-03-860-005-F00

- (5) Make sure this switch is in the CLOSE position:

- (a) P5 Forward Overhead Panel

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1) BLEED ISOLATION VALVE

SUBTASK 80-11-03-840-001-F00

(6) If you remove the Engine 1 start valve, make sure this switch is in the OFF position:

(a) P5 Forward Overhead Panel

1) BLEED APU

SUBTASK 80-11-03-860-006-F00

(7) If you remove the Engine 2 start valve, make sure that ground pneumatic power is not applied.

SUBTASK 80-11-03-010-001-F00

(8) Do this task: Open the Fan Cowl Panels, TASK 71-11-02-010-801-F00.

E. Start Valve Removal

SUBTASK 80-11-03-020-001-F00

(1) Disconnect the MWO312 harness electrical connector [4] from the start valve [10] receptacle.

SUBTASK 80-11-03-020-002-F00

(2) Disconnect the bonding jumper [6] from the start valve [10].

(a) Remove the bolt [8], washer [7], and nut [5] from the bonding jumper [6].

SUBTASK 80-11-03-010-002-F00

CAUTION: DO NOT OPERATE THE MANUAL DRIVE DURING THE REMOVAL PROCEDURE. VALVE OPERATION WITHOUT AIR PRESSURE CAN DAMAGE THE ACTUATOR DIAPHRAGMS.

(3) Remove the coupling [2] from these ducts:

(a) The upper duct [3]

(b) The lower duct [9].

SUBTASK 80-11-03-020-003-F00

(4) Remove the start valve assembly [10].

SUBTASK 80-11-03-020-004-F00

(5) Remove the seal [1].

NOTE: The seal rings [1] are in the ID between the start valve and duct flanges.

(a) Examine the seal rings [1] to find out if they are serviceable.

1) If you find cracks, dents or other damage, replace the seal ring.

2) If a seal ring [1] is serviceable, keep the seal ring [1] for the installation with the replacement valve.

SUBTASK 80-11-03-860-007-F00

(6) Put covers on the openings to the start valve and the ducts (TASK 70-10-02-910-801-F00).

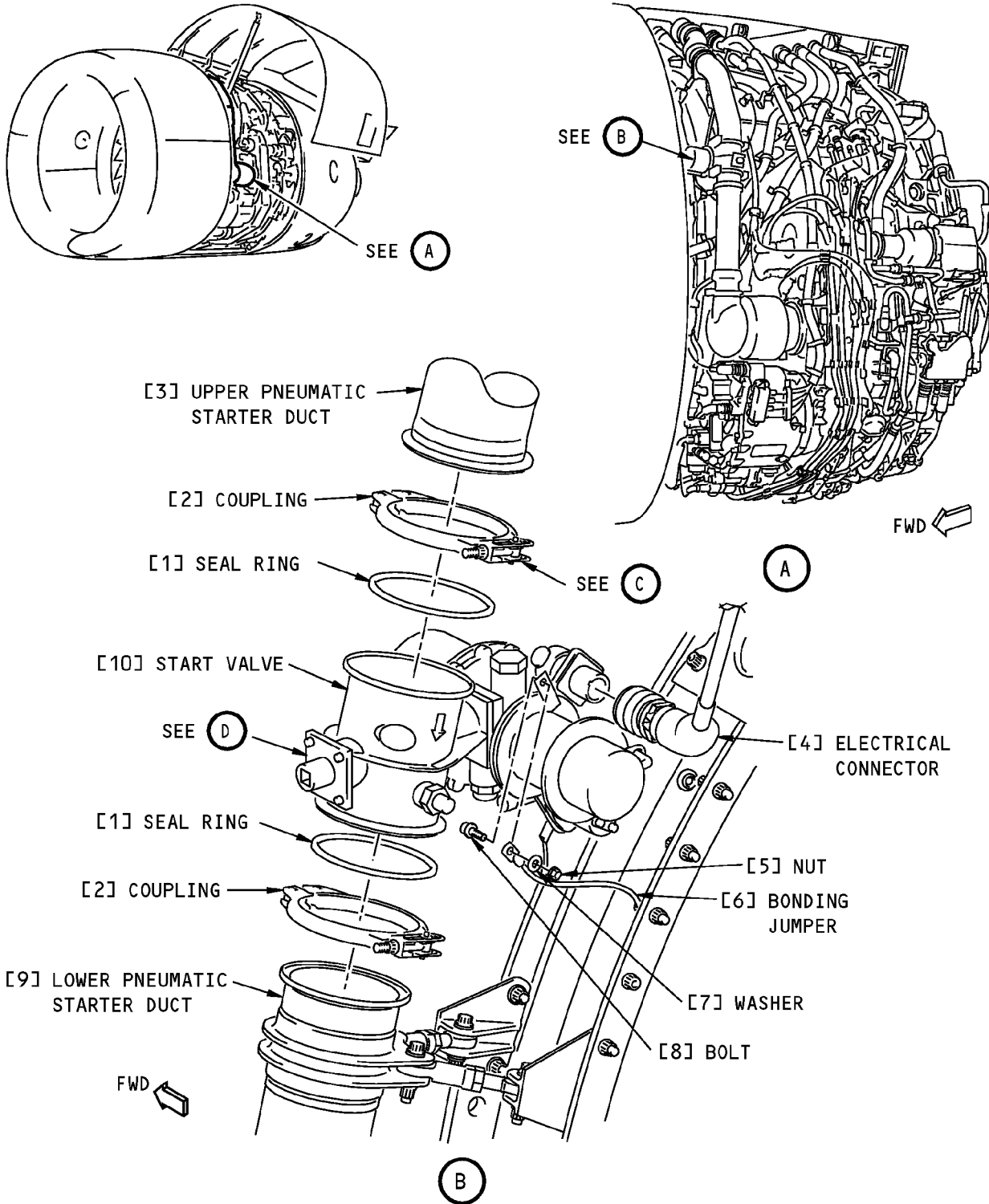
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Start Valve Installation
Figure 401 (Sheet 1 of 2)/80-11-03-990-801-F00

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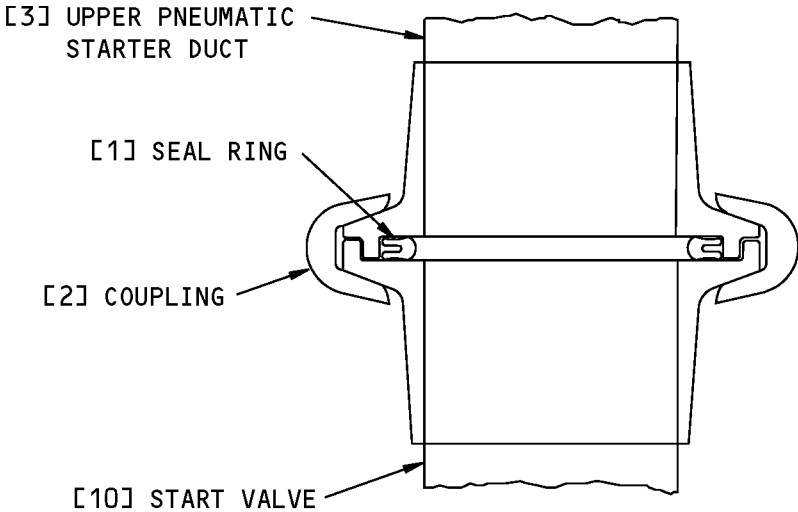
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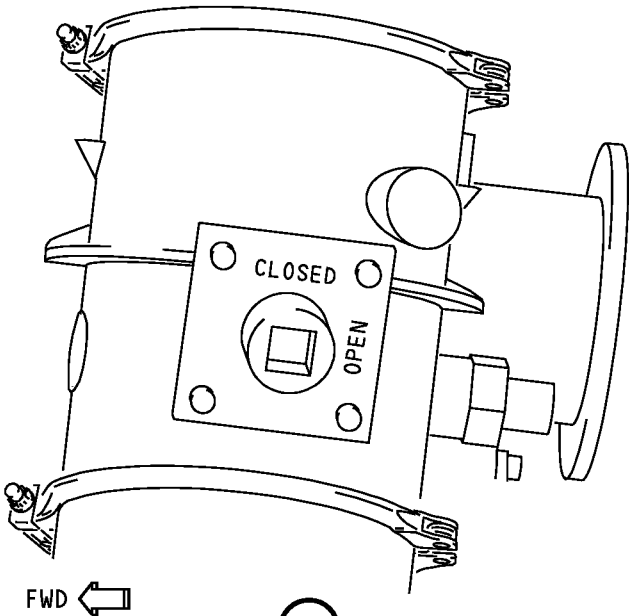
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SEAL INSTALLATION
(EXAMPLE)

(C)



(D)

Start Valve Installation
Figure 401 (Sheet 2 of 2)/80-11-03-990-801-F00

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TASK 80-11-03-400-801-F00

3. Start Valve Installation

(Figure 401)

A. References

Reference	Title
70-10-02-910-801-F00	General Precautions During the Removal and Installation of Engine Components (P/B 201)
71-00-00-800-811-F00	Power Plant Test Reference Table (P/B 501)
71-11-02-410-801-F00	Close the Fan Cowl Panels (P/B 201)

B. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Seal	80-11-03-01A-010	HAP 008-013, 015-026, 028-054, 101-999
10	Valve assembly	80-11-03-01-040 80-11-03-01A-030	HAP 001-007 HAP 008-013, 015-026, 028-054, 101-999

C. Location Zones

Zone	Area
411	Engine 1 - Engine
421	Engine 2 - Engine

D. Prepare for the Installation

SUBTASK 80-11-03-020-005-F00

- (1) Remove the covers from the start valve [10], the upper duct [3] and the lower duct [9] (TASK 70-10-02-910-801-F00).

SUBTASK 80-11-03-160-001-F00

- (2) Clean the flanges on the ducts [3] and [9].

SUBTASK 80-11-03-160-002-F00

- (3) Clean the flanges on the start valve [10].

E. Start Valve Installation

SUBTASK 80-11-03-410-001-F00

- (1) Do these steps to install the start valve [10].
- Install the seal [1] in the ID between the start valve [10] and the duct flanges [3] and [9].
 - Install the start valve assembly [10] between the upper duct [3] and the lower duct [9] flanges.

NOTE: Make sure that the key-slot in the valve flange mates with the key on the duct flange. A maximum clearance of 0.03 inch (0.76mm) is necessary at all points around the flange before the coupling is installed.

SUBTASK 80-11-03-410-002-F00

- (2) Do these steps to install the couplings [2]:
- Loosely install the couplings [2] on the upper duct [3] and lower duct [9].
 - Tighten the couplings [2] to the torque specified on the part.
 - Lightly tap the outer surface of the coupling with a non-metallic mallet.

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(d) Re-tighten the couplings [2] to the torque specified on the part.

SUBTASK 80-11-03-020-006-F00

(3) Connect the MWO312 harness electrical connector [4] to the start valve [10] receptacle.

SUBTASK 80-11-03-410-003-F00

(4) Connect the bonding jumper [6] to the start valve [10].

(a) Install the bolt [8], washer [7], and nut [5] to the bonding jumper [6].

SUBTASK 80-11-03-700-001-F00

(5) Measure the resistance of the bonding jumper [6].

NOTE: The maximum resistance of the bonding jumper [6] from the start valve to the engine bracket is 0.008 OHMS.

F. Put the Airplane Back to its Usual Condition

SUBTASK 80-11-03-860-008-F00

(1) If you removed and installed the Engine 2 start valve [10], you can connect the ground pneumatic power.

SUBTASK 80-11-03-860-009-F00

(2) For engine 1, remove the safety tag and close this circuit breaker:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

SUBTASK 80-11-03-860-010-F00

(3) For engine 2, remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

SUBTASK 80-11-03-860-011-F00

(4) Remove the DO-NOT-OPERATE tag from the start lever and the engine start switch.

G. Start Valve Installation Test

SUBTASK 80-11-03-730-001-F00

(1) Do the tests that are listed for the start valve in the Power Plant Test Reference Table (TASK 71-00-00-800-811-F00).

SUBTASK 80-11-03-860-012-F00

CAUTION: DO NOT OPERATE THE MANUAL DRIVE WITHOUT AIR PRESSURE. YOU MUST APPLY AIR PRESSURE TO THE VALVE TO PREVENT DAMAGE TO THE ACTUATOR DIAPHRAGMS. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE EQUIPMENT CAN OCCUR.

(2) Make sure the manual override to the start valve is in the usual (closed) position.

SUBTASK 80-11-03-410-004-F00

(3) Do this task: Close the Fan Cowl Panels, TASK 71-11-02-410-801-F00.

————— **END OF TASK** —————

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