

**CHAPTER**

**80**

**STARTING**

**(GE90-100 SERIES ENGINES)**

## 777-200/300 AIRCRAFT MAINTENANCE MANUAL

### CHAPTER 80 STARTING

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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 Guide (DDG). These tasks prepare the airplane for flight with certain systems/components inoperative.
- B. This procedure also has the tasks that put the airplane back to its usual condition.
- C. These are the tasks for the components in the starting system:
  - (1) MMEL 80-11-1 (DDG) Preparation - Engine Starter Air Valves Inoperative
  - (2) MMEL 80-11-1 (DDG) Restoration - Engine Starter Air Valves Inoperative

#### **TASK 80-00-00-040-801-H01**

#### 2. MMEL 80-11-1 (DDG) Preparation - Engine Starter Air Valve Inoperative

(Figure 901)

##### A. **General**

- (1) This task gives the maintenance steps which prepare the airplane for flight with the Engine Starter Air Valves Inoperative.
- (2) EICAS Status Messages:
  - (a) ENG START VALVE L
  - (b) ENG START VALVE R

##### B. **References**

Reference	Title
71-00-00-800-801-H01	Engine Ground Safety Precautions (P/B 201)

##### C. **Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

##### D. **Access Panels**

Number	Name/Location
415JB	Thrust Reverser Latch Panel, Left Engine
425JB	Thrust Reverser Latch Panel, Right Engine

##### E. **Procedure**

###### SUBTASK 80-00-00-860-001-H01

- (1) Make sure there is communication between the ground personnel and the flight crew in the flight compartment.

###### SUBTASK 80-00-00-860-002-H01



MAKE SURE THAT YOU OBEY THE SAFETY PRECAUTIONS. IF YOU DO NOT OBEY THE SAFETY PRECAUTIONS, YOU CAN CAUSE INJURY TO PERSON AND EQUIPMENT.

- (2) Make sure that you obey the inlet and exhaust hazard areas and other ground start safety precautions when engine is in operation (TASK 71-00-00-800-801-H01).

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## SUBTASK 80-00-00-010-001-H01

- (3) Open the applicable latch access door on the thrust reverser to get access to the SAV manual control handle for the starter air valve.

- (a) For the left engine, open this access panel:

<u>Number</u>	<u>Name/Location</u>
415JB	Thrust Reverser Latch Panel, Left Engine

- (b) For the right engine, open this access panel:

<u>Number</u>	<u>Name/Location</u>
425JB	Thrust Reverser Latch Panel, Right Engine

## SUBTASK 80-00-00-860-013-H00

- (4) Unstow the starter air valve manual control handle.

## SUBTASK 80-00-00-860-003-H01



THE PERSON ON THE GROUND MUST WEAR GOGGLES, GLOVES, AND PROTECTIVE CLOTHING. THE AIRFLOW CAUSED BY THE STARTER CAN CAUSE INJURY TO PERSONS.

- (5) When commanded by the flight crew, turn the SAV manual control handle clockwise (1 and 1/4 turns) to fully open the starter air valve.

NOTE: Make sure the SAV manual control handle is engaged.

- (a) Hold the starter air valve in the OPEN position.

## SUBTASK 80-00-00-860-004-H01



AT 62% N2, TURN THE SAV MANUAL CONTROL HANDLE TO CLOSE THE STARTER AIR VALVE. SPEEDS THAT ARE HIGHER THAN 62% N2 WITH THE STARTER AIR VALVE OPEN CAN CAUSE DAMAGE TO THE ENGINE STARTER.

- (6) When commanded by the flight crew, turn the SAV manual control handle counterclockwise (1 and 1/4 turns) back to its close position.

## SUBTASK 80-00-00-860-005-H01

- (7) Put the SAV manual control handle to the stowed position.

## SUBTASK 80-00-00-010-002-H01

- (8) Close the latch access door on the applicable thrust reverser.

- (a) For the left engine, close this access panel:

<u>Number</u>	<u>Name/Location</u>
415JB	Thrust Reverser Latch Panel, Left Engine

- (b) For the right engine, close this access panel:

<u>Number</u>	<u>Name/Location</u>
425JB	Thrust Reverser Latch Panel, Right Engine

## SUBTASK 80-00-00-860-006-H01

- (9) Make sure that you obey the inlet and exhaust and other ground start safety precautions when you exit the entry corridor.

————— END OF TASK —————

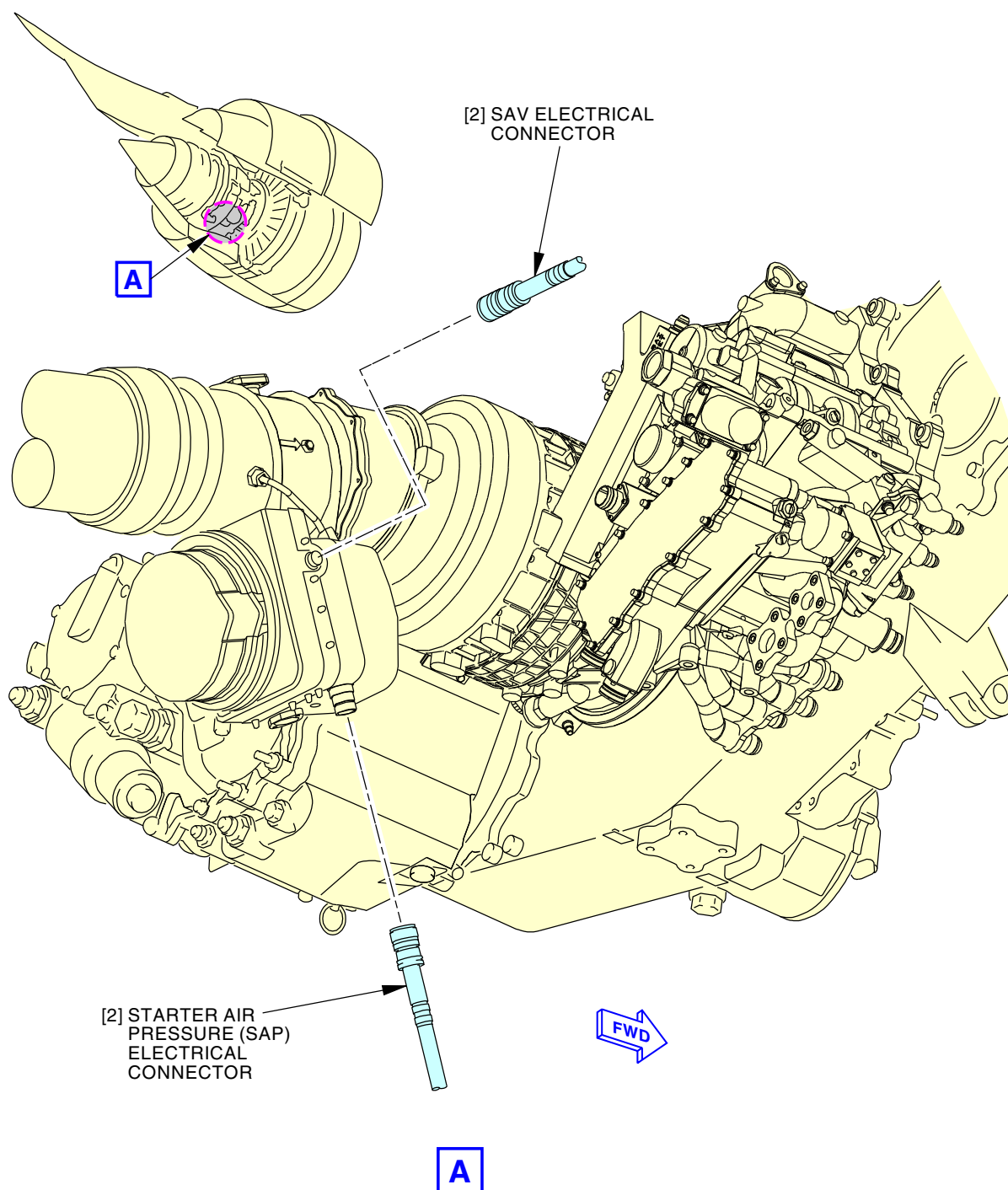
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**SAV AND SAP Sensor Installation**  
**Figure 901/80-00-00-990-801-H01**

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**TASK 80-00-00-440-801-H01**

**3. MMEL 80-11-1 (DDG) Restoration - Engine Starter Air Valve Inoperative**  
(Figure 901)

**A. General**

- (1) This task puts the airplane back to its usual condition after operation with the Engine Starter Air Valves Inoperative.

**B. Location Zones**

<b>Zone</b>	<b>Area</b>
211	Flight Compartment, Left
212	Flight Compartment, Right

**C. Procedure****SUBTASK 80-00-00-740-001-H01**

- (1) Go to the MAT and find the EICAS status message ENG START VALVE L(R).  
 (a) Find the fault code and the correlated maintenance message numbers on the MAT.

**SUBTASK 80-00-00-810-001-H01**

- (2) Go to the Fault Code Index in the FIM and find the fault code (the first two digits of the fault code are the FIM Chapter).  
 (a) For each correlated maintenance message, find the maintenance message number to the right side of the fault code.  
 (b) Find the task number on the same line as the maintenance message number.

**SUBTASK 80-00-00-810-002-H01**

- (3) Go to the task in the FIM and do the steps in the task.

———— **END OF TASK** ————

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### ENGINE STARTING SYSTEM - INSPECTION/CHECK

#### 1. General

- A. This procedure has one task:
- (1) An inspection of the engine starting system.

#### **TASK 80-11-00-200-801-H01**

#### 2. Engine Starting System Inspection

(Figure 601)

##### A. **General**

- (1) This task provides the instructions on how to do the inspection for the engine starting system.
- (2) The engine starting system inspection includes:
  - (a) Examine the engine starter for damage.
  - (b) Examine the starter air valve for damage.
  - (c) Examine the starter air pressure (referred to as SAP) sensor for damage.

##### B. **References**

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
80-11-01-200-801-H01	Engine Starter Inspection (P/B 601)

##### C. **Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

##### D. **Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

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### E. Prepare for the Inspection

SUBTASK 80-11-00-860-003-H00

- (1) For the left engine, open these circuit breakers and install safety tags:

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-00-860-004-H00

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-00-860-005-H00



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (3) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
- (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
- (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

- (d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

### F. Engine Starting System Inspection

SUBTASK 80-11-00-210-001-H01

- (1) Examine the starter for damage:
- (a) Signs of a loose starter

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- 1) If the V-band clamp is loose, tighten the V-band clamp nut to 110-120 pound-inches (12.4-13.6 Newton-meters).
- (b) Signs of oil leaks
  - 1) If the starter shows signs of oil leaks, replace the preformed packings from the starter drive shaft.
- (c) Signs of air leaks
  - 1) If the starter shows signs of air leaks, replace the E-seal from the starter.
- (d) Cracks
  - 1) Cracks are not permitted.
- (e) Dents
  - 1) Dents are not permitted.

**SUBTASK 80-11-00-210-002-H01**

- (2) Visually examine the starter magnetic chip detector part of the oil drain and fill plug (TASK 80-11-01-200-801-H01).

**SUBTASK 80-11-00-210-003-H01**

- (3) Examine the starter air valve for damage:
  - (a) Signs of a loose electrical connector
    - 1) If the electrical connector is loose, tighten the electrical connector by hand.
  - (b) Signs of a loose starter air valve
    - 1) If the V-band clamp is loose, tighten the V-band clamp nut to 110-120 pound-inches (12.4-13.6 Newton-meters).
  - (c) Signs of air leaks
    - 1) If the starter air valve shows signs of air leaks, replace the E-seals.
  - (d) Cracks
    - 1) Cracks are not permitted.

**SUBTASK 80-11-00-210-004-H01**

- (4) Examine the starter air pressure sensor for damage:
  - (a) Signs of a loose electrical connector
    - 1) If the electrical connector is loose, tighten the electrical connector by hand.
  - (b) Cracks in the mounting flange
    - 1) Cracks are not permitted in the mounting flange.
  - (c) Signs of a loose starter air pressure sensor
    - 1) If the starter air pressure sensor is loose, tighten the bolts to 55-70 pound-inches (6.2-7.9 Newton-meters).

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### G. Put the Airplane Back to its Usual Condition

SUBTASK 80-11-00-410-001-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

- (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

- 1) Close these access panels:

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

- (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

- 1) Close these access panels:

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

- (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-00-865-001-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-00-865-002-H01

- (3) For the right engine, remove the safety tags and close these circuit breakers:

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

————— END OF TASK —————

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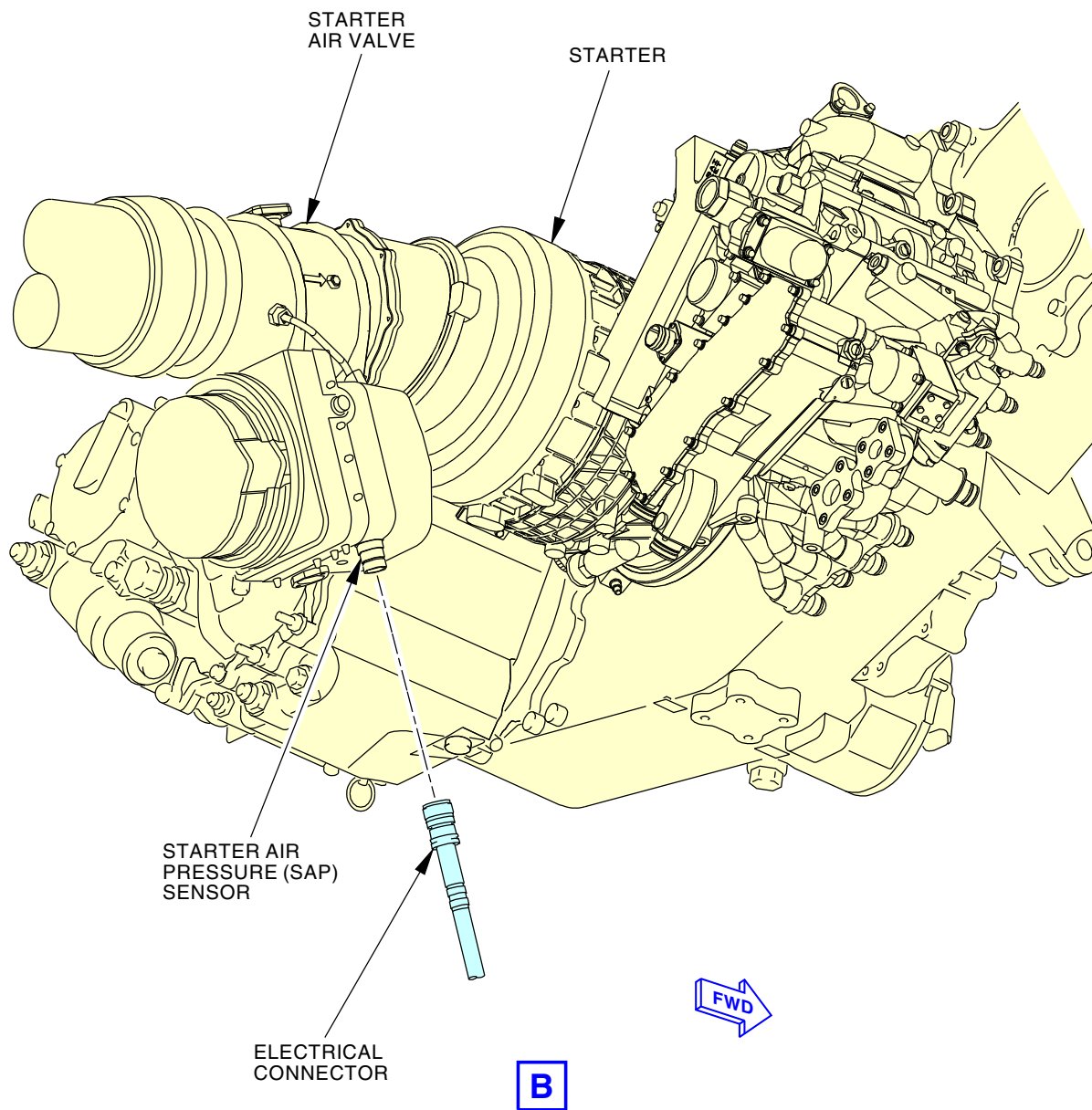
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**Engine Starting System Inspection**  
**Figure 601/80-11-00-990-801-H01 (Sheet 1 of 2)**

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**Engine Starting System Inspection**  
**Figure 601/80-11-00-990-801-H01 (Sheet 2 of 2)**

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**ENGINE STARTER - REMOVAL/INSTALLATION**

**1. General**

- A. This procedure has two tasks:
- (1) A removal of the engine starter
  - (2) An installation of the engine starter.

**TASK 80-11-01-000-801-H01****2. Engine Starter Removal**

(Figure 401, Figure 402, and Figure 403)

**NOTE:** This procedure is a scheduled maintenance task.

**A. General**

- (1) This task provides the instructions on how to remove the engine starter.
- (2) The engine starter (referred to as starter) is installed on the aft side of the accessory gearbox at the 6:00 o'clock position.
- (3) To remove the starter, you must do these steps:
  - (a) Do the deactivation procedure for the leading edge slats.
  - (b) Do the deactivation procedure for the thrust reversers.
  - (c) Open the fan cowl panels and the thrust reversers.
  - (d) Remove the SAV.
  - (e) Install the starter line replaceable units fixture, SPL-331 (referred to as the LRU fixture).
  - (f) Remove the starter from the accessory gearbox.

**B. References**

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
80-11-02-000-801-H01	Starter Air Valve Removal (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-535	Kit - Service Starter Part #: 2886 Supplier: K6057
SPL-331	Fixture - Installation/Removal, Line Replaceable Units Part #: 9C1132G06 Supplier: 06083 Opt Part #: 9C1132G03 Supplier: 06083 Opt Part #: 9C1132G04 Supplier: 06083 Opt Part #: 9C1132G05 Supplier: 06083
STD-205	Container - Oil Resistant, 5 U.S.-Gal (19 l)

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**D. Consumable Materials**

Reference	Description	Specification
D00552 [C02-019]	Oil - Engine Lubricating	GE Spec. D50TF1

**E. Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

**F. Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**G. Prepare for the Removal**

SUBTASK 80-11-01-865-003-H01

- (1) For the left engine, open these circuit breakers and install safety tags:

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-865-004-H01

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

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-01-010-001-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (3) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:
- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
  - (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
  - (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.
  - (d) For the left and right fan cowl panels, do this task:  
Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

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<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

### H. Engine Starter Removal

SUBTASK 80-11-01-020-001-H01

- (1) Remove the starter air valve (SAV) [3] (TASK 80-11-02-000-801-H01).

SUBTASK 80-11-01-010-002-H01

- (2) Disconnect the bracket [8] from the starter [4]:
- (a) Remove the bolts [9] that attach the bracket [8] to the starter [4].
  - (b) Move the bracket [8] with the attached electrical harnesses away from the starter [4].

SUBTASK 80-11-01-610-001-H01

- (3) Drain the oil from the starter [4] (Preferred Procedure):
- (a) Put the 5 U.S.-gal (19 l) oil resistant container, STD-205 under the starter [4].
  - (b) Push the oil fill and drain plug [10] in and turn the plug in the counterclockwise direction to the unlocked position with your hand.
  - (c) Remove the oil fill and drain plug [10] from the starter [4].
  - (d) Attach the oil fill and drain line to the oil fill and drain port.
- NOTE:** The oil fill and drain line is part of the service starter kit, COM-535.
- (e) Attach the collection kit to the oil fill and drain line.
- NOTE:** The collection kit is part of the service starter kit, COM-535.
- (f) Drain the oil, D00552 [C02-019] from the starter [4] into the collection kit.
  - (g) Remove the collection kit from the fill and drain line.
  - (h) Remove the oil fill and drain line from the starter.
  - (i) Remove and discard the preformed packing [11] from the oil fill and drain plug [10].
  - (j) Apply clean oil, D00552 [C02-019] on a new preformed packing [11].
  - (k) Put the new preformed packing [11] on the oil fill and drain plug [10].



**CAUTION**

TIGHTEN PLUG AND SET IN LOCKED POSITION CORRECTLY. IF YOU DO NOT TIGHTEN CORRECTLY, OIL LOSS CAN OCCUR.

- (l) Install the oil fill and drain plug [10] in the starter [4].

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- 1) Push in and turn the oil fill and drain plug [10] in a clockwise direction to set the plug in a locked position in the starter housing.
- 2) Turn the oil fill and drain plug [10] in a counterclockwise direction to make sure the plug is in a locked position.

**NOTE:** Do not push in on the plug.

**SUBTASK 80-11-01-610-002-H01**

- (4) Do the starter [4] oil drain (Alternate Procedure):
- (a) Put the 5 U.S.-gal (19 l) oil resistant container, STD-205 under the starter [4].
  - (b) Push the oil fill and drain plug [10] in and turn the plug in a counterclockwise direction to the unlocked position with your hand.
  - (c) Remove the oil fill and drain plug [10] from the starter [4].
  - (d) Attach the oil fill and drain line to the oil fill and drain port.  
**NOTE:** The oil fill and drain line is part of the service starter kit, COM-535.
  - (e) Drain the oil from the starter [4] into the 5 U.S.-gal (19 l) oil resistant container, STD-205.
  - (f) Remove the oil fill and drain line from the starter [4].
  - (g) Remove and discard the preformed packing [11] from the oil fill and drain plug [10].
  - (h) Apply clean oil, D00552 [C02-019] on a new preformed packing [11].
  - (i) Put the new preformed packing [11] on the oil fill and drain plug [10].



**TIGHTEN PLUG AND SET IN LOCKED POSITION CORRECTLY. IF YOU DO NOT TIGHTEN CORRECTLY, OIL LOSS CAN OCCUR.**

- (j) Install the oil fill and drain plug [10] in the starter [4].
- 1) Push in and turn the oil fill and drain plug [10] in a clockwise direction to set the plug in a locked position in the starter housing.
  - 2) Turn the oil fill and drain plug [10] in a counterclockwise direction to make sure the plug is in a locked position.
- NOTE:** Do not push in on the plug.

**SUBTASK 80-11-01-480-001-H01**

- (5) Connect the line replaceable units fixture, SPL-331 to the starter [4] mounting pad as follows (Figure 402):
- (a) Remove the starter adapter plate from its storage position on the line replaceable units fixture, SPL-331.
  - (b) Hold the LRU mounting adapter of the line replaceable units fixture, SPL-331 with your hand.
  - (c) Remove the adjustment knob that attaches the LRU mounting adapter to the cradle.
  - (d) Install the LRU mounting pad on the bottom of the starter adapter plate with the four captive bolts and the four washers.
  - (e) Attach the starter adapter plate to the bottom of the starter [4] with the four bolts.
  - (f) Move the line replaceable units fixture, SPL-331 into its position below the starter [4], and align the cradle with the mounting adapter.

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- (g) Apply pressure to the hydraulic pump foot pedal of the line replaceable units fixture, SPL-331 and lift the cradle to the mounting adapter.  
**NOTE:** Do not fully engage the cradle and the mounting adapter at this time.
- (h) Adjust the line replaceable units fixture, SPL-331 to align the cradle with the mounting adapter.
- (i) Apply pressure to the hydraulic pump foot pedal until the adapter and cradle engage.
- (j) Install the adjustment knob in the cradle and the mounting adapter.

**SUBTASK 80-11-01-020-002-H01**

- (6) Remove the starter [4] from the accessory gearbox:
  - (a) Remove the V-band clamp [7] that attaches the starter [4] to the accessory gearbox.
  - (b) Move the starter [4] aft with the line replaceable units fixture, SPL-331 until the starter drive gear disengages from the accessory gearbox drive.
  - (c) Push down on the hydraulic pressure release pedal to lower the line replaceable units fixture, SPL-331 until it reaches the lowest height setting.
  - (d) Move the line replaceable units fixture, SPL-331 and the starter [4] away from the engine.
  - (e) Remove and discard the starter drive shaft preformed packing [5].
  - (f) Remove and discard the starter mounting flange preformed packing [6].
  - (g) Visually examine the preformed packing [12] at the forward side of the starter.  
**NOTE:** Make sure the preformed packing [12] at the forward side of the starter is in good condition. The seal acts as a redundant seal to protect against failure of preformed packing [6]. The preformed packing [12] does not have to be removed or replaced if not damaged.
    - 1) If the preformed packing [12] is damaged, remove the preformed packing [12].
  - (h) Install the protective covers on the starter [4] and the accessory gearbox drive.  
**NOTE:** Make sure the oil inlet, the oil outlet, and the mounting flange preformed packing groove are covered.

**SUBTASK 80-11-01-080-001-H01**

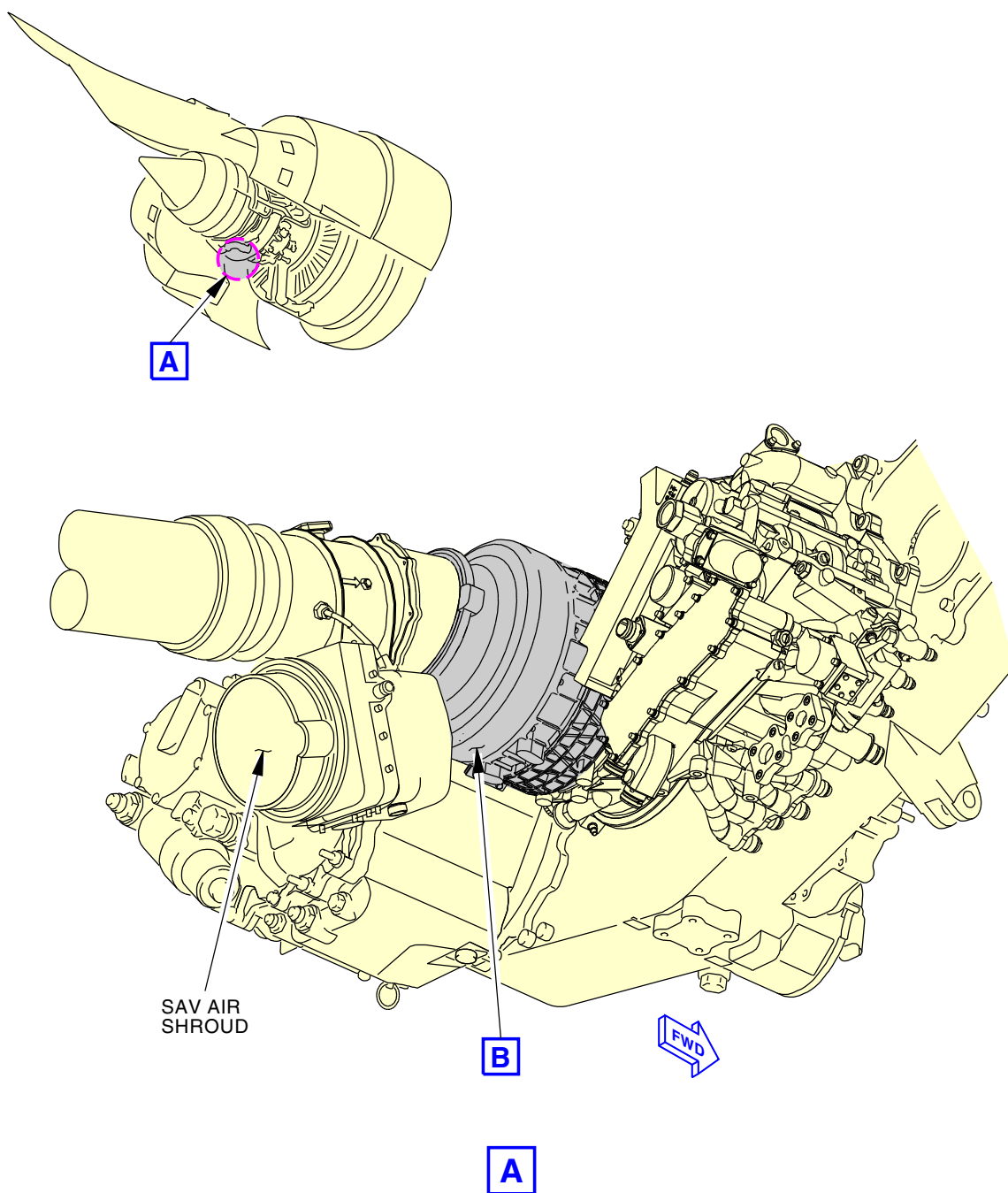
- (7) If you will replace the starter, remove the starter [4] from the line replaceable units fixture, SPL-331:
  - (a) Remove the four bolts that attach the starter adapter plate to the starter [4].

**WARNING**

MAKE SURE YOU HAVE SUFFICIENT SUPPORT FOR THE STARTER BEFORE YOU MOVE THE STARTER. THE STARTER IS APPROXIMATELY 57 POUNDS (25.9 KILOGRAMS). IT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE STARTER IF IT FALLS.

- (b) Remove the starter [4] from the line replaceable units fixture, SPL-331.
- (c) Remove the starter adapter plate from the line replaceable units fixture, SPL-331 mounting adapter.
  - 1) Remove the four captive bolts and the four washers.

———— **END OF TASK** ————



1200961-02-A

M07617 S0004286569\_V4

**Engine Starter Installation**  
**Figure 401/80-11-01-990-804-H01 (Sheet 1 of 3)**

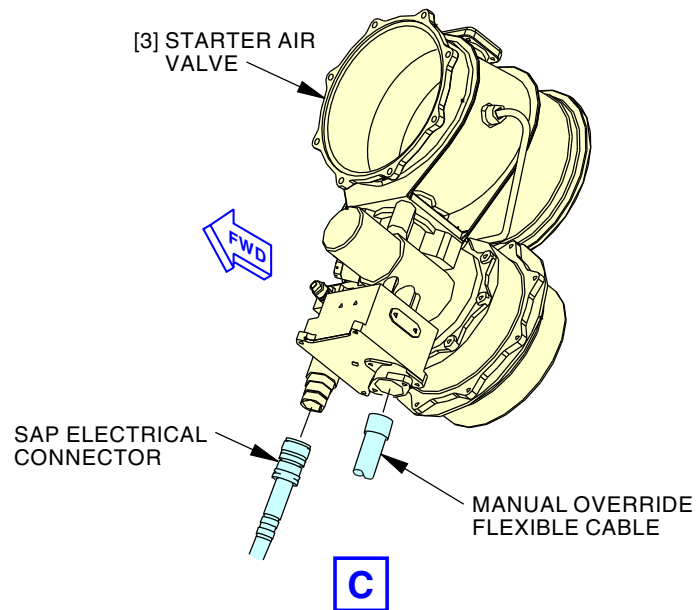
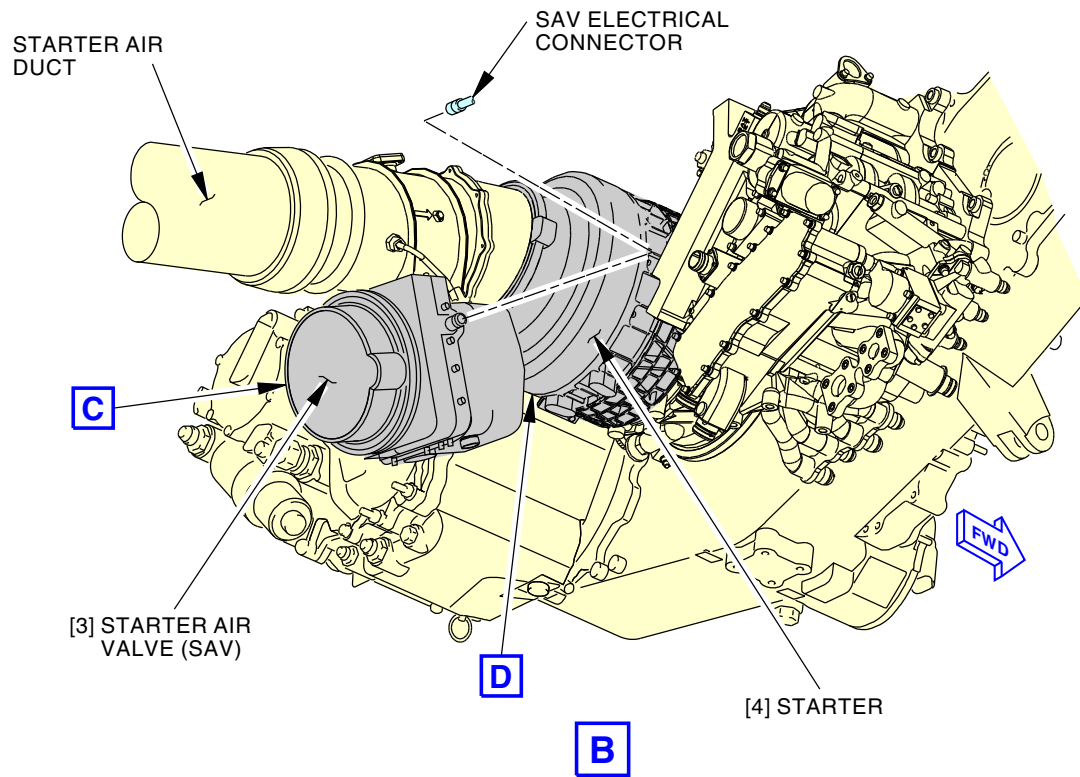
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1200962-01-A

M07618 S0004286570\_V3

**Engine Starter Installation**  
**Figure 401/80-11-01-990-804-H01 (Sheet 2 of 3)**

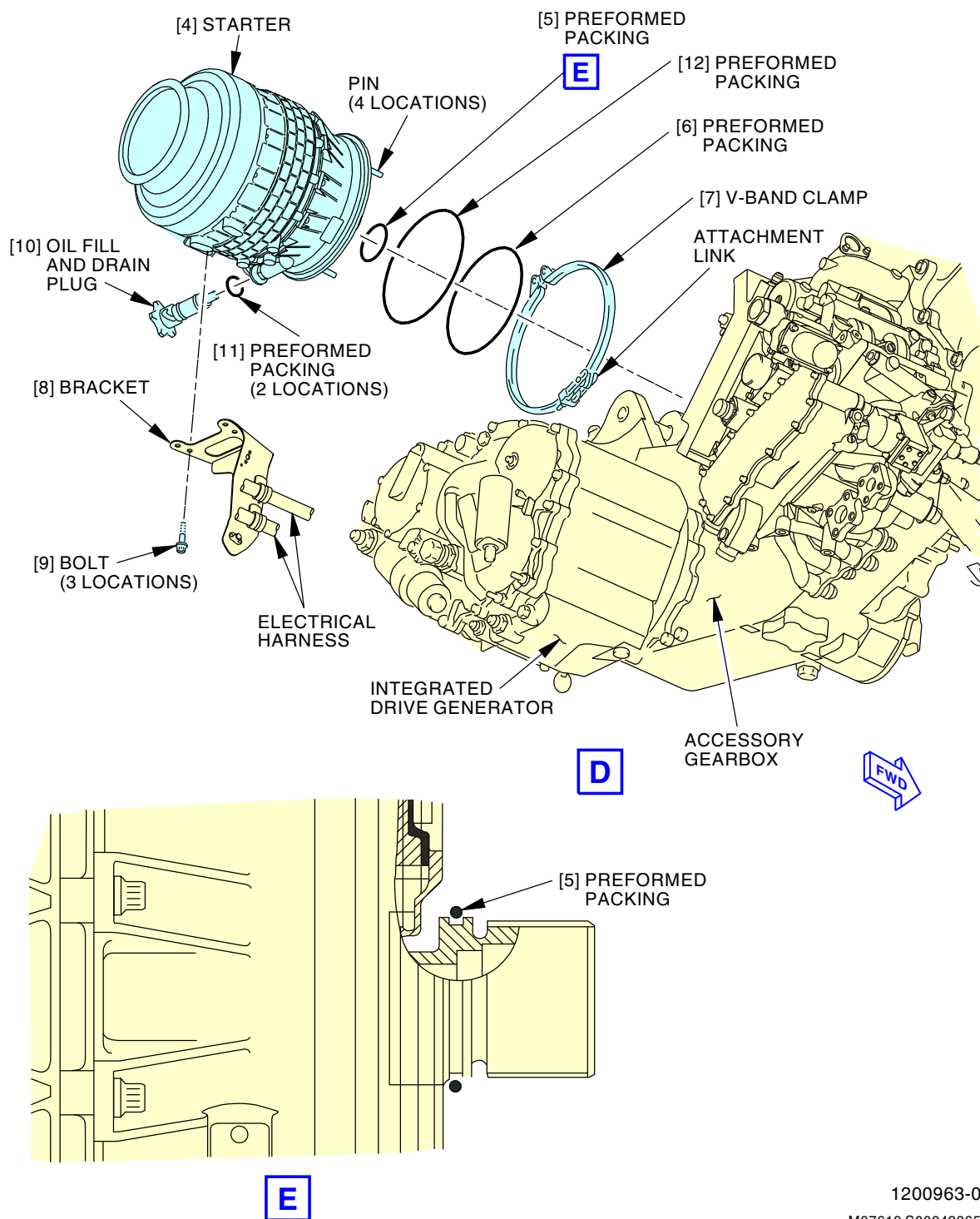
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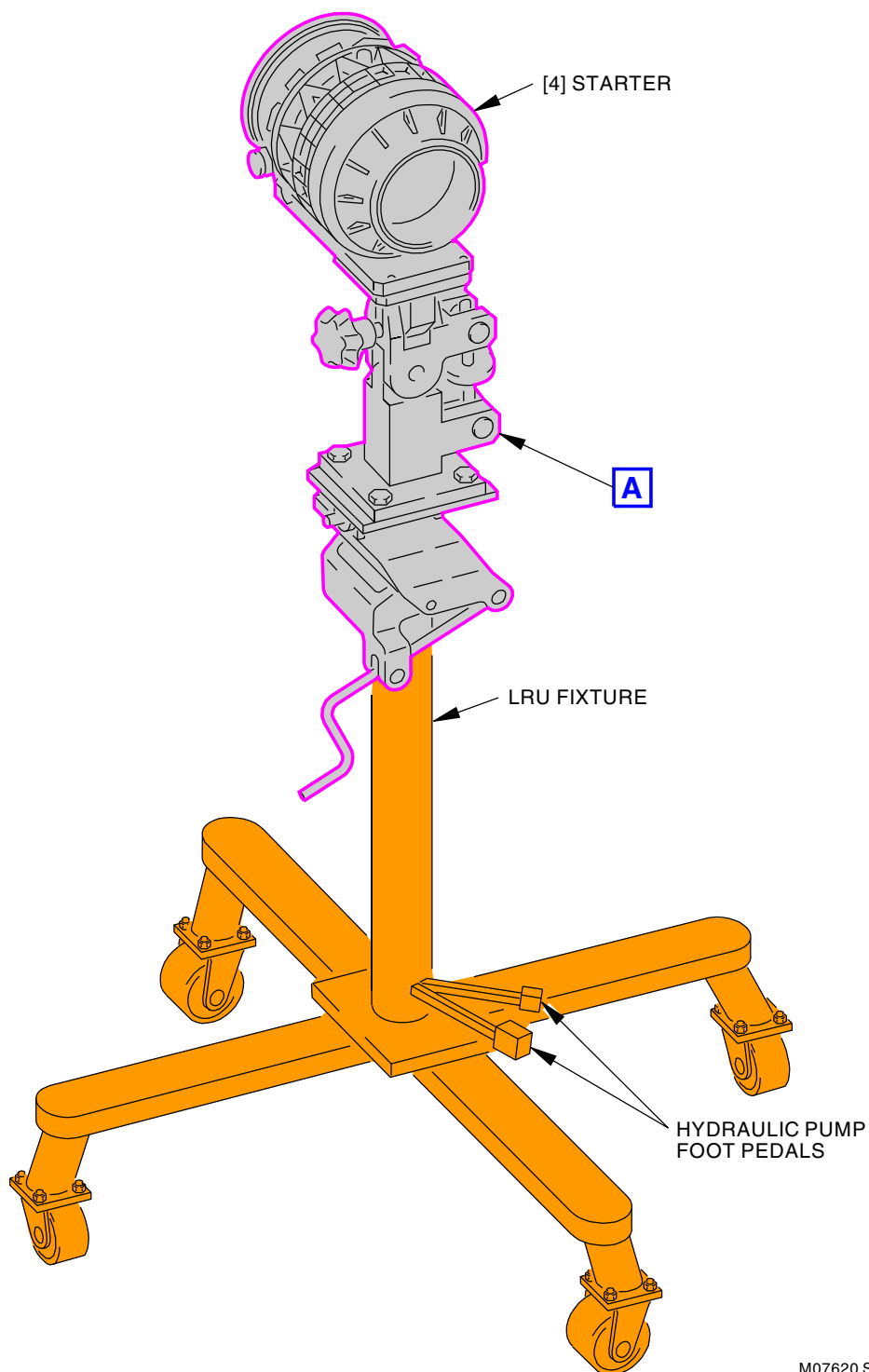
**Engine Starter Installation**  
Figure 401/80-11-01-990-804-H01 (Sheet 3 of 3)

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M07620 S0004286572\_V2

**Engine Starter LRU Fixture Installation**  
**Figure 402/80-11-01-990-805-H01 (Sheet 1 of 2)**

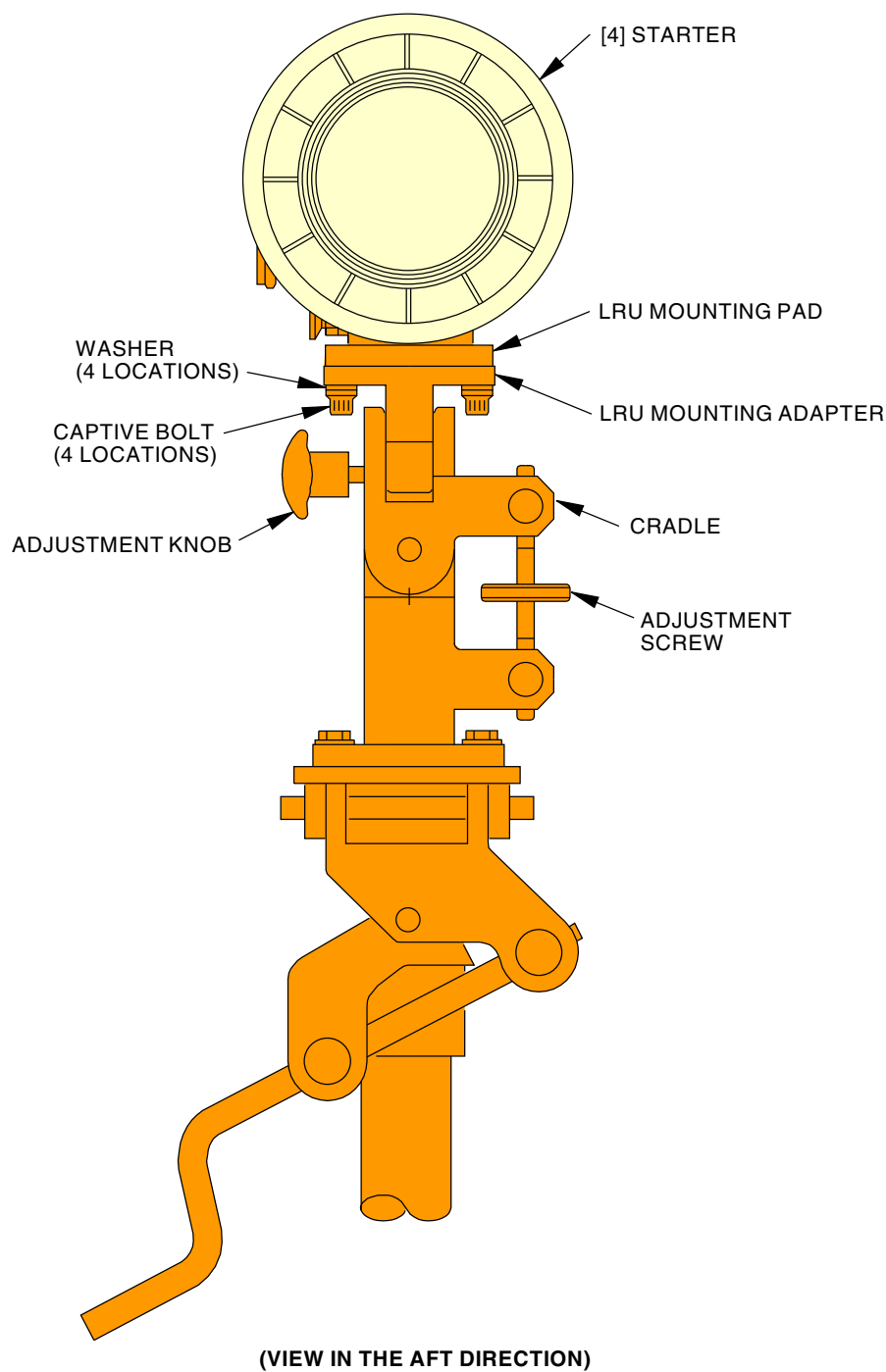
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M07622 S0004286573\_V2

Engine Starter LRU Fixture Installation  
Figure 402/80-11-01-990-805-H01 (Sheet 2 of 2)

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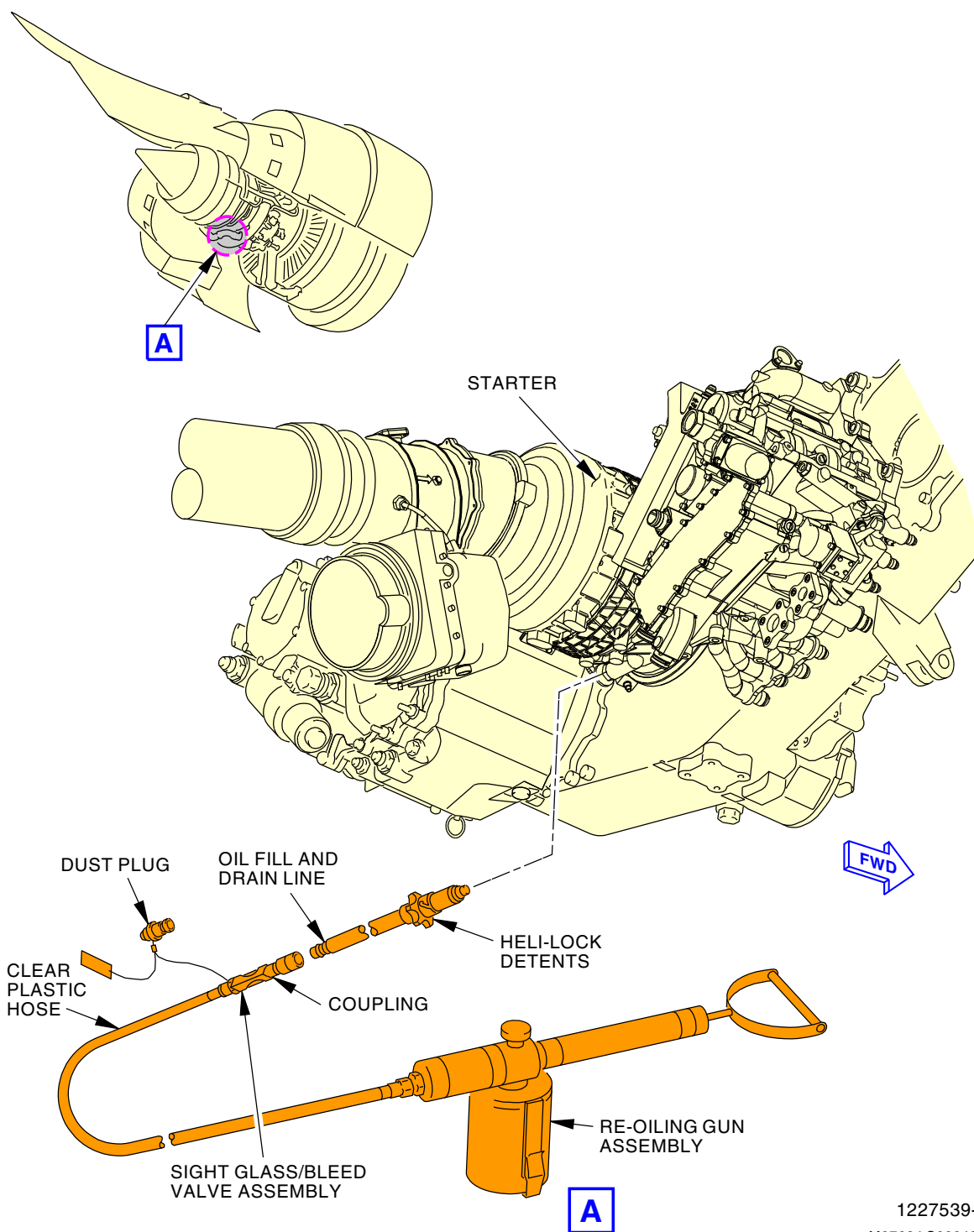
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Re-Oiling Gun Assembly Installation  
Figure 403/80-11-01-990-806-H01

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### TASK 80-11-01-400-801-H01

#### 3. Engine Starter Installation

(Figure 401, Figure 402, and Figure 403)

**NOTE:** This procedure is a scheduled maintenance task.

##### A. General

- (1) This task provides the instructions on how to install the engine starter.
- (2) To install the starter, you must do these steps:
  - (a) Attach the starter to the accessory gearbox.
  - (b) Install the SAV.
  - (c) Close the thrust reversers.
  - (d) Do the activation procedure for the thrust reversers.
  - (e) Close the fan cowl panels.
  - (f) Do the activation procedure for the leading edge slats.
- (3) Do the necessary test for the engine starting system.

##### B. References

Reference	Title
12-13-01-130-803-002	Engine Oil Replenishing (P/B 301)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
80-11-02-400-801-H01	Starter Air Valve 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-535	Kit - Service Starter Part #: 2886 Supplier: K6057
SPL-331	Fixture - Installation/Removal, Line Replaceable Units Part #: 9C1132G06 Supplier: 06083 Opt Part #: 9C1132G03 Supplier: 06083 Opt Part #: 9C1132G04 Supplier: 06083 Opt Part #: 9C1132G05 Supplier: 06083
STD-194	Container - 1 Quart (1 Liter), Calibrated
STD-366	Funnel - Oil Resistant

##### D. Consumable Materials

Reference	Description	Specification
D00520	Oil - Engine - Mobil Jet Oil II	MIL-PRF-23699F-Class STD (Standard)
D00552 [C02-019]	Oil - Engine Lubricating	GE Spec. D50TF1

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Reference	Description	Specification
D50043 [C02-058]	Compound - Antiseize, Acheson GP460 (For Threaded Fasteners 0.250 Inches Diameter Or Larger, C02-079 Is An Alternative)	GE A50TF201 Class A

**E. Expendables/Parts**

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	Starter	80-11-02-03-070	ARO ALL
5	Preformed packing	80-11-02-03-060	ARO ALL
6	Preformed packing	80-11-02-03-055	ARO ALL
11	Preformed packing	80-11-02-03-080	ARO ALL
12	Preformed packing	80-11-02-03-100	ARO ALL

**F. Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

**G. Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**H. Engine Starter Installation**

SUBTASK 80-11-01-480-002-H01



MAKE SURE YOU USE THE CORRECT TOOLS AND PROCEDURES FOR THE ENGINE STARTER INSTALLATION. IF YOU DO NOT USE THE CORRECT TOOLS AND PROCEDURES, YOU MAY DAMAGE THE PACKING ON THE STARTER. A DAMAGED PACKING CAN CAUSE A LOSS OF ENGINE OIL, WHICH CAN AFFECT ENGINE OPERATION AND CAUSE AN IN FLIGHT SHUTDOWN.

- (1) Install the starter [4] on the line replaceable units fixture, SPL-331 if the starter [4] is not on the fixture:



MAKE SURE YOU HAVE SUFFICIENT SUPPORT FOR THE STARTER BEFORE YOU MOVE THE STARTER. THE STARTER IS APPROXIMATELY 57 POUNDS (25.9 KILOGRAMS). IT CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE STARTER IF IT FALLS.

- (a) Connect the starter [4] to the line replaceable units fixture, SPL-331.
- 1) Attach the starter adapter plate to the line replaceable units fixture, SPL-331 with the four captive bolts and the four washers in the LRU adapter.

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- 2) Attach the starter mounting pad to the line replaceable units fixture, SPL-331 adapter plate with the four bolts.

SUBTASK 80-11-01-420-004-H01

**NOTE:** You can use the same oil to fill the starter which is used for the engine. The engine oil is shared with the starter through the Accessory Gear Box (AGB). For list of approved oil brands, refer GE90 SB 79-0001 or Engine Oil Replenishing, TASK 12-13-01-130-803-002.

- (2) Pressure fill the starter [4] with clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 (Preferred Procedure) (Figure 403):
  - (a) Push the oil fill and drain plug [10] in, and turn the plug in a counterclockwise direction to the unlocked position with your hand.
  - (b) Remove the oil fill and drain plug [10] from the starter [4].
  - (c) Attach the oil fill and drain line to the starter oil fill and drain port.

**NOTE:** The oil fill and drain line is part of the service starter kit, COM-535.
  - (d) Attach the oil gun assembly to the oil fill and drain line.

**NOTE:** The oil gun assembly is part of the service starter kit, COM-535.
  - (e) Fill the starter [4] with 0.5 quart (0.473 liter) of clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520.
  - (f) Remove the oil gun assembly from the oil fill and drain line.
  - (g) Remove the oil fill and drain line from the starter.
  - (h) Remove and discard the preformed packing [11] from the oil fill and drain plug [10].
  - (i) Apply clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 on a new preformed packing [11].
  - (j) Put the new preformed packing [11] on the oil fill and drain plug [10].



TIGHTEN PLUG AND SET IN LOCKED POSITION CORRECTLY. IF YOU DO NOT TIGHTEN CORRECTLY, OIL LOSS CAN OCCUR.

- (k) Install the oil fill and drain plug [10] in the starter [4].
  - 1) Push in and turn the oil fill and drain plug [10] in a clockwise direction to set the plug in a locked position in the starter housing.
  - 2) Turn the oil fill and drain plug [10] in a counterclockwise direction to make sure the plug is in a locked position.

**NOTE:** Do not push in on the plug.

SUBTASK 80-11-01-420-005-H01

- (3) Gravity fill the starter with clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 (Alternate Procedure):
  - (a) Push the oil fill and drain plug [10] in, and turn the plug in a counterclockwise direction to the unlocked position with your hand.
  - (b) Remove the oil fill and drain plug [10] from the starter [4].
  - (c) Attach the oil fill and drain line to the oil fill and drain port.

**NOTE:** The oil fill and drain line is part of the service starter kit, COM-535.
  - (d) Put 0.5 quart (0.473 liter) of clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 into a clean calibrated 1 Quart (1 l) calibrated container, STD-194.

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- (e) Put the oil resistant funnel, STD-366 into the open-end of the oil fill and drain line.
- (f) Fill the starter [4] with approximately 0.5 quart (0.473 liter) of clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520.
- (g) Slowly drain the oil from the container into the oil resistant funnel, STD-366 to fill the starter.
- (h) Remove the oil resistant funnel, STD-366 from the oil fill and drain line.
- (i) Remove and discard the preformed packing [11] from the oil fill and drain plug [10].
- (j) Apply clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 on a new preformed packing [11].
- (k) Put the new preformed packing [11] on the oil fill and drain plug [10].



TIGHTEN PLUG AND SET IN LOCKED POSITION CORRECTLY. IF YOU DO NOT TIGHTEN CORRECTLY, OIL LOSS CAN OCCUR.

- (l) Install the oil fill and drain plug [10] in the starter [4].
  - 1) Push in and turn the oil fill and drain plug [10] in a clockwise direction to set the plug in a locked position in the starter housing.
  - 2) Turn the oil fill and drain plug [10] in a counterclockwise direction to make sure the plug is in a locked position.

NOTE: Do not push in on the plug.

**SUBTASK 80-11-01-420-006-H01**

- (4) Do the Work Bench Method to gravity fill the starter [4] with clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 (Alternate Procedure).

NOTE: Do this procedure before the starter is installed on the fixture.

- (a) Put the protective cover on the starter [4] air inlet.
- (b) Set the starter on a clean surface so that the geardrive points upward.
- (c) Put 0.5 quart (0.473 liter) of clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 into a clean calibrated 1 Quart (1 l) calibrated container, STD-194.
- (d) Fill the starter [4] with approximately 0.5 quart (0.473 liter) of clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520.
- (e) Slowly drain the oil from the container past the starter geardrive splines to fill the starter.

NOTE: The starter fill process will take approximately ten minutes.

- (f) Put the starter [4] in the installed position.
- (g) Remove the protective cover from the starter [4] air inlet.

**SUBTASK 80-11-01-420-007-H01**

- (5) Manually turn the air turbine starter assembly drive shaft two full turns, to make sure that the internal components are wet with oil.

**SUBTASK 80-11-01-420-001-H01**

- (6) Install the starter [4] on the accessory gearbox:
  - (a) Remove the protective covers from the starter [4] and the gearbox starter drive.

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- (b) Apply clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520 on a new drive shaft new preformed packing [5].

NOTE: The Mobil Jet Oil II, D00520 is an alternate brand of oil type.

- (c) Put the preformed packing [5] on the starter drive shaft.
- (d) If the preformed packing [12] is removed, do these steps:
- 1) Lubricate the preformed packing [12] with clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520.
  - 2) Install the preformed packing [12] on the forward side of the mounting flange.
- (e) Lubricate the preformed packing [6] with clean engine oil, D00552 [C02-019] or Mobil Jet Oil II, D00520.
- (f) Install the preformed packing [6] on the mounting flange.
- (g) Move the starter [4] below the engine with the line replaceable units fixture, SPL-331.
- (h) Apply light pressure to the line replaceable units fixture, SPL-331 hydraulic pump foot pedal to align the starter [4] with the accessory mounting pad.
- (i) Move the starter [4] forward to the accessory gearbox with the line replaceable units fixture, SPL-331.
- (j) Adjust the line replaceable units fixture, SPL-331 (forward to aft and right to left) to align the starter drive gear and the four dowel pins with the accessory gearbox.



DO NOT FORCE THE STARTER DRIVE SHAFT INTO THE ACCESSORY GEARBOX DRIVE. DAMAGE TO THE STARTER DRIVE SHAFT OR ACCESSORY GEARBOX DRIVE WILL OCCUR WHEN YOU USE FORCE.



MAKE SURE YOU DO NOT DAMAGE THE PREFORMED PACKINGS WHEN YOU INSTALL THE ENGINE STARTER. A DAMAGED PREFORMED PACKING CAN CAUSE A LOSS OF ENGINE OIL, WHICH CAN AFFECT ENGINE OPERATION AND CAUSE AN IN FLIGHT SHUTDOWN.

- (k) Install the starter [4] into the gearbox drive:
- 1) Turn the starter [4] housing to the left or right to engage the starter drive shaft into the gearbox drive.
  - 2) Move the starter [4] into the gearbox with a positive forward motion, until fully installed in the gearbox dowel pin holes.
- (l) Install the V-band clamp [7] on the starter [4] and gearbox mounting flanges.
- 1) Put the V-band clamp [7] attachment link in the 6:00 o'clock position (aft view forward).
- NOTE: The V-band clamp nut faces downward.
- 2) Tighten the V-band clamp [7] nut to 110.0-120.0 Pound-inches (12.4-13.6 Newton-meters).
- (m) Remove the four bolts that attach the line replaceable units fixture, SPL-331 to the starter [4].
- (n) Lower the line replaceable units fixture, SPL-331 to its lowest height and move it away from the engine.

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SUBTASK 80-11-01-420-002-H01

- (7) Install the starter air valve (SAV) [3] (TASK 80-11-02-400-801-H01).

SUBTASK 80-11-01-410-001-H01

- (8) Connect the bracket [8] to the starter [4]:
- (a) Move the bracket [8] with the attached electrical harnesses under the starter [4].
  - (b) Align the bracket bolt holes with the starter bolt holes.
  - (c) Lubricate the bolts [9] with Acheson GP460 compound, D50043 [C02-058].
  - (d) Install the bolts [9] that attach the bracket [8] to the starter [4].
    - 1) Tighten the bolts [9] to 110.0-120.0 Pound-inches (12.4-13.6 Newton-meters).

### I. Put the Airplane Back to Its Usual Condition

SUBTASK 80-11-01-410-001-H02



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:
- (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine
  - (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
  - (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
  - (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-01-865-005-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

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SUBTASK 80-11-01-865-006-H01

- (3) For the right engine, remove the safety tags and close these circuit breakers:

**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

**J. Starter Installation Test**

SUBTASK 80-11-01-710-001-H01

- (1) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

SUBTASK 80-11-01-610-006-H01

- (2) Fill the oil tank if the oil level is low (TASK 12-13-01-130-803-002).

———— **END OF TASK** ————

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**ENGINE STARTER - INSPECTION/CHECK**

**1. General**

A. This procedure has three tasks:

- (1) An inspection of the engine starter
- (2) An inspection of the engine starter magnetic chip detector and starter mount
- (3) An inspection of the engine starter turbine wheel.

**TASK 80-11-01-200-801-H01****2. Engine Starter Inspection**

(Figure 601)

**NOTE:** This procedure is a scheduled maintenance task.

**A. General**

- (1) The task provides the instructions on how to examine the starter magnetic chip detector on the oil fill and drain plug (referred to as the plug) for a sign of internal starter damage.

**B. References**

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
70-41-00-910-803-H00	Lockwire Installation (P/B 201)
71-00-00-700-802-H01	Test No. 2 - Dry Motor leak Check (P/B 501)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
80-11-01-000-801-H01	Engine Starter Removal (P/B 401)
80-11-01-400-801-H01	Engine Starter Installation (P/B 401)

**C. Tools/Equipment**

Reference	Description
STD-205	Container - Oil Resistant, 5 U.S.-Gal (19 l)
STD-562	Lens - Magnifying, 10x

**D. Consumable Materials**

Reference	Description	Specification
D00552 [C02-019]	Oil - Engine Lubricating	GE Spec. D50TF1
D50179	Compound - Lubricating (Lockrey Liqui-Moly NV Thread Compound)	MIL-PRF-907
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

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**E. Expendables/Parts**

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Preformed packing	80-11-02-03-080	ARO ALL
4	Preformed packing	80-11-02-03-085	ARO ALL

**F. Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

**G. Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**H. Prepare for the Inspection**

SUBTASK 80-11-01-865-007-H01

- (1) For the left engine, open these circuit breakers and install safety tags:

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-865-008-H01

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

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-01-010-003-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (3) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:
- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
  - (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
  - (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

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- (d) For the left and right fan cowl panels, do this task:  
Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:  
Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

### I. Engine Starter Inspection

SUBTASK 80-11-01-020-003-H01

- (1) Remove the oil fill and drain plug [1] from the starter:

NOTE: A check valve is installed in the oil fill and drain hole. Oil will not drain from the starter when you remove the plug.

- (a) Put the 5 U.S.-gal (19 l) oil resistant container, STD-205 under the engine starter to collect the oil, D00552 [C02-019].
- (b) Push the oil fill and drain plug [1] in and turn it in a counterclockwise direction with your hand until the oil fill and drain plug [1] is not locked.
- (c) Remove the oil fill and drain plug [1] from the starter.



**CAUTION**

MAKE SURE THE WORK AREA YOU DO THE CHIP DETECTOR EXAMINATION IS FREE FROM CONTAMINATION. CONTAMINATION OF THE CHIP DETECTOR CAN OCCUR IF YOU PUT THE CHIP DETECTOR ON A DIRTY WORK BENCH, ON THE GROUND, OR IN A TOOL BOX.

- (d) If you see an oil leak, the check valve in the housing may not be functional. The housing and the plug must be replaced with the procedure that follows:
  - 1) As necessary, drain the oil completely, preferred procedure (SUBTASK 80-11-01-610-001-H01) or alternative procedure (SUBTASK 80-11-01-610-002-H01) of Engine Starter Removal, TASK 80-11-01-000-801-H01.
  - 2) Remove the lock wire from the magnetic drain plug [5].
- (e) Put the oil fill and drain plug [1] in a clean area.
- (f) Remove and discard the preformed packing [2] from the oil fill and drain plug [1].

SUBTASK 80-11-01-240-001-H01

- (2) Examine the magnetic chip detector on the oil fill and drain plug [1] for the quantity and the type of contamination.

NOTE: Carbon and dirt can form sludge on the chip detector. You can be misled by the quantity of contamination on the chip detector when sludge is mixed with the metal particles.

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- (a) The starter is serviceable if the fuzz indications that follow are on the magnetic chip detector:
  - 1) The magnetic chip detector is clean or there is light fuzz on it.  
NOTE: It is not permitted to have metal chips or flakes on the chip detector when there is light fuzz.
  - 2) If the magnetic chip detector is serviceable, clean the fuzz from the chip detector with a cotton wiper, G00034.
- (b) The starter is serviceable if the metal indications that follow are on the magnetic chip detector.
  - 1) Look at the magnetic chip detector.
  - 2) It is permitted to have metal flakes or chips with these conditions:
    - a) No metal flake or chip is larger than 0.100 inch (2.54 mm) in any direction.
    - b) The quantity of the metal flakes or chips that cover the chip detector is less than 50% of the magnetic surface.
  - 3) Remove the metal particles from the magnetic chip detector.
  - 4) Keep the metal particles for the laboratory analysis.
  - 5) Clean the chip detector with a cotton wiper, G00034.
- (c) The starter is not serviceable if the metal indications that follow are on the magnetic chip detector:
  - 1) Use 10x magnifying lens, STD-562 to examine the metal particles.
  - 2) If a particle of the metal flakes or chips is larger than 0.100 inch (2.54 mm) in any direction, replace the starter (TASK 80-11-01-000-801-H01 and TASK 80-11-01-400-801-H01).
  - 3) If a particle of the metal flakes or chips is less than 0.100 inch (2.54 mm) in any direction and the quantity of the metal flakes or chips that cover the chip detector is greater than 50% of the magnetic surface, replace the starter (TASK 80-11-01-000-801-H01 and TASK 80-11-01-400-801-H01).

**SUBTASK 80-11-01-420-003-H01**

- (3) Before installing the oil fill and drain plug [1] on the starter, check if an oil leak is observed.

NOTE: The check valve in the housing [3] may not be functional.

- (a) If a leak is observed, the housing [3] and the oil fill and drain plug [1] shall be replaced using the following procedure:
  - 1) As necessary, drain the oil completely, preferred procedure (SUBTASK 80-11-01-610-001-H01) or alternative procedure (SUBTASK 80-11-01-610-002-H01) of Engine Starter Removal, TASK 80-11-01-000-801-H01.
  - 2) Remove the lock wire from the housing [3].
  - 3) Remove and discard the housing [3] and the oil fill and drain plug [1] previously removed from the starter.
  - 4) Install the magnetic drain plug [5] assembly into the gear housing and shroud assembly, follow the instructions below:
    - a) Put a layer of Liqui-Moly NV Thread Compound, D50179 on the threads of the housing [3].
    - b) Apply clean oil, D00552 [C02-019] on a new preformed packing [4].

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- c) Put the new preformed packing [4] on the housing [3] and install into the gear housing and shroud assembly.
- d) Tighten the housing [3] to a torque value of 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).
- e) Attach the housing [3] to the starter with lock wire, see (Lockwire Installation, TASK 70-41-00-910-803-H00).
- f) Apply clean oil, D00552 [C02-019] on new preformed packings [2].
- g) Put the new preformed packings [2] on the oil fill and drain plug [1] and install into the housing [3].



MAKE SURE TO TIGHTEN THE PLUG. MAKE SURE TO SET THE PLUG INTO THE LOCKED POSITION. IF YOU DO NOT TIGHTEN AND LOCK THE PLUG, OIL LEAKS CAN CAUSE DAMAGE.

- <1> Push in and turn the oil fill and drain plug [1] in a clockwise direction to the locked position in the housing [3].
  - <2> Turn the oil fill and drain plug [1], without pushing in, in the counter-clockwise position to make sure the plug is locked.
  - h) As necessary, refill starter with clean oil, D00552 [C02-019], preferred procedure; (SUBTASK 80-11-01-420-004-H01) or alternate Procedure (SUBTASK 80-11-01-420-005-H01) of Engine Starter Installation, TASK 80-11-01-400-801-H01.
  - i) Do a dry motor leak check, refer to Test No. 2 - Dry Motor leak Check, TASK 71-00-00-700-802-H01.
- (b) If an oil leak is not detected, install the oil fill and drain plug [1] on the starter:
- 1) Make sure the magnetic chip detector is clean.
  - 2) Apply clean oil, D00552 [C02-019] on a new preformed packing [2].
  - 3) Put the new preformed packing [2] on the magnetic chip detector.
  - 4) Put the oil fill and drain plug [1] in the starter oil fill and drain hole.



MAKE SURE TO TIGHTEN THE PLUG. MAKE SURE TO SET THE PLUG INTO THE LOCKED POSITION. IF YOU DO NOT TIGHTEN AND LOCK THE PLUG, OIL LEAKS CAN CAUSE DAMAGE.

- a) Push in and turn the oil fill and drain plug [1] in a clockwise direction to set the plug in a locked position in the starter housing.
- b) Turn the oil fill and drain plug [1] in a counterclockwise direction to make sure the plug is in a locked position.

NOTE: Do not push in on the oil fill and drain plug [1].

### J. Put the Airplane Back to its Usual Condition

SUBTASK 80-11-01-080-002-H01

- (1) Remove the 5 U.S.-gal (19 l) oil resistant container, STD-205 from below the engine.

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SUBTASK 80-11-01-410-002-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:
- (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
- 1) Close these access panels:
- | <u>Number</u> | <u>Name/Location</u>                |
|---------------|-------------------------------------|
| 415AL         | Left Thrust Reverser, Left Engine   |
| 416AR         | Right Thrust Reverser, Left Engine  |
| 425AL         | Left Thrust Reverser, Right Engine  |
| 426AR         | Right Thrust Reverser, Right Engine |
- (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
- 1) Close these access panels:
- | <u>Number</u> | <u>Name/Location</u>               |
|---------------|------------------------------------|
| 413AL         | Left Fan Cowl Panel, Left Engine   |
| 414AR         | Right Fan Cowl Panel, Left Engine  |
| 423AL         | Left Fan Cowl Panel, Right Engine  |
| 424AR         | Right Fan Cowl Panel, Right Engine |
- (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
- (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-01-865-009-H01

- (3) For the left engine, remove the safety tags and close these circuit breakers:

### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-865-010-H01

- (4) For the right engine, remove the safety tags and close these circuit breakers:

### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

## K. Engine Starter Inspection Test

SUBTASK 80-11-01-700-001-H00

- (1) Do the magnetic chip detector (MCD of the starter) test in the Power Plant Test Reference Table, TASK 71-00-00-800-833-H00.

————— END OF TASK —————

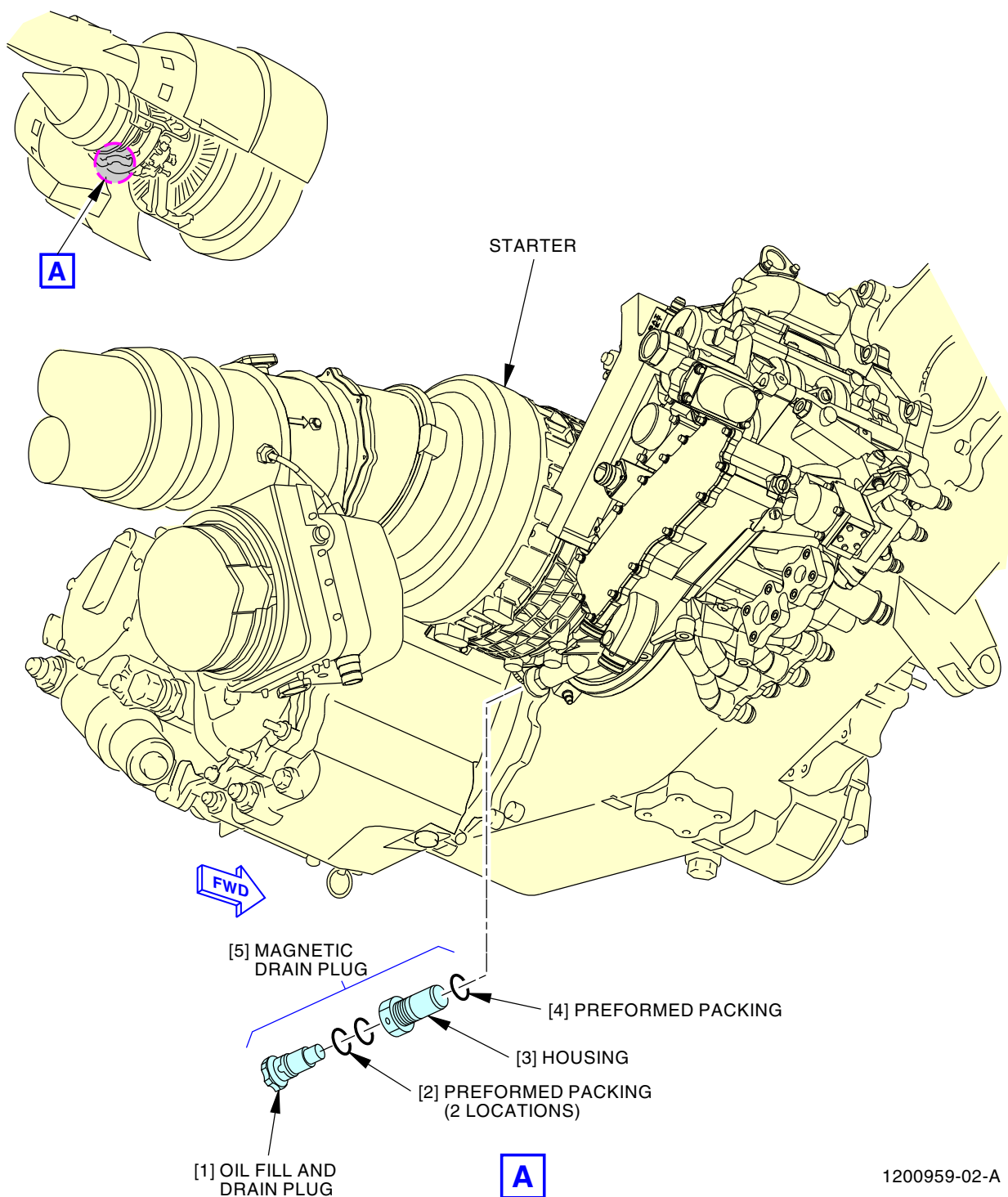
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1200959-02-A  
M07625 S0004286575\_V5

**Engine Starter Inspection**  
**Figure 601/80-11-01-990-807-H01 (Sheet 1 of 2)**

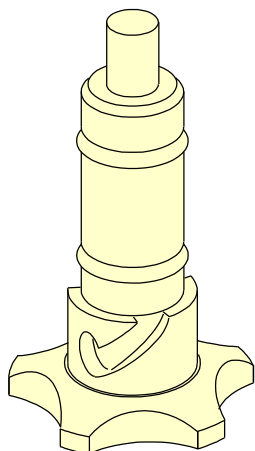
EFFECTIVITY  
ARO ALL

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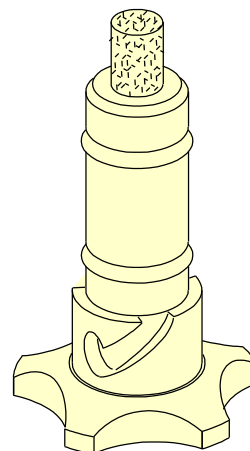
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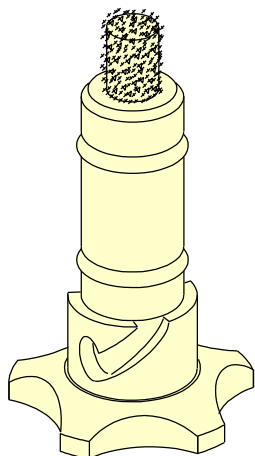
**SATISFACTORY  
(CLEAN)**

**B**



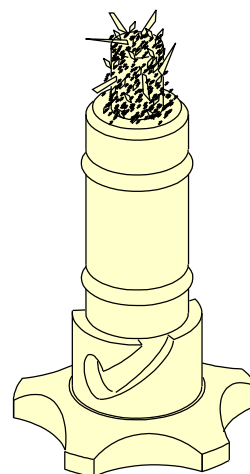
**SATISFACTORY  
(LIGHT FUZZ)**

**B**



**UNSATISFACTORY  
(SMALL METAL PARTICLE DIMENSION  
BUT GREATER THAN 50% COVERAGE)**

**B**



**UNSATISFACTORY  
(LARGE METAL PARTICLE  
DIMENSION)**

**B**

1130648-00-A  
M07626 S0004286576\_V2

**Engine Starter Inspection**  
**Figure 601/80-11-01-990-807-H01 (Sheet 2 of 2)**

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### TASK 80-11-01-200-802-H01

### 3. Engine Starter Oil Leaks Inspection

#### A. General

- (1) This task provides the instructions on how to examine the starter magnetic chip detector and the starter mount for oil leaks.

#### B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
80-11-01-000-801-H01	Engine Starter Removal (P/B 401)
80-11-01-400-801-H01	Engine Starter Installation (P/B 401)

#### C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

#### D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

#### E. Prepare for the Inspection

SUBTASK 80-11-01-860-010-H00

- (1) For the left engine, open these circuit breakers and install safety tags:

##### Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

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SUBTASK 80-11-01-860-011-H00

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

### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-01-860-012-H00



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (3) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
- (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
- (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.
- (d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

## F. Engine Starter Oil Leaks Inspection

SUBTASK 80-11-01-210-001-H01

- (1) Examine the starter for oil leakage:

- (a) Look for signs of oil leaks or an old leak, at the starter Accessory Gear Box (AGB) interface, magnetic chip detector or internal through starter.



INSTALL THE STARTER MAGNETIC PLUG CORRECTLY. A LOOSE MAGNETIC PLUG CAN CAUSE AN OIL LEAK WHICH CAN CAUSE LOW OIL. LOW OIL CAN CAUSE A FIRE OR DAMAGE TO THE ENGINE OR ENGINE FAILURE.

- 1) Do an inspection of the magnetic chip detector for signs of oil leaks or an old oil leak. Replace the preformed packings from the magnetic chip detector if you see an oil leak, (Engine Starter Inspection, TASK 80-11-01-200-801-H01).

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- 2) Do an inspection of the starter magnetic chip detector for signs of internal starter damage, (TASK 80-11-01-200-801-H01).
- 3) If the starter shows signs of oil leaks, do a borescope inspection of starter turbine wheel for evidence of oil leakage on turbine blades, (Engine Starter Oil Leaks Inspection, TASK 80-11-01-200-802-H01).
  - a) If you see oil on the turbine blades, replace the starter, (Engine Starter Removal, TASK 80-11-01-000-801-H01 and Engine Starter Installation, TASK 80-11-01-400-801-H01).

NOTE: A starter internal leak can cause oil to get on the starter turbine blades.
- 4) If the starter shows signs of oil leaks, replace the preformed packings from the starter drive shaft, (Engine Starter Removal, TASK 80-11-01-000-801-H01 and Engine Starter Installation, TASK 80-11-01-400-801-H01).

### G. Put the Airplane Back to its Usual Condition

SUBTASK 80-11-01-410-003-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:
  - (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine
  - (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
  - (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
  - (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-01-865-011-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE

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**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-865-012-H01

- (3) For the right engine, remove the safety tags and close these circuit breakers:

**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

————— **END OF TASK** —————

**TASK 80-11-01-200-803-H00****4. Engine Starter Turbine Wheel Inspection**

(Figure 602 and Figure 603)

**A. General**

- (1) This task provides the instructions on how to examine the engine starter turbine wheel for cracks and missing material.
- (2) This inspection task is not applicable to air turbine starters POST SB 80-0023 OR/AND POST SB 80-0024 OR/AND POST SB 80-0025 OR/AND POST SB 80-0026.

**B. References**

<u>Reference</u>	<u>Title</u>
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
72-00-00-980-801-H01	Manual Motoring of the HPC Rotor (P/B 201)
72-00-00-980-802-H01	Electrical Motoring of the HPC Rotor (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
80-11-01-000-801-H01	Engine Starter Removal (P/B 401)
80-11-01-400-801-H01	Engine 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.

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Reference	Description
COM-117	Borescope - Flexible, 0.24 in. (6mm) Diameter Part #: EVEREST XL PRO VIDEOPROBE Supplier: 06083 Part #: IV9000N Supplier: 32212 Part #: XLG3 VIDEOPROBE Supplier: 06083 Opt Part #: IV7650A-2 Supplier: 32212 Opt Part #: IV8635 Supplier: 32212
COM-571	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083 Part #: 9C1303P02 Supplier: 06083
SPL-114	Borescope - Fiberscope Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083

**D. Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

**E. Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**F. Prepare for the Inspection**

SUBTASK 80-11-01-860-007-H00

- (1) For the left engine, open these circuit breakers and install safety tags:

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-860-008-H00

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

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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SUBTASK 80-11-01-860-009-H00

**WARNING**

DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (3) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
- (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
- (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.
- (d) For the left and right fan cowl panels, do this task:  
Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:  
Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

### G. Engine Starter Turbine Wheel Inspection

SUBTASK 80-11-01-210-002-H00

- (1) Examine the engine starter turbine wheel as follows:
- (a) Install the manual motoring tool or the electrical motoring tool (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).
  - (b) Connect the fiberscope borescope, SPL-114 or flexible borescope, COM-117 to the borescope light source, COM-571.  
**NOTE:** Use a light source of 300-1000 W power or equivalent standard light source.
  - (c) Turn the borescope light source, COM-571 on.
  - (d) Make a selection of the angular location that you can access around the starter exhaust screen to see the full circumference.
  - (e) Insert the fiberscope borescope, SPL-114 or flexible borescope, COM-117 through the starter exhaust screen.
  - (f) Bend the flexible borescope tip 85-99 degrees backward.

**ARO ALL PRE SB 777-GE100-80-0017 AND (PRE SB 777-GE100-80-0023 OR PRE SB 777-GE100-80-0024 OR PRE SB 777-GE100-80-0025 OR PRE SB 777-GE100-80-0026)**

- (g) Do an inspection of the turbine wheel airfoils for cracks or missing material as follows (Figure 603):

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**ARO ALL PRE SB 777-GE100-80-0017 AND (PRE SB 777-GE100-80-0023 OR PRE SB 777-GE100-80-0024 OR PRE SB 777-GE100-80-0025 OR PRE SB 777-GE100-80-0026) (Continued)**

- 1) Put the borescope in position to face an airfoil tip.
- 2) Do the inspection on the first airfoil.
- 3) Use the N2 cranking to turn the starter turbine wheel so that the next airfoil to examine faces to the borescope (TASK 72-00-00-980-801-H01).

**NOTE:** Make sure the borescope will not interfere with the airfoils while you turn the starter turbine wheel.

- 4) Do the inspection on the next airfoil.
- 5) Continue with the inspection until you have examined all 26 airfoils.
- 6) Cracked or missing tip corner is not permitted.
  - a) If you find a crack or missing tip corner, replace the starter in or less than 10 start cycles (TASK 80-11-01-000-801-H01 and TASK 80-11-01-400-801-H01).

**ARO ALL POST SB 777-GE100-80-0017 AND (PRE SB 777-GE100-80-0023 OR PRE SB 777-GE100-80-0024 OR PRE SB 777-GE100-80-0025 OR PRE SB 777-GE100-80-0026)**

- (h) Do an inspection of the turbine wheel blades root for cracks or missing material as follows:

- 1) Do an inspection of the turbine wheel airfoils pressure face (concave side) (Figure 603, Sheet 2).
  - a) Put the borescope in position to face the trailing edge root radius pressure face of an airfoil.
  - b) Do the inspection on the first blade root.
  - c) Use the N2 cranking to turn the starter turbine wheel so that the next airfoil to examine faces to the borescope (TASK 72-00-00-980-801-H01).

**NOTE:** Make sure the borescope will not interfere with the airfoils while you turn the starter turbine wheel.
  - d) Do the inspection on the next blade root.
  - e) Continue with the inspection until you have examined all 26 blades.
- 2) Do an inspection of the turbine wheel airfoils suction face (convex side) (Figure 603, Sheet 3).
  - a) Put the borescope in position to face the trailing edge root radius suction face of an airfoil.
  - b) Do the inspection on the first blade root.
  - c) Use the N2 cranking to turn the starter turbine wheel so that the next airfoil to examine faces to the borescope (TASK 72-00-00-980-801-H01).

**NOTE:** Make sure the borescope will not interfere with the airfoils while you turn the starter turbine wheel.
  - d) Do the inspection on the next blade root.
  - e) Continue with the inspection until you have examined all 26 blades.
- 3) Cracked or missing material in the root radius is not permitted.
  - a) If you find one to five cracked airfoils or missing material on five or less airfoils, replace the air starter in or less than 10 cycles (TASK 80-11-01-000-801-H01 and TASK 80-11-01-400-801-H01).

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ARO ALL POST SB 777-GE100-80-0017 AND (PRE SB 777-GE100-80-0023 OR PRE SB 777-GE100-80-0024 OR PRE SB 777-GE100-80-0025 OR PRE SB 777-GE100-80-0026) (Continued)

- b) If you find cracks or missing material on more than five airfoils, replace the starter immediately (TASK 80-11-01-000-801-H01 and TASK 80-11-01-400-801-H01).

### ARO ALL

- (i) Remove the borescope equipment as follows:
- 1) Turn off the borescope light source.
  - 2) Let the light source blower stay on for a while to cool the lamp and case.
  - 3) Remove the borescope from the starter.
- (j) Remove the manual motoring tool or the electrical motoring tool (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).

### H. Put the Airplane Back to Its Usual Conditions

SUBTASK 80-11-01-410-004-H00



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:
- (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
- 1) Close these access panels:
- | <u>Number</u> | <u>Name/Location</u>                |
|---------------|-------------------------------------|
| 415AL         | Left Thrust Reverser, Left Engine   |
| 416AR         | Right Thrust Reverser, Left Engine  |
| 425AL         | Left Thrust Reverser, Right Engine  |
| 426AR         | Right Thrust Reverser, Right Engine |
- (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
- 1) Close these access panels:
- | <u>Number</u> | <u>Name/Location</u>               |
|---------------|------------------------------------|
| 413AL         | Left Fan Cowl Panel, Left Engine   |
| 414AR         | Right Fan Cowl Panel, Left Engine  |
| 423AL         | Left Fan Cowl Panel, Right Engine  |
| 424AR         | Right Fan Cowl Panel, Right Engine |
- (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
- (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-01-865-017-H00

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE

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**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	3	C80605	L ENG START SW

SUBTASK 80-11-01-865-018-H00

- (3) For the right engine, remove the safety tags and close these circuit breakers:

**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

————— **END OF TASK** —————

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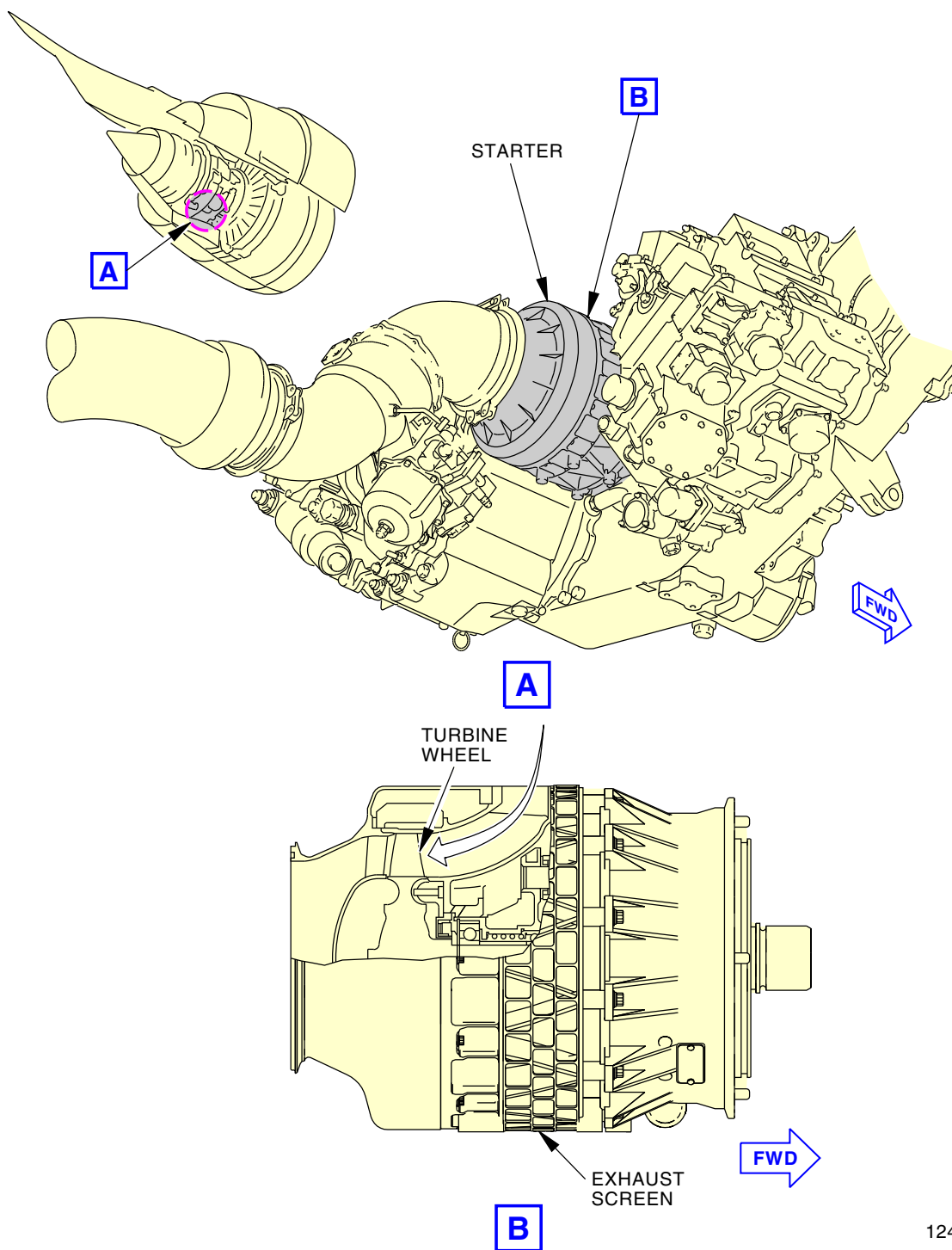
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1246488-00

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Engine Starter Turbine Wheel Inspection  
Figure 602/80-11-01-990-808-H00

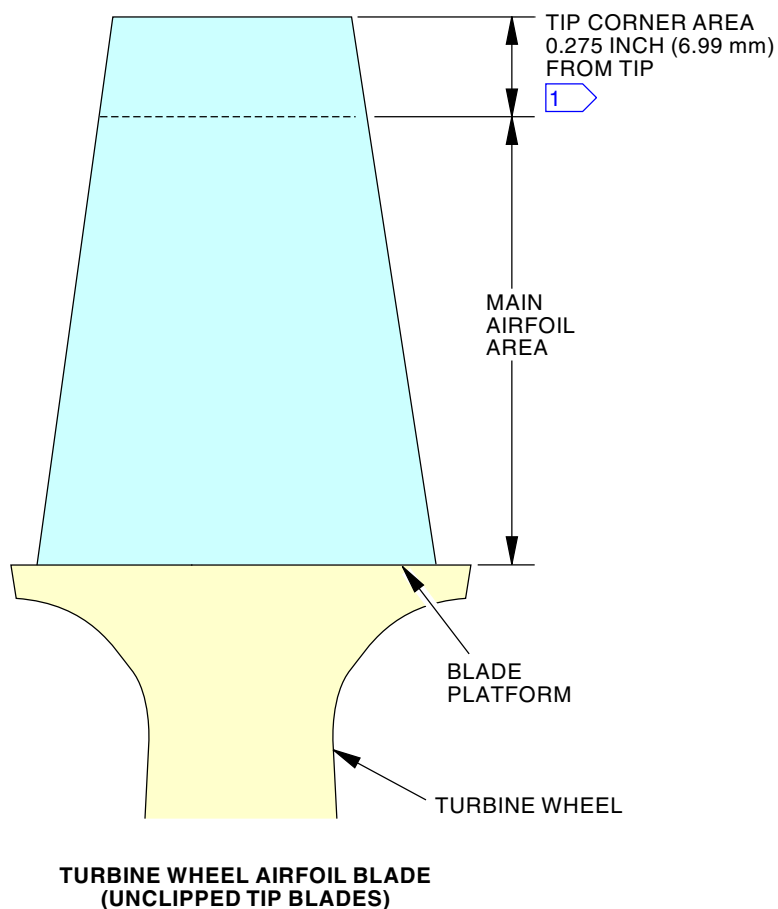
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1

ENGINE STARTER TURBINE WHEEL WITH UNCLIPPED TIP BLADES

1368661-00

2216343 S0000494531\_V3

**Engine Starter Turbine Wheel Airfoil Blade Inspection  
Figure 603/80-11-01-990-809-H00 (Sheet 1 of 3)**

**EFFECTIVITY**

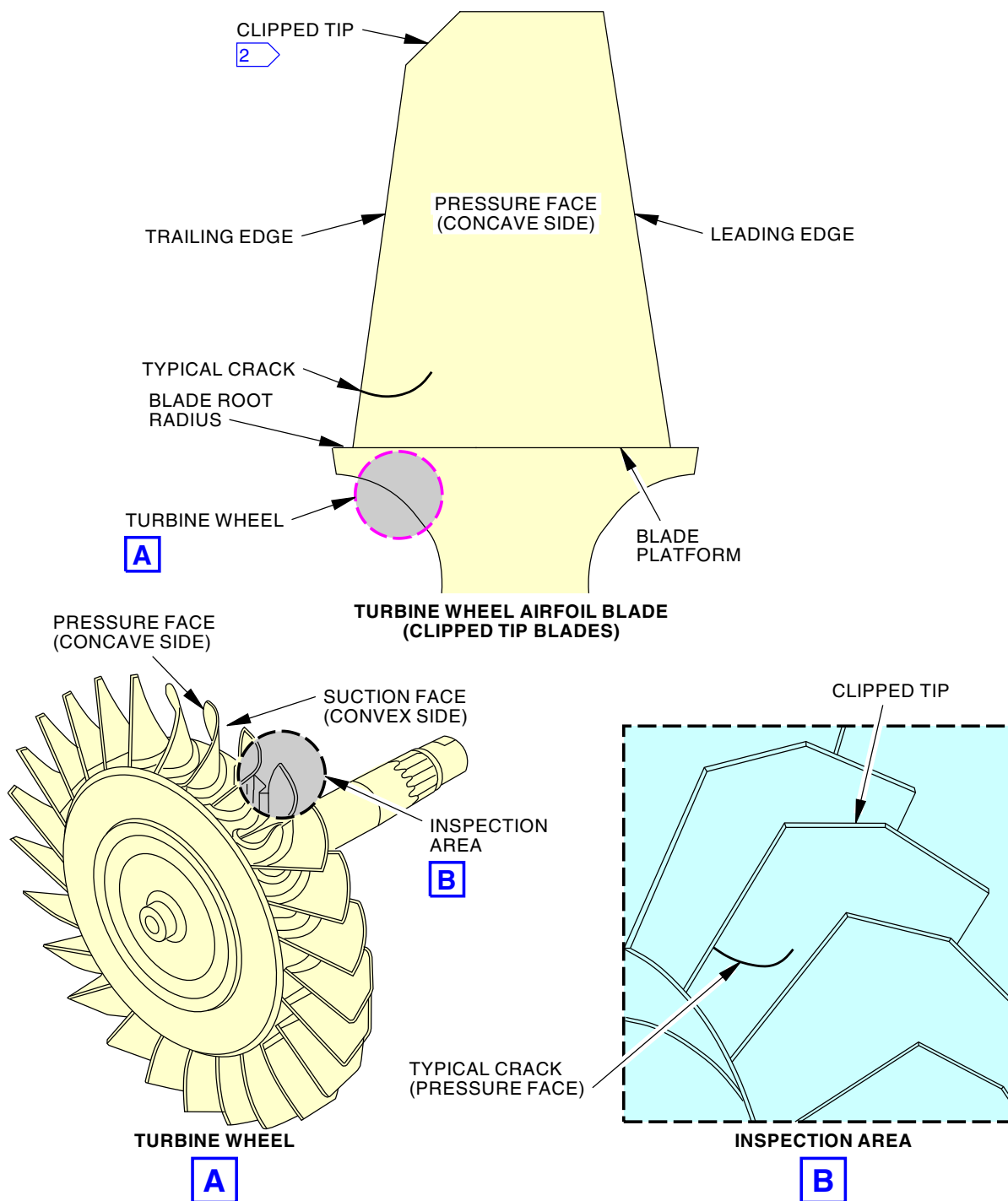
**ARO ALL PRE SB 777-GE100-80-0017 AND (PRE SB  
777-GE100-80-0023 OR PRE SB 777-GE100-80-0024  
OR PRE SB 777-GE100-80-0025 OR PRE SB  
777-GE100-80-0026)**

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2 ENGINE STARTER TURBINE WHEEL WITH CLIPPED TIP BLADES

5015776-00  
2376275 S0000544143\_V2

Engine Starter Turbine Wheel Airfoil Blade Inspection  
Figure 603/80-11-01-990-809-H00 (Sheet 2 of 3)

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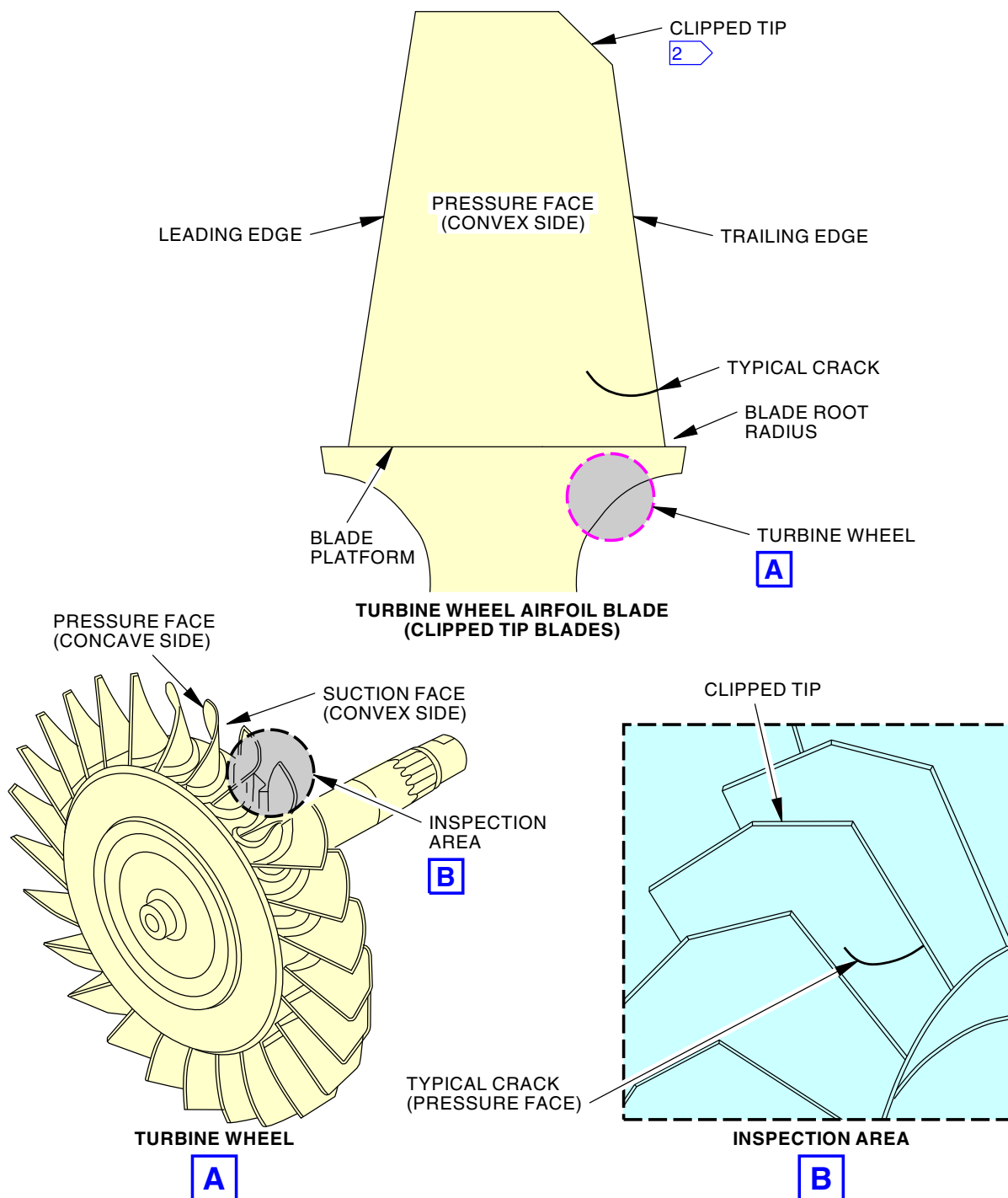
ARO ALL POST SB 777-GE100-80-0017 AND (PRE SB 777-GE100-80-0023 OR PRE SB 777-GE100-80-0024 OR PRE SB 777-GE100-80-0025 OR PRE SB 777-GE100-80-0026)

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**2** ENGINE STARTER TURBINE WHEEL WITH CLIPPED TIP BLADES

5015777-00  
2376284 S0000544144\_V2

**Engine Starter Turbine Wheel Airfoil Blade Inspection**  
**Figure 603/80-11-01-990-809-H00 (Sheet 3 of 3)**

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ARO ALL POST SB 777-GE100-80-0017 AND (PRE  
SB 777-GE100-80-0023 OR PRE SB  
777-GE100-80-0024 OR PRE SB 777-GE100-80-0025  
OR PRE SB 777-GE100-80-0026)

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### STARTER AIR VALVE - REMOVAL/INSTALLATION

#### 1. General

- A. This procedure has two tasks:
- (1) A removal of the starter air valve
  - (2) An installation of the starter air valve.

#### **TASK 80-11-02-000-801-H01**

#### 2. Starter Air Valve Removal

(Figure 401)

##### A. General

- (1) This task provides the instructions on how to remove the starter air valve.
- (2) Each engine has one starter air valve. The starter air valve (referred to as SAV) is installed on the air inlet (aft side) of the starter at the 6:00 o'clock position.
- (3) To remove the SAV, you must do these steps:
  - (a) Do the deactivation procedure for the leading edge slats.
  - (b) Do the deactivation procedure for the thrust reversers.
  - (c) Open the fan cowl panels and the thrust reversers.
  - (d) Disconnect the SAV solenoid and the SAP electrical connectors.
  - (e) Disconnect the SAV manual control.
  - (f) Remove the SAV.
  - (g) Remove the SAV air shroud from the SAV.

##### B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
36-00-00-860-801	Depressurize the Pneumatic System (P/B 201)
70-00-01-400-807-H01	Electrical Connector - Disconnect and Connect (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

##### C. Tools/Equipment

Reference	Description
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)

##### D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

##### E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

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Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**F. Prepare for the Removal**

SUBTASK 80-11-02-865-003-H01

- (1) For the left engine, open these circuit breakers and install safety tags:

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-02-865-004-H01

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

**Overhead Circuit Breaker Panel, P11**

Row	Col	Number	Name
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-02-860-002-H01



YOU MUST REMOVE THE PRESSURE FROM THE STARTER DUCT BEFORE YOU REMOVE THE STARTER VALVE. IF YOU DO NOT REMOVE THE PRESSURE FROM THE STARTER DUCT, HOT HIGH PRESSURE AIR CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

- (3) Do this task: Depressurize the Pneumatic System, TASK 36-00-00-860-801.

SUBTASK 80-11-02-010-001-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

- (4) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:
- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
  - (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
  - (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.
  - (d) For the left and right fan cowl panels, do this task:  
Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

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<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

- (e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

### G. Starter Air Valve Removal

SUBTASK 80-11-02-020-001-H01



MAKE SURE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU DISCONNECT THEM. CONTAMINATION OF ELECTRICAL CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.



USE TEFLON-JAWED PLIERS TO LOOSEN THE ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

- (1) Use teflon-jawed pliers, STD-664 to disconnect the SAV solenoid and the starter air pressure (SAP) electrical connector [4] and electrical connector [7] (TASK 70-00-01-400-807-H01) .

NOTE: Do not remove the SAV air shroud. The SAV air shroud stays attached during the removal procedure.

- (a) Disconnect the SAV solenoid electrical connector [4].
- (b) Disconnect the starter air pressure (SAP) sensor electrical connector [7].
- (c) Install protective covers on the SAV solenoid and the SAP sensor electrical connector [4] and the electrical connector [7], and the connections.

SUBTASK 80-11-02-020-002-H01

- (2) Disconnect the SAV manual control [8] from the SAV [3].
- (a) Remove the two bolts [11] and the washers [12] that attach the SAV manual control [8] flange collar to the SAV [3].
  - (b) Remove the bolt [9] and the washer [10] that attach the SAV manual control [8] flexible shaft to the starter and the gearbox bracket.
  - (c) Disconnect the square drive of the SAV manual control [8] from the SAV [3].
- NOTE: Do not remove the clips from the SAV manual control.
- (d) Put a protective cover on the SAV manual control [8] end.

SUBTASK 80-11-02-020-005-H01

- (3) Disconnect the air tube [17] from the flex joint tube [18].
- (a) Loosen the bolt [15] and remove the air tube [17] from the clamp [16] and the flex joint tube [18].

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(4) Remove the SAV [3] as follows:

- (a) Remove the forward V-band clamp [14] at the starter.
- (b) Remove the aft V-band clamp [5] at the starter air duct.
- (c) Remove the SAV [3].
- (d) Remove the E-Seal [6] and the E-Seal [13] from the SAV [3].
- (e) Examine the E-Seal [6] and the E-Seal [13] for distortion and heat damage.
  - 1) If you do not see damage on the E-Seal [6] or the E-Seal [13], keep the E-Seal [6] and the E-Seal [13] for the installation.
- (f) Install protective covers on the SAV [3], the starter air inlet, and the starter air duct.

**SUBTASK 80-11-02-010-004-H01**

(5) Remove the starter air duct [21] as follows:

- (a) Remove the eight bolts [20] at the starter air duct [21].
- (b) Examine the bolts [20] for damage.
  - 1) If you do not see damage on the bolts [20], keep the bolts [20] for the installation.
- (c) Remove and examine the o-ring [19] for damage.
  - 1) If you do not see damage on the o-ring [19], keep the o-ring [19] for the installation.

**SUBTASK 80-11-02-020-006-H01**

(6) Remove the SAV air shroud [22] as follows:

- (a) Cut the safety cable [23] which attaches the SAV air shroud [22] to the SAV [3].
- (b) Remove the SAV air shroud [22].
- (c) Examine the SAV air shroud [22] for damage.
  - 1) If you do not see damage on the SAV air shroud [22], keep the SAV air shroud [22] for the installation.

———— **END OF TASK** ————

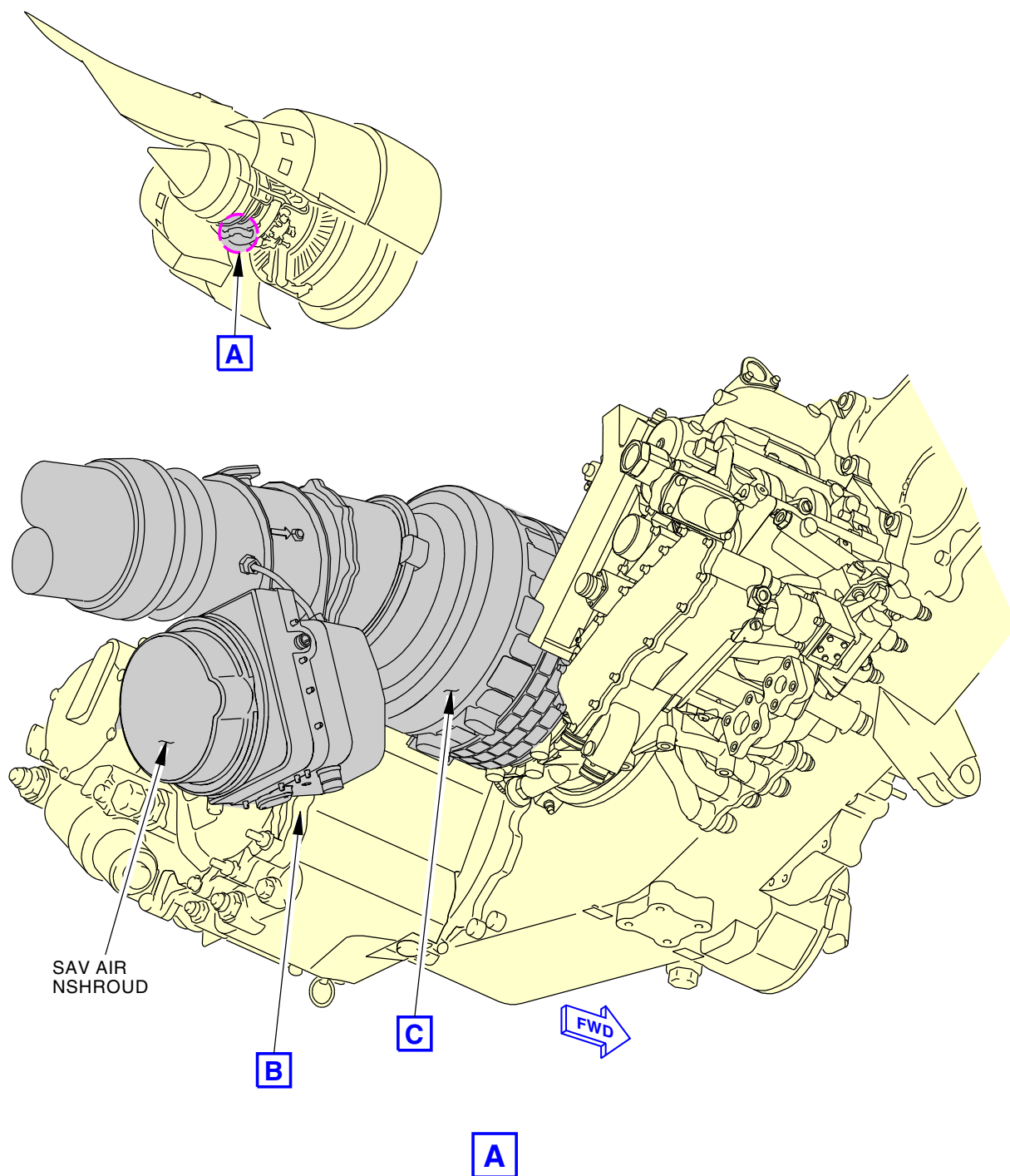
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W71831 S0000128980\_V3

**Starter Air Valve Installation**  
**Figure 401/80-11-02-990-801-H01 (Sheet 1 of 4)**

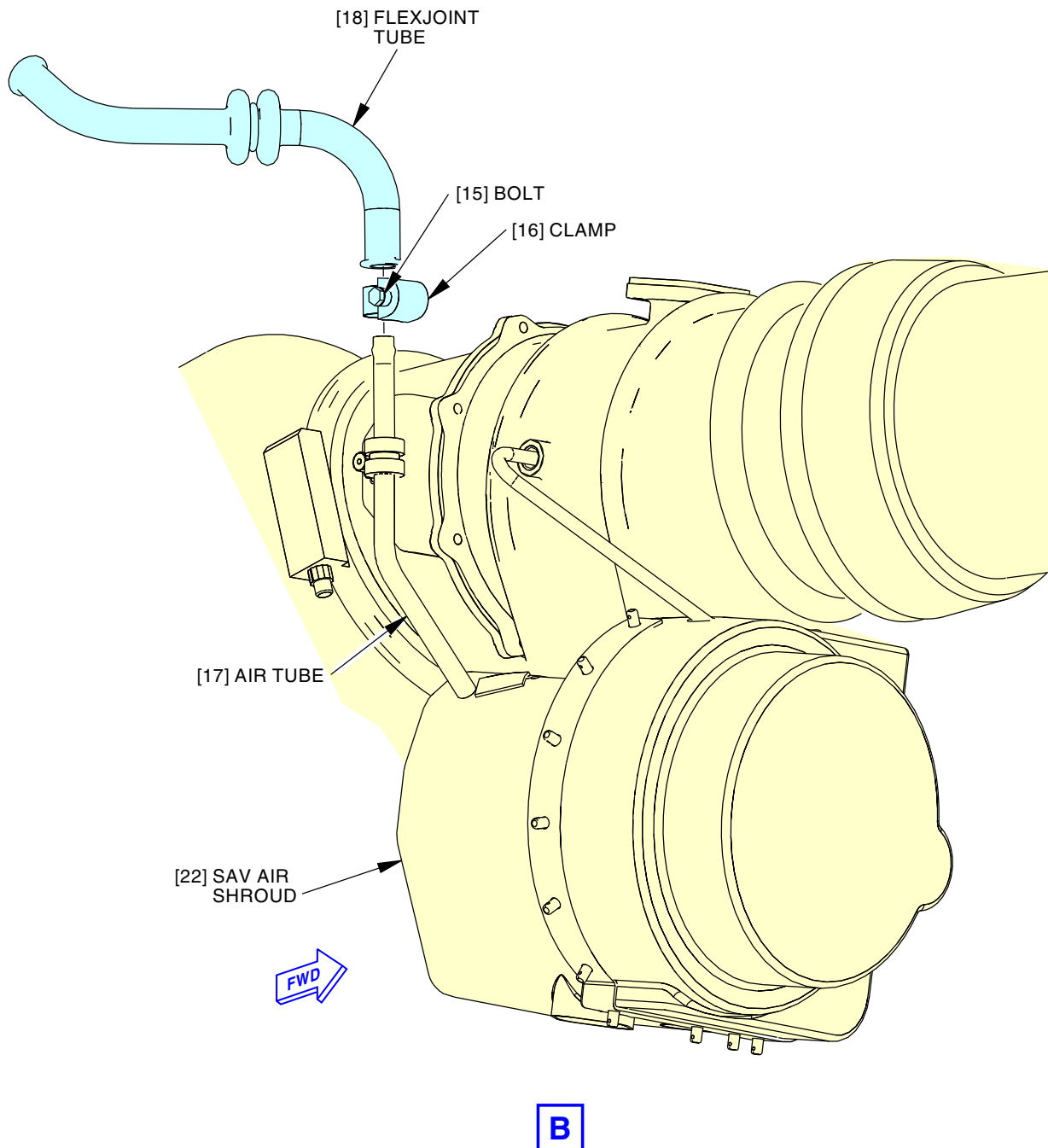
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Starter Air Valve Installation  
Figure 401/80-11-02-990-801-H01 (Sheet 2 of 4)

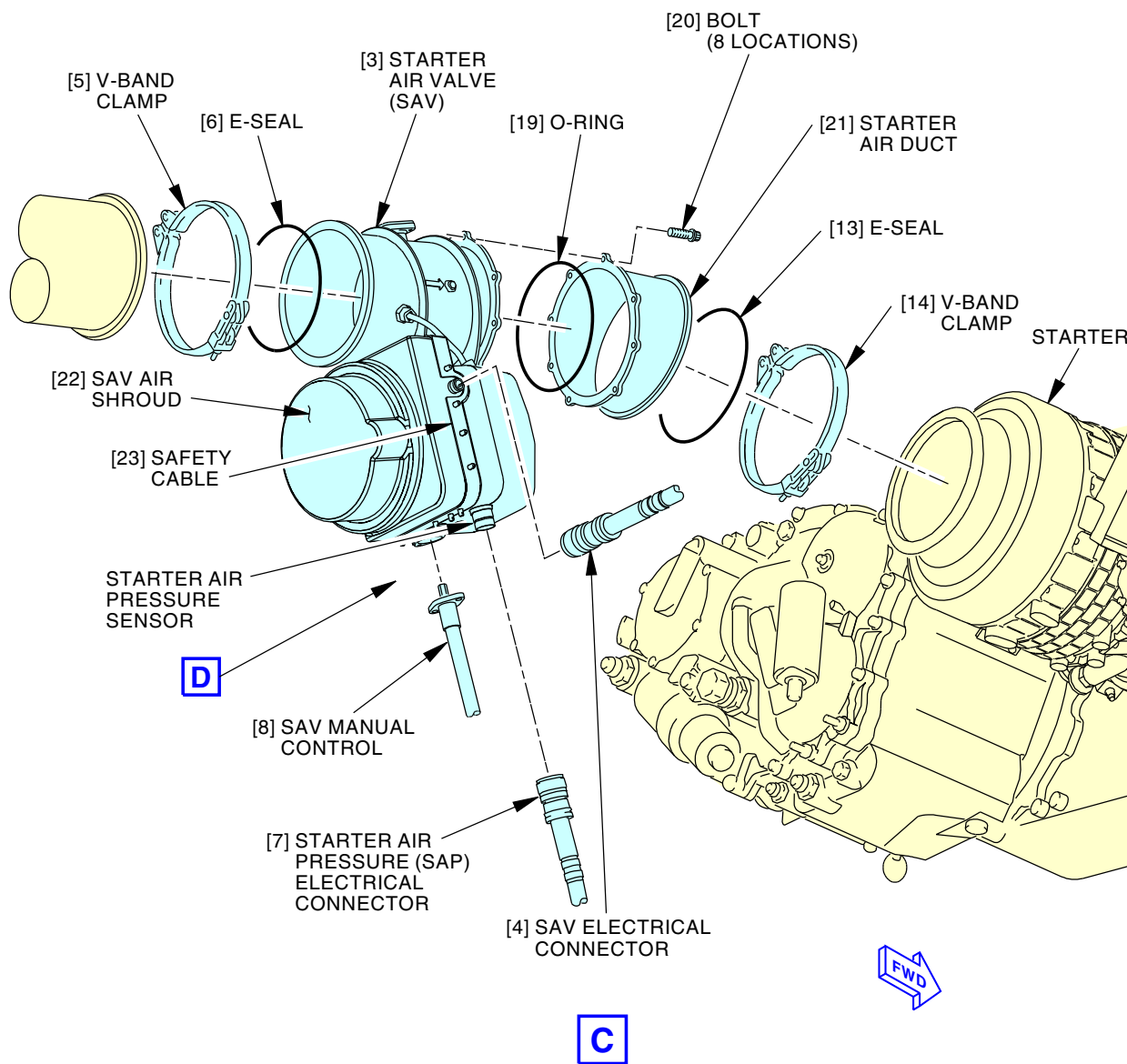
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M07628 S0004286578\_V4

**Starter Air Valve Installation**  
Figure 401/80-11-02-990-801-H01 (Sheet 3 of 4)

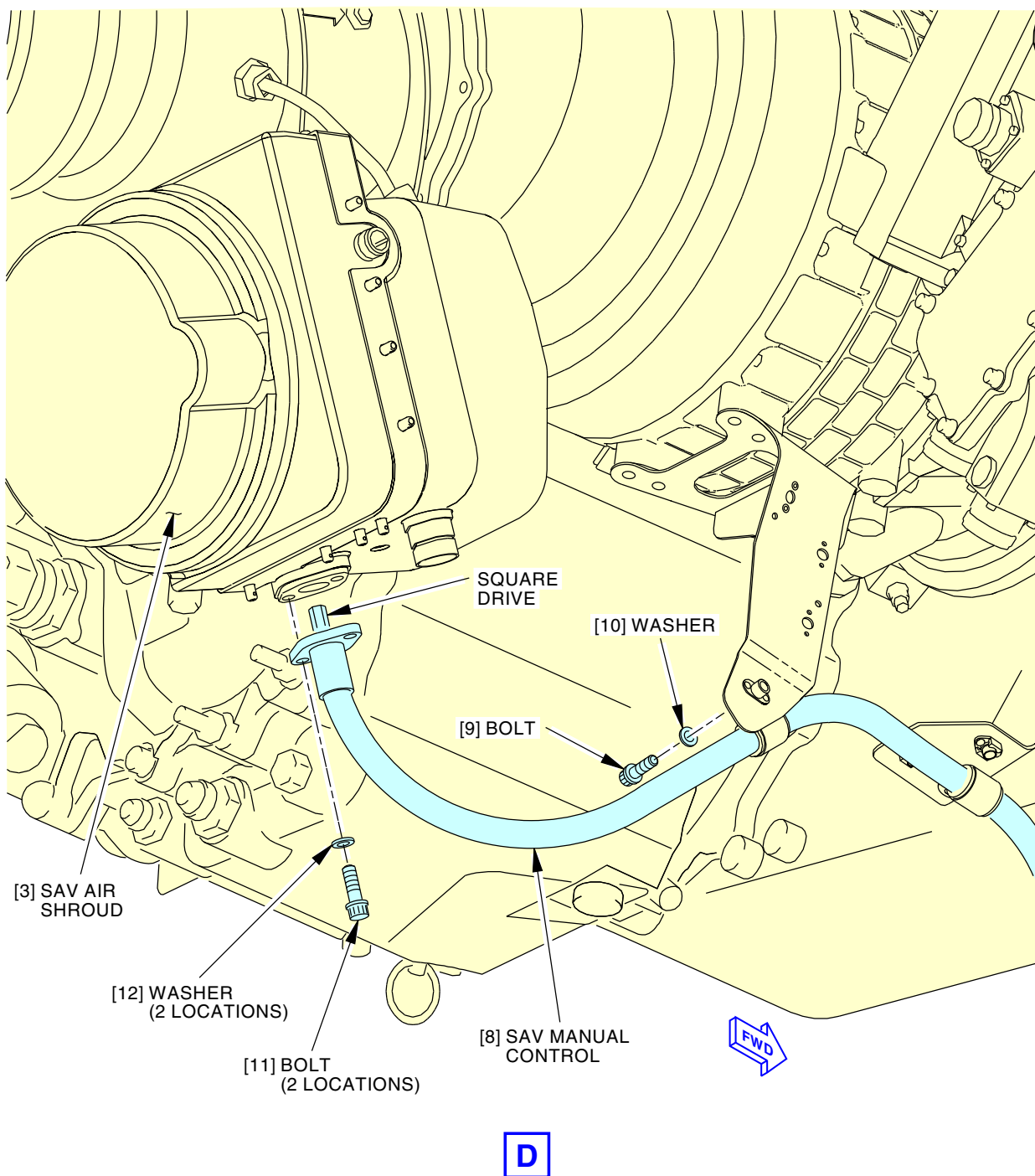
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**Starter Air Valve Installation**  
**Figure 401/80-11-02-990-801-H01 (Sheet 4 of 4)**

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### TASK 80-11-02-400-801-H01

### 3. Starter Air Valve Installation

(Figure 401)

#### A. General

- (1) This task provides the instructions on how to install the starter air valve.
- (2) To install the SAV, you must do these steps:
  - (a) Install the SAV air shroud on the SAV.
  - (b) Install the SAV.
  - (c) Connect the SAV solenoid and the SAP electrical connectors.
  - (d) Connect the SAV manual control.
  - (e) Close the thrust reversers.
  - (f) Do the activation procedure for the thrust reversers.
  - (g) Close the fan cowl panels.
  - (h) Do the activation procedure for the leading edge slats.
  - (i) Do the activation procedure for the leading edge slats.
- (3) Do the necessary test for the engine starting system.

#### B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-00-01-400-807-H01	Electrical Connector - Disconnect and Connect (P/B 201)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

#### C. Tools/Equipment

Reference	Description
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)

#### D. Consumable Materials

Reference	Description	Specification
D50043 [C02-058]	Compound - Antiseize, Acheson GP460 (For Threaded Fasteners 0.250 Inches Diameter Or Larger, C02-079 Is An Alternative)	GE A50TF201 Class A
G02325 [C10-145]	Cable, Safety - GE P/N J1285P01	

#### E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
3	SAV	80-11-02-03-045	ARO ALL
6	E-Seal	80-11-02-03-038	ARO ALL
13	E-Seal	80-11-02-03-037	ARO ALL
19	O-ring	80-11-02-03-040	ARO ALL

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**F. Location Zones**

Zone	Area
411	Engine, Left
421	Engine, Right

**G. Access Panels**

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

**H. Starter Air Valve Installation****SUBTASK 80-11-02-420-006-H01**

- (1) Install the SAV air shroud [22] on the SAV [3]:
- (a) Use the new safety cable [23] (safety cable, G02325 [C10-145]) which attaches the SAV air shroud [22] to the SAV [3].

**SUBTASK 80-11-02-420-005-H01**

- (2) Install the starter air duct [21] on the SAV [3]:
- (a) Remove the eight bolts [20] at the starter air duct [21].
  - (b) Install the o-ring [19] on the SAV [3].
  - (c) Install the starter air duct [21] on the SAV [3].

**NOTE:** Do not lubricate the bolts [20].

- 1) Install the eight bolts [20] and tighten to 50.0-55.0 Pound-inches (5.6-6.2 Newton-meters).

**SUBTASK 80-11-02-420-001-H01**

- (3) Install the SAV [3] as follows :
- (a) Remove the protective covers from the starter air inlet, the SAV [3] and the starter air duct.
  - (b) Look at the inside of the starter air inlet and air duct for unwanted material or damage.
    - 1) Clean the starter air inlet and air duct if it is necessary.
  - (c) Install the E-Seals [6] and E-Seal [13] on the SAV [3].
  - (d) Put the SAV [3] in its position between the starter and the starter air duct.
  - (e) Support the SAV [3] with your hand.
  - (f) Loosely install the forward V-band clamp [14] on the starter air inlet and the SAV flanges.
  - (g) Loosely install the aft V-band clamp [5] on the SAV [3] and the starter air duct flanges.
  - (h) Make sure the SAV [3] is correctly positioned.
  - (i) Tighten the forward V-band clamp [14] and the aft V-band clamp [5] nuts to 110.0-120.0 Pound-inches (12.4-13.6 Newton-meters).

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## SUBTASK 80-11-02-420-004-H01

- (4) Connect the air tube [17] to the flex joint tube [18] with the clamp [16].
- (a) Tighten the bolt [15] to 32.0-38.0 Pound-inches (3.62-4.29 Newton-meters).

## SUBTASK 80-11-02-420-002-H01

- (5) Connect the SAV manual control [8] to the SAV [3]:
- (a) Remove the SAV manual control [8] from the protective cover.
- (b) Put Acheson GP460 compound, D50043 [C02-058] on the bolt [9] and the bolts [11].
- (c) Engage the hex-drive part of the SAV manual control [8] crank handle with the SAV manual control release valve.
- (d) Find the pre-position on the SAV manual control square-drive.
- (e) Turn the crank handle to pre-position on the SAV manual control square drive with the SAV internal drive.
- (f) Disengage the crank handle hex-drive from the release valve.
- (g) Put the square drive of the SAV manual control [8] in the SAV internal drive.
- (h) Move the SAV manual control [8] flange collar into its position on the SAV port.
- (i) Attach the SAV manual control [8] to the SAV with the two bolts [11] and the two washers [12].
- (j) Tighten the bolts [11] to 110.0-120.0 Pound-inches (12.4-13.6 Newton-meters).
- (k) Loosely attach the SAV manual control [8] flexible shaft to the gearbox and the starter bracket with the bolt [9] and the washer [10].
- (l) Tighten the bolt [9] to 55-70 Poundinches. (6.2-7.9 Newton-meters).

## SUBTASK 80-11-02-420-003-H01



MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.



USE TEFLON-JAWED PLIERS TO TIGHTEN THE ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

- (6) Use teflon-jawed pliers, STD-664 to connect the starter air pressure (SAP) sensor and the starter air valve (SAV) solenoid electrical connector [4] and te electrical connector [7] (TASK 70-00-01-400-807-H01).
- (a) Remove the protective covers from the SAP sensor, the SAV solenoid electrical connections, and the SAP electrical connector [4] and the electrical connector [7].
- (b) Connect the SAP electrical connector [7] to the SAP sensor connections.
- (c) Connect the SAV electrical connector [4] to the SAV solenoid connections.
- (d) Tighten the electrical connector [4] and the electrical connector [7].



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### I. Starter Air Valve Installation Test

SUBTASK 80-11-02-865-005-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-02-865-006-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 80-11-02-710-001-H01

- (3) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

### J. Put the Airplane Back to Its Usual Condition

SUBTASK 80-11-02-410-002-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:
- (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine
  - (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
  - (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
  - (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

————— END OF TASK —————

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### STARTER AIR VALVE MANUAL CONTROL - REMOVAL/INSTALLATION

#### 1. General

A. This procedure contains two tasks:

- (1) A removal of the starter air valve manual control
- (2) An installation of the starter air valve manual control.

#### **TASK 80-11-07-000-801-H01**

#### 2. Starter Air Valve Manual Control Removal

(Figure 401)

##### A. General

- (1) This task provides the instructions on how to remove the starter air valve (SAV) manual control.

##### B. References

<u>Reference</u>	<u>Title</u>
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

##### C. Location Zones

<u>Zone</u>	<u>Area</u>
411	Engine, Left
421	Engine, Right

##### D. Access Panels

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

##### E. Prepare for the Removal

SUBTASK 80-11-07-865-003-H01

- (1) For the left engine, open these circuit breakers and install safety tags:

##### **Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 80-11-07-865-004-H01

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

##### **Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE

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(Continued)

**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	18	C80606	R ENG START SW

SUBTASK 80-11-07-010-001-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(3) Do these tasks in sequence to safely open the left thrust reverser on the applicable engine:

- (a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.
- (b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.
- (c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.
- (d) For the left fan cowl panel, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

<u>Number</u>	<u>Name/Location</u>
---------------	----------------------

413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

- (e) For the left thrust reverser, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

<u>Number</u>	<u>Name/Location</u>
---------------	----------------------

415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

**F. Starter Air Valve Manual Control Removal**

SUBTASK 80-11-07-020-001-H01

- (1) Remove the SAV manual control crank handle from the spring clip that holds it in the stowed position.

SUBTASK 80-11-07-020-002-H01

- (2) Remove the two bolts [2] and washers [9] that attach the SAV manual control [1] release valve to the drain mast bracket.

SUBTASK 80-11-07-020-003-H01

- (3) Remove the two bolts [7] and washers [8] that attach the SAV manual control [1] flange collar to the SAV.

SUBTASK 80-11-07-020-004-H01

- (4) Remove the two bolts [6] and washers [5] that attach the SAV manual control [1] flexible shaft to the starter and the gearbox brackets.

SUBTASK 80-11-07-020-005-H01

- (5) Remove the SAV manual control [1] from the drain mast.
- (a) Start at the bottom of the drain mast and remove the three bolts [4] and washers [3] that attach the SAV manual control [1] to the drain mast brackets.
  - (b) Disconnect the square drive of the SAV manual control [1] from the SAV.

NOTE: Do not remove the clips from the SAV manual control.

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- (c) Put the SAV manual control [1] in a protective cover.
- (d) Put a protective cover on the SAV manual control port.

———— **END OF TASK** ————

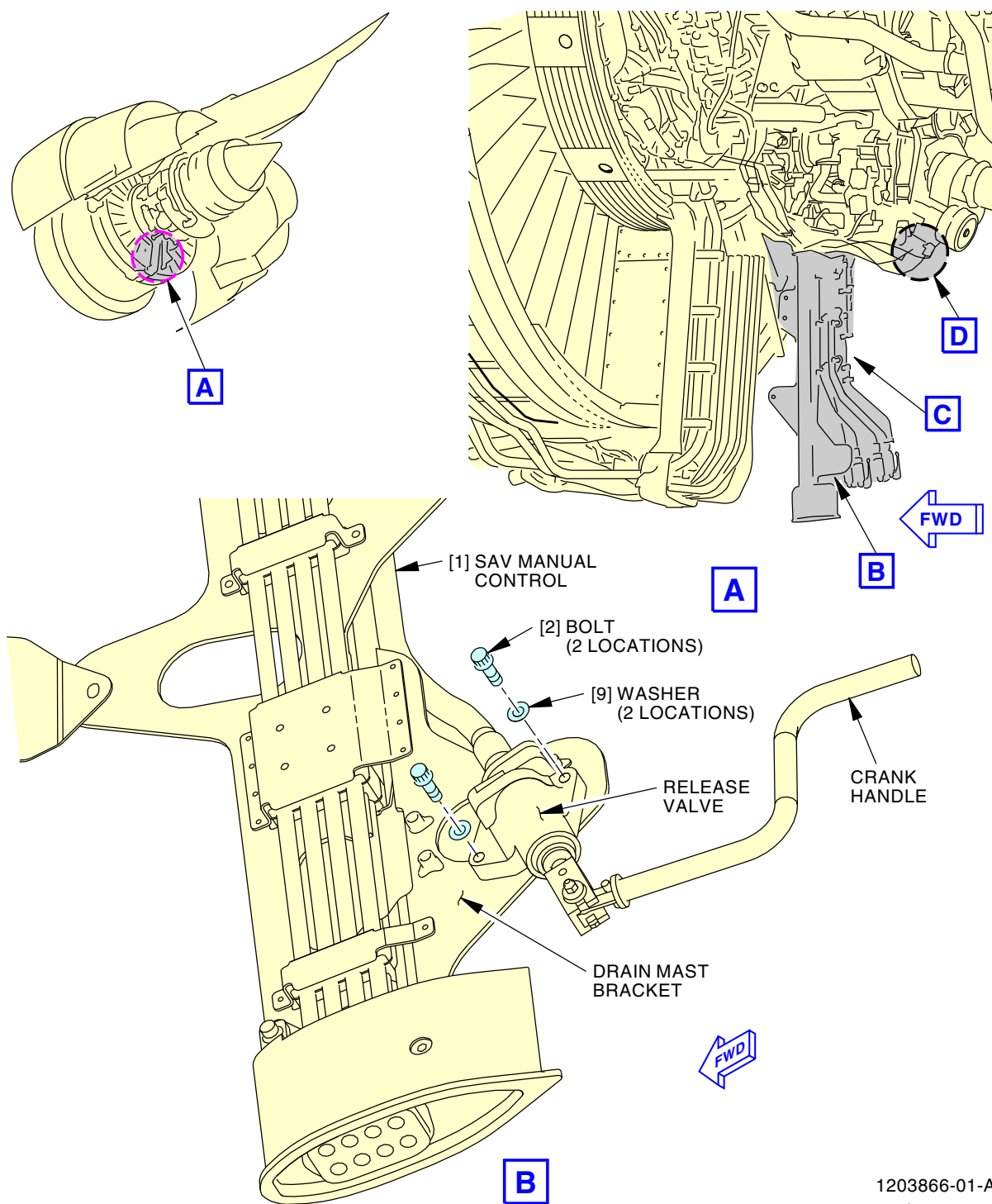
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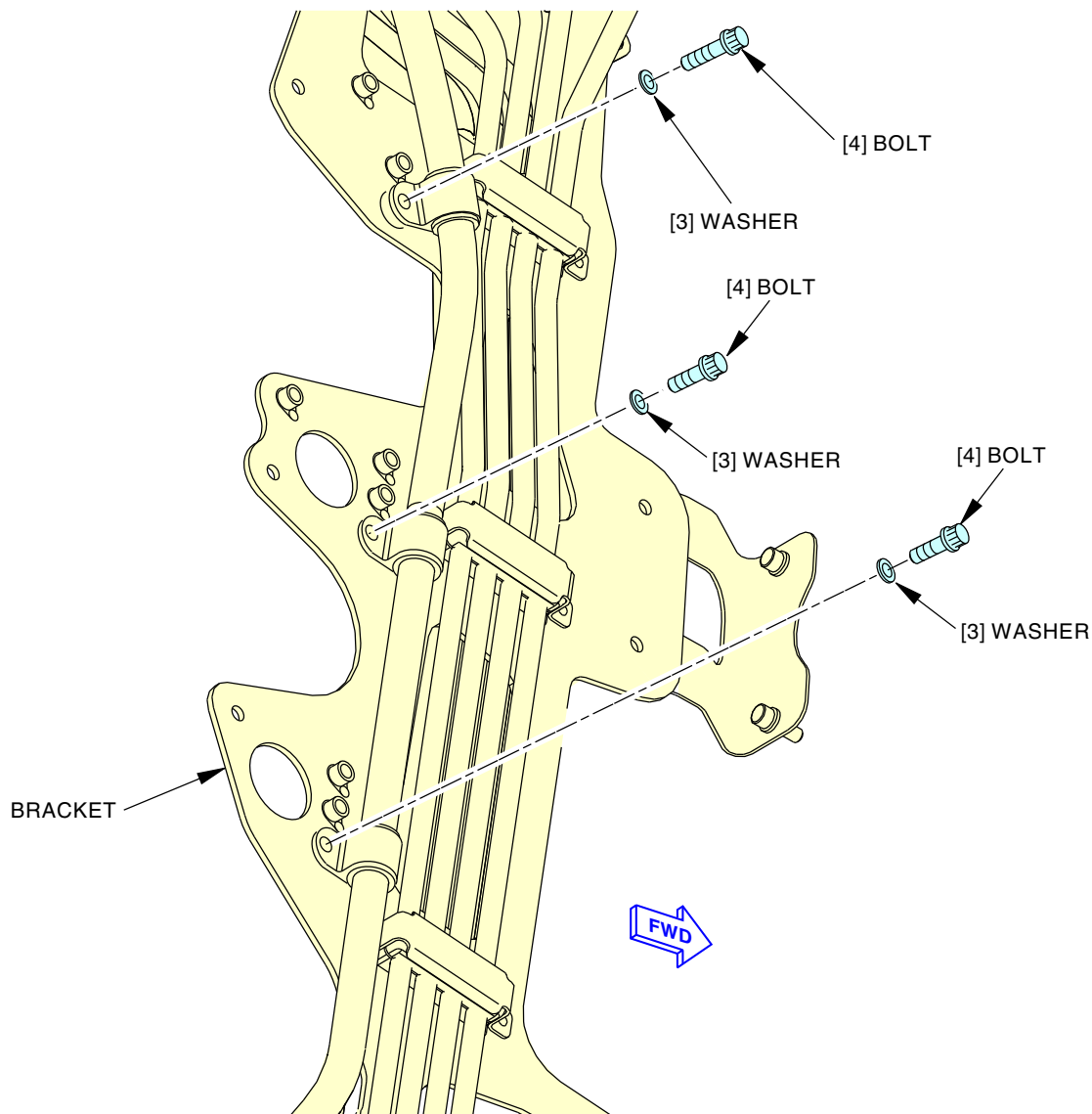
**SAV Manual Control Installation**  
Figure 401/80-11-07-990-801-H01 (Sheet 1 of 3)

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**SAV Manual Control Installation**  
**Figure 401/80-11-07-990-801-H01 (Sheet 2 of 3)**

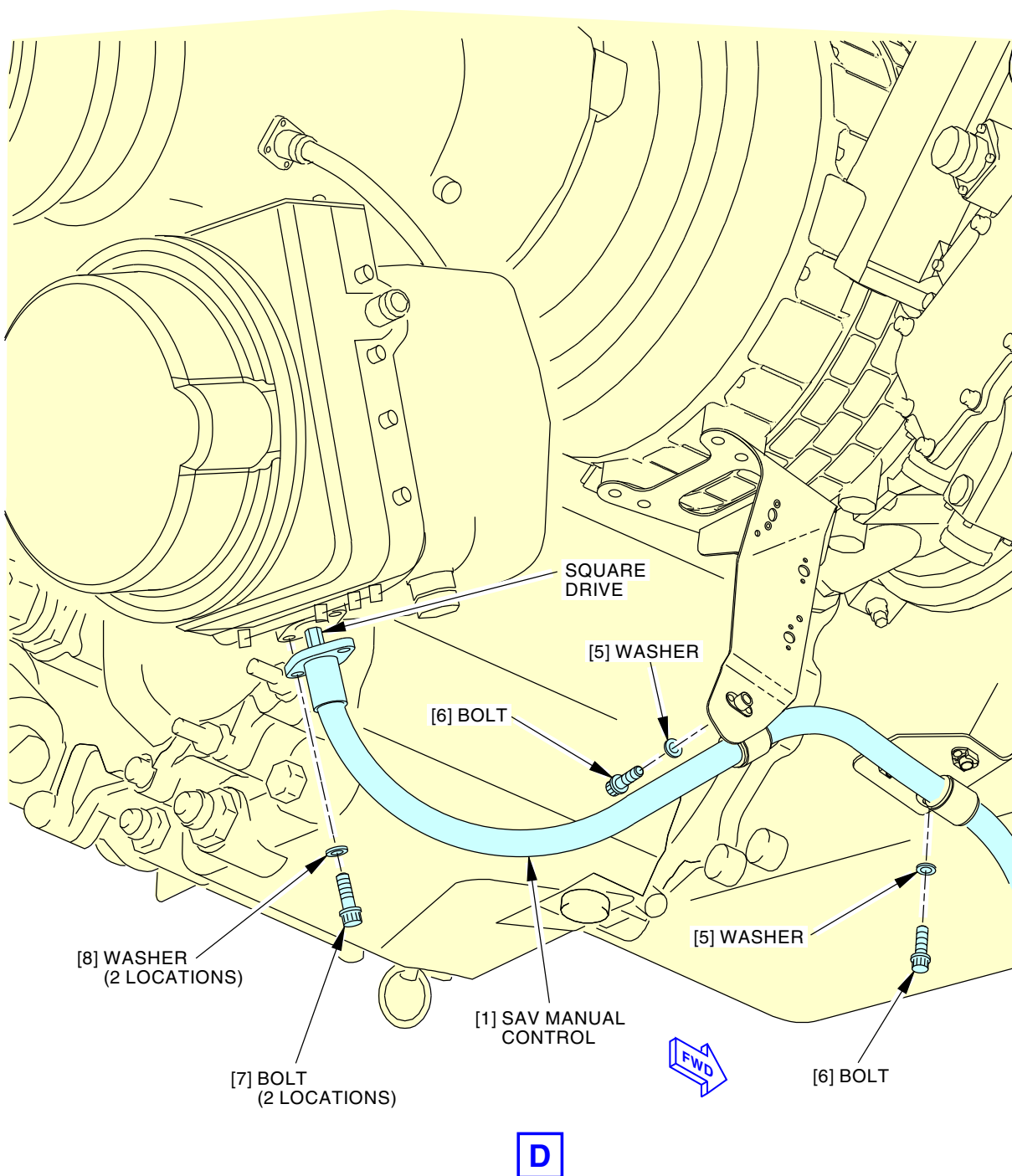
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**SAV Manual Control Installation**  
**Figure 401/80-11-07-990-801-H01 (Sheet 3 of 3)**

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### TASK 80-11-07-400-801-H01

### 3. Starter Air Valve Manual Control Installation

(Figure 401)

#### A. General

- (1) This task provides the instructions on how to install the starter air valve (SAV) manual control.

#### B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

#### C. Consumable Materials

Reference	Description	Specification
D50043 [C02-058]	Compound - Antiseize, Acheson GP460 (For Threaded Fasteners 0.250 Inches Diameter Or Larger, C02-079 Is An Alternative)	GE A50TF201 Class A

#### D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	SAV manual control	Not Specified	

#### E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

#### F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

#### G. Starter Air Valve Manual Control Installation

SUBTASK 80-11-07-420-001-H01

- (1) Install the SAV manual control [1]:
- Remove the SAV manual control [1] from the protective cover.
  - Remove the protective cover from the SAV manual control port.
  - Put Acheson GP460 compound, D50043 [C02-058] on the bolts [2], bolts [4], bolts [6] and the bolts [7].
  - Engage the hex-drive part of the SAV manual control [1] crank handle with the SAV manual control release valve.
  - Look at the position of the SAV internal square-drive.
  - Turn the crank handle to position the SAV manual control square-drive with the SAV internal drive.
  - Disengage the crank handle hex-drive from the release valve.
  - Put the square drive of the SAV manual control [1] in the SAV internal drive.

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- (i) Move the SAV manual control [1] flange-collar into its position with the SAV port.
- (j) Attach the SAV manual control [1] to the SAV with the two bolts [7] and washers [8].
- (k) Tighten the bolts [7] to 110-120 pound-inches (12.4-13.6 Newton-meters).
- (l) Loosely attach the SAV manual control [1] release valve to the drain mast bracket with two bolts [2] and washers [9].
- (m) Loosely attach the SAV manual control [1] flexible shaft to the drain mast brackets with three bolts [4] and washers [3].
- (n) Loosely attach the SAV manual control [1] flexible shaft to the gearbox and starter brackets with bolts [6] and washers [5].
- (o) Tighten the bolts [2] and the bolts [6] to 55-70 pound-inches (6.2-7.9 Newton-meters).
- (p) Tighten the bolts [4] to 110-120 pound-inches (12.4-13.6 Newton-meters).

### H. Put the Airplane Back to its Usual Condition

SUBTASK 80-11-07-410-001-H01



DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Do these tasks in sequence to safely close the left thrust reverser on the applicable engine:
  - (a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
  - (b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.
    - 1) Close these access panels:
 

<u>Number</u>	<u>Name/Location</u>
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
  - (c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.
  - (d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 80-11-07-865-005-H01

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

#### Overhead Circuit Breaker Panel, P11

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

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SUBTASK 80-11-07-865-006-H01

- (3) For the right engine, remove the safety tags and close these circuit breakers:

**Overhead Circuit Breaker Panel, P11**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

———— **END OF TASK** ————

EFFECTIVITY  
ARO ALL

D633W101-ARO

**80-11-07**

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