TR EXHAUST - REMOVAL/INSTALLATION

EFFECTIVITY: ALL

1. General

   A. This section gives the procedures to remove/install the engine thrust reverser. These procedures are applicable to the LH and RH engines.

   B. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	*DESCRIPTION*	*EFFECTIVITY*
78-31-01-000-801-A	THRUST REVERSER - REMOVAL	ALL
78-31-01-400-801-A	THRUST REVERSER - INSTALLATION	ALL

TASK 78-31-01-000-801-A
EFFECTIVITY: ALL

2. THRUST REVERSER - REMOVAL

A. General

(1) Obey these instructions to remove the engine thrust reverser.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-42-00/100	-
AMM MPP 78-30-00/200	- MAINTENANCE PRACTICES
AMM TASK 29-10-00-860-802-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH EMDP
AMM TASK 54-52-01-000-801-A/400	PYLON FAIRINGS - REMOVAL
AMM TASK 71-11-01-000-801-A/400	ENGINE UPPER COWLING - REMOVAL
AMM TASK 71-12-01-000-802-A/400	ENGINE LOWER COWLING - REMOVAL
AMM TASK 71-13-01-000-801-A/400	NACELLE APRON - REMOVAL
AMM TASK 78-33-01-980-801-A/200	ISOLATION CONTROL UNIT - INHIBITION PROCEDURES
SB145-24-0007	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
412	-	LH upper cowling
422	-	RH upper cowling
413	-	LH lower cowling
423	-	RH lower cowling
312	312AR	Rear fuselage ll

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 184	Lifter - Nacelle Exhaust Module LH/RH	To remove/install the engine thrust reverser	
	Workstand	To get access to the work area	
Commercially available	Hoist	To lift the engine thrust reverser	
Commercially available	Container	To catch oil	

E. Auxiliary Items

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
Commercially available	Rubber Gloves, Phosphate Ester-Base, Fluid-Resistant	Protection for the hands	1

(Continued)

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Rubber Goggles, Phosphate Ester-Base, Fluid-Resistant	Protection for the eyes	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
2	Do the task	In the work area

I. Preparation

SUBTASK 841-002-A

WARNING:
- **REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN AMM MPP 78-30-00/200 WHEN YOU DO THE THRUST REVERSER MAINTENANCE PROCEDURES.**
- **MAKE SURE THAT THE ELECTRICAL POWER SUPPLY IS REMOVED FROM THRUST REVERSERS. ENERGIZED CIRCUITS CAN CAUSE INJURY TO PERSONS.**
- **MAKE SURE THAT THE HYDRAULIC TEST STAND IS NOT CONNECTED. THE THRUST LEVERS MUST BE IN THE IDLE OR FWR THRUST POSITION BEFORE YOU START TO REMOVE THE THRUST REVERSER.**
- **THE PHOSPHATE-ESTER-BASE OIL IS HIGHLY CORROSIVE AND CAUSES INJURY TO THE EYES AND SKIN. BE CAREFUL NOT TO TOUCH THIS OIL. YOU MUST USE GLOVES AND GOGGLES.**

CAUTION:
- ALWAYS CLEAN THE HYDRAULIC FLUID THAT FALLS FROM THE ENGINE. DAMAGE CAN COME FROM ITS CORROSIVE ACTION.
- USE APPLICABLE CONTAINERS TO COLLECT THE REMAINING FLUIDS FROM THE OPEN LINES, TO KEEP THE WORK AREA CLEAN AND SAFE.

(1) On the circuit breaker panel, open these circuit breakers and attach a DO-NOT-CLOSE tag to them.
- THRUST REVERSER 1.
- THRUST REVERSER 2.
- HYD. ELEC. PUMP 1.
- HYD. ELEC. PUMP 2.

(2) Put a DO-NOT-OPERATE-THE-THRUST-REVERSERS sign on the instrument panel, in the cockpit.

(3) Fully release the pressure from the hydraulic system (AMM TASK 29-10-00-860-802-A/200).

NOTE: Hydraulic system No. 1 pressurizes the LH engine thrust reverser, and hydraulic system No. 2 pressurizes the RH engine thrust reverser.

(4) Put the workstand in the work area.

(5) Get access to the right side of rear fuselage ll and open access door 312AR (AMM MPP 06-42-00/100).

(6) Inhibit the ICU (AMM TASK 78-33-01-980-801-A/200).

(7) Remove the engine lower cowling (AMM TASK 71-12-01-000-802-A/400).

(8) Remove the engine upper cowling (AMM TASK 71-11-01-000-801-A/400).

(9) Remove the nacelle apron (AMM TASK 71-13-01-000-801-A/400).

(10) Remove the pylon trailing-edge fairing (AMM TASK 54-52-01-000-801-A/400).

(11) Put a container below the hydraulic fittings.

J. Thrust Reverser - Removal (Figure 401)

SUBTASK 020-002-A

WARNING:
- **REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN AMM MPP 78-30-00/200 WHEN YOU DO THE THRUST REVERSER MAINTENANCE PROCEDURES.**
- **BE CAREFUL WHEN YOU USE THE HYDRAULIC FLUID. THE HYDRAULIC FLUID IS DANGEROUS. IT CAN CAUSE DAMAGE TO YOUR EYES AND SKIN. PUT ON SAFETY GOGGLES AND PROTECTION CLOTHING. IF HYDRAULIC FLUID COMES IN YOUR EYES OR ON YOUR SKIN, FLUSH YOUR EYES WITH WATER FOR A MINIMUM OF 15 MINUTES AND CLEAN YOUR SKIN WITH SOAP AND WATER. GET MEDICAL HELP.**

CAUTION: DO NOT HIT THE ENGINE EXHAUST MIXER, EXHAUST CONE, OR THE AIRCRAFT, WHEN YOU REMOVE THE THRUST REVERSER.

(1) Install the lifter to the engine thrust reverser and connect the hoist to the lifter. Refer to DET. C of Figure 401, Sheet 1.

NOTE: The front adapter of the lifter permits RH and LH side installation. Put the lifter on the adapter right side to install the right thrust reverser, and on the adapter left side to install the left thrust reverser.

(2) Remove the supply and return hydraulic lines and install cap/plugs to the open ends. Refer to DET. A of Figure 401, Sheet 2.

CAUTION: BE CAREFUL NOT TO CAUSE DAMAGE TO THE HARNESS DURING THE HEAT-SHRINKABLE BOOT REMOVAL.

(3) For aircraft POST-MOD SB145-24-0007, cut and remove the heat-shrinkable boots (5), (6), (7), and (8) (Refer to Figure 401, Sheet 8).

(4) Disconnect the two electrical connectors of the thrust reverser at the pylon, and install plastic cap/plugs to the open ends of the connectors. Refer to DET. B of Figure 401, Sheet 3.

(5) Release the drain tube and install cap/plugs to the open ends. Refer to DET. B of Figure 401, Sheet 4 or 5, as applicable.

(6) Release the fire extinguishing hose, FADEC wires, and the engine component wires from the U-shaped support.

(7) Loosen the bolts (1) and nuts (3) that attach the engine thrust reverser (4) to the engine mounting flange. Refer to Figure 401, Sheet 1.

(8) Adjust the height of the hoist correctly.

(9) Remove the bolts (1), washers (2), and nuts (3), but a minimum of four bolts with washers and nuts will be necessary to attach the thrust reverser at the top of the engine rear mount ring.

NOTE: When you remove the nuts (3) from the bolts (1) in the upper and lower mounts, be careful and do not let the bolt get out of its location, if you must install the thrust reverser back.

(10) Adjust the height of the hoist again, remove the remaining bolts on the top of the engine rear mount ring, and remove the thrust reverser from the engine.

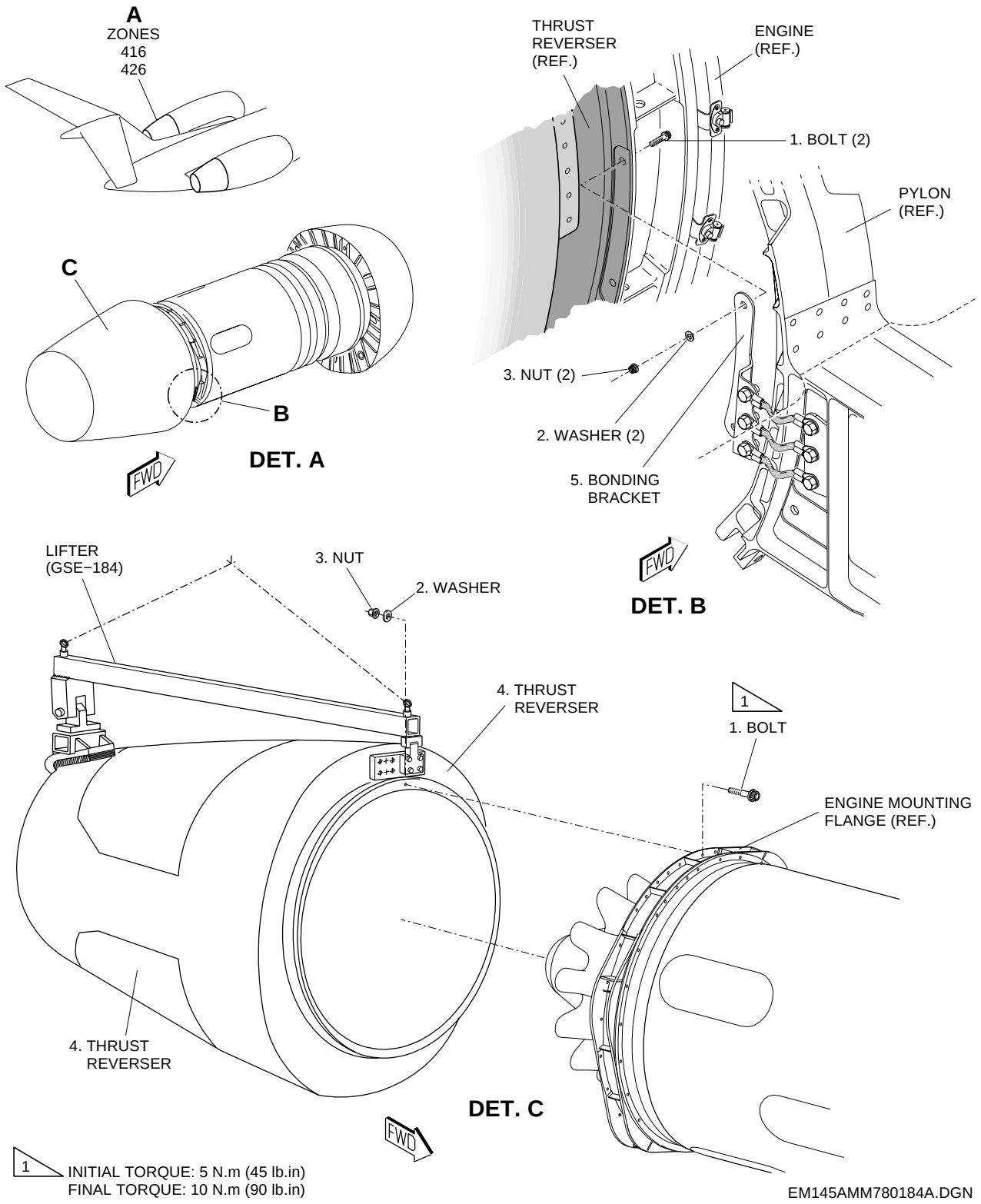
(11) Put the thrust reverser on a wooden platform to prevent damage.

(12) Disconnect the hoist from the lifter, and remove the lifter from the thrust reverser.

EFFECTIVITY: ALL

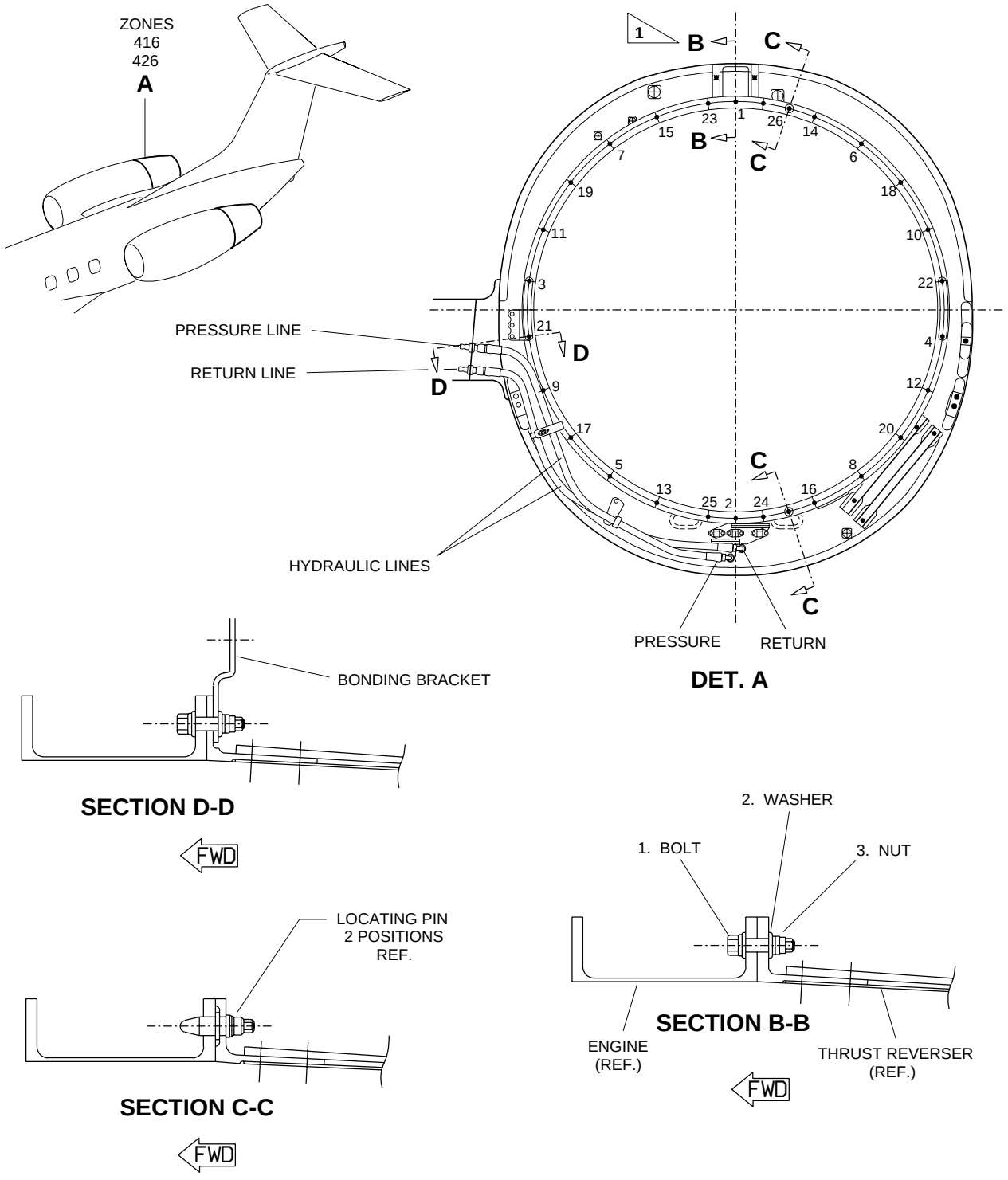
Thrust Reverser - Removal/Installation

Figure 401 - Sheet 1



EFFECTIVITY: ALL

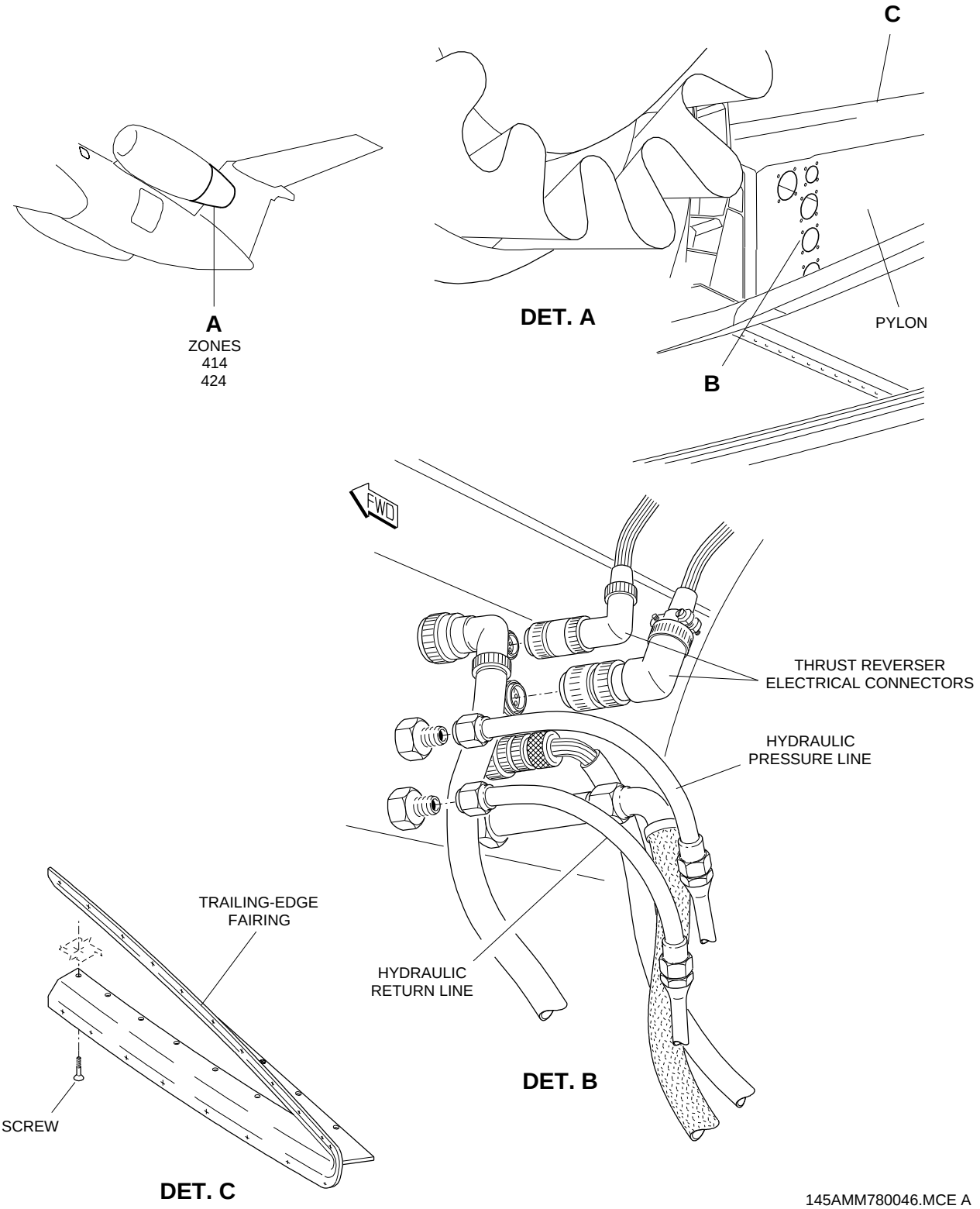
Thrust Reverser - Removal/Installation
Figure 401 - Sheet 2



145AMM780001.MCE B

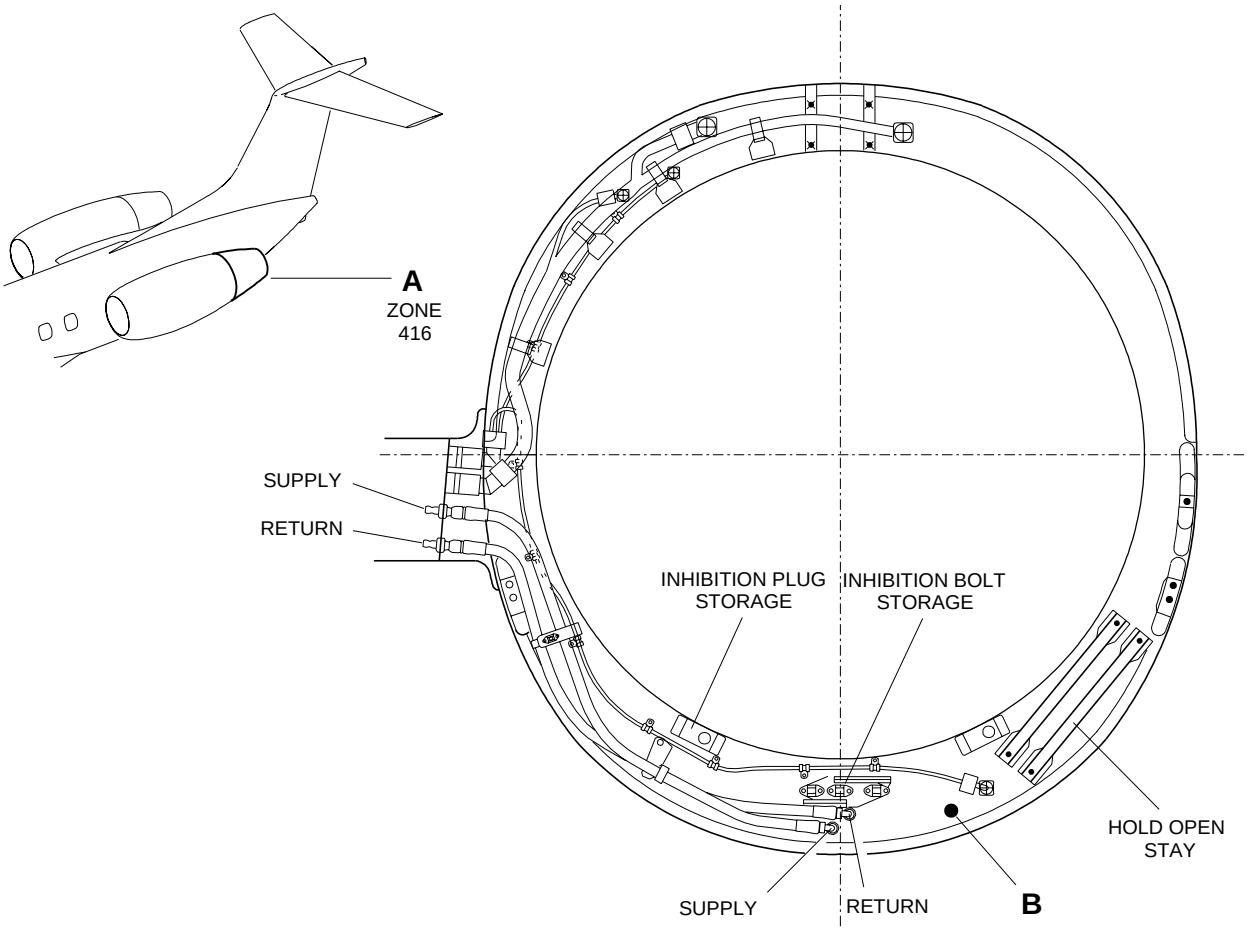
EFFECTIVITY: ALL

Thrust Reverser - Removal/Installation
Figure 401 - Sheet 3

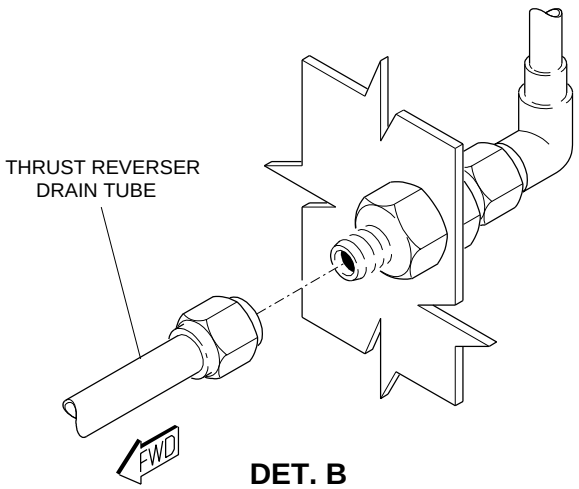


145AMM780046.MCE A

EFFECTIVITY: ALL
Thrust Reverser - Removal/Installation
Figure 401 - Sheet 4



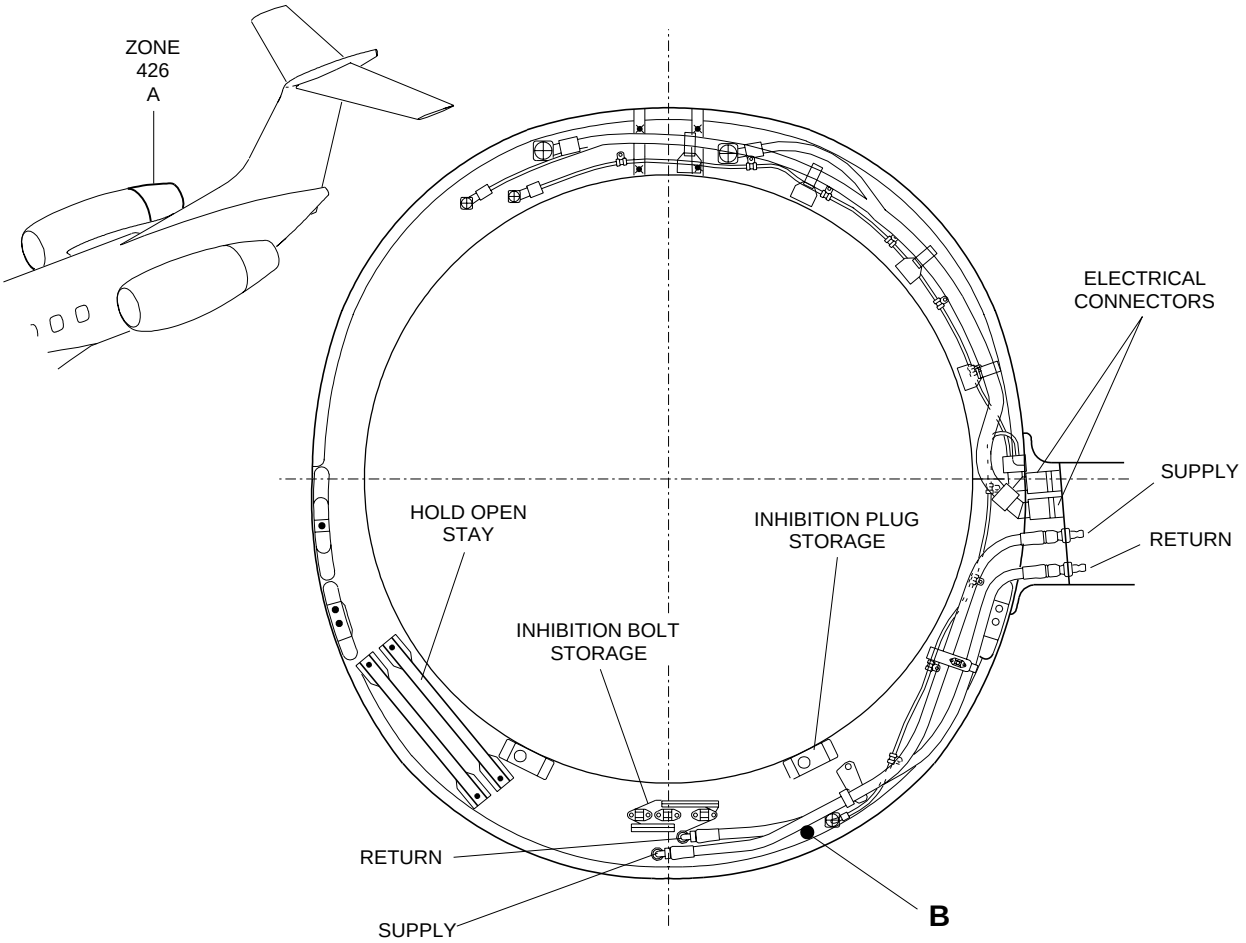
DET. A
LH THRUST REVERSER CONFIGURATION



DET. B

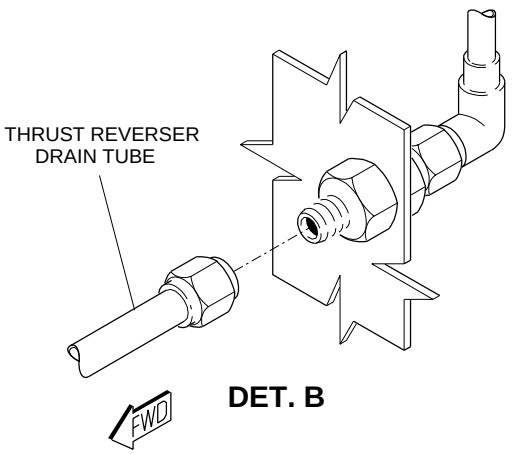
145AMM780049.MCE A

EFFECTIVITY: ALL
Thrust Reverser - Removal/Installation
Figure 401 - Sheet 5



DET. A

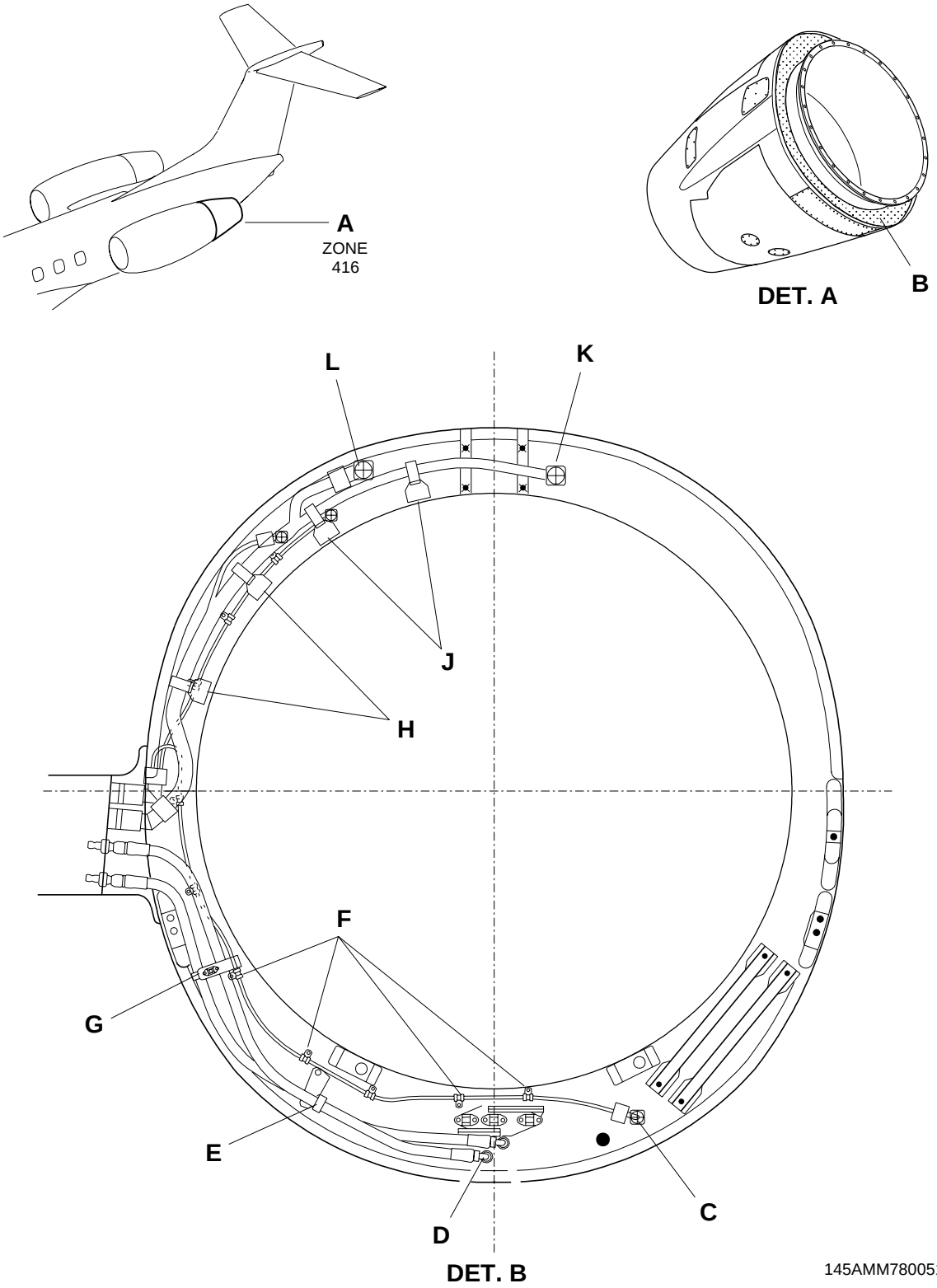
RH THRUST REVERSER CONFIGURATION



DET. B

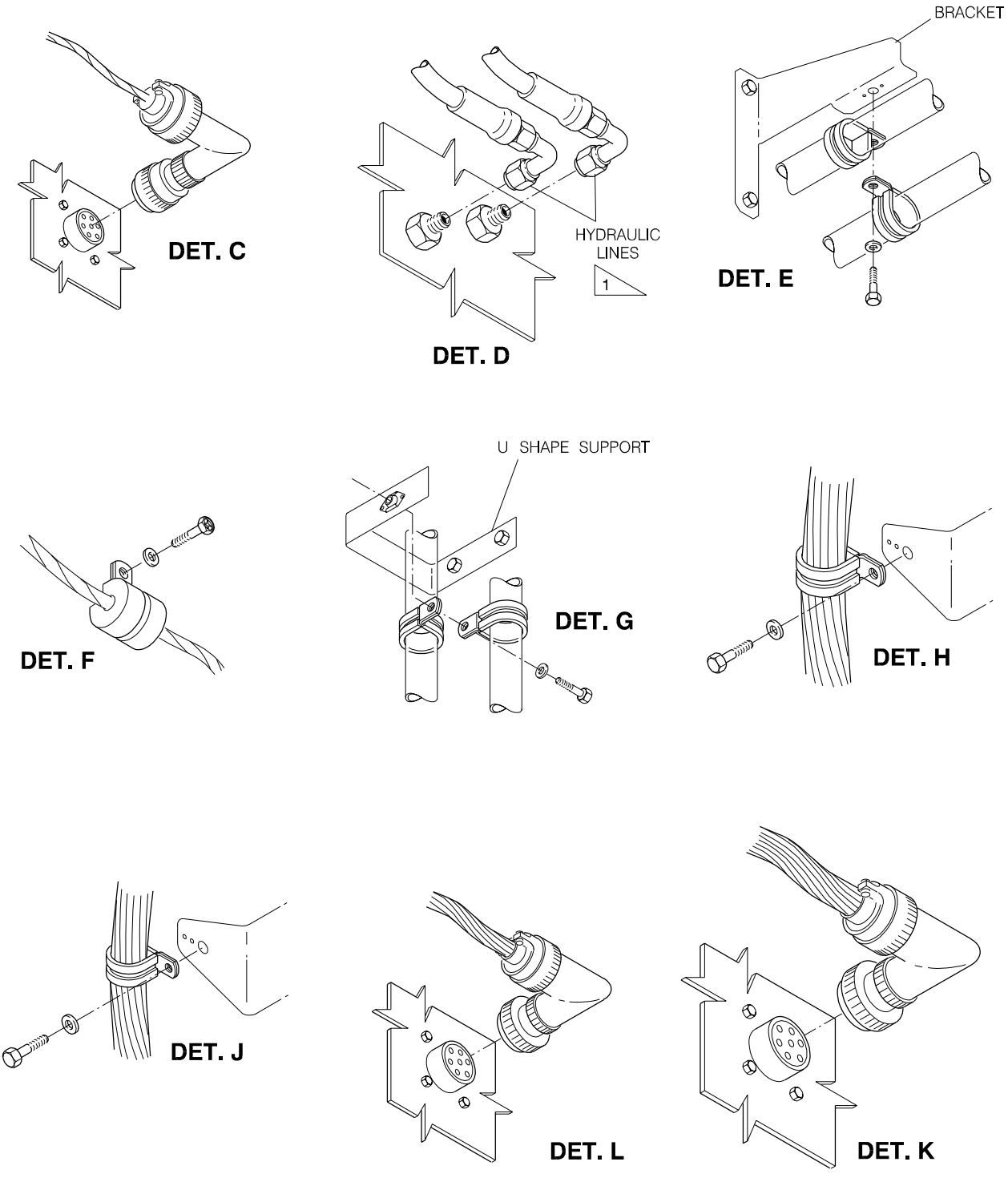
145AMM780050.MCE A

EFFECTIVITY: ALL
Thrust Reverser - Removal/Installation
Figure 401 - Sheet 6



EFFECTIVITY: ALL

Thrust Reverser - Removal/Installation
Figure 401 - Sheet 7

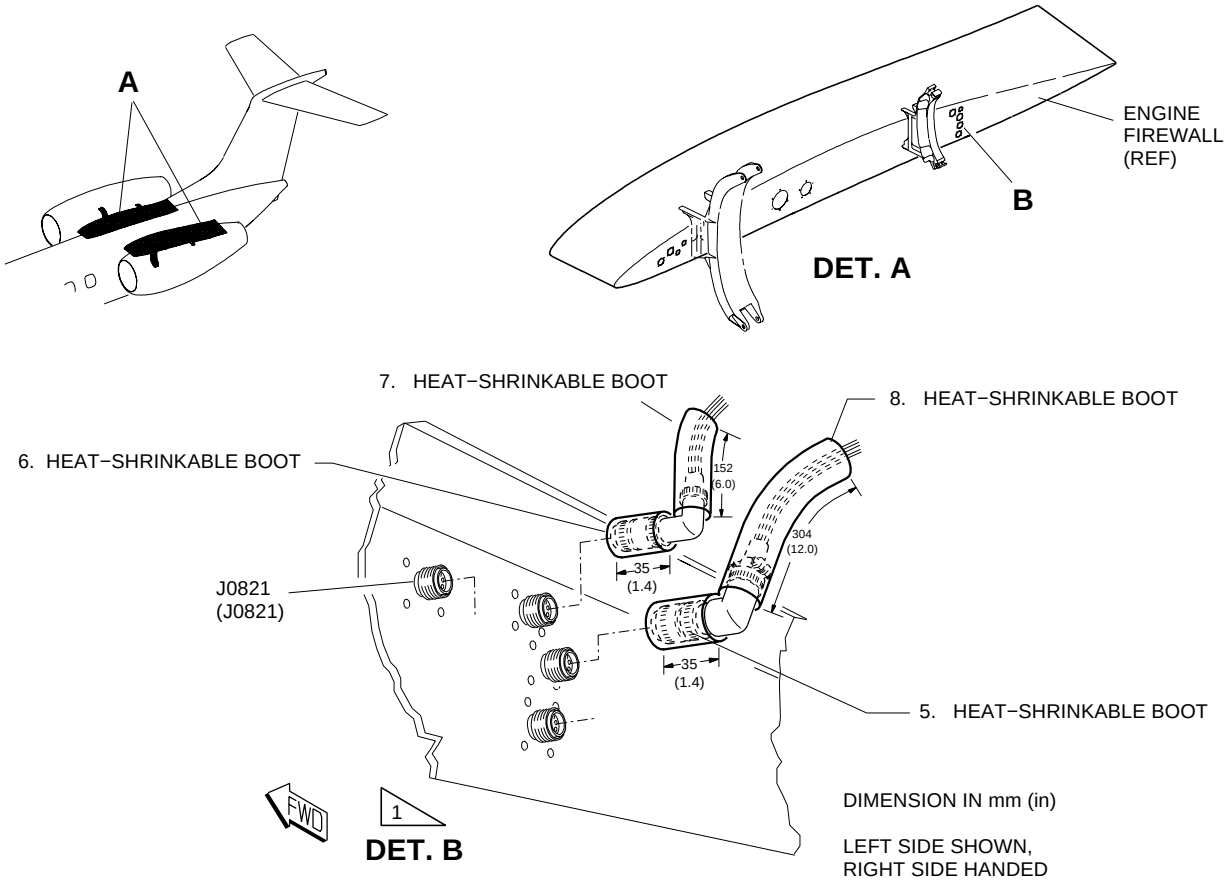


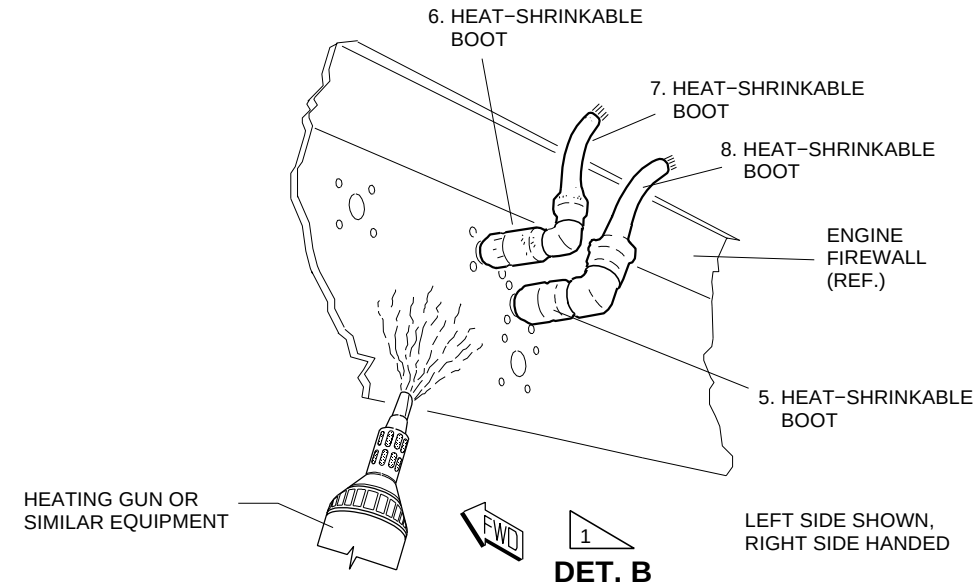
1 TORQUE VALUE OF HYDRAULIC INTERFACE CONNECTIONS: 30,5 Nm (270 lb.in)

145MM78052.MCE

EFFECTIVITY: ALL

Thrust Reverser - Removal/Installation
Figure 401 - Sheet 8





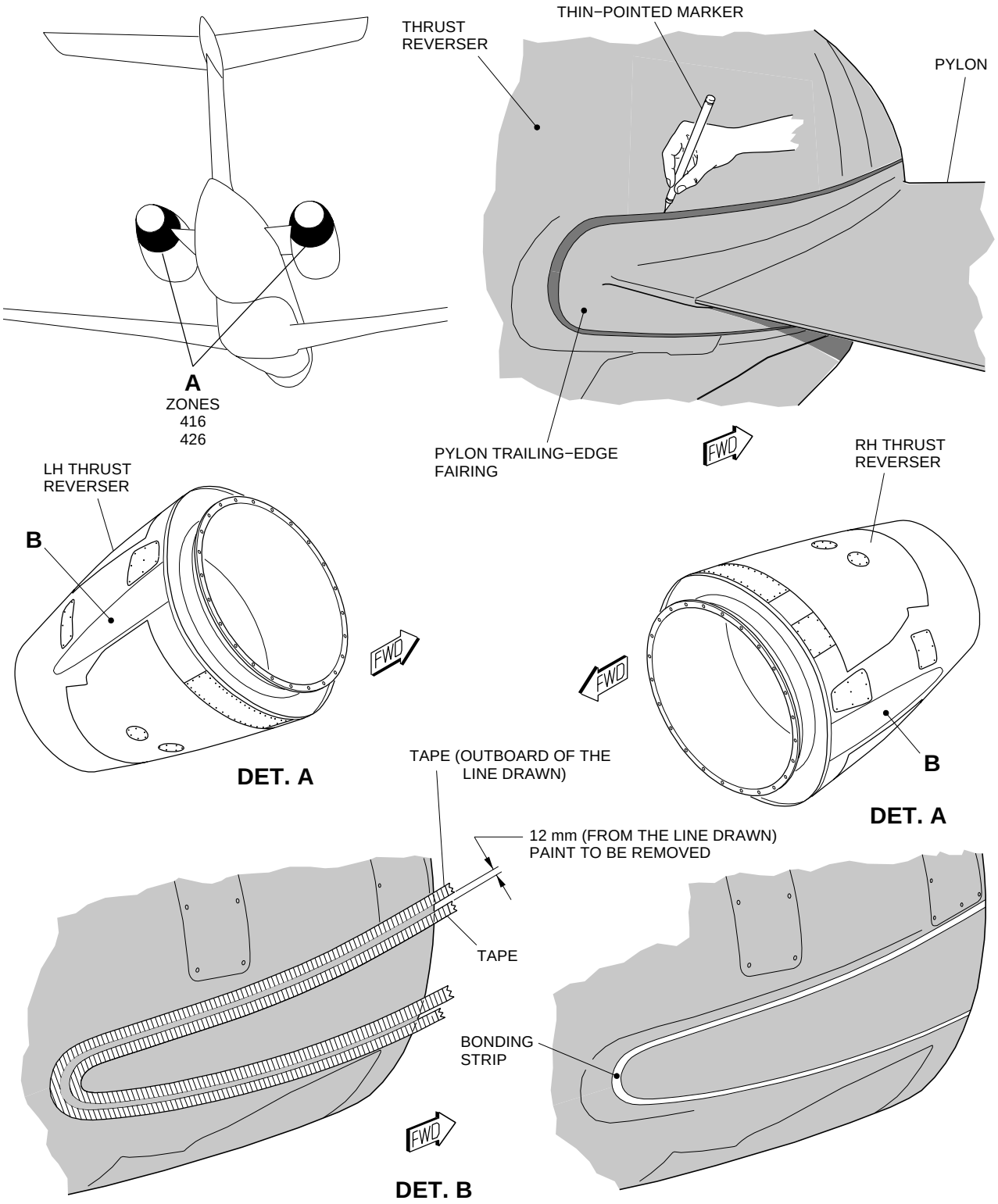
1 POST−MOD S.B. 145−24−0007.

EM145AMM780099B.DGN

EFFECTIVITY: ALL

Thrust Reverser - Removal/Installation

Figure 401 - Sheet 9



EM145AMM780183A.DGN

TASK 78-31-01-400-801-A
EFFECTIVITY: ALL

3. THRUST REVERSER - INSTALLATION

A. General

(1) Obey these instructions to install the engine thrust reverser.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 78-30-00/200	- MAINTENANCE PRACTICES
AMM TASK 20-13-21-700-801-A/200	ELECTRICAL BONDING TEST - STANDARD PROCEDURES
AMM TASK 20-13-21-910-801-A/200	TYPES OF ELECTRICAL BONDING AND SURFACE PREPARATION - STANDARD PROCEDURES
AMM TASK 20-13-21-910-802-A/200	ELECTRICAL BONDING PROTECTION - STANDARD PROCEDURES
AMM TASK 29-10-00-860-803-A/200	HYDRAULIC SYSTEM - BLEED OF AIR
AMM TASK 54-52-01-000-801-A/400	PYLON FAIRINGS - REMOVAL
AMM TASK 54-52-01-400-801-A/400	PYLON FAIRINGS - INSTALLATION
AMM TASK 71-11-01-400-801-A/400	ENGINE UPPER COWLING - INSTALLATION
AMM TASK 71-12-01-400-802-A/400	ENGINE LOWER COWLING - INSTALLATION
AMM TASK 71-13-01-400-801-A/400	APRON - INSTALLATION
AMM TASK 78-31-01-700-801-A/500	THRUST REVERSER - OPERATIONAL CHECK
AMM TASK 78-33-01-980-801-A/200	ISOLATION CONTROL UNIT - INHIBITION PROCEDURES
CPM 51-21-01	-
CPM 51-21-02	-
CPM 51-21-04	-
CPM 51-21-05	-
CPM 51-21-06	-
SB145-24-0007	-
WM 20-10-00	-

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
412	-	LH upper cowling
422	-	RH upper cowling
413	-	LH lower cowling
423	-	RH lower cowling

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 184	Lifter - Nacelle Exhaust Module LH/RH	To remove/install the engine thrust reverser	
	Workstand	To get access to the work area	
Commercially available	Hoist	To lift the thrust reverser	
Commercially available	Torque Wrench (0 to 600 lbs)	To torque the thrust reverser bolts	
Commercially available	Container	To catch oil	
Commercially available	Heating gun	To shrink the heat-shrinkable boot	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	*DESCRIPTION*	*QTY*
FIT-621-2 or CFHR-TW-2000	Heat-shrinkable boot	AR
FIT-621-3, HRNF-300-S or CFHR-TW-3000	Heat-shrinkable boot	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
2	Do the task	In the work area

I. Thrust Reverser - Installation (Figure 401)

SUBTASK 420-002-A

WARNING:

- **REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN AMM MPP 78-30-00/200 WHEN YOU DO THE THRUST REVERSER MAINTENANCE PROCEDURES.**
- **MAKE SURE THAT THE HYDRAULIC TEST STAND IS NOT CONNECTED, AND THAT THE THRUST LEVERS ARE IN THE IDLE OR FORWARD THRUST POSITION.**
- **THE HYDRAULIC LINES ARE EQUAL IN THEIR SIZE. BE CAREFUL WHEN YOU INSTALL THE LINES NOT TO CHANGE THE SUPPLY LINE WITH THE RETURN LINE.**

CAUTION:
- DO NOT HIT THE ENGINE EXHAUST MIXER, EXHAUST CONE, OR THE AIRCRAFT WHEN YOU INSTALL THE THRUST REVERSER.
- MAKE SURE THAT THE LOCATING PINS ARE IN THE CORRECT POSITION, WHEN YOU INSTALL THE THRUST REVERSER.
- MAKE SURE THAT THE BOLTS IN THE UPPER AND LOWER MOUNTS ARE CORRECTLY INSTALLED BEFORE YOU INSTALL THE THRUST REVERSER ON THE ENGINE.

NOTE: The left and right thrust reversers are interchangeable. Before you install a thrust reverser, make sure that you have the correct unit for the related side or change its configuration. Refer to (Figure 401) sheets 4 and 5.

(1) Install the lifter to the thrust reverser and connect the hoist to the lifter. Refer to DET. C of (Figure 401), Sheet 1.

NOTE: The front adapter of the lifter permits RH side and LH side installation. Put the lifter on the adapter right side to install the right thrust reverser and on the adapter left side to install the left thrust reverser.

(2) Operate the hoist to lift the thrust reverser and install the thrust reverser to the engine. Make sure that the locating pins are in the correct position.

(3) Install the bolts (1) with washers (2) and nuts (3) to attach the thrust reverser to the engine rear mount ring. Refer to (Figure 401), Sheet 1, for the torque sequence and torque values. Make sure that the bonding bracket (5) is in position to be attached to the thrust reverser mounting flange. Do not install the bonding bracket now.

NOTE:
- The bolts and nuts that attach the thrust reverser have initial and final torque sequence. Obey the same sequence as shown in (Figure 401) Sheet 1 to apply the initial and final torque values.
- Be careful and do not let the bolts (1) get out of the correct location, when you put the thrust reverser into position.

(4) Prepare the bonding bracket (5) for bonding. Do the bonding procedure method 3 (AMM TASK 20-13-21-910-801-A/200).

(5) Install the bolts (1) with washers (2) and nuts (3) to attach the thrust reverser to the engine rear mounting ring and also the bonding bracket (5) to the thrust reverser mounting flange. Refer to DET. B of (Figure 401), Sheet 1.

(6) Remove the cap/plugs from the supply and return hydraulic line fittings.

CAUTION: TORQUE THE HYDRAULIC FITTINGS CAREFULLY TO PREVENT TORSION OF THE HYDRAULIC TUBES, WHICH COULD CAUSE RUPTURES AND LEAKS.

(7) Install the supply and return hydraulic lines to their correct location at the pylon. Refer to (Figure 401), Sheet 7 for torque values.

CAUTION: MAKE SURE THAT THE HYDRAULIC LINES, THE FIRE EXTINGUISHING HOSE, THE WIRES OF THE ENGINE COMPONENTS, AND THE WIRES OF THE FADEC DO NOT RUB AGAINST EACH OTHER OR AGAINST THE EXHAUST FIRESIDE BLANKET.

(8) Install the fire extinguishing hose, FADEC wires, and engine component wires to the U-shaped support.

(9) Remove the plastic cap/plugs from the line ends.

(10) For aircraft POST-MOD SB145-24-0007, cover the connectors with the heat-shrinkable boots (5), (6), (7), and (8) (Refer to (Figure 401), Sheet 8).

WARNING: OBEY THE SAFETY PRECAUTIONS GIVEN IN (WM 20-10-00) TO USE THE HEATING GUN. EXPLOSIONS CAN OCCUR IF YOU USE HEATING GUN INCORRECTLY NEAR FLAMMABLE MATERIALS OR FLUID VENTS.

(11) Connect the two electrical connectors of the thrust reverser on the pylon. If applicable, heat the heat-shrinkable boots with a heat gun or a similar equipment. Refer to (Figure 401), Sheet 8.

(12) Remove the cap/plugs and install the thrust reverser drain tube. Refer to DET. B of (Figure 401), Sheet 4 or 5, as applicable.

(13) Remove the lifter from the thrust reverser. Disconnect the lifter from the hoist.

(14) Do these steps if an LH thrust reverser was installed in the RH engine, or vice versa (refer to (Figure 401), Sheet 9):

NOTE: Do this procedure to make sure that there is correct electrical bonding between the thrust reverser and the pylon.

(a) Install the pylon trailing-edge fairing (AMM TASK 54-52-01-400-801-A/400).

(b) With a thin-pointed marker, draw a line along the contour of the pylon trailing-edge fairing where it touches the thrust reverser surface.

(c) Remove the pylon trailing-edge fairing (AMM TASK 54-52-01-000-801-A/400).

(d) Use tape to delimit the area on the thrust reverser surface where the paint will be removed from. The width of this area must be 12 mm. Refer to DET. B of (Figure 401), Sheet 9.

(e) Remove the paint. Refer to CPM 51-21-01.

(f) Clean the area where the paint was removed from. Refer to CPM 51-21-02.

(g) Alodize the area where the paint was removed from. Refer to CPM 51-21-04.

(h) Do these steps to repair the paint on the thrust-reverser outboard surface:

1 Clean the area to be painted. Refer to CPM 51-21-02.

2 Alodize the area to be painted. Refer to CPM 51-21-04.

3 Apply epoxy primer. Refer to CPM 51-21-05.

4 Restore the original finish of the area. Refer to CPM 51-21-06.

J. Follow-on

SUBTASK 842-002-A

(1) Do the bonding test procedure (AMM TASK 20-13-21-700-801-A/200) on the bonding bracket (5).

(2) Do the bonding protection procedure (AMM TASK 20-13-21-910-802-A/200) for the bonding bracket (5).

(3) Remove the container from the work area.

(4) Install the engine upper cowling (AMM TASK 71-11-01-400-801-A/400).

(5) Install the nacelle apron (AMM TASK 71-13-01-400-801-A/400).

(6) Install the engine lower cowling (AMM TASK 71-12-01-400-802-A/400).

(7) Install the pylon trailing-edge fairing (AMM TASK 54-52-01-400-801-A/400).

(8) Deinhibit the ICU (AMM TASK 78-33-01-980-801-A/200).

(9) Close access door 312AR.

(10) On the circuit breaker panel, close the circuit breakers below and remove the DO-NOT-CLOSE tag from them:

- THRUST REVERSER 1.
- THRUST REVERSER 2.
- HYD. ELEC. PUMP 1.
- HYD. ELEC. PUMP 2.

(11) Remove the DO-NOT-OPERATE-THE-THRUST-REVERSERS warning sign.

(12) Remove all tools, material, and equipment from the work area. Make sure that the area is clean.

(13) Do a thrust reverser operational test (AMM TASK 78-31-01-700-801-A/500) and examine the unit for general conditions and/or oil leaks.

NOTE: During the operational test, operate the TR through 10 cycles to bleed the air from the hydraulic lines.

(14) Do the air bleeding of the hydraulic system 1 or 2, as applicable (AMM TASK 29-10-00-860-803-A/200).

NOTE:
- If you installed the LH thrust reverser, do the air bleeding of the hydraulic system 1.
- If you installed the RH thrust reverser, do the air bleeding of the hydraulic system 2.