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CHAPTER 78 – EXHAUST

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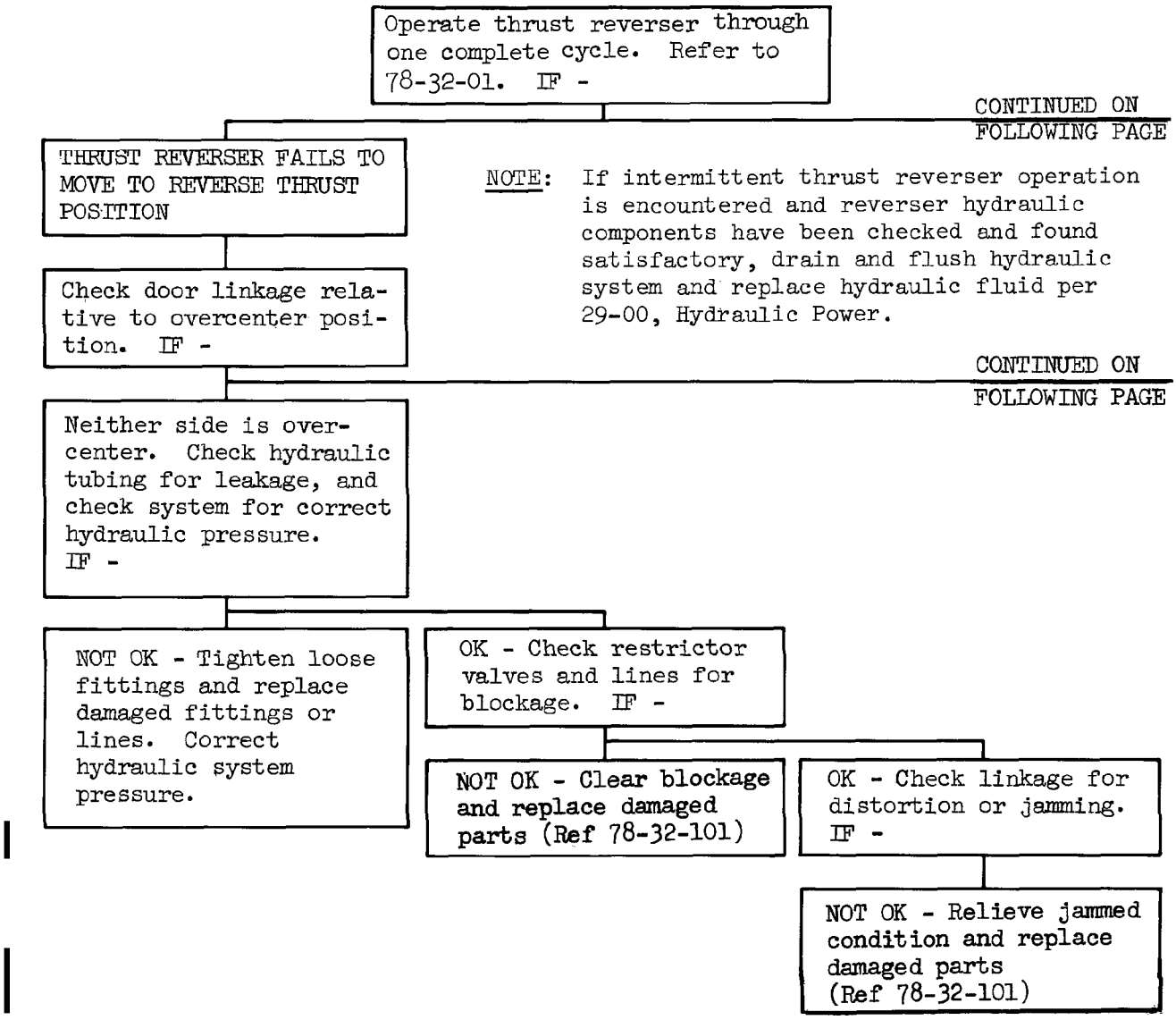
THRUST REVERSER SYSTEM - DESCRIPTION AND OPERATION

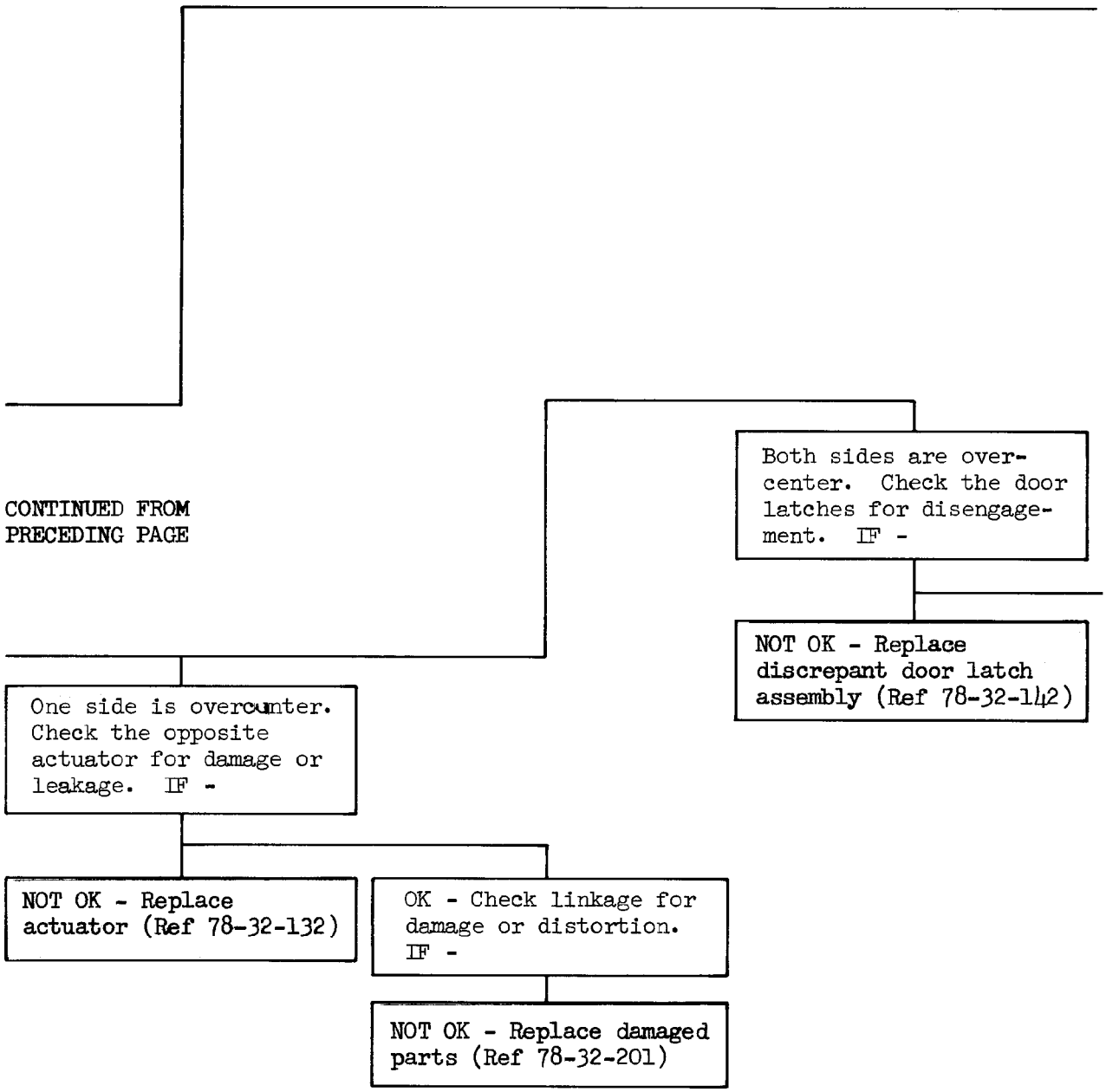
1. General
   A. A thrust reverser system for each engine is used by the pilot to reduce the length of the landing roll. The thrust reverser system consists of the following subsystems: thrust reverser assembly, thrust reverser control system, and thrust reverser position indicating system. The thrust reverser assembly, installed on the aft end of the engine, reverses the direction of engine exhaust gas flow during reverse thrust operation. The thrust reverser control system consists of controls installed at the engine drum-and-shaft assembly on the wing front spar above the engine, hydraulic plumbing, and a push-pull cable running between the controls and the thrust reverser. The control system, operated by a control lever on the throttle controls in the control cab, directs system A hydraulic pressure to the thrust reverser for the selected mode (forward or reverse) of thrust reverser operation. The thrust reverser position indicating system consists of indicator lights in the control cabin, solid state switches mounted in a switching module, and switch sensors installed on the thrust reversers.
   B. See 78-32-101 for description of the thrust reverser assembly, 78-34-01 for description of the thrust reverser control system, and 78-36-01 for description of the thrust reverser position indicating system.

THRUST REVERSER - TROUBLESHOOTING

1. Thrust Reverser TroubleShooting Chart



Thrust Reverser - Troubleshooting
Figure 101 (Sheet 1)



Thrust Reverser - Troubleshooting
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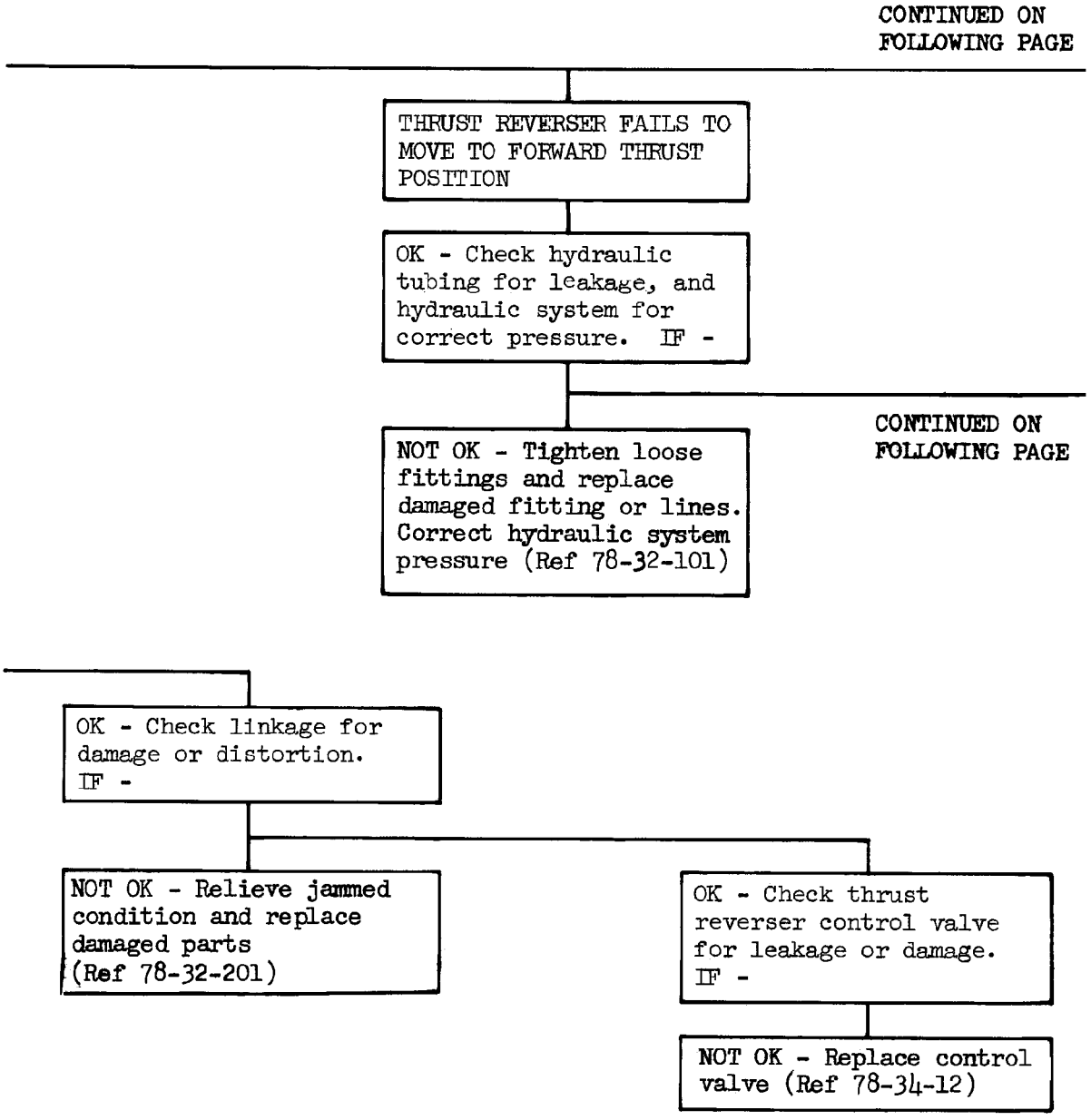
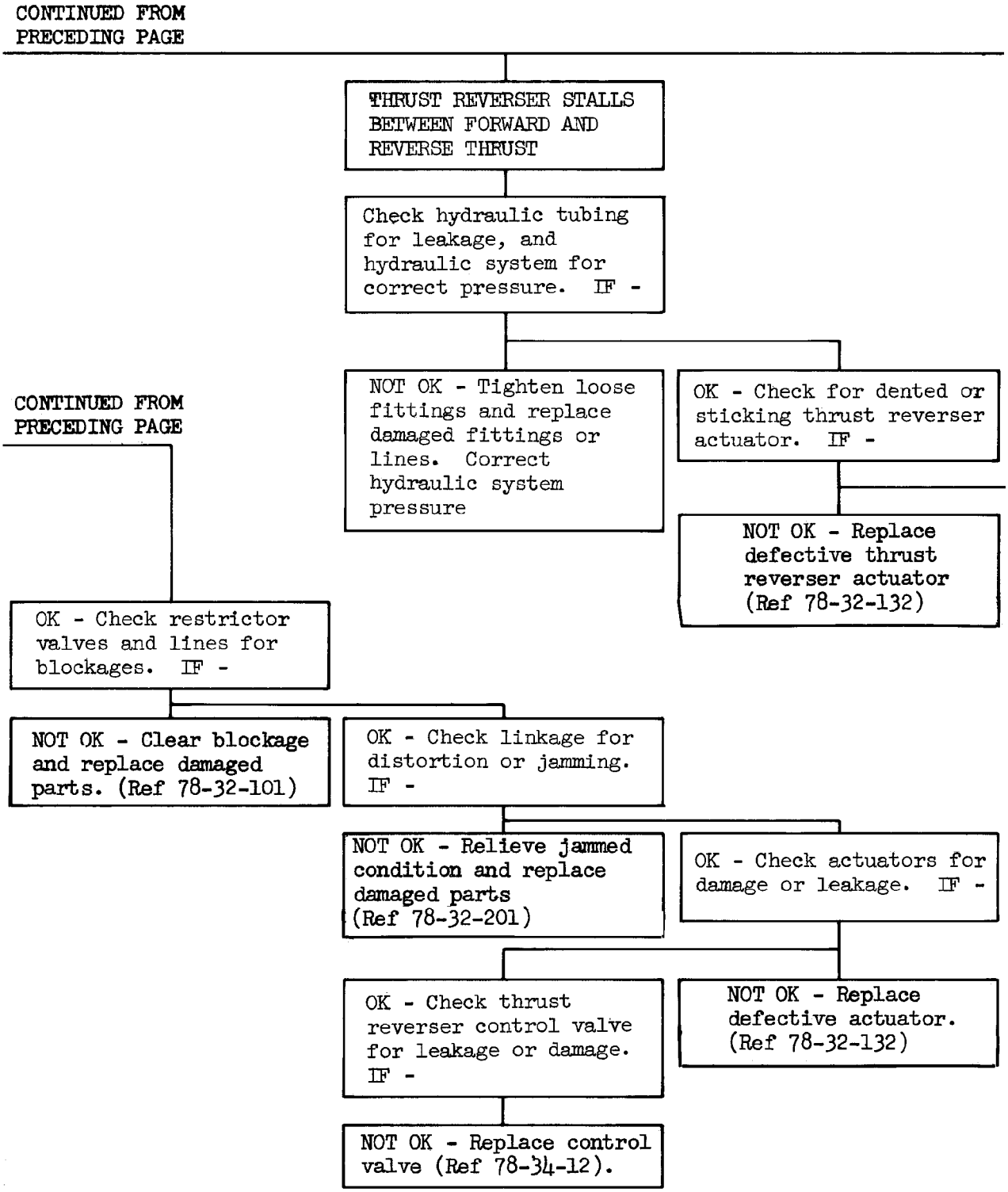


Thrust Reverser - Troubleshooting
Figure 101 (Sheet 3)



Thrust Reverser - Troubleshooting
Figure 101 (Sheet 4)

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DEFLECTOR DOOR INDICATOR LIGHT DOES NOT GO OUT WHEN DOORS ARE STOWED.

Check both latches for engagement. IF –

OK – Check for defective indicating system proximity sensor (Ref 78-36-01, A/T).

NOT OK – Clean latches and recheck engagement. IF –

OK – Check for distorted or damaged linkage components. IF –

OK – Check to see that doors meet step and gap limits (Ref 78-32-112).

NOT OK – Replace defective latch assembly (Ref 78-32-142).

NOT OK – Replace damaged component (Ref 78-32-201).

Thrust Reverser – Troubleshooting
Figure 101 (Sheet 5)

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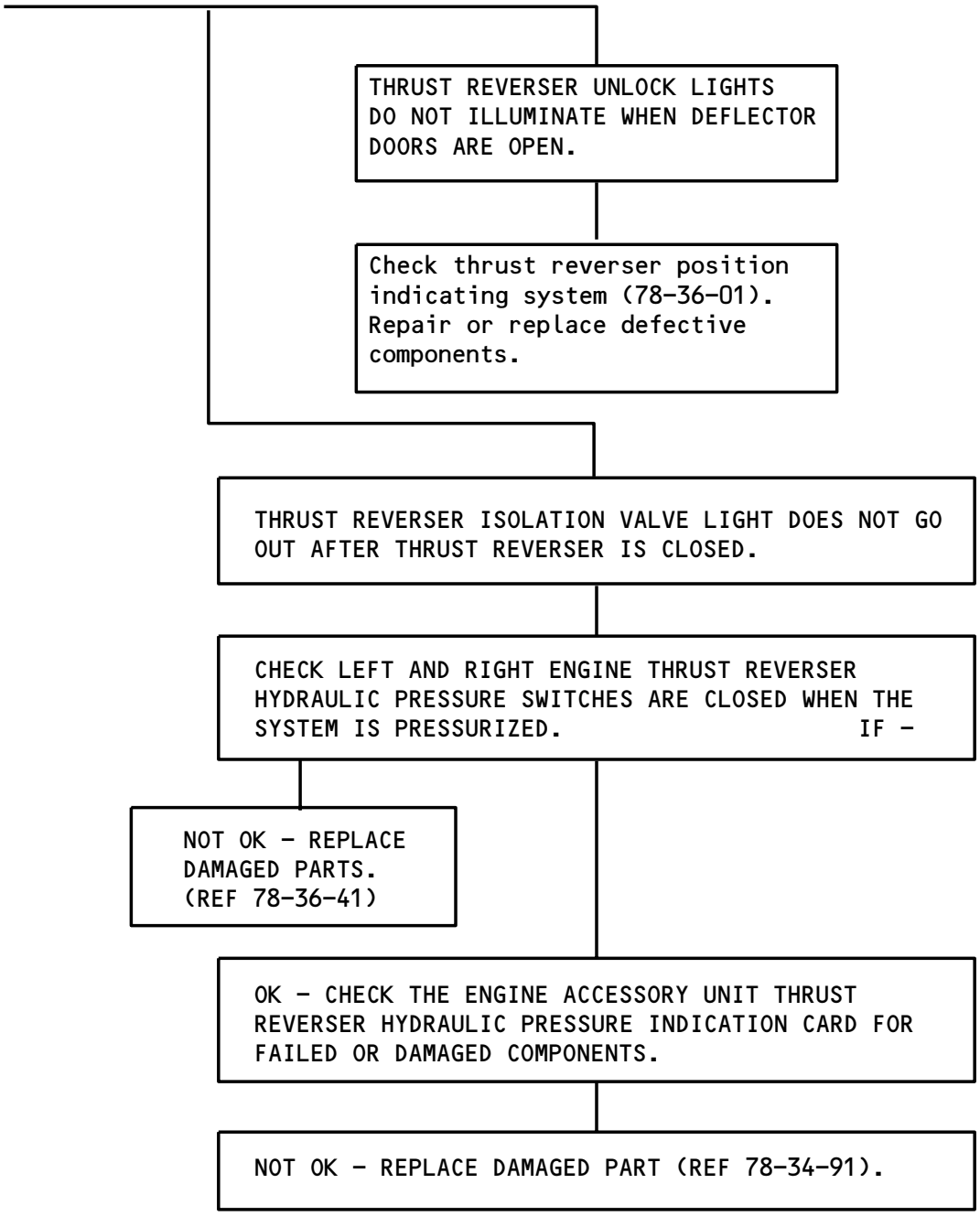


Thrust Reverser - Troubleshooting
Figure 101 (Sheet 6)

THRUST REVERSER - MAINTENANCE PRACTICES

1. General
   A. This procedure provides a method of manually locking the thrust reverser in the forward thrust position. This procedure is to be used for dispatch of an airplane with an inoperable thrust reverser.
   B. The isolation valves, located on the forward bulkhead of the air conditioning bay, can be manually locked by depressing the manual override plunger and installing ground locking pins. This depressurizes the reverser hydraulic system.
2. Manually Deactivate Thrust Reverser For Flight Dispatch
   A. Equipment and Materials
      (1) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 (preferred)
      (2) 3-foot lever (crowbar, prybar, steel tube etc.)
      (3) Protective tape
   B. Thrust Reverser Manual Deactivation
      (1) Open the air conditioning bay access doors and install the rods.
      (2) Deactivate the affected thrust reverser hydraulic system by installing a ground lock cap and pin in the applicable thrust reverser isolation valve (Fig. 201).

          WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCK CAP AND PIN IS NOT PROPERLY INSTALLED. ATTEMPT TO STOW THRUST REVERSER AFTER INSTALLING GROUND LOCK CAP AND PIN. REVERSER SHOULD NOT STOW.

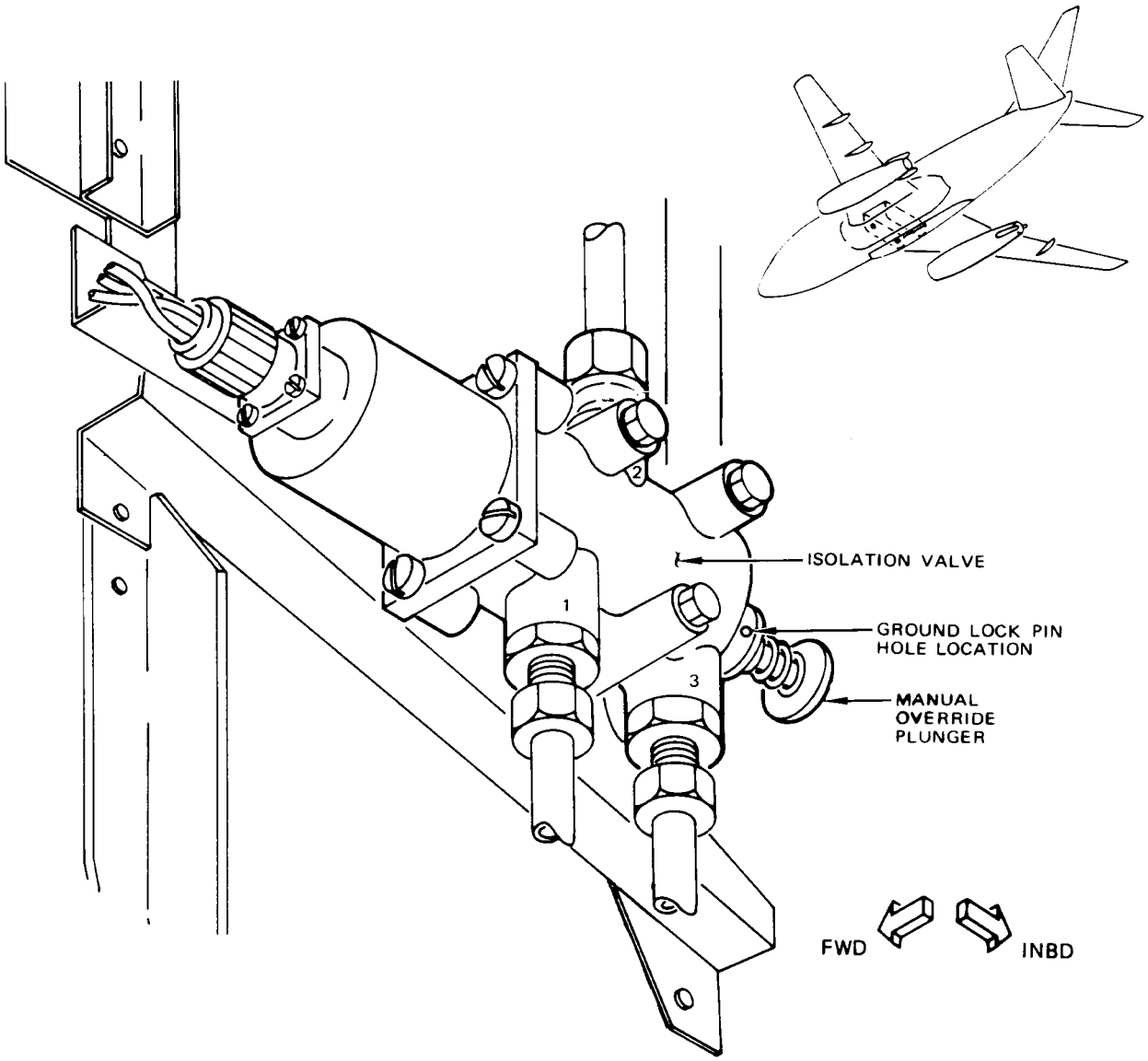
      (3) Pull and tag the affected THRUST REVERSER circuit breaker on panel P6.
      (4) Remove screws attaching actuator housing fairings to thrust reverser and remove both fairings (if necessary) (Fig. 203).
      (5) If malfunction requiring deactivation is attributed to hydraulic system, proceed as follows:
          (a) Apply protective tape to end of lever.

              NOTE: Protective tape is used to prevent damage to thrust reverser guide carriage and shroud assembly box.

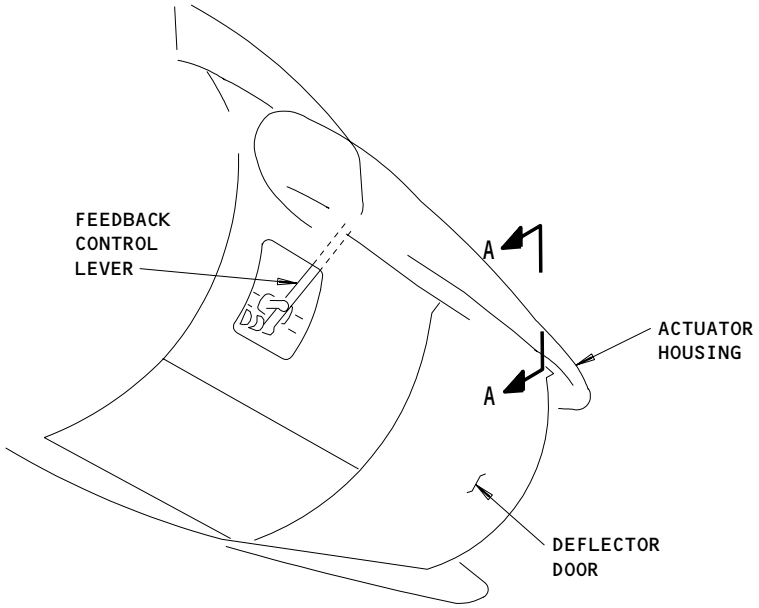
          (b) Manually move deflector doors as close to the stowed position as possible.
          (c) Position tip of lever under either lug of guide carriage and using the shroud assembly box as a fulcrum, pry guide carriage aft until an over center position is reached.

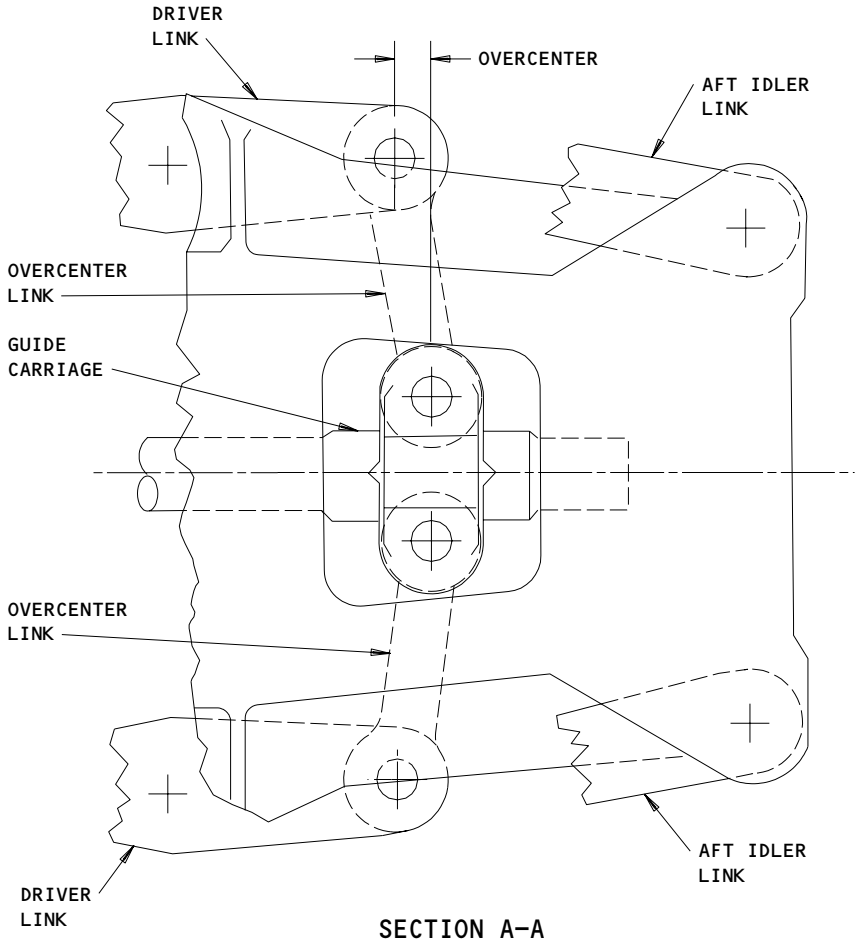
              CAUTION: WHEN PRYING GUIDE CARRIAGE AFT, USE CARE TO PREVENT SCRATCHING ACTUATOR HARDWARE.

          (d) Repeat these steps on the opposite side.



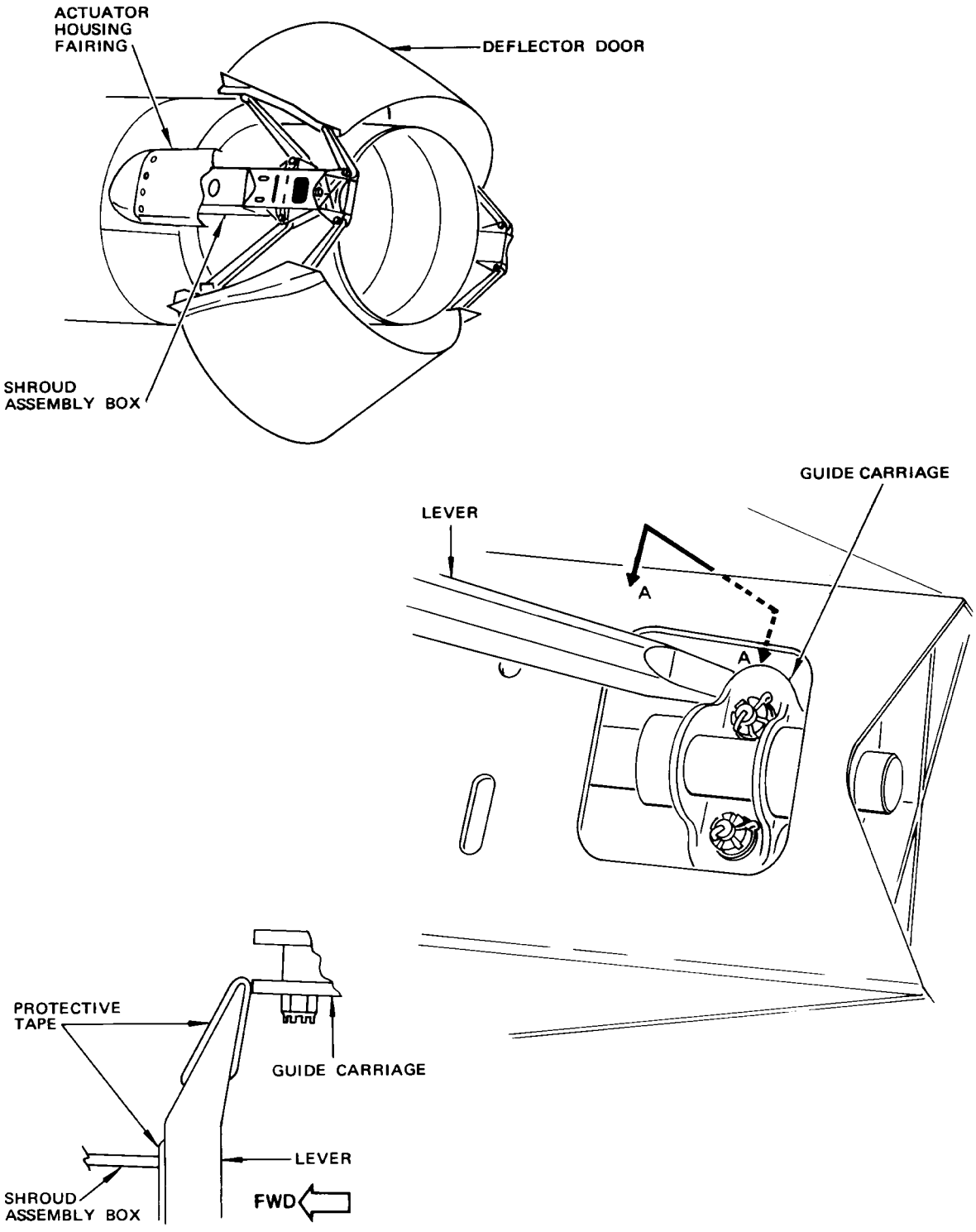
Deactivate Thrust Reverser Isolation Valve
Figure 201





SECTION A-A

Thrust Reverser Overcenter Linkage
Figure 202



Thrust Reverser Manual Deactivation
Figure 203

(6) Attach actuator-housing fairings (if removed) to thrust reverser with screws.

NOTE: Due to deflector door preload it is necessary to pry edges of doors open to slide actuator-housing fairings into place.

(7) If malfunction requiring deactivation is attributed to a jammed deflector door actuator, proceed as follows:
(a) Manually move deflector doors as close to the stowed position as possible.
(b) Remove bolt, washers and nut securing actuator rod to guide carriage.
(c) Firmly secure actuator to shroud assembly box with lockwire or suitable equivalent.
(d) Pry guide carriage over center as follows:
1) Apply protective tape to end of lever.

NOTE: Protective tape is used to prevent damage to thrust reverser guide carriage and shroud assembly box.

2) Manually move deflector doors as close to the stowed position as possible.
3) Position tip of lever under either lug of guide carriage and using the shroud assembly box as a fulcrum, pry guide carriage aft until an over center position is reached.

CAUTION: WHEN PRYING GUIDE CARRIAGE AFT, USE CARE TO PREVENT SCRATCHING ACTUATOR HARDWARE.

(e) Repeat these steps on the opposite side.
(8) For all malfunctions, deactivate the thrust reverser.
(a) Make sure the thrust reverser is locked in the forward position.
1) Look at the links from the aft inboard side of each actuator fairing.
2) The over center links and guide carriage must be in the locked over center position (Fig. 202).
(b) Lockwire the reverse thrust lever to the forward thrust lever.
(c) Install a ground lock cap and pin on the applicable isolation valve in the air conditioning equipment bay (Fig. 201).
(d) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(e) Put a REVERSER INOP tag on the reverse thrust lever.
(f) Put a REVERSER INOP tag on the REVERSER UNLOCKED light.
(9) Install the actuator housing fairings (if removed).

(10) Stow the rods and close the air conditioning bay access doors.

THRUST REVERSER SYSTEM - ADJUSTMENT/TEST

1. Thrust Reverser System Adjustment
   A. General
      (1) The only adjustments (rigging) normally required when installing a thrust reverser, are a check of the thrust reverser push-pull control cable rigging, and a check of the deflector door fairing step and gap limits. Components of the thrust reverser assembly requiring rigging (deflector doors and linkage) are normally rigged during buildup of the thrust reverser assembly prior to installation of the assembly on the airplane. If rigging of any of these components is required, perform rigging according to instructions in the respective component maintenance practices.
      (2) Rigging of the thrust reverser controls other than the follow-up controls is accomplished by rigging the engine controls. For rigging of the follow-up controls and the thrust reverser push-pull cable, refer to AMM 78-34-32.
      (3) Adjustment of the reverse thrust detent is required under the following conditions; after replacing an engine fuel control unit, after changing an engine and after adjustment of any engine control system.
2. Thrust Reverser System Test
   A. General
      (1) A functional test of the thrust reverser and controls operation is performed using the system B electric motor-driven pumps to provide the actuating force. Thrust reverser actuation is also checked using the alternate hydraulic pressure source only.
      (2) The thrust reverser main hydraulic power source is either the main landing gear downline or a direct line from hydraulic system A. To operate the reverser from the main landing gear downline the landing gear selector lever must be in the DOWN position.
      (3) The thrust reverser alternate hydraulic power source is either a hydraulic accumulator (incorporating a LOW PRESSURE light in the control cabin) or a line connection to the standby hydraulic system.
      (4) The thrust reverser system test consists of a system indication test, a circuit check, and a reverser operational test. The landing gear air-ground sensing system, fire switch, and pressure line check valve operation are also tested.

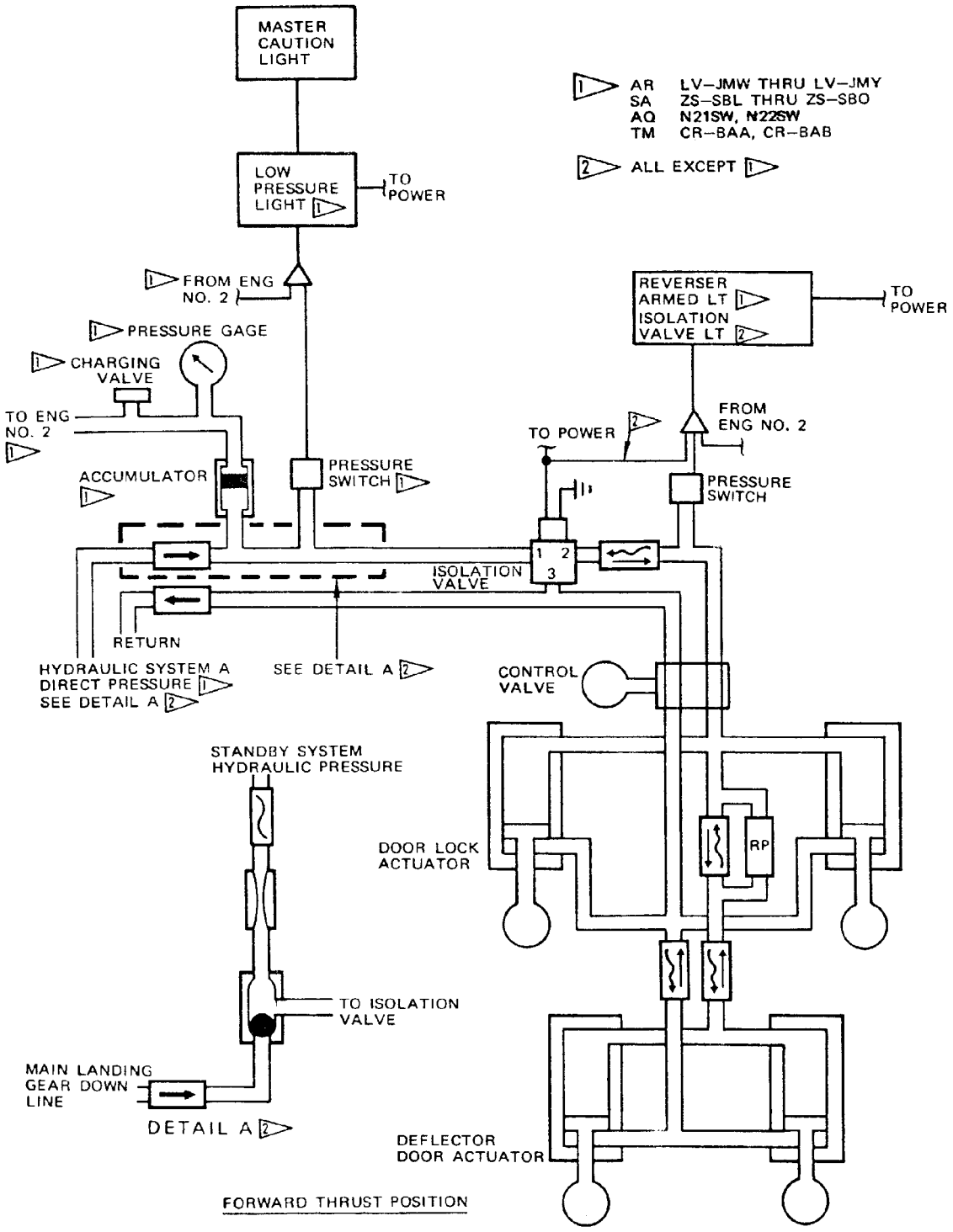
      WARNING: BEFORE OPERATING THRUST REVERSERS, ENSURE THAT ADEQUATE STEPS ARE TAKEN TO PREVENT INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

   B. Equipment and Materials
      (1) Source of 28-volt dc power at battery bus and dc bus No. 1 and 2

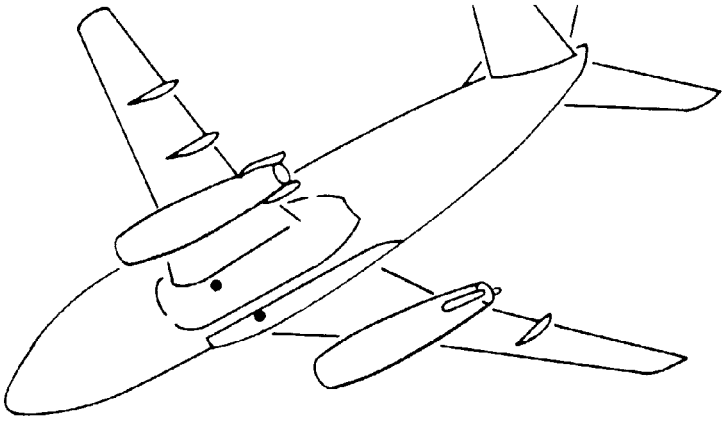
(2) Stopwatch
(3) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 (preferred)

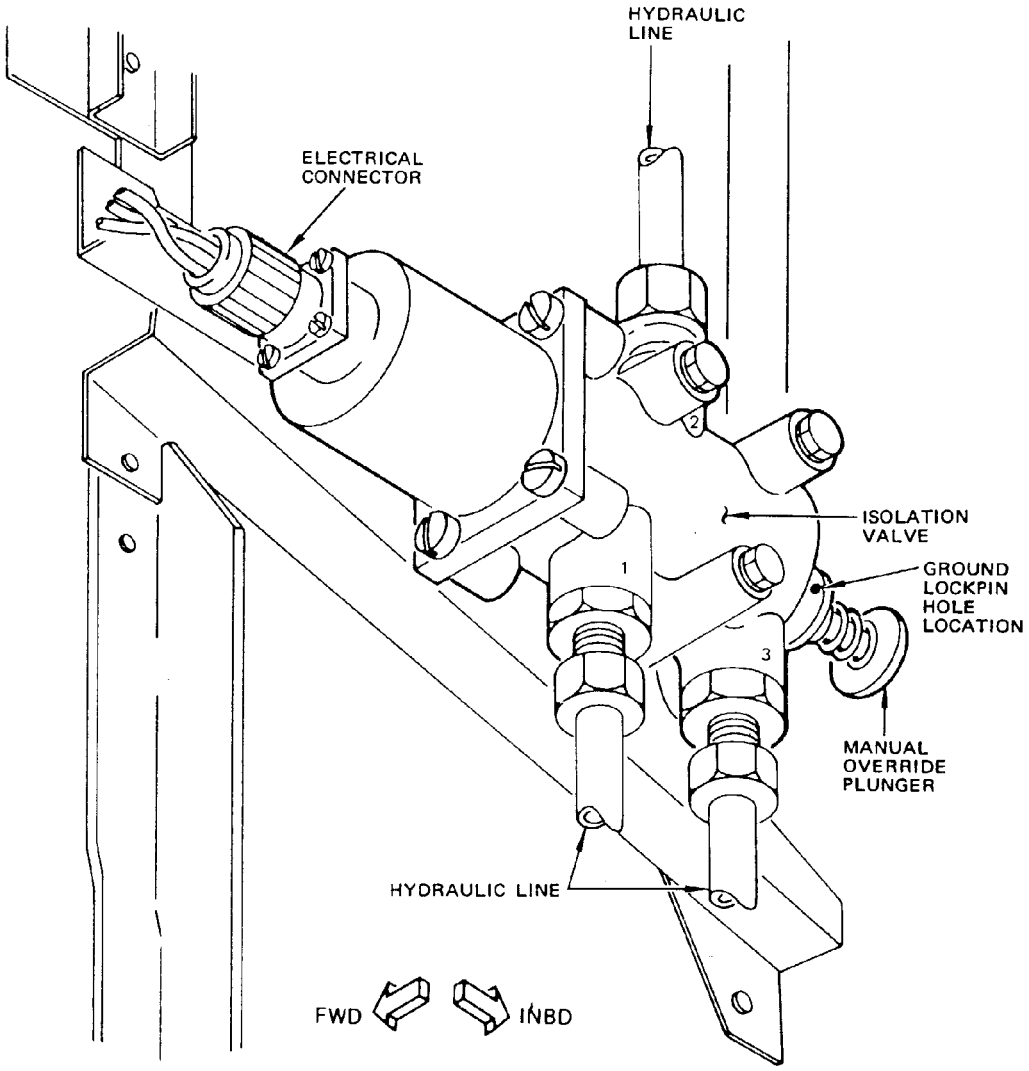
C. Prepare for Test
(1) On airplanes so equipped (Fig. 501 for effectivity), make sure that both thrust reverser accumulators are precharged per placard.
(2) Make sure that ground locks are removed from both thrust reverser isolation valves (Fig. 502).
(3) Make sure that battery bus, dc bus No. 1 and 2 are energized.
(4) Make sure that the following circuit breakers on circuit breaker panel P6 are closed:
(a) ENG 1 THRUST REVERSER
(b) ENG 2 THRUST REVERSER
(c) MASTER CAUTION (two places)
(d) DIM AND TEST
(e) INDICATOR (nine places)
(5) Make sure that both engines are shut down.
(6) On airplanes receiving hydraulic power for the thrust reverser from the main landing gear down line make sure that landing gear selector lever is in the DOWN position (Fig. 501 for effectivity).
(7) Make sure that nose and main landing gear oleo struts are compressed.
(8) Make sure that both forward thrust levers are in the IDLE STOP position.
(9) Make sure that both reverse thrust levers are in the OFF position.
(10) Make sure that both fire switches on the P8 panel are closed.
(11) Pressurize A and B hydraulic systems using the B electric motor-driven pumps (AMM 29-11-0/201).

D. Test Thrust Reverser System
(1) Move both thrust reverser override switches on the P5 panel to OVERRIDE for 10 seconds, and then return both switches to NORMAL.
(a) Both thrust reversers shall be stowed (forward thrust position).
(b) On airplanes with accumulators; make sure these lights remain off:
1) Thrust reverser LOW PRESSURE light
2) Both MASTER CAUTION lights



Thrust Reverser Control System Schematic
Figure 501





Thrust Reverser Isolation Valve
Figure 502

3) OVHD annunciator light

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems.

4) REVERSER ARMED light
5) Both REVERSER UNLOCKED lights

(c) On airplanes without accumulators, make sure these lights remain off.
1) Both MASTER CAUTION lights
2) OVHD annunciator light

NOTE: The MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems.

3) ISOLATION VALVE light
4) Both REVERSER UNLOCKED lights

(2) Test thrust reverser indication system as follows:
(a) Press either MASTER CAUTION light and make sure that both MASTER CAUTION lights and all master caution annunciator lights remain off.
(b) On airplanes with accumulators, press to test REVERSER ARMED, LOW PRESSURE, and both REVERSER UNLOCKED lights and make sure that they come on.
(c) On airplanes without accumulators, press to test the ISOLATION VALVE and both REVERSER UNLOCKED lights.
1) Make sure the REVERSER UNLOCKED and the ISOLATION VALVE lights come on.
(d) On airplanes with accumulators, move the LIGHTS switch on the P2 panel to TEST. These lights will come on:
1) Thrust reverser LOW PRESSURE light
2) REVERSER ARMED light
3) Both REVERSER UNLOCKED lights
4) Both MASTER CAUTION lights
5) OVHD annunciator light
(e) On airplanes without accumulators, move the LIGHTS switch on the P2 panel to TEST. These lights will come on:
1) ISOLATION VALVE light
2) Both REVERSER UNLOCKED lights
3) Both MASTER CAUTION lights
4) OVHD annunciator light

(f) Return the LIGHTS switch on the P2 panel to BRT. All lights shall extinguish.

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems. If this occurs, extinguish these lights by pressing either MASTER CAUTION light.

(3) Test engine override switch operation as follows:
(a) Rotate both reverse thrust levers aft to interlock stop (angular travel of reverse thrust lever from OFF to INTERLOCK is approximately 90 degrees).
1) Thrust reverser deflector doors shall remain stowed, and all lights shall remain extinguished.
(b) Rotate both reverse thrust levers to the OFF position.
(4) Test engine No. 1 thrust reverser operation as follows:
(a) Position engine No. 1 thrust reverser override switch to OVERRIDE.
1) On airplanes with accumulators, the REVERSER ARMED light will come on.
2) On airplanes without accumulators, the ISOLATION VALVE light will come on.
3) Forward thrust levers will be free to advance (return levers to IDLE STOP after trial movement).
(b) Rotate reverse thrust levers rapidly aft to limits of travel.
1) Engine No. 1 thrust reverser shall deploy fully within 2 seconds after completion of thrust lever movement.
2) Engine No. 1 reverse thrust lever shall be free to rotate aft to the No. 2 detent. Aft rotation of engine No. 2 reverse thrust lever shall be limited by the interlock cam and engine No. 2 thrust reverser will remain stowed.
3) Engine No. 1 REVERSER UNLOCKED light will come on.
(c) Rotate both reverse thrust levers rapidly to the OFF position.
1) Engine No. 1 thrust reverser shall fully stow within 3 seconds after completion of reverse thrust lever movement.
2) Engine No. 1 REVERSER UNLOCKED light will extinguish.
3) Forward thrust levers will be free to advance (return levers to IDLE STOP after trial movement).
(d) Position engine No. 1 thrust reverser override switch to NORMAL.
1) On airplanes with accumulators, REVERSER ARMED light will extinguish.
2) On airplanes without accumulators, the ISOLATION VALVE light may come on momentarily.

(5) For engine No. 2 thrust reverser operational test, follow the same procedure outlined in step (4) using the No. 2 override switch and monitoring the No. 2 REVERSER UNLOCKED light.

E. On airplanes with accumulators, do these steps:

(1) Test operation of both thrust reversers simultaneously as follows:

(a) Position both thrust reverser override switches to OVERRIDE, and simultaneously rotate both reverse thrust levers rapidly aft to limits of travel.

1) Both thrust reversers shall fully deploy within 2 seconds after completion of thrust lever movement.

2) REVERSER ARMED and both REVERSER UNLOCKED lights shall illuminate.

(b) Simultaneously return both reverse thrust levers rapidly to the OFF position.

1) Both thrust reversers shall fully stow within 3 seconds after completion of thrust lever movement.

2) Both REVERSER UNLOCKED lights shall extinguish.

(c) Position both thrust reverser override switches to NORMAL. REVERSER ARMED light shall extinguish.

(2) Check thrust reverser pressure line check valve, accumulator and isolation valve as follows:

(a) Remove main hydraulic system pressure.

1) Move ground interconnect switch on aft overhead panel to the CLOSE position.

(b) Monitor both MASTER CAUTION lights, OVHD annunciator light, and thrust reverser LOW PRESSURE light for 2 minutes. All lights will remain off.

(c) Monitor accumulator pressure gage and compare rate of pressure drop with the following time-pressure combinations.

TOTAL ELAPSED TIME (HOURS)	MINIMUM ACCEPTABLE PRESSURE (PSI)
0.5	2650
1.0	2300
1.5	2200
2.0	2050
3.0	1800
4.0	1600
6.0	1300

NOTE: Discontinue test after first half hour if pressure is more than 2650 psi. If pressure is less than 2650 psi, continue test until an acceptable pressure is observed.

If bleed down rate is excessive, a defective check valve or isolation valve is indicated.

(d) Position landing gear selector lever to DOWN or return ground interconnect switch to OPEN position to recharge accumulator.

(3) Operate thrust reversers using accumulator hydraulic pressure only.

(a) Remove main hydraulic system pressure.

1) Move ground interconnect switch on aft overhead panel to the CLOSE position.

(b) Move both thrust reverser switches to OVERRIDE. REVERSER ARMED light will illuminate.

(c) Rotate engine No. 1 reverse thrust lever aft to the interlock stop position.

1) Engine No. 1 thrust reverser shall fully deploy.

2) Thrust reverser LOW PRESSURE light may illuminate.

a) If LOW PRESSURE light illuminates, both MASTER CAUTION lights and the OVHD annunciator light will illuminate approximately 4 seconds after the LOW PRESSURE light illuminates.

3) Engine No. 1 REVERSER UNLOCKED light will illuminate.

(d) Rotate engine No. 1 reverse thrust lever to the OFF position.

1) Engine No. 1 thrust reverser will move toward the forward thrust position (reverser may remain partially deployed).

2) Thrust reverser LOW PRESSURE light will illuminate if previously off.

3) Both MASTER CAUTION lights and the OVHD annunciator light will illuminate approximately 4 seconds after the LOW PRESSURE light illuminates.

(e) Momentarily depress either MASTER CAUTION light. Both MASTER CAUTION lights and the OVHD annunciator light will extinguish.

(f) Momentarily depress either annunciator light panel. Both MASTER CAUTION lights, and the OVHD annunciator light will illuminate (other annunciator lights which illuminate may be disregarded).

(g) Momentarily return hydraulic power to thrust reverser system.
1) Move ground interconnect switch to OPEN for 10 seconds, then return switch to the CLOSE position.

(h) Observe the following:
1) If partially deployed, engine No. 1 thrust reverser will move to the cruise position.
2) Both REVERSER UNLOCKED lights will be off.
3) Thrust reverser LOW PRESSURE light will extinguish.
4) Both MASTER CAUTION and the OVHD annunciator lights will extinguish.

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems. If this occurs extinguish these lights by pressing either MASTER CAUTION light.

(i) Rotate engine No. 2 reverse thrust lever aft to the interlock stop position.
1) Engine No. 2 thrust reverser shall fully deploy.
2) Thrust reverser LOW PRESSURE light may illuminate.
a) If LOW PRESSURE light illuminates, both MASTER CAUTION lights and the OVHD annunciator light will illuminate approximately 4 seconds after the LOW PRESSURE light illuminates.
3) Engine No. 2 REVERSER UNLOCKED light will illuminate.
a) Rotate engine No. 2 reverse thrust lever to the OFF position.
4) Engine No. 2 thrust reverser will move toward the forward thrust position (reverser may remain partially deployed).
5) Thrust reverser LOW PRESSURE light will illuminate if previously off.
6) Both MASTER CAUTION lights and the OVHD annunciator light will illuminate approximately 4 seconds after the LOW PRESSURE light illuminates.

(j) Momentarily return hydraulic power to thrust reverser system.
1) Move ground interconnect switch to OPEN for 10 seconds, then return switch to the CLOSE position.

(k) Observe the following:
1) If partially deployed, engine No. 2 thrust reverser will move to the cruise position.
2) Both REVERSER UNLOCKED lights will be off.

3) Thrust reverser LOW PRESSURE light will extinguish.
4) Both MASTER CAUTION and the OVHD annunciator lights will extinguish.

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems. If this occurs extinguish these lights by pressing either MASTER CAUTION light.

(l) Rotate both reverse thrust levers aft to the interlock stop position.
1) Both thrust reversers will move to the full reverse thrust position.
(m) Rotate engine No. 2 reverse thrust lever to OFF.
1) Engine No. 2 thrust reverser will return to the partially stowed (cruise) position.
2) Thrust reverser LOW PRESSURE light will illuminate.
3) Both MASTER CAUTION and the OVHD annunciator lights will illuminate approximately 4 seconds after the LOW PRESSURE light illuminates.
4) Both REVERSER UNLOCKED lights will illuminate.

(4) Check dimming function of thrust reverser indicator lights.
(a) Position the LIGHTS switch on the P2 panel to DIM. The following lights shall dim:
1) Both MASTER CAUTION lights
2) OVHD annunciator light
3) Thrust reverser LOW PRESSURE light
4) REVERSER ARMED light
5) Both REVERSER UNLOCKED lights
(b) Return the LIGHTS switch on the P2 panel to BRT. All lights will return to their original brightness.

(5) Provide hydraulic power to thrust reverser system.
(a) Return ground interconnect switch to OPEN position.

(6) Rotate engine No. 1 reverse thrust lever to the OFF position.
(a) Both thrust reversers will return to the forward thrust position.
(b) Thrust reverser LOW PRESSURE light will extinguish.

(c) Both MASTER CAUTION and the OVHD annunciator lights will extinguish.

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems. If this occurs, extinguish these lights by pressing either MASTER CAUTION light.

(d) Both REVERSER UNLOCKED lights will extinguish.

(7) Return both thrust reverser override switches to NORMAL. REVERSER ARMED light will extinguish.

F. On airplanes without accumulators, do these tests:

(1) Verify operation of biased shuttle valves by operating thrust reversers with standby hydraulic system pressurized in addition to A and B systems.

(a) With landing gear selector lever in DOWN Position, pressurize standby hydraulic system.

(b) Position engine No. 1 thrust reverser override switch to OVERRIDE and engine No. 2 override switch to NORMAL.

(c) Rotate both reverse thrust levers rapidly aft to limits of travel.

1) Engine No. 1 thrust reverser shall deploy fully within 2 seconds of completion of thrust lever movement.

2) Engine No. 1 reverse thrust lever shall be free to rotate aft to the reverse thrust temperature indicating detent. Aft rotation of engine No. 2 reverse thrust lever shall be limited by the interlock cam and engine No. 2 thrust reverser shall remain stowed.

3) Engine No. 1 REVERSER UNLOCKED light shall illuminate.

(d) Rotate both reverse thrust levers rapidly to the OFF position.

1) Engine No. 1 thrust reverser shall fully stow within 3 seconds of completion of lever movement.

2) Engine No. 1 REVERSER UNLOCKED light shall extinguish.

3) Forward thrust levers will be free to advance. (Return levers to IDLE STOP after trial movement.)

(e) Position engine No. 1 thrust reverser override switch to NORMAL.

(f) Check operation of engine No. 2 reverser by placing No. 2 override switch in OVERRIDE; follow the same procedure outlined in steps 6.(c) and (d) and monitor the No. 2 REVERSER UNLOCKED light.

(g) Return engine No. 2 thrust reverser override switch to NORMAL.

(h) Depressurize standby hydraulic system.

(2) On airplanes equipped with the air-ground switch for the nose gear (SB 78-1050), check the operation of the air-ground sensing system.
  (a) Test to make sure that the thrust reversers will deploy when the main landing gear is on the ground.
    1) Put the nose landing gear in the air mode.
      a) Remove the bolt common to the upper torsion link and the spring cartridge of the nose gear.
      b) Move the spring cartridge down until the stops on the quadrant and the support fitting are in contact.
      c) If the airplane is on jacks with the nose landing gear compressed, release the nose gear.
  (b) Test for ground mode.
    1) Move the No. 1 thrust reverse lever fully aft.
      a) The No. 1 thrust reverser will fully deploy in 2 seconds or less.
      b) The No. 1 REVERSER UNLOCKED light will come on.
    2) Move the No. 1 reverse thrust lever to the OFF position.
      a) The No. 1 thrust reverser will stow in 3 seconds or less.
      b) The No. 1 REVERSER UNLOCKED light will go off.
    3) Move the No. 2 thrust reverse lever fully aft.
      a) The No. 2 thrust reverser will fully deploy in 2 seconds or less.
      b) The No. 2 REVERSER UNLOCKED light will come on.
    4) Move the No. 2 reverse thrust lever to the OFF position.
      a) The No. 2 thrust reverser will stow in 3 seconds or less.
      b) The No. 2 REVERSER UNLOCKED light will go off.
  (c) Test to make sure that the thrust reversers do not deploy while the airplane is in the air mode.
    1) Put the right main landing gear in the air mode.
      a) Remove the bolt that connects the upper and the lower torsion links of the right main landing gear.
      b) Move the upper torsion link down until the push-pull cable is fully extended.
      c) If airplane is on jacks, release the right main landing gear.
    2) Test for air mode.
      a) Move the No. 1 reverse thrust lever fully aft.

1. The No. 1 thrust reversers will remain stowed.
2. The No. 1 REVERSER UNLOCKED light will remain off.

b) Move the No. 1 reverse thrust lever to the OFF position.

c) Move the No. 2 reverse thrust lever fully aft.
1. The No. 2 thrust reversers will remain stowed.
2. The No. 2 REVERSER UNLOCKED light will remain off.

d) Move the No. 2 reverse thrust lever to the OFF position.

(d) Test to make sure that the thrust reversers will deploy when the nose landing gear is on the ground.

1) Put the nose in the ground mode.
a) Install the bolt common to the upper torsion link and the spring cartridge on the nose landing gear.
b) If the airplane is on jacks, compress the nose landing gear.

2) Test for ground mode.
a) Move the No. 1 thrust reverse lever fully aft.
1. The No. 1 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will come on.

b) Move the No. 1 reverse thrust lever to the OFF position.
1. The No. 1 thrust will stow in 3 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will go off.

c) Move the No. 2 thrust reverse lever fully aft.
1. The No. 2 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 2 REVERSER UNLOCKED light will come on.

d) Move the No. 2 reverse thrust lever to the OFF position.
1. The No. 2 thrust reverser will stow in 3 seconds or less.
2. The No. 2 REVERSER UNLOCKED light will go off.

(e) Restore the airplane to normal.

1) Put the main landing gear in the ground mode.
a) Install the bolt common to the upper and lower torsion links of the right main gear.
b) If the airplane is on jacks, compress the right main landing gear.

(3) On airplanes with a Modification to the Radio Altimeter to Enable the Thrust Reverser (SB 78-1051), check the operation of the radio altimeter enabling system.

G. Put airplane in the air mode.

(1) Put the main gear in the air mode.

(a) Remove the bolt common to the upper and lower torsion links of the right main gear.

(b) Move the upper torsion link down until the push-pull cable assembly is fully extended.

(c) If airplane is on jacks, release the right main gear.

(2) Put the nose gear at a 15 foot altitude.

(a) Set the radio altimeter No. 1 to a 15-foot altitude (AMM 34-33-( )/501).

H. Test for air mode.

(1) Rotate the No. 1 and 2 reverse thrust levers aft to limit of travel.

(a) The No. 1 and 2 reversers will not deploy.

(b) The thrust reverser unlocked lights will not come on.

(2) Move the No. 1 and 2 reverse thrust levers to OFF.

(a) The isolation valve light will come on.

I. Put the nose gear in the ground mode.

(1) Reduce the simulated altitude on the radio altimeter to 8 feet (AMM 34-33-( )/501).

J. Test for ground mode.

(1) Rotate the No. 1 and 2 reverse thrust levers aft to the limit of travel.

(a) Both reversers will deploy after approximately 5 seconds.

(b) The thrust reverser unlocked lights will come on.

(2) Move the No. 1 and 2 reverse thrust levers to OFF.

(a) Both of the reversers will stow.

(b) The thrust reverser unlocked lights will go off.

K. Put main gear in the ground mode.

(1) Install the bolt that is common to both of the upper and lower torsion link of the right main gear.

(2) If airplane is on jacks, compress the right main gear oleo.

(3) Check operation of thrust reverser isolation valve light as follows:

(a) Position landing gear selector lever to OFF and make sure that standby hydraulic system is not pressurized.

(b) Move engine No. 1 thrust reverser override switch to OVERRIDE. ISOLATION VALVE light shall come on and after time delay of approximately 12 seconds, MASTER CAUTION and OVHD annunciator lights shall come on.

(c) Position the LIGHTS switch on the P2 panel to DIM and make sure that the lights dim.

(d) Return LIGHTS switch on the P2 panel to BRT. All lights will return to original brightness.

(e) Return engine No. 1 thrust reverser override switch to NORMAL. ISOLATION VALVE, MASTER CAUTION and OVHD annunciator lights shall go out.

(f) Repeat steps (b) and (e) with engine No. 2 thrust reverser override switch.

(4) Operate thrust reversers using alternate pressure source.
(a) With landing gear selector lever in the OFF position, pressurize standby hydraulic system and move both thrust reverser override switches to OVERRIDE. ISOLATION VALVE, MASTER CAUTION and OVHD annunciator lights will remain off.

NOTE: MASTER CAUTION and OVHD annunciator lights may remain on due to signals from other systems. If this occurs, extinguish these lights by pressing either MASTER CAUTION light.

(b) Rotate both reverse thrust levers rapidly aft to limits of travel.
1) Both thrust reversers shall fully deploy within 7 seconds of completion of thrust lever movement.
2) Both REVERSER UNLOCKED lights shall illuminate.
(c) Position landing gear selector lever to DOWN.

NOTE: Using the standby system to stow the thrust reversers on these airplanes could cause the hydraulic fuse to set, on PV ALL EXCEPT CF-EPP; a fuse with larger capacity is used and the reversers may be stowed using standby system pressure only.

(d) Rotate both reverse thrust levers to the OFF position.
1) Both thrust reversers shall move to the forward thrust position.
2) Both REVERSER UNLOCKED lights shall go out.
3) Both forward thrust levers shall be free to advance (return levers to IDLE STOP after trial movement).

NOTE: On PV CF-EPP, disregard step 3.(e). Proceed directly to step 3.(f).

(e) AR ALL EXCEPT LV-JMZ, LV-JND, LV-JNE, LV-JTD, LV-JTO;
FL ALL EXCEPT N7381F, N7382F, N7386F;
NH ALL EXCEPT JA8408 thru JA8417;
PV ALL EXCEPT CF-EPP;
Check that hydraulic fuses are not closed.
1) Within 10 seconds of completing step (8)(d)3), rotate both reverse thrust levers rapidly aft to limits of travel.
a) Both thrust reversers shall fully deploy within 7 seconds of completion of reverse thrust lever movement.

2) Within 10 seconds of completing step (8)(e)1), rotate both reverse thrust levers to OFF position.
a) Both thrust reversers shall move to the forward thrust position within 13 seconds of completion of lever movement.
b) Both forward thrust levers shall be free to advance (return levers to IDLE STOP after trial movement).
3) Position landing gear selector lever to DOWN.
(f) Depressurize standby hydraulic system.
(g) Return both thrust reverser override switches to NORMAL.

L. On all airplanes, do these tests:
(1) Provide a simulated engine run and check operation of fire switches.
(a) Open these circuit breakers on the P6 panel:
1) Engine No. 1 and 2 thrust REV
2) SEC 2 and SEC 5
3) EXTINGUISHER BOTTLES right and EXTINGUISHER BOTTLES left

NOTE: On airplanes with accumulators, the REVERSER ARMED light will go off.

(b) Remove disconnect D752 from engine low oil pressure switch on both engines, and jumper between pins 1 and 2 of disconnect on engines No. 1 and 2.
(c) Close SEC 2, SEC 5, and engines No. 1 and 2 THRUST REVERSER circuit breakers.
1) On airplanes with accumulators, the REVERSER ARMED lights will come on.
(d) Rotate both reverser thrust levers aft to the interlock stop.
1) REVERSER UNLOCKED lights shall come on.
2) Both thrust reversers will move to reverse thrust position.
(e) Pull the No. 1 and 2 fire switches on P8 panel using the override button.

CAUTION: DO NOT ROTATE HANDLE.

1) On airplanes with accumulators, the REVERSER ARMED light will go off.
(f) Rotate both reverse thrust levers to the OFF position. Thrust reversers shall remain deployed and REVERSER UNLOCKED lights shall remain illuminated.
(g) Position both thrust reverser override switches to OVERRIDE; thrust reversers will remain deployed and all lights shall remain unchanged.

(h) Return both thrust reverser override switches to NORMAL and push in both engine fire switches. Thrust reversers will return to forward thrust position.
1) On airplanes with accumulators, the REVERSER ARMED light will come on.
(i) Close the EXTINGUISHER BOTTLES right and the EXTINGUISHER BOTTLES left circuit breakers.

(2) On airplanes equipped with the air-ground switch for the nose gear (SB 78-1050), check the operation of the air-ground sensing system.
(a) Test to make sure that the thrust reversers will deploy when the main landing gear is on the ground.
1) Put the nose landing gear in the air mode.
a) Remove the bolt common to the upper torsion link and the spring cartridge of the nose gear.
b) Move the spring cartridge down until the stops on the quadrant and the support fitting are in contact.
c) If the airplane is on jacks with the nose landing gear compressed, release the nose gear.
(b) Test for ground mode.
1) Move the No. 1 reverse thrust lever fully aft.
a) The No. 1 thrust reverser will fully deploy in 2 seconds or less.
b) The No. 1 REVERSER UNLOCKED light will come on.

1. The No. 1 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will come on.

c) Move the No. 1 reverse thrust lever to the OFF position.
1. The No. 1 thrust reverser will stow in 3 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will go off.

d) Move the No. 2 reverse thrust lever fully aft.
1. The No. 1 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will come on.

e) Move the No. 2 reverse thrust lever to the OFF position.
1. The No. 1 thrust reverser will stow in 3 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will go off.

(c) Test to make sure that the thrust reversers do not deploy while the airplane is in the air mode.

1) Put the right main landing gear in the air mode.
a) Remove the bolt that connects the upper and the lower torsion links of the right main landing gear.
b) Move the upper torsion link down until the push-pull cable is fully extended.
c) If airplane is on jacks, release the right main landing gear.

2) Test for air mode.
a) Move the No. 1 reverse thrust lever fully aft.

1. The No. 1 thrust reversers will remain stowed.
2. The No. 1 REVERSER UNLOCKED light will remain off.

b) Move the No. 1 reverse thrust lever to the OFF position.

c) Move the No. 2 reverse thrust lever fully aft.
1. The No. 1 thrust reversers will remain stowed.
2. The No. 1 REVERSER UNLOCKED light will remain off.

d) Move the No. 2 reverse thrust lever to the OFF position.

(d) Test to make sure that the thrust reversers will deploy when the nose landing gear is on the ground.

1) Put the nose in the ground mode.
a) Install the bolt common to the upper torsion link and the spring cartridge on the nose landing gear.
b) If the airplane is on jacks, compress the nose landing gear.

2) Test for ground mode.
a) Move the No. 1 thrust reverse lever fully aft.
1. The No. 1 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will come on.

b) Move the No. 1 reverse thrust lever to the OFF position.
1. The No. 1 thrust reverser will stow in 3 seconds or less.
2. The No. 1 REVERSER UNLOCKED light will go off.

c) Move the No. 2 thrust reverse lever fully aft.
1. The No. 2 thrust reverser will fully deploy in 2 seconds or less.
2. The No. 2 REVERSER UNLOCKED light will come on.

d) Move the No. 2 reverse thrust lever to the OFF position.
1. The No. 2 thrust reverser will stow in 3 seconds or less.
2. The No. 2 REVERSER UNLOCKED light will go off.

(e) Restore the airplane to normal.

1) Put the main landing gear in the ground mode.
a) Install the bolt common to the upper and lower torsion links of the right main gear.
b) If the airplane is on jacks, compress the right main landing gear.

(3) Test Lock Indication
  (a) Move engine No. 1 thrust reverser override switch to OVERRIDE.
  (b) Rotate engine No. 1 reverse thrust lever aft to limit of travel.
    1) Engine No. 1 REVERSER UNLOCKED light shall illuminate.
    2) Engine No. 1 thrust reverser shall move to the reverse thrust position.
  (c) Move engine No. 1 thrust reverser override switch to NORMAL position.
  (d) Install ground lock on engine No. 1 thrust reverser isolation valve.
  (e) Open engine No. 1 THRUST REVERSER circuit breaker on P6 circuit breaker panel.
  (f) Depressurize hydraulic system A (AMM 29-11-0/201).
  (g) Remove upper lock access panel.
  (h) Remove large access panel located at bottom of thrust reverser shroud.
  (i) Apply a slug (made from carbon or low alloy steel approximately 1.00 by 2.00 inches, 0.06 inch thick) to the upper proximity sensor.
    1) The engine No. 1 REVERSER UNLOCKED light shall remain illuminated.
  (j) With the slug remaining on the upper sensor, apply a like slug to the lower sensor.
    1) The engine No. 1 REVERSER UNLOCKED light shall extinguish.
  (k) Remove slug from the upper sensor.
    1) The engine No. 1 REVERSER UNLOCKED light shall illuminate.
  (l) Remove slug from the lower sensor.
    1) The REVERSER UNLOCKED light shall remain illuminated.
  (m) Close engine No. 1 THRUST REVERSER circuit breaker on P6 circuit breaker panel.
  (n) Pressurize hydraulic system A (AMM 29-11-0/201.
  (o) Remove ground lock from thrust reverser isolation valve.
  (p) Move engine No. 1 thrust reverser override switch to OVERRIDE.
  (q) Rotate engine No. 1 reverse thrust lever to the OFF position.
    1) Engine No. 1 thrust reverser shall move to the forward thrust position.
    2) Engine No. 1 REVERSER UNLOCKED light shall extinguish.
  (r) Move override switch to NORMAL.
  (s) Repeat steps (a) thru (r) for the thrust reverser on engine No. 2 using the engine No. 2 reverse thrust lever, override switch, isolation valve and switch, proximity sensors and observing the engine No. 2 REVERSER UNLOCKED light.
  (t) Install access panels on thrust reversers.

M. Restore Airplane to Normal
   (1) Open both THRUST REVERSER circuit breakers, and SEC 2 and SEC 5 circuit breakers under INDICATOR on P6 panel.
   (2) Remove jumpers from disconnects D752 on both engines.
   (3) Connect the D752 disconnect to the low oil pressure switch on both engines.
   (4) Install ground locks on both thrust reverser isolation valves.
   (5) Close both THRUST REVERSER circuit breakers and SEC 2 and SEC 5 circuit breakers under INDICATOR on P6 panel.
   (6) Place landing gear selector lever in DOWN position.
   (7) Position both thrust reverser override switches to OVERRIDE.
   (8) Rotate both reverse thrust levers aft to interlock stop position and monitor MASTER CAUTION, OVHD annunciator and REVERSE UNLOCKED lights for 2 minutes.
      (a) MASTER CAUTION and OVHD annunciator lights shall illuminate steady.
      (b) On airplanes with accumulators, the ISOLATION VALVE light will remain on.
      (c) On airplanes without accumulators, the REVERSER ARMED light will remain off.
      (d) REVERSER UNLOCKED lights shall remain extinguished and shall not flicker.
   (9) Return both reverse thrust levers to OFF position.
   (10) Return both override switches to NORMAL position.
   (11) On airplanes with accumulators, return ground interconnect switch to CLOSE position.
   (12) On airplanes without accumulators, move the landing gear select lever to the off position.
   (13) Remove ground locks from isolation valves.

N. Check engine pressure ratio (EPR) with the engines in the forward thrust configuration.

   NOTE: Reverse thrust detent check is to be accomplished during systems check but may be performed separately under the following conditions:

   When engines are re-trimmed.
   When engine fuel control is replaced.
   When reverse thrust detent components are replaced or re-rigged.
   When engine has been replaced.

   (1) Remove tie rod nut and remove left stabilizer trim control wheel.
   (2) Remove 10 attachment screws and left upper control stand side door for access to the reverse thrust detents (Fig. 503).
   (3) Loosen adjustment screws and move detent assembly to the maximum forward position.

(4) To allow the use of reverse thrust levers without deploying the reversers, accomplish the following:
   (a) Turn off all bleed air and electrical load.
   (b) Disconnect the reverse thrust follow-up push-pull cables from the reverser mechanisms by removing fasteners connecting the push-pull cable rod end to the crank arm at each thrust reverser.
   (c) Rotate each interlock cam in the direction which allows use of the reverse thrust levers by pulling the push-pull cables until they stop.
   (d) Open ENG 1 and ENG 2 THRUST REV DC circuit breakers on circuit breaker panel P6.
   (e) Install thrust reverser isolation valve ground locks in both isolation valves (Fig. 502).

(5) Start engines (AMM 71-09-100).

(6) Simultaneously raise both reverse thrust levers until EPRs comply with the requirements of Fig. 503 for the engine model installed. On airplanes with intermixed engines installed, lift the reverse thrust levers until the EPR for the higher rated engine complies with Fig. 503. Make sure that the EPR for the lower rated engine is not exceeded. If the EPR requirement for the lower rated engine is exceeded, reduce thrust until the requirement is met.

(7) Mark or measure the position of the reverse thrust levers at this point.

(8) Shut down engines (AMM 71-09-100).

(9) Return reverse thrust levers to the previously marked or measured position and move the detent assembly aft until the rollers contact the cam surfaces on the thrust drums. Lock the detent assembly in this position.

(10) Return levers to stow position and start engines (AMM 71-09-100).

(11) Raise both levers simultaneously past No. 1 detent (Fig. 503), the retard levers until rollers are just contacted by the No. 1 detent on the cam. Make sure that the maximum EPR requirement for either engine is not exceeded and that the minimum EPR requirement for at least one engine is achieved. Readjust if necessary.

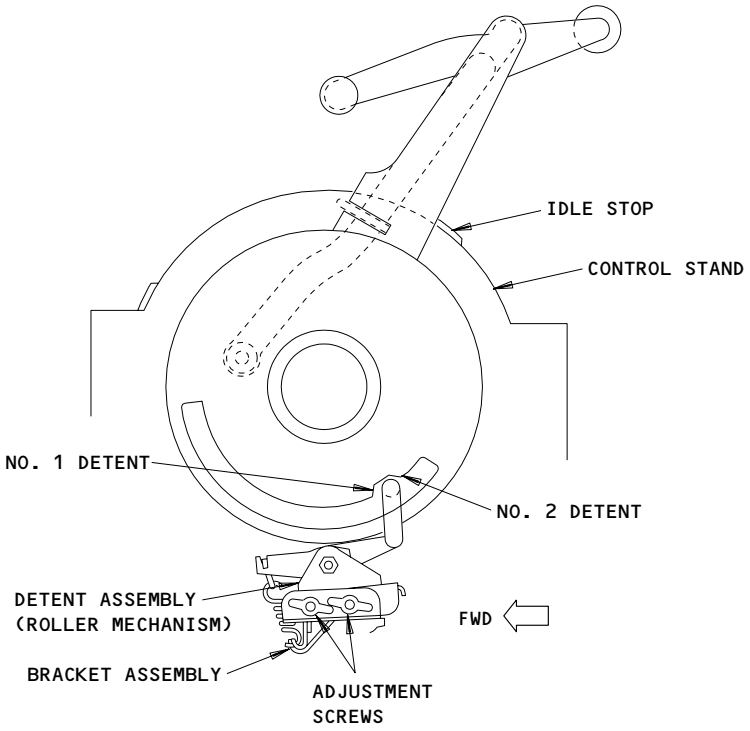
NOTE: Since reverse thrust mismatch is allowable provided neither engine exceeds maximum EPR limits, engines may be checked one at a time. However, the EPR difference between the two engines should not exceed 0.10 EPR. To achieve this it may be necessary to adjust the engine control cable systems between the control stand and the drum and brake mechanism or the autothrottle clutch mechanism. This adjustment must not displace the engine fuel control unit idle index by more than 0.02 inch with the thrust levers at idle. This adjustment is not permitted on airplanes with intermixed engines.

(12) Return both levers to stow position and shut down engines (AMM 71-09-100).
(13) Connect follow-up push-pull cables.
(14) Close ENG 1 and ENG 2 THRUST REV DC circuit breakers on circuit breaker panel P6.
(15) Install left upper side door on control stand using 10 attachment screws. Install left stabilizer trim control wheel. Secure with tie rod nut.

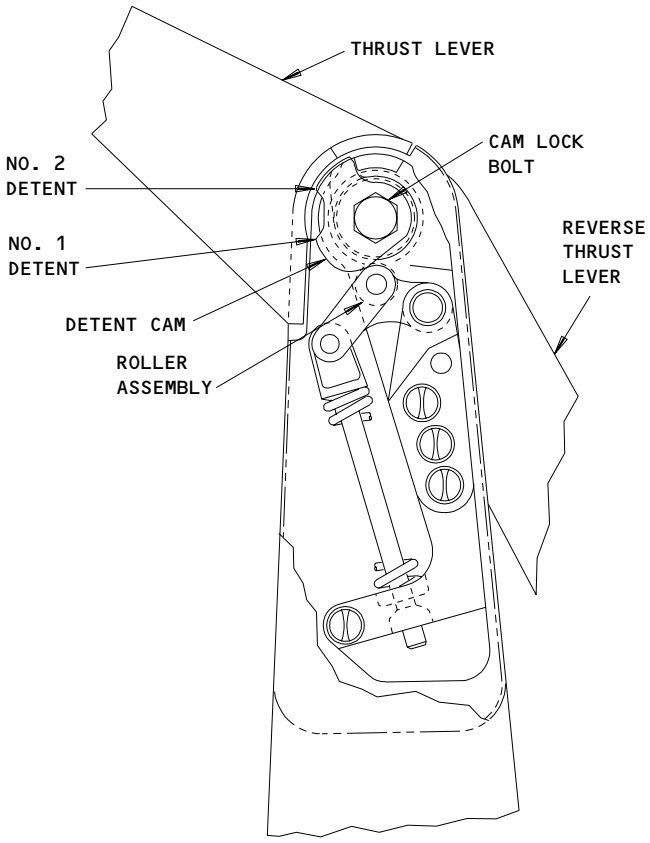
NOTE: Handles on stabilizer trim control wheels should be 90 ±15 degrees apart when installed on control stand.

(16) Remove ground locks from isolation valves.

NOTE: On airplanes with intermixed engines, it is probable that the minimum reverse thrust requirements for one engine may not be achieved. This condition cannot be improved.

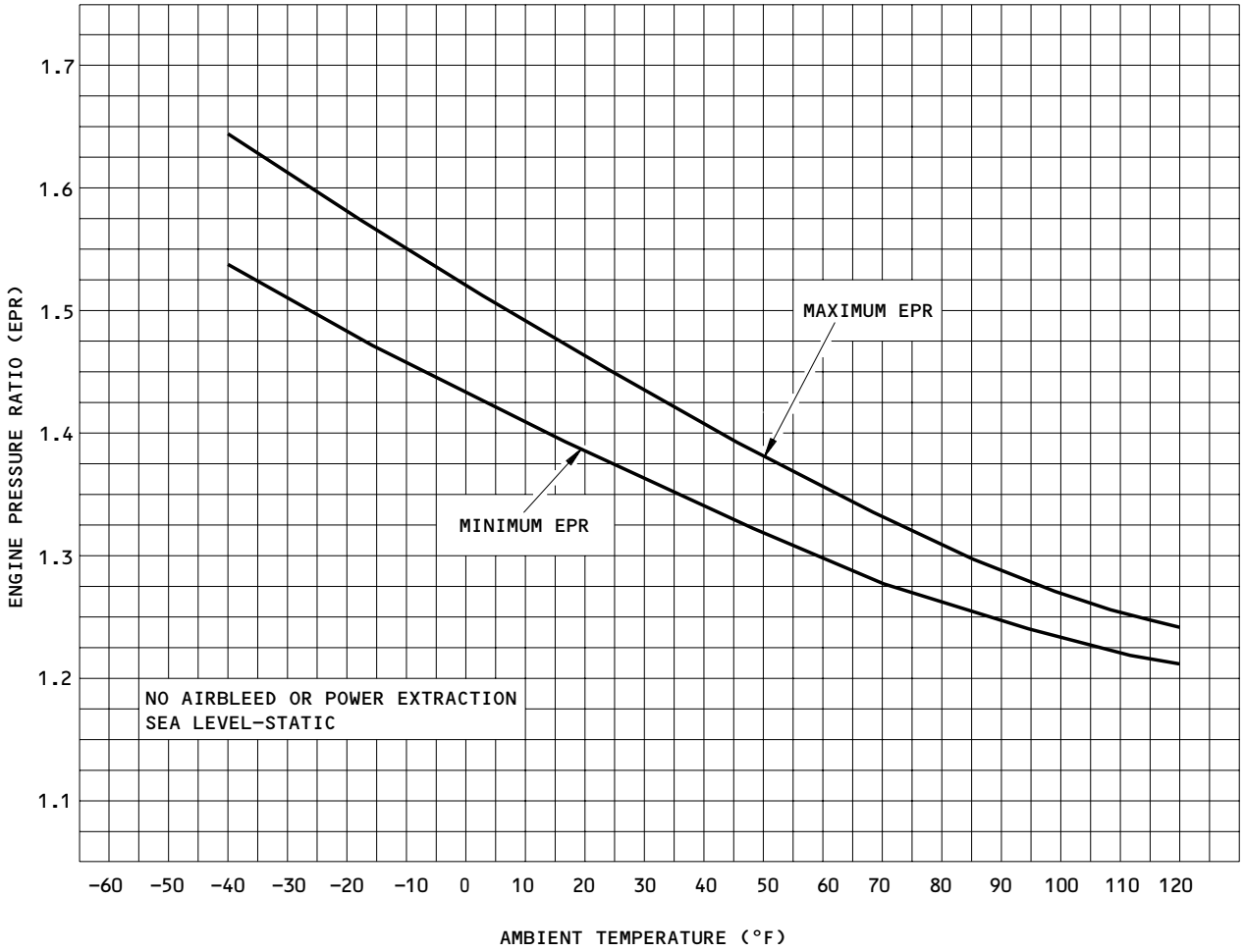


AIRPLANES WITH REVERSE
THRUST DETENT IN CONTROL STAND



AIRPLANES WITH REVERSE
THRUST DETENT IN HANDLE

Reverse Thrust Detent Adjustment
Figure 503 (Sheet 1)

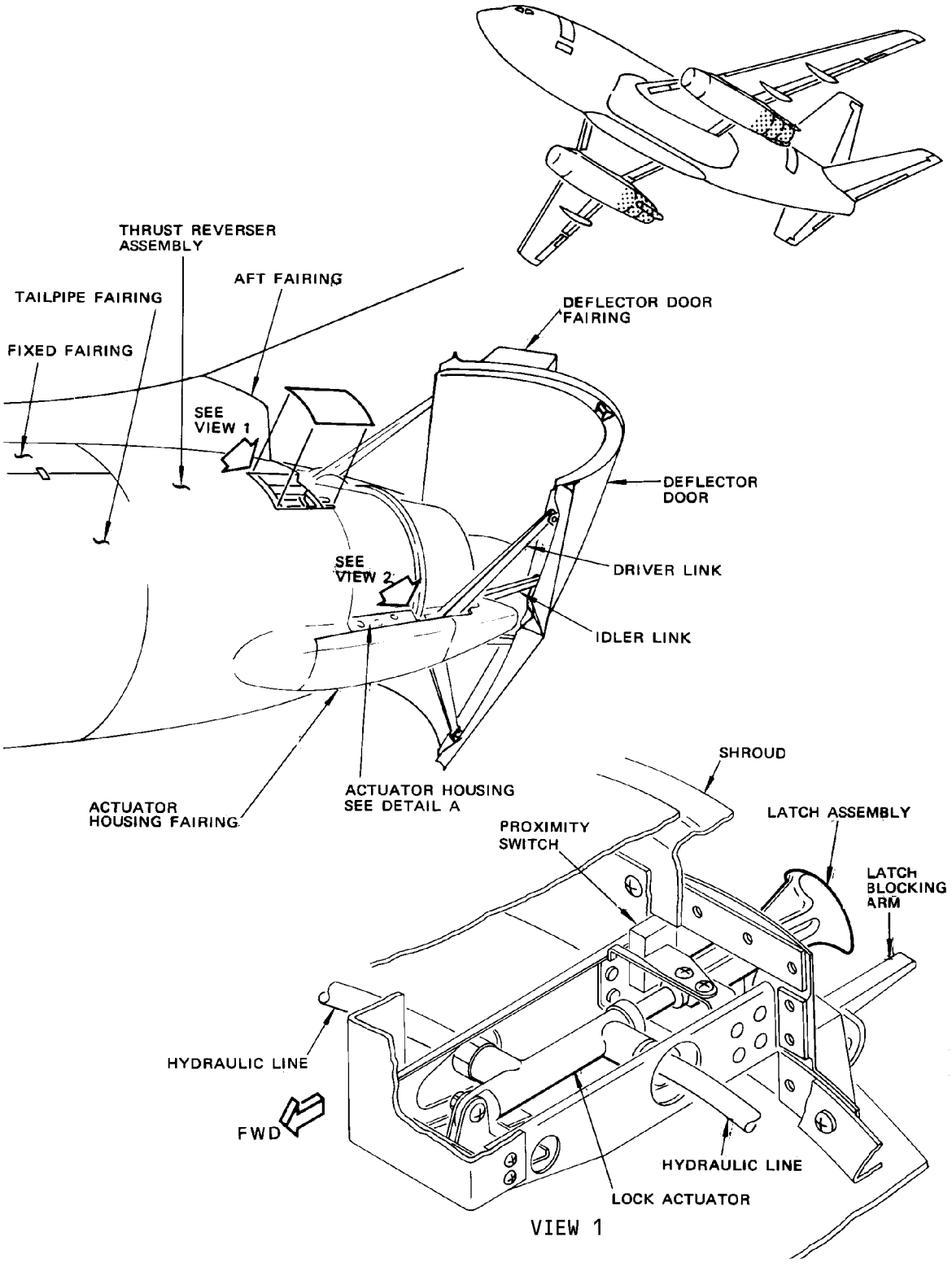


ENGINES TRIMMED TO JT8D–9, –9A

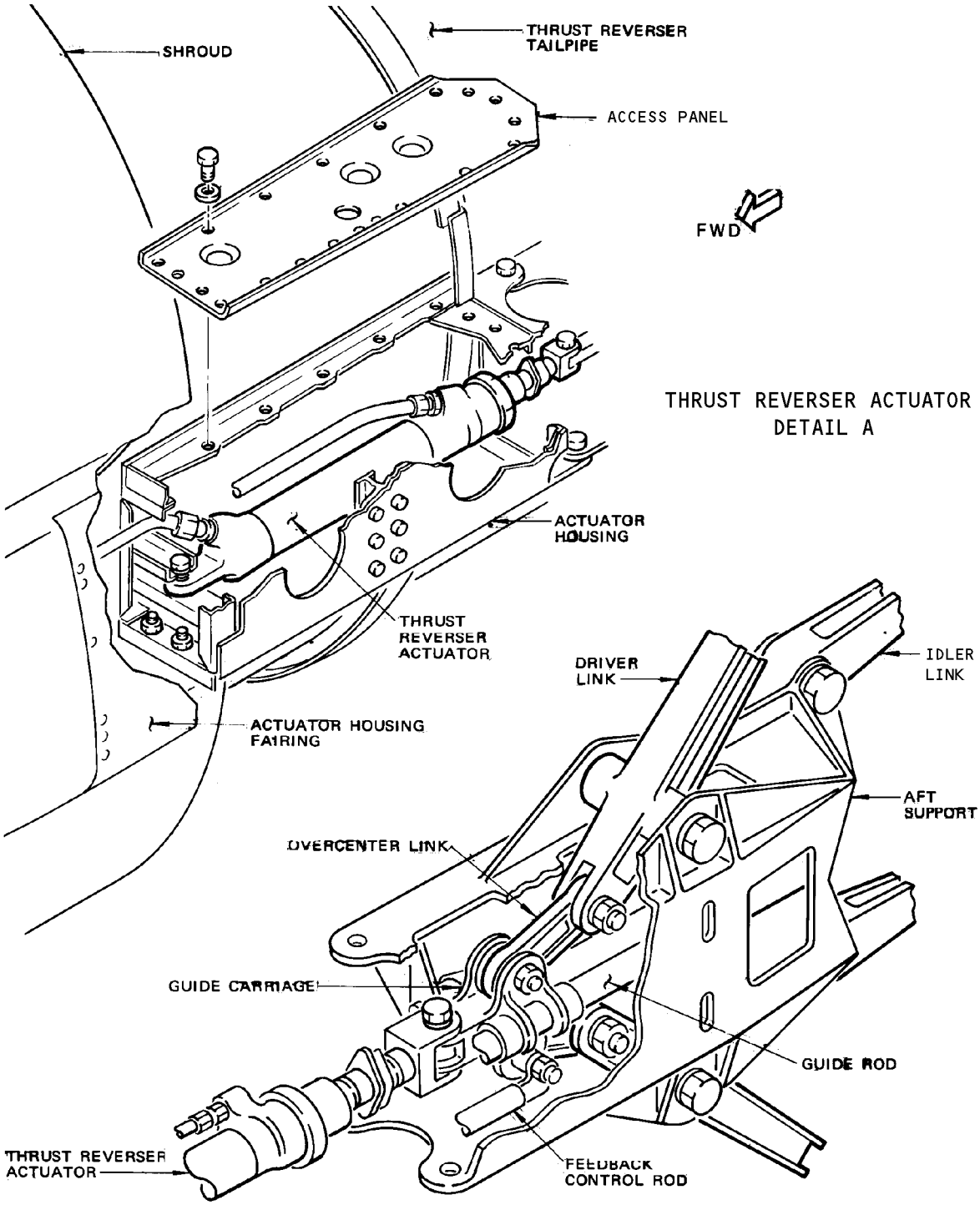
Reverse Thrust Detent Adjustment
Figure 503 (Sheet 2)

THRUST REVERSER ASSEMBLY - DESCRIPTION AND OPERATION

1. General
   A. The thrust reverser assembly is located on the aft end of each engine, and is attached to a tailpipe extension which in turn is attached to the engine. The thrust reversers, when actuated, provide reverse thrust as a means of decelerating the aircraft during landing roll or after a rejected takeoff. The thrust reversers are intended for ground use only. Reverse thrust is provided by two deflector doors which open aft, blocking the engine exhaust gas flow and deflecting the exhaust gas forward. Each thrust reverser operates independently of the other reverser.
   B. The components of the thrust reverser assembly consist of an integral tailpipe and shroud assembly, two deflector doors, two deflector door actuators, two deflector door locks, deflector door actuating linkage, and thrust reverser fairings. (See figure 1.) With the reverser in the forward thrust position, exhaust gases flow unrestricted through the reverser unit. A double flanged tailpipe extension is installed between the aft end of the engine and the forward end of the thrust reverser to direct the exhaust gases for the proper thrust angle during forward thrust operation.
   C. The thrust reverser is hydraulically actuated by system A hydraulic pressure and is controlled by a thrust reverser control system which pressurizes the stow or deploy ports on the thrust reverser actuators. The control for each thrust reverser is separate, operating through the engine control system for the applicable engine. Refer to 78-34-01 for a description of the thrust reverser control system.
2. Thrust Reverser Assembly
   A. Deflector Doors
      (1) The deflector doors form the external cowling around the engine exhaust nozzle when the reverser is in the forward thrust position. When in the reverse thrust position, the deflector doors block the engine exhaust gas flow and deflect the exhaust gas forward, over and under the wing. (See figure 1.) The doors are oriented 30 degrees from the vertical. There are two deflector doors on each reverser, a lower and an upper door. Attached to the upper deflector door is a deflector door fairing which is not part of the door assembly. The deflector door is retained by linkage connecting it to the thrust reverser. During reverse thrust actuation, the thrust reverser actuators, through linkages, cause the doors to move aft and rotate outward simultaneously.



Thrust Reverser Assembly
Figure 1 (Sheet 1)



Thrust Reverser Assembly
Figure 1 (Sheet 2)

B. Thrust Reverser Actuators

(1) The thrust reverser actuators are hydraulically operated, and provide the mechanical driving force to operate the deflector doors when reverse or forward thrust has been selected at the control stand. (See figure 1.) There are two actuators on each reverser. The actuators are located on opposite sides of the thrust reverser, and are oriented 30 degrees from the horizontal. Each actuator is mounted in an actuator housing. When system A hydraulic pressure is applied to the deploy port of the actuator, the actuator piston rod retracts deploying the deflector doors. An internal snubbing provision is employed to cushion the piston at the end of the retracting stroke. Pressure is applied to the stow port of the actuator to return the reverser to the forward thrust position. This extends the actuator piston rod driving the guide carriage aft and closing the deflector doors.

C. Thrust Reverser Lock

(1) The thrust reverser lock assembly maintains the thrust reverser locked in the forward thrust position except when reverse thrust operation is selected. Two locks are used on each reverser, one for each deflector door. (See figure 1.) The doors are held in the forward thrust position by overcentering of the door linkage and by engagement of the door locks. Door lock torsion springs hold the latches in the lock position. When reverse thrust is selected, the lock actuators are pressure-sequenced to unlock the door latches before the door actuators are pressurized. As the doors move to reverse thrust, the latch blocking arms rotate to block the latches in the unlock position. When forward thrust is selected, pressure applied to the actuator lock ports extends the actuators but the latches remain unlocked until the doors are stowed and the blocking arms are depressed. With the latch blocking arms held down by the stowed doors, the latches are driven to the lock position by the door lock torsion springs.

D. Thrust Reverser Fairings

(1) The thrust reverser fairings consist of a deflector door fairing, tailpipe fairings, fixed fairing, and actuator housing fairings. (See figure 1.) The deflector door fairing is attached to the upper deflector door and can be adjusted to fair with the aft fairing. The deflector door fairing is not part of the deflector door assembly. The tailpipe fairings and fixed fairing are used to form the external cowling around the tailpipe extension. The fixed fairing is attached to the tailpipe extension and to the engine shroud, and covers the upper part of the tailpipe extension. The tailpipe fairings are hinged to the fixed fairing, and cover the rest of the tailpipe extension. The actuator housing fairings cover the thrust reverser actuators. There are two actuator housing fairings on each reverser. All fairings are provided to form an aerodynamically smooth surface, and to protect the thrust reverser components.

E. Thrust Reverser Linkage

(1) The thrust reverser linkage assembly is a four-bar linkage system used to stow and deploy the thrust reverser deflector doors. The linkage assembly is powered by the hydraulically operated thrust reverser actuators. The linkage assembly consists of a driver link, idler link, and an overcenter link, with the driver link attached to the forward part of the deflector door, and the idler link attached to the aft part. In addition, there is a guide carriage and two guide rods. (See figure 1.) The driver links are attached to the guide carriage through the overcenter links. This system maintains a positive closed-door position when the deflector doors are in the forward thrust position.

(2) The LH and RH linkage assemblies are identical except for the feedback control mechanism. The feedback control rod is attached to the lower LH guide carriage and is used to mechanically transmit the position of the guide carriage to the power control interlock mechanism. For a description of the feedback control, refer to 78-34-01.

F. Tailpipe Extension

(1) The tailpipe extension is attached to the aft part of the engine and the forward part of the thrust reverser assembly. The tailpipe is tapered so as to direct exhaust gases for the proper thrust during forward thrust operation.

3. Operation

A. The thrust reverser operation is controlled by a thrust reverser control system which is manually operated by manipulation of the reverse thrust lever. The actuating medium is pressurized hydraulic fluid supplied either by the aircraft landing gear down line portion of the A hydraulic system or direct from the A hydraulic system.

B. When reverse thrust operation is selected, with the pressure port on the thrust reverser control valve pressurized, the deploy port on the control valve opens and supplies pressure to the unlock port on the lock actuator, and the deploy port on the thrust reverser actuator. Since less pressure (95 [±45] psig) is required to move the lock actuator piston than is required to move the thrust reverser actuator piston due to the overcenter linkage, the lock actuator piston retracts to the unlock position first. When sufficient pressure (625 [±195] psig) builds up at the thrust reverser actuator, the actuator piston retracts causing the guide carriage to move forward and the doors to open.

C. When forward thrust operation is selected, with the return port on the control valve pressurized, the stow port on the control valve opens, supplying pressure to the lock port on the lock actuator, and the stow port on the thrust reverser actuator. The lock actuator piston extends and positions the lock latch to the closed position. The thrust reverser actuator piston then extends, moving the guide carriage aft and closes the deflector doors. The deflector door mechanically snaps the lock latch into the locked position.

D. See Thrust Reverser Control System for thrust reverser schematics (Ref 78-34-01).

THRUST REVERSER ASSEMBLY - REMOVAL/INSTALLATION

1. General
   A. The thrust reverser is attached to the tailpipe extension aft mounting flange with 42 bolts. The tailpipe extension forward mounting flange is attached to the engine. The reverser is removed and installed at the tailpipe extension aft mounting flange by disconnecting the necessary plumbing and removing the installation bolts. Access to the installation bolts is gained by removing the tailpipe fairings.
   B. For thrust reverser exhaust nozzle configuration and installation refer to step 5.
2. Equipment and Materials

   CAUTION: DO NOT USE CADMIUM-PLATED TOOLS ON TITANIUM COMPONENTS WHICH ARE SUBJECTED TO HIGH TEMPERATURES. CADMIUM REACTS WITH TITANIUM AT HIGH TEMPERATURES AND MAY CAUSE EMBRITTLEMENT AND CRACKS IN TITANIUM PARTS.

   A. Antiseize Compound - Ease-Off 990, Texacone Corp., Dallas, Texas 75207 or equivalent
   B. Cart Assembly - F80101 or equivalent
   C. Sling Assembly - F80110-1 or equivalent
   D. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9, or equivalent
   E. Lever Lock, Thrust Reverser Lever Quadrants - P/N 137-7006
3. Prepare for Removal
   A. Make sure that thrust reverser deflector doors are stowed and locked.
   B. Examine exposed area of exhaust nozzle. Refer to thrust reverser assembly inspection/check for exhaust nozzle crack limitations.
   C. Open the air condition access doors and install the rods.
   D. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.
   E. Install thrust reverser lever lock, P/N 137-7006, on both thrust reverser lever quadrants.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

F. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
G. Remove tailpipe fairings to gain access to forward side of thrust reverser shroud bulkhead (AMM 78-32-162/401).
H. Remove feedback control access panel located on left side of thrust reverser shroud assembly.

4. Remove Thrust Reverser
   A. Disconnect feedback control cable at lower end of thrust reverser feedback control lever (Fig. 401).
   B. Disconnect push-pull cable from shroud bulkhead by removing bolts.
   C. Make sure that feedback mechanism can pass through the shroud bulkhead when the thrust reverser is separated from the tailpipe extension.
   D. Disconnect push-pull cable from brackets on tailpipe extension.
   E. Disconnect proximity sensor electrical line from connector and clamps on shroud bulkhead and cap line.
   F. Disconnect hydraulic stow and deploy lines from fittings on shroud bulkhead and cap hydraulic lines.
   G. Provide support for thrust reverser to assume weight of unit when removing installation bolts.

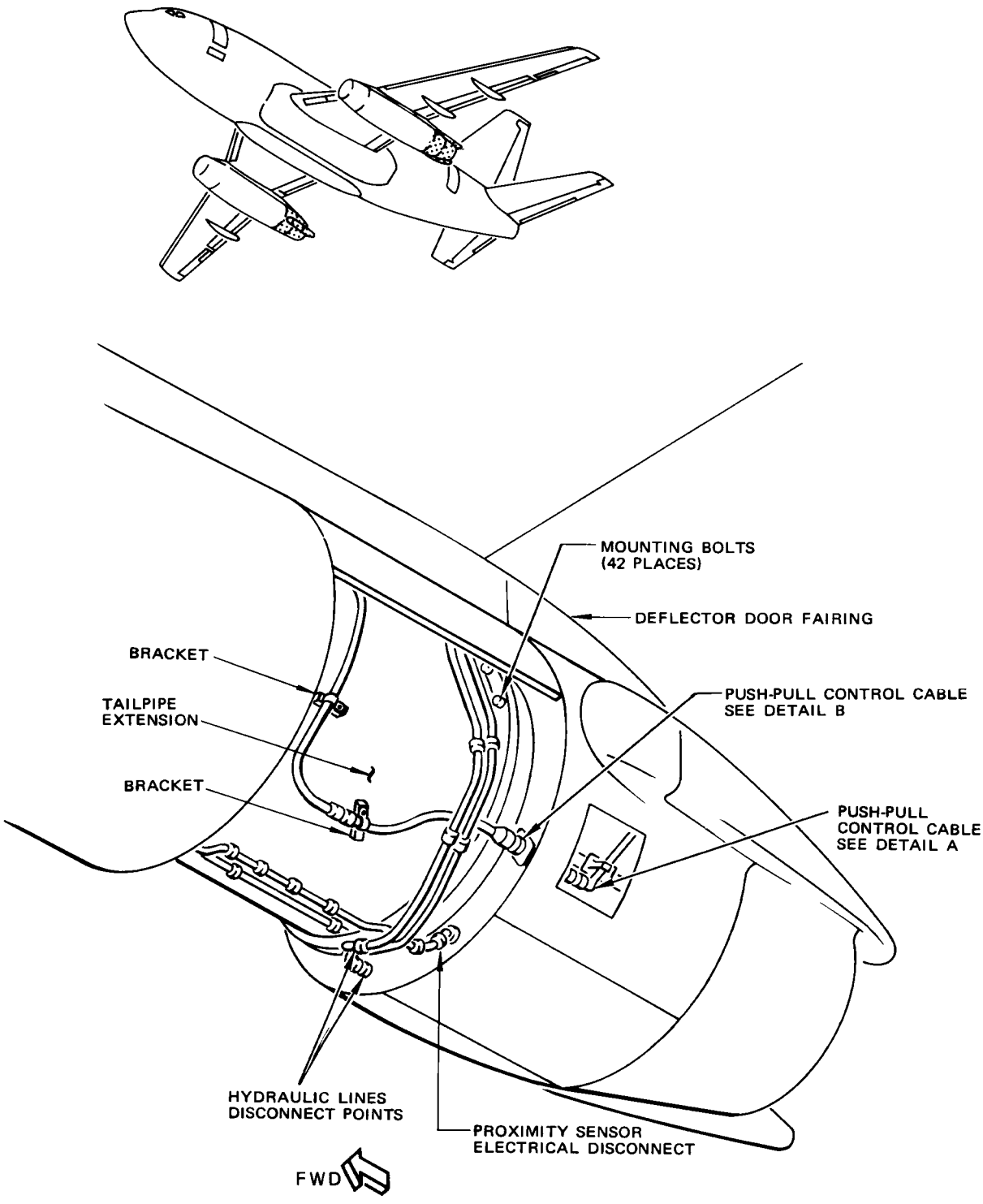
      NOTE: Reverser weighs approximately 392 pounds.

   H. Remove 42 bolts attaching thrust reverser to tailpipe extension aft mounting flange.
   I. Remove thrust reverser assembly.

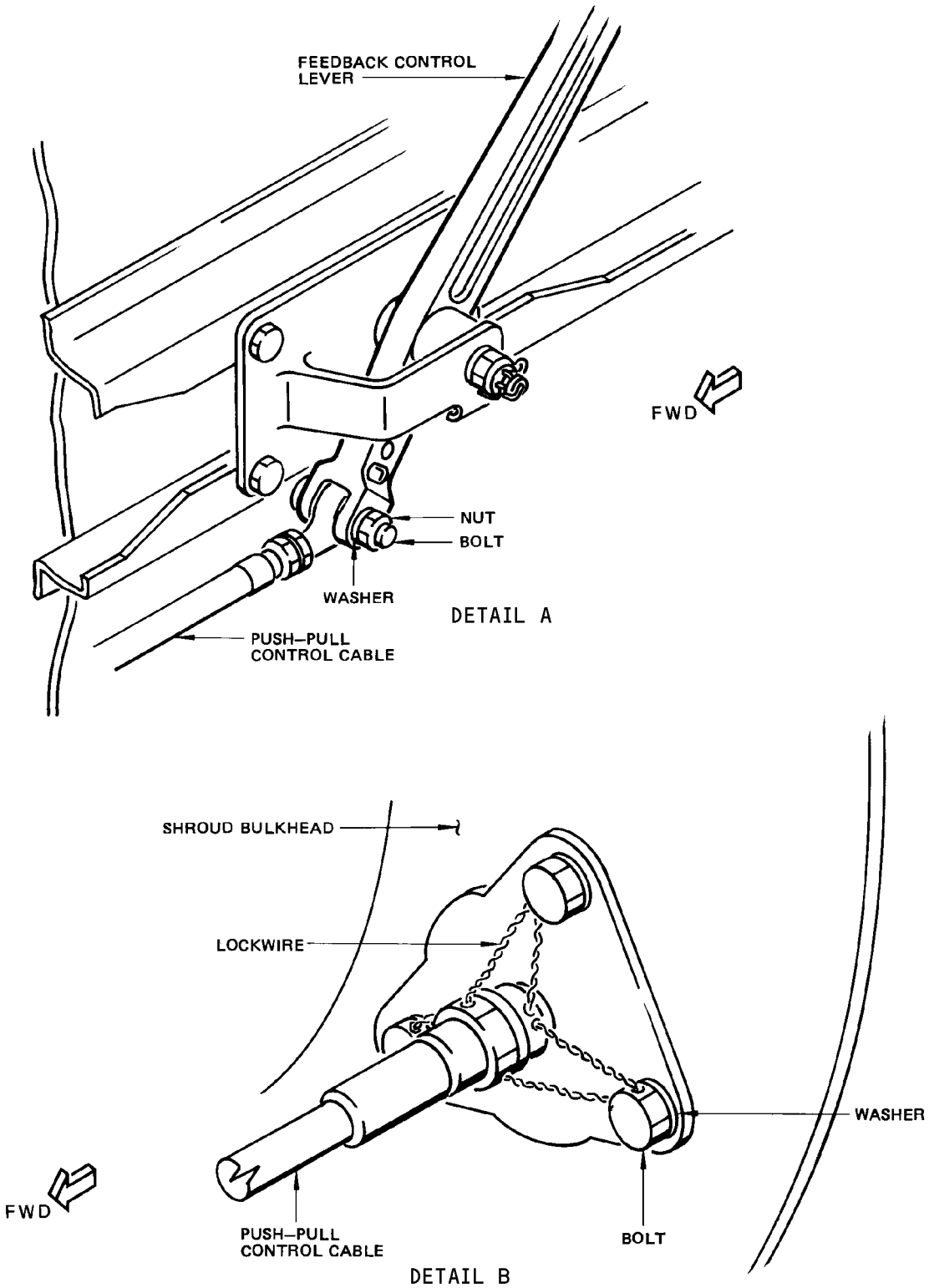
      CAUTION: MOVE THRUST REVERSER IN A HORIZONTAL DIRECTION UNTIL ALIGNMENT PIN AND FEEDBACK CONTROL CABLE ARE DISENGAGED.

5. Install Thrust Reverser
   A. If engine No. 1 reverser is being installed on engine No. 2, or engine No. 2 reverser is being installed on engine No. 1, you must interchange the deflector doors.

      NOTE: Engine No. 1 lower door is interchangeable with engine No. 2 upper door, and engine No. 2 lower door is interchangeable with engine No. 1 upper door.



Thrust Reverser Assembly Installation
Figure 401 (Sheet 1)



Thrust Reverser Assembly Installation
Figure 401 (Sheet 2)

B. Make sure that the reverser exhaust nozzle is the appropriate configuration for the engine model. All JT8D engines except JT8D-17/-17A require a nozzle with an average inside diameter of between 29.829 and 29.919 inches measured at a minimum of four places.

NOTE: Diameter may be determined by circumferential measurement using periphery tape (Norman Collins Co., Escondido, California). All measurements should be made at 60°F.

C. If new reverser is being installed, remove feedback control access panel on left side of shroud assembly.
D. Prior to installation, apply antiseize compound to threaded surface of tube connections only.
E. Position thrust reverser assembly on tailpipe extension (Fig. 401).

CAUTION: ALIGNMENT PIN MUST MATE WITH THE TAILPIPE EXTENSION AT APPROXIMATELY THE 11 O'CLOCK POSITION ON ENGINE NO. 1 REVERSER AND AT APPROXIMATELY THE 9 O'CLOCK POSITION ON ENGINE NO. 2 REVERSER AS VIEWED FROM THE AFT END OF THE ENGINE.

NOTE: The feedback control cable must be fed through the shroud bulkhead before mating the thrust reverser with the tailpipe extension.

F. Attach thrust reverser to tailpipe extension with 42 bolts.
   (1) Bolthead direction is forward.
   (2) Tighten to 130-200 pound-inches.
G. Remove caps from stow and deploy hydraulic lines and connect lines to fittings on shroud bulkhead.
   (1) Tighten the 3/8-inch line fittings to 250-300 pound-inches.
H. Remove cap from proximity sensor electrical line and connect line to electrical connector on shroud bulkhead.
   (1) Install clamps to secure line to shroud bulkhead.
I. Connect push-pull cable to shroud bulkhead and lockwire (Fig. 401).
J. Attach push-pull cable to brackets on tailpipe extension with clamps.
   (1) When you hold the tailpipe extension, wear clean white cotton gloves to protect the Skydrol resistant coating.

K. Connect feedback control cable to lower end of thrust reverser feedback control lever and check the rigging (AMM 78-34-32/501).
L. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
M. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves, and check operation of thrust reverser (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

N. Actuate deflector doors through five cycles to remove entrapped air from thrust reverser lines and actuators. Check for leaks.
O. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

P. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
Q. If new reverser was installed, install deflector door fairing on deflector door (AMM 78-32-162/401).

6. Restore Airplane to Normal
A. Attach feedback control access panel to left side of thrust reverser shroud assembly.
B. Install tailpipe fairings (AMM 78-32-162/401).
C. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
D. Stow the rods and close the air condition access doors.
E. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

THRUST REVERSER ASSEMBLY - INSPECTION/CHECK

1. General
   A. This section covers only the inspection and check of the thrust reverser exhaust nozzle.
2. Thrust Reverser Exhaust Nozzle Inspection
   A. Equipment and Materials
      (1) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9.
   B. Examine Thrust Reverser Exhaust Nozzle
      (1) Place deflector doors in the reverse thrust position (AMM 78-32-01/501).

          WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED, TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

      (2) Open the air condition access doors and install the rods.
      (3) Deactivate the thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

          WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

      (4) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
      (5) Examine thrust reverser exhaust nozzle for cracks.
      (6) If cracks are found in the thrust reverser nozzle, it may continue in service until the next overhaul providing:
          (a) No single crack exceeds 10 inches in length.
          (b) Any combination of cracks does not exceed 15 inches total length.

              NOTE: If two adjacent cracks are within 1 inch of each other, they should be regarded as a single crack and their combined length should not exceed 10 inches.

          (c) All cracks are stop drilled 1/8 inch diameter immediately after being discovered.
          (d) Reversers known to have cracks are inspected at intervals of approximately 100 hours but not exceeding 150 hours until a permanent repair has been accomplished per standard overhaul procedures (OHM 78-30-12).
      (7) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

(8) Stow the rods and close the air condition access doors.
(9) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

DEFLECTOR DOOR - REMOVAL/INSTALLATION

1. General
   A. The thrust reverser deflector doors are removed by placing the doors in the reverse thrust position and disconnecting linkages at four points.
   B. The upper door has a detachable fairing which is not part of the door assembly. If a new door is to be installed, this fairing must be removed from the old door and installed on the new door.
   C. Interchangeable Doors
      (1) The LH upper door is interchangeable with the RH lower door.
      (2) The RH upper door is interchangeable with the LH lower door.
2. Equipment and Materials
   A. Lubricant - MIL-L-23398 Type 2
   B. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
3. Remove Deflector Doors
   A. Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

      WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED, TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

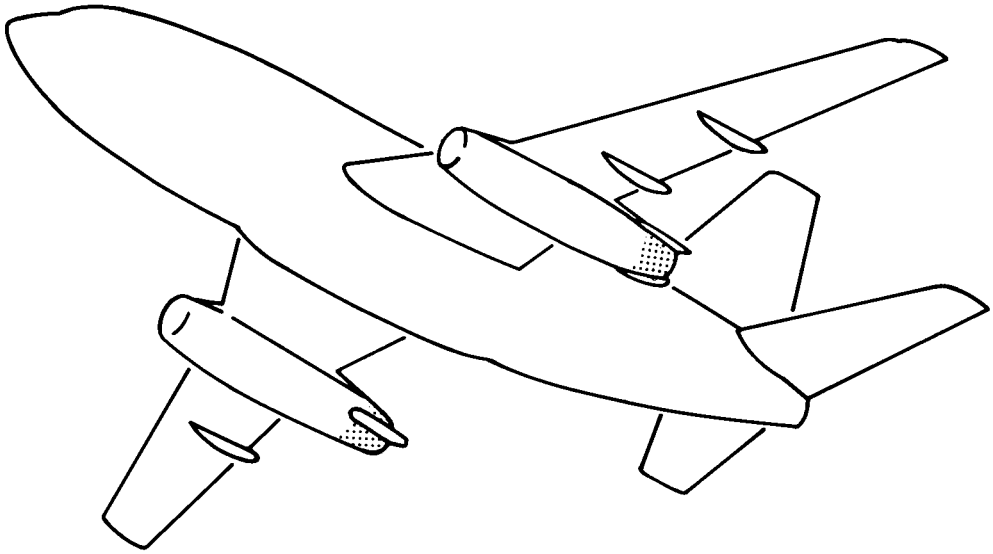
   B. Open the air conditioning bay access doors and install the rods.
   C. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

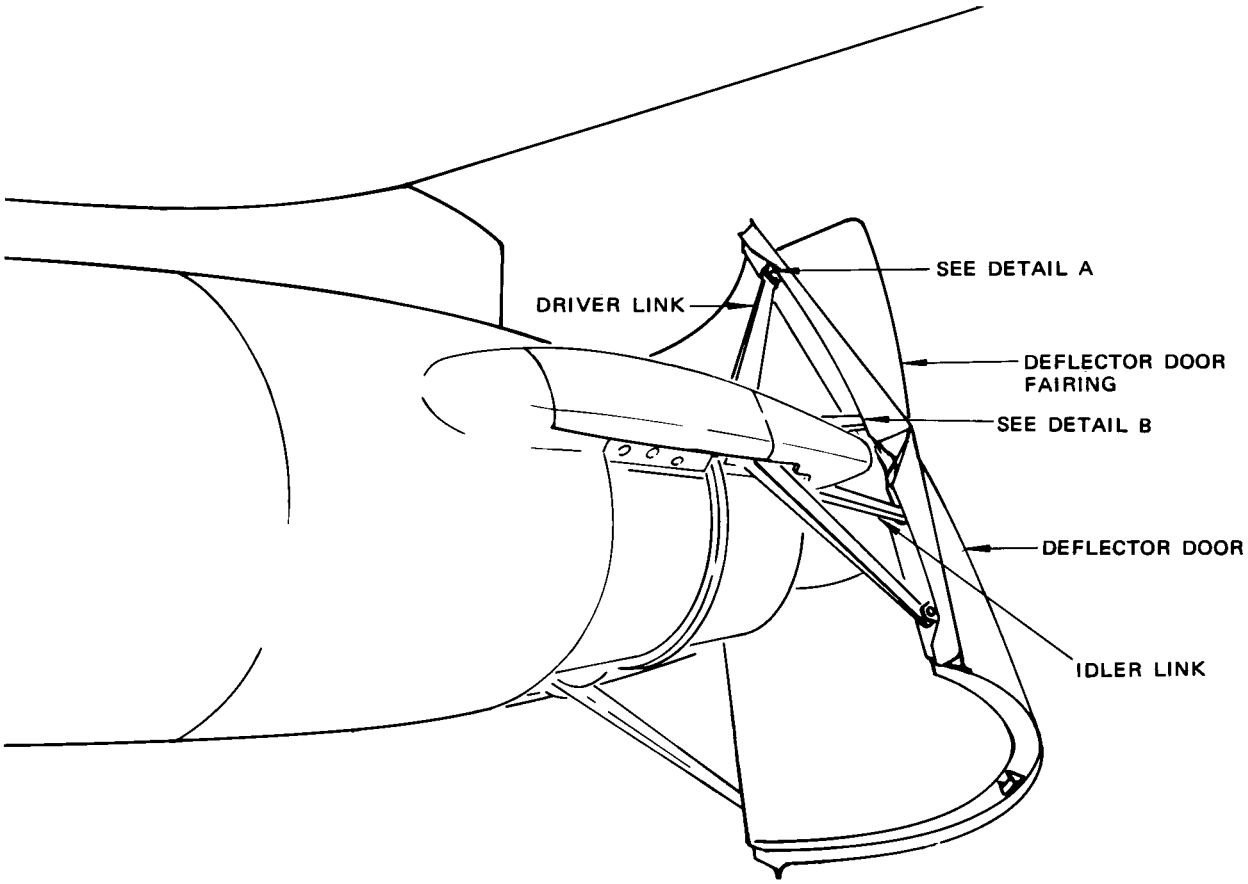
      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   D. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and a attach a DO-NOT-CLOSE tag.
   E. Remove the deflector door from the thrust reverser.
      (1) Remove the nuts, washers and bolts that connect the idler links to the deflector door (Fig. 401).
      (2) Remove the cotter pins, nuts, washers and bolts that connect the driver links to deflector door.
      (3) Carefully remove the deflector door from the thrust reverser.
   F. If new doors are to be installed, remove the deflector door fairing from the upper door and save for the installation (AMM 78-32-162/401).
4. Install Deflector Doors

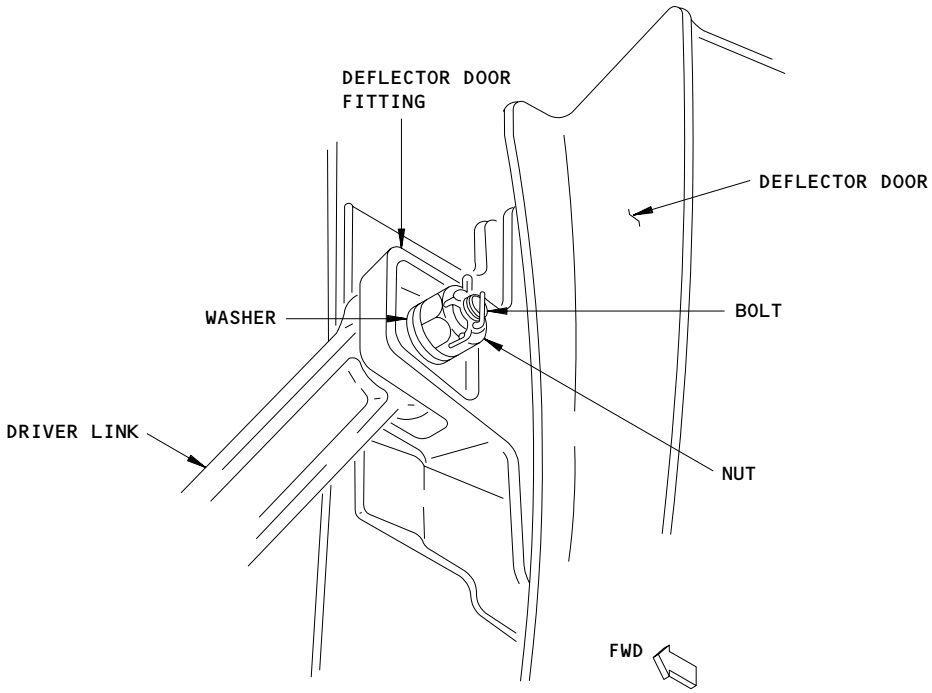
   CAUTION: YOU MUST OBEY THE INTERCHANGEABLE DOOR REQUIREMENTS. MISLOCATED DEFLECTOR DOOR(S) MAY CAUSE ENGINE COMPRESSOR STALLS DURING OPERATION IN REVERSE THRUST.

   A. Apply thin film of lubricant to bearings on driver and idler links.
   B. Position deflector door on thrust reverser.

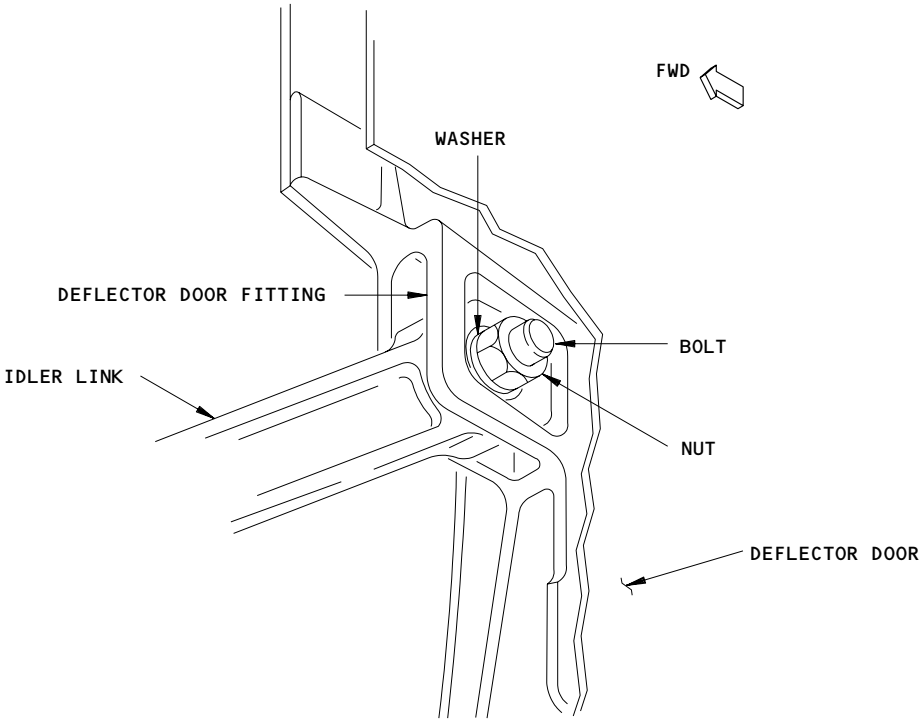




Deflector Door Installation
Figure 401 (Sheet 1)



DETAIL A



DETAIL B

Deflector Door Installation
Figure 401 (Sheet 2)

C. Attach the deflector door to the driver links with bolts, washers and nuts (Fig. 401).

NOTE: The direction of the bolthead is optional.

(1) Tighten the nut to 95-110 pound-inches and install cotter pin.
(2) Do not loosen the nut to install the cotter pin.
(3) If necessary, tighten the nut to a maximum of 240 pound-inches to install the cotter pin.

D. Attach the deflector door to the idler links with bolts, washers and nuts.
(1) Tighten the nut to 160-190 pound-inches.
(2) Make sure the bolthead points to the engine.

E. If new doors are being installed, install the deflector door fairing on the upper door (AMM 78-32-162/401).

F. Do the thrust reverser lock adjustment (AMM 78-32-142/501).

5. Restore Airplane to Normal

A. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

NOTE: It is not necessary to close the air conditioning bay access doors at this time.

B. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

C. Place the deflector doors in forward thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

D. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

E. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and a attach a DO-NOT-CLOSE tag.

F. Adjust the deflector doors (AMM 78-32-112/501).

G. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
H. Stow the rods and close the air conditioning bay access doors.
I. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

DEFLECTOR DOORS - ADJUSTMENT/TEST

1. General
   A. The adjustment of the deflector door consists of a check to determine that the forward edge of the door fairs with the thrust reverser assembly within specified limits and adjustment of door stops and idler link stops. The deflector door operating condition is determined by performing a test of the thrust reverser operation (AMM 78-32-01/501).
2. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
3. Deflector Door Adjustment
   A. Open the air conditioning bay access doors and install the rods.
   B. With thrust reverser in the stow position, deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   C. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   D. Remove the screws that attach the actuator housing fairing to the thrust reverser and remove the fairing.
   E. Measure the fair at the forward edge of the deflector door with thrust reverser assembly (Fig. 501).
      (1) The fair (or step) must be within +0.03/-0.04 inch.
   F. If doors do not fair within limits, adjust as follows:
      (1) Adjust door stops with washers to obtain specified limits.

          NOTE: Each deflector door has four (4) adjustable stops which must be positioned during rigging operation. Figure 501 shows location of adjustable devices.

      (2) Adjust idler link stops.
          (a) Adjust the idler link stops to get a maximum interference between the plates and the idler links of 0.003 to 0.005 inch.

(b) Make sure the gap between the nozzle and deflector door with bumpers installed is a minimum of 0.10 inch.

(3) Activate thrust reverser hydraulic system; remove the ground locks from both thrust reverser isolation valves.

NOTE: It is not necessary to stow the rods and close the air conditioning bay access doors at this time.

(4) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

(5) Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

(6) With thrust reverser in the reverse thrust position, deactivate thrust reverser hydraulic system; install ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

(7) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.

(8) Adjust the number of washers under the door stops to get the fair that was indicated in the previous step.

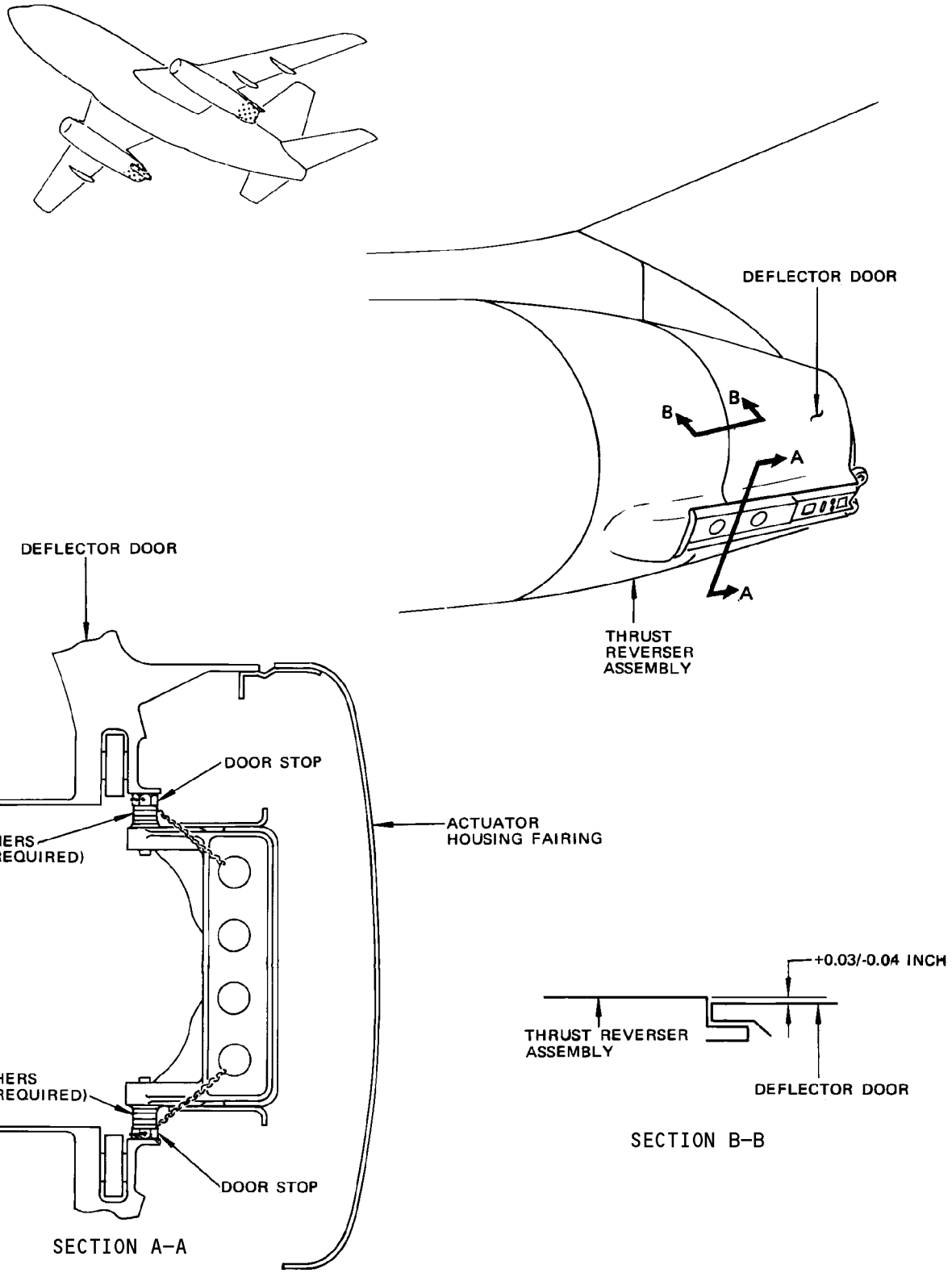
(9) Activate thrust reverser hydraulic system; remove the ground locks from both thrust reverser isolation valves.

NOTE: The air conditioning bay access doors remain open.

(10) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

(11) Place the deflector doors in the forward thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.



Deflector Door Adjustment
Figure 501

G. With thrust reverser in the in the forward thrust position, deactivate thrust reverser hydraulic system; install ground locks on both thrust reverser isolation valves.

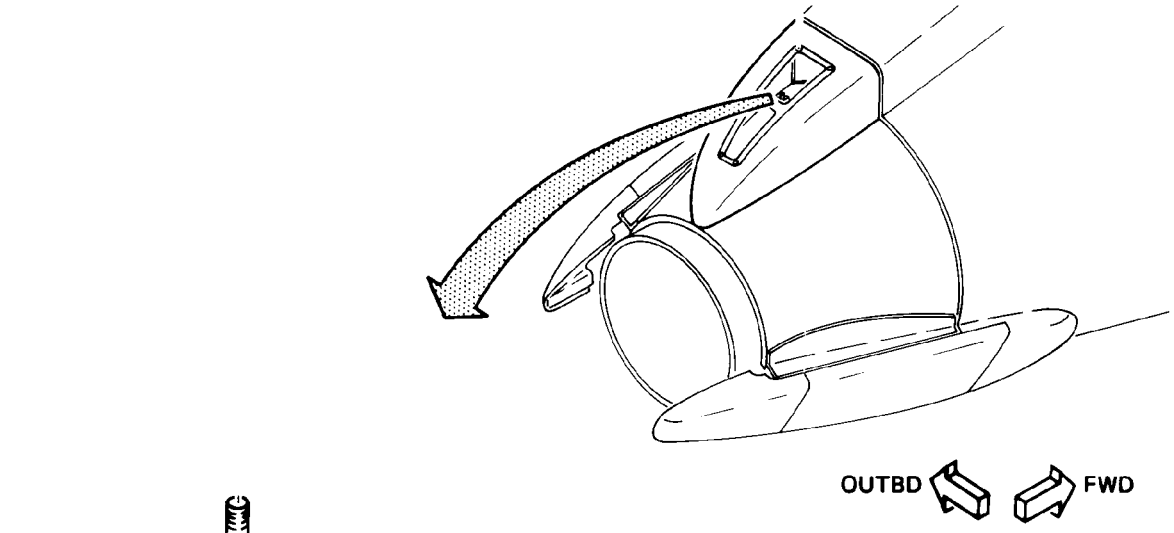
NOTE: The air conditioning bay access doors remain open.

H. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
I. Do a check of the door fair with thrust reverser assembly in the forward thrust position to make sure the door fair is in the limits.
J. Do a check of the thrust reverser linkage adjustment (AMM 78-32-201/501).
K. Put the actuator housing fairing in position on the thrust reverser and attach with screws.
L. Activate the thrust reverser hydraulic system; remove the ground locks from both thrust reverser isolation valves.
M. Stow the rods and close the air conditioning bay access doors.
N. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

DEFLECTOR DOOR - APPROVED REPAIRS

1. General
   A. The studs and spacers mounted on the deflector doors are retained by a nutplate sandwiched between outer and inner deflector door skins. As the nutplate is inaccessible, a special method of repair is required to replace the nutplate without removing the door skins.
2. Repair Deflector Door
   A. Enlarge hole in deflector door skin to .343/.350-inch diameter. Enlarge the two rivet holes to .128 inch. (See detail A, figure 801.)
   B. Rework a NAS680C3 nutplate by enlarging rivet holes to .128 inch.
   C. Attach a piece of safety wire to nutplate and insert nutplate through hole; align rivet holes and install two CR2562S-4 rivets.

      NOTE: When a CFA18-3-14 screw is installed on a lower door that has been repaired using the above method, screw will protrude .037 inch above skin line. This is acceptable on a repair installation.



Deflector Door Nutplate Replacement
Figure 801

THRUST REVERSER ACTUATORS - REMOVAL/INSTALLATION

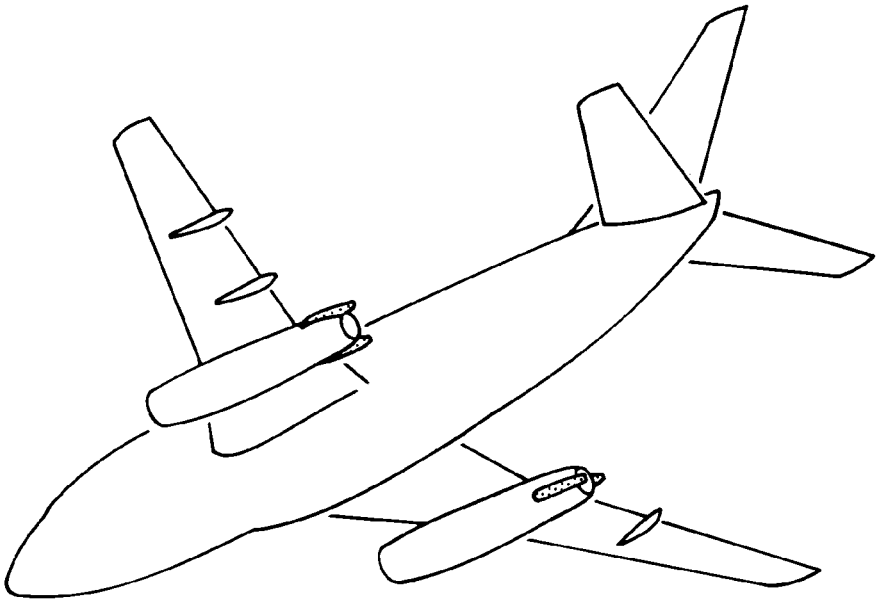
1. Equipment and Materials
   A. Lubricant - MIL-G-81322
   B. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
2. Prepare for Removal
   A. Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

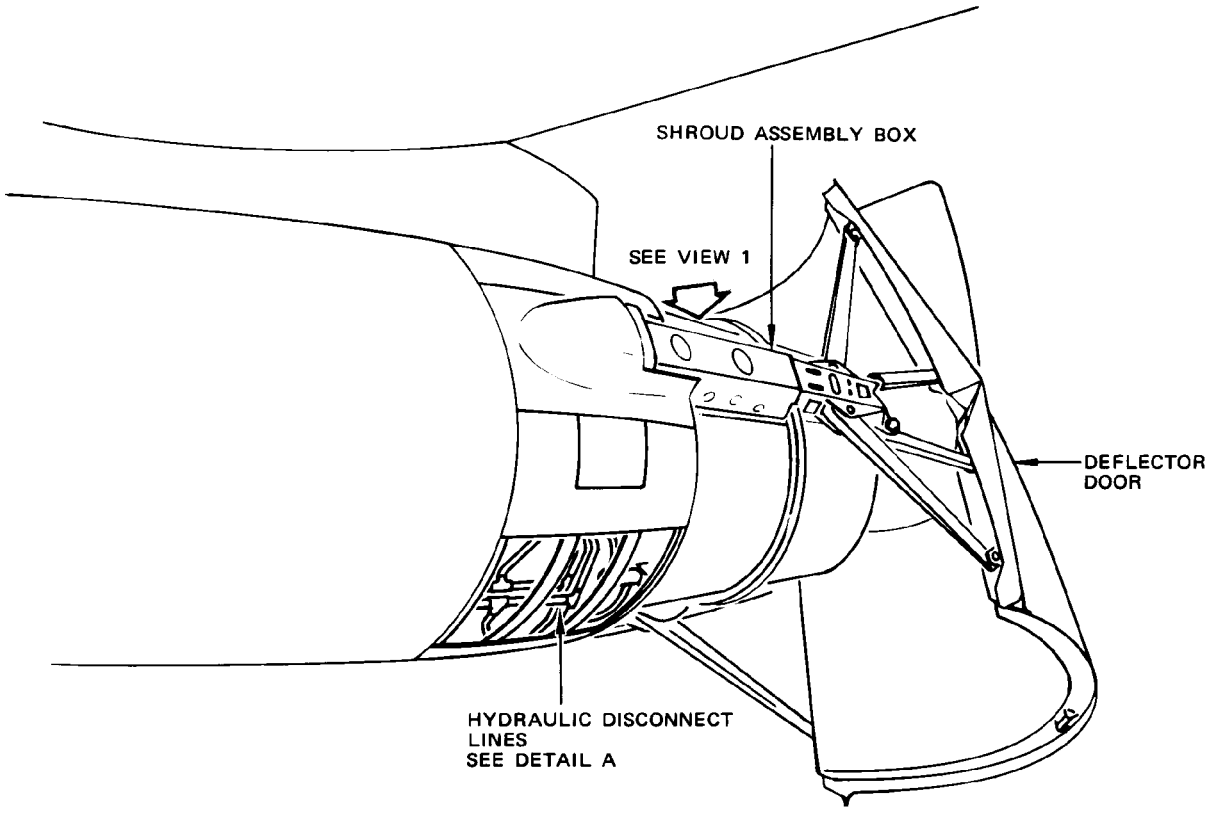
      WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

   B. Open the air conditioning bay access doors and install the rods.
   C. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

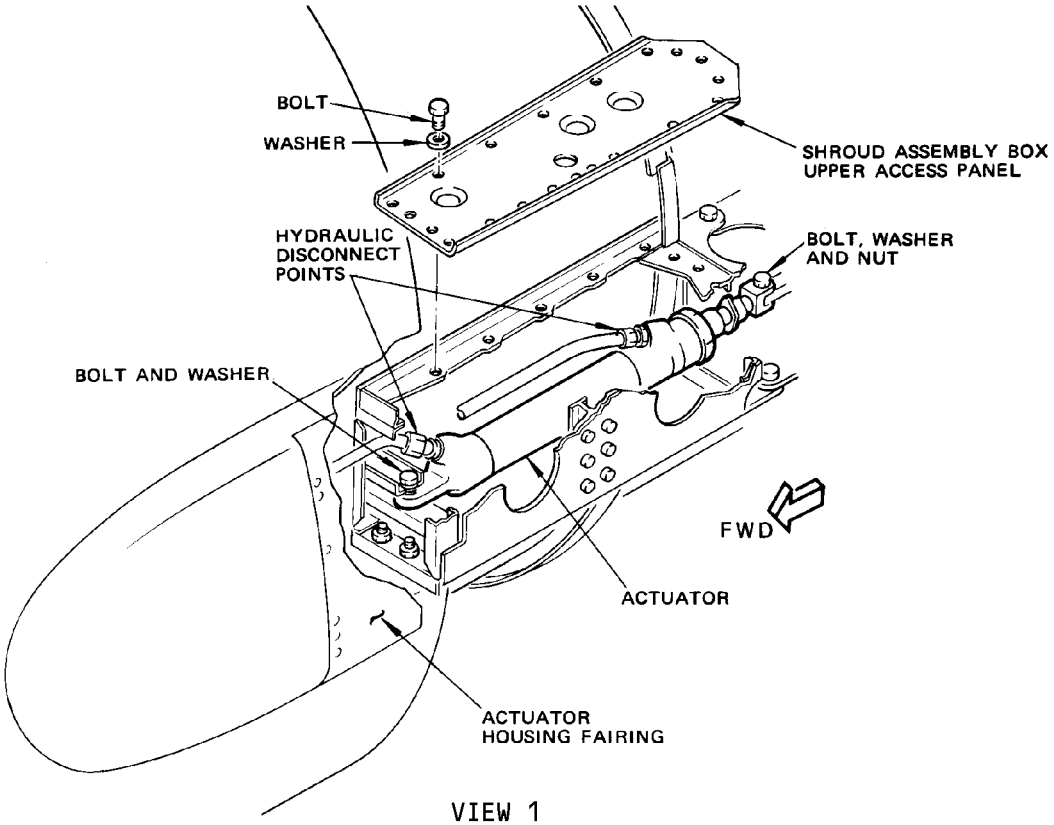
      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   D. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   E. Remove screws attaching actuator housing fairing to thrust reverser and remove fairing.
   F. Remove bolts and washers attaching upper panel to shroud assembly box.
   G. Remove lower access panel to gain access to hydraulic disconnect points.
   H. Remove the feedback control rod (AMM 78-34-32/401).
3. Remove Thrust Reverser Actuators
   A. Disconnect forward end of hydraulic stow line at the tee and cap line. Access to disconnect point is through the lower access panel opening (Fig. 401).
   B. Disconnect forward end of hydraulic deploy line at union and cap line.
   C. Disconnect hydraulic lines at the actuator ports and remove lines.
   D. Remove bolt and washer securing actuator to support bracket.
   E. Remove bolt, washers and nut connecting actuator rod to guide carriage.
   F. Remove thrust reverser actuator and plug actuator ports.
4. Install Thrust Reverser Actuators
   A. Apply thin film of lubricant to actuator bearing.
   B. Remove plugs from actuator ports and position actuator inside shroud assembly box (Fig. 401).
   C. Attach actuator to support bracket with bolt and washer. Torque bolt to 450-500 pound-inches.
   D. Attach actuator rod to guide carriage with bolts, washers and nut. Torque to 160-190 pound-inches.
   E. Position hydraulic lines on thrust reverser and connect lines to actuator ports.

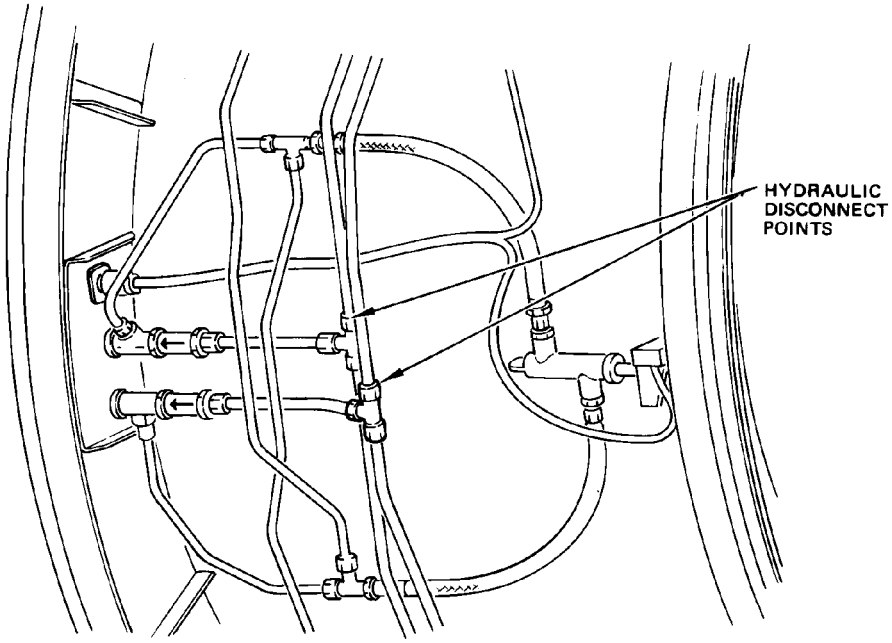




Thrust Reverser Actuator Installation
Figure 401 (Sheet 1)



VIEW 1



DETAIL A

Thrust Reverser Actuator Installation
Figure 401 (Sheet 2)

F. Remove caps from hydraulic lines and connect forward end of stow line to tee and forward end of deploy line to union. Torque fittings to 260-280 pound-inches.
G. Install the feedback control rod (AMM 78-34-32/401).
H. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
I. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

NOTE: It is not necessary to stow the rods and close the air conditioning bay access doors at this time.

J. Cycle thrust reverser through 5 cycles to remove entrapped air from hydraulic lines and actuators (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

(1) Do a check for hydraulic fluid leakage.
(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.
(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

TRAS Actuator Leakage Limit:	
Normal Operation Limits	Dispatch Limits to Avoid Delay
8 drops per minute (stopped or in operation)	60 drops per minute (stopped or in operation)

K. Do a check of the thrust reverser rigging (AMM 78-32-01/501).
L. Deactivate the thrust reverser hydraulic system by installing ground locks in both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

M. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.

5. Restore Airplane to Normal
A. Position upper panel on shroud assembly box and attach with bolts and washers. Torque to 50-70 pound-inches.
B. Attach actuator housing fairing to thrust reverser with screws.
C. Install lower access panel.

D. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
E. Stow the rods and close the air conditioning bay access doors.
F. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

THRUST REVERSER LOCK - REMOVAL/INSTALLATION

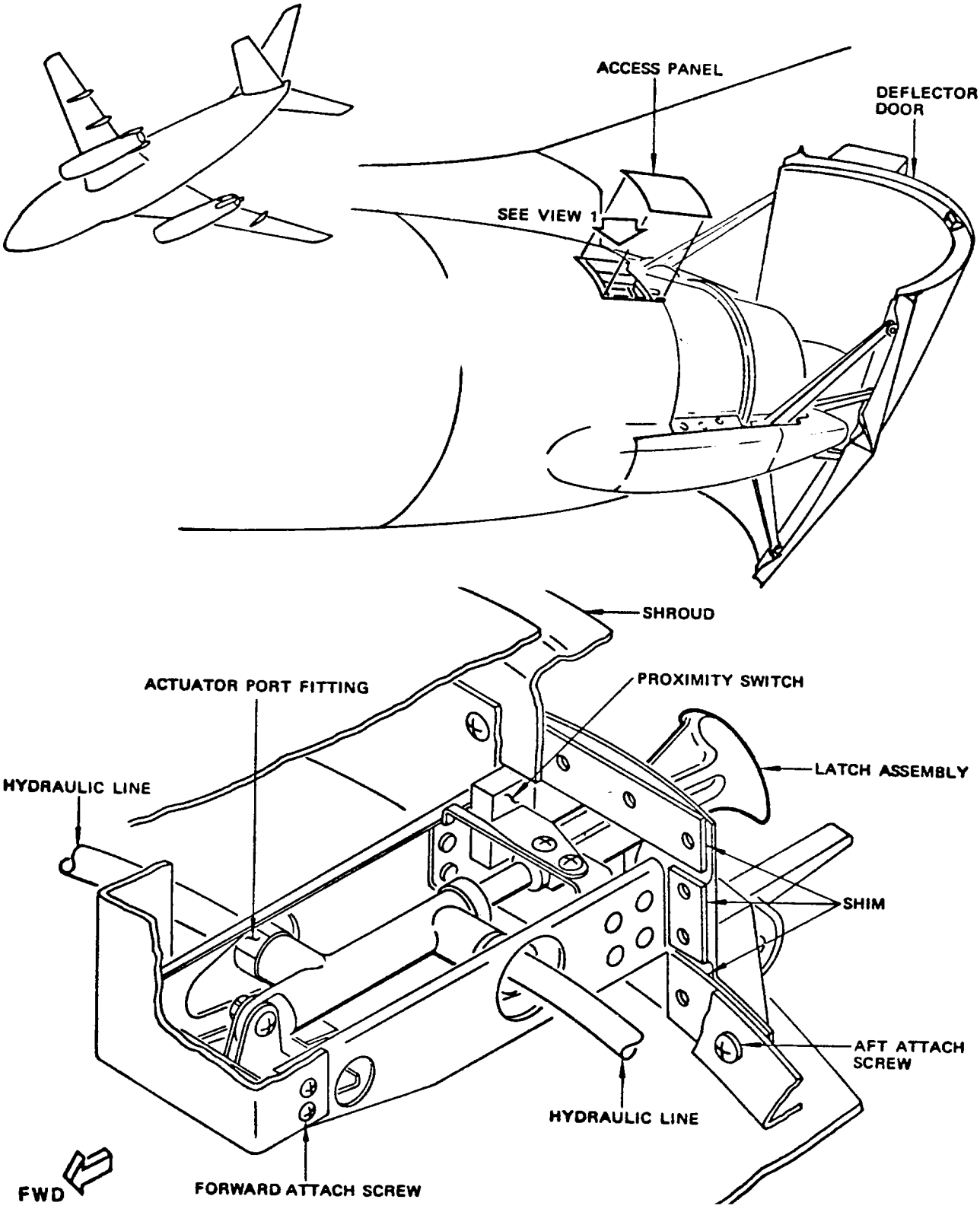
1. Equipment and Materials
   A. Antiseize Compound - MIL-L-25681
   B. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent
2. Prepare for Removal
   A. Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

   B. Open the air conditioning bay access doors and install the rods.
   C. Deactivate thrust reverser hydraulic system; install ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   D. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   E. Remove the access panel.
3. Remove Thrust Reverser Lock
   A. Disconnect hydraulic lines from actuator and cap lines (Fig. 401).
   B. Remove union fittings from actuator ports.
   C. Remove screws attaching proximity switch to latch support and remove switch.
   D. Remove screws, nuts and washers securing forward end of lock assembly to shroud.
   E. Remove screws, nuts, and washers securing aft end of lock assembly to shroud assembly bulkhead.
   F. Remove lock assembly from thrust reverser.
4. Install Thrust Reverser Lock
   A. Apply Antiseize Compound - MIL-L-25681 to all threaded surfaces.
   B. Position the lock assembly inside the thrust reverser shroud (Fig. 401).
   C. Attach forward end of lock assembly to shroud with screws, washers and nuts. Torque to 20-25 pound-inches.
   D. Attach aft end of lock assembly to shroud bulkhead with screws, nuts and washers. Torque to 20-25 pound-inches.
   E. Install the proximity switch (AMM 78-36-12/401).
   F. Install union fittings and O-rings to actuator ports and torque to 130-150 pound-inches.
   G. Remove caps from hydraulic lines and connect lines to actuator. Torque to 130-150 pound-inches.



Thrust Reverser Lock Installation
Figure 401

H. Activate the thrust reverser hydraulic system; remove the ground locks from both thrust reverser isolation valves.

NOTE: It is not necessary to stow the rods and close the air conditioning bay doors at this time.

I. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
J. Operate the thrust reverser through five cycles and check for leaks (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

5. Put the Airplane Back to the Usual Condition
   A. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   B. Deactivate thrust reverser hydraulic system; install ground locks on both thrust reverser isolation valves.
   C. Install the access panel.
   D. Activate the thrust reverser hydraulic system; remove the ground locks from both thrust reverser isolation valves.
   E. Stow the rods and close the air conditioning bay doors.
   F. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

THRUST REVERSER LOCK - ADJUSTMENT/TEST

1. Thrust Reverser Lock Adjustment
   A. Do a check that the deflector doors are correctly adjusted and that they fair with shroud as specified (AMM 78-32-112/501).
   B. Measure and make a record of the gap between the deflector door exterior surface and the shroud exterior at the latch bar.
   C. Initiate reverse thrust to open deflector doors.
   D. Open the air conditioning bay access doors and install the rods.
   E. Remove hydraulic pressure by inserting ground locks on thrust reverser isolation valves.
   F. Open the applicable THRUST REVERSER circuit breakers on the P6 panel and attach DO-NOT-CLOSE tags.
   G. To eliminate possible hydraulic interference in lock, manually extend upper and lower lock actuators.
   H. Manually close both deflector doors until latch and latch bar engage, then pull deflector doors toward open position until latch and latch bar make contact.
   I. Measure and make a record of the gap between shroud exterior and the exterior surface of deflector doors (Fig. 501).
   J. Compare the measurements obtained in the previous two steps; the difference should not be greater than 0.120 inch for each door.
   K. No minimum clearance between latch and latch bar is required, provided the latch fitting travels freely.
   L. If the difference between the measurements obtained in the previous steps are greater than 0.120 inch for each door, adjust the latch fitting vertically.
      (1) Do not exceed a maximum gap dimension of 0.120 inch between the latch and the latch bar (Fig. 501).
      (2) Do the latch fitting adjustment as follows:
         (a) Before you loosen the attach bolts, index the position of latch fitting on serrated retaining plate.
         (b) Loosen the four bolts that attach the latch fitting to the forward flange of deflector door.
         (c) Adjust the latch fitting on the retaining plate.

            NOTE: The serrations on the back of fitting engage the serrations on the retaining plate to hold the fitting in the position selected (Fig. 502).

            1) Adjust the fitting one serration at a time.

2) If the slotted holes in the latch fitting are not long enough to maintain the maximum gap dimension, the slot length may be increased one serration.

(d) Tighten the four latch fitting bolts to 90-125 pound-inches.

2. Restore Airplane to Normal

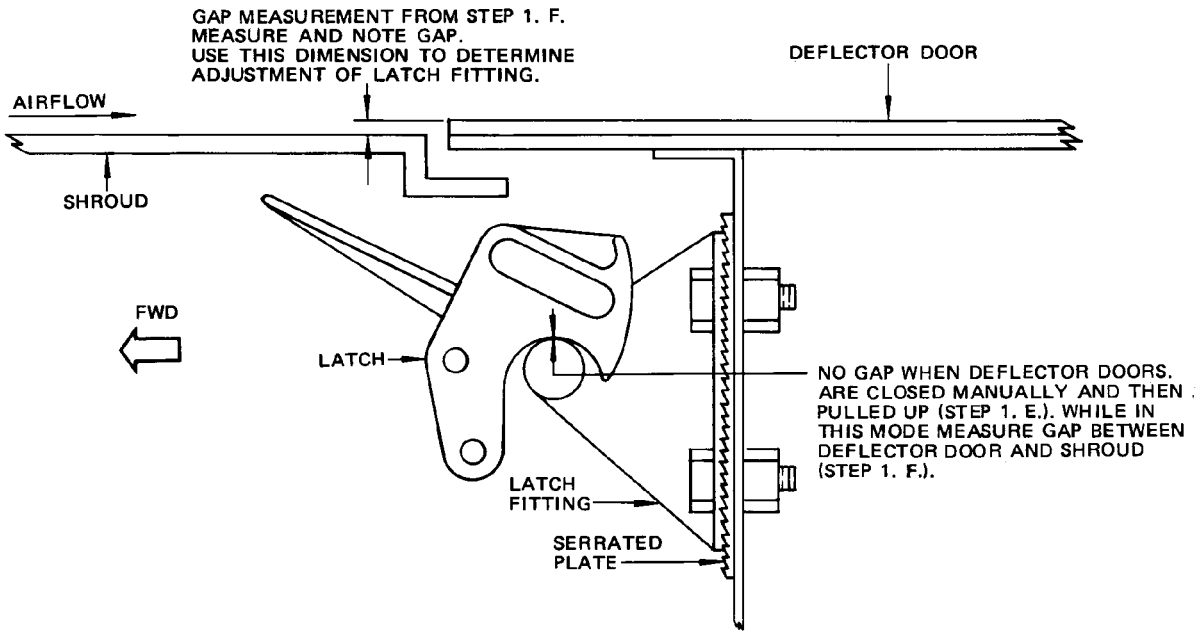
A. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

B. Stow the rods and close the air conditioning bay access doors.

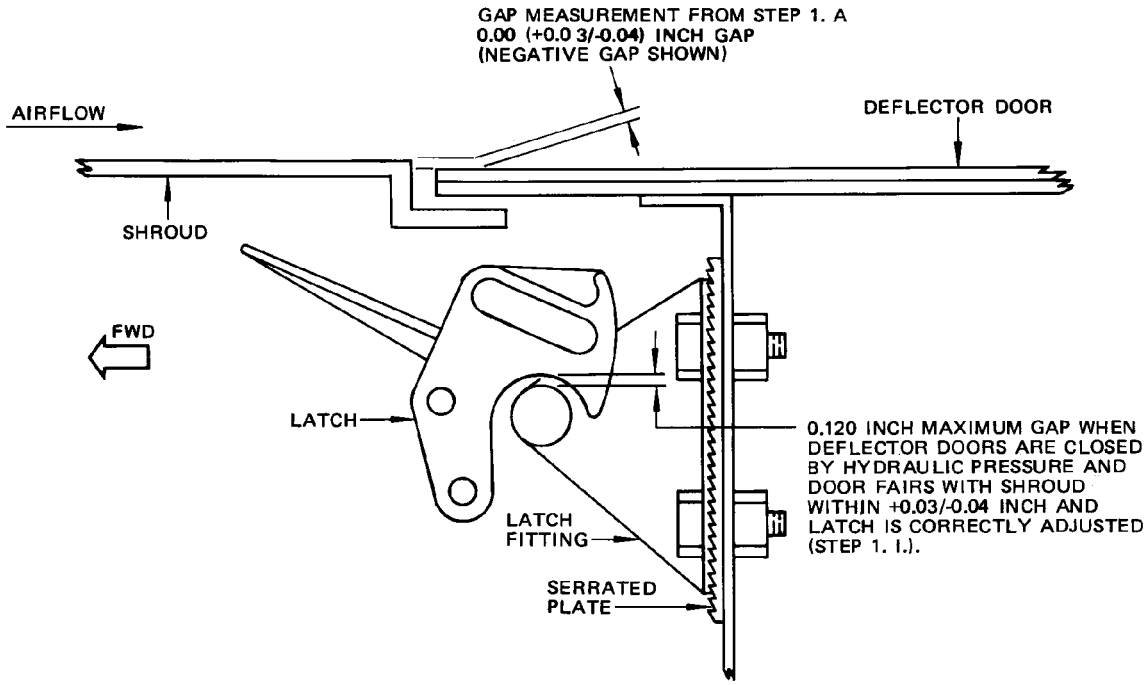
C. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

Examples of Difference Calculations

Dimension obtained from step F	+0.13	
Dimension obtained from step A-	(+0.03)	
	0.10	Gap between latch and latch bar (no lock adjustment required).
Dimension obtained from step F	+0.06	
Dimension obtained from step A-	(-0.04)	
	0.10	Gap between latch and latch bar (no lock adjustment required).
Dimension obtained from step F	+0.13	
Dimension obtained from step A-	(-0.03)	
	0.16	Gap between latch and latch bar (adjustment is required to bring this dimension to 0.12 or less).

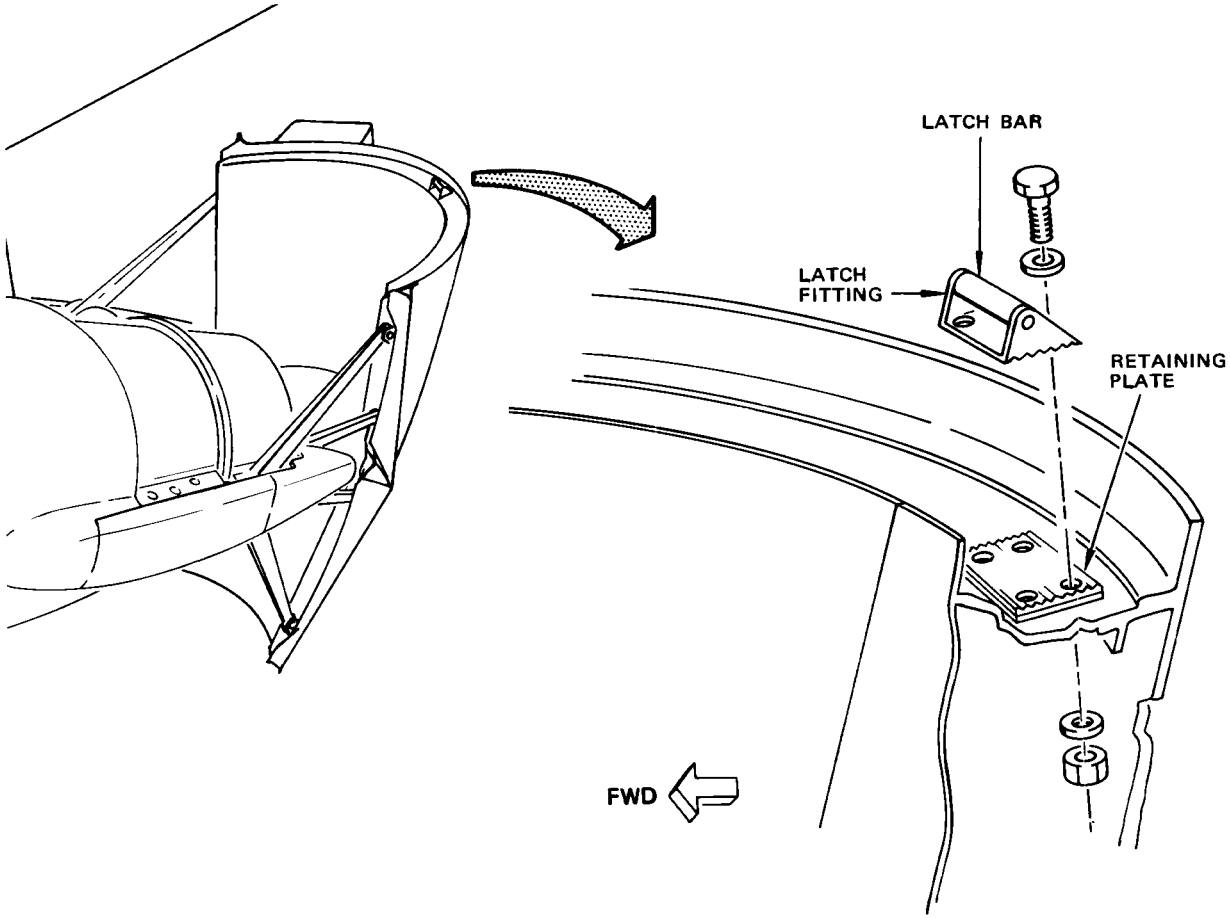


CHECKING THRUST REVERSER LOCK ADJUSTMENT



VIEW OF THRUST REVERSER LOCK ADJUSTED CORRECTLY

Thrust Reverser Lock Adjustment
Figure 501



Thrust Reverser Lock Latch Fitting
Figure 502

THRUST REVERSER FAIRING - REMOVAL/INSTALLATION

1. General
   A. This section covers the removal and installation procedures for the deflector door fairing, the tailpipe fairings and the thrust reverser fixed fairing.
   B. The deflector door fairing is attached to the upper deflector door only.
   C. The fixed fairing is attached to the tailpipe extension.
   D. The tailpipe fairings are connected to the fixed fairing with three hinges.
2. Deflector Door Fairing Removal
   A. Equipment and Materials
      (1) Antiseize Compound - MIL-L-25681
      (2) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
      (3) Thrust Reverser Deflector Door Fairing Spacer Gage - F80215-1
   B. Remove Deflector Door Fairing
      (1) Open the air conditioning bay access doors and install the rods.
      (2) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

          WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

      (3) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
      (4) Remove screws attaching access panel to fairing and remove panel (Fig. 401).
      (5) Remove nuts (1, detail D), washers (2), serrated plates (3) and spacers (4) attaching door fairing to upper deflector door.
      (6) Remove deflector door fairing.
      (7) If required to remove studs (5), proceed as follows:
          (a) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

(b) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
(c) Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

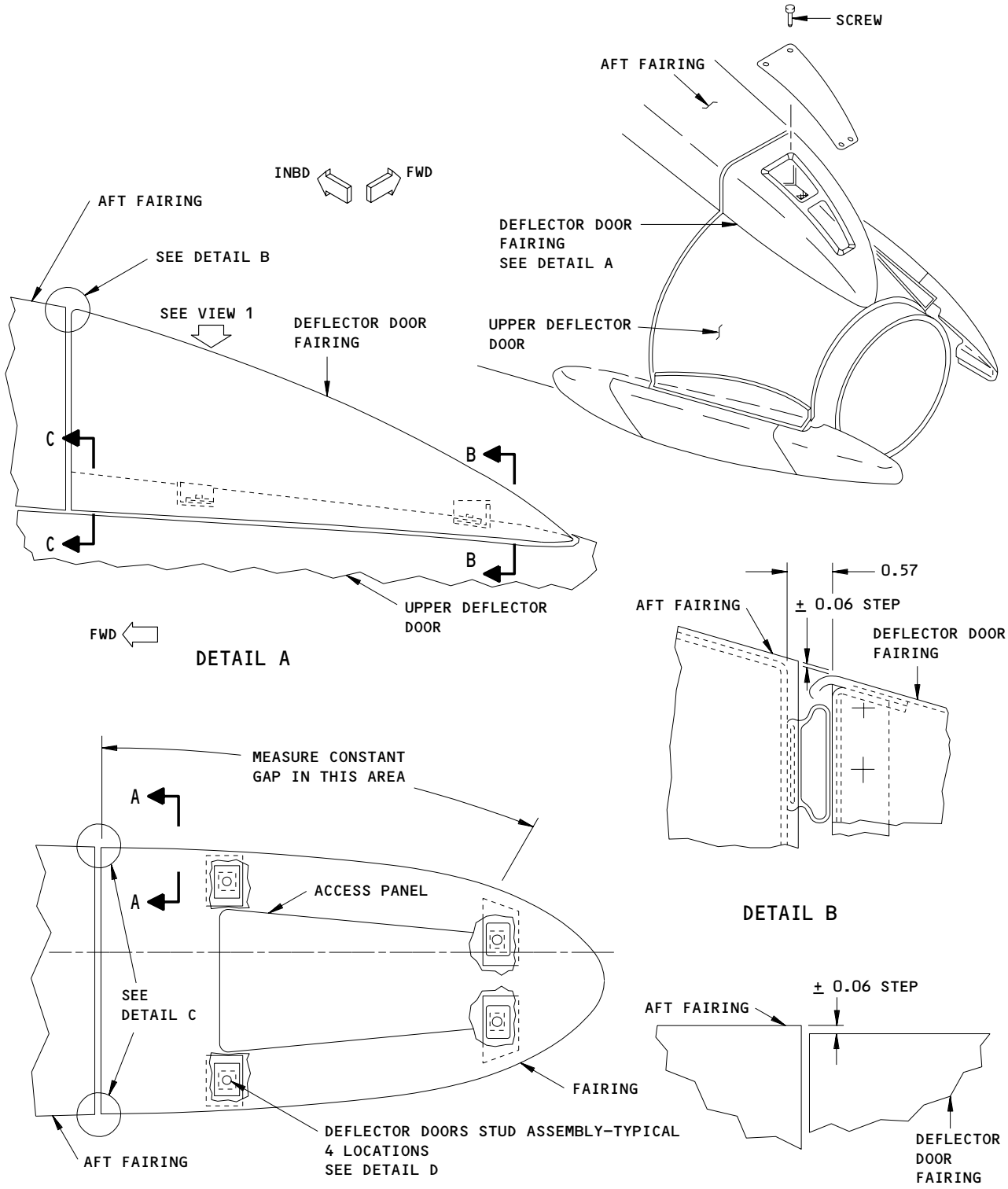
(d) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

(e) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(f) Remove nuts (10), screws (6), washers (7 and 9), spacers (8) and studs (5) from deflector door.

3. Deflector Door Fairing Installation
A. Install Deflector Door Fairing
(1) Apply Antiseize Compound - MIL-L-25681 to all threaded surfaces and nut and washer bearing surfaces.
(2) If studs (5, Detail D, Fig. 401), have been removed from deflector door, install each stud as follows:
(a) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(b) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
(c) Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

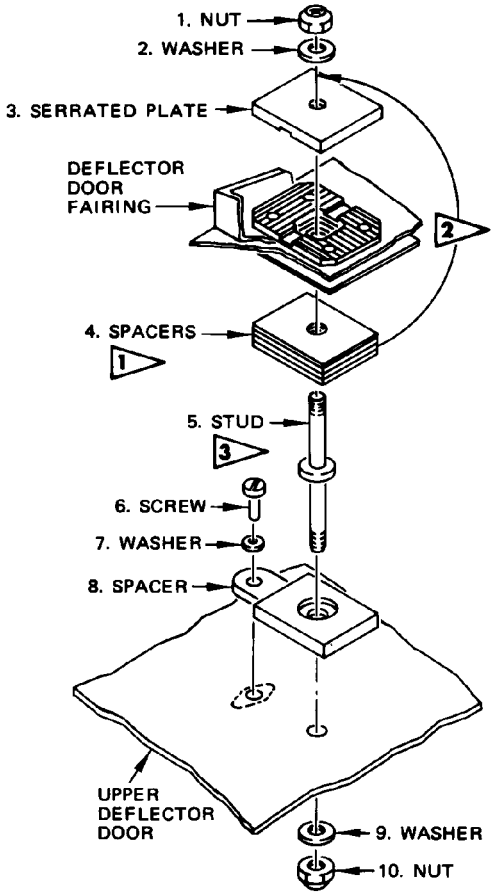
WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.



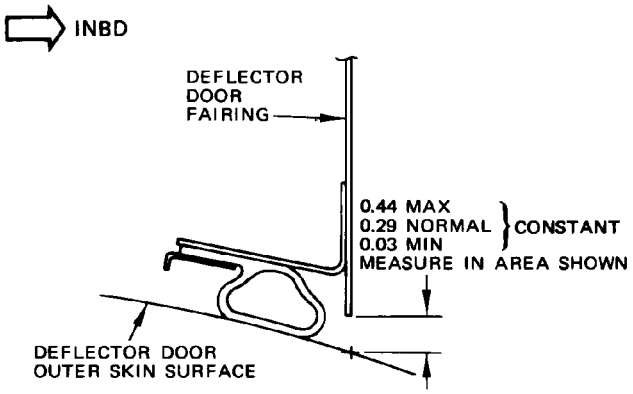
Deflector Door Fairing Installation
Figure 401 (Sheet 1)

1. 173-1162-503 SPACER USED ON FORWARD STUD ONLY.
2. STORE UNUSED SPACERS ON TOP OF SERRATED PLATE.
3. USE 173-1160-503 AT AFT ATTACH POINTS AND 173-1160-505 AT FORWARD ATTACH POINTS

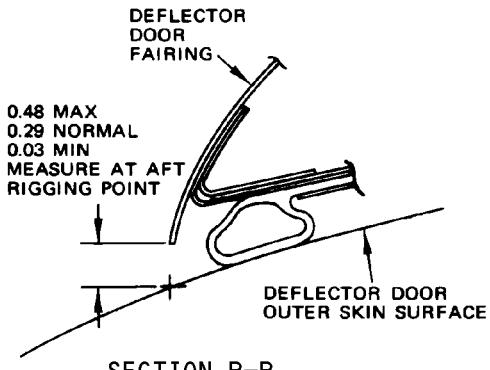
NOTE: ALL DIMENSIONS ARE IN INCHES



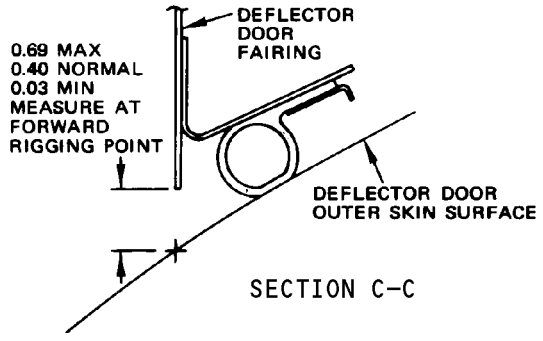
TYPICAL FOUR PLACES
DETAIL D



SECTION A-A



SECTION B-B



SECTION C-C

OUTBD

Deflector Door Fairing Installation
Figure 401 (Sheet 2)

(d) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

(e) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(f) Install spacer (8) using screw (6) and washer (7).
(g) Install stud (5) using self-aligning nut (10) and washer (9); tighten nut to 65-70 pound-inches.
(h) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(i) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
(j) Place the deflector doors in the forward thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

(k) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

(l) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.

(3) Remove access panel from door fairing.

(4) Install and align the door fairing.
  (a) Place soft, clearance putty (soft wax or clay) on top of each of the four spacers (8) and around each of the studs (5); minimum putty size 0.56 x 1.0 x 1.0 inch (approximately).
  (b) Place one spacer (4) on each of the studs.
  (c) Position deflector door fairing on deflector door so the studs (5) protrude through the rectangular cutouts in fittings on door fairing.
  (d) Position the door fairing into general lateral alignment with the wing-mounted aft fairing for detail C (Fig. 401).
  (e) Install a serrated plate (3) on each stud.
  (f) Place a stackup of spacers (4) and/or washers on each stud until two stud threads protrude.
  (g) Install nut (1) on each stud and tighten evenly until the upper exterior surfaces of the aft fairing and the door fairing are within the step tolerances shown in detail B (Fig. 401).
    1) Maintain the general lateral alignment obtained in the step above.
  (h) Adjust tightness of nuts (1) on aft studs as required to obtain a parallel gap between the skin trim on the inboard side of the door fairing and the outer skin surface of the door; gap to be within the limits shown in section A-A (Fig. 401).
    1) Make sure the gap between the skin trim on the outboard side of the door fairing and the outer skin surface of the door at the marked forward and aft rigging points to be within the limits shown in section B-B and C-C.
  (i) Remove nuts (1), washer and/or spacers (4), plate (3) and door fairing from deflector door.
  (j) Measure total thickness of putty and spacer at each of the four stud locations.
    1) Convert these thickness measurements into corresponding thickness combinations of spacers (4) for each stud location.
    2) Place each spacer stackup on its corresponding stud.
  (k) Reinstall door fairing on deflector door.
  (l) Position door fairing into alignment with aft fairing within the limits shown in details B and C (Fig. 401).
    1) Spacer gage may be used on aft fairing to establish gap between fairings.
  (m) Place a serrated plate (3) on each stud; place a stackup of unused spacers (4) in a thickness combination to sufficiently cover the protruding grip length above the serrated plate for each stud.

(n) Install washers (2) and nuts (1) on each stud and tighten nuts evenly to 80-95 pound-inches.

NOTE: Nut must not bottom on stud threads.

(o) Door fairing should be aligned to within tolerances defined in details B and C and sections A-A, B-B and C-C (Fig. 401).
1) If not repeat the steps to install and align the door fairing.

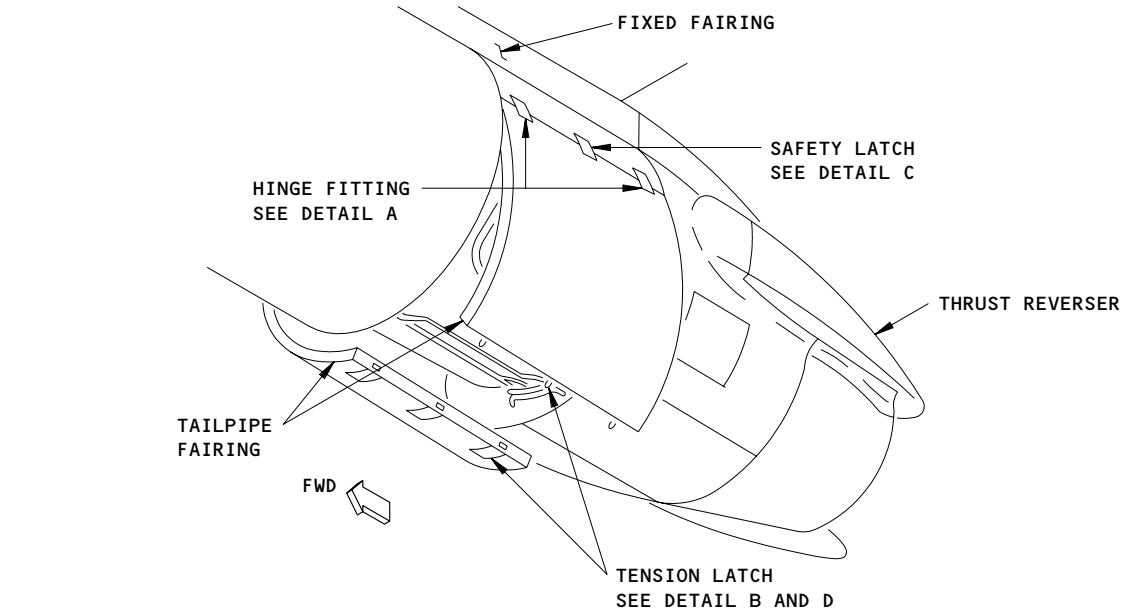
(5) Install access panel on fairing.
(6) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(7) Stow the rods and close the air conditioning bay access doors.
(8) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

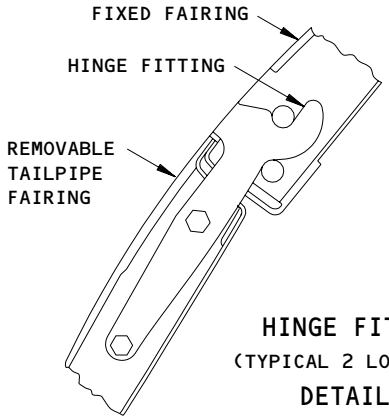
4. Tailpipe Fairing Removal
A. Remove Tailpipe Fairing
(1) Open the air conditioning bay access doors and install the rods.
(2) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

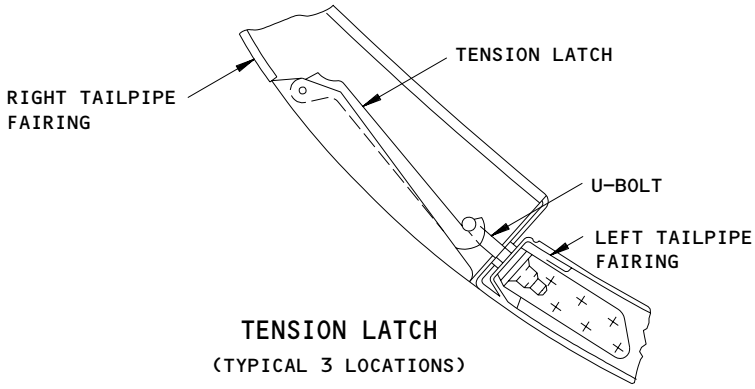
(3) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(4) Release tension latches joining left and right removable tailpipe fairings by inserting screwdriver into each latch slot and pulling screwdriver handle downwards (Fig. 402).
(5) Raise tailpipe fairing to the open position, depress safety latch and pull fairing away from tailpipe extension.

5. Tailpipe Fairing Installation
A. Install Tailpipe Fairing
(1) Position tailpipe fairings on fixed fairing in the fully open position, and engage hinge fittings on fixed fairing hinge rollers (Fig. 402).

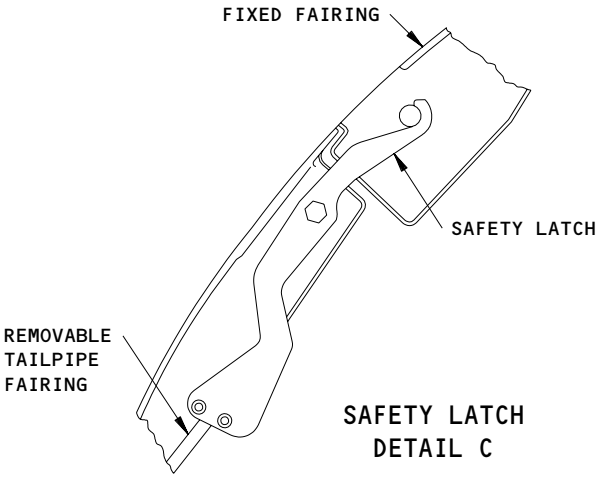




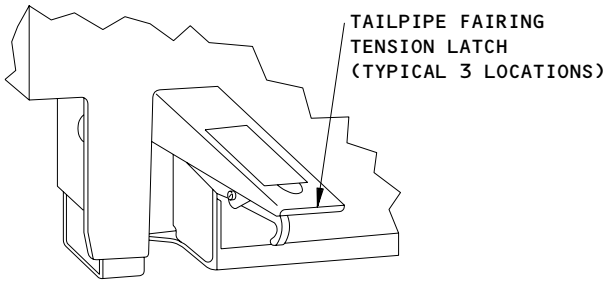
HINGE FITTING
(TYPICAL 2 LOCATIONS)
DETAIL A



TENSION LATCH
(TYPICAL 3 LOCATIONS)
DETAIL B



SAFETY LATCH
DETAIL C



DETAIL D

Tailpipe Fiaring Installation
Figure 402

(2) Lower tailpipe fairings to the closed position, and close tension latches.
(3) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(4) Stow the rods and close the air conditioning bay access doors.
(5) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

6. Fixed Fairing Removal

A. Prepare for Removal

(1) Open the air conditioning bay access doors and install the rods.
(2) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

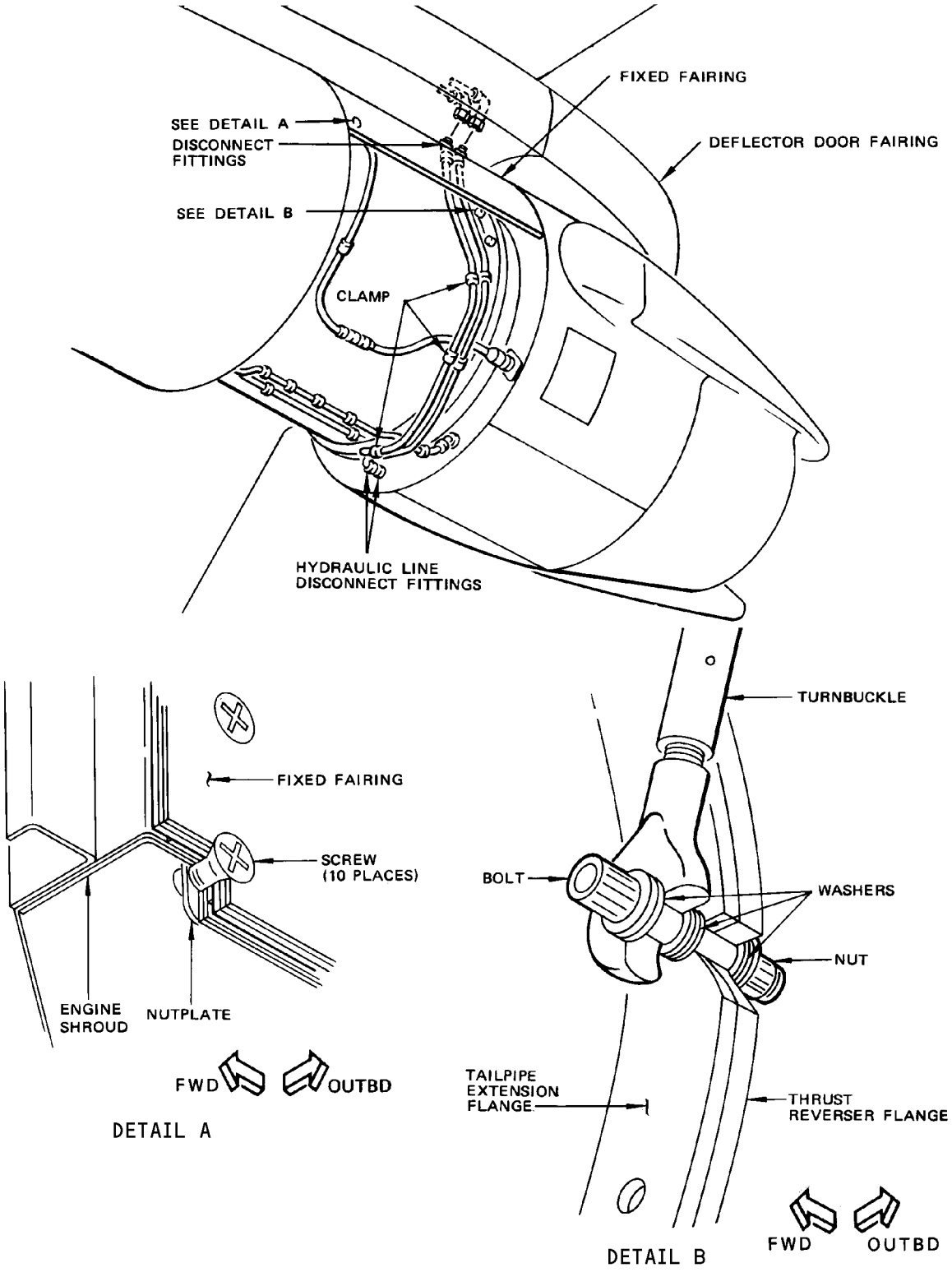
WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

(3) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(4) Remove the tailpipe fairing; use the steps above.
(5) Remove the deflector door fairing before you lower the engine; use the steps above.
(6) Lower engine as required to gain access to hydraulic line disconnect points (AMM 71-00-02/401).

B. Remove Fixed Fairing

WARNING: FIXED FAIRING EDGES ARE EXTREMELY SHARP AND CAN INFLICT SERIOUS INJURY TO PERSONNEL. EDGES SHOULD BE TAPED BEFORE HANDLING FIXED FAIRING. REMOVE TAPE AFTER INSTALLING FAIRING.

(1) Disconnect hydraulic lines from fittings on fixed fairing, and cap lines (Fig. 403).
(2) Disconnect hydraulic lines from shroud bulkhead and cap lines.
(3) Remove clamps attaching hydraulic lines to tailpipe extension, and remove hydraulic lines.
(4) Remove screws attaching forward end of fixed fairing to engine shroud.
(5) Remove bolts, washers and nuts securing turnbuckles to tailpipe extension.
(6) Remove fixed fairing from thrust reverser assembly.



Fixed Fairing Installation
Figure 403

7. Fixed Fairing Installation

A. Install Fixed Fairing

(1) Position fixed fairing on tailpipe extension with turnbuckles aft (Fig. 403).
(2) Attach forward part of fixed fairing to engine shroud with screws.
(3) Attach turnbuckles to tailpipe extension with bolts, washers and nuts.
(4) Position hydraulic lines on tailpipe extension and secure with clamps.
(5) Remove caps from hydraulic lines and connect lines to fittings on shroud bulkhead.
(6) Remove caps from hydraulic lines, and connect lines to fittings on fixed fairing.
(7) Do a check that the stow and deploy hydraulic lines are connected to the stow and deploy fittings respectively.
(8) Raise the engine and tighten the cone bolts (AMM 71-00-02/401).
(9) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(10) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
(11) Deploy deflector doors through 5 cycles to remove entrapped air from hydraulic lines and check for leaks.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

B. Put the Airplane Back to the Usual Condition

(1) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

(2) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(3) Install deflector door fairing on upper deflector door; use the steps above.
(4) Install the tailpipe fairing; use the steps above.
(5) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(6) Stow the rods and close the air conditioning bay access doors.
(7) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.

THRUST REVERSER FAIRING - ADJUSTMENT/TEST

1. General
   A. The thrust reverser fairing consists of a fixed fairing, deflector door fairing and the tailpipe fairings.
   B. There are no adjustments necessary for the fixed fairing.
   C. For the deflector door fairing adjustment, refer to the deflector door fairing removal and installation procedure (AMM 78-32-162/401).
   D. The adjustment of the tailpipe fairing is limited to these procedures:
      (1) The safety latch adjustment.
      (2) The tension latch adjustment.
   E. There are three tension latches on the tailpipe fairing.
2. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent
3. Tailpipe Fairing Adjustment
   A. Open the air conditioning bay access doors and install the rods.
   B. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   C. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   D. Safety Latch Adjustment
      (1) Open the tailpipe fairings.
      (2) Do a check of the force required to operate the safety latch lever to the unlatched position.
         (a) The lever should operate with a force of 9 ± 3 pounds at the handle end (near the detent holes).
         (b) If force is not within the limit, change the number of washers under the base of shear pin to get the required force (Fig. 501).
            1) Add washers to increase the force.

2) Remove the washers to decrease the force.

(3) Operate the safety latch to the latched position.

(4) Close and latch the tailpipe fairings.

E. Tension Latch Adjustment

(1) Make sure that the tailpipe fairings are closed and latched.

(2) Open one latch and do a check of the force to close the latch.

CAUTION: DO NOT USE TOOLS WHEN CLOSING TAILPIPE FAIRING LATCHES. USE HAND PRESSURE ONLY.

(a) Make sure that the adjacent tension latches are closed.

(b) Apply a force to the latch handle; the latch should close with a force of 20 ± 5 pounds applied to the latch handle.

(3) If the force to close the latch is not within the limits, adjust the U-bolt as follows:

(a) Loosen the checknuts as necessary to get the adjustment clearance (Fig. 501).

(b) Make equal adjustments of the self-locking nuts to get the force within the limits.

1) Adjust the self-locking nuts counterclockwise to decrease the force to close the latch.

2) Adjust the self-locking nuts clockwise to increase the force to close the latch.

(c) Tighten the checknuts after the adjustment is completed.

(4) Do the previous steps for each tension latch.

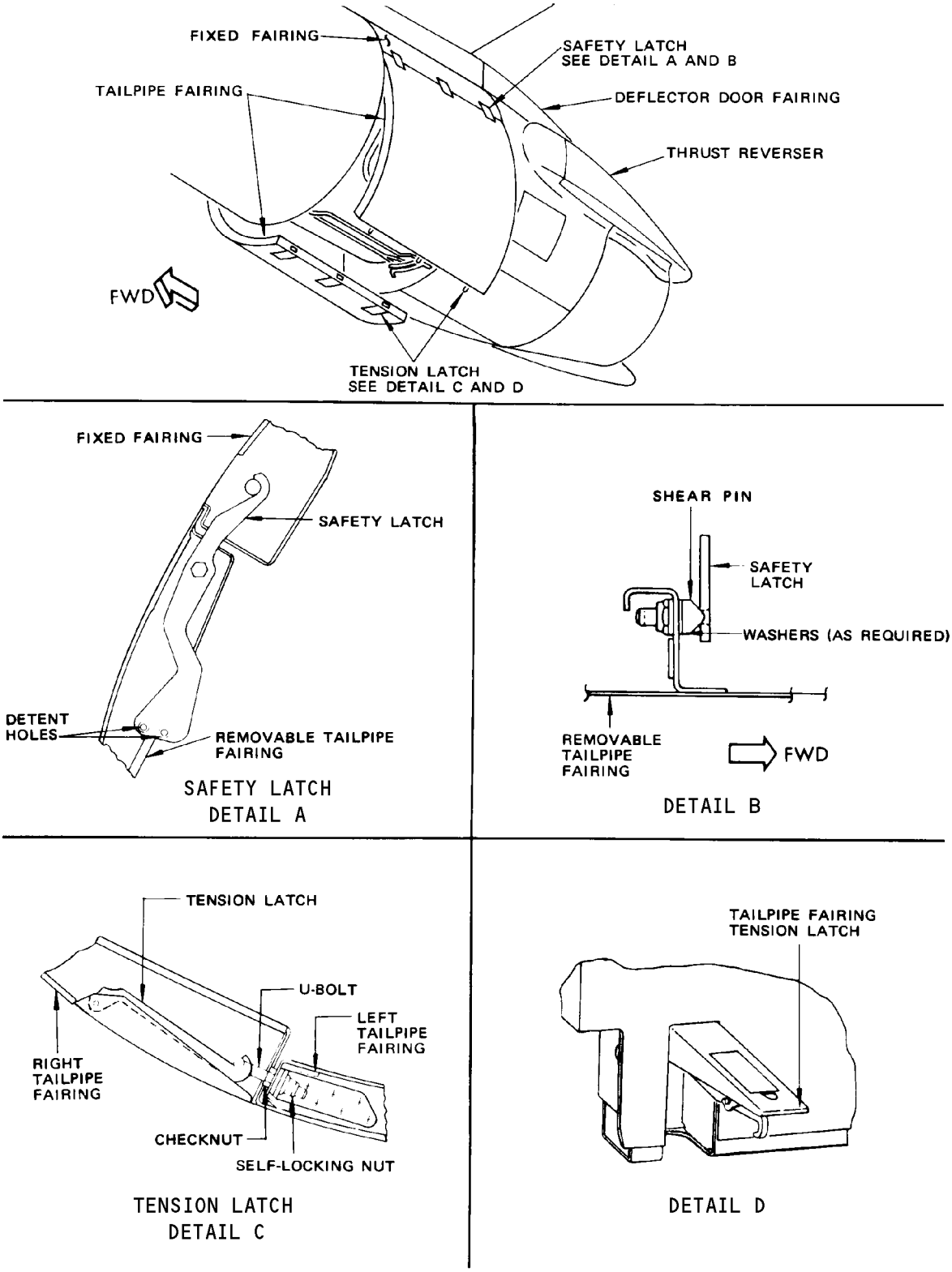
(a) Make sure the adjacent latches are closed when you do a check of the force to close each latch.

(5) Close and latch the tailpipe fairings.

F. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

G. Stow the rods and close the air conditioning bay access doors.

H. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.



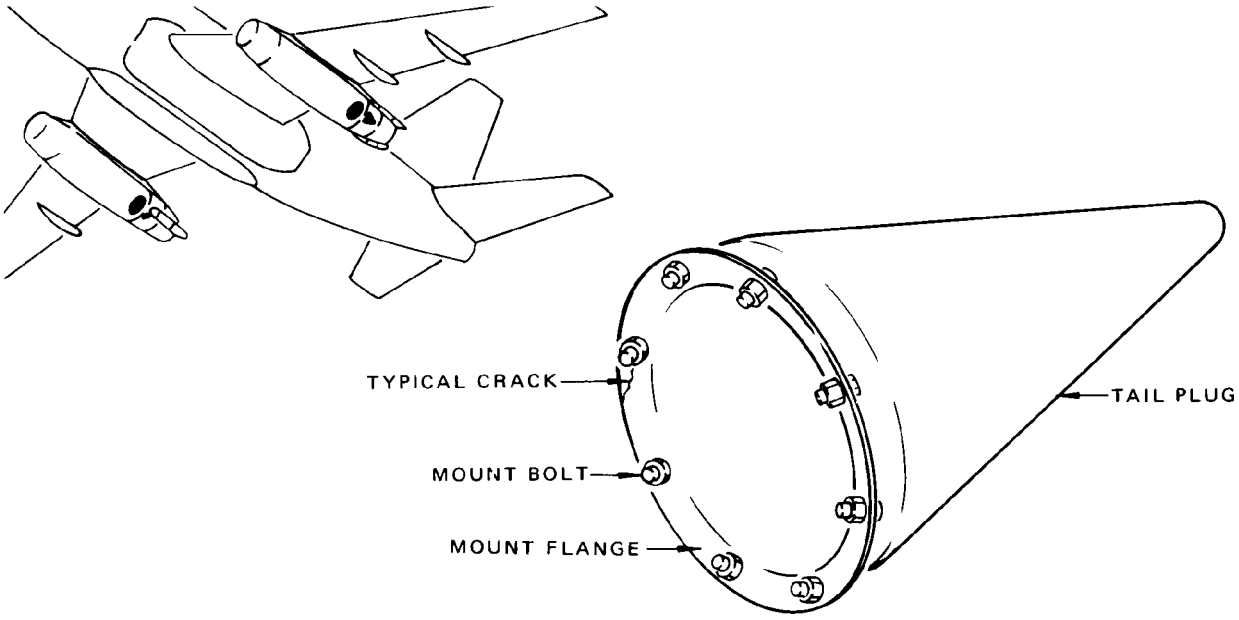
Tailpipe Fairing Adjustment
Figure 501

TAIL PLUG - INSPECTION/CHECK

1. Tail Plug Inspection
   A. Equipment and Materials
      (1) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent.
   B. Examine Tail Plug
      (1) Open the air conditioning bay access doors and install rods.
      (2) Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

          WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

      (3) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and install a DO-NOT-CLOSE tag.
      (4) Examine body of tail plug for cracks. Cracks are allowable through a total of 50 percent of the circumference of the cone. No single crack should exceed a total of 25 percent of the circumference.
      (5) Check for cracks in the tail plug mounting flange. Cracks in the vicinity of the mount holes with a maximum length of 2 inches and affecting not more than four mount holes are allowable. If two consecutive mount holes are affected, there must be two unaffected holes on either side.
      (6) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
      (7) Stow the rods and close the air conditioning bay dooors.
      (8) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker.



Thrust Reverser Tail Plug Crack Data
Figure 601

THRUST REVERSER LINKAGE ASSEMBLY - REMOVAL/INSTALLATION

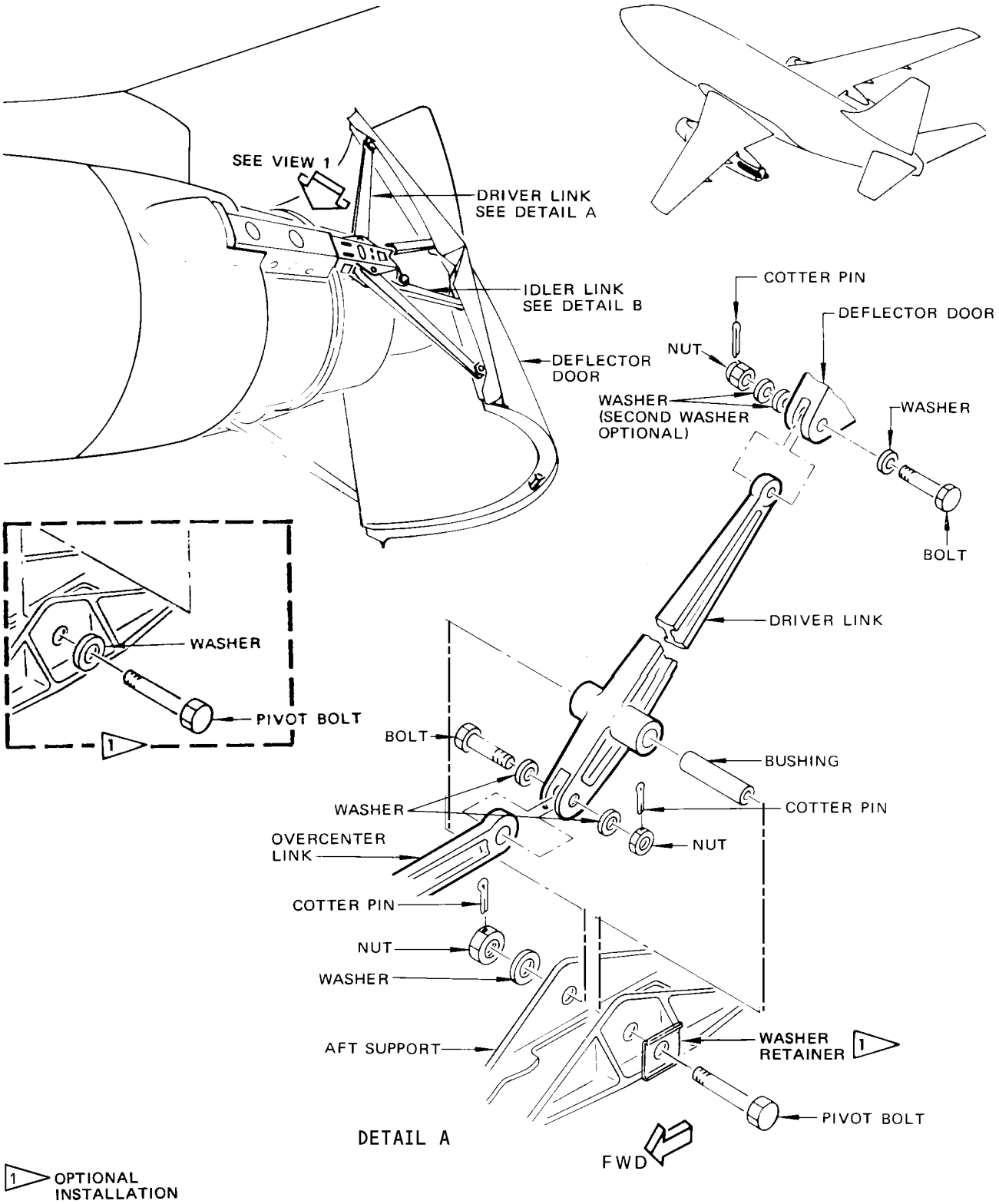
1. General
   A. This section covers the removal and installation procedures for the driver links, idler links, overcenter links, guide rods and guide carriage. Access to the linkage is gained by removing the actuator housing fairing.
   B. New parts may have a dry film lubricant applied when manufactured. No lubricant is to be applied on installation.
2. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
3. Prepare for Removal
   A. Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

      WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED, TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

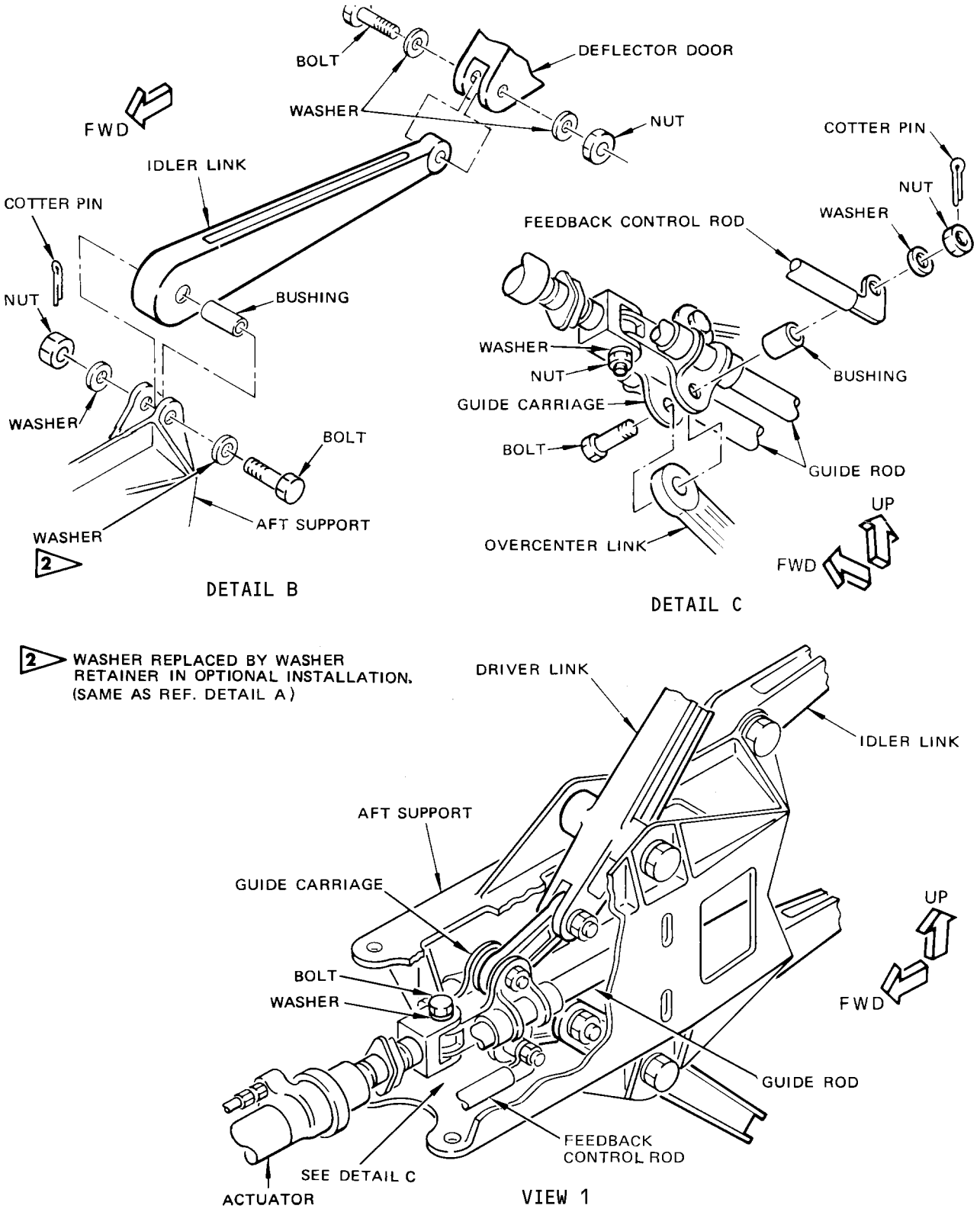
   B. Open the air conditioning bay access doors and install the rods.
   C. Deactivate the thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   D. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   E. Remove screws attaching actuator housing fairing to thrust reverser, and remove fairing.
4. Removal/Installation Driver Links
   A. Remove Driver Link
      (1) Remove cotter pin, nut, washers and bolt attaching driver link to deflector door (Fig. 401).
      (2) Remove cotter pin, nut, washers and bolt attaching driver link to overcenter link.
      (3) Remove pivot bolt, cotter pin, nut, washers and bushing attaching driver link to aft support.
      (4) Remove driver link from linkage assembly.



Thrust Reverser Linkage Installation
Figure 401 (Sheet 1)



Thrust Reverser Linkage Installation
Figure 401 (Sheet 2)

B. Install Driver Link
(1) Attach driver link to aft support with pivot bolt, washer retainer (or washer) bushing, washer and nut. Make sure the bolthead points away from the engine

CAUTION: DO NOT APPLY LUBRICANT. SEIZING COULD OCCUR FROM BREAKDOWN OF LUBRICANT AT HIGH TEMPERATURES.

CAUTION: MAKE SURE THE DRIVER LINK IS INSTALLED WITH THE STRAIGHT SIDE TOWARD THE THRUST REVERSER. INSTALLING THE DRIVER LINK BACKWARDS CAN CAUSE DAMAGE TO EQUIPMENT.

(2) Tighten nut 660 to 780 pound-inches and install cotter pin.
(3) Connect driver link to overcenter link with bolt, washers, and nut. Make sure the bolthead points to the engine.
(4) Tighten nut 95 to 110 pound-inches and install cotter pin.
(5) Attach driver link to deflector door with bolt, washers, and nut.

NOTE: The direction of the bolthead is optional.

(6) Tighten nut 95 to 110 pound-inches and install cotter pin.

5. Removal/Installation Idler Links
A. Remove idler Link
(1) Remove nut, washers, and bolt connecting idler link to deflector door (Fig 401).
(2) Remove cotter pin, nut, washers, bolt and bushing connecting idler link to aft support.
(3) Remove idler link from linkage assembly.
B. Install Idler Link
(1) Attach idler link to aft support with bushing, bolt, washer, washer retainer (or washer) and nut (Fig. 401).

CAUTION: DO NOT APPLY LUBRICANT. SEIZING COULD OCCUR FROM BREAKDOWN OF LUBRICANT AT HIGH TEMPERATURES.

(2) Tighten nut 480 to 600 pound-inches and install cotter pin.
(3) Attach idler link to deflector door with bolt, washers and nut. Bolthead must be in the inboard position.
(4) Tighten nut 160 to 190 pound-inches.

6. Removal/Installation Overcenter Links
A. Remove Overcenter Link
(1) Remove cotter pin, nut, washers and bolt connecting overcenter link to driver link (Fig. 401).

(2) Remove cotter pin, nut, washer and bolt connecting overcenter link to guide carriage.

NOTE: Feedback control rod and spacer are installed on lower left (facing forward) overcenter link and guide carriage connection. Save spacer for reinstallation.

(3) Remove overcenter link from linkage assembly.

B. Install Overcenter Link

(1) Attach overcenter link to guide carriage with nut, washer and bolt. Bolthead must be in the inboard position (Fig. 401).

CAUTION: DO NOT APPLY LUBRICANT. SEIZING COULD OCCUR FROM BREAKDOWN OF LUBRICANT AT HIGH TEMPERATURES.

NOTE: Feedback control rod and spacer must be installed when connecting lower left (facing forward) overcenter link to guide carriage.

(2) Tighten nut 95 to 110 pound-inches and install cotter pin.

(3) Connect overcenter link to driver link with bolt, washers and nut. Make sure the bolthead points toward the engine.

(4) Tighten nut 95 to 110 pound-inches and install cotter pin.

7. Removal/Installation Guide Carriage and Guide Rods

A. Remove Guide Carriage and Rods

(1) Remove cotter pin, nut, washer and bolt connecting overcenter link to guide carriage (Fig. 401).

NOTE: Feedback control rod and spacer are installed on lower left (facing forward) overcenter link and guide carriage connection. Save spacer for reinstallation.

(2) Remove nut, washers and bolt connecting actuator rod to guide carriage.

(3) Remove nuts and washers connecting forward end of guide rods to aft support, and pull guide rods out through aft support.

(4) Remove guide carriage through opening in aft support.

B. Install Guide Carriage and Rods

(1) Position guide carriage inside aft support with actuator connection forward (Fig. 401).

CAUTION: DO NOT APPLY LUBRICANT. SEIZING COULD OCCUR FROM BREAKDOWN OF LUBRICANT AT HIGH TEMPERATURES.

(2) Position guide rods through guide carriage, and attach to aft support with washers and nuts. Tighten nut 95 to 110 pound-inches.
(3) Attach guide carriage to actuator rod with bolt, washers and nut. Bolthead must point upward.
(4) Tighten nut to 95 to 110 pound-inches.
(5) Attach overcenter link to guide carriage with nut, washer and bolt. Make sure the bolthead points to the engine.

NOTE: Feedback control rod and spacer must be installed when connecting lower left (facing forward) overcenter link to guide carriage.

(6) Tighten nut to 95 to 110 pound-inches and install cotter pin.

8. Restore Airplane to Normal
A. Attach actuator housing fairing to thrust reverser with screws.
B. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
C. Stow the rods and close the air conditioning bay access doors.
D. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
E. Place deflector doors in the forward thrust position (AMM 78-32-01/201).

WARNING: PERSONNEL MUST STAY CLEAR OF THE THRUST REVERSER WHEN IT IS ACTUATED, TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

THRUST REVERSER LINKAGE ASSEMBLY - ADJUSTMENT/TEST

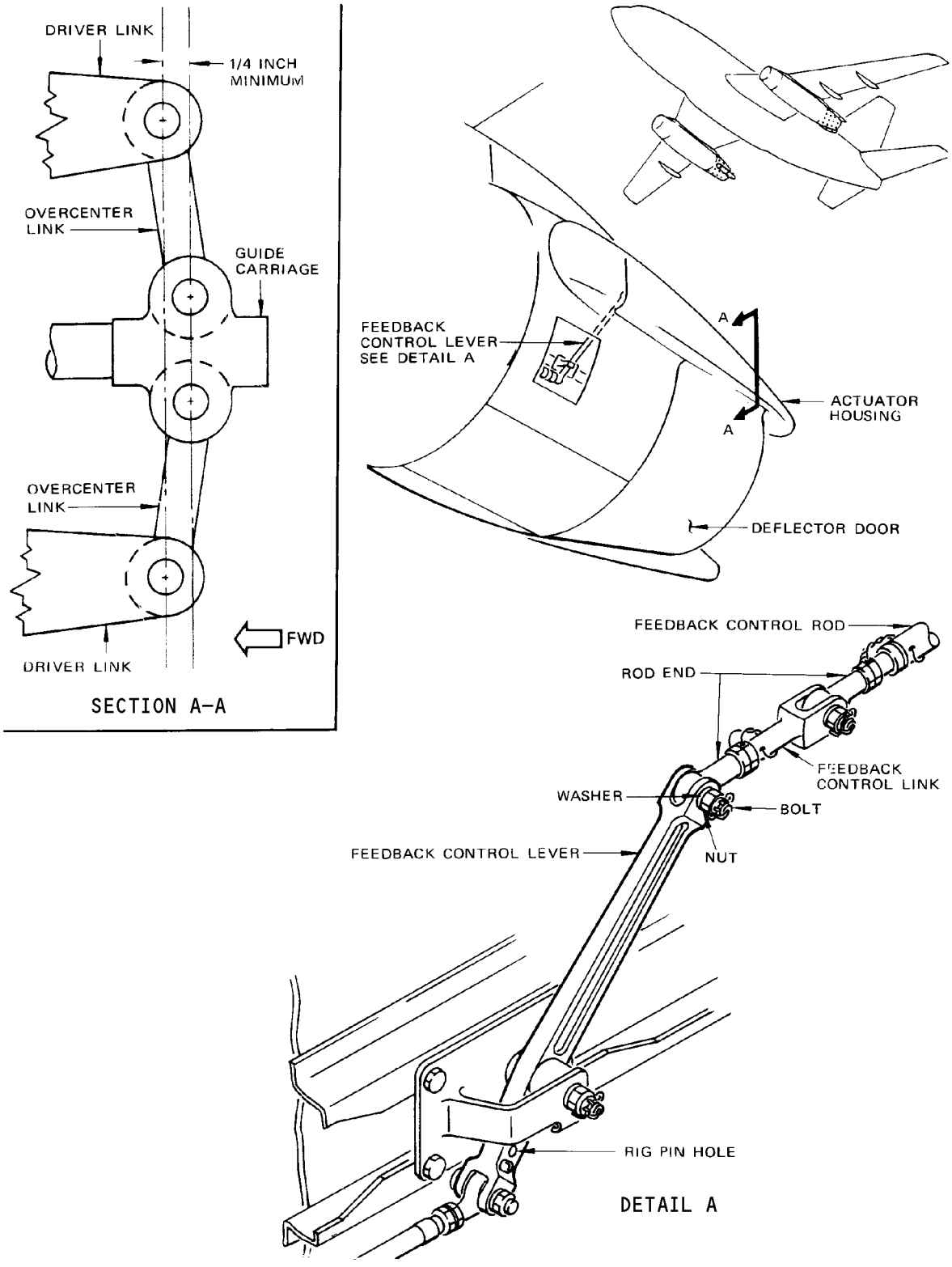
1. General
   A. The thrust reverser linkage adjustment consists of a check to determine that the overcenter link is in the overcenter position, and a feedback control rigging check. The linkage operating condition is determined by performing a test of the thrust reverser operation (AMM 78-32-01/501).
2. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F8010909 or equivalent
3. Linkage Assembly Adjustment
   A. Open the air condition access doors and install the rods.
   B. With the thrust reverser in the forward thrust position, deactivate reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   C. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   D. Remove screws attaching actuator housing fairing to thrust reverser, and remove fairing.
   E. Check that overcenter link - guide carriage attach point is at least 1/4 inch aft of the overcenter link - driver link attach point (Fig. 501).

      NOTE: Overcenter link is housed in aft support.

   F. Position actuator housing fairing on thrust reverser and attach with screws.
   G. Remove feedback control access panel.
   H. Position 1/4 inch diameter rig pin in the feedback control lever rig pin hole.
      (1) If rig pin cannot be inserted without binding, adjust rod ends as follows:
         (a) Disconnect feedback control link rod end from lever by removing bolt, washer, nut, bushing and cotter pin.
         (b) Position feedback control lever so that rig pin hole in lever aligns with rig pin hole in support.
         (c) Insert rig pin.
         (d) Adjust feedback control rod and control link rod ends until feedback control link rod end can be attached to lever. Bolt must be inserted freely.
         (e) Check to see that thread engagement of two rod ends is approximately equal and that rod ends are aligned with each other.
         (f) Check that rig pin can be removed and inserted without binding and remove pin.



Thrust Reverser Linkage Adjustment
Figure 501

(2) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breakers on the P6 panel.
(3) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(4) Stow the rods and close the air condition access doors.
(5) Operate thrust reverser through one cycle, and verify that rig pin can be inserted and removed freely.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

I. Install feedback control access panel.
J. Check deflector door adjustment (AMM 78-32-112/501).

TAILPIPE EXTENSION - REMOVAL/INSTALLATION

1. General

   A. The tailpipe extension forward mounting flange is attached to the engine, the thrust reverser is attached to the tailpipe extension aft mounting flange. Forty two bolts are used at each flange. The reverser is normally removed and installed at the tailpipe extension aft mounting flange and the tailpipe extension then removed from the engine. However, the extension with reverser attached may be removed as a unit if desired.

2. Equipment and Materials
   A. Antiseize Compound - Ease-Off 990, Texacone Corp., Dallas 8, Texas, or equivalent
   B. Cart Assembly - F80101 or equivalent
   C. Sling Assembly - F80110-1 or equivalent
   D. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent

3. Prepare for Removal
   A. Check that thrust reverser deflector doors are stowed and locked.
   B. Open the air condition access doors and install the rods.
   C. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   D. Open the applicable THRUST REVERSER circuit breaker on the circuit breaker panel P6 and attach a DO-NOT-CLOSE tag.
   E. Remove the engine side cowl panels (AMM 71-11-11/401).
   F. Remove the tailpipe fairings (AMM 78-32-162/401).
   G. Remove the thrust reverser, if reverser and extension are not to be removed as a unit (AMM 78-32-101/401).

4. Remove Tailpipe Extension
   A. Get the correct tools.

CAUTION: DO NOT USE CADMIUM-PLATED TOOLS ON TITANIUM COMPONENTS WHICH ARE SUBJECTED TO HIGH TEMPERATURES. CADMIUM REACTS WITH TITANIUM AT HIGH TEMPERATURES AND MAY CAUSE EMBRITTLEMENT AND CRACKS IN TITANIUM PARTS.

B. Disconnect push-pull cable at quick disconnect (Fig. 401).
C. Disconnect electrical connector on forward side of tailpipe extension bulkhead.
D. Provide support to hold unit in position when mounting bolts are removed.

NOTE: Tailpipe extension with thrust reverser attached weighs approximately 488 pounds. Extension alone weighs approximately 96 pounds.

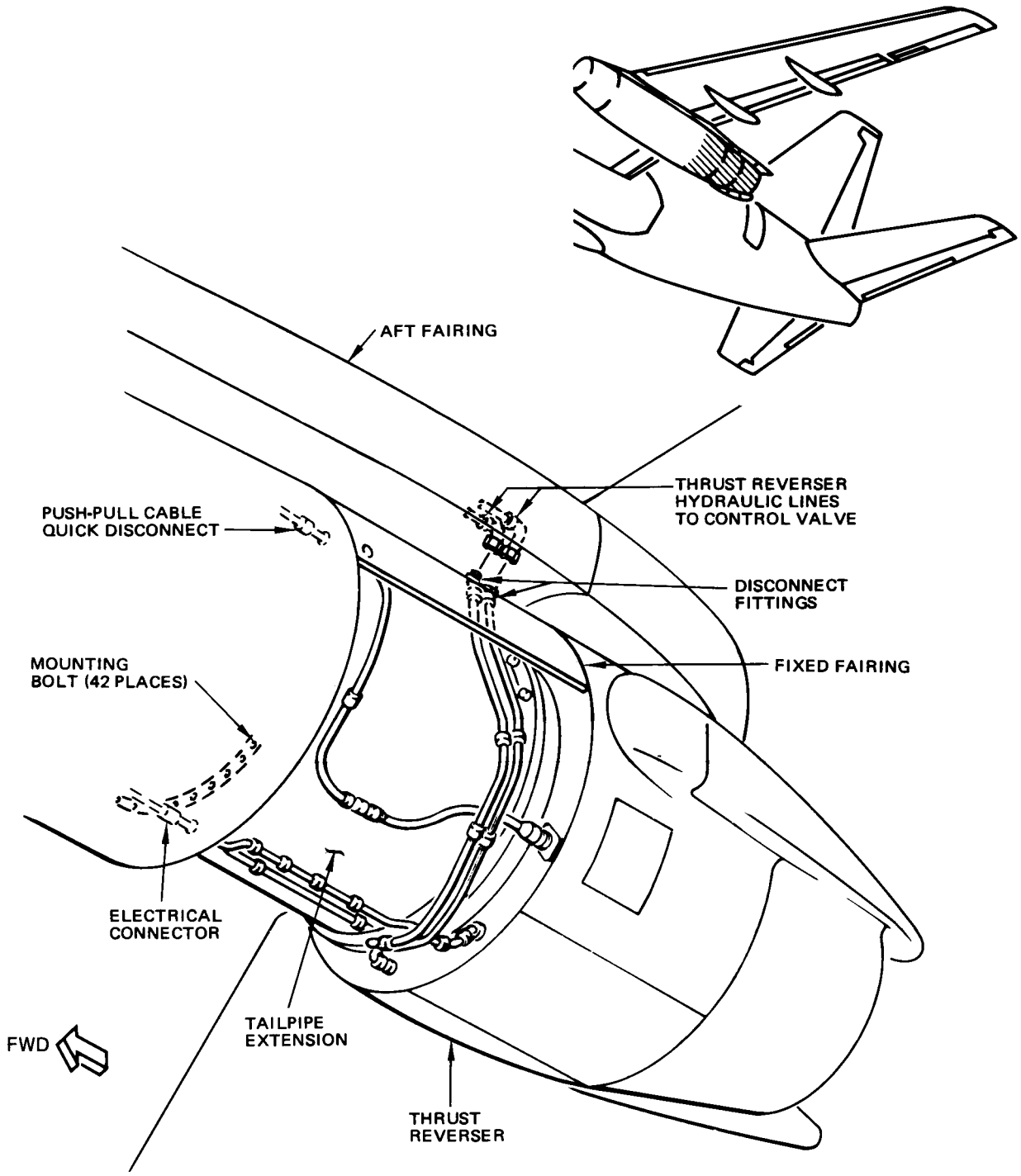
E. Remove bolts attaching tailpipe extension to engine exhaust flange.
F. Carefully lower unit just enough to provide access to fittings and disconnect hydraulic lines at top side of fixed fairing.
(1) Cap disconnected lines.
G. Lower unit clear of engine.

5. Install Tailpipe Extension
A. Raise tailpipe extension to a position that will permit connection of hydraulic lines.
(1) Remove caps and connect lines at top side of fixed fairing (Fig. 401).
(2) Tighten fittings 250 to 300 pound-inches.
B. Raise unit to installed position and install bolts attaching tailpipe extension to engine exhaust flange.
(1) Tighten bolts 130 to 200 pound-inches.
C. Connect electrical connector on forward side of tailpipe extension bulkhead.
D. Connect push-pull cable at quick disconnect.
E. Install thrust reverser, if required (AMM 78-32-101/401).
F. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the circuit breaker panel P6.
G. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
H. Check operation of thrust reverser (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

I. Actuate deflector doors through five cycles to bleed thrust reverser hydraulic system. Check for leaks.
J. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.



Tailpipe Extension Installation
Figure 401

K. Open the applicable THRUST REVERSER circuit breaker on the circuit breaker panel P6 and attach a DO-NOT-CLOSE tag.

6. Restore Airplane to Normal

A. Install engine side cowl panels (AMM 71-11-11/401).
B. Install the tailpipe fairings (AMM 78-32-162/401).
C. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
D. Stow the rods and close the air condition access doors.
E. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the circuit breaker panel P6.

THRUST REVERSER CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. There are two separate, identical, thrust reverser control systems for engine No. 1 and engine No. 2. The thrust reverser control system is operated by a reverse thrust lever located on the throttle lever (forward thrust lever) for each engine. The control system directs System A hydraulic pressure to position the thrust reverser in the appropriate forward or reverse thrust position as selected with the reverse thrust lever.
   B. The major components of the thrust reverser control system are a thrust reverser control cam, rocker arm (cam follower), control valve and follow-up controls, a thrust reverser push-pull cable, and thrust reverser isolation valve. The thrust reverser isolation valves are located in the air conditioning bay. A main hydraulic pressure source and an alternate hydraulic pressure source provide hydraulic pressure to the control valve, and from the control valve to the thrust reverser.
      (1) Main Hydraulic Pressure Source
         (a) The thrust reverser main hydraulic power source is either system A hydraulic pressure from the main landing gear down line, or a direct line from hydraulic system A. (See figure 6 for effectivity.) To operate the thrust reverser from the main landing gear down line the landing gear selector lever must be in the DOWN position.
      (2) Alternate Hydraulic Pressure Source
         (a) The thrust reverser alternate hydraulic power source consists of a hydraulic accumulator for each system, or a line connection to the standby hydraulic power system. (See figure 6 for effectivity.) (Refer to Standby Hydraulic System, Chapter 29.)
   C. When reverse thrust operation is selected, reverse thrust lever input is transmitted to the thrust reverser control cam, through the engine thrust shaft, by direct cable connection. The control cam, through the rocker arm, positions the control valve to route pressurized hydraulic fluid to either the stow or deploy ports as selected by the reverse thrust lever. The push-pull cable and follow-up control provide thrust shaft lockout while the thrust reverser is in transit between thrust positions.

2. Thrust Reverser Controls

A. Thrust Reverser Control Valve

(1) The thrust reverser control valve provides directional control for routing pressurized hydraulic fluid through the deploy or stow ports, as selected by the reverse thrust lever in the control cabin (Fig. 1). The control valve is actuated by the thrust reverser control cam on the engine thrust shaft (Fig. 1). When reverse or forward thrust is selected at the control stand, thrust shaft rotation repositions the control valve, and pressurized hydraulic fluid is routed through the valve to the appropriate port. The control valve is mounted to the engine control drum-and-shaft assembly support bracket at the wing front spar above the engine.

B. Thrust Reverser Control Cam

(1) The thrust reverser control cam transmits position input to the thrust reverser control valve from the thrust levers (Fig. 1). The control cam is splined to the engine thrust shaft at the drum-and-shaft assembly at the wing front spar and is located beneath the start and thrust quadrants on the shaft. When the forward or reverse thrust levers are operated, the thrust shaft is rotated and the control cam positions the control valve through a rocker arm.

C. Thrust Reverser Follow-up Controls

(1) The thrust reverser follow-up controls consist of a shaft installation on which are installed the thrust reverser follow-up cam, control valve rocker arm, and a follow-up crank (Fig. 1). The shaft installation is supported between two flanges on the bracket that supports the engine controls drum-and-shaft installation at the wing front spar. The follow-up cam and follow-up crank are splined to opposite ends of the shaft. The rocker arm is supported by bearings on the shaft and is connected to the control valve piston. The follow-up crank is connected to the thrust reverser push-pull control.

(2) The rocker arm transmits thrust reverser control cam rotation to the control valve, repositioning it to the selected thrust position (Fig. 1). The thrust reverser follow-up cam and crank transmit thrust reverser deflector door position indication from the thrust reverser push-pull control to the thrust shaft to lock out application of increased thrust until the deflector doors have reached the selected thrust position.

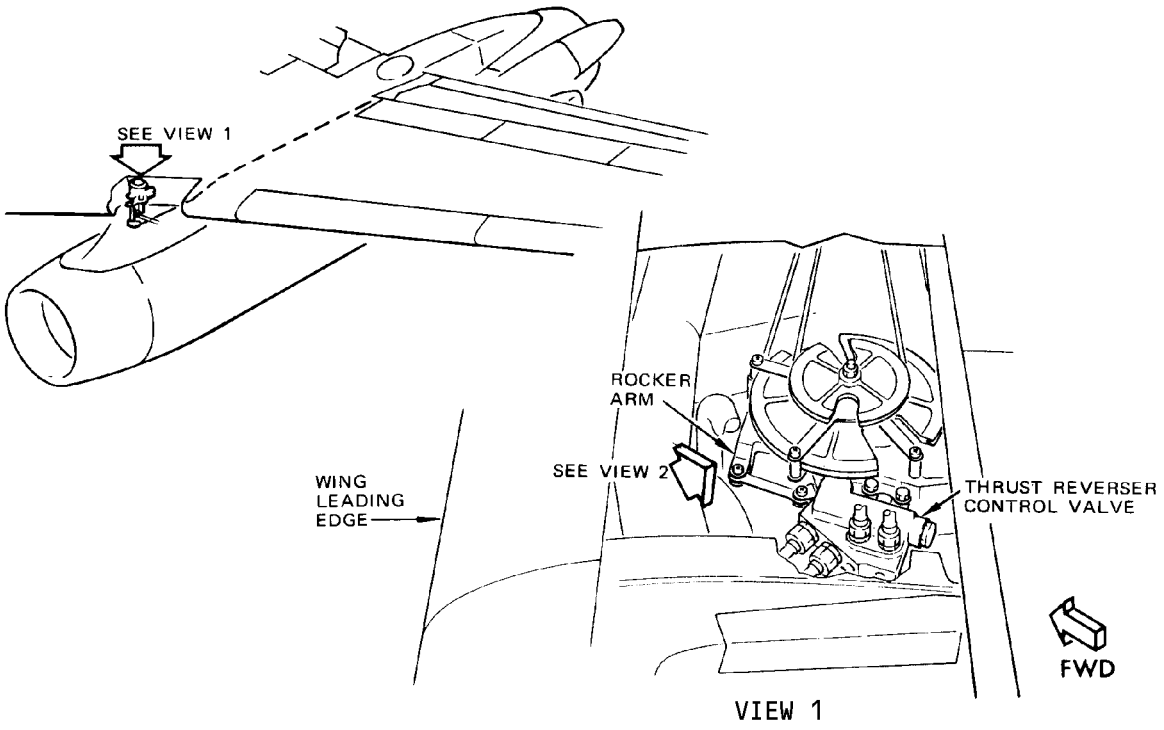
(3) Maintenance practices for the thrust reverser follow-up controls shaft installation are covered in Chapter 76.

D. Thrust Reverser Push-Pull Cable

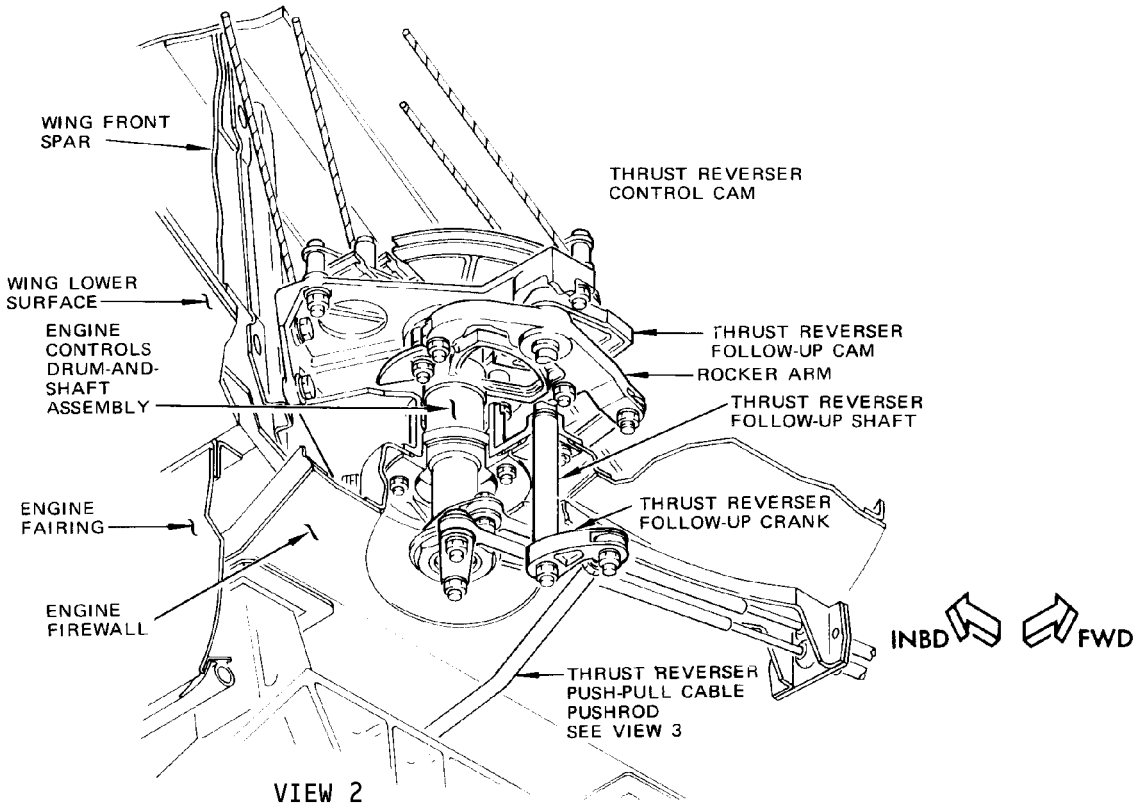
(1) The thrust reverser push-pull cable transmits deflector door position to the engine thrust shaft to provide lockout of the shaft at a low thrust setting when the thrust reverser is in transit between thrust positions (Fig. 3). The push-pull cable is connected at one end to the guide carriage on the thrust reverser and at the opposite end to the thrust reverser follow-up controls at the engine control drum-and-shaft assembly (Fig. 1). The cable installation includes a push-pull cable, a pushrod, an idler link and a feedback control lever. The push-pull cable consists of two cable subassemblies joined at a quick-disconnect and enclosed in a conduit. The quick-disconnect facilitates removal and installation of the engine. A telescopic assembly is located at both ends of the cable. The forward telescopic assembly of the push-pull cable terminates the cable near the forward end of the engine firewall. The telescopic assembly rod end is connected at its rod end fitting to the idler link. The idler link is suspended at its pivot point from the engine firewall. The pushrod is also connected to the idler link and runs forward between the engine mounts to the thrust reverser follow-up shaft where it is connected to the follow-up crank. The cable runs in the conduit along the underside of the engine firewall to the thrust reverser. At the thrust reverser, the cable is connected to the lower arm of the feedback control lever. The upper arm of the feedback control lever is connected to the guide carriage through a feedback control rod. The quick-disconnect in the cable and conduit is located near the aft end of the cable in the engine midfairing area just forward of the thrust reverser tailpipe extension.

3. Thrust Reverser Hydraulic Plumbing

A. The thrust reverser hydraulic plumbing routes pressurized hydraulic fluid from system A to the thrust reverser actuators and lock actuators (Fig. 2 and 6). (Refer to Chapter 29, Hydraulic Power). Hydraulic pressure is supplied to the pressure and return ports of the control valve. For reverse thrust operation, the deploy port on the control valve supplies hydraulic pressure to the unlock port on the lock actuator and the deploy port on the thrust reverser actuator simultaneously. For forward thrust operation, the stow port on the control valve supplies pressure to the lock port on the lock actuator, and the stow port on the thrust reverser actuator at the same time.

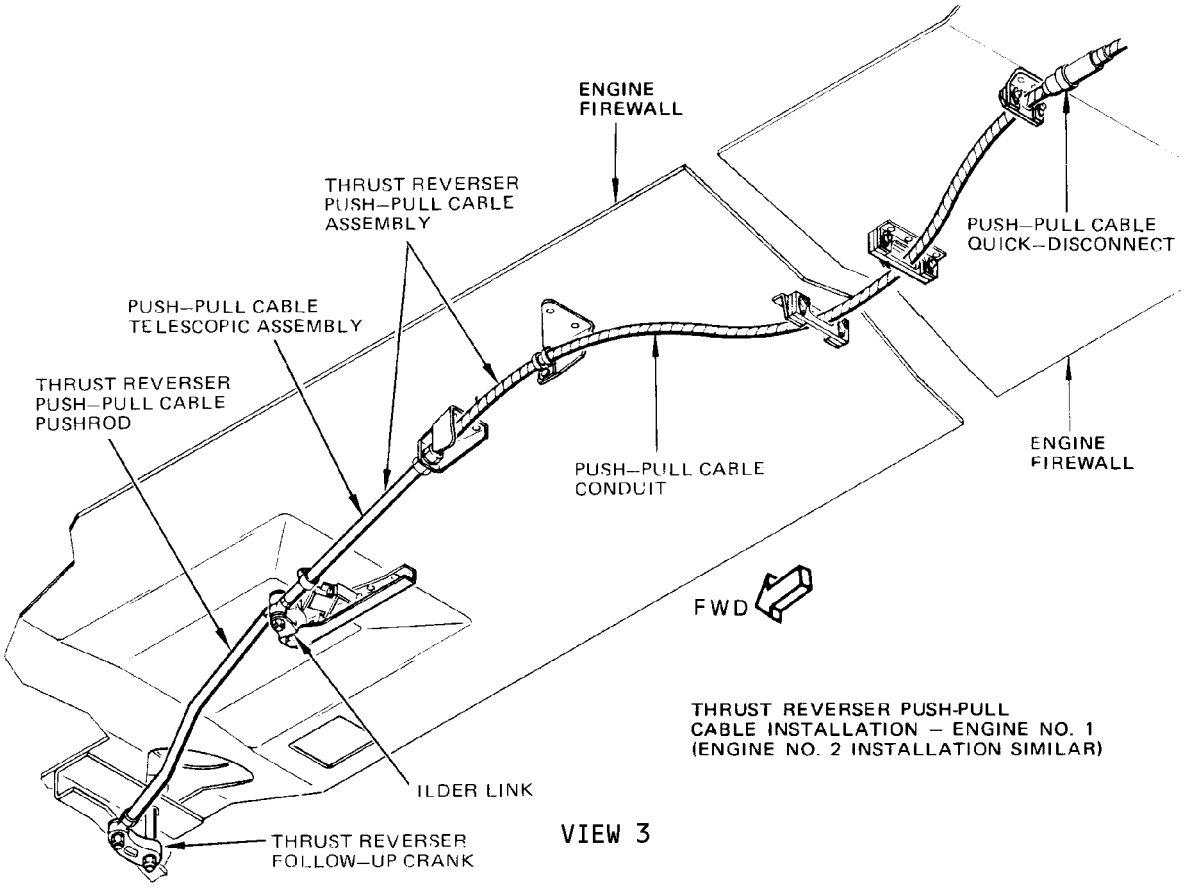


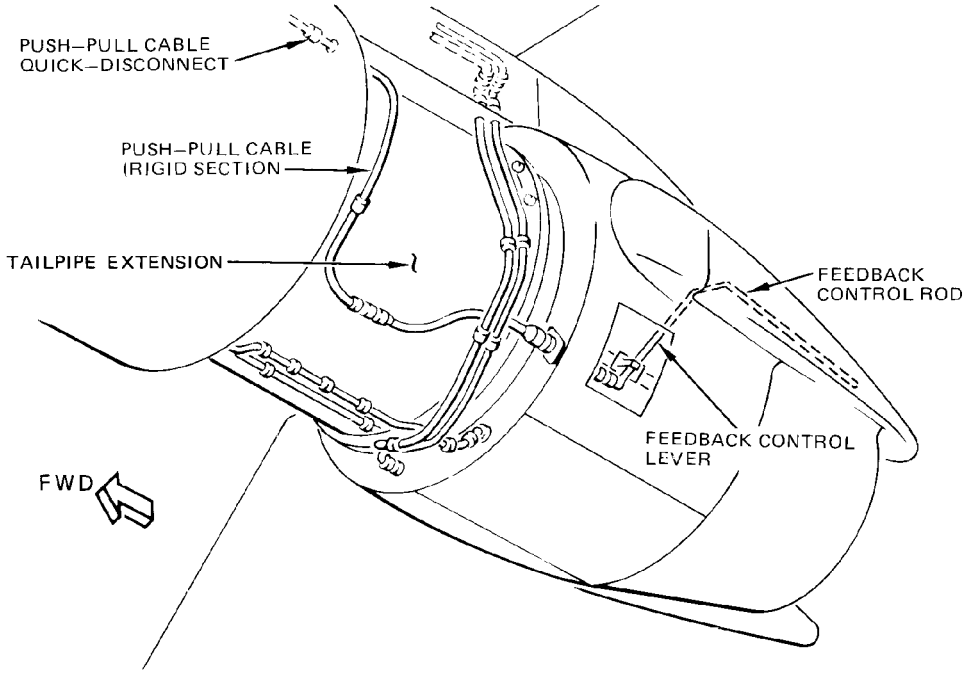
VIEW 1



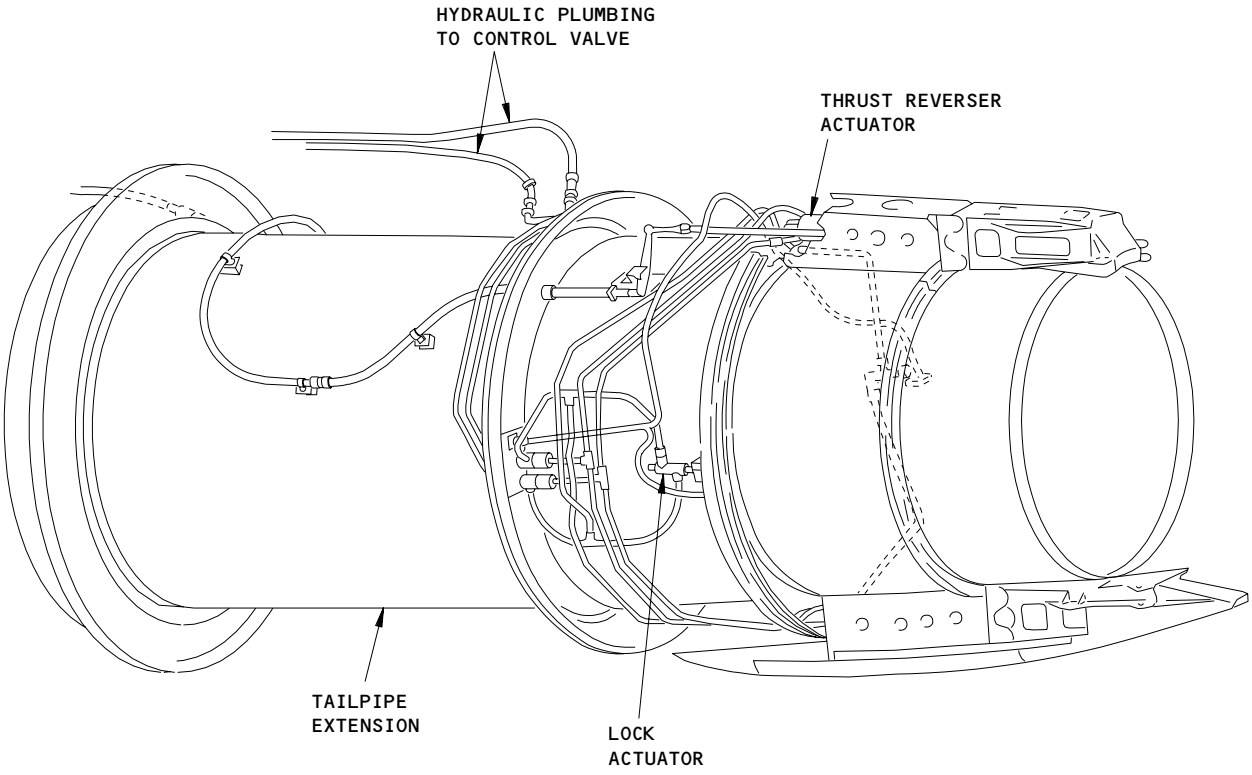
VIEW 2

Thrust Reverser Controls
Figure 1 (Sheet 1)





Thrust Reverser Controls
Figure 1 (Sheet 2)

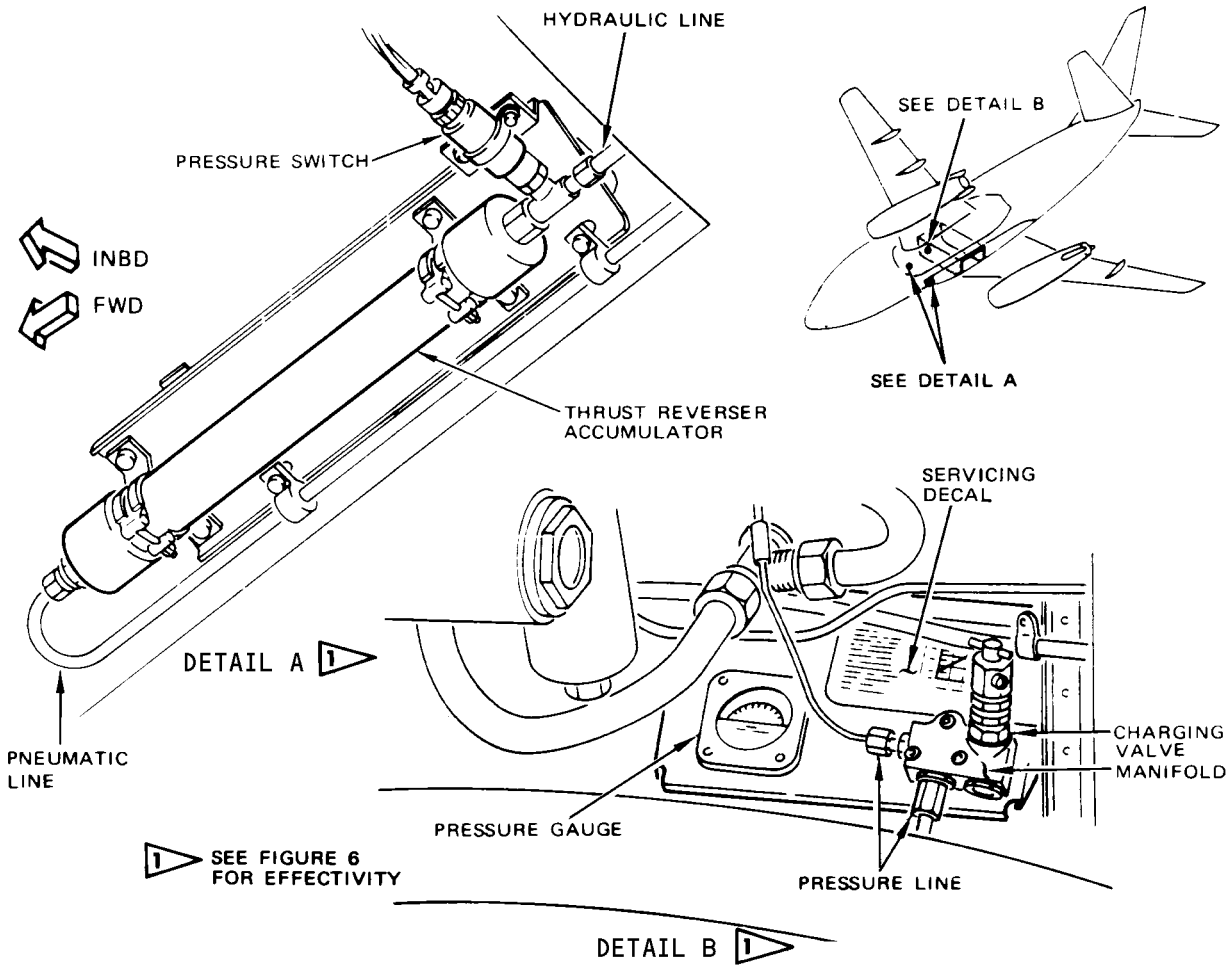


Thrust Reverser Hydraulic Plumbing
Figure 2

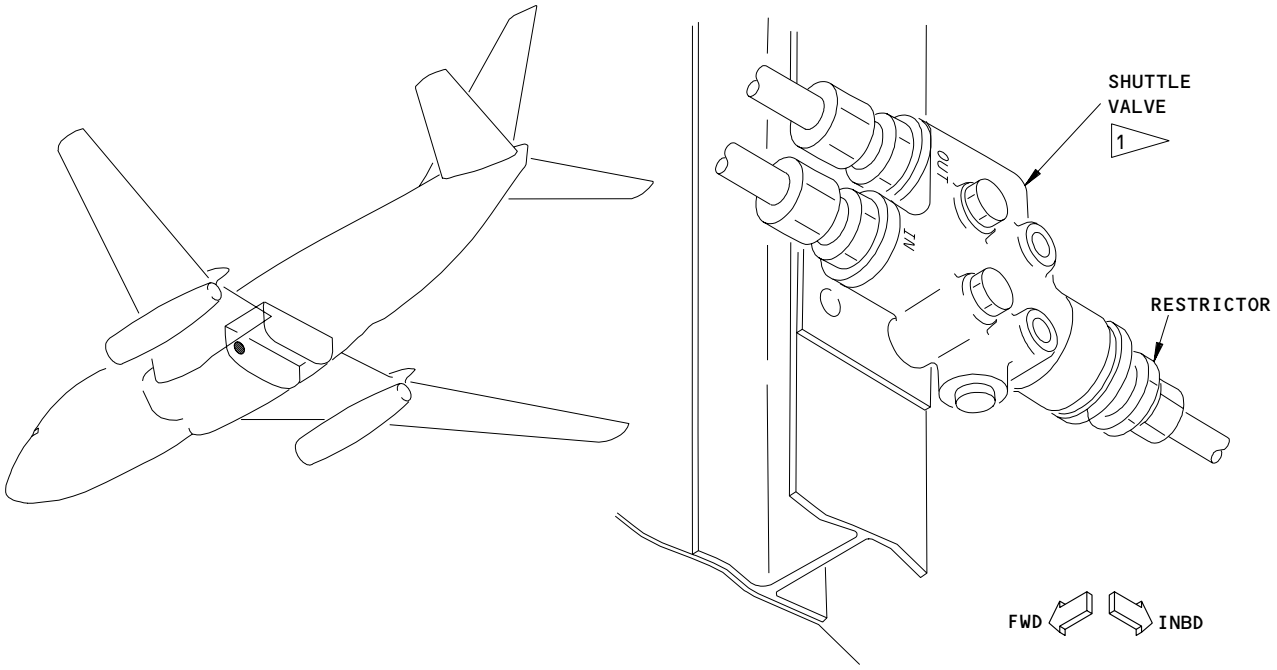
4. Thrust Reverser Alternate Hydraulic Pressure Source

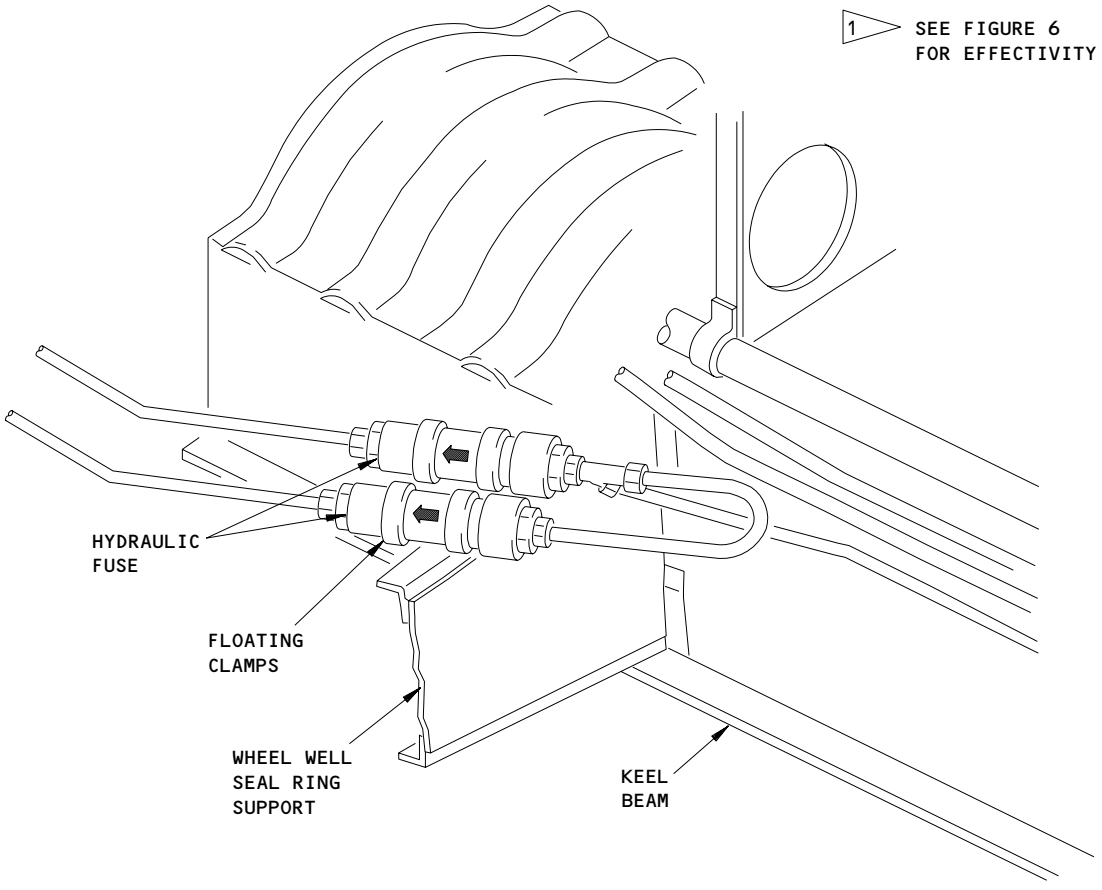
A. The thrust reverser hydraulic system includes an alternate source of hydraulic pressure in case of main system failure. Reverser operation is provided either by accumulators in the forward wing-to-body fairing or by connection, through shuttle valves, to the standby hydraulic system. (See Fig. 3 for component location and Fig. 6 for effectivity). Each accumulator stores sufficient pressurized hydraulic fluid to deploy a thrust reverser in the event of hydraulic system failure. The accumulators are precharged through a common air line by a charging valve located in the main gear wheel well.

B. Airplanes with connection to the standby hydraulic system have hydraulic fuses in the pressure lines (Fig. 3). The hydraulic fuses are located near the forward bulkhead in the left wheel well on top of a support beam for the wheel seal ring. If a failure or line rupture occurs the fuse will close to prevent complete loss of standby system hydraulic fluid. The fuse will reset automatically when hydraulic pressure on both sides of the fuse is equalized within 5 psi.

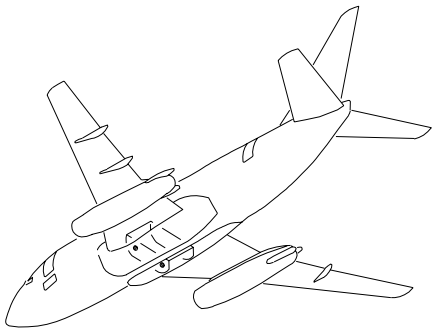


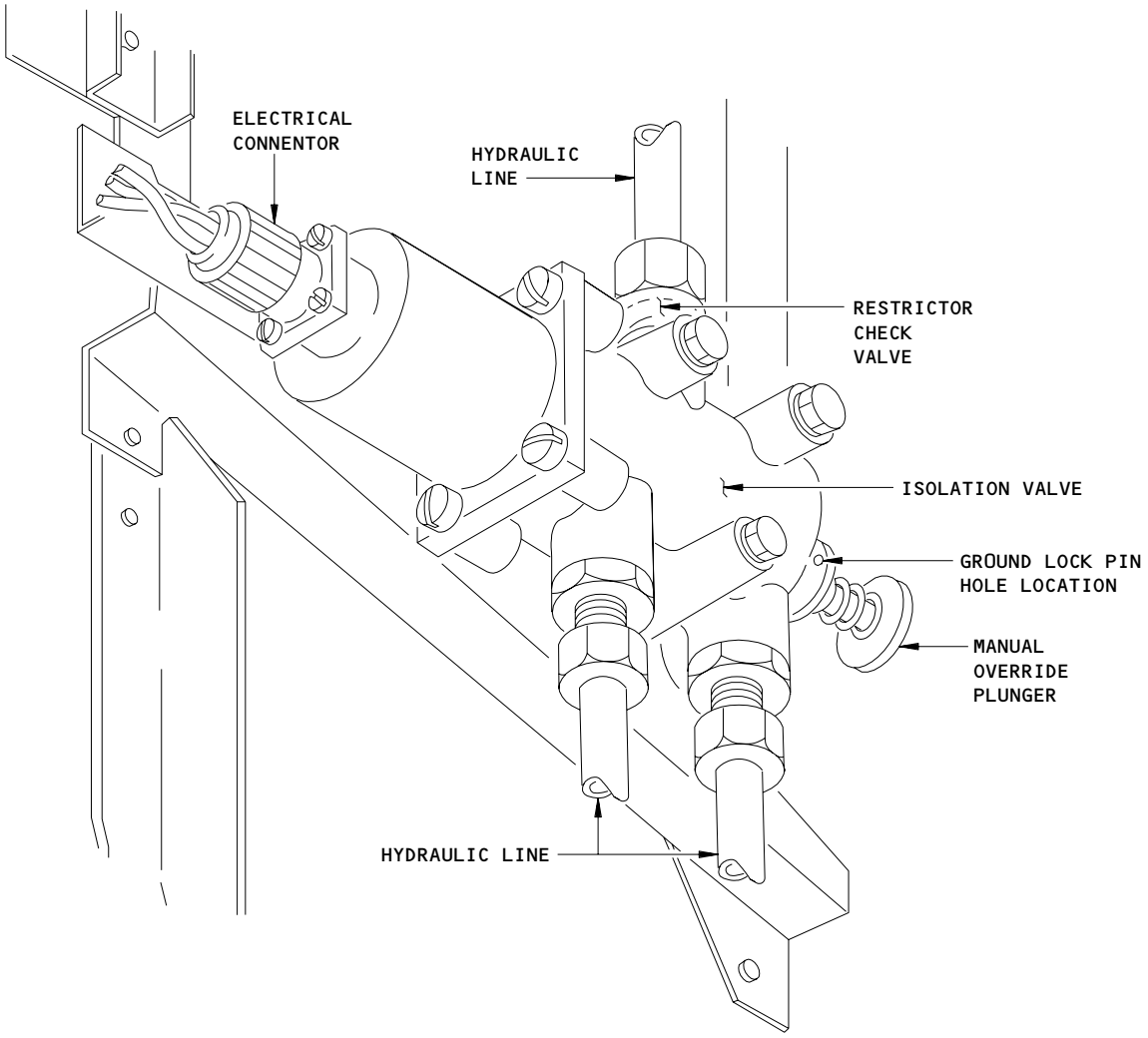
Thrust Reverser Alternate Hydraulic Pressure Source
Figure 3 (Sheet 1)





Thrust Reverser Alternate Hydraulic Pressure Source
Figure 3 (Sheet 2)





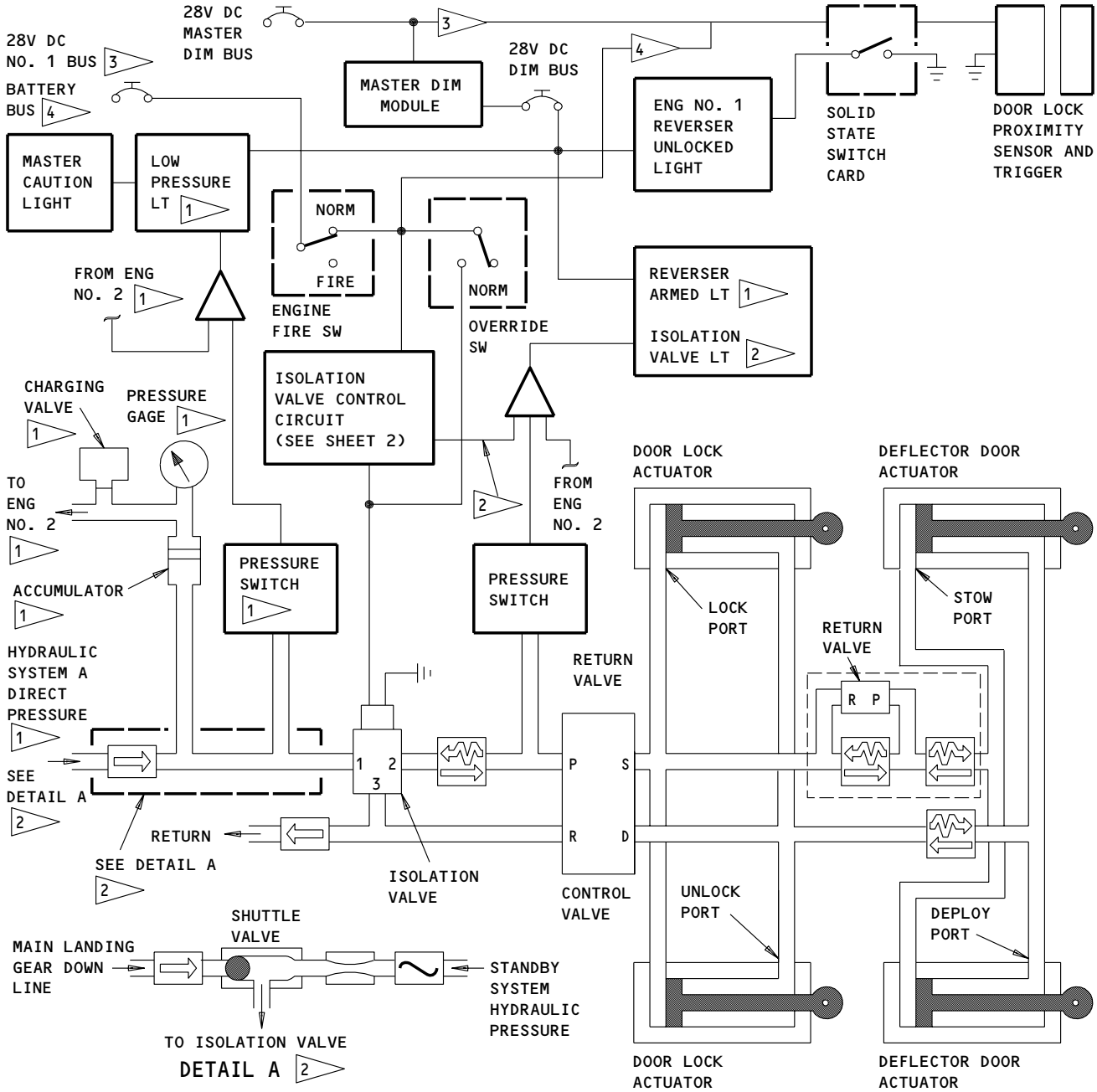
Thrust Reverser Isolation Valve
Figure 4

5. Thrust Reverser Isolation Valve
   A. The isolation valves, one for each reverser, control the connection of the thrust reverser hydraulic systems to the airplane hydraulic system. When energized, the isolation valves permit airplane system pressure to be supplied to the thrust reverser. When de-energized, the valves shut off pressure to the reversers and connect the reverser hydraulic systems to the airplane system return line. The isolation valves are spring-loaded to the de-energized position.
   B. An isolation valve is energized only when all of the following occur: (1) the engine fire switch is closed; 2) the engine running switch, located in the engine accessory unit, is closed by the engine oil pressure switch (closed by an increase in oil pressure); 3) the air- ground switch, located in the landing gear accessory unit, is closed by the main landing gear sensor (actuated by airplane weight on right main landing gear). If any of these switches are open, the isolation valve is de-energized, rendering the reverser inoperable. The air-ground switch controls both reversers; if it is open, both reversers will be inoperable.
   C. The isolation valves, located on the forward bulkhead of the air conditioning bay, can be manually locked by depressing the manual override plunger and inserting ground locking pins. This depressurizes the reverser hydraulic system.
6. Operation
   A. The thrust reverser control system is controlled entirely by use of the reverse thrust lever. Hydraulic pressure is supplied by the A hydraulic system.

B. Reverse thrust operation is initiated by positioning the reverse thrust levers in the control cabin. The operation of each thrust reverser is independent of the other. The forward thrust lever must be returned to idle before the reverse thrust lever can be moved sufficiently to initiate reverse thrust actuation. This prevents accidental actuation of the reverser during forward thrust operation. Initial movement of the reverse thrust lever aft to an interlock position provides sufficient thrust control shaft rotation for the thrust reverser control cam to reposition the control valve, causing pressurized hydraulic fluid to be routed through the deploy port to the thrust reverser actuators. (Fig. 6) Pressurized hydraulic fluid is supplied to the unlock port of the lock actuator and the deploy port of the thrust reverser actuator simultaneously. Since less pressure is required to move the lock actuator piston than is required to move the thrust reverser actuator piston, the lock actuator piston retracts to the unlock position first. Operation of the lock actuator to the unlocked position also moves the thrust reverser position indicating system switch actuating bar from near the switch sensor causing the thrust reverser position indicating switch to close to illuminate the REVERSER UNLOCKED light in the control cabin. The thrust reverser follow-up cam prohibits movement of the reverse thrust lever beyond interlock until the thrust reverser deflector doors approach the full reverse thrust position. When sufficient pressure builds up at the deploy port on the thrust reverser actuator, the actuator piston retracts causing the guide carriage to move forward. Movement of the guide carriage forward causes the feedback control lever to rotate. This pulls the push-pull cable aft causing the telescopic section at the reverser to extend and the telescopic section at the engine controls thrust shaft to retract, rotating the follow-up cam. When push-pull cable travel is completed (deflector door near end of travel) the follow-up cam has rotated sufficiently to allow thrust shaft movement for application of maximum reverse thrust.

C. To return the thrust reverser to the forward thrust position, the reverse thrust lever is moved forward. As the reverse thrust lever nears the off position, the thrust reverser control cam, rotating with the throttle shaft, repositions the control valve. The thrust reverser follow-up cam prohibits movement of the forward thrust lever beyond interlock until the deflector doors have almost reached the forward thrust position. Pressurized hydraulic fluid is supplied to the lock port on the lock actuator, and the stow port on the thrust reverser actuator. (See figure 6.) The lock actuator piston extends and positions the lock latch to the closed position. The thrust reverser actuator then extends, moving the guide carriage aft to close the deflector doors. The push-pull cable, which is slaved to the guide carriage retracts at the thrust reverser telescopic section through the feedback control lever, and extends at the control shaft end. This rotates the follow-up cam to free the control shaft to allow maximum cruise thrust application after the deflector doors have nearly retracted to the cruise position. When the thrust reverser reaches the forward thrust position, the thrust reverser position indicating switch actuating bar is close to the switch sensor causing the position indicating switch to open and the REVERSER UNLOCKED light to go out.

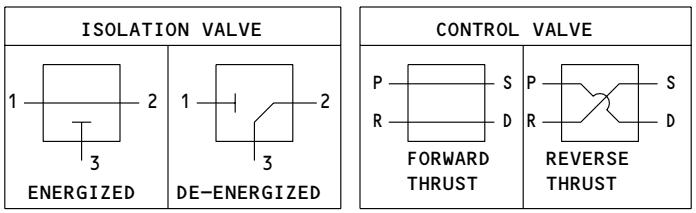
D. The interlock provision limits power setting if the thrust reverser is not in the correct position for the selected thrust condition. If the thrust reverser inadvertently moves to reverse thrust position during forward thrust operation, the push-pull control drives the follow-up cam at the control shaft, forcing the throttle control shaft to a reduced thrust setting. If the thrust reverser inadvertently actuates to cruise while in reverse thrust, the same sequence of actions occurs to reduce the thrust setting, except that all control movements are in the opposite directions.



1 AR LV-JMW THRU LV-JMY
MD 5R-MFA
PV CF-EPL, CF-EPO, CF-EPR

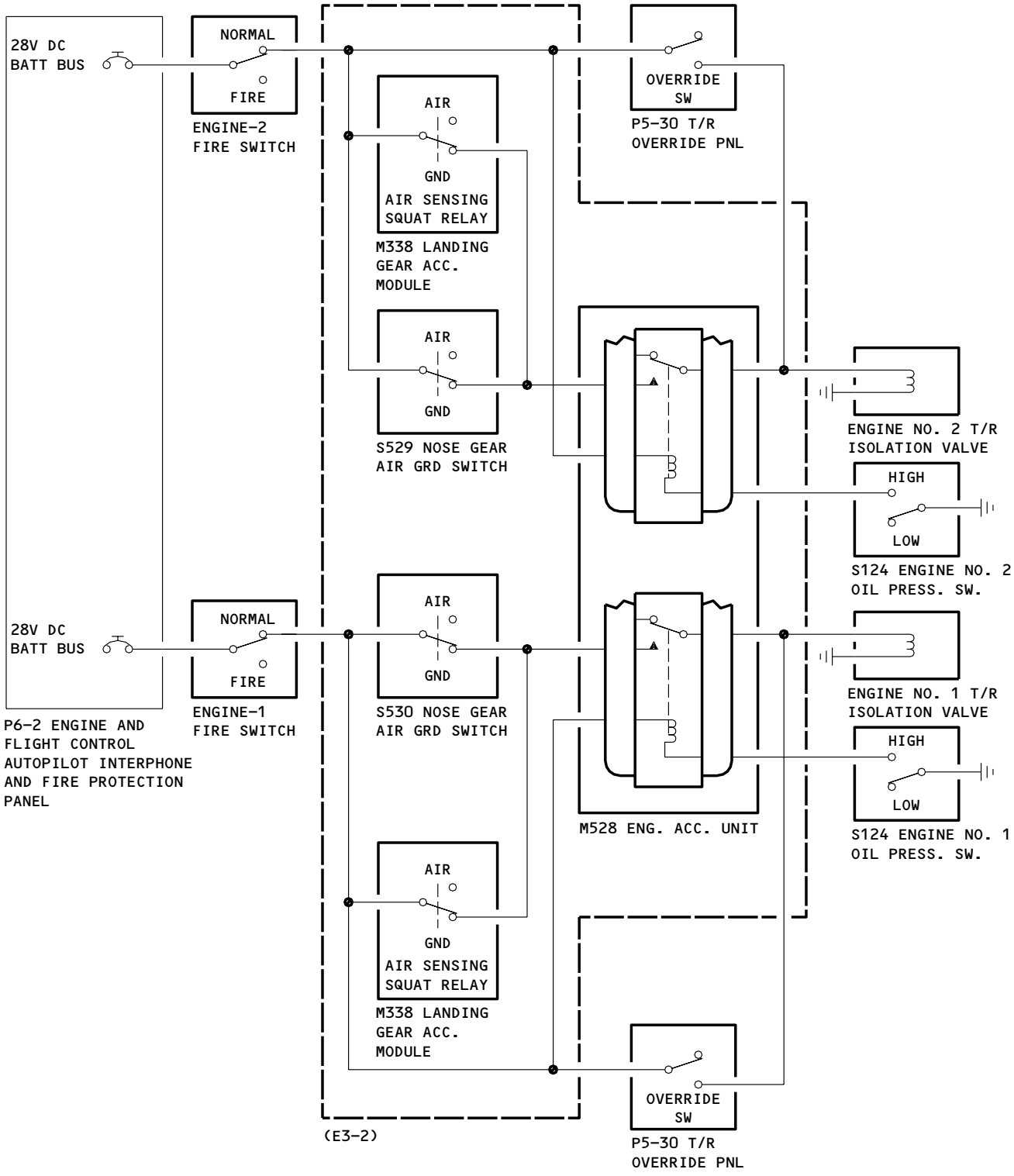
2 ALL EXCEPT 1

3 AR LV-JMW THRU LV-JMZ, LV-JND, LV-JNE, LV-JTD, LV-JTO, LV-LEB, LV-LIU THRU LV-LIW
MD 5R-MFA AND 5R-MFB
PV CF-EPL, CF-EPO, CF-EPP, CF-EPU, CF-EPR, C-GEPA, C-GEPB



4 THOSE 3 AIRPLANES INCORPORATING SB 24-1036

Thrust Reverser Control System Schematic
Figure 5 (Sheet 1)



ISOLATION VALVE CONTROL CIRCUIT

Thrust Reverser Control System Schematic
Figure 5 (Sheet 2)

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THRUST REVERSER RESTRICTOR VALVES - REMOVAL/INSTALLATION

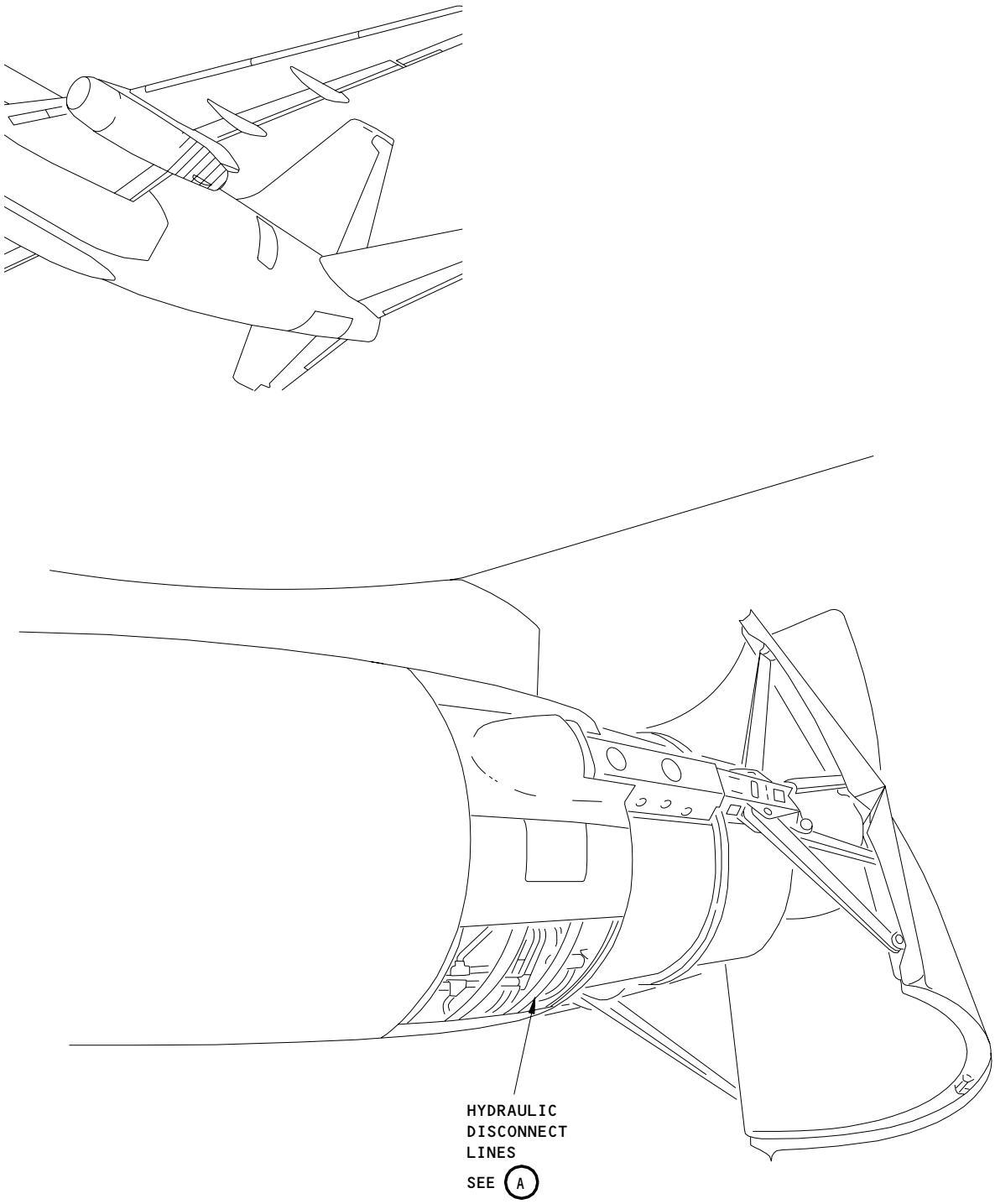
1. General
   A. This procedure contains the tasks to remove and install the thrust reverser one-way restrictor valve and the restrictor/relief valve.
2. Equipment
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly F80109-3 or F80109-9
3. References
   A. AMM 78-32-01/501, Thrust Reverser Deployment and Lock-out
   B. AMM 29-09-30/201, Hydraulic Reservoir Pressurization System
4. Prepare to Remove the Restrictor Valves
   A. Extend the thrust reverser (AMM 78-32-01/501).

      WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE THRUST REVERSER. INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN YOU EXTEND THE THRUST REVERSER.

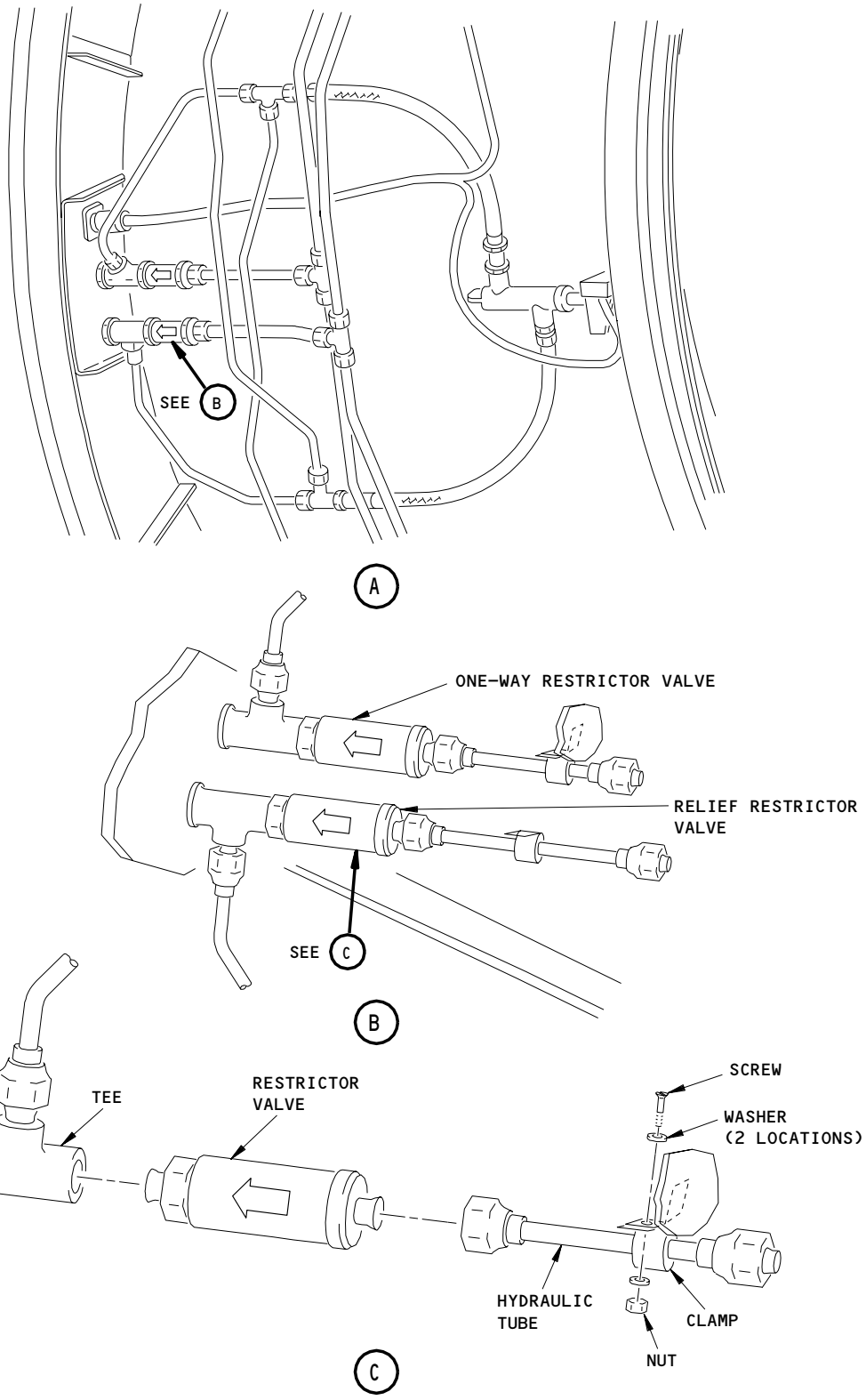
   B. Open the air conditioning bay access doors and install the rods.
   C. Install the thrust reverser isolation valve ground lock cap and pin assembly (F80109-3) or (F80109-9) to deactivate the thrust reverser hydraulic system (AMM 78-32-01/501).

      WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

   D. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   E. Depressurize hydraulic system A and the Standby system (AMM 29-09-30/201).
   F. Remove the lower access panel (Fig. 401).
5. Remove the Restrictor Valves (Fig. 401)
   A. Remove the nut, washers and screw that hold the clamp to the hydraulic tube (Fig. 401, detail B).
   B. Disconnect the hydraulic tube from the restrictor valve.
   C. Disconnect the restrictor valve from the tee.
   D. Remove the restrictor valve.
   E. Install the caps on all the hydraulic tubes and tube connections.
6. Install the Restrictor Valve (Fig. 401)
   A. Remove the caps on all the hydraulic tubes and tube connections.
   B. Install the restrictor valve to the tee (Fig. 401, View C).
   C. Install the hydraulic tube end to the restrictor valve.
   D. Install the nut, washers and screw that hold the clamp to the hydraulic tube.
7. Put the Airplane Back to its Usual Condition
   A. Remove the thrust reverser isolation valve ground lock cap and pin assembly (F80109-3) or (F80109-9) to activate the thrust reverser hydraulic system (AMM 78-32-01/501).



Thrust Reverser Restrictor Valve Installation
Figure 401 (Sheet 1)



Thrust Reverser Restrictor Valve Installation
Figure 401 (Sheet 2)

B. Stow the rods and close the air conditioning bay access doors.
C. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
D. Pressurize hydraulic system A and the Standby system (AMM 29-09-30/201).
E. Cycle the thrust reverser several times to leak check the restrictor (AMM 78-32-01/501).

WARNING: MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE THRUST REVERSER. INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN YOU EXTEND THE THRUST REVERSER.

F. Install the thrust reverser isolation valve ground lock cap and pin assembly (F80109-3) or (F80109-9) to deactivate the thrust reverser hydraulic system (AMM 78-32-01/501).

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

G. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-OPEN tag.
H. Depressurize hydraulic system A and the Standby system (AMM 29-09-30/201).
I. Install lower access panel (Fig. 401).
J. Remove the thrust reverser isolation valve ground lock cap and pin assembly (F80109-3) or (F80109-9) to activate the thrust reverser hydraulic system (AMM 78-32-01/501).
K. Remove DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
L. Pressurize hydraulic system A and the Standby system (AMM 29-09-30/201).
M. Put the thrust reverser in the forward thrust position (AMM 78-32-01/501).

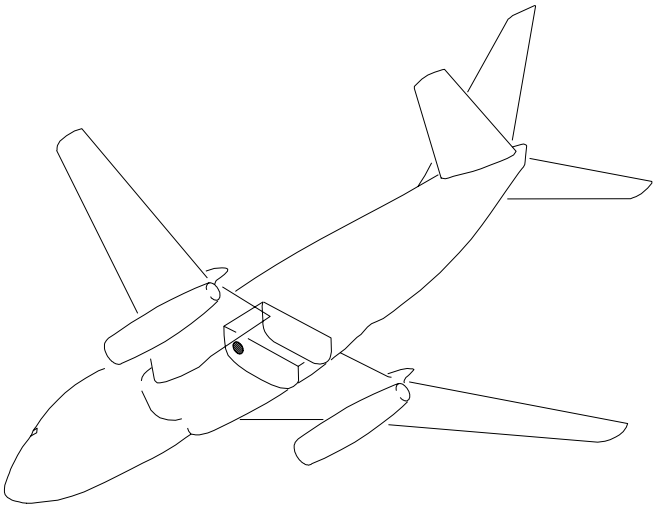
STANDBY SYSTEM THRUST REVERSER HYDRAULIC FUSES - REMOVAL/INSTALLATION

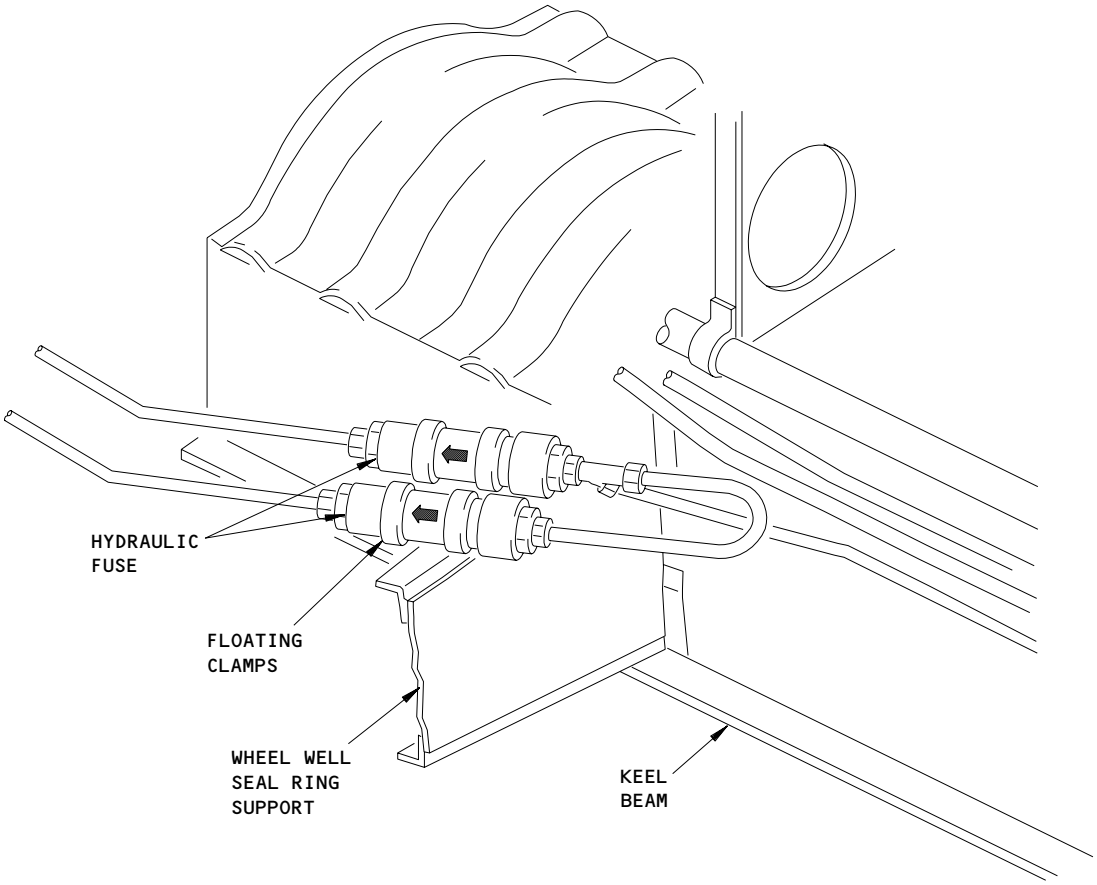
1. General
   A. This procedure contains the tasks to remove and install the thrust reverser hydraulic fuses in the standby hydraulic system. The hydraulic fuses are located near the forward bulkhead in the left wheel well on top of the seal ring support beam.
2. Equipment
   A. Container - for hydraulic fluid, 1 U. S. gallon (4 liter) capacity
   B. Skydrol Assembly Lube - MCS 352B or Fire Resistant Hydraulic Fluid - BMS 3-11
3. References
   A. AMM 29-11-00/201, Hydraulic System A
   B. AMM 29-12-00/201, Hydraulic System B
4. Remove the Hydraulic Fuse (Fig. 401)
   A. Depressurize the hydraulic systems (AMM 29-11-00/201 and 29-12-00/201).
   B. Disconnect the inlet and outlet hydraulic tubes from the hydraulic fuse.
   C. Remove the hydraulic fuse.
   D. Install the protective caps and plugs on all the hydraulic tubes.
5. Install the Hydraulic Fuse (Fig. 401)
   A. Remove the reducer from each end of the used fuse and install them on the new fuse.
   B. Apply hydraulic fluid or assembly lube to the new O-rings and install O-rings on the reducers.
   C. Place the fuse in position and make sure the flow direction arrow points forward.

      CAUTION: MAKE SURE THE FLOW DIRECTION ARROW ON THE FUSE POINTS FORWARD (SEE DECAL ON AIRPLANE). IF THE FUSE IS INSTALLED INCORRECTLY, ASYMMETRIC EXTENSION OF THE THRUST REVERSER CAN OCCUR.

      CAUTION: MAKE SURE THE CORRECT HYDRAULIC FUSE IS INSTALLED FOR THE THRUST REVERSER STANDBY SYSTEM. IF THE INCORRECT FUSE IS INSTALLED, ASYMMETRIC EXTENSION OF THE THRUST REVERSER CAN OCCUR.

   D. Connect the inlet and outlet hydraulic tubes to the hydraulic fuse.
   E. Pressurize the hydraulic systems (AMM 29-11-00/201 and 29-12-00/201).
   F. Make sure there are no leaks at the fuse connections.
   G. Do a test of the thrust reverser operation with the alternate hydraulic system (AMM 78-32-01/501)





Thrust Reverser Hydraulic Fuse Installation
Figure 401

THRUST REVERSER CONTROL VALVE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
2. Remove Thrust Reverser Control Valve
   A. Open the air conditioning bay access doors and install the rods.
   B. Deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   C. Open the applicable THRUST REVERSER circuit breaker on panel P6 and attach a DO-NOT-CLOSE tag.
   D. Remove wing access panel 6301 on left wing or 6401 on right wing to gain access to thrust reverser control valve (Ref Chapter 12, Access Doors and Panels).
   E. Disconnect control valve link at lever arm (Fig. 401).
   F. Disconnect hydraulic lines (four places) from valve fittings and cap al1 lines. Cap or plug control valve ports.

      NOTE 1: To facilitate valve removal, it may be necessary to remove the valve port fittings.

      NOTE 2: To facilitate removal of No. 2 engine control valve, place No. 2 thrust lever in full forward position.

   G. Remove control valve mounting bolts and spacers (and washers and nuts, if applicable). Remove valve.
3. Install Thrust Reverser Control Valve
   A. Position control valve at engine controls mounting bracket on wing front spar and attach to bracket with bolts and spacers (and washers and nuts, if applicable) (Fig. 401).

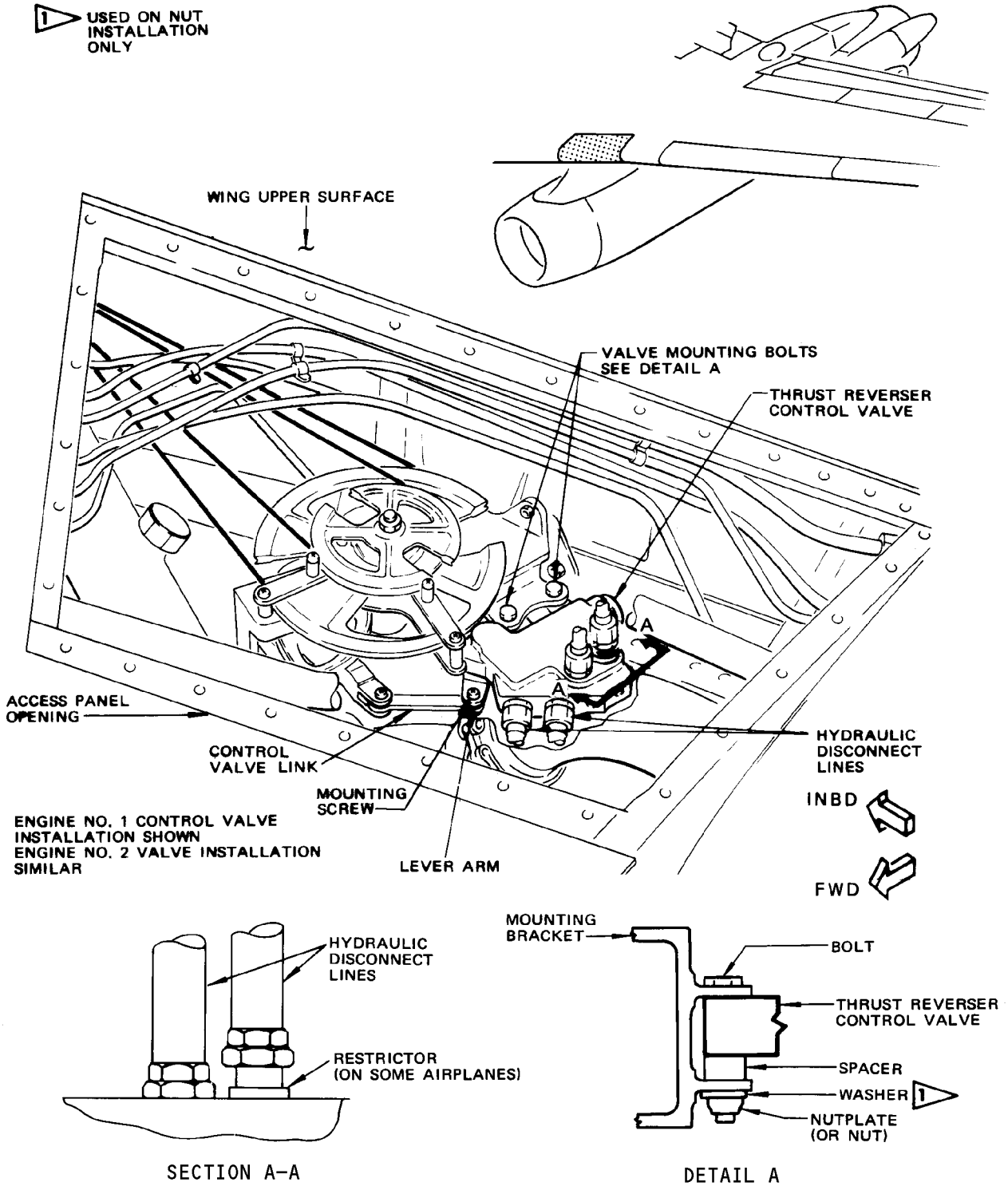
      NOTE: To facilitate installation of No. 2 engine control valve, place No. 2 thrust lever in full forward position.

   B. Remove caps or plugs from control valve and hydraulic lines and connect hydraulic lines to fittings on valve.

      NOTE: If installed, restrictor (section AA) must have shoulder against boss as shown.

   C. Connect valve link to lever arm with screw, washer, and nut. Torque nut 40 to 50 pound-inches.
   D. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.

E. Stow the rods and close the air conditioning bay access doors.
F. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
G. Do a test of the thrust reverser operation with both normal and alternate hydraulic systems.
   (1) Cycle the thrust reverser several times, use both normal and alternate hydraulic systems to leak check the valve assembly, refer to AMM 78-32-01/501.
H. Replace access panel 6301 on left wing or 6401 on right wing.



Thrust Reverser Control Valve Installation
Figure 401

THRUST REVERSER SHUTTLE VALVE - REMOVAL/INSTALLATION

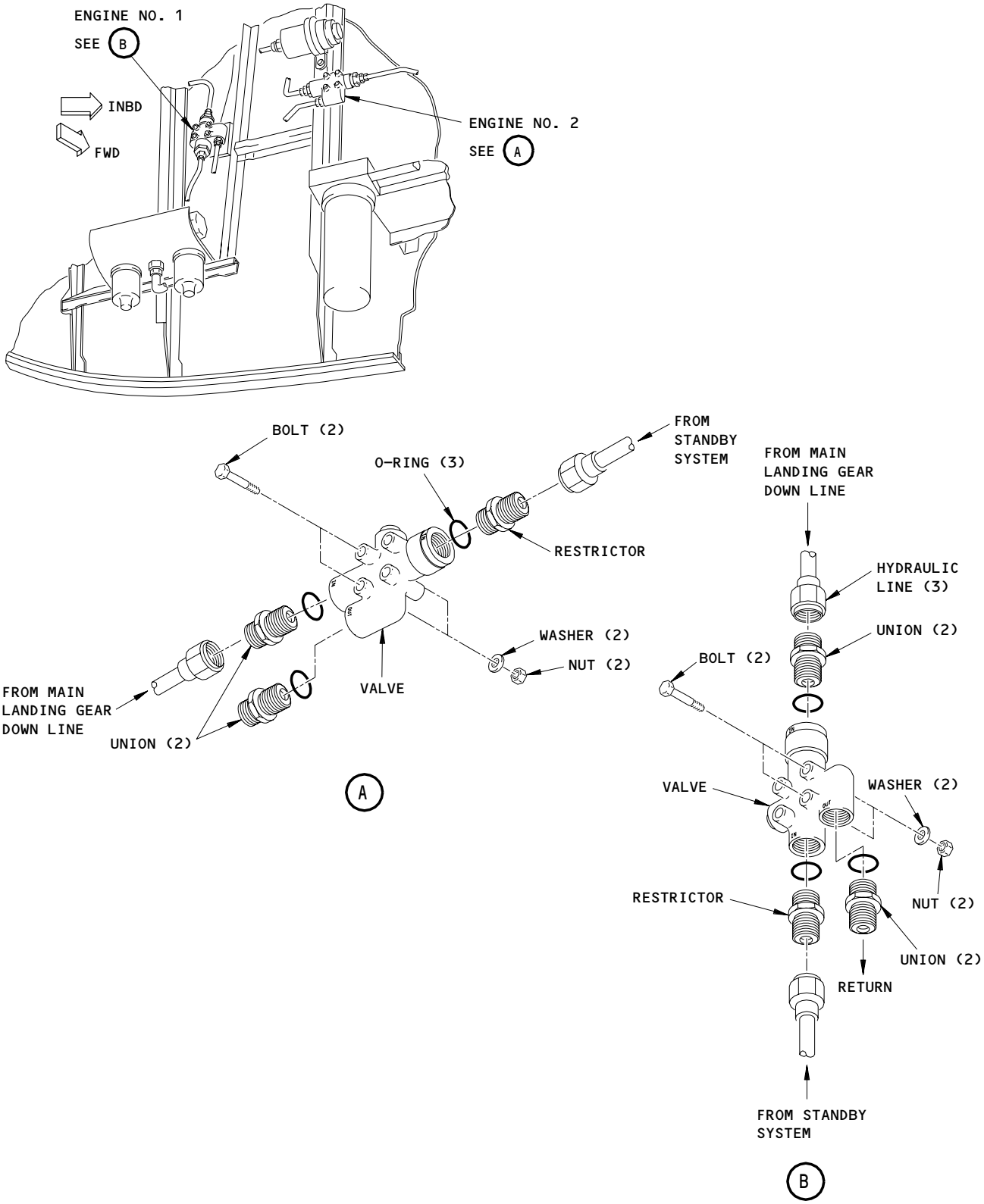
1. Prepare for Removal
   A. Remove hydraulic pressure from the thrust reverser system:
      (1) Move the landing gear selector lever to the OFF position and install a DO-NOT-OPERATE tag.

      NOTE: This will remove the pressure from the main landing gear down line.

      (2) Depressurize the standby hydraulic system (Ref 29-12-0/201) to remove the alternate hydraulic pressure.
      (3) Depressurize the hydraulic system reservoirs (Ref 29-11-0/201) to remove the hydraulic pressure from the return lines.
      (4) Put a container under the shuttle valve.

2. Shuttle Valve Removal (Fig. 401)
   A. Disconnect the hydraulic lines from the ports on the shuttle valve.
   B. Install protective caps on the hydraulic lines and in the ports on the shuttle valve.
   C. Remove the bolts, nuts, and washers that secure the shuttle valve to the bulkhead. Remove the shuttle valve.
   D. Remove the restrictor and O-ring from the shuttle valve. Discard the O-ring.
   E. Remove the unions and O-rings from the shuttle valve. Discard the O-rings.
3. Shuttle Valve Installation (Fig. 401)
   A. Install the unions and new O-rings in the shuttle valve.
   B. Install the restrictor and a new O-ring in the shuttle valve.
   C. Put the shuttle valve on the bulkhead and attach it with two bolts, two washers, and two nuts.
   D. Remove the protective caps from the hydraulic lines and the shuttle valve.
   E. Connect the hydraulic lines to the shuttle valve.
4. Return the Airplane to Normal
   A. Service the hydraulic system (Ref 12-12-0/201).
   B. Remove the DO-NOT-OPERATE tag and move the landing gear selector lever to the down position.
   C. Pressurize the hydraulic system (Ref 29-11-0/201 and 29-12-0/201).
   D. Operate the thrust reverser (Ref 78-32-01/501) and look for leakage at the shuttle valve.

      WARNING: KEEP PERSONS AWAY FROM THE THRUST REVERSERS WHEN THEY OPERATE. THRUST REVERSER OPERATION CAN CAUSE INJURY.



Thrust Reverser Shuttle Vavle Installation
Figure 401

THRUST REVERSER PUSH-PULL CABLE - REMOVAL/INSTALLATION

1. General
   A. The thrust reverser push-pull cable installation consists of a rigid pushrod and a push-pull cable. The pushrod and push-pull cable can be removed and installed as separate units. The push-pull cable can be uncoupled at a quick-disconnect to allow the forward and aft cable subassemblies to be removed as separate units. The forward cable subassembly is supported entirely at the engine firewall. The aft cable subassembly is attached entirely to the thrust reverser assembly.
2. Equipment and Materials
   A. Lubricant - Grease, Dow Corning 33 Light Grade, Dow Corning Corp., Midland, Michigan
   B. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9
3. Prepare for Removal
   A. Open the air conditioning bay access doors and install the rods.
   B. With reverser in the forward thrust position, deactivate thrust reverser hydraulic system by installing ground locks on both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS SHOULD NOT DEPLOY.

   C. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   D. Remove the engine side cowl panels (AMM 71-11-11/401).
   E. Remove engine midfairing forward and midaccess panels on both sides of fairing to gain access to forward end of push-pull cable and cable pushrod.
   F. Remove the wing-to-engine forward fairing (AMM 54-51-11/401).
   G. Remove large access panel at aft end of midfairing just forward of thrust reverser (inboard side panel on engine No. 1 strut and outboard side panel on engine No. 2 strut).
   H. Remove the upper surface, wing access panel 6301 on the left wing or wing access panel 6401 on the right wing to gain access to thrust reverser follow-up cam (AMM 12-31-71/201).
   I. Remove the tailpipe fairings to gain access to aft rigid section of push-pull cable (AMM 78-32-162/401).
   J. Remove feedback control access panel to gain access to feedback control lever.

4. Remove Thrust Reverser Push-Pull Cable

A. Uncouple push-pull cable at quick disconnect located above aft end of engine just forward of thrust reverser tailpipe extension. Thrust reverser must be in forward thrust position in order to uncouple cable at quick disconnect (Fig. 401).

NOTE: If outer sleeve of quick disconnect is jammed, it can be loosened by inserting screwdriver between wrenching flat on forward connector terminal and forward lip of outer sleeve.

B. Remove aft cable and conduit assembly.

CAUTION: DO NOT REMOVE AFT CABLE FROM CONDUIT. TELEFLEX CABLE IS INSERTED IN CONDUIT BEFORE ASSEMBLY IS INSTALLED. REMOVAL AND INSERTION OF CABLE WITH CONDUIT MOUNTED WILL RESULT IN DAMAGE TO THE CONDUIT LINING. CONTROLEX CABLE AND CONDUIT SHOULD NOT BE SEPARATED EXCEPT BY THE MANUFACTURER.

(1) Remove two bolts securing aft cable assembly to engine shroud.
(2) Remove bolt, nut, washer and bushing connecting push-pull cable to feedback control lever.
(3) Remove bolts securing aft rigid section of push-pull cable to shroud bulkhead.
(4) Remove screws securing push-pull cable to brackets on tailpipe extension.
(5) On TELEFLEX assembly, loosen union in aft rigid section of push-pull cable.
(6) Remove cable and conduit assembly, carefully removing aft rigid section of push-pull cable from thrust reverser by pulling through shroud bulkhead.

CAUTION: HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION.

C. Remove forward cable and conduit assembly.
(1) Remove TELEFLEX forward cable and conduit.
(a) At forward end of push-pull cable remove cable locking clamp from push-pull cable telescopic unit. This will free cable at forward end.
(b) Remove forward cable subassembly by pulling out of conduit from quick-disconnect end.

CAUTION: HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION.

(c) Remove cable conduit by disconnecting conduit from forward telescopic unit inner slider at bracket bulkhead connection on engine firewall, unclamping conduit from firewall bracket connection and pulling conduit out through aft end fairleads.

(2) Remove CONTROLEX forward cable and conduit.

CAUTION: DO NOT ATTEMPT TO REMOVE CABLE FROM CONDUIT. CONTROLEX CABLE AND CONDUIT SHOULD NOT BE SEPARATED EXCEPT BY THE MANUFACTURER.

(a) Remove bolt, nut, washer and spacer tube through forward cable rod end. (This requires temporary removal of idler link to allow removal of bolt.)
(b) Loosen and remove rod end and locknut from cable.
(c) Remove union nut and forward washers holding cable union to support bracket.
(d) Loosen clamp halfway along length of conduit.
(e) Pull cable and conduit assembly out through aft end fairleads. Remove remaining washers from cable union as the assembly is removed.

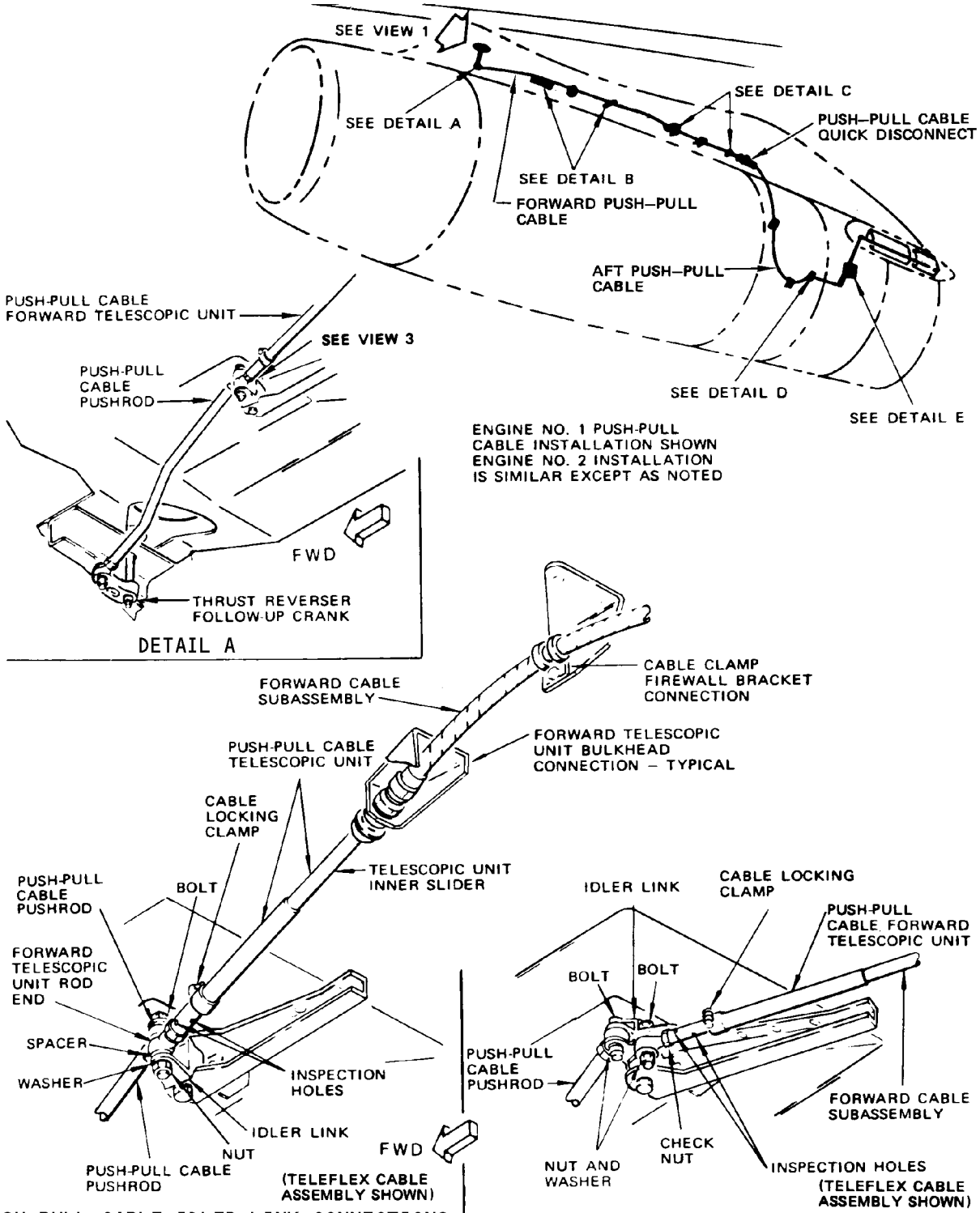
D. Remove push-pull cable pushrod by removing bolt attaching push-pull rod to follow-up crank and bolt attaching rod to idler link, if not removed above.

5. Install Thrust Reverser Push-Pull Cable

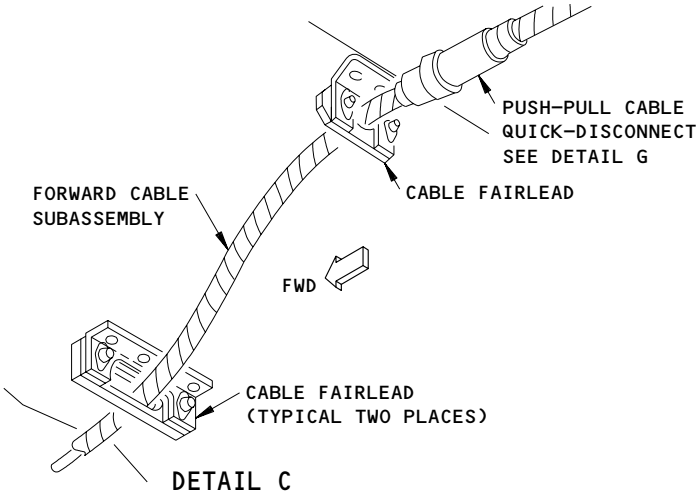
NOTE: Difficulty may be experienced when attempting to join a CONTROLEX forward push-pull cable assembly with a TELEFLEX aft cable assembly. If a problem occurs in joining cables, replace the forward CONTROLEX CABLE assembly with one identified by an R or an S behind the part number.

A. Install forward cable and conduit assembly.
(1) If forward TELEFLEX conduit run is already installed, install push-pull cable (Fig. 402). If conduits and cable are both being installed, proceed as follows:

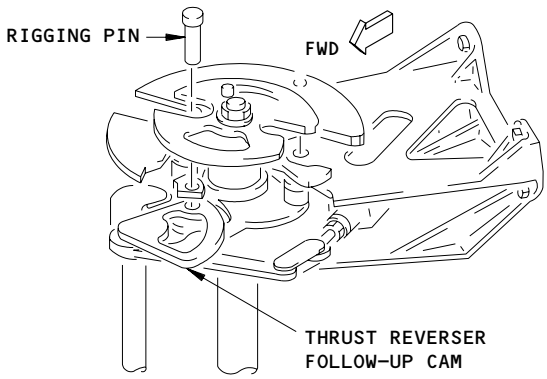
NOTE: It is recommended that the forward TELEFLEX cable and conduit assembly be installed as a unit. All CONTROLEX cables and conduit should be installed as complete units.



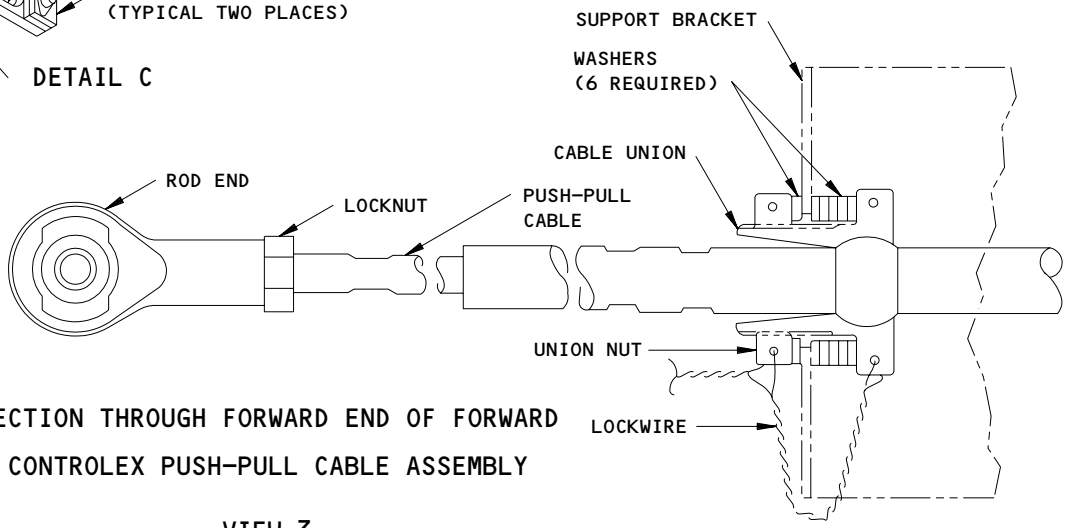
Thrust Reverser Push–Pull Cable Installation
Figure 401 (Sheet 1)



DETAIL C

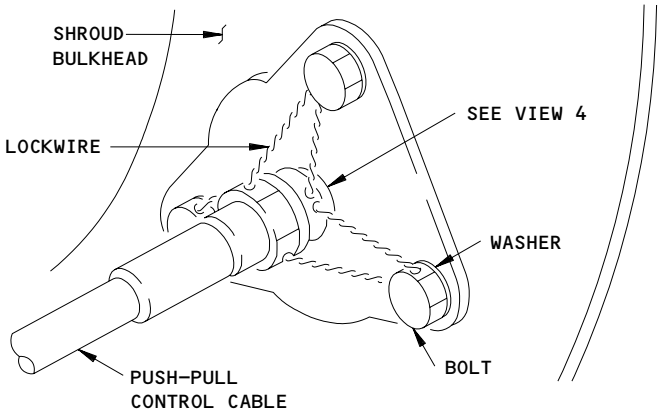


VIEW 1



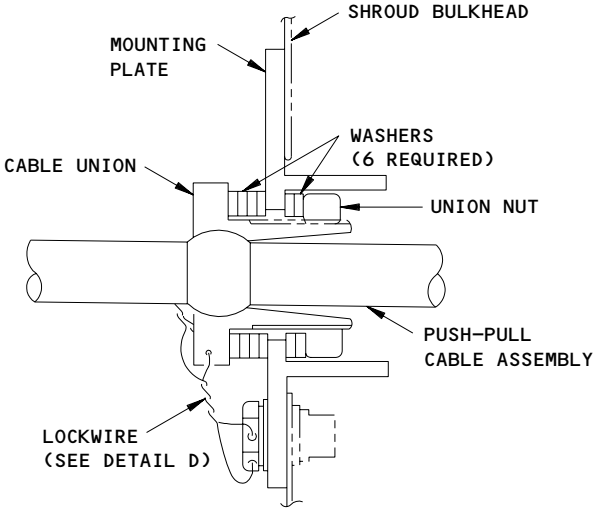
SECTION THROUGH FORWARD END OF FORWARD CONTROLEX PUSH–PULL CABLE ASSEMBLY

VIEW 3



DETAIL D

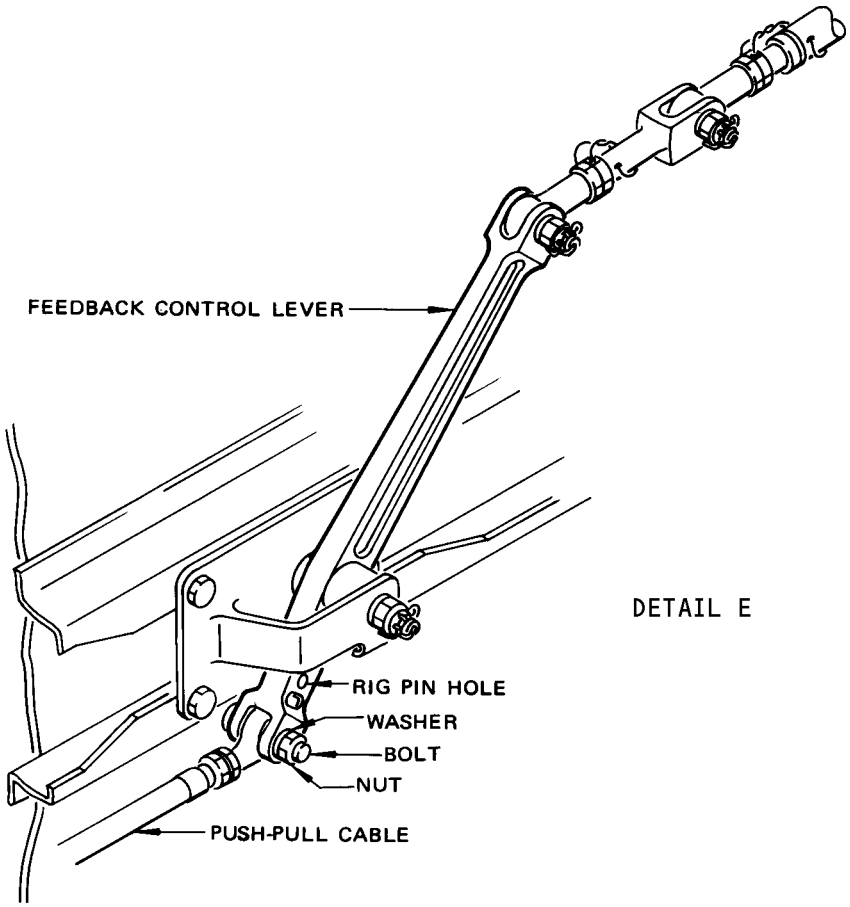
FWD



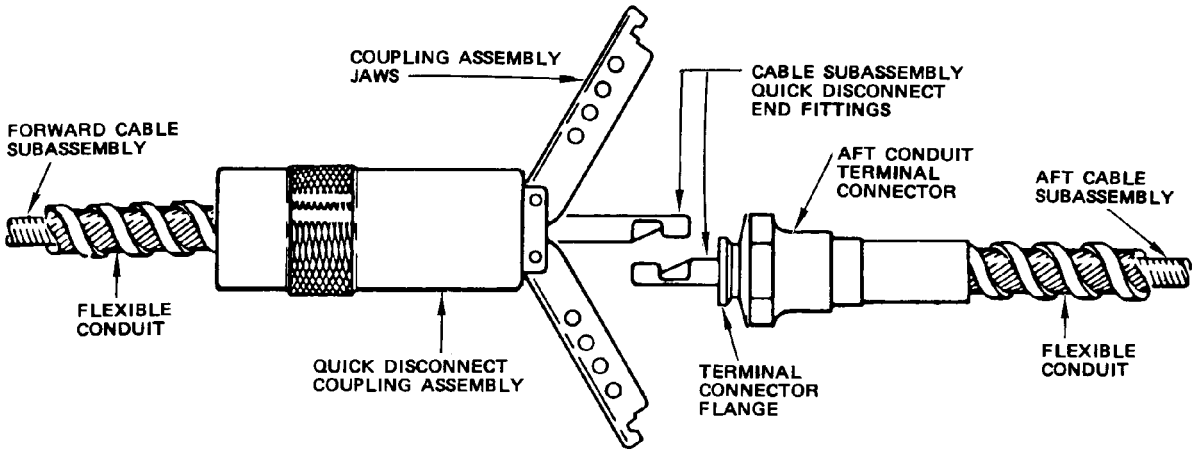
SECTION THROUGH AFT END OF AFT CONTROLEX PUSH–PULL CABLE ASSEMBLY

VIEW 4

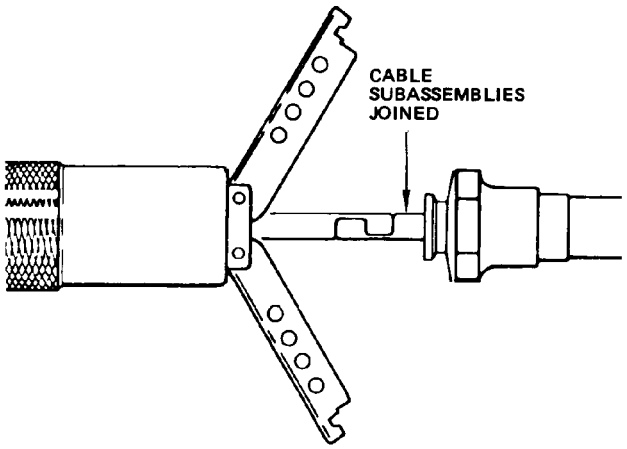
Thrust Reverser Push–Pull Cable Installation
Figure 401 (Sheet 2)



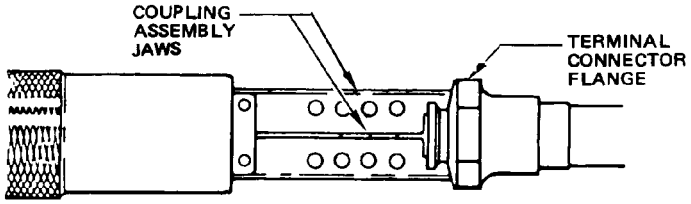
Thrust Reverser Push-Pull Cable Installation
Figure 401 (Sheet 3)



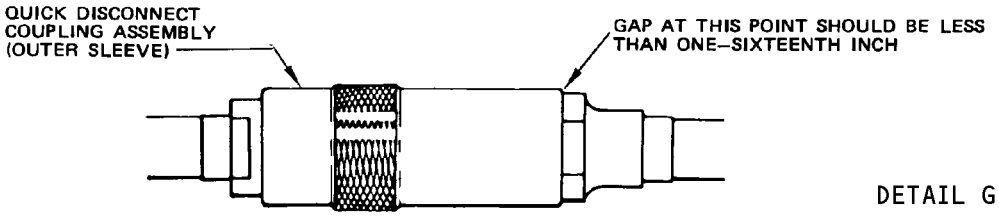
STEP 1. PREPARE TO JOIN CABLE SUBASSEMBLY END FITTINGS



STEP 2. JOIN CABLE SUBASSEMBLIES AT END FITTINGS



STEP 3. CLOSE COUPLING ASSEMBLY JAWS OVER AFT CONDUIT TERMINAL CONNECTOR FLANGE



STEP 4. RELEASE QUICK DISCONNECT COUPLING ASSEMBLY OUTER SLEEVE AND PUSH SLEEVE FULLY AFT TO SECURE CONNECTION

Thrust Reverser Push-Pull Cable Quick-Disconnect Connection
Figure 402

(2) Check TELEFLEX cable for lubrication. If cable is not thoroughly greased, apply Dow Corning 33 light grade lubricant.

CAUTION: HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION. GROOVED CABLE END MUST SHOW NO SHARPNESS WHEN MOVED BETWEEN FINGERS. DEBURR AND BUFF IF NECESSARY.

NOTE: CONTROLEX cable is assembled and operates dry.

(3) Insert forward TELEFLEX cable in conduit before inserting conduit in strut. Insert rounded end of cable into conduit at quick-disconnect coupling end of conduit and thread cable through conduit. If any obstructions are felt during cable insertion, move cable back and forth to assure unforced passage.

CAUTION: WHEN FEEDING CABLE INTO CONDUIT, HOLD CABLE NO FARTHER BACK THAN THREE TO FOUR INCHES FROM CONDUIT OPENING TO PREVENT KINKING.

(4) With threaded connector end of conduit forward, push conduit and cable assembly through the fairleads on engine firewall, starting at aft fairlead, till conduit bracket bulkhead connection is reached.

(5) Attach forward end of cable.

(a) On TELEFLEX assembly, connect forward telescopic unit swivel assembly threaded connector at bulkhead connection. Tighten nuts and lockwire.

(b) On CONTROLEX assembly, install five washers on cable union, insert through support bracket, and install one washer and nut on forward side of bracket. Tighten nut and lockwire union nut to union.

(6) Secure conduit to bracket on engine firewall with clamp. Before clamping check that there are no sharp bends in the conduit run.

(7) Proceed to step D.

B. Prior to inserting forward TELEFLEX cable into an installed conduit, check cable for lubrication. If cable is not thoroughly greased apply Dow Corning 33 light grade lubricant.

CAUTION: HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION. GROOVED CABLE END MUST SHOW NO SHARPNESS WHEN MOVED BETWEEN FINGERS. DEBURR AND BUFF IF NECESSARY.

C. With conduits uncoupled at quick disconnect, insert rounded end of cable into aft end of conduit at quick-disconnect coupling and thread through conduit until end of cable comes out through end of forward swivel assembly. If any obstructions are felt, move cable back and forth to assure unforced passage. (Helixes on cable have a tendency to catch any discontinuities in the conduit due to stiffness of this cable.)

CAUTION: WHEN FEEDING CABLE INTO CONDUIT, HOLD CABLE NO FARTHER BACK THAN THREE TO FOUR INCHES FROM OPENING IN END OF TELESCOPIC UNIT SLEEVE.

D. Install aft cable and conduit assembly.

NOTE: Aft cable and conduit should be installed as a unit.

(1) Install TELEFLEX aft cable and conduit.
   (a) Check TELEFLEX cable for lubrication. If cable is not thoroughly greased apply Dow Corning 33 light grade lubricant.

   CAUTION: HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION. GROOVED CABLE END MUST SHOW NO SHARPNESS WHEN MOVED BETWEEN FINGERS. DEBURR AND BUFF IF NECESSARY.

   (b) Position aft rigid section of push-pull cable on tailpipe extension. Aft part of cable must be inserted through shroud bulkhead.

   CAUTION: WHEN INSERTING CABLE THROUGH SHROUD BULKHEAD HANDLE CABLE WITH CARE TO AVOID CONTAMINATION AND PREVENT KINKING. A KINKED CABLE IS CAUSE FOR REJECTION.

   (c) Tighten union in aft rigid section of push-pull cable.
   (d) Secure push-pull cable to brackets on tailpipe extension with screws.
   (e) Secure push-pull cable to shroud bulkhead with bolts and lockwire. (Fig. 401, sheet 2, detail D)
   (f) Attach push-pull cable to feedback control lever with bolt, nut, washer, and bushing.
   (g) Secure rigid section of push-pull cable to engine shroud with bolts.

(2) Install CONTROLEX aft cable and conduit.
   (a) The CONTROLEX cable assembly includes a flat steel center core which will bend easily in the flat plane, but resists bending in the edgewise direction and may be damaged if forced. Make all bends while holding the unsupported end of the cable assembly straight. Do not force the cable into any position.
   (b) Install the disconnect end forward through the engine shroud and bolt in place.
   (c) Attach clamps to tailpipe extension (2 places) and leave loose.
   (d) Insert aft end through shroud bulkhead. The cable union should have four washers on the forward side and two washers on the aft side of the mounting plate and should be tight. Install bolts in mounting plate.
   (e) Attach bracket marked OUT to tailpipe extension with marking visible. Leave bolts loose.
   (f) If clamp is installed on tailpipe extension bracket, remove the clamp and discard.
   (g) When installing a cable on engine No. 2, which has a clamp installed on the tailpipe extension bracket, remove the clamp and discard.
   (h) Adjust the cable assembly in the brackets and clamps to get the best fit possible and to maintain 0.12 inch minimum clearance with the tailpipe.

      CAUTION: THE ROD ON THE AFT TELESCOPIC UNIT MUST BE CENTERED IN THE CABLE UNION (VIEW 4) WHEN IN THE NEUTRAL (UN-ATTACHED) POSITION. PROVIDE SUFFICIENT LOOP IN THE CABLE BETWEEN THE CABLE UNION AND THE FIRST CLAMPS FORWARD OF THE CABLE UNION TO ENSURE THAT NO PRELOAD EXISTS ON THE TELESCOPE ROD WHEN IT IS CONNECTED TO THE FEEDBACK CONTROL LEVER.

   (i) Tighten all bolts and install lockwire through cable union and bolts (Fig. 401).

E. Connect cable and conduit assemblies at quick-disconnect.
   (1) Align forward and aft cable subassemblies so that cable ends at quick-disconnect can be joined without twisting forward cable. This can be one by moving forward cable back and forth in conduit a few times while positioning end fitting to align with mating end fitting of aft cable.
   (2) Join cable ends together.
   (3) Manually close jaws of coupling assembly over mating flange on connector terminal on aft conduit. Notch at aft end of both jaws must engage circular flange on terminal.
   (4) While holding jaws in place with one hand, release outer sleeve of disconnect from forward holding position with other hand.

(5) Push outer sleeve fully aft to secure connection.

CAUTION: THE GAP BETWEEN AFT END OF OUTER SLEEVE AND AFT CONNECTOR TERMINAL SHOULD BE LESS THAN ONE-SIXTEENTH INCH. A LARGER GAP COULD INDICATE THAT THE COUPLING ASSEMBLY JAWS ARE NOT ENGAGED WITH THE CONNECTOR TERMINAL FLANGE.

F. Connect up front end of forward cable assembly.
   (1) Connect up TELEFLEX rod end.
      (a) Position forward telescopic unit over forward end of push-pull cable and secure to cable with locking clamp. Cable must be visible through inspection hole directly beneath clamp on cable slider prior to clamping.
      (b) Check adjustment of rod end. Dimension from bolt center to end of tube is 0.85 +0.05/-0.05 inches.
      (c) Lockwire rod end locknut to locking clamp bolt.
   (2) Connect up CONTROLLEX rod end.
      (a) Screw locknut and rod end onto end of cable.
      (b) Screw rod end until cable appears in sight hole plus five additional turns.
      (c) Tighten locknut.
   (3) Connect rod end to idler link with bolt, nut, washer and spacer. (This requires temporary removal of idler link to allow installation of bolt from above.)
G. Install push-pull cable pushrod.
   (1) Position push-pull cable pushrod over top of forward engine mount and connect forward end of thrust reverser follow-up crank with bolt, nut, washer, and cotter pin. Orient forward and aft end of rod per AFT stamp on rod.
   (2) For engine No. 2 cable installation, connect aft end of rod to idler link with bolt, nut, and washer.
   (3) For engine No. 1 installation, connect aft end of pushrod when connecting push-pull cable at telescopic assembly rod end.
H. Rig cable and connect to thrust reverser.
   (1) Position thrust reverser follow-up cam so that rigging pin holes in follow-up cam and engine controls bracket line up and instal1 rigging pin.

NOTE: If necessary, move thrust lever in control cab to position cutouts in throttle and start drum to allow rigging pin insertion.

   (2) Check that thrust reverser linkage assembly is properly adjusted (AMM 78-32-201/501).

(3) Adjust aft end of aft assembly as necessary per following to allow installation of bolt through rod end and feedback control lever, and install bolt, nut and washer.
(a) Coarse adjustment
1) For TELEFLEX assembly, coarse adjustment (+0.30 inch, available at either forward or aft end of cable) is made by loosening clamp on telescopic unit outer slider and moving slider as necessary to obtain required length. Tighten clamp. Cable must be visible through inspection hole beneath clamp.
2) For CONTROLEX assembly, coarse adjustment is made by moving washers at aft cable union from one side of mounting plate to the other. Additional coarse adjustment is available at washers at forward cable union, if required. Tighten union nut after adjusting (Fig. 401, sheet 2).
(b) Fine adjustment (+0.12 inch, available at cable aft end only) is made by loosening checknut at rod end and adjusting rod end length. Tighten checknut. Rod end threads must be visible through inspection hole.
(c) Check that rigging pin can be removed and installed freely.
(d) Replace lockwire as required after adjusting.
(4) Remove rigging pins.

I. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
J. Stow the rods and close the air conditioning bay access doors.
K. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
L. Test the thrust reverser operation (AMM 78-32-01/501).

6. Restore Airplane to Normal Configuration
A. Install the wing access panel 6301 on the left wing or 6401 on the right wing (AMM 12-31-71/201).
B. Install engine midfairing access panels.
C. Install the engine forward fairing (AMM 54-51-11/401).
D. Install the engine side cowl panels (AMM 71-11-11/401).
E. Install the tailpipe fairings (AMM 78-32-162/401).
F. Install feedback control access panel.

THRUST REVERSER ISOLATION VALVE - REMOVAL/INSTALLATION

1. Prepare for Removal
   A. Remove hydraulic pressure from thrust reverser system.
      (1) Remove main hydraulic pressure.
         (a) On all airplanes except SA ZS-SBL thru ZS-SBO; AR LV-JMW thru LV-JMY, which receive power from main landing gear down line, move landing gear selector lever to OFF and placard.
         (b) On airplanes SA ZS-SBL thru ZS-SBO; AR LV-JMW thru LV-JMY, which receive power directly from system A, manually position hydraulic system interconnect valve to No. 1 position.
      (2) Remove alternate hydraulic pressure.
         (a) On airplanes SA ZS-SBL thru ZS-SBO; AR LV-JMW thru LV-JMY, having thrust reverser accumulators, proceed as follows:

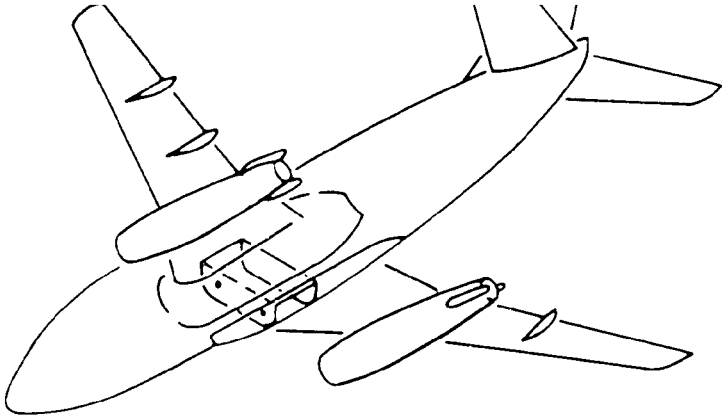
            WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

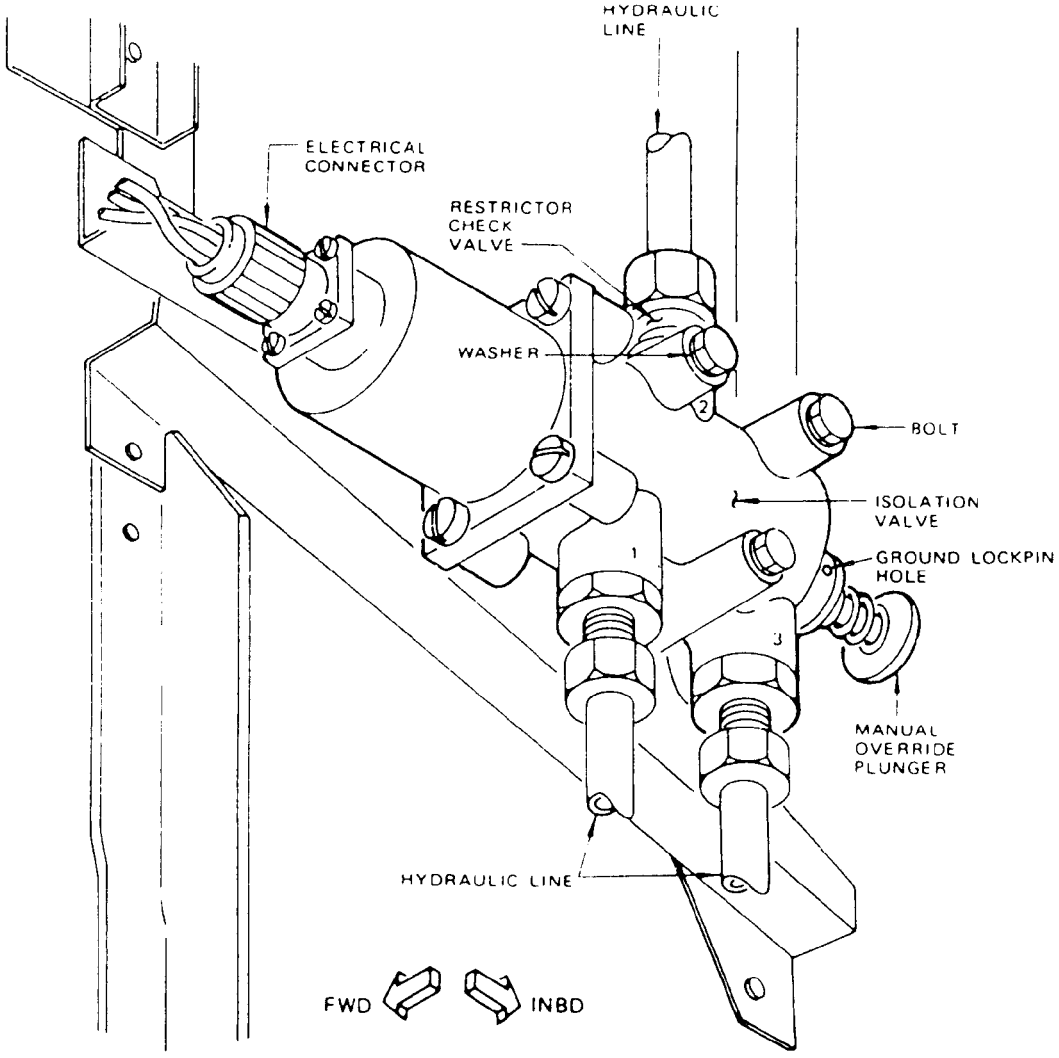
            1) Move thrust reverser override switch to OVERRIDE.
            2) Rotate engine reverse thrust lever between aft interlock stop and OFF positions as many times as needed until reverser remains partially deployed. Allow 10 seconds after each rotation.
            3) Return override switch to NORMAL.
         (b) On all airplanes except SA ZS-SBL thru ZS-SBO; AR LV-JMW thru LV-JMY, depressurize standby hydraulic system. Refer to Chapter 29, Hydraulic Power.
      (3) Remove pressure from return lines by depressurizing hydraulic system reservoirs. Refer to Chapter 29, Hydraulic Power.
   B. Lower air conditioning equipment bay doors.
2. Remove Isolation Valve (See figure 401.)
   A. Disconnect electrical connector from receptacle on isolation valve.
   B. Disconnect hydraulic lines from ports on isolation valve and cap lines.
   C. Remove restrictor check valve from the No. 2 port and save for reinstallation.
   D. Remove bolts and washers securing isolation valve to bracket on front spar, and remove valve.
3. Install Isolation Valve (See figure 401.)
   A. Position isolation valve on bracket on front spar and attach to bracket with bolts and washers.
   B. Install restrictor check valve in the No. 2 port.
   C. Remove caps from hydraulic lines and connect lines to ports on isolation valve.
   D. Connect electrical connector to receptacle on valve.

4. Restore Airplane to Normal
   A. Pressurize hydraulic system. Refer to Chapter 29, Hydraulic Power.
   B. Operate thrust reverser per 78-32-01, and check isolation valve hydraulic lines for leaks.

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGH T BY ROTATING DEFLECTOR DOORS.

   C. Close air conditioning equipment bay doors.





Thrust Reverser Isolation Valve Installation
Figure 401

THRUST REVERSER ACCUMULATOR - REMOVAL/INSTALLATION

1. Deleted.
2. Prepare for Removal
   A. Place hydraulic system interconnect valve in position No. 1.
   B. Move thrust reverser override switch to OVERRIDE.

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

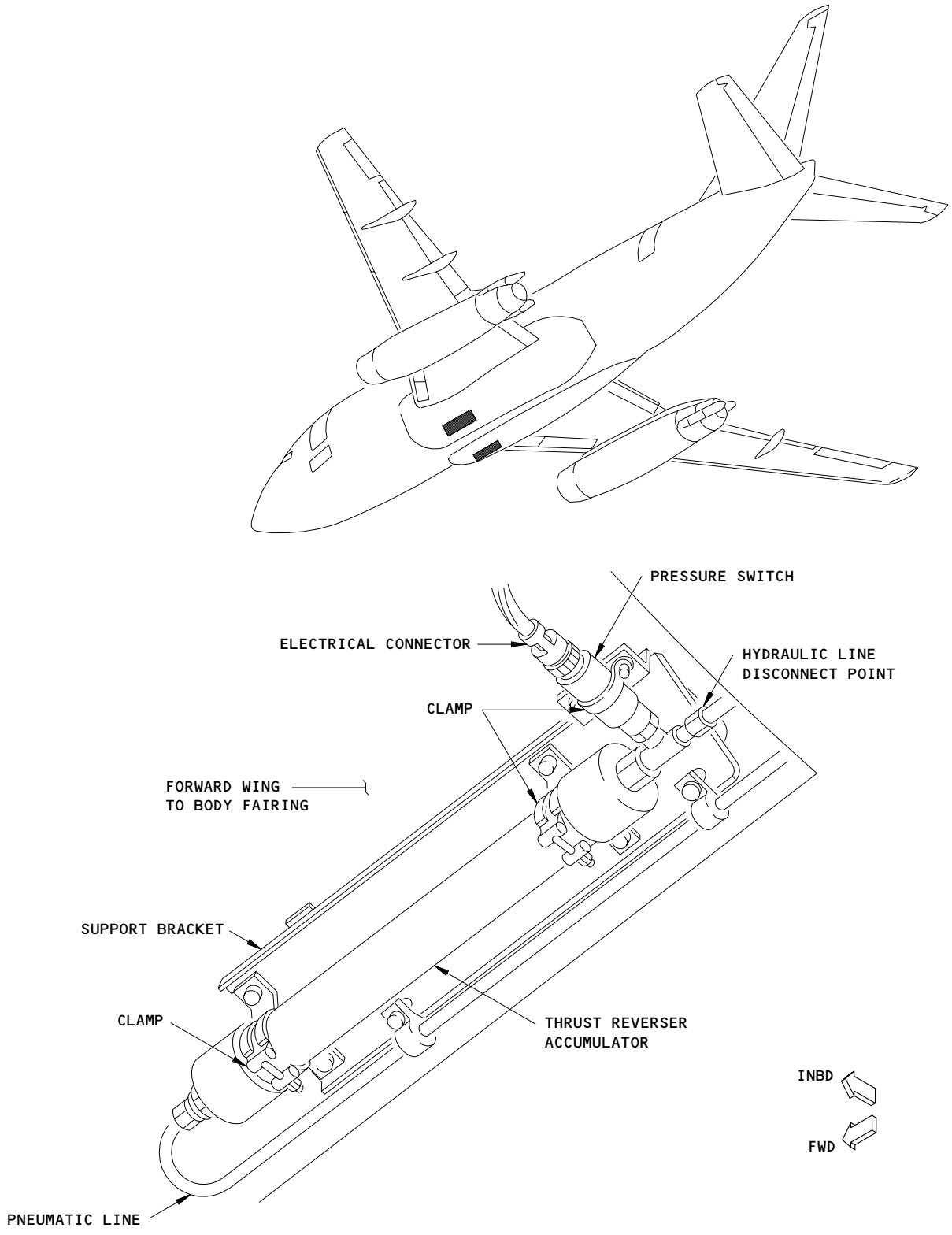
   C. Cycle reverse thrust lever between interlock stop and OFF positions until reverser stops moving hydraulically.
   D. Return override switch to NORMAL.
   E. Open charging valve to release accumulator air preload. Valve is located in main gear wheel well on left side.
   F. Remove forward wing to- -body fairing to gain access to accumulator.
3. Remove Accumulator
   A. Disconnect hydraulic and pneumatic lines from thrust reverser accumulator and cap lines (Fig. 401).
   B. Disconnect electrical connector from pressure switch.
   C. Remove clamp attaching pressure switch to support bracket.
   D. Remove clamps attaching accumulator to support bracket.
   E. Remove accumulator and switch assembly from airplane.

      NOTE: If pressure switch is to be removed from T-fitting, hold switch fitting with wrench to keep from breaking tack weld.

4. Install Accumulator
   A. Position accumulator and switch assembly on support bracket. (See figure 401.)

      NOTE: If pressure switch is to be installed on T-fitting, hold switch fitting with wrench to keep from breaking tack weld.

   B. Attach accumulator to bracket with clamps.
   C. Attach pressure switch to bracket with clamp.
   D. Remove caps from lines and attach hydraulic and pneumatic lines to accumulator.
   E. Connect electrical connector to pressure switch.
   F. Recharge thrust reverser accumulators per placard. Refer to Chapter 12, Hydraulic Accumulator - Servicing.
   G. Deleted.



Thrust Reverser Accumulator Installation
Figure 401

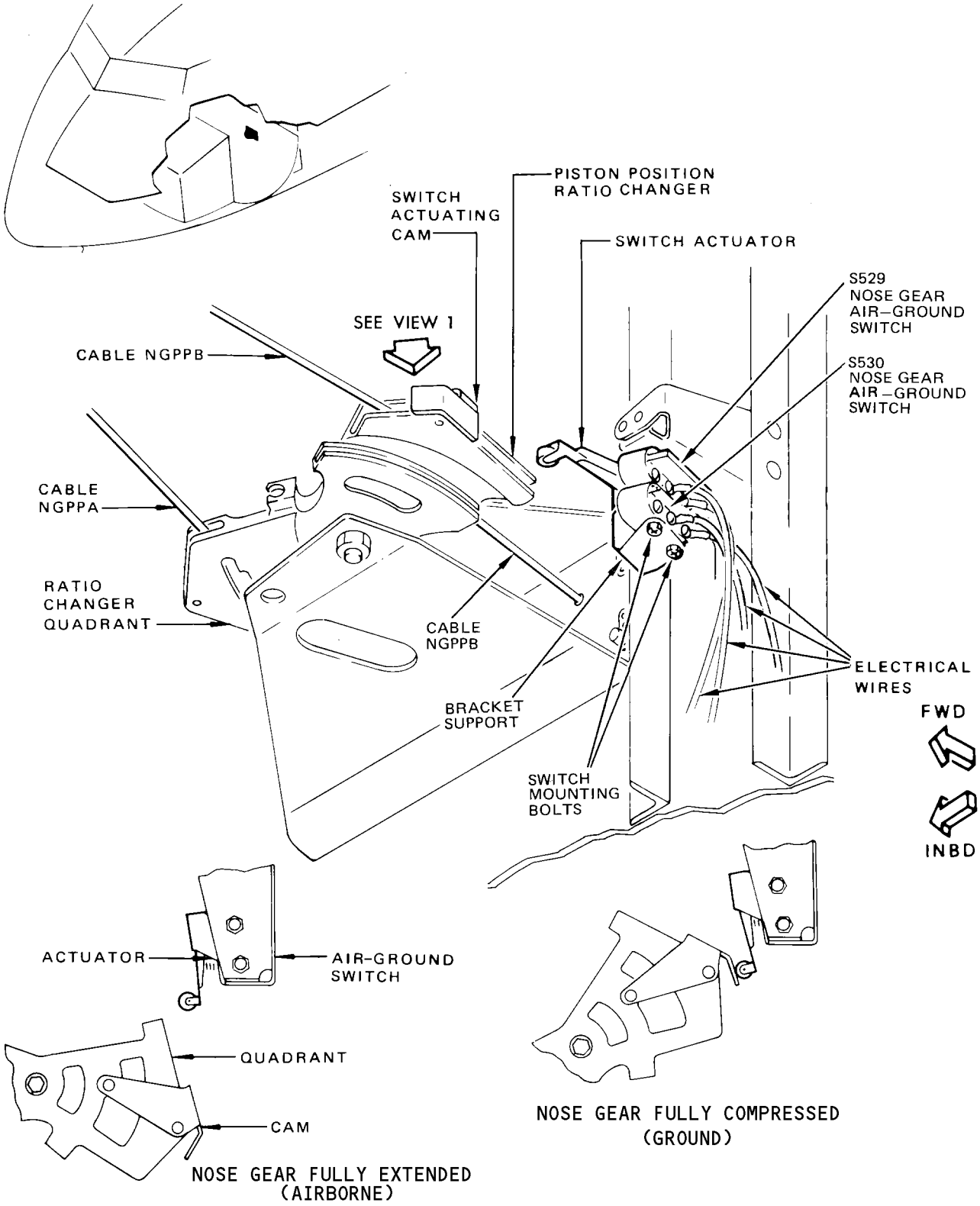
H. Operate thrust reverser on accumulator pressure only and check hydraulic lines for leaks. Refer to 78-32-01, Thrust Reverser System Test.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN THRUST REVERSER IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

I. Install forward wing-to-body fairing.

NOSE GEAR AIR-GROUND SWITCH ASSEMBLY - REMOVAL/INSTALLATION

1. General
   A. There are two nose gear air-ground switches (S529 and S530).
   B. The nose gear air-ground switches are supported by a bracket in the lower nose compartment, outboard of the nose wheel well left side wall. The assembly may be reached through panel 3104 located on the left forward part of the nose wheel well (Fig. 401).
2. Equipment and Materials
   A. Gear Ground Lockpin - F72735, for each landing gear
3. Remove Nose Gear Air-Ground Switch Assembly
   A. Check that all landing gear ground lockpins are installed.
   B. Open all thrust reverser circuit breakers on panel P6.
   C. Remove panel 3104, located on the left forward part of the nose wheel well.
   D. Disconnect electrical wiring from the switches (Fig. 401).
   E. Remove the locknuts, bolts, and washers.
   F. Remove the switches and the actuator from the bracket support.
4. Install Nose Gear Air-Ground Switch Assembly
   A. Put the switches and actuator in bracket support (Fig. 401).
      (1) Make sure S529 is the upper switch.
   B. Insert bolts through switch and actuator.
   C. Add washer and locknut. Tighten locknut.
   D. Connect electrical wiring at switches.
   E. Close all thrust reverser circuit breakers on panel P6.
   F. Adjust switch(es) (AMM 78-34-61/501).

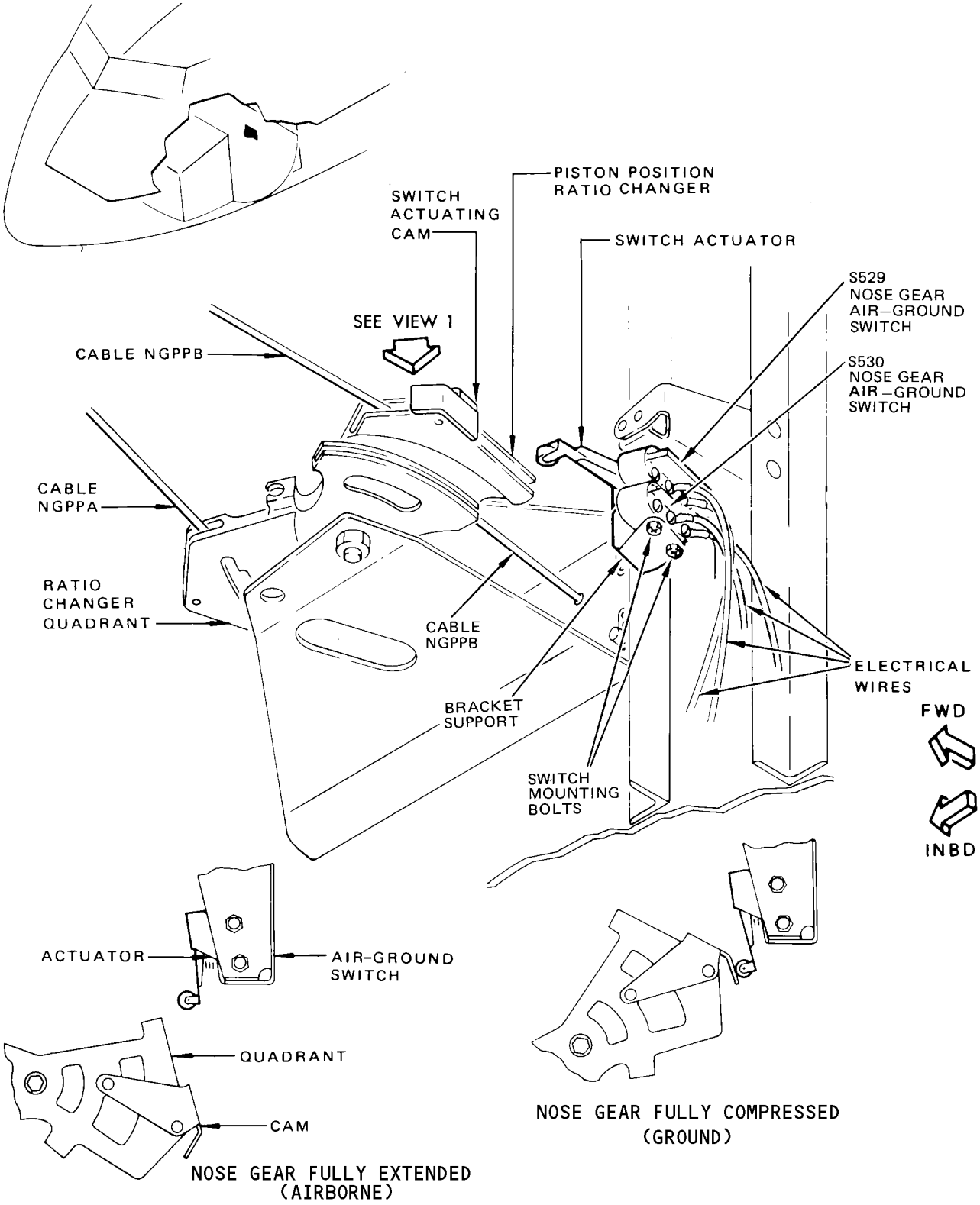


Nose Gear Air-Ground Switch Assembly Installation
Figure 401

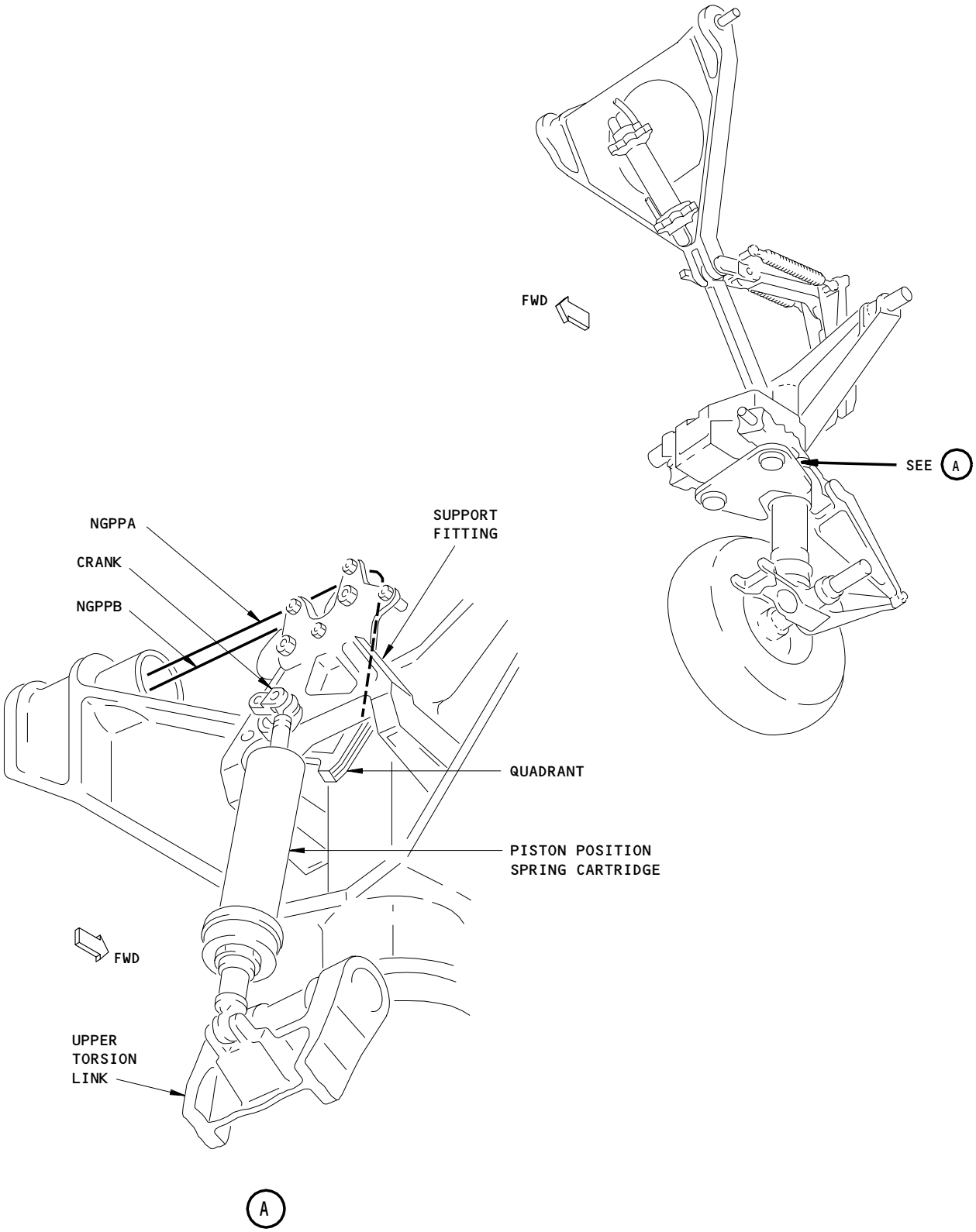
NOSE GEAR AIR-GROUND SWITCH ASSEMBLY - ADJUSTMENT/TEST

1. Nose Gear Air-Ground Switch Assembly Adjustment (Fig. 501, Fig. 502)
   A. Equipment and Materials
      (1) Gear Ground Lockpin - F72735, for all landing gear
      (2) Airplane jacks
      (3) 0.050-inch shim
   B. Prepare for Adjustment
      (1) Provide electrical power to system.
      (2) Check that all landing gear ground lockpins are installed.
      (3) Jack nose of airplane until nose wheel is clear of ground (AMM 07-11-11/201).
   C. Adjust Nose Gear Air-Ground Switch
      (1) Disconnect upper and lower torsion links at apex bolt.
      (2) Raise upper torsion link so that stop on quadrant contacts support fitting. Secure upper torsion link in vertical direction to maintain quadrant and support fittings in contact.
      (3) Place 0.050-inch shim on face of switch actuating cam. Loosen switch assembly adjustment bolts and adjust air-ground switch assembly toward cam face with shim in place until either switch adjustment extreme is used or switch bottoms out from full overtravel usage. Tighten switch assembly adjustment bolts and remove shim.
      (4) Release upper torsion link and move torsion link to normal position.
      (5) Make sure there is continuity between contacts 1C and 1NC for both switches (S529 and S530).
      (6) Raise upper torsion link until quadrant and support fitting stops are in contact. Hold torsion link in position and check that 0.050-inch shim fits freely between switch roller and cam. Readjust switch assembly per step (3) as necessary.
      (7) Make sure there is no continuity between contacts 1C and 1NC for both switches (S529 and S530).
      (8) Connect upper and lower torsion links with apex bolt (AMM 32-21-31/401).
      (9) Test nose gear air-ground switch (AMM 78-32-01/501).
      (10) Lower airplane, remove jacks.

(11) Install panel 3104 on the left forward part of the nose wheel well.
     (a) Torque bolts to 50-70 pounds-inches.



Nose Gear Air–Ground Switch Assembly Installation
Figure 501



Nose Gear Air-Ground Switch Adjustment
Figure 502

ENGINE ACCESSORY UNIT - REMOVAL/INSTALLATION

1. Remove Engine Accessory Unit
   A. Open the following circuit breakers on P6 circuit breaker panel:
      (1) ENGINE NO. 1 THRUST REV DC
      (2) ENGINE NO. 2 THRUST REV DC
      (3) INDICATOR (3 places)
      (4) LANDING GEAR LIGHTS
      (5) AURAL WARN
      (6) EPR WARN
      (7) ENG 1 EPR & LG WARN
      (8) ENG 2 EPR & LG WARN
      (9) LEVER LATCH & PRESS WARN
   B. Open the following circuit breakers on P18 circuit breaker panel:
      (1) FLIGHT RECORDER AC
      (2) FLIGHT RECORDER DC
   C. Open the access door under the fuselage to get access to the electronic equipment rack, E3, in the electronic equipment compartment.
   D. Release the latch and remove the engine accessory unit from the shelf on the electronic equipment rack, E3.
2. Install Engine Accessory Unit
   A. Check that pins on rack and unit electrical connectors are straight.
   B. Install the engine accessory unit on the shelf in the electronic equipment rack, E3, and secure the latch.
   C. Close the access door under the fuselage to the electronic equipment compartment.
   D. Perform checks as follows:
      (1) Close the following circuit breakers on the P18 circuit breaker panel:
         (a) FLIGHT RECORDER DC
         (b) FLIGHT RECORDER AC
      (2) Close the following circuit breakers on the P6 circuit breaker panel:
         (a) ENGINE NO. 1 THRUST REV DC
         (b) ENGINE NO. 2 THRUST REV DC
         (c) INDICATOR (3 places)
         (d) LANDING GEAR LIGHTS
         (e) AURAL WARN
         (f) EPR WARN
         (g) ENG 1 EPR & LG WARN
         (h) ENG 2 EPR & LG WARN
         (i) LEVER LATCH & PRESS WARN

(3) If necessary, position the landing gear selector lever on the center instrument panel, P2, to the OFF position from the DN (down) position.

NOTE: The thrust reverser isolation valve gets airplane system A hydraulic power from the main landing gear system through the thrust reverser shuttle valves. When the landing gear selector lever is moved to the OFF position, hydraulic power to the main landing gear and the thrust reverser isolation valve is removed.

(4) Check that standby hydraulic system is not pressurized.
(5) Move engine No. 1 thrust reverser override switch to OVERRIDE.
  (a) On airplanes without accumulators, the ISOLATION VALVE light will come on.
  (b) On airplanes with accumulators, the reverser armed light will remain off.
(6) Return engine No. 1 thrust reverser override switch to NORMAL.
  (a) On airplanes without accumulators, the ISOLATION VALVE light will go off.
  (b) On airplanes with accumulators, the reverser armed light will remain off.
(7) Repeat steps (5) and (6) using engine No. 2 thrust reverser override switch.
(8) With landing gear selector lever in OFF position, pressurize standby hydraulic system.
(9) Lift engine No. 1 reverse thrust lever to limit of travel.
  (a) The engine No. 1 thrust reverser shall not deploy.
  (b) All lights shall remain extinguished.
(10) Return No. 1 reverse thrust lever to stow position.
(11) Repeat steps (9) and (10) using No. 2 reverse thrust lever.
(12) Depressurize standby hydraulic system.
(13) Position stabilizer so that stabilizer position indicator pointer is within one unit of center of green band.
(14) Place speed brake lever in zero degree detent (STOWED) position.
(15) Check that thrust levers are at idle position.
(16) Fully retract flaps and place flap lever in zero degree detent position.
(17) Check that landing gear ground lockpins are installed in all landing gear.
(18) Start engine No. 1 (Ref 71-09-100).
  (a) Check that flight recorder starts operating during start of engine No. 1
(19) Start engine No. 2 (Ref 71-09-100).
(20) Slowly advance engine No. 1 thrust lever.
  (a) The takeoff warning horn shall sound before the EPR indicator reads 1.48 maximum.
(21) Slowly retard the No. 1 thrust lever.
  (a) The warning horn shall cease sounding before the EPR indicator reads 1.32 minimum.

(22) Return thrust lever to idle stop.

NOTE: Below approximately -20 degrees F (-29 degrees C), an indicated EPR of 1.48 may be commanded before the throttle lever reaches 13.5 degrees from the idle stop, depending on engine model installed. Under these conditions, the horn will start sounding at 13.5 degrees maximum thrust lever travel from idle, and the indicated EPR may exceed 1.48.

(23) Repeat steps (20) thru (22) for engine No. 2.
(24) Extend trailing edge flaps to 15 units.
(25) Simulate a landing gear-not-down-and-locked condition by placing a copper shield (1.5 x 2.5 x 0.06 inches) between any landing gear downlock sensor and its activating bar.
  (a) The continuous warning horn shall sound.
(26) Press the horn cutout switch on the aisle stand.
  (a) The horn will continue to sound.
(27) Slowly advance engine No. 1 thrust lever.
  (a) The warning horn shall cease at or before 1.71 EPR is attained.
(28) Retard No. 1 thrust lever to idle.
  (a) The warning horn shall sound.
(29) Press the horn cutout switch on the aisle stand.
  (a) The horn shall continue to sound.
(30) Repeat steps (27), (28) and (29) with No. 2 engine.
(31) Remove copper shield from downlock sensor.
  (a) The horn shall cease sounding.
(32) Move the landing gear selector lever on the center instrument panel, P2, to the DN (down) position.

NOTE: The thrust reverser isolation valve gets airplane system A hydraulic power from the main landing gear system through the thrust reverser shuttle valves. When the landing gear selector lever is moved to the DN position, hydraulic power is provided to the main landing gear and the thrust reverser isolation valve.

(33) Deploy and stow both thrust reversers at minimum necessary power.
  (a) Check that REVERSER UNLOCKED lights illuminate when deflector doors are out-of-stow, extinguish when the doors are stowed.
    1) On airplanes without accumulators, check that the ISOLATION VALVE light does not come on.

2) On airplanes with accumulators, make sure the reverser armed light is on.

(34) Shut down engine No. 1 using procedure for normal shutdown (Ref 71-09-100).
   (a) Check that flight recorder continues to operate.

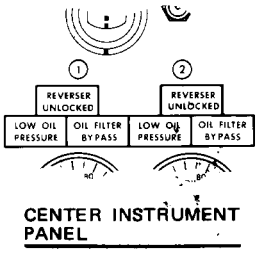
(35) Shut down engine No. 2 using procedure for normal shutdown (Ref 71-09-100).
   (a) Check that flight recorder ceases to operate.

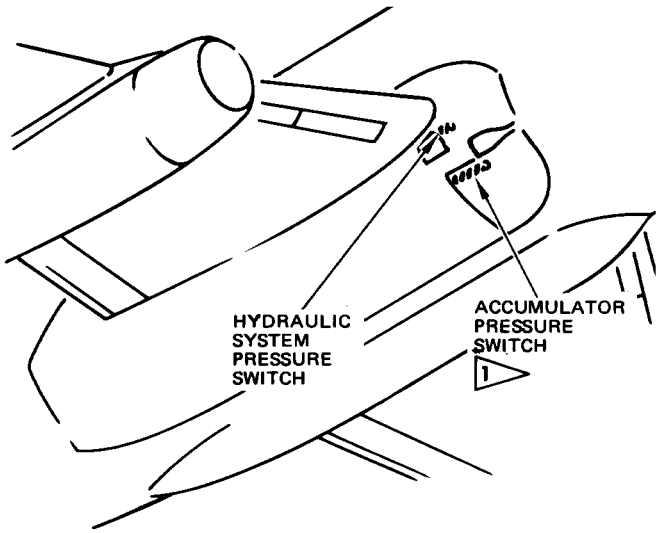
(36) Restore all systems to precheck configuration.

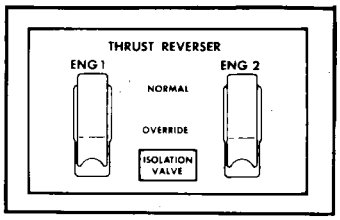
(37) AIRPLANES WITH THE CENTER TANK FUEL SCAVENGE SYSTEM; do the Fuel Scavenge System Test, AMM 28-15-0/501.

THRUST REVERSER INDICATING SYSTEMS – DESCRIPTION AND OPERATION

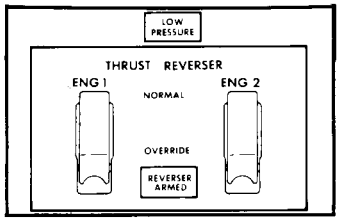
1. General
   A. Indicating systems are provided to monitor operation and condition of the thrust reverser on each engine. Indicator lights in the control cabin respond to sensors at the engines and pressure switches in the hydraulic system to alert the crew to abnormal system operation.
   B. Two or three independent indicating systems are used (Fig. 1 and 2). The position indicating system on all airplanes reacts to deflector door lock engagement to provide indication of thrust reverser position. The accumulator low pressure warning system is used on airplanes with thrust reverser accumulators to indicate that accumulator pressure is below that required for standby operation. The reverser armed indicating system on airplanes with thrust reverser accumulators confirms isolation valve operation preparatory to thrust reverser operation. The isolation valve indicating system on airplanes without thrust reverser accumulators provides visual warning any time system condition does not agree with valve position.
2. Thrust Reverser Position Indicating System
   A. A thrust reverser position indicating system for each engine provides indication to the crew if both thrust reverser locks on either engine are not engaged and consequently, that the thrust reverser might not be in the full forward thrust position. The system for each engine consists of an amber light on the center panel in the control cabin, a proximity switch, and associated wiring. The proximity switch consists of a solid-state switch assembly (in the form of a printed circuit card, mounted in a switch module) and a proximity switch sensor (mounted on each thrust reverser lock assembly) (Fig. 1 and 2). The switch sensor is activated by the thrust reverser lock latch trigger providing a signal to the solid-state switch card.
   B. The solid-state switch is actuated when the switch sensor trigger on the lock latch is brought near a sensitive surface on the switch sensor. The trigger alters the magnetic flux in the sensor to cause increased current flow in the switch circuit. The increased current flow actuates the switch to the open position and, if both latches are engaged, the amber light goes out. This is the position of the switch when the thrust reverser is forward and locked. When reverse thrust is selected, the trigger moves away from the sensor as the thrust reverser is unlocked causing the switch to close and the position indicating light to come on.
3. Thrust Reverser Accumulator Low Pressure Warning System (Airplanes with thrust reverser accumulators)
   A. A warning system provides indication to the crew if the accumulators for both thrust reversers are not fully charged. The system consists of an amber indicator light on the aft overhead panel and a pressure switch at the fluid end of each accumulator. (Fig. 1 and 2)



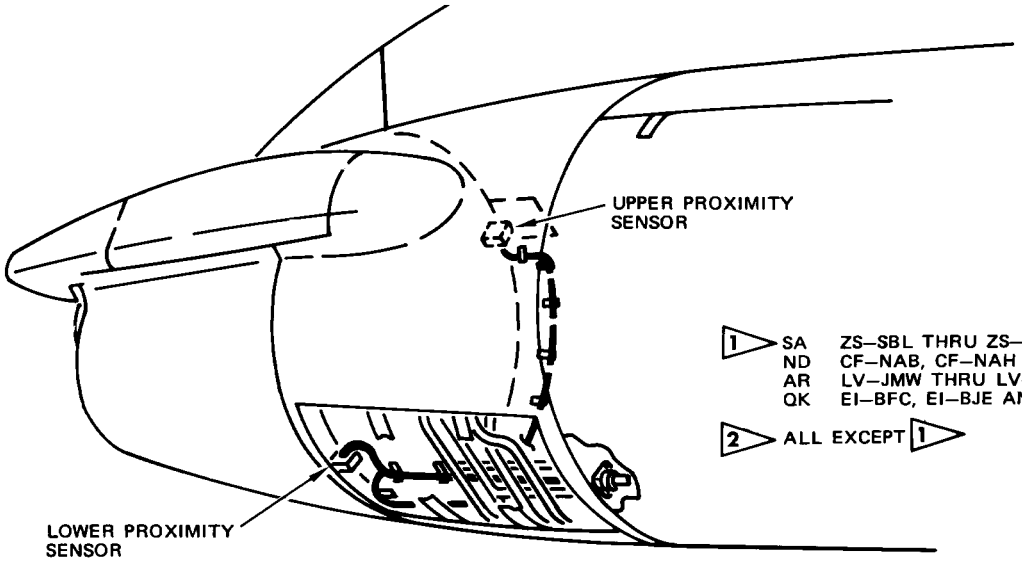




AFT OVERHEAD PANEL
2



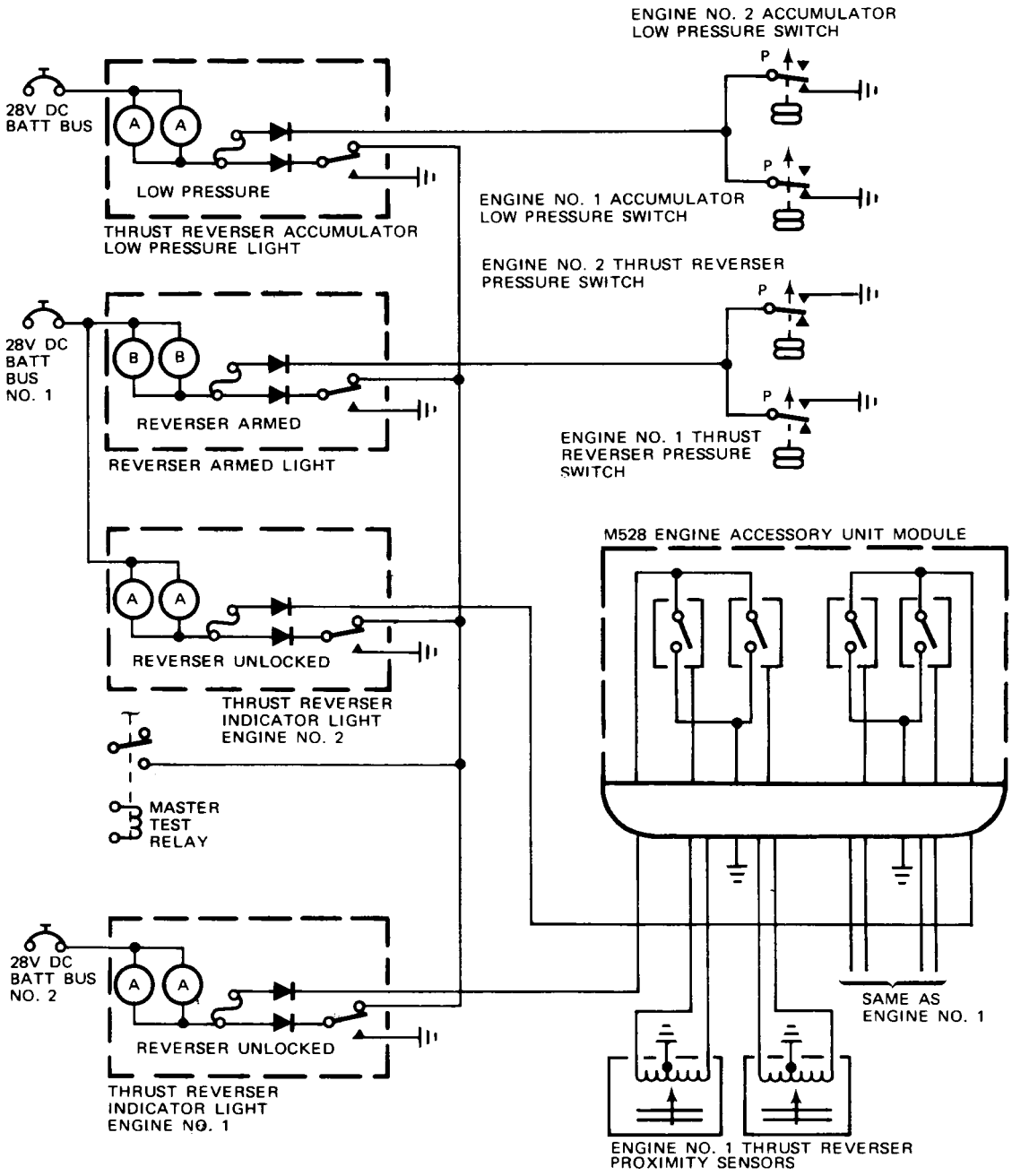
AFT OVERHEAD PANEL
1



1 SA ZS–SBL THRU ZS–SBO
ND CF–NAB, CF–NAH
AR LV–JMW THRU LV–JMY
QK EI–BFC, EI–BJE AND EI–BJP

2 ALL EXCEPT 1

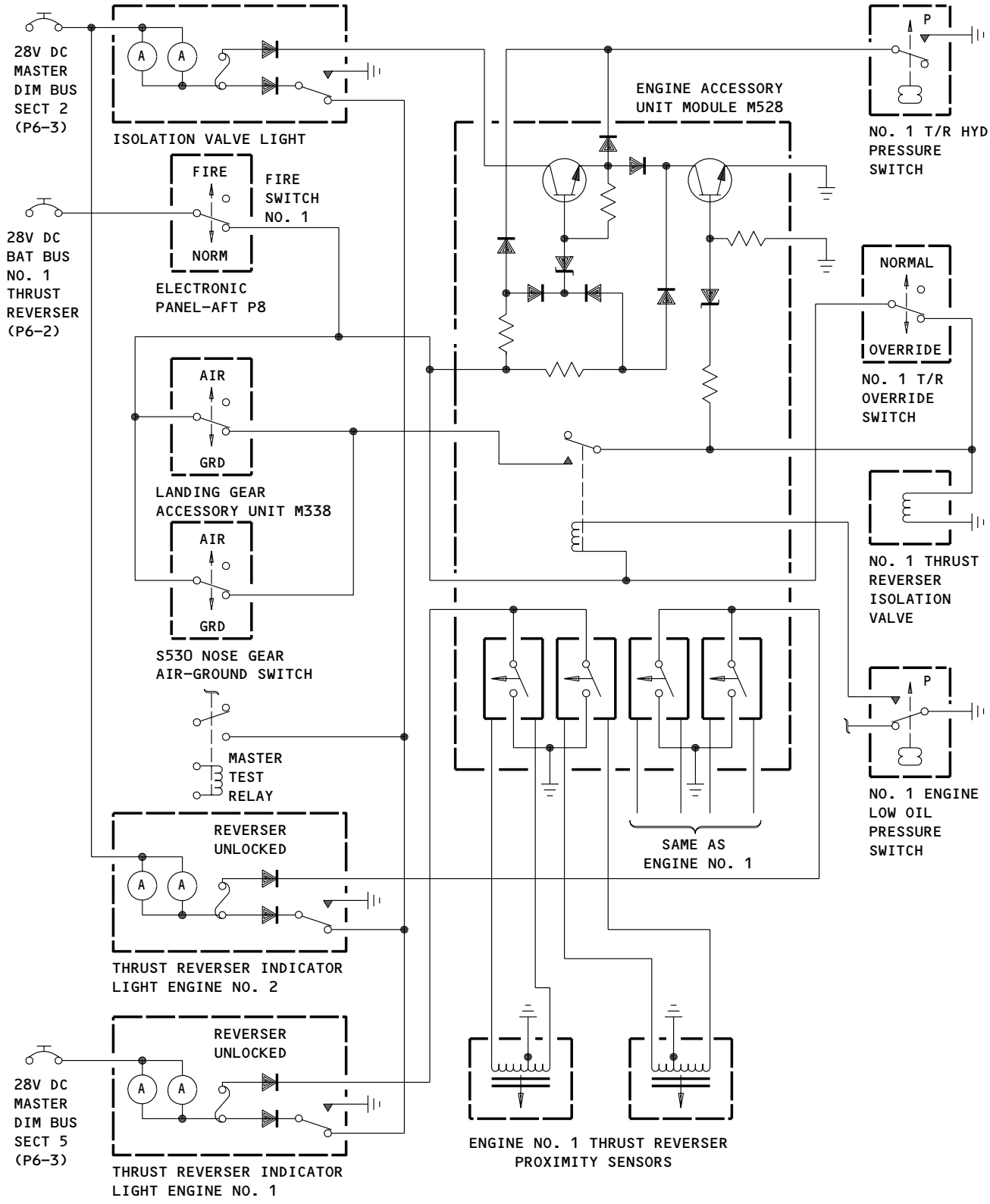
Thrust Reverser Indicating Systems Component Location
Figure 1



EFFECTIVITY

SA ZS–SBL THRU ZS–SBO
ND CF–NAB, CF–NAH
AR LV–JMW THRU LV–JMY
AQ N21SW
QK EI–BFC, EI–BJE AND EI–BJP

Thrust Reverser Indicating System Circuits
Figure 2 (Sheet 1)



Thrust Reverser Indicating System Circuits
Figure 2 (Sheet 2)

B. With both accumulators fully charged, both pressure switches will be open and the indicator light will be out. If hydraulic pressure in either accumulator falls below 1700 psi, the related pressure switch will relax and the warning light will come on. Since the pressure switches are in parallel, the warning light will be on unless both accumulators are properly charged.

4. Thrust Reverser Armed Indicating System (Airplanes with thrust reverser accumulators)
   A. The thrust reverser armed indicating system provides indication to the crew that the thrust reverser is ready for operation. The system consists of a blue indicator light on the aft overhead panel and a pressure switch downstream of each isolation valve. (Fig. 1 and 2)
   B. With both isolation valves closed, hydraulic pressure will not be available to either thrust reverser; both pressure switches will be open and the reverser armed light will be out. The pressure switches will close when the isolation valves open and the indicator light will come on indicating that hydraulic pressure is available for thrust reverser operation. Refer to 78-34-01 for a discussion of isolation valve control.
5. Thrust Reverser Isolation Valve Indicating System (Airplanes without thrust reverser accumulators)
   A. An indicating system provides visual warning any time thrust reverser hydraulic system condition does not agree with isolation valve position. The system consists of an amber indicator light on the aft overhead panel, a pressure switch downstream of each isolation valve, and a solid-state switch card in the engine accessory unit module. (Fig. 1 and 2)
   B. The isolation valve indicator light will remain out during all normal operating conditions. The switch card responds to the isolation valve circuits and the hydraulic system pressure switches to turn on the indicator light any time an isolation valve is energized and hydraulic pressure is not sensed by the corresponding pressure switch. The indicator light will also be on anytime pressure is sensed downstream of a de-energized isolation valve. Refer to 78-34-01 for a discussion of isolation valve control.

THRUST REVERSER INDICATING SYSTEMS - ADJUSTMENT/TEST

1. General
   A. The test procedures included in this section provide a check of only the indicating systems and are intended to support special testing and trouble analysis of these systems. These procedures are not a substitute for a complete thrust reverser system checkout and should not be used in lieu of the system test per 78-32-01.
   B. Separate procedures are presented for each of the independent indicating systems. Each procedure is complete for the system involved.
2. Thrust Reverser Position Indicating System Test
   A. General
      (1) This test provides a check of the proximity sensors and switch cards and will isolate a fault to a specific sensor or card. The test is performed with the thrust reverser deployed and deactivated. Lock engagement is then simulated by hand actuation of the latch blocking arms.
   B. Equipment and Materials
      (1) Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent
   C. Prepare for Test
      (1) Place the deflector doors in the reverse thrust position (AMM 78-32-01/501).

          WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

      (2) Open the air conditioning bay access doors and install the rods.
      (3) Deactivate thrust reverser hydraulic system by installing ground locks at both thrust reverser isolation valves.

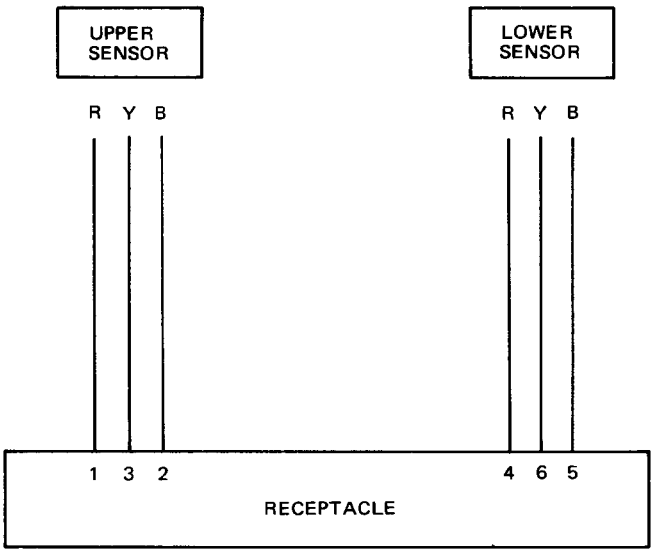
          WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO RETURN THRUST REVERSERS TO FORWARD THRUST AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

(4) Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
(5) Make sure that the Battery Bus, DC Bus No. 1 and Bus No. 2 are energized.
(6) Check that the following circuit breakers on circuit breaker panel P6 are closed:
(a) ENG 1 THRUST REVERSER
(b) ENG 2 THRUST REVERSER
(c) MASTER CAUTION (2 places)
(d) DIM AND TEST
(e) INDICATOR (9 places)

D. Test Position Indicating System
(1) Check that both REVERSER UNLOCKED lights are on. If lights are not on, press to test bulb and check circuit breakers.
(2) Do a test for Engine No. 1.
(a) Manually depress both latch blocking arms on Engine No. 1 and do a check that the Engine No. 1 REVERSER UNLOCKED light goes out.
(b) Release latch blocking arms one at a time. Engine No. 1 REVERSER UNLOCKED light should come on when either blocking arm is released even though the other remains depressed.
(c) If the light response is not correct in the previous two steps, test the sensors and switch cards as follows:
1) Check that gap between sensor and latch arm does not exceed 0.090 inch with latch depressed. Adjust the sensor (AMM 78-36-12/401).
2) Disconnect proximity sensor wiring harness electrical connector at forward side of thrust reverser shroud bulkhead (AMM 78-36-12/401).
3) Measure resistance between pins 1 and 3 and between 2 and 3 of sensor harness connector to check circuit through upper door lock sensor and sensor wires. See Fig. 501 for the resistance values.
4) Measure resistance between pins 4 and 6 and between 5 and 6 to check circuit through lower door lock sensor. See Fig. 501 for the resistance values.
5) If these resistance values are not in the limits shown, replace the proximity sensor (AMM 78-36-12/401).

NOTE: A shop test can determine if sensor is serviceable.

6) If sensors are in the limits, replace the M528 Engine Accessory Unit Module (AMM 78-34-91/401).
7) Connect the electrical connector at the thrust reverser shroud bulkhead.
(3) Do the previous steps to do a test for Engine No. 2.



SENSOR	PIN	COLOR TRACER	
UPPER	1	RED	
	2	BLUE	
	3	YELLOW	GROUND
LOWER	4	RED	
	5	BLUE	
	6	YELLOW	GROUND

READ: YELLOW TO RED – 33 (± 6) OHMS
YELLOW TO BLUE – 348 (± 34) OHMS

Proximity Sensor Resistance Checkout
Figure 501

E. Restore Airplane to Normal
(1) Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
(2) Stow the rods and close the air conditioning bay access doors.
(3) Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
(4) Place the deflector doors in the forward thrust position (AMM 78-32-01/501).

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

3. Thrust Reverser Accumulator Low Pressure Warning System Test (Airplanes With Thrust Reverser Accumulators)
A. General
(1) This test provides a check of the pressure switches installed at the fluid end of each accumulator that operate in parallel to control the single warning light. The test will confirm that both switches are operating or will isolate a fault to one of the two switches. The test is performed by monitoring warning light response while operating one thrust reverser at a time with accumulator pressure.
B. Prepare for Test
(1) Check that both thrust reverser accumulators are precharged per placard.
(2) Open the air conditioning bay access doors and install the rods.
(3) Check that ground locks are removed from both thrust reverser isolation valves.
(4) Do a check that the Battery Bus, DC Bus No. 1 and Bus No. 2 are energized.
(5) Check that the following circuit breakers on circuit breaker panel P6 are closed:
(a) ENG 1 THRUST REVERSER
(b) ENG 2 THRUST REVERSER
(c) MASTER CAUTION (2 places)
(d) DIM AND TEST
(e) INDICATOR (9 places)

(6) Pressurize A and B hydraulic systems using the system B electric motor-driven pumps (AMM 29-11-0/201).
(7) Check that landing gear selector lever is in DOWN position.
(8) Check that thrust reverser LOW PRESSURE warning light is out.

C. Test Low Pressure Warning System
(1) Move ground interconnect switch on aft overhead panel to CLOSE position to remove main hydraulic system pressure.
(2) Place engine No. 1 override switch in OVERRIDE position.
(3) Cycle engine No. 1 reverse thrust lever to operate thrust reverser and deplete accumulator hydraulic pressure. Check that LOW PRESSURE warning light comes on.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

(4) Return ground interconnect switch to OPEN position and check that LOW PRESSURE warning light goes out.
(5) Return engine No. 1 override switch to NORMAL position and place engine No. 2 switch in OVERRIDE position.
(6) Move ground interconnect switch to CLOSE position.
(7) Cycle engine No. 2 reverse thrust lever to operate thrust reverser and deplete accumulator hydraulic pressure. Check that LOW PRESSURE warning light comes on.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

(8) Return ground interconnect switch to OPEN position and check that LOW PRESSURE warning light goes out.
(9) Return engine No. 2 override switch to NORMAL position.

D. Restore Airplane to Normal
(1) Check that both thrust reversers are in forward thrust position.
(2) Move ground interconnect switch to CLOSE.
(3) Stow the rods and close the air conditioning bay access doors.

4. Thrust Reverser Armed Indicating System Test (Airplanes With Thrust Reverser Accumulators)

A. General
(1) This test provides a check of the pressure switches installed downstream of each isolation valve that operate in parallel to control the single indicator light. The test will confirm that both switches are operating or will isolate a fault to one of the two switches. The test is performed by monitoring indicator light response while operating one thrust reverser at a time.

B. Prepare for Test
(1) Check that reverse thrust levers are in forward thrust position.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER. ALTHOUGH REVERSER MOVEMENT IS NOT A REQUIREMENT OF THIS TEST PROCEDURE, HYDRAULIC PRESSURE IS AVAILABLE AND UNINTENTIONAL CONTROL MOVEMENT COULD CAUSE REVERSER TO MOVE UNEXPECTEDLY.

(2) Open the air conditioning bay access doors and install the rods.
(3) Check that ground locks are removed from both thrust reverser isolation valves.
(4) Check that Battery Bus, DC Bus No. 1 and Bus No. 2 are energized.
(5) Check that the following circuit breakers on circuit breaker panel P6 are closed:
(a) ENG 1 THRUST REVERSER
(b) ENG 2 THRUST REVERSER
(c) MASTER CAUTION (2 places)
(d) DIM AND TEST
(e) INDICATOR (9 places)
(6) Pressurize A and B hydraulic systems using the system B electric motor-driven pumps (AMM 29-11-0/201).
(7) Check that landing gear selector lever is in DOWN position.
(8) Check that thrust reverser LOW PRESSURE warning light is out.

C. Test Reverser Armed Indicating System
(1) Check that both thrust reverser override switches are in NORMAL position.
(2) Provide a simulated engine run.
(a) Open the ENG 1 THRUST REVERSER and ENG 2 THRUST REVERSER and the SEC 2 and SEC 5 circuit breakers.
(b) Disconnect the D752 connector from the engines low oil pressure switch on both engines.
(c) Put a jumper across pins 1 and 2 on the D752 connector for both engines.
(d) Close the SEC 2, SEC 5, and the ENG 1 and ENG 2 THRUST REVERSER circuit breakers.
(e) The REVERSER ARMED light will come on.
(f) Open the ENG 1 THRUST REVERSER and ENG 2 THRUST REVERSER circuit breakers.
(g) The REVERSER ARMED light will go off.
(h) Close the ENG 1 THRUST REVERSER circuit breaker.
(i) The REVERSER ARMED light will come on.
(j) Open the ENG 1 THRUST REVERSER circuit breaker.
(k) The REVERSER ARMED light will go off.
(l) Close the ENG 2 THRUST REVERSER circuit breaker.
(m) The REVERSER ARMED light will come on.
(n) Close the ENG 1 THRUST REVERSER circuit breaker.
(3) Connect the D752 connector.
(a) Open the ENG 1 and ENG 2 THRUST REVERSER and the SEC 2 and SEC 5 circuit breakers.
(b) Remove the jumper from the D752 connector.

(c) Connect the D752 connector to the oil pressure switch.
(d) Close the SEC 2, SEC 5, and the ENG 1 and ENG 2 THRUST REVERSER circuit breakers.

(4) Move the engine No. 1 override switch to the OVERRIDE position and do a check that the REVERSER ARMED indicator light comes on.
(5) Move the engine No. 1 override switch to the NORMAL position and do a check that the REVERSER ARMED indicator light goes out.
(6) Move the engine No. 2 override switch to the OVERRIDE position and do a check that the REVERSER ARMED indicator light comes on.
(7) Move the engine No. 2 override switch to the NORMAL position and do a check that the REVERSER ARMED indicator light goes out.

D. Restore Airplane to Normal
(1) Check that both thrust reversers are in forward thrust position.
(2) Move ground interconnect switch to CLOSE.
(3) Stow the rods and close the air conditioning bay access doors.

5. Isolation Valve Indicating System Test (Airplanes Without Thrust Reverser Accumulators)

A. General
(1) This test provides a check of the pressure switches installed downstream of each isolation valve that operate in parallel to control the single indicator light. The test will confirm that both switches are operating or will isolate a fault to one of the two switches. The test is performed by monitoring indicator light response while operating one thrust reverser at a time.

B. Equipment and Materials
(1) Thrust Reverser Isolation Valve Ground Lock Assembly - F80109-3, or equivalent

C. Prepare for Test
(1) Check that reverse thrust levers are in forward thrust position.

WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER. ALTHOUGH REVERSER MOVEMENT IS NOT A REQUIREMENT OF THIS TEST PROCEDURE, HYDRAULIC PRESSURE IS AVAILABLE AND UNINTENTIONAL CONTROL MOVEMENT COULD CAUSE REVERSER TO MOVE UNEXPECTEDLY.

(2) Open the air conditioning bay access doors and install the rods.
(3) Check that ground locks are removed from both thrust reverser isolation valves.
(4) Do a check that the Battery Bus, DC Bus No. 1 and Bus No. 2 are energized.
(5) Check that the following circuit breakers on circuit breaker panel P6 are closed:
  (a) ENG 1 THRUST REVERSER
  (b) ENG 2 THRUST REVERSER
  (c) MASTER CAUTION (2 places)
  (d) DIM AND TEST
  (e) INDICATOR (9 places)
(6) Pressurize A and B hydraulic systems using the system B electric motor-driven pumps (AMM 29-11-0/201).
(7) Check that landing gear selector lever is in DOWN position.

D. Test Isolation Valve Indicating System
(1) Check that both thrust reverser override switches are in NORMAL position and that ISOLATION VALVE indicator light is out.
(2) Provide a simulated engine run.
  (a) Open the ENG 1 and ENG 2 THRUST REVERSER and the SEC 2 and SEC 5 circuit breakers.
  (b) Disconnect the D752 connector from the engines low oil pressure switch on both engines.
  (c) Put a jumper across pins 1 and 2 on the D752 connector for both engines.
  (d) Close the SEC 2, SEC 5, and the ENG 1 and ENG 2 THRUST REVERSER circuit breakers.
(3) Move the landing gear handle to the OFF position.
  (a) The ISOLATION VALVE light will come on.
  (b) The MASTER CAUTION and the OVHD annunciator lights will come on in approximately 12 seconds.
(4) Move the landing gear handle to the DOWN position.
  (a) The ISOLATION VALVE light will go off.
  (b) The MASTER CAUTION and the OVHD annunciator lights will go off.
(5) Connect the D752 connector.
  (a) Open the ENG 1 and ENG 2 THRUST REVERSER and the SEC 2 and SEC 5 circuit breakers.
  (b) Remove the jumper from the D752 connector.
  (c) Connect the D752 connector to the oil pressure switch.
  (d) Close the SEC 2, SEC 5, and the ENG 1 and ENG 2 THRUST REVERSER circuit breakers.
(6) Move the engine No. 1 override switch to the OVERRIDE position and then move the switch to the NORMAL position; do a check that the ISOLATION VALVE indicator light will momentarily come on, then go out.
(7) Move the engine No. 2 override switch to the OVERRIDE position and then move the switch to the NORMAL position; do a check that the ISOLATION VALVE indicator light will momentarily come on, then go out.
(8) Install ground locks at both thrust reverser isolation valves.

(9) Move the engine No. 1 override switch to the OVERRIDE position and do a check that ISOLATION VALVE indicator light comes on.
(10) Move the engine No. 1 override switch to the NORMAL position and do a check that the ISOLATION VALVE indicator light goes out.
(11) Move the engine No. 2 override switch to the OVERRIDE position and do a check that ISOLATION VALVE indicator light comes on.
(12) Move the engine No. 2 override switch to the NORMAL position and do a check that the ISOLATION VALVE indicator light goes out.
(13) If light response is not correct in the previous steps, do a test of the pressure switches as follows:
(a) Press-to-test indicator light bulb and check circuit breakers.
(b) Remove ground locks from both thrust reverser isolation valves.
(c) Disconnect the pressure switch electrical connectors (AMM 78-36-41/401).
(d) With both override switches in NORMAL position, do a check for continuity through the pressure switches between pins 2 and 3.
(e) Move both override switches to OVERRIDE position and do a check for continuity through the pressure switches between pins 2 and 1.
(f) Replace the pressure switch, if defective (AMM 78-36-41/401).
(g) If pressure switches are not defective, a switch card fault is indicated.

NOTE: Card is located in Engine Accessory Unit Module (M528).

(h) Connect the pressure switch electrical connectors.

E. Restore Airplane to Normal
(1) Check that both thrust reversers are in forward thrust position.
(2) Remove ground locks from both thrust reverser isolation valves.
(3) Stow the rods and close the air conditioning bay access doors.
(4) Move ground interconnect switch to CLOSE.

PROXIMITY SENSORS - REMOVAL/INSTALLATION

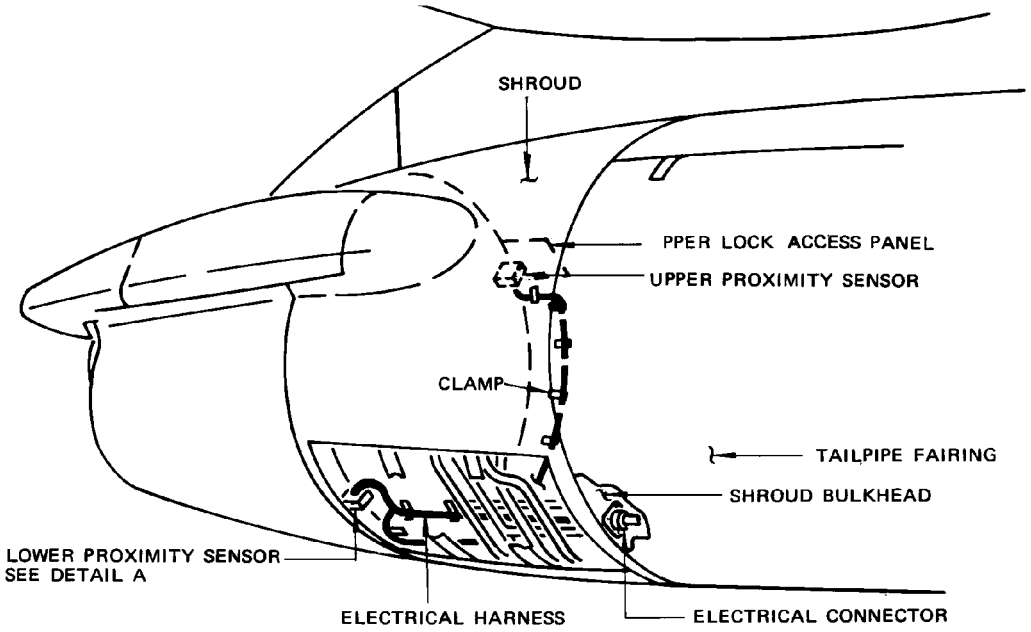
1. General
   A. The thrust reverser proximity sensors are mounted on the latch support. There are two proximity sensors on each reverser. The two proximity sensors and electrical harness are an integral unit, and are removed and installed as a unit.
   B. If only one sensor is defective, maintenance time can be reduced by cutting the harness and splicing in a replacement sensor. Refer to Proximity Sensors - Approved Repairs.
2. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent.
   B. Sealant - Type III, Dow Corning Aerospace Sealant 90-006-2, Dow Corning Corp., Midland, Michigan or equivalent
3. Prepare for Removal
   A. Open the air conditioning bay access doors and attach a DO-NOT-CLOSE tag.
   B. Deactivate thrust reverser hydraulic system by installing ground locks at both thrust reverser isolation valves.

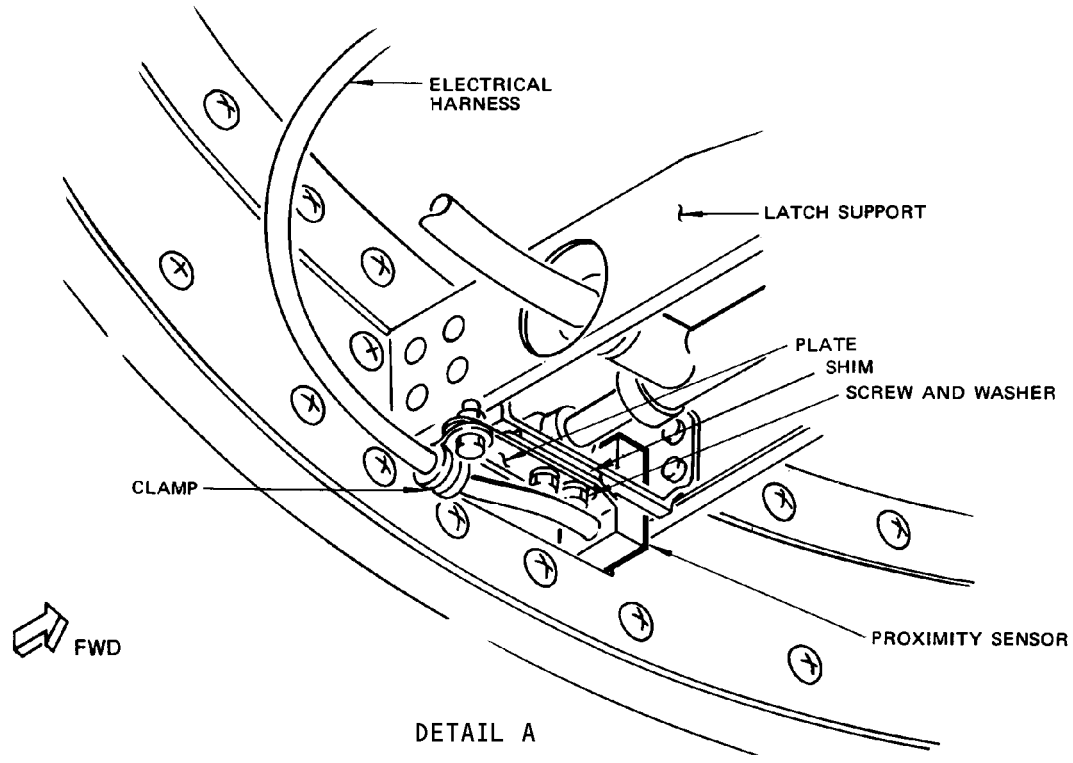
      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   C. AIRPLANES WITH SEPARATE POWER SUPPLY FOR REVERSER UNLOCKED LIGHTS;
      Open BAT, NO. 1 DC and NO. 2 DC circuit breakers under INDICATOR MASTER DIM BUS on circuit breaker panel P6 and attach DO-NOT-CLOSE tags.
   D. AIRPLANES WITH COMMON POWER SUPPLY FOR THE REVERSER UNLOCKED LIGHTS AND THE ISOLATION VALVE;
      Open both THRUST REVERSER circuit breakers on circuit breaker panel P6 and attach DO-NOT-CLOSE tags.

      NOTE: This circuit breaker will remove electrical power to the reverser unlocked lights and the isolation valve.

   E. Remove upper lock access panel.
   F. Remove large access panel located at bottom of thrust reverser shroud assembly.
   G. Open tailpipe fairings to gain access to electrical connector on shroud bulkhead.
4. Remove Proximity Sensors
   A. Disconnect electrical connector at forward side of thrust reverser shroud bulkhead (Fig. 401).
   B. Remove screws, washers and plate attaching upper and lower proximity sensors to latch support.
   C. Remove screws, nuts and washers attaching receptacle to shroud bulkhead.
   D. Remove clamps, screws, and spacers where applicable, securing electrical harness to shroud.





DETAIL A

Proximity Sensors Installation
Figure 401

E. Carefully remove proximity sensors and electrical harness from thrust reverser.
F. Remove old sealant and clean area where shims were located.

5. Install Proximity Sensors
   A. Position proximity sensors and electrical harness inside thrust reverser shroud (Fig. 401).
   B. Temporarily attach upper and lower proximity sensors to latch support with screws, washers and plate. Be sure shim is in place under sensor.
   C. Measure gap between each sensor and latch arm; gap must be more than 0.030 inch, preferably 0.060 to 0.090 inch. Peel laminated shim as required to obtain gap.
   D. After required gap is obtained for both sensors, remove sensors and permanently install laminated shims with Type III sealant.
   E. Reinstall proximity sensors.
   F. Attach electrical harness to shroud with clamps, screws and spacers where applicable.
   G. Attach receptacle to shroud bulkhead with screws, washers and nuts.
   H. Connect electrical connector to receptacle at forward side of shroud bulkhead.
   I. ON AIRPLANES WITH SEPARATE POWER SUPPLY FOR REVERSER UNLOCKED LIGHTS;
      Remove the DO-NOT-CLOSE tags and close the BAT, NO. 1 DC and NO. 2 DC circuit breakers under INDICATOR MASTER DIM BUS on circuit breaker panel P6.
   J. ON AIRPLANES WITH COMMON POWER SUPPLY FOR REVERSER UNLOCKED LIGHTS AND THE ISOLATION VALVE;
      Remove the DO-NOT-CLOSE tag and close both THRUST REVERSER circuit breakers on circuit breaker panel P6.
   K. Reactivate thrust reverser hydraulic system by removing ground locks from both thrust reverser isolation valves.
   L. Stow the rods and close the air conditioning bay access doors.
   M. Cycle thrust reverser deflector doors and check that REVERSER UNLOCKED lights function properly (AMM 78-36-01/501).

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

6. Restore Airplane to Normal
   A. Close and latch tailpipe fairings.
   B. Attach large access panel to bottom of thrust reverser shroud assembly.
   C. Install feedback control access panel.
   D. Install upper lock access panel.

PROXIMITY SENSORS - APPROVED REPAIRS

1. General
   A. The electrical harness is an integral part of the proximity sensor installation. Sensor replacement normally requires replacement of the entire electrical harness. In order to reduce the maintenance time required to replace a defective sensor, the harness may be cut and spliced.
2. Equipment and Materials
   A. Splice - Thomas and Betts BB-2, or equivalent
   B. Shrinkable Sleeving - ThermoFit RNF-100, or equivalent
3. Splice Electrical Harness
   A. Cut electrical harness at approximately 12 inches from the sensor in the vicinity of wire harness clamp.
   B. Splice new sensor to remaining wire harness. Insulate splice with sleeving.
   C. Complete installation of replacement proximity sensor.

THRUST REVERSER ACCUMULATOR PRESSURE SWITCH - REMOVAL/INSTALLATION

1. Prepare for Removal
   A. Place ground interconnect switch on aft overhead panel in CLOSE position.
   B. Move thrust reverser override switch to OVERRIDE.

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN IT IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

   C. Cycle reverse thrust lever between interlock stop and OFF positions until reverser stops moving hydraulically.
   D. Return override switch to NORMAL.
   E. Remove forward wing-to-body fairing to gain access to pressure switch.
2. Remove Accumulator Pressure Switch
   A. Disconnect electrical connector from pressure switch. (See figure 401.)
   B. Remove clamp attaching pressure switch to support bracket.
   C. Remove accumulator pressure switch from T-fitting.

      NOTE: Rotate switch with a wrench at the switch fitting to keep from breaking tack weld.

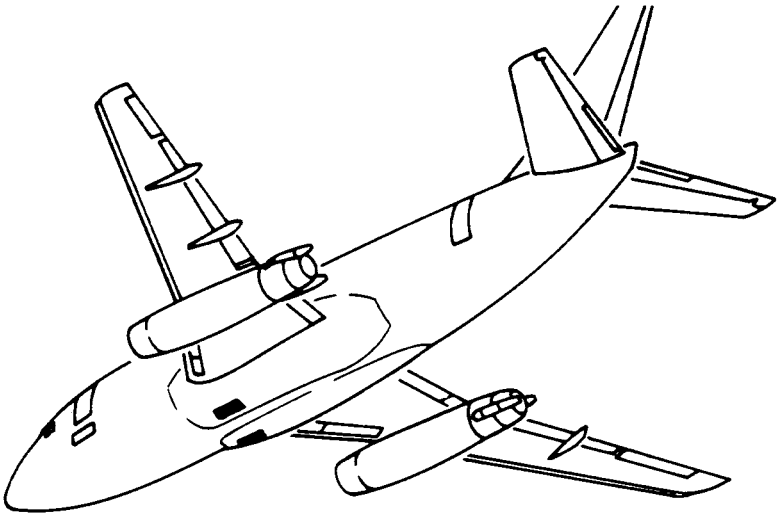
3. Install Accumulator Pressure Switch
   A. Install accumulator pressure switch in T-fitting. (Fig. 401)

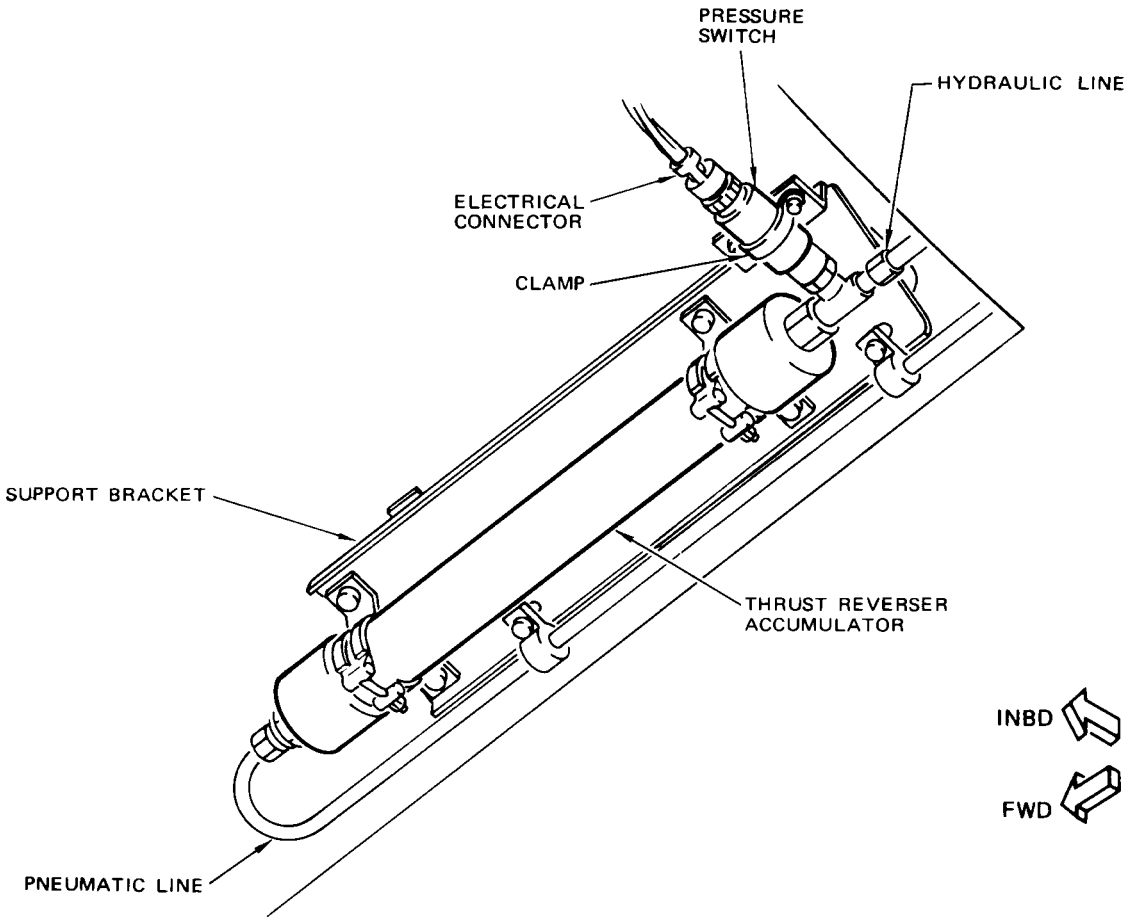
      NOTE: Rotate switch with a wrench at the switch fitting to keep from breaking tack weld.

   B. Attach pressure switch to bracket with clamp.
   C. Connect electrical connector to pressure switch.
   D. Operate thrust reverser on accumulator pressure to check that LOW PRESSURE warning light functions properly and to check hydraulic lines for leaks. Refer to 78-36-01, Thrust Reverser Indicating Systems - Adjustment/Test.

      WARNING: PERSONNEL MUST STAY CLEAR OF THRUST REVERSER WHEN THRUST REVERSER IS ACTUATED TO PREVENT BEING CAUGHT BY ROTATING DEFLECTOR DOORS.

   E. Install forward wing-to-body fairing.





Thrust Reverser Accumulator Pressure Switch Installation
Figure 401

THRUST REVERSER HYDRAULIC SYSTEM PRESSURE SWITCH - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Thrust Reverser Isolation Valve Ground Lock Cap and Pin Assembly - F80109-3 or F80109-9 or equivalent
2. References
   A. AMM 78-36-01/501, Thrust Reverser Indicating System
3. Prepare for Removal
   A. Open the air conditioning bay access doors and install the rods.
   B. Deactivate thrust reverser hydraulic system by installing ground locks at both thrust reverser isolation valves.

      WARNING: SERIOUS INJURY CAN RESULT TO PERSONNEL IF GROUND LOCKS ARE NOT PROPERLY INSTALLED. ATTEMPT TO DEPLOY THRUST REVERSERS AFTER INSTALLING GROUND LOCKS. REVERSERS MUST NOT MOVE HYDRAULICALLY.

   C. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
   D. Remove the access panel from the forward wing-to-body fairing to get access to the pressure switch.
4. Remove Hydraulic System Pressure Switch
   A. Disconnect the electrical connector from the pressure switch (Fig. 401).
   B. Remove the clamp to remove the pressure switch from the support bracket.
   C. Remove the pressure switch from the T-fitting.

      NOTE: Turn the switch with a wrench at the switch fitting to prevent a break of the tack weld.

5. Install Hydraulic System Pressure Switch
   A. Install the pressure switch in T-fitting (Fig. 401).

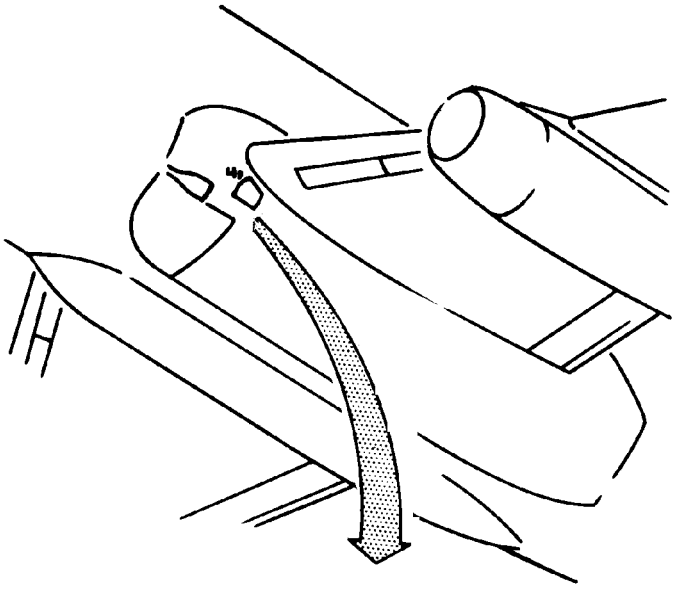
      NOTE: Turn the switch with a wrench at the switch fitting to prevent a break in the tack weld.

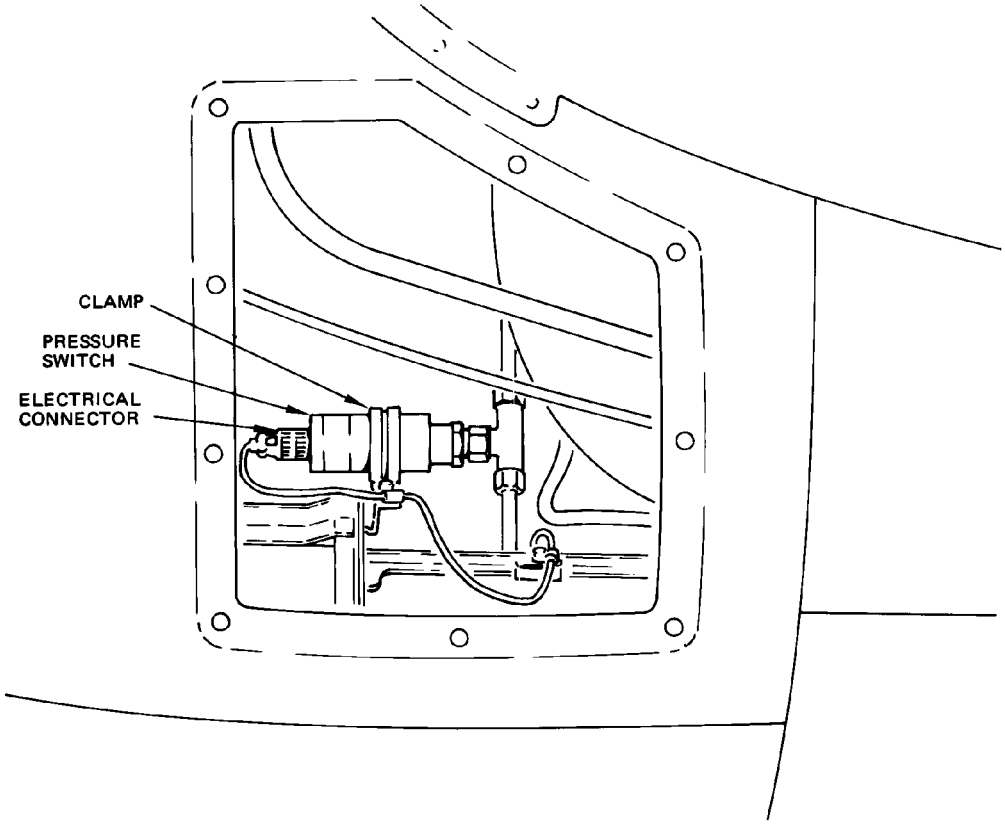
   B. Attach the pressure switch to the bracket with the clamp.
   C. Connect the electrical connector to the pressure switch.
   D. Activate the thrust reverser hydraulic system; remove the ground locks from the isolation valves.

      NOTE: It is not necessary to close the air conditioning bay access doors at this time.

E. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.
F. Do the thrust reverser armed indicating system test or the isolation valve indicating system test as applicable to do a check for correct operation of the pressure switch (AMM 78-36-01/501).

6. Put the Airplane Back to the Usual Condition
A. Deactivate the thrust reverser hydraulic system; install ground locks on both isolation valves.
B. Open the applicable THRUST REVERSER circuit breaker on the P6 panel and attach a DO-NOT-CLOSE tag.
C. Do a check of the hydraulic lines for leakage.
D. Install the access panel on the wing-to-body fairing.
E. Activate the thrust reverser hydraulic system; remove the ground locks from the isolation valves.
F. Stow the rods and close the air conditioning bay access doors.
G. Remove the DO-NOT-CLOSE tag and close the applicable THRUST REVERSER circuit breaker on the P6 panel.





Thrust Reverser Pressure Switch Installation
Figure 401