

CHAPTER

71

Power Plant GE 115

(GE90-100 SERIES ENGINES)

CHAPTER 71
POWER PLANT GE 115

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POWER PLANT - INTRODUCTION

General

Two General Electric GE90–115B engines supply airplane thrust during all phases of flight. The GE90–115B is a high bypass ratio, turbofan engine. The engines supply power for the electric, hydraulic, and pneumatic systems.

The engine systems are described in the following sequence:

- Power plant (71)
- Engine (72)
- Engine fuel and control (73)
- Ignition (74)
- Air (75)
- Engine controls (76)
- Engine indicating (77)
- Exhaust (78).
- Oil (79)
- Starting (80)

- PDOS - powered door opening system
- PRSOV - pressure regulating and shutoff valve
- SVC - service
- TIP - training information points
- T/R - thrust reverser
- T12 - temperature at station 12
- VSV - variable stator vanes

Abbreviations and Acronyms

- ACTR - actuator
- CTRL - control
- EAI - engine anti-ice
- FAV - fan air valve
- GE - General Electric
- GND - ground
- HDLG - handling
- HMU - hydromechanical unit
- HP - high pressure
- IDG - integrated drive generator
- LP - low pressure
- MAT - maintenance access terminal

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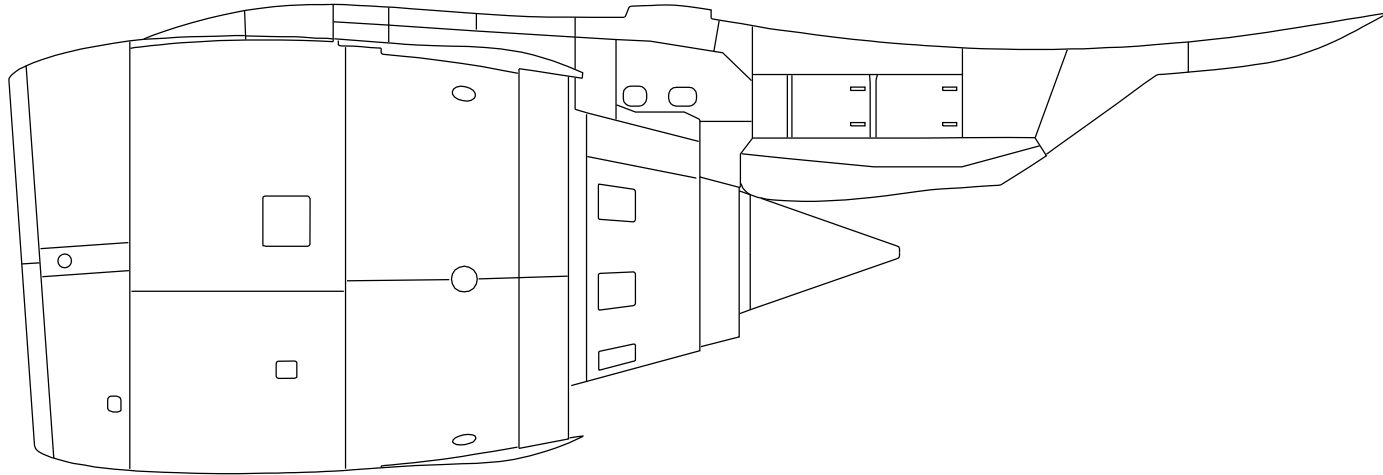
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ENGINE
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ENGINE FUEL
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POWER PLANT - INTRODUCTION

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POWER PLANT - ENGINE HAZARDS**General**

It is dangerous to work around engines. Use the engine entry corridors to go near an engine in operation. You must stay out of the inlet and exhaust hazard areas when the engine is running.

The hazards around jet engines in operation include:

- Inlet suction
- Heat
- Exhaust
- Noise.

Engine Entry Corridors

Engine entry corridors are between the inlet hazard areas and the exhaust hazard areas. You should go near an operating engine only when:

- The engine is at idle (forward thrust only)
- You can speak with the flight deck.

Inlet Suction**WARNING**

ALL PERSONNEL MUST AVOID HAZARD AREAS AROUND THE POWER PLANT AND REMAIN OUTSIDE OF ENGINE SAFETY BARRIER, IF USED, DURING GROUND RUNNING OPERATIONS. THE ENGINE IS CAPABLE OF DEVELOPING ENOUGH SUCTION AT THE INLET TO PULL A PERSON UP TO OR PARTIALLY INTO THE INLET WITH POSSIBLE FATAL RESULTS. THEREFORE, WHEN APPROACHING ANY TYPE OF JET ENGINE, PRECAUTIONS MUST BE TAKEN TO KEEP CLEAR OF THE INLET AIR STREAM. THE SUCTION NEAR THE INLET CAN ALSO PULL IN HATS, GLASSES, LOOSE CLOTHING AND WIPE-RAGS FROM POCKETS. ANY LOOSE ARTICLES MUST BE MADE SECURE OR REMOVED BEFORE WORKING AROUND THE ENGINE.

Suction at the inlet of an engine can pull objects, including a person, into the engine. At idle power, the hazard area is a 15 ft (4.6 m) radius around the inlet. At takeoff thrust, the hazard area is a 63 ft (19.2 m) radius around the inlet.

Engine damage can result when rags, eyeglasses, hats, or other loose objects go into the inlet cowl. You must attach or remove any loose objects before you work around the engine.

Heat

The engine exhaust temperature can remain high for a long distance behind the engine.

Exhaust

The engine fan and thrust reverser develop high speed exhaust gases that can cause injury. The exhaust gases move forward when the thrust reverser deploys.

POWER PLANT - ENGINE HAZARDS

Noise**WARNING**

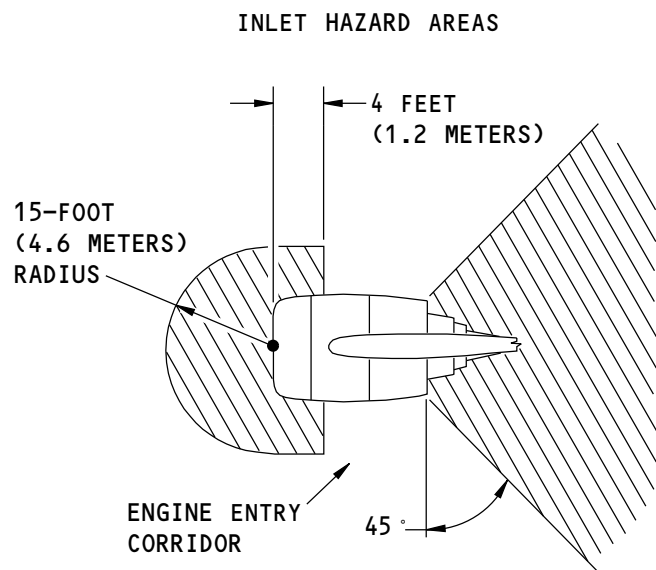
EAR PROTECTION MUST BE WORN BY ALL PERSONS WHO WORK NEAR THE ENGINE WHILE THE ENGINE OPERATES. LOUD NOISE FROM THE ENGINE CAN CAUSE TEMPORARY OR PERMANENT DAMAGE TO THE EARS.

Engine noise can cause temporary and permanent hearing loss. You must wear cup-type ear protection near an engine in operation.

Engine Shut Down Procedures

The GE90-115B engine has a characteristic to have high HPC vibration during initial start, if a period of time has elapsed after shut down. This is due to uneven cooling of the HPC rotor that results in a bowed rotor which is sensed by the vibration monitoring system as high N2 vibrations.

To minimize the HPC vibrations during the start, make sure that you do the engine cool down procedures to reduce the severity of bowed rotor HPC vibrations and to protect the engine from blade tip damage.



IDLE POWER

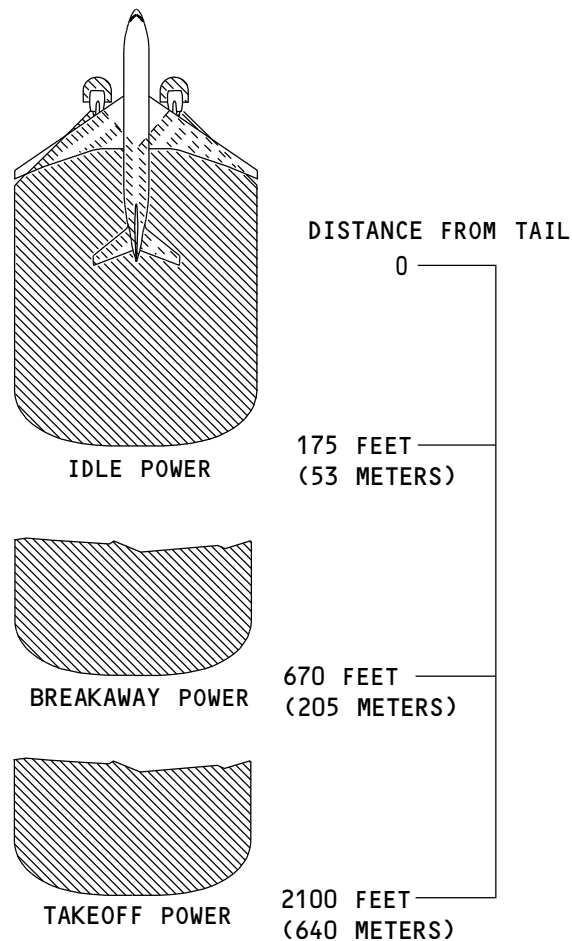
BREAKAWAY POWER

INLET HAZARD RADIUS IS 28.5 FEET (8.7 METERS)
EXTENDS 11 FEET (3.3 METERS) BACK ON INLET

TAKEOFF POWER

INLET HAZARD RADIUS IS 63 FEET (19.2 METERS)
EXTENDS 11 FEET (3.3 METERS) BACK ON INLET

EXHAUST HAZARD AREAS



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POWER PLANT ENGINE HAZARDS

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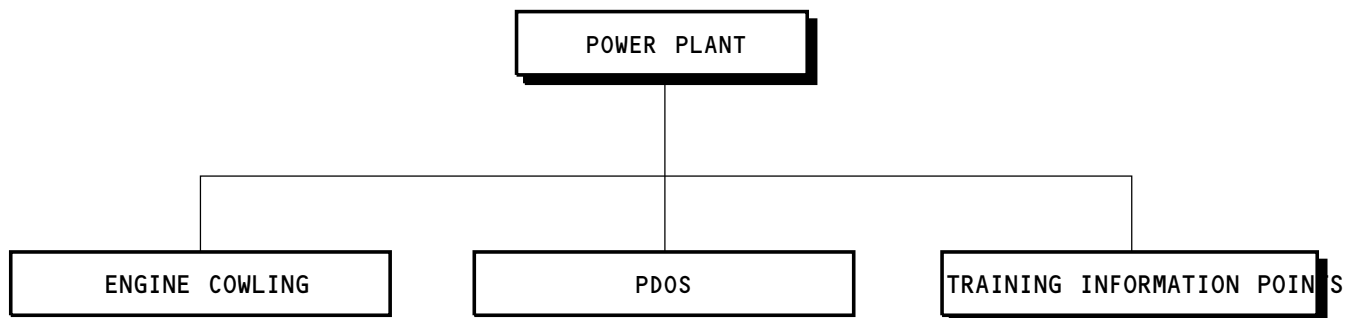
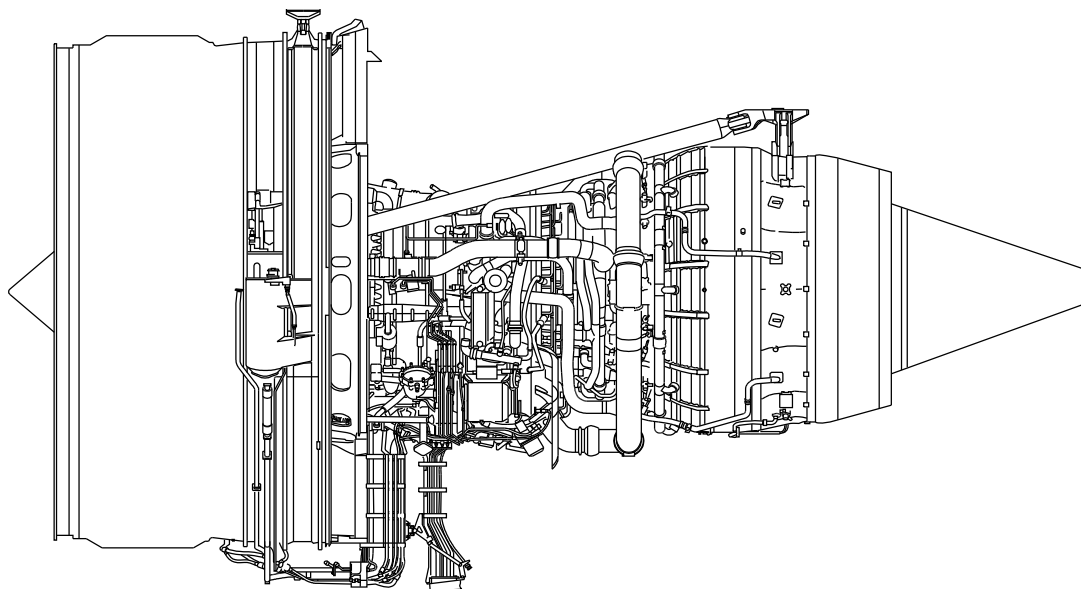


TRAINING INFORMATION POINT (TIP) - INTRODUCTION

General

The power plant has many LRUs. But, the power plant itself is an LRU. There are several procedures with related equipment that apply to the power plant as an LRU. These are the items in this training information points (TIP) section:

- Engine handling
- Thrust reverser hold-open equipment (engine removed)
- Engine disconnects
- Bootstrap equipment
- Engine mounts
- Engine drains
- System tests.



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TRAINING INFORMATION POINT (TIP) - INTRODUCTION

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**TIP - ENGINE HANDLING****General**

The removal and installation of a power plant is a long task. Many special tools and equipment are necessary. For more details on the engine removal and installation, refer to the AMM H71-00-02/401.

This is a summary of the tasks necessary to change an engine:

- Prepare the airplane for an engine change by doing all the necessary safety and disconnect tasks
- Install the engine ground handling adapters
- Install the bootstrap equipment
- Raise the engine cradle and attach it to the ground handling adapters
- Disconnect the engine mounts
- Lower the engine to the transportation stand.

To install the engine you reverse the procedures.

Preparation

Many procedures must be done to make it safe to remove and install the power plant. This is a summary of the procedures:

- Electrically ground the airplane
- Level the airplane
- Close the engine fuel valve and engine fuel spar valve
- Depressurize the hydraulic system
- Close the engine driven pump supply shutoff valve
- Depressurize the pneumatic system
- Retract the leading edge slats
- Deactivate the leading edge slats
- Deactivate the thrust reverser.

You must remove the fan cowls before you remove the engine. They attach to the fan cowl support beam which attaches to the engine.

You must open the thrust reverser halves before you remove the engine. You do not remove them for an engine change. The thrust reverser halves attach to the strut. Special hold-open equipment is necessary to keep the reverser halves open.

Apply tape over the bleed air deflector panels to prevent small parts from falling into the engine.

With the thrust reverser hold-open equipment installed, you disconnect all of these types of connections:

- Electrical
- Hydraulic
- Pneumatic
- Mechanical
- Fuel.

Ground Handling Adapters

There are three places on the engine to attach the ground handling adapters. You remove the adapters from the cradle and install them on the engine. The forward ground handling adapters attach to the fan frame. A bracket on each side of the low pressure turbine case is where you attach the aft ground handling adapter.

NOTE: The forward ground handling adapters on some engine cradles attach to the fan hub frame. You must remove three blank-off panels and two deflector panels on each side to install these adapters. This type of engine cradle is required when you separate the fan stator module assembly from the core of the engine (AMM H71-00-02/401).

Bootstrap Equipment

The bootstrap equipment has the forward and aft bootstrap assemblies. The assemblies attach to fittings under the strut.

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**TIP - ENGINE HANDLING**

The forward bootstrap assemblies connect to two dynamometers with hoists (or shackles (load cells)) which will attach to the forward inboard and outboard cradle attach assemblies. The aft bootstrap assembly connects to one dynamometer with hoist (or shackle (load cell)) which will attach to the aft inboard cradle attach fitting.

Engine Cradle

The engine cradle is part of the engine transportation stand. You must be careful to attach the hoists to the proper lug holes on the cradle.

You initially raise the cradle and transportation stand together to let gravity align them with the engine. You then lower them and disconnect the cradle from the stand. You raise the cradle and attach it to the ground handling adapters.

Engine Mounts

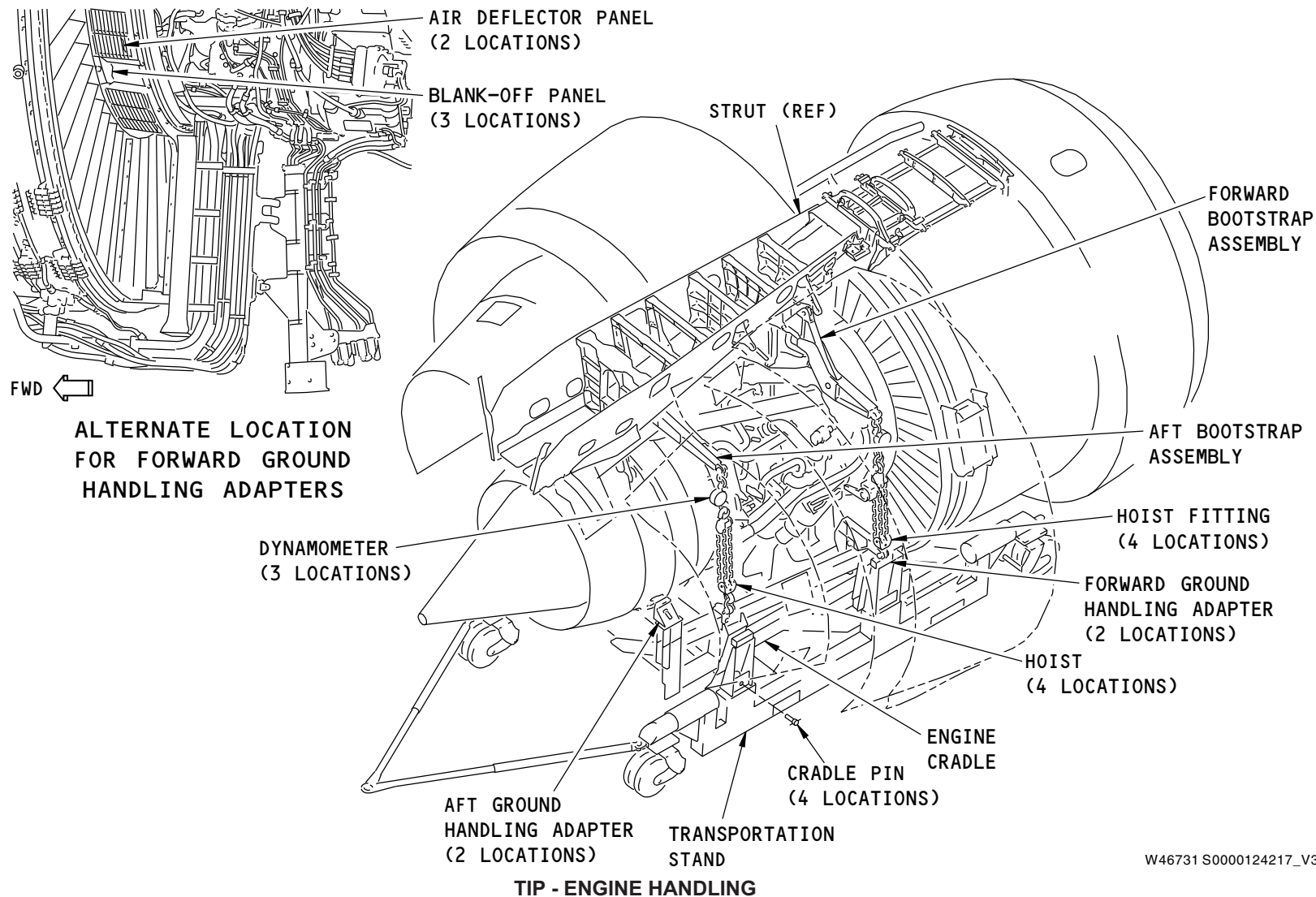
There are two engine mounts: forward and aft. The upper part of each mount is part of the strut. The lower part of each mount attaches to the engine. When the bootstrap loads are within limits, you remove the tension bolts that hold the upper and lower mounts together.

Transportation Stand

You lower the engine and cradle down to the transportation stand. Use the aft bootstrap assembly to change the roll angle of the engine to align it with the stand.

Power Plant Installation

The procedures for installing the engine are basically the reverse of the removal procedures.



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**TIP - THRUST REVERSER HOLD-OPEN EQUIPMENT****General**

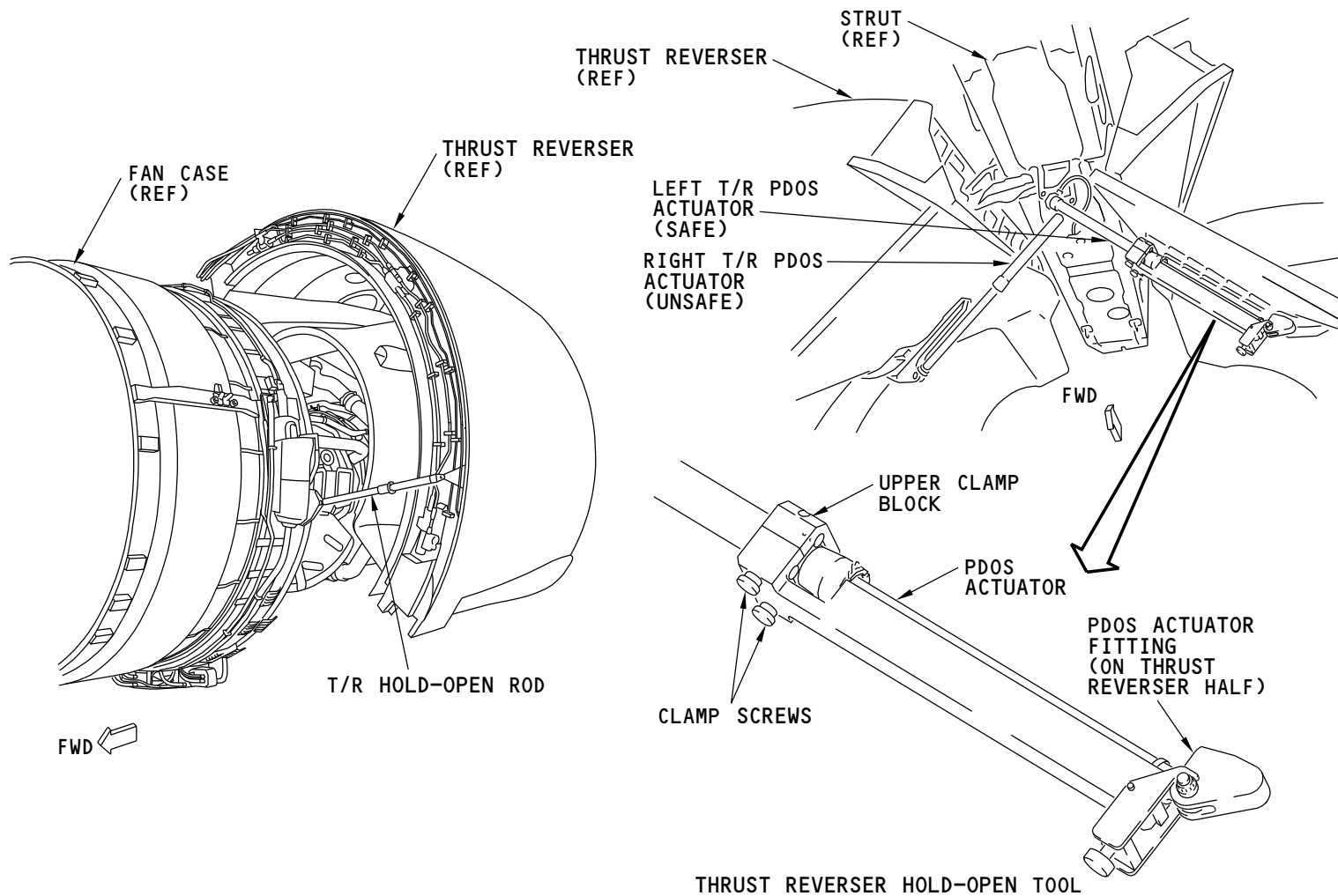
Normally when you open the thrust reverser (T/R) halves, hold-open rods that attach to the engine hold the T/R halves open. When you change an engine, you must attach special T/R hold-open equipment to the T/R PDOS actuators to hold the T/R halves open.

Thrust Reverser Hold-Open Tool

The T/R hold-open tools let the strut hold the weight of the T/R halves. There is one tool for each T/R half.

Operation

With the T/R held open by the hold-open rods, you install the T/R hold-open tools on the T/R PDOS actuators. This makes sure the T/R does not close when you disconnect the hold open rods.



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TIP - THRUST REVERSER HOLD-OPEN EQUIPMENT

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**TIP - ENGINE DISCONNECTS LEFT****General**

When you change an engine you must disconnect many things. You make the disconnects above the fan case and above the engine core just below the strut.

Fan Disconnects

There is a fan/strut disconnect panel above the fan case on the forward end of the strut. The panel contains four electrical connectors and the fan cowl PDOS hydraulic tubes.

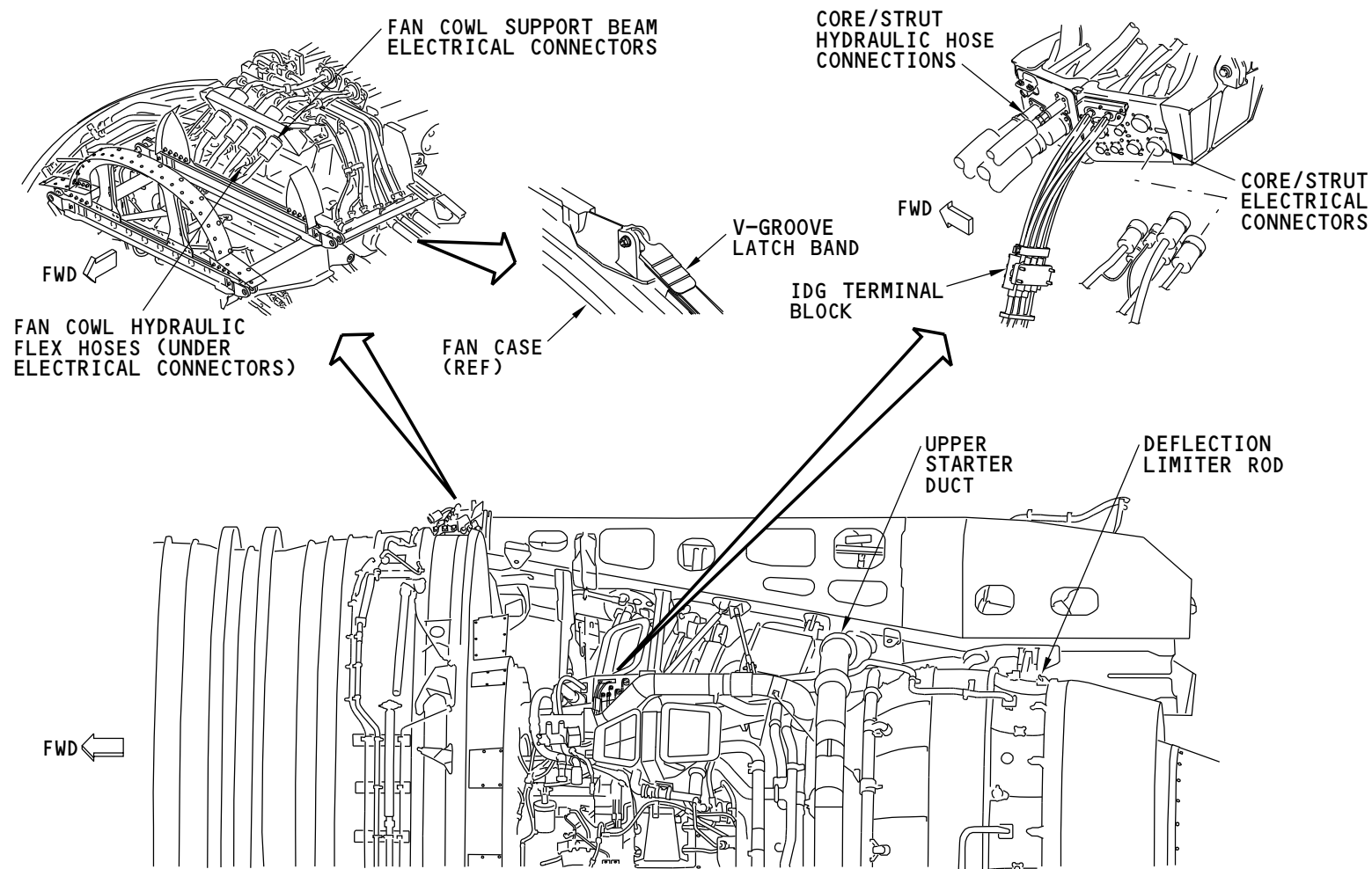
When you change an engine, you must also disconnect the left T/R v-groove latch band.

Core Disconnects

There is a core/strut disconnect panel on the left side of the engine that attaches to the bottom of the strut. This panel has seven electrical connections and three hydraulic hose connections. Just below the panel is the IDG terminal block. This is where you disconnect the IDG feeder cables.

When you change an engine, you must also disconnect the upper starter duct and the left end of the deflection limiter rod.

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TIP - ENGINE DISCONNECTS LEFT

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**TIP - ENGINE DISCONNECTS (RIGHT)****General**

When you change an engine you must disconnect many components. You make the disconnects above the fan case and above the engine core.

Fan Disconnects

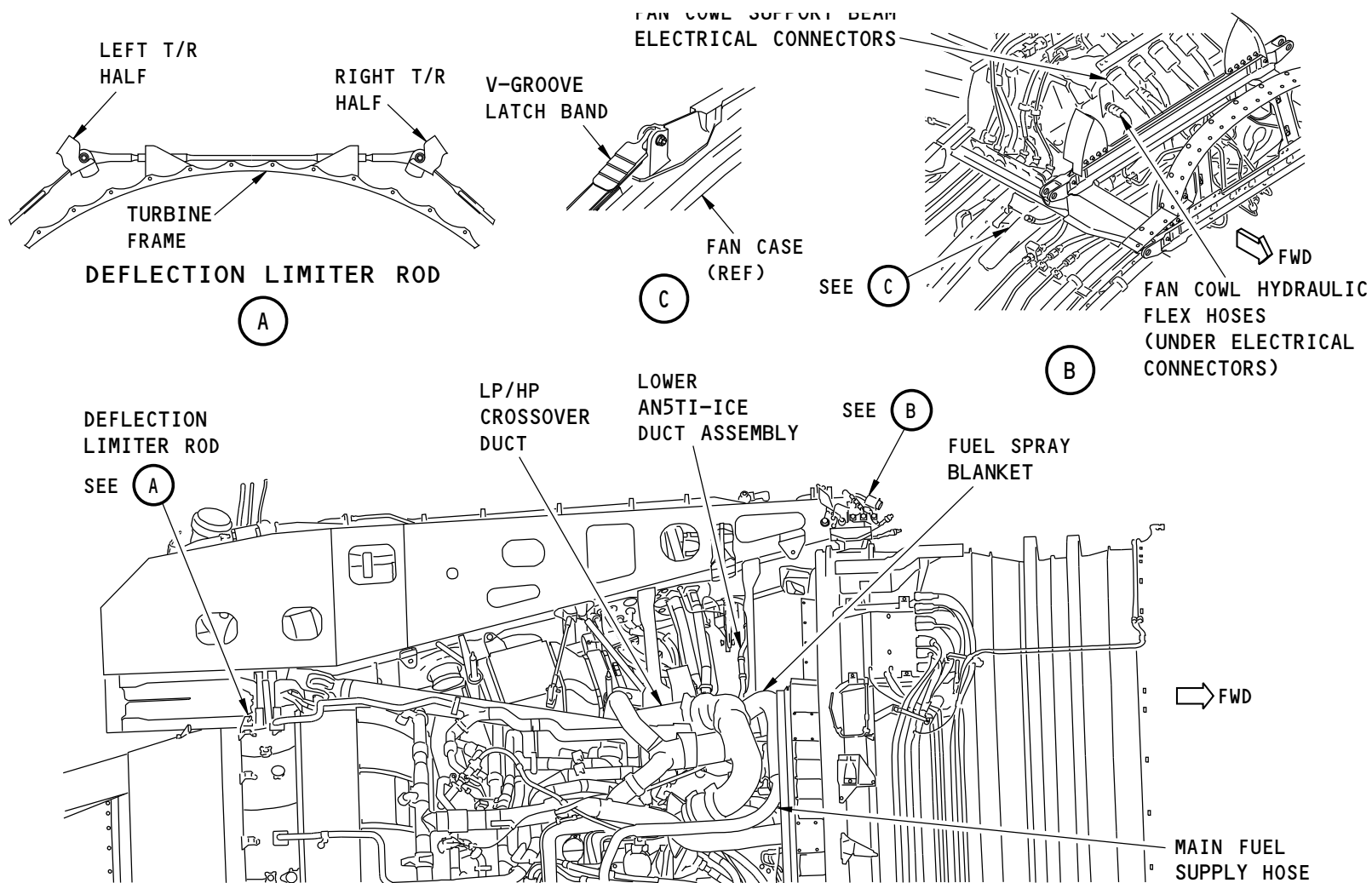
There is a fan/strut disconnect panel above the fan case on the forward end of the strut. The panel contains four electrical connectors and the fan cowl PDOS hydraulic tubes.

When you change an engine, you must also disconnect the right T/R v-groove latch band.

Core Disconnects

When you change an engine, you must disconnect these mechanical connections (For more details, refer to the AMM H71-00-02/401):

- Right end of the deflection limiter rod
- LP/HP crossover duct
- Lower anti-ice duct assembly (for bootstrap accessibility)
- Main fuel supply hose.



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TIP - ENGINE DISCONNECTS (RIGHT)

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TIP - BOOTSTRAP EQUIPMENT**General**

When you change an engine, you lift and lower it with bootstrap equipment. The bootstrap equipment includes these assemblies (AMM H71-00-02/401):

- Forward bootstrap
- Aft bootstrap
- Hoists (manually operated or pneumatically operated). For pneumatically operated hoist usage, refer to the Morgan Aero Products, Washington 98203.

Forward Bootstrap Assembly

The forward bootstrap assembly attaches to the bottom, forward end of the strut. The assembly has these structural components:

- Forward upper inboard arm assembly
- Forward upper outboard arm assembly
- Forward upper attach fitting (2)
- Forward lower inboard arm assembly
- Forward lower outboard arm assembly
- Forward center beam assembly.

Aft Bootstrap Assembly

The aft bootstrap assembly attaches to the bottom, aft end of the strut. The assembly has this structural component:

- Aft inboard arm (short)
- Aft outboard arm (long).

Hoist Assemblies

There are two types of hoist assemblies; manually operated and pneumatically operated. The hoist assemblies connect the bootstrap assemblies to the engine cradle. These are the three hoist assemblies:

- Forward inboard

- Forward outboard
- Aft inboard
- Aft outboard

The forward inboard hoist assembly includes these components:

- Manually hoist or pneumatically hoist
- Forward inboard cradle attach assembly
- Dynamometer or shackle (load cell)

The forward outboard hoist assembly includes these components:

- Manually hoist or pneumatically hoist
- Forward outboard cradle attach assembly.
- Chains and hoists
- Dynamometer or shackle (load cell)

The aft hoist assembly includes these components:

- Manually hoist or pneumatically hoist
- Hoists, Cable, and pulleys
- Dynamometer or shackle (load cell)
- Aft cradle attach fittings.

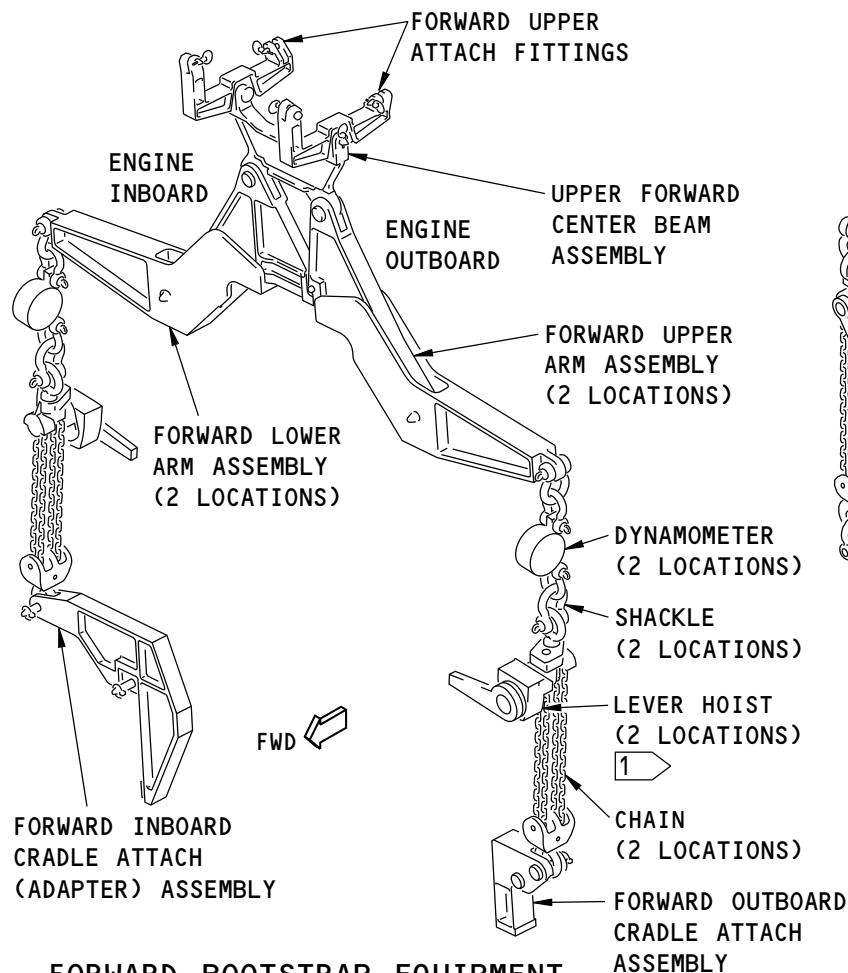
You use the aft hoist assembly to change the roll of the engine.

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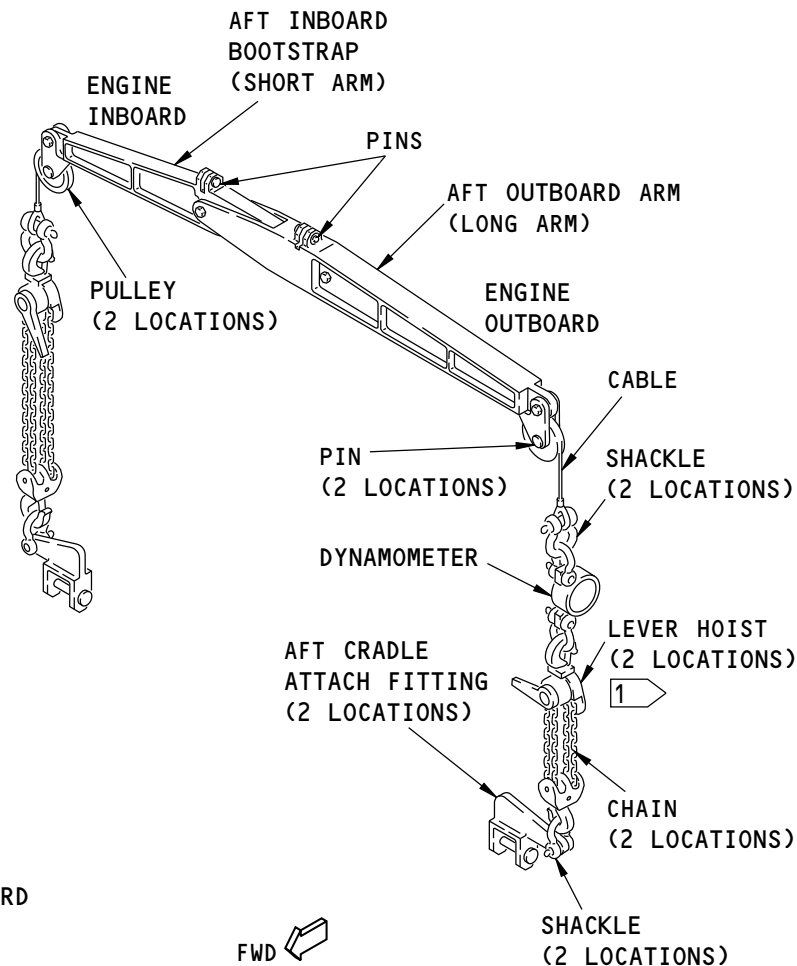
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**FORWARD BOOTSTRAP EQUIPMENT
(MANUALLY OPERATED)**

1 CAN BE USED WITH PNEUMATIC HOIST



**AFT BOOTSTRAP EQUIPMENT
(MANUALLY OPERATED)**

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TIP - 4-POINTS BOOTSTRAP EQUIPMENT

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**TIP - ENGINE MOUNTS****General**

The forward lower engine mount and the aft lower engine mount attach the engine to the strut. The aft engine mount also transfers engine thrust to the airplane.

You disconnect the engine mounts to remove the engine. The engine mounts transmit these loads:

- Thrust
- Weight
- Torque.

Forward Engine Mount

The forward engine mount includes the upper and lower sections. The forward upper engine mount is part of the strut.

The forward lower engine mount connects the aft fan case to the strut with four vertical tension bolts.

Aft Engine Mount

The aft engine mount transfers thrust loads to the strut. The mount includes the upper and lower sections. The aft upper engine mount is part of the strut.

The aft lower engine mount connects the turbine rear frame to the strut with eight vertical tension bolts.

Thrust Links

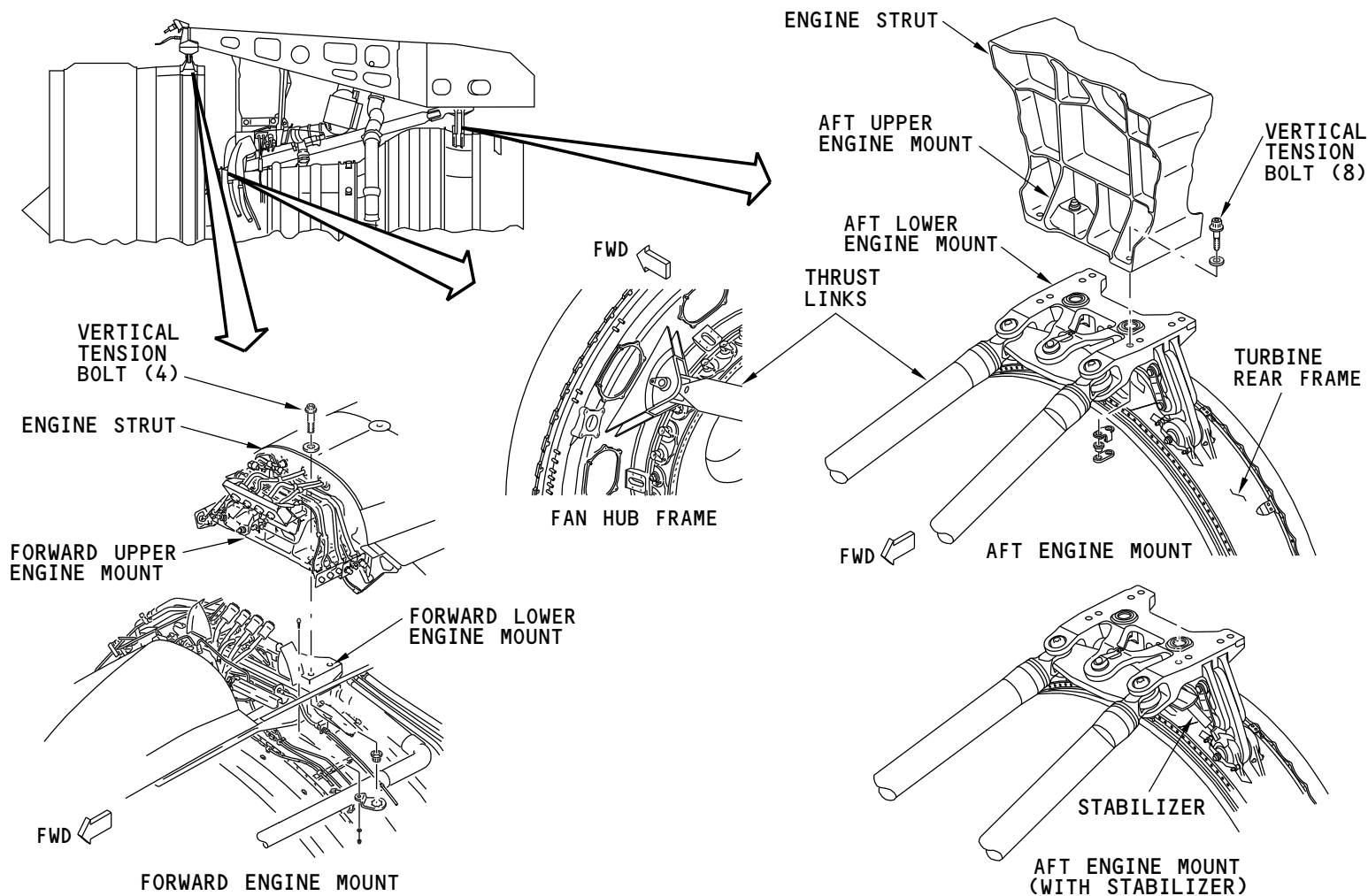
Two thrust links attach to the engine fan hub frame and the aft lower engine mount. The thrust links transfer thrust loads from the engine to the aft lower engine mount.

Training Information Point

When you change an engine, you install a stabilizer on the aft lower engine mount. This keeps the mount in the correct position.

When you install an engine, use only new vertical tension bolts or bolts that you inspect with dye penetrant.

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TIP - ENGINE MOUNTS

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TIP - ENGINE DRAINS

Purpose

The engine drains system removes fluid from the engine cowls, components, and strut. This prevents fluid leakage on to the engine.

Drains

The drain system collects fuel, oil, and hydraulic fluid from leaking components and sends it overboard. The fluids go overboard through the drain mast.

The drain mast is at the 6:00 position on the thrust reverser aft of the forward latch beam access door. Eight drain tubes go from engine components to the drain mast.

These are the engine components that drain through the eight drain tubes:

- VBV/VSV actuators
- HPT ACC and STB valve actuators
- Main fuel pump drive pad
- HMU drive pad
- Backup generator seal and drive pad
- Hydraulic pump seal
- Hydraulic pump drive pad
- IDG drive pad.

The components that mount to the accessory gearbox have drains that connect to their adapter drive pads.

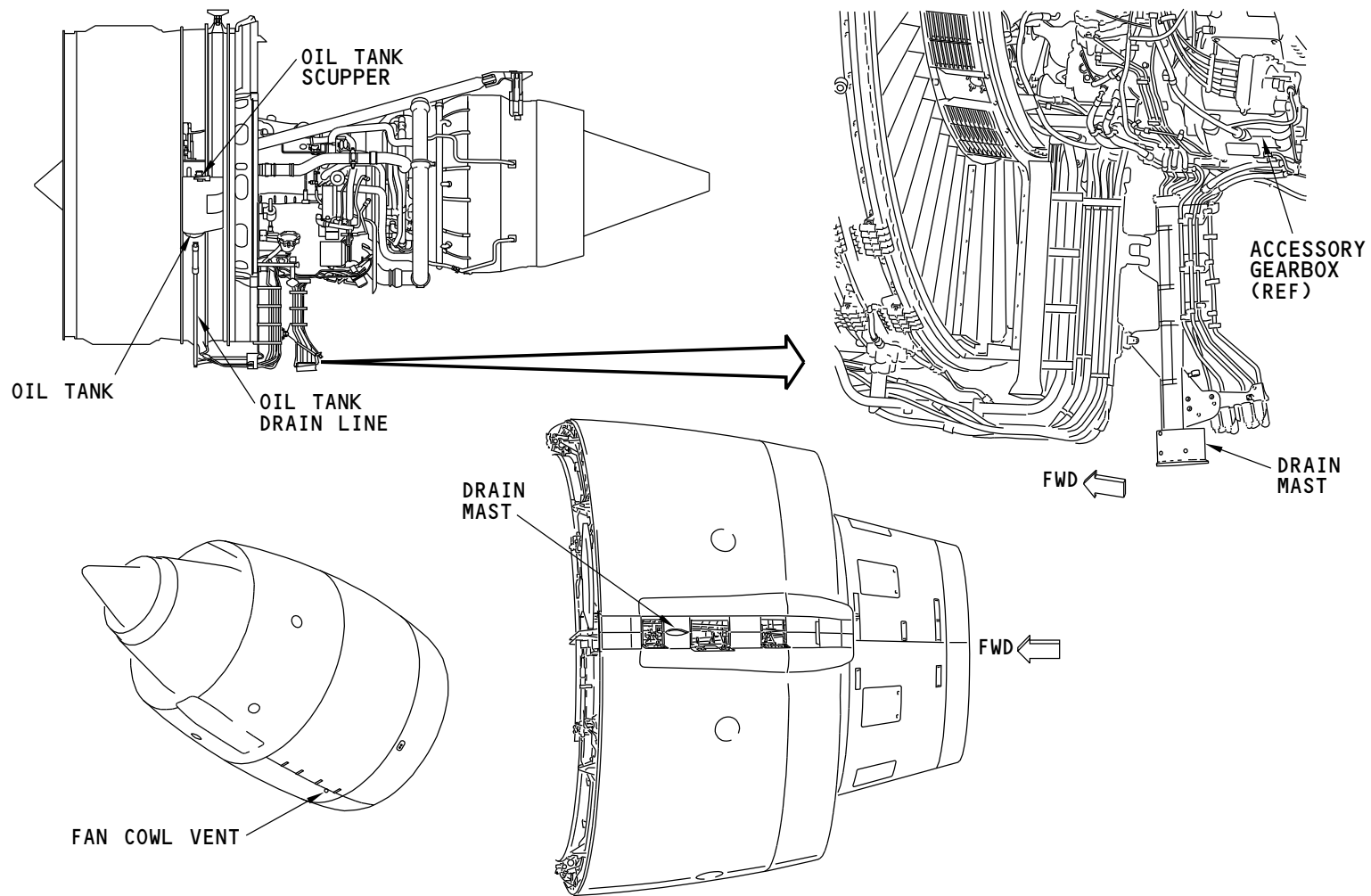
Some of the fuel driven actuators have drain lines that combine into a single line before they get to the drain mast. These components have drain cans (not shown) which also collect leakage. You look in the drain cans to isolate the leakage to a specific component.

The oil tank scupper has a drain line that goes down to the fan cowl vent. The oil tank scupper collects leakage from oil tank servicing and drains it overboard through the fan cowl vent.

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TIP - ENGINE DRAINS

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**POWER PLANT - TIP - SYSTEM TESTS****General**

There are six system tests and ten special functions for each engine. You use the maintenance access terminal (MAT) to do the tests. The left and right engine tests are the same except for the titles.

These are the system tests:

- Fuel driven actuator
- Air driven actuator
- Ignition system
- Reverse thrust lever interlock actuator
- Engine debris monitoring system
- Electronic engine control.

These are the special functions:

- VSV opening for maintenance
- Engine serial number entry
- T/R sync lock rigging (L and R sleeve)
- T/R actuator lock rigging (lower and center for both left and right sleeve)
- T/R directional control valve rigging.

Fuel Driven Actuator Test

As you dry motor the engine, this test opens and closes the actuators for these components:

- Variable stator vanes
- Variable bypass valves
- HPT active clearance control valve

Air Driven Actuator Test

With the engine at approach idle, this test opens and closes the actuators for these components:

- Core compartment cooling valve

- LPT active clearance control valve.

Ignition System Test

This test let you command the EEC to energize each ignition circuit. The test makes sure the igniter, exciter, and the EEC channels operate correctly to supply the electrical power to the ignition system.

Reverse Thrust Lever Interlock Actuator Test

This test makes the EEC open and close the interlock actuator.

Engine Debris Monitoring System Test

This test lets you activate or deactivate the debris monitoring system. The chip counters show, and may be reset with this test.

Electronic Engine Control Test

This test makes the EEC start a self test.

Variable Stator Vane Opening for Maintenance

As you dry motor the engine, the variable stator vane opening for maintenance test moves the VSVs to a more open position. After shutdown, this allows for better boroscope inspection of HPC stage 1 thru stage 5.

Engine Serial Number Entry

You change the engine serial number in the electronic engine control memory with this test. This must be done after an EEC or engine change.

After the engine serial number is installed, access the SYSTEM CONFIGURATION function and choose left or right engine to do a check of the engine serial number.

T/R Sync Lock Rigging

These functions show the position of the left and right sleeve sync lock proximity sensor.

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POWER PLANT - TIP - SYSTEM TESTS

Actuator Lock Rigging

These functions show the position of the lower and center locking actuator lock proximity sensor for both the left and right sleeves.

Directional Control Valve Rigging

This function shows the position of the directional control valve proximity sensor.

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GROUND TESTS

SELECT ATA SYSTEM (55)

36 AIR SUPPLY CONTROL SYSTEM
45 AIMS - CENTRAL MAINTENANCE COMPUTING SYSTEM
45 MAINTENANCE ACCESS TERMINAL / SIDE DISPLAYS
52 PASSENGER DOOR FLIGHT LOCKS
52 FORWARD CARGO AND ACCESS DOORS
52 AFT CARGO DOOR
71 - 80 LEFT ENGINE
71 - 80 RIGHT ENGINE

SELECT TEST TYPE

SYSTEM TEST
TEST LOG
TEST REPORT

SELECT SYSTEM TEST (6)

FUEL DRIVEN ACTUATOR TEST
AIR DRIVEN ACTUATOR TEST
IGNITION SYSTEM TEST
REVERSE THRUST LEVER INTERLOCK ACTUATOR TEST
ELECTRONIC ENGINE CONTROL
DEBRIS MONITORING SYSTEM

CONTINUE HELP GO BACK

SELECT SYSTEM TEST

(6)

FUEL DRIVEN ACTUATOR TEST
AIR DRIVEN ACTUATOR TEST
IGNITION SYSTEM TEST
REVERSE THRUST LEVER INTERLOCK ACTUATOR TEST
ENGINE DEBRIS MONITORING SYSTEM TEST
ELECTRONIC ENGINE CONTROL SYSTEM TEST

SPECIAL FUNCTIONS

SELECT ATA SYSTEM (27)

36 AIR SUPPLY CONTROL SYSTEM
45 AIMS - CENTRAL MAINTENANCE COMPUTING SYSTEM
45 MAINTENANCE ACCESS TERMINAL / SIDE DISPLAYS
52 PASSENGER DOOR FLIGHT LOCKS
52 FORWARD CARGO AND ACCESS DOORS
52 AFT CARGO DOOR
71 - 80 LEFT ENGINE
71 - 80 RIGHT ENGINE

SELECT FUNCTION (10)

L ENG SPECIAL WET MOTORING FUNCTION
L ENG VSV OPENING FOR MAINTENANCE SPECIAL FUNCTION
L ENG SERIAL NUMBER ENTRY
T/R SYNC LOCK (L SLV) (L ENG) RIG
T/R ACT LOCK CTR (L SLV) (L ENG) RIG
T/R ACT LOCK LWR (L SLV) (L ENG) RIG
T/R SYNC LOCK (R SLV) (L ENG) RIG
T/R ACT LOCK CTR (R SLV) (L ENG) RIG
T/R ACT LOCK LWR (R SLV) (L ENG) RIG
T/R DIRECTIONAL CONTROL VALVE RIGGING

CONTINUE HELP GO BACK

SELECT FUNCTION

(10)

L ENG SPECIAL WET MOTORING FUNCTION
L ENG VSV OPENING FOR MAINTENANCE TEST
L ENG SERIAL NUMBER ENTRY
L ENG T/R ACT LOCK CTR (L SLV)(L ENG) RIG
L ENG T/R SYNC LOCK (L SLV)(L ENG) RIG
L ENG T/R ACT LOCK LWR (L SLV)(L ENG) RIG
L ENG T/R SYNC LOCK (R SLV)(L ENG) RIG
L ENG T/R ACT LOCK CTR (R SLV)(L ENG) RIG
L ENG T/R ACT LOCK LWR (R SLV)(L ENG) RIG
L ENG T/R DIRECTIONAL CONTROL VALVE RIGGING

POWER PLANT - TIP - SYSTEM TESTS

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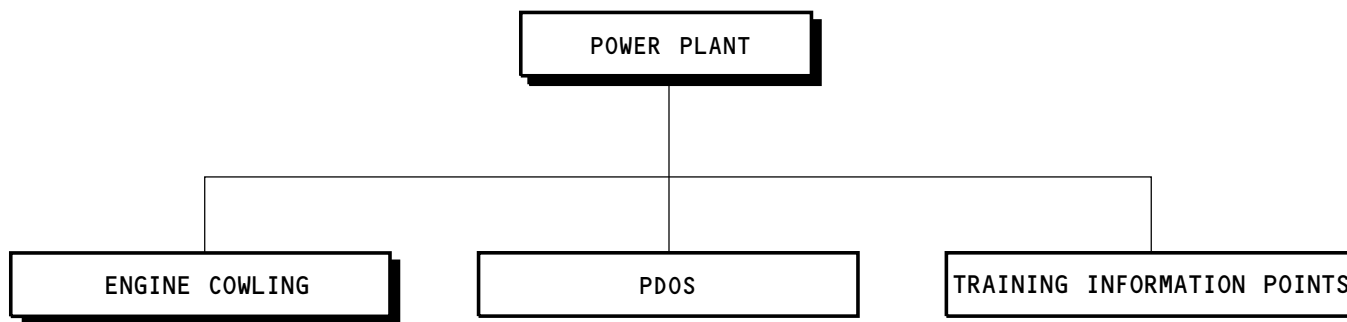
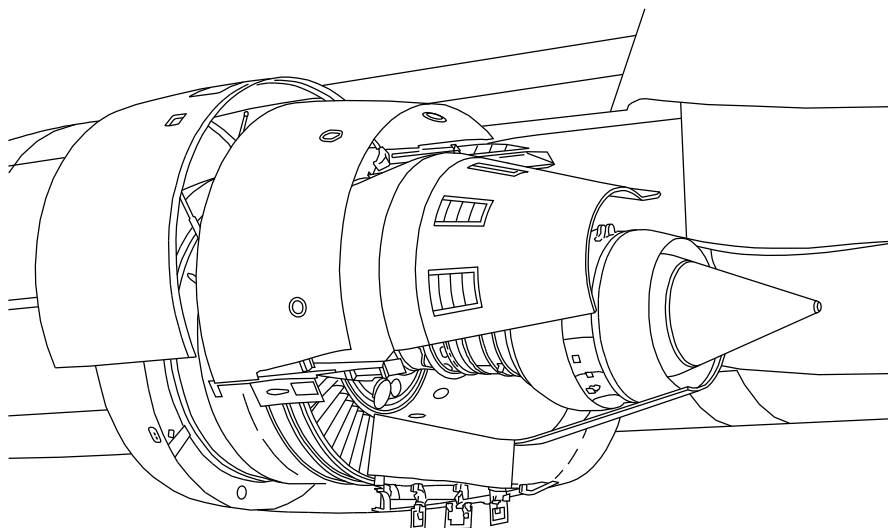
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**ENGINE COWLING - INTRODUCTION****General**

The cowl contains and protects the engine components. The cowl also controls the airflow through and around the engine. Some of the engine cowl opens for maintenance access.

The engine cowl has four parts:

- Inlet cowl
- Fan cowl
- Thrust reverser
- Turbine exhaust system.



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ENGINE COWLING - INTRODUCTION

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**ENGINE COWLING - GENERAL DESCRIPTION****General**

The engine cowl is a cover that contains and gives protection to the engine components. The cowl also controls the airflow through and around the engine. Some parts of the engine cowl open for maintenance access.

The engine cowl has four parts:

- Inlet cowl
- Fan cowl
- Thrust reverser
- Turbine exhaust.

Inlet Cowl

The inlet cowl supplies a smooth airflow into the engine. Each inlet cowl weighs approximately 806lb (366 kg).

Fan Cowl

The fan cowl is aft of the inlet cowl. The fan cowl attaches to the fan cowl support beam on the engine. The fan cowl opens for maintenance. Each fan cowl panel weighs approximately 260 lb (117 kg).

Thrust Reverser

The thrust reverser is aft of the fan cowl. The thrust reverser attaches to the strut and opens for maintenance. Each thrust reverser half weighs approximately 1722 lb (781 kg).

Turbine Exhaust

The turbine exhaust system is aft of the thrust reverser. The system has three parts:

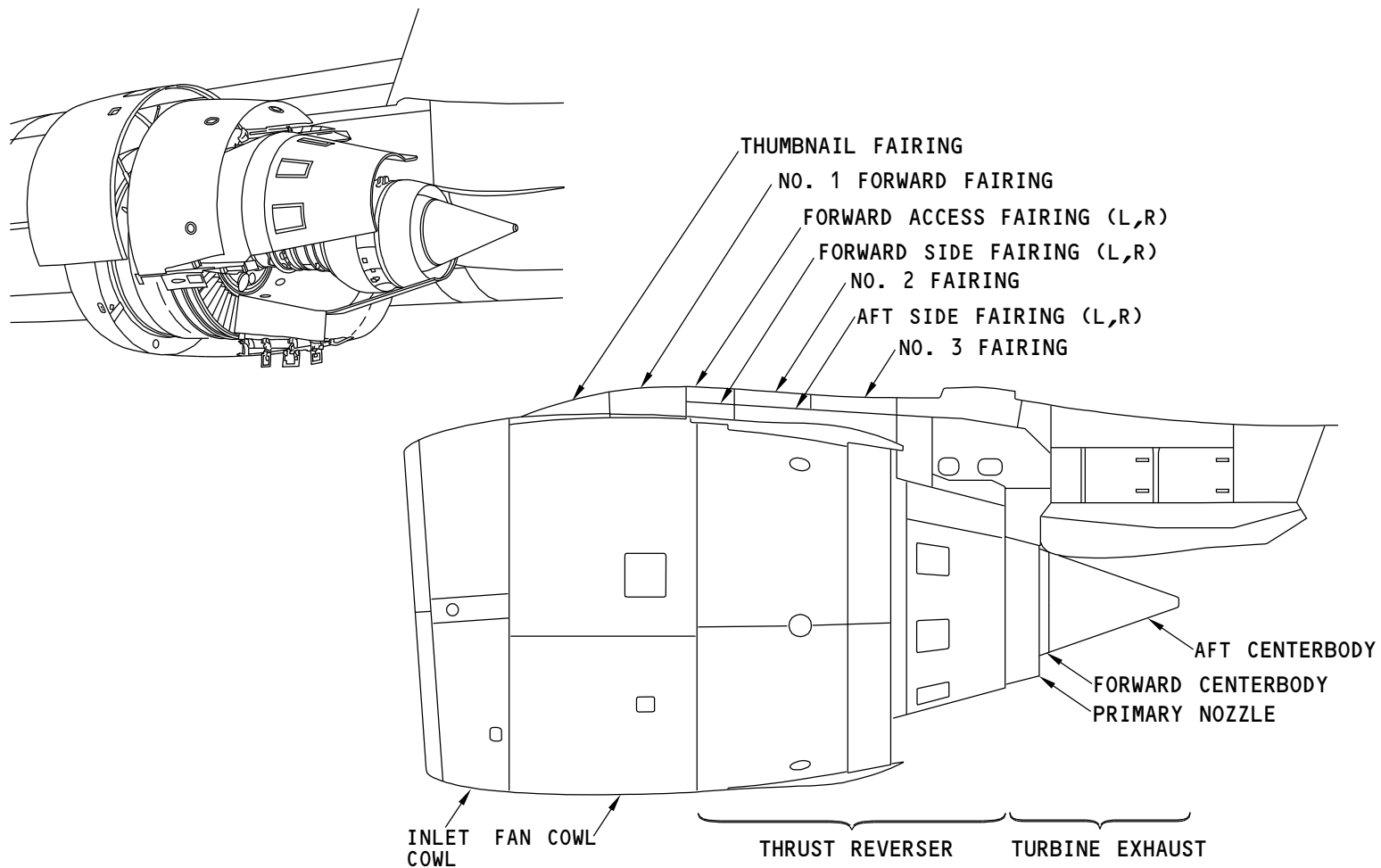
- Primary nozzle — primary nozzle weighs approximately 70 lb (37 kg)
- Forward centerbody
- Aft centerbody. The forward and aft centerbodies weigh approximately 82 lb (37 kg) together.

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ENGINE COWLING - GENERAL DESCRIPTION

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ENGINE COWLING - INLET COWL

General

The inlet cowl controls the airflow into the engine fan. The inlet cowl is a single assembly with an upper and a lower half. The inlet cowls for the left and the right engines are interchangeable. The cowl includes these components:

- T12 sensor
- Engine anti-ice (EAI) system
- Powered door opening system (PDOS) actuation and control switches
- Hoist points.

EAI System

The EAI supply duct is at the 11:00 position on the inlet cowl. It gives anti-ice air to the inlet cowl.

The EAI exhaust duct is at the 9:00 position on the inlet cowl. The exhaust duct permits EAI air to flow overboard.

The EAI duct inside the inlet cowl has a shroud. It sends EAI air into the fan compartment if the duct breaks open.

Electrical Connections

There are two electrical connections on the aft bulkhead of the inlet cowl. They are at the 12:30 and the 3:00 positions. The connections are for the T12 sensor and the PDOS switches.

The T12 sensor measures engine inlet temperature and sends it to the EEC.

PDOS Actuation and Control Switches

The PDOS opens the fan cowls and the thrust reverser halves. Two PDOS switches are on each side of the inlet cowl. The fan cowl switches are at the 4:00 and the 8:00 positions on the outside of the inlet cowl. The thrust reverser switches are at the 4:00 and the 8:00 positions on the aft bulkhead of the inlet cowl.

See the powered door opening system section for more information (SECTION 71-12).

Hoist Points

The inlet cowl has eight hoist points. There are five hoist points on the upper inlet assembly and three on the lower inlet assembly.

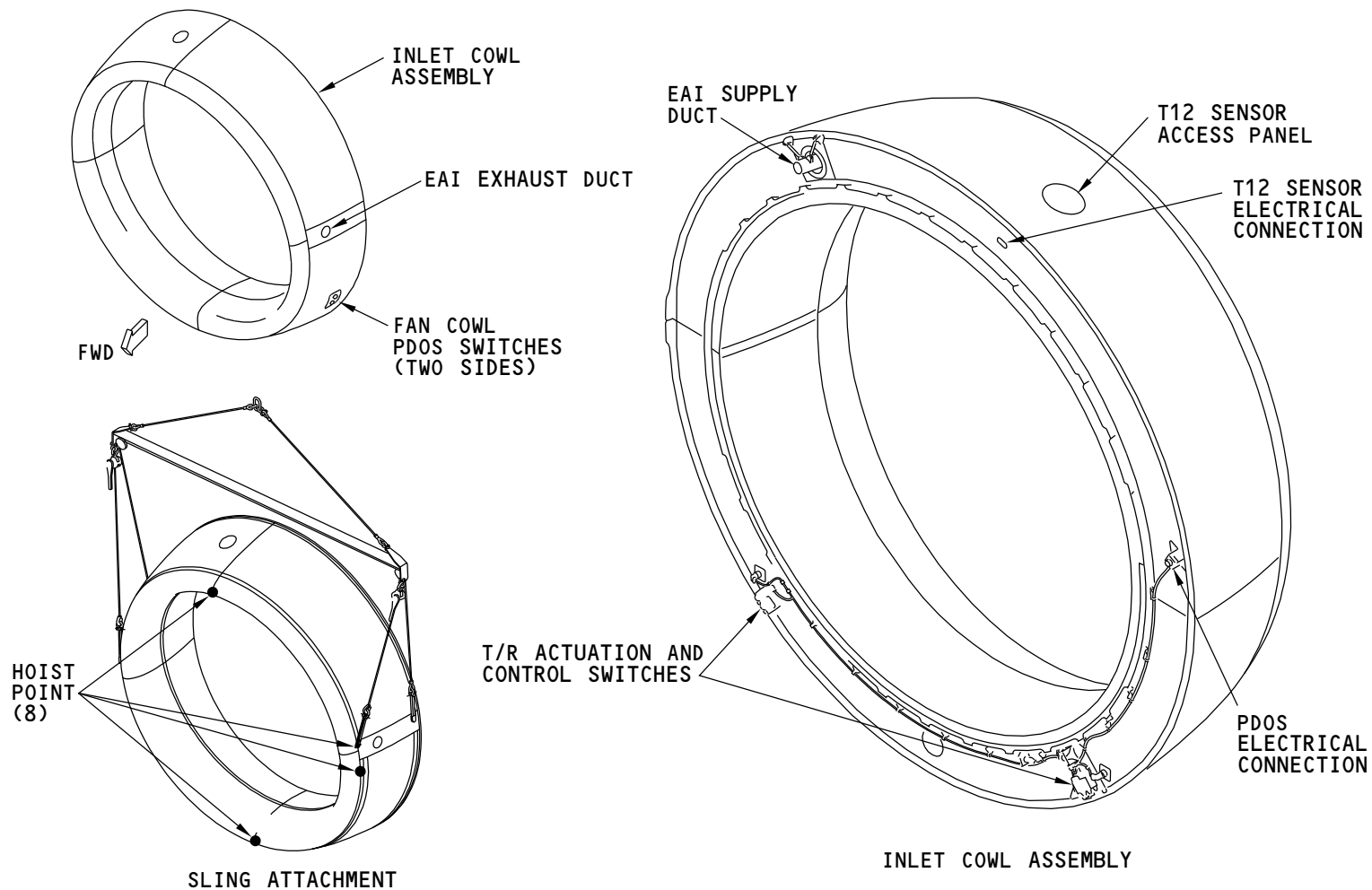
Training Information Point

You can separate the upper and the lower halves of the inlet cowl to move it. The upper and the lower halves are matched sets. They are not interchangeable with other inlet cowl halves.

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ENGINE COWLING - INLET COWL

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ENGINE COWLING - FAN COWL

General

Each engine has two fan cowls. The fan cowls let the air flow smoothly around the engine. The fan cowls open for maintenance.

Physical Description

The fan cowls are graphite-epoxy structures. Each fan cowl has four hinges. Each hinge attaches to the fan cowl support beam on the fan case. Each hinge has a quick release pin.

The inboard fan cowl on each engine has a chine at the 10:00 position. The fan cowl chine controls the airflow direction over part of the wing.

The left fan cowl has an oil tank access door and a pressure relief door. You service the engine oil tank through the oil tank access door.

You can remove each fan cowl panel with a sling that attaches at three hoist points.

Hold-Open Rods

Each fan cowl has a forward and an aft hold-open rod. The rods are telescopic. One end of the hold-open rod attaches to a bracket on the fan case. The other end attaches to fittings on the fan cowl.

Each hold-open rod has a locking collar. The collar locks the hold-open rod in place. When you can see a yellow stripe next to the collar, it is locked.

See the powered door opening system section for more information (SECTION 71-12).

Fan Cowl Opening Actuators

You use the PDOS to open and close the fan cowls. Each fan cowl has a fan cowl opening actuator. The actuator attaches to a bracket on the fan cowl and to the fan case. The fan cowl opening actuators open and close the fan cowls with hydraulic power.

Fan Cowl Panel Latches

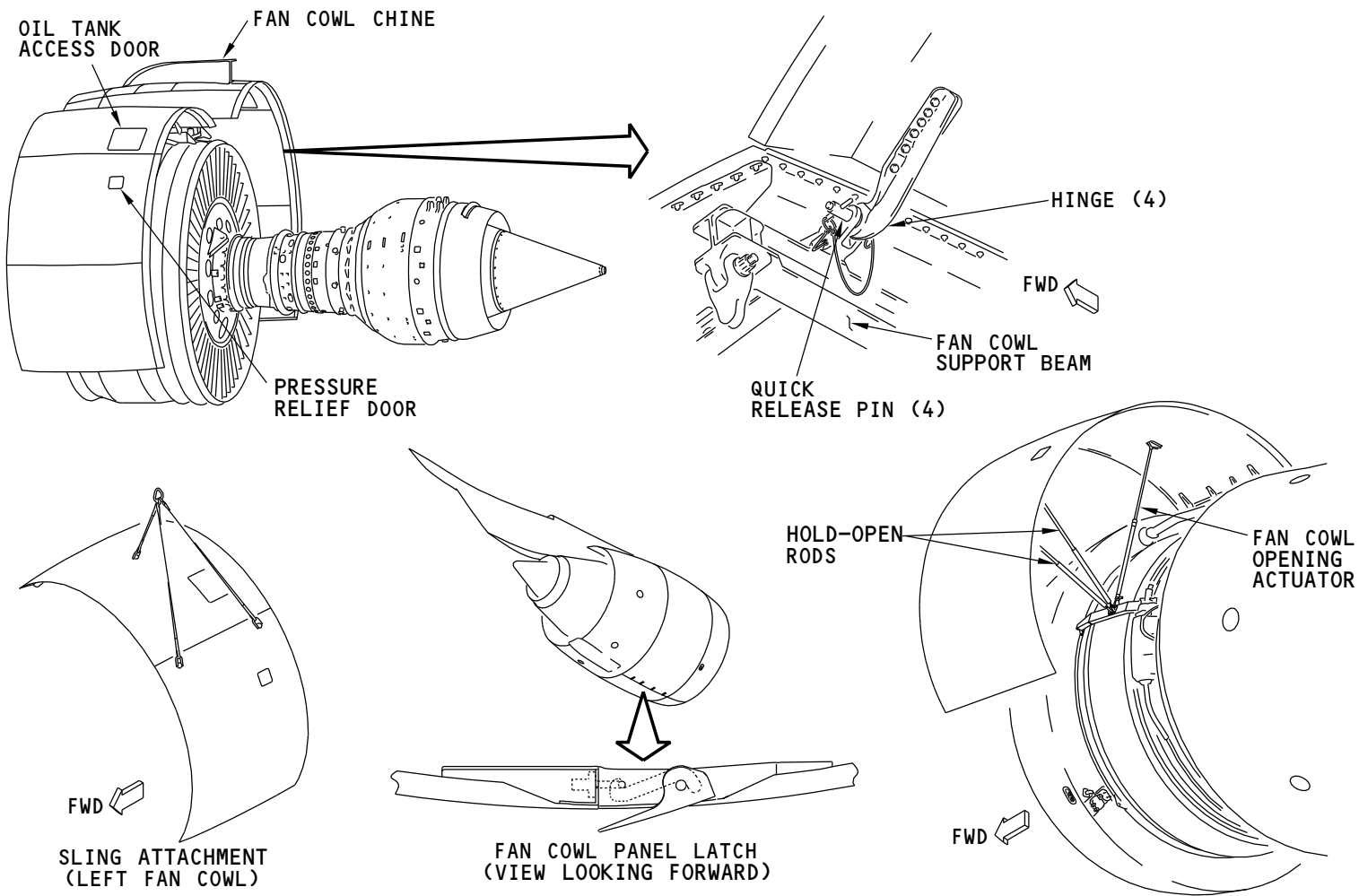
There are four adjustable fan cowl panel latches at the bottom of the cowls. The latches hold the left and right fan cowl panels together.

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ENGINE COWLING - FAN COWL

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**ENGINE COWLING - FAN COWL HOLD-OPEN RODS****General**

The fan cowl hold-open rods keep the fan cowls open for maintenance. The hold-open rods are also a safety device. They protect persons at work on the engine or at work on the fan cowl from injury. They prevent the accidental closure of the fan cowl.

Fan Cowl Hold-Open Rods

Each fan cowl has a forward and an aft hold-open rod. The rods are telescopic. The rods stay attached to the fan case and fan cowl when you open and close the fan cowl.

Each hold-open rod has a locking collar. The locking collars lock the hold-open rods. When you can see the red stripe next to the collar, the hold-open rod is not locked. When you can see the yellow stripe next to the collar, the hold-open rod is locked.

Fan Cowl Opening

This is a summary of how you open the fan cowl:

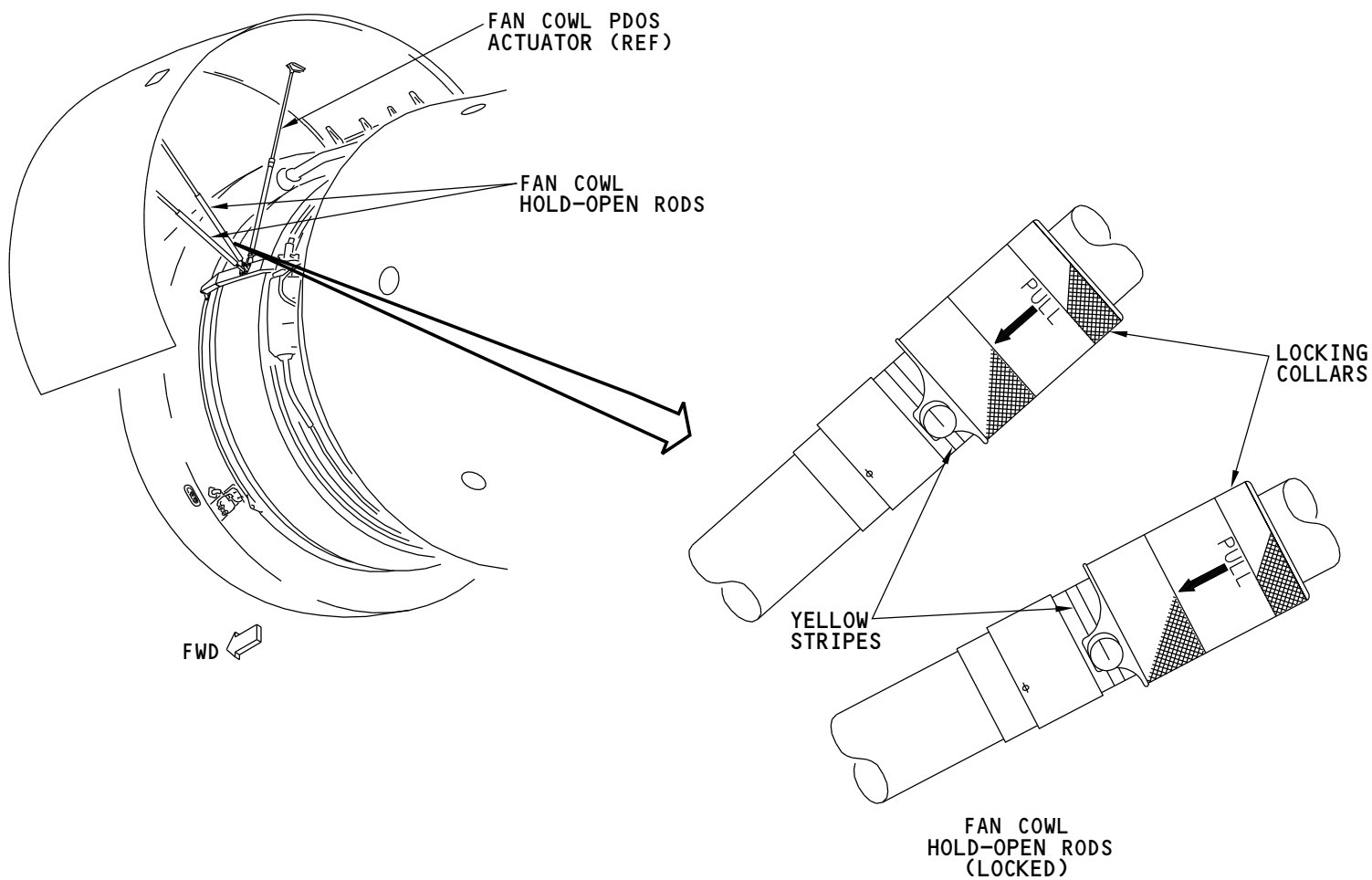
- Open the fan cowl panel latches from aft to forward
- Use the PDOS to open the fan cowl
- The hold-open rods automatically extend and lock.

Make sure the hold-open rod collars are locked (yellow stripes visible) before you go under the fan cowl.

Fan Cowl Closing

This is a summary of how you close the fan cowl:

- Unlock the hold-open rods
- Use the PDOS to close the fan cowl
- Close the fan cowl panel latches from forward to aft.



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ENGINE COWLING - FAN COWL HOLD-OPEN RODS

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**ENGINE COWLING - THRUST REVERSER****Purpose**

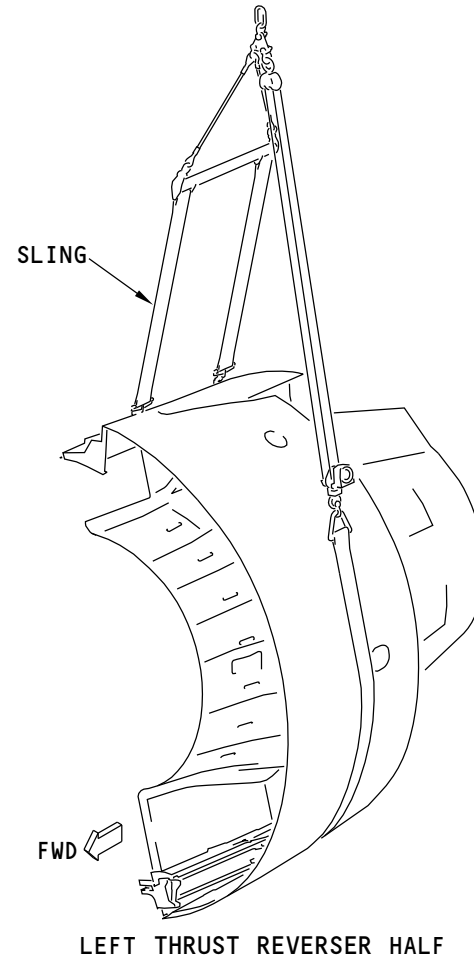
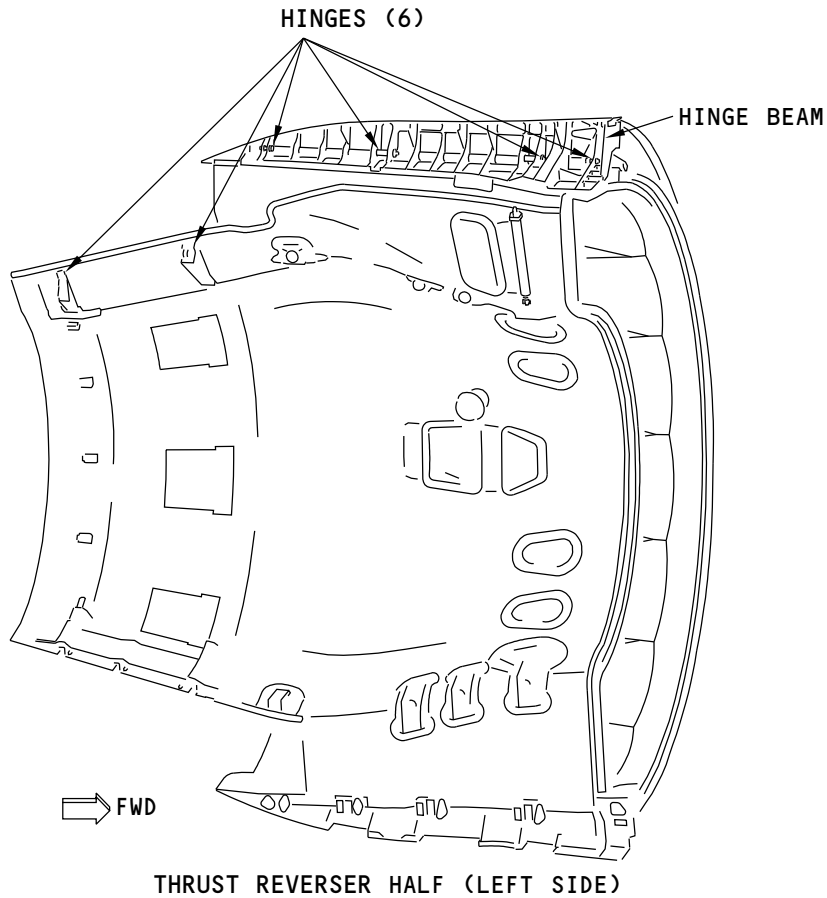
The thrust reverser controls the direction of the fan exhaust. It makes forward or reverse thrust. Reverse thrust can decrease the speed of the airplane during landing rollout or rejected take-off. The surface of the thrust reverser lets air flow smoothly around the engine. The thrust reverser halves open for maintenance.

Physical Description

Each thrust reverser has a left and a right half. Each thrust reverser half has a hinge beam with six hinges. Four hinges attach the thrust reverser halves to the strut. The two aft hinges attach to cross-tie rods (not shown).

Sling Attach Points

Sling attach points for the thrust reverser are on the hinge beam and the latch beam of each thrust reverser half. You install attach fittings on the hinge beam and latch beam to attach a sling.



ENGINE COWLING - THRUST REVERSER

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ENGINE COWLING - THRUST REVERSER LATCHES

General

The thrust reverser (T/R) latches hold the T/R halves together. There are six groups of latches:

NOTE: For more information of the thrust reversers, refer to the 78-31-00-003 section.

- Upper Bifurcation T-Hook Latch
- Deflection limiter (4)
- Aft cowl (3)
- Thrust reverser (5)
- V-band (1)
- Lower Bifurcation Interlock Pin.

Deflection Limiter Latches

There are four deflection limiter latches. These latches attach to two straps that go around the aft part of the T/R. You open the deflection limiter latches first.



CAUTION OPEN THE DEFLECTION LIMITER LATCHES ON THE AFT COWL BEFORE YOU OPEN THE THRUST REVERSER. IF THE LATCHES ARE NOT OPEN, DAMAGE TO THE STRUT, CROSS-TIE RODS, AND THE THRUST REVERSER WILL OCCUR.

Aft Cowl Latches

There are three aft cowl latches. These latches hold the aft part of the T/R together. You open the aft cowl latches after you open the deflection limiter latches.

Upper Bifurcation T-Hook Latch

There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle, push-pull cable, gearbox and T-hook are removed and installed as a one-piece unit.

The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator. The T-hook handle moves a push-pull cable which operates a gearbox that turns the T-hook from the horizontal position to a vertical position. The T-hook is kept in the vertical position against spring force by an internal mechanism. When the T-hook is in the vertical position, the T-hook can pass between the ears of the T-hook receiver on the left side thrust reverser. When the T-hook handle is released, a spring on the gearbox returns the T-hook to the horizontal position. The T-hook engages slots in the ears of the receiver. The T-hook gearbox and the push-pull cable are installed on the inner wall of the thrust reverser. The gearbox and push-pull cable are covered by the thermal insulation blankets.

The T-hook can be adjusted in the vertical position with a turnbuckle and jam nuts on the T-hook handle.

If the gearbox, the push-pull cable or the handle were to become non-serviceable, the T-hook can be opened. You must climb into the right fan duct and get to the upper bifurcation, near the front of the thrust reverser. The T-hook can be accessed through a hole in the upper bifurcation inner wall. The T-hook shank has a 0.250 inch allen wrench feature so that you can turn the T-hook to the vertical position to disengage the T-hook from the T-hook receiver. Next, open the left side thrust reverser. Climb out of the fan duct. Finally, open the right side thrust reverser.

T/R Latches

There are five T/R latches. These latches hold the forward part of the T/R together. You must open latch access doors to get access to the three middle T/R latches.

The forward latch is next to the V-band latch handle on the T/R torque box. There is a trigger release lever on the forward latch. You must move the trigger release lever to the left (looking aft) before you can open the forward latch.

You open the T/R latches after you open the aft cowl latches.

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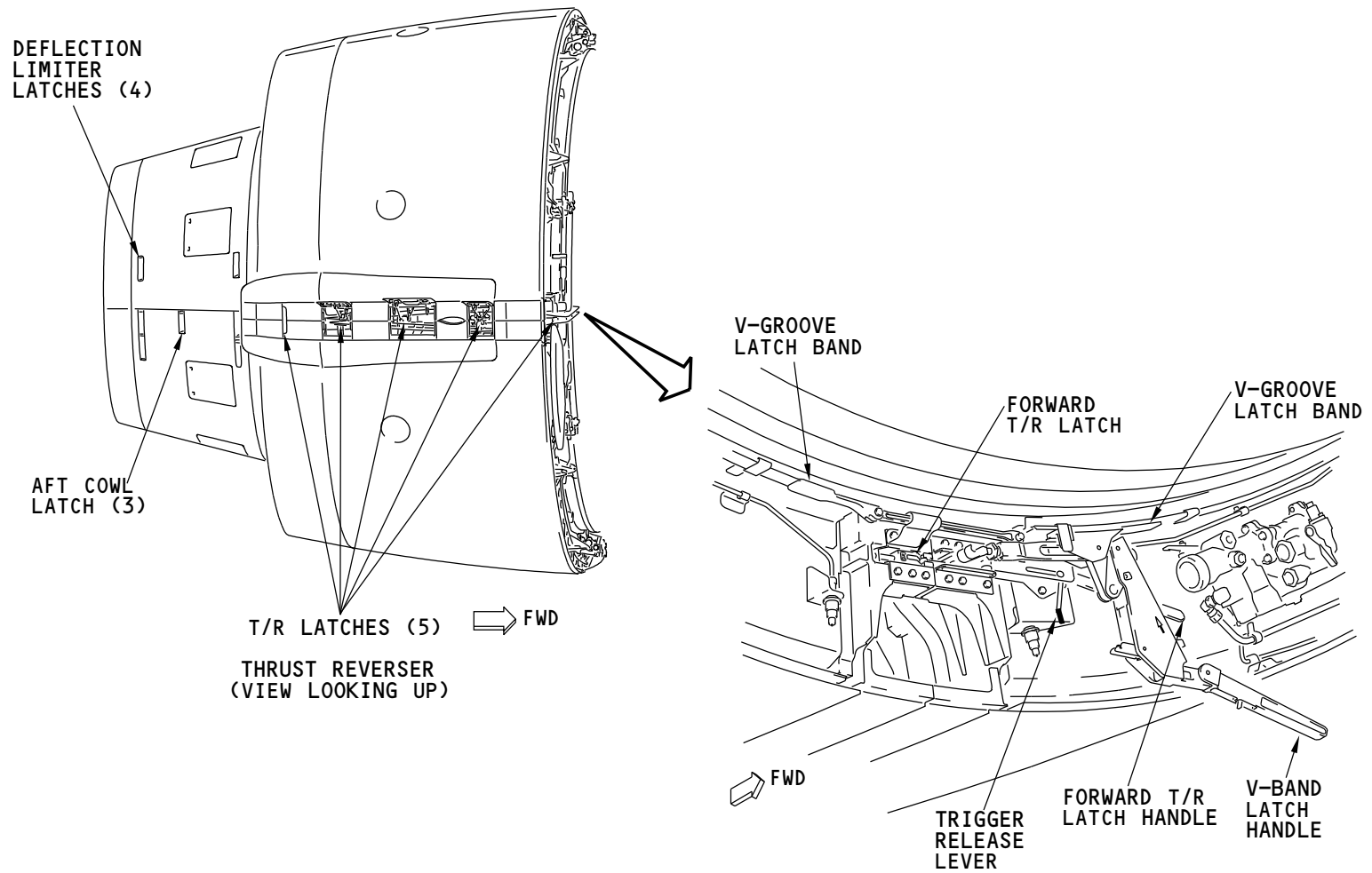
ENGINE COWLING - THRUST REVERSER LATCHES

V-band Latch

The v-band latch supplies tension around the forward part of the T/R. This tension holds the T/R to the fan case. The v-band latch has a handle that loosens the v-groove latch band. You open the v-band latch last.

Lower Bifurcation Interlock Pin

There is an interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a serrated fitting on a compression fitting on the lower bifurcation of the right side thrust reverser. The interlock pin engages the serrated fitting when the No.2 tension latch on the latch beam is closed and locked. The spring loaded interlock pin disengages from the serrated fitting when the No.2 tension latch is opened. The length of the interlock pin assembly can be changed by the adjustment of two turnbuckles to make sure the interlock pin engages the serrated fitting. The interlock pin is installed between a compression fitting and the No.2 latch bolt fitting on the lower bifurcation of the left thrust reverser.



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ENGINE COWLING - THRUST REVERSER LATCHES

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ENGINE COWLING - THRUST REVERSER HOLD-OPEN ROD
General

The thrust reverser (T/R) hold-open rods keep the T/R halves open for maintenance. The hold-open rods are also a safety device. They protect persons at work on the engine or the T/R from injury. They prevent the accidental closure of the T/R.

Thrust Reverser Hold-Open Rod

Each T/R half has one hold-open rod on the torque box of the T/R half. The rod is telescopic. There is a quick disconnect pin on the upper end of the hold-open rod.

Each hold-open rod has a lock collar. The collar locks the hold-open rod in place. When the hold open rod locks, you can see the yellow stripe next to the collar. When you can see the red stripe next to the collar, the hold-open rod is not locked.


WARNING

KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE FLIGHT CONTROL SURFACES, THE THRUST REVERSERS, AND THE LANDING GEAR. THESE COMPONENTS CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

Training Information Point

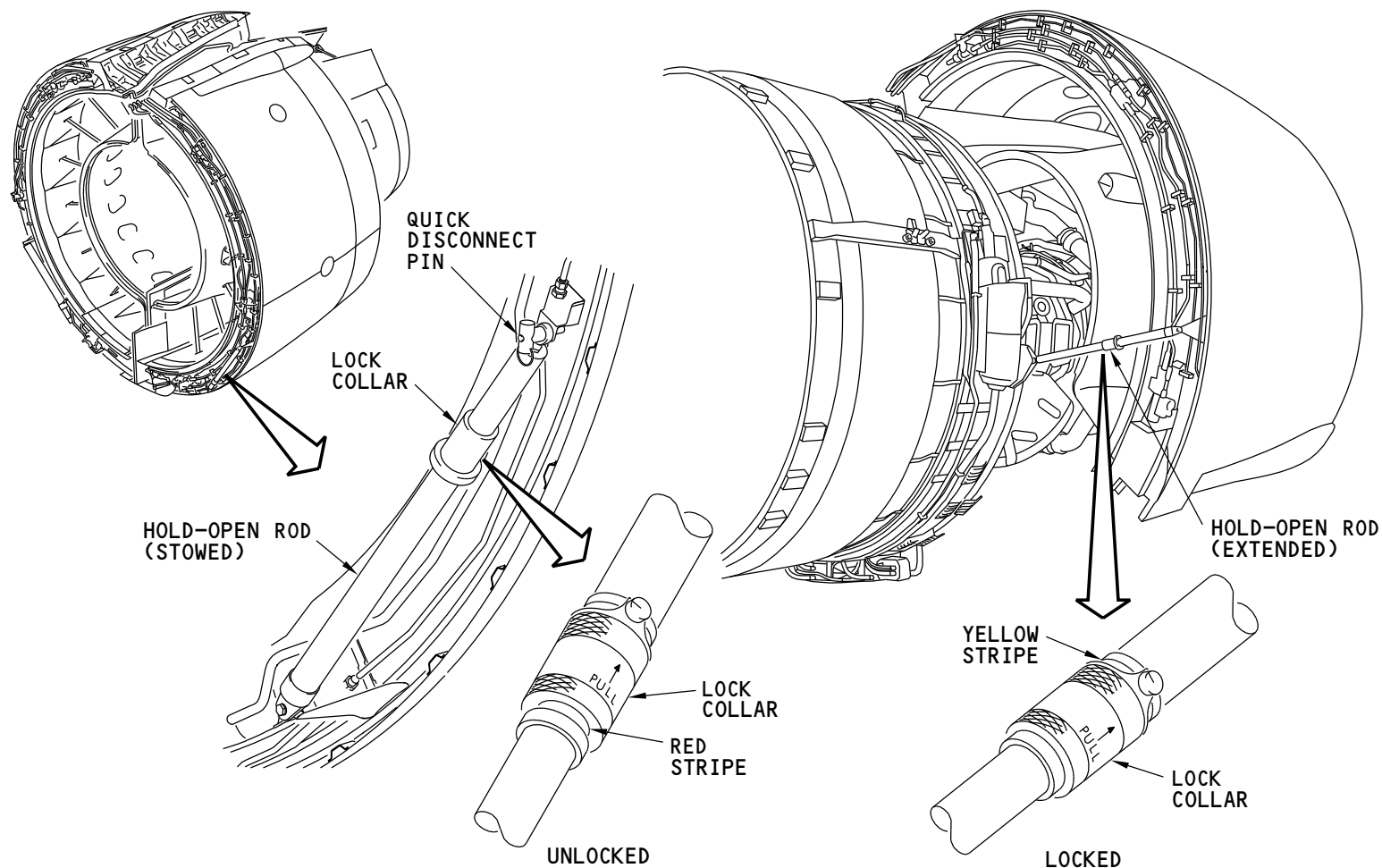
Before you remove the engine or thrust reverser you must stow the hold-open rod on the thrust reverser. First, remove the quick disconnect pin to disconnect the hold-open rod from the engine. Then attach the hold-open rod to the thrust reverser with the same quick disconnect pin.

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ENGINE COWLING - THRUST REVERSER HOLD-OPEN ROD

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**ENGINE COWLING - TURBINE EXHAUST****Purpose**

The turbine exhaust system makes the airflow smooth as it exits the engine. This increases engine efficiency and reduces noise.

Primary Nozzle

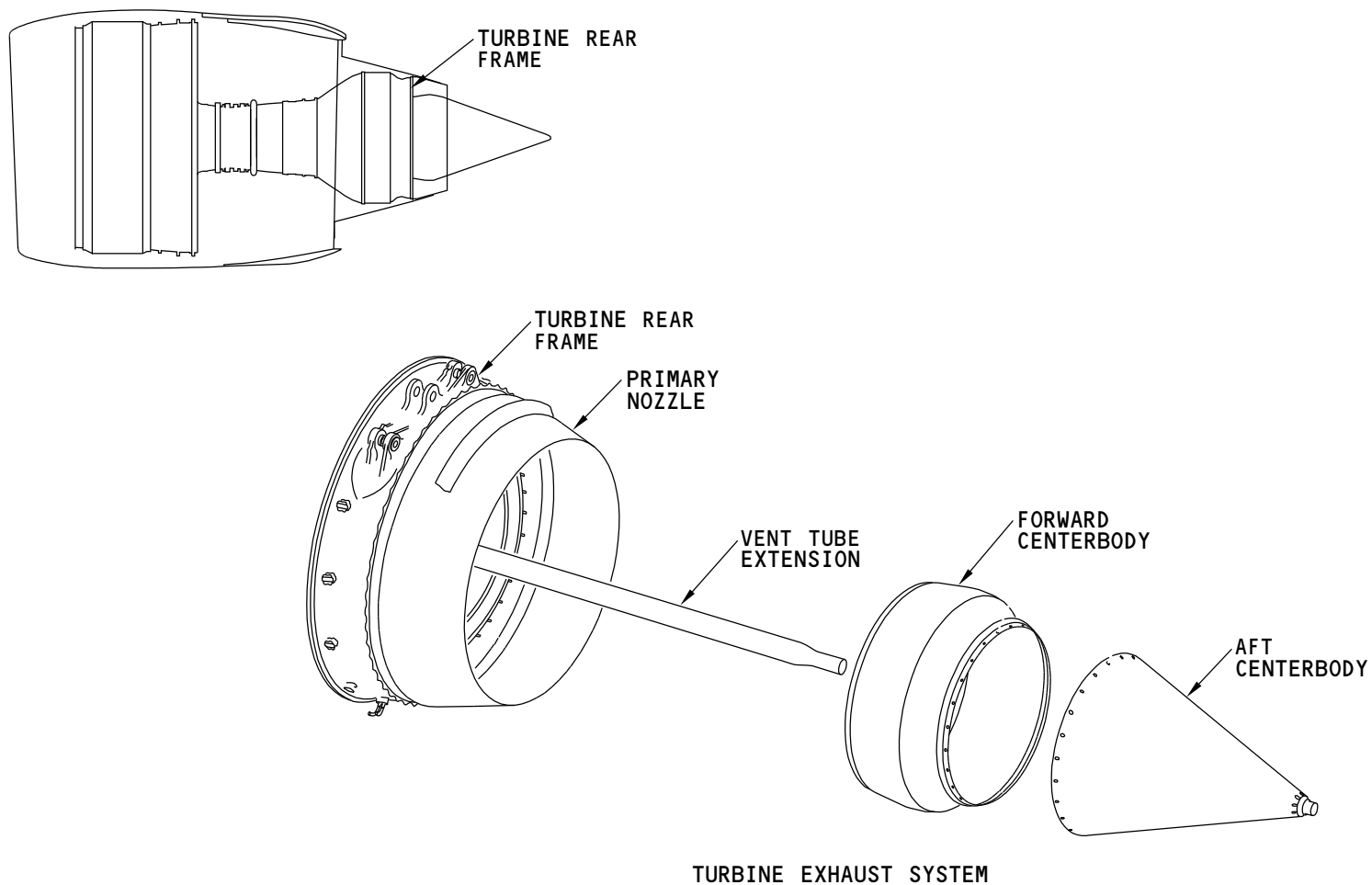
The primary nozzle is aft of the thrust reverser. The primary nozzle attaches to the turbine rear frame.

Centerbody

The centerbody is inside the primary nozzle. The centerbody has two parts. The forward centerbody attaches to the turbine rear frame. The aft centerbody attaches to the forward centerbody.

Vent Tube Extension

The vent tube extension supplies a path for the oil system vent air to go overboard. The vent tube extension fits inside the centerbody. It attaches to the no. 5 bearing sump cover.



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ENGINE COWLING - TURBINE EXHAUST

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ENGINE COWLING - FAN COWL LATCH ADJUSTMENT - TIP
General

The correct adjustment of fan cowl panel latches supplies a smooth airflow over the engine cowling. A latch with the correct adjustment closes with a loud pop noise.

You adjust the thrust reverser latches before you adjust the fan cowl panel latches. You adjust the fan cowl panel latches with the thrust reverser halves closed and latched. You adjust the fan cowl panel latches when you replace any of these components:

- Engine
- Fan cowl panel
- Fan cowl panel latches
- Thrust reverser.

Fan Cowl Panel Latch Adjustment



CAUTION DO NOT PUSH ON THE LATCH HANDLE WITH MORE THAN 100 LBF (445 N) OF FORCE. TOO MUCH FORCE CAN CAUSE DAMAGE TO THE LATCH, LATCH KEEPER, OR FAN COWL PANEL.

You adjust the fan cowl panel latches when you find the split line gap or the closing force of the latches is incorrect. The shims set the width of the split line gap between the fan cowl panels.

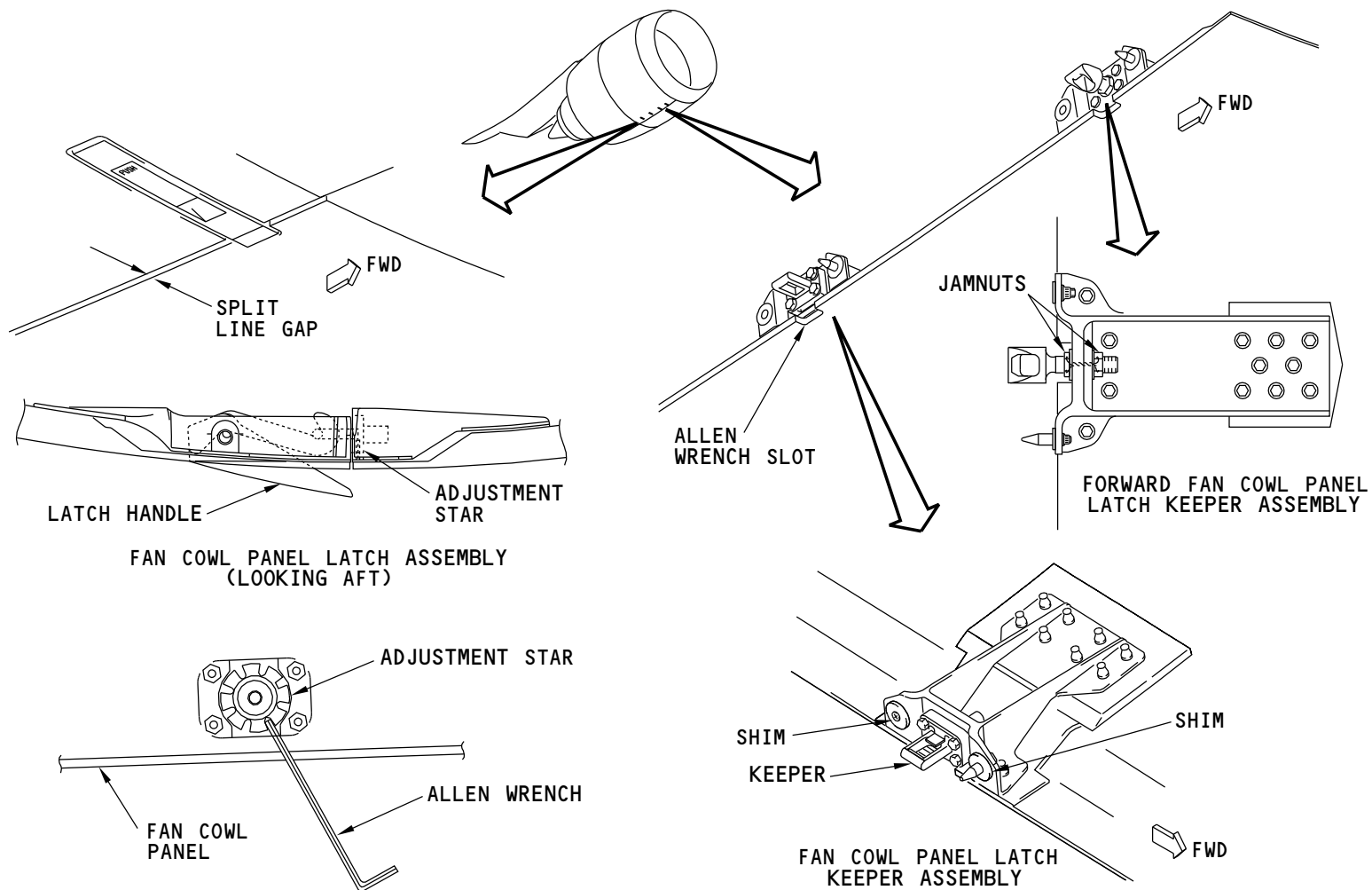
You adjust the closing force of the latches by changing the position of the keeper. Adjust the latches from forward to aft.

You change the position of the forward latch keeper with the two jamnuts that hold it in place. You change the position of the other three latch keepers by turning the adjustment star. Use an allen wrench to turn the adjustment star. The allen wrench goes through a slot in the fan cowl panel.

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ENGINE COWLING - FAN COWL LATCH ADJUSTMENT - TIP

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**ENGINE COWLING - THRUST REVERSER LATCH ADJUSTMENT - TIP****General**

There are 13 latches which hold the thrust reverser (T/R) together. You adjust the tension of the v-band latch first. Then adjust the remaining latches from forward to aft with the v-band latch closed.

V-band Latch Adjustment

You adjust the v-band latch first. All of the other T/R latches must be open. You measure the force necessary to close the v-band latch with a spring scale. If the force is not within limits, adjust the v-band latch hook position with the jamnut until the closing force is within limits.

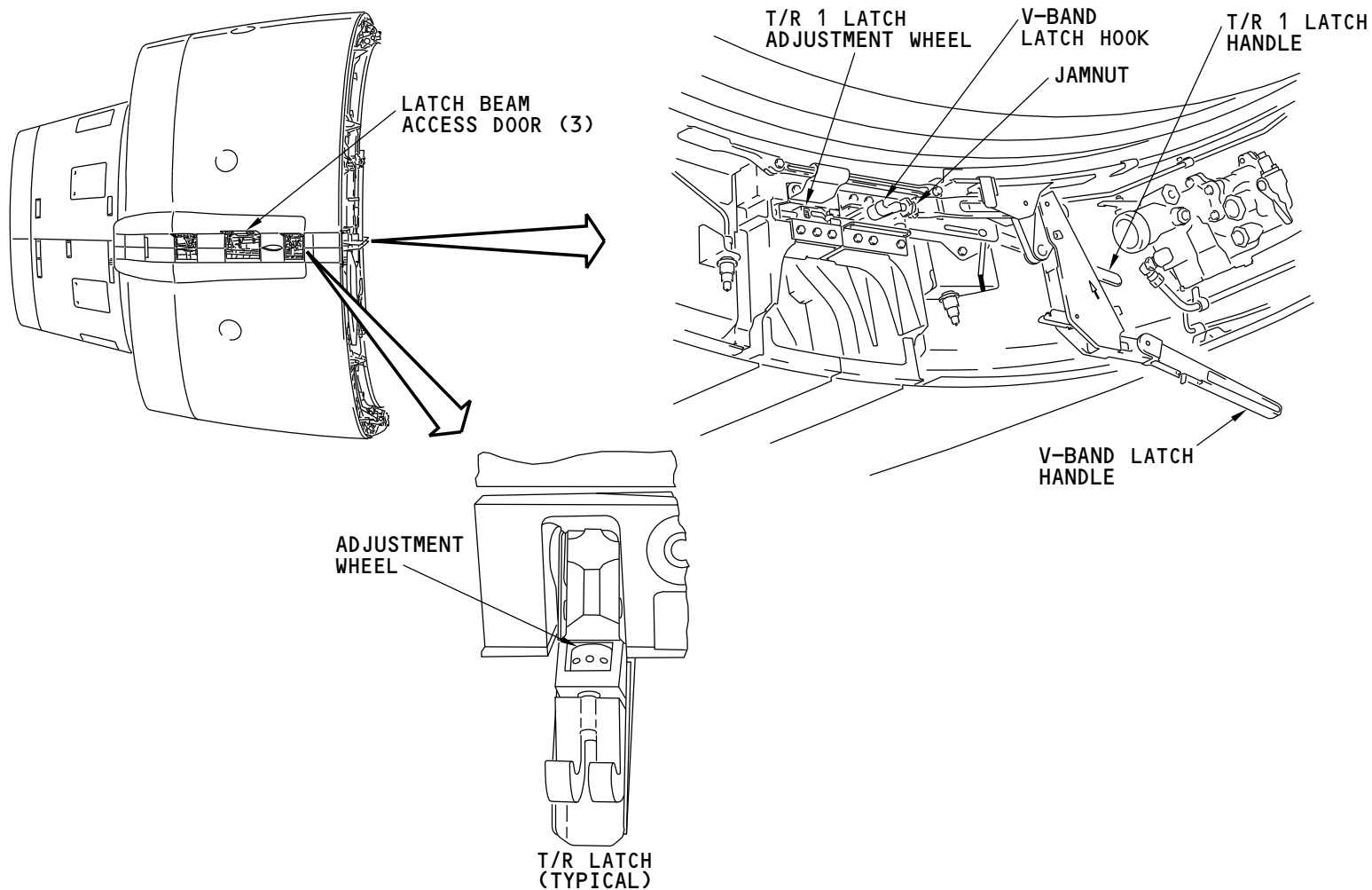
T/R Latch Adjustment

You measure the force necessary to close the T/R latches with a spring scale. If the force is not within limits, turn the adjustment wheel until the closing force is within limits.

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ENGINE COWLING - THRUST REVERSER LATCH ADJUSTMENT - TIP

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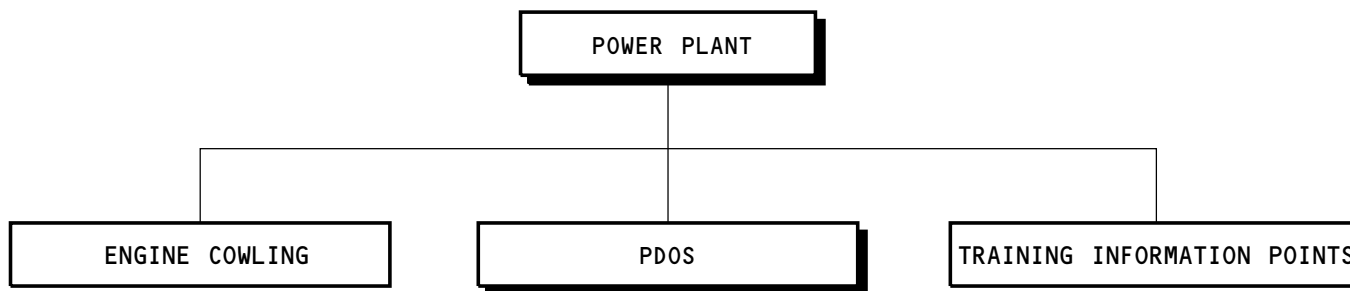
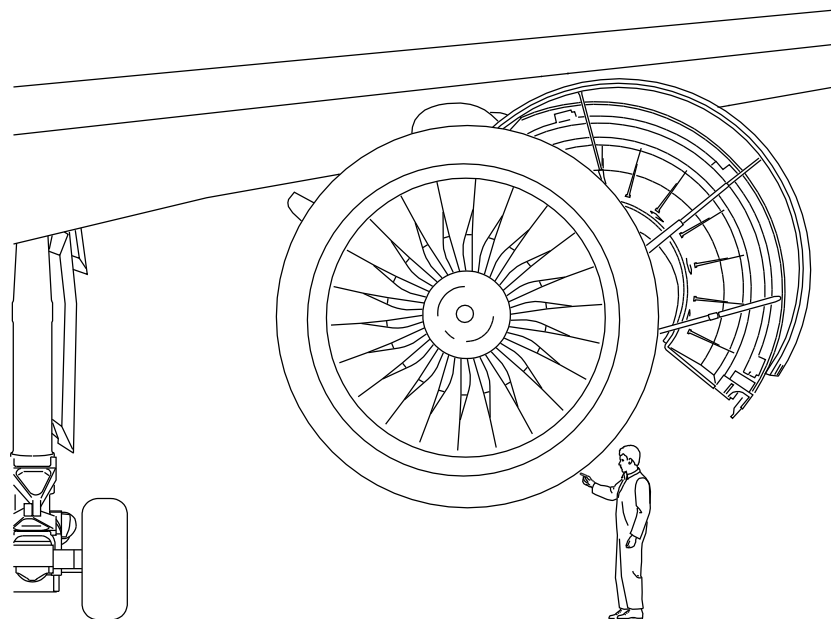
POWERED DOOR OPENING SYSTEM (PDOS) - INTRODUCTION

General

The powered door opening system (PDOS) opens and closes the fan cowls and the thrust reversers. You can also use the PDOS to manually open and close the fan cowls and the thrust reversers.

The PDOS uses hydraulic power to open the fan cowls and the thrust reversers. Gravity closes the fan cowls and the thrust reversers.

You operate the PDOS with the actuation and control switches. Each fan cowl and each thrust reverser half has an actuation and control switch.



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POWERED DOOR OPENING SYSTEM (PDOS) - INTRODUCTION

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PDOS - GENERAL DESCRIPTION**General**

The powered door opening system (PDOS) uses hydraulic power to open the fan cowl and thrust reversers (T/R). The system uses gravity to close them.

The PDOS has these components:

- Actuation and control switches
- Pump/power pack
- Hand pump connectors
- Actuators.

Actuation And Control Switches

Each fan cowl and each T/R half has an actuation and control switch. Each switch has an up and a down button. The up button opens the cowl and the down button closes the cowl. The switches permit 28v dc power to go to the pump/power pack solenoids.

Pump/Power Pack

The pump/power pack supplies hydraulic pressure to the actuators. It has a hydraulic reservoir and an electric hydraulic pump. The pump/power pack gets 115v ac power from the ground handling bus. The hydraulic fluid goes to an actuator when the related solenoid(s) energizes.

Actuators

There are four actuators on each engine. Each fan cowl and each T/R half has an actuator. When the actuators receive hydraulic pressure, they extend to open the cowls. When hydraulic pressure is removed, the actuators retract to close the cowls.

The actuators are also safety devices. Flow control valves in the actuators limit the flow of hydraulic fluid in the closing direction. This prevents the fan cowls and T/Rs from closing quickly.

Manual Operation

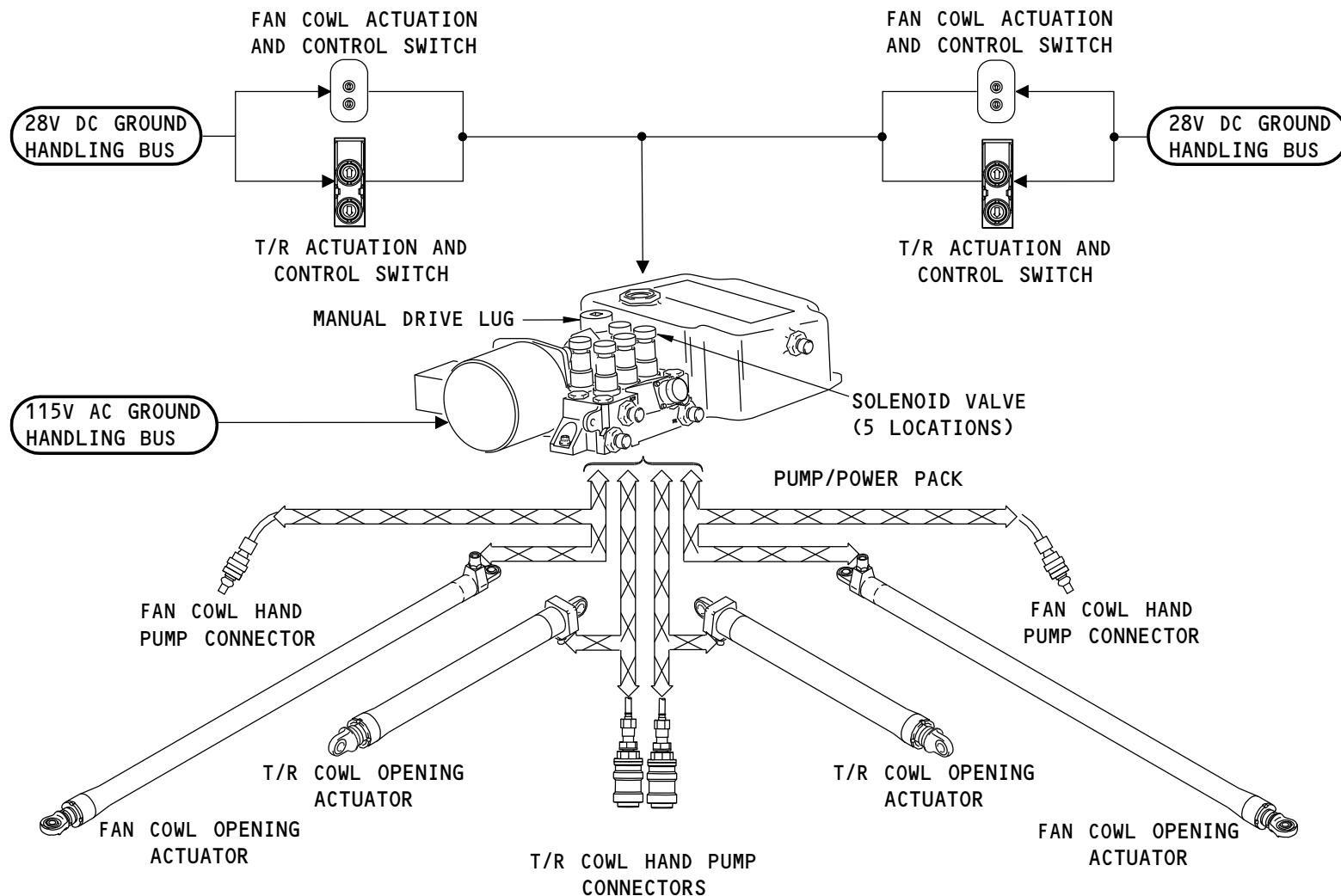
The PDOS pump/power pack has a manual drive lug. When there is no airplane power, you can manually operate the solenoid valves and the manual drive lug to open the fan cowls and T/Rs. You operate only the solenoid valves to permit gravity to close the fan cowls and T/Rs.

You can use a hand pump to open the fan cowls and the T/Rs when there is no airplane power. There is one hand pump connector for each fan cowl and one for each T/R half.

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PDOS - GENERAL DESCRIPTION

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**PDOS - COMPONENT LOCATIONS****General**

The PDOS has these components:

- Pump/power pack
- Cowl opening actuators
- Hydraulic cowl opening flex hoses
- Hand pump connectors
- Actuation and control switches.

Pump/Power Pack

Each engine has one pump/power pack. The pump/power pack is under forward fairing 1.

Fan Cowl Opening Actuators

The fan cowl opening actuators are under the fan cowls. The top of each actuator attaches to an actuator bracket on the fan cowl. The bottom of each actuator attaches to the engine fan case.

The thrust reverser (T/R) cowl opening actuators are under the T/Rs. The top of each actuator attaches to the engine strut. The bottom of each the actuator attaches to the inner wall of the T/R.

Hydraulic Cowl Opening Flex Hoses

The hydraulic cowl opening flex hoses permit the necessary movement of the PDOS hydraulic supply lines. The fan cowl flex hoses connect the PDOS hydraulic tubes on the fan case to the actuators and to the strut. The T/R flex hoses connect the PDOS hydraulic tubes in the strut to the actuators. The T/R hand pump flex hoses connect the PDOS hydraulic tubes in the strut to the hand pump tubes on the forward end of each T/R half.

Actuation and Control Switches

The fan cowl actuation and control switches are on the inlet cowl at the 4:00 and 8:00 positions.

The T/R actuation and control switches are on the aft bulkhead of the inlet cowl near the fan cowl switches.

Hand Pump Connectors

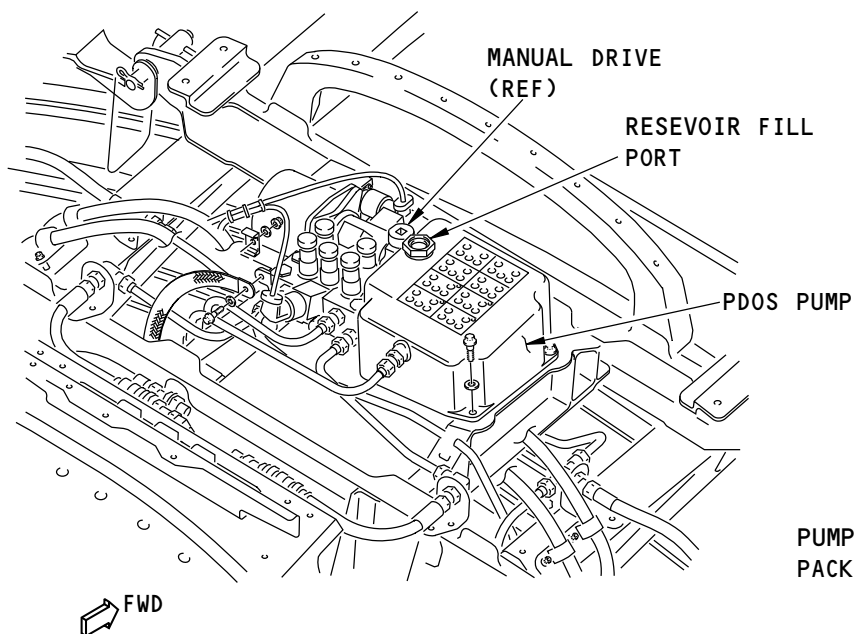
The fan cowl hand pump connectors are at the 6:00 position on the aft bulkhead of the inlet cowl. The T/R hand pump connectors are on each T/R half at the 6:00 position. You must open the fan cowls to get to each hand pump connector.

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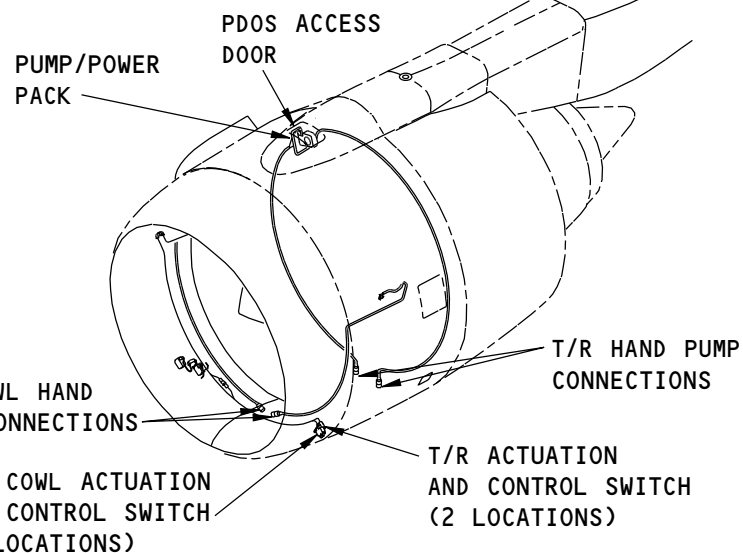


ENGINE STRUT
(PDOS ACCESS DOOR REMOVED)

HYDRAULIC COWL
OPENING FLEX HOSE

T/R COWL
OPENING
ACTUATOR

ENGINE STRUT
(VIEW IN THE AFT DIRECTION)



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PDOS - COMPONENT LOCATION

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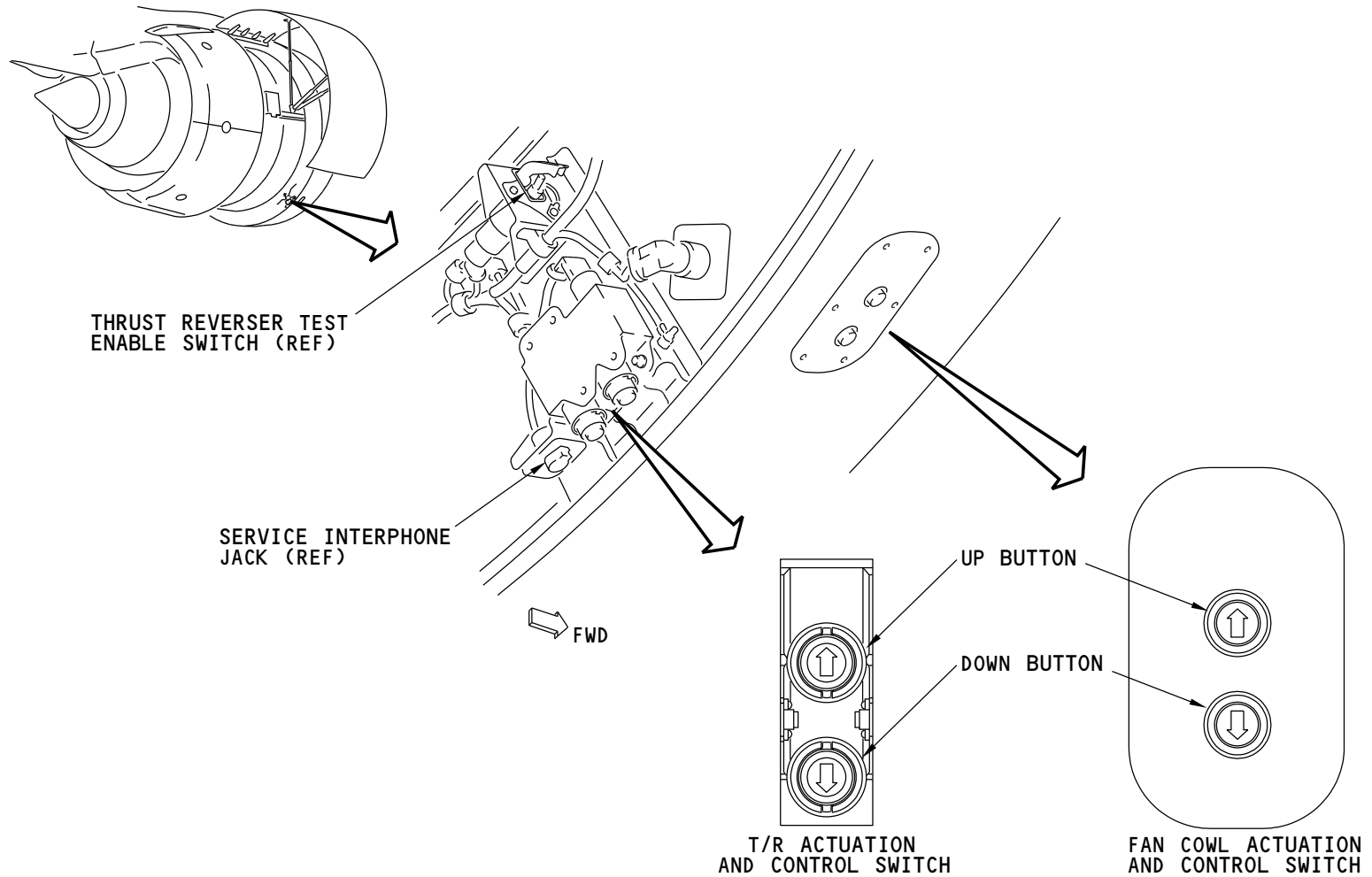
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PDOS - ACTUATION AND CONTROL SWITCHES

Actuation And Control Switches

The actuation and control switches are on each side of the inlet cowl. Each actuation and control switch has an UP button and a DOWN button. The buttons are momentary-action type.



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PDOS - ACTUATION AND CONTROL SWITCHES
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PDOS - PUMP/POWER PACK

General

The pump/power pack supplies hydraulic power to the cowl opening actuators. The actuators open and close the fan cowl and thrust reverser halves.

These are the components of the pump/power pack:

- Housing
- Reservoir
- Solenoid valve (5)
- Electric motor
- Manual drive.

Housing

The pump/power pack parts attach to the housing. The housing contains the pump drive shaft and the pump filter element. The filter element is under the high pressure filter plug.

There are four connectors for hydraulic supply lines to the cowl opening actuators. There is one connector for the solenoid valves.

Reservoir

The reservoir attaches to the housing. The reservoir has a vent and an oil filler cap with a dipstick on it.

Solenoid Valves

Five solenoid valves attach to the housing. The solenoids get power from the 28v dc ground handling bus when you push the actuation and control switches.

Electric Motor

The electric motor turns the hydraulic pump. It gets power from the 115v ac ground handling bus.

Manual Drive Lug

The manual drive lug is on the housing and connects to the pump drive shaft. You use a 3/8 inch square drive to turn the manual drive. A decal on the reservoir shows you how to manually operate the pump/power pack.

Training Information Point

The PDOS pump/power pack filter is an LRU.

You service the PDOS pump/power pack with engine oil.



WARNING

USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.



CAUTION

DO NOT FILL THE PDOS PUMP UNLESS THE FAN COWL PANELS AND THRUSTS REVERSERS ARE IN THE FULLY CLOSED POSITION. YOU WILL ADD TOO MUCH FLUID IF THEY ARE OPEN.



CAUTION

IF YOU MUST ADD PDOS OIL TO THE PDOS PUMP, MAKE SURE THE FAN COWL PANELS AND THRUST REVERSERS ARE COMPLETELY CLOSED OR AN OVERFILL CONDITION COULD OCCUR.



CAUTION

MAKE SURE THE FAN COWL PANELS AND THRUST REVERSERS ARE CLOSED BEFORE YOU FILL THE PDOS PUMP OR AN OVERFILL CONDITION COULD OCCUR.

This is a summary of the procedure to add oil to the PDOS pump:

- Make sure the fan cowl panels and the thrust reversers are in the closed position
- Examine the oil level on the fill port dipstick

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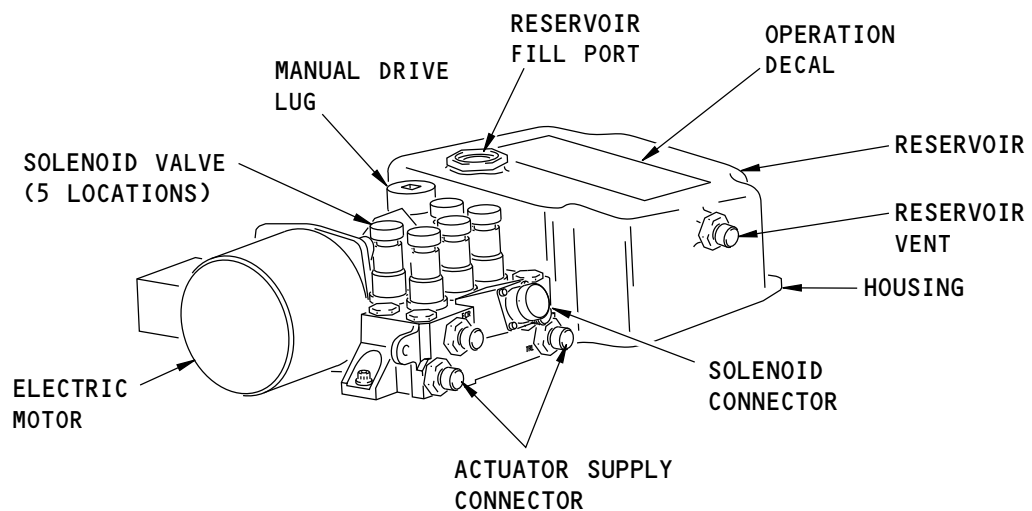
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PDOS - PUMP/POWER PACK

- If the oil level is low, fill the PDOS pump with the specified engine oil to the mark on the dipstick
- Install the fill port dipstick in the PDOS pump.



PDOS - PUMP/POWER PACK

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PDOS - FUNCTIONAL DESCRIPTION

General

The PDOS pump/power pack has a hydraulic reservoir, a pump, a filter, and five solenoid valves. The pump takes fluid (engine oil) from the reservoir and sends it through the filter and solenoid valves to the fan cowl and T/R opening actuators.

Power

The PDOS pump/power pack gets power from the 115v ac ground handling bus. The actuation and control switches get power from the 28v dc ground handling bus.

Fan Cowl and Thrust Reverser Opening

When you push one of the actuation and control switch buttons, power goes to the necessary solenoid valve(s) and the pump motor. The solenoid valves let pressure to go to one of the cowl opening actuators. The cowl opening actuator then opens the fan cowl or a T/R half.

Fan Cowl and Thrust Reverser Closing

The PDOS uses gravity to close the fan cowls and T/Rs. The electric motor does not operate when you close the fan cowls and T/Rs. The DOWN button on the actuation and control switch operates the solenoids. The solenoids release hydraulic pressure, and gravity closes the fan cowls and T/R halves. When the fan cowls and the T/R halves close, the oil goes back to the reservoir.

This table shows which solenoid(s) energize to open the cowl listed:

OPEN	V1	V2	V3	V4	V5
L Fan Cowl			X		
R Fan Cowl	X				
L T/R			X	X	
R T/R	X	X			

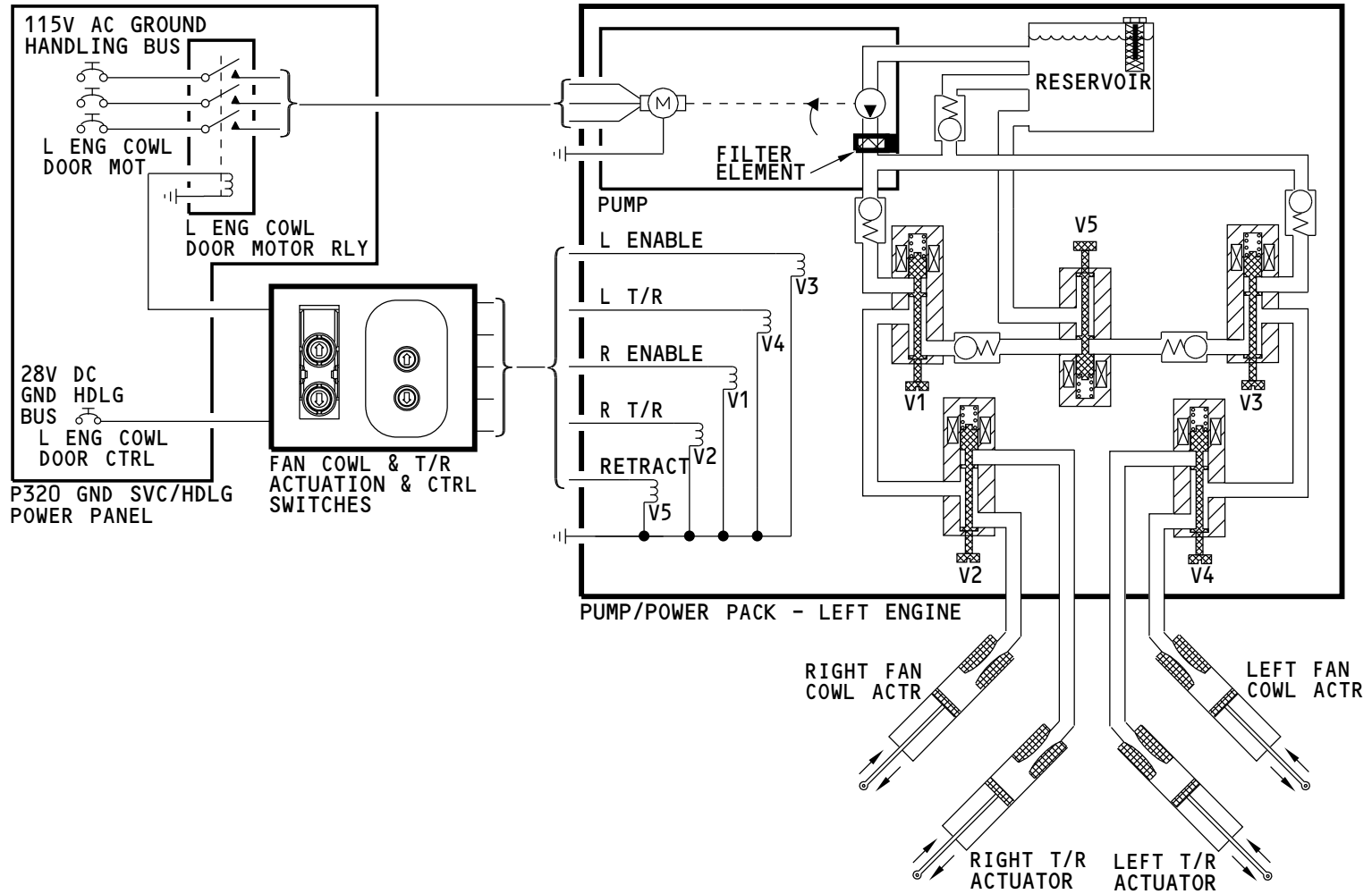
This table shows which solenoid(s) energize to close the cowl listed:

CLOSE	V1	V2	V3	V4	V5
R T/R		X	X		X
L T/R	X			X	X
R Fan Cowl			X		X
L Fan Cowl	X				X

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PDOS - FUNCTIONAL DESCRIPTION

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PDOS - OPERATION - FAN COWL

General

When you work on engine components under the fan cowl, you open the fan cowl only. If you must repair engine components under the thrust reverser (T/R), you open the fan cowl first, and then you open the T/R. You must have electric power before you use the PDOS.

Open the Fan Cowl



RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

Here is a summary of how you open the fan cowl:

- Make sure the area around the engine is clear
- Open the four fan cowl latches
- Push the UP button until the cowl stops moving and you hear the collars lock
- Make sure the collars on the hold-open rods are locked (yellow stripes will be visible)
- Push the DOWN button momentarily to put the fan cowl weight on the hold-open rods.



MAKE SURE THAT THE HOLD-OPEN RODS ARE FULLY EXTENDED AND LOCKED WHEN THE FAN COWL PANEL IS OPEN. THE HOLD-OPEN RODS ARE NOT LOCKED IF YOU SEE THE RED STRIPE WITH THE WORD "UNLOCKED" ON THE LOCK COLLAR. IF THE RODS ARE NOT LOCKED, THE FAN COWL PANEL CAN FALL. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

Close the Fan Cowl

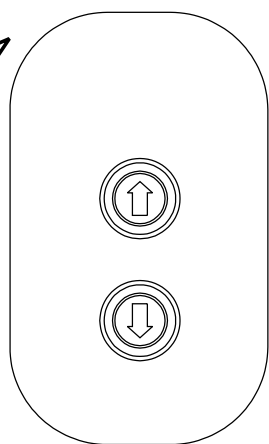
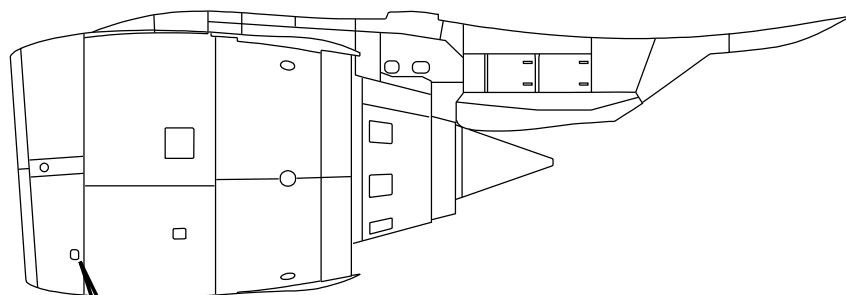
Here is a summary of how you close the fan cowl:

- Push the UP button to take the fan cowl weight off the hold-open rods
- Unlock the collars on the hold-open rods (red stripes will be visible)
- Push the DOWN button until the fan cowl closes
- Close the fan cowl latches.

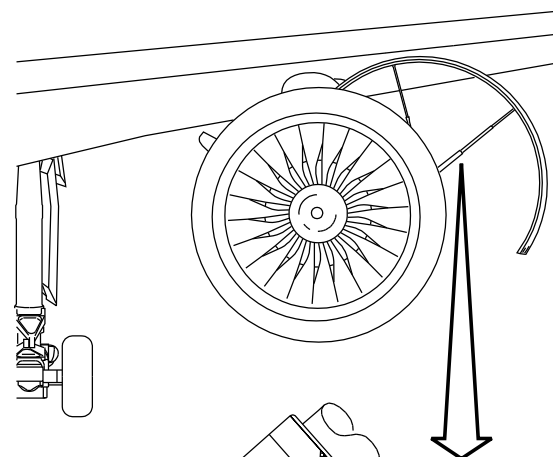
Training Information Point

The fan cowl opens in approximately 20 seconds. When you open the two fan cowls at the same time, it takes approximately 50 seconds.

A single fan cowl closes in approximately 25 seconds. You can close the two fan cowls at the same time.



FAN COWL ACTUATION
AND CONTROL SWITCH



YELLOW
STRIPES

LOCK
COLLARS

FAN COWL
HOLD-OPEN RODS
(LOCKED)

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PDOS - OPERATION - FAN COWL

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PDOS - OPERATION - THRUST REVERSER

General

Before you open a thrust reverser (T/R) half, you must open the necessary fan cowl(s). You must also make sure you do these three tasks:

- Retract the leading edge slats
- Deactivate the leading edge slats
- Deactivate the T/R for ground maintenance.



DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER UNTIL YOU LOCK THE HOLD-OPEN ROD. THE THRUST REVERSER IS HEAVY. IT WILL CLOSE QUICKLY IF THE PRESSURE IS REMOVED FROM THE PDOS. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

Open the Thrust Reverser

This is a summary of the procedure to open a T/R half:

- Open the T/R latches
- Push the UP button until the collar on the hold-open rod locks (a yellow stripe will be visible)
- Push the DOWN button to put the weight of the T/R on the hold-open rod.

Close the Thrust Reverser

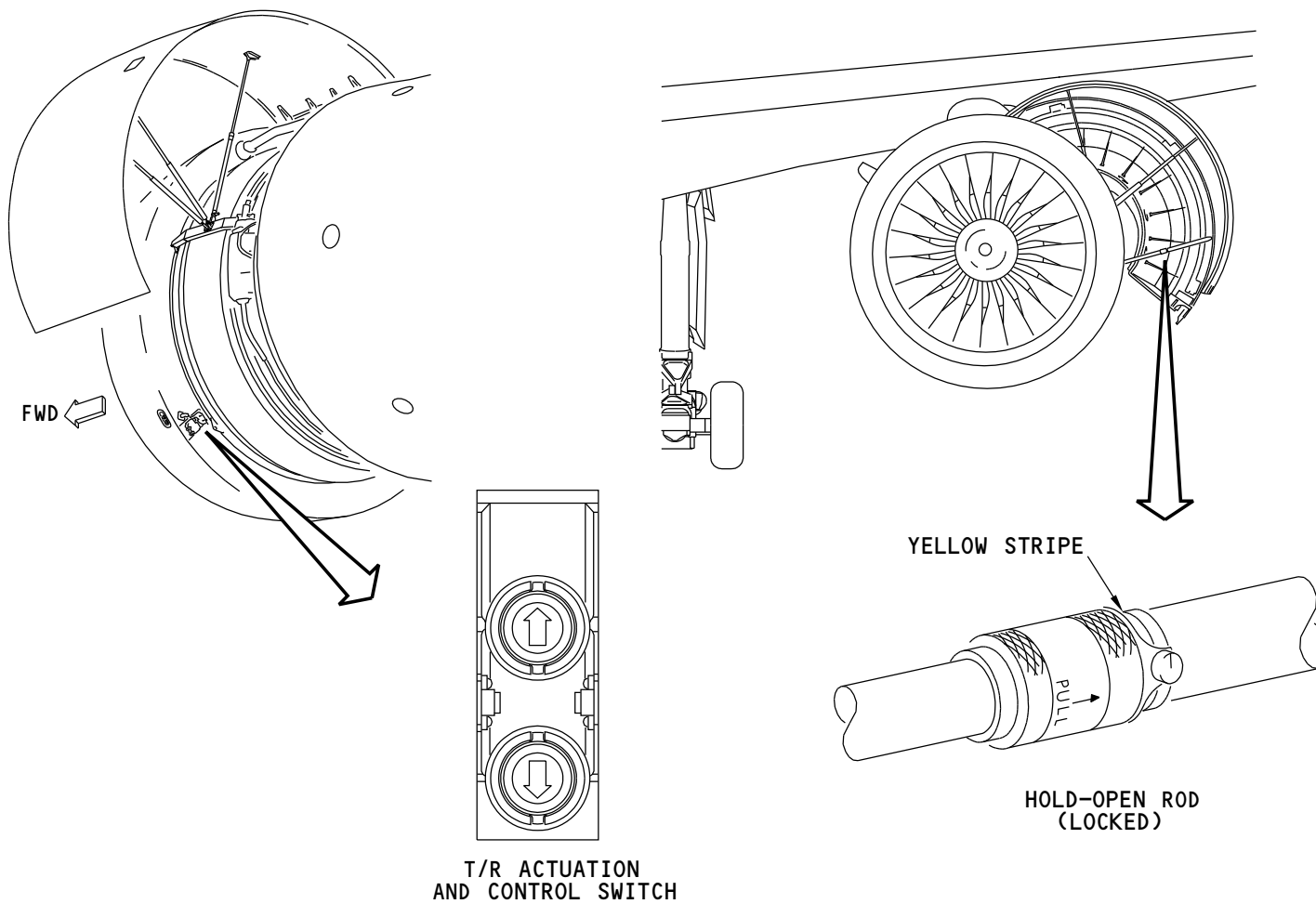
This is a summary of the procedure to close a T/R half:

- Push the UP button to take the weight of the T/R off the hold-open rod
- Unlock the collar on the hold-open rod (a red stripe will be visible)
- Push the DOWN button until the T/R closes
- Close the T/R latches.

Training Information Point

A T/R half opens in approximately 40 seconds. When you open the two T/R halves at the same time, it takes approximately 100 seconds. A T/R half closes in approximately 25 seconds. You can close the two T/R halves at the same time.

When you open the right T/R half you must open the left and right fan cowls. This is because the v-band latch handle will hit the left fan cowl panel if it is not open.



PDOS - OPERATION - THRUST REVERSER

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PDOS - MANUAL OPERATION

General

When there is no airplane power you will use the manual drive lug and the solenoid valves on the PDOS pump/power pack to open and close the fan cowl and the thrust reverser (T/R) halves. A decal on the pump/power pack shows the manual operation procedures.

The manual drive lug uses a 3/8 inch square drive.

Open the Fan Cowl and Thrust Reverser

This is a summary of the procedure to open a fan cowl or T/R half:

- Use a flat blade screwdriver to set the solenoid valves to the positions to open the related cowl
- Turn the manual drive lug
- When the cowl is open and the hold-open rods are locked, set the solenoid valves to the positions to close the related cowl
- Push and hold the V5 solenoid valve to put the weight of the cowl on the hold-open rods
- Put the solenoid valves back to their initial positions.

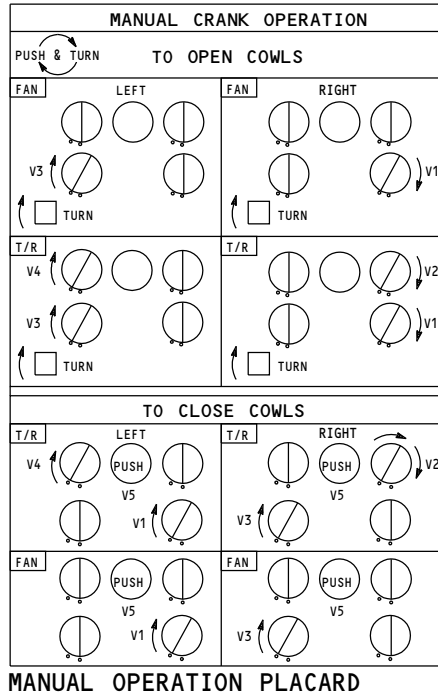
Close the Fan Cowl and Thrust Reverser

This is a summary of the procedure to close a fan cowl or T/R half:

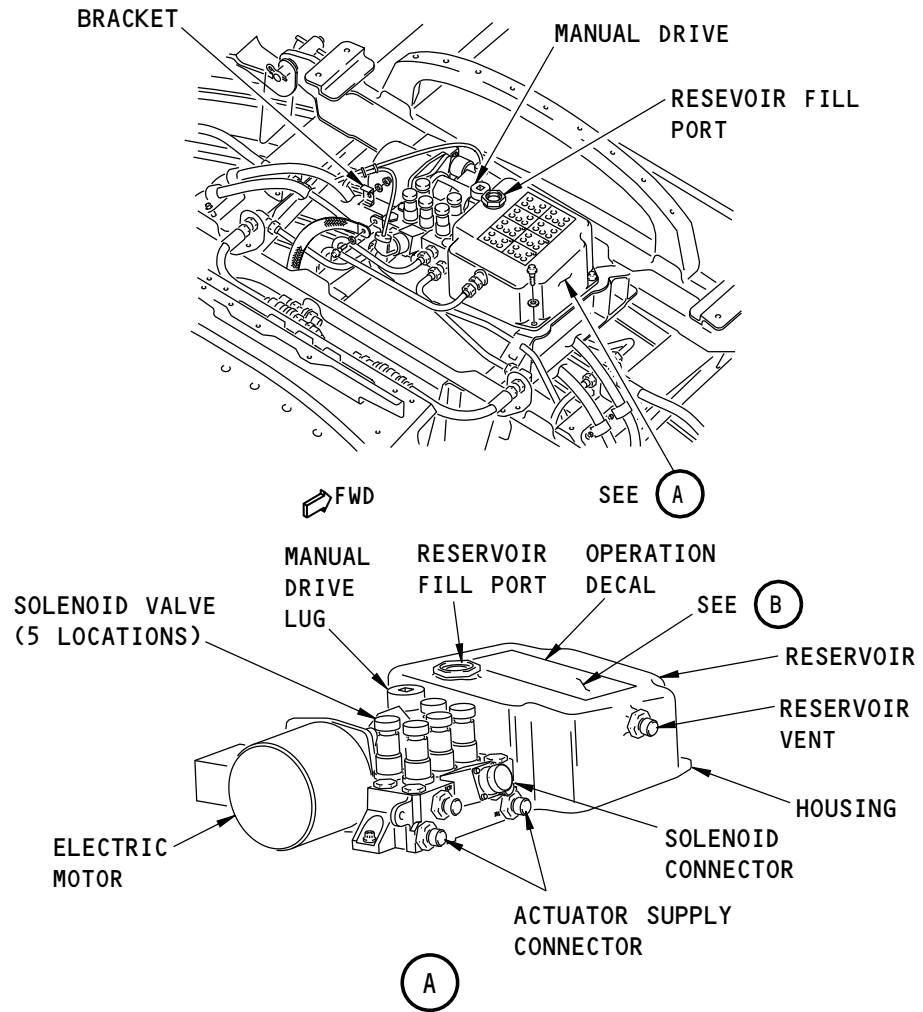
- Use a flat-blade screwdriver to set the solenoid valves to the positions to open the related cowl
- Turn the manual drive lug to move the cowl up and then unlock the hold-open rods
- Set the solenoid valves to the positions to close the related cowl
- Push and hold the V5 solenoid valve to close the cowl
- Put the solenoid valves back to their initial positions.

Training Information Point

The pump/power pack is approximately 14 ft. (4.3 m) from the ground. There is a safety harness attach point with a receptacle for a safety harness. The safety harness attach point is aft of the forward access fairing. Attach the safety harness to the attach point when you operate the pump/power pack.



(B)



PDOS - MANUAL OPERATION

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