MAINTENANCE PRACTICES

OPENING & CLOSING OF ENGINE COWL DOORS

OPENING OF THE ENGINE FAN COWL DOORS

Before working on the engine, safety precautions have to be taken.

WARNING: KEEP PERSONNEL AND EQUIPMENT CLEAR OF THE FAN COWL DOORS WHEN THE HOLD OPEN RODS ARE NOT LOCKED. THE COWL DOORS CAN CLOSE QUICKLY AND INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

DO NOT ATTEMPT TO OPEN THE FAN COWL DOORS IF THE WIND SPEED IS HIGHER THAN 96 KM/H (60 MPH).

BE CAREFUL IF YOU OPEN A FAN COWL DOOR WHEN THE WIND SPEED IS 40 KM/H (25 MPH) OR MORE. IF THE WIND MOVES THE FAN COWL DOOR, INJURY TO PERSONS AND/OR DAMAGE TO THE ENGINE CAN OCCUR.

In the cockpit, make sure that the ENG MODE rotary selector is in the NORM position.

Make sure that the ENG MASTER 1(2) lever was in the OFF position not less than five minutes before you do this procedure.

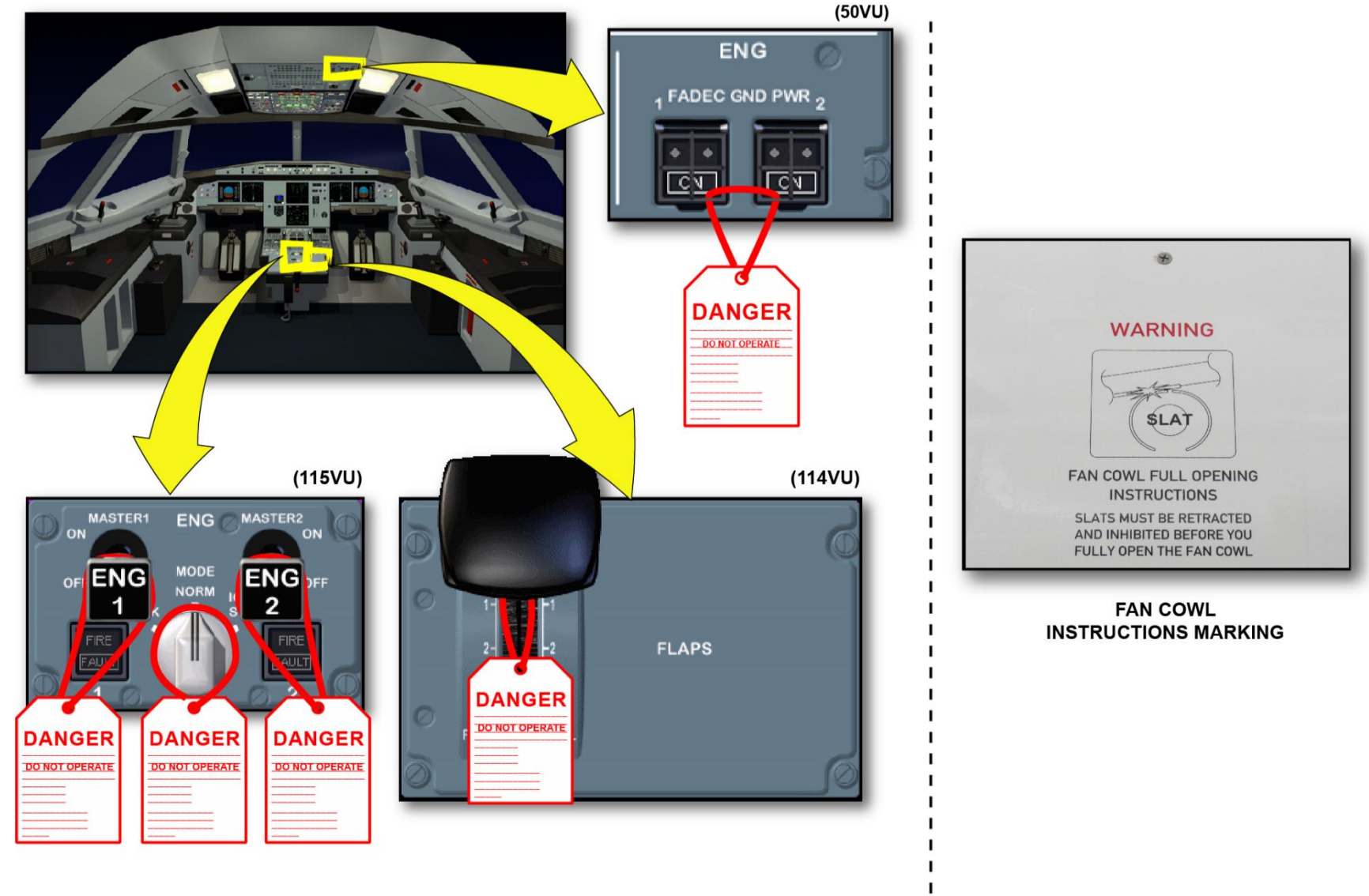
Put WARNING NOTICE(S) in position to tell persons not to operate the ENG MODE rotary selector and the ENG MASTER 1(2) lever.

On the ENG section of maintenance panel 50VU, make sure that the ON legend of the FADEC GND PWR 1(2) pushbutton switch is off.

Put WARNING NOTICE(S) in position to tell persons not to energize FADEC 1(2).

Make sure that the slats are retracted.

Put WARNING NOTICE(S) in the cockpit to tell persons not to move the slat control lever.



FAN COWL INSTRUCTIONS MARKING

CAUTION: DO NOT OPEN THE FAN COWL IF THE WING LEADING EDGE SLATS ARE EXTENDED. DAMAGE TO THE FAN COWL, WING LEADING EDGE SLATS AND WING CAN OCCUR.

On the engine, unlock and open the three latches:

Push the fan cowl door latch triggers to release the AFT latch, CENTER latch and the FWD latch on the bottom of the left fan cowl door.

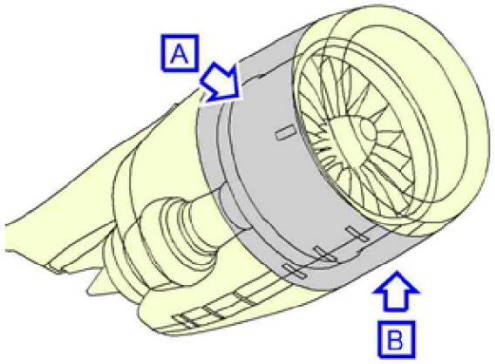
Pull down in sequence each handle (first the AFT then the CENTER then the FWD) to open the three latches.

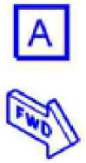
Move the latches away from the three latch keepers.

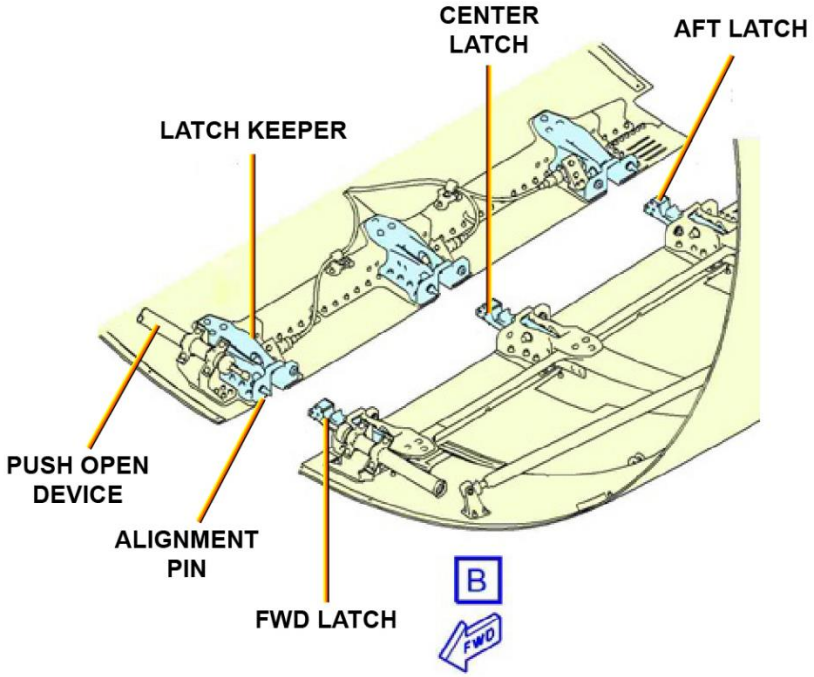
NOTE: The push-open devices on the fan cowl doors will push the doors apart after you release the last latch.

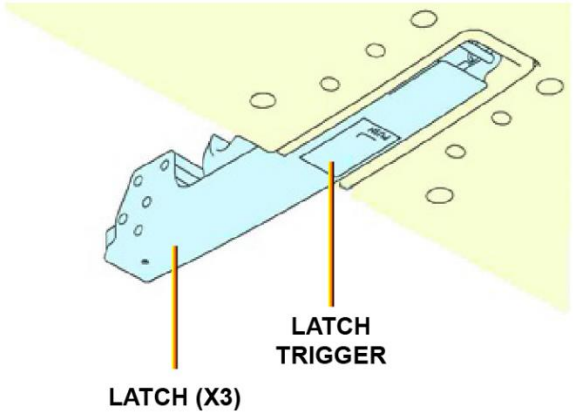
Push the fan cowl door latch trigger to release the side latch on the right fan cowl door (3 o'clock position).

Pull the handle to release the right fan cowl from the inlet cowl.


A
B


A
FWD


CENTER LATCH
AFT LATCH
LATCH KEEPER
PUSH OPEN DEVICE
ALIGNMENT PIN
FWD LATCH
B
FWD


LATCH TRIGGER
LATCH (X3)

Manually lift and hold the left fan cowl door at the lower edge.

Lift the left fan cowl door until the telescoping Hold Open Rod (HOR) correctly engages and locks into position (green band visible).

Make sure that the telescoping HOR is at the correct length.

Remove, lock and attach the fixed HOR to the bracket on the engine.

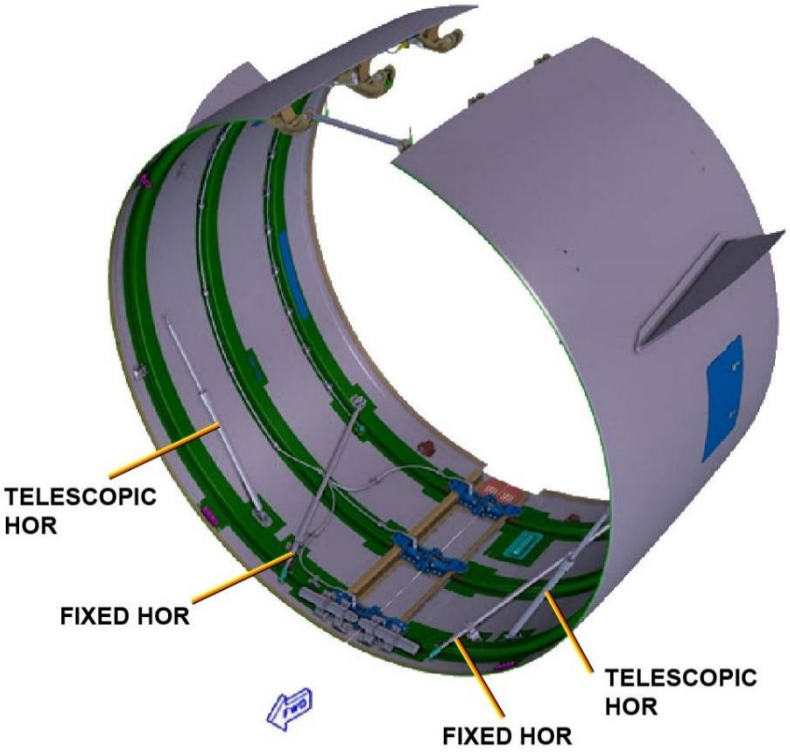
Slowly lower the left fan cowl door until the fixed HOR and the telescoping HOR hold the weight of the door.

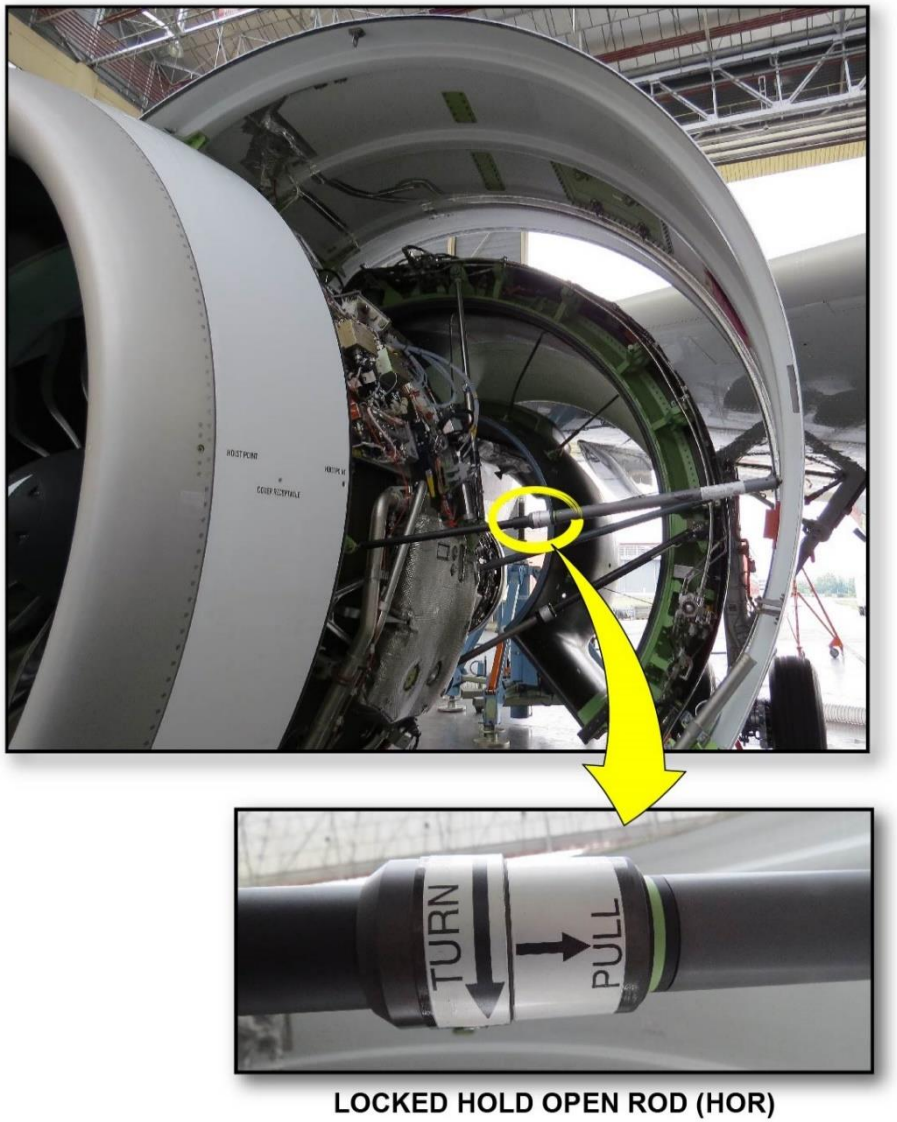
CAUTION: BE CAREFUL IF YOU LIFT THE FAN COWL DOOR MORE THAN 52 DEGREES FROM THE VERTICAL.

DAMAGE TO THE FAN COWL DOOR OR PYLON CAN OCCUR.

If required, repeat this procedure for the other fan cowl door.

Make an entry in the logbook.

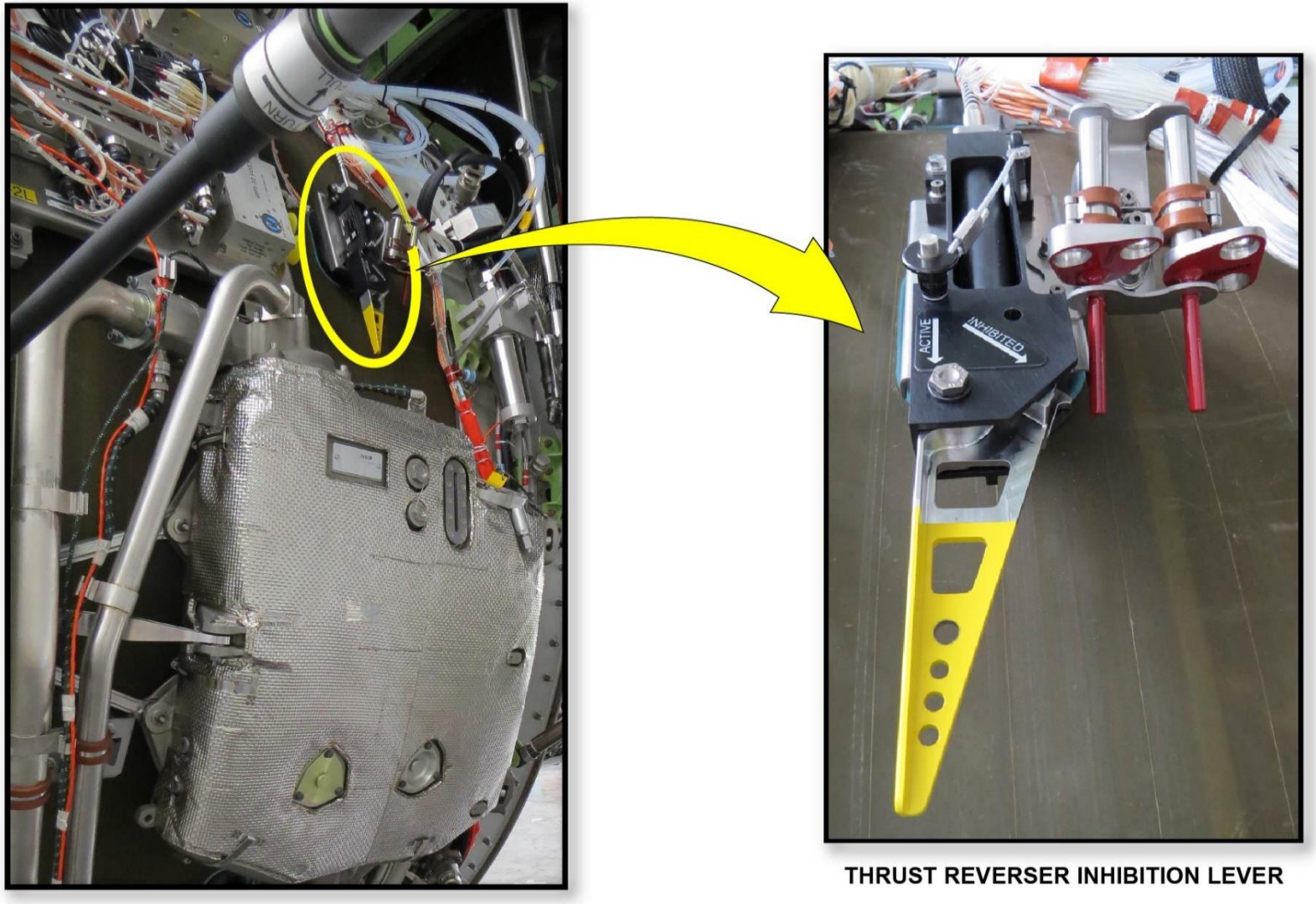




LOCKED HOLD OPEN ROD (HOR)

OPENING OF THE ENGINE THRUST REVERSER COWL DOORS

Do the deactivation of the thrust reverser system for maintenance as per the AMM.



THRUST REVERSER INHIBITION LEVER

WARNING: DO NOT KEEP OPEN A THRUST REVERSER DOOR WHEN THE WIND SPEED IS 83.5 KM/H (51.6 MPH) OR MORE.

IF THE WIND MOVES THE THRUST REVERSER DOOR, INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT CAN OCCUR.

BE CAREFUL IF YOU OPEN OR CLOSE A THRUST REVERSER DOOR WHEN THE WIND SPEED IS 37 KM/H (23 MPH) OR MORE. IF THE WIND MOVES THE THRUST REVERSER DOOR, INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT CAN OCCUR.

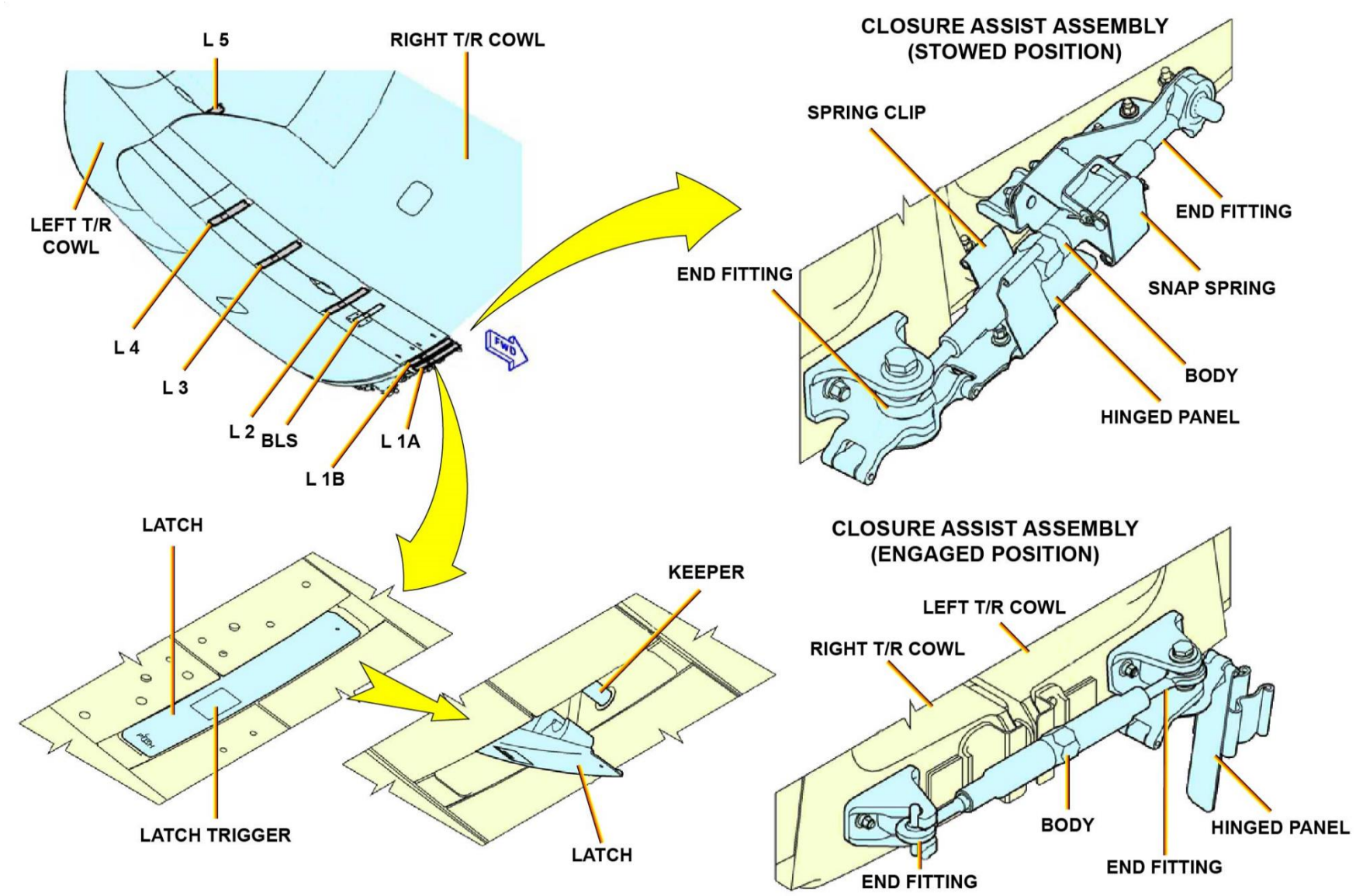
NOTE: Do not open the left and right thrust-reverser cowl-doors at the same time.

Thrust-reverser cowl-doors must be opened one after the other.

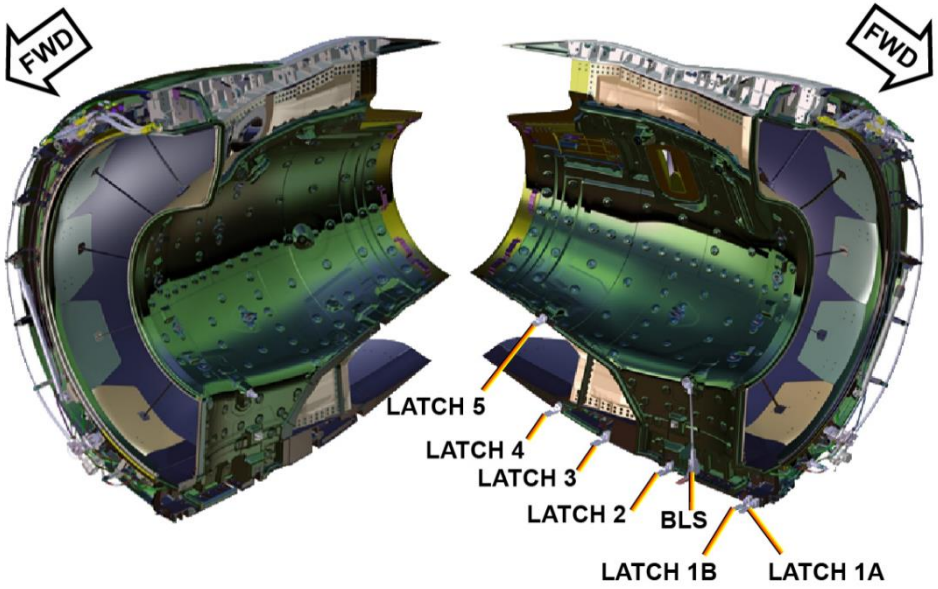
If necessary, engage the closure assist assembly.

NOTE: The closure assist assembly only helps to open or close the L1A and L1B latches.

It is not necessary to use the closure assist assembly if you can open and close these latches without it.

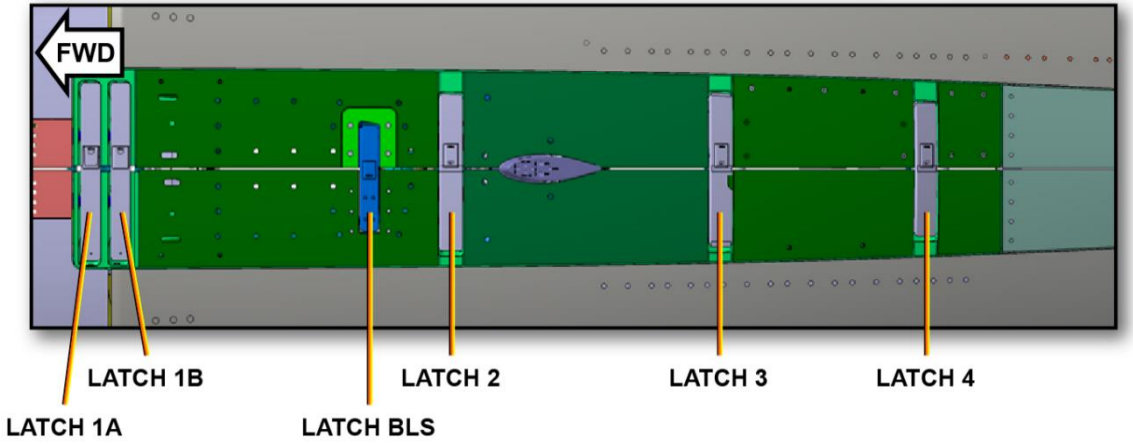

L 5
RIGHT T/R COWL
LEFT T/R COWL
L 4
L 3
L 2
BLS
L 1A
L 1B
FWD
CLOSURE ASSIST ASSEMBLY (STOWED POSITION)
SPRING CLIP
END FITTING
END FITTING
SNAP SPRING
BODY
HINGED PANEL
LATCH
KEEPER
LATCH TRIGGER
LATCH
CLOSURE ASSIST ASSEMBLY (ENGAGED POSITION)
LEFT T/R COWL
RIGHT T/R COWL
BODY
HINGED PANEL
END FITTING
END FITTING

On the Thrust Reverser Cowl, push the latch trigger to release and open the latches in sequence: L5, L4, L3, Bifurcation Latching System (BLS), L2, L1A and L1B.



TR LATCH SEQUENCE:
OPENING: USE TURNBUCKLE, L5, L4, L3, BLS, L2, L1A/L1B, TURNBUCKLE STOW
CLOSING: TURNBUCKLE, L1A/L1B, L2, BLS, L3, L4, L5, TURNBUCKLE STOW

THRUST REVERSER LATCHES



Connect the hand pump flexible hose to the quick disconnect fitting of the Door Opening System (DOS) actuator and operate it until the DOS actuator opens the left thrust reverser door to 45 degrees.

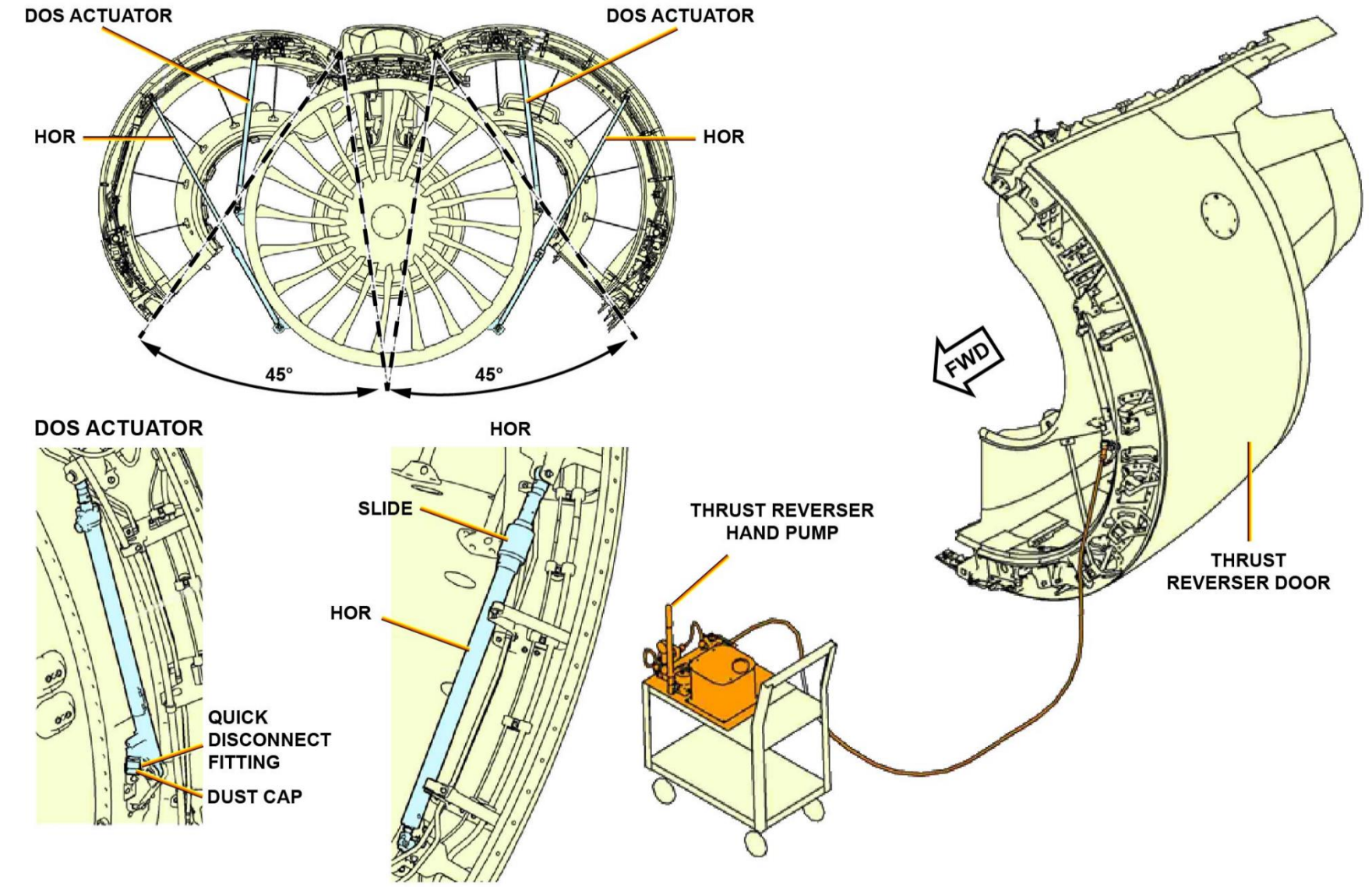
Manually release the pressure from the DOS actuator.

NOTE: The DOS actuator will retract until the compressive lock in the actuator engages.

WARNING: DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER DOOR UNTIL THE COMPRESSIVE LOCK IN THE DOS ACTUATOR IS ENGAGED.

THE THRUST REVERSER DOOR IS HEAVY. IT WILL CLOSE QUICKLY IF THE DOS ACTUATOR FAILS.

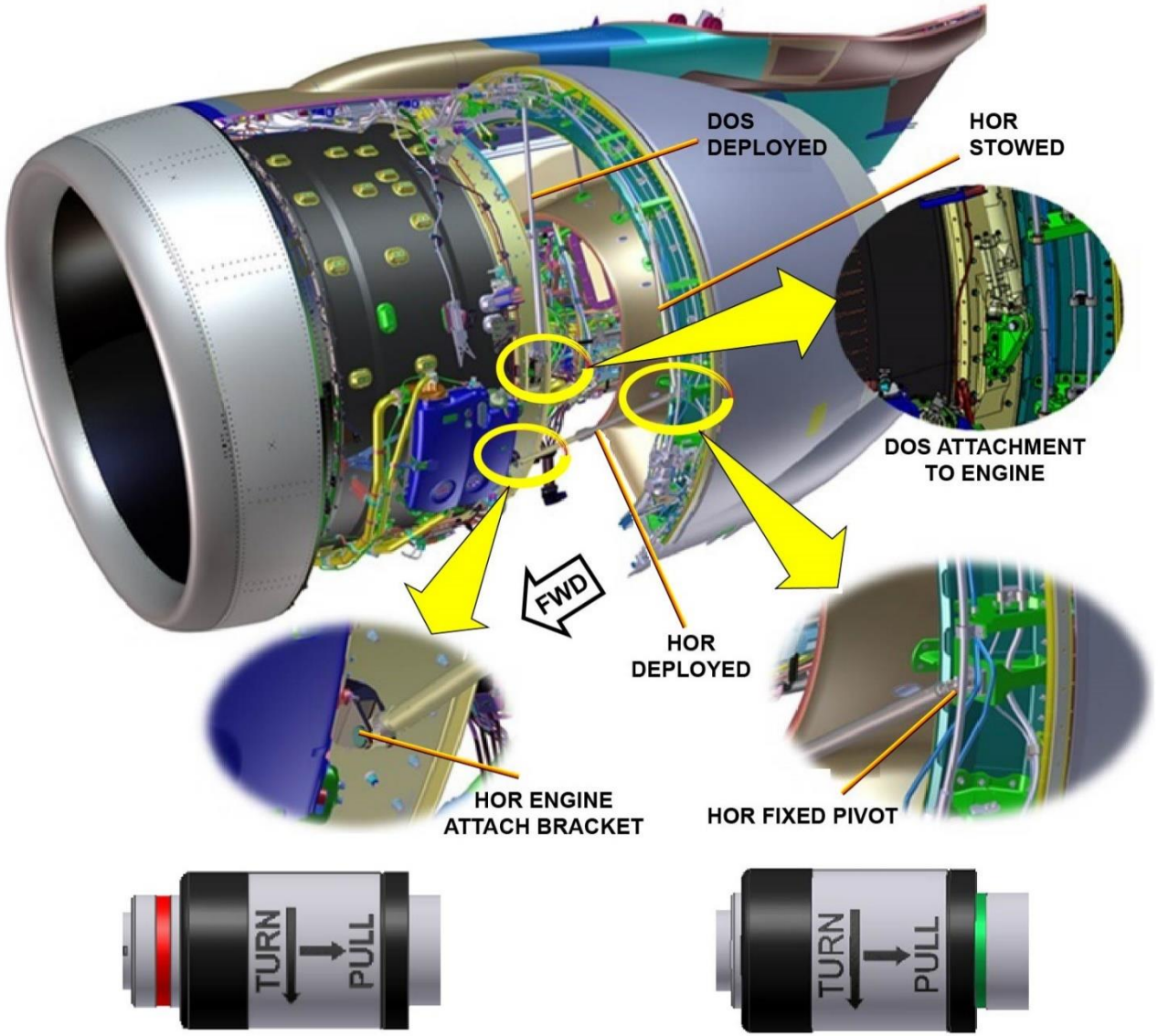
THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.


DOS ACTUATOR
DOS ACTUATOR
HOR
HOR
45°
45°
DOS ACTUATOR
HOR
SLIDE
HOR
QUICK
DISCONNECT
FITTING
DUST CAP
THRUST REVERSER
HAND PUMP
FWD
THRUST
REVERSER DOOR

Release and extend the hold open rod.

Adjust it as necessary and attach it to the HOR support bracket on the fan case. Make sure it is locked (green band visible).

If necessary, repeat the sequence to open the right Thrust Reverser Cowl.


DOS
DEPLOYED
HOR
STOWED
DOS ATTACHMENT
TO ENGINE
FWD
HOR
DEPLOYED
HOR ENGINE
ATTACH BRACKET
HOR FIXED PIVOT
TURN
PULL
TURN
PULL

CLOSING OF THE ENGINE THRUST REVERSER COWL DOORS

Pay attention of the warnings and cautions mentioned for Fan and Thrust Reverser cowls opening.

Make sure that you did the deactivation of the thrust reverser system for maintenance.

NOTE: Do not close the thrust-reverser cowl-doors at the same time.

Thrust-reverser cowl-doors must be closed one after the other.

Connect the hand pump flexible hose to the quick disconnect fitting of the DOS actuator and operate it until the DOS actuator opens the left thrust reverser door to be able to release the HOR from its support bracket on the fan case.

Adjust the length of the HOR as necessary and attach it to the HOR stow bracket on the left thrust reverser door.

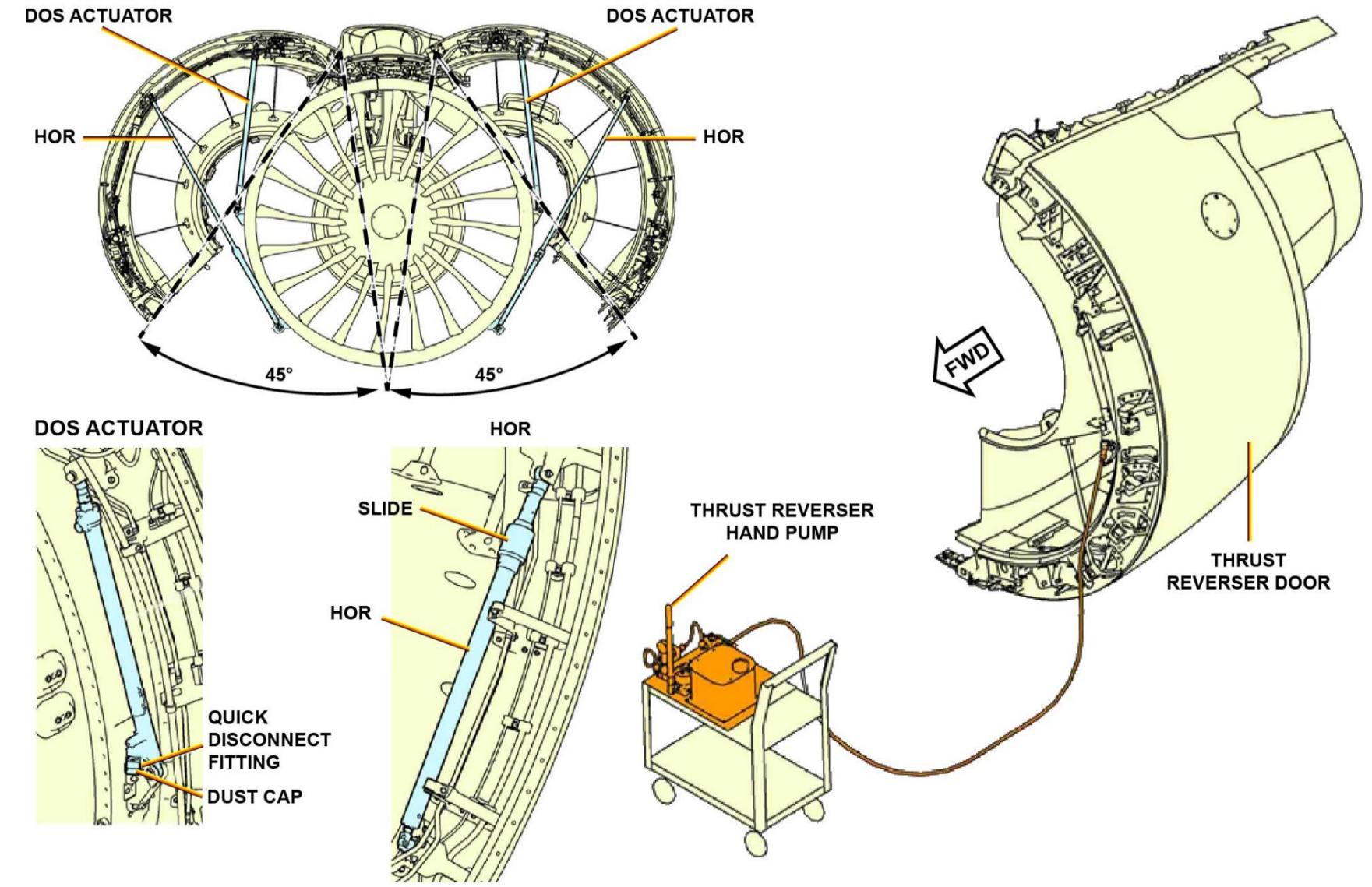
Operate the hand pump until the DOS actuator is fully extended, the compressive lock in the actuator disengages, and the pressure relief valve in the actuator is open.

Manually release the pressure from the DOS actuator to close the pressure relief valve.

NOTE: The DOS actuator will retract at a constant speed until the thrust reverser door closes.

Disconnect the hand pump flexible hose.

Repeat the same sequence to close the right thrust reverser door.


DOS ACTUATOR
DOS ACTUATOR
HOR
HOR
45°
45°
DOS ACTUATOR
HOR
SLIDE
HOR
QUICK
DISCONNECT
FITTING
DUST CAP
THRUST REVERSER
HAND PUMP
FWD
THRUST
REVERSER DOOR

If necessary, engage the closure assist assembly:

Move it out of the stow bracket.

Adjust the length until the end fitting can be attached to the closure assist hook on the right thrust reverser door.

Engage it in the closure assist hook.

Turn the body of the closure assist assembly with a WRENCH to pull the two thrust reverser doors together until you can engage the L1A and L1B latches at the bottom of the doors.

Stow the closure assist assembly in its storage position.

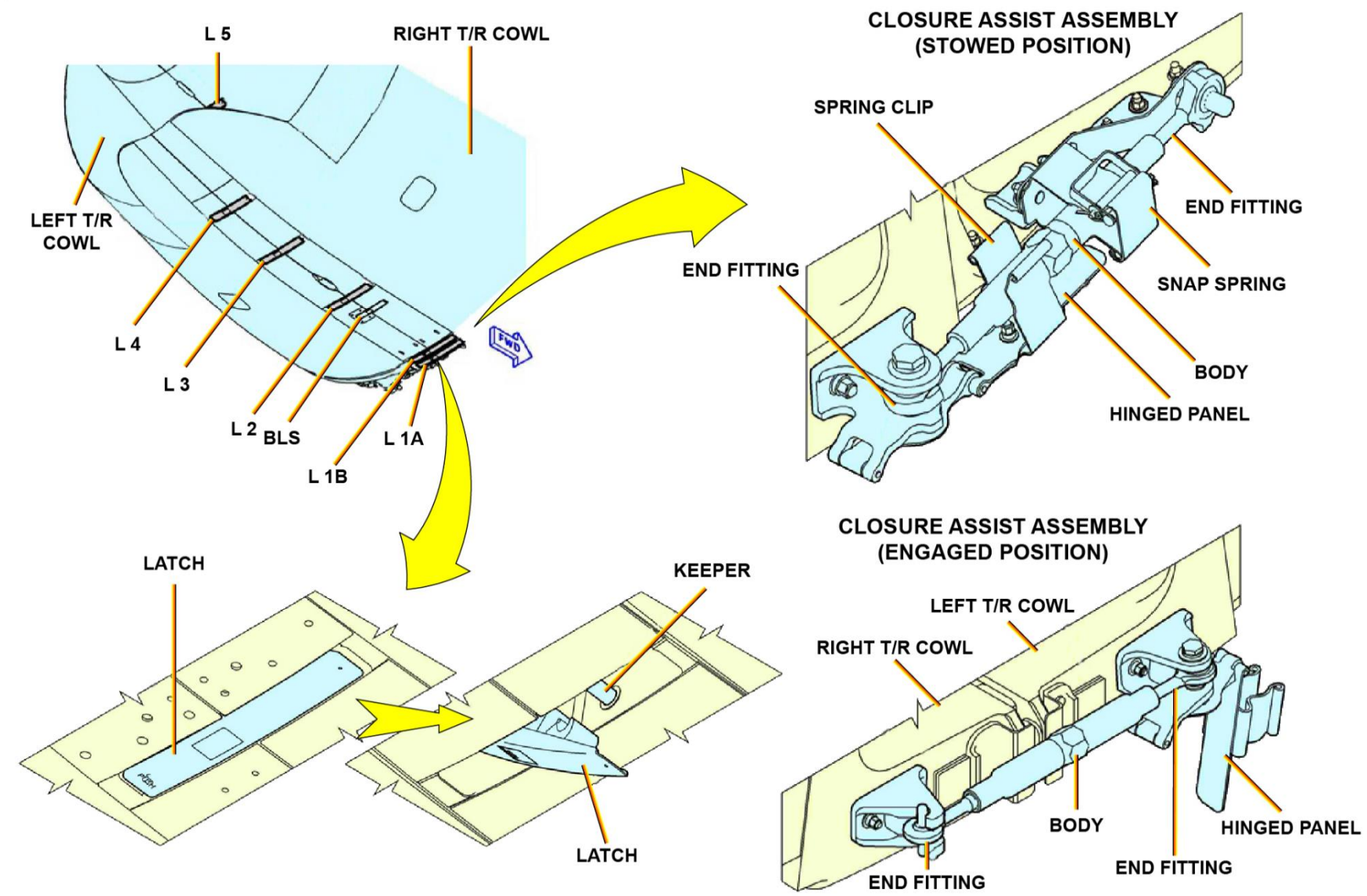
When you engage the L1A and L1B latches, if the force you measure is not between 17.8 daN (40 lbf) and 22.2 daN (50 lbf), adjust the thrust reverser doors.

Close the remaining thrust reverser door latches in the sequence that follows: L1A, L1B, 2, BLS, 3, 4 and 5.

If the force you measure is not between 17.8 daN (40 lbf) and 22.2 daN (50 lbf), adjust the thrust reverser doors.

Make sure that the work area is clean and clear of tool(s) and other items.

Reactivate the T/R.


L 5
RIGHT T/R COWL
LEFT T/R COWL
L 4
L 3
L 2
BLS
L 1A
L 1B
FWD
CLOSURE ASSIST ASSEMBLY (STOWED POSITION)
SPRING CLIP
END FITTING
END FITTING
SNAP SPRING
BODY
HINGED PANEL
LATCH
KEEPER
LATCH
CLOSURE ASSIST ASSEMBLY (ENGAGED POSITION)
LEFT T/R COWL
RIGHT T/R COWL
BODY
HINGED PANEL
END FITTING
END FITTING

CLOSING OF THE ENGINE FAN COWL DOORS

Manually lift and hold the left fan cowl door at the lower edge so that the weight is not on the HOR and telescoping HOR.

Disconnect the fixed HOR from the engine bracket and attach it to the stow bracket on the left fan cowl door.

Manually lift the left fan cowl door until the telescoping HOR extends sufficiently so that you can turn the release collar.

Turn the collar and pull it up to unlock the telescoping HOR.

NOTE: When the telescoping HOR is unlocked, you will no longer see a green band adjacent to the release collar.

You will see a red band adjacent to the release collar.

Slowly lower the left fan cowl door until it is on the bottom.

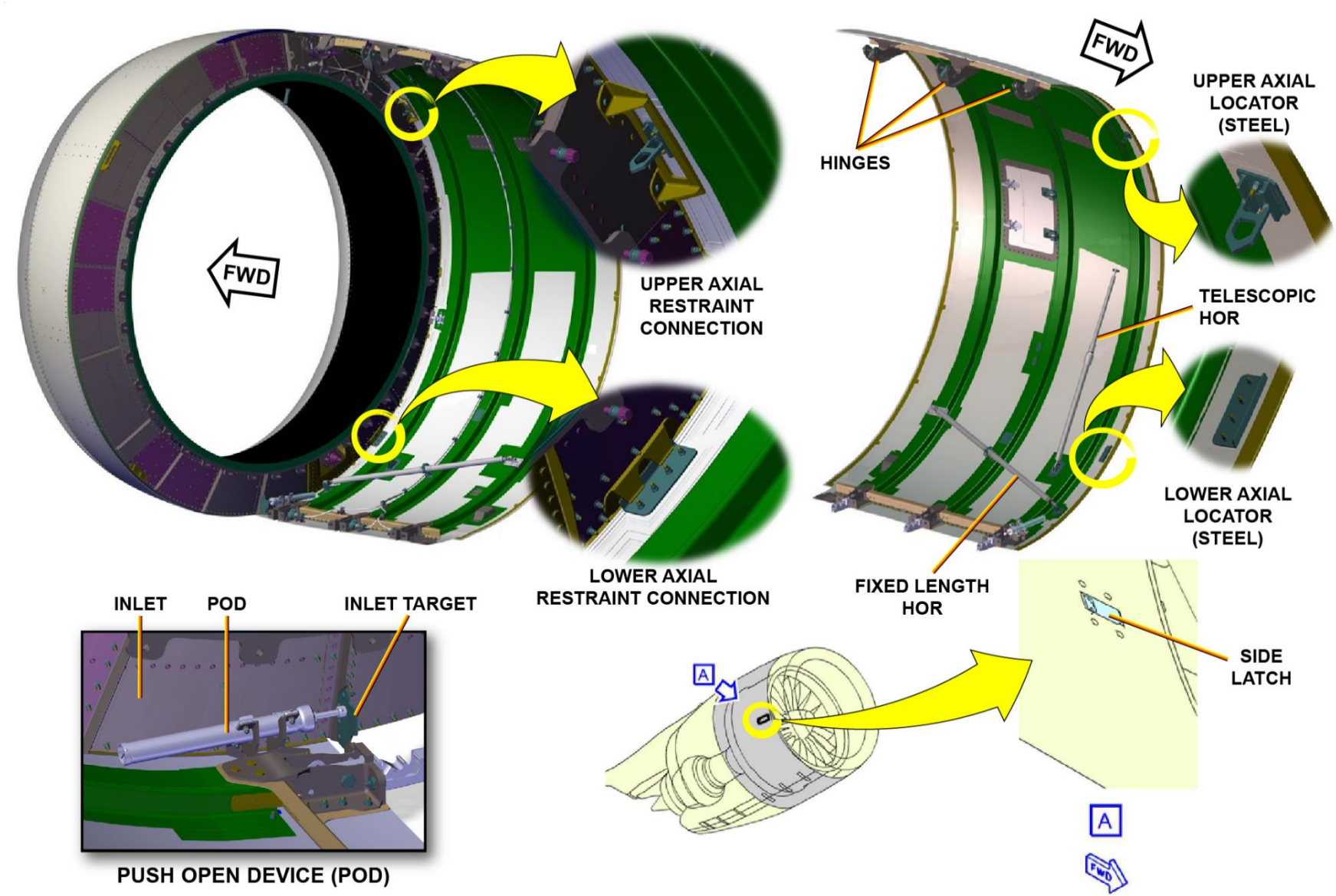
Perform the same steps to lower the right fan cowl door.

Push the right fan cowl door until it is against the inlet cowl.

Make sure that the axial locators on the right fan cowl door engage the locator clips on the inlet cowl.

Close the side latch on the right fan cowl door until the latch is flush with the door surface and locked into position.

Make sure that the latch engages with the inlet cowl.

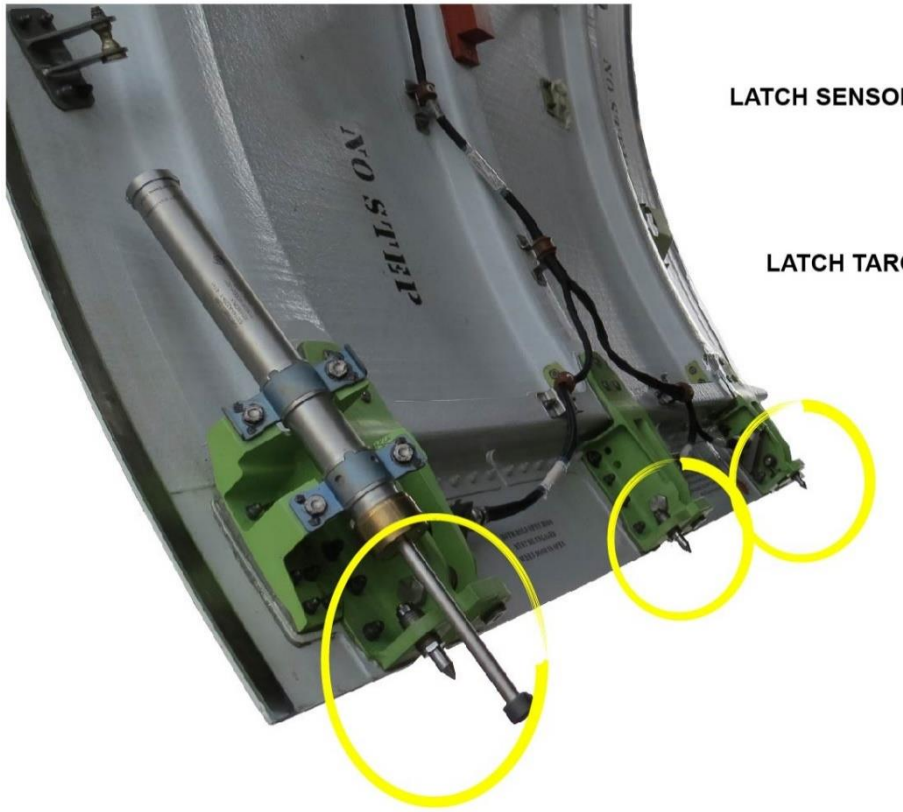

FWD
UPPER AXIAL RESTRAINT CONNECTION
LOWER AXIAL RESTRAINT CONNECTION
FWD
HINGES
UPPER AXIAL LOCATOR (STEEL)
TELESCOPIC HOR
LOWER AXIAL LOCATOR (STEEL)
FIXED LENGTH HOR
INLET
POD
INLET TARGET
PUSH OPEN DEVICE (POD)
A
SIDE LATCH
A
FWD

Push the left fan cowl door against the right fan cowl door.

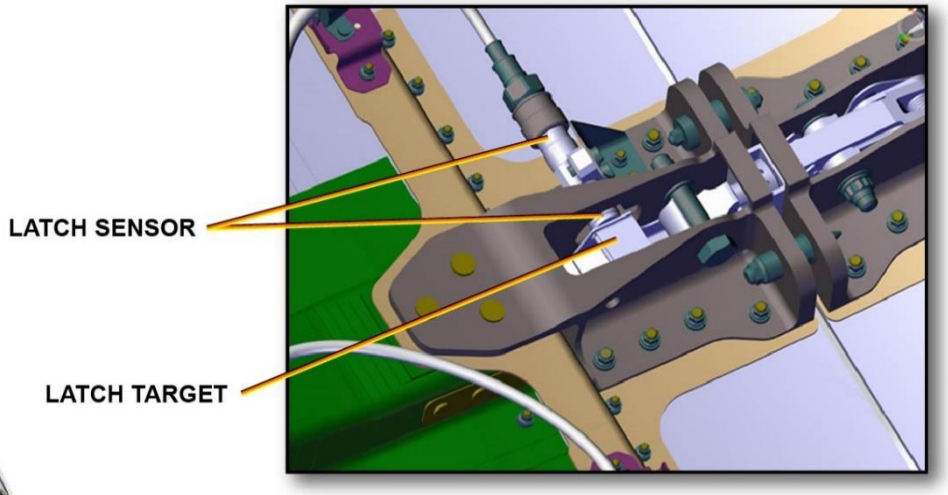
Make sure that the alignment pins go into the holes adjacent to the FWD, CENTER and AFT latches.

Make sure that the axial locators on the left fan cowl door engage the locator clips on the inlet cowl.

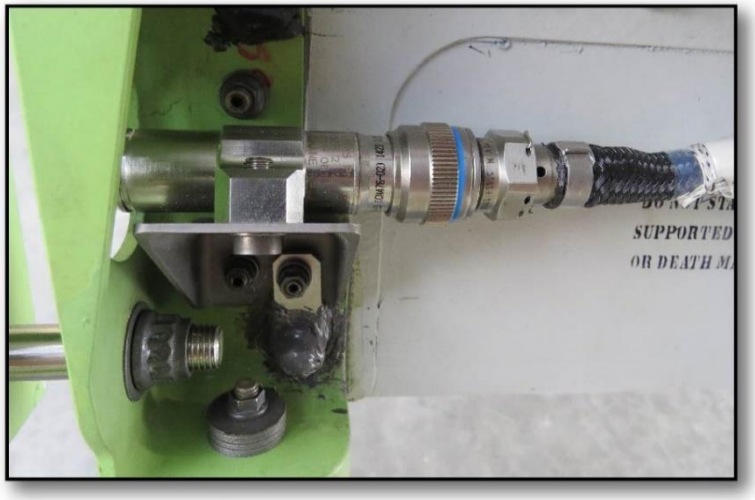
NOTE: The push-open devices on the fan cowl doors will push the doors as you close them.



ALIGNMENT PINS



PROXIMITY SENSOR



Engage the hook on the FWD latch with the related latch keeper.

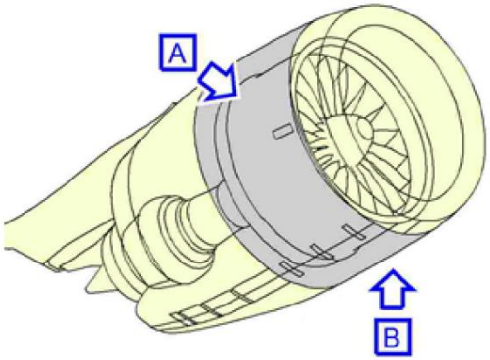
Close the FWD latch until it is flush with the door surface and locked into position.

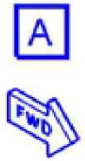
Engage the hook on the CENTER latch with the related latch keeper.

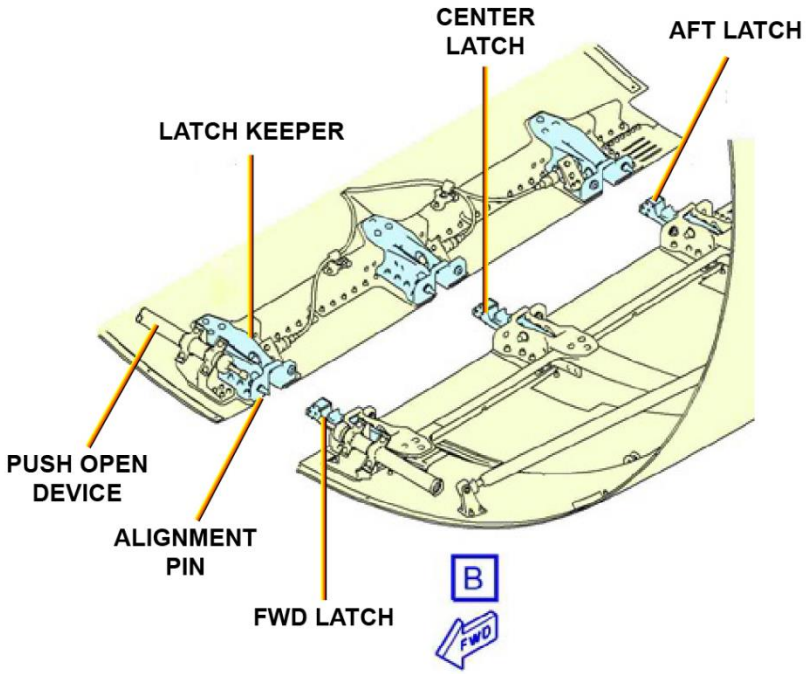
Close the CENTER latch until it is flush with the door surface and locked into position.

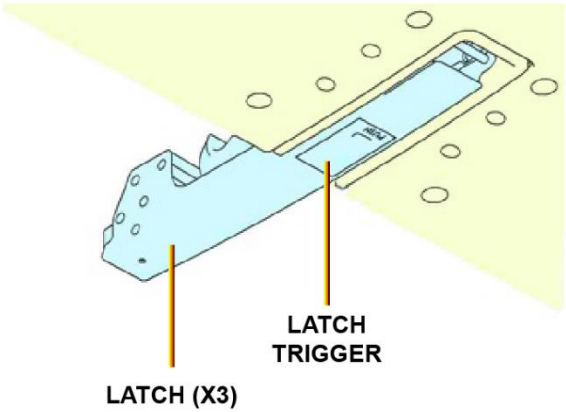
Engage the hook on the AFT latch with the related latch keeper.

Close the AFT latch until it is flush with the door surface and locked into position.


A
B


A
FWD

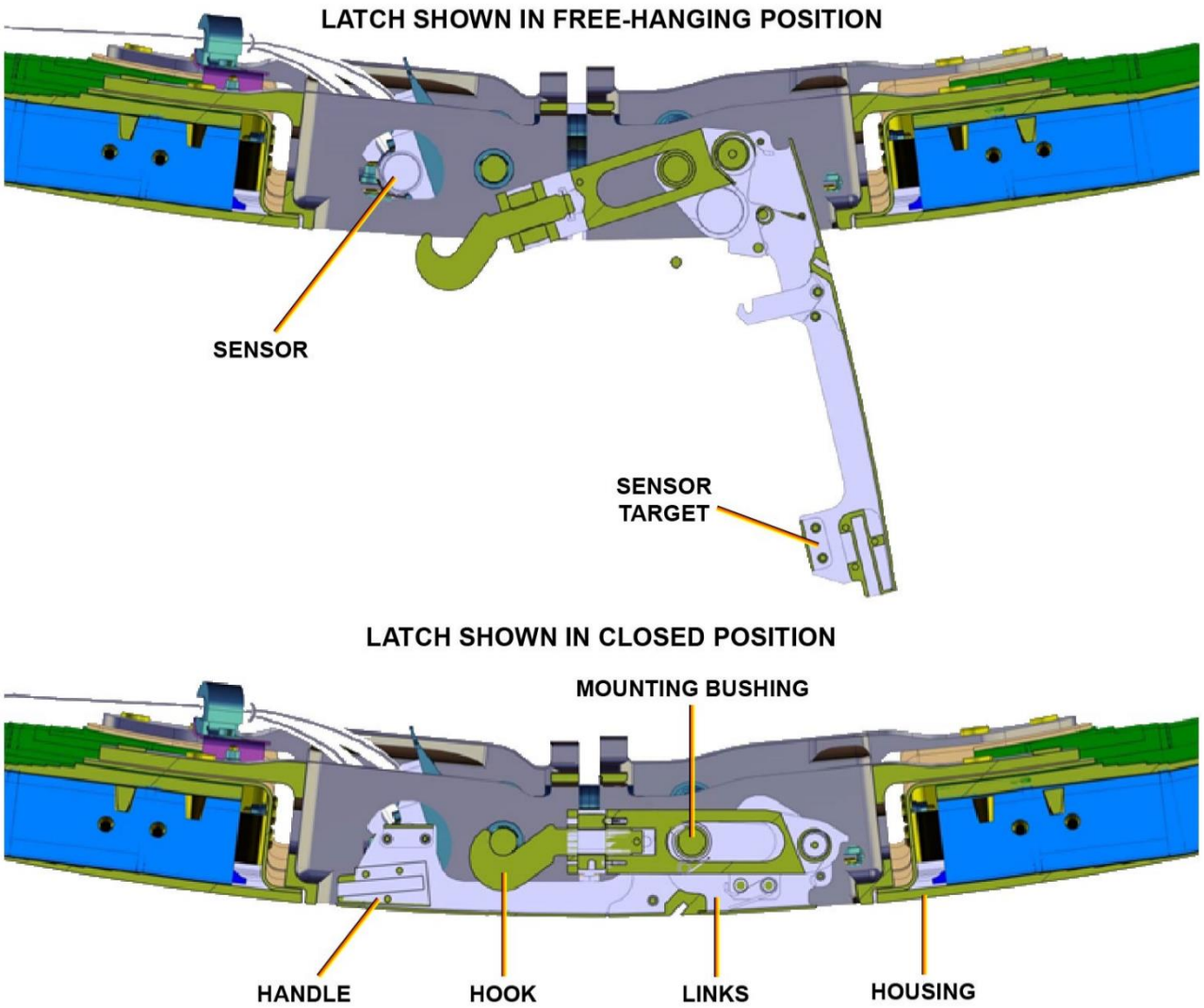

CENTER LATCH
AFT LATCH
LATCH KEEPER
PUSH OPEN DEVICE
ALIGNMENT PIN
FWD LATCH
B
FWD


LATCH TRIGGER
LATCH (X3)

Make sure that the force to close each latch is between 8.9 daN (20 lbf) and 13.3 daN (30 lbf). If not, adjust the fan cowl latches.

Make sure that the distance between the left and right fan cowl doors is between 1.5 mm (0.060 in.) and 4.5 mm (0.180 in.). If not adjust the fan cowl latches.

The proximity sensors installed on each latch detect improper latching and trigger an ECAM indication.


LATCH SHOWN IN FREE-HANGING POSITION
SENSOR
SENSOR TARGET
LATCH SHOWN IN CLOSED POSITION
MOUNTING BUSHING
HANDLE
HOOK
LINKS
HOUSING

THRUST REVERSER HANDLING

THRUST REVERSER DEACTIVATION AND LOCKOUT

Thrust reverser deactivation for ground maintenance:

Apply the applicable safety precautions.

Open the oil tank access-door on the left fan cowl door.

Turn the lever on the inhibit cable handle assembly to the inhibited position and secure it with the lockout pin.

Thrust reverser deactivation for flight:

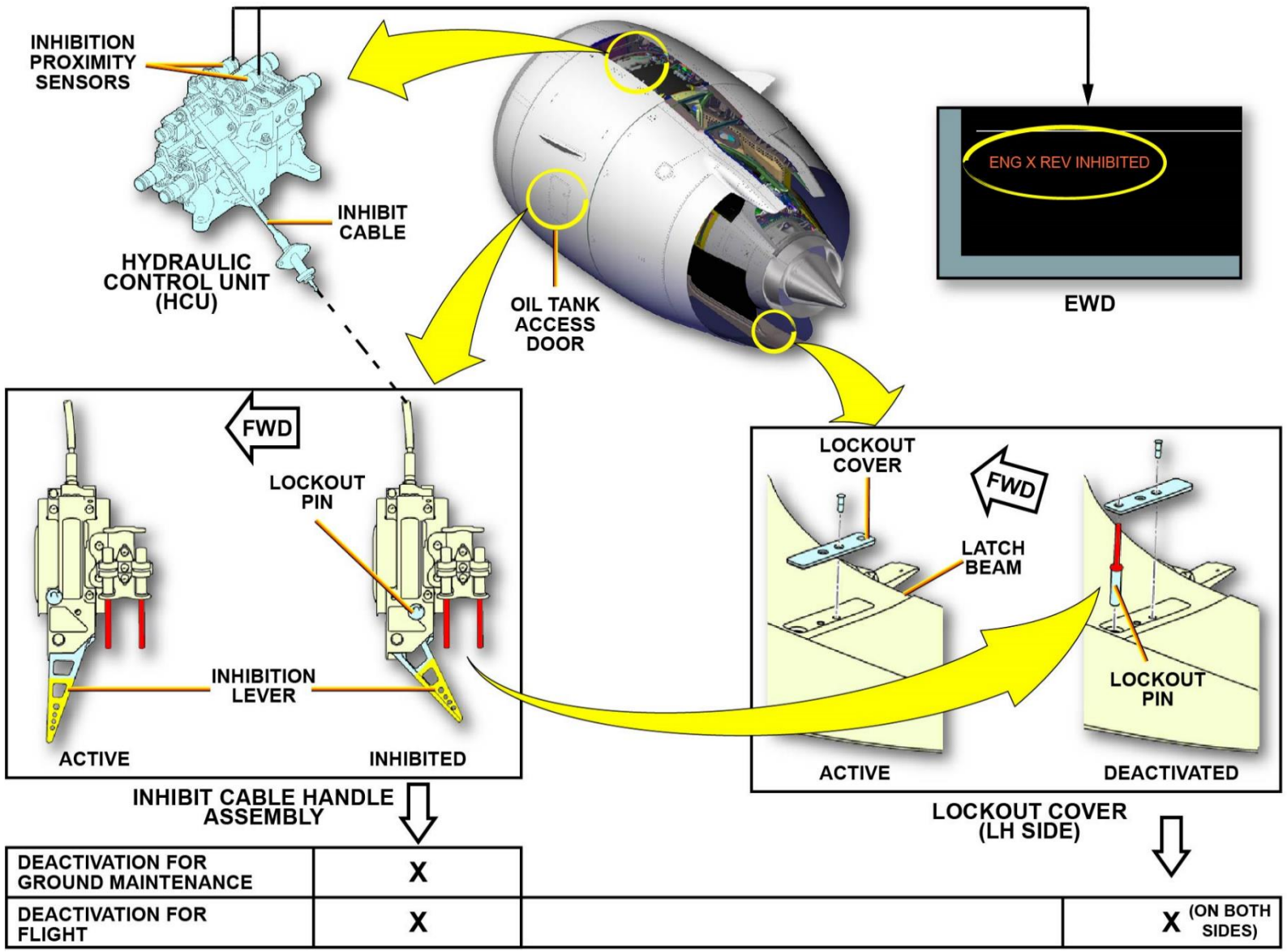
Apply the applicable safety precautions.

Do the Thrust Reverser deactivation for ground maintenance.

Install the translating sleeve lockout pins in the latch beam.

Check for the Thrust Reverser deactivation warning on the EWD.

Make the corresponding entry in the logbook and put a warning notice in the cockpit.



DEACTIVATION FOR GROUND MAINTENANCE	X		
DEACTIVATION FOR FLIGHT	X		X (ON BOTH SIDES)

MANUAL OPERATION OF THE THRUST REVERSER TRANSLATING SLEEVES

Manual extension of the thrust reverser translating sleeves:

Apply the applicable safety precautions.

Open the fan cowl doors.

Do the deactivation of the thrust reverser system for maintenance.

Do the deactivation of the Thrust Reverser Actuation System (TRAS) locking feedback actuator for the applicable thrust reverser half.

Do the deactivation of the TRAS locking actuator for the applicable thrust reverser half.

Do the deactivation of the TRAS track lock for the applicable thrust reverser half.

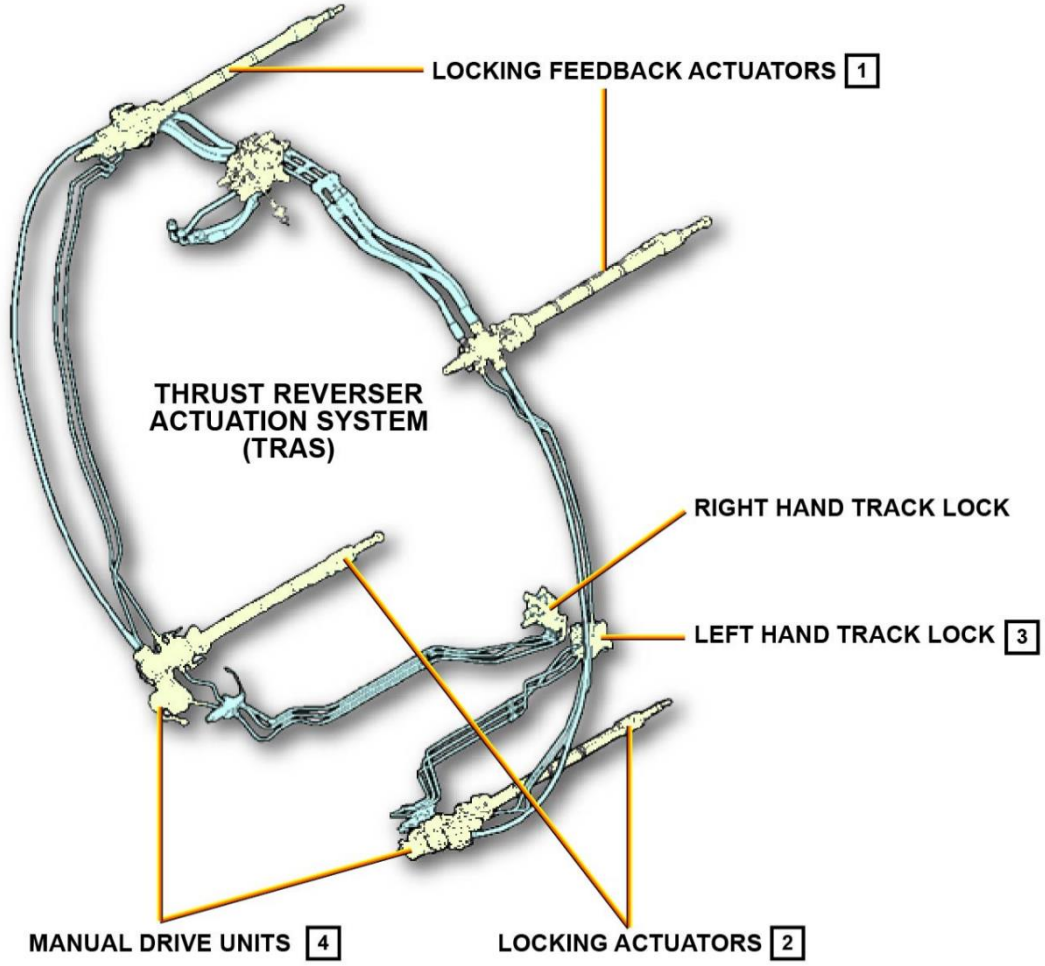
Manually extend the applicable translating sleeve by unlocking the Manual Drive Unit (MDU) and turning it with a square drive tool.

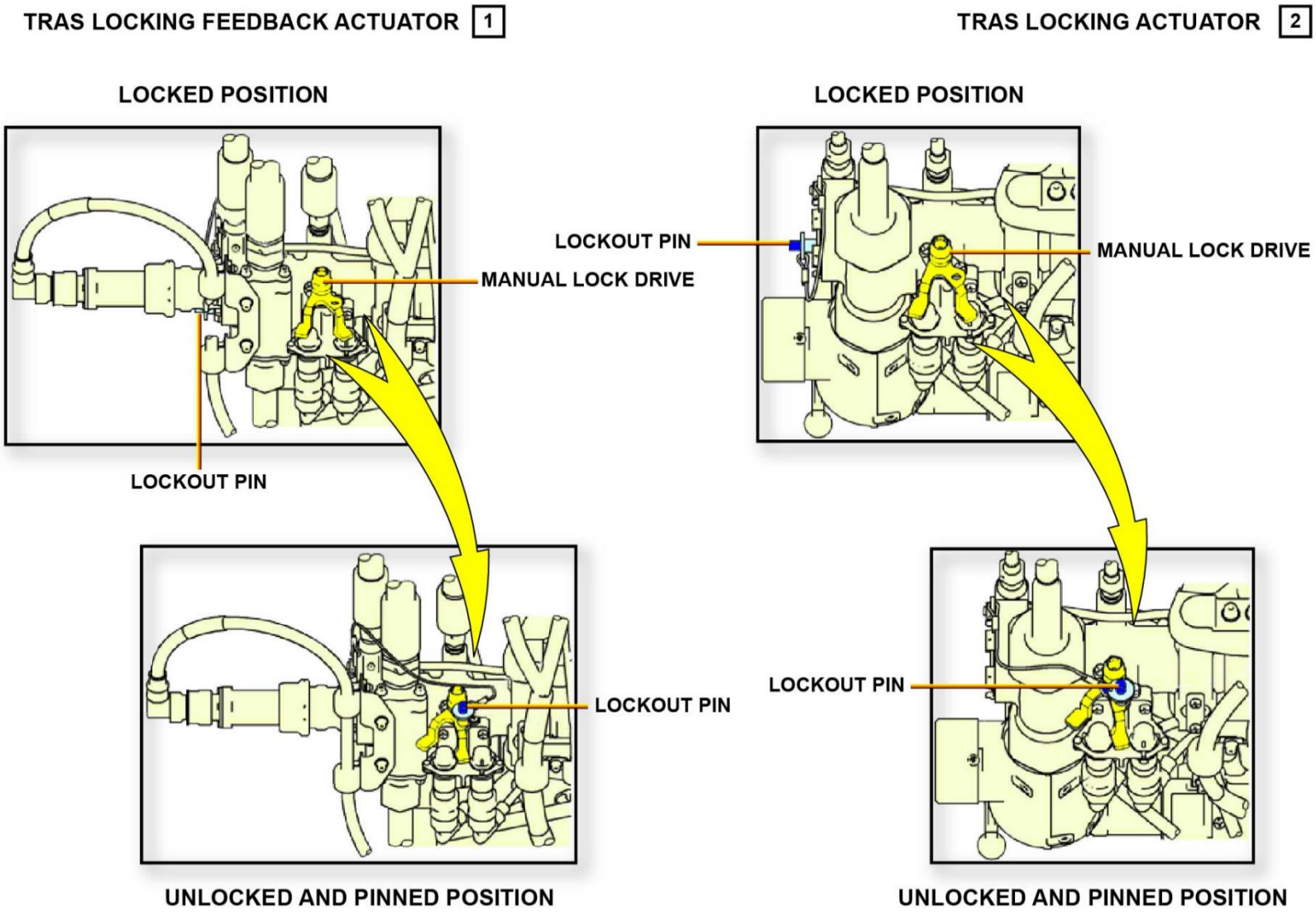
Manual retraction of the thrust reverser translating sleeves:

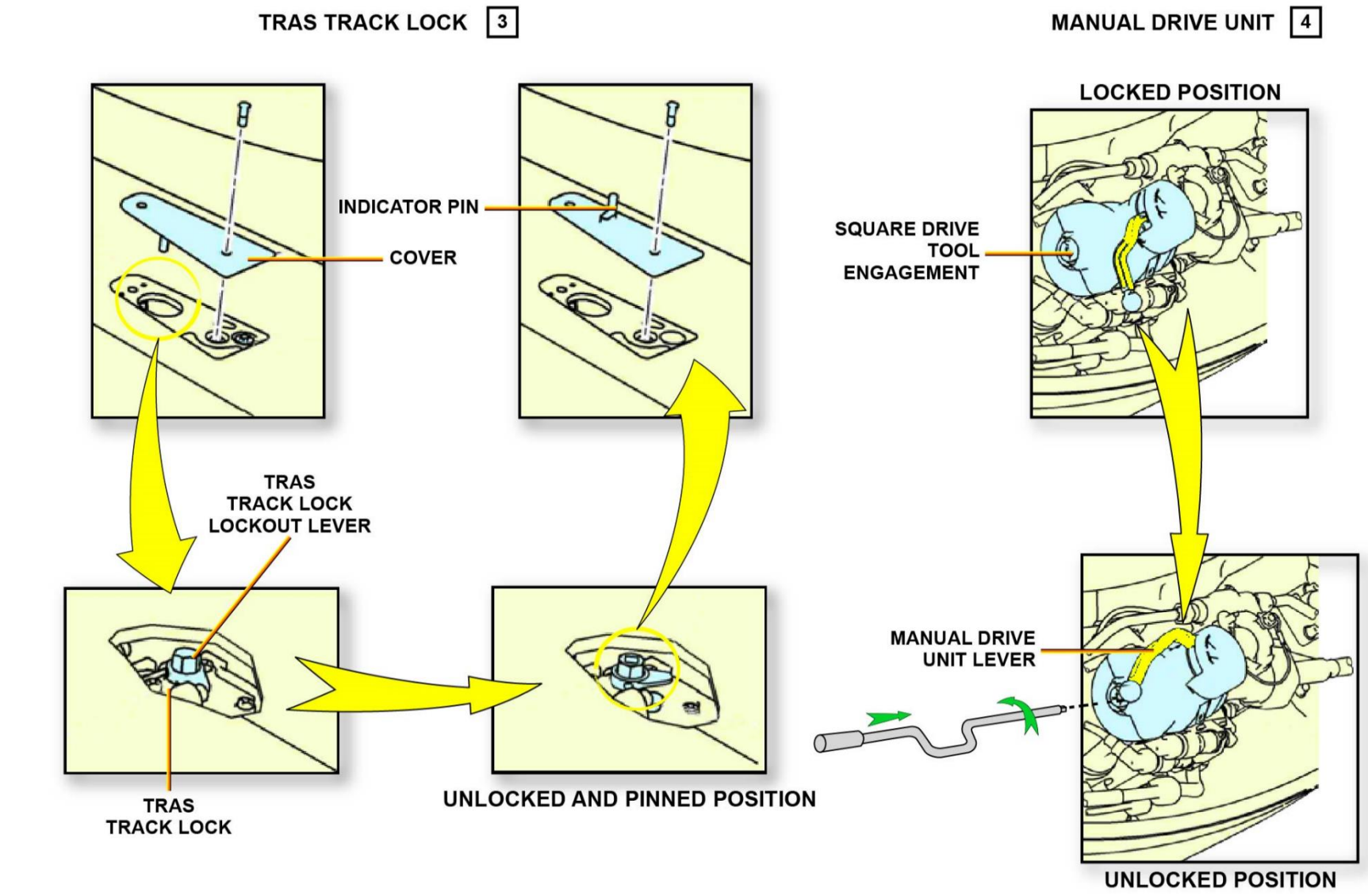
Perform the steps in the opposite order.

Do the operational test of the thrust reverser with the MCDU.

TRANSLATING SLEEVES MANUAL EXTENSION




TRAS LOCKING FEEDBACK ACTUATOR 1
LOCKED POSITION
LOCKOUT PIN
MANUAL LOCK DRIVE
LOCKOUT PIN
UNLOCKED AND PINNED POSITION
TRAS LOCKING ACTUATOR 2
LOCKED POSITION
LOCKOUT PIN
MANUAL LOCK DRIVE
LOCKOUT PIN
UNLOCKED AND PINNED POSITION


TRAS TRACK LOCK 3
INDICATOR PIN
COVER
TRAS
TRACK LOCK
LOCKOUT LEVER
TRAS
TRACK LOCK
UNLOCKED AND PINNED POSITION
MANUAL DRIVE UNIT 4
LOCKED POSITION
SQUARE DRIVE
TOOL
ENGAGEMENT
MANUAL DRIVE
UNIT LEVER
UNLOCKED POSITION

Note:

The rear rectangular panel is for the Flight Inhibition, the forward trapezium shaped panel is where the Track Lock is released for Manual operation of the Translating Sleeve during Maintenance.

Both these panels have sealant surrounding them because they are in the Fan stream, but it takes time to remove the sealant prior to removing the panels and they must be resealed after refit.


TLS
INHIBITION


TR
INHIBITION
TR
INHIBITION

POWER PLANT SYSTEM LINE MAINTENANCE

ENGINE OIL SERVICING

CAUTION: Caution: The engine should be shut down for at least 5 minutes prior to oil servicing.

This allows the residual pressure in the oil tank to decrease.

If you open the filler cap when there is pressure in the tank the hot oil can spray out and burn you.

NOTE: Note: If possible, the engine oil should be checked and serviced within 15 to 120 minutes after engine shutdown.

Note: If the engine has been shutdown for more than 2 hours, dry-motor the engine until the oil pressure is stable.

Procedure:

open engine oil service door on left fan cowl,

check oil level on the sight gage on the oil tank,

raise filler cap handle to vertical (unlocked position),

turn the oil filler cap counter-clockwise and lift to remove,

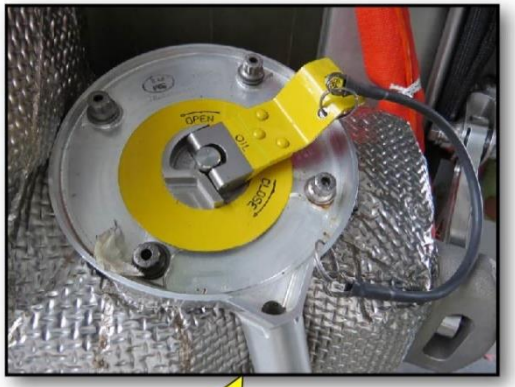
add approved oil as necessary up to the FULL mark on the sight gage,

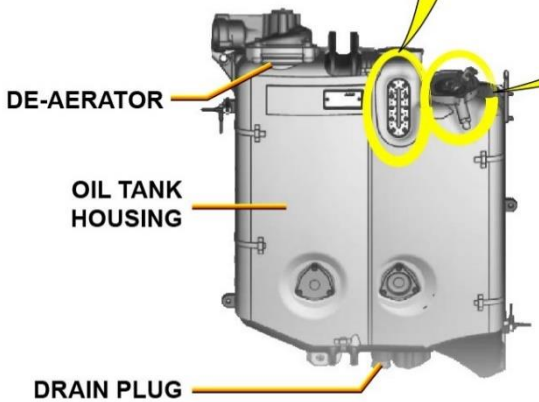
install oil filler cap - make sure to LOCK the cap.

PW1100G OIL TANK ACCESS DOOR

OIL LEVEL
SIGHT GLASS

FILLER NECK
ASSEMBLY





OIL TANK ASSEMBLY

OIL TANK CAPACITY:
39,6 quarts (37,4 liters)
FULL LEVEL:
34,9 quarts (33,1 liters)

AVOID FLUID SPILLAGE
USE APPROPRIATE STORAGE EQUIPMENT
FOR CHEMICAL PRODUCTS

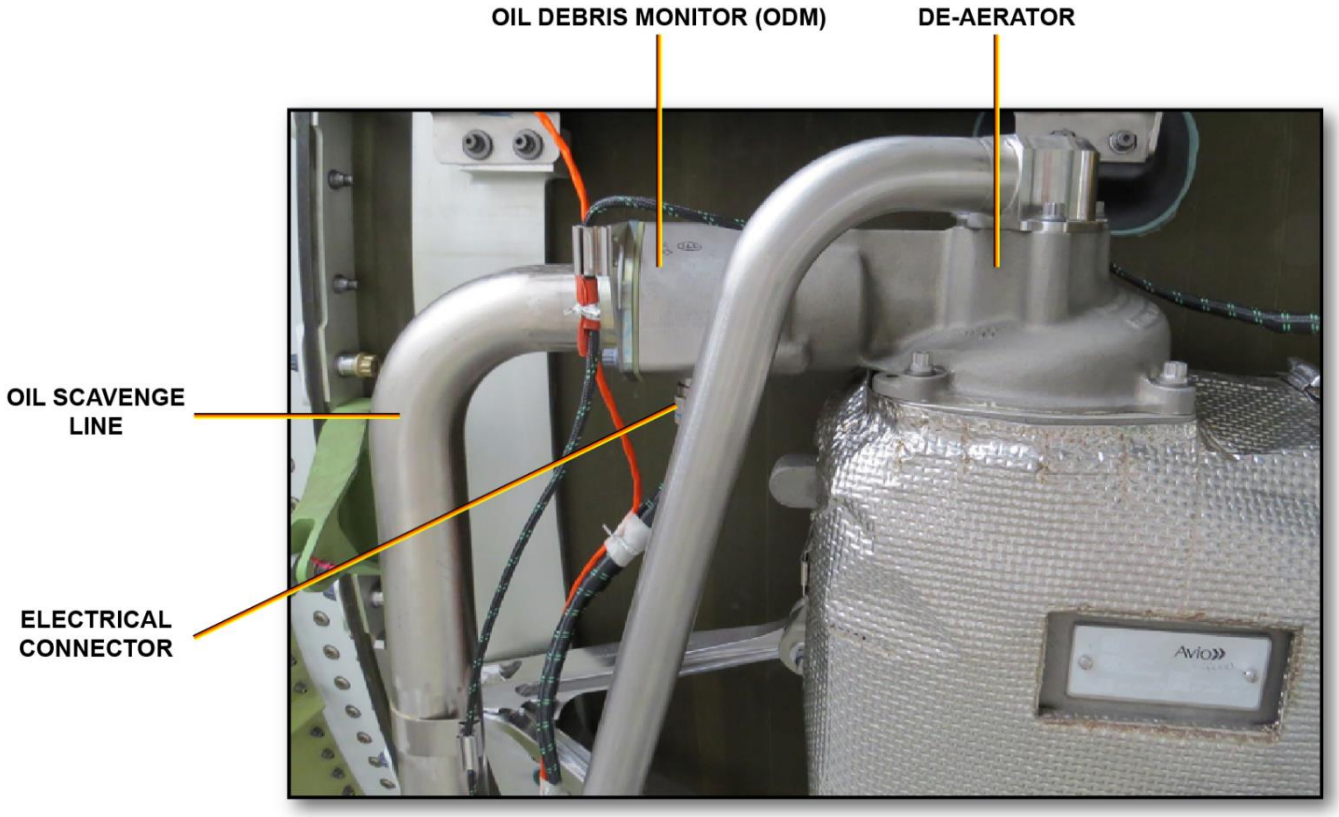
OIL DEBRIS MONITOR (ODM)

An Oil Debris Monitor (ODM) is used to sense the size and quantity of ferrous and non-ferrous metal in the scavenge oil system.

It is an in-line sensor installed between the main oil scavenge line and the de-aerator in the oil tank assembly.

When the ODM detects metallic debris in the engine lubrication system, it signals the Prognostics and Health Management Unit (PHMU) which processes to the Engine Electronic Controller (EEC); then the Engine Interface Unit (EIU) generates appropriate maintenance message.

The ODM is a Line Replaceable Unit (LRU).


OIL DEBRIS MONITOR (ODM)
DE-AERATOR
OIL SCAVENGE LINE
ELECTRICAL CONNECTOR

CHIP COLLECTORS

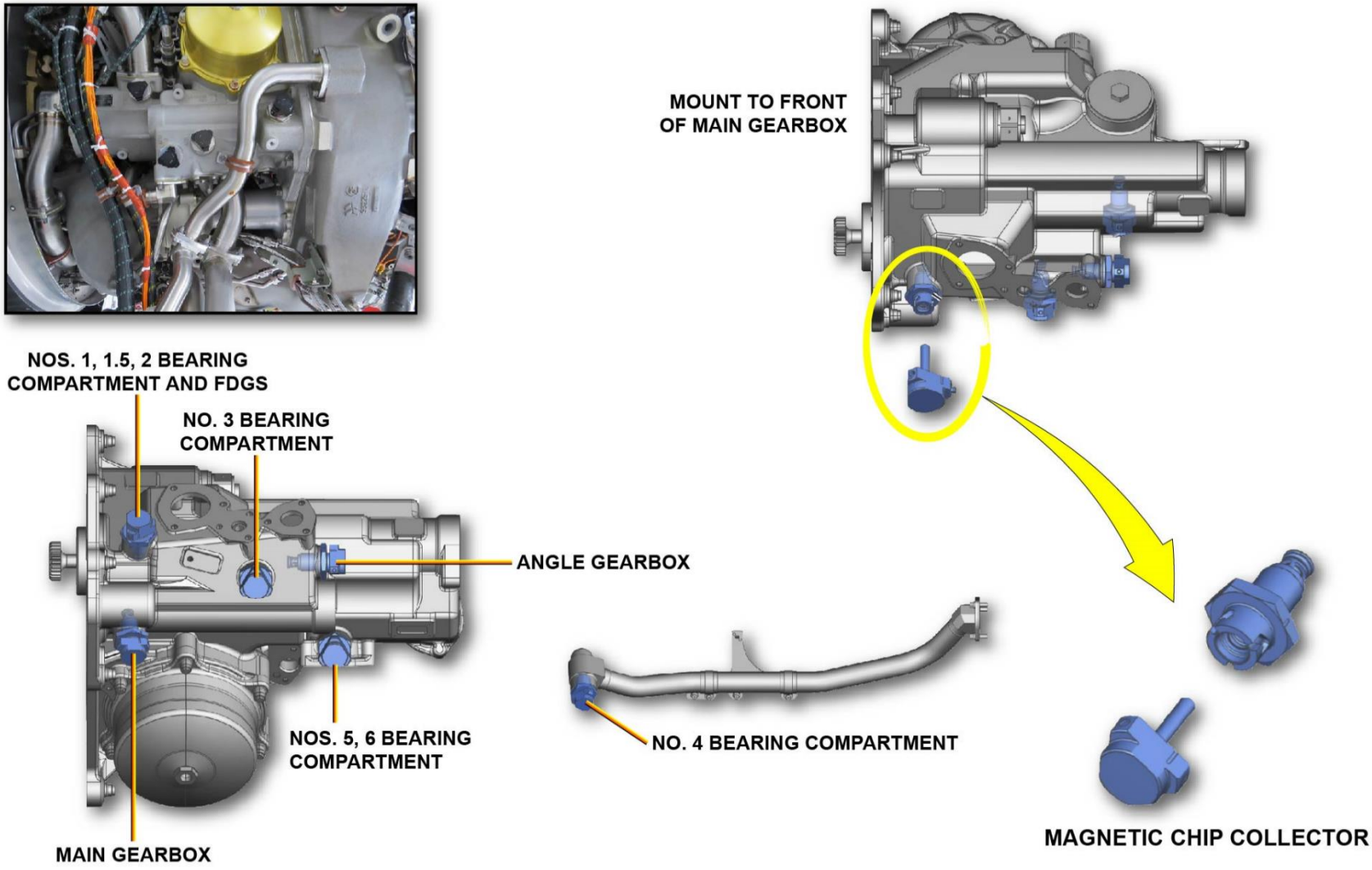
The engine oil scavenge system has six magnetic chip collectors which catch ferrous metal particles that might exist in the scavenge and supply oil:

The No. 4 bearing magnetic chip collector is in the No. 4 bearing oil scavenge line.

The Angle Gearbox (AGB), Main Gearbox (MGB), No. 1, 1.5 and 2 Bearing and Fan Drive Gear System (FDGS), No. 3 bearing, and No. 5 and 6 bearing magnetic chip collectors are located on the lubrication and scavenge oil pump, at the 6 o'clock position.

The six chip collectors are bayonet-type plugs, they are LRUs.

LUBRICATION AND SCAVENGE OIL PUMP WITH CHIP COLLECTORS



MEL / DEACTIVATION

START VALVE MANUAL OPERATION

In case of an electrical failure of the Start Air Valve (SAV), the SAV can be operated manually to start the engine.

The aircraft may be dispatched per MEL with the valve INOP closed.

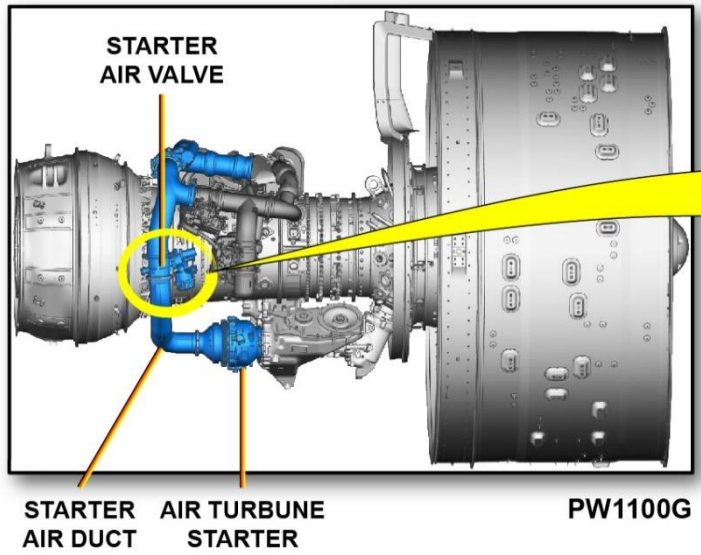
First establish the communications with the cockpit (Interphone jack on engine inlet cowl),

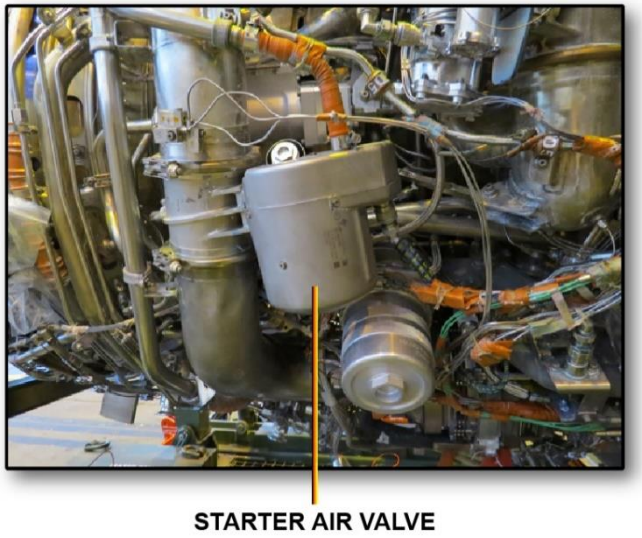
then on command from the cockpit, insert a 3/8" square drive extension into the manual wrench socket located on the RH thrust reverser inner-fixed-structure at 3 O'clock.

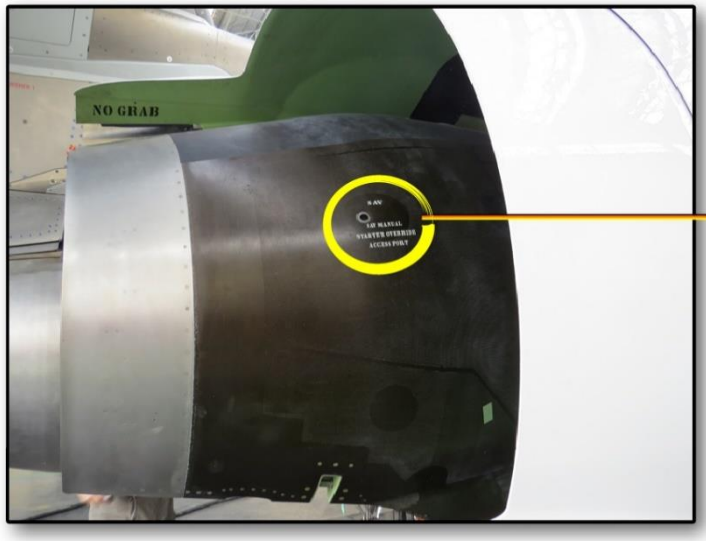
turn the valve shaft, this opens the butterfly valve.

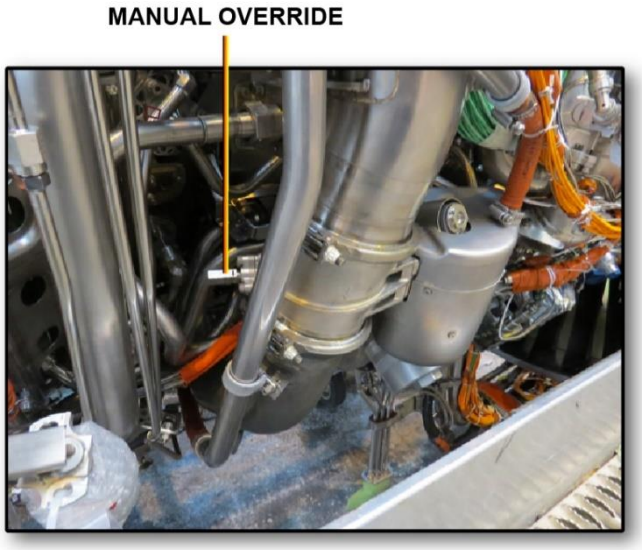
WARNING: STAY AWAY FROM THE DANGER AREAS AT THE FRONT AND THE SIDES OF THE ENGINE DURING OPERATION. THE SUCTION IS SUFFICIENT AT THE AIR INTAKE COWL TO PULL A PERSON INTO (IN PART OR FULLY) THE ENGINE. THIS CAN KILL A PERSON OR CAUSE A BAD INJURY.

The valve will close when the shaft is released. The SAV is an LRU.


STARTER
AIR VALVE
STARTER
AIR DUCT
AIR TURBUNE
STARTER
PW1100G


STARTER AIR VALVE


NO GRAB
STARTER VALVE
ACCESS PORT

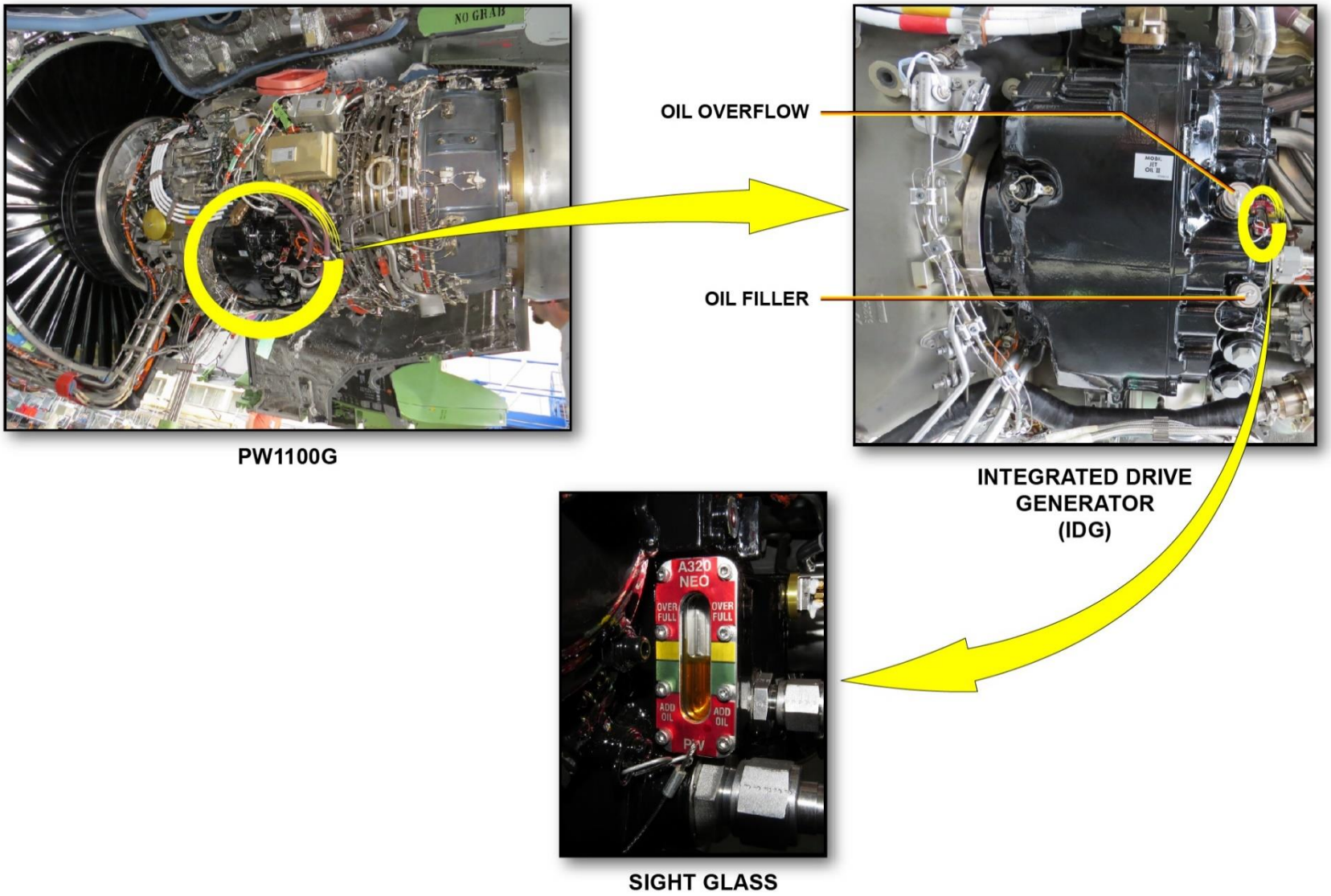

MANUAL OVERRIDE

MAINTENANCE TIPS

For IDG servicing the left thrust reverser cowl-door has to be opened as the IDG installation change to core mounted area.

The IDG has two new additional sensors (oil level sensor and oil filter DPI) providing warnings IDG OIL LVL, IDG FILTER CLOG, which permit to increase the periodic inspection interval.

Follow the General Warnings and Cautions, related Safety Data and Standard Precautions for Maintenance Procedures.



PW1100G

INTEGRATED DRIVE GENERATOR (IDG)

SIGHT GLASS

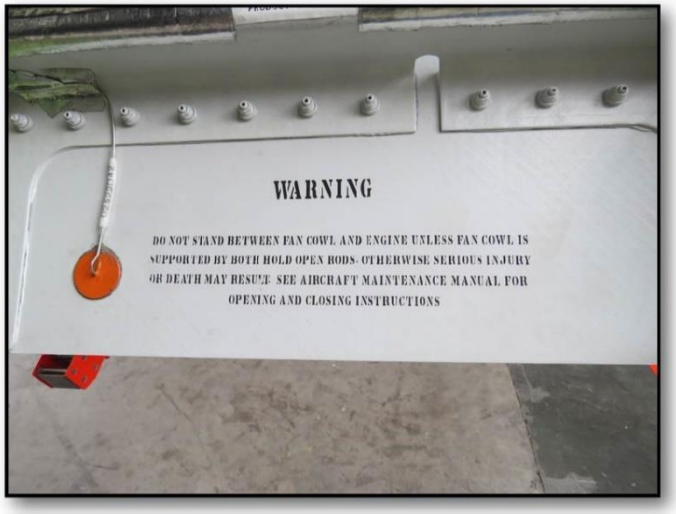
INTENTIONALLY BLANK


NO STEP


NO GRAB
PW1100G-JM
PurePower

PW1100G


WARNING
SLAT
FAN COWL FULL OPENING INSTRUCTIONS
SLATS MUST BE RETRACTED AND INHIBITED BEFORE YOU FULLY OPEN THE FAN COWL


WARNING
DO NOT STAND BETWEEN FAN COWL AND ENGINE UNLESS FAN COWL IS SUPPORTED BY BOTH HOLD OPEN RODS. OTHERWISE SERIOUS INJURY OR DEATH MAY RESULT. SEE AIRCRAFT MAINTENANCE MANUAL FOR OPENING AND CLOSING INSTRUCTIONS


CAUTION
MAKE SURE THAT THE FAN COWL DOORS ARE FULLY LATCHED WHEN CLOSED

INTENTIONALLY BLANK