CHAPTER

36

PNEUMATIC

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A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

36-EFFECTIVE PAGES

CHAPTER 36
PNEUMATIC

Subject/Page	Date	COC
36-10 TASKS (cont)		
D 298	Oct 15/2024	
D 298.1	Oct 15/2024	
D 298.2	Oct 15/2024	
D 298.3	Oct 15/2024	
D 298.4	BLANK	
36-10 TASK SUPPORT		
301	Feb 15/2013	
302	Feb 15/2013	
303	Feb 15/2013	
304	Feb 15/2013	
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R 336	Oct 15/2024	
A 337	Oct 15/2024	
A 338	Oct 15/2024	
A 339	Oct 15/2024	
A 340	Oct 15/2024	
A 341	Oct 15/2024	
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A 343	Oct 15/2024	
A 344	BLANK	

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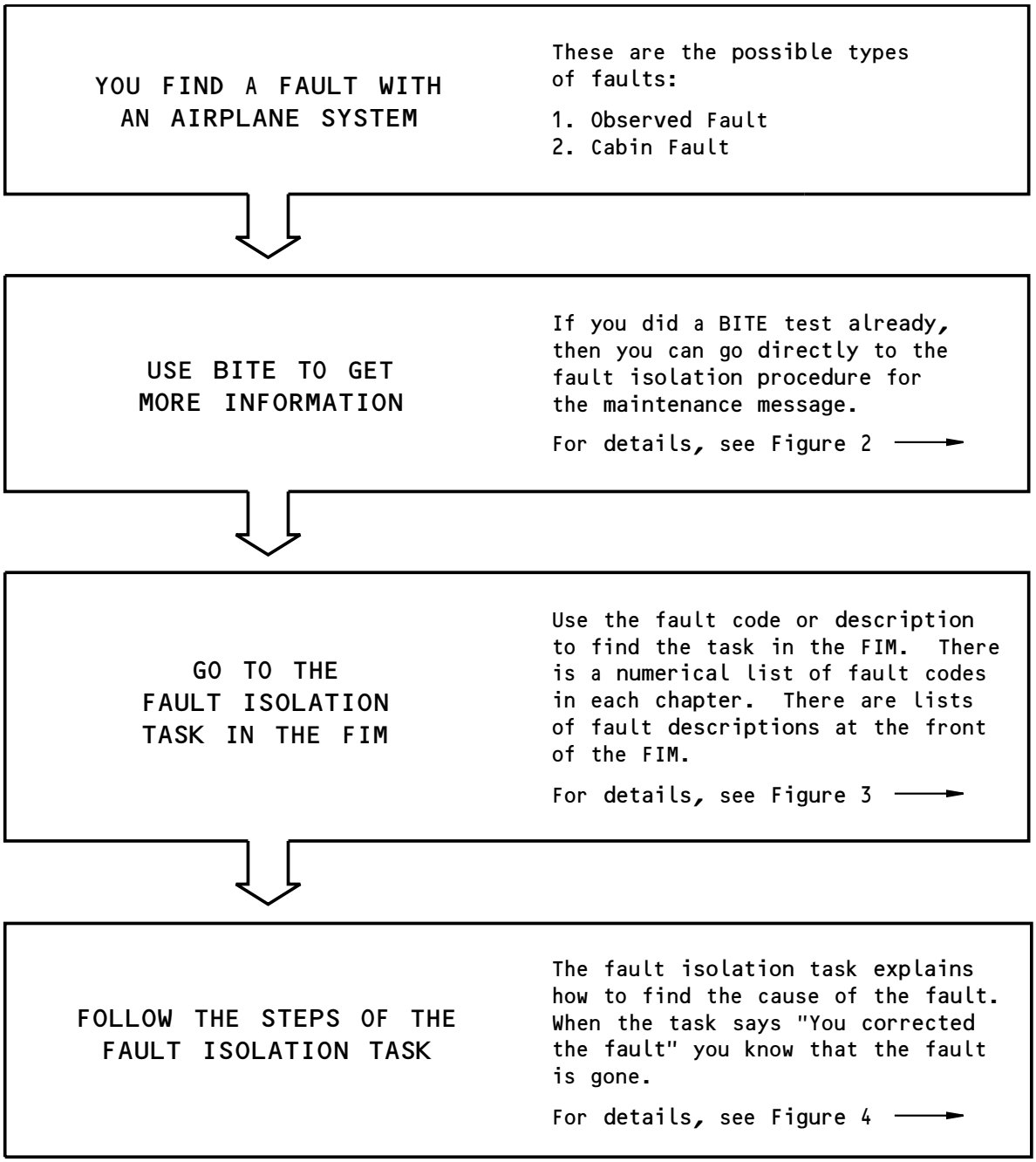
36-EFFECTIVE PAGES



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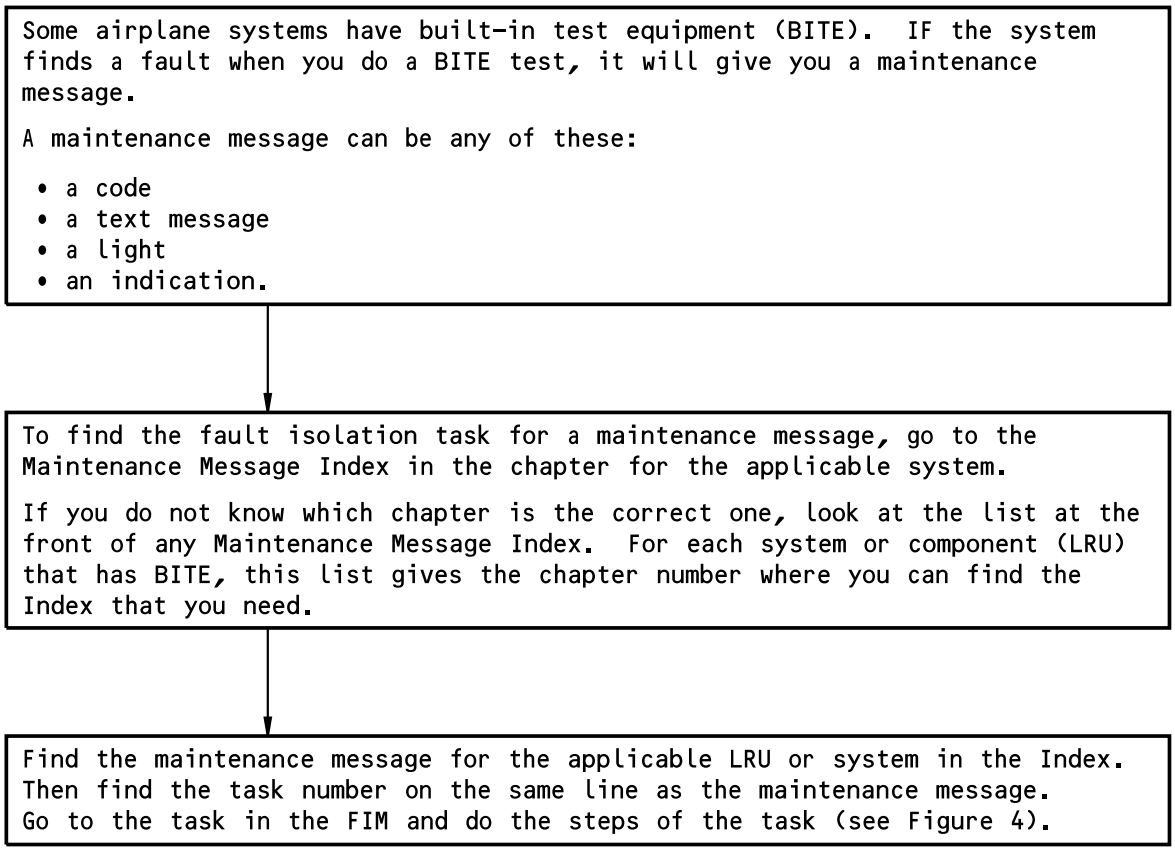
Basic Fault Isolation Process
Figure 1



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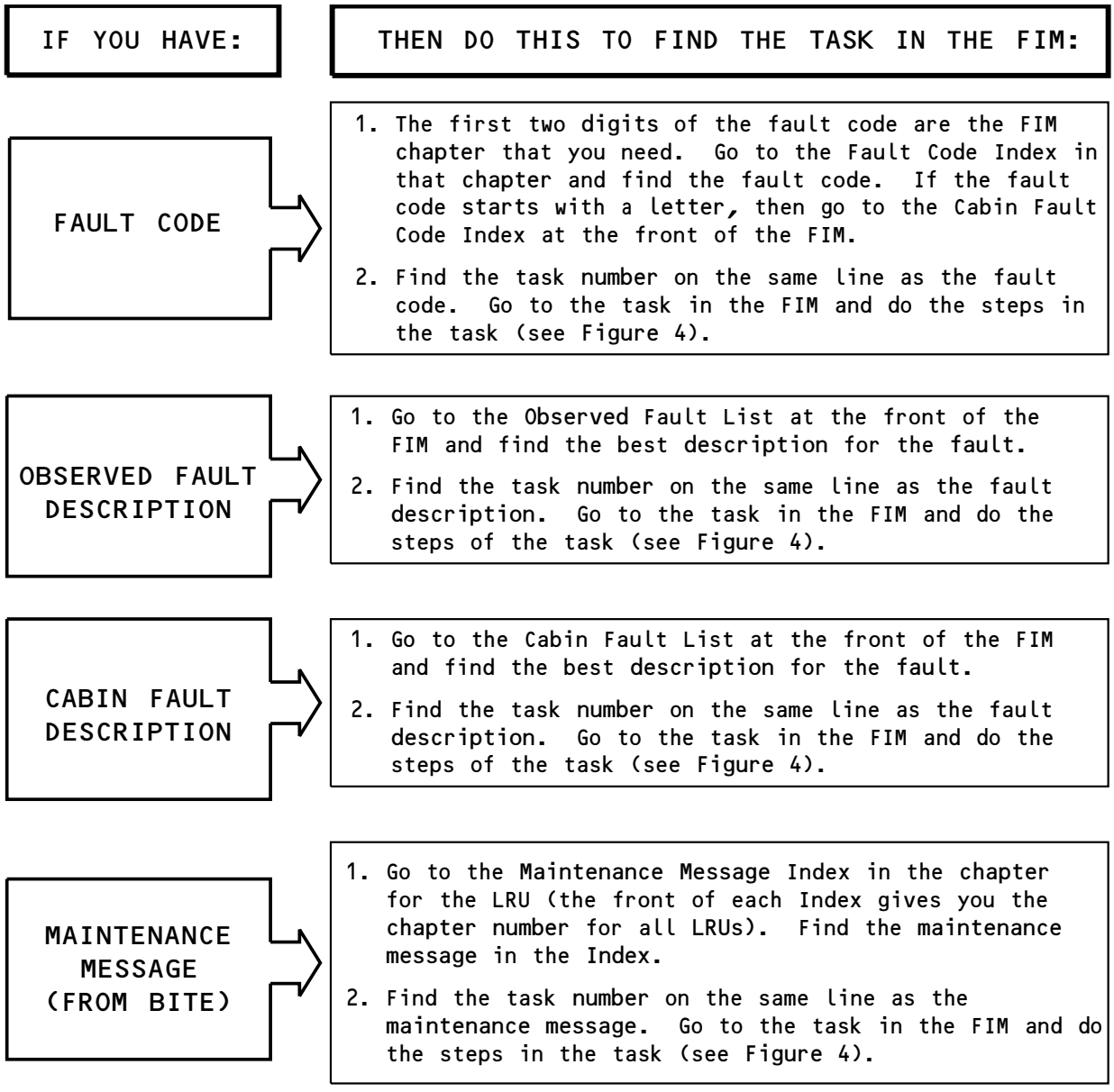
Getting Fault Information from BITE
Figure 2



G04979 S0000148579_V2

Finding the Fault Isolation Task in the FIM
Figure 3

ASSUMED CONDITIONS AT START OF TASK

- External electrical power is ON
- Hydraulic power and pneumatic power are OFF
- Engines are shut down
- No equipment in the system is deactivated

POSSIBLE CAUSES

- The list of possible causes has the most likely cause first and the least likely cause last.
- You can use the maintenance records of your airline to determine if the fault occurred before. Compare the list of possible causes to the past maintenance actions. This will help prevent repetition of the same maintenance actions.

INITIAL EVALUATION PARAGRAPH

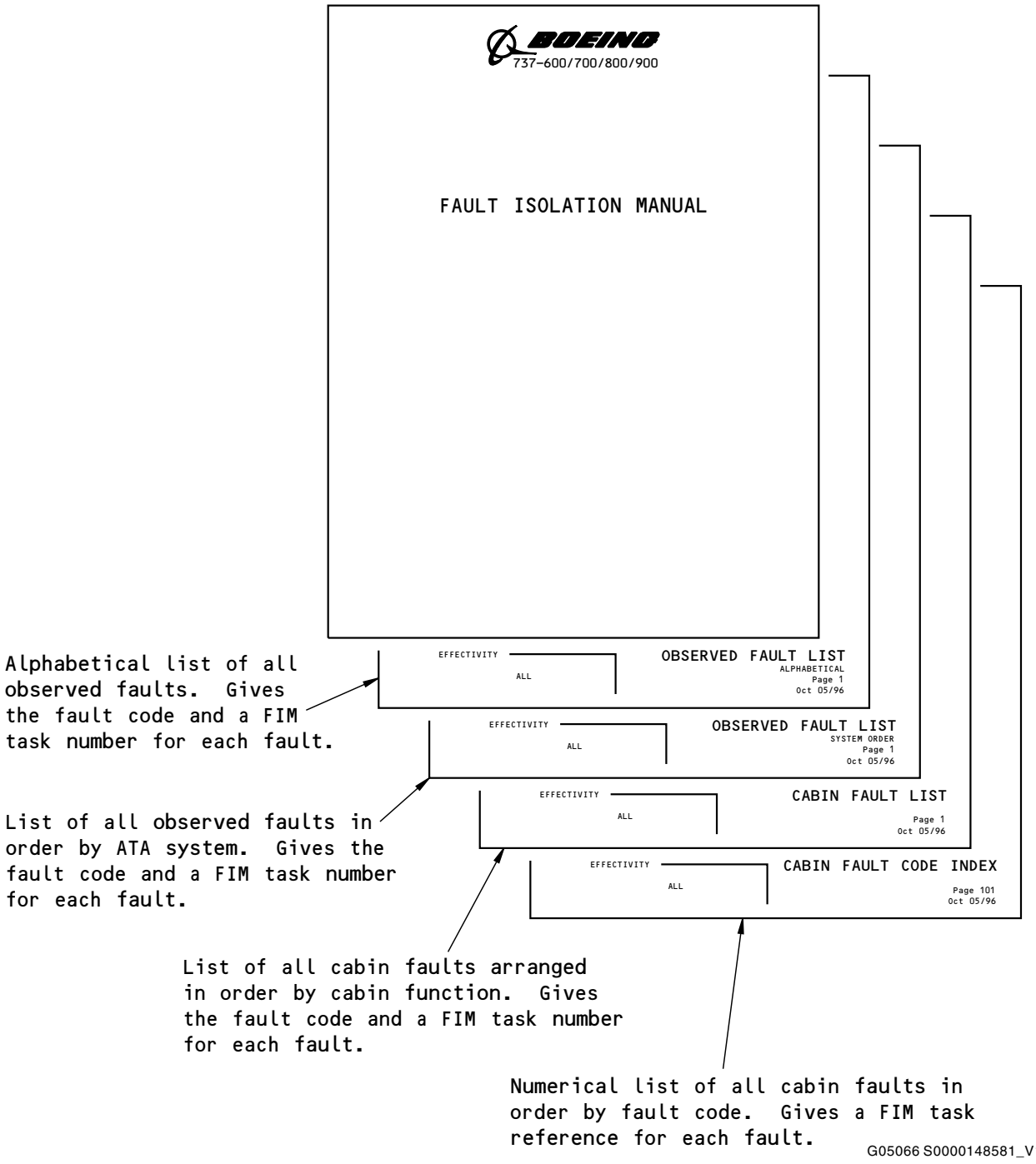
- The primary purpose of the Initial Evaluation paragraph at the start of the task is to help you find out if you can detect the fault right now:
  - If you cannot detect the fault right now, then the task cannot isolate the fault and the Initial Evaluation paragraph will say that there was an intermittent fault.
  - If you have an intermittent fault, you must use your judgement (and follow your airline's policy) to decide which maintenance action to take. Then monitor the airplane to see if the fault happens again on subsequent flights.
- The Initial Evaluation paragraph can also help you find out which Fault Isolation Procedure to use to isolate and correct the fault.

FAULT ISOLATION STEPS

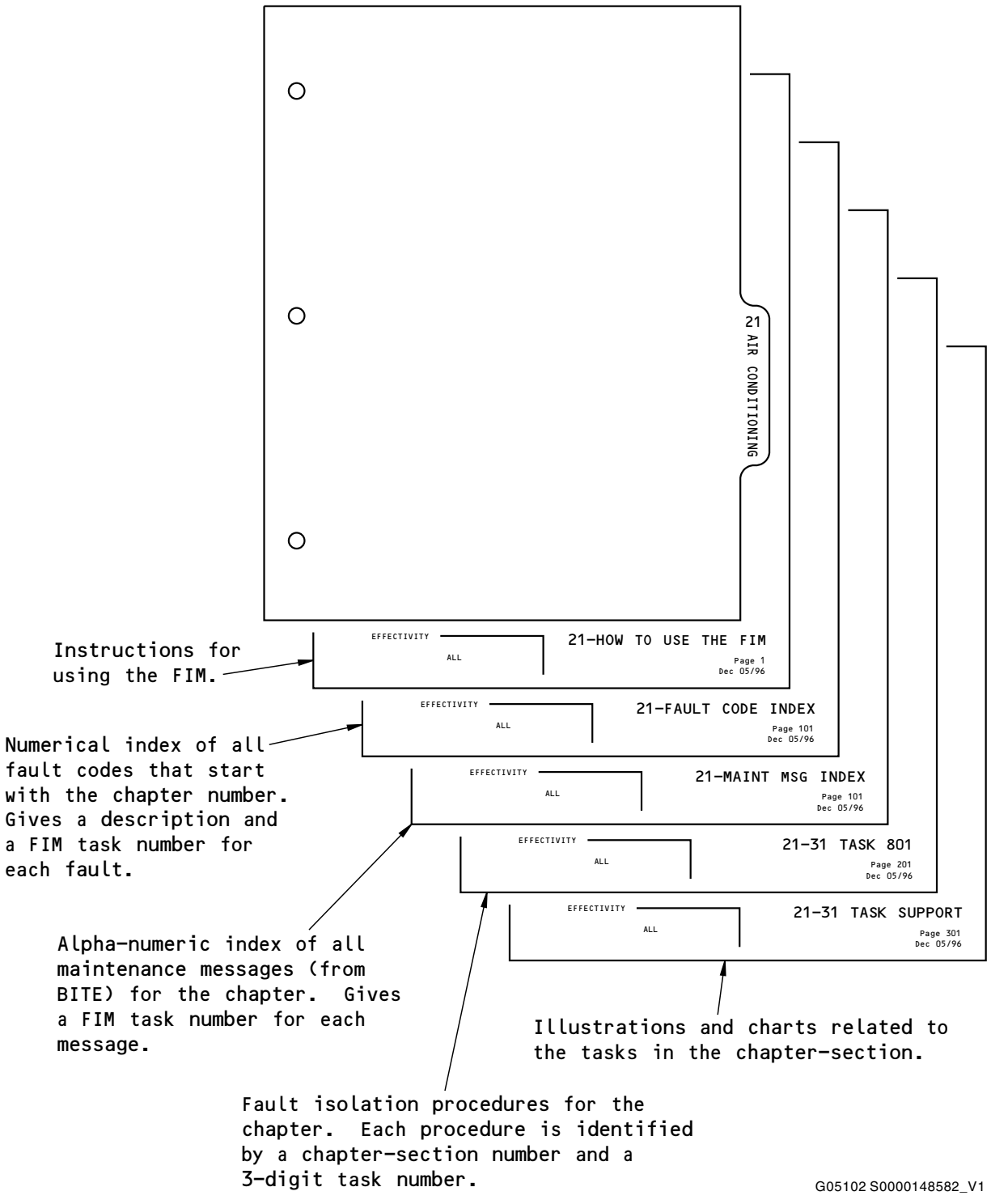
- The FIM task steps are presented in a specified order. The "If... then" statements will guide you along a logical path. But if you do not plan to follow the FIM task exactly, make sure that you read it before you start to isolate the fault. Some FIM procedures start with important steps that have an effect on the other steps in the procedure.
- When you are at the endpoint of the path, the step says "...you corrected the fault." Complete the step and exit the procedure.

G05009 S0000148580_V3

Doing the Fault Isolation Task
Figure 4



Subjects at Front of FIM
Figure 5



Subjects in Each FIM Chapter
Figure 6

FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
361 011 01	BLEED TRIP OFF Light comes ON: during takeoff - light No. 1.	36-10 TASK 809
361 011 02	BLEED TRIP OFF Light comes ON: during takeoff - light No. 2.	36-10 TASK 809
361 012 01	BLEED TRIP OFF Light comes ON: during climb - light No. 1.	36-10 TASK 809
361 012 02	BLEED TRIP OFF Light comes ON: during climb - light No. 2.	36-10 TASK 809
361 013 01	BLEED TRIP OFF Light comes ON: during cruise - light No. 1.	36-10 TASK 809
361 013 02	BLEED TRIP OFF Light comes ON: during cruise - light No. 2.	36-10 TASK 809
361 014 01	BLEED TRIP OFF Light comes ON: during idle descent - light No. 1.	36-10 TASK 809
361 014 02	BLEED TRIP OFF Light comes ON: during idle descent - light No. 2.	36-10 TASK 809
361 020 00	Bleed valve: does not close when the bleed switches are moved to off, the engine is the bleed source.	36-10 TASK 802
361 030 00	Duct Pressure Indication: high, the engine is the bleed source.	36-10 TASK 803
361 040 00	Duct Pressure Indication: low (below 18 psig) during takeoff, climb and cruise; the engine is the bleed source.	36-10 TASK 810
361 050 00	Duct Pressure Indication: Zero, the engine is the bleed source.	Reference Not Currently Available
361 060 00	Isolation valve: does not operate correctly.	36-10 TASK 806
361 070 00	Duct Pressure Indication: L and R pointers not the same (split), with either pointer below 18 psig during takeoff, climb and cruise; the engine is the bleed source.	36-10 TASK 807
361 080 00	Duct Pressure Indication: L and R pointers not the same (split), the APU is the bleed source.	36-10 TASK 808

802. Bleed Valve Will Not Close When the Bleed Switches Are Moved to Off, the Engine Is the Bleed Source - Fault Isolation

A. Description

(1) (SDS SUBJECT 36-11-00)

(2) This condition may be shown when the pressure indication on the Dual Duct Pressure Indicator does not decrease to less than 10 psi (68.9 kPa) with the engines as the bleed source and with the engine bleed switches in the OFF position.

(3) The MW0311 harness with part numbers 325-029-901-0 and 325-029-902-0 can have internal shorting which can cause the circuit breaker that powers the solenoid on the Bleed Air Regulator, M1180 to trip and, subsequently, not allow the PRSOV to close. This internal shorting may not be a constant condition. However, if the circuit breaker is found tripped and has been found tripped in the past, it is possible that there is an intermittent short in the harness. If this is the case, the MW0311 harness should be considered a likely source of the fault and it should be thoroughly examined to determine if it should be replaced.

NOTE: CFM International Service Bulletin 72-0262 provides instructions to rework the harness part numbers listed above to a serviceable condition.

B. Possible Causes

(1) Electrical Harness, MW0311

(a) Failure Mode: Open or shorted wiring

NOTE: CFM56-7b Service Bulletin 72-0262 reworks this harness.

(2) Circuit Breakers

(a) Failure Mode: Failed open

(3) Air Conditioning Module, P5-10

(a) Failure Mode: Internal open or shorted circuit

(4) Engine/APU Fire Control Panel, P8-1

(a) Failure Mode: Internal open or shorted circuit

(5) Air Conditioning Accessory Unit, M324

(a) Failure Mode: Internal short or open

SHZ 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-899, 901-999

(6) Air Conditioning Accessory Unit, M1455

NOTE: Only 737-800 and 737-900 airplanes have the M1455 ACAU.

(a) Failure Mode: Internal short or open

SHZ ALL

(7) Aircraft Wiring

(a) Failure Mode: Failed open or short circuit

(8) Pressure Regulator and Shutoff Valve (PRSOV)

(a) Failure Mode: Failed open

(9) Bleed Air Regulator, M1180

(a) Failure Mode: Open or shorted coil

(10) Indication System

C. Circuit Breakers

(1) These are the primary circuit breakers related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

D. Related Data

(1) Component Location (36-10 TASK SUPPORT Figure 301)

(2) Troubleshooting Check (36-10 TASK SUPPORT Figure 307)

(3) Pneumatic System Control Valve Position Indicators (36-10 TASK SUPPORT Figure 311)

(4) SSM 36-11-11

(5) WDM 36-21-11

E. Initial Evaluation

(1) Make sure that these circuit breakers have not tripped:

(a) These are the circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(b) If one or both of the circuit breakers have tripped, do these steps:

1) Remove the electrical power. This is the task: Remove Electrical Power, AMM TASK 24-22-00-860-812.

WARNING

DO NOT HOLD THE CIRCUIT BREAKER IN THE RESET POSITION. IF YOU HOLD THE CIRCUIT BREAKER IN THE RESET POSITION WHEN A WIRING FAULT IS PRESENT, THE CIRCUIT BREAKER WILL NOT BE ABLE TO TRIP AGAIN. FAILURE TO RESET AND RELEASE THE CIRCUIT BREAKER QUICKLY CAN RESULT IN A FIRE, EXTENSIVE DAMAGE TO WIRING, AND INJURY TO PERSONS.

2) Quickly reset the circuit breaker and release it.

3) Supply the electrical power. This is the task: Supply Electrical Power, AMM TASK 24-22-00-860-811.

(c) If the circuit breaker trips again, proceed to the Fault Isolation Procedure.

(d) If the circuit breaker was reset successfully, then continue with the Initial Evaluation.

1) If the circuit breaker trips again in the steps that follow, make a record of the position that the engine bleed switch was in as it may be useful later on.

(e) If the circuit breaker(s) has not tripped, then continue.

(2) Remove the pressure from the pneumatic system. This is the task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(3) Make sure that the Manifold Pressure Pointer on the Dual Duct Pressure Indicator for the applicable system indicates less than 2 psi (13.8 kPa) with no pneumatic source available.

(a) If the indicated pressure on the Dual Duct Pressure Indicator is 2 psi (13.8 kPa) or greater, then do the Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation Procedure (36-10 TASK 808)

(b) If the indicated pressure on the Dual Duct Pressure Indicator is less than 2 psi (13.8 kPa), continue.

(c) Supply pressure to the pneumatic system with the APU. This is the task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(d) Make sure that the pneumatic pressure increases to a minimum of 12 psi (82.7 kPa) with no user systems in operation and the L and R pointers on the Dual Duct Pressure Indicator are within 3 psi (20.7 kPa) of each other when the ISOLATION VALVE switch is set to OPEN.

1) If the pneumatic pressure does not increase to a minimum of 12 psi (82.7 kPa) with the APU BLEED switch on or if there is a difference (split) in the L and R pointers on the Dual Duct Pressure Indicator that is greater than 3 psi (20.7 kPa), then do the Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation Procedure (36-10 TASK 808).

2) If the pneumatic pressure indication is a minimum of 12 psi (82.7 kPa) with no user systems in operation and the L and R pointers on the Dual Duct Pressure Indicator are within 3 psi (20.7 kPa) of each other, then continue.

(4) Supply pneumatic pressure with the engine on the side with the problem. This is the task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804

(5) Set these Pneumatic Control Switches to the position shown:

(a) APU BLEED to OFF

(b) ISOLATION VALVE to CLOSE

(6) If applicable, remove any external pneumatic source.

(7) Do these steps to do a check of the operation of the engine BLEED switch/PRSOV:

NOTE: The engine BLEED switch will be cycled in these steps to make sure that there are no intermittent malfunctions in the system operation.

(a) Set the applicable engine BLEED 1 or 2 switch to the OFF position.

(b) Make sure that the Pointer for the applicable system on the Dual Duct Pressure Indicator decreases to less than 10 psi (68.9 kPa).

(c) Set the applicable engine BLEED switch to the ON position.

(d) Make sure that the Manifold Pressure Pointer for the applicable system increases to 10 psi (68.9 kPa) –25 psi (172.4 kPa) with the engine at steady idle without user systems in operation.

NOTE: The duct pressure Pointers on the Dual Duct Pressure Indicator may fluctuate without user systems in operation.

(e) Set the applicable engine BLEED switch to the OFF position

(f) Make sure that the applicable Pointer on the Dual Duct Pressure Indicator decreases to less than 10 psi (68.9 kPa).

(8) If the Pressure Pointer decreases to less than 10 psi (68.9 kPa) when the applicable engine BLEED switch is moved to the OFF position, then there was an intermittent fault.

(a) Use your judgement, airline policy, and the aircraft's pneumatic system history to decide if you will take action to correct the fault.

(b) Stop the engine. This is the task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.

(c) Remove Pressure from the Pneumatic System. This is the task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(9) If the manifold pressure either does not decrease to less than 10 psi (68.9 kPa) when the applicable BLEED switch is moved to the OFF position or intermittently decreases to less than 10 psi when the applicable BLEED switch is moved to the OFF position, perform the Fault Isolation Procedure.

F. Fault Isolation Procedure

(1) Do these steps to prepare for Fault Isolation Procedure:

(a) Make sure that there is no pressure in the pneumatic system. This is the task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(b) Make sure the fuel shutoff lever for the applicable engine is in the cutoff position and install DO-NOT-OPERATE tags.

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE THRUST REVERSER (FOR GROUND MAINTENANCE) AND OPEN THE FAN COWL PANEL. FAILURE TO OBEY THE ABOVE SEQUENCE MAY RESULT IN INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) Retract the Leading Edge Flaps and Slats if not previously accomplished. This is the task: Leading Edge Flaps and Slats Retraction, AMM TASK 27-81-00-860-804.

(d) Deactivate the Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats Deactivation, AMM TASK 27-81-00-040-801.

(e) Deactivate the applicable thrust reverser. This is the task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.

(f) Open the applicable thrust reverser. This is the task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.

(2) Do these steps to do a check of the PRSOV:

NOTE: This step makes sure that the valve has not stuck in an open position.

(a) Look at these circuit breakers to see if they are tripped:

1) These are the circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(b) If the applicable circuit breaker has not tripped, then do these steps:

1) Make sure that the applicable engine BLEED switch is set to OFF.

2) Look at the position indicator on the PRSOV.

3) If the PRSOV is not in the fully closed position, then replace the PRSOV. These are the tasks:

- PRSOV Removal, AMM TASK 36-11-04-000-801
- PRSOV Installation, AMM TASK 36-11-04-400-801

a) Do the Repair Confirmation at the end of this task.

4) If the PRSOV is in the fully closed position, then continue.

(c) If the applicable circuit breaker has tripped, then continue to the check of the Engine Harness, MW0311 .

NOTE: The MW0311 Engine Harness may have a short that trips the circuit breaker.

(3) Do this check for 28V DC to the Bleed Air Regulator, M1180:

(a) Open these circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(b) Disconnect connector DP1102 from the applicable Bleed Air Regulator, M1180.

(c) Close these circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(d) Make sure that the applicable engine BLEED switch is set to OFF.

(e) Measure the voltage between pins 7 and 6 of connector DP1102.

1) If there is 22-30V DC between pins 7 and 6 of connector DP1102, measure the resistance between pins 7 and 6 of the connector on the Bleed Air Regulator, M1180.

a) If the resistance between pins 7 and 6 of the Bleed Air Regulator electrical connector is not between 20-40 ohms, replace the Bleed Air Regulator, M1180. To replace the regulator, these are the tasks:

- Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
- Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801

b) Do the Repair Confirmation at the end of this task.

c) If the resistance between pins 7 and 6 of the Bleed Air Regulator electrical connector is between 20-40 Ohms, then continue.

2) If there is not 22-30V DC between pins 7 and 6 of connector DP1102, do a check of the wiring between connector DP1102, pin 6 and the ground (WDM 36-11-11).

**BLEED AIR
REGULATOR
DP1102**
pin 6 . . . . . GROUND

b) Repair any problems that you find.

c) Do the Repair Confirmation at the end of this task.

d) If the ground does not have any problems, then continue.

(4) Do this check to make sure there is 28V DC at the Engine Harness, MW0311:

(a) Open these circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(b) Disconnect connector DP1104 from connector D30204 (D30404) at the engine firewall disconnect, as applicable.

(c) Close these circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(d) Make sure that there is 22-30V DC between pins 12 and 11 of connector D30204 (D30404).

1) If there is not 22-30V DC between pins 12 and 11 of connector D30204 (D30404), then proceed to the Open Electrical Circuit - Fault Isolation Procedure.

2) If there is 22-30V DC between pins 12 and 11 of connector D30204 (D30404), then continue.

(5) Do these steps to do a check of the Engine Harness, MW0311 :

NOTE: MW0311 Engine Harnesses with part numbers 325-029-901-0 or 325-029-902-0 are susceptible to internal shorting which can cause the bleed air valve circuit breaker to trip and prevent the PRSOV from closing. This type of failure is not always a hard fault (always present). Therefore, if you find that the applicable circuit breaker has tripped or if it has tripped in the past, it is quite possible there is an intermittent short in the harness. A thorough check of the harness must be accomplished to determine if the harness must be replaced.

NOTE: A multimeter is required to perform the electrical checks in this procedure. If there is an intermittent short or the fault is not present at any point in the Fault Isolation Procedure, you will need to use a megohmmeter instead of the multimeter to perform a more thorough check of the electrical circuit.

(a) If not already done, disconnect connector DP1104 at the firewall disconnect.

(b) Do a visual examination of the Engine Harness, MW0311 for worn areas, deformed areas, loose or damaged connectors, and damaged pins and sockets:

1) If there is obvious damage to the harness that could cause a short or open circuit, then replace the harness. These are the tasks:
   - 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
   - 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00

   a) Do the Repair Confirmation at the end of this task.

2) If there is no obvious damage to the harness, then continue.

(c) Examine these circuits of the Engine Harness, MW0311 for continuity:

DP1102	DP1104
pin 7	pin 12
pin 6	pin 11
pin 5	pin 3
pin 10	pin 10
pin 9	pin 2

1) If any of the circuits fail the continuity check, then replace the Engine Harness, MW0311. These are the tasks:
   - 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
   - 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00

   a) Do the Repair Confirmation at the end of this task.

2) If there is continuity in all of the circuits, then continue.

(d) If the applicable circuit breaker C796 (C797) was tripped or has a history of tripping, do these steps:

1) Disconnect the applicable connectors DP1103 from the Ground WTAI Temperature Solenoid valve and DP1101 from the Fan Frame Compressor Case Vibration sensor.

CAUTION MAKE SURE THAT YOU USE STANDARD WIRING MAINTENANCE PRACTICES WHEN YOU DO THE MEG CHECK. IF YOU DO NOT OBEY, DAMAGE TO EQUIPMENT CAN OCCUR.

2) Use a megohmmeter to examine the Engine Harness, MW0311 circuits listed below for internal shorts:

DP1104	DP1104
pin 12	pin 1
pin 12	pin 2
pin 12	pin 5
pin 12	pin 10
pin 12	pin 11
pin 12	pin 14
pin 3	pin 1
pin 3	pin 2
pin 3	pin 5
pin 3	pin 10
pin 3	pin 11
pin 3	pin 12
pin 3	pin 14

3) Use a megohmmeter to do a check of pins 5, 7 and 10 of connector DP1102 to the connector backshell.

4) If any of the checks with the megohmmeter failed, replace the engine harness, MW0311. These are the tasks:

- 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
- 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00

a) Do the Repair Confirmation at the end of this task.

5) If the checks with the megohmmeter are satisfactory, then continue.

6) If the circuit breaker continues to trip open, use WDM 36-11-11 to perform additional checks for the source of the ground fault.

G. Open Electrical Circuit - Fault Isolation Procedure

(1) Do the steps that follow to do a check for an open circuit:

NOTE: These steps examine the electrical circuitry between the circuit breaker and the engine firewall connector.

(a) Lower the Forward Overhead Panel, P5 to get access to the back of the P5-10 panel:

1) Disconnect connector D646 (D680).

(b) Do a continuity check between pin 18 (15) of connector D646 (D680) and pin 12 of connector D30204 (D30404).

1) If there is no continuity, repair the problems that you find (WDM 36-11-11).

a) Do the Repair Confirmation at the end of this task.

2) If there is continuity, then continue.

(c) Do a continuity check between pins 18 and 33 of connector D646 (pins 15 and 14 of connector D680) on the P5-10 air conditioning panel as follows:

1) Make sure the applicable engine BLEED switch is set to the OFF position.

2) If there is no continuity, then replace the Air Conditioning Panel, P5-10. These are the tasks:

- Air Conditioning Module Removal, AMM TASK 21-51-65-000-801
- Air Conditioning Module Installation, AMM TASK 21-51-65-400-801

3) Do the Repair Confirmation at the end of this task.

4) If there is continuity, then continue.

(d) Do this check for 28V DC at pin 33 (14) of connector D646 (D680) on the ship's wiring:

1) Make sure the OVHT DET switches on the Fire Control Panel, P8-1, are in the NORMAL position.

2) Make sure there is 22-30V DC present at pin 33 (14) of connector D646 (D680).

3) If there is not 22-30V DC present at pin 33 (14) of connector D646 (D680), then repair the circuit problems you find (WDM 36-11-11).

a) Do the Repair Confirmation at the end of this task.

H. Repair Confirmation

(1) Re-install all components that were removed.

(a) Make sure that the installation test or operational test for each component installed has been accomplished.

1) If the appropriate test has not already been accomplished, perform the test.

(2) Re-connect all connectors that were disconnected.

(3) Reinstall all access panels that were removed.

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Close the left thrust reverser. This is the task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.

(5) Close the Fan Cowl Panels. This is the task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

(6) Activate Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats - Activation, AMM TASK 27-81-00-440-801.

(7) Do this procedure: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.

(8) Make sure that the pressure indication on the Dual Duct Pressure Indicator is less than 2.0 psi (13.8 kPa).

(9) Supply pressure to the pneumatic system with the engine on the applicable side. This is the task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.

(10) Set these pneumatic system control switches to the positions shown:

(a) APU BLEED switch to OFF

(b) ISOLATION VALVE switch to CLOSE

(11) If applicable, remove any external pneumatic source.

(12) Do these steps to do a check of the operation of the engine BLEED switch/PRSOV:

NOTE: The engine BLEED switch will be cycled in these steps to make sure that there are no intermittent malfunctions in the system operation.

(a) Set the applicable engine BLEED 1 or 2 switch to the OFF position.

(b) Make sure that the Pointer for the applicable system on the Dual Duct Pressure Indicator decreases to less than 10 psi (68.9 kPa).

(c) Set the applicable engine BLEED switch to the ON position.

(d) Make sure that the Manifold Pressure Pointer for the applicable system increases to 10 psi (68.9 kPa) - 25 psi (172.4 kPa) with the engine at steady idle without user systems in operation.

NOTE: The Duct Pressure Pointers on the Dual Duct Pressure Indicator may fluctuate without user systems in operation.

(e) Set the applicable engine BLEED switch to the OFF position

(f) Make sure that the applicable pointer on the Dual Duct Pressure Indicator decreases to less than 10 psi (68.9 kPa).

(13) If the Manifold Pressure Pointer decreases to less than 10.0 psi (68.9 kPa) when the applicable engine bleed switch is set to OFF, then you corrected the fault.

(a) Do these steps to complete the task:

1) Do the Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.

2) Remove Pressure from the Pneumatic System. This is the task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(14) If the Repair Confirmation is unsatisfactory, return to the step in the Fault Isolation Procedure that you were at prior to performing the Repair Confirmation and continue the fault isolation procedure with these constraints:

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE LEADING EDGE FLAPS AND SLATS, DEACTIVATE THE THRUST REVERSER (FOR GROUND MAINTENANCE) AND OPEN THE FAN COWL PANEL. FAILURE TO OBEY THE ABOVE SEQUENCE MAY RESULT IN INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Retract the Leading Edge Flaps and Slats.

(b) Deactivate the Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats Deactivation, AMM TASK 27-81-00-040-801.

(c) Deactivate the applicable thrust reverser. This is the task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.

(d) Open the applicable thrust reverser. This is the task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.

END OF TASK

803. Duct Pressure High, the Engine is the Bleed Source - Fault Isolation

A. Description

(1) (SDS SUBJECT 36-11-00, SDS SUBJECT 36-12-00)

(2) A high duct pressure condition is a condition in which one or both pointers on the dual duct pressure indicator are higher than 50 psi, with the engines as the bleed source when operating on regulated 5th stage pressure in a stabilized condition. If you have a pilot report or an observed fault and you know the bleed pressure, engine N1 speed, and the altitude at the time the fault was observed, you can determine if the system was operating within limits. If you have this information, use the information in Figure 305, Duct Pressure Versus N1 at Various Altitudes, to determine if the duct pressure was within the operating limits. If you do not have this information, you must perform a high power engine run during the Initial Evaluation to obtain that information.

B. Possible Causes

(1) Pressure regulator and shutoff valve (PRSOV)

(a) Failure Mode: sticking

(2) Bleed air regulator, M1180

(a) Failure Mode: Incorrect regulation

(3) Leak in the downstream pressure sense line or fittings(36-10 TASK SUPPORT Figure 307)

NOTE: The downstream pressure sense line runs between the high stage regulator and the bleed air outlet side of the precooler. There is also a line from the PRSOV that is connected by a tee fitting to the downstream pressure sense line.

(a) Failure Mode:

1) The downstream pressure sense line is also connected to the high stage regulator. A leak anywhere in that sense line tubing or sense line fittings can cause a high duct pressure condition. This includes the line to the high stage regulator.

(4) Wiring

(a) Failure Mode: Indication circuit wiring problem

(5) Duct pressure transducer, T405 (Left) or T403 (Right)

(a) Failure Mode: Out-of-tolerance or faulty transducer

(6) Dual duct pressure indicator, N12

(a) Failure Mode: Out-of-tolerance or faulty indicator

C. Circuit Breakers

(1) These are the primary circuit breakers related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

D. Related Data

(1) Component Location (36-10 TASK SUPPORT Figure 301)

(2) Component Location (36-10 TASK SUPPORT Figure 302)

(3) Troubleshooting Check (36-10 TASK SUPPORT Figure 307)

(4) (36-10 TASK SUPPORT Figure 305), Duct Pressure Versus N1 at Sea Level and 5000 feet

(5) (36-10 TASK SUPPORT Figure 305), Duct Pressure Versus N1 at Sea Level, 10K feet, 22K feet, 31K feet, 37K feet and 41K feet

(6) (36-10 TASK SUPPORT Figure 311), Pneumatic System Control Valve Position Indicators

(7) (SSM 36-11-11)

(8) (WDM 36-21-11)

E. Initial Evaluation

(1) If you have a pilot report or an observed fault and you know the bleed pressure, engine N1 speed and the altitude at the time the fault was observed, then use the "Duct Pressure versus N1 at Sea level and 5000 feet" graph or the "Duct Pressure versus N1 at Sea Level, 10K feet, 22K feet, 31K feet, 37K feet and 41K feet" graph to determine if one or both engine pneumatic systems have High Duct Pressure.

(2) If you determine that one or both systems have High Duct Pressure, perform the Fault Isolation Procedure.

(3) If you determine that the Duct Pressure for both systems are within limits, then no further action is necessary.

(a) Review the aircraft's pneumatic system history to see if there have been reports of high duct pressure in the past. If there have been reports of high duct pressure in the past, you should perform the Fault Isolation Procedure. If not, you should monitor the aircraft's pneumatic system on subsequent flights.

(4) If you do not have the necessary information to use the graphs to determine if the duct pressure was high, then continue with the Initial Evaluation Procedure.

(5) Supply pressure to the pneumatic system using the APU. To supply pressure, do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(a) Make sure that the ISOLATION VALVE switch is set to OPEN.

(b) Make sure that these conditions occur:

1) The pressure on the dual duct pressure indicator increases to a minimum of 12 psi

2) The duct pressure pointers are within 3 psi of each other.

3) If the duct pressure pointers are not within 3 psi of each other, then do the Fault Isolation below before you proceed.

a) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

4) If the indicated pressures are satisfactory, then continue.

NOTE: The subsequent steps of this Initial Evaluation procedure are very similar to the Repair Confirmation procedure. Both procedures involve a high power engine run to either confirm a fault exists or confirm that you have corrected the fault. Therefore, if you suspect that a fault or faults with the bleed system exist, you may proceed to the Fault Isolation procedure without completing the Initial Evaluation procedure to save time. To complete the Initial Evaluation procedure will only prolong the length of time required to return the aircraft to service by performing the high power engine run twice, getting the pneumatic system components very hot and needing more time to allow the components to cool down before working on them. However, if you suspect that there are no faults, then continue.

(6) Supply pressure to the pneumatic system with the engine with the reported high bleed pressure or both engines if you suspect a problem with both systems. To supply pressure, do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.

(a) Position the APU BLEED switch to OFF and remove any external pneumatic source, if applicable.

(b) Set the ISOLATION VALVE switch on the P5-10 forward overhead panel to CLOSE.

(c) Make sure that the duct pressure pointer for the applicable system(s) indicates between 10-25 psi.

NOTE: The duct pressure pointer on the dual duct pressure indicator may fluctuate without any user system in operation.

CAUTION

DO NOT EXCEED THE ENGINE OPERATION LIMITS. FAILURE TO COMPLY WITH THE ENGINE OPERATION LIMITS COULD RESULT IN ENGINE DAMAGE.

(7) Do not exceed the engine operation limits in the next step. To operate the engine within limits, do this task: Engine Operation Limits, AMM TASK 71-00-00-800-806-F00.

(8) Slowly increase N1 to 80% or greater and make sure that the duct pressure follows the "Duct Pressure versus N1 at Sea Level and 5000 feet" graph as the N1 speed increases.

(9) Examine the dual duct pressure indicator, N12, on the P5-10 panel.

(10) Make sure that the dual duct pressure pointers are not higher than 50 psi.

(11) If the duct pressure pointers on one or both sides are higher than 50 psi, then do the Fault Isolation Procedure below.

(12) If the duct pressure pointers on both sides are not greater than 50 psi, then there was an intermittent fault and no further action is required.

(13) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.

(14) Set the ISOLATION VALVE switch on the P5-10 panel to AUTO.

(15) Remove pressure from the pneumatic system. To remove pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

F. Fault Isolation Procedure

(1) Do these steps to check the sense lines and fittings for leakage:

(a) Remove the pressure from the pneumatic system. To remove pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(b) Make sure that the applicable engine bleed switch is in the OFF position.

(c) Make sure the fuel shutoff lever for the applicable engine is in the cutoff position and install DO-NOT-OPERATE tags.

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSER: RETRACT THE LEADING EDGE, DEACTIVATE THE LEADING EDGE, DEACTIVATE THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(d) Retract the leading edge flaps and slats if not previously accomplished.

(e) Deactivate the Leading Edge Flaps and Slats:

1) Do this task: Leading Edge Flaps and Slats Deactivation, AMM TASK 27-81-00-040-801.

(f) Deactivate the applicable thrust reverser:

1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.

(g) Open the applicable thrust reverser:

1) Do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.

(h) Supply pressure to the pneumatic system with the APU or a ground air source. To supply pressure, do this task: Supply Pressure to the Pneumatic System (Selection), AMM TASK 36-00-00-860-801.

(i) Use a soap solution to detect any leakage in the sense line tubing and sense line fittings from the high stage regulator and the sense line tubing and fittings from the PRSOV that connect together and run to the downstream sense port on the precooler.

NOTE: A leak in the downstream sense line or sense line fitting to the PRSOV can cause the PRSOV to regulate high and cause a high duct pressure condition. Leakage in other sense lines and fittings should be repaired even though the leakage will not cause a high duct pressure condition.

(j) Make sure that there are no leakages.

(k) If you find leakage, then do these steps:

1) Remove the pressure from the pneumatic system. To remove pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

2) Repair the leakages found.

3) Do the Repair Confirmation at the end of this task.

(l) If you do not find any leakage, then continue.

(2) Do this check of the PRSOV for correct operation.

(a) Remove the pressure from the pneumatic system. To remove pressure, (AMM TASK 36-00-00-860-806).

(b) Look at the position indicator on the PRSOV.

(c) If the PRSOV is not completely closed, then replace it:

1) These are the tasks:

- PRSOV Removal, AMM TASK 36-11-04-000-801
- PRSOV Installation, AMM TASK 36-11-04-400-801

2) Do the Repair Confirmation at the end of this task.

(d) If the PRSOV is completely closed, do the steps that follow:

1) Use a wrench on the manual override nut to open the valve.

2) Remove the wrench and make sure that the PRSOV closes smoothly.

3) If the PRSOV does not move to the open and closed position smoothly, then replace the PRSOV:

a) These are the tasks:

- PRSOV Removal, AMM TASK 36-11-04-000-801
- PRSOV Installation, AMM TASK 36-11-04-400-801

b) Do the Repair Confirmation at the end of this task.

4) If the PRSOV moves to the open and closed position smoothly, then continue.

(3) Do these tests of the bleed air regulator control pressure:

(a) Disconnect the bleed air supply line at the inlet to the tee at the supply pressure sense line to the bleed air regulator.

(b) Connect a nitrogen pressure source, pressure regulator, supply pressure gage (Ps) and test hose at the tee to the supply pressure sense line (36-10 TASK SUPPORT Figure 307, View A).

NOTE: The test equipment used in this or subsequent steps is part of P/N C36001-44 Engine Bleed Air System Test Equipment listed in the 737 Illustrated Tool and Equipment List (ITEL). Equivalent test equipment to that specified in P/N C36001-44 can also be used.

(c) Disconnect the control pressure sense line fom the PRSOV (36-10 TASK SUPPORT Figure 307, View B).

(d) Install a 30 psi control pressure gage (Pc) between the flex line and the PRSOV.

1) If you use an equivalent control pressure gage to the one specified in P/N C36001-44, make sure that the indication increments are no greater than 0.2 psi and that the gage accuracy is +/- 0.5% full scale.

(e) Set the applicable engine bleed switch on the P5-10 panel to the ON position.

(f) Adjust the regulator on the nitrogen pressure source, STD-1455 to provide 230–250 psi (16–17 Bar or 1600-1700 kPa) to the pressure regulator, STD-1454.

(g) Slowly increase Ps to 60-70 psig.

(h) Make sure that Pc is between 20-28 psig.

(i) If Pc is between 20-28 psig, then do these steps:

1) Replace the PRSOV. These are the tasks:

- PRSOV Removal, AMM TASK 36-11-04-000-801
- PRSOV Installation, AMM TASK 36-11-04-400-801

2) Do the Repair Confirmation at the end of this task.

(j) If Pc is not between 20-28 psig, then do these steps:

1) Replace the bleed air regulator. These are the tasks:

- Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
- Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801

2) Do the Repair Confirmation at the end of this task.

G. Repair Confirmation

(1) Remove all pressure gages, associated test equipment and hardware.

(2) Re-connect all sense lines that were disconnected.

(a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect the sense lines.

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) For the left thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.

(4) Activate the applicable thrust reverser:

(a) Do this task: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.

(5) Close the fan cowl panels, do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

(6) Reactivate the Leading Edge Flaps and Slats, do this task: Leading Edge Flaps and Slats - Activation, AMM TASK 27-81-00-440-801.

——— END OF TASK ———

806. Isolation Valve Does Not Open or Close Properly - Fault Isolation

A. Description

(1) (SDS SUBJECT 36-13-00)

(2) The isolation valve is controlled by a three-position switch on the P5-10 panel. The switch is also electrically connected through these four switches: engine No. 1 bleed switch, engine No. 2 bleed switch, left pack switch and right pack switch.

(a) If the isolation valve switch is in the AUTO position with the Engine No. 1 and No. 2 bleed switches in the ON position and the left and right pack switches in the AUTO or HIGH position, the isolation valve will close.

(b) However, if the isolation valve switch is in the AUTO position with one or more of these four switches in the OFF position: Engine No. 1 bleed switch, Engine No. 2 bleed switch, left pack switch or right pack switch, the isolation valve will open.

(c) The other two positions (OPEN and CLOSE) function as a conventional switch regardless of the pack and engine bleed switch positions.

(d) APU bleed air or bleed air from an external ground air source may be used to determine if the operation of the isolation valve is correct. The APU connects to the pneumatic manifold on the left side of the isolation valve. An external ground air source connects to the pneumatic manifold on the right side of the isolation valve. Therefore if the isolation valve is closed, the side of the pneumatic manfifold that will be pressurized depends upon the source of the pneumatic pressure.

B. Possible Causes

(1) Bleed air isolation valve, V16

(a) Failure Mode: open or shorted motor windings, a failed limit switch, a valve in a locked position

(2) Air conditioning module, P5-10

(a) Failure Mode: failure of air conditioning pack switch(s), engine bleed switch(s), isolation valve switch, or internal wiring

(3) Wiring

(a) Failure Mode: Open or short in wiring

C. Circuit Breakers

(1) This is the primary circuit breaker related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN

D. Related Data

(1) Component Location (36-10 TASK SUPPORT Figure 303)

(2) Troubleshooting Check (36-10 TASK SUPPORT Figure 310)

(3) (SSM 36-11-11)

(4) (WDM 36-11-11)

E. Initial Evaluation

(1) Supply pressure to the pneumatic system with the APU or an external ground air source with one of the procedures listed below:

(a) Do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(b) Do this task: Supply Pressure to the Pneumatic System with an External Ground Air Source, AMM TASK 36-00-00-860-802.

(2) Set the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.

(3) If the APU is used to pressure the pneumatic system, then make sure the L and R pointers on the dual duct pressure indicator show a minimum of 12 psi.

(4) If an external ground air source is used to pressure the pneumatic system, then make sure the L and R pointers on the dual duct pressure indicator indicate the same pressure as the external ground air source indicates.

(5) If you do not have either the APU or an external ground air source available, examine the valve position indicator on the isolation valve, V16, to make sure that it is at OPEN.

(6) Set the ISOLATION VALVE switch to the CLOSE position.

(7) If the APU is being used to pressure the pneumatic system, then make sure the R pointer on the dual duct pressure indicator decreases to 0 (+/-2) psi.

(a) If the R pointer on the dual duct pressure indicator does not decrease to 0 (+/-2) psi, then do the Fault Isolation procedure.

(b) If the R pointer on the dual duct pressure indicator does decrease to 0 (+/-2) psi, then continue.

(8) If an external ground air source is being used to pressure the pneumatic system, then make sure the L pointer on the dual duct pressure indicator decreases to 0 (+/-2) psi.

(a) If the L pointer on the dual duct pressure indicator does not decrease to 0 (+/-2) psi, then do the Fault Isolation procedure.

(b) If the L pointer on the dual duct pressure indicator does decrease to 0 (+/-2) psi, then continue.

(9) Set the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.

(10) If the APU is being used to pressure the pneumatic system, then make sure the L and R pointers on the dual duct pressure indicator indicate a minimum of 12 psi and the pointers are within 3 psi of each other.

(a) If the R pointer does not increase, then do the Fault Isolation procedure.

(b) If the duct pressure pointers differ by more than 3 psi, visually examine the position indicator on the valve to make sure that it is fully open.

1) If the valve is open and the duct pressure pointers differ by more than 3 psi, do this fault isolation:

a) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

(c) If the L and R pointers on the dual duct pressure indicator indicate a minimum of 12 psi and the pointers are within 3 psi of each other, then continue.

(11) If an external ground air source is being used to pressure the pneumatic system, then make sure the L and R pointers on the dual duct pressure indicator indicate the same pressure as the external ground air source and the pointers are within 3 psi of each other.

(a) If the L pointer does not increase, then do the Fault Isolation procedure.

(b) If the duct pressure pointers differ by more than 3 psi, visually examine the position indicator on the valve to make sure that it is fully open.

1) If the valve is open and the duct pressure pointers differ by more than 3 psi, do this fault isolation:

a) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

(c) If the L and R pointers on the dual duct pressure indicator indicate the same pressure as the external ground air source and the pointers are within 3 psi of each other, then continue.

(12) If you do not have either APU or an external ground air source available, visually examine the position indicator on the isolation valve to make sure it shows the valve is open.

(a) If the valve is not open, then do the Fault Isolation procedure.

(b) If the position indicator shows that the valve is open, then continue.

(13) Set the ISOLATION VALVE switch on the P5-10 panel to the AUTO position.

(14) Make sure that both the L and R duct pressure pointers on the dual duct pressure indicator on the P5-10 panel indicate a minimum of 12 psi and the indications are within 3 psi of each other.

(a) If the L and R pointers do not indicate within 3 psi of each other, then do the fault isolation that follows:

1) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

(b) If the L and R pointers are within 3 psi of each other, then continue.

(15) If you are using the APU to pressurize the pneumatic system, set the BLEED 1, BLEED 2, L PACK and R PACK switches on the P5-10 panel to the positions listed below for configurations 1-6 and check the L and R duct pressures for each configuration:

Table 201

CONFIG.	L BLEED	R BLEED	L PACK	R PACK	L DUCT	R DUCT
1	ON	ON	ON	ON	PSI	NO PSI
2	OFF	ON	ON	ON	PSI	PSI
3	ON	OFF	ON	ON	PSI	PSI
4	ON	ON	OFF	ON	PSI	PSI
5	ON	ON	ON	ON	PSI	NO PSI
6	ON	ON	ON	OFF	PSI	PSI

(a) Make sure the left and right duct pressure indications are correct for each configuration.

(b) If the duct pressure indications are not correct for each configuration, then replace the P5-10 panel. These are the tasks:

- Air Conditioning Module Removal, AMM TASK 21-51-65-000-801
- Air Conditioning Module Installation, AMM TASK 21-51-65-400-801

(c) Do the Repair Confirmation at the end of this task.

(16) If you are using an external ground air source to pressurize the pneumatic system, set the BLEED 1, BLEED 2, L PACK and R PACK switches on the P5-10 panel to the positions listed below for configurations 1-6 and check the L and R duct pressures for each configuration:

Table 202

CONFIG.	L BLEED	R BLEED	L PACK	R PACK	L DUCT	R DUCT
1	ON	ON	ON	ON	NO PSI	PSI
2	OFF	ON	ON	ON	PSI	PSI
3	ON	OFF	ON	ON	PSI	PSI
4	ON	ON	OFF	ON	PSI	PSI
5	ON	ON	ON	OFF	PSI	PSI
6	ON	ON	ON	ON	NO PSI	PSI

(a) Make sure the left and right duct pressure indications are correct for each configuration.

(b) If the duct pressure indications are not correct for each configuration, then replace the P5-10 panel. These are the tasks:

- Air Conditioning Module Removal, AMM TASK 21-51-65-000-801

- Air Conditioning Module Installation, AMM TASK 21-51-65-400-801

(c) Do the Repair Confirmation at the end of this task.

(17) If the isolation valve operates correctly, then there may have been an intermittent fault.

(a) No further action is required other than to complete this Initial Evaluation.

(18) Remove the pressure from the pneumatic system as follows:

(a) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(19) As applicable, install any access panels that were removed for the Initial Evaluation.

(20) Close the following, or any other access doors that were opened for this Initial Evaluation:

(a) Close this access panel:

Number	Name/Location
192CL	ECS Access Door

F. Fault Isolation Procedure

(1) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(2) Set the ISOLATION VALVE switch in the position applicable to one of the steps that follow:

(a) If the valve will not move to the open position when commanded, set the ISOLATION VALVE switch to the OPEN position.

(b) If the valve will not move to the closed position when commanded, set the ISOLATION VALVE switch to the CLOSE position.

(3) Do this check for power to the bleed air isolation valve:

(a) Open this circuit breaker:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN

(b) Disconnect the connector D398 at the bleed air isolation valve, V16.

(c) Close this circuit breaker:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN

(d) Do a check for 115V AC between pins 1 and 3 (ground) of connector D398 if the ISOLATION VALVE switch is set to the OPEN position or between pins 2 and 3 (ground) of connector D398 if the ISOLATION VALVE switch is set to the CLOSE position.

1) If 115V AC is present between pins 1 and 3 or between pins 2 and 3, as applicable, then replace the isolation valve. These are the tasks:

- Bleed Air Isolation Valve Removal, AMM TASK 36-13-04-000-801
- Bleed Air Isolation Valve Installation, AMM TASK 36-13-04-400-801

a) Do the Repair Confirmation at the end of the task.

2) If 115V AC is not present between pins 1 and 3 or between pins 2 and 3, as applicable, then do these steps:

a) Do a check of the wiring between pin 3 of connector D398 and the ground GD548-AC (WDM 36-11-11).

b) Repair any problems that you find.

c) If the ground is good, then continue.

(4) Do these steps to do a check of the wiring between the isolation valve and the P5-10 panel:

(a) Get access to the back of the P5-10 panel and disconnect electrical connector D646.

(b) Do a check of the wiring between either pin 1 of connector D398 and pin 22 of electrical connector D646 on the P5-10 panel or pin 2 of connector D398 and pin 21 of electrical connector D646 on the P5-10 panel.

(c) Repair any problems that you find in the wiring (WDM 36-11-11).

(d) Re-connect electrical connector D646 to the back of the P5-10 panel.

(e) Re-connect electrical connector D398 to the isolation valve.

(f) Do the Repair Confirmation at the end of this task.

G. Repair Confirmation

(1) Set the ISOLATION VALVE switch to the AUTO position.

(a) Make sure the valve position indicator on the bleed air isolation valve is in the open position.

(2) Suppy pressure to the pneumatic system with one of the steps below:

(a) Do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(b) Do this task: Supply Pressure to the Pneumatic System with an External Ground Air Source, AMM TASK 36-00-00-860-802.

(3) Examine the duct duct pressure indicator on the P5-10 panel:

(a) Make sure that both the L and R pressure pointers on the duct duct pressure indicator indicate a minimum of 12 psi and the pressure indications are within 3 psi of each other.

(b) If both the L and R pressure indications are not within 3 psi of each other, then do this fault isolation:

1) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

(c) If both the L and R pressure indications are with 3 psi of each other, then continue.

(4) If you are using the APU to pressurize the pneumatic system, set the BLEED 1, BLEED 2, L PACK and R PACK switches on the P5-10 panel to the positions listed below for configurations 1-6 and check the L and R duct pressures for each configuration:

Table 203

CONFIG.	L BLEED	R BLEED	L PACK	R PACK	L DUCT	R DUCT
1	ON	ON	ON	ON	PSI	NO PSI
2	OFF	ON	ON	ON	PSI	PSI
3	ON	OFF	ON	ON	PSI	PSI
4	ON	ON	OFF	ON	PSI	PSI
5	ON	ON	ON	ON	PSI	NO PSI
6	ON	ON	ON	OFF	PSI	PSI

(a) Make sure the left and right duct pressure indications are correct for each configuration.

(5) If you are using an external air source to pressurize the pneumatic system, set the BLEED 1, BLEED 2, L PACK and R PACK switches on the P5-10 panel to the positions listed below for configurations 1-6 and check the duct pressures for each configuration:

Table 204

CONFIG.	L BLEED	R BLEED	L PACK	R PACK	L DUCT	R DUCT
1	ON	ON	ON	ON	NO PSI	PSI
2	OFF	ON	ON	ON	PSI	PSI
3	ON	OFF	ON	ON	PSI	PSI
4	ON	ON	OFF	ON	PSI	PSI
5	ON	ON	ON	OFF	PSI	PSI
6	ON	ON	ON	ON	NO PSI	PSI

(a) Make sure the left and right duct pressure indications are correct for each configuration.

(6) If the bleed air isolation valve operates correctly, then you corrected the fault.

(7) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(8) Install any access panels that were removed.

(9) Close the following, or any other access doors that were opened during this procedure:

(a) Close this access panel:

Number	Name/Location
192CL	ECS Access Door

(10) If the isolation valve did not operate properly, then return to the step in the Fault Isolation procedure that directed you to the Repair Confirmation and continue with the fault isolation.

——— END OF TASK ———

807. Duct pressure, L and R pointers not the same (split), the engine is the bleed source - Fault Isolation

A. Description

(1) Split duct pressure is a condition in which the duct pressure on one side, as shown on the dual duct pressure indicator, is either lower or higher than the duct pressure on the other side with the engines as the bleed source. Duct pressure splits can occur during both normal and abnormal operation of the engine bleed systems. The procedures in this task will enable you to determine if a fault exists in either the left or right pneumatic system based on information from the pilot report or knowledge of the pneumatic system pressure at specific engine N1 speeds and aircraft altitudes.

There are no system controls to regulate both systems to a common pressure so an acceptable split in duct pressure cannot be specified. Each system regulates duct pressure independent from the other when the isolation valve is closed and should be evaluated based on the engine N1, not compared to the other duct pressure. FIM 36–10 Task Support Figure 305 defines normal operating limits for the 9th stage regulated pressure as 32 ± 6 psig and 5th stage regulated pressure as 42 ± 8 psig.

NOTE: Recommended Airplane Condition Monitoring System (ACMS) low duct pressure alert for regulated 5th stage area is duct pressure less than 28 psi. For regulated 9th stage area, the low pressure alert is duct pressure less than 22 psi (Service Letter 36-024). If duct pressure is less than the normal operating limits for the regulated 5th and 9th stage areas shown on Figure 305, but equal to or greater than the recommended alert limits, maintenance action can be deferred until duct pressure is below the recommended alert limits.

(2) When an engine pneumatic system is operating properly, the N1 speed of the engine and altitude of the aircraft determines what the pneumatic system pressure should be when within the regulated 5th stage or regulated 9th stage pressure areas of the "Duct Pressure Versus N1 at sea level and 5K feet) graph or the "Duct Pressure Versus N1 at sea level, 10K feet, 22K feet, 31K feet, 37K feet and 41K feet" graph.

(3) If the pilot report contains all of the necessary information to use either one of the graphs, a system test using the engines may not be necessary to determine if one or both systems have faults. For example, if the data from the pilot report shows that the duct pressure split occurred when one of the engine pneumatic systems was operating in the unregulated pressure areas or within the 5th or 9th stage switchover areas, then fault isolation does not have to be accomplished.

(4) If the pilot report does not contain all of the necessary information, the duct pressure split can be greater than 15 psi but the pneumatic systems still may be operating within normal limits. In this situation, a system test using the engines is necessary to determine if either system has faults because the systems may have been operating in different modes of pressure regulation and a duct pressure comparison under those conditions would be invalid.

(5) In summary, duct pressure splits do not always indicate a fault condition. As long as the pressures are within system tolerances for the pneumatic system 9th and 5th stage operation, fault isolation is not required.

B. Possible Causes

(1) These are the possible causes for the condition where the duct pressure on one side is lower than normal based on the "Duct Pressure Versus N1 at Sea Level" graphs. See task 804.

(a) Duct pressure transducer, T405 (left) or T403 (right)

1) Failure Mode: Faulty transducer

(b) Dual duct pressure indicator, N12

1) Failure Mode: Faulty indicator

(c) Precooler control valve

1) Failure Mode: stuck closed or not modulating properly

(d) Precooler control valve sensor (390 F)

1) Failure Mode: Not opening when temperature is in the 390-440 degree F range

(e) Pressure Regulator and Shutoff Valve (PRSOV)

1) Failure Mode: sticking

(f) 450 Degree F thermostat

1) Failure Mode: failed open

(g) Bleed air regulator, M1180

1) Failure Mode: regulates control pressure too low (Service Letter 71-051)

(h) High stage valve

1) Failure Mode: sticking

(i) High stage regulator

1) Failure Mode: not regulating properly (reverse flow)

(j) Sense lines and fittings

NOTE: There are several sense lines where leakage can cause low duct pressure.

1) Transducer sense line: low duct pressure APU and engines (all phases of operation)
2) PRSOV control pressure line from bleed air regulator to PRSOV and 450 F thermostat line (5th and 9th stage operations)
3) Supply line to the bleed air regulator (5th and 9th stage operations)
4) Control pressure line between the high stage regulator and high stage valve (9th stage operations)
5) Supply pressure line to high stage regulator (9th stage operations)
6) Sense line between the precooler control valve and 390 F sensor (obstructed not leaking)

(k) Wiring (Indication Circuit)

NOTE: This applies to all pneumatic sources.

1) Failure Mode:
   a) Open in the wiring results in 0 psi indication
   b) Short in the wiring results in low pressure indication

(l) Precooler

1) Failure Mode:
   a) Obstructed
   b) Cracked and leaking
   c) Contamination
   d) Temperature topping at high altitude (450 F thermostat) or on high regulated 5th or 9th stage operations

(m) Precooler kiss seal

1) Failure Mode: Distorted, torn or missing

(n) Duct pressure transducer, T405 (left) and T403 (right)

1) Failure Mode: Faulty transducer

(o) Dual duct pressure indicator, N12

1) Failure Mode: Faulty indicator

(2) These are the possible causes for the condition where the duct pressure on one side is higher than normal based on the "Duct Pressure Versus N1 at Sea Level" graphs. Refer to Duct Pressure High, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 803.

(a) Pressure regulator and shutoff valve (PRSOV)

1) Failure Mode: sticking

(b) Bleed air regulator, M1180

1) Failure Mode: Regulating control pressure too high

(c) Leak in PRSOV downstream pressure sense line or fittings

1) Failure Mode: Leakage will cause the PRSOV to regulate too high

(d) Wiring

1) Failure Mode: induced voltage

C. Circuit Breakers

(1) Refer to circuit breakers in the fault isolation task that this procedure references.

D. Related Data

(1) (36-10 TASK SUPPORT Figure 305)

E. Initial Evaluation

(1) Collect the applicable information that follows, if available, either from the pilot report or the data recorded from an observed fault:

(a) Both left and right pneumatic duct pressures at the time of fault observation

(b) Both left and right engine N1 speeds at the time of fault observation

(c) Altitude at time of fault observation

NOTE: The information in the above three steps is necessary to perform the Initial Evaluation. The information in the next four steps is not necessary but it may be helpful.

(d) Position of the isolation valve switch

(e) Position of the engine bleed valve switches

(f) Position of the APU bleed switch

(g) Pneumatic pressure operated systems at the time of fault observation such as:

NOTE: If other related faults were observed, then perform the respective FIM tasks for those faults.

1) Respective air conditioning system

2) Cowl or wing anti-ice systems

3) Cabin pressurization problems if existing

(2) If the pilot report contains the following data, then perform the Initial Evaluation Procedure.

(a) Both left and right pneumatic duct pressures at the time of fault observation

(b) Both left and right engine N1 speeds at the time of fault observation

(c) Altitude at time of fault observation.

(3) If the pilot report does not contain the following data, then perform the Fault Isolation Procedure.

(a) Both left and right pneumatic duct pressures at the time of fault observation

(b) Both left and right engine N1 speeds at the time of fault observation

(c) Altitude at time of fault observation

(4) If this was an observed fault and the fault conditions are not known, then perform the Fault Isolation Procedure.

NOTE: The Fault Isolation Procedure and the Repair Confirmation procedure in this task are similar. Both procedures require a high power run to determine if both pneumatic system duct pressures are within limits.

(5) Low duct pressures can be caused by the bleed system crossover from low-to-high stage occurring at a different time for the left and right sides. This can give the impression that one side has a lower pressure than the other side. If the crossover occurs within the normal range as shown on the "Duct Pressure Versus N1 at Various Altitudes" graph (36-10 TASK SUPPORT Figure 305), the system is normal and no action is required.

(6) If the necessary information is available in the pilot report, use the "Duct Pressure Versus N1 at 10K feet, 22K feet, 31K feet, 37K feet, or 41K feet" graph or if you have the necessary information from an observed fault, use the "Duct Pressure Versus N1 at Sea Level and 5000 feet" graph to determine if both the left and right engine bleed systems operated within the limits of the graph.

NOTE: If the fault was observed at an altitude other than sea level, 5K, 10K, 22K, 31K, 37K or 41K feet, you may use the altitude line that is closest to the altitude at which the fault was observed provided that the N1 speed of both engines at that time were within the N1 speed necessary for both pneumatic systems to be operating in either the regulated 5th stage or regulated 9th stage pressure areas on both the higher and lower altitude lines on the graph. For example, if the pilot report indicates a duct pressure split at 16,000 feet during climb with both engine N1 speeds at 88%, you can see that both 10,000 feet and 22,000 feet altitudes lines on the graph indicate that both systems should be operating within the regulated 5th stage pressure of 42 (+/-8) psi at the N1 speed of 88% at both altitudes. See (36-10 TASK SUPPORT Figure 305).

(a) If you are not sure if both N1 speeds were sufficient for both the bleed systems to be operating within the regulated 5th or regulated 9th stage pressure areas or if you suspect that one or both systems were operating in the switchover area between regulated 5th and regulated 9th stage pressures or in the unregulated 5th or 9th stage area, then it is possible that both systems are operating properly and you should perform the Fault Isolation Procedure.

NOTE: If N1 speeds and the altitude at the time the fault was observed on one or both systems falls within the 5th and 9th stage switchover area or the unregulated 5th or 9th stage area, the duct pressure split can be greater than the graphs(s) show during normal operation.

NOTE: In the unlikely event that the reported duct pressures are at 50 and 34 psi (PRSOV regulates to 42 +/-8 psi) when both systems are operating on regulated 5th stage, then both systems may be showing signs of degradation. You must use your judgement, airline policy, and the aircraft's bleed system history to determine your course of action.

(b) If you determine that both system pressures are within limits and there were no faults reported with any of the user systems such as air conditioning, pressurization, wing or cowl anti-ice systems, a wing body overheat or a false engine fire warning condition, then the system is operating properly and no further action is necessary. You should monitor the aircraft's pneumatic systems operation on subsequent flights.

NOTE: Pneumatic duct pressure must be a minimum of 18 psig to supply sufficient air for cabin pressurization.

(c) If you determine that one or both engine bleed systems has either low or high duct pressure, then continue.

(7) If you know which side has low duct pressure, do this task: Duct Pressure Low or Duct Pressure Very Low / Zero, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 810.

(8) If you know which side has high duct pressure, do this task: Duct Pressure High, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 803.

(9) If you do not know if either side has low or high duct pressure, then perform the Fault Isolation Procedure.

F. Fault Isolation

NOTE: The Fault Isolation procedure and the Repair Confirmation procedure in this task are similar. Both procedures require a high power run to determine if both pneumatic system duct pressures are within limits.

(1) Supply pressure to the pneumatic system with the APU. To supply pressure, do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(a) You may use an external pneumatic source if the APU is not available to make sure the pneumatic duct pressure indications are accurate.

(b) If you use an external source, the pressure indication should be the same as the output of that source.

(c) The 12 psi minimum limit in the next step only applies if the APU is the pneumatic source.

(2) Make sure that the isolation valve is open.

(3) Make sure that the duct pressure pointers indicate a minimum of 12 psi.

(4) Make sure that the duct pressure indications are within 3 psi of each other:

(a) If the duct pressure indications are not within 3 psi of each other, then do this fault isolation procedure:

1) Do this task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

(b) If the duct pressure indications are within 3 psi of each other, then continue.

(5) Supply pressure to the pneumatic system with both engines. To supply pressure, do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.

(a) If applicable, set the APU BLEED switch on the P5-10 panel to OFF or remove any external pneumatic source.

(b) Set the ISOLATION VALVE switch on the P5-10 panel to CLOSE.

(c) Make sure that the engine BLEED 1 and 2 switches are set to ON.

(d) Make sure that both left and right manifold duct pressures increase to 10-25 psi:

NOTE: The duct pressure pointers on the dual duct pressure indicator may fluctuate without user systems in operation.

1) If both left and right manifold duct pressure do not increase to 10-25 psi, then record the pressures and continue.

NOTE: A dual duct pressure indication of less than 10 psi may be caused by a PRSOV not opening properly or a problem with the high stage regulator or high stage valve.

2) If both left and right manifold duct pressures increase to 10 - 25 psi, then continue.

(6) Set the L and R PACK switches on the P5-10 panel to AUTO.

(7) You can do the two steps [(8) and (9)] that follow at the same time or you can do them separately if you so choose.

NOTE: Doing them at the same time will prevent possible undesired airplane movement under inclement conditions.

CAUTION

OBEY THE SPECIFIED LIMITS. IF YOU IGNORE THE LIMITS, DAMAGE TO EQUIPMENT WILL OCCUR.

(8) Slowly increase the left engine N1 speed in 5-10% increments to 80% or greater as you monitor the engine N1 and pressure indications on the dual duct pressure indicator:

(a) To comply with the engine operation limits, do this task: Engine Operation Limits, AMM TASK 71-00-00-800-806-F00.

(b) Make sure the L pressure pointer on the dual duct pressure indicator follows the "Duct Pressure Versus N1 at Sea Level and 5000 feet" graph and stays within the limits of the graph.

1) Make a record of any N1 speeds and pressures where the pressure is either lower or higher than the limits of the graph.

(c) Keep the engine N1 speed at 80% or greater for a minimum of 5 minutes.

(d) Monitor left side duct pressure to make sure it stays at 42 (+/-8) psi.

1) If the left side duct pressure starts to decrease after it reaches a stable pressure of 42 (+/-8) psi, there is most likely a temperature related problem and not a pressure regulation fault.

a) Possible causes for the pressure decrease are a faulty high stage valve, high stage regulator, a precooler control valve, a precooler control valve sensor or the 450 F thermostat.

CAUTION

OBEY THE SPECIFIED LIMITS. IF YOU IGNORE THE LIMITS, DAMAGE TO EQUIPMENT WILL OCCUR.

(9) Slowly increase the right engine N1 speed in 5-10% increments to 80% or greater as you monitor the engine N1 and pressure indications on the dual duct pressure indicator:

(a) To comply with the engine operation limits, do this task: Engine Operation Limits, AMM TASK 71-00-00-800-806-F00.

(b) Make sure the R pressure pointer on the dual duct pressure indicator follows the "Duct Pressure Versus N1 at Sea Level and 5000 feet" graph and stays within the limits of the graph.

1) Make a record of any N1 speeds and pressures where the pressure is either lower or higher than the limits of the graph.

(c) Keep the engine N1 speed at 80% or greater for a minimum of 5 minutes.

(d) Monitor right side duct pressure to make sure it stays at 42 (+/-8) psi.

1) If the right side duct pressure starts to decrease after it reaches a stable pressure of 42 (+/-8) psi, there is most likely a temperature related problem and not a pressure regulation fault.

a) Possible causes for the pressure decrease are a faulty high stage valve, high stage regulator, a precooler control valve, a 390 F precooler control valve sensor or the 450 F thermostat.

(10) Set the L and R PACK switches to OFF.

(11) Slowly return both engine throttles to idle and allow the engines to stabilize.

(12) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.

(13) If one or both sides has duct pressure lower than 34 psi when operating on regulated 5th stage pressure, less than 26 psi when operating on regulated 9th stage pressure or is less than 10 psi in the unregulated 9th stage mode, do this task:

(a) Do this task: Duct Pressure Low or Duct Pressure Very Low / Zero, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 810.

(14) If one or both sides has duct pressure higher than 50 psi when operating on regulated 5th stage pressure, higher than 38 psi when operating on regulated 9th stage pressure or higher than 25 psi when operating in the unregulated 9th stage mode, do this step:

(a) Do this task: Duct Pressure High, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 803.

(15) If you do not find a fault with either the left or right pneumatic systems, then one of these situations exist:

(a) There was an intermittent fault

(b) One or both of the pneumatic systems was operating in the 5th to 9th stage transition, the 9th to 5th stage transition, or the unregulated 5th or 9th stage; any of which make a duct pressure comparison invalid.

(c) Continue to the next step for a possible course of action.

(16) Use your judgment, airline policy, the history of the aircraft's pneumatic systems, and any reports of user systems malfunctions to determine which of the following actions to take:

(a) Monitor the system performance on subsequent flights

(b) Perform the Engine Bleed System Health Check and the Precooler Control Valve System Health Check:

1) Do this task: Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.

2) Do this task: Precooler Control Valve System Health Check, AMM TASK 36-12-00-700-801.

——— END OF TASK ———

808. Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation

A. Description

(1) Split duct pressure is a condition in which the duct pressure on one side, as shown on the dual pressure indicator, is either lower or higher than the duct pressure on the other side when the APU is the only bleed source and the isolation valve is open. When the APU BLEED switch is ON and the isolation valve is open, the duct pressure in the left and right pneumatic manifolds should be the same. The left and right pneumatic pressure indication systems should indicate the actual duct pressures within a tolerance of plus/minus 2 psi. However, when the left and right systems are pressurized by only the APU bleed air, the maximum duct pressure indication difference (split) between the left and right indication systems is 3 psi.

B. Possible causes:

(1) Duct pressure transducer, T405 (Left) or T403 (Right)

(a) Failure Mode: out of tolerance

(2) Dual duct pressure indicator, N12

(a) Failure Mode: out of tolerance

(3) Isolation valve

(a) Failure Mode: not in commanded position

(4) Leaky sense line or fittings

(a) Failure Mode: loose fittings or damaged tube assembly

(5) Wiring

(a) Failure Mode: open or shorted wiring

C. Circuit Breakers

(1) These are the primary circuit breakers related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT

D. Related Data

(1) 36-10 TASK SUPPORT Figure 302, 36-10 TASK SUPPORT Figure 303, 36-10 TASK SUPPORT Figure 308

(2) SSM 36-21-11

(3) WDM 36-21-11

E. Initial Evaluation

NOTE: The initial evaluation will direct you to fault isolation procedures for component faults or faults in the electrical wiring (or component internal electrical faults).

(1) Make sure that none of the circuit breakers listed below have tripped:

(a) These are the circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT

(b) Reset any circuit breakers that you find tripped.

(c) If a circuit breaker trips again, then proceed to the Indication Circuit Wiring - Fault Isolation Procedure.

(d) If no circuit breaker was found tripped or if a circuit breaker was successfully reset, then continue.

(2) Remove the pressure from the pneumatic system if not previously accomplished. To remove the pneumatic pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(3) Do this check of the precision of the dual duct pressure indicator:

(a) Make sure that the L and R pointers on the dual duct pressure indicator are at 0 (± 2) psi and are not split more than 3 psi.

(b) If one or both pointers do not indicate 0 (±2) psi or are split by 3 psi or greater, then perform the Indication System - Fault Isolation Procedure on the faulty indication system(s).

(c) If both pointers indicate 0 (±2) psi and are within 3 psi of each other, then continue.

(4) Supply pressure to the pneumatic system with the APU. To supply pressure, do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

NOTE: You may use a pneumatic ground source to supply pneumatic pressure.

(5) Set the ISOLATION VALVE switch on the P5-10 air conditioning panel to the OPEN position.

(6) If the duct pressure pointers on both sides are not within 3 psi of each other, then proceed to the Indication System - Fault Isolation Procedure.

(7) If the duct pressure needles on both sides indicate a minimum of 12 psi and are within 3 psi of each other, then do these steps:

(a) Set the R PACK switch on the P5-10 air conditioning panel to the AUTO or HIGH position.

NOTE: The left and right duct pressure indications may fluctuate momentarily.

(b) Allow the left and right duct pressures to stabilize.

(c) Make sure that the L and R duct pressure pointers are within 3 psi of each other:

1) If the L and R duct pressure pointers are within 3 psi of each other, then the system is normal and no further action is required.

2) If the L and R duct pressure pointers are not within 3 psi of each other, then continue.

(8) Look at the position indicator on the isolation valve.

(9) If the position indicator shows that the valve is not fully open, then fault isolate the isolation valve:

(a) Do this task: Isolation Valve Does Not Open or Close Properly - Fault Isolation, 36-10 TASK 806.

(10) If the position indicator shows that the valve is fully open, then look for leaks at the sense lines and sense line fittings between the duct and the duct pressure transducer.

(11) If you find leakage, then do these steps:

(a) Repair any leakage or problems that you find:

1) Use Never-Seez Pure Nickel Special anti-seize compound (or euivalent) when you reconnect sense lines.

(b) Do the Repair Confirmation at the end of this task.

(12) If you do not find any leakage, then do the Indication System - Fault Isolation Procedure.

F. Indication System - Fault Isolation Procedure

(1) Set the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.

(2) If not done previously, look at the position indicator on the isolation valve to make sure it is fully open:

(a) If the isolation valve is not fully open, then fault isolate the valve as follows:

1) Do this task: Isolation Valve Does Not Open or Close Properly - Fault Isolation, 36-10 TASK 806.

(b) If the isolation valve is fully open, then continue.

(3) Do these steps to prepare for a check of the precision of the indication system:

(a) Remove the pressure from the pneumatic system if not previously accomplished. To remove the pneumatic pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(b) Disconnect the flexible sense line from the pneumatic duct in the system (left or right) that is suspected to be out of tolerance.

(c) Install a nitrogen source and a 60 psi test gauge, part of C36001-44 (or equivalent), to the flexible sense line.

NOTE: The test equipment used in this step is part of P/N C36001-44 Engine Bleed Air System Test Equipment listed in the 737 Illustrated Tool and Equipment List (ITEL).

CAUTION

DO NOT EXCEED 50 PSI. EXCESSIVE PRESSURE CAN DAMAGE THE EQUIPMENT.

(4) Supply 50 psi to the pressure transducer with the nitrogen source.

(5) Do these checks for leakage in the pneumatic indication system:

(a) Use a soap solution to examine for leaks in the flexible sense line and connections.

(b) If you find leaks in the flexible sense line and connections, do these steps:

1) Remove the pressure from the transducer.

2) Repair any leaks that you find:

a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect the flexible sense line or connections.

3) Supply 50 psi with the nitrogen source to the transducer and test gage.

a) Make sure that all leaks have been repaired.

b) Continue.

(c) If there is no leakage detected in the flexible sense line and connections, then continue.

(6) Make sure that the applicable pointer on the dual duct pressure indicator agrees within +/-3 psi of the test gage.

(7) If the applicable pointer on the dual duct pressure indicator does not agree within +/-3 psi of the test gage, then do these steps:

(a) Remove the pressure from the transducer.

(b) Replace the pressure transducer. These are the tasks:

- Duct Pressure Transducer Removal, AMM TASK 36-21-01-000-801
- Duct Pressure Transducer Installation, AMM TASK 36-21-01-400-801

NOTE: The nitrogen source and the test gage should still be connected to the flexible sense line.

(c) Supply 50 psi to the transducer.

(d) If the applicable pointer on the dual duct pressure indicator agrees within +/-3 psi of the test gage, then do these steps:

1) Remove the pressure.

2) Disconnect the test gage.

3) Reconnect the flexible sense line to the pneumatic system duct.

a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) at the connection.

4) Do the Repair Confirmation at the end of this task.

(e) If the applicable pointer on the dual duct pressure indicator does not agree within +/-3 psi of the test gage, then continue.

(f) Remove the pressure from the transducer.

(g) Replace the dual duct pressure indicator. These are the tasks:

- Dual Duct Pressure Indicator Removal, AMM TASK 36-21-02-600-801
- Dual Duct Pressure Indicator Installation, AMM TASK 36-21-02-600-802

(h) Supply 50 psi to the transducer.

(i) Make sure that the applicable pointer on the dual duct pressure indicator agrees within +/-3 psi of the test gage:

1) If the applicable pointer on the dual duct pressure indicator does not agree within +/-3 psi of the test gage, do these steps:

a) Remove the pressure to the transducer.

b) Do the Indication Circuit Wiring - Fault Isolation Procedure.

2) If the applicable pointer on the dual duct pressure indicator agrees within +/-3 psi of the test gage, then do the Repair Confirmation at the end of this task.

(8) If the applicable pointer on the dual duct pressure indicator agrees within +/-3 psi of the test gage, then continue.

(9) Do the above steps, as applicable, to examine the precision of the pressure transducer on the other pneumatic indication system.

G. Indication Circuit Wiring - Fault Isolation Procedure

NOTE: This procedure is used when circuit breakers have tripped and cannot be reset or components have been replaced and the fault still exists.

(1) Do these steps for a check of the indication circuit wiring:

(a) If any of the system circuit breakers tripped, isolate and repair the short in the wiring or faulty component.

(b) Do a check of the wiring between these components WDM 36-21-11:

1) The load side of circuit breaker C77 on the P6-4 panel and the dual duct pressure indicator, N12

2) As applicable, the load side of circuit breaker C1469 on the P6-4 panel and the right manifold transducer, T403

3) As applicable, the load side of circuit breaker C1470 on the P6-4 panel and the left manifold transducer, T405

4) As applicable, the dual duct pressure indicator and the left manifold transducer, T405, and/or the right manifold transducer, T403.

(c) Repair any problems that you find.

(d) Do the Repair Confirmation at the end of this task.

H. Repair Confirmation

(1) Supply pressure to the pneumatic system with one of the steps below:

(a) Do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

(b) Do this task: Supply Pressure to the Pneumatic System with an External Ground Air Source, AMM TASK 36-00-00-860-802.

(2) Examine the dual pressure indicator, N12, on the P5-10 air conditioning panel as follows:

(a) Make sure that the duct pressure pointers on both sides are within 3 psi of each other.

1) If the duct pressure pointers on both sides are within 3 psi of each other, then you corrected the fault.

2) If the duct pressure pointers on both sides are not within 3 psi of each other, then return to the step you were at in the Initial Evaluation or Fault Isolation Procedure and continue.

(3) Remove pressure from the pneumatic system:

(a) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

——— END OF TASK ———

809. BLEED TRIP OFF Light ON - Fault Isolation

A. Description

(1) The BLEED TRIP OFF Light on the Overhead Panel turns ON to show overtemperature or overpressure:

(a) Overtemperature

1) Precooler Outlet Temperature gets to 485°F (252°C) to 500°F (260°C).

2) Most common cause of a BLEED TRIP OFF is a cooling problem.

(b) Overpressure

1) Pneumatic Pressure upstream of the Pressure Regulating and Shutoff Valve (PRSOV) gets to the applicable pressure ranges: 210 psi (15 kg/cm^2) to 230 psi (16 kg/cm^2).

2) Overpressure conditions require the High Stage Valve (HSV) to be stuck in the open position. Based on operator experience, this is not a likely cause.

(2) The BLEED TRIP OFF Light may also illuminate due to an indication system fault (false bleed trip). A false bleed trip can be caused by faulty 490°F Overtemperature Switch, faulty Bleed Air Regulator (BAR) Overpressure Switch, damaged wiring, or faulty Air Conditioning Accessory Unit (ACAU).

(3) The most valuable tool in the fault isolation of the Pneumatic System is a thorough knowledge of the system. Information from the flight crew and awareness of the Aircraft Maintenance History can be invaluable in determining the fault isolation plan.

(a) If the BLEED TRIP OFF Light comes ON intermittently during various phases of flight and system operation, do a check of the system wiring before you replace components.

NOTE: The BLEED TRIP OFF Light can come ON when a BLEED Switch is selected immediately after a NO BLEED takeoff.

(b) If the BLEED TRIP OFF Light can be reset, no maintenance action is necessary for one-off occurrences.

(c) If the BLEED TRIP OFF Light cannot be reset or an airplane continues to experience resettable BLEED TRIP OFF Lights when a BLEED Switch is selected immediately after a NO BLEED takeoff, use this FIM task to troubleshoot the Precooler System.

B. Possible Causes

(1) Precooler System

(a) Precooler Control Valve (PCCV) - Failure Mode: Valve not modulating correctly or stuck closed

(b) 390° Sensor - Failure Mode: Sensor is out-of-tolerance, stuck closed or plugged

(c) 450° Sensor - Failure Mode: Sensor is out of tolerance, stuck closed, or plugged

(d) Kiss seal - Failure Mode: Damaged, Foreign Object Debris (FOD), blocked fan airflow

(e) Precooler - Failure Mode: Foreign object debris blocking fan airflow, degraded operational capability

(2) High Stage System

(a) HSV - Failure Mode: Stuck open butterfly plate

(3) Sense Lines - Failure Mode: Obstructed or kinked line from PCCV to 390°F Sensor; Obstructed or kinked line from PRSOV to 450°F Sensor

(4) BAR, M1180 - Failure Mode: Pressure Switch actuates at pressure below minimum specified

(5) Engine 1 (Engine 2) 490°F Overtemperature Switch, S20 (S21) - Failure Mode: Switch is out of calibration (closes at temperature that is too low), short to ground in the wiring

(6) ACAU, M324 or M1455 - Failure Mode: Internal short or faulty relay

(7) Air Conditioning Module, P5-10 - Failure Mode: Internal short

(8) Wiring - Failure Mode: Shorted wiring to Overpressure Switch in BAR or 490°F Overtemperature Switch

(9) Engine Wiring Harness, MW0311 - Failure Mode: Possible wire shorting on backshell of connector DP1102

NOTE: MW0311 electrical harnesses P/N 325-029-901-0 and 325-029-902-0 are known to be the source of faults. These electrical harnesses can be reworked to serviceable units with the incorporation of CFM International Service Bulletin 72-0262.

C. Circuit Breakers

(1) These are the primary circuit breakers related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

D. Related Data

(1) Component Location (36-10 TASK SUPPORT Figure 301)

(2) Component Location (36-10 TASK SUPPORT Figure 302)

(3) Duct Pressure Versus N1 at Sea Level and 5000 Feet Graph (36-10 TASK SUPPORT Figure 305)

(4) Duct Pressure Versus N1 at Sea Level, 10K, 22K, 31K, 37K and 41K Feet Graph (36-10 TASK SUPPORT Figure 305)

(5) Troubleshooting Check (36-10 TASK SUPPORT Figure 308)

(6) Pneumatic System Control Valve Position Indicators (36-10 TASK SUPPORT Figure 311)

(7) Possible Causes and Effects of a Bleed Trip (36-10 TASK SUPPORT Figure 315)

(8) SSM 36-11-11

(9) WDM 36-11-11

(10) SDS SUBJECT 36-11-00

(11) SDS SUBJECT 36-12-00

E. Initial Evaluation

(1) Push the TRIP RESET Button on the P5-10 Panel to put the Bleed System back to the normal configuration.

(a) If the BLEED TRIP OFF Light was ON and successfully reset or the pilot's report stated that the BLEED TRIP OFF Light came ON and was reset one or more times, then do the Fault Isolation Procedure.

NOTE: The Fault Isolation Procedure primary troubleshoots a bleed trip due to overtemperature or overpressure condition. If an intermittent indication system fault is suspected (false bleed trip), do the Electrical Checks - Fault Isolation section.

(b) If the BLEED TRIP OFF Light was on and does not go off, then do the Electrical Checks - Fault Isolation section.

NOTE: This condition indicates a hard fault with a Pressure Switch in the BAR, the 490° F Overtemperature Switch or associated electrical wiring of the BLEED TRIP OFF Light.

(c) If the BLEED TRIP OFF Light came ON during a "no engine bleeds takeoff“ prior to the BLEED Switch being selected ON, then replace the HSV. These are the tasks:

- High Stage Valve Removal, AMM TASK 36-11-06-000-801
- High Stage Valve - Installation, AMM TASK 36-11-06-400-801

NOTE: A HSV with a leaky butterfly valve can cause the Pressure Switch in the BAR to close and initiate the BLEED TRIP OFF Light to come ON during a "no engine bleeds takeoff".

(2) For further system operation understanding, refer to 36-10 TASK SUPPORT Figure 315 for possible causes and effects of a BLEED TRIP OFF condition, and BLEED TRIP OFF conditions organized by flight phase.

NOTE: Electrical faults have been known to cause BLEED TRIP OFF conditions in all flight phases. If a BLEED TRIP OFF is reported multiple times and/or in different flight phases, it may be caused by an electrical fault in addition to the possible causes noted in 36-10 TASK SUPPORT Figure 315.

F. Fault Isolation Procedure

(1) Leak check the system using Auxiliary Power Unit (APU) bleed air. This is the task: Engine Bleed Air System Leak Check Using the APU, AMM TASK 36-11-00-700-802.

(2) If no fault is found, perform the PCCV System Health Check. This is the task: Precooler Control Valve System Health Check, AMM TASK 36-12-00-700-801.

(3) If no faults were found, the problem could be with the following parts:

(a) 390° Sensor and 450° Sensor

(b) Kiss Seal

(c) Precooler

(d) 490° Overtemperature Switch

(e) Wiring faults

(f) ACAU

(4) Check the kiss seal for deformation.

(a) Make sure that it makes a proper seal between the PCCV and the Precooler.

(b) If the kiss seal is deformed or has gaps that would allow fan air to escape, or is otherwise not installed correctly, replace the kiss seal.

(5) Move the kiss seal and check the Precooler inlet for obstructions.

(a) Remove any obstructions found.

(6) Do this check of the Sense Lines between PCCV and the 390°F Sensor, and between PRSOV and 450°F Thermostat (36-10 TASK SUPPORT Figure 306).

(a) Disconnect the Sense Line at both ends.

(b) Blow dry shop air (80 psi (552 kPa) maximum) or low pressure nitrogen through the Sense Line to make sure there are no obstructions in the line.

(c) Make sure that there is good airflow through the open line.

1) If the airflow is satisfactory, then re-connect the Sense Line as follows:

a) Apply a light coat of Never-Seez Pure Nickel Special anti-seize compound (or equivalent) to the Sense Line connections.

b) Re-connect the Sense Line and continue.

2) If there is poor airflow, do these steps:

a) Repair the obstruction or get a new Sense Line.

b) Apply a light coat of Never-Seez Pure Nickel Special anti-seize compound (or equivalent) to the Sense Line connections.

c) Re-connect the Sense Line.

(7) There is no procedure to test the 390° and 450° Sensors. Because all else has shown to be good, replace the 390° and 450° Sensors. These are the tasks:

NOTE: Use compound, D00010 (Alternate: Never-Seez NSBT compound, D00006), on the threads of all fittings when connecting the sense lines.

- Precooler Control Valve Sensor Removal, AMM TASK 36-12-03-000-801
- Precooler Control Valve Sensor Installation, AMM TASK 36-12-03-400-801
- Thermostat Removal, AMM TASK 36-11-05-000-801
- Thermostat Installation, AMM TASK 36-11-05-400-801

(8) Replace the Wiring Harness, MW0311 to the BAR, M1180. These are the tasks:

- 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
- 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00

NOTE: Electrical Harnesses MW0311 (P/N 325-029-901-0 and 325-029-902-0) are known to be the source of faults. The P/N 325-029-901-0 and 325-029-902-2 Electrical Harnesses can be reworked by CFM International Service Bulletin 72-0262 to serviceable Electrical Harnesses P/N 325-029-903-0 and 325-029-904-0, respectively. P/N 325-029-905-0 is the Production Harness and also the spared replacement.

(9) Replace the 490° F Overtemperature Switch, S20 (S21). These are the tasks:

- Overtemperature Switch Removal, AMM TASK 36-11-08-000-801
- Overtemperature Switch Installation, AMM TASK 36-11-08-400-801

(10) Do a check of the Pressure Actuation Point of the Overpressure Switch in the BAR as follows:

NOTE: Do this check ONLY if airplane Electrical Power is available. The airplane's Electrical Power is necessary to activate the BAR's Overpressure Switch.

(a) Connect a nitrogen pressure source, STD-1455, pressure regulator, STD-1454, to supply pressure tee for the BAR and PCCV. This is the task: Bleed Air Regulator/PRSOV/450° F Thermostat Health Check, AMM TASK 36-11-00-710-802.

(b) Disconnect the control line to the PRSOV and tee in a pressure gauge, STD-1201. This is the task: Bleed Air Regulator/PRSOV/450° F Thermostat Health Check, AMM TASK 36-11-00-710-802.

(c) Slowly increase Supply Pressure (Ps) to 250 psig (1724 kPa) and then reduce Ps to 80 psig (552 kPa).

(d) On the flight deck, push the TRIP RESET Switch to reset the BLEED TRIP OFF Light that illuminated when Ps was increased to 250 psig (1724 kPa).

(e) Slowly increase Ps to 210 psig (1448 kPa) - 230 psig (1586 kPa).

1) Make sure that the BLEED TRIP OFF Light is illuminated when Ps is greater than 120 psig (827 kPa) and the control pressure (Pc) drops to 0 psig (0 kPa) - 6 psig (41 kPa).

2) Record the Ps when the BLEED TRIP OFF Light illuminates and the Pc drops to 0 psig (0 kPa) - 6 psig (41 kPa). This is the pressure actuation point of the Overpressure Switch.

(f) If the Pressure Actuation Point of the Overpressure Switch is low, replace the BAR. These are the tasks:

- Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
- Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801

(11) Replace the Bleed Air Precooler. These are the tasks:

- Bleed Air Precooler Removal, AMM TASK 36-12-01-000-801
- Bleed Air Precooler Installation, AMM TASK 36-12-01-400-802

G. Electrical Checks - Fault Isolation

(1) If the BLEED TRIP OFF Light is ON at this time or if the fault is intermittent and suspected to be an electrical fault, then do these steps to prepare pneumatic components on the engine for fault isolation:

NOTE: Electrical Harnesses MW0311 (P/N 325-029-901-0 and 325-029-902-0) are known to be the source of faults. These harnesses can short to the connector backshell under hot operating conditions with a result of a BLEED TRIP OFF Light or a tripped circuit breaker.

(a) Make sure that there is no pressure in the Pneumatic System.

1) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

(b) Make sure that the applicable Engine Bleed Switch is in the OFF position.

(c) Make sure that the Fuel Shutoff Lever for the applicable engine is in the CUTOFF position and install DO-NOT-OPERATE tags.

WARNING

DO THESE SPECIFIED TASKS IN THE CORRECT SEQUENCE BEFORE YOU OPEN THE THRUST REVERSERS: RETRACT THE LEADING EDGE, DO THE DEACTIVATION PROCEDURES FOR THE LEADING EDGE AND THE THRUST REVERSER (FOR GROUND MAINTENANCE), AND OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(d) Retract the Leading Edge Flaps and Slats, if not previously accomplished, and deactivate the Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats Deactivation, AMM TASK 27-81-00-040-801.

(e) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.

(f) For the applicable Thrust Reverser, do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.

(2) Do these steps to do a check of the Pressure Switch wiring in the BAR:

(a) Disconnect connector DP1102 from the BAR, M1180.

(b) Push the TRIP RESET Button on the P5-10 Panel.

(c) If the BLEED TRIP OFF Light goes OFF, replace the BAR. These are the tasks:

- Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
- Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801

(d) If the BLEED TRIP OFF Light does not go OFF, re-connect connector DP1102 to the BAR, M1180, and continue.

(3) Do these steps to do a check of the for the 490° F Overtemperature Switch wiring:

(a) Disconnect connector D526 (Engine 1) or D528 (Engine 2) from the applicable 490° F Overtemperature Switch, S20 or S21.

(b) Push the TRIP RESET Button on the P5-10 Panel.

(c) If the BLEED TRIP OFF Light goes OFF, then replace the 490° F Overtemperature Switch, S20 or S21, as applicable. These are the tasks:

- Overtemperature Switch Removal, AMM TASK 36-11-08-000-801

- Overtemperature Switch Installation, AMM TASK 36-11-08-400-801

(d) If the BLEED TRIP OFF Light does not go OFF, re-connect connector, D526 (Engine 1) or D528 (Engine 2) to the applicable Overtemperature Switch and continue.

(4) Do a check of the wiring for a short to ground as follows (WDM 36-11-11):

NOTE: An internal short to ground within the ACAU, the P5-10 Air Conditioning Module, the MW0311 Engine BAR Harness, or other aircraft wiring can cause the BLEED TRIP OFF Light to stay ON.

(a) Remove the ACAU. This is the task: Air Conditioning Accessory Unit (ACAU) Removal, AMM TASK 21-51-02-000-801.

1) If the BLEED TRIP OFF Light goes OFF, do a check of the wiring between:

- ACAU and the BAR Pressure Switch
- ACAU and the Bleed Air Overtemperature Switch

a) Repair the problems that you find.

2) If the light does not go OFF, then do a check of the wiring between the P5-10 Air Conditioning Module and the ACAU.

a) Repair the problems that you find.

b) If you do not find wiring problems, then install a serviceable ACAU. This is the task: Air Conditioning Accessory Unit (ACAU) Installation, AMM TASK 21-51-02-400-801.

NOTE: You can do the Adjustment/Test of the ACAU after the Electrical Fault Isolation has been completed.

c) If you do not find problems, then install a serviceable P5-10 Air Conditioning Module. This is the task: Air Conditioning Module Installation, AMM TASK 21-51-65-400-801.

d) If you have not already done so, do the Air Conditioning Accessory Unit - Operational Test, AMM TASK 21-51-02-710-801-001 or Air Conditioning Accessory Unit - Operational Test, AMM TASK 21-51-02-710-802-002.

H. Repair Confirmation

(1) Remove all pressure gages, associated test equipment and hardware.

(2) Re-connect all sense lines that were disconnected.

(a) Use Never-Seeze Pure Nickel Special anti-seeze compound (or equivalent) when you re-connect the sense lines.

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS WHEN YOU CLOSE THE THRUST REVERSERS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) For the applicable thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.

(4) Activate the applicable thrust reverser. This is the task: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.

(5) Close the Fan Cowl Panels. This is the task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

(6) Re-activate the Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats - Activation, AMM TASK 27-81-00-440-801.

——— END OF TASK ———

810. Duct Pressure Low or Duct Pressure Very Low / Zero, the Engine is the Bleed Source - Fault Isolation

A. Description

(1) Low duct pressure is conditional based on the phase of flight, altitude, and throttle settings. Using 36-10 TASK SUPPORT Figure 305, the technician can determine whether a pilot report of low duct pressure is a real fault or within normal operational tolerances.

NOTE: Recommended Airplane Condition And Monitoring System (ACMS) low duct pressure alert for regulated 5th stage area is duct pressure less than 28 psi (193 kPa). For regulated 9th stage area, the low pressure alert is duct pressure less than 22 psi (152 kPa) (Service Letter 36-024). If duct pressure is less than the normal operating limits for the regulated 5th and 9th stage areas shown on 36-10 TASK SUPPORT Figure 305, but equal to or greater than the recommended alert limits, maintenance action can be deferred until duct pressure is below the recommended alert limits.

(2) If phase of flight is known, a determination of which part of the Pneumatic System may be at fault and only those items need to have troubleshooting performed. For instance, if the phase of flight is takeoff or climb, the High Stage Regulator (HSR) and HSV should not be operational and they do not need to be tested. If the phase of flight is cruise or descent, then all items in the Pneumatic System can be operational and complete system troubleshooting per this task is recommended.

(3) If inflight duct pressures are below the values shown on 36-10 TASK SUPPORT Figure 305 during takeoff, climb and cruise but greater than 18 psig (124 kPa) and the aircraft is able to pressurize normally, the bleed system is experiencing drifting performance but is still serviceable. The aircraft may be operated normally but maintenance action should be taken to restore the bleed system performance to normal operation at the operator's earliest convenience.

(4) If duct pressures below 18 psig (124 kPa) are noted during takeoff, climb and cruise, the Bleed System is operating below acceptable performance and fault isolation is required to return the Pneumatic System to acceptable performance.

(5) If inflight pneumatic duct pressures are less than 18 psig (124 kPa), but not less than 10 psig (69 kPa) after the top of descent, no fault isolation check is necessary. This condition is considered normal, especially if Cowl Thermal Anti-Icing (CTAI) and/or Wing Thermal Anti-Ice (WTAI) are on.

(6) It is not necessary to accomplish all steps in this Task, however, there may be multiple faults causing low duct pressure and completing this task will ensure all faults are corrected.

(7) For further system operation understanding, refer to 36-10 TASK SUPPORT Figure 314 for possible causes and effects of a low or very low / zero duct pressure condition.

(8) A very low / zero duct pressure condition is a condition in which one or both pointers on the dual duct pressure indicator is less than 10 psig (69 kPa) with the engine(s) as the bleed source.

(9) A very Low / Zero duct pressure can occur due to a valve in the failed closed position (i.e. HSV, PRSOV, or 5th stage check valve) or an indication failure. With a failed closed valve, the dual duct pressure indicator can show a very low pressure (less than 10 psig (69 kPa)) due to internal leakage. In this scenario, the pilot report may state the observed fault was low duct pressure.

B. Possible Causes

(1) Precooler System - Temperature

(a) PCCV - Failure Mode: Valve not modulating correctly or stuck closed

(b) 390° Sensor - Failure Mode: Sensor is out-of-tolerance, stuck closed or plugged

(c) Kiss seal - Failure Mode: Damaged, FOD, blocked fan airflow

(d) Precooler - Failure Mode: FOD blocking fan airflow, degraded operational capability

(2) Pressure Regulating System

(a) PRSOV - Failure Mode: Sticking butterfly valve or leaky control pressure side

(b) BAR - Failure Mode: regulates control pressure too low

(c) 450° Sensor - Failure Mode: Out of tolerance or failed open

(3) High Stage System

(a) HSV - Failure Mode: Sticking butterfly valve or leaky control pressure side

(b) HSR - Failure Mode: regulates control pressure too low

(4) Leaky Sense Lines or Fittings.

(a) Failure Mode: loose connections or damaged lines.

1) PRSOV control pressure line from BAR to PRSOV and 450° F thermostat line (5th and 9th stage operation)

2) Supply line to the BAR (5th and 9th stage operations)

3) Control pressure line between the HSR and HSV (9th stage operation)

4) Supply pressure line to HSR (9th stage operations)

5) Transducer sense line: low duct pressure APU and engines (all phases of operation)

6) Sense line between PCCV and the 390°F Sensor obstructed, not leaking

(5) Indication System

(a) Duct Pressure Transducer Left (Right), T405 (T403) - Failure Mode: Out-of-tolerance or faulty transducer

(b) Dual Duct Pressure Indicator, N12 - Failure Mode: Out-of-tolerance or faulty indicator

(6) Bleed Air Check Valve (Stage 5)

(a) Failure Mode: Valve stuck closed

(b) A stuck 5th Stage Bleed Air Check Valve will result in very low duct pressure (close to 0 psi) when the system switches from 9th stage to 5th stage bleed air at approximately 60% N1 at sea level

(7) Wiring

(a) Failure Mode: open or shorted

(b) Engine Wiring Harness, MW0311

NOTE: MW0311 electrical harnesses P/N 325-029-901-0 and 325-029-902-0 are known to be the source of faults. These electrical harnesses can be reworked to serviceable units with the incorporation of CMF International Service Bulletin 72-0262.

1) Failure Mode: Possible wire shorting on backshell of connector DP1102

2) Failure Mode: Possible broken wires inside connector DP1102

C. Circuit Breakers

(1) These are the primary circuit breakers related to the fault:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	5	C00259	AIR CONDITIONING BLEED AIR VALVE ISLN
A	6	C01470	AIR CONDITIONING BLEED AIR XDCR LEFT
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	5	C00077	AIR CONDITIONING BLEED AIR PRESS IND
B	6	C01469	AIR CONDITIONING BLEED AIR XDCR RIGHT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

D. Related Data

(1) Component Location (36-10 TASK SUPPORT Figure 301)

(2) Component Location (36-10 TASK SUPPORT Figure 302)

(3) Duct Pressure Versus N1 at Sea Level and 5000 Feet Graph (36-10 TASK SUPPORT Figure 305)

(4) Duct Pressure Versus N1 at Sea Level, 10K, 22K, 31K, 37K and 41K Feet Graph (36-10 TASK SUPPORT Figure 305)

(5) Troubleshooting Check (36-10 TASK SUPPORT Figure 308)

(6) Pneumatic System Control Valve Position Indicators (36-10 TASK SUPPORT Figure 311)

(7) Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table (36-10 TASK SUPPORT Figure 314)

(8) SSM 36-11-11

(9) WDM 36-11-11

(10) SDS SUBJECT 36-11-00

(11) SDS SUBJECT 36-12-00

E. Initial Evaluation

(1) If the pilot report includes the low duct pressure value, the altitude, and the N1 engine speed at the time of the low duct pressure, you can use 36-10 TASK SUPPORT Figure 305 sheet 2 of 2 to determine if the report of low duct pressure is valid. If the pressure is within tolerance, then there is no fault.

(2) Because the PRSOV has a tolerance of 34 psi (234 kPa) - 50 psi (345 kPa) and the HSV has a tolerance of 26 psi (179 kPa) - 38 psi (262 kPa), a low pressure that is noted by flight crew that is 34 psi (234 kPa) or above, is not considered a low duct pressure. See 36-10 TASK SUPPORT Figure 305 to determine stage of operation if possible.

(3) If the low duct pressure report is valid, it is more often the case that it is a result of a cooling problem. This would indicate that the 450° Sensor is working properly. Therefore, the PCCV and/or the 390° Sensor are not working properly in most cases.

(4) Do a check to see if any of these circuit breakers have tripped:

(a) These are the circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

WARNING

DO NOT HOLD THE CIRCUIT BREAKER IN THE RESET POSITION. IF YOU HOLD THE CIRCUIT BREAKER IN THE RESET POSITION WHEN A WIRING FAULT IS PRESENT, THE CIRCUIT BREAKER WILL NOT BE ABLE TO TRIP AGAIN. FAILURE TO RESET AND RELEASE THE CIRCUIT BREAKER QUICKLY CAN RESULT IN A FIRE, EXTENSIVE DAMAGE TO WIRING, AND INJURY TO PERSONS.

(b) If the circuit breaker(s) for the applicable engine bleed air valve(s) has tripped, reset the circuit breaker(s).

(c) If the circuit breaker trips again, then proceed to the Electrical Checks - Fault Isolation Procedure.

(d) If the circuit breaker(s) was successfully reset or if none of the circuit breakers has tripped, then continue.

F. Fault Isolation Procedure

(1) Do the leak check the system using APU bleed air. This is the task: Engine Bleed Air System Leak Check Using the APU, AMM TASK 36-11-00-700-802.

(2) If no fault is found, do the Engine Bleed Air System Health Check. This is the task: Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.

NOTE: Low duct pressure can be caused by multiple faulty components. Therefore, it is recommended to complete the Engine Bleed Air System Health Check in its entirety even if a faulty component has been identified.

(3) If no faults were found, the problem could be with the following parts:

(a) Kiss Seal

(b) Precooler

(c) 390° Sensor

(d) 450° Sensor

(e) Pressure transmitter or indicator

(f) Wiring faults

(4) Check the kiss seal for deformation.

(a) Make sure that it makes a proper seal between the PCCV and the Precooler.

(b) If the kiss seal is deformed or has gaps that would allow fan air to escape, or is otherwise not installed correctly, replace the kiss seal.

(5) Move the kiss seal and check the Precooler inlet for obstructions.

(a) Remove any obstructions found.

(6) Do this check of the Sense Line between the PCCV and the 390°F Sensor, (36-10 TASK SUPPORT Figure 306).

(a) Disconnect the Sense Line at both ends.

(b) Blow dry shop air (80 psi (552 kPa) maximum) or low pressure nitrogen through the Sense Line to make sure there are no obstructions in the line.

(c) Make sure that there is good airflow through the open line.

1) If the airflow is satisfactory, then reconnect the Sense Line as follows:

a) Apply a light coat of Never-Seez Pure Nickel Special anti-seize compound (or equivalent) to the Sense Line connections.

b) Reconnect the Sense Line and continue.

2) If there is poor airflow, do these steps:

a) Repair the obstruction or get a new Sense Line.

b) Apply a light coat of Never-Seez Pure Nickel Special anti-seize compound (or equivalent) to the Sense Line connections.

c) Reconnect the Sense Line.

(7) There is no procedure to test the 390° and 450° Sensors. Because all else has been shown to be good, replace the 390° and 450° Sensors. These are the tasks:

NOTE: Use compound, D00010 (Alternate: Never-Seez NSBT compound, D00006), on the threads of all fittings when connecting the sense lines.

- Thermostat Removal, AMM TASK 36-11-05-000-801
- Thermostat Installation, AMM TASK 36-11-05-400-801
- Precooler Control Valve Sensor Removal, AMM TASK 36-12-03-000-801
- Precooler Control Valve Sensor Installation, AMM TASK 36-12-03-400-801

(8) Do the following to troubleshoot the indication system.

(a) Make sure that the ISOLATION VALVE Switch on the P5-10 Panel is set to the OPEN position.

(b) Put the engine BLEED 1 and 2 Switches on the P5-10 Panel to OFF.

(c) Supply pressure using the APU. This is the task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.

1) Make sure that the manifold pressure on the Dual Duct Pressure Indicator, N12 increases to a minimum of 12 psi (83 kPa) for both the Left and Right Pneumatic Systems.

2) Make sure that the pressure pointers on the Dual Duct Pressure Indicator, N12 are within 3 psi (21 kPa) of each other.

a) If the pressure pointers on the Dual Duct Pressure Indicator, N12 are not within 3 psi (21 kPa) of each other, then do the Duct pressure, L and R pointers are not the same (split) the APU is the bleed source - Fault Isolation. This is the task: Duct pressure, L and R pointers not the same (split) the APU is the bleed source - Fault Isolation, 36-10 TASK 808.

b) If the indicated pressures are correct, then continue.

(9) Inspect the 5th Stage Bleed Air Check Valve. This is the task: Bleed Air Check Valve Inspection, AMM TASK 36-11-02-200-801.

NOTE: A stuck closed 5th Stage Bleed Air Check Valve will result in very low duct pressure (close to 0 psi) when the system switches over from 9th stage to 5th stage bleed air at approximately 60% N1 at sea level. If the pilot report does not match this fault description, it is not necessary to complete this inspection.

(10) If you completed the entire Fault Isolation Procedure and the low duct pressure condition still exists, then replace the Bleed Air Precooler. These are the tasks:

- Bleed Air Precooler Removal, AMM TASK 36-12-01-000-801
- Bleed Air Precooler Installation, AMM TASK 36-12-01-400-802

G. Electrical Checks - Fault Isolation

(1) Do this check of electrical harness, MW0311 between the engine firewall connector DP1104 and connector DP1102 to the solenoid on the BAR:

NOTE: These electrical checks are needed to determine why the circuit breaker that controls the PRSOV trips.

NOTE: Harnesses with part numbers 325-029-901-0 or 325-029-902-0 are susceptible to internal shorting which can cause the bleed air valve circuit breaker to trip and prevent the PRSOV from opening. This type of failure is not always a hard fault (always present). Therefore, if you found the applicable circuit breaker tripped or if it has tripped in the past, it is quite possible there is an intermittent short in the harness. A thorough check of the harness must be accomplished to determine if the harness must be replaced.

NOTE: A multimeter is required to perform the electrical checks in this procedure. If there is an intermittent short or the fault is not present at any point in the Fault Isolation you may use a megohmmeter instead of the multimeter to perform a more thorough check of the electrical circuit.

(a) Open the applicable circuit breaker(s):

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(b) Disconnect connectors DP1104 and DP1102.

(c) Do these steps to do a general visual inspection of the airplane wire harness, MW0311:

1) Visually examine the airplane wire harness for loose connections, worn areas, deformation and internal damage.

2) If you find loose connections, worn areas, deformation or internal damage then repair the problems that you find.

3) If you do not find loose connections, worn areas, deformation or internal damage, then continue.

(d) Do the continuity checks on the MW0311 harness as listed below:

DP1104	DP1102
pin 12	pin 7
pin 11	pin 6
pin 3	pin 5
pin 10	pin 10
pin 2	pin 9

1) If any of the continuity checks failed, then replace the harness, MW0311. These are the tasks:

- 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
- 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00

2) If the continuity checks are satisfactory, then continue.

3) Use a multimeter or megohmmeter to do checks for continuity from the backshell of connector DP1102 to pins 5, 7, and 10 of connector DP1102.

4) If any of the electrical checks fail, replace the harness, MW0311. These are the tasks:
   - 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
   - 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00
5) If all the electrical checks are satisfactory, then continue.

(e) Do a check of the resistance between pins 5 and 6 of the BAR connector.
1) If the resistance is not 20 - 40 ohms, then replace the BAR. These are the tasks:
   - Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
   - Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801
2) If the resistance is 20 - 40 ohms, then continue.

(f) Re-connect connector DP1102 to the BAR.

(g) Do a check of the resistance between pins 3 and 11 of connector D30204 (D30404).
1) If the resistance is not 20 - 40 ohms, then replace the harness, MW0311. These are the tasks:
   - 3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00
   - 3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00
2) If the resistance is 20 - 40 ohms, then continue.

(h) Re-connect connector DP1104.

(2) Do this check for power at the BAR:

(a) Disconnect connector DP1102.

(b) Close the applicable circuit breaker(s):

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES L
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES R

(c) Set the applicable BLEED Switch on the P5-10 Panel to the ON position.

(d) Do a check for 22 - 30 VDC between pins 5 and 6 of connector DP1102.
1) If there is 22 - 30 VDC between pins 5 and 6 of connector DP1102, then replace the BAR, M1180. These are the tasks:
   - Bleed Air Regulator Removal, AMM TASK 36-11-03-000-801
   - Bleed Air Regulator Installation, AMM TASK 36-11-03-400-801
2) If there is not 22 - 30 VDC between pins 5 and 6 of connector DP1102, then continue.

(3) Do this check of the wiring:

SHZ 002, 009-699, 706, 721-799

(a) Do a continuity check between these pins on connector DP1102 at the BAR, M1180, and connector D458B at the Air Conditioning Relay Module, M324 on the E4-1 Shelf.

DP1102		D458B
pin 5	. . . . .	pin 50

SHZ 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-899, 901-999

(b) For the Left Pneumatic System, do a continuity check between these pins on connector DP1102 at the BAR, M1180, and connector D458A at the Air Conditioning Relay Module, M324 on the E4-1 Shelf.

DP1102		D458A
pin 5	. . . . .	pin 2

(c) For the Right Pneumatic System, do a continuity check between these pins on connector DP1102 at the BAR, M1180, and connector D10002A at the Air Conditioning Relay Module, M1455 on the E4-1 Shelf.

DP1102		D10002A
pin 5	. . . . .	pin 2

SHZ ALL

(d) If you find a problem with the wiring, repair the wiring.

(e) Re-connect electrical connector DP1102 to the BAR, M1180.

SHZ 002, 009-699, 706, 721-799

(f) Re-connect connector D458B to the Air Conditioning Relay Module, M324.

SHZ 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-899, 901-999

(g) For the Left Pneumatic System, re-connect connector D458A to the Air Conditioning Relay Module, M324.

(h) For the Right Pneumatic System, re-connect connector D10002A to the Air Conditioning Relay Module, M1455.

SHZ ALL

(i) Do the Repair Confirmation at the end of this task.

H. Repair Confirmation

(1) Remove all pressure gages, associated test equipment and hardware.

(2) Re-connect all sense lines that were disconnected.

(a) Use Never-Seeze Pure Nickel Special anti-seeze compound (or equivalent) when you re-connect the sense lines.

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

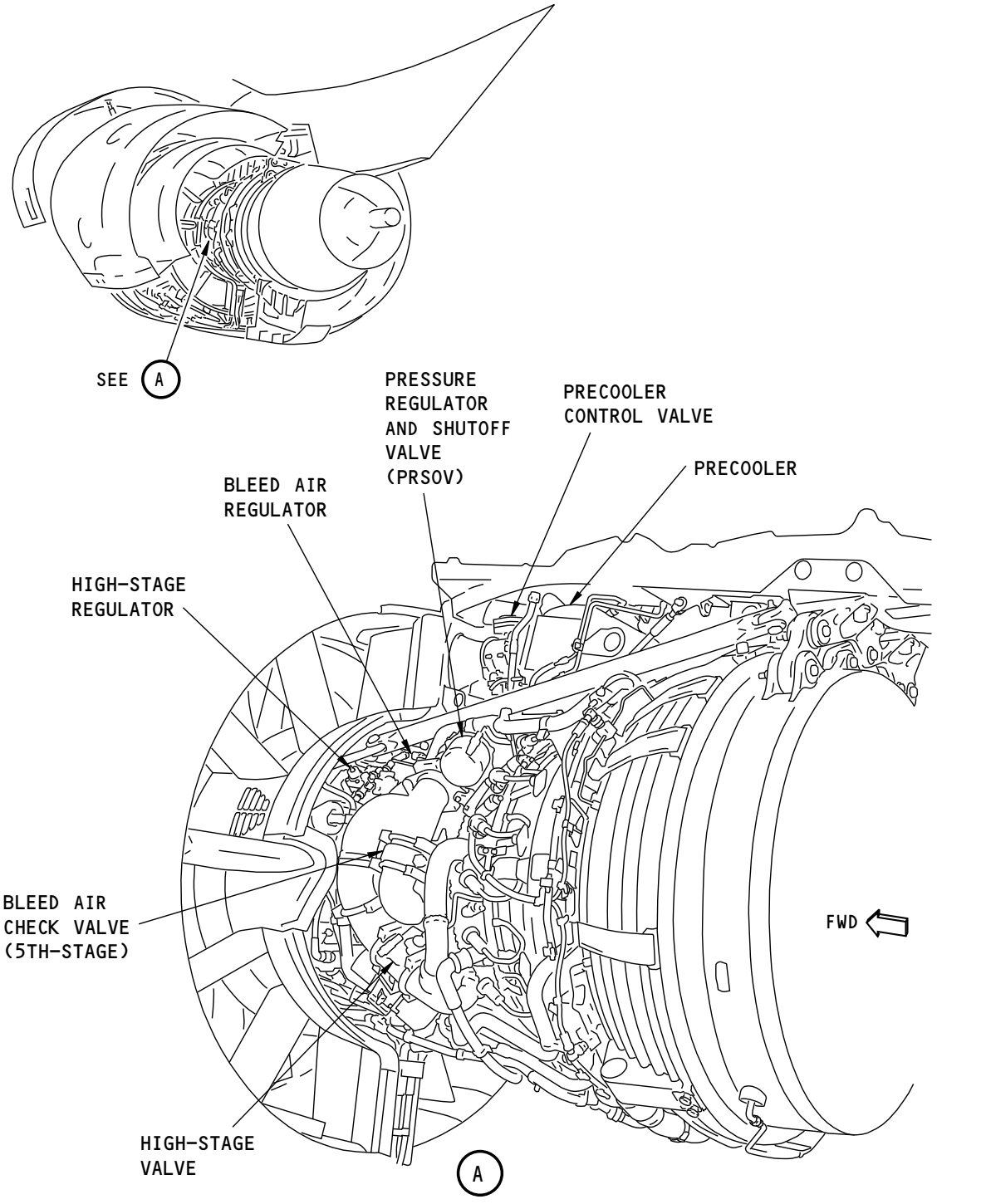
(3) For the applicable thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.

(4) Activate the applicable thrust reverser. This is the task: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.

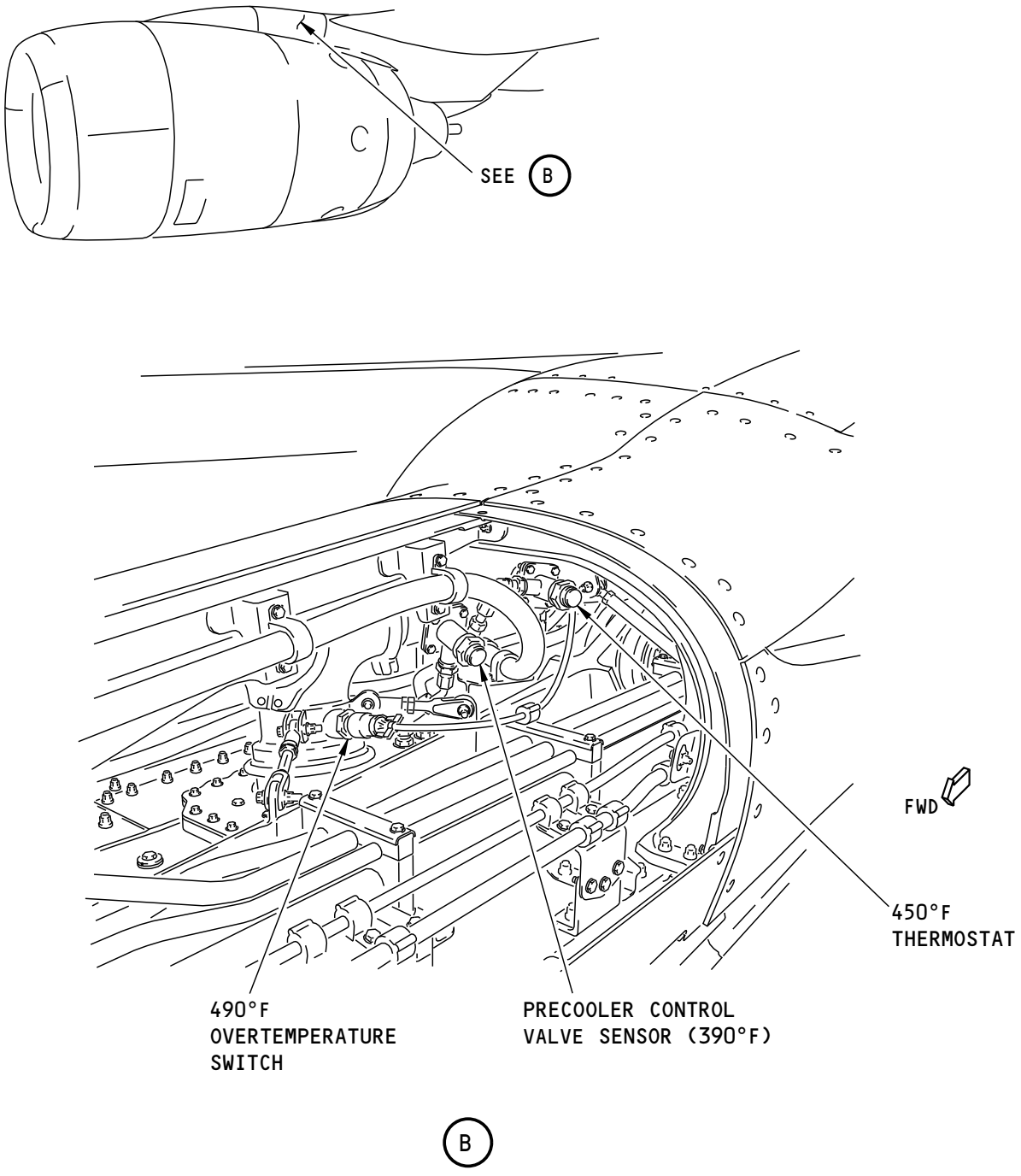
(5) Close the Fan Cowl Panels. This is the task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

(6) Re-activate the Leading Edge Flaps and Slats. This is the task: Leading Edge Flaps and Slats - Activation, AMM TASK 27-81-00-440-801.

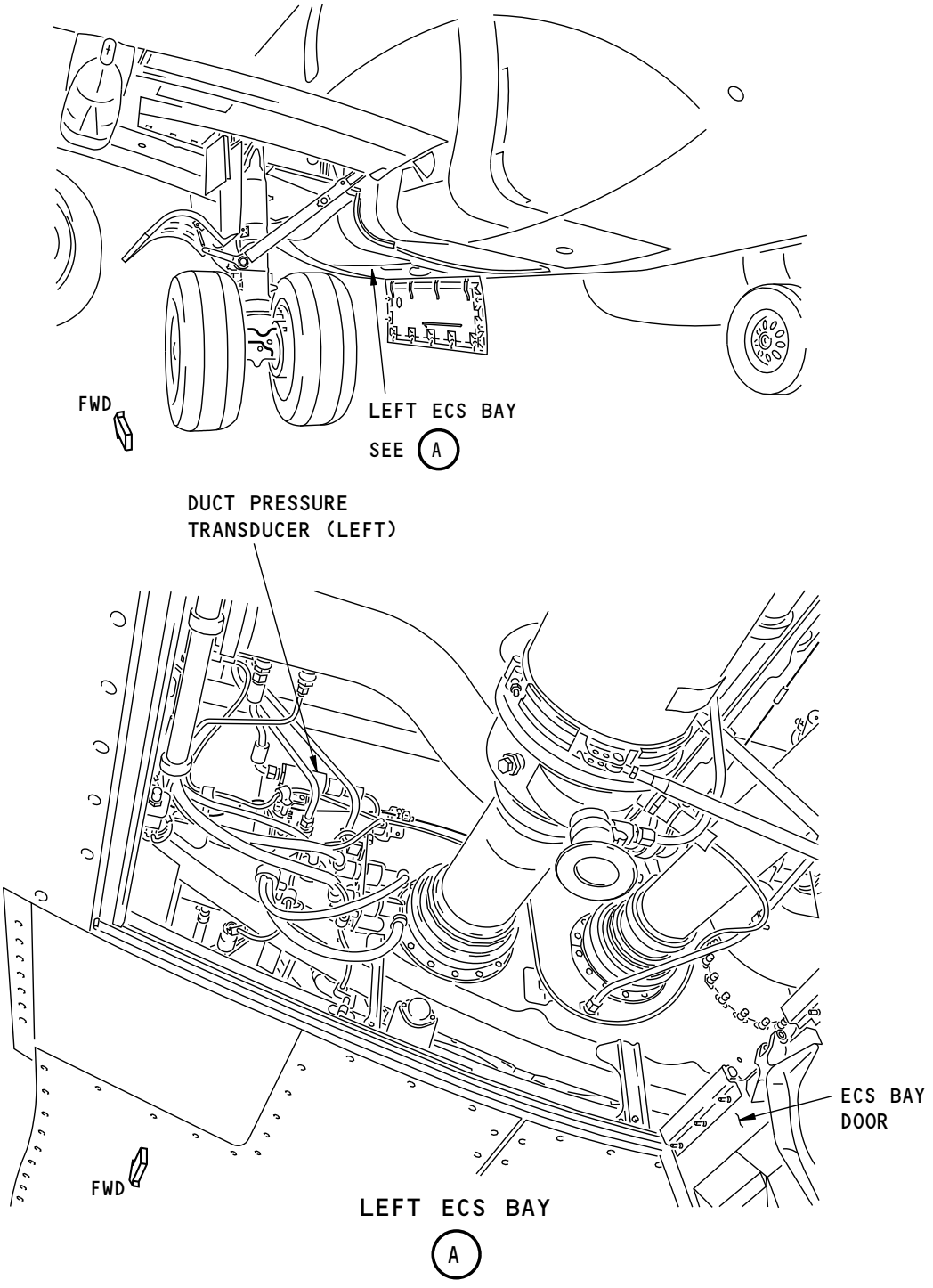
END OF TASK



Pneumatic System on the Engine/Strut Component Location
Figure 301/36-10-00-990-801 (Sheet 1 of 2)

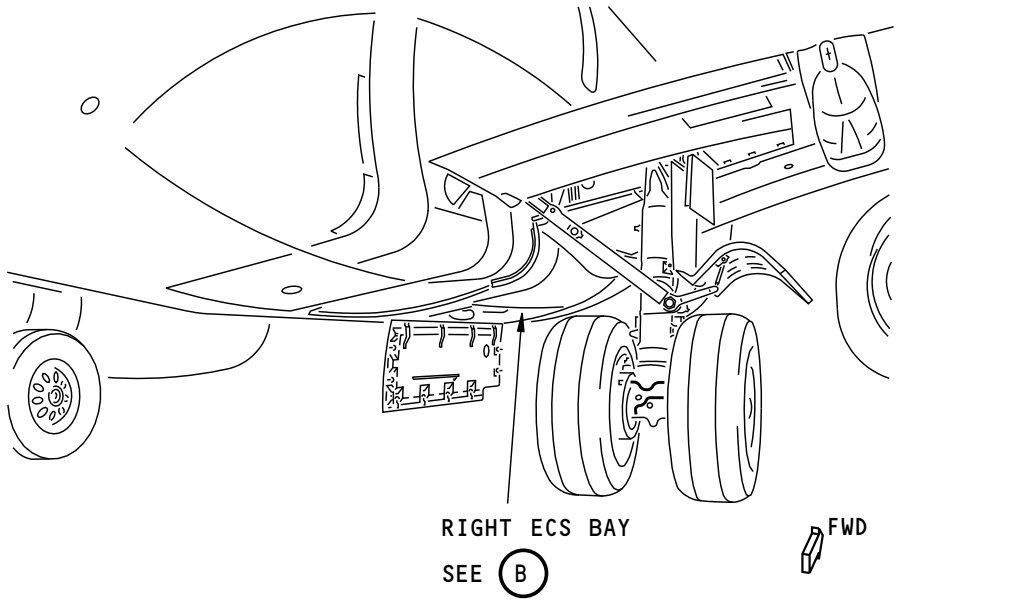


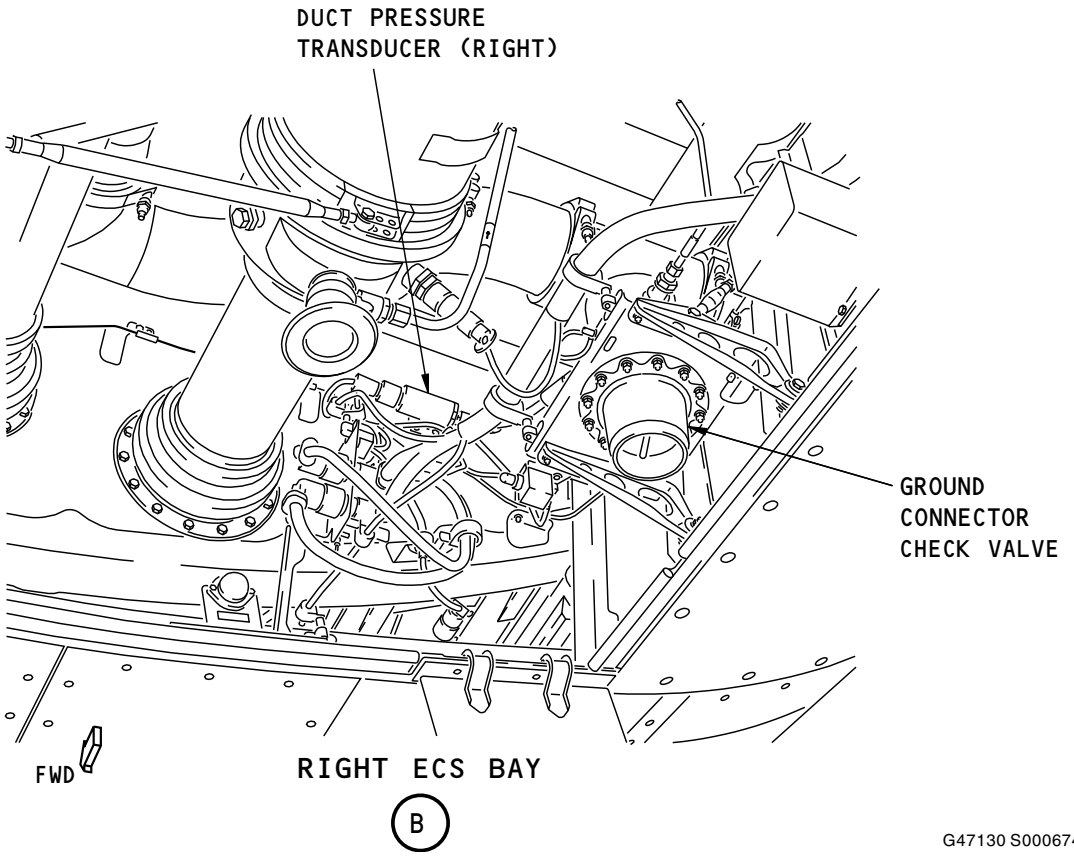
Pneumatic System on the Engine/Strut Component Location
Figure 301/36-10-00-990-801 (Sheet 2 of 2)



G47128 S0006744850_V1

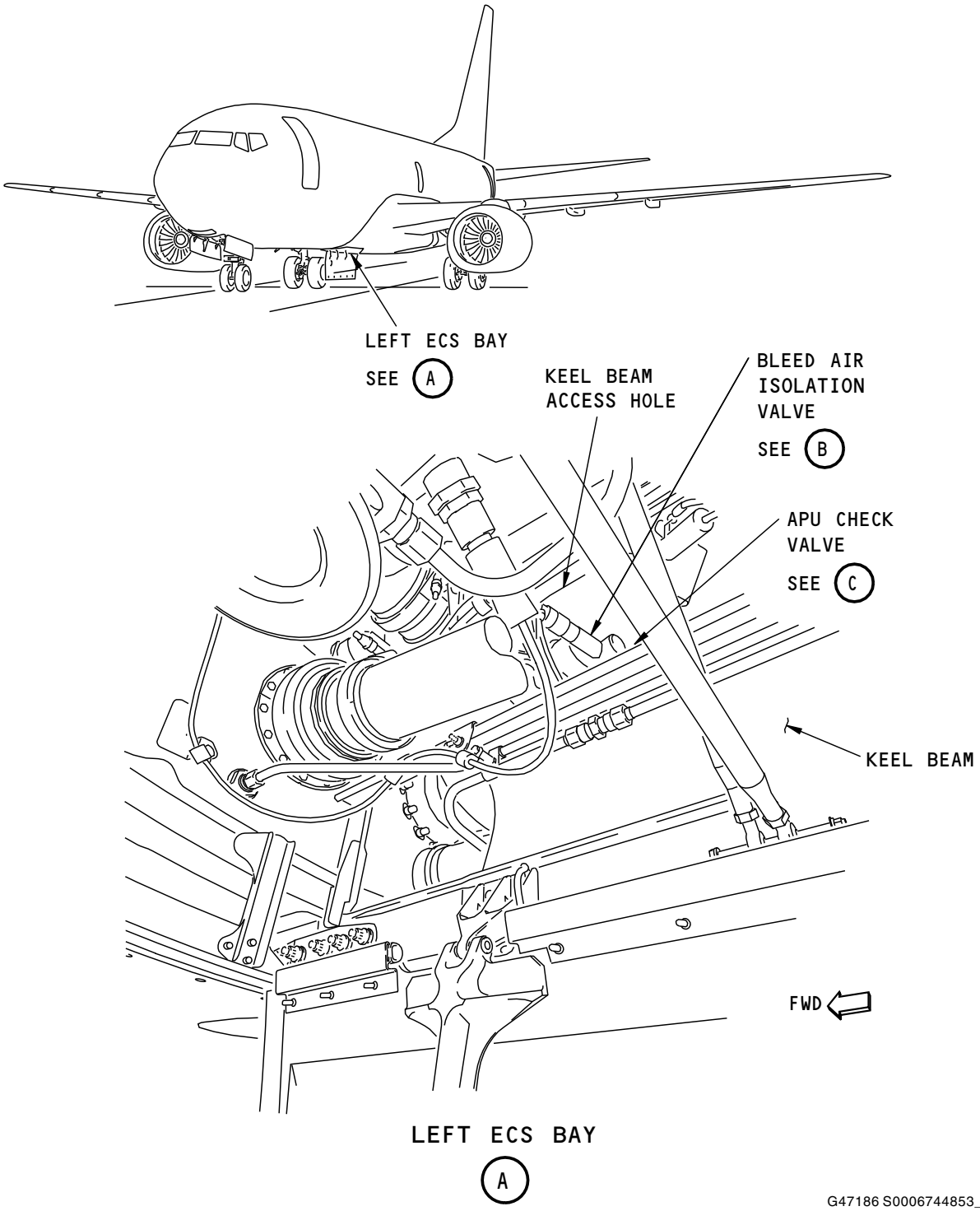
Pneumatic System in the ECS Bay Component Location
Figure 302/36-10-00-990-802 (Sheet 1 of 2)



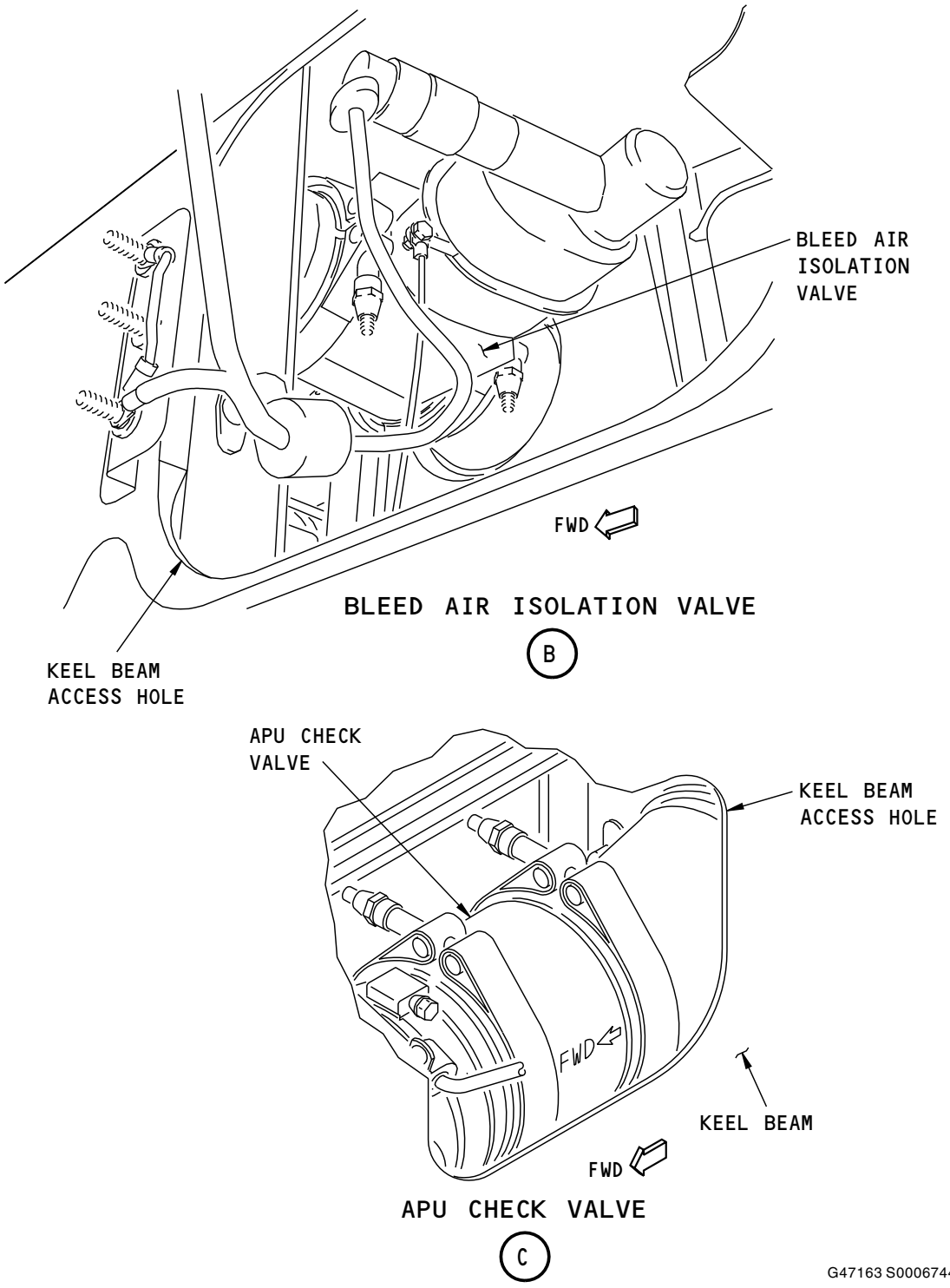


G47130 S0006744851_V1

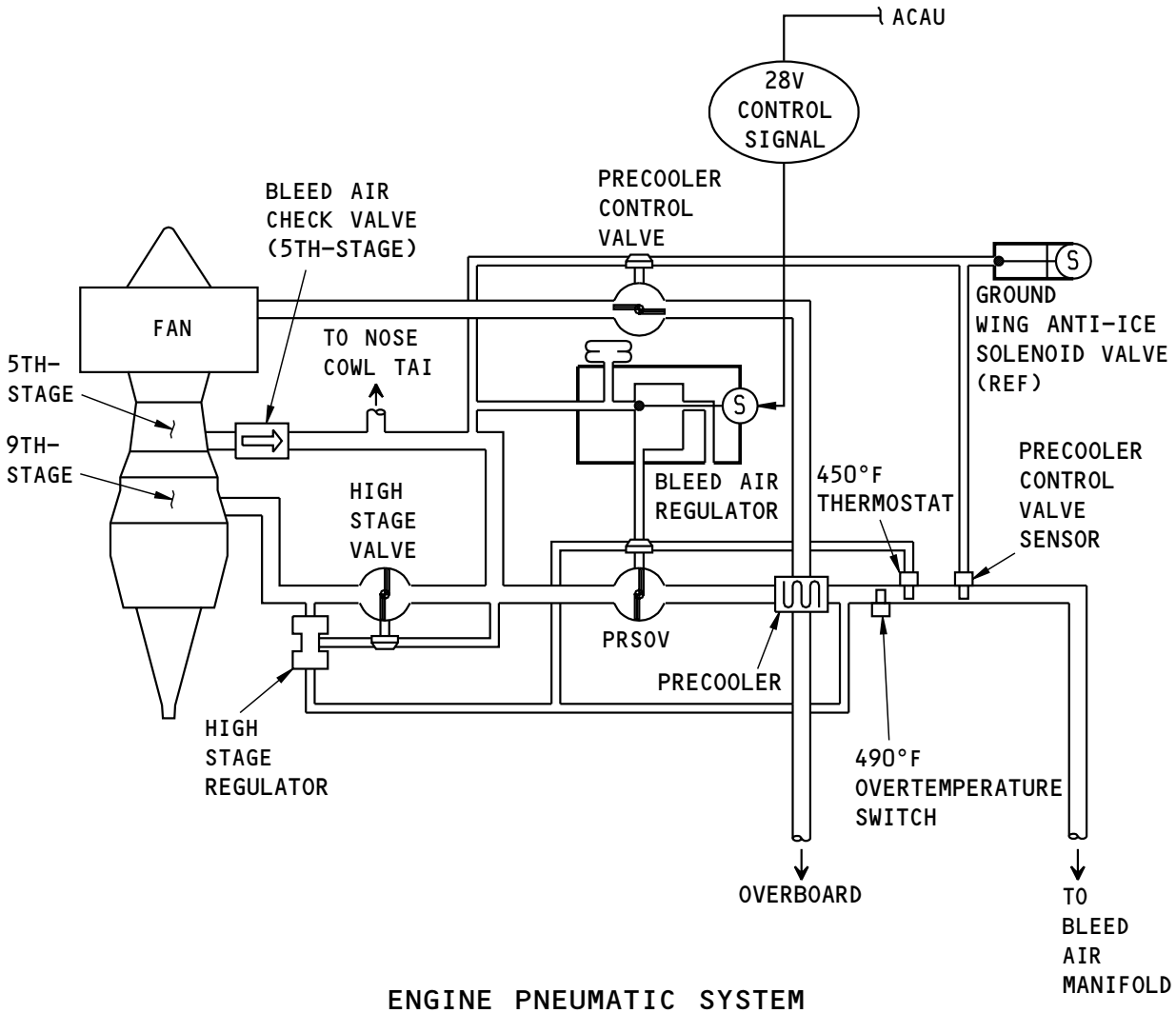
Pneumatic System in the ECS Bay Component Location
Figure 302/36-10-00-990-802 (Sheet 2 of 2)



Pneumatic System in the Keel Beam Component Location
Figure 303/36-10-00-990-803 (Sheet 1 of 2)



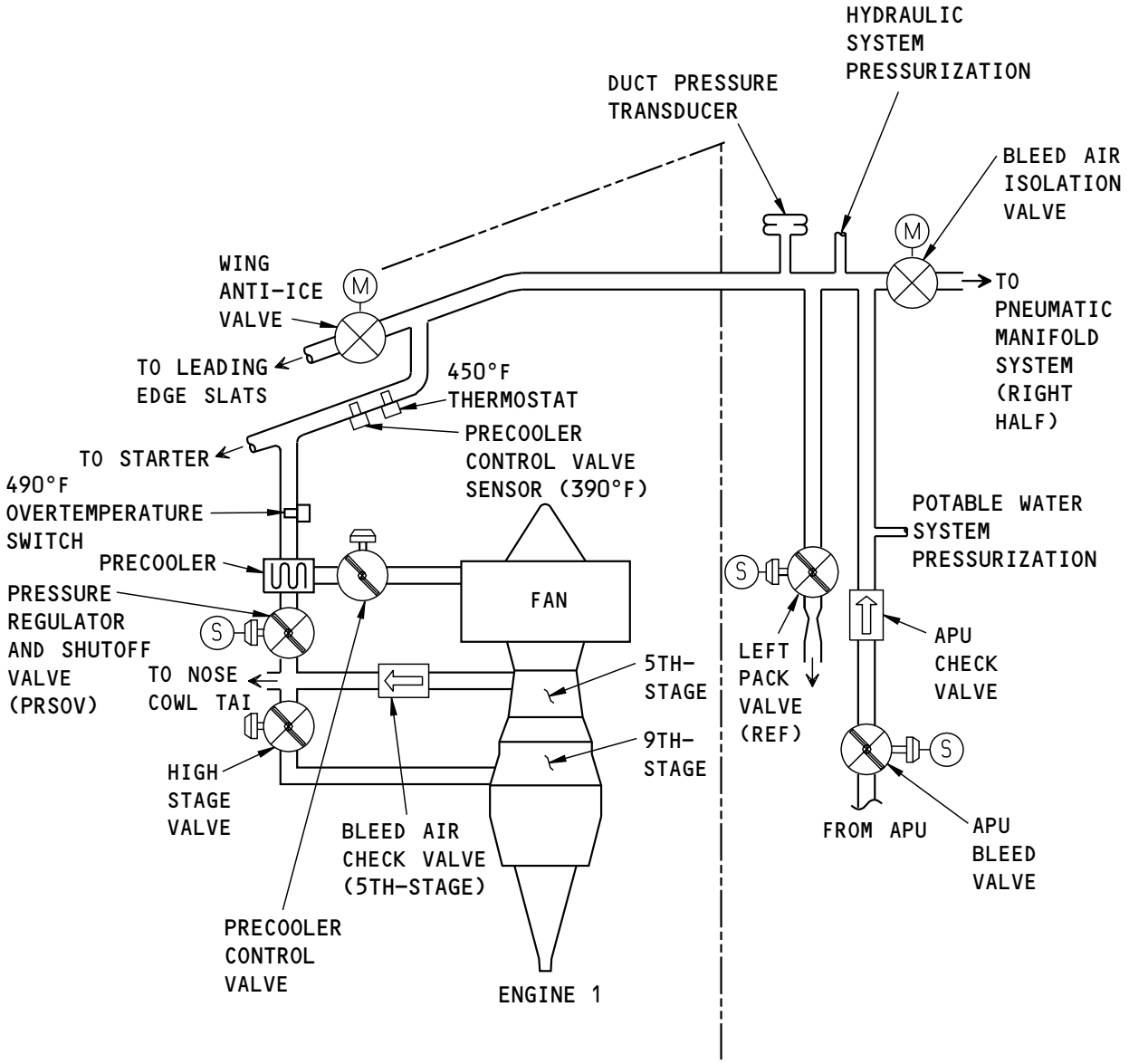
Pneumatic System in the Keel Beam Component Location
Figure 303/36-10-00-990-803 (Sheet 2 of 2)



ENGINE PNEUMATIC SYSTEM

G43678 S0006744855_V1

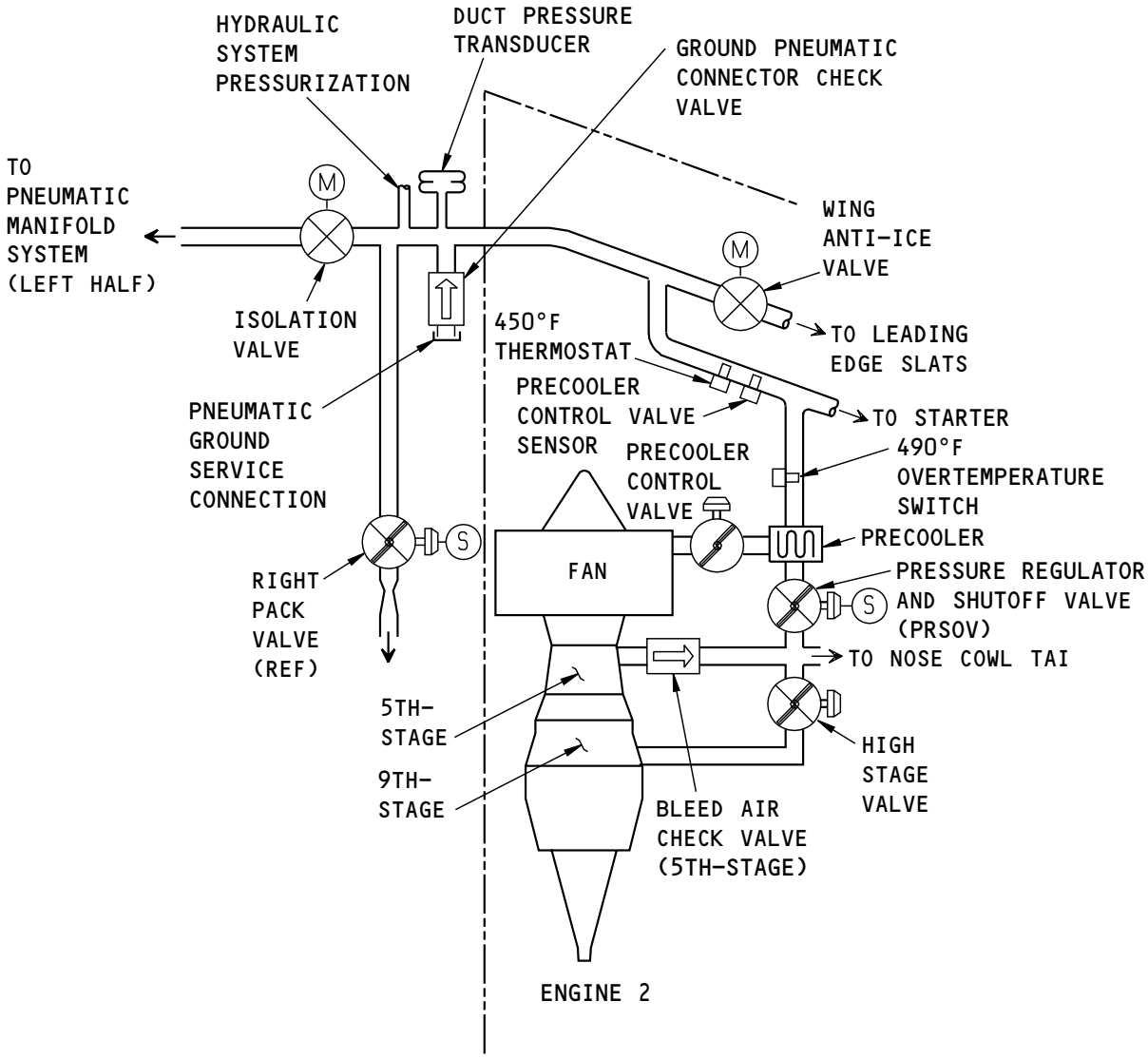
Pneumatic System Schematic
Figure 304/36-10-00-990-804 (Sheet 1 of 3)



PNEUMATIC MANIFOLD SYSTEM
(LEFT HALF)

G49426 S0006744856_V1

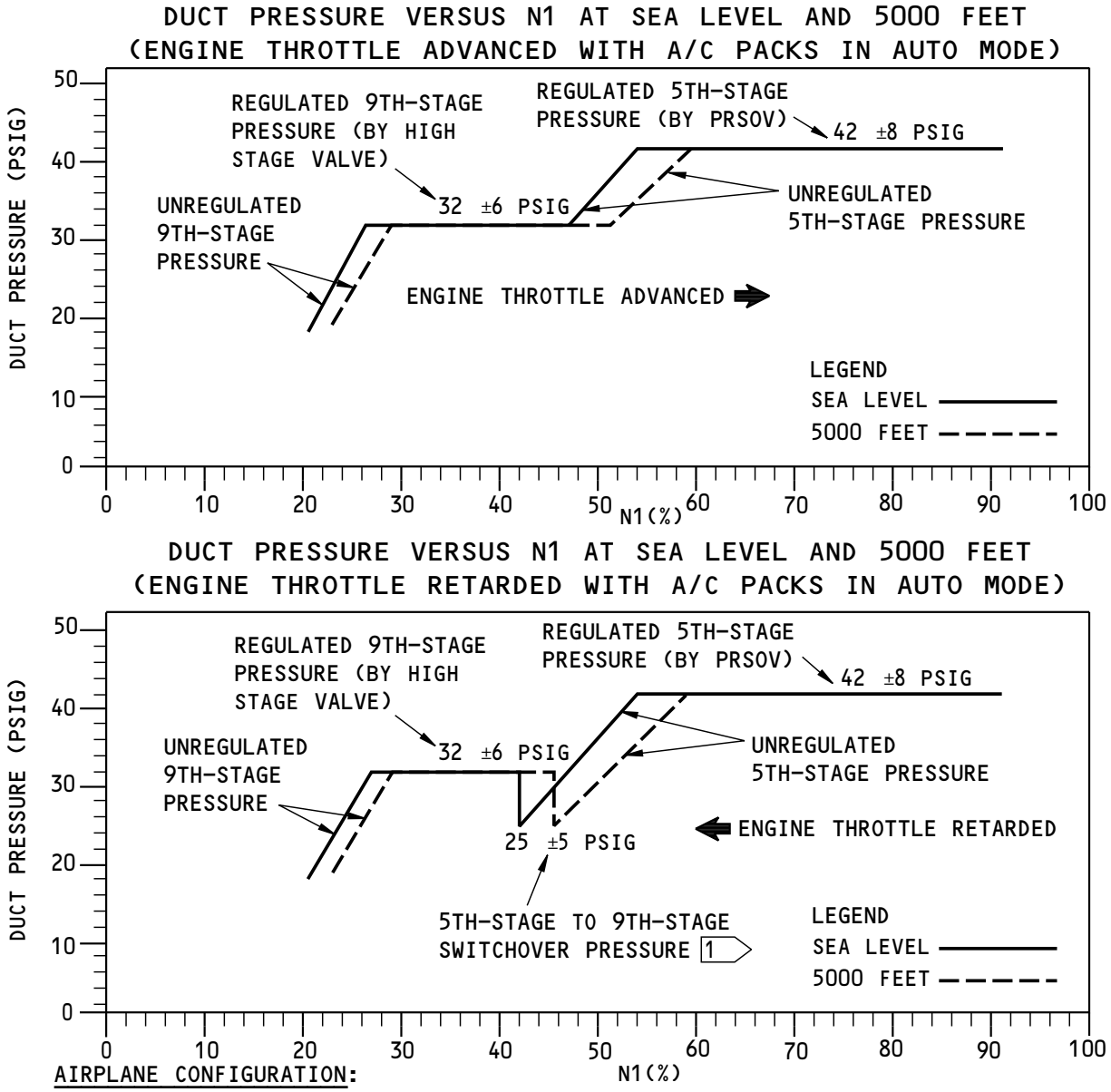
Pneumatic System Schematic
Figure 304/36-10-00-990-804 (Sheet 2 of 3)



PNEUMATIC MANIFOLD SYSTEM
(RIGHT HALF)

G49700 S0006744858_V1

Pneumatic System Schematic
Figure 304/36-10-00-990-804 (Sheet 3 of 3)

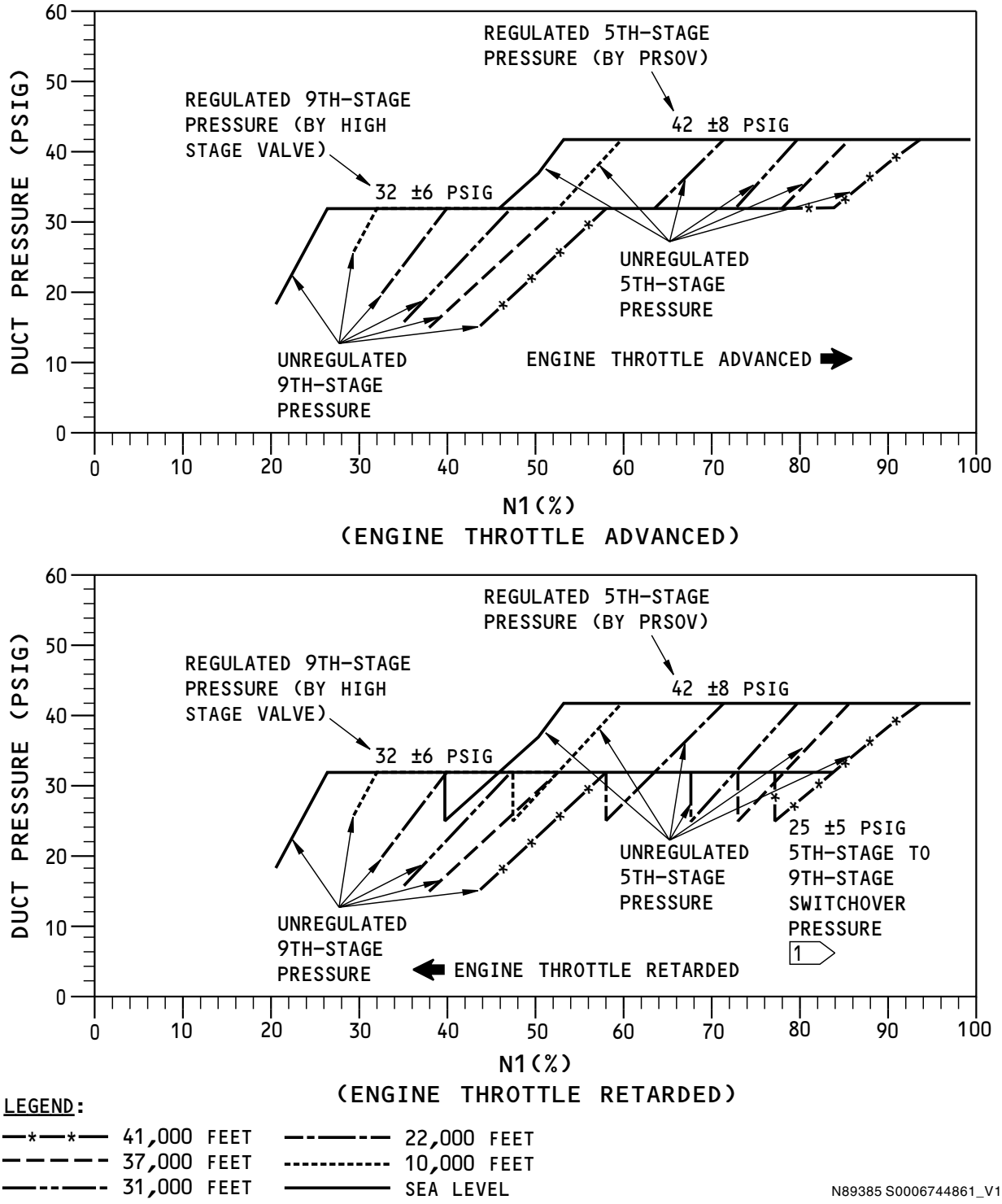


AIRPLANE CONFIGURATION:
ASSOCIATED PACK: AUTO
ASSOCIATED BLEED: ON
ASSOCIATED CTAI: OFF
ISOLATION VALVE: CLOSED
WTAI: OFF

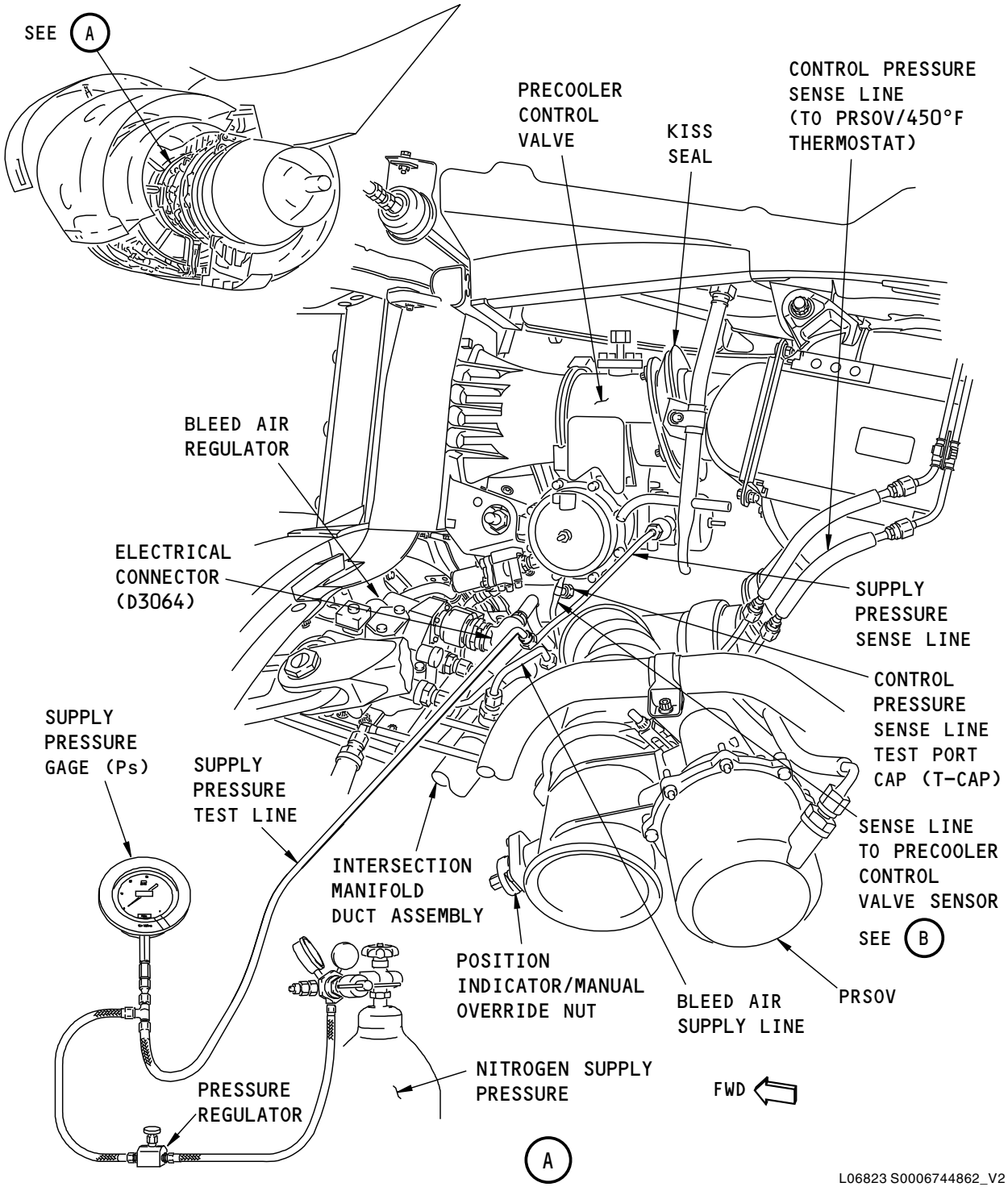
1 WHEN THE ENGINE THROTTLE IS RETARDED AND THE ENGINE BLEED SYSTEM SWITCHOVER OCCUR FROM 5TH-STAGE PRESSURE TO 9TH-STAGE PRESSURE, DUCT PRESSURE CAN DECAY TO AS LOW AS 20 PSIG BEFORE THE HIGH STAGE VALVE OPENS AND REGULATES THE DUCT PRESSURE TO NOMINAL 32 PSIG.

G08869 S0006577919_V2

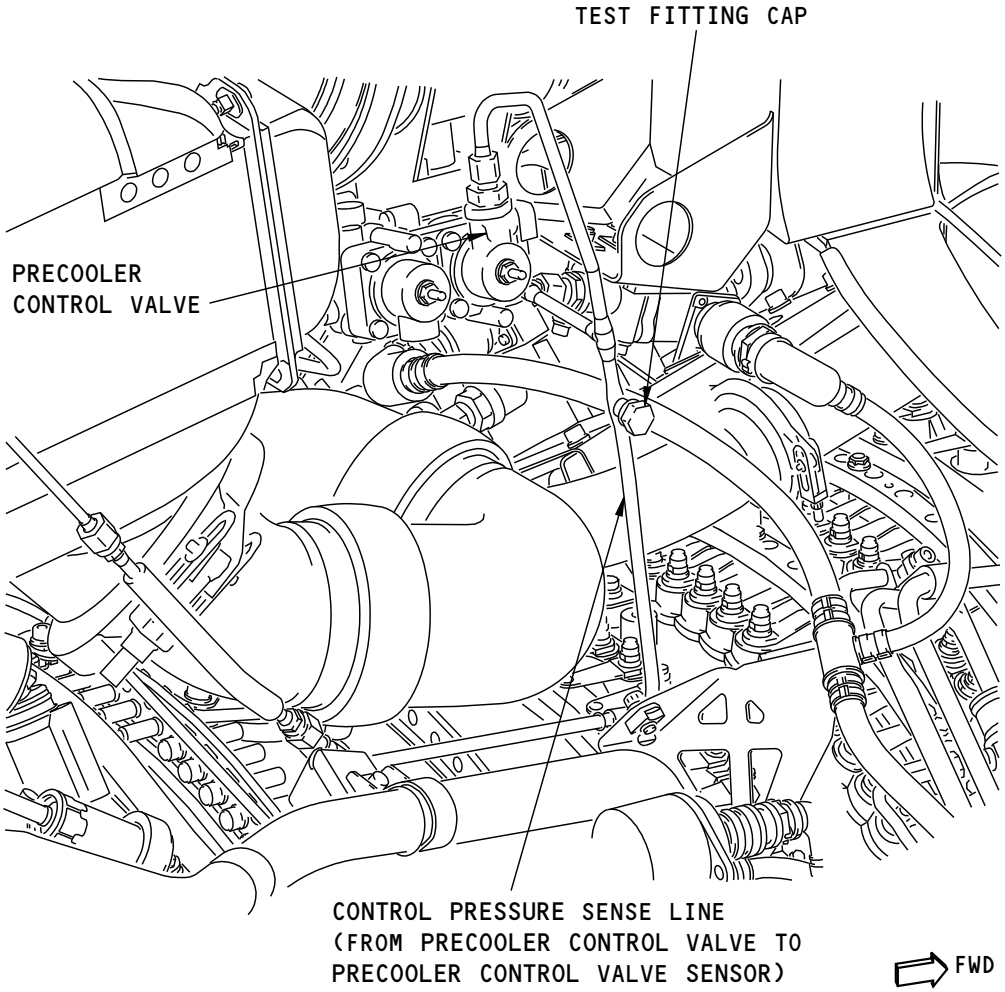
Duct Pressure Versus N1 at Various Altitudes
Figure 305/36-10-00-990-805 (Sheet 1 of 2)



Duct Pressure Versus N1 at Various Altitudes
Figure 305/36-10-00-990-805 (Sheet 2 of 2)



Bleed Trip Off Light On. The Engine Is the Bleed Source.
Figure 306/36-10-00-990-806 (Sheet 1 of 2)

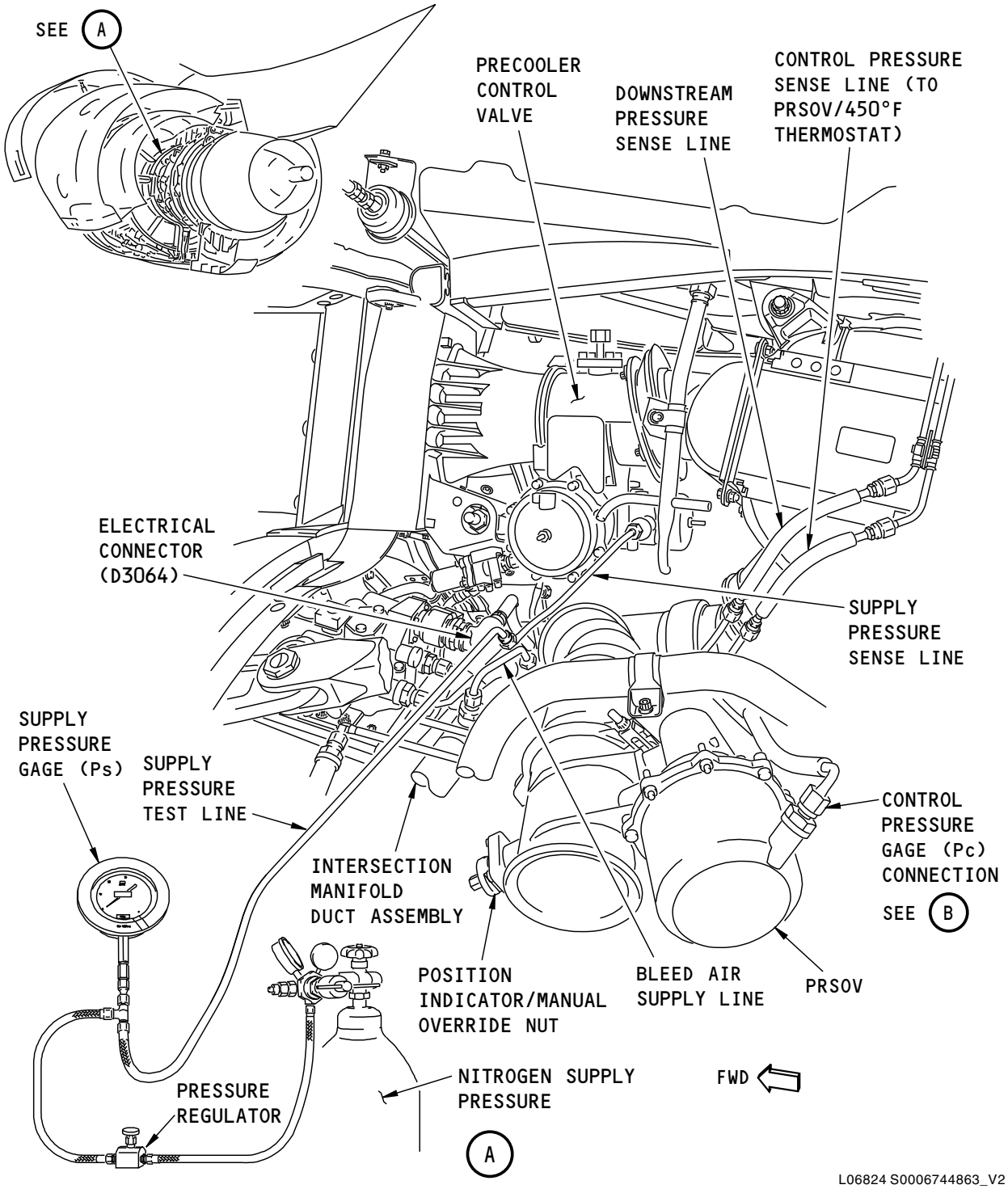


CONTROL PRESSURE SENSE LINE

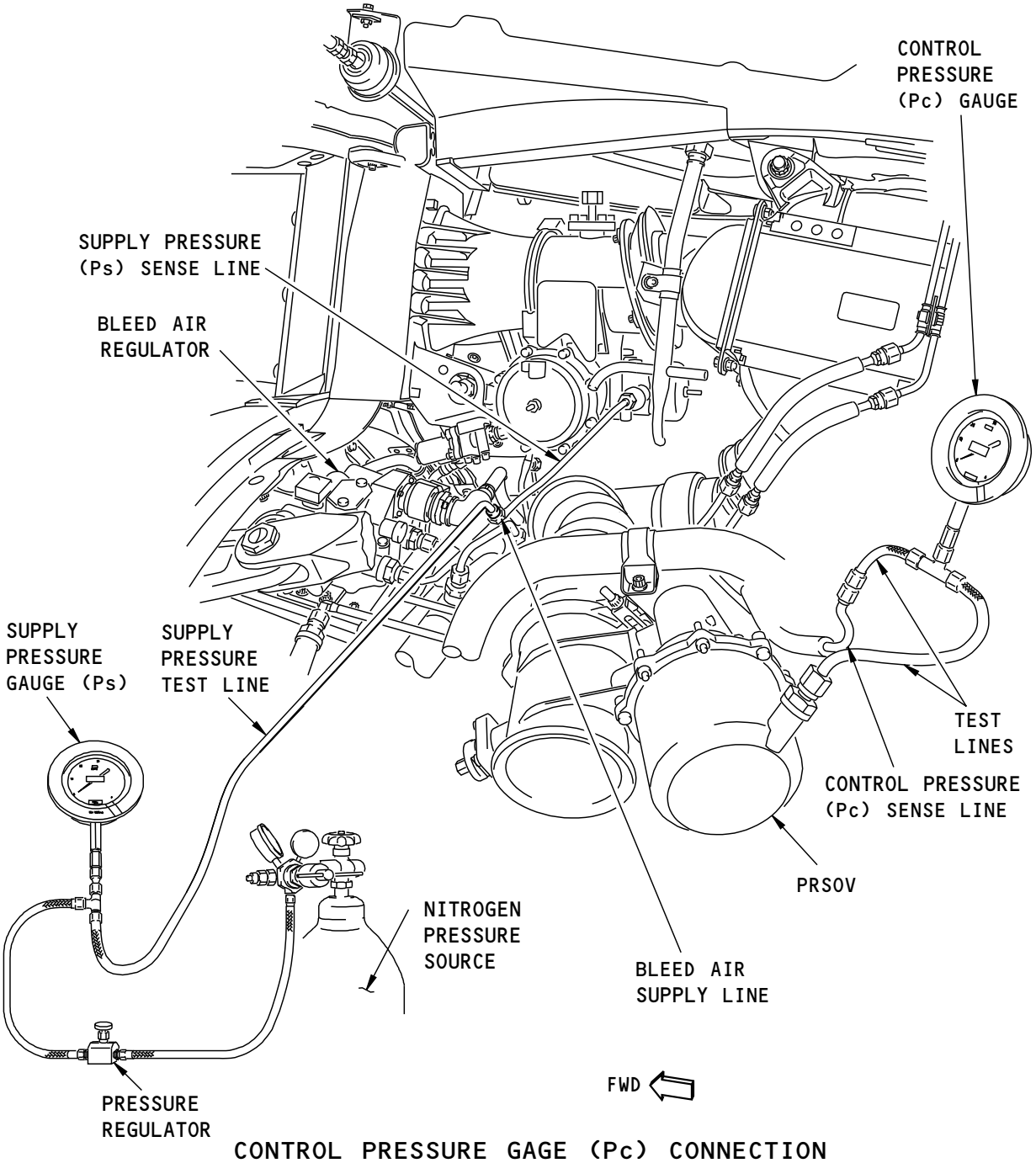
B

1363445 S0000246231_V1

Bleed Trip Off Light On. The Engine Is the Bleed Source.
Figure 306/36-10-00-990-806 (Sheet 2 of 2)

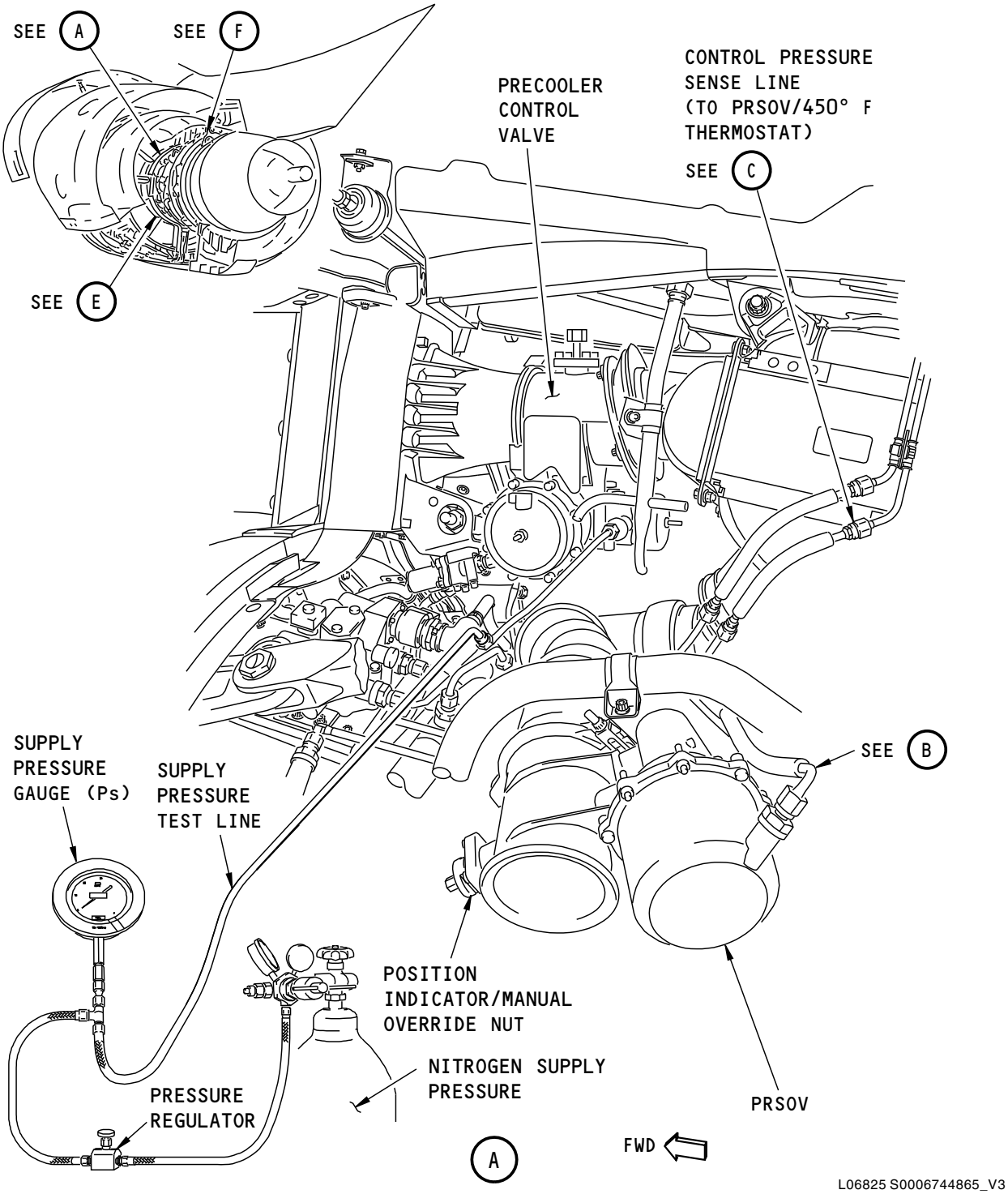


Duct Pressure High/Bleed Valve Does Not Close When Bleed Switches are Moved to Off. The Engine is the Bleed Source.
Figure 307/36-10-00-990-807 (Sheet 1 of 2)

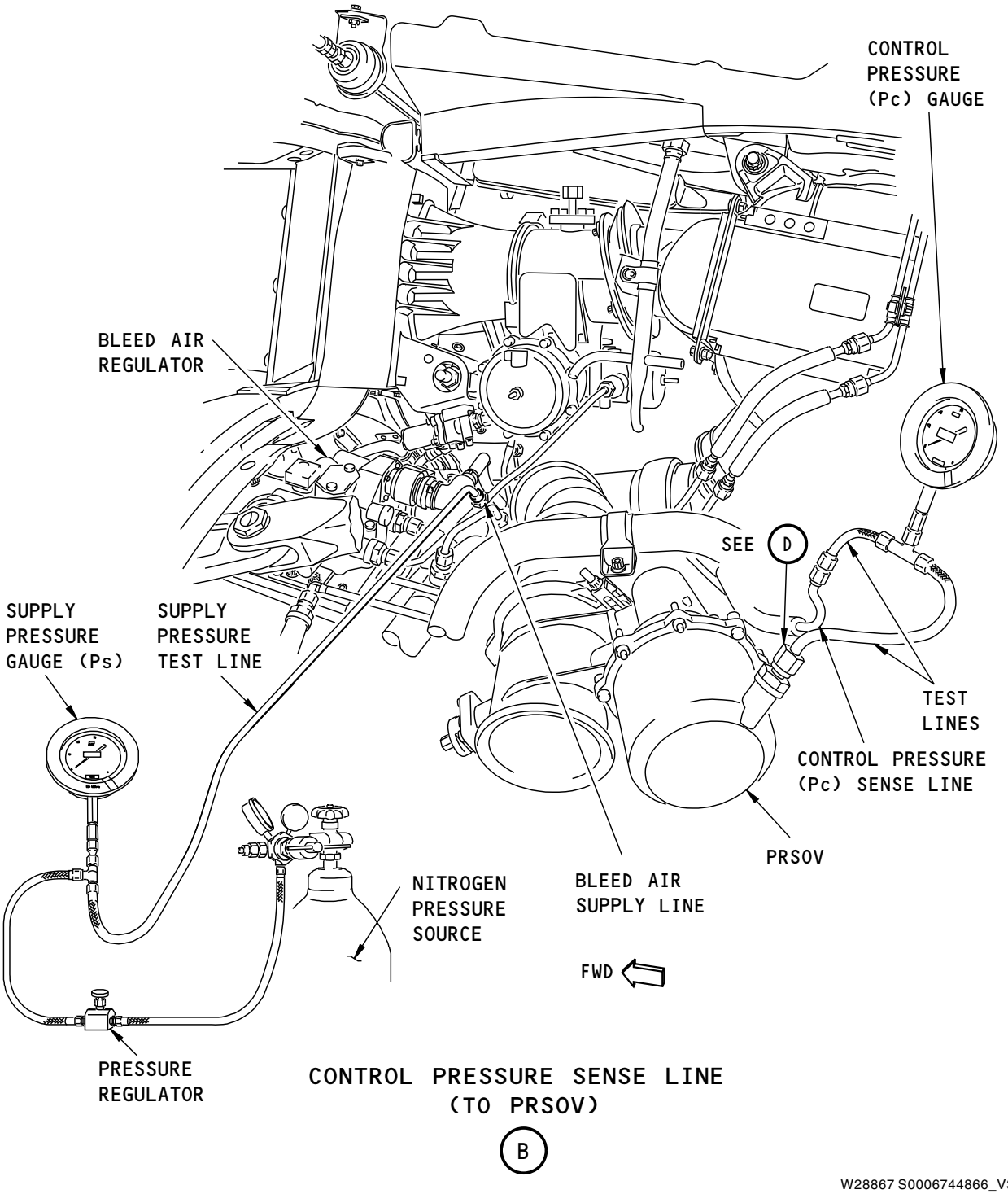


W28866 S0006744864_V2

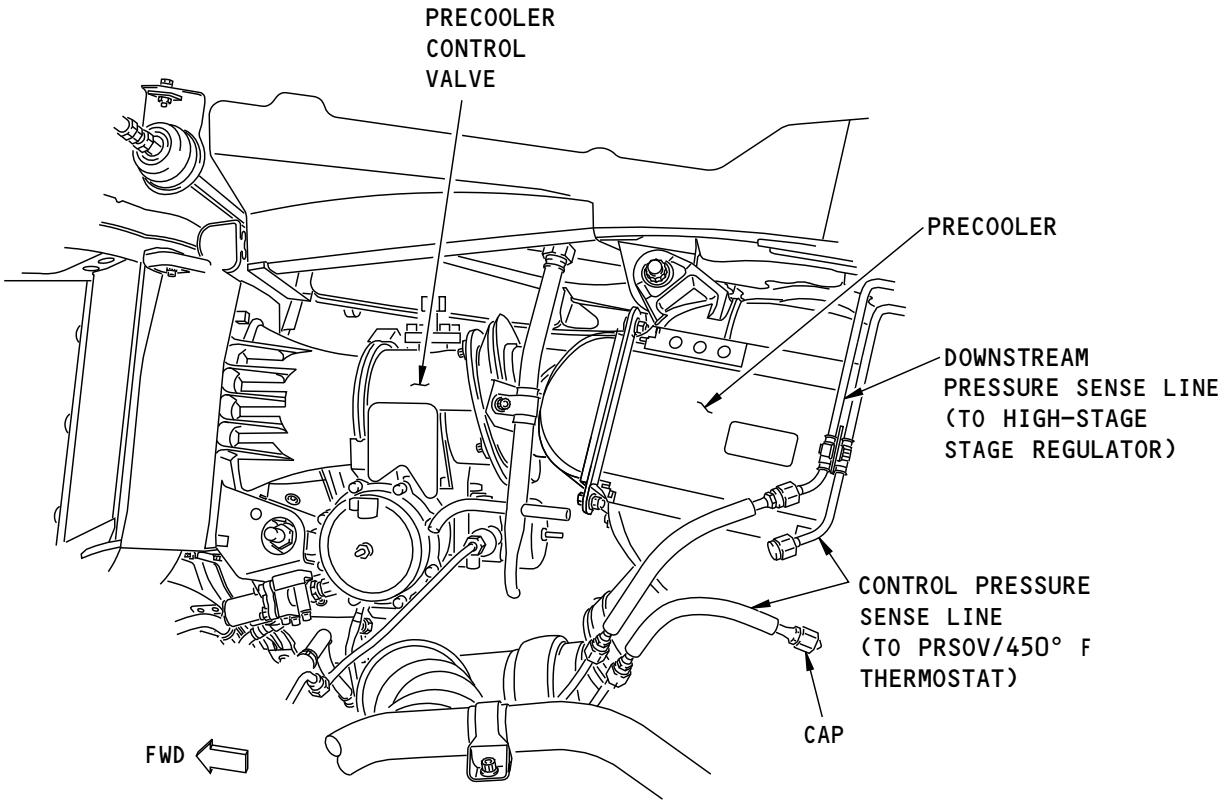
Duct Pressure High/Bleed Valve Does Not Close When Bleed Switches are Moved to Off. The Engine is the Bleed Source.
Figure 307/36-10-00-990-807 (Sheet 2 of 2)



Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 1 of 6)



Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 2 of 6)

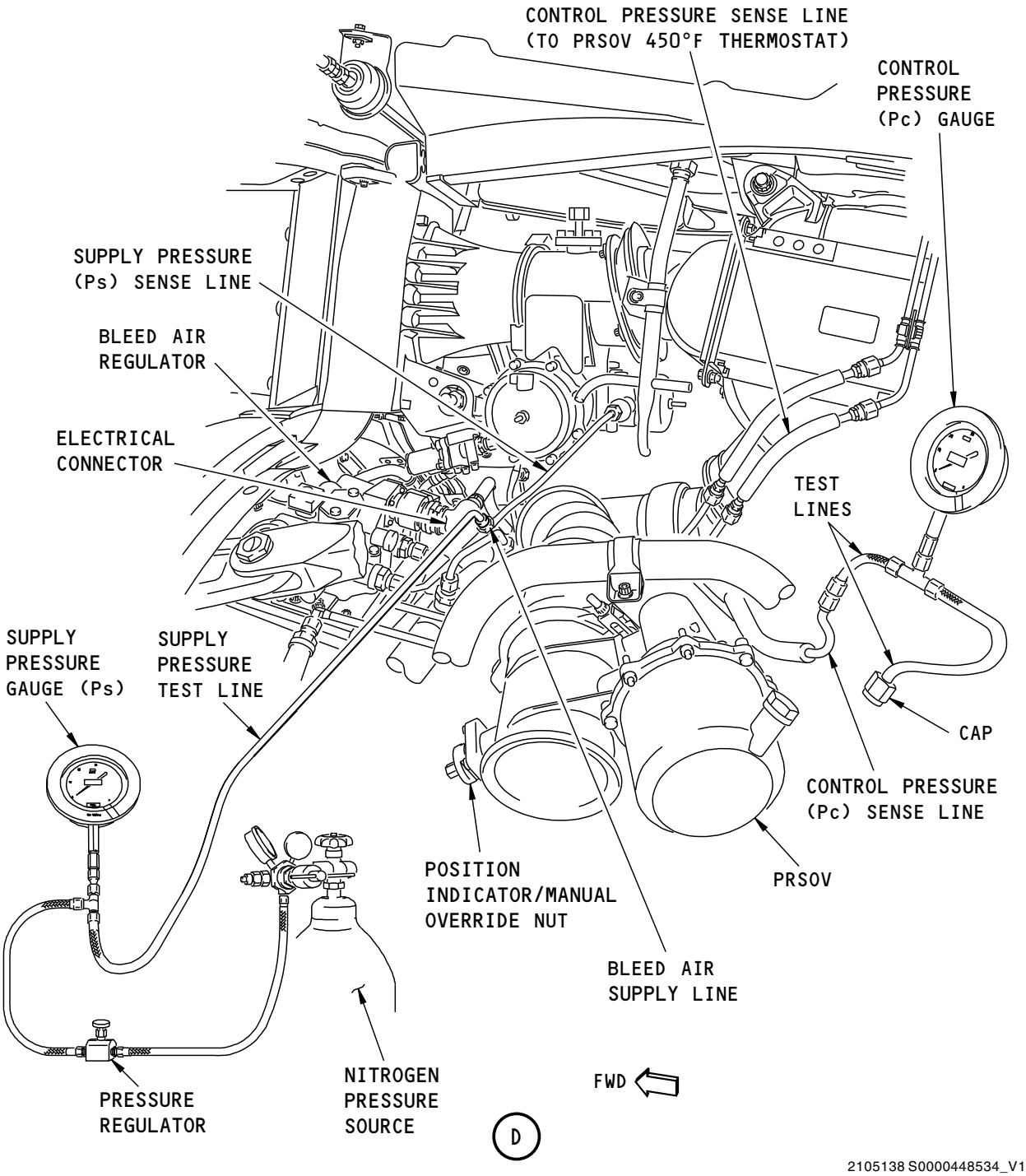


CONTROL PRESSURE SENSE LINE WITH CAP

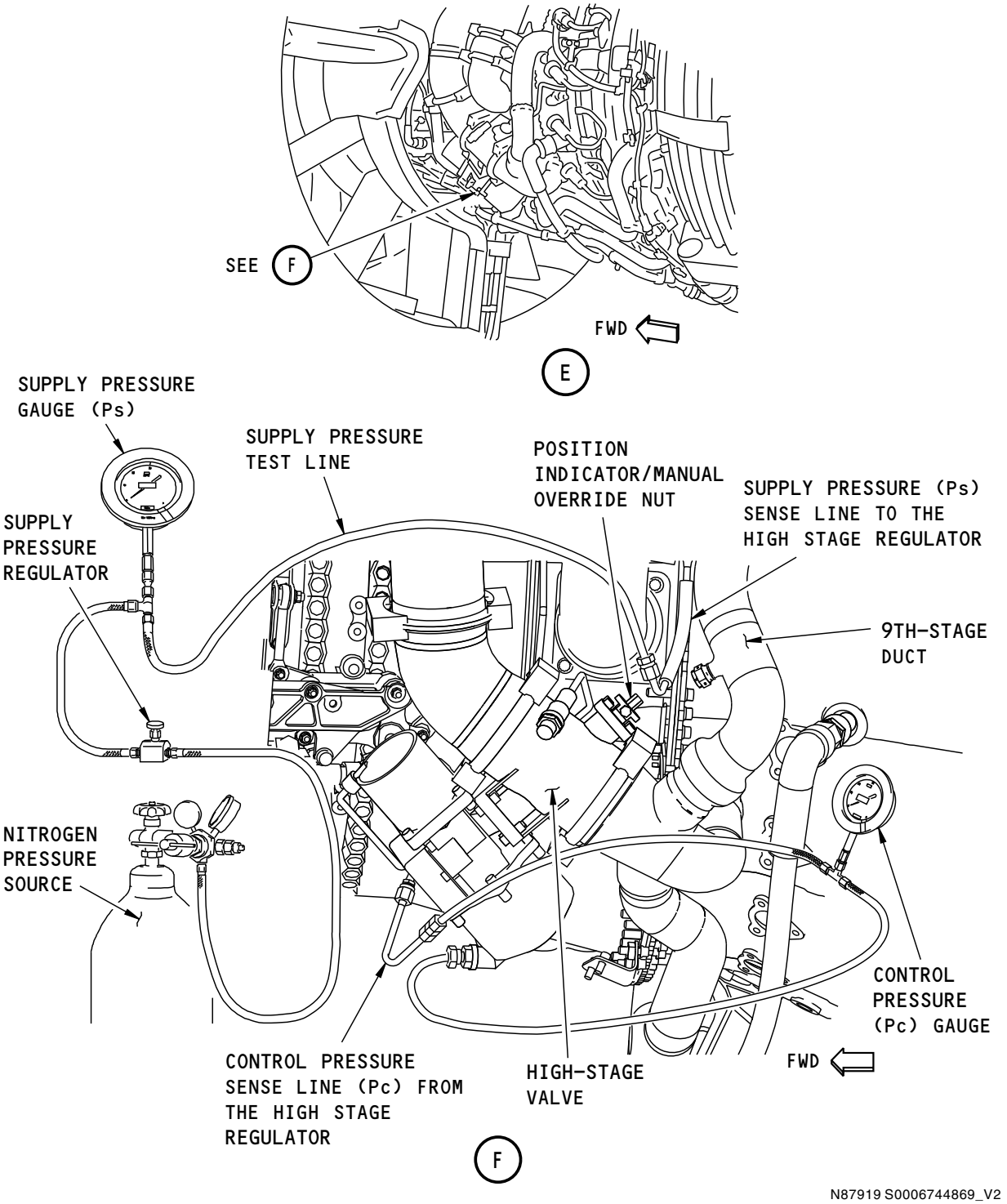
C

W28869 S0006744870_V3

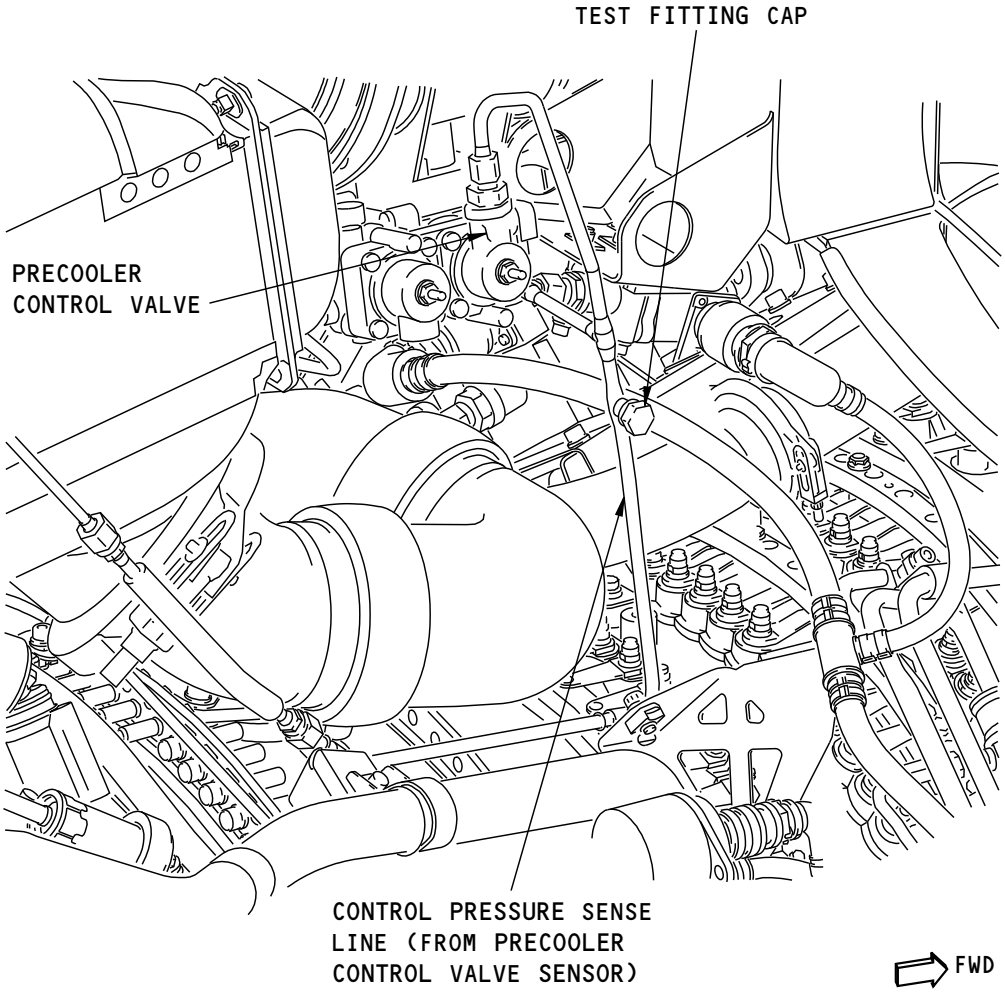
Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 3 of 6)



Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 4 of 6)



Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 5 of 6)

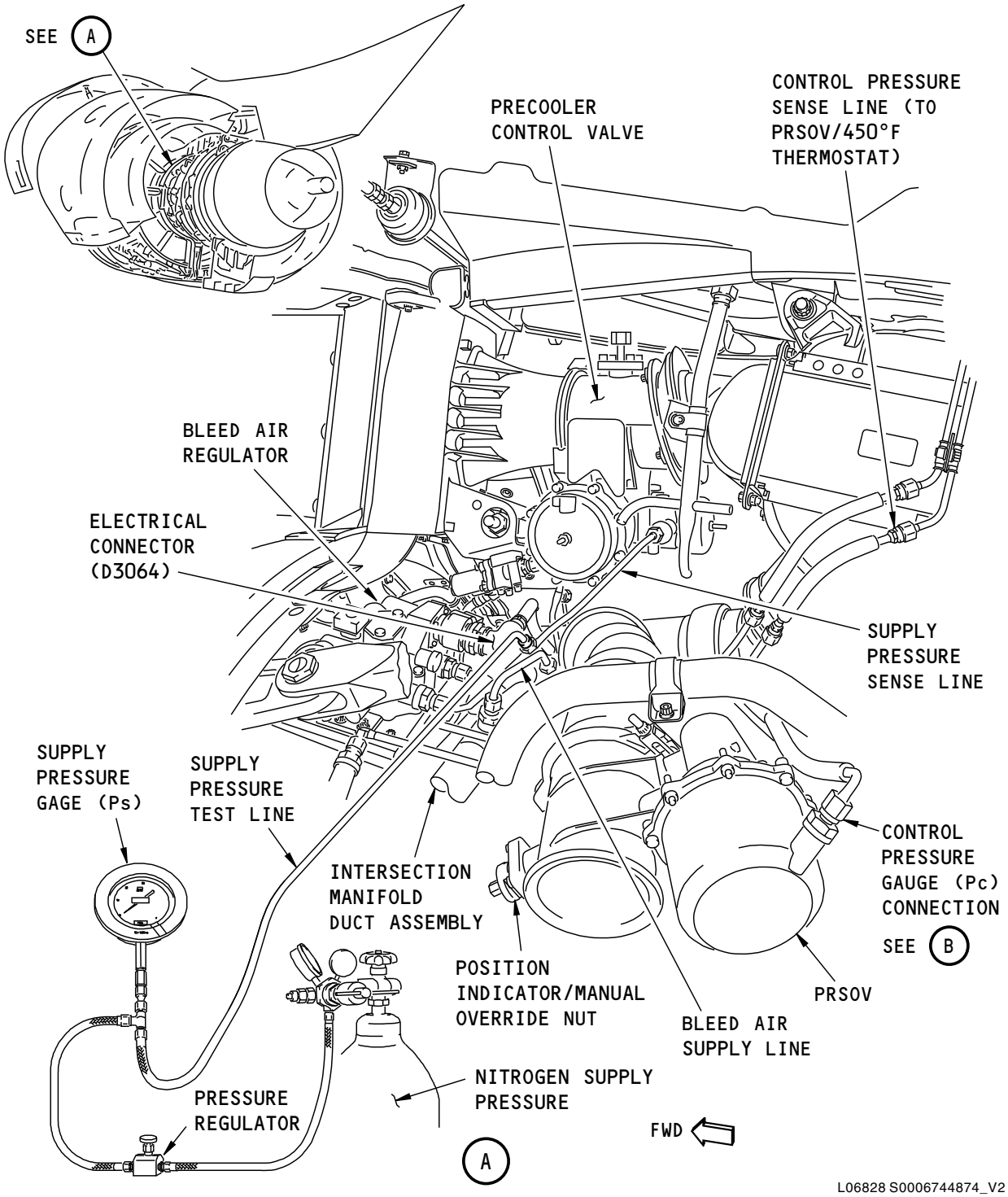


CONTROL PRESSURE SENSE LINE
(FROM PRECOOLER CONTROL VALVE SENSOR)

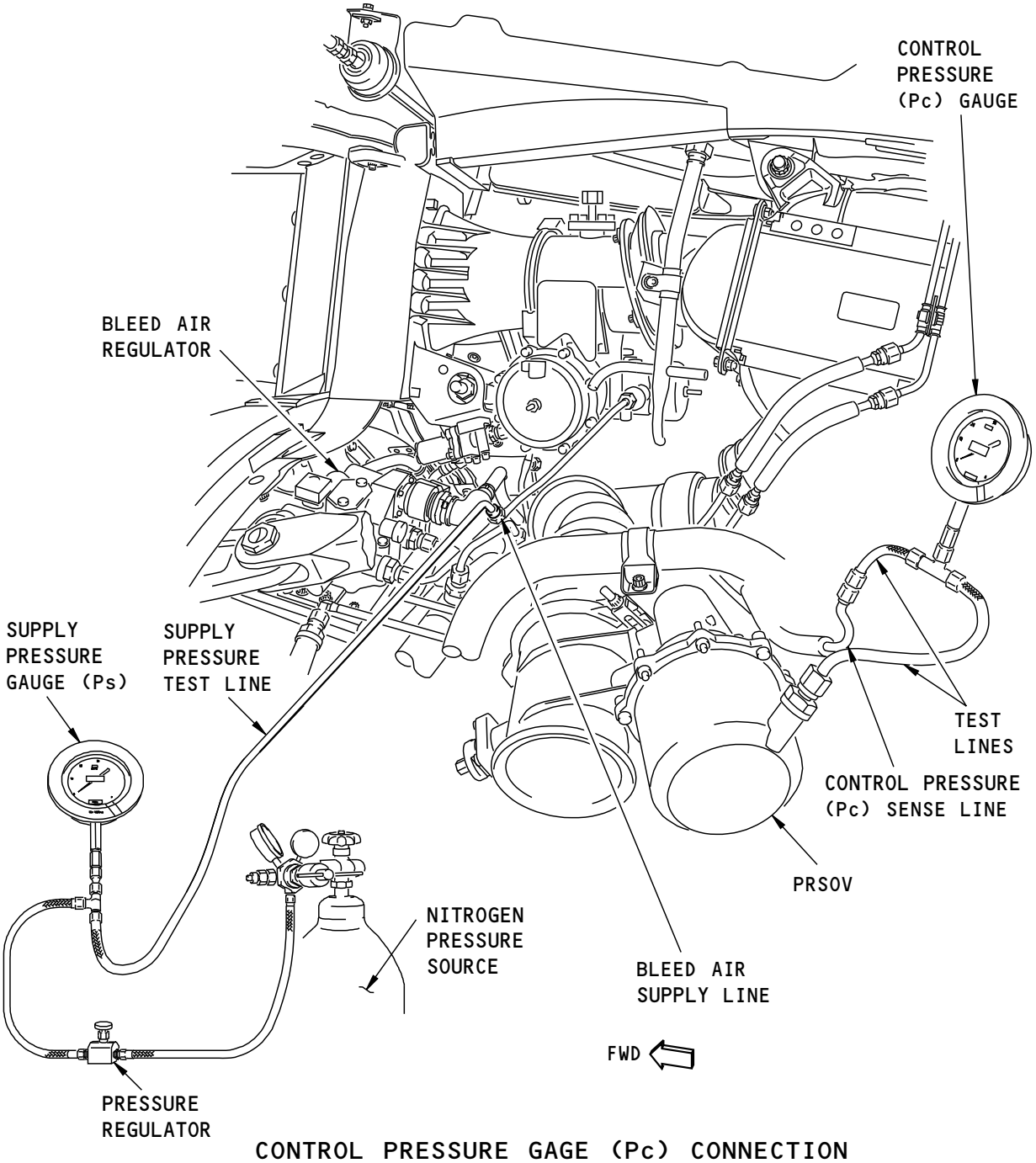
G

L06827 S0006744867_V2

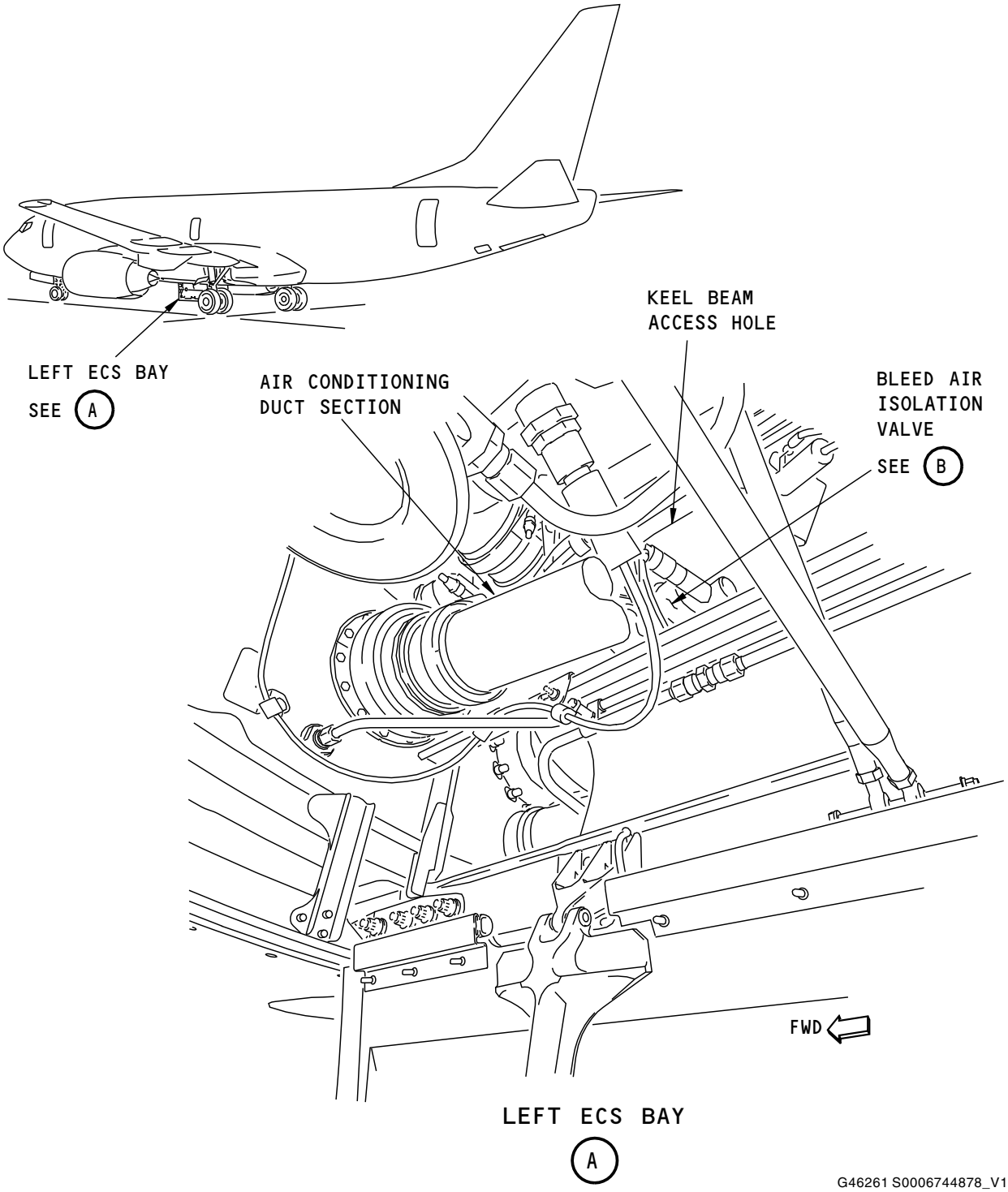
Duct Pressure Low. The Engine is the Bleed Source.
Figure 308/36-10-00-990-808 (Sheet 6 of 6)



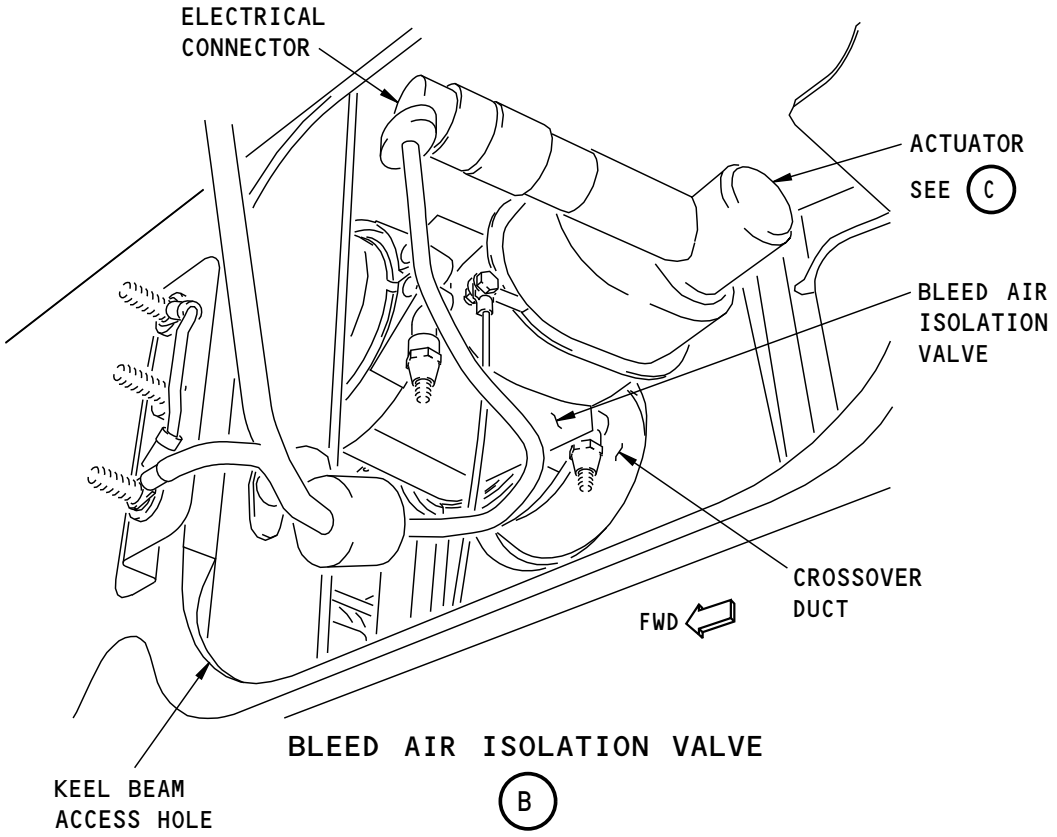
Duct Pressure Zero. The Engine is the Bleed Source.
Figure 309/36-10-00-990-809 (Sheet 1 of 2)



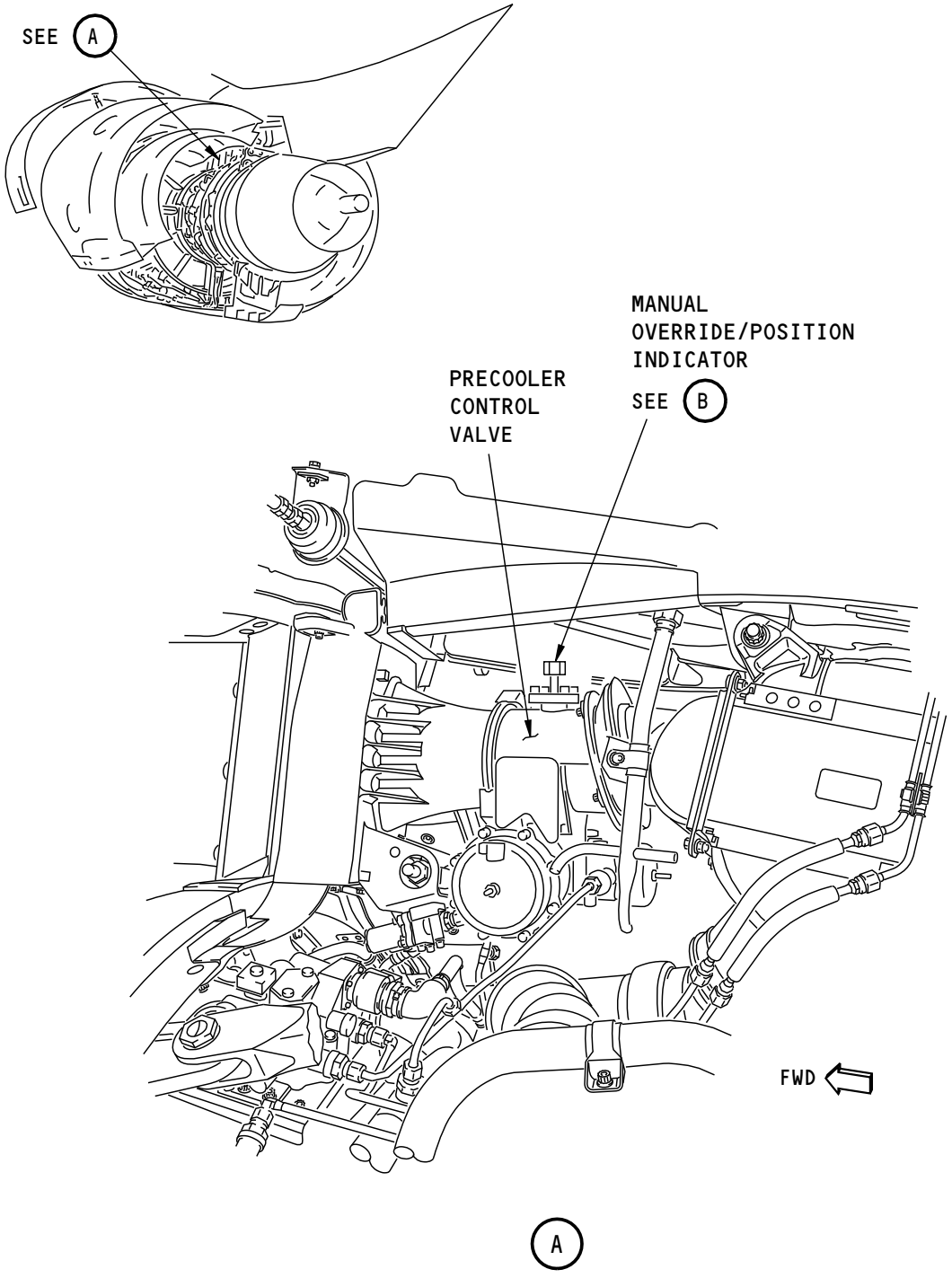
Duct Pressure Zero. The Engine is the Bleed Source.
Figure 309/36-10-00-990-809 (Sheet 2 of 2)



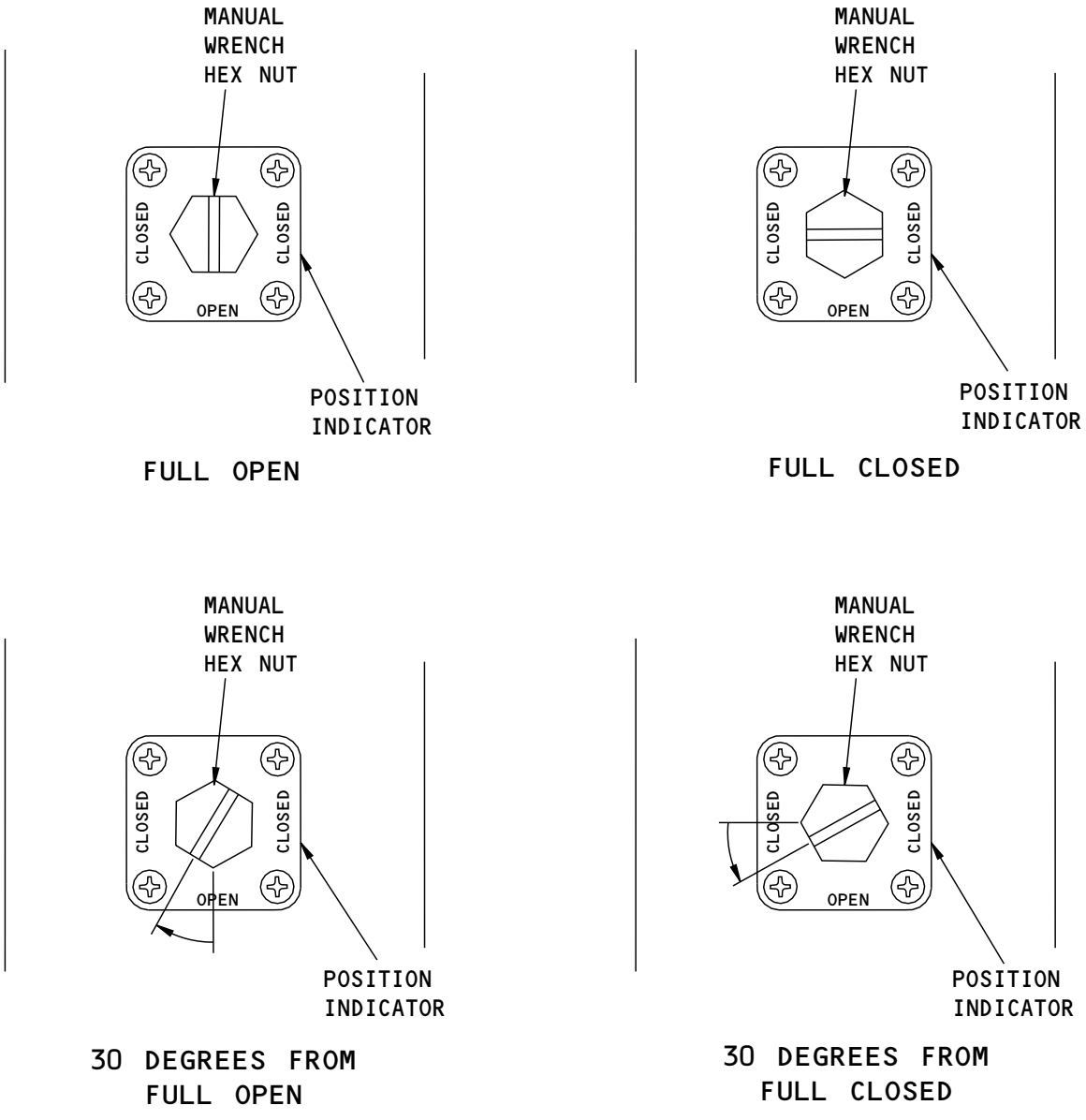
Isolation Valve Does Not Open or Close Properly.
Figure 310/36-10-00-990-810 (Sheet 1 of 2)



Isolation Valve Does Not Open or Close Properly.
Figure 310/36-10-00-990-810 (Sheet 2 of 2)

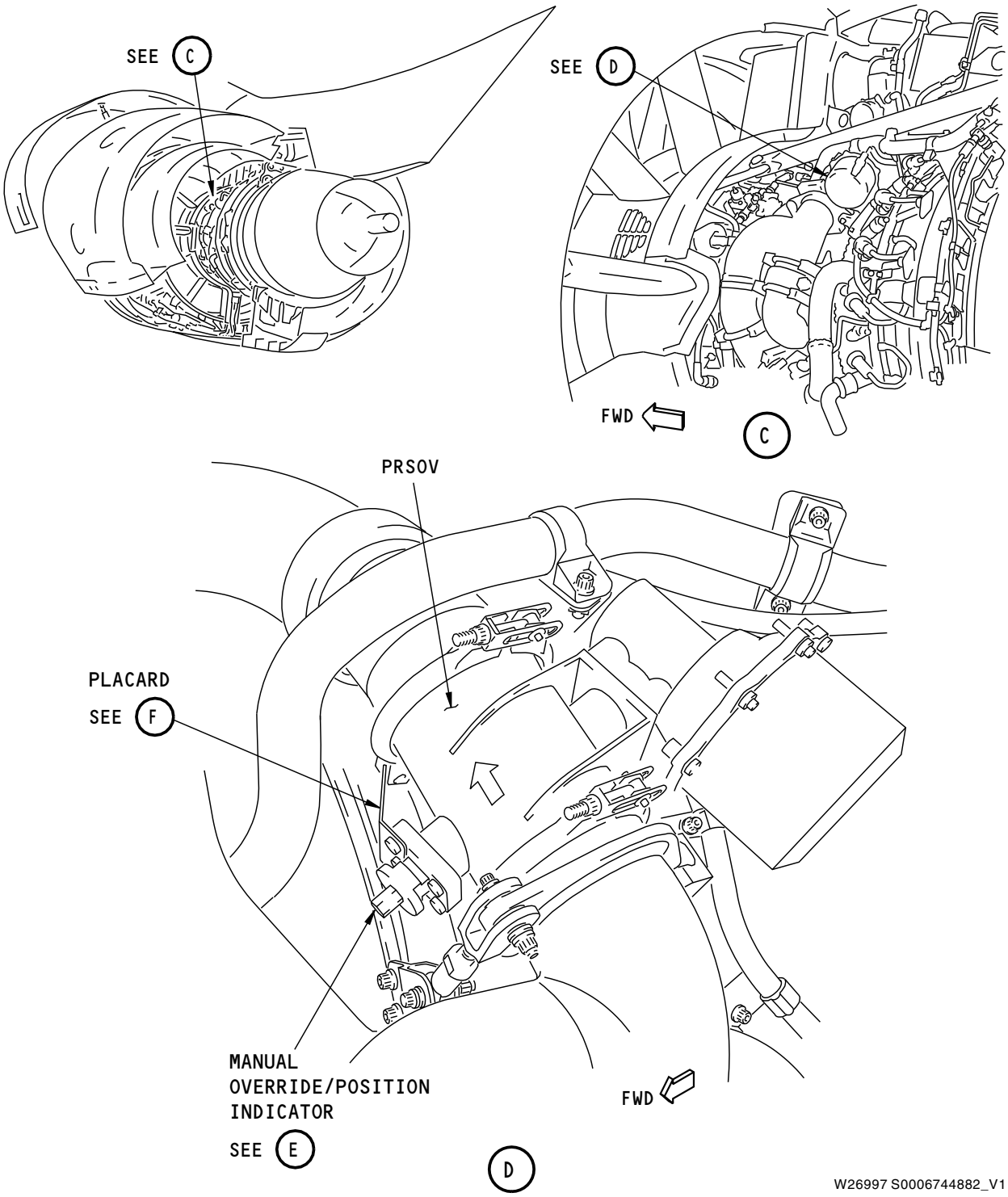


Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 1 of 6)

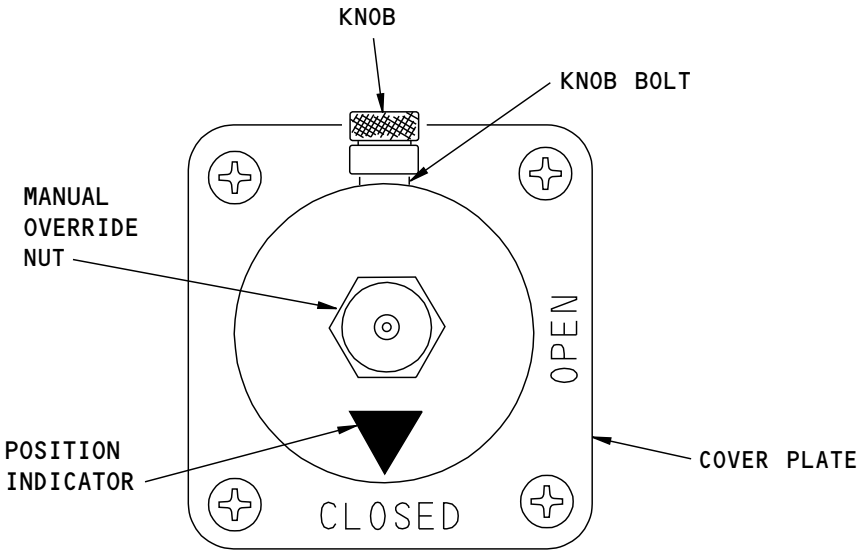


W26989 S0006744881_V2

Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 2 of 6)



Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 3 of 6)



MANUAL OVERRIDE/POSITION INDICATOR

E

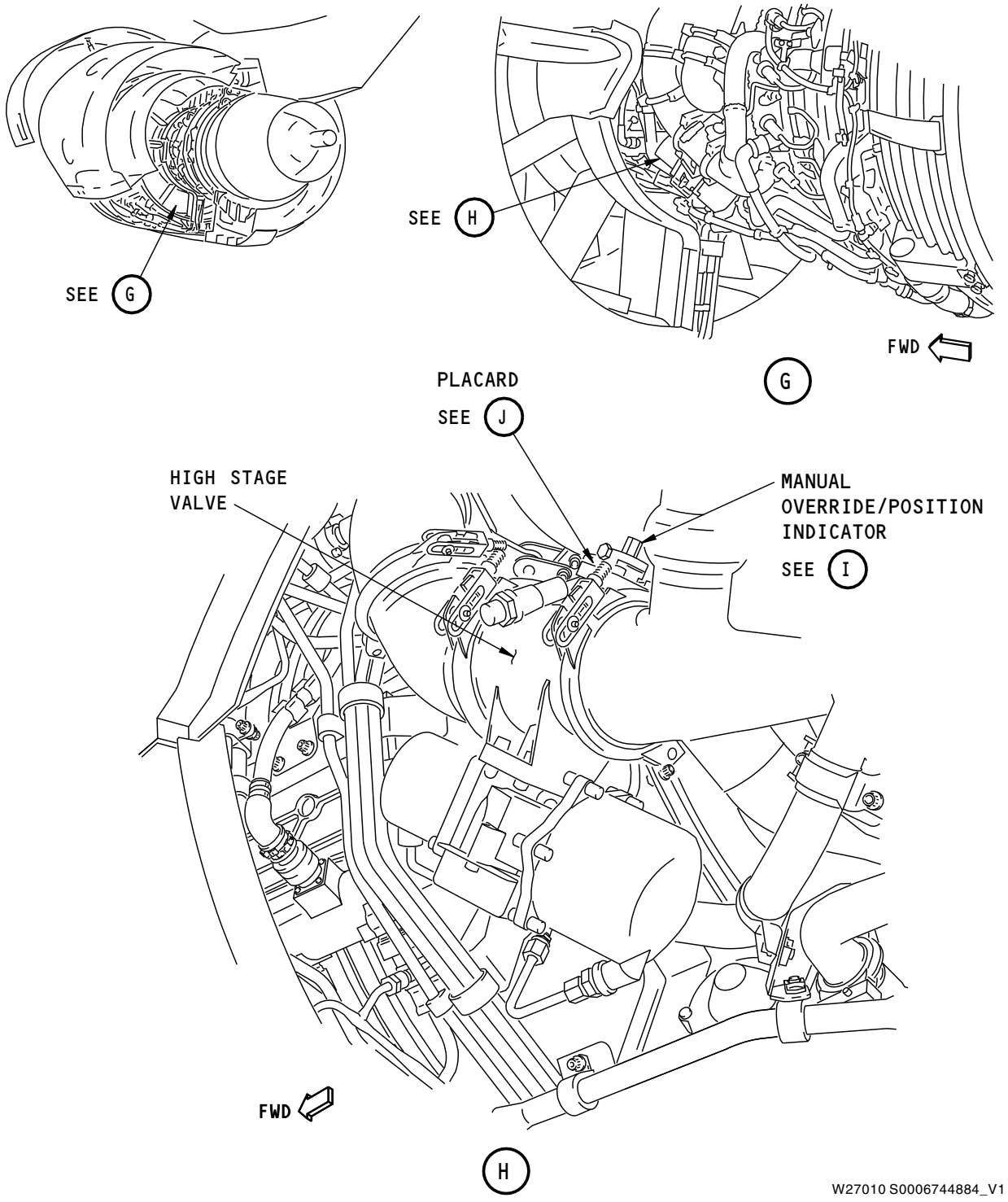
WRENCH/LATCH/LOCK
WRENCH SHAFT HEX AS REQD
UNLOCK: LOOSEN KNOB BOLT-90°CCW
LATCH: PUSH KNOB IN
UNLATCH: PULL KNOB OUT
LOCK: TIGHTEN KNOB BOLT

PLACARD

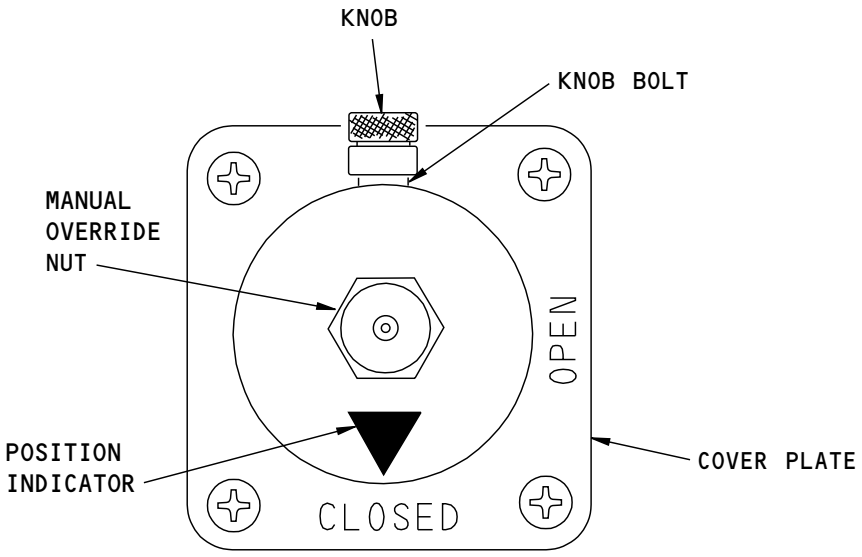
F

W27013 S0006744883_V1

Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 4 of 6)

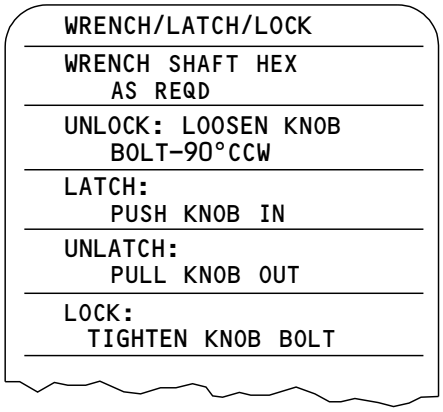


Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 5 of 6)



MANUAL OVERIDE/POSITION INDICATOR

I

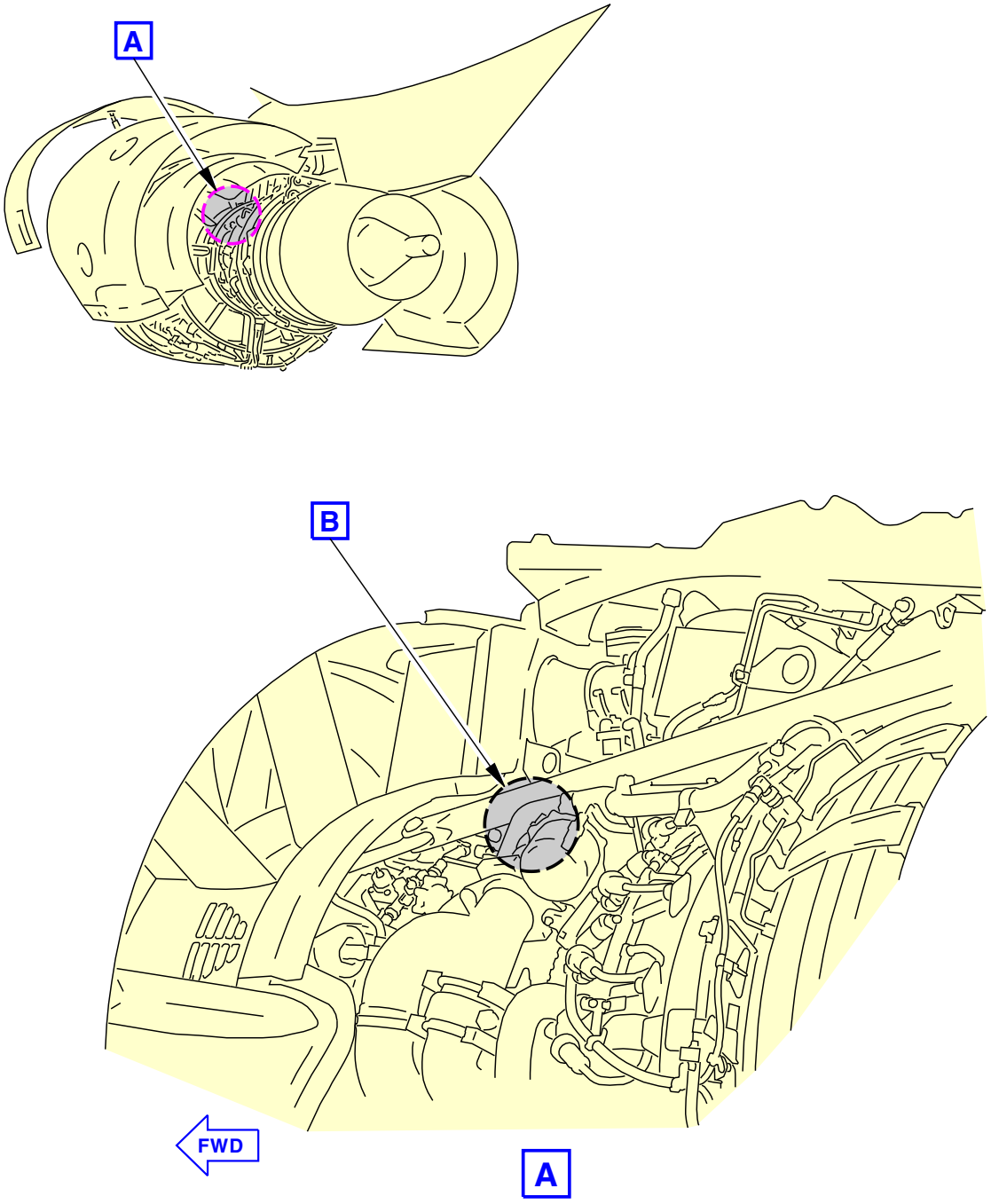


PLACARD

J

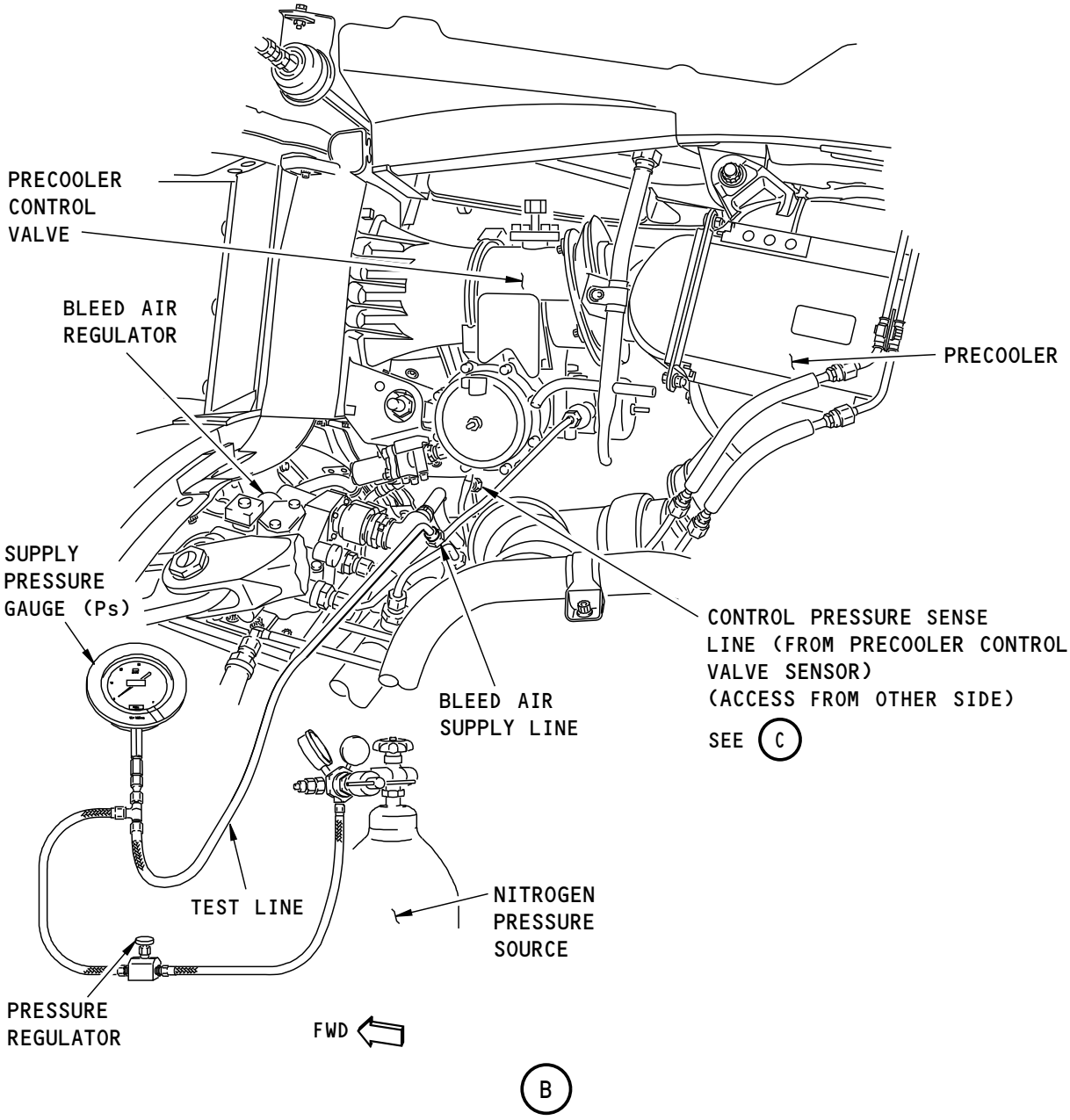
W27017 S0006744885_V1

Pneumatic System Control Valve Position Indicators
Figure 311/36-10-00-990-811 (Sheet 6 of 6)



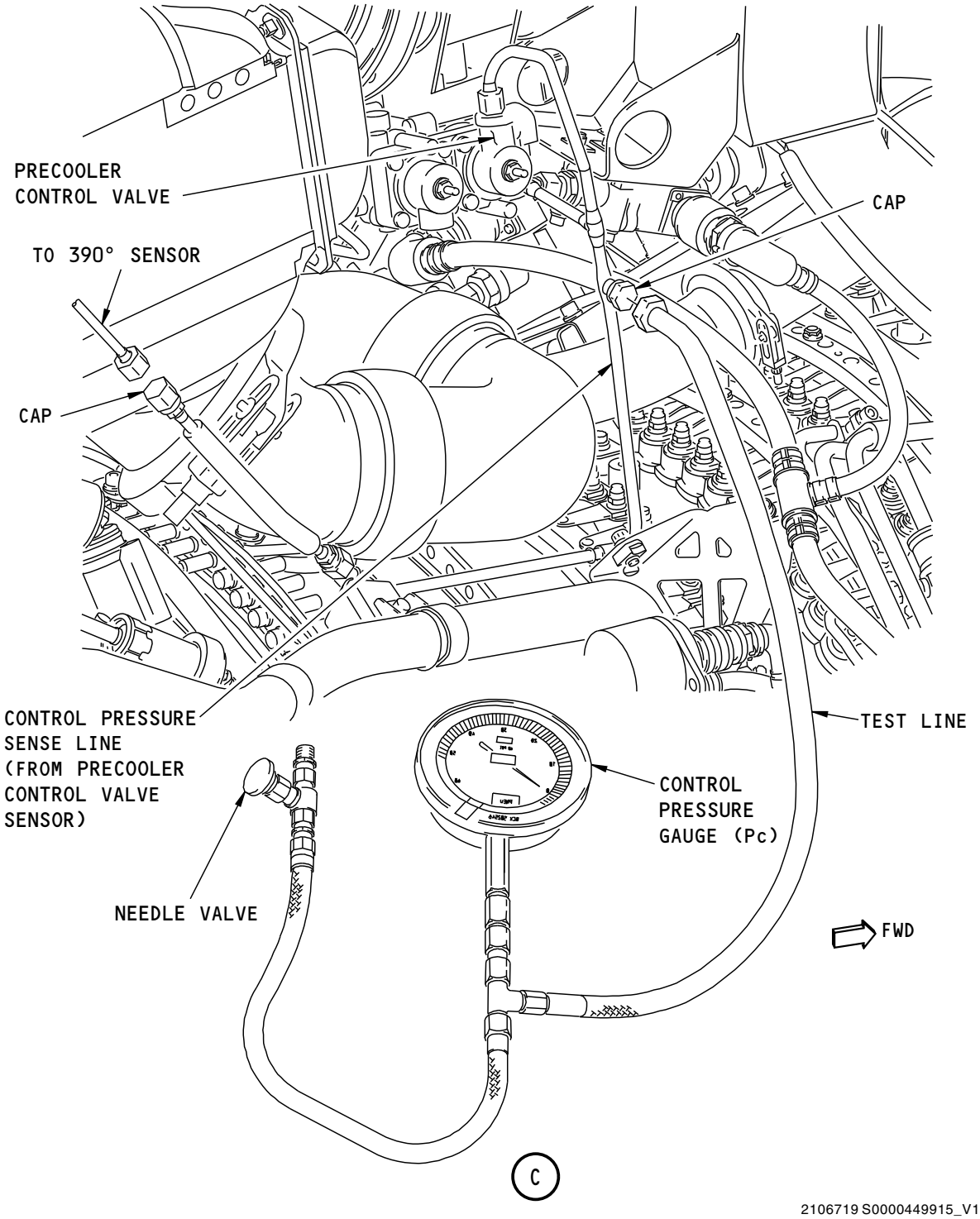
G15633 S0006577989_V2

QUICK FIM TASK - Bleed Trip, the Engine is the Bleed Source
Figure 312/36-10-00-990-813 (Sheet 1 of 3)

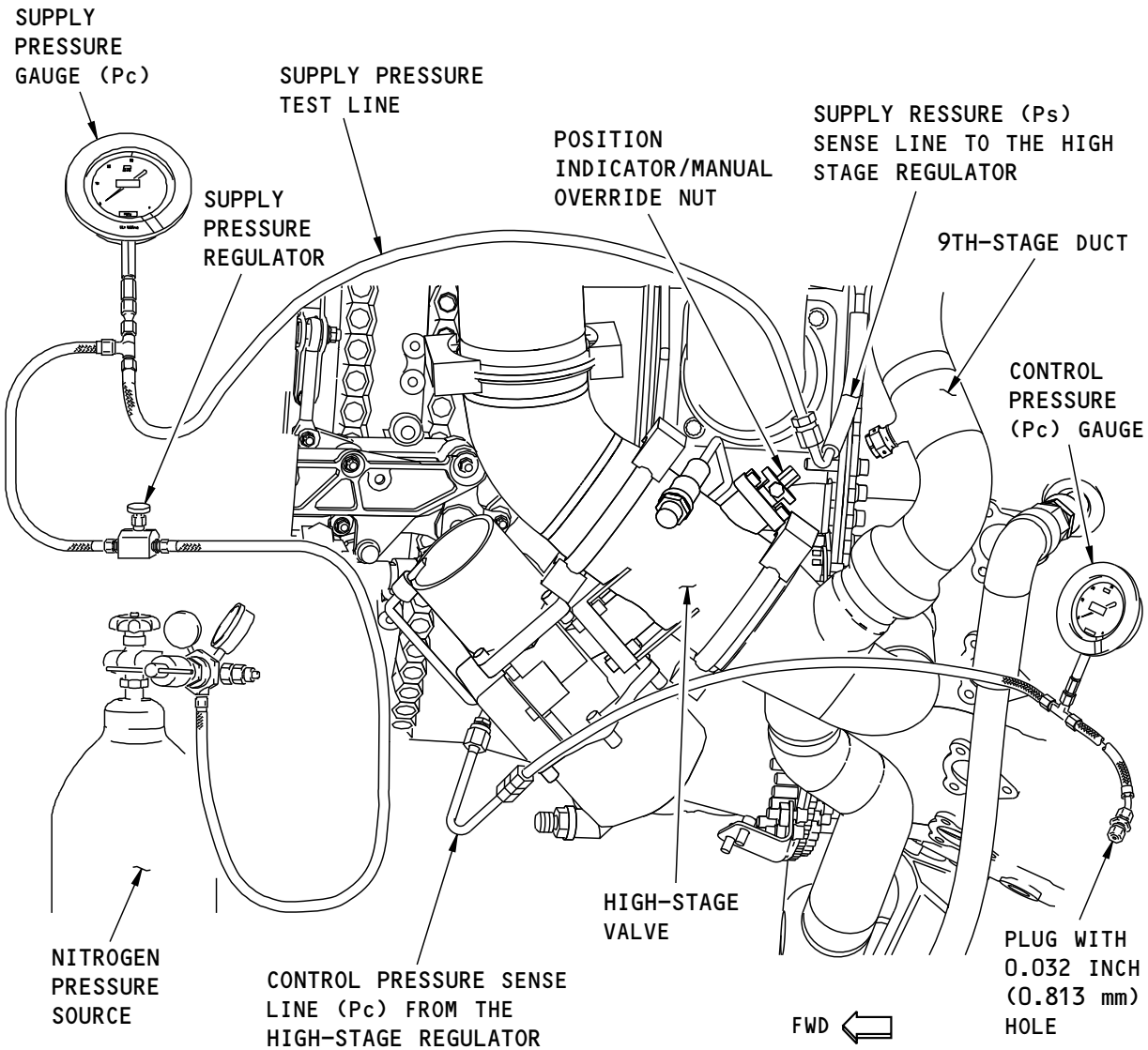


2106718 S0000449914_V1

QUICK FIM TASK - Bleed Trip, the Engine is the Bleed Source
Figure 312/36-10-00-990-813 (Sheet 2 of 3)



QUICK FIM TASK - Bleed Trip, the Engine is the Bleed Source
Figure 312/36-10-00-990-813 (Sheet 3 of 3)



2106729 S0000449927_V1

QUICK FIM TASK - Duct Pressure Low, the Engine is the Bleed Source
Figure 313/36-10-00-990-814

POSSIBLE CAUSES AND EFFECTS OF LOW DUCT PRESSURE OR VERY LOW/ ZERO DUCT PRESSURE TABLE

FIM 36-10 TASK 810 STEP	FIRST COMPONENT FAULT AND FAILURE MODE	FIRST FAULT SUBSYSTEM EFFECT	SYSTEM EFFECT	FLIGHT DECK EFFECT
	INDICATION ERROR			
F.(8)	DUCT PRESSURE TRANSMITTER OUT OF CALIBRATION	INDICATION FAULT	INDICATION FAULT	LOW DUCT PRESSURE
	DUCT PRESSURE INDICATOR OUT OF CALIBRATION			
	WIRING OPEN OR SHORT BETWEEN THE TRANSMITTER AND INDICATOR			
	LOW ENGINE POWER SETTING (GROUND IDLE, TAXI, FLIGHT IDLE)			
F.(2)	PS SENSE LINE LEAK BETWEEN 9TH STAGE SUPPLY TO HSR	LOW OR NO OPENING FORCE TO HSV	HSV REGULATION IS LOWER THAN NORMAL, RESULTING IN LOW DUCT PRESSURE	LOW DUCT PRESSURE OR VERY LOW/ ZERO DUCT PRESSURE
	HSR -SHUTOFF STRUCK CLOSE -REGULATOR FAILURE -RELIEF VALVE STUCK OPEN -REVERSE FLOW DIAPHRAGM OPERATED POPPET VALVE STUCK OPEN			
	PC SENSE LINE LEAK BETWEEN HS RAND HSV			
	HSV: -STICKS CLOSED -EXCESSIVE LEAKAGE ON OPENING PISTON	HSV DOES NOT OPEN		
	ANY OR ALL ENGINE POWER SETTINGS			

3065212 S0000827261_V1

Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table
Figure 314/36-10-00-990-823 (Sheet 1 of 5)

POSSIBLE CAUSES AND EFFECTS OF LOW DUCT PRESSURE OR VERY LOW/ ZERO DUCT PRESSURE TABLE (CONTINUED)

FIM 36-10 TASK 810 STEP	FIRST COMPONENT FAULT AND FAILURE MODE	FIRST FAULT SUBSYSTEM EFFECT	SYSTEM EFFECT	FLIGHT DECK EFFECT
F.(1)	PS SENSE LINE LEAK BETWEEN 5TH STAGE SUPPLY TO BAR	LOW OPENING FORCE TO PRSOV	PRSOV REGULATION IS LOWER THAN NORMAL, RESULTING IN LOW DUCT PRESSURE	LOW DUCT PRESSURE OR VERY LOW/ ZERO DUCT PRESSURE
F.(2)	BAR -REFERENCE REGULATOR FAILURE -RELIEF VALVE HAS EXCESSIVE LEAKAGE			
F.(1)	PC SENSE LINE LEAK BETWEEN THE BAR AND PRSOV			
F.(2)	PRSOV -STICKS CLOSED -EXCESSIVE LEAKAGE ON OPENING PISTON	PRSOV DOES NOT OPEN		
F.(1) AND F.(2)	PC SENSE LINE LEAKS BETWEEN THE PRSOV AND 450 °F THERMOSTAT	LOW OPENING FORCE TO PRSOV		
F.(1), F.(2), AND F.(7)	450 ° F THERMOSTAT -STUCK OPEN -EXCESSIVE LEAKAGE -OPENS BELOW 450 ° F			
G.	WIRING ISSUE - MW0311 HARNESS - WIRING FROM ACAU TO BAR	BAR SOLENOID DOES NOT RECEIVE COMMAND TO OPEN THE PRSOV	PRSOV REMAINS CLOSED, RESULTING IN VERY LOW/ ZERO DUCT PRESSURE	VERY LOW/ ZERO DUCT PRESSURE
	HIGH/INTERMEDIATE ENGINE POWER SETTING (TAKE OFF, CLIMB, CRUISE)			

3065218 S0000827262_V1

Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table
Figure 314/36-10-00-990-823 (Sheet 2 of 5)

POSSIBLE CAUSES AND EFFECTS OF LOW DUCT PRESSURE OR VERY LOW/ ZERO DUCT PRESSURE TABLE (CONTINUED)

FIM 36-10 TASK 810 STEP	FIRST COMPONENT FAULT AND FAILURE MODE	FIRST FAULT SUBSYSTEM EFFECT	SYSTEM EFFECT	FLIGHT DECK EFFECT
F.(1)	HSV -DOES NOT FULLY CLOSE -EXCESSIVE INTERNAL BORE LEAKAGE	5TH STAGE SUPPLY ENGINE BLEED AIR TEMPERATURE IS HIGHER THAN NORMAL	SECOND LEVEL OF TEMPERATURE CONTROL BECOMES ACTIVE. 450° F THERMOSTAT OPENS CAUSING THE PRSOV REGULATED PRESSURE TO DECREASE NOTE: THIS IS NORMAL OPERATION OF THE SECOND LEVEL OF TEMPERATURE CONTROL.	LOW DUCT PRESSURE
	PS SENSE LINE LEAKS BETWEEN THE 5TH STAGE MANIFOLD AND THE PCCV	FIRST LEVEL OF TEMPERATURE CONTROL IS DEGRADED OR NOT FUNCTIONING		
F.(2)	PCCV FAULT; DOES NOT OPEN			
F.(6)	PC SENSE LINE PLUGGED BETWEEN THE PCCV AND 390° F SENSOR			
F.(7)	390° F SENSOR DOES NOT OPEN			
F.(4)	KISS SEAL TORN OR DEGRADED			
F.(5)	FAN AIR BLOCKAGE			
F.(10)	PRECOOLER DAMAGED OR FAN AIR PATH BLOCKED			
F.(2)	REVERSE FLOW DIAPHRAGM IN THE HSR IS RUPTURED	CAUSES ELEVATED DOWNSTREAM PRESSURE SENSED BY THE PRSOV	PRSOV REGULATED PRESSURE IS LOWER THAN NORMAL. NOTE: LOW PRESSURE OCCURS AT START OF CRUISE PHASE AND GRADUALLY INCREASES AS CRUISE PROGRESSES.	
F.(9)	5TH STAGE BLEED AIR CHECK VALVE -STUCK CLOSED	5TH STAGE BLEED AIR CHECK VALVE DOES NOT OPEN	VERY LOW/ ZERO DUCT PRESSURE AFTER SYSTEM SWITCHES OVER FROM 9TH STAGE TO 5TH STAGE BLEED AIR AT APPROXIMATELY 60% N1 AT SEA LEVEL	VERY LOW/ ZERO DUCT PRESSURE

3065219 S0000827263_V1

Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table
Figure 314/36-10-00-990-823 (Sheet 3 of 5)

LOW DUCT PRESSURE FAULT TABLE ORGANIZED BY FLIGHT PHASE

CONDITION	GROUND/TAXI	TAKE OFF	CLIMB	CRUISE	IDLE DESCENT
NORMAL OPERATION	WTAI OFF -18 PSIG (124 KPa) - 22 PSIG (152 KPa) WTAI ON - 12 PSIG (83 KPa) - 14 PSIG (97 KPa) HSV: FULL OPEN PRSOV: FULL OPEN PCCV: CLOSED ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BELOW REGULATION LEVELS.	34 PSIG (234 KPa) - 50 PSIG (345 KPa) HSV: CLOSED PRSOV: REGULATING PCCV: REGULATING ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BEING REGULATED.	34 PSIG (234 KPa) - 50 PSIG (345 KPa) HSV: CLOSED PRSOV: REGULATING PCCV: REGULATING ENGINESUPPLY PRESSUREAND TEMPERATURE ARE BEING REGULATED.	26 PSIG (179 KPa) - 50 PSIG (345 KPa) HSV: MAY BE CLOSED OR REGULATING PRSOV: MAY BE REGULATING OR OPEN PCCV: MAY BE REGULATING OR CLOSED. AT LOWER CRUISE SETTINGS, ENGINE PRESSURE AND TEMPERATURE MAY DROP BELOW REGULATED LEVELS.	WTAI OFF - 18 PSIG (124 KPa) - 25 PSIG (172 KPa) HSV: FULL OPEN PRSOV: FULL OPEN PCCV: CLOSED ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BELOW REGULATION LEVELS.
GROUND/TAXI FAULT	LOW PRESSURE NO HIGH STAGE AIR -HSR, HSV, OR SENSE LINE LEAK	NO FAULT	NO FAULT	NO FAULT	NO FAULT
TAKE OFF FAULT	NO FAULT	LOW PRESSURE LOW REGULATED PRESSURE -FIRST LEVEL OF TEMPERATURE CONTROL NOT OPERATING (PCCV/390° F SENSOR, ORPLUGGED SENSE LINE) TEMPERATURE TOPPING(450° F OPENS) -BAR, PRSOV, OR SENSE LINE LEAK -HSV LEAKAGE.	NO FAULT	NO FAULT	NO FAULT

3065220 S0000827264_V1

Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table
Figure 314/36-10-00-990-823 (Sheet 4 of 5)

LOW DUCT PRESSURE FAULT TABLE ORGANIZED BY FLIGHT PHASE (CONTINUED)

CONDITION	GROUND/TAXI	TAKE OFF	CLIMB	CRUISE	IDLE DESCENT
CLIMB FAULT	NO FAULT	NO FAULT	LOW PRESSURE LOW REGULATED PRESSURE - FIRST LEVEL OF TEMPERATURE CONTROL NOT OPERATING (PCCV/390° F SENSOR, OR PLUGGED SENSE LINE) TEMPERATURE TOPPING (450° F OPENS) –BAR, PRSOV, OR SENSE LINE LEAK –HSV LEAKAGE.	NO FAULT	NO FAULT
CRUISE FAULT	NO FAULT	NO FAULT	NO FAULT	LOW PRESSURE LOW REGULATED PRESSURE - FIRST LEVEL OF TEMPERATURE CONTROL NOT OPERATING (PCCV/390° F SENSOR, OR PLUGGED SENSE LINE) - BAR, PRSOV, OR SENSE LINE LEAK HSR REVERSE FLOW DIAPHRAGM RUPTURE. LOW DUCT PRESSURE STARTS AT START OF CRUISE AND GRADUALLY GOES AWAY DURING CRUISE.	NO FAULT
DESCENT FAULT	NO FAULT	NO FAULT	NO FAULT	NO FAULT	LOW PRESSURE NO HIGH STAGE AIR –HSR,HSV,OR SENSE LINE LEAK.

3065222 S0000827265_V1

Possible Causes and Effects of Low Duct Pressure or Very Low / Zero Duct Pressure Table
Figure 314/36-10-00-990-823 (Sheet 5 of 5)

POSSIBLE CAUSES AND EFFECTS OF A BLEED TRIP

FIM 36-10 TASK 809 STEP	FIRST COMPONENT FAULT AND FAILURE MODE	FIRST FAULT SUB-SYSTEM EFFECT	SECOND COMPONENT FAULT AND FAILURE MODE	SECOND FAULT SUB-STEM EFFECT	FLIGHT DECK EFFECT
E.(1)(C) AND F.(1)	HIGH STAGE VALVE STICKS OPEN	REDUCTION OR LOSS OF THE FIRST LEVEL OF TEMPERATURE CONTROL	NONE	NONE	BLEED TRIP
F.(2)	PRECOOLER CONTROL VALVE (PCCV) NOT OPEN		450 °F THERMOSTAT DOES NOT OPEN OR PC SENSE LINE IS PLUGGED BETWEEN THE PRESSURE REGULATING SHUTOFF VALVE AND THE 450 °F THERMOSTAT	LOSS OF THE SECOND LEVEL OF TEMPERATURE CONTROL	BLEED TRIP
F.(6)	BLOCKAGE IN THE SENSE LINE (PC) BETWEEN PCCV AND 390 °F SENSOR				
F.(7)	390 ° SENSOR DOES NOT OPEN				
F.(4)	KISS SEAL TORN OR DEGRADED				
F.(5)	BLOCKAGE IN THE FAN AIR PATH				
F.(11)	PRECOOLER CRACKED OR PLUGGED FAN AIR PATH				
F.(1)	HIGH STAGE VALVE SLIGHTLY OPEN OR EXCESSIVE BORE LEAKAGE	BLEED AIR TEMPERATURE FROM THE ENGINE IS HIGHER THAN NORMAL			
F.(7)	450 °F THERMOSTAT FAILED CLOSED	LOSS OF THE SECOND LEVEL OF TEMPERATURE CONTROL	NONE	NONE	BLEED TRIP
F.(6)	BLOCKAGE IN THE SENSE LINE (PC) BETWEEN PRSOV AND 450 °F THERMOSTAT				
F.(10)	BLEED AIR REGULAR 220 PSIG SWITCH CLOSES AT LOWER PRESSURE	INDICATION FAULT	NONE	NONE	BLEED TRIP
F.(9)	450 °F THERMOSTAT CLOSES AT LOWER TEMPERATURE	INDICATION FAULT	NONE	NONE	BLEED TRIP
F.(8) AND G.	AIRPLANE OR STRUT WIRING SHORT	INDICATION FAULT	NONE	NONE	BLEED TRIP

3071205 S0000831831_V1

Possible Causes and Effects of a Bleed Trip
Figure 315/36-10-00-990-824 (Sheet 1 of 3)

BLEED TRIP FAULT TABLE ORGANIZED BY FLIGHT PHASE

CONDITION	GROUND/TAXI	TAKE OFF	CLIMB	CRUISE	IDLE DESCENT
NORMAL OPERATION	WTAI OFF -18 TO 22 PSIG WTAI ON - 12 TO 14 PSIG HSV: FULL OPEN PRSOV: FULL OPEN PCCV: CLOSED ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BELOW REGULATION LEVELS.	37 TO 53 PSIG HSV: CLOSED PRSOV: REGULATING PCCV: REGULATING ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BEING REGULATED.	34 TO 53 PSIG HSV: CLOSED PRSOV: REGULATING PCCV: REGULATING ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BEING REGULATED.	26 TO 45M PSIG HSV: MAY BE CLOSED OR REGULATING PRSOV: MAY BE REGULATING OR OPEN PCCV: MAY BE REGULATING OR CLOSED. AT LOWER CRUISE SETTINGS, ENGINE PRESSURE AND TEMPERATURE MAY DROP BELOW REGULATED LEVELS.	WTAI OFF - 18 TO 25 PSIG HSV: FULL OPEN PRSOV: FULL OPEN PCCV: CLOSED ENGINE SUPPLY PRESSURE AND TEMPERATURE ARE BELOW REGULATION LEVELS.
GROUND /TAXI FAULT	BLEED TRIP–SUPPLY PRESSURE AND TEMPERATURE ARE NOT SUFFICIENT TO CAUSE A TRIP (ELECTRICAL/ INDICATION SYSTEM FAULT, INCLUDING MW0311 HARNESS)	NO FAULT	NO FAULT	NO FAULT	NO FAULT
TAKE OFF FAULT	NO FAULT	BLEED TRIP–TRIPS IMMEDIMATELY ON HIGH POWER –OVER PRESSURE: –HSV DOES NOT CLOSE MID TO LATE TAKE OFF ROLL–OVER TEMPERATURE: –FIRST AND SECOND LEVEL TEMPERATURE CONTROL NOT OPERATING (PCCV/390 °F SENSOR, 450 °F SENSOR OR UNPLUGGES SENSE LINES) –HSV LEAKAGE	NO FAULT	NO FAULT	NO FAULT

3071216 S0000831832_V1

Possible Causes and Effects of a Bleed Trip
Figure 315/36-10-00-990-824 (Sheet 2 of 3)

BLEED TRIP FAULT TABLE ORGANIZED BY FLIGHT PHASE. (CONTINUED)

CONDITION	GROUND/TAXI	TAKE OFF	CLIMB	CRUISE	IDLE DESCENT
CLIMB FAULT	NO FAULT	NO FAULT	BLEED TRIP–OVER TEMPERATURE: –FIRST AND SECOND LEVEL TEMPERATURE CONTROL NOT OPERATING (PCCV/390 °F SENSOR, 450 °F SENSOR OR PLUGGED SENSE LINES) –HSV LEAKAGE	NO FAULT	NO FAULT
CRUISE FAULT	NO FAULT	NO FAULT	NO FAULT	BLEED TRIP–PRESSURE SHOULD BE BELOW TRIP LEVEL. NOTE: USE OF WTAI IN CRUISE CAN CAUSE THE HIGH STAGE VALVE TO OPEN, CAUSING AN OVER TEMPERATURE.	NO FAULT
DESCENT FAULT	NO FAULT	NO FAULT	NO FAULT	NO FAULT	BLEED TRIP–TOP OF DESCENT (PART POWER) –OVER PRESSURE: –HSV OPENS: SECOND LEVEL OF TEMPERATURE CONTROL NOT OPERATE (450 °F SENSOR OR SENSE LINE PLUGGED)

3071191 S0000831839_V1

Possible Causes and Effects of a Bleed Trip
Figure 315/36-10-00-990-824 (Sheet 3 of 3)