

**CHAPTER**

**36**

**PNEUMATIC**


  
**737-600/700/800/900**
  
**FAULT ISOLATION MANUAL**

**CHAPTER 36**
  
**PNEUMATIC**

Page	Date	COC	Page	Date	COC	Page	Date	COC
EFFECTIVE PAGES			36-10 TASKS (cont)			36-10 TASKS (cont)		
1 thru 2	Jun 15/2009		R 227	Jun 15/2009		266	Jun 15/2008	
			R 228	Jun 15/2009		267	Jun 15/2008	
36-HOW TO USE THE FIM			229	Feb 15/2009		268	Oct 15/2008	
1	Feb 10/2005		230	Jun 15/2008		269	Oct 15/2008	
2	Feb 10/2005		231	Jun 15/2008		R 270	Jun 15/2009	
3	Jun 10/2006		R 232	Jun 15/2009		271	Oct 15/2008	
4	Oct 10/2006		233	Jun 15/2008		272	Oct 15/2008	
5	Feb 10/2005		234	Jun 15/2008		273	Oct 15/2008	
6	Feb 10/2005		235	Jun 15/2008		274	Oct 15/2008	
36-FAULT CODE INDEX			236	Jun 15/2008		275	Oct 15/2008	
101	Feb 10/2005		237	Jun 15/2008		276	Oct 15/2008	
102	BLANK		238	Jun 15/2008		277	Oct 15/2008	
36-10 TASKS			R 239	Jun 15/2009		R 278	Jun 15/2009	
201	Feb 10/2005		R 240	Jun 15/2009		279	Jun 15/2008	
202	Oct 10/2007		R 241	Jun 15/2009		R 280	Jun 15/2009	
203	Feb 15/2008		R 242	Jun 15/2009		281	Jun 15/2008	
204	Jun 15/2008		R 243	Jun 15/2009		282	Jun 15/2008	
205	Jun 15/2008		O 244	Jun 15/2009		36-10 TASK SUPPORT		
R 206	Jun 15/2009		O 245	Jun 15/2009		301	Oct 10/2005	
207	Jun 15/2008		O 246	Jun 15/2009		302	Oct 10/2005	
208	Jun 15/2008		247	Jun 15/2008		303	Oct 10/2005	
209	Jun 15/2008		248	Jun 15/2008		304	Oct 10/2005	
210	Jun 15/2008		249	Jun 15/2008		305	Oct 10/2005	
211	Jun 15/2008		250	Jun 15/2008		306	Oct 10/2005	
212	Jun 15/2008		251	Jun 15/2008		307	Oct 10/2005	
213	Jun 15/2008		252	Jun 15/2008		308	Oct 10/2005	
214	Jun 15/2008		253	Jun 15/2008		309	Oct 10/2005	
215	Jun 15/2008		254	Jun 15/2008		310	Jun 15/2008	
216	Feb 15/2009		255	Jun 15/2008		311	Oct 10/2005	
217	Jun 15/2008		R 256	Jun 15/2009		312	Jun 15/2008	
218	Jun 15/2008		R 257	Jun 15/2009		313	Oct 10/2007	
219	Jun 15/2008		O 258	Jun 15/2009		314	Oct 10/2007	
220	Jun 15/2008		259	Jun 15/2008		315	Oct 10/2007	
221	Jun 15/2008		260	Feb 15/2009		316	Oct 10/2007	
222	Jun 15/2008		261	Feb 15/2009		R 317	Jun 15/2009	
223	Jun 15/2008		262	Jun 15/2008		R 318	Jun 15/2009	
224	Jun 15/2008		263	Jun 15/2008		319	Oct 10/2007	
R 225	Jun 15/2009		264	Jun 15/2008		320	Oct 10/2007	
226	Jun 15/2008		265	Jun 15/2008		321	Oct 10/2007	

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**36-EFFECTIVE PAGES**

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**FAULT ISOLATION MANUAL**

**CHAPTER 36**  
**PNEUMATIC**

Page	Date	COC	Page	Date	COC	Page	Date	COC
36-10 TASK SUPPORT (cont)								
R 322	Jun 15/2009							
323	Oct 10/2007							
324	Oct 10/2007							
325	Oct 10/2007							
326	Oct 10/2007							
327	Oct 10/2007							
328	Oct 10/2007							
329	Oct 10/2007							
330	Oct 10/2007							
331	Oct 10/2007							
332	Oct 10/2007							
333	Oct 10/2007							
334	Oct 10/2007							

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

**36-EFFECTIVE PAGES**

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**FAULT ISOLATION MANUAL**

YOU FIND A FAULT WITH  
AN AIRPLANE SYSTEM

These are the possible types  
of faults:

1. Observed Fault
2. Cabin Fault



USE BITE TO GET  
MORE INFORMATION

If you did a BITE test already,  
then you can go directly to the  
fault isolation procedure for  
the maintenance message.

For details, see Figure 2 →



GO TO THE  
FAULT ISOLATION  
TASK IN THE FIM

Use the fault code or description  
to find the task in the FIM. There  
is a numerical list of fault codes  
in each chapter. There are lists  
of fault descriptions at the front  
of the FIM.

For details, see Figure 3 →



FOLLOW THE STEPS OF THE  
FAULT ISOLATION TASK

The fault isolation task explains  
how to find the cause of the fault.  
When the task says "You corrected  
the fault" you know that the fault  
is gone.

For details, see Figure 4 →

Basic Fault Isolation Process  
Figure 1

EFFECTIVITY  
HAP ALL

## 36-HOW TO USE THE FIM

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Some airplane systems have built-in test equipment (BITE). IF the system finds a fault when you do a BITE test, it will give you a maintenance message.

A maintenance message can be any of these:

- a code
- a text message
- a light
- an indication.

To find the fault isolation task for a maintenance message, go to the Maintenance Message Index in the chapter for the applicable system.

If you do not know which chapter is the correct one, look at the list at the front of any Maintenance Message Index. For each system or component (LRU) that has BITE, this list gives the chapter number where you can find the Index that you need.

Find the maintenance message for the applicable LRU or system in the Index. Then find the task number on the same line as the maintenance message. Go to the task in the FIM and do the steps of the task (see Figure 4).

Getting Fault Information from BITE  
Figure 2

EFFECTIVITY  
HAP ALL

## 36-HOW TO USE THE FIM

IF YOU HAVE:

THEN DO THIS TO FIND THE TASK IN THE FIM:

FAULT CODE

1. The first two digits of the fault code are the FIM chapter that you need. Go to the Fault Code Index in that chapter and find the fault code. If the fault code starts with a letter, then go to the Cabin Fault Code Index at the front of the FIM.
2. Find the task number on the same line as the fault code. Go to the task in the FIM and do the steps in the task (see Figure 4).

OBSERVED FAULT DESCRIPTION

1. Go to the Observed Fault List at the front of the FIM and find the best description for the fault.
2. Find the task number on the same line as the fault description. Go to the task in the FIM and do the steps of the task (see Figure 4).

CABIN FAULT DESCRIPTION

1. Go to the Cabin Fault List at the front of the FIM and find the best description for the fault.
2. Find the task number on the same line as the fault description. Go to the task in the FIM and do the steps of the task (see Figure 4).

MAINTENANCE MESSAGE (FROM BITE)

1. Go to the Maintenance Message Index in the chapter for the LRU (the front of each Index gives you the chapter number for all LRUs). Find the maintenance message in the Index.
2. Find the task number on the same line as the maintenance message. Go to the task in the FIM and do the steps in the task (see Figure 4).

Finding the Fault Isolation Task in the FIM  
Figure 3

EFFECTIVITY  
HAP ALL

## 36-HOW TO USE THE FIM

**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**

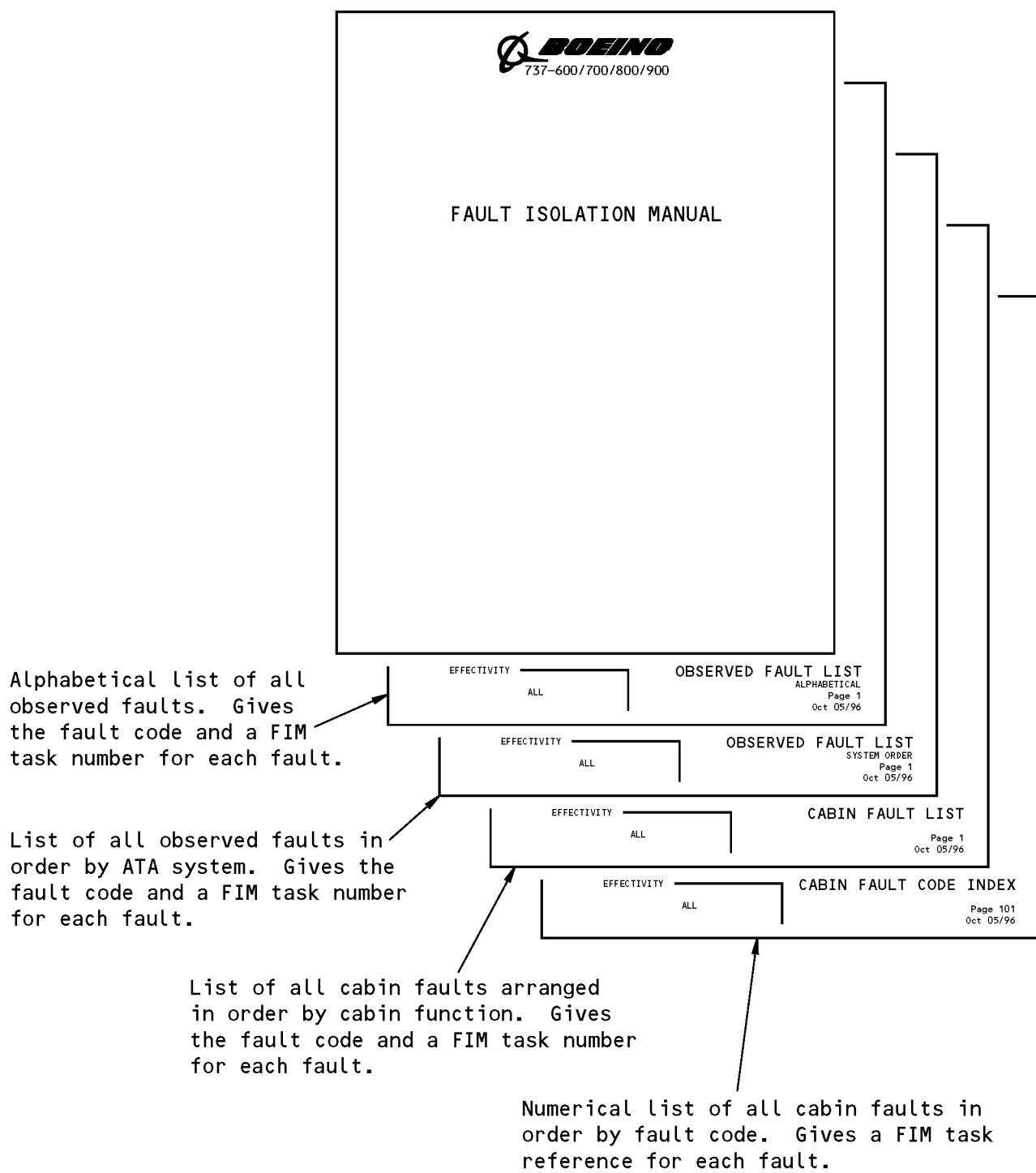
- Do the steps of the task in the specified order. The "If ... then" statements that you see will guide you along the correct path.
- When you are at the endpoint of the path, the step says "...you corrected the fault." Complete the step and exit the procedure.

Doing the Fault Isolation Task  
Figure 4

EFFECTIVITY  
HAP ALL

**36-HOW TO USE THE FIM**

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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



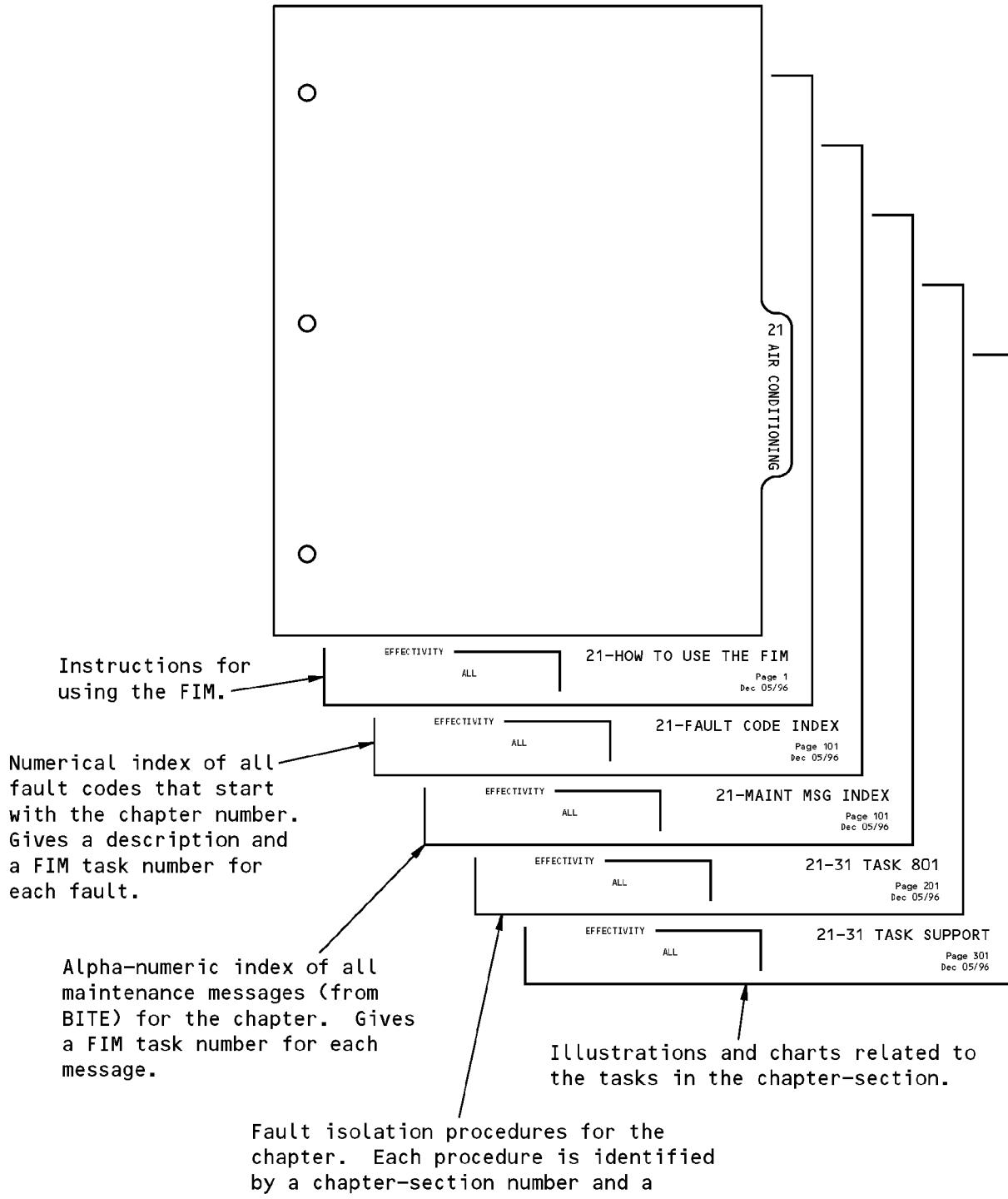
Subjects at Front of FIM  
 Figure 5



## 36-HOW TO USE THE FIM

Page 5  
 Feb 10/2005


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**FAULT ISOLATION MANUAL**



Subjects in Each FIM Chapter  
 Figure 6



## 36-HOW TO USE THE FIM



737-600/700/800/900

## FAULT ISOLATION MANUAL

FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
361 010 01	BLEED TRIP OFF light: light on, the engine is the bleed source - no. 1.	36-10 TASK 801
361 010 02	BLEED TRIP OFF light: light on, the engine is the bleed source - no. 2.	36-10 TASK 801
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, the engine is the bleed source.	36-10 TASK 804
361 050 00	Duct pressure indication: zero, the engine is the bleed source.	36-10 TASK 805
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), 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





737-600/700/800/900

## FAULT ISOLATION MANUAL

### 801. BLEED TRIP OFF Light On - Fault Isolation

#### A. Description

- (1) (SDS SUBJECT 36-11-00)
- (2) The BLEED TRIP OFF light on the overhead panel can come on if either one or both of these conditions occur:
  - (a) Precooler outlet temperature gets to 485-500°F (252-260°C)
  - (b) AIRPLANES WITH BLEED AIR REGULATORS WITH PART NUMBER 10-62008-37; Pneumatic pressure upstream of the PRSOV gets to the applicable pressure ranges: 170-190 psi.
  - (c) AIRPLANES WITH BLEED AIR REGULATORS WITH PART NUMBER 10-62008-40; Pneumatic pressure upstream of the PRSOV gets to the applicable pressure ranges: 210-230 psi.
- (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 an awareness of the maintenance history of the aircraft can be invaluable in determining the fault isolation plan. If the BLEED TRIP OFF light comes on intermittently during various phases of flight and system operation, be suspicious of the electrical circuit. In that case, you might consider a thorough check of the system wiring before replacement of any components.

#### B. Possible Causes

- (1) High stage valve
  - (a) Failure Mode: butterfly not completely closed, seal ring leakage.
- (2) Precooler control valve
  - (a) Failure Mode: Valve sticks closed or is closed when it should be open
- (3) High Stage Regulator
  - (a) Failure Mode: High control pressure
- (4) Bleed air regulator, M1180
  - (a) Failure Mode: pressure switch actuates at pressure below minimum specified
- (5) Precooler control valve sensor (390 F sensor)
  - (a) Failure Mode: Failed to close position
- (6) 450 F thermostat
  - (a) Failure Mode: Failed to close position
- (7) Sense Lines
  - (a) Failure Mode: Obstructed or kinked line from precooler control valve to 390 F sensor; Obstructed or kinked line from PRSOV to 450 F sensor
- (8) Precooler kiss seal
  - (a) Failure Mode: Distorted or torn allowing air to be blocked or bypass precooler
- (9) Air Conditioning Accessory Unit, M324
  - (a) Failure Mode: Internal short or faulty relay





737-600/700/800/900

## FAULT ISOLATION MANUAL

(10) Air Conditioning Accessory Unit, M1455

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

(a) Failure Mode: Internal short or faulty relay

(11) Air Conditioning Module P5-10

(a) Failure Mode: Internal short

(12) Wiring

(a) Failure Mode: Shorted wiring to overpressure switch in bleed air regulator or 490 F overtemperature switch

(b) MW0311 Engine Wiring Harness

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.

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

(13) 490°F overtemperature switch, S20 (Engine 1) or S21 (Engine 2)

(a) Failure Mode: Switch is out of calibration (closes at temperature that is too low), short-to-ground in circuit

(14) Precooler

(a) Failure Mode: Clogged or obstructed passages, cracked plenums, internal leaks, damaged surfaces

### 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 LEFT
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 RIGHT

### D. Related Data

- (1) Component Location (Figure 301)
- (2) Component Location (Figure 302)
- (3) Pneumatic System Schematic (Figure 304)
- (4) Troubleshooting Check (Figure 307)
- (5) Pneumatic System Control Valve Position Indicators (Figure 312)
- (6) (SSM 36-11-11)
- (7) (WDM 36-11-11)
- (8) Precooler Control Valve System Health Check, AMM TASK 36-12-00-700-801.



36-10 TASK 801



737-600/700/800/900

## FAULT ISOLATION MANUAL

- (9) Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.
- (10) Duct Pressure Versus N1 at Various Altitudes (Figure 305)
- (11) Engine Bleed Air System Leak Check Using the APU, AMM TASK 36-11-00-700-802

### E. Initial Evaluation

- (1) Push the TRIP RESET button on the P5-10 panel to put the bleed system back to the normal configuration.
- (2) 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 able to be reset one or more times, then do the Preliminary Checks - Fault Isolation Procedure.
- (3) If the BLEED TRIP OFF light was on and does not go off, then do the Fault Isolation Procedure - BLEED TRIP OFF Light is ON and Cannot Be Reset.

NOTE: This condition indicates a fault with a pressure switch in the bleed air regulator, the 490 F overtemperature switch or associated electrical circuits of the BLEED TRIP OFF light.

- (4) If the BLEED TRIP OFF light came on during a "no engine bleeds takeoff", then replace the high stage valve. 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 high stage valve with a leaky butterfly valve can cause the pressure switch in the bleed air regulator to close and initiate the BLEED TRIP OFF light to come on during a "no engine bleeds takeoff".

- (a) Do the Repair Confirmation at the end of this task.
- (b) If the Repair Confirmation is not satisfactory, then continue.

### F. Preliminary Checks - Fault Isolation Procedure

NOTE: This check provides a means to quickly fault isolate the high stage valve, the precooler control valve, the "kiss" seal, the precooler control valve to 390 F sensor sense line, and the PRSOV to 450 F thermostat sense line. It is recommended that the entire Preliminary Checks - Fault Isolation Procedure be performed before the Repair Confirmation is accomplished.

- (1) Do these steps to prepare the airplane for the Preliminary Checks:
  - (a) Make sure 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 the applicable engine BLEED switch is set to OFF.
  - (c) Make sure that the fuel shutoff lever for the applicable engine is in the cutoff position and install DO-NOT-OPERATE tags.





737-600/700/800/900

## FAULT ISOLATION MANUAL

**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. 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. To deactivate the Leading Edge Flaps and Slats, do this task: Deactivate the Leading Edge Flaps and Slats, 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 high stage valve:

- (a) Examine the position indicator on the high stage valve:
  - 1) Make sure the position indicator is pointed to the fully closed position.
    - a) If the position indicator is not pointed to the fully closed position, replace the high stage valve. 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
    - b) If the position indicator is pointed to the fully closed position, then continue.
  - (b) Use a wrench on the high stage valve position indicator to open the valve, then remove the wrench and make sure the valve closes fully.
    - 1) If the position indicator on the high stage valve does not move to the open and closed positions smoothly or does not return to the fully closed position, replace the high stage valve. 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
    - 2) If the position indicator on the high stage valve moves to the open and closed positions smoothly, then continue.
  - (c) Check the high stage valve for excessive gaps between the valve body and the valve plate seal which will cause excessive leakage.
    - 1) Remove the high stage valve by doing this task: High Stage Valve Removal, AMM TASK 36-11-06-000-801
    - 2) Hold the valve up to the light and look for gaps between the valve body and the valve plate seal.

NOTE: It is normal to see several slivers of light between the valve body and the valve plate seal in isolated locations.

    - 3) Excessive leakage can be expected if there is a gap around the entire circumference of the valve plate (about 0.020 inch gap).
      - a) If excessive gaps are found, install a new or overhauled high stage valve by doing this task: High Stage Valve Installation, AMM TASK 36-11-06-400-801
      - b) If the gaps between the valve body and valve plate seal are determined to be normal, reinstall the valve by doing this task: High Stage Valve Installation, AMM TASK 36-11-06-400-801



## FAULT ISOLATION MANUAL

(3) Do these steps to do a check of the precooler control valve:

- Examine the position indicator on the precooler control valve.
  - If the precooler control valve is not fully open, then replace it. These are the tasks:
    - Precooler Control Valve Removal, AMM TASK 36-12-02-000-801
    - Precooler Control Valve Installation, AMM TASK 36-12-02-400-801
  - If the precooler control valve is in the fully open position, then continue.

(4) Use the APU to pressurize the bleed air system. Do this task:

- Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803

NOTE: The PRSOV should be closed when pressurizing the bleed air system.

(5) Put the BLEED switch in the ON position.

**WARNING:** USE A RATCHET-TYPE WRENCH TO OPEN THE PRSOV. PRESSURE IN THE SYSTEM CAN CAUSE THE PRSOV TO OPEN QUICKLY. THIS CAN PULL THE WRENCH FROM YOUR HANDS. INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Use a 3/8-inch socket on a ratcheted-type wrench to turn the manual override nut on the PRSOV. Once you begin turning the manual override nut, the air pressure should move the PRSOV to the fully OPEN position.

(7) Listen for air leakage in the engine.

NOTE: Air leakage in the engine is an indication that the high stage valve is allowing air to backflow into the engine.

**WARNING:** REMOVE THE PRESSURE FROM THE PNEUMATIC DUCTS BEFORE YOU REMOVE A PNEUMATIC SYSTEM COMPONENT. HOT HIGH PRESSURE AIR CAN CAUSE INJURIES TO PERSONNEL OR DAMAGE TO EQUIPMENT.

- Replace the high stage valve if air can be heard in the engine when the system is pressurized. Do these tasks:
  - Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806
  - High Stage Valve Removal, AMM TASK 36-11-06-000-801
  - High Stage Valve Installation, AMM TASK 36-11-06-400-801
- Use the APU to pressurize the bleed air system again if you replaced the high stage valve. Do this task:

Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803

(8) Disconnect the supply pressure sense line from the high stage regulator.

(9) Do a check for air leakage at the supply pressure inlet on the high stage regulator.

NOTE: Air leaking from the supply pressure inlet when the bleed air system is pressurized with the APU indicates the reverse flow diaphragm inside the high stage regulator is damaged.

(10) Replace the high stage regulator if air leakage is detected from the supply pressure inlet. Do these tasks:

High Stage Regulator Removal, AMM TASK 36-11-07-000-801

High Stage Regulator Installation, AMM TASK 36-11-07-400-801



## FAULT ISOLATION MANUAL

- (11) Perform the repair confirmation at the end of this task.
- (12) Do a check of the supply and control pressure sense lines:
  - (a) Do this task: Supply Pressure Upstream of the PRSOV, AMM TASK 36-00-00-860-805.
  - (b) Perform a leak check with a soap solution on the entire length of the flexible and rigid lines and fittings of these pneumatic sense lines:
 

NOTE: Only leakage in the sense lines listed below will cause the low duct pressure condition.

    - 1) Supply pressure sense line to the bleed air regulator
    - 2) Control pressure sense line from the bleed air regulator to the PRSOV
    - 3) Control pressure sense line from the PRSOV to the 450 F thermostat

NOTE: A small leak at the top of the 450 F thermostat is acceptable. Leakage found at the sense lines or sense line fittings must be repaired.
  - (c) If you find leakage in the sense lines or fittings, do these steps:
    - 1) Repair the sense line or, if necessary, replace the sense line.
      - a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect the sense lines.
    - 2) Do the Repair Confirmation at the end of this task.
  - (d) If you do not find any leakage in the sense lines or fittings, then continue.
- (13) Look at the position indicator on the precooler control valve:
  - (a) If the precooler control valve is not within 30 degrees from the fully closed position, examine these areas for leakage:
 

NOTE: If the precooler control valve is not within 30 degrees from the fully closed position, it may be due to a faulty 390 F precooler control valve sensor or a leak in the sense line or the sense line fittings between the precooler control valve and the 390 F precooler control valve sensor which should be isolated and corrected. However, if the precooler control valve moves to the fully open position in the next step, then the precooler control valve should be modulating to open and this condition will not result in low duct pressure unless the precooler control valve sensor is failed in the closed position. There is no way to do a check of the 390 F precooler control valve sensor on the aircraft. Keep this in mind if you do not find any failed components or if you still get a low duct pressure condition during the Repair Confirmation.

    - 1) Sense line to the precooler control valve
    - 2) Sense line between the precooler control valve and the precooler control valve sensor
    - 3) Precooler control valve sensor.
  - (b) If leakage is detected, repair lines and connections as necessary:
    - 1) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect lines.
  - (c) If leakage is not found, replace the precooler control valve as follows:
    - 1) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.
    - 2) Make sure there is no debris at the precooler inlet.
    - 3) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.
  - (d) If the precooler control valve is within 30 degrees of being fully closed, then continue.



## 36-10 TASK 801



737-600/700/800/900

## FAULT ISOLATION MANUAL

(14) Do these steps to simulate the opening of the precooler control valve sensor:

**WARNING:** MAKE SURE THAT YOU WEAR THE PERSONAL PROTECTIVE EQUIPMENT WHEN YOU DO THIS TASK. PERSONAL PROTECTIVE EQUIPMENT WILL PREVENT INJURIES TO PERSONNEL.

(a) Slowly remove the cap from the test fitting in the sense line next to the WTAI solenoid valve. (Figure 309), View C

NOTE: This simulates the opening of the precooler control valve sensor.

(b) Make sure that the precooler control valve opens fully.

1) If the precooler control valve does not open fully, then replace the precooler control valve:

a) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.

b) Make sure that there is no debris at the precooler inlet.

c) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.

2) If the precooler control valve opens fully, then continue.

(15) Do these steps to do a check of the precooler "kiss" seal:

(a) Examine the precooler "kiss" seal for proper seating against the precooler, distortion or any obvious damage that might cause fan air to bypass the precooler or in any way obstruct the flow of fan air through the precooler.

(b) If the "kiss" seal is distorted, obviously damaged, or not properly seated, replace the "kiss" seal as follows:

NOTE: The "kiss" seal replacement is part of the precooler control valve replacement.

1) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.

2) Inspect the fan air side of the bleed air precooler for foreign matter:

a) Remove all foreign matter found.

3) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.

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

(a) If the Repair Confirmation was not satisfactory, then continue.

(17) Perform the Fault Isolation Procedure for BLEED TRIP OFF Light Came On But Could Be Reset if one of these conditions exist:

(a) No system faults have been isolated

(b) Repair Confirmation was unsuccessfully performed.

### G. BLEED TRIP OFF light Came On But Could Be Reset - Fault Isolation Procedure

(1) If the BLEED TRIP OFF light came on but could be reset and there were no system faults found in the Preliminary Checks - Fault Isolation procedure, then do the steps that follow:

(a) Make sure 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.

(2) Do these steps to do a check of the pressure actuation point of the overpressure switch in the bleed air regulator:





737-600/700/800/900

## FAULT ISOLATION MANUAL

- (a) Do only the applicable steps of the Engine Bleed System Health Check below that makes sure the overpressure switch in the bleed air regulator will operate at the correct pressure range.
  - 1) Do this task: Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.
  - 2) If the pressure actuation point of the overpressure switch is either low or high, replace the bleed air regulator:
    - a) 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) If the pressure actuation point of the overpressure switch is low, do the Repair Confirmation at the end of this task.
    - c) If the pressure actuation point of the overpressure switch is high, continue.
- (3) Do these checks of the high stage regulator:
  - (a) Do this task: Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.
    - 1) Do only those steps that do a test of the pressure regulation of the high stage regulator.
    - 2) If the high stage regulator control pressure is out of limits, replace the high stage regulator:
      - a) These are the tasks:
        - High Stage Regulator Removal, AMM TASK 36-11-07-000-801
        - High Stage Regulator Installation, AMM TASK 36-11-07-400-801
      - b) Do the Repair Confirmation at the end of this task.
  - 3) If the high stage regulator control pressure is within specifications, then continue.
- (4) Do these checks of the precooler control valve system:
  - (a) Do this task: Precooler Control Valve System Health Check, AMM TASK 36-12-00-700-801.
    - 1) If you found and repaired defects when you performed the Precooler Control Valve System Health Check, then do the Repair Confirmation at the end of this task.
    - 2) If the precooler control valve control pressure is within specifications, then continue.
- (5) Do this check of the sense line between the precooler control valve and the precooler control valve sensor, Figure 307
  - (a) Disconnect the sense line at both ends.
  - (b) Blow dry shop air (80 psi maximum) or low pressure nitrogen through the sense line to make sure there are no obstructions in the line.
  - (c) Make sure 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.
      - c) Continue.
  - (d) If there is poor airflow, do these steps:
    - 1) Repair the obstruction or get a new sense line.
    - 2) Apply a light coat of Never-Seez Pure Nickel Special anti-seize compound (or equivalent) to the sense line connections.



**FAULT ISOLATION MANUAL**

- 3) Reconnect the sense line.
- 4) Do the Repair Confirmation at the end of this task.
- 5) If the Repair Confirmation is not satisfactory, then continue.

(6) Inspect the fan air side of the bleed air precooler for foreign matter as follows:

- (a) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.
- (b) Remove all foreign matter found.
- (c) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.

(7) Replace these components if this fault isolation procedure has not isolated any defective components:

**NOTE:** The precooler control valve sensor and the 450 F thermostat cannot be tested on wing.  
Replace both the precooler control valve sensor and the 450 F thermostat before you do the Repair Confirmation.

- (a) Replace the precooler control valve sensor and the 450 F thermostat as follows:
  - 1) These are the tasks:
    - Precooler Control Valve Sensor Removal, AMM TASK 36-12-03-000-801
    - Precooler Control Valve Sensor Installation, AMM TASK 36-12-03-400-801
  - 2) These are the tasks:
    - Thermostat Removal, AMM TASK 36-11-05-000-801
    - Thermostat Installation, AMM TASK 36-11-05-400-801
  - 3) Do the Repair Confirmation at the end of this task.
  - 4) If the Repair Confirmation is not satisfactory, then continue.
- (b) Replace the MW0311 wiring harness to the bleed air regulator, 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:** MW0311 electrical harnesses 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.

- 1) Do the Repair Confirmation at the end of this task.
- 2) If the Repair Confirmation is not satisfactory, then continue.
- (c) Replace or test the 490 F overtemperature switch as follows:
  - 1) Replace the 490 F overtemperature switch. These are the tasks:
    - Overtemperature Switch Removal, AMM TASK 36-11-08-000-801
    - Overtemperature Switch Installation, AMM TASK 36-11-08-400-801
    - a) Do the Repair Confirmation at the end of this task.
    - b) If the Repair Confirmation is not satisfactory, then continue.
  - 2) As an option to switch replacement, do this test of the switch to make sure it is within specification:

**NOTE:** If the switch is within specification, there is no need to replace it at this time.

**36-10 TASK 801**



737-600/700/800/900

## FAULT ISOLATION MANUAL

- a) Do this task: Bleed Air Regulator and 490F Overtemperature Switch Functional Test, AMM TASK 36-11-00-720-801.

NOTE: It is only necessary to do those steps applicable to the functional test of the 490 F overtemperature switch.

- b) Replace the switch if it is not within specification. These are the tasks:
  - Overtemperature Switch Removal, AMM TASK 36-11-08-000-801
  - Overtemperature Switch Installation, AMM TASK 36-11-08-400-801
- c) Do the Repair Confirmation at the end of this task.
- d) If the Repair Confirmation is not satisfactory, then continue.

- (d) 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

- 1) Do the Repair Confirmation at the end of this task.

### H. BLEED TRIP OFF Light is ON and Cannot Be Reset - Fault Isolation Procedure

- (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: MW0311 electrical harnesses P/N 325-029-901-0 and 325-029-902-0 are known to be the source of faults. These harnesses may 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) To remove the pressure from the pneumatic system, 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 FLAPS AND SLATS, DEACTIVATE THE LEADING EDGE FLAPS AND SLATS, 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, and deactivate the Leading Edge Flaps and Slats. To deactivate the Leading Edge Flaps and Slats, do this task: Deactivate the Leading Edge Flaps and Slats, 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 electrical circuit in the bleed air regulator:
  - (a) Disconnect the electrical connector DP1102 from the bleed air regulator, M1180.
  - (b) Push the TRIP RESET button on the P5-10 panel.
  - (c) If the BLEED TRIP OFF light goes off, replace the bleed air regulator:



**36-10 TASK 801**



737-600/700/800/900

## FAULT ISOLATION MANUAL

- 1) 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.
- (d) If the BLEED TRIP OFF light does not go off, do these steps:
  - 1) Re-connect electrical connector DP1102 to the bleed air regulator, M1180, and continue.
- (3) Do these steps to do a check of the electrical circuits for the 490 F overtemperature switches:
  - (a) Disconnect the electrical 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:
    - 1) These are the tasks:
      - Overtemperature Switch Removal, AMM TASK 36-11-08-000-801
      - Overtemperature Switch Installation, AMM TASK 36-11-08-400-801
    - 2) Do the Repair Confirmation at the end of this task.
  - (d) If the BLEED TRIP OFF light does not go off, re-connect electrical connector, D526 (Engine 1) or D528 (Engine 2) to the applicable overtemperature switch and continue.
- (4) Do these checks to isolate for a wiring short-to-ground fault as follows:

NOTE: An internal short to ground within the ACAU, the P5-10 air conditioning module, the MW0311 engine bleed air regulator harness, or other aircraft wiring can cause the BLEED TRIP OFF light to stay on.

  - (a) Refer to the appropriate version of WDM 36-11-11 for the airplane that you are troubleshooting.
  - (b) Remove the Air Conditioning Accessory Unit (ACAU). To remove the ACAU, do this task: Air Conditioning Accessory Unit (ACAU) Removal, AMM TASK 21-51-02-000-801.
  - (c) If the BLEED TRIP OFF light goes off, do a check of the wiring between the ACAU and the bleed air regulator pressure switch; and the ACAU and the bleed air overtemperature switch.
    - 1) Repair any problems that you find.
  - (d) If the light does not go off, then do a check of the wiring between the P5-10 Air Conditioning module and the ACAU.
    - 1) Repair any problems that you find.
    - 2) If you do not find any wiring problems, then install a serviceable ACAU. To install the ACAU, do this task: Air Conditioning Accessory Unit (ACAU) Installation, AMM TASK 21-51-02-400-801.

NOTE: You may delay the adjustment/test of the ACAU until the electrical fault isolation has been completed.

  - 3) If you do not find any problems, then install a serviceable P5-10 Air Conditioning Module. To install the P5-10 Air Conditioning Module, do this task: Air Conditioning Module Installation, AMM TASK 21-51-65-400-801.
    - a) Do the Repair Confirmation at the end of this task.
- (e) If you have not already done so, do the operational test of the ACAU:



**FAULT ISOLATION MANUAL**

- 1) Do this task: 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.

**I. Repair Confirmation**

- (1) If not already accomplished, remove all pressure gages, test equipment and associated hardware.
- (2) Re-connect all sense lines that were disconnected.
  - (a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) on the sense line fittings.
- (3) Re-install all components that were removed.
- (4) Make sure that all electrical connectors removed for wiring checks have been re-connected.
- (5) Perform the operational test for all components that were removed and re-installed.
- (6) Install any 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.

- (7) For the left thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.
- (8) Close the fan cowl panels:
  - (a) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (9) Reactivate the Leading Edge Flaps and Slats:
  - (a) Do this task: Reactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-440-801.
- (10) Reactivate the thrust reverser:
  - (a) Do this task: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.
- (11) Push the TRIP RESET button on the P5-10 panel:
  - (a) Make sure that there are no BLEED TRIP OFF lights on.
- (12) Do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.
- (13) Set the APU BLEED switch to the OFF position and remove any external pneumatic source, if applicable.
- (14) Do these steps if the BLEED TRIP OFF light came on during a "no engine bleeds takeoff":
  - (a) If applicable, set the applicable PACK switch to OFF.
  - (b) Set the applicable engine BLEED switch to OFF.

**CAUTION:** DO NOT EXCEED THE ENGINE OPERATING LIMITS. FAILURE TO COMPLY WITH THE ENGINE OPERATING LIMITS COULD RESULT IN ENGINE DAMAGE.

- (c) Slowly increase applicable engine N1 speed to 80% and maintain for 5 minutes
- (d) Make sure the engine BLEED TRIP OFF light does not come on.

**36-10 TASK 801**

## FAULT ISOLATION MANUAL

- (e) Slowly return the engine throttle to idle and make sure the BLEED TRIP OFF light does not come on.
- (f) If the BLEED TRIP OFF light did not come on, then you corrected the fault.
- (g) If the Repair Confirmation is not satisfactory, then do these steps:
  - 1) Make sure there is no pressure in the pneumatic system:
    - a) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
  - 2) Make sure the applicable engine BLEED switch is set to OFF.
  - 3) Make sure that the fuel shutoff lever for the applicable engine is in the cutoff position.

**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. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 4) Retract the Leading Edge Flaps and Slats, if not previously accomplished, and deactivate the Leading Edge Flaps and Slats. To deactivate the Leading Edge Flaps and Slats, do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- 5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- 6) For the applicable thrust reverser, do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.
- 7) Return to the step in the Fault Isolation procedure that directed you to the Repair Confirmation and continue with the Fault Isolation.

- (h) Do these steps to complete the task:
  - 1) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
  - 2) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
  - 3) Set the ISOLATION VALVE switch on the P5-10 panel to the AUTO position.

(15) Do this check for all fault conditions except the case when the BLEED TRIP OFF light came on during a "no engine bleeds takeoff":

**NOTE:** This check will operate the pneumatic system under conditions which the BLEED TRIP OFF light is most likely to come on.

- (a) Set the applicable engine BLEED switch on the P5-10 panel to the ON position.
- (b) Set the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.
- (c) Slowly increase N1 to approximately 48% so that the bleed system is operating on regulated 9th stage supply just before the crossover to 5th stage supply:
  - 1) Make sure that the duct pressures follow the pressure schedules shown on (Figure 305), Duct Pressure vs. N1 at Sea Level and 5000 feet.
- (d) Set the L and R PACK switches to HIGH.
- (e) Operate the applicable engine pneumatic system for approximately 5 minutes and observe for these conditions:



## 36-10 TASK 801

**FAULT ISOLATION MANUAL**

- 1) Make sure the BLEED TRIP OFF light does not come on.
- 2) Make sure that the pressure indication on the dual duct pressure indicator is 32 (+/-6) psi.
- 3) Monitor the applicable pointer on the dual duct pressure indicator for a decrease in pressure.

**NOTE:** If the outside air temperature is near 100 degrees F or higher, the duct pressure may decrease as the 450 F thermostat opens and the PRSOV moves toward the closed position.

- (f) After operating the applicable engine for 5 minutes at 48% N1, set the PACK switch not applicable to the engine pneumatic system under test to the OFF position.
  - 1) For example, if the left engine pneumatic system is being checked and the BLEED 1 switch is ON, then set the R PACK switch to OFF.
- (g) Slowly increase N1 to approximately 80% so that the applicable bleed system is operating on regulated 5th stage supply:
  - 1) Make sure that the duct pressures follow the pressure schedules shown on (Figure 305), Duct Pressure vs. N1 at Sea Level and 5000 feet.
- (h) Operate the applicable engine pneumatic system for approximately 5 minutes and observe for these conditions:
  - 1) Make sure the duct pressure on the dual duct pressure indicator remains steady at 42 (+/-8) psi and does not decrease during the 5 minutes.
  - 2) Make sure the BLEED TRIP OFF light does not come on.
  - 3) Monitor the applicable pointer on the dual duct pressure indicator for a decrease in pressure.

**NOTE:** If the outside air temperature is near 100 degrees F or higher, the duct pressure may decrease as the 450 F thermostat opens and the PRSOV moves toward the closed position.

- (i) Slowly return the throttle to idle and make sure the BLEED TRIP OFF light does not come on.
- (j) If the BLEED TRIP OFF light did not come on, then you corrected the fault.
- (k) If the Repair Confirmation is not satisfactory, then do these steps:
  - 1) Make sure there is no pressure in the pneumatic system:
    - a) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
  - 2) Make sure the applicable engine BLEED switch is set to OFF.
  - 3) Make sure that the fuel shutoff lever for the applicable engine is in the cutoff position (Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00).

**36-10 TASK 801**

**FAULT ISOLATION MANUAL**

**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. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 4) Retract the Leading Edge Flaps and Slats, if not previously accomplished, and deactivate the Leading Edge Flaps and Slats. To deactivate the Leading Edge Flaps and Slats, do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- 5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- 6) For the applicable thrust reverser, do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.
- 7) Return to the step in the Fault Isolation procedure that directed you to the Repair Confirmation and continue with the Fault Isolation.

(I) Do these steps to complete the task:

- 1) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
- 2) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
- 3) Set the ISOLATION VALVE switch on the P5-10 panel to the AUTO position.

**END OF TASK**

**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 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 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) MW0311 Electrical Harness
  - (a) Failure Mode: Open or shorted wiring

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

- (2) Circuit Breakers

**36-10 TASKS 801-802**

**FAULT ISOLATION MANUAL**

- (a) Failure Mode: Failed open
- (3) P5-10 Air Conditioning Module
  - (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

**HAP 001-013, 015-026, 028-054**

- (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

**HAP 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 LEFT
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 RIGHT

**D. Related Data**

- (1) Component Location (Figure 301)
- (2) Troubleshooting Check (Figure 308)
- (3) Pneumatic System Control Valve Position Indicators (Figure 312)
- (4) (SSM 36-11-11)
- (5) (WDM 36-21-11)

**E. Initial Evaluation**

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

**36-10 TASK 802**

## FAULT ISOLATION MANUAL

(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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

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

1) Do this 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) Do this 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. To remove the pressure, do this 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 with no pneumatic source available.

(a) If the indicated pressure on the dual duct pressure indicator is 2 psi or greater, 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.

2) Continue with the Initial Evaluation.

(b) If the indicated pressure on the dual duct pressure indicator is less than 2 psi, continue.

(c) Supply pressure to the pneumatic system with the APU. To supply pressure with the APU, do this 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 with no user systems in operation and the L and R pointers on the dual duct pressure indicator are within 3 psi 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 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, then 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.

b) Continue with this Initial Evaluation.



## 36-10 TASK 802

## FAULT ISOLATION MANUAL

- 2) If the pneumatic pressure indication is a minimum of 12 psi with no user systems in operation and the L and R pointers on the dual duct pressure indicator are within 3 psi of each other, then continue.
- (4) Supply pneumatic pressure with the engine on the side with the fault:
  - (a) Do this 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.
  - (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 10-25 psi 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.
- (8) If the pressure pointer decreases to less than 10 psi 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) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
  - (c) Do this 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 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:
  - (a) Make sure that there is no pressure in the pneumatic system. To remove the pressure from the pneumatic system, do this 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.



## 36-10 TASK 802

## FAULT ISOLATION MANUAL

**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 SLAPS, 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.

- (c) Retract the Leading Edge Flaps and Slats if not previously accomplished. To retract the Leading Edge Flaps and Slats, do this task: Leading Edge Flaps and Slats Retraction, AMM TASK 27-81-00-860-804.
- (d) Deactivate the Leading Edge Flaps and Slats. To deactivate the Leading Edge Flaps and Slats, do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- (e) Deactivate the applicable thrust reverser. To deactivate the thrust reverser, do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- (f) Open the applicable thrust reverser. To open the 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 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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

(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.
  - b) If the Repair Confirmation is not satisfactory, then continue.
- 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 MW0311 engine harness.

**NOTE:** The MW0311 engine harness may have a short that trips the circuit breaker.

(3) Do this check for 28 VDC to the bleed air regulator:

(a) Open these circuit breakers:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT



## 36-10 TASK 802



737-600/700/800/900

**FAULT ISOLATION MANUAL**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (b) Disconnect electrical connector DP1102 from the applicable bleed air regulator.
- (c) Close these circuit breakers:

F/O Electrical System Panel, P6-4

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (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 22-30 VDC between pins 7 and 6 of connector DP1102, measure the resistance between pins 7 and 6 of the electrical connector on the bleed air regulator.
    - 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. 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 Repair Confirmation is not satisfactory, then continue.
    - d) 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 22-30 VDC between pins 7 and 6 of connector DP1102, do a check of the wiring between connector DP1102, pin 6 and the ground (GD3838-DC, left) (GD3938-DC, right).
    - a) Repair any problems that you find.
    - b) If the ground does not have any problems, then continue.

- (4) Do this check to make sure there is 28 VDC at the MW0311 engine harness:

- (a) Open these circuit breakers:

F/O Electrical System Panel, P6-4

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (b) Disconnect electrical connector DP1104 from electrical connector D30204 (D30404) at the engine firewall disconnect, as applicable.
  - (c) Close these circuit breakers:

F/O Electrical System Panel, P6-4

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

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

**36-10 TASK 802**



737-600/700/800/900

## FAULT ISOLATION MANUAL

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

(5) Do these steps to do a check of the MW0311 engine harness:

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, 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 electrical connector DP1104 at the firewall disconnect.
- (b) Do a visual examination of the MW0311 engine harness 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.
    - b) If the Repair Confirmation is not satisfactory, then continue.
  - 2) If there is no obvious damage to the harness, then continue.
- (c) Examine these circuits of the MW0311 harness 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 harness. To replace the MW0311 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.
  - b) If the Repair Confirmation is not satisfactory, then continue.
- 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 electrical connectors D3200 (D3202) from the Ground WTAI Temperature Solenoid valve and DP1101 from the Fan Frame Compressor Case Vibration sensor.



## 36-10 TASK 802



737-600/700/800/900

## FAULT ISOLATION MANUAL

**CAUTION:** YOU MUST PERFORM THE MEG CHECK IN ACCORDANCE WITH STANDARD WIRING MAINTENANCE PRACTICES. FAILURE TO FOLLOW PROPER PROCEDURES COULD RESULT IN DAMAGE TO EQUIPMENT.

- 2) Use a megohmmeter to examine the 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 MW0311 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) Perform 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 P5 forward overhead panel to get access to the back of the P5-10 panel:
  - 1) Disconnect electrical connector D646 (D680).
- (b) Do a continuity check between pin 18 (15) of electrical connector D646 (D680) and pin 12 of electrical 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.
    - b) If the Repair Confirmation is not satisfactory, then continue.
  - 2) If there is continuity, then continue.
- (c) Do a continuity check between pins 18 and 33 of electrical connector D646 (pins 15 and 14 of electrical 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 P5-10 air conditioning panel as follows:
    - a) These are the tasks:





737-600/700/800/900

## FAULT ISOLATION MANUAL

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

- 3) If there is continuity, then continue.
- (d) Do this check for 28 VDC 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 22-30 VDC present at pin 33 (14) of connector D646 (D680).
  - 3) If there is not 22-30 VDC 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 electrical 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) For the left thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.
- (5) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (6) Do this task: Reactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-440-801.
- (7) Do this task: 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.
- (9) Supply pressure to the pneumatic system with the engine on the applicable side. To supply pressure, do this 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.



**36-10 TASK 802**

## FAULT ISOLATION MANUAL

- (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 - 25 psi 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.
- (13) If the manifold pressure pointer decreases to less than 10.0 psi 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 this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
    - 2) Do this 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 as follows:
  - 1) Do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- (c) Deactivate the applicable thrust reverser as follows:
  - 1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- (d) Open the applicable thrust reverser, as follows:
  - 1) Do this 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) (Reference TBD)



## 36-10 TASKS 802-803

## FAULT ISOLATION MANUAL

(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) Duct pressure transducer, T405 (Left) or T403 (Right)
  - (a) Failure Mode: Out-of-tolerance or faulty transducer
- (2) Dual duct pressure indicator, N12
  - (a) Failure Mode: Out-of-tolerance or faulty indicator
- (3) Pressure regulator and shutoff valve (PRSOV)
  - (a) Failure Mode: sticking
- (4) Bleed air regulator, M1180
  - (a) Failure Mode: Incorrect regulation
- (5) Leak in the downstream pressure sense line or fittings(Figure 308)

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.

## (6) Wiring

- (a) Failure Mode: Indication circuit wiring problem

## 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 LEFT
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 RIGHT

## D. Related Data

- (1) Component Location (Figure 301)
- (2) Component Location (Figure 302)



## 36-10 TASK 803

**FAULT ISOLATION MANUAL**

- (3) Troubleshooting Check (Figure 308)
- (4) (Figure 305), Duct Pressure Versus N1 at Sea Level and 5000 feet
- (5) (Figure 305), Duct Pressure Versus N1 at Sea Level, 10K feet, 22K feet, 31K feet, 37K feet and 41K feet
- (6) (Figure 312), 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.

**36-10 TASK 803**

## FAULT ISOLATION MANUAL

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:



## 36-10 TASK 803

## FAULT ISOLATION MANUAL

- (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: Deactivate the Leading Edge Flaps and Slats, 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:





737-600/700/800/900

## FAULT ISOLATION MANUAL

- 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.

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 (to the 450°F thermostat) at the flex line to the 450°F thermostat (Figure 308).
- (d) Install a 30 psi control pressure gage (Pc) between the flex line and the 450°F thermostat.
  - 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) Slowly increase Ps to 60-70 psig.
- (g) Make sure that Pc is between 20-28 psig.
- (h) 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.
- (i) 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.



**36-10 TASK 803**



737-600/700/800/900

## FAULT ISOLATION MANUAL

- (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. To close the panels, do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (6) Supply pressure to the pneumatic system with the applicable engine(s). To supply pressure, do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.
- (7) Set the APU BLEED switch to OFF.
  - (a) Remove any external pneumatic source, if applicable.
- (8) Set the ISOLATION VALVE switch on the P5-10 panel to the CLOSE position.
- (9) Examine the dual duct pressure indicator, N12 on the P5-10 panel.
- (10) Make sure the duct pressure pointer for the applicable pneumatic system increases to 10-25 psi.

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

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

- (11) 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.
- (12) Examine the dual duct pressure indicator, N12, on the P5-10 panel.
- (13) If the duct pressure is higher than 50 psi, return to the step in the Initial Evaluation Procedure or Fault Isolation Procedure that you were at prior to performing the Repair Confirmation and continue with the procedure.
- (14) If the duct pressure pointer(s) of the applicable system(s) is 42 (+/- 8) psi, then you corrected the fault.
- (15) Do these steps to complete the task:
  - (a) Slowly return the throttle to idle and allow the engine to stabilize.
  - (b) Make sure the duct pressure is 10 - 25 psi.

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

  - (c) Stop the engine. To stop the engine, do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.



**FAULT ISOLATION MANUAL**

- (d) Set the ISOLATION VALVE switch on the P5-10 panel to AUTO.
- (e) Remove the pressure from the pneumatic system. To remove the pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806
- (f) Reactivate the Leading Edge Flaps and Slats:
  - 1) Do this task: Reactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-440-801.

**END OF TASK****804. Duct Pressure Low, the Engine is the Bleed Source - Fault Isolation****A. Description**

- (1) (SDS SUBJECT 36-11-00, SDS SUBJECT 36-12-00)
- (2) A low duct pressure condition is a condition in which one or both pointers on the dual duct pressure indicator are lower than 34 psi with the engines as the bleed source when operating on the regulated 5th stage pressure as determined by using the "Duct Pressure Versus N1 at Various Altitudes" graphs. The graphs are based on steady state operating conditions.
- (3) The operating limits of the bleed system within the regulated 9th stage pressure area is 32 (+/- 6) psi and within the regulated 5th stage is 42 (+/-8) psi. These limits do not apply to the unregulated 9th stage, the unregulated 5th stage, the 9th stage to 5th stage switchover when the engine throttle is advanced or the 5th stage to 9th stage switchover when the engine throttle is retarded.
- (4) If you have the necessary information, you can determine if the bleed system is operating properly without operating the engine by using the "Duct Pressure Versus N1 at Various Altitudes" graphs, (Figure 305). If you do not have this information, you must perform a high power engine run during the Initial Evaluation to obtain that information. Determining the mode of operation of the bleed system at the time the fault was observed can be very helpful in determining the possible cause of the fault. For example, if the duct pressure was low when the throttles were retarded during descent, the problem is most likely with the high stage valve, the high stage regulator, or the sense lines between the two components. Ultimately, the most valuable tool in the fault isolation of this system is a thorough working knowledge of the system operation.
- (5) If the N1 speed of the engine and altitude of the aircraft at the time the fault was observed places the bleed system in the regulated 5th stage pressure area of the graph, the duct pressure should not be lower than 34 psi. In the regulated 9th stage area of the graph, the duct pressure should not be lower than 26 psi. If the bleed system was in the unregulated 9th stage area, the pressure can be significantly lower than 26 psi but should not be less than 10 psi.

**B. Possible Causes**

- (1) Duct pressure transducer, T405 (Left) or T403 (Right)
  - (a) Failure Mode: Out-of-tolerance or faulty transducer
- (2) Dual duct pressure indicator, N12
  - (a) Failure Mode: Out-of-tolerance or faulty indicator
- (3) Precooler control valve
  - (a) Failure Mode: Valve not modulating correctly or stuck closed
- (4) Precooler control valve sensor (390 F sensor)
  - (a) Failure Mode: Sensor is out-of-tolerance, stuck closed or plugged

**36-10 TASKS 803-804**

## FAULT ISOLATION MANUAL

- (5) Pressure regulator and shutoff valve (PRSOV)
  - (a) Failure Mode: Sticking butterfly valve
- (6) 450 F thermostat
  - (a) Failure Mode: Failed open
- (7) Bleed air regulator, M1180
  - (a) Failure Mode: regulates control pressure too low (Service Letter 71-051)
- (8) High stage valve
  - (a) Failure Mode: Sticky valve
- (9) High stage regulator
  - (a) Failure Mode: Not regulating properly
- | (10) Leaky sense lines or fittings
  - (a) Failure Mode: loose connections or damaged lines
  - | (b) Leakage at these sense lines or sense line fittings can cause low duct pressures:
    - 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 operation)
    - 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 operation)
    - 5) Supply pressure line to high stage regulator (9th stage operations)
    - 6) Sense line between the precooler control valve and the 390 F precooler control valve sensor (obstructed, not leaking)
- (11) Wiring
  - (a) Failure Mode: shorted or open indication system wiring
- (12) Precooler
  - (a) Failure Mode: Degraded operational capability
- (13) Kiss seal
  - (a) Failure Mode: Damaged, foreign object debris (FOD), blocked fan airflow

## 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 LEFT
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 RIGHT



## 36-10 TASK 804



737-600/700/800/900

## FAULT ISOLATION MANUAL

### D. Related Data

- (1) Component Location (Figure 301)
- (2) Component Location (Figure 302)
- (3) Duct Pressure Versus N1 at Sea Level and 5000 Feet Graph (Figure 305)
- (4) Duct Pressure Versus N1 at Sea Level, 10K, 22K, 31K, 37K and 41K Feet Graph (Figure 305)
- (5) Troubleshooting Check (Figure 309)
- (6) Pneumatic System Control Valve Position Indicators (Figure 312)
- (7) (SSM 36-11-11)
- (8) (WDM 36-11-11)

### E. Initial Evaluation

- (1) If you have a pilot report or an observed fault of low duct pressure and you know the bleed pressure, the N1 speed of the applicable engine and the altitude of the aircraft at the time the fault was observed, use the "Duct Pressure Versus N1 at 10K, 22K, 31K, 37K or 41K feet" graph or the "Duct Pressure Versus N1 at Sea Level and 5000 feet" graph to determine if the pressure is within limits.

NOTE: If the fault was observed at an altitude other than sea level, 5K feet, 10K feet, 22K feet, 31K feet, 37K feet or 41K feet, you may use the altitude line on the graph that is closest to the altitude the fault was observed at provided that the N1 speed of the engine at that time was sufficient for the pneumatic system to be operating in 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 indicated a low duct pressure at 16,000 feet during climb with the engine N1 speed at 88%, you can see that both the 10,000 feet and 22,000 feet altitude lines on the graph indicate that the system should be operating within the regulated 5th stage pressure of 42 (+/-8) psi at the N1 speed of 88%. (Figure 305, Figure 305)

NOTE: If the N1 engine speed and altitude at the time the fault was observed fall within the 5th to 9th stage switchover area, the duct pressure can decay to as low as 20 psi below 5,000 feet and even lower than 20 psi at higher altitudes when the throttles are retarded before the high stage valve opens. This is a typical response during the 5th to 9th stage transition and is considered normal operation.

- (a) If you are not certain that the bleed system was operating in the regulated 5th or regulated 9th stage areas, then continue with this Initial Evaluation procedure to determine if the system pressure was normal for the mode of operation that the bleed system was in at the time the fault was observed.
- (b) If the bleed pressure is not within limits, proceed to the Fault Isolation procedure.
- (c) If the bleed pressure is within limits, then the bleed system is functioning normally and no further action is necessary provided there were no faults reported with associated systems.



## FAULT ISOLATION MANUAL

- 1) Find if there are any reports of associated faults with the user systems at the time the fault was observed such as air conditioning, pressurization, wing or cowl anti-ice systems. If there are associated faults, perform the appropriate FIM task for the specific fault. If there are no associated faults, you should review the aircraft's pneumatic system history. If the system does have a recent history of problems, you should perform the Fault Isolation procedure. If there is no history of problems with the system, then you should monitor the system on subsequent flights. If you are not certain that the system is operating properly, then continue.
- 2) If you suspect that the pneumatic system has faults based on the aircraft's pneumatic system history or if there are associated faults with systems like the air conditioning or pressurization systems, you may proceed to the Fault Isolation Procedure without completion of the Initial Evaluation procedure to save time.

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.

- (a) If you suspect that there are no faults, then continue.
- (3) If you do not have the necessary information to determine if the bleed pressure is within limits, then continue with the Initial Evaluation procedure.
- (4) Make sure the ISOLATION VALVE switch on the P5-10 panel is set to the OPEN position.
- (5) Set the engine BLEED 1 and 2 switches on the P5-10 panel to OFF.
- (6) 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) Make sure the manifold pressure on the dual duct pressure indicator increases to a minimum of 12 psi for both the left and right pneumatic systems.
  - (b) Make sure the pressure pointers on the dual duct pressure indicator are within 3 psi of each other.
    - 1) If the pressure pointers on the dual duct pressure indicator are not within 3 psi of each other, then do these steps:
      - 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.
      - b) Continue.
    - (c) If the indicated pressures are correct, then continue.
- (7) Supply pressure with the engine with the pneumatic system that has the report of low bleed pressure or both engines if you suspect a low bleed pressure problem on both sides. 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) Set the APU BLEED switch to OFF.
  - (b) If applicable, remove any external pneumatic source.
  - (c) Set the ISOLATION VALVE switch on the P5-10 panel to the CLOSE position.
  - (d) Make sure the duct pressure pointer for the applicable pneumatic system indicates between 10-25 psi.

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



## 36-10 TASK 804

## FAULT ISOLATION MANUAL

- 1) If the duct pressure pointer for the applicable pneumatic system does not indicate 10-25 psi, then perform the Fault Isolation Procedure.
- 2) If the duct pressure pointer for the applicable pneumatic system indicates 10-25 psi, then continue.
- (e) Set the engine BLEED switch to the OFF position.
- (f) Monitor that the duct pressure on the dual duct pressure indicator decreases to less than 10 psi.

NOTE: This indicates that the PRSOV has closed.

- 1) If the PRSOV does not close properly, do this task:

- a) Do this task: Bleed Valve Will Not Close When the Bleed Switches Are Moved to Off, the Engine Is the Bleed Source - Fault Isolation, 36-10 TASK 802.

NOTE: Faults with the engine harness MW0311, aircraft wiring and the bleed air regulator can cause both fault conditions (low duct pressure and bleed valve will not close). Therefore, the continuation of this Initial Evaluation with the engine high power run is not necessary to further isolate the fault.

- (g) Set the applicable engine BLEED switch to ON.
- (h) Make sure the duct pressure on the dual duct pressure indicator increases to 10-25 psi.

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

- (8) Set the applicable PACK to normal operation.
- (a) Put the switch on the P5-10 panel in the AUTO position.
- (9) Do these steps to do a check of the pneumatic system pressures:

**CAUTION:** OBSERVE THE ENGINE OPERATIONAL LIMITS. IF YOU DO NOT OBEY THE ENGINE OPERATIONAL LIMITS, DAMAGE TO THE ENGINE COULD RESULT

- (a) To operate the engine within the guidelines, do this task: Engine Operation Limits, AMM TASK 71-00-00-800-806-F00.
- (b) Slowly increase N1 in 5-10% increments on the applicable engine to 80% or greater and make sure the applicable pneumatic pressure indication follows the "Duct Pressure Versus N1 at Sea Level and 5000 Feet" graph and is within the limits of the graph.
  - 1) If the duct pressure is lower than the specified pressures on the graph, then perform the Fault Isolation Procedure.
  - 2) If the duct pressures are within limits of the graph, then continue.
- (c) Maintain the N1% setting at 80% or greater for a minimum of 5 minutes.
- (d) Monitor the duct pneumatic pressures to make sure the pressures remain at 42 (+/-8) psi.
  - 1) If the duct pressure starts to decrease after reaching a stable pressure of 42 (+/-8) psi, the problem is most likely temperature related and not a pressure regulation fault.
    - a) In this situation, either the high stage valve, the high stage regulator, the precooler control valve or the 390 F precooler control valve sensor is most likely to be at fault.
- (10) Examine the dual duct pressure indicator, N12 on the P5-10 panel.
- (11) Make sure that the duct pressure pointers are not lower than 34 psig.
- (12) Slowly return the throttle(s) to idle as you make sure that the duct pressure follows the "Duct Pressure Versus N1 at Sea Level and 5000 Feet" graph.



## 36-10 TASK 804

**FAULT ISOLATION MANUAL**

- (a) Make sure that the switchover from 5th stage regulation to 9th stage regulation occurs.
- (13) Once the throttle is at idle, make sure the duct pressure is at 10-25 psi.
- (14) If the duct pressure pointer on one or both sides was lower than 34 psi when the system was on regulated 5th stage pressure, lower than 20 psi in the unregulated 5th stage mode, lower than 26 psi when the system was on regulated 9th stage pressure or less than 10 psi in the unregulated 9th stage mode, then do the Fault Isolation Procedure below.
- (15) If you do not find a fault with either the left or right pneumatic systems, then one of these situations exists:
  - (a) There was an intermittent fault
  - (b) One or both of the pneumatic systems was operating in the 5th to 9th stage switchover, the 9th to 5th stage switchover, or the unregulated 9th stage which makes a duct pressure comparison invalid.
  - (c) Continue to the next step for a possible course of action.
- (16) Use your judgement, airline policy, the history of the aircraft's pneumatic systems, and any reports of user systems malfunctions to determine which of the actions that follow 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.
- (17) Set the applicable engine BLEED switch to OFF.
  - (a) Make sure the applicable duct pressure pointer decreases to less than 10 psi.
- (18) Set the applicable engine BLEED switch to ON.
  - (a) Make sure the applicable duct pressure pointer increases to 10-25 psi.

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

- (19) Stop the engine operation:
  - (a) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
- (20) Set the ISOLATION VALVE switch on the P5-10 panel to the AUTO position.
- (21) Remove the pressure from the pneumatic system. To remove the pressure, do this task:  
Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806

**F. Fault Isolation Procedure**

- (1) Make sure there is no pressure in the pneumatic system:
  - (a) 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 set to OFF.
- (2) Make sure the fuel shutoff lever for the applicable engine is in the cutoff position.
  - (a) Install DO-NOT-OPERATE tags.

**36-10 TASK 804**



737-600/700/800/900

## FAULT ISOLATION MANUAL

**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. IF YOU DO NOT OBEY THE ABOVE SEQUENCE, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Retract the leading edge flaps and slats if not previously accomplished:
  - (a) Do this task: Leading Edge Flaps and Slats Retraction, AMM TASK 27-81-00-860-804.
- (4) Deactivate the leading edge flaps and slats:
  - (a) Do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- (5) Deactivate the applicable thrust reverser:
  - (a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- (6) Open the applicable thrust reverser:
  - (a) Do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.
- (7) Use a dental mirror, STD-3907 to look at the position indicator/manual override nut on the precooler control valve to make sure it is in the OPEN position.
  - (a) Use a 3/4-inch wrench on the manual override nut to close the precooler control valve to make sure it moves smoothly.
  - (b) Remove the wrench and allow the valve to return to the OPEN position by spring force only.
  - (c) If the precooler control valve does not close smoothly or return to the OPEN position, replace the valve by following these procedures:  
Precooler Control Valve Removal, AMM TASK 36-12-02-000-801  
Precooler Control Valve Installation, AMM TASK 36-12-02-400-801
- (8) Do this inspection of the precooler "kiss" seal:
  - (a) Examine the precooler "kiss" seal for any of these conditions:
    - 1) Improper seating
    - 2) Distortion that can block air flow
    - 3) Any damage that would cause the fan air flow to bypass the precooler.
  - (b) If the inspection finds any of the above conditions, then replace the "kiss" seal as follows:
    - 1) These are the tasks:
      - Precooler Control Valve Removal, AMM TASK 36-12-02-000-801
      - Precooler Control Valve Installation, AMM TASK 36-12-02-400-801
    - 2) If you replace the "kiss" seal, examine the face of the precooler for contamination and FOD damage.
      - a) Replace the precooler if contamination or damage is found. 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
      - (c) If the inspection does not find any of the conditions listed above, then continue.





737-600/700/800/900

## FAULT ISOLATION MANUAL

- (9) Look at the position indicator/manual override nut on the PRSOV to make sure it is in the CLOSED position.
  - (a) Use a 3/4-inch wrench on the manual override nut to open the PRSOV to make sure it moves smoothly.
  - (b) Remove the wrench and allow the valve to return to the CLOSED position by spring force only.
  - (c) If the PRSOV does not open smoothly or return to the CLOSED position, replace the valve by following these procedures:  
PRSOV Removal, AMM TASK 36-11-04-000-801  
PRSOV Installation, AMM TASK 36-11-04-400-801
- (10) Look at the position indicator/manual override nut on the high stage valve to make sure it is in the CLOSED position.
  - (a) Use a 3/8-inch wrench on the manual override nut to open the high stage valve to make sure it moves smoothly.
  - (b) Remove the wrench and allow the valve to return to the CLOSED position by spring force only.
  - (c) If the high stage valve does not open smoothly or return to the CLOSED position, replace the valve by following these procedures:  
High Stage Valve Removal, AMM TASK 36-11-06-000-801  
High Stage Valve Installation, AMM TASK 36-11-06-400-801
- (11) Use the APU to pressurize the bleed air system. Do this task:
  - (a) Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803

NOTE: The PRSOV should be closed when pressurizing the bleed air system.
- (12) Put the BLEED switch in the ON position.
- WARNING:** USE A RATCHET-TYPE WRENCH TO OPEN THE PRSOV. PRESSURE IN THE SYSTEM CAN CAUSE THE PRSOV TO OPEN QUICKLY. THIS CAN PULL THE WRENCH FROM YOUR HANDS. INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT CAN OCCUR.
- (13) Use a 3/8-inch socket on a ratcheted-type wrench to turn the manual override nut on the PRSOV. Once you begin turning the manual override nut, the air pressure should move the PRSOV to the fully OPEN position.
- (14) Listen for air leakage in the engine.

NOTE: Air leakage in the engine is an indication that the high stage valve is allowing air to backflow into the engine.

**WARNING:** REMOVE THE PRESSURE FROM THE PNEUMATIC DUCTS BEFORE YOU REMOVE A PNEUMATIC SYSTEM COMPONENT. HOT HIGH PRESSURE AIR CAN CAUSE INJURIES TO PERSONNEL OR DAMAGE TO EQUIPMENT.

  - (a) Replace the high stage valve if air can be heard in the engine when the system is pressurized. Do these tasks:
    - 1) Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806
    - 2) High Stage Valve Removal, AMM TASK 36-11-06-000-801
    - 3) High Stage Valve Installation, AMM TASK 36-11-06-400-801





737-600/700/800/900

## FAULT ISOLATION MANUAL

(b) Use the APU to pressurize the bleed air system again if you replaced the high stage valve. Do this task:  
Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803

(15) Disconnect the supply pressure sense line from the high stage regulator.

(16) Do a check for air leakage at the supply pressure inlet on the high stage regulator.

NOTE: Air leaking from the supply pressure inlet when the bleed air system is pressurized with the APU indicates the reverse flow diaphragm inside the high stage regulator is damaged.

(17) Replace the high stage regulator if air leakage is detected from the supply pressure inlet. Do these tasks:  
High Stage Regulator Removal, AMM TASK 36-11-07-000-801  
High Stage Regulator Installation, AMM TASK 36-11-07-400-801

(18) Perform the repair confirmation at the end of this task.

(19) Do a check of the supply and control pressure sense lines:

- Do this task: Supply Pressure Upstream of the PRSOV, AMM TASK 36-00-00-860-805.
- Perform a leak check with a soap solution on the entire length of the flexible and rigid lines and fittings of these pneumatic sense lines:

NOTE: Only leakage in the sense lines listed below will cause the low duct pressure condition.

- Supply pressure sense line to the bleed air regulator
- Control pressure sense line from the bleed air regulator to the PRSOV
- Control pressure sense line from the PRSOV to the 450 F thermostat

NOTE: A small leak at the top of the 450 F thermostat is acceptable. Leakage found at the sense lines or sense line fittings must be repaired.

- If you find leakage in the sense lines or fittings, do these steps:
  - Repair the sense line or, if necessary, replace the sense line.
    - Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect the sense lines.
  - Do the Repair Confirmation at the end of this task.
- If you do not find any leakage in the sense lines or fittings, then continue.

(20) Look at the position indicator on the precooler control valve:



## FAULT ISOLATION MANUAL

(a) If the precooler control valve is not within 30 degrees from the fully closed position, examine these areas for leakage:

**NOTE:** If the precooler control valve is not within 30 degrees from the fully closed position, it may be due to a faulty 390 F precooler control valve sensor or a leak in the sense line between the precooler control valve and the 390 F precooler control valve sensor which should be isolated and corrected. However, if the precooler control valve moves to the fully open position in the next step, then the precooler control valve should be modulating to open and this condition will not result in low duct pressure unless the precooler control valve sensor is failed in the closed position. There is no way to do a check of the 390 F precooler control valve sensor on the aircraft. Keep this in mind if you do not find any failed components or if you still get a low duct pressure condition during the Repair Confirmation.

- 1) Sense line and fittings to the precooler control valve
- 2) Sense line and fittings between the precooler control valve and the precooler control valve sensor
- 3) Precooler control valve sensor.

(b) If leakage is detected, repair lines and connections as necessary:

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

(c) If leakage is not found, replace the precooler control valve as follows:

- 1) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.
- 2) Make sure there is no debris at the precooler inlet.
- 3) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.

(d) If the precooler control valve is within 30 degrees of being fully closed, then continue.

(21) Do these steps to simulate the opening of the precooler control valve sensor:

**WARNING:** USE THERMAL PROTECTIVE EQUIPMENT WHEN YOU REMOVE THE CAP ON THE TEST PORT. HOT, HIGH PRESSURE AIR MAY BE PRESENT WHICH CAN CAUSE INJURIES TO PERSONS.

(a) Slowly remove the cap from the test fitting in the sense line next to the WTAI solenoid valve. (Figure 309), View C

**NOTE:** This simulates the opening of the precooler control valve sensor.

(b) Make sure that the precooler control valve opens fully.

- 1) If the precooler control valve does not open fully, then replace the precooler control valve:
  - a) Do this task: Precooler Control Valve Removal, AMM TASK 36-12-02-000-801.
  - b) Make sure that there is no debris at the precooler inlet.
  - c) Do this task: Precooler Control Valve Installation, AMM TASK 36-12-02-400-801.
- 2) If the precooler control valve opens fully, then continue.

(22) Set the applicable engine BLEED switch to OFF.

(23) Set the APU BLEED switch to OFF.

(24) Make sure that the PRSOV closes.



## 36-10 TASK 804

## FAULT ISOLATION MANUAL

(25) Consider the results of the fault isolation at this point and take the appropriate action listed below:

- If you have isolated and replaced any faulty components, perform the Repair Confirmation at the end of the task.
  - If the Repair Confirmation is unsatisfactory, then continue.
- If you have not found any faults or if you have found and corrected faults that may not necessarily cause a low duct pressure condition, then continue.

NOTE: Additional test equipment is required in the subsequent procedures.

(26) Install this test equipment to the pressure supply side of the applicable bleed air regulator:

NOTE: The test equipment used in this and 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). Test equipment equivalent to the equipment in the P/N C36001-44 may be used.

- Connect a nitrogen pressure source, a pressure regulator, a supply pressure gage (Ps), and a supply pressure test hose at the tee to the supply pressure sense line to the bleed air regulator. (Figure 309)

(27) Install test equipment to the control pressure side of the bleed air regulator (control pressure to the PRSOV and the 450 F thermostat) (Figure 309):

- Install a 30 psi control pressure gage (Pc) at the flexible line between the bleed air regulator and the 450 F thermostat adjacent to the precooler using a tee fitting so that the PRSOV and the 450 F thermostat will sense the control pressure.
  - If you use a pressure gage equivalent to the gage 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.

(28) Do this check of the bleed air regulator circuit:

- Put the applicable BLEED switch on the P5-10 panel to the ON position.
- Increase Ps to 60-70 psig.
- Make sure the PRSOV is fully open.

NOTE: Sense line leakage or low control pressure (Pc) could prevent the PRSOV from being fully open.

- If Pc is greater than 28 psig, then 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
  - Continue with this procedure as this will not cause a low duct pressure condition.
- If Pc is less than 20 psig, then use a soap solution to examine the sense line and fittings from the bleed air regulator to the PRSOV and the sense line and fittings from the PRSOV to 450 F thermostat for pressure leakage.

NOTE: A small leak at the top of the 450 F thermostat is acceptable. The 450 F thermostat will be isolated in subsequent steps. Leakage detected at the sense line connections must be repaired.

- If you find any leakage, decrease Ps to 0 psig.
- Repair the sense line to stop the leakage:



737-600/700/800/900

## FAULT ISOLATION MANUAL

- a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect sense lines.
- b) Increase Ps to 60-70 psig and make sure the repaired sense line or fittings do not leak.
- 3) If you do not find any leakage, then continue.
- 4) Slowly increase Ps to 60-70 psig.
- 5) Make sure that Pc is 20-28 psig.
- 6) If Pc is not between 20-28 psig, do these steps:
  - a) Decrease Ps to 0 psig.
  - b) Disconnect the control pressure sense line to the 450 F thermostat at the connection to the thermostat.
  - c) Install a plug in the disconnected control pressure sense line where it connects to the fitting on the thermostat.

NOTE: This removes the 450 F thermostat as a source of pressure leakage.

- (f) Increase Ps to 60-70 psig.
- (g) Continue.

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

NOTE: These steps are a continuation of the check of the bleed air regulator circuit from the previous step.

- (a) Decrease Ps to 0 psig.
- (b) Replace the 450 F thermostat. These are the tasks:
  - Thermostat Removal, AMM TASK 36-11-05-000-801
  - Thermostat Installation, AMM TASK 36-11-05-400-801
- 1) Do the Repair Confirmation.
- (c) If Pc is not between 20-28 psig, then do these steps:
  - 1) Decrease Ps to 0 psig.
  - 2) Remove the plug from the control pressure sense line to the 450 F thermostat.
  - 3) Reconnect the control pressure sense line to the 450 F thermostat:
    - a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect sense lines.
  - 4) Disconnect the control pressure sense line to the PRSOV.
  - 5) Install a cap on the disconnected PRSOV control pressure sense line.  
(Figure 309)(View G)
  - 6) Increase Ps to 60-70 psig.
  - 7) Make sure that Pc is 20-28 psig.
  - 8) If Pc is not between 20-28 psig, then do these steps:
    - a) Decrease Ps to 0 psig.
    - b) 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
    - c) Do the Repair Confirmation.
  - 9) If Pc is between 20-28 psig, then do these steps:



## FAULT ISOLATION MANUAL

- a) Decrease Ps to 0 psig.
- b) 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
- 10) Increase Ps to 60-70 psig.
- 11) If Pc is between 20-28 psig, then do these steps:
  - a) Decrease Ps to 0 psig.
  - b) Remove all the pressure gages, associated test equipment, and hardware that was installed.
  - c) Re-connect all sense lines that were disconnected using Never-Seez Pure Nickel Special anti-seize compound (or equivalent).
  - d) If Pc is 20-28 psi, then continue.
- (30) Do this check of the control pressure sense line from the high stage regulator to the high stage valve:
  - (a) Disconnect the supply pressure sense line at the high stage regulator (Figure 309)(View H).
  - (b) Connect a pressure regulator, supply pressure gage (Ps), and a nitrogen pressure source to the supply pressure port on the high stage regulator (Figure 309)(View H).
  - (c) Slowly increase Ps to 70 psig.
  - (d) Examine the control pressure sense line and fittings from the high stage regulator to the high stage valve for pressure leakage.
  - (e) If any leakage is detected, then do these steps:
    - 1) Decrease Ps to 0 psig.
    - 2) Repair the sense line as required.
      - a) Use Never-Seez Pure Nickel Special anti-seize compound (or equivalent) when you reconnect sense lines.
    - 3) Do the Repair Confirmation at the end of this task.
  - (f) If no leakage is detected, decrease Ps to 0 psig.
  - (g) Continue.
- (31) Do this check of the high stage regulator and high stage valve for correct operation:
  - (a) Disconnect the control pressure sense line at the high stage regulator.
  - (b) Install a 30 psi control pressure gage (Pc) and test hose using a tee fitting between the control pressure sense line and the control pressure port on the high stage regulator so that the high stage valve senses the control pressure from the high stage regulator (Figure 309)(View I).
    - 1) If you use a pressure gage that is equivalent to the one specified in the P/N C36001-44 test set, make sure that the pressure indication increments are no greater than 0.2 psi and that the gage accuracy is +/- 0.5% full scale.
  - (c) Increase Ps to 35-40 psi and then back to 0 psig to cycle the valve several times.
  - (d) Slowly increase the supply pressure Ps to the high stage regulator as you monitor the control pressure Pc to the high stage valve.
  - (e) Make a note of the Pc pressure at which the high stage valve moves to the fully open position.





737-600/700/800/900

## FAULT ISOLATION MANUAL

- 1) If the control pressure  $P_c$  was greater than 10 psi when the high stage valve opened fully, then replace the high stage valve:
  - a) 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
  - b) Perform the Repair Confirmation.
- 2) If the control pressure was 10 psi or less when the high stage valve opened fully, then continue.
  - (f) Continue to increase  $P_s$  to 35-40 psig.
  - (g) Make sure that  $P_c$  is more than 14 psig.
    - 1) If  $P_c$  is not more than 14 psig, then do these steps:
      - a) Decrease  $P_s$  to 0 psig.
      - b) Replace the high stage regulator. These are the tasks:
        - High Stage Regulator Removal, AMM TASK 36-11-07-000-801
        - High Stage Regulator Installation, AMM TASK 36-11-07-400-801
      - c) Do the Repair Confirmation at the end of this task.
      - d) If the Repair Confirmation is not satisfactory, then continue.
    - (h) Slowly increase  $P_s$  to 110 (+/-10) while you monitor  $P_c$ .
      - 1) If  $P_c$  is greater than 4 psi, then replace the high stage regulator. These are the tasks:
        - High Stage Regulator Removal, AMM TASK 36-11-07-000-801
        - High Stage Regulator Installation, AMM TASK 36-11-07-400-801
      - 2) If  $P_c$  is less than 4 psi, then continue.
      - 3) Decrease  $P_s$  to 0 psi.
    - (i) If no faults are found, then continue.
  - (32) Replace the 450 F thermostat:

NOTE: You cannot do a test of this component on the aircraft.

    - (a) These are the tasks:
      - Thermostat Removal, AMM TASK 36-11-05-000-801
      - Thermostat Installation, AMM TASK 36-11-05-400-801
  - (33) Replace the precooler control valve sensor:

NOTE: You cannot do a test of this component on the aircraft.

    - (a) These are the tasks:
      - Precooler Control Valve Sensor Removal, AMM TASK 36-12-03-000-801
      - Precooler Control Valve Sensor Installation, AMM TASK 36-12-03-400-801
    - (b) Do the Repair Confirmation at the end of this task.
      - 1) If the Repair Confirmation is not satisfactory, then continue.
  - (34) If you have completed the entire Fault Isolation Procedure and the low duct pressure condition still exists, then replace the bleed air precooler:
    - (a) 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
    - (b) Do the Repair Confirmation.



## 36-10 TASK 804



737-600/700/800/900

## FAULT ISOLATION MANUAL

### 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 applicable thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.
- (4) Reactivate 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:
  - (a) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (6) 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.
- (7) Set the ISOLATION VALVE switch on the P5-10 panel to the OPEN position.
- (8) Examine the dual duct pressure indicator, N12, on the P5-10 panel.
  - (a) Make sure the pressure increases to a minimum of 12 psi on the pressure indications for both the left and right pneumatic systems.
  - (b) Make sure that the L and R duct pressure pointers are within 3 psi of each other.
    - 1) If the duct pressure pointers differ by more than 3 psi, do this step:
      - 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 pressure indications are correct, then continue.
- (9) Supply pressure to the pneumatic system with the engine that had the report of low bleed pressure or supply pressure with both engines if there were reports of low bleed pressure on both sides. To supply pressure, do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.
- (10) Set the APU BLEED switch to OFF or remove any external pneumatic source, if applicable.
- (11) Set the ISOLATION VALVE switch on the P5-10 panel to CLOSED.
- (12) Make sure that the duct pressure pointer for the applicable system indicates between 10-25 psi.  
**NOTE:** The duct pressure pointers on the dual duct pressure indicator may fluctuate without user systems in operation.
- (13) Set the engine BLEED switch to the OFF position.
  - (a) Make sure the applicable duct pressure on the dual duct pressure indicator decreases to less than 10 psi.
- (14) Set the engine BLEED switch to the ON position.



## FAULT ISOLATION MANUAL

- (a) Make sure the applicable duct pressure on the dual duct pressure indicator increases to 10-25 psi.
- (15) Set the L or R PACK switch, as applicable, to the HIGH position.
- (16) Do these steps to do a check of the pneumatic system pressures:

**CAUTION:** OBSERVE THE ENGINE OPERATIONAL LIMITS. IF YOU DO NOT OBEY THE ENGINE OPERATIONAL LIMITS, DAMAGE TO THE ENGINE COULD RESULT.

  - (a) To operate the engine within the operational limits, do this task: Engine Operation Limits, AMM TASK 71-00-00-800-806-F00.
  - (b) Slowly increase engine N1 in 5-10% increments on the applicable engine to 80% or greater and make sure the applicable pneumatic pressure indication follows the "Duct Pressure Versus N1 at Sea Level and 5000 Feet" graph and is within the limits of the graph.
    - 1) If the duct pressure is lower than the specified pressures on the graph, then do this step:
      - a) If you did not do all the Fault Isolation steps, then return to the step in the Fault Isolation that directed you to the Repair Confirmation.
    - 2) If the duct pressures are within limits of the graph, then continue.
  - (17) Slowly return the throttle(s) to idle as you make sure that the duct pressure follows the "Duct Pressure Versus N1 at Sea Level and 5000 Feet" graph.
    - (a) Make sure that the switchover from 5th stage regulation to 9th stage regulation occurs.
  - (18) Allow the engine to stabilize at idle throttle, then make sure the duct pressure is at 10-25 psi.
  - (19) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
  - (20) If the duct pressure pointer on one or both sides was less than 34 psi when the system was on regulated 5th stage pressure, less than 20 psi in the unregulated 5th stage mode, less than 26 psi when the system was on regulated 9th stage pressure or less than 10 psi in the unregulated 9th stage mode, then return to the step in the Fault Isolation Procedure that directed you to the Repair Confirmation and continue with the Fault Isolation Procedure.
  - (21) If the duct pressure pointer on one or both sides was greater than 34 psi when the system was on regulated 5th stage pressure, greater than 20 psi in the unregulated 5th stage mode, greater than 26 psi when the system was on regulated 9th stage pressure or greater than 10 psi in the unregulated 9th stage mode, then you have corrected the fault.
  - (22) Do these steps to complete the task:
    - (a) Remove the pressure from the pneumatic system. To remove the pressure, do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
    - (b) Set the ISOLATION VALVE switch on the P5-10 panel to AUTO.
    - (c) Reactivate the leading edge flaps and slats. To reactivate the LE flaps and slats, do this task: Reactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-440-801.
  - (23) The following is an Engine Bleed System Troubleshooting Table. Print out the table and use it as a quick reference troubleshooting guide when working on the bleed system of an airplane.



## 36-10 TASK 804



737-600/700/800/900

## FAULT ISOLATION MANUAL

Engine Bleed System Troubleshooting Table

STE~ P	737- 600/700/800/900	TROUBLESHOOTING STEP	EXPECTATION - NORMAL OPERATION	REMEDY FOR ABNORMAL OPERATION	OBSERVATION
1	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(6) FIM 36-10-804, F.(6)	Open the thrust reverser.			
2.A	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(9) FIM 36-10-804, F.(10)	Look at the position indicator on the high stage valve.	Should be CLOSED.		
2.B	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(9)(a) FIM 36-10-804, F.(10)(a)	Manually wrench OPEN the high stage valve and allow it to move CLOSED by spring force only.	Should move smoothly to the OPEN position and return to the CLOSED position by spring force only.	If the valve does not move smoothly and return to CLOSED, replace per the R/I in AMM 36-11- 06/400 series pages.	
3.A	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(8) FIM 36-10-804, F.(9)	Look at the position indicator on the pressure regulating shutoff valve (PRSOV).	Should be CLOSED.		
3.B	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(9)(a)	Manually wrench OPEN the PRSOV and allow it to move CLOSED by spring force only.	Should move smoothly to the OPEN position and return to the CLOSED position by spring force only.	If the valve does not move smoothly and return to CLOSED, replace per the R/I in AMM 36-11- 04/400 series pages.	
4.A	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(7) FIM 36-10-804, F.(7)	Look at the position indicator on the precooler control valve.	Should be open.		



36-10 TASK 804



737-600/700/800/900

## FAULT ISOLATION MANUAL

(Continued)

STE~ P	737- 600/700/800/900	TROUBLESHOOTING STEP	EXPECTATION - NORMAL OPERATION	REMEDY FOR ABNORMAL OPERATION	OBSERVATION
4.B	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.F.(7)(a) FIM 36-10-804, F.(7)(a)	Manually wrench CLOSED the precooler control valve and allow it to move OPEN by spring force only.	Should move smoothly to the CLOSED position and return to the OPEN position by spring force only.	If the valve does not move smoothly and return to OPEN, replace per the R/I in AMM 36-12- 02/400 series pages.	
5A	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.G.(1)(a) FIM 36-10-804, F.(11)	Supply pneumatic pressure from the APU or ground supply (pressure should be less than 40 psig).			
5.B	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.G.(8) FIM 36-10-804, F.(15)	Disconnect the supply line connection from the high stage regulator port.	No air should flow from the supply port.	If air flows from the supply port, the reverse flow diaphragm is ruptured. Replace the high stage regulator per the R/I in AMM 36-11- 07/400 series pages	

EFFECTIVITY	_____
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36-10 TASK 804



737-600/700/800/900

## FAULT ISOLATION MANUAL

(Continued)

STE~ P	737- 600/700/800/900	TROUBLESHOOTING STEP	EXPECTATION - NORMAL OPERATION	REMEDY FOR ABNORMAL OPERATION	OBSERVATION
5.C	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.G.(3) FIM 36-10-804, F.(13)	Manually OPEN the PRSOV with a wrench if it does not OPEN when the APU bleed is selected ON.  WARNING: Use a ratchet-type wrench when opening the PRSOV to avoid injury.	PRSOV will move to and stay in the FULL OPEN position.  Low control pressure from the BAR or leaking control pressure lines can result in low duct pressure when the PRSOV is regulating the pneumatic pressure.  Check for leaking relief valve on the bleed air regulator, leaking flex line to the PRSOV, leaking control pressure line from the PRSOV to the 450° F sensor, excessive venting of the 450° F sensor.	Check for leaks on: 1. the supply and control pressure lines. 2. relief valve on the regulator.  If the relief valve is leaking, replace the bleed air regulator per the R/I in AMM 36-11- 03/400 series pages.	
5.D	AMM 36-11-00/500 Task 36-11-00- 700-802 Para 6.G.(4) FIM 36-10-804, F.(20)	When the PRSOV moves OPEN, the precooler control valve should move CLOSED.	The precooler control valve moves to the CLOSED position.	If the valve does not move CLOSED, check for leaks on the supply and control pressure lines.  If no leaks are found, replace the precooler control valve per the R/I in AMM 36-12-02/400 series pages.	



36-10 TASK 804

## FAULT ISOLATION MANUAL

(Continued)

STEP	737-600/700/800/900	TROUBLESHOOTING STEP	EXPECTATION - NORMAL OPERATION	REMEDY FOR ABNORMAL OPERATION	OBSERVATION
5.E	AMM 36-11-00/500 Task 36-11-00-700-802 Para 6.G.(5) FIM 36-10-804, F.(21)(a)	Disconnect the test cap on the precooler control valve control pressure line.	The precooler control valve should move to the OPEN position.	If the valve does not move OPEN; check for blockage in the sense line.	
6.A	AMM 36-11-00/500 Task 36-11-00-700-802 Para 6.H.(1)-(3)	Return pneumatic system to normal configuration.			
6.B	AMM 36-11-00/500 Task 36-11-00-700-802 Para 6.H.(4), (5)	Return airplane to normal configuration.			

————— END OF TASK —————

**805. Duct Pressure Zero, the Engine is the Bleed Source - Fault Isolation**

## A. Description

- (1) (SDS SUBJECT 36-11-00, SDS SUBJECT 36-12-00)
- (2) A zero duct pressure condition is a condition in which one or both pointers on the dual duct pressure indicator is at 0 psi with the engine(s) as the bleed source.

## B. Possible Causes

- (1) Pressure regulator and shutoff valve (PRSOV)
  - (a) Failure Mode: stuck or locked closed
- (2) Bleed air regulator, M1180
  - (a) Failure Mode: No or low control pressure, open or shorted solenoid
- (3) Tripped circuit breaker
- (4) Pneumatic sense lines (supply or control)
  - (a) Failure Mode: leakage or blockage
- (5) Duct pressure transducer, T405 (Left) or T403 (Right)
  - (a) Failure Mode: Out of tolerance or totally failed
- (6) Dual duct pressure indicator, N12
  - (a) Failure Mode: Out of tolerance or totally failed
- (7) Wiring
  - (a) Failure Mode: open or shorted

EFFECTIVITY HAP ALL
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**36-10 TASKS 804-805**

## FAULT ISOLATION MANUAL

(b) MW0311 Engine Wiring Harness

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.

- 1) Failure Mode: Possible wire shorting on backshell of connector DP1102
- 2) Failure Mode: Possible broken wires inside connector DP1102

(8) Precooler control valve

(a) Failure Mode: leaking diaphragm that causes insufficient supply pressure to the bleed air regulator

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 LEFT
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 RIGHT

D. Related Data

- (1) Component Location (Figure 301)
- (2) Component Location (Figure 302)
- (3) Troubleshooting Check (Figure 310)
- (4) Pneumatic System Control Valve Position Indicators (Figure 312)
- (5) (SSM 36-11-11)
- (6) (WDM 36-21-11)

E. Initial Evaluation

(1) 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	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

**WARNING:** RESET AND RELEASE THE CIRCUIT BREAKER QUICKLY. DO NOT HOLD THE CIRCUIT BREAKER IN THE RESET POSITION. IF THERE IS AN ACTIVE WIRING FAULT, HOLDING THE CIRCUIT BREAKER IN THE RESET POSITION WILL PREVENT IT FROM TRIPPING AGAIN. THIS CAN CAUSE EXTENSIVE DAMAGE TO WIRING, INJURY TO PERSONS AND IT CAN RESULT IN A FIRE.

(b) If any of the circuit breakers are tripped, reset the circuit breaker(s).



**36-10 TASK 805**

## FAULT ISOLATION MANUAL

- (c) If the circuit breaker trips again, then do these checks of the indication circuit:
  - 1) Fault isolate and repair the short in the wiring or faulty component.
  - 2) Do a check of the wiring between the power supply, the dual duct pressure indicator, and the transducers (WDM 36-21-11).
  - 3) Repair any problems that you find.
  - 4) Do the Repair Confirmation at the end of this task.
- (d) If the circuit breaker(s) was successfully reset or if none of the circuit breakers has tripped, then continue.

(2) 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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

**WARNING:** RESET AND RELEASE THE CIRCUIT BREAKER QUICKLY. DO NOT HOLD THE CIRCUIT BREAKER IN THE RESET POSITION. IF THERE IS AN ACTIVE WIRING FAULT, HOLDING THE CIRCUIT BREAKER IN THE RESET POSITION WILL PREVENT IT FROM TRIPPING AGAIN. THIS CAN CAUSE EXTENSIVE DAMAGE TO WIRING, INJURY TO PERSONS AND IT CAN RESULT IN A FIRE.

- (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.

(3) Make sure that there is no pressure in the pneumatic systems and make these observations:

- (a) Make sure that both L and R pressure pointers on the dual duct pressure indicator indicate 0 (+/-2) psi.
- (b) Make sure that the left and right pressure indications are not different more than 3 psi.
- (c) If one or both pressure pointers do not indicate 0 (+/-2) psi or if the pointer indications are split more than 3 psi, do these steps:
  - 1) Fault isolate the duct pressure indication fault as follows:
    - 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.
    - 2) Continue with this Initial Evaluation procedure.
  - (d) If both the left and right pressure indications are within limits, then continue.

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

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

(6) Examine the dual duct pressure indicator, N12, on the P5-10 panel:

- (a) If you pressurized the pneumatic system with the APU, make sure these results occur:



## 36-10 TASK 805

## FAULT ISOLATION MANUAL

- 1) The L and R pointers indicate a minimum of 12 psi.
- 2) The L and R pointer indications are within 3 psi of each other.
- 3) If the L and R pressure pointers do not indicate a minimum of 12 psi or if the pointer indications are split more than 3 psi, do these steps:
  - a) Fault isolate the duct pressure indication fault as follows: 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) Continue with this Initial Evaluation procedure.
- 4) If both the left and right pressure indications are within limits, then continue.
- (b) If you pressurized the pneumatic systems with a ground pneumatic source, make sure these results occur:
  - 1) The L and R pointers indications are the same as the output pressure indication on the ground source.
  - 2) The L and R pointer indications are within 3 psi of each other.
  - 3) If the pressure pointers do not indicate the same as the pressure indication on the ground source or if the pointer indications are split more than 3 psi, do these steps:
    - a) Fault isolate the duct pressure indication fault. 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) Continue with this Initial Evaluation procedure.
  - 4) If both the left and right pressure indications are within limits, then continue.
- (c) If both the L and R pressure pointers indicate 0 psi, then do these steps:
  - 1) 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
  - 2) Do the Initial Evaluation procedure again.
- (d) If one of the pressure pointers indicates 0 psi, then do this step:
  - 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.
  - 2) Continue with this Initial Evaluation procedure.
- (e) If both of the pressure pointers indicate properly, then continue.
- (7) If you suspect that there is a system fault, you may proceed to the Fault Isolation Procedure to avoid an engine run to confirm the fault or continue.
- (8) Supply pneumatic pressure to the pneumatic systems as follows:
  - (a) Supply pressure to the pneumatic system with the faulty pressure with its respective engine.
    - 1) Do this task: Supply Pressure to the Pneumatic System with One or Both Engines, AMM TASK 36-00-00-860-804.
- (9) Set the ISOLATION VALVE switch on the P5-10 panel to the CLOSED position.
- (10) Set the APU BLEED switch to OFF or remove the external pneumatic source if applicable.
- (11) Examine the dual duct pressure indicator, N12, on the P5-10 panel:



## 36-10 TASK 805



737-600/700/800/900

## FAULT ISOLATION MANUAL

(12) Make sure that the respective duct pressure pointer(s) indicates between 10-25 psi.

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

(13) If the respective duct pressure pointer(s) indicates between 10 - 25 psi, then there was an intermittent fault.

(a) Use your judgement, airline policy and the history of the aircraft's pneumatic system to determine if you will take further action or monitor the system performance on subsequent flights.

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

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

(16) If one or both duct pressure pointer(s) indicates 0 psi, then do the Fault Isolation Procedure.

### F. Fault Isolation Procedure

NOTE: It is unlikely that both bleed systems have zero duct pressure. However, if this is the case, this procedure must be done on both engines.

NOTE: At this point in this fault isolation task, you should have confirmed that the duct pressure indication system is not at fault.

(1) Do these steps to prepare for fault isolation:

- Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
- Make sure that the applicable engine BLEED switch is in the OFF position.
- Make sure that the fuel shutoff lever for the applicable engine is in the cutoff position.
  - Install a DO-NOT-OPERATE tag.
- Retract the Leading Edge Flaps and Slats. To do this, do this task: Leading Edge Flaps and Slats Retraction, AMM TASK 27-81-00-860-804.
- Deactivate the Leading Edge Flaps and Slats. Do this task: Deactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-040-801.
- Do this task: Thrust Reverser Deactivation For Ground Maintenance, AMM TASK 78-31-00-040-802-F00.
- Do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.

(2) Examine these circuit breakers:

(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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- If the circuit breaker applicable to the pneumatic system with the zero duct pressure has tripped, then do the Electrical Checks - Fault Isolation.
- If the circuit breaker applicable to the pneumatic system with the zero duct pressure has not tripped, do these steps:



36-10 TASK 805

## FAULT ISOLATION MANUAL

(a) Make sure that the locking device on the position indicator of the PRSOV is not engaged with the bracket on the valve.

1) If the locking device is engaged, do these steps:

a) Unlock the PRSOV.

Do this task: MMEL 36-5 (DDPG) Restoration - Pressure Regulating and Shutoff Valve Inoperative, AMM TASK 36-00-00-440-804

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

2) If the PRSOV was not locked closed, then continue.

(5) Do these steps to make sure there is power to the bleed air regulator solenoid:

(a) Make sure the applicable engine BLEED switch on the P5-10 panel is set to ON.

(b) 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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

(c) Disconnect electrical connector DP1102 from the bleed air regulator.

(d) Open the housing of electrical connector DP1102 and inspect the wires.

1) Make sure none of the wires are broken.

a) If wires are broken, 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

<1> Do the Repair Confirmation at the end of this task.

b) If the wires are not broken, continue with step (d).

(e) 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 LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

(f) Do a check for 22 - 30 VDC between pins 5 and 6 of electrical connector DP1102:

1) If there is 22 - 30 VDC between pins 5 and 6 of electrical connector DP1102, then do these steps:

a) Do a check of the resistance between pins 5 and 6 of the bleed air regulator electrical connector.

b) If the resistance is 20 - 40 ohms, then proceed to Electrical Check - Fault Isolation.

c) If the electrical resistance is not 20 - 40 ohms, then 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

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

2) If there is not 22 - 30 VDC between pins 5 and 6 of electrical connector DP1102, then continue.



**36-10 TASK 805**

## FAULT ISOLATION MANUAL

- (6) If the circuit breaker applicable to the pneumatic system with the zero duct pressure has not tripped and electrical power to the bleed air regulator solenoid is satisfactory, do a check of the operation of the PRSOV as follows:
  - (a) Use a wrench to open the PRSOV.
    - 1) Make sure the PRSOV opens smoothly.
  - (b) Remove the wrench and make sure the PRSOV closes fully.
  - (c) If the PRSOV does not smoothly move to the open and closed positions, 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
  - (d) If the PRSOV moves smoothly to the open and closed positions, then continue.
- (7) Install P/N C36001-44 test equipment (or equivalent) to the pressure supply side of the applicable bleed air regulator:

NOTE: The test equipment used in this and 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.

- (a) Connect a nitrogen pressure source, a pressure regulator, a supply pressure gage (Ps), and a supply pressure test hose at the tee to the supply pressure sense line to the bleed air regulator. (Figure 309)
- (8) Install this test equipment to the control pressure side of the bleed air regulator (control pressure to the PRSOV and the 450 F thermostat) (Figure 309):
  - (a) Install a tee fitting in the control pressure sense line to the 450 F thermostat between the flexible line and the rigid line (Figure 308, View B).
  - (b) Install a 30 psi control pressure gage (Pc) at the tee fitting.
    - 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.
- (9) Do this check of the bleed air regulator circuit:
  - (a) Put the applicable BLEED switch on the P5-10 panel to the ON position.
  - (b) Increase Ps to 60-70 psig.
  - (c) Make sure the PRSOV is fully open.
  - (d) If Pc is greater than 28 psi, then replace the bleed air regulator:
    - 1) 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) Continue with this procedure as this will not cause a zero duct condition.
  - (e) If Pc is less than 20 psig, then use a soap solution to examine the sense line and fittings from the bleed air regulator to the PRSOV and the sense line and fittings from the PRSOV to 450 F thermostat for pressure leakage.

NOTE: A small leak at the top of the 450 F thermostat is acceptable. The 450 F thermostat will be isolated in subsequent steps. Leakage detected at the sense line connections must be repaired.

- 1) If you find any leakage, decrease Ps to 0 psig.



## 36-10 TASK 805



737-600/700/800/900

## FAULT ISOLATION MANUAL

- 2) Repair the sense line to stop the leakage:
  - a) Use Never-Seez Pure Nickel Special anti-seize compound when you reconnect sense lines.
  - b) Increase Ps to 60 - 70 psig and make sure the repaired sense line and fittings do not leak.
- 3) If you do not find any leakage, then continue.
- 4) Slowly increase Ps to 60 - 70 psig.
- 5) Make sure that Pc is 20 - 28 psig.
- 6) If Pc is not between 20 - 28 psig, do these steps:
  - a) Decrease Ps to 0 psig.
  - b) Disconnect the control pressure sense line to the 450 F thermostat at the connection to the thermostat.
  - c) Install a plug (P/N MS21913-5) in the disconnected control pressure sense line where it connects to the fitting on the thermostat.

NOTE: This removes the 450 F thermostat as a source of excessive pressure leakage.
- (f) Increase Ps to 60 - 70 psig.
- (g) Continue.

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

NOTE: These steps are a continuation of the check of the bleed air regulator circuit from the previous step.

- (a) Decrease Ps to 0 psig.
- (b) Replace the 450 F thermostat. These are the tasks:
  - Thermostat Removal, AMM TASK 36-11-05-000-801
  - Thermostat Installation, AMM TASK 36-11-05-400-801
- 1) Do the Repair Confirmation.
- (c) If Pc is not between 20 - 28 psig, then do these steps:
  - 1) Decrease Ps to 0 psig.
  - 2) Remove the plug from the control pressure sense line to the 450 F thermostat.
  - 3) Reconnect the control pressure sense line to the 450 F thermostat:
    - a) Use Never-Seez Pure Nickel Special anti-seize compound when you reconnect sense lines.
  - 4) Disconnect the control pressure sense line to the PRSOV.
  - 5) Install a cap on the disconnected PRSOV control pressure sense line.  
(Figure 309)(View G)
  - 6) Increase Ps to 60-70 psig.
  - 7) Make sure that Pc is 20-28 psig.
  - 8) If Pc is not between 20-28 psig, then do these steps:
    - a) Decrease Ps to 0 psig.
    - b) 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

EFFECTIVITY  
HAP ALL

36-10 TASK 805

## FAULT ISOLATION MANUAL

- c) Do the Repair Confirmation.
- 9) If  $P_c$  is between 20 - 28 psig, then do these steps:
  - a) Decrease  $P_s$  to 0 psig.
  - b) 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
- 10) Increase  $P_s$  to 60 - 70 psig.
- 11) If  $P_c$  is between 20 - 28 psig, then do these steps:
  - a) Decrease  $P_s$  to 0 psig.
  - b) Remove all the pressure gages, associated test equipment, and hardware that was installed.
  - c) Re-connect all sense lines that were disconnected using Never-Seez Pure Nickel Special anti-seize compound.
  - (d) If  $P_c$  is 20-28 psi, then continue.

## G. Electrical Checks - Fault Isolation

- (1) Do this check of electrical harness MW0311 between the engine firewall connector DP1104 and the connector DP1102 to the solenoid on the bleed air regulator:

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 these circuit breakers and install safety tags:

## F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (b) Disconnect electrical 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 and internal damage, then do these steps:
    - a) Repair the problems that you find.
    - b) Do the Repair Confirmation at the end of this task.
    - c) If the Repair Confirmation is not satisfactory, then continue.



## 36-10 TASK 805



737-600/700/800/900

## FAULT ISOLATION MANUAL

- 3) If you do not find loose connections, worn areas, deformation and 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 MW0311 harness:
  - a) 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
  - b) Do the Repair Confirmation at the end of this task.
  - c) If the Repair Confirmation is not satisfactory, then continue.
- 2) If the continuity checks are satisfactory, then continue.
- (e) If the circuit breaker for the bleed air regulator tripped or has a history of tripping, then do these steps:
  - 1) Open these circuit breakers and install safety tags:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- 2) Disconnect electrical connectors D3200 (D3202) from the ground wing anti-ice temperature solenoid valve and DP1101 from the fan frame compressor case vibration sensor.

**CAUTION:** YOU MUST PERFORM THE MEG CHECK IN ACCORDANCE WITH STANDARD WIRING MAINTENANCE PRACTICES. FAILURE TO FOLLOW PROPER PROCEDURES COULD RESULT IN DAMAGE TO EQUIPMENT.

- 3) Use a multimeter or megohmmeter to do checks for internal shorts on the pins listed below:

DP1104	DP1102
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



## 36-10 TASK 805

## FAULT ISOLATION MANUAL

- 4) 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.
- 5) If any of the electrical checks fail, replace the wiring harness MW0311:
  - a) 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
  - b) Do the Repair Confirmation at the end of this task.
  - 6) If all of the electrical checks are satisfactory, then continue.
- (f) Connect electrical connector DP1102 to the bleed air regulator.
- (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 MW0311 wiring harness. To replace the wiring 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
  - 2) If the resistance is 20 - 40 ohms, then do the Repair Confirmation at the end of the task.

(2) Do this check of the electrical connector for the bleed air regulator:

NOTE: If there is a problem with the bleed air regulator or power is not supplied to the bleed air regulator, the PRSOV may not close.

- (a) Make sure that these circuit breakers are open:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (b) Disconnect the electrical connector DP1102 at the bleed air regulator, M1180.
- (c) Examine the connector for contamination and damage:
  - 1) If the connector has contamination, then clean the connector.
  - 2) If the connector has a loose backshell, bent or pushed pins, then do these steps:
    - a) Repair the connector.
    - b) Reconnect the connector DP1102 to the bleed air regulator.
    - c) Do the Repair Confirmation at the end of this task.
    - d) If the Repair Confirmation is not satisfactory, then continue.
  - (d) If you do not find any contamination or damage at the connector, then continue.

(3) Do this check for power at the bleed air regulator:

- (a) Make sure that these circuit breakers are closed:

F/O Electrical System Panel, P6-4

Row	Col	Number	Name
A	7	C00796	AIR CONDITIONING BLEED AIR VALVES LEFT
B	7	C00797	AIR CONDITIONING BLEED AIR VALVES RIGHT

- (b) Set the applicable engine BLEED switch on the P5-10 panel to the ON position.
- (c) Do a check for 22 - 30 VDC between pins 5 and 6 (ground) of the applicable connector DP1102.



## FAULT ISOLATION MANUAL

(d) If there is 22 - 30 VDC between pins 5 and 6 (ground) of the applicable connector, then do these steps:

- 1) Replace the bleed air regulator, 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) Do the Repair Confirmation at the end of this task.

(e) If there is not 22 - 30 VDC between pins 5 and 6 (ground) of the applicable connector, then continue.

(4) Do this check of the wiring:

### **HAP 101-999**

(a) Do a continuity check between these pins on connector DP1102 at the bleed air regulator, M1180, and connector D458B at the air conditioning relay module, M324 on the E4-1 shelf.

<b>DP1102</b>	<b>D458B</b>	
pin 5	-----	pin 50

### **HAP 001-013, 015-026, 028-054**

(b) For the left side pneumatic system, do a continuity check between these pins on connector DP1102 at the bleed air regulator, M1180, and connector D458A at the air conditioning relay module, M324 on the E4-1 shelf.

<b>DP1102</b>	<b>D458A</b>	
pin 5	-----	pin 2

(c) For the right side pneumatic system, do a continuity check between these pins on connector DP1102 at the bleed air regulator, M1180, and connector D10002A at the air conditioning relay module, M1455 on the E4-1 shelf.

<b>DP1102</b>	<b>D10002A</b>	
pin 5	-----	pin 2

### **HAP ALL**

(d) If you find a problem with the wiring, then do these steps:

- (e) Repair the wiring.
- (f) Re-connect the electrical connector DP1102 to the bleed air regulator, M1180.

### **HAP 101-999**

(g) Reconnect the electrical connector D458B to the air conditioning relay module, M324.

### **HAP 001-013, 015-026, 028-054**

- (h) For the left side pneumatic system, reconnect the electrical connector D458A to the air conditioning relay module, M324.
- (i) For the right side pneumatic system, reconnect the electrical connector D10002A to the air conditioning relay module, M1455.

### **HAP ALL**

(j) 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.



## 36-10 TASK 805



737-600/700/800/900

## FAULT ISOLATION MANUAL

(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 thrust reverser. To activate the thrust reverser, do this task: Thrust Reverser Activation After Ground Maintenance, AMM TASK 78-31-00-440-803-F00.

(5) Close the fan cowl panels. To 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. To reactivate the LE Flaps and Slats, do this task: Reactivate the Leading Edge Flaps and Slats, AMM TASK 27-81-00-440-801

(7) Supply pressure to the pneumatic system with the engine(s), 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.

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

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

(10) Make sure that both duct pressure pointers are not at 0 psi.

(11) If both duct pressure pointers are not at 0 psig, then you corrected the fault.

(12) If a duct pressure pointer is at 0 psi, then return to the step in the Fault Isolation that directed you to this Repair Confirmation and continue.

(13) 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.

————— 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.



## FAULT ISOLATION MANUAL

(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 manifold 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 (Figure 303)
- (2) Troubleshooting Check (Figure 311)
- (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.



## 36-10 TASK 806

**FAULT ISOLATION MANUAL**

- (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.

**36-10 TASK 806**



737-600/700/800/900

**FAULT ISOLATION MANUAL**

(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.

**36-10 TASK 806**

## FAULT ISOLATION MANUAL

(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:

<u>Number</u>	<u>Name/Location</u>
192CL	Air Conditioning 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

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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:

- Engine 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.



## 36-10 TASK 806



737-600/700/800/900

**FAULT ISOLATION MANUAL**

- 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) 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.
- (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 within 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

**36-10 TASK 806**

Page 267

Jun 15/2008



737-600/700/800/900

## FAULT ISOLATION MANUAL

(Continued)

CONFIG.	L BLEED	R BLEED	L PACK	R PACK	L DUCT	R DUCT
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:

<u>Number</u>	<u>Name/Location</u>
192CL	Air Conditioning 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.

**36-10 TASKS 806-807**

## FAULT ISOLATION MANUAL

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 the 9th stage regulated pressure as  $32 \pm 6$  psig and 5th stage regulated pressure as  $42 \pm 8$  psig.

- (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



## 36-10 TASK 807

## FAULT ISOLATION MANUAL

- 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

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

- 1) Failure Mode: Faulty transducer

- (b) Dual duct pressure indicator, N12

- 1) Failure Mode: Faulty indicator

- (c) Pressure regulator and shutoff valve (PRSOV)

- 1) Failure Mode: sticking

- (d) Bleed air regulator, M1180

- 1) Failure Mode: Regulating control pressure too high

- (e) Leak in PRSOV downstream pressure sense line or fittings

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

- (f) Wiring

- 1) Failure Mode: induced voltage



## 36-10 TASK 807



737-600/700/800/900

## FAULT ISOLATION MANUAL

### C. Circuit Breakers

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

### D. Related Data

- (1) (Figure 305)

- (2) (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.



## 36-10 TASK 807



737-600/700/800/900

## FAULT ISOLATION MANUAL

- (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 (Figure 305, 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 (Figure 305, 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 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, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 804.
- (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.





737-600/700/800/900

## FAULT ISOLATION MANUAL

(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 [(7) and (8)] 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.





737-600/700/800/900

## FAULT ISOLATION MANUAL

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

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

- (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.



**FAULT ISOLATION MANUAL**

- (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, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 804.
- (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.

**G. Repair Confirmation**

- (1) 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 to OFF or remove any external pneumatic source.
  - (b) Set the ISOLATION VALVE switch to CLOSE.
  - (c) Make sure the duct pressure pressure pointers for both systems indicate 10 - 25 psi.

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

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.

- 1) If one or both pneumatic systems do not indicate pressure, then fault isolate as follows:
  - a) Do this task: Duct Pressure Zero, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 805.
- (d) Set the engine BLEED 1 and 2 switches on the P5-10 panel to OFF.
  - 1) Observe that the manifold duct pressures in both the left and right sides decrease to 10 psi or less to make sure that the PRSOVs close.
  - 2) If a PRSOV does not close, fault isolate as follows:

**36-10 TASK 807**

## FAULT ISOLATION MANUAL

- a) Do this task: Bleed Valve Will Not Close When the Bleed Switches Are Moved to Off, the Engine Is the Bleed Source - Fault Isolation, 36-10 TASK 802.
- (e) Set the engine BLEED 1 and 2 switches on the P5-10 panel to ON.
- (f) Observe that the manifold duct pressures in the left and right systems increase to 10 - 25 psi to make sure that both PRSOVs open.

NOTE: The duct pressure pointers on the dual duct pressure indicator may fluctuate with no user systems in operation.

- (2) Set the L PACK switch on the P5-10 panel to AUTO.

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

- (3) 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.

NOTE: 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.

- (4) Set the R PACK switch on the P5-10 panel to AUTO.

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

- (5) 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.



## 36-10 TASK 807



737-600/700/800/900

## FAULT ISOLATION MANUAL

- 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.

NOTE: 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.

- (6) Slowly return both engine throttles to idle and allow the engines to stabilize.
- (7) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
- (8) If both pneumatic system pressures are within limits of the "Duct Pressure Versus N1 at Sea Level and 5000 feet" (or 10,000 feet) graphs when both bleeds are operating on either regulated 5th stage or both are operating on regulated 9th stage pressures, then you have corrected the fault.
- (9) 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, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 804.
- (10) 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 task:
  - (a) Do this task: Duct Pressure High, the Engine is the Bleed Source - Fault Isolation, 36-10 TASK 803.
- (11) 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.
- (12) 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.
- (13) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.

————— END OF TASK ————



**36-10 TASK 807**



737-600/700/800/900

## FAULT ISOLATION MANUAL

### **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) Figure 302, Figure 303, Figure 309
- (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:



## 36-10 TASK 808

## FAULT ISOLATION MANUAL

(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:

- Make sure that the L and R pointers on the dual duct pressure indicator are at 0 ( $\pm 2$ ) psi and are not split more than 3 psi.
- If one or both pointers do not indicate 0 ( $\pm 2$ ) psi or are split by 3 psi or greater, then perform the Indication System - Fault Isolation Procedure on the faulty indication system(s).
- If both pointers indicate 0 ( $\pm 2$ ) 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:

- 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.

- Allow the left and right duct pressures to stabilize.
- Make sure that the L and R duct pressure pointers are within 3 psi of each other:
  - 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.
  - 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:

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



**36-10 TASK 808**



737-600/700/800/900

## FAULT ISOLATION MANUAL

- (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 equivalent) 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.



**36-10 TASK 808**



737-600/700/800/900

## FAULT ISOLATION MANUAL

- (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:



**36-10 TASK 808**

## FAULT ISOLATION MANUAL

- (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

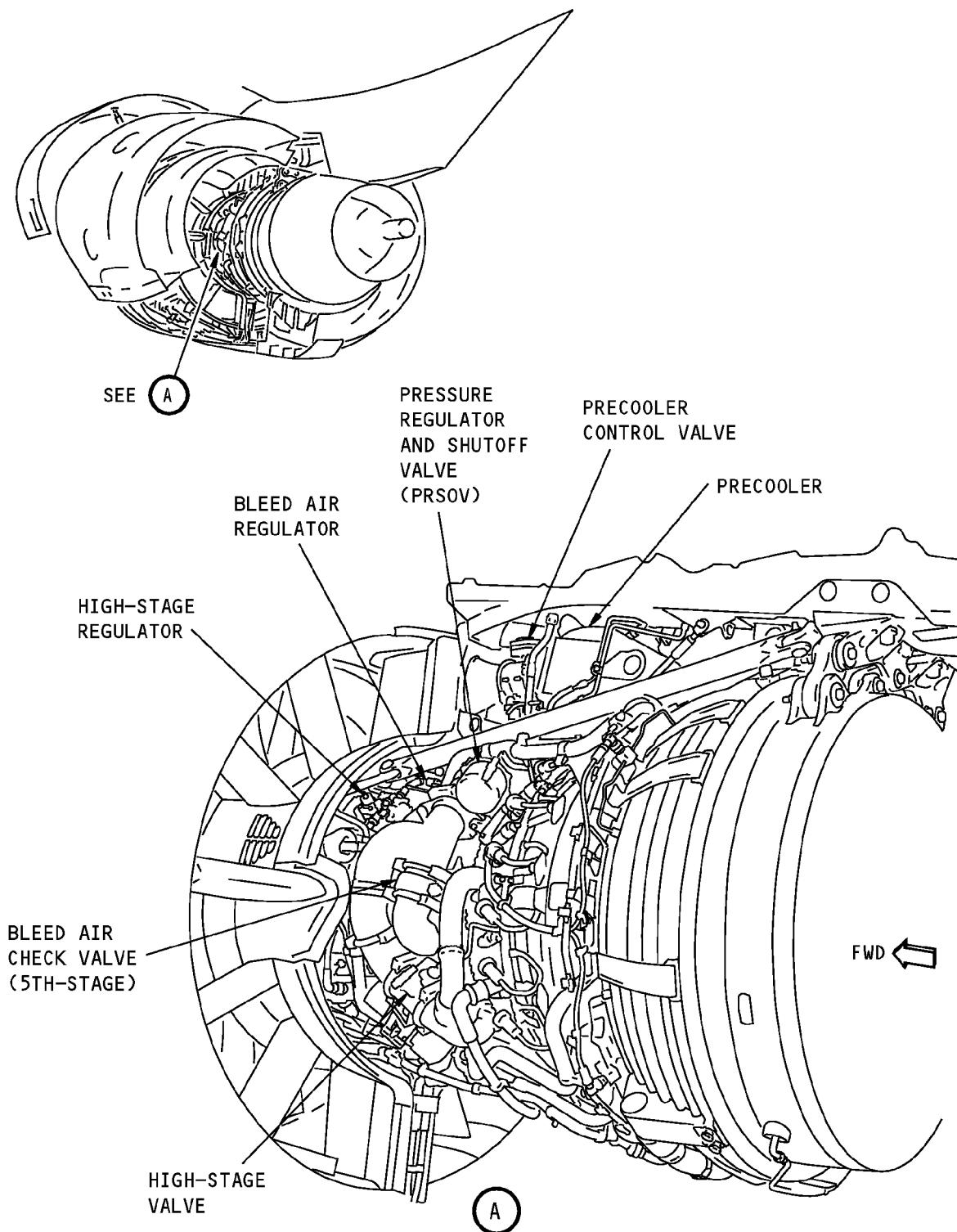
- (1) Supply pressure to the pneumatic system with one of the steps below:
  - (a) Do this task: Supply Pressure to the Pneumatic System with the APU, AMM TASK 36-00-00-860-803.
  - (b) Do this task: Supply Pressure to the Pneumatic System with an External Ground Air Source, AMM TASK 36-00-00-860-802.
- (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 —————



**36-10 TASK 808**


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**FAULT ISOLATION MANUAL**



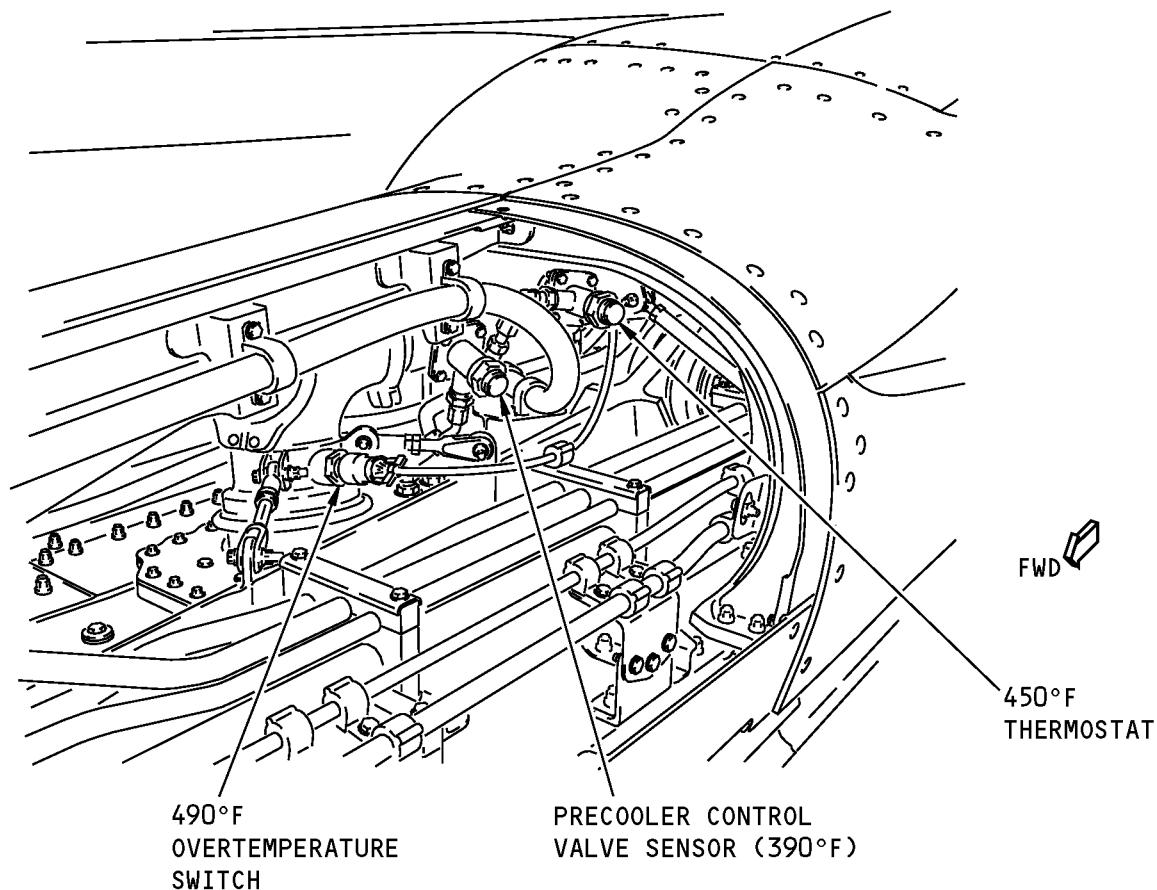
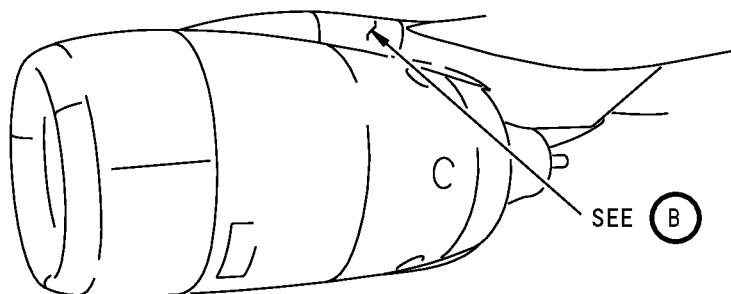
Pneumatic System on the Engine/Strut Component Location  
 Figure 301 (Sheet 1 of 2) / 36-10-00-990-801

EFFECTIVITY  
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## 36-10 TASK SUPPORT

Page 301  
 Oct 10/2005

**BOEING®**  
737-600/700/800/900  
FAULT ISOLATION MANUAL



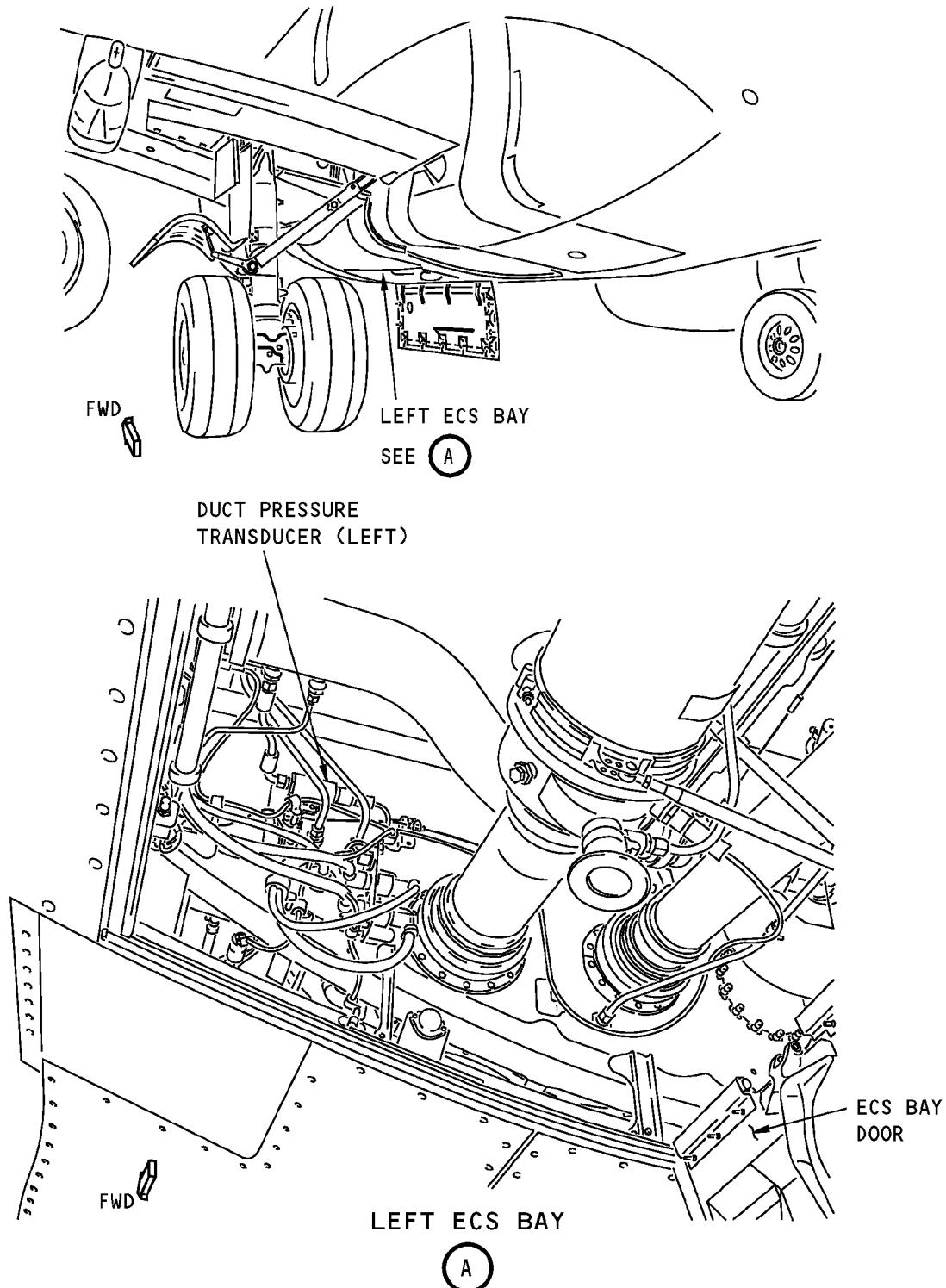
B

Pneumatic System on the Engine/Strut Component Location  
Figure 301 (Sheet 2 of 2)/ 36-10-00-990-801

EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

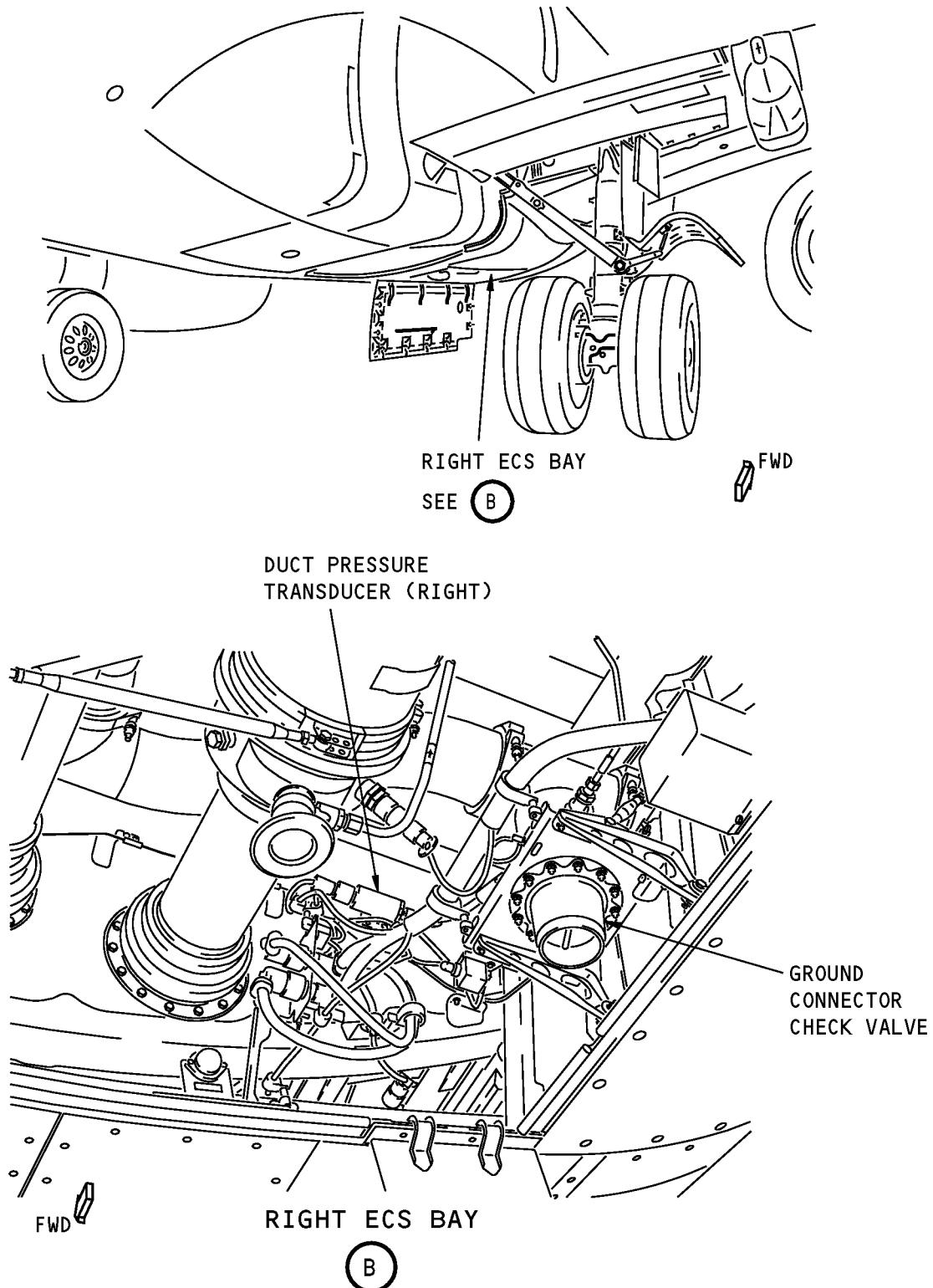


Pneumatic System in the ECS Bay Component Location  
 Figure 302 (Sheet 1 of 2)/ 36-10-00-990-802

EFFECTIVITY  
 HAP ALL

## 36-10 TASK SUPPORT


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

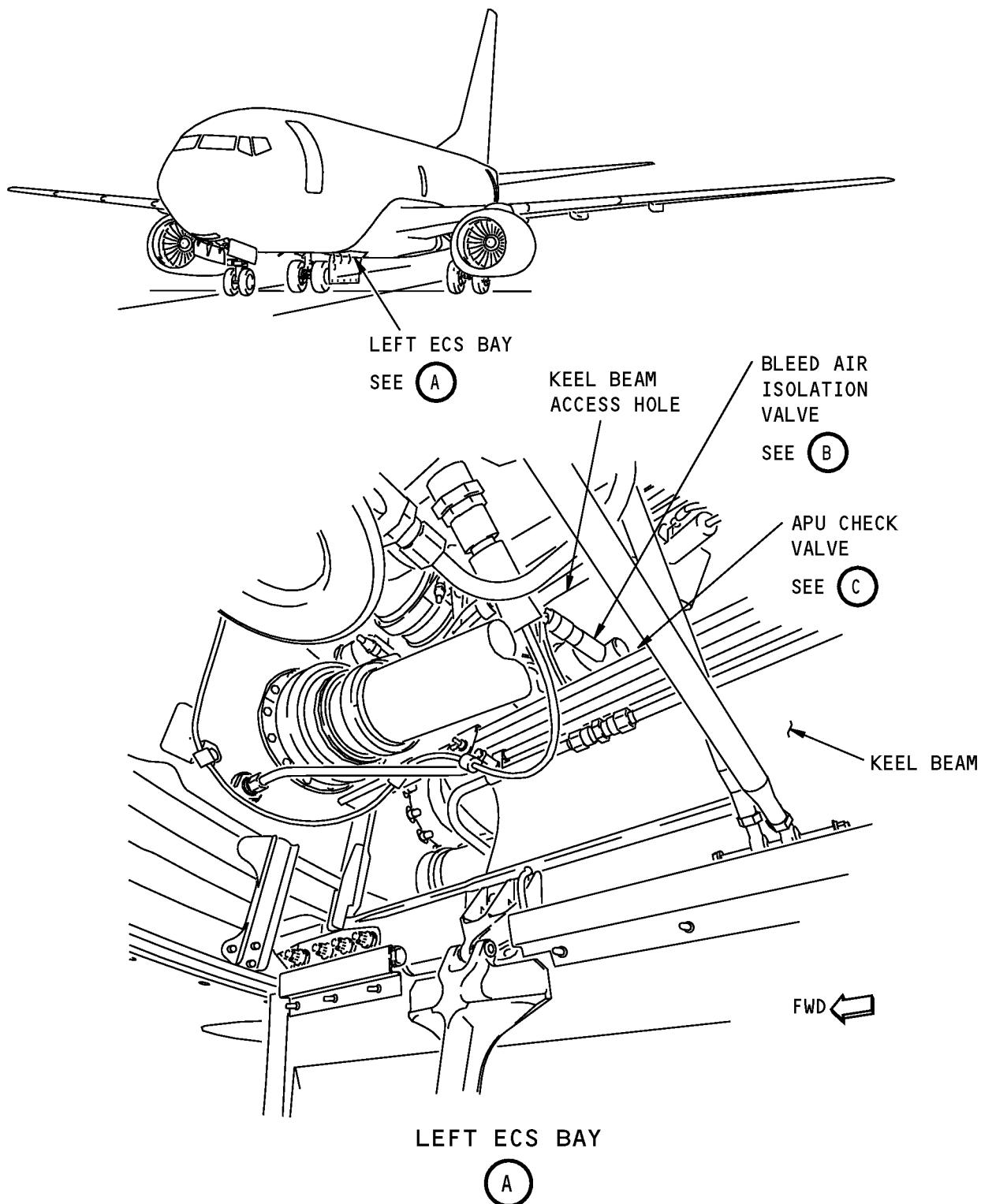


Pneumatic System in the ECS Bay Component Location  
 Figure 302 (Sheet 2 of 2)/ 36-10-00-990-802

EFFECTIVITY  
 HAP ALL

## 36-10 TASK SUPPORT


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

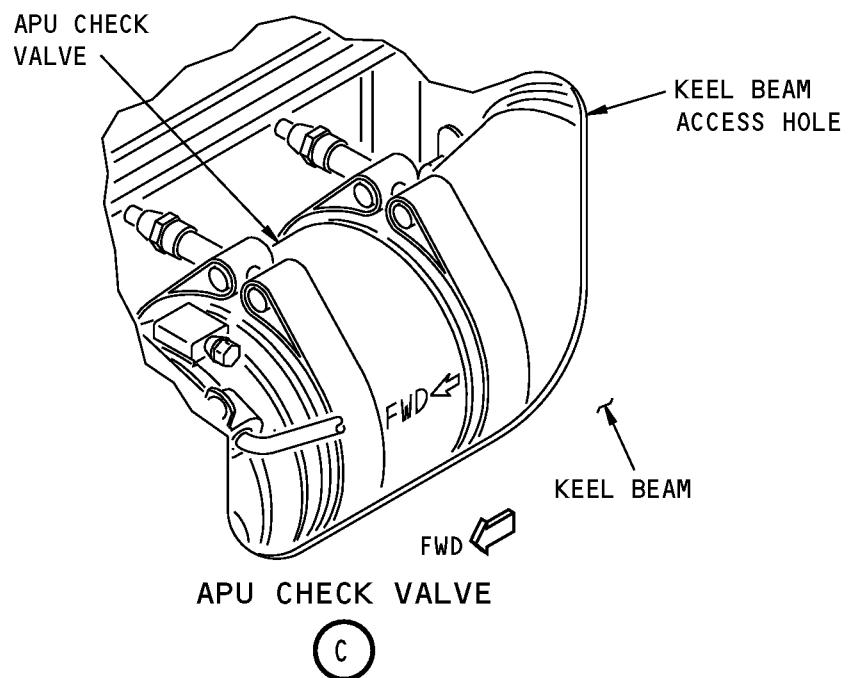
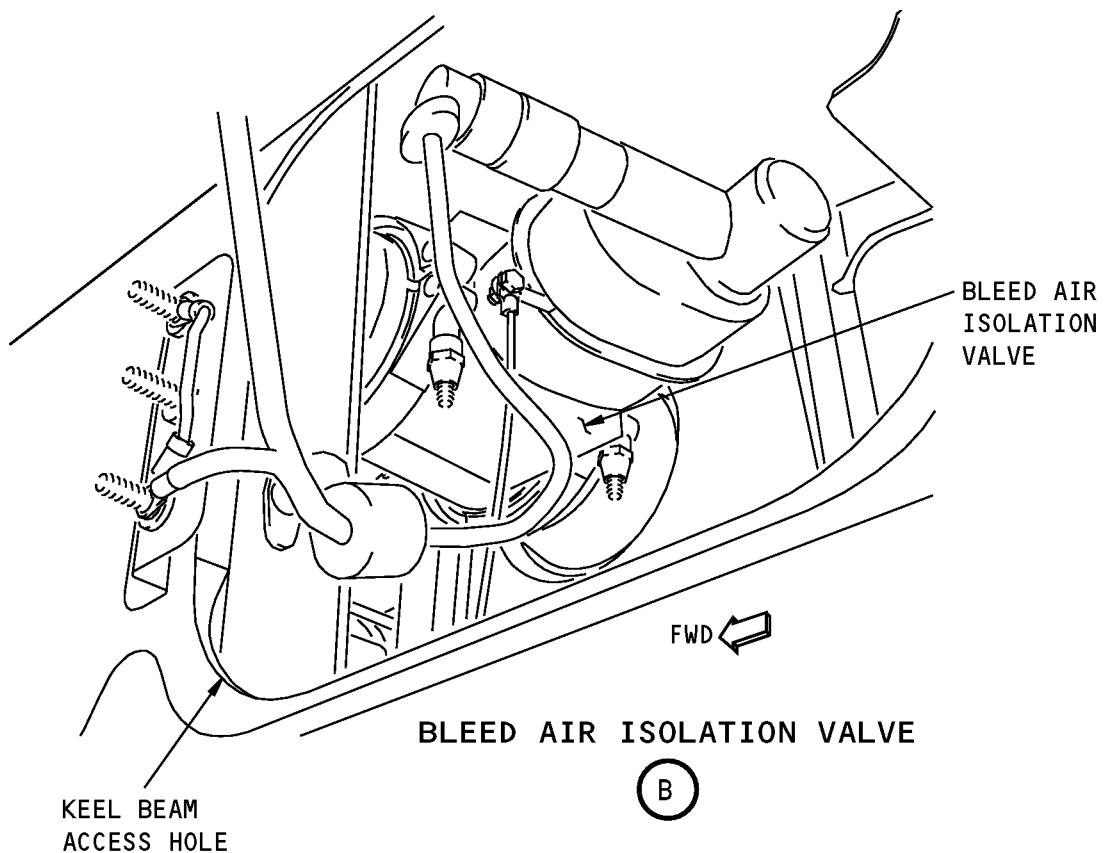


Pneumatic System in the Keel Beam Component Location  
 Figure 303 (Sheet 1 of 2)/ 36-10-00-990-803

EFFECTIVITY  
 HAP ALL

## 36-10 TASK SUPPORT


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

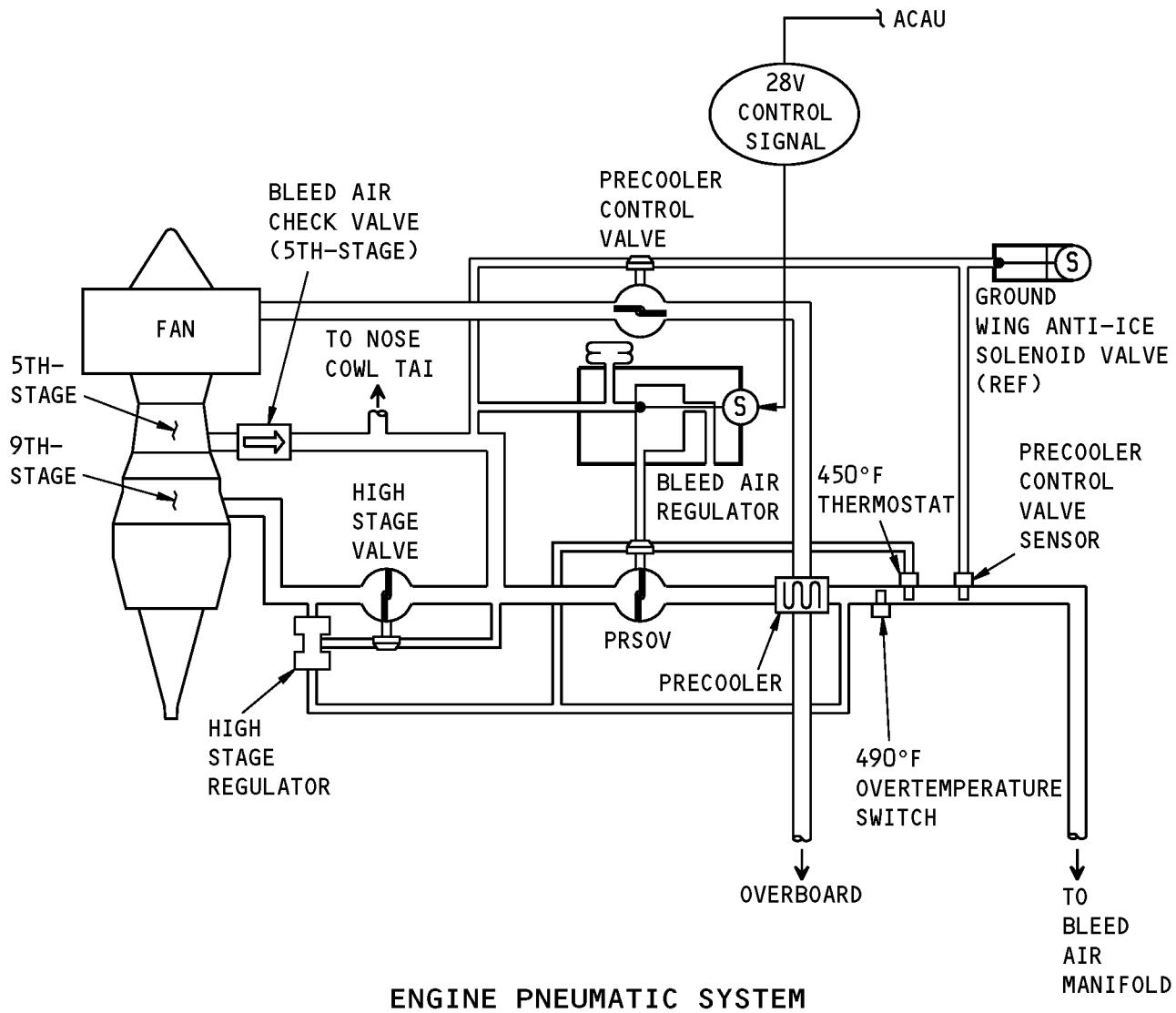


Pneumatic System in the Keel Beam Component Location  
 Figure 303 (Sheet 2 of 2)/ 36-10-00-990-803

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**


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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

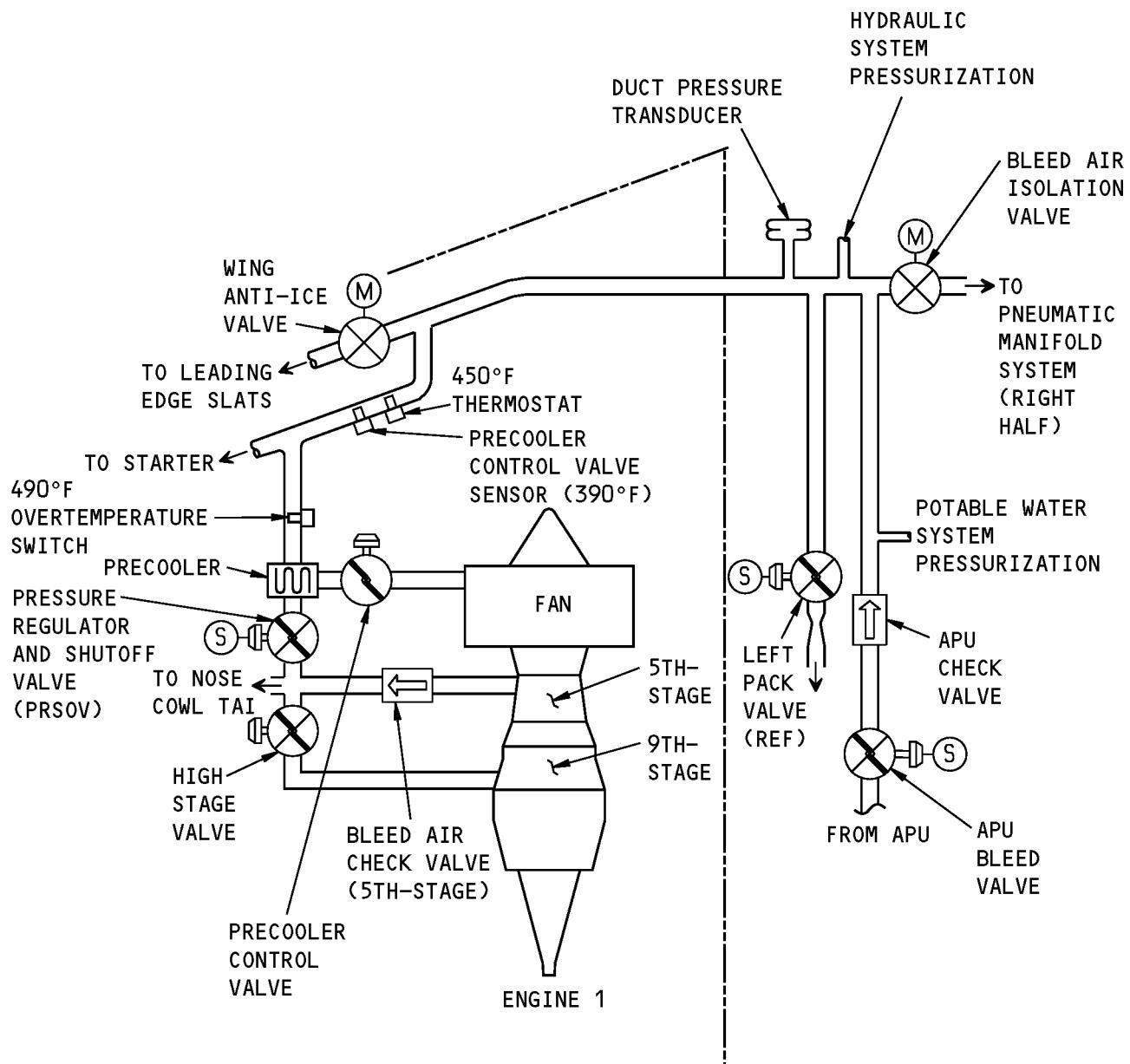


Pneumatic System Schematic  
 Figure 304 (Sheet 1 of 3)/ 36-10-00-990-804

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



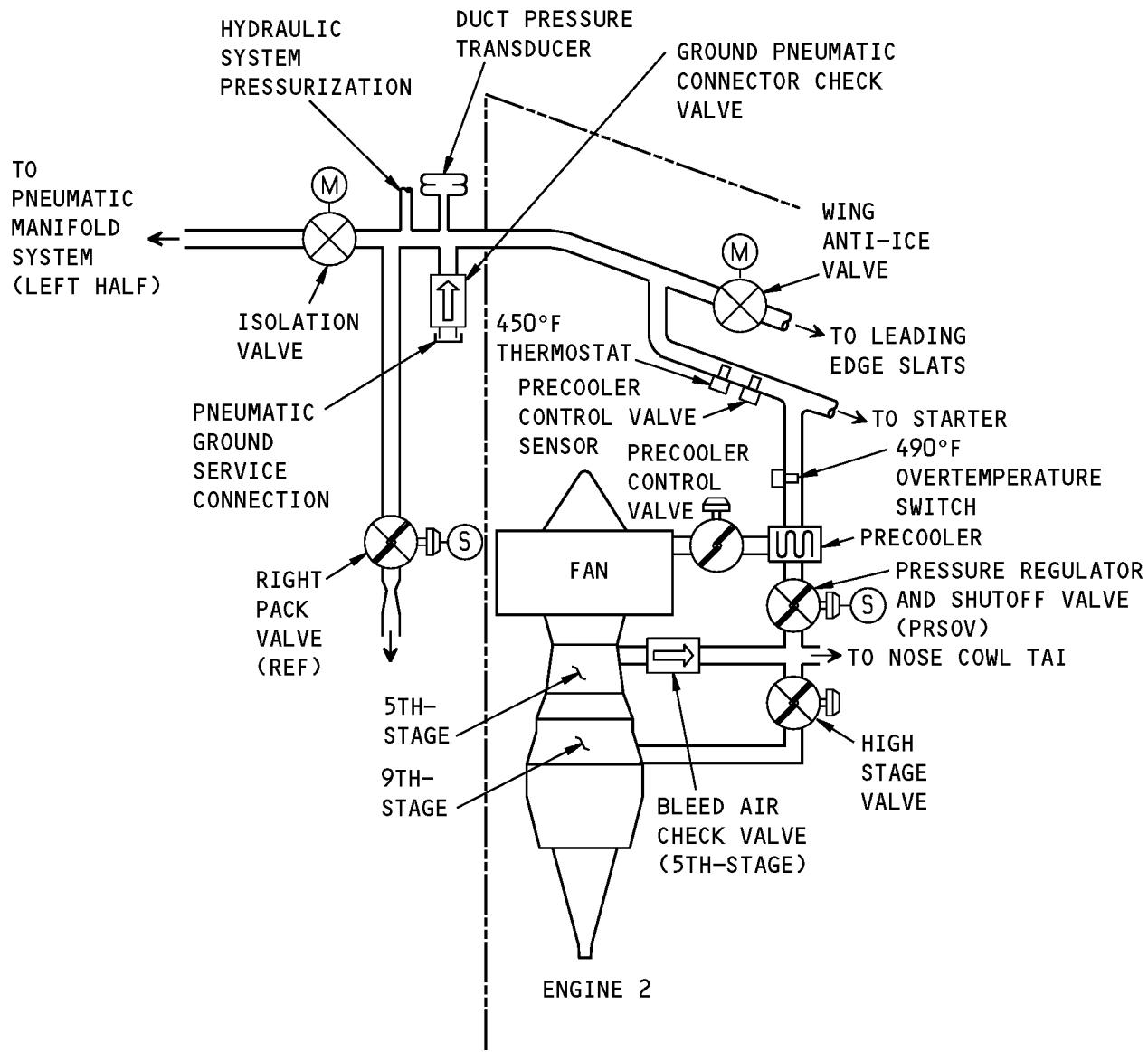
**PNEUMATIC MANIFOLD SYSTEM  
(LEFT HALF)**

Pneumatic System Schematic  
Figure 304 (Sheet 2 of 3)/ 36-10-00-990-804

EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



**PNEUMATIC MANIFOLD SYSTEM  
(RIGHT HALF)**

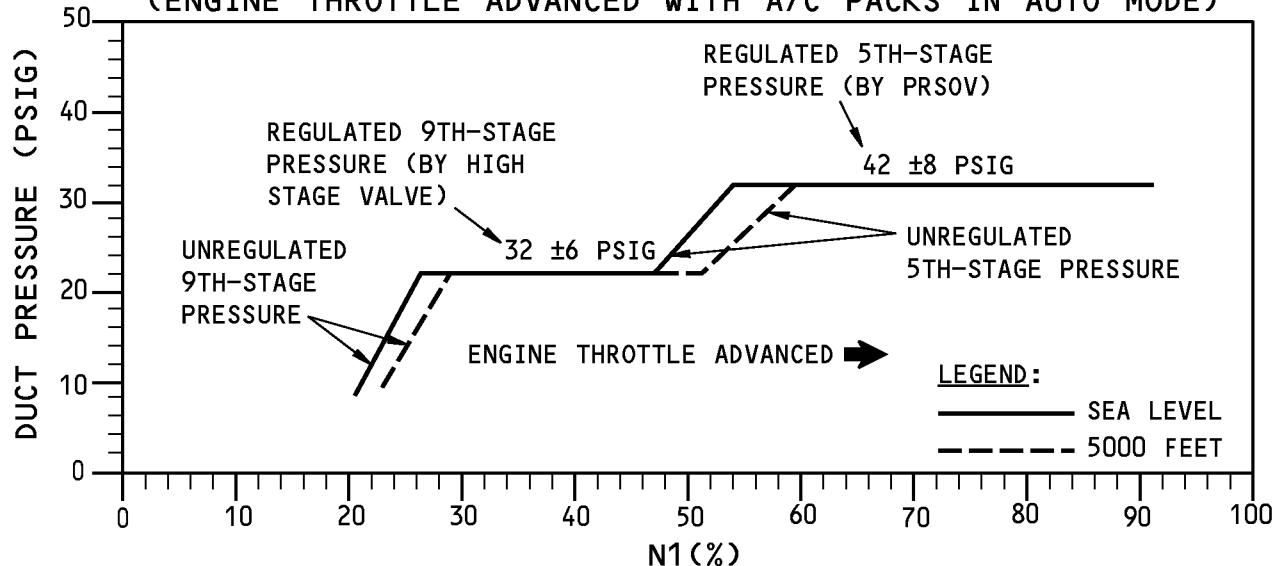
Pneumatic System Schematic  
 Figure 304 (Sheet 3 of 3)/ 36-10-00-990-804

EFFECTIVITY  
 HAP ALL

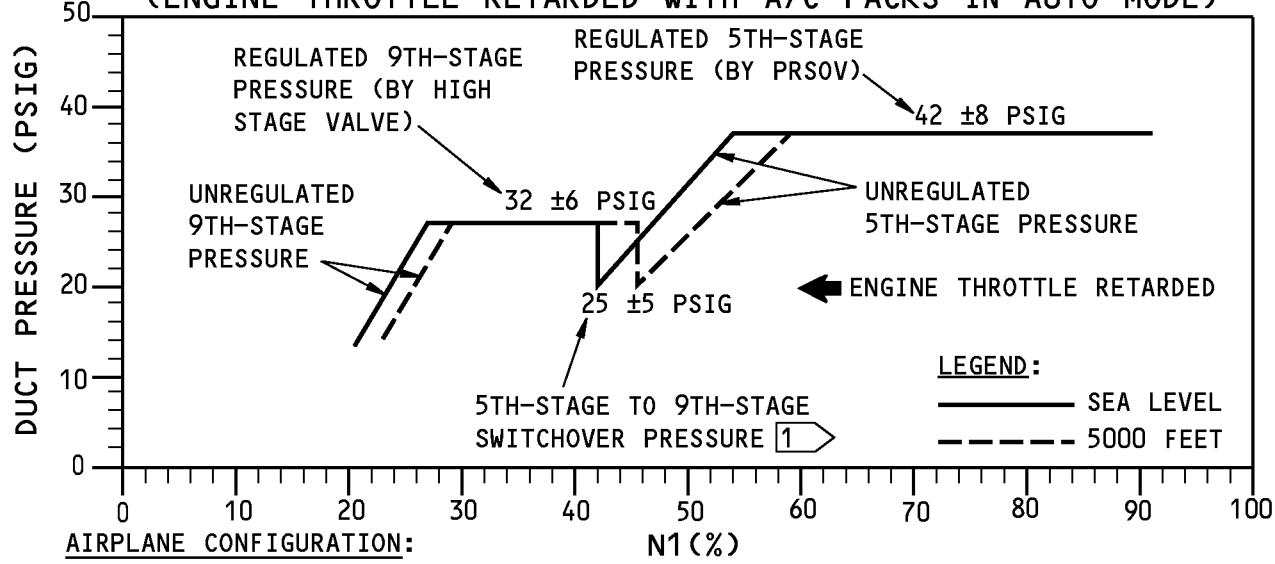
**36-10 TASK SUPPORT**

## FAULT ISOLATION MANUAL

DUCT PRESSURE VERSUS N1 AT SEA LEVEL AND 5000 FEET  
(ENGINE THROTTLE ADVANCED WITH A/C PACKS IN AUTO MODE)



DUCT PRESSURE VERSUS N1 AT SEA LEVEL AND 5000 FEET  
(ENGINE THROTTLE RETARDED WITH A/C PACKS IN AUTO MODE)

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.

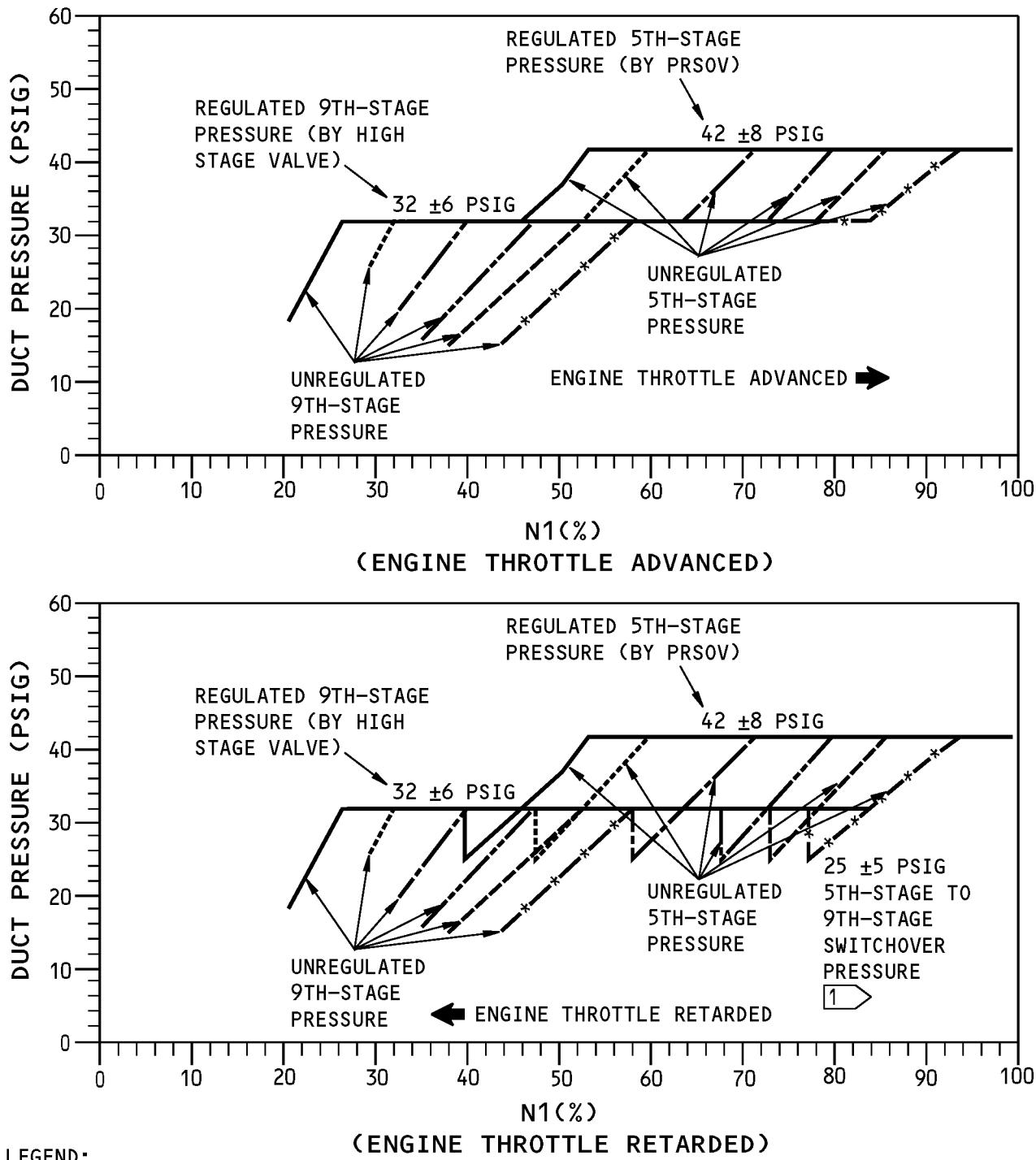
G50747 S0006744860\_V2

Duct Pressure Versus N1 at Various Altitudes  
Figure 305 (Sheet 1 of 2)/ 36-10-00-990-805

EFFECTIVITY  
HAP ALL

36-10 TASK SUPPORT

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

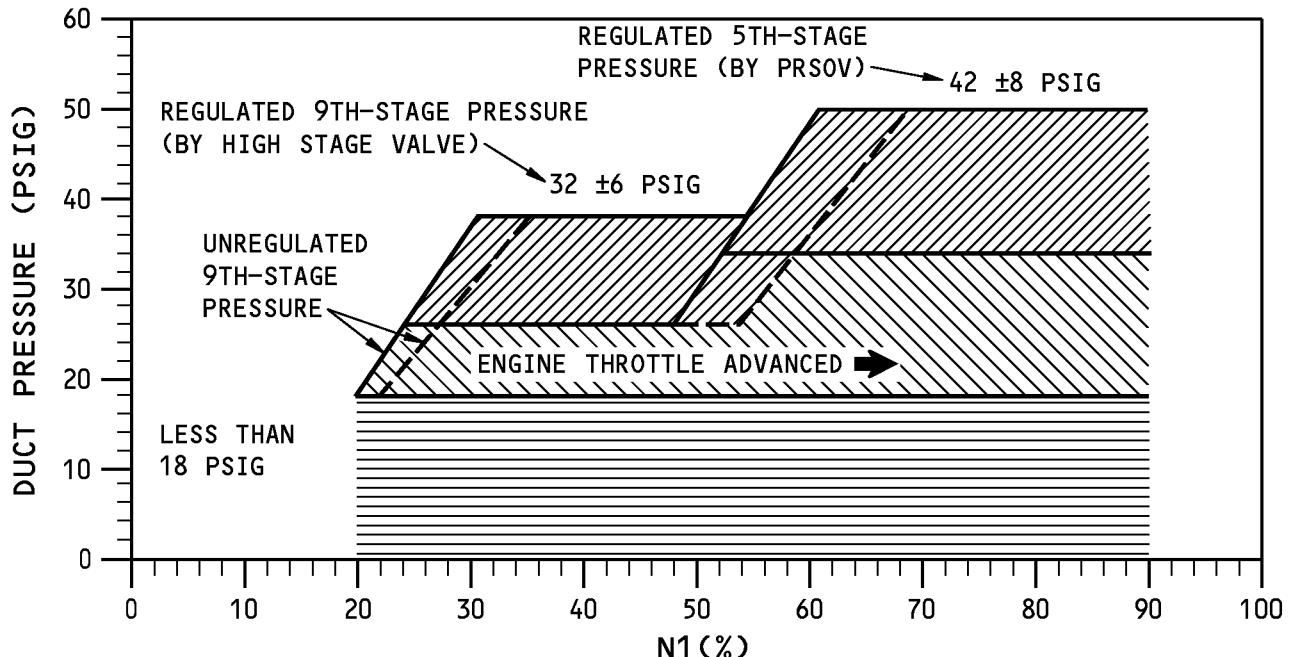


Duct Pressure Versus N1 at Various Altitudes  
 Figure 305 (Sheet 2 of 2)/ 36-10-00-990-805



**36-10 TASK SUPPORT**

MINIMUM SERVICEABLE PNEUMATIC DUCT PRESSURE  
UNDER IN-FLIGHT AIRPLANE CONFIGURATION AND OPERATING CONDITIONS



NOTE: MINIMUM POWER IN FLIGHT IS GREATER THAN MINIMUM POWER ON THE GROUND.

LEGEND:

- SEA LEVEL
- 5000 FEET
- //// BLEED SYSTEM OPERATING NORMALLY.
- \\\\ BLEED SYSTEM PERFORMANCE DRIFTING. AIRPLANE CAN BE OPERATED NORMALLY BUT ACTION TO RESTORE BLEED SYSTEM TO OPTIMUM OPERATION SHOULD BE TAKEN AT A CONVENIENT OPPORTUNITY.
- == BLEED SYSTEM INOPERATIVE. RESTORE TO NORMAL OPERATION BEFORE FLIGHT OR IMPOSE THE MEL RESTRICTION FOR CONTINUED OPERATION.

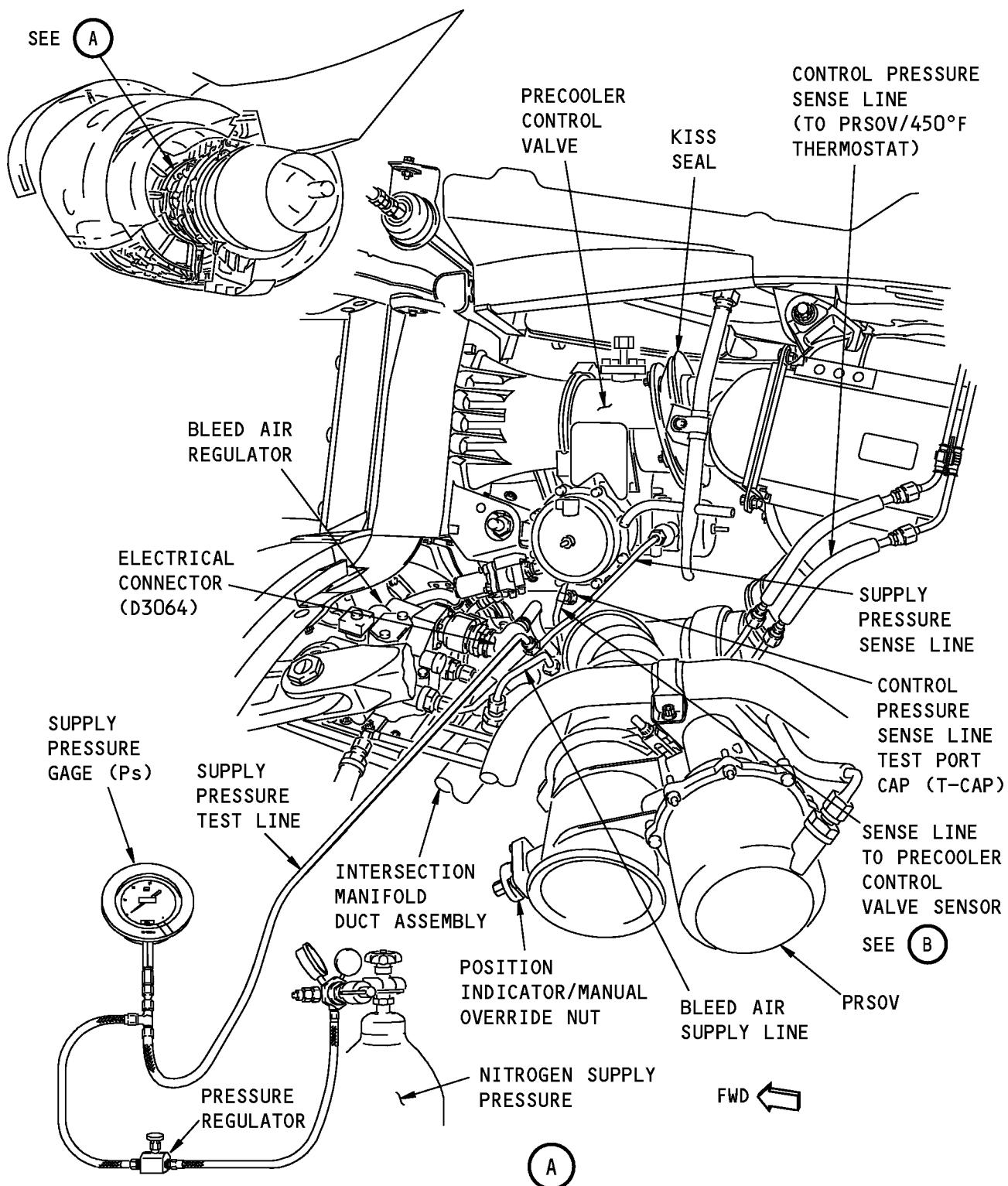
1418175 S0000255925\_V2

Minimum Serviceable Pneumatic Duct Pressure  
Figure 306 / 36-10-00-990-812

EFFECTIVITY  
HAP ALL

36-10 TASK SUPPORT

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

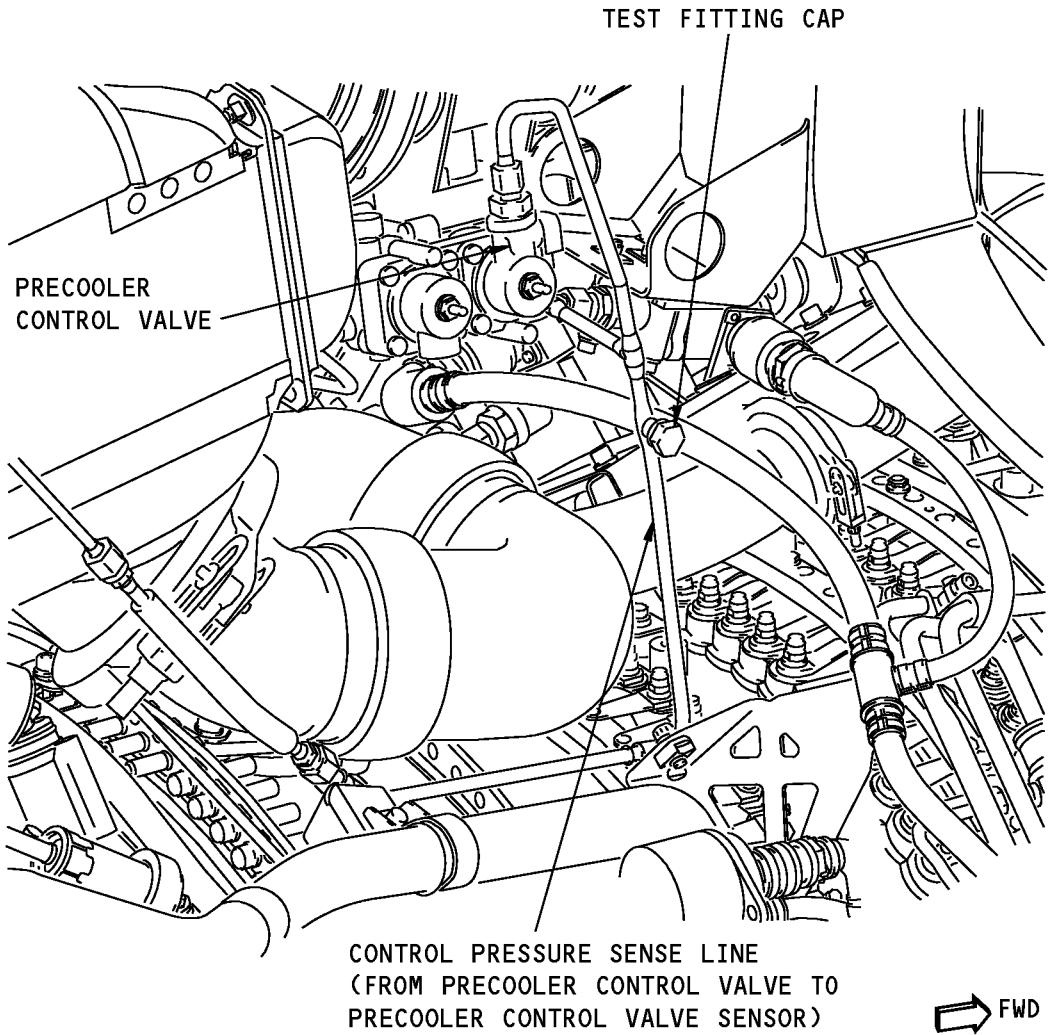


Bleed Trip Off Light On. The Engine Is the Bleed Source.  
 Figure 307 (Sheet 1 of 2)/ 36-10-00-990-806

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

 **BOEING®**  
737-600/700/800/900  
**FAULT ISOLATION MANUAL**



**CONTROL PRESSURE SENSE LINE**

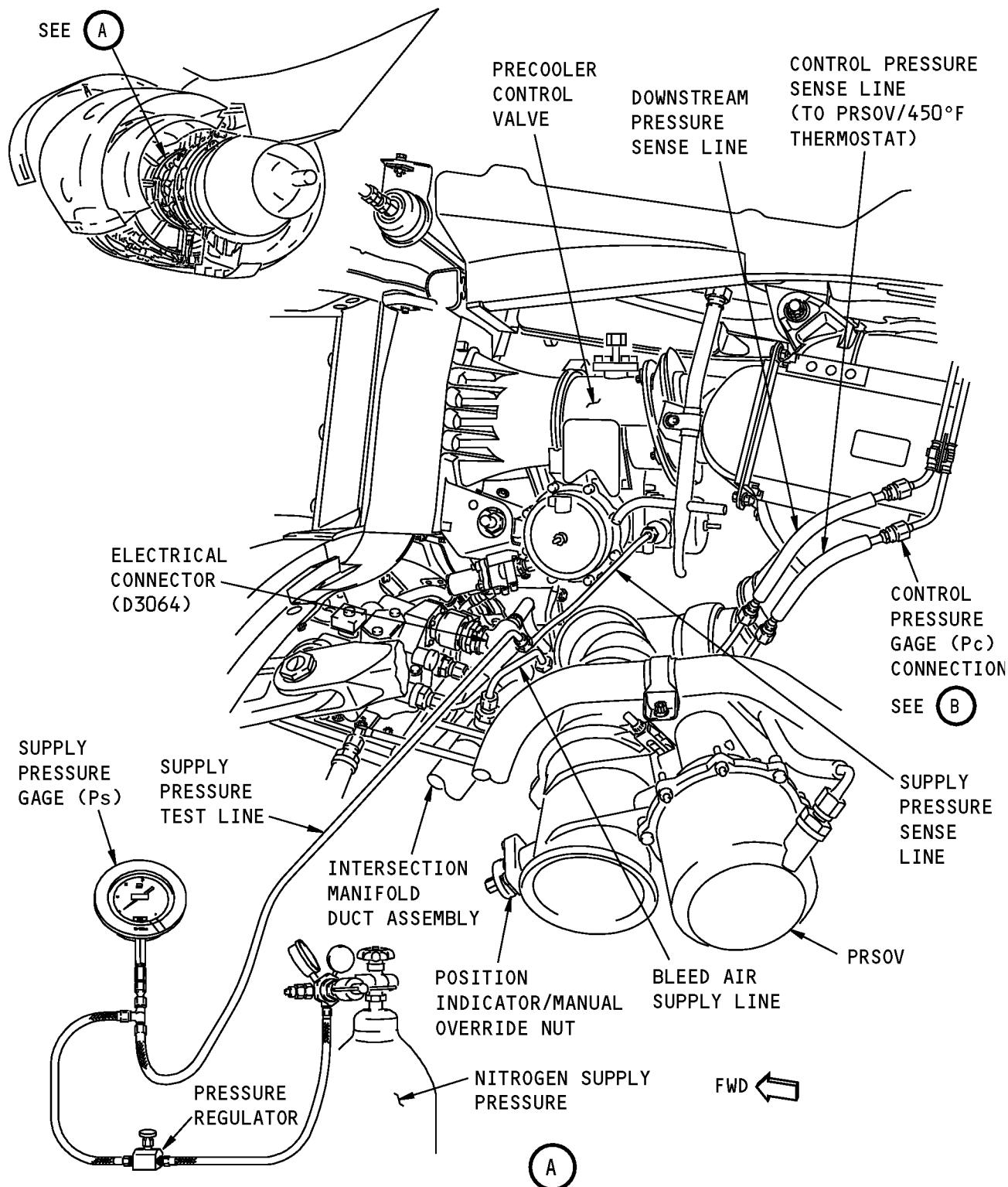
(B)

Bleed Trip Off Light On. The Engine Is the Bleed Source.  
Figure 307 (Sheet 2 of 2)/ 36-10-00-990-806

EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

BOEING®  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



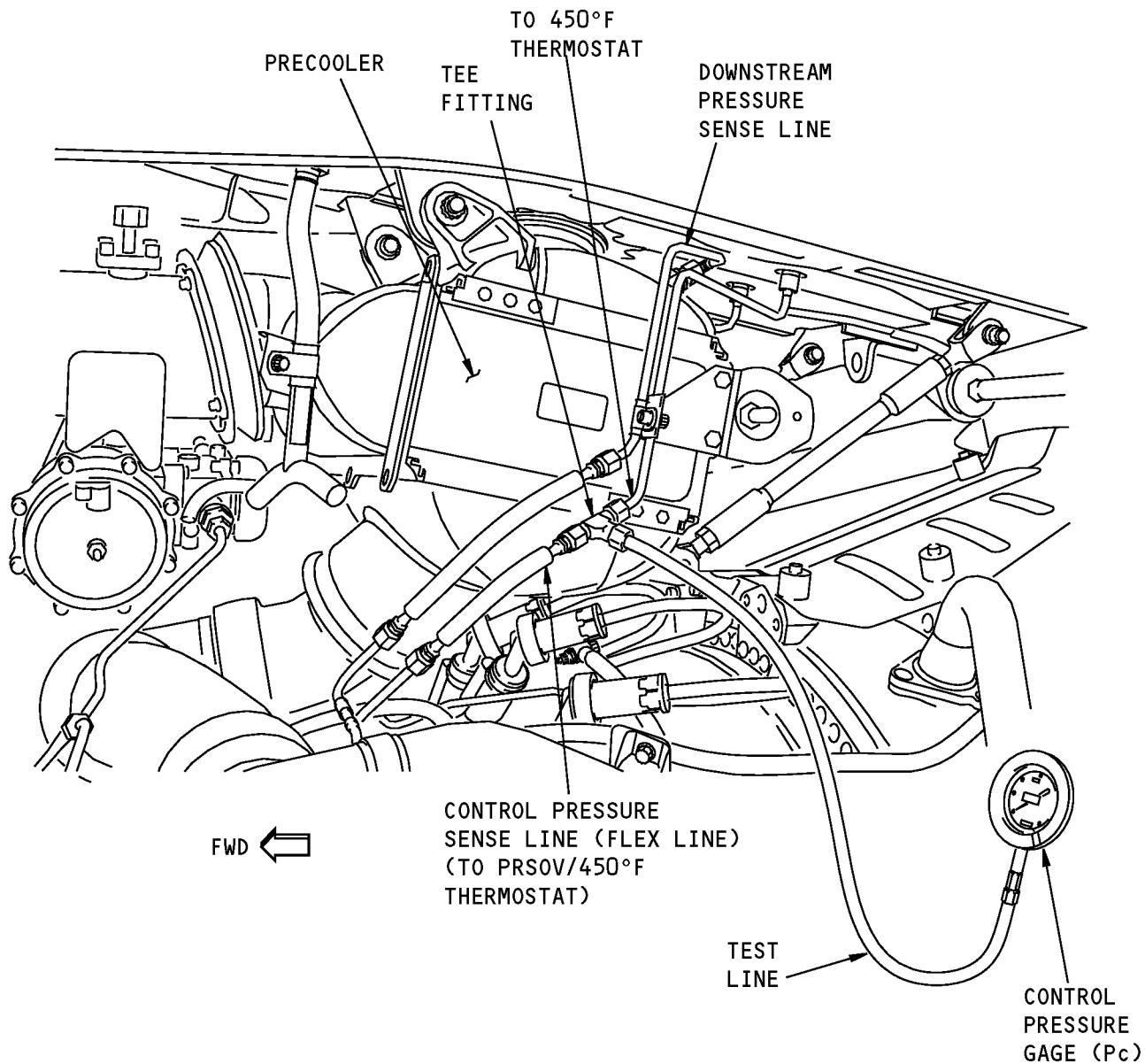
Duct Pressure High/Bleed Valve Does Not Close When Bleed Switches are Moved to Off. The Engine is the Bleed Source.

Figure 308 (Sheet 1 of 2) / 36-10-00-990-807

EFFECTIVITY  
**HAP ALL**

**36-10 TASK SUPPORT**

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



**CONTROL PRESSURE GAGE (Pc) CONNECTION**

B

Duct Pressure High/Bleed Valve Does Not Close When Bleed Switches are Moved to Off. The Engine is the Bleed Source.

Figure 308 (Sheet 2 of 2)/ 36-10-00-990-807

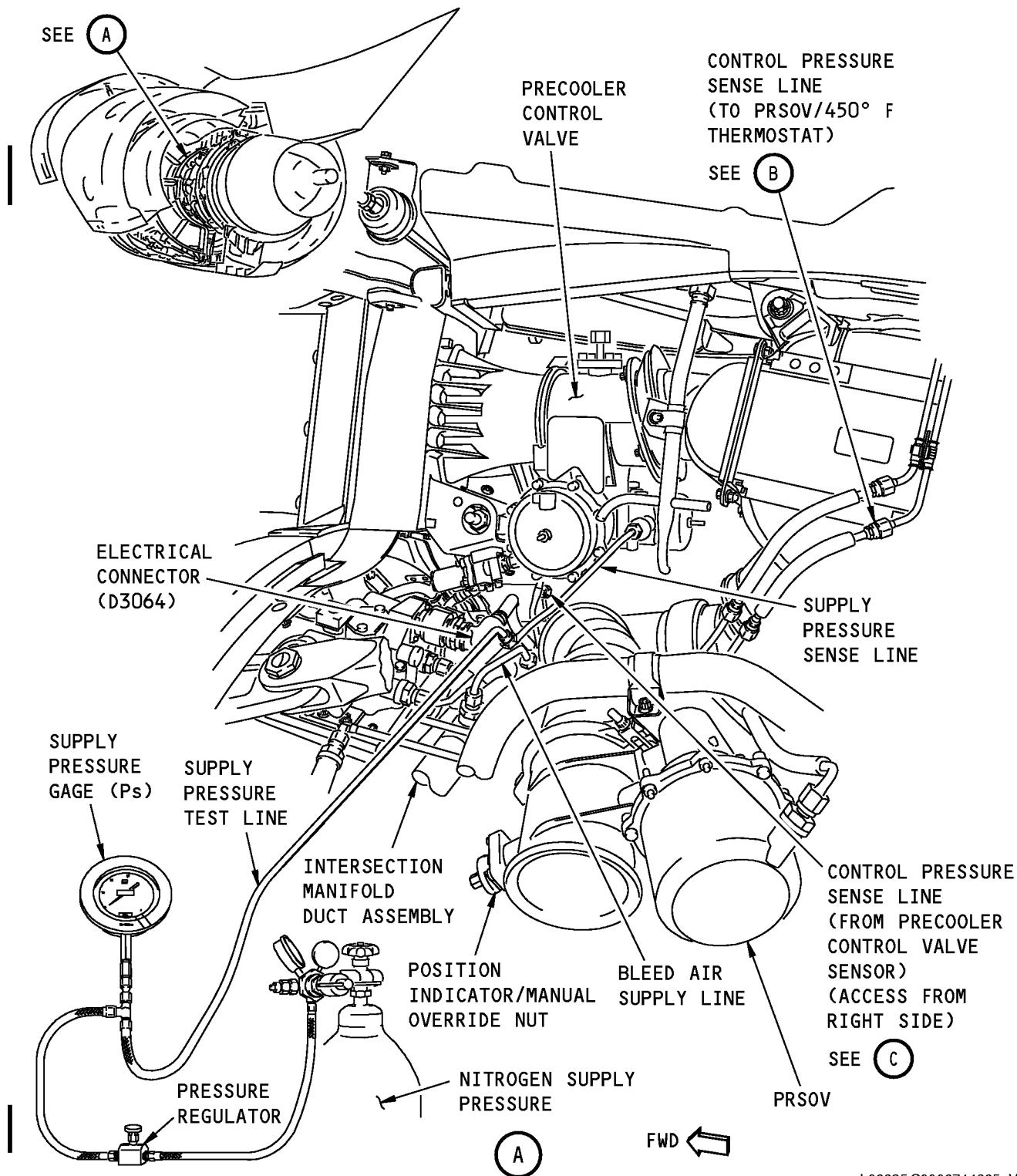
EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

Page 316  
Oct 10/2007

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**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



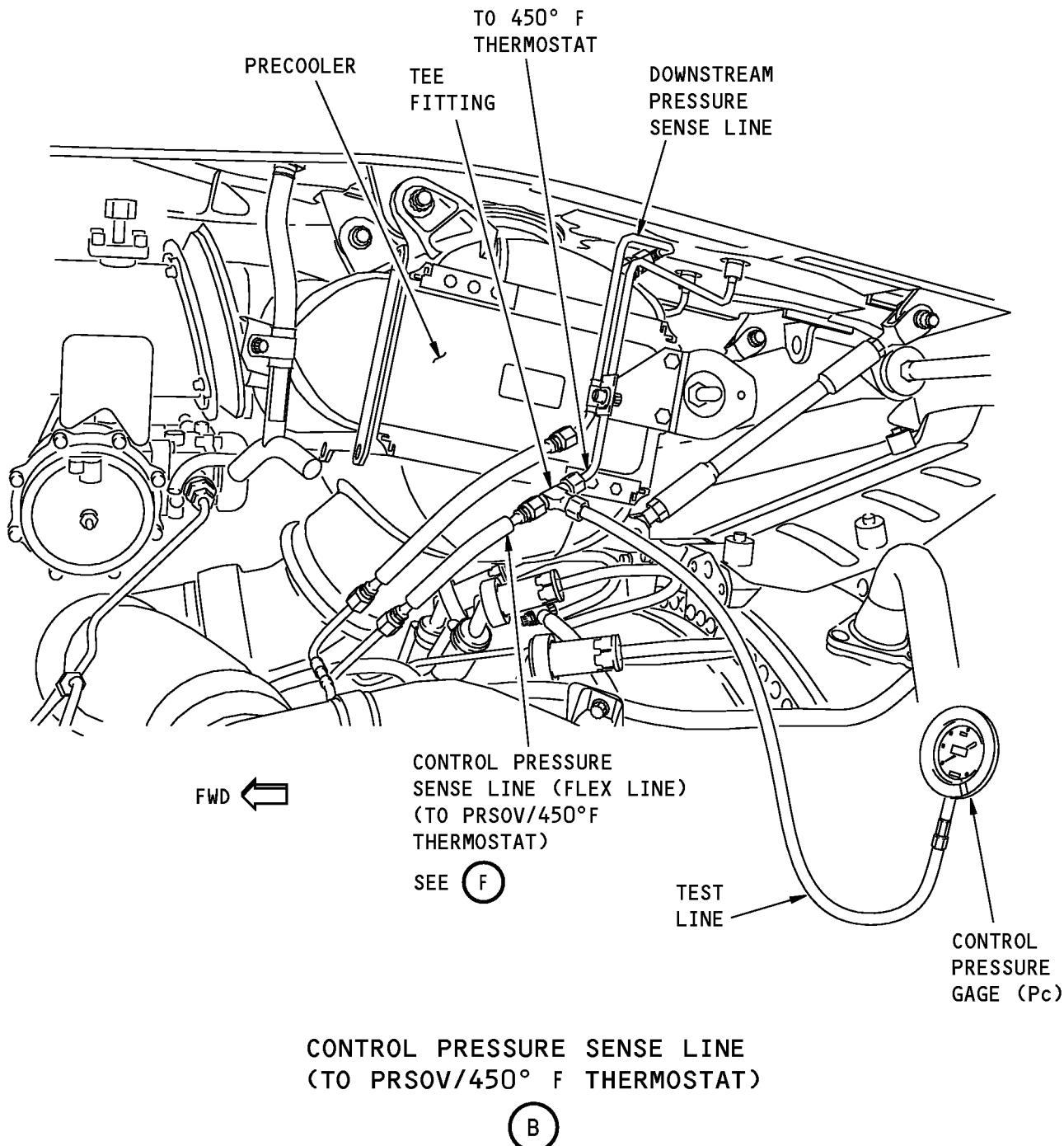
L06825 S0006744865\_V2

Duct Pressure Low. The Engine is the Bleed Source.  
 Figure 309 (Sheet 1 of 8) / 36-10-00-990-808

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



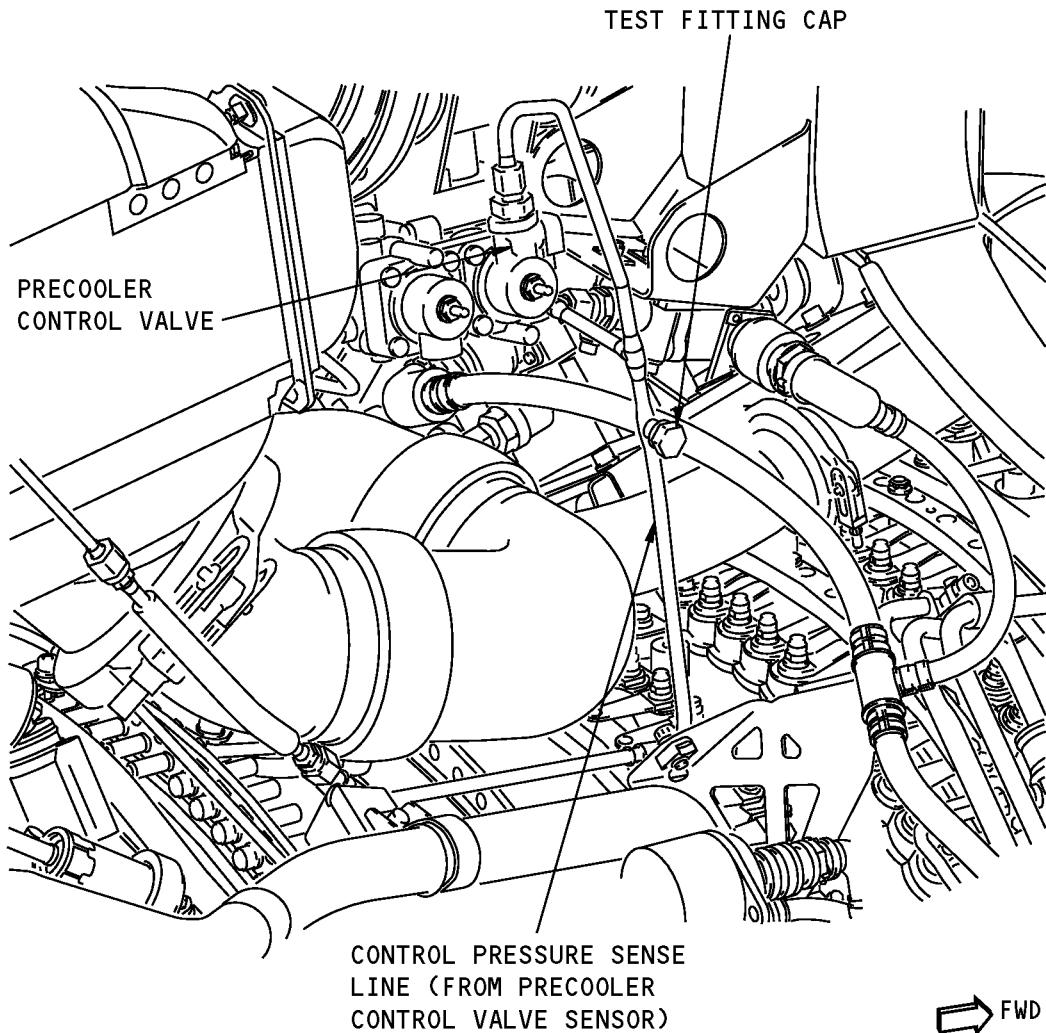
W28867 S0006744866\_V2

Duct Pressure Low. The Engine is the Bleed Source.  
 Figure 309 (Sheet 2 of 8) / 36-10-00-990-808

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

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737-600/700/800/900  
**FAULT ISOLATION MANUAL**



CONTROL PRESSURE SENSE LINE  
(FROM PRECOOLER CONTROL VALVE SENSOR)

(C)

Duct Pressure Low. The Engine is the Bleed Source.  
Figure 309 (Sheet 3 of 8) / 36-10-00-990-808

EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

BOEING®

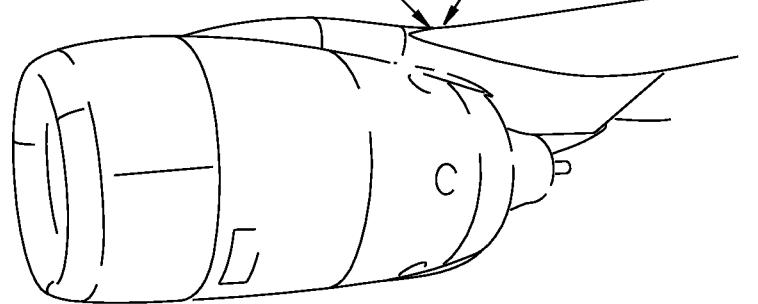
737-600/700/800/900

## FAULT ISOLATION MANUAL

OVERWING FAIRING ACCESS  
PANEL, 431CL (441CL)

SEE

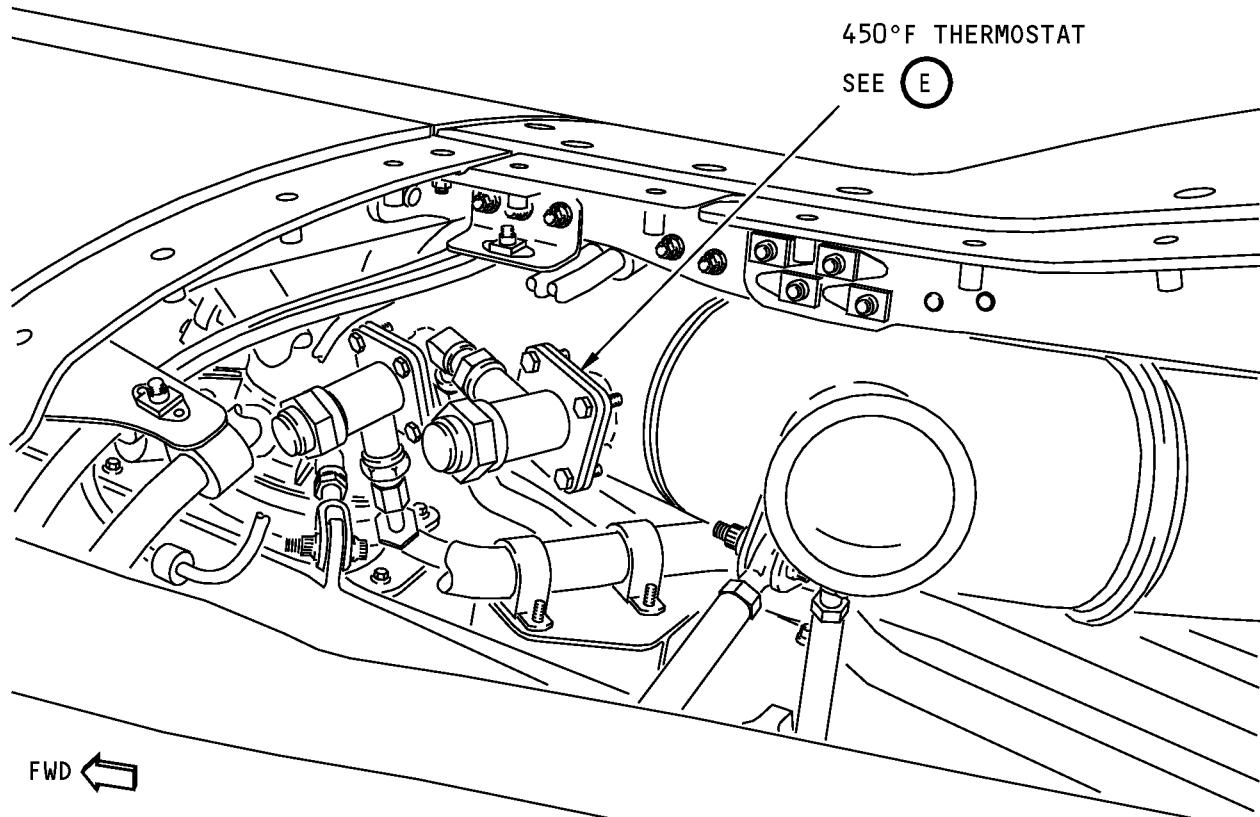
(D)



450°F THERMOSTAT

SEE

(E)



LEFT STRUT  
(RIGHT STRUT IS EQUIVALENT)

(D)

Duct Pressure Low. The Engine is the Bleed Source.  
Figure 309 (Sheet 4 of 8) / 36-10-00-990-808

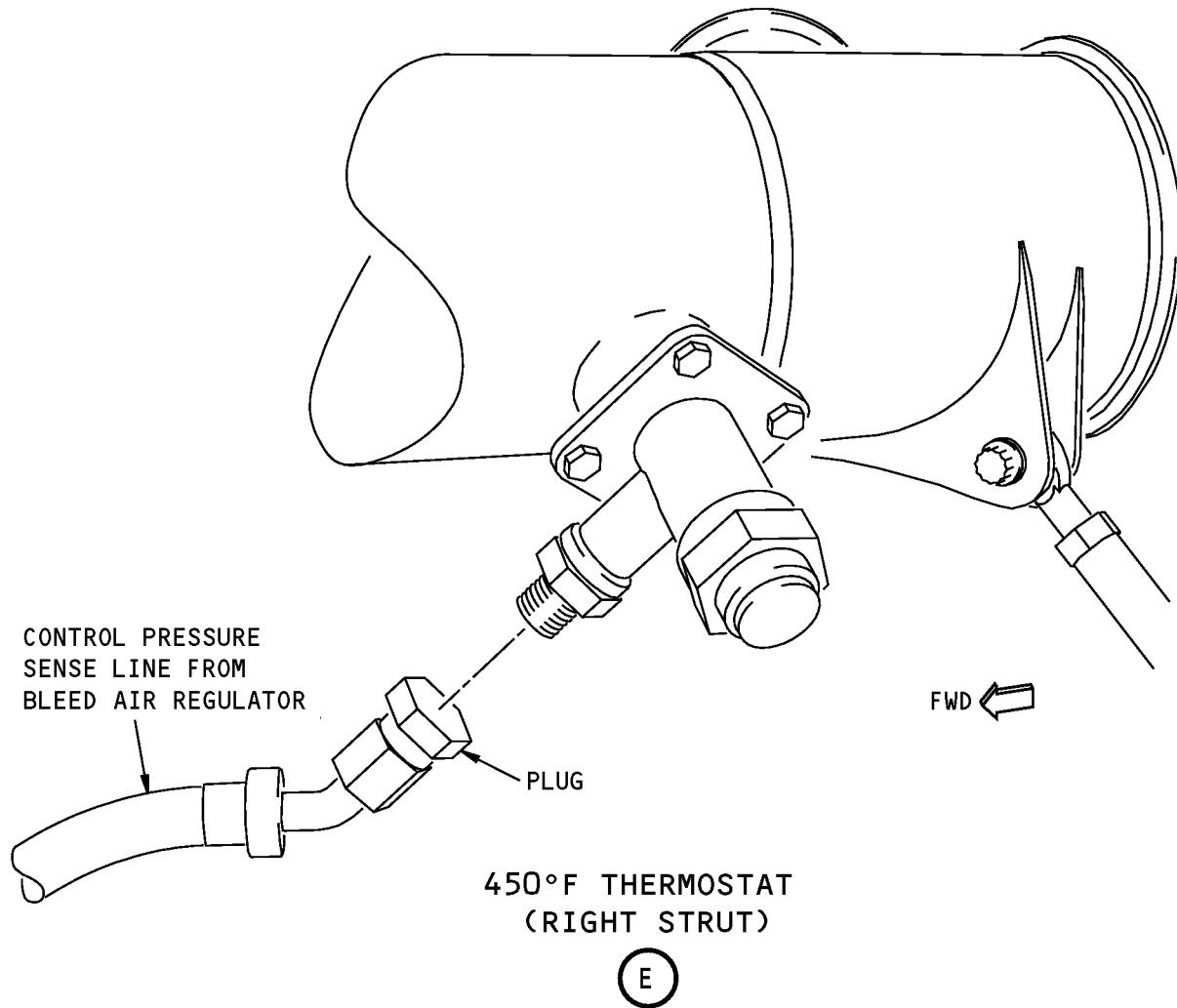
EFFECTIVITY  
HAP ALL

## 36-10 TASK SUPPORT

Page 320  
Oct 10/2007

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737-600/700/800/900  
**FAULT ISOLATION MANUAL**



Duct Pressure Low. The Engine is the Bleed Source.  
Figure 309 (Sheet 5 of 8) / 36-10-00-990-808

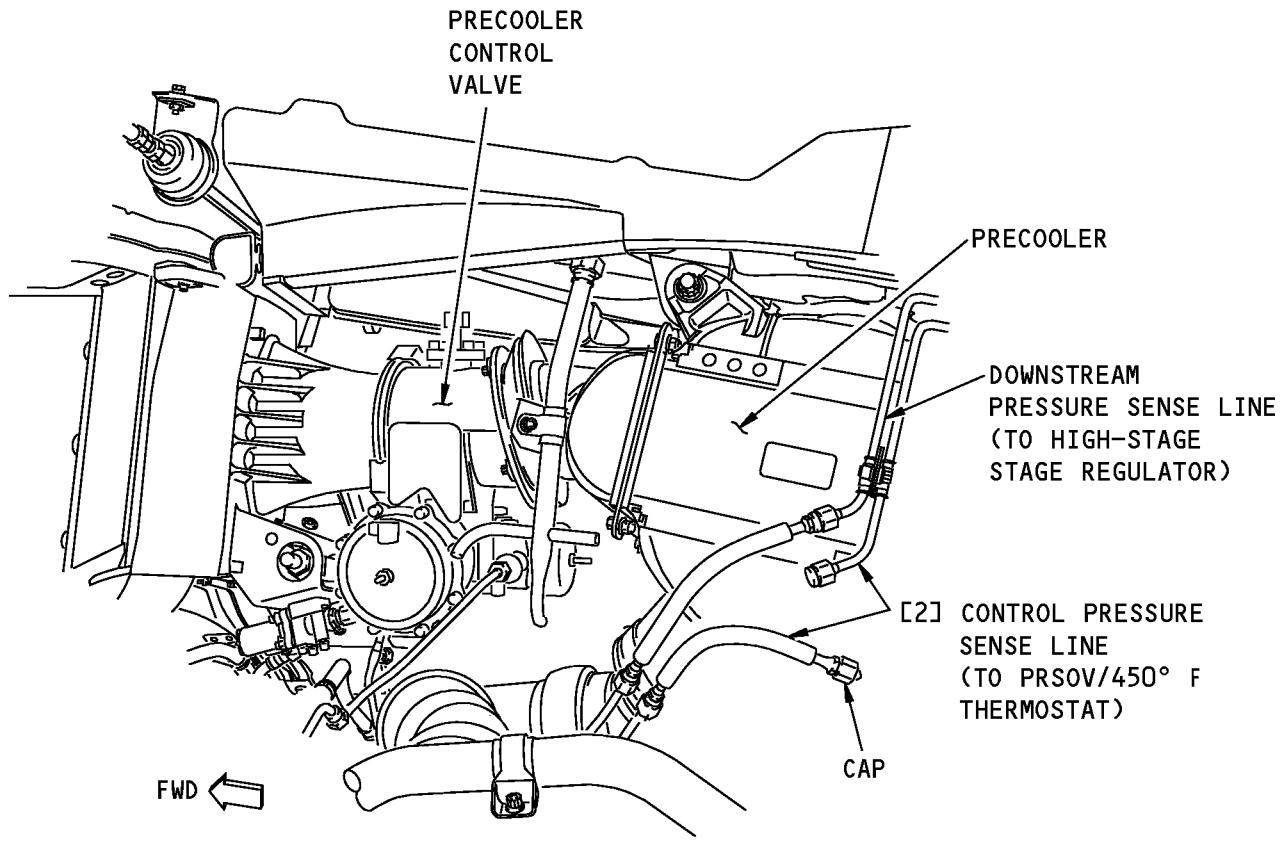
EFFECTIVITY  
HAP ALL

## 36-10 TASK SUPPORT

Page 321  
Oct 10/2007

D633A103-HAP

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FAULT ISOLATION MANUAL



CONTROL PRESSURE SENSE LINE WITH CAP

F

W28869 S0006744870\_V2

Duct Pressure Low. The Engine is the Bleed Source.  
Figure 309 (Sheet 6 of 8) / 36-10-00-990-808

EFFECTIVITY  
HAP ALL

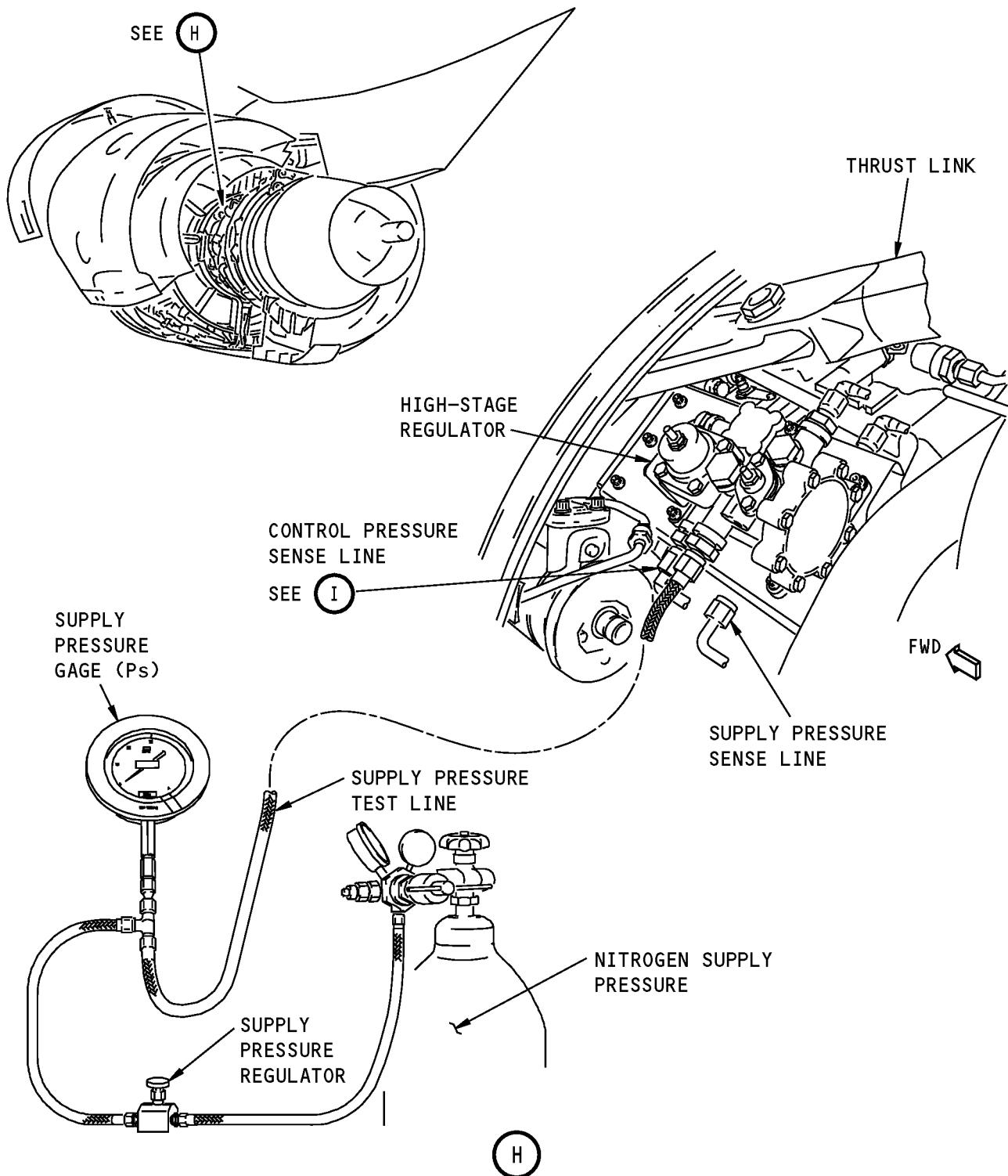
**36-10 TASK SUPPORT**

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Page 322  
Jun 15/2009

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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



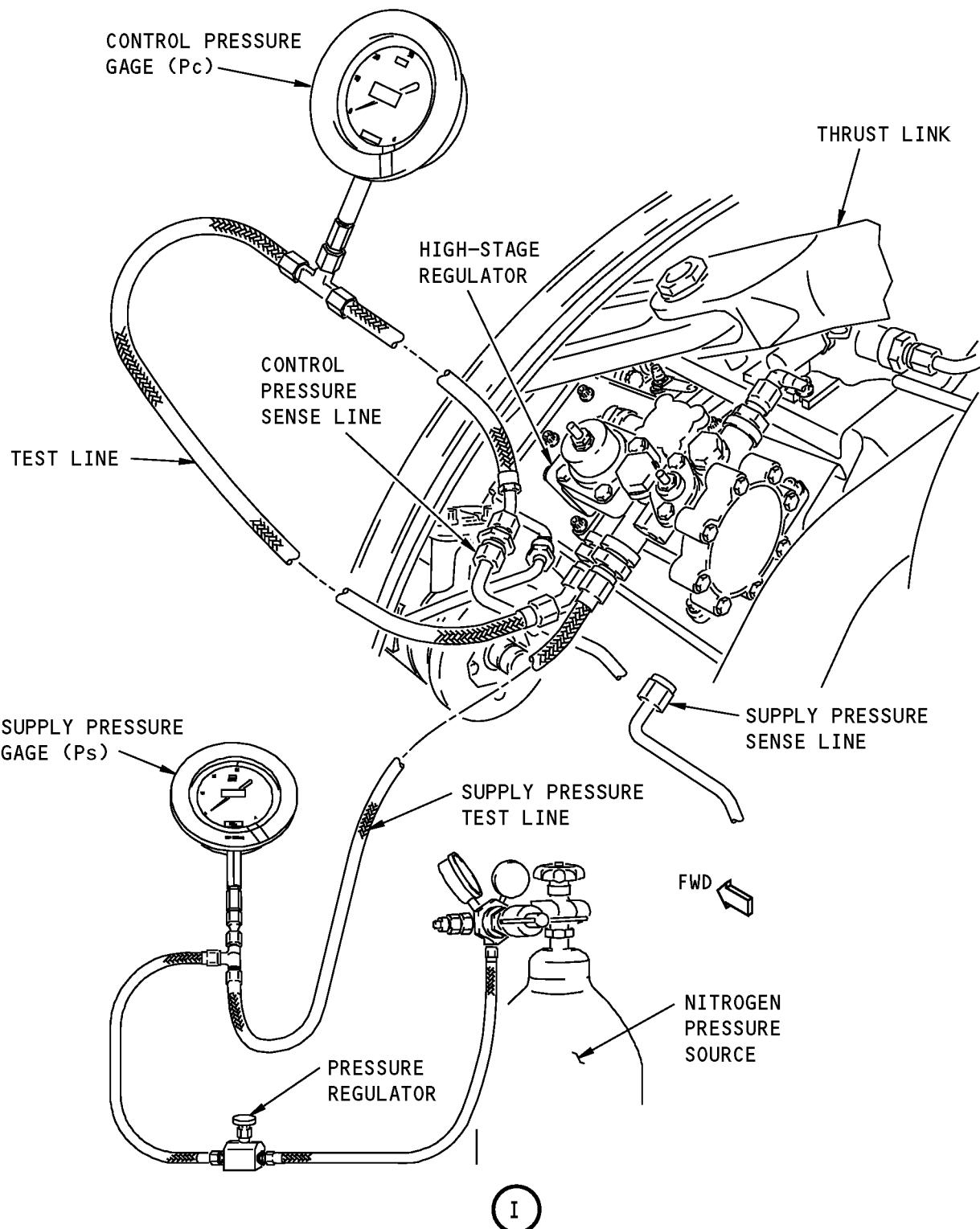
Duct Pressure Low. The Engine is the Bleed Source.  
 Figure 309 (Sheet 7 of 8) / 36-10-00-990-808

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

Page 323  
 Oct 10/2007

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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

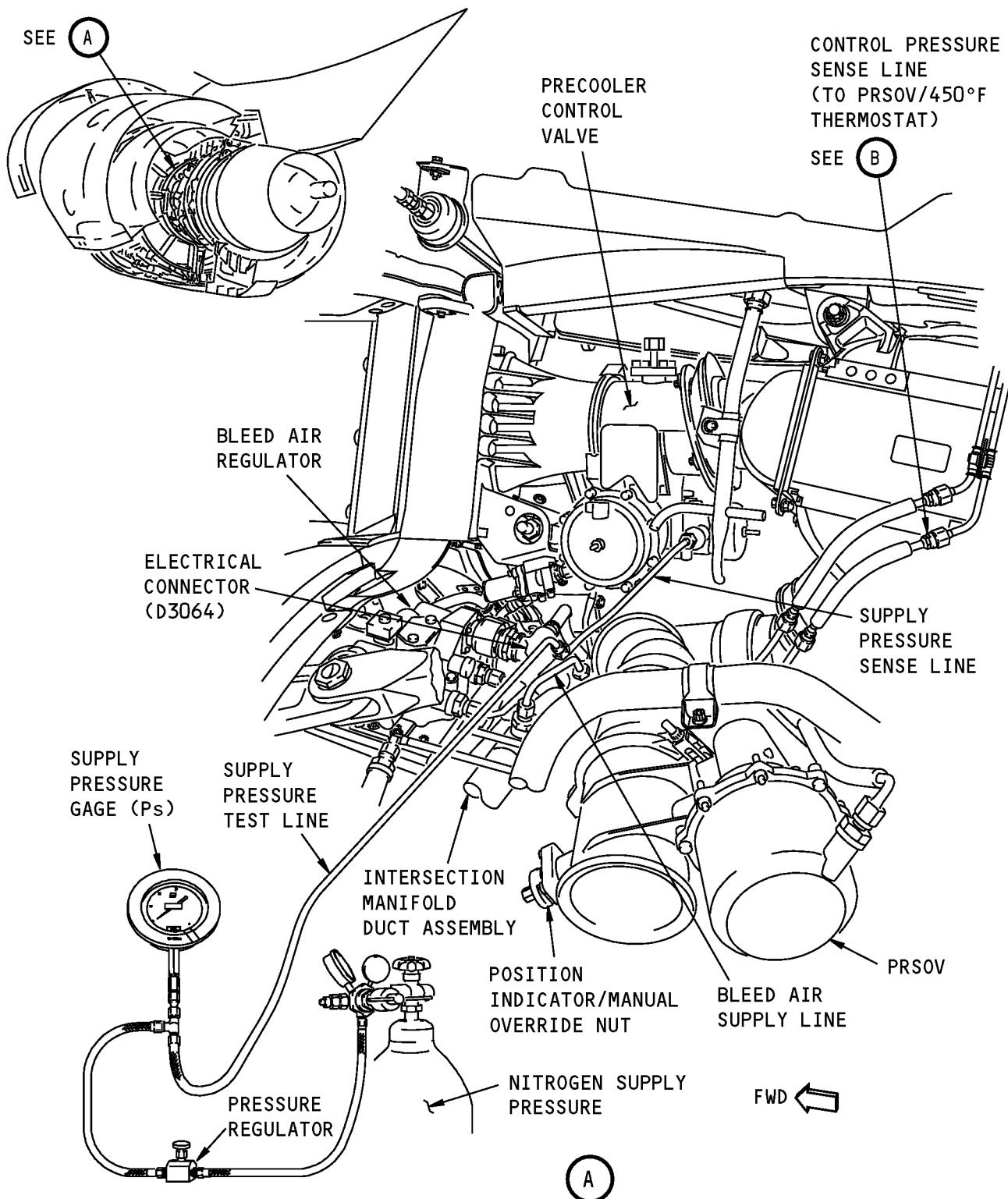


Duct Pressure Low. The Engine is the Bleed Source.  
 Figure 309 (Sheet 8 of 8) / 36-10-00-990-808

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**

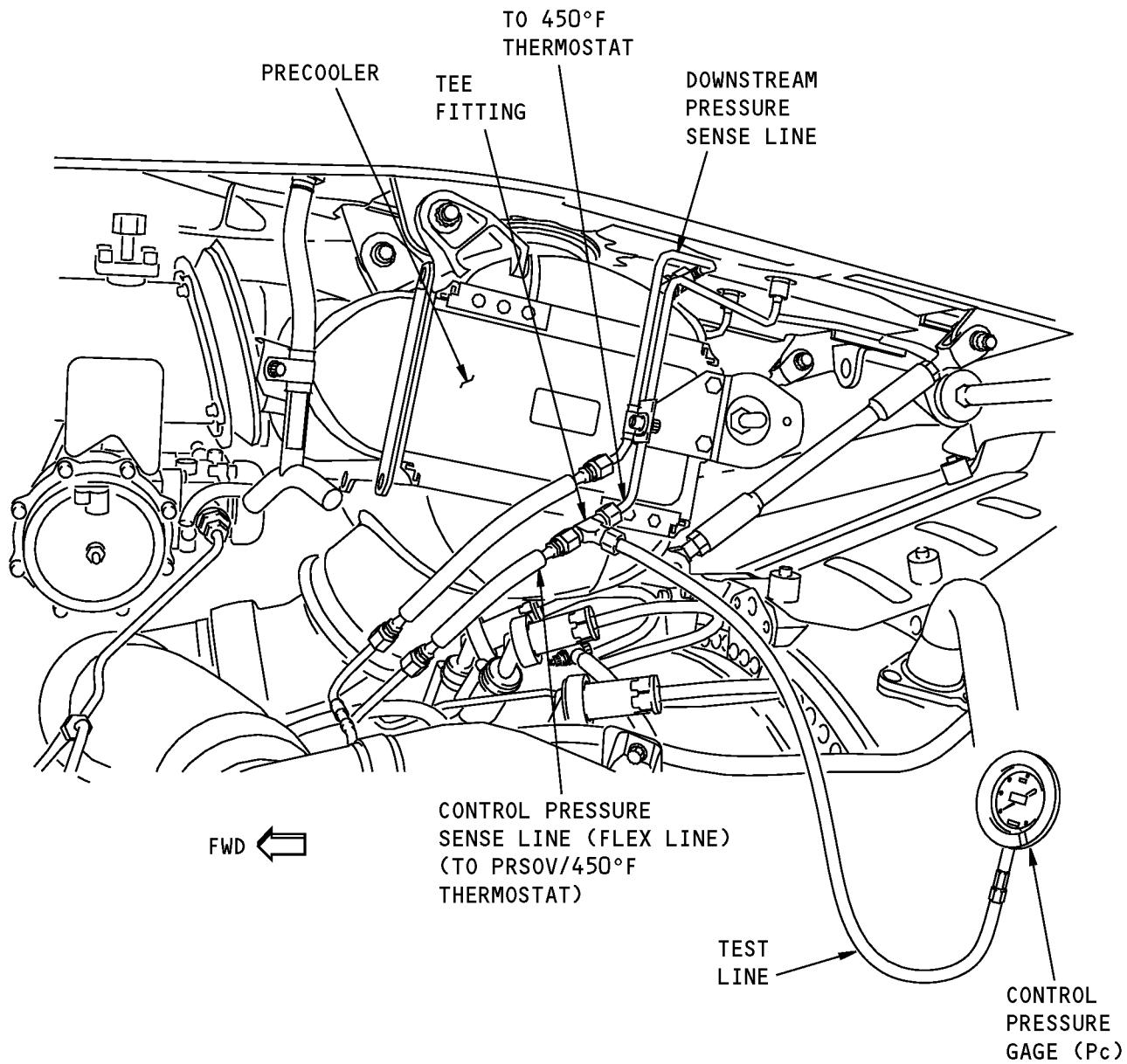


Duct Pressure Zero. The Engine is the Bleed Source.  
 Figure 310 (Sheet 1 of 2)/ 36-10-00-990-809

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



**CONTROL PRESSURE SENSE LINE  
(TO PRSOV/450°F THERMOSTAT)**

**B**

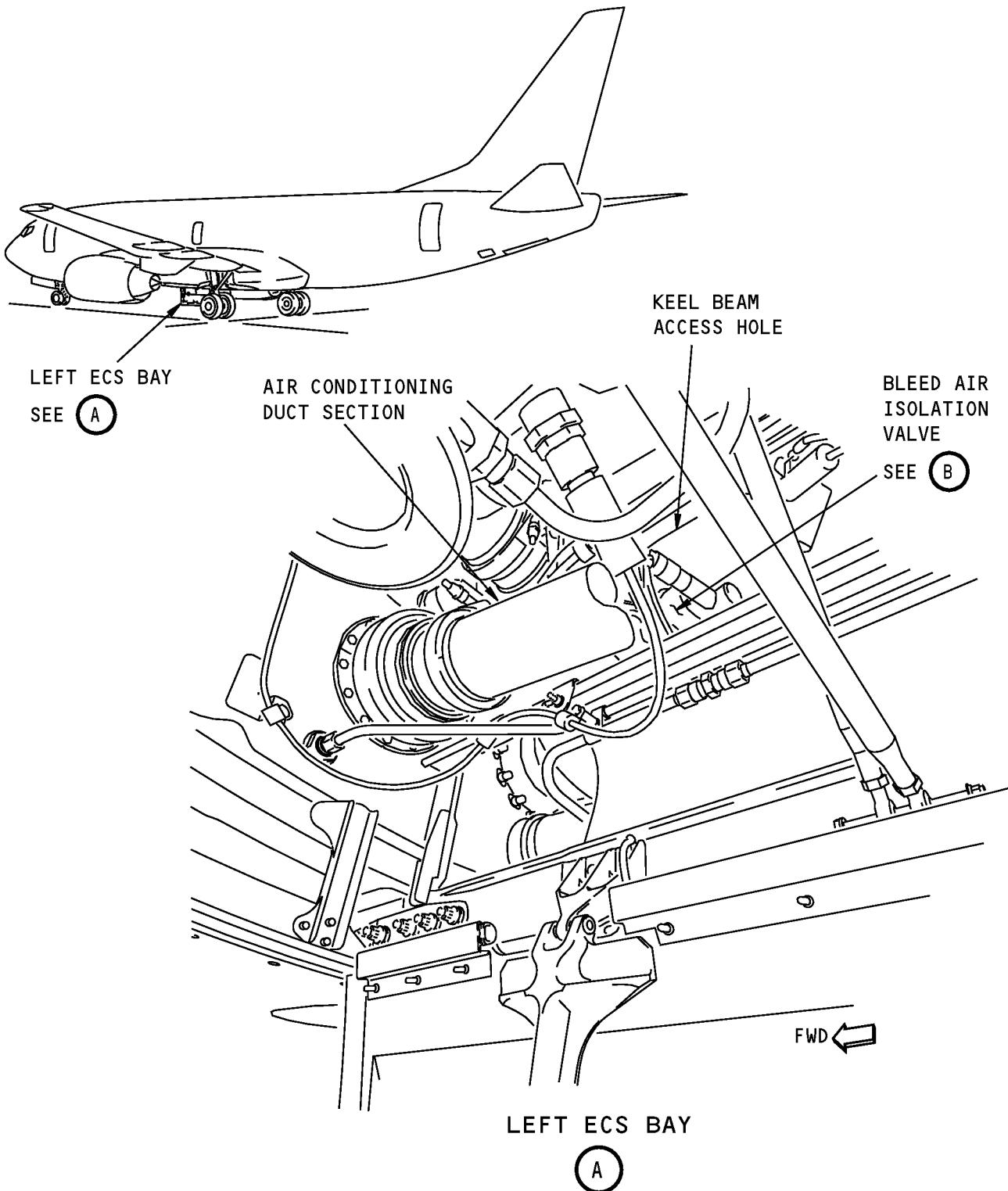
Duct Pressure Zero. The Engine is the Bleed Source.  
 Figure 310 (Sheet 2 of 2)/ 36-10-00-990-809

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

Page 326  
 Oct 10/2007

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FAULT ISOLATION MANUAL



Isolation Valve Does Not Open or Close Properly.  
Figure 311 (Sheet 1 of 2)/ 36-10-00-990-810

EFFECTIVITY  
HAP ALL

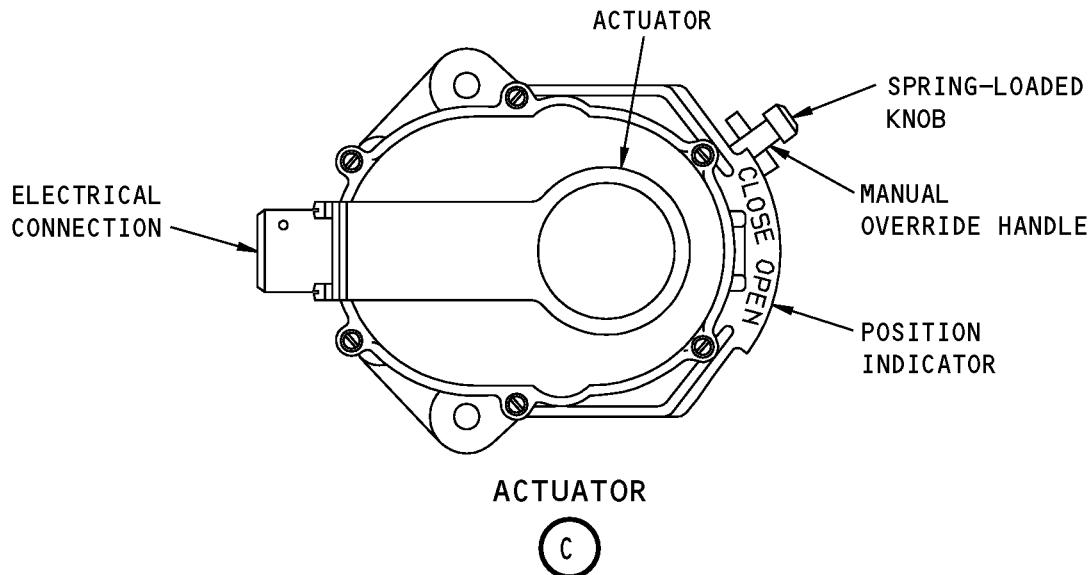
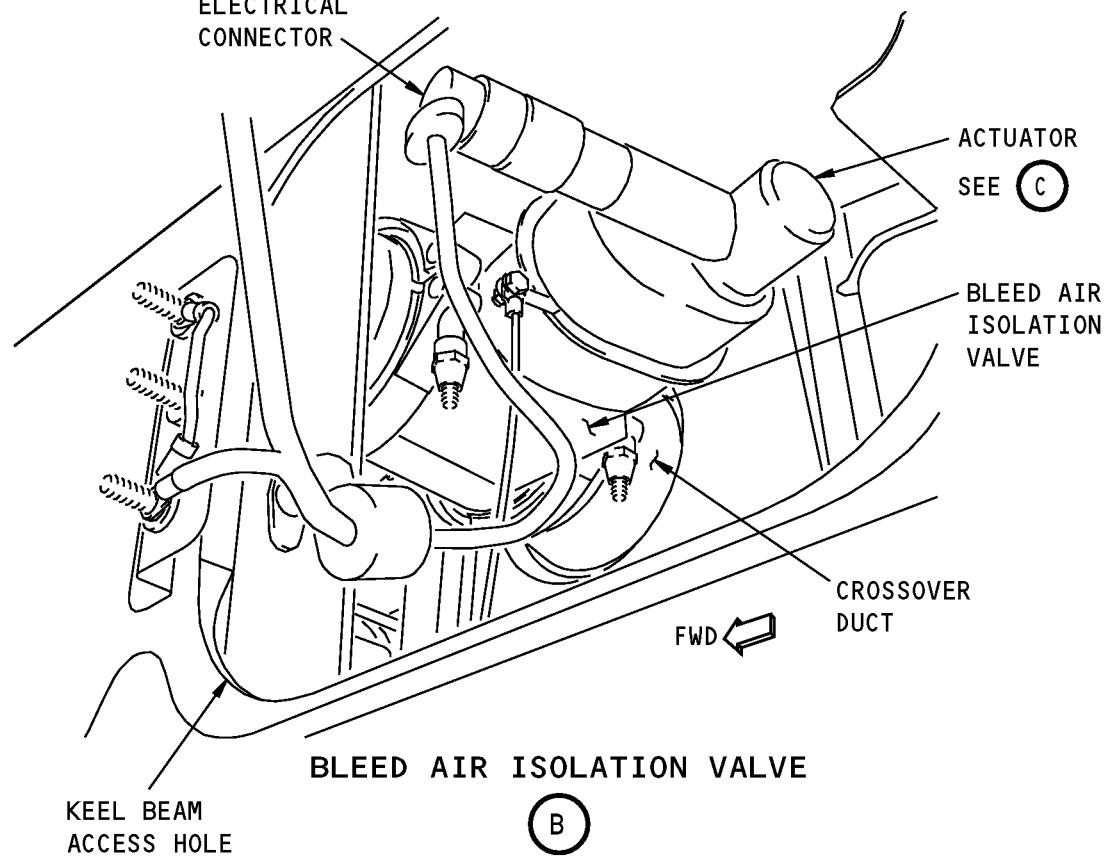
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Page 327  
Oct 10/2007

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**FAULT ISOLATION MANUAL**

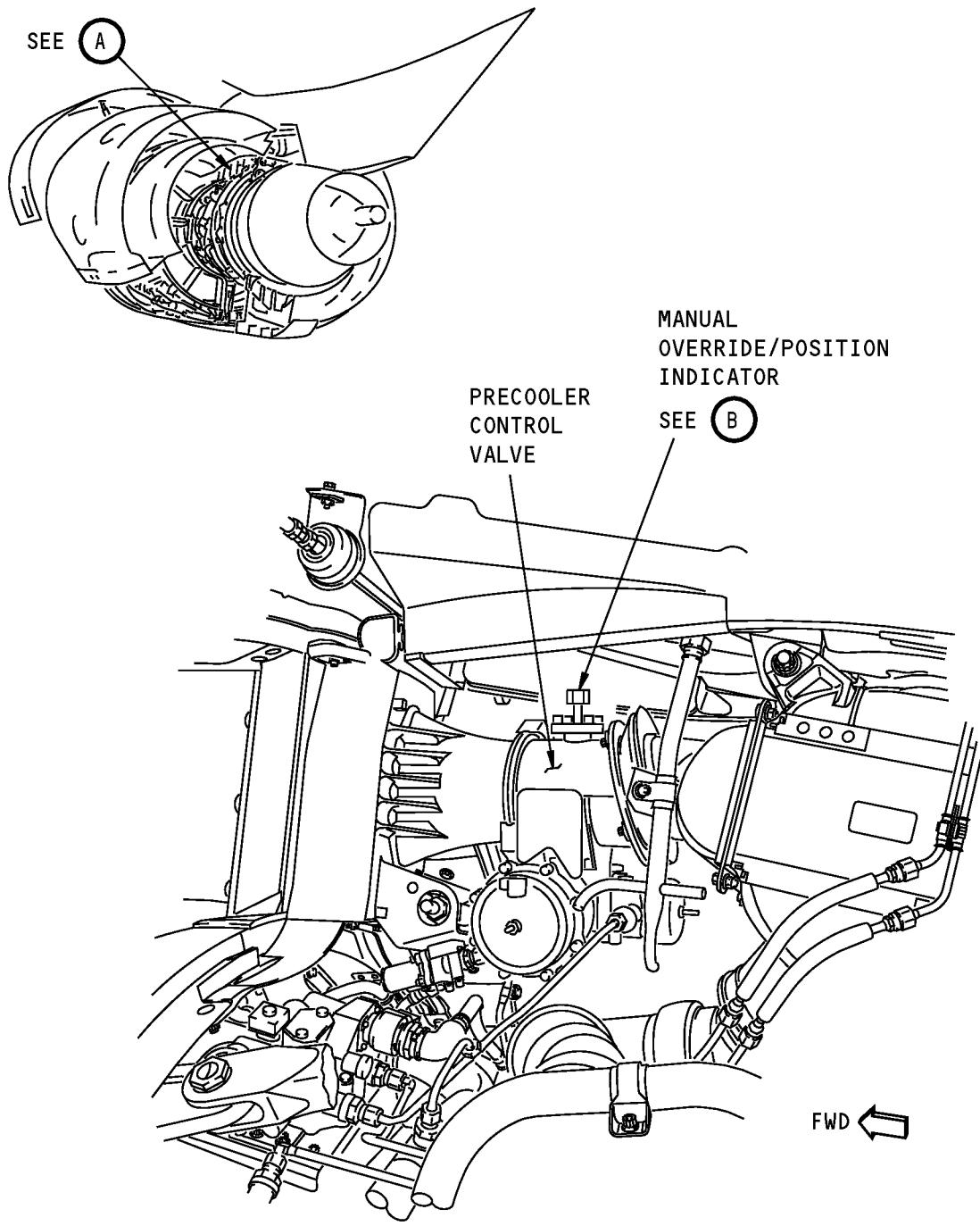


Isolation Valve Does Not Open or Close Properly.  
 Figure 311 (Sheet 2 of 2)/ 36-10-00-990-810

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

**BOEING®**  
737-600/700/800/900  
**FAULT ISOLATION MANUAL**



A

Pneumatic System Control Valve Position Indicators  
Figure 312 (Sheet 1 of 6)/ 36-10-00-990-811

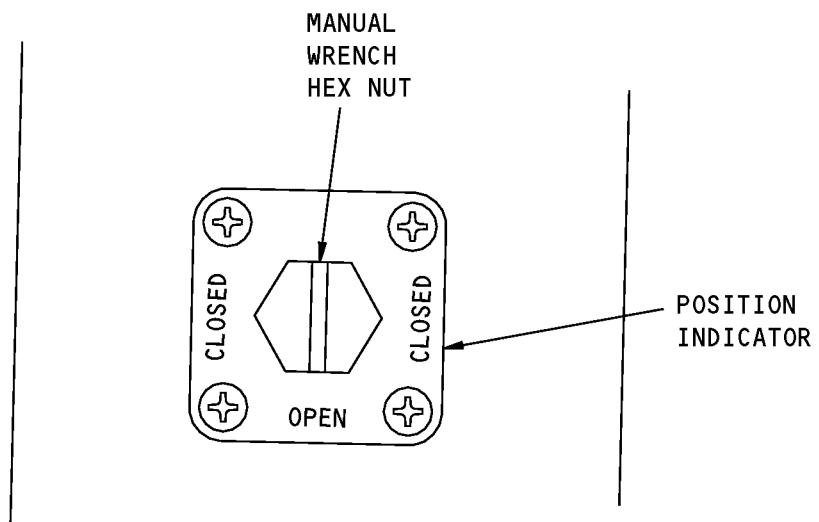
EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

Page 329  
Oct 10/2007

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737-600/700/800/900  
**FAULT ISOLATION MANUAL**



**MANUAL OVERRIDE/POSITION INDICATOR**

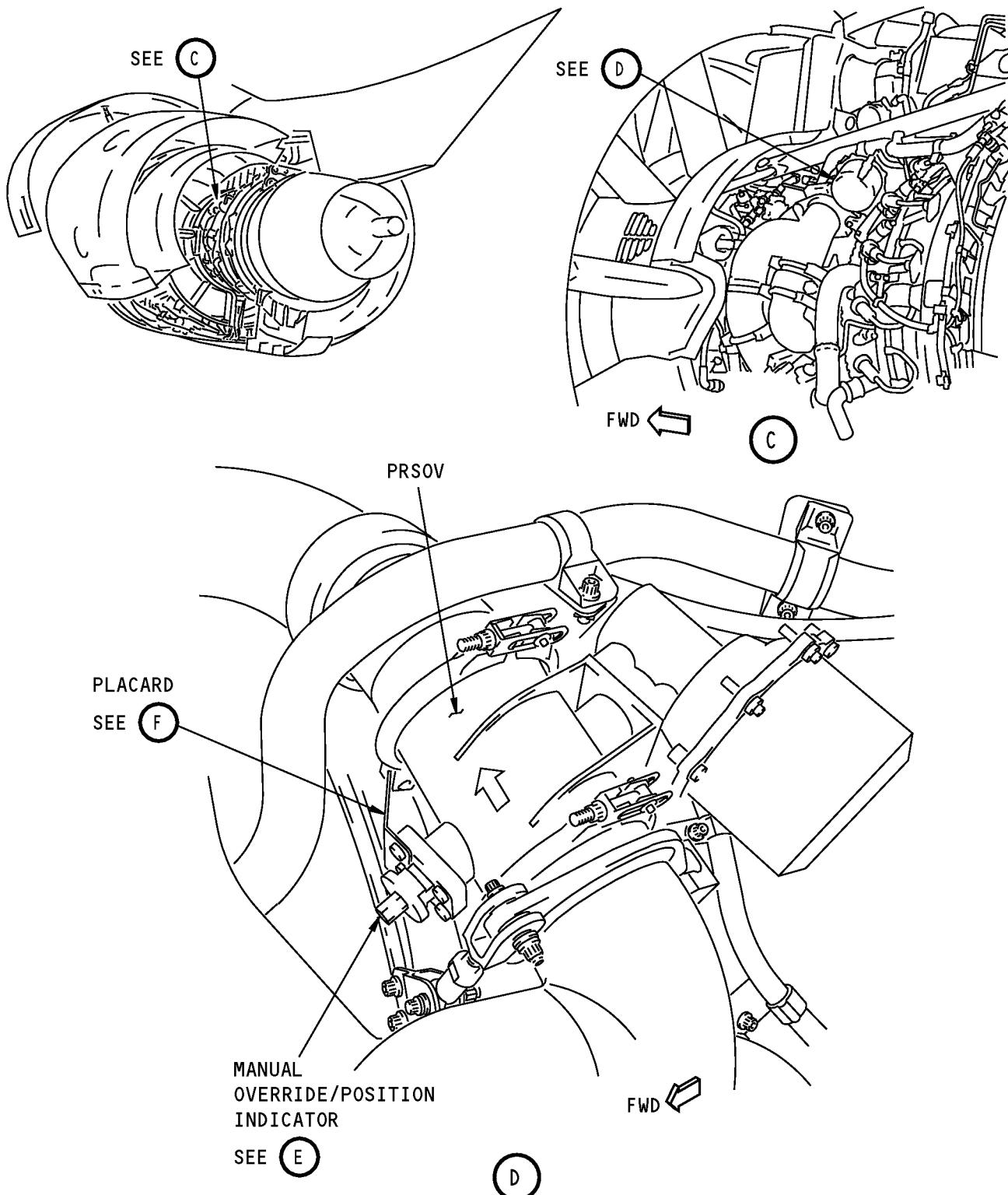
(B)

Pneumatic System Control Valve Position Indicators  
Figure 312 (Sheet 2 of 6) / 36-10-00-990-811

EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**


**BOEING®**  
**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



Pneumatic System Control Valve Position Indicators  
 Figure 312 (Sheet 3 of 6) / 36-10-00-990-811

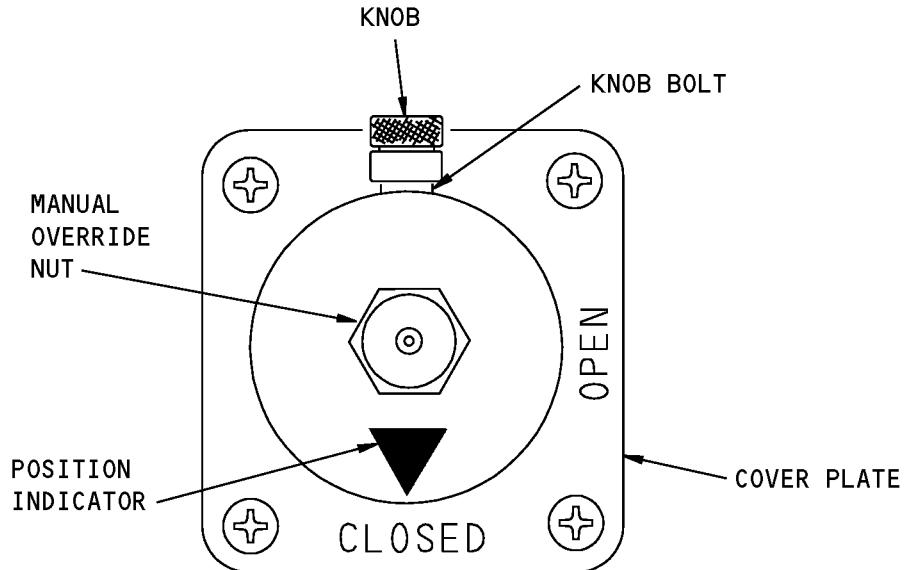
EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

Page 331  
 Oct 10/2007

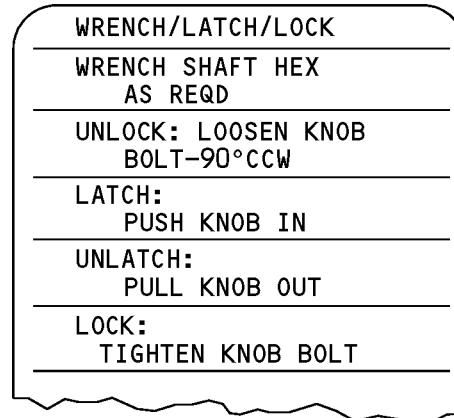
D633A103-HAP

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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



**MANUAL OVERRIDE/POSITION INDICATOR**

(E)



**PLACARD**

(F)

Pneumatic System Control Valve Position Indicators  
 Figure 312 (Sheet 4 of 6) / 36-10-00-990-811

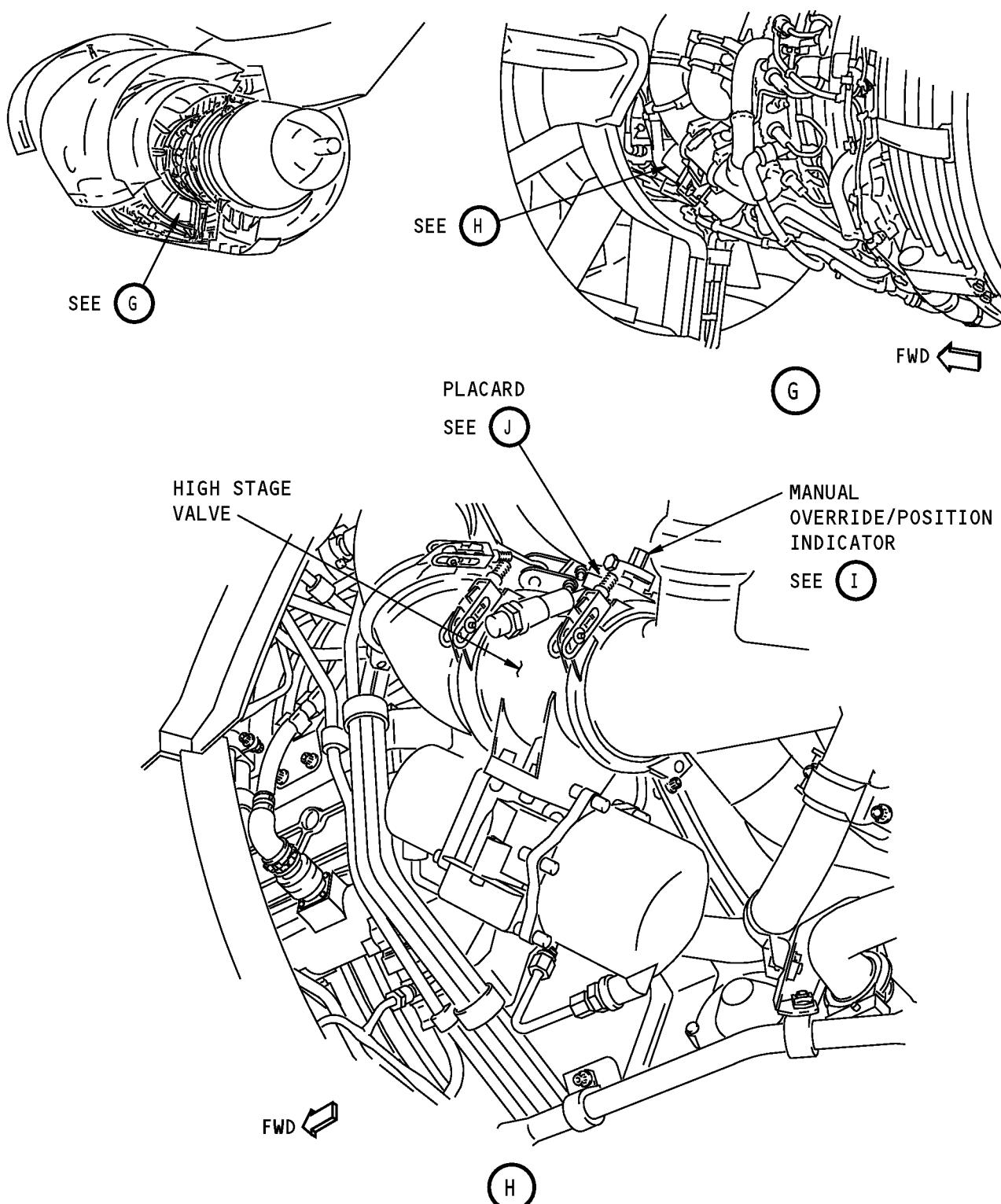
EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**

BOEING®

737-600/700/800/900

**FAULT ISOLATION MANUAL**



Pneumatic System Control Valve Position Indicators  
Figure 312 (Sheet 5 of 6) / 36-10-00-990-811

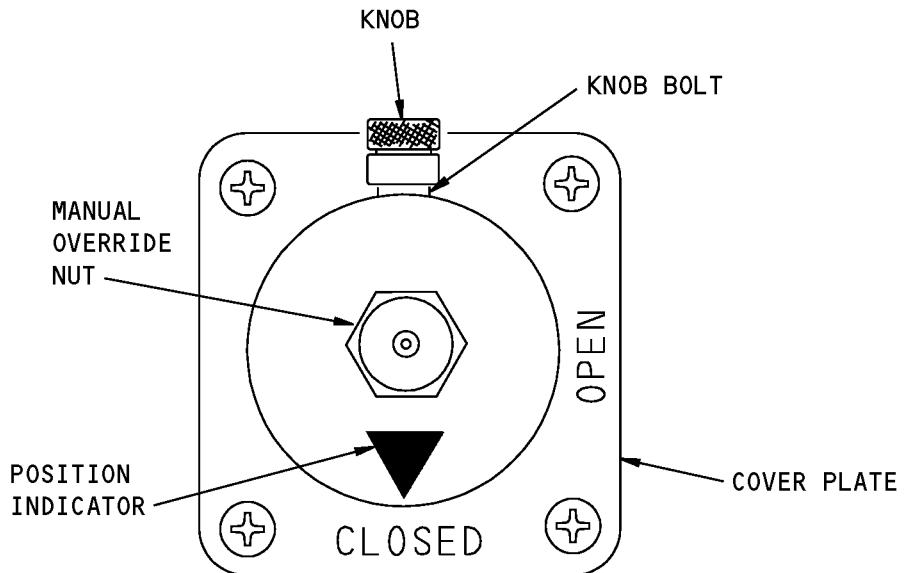
EFFECTIVITY  
HAP ALL

**36-10 TASK SUPPORT**

Page 333  
Oct 10/2007

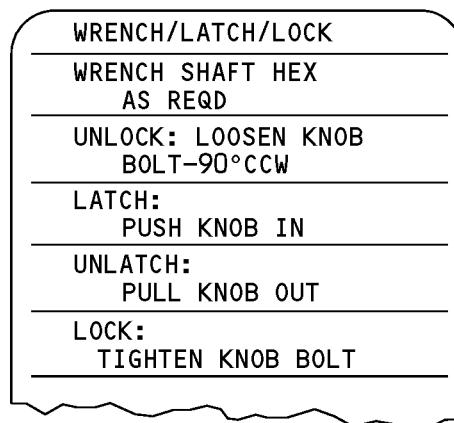
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**737-600/700/800/900**  
**FAULT ISOLATION MANUAL**



**MANUAL OVERRIDE/POSITION INDICATOR**

(I)



**PLACARD**

(J)

Pneumatic System Control Valve Position Indicators  
 Figure 312 (Sheet 6 of 6)/ 36-10-00-990-811

EFFECTIVITY  
 HAP ALL

**36-10 TASK SUPPORT**