

**CHAPTER**

**80**

**STARTING**

**(CFM56 ENGINES (CFM56-7))**

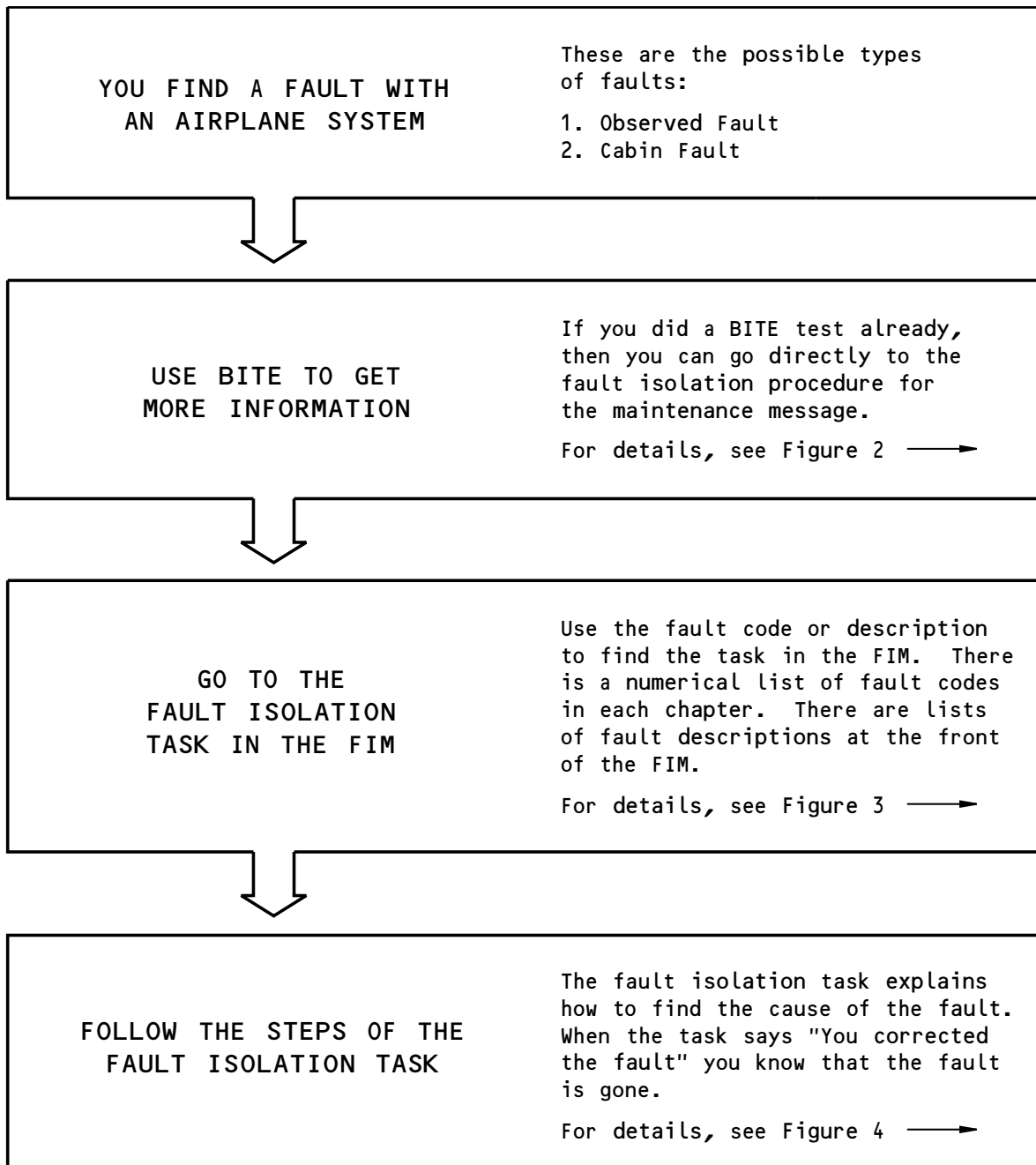
## 737-600/700/800/900 FAULT ISOLATION MANUAL

### CHAPTER 80 STARTING

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

## 80-EFFECTIVE PAGES

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G04902 S0000148576\_V1

**Basic Fault Isolation Process  
Figure 1**

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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).

G04950 S0000148578\_V1

**Getting Fault Information from BITE**  
**Figure 2**

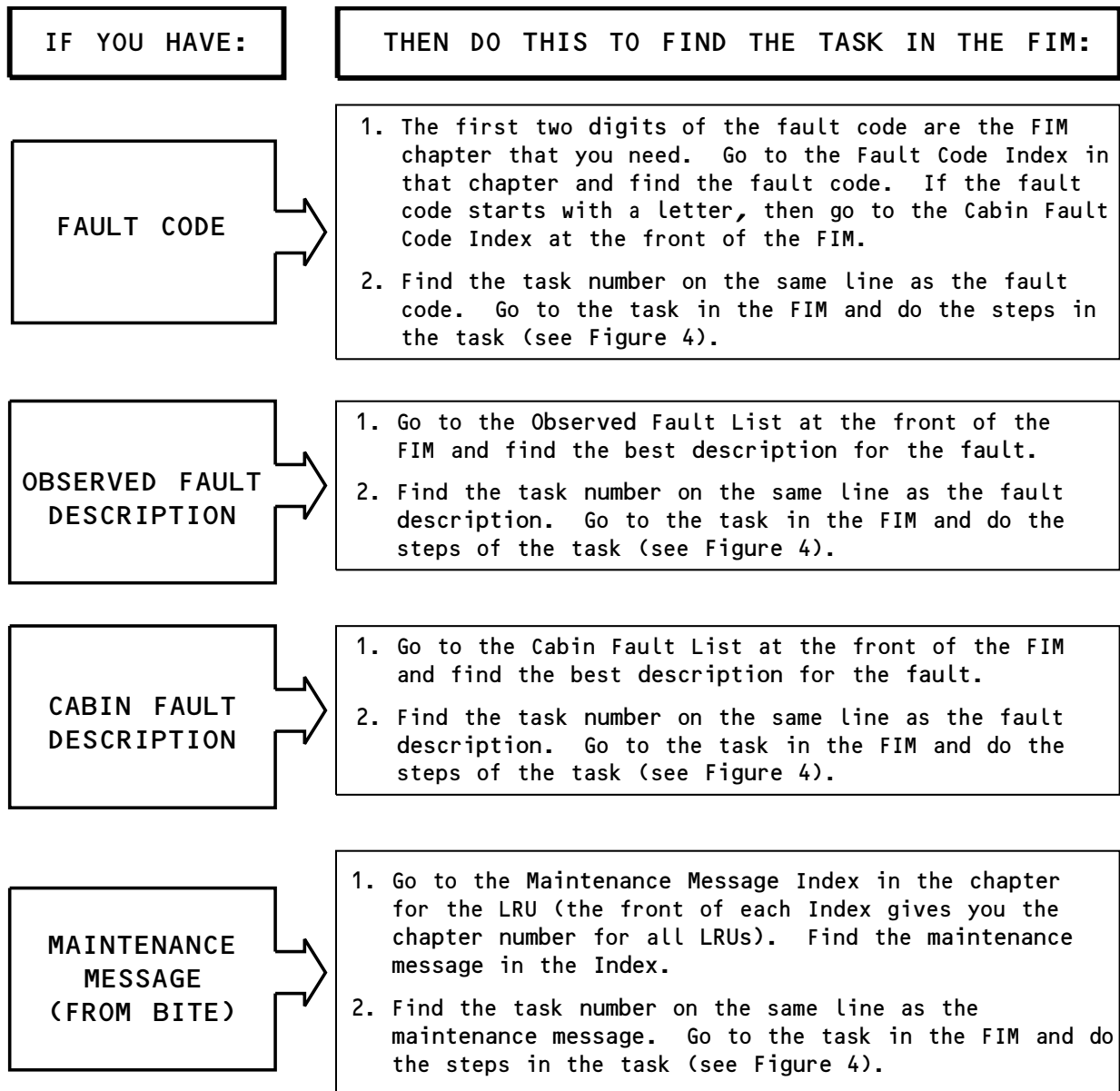
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G04979 S0000148579\_V2

Finding the Fault Isolation Task in the FIM  
Figure 3

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### ASSUMED CONDITIONS AT START OF TASK

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

### POSSIBLE CAUSES

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

### INITIAL EVALUATION PARAGRAPH

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

### FAULT ISOLATION STEPS

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

G05009 S0000148580\_V3

### Doing the Fault Isolation Task Figure 4

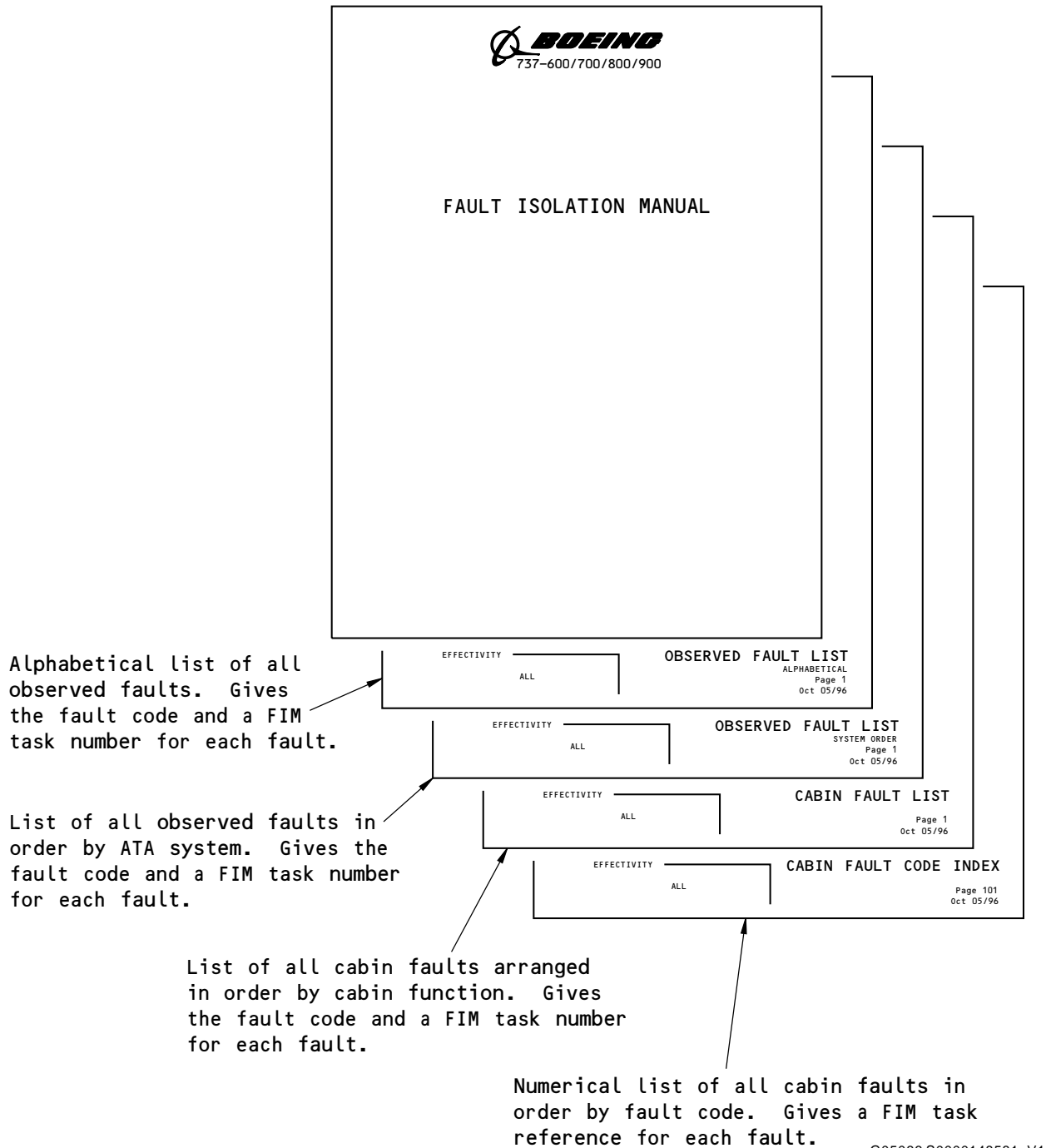
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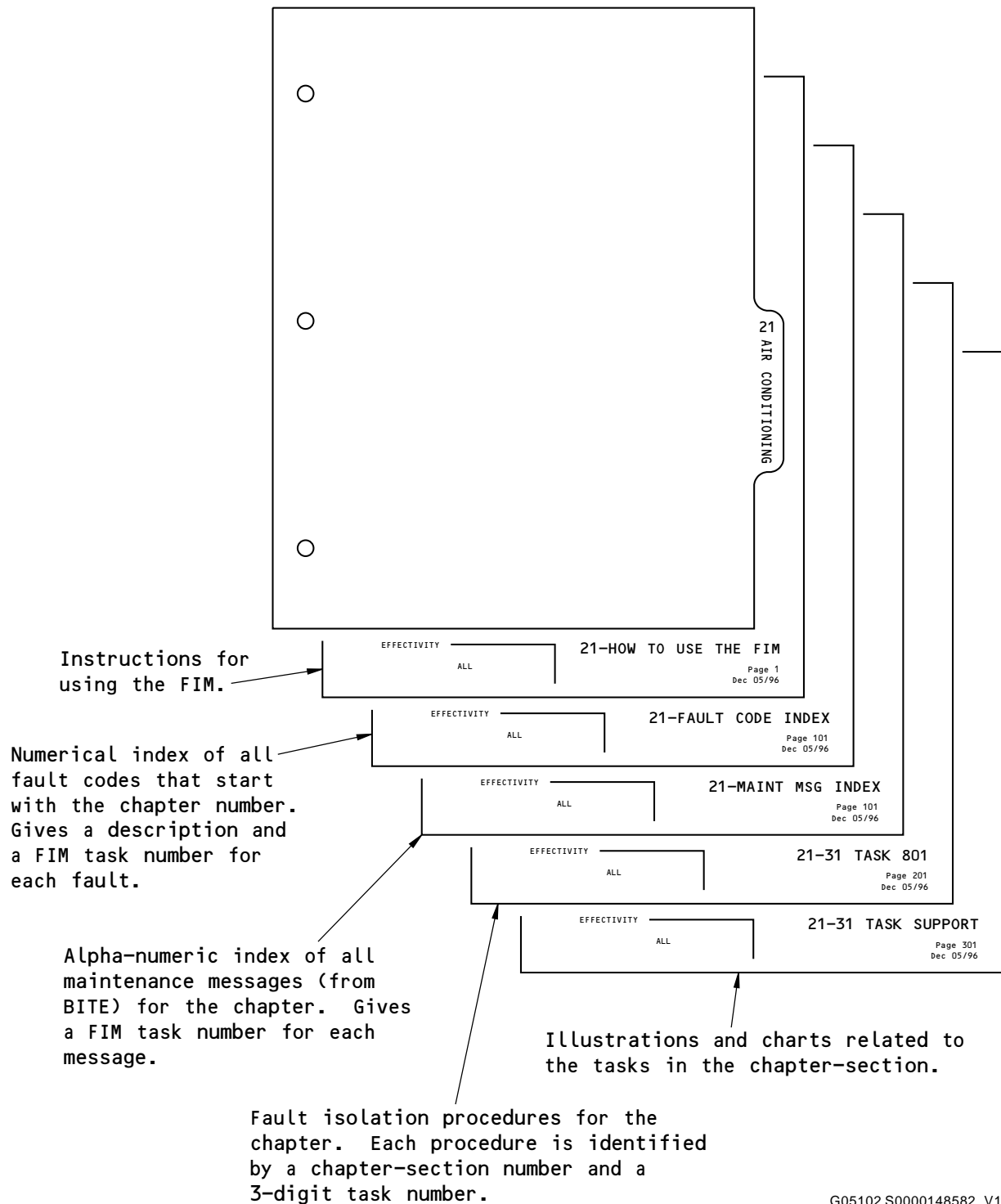
**Subjects at Front of FIM  
Figure 5**

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G05102 S0000148582\_V1

**Subjects in Each FIM Chapter  
Figure 6**

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FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
800 010 51	Engine motoring: no or low maximum dry motor speed (N2 low), duct pressure low (less than 30 psi), START VLV OPEN message shows on the engine display - engine 1.	80-07 TASK 801
800 010 52	Engine motoring: no or low maximum dry motor speed (N2 low), duct pressure low (less than 30 psi), START VLV OPEN message shows on the engine display - engine 2.	80-07 TASK 801
800 020 51	Engine motoring: no or low maximum dry motor speed (N2 low), duct pressure normal, START VLV OPEN message shows on the engine display - engine 1.	80-07 TASK 802
800 020 52	Engine motoring: no or low maximum dry motor speed (N2 low), duct pressure normal, START VLV OPEN message shows on the engine display - engine 2.	80-07 TASK 802
800 030 51	Engine start: EGT increase and lightoff not normal (impending hot start), fuel flow and duct pressure normal, engine started - engine 1.	80-05 TASK 801
800 030 52	Engine start: EGT increase and lightoff not normal (impending hot start), fuel flow and duct pressure normal, engine started - engine 2.	80-05 TASK 801
800 050 51	Engine start: START VLV OPEN message does not show on the engine display, N2 rotation normal - engine 1.	80-07 TASK 803
800 050 52	Engine start: START VLV OPEN message does not show on the engine display, N2 rotation normal - engine 2.	80-07 TASK 803
800 060 51	Engine start: START VLV OPEN message does not show on the engine display, no N2 rotation - engine 1.	80-07 TASK 804
800 060 52	Engine start: START VLV OPEN message does not show on the engine display, no N2 rotation - engine 2.	80-07 TASK 804
800 062 51	Engine start: START VLV OPEN message flashes (for up to 10 seconds) and then stays on during engine engine operation - engine 1.	80-07 TASK 809
800 062 52	Engine start: START VLV OPEN message flashes (for up to 10 seconds) and then stays on during engine engine operation - engine 2.	80-07 TASK 809
800 070 51	Engine start: engine overtemperature, EGT red, engine had an automatic shutdown - engine 1.	80-05 TASK 802
800 070 52	Engine start: engine overtemperature, EGT red, engine had an automatic shutdown - engine 2.	80-05 TASK 802
800 080 51	Engine start: fuel flow high, EGT high, engine started - engine 1.	80-05 TASK 803
800 080 52	Engine start: fuel flow high, EGT high, engine started - engine 2.	80-05 TASK 803
800 090 51	Engine start: fuel flow low, high, or zero, EGT and N2 increase normal, engine started - engine 1.	80-05 TASK 804
800 090 52	Engine start: fuel flow low, high, or zero, EGT and N2 increase normal, engine started - engine 2.	80-05 TASK 804

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FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
800 110 51	Engine start: no N1 rotation, EGT and N2 increase normal, engine started - engine 1.	80-05 TASK 805
800 110 52	Engine start: no N1 rotation, EGT and N2 increase normal, engine started - engine 2.	80-05 TASK 805
800 140 51	Engine start: no lightoff, duct pressure and N2 normal, ENG VALVE CLOSED light on - engine 1.	80-06 TASK 801
800 140 52	Engine start: no lightoff, duct pressure and N2 normal, ENG VALVE CLOSED light on - engine 2.	80-06 TASK 801
800 150 51	Engine start: no lightoff, duct pressure and N2 normal, SPAR VALVE CLOSED light on - engine 1.	80-06 TASK 802
800 150 52	Engine start: no lightoff, duct pressure and N2 normal, SPAR VALVE CLOSED light on - engine 2.	80-06 TASK 802
800 180 51	Engine start: no lightoff, fuel flow normal, ignition switch at IGN L, engine start normal with ignition switch at IGN R or BOTH - engine 1.	80-06 TASK 803
800 180 52	Engine start: no lightoff, fuel flow normal, ignition switch at IGN L, engine start normal with ignition switch at IGN R or BOTH - engine 2.	80-06 TASK 803
800 190 51	Engine start: no lightoff, fuel flow normal, ignition switch at IGN R, engine start normal with ignition switch at IGN L or BOTH - engine 1.	80-06 TASK 804
800 190 52	Engine start: no lightoff, fuel flow normal, ignition switch at IGN R, engine start normal with ignition switch at IGN L or BOTH - engine 2.	80-06 TASK 804
800 200 51	Engine start: no lightoff, fuel flow zero, ENG VALVE CLOSED and SPAR VALVE CLOSED lights are off - engine 1.	80-06 TASK 805
800 200 52	Engine start: no lightoff, fuel flow zero, ENG VALVE CLOSED and SPAR VALVE CLOSED lights are off - engine 2.	80-06 TASK 805
800 220 51	Engine start: slow N2 acceleration to idle or hung start - engine 1.	80-05 TASK 806
800 220 52	Engine start: slow N2 acceleration to idle or hung start - engine 2.	80-05 TASK 806
800 230 51	Engine start switch: switch does not hold in GRD position, switch manually held in GRD position, N2 rotation normal - engine 1.	80-07 TASK 805
800 230 52	Engine start switch: switch does not hold in GRD position, switch manually held in GRD position, N2 rotation normal - engine 2.	80-07 TASK 805
800 240 51	Engine start switch: switch does not hold in GRD position, switch manually held in GRD position, no N2 rotation - engine 1.	80-07 TASK 806
800 240 52	Engine start switch: switch does not hold in GRD position, switch manually held in GRD position, no N2 rotation - engine 2.	80-07 TASK 806

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<b>FAULT CODE</b>	<b>FAULT DESCRIPTION</b>	<b>GO TO FIM TASK</b>
800 250 51	Engine start switch: Switch moves from GRD to OFF before N2 is at 55%, engine started - engine 1.	80-07 TASK 807
800 250 52	Engine start switch: Switch moves from GRD to OFF before N2 is at 55%, engine started - engine 2.	80-07 TASK 807
800 260 51	Engine start switch: Switch stays at GRD after N2 is more than 55%, engine started - engine 1.	80-07 TASK 808
800 260 52	Engine start switch: Switch stays at GRD after N2 is more than 55%, engine started - engine 2.	80-07 TASK 808
800 270 51	Engine start: engine overtemperature, EGT red, engine did not have an automatic shutdown - engine 1.	80-05 TASK 807
800 270 52	Engine start: engine overtemperature, EGT red, engine did not have an automatic shutdown - engine 2.	80-05 TASK 807

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**801. Engine Start - EGT Indication Flashing, Engine Started or Engine Had An Automatic Shutdown - Fault Isolation**

**A. Description**

- (1) During an engine start, the white box around the digital indication for EGT flashes with these conditions:
  - (a) The fuel flow and the duct pressure were correct and
  - (b) The engine started or
  - (c) The engine had an automatic shutdown.
- (2) EEC SOFTWARE 7.B.Q AND SUBSEQUENT VERSIONS (ENGINES POST-CFMI-SB 73-0115);  
 Either an impending hot start or a start stall will cause the white box around the EGT indication to flash and the engine to be automatically shutdown.
  - (a) To identify the software part number, do the software part of the IDENT/CONFIG test, AMM TASK 73-21-00-700-808-F00, then refer to the applicable CFM Service Bulletin.

**B. Possible Causes**

- (1) Compressor thermal stability
- (2) Internal engine damage
- (3) HMU, M1823
- (4) EEC, M1818.
- (5) Bleed air check valve (Stage 5)

**C. Circuit Breakers**

- (1) Not Applicable

**D. Related Data**

- (1) Component Location (Figure 301)

**E. Fault Isolation Procedure**

- (1) Do these steps to find out if there was an EGT HOT START exceedance:
  - (a) Get the EXCEEDANCES data on the FMCS CDU. To get it, do this task: Engine Exceedance Page Check, AMM TASK 71-00-00-740-801-F00.
    - 1) Look for the applicable exceedance.
    - 2) Make sure that you record the exceedance.
    - 3) If there is an applicable exceedance, reset the exceedance.
  - (b) If an EGT HOT START exceedance does show, do this task: Inspection After Engine Operations Above the Limits and High Engine Stress, AMM TASK 71-00-00-800-804-F00.
    - 1) If the engine is not serviceable, then do the applicable corrective action.
    - 2) If the engine is serviceable, then continue.
  - (c) If an EGT HOT START exceedance does not show, then continue.
- (2) Do these steps to make sure that the engine is serviceable.
  - (a) Do a visual check of the turbine exhaust area for signs of engine failure.  
NOTE: These signs can include metal splatter, missing or broken blades and loose pieces in the exhaust area.
    - 1) If there are signs of engine failure, then replace the engine.

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These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

- (3) Do this task: EEC BITE Procedure, 73-00 TASK 801.
  - (a) Look for maintenance messages on these components:
    - 1) Internal EEC
    - 2) HMU
  - (b) Go to the fault isolation tasks for the maintenance messages that you find first.
    - 1) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
    - (c) If you do not find the maintenance messages, then continue.
- (4) Do this task: Bleed Air Check Valve Removal, AMM TASK 36-11-02-000-801.
  - (a) Visually examine the bleed air check valve as follows:
    - 1) Make sure that the valve is not damaged and is complete.
    - 2) Make sure that the valve components move freely and smoothly.
  - (b) If the visual inspection is not satisfactory, install a new bleed air check valve.  
This is the task:  
Bleed Air Check Valve Installation, AMM TASK 36-11-02-400-801
    - 1) Do the repair confirmation at the end of the task.
  - (c) If the visual inspection is satisfactory, install the bleed air check valve that you removed and continue.  
This is the task:  
Bleed Air Check Valve Installation, AMM TASK 36-11-02-400-801
- (5) Do the applicable task to borescope the Stage 1 LPT blades:
  - (a) Do this task: Stage 1-3 LPT Blades Borescope Inspection, AMM TASK 72-00-00-200-808-F00.  
NOTE: If you find that the N1 rotor stopped during the hot start, a maximum service extension of one start is permitted. If that start is satisfactory, one cycle is permitted before you must find and correct the problem.
  - (b) If the engine is not serviceable, then do the applicable corrective action.
  - (c) If the engine is serviceable, then do the Repair Confirmation at the end of this task.
- (6) If the fuel flow was high during the start, replace the HMU. These are the tasks:
  - (a) HMU Removal AMM TASK 73-21-10-000-801-F00.
  - (b) HMU Installation AMM TASK 73-21-10-400-801-F00.
    - 1) Do the repair confirmation at the end of this task.

### F. Repair Confirmation

- (1) Do one of these two optional procedures:
  - (a) Option 1,  
Record the steps that you completed to find and repair this fault.
    - 1) Monitor the airplane on the subsequent flights.

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- (b) Option 2;

Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.

- 1) If the engine start is correct, then you corrected the fault.

————— **END OF TASK** —————

**802. Engine Start - Engine Overtemperature, EGT Red, Engine Had An Automatic Shutdown - Fault Isolation**

**A. Description**

- (1) For engine start, there was an EGT red overtemperature and there was an automatic engine shutdown.

**B. Possible Causes**

- (1) HMU, M1823
- (2) EEC, M1808
- (3) Bleed air check valve
- (4) VSV system
- (5) PS3 line
- (6) TBV.

**C. Circuit Breakers**

- (1) Not Applicable

**D. Related Data**

- (1) Component Location (Figure 301)

**E. Fault Isolation Procedure**

- (1) Get the EGT HOT START exceedance data and make sure that the engine is still serviceable:  
NOTE: Before you try to find the cause of the EGT exceedance, it is necessary to see if the engine is serviceable.
  - (a) Get the EXCEEDANCES data on the FMCS CDU. To get it, do this task: Engine Exceedance Page Check, AMM TASK 71-00-00-740-801-F00.
    - 1) Look for the applicable exceedance.
    - 2) Make sure that you record the exceedance.
    - 3) If there is an applicable exceedance, reset the exceedance.
  - (b) If an EGT HOT START exceedance does show, do this task: Inspection After Engine Operations Above the Limits and High Engine Stress, AMM TASK 71-00-00-800-804-F00.
    - 1) If the engine is not serviceable, then do the applicable corrective action.
    - 2) If the engine is serviceable, then continue.
  - (c) If an EGT HOT START exceedance does not show, then continue.
- (2) Do a visual check of the turbine exhaust area for signs of engine failure.  
NOTE: These signs can include metal splatter, missing or broken blades and loose pieces in the exhaust area.
  - (a) If there are signs of engine failure, then replace the engine.

These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

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## 80-05 TASKS 801-802

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Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

- (3) Do this task: EEC BITE Procedure, 73-00 TASK 801.
  - (a) Look for maintenance messages on these components:
    - 1) Internal EEC
    - 2) HMU
    - 3) VSV system
    - 4) TBV
  - (b) Go to the fault isolation tasks for the maintenance messages that you find first.
    - 1) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
    - (c) If you do not find the maintenance messages, then continue.
- (4) Do this check of the bleed air check valve:
  - (a) Remove the bleed air check valve. To remove it, do this task: Bleed Air Check Valve Removal, AMM TASK 36-11-02-000-801.
  - (b) Make sure that there are no signs of damage.
  - (c) If the inspection is not satisfactory, then do these steps:
    - 1) Install a new check valve. To install it, do this task: Bleed Air Check Valve Installation, AMM TASK 36-11-02-400-801.
    - 2) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
    - (d) If the inspection is satisfactory, then continue.
  - (5) Do these steps to examine the VSV system:
    - (a) Do this task: Test 12 - Actuators Test, AMM TASK 71-00-00-700-807-F00.
      - 1) Visually examine the VSV system hardware during the test and make sure they move freely.
    - (b) If you find a problem with the VSV components, repair or replace the component as it is necessary.
      - 1) Do the Repair Confirmation at the end of this task.
    - (c) If you do not find a problem with the VSV components, and the Actuators Test is not satisfactory, do the corrective action for the maintenance messages that show.
      - 1) Do the Repair Confirmation at the end of this task.
    - (d) If you do not find a problem with the VSV components, and the Actuators Test is satisfactory, then continue.
  - (6) Examine the PS3 tube for signs of a blockage, obvious damage, and loose connection at the EEC.
    - (a) If you find a problem, then repair or replace the tube or hose.
      - 1) Do the Repair Confirmation at the end of this task.
      - 2) If the Repair Confirmation is not satisfactory, then continue.
    - (b) If you do not find a problem, then continue.
  - (7) Replace the HMU, M1823.

These are the tasks:

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HMU Removal, AMM TASK 73-21-10-000-801-F00,

HMU Installation, AMM TASK 73-21-10-400-801-F00.

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

1) If the Repair Confirmation is not satisfactory, then continue.

(8) Replace the EEC, M1808.

These are the tasks:

EEC Removal, AMM TASK 73-21-60-000-801-F00,

EEC Installation, AMM TASK 73-21-60-400-801-F00.

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

### F. Repair Confirmation

(1) Do one of these two optional procedures:

(a) Option 1;

Record the steps that you completed to find and repair this fault.

1) Monitor the airplane on the subsequent flights.

(b) Option 2;

Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.

(c) If the start procedure is correct, then you corrected the fault.

### — END OF TASK —

## 803. Engine Start - Fuel Flow High, EGT High, Engine Started - Fault Isolation

### A. Description

(1) For engine start, the fuel flow and EGT were high and the engine started.

### B. Possible Causes

(1) HMU, M1823

(2) EEC, M1818.

### C. Circuit Breakers

(1) Not Applicable

### D. Related Data

(1) Component Location (Figure 301)

### E. Fault Isolation Procedure

(1) Do these steps to find out if there was an EGT HOT START exceedance:

**NOTE:** If there is an impending hot start, the white box around the digital indication flashes for the applicable engine.

(a) Get the EXCEEDANCES data on the FMCS CDU. To get it, do this task: Engine Exceedance Page Check, AMM TASK 71-00-00-740-801-F00.

1) Look for the applicable exceedance.

2) Make sure that you record the exceedance.

3) If there is an applicable exceedance, reset the exceedance.

(b) If an EGT HOT START exceedance does show, do this task: Inspection After Engine Operations Above the Limits and High Engine Stress, AMM TASK 71-00-00-800-804-F00.

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## 80-05 TASKS 802-803

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- 1) If the engine is not serviceable, then do the applicable corrective action.
- 2) If the engine is serviceable, then continue.
- (c) If an EGT HOT START exceedance does not show, then continue.
- (2) Do these steps to make sure that the engine is serviceable:
  - (a) Do a visual check of the turbine exhaust area for signs of engine failure.  
NOTE: These signs can include metal splatter, missing or broken blades and loose pieces in the exhaust area.
    - 1) If there are signs of engine failure, then replace the engine.  
 These are the tasks:  
 Power Plant Removal, AMM TASK 71-00-02-000-801-F00,  
 Power Plant Installation, AMM TASK 71-00-02-400-801-F00.
- (3) Do this task: EEC BITE Procedure, 73-00 TASK 801.
  - (a) Look for maintenance messages on these components:
    - 1) Internal EEC
    - 2) HMU
  - (b) Go to the fault isolation tasks for the messages that you find first.
    - 1) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
  - (c) If you do not find the maintenance messages, then continue.
- (4) Replace the HMU (the most likely LRU in the Possible Causes list).  
 These are the tasks:  
 HMU Removal, AMM TASK 73-21-10-000-801-F00,  
 HMU Installation, AMM TASK 73-21-10-400-801-F00.
  - (a) Do the Repair Confirmation at the end of this task.

### F. Repair Confirmation

- (1) Do one of these two optional procedures:
  - (a) Option 1  
 Record the steps that you completed to find and repair this fault.
    - 1) Monitor the airplane on the subsequent flights.
  - (b) Option 2  
 Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
    - 1) If the engine start is correct, then you corrected the fault.

————— END OF TASK —————

## 804. Engine Start - Fuel Flow Low, High Or Zero, EGT and N2 Increase Normal, Engine Started - Fault Isolation

### A. Description

- (1) For engine start, the fuel flow was low, high or zero with these conditions:
  - (a) The EGT and N2 increases were normal.
  - (b) The engine started.

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### B. Possible Causes

- (1) Fuel flow transmitter, T435
- (2) EEC, M1818.

### C. Circuit Breakers

- (1) For Engine 1;
  - (a) These are the primary circuit breakers related to the fault:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

- (2) For Engine 2;
  - (a) These are the primary circuit breakers related to the fault:

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

### D. Related Data

- (1) Component Location (Figure 301)
- (2) (WDM 73-31-11)
- (3) (SSM 73-31-11)

### E. Fault Isolation Procedure

- (1) Go to the applicable fault isolation task for the applicable engine:
  - (a) If the fuel flow was low, high, or zero then, do this task: Engine Fuel, Fuel Flow Display is not Normal (High, Low, Intermittent, or Blank), Other Engine Parameters (N1, N2, and EGT) are Normal - Fault Isolation, 73-07 TASK 802.
  - (b) Do the Repair Confirmation at the end of this task.

### F. Repair Confirmation

- (1) Do one of these two optional procedures:
  - (a) Option 1;  
Record the steps that you completed to find and repair this fault.
    - 1) Monitor the airplane on the subsequent flights.
  - (b) Option 2;  
do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
    - 1) If the engine start is correct, then you corrected the fault.

————— **END OF TASK** —————

## 805. Engine Start - No N1 Rotation, EGT and N2 Increase Normal, Engine Started - Fault Isolation

### A. Description

- (1) For engine start, there was no N1 rotation with these conditions:
  - (a) The EGT and N2 increases were correct.

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(b) The engine started.

### B. Possible Causes

(1) Low pressure system

### C. Circuit Breakers

(1) Not Applicable

### D. Fault Isolation Procedure

(1) Do a visual check of the engine inlet and turbine exhaust area for signs of engine failure.

**NOTE:** These signs can include metal splatter, missing or broken blades and loose pieces in the exhaust area.

(a) If there are signs of engine failure, then replace the engine.

These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

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

(b) If no damage is found, then continue.

(2) Do a visual check that the fan blades can move freely and do not rub the abradable shroud.

**WARNING:** MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(a) If the fan blades can not move freely or rub the abradable shroud, then do these steps:

1) Use your hand to move the blade tip forward and circumferentially to free the fan blades.

2) Examine the fan blades. To examine the fan blades, do this task: Engine Inlet and Fan Blades Inspection (Detail), AMM TASK 72-21-00-220-801-F00.

a) If the inspection is not satisfactory, then replace the fan blade.

These are the tasks:

Fan Blade Removal (Complete Set), AMM TASK 72-21-02-000-801-F00,

Fan Blade Installation (Complete Set), AMM TASK 72-21-02-400-801-F00.

3) Make sure that the abradable shroud is serviceable. To examine the shroud, do this task: Abradable Shroud (Detail) Inspection, AMM TASK 72-24-02-200-801-F00.

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

(b) If the fan blades can move freely and do not rub the abradable shroud, then continue.

**WARNING:** MAKE SURE YOU WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES. IF YOU DO NOT WEAR GLOVES WHEN YOU HANDLE THE FAN BLADES, YOU CAN INJURE YOUR HANDS.

(3) Manually turn the N1 rotor and listen for unusual noises.

(a) If the N1 rotor does not turn correctly, then examine the chip detectors for the forward and aft sumps.

1) Do this task: Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00.

2) If signs of engine damage are found, then replace the engine.

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These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

- 3) If no signs of engine damage are found, then wait 30 minutes and try to turn the N1 rotor again.

- a) If the N1 rotor does not turn correctly, then replace the engine.

These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

- b) If the N1 rotor turns correctly, then do the Repair Confirmation at the end of this task.

- (b) If the N1 rotor turns correctly, then examine the chip detectors for the forward and aft sumps.

- 1) Do this task: Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00.

- 2) If signs of engine damage are found, then replace the engine.

These are the tasks:

Power Plant Removal, AMM TASK 71-00-02-000-801-F00,

Power Plant Installation, AMM TASK 71-00-02-400-801-F00.

- 3) If no signs of engine damage are found, then do the Repair Confirmation at the end of this task.

### E. Repair Confirmation

- (1) Do one of these two optional procedures:

- (a) Option 1

Record the steps that you completed to find and repair the fault.

- 1) Monitor the airplane on subsequent flights.

- (b) Option 2,

Do these steps:

- 1) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.

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

- 3) If the start procedure is correct, then you corrected the fault.

————— **END OF TASK** —————

### 806. Engine Start - Slow N2 Acceleration To Idle Or Hung Start - Fault Isolation

#### A. Description

- (1) For engine start, the N2 acceleration to idle was slow or there was a hung start.

#### B. Possible Causes

- (1) HMU, M1823
- (2) Engine fuel pump

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- (3) VSV system
- (4) PS3 line
- (5) Bleed air system
- (6) Engine Fuel Spar Valve.
- (7) Upper 11 Fuel Nozzles if first start of the day or cold soaked engine.

### C. Circuit Breakers

- (1) Not Applicable

### D. Related Data

- (1) Component Location (Figure 301)

### E. Initial Evaluation

- (1) Do this step to make sure that the engine is serviceable:
  - (a) Do a visual check of the turbine exhaust area for signs of engine failure.  
**NOTE:** These signs can include metal splatter, missing or broken blades and loose pieces in the exhaust area.
    - 1) If there are signs of engine failure, replace the engine:
      - a) Do this task: Power Plant Removal, AMM TASK 71-00-02-000-801-F00
      - b) Do this task: Power Plant Installation, AMM TASK 71-00-02-400-801-F00.
    - 2) If no damage is found, then continue.
- (2) If the fault occurred because the start was initiated at an N2 speed of less than 20 percent, then no fault isolation is necessary.
- (3) If the fault occurred during a correct start procedure, then do the Fault Isolation Procedure below.

### F. Fault Isolation Procedure

- (1) Do this task: EEC BITE Procedure, 73-00 TASK 801.
  - (a) Look for one or more maintenance messages on the INTERNAL EEC, HMU, VSV, and PS3.
    - 1) Go to the fault isolation tasks for the maintenance messages that you find first.
    - 2) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
- (2) Do a check of the engine bleed air distribution system:
  - (a) Do this task: Test 1 - Pneumatic Leak Check, AMM TASK 71-00-00-700-809-F00. Also do a check upstream of the PRSOV.
    - 1) If you find a problem, then repair or replace components as it is necessary.
      - a) Do the Repair Confirmation at the end of this task.
      - b) If the Repair Confirmation is not satisfactory, then continue.
    - 2) If you do not find a problem, then continue.
- (3) Do these steps to examine the VSV system:
  - (a) Do this task: Test 12 - Actuators Test, AMM TASK 71-00-00-700-807-F00.
    - 1) Visually examine the VSV system hardware during the Actuators Test and make sure they move freely.

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- (b) If you find a problem with the VSV components, repair or replace the components as it is necessary.
  - 1) Do the Repair Confirmation at the end of this task.
- (c) If you do not find a problem with the VSV components, and the Actuators Test is not satisfactory, do the corrective action for the maintenance messages that show.
  - 1) Do the Repair Confirmation at the end of this task.
- (d) If you do not find a problem with the VSV components, and the Actuators Test is satisfactory, then continue.
- (4) Examine the PS3 tube for signs of a blockage, obvious damage, and loose connection at the EEC.
  - (a) If you find a problem, then repair or replace the tube or hose.
    - 1) Do the Repair Confirmation at the end of this task.
    - 2) If the Repair Confirmation is not satisfactory, then continue.
  - (b) If you do not find a problem, then continue.
- (5) Do these steps to examine the fuel pump:
  - (a) Do this task: The Visual Inspection of the Impeller Rotation, AMM TASK 73-11-01-200-801-F00.  
Do not operate the engine as directed in the Lubrication Flow Screen Installation Test.
    - 1) Make sure that the N2 rotor turns freely and smoothly when you do the fuel pump impeller inspection.
      - a) If the N2 rotor does not turn freely and smoothly, replace the engine:
        - <1> Do this task: Power Plant Removal, AMM TASK 71-00-02-000-801-F00
        - <2> Do this task: Power Plant Installation, AMM TASK 71-00-02-400-801-F00.
    - 2) If the fuel pump impeller inspection is not satisfactory, replace the fuel pump:
      - a) Do this task: Fuel Pump Package Removal, AMM TASK 73-11-01-000-801-F00
      - b) Do this task: Fuel Pump Package Installation, AMM TASK 73-11-01-400-801-F00.
      - c) Do the Repair Confirmation at the end of this task.
    - 3) If the fuel pump impeller inspection is satisfactory, then continue.
- (6) Do this task: Engine Fuel Spar Valve - Electrical Control and Indication Test, AMM TASK 28-22-00-710-801.
  - (a) If the test fails, then repair the problems that you find.
    - 1) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
  - (b) If the test passes, then continue.
- (7) Replace the HMU:
  - (a) Do this task: HMU Removal, AMM TASK 73-21-10-000-801-F00
  - (b) Do this task: HMU Installation, AMM TASK 73-21-10-400-801-F00.
  - (c) Do the Repair Confirmation at the end of this task.
    - 1) If the Repair Confirmation is not satisfactory, then continue.

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- (8) Do these borescope inspections for damage:
  - (a) Do this task: Stages 2-4 Booster Blades and Vanes Borescope Inspection, AMM TASK 72-00-00-200-803-F00.
  - (b) Do this task: HP Compressor Blades Borescope Inspection, AMM TASK 72-00-00-200-804-F00.
  - (c) Do the applicable task to borescope the combustion chamber:
    - 1) Do this task: Combustion Section Borescope Inspection, AMM TASK 72-00-00-200-805-F00.
  - (d) Do this task: HPT Blades Borescope Inspection, AMM TASK 72-00-00-200-807-F00.
  - (e) Do this task: Stage 1-3 LPT Blades Borescope Inspection, AMM TASK 72-00-00-200-808-F00.
    - 1) If you find damage more than the limits, then replace the engine.
    - 2) Do the Repair Confirmation at the end of this task.
- (9) Replace the upper 11 Fuel Nozzles:
  - (a) Do this task: Fuel Nozzle Removal, AMM TASK 73-11-04-000-805-F01 or Fuel Nozzle Removal, AMM TASK 73-11-04-000-804-F02
  - (b) Do this task: Fuel Nozzle Installation, AMM TASK 73-11-04-400-805-F01 or Fuel Nozzle Installation, AMM TASK 73-11-04-400-804-F02.

### G. Repair Confirmation

- (1) Do one of these two optional procedures:
  - (a) Option 1;  
Record the steps that you completed to find and repair the fault.
    - 1) Monitor the airplane on subsequent flights.
  - (b) Option 2;  
Do these steps:
    - 1) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
      - a) Let the engine become stable at idle.
    - 2) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
    - 3) If the start procedure is correct, then you corrected the fault.

————— END OF TASK —————

### 807. Engine Start - Engine Overtemperature, EGT Red, Engine Did Not Have An Automatic Shutdown - Fault Isolation

#### A. Description

- (1) For engine start, there was an EGT red overtemperature and there was no automatic engine shutdown.

#### B. Possible Causes (No automatic engine shutdown)

- (1) EEC Start Mode system wiring
- (2) EEC, M1818
- (3) Bleed air check valve (Stage 5)

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### C. Circuit Breakers

- (1) Not Applicable

### D. Related Data

- (1) Component Location (Figure 301)
- (2) (WDM 73-21-11)
- (3) (SSM 73-21-11)

### E. Fault Isolation Procedure

- (1) To make sure the engine is serviceable and to find the cause of the overtemperature, do this task: Engine Start - Engine Overtemperature, EGT Red, Engine Had An Automatic Shutdown - Fault Isolation, 80-05 TASK 802
  - (2) To examine the EEC Start Mode, do this task: IDENT/CONFIG, AMM TASK 73-21-00-700-808-F00.
    - (a) Make sure the Start Mode is Enhanced
    - (b) If the Start Mode is not Enhanced, do these steps to examine the Start Mode wiring at the EEC, M1818:
      - 1) Do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.
      - 2) Examine the electrical connector DP0404 at the EEC.
 

NOTE: The electrical connector DP0404 is on the MW0304 wire harness at the J4 receptacle.

        - a) Make sure the electrical connector DP0404 is correctly connected to the EEC.
        - b) Disconnect the electrical connector DP0404 from the EEC.
        - c) Visually examine the EEC J4 receptacle and wire harness connector, (AMM TASK 70-70-01-200-801-F00)
        - d) If the EEC J4 receptacle is damaged, replace the EEC, M1818.

These are the tasks:

EEC Removal, AMM TASK 73-21-60-000-801-F00,  
EEC Installation, AMM TASK 73-21-60-400-801-F00.

      - e) If the wire harness connector is damaged, replace the MW0304 wire harness.

These are the tasks:

Nacelle Wiring Harnesses Removal, AMM TASK 71-51-03-000-801-F00,  
Nacelle Wiring Harnesses Installation, AMM TASK 71-51-03-400-801-F00.

    - f) If the connector was not correctly connected and no other problem was found, re-connect the connector.
    - g) Do the Repair Confirmation at the end of this task.
    - h) If you did not find a problem, then continue.
  - 3) Do a continuity check from pin D to pin E on the electrical connector DP0404.
    - a) If there is continuity, examine the MW0304 wire harness and the applicable strut connector D30260 (D30460) and repair the problems that you find.
    - b) Do the Repair Confirmation at the end of this task..
    - c) If there is no continuity, re-connect the connector and continue.
- (c) If the Start Mode is Enhanced, then continue.



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- (3) Do this task: EEC BITE Procedure, 73-00 TASK 801.
  - (a) Look for one or more maintenance messages on the INTERNAL EEC, HMU, FMV, and Ignition.
    - 1) Go to the fault isolation tasks for the maintenance messages that you find first.
    - 2) Do the Repair Confirmation at the end of this task.
- (4) Examine the bleed air check valve as follows:
  - (a) Do this task: Bleed Air Check Valve Removal, AMM TASK 36-11-02-000-801.
  - (b) Visually examine the bleed air check valve.
    - 1) Make sure that the bleed air check valve is not damaged.
    - 2) Make sure that the valve components move freely and smoothly.
  - (c) If the visual inspection is not satisfactory, do these steps:
    - 1) Install a new bleed air check valve (AMM TASK 36-11-02-400-801)
    - 2) Do the repair confirmation in this task.
  - (d) If the visual inspection is satisfactory, do this step:
    - 1) Install the bleed air check valve (AMM TASK 36-11-02-400-801).

**F. Repair Confirmation**

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure the electrical connector DP0404 is correctly connected to the EEC.
  - (b) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (2) Do this task: IDENT/CONFIG, AMM TASK 73-21-00-700-808-F00.
  - (a) If the Start Mode is Enhanced, then you corrected the fault.
  - (b) Record the steps that you completed to find and repair this fault.
  - (c) Monitor the airplane on the subsequent starts.

———— **END OF TASK** ————

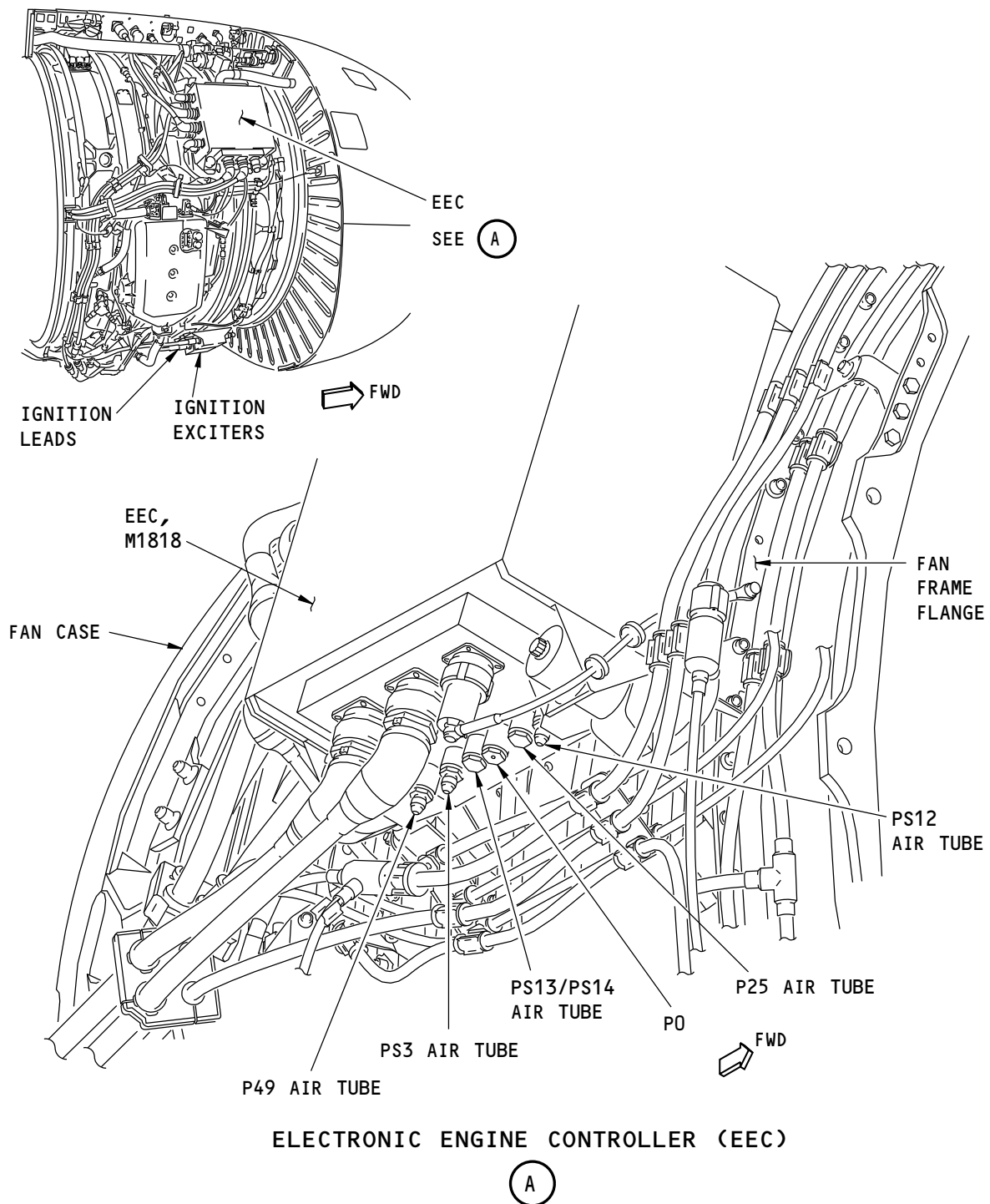
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H95456 S0006746604\_V1

**Starting System - Component Location**  
Figure 301/80-05-00-990-801-F00 (Sheet 1 of 4)

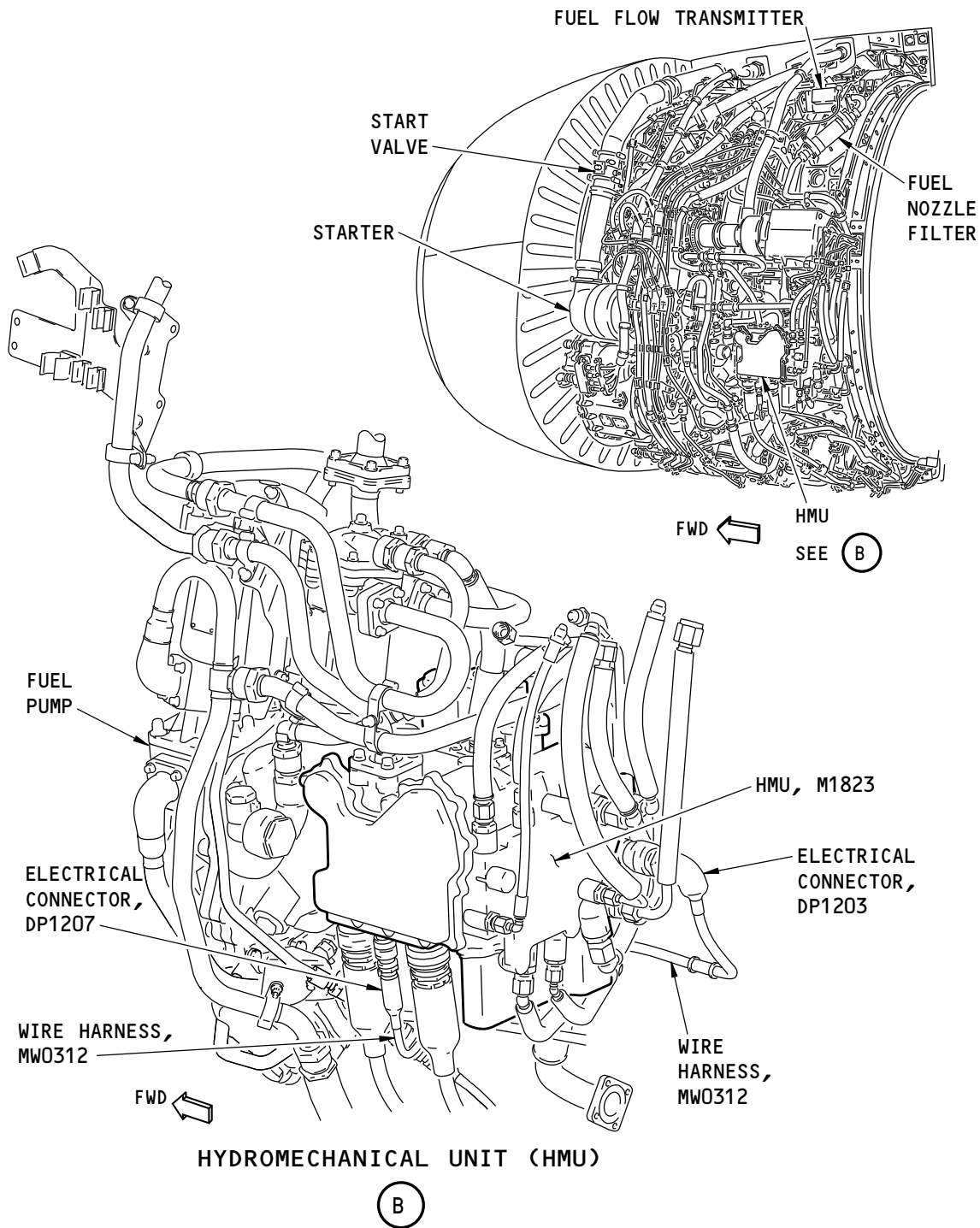
EFFECTIVITY  
AKS ALL

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H95485 S0006746605\_V1

**Starting System - Component Location**  
Figure 301/80-05-00-990-801-F00 (Sheet 2 of 4)

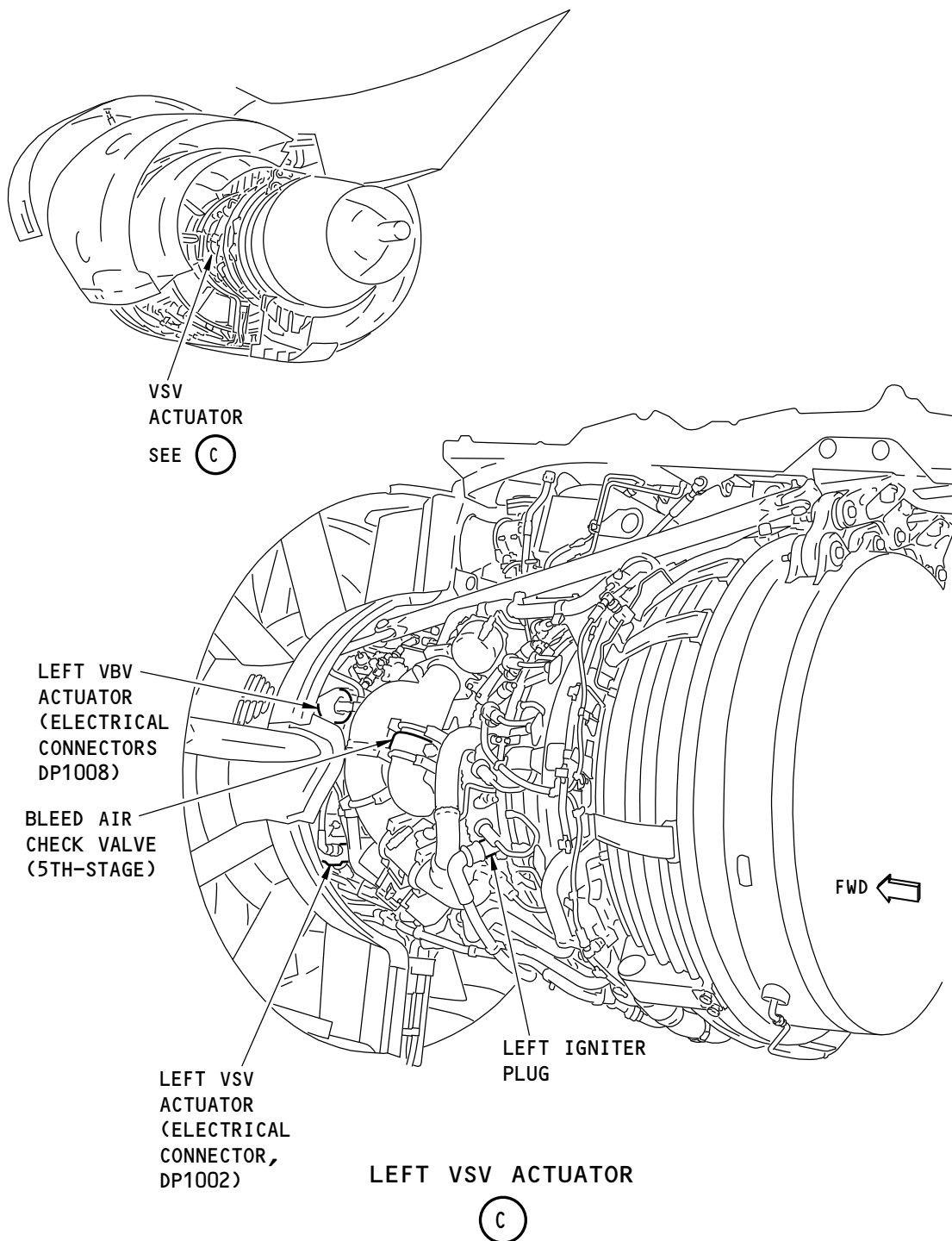
EFFECTIVITY  
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H95496 S0006746606\_V1

**Starting System - Component Location**  
Figure 301/80-05-00-990-801-F00 (Sheet 3 of 4)

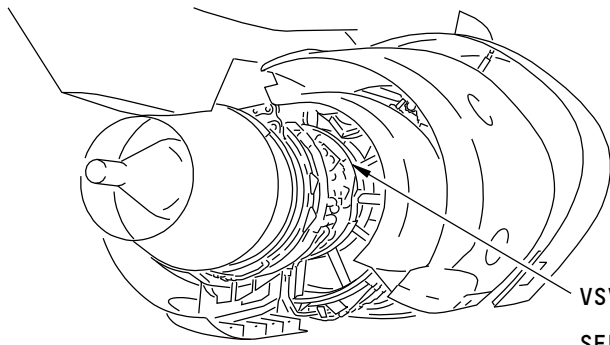
EFFECTIVITY  
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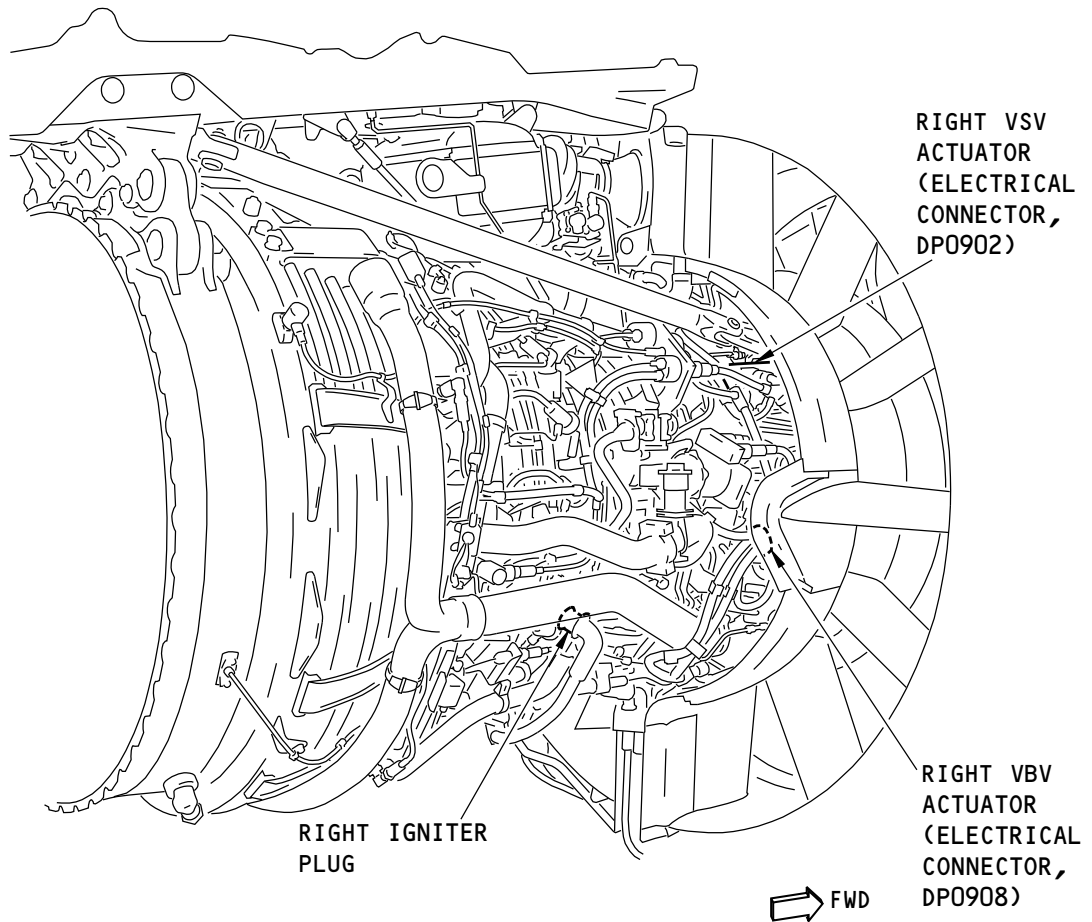
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VSV ACTUATOR

SEE (D)



RIGHT VSV  
ACTUATOR  
(ELECTRICAL  
CONNECTOR,  
DP0902)

RIGHT VBV  
ACTUATOR  
(ELECTRICAL  
CONNECTOR,  
DP0908)

RIGHT IGNITER  
PLUG

➡ FWD

RIGHT VSV ACTUATOR

(D)

H95511 S0006746607\_V1

**Starting System - Component Location**  
**Figure 301/80-05-00-990-801-F00 (Sheet 4 of 4)**

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### 801. Engine Start - No Lightoff, Duct Pressure and N2 Normal, ENG VALVE CLOSED Light On - Fault Isolation

#### A. Description

(1) For engine start, there was no lightoff with these conditions:

- (a) Duct pressure and N2 is correct.
- (b) ENG VALVE CLOSED light is on dim (closed) or bright (not in commanded position).

**NOTE:** Because of the failure modes for this fault, it is possible you will also not hear the igniters during the start. You can do the EEC Bite Igniters Test to make sure the ignition system is correct.

#### B. Possible Causes

- (1) HMU, M1823
- (2) Engine start brake assembly M1824 (Eng 1), M1825 (Eng 2)
- (3) System wire and connectors.

#### C. Circuit Breakers

(1) For Engine 1;

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

##### **CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	1	C01316	ENGINE 1 START LEVER CHAN A
B	2	C01317	ENGINE 1 START LEVER CHAN B

##### **F/O Electrical System Panel, P6-3**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
E	5	C01320	ENGINE FUEL ENGINE 1 HPSOV CONT
E	6	C01395	ENGINE FUEL ENGINE 1 HPSOV IND

(2) For Engine 2;

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

##### **F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	6	C01318	ENGINE 2 START LEVER CHAN A
B	7	C01319	ENGINE 2 START LEVER CHAN B

##### **F/O Electrical System Panel, P6-3**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
E	3	C01321	ENGINE FUEL ENGINE 2 HPSOV CONT
E	4	C01396	ENGINE FUEL ENGINE 2 HPSOV IND

#### D. Related Data

- (1) Component Location (Figure 301, Figure 302)
- (2) Simplified Schematic (Figure 303)
- (3) (SSM 76-21-11,21)
- (4) (WDM 76-21-11,21)



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### E. Fault Isolation Procedure

- (1) Do these steps to examine the start lever discrete on the input monitoring display on the FMCS Control Display Unit (CDU):

**NOTE:** Examine each channel of the applicable EEC.

- (a) Make sure the applicable start lever is in the CUTOFF position.
- (b) To set the active channel for the EEC to be CH A, open the applicable circuit breaker for the other channel on the applicable engine:

- 1) For CH A active;
- a) Open these circuit breakers:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

- (c) Get access to the input monitoring screen on the CDU:
- 1) Push the INIT REF key two times.  
**NOTE:** This causes the PERF INIT INDEX to show.
  - 2) Push the INDEX line select key (LSK).
  - 3) Push the MAINT LSK.
  - 4) Push the ENGINE LSK.
  - 5) Push the line select key for the applicable engine (ENGINE 1 or ENGINE 2).  
**NOTE:** This causes the ENGINE X BITE TEST MAIN MENU to show.
  - 6) Push the INPUT MONITORING LSK.  
**NOTE:** An alert message will show to tell you that only data from one channel is available.
  - 7) Push the CONTINUE LSK.  
**NOTE:** This causes the INPUT MONITORING MENU to show. Push the NEXT PAGE key to go to page 2 of the menu
  - 8) Push the DISCRETES LSK.  
**NOTE:** This causes the INPUT MONITORING GMM DISCRETES screen to show.
- (d) Do these steps to examine the start lever input at the CUTOFF position:
- 1) Find the START LEVER POS: and START LEVER SEL: lines on the screen.
  - 2) Make sure the input is CUTOFF for each line.
  - 3) Push the NEXT PAGE KEY two times to see Page 3/3 and find the Start Lever lines.
  - 4) Make sure the input is CUTOFF for each line.
  - 5) Make sure the ACT CH (active channel) is correct.
- (e) Do these steps to examine the start lever input at the IDLE position:
- 1) Put the applicable start lever to the IDLE position.
  - 2) Find the START LEVER POS: and START LEVER SEL: lines on the screen.

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- a) Make sure the input is IDLE for each line.
- 3) Push the NEXT PAGE KEY two times to see Page 3/3 and find the Start Lever lines.
- 4) Make sure the input is IDLE for each line.
- 5) Push the INIT REF key to end the INPUT MONITORING.
- 6) Put the applicable start lever to the CUTOFF position.
- (f) Do the above steps again for the start lever discrete with the EEC and CH B active.
  - 1) For CH B active;
    - a) Open these circuit breakers:

### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

- 2) Close these circuit breakers:

### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

- a) If the Repair Confirmation is not satisfactory, then continue.
- (g) If the START LEVER POS and START LEVER SEL disagree, replace the switch on the start brake assembly for the applicable START LEVER line.
  - 1) To replace the switch, these are the tasks:
    - Engine Start Brake Assembly Switch Removal, AMM TASK 76-11-11-010-801-F00
    - Engine Start Brake Assembly Switch Installation, AMM TASK 76-11-11-420-801-F00
  - 2) START LEVER - DEU1, S1024 or S1027
  - 3) START LEVER - DEU2, S1024 or S1027
- (h) If the START LEVER POS and START LEVER SEL agree, then continue.
- (2) Examine the electrical connector DP1203 at the HMU:
  - (a) Do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.
  - (b) See if the electrical connectors DP1203 is correctly connected to the HMU, and continue.
  - (c) Disconnect the electrical connector DP1203 from the HMU.
  - (d) Visually examine the HMU receptacle and wire harness connector (AMM TASK 70-70-01-200-801-F00).
    - 1) If the HMU receptacle is damaged, then replace the HMU, M1823. These are the tasks:



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- HMU Removal, AMM TASK 73-21-10-000-801-F00
- HMU Installation, AMM TASK 73-21-10-400-801-F00
  - a) Do the Repair Confirmation at the end of this task.
  - b) If the Repair Confirmation is not satisfactory, then continue.
- 2) If the harness connector is damaged, then replace the MW0312 wire harness.  
These are the tasks:
  - Nacelle Wiring Harnesses Removal, AMM TASK 71-51-03-000-801-F00
  - Nacelle Wiring Harnesses Installation, AMM TASK 71-51-03-400-801-F00
    - a) Do the Repair Confirmation at the end of this task.
    - b) If the Repair Confirmation is not satisfactory, then continue.
- 3) If the connector was not correctly connected and no other problem was found, then re-connect the connector and do the Repair Confirmation at the end of this task.
  - a) If the Repair Confirmation is not satisfactory, then continue.
- (e) If you did not find a problem, then continue.
- (3) Do this check of the input voltage to the HPSOV solenoid on the HMU M1823.
  - (a) Remove the DP1203 electrical connector from the HMU.
  - (b) Put the applicable engine start lever to the IDLE position.
  - (c) Look for 0 VDC between pin 1 and pin 2 (ground) of the DP1203 connector.
  - (d) If there is DC voltage, then do these steps:
    - 1) Examine and repair the system wires and switches from the circuit breakers to the HPSOV solenoid.
    - 2) Do the Repair Confirmation at the end of this task.
  - (e) If there is 0 VDC, then do these steps:
    - 1) Replace the HMU (the most likely LRU in the Possible Causes list). These are the tasks:
      - HMU Removal, AMM TASK 73-21-10-000-801-F00
      - HMU Installation, AMM TASK 73-21-10-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.

### F. Repair Confirmation

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure that the DP1203 connector is correctly installed on the HMU.
  - (b) Make sure that these circuit breakers are closed:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

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(2) Do one of these optional procedures:

(a) Option 1;

Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00

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

2) If the start procedure is correct, then you corrected the fault.

(b) Option 2

Record the steps that you completed to find and repair the fault.

1) Monitor the airplane on subsequent flights.

———— **END OF TASK** ————

**802. Engine Start - No Lightoff, Duct Presssure And N2 Normal, SPAR VALVE CLOSED Light On - Fault Isolation**

**A. Description**

(1) For engine start, there was no lightoff with these conditions:

(a) The duct pressure and N2 are correct.

(b) The SPAR VALVE CLOSED light is on (closed or not in commanded position).

**B. Possible Causes**

(1) Spar valve system.

(2) Engine start brake assembly M1824 (Eng 1), M1825 (Eng 2)

**C. Circuit Breakers**

(1) For Engine 1;

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

**F/O Electrical System Panel, P6-3**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	4	C00359	FUEL SPAR VALVE ENG 1
B	5	C00540	FUEL SPAR VALVE IND

(2) For Engine 2;

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

**F/O Electrical System Panel, P6-3**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	3	C00360	FUEL SPAR VALVE ENG 2
B	5	C00540	FUEL SPAR VALVE IND

**D. Related Data**

(1) Component Location (Figure 301)

(2) (WDM 28-21-11)

(3) (SSM 28-21-11)

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### E. Fault Isolation Procedure

- (1) For the applicable engine, do the fault isolation for the SPAR VALVE CLOSED light:
  - (a) Do this task: Engine No. 1 SPAR VALVE CLOSED Light Stays on Bright - Fault Isolation, 28-22 TASK 809.
  - (b) Do this task: Engine No. 2 SPAR VALVE CLOSED Light Stays on Bright - Fault Isolation, 28-22 TASK 810.
  - (c) Do the Repair Confirmation at the end of this task.
    - 1) If the Repair Confirmation is not satisfactory, then continue.
- (2) Do these steps to examine the start lever discrete on the input monitoring display on the FMCS Control Display Unit (CDU):

**NOTE:** Examine each channel of the applicable EEC.

- (a) Make sure the applicable start lever is in the CUTOFF position.
- (b) To set the active channel for the EEC to be CH A, open the applicable circuit breaker for the other channel on the applicable engine:
  - 1) For CH A active;
    - a) Open these circuit breakers:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

- (c) Get access to the input monitoring screen on the CDU:
  - 1) Push the INIT REF key two times.  
**NOTE:** This causes the PERF INIT INDEX to show.
  - 2) Push the INDEX line select key (LSK).
  - 3) Push the MAINT LSK.
  - 4) Push the ENGINE LSK.
  - 5) Push the line select key for the applicable engine (ENGINE 1 or ENGINE 2).  
**NOTE:** This causes the ENGINE X BITE TEST MAIN MENU to show.
  - 6) Push the INPUT MONITORING LSK.  
**NOTE:** An alert message will show to tell you that only data from one channel is available.
  - 7) Push the CONTINUE LSK.  
**NOTE:** This causes the INPUT MONITORING MENU to show. Push the NEXT PAGE key to go to page 2 of the menu
  - 8) Push the DISCRETES LSK.  
**NOTE:** This causes the INPUT MONITORING GMM DISCRETES screen to show.
- (d) Do these steps to examine the start lever input at the CUTOFF position:
  - 1) Find the START LEVER POS: and START LEVER SEL: lines on the screen.

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- 2) Make sure the input is CUTOFF for each line.
- 3) Push the NEXT PAGE KEY two times to see Page 3/3 and find the Start Lever lines.
- 4) Make sure the input is CUTOFF for each line.
- 5) Make sure the ACT CH (active channel) is correct.
- (e) Do these steps to examine the start lever input at the IDLE position:
  - 1) Put the applicable start lever to the IDLE position.
  - 2) Find the START LEVER POS: and START LEVER SEL: lines on the screen.
    - a) Make sure the input is IDLE for each line.
  - 3) Push the NEXT PAGE KEY two times to see Page 3/3 and find the Start Lever lines.
  - 4) Make sure the input is IDLE for each line.
  - 5) Push the INIT REF key to end the INPUT MONITORING.
  - 6) Put the applicable start lever to the CUTOFF position.
- (f) Do the above steps again for the start lever discrete with the EEC and CH B active.
  - 1) For CH B active;
    - a) Open these circuit breakers:

### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

- 2) Close these circuit breakers:

### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

- a) If the Repair Confirmation is not satisfactory, then continue.
- (g) If the START LEVER POS and START LEVER SEL disagree, replace the switch on the start brake assembly for the applicable START LEVER line.
  - 1) To replace the switch, these are the tasks:
    - Engine Start Brake Assembly Switch Removal, AMM TASK 76-11-11-010-801-F00
    - Engine Start Brake Assembly Switch Installation, AMM TASK 76-11-11-420-801-F00
  - 2) START LEVER - DEU1, S1024 or S1027
  - 3) START LEVER - DEU2, S1024 or S1027
  - 4) Do the Repair Confirmation at the end of this task.

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**F. Repair Confirmation**

(1) Do one of these two optional procedures:

(a) Option 1;

Look at the SPAR VALVE CLOSED light as you do these steps:

- 1) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
- 2) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
- 3) If the start procedure is normal, then you corrected the fault.

(b) Option 2;

Record the steps that you completed to find and repair the fault.

- 1) Monitor the airplane on subsequent flights.

————— **END OF TASK** —————

**803. Engine Start - No Lightoff, Fuel Flow Normal, Ignition Switch At IGN L, Engine Start Normal With Ignition Switch At IGN R Or BOTH - Fault Isolation**

**A. Description**

(1) For engine start, there was no lightoff with these conditions:

- (a) The ignition switch was at the IGN L position.
- (b) The fuel flow is correct.
- (c) The engine starts with the ignition switch at the IGN R or BOTH position.

**B. Possible Causes**

(1) For an Audible Igniters Test (Left Igniter) with one audible confirmation:

(a) EEC, M1818.

(2) For an Audible Igniters Test (Left Igniter) with no audible confirmation:

- (a) Left igniter plug
- (b) Left ignition lead
- (c) Left ignition exciter
- (d) MW0301 wire harness.

(3) For an Audible Igniters Test (Left Igniter) with two audible confirmations:

- (a) Left igniter plug
- (b) Start brake assembly M1824 (Eng 1), M1825 (Eng 2), for left ignition switches S88, S90
- (c) Left ignition lead
- (d) Left ignition exciter
- (e) EEC, M1818
- (f) MW0301 wire harness.

**C. Circuit Breakers**

(1) For Engine 1:

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- (a) This is the circuit breaker:

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<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	3	C00153	ENGINE 1 IGNITION LEFT

- (2) For Engine 2:

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

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	6	C00151	ENGINE 2 IGNITION LEFT

#### D. Related Data

- (1) Component Location (Figure 301, Figure 302)
- (2) (WDM 74-11-11)
- (3) (WDM 74-31-11)
- (4) (SSM 74-11-11)
- (5) (SSM 74-31-11)

#### E. Fault Isolation

- (1) To see if the left igniter plug operates, do this task: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.
  - (a) The operation of the left igniter plug should be heard twice, for CH A and then for CH B.
  - (b) If only one audible confirmation is heard, do the Fault Isolation Procedure - One Audible Confirmation.
  - (c) If no audible confirmation is heard, do the Fault Isolation Procedure - No Audible Confirmation.
  - (d) If the two audible confirmations are heard, do these steps:
    - 1) With the IGN L selected, do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
    - 2) If the engine start is correct, then there was an intermittent fault.
    - 3) If the engine does not start, do the Fault Isolation Procedure - Two Audible Confirmations.

#### F. Fault Isolation Procedure - One Audible Confirmation

- (1) Replace the EEC, M1818, for a defective EEC internal igniter relay. These are the tasks:
  - EEC Removal, AMM TASK 73-21-60-000-801-F00
  - EEC Installation, AMM TASK 73-21-60-400-801-F00
  - (a) Do the Repair Confirmation at the end of this task.

#### G. Fault Isolation Procedure - No Audible Confirmation

- (1) If there are maintenance messages, do the fault isolation for those messages.
  - (a) Do the Repair Confirmation at the end of this task.
  - (b) If the Repair Confirmation is not satisfactory, then continue.
- (2) If there are no maintenance messages, then continue.

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- (a) Examine the left igniter plug; do this task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.
    - 1) If the damage is more than the limits, replace the left igniter plug. These are the tasks:
      - Main Igniter Plug Removal, AMM TASK 74-21-02-000-801-F00
      - Main Igniter Plug Installation, AMM TASK 74-21-02-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.
    - 3) If the Repair Confirmation is not satisfactory, then continue.
  - (b) Examine the left ignition lead; do this task: Ignition Lead Inspection, AMM TASK 74-21-01-200-801-F00.
    - 1) If the damage is more than the limits, replace the left ignition lead. These are the tasks:
      - Ignition Lead Removal, AMM TASK 74-21-01-000-801-F00
      - Ignition Lead Installation, AMM TASK 74-21-01-400-801-F00
 Do the Repair Confirmation at the end of this task.
    - 2) If the Repair Confirmation is not satisfactory, then continue.
  - (c) Examine the left ignition exciter; do this task: Ignition Exciter Inspection, AMM TASK 74-11-01-200-801-F00.
    - 1) If the damage is more than the limits, replace the left ignition exciter. These are the tasks:
      - Ignition Exciter Removal, AMM TASK 74-11-01-000-801-F00
      - Ignition Exciter Installation, AMM TASK 74-11-01-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.
    - 3) If the Repair Confirmation is not satisfactory, then continue.
- (3) Examine the electrical connector DP0101 at the EEC:
- NOTE: The electrical connector DP0101 is on the MW0301 wire harness at the J1 receptacle.
- (a) Make sure that the electrical connector DP0101 is correctly connected to the EEC.
  - (b) Disconnect the electrical connector DP0101 from the EEC.
  - (c) Visually examine the EEC J1 receptacle and wire harness connector.
    - 1) If the EEC J1 receptacle is damaged, then replace the EEC, M1818. These are the tasks:
      - EEC Removal, AMM TASK 73-21-60-000-801-F00
      - EEC Installation, AMM TASK 73-21-60-400-801-F00
      - a) Do the Repair Confirmation at the end of this task.
    - 2) If the harness connector is damaged, then replace the MW0301 wire harness. These are the tasks:
      - Nacelle Wiring Harnesses Removal, AMM TASK 71-51-03-000-801-F00
      - Nacelle Wiring Harnesses Installation, AMM TASK 71-51-03-400-801-F00
      - a) Do the Repair Confirmation at the end of this task.
    - 3) If the connector was not correctly connected, and no other problem was found, then do the Repair Confirmation at the end of this task.

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### H. Fault Isolation Procedure - Two Audible Confirmation

- (1) For the left igniter plug, do this task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.
  - (a) If the damage to the igniter plug is more than the limits, then replace the left igniter plug (AMM TASK 74-21-02-400-801-F00).
    - 1) Do the Repair Confirmation at the end of this task.
    - 2) If the Repair Confirmation is not satisfactory, then continue.
  - (b) If the damage is in the limits, then re-install the left igniter plug (AMM TASK 74-21-02-400-801-F00) and continue.
- (2) If the problem continues, then there was an intermittent fault.
  - (a) For an intermittent fault you must use your judgment, your airline policies, and the Possible Causes list to make the decision if you will try to correct the fault.
    - 1) Replace components as listed in the Possible Causes list above and do the Repair Confirmation.
    - 2) To examine the operation of the ignition switch in the engine start brake assembly, you can do the procedure that follows.
- (3) To examine the applicable left ignition switches, S88 (Eng 1) or S90 (Eng 2), in the engine start brake assembly, you can use input monitoring to see if the switch operation agrees with the selected start lever position.

**NOTE:** 737-SL-76-020 notes that some switches in the engine start brake assembly cause engine start problems.

- (a) Get access to the input monitoring screen on the CDU:
  - 1) Push the INIT REF key two times.  
**NOTE:** This causes the PERF INIT INDEX to show.
  - 2) Push the INDEX line select key (LSK).
  - 3) Push the MAINT LSK.
  - 4) Push the ENGINE LSK.
  - 5) Push the line select key for the applicable engine (ENGINE 1 or ENGINE 2).  
**NOTE:** This causes the ENGINE X BITE TEST MAIN MENU to show.
  - 6) Push the INPUT MONITORING LSK.  
**NOTE:** An alert message will show to tell you that only data from one channel is available.
  - 7) Push the CONTINUE LSK.  
**NOTE:** This causes the INPUT MONITORING MENU to show. Push the NEXT PAGE key to go to page 2 of the menu
  - 8) Push the DISCRETES LSK.  
**NOTE:** This causes the INPUT MONITORING GMM DISCRETES screen to show.
  - 9) Push the NEXT PAGE key twice to see page 3/3 and find the L IGNITER 115V line on the screen.
- (b) With the applicable start lever in the CUTOFF position, make sure the value is OFF.
- (c) Put the applicable start lever to the IDLE position and make sure the value is ON for each line.



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- (d) Operate the start lever several times and see if the switch operates correctly.
  - 1) If the switch does not operate correctly, replace the switch, S88 or S90. These are the tasks:
    - Engine Start Brake Assembly Switch Removal, AMM TASK 76-11-11-010-801-F00
    - Engine Start Brake Assembly Switch Installation, AMM TASK 76-11-11-420-801-F00

**I. Repair Confirmation**

- (1) If the initial audible test of the ignition system failed, do these steps:
  - (a) For the left igniter plug, do this task: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.
  - (b) If the left igniter test passes and two audible confirmations are heard, then you corrected the fault.
- (2) If the initial audible test of the ignition system passed, do these steps:
  - (a) With the IGN L selected, do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
  - (b) If the start procedure is correct, then you corrected the fault.

**— END OF TASK —**

**804. Engine Start - No Lightoff, Fuel Flow Normal, Ignition Switch At IGN R, Engine Start Normal With Ignition Switch At IGN L Or BOTH - Fault Isolation**

**A. Description**

- (1) For engine start, there was no lightoff with these conditions:
  - (a) The ignition switch was at the IGN R position.
  - (b) The fuel flow is correct.
  - (c) The engine starts with the ignition switch at the IGN L or BOTH position.

**B. Possible Causes**

- (1) For an Audible Igniters Test (Right Igniter) with one audible confirmation.
  - (a) EEC, M1818.
- (2) For an Audible Igniters Test (Right Igniter) with no audible confirmation:
  - (a) Right igniter plug
  - (b) Right ignition lead
  - (c) Right ignition exciter
  - (d) MW0302 wire harness.
- (3) For an Audible Igniters Test (Right Igniter) with two audible confirmations:
  - (a) Right igniter plug
  - (b) Start brake assembly M1824 (Eng 1), M1825 (Eng 2), for right ignition switches S89, S91
  - (c) Right ignition lead
  - (d) EEC, M1818
  - (e) MW0302 wire harness.

**C. Circuit Breakers**

- (1) For Engine 1;

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

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<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	1	C00458	ENGINE 1 IGNITION RIGHT

- (2) For Engine 2;

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

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	4	C00459	ENGINE 2 IGNITION RIGHT

#### D. Related Data

- (1) Component Location (Figure 301, Figure 302)
- (2) (WDM 74-11-11)
- (3) (WDM 74-31-11)
- (4) (SSM 74-11-11)
- (5) (SSM 74-31-11)

#### E. Fault Isolation Procedure

- (1) To see if the right igniter plug operates, do this task: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.
  - (a) The operation of the right igniter plug should be heard twice, for CH A and then for CH B.
  - (b) If only one audible confirmation is heard, do the Fault Isolation Procedure - One Audible Confirmation.
  - (c) If no audible confirmation is heard, do the Fault Isolation Procedure - No Audible Confirmation.
  - (d) If the two audible confirmations are heard, do these steps:
    - 1) With the IGN R selected, do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
    - 2) If the engine start is correct, then there was an intermittent fault.
    - 3) If the engine does not start, do the Fault Isolation Procedure - Two Audible Confirmations.

#### F. Fault Isolation Procedure - One Audible Confirmation

- (1) Replace the EEC, M1818, for a defective EEC internal igniter relay. These are the tasks:
  - EEC Removal, AMM TASK 73-21-60-000-801-F00
  - EEC Installation, AMM TASK 73-21-60-400-801-F00
  - (a) Do the Repair Confirmation at the end of this task.

#### G. Fault Isolation Procedure - No Audible Confirmation

- (1) If there are maintenance messages, do the fault isolation for those messages.
  - (a) Do the Repair Confirmation at the end of this task.
  - (b) If the Repair Confirmation is not satisfactory, then continue.
- (2) If there are no maintenance messages, then continue.

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FAULT ISOLATION MANUAL**

- (a) Examine the right igniter plug; do this task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.
    - 1) If the damage is more than the limits, replace the right igniter plug. These are the tasks:
      - Main Igniter Plug Removal, AMM TASK 74-21-02-000-801-F00
      - Main Igniter Plug Installation, AMM TASK 74-21-02-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.
    - 3) If the Repair Confirmation is not satisfactory, then continue.
  - (b) Examine the right igniter lead. To examine it, do this task: Ignition Lead Inspection, AMM TASK 74-21-01-200-801-F00.
    - 1) If the damage is more than the limits, replace the right ignition lead. These are the tasks:
      - Ignition Lead Removal, AMM TASK 74-21-01-000-801-F00
      - Ignition Lead Installation, AMM TASK 74-21-01-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.
    - 3) If the Repair Confirmation is not satisfactory, then continue.
  - (c) Examine the right ignition exciter. To examine it, do this task: Ignition Exciter Inspection, AMM TASK 74-11-01-200-801-F00.
    - 1) If the damage is more than the limits, replace the right ignition exciter. These are the tasks:
      - Ignition Exciter Removal, AMM TASK 74-11-01-000-801-F00
      - Ignition Exciter Installation, AMM TASK 74-11-01-400-801-F00
    - 2) Do the Repair Confirmation at the end of this task.
    - 3) If the Repair Confirmation is not satisfactory, then continue.
- (3) Examine the electrical connector DP0202 at the EEC:
- NOTE: The electrical connector DP0202 is on the MW0302 wire harness at the J2 receptacle.
- (a) Make sure that the electrical connector DP0202 is correctly connected to the EEC.
  - (b) Disconnect the electrical connector DP0202 from the EEC.
  - (c) Visually examine the EEC J2 receptacle and wire harness connector.
    - 1) If the EEC J2 receptacle is damaged, then replace the EEC, M1818. These are the tasks:
      - EEC Removal, AMM TASK 73-21-60-000-801-F00
      - EEC Installation, AMM TASK 73-21-60-400-801-F00
      - a) Do the Repair Confirmation at the end of this task.
    - 2) If the harness connector is damaged, then replace the MW0302 wire harness. These are the tasks:
      - Nacelle Wiring Harnesses Removal, AMM TASK 71-51-03-000-801-F00
      - Nacelle Wiring Harnesses Installation, AMM TASK 71-51-03-400-801-F00
      - a) Do the Repair Confirmation at the end of this task.
    - 3) If the connector was not correctly connected, and no other problem was found, then do the Repair Confirmation at the end of this task.

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### H. Fault Isolation Procedure - Two Audible Confirmation

- (1) For the right igniter plug, do this task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.
  - (a) If the damage to the igniter plug is more than the limits, then replace the right igniter plug (AMM TASK 74-21-02-400-801-F00).
    - 1) Do the Repair Confirmation at the end of this task.
    - 2) If the Repair Confirmation is not satisfactory, then continue.
  - (b) If the damage is in the limits, then re-install the right igniter plug (AMM TASK 74-21-02-400-801-F00) and continue.
- (2) If the problem continues, then there was an intermittent fault.
  - (a) For an intermittent fault, you must use your judgment, your airline policies, and the Possible Causes list to make the decision if you will try to correct the fault.
    - 1) Replace components as listed in the Possible Causes list above and do the Repair Confirmation.
    - 2) To examine the operation of the ignition switch in the engine start brake assembly, you can do the procedure that follows.
- (3) To examine the applicable right ignition switch, S89 (Eng 1) or S91 (Eng 2) in the engine start brake assembly, you can use input monitoring the see if the switch position agrees with the selected start lever position.

**NOTE:** 737-SL-76-020 notes some switches in the engine start brake assembly cause engine start problems.

- (a) Get access to the input monitoring screen on the CDU:
  - 1) Push the INIT REF key two times.  
**NOTE:** This causes the PERF INIT INDEX to show.
  - 2) Push the INDEX line select key (LSK).
  - 3) Push the MAINT LSK.
  - 4) Push the ENGINE LSK.
  - 5) Push the line select key for the applicable engine (ENGINE 1 or ENGINE 2).  
**NOTE:** This causes the ENGINE X BITE TEST MAIN MENU to show.
  - 6) Push the INPUT MONITORING LSK.  
**NOTE:** An alert message will show to tell you that only data from one channel is available.
  - 7) Push the CONTINUE LSK.  
**NOTE:** This causes the INPUT MONITORING MENU to show. Push the NEXT PAGE key to go to page 2 of the menu
  - 8) Push the DISCRETES LSK.  
**NOTE:** This causes the INPUT MONITORING GMM DISCRETES screen to show.
  - 9) Push the NEXT PAGE key twice to see page 3/3 and find the R IGNITER 115V line on the screen.
- (b) With the applicable start lever in the CUTOFF position, make sure the value is OFF.
- (c) Put the applicable start lever to the IDLE position and make sure the value is ON.
- (d) Operate the start lever several times to see if the switch operates correctly.

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- 1) If the switch does not operate correctly, replace the switch, S89 or S91. These are the tasks:
  - Engine Start Brake Assembly Switch Removal, AMM TASK 76-11-11-010-801-F00
  - Engine Start Brake Assembly Switch Installation, AMM TASK 76-11-11-420-801-F00

### I. Repair Confirmation

- (1) If the initial audible test of the ignition system failed, do these steps:
  - (a) For the right igniter, do this task: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.
    - 1) If the right igniter test passes and two audible confirmations are heard, then you corrected the fault.
- (2) If the initial audible test of the ignition system passed, do these steps:
  - (a) With the IGN R selected, do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
  - (b) If the start procedure is correct, then you corrected the fault

————— END OF TASK —————

### 805. Engine Start - No Lightoff, Fuel Flow Zero, ENG VALVE CLOSED and SPAR VALVE CLOSED Lights Are Off - Fault Isolation

#### A. Description

- (1) For engine start, there was no lightoff with these conditions:
  - (a) The fuel flow is zero.
  - (b) The ENG VALVE CLOSED and SPAR VALVE CLOSED lights are off (valves open).

#### B. Possible Causes

- (1) HMU, M1823
- (2) Engine fuel pump.

#### C. Related Data

- (1) Component Location (Figure 301, Figure 302)
- (2) (WDM 73-25-11, 73-25-21, 73-31)
- (3) (SSM 73-25-11, 73-25-21, 73-31-1)

#### D. Initial Evaluation

- (1) If the fault occurred at an N2 speed of less than 11 percent, then no fault isolation is necessary.  
NOTE: The fuel pump must have this N2 speed to supply fuel pressure to the HMU.
- (2) If the fault occurred at an N2 speed of more than 11 percent, then do the Fault Isolation Procedure below.

#### E. Fault Isolation Procedure

- (1) Do this task: EEC TEST, AMM TASK 73-21-00-700-804-F00.
  - (a) Look for one or more maintenance messages on the INTERNAL EEC and HMU.
    - 1) Do the corrective action for the maintenance messages that you find first.
      - a) Do the Repair Confirmation task at the end of this procedure.
      - b) If the Repair Confirmation is not satisfactory, then continue.

EFFECTIVITY  
AKS ALL

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

- 2) If those messages do not show, then continue.
- (2) Examine the fuel pump:
  - (a) Do this task: The Visual Inspection of the Impeller Rotation, AMM TASK 73-11-01-200-801-F00.  
Do not operate the engine as directed in the Lubrication Flow Screen Installation Test.
    - 1) Make sure that the N2 rotor turns freely and smoothly as you do the fuel pump impeller inspection.
      - a) If the N2 rotor does not turn freely and smoothly, then replace the engine.  
These are the tasks:  
Power Plant Removal, AMM TASK 71-00-02-000-801-F00,  
Power Plant Installation, AMM TASK 71-00-02-400-801-F00.
    - 2) If the fuel pump impeller inspection is not satisfactory, then replace the fuel pump.
      - a) These are the tasks:  
Fuel Pump Package Removal, AMM TASK 73-11-01-000-801-F00,  
Fuel Pump Package Installation, AMM TASK 73-11-01-400-801-F00.
      - b) Do the Repair Confirmation at the end of this task.
      - c) If the Repair Confirmation is not satisfactory, then continue.
    - 3) If you do not find a problem, then continue.
  - (3) Examine the fuel filter for signs of contamination.
    - (a) Do this task: Fuel Filter Removal, AMM TASK 73-11-02-000-801-F00.
    - (b) If there are large amounts of aluminum or bronze particles, do these steps:
      - 1) Replace the fuel filter.  
These are the tasks:  
Fuel Filter Removal, AMM TASK 73-11-02-000-801-F00,  
Fuel Filter Installation, AMM TASK 73-11-02-400-801-F00.
      - 2) Replace the HMU.  
These are the tasks:  
HMU Removal, AMM TASK 73-21-10-000-801-F00,  
HMU Installation, AMM TASK 73-21-10-400-801-F00.
      - 3) Replace the fuel pump.  
These are the tasks:  
Fuel Pump Package Removal, AMM TASK 73-11-01-000-801-F00,  
Fuel Pump Package Installation, AMM TASK 73-11-01-400-801-F00.
      - 4) Replace the fuel nozzle filter.  
These are the tasks:  
Fuel Nozzle Filter Removal (SAC), AMM TASK 73-11-03-000-802-F00,  
Fuel Nozzle Filter Installation (SAC), AMM TASK 73-11-03-400-802-F00.
      - 5) Do the Repair Confirmation at the end of this task.
        - a) If the Repair Confirmation is not satisfactory, then continue.

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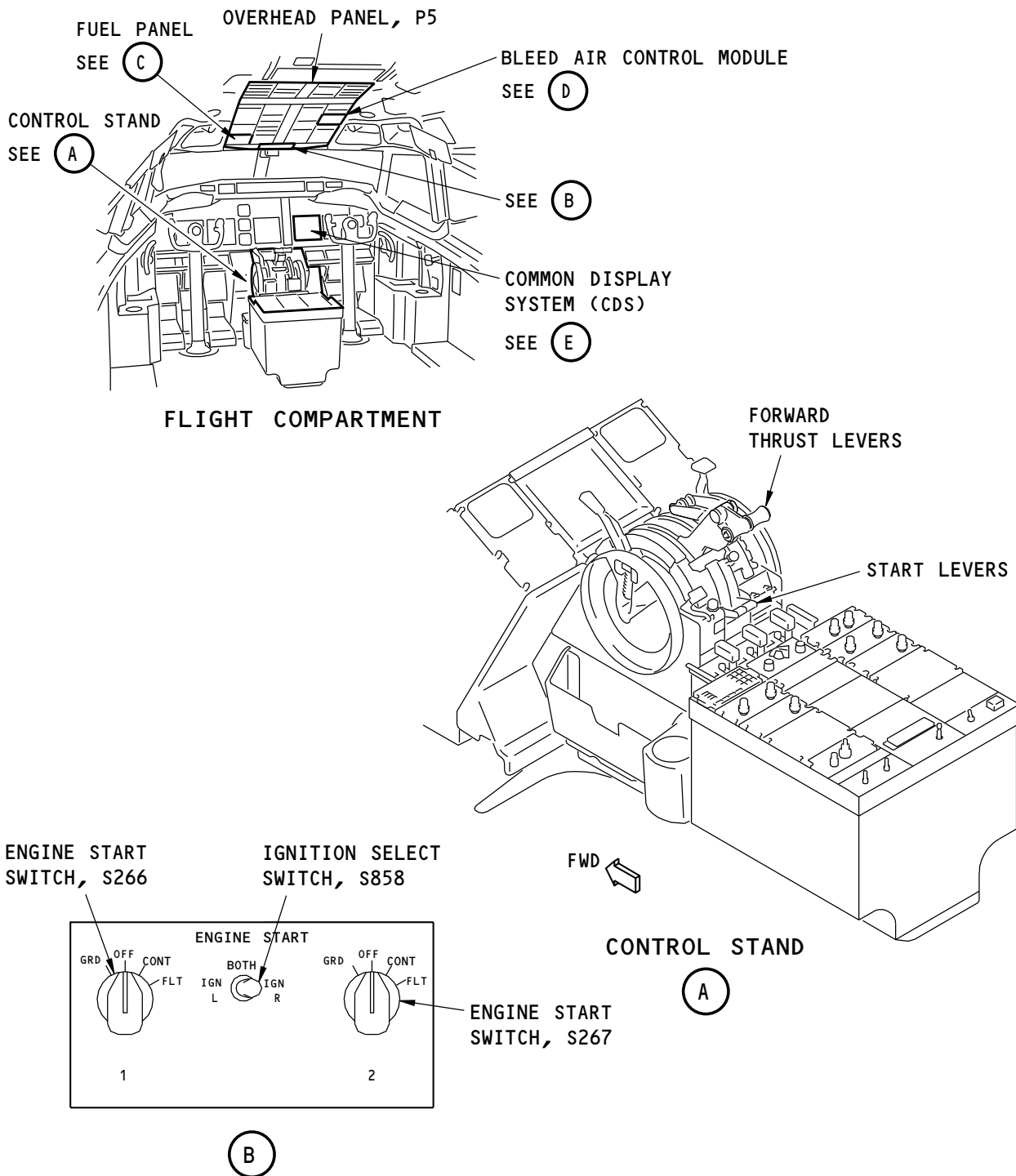
- (c) If contamination is not found, do this task: Fuel Filter Installation, AMM TASK 73-11-02-400-801-F00  
then continue.
- (4) Do this task: Engine Fuel Spar Valve - Electrical Control and Indication Test, AMM TASK 28-22-00-710-801.
  - (a) If the test fails, repair the problems that you find.
    - 1) Do the Repair Confirmation at the end of this task.
      - a) If the Repair Confirmation is not satisfactory, then continue.
    - (b) If the test passes, then continue.
  - (5) Replace the HMU (the most likely LRU in the Possible Causes list).  
These are the tasks:  
HMU Removal, AMM TASK 73-21-10-000-801-F00,  
HMU Installation, AMM TASK 73-21-10-400-801-F00.
    - (a) Do the Repair Confirmation at the end of this task.

**F. Repair Confirmation**

- (1) Do these steps:
  - (a) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
  - (b) Let the engine become stable at idle.
  - (c) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.
  - (d) If the start procedure is correct, then you corrected the fault.

———— **END OF TASK** ————

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H95110 S0006746617\_V1

**Starting System - Component Location**  
Figure 301/80-06-00-990-801-F00 (Sheet 1 of 2)

EFFECTIVITY  
AKS ALL

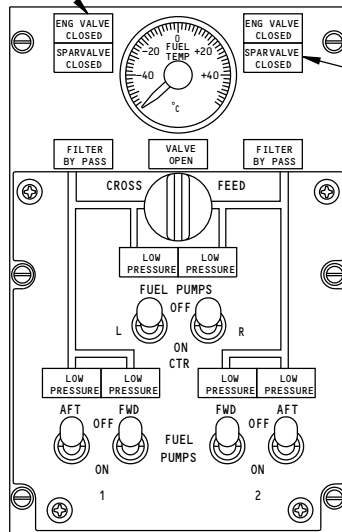
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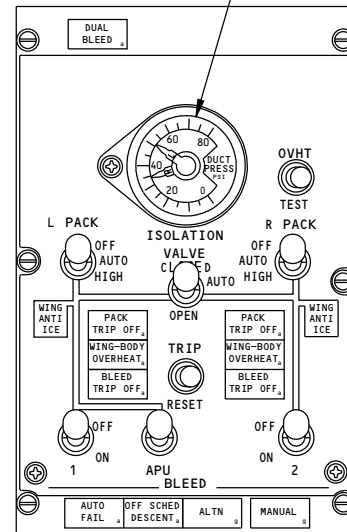


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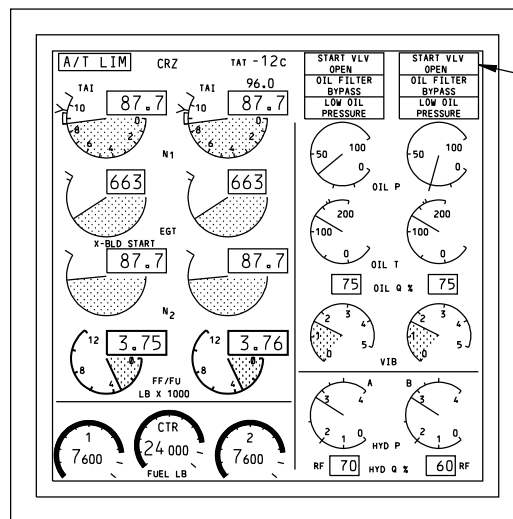
ENGINE VALVE  
CLOSED LIGHTS

FUEL PANEL (P5-2)

C

DUCT  
PRESSUREBLEED AIR CONTROL  
MODULE (P5-10)

D



CDS - ENGINE DISPLAYS

E

H96970 S0006746620\_V1

Starting System - Component Location  
Figure 301/80-06-00-990-801-F00 (Sheet 2 of 2)

EFFECTIVITY  
AKS ALL

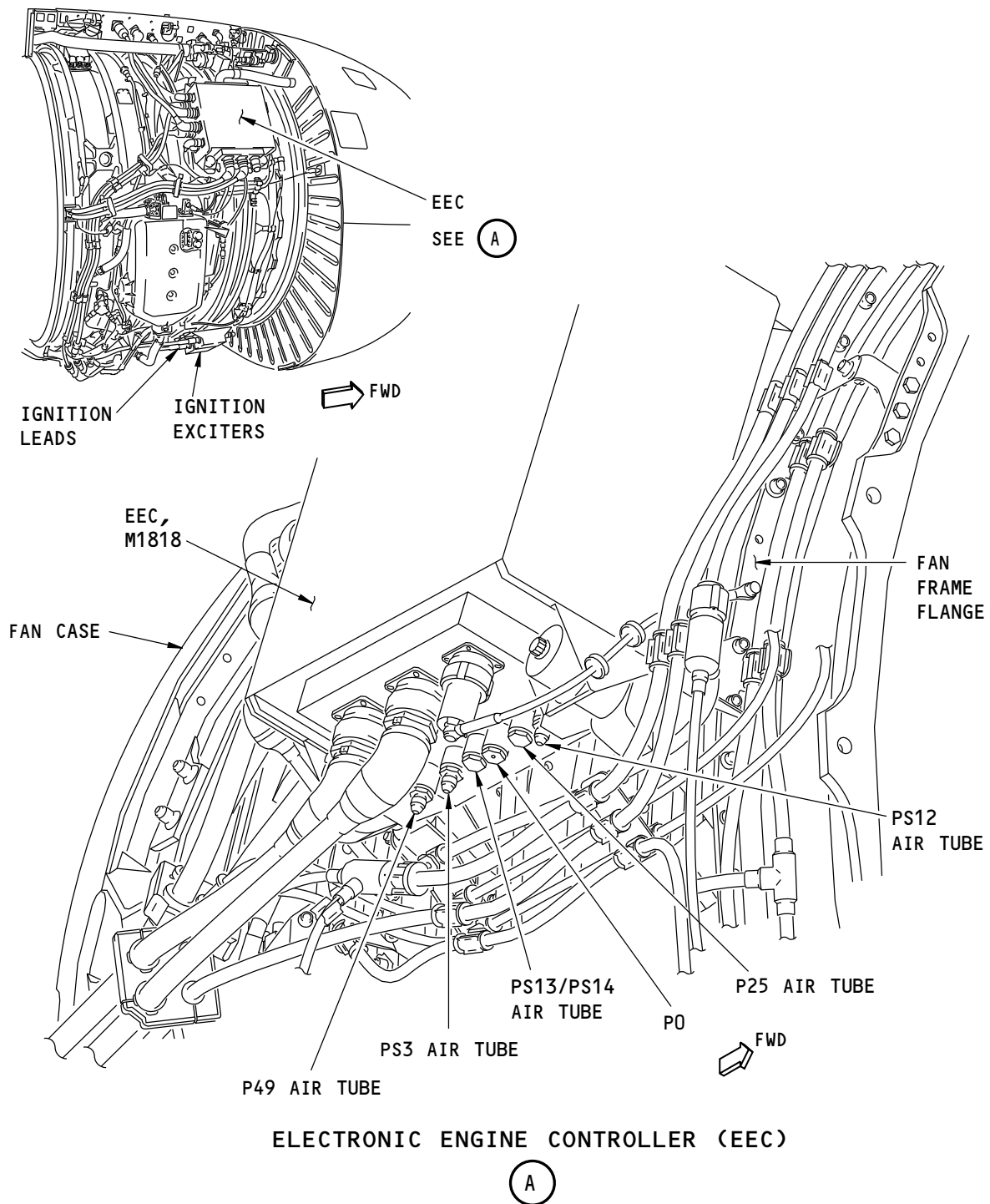
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H95522 S0006746621\_V1

**Starting System (Engines) - Component Location**  
Figure 302/80-06-00-990-802-F00 (Sheet 1 of 4)

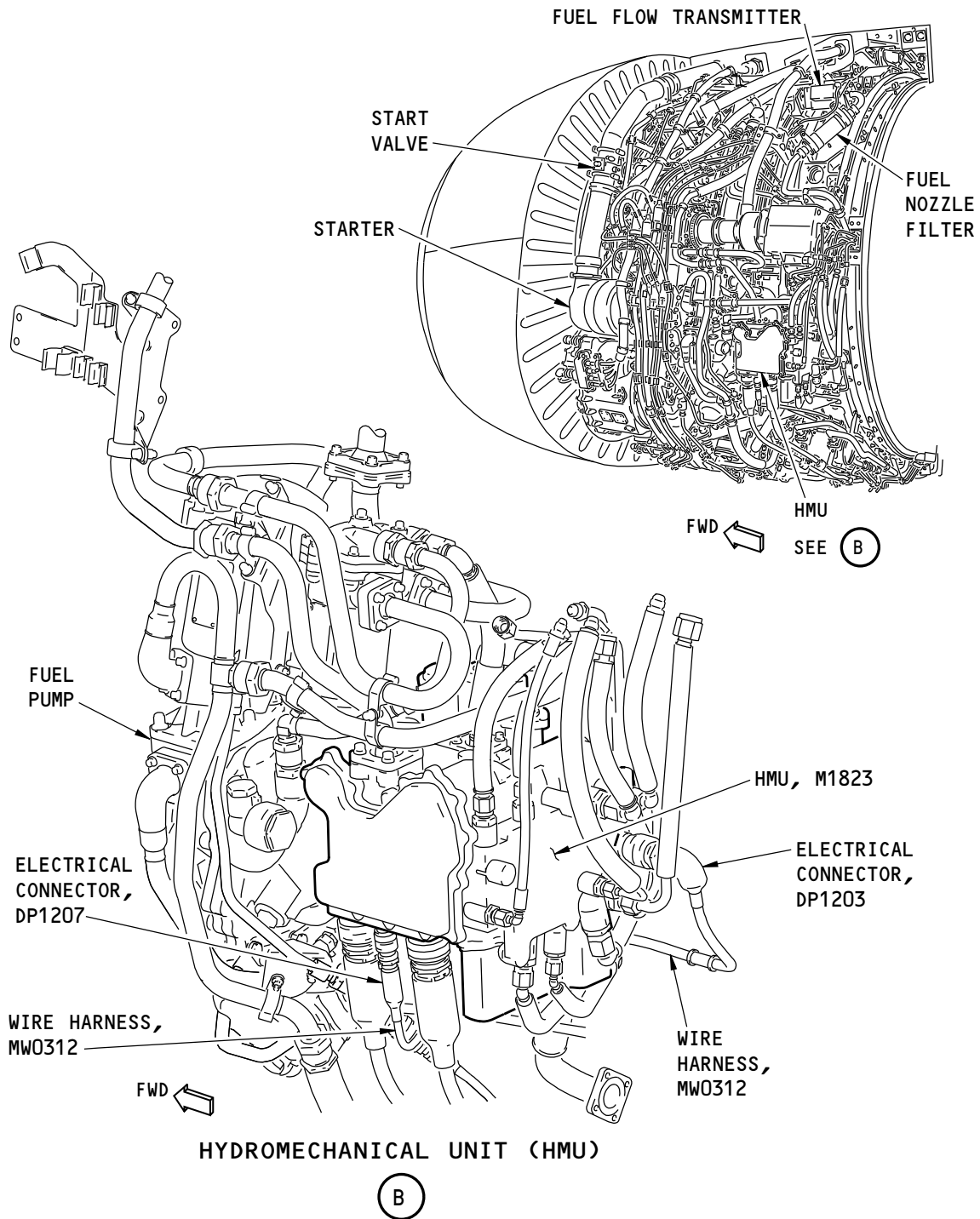
EFFECTIVITY  
AKS ALL

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H95523 S0006746622\_V1

**Starting System (Engines) - Component Location**  
Figure 302/80-06-00-990-802-F00 (Sheet 2 of 4)

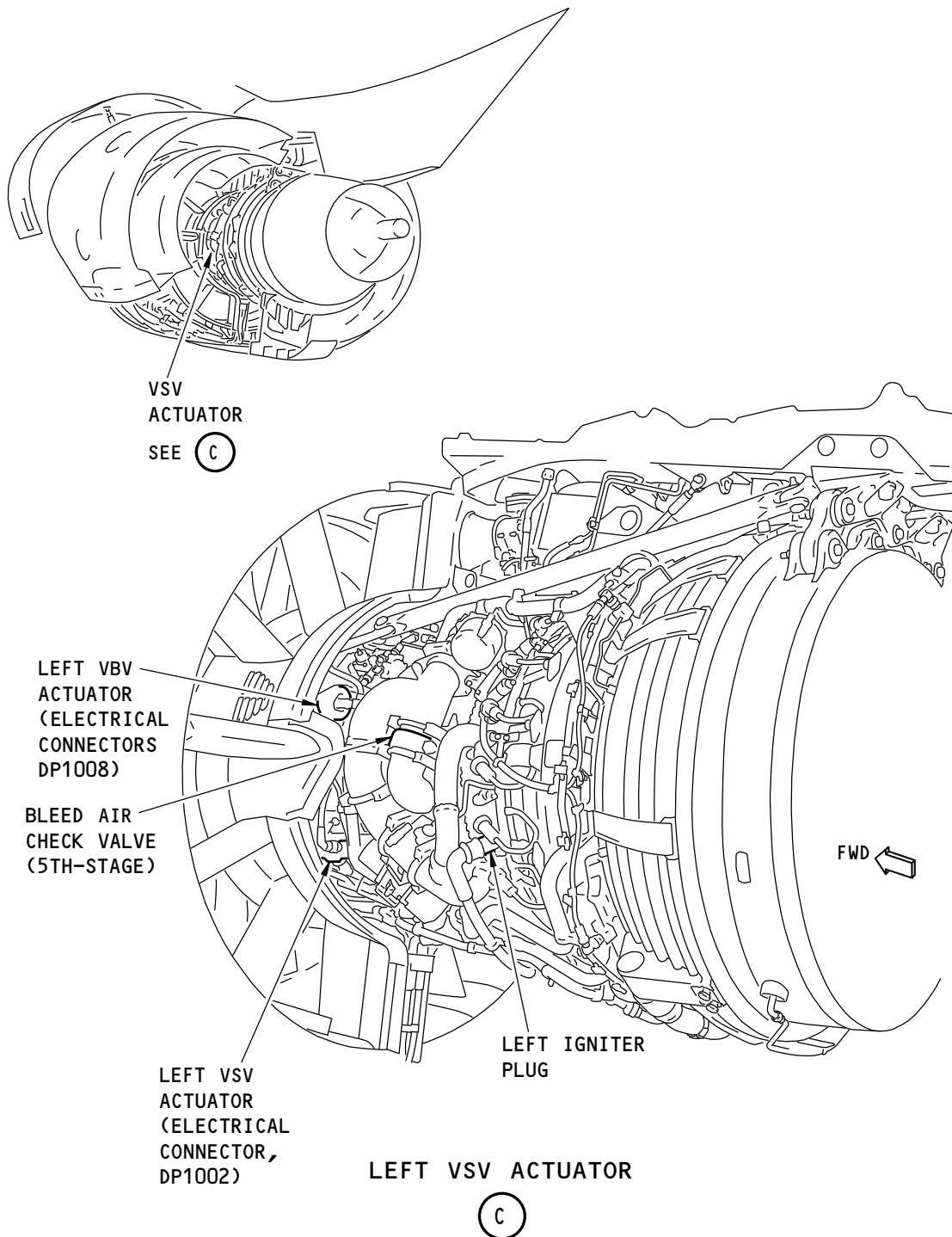
EFFECTIVITY  
AKS ALL

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H95524 S0006746623\_V1

**Starting System (Engines) - Component Location**  
**Figure 302/80-06-00-990-802-F00 (Sheet 3 of 4)**

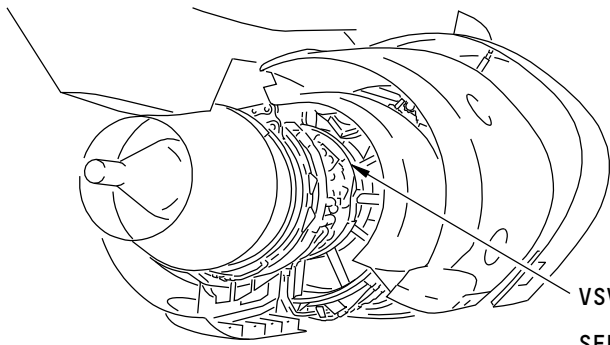
EFFECTIVITY  
 AKS ALL

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D633A103-AKS

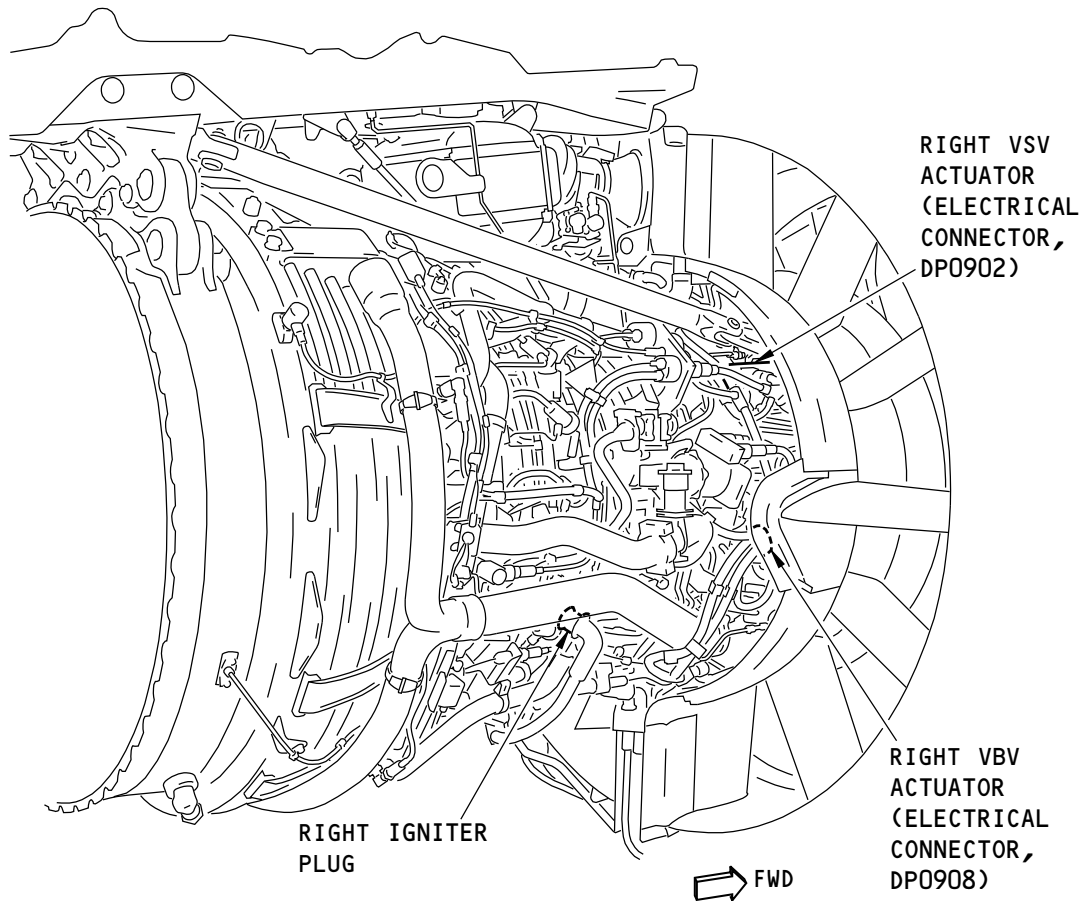
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VSV ACTUATOR

SEE (D)



RIGHT VSV  
ACTUATOR  
(ELECTRICAL  
CONNECTOR,  
DP0902)

RIGHT VBV  
ACTUATOR  
(ELECTRICAL  
CONNECTOR,  
DP0908)

RIGHT IGNITER  
PLUG

➡ FWD

RIGHT VSV ACTUATOR

(D)

H95527 S0006746624\_V1

Starting System (Engines) - Component Location  
Figure 302/80-06-00-990-802-F00 (Sheet 4 of 4)

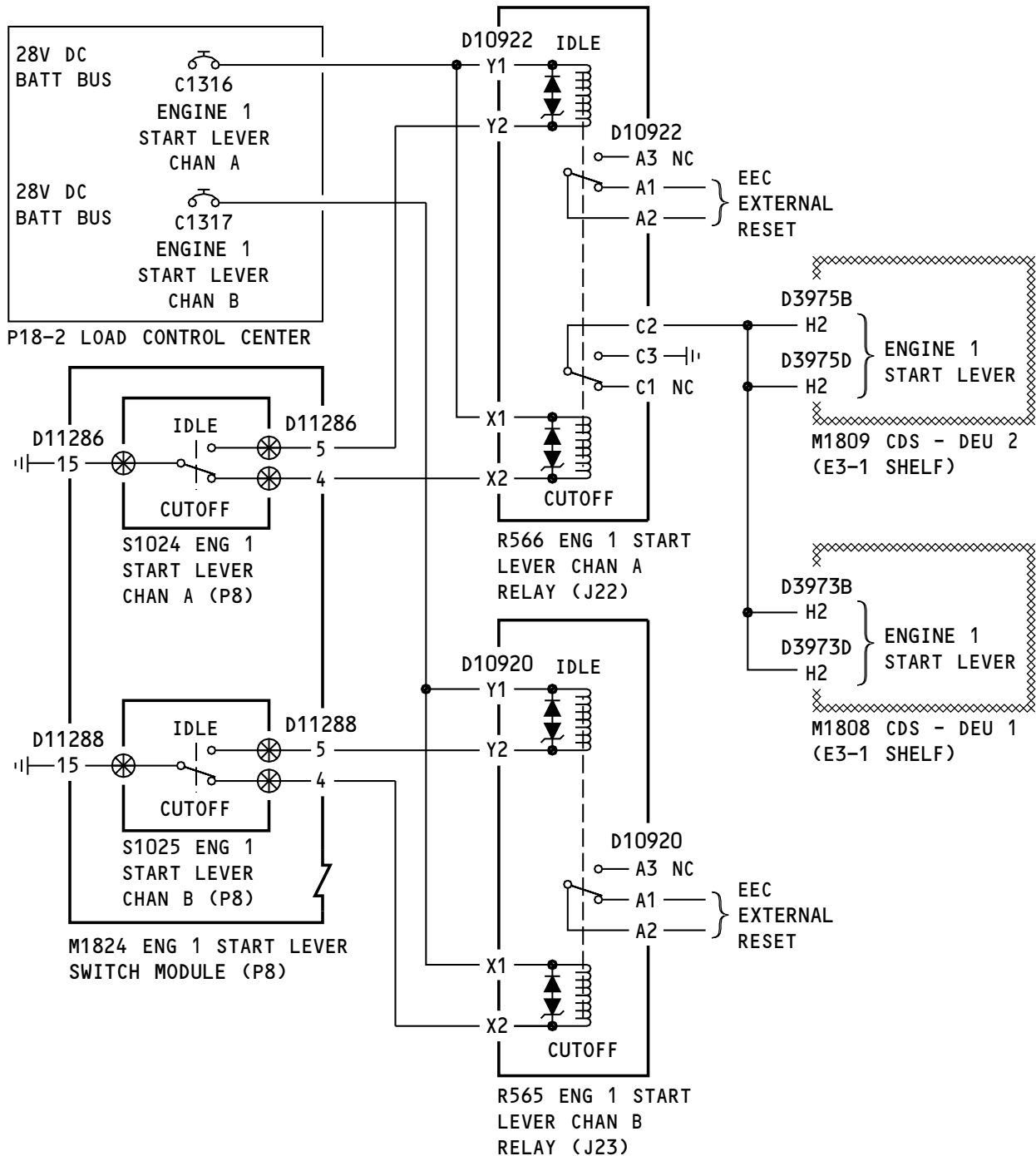
EFFECTIVITY  
AKS ALL

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H96914 S0006746625\_V1

**Fuel Condition Control Simplified Schematic**  
Figure 303/80-06-00-990-803-F00 (Sheet 1 of 4)

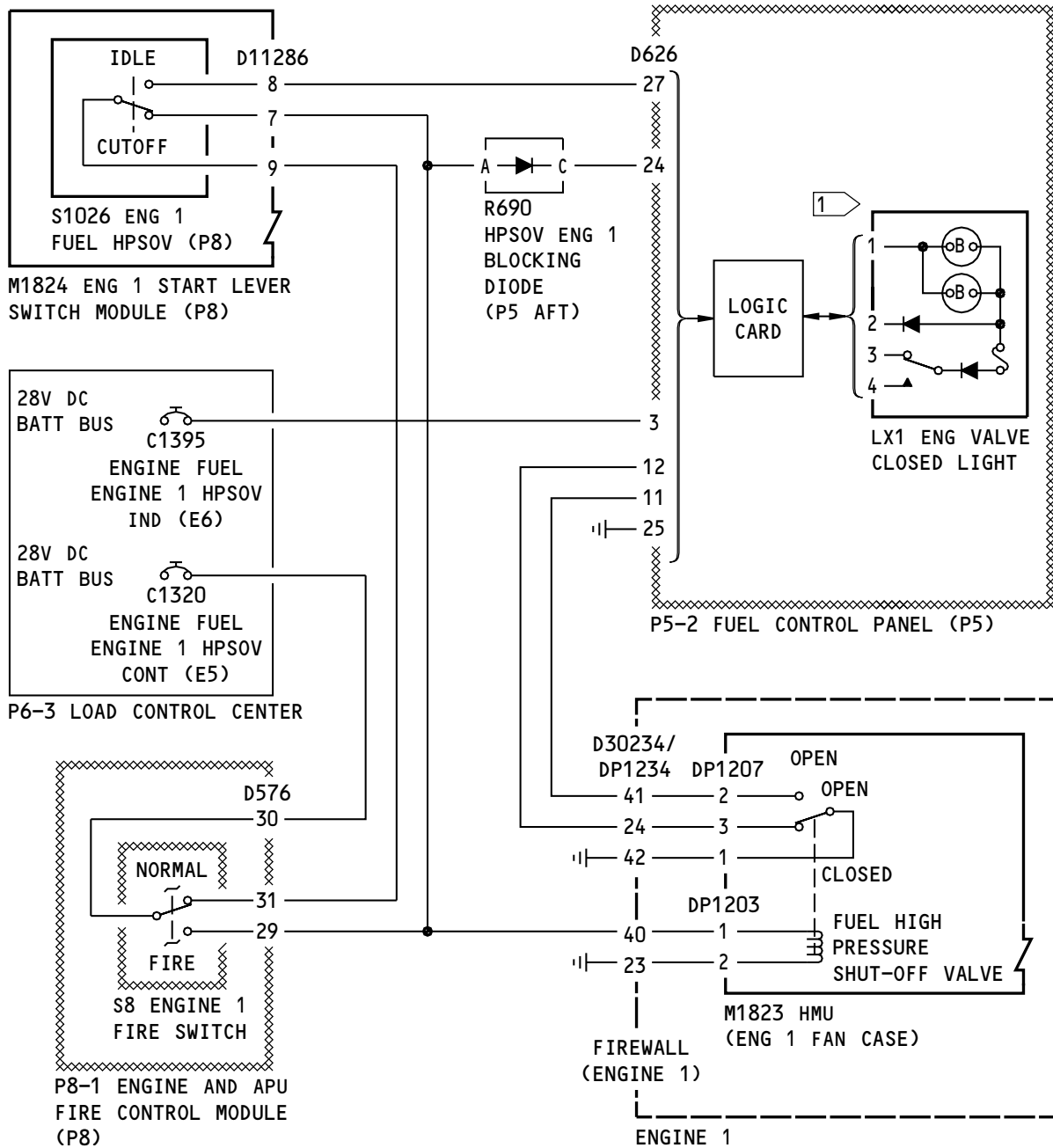
EFFECTIVITY  
AKS ALL

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- 1 VALVE OPEN - NO LIGHT  
 VALVE CLOSED - DIM BLUE LIGHT  
 VALVE IN DISAGREE - BRIGHT BLUE LIGHT

ENGINE 1

H96952 S0006746626\_V1

Fuel Condition Control Simplified Schematic  
 Figure 303/80-06-00-990-803-F00 (Sheet 2 of 4)

EFFECTIVITY  
 AKS ALL

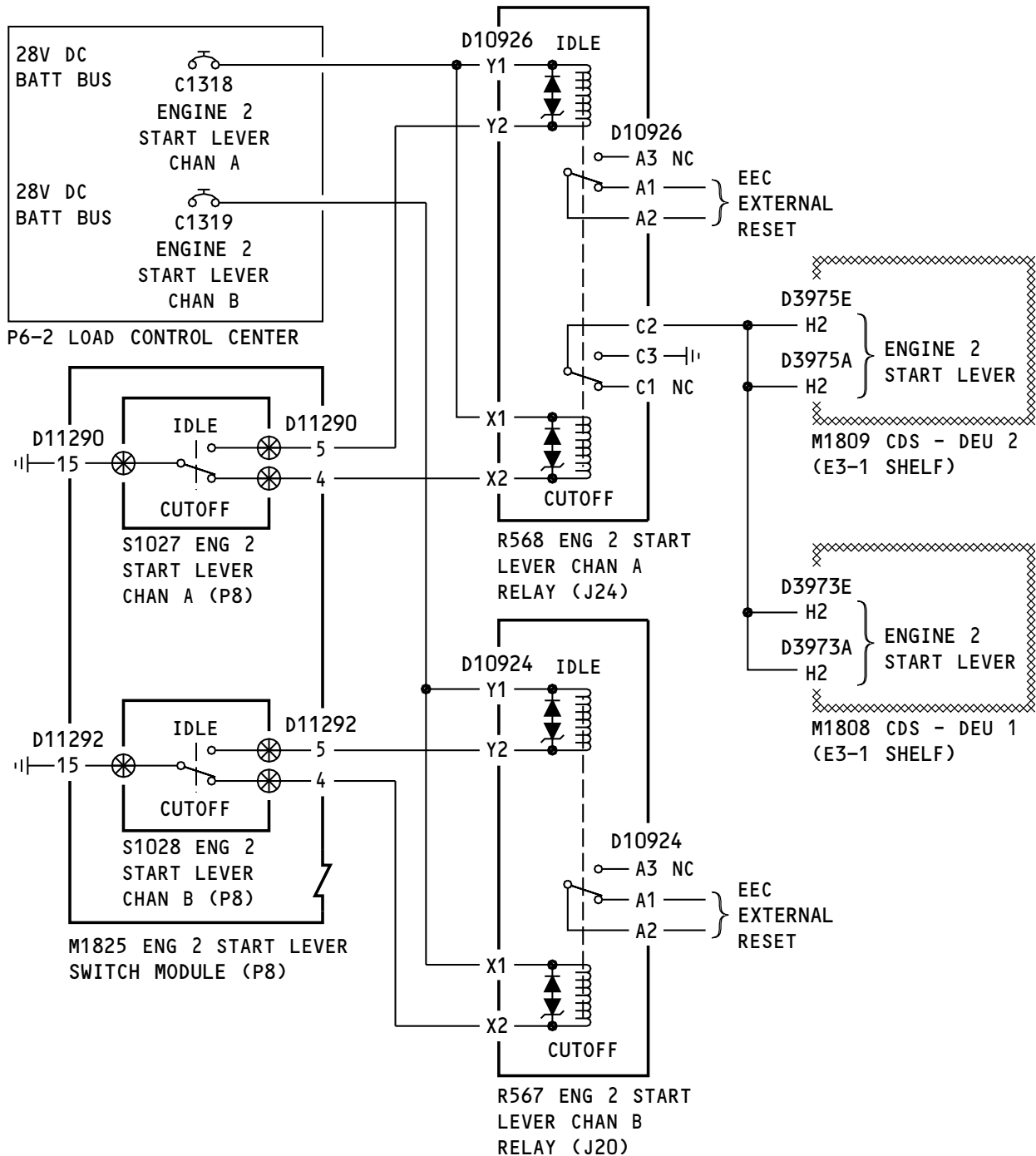
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ENGINE 2

H97342 S0006746627\_V1

Fuel Condition Control Simplified Schematic  
Figure 303/80-06-00-990-803-F00 (Sheet 3 of 4)

EFFECTIVITY  
AKS ALL

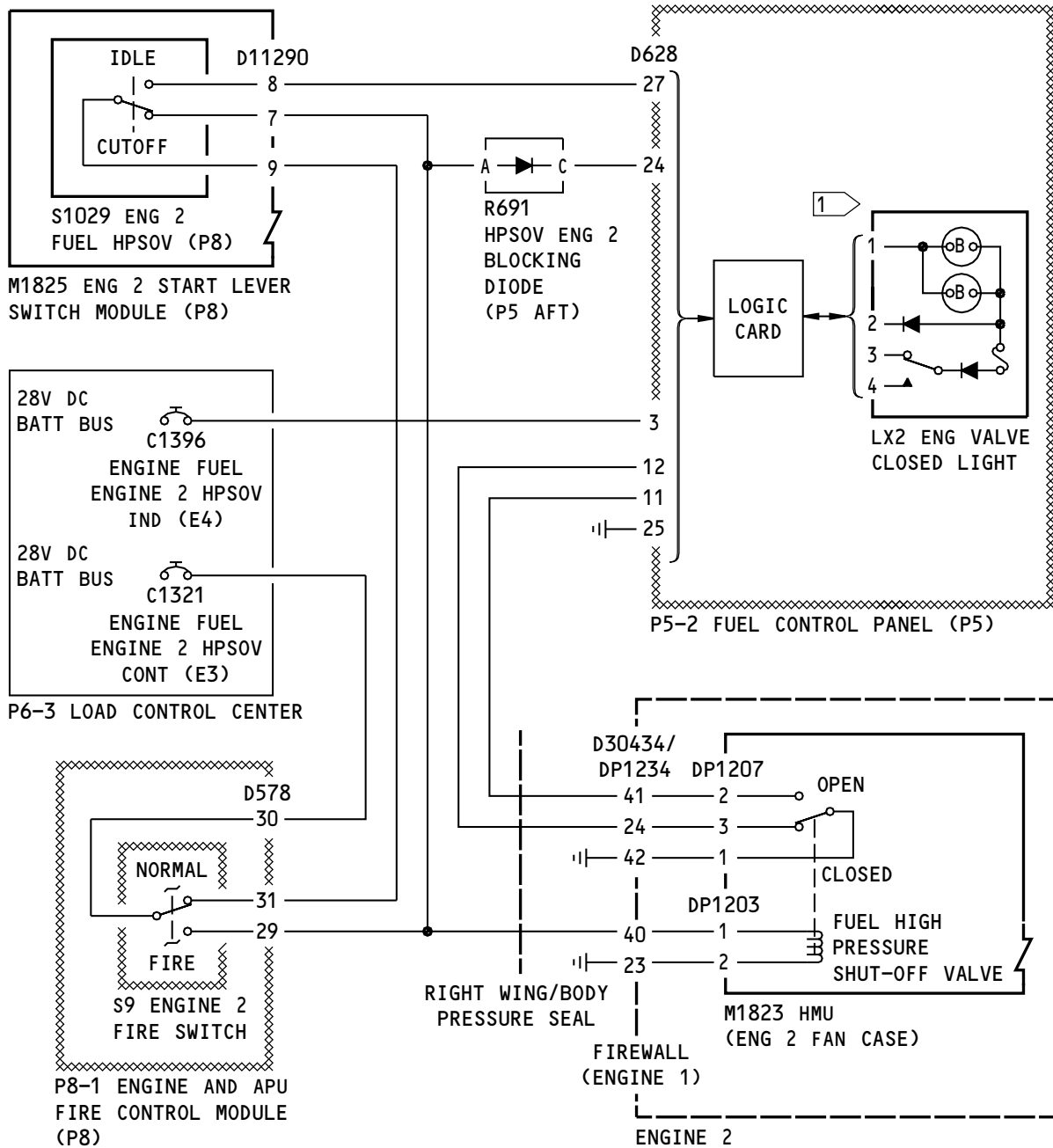
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# 737-600/700/800/900 FAULT ISOLATION MANUAL



- 1 VALVE OPEN - NO LIGHT  
 VALVE CLOSED - DIM BLUE LIGHT  
 VALVE IN DISAGREE - BRIGHT BLUE LIGHT

H97328 S0006746628\_V1

**Fuel Condition Control Simplified Schematic**  
**Figure 303/80-06-00-990-803-F00 (Sheet 4 of 4)**

EFFECTIVITY  
 AKS ALL

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FAULT ISOLATION MANUAL**

**801. Engine Motoring - No or Low Maximum Dry Motor Speed (N2 Low), Duct Pressure Low (Less Than 30 psi), START VLV OPEN Message Shows on the Engine Display - Fault Isolation**

**A. Description**

- (1) For engine motoring, N2 is zero or low with these conditions:
  - (a) The duct pressure is low (less than 30 psi)
  - (b) The START VLV OPEN message is ON.

**B. Possible Causes**

- (1) Pneumatic duct leakage
  - (a) Starter duct

**C. Circuit Breakers**

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
  - (a) This is the primary circuit breaker related to the fault:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

**D. Related Data**

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

**E. Fault Isolation Procedure**

- (1) Do this task: Test 1 - Pneumatic Leak Check, AMM TASK 71-00-00-700-809-F00.
  - (a) If leakage is found, repair or replace the ducts and couplings.
    - 1) Do the Repair Confirmation at the end of this task.
  - (b) If leakage is not found and the duct pressure is low, then do the fault isolation for the applicable bleed source.

**F. Repair Confirmation**

- (1) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.
  - (a) If the N2 is normal during the dry motor procedure, then you corrected the fault.

————— **END OF TASK** —————

EFFECTIVITY  
AKS ALL

**80-07 TASK 801**

D633A103-AKS

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**802. Engine Motoring - No or Low Maximum Dry Motor Speed (N2 Low), Duct Pressure Normal, START VLV OPEN Message Shows on the Engine Display - Fault Isolation**

**A. Description**

- (1) During engine motoring, N2 is zero or low with these conditions:
  - (a) The duct pressure is correct
  - (b) The START VLV OPEN message is ON.

**B. Possible Causes**

- (1) Starter
- (2) Accessory gearbox (AGB)
- (3) Transfer gearbox (TGB).

**C. Circuit Breakers**

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
  - (a) This is the primary circuit breaker related to the fault:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

**D. Related Data**

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

**E. Fault Isolation Procedure**

- (1) Do these two tasks:
  - (a) Look for damage to the starter; do this task: Starter Magnetic Plug Inspection, AMM TASK 80-11-01-200-801-F00.
  - (b) Look for particles in the magnetic chip detectors for the AGB/TGB; do this task: Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00
  - (c) If no contamination is found or if contamination is found on the starter MCD and/or if contamination is found on the starter MCD and on the AGB/TGB MCD, do these tasks:
    - 1) Remove the starter, do this task, Starter Removal, AMM TASK 80-11-01-000-801-F00
    - 2) Make sure that the N2 rotor turns freely and smoothly, do this task: Turn the N2 Rotor, AMM TASK 72-00-00-980-801-F00. If the Repair Confirmation is not satisfactory, then continue.
    - 3) If the N2 rotor does not turn freely, replace the engine. These are the tasks:

EFFECTIVITY  
AKS ALL

## 80-07 TASK 802

D633A103-AKS

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

- Power Plant Removal, AMM TASK 71-00-02-000-801-F00
- Power Plant Installation, AMM TASK 71-00-02-400-801-F00
- 4) If the N2 rotor turns freely, install a new starter.
  - a) Do this task, Starter Installation, AMM TASK 80-11-01-400-801-F00
  - b) Do the Repair Confirmation at the end of this task.
- (d) If contamination is found on the AGB/TGB MCD only, do this task:
  - 1) Identify the source of the debris and do the applicable action Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00.
  - 2) Do the Repair Confirmation at the end of this task.

### F. Repair Confirmation

- (1) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.

**NOTE:** A N2 rotor seizure can be found occasionally on brand new or refurbished engines. The rotating seals abradable/honeycomb can touch because of tight clearances and or lack of an engine cooling period before shutdown. This condition is not detrimental. It is recommended to let the N2 rotor become free to turn before you try a restart procedure.

- (a) If the dry motor procedure is correct, then you corrected the fault.

————— **END OF TASK** —————

## 803. Engine Start - START VLV OPEN Message Does Not Show on the Engine Display, N2 Rotation

### Normal - Fault Isolation

#### A. Description

- (1) For engine start, the START VLV OPEN message does not show and the N2 rotation is correct.

#### B. Possible Causes

- (1) Start valve, V6
- (2) Wires and connectors from the start valve to the DEU's.

#### C. Circuit Breakers

- (1) For Engine 1;
- (a) This is the primary circuit breaker related to the fault:

#### **CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
- (a) This is the primary circuit breaker related to the fault:

#### **F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

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### D. Related Data

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

### E. Fault Isolation Procedure

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure that the applicable engine start switch is in the OFF position.
  - (b) Make sure that the applicable engine start lever is in the CUTOFF position.
  - (c) Make sure that the pneumatic power is not in use.
  - (d) Do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.
- (2) Do these steps to examine the applicable START VLV OPEN circuit:
  - (a) Disconnect connector DP1202 from the start valve.
  - (b) Install a jumper from pin 4 to pin 5 of the connector DP1202.
  - (c) Put the start switch to the GRD position.
  - (d) Look for the START VLV OPEN indication on the CDS panel.
  - (e) If the indication shows, then replace the start valve for a failed position switch. These are the tasks:
    - Start Valve Removal, AMM TASK 80-11-03-000-801-F00
    - Start Valve Installation, AMM TASK 80-11-03-400-801-F00
    - 1) Do the Repair Confirmation at the end of this task.
  - (f) If the indication does not show, then do these steps:
    - 1) Examine and repair the wires and connectors from the DEU's to the start valve for an open circuit.

	VALUE CONNECTOR	DEU CONNECTOR
ENG 1	D1202 PIN 4 .....	DEU1 D3973B PIN K12
ENG 1	D1202 PIN 4 .....	DEU2 D3975B PIN K12
ENG 2	D1202 PIN 4 .....	DEU1 D3973E PIN K12
ENG 2	D1202 PIN 4 .....	DEU2 D3975E PIN K12

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

### F. Repair Confirmation

- (1) Prepare for the procedure.
  - (a) Make sure that the connector DP1202 is correctly connected to the start valve.

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- (2) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.
  - (a) If the dry motor procedure is correct, then you corrected the fault.
- (3) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

————— **END OF TASK** —————

**804. Engine Start - START VLV OPEN Message Does Not Show on the Engine Display, No N2 Rotation -  
Fault Isolation**

**A. Description**

- (1) For engine start, the START VLV OPEN message does not show and there is no N2 rotation.

**B. Possible Causes**

- (1) Start valve, V6
- (2) 28 VDC electrical power to start valve.

**C. Circuit Breakers**

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
  - (a) This is the primary circuit breaker related to the fault:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

**D. Related Data**

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

**E. Fault Isolation Procedure**

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure that the applicable engine start switch is in the OFF position.
  - (b) Make sure that the applicable engine start lever is in the CUTOFF position.
  - (c) Make sure that the pneumatic power is not in use.
  - (d) Do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.
- (2) Do this check for 28 VDC the applicable start valve:
  - (a) Disconnect connector DP1202 from the start valve.
  - (b) Put the start switch to the GRD position.
  - (c) Do a check for 28 VDC between pin 2 to pin 1 (ground) of the connector DP1202.
  - (d) If there is 28 VDC between pin 1 and pin 2, then do these steps:

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- 1) Replace the start valve. These are the tasks:
  - Start Valve Removal, AMM TASK 80-11-03-000-801-F00
  - Start Valve Installation, AMM TASK 80-11-03-400-801-F00
- 2) Do the Repair Confirmation at the end of this task.
- (e) If there is not 28 VDC between pin 1 and pin 2, then do these steps:
  - 1) Examine and repair the wires and connectors from the start switch to the start valve.

	VALVE CONNECTOR	SWITCH CONNECTOR
<b>ENG 1</b>	<b>D1202</b>	<b>S266</b>
	PIN 1 .....	GROUND
	PIN 2 .....	PIN X1
<b>ENG 2</b>	<b>D1202</b>	<b>S267</b>
	PIN 1 .....	GROUND
	PIN 2 .....	PIN X1

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

### F. Repair Confirmation

- (1) Prepare for the procedure.
  - (a) Make sure that the connector DP1202 is correctly connected to applicable start valve.
- (2) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.
  - (a) If the dry motor procedure is correct, then you corrected the fault.
- (3) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.

### — END OF TASK —

## 805. Engine Start Switch - Switch Does Not Hold In GRD Position, Switch Manually Held In GRD Position, N2 Rotation Normal - Fault Isolation

### A. Description

- (1) The engine start switch does not hold in the GRD position.
  - (a) The switch is manually held in the GRD position and N2 rotation is correct.

### B. Possible Causes

- (1) Engine start switch, S266 (Engine 1) or S267 (Engine 2)
- (2) The wires and connectors between the engine start switch and the DEU's
- (3) DEU 1, M1808
- (4) DEU 2, M1809

### C. Circuit Breakers

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

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- (2) For Engine 2;  
 (a) This is the primary circuit breaker related to the fault:

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

#### D. Related Data

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

#### E. Fault Isolation Procedure

- (1) Do this task: Start Switch Test, AMM TASK 80-11-00-730-801-F00.
  - (a) If no problem was found, then continue.
- (2) Replace one of the DEU's (the most likely subsequent LRU in the Possible Causes list). These are the tasks:
  - Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
  - (a) Do the Repair Confirmation procedure at the end of this task.
  - (b) If the Repair Confirmation is not satisfactory, then continue.
- (3) Replace the other DEU (the most likely subsequent LRU in the Possible Causes list). These are the tasks:
  - Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
  - (a) Do the Repair Confirmation procedure at the end of this task.

#### F. Repair Confirmation

- (1) Prepare for the procedure.
  - (a) Make sure that the applicable engine start switch is correctly installed and connected.
  - (b) Make sure that the DEU's are installed.
- (2) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.
  - (a) If the dry motor procedure is correct, then you corrected the fault.

————— END OF TASK —————

### 806. Engine Start Switch - Switch Does Not Hold In GRD Position, Switch Manually Held In GRD Position, No N2 Rotation - Fault Isolation

#### A. Description

- (1) The engine start switch does not hold in the GRD position.
  - (a) The switch is manually held in the GRD position and there is no N2 rotation.

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### B. Possible Causes

- (1) Engine start switch:
  - S266 (Engine 1)
  - S267 (Engine 2)
- (2) No 28 VDC electrical power to engine start switch.

### C. Circuit Breakers

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
  - (a) This is the primary circuit breaker related to the fault:

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

### D. Related Data

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

### E. Fault Isolation Procedure

- (1) Do this task: Start Switch Test, AMM TASK 80-11-00-730-801-F00.
  - (a) Do the Repair Confirmation at the end of this task.

### F. Repair Confirmation

- (1) Prepare for the procedure.
  - (a) Make sure that the applicable engine start switch is correctly installed and connected.
- (2) Do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00.
  - (a) If the dry motor procedure is correct, then you corrected the fault.

————— **END OF TASK** —————

## 807. Engine Start Switch - Switch Moves Away GRD Before N2 is at 55 Percent - Fault Isolation

### A. Description

- (1) The engine start switch moves from the GRD to the OFF position before N2 is at 55 percent and the engine started.

### B. Possible Causes

- (1) DEU 1, M1808
- (2) DEU 2, M1809

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### C. Circuit Breakers

- (1) For Engine 1, these are the primary circuit breakers related to the fault:
  - (a) This is the circuit breaker:

#### CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2, these are the primary circuit breakers related to the fault:
  - (a) This is the circuit breaker:

#### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

### D. Related Data

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

### E. Fault Isolation Procedure

- (1) Replace one of the DEU's (the most likely subsequent LRU in the Possible Causes list). These are the tasks:
  - Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
  - (a) Do the Repair Confirmation procedure at the end of this task.
  - (b) If the Repair Confirmation is not satisfactory, then continue.
- (2) Replace the other DEU (the most likely subsequent LRU in the Possible Causes list). These are the tasks:
  - Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
  - (a) Do the Repair Confirmation procedure at the end of this task.

### F. Repair Confirmation

- (1) Prepare for the procedure.
  - (a) Make sure that the DEU's are installed.
- (2) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
  - (a) If the start procedure is correct, then you corrected the fault.

————— END OF TASK —————

## 808. Engine Start Switch - Switch Stays In GRD Position After N2 Is More Than 55 Percent, Engine Started - Fault Isolation

### A. Description

- (1) The engine start switch stays in the GRD position after N2 is more than 55 percent and the engine started.

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**B. Possible Causes**

- (1) Engine start switch, S266 (Eng 1) or S267 (Eng 2)
- (2) The wires and connectors between the engine start switch and the DEU's
- (3) DEU 1, M1808
- (4) DEU 2, M1809.

**C. Circuit Breakers**

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;
  - (a) This is the primary circuit breaker related to the fault:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

**D. Related Data**

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

**E. Fault Isolation Procedure**

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure that these circuit breakers are closed:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	5	C01359	DISPLAY DEU 1 PRI

**F/O Electrical System Panel, P6-1**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP
D	11	C01360	DISPLAY DEU 2 PRI

- (b) Make sure that the applicable start lever is in the CUTOFF position.
- (c) Make sure that pneumatic power is not in use.
- (d) Get access to the E3-1 shelf in the EE bay:
  - 1) Open this access panel:

<u>Number</u>	<u>Name/Location</u>
117A	Electronic Equipment Access Door

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- (2) Do this check of the engine start switch:

**NOTE:** The steps that follow will examine the coil in the engine start switch by closing and then opening the engine start valve circuit breaker.

- (a) For Engine 1;

Make sure that this circuit breaker is closed:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (b) For Engine 2;

Make sure that this circuit breaker is closed:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

- (c) Move the applicable engine start switch to the GND position and make sure it stays in the GND position.

- (d) For Engine 1

Make sure that this circuit breaker is open:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (e) For Engine 2;

Make sure that this circuit breaker is open:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

- (f) Make sure the applicable engine start switch moves to the OFF position.

- (g) If the engine start switch does not stay in the GND position with the circuit breaker closed or if the switch does not move to the OFF position with the circuit breaker open, then do these steps:

- 1) Replace the applicable engine start switch.
- 2) Do the Repair Confirmation at the end of this task.

- (3) Do this wiring check to examine the wires and connectors between the start switch and the DEU's:

- (a) Remove the applicable engine start switch on the P5 pilots overhead panel.
- (b) To remove the DEU's, do this task: Display Electronic Unit Removal, AMM TASK 31-62-21-000-801.
- (c) Measure the resistance between these pins to look for a short to ground.

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SWITCH		CONNECTOR	RESISTANCE
S266	PIN X1	DEU1 D3973B PIN H4	LESS THAN 10 OHMS
	PIN X1	DEU2 D3975B PIN H4	LESS THAN 10 OHMS
	PIN X1 TO THE AIRPLANE GROUND		GREATER THAN 1 MEGOHM
S267	PIN X1	DEU1 D3973E PIN H4	LESS THAN 10 OHMS
	PIN X1	DEU2 D3975E PIN H4	LESS THAN 10 OHMS
	PIN X1 TO THE AIRPLANE GROUND		GREATER THAN 1 MEGOHM

- (d) If the resistance is not in the specified range, then repair or replace the applicable wire.
- 1) Do the Repair Confirmation at the end of this task.
- (e) If the resistance is in the specified range, then continue.
- (4) Replace one of the DEU's (the most likely LRU in the Possible Causes list). These are the tasks:
- Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
- (a) Do the Repair Confirmation procedure at the end of this task.
  - (b) If the Repair Confirmation is not satisfactory, then continue.
- (5) Replace the other DEU (the most likely LRU in the Possible Causes list). These are the tasks:
- Display Electronic Unit Removal, AMM TASK 31-62-21-000-801
  - Display Electronic Unit Installation, AMM TASK 31-62-21-400-801
- (a) Do the Repair Confirmation procedure at the end of this task.

**F. Repair Confirmation**

- (1) Prepare for the procedure.
  - (a) Make sure that the applicable engine start switch is correctly installed and connected.
  - (b) Make sure that the DEU's are installed.
  - (c) Make sure that these circuit breakers are closed:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	5	C01359	DISPLAY DEU 1 PRI

**F/O Electrical System Panel, P6-1**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP

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**F/O Electrical System Panel, P6-1**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	11	C01360	DISPLAY DEU 2 PRI

(d) For Engine 1;

- 1) Remove the safety tag and close this circuit breaker:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

(e) For Engine 2;

- 1) Remove the safety tag and close this circuit breaker:

**F/O Electrical System Panel, P6-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

(2) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.

- (a) If the start procedure is correct, then you corrected the fault.
- (b) Close the access panel,

<u>Number</u>	<u>Name/Location</u>
117A	Electronic Equipment Access Door

————— **END OF TASK** —————

### 809. Start Valve - START VLV OPEN message flashes (10 seconds) and stays ON during engine operation - Fault Isolation

**A. Description**

- (1) During engine operation, the START VLV OPEN message flashes (10 seconds) and stays ON to show an uncommanded open start valve.

**B. Possible Causes**

- (1) Start valve, V6
- (2) Wires and connectors from the DEUs to the start valve

**C. Circuit Breakers**

- (1) For Engine 1;
  - (a) This is the primary circuit breaker related to the fault:

**CAPT Electrical System Panel, P18-2**

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	8	C01103	ENGINE 1 START VALVE

- (2) For Engine 2;

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

### F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
C	4	C00154	ENGINE 2 START VALVE

#### D. Related Data

- (1) Component Location (Figure 301)
- (2) Simplified Schematic (Figure 302)
- (3) (WDM 80-11-11)
- (4) (SSM 80-11-11)

#### E. Fault Isolation Procedure

- (1) Do these steps to prepare for the procedure:
  - (a) Make sure that the applicable engine start switch is in the OFF position.
  - (b) Make sure that the applicable engine start lever is in the CUTOFF position.
  - (c) Make sure that the pneumatic power is not in use.
  - (d) Do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.
- (2) Do these steps to examine the applicable start valve position switch:
  - (a) Disconnect connector DP1202 from the start valve.
  - (b) Look for an open circuit between pin 4 and pin 5 on the valve.
    - 1) If there is continuity, replace the start valve. These are the tasks:
      - Start Valve Removal, AMM TASK 80-11-03-000-801-F00
      - Start Valve Installation, AMM TASK 80-11-03-400-801-F00
    - 2) If there is an open circuit, then examine the circuit from DEU1 and DEU2 to the applicable start valve.

	<b>VALUE CONNECTOR</b>	<b>DEU CONNECTOR</b>
<b>ENG 1</b>	<b>D1202</b>	<b>DEU1 D3973B</b>
	PIN 4 .....	PIN K12
<b>ENG 1</b>	<b>D1202</b>	<b>DEU2 D3975B</b>
	PIN 4 .....	PIN K12
<b>ENG 2</b>	<b>D1202</b>	<b>DEU1 D3973E</b>
	PIN 4 .....	PIN K12
<b>ENG 2</b>	<b>D1202</b>	<b>DEU2 D3975E</b>
	PIN 4 .....	PIN K12

- a) Look for a short to ground. Repair the problem that you find
  - c) Do the Repair Confirmation at the end of this task.

EFFECTIVITY  
AKS ALL

## 80-07 TASK 809

D633A103-AKS

**737-600/700/800/900  
FAULT ISOLATION MANUAL****F. Repair Confirmation**

- (1) Prepare for the procedure.
  - (a) Make sure that the connector DP1202 is correctly connected to the start valve.
- (2) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.
  - (a) Let the engine operate at idle.
  - (b) If the start valve operation is correct, then you corrected the fault.
  - (c) Do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00.

———— **END OF TASK** ————

EFFECTIVITY  
AKS ALL

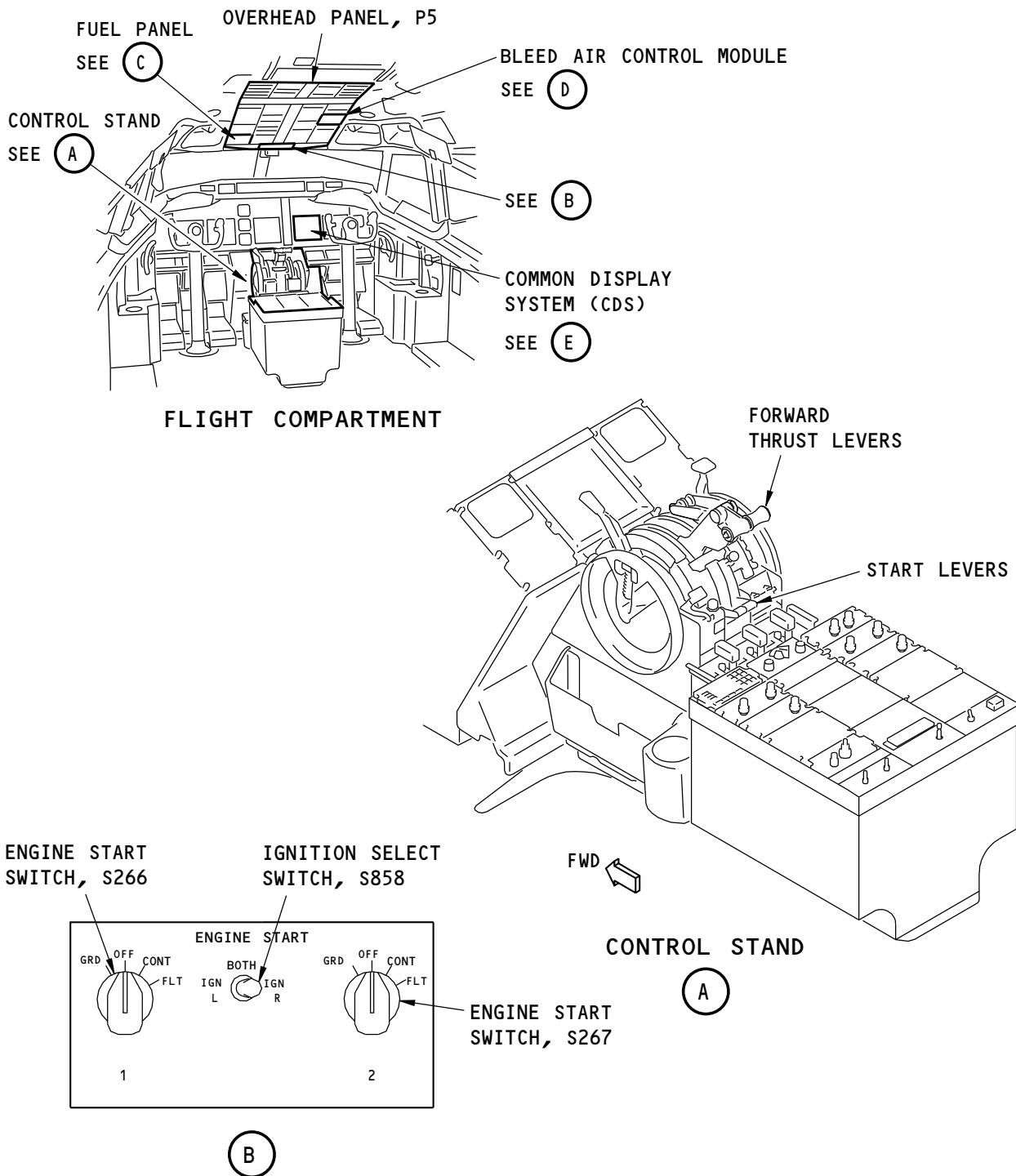
**80-07 TASK 809**

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



H95335 S0006746646\_V1

**Starting System - Component Location**  
Figure 301/80-07-00-990-801-F00 (Sheet 1 of 3)

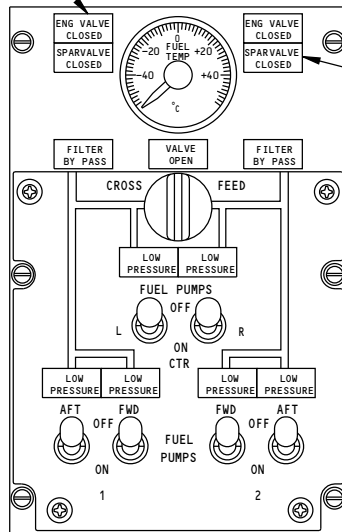
EFFECTIVITY  
AKS ALL

## 80-07 TASK SUPPORT

D633A103-AKS

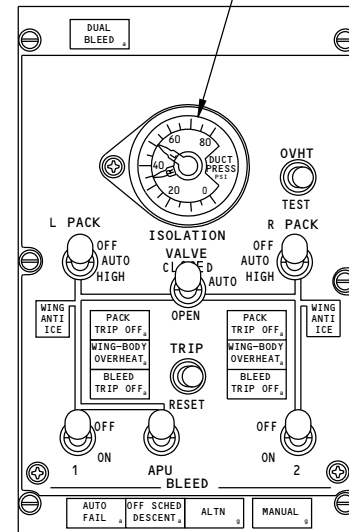
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## 737-600/700/800/900 FAULT ISOLATION MANUAL

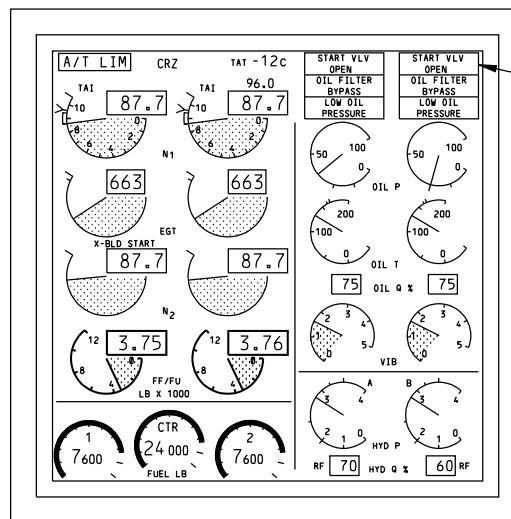
ENGINE VALVE  
CLOSED LIGHTS

FUEL PANEL (P5-2)

C

DUCT  
PRESSUREBLEED AIR CONTROL  
MODULE (P5-10)

D

START VALVE  
OPEN MESSAGES

CDS - ENGINE DISPLAYS

E

H96971 S0006746649\_V1

Starting System - Component Location  
Figure 301/80-07-00-990-801-F00 (Sheet 2 of 3)

EFFECTIVITY  
AKS ALL

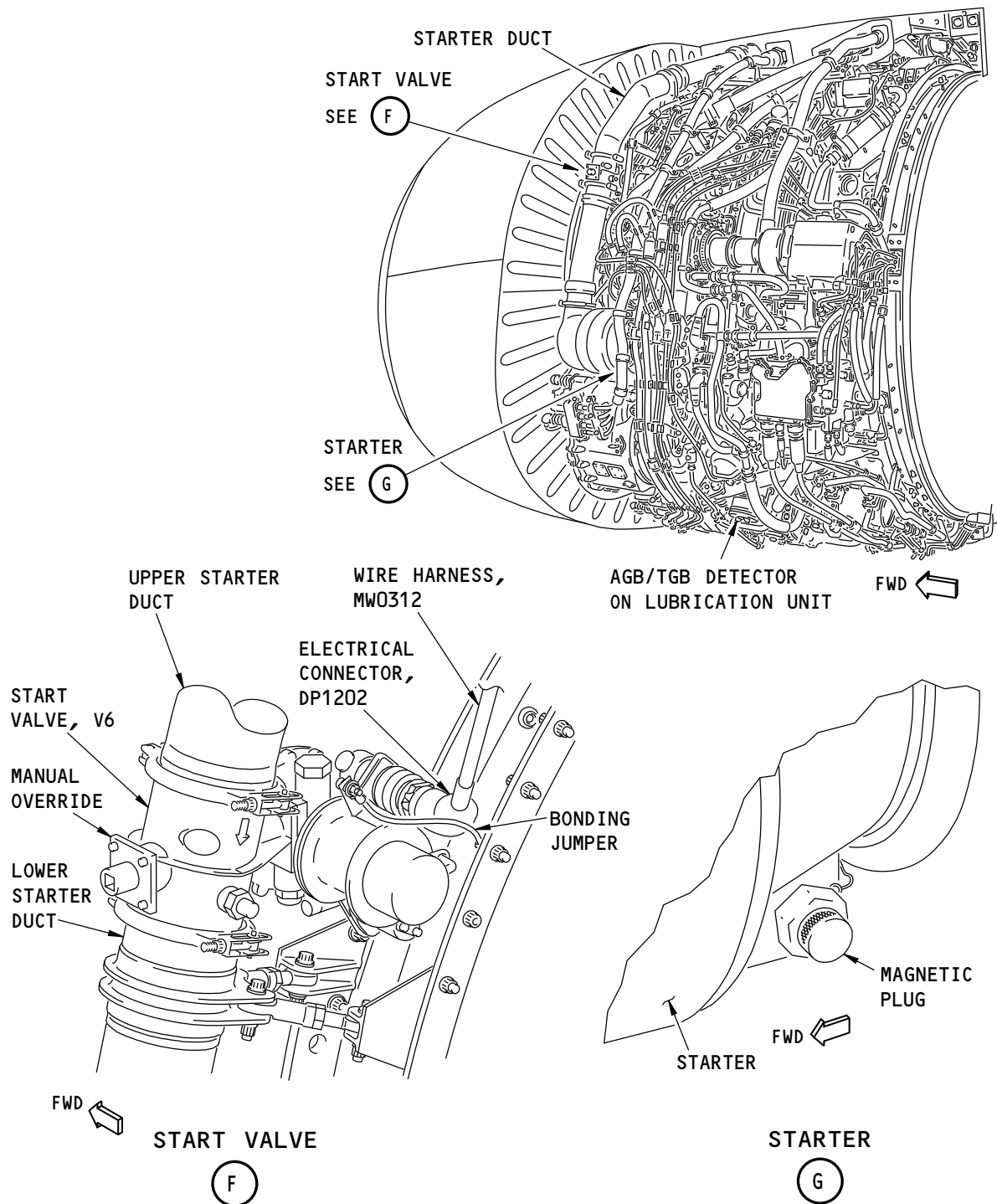
# 80-07 TASK SUPPORT

D633A103-AKS

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



H95579 S0006746650\_V1

**Starting System - Component Location**  
Figure 301/80-07-00-990-801-F00 (Sheet 3 of 3)

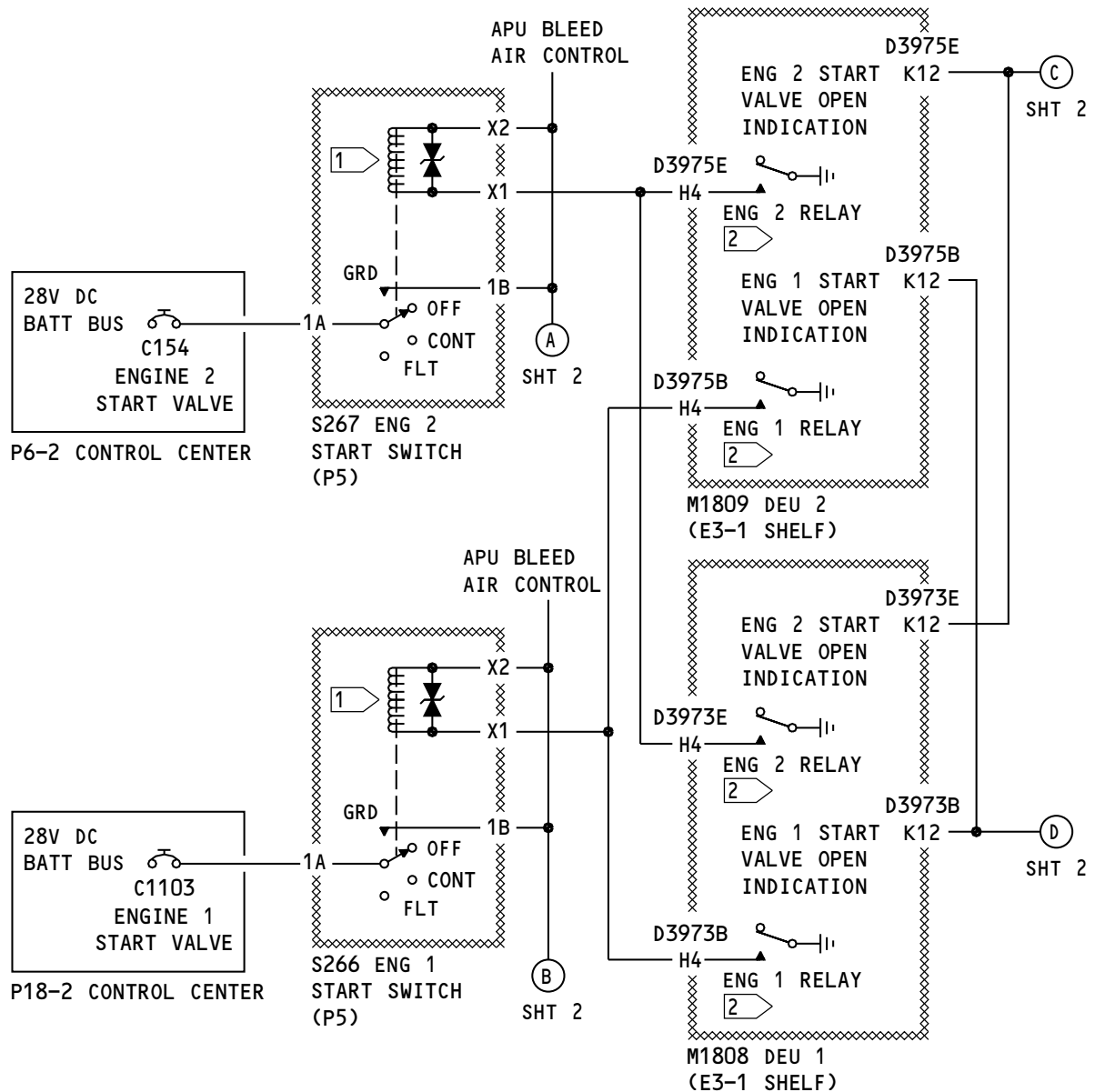
EFFECTIVITY  
AKS ALL

## 80-07 TASK SUPPORT

D633A103-AKS

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



1 THE COIL HOLDS THE START SWITCH IN THE GRD POSITION UNTIL  $N_2 > 53.25\%$  RPM

2 ENGINE RELAY ENERGIZES  
WHEN:  $N_2 < 55.3\%$  RPM  
OR THE EEC STARTER CUTOFF  
DISCRETE IS RESET

H97240 S0006746651\_V1

Starting Simplified Schematic  
Figure 302/80-07-00-990-802-F00 (Sheet 1 of 2)

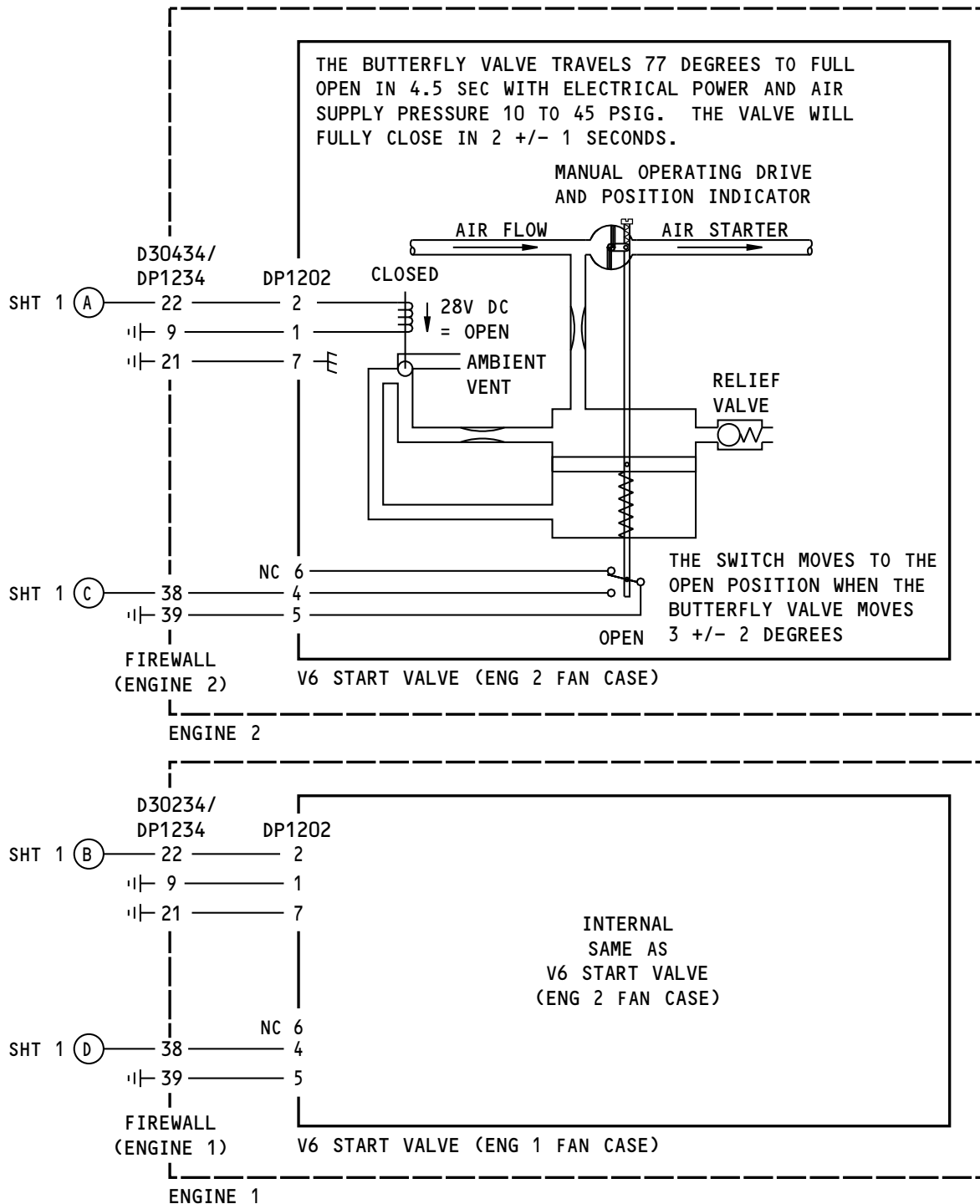
EFFECTIVITY  
AKS ALL

## 80-07 TASK SUPPORT

D633A103-AKS

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



H97251 S0006746652\_V1

Starting Simplified Schematic  
Figure 302/80-07-00-990-802-F00 (Sheet 2 of 2)

EFFECTIVITY  
AKS ALL

## 80-07 TASK SUPPORT

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