CHAPTER

80

STARTING

(CFM56 ENGINES (CFM56-7))

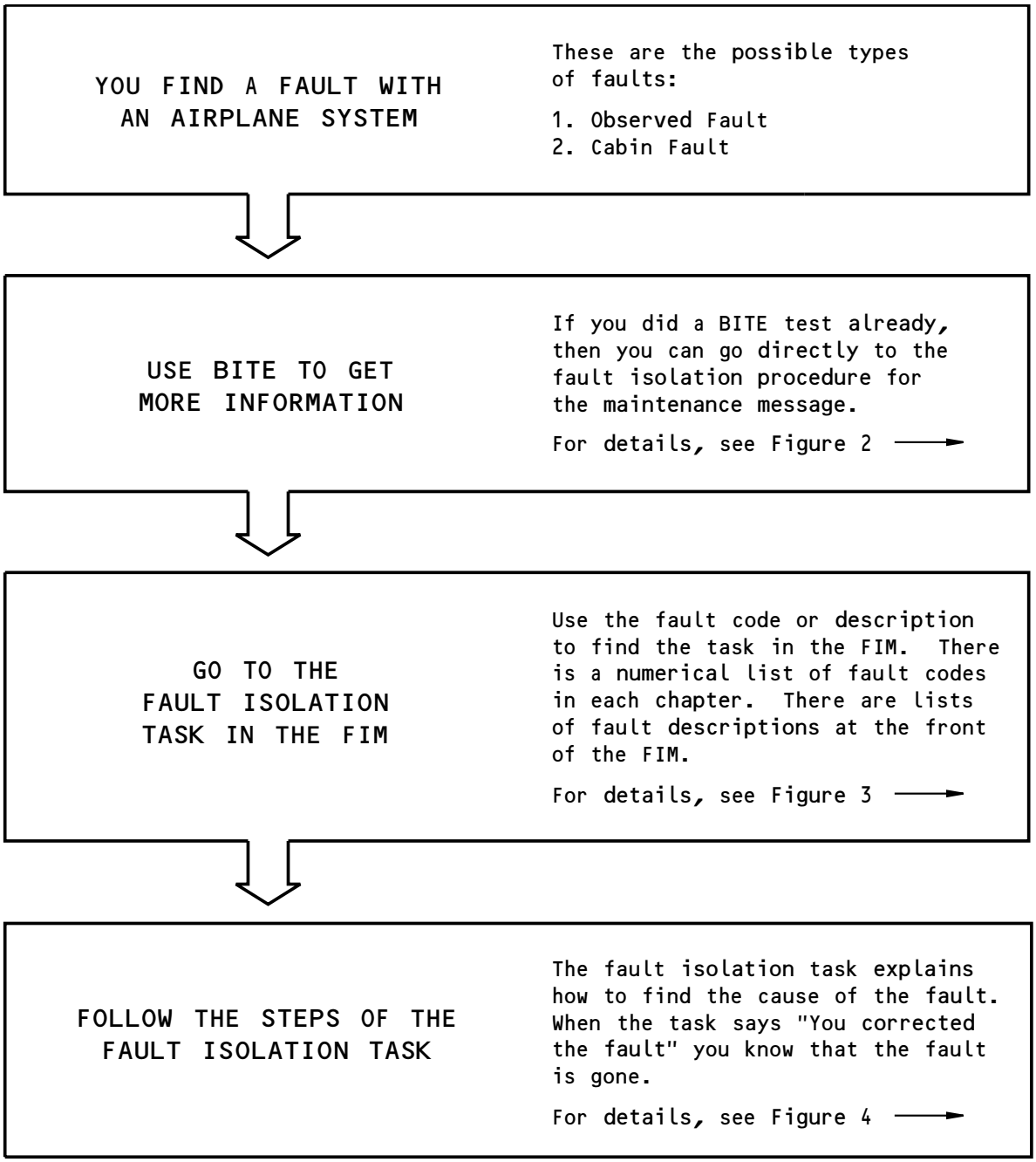
BOEING

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

CHAPTER 80
STARTING

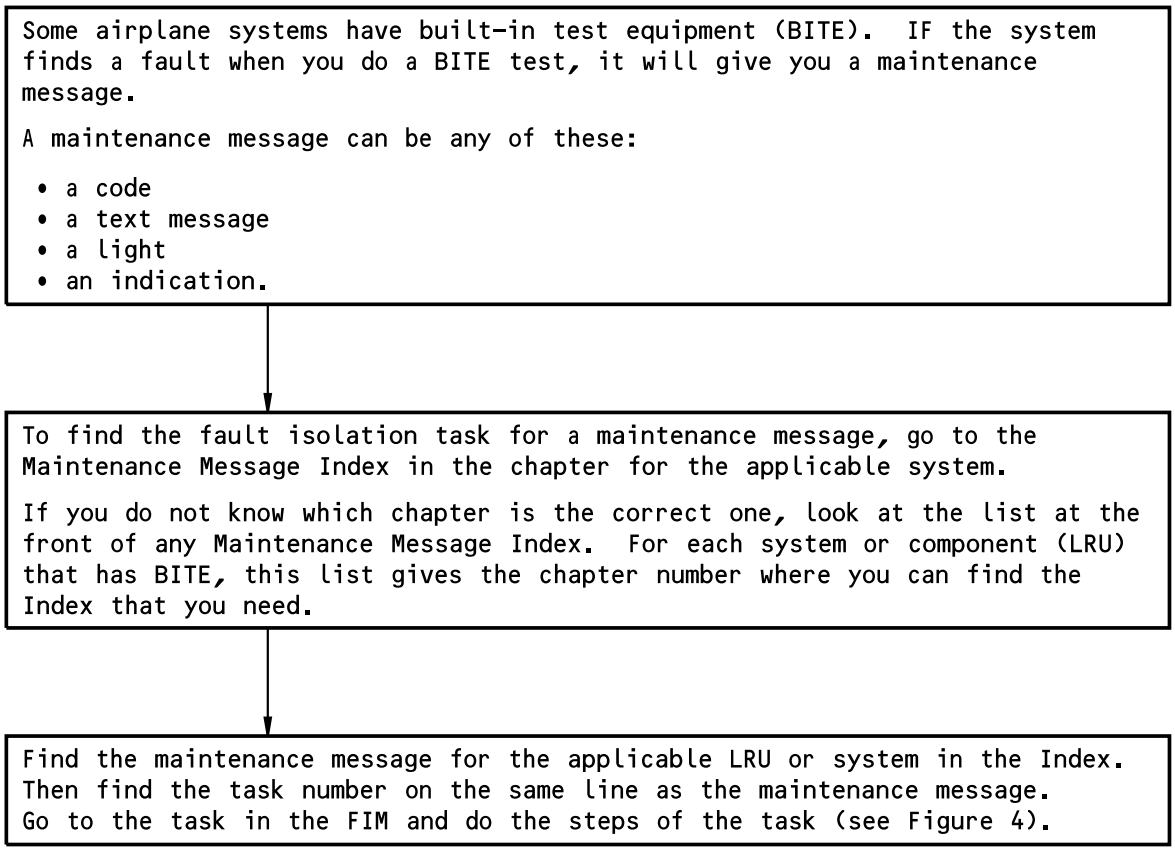
A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

80-EFFECTIVE PAGES



G04902 S0000148576_V1

Basic Fault Isolation Process
Figure 1



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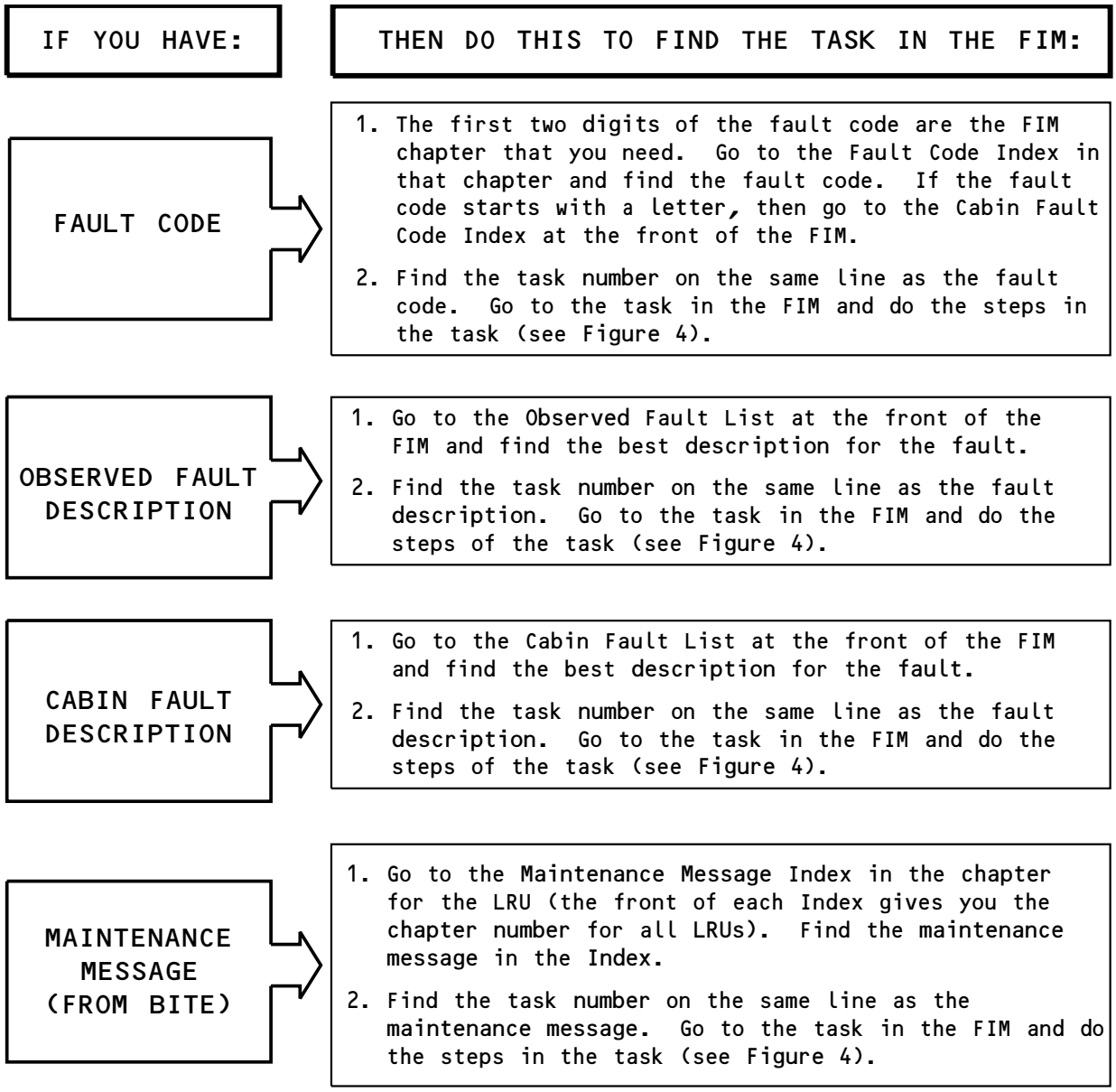
Getting Fault Information from BITE
Figure 2



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Finding the Fault Isolation Task in the FIM
Figure 3

ASSUMED CONDITIONS AT START OF TASK

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

POSSIBLE CAUSES

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

INITIAL EVALUATION PARAGRAPH

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

FAULT ISOLATION STEPS

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

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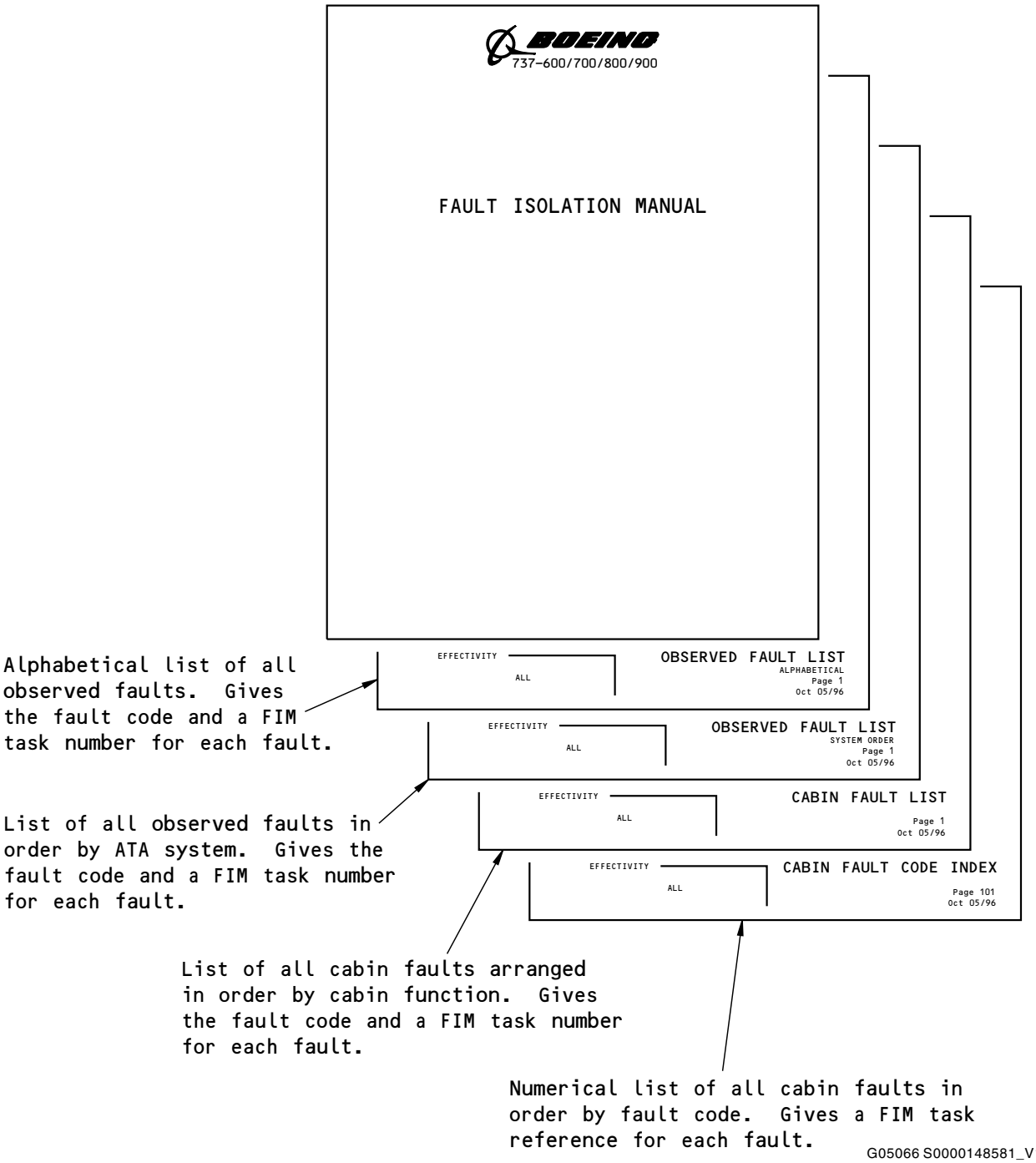
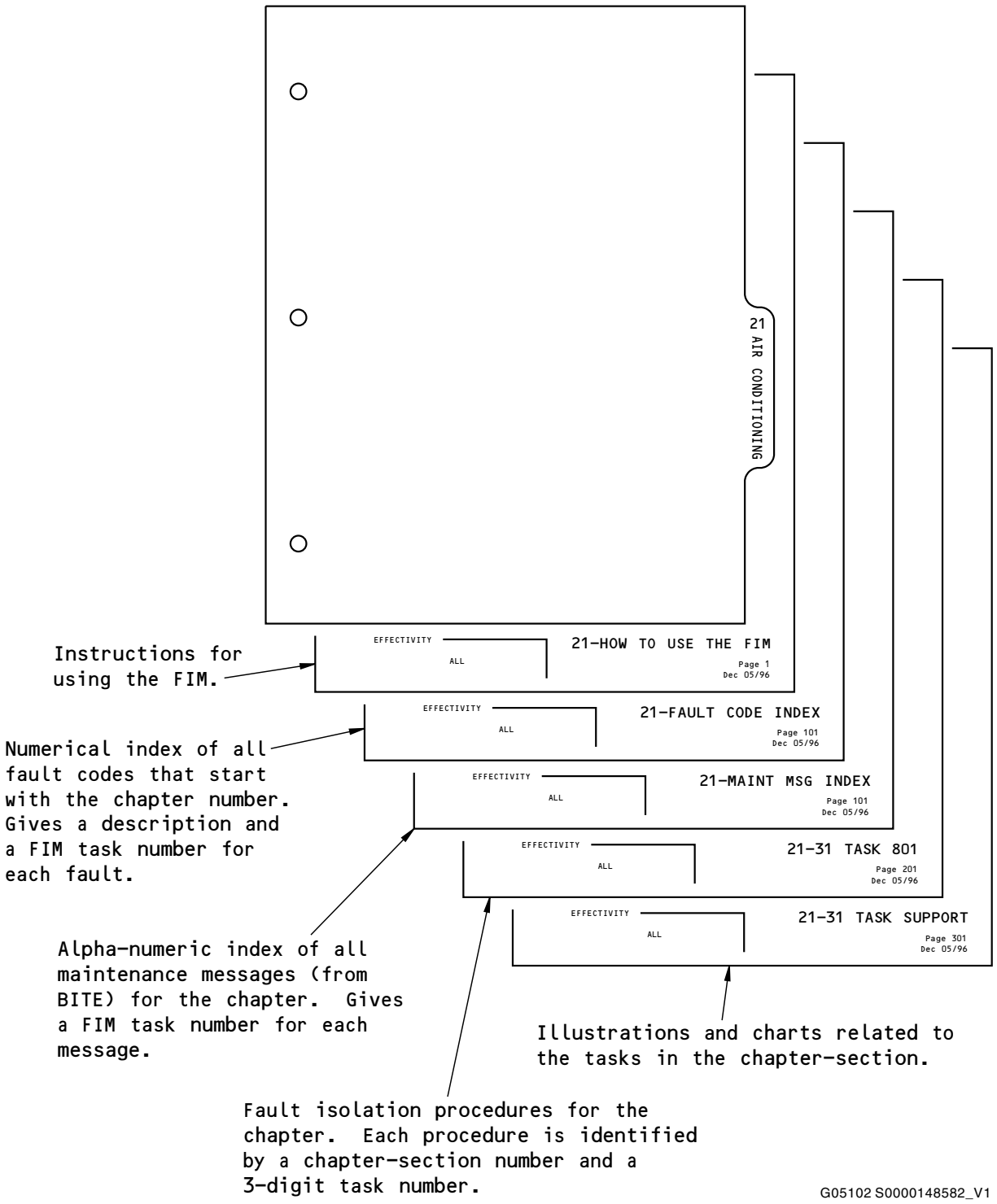
Doing the Fault Isolation Task
Figure 4



Subjects at Front of FIM
Figure 5



Subjects in Each FIM Chapter
Figure 6

FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
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 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 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
800 110 51	Engine start: no N1 rotation, EGT and N2 increase normal, engine started - engine 1.	80-05 TASK 805

FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
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 EGT Rise (no Lightoff) during L (R) Engine start attempt; Duct Pressure and N2 Normal and SPAR VALVE CLOSED Light is ON - engine 1.	80-06 TASK 802
800 150 52	Engine start: No EGT Rise (no Lightoff) during L (R) Engine start attempt; Duct Pressure and N2 Normal and SPAR VALVE CLOSED Light is 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 EGT Rise (no Lightoff) during L (R) Engine start attempt and Zero Fuel Flow indicated; ENG VALVE CLOSED and SPAR VALVE CLOSED Lights are OFF - engine 1.	80-06 TASK 805
800 200 52	Engine start: No EGT Rise (no Lightoff) during L (R) Engine start attempt and Zero Fuel Flow indicated; 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

FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
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
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

801. Engine Start - EGT Indication Flashing 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) Hydro-Mechanical Unit (HMU), M1823

(4) Electronic Engine Control (EEC), M1818.

(5) Bleed air check valve (Stage 5)

(6) Pressure Regulating and Shutoff Valve (PRSOV)

C. Related Data

(1) Component Location (80-05 TASK SUPPORT Figure 301)

D. 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. This is the 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. 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 Inspection, AMM TASK 36-11-02-200-801.

(a) If you find a problem during the inspection, then do the corrective action shown in the inspection procedure.

1) Do the repair confirmation at the end of this task.

(b) If you don't find a problem during the inspection, then install the bleed air check valve and continue.

1) This is the task: Bleed Air Check Valve - Installation, AMM TASK 36-11-02-400-801.

(5) On the opposite engine, do this task: Engine Bleed Air System Health Check, AMM TASK 36-11-00-700-801.

(6) 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.

(7) If the fuel flow was high during the start, replace the HMU, M1823. 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.

E. 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 problem.

——— 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 (80-05 TASK SUPPORT 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,

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 task: Bleed Air Check Valve Inspection, AMM TASK 36-11-02-200-801.
(a) If you find a problem during the inspection, then do the corrective action shown in the inspection procedure.
1) Do the repair confirmation at the end of this task.

(b) If you don't find a problem during the inspection, then install the bleed air check valve and continue.
1) This is the task: Bleed Air Check Valve - Installation, AMM TASK 36-11-02-400-801.

(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:

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 (80-05 TASK SUPPORT 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.

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.

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

Row	Col	Number	Name
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

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

D. Related Data

(1) Component Location (80-05 TASK SUPPORT 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.

(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.

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(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.

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) Hydro-Mechanical Unit (HMU), M1823

(2) Engine fuel pump

(3) Variable Stator Vane (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

(8) Fuel Nozzles from positions 7, 8, 14, and 15.

C. Circuit Breakers

(1) Not Applicable

D. Related Data

(1) Component Location (80-05 TASK SUPPORT 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 this task: Bleed Air Check Valve Inspection, AMM TASK 36-11-02-200-801.

(a) If you find a problem during the inspection, then do the corrective action shown in the inspection procedure.

1) Do the repair confirmation at the end of this task.

(b) If you don't find a problem during the inspection, then install the bleed air check valve and continue.

1) This is the task: Bleed Air Check Valve - Installation, AMM TASK 36-11-02-400-801.

(3) 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.

(4) 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.

(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.

(5) 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.

(6) 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.

(7) 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.

(8) 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.

(9) 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.

(10) 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.

(11) Replace the Fuel Nozzles from positions 7, 8, 14, and 15.

NOTE: Fuel Nozzles from positions 7, 8, 14, and 15 are installed adjacent to each Igniter Plug at the 4 o'clock and 8 o'clock positions.

(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)

C. Circuit Breakers

(1) Not Applicable

D. Related Data

(1) Component Location (80-05 TASK SUPPORT 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, this is the task: Standard Engine Wiring and Equipment Check, 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.

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

g) If you did not find a problem, then continue.

3) Do a continuity check from pin D to pin E, pin D to structure ground and pin E to structure ground 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.

(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) Do this task: Bleed Air Check Valve Inspection, AMM TASK 36-11-02-200-801.

(a) If you find a problem during the inspection, then do the corrective action shown in the inspection procedure.

1) Do the repair confirmation at the end of this task.

(b) If you don't find a problem during the inspection, then install the bleed air check valve and continue.

1) This is the task: Bleed Air Check Valve - Installation, 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.

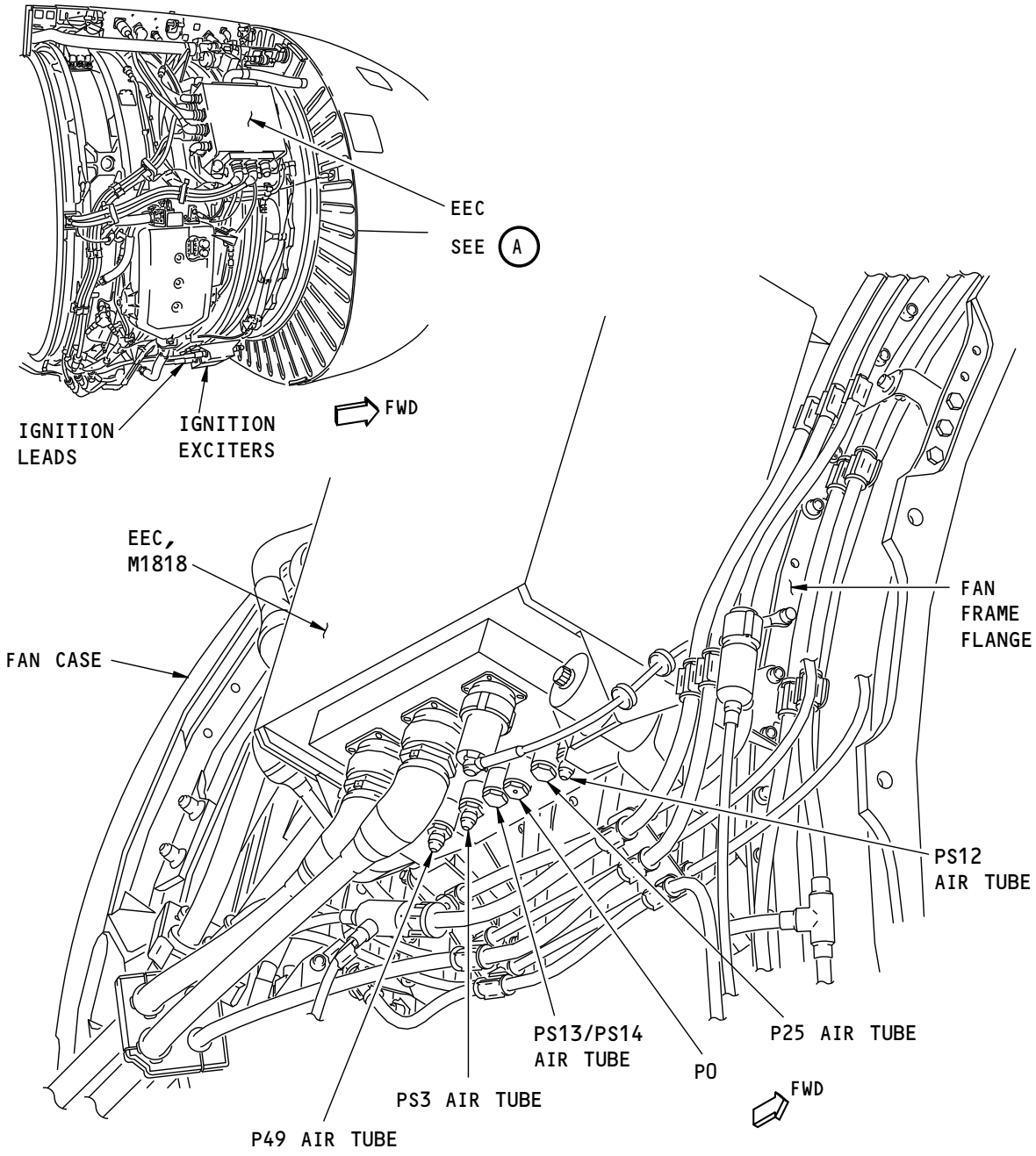
(2) Do this task: IDENT/CONFIG, AMM TASK 73-21-00-700-808-F00.

(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 ———

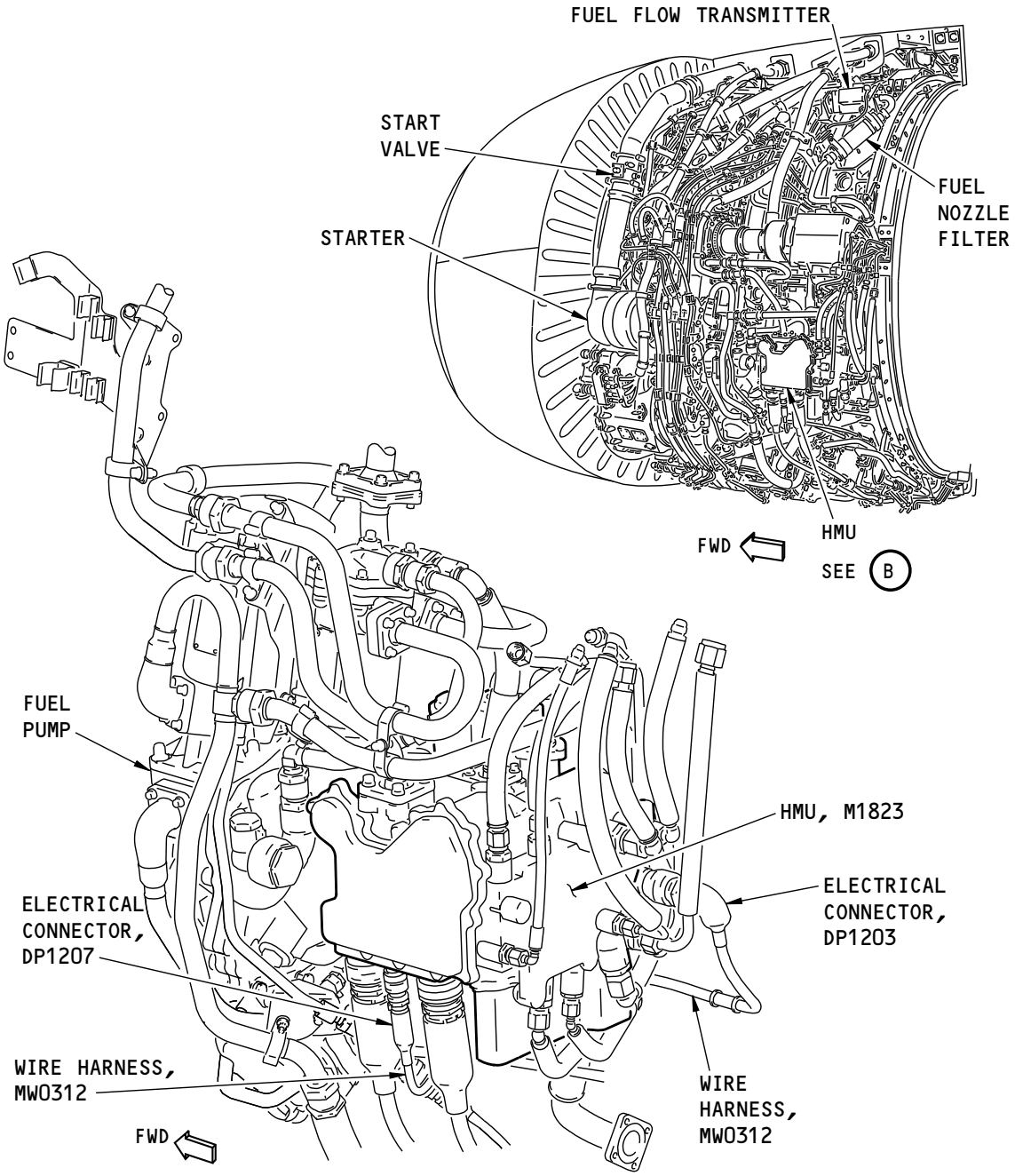


ELECTRONIC ENGINE CONTROLLER (EEC)

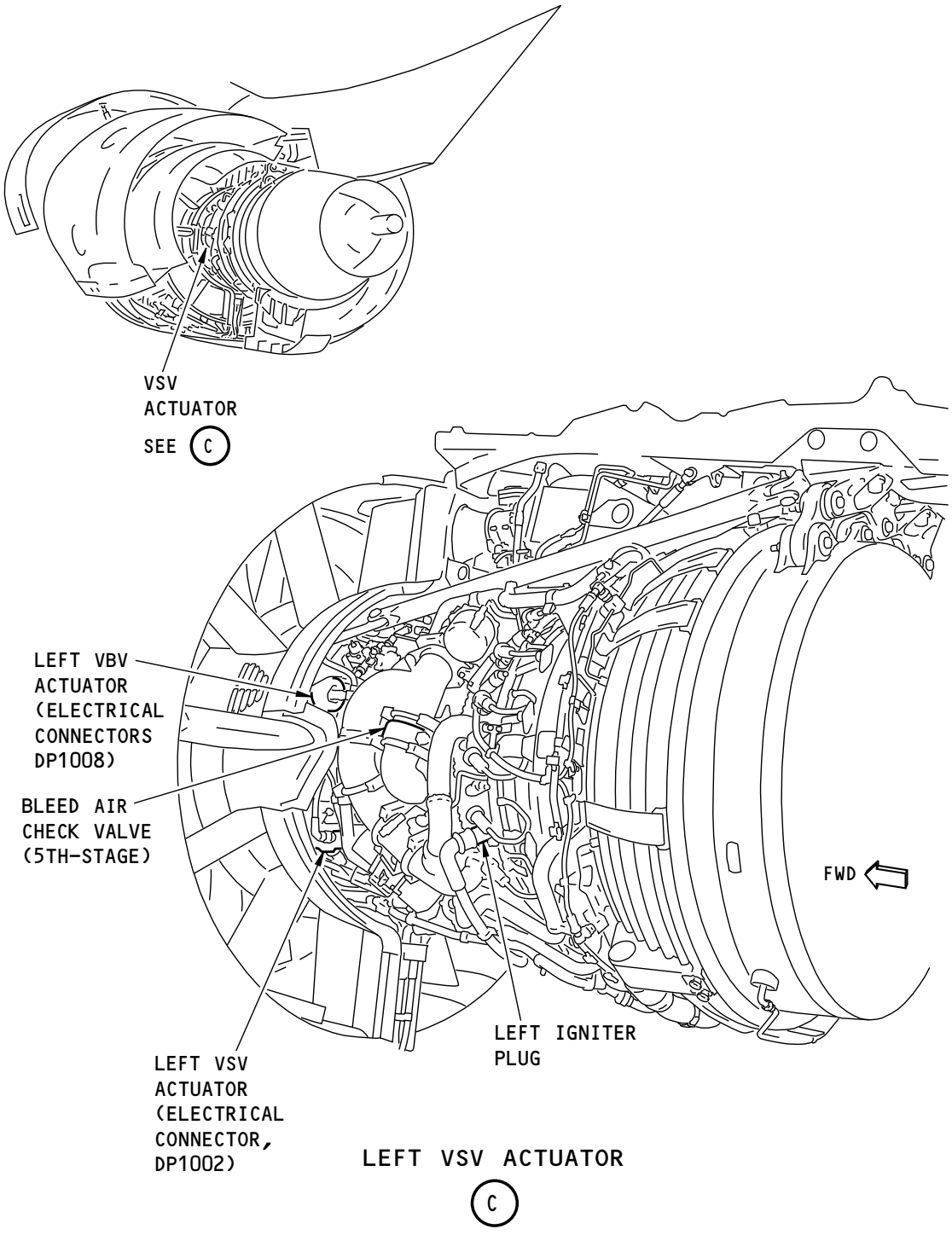
A

H95456 S0006746604_V1

Starting System - Component Location
Figure 301/80-05-00-990-801-F00 (Sheet 1 of 5)

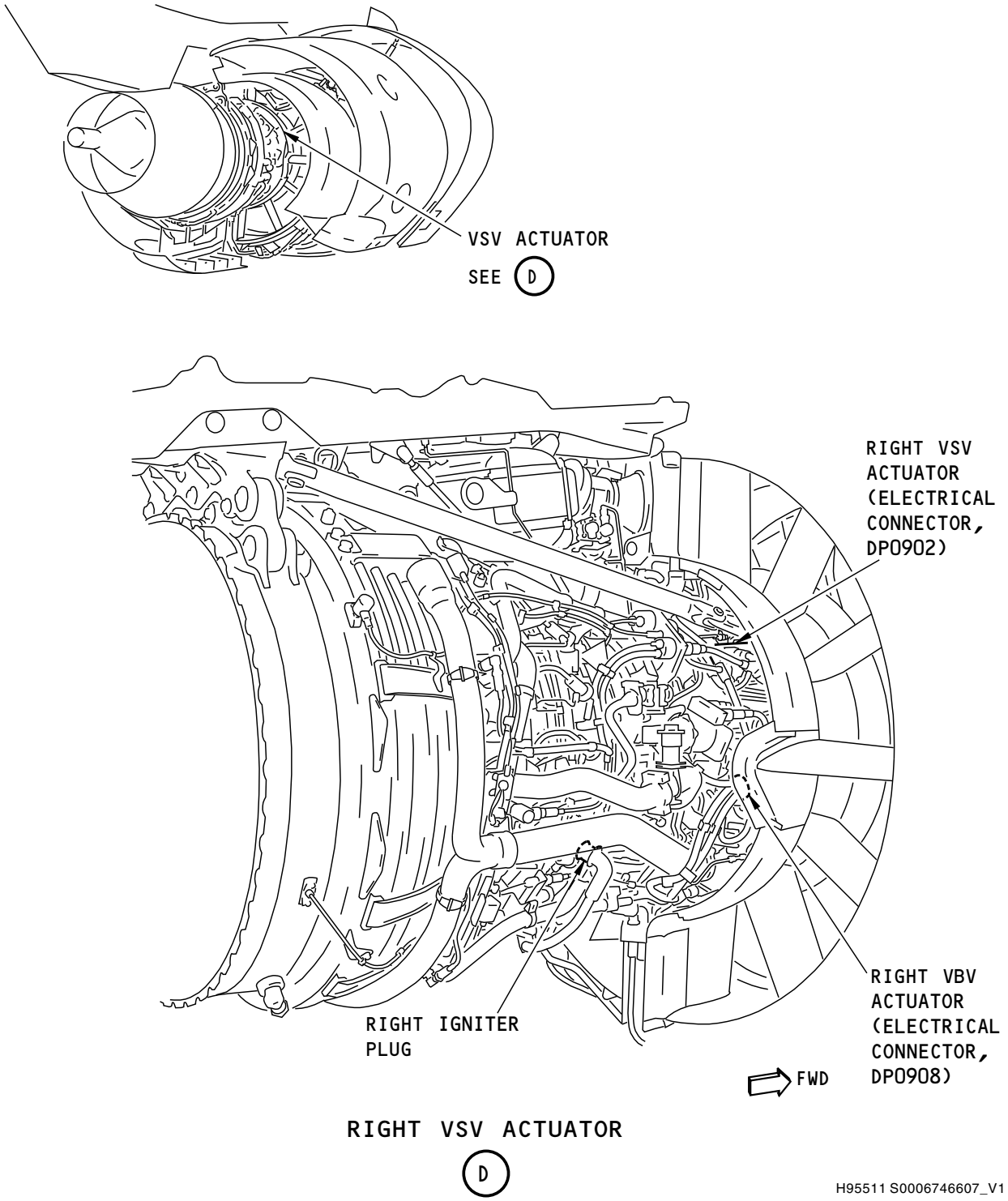


Starting System - Component Location
Figure 301/80-05-00-990-801-F00 (Sheet 2 of 5)

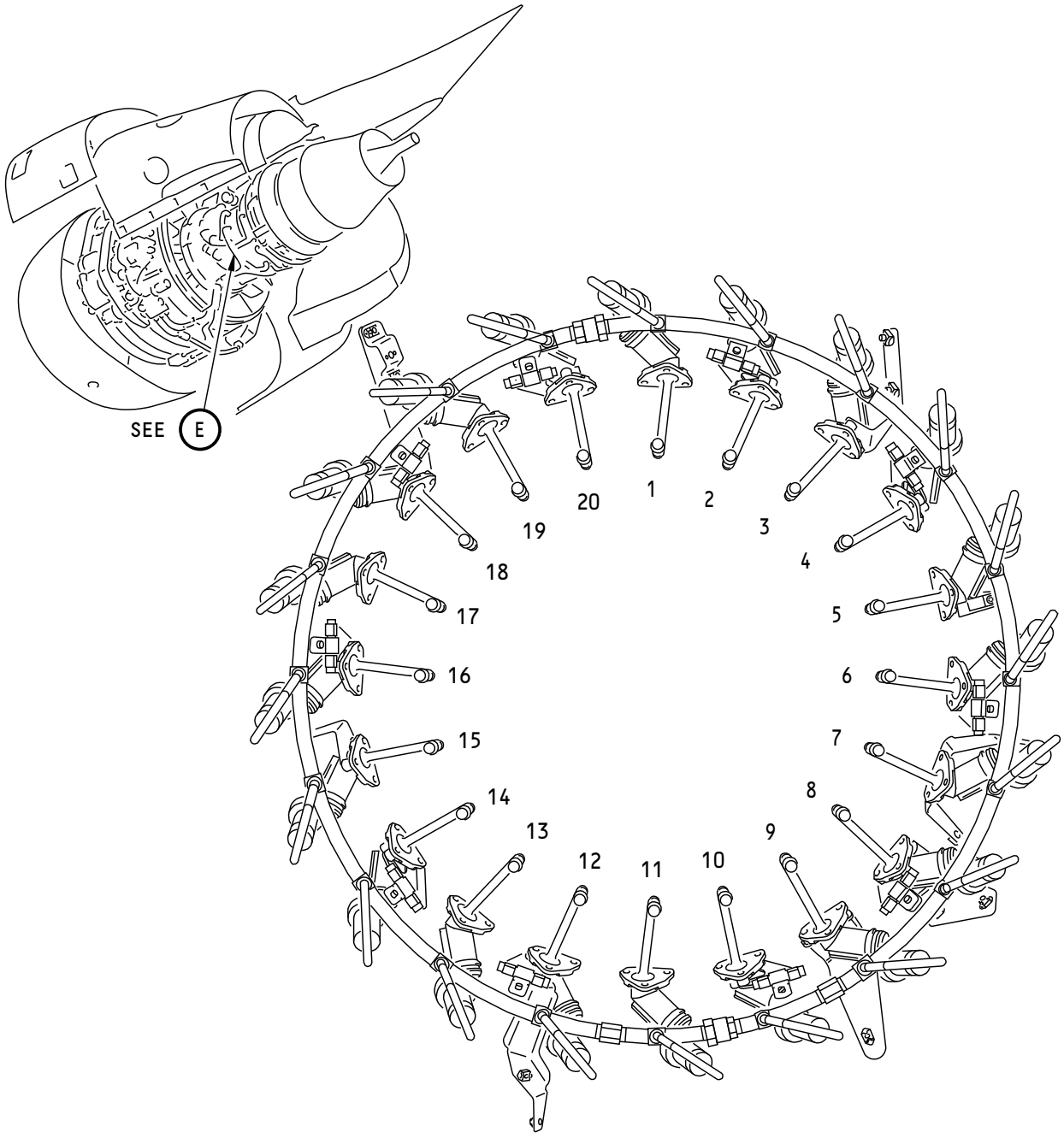


H95496 S0006746606_V1

Starting System - Component Location
Figure 301/80-05-00-990-801-F00 (Sheet 3 of 5)



Starting System - Component Location
Figure 301/80-05-00-990-801-F00 (Sheet 4 of 5)



Starting System - Component Location
Figure 301/80-05-00-990-801-F00 (Sheet 5 of 5)

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 are 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 that you will also not hear the igniters during the start. You can do the EEC Bite Igniters Test to make sure that the Ignition System operates correctly.

B. Possible Causes

(1) HMU, M1823

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(2) ENG-1 (ENG-2) Start Brake Assembly, M1824 (M1825)

SHZ 885-899

(3) ENG-1 (ENG-2) Start Lever, S1221 (S1222)

SHZ ALL

(4) System Wiring

(5) Engine Fuel Pump.

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	1	C01316	ENGINE 1 START LEVER CHAN A
B	2	C01317	ENGINE 1 START LEVER CHAN B

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
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

Row	Col	Number	Name
E	3	C01321	ENGINE FUEL ENGINE 2 HPSOV CONT
E	4	C01396	ENGINE FUEL ENGINE 2 HPSOV IND
E	5	C01320	ENGINE FUEL ENGINE 1 HPSOV CONT
E	6	C01395	ENGINE FUEL ENGINE 1 HPSOV IND

D. Related Data

(1) Component Location (80-06 TASK SUPPORT Figure 301, 80-06 TASK SUPPORT Figure 302)

(2) Simplified Schematic (80-06 TASK SUPPORT Figure 303)

(3) WDM 76-21-11

(4) WDM 76-21-21

(5) SSM 76-21-11

(6) SSM 76-21-21

E. Fault Isolation Procedure

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(1) On the Flight Management Computer System (FMCS) Control Display Unit (CDU) INPUT MONITORING Screen, do these steps to examine the Start Lever Discretes:

NOTE: Examine each channel of the applicable EEC.

(a) Make sure that 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 breakers for the other channel on the applicable engine:

1) For CH A active:

a) Open these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

(c) Get access to the INPUT MONITORING Screen as follows:

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 LSK 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.

a) Make sure that 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) Open these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

2) Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

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

(g) If the START LEVER POS and START LEVER SEL disagree, replace the applicable ENG-1 (ENG-2) Start Lever Switch on the Start Brake Assembly. 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

1) START LEVER - DEU1, S1024 or S1027

2) START LEVER - DEU2, S1024 or S1027

(h) If the START LEVER POS and START LEVER SEL agree, then continue.

SHZ ALL

(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 connector 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 (Standard Engine Wiring and Equipment Check, AMM TASK 70-70-01-200-801-F00).

1) If the HMU Receptacle is damaged, then replace the HMU, M1823. 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.

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.

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.

(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 0V DC between pin 1 and pin 2 (Ground) of the DP1203 connector.

(d) If there is DC voltage, then do these steps:

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

1) Examine and repair the System Wiring and ENG-1 (ENG-2) Start Lever Switches from the applicable circuit breakers to the HPSOV Solenoid.

SHZ 885-899

2) Examine and repair/replace the System Wiring and ENG-1 (ENG-2) Start Levers from the applicable circuit breakers to the HPSOV Solenoid.

SHZ ALL

3) 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.

(4) If you did not find a problem, replace the engine 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

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

F. Repair Confirmation

(1) Make sure that the DP1203 connector is correctly installed on the HMU.

(2) Make sure that these circuit breakers are closed:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
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

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

(3) 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.

3) If the Start Procedure is not correct, then continue the Fault Isolation Procedure at the subsequent step.

(b) Option 2

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

1) Monitor the airplane on the 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 an Engine Start, there is no lightoff with these conditions:

(a) Duct Pressure and N2 are correct.

(b) SPAR VALVE CLOSED Light is ON dim (closed) or bright (not in commanded position).

B. Possible Causes

(1) Spar Valve System

(2) Engine Fuel Pump

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(3) ENG-1 (ENG-2) Start Brake Assembly, M1824 (M1825)

SHZ ALL

C. Circuit Breakers

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

F/O Electrical System Panel, P6-3

Row	Col	Number	Name
B	3	C00360	FUEL SPAR VALVE ENG 2
B	4	C00359	FUEL SPAR VALVE ENG 1
B	5	C00540	FUEL SPAR VALVE IND

D. Related Data

(1) Component Location (80-06 TASK SUPPORT Figure 301)

(2) WDM 28-21-11

(3) SSM 28-21-11

E. Fault Isolation Procedure

(1) Do the applicable task below for the applicable Engine 1 (2):

- Engine No. 1 SPAR VALVE CLOSED Light Stays ON Bright - Fault Isolation, 28-22 TASK 809
- Engine No. 2 SPAR VALVE CLOSED Light Stays ON Bright - Fault Isolation, 28-22 TASK 810

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

(2) If the engine did not start per AMM task: Start the Engine Procedure (Normal Start), AMM TASK 71-00-00-800-808-F00, then replace the engine 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

NOTE: The Fuel Pump and the Hydro Mechanical Unit are fuel lubricated, zero fuel pressure can cause damage to the Fuel Pump and the Hydro Mechanical Unit.

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(3) On the FMCS CDU INPUT MONITORING Screen, do these steps to examine the Start Lever Discretes:

NOTE: Examine each channel of the applicable EEC.

(a) Make sure that 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 breakers for the other channel on the applicable engine:

1) For CH A active:

a) Open these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

(c) Get access to the INPUT MONITORING Screen as follows:

1) Push the INIT REF key two times.

NOTE: This causes the PERF INIT INDEX to show.

2) Push the INDEX LSK.

3) Push the MAINT LSK.

4) Push the ENGINE LSK.

5) Push the LSK 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.

a) Make sure that 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) Open these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	5	C01314	ENGINE 1 ALTN PWR CHAN A

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	8	C01315	ENGINE 2 ALTN PWR CHAN A

2) Close these circuit breakers:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	4	C01390	ENGINE 1 ALTN PWR CHAN B

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	7	C01391	ENGINE 2 ALTN PWR CHAN B

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

(g) If the START LEVER POS and START LEVER SEL disagree, replace the applicable ENG-1 (ENG-2) Start Lever Switch on the Start Brake Assembly. 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

NOTE: START LEVER - DEU1, S1024 or S1027
START LEVER - DEU2, S1024 or S1027

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

SHZ ALL

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 problem.

(b) Option 2:

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

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 an Engine Start, there is no lightoff with these conditions:

(a) The Ignition Switch is 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 Igniter Test (Left Igniter) with one audible confirmation:

(a) Electronic Engine Control (EEC), M1818

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

(a) Left Igniter Plug

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(b) ENG 1 (2) Start Brake Assembly, M1824 (M1825) for Left Ignition Switches S88, S90

SHZ ALL

(c) Left Ignition Lead

(d) Left Ignition Exciter

(e) EEC, M1818

(f) MW0301 Wire Harness

(g) Upper 11 Fuel Nozzles (if problem occurred during the first start of the day or with a cold soaked engine)

(h) Fuel Nozzles from positions 7, 8, 14, and 15.

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	3	C00153	ENGINE 1 IGNITION LEFT

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	6	C00151	ENGINE 2 IGNITION LEFT

D. Related Data

(1) Component Location (80-06 TASK SUPPORT Figure 301, 80-06 TASK SUPPORT Figure 302)

(2) WDM 74-11-11

(3) WDM 74-31-11

(4) SSM 74-11-11

(5) SSM 74-31-11

E. Initial Evaluation

(1) Do this task: EEC BITE Procedure, 73-00 TASK 801.

(2) Look at the RECENT FAULTS for Flight Leg 0.

(a) If a combination of maintenance messages as shown below shows, do this task FMV Demand and Position Signals Disagree - Fault Isolation, 73-25 TASK 802:

1) 74-10951 and 73-20331

2) 74-20951 and 73-10331

3) 74-10952 and 73-20332

4) 74-20952 and 73-10332

(3) Do this task to see if the Left Igniter Plug operates correctly: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.

NOTE: You should hear the operation of the Left Igniter Plug two times, first for CH A and then for CH B.

(a) If you only hear one audible confirmation, do the “Fault Isolation Procedure - One Audible Confirmation” below.

(b) If you hear no audible confirmation, then do the “Fault Isolation Procedure - No Audible Confirmation” below.

(c) If you hear the two audible confirmations, then 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.

a) If the engine starts correctly, then there was an intermittent fault.

b) If the engine does not start, do the “Fault Isolation Procedure - Two Audible Confirmations” below.

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 applicable Fault Isolation Manual (FIM) Tasks for the maintenance messages that show.

(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 examine the Left Igniter Plug. This is the task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.

(a) 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

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

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

(b) Examine the Left Ignition Lead. This is the 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
2) Do the Repair Confirmation at the end of this task.
   a) If the Repair Confirmation is not satisfactory, then continue.

(c) Examine the Left Ignition Exciter. This is the 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.
   a) 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 EECC, 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.

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 (Main Igniter Plug Installation, 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 and continue (Main Igniter Plug Installation, AMM TASK 74-21-02-400-801-F00).

(2) Replace the upper 11 fuel nozzles. These are the tasks:

- AMM TASK 73-11-04-000-805-F01 or AMM TASK 73-11-04-000-804-F02
- AMM TASK 73-11-04-400-805-F01 or AMM TASK 73-11-04-400-804-F02

(3) Replace the Fuel Nozzles from positions 7, 8, 14, and 15.

NOTE: Fuel Nozzles from positions 7, 8, 14, and 15 are installed adjacent to each Igniter Plug at the 4 o'clock and 8 o'clock positions.

(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.

(4) If the problem continues, then this could be 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 shown in the Possible Causes list above and do the Repair Confirmation.

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(5) Use INPUT MONITORING to examine the applicable ENG 1 (ENG 2) Left Ignition Switch, S88 (S90), in the Engine Start Brake Assembly to see if the switch operation agrees with the selected Start Lever position.

NOTE: Some switches in the Engine Start Brake Assembly can 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 LSK.

3) Push the MAINT LSK.

4) Push the ENGINE LSK.

5) Push the LSK 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 two times 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 that the value is OFF.

(c) Put the applicable Start Lever to the IDLE position and make sure that the value is ON for each line.

(d) Operate the Start Lever many times and see if the switch operates correctly.

1) If the switch does not operate correctly, replace the applicable ENG 1 (ENG 2) Left Ignition Switch, S88 (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

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

SHZ ALL

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.

1) If the Left Igniter Test passes and you hear two audible confirmations, then you corrected the problem.

(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.

1) If the engine start is normal, then you corrected the problem.

——— 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 an Engine Start, there is no lightoff with these conditions:

(a) The Ignition Switch is 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 Igniter Test (Right Igniter) with one audible confirmation:

(a) EEC, M1818

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

(a) Right Igniter Plug

(b) Right Ignition Lead

(c) Right Ignition Exciter

(d) MW0301 Wire Harness

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

(a) Right Igniter Plug

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(b) ENG 1 (2) Start Brake Assembly, M1824 (M1825) for Right Ignition Switches S89, S91

SHZ ALL

(c) Right Ignition Lead

(d) Right Ignition Exciter

(e) EEC, M1818

(f) MW0302 Wire Harness

(g) Upper 11 Fuel Nozzles (if problem occurred during the first start of the day or with a cold soaked engine)

(h) Fuel Nozzles from positions 7, 8, 14, and 15.

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
A	1	C00458	ENGINE 1 IGNITION RIGHT

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
D	4	C00459	ENGINE 2 IGNITION RIGHT

D. Related Data

(1) Component Location (80-06 TASK SUPPORT Figure 301, 80-06 TASK SUPPORT Figure 302)

(2) WDM 74-11-11

(3) WDM 74-31-11

(4) SSM 74-11-11

(5) SSM 74-31-11

E. Initial Evaluation

(1) Do this task: EEC BITE Procedure, 73-00 TASK 801.

(2) Look at the RECENT FAULTS for Flight Leg 0.

(a) If a combination of maintenance messages as shown below shows, do this task FMV Demand and Position Signals Disagree - Fault Isolation, 73-25 TASK 802:

1) 74-10961 and 73-20331

2) 74-20961 and 73-10331

3) 74-10962 and 73-20332

4) 74-20962 and 73-10332

(3) Do this task to see if the Right Igniter Plug operates correctly: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00.

NOTE: You should hear the operation of the Right Igniter Plug two times, first for CH A and then for CH B.

(a) If you only hear one audible confirmation, do the “Fault Isolation Procedure - One Audible Confirmation” below.

(b) If you hear no audible confirmation, then do the “Fault Isolation Procedure - No Audible Confirmation” below.

(c) If you hear the two audible confirmations, then 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.

a) If the engine starts correctly, then there was an intermittent fault.

b) If the engine does not start, do the “Fault Isolation Procedure - Two Audible Confirmations” below.

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 applicable FIM Tasks for the maintenance messages that show.

(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 examine the Right Igniter Plug. This is the task: Main Igniter Plug Inspection, AMM TASK 74-21-02-200-801-F00.

(a) 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

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

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

(b) Examine the Right Ignition Lead. This is the 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.

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

(c) Examine the Right Ignition Exciter. This is the 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.

a) 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.

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 and continue(AMM TASK 74-21-02-400-801-F00).

(2) Replace the upper 11 fuel nozzles. These are the tasks:

- AMM TASK 73-11-04-000-805-F01 or AMM TASK 73-11-04-000-804-F02
- AMM TASK 73-11-04-400-805-F01 or AMM TASK 73-11-04-400-804-F02

(3) Replace the Fuel Nozzles from positions 7, 8, 14, and 15.

NOTE: Fuel Nozzles from positions 7, 8, 14, and 15 are installed adjacent to each Igniter Plug at the 4 o'clock and 8 o'clock positions.

(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.

(4) If the problem continues, then this could be 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 shown in the Possible Causes list above and do the Repair Confirmation.

SHZ 002, 009-699, 706, 721-799, 801-825, 827-847, 850-852, 855-863, 865, 866, 871-874, 876-884, 901-999

(5) Use INPUT MONITORING to examine the applicable ENG 1 (ENG 2) Right Ignition Switch, S89 (S91), in the Engine Start Brake Assembly to see if the switch operation agrees with the selected Start Lever position.

NOTE: Some switches in the Engine Start Brake Assembly can 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 LSK.

3) Push the MAINT LSK.

4) Push the ENGINE LSK.

5) Push the LSK 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 two times 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 that the value is OFF.

(c) Put the applicable Start Lever to the IDLE position and make sure that the value is ON for each line.

(d) Operate the Start Lever several times and see if the switch operates correctly.

1) If the switch does not operate correctly, replace the applicable ENG 1 (ENG 2) Right Ignition Switch, S89 (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

SHZ ALL

I. Repair Confirmation

(1) If the initial audible test of the Ignition System failed, then do these steps:

(a) For the Right Igniter Plug, do this task: Ignition System Audible Test, AMM TASK 74-00-00-750-801-F00

(b) If the Right Igniter Test passes two audible confirmations are heard, then you corrected the problem

(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 engine start is normal, then you corrected the problem.

——— 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 an Engine Start, there is 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) Fuel Filter

(3) Fuel Nozzle Filter

(4) Engine Fuel Pump

C. Related Data

(1) Component Location (80-06 TASK SUPPORT Figure 301, 80-06 TASK SUPPORT Figure 302)

(2) WDM 73-25-11

(3) WDM 73-25-21

(4) SSM 73-25-11

(5) SSM 73-25-21

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 Hydro-Mechanical Unit (HMU).

(2) If the fault occurred at an N2 Speed of more than 11 percent, then do the Fault Isolation Procedure below.

E. Related Data

(1) (WDM 73-25-11, 73-25-21, 73-31)

(2) (SSM 73-25-11,73-25-21,73-31-1)

F. Fault Isolation Procedure

(1) Do this task: EEC TEST, AMM TASK 73-21-00-700-804-F00.

(a) Look for one or more EEC and HMU INTERNAL FAULT maintenance messages.

1) If you find maintenance messages, refer to the FIM 73-MAINT MSG INDEX to find the applicable Tasks for the messages that show and first do those corrective actions.

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

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

2) If EEC and HMU INTERNAL FAULT maintenance 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.

NOTE: Do not operate the engine as directed in the Lubrication Flow Screen Installation Test.

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

b) If the Fuel Pump Impeller Inspection is not satisfactory, then 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

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

c) If you do not find a problem, then continue.

(3) Examine the Fuel Filter for signs of contamination. Do this task: Fuel Filter - Removal, AMM TASK 73-11-02-000-801-F00.

(a) If you find 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.

(b) If you do not find contamination, then do this task and then continue: Fuel Filter - Installation, AMM TASK 73-11-02-400-801-F00.

(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.

(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.

G. Repair Confirmation

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

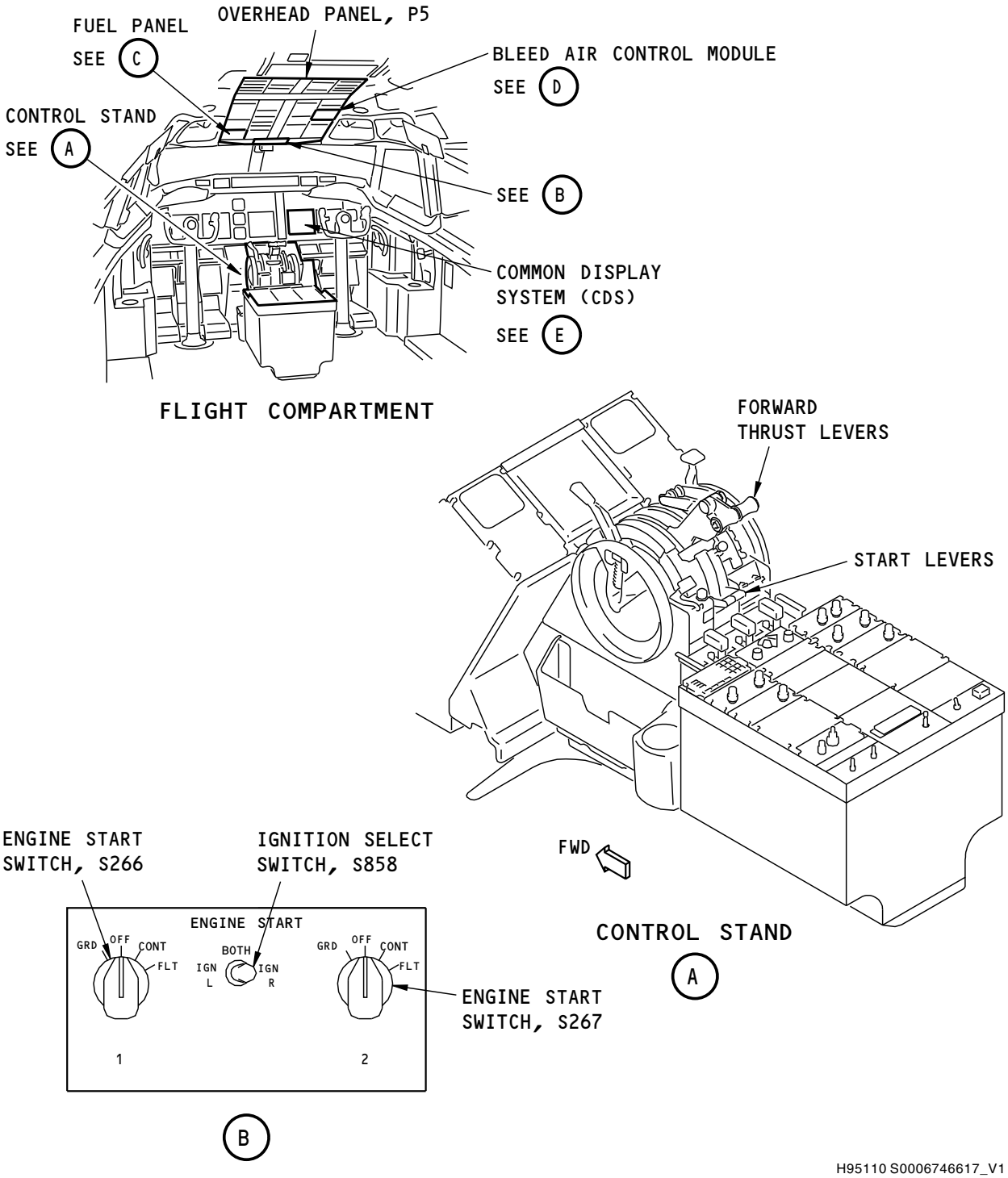
(2) Let the engine become stable at idle.

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

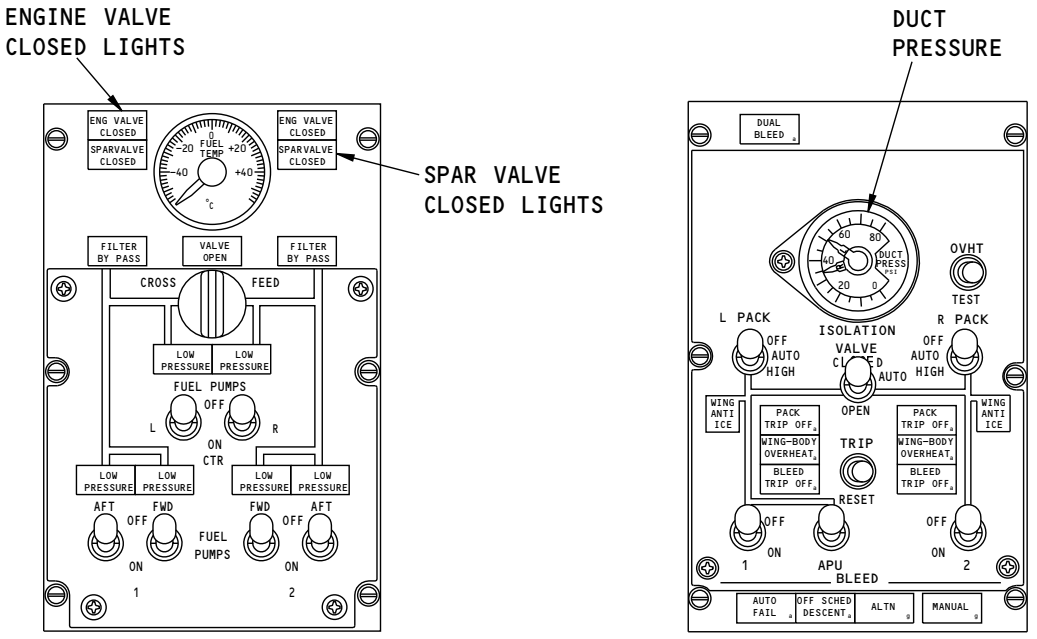
(4) If the Start Procedure is correct, then you corrected the problem.

(5) If the Start Procedure is not correct, then continue the Fault Isolation Procedure at the subsequent step.

——— END OF TASK ———



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

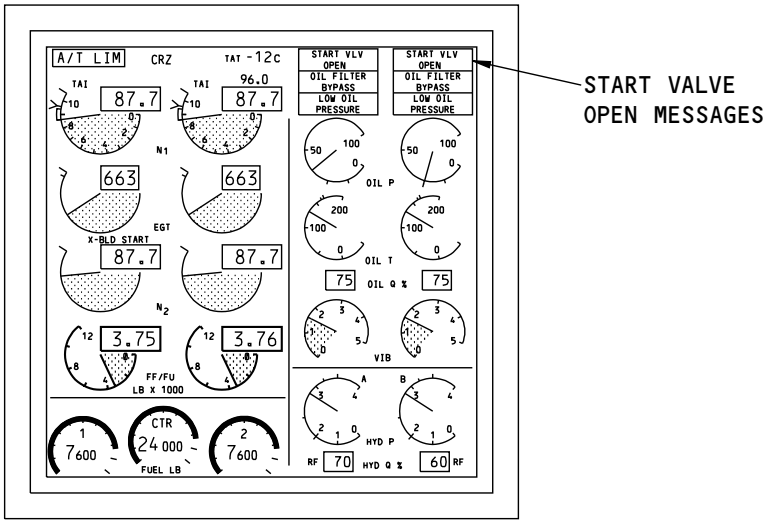


FUEL PANEL (P5-2)

C

BLEED AIR CONTROL MODULE (P5-10)

D

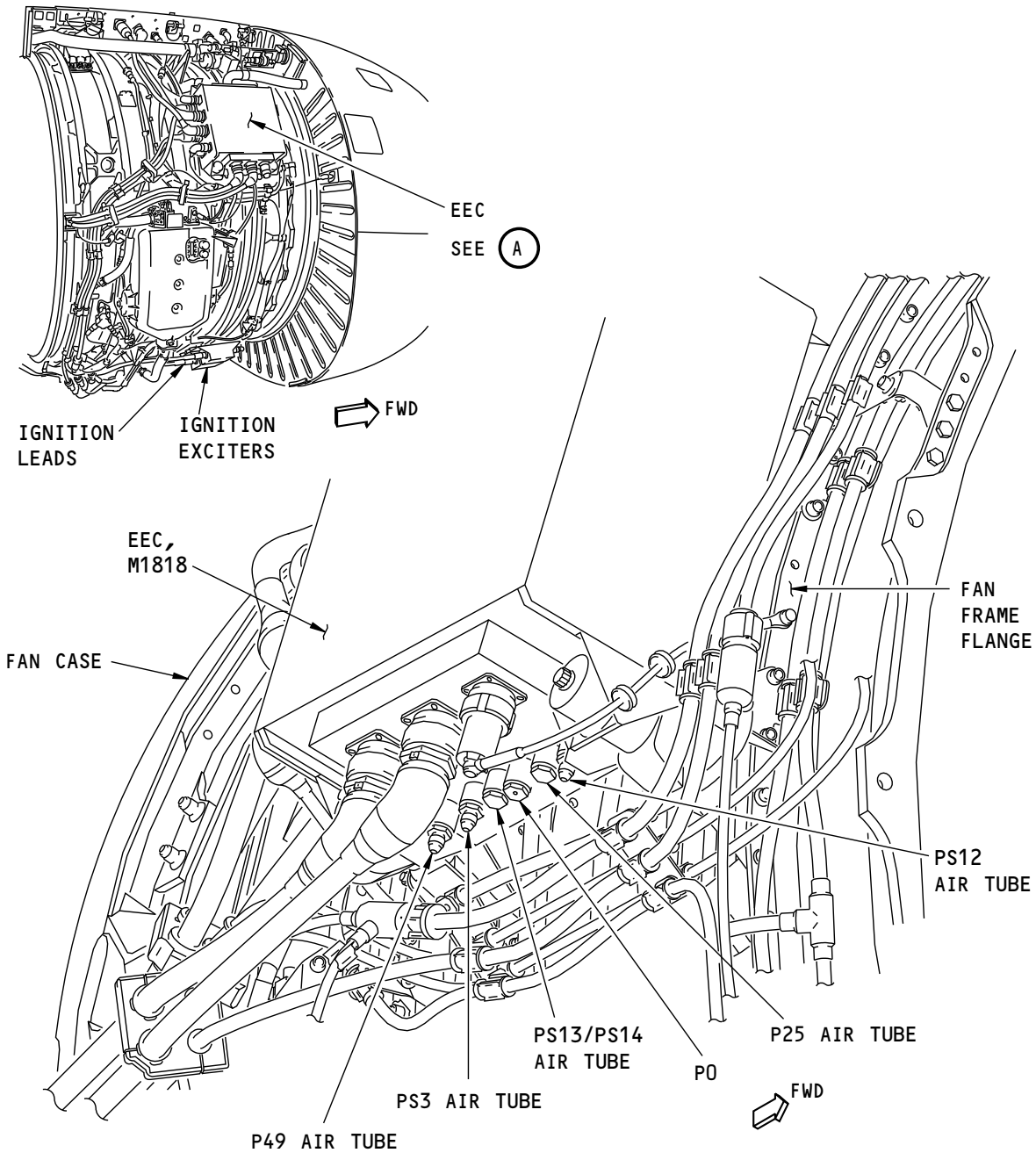


CDS - ENGINE DISPLAYS

E

H96970 S0006746620_V1

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

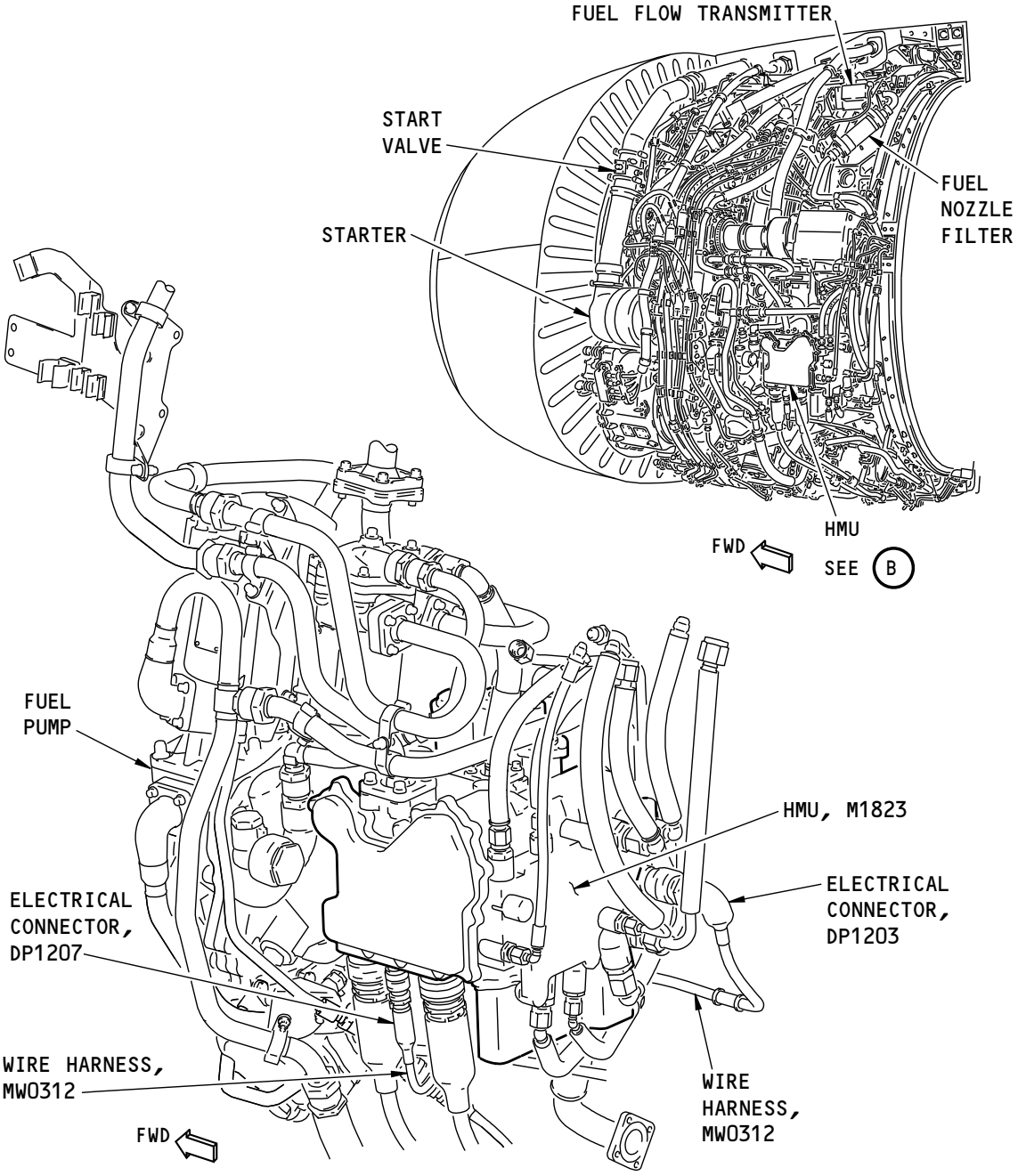


ELECTRONIC ENGINE CONTROLLER (EEC)

A

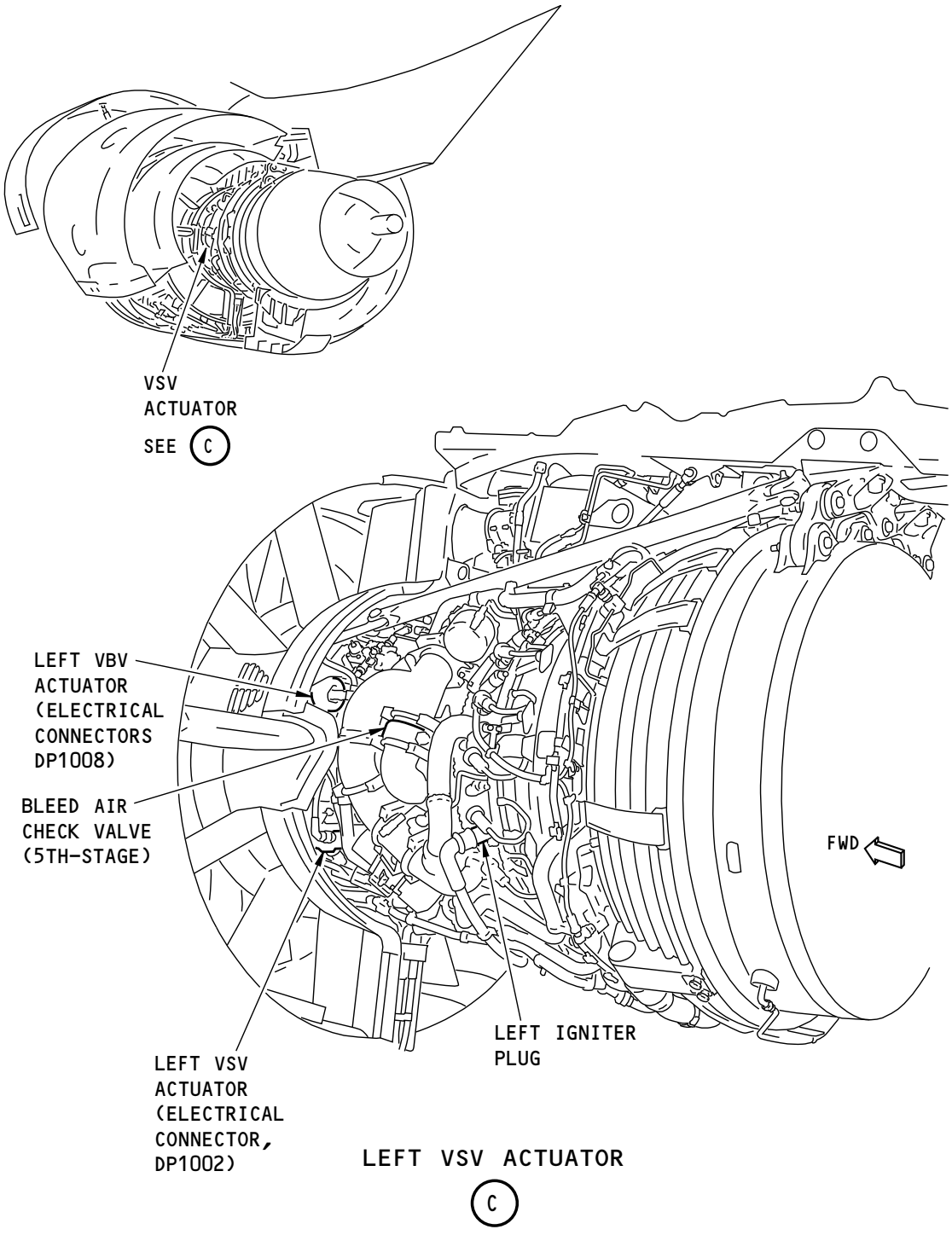
H95522 S0006746621_V1

Starting System (Engines) - Component Location
Figure 302/80-06-00-990-802-F00 (Sheet 1 of 5)



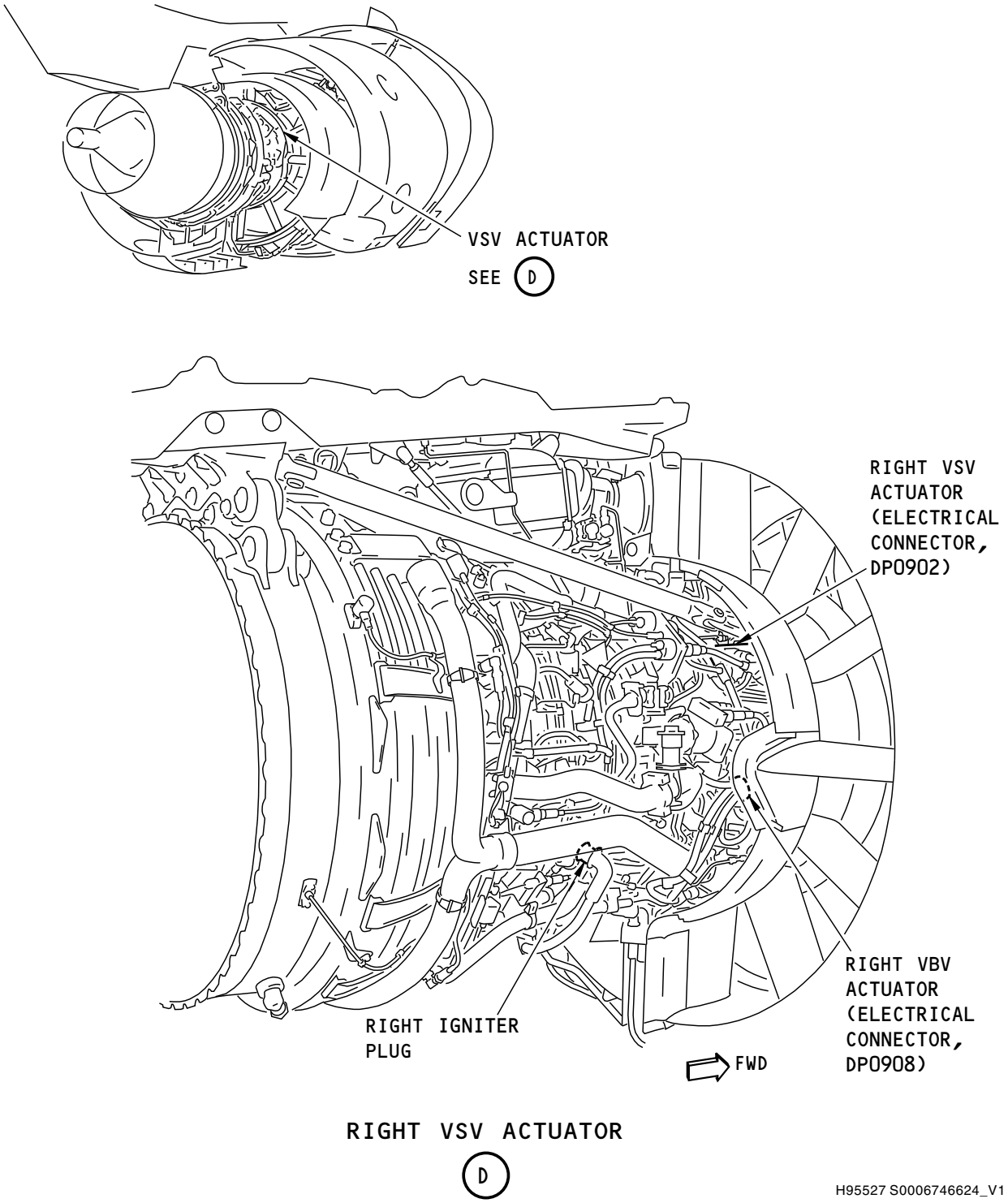
H95523 S0006746622_V1

Starting System (Engines) - Component Location
Figure 302/80-06-00-990-802-F00 (Sheet 2 of 5)

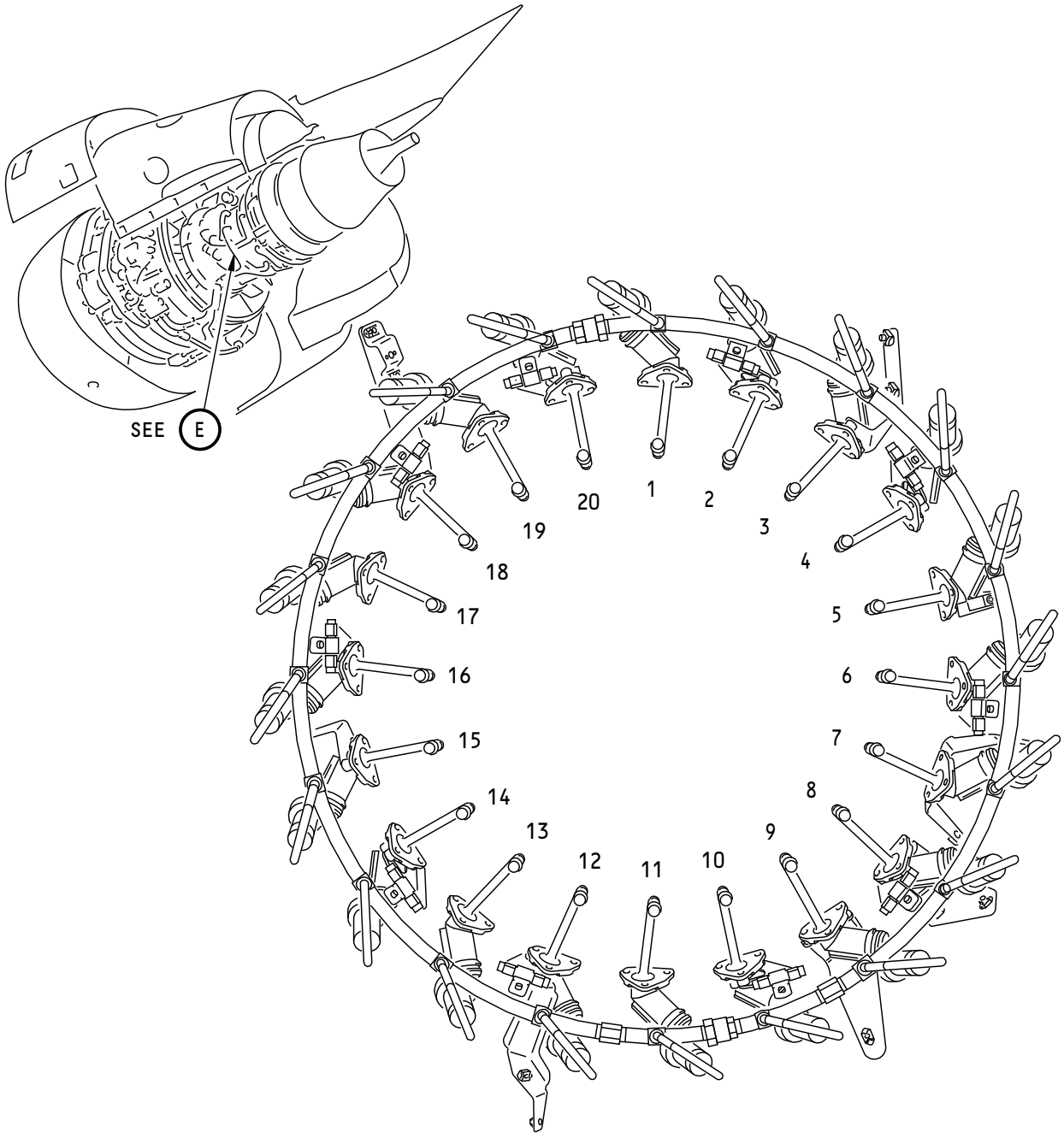


H95524 S0006746623_V1

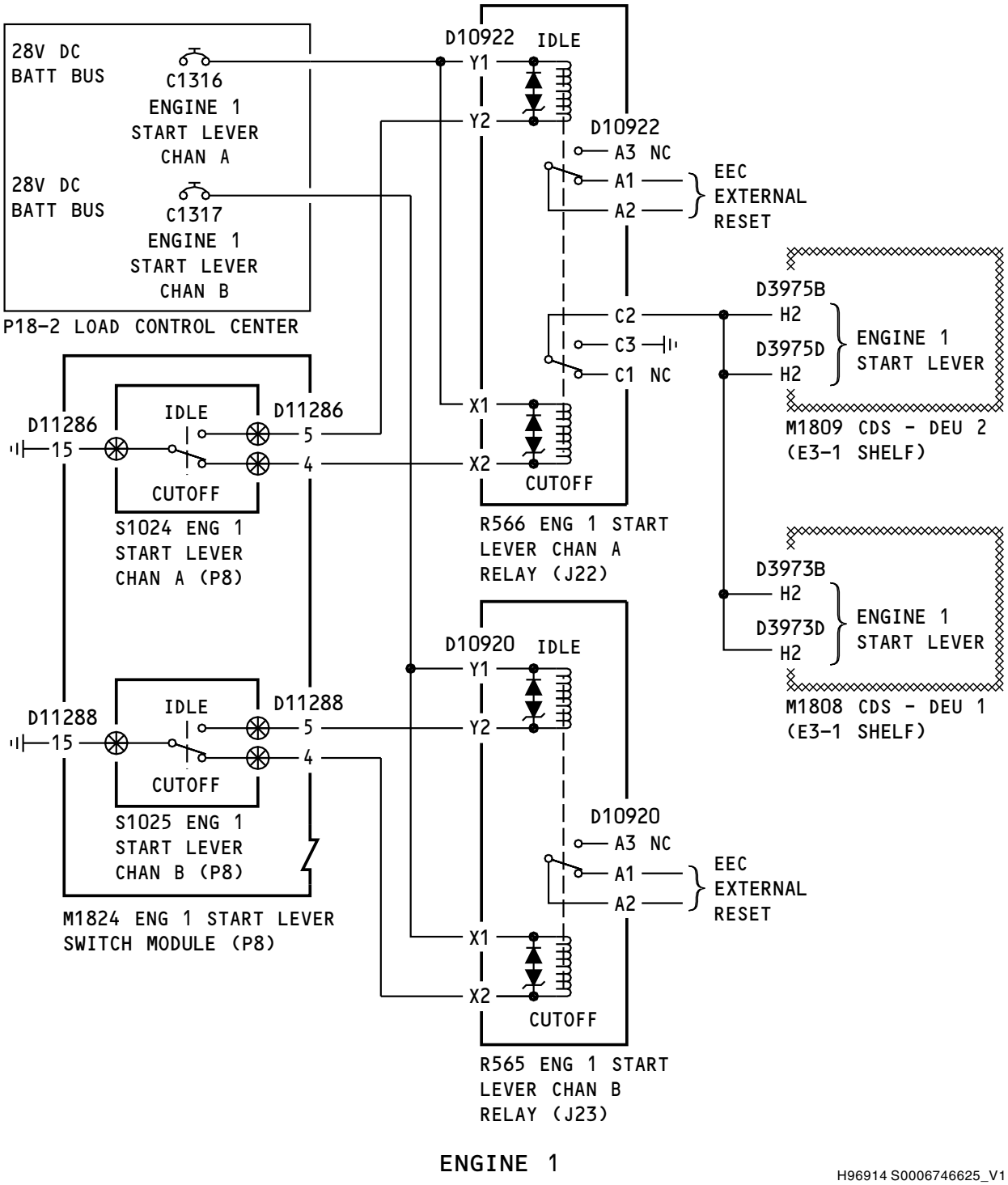
Starting System (Engines) - Component Location
Figure 302/80-06-00-990-802-F00 (Sheet 3 of 5)



Starting System (Engines) - Component Location
Figure 302/80-06-00-990-802-F00 (Sheet 4 of 5)

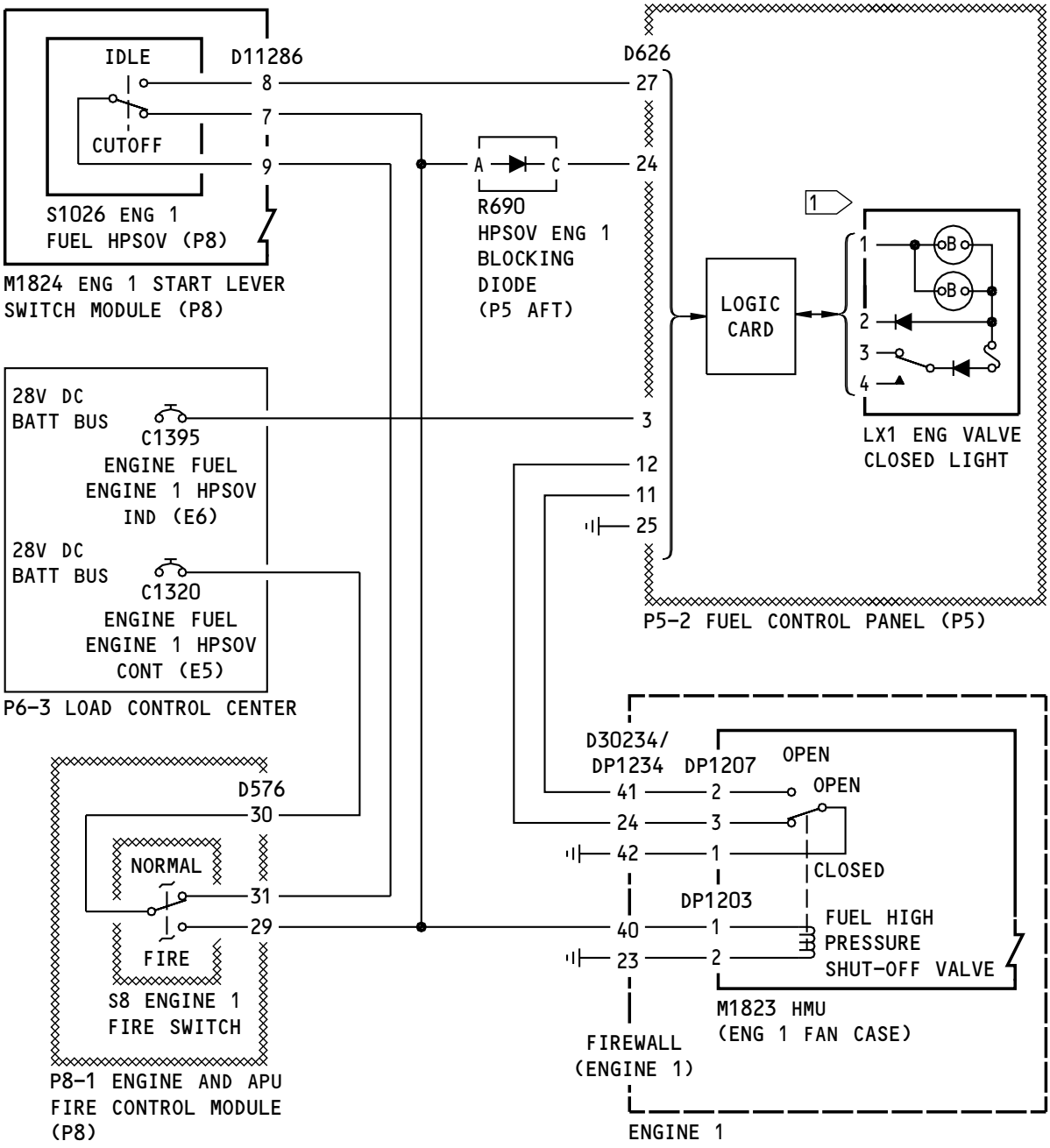


Starting System (Engines) - Component Location
Figure 302/80-06-00-990-802-F00 (Sheet 5 of 5)



H96914 S0006746625_V1

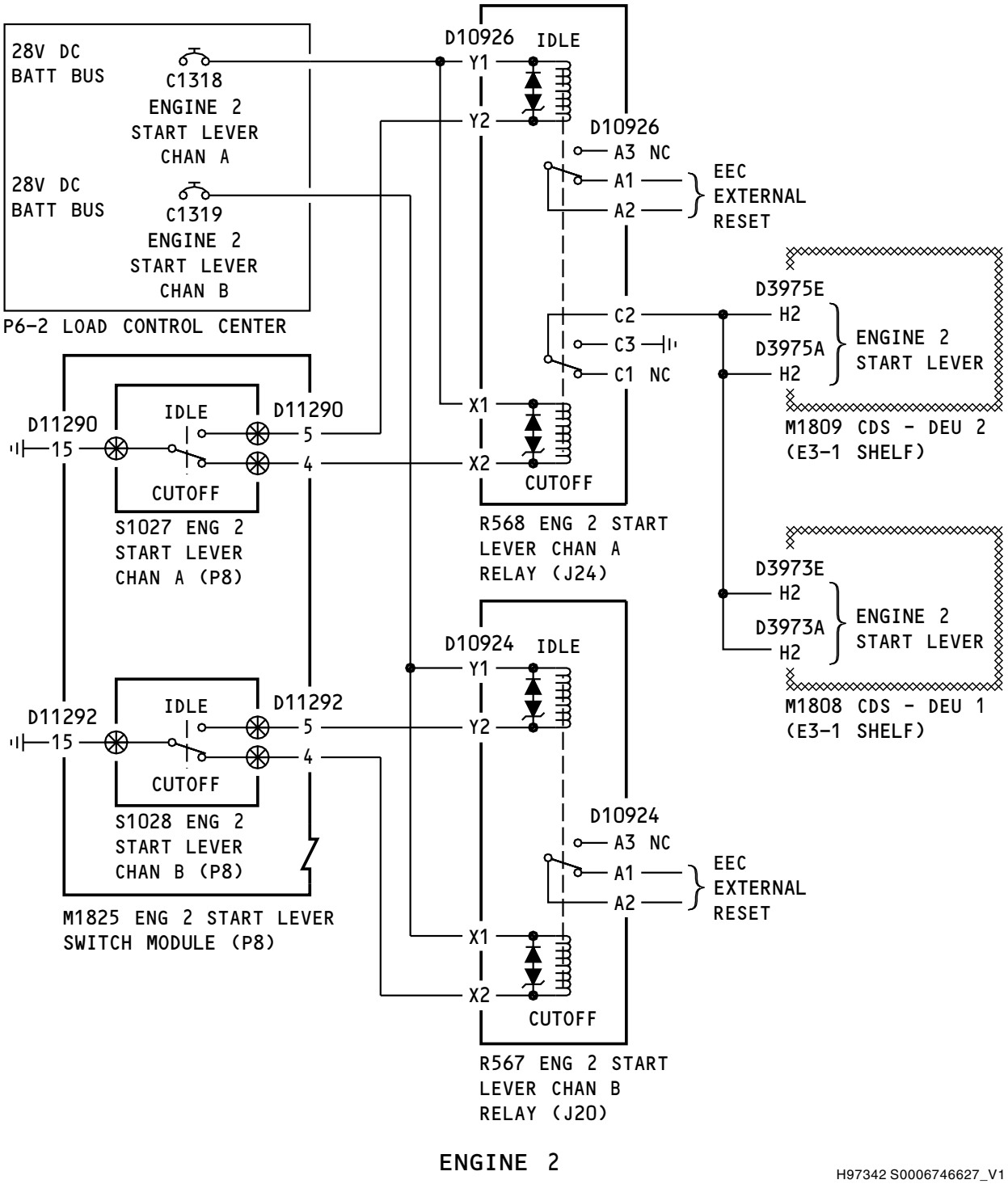
Fuel Condition Control Simplified Schematic
Figure 303/80-06-00-990-803-F00 (Sheet 1 of 4)



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

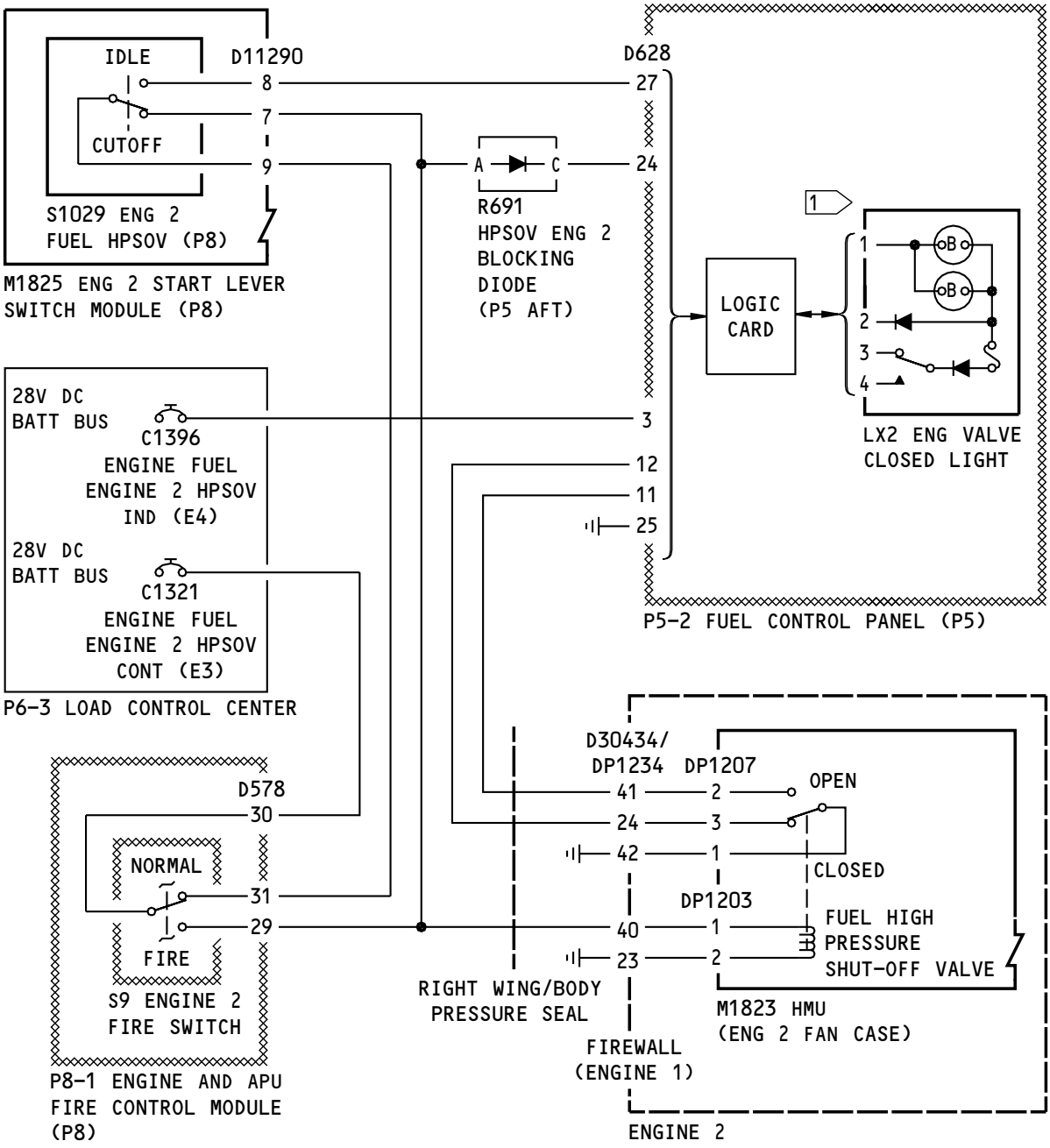
H96952 S0006746626_V1

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



H97342 S0006746627_V1

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



H97328 S0006746628_V1

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

801. Engine Motoring - No or Low Maximium 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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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

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 Gear Box (AGB)

(3) Transfer Gearbox (TGB)

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT Figure 302)

(3) WDM 80-11-11

(4) SSM 80-11-11

E. Fault Isolation Procedure

(1) Do these steps:

(a) Look for damage to the Starter. This is the task: Starter Magnetic Plug Inspection, AMM TASK 80-11-01-200-801-F00.

(b) Look for particles in the Magnetic Chip Detector (MCD) for the AGB/TGB. This is the 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, then do these steps:

1) Remove the Starter. This is the task: Starter Removal, AMM TASK 80-11-01-000-801-F00.

2) Make sure that the N2 rotor turns freely and smoothly. This is the task: Turn the N2 Rotor, AMM TASK 72-00-00-980-801-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.

3) If the N2 rotor does not turn freely, 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

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

4) If the N2 rotor turns freely, install a new Starter. This is the task: Starter Installation, AMM TASK 80-11-01-400-801-F00.

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

(d) If contamination is found on the AGB/TGB MCD only, then do these steps:

1) Identify the source of the debris and do the applicable action. This is the task: 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.

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

(b) If the dry motor procedure is not correct, then continue the Fault Isolation Procedure at the subsequent step.

——— 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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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**	**DEU1 D3973B**
	PIN 4	PIN K12
ENG 1	**D1202**	**DEU2 D3975B**
	PIN 4	PIN K12
ENG 2	**D1202**	**DEU1 D3973E**
	PIN 4	PIN K12
ENG 2	**D1202**	**DEU2 D3975E**
	PIN 4	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.

(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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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:

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
ENG 1	**D1202**	**S266**
	PIN 1	GROUND
	PIN 2	PIN X1
ENG 2	**D1202**	**S267**
	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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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.

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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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 55.3 Percent - Fault Isolation

A. Description

(1) The engine start switch moves from the GRD to the OFF position before N2 is at 55.3 percent and the engine started.

B. Possible Causes

(1) DEU 1, M1808

(2) DEU 2, M1809

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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT Figure 302)

(3) (WDM 80-11-11)

(4) (SSM 80-11-11)

E. Fault Isolation Procedure

(1) Replace one of the Display Electronic Unit (DEU)'s (the most likely subsequent Line Replaceable Unit (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 55.3 Percent, Engine Started - Fault Isolation

A. Description

(1) The engine start switch stays in the GRD position after N2 is more than 55.3 percent and the engine started.

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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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

Row	Col	Number	Name
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
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 Electronic Equipment (EE) bay:

1) Open this access panel:

Number	Name/Location
117A	Electronic Equipment Access Door

(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

Row	Col	Number	Name
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

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

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

(d) For Engine 1

Make sure that this circuit breaker is open:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
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

Row	Col	Number	Name
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 GRD 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.

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

Row	Col	Number	Name
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
D	9	C01362	DISPLAY DEU 2 HOLDUP
D	10	C01361	DISPLAY DEU 1 HOLDUP

(Continued)

F/O Electrical System Panel, P6-1

Row	Col	Number	Name
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

Row	Col	Number	Name
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

Row	Col	Number	Name
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,

Number	Name/Location
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) These are the primary circuit breakers related to the fault:

CAPT Electrical System Panel, P18-2

Row	Col	Number	Name
B	8	C01103	ENGINE 1 START VALVE

F/O Electrical System Panel, P6-2

Row	Col	Number	Name
C	4	C00154	ENGINE 2 START VALVE

D. Related Data

(1) Component Location (80-07 TASK SUPPORT Figure 301)

(2) Simplified Schematic (80-07 TASK SUPPORT 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 DEU–1 and DEU–2 to the applicable start valve.

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

F. Repair Confirmation

(1) Prepare for the procedure.

(a) Make sure that the connector DP1202 is correctly connected to the start valve.

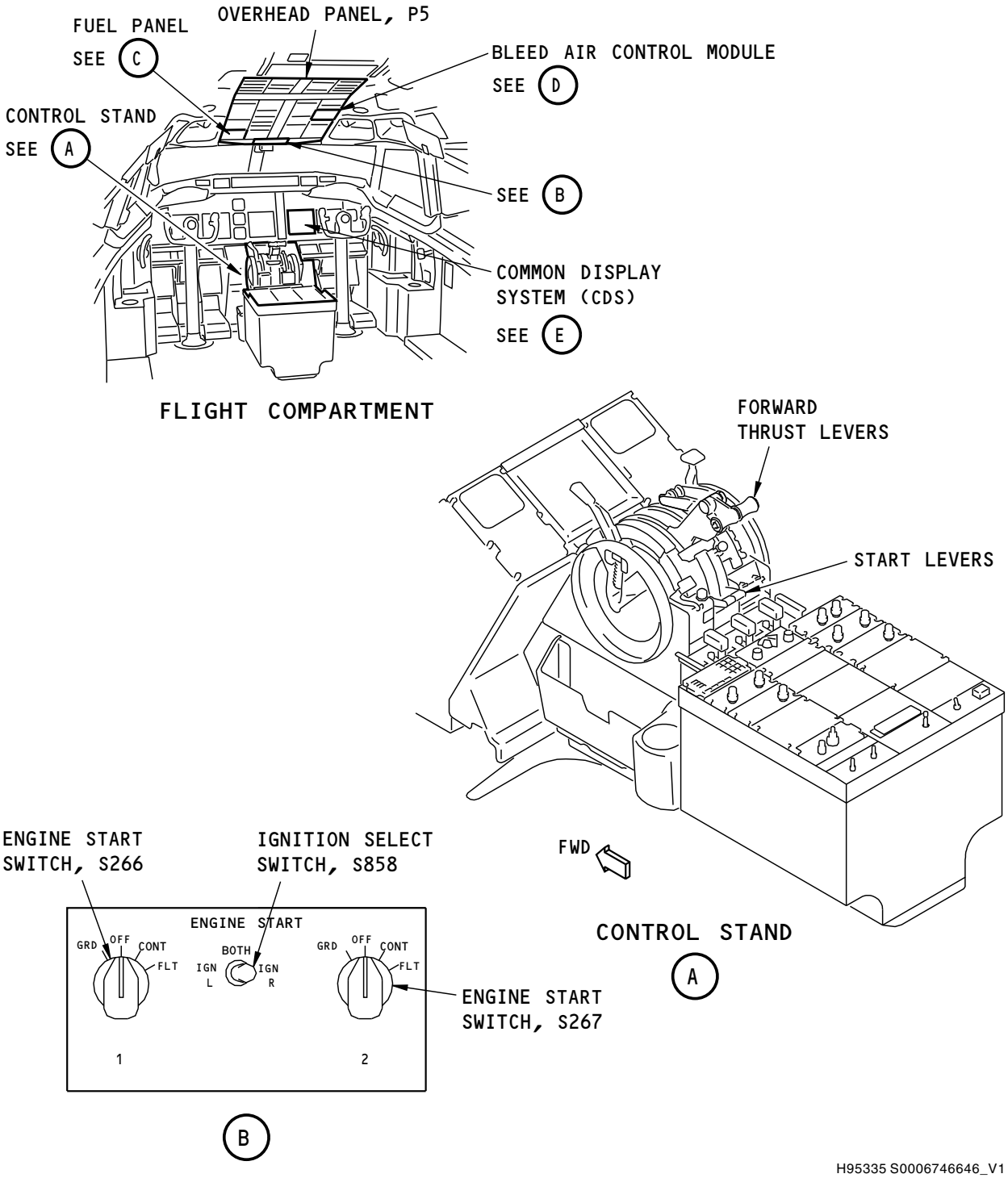
(2) Do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00.

(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 ———



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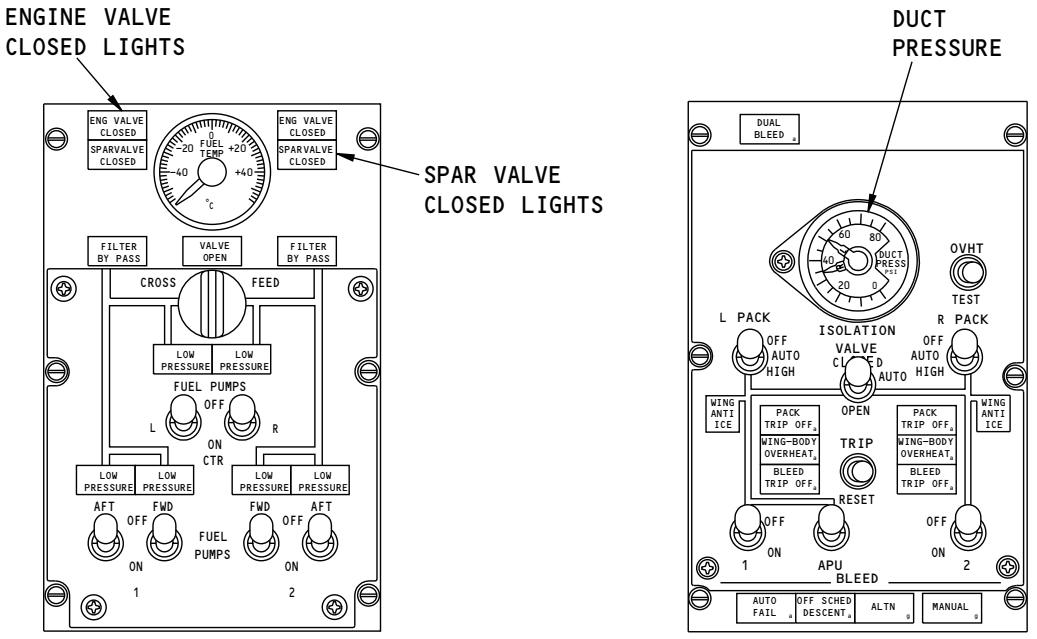
Starting System - Component Location
Figure 301/80-07-00-990-801-F00 (Sheet 1 of 3)

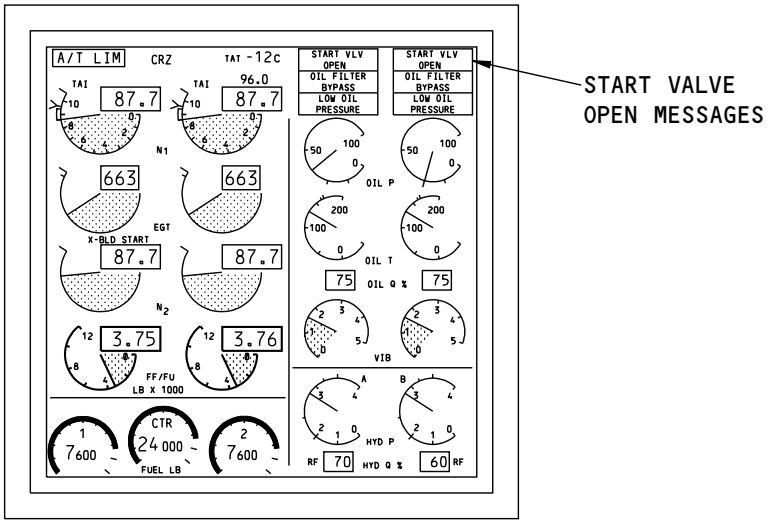


FUEL PANEL (P5-2)

C

BLEED AIR CONTROL MODULE (P5-10)

D

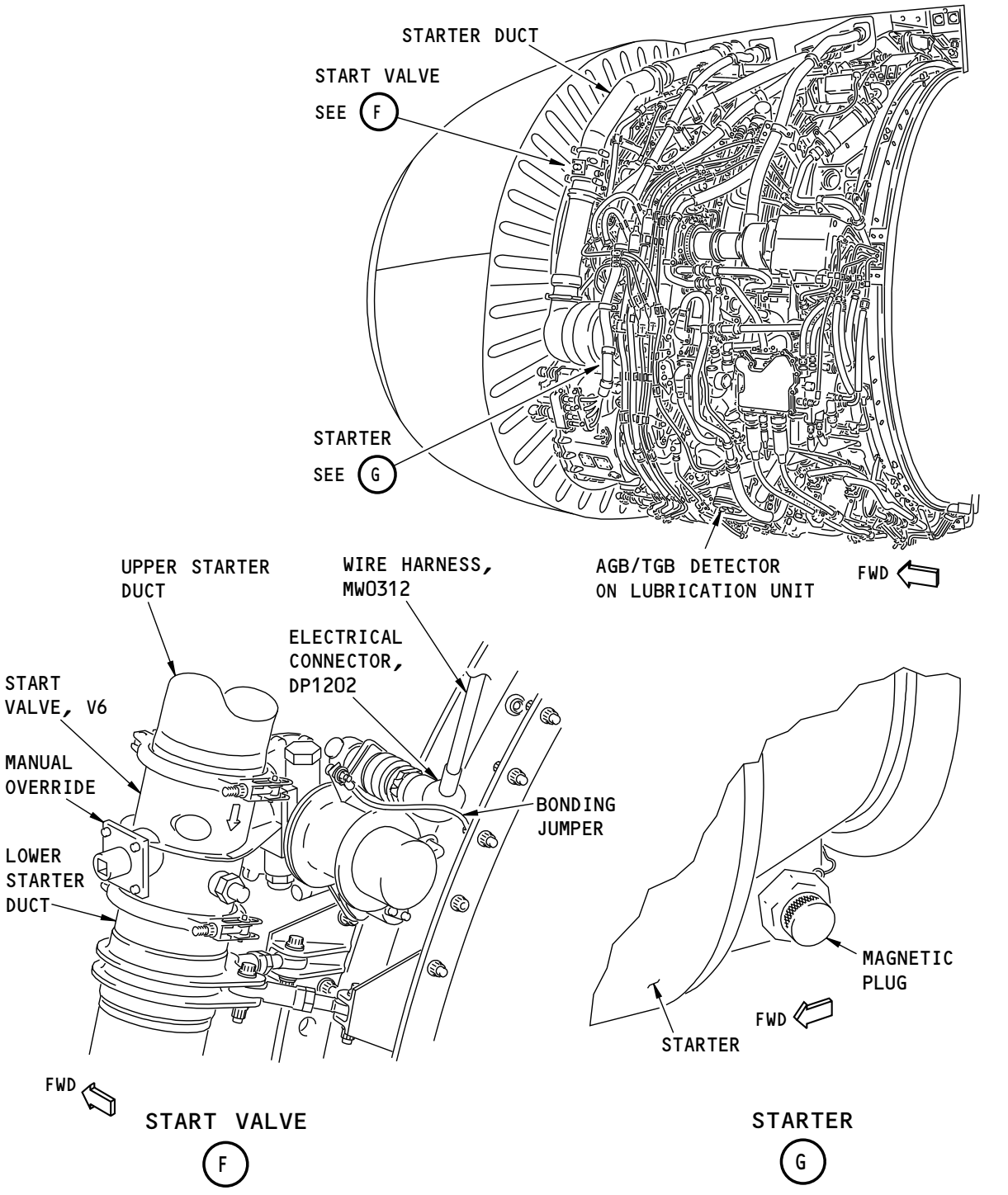


CDS - ENGINE DISPLAYS

E

H96971 S0006746649_V1

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



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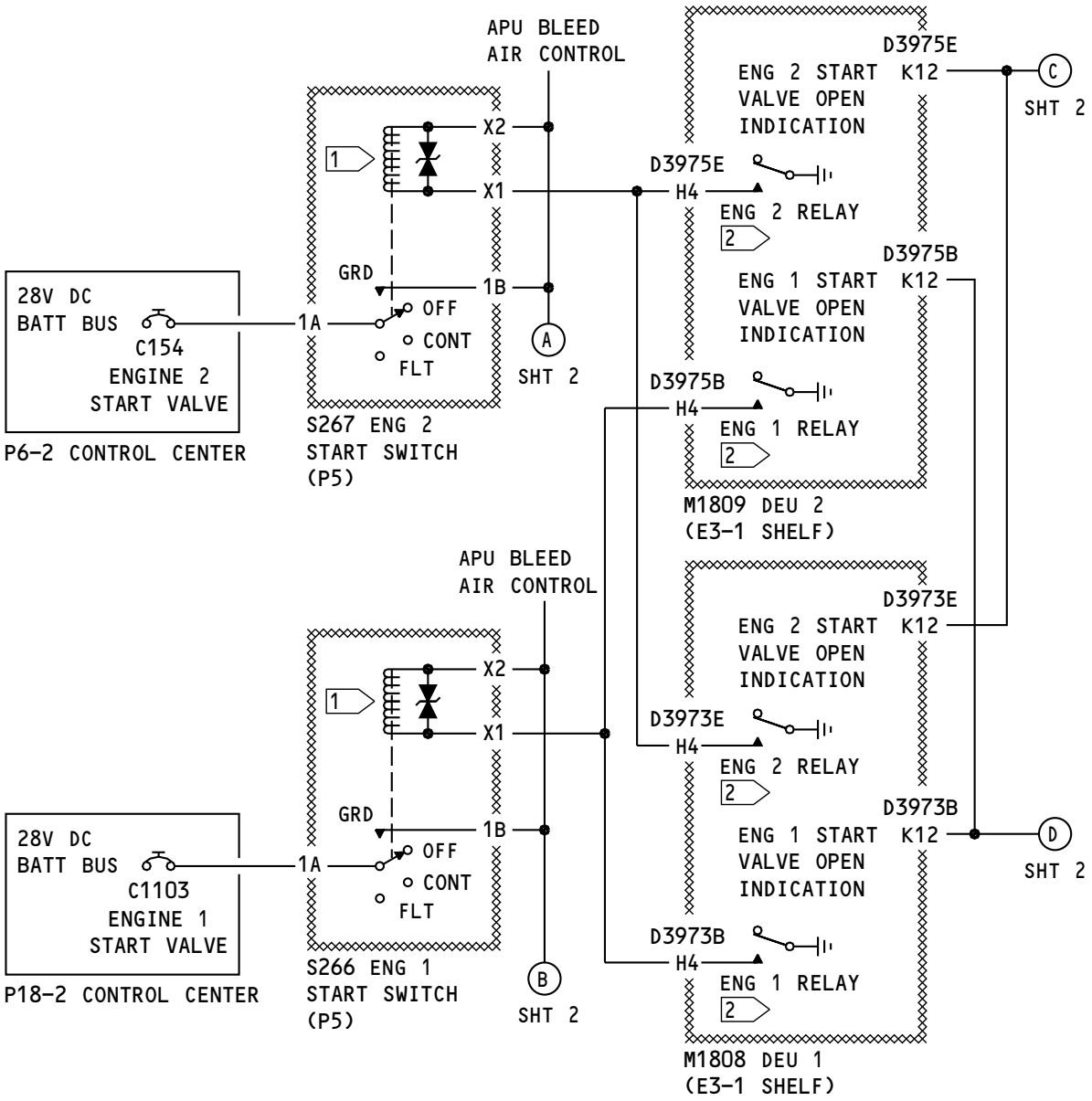
Starting System - Component Location
Figure 301/80-07-00-990-801-F00 (Sheet 3 of 3)

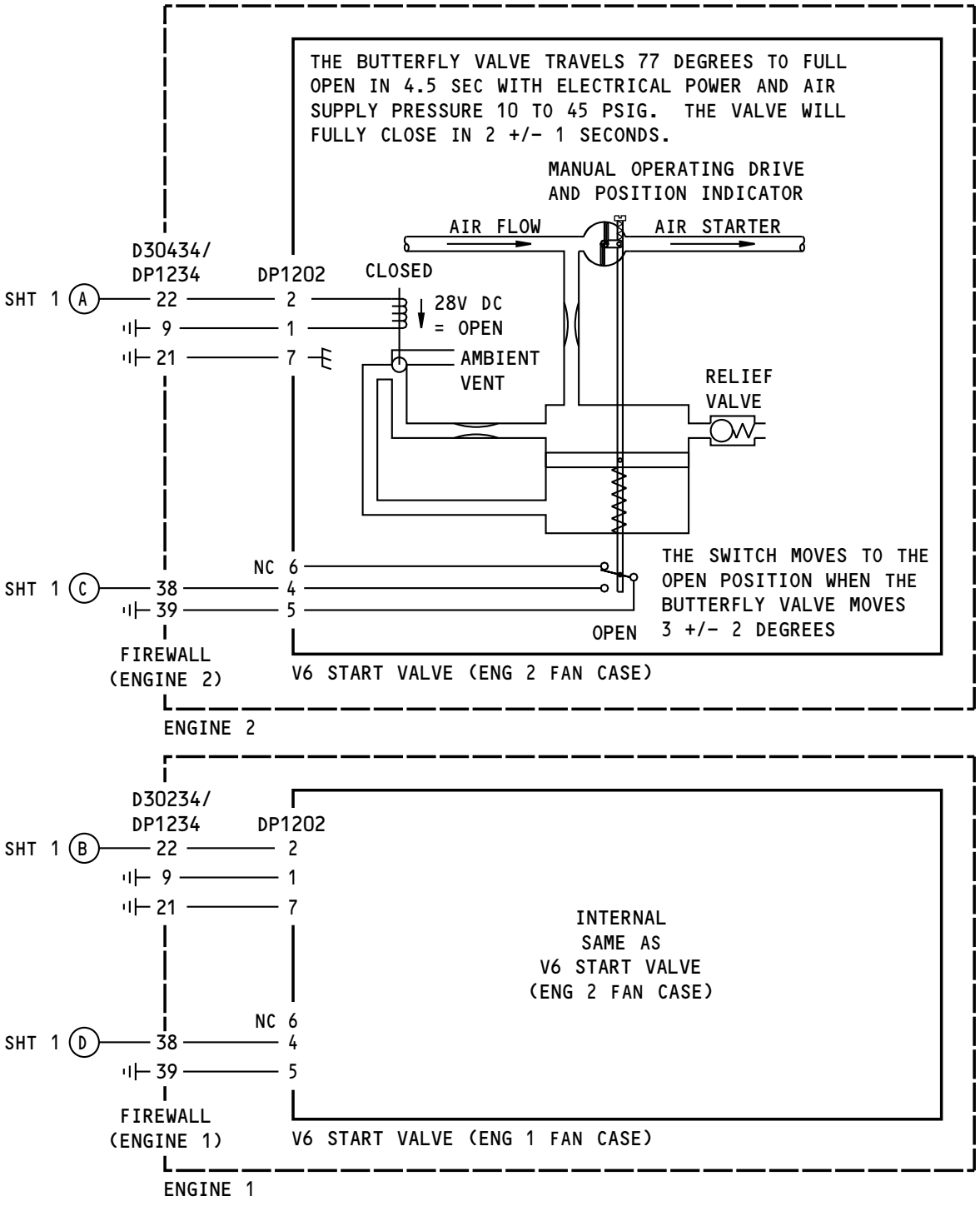


1 THE COIL HOLDS THE START SWITCH IN THE GRD POSITION UNTIL N2 > 53.25% RPM

2 ENGINE RELAY ENERGIZES
WHEN: N2 < 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)



H97251 S0006746652_V1

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