

CHAPTER

71

POWER PLANT



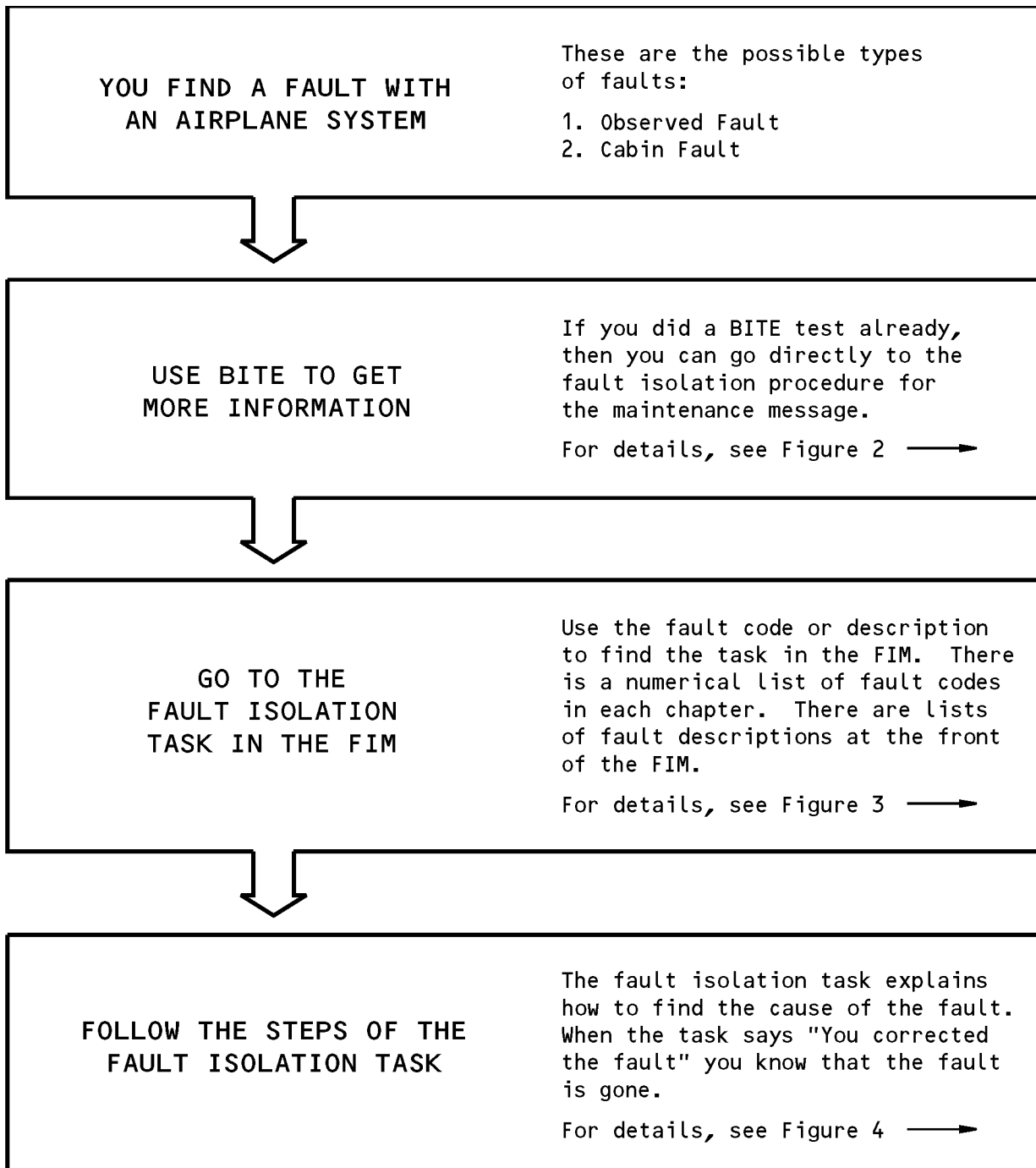
FAULT ISOLATION MANUAL

CHAPTER 71
POWER PLANT

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

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FAULT ISOLATION MANUAL

Basic Fault Isolation Process
Figure 1

FAULT ISOLATION MANUAL

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

A maintenance message can be any of these:

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

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

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

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

Getting Fault Information from BITE
Figure 2

FAULT ISOLATION MANUAL**IF YOU HAVE:****THEN DO THIS TO FIND THE TASK IN THE FIM:****FAULT CODE**

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

**OBSERVED FAULT
DESCRIPTION**

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

**CABIN FAULT
DESCRIPTION**

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

**MAINTENANCE
MESSAGE
(FROM BITE)**

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

Finding the Fault Isolation Task in the FIM
Figure 3

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FAULT ISOLATION MANUAL**ASSUMED CONDITIONS AT START OF TASK**

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

POSSIBLE CAUSES

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

INITIAL EVALUATION PARAGRAPH

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

FAULT ISOLATION STEPS

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

Doing the Fault Isolation Task
Figure 4

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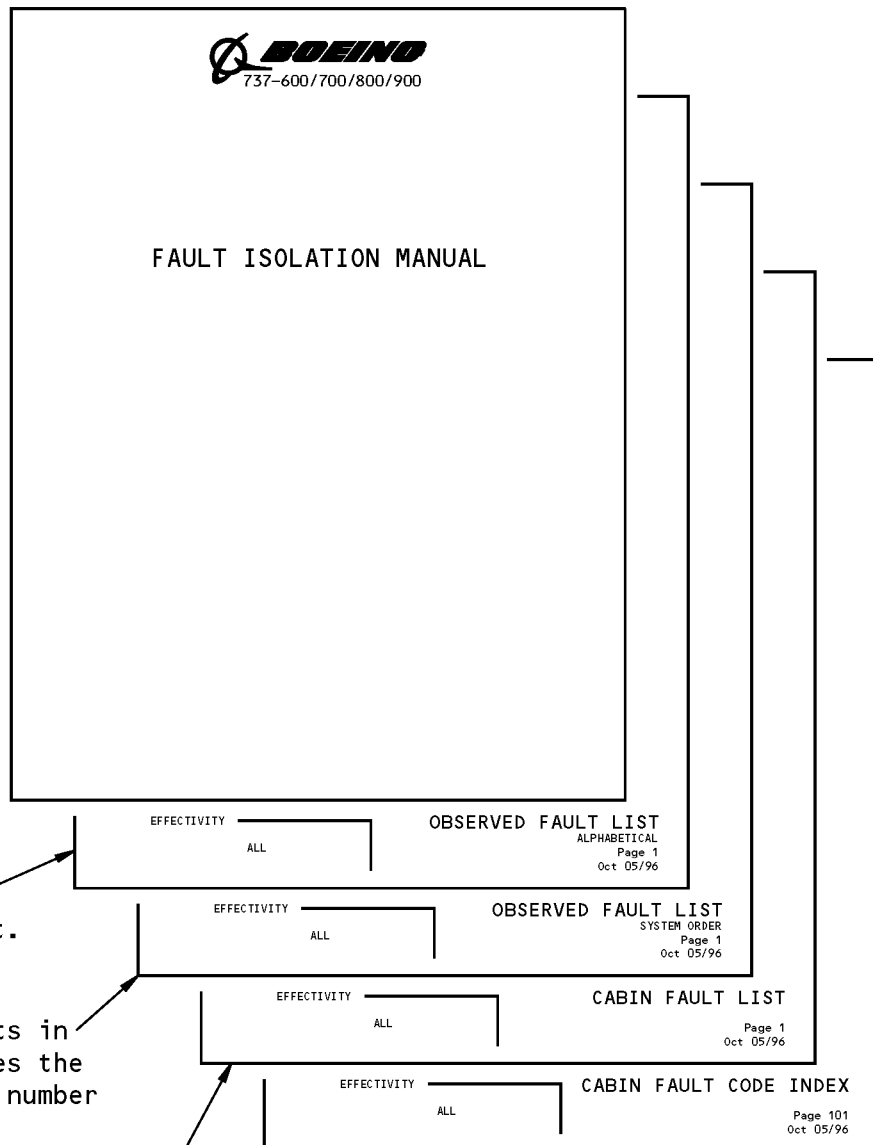
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737-600/700/800/900

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Alphabetical list of all observed faults. Gives the fault code and a FIM task number for each fault.

List of all observed faults in order by ATA system. Gives the fault code and a FIM task number for each fault.

List of all cabin faults arranged in order by cabin function. Gives the fault code and a FIM task number for each fault.

Numerical list of all cabin faults in order by fault code. Gives a FIM task reference for each fault.

Subjects at Front of FIM
Figure 5

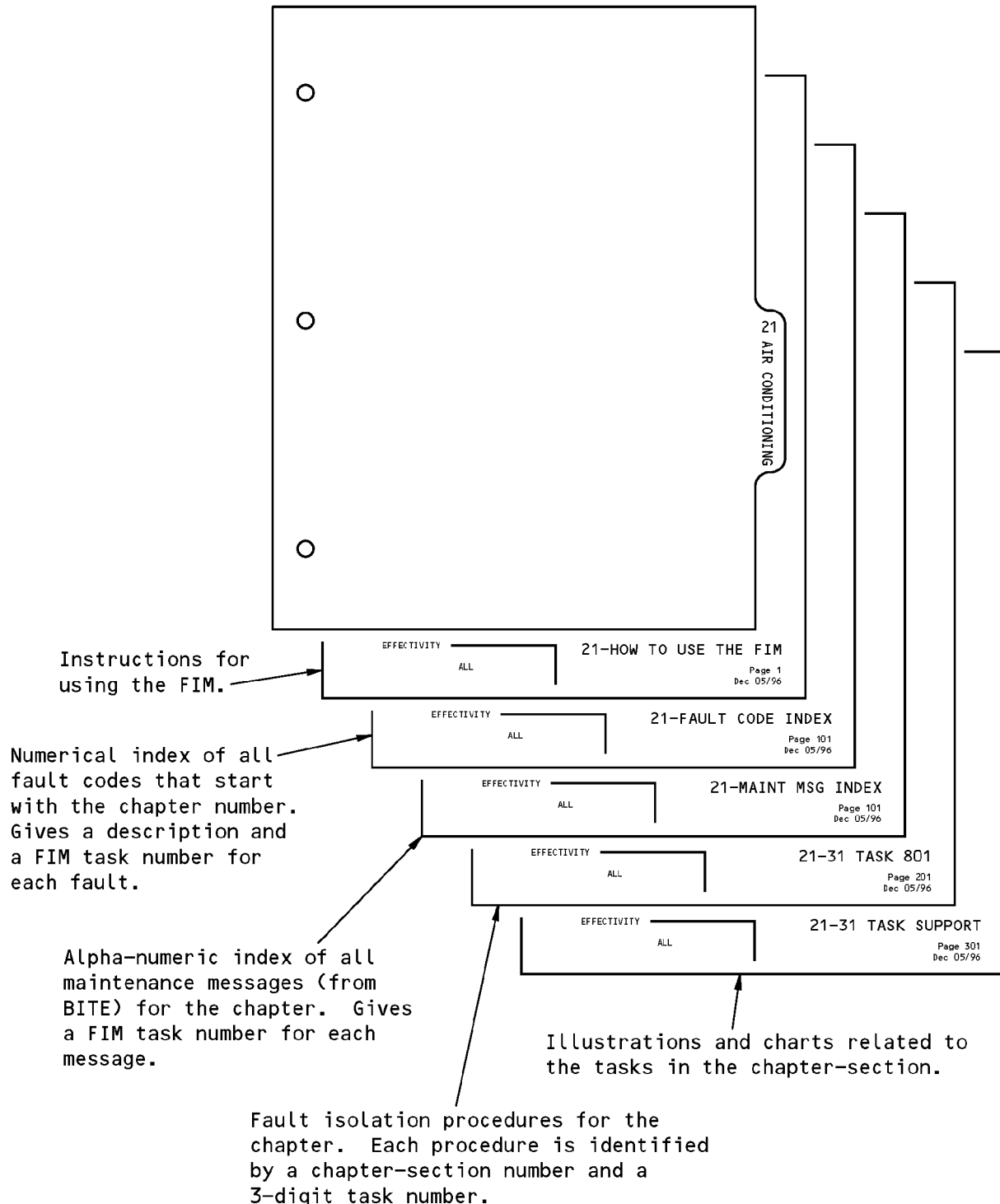
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Subjects in Each FIM Chapter
Figure 6

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FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
710 010 51	Birdstrike/FOD: in engine, engine parameters normal - engine 1.	71-05 TASK 801
710 010 52	Birdstrike/FOD: in engine, engine parameters normal - engine 2.	71-05 TASK 801
710 020 51	Birdstrike/FOD: in engine, engine parameters not normal or unknown - engine 1.	71-05 TASK 801
710 020 52	Birdstrike/FOD: in engine, engine parameters not normal or unknown - engine 2.	71-05 TASK 801
710 030 51	Birdstrike/FOD: in engine, engine had a surge/stall - engine 1.	71-05 TASK 805
710 030 52	Birdstrike/FOD: in engine, engine had a surge/stall - engine 2.	71-05 TASK 805
710 060 51	Engine overspeed: N1 over redline - engine 1.	71-06 TASK 801
710 060 52	Engine overspeed: N1 over redline - engine 2.	71-06 TASK 801
710 070 51	Engine overspeed: N2 over redline - engine 1.	71-06 TASK 802
710 070 52	Engine overspeed: N2 over redline - engine 2.	71-06 TASK 802
710 080 51	Engine overspeed: reverse thrust (N1) over limit, write maximum N1 - engine 1.	71-06 TASK 803
710 080 52	Engine overspeed: reverse thrust (N1) over limit, write maximum N1 - engine 2.	71-06 TASK 803
710 090 51	Engine overtemperature (except starting): EGT over amber band limit, no surge/stall - engine 1.	71-06 TASK 804
710 090 52	Engine overtemperature (except starting): EGT over amber band limit, no surge/stall - engine 2.	71-06 TASK 804
710 100 51	Engine overtemperature (except starting): EGT over amber band limit due to surge/stall - engine 1.	71-05 TASK 804
710 100 52	Engine overtemperature (except starting): EGT over amber band limit due to surge/stall - engine 2.	71-05 TASK 804
710 110 51	Engine overtemperature (except starting): EGT over redline, no surge/stall - engine 1.	71-06 TASK 805
710 110 52	Engine overtemperature (except starting): EGT over redline, no surge/stall - engine 2.	71-06 TASK 805
710 115 51	Engine overtemperature (except starting): EGT over redline due to surge/stall - engine 1.	71-06 TASK 806
710 115 52	Engine overtemperature (except starting): EGT over redline due to surge/stall - engine 2.	71-06 TASK 806
710 130 51	Engine parameters: N1, N2, EGT, and FF read low or fluctuate - engine 1.	73-06 TASK 809
710 130 52	Engine parameters: N1, N2, EGT, and FF read low or fluctuate - engine 2.	73-06 TASK 809

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FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
710 135 51	EGT, FF, oil pressure, and oil temperature indications: continue to show after engine shutdown - left engine.	71-06 TASK 808
710 135 52	EGT, FF, oil pressure, and oil temperature indications: continue to show after engine shutdown - right engine.	71-06 TASK 808
710 140 51	Engine parameters: EGT fluctuates at all power settings - engine 1.	71-06 TASK 807
710 140 52	Engine parameters: EGT fluctuates at all power settings - engine 2.	71-06 TASK 807
710 150 51	Engine parameters: EGT high - engine 1.	71-06 TASK 807
710 150 52	Engine parameters: EGT high - engine 2.	71-06 TASK 807
710 160 51	Engine parameters: EGT low - engine 1.	71-06 TASK 807
710 160 52	Engine parameters: EGT low - engine 2.	71-06 TASK 807
710 180 51	Engine surge/stall: surge/stall during acceleration or deceleration, engine operation normal after thrust was decreased to idle, engine shutdown - engine 1.	71-05 TASK 804
710 180 52	Engine surge/stall: surge/stall during acceleration or deceleration, engine operation normal after thrust was decreased to idle, engine shutdown - engine 2.	71-05 TASK 804
710 190 51	Engine surge/stall: surge/stall during acceleration or deceleration, engine operation not normal after thrust was decreased to idle, engine shutdown - engine 1.	71-05 TASK 804
710 190 52	Engine surge/stall: surge/stall during acceleration or deceleration, engine operation not normal after thrust was decreased to idle, engine shutdown - engine 2.	71-05 TASK 804
710 200 51	Engine surge/stall: surge/stall during takeoff, engine operation normal after surge - engine 1.	71-05 TASK 804
710 200 52	Engine surge/stall: surge/stall during takeoff, engine operation normal after surge - engine 2.	71-05 TASK 804
710 210 51	Engine surge/stall: surge/stall during takeoff, engine operation not normal after surge, engine shutdown - engine 1.	71-05 TASK 804
710 210 52	Engine surge/stall: surge/stall during takeoff, engine operation not normal after surge, engine shutdown - engine 2.	71-05 TASK 804
710 232 51	Engine vibration: vibration high - engine 1.	71-05 TASK 808
710 232 52	Engine vibration: vibration high - engine 2.	71-05 TASK 808
710 240 51	Engine surge/stall: surge/stall during reverse thrust, engine operation normal after thrust was decreased to idle - engine 1.	71-05 TASK 804
710 240 52	Engine surge/stall: surge/stall during reverse thrust, engine operation normal after thrust was decreased to idle - engine 2.	71-05 TASK 804

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FAULT CODE	FAULT DESCRIPTION	GO TO FIM TASK
710 250 51	Engine surge/stall: surge/stall during reverse thrust, engine operation not normal after thrust was decreased to idle - engine 1.	71-05 TASK 804
710 250 52	Engine surge/stall: surge/stall during reverse thrust, engine operation not normal after thrust was decreased to idle - engine 2.	71-05 TASK 804
710 300 51	Fumes or smoke in cabin: pneumatic power supplied by engine - engine 1.	71-05 TASK 807
710 300 52	Fumes or smoke in cabin: pneumatic power supplied by engine - engine 2.	71-05 TASK 807

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801. Birdstrike/FOD in Engine - Fault Isolation

A. Description

- (1) The engine had a birdstrike or Foreign Object Damage (FOD).

B. Possible Causes

- (1) Birdstrike or FOD

C. Circuit Breakers

- (1) Not Applicable

D. Related Data

- (1) Not Applicable

E. Fault Isolation Procedure

- (1) Do this task: Foreign Object Damage Inspection, AMM TASK 71-00-00-800-802-F00.

- (a) If the foreign object damage inspection is not in the specified range, 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 foreign object damage inspection is in the specified range, then repair or replace the damaged components that you found.

- (c) If it is necessary, clean the engine to remove the organic debris. To clean it, do this task: Clean the Engine Gas-Path With Pure Water, AMM TASK 72-00-00-100-803-F00

or, do this task: Clean the Engine Gas-Path with Cleaning Solution, AMM TASK 72-00-00-100-804-F00.

NOTE: Use of cleaning solution instead of water gets better results for the removal of the organic debris. If the amount of organic debris is not great, the use of water can be sufficient.

————— **END OF TASK** —————

804. Engine Stall/Surge, Engine Parameters Normal, Not Normal - Fault Isolation

A. Description

- (1) The engine had a surge or a stall, the engine parameters were normal or were not normal after the event.
- (2) Refer to this task Engine Stall/Surge, Engine Parameters Normal Or Not Normal, Engine Recovered Or Shutdown - Fault Isolation, 71-05 TASK 805

————— **END OF TASK** —————

805. Engine Stall/Surge, Engine Parameters Normal Or Not Normal, Engine Recovered Or Shutdown - Fault Isolation

A. Description

- (1) The engine had a surge or a stall and:
- (a) The engine parameters were normal or were not normal after the event,
- (b) The engine recovered or the engine shut down.

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- (2) The surge or stall could have occurred on the ground or in flight during takeoff, during an engine acceleration or deceleration, or during reverse thrust.

NOTE: An on-ground engine stall at low power can cause an uncommanded engine shutdown.

NOTE: For engines which may have ingested dirt, deicing or anti-icing fluid or other external contaminants, it can be necessary to clean the engine gaspath one or more times.

B. Possible Causes

- (1) Internal Engine Failure
- (2) Crosswind or tailwind
- (3) Bleed air check valve (Stage 5)
- (4) VSV System
- (5) VBV System
- (6) HMU, M1823
- (7) T25 sensor
- (8) N2 sensor
- (9) EEC, M1818
- (10) Birdstrike
- (11) Compressor inefficiency (dirty, damaged or eroded)

C. Circuit Breakers

- (1) For Engine 1:

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

CAPT Electrical System Panel, P18-2

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

- (2) For Engine 2:

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 75-31-12)
- (2) (SSM 75-31-22)
- (3) (WDM 73-22-11)
- (4) (WDM 75-31-12)
- (5) (WDM 75-31-22)

FAULT ISOLATION MANUAL**E. Fault Isolation Procedure**

- (1) Examine the inlet for evidence of birdstrike or FOD.
 - (a) If you find evidence, do this task: Foreign Object Damage Inspection, AMM TASK 71-00-00-800-802-F00.
 - 1) If the inspection is not satisfactory and the engine could not be repaired, then replace the engine. These are the tasks:
 - Power Plant Removal, AMM TASK 71-00-02-000-801-F00
 - Power Plant Installation, AMM TASK 71-00-02-400-801-F00
 - 2) If the engine was repaired, then do the Repair Confirmation at the end of this task.
 - a) If the Repair Confirmation was not satisfactory, then continue.
 - 3) If the inspection is satisfactory, then continue to find the cause.
 - (b) If you did not find evidence, then continue.
- (2) Do this task: Inspection of the Engine After an Engine Stall or Possible Engine Stall, AMM TASK 71-00-00-210-801-F00.
 - (a) If the inspection is not satisfactory, 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 inspection is satisfactory or the engine was repaired, then continue to find the cause.
- (3) Make sure that the surge or stall did not occur on the ground with crosswinds or tailwinds.
 - (a) If crosswinds or tailwinds were present, operate the engine into the wind at the thrust levels and engine loads at which the surge occurred and look for operational problems.
 - 1) If there are no more problems, continue the engine in service and monitor on the subsequent flight.
 - 2) If there were problems, then continue.
 - (b) If crosswinds or tailwinds were not present, then continue.
- (4) If a surge or stall occurred in reverser thrust, do a check to make sure the thrust reverser cascades are installed in the correct configuration.
 - (a) If the cascades are not installed correctly, do this task: Cascade Installation, AMM TASK 78-31-05-400-801-F00.
 - (b) If the cascades are installed correctly, then continue.
- (5) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Do the corrective action for VSV, VBV, HMU, T25, N2 or INTERNAL EEC maintenance messages that you find.
 - 1) Do the Repair Confirmation at the end of this task.
 - (b) If you do not find the maintenance messages or the problem continues, then continue.
- (6) Do this task: Bleed Air Check Valve Removal, AMM TASK 36-11-02-000-801.
 - (a) Visually examine the bleed air check valve:
 - 1) Make sure that the valve is not damaged and is complete.
 - 2) Make sure that the valve components move freely and smoothly.
 - (b) If the visual inspection is not satisfactory, install a new bleed air check valve. To install it, do this task: Bleed Air Check Valve Installation, AMM TASK 36-11-02-400-801.
 - 1) Do the Repair Confirmation at the end of this task.

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- (c) If the visual inspection is satisfactory, then, do this task: Bleed Air Check Valve Installation, AMM TASK 36-11-02-400-801 and continue.
- (7) Do these steps to examine the VSV and VBV systems:
- (a) Do this task: Test 12 - Actuators Test, AMM TASK 71-00-00-700-807-F00.
 - 1) Visually examine the VSV and VBV system hardware during the test.
 - a) Make sure the components move freely and smoothly.
 - 2) If you find a problem with the VSV or VBV components, then repair or replace the component as it is necessary.
 - a) Do the Repair Confirmation at the end of this task.
 - 3) If you do not find a problem with the VSV or VBV components and the actuators test is not satisfactory, then do the corrective action for the maintenance messages that show.
 - a) Do the Repair Confirmation at the end of this task.
 - 4) If you do not find a problem with the VSV or VBV components and the actuators test is satisfactory, then continue.
 - (8) Replace the HMU (the most likely LRU from 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 this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.
 - (a) If the Power Assurance test is satisfactory, then, do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (b) If no VSV, VBV, HMU, T25, N2 or INTERNAL EEC maintenance messages show in Flight Leg 0, then you corrected the problem.
 - (2) If the problem occurs on subsequent flights, it can be necessary to do more troubleshooting and inspections.

————— **END OF TASK** —————

807. Fumes or Smoke in Cabin, Pneumatic Power Supplied by Engine - Fault Isolation

A. Description

- (1) The left (right) power plant is the cause of smoke or fumes in the flight compartment or cabin.
 - (a) The leakage checks are the same for either engine.

B. Possible Causes

- (1) Lubricant accidentally put into the engine gas path or airplane bleed system during previous maintenance task.
- (2) Engine oil over-servicing due to oil retention.
- (3) Incorrect rinse of the engine gas path or incorrect bleed system flush after a cleaning solution water wash.
- (4) Engine internal oil leak.

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- (1) Not Applicable

D. Related Data

- (1) Not Applicable

E. Fault Isolation Procedure

- (1) If one of the engines is also reported for High Oil Consumption, do this task for oil tank over-servicing due to oil retention.
 - (a) Do this task: Engine Oil Consumption is High (Oil Quantity Decreases at a Quick Rate) - Fault Isolation, 79-05 TASK 801.
- (2) If one of the following maintenance tasks was done before the fumes or smoke was reported, do the applicable steps:
 - (a) Fan blade re-lubrication - remove the excessive lubricant from the fan blades.
 - (b) HPC borescope inspection - remove the excessive lubricant from the borescope plugs.
 - (c) Engine gas path water wash with cleaning solution - remove the unwanted cleaning solution.
 - 1) Do this task: Clean the Engine Gas-Path With Pure Water, AMM TASK 72-00-00-100-803-F00.
- (3) Do this check of the air recirculation system:
 - (a) Do this task: Recirculation Air Filter Removal, AMM TASK 21-25-01-000-801.
 - (b) Examine the air recirculation filter to see if it is necessary to replace it.
 - (c) Do this task: Recirculation Air Filter Installation, AMM TASK 21-25-01-400-801.
- (4) If the cause has been identified, then do the Repair Confirmation at the end of this task.
 - (a) If the cause has not been identified, then continue
- (5) To find which engine is the cause, note if the smoke stops with these conditions:
 - (a) The isolation valve closed and the left pack switch OFF, then Engine 1 is the most likely cause:
 - 1) Do this task: Smoke or Fumes in the Passenger Cabin or Flight Compartment, Reported During Flight, Smoke Stops With Isolation Valve Closed, Left Pack Switch Off - Fault Isolation, 21-00 TASK 802.
 - (b) The isolation valve closed and the right pack switch OFF, then Engine 2 is the most likely cause:
 - 1) Do this task: Smoke or Fumes in the Passenger Cabin or Flight Compartment, Reported During Flight, Smoke Stops With Isolation Valve Closed, Right Pack Switch Off - Fault Isolation, 21-00 TASK 801.
 - (c) If the cause has been identified, then do the Repair Confirmation at the end of this task
 - (d) If the cause has not been identified, then continue
- (6) Do these checks for an engine internal oil leak
 - (a) Do a borescope inspection of the HPC stage 1 to 3 blades.
 - 1) Do this task: Borescope Inspection of the HP Compressor Blades, AMM TASK 72-00-00-200-804-F00.
 - 2) If oil wetting is found, replace the engine.

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These are the tasks:

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

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

- (b) Do a borescope inspection of the LPC outlet as follows:

- 1) Make sure the VBV doors are in the open position.
 - a) Do this task: VBV Actuation System - Manual Operation, AMM TASK 75-32-00-730-801-F00.
- 2) Examine the gas path through a VBV door for signs of oil wetting.
- 3) If oil wetting is found, 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.

F. Repair Confirmation

- (1) Do this task: Oil Contamination Removal from Air Conditioning and Pneumatic Systems, AMM TASK 21-00-01-100-801.
 - (a) If the oil contamination removal procedure is done until there is no smoke or fumes, and if the problem does not occur on the subsequent flight, then you corrected the fault.

————— **END OF TASK** —————

808. Engine Vibration, Vibration High - Fault Isolation

A. Description

- (1) This fault is a vibration problem which could be an engine problem or an airborne vibration monitoring (AVM) system problem.

B. Possible Causes

- (1) High engine vibration
- (2) AVM system: to include AVM, electrical connectors, #1 bearing and FFCCV sensors.

C. Circuit Breakers

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

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	2	C01076	ENGINE VIB MON

D. Related Data

- (1) (SSM 77-31-11)
- (2) (WDM 77-31-11,-21)

E. Fault Isolation Procedure

- (1) Do a check of the AVM flight history to identify the source of the vibration:
 - (a) Do the applicable —task: AMM TASK 77-31-00-970-802-F00 or AMM TASK 77-31-00-970-803-F00 or AMM TASK 77-31-00-970-804-F00.
 - (b) Record the source of the high vibration and the related engine speed at the time.

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- (c) If the vibration is high on the Fan and HPC, there could be a problem between the No. 1 bearing sensor and the AVM unit.
 - 1) Do the Fault Isolation Procedure - AVM System Problem.
- (d) If the vibration is high on the HPT and LPT, there could be a problem between the fan frame compressor case vibration (FFCCV) sensor and the AVM unit.
 - 1) Do the Fault Isolation Procedure - AVM System Problem.
- (e) If the Pilot reports that the vibration is high, independently of the rotor speed, there could be a problem between either of the sensors and the AVM unit.
 - 1) Do the Fault Isolation Procedure - AVM System Problem.
- (f) If the AVM flight history shows true high engine vibration, do the Fault Isolation Procedure - High Engine Vibration.

F. Fault Isolation Procedure - AVM System Problem

- (1) Do these steps to prepare for the procedure:
 - (a) Open this circuit breaker and install safety tag:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	2	C01076	ENGINE VIB MON

- (b) For the applicable engine, do this task: Open the Fan Cowl Panels, AMM TASK 71-11-02-010-801-F00.

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

- (c) To examine the FFCCV sensor, open the right thrust reverser, do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.
- (2) Examine the electrical connector, D3228A (engine 1) or D3228B (engine 2), at the AVM:
 - (a) Do this task: Airborne Vibration Monitor (AVM) Signal Conditioner Removal, AMM TASK 77-31-03-000-801-F00.
 - (b) Visually examine the AVM receptacle and wire harness connector (AMM TASK 70-70-01-200-801-F00).
 - 1) If the AVM receptacle is damaged, then replace the AVM, M1240.

These are the tasks:

Airborne Vibration Monitor (AVM) Signal Conditioner Removal, AMM TASK 77-31-03-000-801-F00,

Airborne Vibration Monitor (AVM) Signal Conditioner Installation, AMM TASK 77-31-03-400-801-F00.

 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - 2) If the wire harness connector is damaged, then repair the wire harness (SWPM Ch 20).
 - a) Do the Repair Confirmation at the end of this task.



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- b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - c) If you did not find a problem, then continue.
 - (3) To look for a problem with the No. 1 bearing sensor circuit, do these steps:
 - (a) Examine the electrical connector, DP1304, on the fan case aft of the oil tank, just above the engine nameplate.
 - (b) See if the electrical connector, DP1304, is correctly connected to the fan case disconnect, and continue.
 - (c) Disconnect the electrical connector, DP1304, from the fan case disconnect.
 - (d) Visually examine the fan case disconnect receptacle and wire harness connector (AMM TASK 70-70-01-200-801-F00).
 - 1) If the fan case disconnect receptacle is damaged, then deactivate the No. 1 bearing vibration sensor, T332 or replace the No. 1 bearing vibration sensor, T332.
 - 2) To deactivate the No. 1 bearing vibration sensor, do this task: No. 1 Bearing Vibration Sensor Deactivation, AMM TASK 77-31-05-040-801-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - 3) To replace the No. 1 bearing vibration sensor, 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.
 - b) If the Repair Confirmation is not satisfactory, examine and repair the wiring between the AVM and the fan case disconnect (SWPM Ch 20).
 - 4) If the wire harness connector is damaged, then replace the wire harness, MW0313.
 - These are the tasks:
 - Nacelle Wiring Harnesses Removal, AMM TASK 71-51-03-000-801-F00,
 - Nacelle Wiring Harnesses Installation, AMM TASK 71-51-03-400-801-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - 5) If the connector was not correctly connected and no other problem was found, then re-connect the connector and do the Repair Confirmation at the end of this task.
 - a) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - (e) Do a continuity check between these pins of the wires between the applicable AVM connector on the wire harness and the electrical connector DP1304, to the No. 1 bearing sensor:

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Table 201

AVM CONNECTOR D3228A (ENG 1) D3228B (ENG 2) PINS	NOB CONNECTOR DP1304 DP1304 PINS	CONTINUITY
A4	2	YES
B4	3	YES
PIN A4 TO THE CONNECTOR SHELL		NO
PIN B4 TO THE CONNECTOR SHELL		NO

- 1) If the continuity is not correct, then do these steps:
 - a) Repair the wire harness between the AVM and the fan case disconnect (SWPM Ch 20).
 - b) Do the Repair Confirmation at the end of this task.
- 2) If the continuity is correct, then, do this task: No. 1 Bearing Vibration Sensor Deactivation, AMM TASK 77-31-05-040-801-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
- (4) To look for a problem with the FFCCV sensor circuit, do these steps:
 - (a) Examine the electrical connector, DP1101, to the FFCCV sensor on the rear fan frame at the 3:00 o'clock strut:
 - (b) See if the electrical connector, DP1101, is correctly connected to the FFCCV sensor, and continue.
 - (c) Disconnect the electrical connector, DP1101, from the FFCCV sensor.
 - (d) Visually examine the fan frame disconnect receptacle and wire harness connector (AMM TASK 70-70-01-200-801-F00).
 - 1) If the FFCCV sensor receptacle is damaged, then replace the FFCCV sensor, T537.
These are the tasks:
FFCC Vibration Sensor Removal, AMM TASK 77-31-04-000-801-F00,
FFCC Vibration Sensor Installation, AMM TASK 77-31-04-400-801-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
 - 2) If the wire harness connector is damaged, then replace the wire harness, MW0311.
These are the tasks:
3 O'clock Strut Harness Removal, AMM TASK 73-21-06-000-802-F00,
3 O'clock Strut Harness Installation, AMM TASK 73-21-06-400-802-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.

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- 3) If the connector was not correctly connected and no other problem was found, then re-connect the connector and do the Repair Confirmation at the end of this task.
 - a) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.
- (e) Do a continuity check between these pins of the wires between the AVM connector on the wire harness and the electrical connector, DP1101, to the FFCCV sensor pigtail:

Table 202

AVM CONNECTOR D3228A (ENG 1) D3228B (ENG 2) PINS	FFCCV CONNECTOR DP1101 DP1101 PINS	CONTINUITY
A1	2	YES
B1	3	YES
PIN A1 TO THE CONNECTOR SHELL		NO
PIN B1 TO THE CONNECTOR SHELL		NO

- 1) If the continuity is not correct, then do these steps:
 - a) Repair the wire harness between the AVM and the FFCCV sensor (SWPM Ch 20).
 - b) Do the Repair Confirmation at the end of this task.
- 2) If the continuity is correct, then replace the FFCCV sensor, T537.
These are the tasks:
FFCC Vibration Sensor Removal, AMM TASK 77-31-04-000-801-F00,
FFCC Vibration Sensor Installation, AMM TASK 77-31-04-400-801-F00.
 - a) Do the Repair Confirmation at the end of this task.
 - b) If the Repair Confirmation is not satisfactory, then open the circuit breaker above and continue.

G. Fault Isolation Procedure - High Engine Vibration

- (1) Visually examine the applicable engine:
 - (a) Examine the inlet and exhaust for signs of a birdstrike, FOD damage, or metal particles.
 - 1) If you find a problem, do this task: Birdstrike/FOD in Engine - Fault Isolation, 71-05 TASK 801.
 - (b) Use your hand to turn the fan rotor, look for bearing roughness, unusual noises, or binding as the engine turns.
NOTE: Light rubbing of seals and shrouds is normal.
 - 1) If you find bearing roughness, unusual noises or binding, 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.
 - (c) Do this task: Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00.
 - 1) If you find evidence of an internal engine failure, then replace the engine.

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These are the tasks:

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

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

- (d) If no problem was found with the visual inspection, then continue.
 - (2) If the vibration is recorded on the LP rotor only, do these steps:
 - (a) Do one of these visual checks for missing or unbonded elastomer lip seals on the fan blade platforms:
 - 1) Use a flashlight and look on each side of the platform along the blade face.
 - 2) (Alternate method) Put a piece of plastic or a wood stick into the clearance between each side of the platform and the adjacent fan blade face.
 - a) If the plastic (wood) goes into the platform to these limits, then a seal or piece of seal is missing.
 - b) Platform forward end, 0.78 inch (20 mm)
 - c) Platform aft end, 2.7 inches (70 mm).
 - (b) If the amount of missing or unbonded lip seals is more than the limits in this reference (AMM TASK 72-21-02-200-801-F00), replace the platform (AMM TASK 72-21-02-000-802-F00).
 - (c) If there is no missing or unbonded lip seals and the vibration level is greater than or equal to 4 units, do the borescope inspections of the Booster blades and stage 1-3 LPT blades.
 - 1) Do this task: Borecope Inspection of the Booster Blades and Vanes, AMM TASK 72-00-00-200-803-F00.
 - 2) Do this task: Borecope Inspection of the Stage 1-3 LPT Blades, AMM TASK 72-00-00-200-808-F00.
 - 3) If you find damage that is not in the limits, 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.
- (d) To decrease the vibration level, do a fan trim balance and monitor the engine for LP rotor vibration during the subsequent flights.
 - 1) Do one of these tasks: AMM TASK 71-00-00-750-802-F00 or AMM TASK 71-00-00-750-803-F00 or AMM TASK 71-00-00-750-804-F00 or AMM TASK 71-00-00-750-805-F00.
 - 2) If the LP rotor vibration is high again, do these steps:
 - a) Do this task: Fan Blade Removal (Complete Set), AMM TASK 72-21-02-000-801-F00.
 - b) Examine the platforms for missing or unbonded elastomer strip weight adjustment in this reference (AMM TASK 72-21-02-200-801-F00). Replace the platforms not in the limits.
 - c) Lubricate the fan blades per the installation procedure and, do this task: Fan Blade Installation (Complete Set), AMM TASK 72-21-02-400-801-F00.
 - d) Do the fan trim balance again.
 - (3) If the vibration is recorded on the HP rotor only and the vibration level is greater than or equal to 3 units, do these steps:
 - (a) Do these borescope inspections of the HPC blades, stages 3,5 and 6 and the HPT blades:

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- 1) Do this task: Borescope Inspection of the HP Compressor Blades, AMM TASK 72-00-00-200-804-F00.
- 2) Do this task: Borescope Inspection of the HPT Blades, AMM TASK 72-00-00-200-807-F00.
- 3) If you find damage that is not in the limits, 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) Do this task: Test 7 - Vibration Survey, AMM TASK 71-00-00-700-814-F00.

- 1) If the vibration survey is in the limits, then put the engine back into service.

- 2) If the N2 vibration level is not in the limits, 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.

H. Repair Confirmation

- (1) Do these steps to prepare for the procedure:

- (a) If the AVM unit is not installed, do this task: Airborne Vibration Monitor (AVM) Signal Conditioner Installation, AMM TASK 77-31-03-400-801-F00.
- (b) Make sure the connectors at the No. 1 bearing sensor and FFCCV sensor are installed.
- (c) Remove the safety tag and close this circuit breaker:

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	2	C01076	ENGINE VIB MON

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

- (d) If not already done, close the right thrust reverser, do this task: Close the Thrust Reverser (Selection), AMM TASK 78-31-00-010-804-F00.
- (e) Do this task: Close the Fan Cowl Panels, AMM TASK 71-11-02-410-801-F00.
- (2) Do this task: Test 7 - Vibration Survey, AMM TASK 71-00-00-700-814-F00.
- (a) If the Vibration Survey is in the limits, then you corrected the problem.

END OF TASK

809. Engine Rotors (N1 and N2) Locked Together - Fault Isolation**A. Description**

- (1) During post/pre-flight inspection or maintenance, the engine N1 and N2 rotors are found to rotate together with these conditions:
 - (a) When the fan (N1) rotor or N2 rotor is turned manually, a rattling noise of the accessory gearbox (AGB) gears is heard
 - (b) The locked rotors can occur on low or high time engines
 - (c) It can correct itself by engine cool down

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- (d) There was no abnormal engine faults reported by the flight crew during the previous flight such as high vibration or engine stall.

B. Possible Causes

- (1) Interaction between the LP/HP rotating air seals.

NOTE: This is caused by tight clearances between the HPT and LPT rotating seal. Such a phenomenon is not detrimental to the engine and is not a sign of hardware deterioration.

C. Circuit Breakers

- (1) Not applicable.

D. Related Data

- (1) Not applicable.

E. Initial Evaluation

- (1) Examine the chip detector for the aft sump.
- (a) Do this task: Chip Detectors and Scavenge Screens Inspection, AMM TASK 79-00-00-200-804-F00.
 - (b) If signs of engine damage are found, do the applicable action per the procedure.
 - (c) If no signs of engine damage are found, there is no specific maintenance action necessary.
 - 1) If you want to decrease the time to free the engine rotors, then continue.
- (2) Manually turn the N2 rotor. do this task: Turn the N2 Rotor, AMM TASK 72-00-00-980-801-F00
- (a) If the N2 rotor does not drive the N1 rotor, then no more action is necessary.
 - (b) If the N2 rotor drives the N1 rotor, do the Fault Isolation Procedure.

F. Fault Isolation Procedure

- (1) The rotors can eventually be broken loose, if you do these steps:
- (a) Dry motor the engine for one minute. do this task: Dry Motor the Engine, AMM TASK 71-00-00-700-821-F00
 - 1) If the N1 and N2 rotors are free to turn with no rattling noise from the AGB, no more action is necessary.
 - (b) If the N1 and N2 rotors are still locked, stop for a minimum of 30 minutes, and then manually turn the N2 rotor. do this task: Turn the N2 Rotor, AMM TASK 72-00-00-980-801-F00
 - 1) If the N1 and N2 rotors are free to turn with no rattling noise from the AGB, no more action is necessary.
 - (c) If the N1 and N2 rotors are still locked, do the above steps again starting with the one minute dry motor.

G. Repair Confirmation

- (1) Record the steps that you completed to find and repair this fault.

————— **END OF TASK** —————

FAULT ISOLATION MANUAL

801. Engine Overspeed, N1 Over Redline - Fault Isolation

A. Description

- (1) The engine fan speed signal (N1) N1 was more than the redline limit.
 - (a) The applicable N1 speed transmitter sends an analog signal to the EEC. The EEC changes the analog signal into the digital ARINC format and sends the digital signal to the DEU's. The DEU's show the N1 data on the airplane display unit (DU).

B. Possible Causes

- (1) HMU, M1823
- (2) N1 speed sensor, T421
- (3) EEC, M1818
- (4) DEU, M1808 (DEU1) or M1809 (DEU2).

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

FAULT ISOLATION MANUAL**D. Related Data**

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-11)

E. Fault Isolation Procedure

- (1) 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.
 - (a) Look for the applicable exceedance.
 - 1) Make sure that you record the exceedance.
 - 2) Compare the PEAK value of the exceedance with the RED value. If the PEAK value is less than half of the RED value, then the exceedance is a nuisance indication.

NOTE: Nuisance exceedances can occur after engine shutdown. See 737ng-FTD-7702001 for more information on nuisance engine exceedance indications.
 - a) Further fault isolation is not necessary, reset the exceedance.
 - 3) If there is an applicable exceedance, reset the exceedance.
 - (b) If you find an N1 exceedance on the EXCEEDANCES display, then, 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 inspection is not satisfactory, 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.
 - a) Do the Repair Confirmation at the end of this task.
 - 2) If the inspection is satisfactory, then continue.
 - (c) If you do not find an N1 exceedance on the EXCEEDANCES display, then continue.
- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Do the corrective action for the INTERNAL EEC, HMU, FMV, or N1 maintenance messages that you find.
 - 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 the maintenance messages, then continue.
- (3) Replace the HMU (the most likely LRU from the Possible Causes list).

These are the tasks:

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

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

- (a) Do the Repair Confirmation at the end of this task.
- (b) If the Repair Confirmation is not satisfactory, then replace a subsequent LRU from the Possible Causes list.

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

F. Repair Confirmation

- (1) Do one of these steps:

- (a) Monitor the engine operation on the subsequent flight.
- (b) Do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.

- 1) If the Power Assurance test is satisfactory, then, do this task: EEC BITE Procedure, 73-00 TASK 801.
- 2) If no INTERNAL EEC, HMU, FMV, or N1 maintenance messages show in Flight Leg 0, then you corrected the problem.

————— **END OF TASK** —————

802. Engine Overspeed, N2 Over Redline - Fault Isolation**A. Description**

- (1) The engine core speed signal (N2) indicates that N2 is over the redline limit.
 - (a) The applicable N2 speed transmitter sends an analog signal to the EEC. The EEC changes the analog signal into the digital ARINC format and sends the digital signal to the DEU's. The DEU's show the N1 data on the airplane display unit (DU)

B. Possible Causes

- (1) HMU, M1823
- (2) N2 speed sensor, T422
- (3) EEC, M1818
- (4) DEU, M1808 (DEU1) or M1809 (DEU2).

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

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(2) For Engine 2;

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-21)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-21)

E. Fault Isolation Procedure

- (1) 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.
 - (a) Look for the applicable exceedance.
 - 1) Make sure that you record the exceedance.
 - 2) Compare the PEAK value of the exceedance with the RED value. If the PEAK value is less than half of the RED value, then the exceedance is a nuisance indication.

NOTE: Nuisance exceedances can occur after engine shutdown. See 737ng-FTD-7702001 for more information on nuisance engine exceedance indications.

 - a) Further fault isolation is not necessary, reset the exceedance.
 - 3) If there is an applicable exceedance, reset the exceedance.
 - (b) If you find an N2 exceedance on the EXCEEDANCES display, 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 inspection is not satisfactory, then replace the engine.

These are the tasks:

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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.
- 2) If the inspection is satisfactory, then continue.
- (c) If you do not find an N2 exceedance on the EXCEEDANCES display, then continue.
- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Do the corrective action for INTERNAL EEC, HMU, FMV, or N2 maintenance messages that you find.
 - 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 the maintenance messages, then continue.
- (3) Replace the HMU (the most likely LRU from 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.
 - (b) If the Repair Confirmation is not satisfactory, then replace a subsequent LRU from the Possible Causes list.
 - 1) Do the Repair Confirmation at the end of this task.

F. Repair Confirmation

- (1) Do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.
 - (a) If the Power Assurance test is satisfactory, do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (b) If no INTERNAL EEC, HMU, FMV, or N2 maintenance messages show in Flight Leg 0, then you corrected the problem.

————— **END OF TASK** —————

803. N1 is High in Reverse Thrust, Record Maximum N1 - Fault Isolation**A. Description**

- (1) The engine fan speed signal (N1) is higher than usual in reverse thrust.
 - (a) The applicable N1 speed transmitter sends an analog signal to the EEC. The EEC changes the analog signal into the digital ARINC format and sends the digital signal to the DEU's. The DEU's show the N1 data on the airplane display unit (DU).

B. Possible Causes

- (1) HMU, M1823
- (2) N1 speed sensor, T421
- (3) EEC, M1818.

C. Circuit Breakers

- (1) For Engine 1;

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FAULT ISOLATION MANUAL

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

- (2) For Engine 2;

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-11)

E. Fault Isolation Procedure

- (1) For the applicable engine, look at the N1 indication on the center display unit.
 - (a) If the box around the digital indication is red, then go to the FIM Observed Fault List, and do the applicable fault isolation task for N1 over the redline limit.
 - (b) If the box around the digital indication is white, then continue.

FAULT ISOLATION MANUAL

- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Do the corrective action for the INTERNAL EEC, HMU, FMV, or N1 maintenance messages that you find.
 - 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 the maintenance messages, then continue.
- (3) Replace the HMU (the most likely LRU from 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.
 - (b) If the Repair Confirmation is not satisfactory, then replace a subsequent LRU from the Possible Causes list.
 - 1) Do the Repair Confirmation at the end of this task.

F. Repair Confirmation

- (1) Record the steps that you completed to find and repair this fault.
 - (a) Monitor the airplane on subsequent flights.

————— END OF TASK —————

804. Engine Overtemperature, EGT Amber (Not During Engine Start), No Engine Surge or Stall - Fault Isolation

A. Description

- (1) The engine exhaust gas temperature (EGT) indication shows that the EGT was higher than the EGT amber band limit.
- (2) There was no indication of a surge or stall.

B. Possible Causes

- (1) Internal engine failure or deterioration
- (2) VSV system
- (3) VBV system
- (4) HPTACC system
- (5) TBV, T519
- (6) EGT indicating system
 - (a) EEC, M1818
 - (b) DEU, M1808 (DEU 1) or M1809 (DEU 2)
- (7) Engine bleed air distribution system.

C. Circuit Breakers

- (1) For Engine 1;

FAULT ISOLATION MANUAL

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

- (2) For Engine 2;

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-11)

E. Fault Isolation Procedure

- (1) For the applicable engine, look at the EGT indication on the center display unit.
 - (a) If the box around the digital indication is red, then, do this task: Engine Overtemperature, EGT Over Redline (Not During Engine Start), No Engine Surge or Stall - Fault Isolation, 71-06 TASK 805.

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- (b) If the box around the digital indication is white, then continue.
- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Do the corrective action for maintenance messages that are related to these components:
 - 1) INTERNAL EEC
 - 2) VBV
 - 3) VSV
 - 4) TBV
 - 5) HPTACC
 - 6) T495
 - 7) DEU Data Faults.
 - (b) If you did the corrective action for one of these messages, then do the Repair Confirmation at the end of this task.
 - 1) If the Repair Confirmation is not satisfactory, then continue.
 - (c) If you do not find a maintenance message, then continue.
- (3) Do this task: Borescope Inspection of the HPT Blades, AMM TASK 72-00-00-200-807-F00.
 - (a) If you find damage that is more than the limits, 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 you do not find damage that is more than the limits, then continue.
- (4) Do these checks 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 for leaks 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.
 - (b) Do this task: Engine Bleed Air Crossover Operational Test, AMM TASK 36-11-00-710-801.
 - 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.
- (5) Do this task: Clean the Engine Gas-Path With Pure Water, AMM TASK 72-00-00-100-803-F00.
 - (a) Do the Repair Confirmation at the end of this task.
 - 1) If the engine operation is not satisfactory, 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.

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F. Repair Confirmation

- (1) Do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.
 (a) If the engine operation is satisfactory, then you corrected the faults

————— **END OF TASK** —————

805. Engine Overtemperature, EGT Over Redline (Not During Engine Start), No Engine Surge or Stall - Fault Isolation

A. Description

- (1) The engine exhaust gas temperature (EGT) indication shows that the EGT is higher than the EGT redline limit.
 (2) There was no indication of a surge or stall.

B. Possible Causes

- (1) Internal engine failure or deterioration
 (2) VSV system
 (3) VBV system
 (4) HPTACC system
 (5) TBV, T519
 (6) EGT indicating system
 (a) EEC, M1818
 (b) DEU, M1808 (DEU 1) or M1809 (DEU 2)
 (7) Engine bleed air distribution system.

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

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

CAPT Electrical System Panel, P18-2

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

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F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-11)

E. Initial Evaluation

- (1) For the applicable engine, look at the EGT indication on the center display unit.
 - (a) If the box around the digital indication is white, then, do this task: Engine Overtemperature, EGT Amber (Not During Engine Start), No Engine Surge or Stall - Fault Isolation, 71-06 TASK 804.
 - (b) If the box around the digital indication is red, then continue.

F. Fault Isolation Procedure

- (1) 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.
 - (a) Look for the applicable exceedance.
 - 1) Make sure that you record the exceedance.
 - 2) Compare the PEAK value of the exceedance with the RED value. If the PEAK value is less than half of the RED value, then the exceedance is a nuisance indication.

NOTE: Nuisance exceedances can occur after engine shutdown. See 737ng-FTD-7702001 for more information on nuisance engine exceedance indications.

 - a) Further fault isolation is not necessary, reset the exceedance.
 - 3) If there is an applicable exceedance, reset the exceedance.
 - (b) If you find an EGT exceedance on the EXCEEDANCES display, then, 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 inspection is not satisfactory, then replace the engine.

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These are the tasks:

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

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

- a) Do the Repair Confirmation at the end of this task.
 - 2) If the inspection is satisfactory, then continue.
- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
- (a) Do the corrective action for maintenance messages that are related to these components:
 - 1) INTERNAL EEC
 - 2) VBV
 - 3) VSV
 - 4) TBV
 - 5) HPTACC
 - 6) T495
 - 7) DEU Data Faults.
 - (b) If you did the corrective action for one of these messages, then do the Repair Confirmation at the end of this task.
 - 1) If the Repair Confirmation is not satisfactory, then continue.
 - (c) If you do not find a maintenance message, then continue.
- (3) Do these checks 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 for leaks 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.
 - (b) Do this task: Engine Bleed Air Crossover Operational Test, AMM TASK 36-11-00-710-801.
 - 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 this task: Borescope Inspection of the HPT Blades, AMM TASK 72-00-00-200-807-F00.
- (a) If you find damage that is more than the limits, 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 you do not find damage that is more than the limits, then continue.
- (5) Do this task: Clean the Engine Gas-Path With Pure Water, AMM TASK 72-00-00-100-803-F00.
- NOTE:** This task is optional but is recommended if the cause of the exceedance is still unknown.

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- (6) Do the Repair Confirmation at the end of this task.
- (a) If the engine operation is not satisfactory, 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.

G. Repair Confirmation

- (1) Do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.
- (a) If the engine operation is satisfactory, then you corrected the faults

————— **END OF TASK** —————

806. Engine Overtemperature, EGT Over Redline Limit Due to Surge - Fault Isolation**A. Description**

- (1) You saw or heard indications of a surge or a stall.
- (2) The engine exhaust gas temperature (EGT) indication shows that the EGT is higher than the EGT redline limit.
- (3) This task assumes that the EGT over temperature occurred after a surge or stall condition.

B. Possible Causes

- (1) Internal engine failure or deterioration
- (2) VSV system
- (3) VBV system
- (4) HPTACC system
- (5) TBV, T519

C. Circuit Breakers

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

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	4	C01390	ENGINE 1 ALTN PWR CHAN B
A	5	C01314	ENGINE 1 ALTN PWR CHAN A
D	5	C01359	DISPLAY DEU 1 PRI

F/O Electrical System Panel, P6-1

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

- (2) For Engine 2;

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

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-1

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (WDM 73-24-11)
- (6) (WDM 73-24-12)
- (7) (WDM 73-24-21)
- (8) (WDM 77-12-11)

E. Initial Evaluation

- (1) For the applicable engine, look at the EGT indication on the center display unit.
 - (a) If the box around the digital indication is white, then go to the FIM Observed Fault List, and do the applicable fault isolation task for surge/stall.
 - (b) If the box around the digital indication is red, then continue.

F. Fault Isolation Procedure

- (1) Do this task: Inspection of the Engine After an Engine Stall or Possible Engine Stall, AMM TASK 71-00-00-210-801-F00.
 - (a) If you find damage that is more than the limits, 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 damage is not more than the limits, then continue.
- (2) 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.
 - (a) Make sure that you record the exceedance.
 - (b) If there is an applicable exceedance, reset the exceedance.

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- (c) After you find an EGT exceedance on the EXCEEDANCES display, 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 inspection is not satisfactory, then replace the engine.

These are the tasks:

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

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

- 2) If the inspection is satisfactory, then continue.

- (3) Do one of these tasks to do the fault isolation for the engine surge:

- (a) Do this task: Engine Stall/Surge, Engine Parameters Normal, Not Normal - Fault Isolation, 71-05 TASK 804.

- (b) Do this task: Engine Stall/Surge, Engine Parameters Normal Or Not Normal, Engine Recovered Or Shutdown - Fault Isolation, 71-05 TASK 805.

- (c) If you do not find a fault, or if the subsequent engine operation is not satisfactory, then, do this task: Borescope Inspection of the HP Compressor Blades, AMM TASK 72-00-00-200-804-F00.

- 1) If you find damage that is more than the limits, 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.

- (d) If you do not find damage that is more than the limits, then do these steps:

- 1) Do this task: Clean the Engine Gas-Path With Pure Water, AMM TASK 72-00-00-100-803-F00.

- 2) Do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.

- (e) If the engine operation is not satisfactory, 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.

G. Repair Confirmation

- (1) Make a record of the steps you did to find and repair this fault, and then look for this fault on the subsequent flight.

————— **END OF TASK** —————

807. Engine Parameters EGT High, Low or Fluctuates - Fault Isolation**A. Description**

- (1) EGT is high or low or the EGT fluctuates.

B. Possible Causes

- (1) Engine Bleed Air Distribution System
(2) HPTACC System
(3) VBV System
(4) TBV System

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(5) VSV System

C. Circuit Breakers

(1) For Engine 1;

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

CAPT Electrical System Panel, P18-2

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

(2) For Engine 2;

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

F/O Electrical System Panel, P6-2

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

D. Related Data

- (1) (SSM 73-24-11)
- (2) (SSM 73-24-12)
- (3) (SSM 73-24-21)
- (4) (SSM 77-12-11)
- (5) (SSM 77-21-11)
- (6) (WDM 73-22-11)
- (7) (WDM 73-24-11)
- (8) (WDM 73-24-12)
- (9) (WDM 73-24-21)
- (10) (WDM 77-12-11)
- (11) (WDM 77-21-11)

E. Fault Isolation Procedure

- (1) If it is apparent from the pilot's report or from the engine condition monitoring system report that this fault is an indication problem and not an engine operational problem, then, do this task: Engine EGT Indication High, Low, Blank or Fluctuates - Fault Isolation, 77-05 TASK 801.
- (2) Do this task: EEC BITE Procedure, 73-00 TASK 801.
 - (a) Look for HPTACC, T3, TCC, VBV, TBV and VSV maintenance messages.
 - (b) Do the corrective action for the maintenance messages that you find.
 - 1) Do the Repair Confirmation for this task.
 - 2) If the Repair Confirmation is not satisfactory, then continue.
 - (c) If you do not find the maintenance messages, then continue.
- (3) Do this task: EEC TEST, AMM TASK 73-21-00-700-804-F00.

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- (a) Look for T3, TCC, VBV, TBV and VSV maintenance messages.
- (b) Do the corrective action for the maintenance messages that you find.
 - 1) Do the Repair Confirmation for this task.
 - 2) If the Repair Confirmation is not satisfactory, then continue.
- (c) If you do not find the maintenance messages, then continue.
- (4) Do this task: Test 12 - Actuators Test, AMM TASK 71-00-00-700-807-F00.
 - (a) Look for HPTACC, VBV, TBV and VSV maintenance messages.
 - (b) Do the corrective action for the maintenance messages that you find.
 - 1) Do the Repair Confirmation at the end of this task.
 - 2) If the Repair Confirmation is not satisfactory, then continue.
 - (c) If you do not find the maintenance messages, then continue.

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

- (5) Do this task: Open the Thrust Reverser (Selection), AMM TASK 78-31-00-010-801-F00.
- (6) Do this task: Variable Bleed Valve Doors Inspection, AMM TASK 75-32-03-200-801-F00.
 - (a) If you find a problem, then repair or replace components as it is necessary.
 - 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) Do a continuity check from the applicable Engine Anti-Ice Switch on the P5-11 panel to the DEUs.
 - (a) Remove the two DEUs. To remove the DEU, do this task: Display Electronic Unit Removal, AMM TASK 31-62-21-000-801.
 - (b) Examine the wires between the DEU connectors and the applicable switch.

CONNECTOR	SWITCH POSITION	PINS	EXPECTED RESULTS
ENG 1, DEU DP3973B	OFF	PIN A11 GROUND	CONTINUITY
ENG 1, DEU DP3975B	OFF	PIN A11 GROUND	CONTINUITY
ENG 1, DEU DP3973B	ON	PIN A11 GROUND	OPEN
ENG 1, DEU DP3975B	ON	PIN A11 GROUND	OPEN
ENG 2, DEU DP3973E	OFF	PIN A11 GROUND	CONTINUITY
ENG 2, DEU DP3975E	OFF	PIN A11 GROUND	CONTINUITY

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(Continued)

CONNECTOR	SWITCH POSITION	PINS	EXPECTED RESULTS
ENG 2, DEU DP3973E	ON	PIN A11 GROUND	OPEN
ENG 2, DEU DP3975E	ON	PIN A11 GROUND	OPEN

- (c) If the continuity check is not satisfactory, do a check of the applicable Engine Anti-Ice switch.
 - 1) Remove the switch and examine its operation.
 - 2) If the switch does not operate correctly, then replace the switch.
 - 3) If the switch operates correctly, then examine and repair the wires from the switch to the DEUs.
 - 4) Install the Engine Anti-Ice switch.
 - 5) Install the two DEUs.
 - 6) Do the Repair Confirmation at the end of this task.
- (d) If the continuity check is satisfactory, then do these steps:
 - 1) Install the two DEUs. To install the DEU, do this task: Display Electronic Unit Installation, AMM TASK 31-62-21-400-801.
- (8) Examine the engine bleed air distribution system:
 - (a) Do a visual check of the sense line to the PRSOV for a source of leakage.
 - 1) If you find a source of leakage, 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 did not find a source of leakage, then continue.
 - (b) Do this task: Test 1 - Pneumatic Leak Check, AMM TASK 71-00-00-700-809-F00.
NOTE: Also, look for leaks 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.
 - (c) Do this task: Engine Bleed Air Crossover Operational Test, AMM TASK 36-11-00-710-801.
 - 1) If the EGT indication is high during the test, then, do this task: Test 5 - Power Assurance Check, AMM TASK 71-00-00-700-813-F00.
NOTE: The power assurance test will show if the engine efficiency has degraded.
 - 2) If you find a problem, then repair or replace components as it is necessary.
 - 3) Do the Repair Confirmation at the end of this task.
 - 4) If the Repair Confirmation is not satisfactory, then continue.

F. Repair Confirmation

- (1) Do one of these optional procedures:

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- (a) Option 1;
 - 1) do this task: Start the Engine Procedure (Selection), AMM TASK 71-00-00-800-807-F00
 - a) As the engine operates at idle-power, monitor the EGT indication on the center DU.
 - b) If the EGT indication is satisfactory, do this task: Stop the Engine Procedure (Usual Engine Stop), AMM TASK 71-00-00-700-819-F00
 You corrected the fault.
- (b) Option 2;
 - 1) Record the steps you did to find and repair this fault, and then look for this fault on the subsequent flight.

————— **END OF TASK** —————

808. Engine EGT, Fuel Flow, Oil Pressure and Oil Temperature Show After Engine Shutdown - Fault Isolation**A. Description**

- (1) The EEC did not de-power when the start lever is set to CUTOFF and the engine start switch is set to OFF which causes the engine EGT, Fuel Flow, Oil Pressure and Oil Temperature to continue to show.
- (2) There are no numbered EEC maintenance message related with this fault. If there are any numbered EEC maintenance messages do the Fault isolation Procedure for those maintenance messages first.

B. Possible Causes

- (1) Alternate Power Relay, R576 (Eng 1) or R575 (Eng 2).
- (2) Engine start lever relay:
 - (a) Engine 1 start lever relay, R566 (Ch A) or R565 (Ch B)
 - (b) Engine 2 start lever relay, R568 (Ch A) or R567 (Ch B).
- (3) Engine start switch, S266 (Eng 1) or S267 (Eng 2).
- (4) Engine start lever switch module, M1824 (Eng 1) or M1825 (Eng 2).

C. Related Data

- (1) Component Locator.
- (2) WDM 73-22-11
- (3) WDM 74-31-11
- (4) WDM 76-21-11
- (5) WDM 76-21-21
- (6) SSM 73-22-11
- (7) SSM 74-31-11
- (8) SSM 76-21-11
- (9) SSM 76-21-21

D. Fault Isolation Procedure

- (1) Do these steps to find out if the EEC is still powered.
 - (a) Examine the Common Display System (CDS) for the following engine indications for the applicable engine:
 - 1) Exhaust Gas Temperature (EGT)

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- 2) Engine Fuel Flow
- 3) Engine Oil Pressure
- 4) Engine Oil Temperature.
- (b) If the above indications do not show or are blank, then this evaluation has shown that the fault is not active at this time and you have an intermittent fault.
 - 1) If you cannot find the fault at this time, then this Fault Isolation procedure cannot isolate the fault.
 - 2) For an intermitting fault you must use your judgement, your airline policies, and the Possible Causes list to make the decision if you try to correct the fault.
- (c) If the above indications show and are not blank, then continue.
- (2) Set the engine start switch to the OFF position.
 - (a) If the engine start switch is not in the OFF position, the EEC will receive airplane power from the transfer bus.
- (3) Make sure that the N2 speed is less than 5% when this fault was observed.
 - (a) As the engine spools down during a shutdown, the EEC can remain on EEC alternator power down to speeds of approximately 5% N2.
- (4) Make sure that the CDU is not set to the engine maintenance pages.
 - (a) If the EEC is set to the engine maintenance pages, the EEC will receive airplane power from the transfer bus.
- (5) Do the following check of the Flight Management Computer (FMC):
- (5) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	6	C01017	FMCS CMPTR 1

F/O Electrical System Panel, P6-1

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
D	16	C01262	FMCS CMPTR 2

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NOTE: These circuit breakers must be opened for a minimum 10 seconds before you close them.

- (a) Make sure that the engine EGT, fuel flow, oil pressure and oil temperature still show on the Common Display System (CDS).
 - 1) If the EEC data blanks on the CDS when the FMCS circuit breakers are opened, then there is a problem with the FMCS and troubleshooting for the FMCS should be done.

NOTE: This scenario is possible, but very unlikely. This check is done first because it is very quick and easy and can save considerable of time and effort from the troubleshooting and replacing the other components if it does occur.
- (b) Do this step as follows:

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- (b) Remove the safety tags and close these circuit breakers:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
A	6	C01017	FMCS CMPTR 1

F/O Electrical System Panel, P6-1

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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D	16	C01262	FMCS CMPTR 2
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- (6) Do this task, Supply Electrical Power, AMM TASK 24-22-00-860-811.
- (7) Do this task: Remove Pressure from the Pneumatic System, AMM TASK 36-00-00-860-806.
- (8) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	3	C01312	ENGINE 1 RUN/PWR

F/O Electrical System Panel, P6-2

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	5	C01313	ENGINE 2 RUN/PWR

- (9) If the engine EGT, Fuel Flow, Oil Pressure and Oil Temperature still show on the Common Display System (CDS), then the Alternate Power Relay is the cause of the fault.
- (a) Replace the appropriate Alternate Power Relay T576 (Eng 1) or R575 (Eng 2), and proceed to the Repair Confirmation.
- 1) If the EEC data blanks on the CDS when you open the circuit breaker in step (3) "Open these circuit breakers and install safety tags", then continue.
- (10) Open these circuit breakers and install safety tags:

CAPT Electrical System Panel, P18-2

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

F/O Electrical System Panel, P6-2

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

NOTE: You may also choose to remove airplane power according to your airline safety standards.

- (11) Do this check for a ground on the wiring to the Alternate Power Relay.
- (a) Remove the appropriate Alternate Power Relay, R576 (Eng 1) or R575 (Eng 2).
- 1) Use a standard ohmmeter, STD-7618 and examine the resistance as follows:
- a) For the engine 1:

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D10954

2 -----

D10954

ground

b) For the engine 2:

D10952

2 -----

D10952

ground

c) If the resistance to the ground is less than 500 ohms, then there is a problem in the wiring to the Alternate Power Relay.

d) Examine and repair the wires and proceed to the Repair Confirmation.

(12) To get access to the CDS DEU 1 BITE main menu using the FMC CDU.

(a) Do this task: Common Display System - Operational Test, AMM TASK 31-62-00-710-801.

(13) Select the "INPUT MONITORING DISCRETE STATUS".

(14) verify that the discretes are operating correctly as shown in the Table as follow.

Monitoring Discrete Status Message

POSSIBLE CAUSE	SWITCH POSITION	INSERT	PIN	DISCRETE STATUS ^{*[1]}
ENGINE 1				
Eng 1 Start Switch	FLT	B	C14	O ^{*[2]}
Eng 1 Start Switch	GND / CONT	B	F9	O
Engine 1 Start Lever Relay Ch A	CUTOFF	B	H2	O
Engine 1 Start Lever Relay Ch A	CUTOFF	D	H2	O
ENGINE 2				
Eng 2 Start Switch	FLT	E	C14	O ^{*[2]}
Eng 2 Start Switch	GND / CONT	E	F9	O
Engine 2 Start Lever Relay Ch A	CUTOFF	E	H2	O
Engine 2 Start Lever Relay Ch A	CUTOFF	A	H2	O

*[1] G = Ground

*[2] O = Open

(15) If the discrete status is not as described in the table above, then replace the appropriate start lever relay, R566 (Eng 1) or R568 (Eng 2), or start switch, S266 (Eng 1) or S267 (Eng 2), or engine start lever switch module, M1824 (Eng 1) or M1825 (Eng 2).

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- (a) If the discrete status is correct, then continue.
- (16) To get access to the CDS DEU 1 bite main menu using the FMC CDU.
- (a) Do this task: Common Display System - Operational Test, AMM TASK 31-62-00-710-801.
- (17) Select the “INPUT MONITORING DISCRETE STATUS”.
- (18) Verify that the discretes are operating correctly as shown in the Table as follow.

Monitoring Discrete Status Message

POSSIBLE CAUSE	SWITCH POSITION	INSERT	PIN	DISCRETE STATUS ^{*[1]}
ENGINE 1				
Eng 1 Start Switch	FLT	B	C14	O ^{*[2]}
Eng 1 Start Switch	GND / CONT	B	F9	O
Engine 1 Start Lever Relay Ch A	CUTOFF	B	H2	O
Engine 1 Start Lever Relay Ch A	CUTOFF	D	H2	O
ENGINE 2				
Eng 2 Start Switch	FLT	E	C14	O
Eng 2 Start Switch	GND / CONT	E	F9	O
Engine 2Start Lever Relay Ch A	CUTOFF	E	H2	O
Engine 2Start Lever Relay Ch A	CUTOFF	A	H2	O

*[1] G = Ground

*[2] O = Open

- (19) If the discrete status is not as described in the table above, then replace the appropriate start lever relay, R566 (Eng 1) or R568 (Eng 2), or start switch, S266 (Eng 1) or S267 (Eng 2), or engine start lever switch module, M1824 (Eng 1) or M1825 (Eng 2).
- (a) If the discrete status is correct then use your judgement, your airline policies, and the Possible Causes list to make the decision if you will try to correct the fault.

E. Repair Confirmation

- (1) Do the repair confirmation procedure as follows:
- (a) Do this task: AMM TASK 71-00-00-800-807-F00.
- 1) Let the engine to operate at the idle power for a minimum 5 minutes.
- (b) Do this task: AMM TASK 71-00-00-700-819-F00.

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- 1) Make sure that the EEC data displayed on the Common Display System (CDS) such as EGT, Fuel Flow, Oil Pressure, Oil Temperature are all blanks after the engine is shutdown.
 - a) Make sure to wait until after the engine N2 has spooled down below 5% as the EEC may still be on EEC alternate power until approximately 5% N2.
- 2) If the EEC display blanks after the engine shutdown, then you have corrected the fault.

————— **END OF TASK** —————

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