CHAPTER

80

STARTING

(GE90-100 SERIES ENGINES)

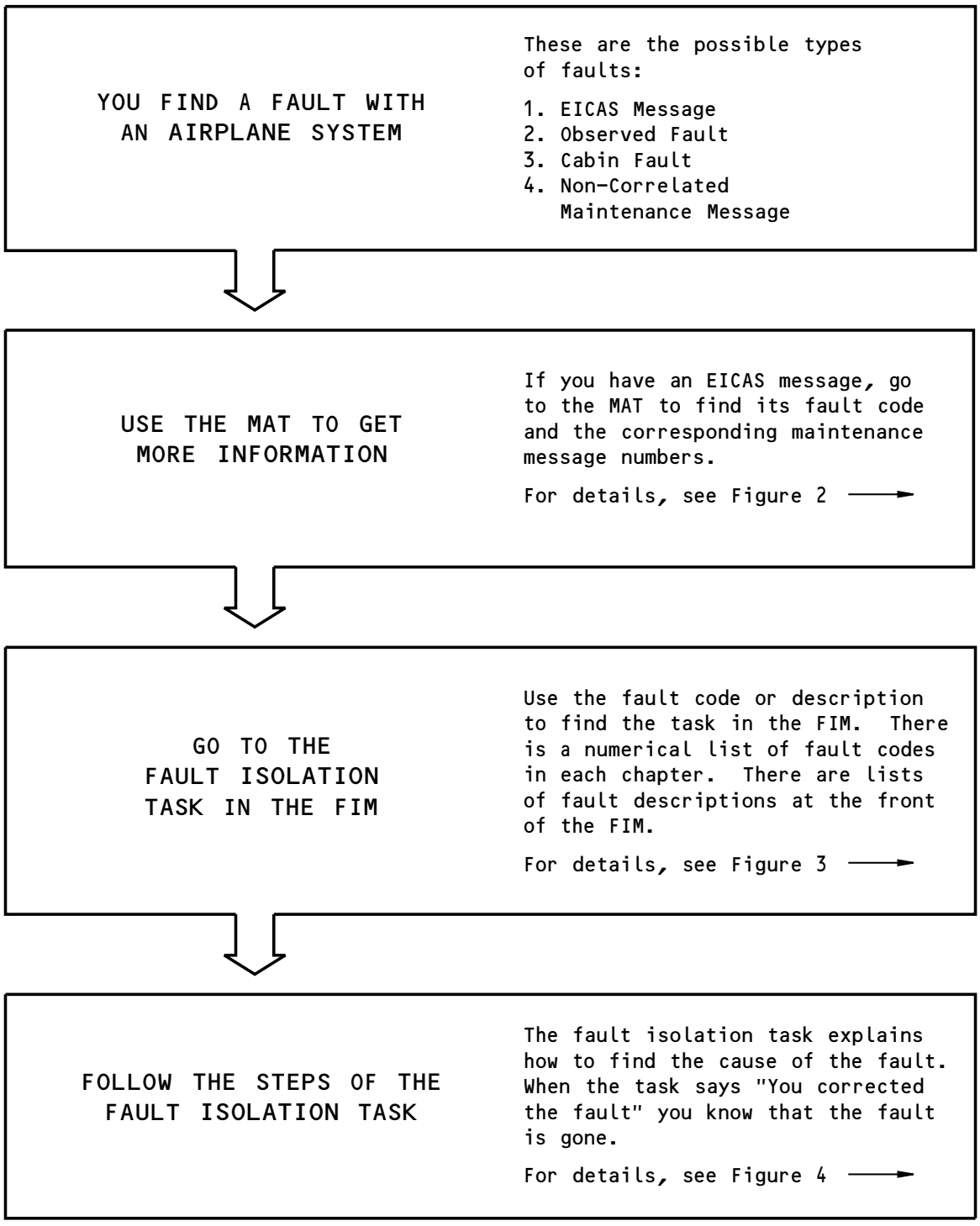
BOEING

777-200/300
FAULT ISOLATION MANUAL

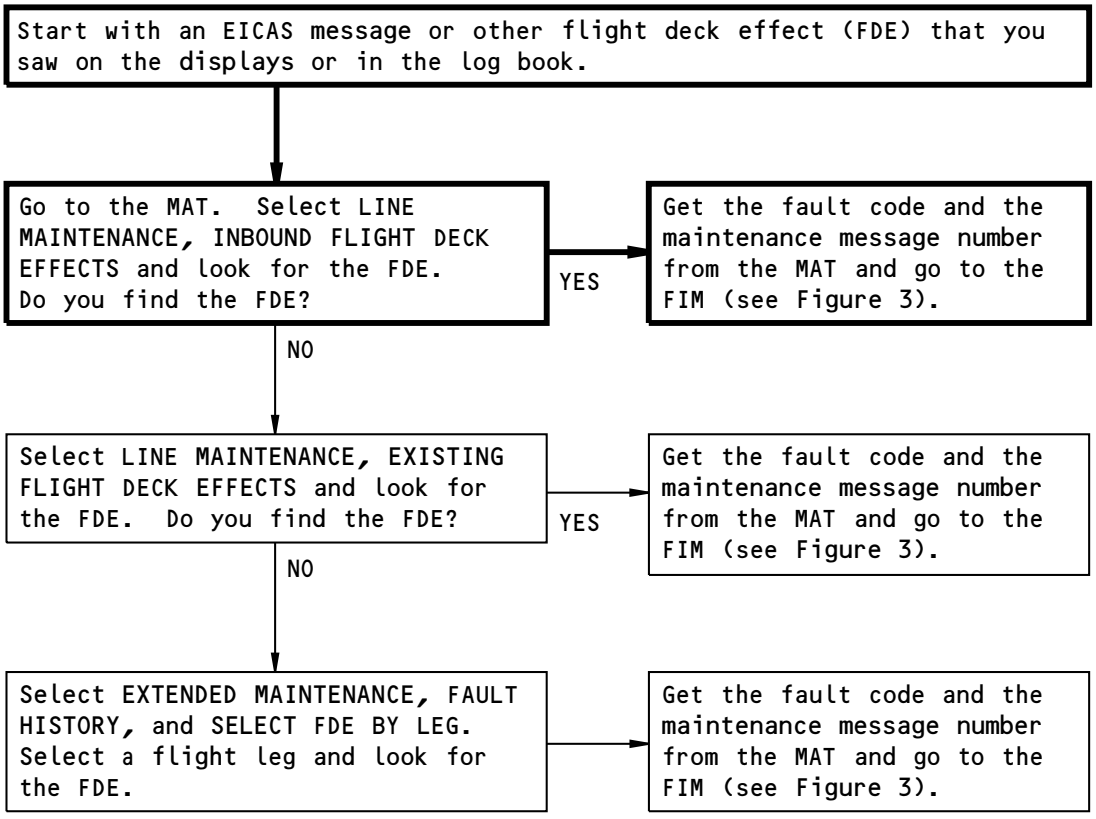
CHAPTER 80
STARTING

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

80-EFFECTIVE PAGES



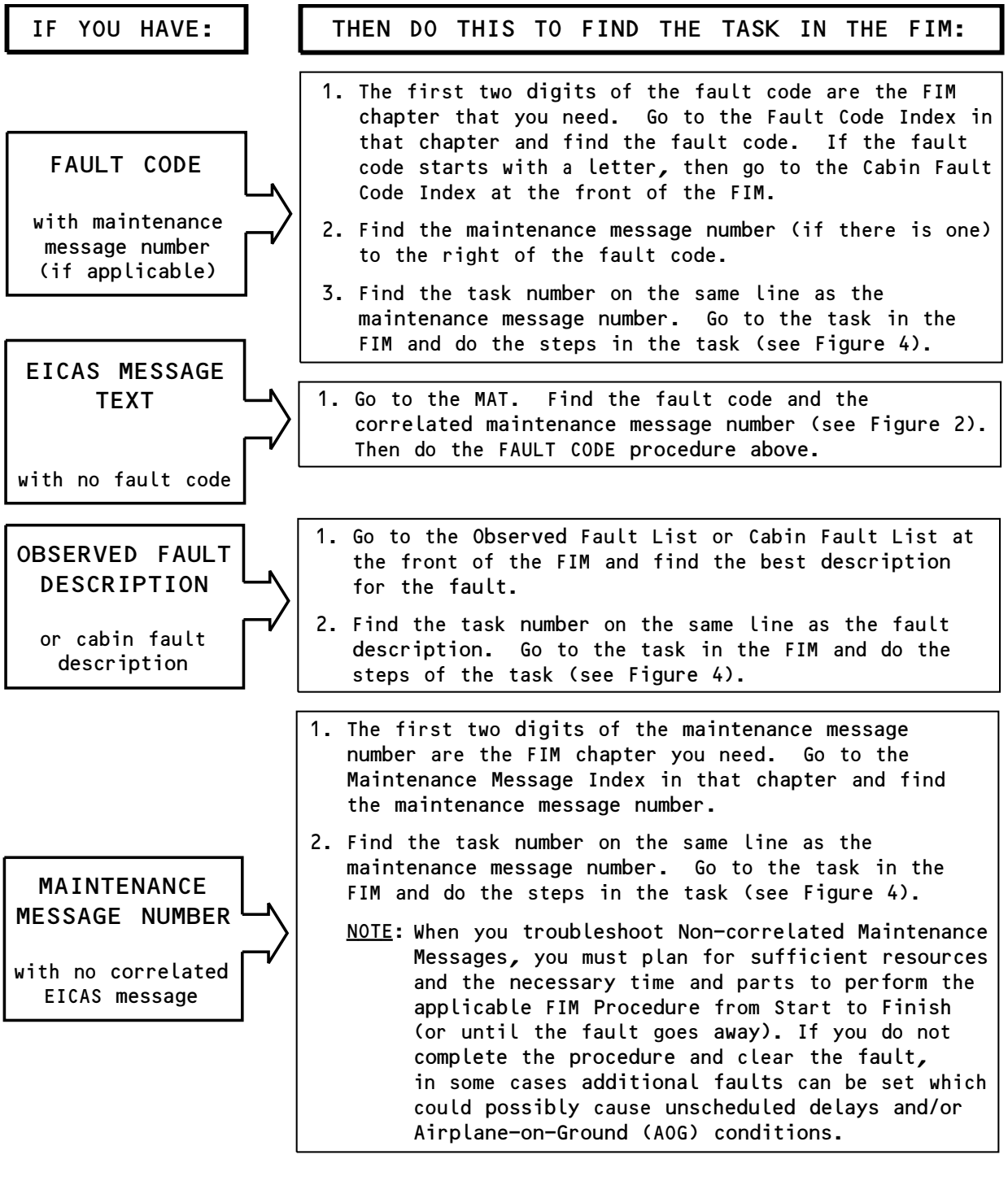
Basic Fault Isolation Process
Figure 1



NOTE: The bold lines show the most common path.

E84425 S0000132475_V1

Getting Fault Information from the MAT
Figure 2



E84427 S0000132476_V2

Finding the Fault Isolation Task in the FIM
Figure 3

ASSUMED CONDITIONS AT START OF TASK

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

INITIAL EVALUATION PARAGRAPH

- The Initial Evaluation paragraph at the start of the task helps you determine whether 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 components to replace. Then monitor the airplane to see if the fault happens again on subsequent flights.

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.
- The Recommended Maintenance Action that shows on the MAT for the maintenance message gives a list of possible causes in order by probability of failure. In the FIM procedure, the possible causes can be in a different order from the MAT.

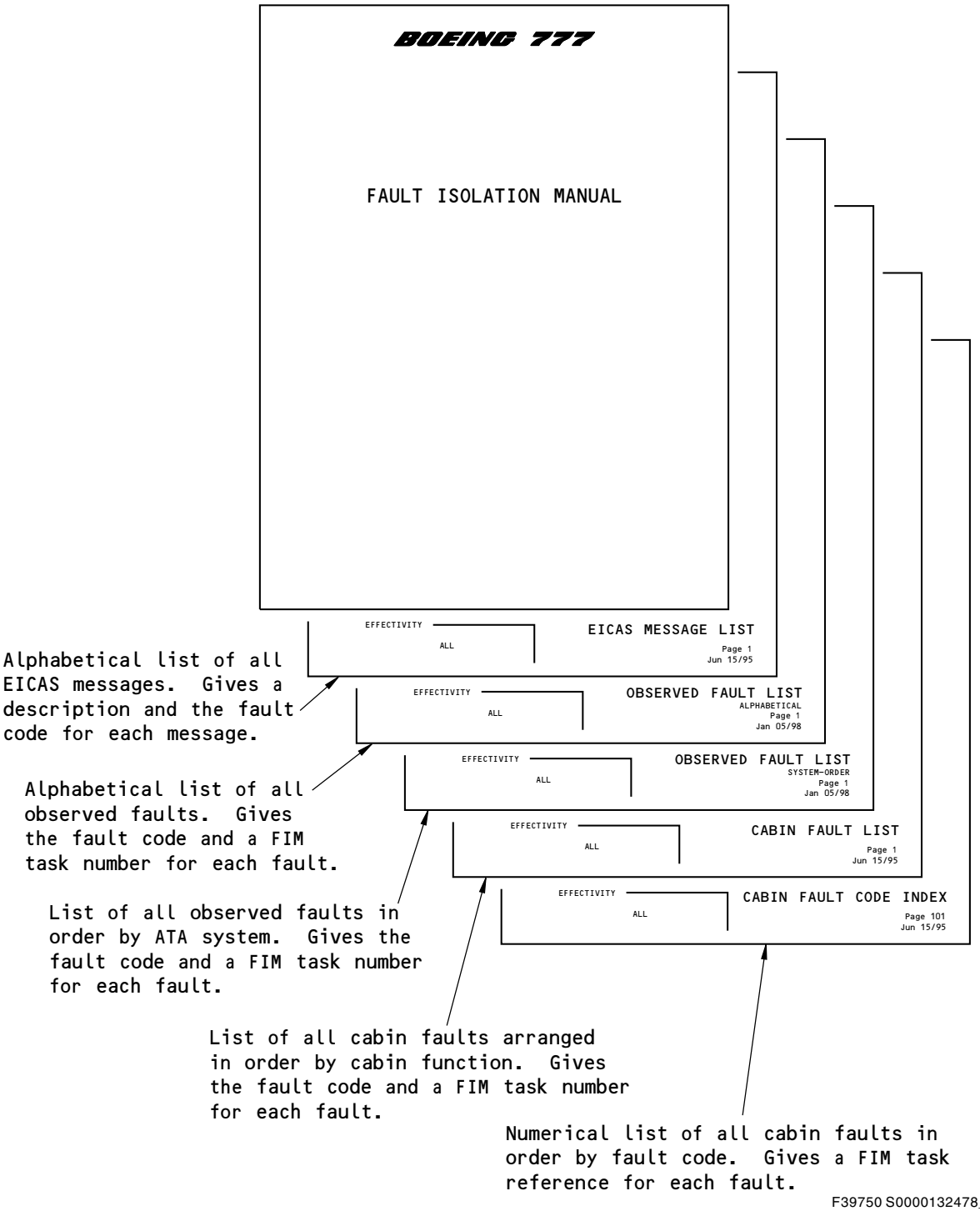
WIRING CHECKS

When a step says "Do a wiring check", do these three types of electrical checks for the specified contacts (pins):

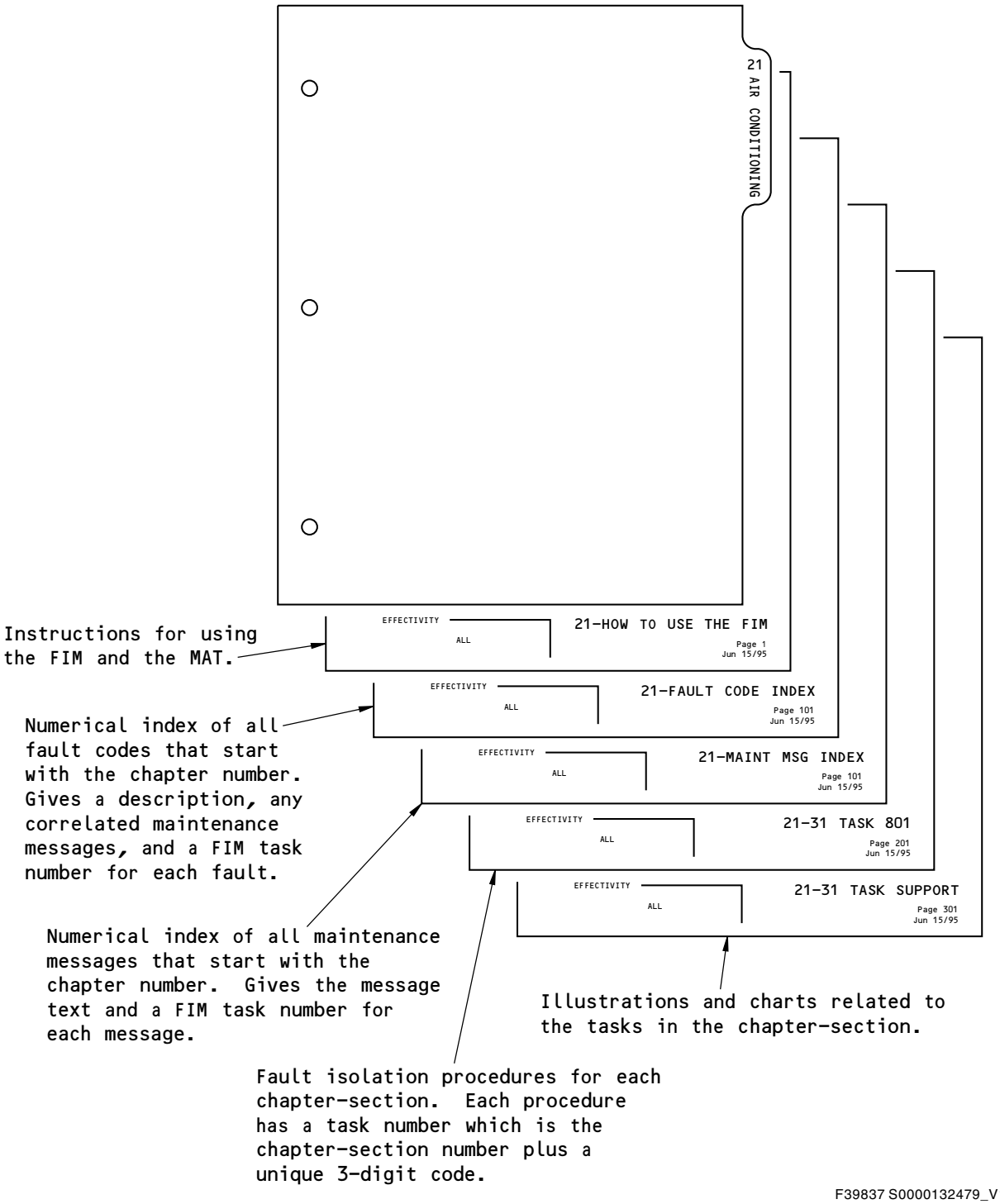
- continuity from contact to contact
- shorts between the contacts
- shorts from each contact to ground

E84428 S0000132477_V3

Doing the Fault Isolation Task
Figure 4



Subjects at Front of FIM
Figure 5



F39837 S0000132479_V1

Subjects in Each FIM Chapter
Figure 6

FAULT CODE	FAULT DESCRIPTION	MAINT MSG	GO TO FIM TASK
801 001 51	ENG AUTOSTART L (EICAS CAUTION)	72-33901	72-21 TASK 802
		73-33321	73-21 TASK 862
		73-33861	73-22 TASK 833
		73-33891	73-22 TASK 834
		73-34881	73-22 TASK 854
		77-14661	77-21 TASK 808
		77-14671	77-21 TASK 809
		77-14691	77-21 TASK 811
		77-24661	77-21 TASK 808
		77-24681	77-21 TASK 810
		77-24691	77-21 TASK 811
		79-34491	79-21 TASK 823
		80-33851	80-21 TASK 816
		80-33871	80-21 TASK 817
		80-33881	80-21 TASK 819
		80-33911	80-21 TASK 818
		80-33961	80-21 TASK 820
801 001 52	ENG AUTOSTART R (EICAS CAUTION)	72-33902	72-21 TASK 802
		73-33322	73-21 TASK 863
		73-33862	73-22 TASK 833
		73-33892	73-22 TASK 834
		73-34882	73-22 TASK 854
		77-14662	77-21 TASK 808
		77-14672	77-21 TASK 809
		77-14692	77-21 TASK 811
		77-24662	77-21 TASK 808
		77-24682	77-21 TASK 810
		77-24692	77-21 TASK 811
		79-34492	79-21 TASK 823
		80-33852	80-21 TASK 816
		80-33872	80-21 TASK 817
		80-33882	80-21 TASK 819
		80-33912	80-21 TASK 818
		80-33962	80-21 TASK 820

FAULT CODE	FAULT DESCRIPTION	MAINT MSG	GO TO FIM TASK
801 011 51	ENG STARTER CUTOUT L (EICAS CAUTION)	80-33841	80-21 TASK 815
		80-34821	80-21 TASK 814
		80-34831	80-21 TASK 813
801 011 52	ENG STARTER CUTOUT R (EICAS CAUTION)	80-33842	80-21 TASK 815
		80-34822	80-21 TASK 814
		80-34832	80-21 TASK 813
801 021 50	ENG AUTOSTART OFF (EICAS ADVISORY)		74-21 TASK 805
801 031 51	ENG START VALVE L (EICAS ADVISORY)	73-13111	73-21 TASK 842
		73-23111	73-21 TASK 842
		80-33841	80-21 TASK 815
801 031 52	ENG START VALVE R (EICAS ADVISORY)	73-13112	73-21 TASK 842
		73-23112	73-21 TASK 842
		80-33842	80-21 TASK 815
801 032 51	ENG START VALVE L (EICAS STATUS) Before you do any task listed here, see FIM 80-98 TASK 802. **NOTE:** AIMS CAN LATCH THIS MESSAGE.	73-13111	73-21 TASK 842
		73-23111	73-21 TASK 842
		80-33811	80-21 TASK 812
		80-33841	80-21 TASK 815
801 032 52	ENG START VALVE R (EICAS STATUS) Before you do any task listed here, see FIM 80-98 TASK 802. **NOTE:** AIMS CAN LATCH THIS MESSAGE.	73-13112	73-21 TASK 842
		73-23112	73-21 TASK 842
		80-33812	80-21 TASK 812
		80-33842	80-21 TASK 815
801 611 51	Start (engine): Start fails with fuel flow zero or low - left engine.		80-98 TASK 803
801 611 52	Start (engine): Start fails with fuel flow zero or low - right engine.		80-98 TASK 803

MAINT MESSAGE	MESSAGE TEXT	GO TO FIM TASK
80-33801	Pressure signals from Starter Air Pressure Sensor (L Eng) channel A and B do not agree.	80-21 TASK 812
80-33802	Pressure signals from Starter Air Pressure Sensor (R Eng) channel A and B do not agree.	80-21 TASK 812
80-33811*	Starter Air Pressure Sensor (L Eng) signal is out of range.	80-21 TASK 812
80-33812*	Starter Air Pressure Sensor (R Eng) signal is out of range.	80-21 TASK 812
80-33841*	Starter Air Valve (L Eng) is not in commanded position.	80-21 TASK 815
80-33842*	Starter Air Valve (R Eng) is not in commanded position.	80-21 TASK 815
80-33851	Left Engine start failed due to starter failure.	80-21 TASK 816
80-33852	Right Engine start failed due to starter failure.	80-21 TASK 816
80-33871	Starter (L Eng) air pressure is low.	80-21 TASK 817
80-33872	Starter (R Eng) air pressure is low.	80-21 TASK 817
80-33881	Starter Air Valve (L Eng) failed to open.	80-21 TASK 819
80-33882	Starter Air Valve (R Eng) failed to open.	80-21 TASK 819
80-33911	Starter (L Eng) duty cycle is exceeded.	80-21 TASK 818
80-33912	Starter (R Eng) duty cycle is exceeded.	80-21 TASK 818
80-33961	**AIMS-2, CMCF LDI 3114-BCG-00W-16;** Left Engine fuel switch was turned on too soon during manual start. **AIMS-1, CPM/Comm OPS S/W 3166-HNP-002-11;** **AIMS-2, CMCF LDI 3111-BCG-00W-13;** **AIMS-2, CMCF LDI 3116-BCG-00W-14;** **AIMS-2, CMCF LDI 3117-BCG-00W-15;** Left engine fuel switch was turned on too soon during manual start.	80-21 TASK 820
80-33962	**AIMS-2, CMCF LDI 3114-BCG-00W-16;** Right Engine fuel switch was turned on too soon during manual start. **AIMS-1, CPM/Comm OPS S/W 3166-HNP-002-11;** **AIMS-2, CMCF LDI 3111-BCG-00W-13;** **AIMS-2, CMCF LDI 3116-BCG-00W-14;** **AIMS-2, CMCF LDI 3117-BCG-00W-15;** Right engine fuel switch was turned on too soon during manual start.	80-21 TASK 820
80-34821	Starter Air Valve (L Eng) is failed open.	80-21 TASK 814
80-34822	Starter Air Valve (R Eng) is failed open.	80-21 TASK 814
80-34831	Start/Ignition Switch (Left) is failed.	80-21 TASK 813
80-34832	Start/Ignition Switch (Right) is failed.	80-21 TASK 813

*If the MAT shows LATCHED for the correlated EICAS message, then you must erase the EICAS message after you complete the FIM task.

812. Starter Air Pressure Sensor Faults - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33801, 80-33802, 80-33811, 80-33812.

B. Description

(1) Starter air pressure sensor signal is failed. This fault can be reported whenever the EEC is powered.

C. Initial Evaluation

(1) Set the applicable EEC MAINT POWER switch on the overhead maintenance panel, P61, to the TEST position. If there is a fault, then the MAT will show the maintenance message in 120 seconds or less.

(a) If the MAT shows ACTIVE for the maintenance message, then do the fault isolation procedure below.

(b) If the MAT shows NOT ACTIVE for the maintenance message, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airline policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

D. Fault Isolation Procedure

(1) Make sure the applicable EEC MAINT POWER switch is in the NORM position.

CAUTION

REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(2) Disconnect the electrical connector DP72904 from the starter air pressure sensor, M80002 (WDM 80-11-11, 80-11-21).

(a) Examine the electrical harness connector for bent pins, damaged sockets, dirt, debris, damage or looseness. If loose, tighten the connector with soft jaw pliers.

1) If you find dirt or debris, clean the connector.

(b) Examine the electrical harness for damage.

1) If you find a problem with the wiring, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(c) Do the repair confirmation at the end of this task

(3) If you do not find a problem with the connectors or wiring, or if the problem continues, then measure the resistances between these pairs of pins on the sensor receptacle, DP72904:

DP72904	DP72904	
3	11	500 - 5K ohms
4	12	500 - 5K ohms
2	9	500 - 5K ohms
7	8	500 - 5K ohms
2	GND	> 100K ohms
3	GND	> 100K ohms
4	GND	> 100K ohms
7	GND	> 100K ohms
8	GND	> 100K ohms
9	GND	> 100K ohms
11	GND	> 100K ohms
12	GND	> 100K ohms

(4) If the resistance is in not in the range specified for each pair of pins, or if the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(5) If the resistance is in the range specified for each pair of pins, connect the electrical connector DP72904 to the starter air pressure sensor, M80002.

CAUTION

MAKE SURE YOU REMOVE ELECTRICAL POWER FROM THE EEC (FADEC) BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT, YOU CAN CAUSE DAMAGE TO THE EEC (FADEC).

(6) Disconnect electrical connectors DP70911 (CH A) and DP70912 (CH B) from the EEC (FADEC), M73003.

(7) Measure the resistances between these pairs of pins on the channel A and channel B harness connectors:

DP70911	DP70911	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

DP70912	DP70912	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

(8) If the resistance is not in the range specified for each pair of pins, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(9) If the resistance is in not in the range specified for each pair of pins, or if the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(10) If the resistance is in the range specified for each pair of pins, or if the fault continues, replace the EEC (FADEC) M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01.

E. Repair Confirmation

(1) Set the applicable EEC MAINT POWER switch on the overhead maintenance panel, P61, to the TEST position. If there is a fault, then the MAT will show the maintenance message in 120 seconds or less.

(a) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then put the EEC MAINT POWER switch back to the NORM position and no more action is necessary (you corrected the fault).

(b) If the MAT shows ACTIVE for the maintenance message, then put the EEC MAINT POWER switch back to the NORM position and continue with this fault isolation procedure at the subsequent step.

END OF TASK

813. Start/Ignition Switch (L/R Eng) is Failed - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-34831, 80-34832.

B. Description

(1) The start switch is at start after the command to close by the EEC (FADEC) start and run logic for more than 4 seconds.

C. Initial Evaluation

(1) Do these steps:

(a) Do the engine dry motor procedure.

This is the task:

Dry Motor, AMM TASK 71-00-00-800-836-H00.

NOTE: You will have to watch the MAT for the maintenance message as you stop the dry motor (after you put start switch to the cutoff position).

(b) Look at the MAT while you stop the engine dry motor procedure.

This is the task:

Dry Motor, AMM TASK 71-00-00-800-836-H00.

1) If the MAT show ACTIVE for the maintenance message while the engine stops, then do the fault isolation procedure below.

2) If the MAT shows NOT ACTIVE for the maintenance message while the engine stops, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airlines policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

D. Fault Isolation Procedure

(1) Troubleshoot the wiring between the start switch and the EEC (WDM 80-11-11).

(a) If you find a problem, repair or replace the wiring as it is necessary.

(b) Do the repair confirmation procedure at the end of this task.

(2) If you do not find a problem, or if the fault continues, replace the start control switch, S80100.

(a) Do the repair confirmation procedure at the end of this task.

(3) If the fault continues, replace the EEC (FADEC), M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01.

E. Repair Confirmation

(1) Do these steps:

(a) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

NOTE: You will have to watch the MAT for the maintenance message as you stop the dry motor (after you put start switch to the cutoff position).

(b) Look at the MAT while you stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

1) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then you corrected the fault.

2) If the MAT shows ACTIVE for the maintenance message, then continue with this fault isolation procedure at the subsequent step.

——— END OF TASK ———

814. Starter Air Valve is Failed Open - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-34821, 80-34822.

B. Description

(1) The starter air valve is failed in the OPEN position after the given command to close by the EEC (FADEC) start and run logic. The starter air pressure sensor, the starter air valve relay, and the air supply duct pressure are valid.

C. Initial Evaluation

(1) Do these steps:

(a) Do the inspection of the starter MCD for unwanted material (AMM TASK 80-11-01-200-801-H01.

1) Do this inspection again once a day for the next seven days.

2) Do this inspection again at least one more time between the interval of 25-35 days after the initial inspection.

(b) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

NOTE: You will have to watch the MAT for the maintenance message as you stop the dry motor (after you put start switch to the cutoff position).

(c) Look at the MAT while you stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

1) If the MAT show ACTIVE for the maintenance message while the engine stops, then do the fault isolation procedure below.

2) If the MAT shows NOT ACTIVE for the maintenance message while the engine stops, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airlines policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

D. Fault Isolation Procedure

(1) Make sure the applicable EEC MAINT POWER switch is in the NORM position.

CAUTION REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(2) Disconnect the electrical connector DP72904 from the starter air pressure sensor, M80002 (WDM 80-11-11, 80-11-21).

(a) Examine the electrical harness connector for bent pins, damaged sockets, dirt, debris, damage or looseness. If loose, tighten the connector with soft jaw pliers.

1) If you find dirt or debris, clean the connector.

(b) Examine the electrical harness for damage.

1) If you find a problem with the wiring, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(c) Examine the sensor connector pins and sockets for bent pins, damaged sockets, dirt debris, damage or looseness. If you find a problem, replace the starter air starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(d) Do the repair confirmation at the end of this task.

(3) If you do not find a problem with the connectors or wiring, of if the problem continues, then measure the resistances between these pairs of pins on the sensor receptacle:

DP72904	DP72904	
3	11	500 - 5K ohms
4	12	500 - 5K ohms
2	9	500 - 5K ohms
7	8	500 - 5K ohms
2	GND	> 100K ohms
3	GND	> 100K ohms
4	GND	> 100K ohms
7	GND	> 100K ohms
8	GND	> 100K ohms
9	GND	> 100K ohms
11	GND	> 100K ohms
12	GND	> 100K ohms

(4) If the resistance is not in the range specified for each pair of pins replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(5) If the resistance is in the range specified for each pair of pins, connect the electrical connector DP72908 to the starter air pressure sensor, M80002.

CAUTION

REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(6) Disconnect electrical connectors DP70913 (CH A) and DP70912 (CH B) from the EEC (FADEC), M73003.

(7) Measure the resistances between these pairs of pins on the channel A and channel B harness connectors:

DP70913	DP70913	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

DP70912	DP70912	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

(8) If the resistance is not in the range specified for each pair of pins, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(9) If you do not find a problem with the wiring or if the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(10) If the fault continues, replace the EEC (FADEC), M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01

E. Repair Confirmation

(1) Do these steps:

(a) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

NOTE: You will have to watch the MAT for the maintenance message as you stop the dry motor (after you put start switch to the cutoff position).

(b) Look at the MAT while you stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

1) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then you corrected the fault.

2) If the MAT shows ACTIVE for the maintenance message, then continue with this fault isolation procedure at the subsequent step.

——— END OF TASK ———

815. Starter Air Valve Position Fault - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33841, 80-33842.

B. Description

(1) The starter air valve is failed in the OPEN or CLOSE position after the given command by the EEC (FADEC) start and run logic. The starter air pressure sensor, the starter air valve relay, and the air supply duct pressure are valid.

C. Initial Evaluation

(1) Do these steps:

(a) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

1) If the MAT show ACTIVE for the maintenance message while the engine motors, then do the fault isolation procedure below.

2) If the MAT shows NOT ACTIVE for the maintenance message while the engine motors, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airlines policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

(b) Stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

D. Fault Isolation Procedure

(1) Make sure the applicable EEC MAINT POWER switch is in the NORM position.

CAUTION

REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(2) Disconnect the electrical connector DP72904 from the starter air pressure sensor, M80002 (WDM 80-11-11, 80-11-21).

(a) Examine the electrical harness connector for bent pins, damaged sockets, dirt, debris, damage or looseness. If loose, tighten the connector with soft jaw pliers.

1) If you find dirt or debris, clean the connector.

(b) Examine the electrical harness for damage.

1) If you find a problem with the wiring, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(c) Examine the sensor connector pins and sockets for bent pins, damaged sockets, dirt debris, damage or looseness. If you find a problem, replace the starter air starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(d) Do the repair confirmation at the end of this task.

(3) If you do not find a problem with the connectors or wiring, of if the problem continues, then measure the resistances between these pairs of pins on the sensor receptacle:

DP72904	DP72904	
3	11	500 - 5K ohms
4	12	500 - 5K ohms
2	9	500 - 5K ohms
7	8	500 - 5K ohms
2	GND	> 100K ohms
3	GND	> 100K ohms
4	GND	> 100K ohms
7	GND	> 100K ohms
8	GND	> 100K ohms
9	GND	> 100K ohms
11	GND	> 100K ohms
12	GND	> 100K ohms

(4) If the resistance is not in the range specified for each pair of pins, replace the starter air starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(5) If the resistance is in the range specified for each pair of pins, connect the electrical connector DP72904 to the starter air pressure sensor, M80002.

CAUTION

REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(6) Disconnect electrical connectors DP70913 (CH A) and DP70912 (CH B) from the EEC (FADEC), M73003.

(7) Measure the resistances between these pairs of pins on the channel A and channel B harness connectors:

DP70913	DP70913	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

DP70912	DP70912	
D	E	500 - 5K ohms
Z	m	500 - 5K ohms
D	GND	> 100K ohms
E	GND	> 100K ohms
Z	GND	> 100K ohms
m	GND	> 100K ohms

(8) If the resistance is not in the range specified for each pair of pins, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(9) If you do not find a problem with the wiring or if the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(10) If the fault continues, replace the EEC (FADEC), M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01.

E. Repair Confirmation

(1) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

(a) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then you corrected the fault.

(b) If the MAT shows ACTIVE for the maintenance message, then continue with this fault isolation procedure at the subsequent step.

——— END OF TASK ———

816. Starter Shaft Shear - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33851, 80-33852.

B. Description

(1) N2 speed is monitored to determine if it has reached a set threshold in a predetermined amount of time. If N2 is not greater than the threshold limit within the given time or if you abort the autostart on the ground, this fault will display.

C. Fault Isolation Procedure

(1) Do this task: Pressurize the Pneumatic System, AMM TASK 36-00-00-860-802.

(a) Make sure you see a minimum of 30 psig duct pressure displayed on EICAS with the SAV valve in the OPEN position.

(b) If the duct pressure is less than 30 psig, depressurize the pneumatic system (AMM TASK 36-00-00-860-801).

1) Troubleshoot the pneumatic system.

(c) If the duct pressure is 30 psig or more, depressurize the pneumatic system (AMM TASK 36-00-00-860-801).

1) Continue with this fault isolation procedure.

CAUTION

IF THERE IS AN IDG FAILURE, IT CAN CAUSE DAMAGE TO THE SHAFT AND CAUSE STARTER SHAFT SHEAR.

(2) Check for IDG faults.

(3) Replace the engine starter.

These are the tasks:

Engine Starter Removal, AMM TASK 80-11-01-000-801-H01

Engine Starter Installation, AMM TASK 80-11-01-400-801-H01.

——— END OF TASK ———

817. Low Starter Air Pressure - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33871, 80-33872.

B. Description

(1) The starter air supply pressure is not enough to accomplish a successful start. This fault will display on the ground if one of these conditions exist: (1) the starter air pressure is less than 18 psig, or (2) no air pressure at all, or (3) the starter air pressure is lost after you initiate the start sequence.

C. Initial Evaluation

(1) Do these steps:

(a) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

(b) While you do the engine dry motor procedure, monitor DUCT PRESS on the Chapter 36 Air Synoptic Display.

1) If DUCT PRESS is less than 20 psig while you do the engine dry motor procedure, examine the MAT for maintenance messages related to the aircraft ECS system, and do the fault isolation for these messages.

2) If DUCT PRESS is 20 psig or greater while you do the engine dry motor procedure, continue with the initial evaluation steps that follow.

(c) If the MAT show ACTIVE for the maintenance message while you do the engine dry motor procedure, then do the fault isolation procedure below.

(d) If the MAT shows NOT ACTIVE for the maintenance message while you do the engine dry motor procedure, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airlines policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

(e) Stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

D. Fault Isolation Procedure

(1) Do a check of the starter duct for obvious signs of leaks or loose connections.

(a) If you find damage or loose connections, repair or replace the starter duct as it is necessary.

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

(2) If the starter duct is satisfactory or the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(3) If the fault continues, replace the engine starter.

These are the tasks:

Engine Starter Removal, AMM TASK 80-11-01-000-801-H01

Engine Starter Installation, AMM TASK 80-11-01-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(4) If the fault continues, replace the EEC (FADEC), M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01.

E. Repair Confirmation

(1) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

(a) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then you corrected the fault.

(b) If the MAT shows ACTIVE for the maintenance message, then continue with this fault isolation procedure at the subsequent step.

(c) Stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

——— END OF TASK ———

818. Starter Duty Cycle Exceeded - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33911, 80-33912.

B. Description

(1) The engine starter has operated more than the starter duty cycle limits. This fault will display after the EEC (FADEC) has aborted the start on the ground due to a start time that is greater than 5 minutes.

C. Fault Isolation Procedure

(1) Do a check of the magnetic chip detector in the engine starter (AMM TASK 80-11-01-200-801-H01).

(a) If you see chips or metal particles on the chip detector that are more than the limit, replace the engine starter.

These are the tasks:

Engine Starter Removal, AMM TASK 80-11-01-000-801-H01

Engine Starter Installation, AMM TASK 80-11-01-400-801-H01.

(b) If you do not see chips or metal particles on the chip detector, then return the starter to service.

END OF TASK

819. Starter Air Valve Fails to Open - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33881, 80-33882.

B. Description

(1) There is insufficient starter air supply pressure to open the starter air valve, or the starter air valve has failed in the closed position.

C. Initial Evaluation

(1) Do these steps:

(a) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

(b) While you do the engine dry motor procedure, monitor DUCT PRESS on the Chapter 36 Air Synoptic Display.

1) If DUCT PRESS is less than 20 psig while you do the engine dry motor procedure, examine the MAT for maintenance messages related to the aircraft ECS system, and do the fault isolation for these messages.

2) If DUCT PRESS is 20 psig or greater while you do the engine dry motor procedure, continue with the initial evaluation steps that follow.

(c) If the MAT show ACTIVE for the maintenance message while you do the engine dry motor procedure, then do the fault isolation procedure below.

(d) If the MAT shows NOT ACTIVE for the maintenance message while you do the engine dry motor procedure, then there was an intermittent fault.

NOTE: If you have an intermittent fault, you must use your judgement (and your airlines policy) to make a decision if you will replace components and if so, which components to replace. Then monitor the airplane on the subsequent flight.

(e) Stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

D. Fault Isolation Procedure

CAUTION REMOVE ELECTRICAL POWER FROM THE EEC BEFORE YOU DISCONNECT THE ELECTRICAL CONNECTORS. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE EEC CAN OCCUR.

(1) Disconnect connector DP72610 at the starter air valve, V80001, and connector DP70606 at the EEC (FADEC), M73003 (WDM 80-11-11, 80-11-21).

(a) Attach a jumper from pin c to pin j of connector DP70606 and do a check for continuity between pins 1 and 2 of connector DP72610 at the starter air valve.

(b) Measure the resistances between these pairs of pins on connector DP72610:

DP72610		DP72610	
1	. . . . .	GND	> 100K ohms
2	. . . . .	GND	> 100K ohms

(2) If you find a problem with the wiring, replace the applicable electrical harness.

These are the tasks:

EEC (FADEC) Electrical Harness Removal, AMM TASK 73-22-01-000-801-H01

EEC (FADEC) Electrical Harness Installation, AMM TASK 73-22-01-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(3) If you do not find a problem with the wiring or if the fault continues, replace the starter air valve, M80001.

These are the tasks:

Starter Air Valve Removal, AMM TASK 80-11-02-000-801-H01

Starter Air Valve Installation, AMM TASK 80-11-02-400-801-H01.

(a) Do the repair confirmation procedure at the end of this task.

(4) If the fault continues, replace the EEC (FADEC), M73003.

These are the tasks:

EEC (FADEC) Removal, AMM TASK 73-21-15-000-801-H01

EEC (FADEC) Installation, AMM TASK 73-21-15-400-801-H01.

E. Repair Confirmation

(1) Do this task: Dry Motor, AMM TASK 71-00-00-800-836-H00.

(a) If the MAT shows NOT ACTIVE for the maintenance message (or if the message does not show), then you corrected the fault.

(b) If the MAT shows ACTIVE for the maintenance message, then continue with this fault isolation procedure at the subsequent step.

(c) Stop the engine dry motor procedure (AMM TASK 71-00-00-800-837-H00).

END OF TASK

820. Fuel On Too Soon During Manual Start - Fault Isolation

A. Maintenance Messages

(1) This task is for maintenance messages: 80-33961, 80-33962.

B. Description

(1) The EEC has detected the fuel was turned on with core speed less than 18 percent (too soon) during a manual start attempt.

C. Fault Isolation Procedure

(1) Do these steps:

(a) Put the AUTO/MAN start switch in the MAN position.

(b) Make sure you see the EICAS message ENG AUTOSTART OFF display.

(c) Put the AUTO/MAN start switch in the AUTO position.

(d) Make sure you do NOT see the EICAS message ENG AUTOSTART OFF.

(2) If the two conditions above occurred, return the airplane to service.

(3) If either of these two conditions did not occur, troubleshoot the AUTO/MAN start switch and related wiring.

(4) If the problem continues, replace the applicable fuel control switch.

These are the tasks:

Engine Fuel Control Module Removal, AMM TASK 76-11-09-000-801-H01

Engine Fuel Control Module Installation, AMM TASK 76-11-09-400-801-H01.

——— END OF TASK ———

821. Autostart Switch Has Failed - Fault Isolation

A. Description

(1) The autostart switch, M80001S7, has failed.

B. Initial Evaluation

(1) Put the applicable EEC MAINT POWER switch on the P61 panel in the TEST position.

(2) Put the applicable AUTOSTART switch on the P5 panel in the ON position.

(3) Look to see if the EICAS Advisory message, ENG AUTOSTART OFF, shows.

(4) If the EICAS Advisory message, ENG AUTOSTART OFF, shows, do the fault isolation procedure that follows.

(5) If the EICAS Advisory message, ENG AUTOSTART OFF, does not show, then no corrective action is necessary.

C. Fault Isolation Procedure

(1) Do this task: Remove Electrical Power, AMM TASK 24-22-00-860-806.

(2) Replace the Autostart switch, M80001S7.

(a) Do the repair confirmation procedure at the end of this task.

(b) If the maintenance message does not show on the MAT in 20 seconds, then you corrected the fault.

(c) If the maintenance message does show, then continue with the subsequent step of this fault isolation procedure.

(3) Look for a failure in the wire harness between the autostart switch, M8001S7, and the Overhead Panel Card File Chassis (left), M23117.

(a) Disconnect the electrical connector, DM80001A, from the Autostart switch, M80001S7, and DM23117K from the Overhead Panel Card File Chassis (left), M23117.

(b) Look for wire to wire shorts, shorts to ground, and continuity in the circuit as shown below (WDM 80-11-11):

NOTE: When you look for shorts to ground, the insulation resistance must be more than 100K ohms.

DM80001A	DM23117K
8	B3
7	B1
9	B2

(c) If you find a problem in the wire harness, then repair or replace the wire harness.

(d) Do the repair confirmation procedure at the end of this task.

(4) Replace the Overhead Panel Card File Chassis, M23117.

(a) Do the repair confirmation procedure at the end of this task.

D. Repair Confirmation Procedure

(1) Put the applicable EEC MAINT POWER switch on the P61 panel in the TEST position.

(2) Put the applicable AUTOSTART switch on the P5 panel in the ON position.

(3) Wait 20 seconds, and make sure the maintenance message does not show.

(4) Make sure the EICAS Advisory message, ENG AUTOSTART OFF, does not show.

(5) If the EICAS Advisory message, ENG AUTOSTART OFF, does not show, then you corrected the fault.

——— END OF TASK ———

802. EICAS Message Latched by AIMS - Fault Isolation

A. Initial Evaluation

NOTE: AIMS can latch this EICAS message when it occurs. After you find the cause of the fault and correct it, it is possible that the EICAS message will continue to show.

(1) Do not erase the EICAS message until you complete the task for the correlated maintenance message.

(2) When this EICAS message occurs, do these steps:

(a) Make sure that you have the correlated maintenance message number that shows on the MAT with the EICAS message.

(b) Go back to the FIM Fault Code Index and find the fault code for the EICAS message.

(c) Find the correlated maintenance message number and the task number to the right of the fault code.

(d) Go to the specified task in the FIM and do the steps in the task.

(e) After you do the actions in the task to correct the fault, do these steps:

1) Look at the MAT for the EICAS message.

2) If the MAT shows LATCHED for the EICAS message, then you must erase it from the EICAS status display (AMM TASK 31-61-00-800-802).

——— END OF TASK ———

803. Observed Fault with Correlated Maintenace Messages - Fault Isolation

A. Initial Evaluation

(1) Find the fault code to the right of the fault description in the Observed Faults List (at the front of the FIM).

(a) 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.

(b) Find the maintenance message to the right of the fault code.

(c) Find the task number on the same line as the maintenance number.

(d) Go to the task in the FIM and do the steps in the task.

——— END OF TASK ———