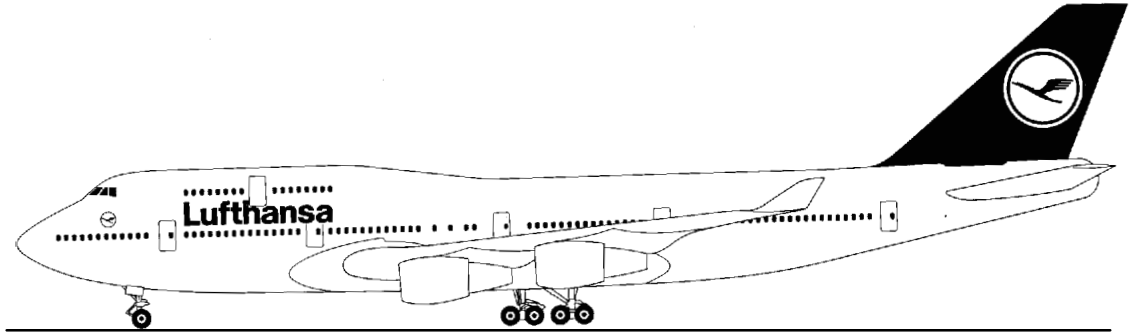
Lufthansa
Technical Training

Training Manual
B 747-400



ATA 00
Maintenance Documents

ATA 104 Level 3

Book No: B747-4 00 MANUAL E

Lufthansa
Technical Training GmbH
Lufthansa Base

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ATA 00 MAINTENANCE DOCUMENTATION

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INTRODUCTION

GENERAL

The 747-400 maintenance documents supply information for scheduled and unscheduled maintenance.

Scheduled Maintenance

These are examples of scheduled maintenance work:

- Through-stop checks
- Airplane turn-around
- Daily checks
- Scheduled checks.

Use these documents to do scheduled maintenance:

- Maintenance planning document (MPD)
- Airplane maintenance manual (AMM).

Unscheduled Maintenance

These are examples of unscheduled maintenance:

- In-service faults
- Inspection discrepancies
- Service problems
- Structural damage.

You use these documents to do unscheduled maintenance:

- Fault reporting manual (FRM)
- Fault isolation manual (FIM)
- Structural repair manual (SRM)
- Dispatch deviation guide (DDG)
- Airplane maintenance manual (AMM)
- Maintenance tips
- System schematics manual (SSM)
- Wiring diagram manual (WDM)
- Illustrated parts catalog (IP0

Maintenance Planning Document

The MPD defines the tasks for each type of scheduled maintenance check. Airlines use the MPD to make task cards that the technician uses during the maintenance checks.

Task Cards

The airline use the task cards to do airplane servicing tasks. The task cards contain these areas:

- Special tools and equipment
- References
- Access (location and panels)
- procedure.

The task cards have graphic pages to assist the mechanic with access and the task procedure.

Training Information Point

Each maintenance document has an introduction to show how to use that document.

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Fault Reporting Manual

The flight crew uses the FRM to communicate faults to maintenance personnel. The flight crew uses the FRM to get 8-cligit codes for airplane faults. These faults can be flight deck effects or other faults. The FRM has standard log book write-ups for each fault code. FRM fault codes refer you to the FIM.

Fault Isolation Manual

The FIM is supplied as part of the AMM. The FIM can also be ordered as a separate manual. You use the FIM to troubleshoot airplane faults. You start the fault isolation process with FRM fault code, a flight deck effect, or other fault data. The FIM uses the fault data to identify the maintenance actions necessary to correct the fault.

Dispatch Deviation Guide

The DDG supplies:

- Boeing≥s recommended minimum equipment required for dispatch in the master minimum equipment list (MMEl)
- Procedures for dispatch with a fault if permitted.

Airplane Maintenance Manual

The AMM provides the information required to do maintenance on all systems and equipment in the airplane. The manual covers only the specific airplanes listed in the introduction section. The AMM is divided into topics that are defined by ATA 100.

System Schematics Manual

The system schematic manual shows:

- The function occurring insideeach LRU
- The interconnection of all LRUs of a system or subsystem.

Wiring Diagram Manual

The wiring diagram manual supplies cletails of the point-to-point wiring on the airplane.

Standard Wiring Practices Manual

The standard wiring practices manual has instructions for maintenance and repair of the wiring of all Boeing airplanes. It is not customized, and it is contained in ATA chapter 20 of the wiring diagram manual.

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Illustrated Parts Catalog

The IPC supplies part replacement data. This data includes:

- Replacement part number
- Part illustrations
- Supplier data
- Specification numbers
- Recommended spares
- Service bulletin activity.

Structural Repair Manual

The structural repair manual supplies specific instructions to help in field repair of the airplane structure. The SRM is not customized. It has data relative to these areas:

- Allowable damage evaluation
- Typical repairs
- Material identification
- Material substitution
- Fastener installation
- Alignment check
- Planning.

Maintenance Tips

Maintenance tips give information to assist with repairs. Maintenance tips have these sections:

- Subject .
- Applicability
- Condition
- Recommended action
- Background
- Maintenance manual action.

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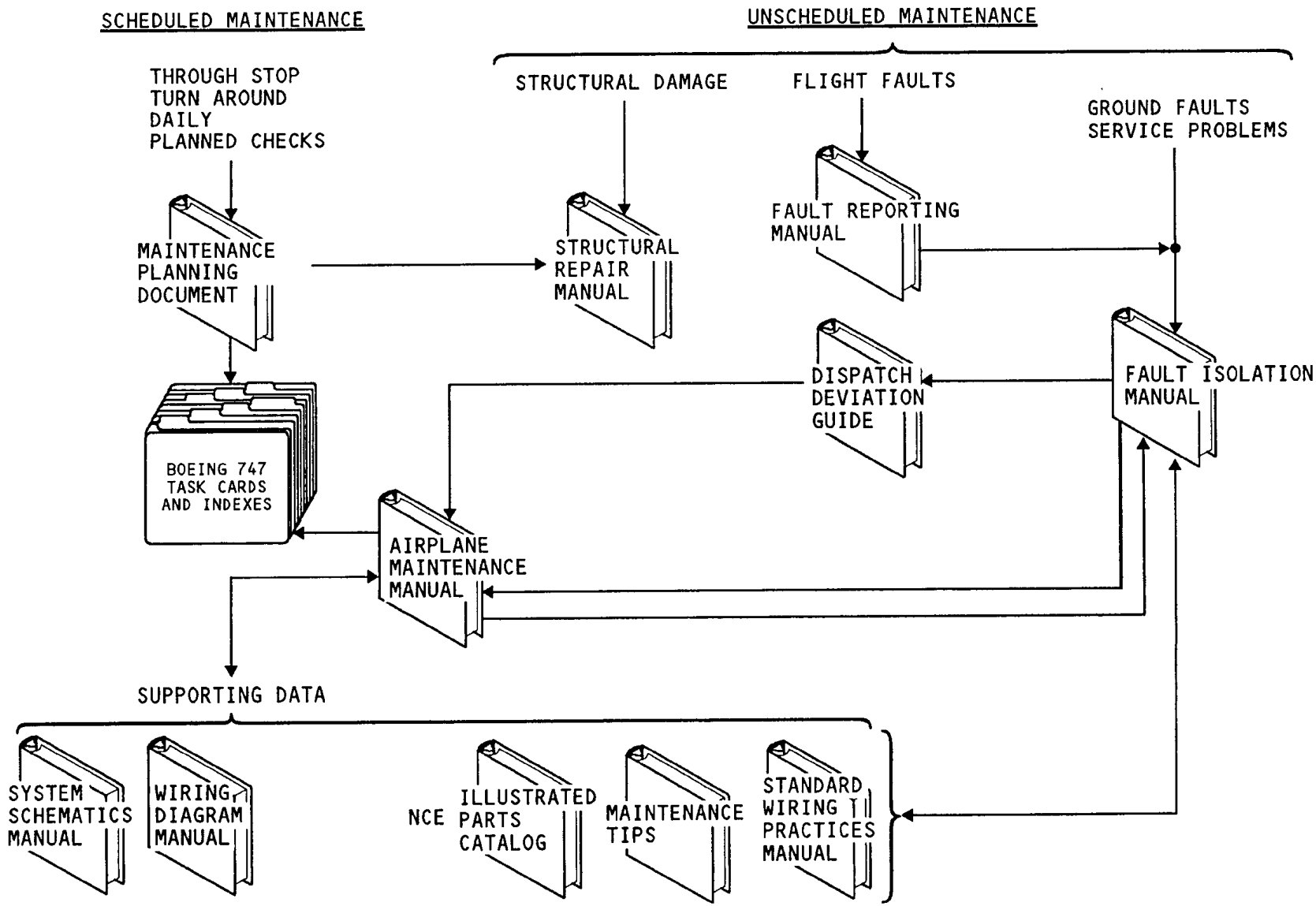

Figure 1 Maintenance Documents - Introduction

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AIRCRAFT MAINTENANCE MANUAL

INTRODUCTION

The airplane maintenance manual (AMM) is customized to a specific airplane or group of airplanes. The AMM is separated by tabs for each ATA chapter. Each chapter is separated by page blocks. Each page block defines a different maintenance function.

Divisions

The first page block of each tab section is called the description and operation (D and 0). The D and 0 gives descriptions of the interfaces, function, and operation of the airplane systems and subsystems.

Each subject of the D and 0 has this information:

- Purpose/introduction
- General description
- Component location
- Interface
- Operation
- Functional description

The remaining page blocks contain the airplane maintenance procedures.

Chapter Numbering

The pages within each tab each have a six digit number that identifies the ATA chapter, section, and unit.

The first four digits identify the chapter/section, as defined by ATA 100.

The last two digits represent the unit number, or level of coverage, as defined by the assigned subject number (ASN) listing.

Page Numbering System

Pages in each tab are assigned to page blocks. The numbers in each subject are unique to the maintenance manual. These are the page block subjects:

Contents

- Description/ Operation Page Block 001 -099
  - If more than 100 pages a letter is put in front
- Fault Isolation (FI) Page Block 101-199
- Maintenance Practices (MP) Page Block 201-299
- Servicing (SRV) Page Block 301-399
- Removal / Installation (R/I) Page Block 401-499
- Adjustment / Test (A/T) Page Block 501-599
- Inspection / Check (I/C) Page Block 601-699
- Cleaning / Painting (C/P) Page Block 701-799
- Approved Repairs (AR) Page Block 801-899
- DDG Procedure (if used) Page Block 901-999

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BOEING 747-400
MAINTENANCE MANUAL

INSTRUMENT PANELS - DESCRIPTION AND OPERATION

1. General
   A. The 747-400 airplane instrument panels consist of the pilots' forward, overhead maintenance, and auxiliary panels, observers' panels, attendants' panels, cargo handling panels, and miscellaneous control panels. All panels are arranged and located consisent with the prime user(s) of the panel.
   B. Instrument Indicators
      (1) There are three principle types of front-mounted instrument installations. They are the clamp mounted, locking-handle mounted, and Camlock mounted.
      (2) The clamp-mounted instrument is held in position by a spring clamp which is fastened to the rear of the front panel or module with a clamp retaining screw; thereby, holding the indicator in position.
      (3) The Camlock mounted instrument is attached to the instrument panel using a quarter-turn fastener.
      (4) The locking-handle mounted instrument is secured in position by a hook on each end of the handle. The two hooks latch over two pins in the instrument panel when the handle is held flat against the instrument with two captive screws.
   C. Flight-Compartment Panels
      (1) The captain's and first officer's forward instrument panels are installed on support structure with quarter-turn camloc fasteners.
      (2) The other flight compartment instrument panels are a semipermanent installation. That is, the panels remain fixed during normal maintenance operation and component modules are removed from the panels by quick-release fasteners. Each component module is electrically connected to the airplane wiring system by quick-disconnect type connectors.
   D. Attendants' Panels
      (1) An attendants' panel is mounted adjacent to each passenger compartment door and in the upper stairwell.
      (2) The attendants' panel consists of different modules. You must remove the shroud before you can replace one of the modules. Each module is connected to the airplane wiring by a quick-disconnect type of connector.

EFFECTIVITY
ALL

31-10-00
01.1 Page 1 Jun 10/93

ATA CHAPTER
ATA SECTION
ASN
D/O TOPIC PAGE

BOEING 747-400
MAINTENANCE MANUAL

FRONT-MOUNTED INSTRUMENTS - REMOVAL/INSTALLATION

1. General
   A. There are three types of front-mounted instruments: Camlock mounted, locking-handle mounted, and clamp mounted. Camlock mounted instruments are attached to the instrument panel with a quarter turn fastener. Locking-handle mounted instruments are attached when the handle is held flat against the instrument with captive screws. Both the Camlock mounted and locking-handle mounted instruments are easily removed and installed. Clamp mounted instruments are attached to the instrument panel with an adjustable clamp which is behind the panel.
   B. Two tasks are in this procedure:
      (1) A general removal procedure for clamp-mounted instruments
      (2) A general installation procedure for clamp-mounted instruments.
   C. To remove a clamp mounted instrument, turn only the the clamp adjustment screws, not the clamp mounting screws, to loosen the clamp. You can easily identify the adjustment screws because they are larger than the mounting screws. Rectangular instruments use two screws of each size, and round instruments use one of each size. It is important to identify the adjustment screws by their larger size. Do not identify the adjustment screws by position, because the position is not always the same.

TASK 31-10-01-004-001
2. Clamp-Mounted Instrument Removal (Fig. 401)
   A. Access
      (1) Location Zone
            221 and 222 Control Cabin
   B. Procedure

      S 864-002
      (1) Open the applicable circuit breakers and attach DO-NOT-CLOSE tags for the instrument that you will remove.

      S 034-003
      (2) Loosen the instrument.

      CAUTION: ADJUST ONLY THE LARGER SCREW. IF YOU ADJUST THE SMALLER SCREW, THE CLAMP CAN COME LOOSE FROM THE PANEL.

      (a) Loosen the clamp adjustment screw(s).
      (b) Push on the clamp adjustment screw(s) to loosen the clamp.

      S 024-004
      (3) Remove the instrument from the panel.

      S 034-005
      (4) Disconnect the connectors.
      (a) If it is applicable, put a cap on the connectors.

EFFECTIVITY
ALL

31-10-01
01.1 Page 401 Jun 10/93

R/I TOPIC PAGE

Figure 2 AMM Introduction

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AMM - MAINTENANCE PRACTICES SECTION

General

The maintenance practices page block (**201 - 299**) shows task procedures for example:

- Inspection
- lubrication
- Battery replacement.

Each procedure has some or all of the following paragraphs:

- General
- Access
- Prepare for removal
- Equipment
- Consumable materials
- References.

General Paragraph

The general paragraph is an introduction that gives the purpose and limitations of the task. There may be a general paragraph for the page block or for each task.

References Paragraph

The references paragraph lists all the references.

Access Paragraph

The access paragraph is a summary of all location zones and access panel information to do the task.

Procedure Paragraph

The procedure paragraph has the steps to complete the task.

Other Paragraphs

These are other paragraphs that are used as needed:

- Prepare for removal paragraph
- Equipment paragraph
- Consumable material paragraph.

Additional Information

Each page has a section that gives the effectivity of the page. It may say All or it may give specific airplane identification numbers.

Effectivity

Effectivity listing of airplanes.

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GENERAL PARAGRAPH

REFERENCES PARAGRAPH

ACCESS PARAGRAPH

PROCEDURE PARAGRAPH

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MAINTENANCE MANUAL

INSTRUMENT PANELS - MAINTENANCE PRACTICES

1. General
   A. This procedure has one task:
      (1) A pneumatic hose check for the standby airspeed indicator.
   B. You must remove the EICAS display unit to examine the pneumatic hose for kinks and damage.

TASK 31-10-00-202-001

2. Pneumatic Hose Check for the Standby Airspeed Indicator
   A. References
      (1) 31-61-02/401, Integrated Display Unit
   B. Access
      (1) Location Zone
            221 Control Cabin, LH
   C. Procedure

      S 012-002
      (1) Remove the EICAS display unit adjacent to the standby airspeed indicator (Ref 31-61-02/401).

      S 212-003
      (2) Examine the pneumatic hose.
         (a) Look through the EICAS display unit opening and examine the hoses for kinks and damage.
         (b) If a hose bends and/or twists more than 45 degrees from the disconnect fitting centerline, do this step:
            1) Change the position of the hose or panel wire bundle until the kink is less than 45 degrees.

               NOTE: It is possible for a hose to have some permanent bend which does not decrease instrument performance.

         (c) If a hose bends or twists too much, or if a hose is damaged, replace the hose assembly.

      S 412-004
      (3) Install the EICAS display unit (Ref 31-61-02/401).

EFFECTIVITY

EFFECTIVITY
ALL

31-10-00
01.1 Page 201
Jun 10/93

PAGES 201 - 299

Figure 3 AMM - Maintenance Practices Section

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FAULT REPORTING MANUAL

INTRODUCTION

General

The fault reporting manual (FRM) is a customized document that gives the flight crew a list of fault descriptions. Each fault description has an eight digit fault code.

When the flight crew finds a problem on the airplane, they look for the description of the fault indication in the FRM. They write the fault description and the fault code in the log book.

Each ATA chapter in the FRM has these sections:

- Contents
- Fault code diagram
- log book reports.

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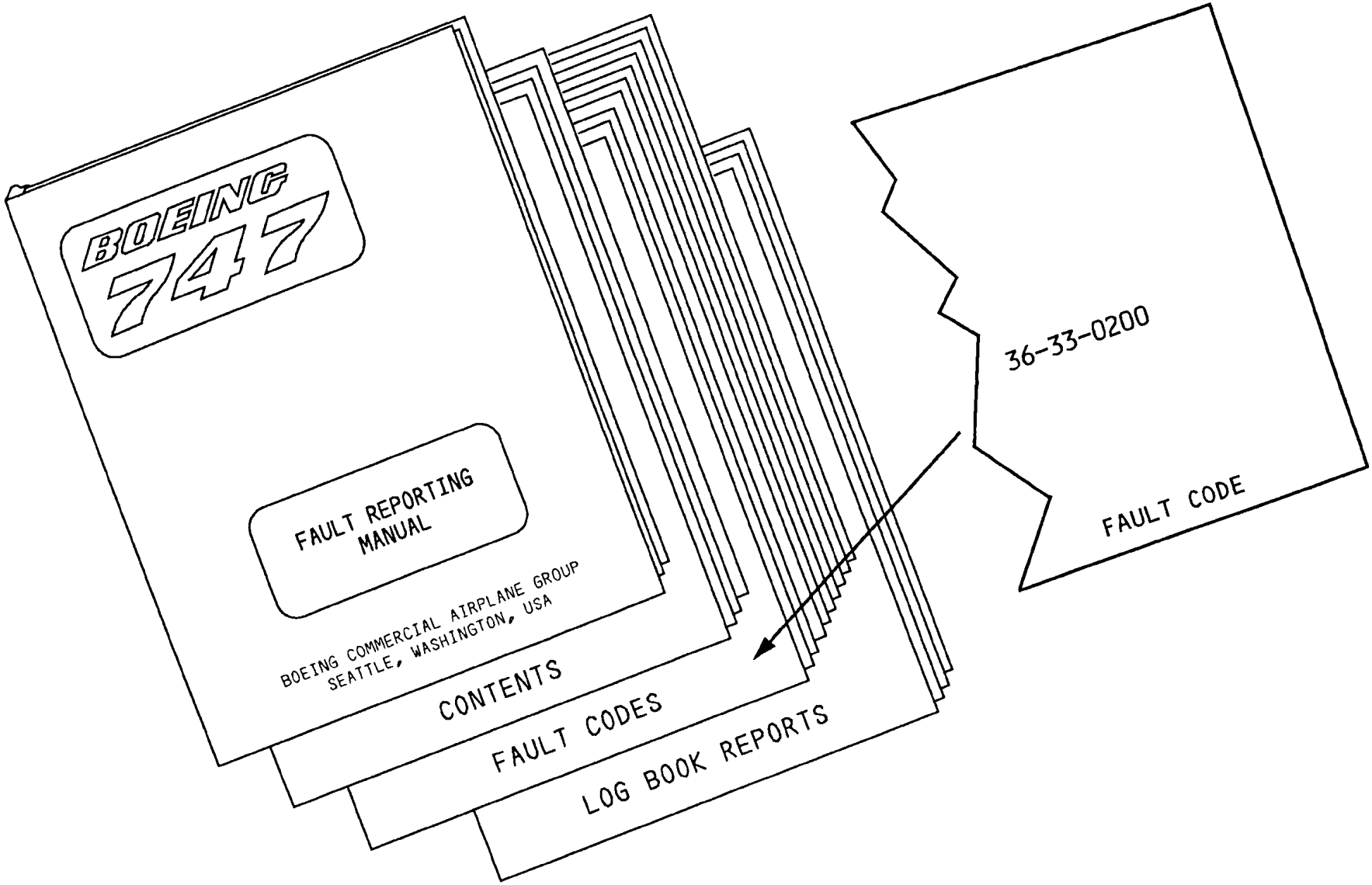

Figure 4 FRM - Introduction

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FAULT ISOLATION MANUAL

INTRODUCTION

General

The fault isolation manual (FIM) identifies, isolates and gives corrective action for airplane system faults.

The FIM is divided into ATA chapters. Each chapter is tabbed with the chapter number and title. Each chapter each consists of six sections:

- FIM contents
- EICAS messages
- Fault code diagrams
- Fault code index
- CMCS index
- Supporting information.

In the front mater of the FIM is a list of all EICAS messages in alphabetical order.

Training Information Point

If the FIM is ordered as a separate document, it has the same page Mock numbering system that it would haveas part of the AMM.

Purpose

The flight crew uses the FRM get an eight digit fault code. This fault code is used to identify system failures on logbook reports. If the flight crew does not give a fault code, use the FIM to find the fault code.

The FIM introduction has complete instructions on how to use the manual.

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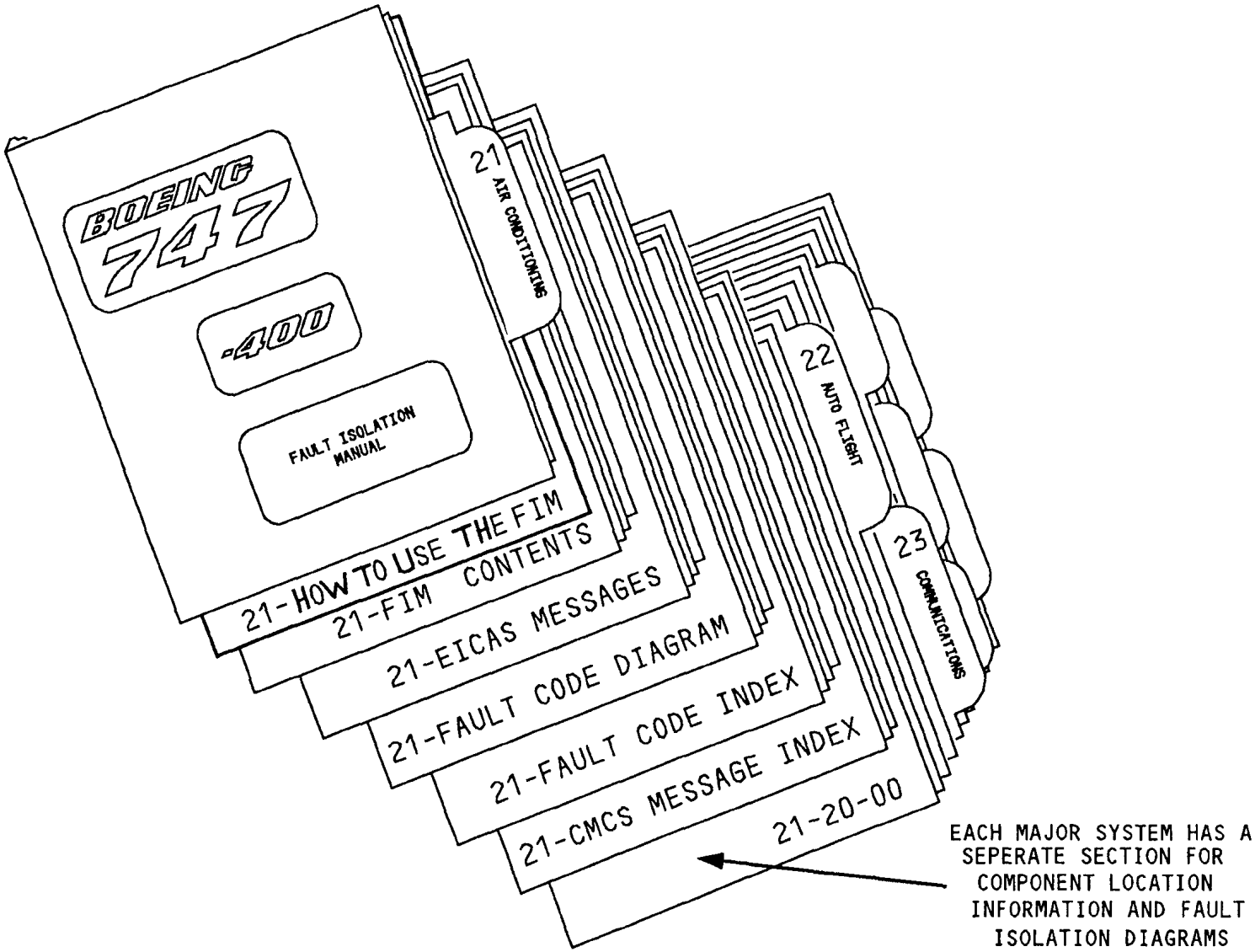

Figure 5 FIM - INTRODUCTION

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FAULT ISOLATION MANUAL - HOW TO USE THE FIM

General

The "How to use the FIM" section gives troubleshooting instructions. It is divided in three columns:

- If you are given
- Go to this FIM section
- And follow the steps you find.

"If you are given" starts the troubleshooting process based on the data you have reported on the fault.

"Go to this FIM" section directs you to the first section of the FIM to go to.

General

1 If you know the FAULT CODE:

go to the FAULT CODE INDEX and find the necessary tasks.

In the FAULT CODE INDEX you will be directed to the :

- CMC. There you will find a correlated CMC Message.
- AMM, where you will find a ground test (AMM ATA45)
- FAULT ISOLATION DIAGRAM, where you find the fault isolation procedures.

2 If you know CMCS MESSAGE :

go to the CMCS MESSAGE INDEX and find the necessary tasks.

- In the CMCS MESSAGE INDEX you will find the necessary tasks in the AMM
- you have to do a trouble-shooting according to FAULT ISOLATION DIAGRAM.

3 If you know the EICAS MESSAGE only :

go to the EICAS MESSAGE LIST and find the FAULT CODE.

- In the FAULT CODE you will be directed to the :
- CMC. There you will find a correlated CMC Message.
- AMM, where you will find a ground test (AMM ATA45)
- FAULT ISOLATION DIAGRAM, where you find the fault isolation procedures.

4 If you have none of the above messages go to OTHER FAULTS :

In the FAULT CODE DIAGRAM you may find the FAULT CODE.

In the FAULT CODE INDEX you will be directed to the :

- CMC. There you will find a correlated CMC Message.
- AMM, where you will find a ground test (AMM ATA45)
- FAULT ISOLATION DIAGRAM, where you find the fault isolation procedures.

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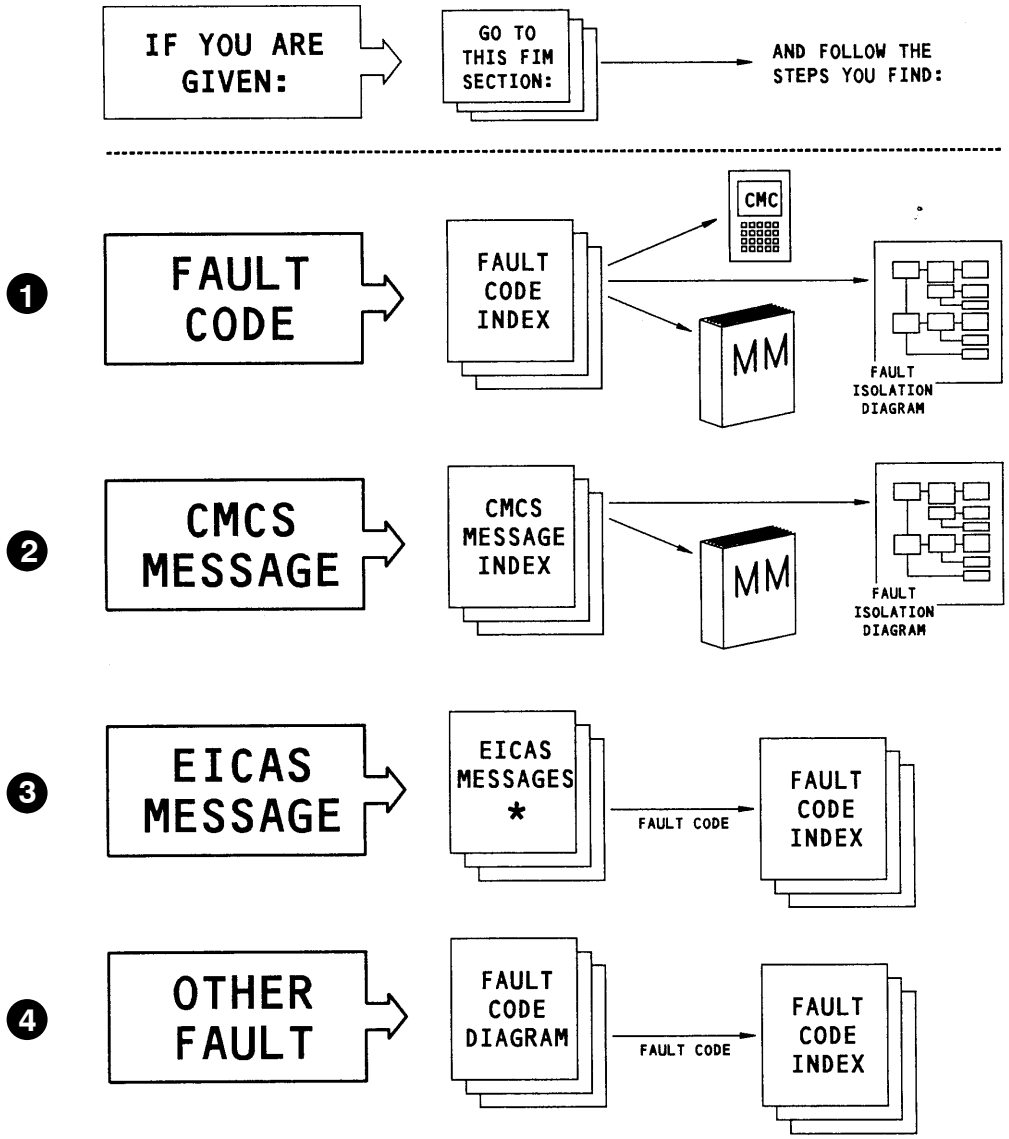

* THERE IS ALSO A MASTER LIST OF ALL EICAS MESSAGES IN CHAPTER 31

Figure 6 How to Use the Fault Isolation Manual (Overview)

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FAULT ISOLATION MANUAL - TABLE OF CONTENTS

General

The FIM table of contents lists:

- Subject
- ATA chapter and section
- Page number
- Effectivity number.

The second portion of the FIM table of contents shows panels and system indications for the associated chapter. The panels and indications are identified by their ATA chapter and section number.

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FAULT ISOLATION/
MAINTENANCE MANUAL

CHAPTER 31 - INDICATING/RECORDING SYSTEMS

TABLE OF CONTENTS

Subject	Chapter Section Subject	Page	Effectivity
CENTRAL DISPLAY SYSTEMS	31-60-00		
INTEGRATED DISPLAY SYSTEM	31-61-00		
Component Location		101	ALL
Component Index			
Component Location			
Fault Isolation			
General		109	
CENTER EIU FAIL Message Shows (Fig. 104)		111	
LEFT EIU FAIL Message Shows (Fig. 103)		110	
RIGHT EIU FAIL Message Shows (Fig. 105)		112	
EIU Disagree		101	

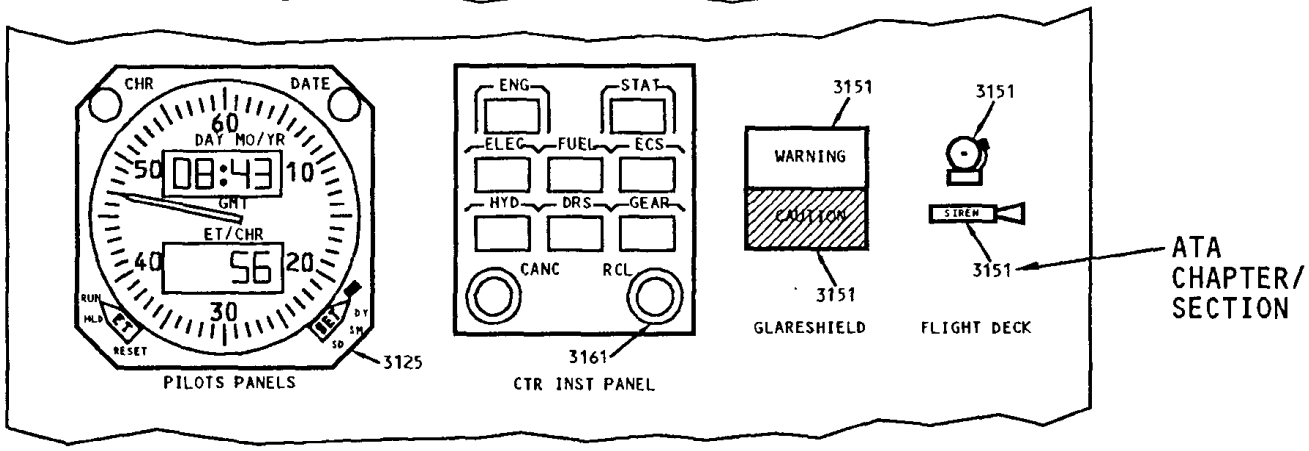

Figure 7 FIM - Table Of Contents

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FAULT ISOLATION MANUAL - EICAS MESSAGES

General

The EICAS message section lists EICAS messages for each chapter in alphabetical order. The EICAS message list contains:

- EICAS message
- level
- Description
- Fault code.

Memo messages

Memo messages are for information only and do not indicate a fault. Each memo message shows the letters ME as part of the fault code.

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FAULT ISOLATION/
MAINTENANCE MANUAL

EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
>PILOT RESPONSE	(WARNING)	NO MCDU, EFIS/EICAS CONTROL PANEL, MCP ACTIVITY AND NO HF/VHF FLIGHT DECK	34 61 41 00
>PILOT RESPONSE	(ADVISORY)	NO MCDU, EFIS/EICAS CONTROL PANEL OR MCP ACTIVITY AND NO HF/VHF FLIGHT DECK TRANSMISSION HAS BEEN DETECTED FOR 20 MINUTES	34 61 42 00
RADIO ALT CENTER	(STATUS)	C RADIO ALT FAILURE	34 33 01 00
RADIO ALT LEFT	(STATUS)	L RADIO ALT FAILURE	34 33 02 00
RADIO ALT RIGHT	(STATUS)	R RADIO ALT FAILURE	34 33 03 00
SATCOM CALL	(MEMO)	GROUND TO AIR CALL	34 ME 03 07
SATCOM MESSAGE	(MEMO)	SATCOM MESSAGE RECEIVED	34 ME 31 80
>SNGL SOURCE ILS	(CAUTION)	BOTH PILOTS PFD/ND ON SAME G/S SOURCE OR LOC SOURCE	34 31 11 00

Figure 8 FIM - EICAS MESSAGES

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FAULT ISOLATION MANUAL - FAULT CODE DIAGRAM

General

The fault code diagrams assign system failures a fault code.

The fault code diagrams in the FIM are the same as the fault code diagrams in the fault reporting manual (FRM). They are included in the FIM as a FRM reference.

There are some additional diagrams in the FIM for faults that can only occur on the ground. These are not in the FRM. They are identified by the word ”ground” on the title page

Diagram Conteats

The top of the page shows possible incliciations or conditions that may occur. With each possible condition is a question that asks if this indication or condition occurred.

The center portion of the page shows a tree with decision blocks. The tree directs the operator to the right side of the page, and shows the unique fault code for the fault condition.

Fault Code

The fault code is the link between the fault reporting analysis of the flight crew and the fault isolation process of the maintenance crew.

If the flight crew does not provicle a fault code in the logbook write-up, maintenance personnel must obtain a fault code using the FIM before continuing with the fault isolation process.

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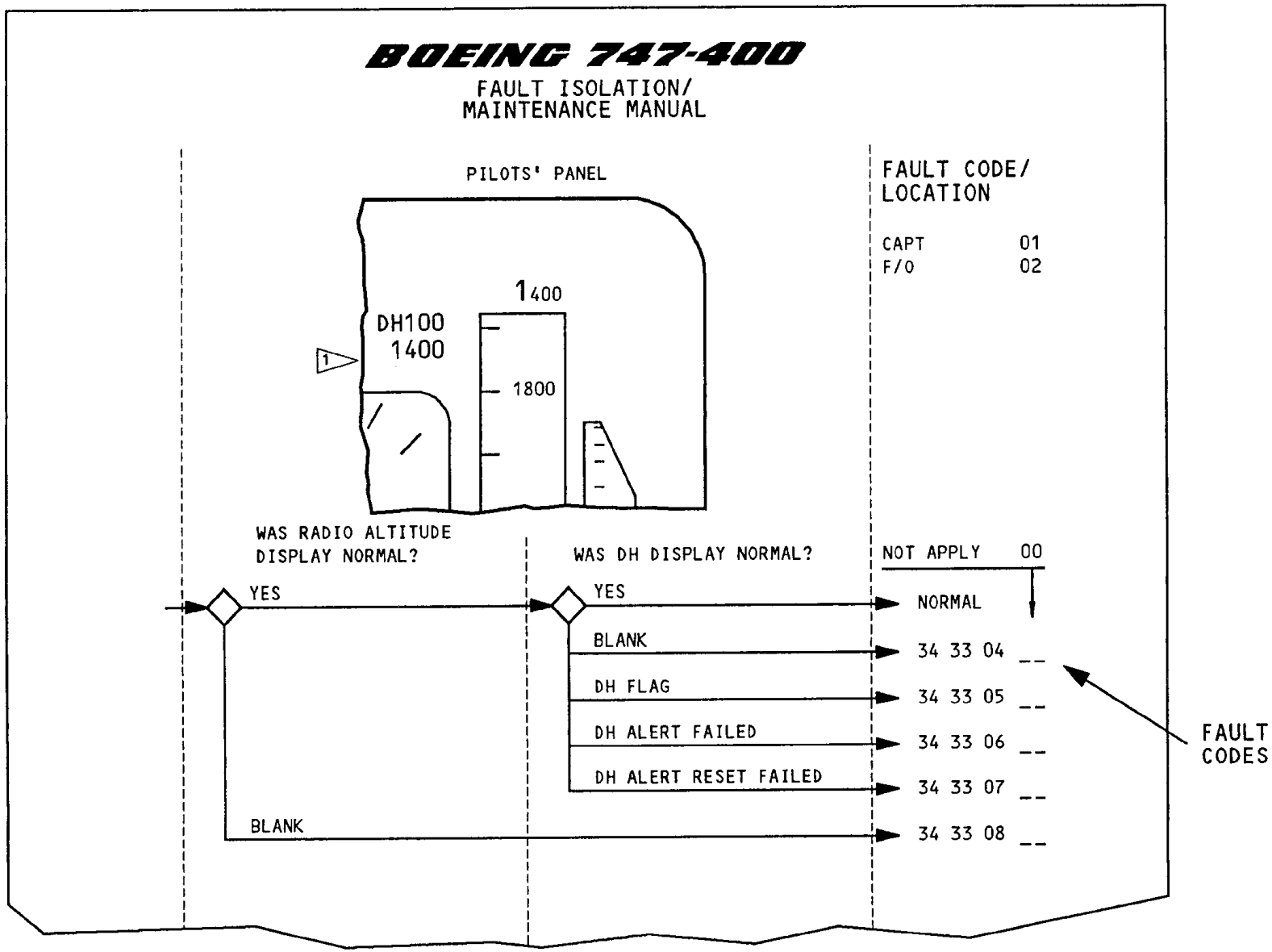

Figure 9 FIM - FAULT CODE DIAGRAM

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FAULT ISOLATION MANUAL - FAULT CODE INDEX

General

The fault code index is a list of all eight digit fault codes for that ATA chapter. These are the same fault codes that are listed in the fault reporting manual. The first two digits represent the ATA chapter.

Contents

The fault code index shows special procedures or corrective action. In cases where there is only one possible cause of the fault condition, the fault code index gives the corrective action.

Right Deck Effect

Many fault codes represent a flight deck effect (FDE). An FDE can be:

- An EICAS message
- An exceeclence flag
- Right director bar bias.

Each FDE has its own unique fault code. For most fault codes related to a FDE, the fault code index directs the operator to figure 1 at the front of the fault code index.

Figure 1 is the Fault isolation procedures with the CMCS. The fault isolation procedure diagram gives a step-by-step procedure to isolate the cause of the FDE using the CMCS.

The fault code index lists all the CMCS fault messages that can be correlated to the FDE.

Some FDEs have special procedures listed for them. A special procedure is a unique fault isolation procedure for a particular FDE. Often no corrective action is necessary if a given set of conditions are true. This may apply to specific part numbers or a set of FDE. It may also involve extra tests or conditions to be set when isolating the fault.

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FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
34 32 07 00	Marker beacon failed to display on Capt & F/O PFD when passing outer marker. (inop, weak). 1. 34-32-00, Fig. 103 Block 1. 2. Make sure that there is an open circuit at pin D2 of connector DB621CA for the left VOR/MKR receiver (WDM 34-32-11) when the failure continues.
34 33 01 00	The EICAS message RADIO ALT CENTER (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B4, RAD ALTM CENTER 2. Look for one or more of these CMCS messages (Fig. 1): 22551 (22-11) 22847 (22-11) 22848 (22-11) 24700 (22-11) 34092 (34-33) 34094 (34-33) 34095 (34-33) 34096 (34-33) 34097 (34-33) 34098 (34-33) 34099 (34-33) 34100 (34-33)
34 33 02 00	The EICAS message RADIO ALT LEFT (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B3, RAD ALTM LEFT 2. Look for one or more of these CMCS messages (Fig. 1): 22549 (22-11) 22846 (22-11) 22847 (22-11) 24702 (22-11) 31212 (34-33) 34072 (34-33) 34074 (34-33) 34075 (34-33) 34076 (34-33) 34077 (34-33) 34078 (34-33) 34079 (34-33) 34080 (34-33)

SPECIAL PROCEDURE

ATA CHAPTER

FAULT CODE

POSSIBLE CORRELATED CMCS FAULT MESSAGES

Figure 10 FIM - FAULT CODE INDEX

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FAULT ISOLATION MANUAL - FAULT CODE INDEX FIGURE 1

General

For most fault codes related to a FDE, the fault code index directs the operator to Figure 1. Figure 1 is the fault isolation procedure with the CKS. It is located at the front of the fault code index.

Purpose

The fault isolation procedure diagram gives a step-bystep procedure to isolate the cause of a FDE using the MS.

The fault isolation procedure diagram assumes that the operator has already checked the fault code index for a possible special procedure or corrective action. It is important to refer to the fault code index for each FDE to make sure that a corrective action is necessary.

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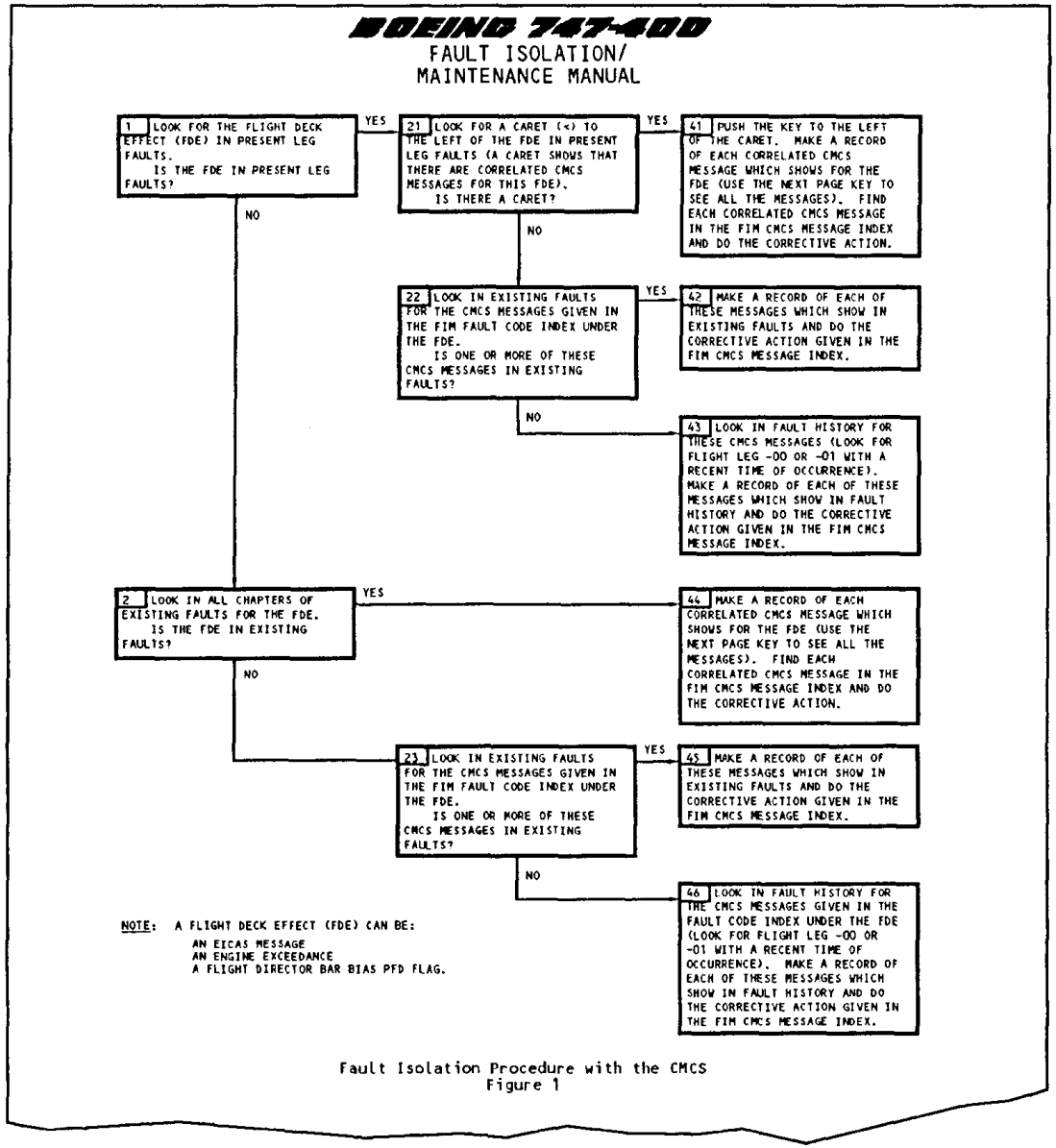

Figure 11 FIM - FAULT CODE INDEX FIGURE 1

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FAULT ISOLATION MANUAL - CMCS MESSAGE INDEX

General

Figure 1 in the FIM directs you to the CMCS message index for the corrective action.

Index organization

The CMCS message index lists the CMCS message in numerical order for the associated chapter. The first two digits of the CMCS message number represent the ATA chapter. The fault message text shows below the message number.

The second box lists all the flight deck effects (FDEs) that can be correlated to that CMCS fault message.

The lower box shows the:

- Corrective action
- Equipment number of the failed LRU
- Maintenance manual procedure for the corrective action.

Special Procedures

The CMCS message index gives special procedures for some messages. The special procedure may apply to a part number or a set of conditions true at the time of the fault.

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CMCS FAULT MESSAGE NUMBER

CMCS FAULT MESSAGE TEXT

SPECIAL PROCEDURE

BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
36031 BLEED-3 PRESSURE REGULATING & SHUTOFF VALVE FAIL	BLEED 3 OVHT (ADVISORY)	BLEED 3 (ADVISORY) ENG 3 START VLV (STATUS)	BLEED 3 OVHT (STATUS) ENG 3 START VLV (ADVISORY)

CORRECTIVE ACTION:

A. Replace the Engine No. 3 PRSOV, V86 (MM 36-11-04/401). *[3]

NOTE: On airplanes with the ASCTU P/N 797147-3-002 or 797147-2-003, if the CMCS messages was shown when engine 3 is OFF and the airplane is on the ground, the message is a nuisance message. No corrective action is necessary.

*[3] Failure of the BLEED 3 TEMP SENSOR (36035) can cause this message to be incorrectly shown.

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
36032 BLEED-4 PRESSURE REGULATING & SHUTOFF VALVE FAIL	BLEED 4 OVHT (ADVISORY)	BLEED 4 (ADVISORY) ENG 4 START VLV (STATUS)	BLEED 4 OVHT (STATUS) ENG 4 START VLV (ADVISORY)

CORRECTIVE ACTION:

A. Replace the Engine No. 4 PRSOV, V83 (MM 36-11-04/401). *[4]

NOTE: On airplanes with the ASCTU P/N 797147-3-002 or 797147-2-003, if the CMCS messages was shown when engine 4 is OFF and the airplane is on the ground, the message is a nuisance message. No corrective action is necessary.

Figure 12 FIM - CMCS MESSAGE INDEX

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FAULT ISOLATION MANUAL - SUPPORTING INFORMATION

General

The final section of each chapter gives supporting information on the chapter subsystems not covered in the previous sections.

The supporting information section is divided into the subsystems for chapter containing:

- Component location
- Fault isolation information listed for each subsystem.

Component Location Section

The component location portion lists this information:

- The location of the assigned subject number (ASN) components
- Cross reference information for the components.

Fault Isolation Section

The fault isolation portion gives additional information to isolate faults that require two or more checks to determine the corrective action. It is used to isolate non-monitored faults.

The fault isolation steps are listed in fault isolation trees. The reference to the tree is from the fault code index or the CMCS messages index.

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BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

CMC SHOWS THE CMCS
FAULT MESSAGE 32240
"IRU-L>BSCU CAPT
SELECT BUS FAIL"

PREREQUISITES

ELECTRICAL POWER (MM 24-22-00/201)

CB'S: 180F07,180F08,180F09,180F10,180F22,180F23,
180F24,18F025,180J07,180J08,180J09,180J22,
180J23,180J24,180J25

1 SET THE CAPTAIN'S IRS SOURCE SELECT SWITCH TO THE "R" POSITION. DO A CHECK OF CMC PRESENT LEG FAULTS FOR CMCS FAULT MESSAGE 32241 "IRU-R>BSCU CAPT SELECT BUS FAIL".
SET THE CAPTAIN'S IRS SOURCE SELECT SWITCH TO THE "C" POSITION. DO A CHECK OF CMC PRESENT LEG FAULTS FOR CMCS FAULT MESSAGE 32321 "IRU-C>BSCU CAPT SELECT BUS FAIL".
DOES THE CMC SHOW THE CMC FAULT MESSAGES 32241 AND 32321?

NO

41 REMOVE THE LEFT IRU, B7161 (MM 34-21-01/401).
EXAMINE AND REPAIR THE CIRCUIT FROM LEFT MAIN EQUIPMENT CENTER SHELF 6, E1-6, TO THE LEFT IRS CENTER SELECT RELAY, R1158; CONNECTOR DB7161CA, PIN C10 (C11) TO CONNECTOR DR1158, PIN 8 (4) (WDM 32-42-12; 34-21-12).

YES

42 REPLACE THE LEFT IRS RIGHT SELECT RELAY, R1156 (WDM 32-42-12).
IF THE PROBLEM CONTINUES, REPLACE THE LEFT IRS CENTER SELECT RELAY, R1158 (WDM 32-42-12).
IF THE PROBLEM CONTINUES, REMOVE THE BSCU, M80 (MM 32-42-01/401).
EXAMINE AND REPAIR THE CIRCUIT FROM THE LEFT IRS RIGHT SELECT RELAY, R1156, TO CENTER FUSELAGE EQUIPMENT CENTER SHELF 2, E9-2; CONNECTOR DR1156, PIN 2 (6) TO CONNECTOR DM80CA, PIN A9 (A10) (WDM 32-42-12).

Figure 13 FIM - SUPPORTING INFORMATION

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SYSTEM SCHEMATIC MANUAL

GENERAL

The system schematics manual is customized to a specific airplane or group of airplanes. The schematic manual information includes:

- Component locations
- Component identification (drawings)
- Controls
- Displays
- logic for system/subsystem operation
- logic for messages.

Organization

The system schematics manual is organized by ATA chapter, then chapter/section (subsystem). Each ATA chapter/section defines an airplane system or subsystem.

The schematic numbers follow this order:

- ATA chapter/section (four-digit number)
- Schematic number (two-digit number)
- Page number
- Sheet number.

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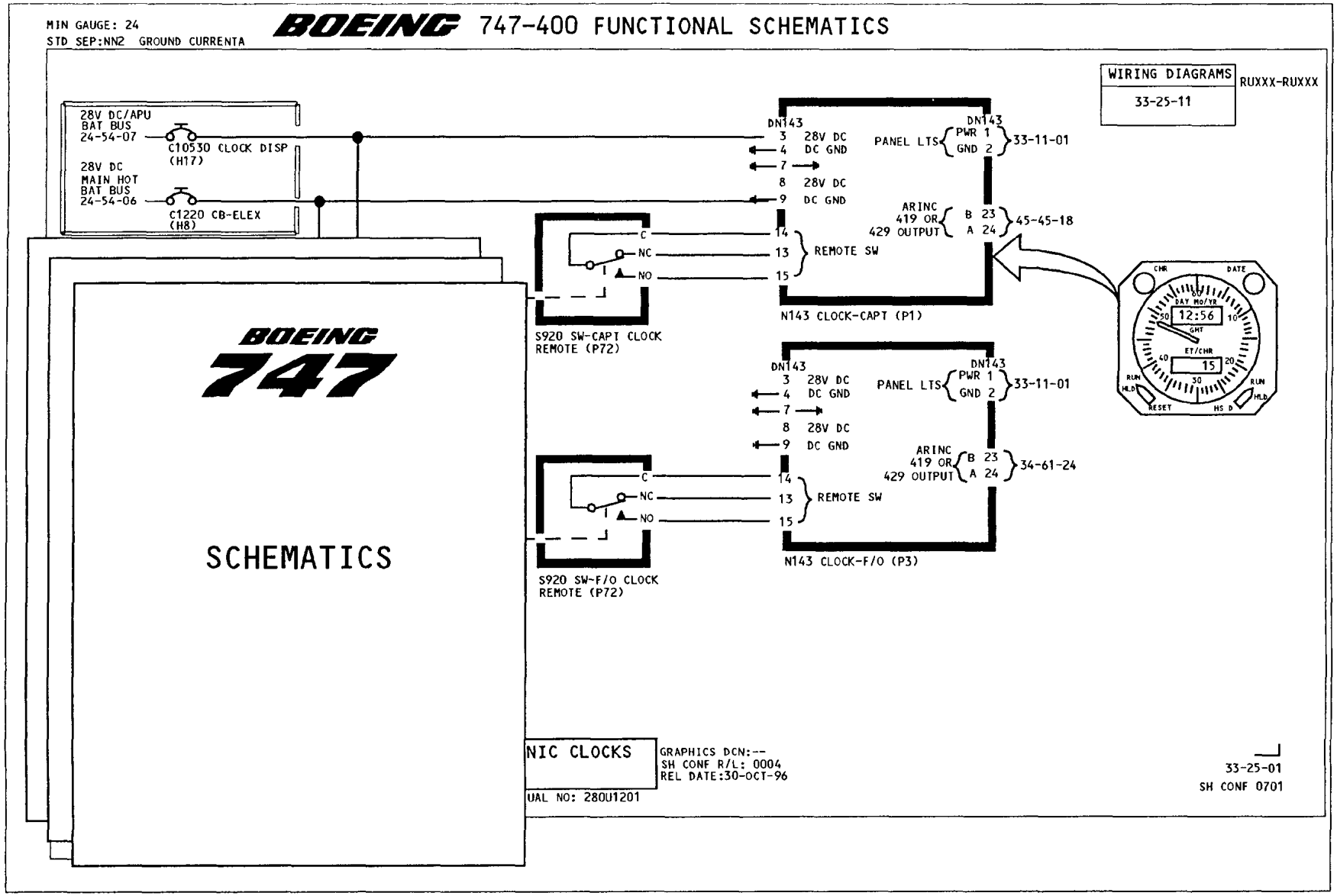

Figure 14 System Schematic Manual

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WIRING DIAGRAM MANUAL

General

The wiring diagram manual (WDM) is customized for a particular airplane, or group of airplanes. It gives cletails of the point-to-point wiring on the airplane. It shows all connections, including breakout and equipment shelf connectors.

Organization

The WDM is organized into four sections:

- Introduction
- Equipment list index (EII)
- Wiring diagrams
- Chapter 91 - Charts and lists

Introduction

The introduction section gives the following general information on how to use the sections of the WDM:

- Acronyms and abbreviations
- Codes used in the manual
- Symbols used in the manual.

Eguipment List Index

The EII is provided as a separate set of binders.

It provides a cross-reference between the equipment numbers and their associated part numbers. Each listing also gives the following:

- Manufacturer
- Wiring diagram number that shows the part
- location of the part
- Drawing number for the part.

Wiring Diagrams

Wiring diagrams are assembled in ATA chapter. The diagrams show all wiring between system components and interfacing components, beginning at the power source. When a piece of equipment is shown, it is identified by name and equipment number. It also shows:

- Connector plug and pin numbers
- Disconnects
- Breakouts as assembled in the airplane.

Chapter 91 Charts and Lists

The chapter 91 charts contain:

- Airplane stations
- Wire zones
- Wire bundle pathways
- Panel and equipment shelf locations
- Circuit breaker panel charts
- disconnect bracket charts
- master bundle information

The chapter 91 lists are numbered in ATA format and contain these sections:

- 91-02-00, circuit breaker list
- 91-04-00, bracket list
- 91-21-1 1, write list
- 91-21-21, ground list
- 91-21-31, splice list
- 91-21-41, terminal strip list
- 91-21-51, Hookup list.

Chapter 20 (Standard Wiring Practices) is a subset of the WDM. It gives standard practices to remove, repair, and install wiring and equipment associated with wiring and wiring termination.

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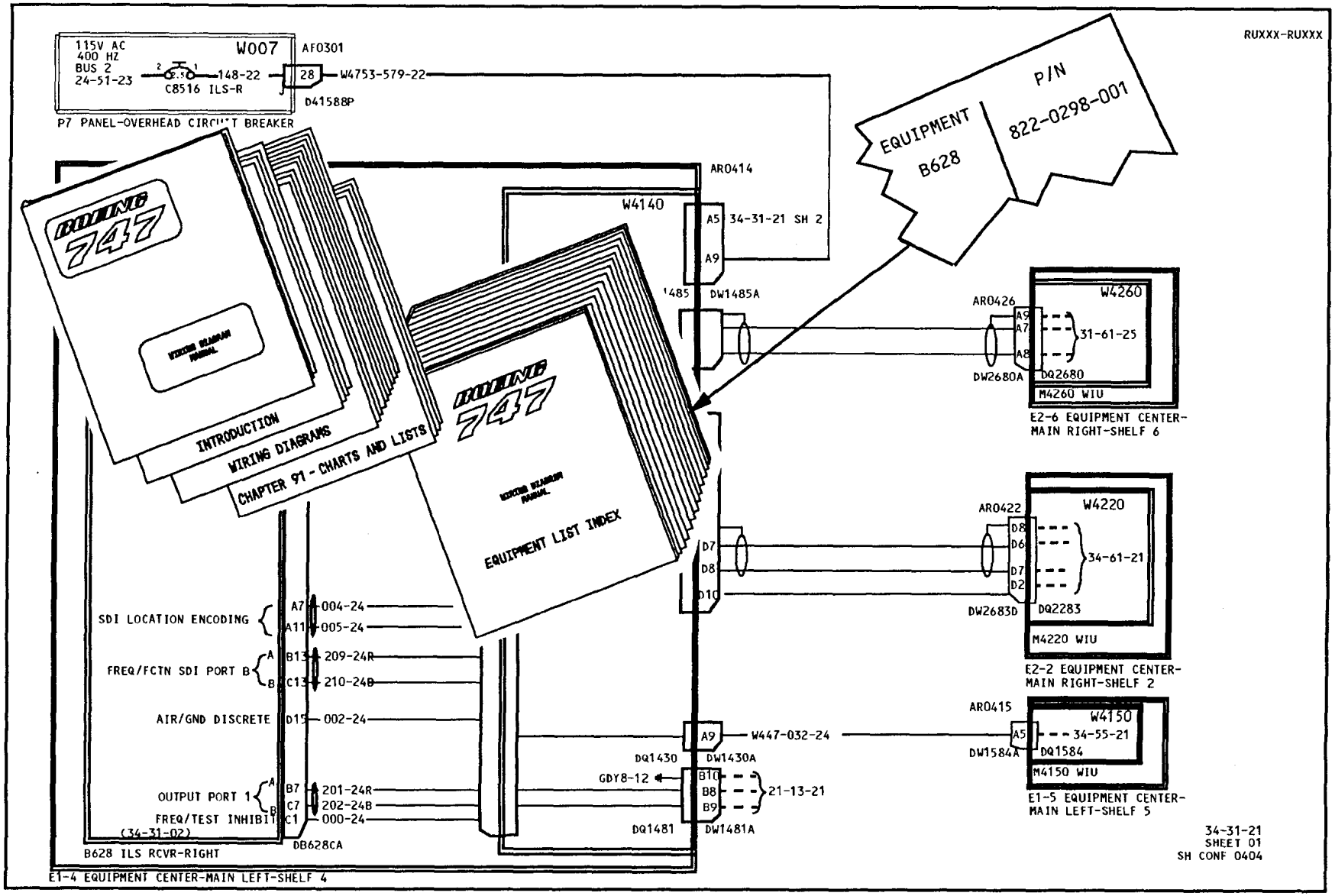

Figure 15 Wiring Diagram Manual

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ILLUSTRATED PARTS CATALOG

INTRODUCTION

General

The Boeing company maintains a Master Parts Catalog for each airplane mo-clel. The Illustrated Parts Catalog (IP0is customized for a specific airplane or group of airplane using the Master IPC.

The IPC is used by the airline for the following provisioning and requisition of line replaceable airplane parts.

The IPC has these sections:

- Table of contents
- Introduction
- Explanation of parts list data
- Illustrations to locate a part
- Airline code to name list
- Zone diagrams
- Section and station diagrams
- Major drawing index
- Filter kits
- Suppliers name and address index
- Service bulletin and modification list

The introduction section of the IPC gives cletailed instructions on how to use the manual.

Training Information Point

Airlines purchase revision service for the IPC in 90 or 120 day cycles. It is very important that your airline maintain current revisions to the manual. If the airline installs a modification to the airplane, they must request an update to the IPC so that it reflects new parts.

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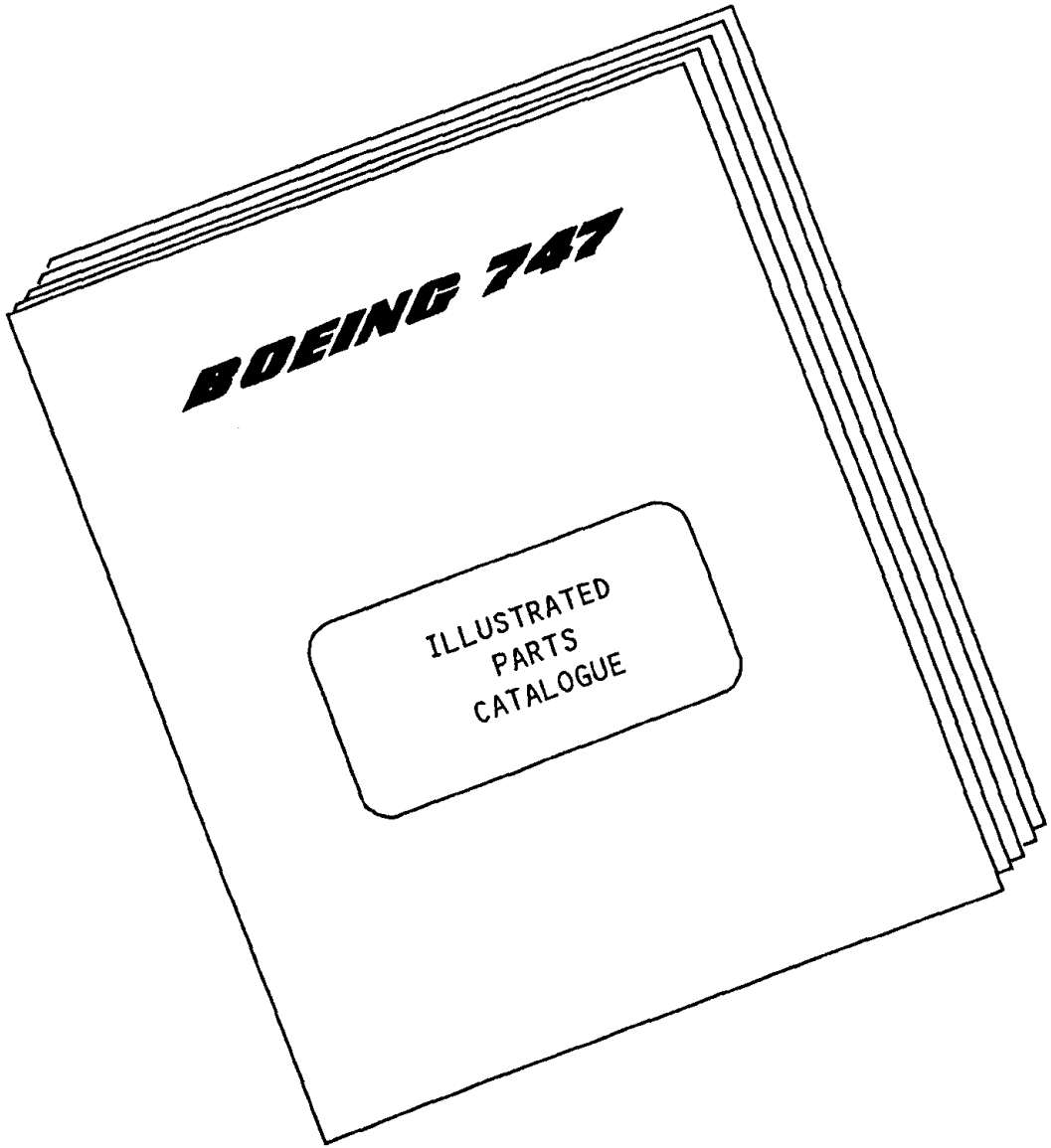

Figure 16 IPC - Introduction

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IPC

Using the IPC

With a part number, you use the IPC numerical index to get more information on the part. The index contains the following information:

- Chapter
- Section
- Unit
- Figure
- Item number.

Do these steps when you do not know the part number:

- Go to the table of contents in the ATA chapter that the part belongs to.
- Refer to the main group in which the part should be listed.
- Figures are listed in alphabetical order by a main noun. Find the title of the figure where the part is shown.
- Copy the section, unit, and figure number.
- Go to that chapter and figure. Find the part on the Mustration. The part will be identified by an item number.
- locate the item number on the corresponding parts list. Read across the row to see the part number for the item.

EFFECTIVITY

Each item has an effectivity code for an airplane or group of airplanes.

Training Information Point

If the part is an electrical component, you can get the part number from the Equipment List Index (ELI), within the wiring Diagram Manual (WDM). The equipment list index does NOT include information on:

- Authorized substitute parts
- Figure numbers
- Item numbers.

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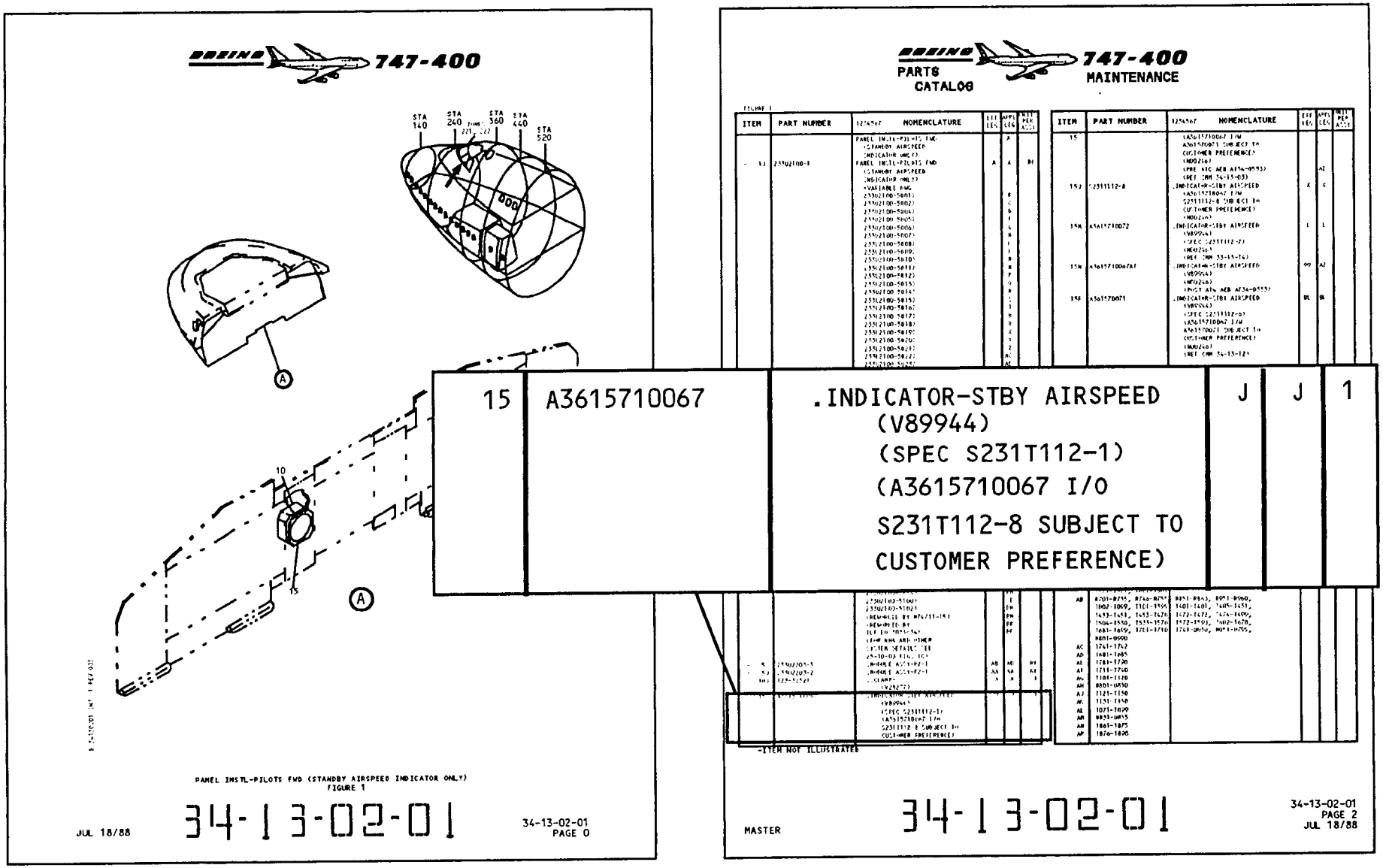

Figure 17 IPC

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DISPATCH DEVIATIONS GUIDE (DDG)

General

The dispatch deviations guide (DDG) contains the Federal Aviation Administration (FAA) approved minimum equipment list (MEL). The DDG helps the airline operations and maintenance organizations make the procedures they need to operate their airplane in nonstandard configurations. The DDG has these sections:

- Introduction
- EICAS message cross reference list
- Minimum equipment list items
- Configuration deviation list items
- Ferry items
- Miscellaneous items.

Introduction

The introduction section gives the purpose, background, contents, and organization of the DDG.

Minimum Eguipment List Items

The FAA publishes a master minimum equipment list (MMEL). The operator can add to the MMEL. Then it is the minimum equipment list (MEL). The MEL tells you the minimum equipment and the procedures necessary to operate the airplane. The operator MEL cannot be less restrictive than the master minimum equipment list. The codes used in this section are explained in the introduction.

Configuration Deviation List Items

The configuration deviation list (CDL) is published as an appendix to the FAA approved aircraft flight manual (AFM). It includes secondary airframe and engine parts which you do not have to have for dispatch.

This section contains illustrations of various CDL items plus information on systems effects or performance.

Ferry Items

The ferry items section contains information you must have for dispatch with a configuration deviation for which revenue passengers are not permitted by the MMEL or the CDL. This ferry flight is used when it is necessary to fly the airplane back to a maintenance base for repairs.

Miscellaneous Items

This section has information on items that do not fit into the other categories. The airplane owner/operator typically use it for special situations not normally covered.

For example: Landing Gear Down/Locked Ferry Flight.

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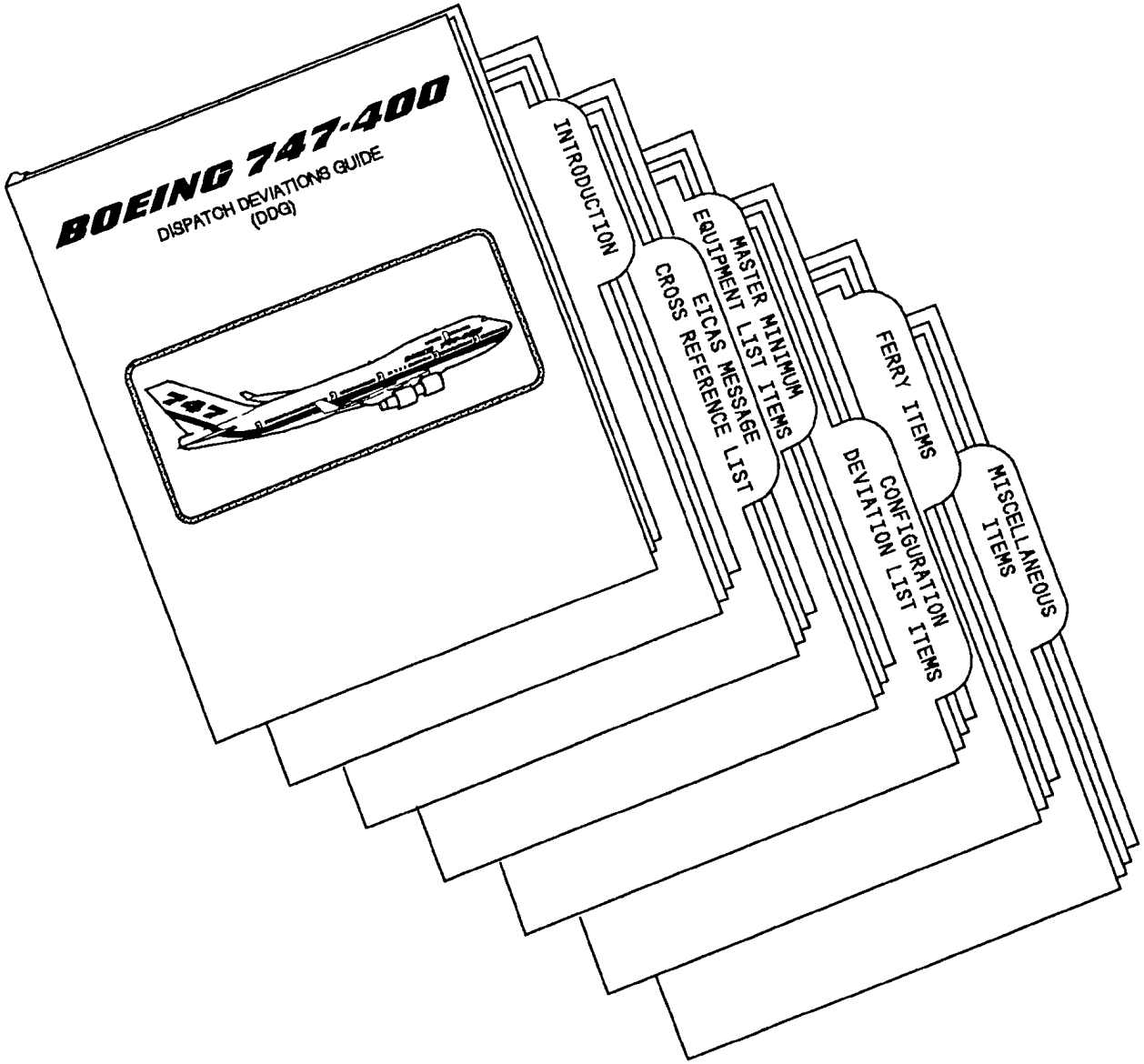

Figure 18 Dispatch Deviations Guide

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MASTER MINIMUM EQUIPMENT LIST (MMEL)

DISPATCH DEVIATIONS GUIDE MMEL EXAMPLE

Minimum Equipment List Items Example

The MEL list contains all items from the MMEL. The pages are numbered by:

- DDG section number
- ATA number
- Page sequence

The example page shows the following:

- Item
- Repair interval
- Number installed
- Number required for dispatch
- Remarks or exceptions
- EICAS status messages
- Placard
- Maintenance
- Operation.

Item

The items are given the following:

- ATA sequence number
- Name
- Description.

Repair Interval

The repair interval is represented by a character, A, B, or C. The character represents the time before a repair must be done.

Number Installed

Number installed shows the number of items installed on the airplane.

Number Required For Dispatch

Number of operational items required for dispatch of the airplane.

Remarks Or Exceptions

Remarks or exceptions provides information required to dispatch the airplane.

EICAS Status Messages

EICAS status messages lists the messages that relate to this fault condition.

Placard

Placard describes the way to inform the flight crew of the dispatch limitation. For example:

- Airplane flight log
- Inop sticker on a flight deck switch.

Maintenance

Maintenance describes procedures required to ready the airplane for dispatch.

Operation

Special procedures required to operate the airplane.

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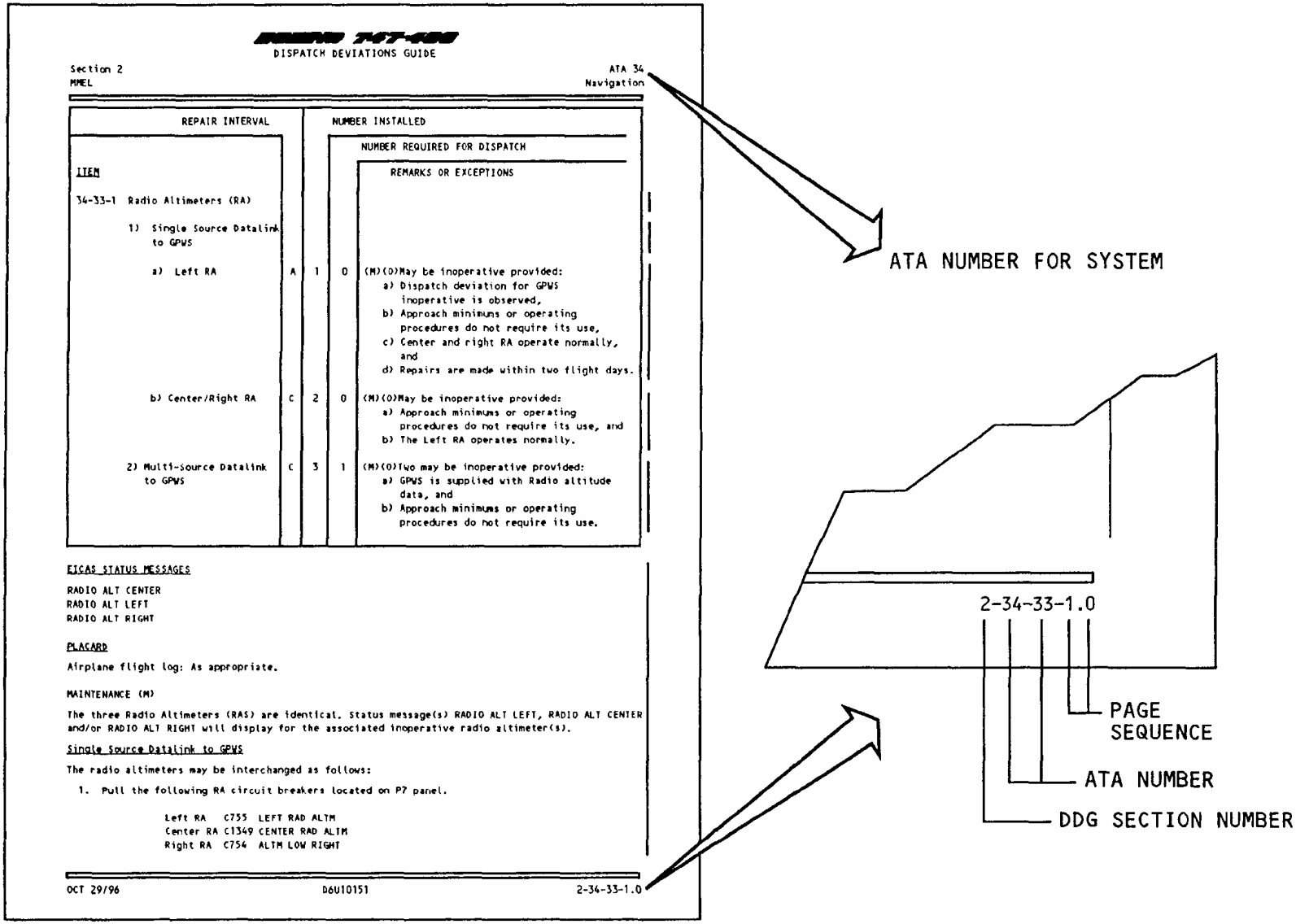

DISPATCH DEVIATIONS GUIDE

Section 2
MMEL

ATA 34
Navigation

ITEM	REPAIR INTERVAL	NUMBER INSTALLED	NUMBER REQUIRED FOR DISPATCH	REMARKS OR EXCEPTIONS
34-33-1 Radio Altimeters (RA)				
1) Single Source Datalink to GPWS				
a) Left RA	A	1	0	(M)(O)May be inoperative provided: a) Dispatch deviation for GPWS inoperative is observed, b) Approach minimums or operating procedures do not require its use, c) Center and right RA operate normally, and d) Repairs are made within two flight days.
b) Center/Right RA	C	2	0	(M)(O)May be inoperative provided: a) Approach minimums or operating procedures do not require its use, and b) The Left RA operates normally.
2) Multi-source Datalink to GPWS	C	3	1	(M)(O)Two may be inoperative provided: a) GPWS is supplied with Radio altitude data, and b) Approach minimums or operating procedures do not require its use.

EICAS STATUS MESSAGES

RADIO ALT CENTER
RADIO ALT LEFT
RADIO ALT RIGHT

PLACARD

Airplane flight log: As appropriate.

MAINTENANCE (M)

The three Radio Altimeters (RAS) are identical. Status message(s) RADIO ALT LEFT, RADIO ALT CENTER and/or RADIO ALT RIGHT will display for the associated inoperative radio altimeter(s).

Single Source Datalink to GPWS

The radio altimeters may be interchanged as follows:

1. Pull the following RA circuit breakers located on P7 panel.

Left RA C755 LEFT RAD ALTM
Center RA C1349 CENTER RAD ALTM
Right RA C754 ALTM LOW RIGHT

OCT 29/96 D6U10151 2-34-33-1.0

Figure 19 Dispatch Deviations Guide MMEL Example

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STRUCTURAL REPAIR MANUAL

General

The structural repair manual is not customized. It gives instructions for repair of the Boeing 747-400 airplane structure. The Federal Aviation Administration (FAA) gives approval for data in the structural repair manual that affects structural integrity.

Purpose

The SRM is the primary reference used to determine damage assessment and repair procedures necessary for dispatch.

Chapter Numbering

The structural repair manual contains these chapters:

- Standard Practices and Structures-General (51)
- Doors (52)
- Fuselage (53)
- Nacelles/Pylons (54)
- Stabilizers (55)
- Windows (56)
- Wings (57).

Chapters 52 through 57 have three basic topics:

- Structure identification
- Allowable damage
- Repairs.

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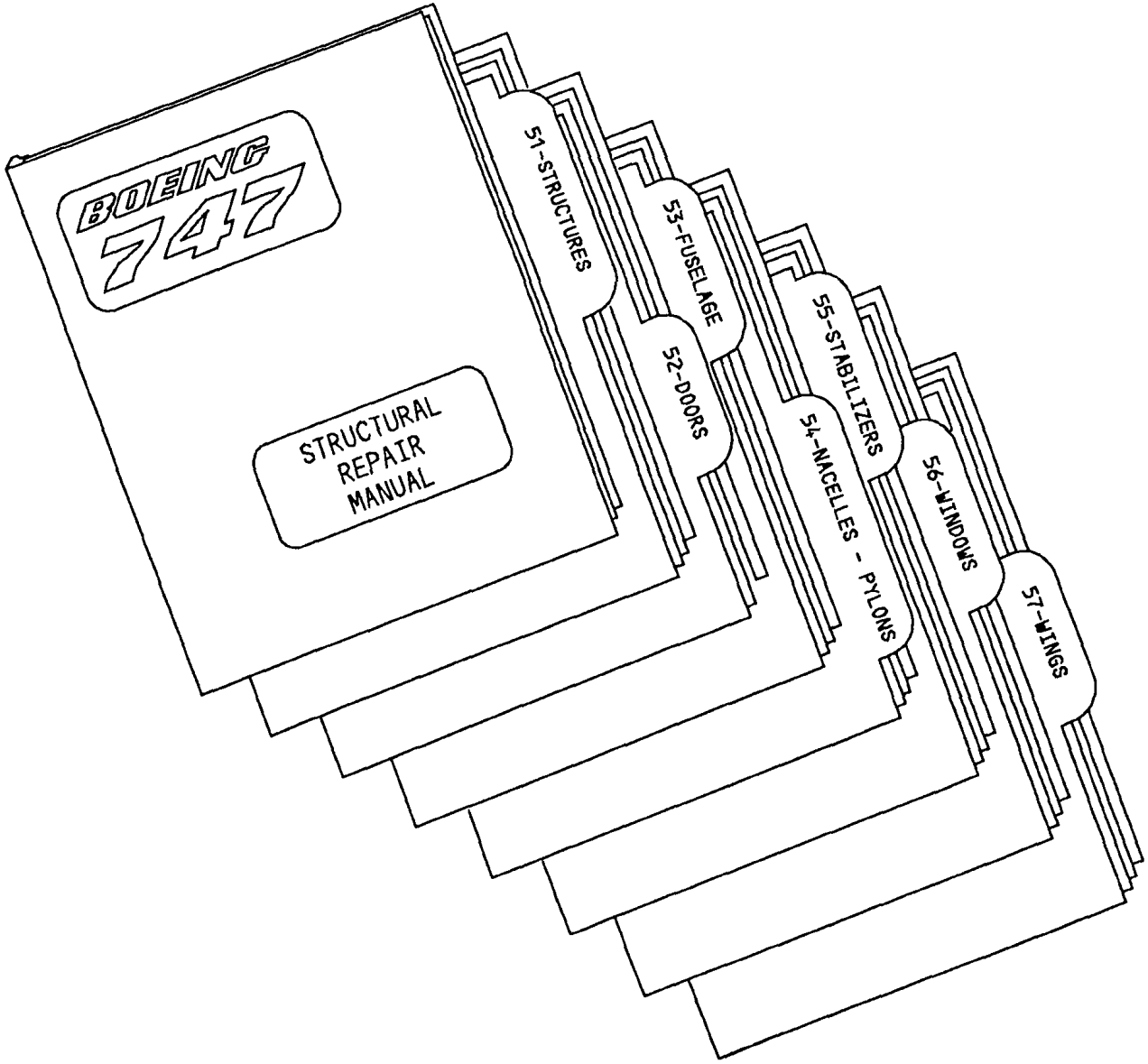

Figure 20 Structural Repair Manual

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FAULT ISOLATION PROCEDURE

INTRODUCTION

General

You use both the fault isolation manual(FIM) and the central maintenance computer system (CMCS) together to isolate faults on the 747-400.

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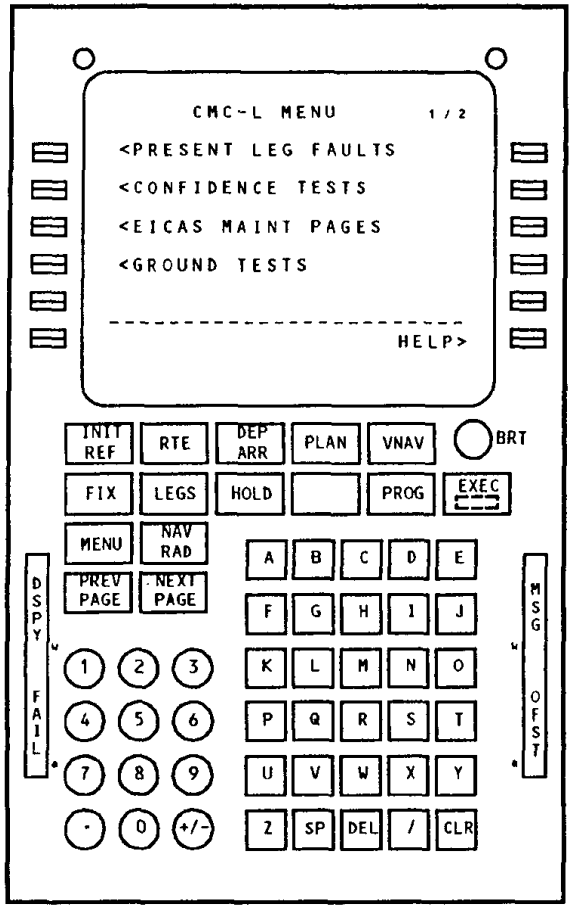
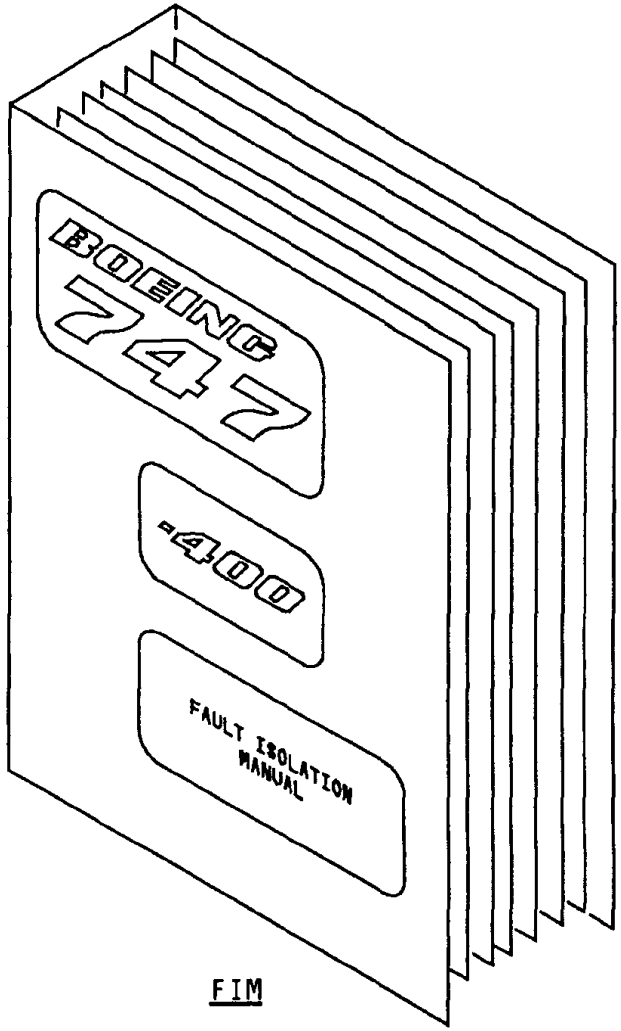


CONTROL DISPLAY UNIT



FIM

Figure 21 Introduction

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PRESENT LEG FAULTS

You can find " PRESENT LEG FAULTS " on the control and display unit (CDU). It is more convenient to use the hard copy (PRESENT LEG FAULTS SUMMARY REPORT) .

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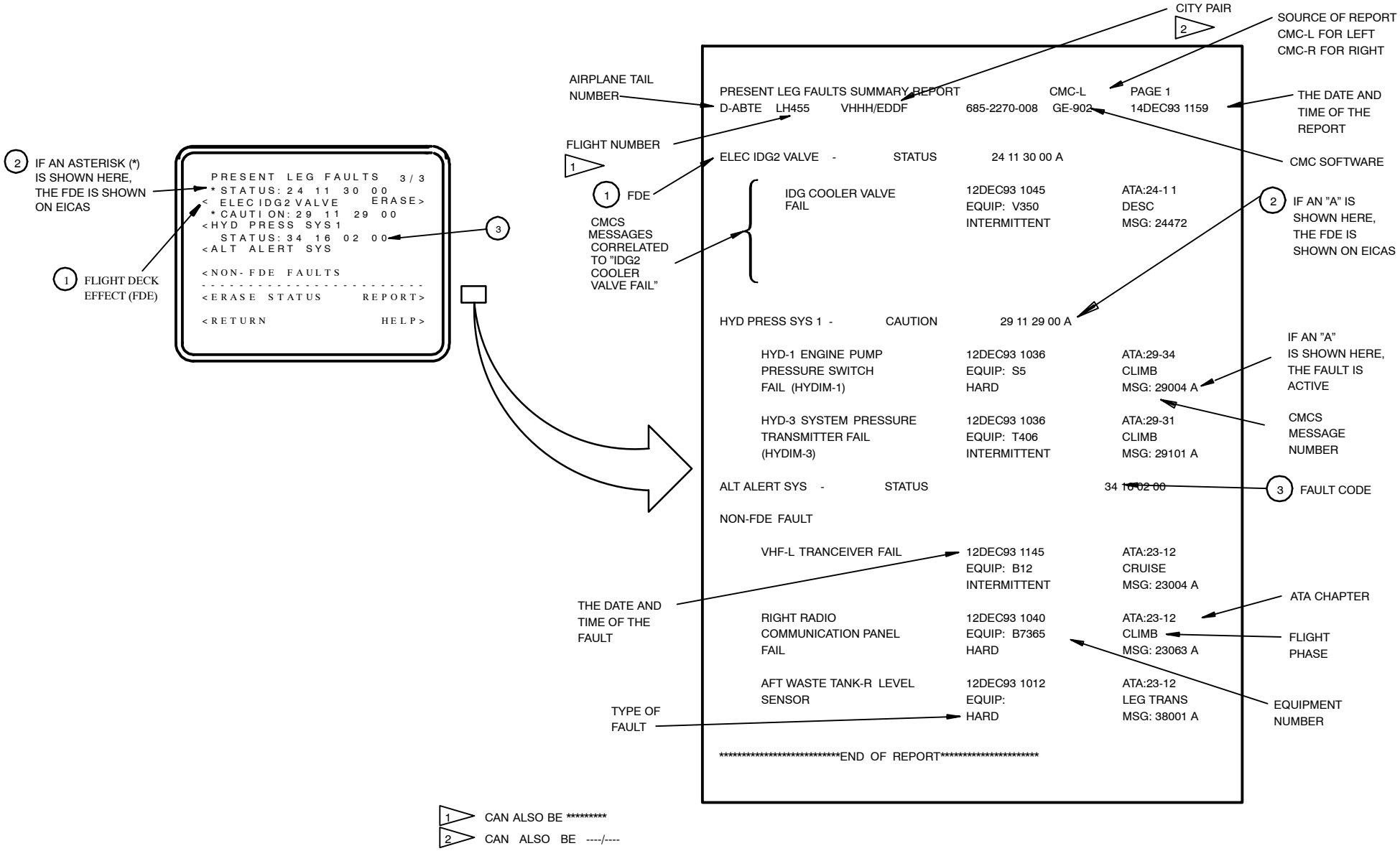

Figure 22 Present Leg Faults Summary Report

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FAULT ISOLATION STEPS

General

The fault isolation steps show a logical step-by-step procedure to identify the fault(s) that cause a flight deck effect (FDE). These are examples of FDEs:

- An EICAS message
- An engine exceedence display
- A flight director bar bias.

The FDE can be an active EICAS message that must be cleared before dispatch, or it may be in a logbook report that refers to an FDE that occurred during flight.

Although the CMCS and the FIM are also used to isolate faults that are not associated with an FDE; this lesson focuses primarily on isolating the cause of an FDE. It gives examples of how to use the fault isolation steps.

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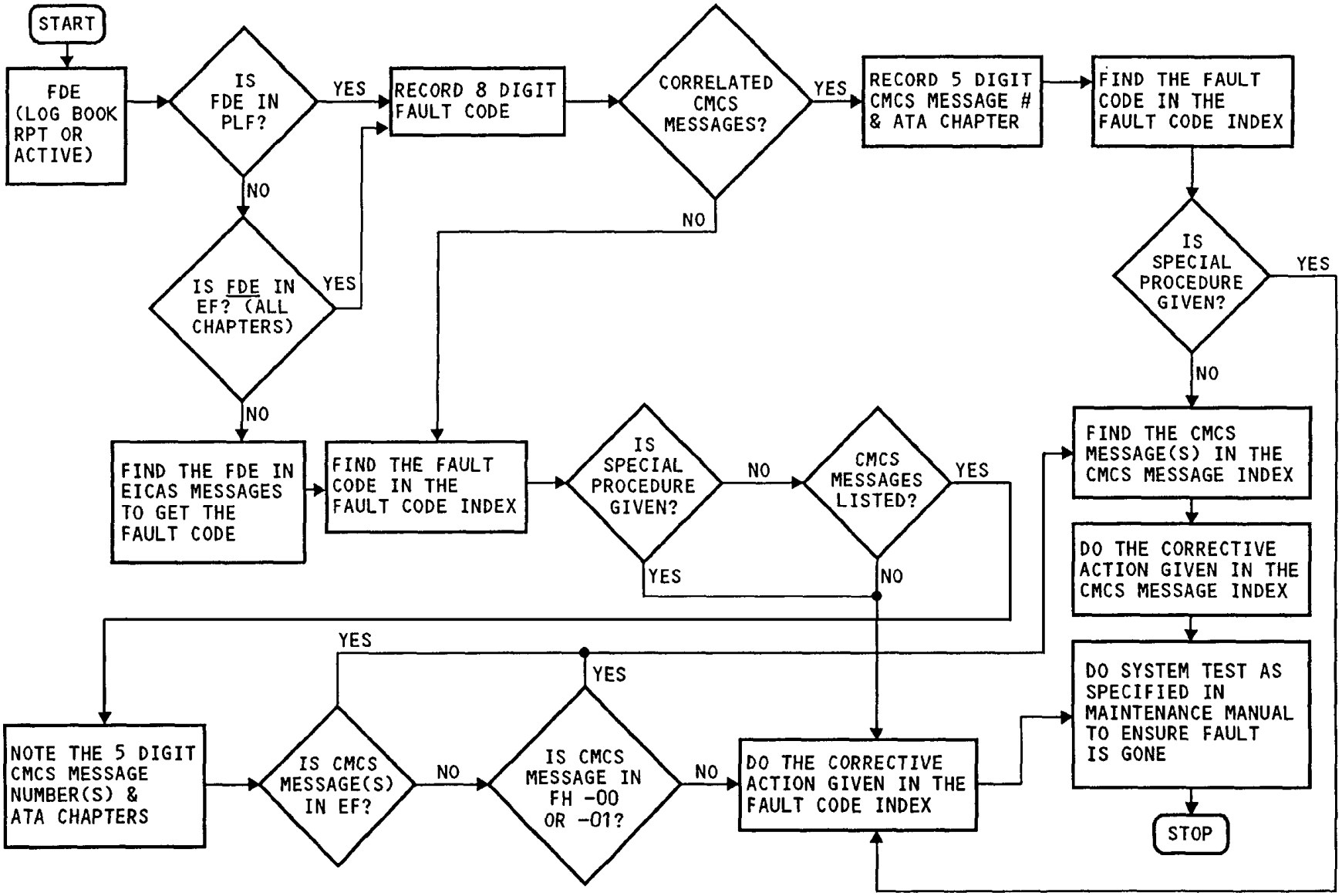

Figure 23 Fault Isolation Steps

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FLIGHT DECK EFFECTS

General

Flight deck effects (FDEs) show on EICAS.

Warnings, cautions, and advisories show on the main EICAS display.

Status messages show on the status page of the auxiliary EICAS clisplay.

Status Messages

These are the two types of status messages:

- Nonlatchable
- latchable.

Nonlatchable status messages show on the status page when a malfunction occurs in any of the systems monitored by the EIUs. The newest message is listed first. When the condition clears that caused the message, it is removed from the status page.

Latchable status messages appear on the status page when a malfunction occurs. They have the same priority with the newest of either type listed first.

Latchable status messages are stored in the EIUs nonvolatile memory (NVM).

These are the three types of latchable messages:

- Ground only (NVM-G)
- Air only (NVM-A)
- Unconclitional (NVM)

Latched status messages are not removed when the condition clears. Special procedures are required to erase latched status messages.

Messages are latched to allow maintenance personnel to review failures that occur in specific flight phases but may not be present or active all the time.

The status messages go to the central maintenance computers for flight deck effect correlation.

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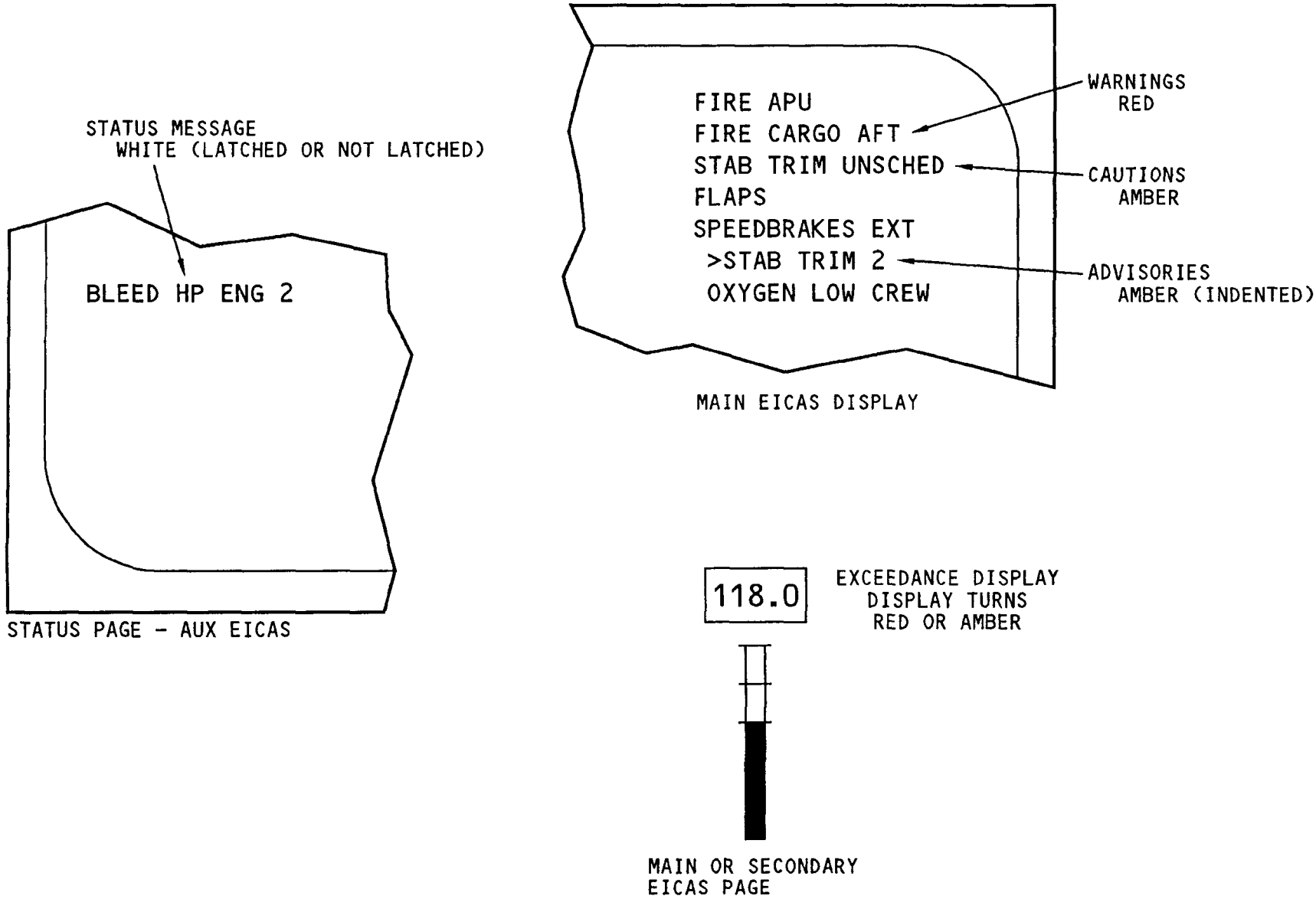

Figure 24 Flight Deck Effects

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PRESENT LEG FAULTS

Present Leg Fault Menu

When you have an active FDE or a logbook report referring to an FDE, go to the CMC menu and select the present leg faults menu. Push the line select key (LSK) next to ” PRESENT LEG FAULTS ” to display the menu.

FDE Fault Code

Check all pages to see if the FDE shows. If the FDE shows, record the eight digit fault code beside it.

Correlated Fault Messages

A caret (<) shows next to the FDE if the central maintenance computer system (CMCS) has correlated a fault message to it. Push the LSK next to the FDE to display the correlated fault message. Record the five digit CMCS fault message number and the ATA chapter number.

Present Leg Fault Summary

If a printer is available, it may be easier to print a present leg fault summary report. Push the line select key next to ” REPORT” on the present leg faults menu page to print the summary.

NON-FDE Faults

The Non-FDE faults is a list of non correlated CMC faults.

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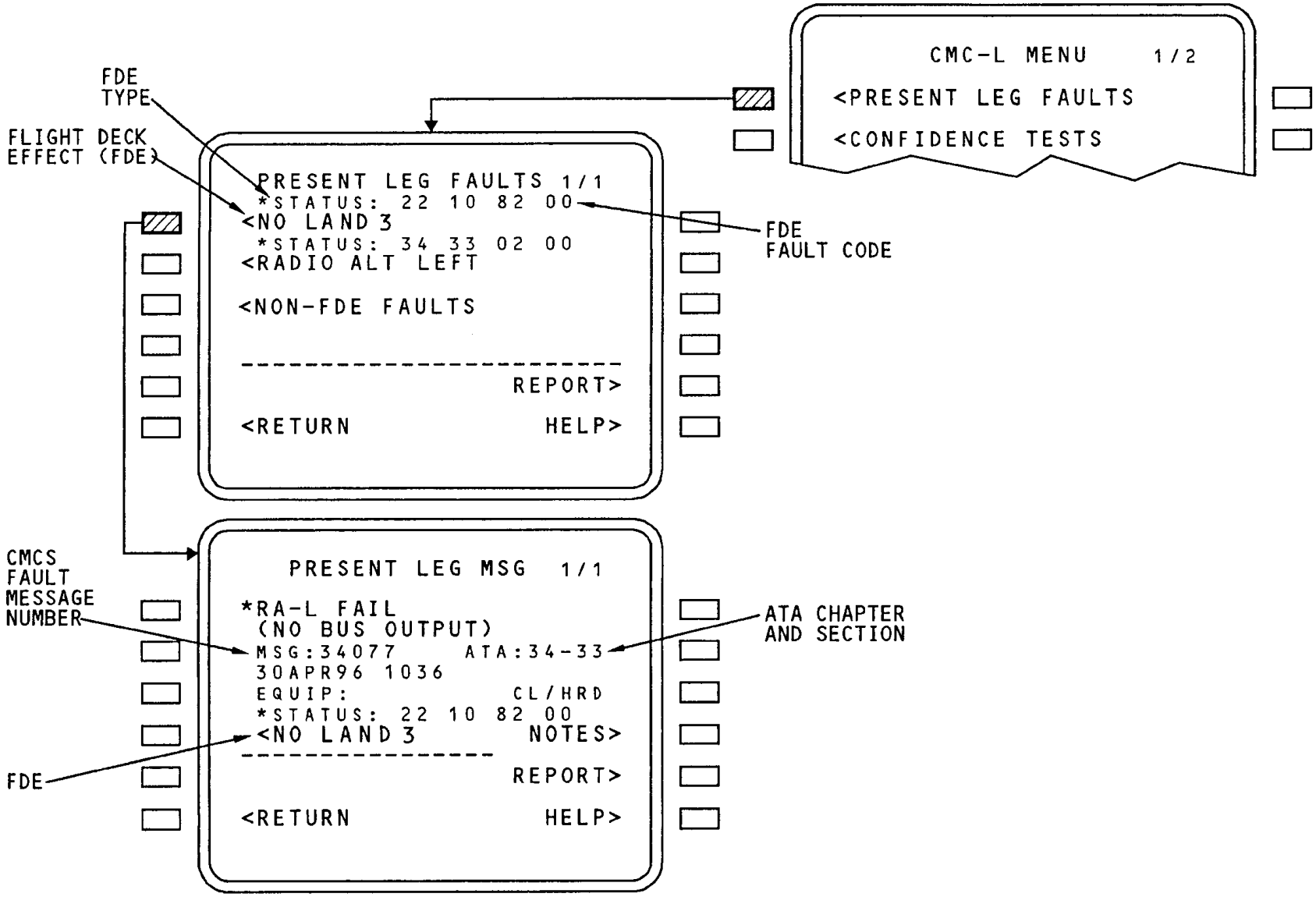

Figure 25 PRESENT LEG FAULTS

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FAULT CODE INDEX - SPECIAL PROCEDURES

General

Before you do any corrective action for a CMCS fault message, make sure the FDE has no special procedure associated with it.

Go to the FIM fault code index. Each FDE has a unique fault code. They are listed in the fault code index in numerical order.

You use the eight digit fault code from the present leg faults menu or from the fault reporting manual, to find the fault isolation procedure for the FDE in the fault code index.

If there is a special procedure for the FDE, it is listed in the fault code index.

A special procedure is a unique fault isolation procedure for the FDE. It may apply to a specific part number, or it may apply to a set of airplane conditions set at the time of the FDE. Often the special procedure shows that if the given conditions are true, no corrective action is needed. It may also involve extra tests or conditions required to isolate the fault correctly.

If no special procedure is listed, go to the CMCS fault message for corrective action.

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BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
34 32 07 00	Marker beacon failed to display on Capt & F/O PFD when passing outer marker. (inop, weak). 1. 34-32-00, Fig. 103 Block 1. 2. Make sure that there is an open circuit at pin D2 of connector DB621CA for the left VOR/MKR receiver (WDM 34-32-11) when the failure continues.
34 33 01 00	The EICAS message RADIO ALT CENTER (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B4, RAD ALTM CENTER 2. Look for one or more of these CMCS messages (Fig. 1): 22551 (22-11) 22847 (22-11) 22848 (22-11) 24700 (22-11) 34092 (34-33) 34094 (34-33) 34095 (34-33) 34096 (34-33) 34097 (34-33) 34098 (34-33) 34099 (34-33) 34100 (34-33)
34 33 02 00	The EICAS message RADIO ALT LEFT (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B3, RAD ALTM LEFT 2. Look for one or more of these CMCS messages (Fig. 1): 22549 (22-11) 22846 (22-11) 22847 (22-11) 24702 (22-11) 31212 (34-33) 34072 (34-33) 34074 (34-33) 34075 (34-33) 34076 (34-33) 34077 (34-33) 34078 (34-33) 34079 (34-33) 34080 (34-33)

SPECIAL PROCEDURE

ATA CHAPTER

FAULT CODE

POSSIBLE CORRELATED CMCS FAULT MESSAGES

Figure 26 FAULT CODE INDEX – Special Procedures

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CMCS MESSAGE LIST

General

If no special procedures are listed in the fault code index, then do the corrective action for the correlated CMCS fault message.

The corrective action for a CMCS fault message is in the FIM - CMCS message index for the associated chapter. The fault messages are listed in numerical order.

After the corrective action is complete, do a system test to be sure the fault is corrected. The required test is specified in the maintenance manual.

Training Information Point

The power plant CMCS Message list for all power plant chapters is found in chapter 71.

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BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

CMCS FAULT MESSAGE NUMBER

POSSIBLE CORRELATED FDES

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
34074 RA-L TRANSCEIVER FAIL	>ALT CALLOUT (ADVISORY) F/D BAR BIAS (DISPLAY) NO AUTOLAND (STATUS) >NO AUTOLAND (ADVISORY) >NO LAND 3 (CAUTION) >TCAS SYS (STATUS) >WNSHR ALERT SY (ADVISORY)	>AUTOPILOT (CAUTION) >GND PROX SYS (ADVISORY) NO AUTOLAND (ADVISORY) NO LAND 3 (STATUS) >NO LAND 3 (ADVISORY) >TCAS SYS (STATUS) >WNSHR ALERT SY (STATUS)	>AUTOPILOT DISC (WARNING) GROUND PROX SYS (STATUS) >NO AUTOLAND (CAUTION) NO LAND 3 (ADVISORY) RADIO ALT LEFT (STATUS) >TCAS SYS (ADVISORY)

CORRECTIVE ACTION

CORRECTIVE ACTION:
A. Replace Left Radio Altimeter R/T, B73 (mm 34-33-02/401).

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Figure 27 CMCS MESSAGE List

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EXISTING FAULTS

General

A fault is stored in present leg faults only if it is active during a storable flight phase. If a fault becomes active during a non-storable flight phase and remains active only during non-storable flight phases, it does not show in present leg faults. This is called flight phase screening.

Latchable status messages and their correlated CMCS fault messages are the only exception to flight phase screening. Present leg faults show all active latchable status messages and CMCS fault messages correlated to these FDEs.

Existing faults does not flight phase screen any fault messages. Existing faults shows all active faults regardless of flight phase.

If the FDE you want to correct does not show in present leg faults, look for the FDE in existing faults.

Displaying Existing Faults

Push the line select key (LSK) next to existing faults from the CMC menu. When the existing faults menu shows, push the LSK next to the chapter which may have faults that caused the FDE. If the fault does not show in that chapter, try all other related chapters. A fault in one chapter may cause an FDE in another chapter.

If there is more than one FDE correlated to a CMCS fault message, a caret (<) shows next to the FDE.

Push the LSK next to the FDE to show additional FDEs correlated to the CMCS fault message.

An existing fault summary report gives a printout of all active faults with all correlated FDEs and their fault codes.

If you find the FDE, record the five digit CMCS message number and ATA chapter number.

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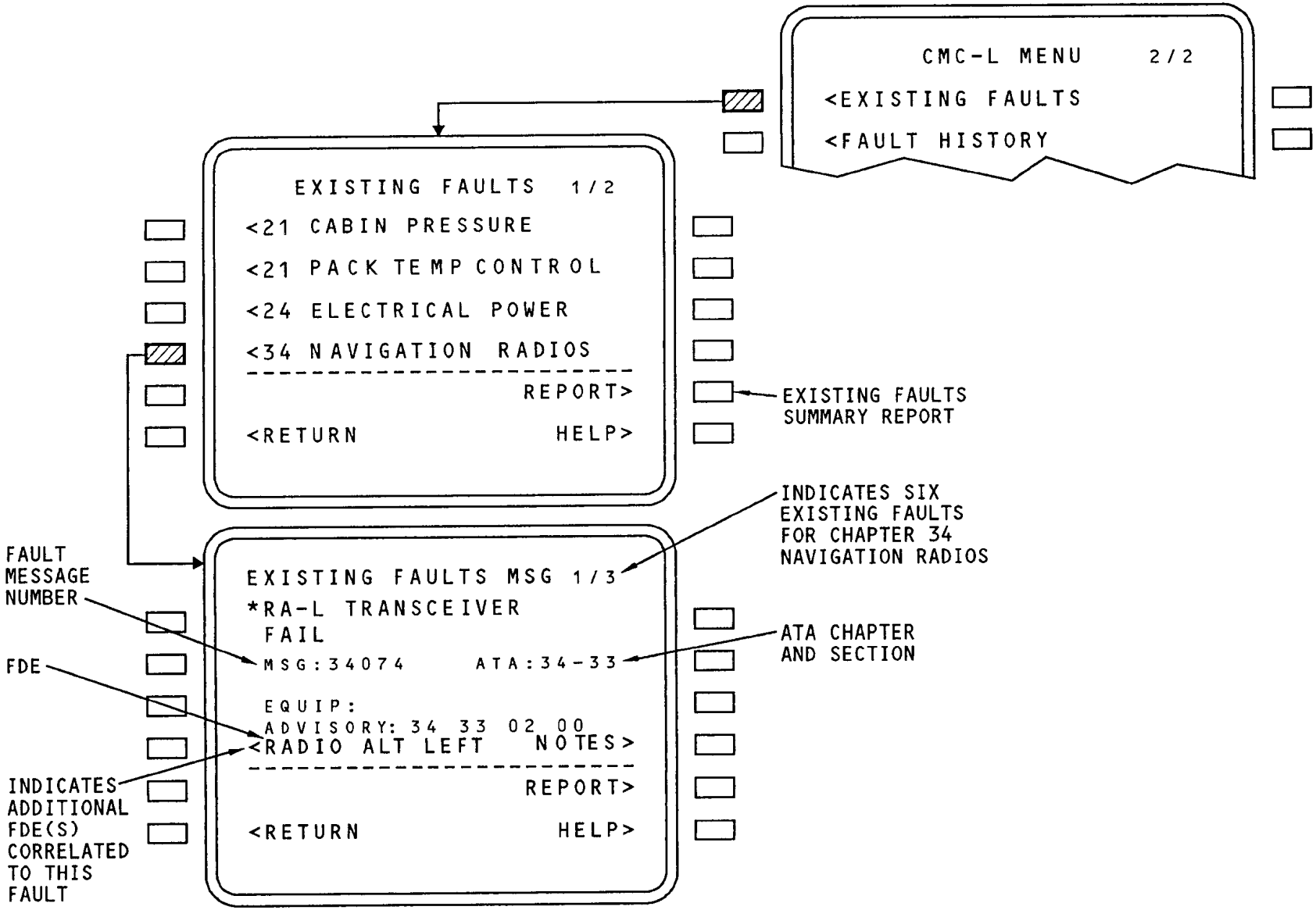

Figure 28 EXISTING FAULTS

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FAULT CODE INDEX - MANUAL CORRELATION

General

If the correlation criteria for a fault/FDE pair is not met, then the fault message and FDE do not correlate.

The FDE does not show in either present leg faults or existing faults when the correlation criteria was not met. If the FDE is not correlated, then you have to manually correlate the FDE to a CMCS fault message.

Manual Correlation

The FIM - fault code index lists all the CMC faults that can correlate to each FDE. Use the index to correlate the FDE to a CMCS fault message. These are the steps you take:

- Get the fault code for the FDE from the EICAS messages section of the FIM.
- Use the fault code to find the FDE fault isolation procedure in the fault code index.
- Make a list of all CMCS fault message numbers and ATA chapters that can cause the FDE.
- Go to existing faults to see if any on your list are active.

There are some FDEs where only one possible fault can cause the FDE. Often in this case, there are no CMCS fault messages and the corrective action is given in the fault code index.

In the case of fault tolerant systems such as EECs, the CMCS normally correlates the FDE to the last fault occurrence only.

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FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
34 32 07 00	Marker beacon failed to display on Capt & F/O PFD when passing outer marker. (inop, weak). 1. 34-32-00, Fig. 103 Block 1. 2. Make sure that there is an open circuit at pin D2 of connector DB621CA for the left VOR/MKR receiver (WDM 34-32-11) when the failure continues.
34 33 01 00	The EICAS message RADIO ALT CENTER (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B4, RAD ALTM CENTER 2. Look for one or more of these CMCS messages (Fig. 1): 22551 (22-11) 22847 (22-11) 22848 (22-11) 24700 (22-11) 34092 (34-33) 34094 (34-33) 34095 (34-33) 34096 (34-33) 34097 (34-33) 34098 (34-33) 34099 (34-33) 34100 (34-33)
34 33 02 00	The EICAS message RADIO ALT LEFT (STATUS) shows. 1. Cycle this circuit breaker on the P7 panel: A. 7B3, RAD ALTM LEFT 2. Look for one or more of these CMCS messages (Fig. 1): 22549 (22-11) 22846 (22-11) 22847 (22-11) 24702 (22-11) 31212 (34-33) 34072 (34-33) 34074 (34-33) 34075 (34-33) 34076 (34-33) 34077 (34-33) 34078 (34-33) 34079 (34-33) 34080 (34-33)

SPECIAL PROCEDURE

ATA CHAPTER

FAULT CODE

POSSIBLE CORRELATED CMCS FAULT MESSAGES

Figure 29 FAULT CODE INDEX - Manual Correlation

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EICAS MESSAGES

General

Before you do any corrective action for a CMCS faults message, first make sure that there is no special procedure for the FDE. If there is it will show in the FIM-Fault Code Index.

To find the FDE in the fault code index, you must first get the fault code for the FDE.

Use the fault code to find the FDE in the fault code index. Check to see if there are any special procedures for the FDE.

If there are no special procedures, do the corrective action that shows in the CMCS message index. Then do the appropriate system test to be sure the fault is corrected.

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FAULT ISOLATION/
MAINTENANCE MANUAL

EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
BLEED ASCTU B	(STATUS)	CHANNEL B OF AIR SUPPLY CONTROL AND TEST UNIT FAILED OR ARINC 429 BUS INVALID OR MISSING	36 10 21 00
BLEED HP ENG 1	(STATUS)	ENGINE 1 HPSOV OPEN AND PH SWITCH ACTUATED OR HPSOV OPEN WHEN ELECTRICALLY COMMANDED CLOSED	36 10 35 00
BLEED HP ENG 2	(STATUS)	ENGINE 2 HPSOV OPEN AND PH SWITCH ACTUATED OR HPSOV OPEN WHEN ELECTRICALLY COMMANDED CLOSED	36 10 37 00
BLEED HP ENG 3	(STATUS)	ENGINE 3 HPSOV OPEN AND PH SWITCH ACTUATED OR HPSOV OPEN WHEN ELECTRICALLY COMMANDED CLOSED	36 10 39 00
BLEED HP ENG 4	(STATUS)	ENGINE 4 HPSOV OPEN AND PH SWITCH ACTUATED OR HPSOV OPEN WHEN ELECTRICALLY COMMANDED CLOSED	36 10 41 00

FDE

FAULT CODE

Figure 30 EICAS Messages

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EXISTING FAULTS - 2

General

With the list of existing CMCS fault messages go to the CMC menu and select existing faults.

Push the line select key (LSK) next to the chapter/section for the possible fault code messages. If there is more than one page in a chapter, push the NEXT PAGE key to show additional fault messages. Find and record all fault messages that match the messages on the list.

Do the corrective action given in the CMCS message section for each fault. Finally, do the specified system test to be sure the fault is actually corrected.

If the fault is no longer active, it does not show in existing faults. The fault may show in fault history.

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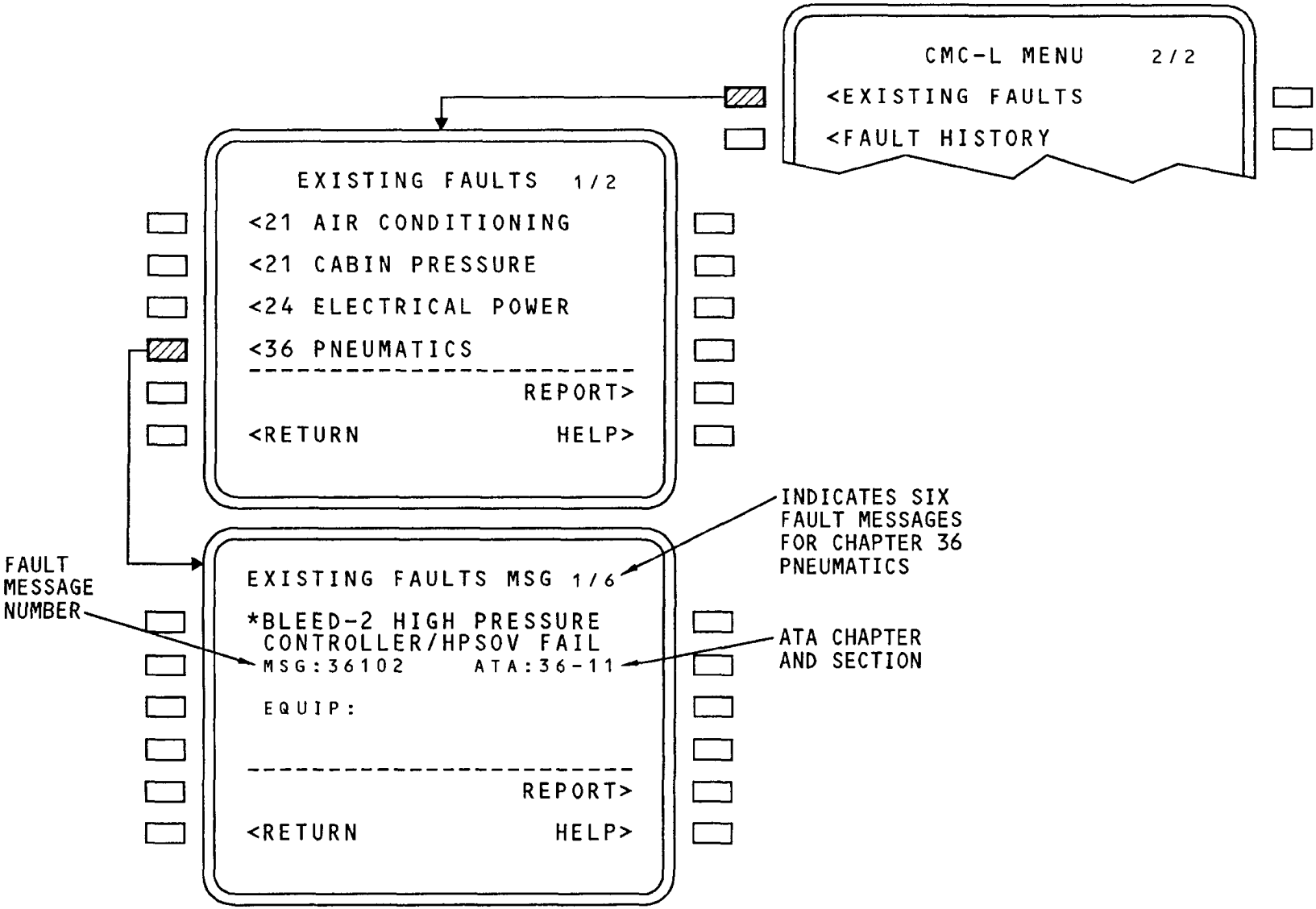

Figure 31 EXISTING FAULTS - 2

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FAULT HISTORY - LEG-00

General

If the fault is no longer active, it does not show in existing faults.

If the fault was active during a storable flight phase, then the fault message is stored in NVM and shows in fault history for flight leg -00.

With the list of possible CMCS fault messages, go to the CMC menu and select FAULT HISTORY.

Push the line select key (LSK) next to the chapter/section for possible faults. Look for a fault for leg-00. The fault message number shows above the CMC message. Push the LSK next to the fault message to show the most recent fault occurrence.

Check the message number against the message numbers on the list. If you find a match, do the corrective action in the CMCS message index. Do the appropriate system test to make sure that the fault is corrected.

In this example, the fault message could also be found in present leg faults under NON-FDE Faults.

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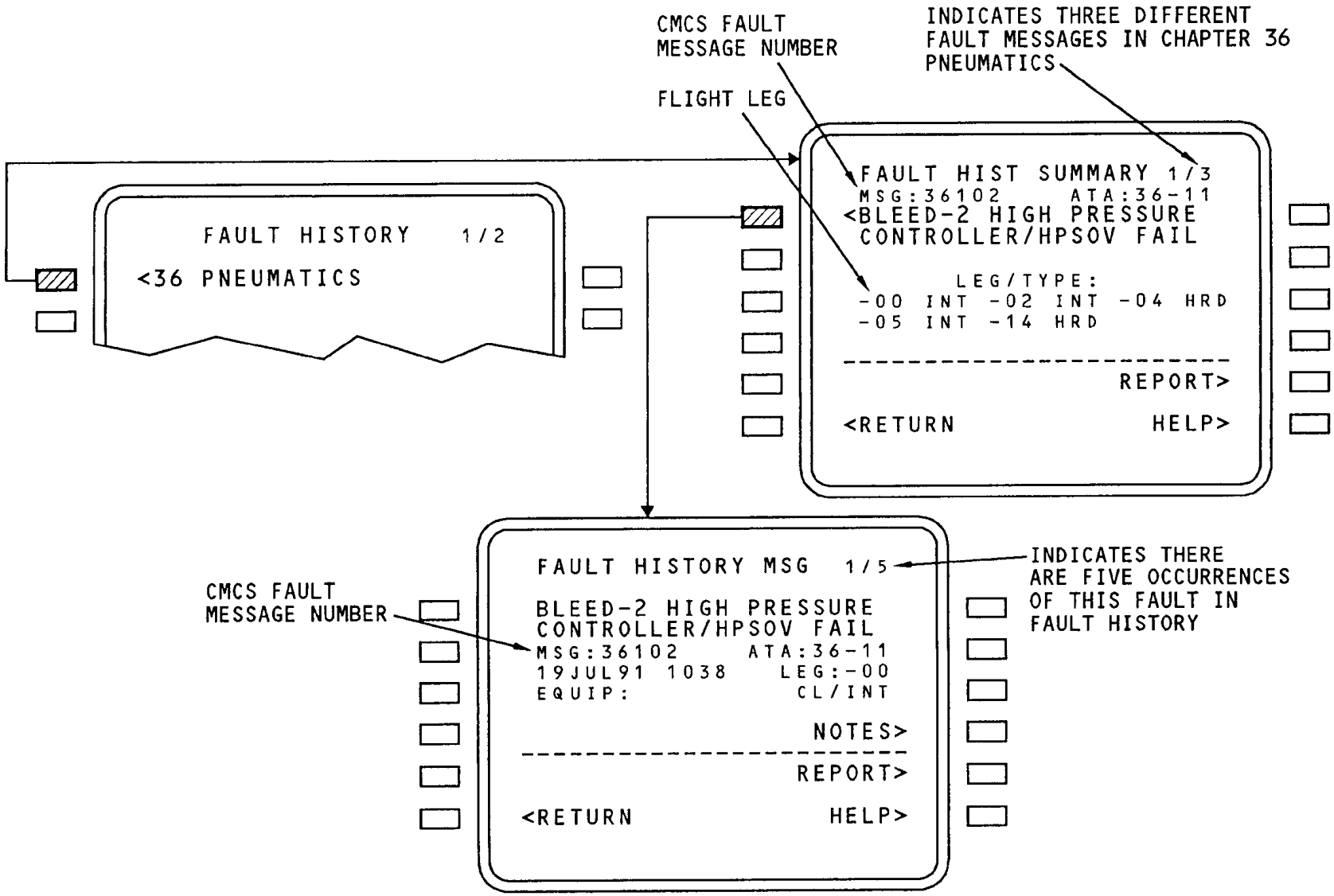

Figure 32 FAULT HISTORY - LEG-00

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FAULT HISTORY (LEG-01)

General

It is possible that an inadvertent leg transition may occur before the logbook write-ups have been reviewed and corrected.

If a fault occurs during flight and then becomes inactive before the leg transition, it is no longer part of present leg faults. In this case, look for a fault on the list obtained from the fault code index by checking the fault history for leg-01. Be sure that the time of occurrence is the same as the logbook write-up.

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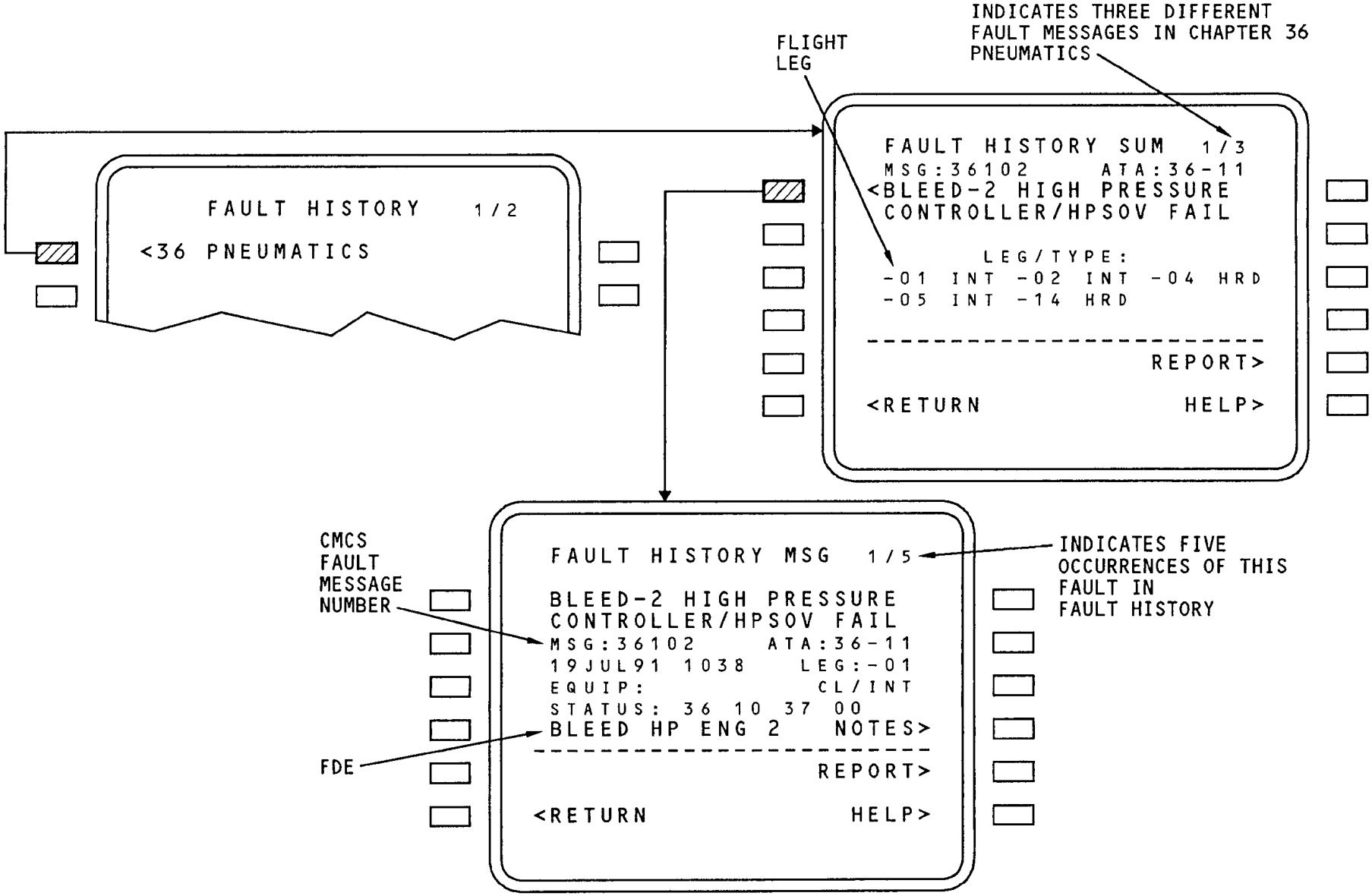

Figure 33 FAULT HISTORY LEG-01

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INPUT MONITORING

General

Some system failures require additional troubleshooting. Input monitoring is very useful to determine which failed LRU to replace when there is more than one LRU that can cause a FDE.

The fault isolation manual may direct you to a figure number within that ATA chapter of the FIM. All of the information you need to use input monitoring is listed in the FIM.

In this example: E/ 086 / 271 / 00 is used.

E	The data is received via the EFIS/EICAS Interface Units
086	Port number for the BCU1
271	Discrete word
00	No special identifier required

Via the BCU1 you get data from the idg cooler valve via GCU 2.

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CMCS MESSAGE 36101, 36102,36103, OR 36104 IS SHOWN: HIGH PRESSURE SHUTOFF VALVE/HIGH PRESSURE CONTROLLER FAIL

1 WARNING

DO THE DEACTIVATION PROCEDURE FOR THE THRUST REVERSER TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT.

DEACTIVATE THE THRUST REVERSER WHEN YOU WORK IN AND AROUND THE ENGINE (AMM 78-31-00/201).

ACCESS CMC INPUT MONITORING (AMM 45-10-00/201). ENTER THE APPLICABLE INPUT CODES AS FOLLOWS:

ENG	CODE
1	E/59/352/10
2	E/59/352/01
3	E/59/352/11
4	E/59/352/00

IS THE HPSOV CLOSED (BIT 17=1)?

YES

SEE SHEET 2 (BLOCK 2)

PREREQUISITES

MAKE SURE THIS SYSTEM WILL OPERATE:
CMCS (AMM 45-10-00/201)

MAKE SURE THESE CIRCUIT BREAKERS ARE CLOSED:
6H32,6H33,6H34,6H35

MAKE SURE THE AIRPLANE IS IN THIS CONFIGURATION:
ELECTRICAL POWER IS ON (AMM 24-22-00/201)
NO PRESSURE IN THE PNEUMATIC SYSTEM (AMM 36-00-00/201)
APPLICABLE ENGINE BLEED SWITCH (OVERHEAD PANEL P5) IN THE OFF POSITION
ACCESS TO THE HIGH PRESSURE SHUTOFF VALVE (HPSOV) (AMM 36-11-05/401) IF NECESSARY ACCESS TO THE HIGH PRESSURE CONTROLLER (HPC)(AMM 36-11-06/401) IF NECESSARY

EQUIPMENT:
0-50 PSIG GAS SOURCE (NITROGEN BOTTLE) WITH A 0.5625-18 UNJF-3A INTERNAL THREAD CONNECTION AND A 0.037 INCH ORIFICE (IF AVAILABLE)
VOLT/OHMMETER (ANALOG METER IS RECOMMENDED)

CMCS Message 36101,36102,36103, or 36104 Is Shown:
High Pressure Shutoff Valve/High Pressure Controller Fail
Figure 112 (Sheet 1)

Figure 34 INPUT MONITORING - 1

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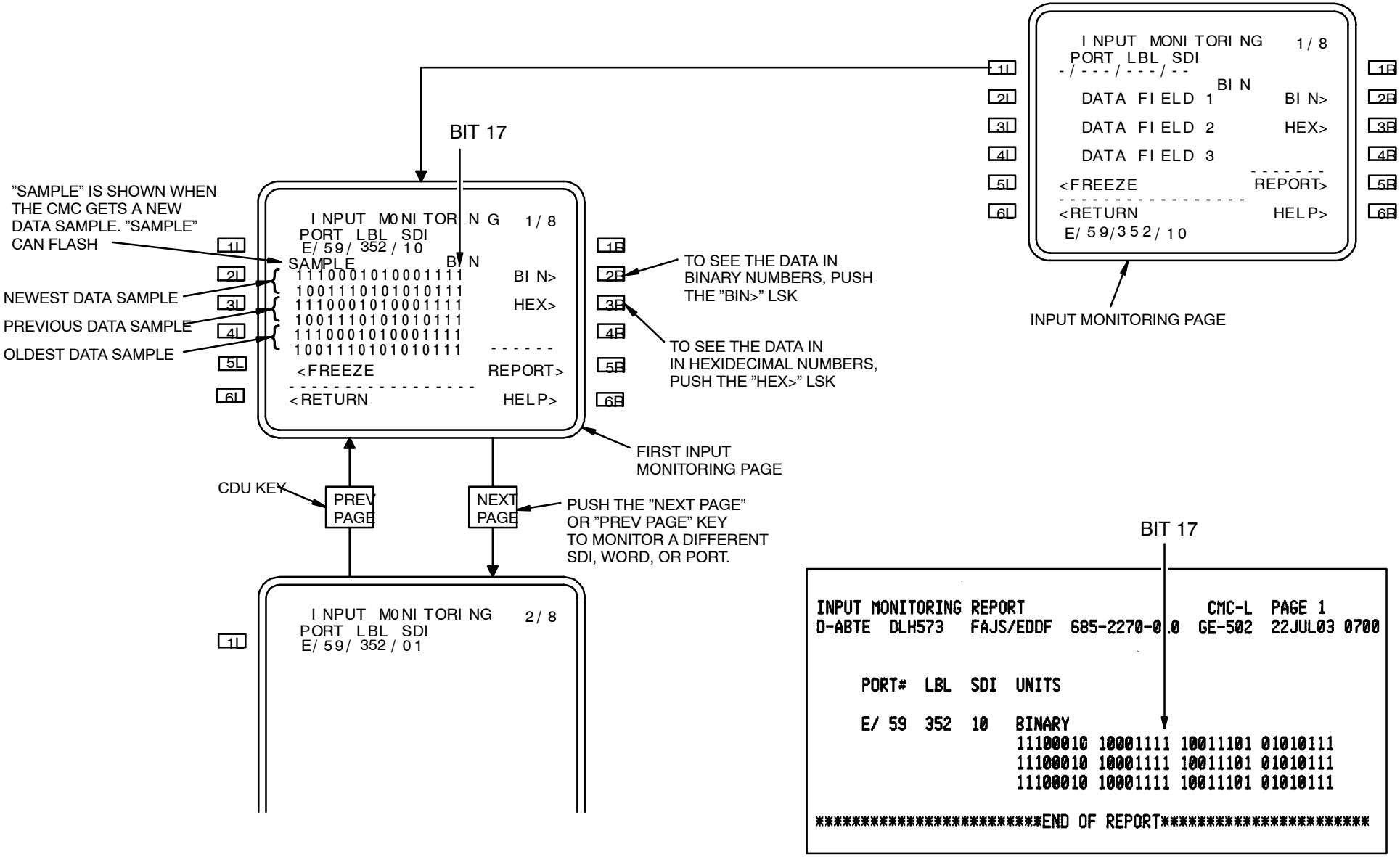

Figure 35 Input Monitoring Data Field

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LOG BOOK ENTRY1: ELEC IDG 2 VALVE (EICAS MESSAGE)

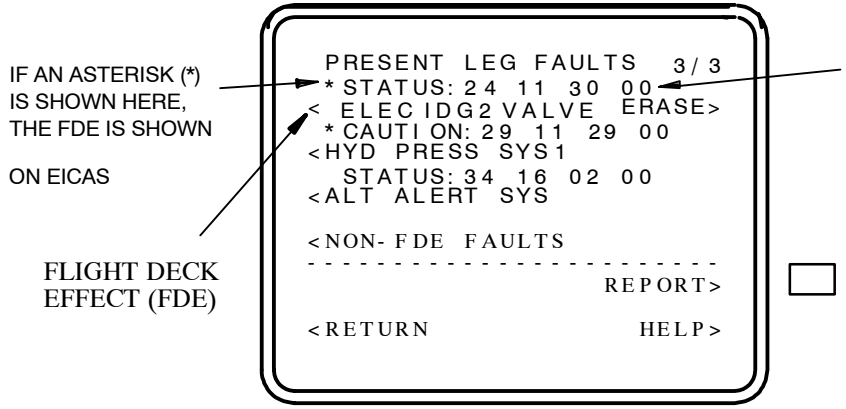
In the Fault Isolation Manual (FIM) you will find in the EICAS message list:

- EICAS MESSAGE:
  The flight deck effect "ELEC IDG 2 VALVE" is shown on the EICAS Display (an asterisk indicates that the message is shown now).
  ERASE indicates that the message is latchable. To find out if the message is really latched you have to go to the Fault Code Index.

- LEVEL:
  The level can be STATUS, CAUTION or WARNING.
  In this example it is a STATUS message.

- DESCRIPTION:
  Here you will find a short description of the fault.

- FAULT CODE:
  The 8-digit FAULT CODE is shown (**24 11 30 00**)
  With this code you have to go to the FAULT CODE INDEX .



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FAULT ISOLATION/
MAINTENANCE MANUAL

EICAS MESSAGE	LEVEL	DESCRIPTION	FAULT CODE
ELEC GEN SYS 3	(STATUS)	ONE OR MORE OF THESE PROBLEMS OCCURED: 1) IDG 3 HAS A FAILURE 2) GENERATOR FEEDER 3 FAILURE 3) GCU 3 IS OFF OR HAS A FAILURE 4) THE 28V BACKUP TO GCU 3 HAS A FAILURE 5) THE ARINC BUS BETWEEN GCU 3 AND ONE OF THE BCU'S HAS A FAILURE 6) THE GCB 3 HAS A FAILURE.	24 11 25 00
ELEC GEN SYS 4	(STATUS)	ONE OR MORE OF THESE PROBLEMS OCCURED: 1) IDG 4 HAS A FAILURE 2) GENERATOR FEEDER 4 FAILURE 3) GCU 4 IS OFF OR HAS A FAILURE 4) THE 28V BACKUP TO GCU 4 HAS A FAILURE 5) THE ARINC BUS BETWEEN GCU 4 AND ONE OF THE BCU'S HAS A FAILURE 6) THE GCB 4 HAS A FAILURE.	24 11 27 00
ELEC IDG 1 VALVE	(STATUS)	THE OIL COOLER VALVE FOR IDG 1 IS CLOSED WHEN IT IS DIRECTED OPEN. (OR) THE VALVE IS OPEN WHEN IT IS DIRECTED CLOSED.	24 11 29 00
ELEC IDG 2 VALVE	(STATUS)	THE OIL COOLER VALVE FOR IDG 2 IS CLOSED WHEN IT IS DIRECTED OPEN. (OR) THE VALVE IS OPEN WHEN IT IS DIRECTED CLOSED.	24 11 30 00
ELEC IDG 4 VALVE	(STATUS)	THE OIL COOLER VALVE FOR IDG 4 IS CLOSED WHEN IT IS DIRECTED OPEN. (OR) THE VALVE IS OPEN WHEN IT IS DIRECTED CLOSED.	24 11 32 00

1

ELECTRICAL POWER - EICAS MESSAGES

EFFECTIVITY

24-EICAS MESSAGES

Figure 36 EICAS Messages

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FAULT CODE INDEX

Introduction

The description of the FAULT CODE INDEX you will find on page 1.

The description of the FAULT ISOLATION PROCEDURE you will find on the next page. .

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FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE INDEX

1. General

A. The Fault Code Index includes fault isolation or corrective action for each fault code in the Fault Reporting Manual (FRM). The fault codes for each chapter are in numerical order.

(1) The first paragraph given with each fault code is the log book report from the FRM. The log book report is a short description of the fault.

(2) The numbered paragraphs after the log book report contain the fault isolation or the corrective action.

B. The fault isolation for most EICAS messages, engine exceedances, or PFD flags includes a list of one or more possible correlated CMCS messages.

(1) For each CMCS message in the list, there is the message number and an ATA number. The ATA number is the prompt under which you can find the message in Existing Faults or Fault History on the CDU.

(2) The corrective action refers to the procedure in Figure 1 of this section. Figure 1 shows how to use the Present Leg Faults, Existing Faults, and Fault History functions of the CMC to isolate the fault to a specific CMCS message.

C. For those EICAS status messages which latch into EIU memory when they occur, this index includes the letters NVM, NVM-A, or NVM-G to the right of the log book report.

(1) NVM indicates that the message latches if it occurs in the air or on the ground.

(2) NVM-A indicates that the message latches only if it occurs in the air.

(3) NVM-G indicates that the message latches only if it occurs on the ground.

(4) To remove the latched message from the EICAS after you correct the fault, you must use the ERASE function of the CMC.

NOTE: Do not erase a latched EICAS message until you are sure that you have corrected the fault.

24-FAULT CODE INDEX

Figure 37 Introduction

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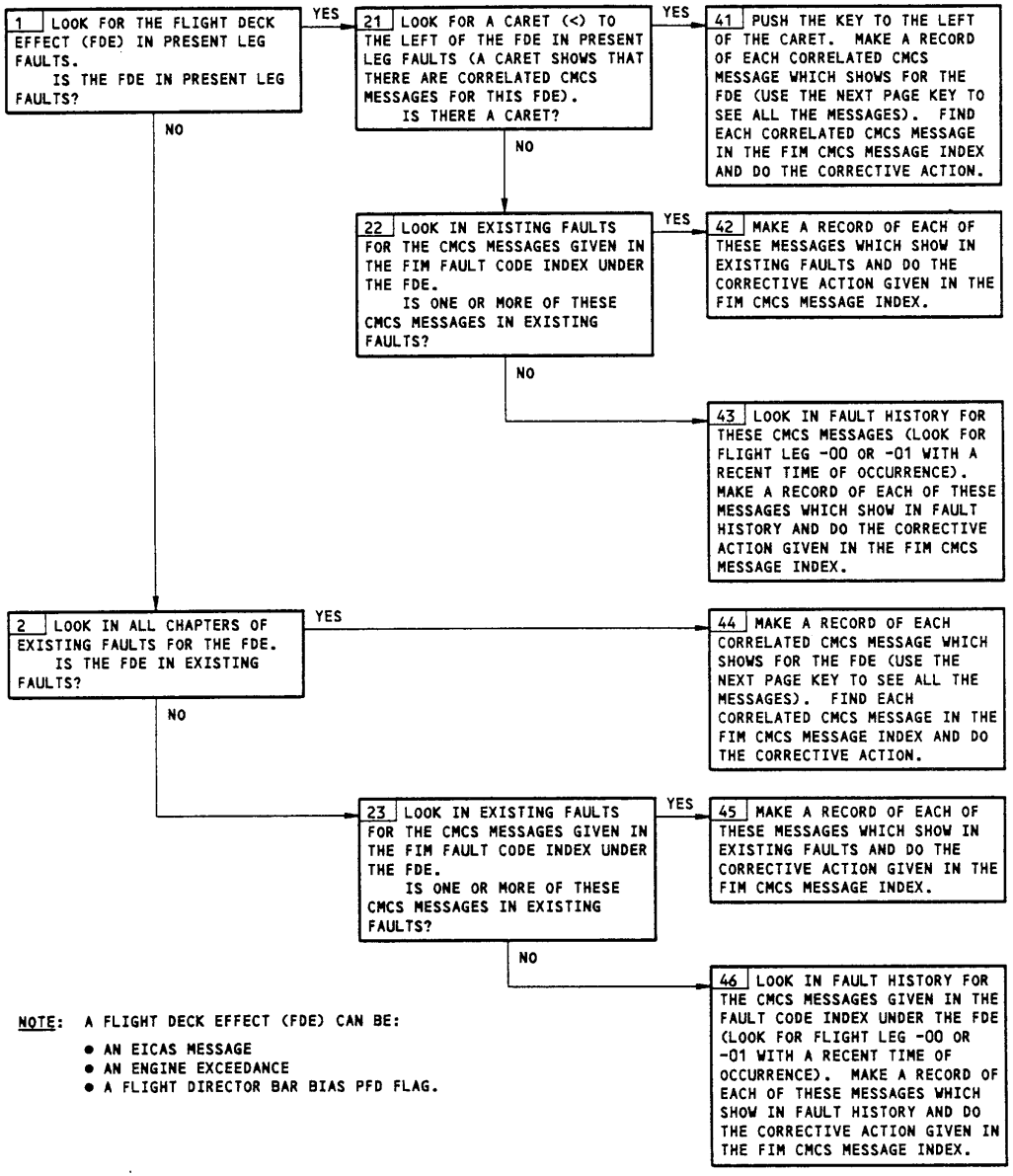
FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE INDEX



24-FAULT CODE INDEX

Figure 38 Fault Isolation Procedure

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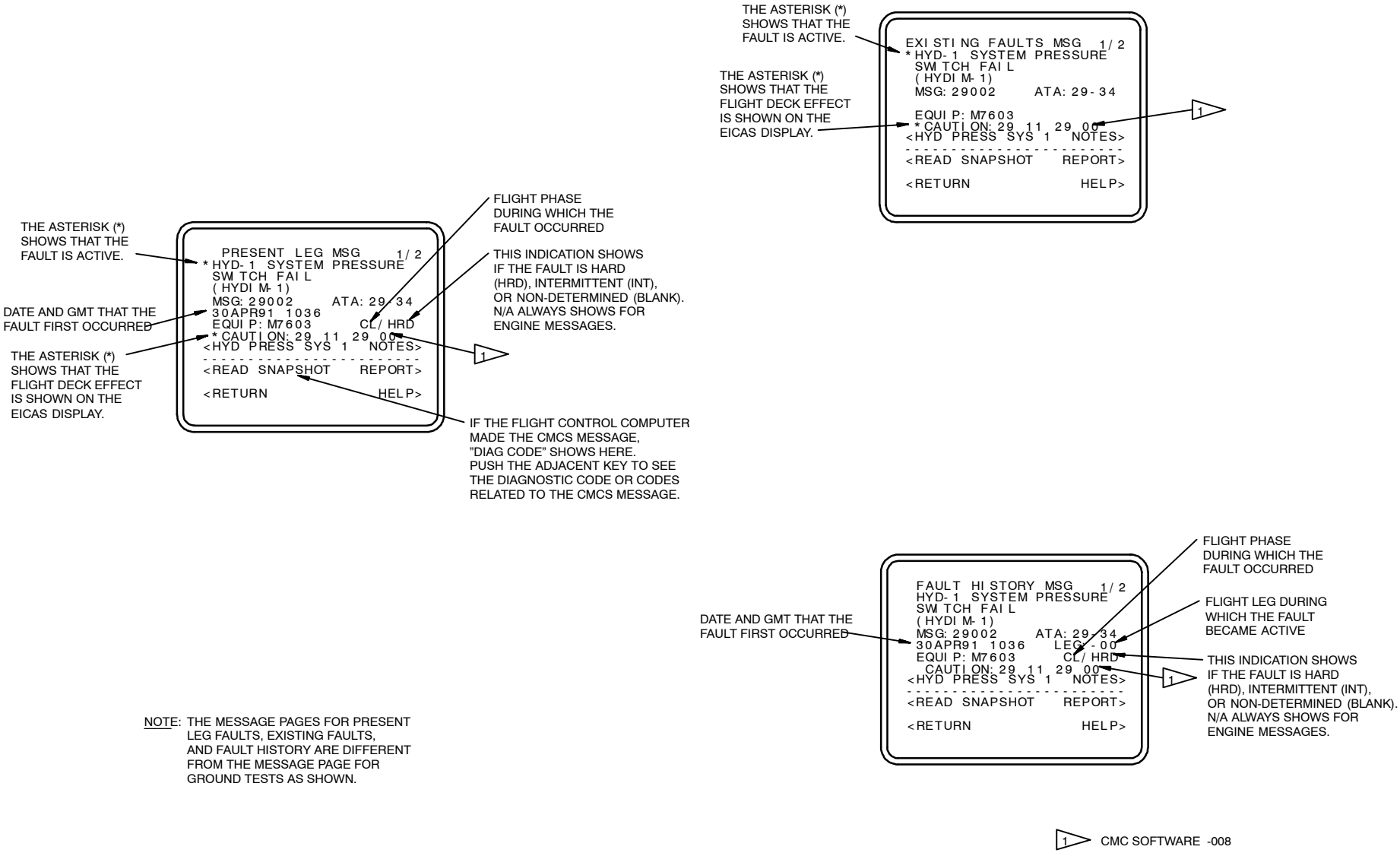

NOTE: THE MESSAGE PAGES FOR PRESENT LEG FAULTS, EXISTING FAULTS, AND FAULT HISTORY ARE DIFFERENT FROM THE MESSAGE PAGE FOR GROUND TESTS AS SHOWN.

Figure 39 CMC Messages (PLF, EF, FH)

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FAULT CODE INDEX

In the EICAS Message list you have found the FAULT CODE **24 11 30 00**.

The text (NVM-A), (Non-Volatile Memory -Air) shows, that the STATUS message was stored in air.

Corrective Actions

As a CORECTIVE ACTION you have to check the valve.

If no faults can be identified look for the CMCS message.

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(NVM-A)
24 11 30 00

The EICAS message ELEC IDG 2 VALVE (STATUS) shows.

NOTE: On IDS software version -007, this may be a nuisance message.

AIRPLANES WITH IDS SOFTWARE GE-007 THRU GE-009;

1. Do these steps to make sure the cooler valve operates correctly:
   (1) Make sure there is 28 VDC across pins A and C of connector DV350B. If there is no 28 VDC across pins A and C, replace the generator control unit (GCU) (AMM 24-23-01/401) and repair the wiring (WDM 24-23-12).
   (2) Make sure the cooler valve muscle line and fittings at the 11th stage manifold and at the valve are secure and not damaged. Tighten loose fittings, replace damaged parts.
   (3) If there are no loose fittings or damaged parts, remove the muscle line at the 11th stage manifold and connect a source of dry air or nitrogen to the line.
   (4) Apply 50 +/- 5 PSIG and make sure the valve closes. Reduce the pressure to 35 +/- 5 PSIG and make sure the valve opens. If the valve does not open or close, replace the IDG cooler valve (AMM 24-11-15/201).
   (5) If the cooler valve appears to operate correctly, make sure the IDG temperature bulb is operating correctly. Temp bulb faults are indicated by the CMCS message IDG 2 TEMP BULB SENSE FAIL.
   (6) If no additional faults can be identified, replace the IDG cooler valve as a precautionary measure. (AMM 24-11-15/201).

AIRPLANES WITH IDS SOFTWARE GE-010;

2. Do these steps to make sure the IDG cooler valve operates correctly:
   (1) Record the values of IDG OUT TEMP and IDG RISE TEMP from the auto event page.
   (2) If the IDG OUT TEMP value for one valve is substantially lower than the other valves, the valve has failed in the open position.
      (a) Make sure there is 28 VDC across pins A and C of connector DV350B. If there is no voltage across pins A and C, replace the generator control unit (GCU) (AMM 24-23-01/401) and repair the wiring (WDM 24-23-12).
      (b) Make sure the cooler valve muscle line and fittings at the 11th stage manifold and at the valve are not loose or damaged. Repair as necessary.
      (c) If you found no loose connections or damage, remove the muscle line at the 11th stage manifold and connect a source of dry air or nitrogen to the line.
      (d) Make sure the valve closes when 50 +/- 5 PSIG is applied and opens when the pressure is reduced to 35 +/- 5 PSIG. Replace the valve if it fails to open and close (AMM 24-11-15/201).
   (3) If the IDG OUT TEMP value for one valve is higher than the other valves, (above 125 deg C) the valve has failed in the closed position
      (a) Make sure the cooler valve muscle line and fittings at the 11th stage manifold and at the valve are not loose or damaged. Repair as necessary.
      (b) If you found no loose connections or damage, remove the muscle line at the 11th stage manifold and connect a source of dry air or nitrogen to the line.
      (c) Make sure the valve closes when 50 +/- 5 PSIG is applied and opens when the pressure is reduced to 35 +/- 5 PSIG. Replace the valve if it fails to open and close (AMM 24-11-15/201).
   (4) If the IDG RISE TEMP value is greater than 15 deg C or negative, check the IDG temp bulb and wiring (WDM 24-11-12). Repair as necessary. NOTE: A high IDG RISE TEMP value may also be caused by a generator fault.
   (5) If no fault can be identified, replace the cooler valve as a precautionary measure (AMM 24-11-15/201).
3. Look for one or more of these CMCS messages (Fig. 1):

24472 (24-11)

Figure 40 Fault Code Index

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CMCS MESSAGE INDEX

Description

In the FAULT CODE INDEX you have found the CMCS message number:

24472

In the CMCS message index you find the message **IDG-2 COOLER VALVE FAIL.**

According to CORRECTIVE ACTION you check the system with input monitoring.

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CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24472 IDG-2 COOLER VALVE FAIL	ELEC IDG 2 VALVE (STATUS)

A. CORRECTIVE ACTION:

NOTE: AIRPLANES WITH IDS SOFTWARE -007; ELEC IDG 2 VALVE may be a nuisance EICAS message.

NOTE: AIRPLANES WITH CMC SOFTWARE -009 AND SUBSEQUENT; Look at the snapshot for help with fault isolation.

(1) Do the steps that follow to examine the IDG Air/Oil Cooler Valve.
- (a) Make sure the applicable engine is not running.
- (b) Examine the 11th stage muscle line for leaks at the manifold, valve or connections. Examine for heat damage to the wiring on the valve, or heat damage to tubing around the 11th stage muscle line. Repair the damage that you find.
- (c) If the problem continues, do the steps that follow.
  - 1) Supply electrical power (AMM 24-22-00/201).
  - 2) Get access to the EPGS maintenance page on the CMCS.
  - 3) Look at the IDG OUT TEMP for IDG 2.
  - 4) Make sure that the temperature is less than 104 degrees centigrade. If the temperature is more than 104 degrees, allow the equipment to cool before you continue to troubleshoot.
  - 5) Disconnect connector DV350B from the valve.
  - 6) Measure the voltage at pin A of connector DV350B.
  - 7) Make sure there is 28 V DC at pin A of connector DV350B.
    - a) If there is not 28 V DC at pin A, this indicates a wiring or GCU control circuit problem. Examine and repair the wiring between GCU G7, connector DG7BA, pin J5, and pin A of connector DV350B (WDM 24-11-12).
    - b) Reconnect connector DV350B to the valve.
  - 8) If the problem continues, do the steps that follow:
    - a) Get access to the INPUT MONITORING page on the CMCS.
    - b) Use the CDU keyboard to write the PORT LBL SDI word E/086/271/00.
    - c) Push the 1L key to start to monitor the system.
    - d) Make sure that bit 21 (top line - 5th from the right) is a 1.
      - <1> If bit 21 is not a 1, the valve or feedback switch is stuck closed. Remove and replace the IDG cooler valve (AMM 24-11-15/201).
    - e) Disconnect connector DV350A from the valve.
    - f) Ground pin 2 on connector DV350A.
    - g) Make sure that bit 21 changes from 1 to 0 when you ground pin 2.
      - <1> If the bit does not change from 1 to 0 when you ground pin 2, this indicates that a wiring problem exists. Examine and repair the wiring between GCU G7, connector DG7BA, pin F1, and pin 2 of connector DV350A (WDM 24-11-12).
    - h) Reconnect connector DV350A to the valve.
    - i) If the problem continues, do the test for the IDG Air/Oil Cooler Valve (AMM 24-11-15/201).

Figure 41 CMCS Message Index

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Input Monitoring

Enter

E/086/270/00

E	EIU Port
086	BCU1 Port
270	Discrete Word Label 270
00	SDI

BIT 21 is 1 when the valve is open

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```
.D-ABVELH  ********  ----/----

SYSTEM ID: 24-11 ELECTRICAL POWER

   IDG-2 COOLER VALVE        01FEB91 1043       LEG:-10
   FAIL                      EQUIP:  V350       DESCENT
   (GCU-2)                   INTERMITTENT       MSG: 24472

.D-ABVELH  ********  ----/----

    PORT#  LBL  SDI  UNITS

    E/086  271  00   BINARY
                     01100000 01111000 00000000 10011101
                     01100000 01111000 00000000 10011101
                     01100000 01111000 00000000 10011101
```

Figure 42 Input Monitoring Data Report

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LOG BOOK ENTRY 2:

External Power can not be switched on.

Introduction

If you have not got an adequate PRESENT LEG MESSAGE REPORT or EICAS message you have to find the FAULT CODE via the FAULT CODE DIAGRAM.

Use the FAULT CODE DIAGRAM .

Step 1:

DID EXT PWR TRANSFER TO AIRPLANE BUSES. NO.

Step 2:

FAULT CODE **24 41 04 00**.

With the FAULT CODE go to the FAULT CODE INDEX.

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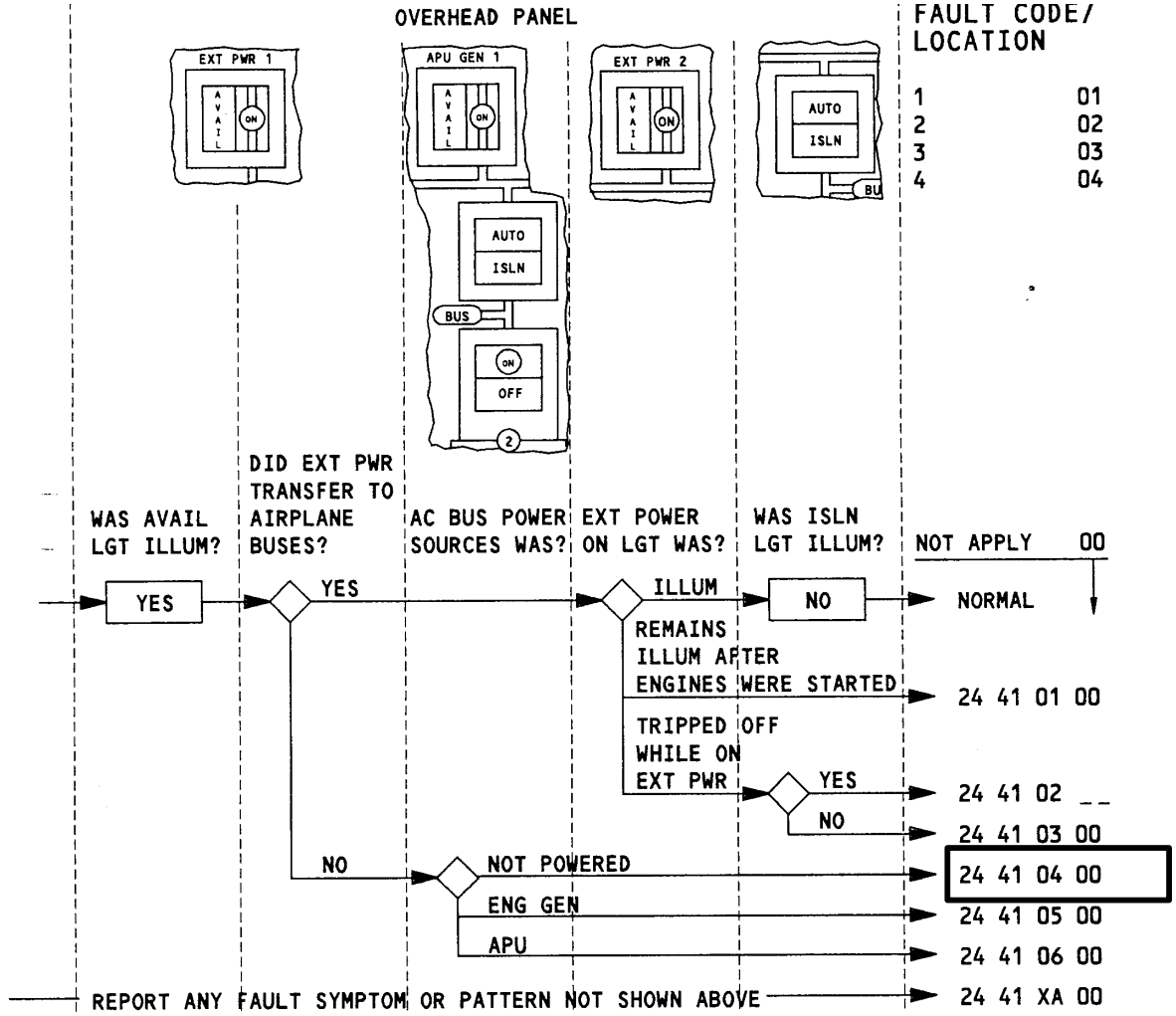
BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL



APPLICABLE CIRCUIT BREAKERS

6G6	BUS CONT UNIT 1
6G7	BUS CONT UNIT 2

24-FAULT CODE DIAGRAM

Figure 43 Fault Code Diagram

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FAULT CODE INDEX

If you have found the Fault Code

24 41 04 00

you will find the CORRECTIVE ACTION:

Look for one or more of these CMC messages

But it is only possible to read the CMCS messages when power is available.

Start the APU if possible.

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FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE INDEX

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
	2. Do these steps if you do not find the correlated fault messages: A. Examine and repair the wires between the external power receptacle No. 1 D51 or No. 2 D52; their adjacent bus tie breakers No. 1 C957, No. 2 C958, No. 3 C959, or No. C960; and the split system breaker C961. B. If you use a single external power source, also examine the opposite wires between the bus tie breakers No. 3 C959 and No. 4 C960 and the split system breaker C961 (WDM 24-41-13, 24-41-23, and 24-21-71).
24 41 03 00	The external power goes OFF and the ON light goes out. The external power AVAIL light goes on. The bus tie ISLN lights go out. 1. Push the EXT PWR 1 and/or EXT PWR 2 switch(es), on the P5 overhead panel, to put the electrical power on the airplane.
24 41 04 00	While the AVAIL light is on, the external power did not transfer to airplane buses. The AC power is not on the airplane. 1. Look for one or more of these CMCS messages (Fig. 1): 24083 (24-41) 24101 (24-41) 24124 (24-22) 24138 (24-22) 24166 (24-41) 24167 (24-41) 24168 (24-41) 24169 (24-41) 24170 (24-41) 24171 (24-41) 24173 (24-41) 24174 (24-41)
24 41 05 00	While the AVAIL light is on, the external power did not transfer to airplanes buses. The electrical power on the AC busses is supplied by the engine generators. 1. Look for one or more of these CMCS messages (Fig. 1):

24-FAULT CODE INDEX

Figure 44 Failure (Example 2)

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CMCS MESSAGE INDEX

Description

In the FAULT CODE INDEX you have found several CMCS message numbers.
If the CMC gives the message number

24083

you will find the correlated CMCS message

EXTERNAL POWER CONTACTOR-1 FAIL (BCU-1)

According to CORRECTIVE ACTION you replace the contactor.

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FAULT ISOLATION/
MAINTENANCE MANUAL

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24083 EXTERNAL POWER CONTRACTOR-1 FAIL (BCU-1)	

CORRECTIVE ACTION:

A. Replace the No. 1 external power contactor, R12 (MM 24-41-04/401).

B. If the problem continues, examine the circuit between the No. 1 external power contactor, R12, connector DR12, pin 24 and electrical ground (WDM 24-41-13). Repair the problems that you find.

C. If the problem continues, examine the circuit between the No. 1 external power contactor, R12, connector DR12, pins 6, 23, and the No. 1 BCU, G10, connector DG10BA, pins A-C8, A-K15 (WDM 24-41-13). Repair the problems that you find.

D. If the problem continues, examine the circuit between the No. 1 external power contactor, R12, connector DR12, pin 28, and the No. 2 BCU, G11, connector DG11BA, pin A-B14 (WDM 24-41-13). Repair the problems that you find.

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24-CMCS MESSAGE INDEX

Figure 45 CMCS Message Index

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LOG BOOK ENTRY 3:

EXTERNAL POWER CAN NOT BE CONNECTED TO THE AIRPLANE

Use Fault Code Diagram.

REPORT ANY FAULT SYMPTOM OR PATTERN NOT SHOWN ABOVE

If no item above is compatible to the problem you have to use the fault code

24 41 XA 00.

This FAULT CODE is used in the FAULT CODE INDEX.

APPLICABLE CIRCUIT BREAKERS listed on the lower end of the page must be closed.

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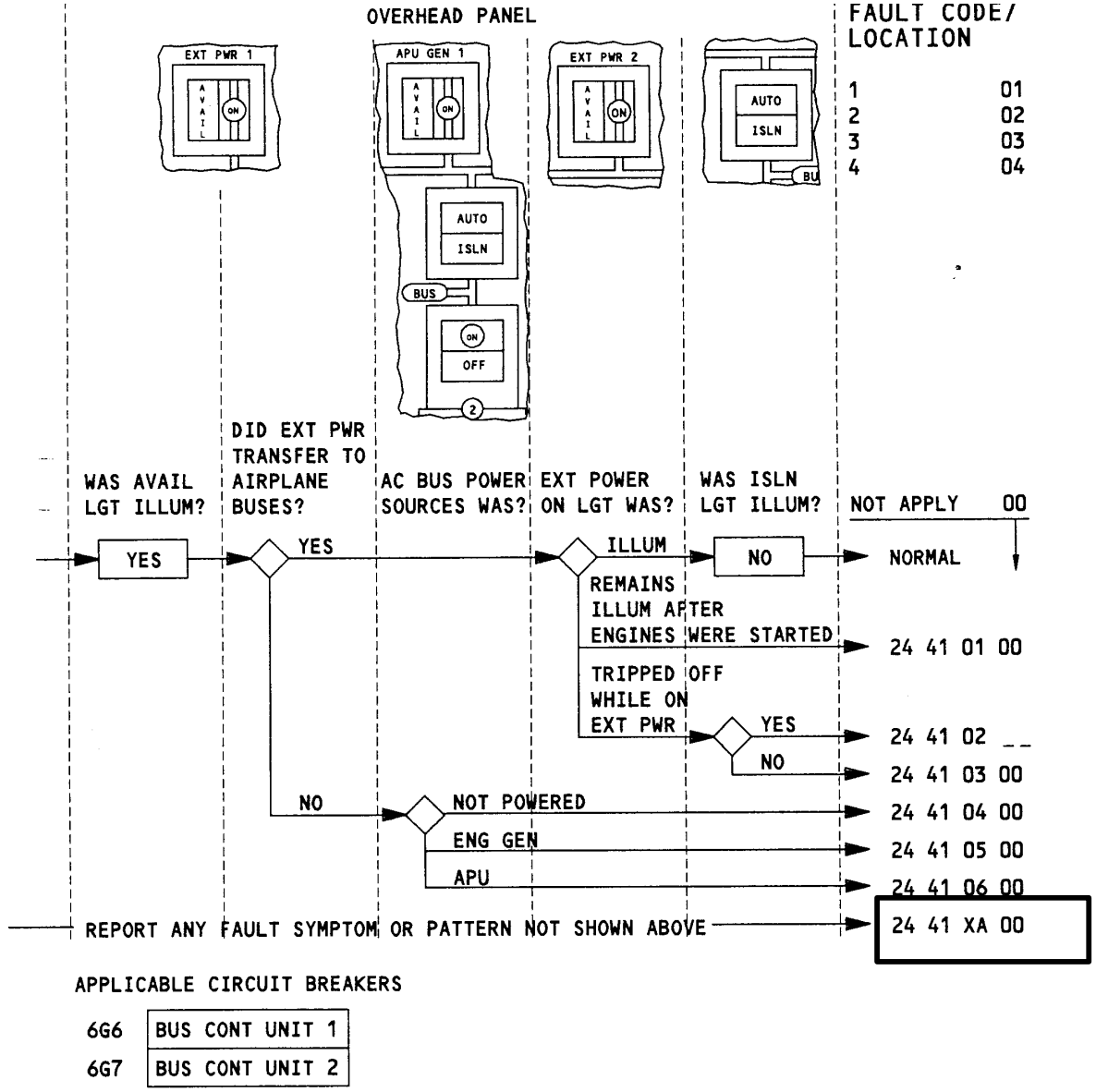
FAULT ISOLATION/
MAINTENANCE MANUAL



24-FAULT CODE DIAGRAM

Figure 46 Special Trouble Shooting

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TROUBLE SHOOTING PROCEDURES ACCORDING TO FAULT CODE INDEX

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FAULT ISOLATION/
MAINTENANCE MANUAL

FAULT CODE INDEX

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
24 40 XA 00	The flight crew found an external power problem that is not on the fault code diagram in the FRM. See the entry that the flight crew wrote in the log book. 1. MM 24-41-00/501 2. Do this step if the ground power AVAIL light is not on for EXT 1 and/or EXT 2 and the airplane will not accept ground power. A. Shut down the APU (AMM 49-11-00/201). CAUTION: If you open circuit breaker BUS CONT UNIT 1 before you shut down the APU, you will cause the APU to shut down automatically without the one minute cool-down cycle. This may result in damage to the APU. NOTE: If external power 1 cannot be applied, remove the power from BCU-1. If external power 2 cannot be applied, remove the power from BCU-2. B. If external power 1 cannot be applied, reset the BCU-1 by removing all the power from the BCU-1. Open all these circuit breakers, then close them to reset the BCU-1: (1) On the P18O or P18O-1 panel: a) 18OB14 or 18O-1L02 BCU 1 AIRPLANES WITH CIRCUIT BREAKER 18OB29, BCU 1-ALT: b) 18OB29, BCU 1-ALT (2) On the P6 panel: a) G06 BUS CONT UNIT 1 (3) On the P714 panel: a) BCU 1-EXT NOTE: The circuit breakers must be open at the same time to make sure all power is removed from the BCU 1.

Figure 47 Fault Code Index

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DC GENERATION - FAULT ISOLATION

BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

DC GENERATION - FAULT ISOLATION

1. General
   A. This procedure contains Fault Isolation tips and procedures to help you find the problems in the DC system.
   B. It is necessary to have the electrical power on the airplane during this procedure.
   C. You can use these indications to find the problems in the DC system:
      (1) Examine the condition of the components and the circuits.
      (2) Operate the system on the ground.
      (3) Examine the continuity and the voltage of the wires and the connectors in the system.
      (4) Use the EICAS, the CMCS, and other cockpit indications to do the operational tests for the system (MM 24-30-00/501).
2. Fault Isolation Tips
   A. General
      (1) Make sure that the system operates correctly after you repair or replace a component. Operate the system where you found the problem, to make sure that the problem does not occur again.
3. Fault Isolation Procedures

Figure 103 The DC Generation System Does Not Operate Correctly

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PREREQUISITES

EXTERNAL POWER (MM 24-22-00/201)

CB'S CLOSED: 6A5,6A6,6A7,6A14,6A23,6A32,6G9,6H17, 6J7,6J8,6J9,6K1,6K2,6K3,6K4,6K5,6K6, 6K7,6K8,6K9,6L2,6L3,180A8 OR 180K7, 180A9 OR 180K9; P183: APU BATTERY - OVHT PROT,BUS,CHGR OUTPUT, AND CHGR AND 414P18

WARNING: MAKE SURE THAT YOU OPEN THE ENGINE IGNITION CIRCUIT BREAKERS (REF SHEET 2, BLOCK 2) BEFORE YOU REMOVE POWER FROM THE MAIN BATTERY BUS. THE IGNITOR PLUGS CAN AUTOMATICALLY FIRE IF YOU DO NOT OPEN THE CIRCUIT BREAKERS. IF THERE IS FUEL IN THE COMBUSTION CHAMBER, THE IGNITOR CAN CAUSE AN ENGINE FIRE. THIS CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE ENGINE.

THE DC GENERATION SYSTEM DOES NOT OPERATE CORRECTLY

NOTE: WHEN YOU ARE DONE WITH THE CORRECTIVE ACTION ON THE DC GENERATION SYSTEM, REFER TO SHEET 15, BLOCK 12 TO PUT THE AIRPLANE BACK TO ITS USUAL CONDITION.

1 LOOK FOR THESE CMCS MESSAGES:

24054 STBY POWER SWITCH FAIL (BCU)
24078 GROUND SERVICE SELECT RELAY FAIL (BCU-1)
24079 GROUND SERVICE TRANSER RELAY FAIL (BCU-1)
24080 DC CURRENT SENSOR-5 FAIL (BCU-1)
24081 MAIN BATTERY CHARGER FAIL (BCU-1)
24098 DC CURRENT SENSOR-6 FAIL (BCU-2)
24099 APU BATTERY CHARGER FAIL (BCU-2)
24113 DC LOAD SHED OUTPUT FAIL (BCU-1)
24133 DC LOAD SHED OUTPUT FAIL (BCU-2)
24453 DCIR-1 FAIL (GCU-1)
24455 BUS TIE SWITCH-1 FAIL (GCU-1)

YES → 101 DO THE CORRECTIVE ACTION FROM THE FIM-CMCS MESSAGE INDEX.

24-30-00

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Figure 48 Fault Isolation (Pageblock 101)

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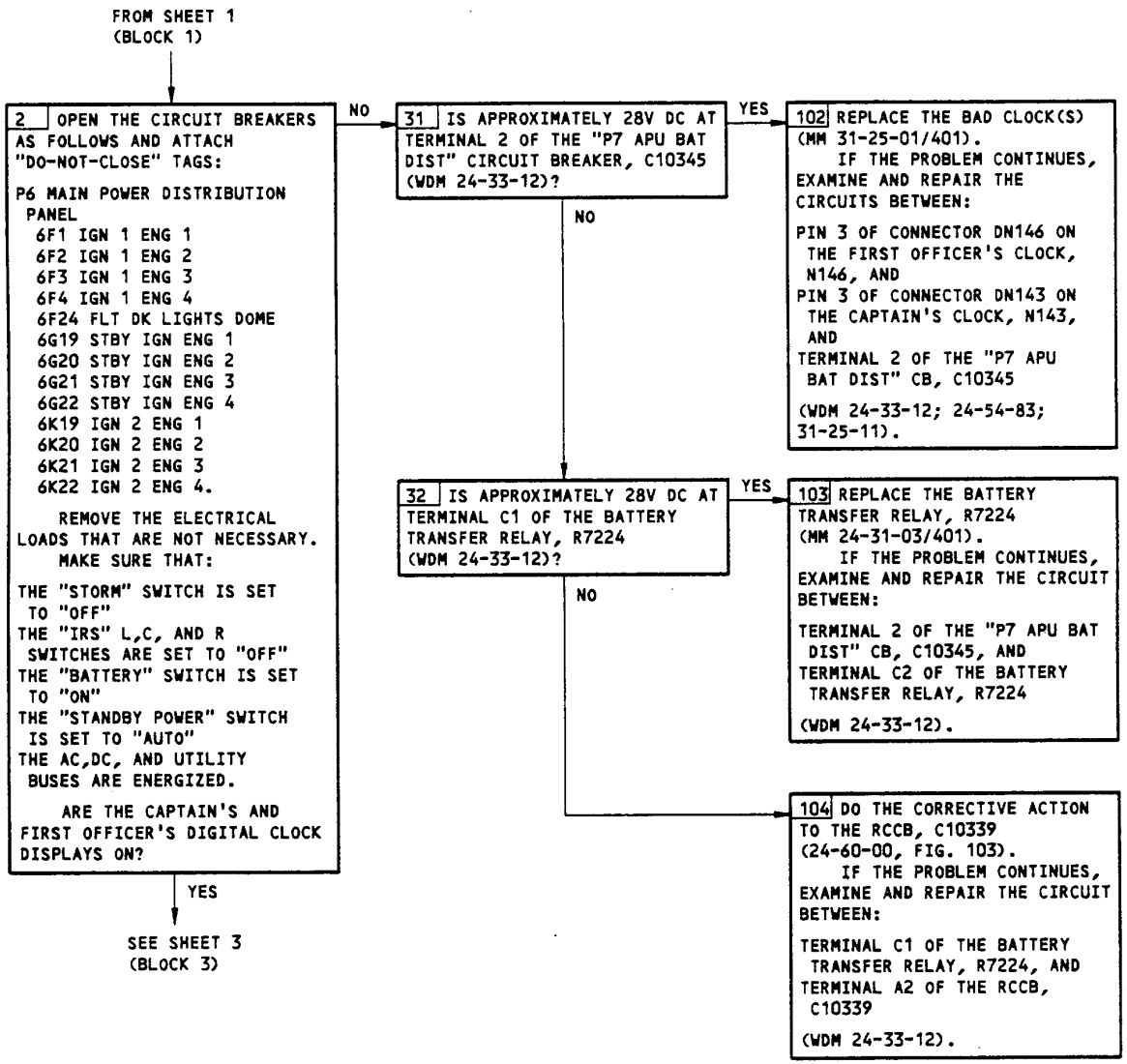

The DC Generation System Does Not Operate Correctly
Figure 103 (Sheet 2)

24-30-00

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Figure 49 Fault Isolation (Pageblock 101)

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BOEING 747-400

FAULT ISOLATION/
MAINTENANCE MANUAL

FROM SHEET 14
(BLOCK 11)

12 THE DC GENERATION SYSTEM OPERATES CORRECTLY.

MAKE SURE THAT THESE CIRCUIT BREAKERS ARE CLOSED:

- P6 MAIN POWER DISTRIBUTION PANEL
  - 6A5 TRU 1
  - 6A14 TRU 2
  - 6A32 TRU 4
  - 6F1 IGN 1 ENG 1
  - 6F2 IGN 1 ENG 2
  - 6F3 IGN 1 ENG 3
  - 6F4 IGN 1 ENG 4
  - 6F24 FLT DK LIGHTS DOME
  - 6G19 STBY IGN ENG 1
  - 6G20 STBY IGN ENG 2
  - 6G21 STBY IGN ENG 3
  - 6G22 STBY IGN ENG 4
  - 6J7 MN BAT RELAY CONT
  - 6J9 APU BAT BUS APU BAT CONT
  - 6K3 MN BAT-CONT MN BAT BUS
  - 6K4 TRU-CONT MN BAT BUS
  - 6K19 IGN 2 ENG 1
  - 6K20 IGN 2 ENG 2
  - 6K21 IGN 2 ENG 3
  - 6K22 IGN 2 ENG 4

MAKE SURE THAT THE "STANDBY POWER" SWITCH IS SET TO "AUTO".

REMOVE ELECTRICAL POWER FROM THE AIRPLANE IF IT IS NO LONGER NECESSARY (MM 24-22-00/201).

The DC Generation System Does Not Operate Correctly
Figure 103 (Sheet 15)

24-30-00

Page 121

Figure 50 Fault Isolation Close-Up (Pageblock 101)

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MAINTENANCE MANUAL

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- Description/ Operation Page Block 001
  - Sind mehr als 100 Seiten vorhanden, werden Buchstaben vorangestellt
- Component Location Page Block 101
- Maintenance Practices Page Block 201
- Servicing Page Block 301
- Removal / Installation Page Block 401
- Adjustment / Test Page Block 501
- Inspection / Check Page Block 601
- Cleaning / Painting Page Block 701
- DDG Maintenance Procedure Page Block 901

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MAINTENANCE MANUAL

IDG AIR/OIL HEAT EXCHANGER VALVE - MAINTENANCE PRACTICES

1. General
   A. This procedure contains three tasks:
      (1) The IDG air/oil heat exchanger valve V350 removal.
      (2) The IDG air/oil heat exchanger valve V350 installation.
      (3) The IDG air/oil heat exchanger air filter replacement.

      NOTE: The air filter replacement tasks includes instructions to clean and examine the air filter.

   B. The IDG air/oil heat exchanger valve V350 (heat exchanger valve) installation task includes an operational test of the valve. It is necessary to operate the engine at a high-power to do the test. You can do the test immediately after you install the valve or you can make sure the valve operates during a subsequent engine operation.
   C. The heat exchanger valve is installed on the high pressure compressor (HPC) case at the 3 o'clock position.
   D. Open the right thrust reverser half to get access to the heat exchanger valve.

   TASK 24-11-15-002-037
2. IDG Air/Oil Heat Exchanger Valve Removal (Fig. 201)

EFFECTIVITY
ALL

24-11-15

02G.1 Page 201
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Figure 51 MM Pageblock 201

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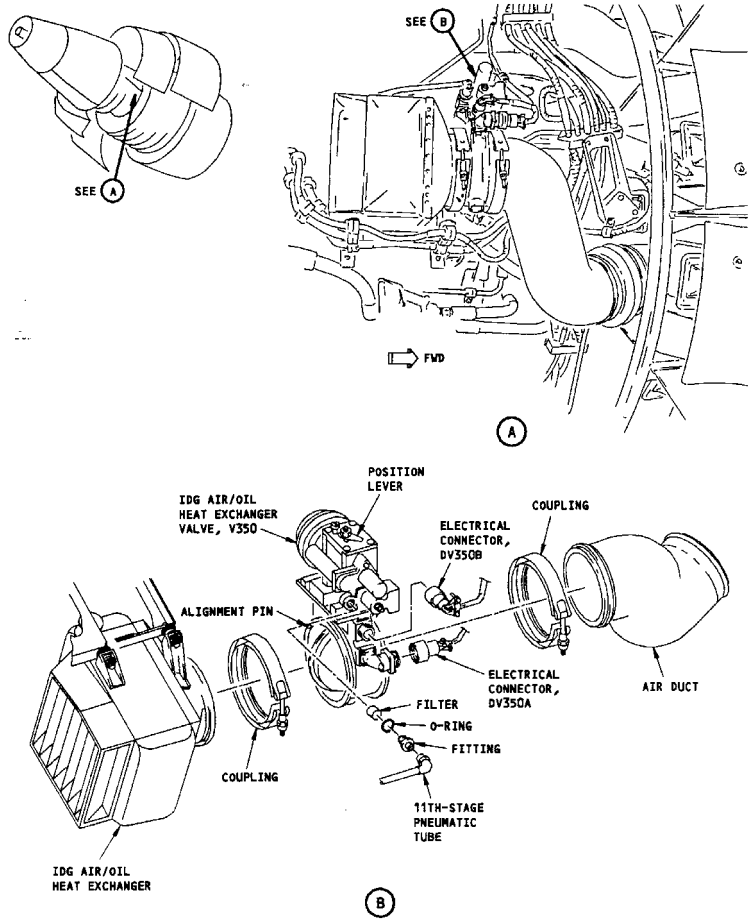
MAINTENANCE MANUAL



IDG Air/Oil Heat Exchanger Valve Installation
Figure 201

EFFECTIVITY
ALL

24-11-15

01G Page 202
Jun 10/91

Figure 52 MM Pageblock 201

AIRCRAFT OPERATING MANUAL (AOM)

MINIMUM EQUIPMENT LIST (MEL)

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AOM B747-4 Airplane Operations Manual	Minimum Equipment List ENGINE BLEED AIR	II	7. 75/1 REV 22

Item	A. Required for all flight conditions except as provided in column B.	B. Remarks and/or Exceptions.
-23-1 Core Compartment Cooling Valves	4	One or more may be inoperative provided associated valve remains open. Crew Operating Procedure For each engine with CCCV and ESCV inoperative open, fuel burn per engine will increase approx. 0.8%. This means min. fuel has to be increased by approx. 0.2% if one engine, respectively 0.4% if two engines have open valves. Maintenance Procedure
-23-2 Bore Cooling System	4	One or more may be
		Crew Operating Procedure For each engine with CCCV and ESCV inoperative open, fuel burn will increase approx. 0.8%. This means min. fuel has to be increased by approx. 0.2% if one engine, respectively 0.4% if two engines have open valves. Maintenance Procedure
-33-1 IDG Air/Oil Cooler (AOC) Valves	4	May be inoperative provided: 1) Valves are inoperative open, and 2) for each inoperative valve, performance limited weights are reduced by: Takeoff and Landing - 640 kg Enroute - 910 kg Crew Operating Procedure Estimated fuel burn increase for each IDG AOC Valve inoperative open : 0.5%. This means min. fuel has to be increased by approx. 0.13% if one engine, respectively 0.25% if two engines have open valves. Maintenance Procedure

Figure 53 MEL (Engine Bleed Air)

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MEL

MEL MAINTENANCE PROCEDURE MMP

Introduction

Die MEL ist Bestandteil des AOM B747-4, Chapter 7.

Die Anwendung der Minimum Equipment List (MEL) ist im AOM vorgeschrieben und unbedingt zu beachten.

Die MMP, als eigenständiges Dokument, basiert auf dem Inhalt des AOM, Chapter 7 und wurde dem DDG (Dispatch Deviation Guide) des Maintenance Manuals entnommen.

In der MMP finden wir die für die Maintenance zutreffenden Maßnahmen an einem inoperativen Teil , Gerät und/ oder System, die vor dem Weiterflug durchzuführen sind.

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Technisches Betriebshandbuch

MEL - Maintenance Procedure B 747-400

Ref. MEL-Item 75-33-1 IDG Air/Oil Cooler (AOC) Valves

MAINTENANCE (M) - GE ENGINE

Deactivate IDG Air/Oil Heat Exchanger Valve Open as follows:

1. Open right thrust reverser half (Ref MM 78-31-00/201).
2. Verify valve is open by noting position lever (on top of valve) is set to the OPEN position.
3. Secure valve in open position by removing stowed lock screw and inserting lock screw down through hole in position lever and into threaded hole in valve plate.
4. Close right thrust reverser half. (Ref MM 78-31-00/201)

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Figure 54 Maintenance Procedure

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AIRCRAFT SCHEMATIC MANUAL

SYSTEM SCHEMATICS

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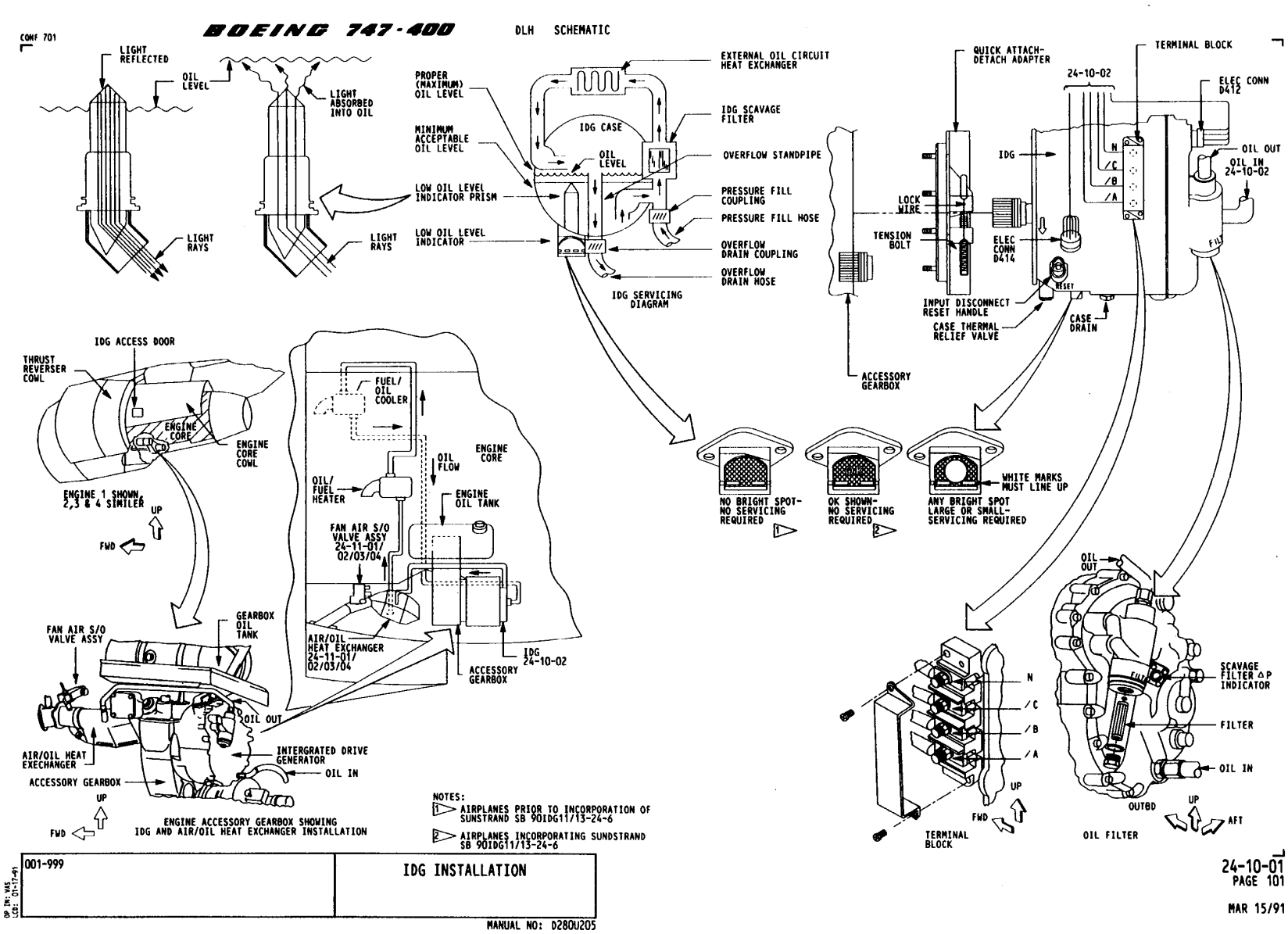

Figure 55 IDG Schematic

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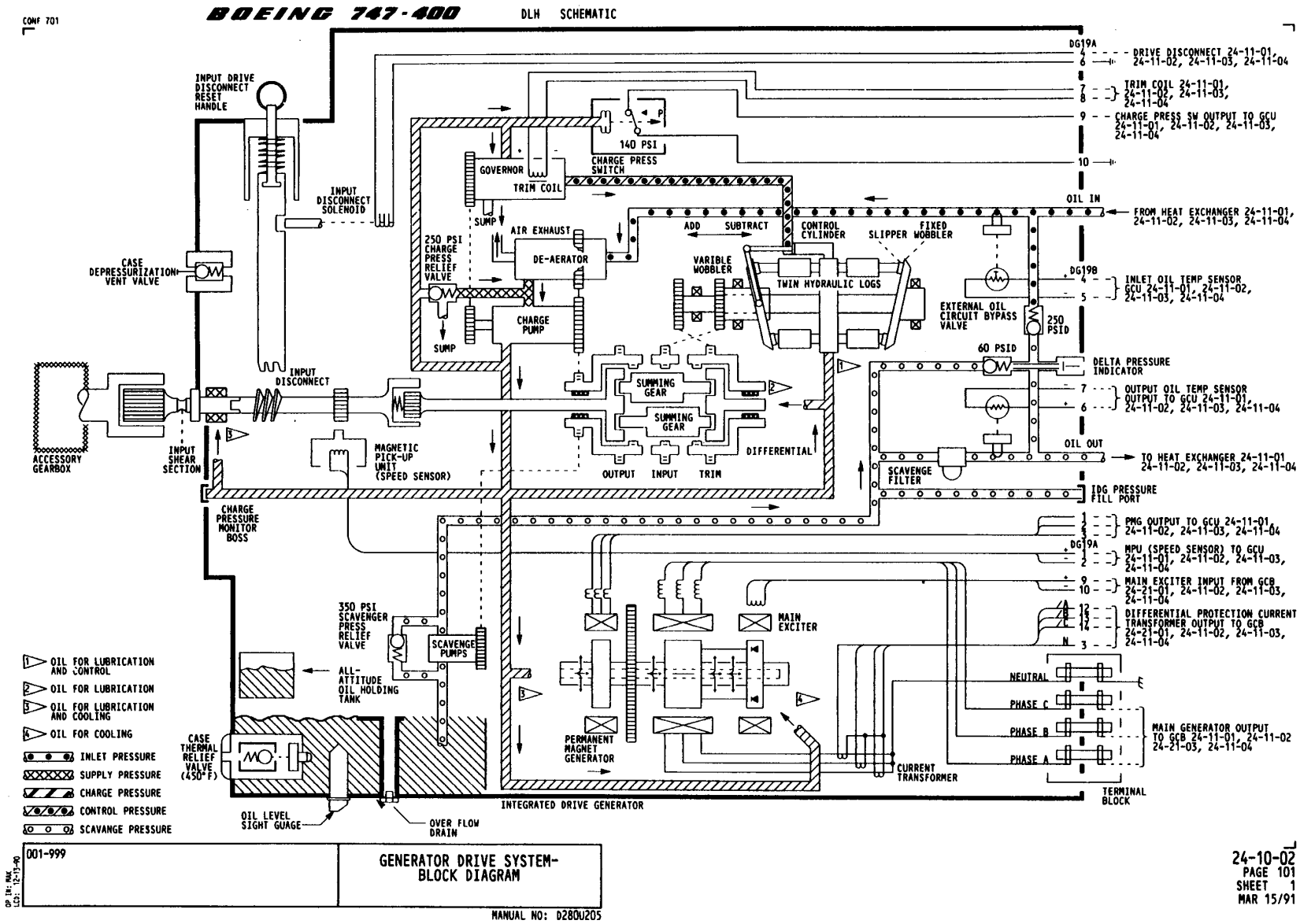

Figure 56 IDG Schematic

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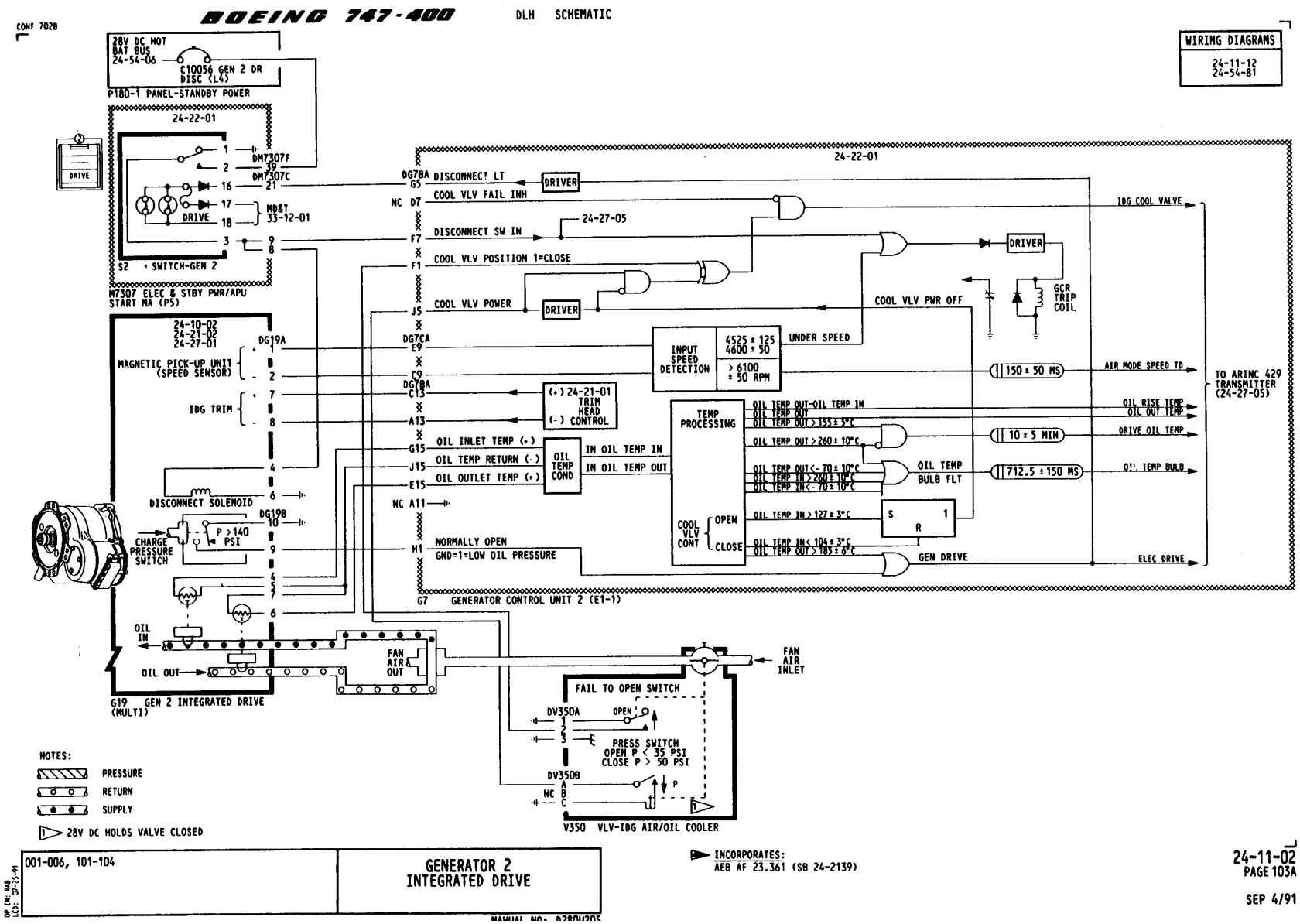

Figure 57 Generator 2 Schematic

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EQUIPMENT LIST

General

If you have found on the MCDU (Multipurpose Control Display Unit) or in the schematic manual an equipment number, you will find in the equipment list the partnumber.

”VALVE ASSY FAN AIR S/O IDG OIL COOLER” has the:

Equip. Number:	V350
P/N:	23E59-4
Effectivity:	ALL

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REV	MOD	EQUIP	OPT	PART NUMBER / PART DESCRIPTION	USED ON DWG CH 20 REF	VENDOR STATION	QTY -WL	DIAGRAM -BL	EFFECTIVITY
		V00347		S210T120-101 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 88-	36-11-41	RT041-RT044
		V00347		S210T120-101 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 88-	36-11-41	RT431-RT435
		V00347		S210T120-111 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 88-	36-11-41	RT045-RT060
		V00347		S210T120-111 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 88-	36-11-41	RT436-RT441
		V00347		S210T120-131 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 88-	36-11-41	RT442-RT450
		V00348		S210T120-15 VALVE-FAN AIR CONTROL	65B00TBD	V99207 ENG-	1 -	71-51-11	ALL
		V00349	1	60B00200 VALVE-HYDR DEPRESS EDP	332U2120	V81205 MULTI-	4 -	29-11-01	ALL
		V00349	2	60B00256 VALVE-HYDR DEPRESS EDP	332U2120	V81205 MULTI-	4 -	29-11-01	ALL
		V00350		23E59-4 VALVE ASSY FAN AIR S/O IDG OIL COOLER	284U2000	V77445 ENG-	4 -	24-11-01	ALL
		V00351		S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG- V59364	4 -	80-11-01	RT041-RT060
		V00351		S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG- V59364	4 -	80-11-01	RT431-RT431
		V00351		S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG- V59364	4 -	80-11-01	RT433-RT450
		V00351	1	S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG- V59364	4 -	80-11-01	RT432-RT432
		V00351	2	S332U232-7 VAL ENG START CONT 979826-5	332U2311	V81205 ENG- V59364	4 -	80-11-01	RT432-RT432

MODEL 747
CUSTOMER DLH
747-400

REV DATE
AUG 18/93

MANUAL D280U105
DWG NO. 280U1105

EQUIPMENT LIST
VOLUME-1

SECTION V00300
PAGE 1

Figure 58 Equipment Number

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