

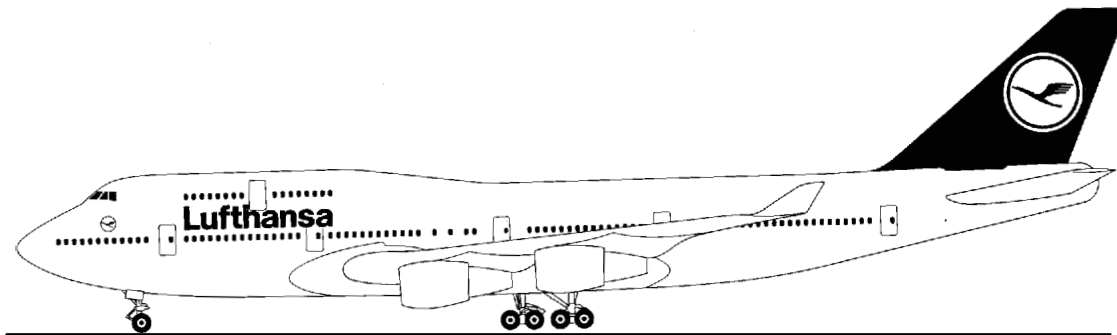


Lufthansa Technical Training

Training Manual B 747-400

ATA 00-00 Trouble-Shooting

Level III





Lufthansa Technical Training

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ATA 00-00 TROUBLE SHOOTING



MAINTENANCE CONCEPT**Introduction**

Die Aufgabe dieser Unterlage ist es, eine Übersicht über die wichtigsten Unterlagen zu geben, die für ein Trouble-Shooting zur Verfügung stehen.
Anhand einiger Fallbeispiele wird die Handhabung erläutert.

**CMC AVIONICS WARTUNGSKONZEPT****General**

Alle Systeme die an den CMC angeschlossen sind, sind bei Beanstandungen nach dem "neuen" Avionics Wartungskonzept zu bearbeiten.

Ausgehend vom TLB-Eintrag gibt es zwei Vorgehensweisen bei der Bearbeitung von Beanstandungen:

4. Die TLB Beanstandung des Flugzeugführers läßt sich mit einer EICAS STATUS Message in Beziehung setzen.

Suche die entsprechende Message auf den PRESENT LEG FAULT Pages. Suche die CMC Message-Number.

Überprüfe, ob ein Wartungshinweis in der Engineering Order 010139 vorhanden ist.

Wenn ja: Fehler entsprechend abarbeiten b.z.w. Message ignorieren.

Ist ein Ground Test zur CMC -Message vorhanden, dann ist für das beanstandete System / Komponente der zugehörige Ground Test durchzuführen.

A. Ist das Ground Test Ergebnis "PASS", so ist die getestete Hardware in Ordnung, d.h. Gerätewechsel ist **NICHT erforderlich**.
Wenn auf den letzten 5 Legs hierzu kein Fehler aufgetreten war, ist die Beanstandung mit *FIX* abzuschreiben.

B. Ist der Ground Test "FAIL", so ist die angezeigte LRU zu wechseln und anschließend die gewechselte Komponente mittels FunctionTest gemäß Maintenance Manual zu prüfen.

5. Die TLB Beanstandung des Flugzeugführers läßt sich nicht mit einer EICAS STATUS Message in Beziehung setzen.

A. Die Beschreibung der Beanstandung ist so eindeutig, daß nur ein bestimmtes Gerät für die Fehlerursache in Frage kommt, so ist nach Pkt. 1 zu verfahren.

B. Ist die Fehlerursache aus der Fehlerbeschreibung nicht eindeutig zu erkennen, so sind die PRESENT LEG FAULT Pages und ggfs. auch die EXISTING FAULTS und die FAULT HISTORY im CMC anzusehen, um festzustellen, ob hier ein Hinweis auf ein fehlerhaftes System / Komponente zu erhalten ist.

Ist dies der Fall, so erfolgt die Bearbeitung wie unter Pkt. 1.

C. Sind jedoch alle zuvor beschriebenen Maßnahmen erfolglos, so ist je nach Beanstandungsbeschreibung u.U. im Einzelfall mit "ATT CREW" "ATT FRA" bzw. "PLS CHECK AGAIN" abzuschreiben.

Hinweise:

- Die SystemTests prüfen die Hardware der Computer und deren Interface.
- Wiederholungsfehler und Systemschwächen werden auf Grund der "Repeated Items" bzw. durch ROD-Analysen erkannt. Hieraus werden weitergehende Maßnahmen der jeweiligen Ingenieur-Fachbereiche erfolgen.

TLB-Eintragungen im ACT-Feld

Neben der Nutzung der Ground Test ist das standardisierte Reporting im TLB die zweite tragende Säule des Avionics Wartungskonzepts.

Ohne standardisiertes Reporting wird die Verbesserung der einzelnen Systeme und damit auch der CMC's erheblich behindert.

Folgende Informationen müssen mindestens vom PRESENT LEG FAULTS SUMMARY REPORT oder der jeweiligen CMC Seite ins TLB ACT-Feld übernommen werden:

- Fehlerhaftes Bauteil (LRU) und Zustand (IDG COOLER VALVE FAIL),
- 5-stellige CMC Message Number (24472)
- Flugphase und Fehlertyp (Beispiel :DESC / INT)
DESC = Descent / INT = Intermittent Failure
- Ground Test Ergebnis (EPGS GRD TEST - FAIL)
- U U. FAULT HISTORY (FH) abfragen.

Wichtig ist, alle jeweiligen CMC-Messages vor / zwischen / nach den Behebungsmaßnahmen analog zu o.a. Beispielen festzuhalten.

Eine TLB-Abschreibung ist nur mit Angabe der entsprechenden CMC-Message(s) vollständig und verwertbar.

Ist im CMC keine Message zu einer Beanstandung zu finden, so ist folgender Text in die TLB ACT Spalte zu übernehmen:

"NO CMC FAULT MSG"

TROUBLE SHOOTING WARTUNGSKONZEPT



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Lufthansa Technical Log Book			PRE-FLT-Check Date	MECH PK-No.	PRE-FLT-Check Date	MECH PK-No.	PRE-FLT-Check Date	MECH PK-No.	PRE-FLT-Check Date	MECH PK-No.
			PRE-FLT-Check Sign	ACC. CAPT Sign	PRE-FLT-Check Sign	ACC. CAPT Sign	PRE-FLT-Check Sign	ACC. CAPT Sign	PRE-FLT-Check Sign	ACC. CAPT Sign
Maintenance Check Station	A/C-Reg	Check	A/C-Reg	ABTH	A/C-Reg		A/C-Reg		A/C-Reg	
	CPT or FE PK-No.		CPT or FE PK-No.	1 2 4 3 6	CPT or FE PK-No.		CPT or FE PK-No.		CPT or FE PK-No.	
Date	PK-No.	Sign	Flight-No.	LH 431	Flight-No.		Flight-No.		Flight-No.	
			Leg	ORDFRA	Leg		Leg		Leg	
LBA.0001/others:			TLB-No.	/ /	TLB-No.	/ /	TLB-No.	/ /	TLB-No.	/ /
TLB-No.	T 01	TLB-Refer.	MEL/CDL-Ref If relevant →			See Note → cover inside			ATT to	
ASC		CLASS. H, I, M	ACT PLF:IDG COOLER VALVE FAIL MSG: 24472 DESC/INT			Station				
REP	MEL/CDL-REF If class H →		EPGS GRD TEST: FAIL, MSG 24472			Date			D D M M Y Y	Sign
EICAS STATUS MSG:ELEC IDG 2 VALVE			Cooler Valve Replaced			UTC				
			PK-No.		Sign	MEL A, B, C, D, N	LBA.0001/others:			
			T 02		TLB-Refer.		ASC		See Note → cover inside	ATT to
			MEL/CDL-Ref If relevant →			Station				
			ACT			Date			D D M M Y Y	Sign
						UTC				
						PK-No.				
			CPT or FE		PK-No.		Sign	MEL A, B, C, D, N	LBA.0001/others:	
TLB-No.	T 03	TLB-Refer.	MEL/CDL-Ref If relevant →			See Note → cover inside			ATT to	
ASC		CLASS. H, I, M	ACT			Station				
REP	MEL/CDL-REF If class H →					Date			D D M M Y Y	Sign
						UTC				
						PK-No.				
			PK-No.		Sign	MEL A, B, C, D, N	LBA.0001/others:			
			T 04		TLB-Refer.		ASC		See Note → cover inside	ATT to
			MEL/CDL-Ref If relevant →			Station				
			ACT			Date			D D M M Y Y	Sign
						UTC				
						PK-No.				
			CPT or FE		PK-No.		Sign	MEL A, B, C, D, N	LBA.0001/others:	
Oil quant. missing →	0	0	0	0	0	Oil quantity refilled (QTS - LTRS)	→		D D M M Y Y	UTC
ENG 1	2	3	4	APU	A/C-Reg			ENG 1	2	3
Certifies that the work specified except as otherwise specified was carried out in accordance with JAR-145 and in respect to that work the aircraft is considered ready for release to service.										

Figure 1 Technical Log Book



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CMCS FAULT ISOLATION

Description

Das CMCS ist das Troubleshooting Werkzeug der B747-400 Flugzeuge. Über die Control Display Units hat man im Cockpit Zugriff auf die Maintenance Daten.

Nach Drücken der MENU-Taste auf der CDU erfolgt die Anzeige des CDU Menüs. Wird <CMC gewählt, kommt man in das CMC Menü.

Die standardisierten Fehlerinformationen, die das CMCS auf den Menü-Seiten anbietet ermöglichen:

- gezieltere Wartungsmaßnahmen
- Fault Confirmation an Bord, d.h. die BITE Tests ermöglichen die Aussage PASS, FAIL oder DONE.

Present Leg Faults

Wird das CMC Menu PRESENT LEG FAULTS angewählt, erhält man die Fehler des letzten Fluges in umgekehrter Reihenfolge des Auftretens in englischer Sprache.

Diese Daten können als PRESENT LEG SUMMARY REPORT ausgedruckt werden.

Oberhalb des Warn-Textes gibt es einen Hinweis auf die Art der zugehörigen EICAS Message.

Der EICAS Message ist ein 8-stelliger FAULT CODE zugeordnet.

Diese Fault Codes entsprechen denen im Fault Reporting Manual (FRM) .

Ein auf dem EICAS angezeigter Fehler wird durch ein Sternzeichen (asterisk) angezeigt.

Zur weiteren Bearbeitung des Fehlers muß im Menu die Present Leg Fault Messages gewählt werden. Hier erhält man zusätzliche Angaben über:

-Fehlerart (HRD(hard) , INT(intermittent) , N/A (not applicable))

-ATA Chapter / Section

-Datum/Uhrzeit

-FIM (Fault Isolation Manual) Message Nr.

-Equipment Nr.

Mit Hilfe dieser Angaben kann der Fehler im Fault Isolation Manual (FIM) weiter bearbeitet werden.

FRM (Fault Reporting Manual)

Das FRM dient der Flugzeugbesatzung zur Ermittlung eines 8-stelligen Fehlercodes für ein standardisiertes Reporting.

FIM (Fault Isolation Manual)

Das Fault Isolation Manual (FIM) ist das Gegenstück zum Fault Reporting Manual (FRM).

Jedes Kapitel beginnt mit den EICAS Messages in alphabetischer Reihenfolge mit zugehörigem Text, EICAS Warning Level und einem zugeordneten Fault Code.

Hat man den Text und den 8-stelligen Fault Code gefunden, muß auf den Fault Code Index Seiten der Fault Isolation Reference Code (fünfstellig) gesucht werden.

Ist der Code gefunden, sind auf den FIM-Message Index Seiten die Maintenance Aktionen (Corrective Action) durchzuführen.

STATUS Erase

Das PRESENT LEG FAULT Menu ermöglicht über den LSK ERASE> die Löschung der Status Message. Nicht mehr aktive Status Messages werden gelöscht und verschwinden vom AUX EICAS Display.

Vorsicht:

erst Fehler bearbeiten, dann Message löschen!

Fault History

Um zu überprüfen, ob der Fehler bereits mehrfach aufgetreten ist, kann man in der FAULT HISTORY nachsehen.

Mechaniker mit B1 Qualifikation müssen in der FAULT HISTORY nachsehen.

TROUBLE SHOOTING CMCS Fault Isolation



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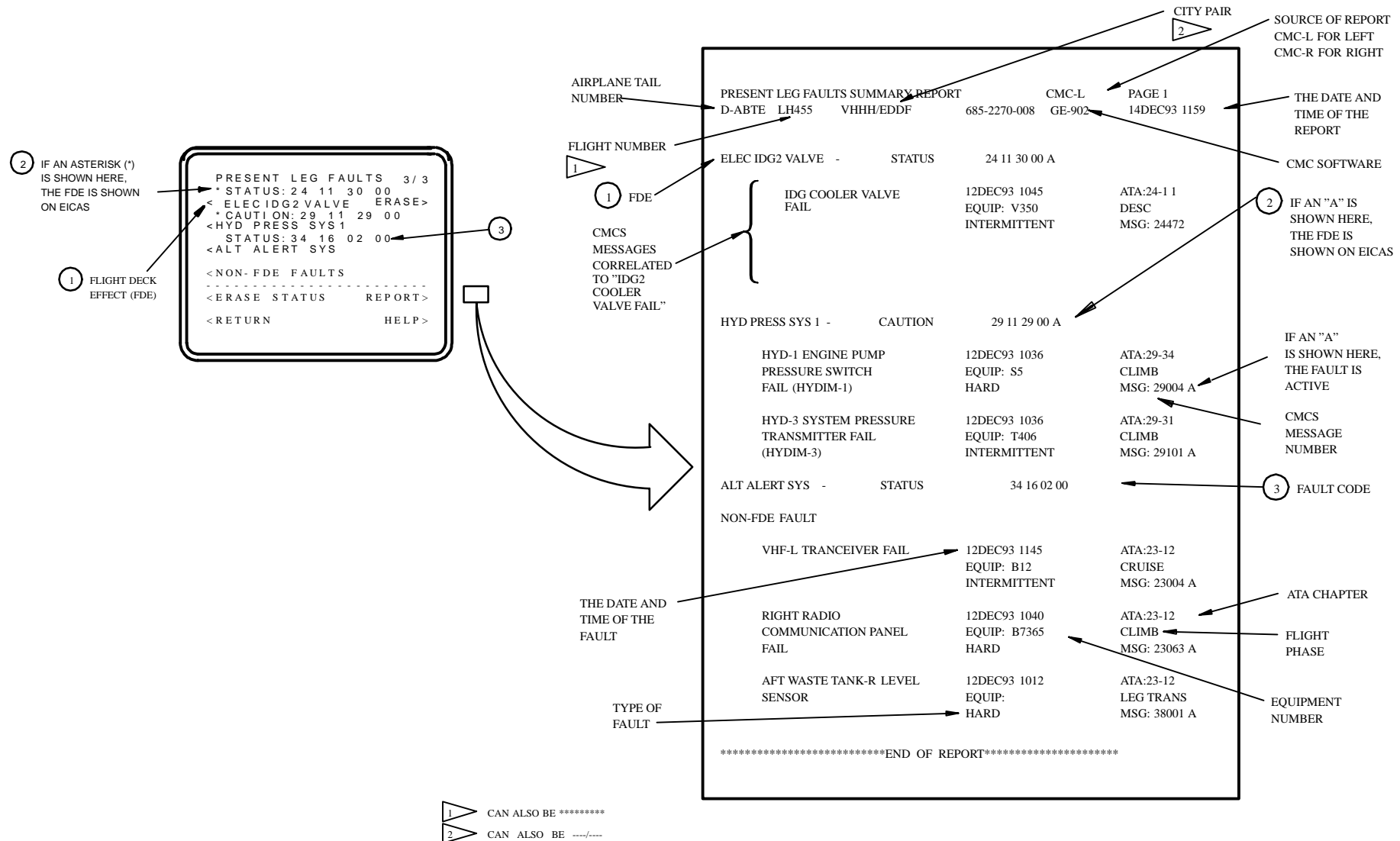


Figure 2 Present Leg Faults Summary Report



TROUBLE-SHOOTING DOCUMENTS


Dokumente (im Flugzeug vorhanden)
Engineering Order (EO) 010139

- Enthält Hinweise zur Behebung von Fehlerfällen, die z.Z.mit der Dokumentation von Boeing nur mit Schwierigkeiten abzarbeiten sind.

Fault Isolation Manual (FIM),

- Page Block 001 Dieses Buch zeigt
 - alle EICAS Messages und die zugehörigen FAULT CODES
 - CMC Messages
 - und die zugehörigen Behebungsmaßnahmen.
 -
 - Im FAULT CODE DIAGRAM kann der Fault Code ermittelt werden , wenn die Besatzung diesen Code nicht aus dem FAULT REPORTING MANUAL (FRM) ermittelt hat.
- Page Block 101 Ab Seite 101 findet man:
 - die Einbauorte der Bauteile und
 - weitergehende Informationen zur Fault Isolation

Aircraft Operating Manual (AOM),

- Enthält kurzgefaßte Systembeschreibungen.
- Enthält Minimum Equipment List (MEL).
 - Gibt eine Übersicht über die Teile b,z,w, Systeme , die für den Flugbetrieb ganz oder teilweise betriebsbereit sein müssen.

Mel Maintenance Procedures MMP

Die MMP gibt Anweisungen, wie mit Systemen zu verfahren ist, die gemäß MEL inoperativ sein dürfen.

Dokumente (am Boden vorhanden)
Maintenance Manual (MM)

Das MM enthält Systembeschreibungen ,Einbauorte der Bauelemente, Wartungshinweise, Ein-und Ausbaubeschreibungen, Einstellungen und Tests, Überprüfungen, Reinigungsvorschriften und den Dispatch Deviation Guide (DDG).

BITE Manual

Auszug aus dem Maintenance Manual ATA45. Beschreibung der Testmöglichkeiten mit dem CMC .

Ramp Maintenance Manual (RMM)

Auszüge aus dem Maintenance Manual , die für die Arbeit auf der Ramp wichtig sind.

Aircraft Schematic Manual (ASM)

Zeigt schematisch, wie elektrische Komponenten im Flugzeug miteinander verbunden sind.

Wiring Diagram Manual (WDM)

Zeigt detailliert die elektrischen Verbindungen im Flugzeug.
Im Kapitel 91 (CHARTS) werden die Einbauorte der elektrischen Kabelbäume, Connectors, Panels u.s.w. gezeigt.



FAULT ISOLATION MANUAL

FIM CONTENTS

Fault Isolation Manual (FIM) Contents

Das Fault Isolation Manual ist wie folgt aufgebaut:

TOPIC	PAGE BLOCK
• HOW TO USE THE FIM Beschreibung der Handhabung des Fault Isolation Manuals.	1 to 99
• FIM CONTENTS Inhaltsverzeichnis des Fault Isolation Manuals	1 to 99
• EICAS MESSAGES Liste der EICAS Messages mit einer kurzen Erläuterung und dem zugehörigen FAULT CODE	1 to 99
• FAULT CODE DIAGRAM Enthält Diagramme, die eine Ermittlung eines FAULT CODES aus Beobachtungen ermöglicht.	1 to 99
• FAULT CODE INDEX Gibt einen Hinweis, nach welcher CMC Message bei einem gegebenen FAULT CODE gesucht werden soll, b.z.w. wie ohne CMC Message der Fehler eingekreist werden kann.	1 to 99
• CMCS MESSAGE INDEX Nennt die zur CMC Message möglichen Flight Deck Effects und die Behebungsmaßnahmen für diesen Fehler.	1 to 99
• FAULT ISOLATION Zeigt die Einbauorte der Bauelemente und Fault Isolation Diagrams.	101 to 199

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FAULT ISOLATION/ MAINTENANCE MANUAL

LIST OF EFFECTIVE AIRPLANES

1. General

A. The following list provides a cross reference table of the airplanes that are applicable to the information contained in this Fault Isolation Manual.

DEUTSCHE LUFTHANSA A.G.

Customer Effectivity Code	Line No.	Variable Number	Manufacturing Serial Number	Basic Number	Registration Number
MODEL 747-430					
DLH 001	700	RT431	23817	R2402	D-ABVB
DLH 002	723	RT432	23816	R2409	D-ABVA
DLH 003	757	RT433	24288	R2432	D-ABVC
DLH 004	786	RT434	24740	R2454	D-ABVD
DLH 005	787	RT435	24741	R2455	D-ABVE
DLH 006	796	RT436	24761	R2462	D-ABVF
DLH 007	845	RT437	25045	R2505	D-ABVH
DLH 008	847	RT438	25046	R2506	D-ABVK
DLH 009	898	RT439	26425	R2541	D-ABVL
DLH 010	910	RT440	26426	R2551	D-ABVM
DLH 011	915	RT441	26427	R2555	D-ABVN
MODEL 747-430BC					
DLH 101	747	RT041	24285	R2006	D-ABTA
DLH 102	749	RT042	24286	R2007	D-ABTB
DLH 103	754	RT043	24287	R2008	D-ABTC
DLH 104	785	RT044	24715	R2013	D-ABTD
DLH 105	846	RT045	24966	R2017	D-ABTE
DLH 106	848	RT046	24967	R2018	D-ABTF
DLH 107	856	RT047	25047	R2021	D-ABTH

LIST OF EFFECTIVE AIRPLANES

22.1

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TROUBLE SHOOTING
FIM
FIM CONTENTS

BOEING 747-400			
FAULT ISOLATION/ MAINTENANCE MANUAL			
CHAPTER 24 - ELECTRICAL POWER			
TABLE OF CONTENTS			
<u>Subject</u>	<u>Chapter Section Subject</u>	<u>Page</u>	<u>Effectivity</u>
<u>HOW TO USE THE FIM</u>	24-HOW TO USE THE FIM	1	ALL
<u>FIM CONTENTS</u>	24-FIM CONTENTS	1	ALL
<u>EICAS MESSAGES</u>	24-EICAS MESSAGES	1	ALL
<u>FAULT CODE DIAGRAMS</u>	24-FAULT CODE DIAGRAMS	1	ALL
<u>FAULT CODE INDEX</u>	24-FAULT CODE INDEX	1	ALL
<u>CMCS MESSAGE INDEX</u>	24-CMCS MESSAGE INDEX	1	ALL
<u>ELECTRICAL POWER</u>	24-00-00		
<u>GENERATOR DRIVE</u>	24-10-00		
GENERATOR DRIVE SYSTEM	24-11-00		
Component Location		101	ALL
Component Index			
Component Location			
<u>AC GENERATION</u>	24-20-00		
Component Location		101	ALL
Component Index			
Component Location			
<u>DC GENERATION</u>	24-30-00		
Component Location		101	ALL
Component Index			
Component Location			
Fault Isolation			
General		106	
The DC Generation System Does Not Operate Correctly (Fig. 103)		106	
24-CONTENTS			
/ ATG.1 Page 1 Feb 10/93			

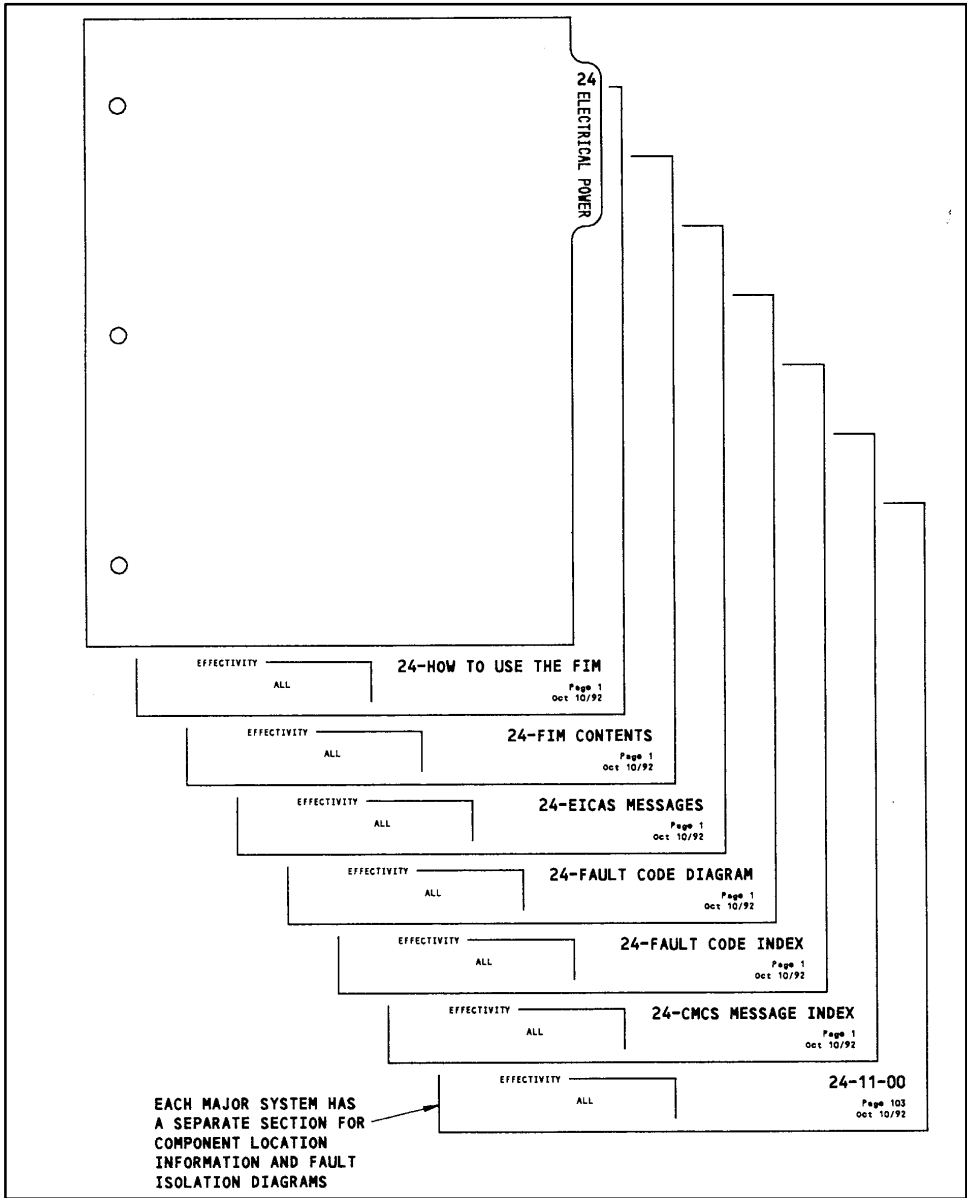


Figure 3 FIM Contents

TROUBLE SHOOTING FIM FIM CONTENTS



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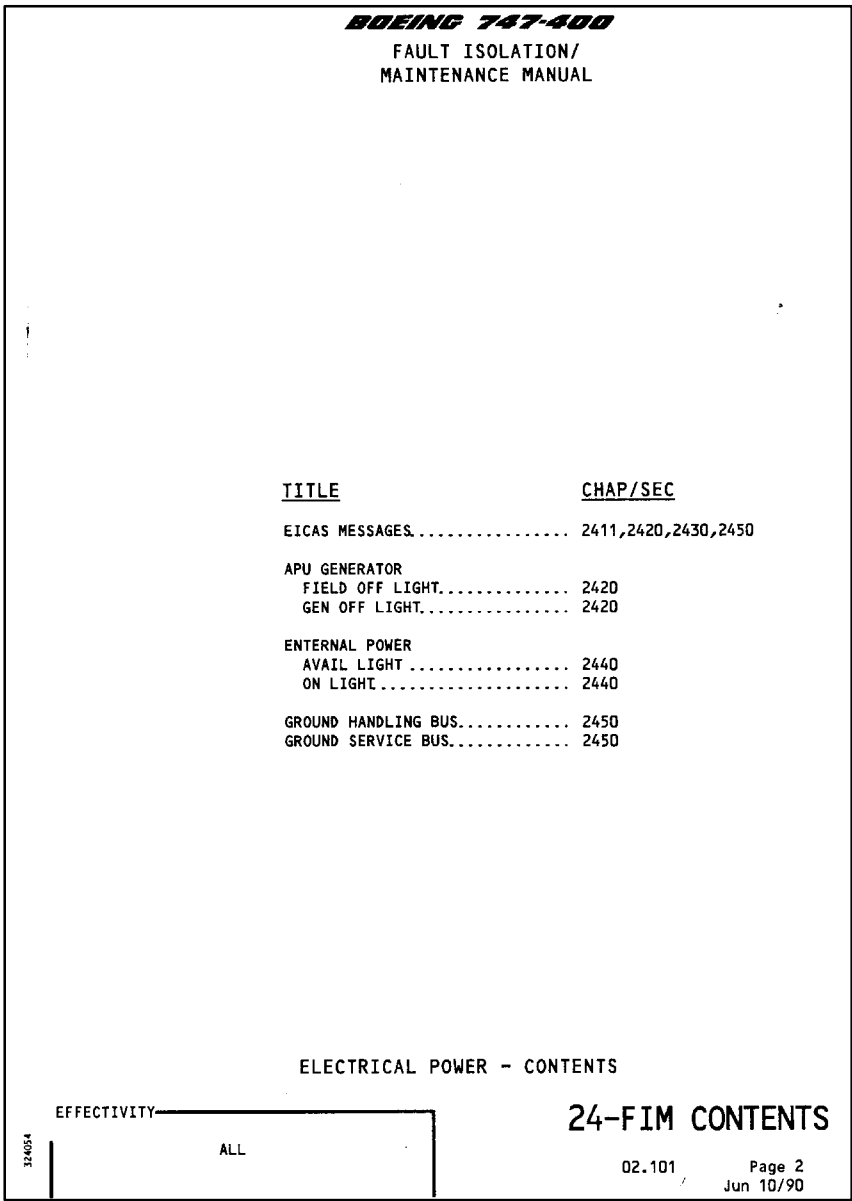
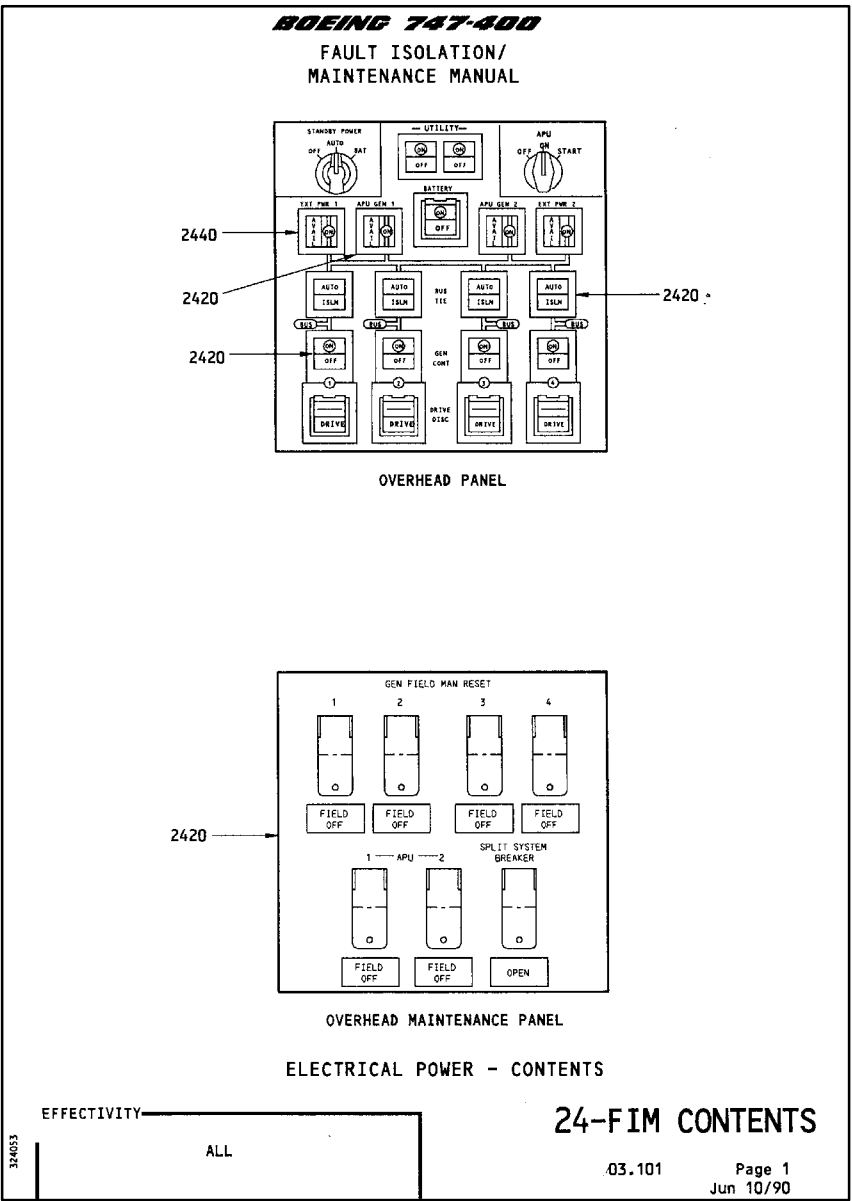


Figure 4 FIM Contents



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TROUBLE SHOOTING FIM HOW TO USE THE FIM



HOW TO USE THE FIM

General

Zu Beginn eines jeden Kapitels wird die Handhabung des Fault Isolation Manuals erläutert.

1 Falls der FAULT CODE vorliegt:

gehe in den FAULT CODE INDEX und ermittle die erforderlichen Behebungsmaßnahmen.

- Im FAULT CODE INDEX wird auf den CMC zur Ermittlung der CMC Message verwiesen oder
- es wird ein Ground Test gemäß MM (ATA45) angewiesen oder
- es ist eine Fehlereinkreisung gemäß FAULT ISOLATION DIAGRAM erforderlich.

2 Falls die CMCS MESSAGE vorliegt:

gehe in den CMCS MESSAGE INDEX und ermittle die erforderlichen Behebungsmaßnahmen.

- Im CMCS MESSAGE INDEX wird ein Bauteilwechsel und Test gemäß MM angewiesen oder
- es ist eine Fehlereinkreisung gemäß FAULT ISOLATION DIAGRAM erforderlich.

3 Falls die EICAS MESSAGE vorliegt:

gehe in die EICAS MESSAGE LIST und ermittle den FAULT CODE.

- Mit dem FAULT CODE gehe in den FAULT CODE INDEX und ermittle die erforderlichen Behebungsmaßnahmen.

4 Falls OTHER FAULTS vorliegen:

gehe in das FAULT CODE DIAGRAM und ermittle den FAULT CODE. Im FAULT CODE INDEX sind die erforderlichen Behebungsmaßnahmen zu finden.

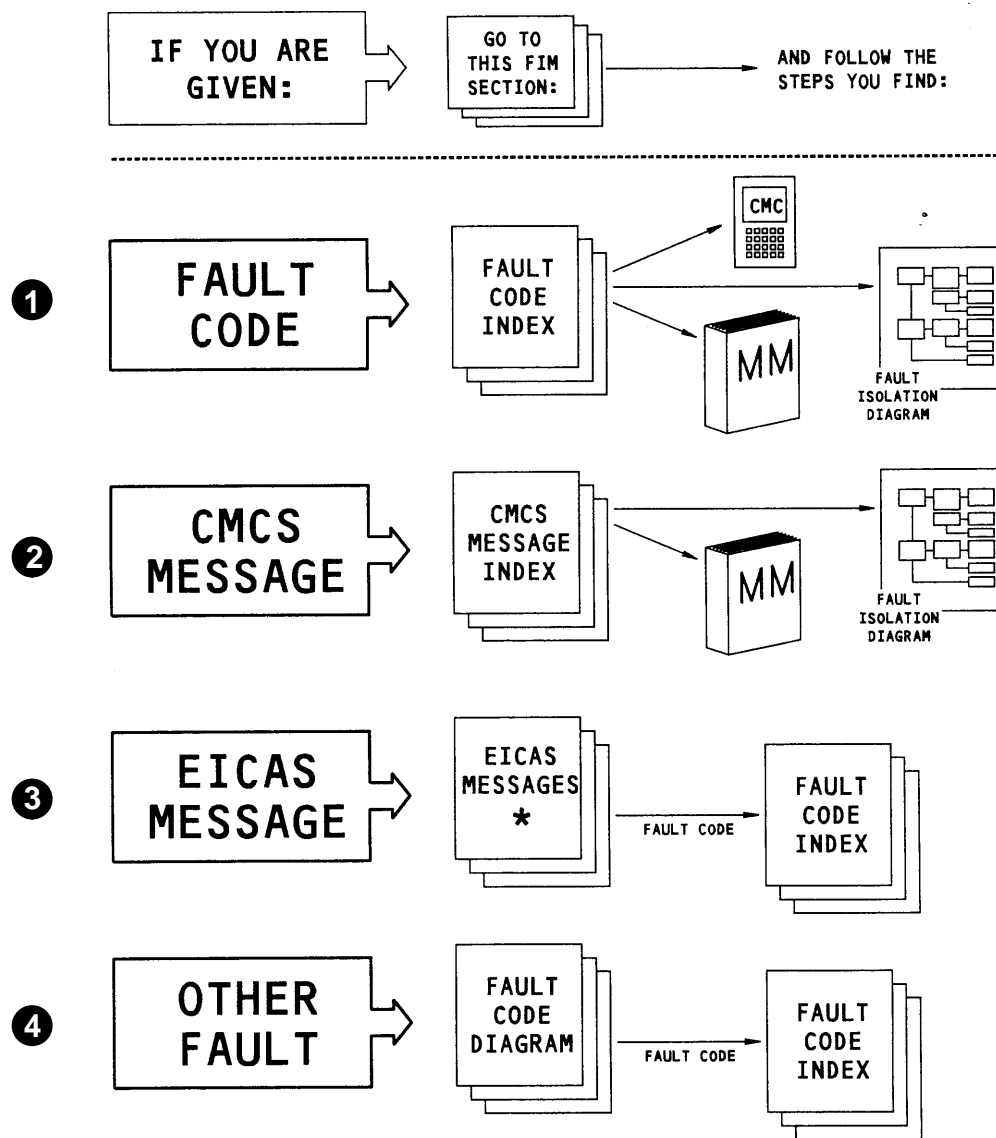
TROUBLE SHOOTING FIM HOW TO USE THE FIM



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

Figure 5 How to use the Fault Isolation Manual (Overview)

TROUBLE SHOOTING FIM EICAS MESSAGES

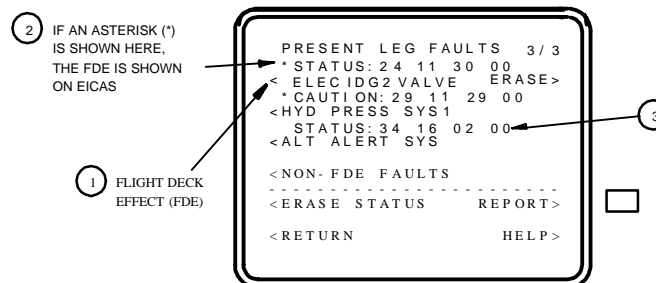


EICAS MESSAGES

Failure (Example1)

ELEC IDG 2 VALVE (EICAS STATUS Message)

- **EICAS MESSAGE:**
Die Message "ELEC IDG 2 VALVE" war b.z.w. ist auf dem EICAS Display zu sehen und hat zu der Beanstandung geführt.
- **LEVEL:**
Kann entweder STATUS, CAUTION, WARNING sein.
In diesem Beispiel ist es eine STATUS Message.
- **DESCRIPTION:**
Liegt eine Message vor, dann findet man hier eine Kurzbeschreibung der Fehlerursache.
- **FAULT CODE:**
Der zugehörige 8-stellige FAULT CODE wird gezeigt , mit dem man in den FAULT CODE INDEX geht .
(Beispiel: 24 11 30 00)



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 ①	(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 3 VALVE	(STATUS)	THE OIL COOLER VALVE FOR IDG 3 IS CLOSED WHEN IT IS DIRECTED OPEN. (OR) THE VALVE IS OPEN WHEN IT IS DIRECTED CLOSED.	24 11 31 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

ELECTRICAL POWER - EICAS MESSAGES

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24-EICAS MESSAGES

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Figure 6 Failure (Example1)

TROUBLE-SHOOTING FIM FAULT CODE DIAGRAM



FAULT CODE DIAGRAM

Introduction

War der FAULT CODE nicht durch die Bordbucheintragung oder durch den PRESENT LEG MESSAGE REPORT zu erhalten, dann muß der Code über das FAULT CODE DIAGRAM ermittelt werden.

Failure Example 2:

DID EXT PWR TRANSFER TO AIRPLANE BUSES. NO.

Wenn External Power sich überhaupt nicht zuschalten läßt, dann muß man nach dem FAULT CODE DIAGRAM vorgehen.

Hier ermittelt man den **FAULT CODE 24 41 04 00**.

Mit diesem FAULT CODE geht man dann in den FAULT CODE INDEX.

Failure Example 3:

REPORT ANY FAULT SYMPTOM OR PATTERN NOT SHOWN ABOVE

Wenn keine der oben aufgeführten Beispiele zutreffend sind, dann gilt zum Trouble -Shooting der Fehlercode **24 41 XA 00**.

Mit diesem FAULT CODE geht man dann in den FAULT CODE INDEX.

Unter APPLICABLE CIRCUIT BREAKERS sind die CB's gelistet, die zur Fehlereinkreisung eingedrückt sein müssen



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FAULT ISOLATION/ MAINTENANCE MANUAL

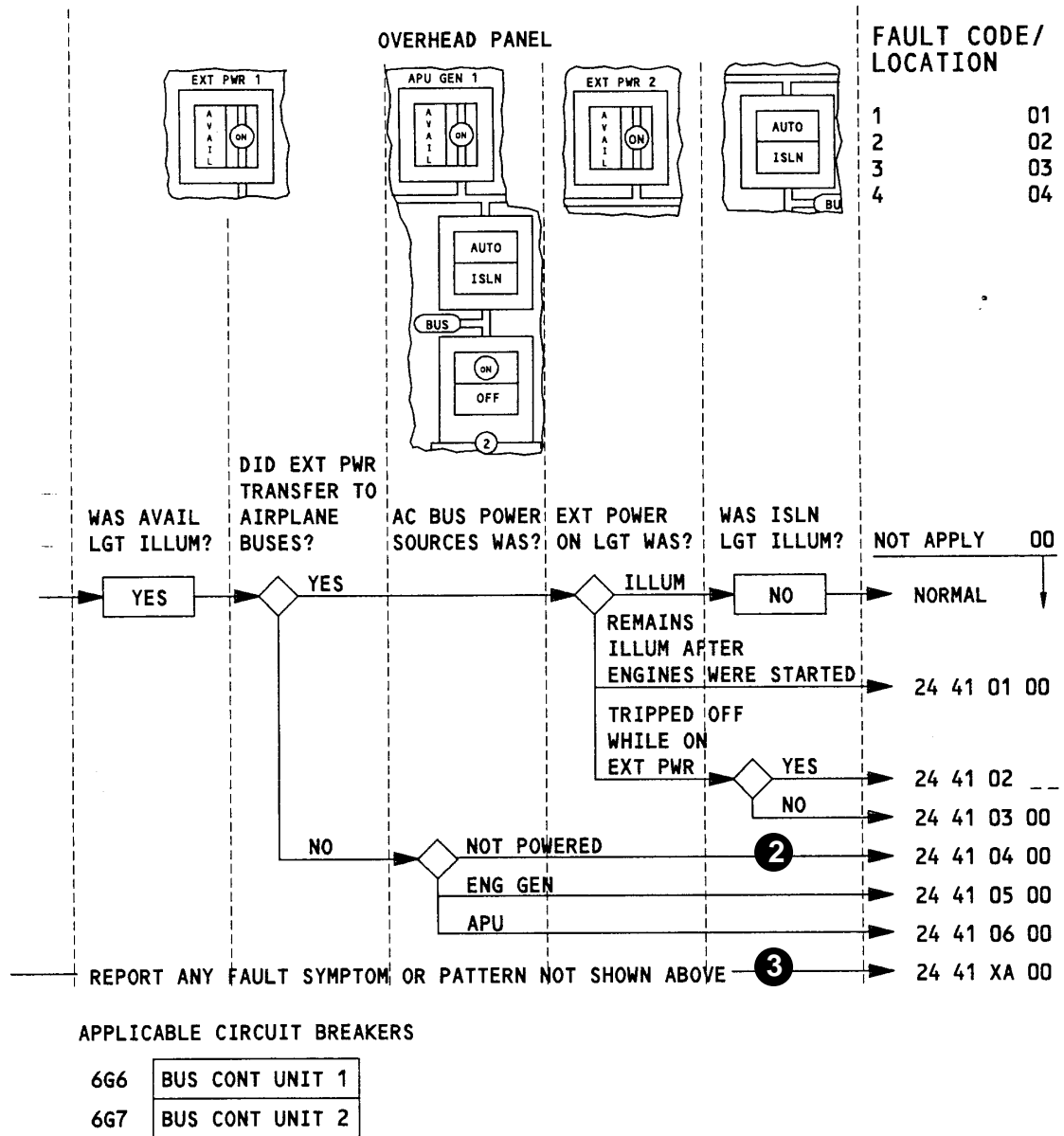


Figure 7 Failure (Examples 2,3)

EXTERNAL POWER - FAULT CODES

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24-FAULT CODE DIAGRAM

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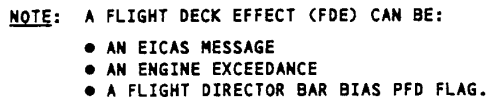
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**FAULT CODE INDEX****Introduction**

Die Beschreibung des FAULT CODE INDEX ist auf PAGE1 zu finden.

Die FAULT ISOLATION PROCEDURE ist auf PAGE2 beschrieben.

FAULT ISOLATION/ MAINTENANCE MANUAL



Fault Isolation Procedure with the CMCS
Figure 1

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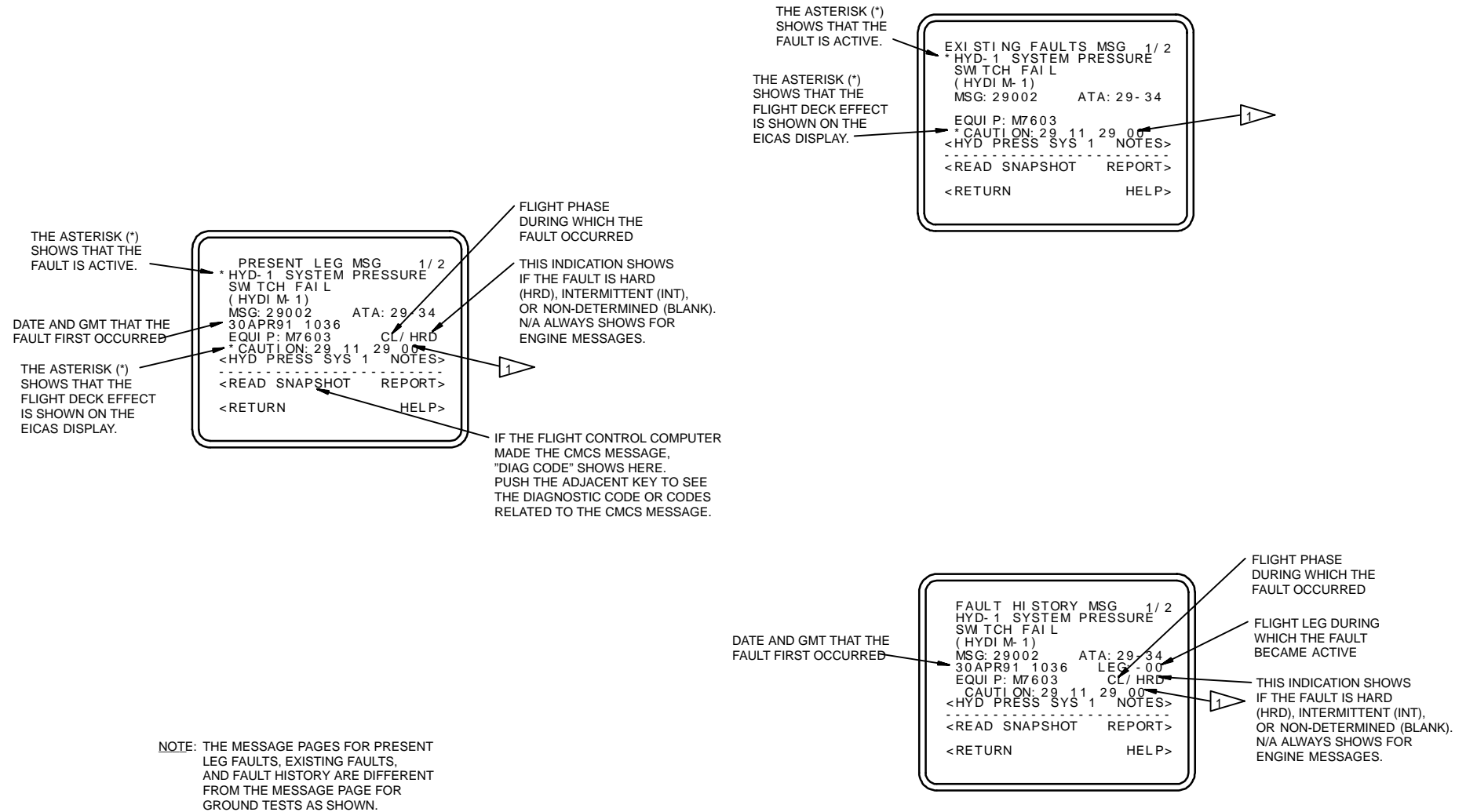
TROUBLE-SHOOTING FIM FAULT CODE INDEX



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1 CMC SOFTWARE -008

Figure 10 CMC Messages (PLF, EF, FH)

TROUBLE-SHOOTING FIM FAULT CODE INDEX



1 Failure (Example 1)

Auf PAGE13 des Fault Isolation Manuals ist der FAULT CODE **24 11 30 00** zu finden.

Unter LOG BOOK REPORT/ CORRECTIVE ACTION wird nochmals die EICAS Message gezeigt.

Der Text (NVM-A), (Non-Volatile Memory -Air) zeigt an, daß die STATUS Message im Fluge gespeichert wurde.

Als CORECTIVE ACTION wird unter Punkt F. aufgefordert, über Input Monitoring die Stellung des Cooler Valves bei stehendem und laufendem Motor zu überprüfen.

Ein Ausdruck (bei stehendem Motor) ist auf der folgenden Seite zu sehen. Dabei ist zu beachten, daß die Bits beim Ausdruck alle in eine Reihe geschrieben werden und von rechts nach links gelesen werden.

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FAULT ISOLATION/ MAINTENANCE MANUAL

FAULT CODE

LOG BOOK REPORT/
CORRECTIVE ACTION

2. Look for one or more of these CMCS messages (Fig. 1):

24452 (24-11) 24528 (24-11) 24529 (24-11) 24530 (24-11)
24531 (24-11)

24 11 30 00 The EICAS message ELEC IDG 2 VALVE (STATUS) shows. (NVM-A)

NOTE: This EICAS message can show and not be correct.

1. Do this test to make sure that the IDG cooler valve operates correctly:

- A. Put the electrical power on the airplane (MM 24-22-00/201).
- B. Make sure that engine 2 is stopped (MM 71-00-00/201).
- C. Push the ELEC button on the EICAS display select panel.
- D. Make sure that the IDG OUT TEMP indication on the lower EICAS screen is less than 219 °F or 104 °C.
- E. Get access to the INPUT MONITORING page on the CMC (MM 45-45-00/201).
- F. Use the CDU keyboard to write the PORT LBL SDI word:
 - (1) Enter "E/086/271/00".
 - (2) Push the "1L" key to start to monitor.
- G. Make sure that bit 21 (top row, 5th bit from the right) is 1. If the bit is 0, look for one or more of the CMCS messages that follow (Fig. 1).
- H. Start the engine (MM 71-00-00/201).
- I. Push the ENG button on the EICAS display select panel.
- J. Make sure that the OIL T indication on the lower EICAS screen is less than 295 °F or 146 °C.
- K. Increase the engine speed to 90% N2.
 - (1) Make sure that the bit stays at 1 until 75% of N2 minimum.
 - (2) Then, make sure that the bit changes to 0.
- L. Stop the engine (MM 71-00-0/201).
- M. If the bit changes to 0 too soon or stays at 1, look for one or more of the CMCS messages that follow (Fig. 1).

If the IDG cooler valve passes this test, ignore the EICAS message.

2. Look for one or more of these CMCS messages (Fig. 1):

24472 (24-11)

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Figure 11 Failure (Example1)

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/006	271	00	BINARY
			01100000 01111000 00000000 10011101
			01100000 01111000 00000000 10011101
			01100000 01111000 00000000 10011101

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

PORT#	LBL	SDI	UNITS
E/008	271	00	BINARY
			01100000 01111000 00000000 10011101
			01100000 01111000 00000000 10011101
			01100000 01111000 00000000 10011101

Figure 12 Input Monitoring Data Report

**TROUBLE-SHOOTING
FIM
FAULT CODE INDEX**



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TROUBLE-SHOOTING FIM FAULT CODE INDEX



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2 Failure (Example 2)

Hier ist der Fault Code zum Fehlerbeispiel 2 zu finden.

24 41 04 00

Natürlich kann hier nur ein Troubleshooting mit Hilfe des CMCS durchgeführt werden, wenn von einer anderen Spannungsquelle Strom zur Verfügung gestellt wird (z.B. ein APU- Generator).

**3** Failure (Example 3)

Wenn External Power1 nicht zugeschaltet werden kann, ist die BCU-1 zu re-
setzen. Falls External Power 2 nicht zugeschaltet werden kann, ist die BCU-2
zu resetten

Die Arbeitsvorgänge sind auf Page 3 und 4 beschrieben.

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FAULT ISOLATION/ MAINTENANCE MANUAL

FAULT CODE	LOG BOOK REPORT/ CORRECTIVE ACTION
24 20 XA 00	The flight crew found an electrical 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 24-50-00/501
24 20 XB 00	The flight crew found an APU generator 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 24-20-00/501
24 40 XA 00	<p>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.</p> <p>1. MM 24-41-00/501</p> <p>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.</p> <p>A. Shut down the APU (AMM 49-11-00/201).</p> <p>3</p> <p><u>CAUTION:</u> 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.</p> <p><u>NOTE:</u> 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.</p> <p>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:</p> <p>(1) On the P180 or P180-1 panel:</p> <p>a) 180B14 or 180-1L02 BCU 1</p> <p>AIRPLANES WITH CIRCUIT BREAKER 180B29, BCU 1-ALT:</p> <p>b) 180B29, BCU 1-ALT</p> <p>(2) On the P6 panel:</p> <p>a) G06 BUS CONT UNIT 1</p> <p>(3) On the P714 panel:</p> <p>a) BCU 1-EXT</p> <p><u>NOTE:</u> The circuit breakers must be open at the same time to make sure all power is removed from the BCU 1.</p>

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Figure 14 Failure (Example 3)

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FAULT ISOLATION/ MAINTENANCE MANUAL

FAULT CODE

LOG BOOK REPORT/
CORRECTIVE ACTION

3

- C. If external power 2 cannot be applied, reset the BCU-2 by removing all the power from the BCU-2. Open all these circuit breakers, then close them to reset the BCU-2:
- (1) On the P180 or P180-1 panel:
 - a) 180B15 or 180-1M02 BCU 2
 - AIRPLANES WITH CIRCUIT BREAKER 180B30, BCU 2-ALT:
 - b) 180B30, BCU 2-ALT
 - (2) On the P6 panel:
 - a) G07 BUS CONT UNIT 2
 - (3) On the P715 panel:
 - a) BCU 2-EXT

NOTE: The circuit breakers must be open at the same time to make sure all power is removed from the BCU 2.

- 24 50 XA 00 The flight crew found a ground service or ground handling 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 24-50-00/501
- 24 11 01 00 The EICAS message ELEC DRIVE 1 (STATUS) shows. (NVM)
1. Look for one or more of these CMCS messages (Fig. 1):
24535 (24-11) 24537 (24-11) 24548 (24-11)
- 24 11 02 00 The EICAS message DRIVE 1 TEMP SNS (STATUS) shows. (NVM)
1. Look for one or more of these CMCS messages (Fig. 1):
24547 (24-11) 24548 (24-11)
- 24 11 03 00 The EICAS message ELEC DRIVE 2 (STATUS) shows. (NVM)
1. Look for one or more of these CMCS messages (Fig. 1):

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Figure 15 Failure (Example 3)



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**CMCS MESSAGE INDEX****Description**

Liegt eine 5-stellige CMC Message vor, dann ist die Corrective Action dort zu finden. Als Referenz wird der POSSIBLE FLIGHT DECK EFFECT angegeben. Damit könnte eine Beziehung zu den Bordbucheintragungen hergestellt werden.

Auf den folgenden Seiten werden Messages zu den Fehlerbeispielen 1 und 2 gezeigt.

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FAULT ISOLATION/ MAINTENANCE MANUAL

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
24470 GENERATOR CONTROL BREAKER-2 FAIL (GCU-2)	ELEC GEN SYS 2 (STATUS) >NO LAND 3 (CAUTION)	NO LAND 3 (STATUS) NO LAND 3 (ADVISORY)	>NO LAND 3 (ADVISORY)

CORRECTIVE ACTION:

- Replace generator circuit breaker (GCB) No. 2 C952 (MM 24-22-02/401).
- If fault persists, replace GCB No. 2 protection relay R8121 (WDM 24-22-12).
- If fault persists, check and repair circuits between GCB No. 2 C952 DC952 pins 40, 16, and 48 and BCU No. 1 G10 DG10BA pin A-C12, BCU No. 2 G11 DG11BA pin A-C10, and GCU No. 2 G7 DG7BA pin A-K3 (WDM 24-22-12).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT		
24471 BUS TIE BREAKER-2 FAIL FAIL (GCU-2)	ELEC BTB 2 (STATUS) >NO LAND 3 (CAUTION)	NO LAND 3 (STATUS) NO LAND 3 (ADVISORY)	>NO LAND 3 (ADVISORY)

CORRECTIVE ACTION:

- Replace bus tie breaker (BTB) No. 2 C958 (MM 24-22-02/401).
- If fault persists, replace BTB No. 2 protection relay R8125 (WDM 24-22-22).
- If fault persists, check and repair circuit between BTB No. 2 C958 DC958 pin 48 and GCU NO. 2 G7 DG7BA pin A-K1 (WDM 24-22-22).

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24472 IDG-2 COOLER VALVE FAIL 1	ELEC IDG 2 VALVE (STATUS)

CORRECTIVE ACTION:

- Make sure that the position indication wires are correct between the IDG air/oil heat exchanger valve V350 connector DV350A, pin 2 and GCU-2 G7 connector DG7BA pin F1. Make sure that there are no shorts or grounds in the wires. If the wiring is correct, replace the IDG air/oil heat exchanger valve V350 (MM 24-11-15/401) (WDM 24-11-12).

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Figure 16 CMCS Message (Failure Example 1)

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FAULT ISOLATION/ MAINTENANCE MANUAL

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24101 EXTERNAL POWER CONTACTOR-2 FAIL (BCU-2)	2
<p><u>CORRECTIVE ACTION:</u></p> <p>A. Replace the No. 2 external power contactor, R13 (MM 24-41-04/401).</p> <p>B. If the problem continues, examine the circuit between the No. 2 electrical power contactor, R13, connector DR13, pins 6, 24, 27 and electrical ground (WDM 24-41-23). Repair the problems that you find.</p> <p>C. If the problem continues, examine the circuit between the No. 2 external power contactor, R13, connector DR13, pins 7, 23, and the No. 2 BCU, G11, connector DG11B A, pins A-C8, A-K15 (WDM 24-41-23). Repair the problems that you find.</p> <p>D. Examine the circuit between the No. 2 external power contactor, R13, connector DR13, pin 28, and the No. 1 BCU, G10, connector DG10BA, pin A-B14 (WDM 24-41-23). Repair the problems that you find.</p>	

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24124 AIR/GND SWITCH FAIL (BCU-1)	2
<p><u>CORRECTIVE ACTION:</u></p> <p>A. Examine the circuit between the No. 1 BCU, G10, connector DG10BA, pin A-D11, and the air/ground relay, R7321, connector DR7321, pin 13 (WDM 24-22-22). Repair the problems that you find.</p>	

CMCS MESSAGE	POSSIBLE FLIGHT DECK EFFECT
24138 AIR/GND SWITCH FAIL (BCU-2)	2
<p><u>CORRECTIVE ACTION:</u></p> <p>A. Examine the circuit between the No. 2 BCU, G11, connector DG11BA, pin A-D11, and the air ground relay, R8129, connector DR8129, pin 13 (WDM 24-22-21). Repair the problems that you find.</p>	

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FAULT ISOLATION/ MAINTENANCE MANUAL

CORRECTIVE ACTION:

- A. Make sure that circuit breaker C10051 BCU-2 on the P180 panel is closed.
- B. Look for these CMCS messages:
24170 BCU-1 HOT BATTERY BACKUP FAIL
30278 ENG-1 TAI VALVE DISAGREE
30279 ENG-2 TAI VALVE DISAGREE
32504 PSEU PRIMARY GEAR CHANNEL "NO POWER"
- C. If all of the messages in the list above show, replace or charge the main battery (MM 24-31-01/401 or 24-22-00/201).
- D. If none of the messages in the list above show, examine and repair the circuit between circuit breaker C10051 BCU-2 and connector DG11DA pin C2 at BCU-2, G11 (WDM 24-41-22).
- E. If only messages 30278, 30279 and 32504 show with the STANDBY POWER switch in the AUTO position and the airplane using external, APU or IDG power, do the following steps:
 - (1) Make sure that circuit breakers C8847 BAT XFR RLY and C10342 APU BAT BUS/TRU CONT on the P6 panel are closed.
 - (2) Make sure the Remote Control Circuit Breaker (RCCB) C10339 APU BAT BUS/TRU on the P180 panel is closed. If RCCB C10339 is not closed, check for continuity between pin 3 of RCCB C10339 and ground (WDM 24-33-12). If RCCB C10339 is not closed and there is continuity between pin 3 of RCCB C10339 and ground, replace C10339 RCCB (MM 24-60-01/401).
 - (3) If the problem continues, examine and repair the circuit between pin A2 at RCCB C10039 and pin C2 at relay R7224 at the P180 panel (WDM 24-33-12).
- F. If only messages 30278, 30279 and 32504 show with the STANDBY POWER switch in the BAT position, do the following steps:
 - (1) Make sure circuit breaker C10343 APU BAT BUS/APU BAT CONT on the P6 panel is closed.
 - (2) Make sure RCCB C10340 APU BAT BUS/APU BAT on the P183 panel is closed. If RCCB C10340 is not closed, check for continuity between pin 3 of RCCB C10340 and ground. If RCCB C10340 is not closed and there is a continuity between pin 3 of RCCB C10340 and ground, replace RCCB C10340 (MM 24-60-01/401).

- (3) If the problem continues, examine and repair the circuit between pin A2 at RCCB C10340 and pin C2 at relay R7223 on the P180 panel (WDM 24-33-11).

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Figure 24 Corrective Actions

TROUBLE SHOOTING FIM FAULT ISOLATION



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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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FAULT ISOLATION/ MAINTENANCE MANUAL

PREREQUISITES

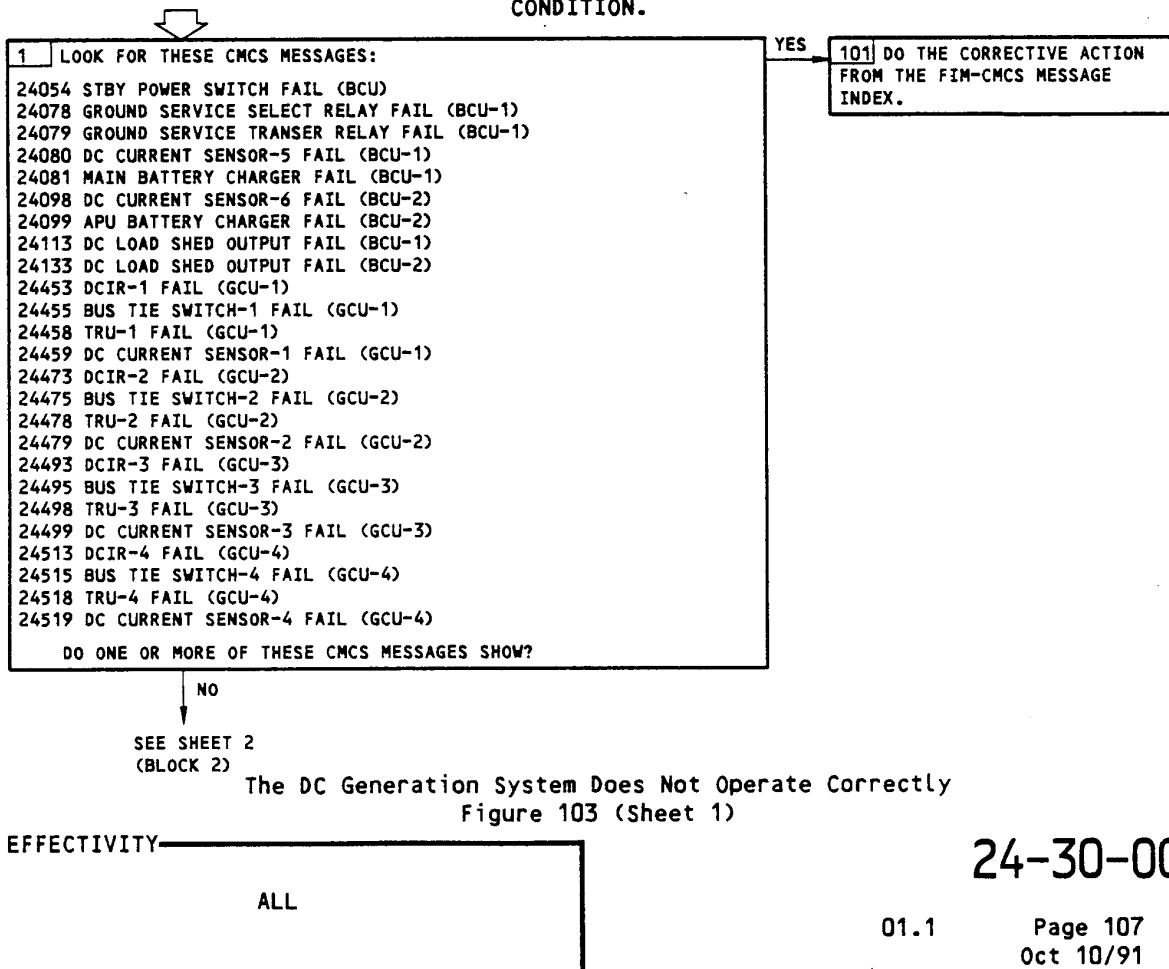
EXTERNAL POWER (MM 24-22-00/201)

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.



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Figure 25 Fault Isolation (Pageblock 101)

FAULT ISOLATION/ MAINTENANCE MANUAL

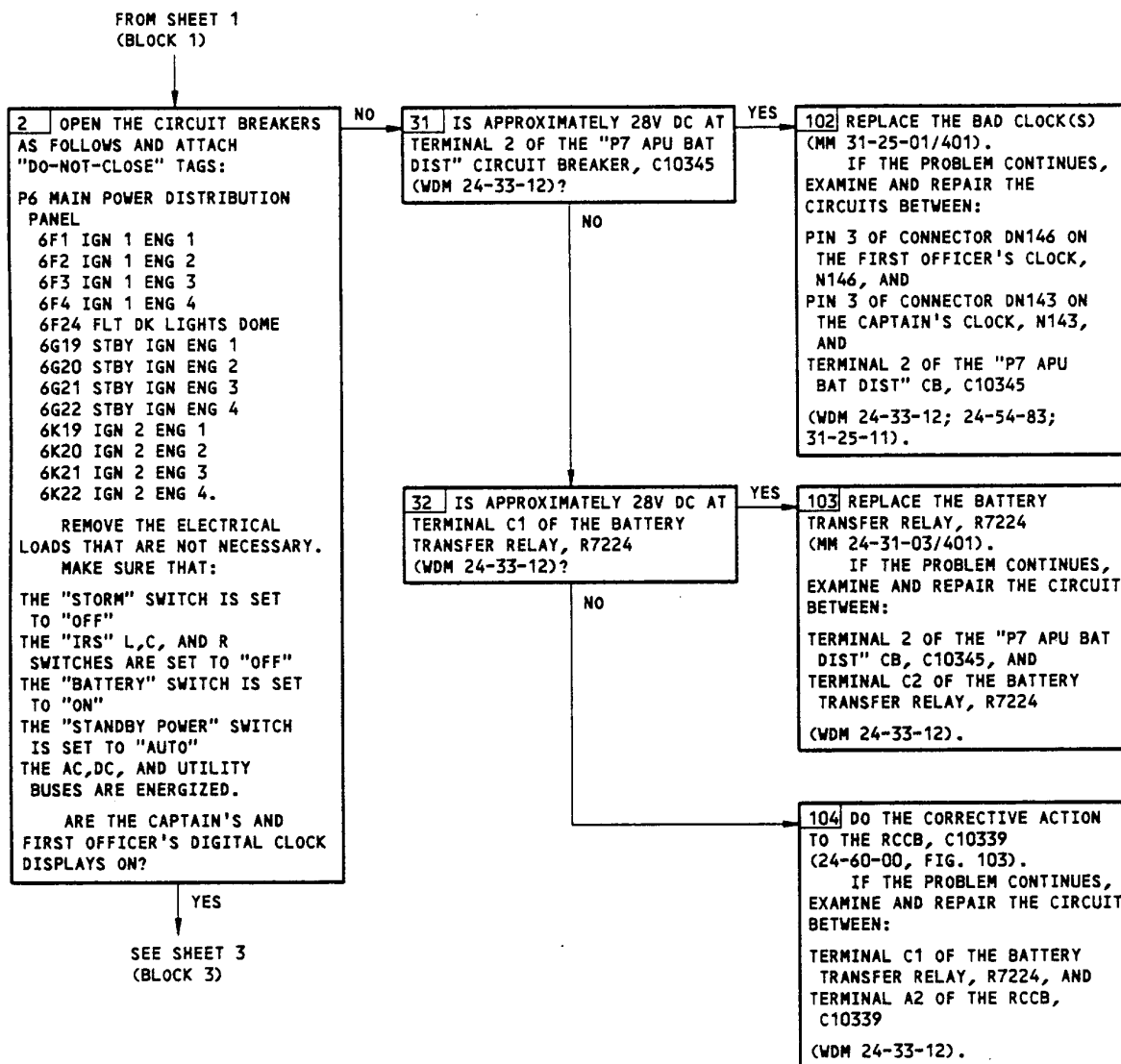


Figure 26 Fault Isolation (Pageblock 101)

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

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FAULT ISOLATION/ MAINTENANCE MANUAL

FROM SHEET 14
 (BLOCK 11)

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THE DC GENERATION SYSTEM OPERATES CORRECTLY.

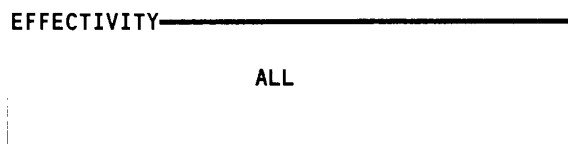
MAKE SURE THAT THESE CIRCUIT BREAKERS ARE CLOSED:

- 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)



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Figure 27 Fault Isolation Close-Up (Pageblock 101)



ENGINEERING ORDER

Trouble- Shooting Aid

Fehlerhäufungen, die mit Hilfe des Fault Isolation Manuals nicht zufriedenstellend bearbeitet werden können, sind eventuell in der Engineering Order EO 010139 mit entsprechenden Hinweisen wieder zu finden.

Die EO 010139 befindet sich an Bord des Flugzeugs.
Die Hinweise sind nach ATA Chapters geordnet.

Beachte beim Ground Test:

Beim Test mechanischer Systeme werden u. U. nur die elektrischen Komponenten überprüft.

Eine Überprüfung z. B. des Cooler Valves ist nur mit einem System Test bei laufendem Motor möglich.

Im August 1999 ist die EO 010139, 36. Ausgabe herausgekommen.

Engineering Order Operation



Lufthansa Technik

Customer DLH	A/C Type 747-400	Issue 36	Date of Issue 20.08.1999	EO-Number 010139		
Subject 747-400 - Special Procedures for Maintenance Actions						
Reason for Revision Update of Content						
Note The design data contained in this EO represents a minor change to the type design and are approved under the authority of LBA/JA.003.						
Description The goal of this EO is to provide flight / cabin / maintenance crew with additional technical /operational /material information. This document should be used as the first entry point for each maintenance action required after a log book report.						
Modification minor						
Airworthiness LHT Development Engineering						
Effectivity A/C Type 747-400 Registrations D-ABTA, TB, TC, TD, TE, TF, TH, VA, VB, VC, VD, VE, VF, VH, VK, VL, VN, VM, VO, VP, VR, VS, VT, VU, VW						
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TROUBLE-SHOOTING ENGINEERING ORDER INFORMATION



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Engineering Order Operation

Lufthansa Technik

Customer	A/C Type	Issue	Date of Issue	EO-Number
DLH	747-400	36	20.08.1999	010139

- 00 - TECHNICAL DOCUMENTATION EFFECTIVITY FOR ABVM
- 23 - ACARS - No ATIS or Weather Reception after INIT Request
 - ACARS - No Datalink via Satcom
 - ACARS - Wrong Airport in ATIS and Weather reports
 - ACARS in 'NO COMM'
 - Communication - 8.33 kHz Modification
 - Emergency Locator Transmitter (ELT)
 - SATCOM, ORT load after SDU change
 - SATCOM, Test of Cockpit Voice function
 - SATCOM/SATPHONE/DATALINK
- 233 - Maintenance Message on CMT
 - New CD - Reproducer
 - Passenger Entertainment System - Matsushita 2000
 - Wrong CMT-Functions with new Operational Software -LH14
 - Passenger Entertainment System - No Entertainment and no Service-Functions on Upper Deck Cabin Attendant Seats (RH fwd)
 - PVP Removal / Installation Procedure
- 24 - GROUND POWER NOT AVAILABLE
 - Maintenance-Procedure after IDG OIL CHANGE and IDG SCAVENGE FILTER CHANGE
 - OPERATING ON GROUND POWER
 - WIRE INSTALLATION
- 25 - Escape Facilities:
 - Stretched Upper Deck Escape Slide Fascia Panel Replacement.
 - Modification in the Upper Deck to comply with new JAR requirements
- 26 - Eng Fire Detection:
 - Splices in Fire Warning System Wires, Engine.
 - Engine Fire Detection-Introduction of new improved fire detection loops for aft upper loop assembly
 - Test anomalies during CMC Fire System Test on aircraft converted from Combi to Full Pax Version.
- 27 - Automatic LE flap retraction during thrust reversion
 - TE/LE unexpected flap movement during maintenance
- 28 - Battery Refuelling
 - EICAS Message 'Fuel Ballast Qty' and 'Fuel Balast Sys'
 - ENG FUEL FEED LINE LEAK IN STRUT
 - Flight Deck Refueling Procedure
 - Fuel Boost Pumps running during APU Operation
 - Fuel Feeding Main Tank #1 + #4 during CTR-Tank Operation
 - FUEL GENERAL:
 - OMC and EICAS nuisance messages
 - Fuel System Management Card Failure
 - Jettison Transfer Valve Test
 - Main Tank 1/4 Probe 1 Short LO-Z to Ground
 - Stabilizer Fuel Tank (TD, TE, TF, TH)
- 31 - Loadprocedure of the ACMS-Software
 - New Solid State Flight Data Recorder
- 32 - Alternate Extension Auto Reset Addition ABVO and on
 - Hydraulic Brake Quick Disconnect ABVO and on
 - Nose Gear Vibration

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Figure 28 EO (Table of Contents)

Engineering Order Operation

Lufthansa Technik

Customer	A/C Type	Issue	Date of Issue	EO-Number
DLH	747-400	36	20.08.1999	010139

- 32 - Yellow Marked Undersized Axle Threads And Nuts
- 34 - EGPWS - Enhanced Ground Proximity Warning System
 - FLIGHT MANAGEMENT COMPUTER SYSTEM
 - IRS - Inertial Reference System
 - Standby Altimeter
- 35 - Free Flow System and Mask actuated System
- 36 - "BLEED PRV ENG X" EICAS STATUS MESSAGE DISPLAYED DURING GROUND OPERATIONS WITH ENGINES SHUT DOWN
 - "BLEED X" EICAS MESSAGE DURING ENGINE START
- 73 - DIFFERENCES OF NEW DELIVERED A/C
 - ECU SOFTWARE INFORMATIONS
 - ENG(X) CONTROL MESSAGE
 - LPTC POSITION ERROR ON EPCS PAGE
 - Time Intervals for EEC C1 and C2 Faults
- 78 - AIRCRAFTS WITH 3. LOCK REVERSER
 - OPERATION TEST OF THRUST REVERSER (ENGINE NOT RUNNING)
 - SLOW MOVEMENT OF REVERSER
- 79 - Engine Oil Evaluation
 - Engine Oil Press Switches
 - Fuel in Oil

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Engineering Order Operation



Lufthansa Technik

Customer	A/C Type	Issue	Date of Issue	EO-Number
DLH	747-400	36	20.08.1999	010139

24 - ELECTRICAL POWER

GROUND POWER NOT AVAILABLE

Description Ground power AVAIL light is not on for EXT 1 and/or EXT 2 and the airplane will not accept ground power.

Att Maint A. EXTERNAL POWER 1 CANNOT BE APPLIED.

1. On airplanes with the 60B40162-11 BCU installed in the #1 position, push the external power #1 switch on the P5 panel.

2. On airplanes with the 60B40162-7 and 60B40162-9 BCU installed in the #1 position, perform the following steps:

Shut down APU (Reference MM 49-11-00/201)

CAUTION: Opening circuit breaker C10054 P6 panel will cause the APU to auto-shut down without the one minute cool-down cycle which could result in equipment damage.

Remove all power from BCU 1 by opening the following circuit breakers:

NUMBER	FUNCTION	NOMENCLATURE	LOCATION
C10053	Battery Bus	BCU 1	(P180-1/L02 or P180/B14)
C10054	Hot Battery Bus	BUS CONT UNIT 1	(P6/G06)
C00860	External Power	EXT PWR NO. 1	(P714)

Open the following additional circuit breaker if installed:

NUMBER	FUNCTION	NOMENCLATURE	LOCATION
C10754	DC Ground Handling Bus	BCU 1-ALT	(P180/B29)

All 3 (or 4) BCU 1 circuit breakers must be open at the same time to assure that all power is removed from BCU 1.

Close the above circuit breakers.

B. EXTERNAL POWER 2 CANNOT BE APPLIED

1. On airplanes with the 60B40162-11 BCU is installed in the #2 position, push the external power #2 switch on the P5 panel.

2. On airplanes with the 60B40162-7 and 60B40162-9 BCU installed in the #2 position, perform the following steps:

Remove all power from BCU 2 by opening the following circuit breakers:

NUMBER	FUNCTION	NOMENCLATURE	LOCATION
C10051	Battery Bus	BCU 2	(P180-1/M02 or P180/B15)
C10052	Hot Battery Bus	BUS CONT UNIT 2	(P6/G07)
C00861	External Power	EXT PWR NO. 2	(P715)

Open the following additional circuit breaker if installed:

NUMBER	FUNCTION	NOMENCLATURE	LOCATION
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Engineering Order Operation



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Customer	A/C Type	Issue	Date of Issue	EO-Number
DLH	747-400	36	20.08.1999	010139

24 - ELECTRICAL POWER

C10755 DC Ground BCU 2-ALT (P180/B30)
 Handling Bus

All 3 (or 4) BCU 2 circuit breakers must be open at the same time to assure that all power is removed from BCU 2.

Close the above circuit breakers.

NOTE: It is not necessary to completely remove power from the airplane. One half of the main buses will be powered while performing procedure A or B, if only one BCU is reset a time.

Att Crew see Att. Maint.

Zucker

Maintenance-Procedure after IDG OIL CHANGE and IDG SCAVENGE FILTER CHANGE

Description According the AMM (since Rev.:33) an Engine Ground Test - Idle Power (Run-up) must be performed after IDG OIL CHANGE (AMM 12 22 07 603 001) and IDG SCAVENGE FILTER CHANGE (AMM 24 11 04 004 001).

Due to the good maintenance experience to perform the leakage checks of the IDGs by engine motoring, is deviant from the AMM an Engine Ground Test-Idle Power after IDG OIL CHANGE and/or IDG SCAVENGE FILTER CHANGE not necessary.

Att Maint After IDG OIL CHANGE (AMM 12 22 07 603 001) and/or IDG SCAVENGE FILTER CHANGE (AMM 24 11 04 004 001) only an engine motoring must be performed to check the IDG for any leakage. An Engine Ground Test-Idle Power (Run-up with idle power) is not necessary.

Att Crew Not necessary

Zucker

Engineering Order Operation



Customer	A/C Type	Issue	Date of Issue	EO-Number
DLH	747-400	36	20.08.1999	010139

24 - ELECTRICAL POWER

OPERATING ON GROUND POWER

Description A single ground source capable of maintaining 115 volts plus or minus 5 volts and 400 Hz plus or minus 20 Hz at 120 KVA connected to external power 1 only (no WYE connection) will allow airplane operation subject to automatic airplane overload protection (load shedding). This may restrict operation of some galley equipment. If sources of the above capacity are not available, manual load shedding (turning off hydraulic pumps, fuel pumps, galleys, utility busses etc.) may be required to preclude rejection of ground power.

Att Maint The following alternatives for ground power are recommended:

A. TWO EXTERNAL POWER SOURCES

Two separate 90 KVA sources will allow unrestricted airplane operation. This configuration is required for B747-400 combi models and recommended for B747-400 passenger.

B. ONE EXTERNAL POWER SOURCE

A single source capable of maintaining 115 volts plus or minus 5 volts and 400 Hz plus or minus 20 Hz at 120 KVA connected to external power 1 only (no WYE connection) will allow airplane operation subject to automatic airplane overload protection (load shedding). This may restrict operation of some operator galley options. If sources of the above capacity are not available, manual load shedding (turning off hydraulic pumps, fuel pumps, galleys, utility busses, etc.) may be required to preclude rejection of ground power.

C. REDUCED AIRPLANE ELECTRICAL LOAD DURING ENGINE START

Reduce the airplane total electrical load during engine start by using following procedure. Prior to beginning the ENGINE START CHECKLIST:

1. Select the R/H UTILITY power switch in OFF.
2. Complete the engine start procedure.
3. If engine cannot started due to insufficient external electrical power:
 - a) Select L/H UTILITY power switch in OFF also.
 - b) Complete engine start procedure.
4. Select L/H and R/H UTILITY power switches ON after completion of engine start procedure.
5. Rotate the equipment cooling switch to the OVERRIDE position and then back to NORMAL to clear "EE COOLING SUP FAN" status message.
6. Momentarily depress the PACK RST switch until all "RECIRC FAN UPR/LWR" status messages are cleared.

Att Crew See Att. Maint.

Zucker

Engineering Order Operation**Lufthansa Technik**

Customer DLH	A/C Type 747-400	Issue 36	Date of Issue 20.08.1999	EO-Number 010139
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24 - ELECTRICAL POWER**WIRE INSTALLATION**

Description Wire installation during modification, repair and additional or temporary installations.

Att Maint Wire installation in general must be done taking into account the special requirements for wire separation. There are two types of separation: Functional Separation and Electric Magnetic Interference Separation. Details can be read in the Boeing Wiring Practices Manual (D6-54446), chapter 20-10-19. In general this separation is evident to the maintenance staff by using different colors for the different harnesses. In the lot of cases this colors are applied by the color of tiewraps. On harness with colored tiewraps special attention is required.

Att Crew No Action.

Zucker

Figure 32 EO Information/Maintenance Tip



MAINTENANCE MANUAL

CONTENTS

- 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
 - Dispach Deviation Guide gibt Hinweise wie zu verfahren ist, wenn Systeme gemäß MEL inoperativ sein dürfen.

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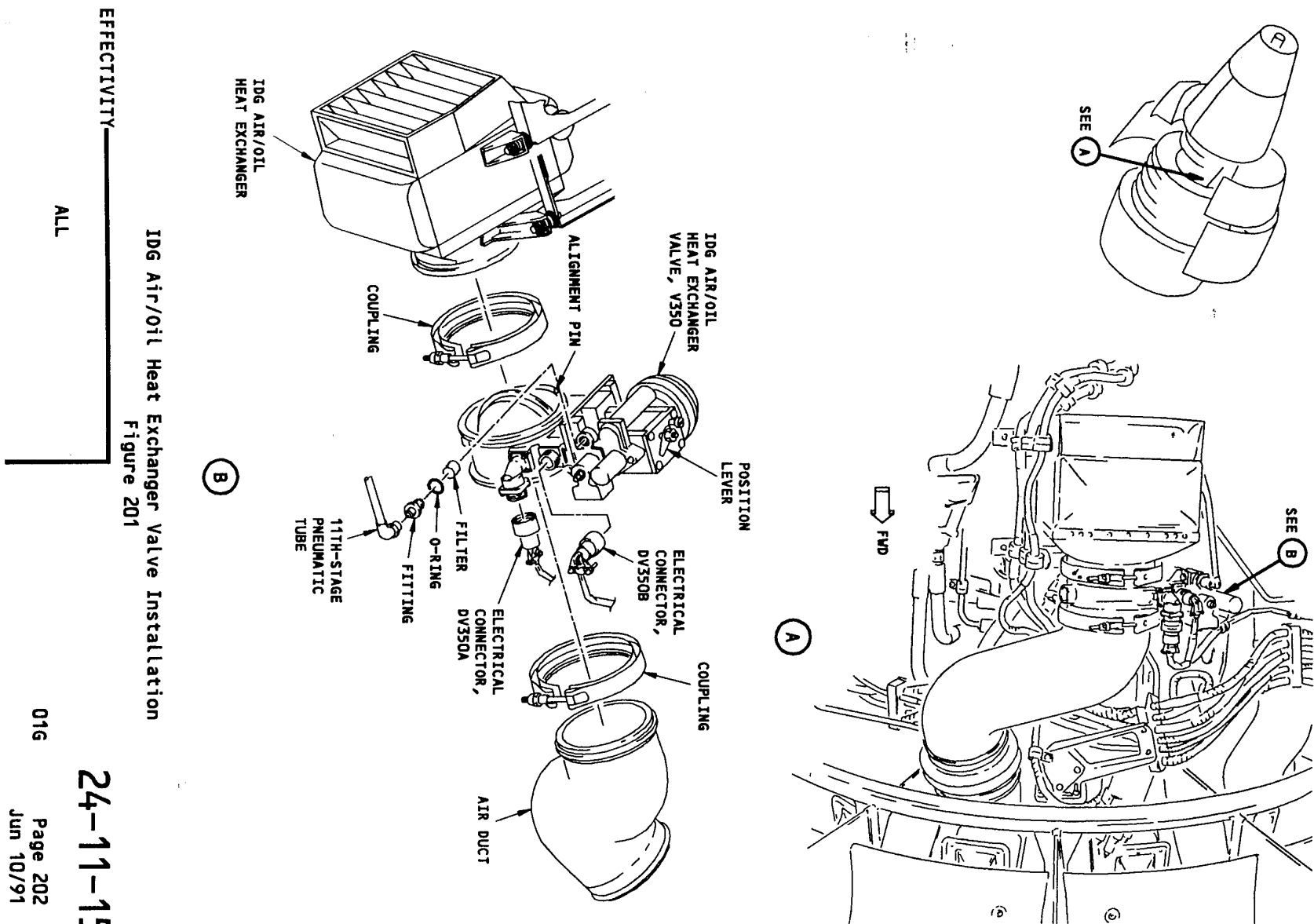


Figure 34 MM Pageblock 201



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MAINTENANCE MANUAL

- S 034-017
- (3) Do these steps to lock the heat exchanger valve in the closed position:
- Remove the set screw and the lock screw from the top of the valve.
 - To close the valve, move the position lever on the top of the valve to the closed position.
 - Install the lock screw in the position level to hold the valve closed.
 - Install the set screw in the storage hole for the lock screw and tighten the set screw.

- S 022-040
- (4) Do these steps to remove the valve.
- Disconnect the 11th-stage pneumatic line from the valve.
 - Install a cover on the pneumatic line and the pneumatic port in the valve.
 - Disconnect the electrical connectors, DV350A and DV350B, from the valve.
 - Install a cover on the plugs and the receptacles.
 - Remove the clamp that holds the valve to the air duct.
 - Hold the valve.
 - Remove the clamp that holds the valve to the heat exchanger.
 - Remove the heat exchanger valve.
 - Remove the reducer fitting from the pneumatic port on the valve.
 - Remove and discard the packing that is on the fitting.

NOTE: Keep the fitting for the subsequent installation of the valve.

- Install a cover on each opening in the valve.

TASK 24-11-15-402-038

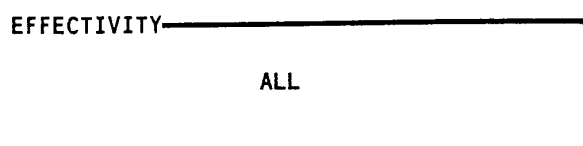
3. IDG Air/Oil Heat Exchanger Valve Installation (Fig. 201)

A. Consumable Materials

- D00389 Oil - Lubricating, GE Spec D50TF1 (GE C02-019)

B. References

- 24-22-00/201, Manual Control
- 71-00-00/201, Power Plant
- IPC 24-11-15 Fig. 5
- WDM 24-11-11, 24-11-12, 24-11-13, 24-11-14
- SSM 24-11-01, 24-11-02, 24-11-03, 24-11-04



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C. Access

(1) Location Zone

- 412 Engine 1 - HPC Case 3 o'clock
- 422 Engine 2 - HPC Case 3 o'clock
- 432 Engine 3 - HPC Case 3 o'clock
- 442 Engine 4 - HPC Case 3 o'clock

(2) Access Panel

- 416 Right Thrust Reverser Half - Engine 1
- 426 Right Thrust Reverser Half - Engine 2
- 436 Right Thrust Reverser Half - Engine 3
- 446 Right Thrust Reverser Half - Engine 4

D. Procedure

S 422-041

- (1) Prepare to install the heat exchanger valve (valve).
 - (a) Remove the cover from each opening in the valve.
 - (b) Lubricate a new preformed packing with engine oil.
 - (c) Install the new packing on the reducer fitting.
 - (d) Install the reducer fitting in the pneumatic port on the valve.
 - 1) Tighten the fitting to a torque of 155 to 175 pound-inches (17.5 to 19.8 N.m.).


S 434-015

Make sure that the valve is locked in the closed position.

- (f) Do these steps if the valve is not locked in the closed position:
 - 1) Remove the set screw and the lock screw from the top of the valve.
 - 2) To close the valve, move the position lever on the top of the valve to the closed position.
 - 3) Install the lock screw in the position level to hold the valve closed.
 - 4) Install the set screw in the storage hole for the lock screw and tighten the set screw.

S 424-016

- (2) Do these steps to install the heat exchanger valve (valve):
 - (a) Install the clamp that holds the valve to the heat exchanger.
 - 1) Tighten the clamp nut to a torque of 55-70 pound-inches (6.21-7.91 N.m.).
 - (b) Install the clamp that holds the valve to the air duct.
 - 1) Tighten the clamp nut to a torque of 55-70 pound-inches (6.21-7.91 N.m.).

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Figure 36 MM Pageblock 201

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- (c) Remove the cover from the 11th-stage pneumatic line.
- (d) Connect the pneumatic line to the pneumatic port in the valve.
 - 1) Tighten the coupling nut on the pneumatic line to a torque of 270 to 300 pound-inches (30.5 to 33.9 N.m.).
- (e) Remove the covers from the plugs and the receptacles for the electrical connectors DV350A and DV350B.
- (f) Connect the electrical connectors DV350A and DV350B.
- (g) Tighten the lock-rings on the electrical connectors with your fingers.
 - 1) Tighten the lock-rings one-eighth of a turn more.

S 434-022

- (3) Do these steps to release the heat exchanger valve and let it open:
 - (a) Remove the lock screw that holds the valve in the closed position.
 - (b) Remove the set screw from the storage hole for the lock screw on the top of the valve.
 - (c) Install the lock screw in the storage hole on the top of the valve.
 - (d) Install the set screw in the lock screw hole in the position lever on the valve.
 - (e) Tighten the set screw and the lock screw.

S 414-020

- (4) Close the right thrust reverser half (Ref 78-31-00/201).
- E. Do a Test of the IDG Air/Oil Heat Exchanger Valve

NOTE: This test is optional. If you do not do this test, make sure the valve operates correctly during a subsequent engine operation.

S 212-042

- (1) Do these steps to make sure the heat exchanger valve operates correctly:
 - (a) Supply electrical power to the airplane (Ref 24-22-00/201).
 - (b) Make sure that the applicable engine is stopped.
 - (c) Get access to the INPUT MONITORING page on the CMCS.
 - (d) Use the CDU keyboard to write the PORT LBL SDI word as follows:
 - 1) For engine 1 and 2, write "E/086/271/00".
 - 2) For engine 3 and 4, write "E/008/271/00".
 - 3) Push the 1L key to start to monitor the system.

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(e) Make sure that the bit for the applicable engine is a 1.

NOTE: Engine 1 is bit 20 (top line - 4th from the right)
Engine 2 is bit 21 (top line - 5th from the right)
Engine 3 is bit 22 (top line - 6th from the right)
Engine 4 is bit 23 (top line - 7th from the right)

(f) Start the applicable engine (Ref 71-00-00/201).

(g) Make sure that the applicable engine bit is 1, while the engine is at idle speed.

(h) Increase the engine speed to 90% N2.

- 1) Make sure the bit stays at 1 until 75% of N2 minimum.
- 2) Then, make sure that the bit changes to 0.

(i) Stop the engine (Ref 71-00-00/201).

(j) Remove electrical power, if it is not necessary (Ref 24-22-00/201).

TASK 24-11-15-902-032

4. IDG Air/Oil Heat Exchanger Air Filter Replacement (Fig. 201).

A. References

- (1) 24-22-00/201, Manual Control
- (2) 71-00-00/201, Power Plant
- (3) IPC 24-11-15 Fig. 5
- (4) WDM 24-11-11, 24-11-12, 24-11-13, 24-11-14
- (5) SSM 24-11-01, 24-11-02, 24-11-03, 24-11-04

B. Access

(1) Location Zone

- | | |
|-----|-------------------------------|
| 412 | Engine 1 - HPC Case 3 o'clock |
| 422 | Engine 2 - HPC Case 3 o'clock |
| 432 | Engine 3 - HPC Case 3 o'clock |
| 442 | Engine 4 - HPC Case 3 o'clock |

(2) Access Panel

- | | |
|-----|---------------------------------------|
| 416 | Right Thrust Reverser Half - Engine 1 |
| 426 | Right Thrust Reverser Half - Engine 2 |
| 436 | Right Thrust Reverser Half - Engine 3 |
| 446 | Right Thrust Reverser Half - Engine 4 |

Figure 38 Replacement of Heat Exchanger

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C. Replace the Air Filter.

S 012-033

- (1) Open the right thrust reverser (Ref 78-31-00/201).

S 022-034

- (2) Remove the filter:

- (a) Disconnect the 11th-stage pneumatic line from the valve.
 - 1) Install a cover on the pneumatic line.
- (b) Remove the reducer fitting from the valve.
 - 1) Remove and discard the preformed packing from the fitting.
 - 2) Keep the reducer for the subsequent filter installation.
- (c) Use a 1/4 inch allen wrench to remove the filter from the recess port on the valve.

S 212-039

- (3) Do these steps to clean and examine the air filter:

- (a) Blow out the filter with dry compressed air.
- (b) Clean the filter with a solvent.
- (c) Dry the filter with dry compressed air.
- (d) Make sure that you can see light through the screen of the filter.
 - 1) If you cannot clean the filter, replace it with a new one.
 - 2) If the filter screen is damaged (bent, crushed or torn), replace it with a new one.

S 422-035

- (4) Install the filter:

- (a) Use a 1/4 inch allen wrench to install the filter in the recess port of the valve.
 - 1) Tighten the filter until it stops.
- (b) Lubricate a new preformed packing with engine oil.
- (c) Install the new packing on the reducer fitting.
- (d) Install the reducer fitting in the pneumatic port on the valve.
 - 1) Tighten the fitting to a torque of 155 to 175 pound-inches (17.5 to 19.8 N.m.).
- (e) Remove the cover from the pneumatic line.
- (f) Connect the pneumatic line to the fitting in the valve.
 - 1) Tighten the coupling nut on the pneumatic line to a torque of 270 to 300 pound-inches (30.5 to 33.9 N.m.).

S 412-036

- (5) Close the right thrust reverser (Ref 78-31-00/201).

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RAMP MAINTENANCE MANUAL (RMM)

CONTENTS

IDS Messages

Eine Auswahl der am häufigsten vorkommenden Message ist hier zu finden.
Ist eine Message hier nicht zu finden, dann muß man im Troubleshooting Manual nachschlagen.

Reference

Eine Referenz zu weiterer Dokumentation ist hier zu finden.

Simplified Schematics

Zur Orientierung im System sind die Simlified Schematics.

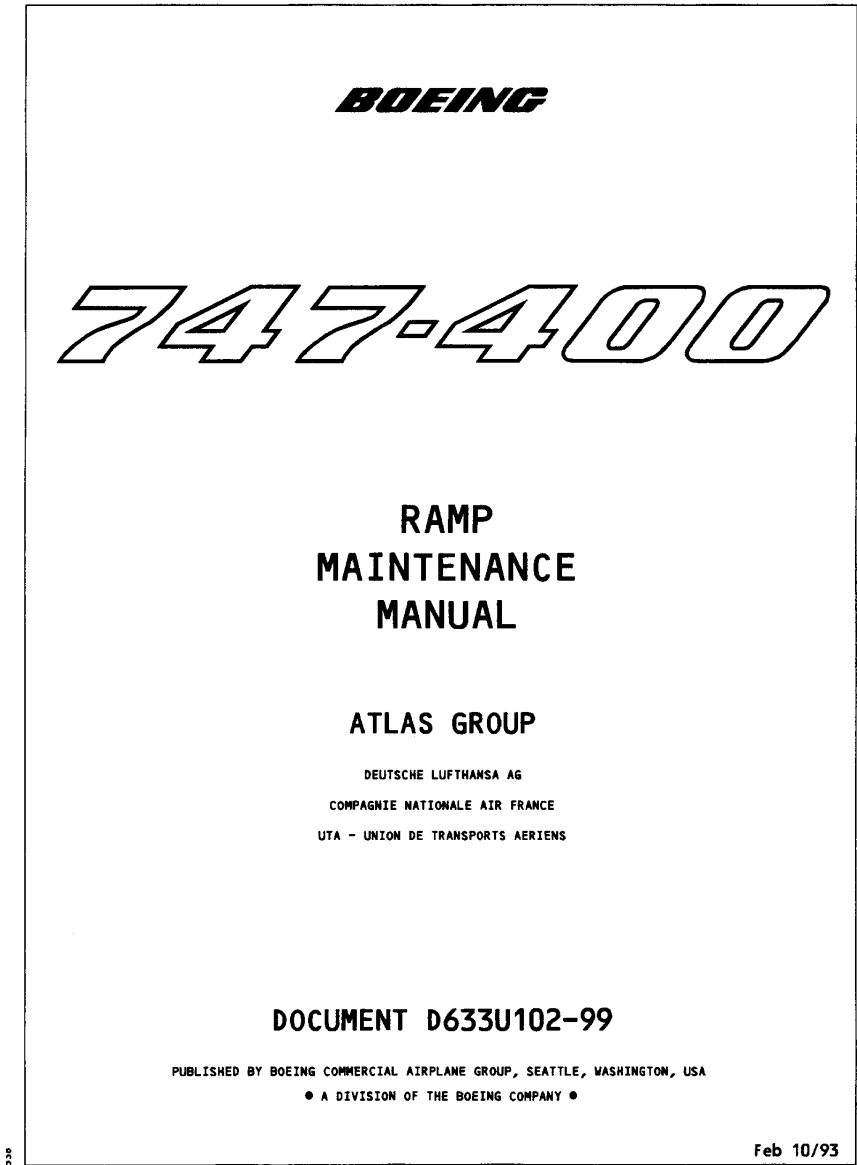
Servicing

Servicebeschreibungen aus dem Maintenance Manual sind hier zu finden.

Lamp Usage Chart

Zeigt welche Lampen in welcher Position verwendet werden sollen.

TROUBLE-SHOOTING
RAMP MAINTENANCE MANUAL
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RAMP MAINTENANCE MANUAL

Chapter 24 - ELECTRICAL POWER

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Figure 40 Ramp Maintenance Manual

TROUBLE-SHOOTING RAMP MAINTENANCE MANUAL CONTENTS



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RAMP MAINTENANCE MANUAL

IDS MESSAGES - TROUBLE SHOOTING

ELEC GEN SYS 4 (STATUS)24 11 27 00

1. If this message first shows during an engine shutdown and none of the CMCS messages in step 2 below show, no corrective action is necessary.

2. Look for these possible CMCS correlations:

24118 (24-27)24137 (24-27)24381 (24-11)24382 (24-21)24383 (24-21)
24384 (24-23)24385 (24-21)24386 (24-21)24387 (24-23)24388 (24-21)
24389 (24-21)24390 (24-21)24391 (24-21)24392 (24-21)24393 (24-11)
24394 (24-22)24395 (24-22)24396 (24-22)24397 (24-23)24398 (24-21)
24401 (24-11)24402 (24-21)24403 (24-21)24404 (24-21)24406 (24-21)
24407 (24-21)24409 (24-21)24415 (24-21)24416 (24-21)24417 (24-21)
24510 (24-22)24516 (24-22)24517 (24-22)24521 (24-22)24522 (24-22)
24523 (24-22)24525 (24-22)24595 (24-22)24596 (24-11)24597 (24-11)
24607 (24-11)

ELEC IDG X VALVE (STATUS) (NVM-A)24 11 29/30/31/32 00

1. No corrective action is necessary if the valve passes this test:

NOTE: This test requires an engine run at 90% N2.

A. Supply electrical power (MM 24-22-00/201).

B. Make sure that the applicable engine is shut down.

C. Show the EICAS maintenance page for electrical systems (MM 45-10-00/201).

D. Make sure that the applicable IDG OUT TEMP indication on the maintenance page is less than 219°F (104°C).

E. Get access to the CMCS INPUT MONITORING page (MM 45-10-00/201).

F. Use the CDU keyboard to enter the PORT LBL SDI word.

(1) For engine 1 or 2, enter "E/086/271/00"

(2) For engine 3 or 4, enter "E/008/271/00"

(3) Push the "IL" key to start to monitor.

G. Make sure that the bit for the applicable engine is 1.

(1) Engine 1 - Bit 20 (top row, 4th bit from the right)

(2) Engine 2 - Bit 21 (top row, 5th bit from the right)

(3) Engine 3 - Bit 22 (top row, 6th bit from the right)

(4) Engine 4 - Bit 23 (top row, 7th bit from the right)

H. If the bit is 0, the test fails.

I. Start the engine (MM 71-00-00/201).

J. Push the ENG button on the EICAS display select panel.

K. Make sure that the applicable OIL T indication on the Lower EICAS display is less than 295°F (146°C).

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CMC SOFTWARE PART NUMBERS 685-2270-007
685-2270-902

D633U102-99

IDS MESSAGES

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IDS MESSAGES - TROUBLE SHOOTING	
L. Increase the engine RPM to 90% of N2.	
(1) Make sure that the bit stays at 1 until a minimum of 75% N2.	
(2) Then, make sure that the bit changes to 0.	
M. Shut down the engine.	
N. If the bit changes to 0 too soon or stays at 1, the test fails.	
2. Replace the cooler valve, V350 (MM 24-11-15/401).	
>ELEC SSB OPEN (ADVISORY)	24 20 37 00
ELEC SSB OPEN (STATUS) (NVM)	24 20 27 00
1. Replace the split system breaker (SSB), C961 (MM 24-22-02/401).	
2. Replace the SSB protection relay, R8128 (WDM 24-22-41).	
3. Examine the wiring (WDM 24-22-41 and 24-22-04).	
ELEC STBY POWER (STATUS)	24 20 48 00
1. Make sure that the BATTERY switch is ON.	
2. Make sure that the STANDBY POWER switch is not OFF.	
3. A. Apply AC power to buses, if not already accomplished (MM 24-22-00/201).	
B. If message remains with the STANDBY POWER switch in the OFF, AUTO, and BAT positions, replace standby power transfer relay R7227 (MM 24-29-03/401 and WDM 24-33-21).	
C. If message remains only while the STANDBY POWER switch is in the OFF and BAT positions, replace the main battery relay, R7223 (MM 24-31-03/401 and WDM 24-33-11) and replace the battery transfer relay R7224 (MM 24-31-03/401 and WDM 24-33-12).	
4. Examine the static inverter, M7438, wiring and contacts (WDM 24-33-21).	
5. Replace the static inverter, M7438 (MM 24-29-01/401).	
6. Replace the electrical system control module, M7307 (MM 24-22-01/401).	
ELEC TR UNIT 1 (STATUS)	24 30 16 00
1. Replace TRU-1, T1494 (MM 24-32-01/401).	
2. Examine and repair the wiring (WDM 24-11-11, 24-32-12).	
ELEC TR UNIT 2 (STATUS)	24 30 17 00
1. Replace TRU-2, T1495 (MM 24-32-01/401).	
2. Examine and repair the wiring (WDM 24-11-11, 24-32-12).	
ELEC TR UNIT 3 (STATUS)	24 30 18 00
1. Replace TRU-3, T1496 (MM 24-32-01/401).	
2. Examine and repair the wiring (WDM 24-11-11, 24-32-12).	

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CMC SOFTWARE PART NUMBERS 685-2270-007
685-2270-902

D633U102-99

IDS MESSAGES

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Figure 41 IDS Messages

TROUBLE-SHOOTING RAMP MAINTENANCE MANUAL CONTENTS

BOEING 747-400

RAMP MAINTENANCE MANUAL

SYSTEM/COMPONENT	MM/RMM REF		FIM	IPC	WDM/SSM
Electrical Power	D&O	MM 24-00-00/001			
Generator Drive System	D&O Depressurize IDG Oil Sys IDG Oil Sys Static Leak Ck Oper Test	MM 24-11-00/001 MM 24-11-00/201 MM 24-11-00/201 MM 24-11-00/501	24-11-00		WDM 24-11-11 thru WDM 24-11-14 SSM 24-11-01 thru SSM 24-11-04
Exchanger - Heat, IDG Air/Oil	R/I	MM 24-11-14/401		24-11-14	
Exchanger - Heat, IDG Fuel/Oil	R/I	MM 24-11-13/401		24-11-13 73-11-06	
Filter - Scavenge	R/I	MM 24-11-04/401		24-11-01	
Generator - Integrated Drive	IDG - Disconnect/Reconnect R/I Inspect Service (Oil Replenish)	MM 24-11-01/201 MM 24-11-01/401 MM 24-11-01/601 RMM 24		24-11-01	
Ring - QAD, IDG	R/I Inspect	MM 24-11-08/401 MM 24-11-08/601		24-11-01	
Valve - Heat Exchanger, IDG Air/Oil	R/I	MM 24-11-15/401		24-11-15	
Valve - Pressure Relief, IDG	R/I	MM 24-11-05/401		24-11-13	
AC Generation	D&O Oper Test	MM 24-20-00/001 MM 24-20-00/501	24-20-00		

Electrical Power - Reference Table

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24 ELECTRICAL PWR

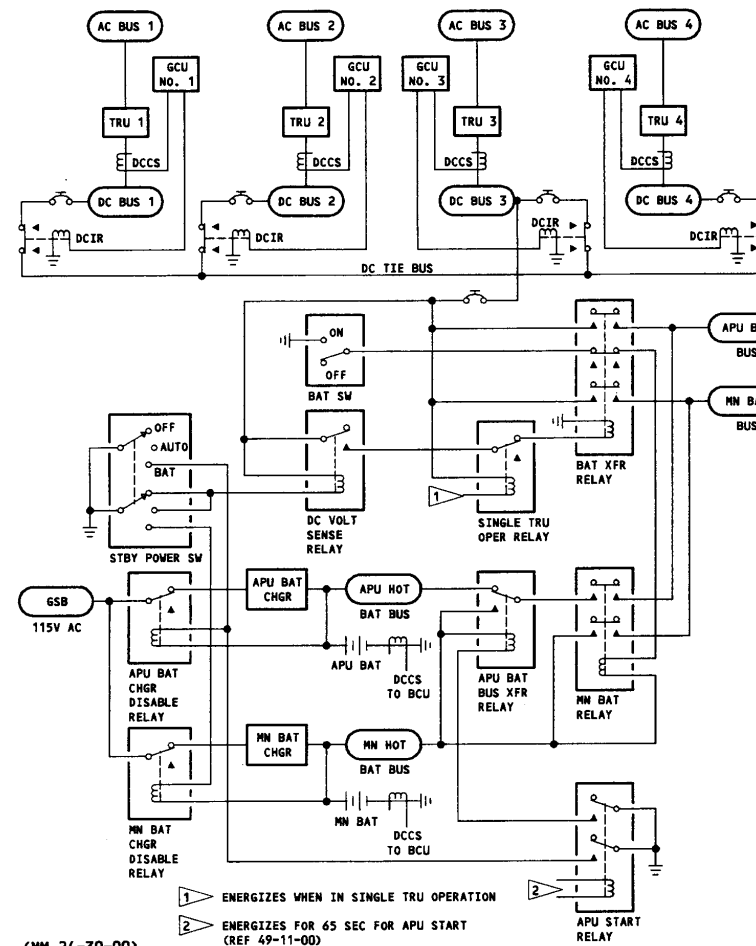
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Figure 42 RMM (ATA 24)

BOEING 747-400

RAMP MAINTENANCE MANUAL



(MM 24-30-00)

DC Generation Simplified Schematic
Figure 24-2

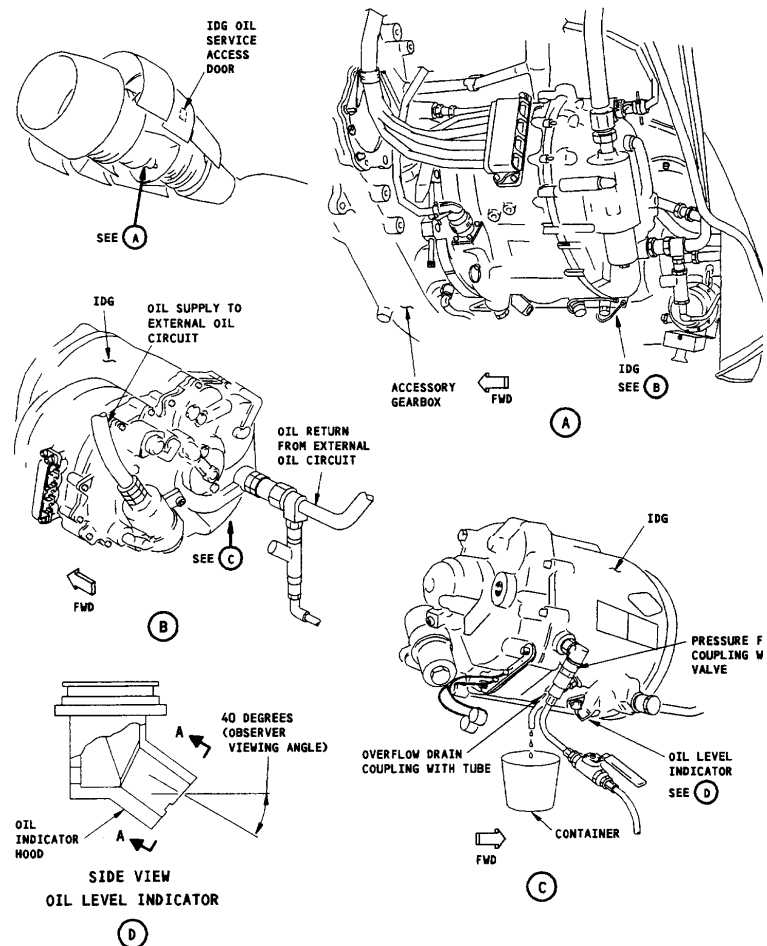
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24 ELECTRICAL PWR

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**BOEING 747-400****RAMP MAINTENANCE MANUAL**

Integrated Drive Generator Oil Replenishing
Figure 24-3 (Sheet 1)

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Figure 43 Service Informations



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RAMP MAINTENANCE MANUAL

FUNCTION	LAMP NO.	FUNCTION	LAMP NO.
FLIGHT COMPARTMENT		AREA AND MISC. LIGHTS	
<u>ANNUNCIATOR AND WARNING LIGHTS</u>		Module Lightplates	MS90451-6832
Advisory-Lighted PB Switches	MS25237-387	Map Lights	1308
Status-Lighted PB Switches	MS24515-685AS15	Reading Lights	1308
Warning and Caution Annunciators	MS25237-387	Utility Lights	313
Fire Handles	MS25237-387	Dome Lights	16651F
Engine Start Switches	MS25237-387	Worktable Lights	1864
Fuel Cut Off Switches	MS25237-387	Approach Chart Lights	WI-7049
		Instrument Panel Floodlights	7152
			6832
			1385
<u>INDICATOR LIGHTS</u>		<u>PASSENGER COMPARTMENT LIGHTS</u>	
Brake Pressure	0312-0469	Night Illumination/Closet	1864
Clocks	7715	Reading/Door Work Lights	2233
Weather Radar	328AS15	Entry Door Threshold	325
Stab Trim Position	715AS15	Direct Ceiling	1691
	OL8552AS15	Crossover/Crew Rest/Reading/Spotlight	1665
Standby Attitude	7152	Coat Closet	1495
Standby Altimeter	715	Attendant Call/Attendant Advisory	387
Standby Airspeed	715	Attendant Panels	85
Radio Magnetic	7153AS15	Sill/Overdoor	1317
Rudder Trim	7152	Direct Ceiling-Upper Deck	1308
Standby Compass	328	Stairwell Tread	5113/VW
<u>CONTROL PANEL LIGHTS</u>		Ceiling/Wall Wash Fluorescent	F09/31K/BCAC
Radio Communication	MS90451-6832AS15	Ceiling/Wall Wash Fluorescent	F013/31K/BCAC
Audio Control	MS90451-6832AS15	Ceiling/Wall Wash Fluorescent/Upper Deck Galley	F019/31K/BCAC
	DL8562BPPE	Ceiling/Wall Wash Fluorescent	F027/31K/BCAC
	HLMP-1540	Ceiling/Wall Wash Fluorescent	F032/31K/BCAC
Multi-Purpose Control Display Unit	MS90451-7132	Ceiling/Wall Wash Fluorescent/Window Reveal/Crew Rest Ceiling/Crew Rest Stair	F039/31K/BCAC
	MS90451-6832		
	MS90452-7152		
	OL30702AS156PL		
IRS Mode Control	MS90451-6832 or MS524367-6834S15		
Mode Select	685		
	387		
Emergency Evacuation	1820		
	6832		
Weather Radar	328AS15		
Cabin Attitude Control	328AS15		
Pilot's Call-Cabin Telephone	DL-8562BPPE		
Multi-Input Printer	21023-0201		

(VDM 33-00-01)

Lamp Usage Chart

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33 LIGHTS

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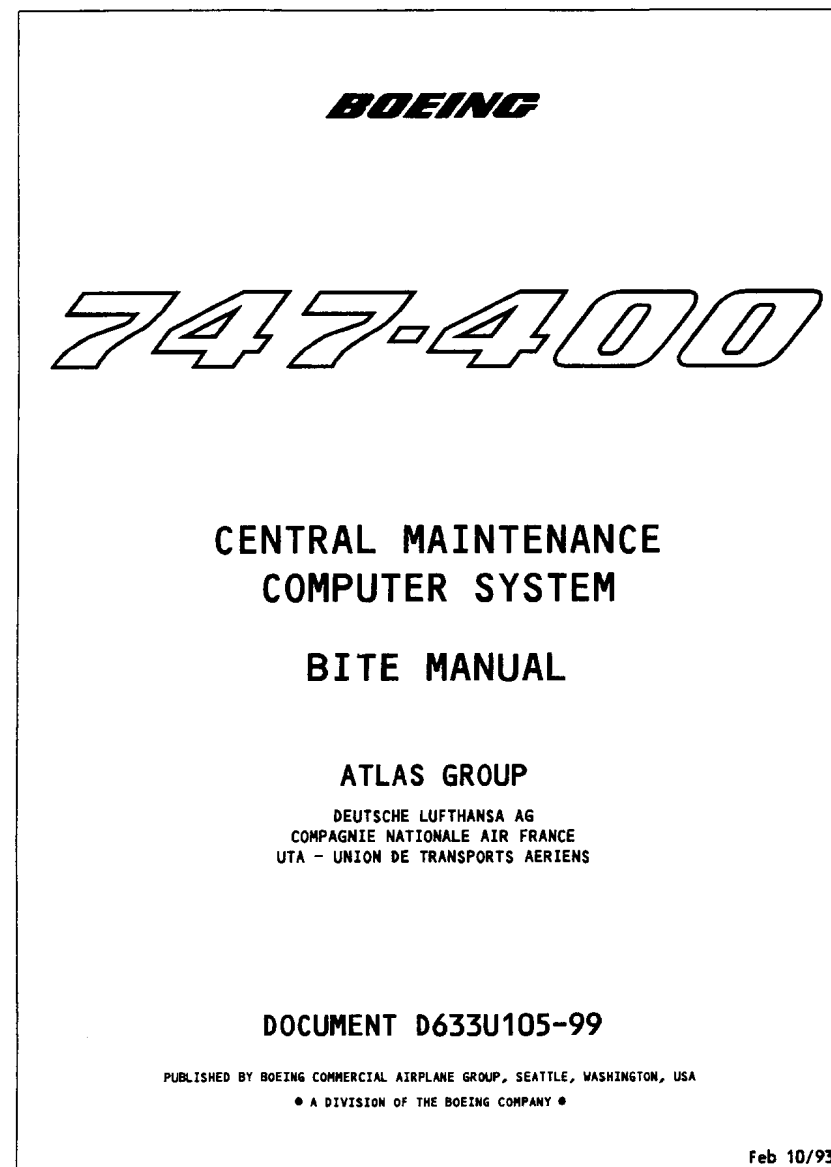
Figure 44 Lamp Usage Charts



BITE MANUAL

CONTENTS

Nennt die für die ATA Chapters verfügbaren Ground Tests.
Außerdem wird eine Beschreibung des Testablaufs gegeben.



TROUBLE-SHOOTING BITE MANUAL CONTENTS



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BOEING 747-400
MAINTENANCE/CMCS BITE MANUAL

CENTRAL MAINTENANCE COMPUTER SYSTEM - ELECTRICAL POWER - MAINTENANCE PRACTICES

1. General

A. Table 201 shows the available CMCS ground tests in ATA chapter 24. These are the prompts that show on the GROUND TESTS menus. The test procedures follow the table in the sequence shown in the table.

GROUND TESTS MENU PROMPTS
<24 ELECTRICAL POWER <EPGS (BCU1) <EPGS (BCU2)

Table 201 - Ground Tests

TASK 45-24-00-742-014

2. Ground Test - Generator and Bus Control Units

A. General

(1) The CMC sends commands to the BCUs and GCUs to start the tests of the internal circuits and non-volatile memory. If the internal circuit of a unit does not operate correctly, the unit sends a failure indication to the CMCS. Then, the CMC shows the line-relevant failures as CMCS messages. Also, the unit keeps the shop-relevant failures in its non-volatile memory (NVM).

B. References

(1) 24-22-00/201, Manual Control

C. Access

(1) Location Zone

221	Control Cabin, LH
222	Control Cabin, RH

D. Prepare for the Test

S 862-002
Supply electrical power (Ref 24-22-00/201).

(2) Set the STANDBY POWER switch to the OFF position.

NOTE: EICAS messages will appear when the STANDBY POWER switch is OFF. Ignore these messages.

S 712-003
Prepare the CDU for the test:

(a) Push the MENU key on the CDU to show the MENU.

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45-24-00

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MAINTENANCE/CMCS BITE MANUAL

(b) Push the line select key (LSK) that is adjacent to <CMC to show the CMC MENU.

(c) If <RETURN shows after you push the LSK, push the LSK that is adjacent to <RETURN until you see the CMC MENU.

(d) Push the LSK that is adjacent to <GROUND TESTS to show the GROUND TESTS menu.

(e) Push the NEXT PAGE key until you find <24 ELECTRICAL POWER.

(f) Push the LSK that is adjacent to <24 ELECTRICAL POWER to show the GROUND TESTS menu for the electrical system.

(g) Push the NEXT PAGE key until you find <EPGS (BCU1) or <EPGS (BCU2).

NOTE: If INHIBITED shows above <EPGS (BCU1) or <EPGS (BCU2) the test will not operate.

(h) If INHIBITED shows above <EPGS (BCU1) or <EPGS (BCU2):

- 1) Push the LSK that is adjacent to the test prompt.
- 2) Do the steps shown on the CDU.
- 3) Push the LSK that is adjacent to <RETURN to show the ground test menu again.

E. EPGS Ground Test

(1) Push the LSK that is adjacent to the applicable prompt (<EPGS (BCU1) or <EPGS (BCU2)).

NOTE: IN PROGRESS shows during the test.

S 742-004
When IN PROGRESS goes out of view, look for PASS or FAIL> adjacent to <EPGS (BCU1) or <EPGS (BCU2).

NOTE: If a PASS indication shows, no failures occurred during the test.

(a) If FAIL> shows:

- 1) Push the LSK that is adjacent to FAIL> to see the GROUND TEST MSG pages for the failure.
- 2) Push the NEXT PAGE key until you find all the GROUND TEST MSG pages.
- 3) Make a list of all CMCS messages, CMCS message numbers, and ATA numbers that show on the GROUND TEST MSG pages.
- 4) Go to the CMCS Message Index of the Fault Isolation Manual (FIM) to find the corrective action for each CMCS message.

S 862-005
Put the Airplane in its Usual Condition.

(a) Set the STANDBY POWER switch to AUTO.

(b) Remove electrical power if it is not necessary (Ref 24-22-00/201).

EFFECTIVITY _____

ALL

45-24-00

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Figure 45 CMCS BITE MANUAL



AIRCRAFT OPERATING MANUAL (AOM)

MINIMUM EQUIPMENT LIST (MEL)

Introduction

In der MEL sind alle Komponenten gelistet, die außer Betrieb sein dürfen, ohne dadurch die Sicherheit der Flugdurchführung zu beeinflussen.

Dabei handelt es sich um Komponenten , die wegen ausreichender Redundanz oder wegen fehlenden Einflusses auf den Flugbetriebdefekt sein dürfen.


<div> AOM B747-4 Airplane Operations Manual</div>		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. <u>Crew Operating Procedure</u> 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. <u>Maintenance Procedure</u>		
-23-2 Bore Cooling System		4	One or more may be inoperative open.		
-24-1 Turbine Case Cooling Air Flow Systems		4	One or more may be inoperative provided associated turbine case cooling valve is closed. <u>Crew Operating Procedure</u> For each engine with inoperative Turbine Case Cooling, fuel burn will increase approx. 0.45%. This means min. fuel has to be increased by approx. 0.12% if one engine, respectively 0.23% if two engines have closed valves. <u>Maintenance Procedure</u>		
-24-2 Turbine Cooling Air Systems		4	One or more may be inoperative provided turbine cooling air valve remains open. <u>Crew Operating Procedure</u> 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. <u>Maintenance Procedure</u>		
-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 <u>Crew Operating Procedure</u> 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. <u>Maintenance Procedure</u>		

Figure 46 MEL (Engine Bleed Air)



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.



Technisches Betriebshandbuch

MEL - Maintenance Procedure

B 747-400

TBH - L, II

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)

Figure 47 Maintenance Procedure

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AIRCRAFT SCHEMATIC MANUAL

SYSTEM SCHEMATICS

Introduction

Zeigt schematisch, wie elektrische Komponenten im Flugzeug miteinander verbunden sind.

Außerdem werden im Bedarfsfall mechanisch-elektrische Verknüpfungen dargestellt .

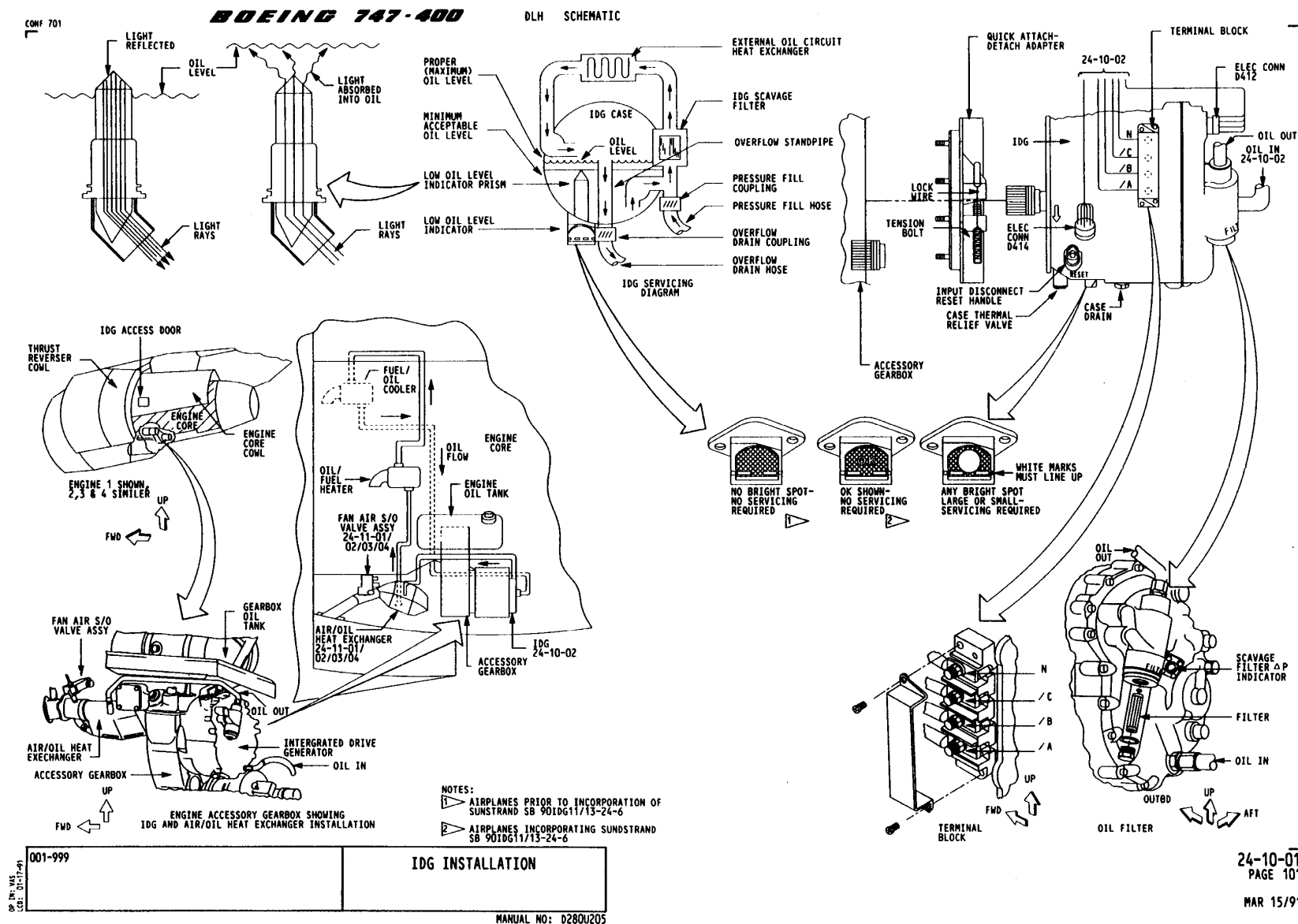


Figure 48 IDG Schematic

TROUBLE-SHOOTING AIRCRAFT SCHEMATIC MANUAL (ASM)



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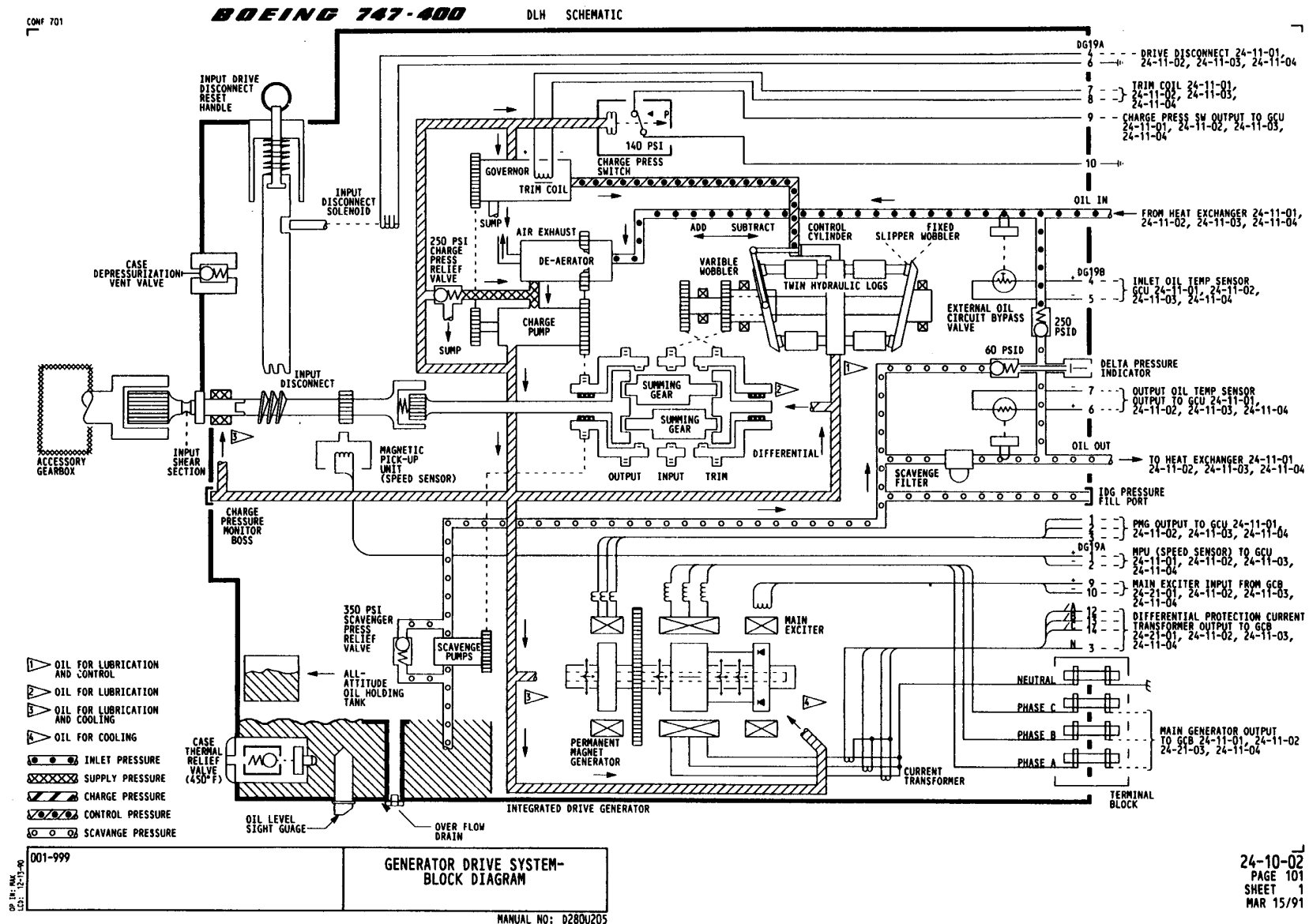


Figure 49 IDG Schematic

TROUBLE-SHOOTING AIRCRAFT SCHEMATIC MANUAL (ASM)



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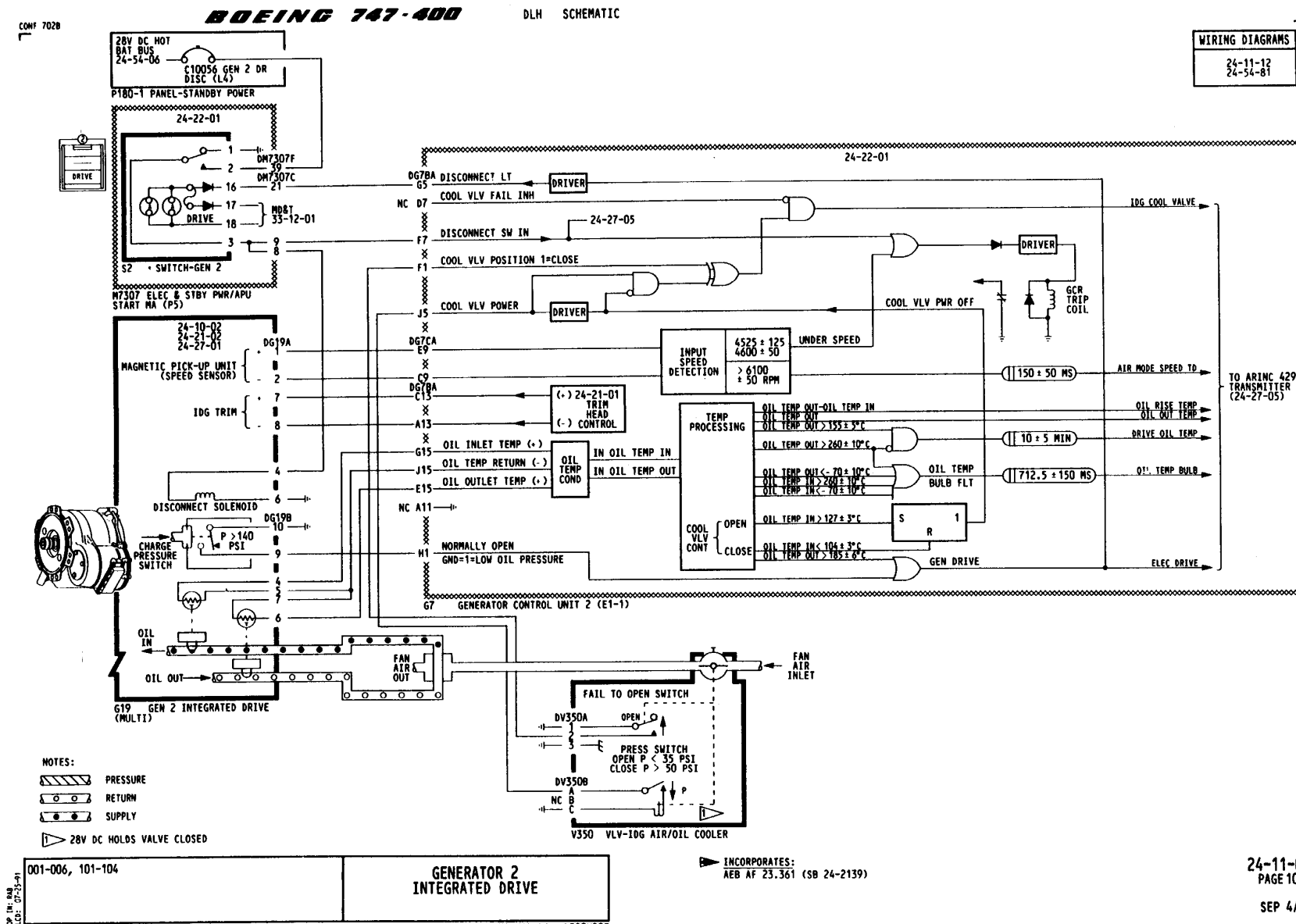


Figure 50 Generator 2 Schematic



EQUIPMENT LIST

General

Hat man auf der MCDU (Multipurpose Control Display Unit) oder im Schematic Manual z.B. eine Equipment Number gefunden, dann kann man aus der Equipment List die Partnumber ermittelt werden.

Das "VALVE ASSY FAN AIR S/O IDG OIL COOLER" hat die

Equip. Number: V350 und die

P/N: 23E59-4

Effectivity: ALL

TROUBLE-SHOOTING
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R M E O V D	EQUIP	O P T	PART NUMBER PART DESCRIPTION	USED ON DWG CH 20 REF	VENDOR QTY STATION -WL -EL	DIAGRAM -WL -EL	EFFECTIVITY
	V00347		S210T120-101 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 36-11-41 88-	RT041-RT044
	V00347		S210T120-101 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 36-11-41 88-	RT431-RT435
	V00347		S210T120-111 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 36-11-41 88-	RT045-RT060
	V00347		S210T120-111 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 36-11-41 88-	RT436-RT441
	V00347		S210T120-131 VALVE-HP-SHUTOFF ENG 1,2,3,4	332T4320	V73030 NR175-	4 36-11-41 88-	RT442-RT450
	V00348		S210T120-15 VALVE-FAN AIR CONTROL	65E00TBD	V99207 ENG-	1 71-51-11 -	ALL
	V00349	1	60E00200 VALVE-HYDR DEPRESS EDP	332U2120	V81205 MULTI-	4 29-11-01 -	ALL
	V00349	2	60E00256 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-	4 80-11-01 -	RT041-RT060
	V00351		S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG-	4 80-11-01 -	RT431-RT431
	V00351		S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG-	4 80-11-01 -	RT433-RT450
	V00351	1	S332U232-6 VAL ENG START CONT 979826-6	332U2311	V81205 ENG-	4 80-11-01 -	RT432-RT432
	V00351	2	S332U232-7 VAL ENG START CONT 979826-5	332U2311	V81205 ENG-	4 80-11-01 -	RT432-RT432
					V59364		
MODEL	747		REV DATE	MANUAL D280U105	EQUIPMENT LIST	SECTION V00300	
CUSTOMER DLH	747-400		AUG 18/93	DWG NO. 280U1105	VOLUME-1	PAGE 1	

Figure 51 Equipment Number

