modules, called Core Processing Input/output Modules (CPIOMs). As a consequence, IMA concept reduces the maintenance cost due to less sparecomputers.

Each CPIOM integrates new hardware and software technologies and hosts these independent applications in the same computing and memory resources, and also supplies an Input/output interface service to some of the conventional avionics. Moreover, in order tosatisfythehighdemandofconventionalavionics,thisservice

capability has been increased thanks to additional IMA modules called Input/output Modules (IOMs). CPIOMs and IOMs are Line Replaceable Modules (LRMs). Theses LRMs dialogue through the Avionics Data Communication Network (ADCN) by the means of communication technology developed from non- aeronautical standard, which has been adapted to aviation constraints. This technology is called Avionics Full DupleXswitched Ethernet(AFDX).

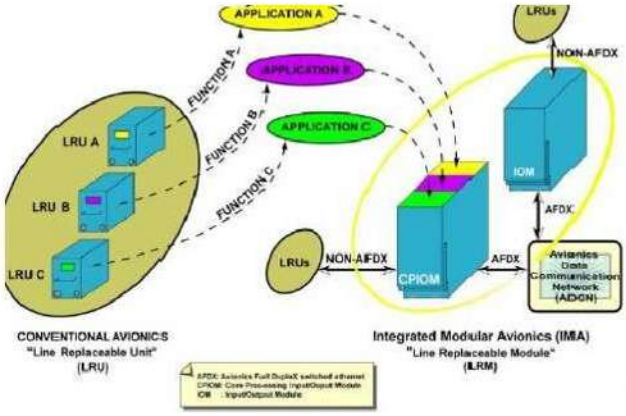


Fig. 19.10

Integrated Modular Avionics Description (3) CPIOM Types

There are 7 types of CPIOM, each one identified by a letter (A to G). Each type is associated to a specific part number. Within a given type, all CPIOMs are interchangeable but may require a software reconfiguration.

Each type hosts avionics application:

- 4 CPIOM-A: Pneumatic applications (+Optional Air Conditioning Air Conditioningapplications)
- 4 CPIOM-B: Air Conditioningapplications
- 2 CPIOM-C: Cockpit and Flight Controlsapplications
- 2 CPIOM-D: Data Link applications
- 4 CPIOM-E: Energyapplications
- 4 CPIOM-F: Fuelapplications
- 4 CPIOM-G: Landing Gearapplications

ATA 36 applications:

- The Engine Bleed Air System(EBAS)
- The Over Heat Detection System(OHDS)
- The Pneumatic Air Distribution System(PADS)

ATA 21 application (optional)

- The supplemental Cooling System(SCS)

In addition Each CPIOM-A hosts its own module software, which are:

- The CPIOM-Ax coresoftware
- The CPIOM-Ax configuration tablesoftware

The 4 CPIOM-Bx (x-1, 2, 3 or 4) host the air conditioning applications, which are:

Fig. 19.11 CPIOM Types

Integrated Modular Avionics Description CPIOM Types (continued)

CPIOM-A & CPIOM-B

The 4 CPIOM-Ax (x-1, 2, 3 or 4) host the pneumatics and optional air conditioning applications, whichare:

ATA 21 application:

- The air Generation System(AGS)
- The Avionics Ventilation System(AVS)
- The Cabin Pressure Control System(CPCS)
- The Temperature Control System(TCS)
- The Ventilation Control System(VCS)

In addition Each CPIOM-B Hosts its own module software, which are:

- The CPIOM-Bx CoreSoftware
- The CPIOM-Bx configuration tablesoftware

The DC BUS 1 supplies the CPIOM-A1, the DC BUS 2 supplies the CPIOM-A4 and the DC ESS BUS supplies the CPIOM-A2/3

The DC BUS 1 supplies the CPIOM-B1, the DC BUS 2 supplies the CPIOM-B4 and the DC ESS BUS supplies the CPIOM-B2/3

ATA 31 application:

- The Flight Warning System(FWS)

In addition Each CPIOM-C hosts its own module software, which are:

- The CPIOM-Cx coresoftware
- The CPIOM-Cx configuration tablesoftware
- The CPIOM-D1 hosts the data link application, whichis:

ATA 46 application:

- The Air Traffic Control(ATC)
- The CPIOM-D3 hosts the data link application, whichis:

Fig. 19.12 CPIOM Types-CPIOM-A & CPIOM-B

Integrated Modular Avionics Description CPIOM Types (continued)
CPIOM-C & CPIOM-D

ATA 23 application:

- The Avionics Communication Router (ACR)1

In addition each CPIOM-D hosts its own module software, which are:

The 2 CPIOM-Cx (x=1 or 2) host the cockpit and flight controls applications, which are:

ATA 22 applications:

- The Flight Control Unit (FCU)backup
- The Weight and Balance Backup Computation(WBBC)

ATA 27 applications:

- The Flight Control DATA Concentrator(FCDC)

- The CPIOM-Dx coresoftware
- The CPIOM-Dx configuration tablesoftware

The DC BUS 2 supplies the CPIOM-C2 and the DC ESSBUS supplies the CPIOM-C1
The DC BUS 1 supplies the CPIOM-D1/3

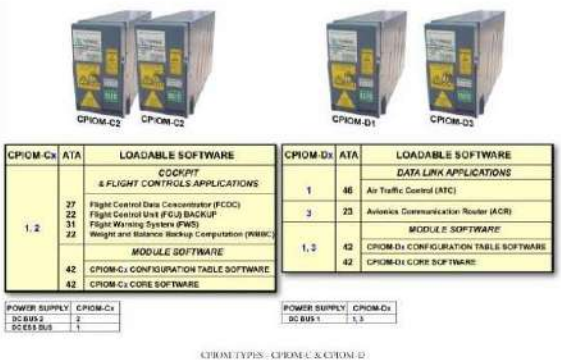


Fig. 19.13 CPIOM Types-CPIOM-C & CPIOM-D

Integrated Modular Avionics Description (3) CPIOM Types (continued)
CPIOM-E

The 2 CPIOM-Ex (x=1 or 2) host the energy applications, which are:
ATA 24 applications:

- The Circuit Breaker Monitoring System(CBMS)
- The Electrical Load Management System(ELMS)
- The Electrical System Bite(ESB)

In addition Each CPIOM-E hosts its own module software, which are:

- The CPIOM-Ex coresoftware
- The CPIOM-Ex configuration tablesoftware

The DC BUS 1 supplies the CPIOM-E1 and the DC BUS 2 supplies the CPIOM-E2

CPIOM-Ex	ATA	LOADABLE SOFTWARE
1, 2		*ENERGY APPLICATIONS*
	24	Circuit Breaker Monitoring System (CBMS)
	24	Electrical Load Management System (ELMS)
	24	Electrical System BITE (ESB)
		MODULE SOFTWARE
	42	CPIOM-Ex CONFIGURATION TABLE SOFTWARE
	42	CPIOM-Ex CORE SOFTWARE

POWER SUPPLY	CPIOM-Ex
DC BUS 1	1
DC BUS 2	2

Fig. 19.14 CPIOM Types-CPIOM-E

Integrated Modular Avionics Description (3) CPIOM Types (continued)
CPIOM-F & CPIOM-G

The 2 CPIOM-Fx (x=1 or 2) host the fuel applications, which are: ATA 28 applications:

- The Fuel CG measurementCOM
- The Fuel measurementCOM
- The Fuel management and CG ControlCOM

The 2 CPIOM-Fx (x=3 or 4) host the fuel applications, which are:

ATA 28 applications:

- The fuel system BITEMON
- The fuel CG measurementMON
- The fuel integrityMON
- The fuel monitorMON

In addition Each CPIOM-F hosts its own module software, which are:

- The CPIOM-Fx coresoftware
- The CPIOM-Fx configuration tablesoftware

The 2 CPIOM-Gx (x= 1 or 2) host the landing gear application, which are:

ATA 32 applications:

- The braking control systemCOM
- The steering control systemMON
- The Landing Gear Extension and Retraction System (LGERS) Low (LO)
- The steering control systemBITE

The 2 CPIOM-Gx (x=3 or 4) host the landing gear applications, which are:

ATA 32 applications:

- The braking control systemMON
- The steering control systemCOM
- The LGERS High(HI)

- The landing gear monitoringsystem
- The braking control systemBITE
- The LGERS BITE
- The landing gear monitoring systemBITE

In addition Each CPIOM-G hosts its own module software, which are:

- The CPIOM-Gx coresoftware
- The CPIOM-Gx configuration tablesoftware

The DC GROUND SERVICE BUS supplies the CPIOM-F2/4 and the DC ESS BUS supplies the CPIOM-G1 and the DC BUS 2 supplies the CPIOM-G2/3/4

CPIOM-Fx	ATA	LOADABLE SOFTWARE
		FUEL APPLICATIONS
1, 2	28	FUEL CG MEASUREMENT COM
	28	FUEL MEASUREMENT COM
	28	FUEL MANAGEMENT & CG CONTROL COM
3, 4	28	FUEL SYSTEM BITE MON
	28	FUEL CG MEASUREMENT MON
	28	FUEL INTEGRITY MON
	28	FUEL MONITOR MON
		MODULE SOFTWARE
1, 2, 3, 4	42	CPIOM-Fx CONFIGURATION TABLE SOFTWARE
	42	CPIOM-Fx CORE SOFTWARE

CPIOM-Gx	ATA	LOADABLE SOFTWARE
		LANDING GEAR APPLICATIONS
1, 2	32	BRAKING CONTROL SYSTEM COM
	32	STEERING CONTROL SYSTEM MON
	32	Landing Gear Extension and Retraction System (LGERS) LO
	32	STEERING CONTROL SYSTEM BITE
3, 4	32	BRAKING CONTROL SYSTEM MON
	32	STEERING CONTROL SYSTEM COM
	32	Landing Gear Extension and Retraction System (LGERS) HI
	32	LANDING GEAR MONITORING SYSTEM
	32	BRAKING CONTROL SYSTEM BITE
	32	Landing Gear Extension and Retraction System (LGERS) BITE
	32	LANDING GEAR MONITORING SYSTEM BITE
		MODULE SOFTWARE

Fig. 19.15

Integrated Modular Avionics Description CPIOM Components

A CPIOM is composed of various components, which are: Hardware Boards

- A power supply board connected to the 28VDC
- 2 inputs/outputs boards connected to the A/C systems through analogical, ARINC, Controller Area Network (CAN) and/or discretesignals.
- 1 Central Processing Unit (CPU) board supporting an AFDX END SYSTEM board. This AFDX END SYSTEM board supplies an AFDX interface to the CPIOM to exchange AFDX data with theADCN.

Field Loadable Module Software

One CPIOM core software operates the module and its hosted avionics applications.

One CPIOM configuration table software gives the module and the avionics applications with configuration data (e.g. memory, CPU, input/output allocations,etc.)

Field loadable Avionics Application/Database

Each ATA software is composed of one or more avionics applications and may include one or more database.

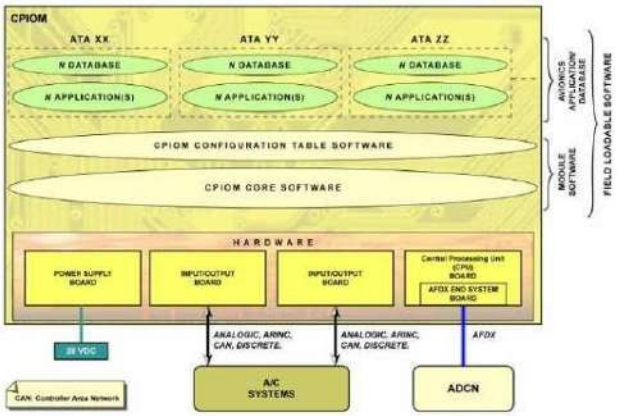


Fig. 19.16 CPIOM Components Integrated Modular Avionics Description

"Mirror" IOM Principle

An IOM converts non-AFDX data, coming from conventional LRUs, into AFDX data used within the ADCN and vice versa. There are 8 IOM-A connected to the ADCN. 4 IOMs on side 1 and 4 IOMs on side 2. The IOM-A1/2/3/5/7 is "mirror" IOMs of IOM-A2/4/6/8 and vice versa. A LRU such as computer, sensor, etc., that exchange message with ADCN subscribers must use both "mirror" IOMs. For an A/C system composed of more than one LRU (e.g. Navigation System), each LRU (e.g. RA) of this system dialogues through "mirror" IOMs different than those used by the otherLRUs.

Thus, the LRU and the ADCN subscribers send or receive redundant messages. In case on one IOM loss, the communication between a LRU and an ADCN subscriber is not lost thanks to the "mirror: IOM.

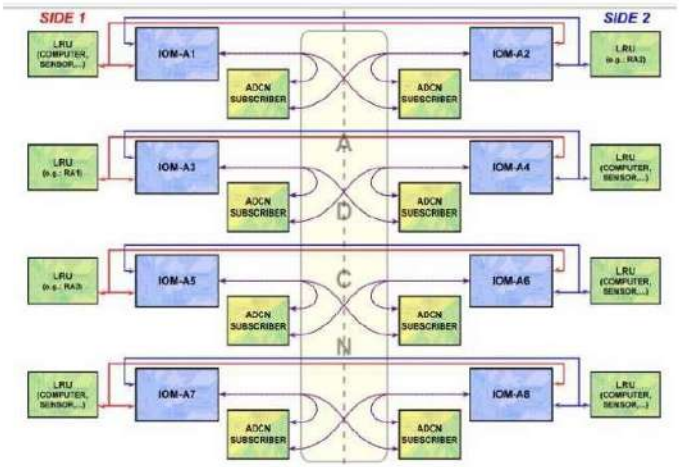


Fig. 19.17 “Mirror” IOM Principle

Integrated Modular Avionics Description (3) IOM Software

There is 1 type of IOM identified by a letter A. an IOM does not host avionics application. The 8 IOM-Ax (x=1, 2, 3, 4, 5, 6, 7 or
8) host the module software, whichare;

- The IOM-Ax operational programsoftware
- The IOM-Ax configuration table software All IOMs are fullyinterchangeable

The DC BUS 2 supplies the IOM-A2/4/6/8 and the DC ESS BUS supplies the IOM-A1/3/5/7.

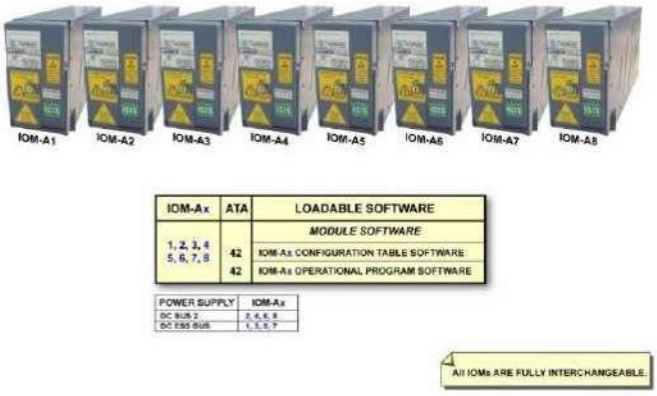


Fig. 19.18 IOM Software

Integrated Modular Avionics Description (3) IOM Components

An IOM is composed of various components, which are: Hardware Boards

- A power supply board connected to the 28VDC
- 2 inputs/outputs boards connected to the A/C systems through analogical, ARINC, CAN and/or discretesignals,
- 1 CPU board supporting an AFDEX END SYSTEM board. This AFDEX END SYSTEM board lets the IOM to exchange AFDX data with theADCN.

Field Loadable Module Software

One IOM-A operational program software that mainly assumes the gateway function between the non-

AFDX data to ADFDX data and viceversa.
One IOM-configuration table software gives the module with configuration data (e.g. input/output allocations, etc.)

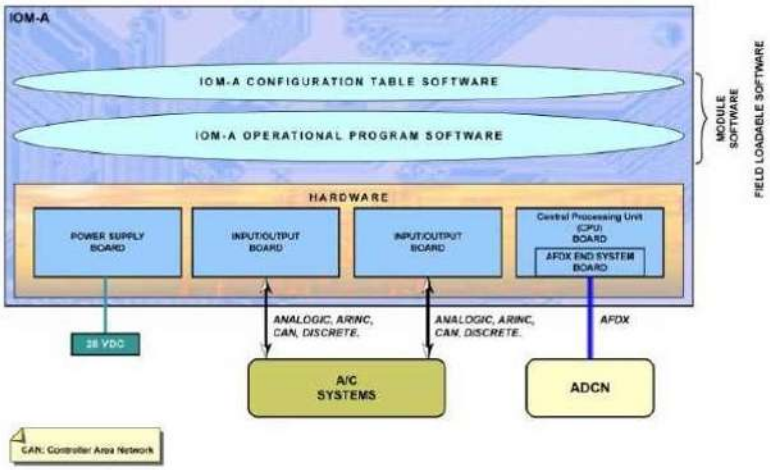


Fig. 19.19 IOM Components

Integrated Modular Avionics Failures Description (3) Loss of CPIOM

In case of CPIOM failure, only cockpit effect related to the loss of its hosted applications is triggered, not to the loss of the CPIOM itself.

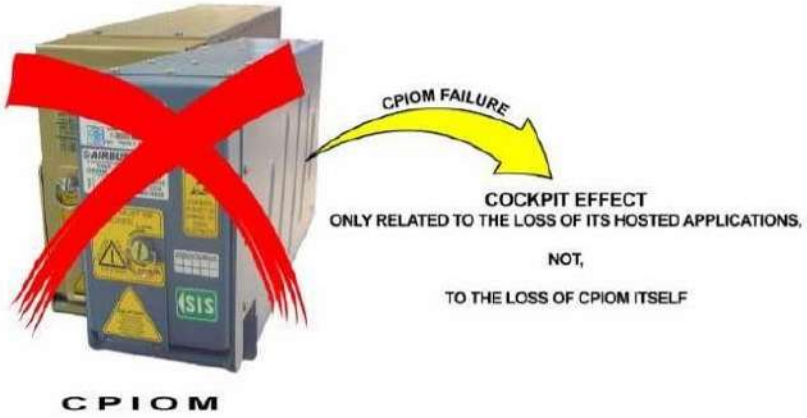


Fig. 19.20

Integrated Modular Avionics Failures Description (3) IOM Normal Operation

In normal operation, the 8 IOMs convert the A/C system data sent and received by LRUs directly connected to them from non- AFDX into AFDX format and vice versa.

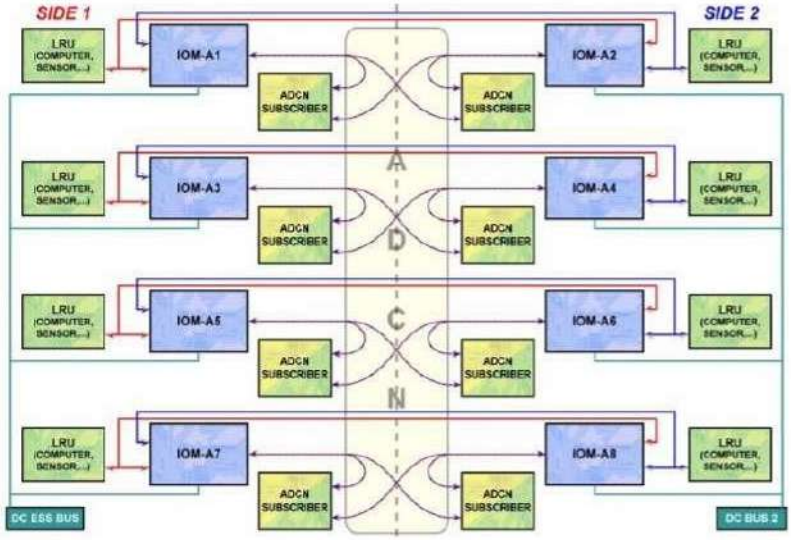


Fig.20.21 IOM Normal Operation

Integrated Modular Avionics Failures Description (3) Single IOM Loss

In case of a single IOM loss, only its mirror IOM is converting the A/C system data. It is a class 4 fault. If this failure is not repaired is not repaired prior to 1000 flight hours, it becomes a class 1 level 1fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a GO with C rectification interval.

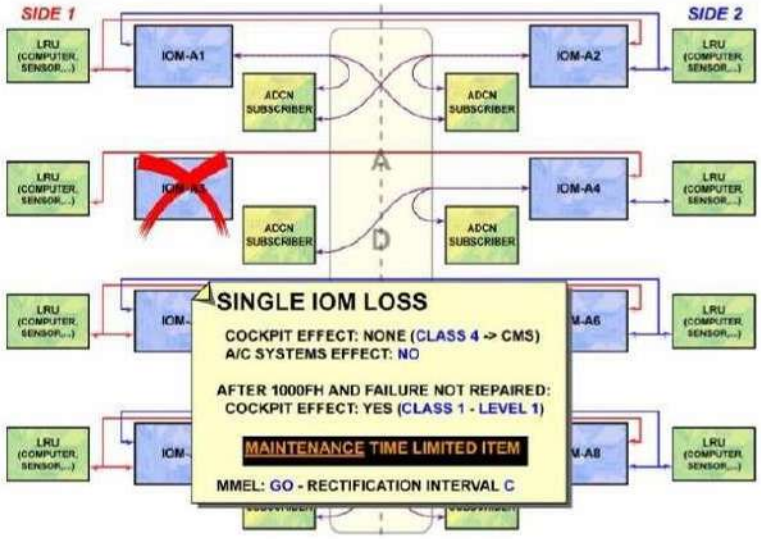


Fig. 19.22 Single IOM Loss

Integrated Modular Avionics Failures Description (3) IOM-A2 and IOM-A4 Loss

In case of IOM-A2 and IOM-A4 loss, only their "mirror" IOMs is converting the A/C system data. It is a class 1 fault level 1 deferred until the end of the flight. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a GO with B rectification interval. This case is only valid for the loss of IOM-A2 andIOM-A4.

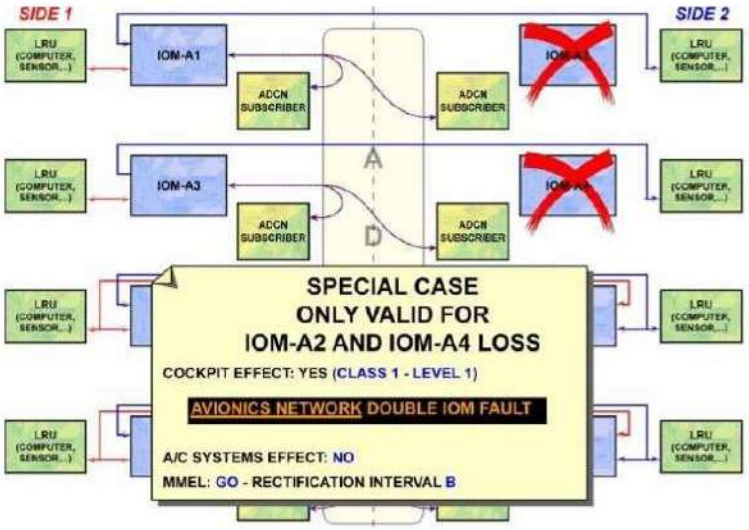


Fig. 19.23 IOM-A2 and IOM-A4 Loss

Integrated Modular Avionics Failures Description (3)
Multiple "Non-Mirror" IOM

In case of loss of multiple "non-mirror" IOMs, only their "mirror: IOMs are converting the A/C system data. It is a class 1 level 1 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a No GO.

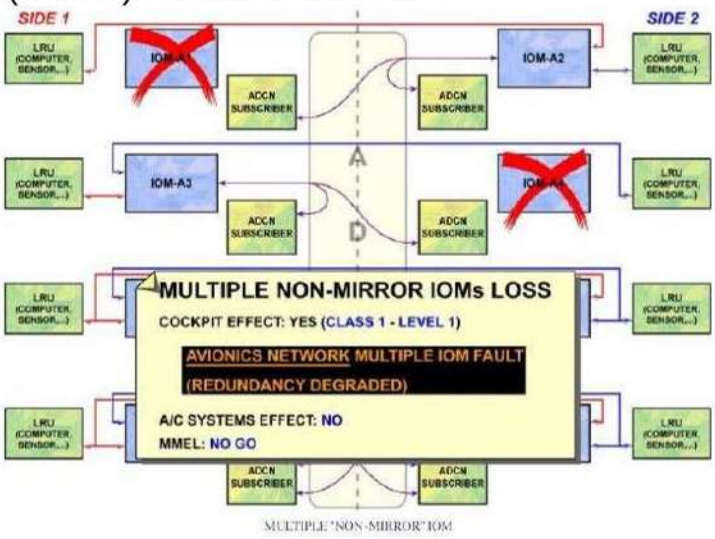


Fig. 19.24 Multiple "Non-Mirror" IOM

Integrated Modular Avionics Failures Description (3)
Multiple "Mirror" IOM Loss

In case of loss of multiple "mirror" IOMs, the A/C systemdata sent and received by LRUs connected to them are lost. It is aclass 1 level 2 fault. There is a functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is NO GO.

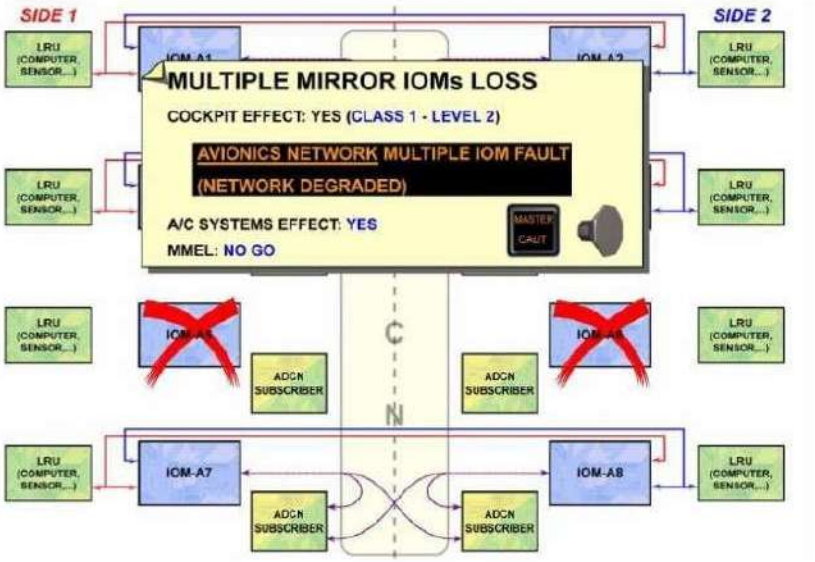


Fig. 19.25 Multiple "Mirror" IOM Loss

Avionics Data Communication Network Description General

The avionics world gathers the aircraft systems supplied within 7 functional areas, related to:

- Flight Control and Auto Flight
- Cockpit
- EngineControl
- Energy
- Pneumatic andCabin
- Fuel
- LandingGear

These functional areas group computers like LRUs, IOMs, CPIOMs and /or LRUs with AFDX interface that share a common interest or characteristic. These computers exchange operational and maintenance data. For most of them, this exchange is done through the Avionics Data Communication Network (ADCN). The ADCN is composed of two redundant networks, A and B both networks are composed of 8 AFDX switches, connected to each other with AFDXcables.

The ADCN uses AFDX technology based on the Ethernet protocol adapted to aeronautical constraints. It is used for the exchange of operational, maintenance and loading data between the ADCN subscribers which are LRUs with AFDX interface and the LRMs.

The subscribers can communicate at speeds 10 or 100 Mbits/s. this type of network is extensible and does not need specific connections for newsubscribers.

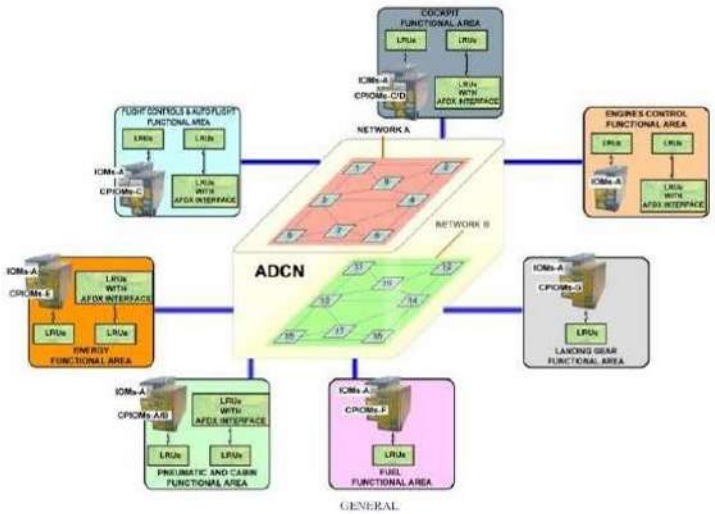


Fig. 19.26

Avionics Data Communication Network Description Data Transmission using ADCN

A/C system data are sent simultaneously from an ADCN subscriber to another ADCN subscribers (s) on both redundant network A and B through AFDX switches according to a predefined path called Virtual Link (VL).

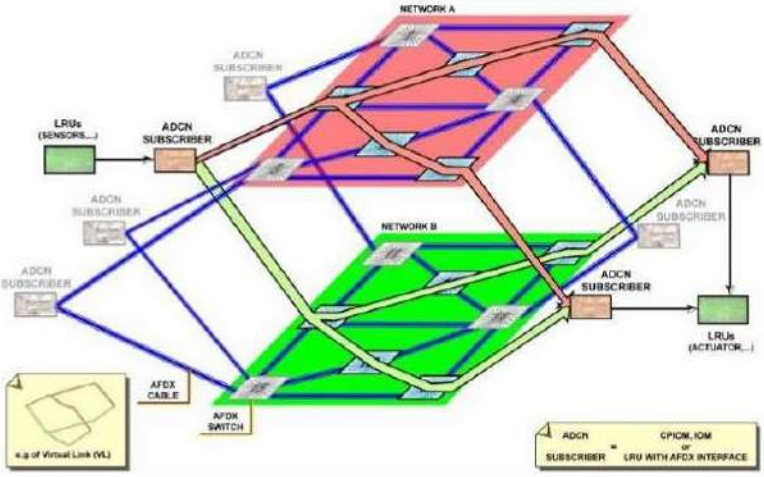


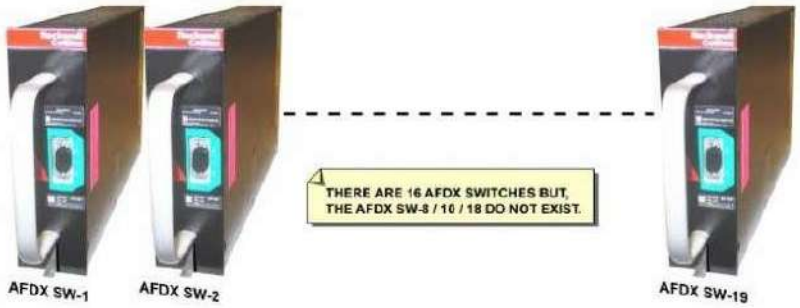
Fig. 19.27 Data Transmission using ADCN

Avionics Data Communication Network Description (3) AFDX SW Software

The 16 AFDX SW-XX (XX=1 to 19 but 8, 10 do not exist) host software, which are:

- The AFDX SW-XX operational programsoftware
- The AFDX SW-XX configuration tablesoftware

All AFDX switches are interchangeable but may require software reconfiguration. The AFDX SW-12/14/16/17 are supplied by the DC BUS 1, the AFDX SW-2/4/6/7 are supplied by the DC BUS 2, the AFDX-SW-1/3/5/9 are supplied by the DC ESS BUS and the AFDX SW-11/13/15/19 are supplied by the DC BUS 1, and DC ESS BUS in case of DC BUS 1 loss.



AFDX SW-xx	ATA	LOADABLE SOFTWARE
		MODULE SOFTWARE
ALL	42	AFDX SW-xx CONFIGURATION TABLE SOFTWARE
	42	AFDX SW-xx OPERATIONAL PROGRAM SOFTWARE

AFDX SW-xx	DC BUS	
12, 14, 16,17	1	
2, 4, 6, 7	2	
1, 3, 5, 9	ESS	
11, 13, 15, 19	1	ESS

Fig. 19.28 AFDX SW Software

Avionics Data Communication Network Description (3) AFDX Switch Components

An AFDX switch is composed of various components, which are: Hardware Boards

- A power supply board connected to the 28VDC
- A switching board, which routes the AFDX, frames according to a configurationtable
- An inputs/outputs board connected to other AFDX switches and ADCNsubscribers.

Field Loadable Module Software

One AFDX SW-XX operational program software that operates the module.

One AFDX SW-XX configuration table software gives the AFDX switch with configuration data. (e.g. switching board configuration, etc.)

NotethattheAFDXswitchesnumber1,2,3,4,5,6,7,9areon
the network A and the AFDX switches number 11, 12, 13, 14, 15,
16, 17, 19 are on the network B.

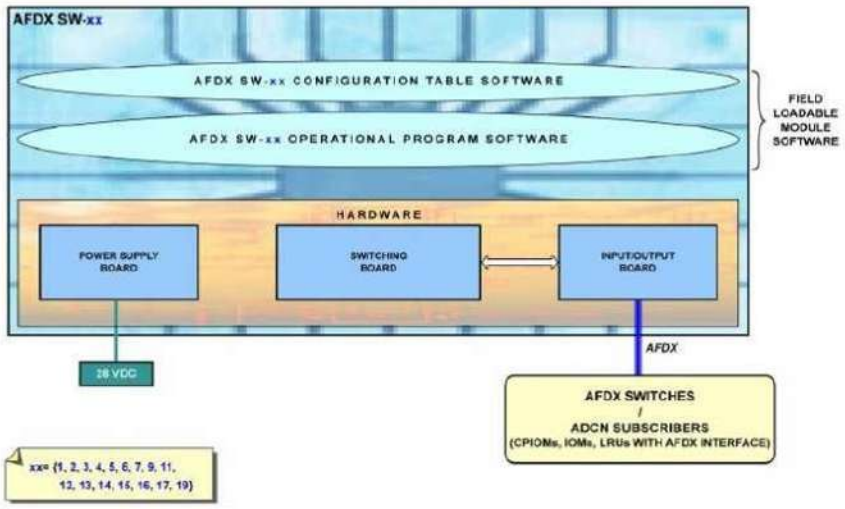


Fig. 19.29 AFDX Switch Components

Avionics Data Communication Network Description (3) The Virtual Link Philosophy
The ADCN is a set of AFDX switches interconnecting several ADCN subscribers. Each ADCN subscriber has an input/output interface called AFDX End System. This AFDX End System lets the subscribers send and receive AFDX frames to and from another (s) ADCN subscribers (s), through the ADCN. This is, by encoding the computer data into AFDX frame for transmission or decoding AFDX frame into computer data after reception. This AFDX END System duplicated AFDX frames in transmission and keeps the first incoming one in reception. This duplication increases the availability of A/C system data by sending them simultaneously on both redundant networks A and B.
Due to the AFDX technology, this data exchange uses a new concept called "Virtual Link" (VL).
The VL is similar to an unidirectional "pipe" through the ADCN.
The Virtual Link:

- Carries AFDXframe
- Has one specificidentification
- Is sent by one transmitteronly
- Is received by one or more subscribers in receivemode
- Goes on both redundant networks A and B, through a specificrouting.

This routing depends on receivers (e.g. application(s), computer(s), based on the configuration table. An AFDX switch has 24 AFDX input/output ports. To sum up, the emitter wants to send data. Each AFDX switch has a switching function. This function receives the VL coming from one emitter, routes it to the

appropriate output port (s) based on the configuration table. An AFDXswitchhas24AFDXinput/outputports.Tosumup,the

emitter sends a VL simultaneously to both first AFDX switches (one per network), then, each AFDX switch, according to the VL identification and its configuration table, routes the VL to the following AFDX switch and so forth till the receiver.

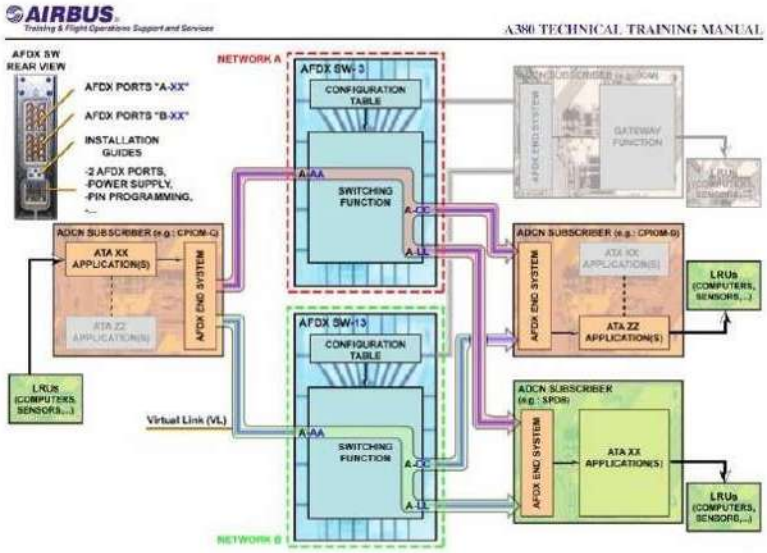


Fig. 19.30 The Virtual Link Philosophy

Avionics Data Communication Network Failures Description (3)
Normal Operation

In normal operation, the Virtual Link (VL) is transmitted onto both redundant networks A andB.

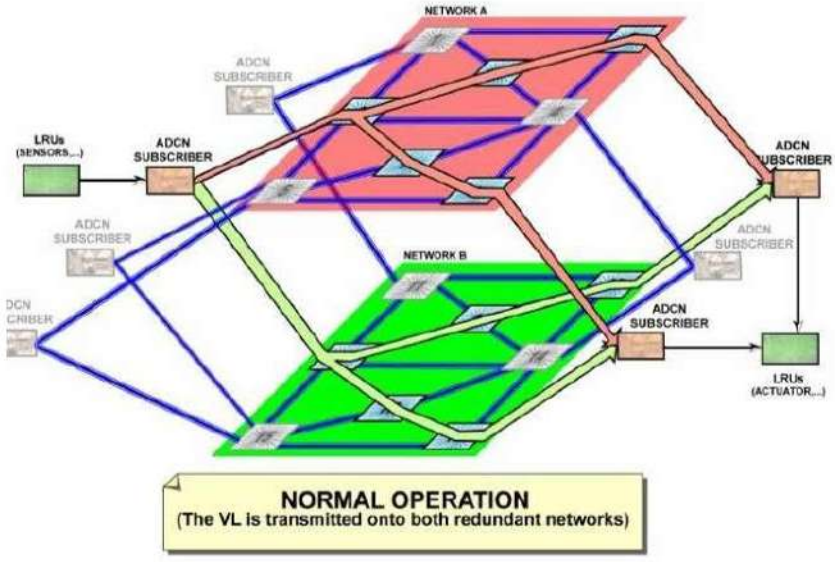
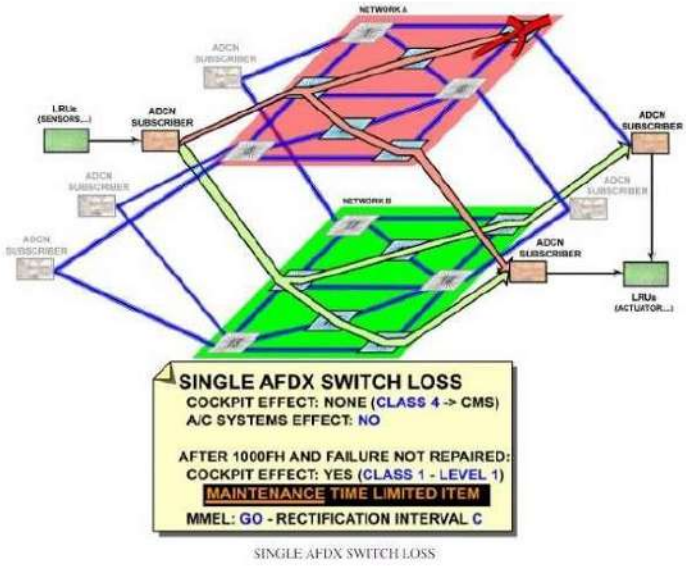


Fig. 19.31 Normal Operation

Avionics Data Communication Network Failures Description (3)
Single AFDX Switch Loss

In case of single a AFDX switch loss, the non-degraded network is transmitting the A/c system data. It is a class 4 fault. It this failure is not repaired prior to 1000 flight hours, it becomes a class 1 level 1 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List

(MMEL) this failure is a GO with C rectificationinterval.



SINGLE AFDX SWITCH LOSS

Fig. 19.32 Single AFDX Switch Loss

Avionics Data Communication Network Failures Description (3)
AFDX Switches 2 and 6 Loss

In case of AFDX-SW2 and AFDX-SW6 loss, the non-degraded network is transmitting the A/C system data. It is a class 1 fault level 1 deferred until the end of the flight. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a GO with B rectification interval. This case is only valid for the loss of AFDX-SW2 and AFDX-SW6.

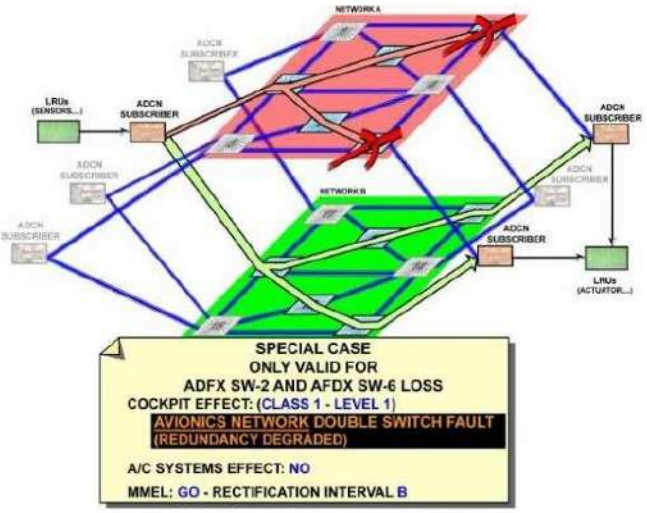


Fig. 19.33 AFDX Switches 2 and 6 Loss

Avionics Data Communication Network Failures Description (3)
Multiple AFDX Switches Loss (Same Network)

In case of multiple AFDX switches loss (two or more) on the same network (A or B), the non-degraded network is transmitting the A/C system data. It is a class 1 level 1 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a NOGO.

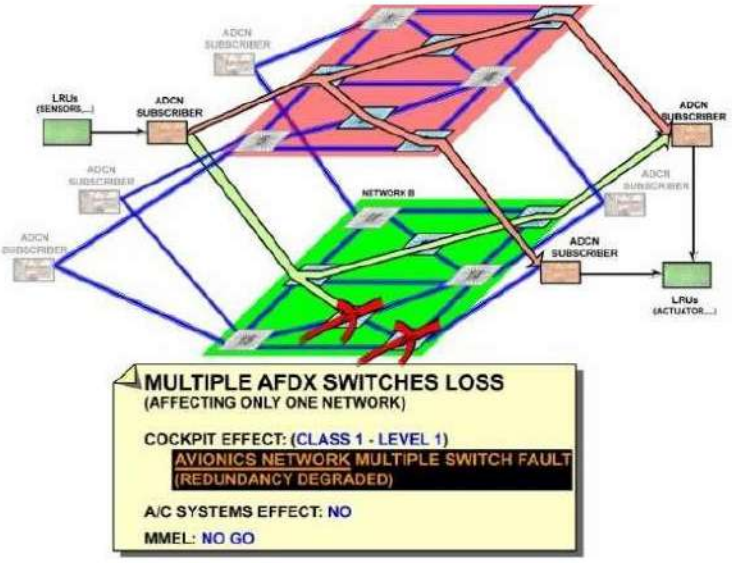


Fig. 19.34 Multiple AFDX Switches Loss (Same Network)

Avionics Data Communication Network Failures Description (3)
Multiple AFDX Switches Loss (Both Network)

In case of multiple AFDX switches loss (two or more) on the both networks, A/C system data is partially or no more transmitted. It is a class 1 level 2 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a NO GO.

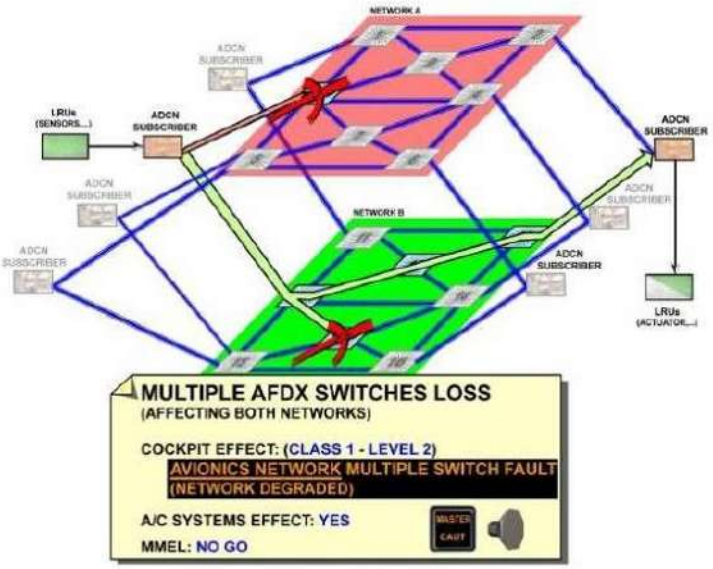


Fig. 19.35 Multiple AFDX Switches Loss (Both Network)

Avionics Data Communication Network Failures Description (3)
All AFDX Switches Loss
In case of All AFDX switches loss A/C system data is no more transmitted. It is a class 1 level 2 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a NO GO.
Note: The A/C can still be safely operated thanks to the backup of the main A/C systems.

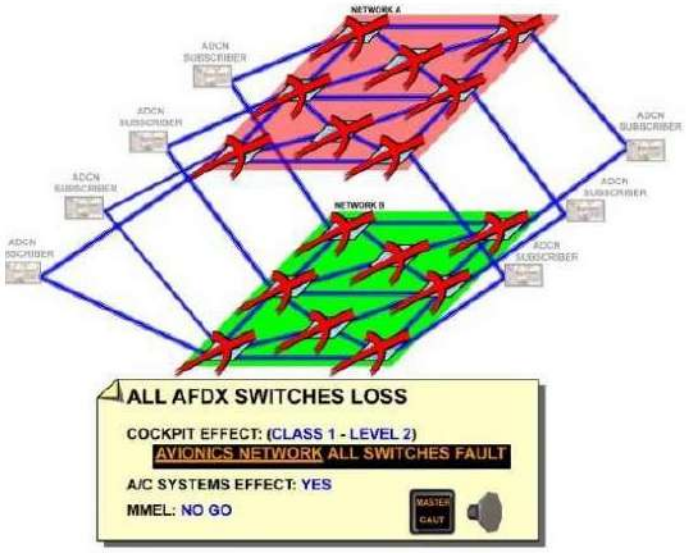


Fig. 19.36 All AFDX Switches Loss

Avionics Data Communication Network Failures Description (3)
Single AFDX Cable Loss

In case of single a AFDX cables loss, the non-degraded network is transmitting the A/c system data. It is a class 4 fault. It this failure is not repaired prior to 1000 flight hours, it becomes a class 1 level 1 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a GO with C rectificationinterval.

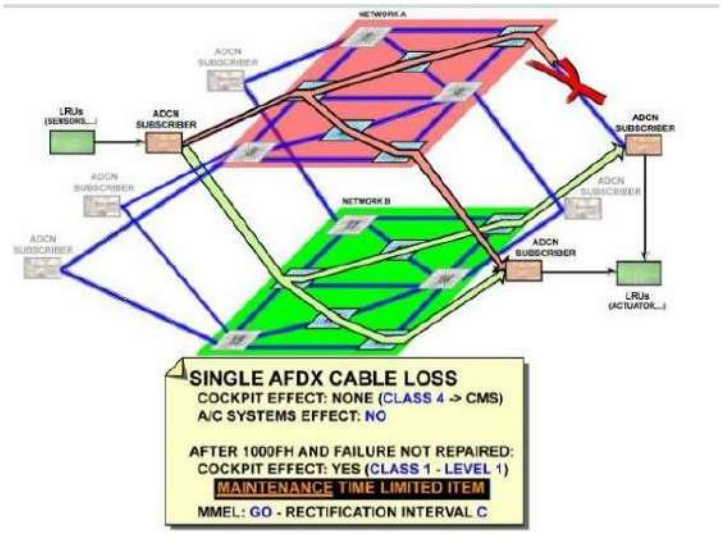


Fig. 19.37 Single AFDX Cable Loss

Avionics Data Communication Network Failures Description (3)
Multiple AFDX Cables Loss

In case of multiple AFDX cables loss (two or more), the A/C system data is partially or no more transmitted. It is a class 1 level 1 fault. There is no functional effect on A/C systems. According to the Master Minimum Equipment List (MMEL) this failure is a NOGO.

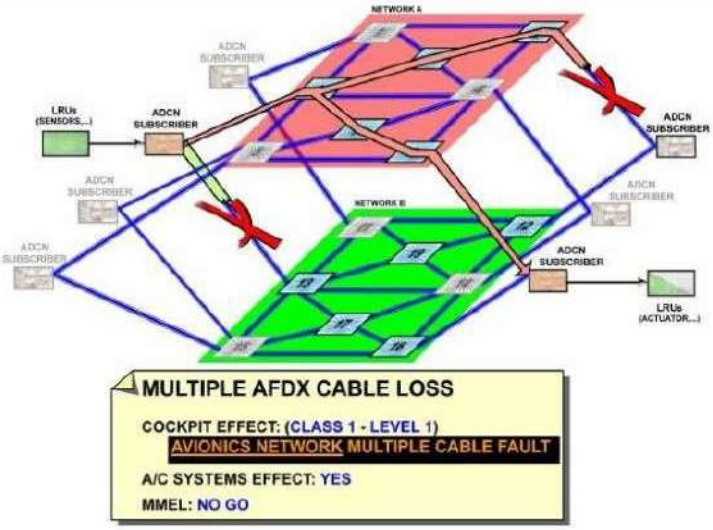


Fig. 19.38 Multiple AFDX Cables Loss

IMA & ADCN Component Location (3) Avionics Bay

AFDX Switches CPIOM
IOM

Common Core System Description
This lesson provides information on components and interfaces of the Common Core System.

Objectives

State the purpose of the system.
Identify the major system components of the system. State the purpose of the major system components.
State the general location of major system components.
Describe the major system interfaces and be able to explain the normal system function.
State the safety precautions related to fiber optics

Purpose

1. The common core system (CCS) supplies a common processing and common data network to support the operation of many airplanesystems.
2. The CCSprovides:

- Improvedreliability
- Decreasedcost
- Decreasedweight

The common core system (CCS) has a common data network (CDN) connection to send and receive airplane systems data. The CCS has a common computing system that calculates data used to operate airplane systems functions. These airplane systems include:

- Avionics
- Environmental control systems
- Electricalsubsystems
- Mechanicalsystems
- Hydraulicsystems
- Auxiliary powerunit
- Cabin servicessystems
- Flightcontrols
- Maintenancesystems

- Fuelsystem
- Flightdeck
- Payloads
- Propulsionsystem.

Fig. 19.39 Common Core System

General Description

1. The common core system (CCS) has software applications that do calculations for many, but not all, of the airplane systems.

2. The CCS has thesecomponents:
- 2 common computing resource (CCR) cabinets - leftandright
- 6 ARINC 664 network remote switches(ARS)
- 21 remote data concentrators(RDC).

3. The left and right CCR cabinet each contain these 16 modules:
- 2 power conditioning modules(PCM)
- 8 general processor modules(GPM)
- 2 ARINC 664 network cabinet switches(ACS)
- 2 fiber optic translator modules(FOX)
- 2 graphics generators (GG) - not part ofCCS.

4. The ARINC 664 network switches (ACS and ARS), the FOX modules, and the connections (fiber optic and electrical) make up a dual redundant common data network (CDN) of theCCS.

5. The 21 RDCs communicate/connect with these CDN components on electrical ARINC 664 databuses:
- ACS in left and right CCRcabinets
- ARS in the forward, mid and aft section of the airplane.

6. The RDCs communicate/connect with airplane sensors and systemson:
- Electricalbuses
- ARINC 429 databuses
- Controller area network (CAN)buses.

7. Some airplane systems connect directly to theCDN. System Description Section(SDS)

The common core system (CCS) has 2 common computing resource (CCR) cabinets, left and right. Each CCR cabinet has 2 common data network (CDN) channels, channel A and channel B. Each CCR cabinet contains a set of modules that do these functions:

- Control power andcooling
- Processdata
- Control data input andoutput.

All the data the CCR cabinets send or receive goes through the CDN. The components that are in the CDN are the:

- ARINC 664 network cabinet switches(ACS)
- ARINC 664 network remote switches(ARS)
- Fiber optic databuses
- Fiber optic translator modules (FOX). The CDN receives and transmits airplanedata:
- Through remote data concentrators (RDC)
- Directly through the airplane systemsinterfaces.

The CCR cabinets supply the main computing functions with the general processor modules (GPM). The GPMs contain the software application programs that calculate data for many airplane systems and functions. These software application programs are called hosted applications. The airplane systems or functions that use the CCS for this purpose are called hosted functions. The hosted functions and hosted applications use the CDN and RDCs for their interfaces with other airplane systems and components.

Each CCR cabinet has 2 graphic generators (GG) that transmit data to the head-down displays (HDD) and head-up displays (HUD). The CDN connects the CCRs to the airplane systems and components. The CDN uses ARINC 664 Ethernet fiber opticsand CCR Cabinet

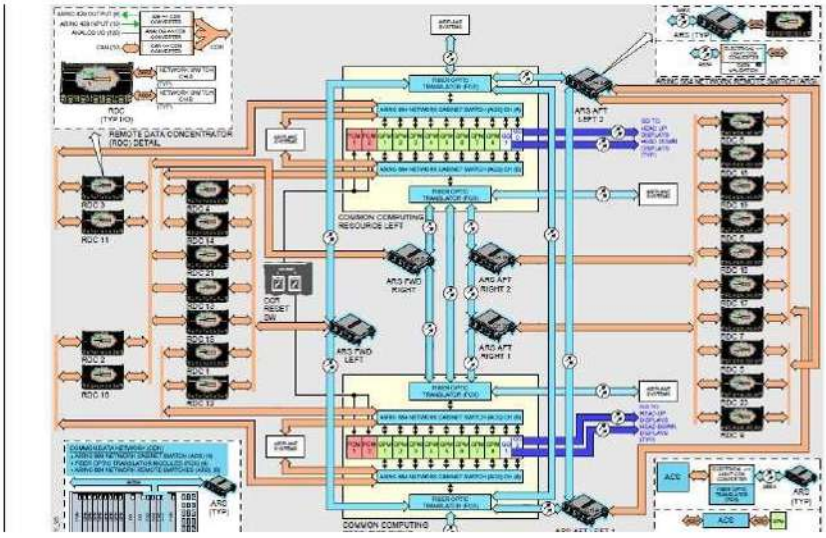


Fig. 19.40

copper bus systems for high speed (100 Mbps)/high bandwidth communications for digital audio, databases, and display data. The CDN also uses low speed (10 Mbps) communications for control and monitor functions.

The RDCs are the interface for the CDN. Airplane system components have an interface to the nearest RDC. The interface from the airplane system components to the RDC can be analog, discrete, or serial digital connections.

1. Each common computing resource (CCR) cabinet has 16 slots for line replaceable modules(LRM):

- 2 power conditioning modules(PCM)
- 8 general processor modules(GPM)
- 2 ARINC 664 network cabinet switches(ACS)
- 2 fiber optic translator (FOX) modules

- 2 graphics generator (GG) modules (not part of CCS, part of primary display system31-61).

2. All modules of the same type areinterchangeable.

3. The 2 CCR cabinet chassis are thesame.

- CCR cabinet location is determined by programpins.

System Description Section (SDS)

The common core system (CCS) has 2 common computing resource (CCR) cabinets. Each CCR cabinet is the primary interface between CCS components external to the CCRs, other airplane systems, and the CCR modules.
Each CCR cabinet contains modules that process data for many airplane systems that connect to the common data network (CDN). Each CCR cabinet contains thesemodules:

- ARINC 664 network cabinet switch (ACS)(2)
- Fiber optic translator module (FOX)(2)
- General processor module (GPM)(8)
- Power conditioning module (PCM)(2).

Each CCR cabinet has a CCR cabinet fan and valve assembly for alternate cooling.
The CCR cabinets also contain the graphics generator modules (GGM) that the primary display system uses.
The CCR cabinet contains:

- Connections between the CCR modules and theACS
- Connections between the FOX and theCDN
- Internal power distribution from thePCMs
- Bus routing for internal communications for all modules in the cabinet.

Fig.19.41

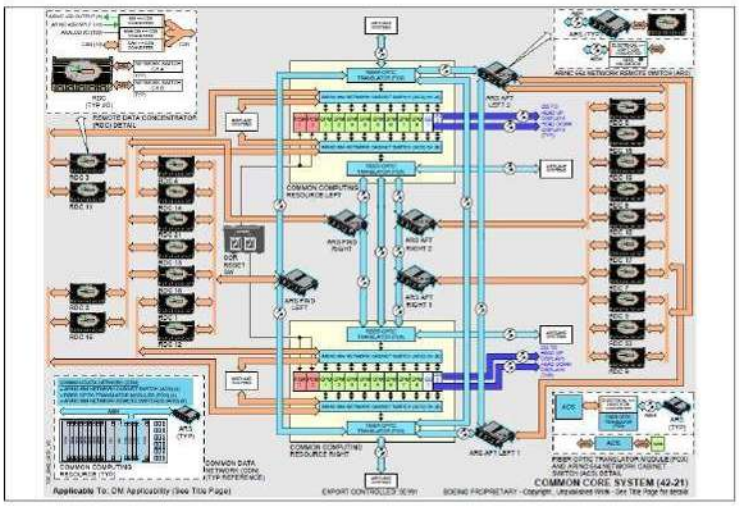


Fig.19.42

CCR Cabinet Fan and Valve Assembly

1. Usual cooling air for each CCR cabinet comes from the forward equipment coolingsystem.

2. If usual cooling does not operate (low flow or smoke detected by the LPS function), a fan and valve assembly on the CCR cabinet is commanded to operate by the power conditioning module(PCM).

- The fan pulls ambient air from the top of the CCR cabinet, across the CCR modules, and then exhausts out of thefan.
- The valve portion of the assembly closes the EE cooling duct connection which prevents the fan from pulling air from the equipment cooling ductconnection.

3. The fan and valve assembly is on the back of the each CCRcabinet.

System Description Section (SDS)

The common computing resource (CCR) cabinet fan and valve assembly supplies CCR cabinet cooling if the usual airplane cooling does not operate.

Usual cooling for each CCR cabinet is from the forward electronic equipment (E/E) cooling system through the air conditioning (AC) duct. The AC duct connects to a fan and valve assembly. If the usual aircraft equipment cooling does not operate, the valve closes to stop the air flow from the AC duct. The fan pulls cooling air

across the cabinet from the E/E bay. The fan and valve assembly is on the back of the CCR cabinet. The fan gets power from the power conditioning modules (PCM). The status message, CCR CABINET

COOLING L (R), shows if the fan and valve assembly fails.

Fig. 19.43

Power Conditioning Module

1. The power conditioning modules (PCM) give power for the CCR cabinetmodules.
- Each CCR cabinet has 2PCMs.

2. Each PCM gets power from 2sources:
- One of the electrical system four 28v dcbuses
- Hot battery bus(HBB).

3. Both PCMs in a CCR cabinet usually supply power to these CCR cabinetmodules:
- General processor modules(GPM)
- ARINC 664 network cabinet switches(ACS)
- Fiber optic translator (FOX)modules
- Graphic generators (GG).

4. The HBBsupplies:
- Usual power for PCM internal clock and GPM volatile memory
- Emergency backup power if airplane 28v dc power fails.

5. One 28v dc source is sufficient for 1 PCM to supply correct power to the CCR cabinetmodules.
6. The PCM modules attach with small captive screws and modulelocks.

The power conditioning module (PCM):
- Supplies filtered power to the other modules in the common computing resource (CCR) cabinet. The filtered power prevents non-normal operation of these modules.
- Isolates the airplane power from the CCR cabinet modules.

Each CCR cabinet contains 2 PCMs. Each PCM has 2 power input channels from the electrical power system. One power channel receives 28v dc from the hot battery bus (HBB) for internal clock and power for the volatile memory of the general processor modules (GPM). The other power channel stabilizes aircraft power to CCR cabinetmodules.

A PCM with one good 28v dc source is necessary for the CCR cabinet to operate. If any PCM in either left or right CCR fails, the status message, CCR POWER CONTROL MODULE, shows Component Maintenance Manual

In the CCR cabinet, two PCMs are in a redundant configuration to change28vdctoregulatedandisolated+12.5and+28vdc.The

+12.5v dc is used by all the modules in the CCR.The regulated

+28v dc supplies power to the auxiliary cabinet cooling fan and a control valve motor in the CCR cabinet. If the PCM input power is not correct, the PCM changes its input source from aircraft power to battery power. If one of the PCMs does not operate, the second PCM supplies sufficient power for all of the CCRcabinet.

Each PCM provides an isolated power output to each module in the cabinet. At the module level, the 2 power inputs, current limiting, and isolation prevent interruption of the modules from a common mode failure. Each module can get power from either PCM and each PCM can supply sufficient power for the cabinet. Therefore, the failure of an aircraft power feed, PCM, or module cannot cause a failure of the cabinet.

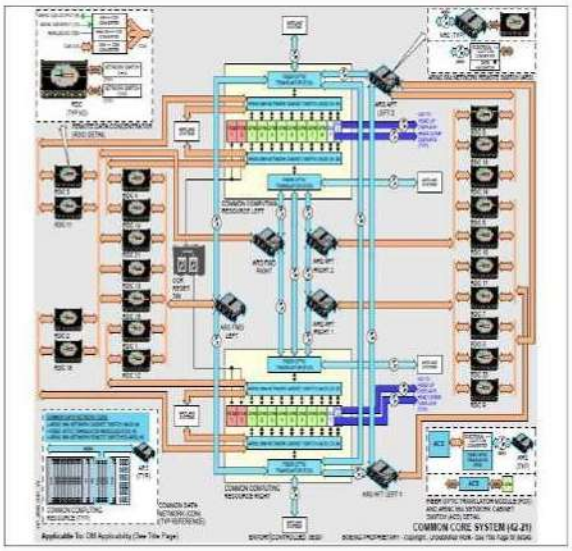


Fig.19.44

Fig.19.45

General Processor Module

1. The general processor modules (GPM) of the CCS have softwarefor:
- CCS database manifest to identify what software should be in each GPM
- Operational software to define how each GPMoperates
- Airplane system operation known as hosted software applications.

2. Each GPM is a dual redundant computerwith:
- Processors
- Memory
- Powersupply.

3. Each CCR cabinet has 8GPMs.

4. The GPMs are numbered 1 to 8, right to left, looking at the cabinet.

System Description Section (SDS)

Each general processor module (GPM) contains computing hardware and software application programs that calculate and process data for many airplane system functions.

Each CCR cabinet has 8 GPMs. Each GPM has the same hardware and the same operating system software. The GPMs contain thishardware:

- 800 MHz central processing units (CPU)(2)
- 512 megabytes (MB) of random access memory(RAM)
- 128 MB of programmable read-only memory(PROM)
- 32 MB of non-volatile memory(NVM).

Each GPM contains 2 CPUs. A GPM can continue to operate correctly if one CPU has a fault. A GPM can have some internal faults and continue to operate safely with full function. A GPM can also have faults that cause the GPM to stop operation.

The GPMs contain the core operating system (OS) software. The core OS has functions that control GPM operation with other GPMs and other components in the common core system (CCS). These functions include:

- Systeminitialization
- Resourceschedules
- Memorymanagement
- Input/outputcontrol
- Faultprocessors.

All the core software functions do general purpose and realtime processing for the hosted applications on the common computing resource (CCR).

GPMs also get hosted applications software that calculates the hosted airplane functions. The position of the GPM in the CCR cabinet specifies where the hosted software applications are loaded. These are examples of some of the hosted airplane systemsfunctions:

- Display and crew alerting function(DCAF)
- Hydraulic interface function(HYDIF)
- Landing gear actuation system/nose wheel steering (LGAS/NWS)
- Central maintenance computing function(CMCF)
- Flight management function(FMF)
- Data communication management function(DCMF).

Each GPM can calculate data for many hosted functions at the same time. To do these functions, the GPM operating system identifies the:

- Area for space inmemory
- Time in the processor to calculatedata
- Input/output data for the airplanesystems.

The input data used by the GPMs for calculations comes from other airplane systems from:

- Common data network(CDN)
- OtherGPMs
- Other areas in the sameGPM.

If a GPM fails, the status message, CCR GPM (N) L/R, shows.

MMEL

The Boeing MMEL permits dispatch with one GPM defective provided it is in GPM slot 8 (8L or 8R). MMEL states 16 installed, 15 required for dispatch.

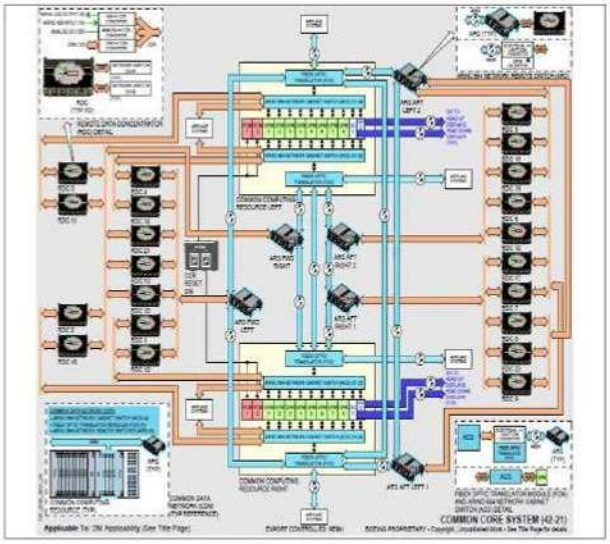


Fig.19.46

GPM Hosted Applications

1. Hosted software applications on the GPMs do fault reporting, processing, and calculations for many airplane functions, such as:

- Displays and crew alerting function(DCAF)
- Hydraulic interface function(HYDIF)
- Landing gear actuation system/nose wheel steering (LGAS/NWS)
- Central maintenance computing function(CMCF)
- Flight management function(FMF)
- Data communication management function(DCMF).

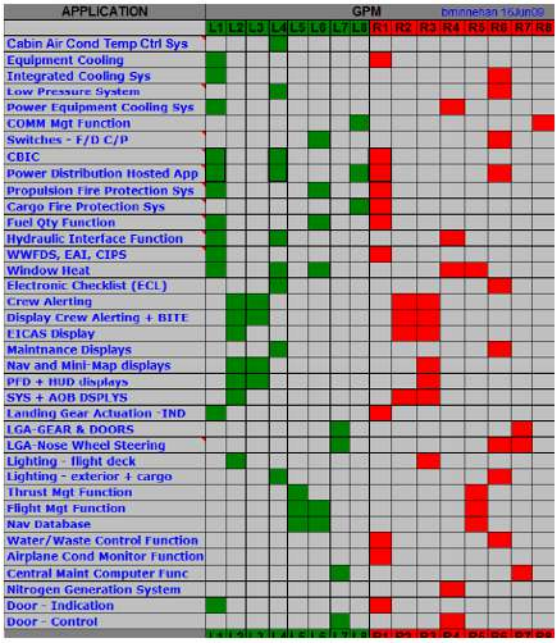


Fig. 19.48

Fiber Optic Translator Module

1. The 2 fiber optic translator (FOX)modules:

- Change electrical data from ARINC 664 network cabinet switch (ACS) to fiber optic data for ARINC 664 network remote switch(ARS).
- Change fiber optic data from ARS to electrical data for ACS

- Change fiber optic data directly from some airplane systems to electrical data forACS
- Transfer data between left and right CCR cabinets through the common data network (CDN) fiber opticbuses.

2. There is a channel A and a channel B FOX module in each CCR cabinet which provides 2 independent CDNpaths.

3. The 2 FOX modules in each CCRcabinet:
- Are adjacent to the ACS modules
- Get power from the CCR cabinet power condition modules (PCM).

4. The FOX modules do not contain operational software nor do anycalculations.
5. The FOX modules are part of theCDN.

6. FOX module removal/installation is similar to PCMs and GPMs

System Description Section (SDS)

The fiber optic translator (FOX) module:

- Connects directly to some airplane systems to send and receive data through fiber optic buses
- Changes digital light signals from the ARINC 664 network remoteswitch

(ARS) and airplane systems to digital electrical signals for the ARINC 664 network cabinet switches (ACS)
- Changes the digital electrical signals from ACSs to digital light signals for the ARS and airplanesystems
- Connects to the same channel FOX in the other CCR. For example, the FOX channel A in the left CCR connects to the FOX channel A in the rightCCR
- Connects to theARS.

Each common computing resource (CCR) cabinet has 2 FOX modules, channel A and channel B.

Fig.19.49

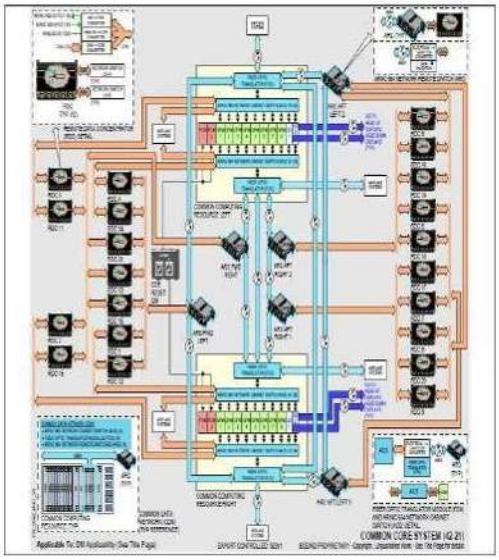


Fig.20.50

ARINC 664 Network Switches

1. The common core system (CCS) has 10 ARINC 664 network switches:
- 4 ARINC 664 network cabinet switches(ACS)
- 6 ARINC 664 network remote switches(ARS).

2. The CCS network switches do thesefunctions:
- Monitor for correctoperation
- Send data to the correct destination (airplane system, GPM hosted application,etc.)
- Change data formats between fiber optic and electrical signalformat.

3. Each network switch operates as a channel A switch or as a channel B switch which gives 2 independent data paths for the common data network (CDN).

4. The network switches are softwareloadable.

System Description Section (SDS)

The ARINC 664 network switches:

- Control how data flows to and from the GPMs, FOXs, RDCs, and airplanesystems
- Monitors data for the correctconfiguration
- Self-monitors for correct operation
- Isolatesfaults

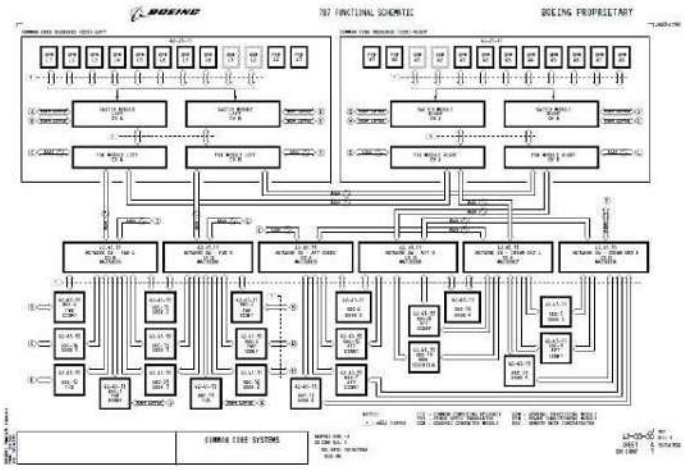


Fig. 19.51

ARINC 664 Network Cabinet Switches

1. The ARINC 664 network cabinet switches(ACS):
- Send and receive ARINC 664 electrical signal data to and from the general processor modules(GPM)
- Send and receive ARINC 664 electrical signal data to and from fiber optic translator (FOX)modules
- Have direct ARINC 664 electrical signal interface with some remote data concentrators(RDC)
- Have direct ARINC 664 electrical signal interface with some airplanesystems.

2. All ARINC 664 data to and from the GPMs in each CCR cabinet is monitored and controlled by theACSs.

3. The ACSs are components of the common data network (CDN).

4. There is a channel A and a channel B ACS in each CCR cabinet which gives 2 independent data paths for theCDN.

System Description Section (SDS)

The ARINC 664 network cabinets switch (ACS):

- Connects the general processor modules (GPM) to fiber optic translator (FOX) modules, remote data concentrators (RDC), and airplanesystems
- Controls how data flows to and from the GPMs, FOXs, RDCs, and airplanesystems
- Monitors data for the correctconfiguration
- Self monitors for correct operation
- Isolatesfaults.

The ACS does not have a fiber optic connection.

Each common computing resource (CCR) cabinet has 2 ACSs. There is 1 ACS for channel A and 1 ACS for channel B. The ACSs are part of the common data network (CDN). All ARINC 664 data to and from the FOX modules, RDCs, airplane systems, and GPMs go through the ACS modules. If an ACS fails, the status message, CCR NETWORK SWITCH,shows.

Fig. 19.52

ARINC 664 Network Remote Switches

1. The 6 ARINC 664 network remote switches(ARS):
- Send/receive ARINC 664 fiber optic data to and from the fiber optic translator (FOX)modules
- Change fiber optic data from FOX modules to ARINC 664 electrical signal data for remote data concentrators(RDC)
- Send and receive ARINC 664 electrical signal data to/from RDCs
- Change RDC electrical signals to fiber optic data for FOX modules.

2. All data that goes through an ARS is monitored and controlled by thatARS.

3. The ARSs are components of the common data network (CDN).

4. There are 3 channels A and 3 channel B ARSs which gives 2 independent data paths for theCDN.

System Description Section (SDS)

The ARINC 664 network remote switch (ARS):

- Changes the digital electrical signals from the remote data concentrators (RDC) to digital light signals for the fiber optic translator (FOX)modules
- Gives the network dual communication channels, channels A and channelB
- Connects FOX modules toRDCs
- Controls how data flows to and from the FOX modules and RDCs
- Monitors data for the correctconfiguration
- Monitors for correctoperation.

There are 6 ARSs in the common data network (CDN). Two ARSs are in the forward part of the airplane and 4 ARSs are in the aft part of the airplane. The ARSs connect RDCs to FOX modules in the common computing resource (CCR) Cabinets through a dual channel network. If an ARS fails the status msg CCS NETWORK SWITCH (N)shows.

Fig. 19.53

Remote Data Concentrator

1. The 21 remote data concentrators (RDC) are the interface between the network switches (ARS or ACS) and most airplane systems that do not operate with ARINC664.

2. TheRDCs:
- Change airplane system data from analog, ARINC 429, or CAN bus data to ARINC 664 format
- Send ARINC 664 data to the common data network (CDN) ARS orACS
- Receive ARINC 664 data from the CDN ARS orACS
- Change ARINC 664 data to analog, ARINC 429, or CAN bus data for airplanesystems.

3. Each RDC has 2 channels (A and B).
- Channel A connects to channel A networkswitches.
- Channel B connects to channel B networkswitches.

4. Some RDCs have direct interface with the CCR network cabinet switches(ACS).
5. The RDCs do not have any fiber opticconnections.

System Description Section (SDS)

The remote data concentrator (RDC):

- Receives analog, discrete, ARINC 429, and controller area network (CAN) bus data signals from the airplane systems components
- Changes the airplane systems data to ARINC 664 data format for common data network(CDN)
- Transmits the airplane systems data to theCDN
- Receives airplane systems control data fromCDN
- Changes the CDN data to analog, discrete, ARINC 429 and CAN bus data signals for the airplanesystems
- Transmits the control data to the airplanesystems.

The RDC has 2 channels, channel A and channel B. Each RDC channel connects directly to the same channel of an ARINC 664 network remote switch (ARS) or ARINC 664 network cabinet switch (ACS). For example, RDC 4, channel A connects directly to ARS, forward left; channel A. RDC 4, channel B connects directly to ACS, channel B in the common computing resource
(CCR) cabinet left. If an RDC fails, the status message, CCS RDC
(N) LOCATION,shows.

Each RDC connects to adjacent airplane systems components. Program pins at the RDC connector supply the RDC location.
MMEL

The Boeing MMEL permits dispatch with one RDC defective.

- 42-21-02 Remote Data Concentrators (RDC)
- 42-21-02-04 RDC19
- 42-21-02-04B RDC 19Inoperative

May be inoperative deactivated provided remaining RDCs operate normally.
Component Location - Forward EE Bay

1. The 2 common computing resource (CCR) cabinets are in the forward electronic equipment (EE)bay.
- Left CCR cabinet is on the bottom of the E-1 rack, left side of theairplane.
- Right CCR cabinet is on top of the nose wheel well box, right side of theairplane.

2. Each CCR cabinet contains these components of theCCS:
- Power conditioning modules(PCM)
- General processor modules(GPM)
- ARINC 664 network cabinet switches(ACS)
- Fiber optic translator (FOX)modules.

3. The 2 forward ARINC 664 network remote switches (ARS) are in the forward EEbay.
- Left forward ARS is on the side of the E-1rack.
- Right forward ARS is on the right side of the right CCR cabinet.

4. The forward EE bay has 4 remote data concentrators(RDC).
- RDC 1 and 3 is on the left of the E-1 rack above the left forwardARS.
- RDC 2 and 4 is on the right side of the nose wheel well box below the right forward ARS.

System Description Section (SDS)

These CCS components are in the forward equipment center:

- CCR cabinet -left
- CCR cabinet -right
- ARINC 664 network remote switch (ARS) -right
- ARS -left
- RDC 1 and RDC 3 -left
- RDC 2 and RDC 4 -right.

These CCS components are in each CCR cabinet:

- General processormodule
- Power conditioningmodule
- ARINC 664 network cabinet switch(ACS)
- Fiber optic translatormodule

There is a CCR cabinet fan and valve assembly on each CCR cabinet.
Component Location - Aft EE Bay and Aft Cargo

1. The aft EE bayhas:
- A right aft ARINC 664 network remote switch (ARS) on the right side of the E-4rack

- Remote data concentrator (RDC) 8 on the right side of the E-4rack
- RDC 7 and 19 on the left side of the E-3rack.

2. The aft cargo compartment has a left aft ARS on the left hand sidewall.

System Description Section (SDS)

An ARS is in the aft left cargo cheek area.

These CCS components are in the aft equipment center:

- ARS -right
- RDC 7 -left
- RDC 8 -right
- RDC 19.

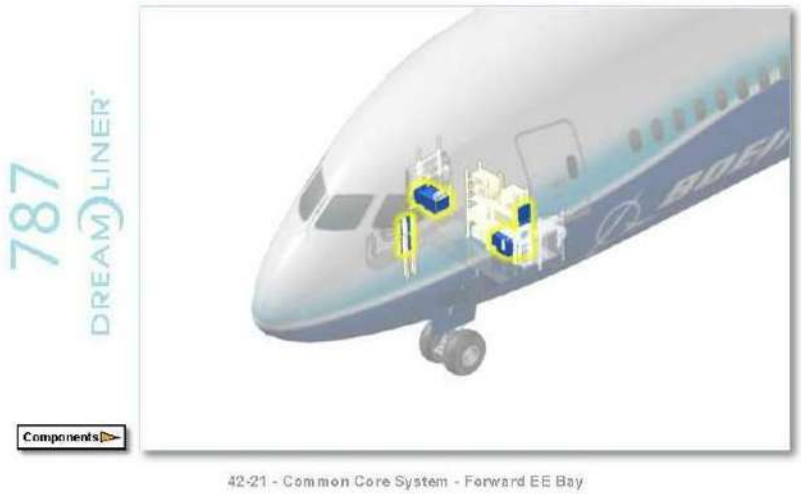


Fig.19.54

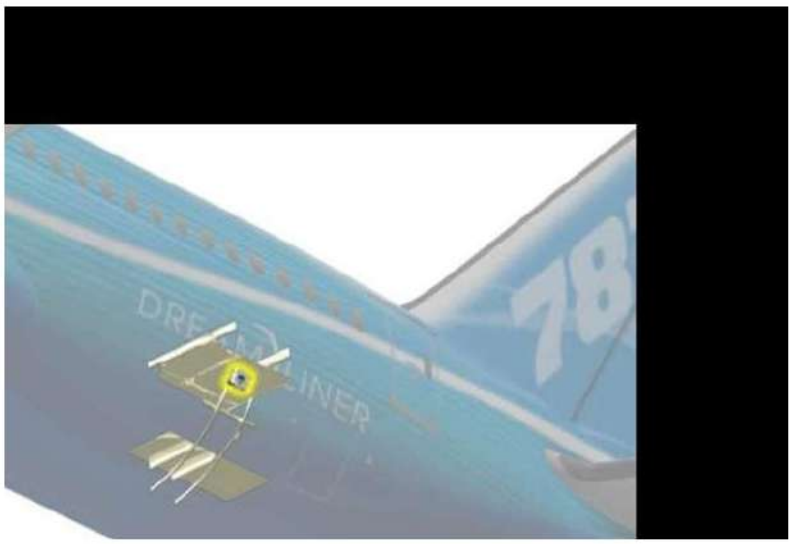


Fig.19.55

Component Location - Fuselage Crown Area

1. The fuselage crown area above the cabin ceilinghas:
- Left aftARS

- Right aftARS
- Remote data concentrators (RDC) 5, 6, 9, and 10 forward of theA

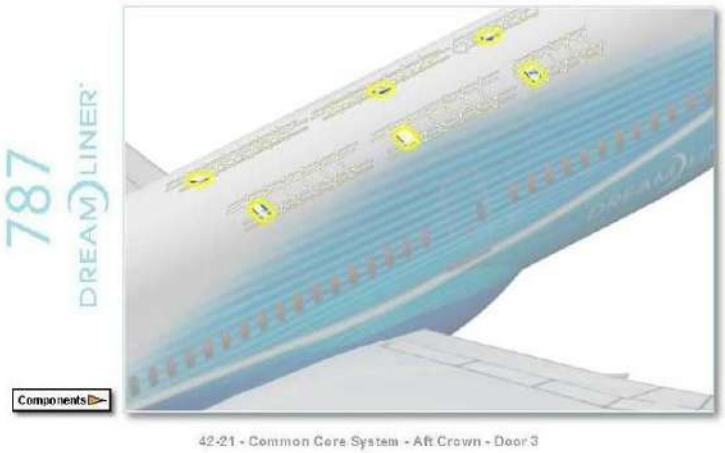


Fig. 19.56

Operation - Common Data Network - Data Flow

1. The ACS, ARS, FOX modules, and the connections between them are the common data network(CDN).

2. The GPMs and RDCs are not part of theCDN.
3. ATA 34-55 distance measuring equipment (DME) system synoptic shows the CDNrepresentation.

4. On the maintenance synoptic, these symbols show theCDN:
- The blue bar is the ARS and the fiber opticconnections
- The blue box shows the CDN components in the CCR cabinets (ACS, FOX modules, andconnections).

5. ATA 42-10 common core system (CCS) synoptic shows the details of theCDN:
- 6ARS
- 2 ACS and 2 FOX modules in each CCRcabinet
- Fiber optic connections between ARS and CCRcabinets.

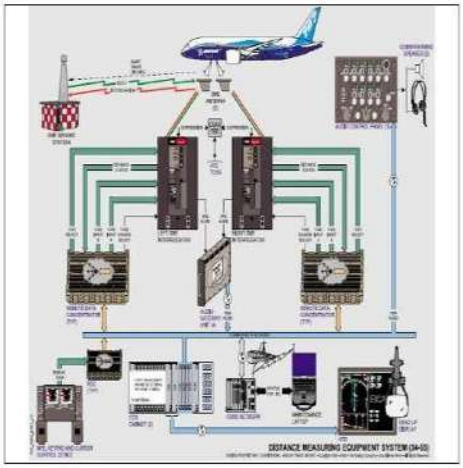


Fig. 19.57

Operation - P5 Panel Switches

1. Many of the P5 panel switches interface with theCDN.

2. The panel modules have panel interface pod (PIP) logic circuit cardassemblies.

3. ThePIPs:
- Digitize panel switch position data and send it to the CDN
- Receive indication data from theCDN
- Send CDN data to the panel switches (FAULT lights, system ON, systemOFF).

4. PIP switch position data goes to airplane systems through RDCs.
- PIPs connect to flight deck RDCs through CANbus.
- The RDCs send the data through the CDN to a GPM in each CCRcabinet.
- The GPM has a flight deck control panel (FDCP) application that does switch position and indication calculations.

5. There are 3 types of switch connections to airplanesystems:
- Digital PIP interface through theCDN
- Hardwire interface (does not go through theCDN)
- Combined digital and hardwireinterface.

6. The panels have a built-in-test function to detect and report faults.

Component Maintenance Manual

The electrical control panel is dual channel LRU powered by redundant 28v dc buses. The control panel interfaces to airplane systems using CAN data bus connections to the common core system (CCS). Some of the switches in the control panel also have direct hard-wired connections to systems on the airplane. The control panel uses embedded microcontrollers and software that process control panel status and communicate data over the CAN data buses with the CCS. The control panels provide built-in-test (BIT) to detect faults.

The BIT functions in the control panel operate with the flight deck hosted application software to support the health management system.

The P5 flight deck panels are line replaceable units.

- The panel interface pods (PIP) are not linereplaceable

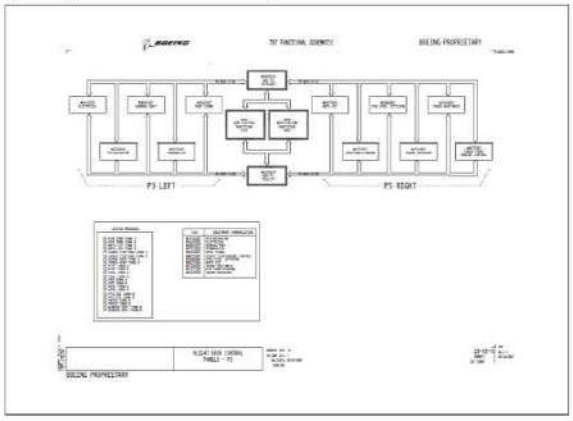


Fig. 19.58

Operation - CCS Start-Up Modes

1. There are 2 CCS power-upmodes:
- Uninhibited
- Inhibited.

2. The CCS starts automatically in the uninhibited mode when the airplane is on the ground and either of these conditions aretrue:
- External power is available on theairplane
- Battery is selectedon.

3. In the uninhibited mode, the GPMs do a full power-up built-in- test(PBIT).
- The PBIT can take up to 3minutes.
- CCR Hosted functions are not available until the PBIT is complete.

4. In the inhibited power-up mode, the GPMs do not do a full PBIT.
- Hosted functions are available in 50seconds.

5. The CCS starts in the inhibited mode when any of these conditions aretrue:
- The airplane is in theair
- A fuel cutoff switch is in the RUNposition
- No Fuel Cutoff switch data isavailable.

6. Network switches, FOX modules, and RDCs always start in less than 50seconds.

7. The startup is complete when the displays show their default displays, the stick shaker activates, and you hear a 1khztone.

System Description Section (SDS) CCS Startup Modes

There are 2 start-up modes for the common core system (CCS), uninhibited and inhibited.

Uninhibited Start-Up Mode

On battery power, only the left CCR cabinet receives power and does a full power-up built-in-test (PBIT). When the left CCR cabinet completes the startup sequence (2-3 minutes) the captain inboard head-down display (HDD) and the lower HDDs show their defaultpages.

When either forward external electrical power sources are available (AVAIL) but not selected ON, the left CCR cabinet startup is the same as on battery power. The right CCR cabinet receives power and begins its start-up sequence when the BPCU enables the loads on the left and right main DC buses.

If you change the power source from battery only to external power ON, the BPCUs reconfigure and the right CCR cabinet start-up in the uninhibited mode. The captain and first officer HDDs show their default displays and the lower HDD is blank. This is because the left CCR cabinet is the only source for graphic generators. The right CCR cabinet start-up takes 2-3 minutes to complete the full PBIT. The total start-up time for both cabinets in this case could be up to 6 minutes.

When one external power source is AVAIL, the ground handling bus has power and all other loads are kept de-energized. The only display that is active at this time is the lower HDD. When you select a power source ON, all selected loads have power. The start-up is complete when the displays show their default displays, the stick shaker activates and you hear a 1khz tone.

Inhibited Start-Up Mode

The CCS inhibited start-up mode is a soft restart of the CCR cabinet. During this start-up, the CCR cabinet does a partial PBIT instead of a full PBIT to make the return of the displays to the flight crew faster. The CCS starts in the inhibited mode for these conditions:

- Airplane is in the air - data comes from the primary flight control electronics(FCE)
- Fuel cutoff switches are in the operational (not cutoff) position - data comes through theCDN

- No fuel cutoff switch data isavailable.

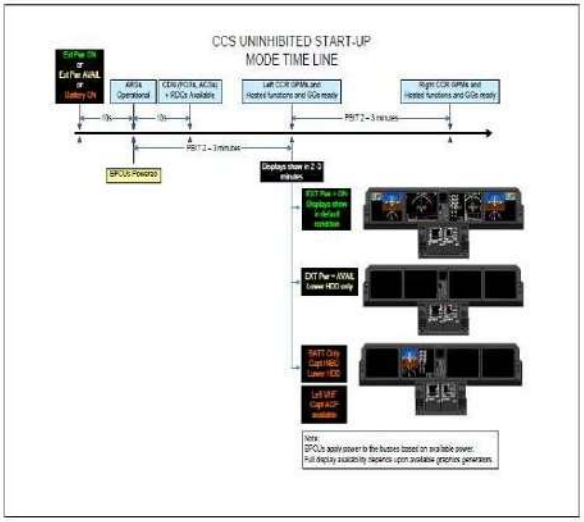


Fig. 19.59

4. These guarded, momentary action switches are on the window heat control panel above the passenger oxygen guarded switch.

5. The flight crew uses these switches if there is a loss of all displays.
- The maintenance crew uses these switches only if it is part of an AMMprocedure.

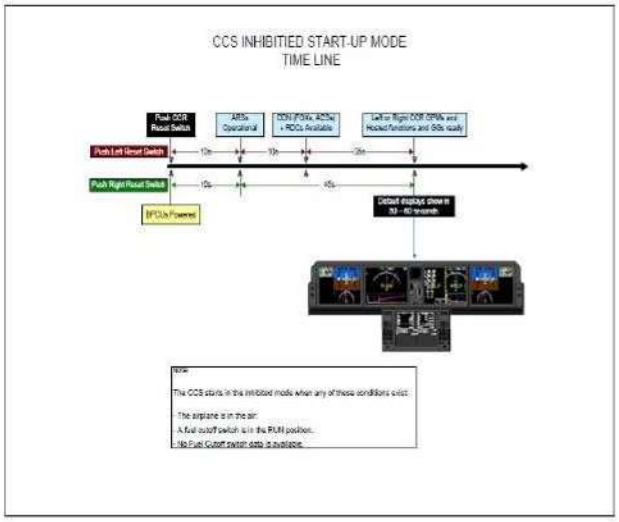


Fig. 19.60

Operation - CCR Cabinet Reset Switches

1. You use the CCR reset switches to cycle power to the CCR cabinets if there is a loss of flight deck displays or other CCR failures.

2. The switches connect directly to the onside CCR cabinet power conditioning modules(PCM).

3. The switch sends a signal to the onside CCR cabinetPCMs.
- The PCMs remove and then apply power to the CCR cabinetmodules.
- This cause the modules to restart(reboot).

AMM

DMC-B787-A-42-21-09-00B-320A-A
Common Computing Resource Cabinet Reset Switch Operational Test Procedure

Common Computing Resource Cabinet Reset Switch - OperationalTest
A. General

The operational test does a check of the internal functions of the CCR Cabinet Reset Switches. The switches are on the overhead panel.
NOTE: DO NOT USE THE CCR RESET SWITCH FOR MAINTENANCE ACTIVITIES. THE USE OF THE SWITCH CAN CAUSE GPM CORRUPTION OR FAILURE.

Fig. 19.61

Operation - CCS / CDN Maintenance Page Menu

1. The CCS/CDN maintenance pages show details of CCS, display system, and other components that interface with the CCS and common data network (CDN) of theCCS.

2. The first page of the CCS/CDN maintenance pages gives indication and selections to show pages 2 through 11 for the status of:
- CCS LRUs in left and right CCRcabinets
- Displays and crew alerting (DCA)LRUs
- Remote data concentrators(RDC)
- ARINC 664 network remote switches(ARS)

- Systems/Components LRUs that connect directly to the common data network (CDN).

3. The CCS/CDN maintenance page (1 of 11)shows:
- NORMAL (white text) - normaloperation
- FAULT (amber text) - component or CDN terminal connection on the related maintenance page has afault.

4. The STATUS page on the multifunction display (MFD) of the display system shows dispatch critical status messages for CCS.

Common Core System - CCS/CDN Maintenance Page Menu CCS/CDN Maintenance Page Menu Access

To go to the CCS/CDN maintenance page menu, see the systems description section (SDS), DMC-B787-A-31-61-00-49A-110A-A, 31-61 Primary Display System - Maintenance Page CCS/CDN Menu Access - Operation.

CCS/CDN Maintenance Page Menu Indications

The CCS/CDN maintenance page menu lets you make selections to get access to the common core system (CCS) and the common data network (CDN) maintenance pages. The CCS/CDN maintenance menu page shows keys related to a CCS or CDN maintenance page. Each key shows NORMAL or FAULT. The key shows FAULT when the CCS component or line replaceable unit (LRU) interface has a fault. Select a key to go to the related maintenance page. From the maintenance page, use the NEXT PAGE/PREV PAGE keys to go between maintenance pages for the CCS and CDN components. The selections are:

- CCS LEFT CCR (common computingresource)
- CCS RIGHTCCR
- CCS DCA (displays and crewalerting)
- CCS RDC'S (remote dataconcentrators)
- CCSSWITCHES
- CDN LRU (3).

The maintenance pages for the left and right CCR show the status of the components in the CCR. The maintenance pages for the RDCs and the switches show the status of these components.

The CDN LRU maintenance pages show indications for airplane systems LRU or components that do not connect to the RDCs. These LRUs connect to the CDN through the ARINC 664 network cabinet switches (ACS) or the fiber optic translator (FOX) modules in the CCRcabinets.

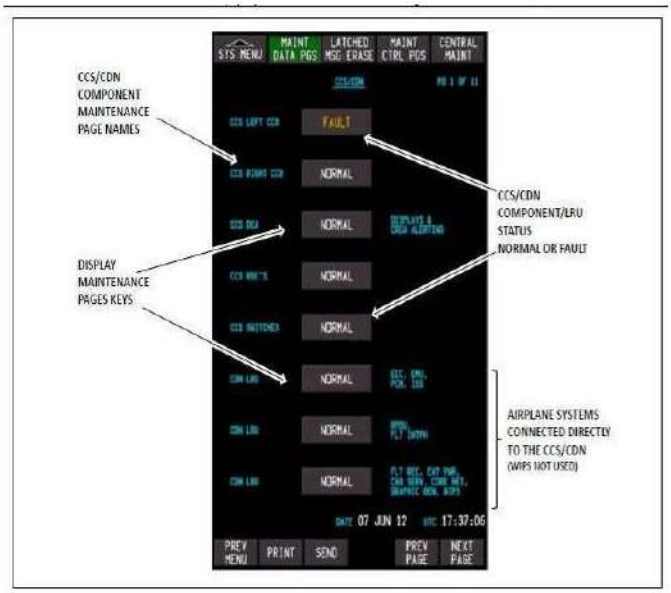


Fig.19.62

Operation - CCS MaintenancePage

1. The CCS LEFT and RIGHT CCR maintenance pages (2 of 11 and 3 of 11)show:
   - Status of the components in the left and right CCRcabinets
   - Channel A and B CDN terminalconnection.

2. The maintenance page indicationsare:

- NORMAL (white text) - normaloperation
- SEE CMCF (amber text) - component or CDN terminal connectionfault.

3. Go to the central maintenance computing function (CMCF) to show any CMCF maintenance messages related to CCS failures for faultisolation.

System Description Section (SDS) Maintenance Page Access

On the CCS/CDN maintenance page menu, select a key adjacent to the maintenance page name to go to the related maintenance page. Use the NEXT PAGE/PREV PAGE keys to go between maintenance pages. Use the CCS MENU key to go to the CCS/CDN maintenance pagemenu.

CCS LEFT CCR and CCS RIGHT CCR Maintenance Page Indications The maintenance pages show the status of these onside common core system (CCS) components in the common computing resource (CCR) cabinets:

- General processor modules (GPM)
- Power conditioning modules(PCM)
- ARINC 664 network cabinet switches(ACS)
- Fiber optic translator (FOX)modules.

All CCS components have STATUS indications that show NORMAL in white text for no fault or SEE CMCF in amber text in an amber box if the component has a fault.

GPMs have these indications also:

- CDN TERMINAL - CHNLA
- CDN TERMINAL - CHNLB.

These indications show NORMAL in white text for no fault or SEE CMCF in amber text in an amber box if the component has a fault in the CDN interface.

PCMs have these indications also:

- AUXCOOLING
- MASTER.

The AUX COOLING indication shows NORMAL in white text for no fault or SEE CMCF in amber text in an amber box when the PCM has a coolingfault.

The MASTER indication is not in use and shows blank.

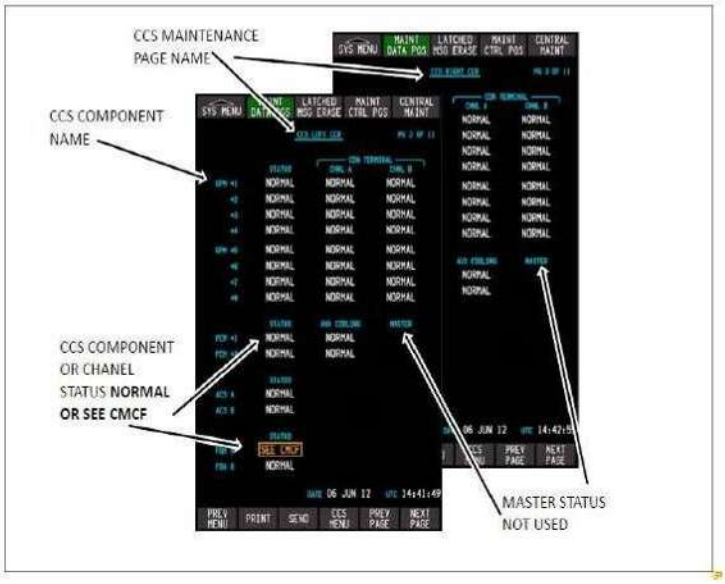


Fig. 19.63

Operation - CCS RDC / Switches Maintenance Pages

1. The CCS RDC'S maintenance page (7 of 11) and CCS SWITCHES maintenance page (8 of 11)show:

- RDC status and the channel A and B CDN terminal connection
- ARS status.

2. The maintenance page indicationsare:

- NORMAL (white text) - normaloperation
- SEE CMCF (amber text in an amber box) - component or CDN terminal connection has afault.

System Description Section (SDS)

Maintenance Page Access on the CCS/CDN maintenance page menu selects a key adjacent to the maintenance page name to go to the related maintenance page. Use the NEXT PAGE/PREV PAGE keys to go between maintenance pages. Use the CCS MENU key to go to the CCS/CDN maintenance pagemenu.

CCS RDC'S and CCS SWITCHES Maintenance Pages Indications the CCS RDC'S maintenance page and CCS SWITCHES maintenance page have STATUS indications that show NORMAL in white text for no fault or SEE CMCF in amber text in an amber box when the component has afault.

The CCS RDC'S maintenance page also shows these indications.

- CDN TERMINAL - CHNLA
- CDN TERMINAL - CHNLB.

These indications show NORMAL in white text for no fault or SEE CMCF in amber text in an amber box when the component has a fault in the CDN interface.

Fig. 19.64

Operation - CDN LRU Maintenance Pages

1. The airplane systems that have direct interface with the CDN show on the CCS/CDN maintenance page1.

- The connection status to the CDN for the LRUs of these systems shows on the 3 CDN LRU maintenance pages (9, 10, and 11 of11).
- The CDN LRU maintenance pages show connection status only (not systemfaults).

2. The CDN componentsare:

- ARINC 664 network remoteswitches

- ARINC 664 network cabinetswitches
- FOXmodules.

3. The maintenance page indicationsare:

- NORMAL (white text) - normaloperation
- SEE CMCF (amber text in an amber box) - channel A or B CDN terminalfault.

System Description Section (SDS) Maintenance Page Access

On the CCS/CDN maintenance page menu selects a key adjacent to the maintenance page name to go to the related maintenance page. Use the NEXT PAGE/PREV PAGE keys to go between maintenance pages. Use the CCS MENU key to go to the CCS/CDN maintenance page menu.

CDN LRU Maintenance Pages

There are 3 CDN LRU maintenance pages. This maintenance pages show the common data network (CDN) line replaceable units (LRU) that connect directly to the ARINC 664 network remote switches (ARS), ARINC 664 network cabinet switches (ACS) or the fiber optic translator (FOX) modules in the common computer resource (CCR) cabinets and not through remote data concentrators (RDC). These CDN LRU maintenance pages show the status of the interface connections not the status of the LRUs. The indications show NORMAL in white text for no fault or SEE CMCF in amber text in an amber box if the component has a fault in the CDN interface.

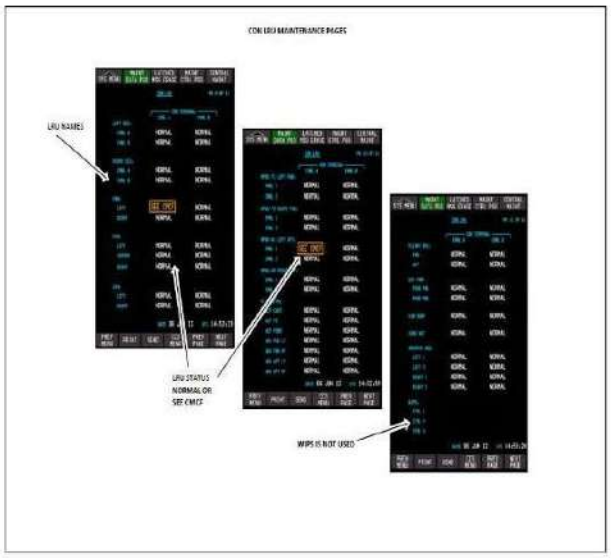


Fig. 19.65

1. AIRCRAFT CABINSYSTEMS

Idea behind theAircraft Cabin & Cabin Systems design is less weight, less maintenance, less costs, less waste/emissions more comfort: seats, beds, fitness room, bar, medical roommore safety (crash safety, child restraint systems) cabin shows airline corporate identity: airlines want to differentiate themselves from other airlines (passenger identify their favorite airline) make use of your time on board:-IFE and passenger communication, video on demand, games, e-shopping , e-learning ,internet Data transfer life TV, in-seat-power Special services for senior passenger, children Emotional travelling like moonlighting.

Definition

In general Cabin systems are all aircraft systems that are related to the cabin,however more specifically cabin system is defined as the system and its units and components used for entertaining the passengers and providing communication within the aircraft and between the aircraft cabin and ground stations which includes voice, data, music and video transmissions.

Cabin Systems comprised of Cabin Core System, in-flight Entertainment System, External Communication System, Cabin Mass Memory System, Cabin Monitoring System, Miscellaneous Cabin System

General

Cabin system is related with many other aircraft system likewise Air conditioning and pressurization system, communication system, Electrical power system, Cabin,Fire Detection and Extinguishing system, Ice and rain protection system, Lighting system, Oxygen system,Water and Waste system, In flight entertainment system, Cabin information system, Doors, Windows.

Many things have changed with technological advancement to provide better facilities to the passenger in term of their requirements also to entertain them economically. While doing so easy maintenance and comfortable operation for crew member was also considered. Every airline tries to do in a different manner to differentiate with other for attracting passenger. So many things arecustomized.

Basic requirements in the cabin starts with the passenger seat and it is different for different airlines to give maximum comfort to the passengers with many amenities like fully automatic operation
,massager, PC power, on-seat video (on demand , broadcast), music ,video games, sky telephone-mail etc.

Each zone temperature can be controlled by the demand of that zone also gasper outlets are for individual requirement. Oxygen mask is there for each passenger in case of emergency like loss of pressurization etc.

Communication is one of the most important parts in cab system which includes communication between cabin crew to cockpit crew, cabin crew to cabin crew, cabin crew to passengers includes passenger address, sky telephones etc.

Light is the basic requirement of the cabin but it has changed in terms of control. Light starting with flood light, reading light, call lightends with mood light.
Galleyand Lavatories are customaries, some lavatory has got vaccumm pump. Smoke detectors and fire

extinguishers are also thereWater and waste system control and indication are in attendant panel.

Most of the control and monitoring used in cab system are in a panel called flight attendant panel along with alternate panel. Sometimes IFE panels may be separate.

Applications

In older aircraft similar functions used in cabin system (ata-44) was in ata-23 or ata-33. A brief ideaof pre &post ata44 will be given below with systems used in B-747-400/B-777andB-787/A- 380aircraft to give an idea how the transition took place. Terminologies used are different for different aircraft for the similar function.

Cabin system in B747-400

ADVANCEDCABINENTERTAINMENT/SERVICE SYSTEM

DESCRIPTION AND OPERATION

1. General

a. The Advanced Cabin Entertainment/Service System (ACESS) is an integrated system consisting ofthe followingsubsystems:

i. Passenger AddressSystem
ii. Passenger Entertainment System)
iii. Passenger ServicesSystem
iv. Cabin Interphone System
v. Cabin LightingSystem

b. The Passenger Address System is used by the flight crew to makeannouncements to the passengers. Flight deck announcements, flight attendant announcements, prerecorded announcements, entertainment or boarding music, and video audio are broadcastthrough the Passenger AddressSystem.

c. The Passenger Entertainment System provides selectable recorded entertainmentaudio at each passenger seat. Video, passenger address and entertainment audio are controlledand distributed through the Passenger Entertainment System to each passengerseat.

d. The Passenger Services System provides controls of the passenger reading lights, call lights, passengerinformation signs, passenger to attendant call function, and lavatory callfunctions. The Passenger Service System also has the special feature that interfaces to the lavatorysmoke detector for smoke detectionannunciation.

e. The Cabin Interphone System is used for communication between crew members; it is the telephone system on board the airplane. Flight deck to attendant stations, attendant station to flight deckand flight deck to ground crew, flight deckto load cargo master, attendant to attendant calls, and passenger address announcements are made through the Cabin InterphoneSystem.

f. The Cabin Lighting Systemprovides controls of the airplane ceiling/washlights, night illumination lights,direct ceiling lights, and lavatory and crew restlights.

g. In addition to the above subsystems, the ACESS contains two special features: Cabin ConfigurationSystem (CCS) and ACESS Test System(ATS).

h. The Cabin Configuration System (CCS) is a special feature of ACESS. The CCS allows the

airlines tomake changes to their airplane interior configuration with minimal hardware changes. Airplaneconfiguration changes can be accomplished by modifying software: the ACESS configurationdatabase. The ACESS configuration database is created from the Airplane ConfigurationSystem(ACS), which is the on-ground Personal Computer (PC) software. With ACS, the ACESS configurationdatabase offersthe

ACESS the capabilities to configure the airplane in the following ways: seatingareas, PA areas, lavatory areas, speaker volume zones, chime mute zones, master callzones,audio/video channel assignments, smoking areas, lighting areas, etc.

i. The ATS provides fault monitoring and reporting of the ACESS system. It contains an on-line,continuous Built-in Test (BIT), off-line Built-in-Test Equipment (BITE), system status test, andprogrammingtest.Test results are reported to the EICAS/EFIS Interface Units (EIUs), Central Maintenance Computers(CMCs), and Cabin Configuration/Test Module (CCTM) asappropriate.

j. ACESS interfaces with the APAX 150 In-Seat Video System (IVS) The IVS is the integrated audio and video passenger entertainmentsystem.

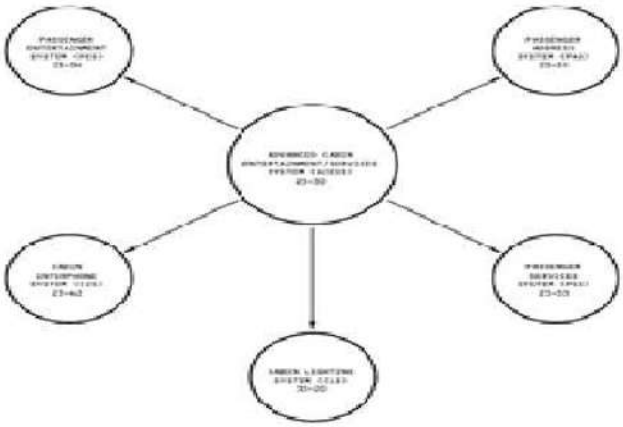


Fig. 20.1 Advance Cabin Entertainment / Services System (ACESS)

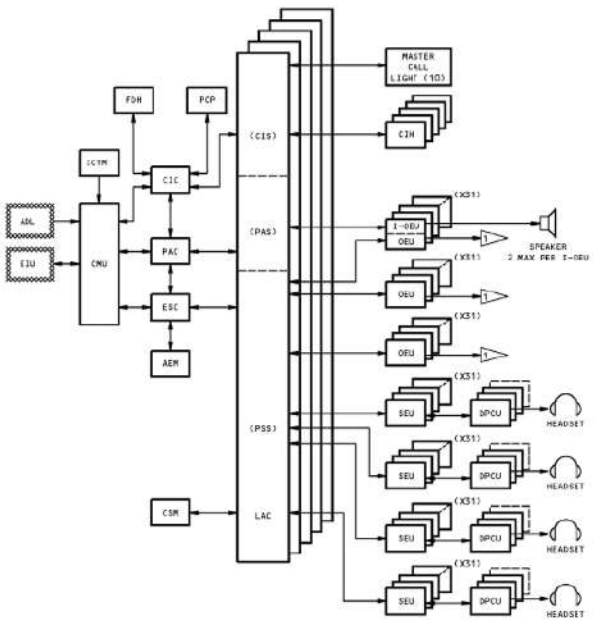


Fig. 20.2 Simplified ACESS System Block Diagram

ACESS Components

- Major ACESSControllers

a. Central Management Unit(CMU)
b. Passenger Address Controller (PAC)
c. Cabin Interphone Controller (CIC)
d. Entertainment/Service Controller(ESC)
e. Local Area Controller(LAC)

- User InterfaceUnits

a. Pilot's Call Panel(PCP)
b. Cabin Configuration/Test Module(CCTM)
c. Cabin System Module(CSM)
d. Cabin Interphone Handset(CIH)
e. Flight Deck Handset(FDH)
f. Digital Passenger Control Unit(DPCU)

- PeripheralUnits

a. Audio Entertainment Multiplexer(AEM)
b. Seat Electronics Unit(SEU)
c. Outboard Overhead Electronics Unit(O-OEU)
d. Inboard Overhead Electronics Unit(I-OEU)

- Indicators, Annunciators andSwitches

a. Speakers
b. ReadingLights
c. Row CallLights
d. Master CallLights
e. Electronic LampBallast
f. Passenger Information Signs
g. Switches andRelays

The location of the ACESS Line Replaceable Units (LRUs) is shown in Figure:
The location of the ACESS Line Replaceable Units (LRUs) is also shown in the followingtable:

LRU	LOCATION
LAC 3	Main deck, station 1500, RBL 41.89, WL 335.50
LAC 4	Main deck, door 2R Fwd, over aisle panel
CCTM	Main deck, door 2R, attendant panel
CSM	Main deck, door 1L, 2L and 4L ATT panel; U/D galley
CIH	Throughout the cabin area
PCP	Center aisle stand in the flight deck
AEM	Main equipment center, E31 shelf
I-OEU	Main deck, center column PSU rail; main deck entry door 1L, 2L, 2R, 4L, 5R; over each lavatory; outboard PSU rail
O-OEU	Main deck, outboard PSU rail; main deck entry door 1R, 3L, 3R, and 4R.
PALCS *	Main deck, zone A, Sta 307, BL 0
SEU	One for each seat group
FDH	Center aisle stand in the flight deck
DPCU	One for each passenger seat
[*] AIN 801	

LRU	LOCATION
CMU	Main equipment center, E2-5 shelf
PAC	Main equipment center, E2-5 shelf
CIC	Main equipment center, E2-5 shelf
ESC	Main equipment center, E2-5 shelf
LAC 1	Main deck, door 2L Fwd, over door panel
LAC 2	Main deck, door 2L Aft, over door panel

Fig. 20.3 ACESS Line Replaceable Units (LRUs)

There is only one of each of the following units installed in ACESS:

1. Central Management Unit(CMU)
2. Cabin Configuration/Test Module(CCTM)
3. Passenger Address Controller(PAC)
4. Cabin Interphone Controller (CIC)
5. Pilot's Call Panel(PCP)
6. Entertainment Service Controller(ESC)
7. Audio Entertainment Multiplexer(AEM)
8. Flight Deck Handset(FDH)

The CIC, PAC, and ESC units have a normal and alternate side with only one side being powered up at any time. Switching from the "normal" to the "alternate" side is accomplished using the switches on the CCTM.

- Central ManagementUnit

1. The CMU is the brain of the ACESS system. It stores and distributes the ACESS programmingand configuration database. The CMU also downloads software to other controllers and reportsstatus of ACESS to the Central Management Computer (CMC) via the EICAS/EFIS InterfaceUnit(EIU).

2. Each user (flight attendant, maintenance personnel, etc.) interfaces with the CMU via the CCTMto reconfigure smoking/no smoking rows, to change PA volume, to activate downloadingprocesses, or to run BITE and system status, asapplicable.

3. The CMU interface also includes RS-232 data buses to communicate with ACESS LRUs, ARINC429 data buses to communicate with the EIU for fault reports to theEICAS and CMC, and theSoftware Data Loader for configuration database loading and for operational code changes.

- Local AreaController

1. The Local Area Controller (LAC) interfaces the ACESS main controllers (PAC, CIC, ESC) with the OEUs, SEUs, CIHs, CSM. The LAC provides circuits which control the reception and distributionof digital and analog signals for the Passenger Address System, Passenger EntertainmentSystem, Passenger Service System, and Cabin Lighting system. The LAC also has the capabilityof storing the configuration of the area of zone it is controlling and initializing the addressing ofthe SEUs and OEUs

2. It has three mutually exclusive power sources: 28V dc from PAS, 28V dc from CIS, and 115V acfrom thePSS.

- Passenger AddressSystem

1. The LAC receives and distributes the digital signal from the PAC to the I-OEUs withoutperforming any signal processing.The LAC also distributes the analog signal from one cabin attendant handset to the PACwhen handset has been set to "directaccess.

- Passenger ServiceSystem

a. The LAC receives data from the SEUs and distributes data totheinboardandoutboardOEUstocontrolthereading lights and passenger-to-attendant call lights and turn on theappropriate master call lights. The LAC also receives data from theappropriate SEU tocancel

passenger call function (reading, passenger-to-attendant call and master call lights)in the LAC local zones.

b. The LAC receives data from the CSM for controlling the following:
1. Readinglights
2. Attendant calllights
3. Passenger Cabin generalillumination
4. PES entertainment tape deckpower
5. SEU

c. The LAC receives data from the ESC to distribute to the appropriate inboard and outboardOEUs to control the following passenger informationsign:
1. Fasten seatbelt
2. No smoking
3. Lavatory occupied (I-OEUonly)
4. Lavatory

d. For the lavatory system, the LAC receives data from the appropriate I-OEU and ESC andgenerates a multiplexedsignal to the appropriate I-OEU the following controlmodes:
1. Passenger calllight

2. Return to seatsign
3. Smoke detectionsystem
4. Lavatory inoperativesign

e. In addition, the LAC turns on the master attendant call lights associated with the lavatory passenger call, passenger-to-attendant call, smoke detectors, and cabin interphone call functions f) Up to five 28V dc master attendant call lights associated with the lavatory passenger call at 100 ma(max).

• Passenger EntertainmentSystem

a. The LAC receives multiplexed digital audio from the ESC and distributes the digital audio toa maximum of four SEU columns.Each column can have up to 31 SEUs.

• Cabin InterphoneSystem

a. The LAC receives digital and analog signals from up to five cabin attendant handsets. Itconverts the analog signal to digital data and multiplexes the data into a single digitalstream to distribute to the CIC. The LAC receivesmultiplexed data from the CIC whichcontains digital audio and interphone call routing information. LAC supplies power to theCIHs. The LAC demultiplexes the signal and performs thefollowing:

1. Converts the digital audio to analogaudio.
2. Routes the calls to the appropriate cabin attendant handset.
3. Turns on the appropriate master calllight.

• Cabin LightingSystem

The LAC receives lighting data from the main deck CSM (LAC No. 1 only) and distributesthis data to the ESC where the commands are generated and distributed to the other LAC's.
The LACs then distribute the data to the appropriate inboard or outboard OEUs to controlthe following lights within the cabin area and lavatories:

1. Ceilinglights
2. Washlights
3. Direct ceilinglights
4. Night illuminationlights

- Fault Detection andMonitoring

a. The LAC has two modes of operation for fault detection and reporting, BIT (Built-in-Test)and BITE (Built-in-Test Equipment). BIT is a continuous, on-line test. During normal systemoperation, BIT continuously monitors the LAC's internal functions for fault status andstorage, performs a background check on LAC non-volatile memory for data error, andchecks the LAC's power supply for power quality. BIT also monitors datalink

failurebetween LAC, CSM, OEUs, ESC, and CIC. BITE is off-line, manually initiated from theCCTM. BITE performs the same function as BIT with an additional function to monitor datalink failure between LAC and the call lightsinterfa.

- Passenger Address Controller(PAC)

1. The PAC is the controller for the Passenger Address System.

2. The PAC programs each I-OEU upon request from the CMU, and transmits PA messages tospeaker areas as defined by the configuration database softwareprogram.

3. The PAC responds to chime requests from the CIC, from the ESC, and from switch inputsasapplicable.

4. The PAC can be downloaded with both configuration database and operational code from CMUassuming the code has been loaded into the CMU from the Software Data Loader.

- Cabin Interphone Controller(CIC)

1. The CIC is the controller for the Cabin Interphone System.

2. The CIC monitors the Cabin Interphone handsets, the Digital Controlled Audio System (DCAS),the PCP, and call requestinputs.

3. The CIC responds to these inputs by initiating Passenger Address or interphone audio routing and conferencing. The CIC uses busy signals, ring back, and dial tone to inform the handset user of the state of thecall.

4. The CIC turns on lights at the called station and sends chime requests to the PAC to signal awaitingcall.

5. The CIC turns on lights at the station called and sends a chime request to the PAC to signalCALLWAITING.

6. The CIC outputs a chime to flight deck crew and turns on a DCAS CALL light for any call to aflight crew member.

7. The PAC can be downloaded with both configuration database and operational code from CMUassuming the code has been loaded into the CMU from the Software Data Loader.

- Entertainment/Service Controller(ESC)

1. The ESC is the controller for the Passenger Entertainment and Passenger Services systems.

2. The ESC monitors switch inputs, and responds to those inputs by illuminating various cabinlights, Passenger Information Signs (PIS), or reading lightoutputs.

3. The ESC also processes attendant call chime requests and transmits them to thePAC.

4. All audio signals for the passenger headsets are routed through and controlled by theESC.

- Audio Entertainment Multiplexer(AEM)

1. The AEM accepts 18 audio music channels from the entertainment tape reproducer (ENT T/R)and 6 movie audio channels from the video system. It also accepts the audio channelconfiguration database from the CMU and stores the information in a programmable audio matrix. This matrix defines the passenger entertainment audio information for the airplane. Itmultiplexes the audio signals and converts them to a digital format data stream and sends thesedata to the ESC.

- Overhead Electronics Unit(OEU)

1. There are two types of OEU. The outboard OEU (O-OEU) is usedinseatcolumnsoneandthreeoutofaLAC.Thesecond type is the inboard OEU (I-OEU). It is used in seat column two out of aLAC.

- Outboard Overhead Electronic Unit(O-OEU)

a. The O-OEU has four switch inputs, six reading light outputs, six passenger information signoutputs, two ballast outputs, and two row call lightoutputs.

b. Reading light outputs and passenger information sign outputs are used for a variety ofpurposes and are not limited to just reading lights or passenger information signs. Theswitch inputs are passed back to the Local Area Controller for processing while the lightoutputsare controlled by service requests from the LAC. Switch inputs are used for suchthings as light switches for crew rest areas, lavatory doors, or Attendant Calls fromlavatories. Light outputs control such things as reading lights, passenger informationsigns, lighted switches, ceiling lights,etc.

- Inboard Overhead Electronics Unit(I-OEU)

a. The I-OEU is actually two LRUs in one box. The I-OEU contains all the OEU outputs asdescribed above with the exception that it can have eight reading light outputs and four rowcall light outputs. In addition, it also contains aseparate and independent card forPassenger Address. This board converts digitized audio data from the PAC and sends theanalog output to the PAspeakers.

- Seat Electronics Unit(SEU)

1. The SEU performs two functions: the encoding function for the Passenger Service System (PSS)and the demultiplexing function for the Passenger Entertainment System(PES).
2. In the PSS portion, the SEU accepts passenger-to- attendant call and reading light ON/OFF datafrom the DPCU. The data is then transmitted serially by the SEU to the LAC which distributes it

tothe respective OEU. The SEU also receives No Smoking indication from the LAC for display onapplicableDPCUs.

3. In the PES portion, the SEU receives multiplexed audio from the LAC (sent by the ESC), and thechannel selection and volume control from the DPCU. The SEU demultiplexes the audio signal and outputs to the DPCU. A channel number is sent to the DPCU for display. The SEU alsoreceives a Passenger Address override command and will play PA messages over DPCUheadsets regardless of channelselection.

- Cabin Configuration/Test Module(CCTM)

a. The CCTM is a primary control panel for the ACESS system. It provides the user interface totheCMU.

b. The CCTM provides control capability for each operation associated with software downloading,system testing, smoking area configuration, and PA volume control adjustment.The Cabin Configuration/Test Module (CCTM) is the user interface to the CentralManagement Unit (CMU). It provides user to control and monitor the ACESSsystem.
It has fivemodes of operation, these are:

1. Smoking/no smoking zoneconfiguration,
2. Passenger Address (PA) area volumecontrol.
3. ACESS self-test initialization and faultannunciation.
4. Alternate (redundant) system switching for Passenger Address Control (PAC), Cabin InterphoneControl (CIC), Entertainment Service Controller (ESC), and Cabin System Module (CSM)LRUs.
5. Control of configuration program downloading to the Central Management Unit (CMU) from thedata loader and distribution of configuration data from the CMU to the ACESSsubsystems.

- Cabin System Module(CSM)

1. The CSM is the user interface to the LAC and ESC. At this panel the user controls cabin lightingchanges, reading light changes, and attendant call resets. Passenger entertainment

andpassenger service functions also may be turned on and off from this panel.

- Pilot Call Panel (PCP)

1. The PCP enables the flight crew to perform thesefunctions:
a. Initiates calls from the flight deck by sending dial code to theCIC.
b. Annunciates incoming flight deck calls on thedisplay.
c. Stores a complete directory listing consisting of all possible two-digit dialcodes.

2. The PCP has a 16-character LED display and 9 momentary push-buttons.
a. The push-buttons (1, 2, 3, 4, 5, 6, and P) are used to dial two-digit station codes on the cabininterphonesystem.
b. The NXT push-button, when pushed, causes the character display to scroll through thedirectory listing of the station dialcodes.
c. The RST push-button cancels any call made from the flight deck and has the same effect ashanging up the flight deckhandset.

3. An external light sensor monitors the ambient light in the flight deck. The LED character

displaybrightnessiscontrolled by the input from the ambient lightsensor.

- Cabin Interphone Handset(CIH)

1. The cabin interphone handset (CIH) allows the attendants to use the cabin interphone systemandto makeannouncements through the passenger address system.

2. There are ten push-buttons on the CIH. The pushbuttons 1, 2, 3, 4, 5, 6, and P are used to dialtwo-digit station codes. The push-button labeled R (reset) is used to end a call made from theother CIH. The push-button labeled PTT (push-to-talk) is only used while making announcementsthrough the passenger addresssystem.

3. CIH provides switch closures and microphone outputs only; therefore, it provides no electronicintelligence. The state of each CIH button is read by the interfacing LAC and any voice input tothe CIH is digitized in thatLAC.

- Flight Deck Handset(FDH)

1. The flight deck handset (FDH) allows the flight crew to use the cabin interphone system andmake announcements through the passenger addresssystem.

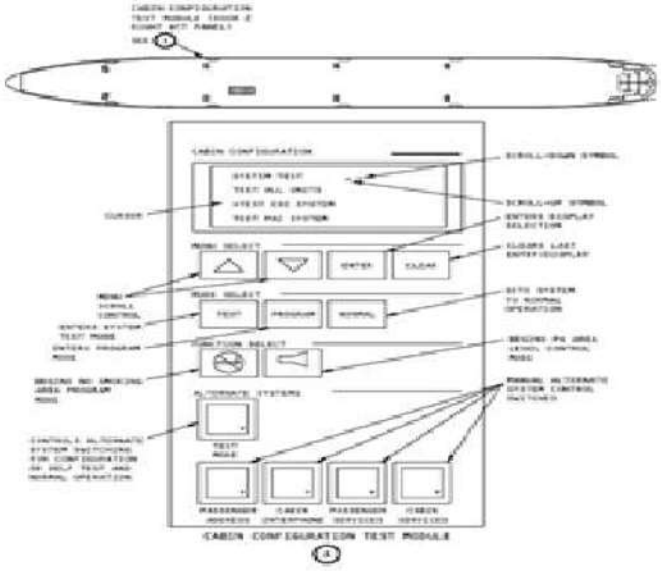
2. There are two identical PTT pushbuttons on the FDH. These are used to make passengeraddress announcements. The R (reset) push-button is used to end acall.

3. The FDH works in conjunction with the PCP. Station codes are dialed at the PCP. Station codes ofincoming

calls to the flight deck are shown at the PCP. The FDH is connected to the CIC.

- Digital Passenger Control Unit(DPCU)

1. The DPCU is the passenger interface with ACESS. It provides inputs for channel selection andvolumecontrol for headset audio. It has pushbuttons for attendant calls and reading light



control.DPCUs display the current channel selection. Some DPCUs also illuminate a No Smokinglight.

Fig. 20.4 Cabin Configuration Test Module

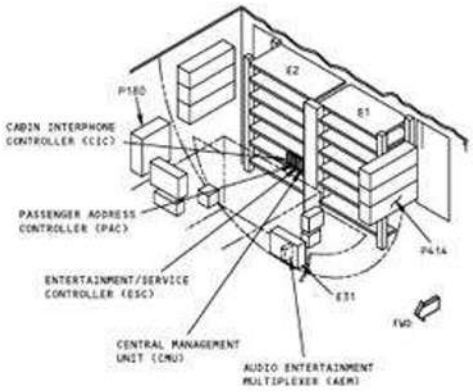


Fig. 20.5 Main Equipment Center

Fig. 20.6 Cabin System Module (CSM)

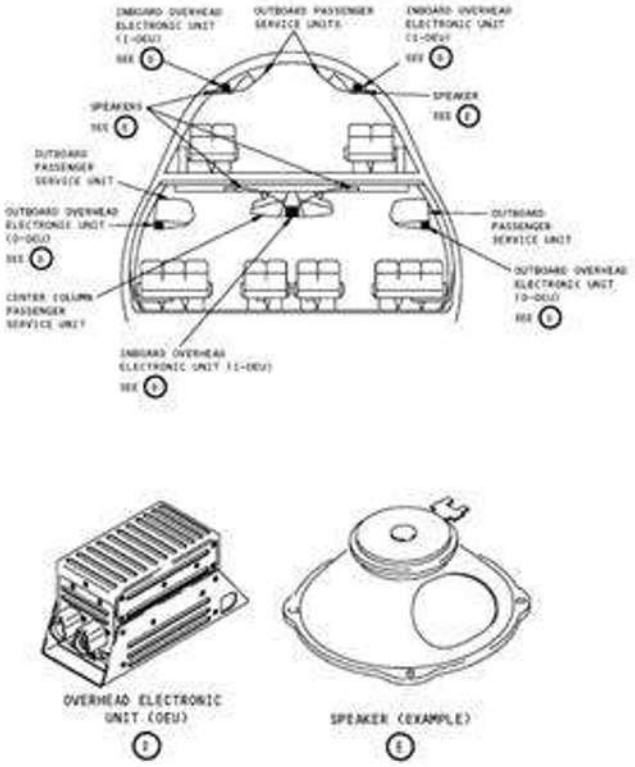


Fig. 20.7 Advance Cabin Entertainment / Services System (ACESS)-Component Location

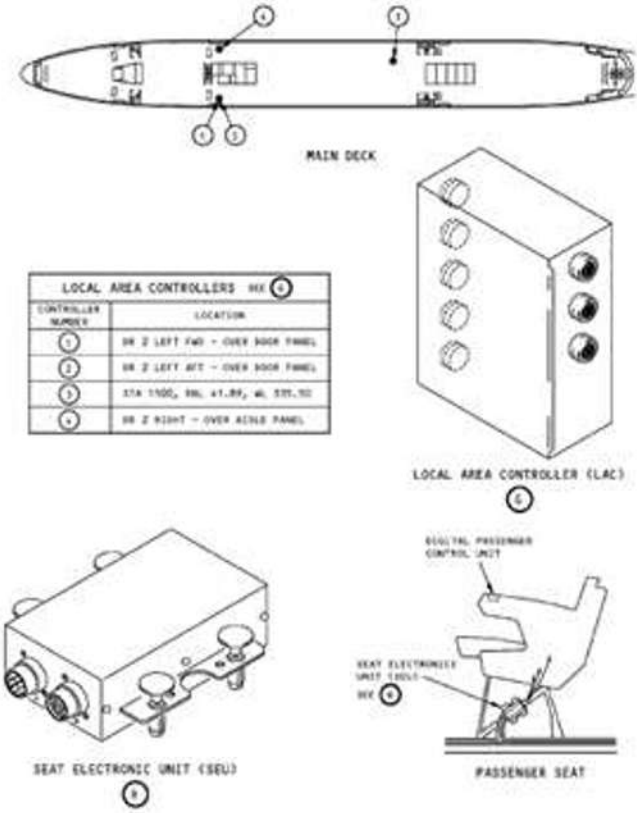


Fig. 20.8 Advance Cabin Entertainment / Services System (ACESS)-Component Location

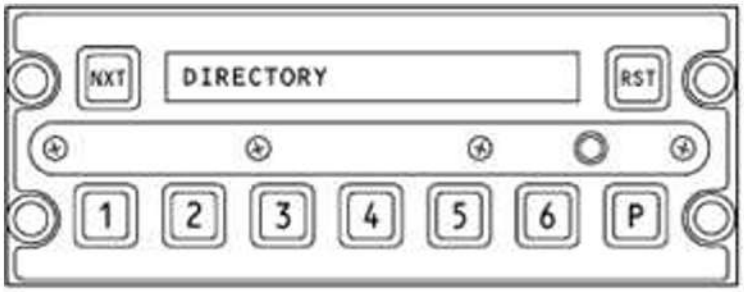


Fig. 20.9 Pilot's Call Panel

Fig. 20.10 Flight Deck Handset (FDH)

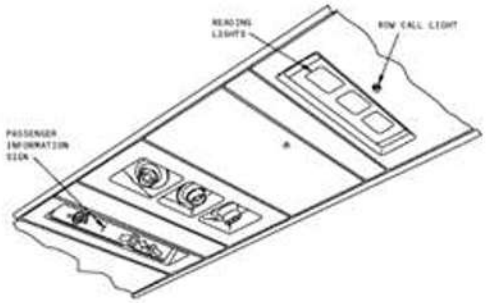


Fig. 20.11 Cabin Interphone Handset (CIH)

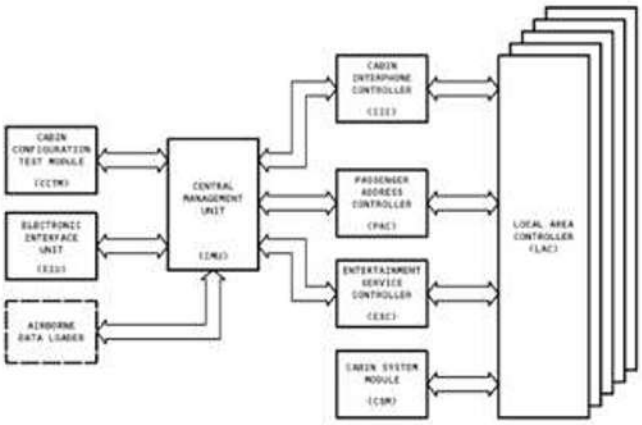


Fig. 20.12 Reading Lights, Row Call Light and Passenger Information Sign (Example)

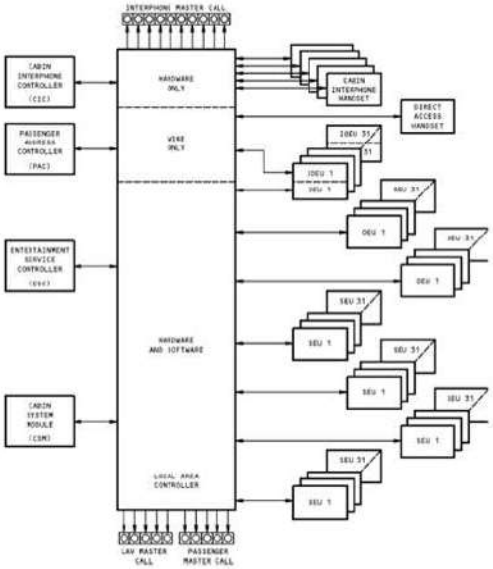


Fig. 20.13 Central Management Unit (CMU) Interface Block Diagram

Fig. 20.14 Local Area Controller (LAC) Interconnects

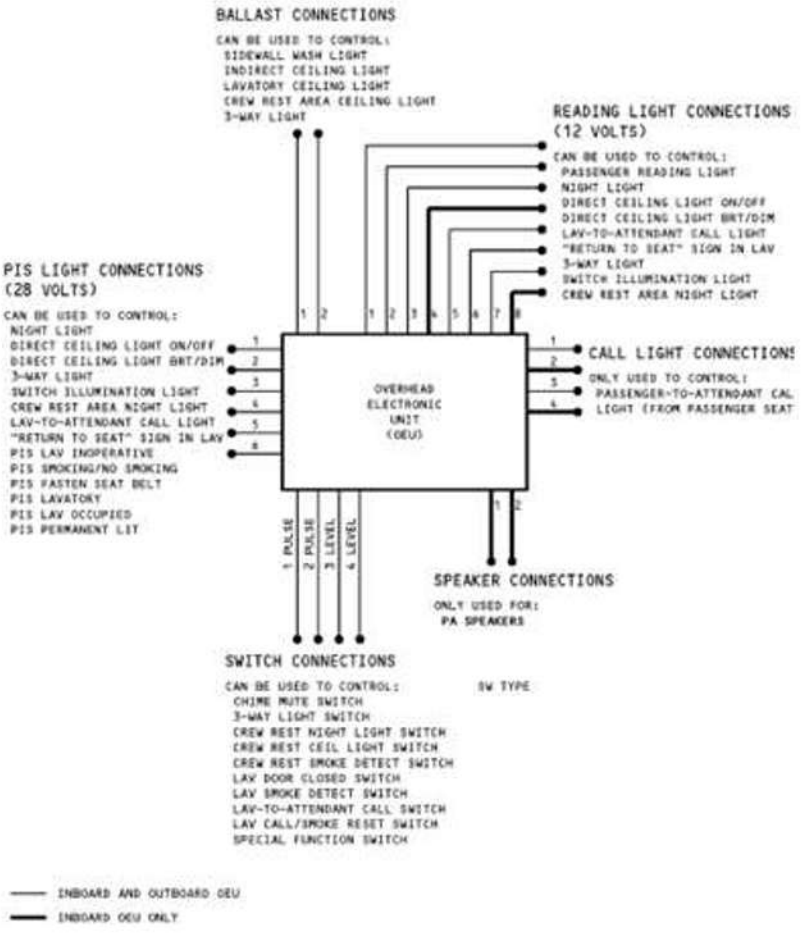


Fig. 20.15 Overhead Electronic Unit (OEU) Connections

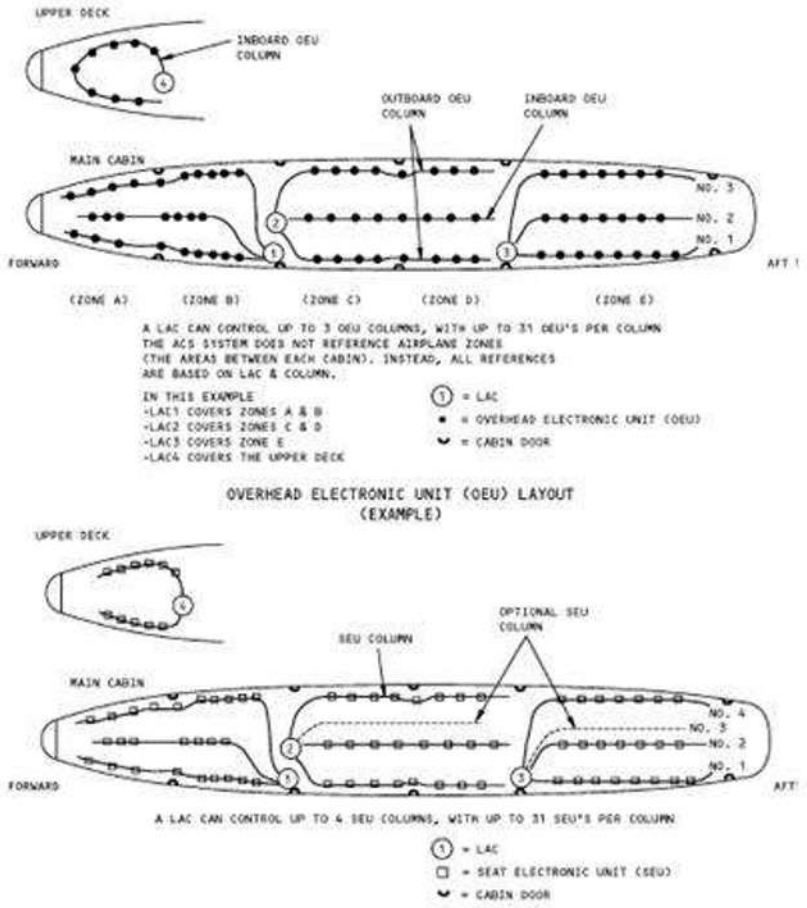


Fig. 20.16 Seat Electronic Unit (SEU) Layout

- ACESS OperationalSoftware

a. The ACESS controllers CMU, PAC, CIC, ESC, and LAC each have their own operational software, or operationalcode, to function within the system. The software for each controller iscontained in a loadable diskette which can be downloaded from either the ADL or a portable dataloader. The CMU software is loaded directly from the dataloader.

Software for the ESC, PAC, CIC, and LAC (-604 only)must be loaded into the CMU from the dataloader as a download data file and then programmed into the appropriate controller.

b. The operational software for each ACESS controller has already been loaded into each controller's memory by the vendor at a time of delivery, therefore, it is not necessary to load the operational software for each ACESS controller unless the operational software is lost orcorrupted.

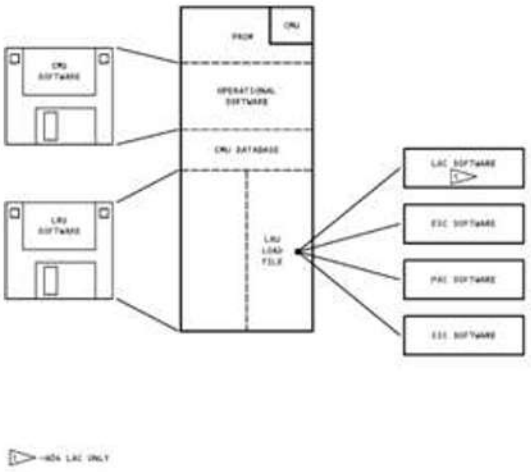


Fig. 20.17 ACESS Software Download

- Cabin Configuration System(CCS)

a. ACESS Cabin Configuration System (CCS) allows the airlines to modify their airplane interiorconfiguration to accommodate their currentrequirement.

b. b. The configuration variables for each subsystem are the following:

- Passenger AddressSystem

a. Passenger Address (PA) AreasSelection

1. Separate PA areas permit the flight attendants to be selective in making theirannouncements. Up to four PA areas can be defined on the airplane. This includescombinations of upper deck and main passenger cabin seating.
2. Up to two PA areas may be defined for one LAC. Once the PA areas are defined basedon seating, the database defines which speakers are controlled by which PA area. Thisthen determines which speakers are active during PA announcements. SEUs are alsoassigned to particular PA areas since PA is also transmitted over theheadsets.

b. Manual Level ControlZones

1. The manual volume control zone (or speaker volume zone) is a group of speakers' witha similar level of background noise. There can be up to 16 manual volume controlzones.These zones are also oriented toward speakers rather than seats. However, seatarrangement has an influence on how these zones are arranged. Manual zones arecompletely independent of the automatic zones. An attendant can adjust speakervolume manually when necessary from the CCTM.

c. Chime LocationAnnunciation

1. Chime is configurable to a specific speaker or on a system wide basis. This is based onthe subsystem requirements.

d. Crew Rest Area (PA 4 option) Announcement Lockout

1. The crew rest area can be configured to exclude the boarding music, video audio,chimes, pre-recorded announcements,cabininterphoneareaannouncements, or anycombinationthereof.

e. Speaker output level control by area andlocation

1. Output level of the PA speakers can be configured to specific locations as well as on anarea basis. The PAS can mute the output of the PA speaker associatedwith a CIHlocation. When a PA announcement is being made through the CIS, the PAS can muteup to three speakers associated with the CIH location.
2. Passenger ServiceConfiguration

a. Reading and Call Lights Variations - Passenger reading and call lights are controlled bythe DPCU and the CSM. The CSM can be configurable to two modes of control for thereading lights on an airplane system basis.

- Absolute ControlMode

a. The CSM READING LIGHTS - ON, - NORMAL and - OFF switches determine controlof the reading lights in an area. The DPCUs in the associated area have control ofthe reading lights only when the READING LIGHTS - NORMAL switch has been pressed for thatarea.

- Momentary ControlMode

a. The system assumes NORMAL control for reading light operation. When theREADING LIGHTS - ON or - OFF switch is pressed on the CSM, for any area, thereading lights turn ON or turn OFF, but control of the reading lights returns to theDPCUimmediately.

b. Passenger Information Sign

1. Location Changes - PIS drives can be configurable to anyOEU.
2. Lavatory area control - Up to 16 lavatory areas within the PSS. Each lavatory area hasup to 8 lavatories within it (up to 24 lavatories maximum for the system). PIS lav light control can be programmed as either absolute or toggle. When programmed forabsolute mode, the PIS lights for "Lavatory" are always on. This is normally used forwritten signs. When programmed for toggle mode, the PIS lavatory signs go off whenthe "Lavatory Occupied" sign comes on. This is normally used for symbolicsigns.

c. Smoking/no smoking area changes (within 8 defined seatingareas).

d. LavatoryFunctions

1. Lavatory call annunciation with configuration changes
2. Lavatory smoke detectionannunciations
3. Lavatory call/smoke detectionreset

- Smoke indicator detection reset by smoke detector input only
- Smoke indicator detection reset by the lav call reset input or the smokedetectorinput.
- Smoke detector is configurable from 0 to24.

e. Passenger-to-Attendant Call Chime ON/OFFControl

1. The chime ON/OFF control can be configurable to enable suppression of thepassenger-to-attendant call chime at appropriatespeakers
2. The chime ON/OFF control can be configured to inhibit allpassengers to attendant callchimes to a specificspeaker.

3. The chime ON/off control can be configured for combinations of seat groups andspeaker mute from zero to nineteen mutecontrols.

- Passenger EntertainmentConfiguration

a. Number and sequential order of entertainment and video audiochannels

b. Format for eachchannel
- Mono or stereo (entertainment audio channelonly)
- Mono, stereo, or dual language (video channels only)

- Cabin InterphoneConfiguration

a. Cabin interphone configuration consists of handset location and description, call light andchime definition, dial codedefinition, and a variety of handset capabilities. Handset locationis defined by handset input number and LAC number where it is connected.

b. The dial code description usually provides a more accurate description of airplanelocation, such as "Door 1 Left". There are ten interphone call light outputs from each LAC.A call to any handset will light a call light which is defined by thedatabase.

c. Each handset has a dial code associated with it for station to station calls. This is the"telephone number" for that handset.

d. There are dial codes that have no handsets associated with them. These are primarilyPassenger Address calls and "All Calls". The PA dial codes allow the flight attendants orflight crew to address the passengers over the PA by using the handsets. These calls canbe directed to a single PA area or to all PAareas.

e. "All Calls" refer to calls to other handsets. There are two such "All Call" dial codes. Theseare for calling multiple flight attendants simultaneously and may include the flight crew.

f. Other configuration information included in the database are:can a handset receive a call from other attendants or the flight crew, can the handsetreceive all calls, can the handset make a priority call to the flight deck, and does thehandset description show up in the PCPdirectory.

g. Handset data is stored in the Cabin InterphoneController.

- Cabin LightingConfiguration

a. The Cabin System Module (CSM) can be configured to control the lighting of one or moreareas (8maximum).
b. The nomenclature of the area displayed in the CSM is alsoconfigurable.

- ACESS ConfigurationDatabase

A. General

1. The ACESS configuration database is created from the on-ground PC software: the AirplaneConfiguration System (ACS)program.

2. The ACS program creates an individual database for the CMU, ESC, PAC, CIC, AEM and each ofthe LACs. Database information for the SEUs and OEUs is contained in the LAC database, for thel-

OEUs is contained within the PAC database, and for the CCTM is contained within theCMUdatabase.

3. The ACESS configuration database is contained in a diskette and is downloaded to the ACESSfrom the data loader.

4. The database controls the function and operation of the entire ACESS LRUs. It defines whatdevices are installed, where they are located, and what specific functions theyperform.

5. The following sections describe the configuration variables for each ACESS subsystem and theinformation provided in the configuration database and tells which unit stores thisinformation.
This is strictly a functional description and is not partitioned as it is in the software program (Airplane Configuration System) used to generate the database.

B. InstalledLRUs

1. During automatic test, the controllers must know what LRUs are installed. It must know howeach unit is expected to respond to service requests, and when not to communicate with an LRUthat is not installed. If a controller were to attempt to communicate with an LRU that is notinstalled, this would result in a nuisance error message (faulting a nonexistent LRU). If it did notcommunicate with a device that was installed some activities could never take place, such asturning on reading lights for a particular seat row.The database informs the various controllers as to what equipment they should expect tosee.

2. OEU Input/outputDefinition.

3. Each OEU contains the followinginputs/outputs:

a. Six reading light outputs for outboard OEU or eight reading light outputs for inboardOEU.
b. Six Passenger Information Sign (PIS)outputs
c. Two sets of ballastoutputs
d. Four switch inputs (two momentary and twopulsed)
e. Four row call light outputs for inboard OEU or two row call light outputs for outboardOEU

4. Switch inputs from the OEU may be level or pulse. Each input is defined so that ACESS uses it as specified to initiate predetermined actions (for example, turns on the correct light). All necessaryinformation is stored in the LAC andESC.

C. Audio ChannelDefinition

1. The passenger entertainment audio provided to theheadsets can consist of either audioentertainment or audio associated with video entertainment. There are a maximum of 18channels available to the passenger. The actual numbers that are made available depend on thedatabase definition. Audio entertainment can be either stereo or mono, while the movie audiocan be stereo, mono, or duallanguage.
The dual language audio is provided on two separate channels as mono on each channel andeach channel is a different language. Up to three movies at a time are available, and anycombinations of these three are available to any one LAC. The database determines which movieand movie type is provided to each LAC, and what channels and audio type is available at theDPCU.

D. SeatingConfiguration

1. Seating configuration includesa wide variety of information: which SEU is in each seat row,which DPCU services which input to the SEU, what OEU services which row and which

readinglight output goes with each seat. It also includes permanent no smoking definition, attendant calllight definition (which row call light and master call light is illuminated by a particular DPCUaction), and determines which chime mute switch will mute the attendant call chime from thatseat. The seat rows on the airplane are also divided into variable smoking and no smoking rowsand for lighting controlinformation.

2. Two independent sets of smoking/no smoking rows can be defined for each seating area.Smoking row definition includes default power up smoking rows and predetermined limits forsmoking rows. Every predefined smoking row can be changed to no smoking using the CCTM.Any seat row designated as permanent no smoking cannot be changed to a smoking row bytheCCTM.

3. Up to four different LAC outputs can be driven for an Attendant Call from any one seat, and up toeight speakers can be defined to chime for thiscall.

E. Passenger Address AreaDefinition

1. There are up to four Passenger Address (PA) areas on the airplane.

2. Each speaker is given a default volume level based on its location in the airplane. This level canbe modified through the CCTM.Change in volume level always results in a volume level greater than or equal to the defaultlevel. Volume can never be lowered at the CCTM below the default value. This level is modifiedzone wide on one volume zone at a time. There are also up to 16 volume zones per airplane.Modification within a volume zone occurs to all speakers within that zone and is an incrementalchange. That is, all speaker volumes are changed upward or downward by the same amount,but always maintain the same relative difference between individualspeakers.

F. Passenger Information SignDefinition

1. Each OEU has six outputs set aside for Passenger Information Signs. These outputs can actuallybe used for other lights, but the primary function is for passenger information. This includes NoSmoking signs, Fasten Seat Belt signs, Lavatory signs, Lavatory Occupied signs, Return to Seat signs, and Lav Inoperable signs. Another option available is "Permanently On". This allows thelightto be on all the time independent of switch inputs that control thePIS.

G. Cabin LightingDefinition

1. Cabin lighting definition covers several aspects associated with lighting and seating areas.There are four typesof

lighting in the airplane: Night, Direct Ceiling, Indirect Ceiling, andSidewall.Ballast output from any OEU is used to control the Indirect Ceiling and Sidewall lighting whilethe Reading Light and Passenger Information Sign outputs control the Night and Direct Ceilinglights.

2. The database defines which output drives which type of light and which seating area that light isin. The database also defines how NIGHT, LOW, MED, HI is interpreted from the CSM for eachtype of light. For Night lights this can be off or on. For the other three types this can be off, bright,or dim. Each seating area can have the CSM light controls interpreteddifferently.

3. There can also be lights on the airplane that are not controlled by the CSM, but rather by aswitch input to an OEU. These are called three way lights because they can be controlled by twoseparate light switches similar to three ways light switches in the home.These type of light controls are typically used in the crew rest area, but are not limited to thecrew rest area and stairways from the lower to the upper

deck. The light switches can be definedsuch that when the lights are off the light switch light is on; and when the lights are on, the switchlight isoff.

4. Lighting information is stored in theESC.

H. ChimesDefinition

1. Four types of chimes: Hi, Lo, Hi/Lo, Lo/Hi are used to signal cabin interphone calls, smokedetect, decompression, and attendant calls.Passenger to Attendant Call chimes can be muted so as not to disturb other passengers late atnight. All this information is stored in the database. Additional information stored in the databaseincludes the number of times the chimes sound, what speakers sound a particular chime, andwhat OEU provides the switch input for chime muting.

I. Lav AreasDefinition

1. Lavs are typically grouped together in lav areas for LAVATORY/OCCUPIED sign control. Thesesigns are lit only when all the lavs in alav area are in use. ACESS can accommodate up to eight lavatories per Lav Area, and upto 16 Lav areas per airplane, however, there can be no morethan 24 lavatories on the airplane at atime.

2. In defining the Lav areas, the PIS outputs for the appropriate OEUs are defined, inputs in OEUsfor closed door switches are determined, and waste tank discrete inputs into the ESCareassigned.

3. Each lavatory has an I-OEU associated with it. This OEU provides PIS outputs for "Local LavCall" lights, "Return to Seat" and "Lav Inoperable" signs. Ballast outputs and Reading Lightoutputs are available forlighting.

4. The four switch inputs to the OEU are used for Lav Call, Door Closed (locked), sensor LavSmoke Detect, and Lav Call/Smoke DetectReset.

5. Each Lav can signal up to four different LAC Lav Call Light outputs. It is also possible for differentlavatories to signal the same LACoutput.

J. Crew Rest Area Definition

1. Crew rest area definition determines which OEUs control crew rest area lights (which outputscontrol what type of lights), which LAC output provides smoke detection indication and whichLAC output controls the crew rest area chime.

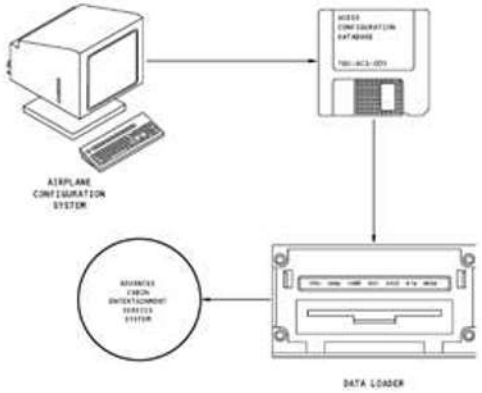


Fig. 20.18 ACESS Configuration Database Download

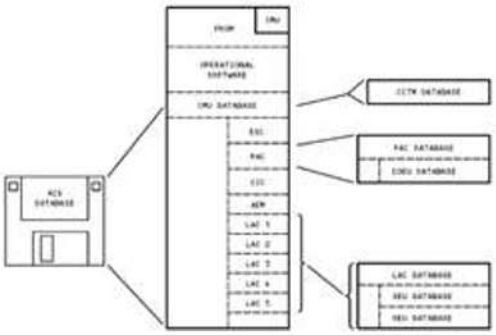


Fig. 20.19 ACESS Configuration Database Download

PASSENGER ENTERTAINMENT SYSTEM (VIDEO) - DESCRIPTION AND OPERATION

A. General

The passenger entertainment (video) system supplies passengers with video program entertainment. Video program audio is supplied to each passenger through the passenger entertainment (music) system. Video program audio may also be supplied through the passenger address (PA) system.

B. The video entertainment system has thesecomponents:

1. Video cassette tape reproducers(VTR)
2. Video system control unit(VSCU)
3. Video distribution units(VDU)
4. Video projectors and viewingscreens
5. Videomonitors

C. The equipment can show feature motion pictures,short subjects or generalinformation.

- Video Tape Reproducer(VTR)

The video tape reproducer (VTR) provides up to 120minutes of program playback on VHS cassettes for three formats (SECAM, PAL and NTSC 4.43). VTRs with BETA cassettes provide program material for up to 180 minutes in length. They have the added format of NTSC
3.58 in addition to the three formats for VHS VTRs. The video cassette programs are displayed on video projection screens or monitors. The VTRs supply entertainment programs for the video system. The VTRs are located in the video control center. The VTR features dual language playback and has two modes of operation: manual and program.

- Video System Control Unit(VSCU)

The video system control unit (VSCU) includes the controls necessary for program presentation. The VSCU gets video programs from the video tape reproducers (VTRs) and sends the video programs throughout the video system. The VSCU may be programmed so the same or different video programs (VTR 1 or VTR 2 and if installed VTR 3) may be sent to any combination of viewing areas.The VSCU has these controls and/or displays

- VideoProjector

a. In a typical configuration there are five video projectors in the main passenger cabin. One each inZone A, B, C, Dand

E. The video projectors hang from the PSU rail. Projector lenses are aimed atand focus television images on their respective screens. Flight personnel cannot get access to theadjustment controls on the video projectors.

b. After the VDU turns on the projector power, the projector sends an on discrete signal to the VDU. This signal willilluminate the applicable VSCU MON (monitor) STATUS LED (A light shows on; no light showsoff).

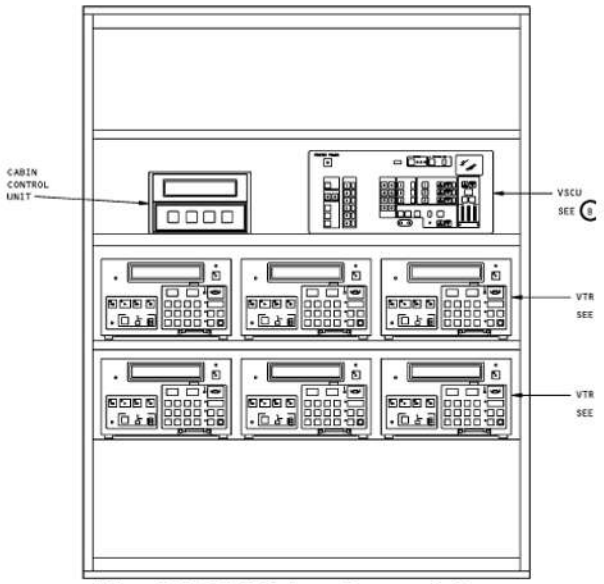


Fig. 20.20 Video Control Centre

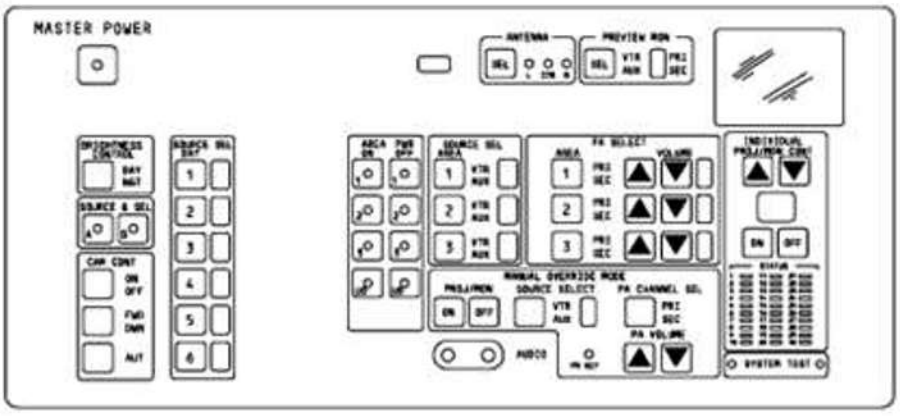


Fig. 20.21 Video System Control Unit

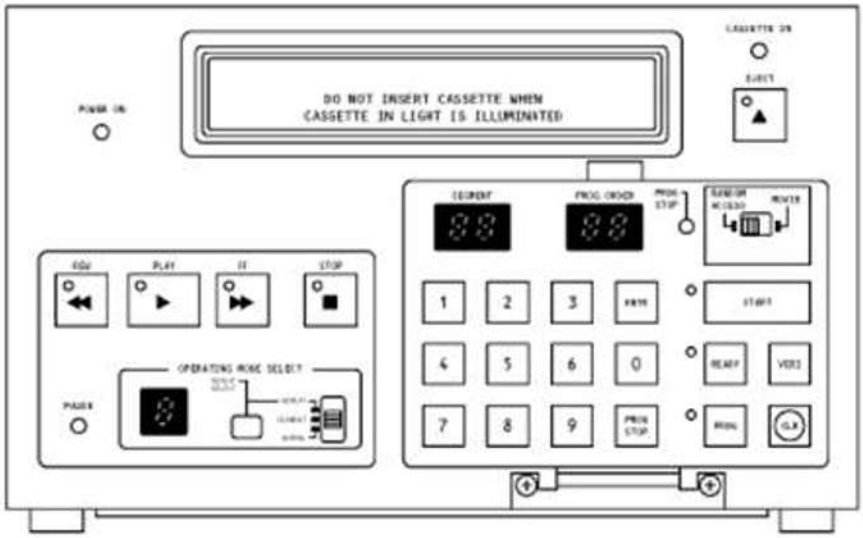


Fig. 20.22 Video Tape Reproducer (VTR)

- Video Distribution Unit(VDU)

a. The video distribution unit (VDU) acts as an interface between the video system control unit (VSCU) and the projectors/monitors in a particularzone.

b. The typical video system is divided into 3 areas: area- 1, area-2 and area-3. The monitors/projectors in zone and are configured to area-1 and receive video signals from corresponding VDU'S. The monitors/projectors in zone B, zone C forward and the upper deck are configured to area-2 and receive video signals from corresponding VDU'S. Monitors/projectors in zone C aft, zone D and zone E are configured to area-3 and receive video signals from corresponding VDU'S. Each VDU can supply video signals to two projectors or monitors. Projectors and monitors receive the same data from a VDU and are interchangeable from a VDU output point ofview.

c. The VDU performs channel selection and on/off control of the monitors/projectors through videosystem control unit (VSCU) commands.TheVDUs also pass the video signals (from the VTR) to the downstream VDU'S. Video signals areamplified going to the monitors/projectors to make allowance for signal loss due to the longtransmissiondistances.

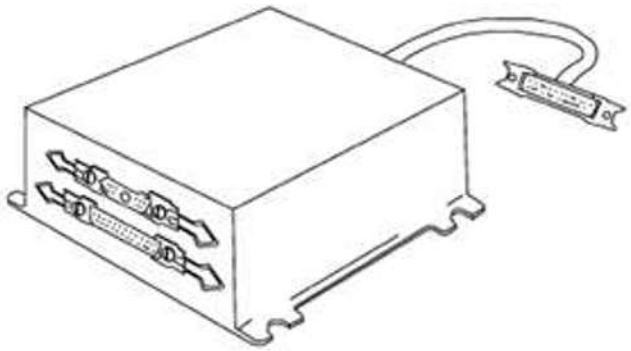


Fig. 20.23 Video Distribution Unit (VDU)

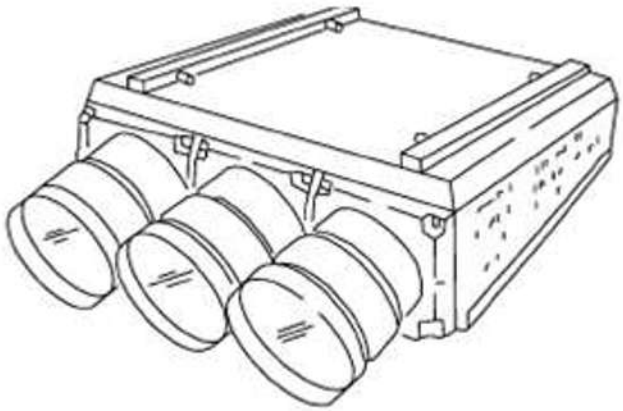


Fig. 20.24 Video Projector (PROJ)

PASSENGER ENTERTAINMENT SYSTEM (MUSIC) - DESCRIPTION AND OPERATION

1. General

A. Passenger Entertainment System (music) is part of the Advanced Entertainment/Services System(ACESS). The music portion of the passenger entertainment system provides each passenger withselectable entertainment audio at each passenger seatlocation.

B. Each passenger plugs an electronic headset or pneumatic headset into either an electrical output socket or a transducer socket of the seat digital passenger control unit (DPCU). The passenger thenselects an audio channel, and adjusts the DPCU volume control for a comfortable listeninglevel.

C. The passenger entertainment audio provided to the headsets can consist of either audioentertainment or audio associated with video entertainment.There are a maximum of 18 channels of the entertainment audio and 6 channels of video audioavailable to the passenger. The ACESS database defines the actual number of channels that aremadeavailable.

D. Audio entertainment can be either stereo or mono, while the movie audio can be stereo, mono, ordual language. The dual language audio is provided on two separate channels asmonooneachchannelandeachchannelisadifferent

language. Up to three movies at a time are available, andany combinations of these three are available to any one Local Area Controller (LAC). The databasedetermines which movie and movie type is provided to each LAC, and what channels and audio typeis available at theDPCU.

E. The passenger entertainment system (music) consists of an audio reproducer unit, an audioentertainment multiplexer (AEM), an entertainment/service controller (ESC), four local areacontrollers, switches on the cabin system modules (CSM), a seat electronic unit (SEU) for each seatgroup, seat electronic unit termination plugs, a digital passenger control unit (DPCU) for each seat, aheadset for each DPCU, switches on the cabin configuration test module (CCTM), and a configurationprogram stored in the central management unit(CMU).

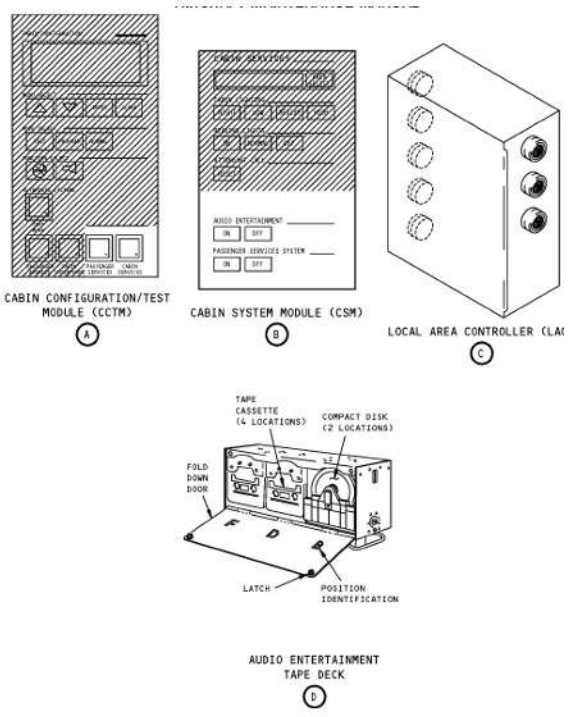
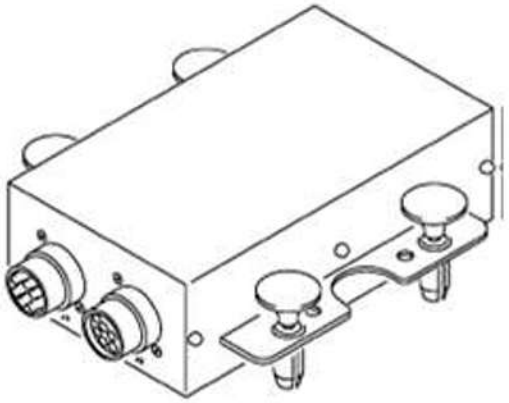


Fig. 20.25



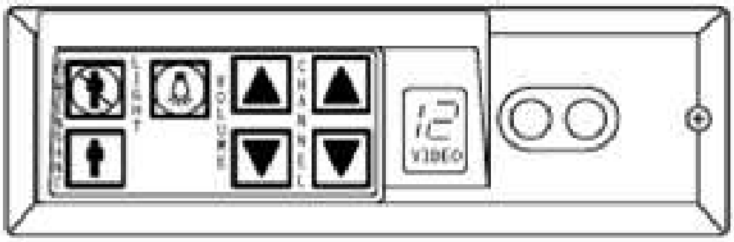


Fig. 20.26 Seat Electronic Unit (SEU)

Fig. 20.27 Digital Passenger Control Unit (DPCU)

- Audio Entertainment Multiplexer(AEM)

The audio entertainment multiplexer receives 12 channels (18 channels maximum) of analog audiofrom the audio reproducer unit, and 6 channels of analog audio from the video entertainment system.Keylines from the video entertainment system tell the AEM to process the individual videoentertainment system audio channels as monaural, stereo or bi-lingual.The AEM converts the analog audio to a digital format, multiplexes the digital audio into a datastream, and sends the digital audio to the entertainment/service controller (ESC).

The AEM has a Built-in-Test (BIT) circuit. AEM continuously monitors its internal circuit and itsexternalInterfaces for proper operation. Any detected faults are stored in non-volatile memories.Fault status is continuously transmitted to the ESC for distribution to the CMU.

- Entertainment/Service Controller(ESC)

The ESC contains two identical controller circuits: the normal (primary) and alternate (secondary)controllers. Only one controller is turned on at any given time. The normal controller is the primaryoperating controller. In case the normal (primary) controller fails, the ESC can be manually switchedto operate on the alternate (secondary) controller by pressing the PASSENGER SERVICES switch on theCCTM.

The ESC receives entertainment/service system configuration data from the CMU and distributes the information to the LACs. The configuration data from the CMU for the passenger entertainmentsystem are:

1. The number of audio and video channels required for each area within the passengercabin.
2. Stereo/monaural audio channels for entertainmentaudio.

3. Stereo/monaural, dual languages and area distribution of video systemaudio.

The ESC receives inputs from the AEM and PAC. The inputs from the AEM are entertainment audio (music) and video system audio. Input from the PAC is the PA announcement. The digital audio from the PAC overrides the entertainment audio and the video audio when the PA announcement is made. A sync input between the AEM and the ESC is used to properly transmit the digital audio from the AEM toESC.

The ESC multiplexes the digital audio received from the AEM and PAC according to the configurationprogramming received from the CMU before transmitting the entertainment and passenger addressaudio to theLACs.

The ESC has its own Built-in-Test (BIT). It continually monitors its internal components and interfacesfor proper operation. The ESC stores these faults in non-volatile memory and transmits them to theCMU. The CMU stores these faults and for some units displays status messages on the auxiliaryEICAS display. Status message PASSENGER SERVICES 1 represents a failure of the normalcontroller of the ESC. StStatus message PASSENGER SERVICES 2 represents a failure of the alternate controller of the ESC.

- Local Area Controller(LAC)

Four local area controllers (LAC) are mounted to overhead structures in the main passenger cabin.Local area controller (LAC) #1 and LAC #2 are mounted on the door 2 left life raftbox.

LAC #1 ismounted in front of LAC #2. LAC #3 is mounted above the ceiling, over the right aisle, in front of door4 right. LAC #4 is mounted on the door 2 right life raft box.
The LAC is functionally partitioned into three major circuits. Each major circuit functionsindependently of the other two and the failure of any major circuit will not affect the operation of theother two. One major circuit is dedicated to the cabin interphone system, one major circuit isdedicated to the passenger address system and the other major circuit is dedicated to the cabinlighting system, passenger entertainment system (music) and passenger service system. Only theentertainment portion is discussed.
The LAC receives multiplexed digital audio from the ESC. The LAC distributes the digital audio toeach column of SEUs within the area it is controlling. A column may have up to 31 seat groups witheach seat group having one SEU.Each LAC continuously monitors internal components and interfaces for proper operation. Testresults are stored in non-volatile memory within the LAC and are transmitted to the CMU through theESC. The CMU transmits the test results to the left, center and right EFIS/EICAS Interface Units (EIU) to be distributed to the CMC.
ACESS configuration data for the passenger entertainment system (music) is routed from the ESC to the AEM. The AEM configures the data to certain time slots on a stream. The data stream is sent to the ESC which distributes to the LACs, which distributes to the SEUs.

- Cabin System Module(CSM)

A. The cabin system modules (CSMs) are installed throughout the airplane. Here are the locations for theCSM:
1. One CSM locates on the door 1 left attendantpanel
2. One CSM locates on the door 2 left attendantpanel
3. One CSM locates on the door 4 left attendantpanel
4. One CSM locates on the upper deck galley

The AUDIO ENTERTAINMENT ON and OFF switches on any cabin system module (CSM) controls power to the entertainment tape deck. The switch that is selected has a light on the switch which comes on to indicate the selection that was made.
The PASSENGER SERVICES SYSTEM ON and OFF switches on any cabin system module (CSM) controls power to the seat electronic units (SEU). The switch that is selected has a light on the switch which comes on to indicate the selection that was made.
- Seat Electronic Unit(SEU)

Each seat electronic unit (SEU) is located underneath each seat group. The SEU is used for all seat configurations: 1, 2, 3 or 4 seat installations.
There are six connectors providing signal interfacing. Connector J1 provides connection to the LAC or previous SEU; connector J2 provides connection to the next SEU or SEU termination plug on the last SEU in a column. The other four connectors (J3, J4, J5, and J6) on the other end of the SEUprovide signal interface with all the DPCU in the seat group.
The SEU receives multiplexed digital audio signals from the LAC, restores the digital audio to itsoriginal analog from, and provides audio program selection capability for each individual passengerin the seat group where it islocated.
The SEU also receives program selection information from each of its DPCUs. The SEU extracts thedesired channel(s) from the multiplexed information sent to it by the LAC, demultiplexes the signals, converts the digital signals to analog form, and distributes the audio output to theDPCUs.
Each SEU can provide audio outputs to maximum 4 DPCUs.

Power to the SEUs is controlled by the PASSENGER SERVICES SYSTEM ON and OFF switches on any CSM or SEU circuit breaker, located on the P414 panel.
Each SEU continuously monitors internal components and external interfaces for properoperation.
Test results are stored in non-volatile memory within the SEU and are transmitted to the associatedLAC.

The LAC transmits the test results to the EFIS/EICAS Interface Units (EIU) which sends the information to the CMC.

- Digital Passenger Control Unit(DPCU)

Each DPCU, located on the armrest of each passenger seat, sends channel select and volumecontrol data to the SEU in the seat group.
Selection of an audio channel and its volume level is done using the keypad on the DPCU. Twomomentary-action CHANNEL switches allow UP or DOWN channel selection. The selected channel is displayed on two LED's.
Two momentary-action VOLUME switches allow control of the audio level of the entertainmentprogram.
The keypad sends the data to the DPCU which transmits the selections to the SEU. Audio input isdirected to an electrical orpneumatic headset connector at the DPCU. The DPCU also contains anattendant call switch and reading light switch described in 23-33-00. A single multipin connector provides signal interface with the SEU. The headset plugs into the receptacle on the DPCU.
The DPCU is supplied 16v DC from the associated SEU.

2. B-777 CAB SYSTEM General

The cabin services system (CSS) is an integrated system that combines these systems:

- Passengeraddress
- Cabininterphone
- Passengerservice
- Cabinlighting
- Monitor andcontrol.

- Passenger AddressSystem

The flight crew and cabin attendants use the passenger address system (PAS) to make announcements to the passengers. The
PA audio goes to speakers in the passenger cabin.

- Cabin InterphoneSystem

The flight crew and cabin attendants use the cabin interphone system (CIS) to speak with each other. They use handsets in the cabin and flight deck.

- Passenger ServiceSystem

Passengers use the passenger service system (PSS) to control reading lights and to call attendants. The PSS also controls the passenger information signs.

- Cabin LightingSystem

The cabin lighting system (CLS) controls the passenger cabin illumination.

- Monitor and ControlFunctions

The CSS has interfaces with other airplane systems for different functions. Flight attendants use CSS control panels to select monitor and control functions. These are some of the CSSmonitor and control functions:

- Cabin temperatureselection
- Potable waterstatus
- Cabin doorstatus.

- Abbreviations andAcronyms

- AIMS - airplane information managementsystem
- AMU - audio managementunit
- annct -announcement
- ASG - ARINC signalgateway
- ASP - attendant switchpanel
- BFE - buyer furnishedequipment
- CACP - cabin area controlpanel
- CAH - cabin attendanthandset
- CCP - cabin controlpanel
- CDG - configuration databasegenerator
- CDU - control displayunit
- CIC - cabin interphonecontroller
- CIS - cabin interphonesystem
- CLS - cabin lightingsystem
- CSCP - cabin system controlpanel
- CSMU - cabin system managementunit
- CSS - cabin servicessystem
- ECS - environmental controlsystem
- ELMS - electrical load managementsystem
- FDH - flight deckhandset
- FSEU - flap/slat electronicsunit
- IFE - in-flightentertainment
- MCU - modular conceptunit
- MMC - mass memorycard
- OEU - overhead electronicsunit
- OPAS - overhead panel ARINC 629system
- PA - passengeraddress
- PA/CI - passenger address/cabininterphone
- PAC - passenger address controller
- PAS - passenger addresssystem
- pax - passenger
- PSEU - proximity sensor electronicsunit
- PSS - passenger servicesystem
- PTT - push totalk
- RF - radiofrequency
- SDM - speaker drivemodule
- SFE - seller furnishedequipment
- WES - warning electronicsystem
- ZMU - zone managementunit

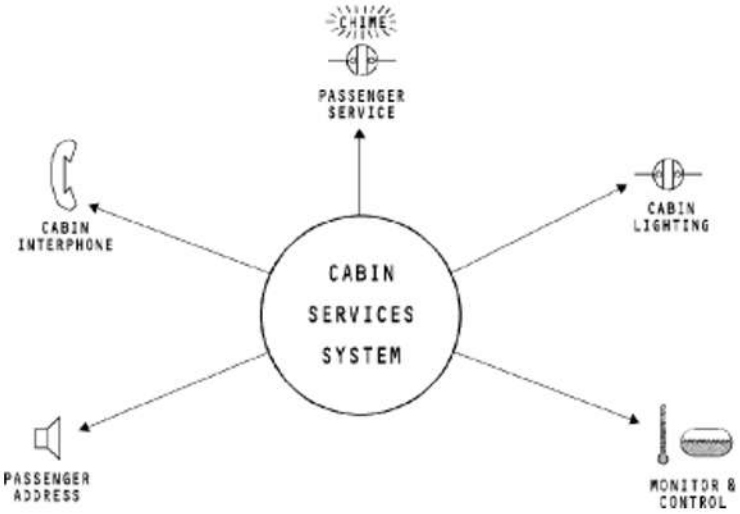


Fig. 20.28 Cabin Service System Introduction

3. CSS GENERAL - INTRODUCTION TO ARINC 628 General

ARINC628 gives design guidance for the development, installation, and certification of new cabinsystems.

The cabin system has two parts, the cabin services system (CSS) and the in-flight entertainment (IFE)system.

The CSS has these basic systems and functions:

- Cabin interphone system(CIS)
- Passenger address system(PAS)
- Passenger service system (PSS)
- Cabin lighting system(CLS)
- Monitor and control functions(MCF).

The IFE system provides passenger entertainment and may have optional capabilities including in-seat passengertelephone.

ARINC 628 has four parts. Each part gives design guidance in a different part of the cabin system.

ARINC 628 Part 1 – Peripherals

Part 1 of the ARINC 628 specification defines standards for the interfaces between the IFE systems main controller(s) and the head-end equipment. These are examples of head-end equipment:

- Audio entertainment player(AEP)
- Video entertainment player(VEP)
- Passenger in-flight information computer(PIIC)
- Prerecorded announcement machine(PRAM).

ARINC 628 Parts 2 - Seat Interfaces

Part 2 of the ARINC 628 specification defines standards for the interfaces between the seat peripherals and the seat-end equipment. These are examples of seatperipherals:

- Passenger control units(PCU)
- Passengerheadphones
- Seat video displays(SVD)

- Passenger telephonehandsets.

Seat-end equipment is equipment installed on the bottom ofthe seat group such as a seat electronics box(SEB).

ARINC 628 Parts 3 - In-Flight Entertainment Interfaces

Part 3 of the ARINC 628 specification defines standards for the interfaces between the IFE system and other airplane systems.

ARINC 628 Part 4 - Cabin Distribution System

Part 4 of the ARINC 628 specification defines standards for an in- flight entertainment cabin distribution system (CDS). TheCDS consists of some or all of these networks:

- A seat related network. This network distributes audio and video signals to each passenger seat and handles all passenger service functions. The network can also distributedata for functions like passenger telephone, games, and interactiveservices.
- An overhead video network. This network distributes videosignals and control data such as monitor on/off and video select commands to the overhead displayunits.
- A cabin management network. This network provides aconnection to printers, fixed or handheld terminals, datastorage units,etc.
- A telecom network. This network provides for bidirectionalvoice and fax communication. The network is used fordedicated telephone/fax stations which are not integratedinto the seat relatednetwork.

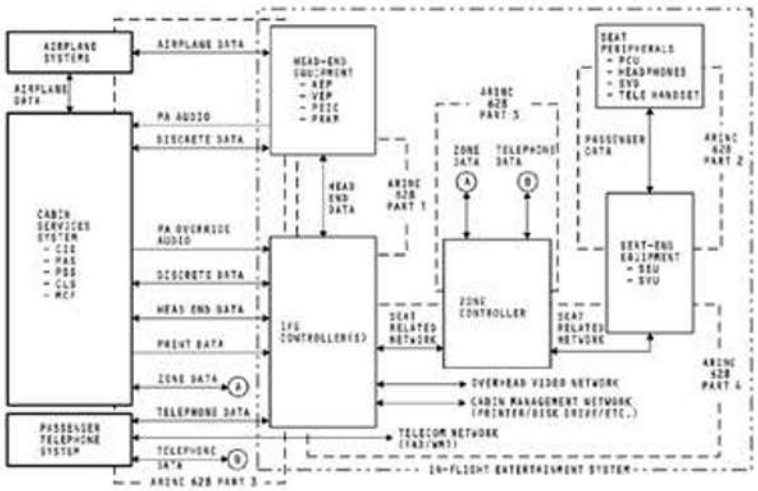


Fig. 20.29 CSS General-Introduction to ARINC 628

4. CABIN SERVICES SYSTEM - GENERAL DESCRIPTION

General

You use cabin control panels (CCPs) to operate the CSS. The hardware configuration of a CCP tells it to operate as a cabin area control panel (CACP) or a cabin system control panel (CSCP).
The CSS uses a configuration database to define the cabininterior. You change the configuration database to agree withchanges in the cabininterior.

Operation

Maintenance personnel use the CSCP to test and to programthe CSS. Flight attendants use the CSCP and the CACPs toselect light settings and other monitor and control functions.
The CSCP also has a mass storage device to keep programdata and testresults.
The cabin system management unit (CSMU) sends testcommands. It also has interfaces with other airplane systems for some CSS functions.
The passenger address/cabin interphone (PA/CI) controller controls the passenger address and cabin interphone functions.
It controls routing of cabin interphone calls. The PA/CI controller gets passenger address audio inputs and sends them through the speaker drive modules (SDMs) to cabin speaker.
There are four zone management units (ZMUs). The ZMUs control thesezones:

- ZMU 1 controls zone1
- ZMU 2 controls zone2
- ZMU 3 controls zone3
- ZMU 4 controls zone4.

In each zone, the ZMUs connect to these three types of LRUs:

- Overhead electronics units(OEUs)
- Cabin attendant handsets(CAHs)
- Cabin control panels(CCPs).

The OEUs control lights and passenger information signs. They also receive inputs from other cabin systems.Flight attendants use CAHs to talk on the cabin interphone andto make passenger address announcement.
Flight attendants use the CACPs to select cabin light settings,set some passenger service functions and operate the monitorand control functions.The ZMUs also have an interface with the in- flight entertainmentsystem. The passengers use controls at the passenger seat tocontrol reading lights and make attendant calls.
The CSS components operate together in five subsystems

Passenger Address System (PAS)

The PA/CI controller gets audio inputs from different sources. It selects the highest priority audio, digitizes it and sends it to the SDMs and the in-flight entertainment system. The SDMs change the signal back to analog and send it to one or two speakers. The inflight entertainment system overrides entertainmentaudio at the passenger seat with PA audio.
The PAS also supplies chimes to the cabin.

Cabin Interphone System (CIS)

CAHs connect to ZMUs to send and receive audio and dial codes. The ZMUs have a digital interface with the PA/CIcontroller. The PA/CI controller makes the connection betweenattendant stations.
When a station gets a call, the PAS makes a chime and the ZMU makes a master call light come on.

The flight crew interface to the CIS is almost the same, except the flight interphone system and flight deck handset connectdirectly to the PA/CIcontroller.
Passenger Service System (PSS)

Passengers use controls at the passenger seat to control reading lights and to call attendants. The passenger selectionsgo to the ZMU over an ARINC 628 zone interface. The ZMUsends the data to an

OEU. The OEU makes a reading light orrow call light come on. For an attendant call, the ZMU alsomakes a master call light come on. The PAS makes a chimesound.

Cabin Lighting System (CLS)

The CLS uses these four types of lights:

- Sidewall washlights
- Indirect ceilinglights
- Direct ceilinglights
- Nightlights.

Flight attendants use the CACPs to select light settings. TheCACPs send the selection to the ZMUs. The ZMUs send signals to the OEUs which make the applicable lights go on or off.

Monitor and Control Functions

The CSS monitors many other cabin systems. This gives the flight attendants a central location to select cabin controls.Attendants use the CSCP and CACPs for monitor and control functions. The monitor function shows information only. These are someof the monitoredsystems:

- Potable waterstatus
- Waste tankstatus
- Cabin doorstatus
- Smokedetectors.

The control function permits both display and selection. These are some of the systems controlled by the CSS:

- Cabin temperatureselection
- Air/groundcommunication.

CSSMaintenance

Maintenance personnel use the cabin system control panel (CSCP) to test and to install software in the CSS. The CSCP hasa touch sensitive screen for selections.The CSCP sends test selections to the CSMU. The CSMU sendsthe test selection to the CSS components. The CSCP keeps testresults in memory and shows them on thescreen.

The CSCP has a disk drive. You use the CSCP to install software for the configuration database and LRU operational programs.

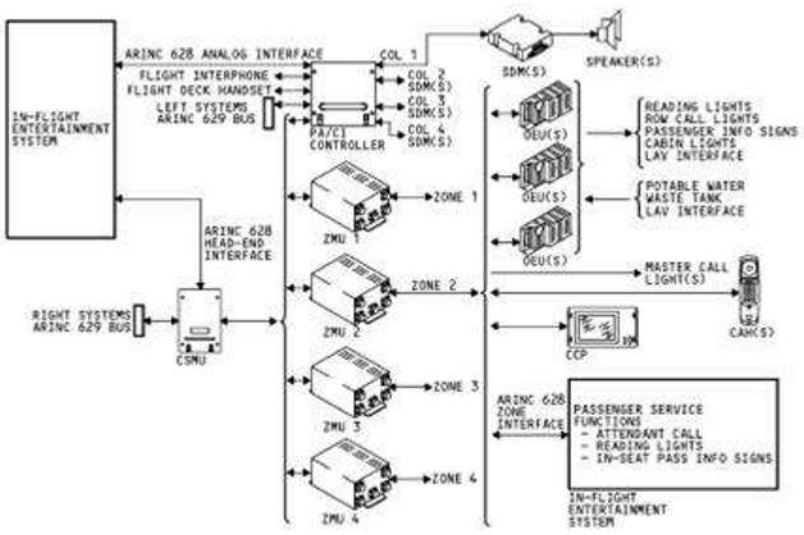


Fig. 20.30 Cabin Services System-General Description CSS GENERAL - POWER INTERFACE

Power for the cabin services system (CSS) comes through these three power management panels:

- P110 left power managementpanel
- P210 right power managementpanel
- P310 standby power managementpanel.

Circuit breakers control power to these CSS core components:

- Cabin system management unit(CSMU)
- Cabin system control panel(CSCP)
- Cabin area control panels(CACPs)
- Passenger address/cabin interphone (PA/CI)controller

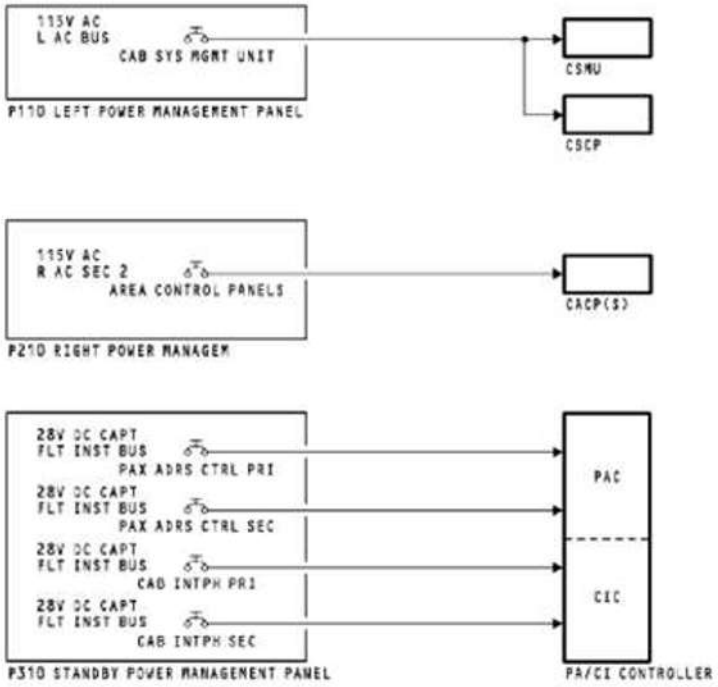


Fig. 20.31 CSS General-Power Interface

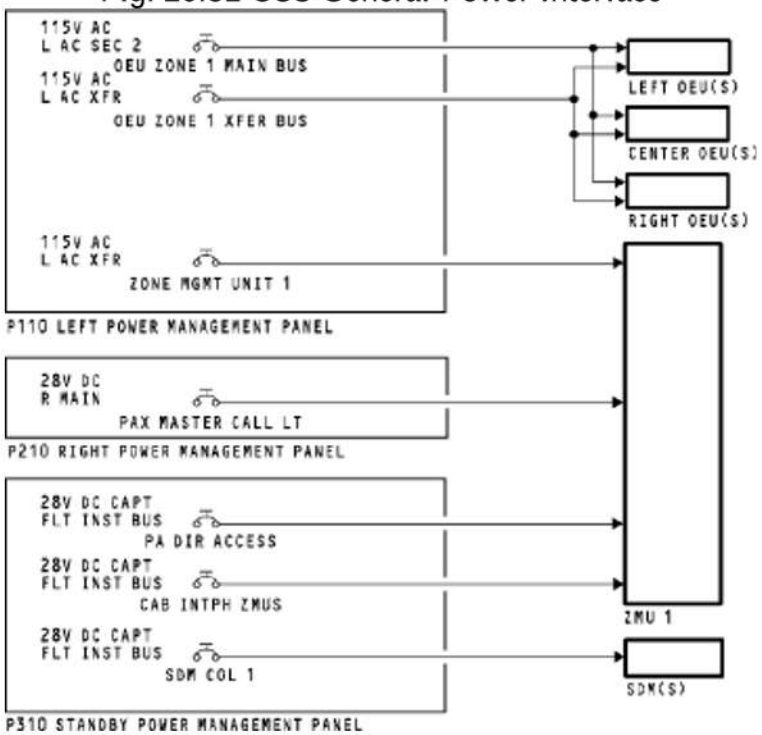


Fig. 20.32

CSS GENERAL - SYSTEM INTERFACES

The CSS uses different buses and interfaces to send data between the CSS components. These are the interfaces with themain CSS components:

- Intersystem (I/S)bus
- Cabin interphone (CI)bus
- Passenger address/cabin interphone (PA/CI)bus.

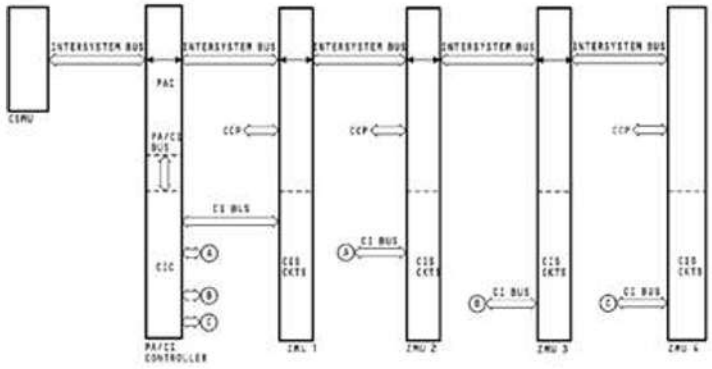


Fig. 20.33 CSS General-System Interfaces

CABIN CONTROL PANEL

Purpose

You use the cabin control panels (CCPs) to operate the CSS. The hardware configuration of a CCP tells it to operate as acabin area control panel (CACP) or a cabin system control panel (CSCP). Flight attendants use the CSCP or the CACPs to control CSS functions. Maintenance personnel use the CSCP to do tests and to install software.

Functional Description

Attendants make selections on the touch screen to control these CSS functions:

- Cabinlighting
- Passengerservices
- Cabinenvironment.

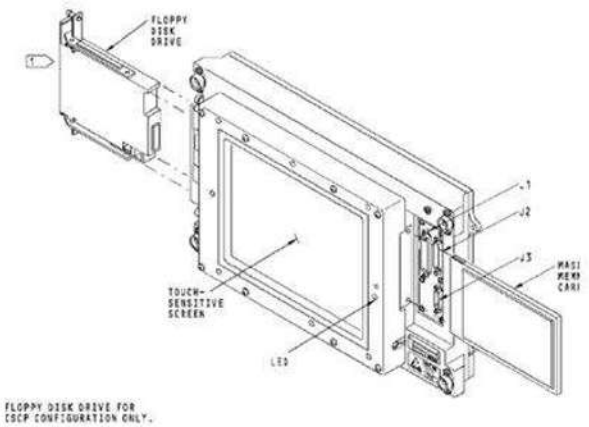


Fig. 20.34 CSS General-Cabin Control Panel

The mass memory card and the floppy disk drive are line replaceable.

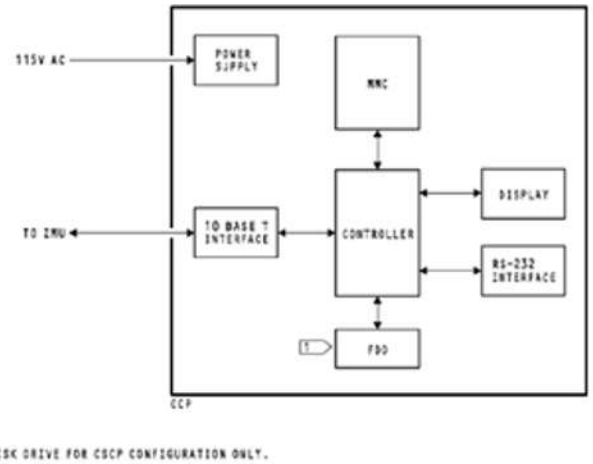


Fig. 20.35 CSS General-Cabin Control Panel Functional Description

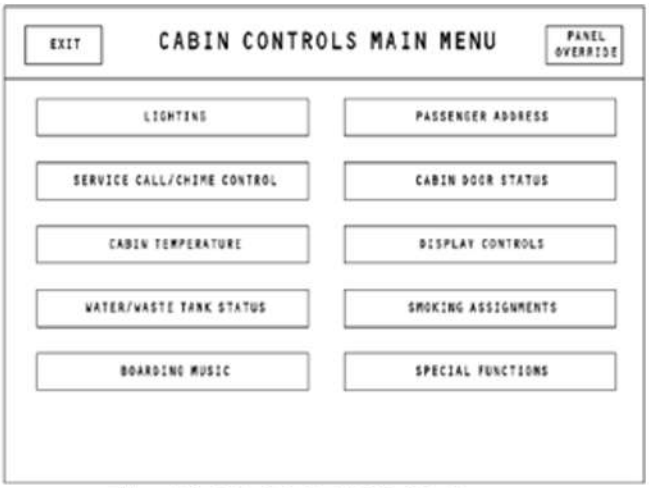


Fig. 20.36 CSCP/CACP Screen

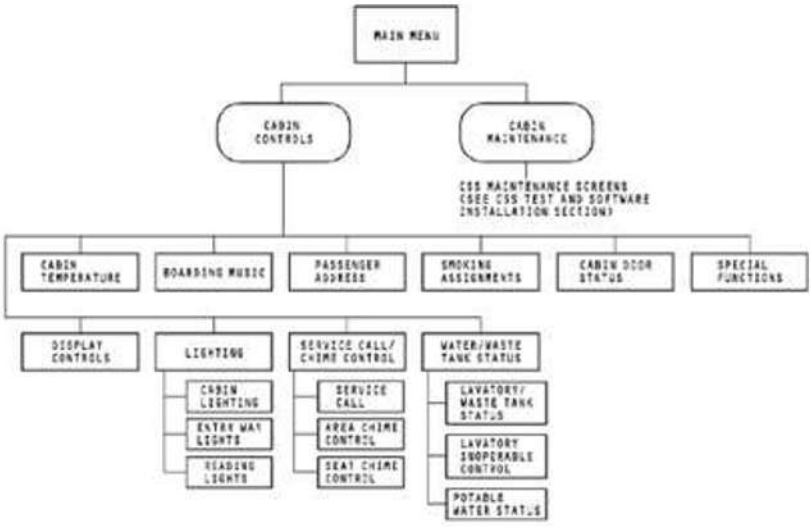


Fig. 20.37 CSS General-CSCP/CACP Screens Menu Tree

CABIN SYSTEM MANAGEMENT UNIT

The cabin system management unit (CSMU) supplies an interface between CSS LRUs and other airplane systems

Functional Description

The CSMU does these functions:

- Gets CSS database and operational program softwarefrom the cabin system control panel (CSCP) and sends it to other CSS LRUs
- Sends data to and gets data from the right systems ARINC629 bus (temperature control, maintenance information,etc.

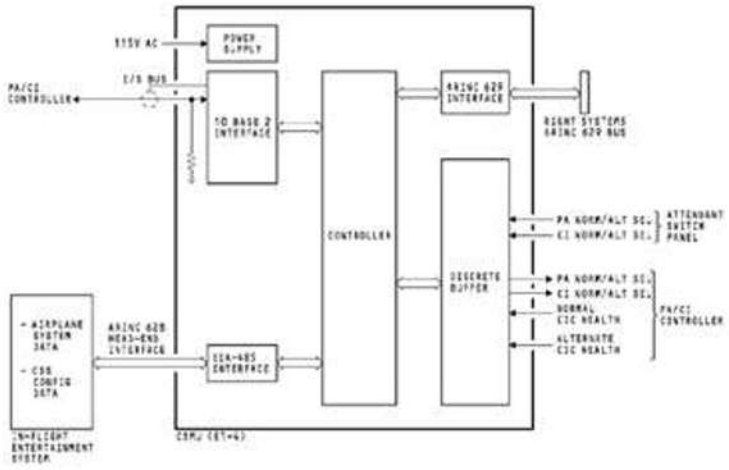


Fig. 20.38 CSS General-Cabin System Management Unit- Functional Description

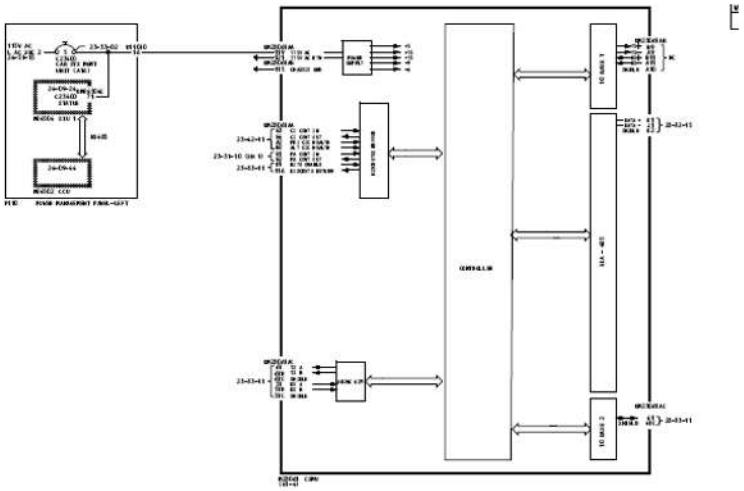


Fig. 20.39 Schematic Diagram of CSMU

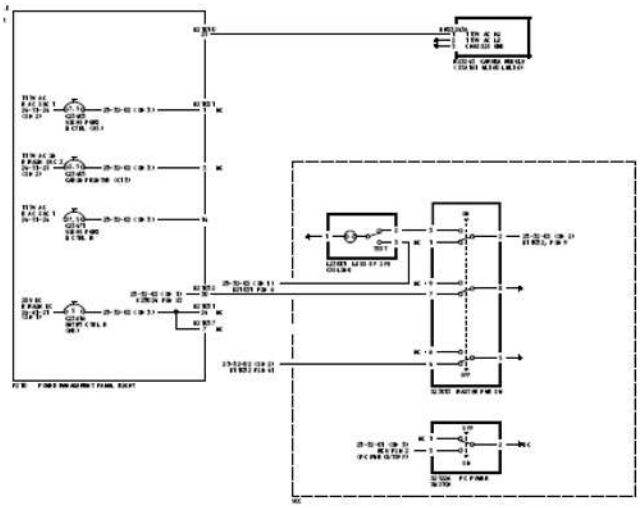


Fig. 20.40 IFE Power Distribution

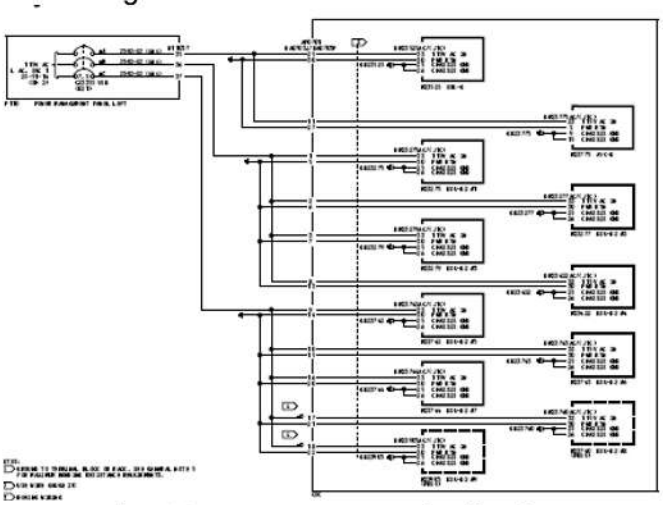


Fig. 20.41 IFE PowerDistribution

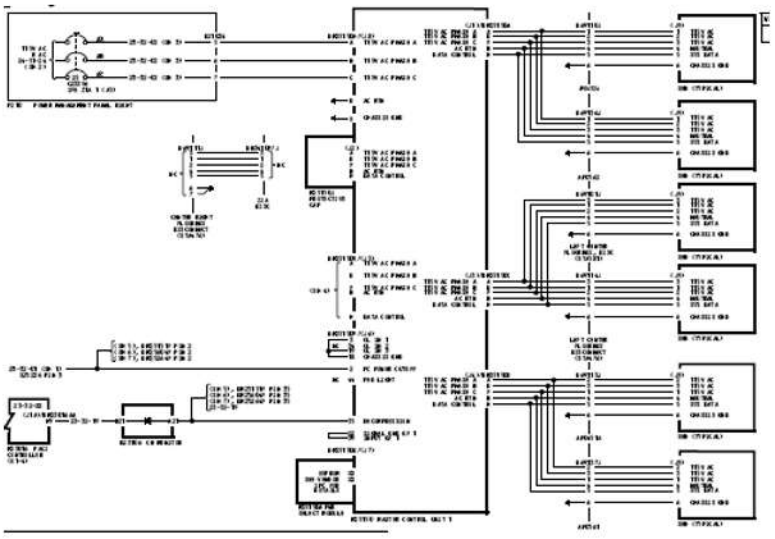


Fig. 20.42 IFE PowerDistribution

PASSENGER ADDRESS/CABIN INTERPHONECONTROLLER

The passenger address/cabin interphone (PA/CI) controllerpermits announcements on the passenger address system. It also permits attendants to make station to station calls and calls to the flight deck.

Functional Description

The PA/CI controller has two passenger address controllers and two cabin interphone controllers. Each controller uses different circuits in the LRU. Only one passenger address controller and one cabin interphone controller operates at atime. If a controller fails, you can select the alternatecontroller.

The PA controller does these functions:

- Digitizes six PA channels for audiooutput
- Sends PA override signals to the in-flight entertainment (IFE) system (overrides passenger entertainment audio whennecessary)
- Calculates the volume for eachspeaker
- Receives audio inputs from the flight interphone system, direct access, cabin interphone controller, and IFE system (prerecorded announcements, video audio, boarding music)
- Controls the logic for the passenger informationsigns
- Has an interface with the left systems ARINC 629bus.

The cabin interphone controller does these functions:

- Makes digital connections betweenstations
- Sends audio tones to off-hookhandsets
- Sends audio sidetone to the flightdeck
- Processes ground crewcalls
- Has interfaces with the flight deck, flight interphone system, andAIMS.

ZONE MANAGEMENT UNIT

The zone management units (ZMUs) primarily control passenger service and cabin lighting. They have interfaces with these components:

* Passenger address/cabin interphone (PA/CI)controller
- Cabin area control panels(CACPs)
- Cabin attendant handsets(CAHs)
- Overhead electronics units(OEUs).

Functional Description

Each ZMU does these functions:

- Does bus conversion from 10 base 2 to 10 base T for as many as three cabin area controlpanels
- Has interfaces for as many as five handsets and three columns ofOEUs
- Controls as many as 30 master calllights
- Routes PA direct accesssignals.

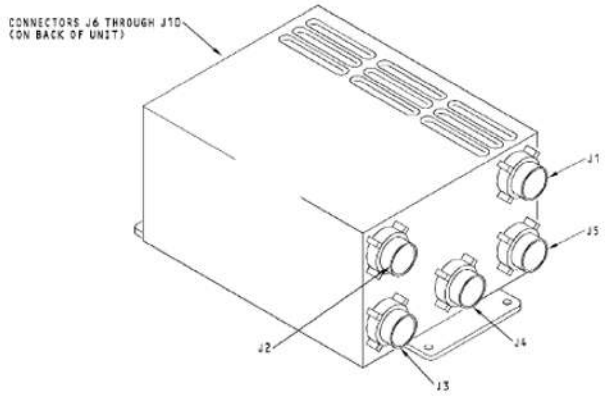


Fig. 20.43 Zone Management Unit

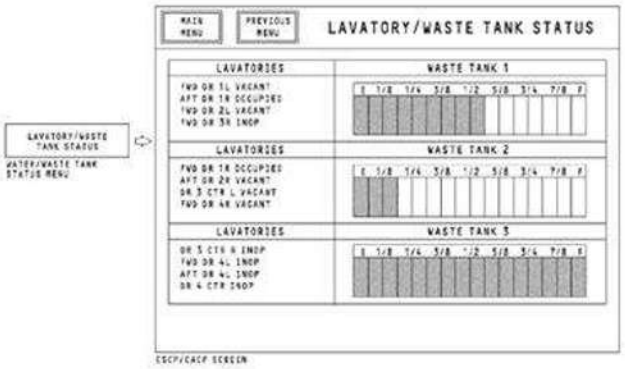


Fig. 20.44 CSS General-Lavatory/Waste Tank Status Screen

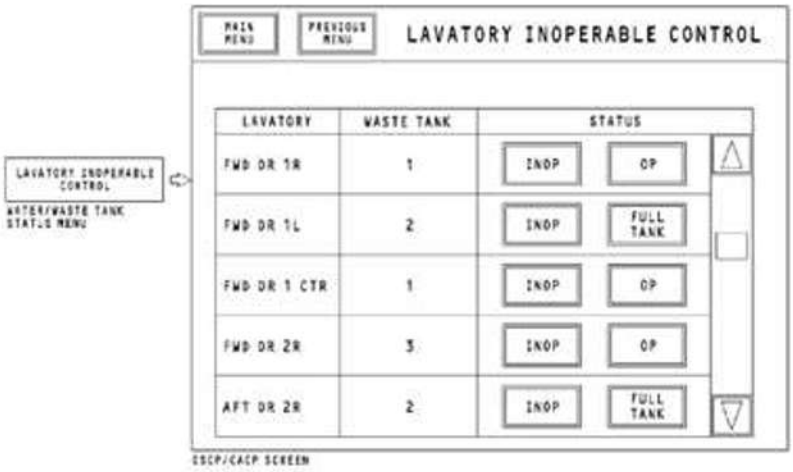


Fig. 20.45 CSS General-Lavatory Inoperable Control Screen

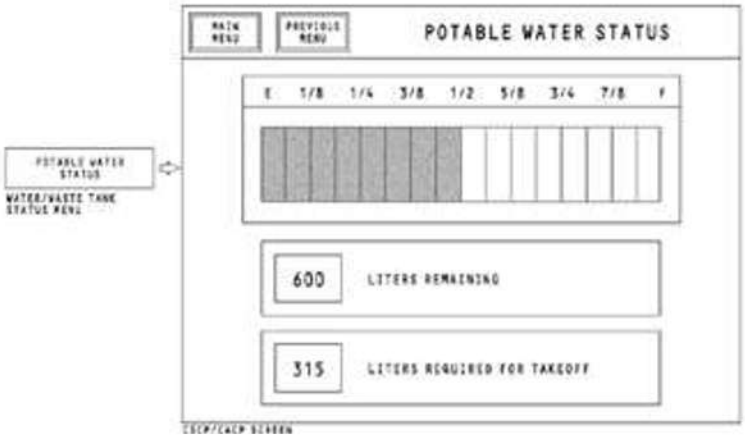


Fig. 20.46 CSS General-Potable Water Status Screen

CSS TEST AND SOFTWARE INSTALLATION

General

You do most cabin services system (CSS) maintenance functions from the cabin system control panel (CSCP). CSS maintenance includes two general areas; tests and software installation.
Tests

You use the CSCP to do tests and review failure data. BITE and continuous fault monitor are the two primary types of tests.
Software Installation

You use the CSCP to install software in the CSS. Software operation functions include software installation and configuration checks.
CSS TEST AND SOFTWARE INSTALLATION

For some CSS maintenance functions, you may need to enter a password. The configuration database controls which functions require passwords.
A dialogue window shows automatically when you make a selection that requires a password

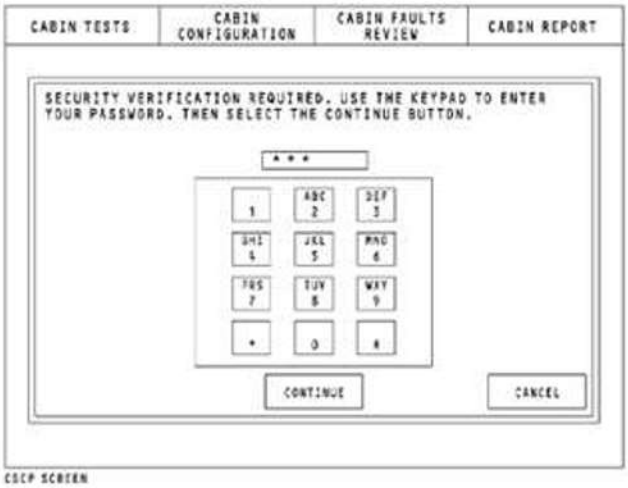


Fig. 20.47 CSS Test and Software Installation-Request for Password Dialogue Window
You use the cabin system control panel (CSCP) cabin maintenance main menu to select all maintenancefunctions.
Access

Touch CABIN MAINTENANCE on the CSCP main menu to showthe cabin maintenance main menu.
Controls

Touch any of these four selections at the top of this screen to do the related function:

- CABIN TESTS - start CSS tests and monitor test results CABIN CONFIGURATION - install software and see LRU hardware and software partnumbers.
- CABIN FAULTS REVIEW - review failure data including faults related to CSS flight deckeffects.
- CABIN REPORT - send fault and part number data to a cabinprinter.
- The four selections show at the top of all maintenance screens.
- You can select any of the four selections from any maintenance screen (except for dialogue windows). Touch these selections at the bottom of the screen to do the relatedfunction:
- HELP - to go to the cabin maintenance menu tree. The menu tree shows cabin maintenance

selections and gives access to additional data on cabin maintenancefunctions

- EXIT - to go back to the CSCP mainmenu

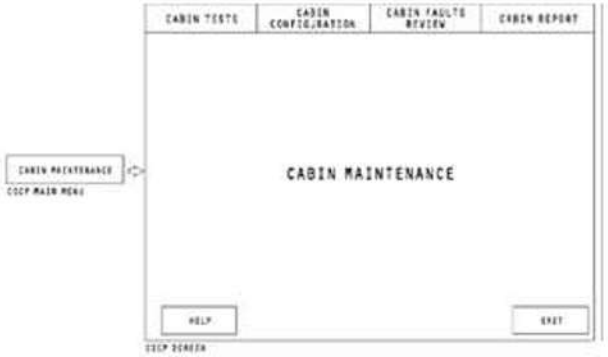


Fig. 20.48 CSS Test and Software Installation –Cabin Maintenance Main Menu

CSS TEST AND SOFTWARE INSTALLATION - CABIN MAINTENANCE MENU TREE

General

The cabin maintenance menu tree gives you data for all the available selections on the maintenance menus. Because of selections made in the configuration database generator or airline equipment options, some menu selections will not operate.

Access

To show the cabin maintenance menu tree, touch HELP on the cabin maintenance main menu.

Controls and Indications

The selections at the top of the menu tree show general data about these four top-level selections available on allmaintenance screens:

- CabinTests
- CabinConfiguration
- Cabin FaultsReview
- CabinReport.

Cabin Tests

The Cabin Tests selection shows you general data about the different tests of the CSS. Touch any of the four selections below Cabin Tests to see the help screen for that function.

These are the four cabin tests:

- Quick test; collects real-time failures for 20 seconds and shows them on thescreen.
- All test; starts a full BITE of the CSS. The CSCP shows all failures the BITEfinds.
- Engineering tests have a special use. Different functions have different engineeringtests.
- Lamps test; lets you control cabin lights. It lets you visually check the operation of thelamps.

Cabin Configuration

The Cabin Configuration selection shows you general data about software installation and configuration

checks of the CSS.
Touch any of the three selections below Cabin Configuration to see the help screen for that function.
These are the three cabin configuration functions:

- You can select and install a configuration database in the CSScomponents.
- A software management menu lets you install operational programs in CSS LRUs and remove and load software programs in the CSCPmemory.

- Use the configuration check to see the LRU part number data of CSS components installed in theairplane.

Cabin Faults Review

This selection shows you general data about faults review screens. Touch any of the six selections below Cabin FaultsReview to see the help screen for that function
These are the different types of review screens:

- The quick test faults review shows the results of the last quicktest.
- The all test faults review shows the results of the last all test.
- A data installation faults review screen shows the results of the last softwareinstallation.
- The flight deck effects faults (active) screen showsactive
- CSS related flight deck effects (FDEs). The CSCP shows all active CSS related FDEs and the failure that caused the FDE.
- The flight deck effects faults (history) screen shows CSS related flight deck effects (FDEs) in memory. The CSCP shows as many as 99 of the last CSS related FDEs and the failures that caused each FDE.

Cabin Report Menu
This selection tells you how to make a paper copy of the faults results and configuration data. Touch any of the eight selections below cabin report to see the help screen for that function.
These are the different reports:

- A fault summary report that shows maintenance message numbers and the number of times they haveoccurred.
- A quick test faults report that shows the results of the last quicktest.
- A report of the results of the last alltest.
- A data installation report that contains failure descriptions from the last configuration database or operational programinstallation.
- A list of active CSS related FDEs and maintenance messages.
- A list all CSS related FDEs and maintenance messages in memory(history).
- A CSS configuration report that lists the hardware and software part numbers of the CSS related items installed intheairplane.
- The CSS configuration summary report shows part numberdata for CSScomponents.

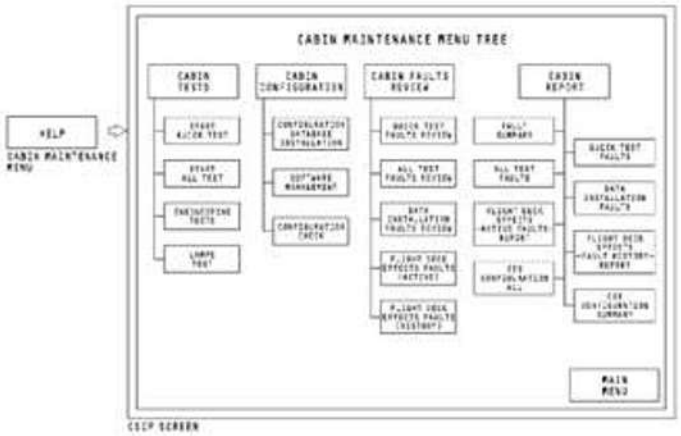


Fig. 20.49 CSS Test and Software Installation-Cabin Maintenance Menu Tree

CSS TEST AND SOFTWARE INSTALLATION - CABIN CONFIGURATION MENU TREE

General

You use the cabin system control panel (CSCP) for CSS maintenance procedures.Use the cabin configuration menu to install software and checkthe configuration of components in the CSS. The cabinconfiguration menu has three selections:

- Configuration databaseinstallation
- Softwaremanagement
- Configurationcheck.

Configuration Database Installation

Touch CONFIGURATION DATABASE INSTALLATION to
install aconfiguration database.
The configuration database installation window shows the part number and version number of the active database. It also gives you alternative selections for installing the database.After you install a database, one of two screens shows on theCSCP.Installation completes with no faults shows if theinstallation is good. If there are faults, a faults results screen shows them.

Software Management

You use the SOFTWARE MANAGEMENT selection to install operational programs.The SOFTWARE MANAGEMENT selection shows the software management menu. It has four selections:

- Operational program softwareinstallation
- Install data from floppy diskdrive
- List of files on floppydiskette
- Diskmaintenance
- Software in massstorage.

Select Operational Program Software Installation to install software in selected LRUs. Installation of operationalprogram software is almost the same as the configurationdatabase installation.
LIST OF FILES ON FLOPPY DISKETTE shows you all of the software files on any disk you have in the CSCP disk drive.
Select INSTALL DATA FROM CSCP DISK DRIVE to install configuration database or operational software from a floppy disk in the CSCP disk drive.
DISK MAINTENANCE lets you remove database or operational programs from thesystem.
SOFTWARE IN MASS STORAGE lets you see the software files in the CSCP massstorage.

Configuration Check

The configuration check lets you see the current configuration of selected LRUs installed in the airplane.You can use the configuration check to see all hardware/software part numbers related to a selected LRU.

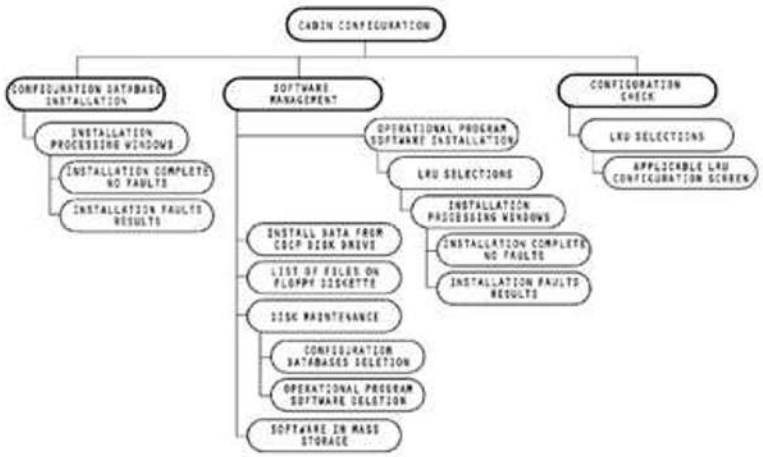


Fig. 20.50 CSS Test and Software Installation-Cabin Configuration Menu Tree

PC POWER SYSTEM
General

The PC Power System provides 110 VAC/60 Hz electrical powers for use by passengers and crew. The interface to the PC Power System is through outlets installed in selected passenger seats and certain crew areas. The user connects a laptop computer orother personal electronic device (PED) to the outlets

General Description

The PC Power System receives 115 VAC/400 Hz aircraft power and converts it to 110 VAC/60 Hz power for passenger and crew use.

The PC Power System has these components:

- Master Control Unit(MCU)
- Programming Module(PM)
- In-Seat Power Converter (ISPC)
- Outlet Units(OU)
- PED Power In-Use Indicator (PPUI)
- PC Power Master Switch(ES)
- Applicable cables and harnessconnections

This is done by controlling available three phase power to each column (up to five). The current in each column is continuously monitored. If power faults are detected, it is indicated and power lines are switched off.

The MCU measures the total current consumption of the seat demands by portable electronic devices (PED) at the ACOUs and limits or shuts off the available power if necessary.The PC Power System is disabled when the MCU receives acabin decompression signal.

Operation

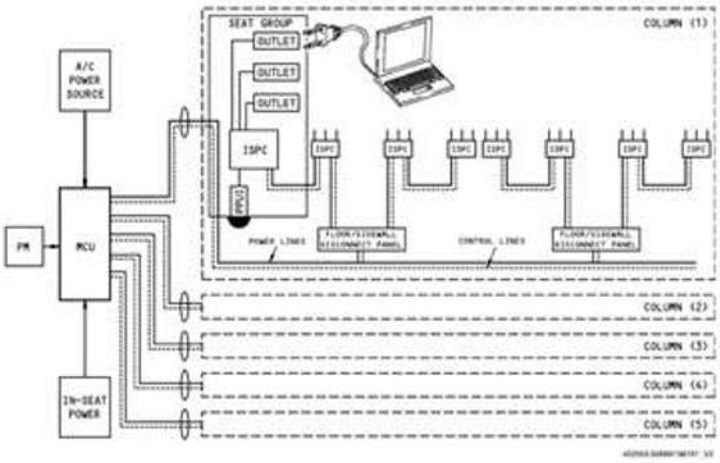


Fig. 20.51 PC Power System-General Description

MCU

The PC Power System must have two inputs to operate. The inflightentertainment (IFE) switch in the flight compartment must be on and there is one or more PC Power master switches at the video control center (VCC) that must be on.
The MCUs operate with three phase 115 VAC/400Hz aircraft power from the 115 VAC Utility bus. The PC Power System circuit breakers are on the P210 and the P110 Power Management Panels in the E/E compartment. Alsoinstalledon the power management panesl are relays. The relays areenergized when the in-flight entertainment (IFE) switch in theflight compartment is on. Power is then applied from the circuitbreaker across the energized relays toMCU.

The master control unit (MCU) is a power distribution unit whose
two main functions are power management and current monitoring.
The MCU provides system power management of the cabin.

NOTE: A green in color status LED is on the power input side of the MCU housing. When the green status LED is on, this indicates the MCU microcontroller circuit card has power and is operational.
Functional Description

The MCU provides power distribution from one 3-phase input to five 3-phase outputs. The power path includes a fuse for each output phase after the separation point, a relay for switching purposes and a current sensor for power management. The GFI protection circuit uses a separate current transformer that monitors the differential current of 3 phases and aircraft returnfor each output port.
The internal circuits of the MCU are directly supplied by any of the 3 power input phases. The power supply is protected by a fuse for each supply phase. The MCU contains GFI circuits anda microcontroller. The purpose of the microcontroller system isto control the power path, evaluate the current measurement,control (through a discrete) the relays for switching, control thedata out control line interface and evaluate most of the discreteinputs and outputs.

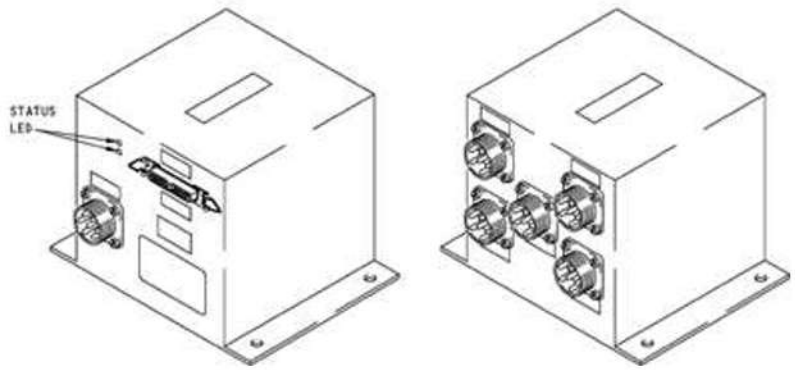


Fig. 20.52 Master Control Unit

ISPC

The in-seat power converter (ISPC) is installed underneath one seat in each applicable seat group. The ISPC is supplied with 115 VAC/400Hz 3 phase input power from the MCU. The ISPCconverts the input power to 110VAC/60Hz and routes this output power to each AC outlet unit (ACOU) in the seat group. The ISPC has two configurations: two outputs and three outputs. The type of output required is based on the seat-group configuration where the ISPC is installed.

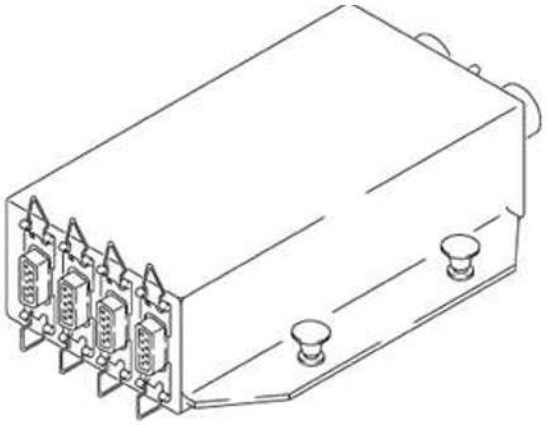


Fig. 20.53 ISPC B-787 CABIN SYSTEM

Cabin Core Systems

The cabin core systems include these cabin systems:

- Cabin services - cabin controls andmaintenance
- Passenger address - announcements and alerts in thecabin
- Passenger services - attendant call, reading lights, and informationsigns
- Cabin interphone - cabin and flight crewcommunication

1. The cabin services system controller (CSSC) controlsall cabin systemfunctions.
2. The CSSC sends control data through cabin zone units(CZU) to control passenger functions such as:

- Cabinlights
- Signs
- Electrically dimmable windows(EDW).

3. Control of these passenger functions comes through an in- flight entertainment (IFE) system interface with theCSSC:

- Readinglights
- Attendantcall.

4. A cabin attendant panel (CAP) in each cabin zone lets the crew monitor and control passenger functions such as:- Cabin services

- Passengerservices
- Environmental control system(ECS)
- Passenger entry doorstatus
- Water andwaste.

5. Digital audio from the flight deck comes through the common data network (CDN) for:

- Passengeraddress
- Cabininterphone.

6. All CSS components are software loadable System Description

System Description

The cabin services system controller (CSSC) contains airplane configurationdata and control software for all cabin system functions. Control data anddigital audio from the CSSC go to each of the cabin zone units (CZU) insequence and then back again to the CSSC. There is a CZU for each of these3 cabin areas:
- Forward cabin
- Midcabin
- Aftcabin.

The CSSC supplies cabin configuration data to the CZUs. Each CZUconnects:
- Passenger address audio to the speaker drive modules (SDM), whichoperate thespeakers
- Control and system data to and from a related cabin attendant panel(CAP)
- Cabin interphone audio from the cabin attendant handset (CAH) and flightdeck handset (FDH) (FDH connects through the forward CZU)
- Control data to cabin lights and master calllights
- Control data to and fromEDWs
- Control data to the passenger service modules(PSM).

The flight crew can also use the audio control panels (ACP) and tuning controlpanels (TCP) to make passenger address and cabin interphone calls with amicrophone. The digital audio and control data for these calls connect to theCSSC through the CDN.
Passenger service data to the passenger service modules (PSM) control theselights and signs:- Passenger reading lights
- Attendant calllights
- Informationsigns
- Smartsigns
- Attendant worklights.

Reading light and attendant call inputs come to the CSSC through the IFEsystem. The IFE system can also supply recorded passenger address audiothrough the CSSC to thecabin.
The SDMs and the PSMs are in left, center, and right columns in each cabinzone. A termination connects to the last SDM or PSM in a relatedcolumn.
The CAPs have menu screens for operation of cabin services and maintenance functions. A maintenance laptop can also do CAP maintenancefunctions through an ODN connection to the CSSC.

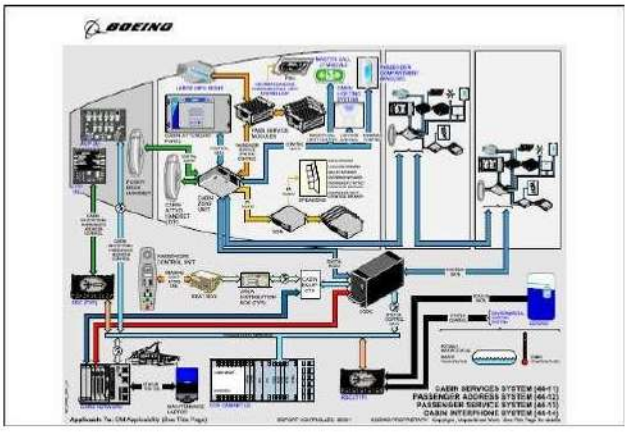


Fig. 20.54

PA Function/IFE Interface

1. The passenger address (PA) system sends these types of audio to thecabin:
- Flight crewannouncements
- Flight attendantannouncements
- Passenger call chime and master calllight
- Cabin interphone call chime and master calllight
- Smoke alarm aural and visual indications including the pertinent chimetone(s), indicator light and a message on the cabin attendant panel (CAP) inthe cabin when smoke is detected in a lavatory or crew rest.
- Pause and resume commands to the IFE system and prerecorded announcement machine (PRAM) when a PA announcement is in progress.

2. In-flight Entertainment (IFE) system interfaces with the PA system andprovides:

- Prerecorded announcements(decompression)
- Boardingmusic
- Overheadvideo/audio

3. Voice announcementpriorities:
- Flight interphone announcement highest priority
- Handset - priority handset announcementV
- Handset - usual handset announcement V
- Priority recorded digital audioV
- Normal recorded digital audioV
- Special recorded digital audio lowestpriority

4. The CSSC configuration software controls PA areas and speaker volumethrough the speaker drivemodules.
5. The PA system has thesecomponents:
- Speaker drivemodules
- Speakers.

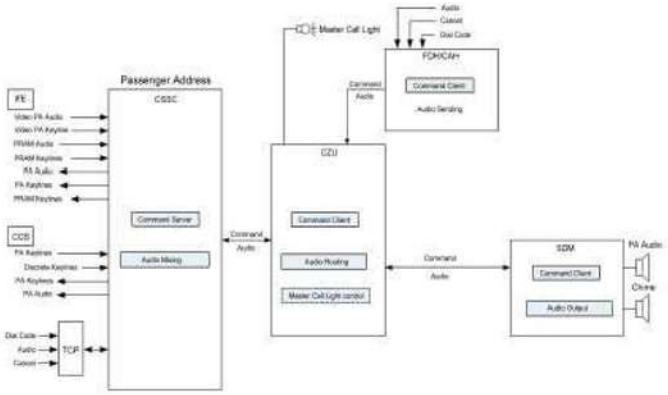


Fig. 20.55 Pa/Ife Interface

Cabin Services System Controller

1. The cabin services system controller (CSSC) contains the cabinconfiguration database and control software for all related cabincomponents.

2. The cabin configuration database controls data addressingfor:
- Seating andzones
- Cabinlights
- Informationsigns.

3. The CSSC sends data to and receives datafrom:
- Cabin zone units (CZU) - Ethernetloop
- In-flight entertainment (IFE) system -Ethernet
- Common data network (CDN) - fiberoptic
- Maintenance laptop through the core network -Ethernet.

4. The CSSC receives digital audio and control data (PA, cabin interphone, chime, and FASTEN SEAT BELTS) from the flight deck on theCDN.

5. If the CSSC fails, youlose:
- Electrically dimmable window (EDW) control, except at the EDWitself
- IFE system input including audio from boarding music, video and prerecorded announcements, reading light and attendant call from the passenger controlunit
- All airplane data from the CDN (TCP and ACP, P5 chime button and fasten seat belt switch, waste tank level on the cabin attendant panel showsINVALID)
- Functions that use data from the CDN may go to a default setting (for example, FASTEN SEAT BELTS signs goon).

6. Cabin Interphone and PA from the cabin attendant handset or Flight deck handset will function because of the master CAP functionality.

7. All CSS system components do a power-up BITE test and report their health to theCSSC.
- The CSSC stores the healthdata.
- Maintenance personnel can get access to system health data through the cabin attendantpanel.

Description of Operation

The cabin services system controller (CSSC) is a component of the cabin services system (CSS). It is the central control unit in the CSS.
For the cabin service data, the CSSC interfaces with:
- In-flight entertainment (IFE) system
- Common computing system (CCS) through the common data network(CDN)
- Crew information system (CIS) through the isolated data network(IDN).

The CSSC usually controls:
- CSSnetwork
- Passenger address (PA)
- Cabin interphone(CI)
- Monitor control(MC)
- Download function(DLF)
- Health management(HM)

- Database logicfunction.

The CSSC also does these functions:

- Stores and updates the configurationdatabase
- Manages the database to control each function
- Identifies which audio source is selected asPA
- Identifies which headset is selected asinterphone
- Web server and firewall for externalsystem.

The CSSC sends the cabin service data to the cabin zone unit (CZU). The cabin service data goes from one CZU to the next CZU. The last CZU sends the cabin service data back to the CSSC

Fig. 20.56

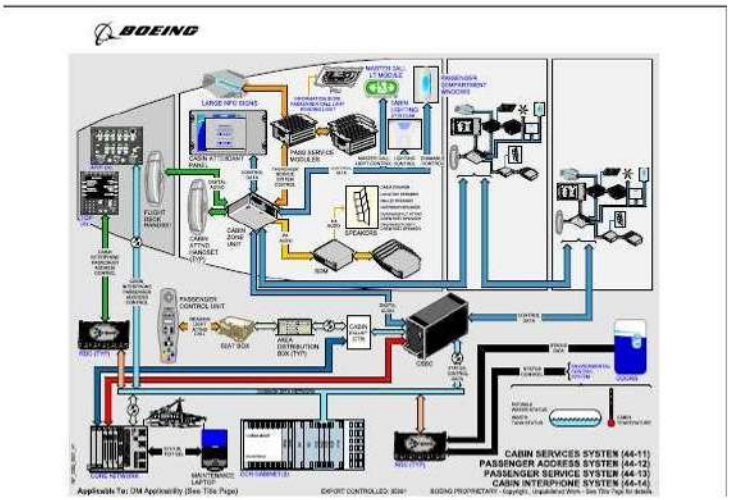


Fig. 20.57

Cabin Zone Unit

5. The 3 cabin zone units (CZU) have internalsoftware.
- The software loads from the cabin services system controller (CSSC).
6. The CZUs also have interfacewith:
- Cabin attendantpanels
- Cabin attendanthandsets
- Flight deck handset (forward CZUonly)
- Passenger service modules(PSM).
7. CZU location and network address are determined by programpins.

Description and Operation

The cabin zone unit (CZU) usually receives the cabin service data

1. Cabin zone units (CZU) control cabin services functions in a specifiedzone.
2. There are 3CZUs.
3. Each CZU controls these functions in itszone:
- Cabin lightingsystem
- Master calllights
- Passenger address
- Cabininterphone
- Electrically dimmablewindows.

4. The CZUs and the CSSC connect together in aloop.
- First and last CZUs connect to theCSSC.
- Serviceable CZUs can continue to operate through the loop connectionwith a CZUfailure.

from theCSS controller (CSSC) or the preceding CZU, and transfers the cabin servicedata to another CZU.
Usually, there are 3 CZUs are in one system, and are connected in a row. Thelast CZU sends the data to the CSSC to complete the loop.
The CZU controls these items through TIA-485 interfaces:
- Master calllight.
- Cabin lighting modules(CLM).
- Electronically dimmable windows(EDW).

The CZU shares data with these items through Ethernet interfaces:
- CSSC and/orCZU.
- Cabin attendant panel(CAP).
- Speaker drive module(SDM).
- Passenger service module(PSM).
- CSS handset(CHS).

The CZU has 8 discrete input lines and 8 discrete output lines. The CZU has 1wireless access point (WAP)interface.
The CZU has 1 RS-232 port for maintenance functions. This port is used tomonitor the internal circuit operation and to download the software (i.e.,firmware) into theCZU.
CZU software loads automatically from CSSC at start-up if necessary.If CSSC functions fail, some addressing and routing is done by CZUs.
- Most lights and cabin signs operatenormally.

Cabin Attendant Panel

Fig. 20.57

- Some cabin interphone and PA functions operatenormally.

If the CZU has a failure, some functions can continue. The Ethernet will senddata through to the next CZU:
- Example, control of EDW, area lights and master call from the CAP
- Discrete control of work lights and small information signs in zone cancontinue tooperate.

The CZUs get 28v dc from RPDUs.
A CZU has 2 LEDs (no front panel BITE):
- Green - poweron
- Amber - LANon.

1. The cabin attendant panels (CAP) let the cabin crew monitors and control some cabinfunctions.

2. The CAPs monitor functions suchas:
- Lav smokedetection
- Cabin doors open/close status
- Potable water and waste tanklevels
- Actual and target cabin zone temperatures (can request temperature adjustments from theECS)
- Galley chillerstatus.

3. There are 3CAPs.
- All CAPs are thesame.

A cabin attendant panel (CAP) connects to each cabin zone unit (CZU).

5. The CAPs have a touch screenmenu.
- The menu has cabin and maintenance controlselections.

6. Each CAP has software for operation andconfiguration.
- Can load from cabin services system controller(CSSC).

7. Each CAP can store a backup copy of the CSSCsoftware.

8. Each CAP has 2 USB ports on thefront.
- You use these ports to download data to a thumb drive for engineeringsupport.

9. Failure of 1 CAP has no effect on the otherCAPs.

Purpose

The cabin attendant panel (CAP) gives control of cabin functions through screen menus.
General

The CAPs have these cabin functions:
- Cabin temperature control andmonitor
- Lavatory smoke detectionmonitor
- Cabin doors open/close status monitor
- Potable water and waste tanks levelmonitor
- Seat countcontrol
- Galley chillers control andmonitor.

The CAPs also have system maintenance control and monitor functions.

Physical Description

The CAP screen is a liquid crystal display (LCD) with a diagonal dimension of 10.4 in (26.4 cm) and an aspect ratio of 4:3. The screen resolution is 1024 x 768 pixels.
Controls

The CAP screen uses a touch panel on which you make selections

Fig. 20.58

Speaker Drive Module

1. The speaker drive modules (SDM) receive digital audio from the cabin zone units (CZU) and send it to thespeakers.

2. TheSDMs:
- Change the digital signal to analogaudio
- Make alert and chimetones.

3. The SDMs have internal software thatcontrols:
- Volumesettings
- Announcementpriority.

4. Each SDM can control audio for up to 4 speakers in the cabin areas.

5. SDMs connect together in columns.

Purpose
The speaker drive module (SDM) changes digital audio to analog signals that operate the cabin speakers.
Speaker

General

Internal software controls the SDM volume level settings independently for each of 1 to 4 speakers.

The SDMs get 28v dc from RPDUs.
The SDM has 2 LEDs (no front panel BITE):
- Green -power
- Amber -LAN.

Passenger address (PA) volume changes for these conditions:
- OnGround
- Engines in operation (1 or the other startswitch)

1. The speakers give passenger address (PA) system voice and chime audio to passengers and crew in the cabinareas.

2. There are speakers inthe:
- Passenger cabin
- Lavatories
- Galleys
- Door overheadareas
- Crew rest areas (customeroption).
- The digital interfaces connect to the CZU, large information signs, and the next PSM.
- The discrete interfaces connect to thelights.

4. The PSMs get control data from the cabin zoneunit.

5. Reading light and attendant call light controls are on the passenger control units (PCU).
- The PCUs are part of the in-flight entertainment (IFE)system.
- Control data comes from the IFE system through theCSSC.

6. The PSMs go to lighting default conditions if communication is lost with theCSSC.

Passenger Service Module

Fig. 20.60

7. The PSMs do not controlthe:
- Cabin lightingsystem
- Emergencylights.

Purpose

1. The passenger service modules (PSM) control the large passenger information signs and individuallights.

2. Examples of lights controlled by the PSMsare:
- Readinglights
- Galley/crew work arealights
- Attendant calllights
- Fasten seat belt signs
- Crew rest lights (customeroption)

3. Each PSM has digital and discreteinterfaces.

The passenger service module (PSM) receives passenger service data to control these lights and signs in the cabin:
- Readinglights
- Attendant calllights
- Passenger informationsigns
- Smartsigns
- Attendant worklights.

General

The PSMs get 115v ac from RPDUs.
The 29 passenger service modules (PSM) (number can change) are in the cabin ceiling area above the passenger service units. Original configuration was 48 PSMs, 8 over doors, 40 in passenger service units (PSU). One PSM per each 3 seat groups (12 seats). Options available for selection are 33 or 29 with a 224 pax configuration. Airline can select number of PSMs to 48 max for future configurationchanges.
The PSM has theseconnections:
- 3 Ethernet - 1 to cabin zone unit (CZU), 1 to the next PSM, 1 to smartsign.
- 22 discrete (outputs only) - 12 reading lights, 6 call lights, 4 informationsigns.

Fig. 20.61

Cabin Attendant Handset

1. The crew use handsetsfor:
- Cabin interphone systemcalls
- Passenger addresses (PA)announcements.

2. There is 1 flight deck handset (FDH) and multiple cabin attendant handsets (CAH).
- The FDH and CAH are the same partnumber.

3. Each handset sends digital audio to and receives digital audio from a cabin zone unit(CZU).
- The FDH connects to the forwardCZU.

4. The handsets are softwareloadable.
- They are loaded from the cabin services system controller (CSSC).
5. The software determines the handset directorycodes.
- Codes are set by theairline.

6. Handset featuresare:
- LCD screen - shows directory and incoming and outgoingcalls
- 3 Side buttons - to scroll up or down and select a calldestination
- Number keys - to enter a destination code
- Push-to talk (PTT) button (for PAannouncements)
- RESET button - ends thecall.

7. Handsets get power through the Ethernet bus from the related CZU.

8. If the CSSC fails, handsets continue to operatenormally.
- The CZUs control the handsetfunctions.

Controls and Indications

The flight deck handset (FDH) and cabin attendant handsets (CAH) have these controls:
- 12-digit keypad - enter the dial code
- Reset switch - stops the call but does not disconnect fromsystem
- Push-to-talk (PTT) switch - to make a PAannouncement
- UP, DOWN, and ENTER switch - selects a dial code from the directorylist.

The FDH and CAHs have a liquid crystal display (LCD) that shows a dial code directory and messages.

Component Description
Each cabin zone unit (CZU) can connect to up to 6 handsets.

Fig.20.62

Operation - PA & CabinInterphone

1. You can use these devices to make a passenger address (PA) or cabin interphonecall:
- Tuning control panel (TCP) - flightdeck
- Audio control panel (ACP) - flightdeck
- Flight deck handset (FDH) - flightdeck
- Cabin attendant handset (CAH) -cabin.

2. The TCP has DIRECTORY selections for PA areas and cabin interphonelocations.
- You use the CAB MIC switch on the ACP to make calls with a microphone.

3. To give PA audio to all areas, push and hold the button above the PA switch on theACP.

4. To make an interphone call to a pre-set location, push the CAB MIC switch 2 times quickly on theACP.
- The preset location is determined by theairline.

5. TCP and ACP control data and digital audio goes through the CDN to theCSSC.

6. The FDH and CAHs operate the same to make PA announcements and interphonecalls.
- You can make a selection on a display menu or enter a code on thekeypad.
- The push-to-talk (PTT) switch on the front of the handset is for passenger addressonly.
- The RESET switch disconnects the handset when not in the cradle.
- The handset disconnects when put in thecradle.

General

The flight crew can use a microphone and these panels to make passenger address (PA) and cabin interphone calls:
- Audio control panel(ACP)
- Tuning control panel(TCP).

The flight crew and cabin crew can make PA and cabin interphone calls on handsets. The flight deck handset (FDH) and the cabin attendant handsets (CAH) operate the same.

ACP Only Calls

The flight crew can use the PA switch on the ACP to make an all area PA call.
The flight crew pushes the CAB MIC switch 2 times quickly to make a priority interphone call to a set cabin attendant station. A priority call does not cause an override of a PA announcement.

TCP and ACP Calls

The CABIN INTERPHONE menu on the TCP gives the flight crew PA and cabin interphone selections. These selections include cabin areas for PA and attendant stations and groups of stations for cabin interphone. The PA and CAB switches on the ACP connect the microphoneaudio.

These messages can show on the TCP page:
- PA IN USE
- VIDEO INUSE

FDH and CAH Calls

The FDH and CAHs each have a liquid crystal display (LCD) that shows dial codes for PA and cabin interphone calls. You use the step up/step down switch to select the dial code and the select switch to start the call. You can also manually put in a dial code. An INVALID ENTRY message shows if you

make an incorrect entry. You can use the RESET switch to start a new call.

Fig. 20.63 Cabin Cora System-Passenger Address/Cabin Interphone-Operation

Operation - Cabin Controls

1. At power-up, these MAIN MENU selections show on the cabin attendant panel (CAP):
- CABINCONTROLS
- CABINMAINTENANCE
- CABINAPPLICATIONS.

2. There can be a password necessary and a screensaver.

3. Some CABIN CONTROLS selections show other menu selections.

4. Some CABIN CONTROLS screens have a cabin diagram that lets you select different areas to control andmonitor.

General

The CABIN CONTROLS selection on the MAIN MENU of the CAP shows screens for the cabin services and passenger service functions.

CABIN CONTROLS Menu

These CABIN CONTROLS menu selections can show in a column down the left side of thescreen:
- MAIN MENU - returns to the MAINMENU
- LIGHTING - gives moreselections
- ATTENDANT CALL - gives moreselections
- TEMPERATURE - gives moreselections
- DIMMABLE WINDOWS - gives moreselections
- WATER/WASTE TANK STATUS - gives moreselections
- PASSENGER INFO. SIGNS - shows scene selections for smart signs in thecabin
- ADDITIONALSTATUSANDCONTROL-givesmore selections.

Most of the screens show a cabin diagram that lets you selects cabin areas for monitor and control.

CAPs can have some menu accesses and area selections that are not available.

LIGHTING

These selections can show when you touch LIGHTING:
- CABIN SCENE LIGHTING - sets a lighting scene for cabin lightingareas
- ENTRY WAY SCENE LIGHTING - sets a lighting scene for entry way lightingareas
- GALLEY SCENE LIGHTING - sets a lighting scene for galley lightingareas
- DOOR LIGHTING - sets door lights on or off
- READING LIGHTS BY SEAT - sets reading lights on oroff
- BAR LIGHTS - sets bar lights bright, dim, oroff.

ATTENDANT CALL

These selections can show when you touch ATTENDANT CALL:
- SERVICE CALL - monitors and does a reset of seat, lavatory, and crew rest calls
- CHIME CONTROL BY AREA - enables or disables chimes by chime control areas
- CHIME CONTROL BY SEAT - enables or disables chimes by seats.

TEMPERATURE

These selections can show when you touch TEMPERATURE:
- CABIN TEMPERATURE - monitors and controls cabin temperature byareas
- GALLEY CHILLERS - monitors and controls galleychillers
- GALLEY HEATERS - monitors and controls galley heaters

- HEAT REDUCTION - sets heat reduction function on oroff.

DIMMABLE WINDOWS

These selections can show when you touch DIMMABLE WINDOWS:
- WINDOW CONTROL BYAREA
- WINDOW CONTROL BYWINDOW.

These CAP screens let you set state and control limits on electrically dimmable window (EDW) operation.

WATER/WASTE TANK STATUS

These selections can show when you touch WATER/WASTE TANK STATUS:
- LAVATORY/WASTE TANK STATUS - shows tank status and vacant/ occupied status of lavatories
- POTABLE WATER STATUS - shows tank status and set fill quantity.

ADDITIONAL STATUS AND CONTROL

These selections can show when you touch ADDITIONAL STATUS AND CONTROL:
- CABIN OCCUPANTS - shows cabin passenger and seat count
- DOOR STATUS - shows locked/unlocked status of thedoors
- DISPLAY CONTROLS - controls panel intensity andlockout.

Non-normal Indications

Pop-up windows can show on the CAP for important system messages. More than 1 pop-up window can show at a time. The highest priority window is on top. You must touch CLEAR to remove a pop-up window and return to the CAP screen. A pop-up window can show for these conditions:

- Alertmessages
- Function lockoutmessages
- Errormessages.

This is the priority order of the pop-up windows that show these alert messages:

- SMOKEDETECTION
- WASTE TANKFULL
- POTABLE WATERSTATUS
- CABIN INTERPHONEFAILURE
- PASSENGER ADD RESSESFAILURE.

The smoke detection pop-window shows the location of the smoke alarm. Up to 4 locations can show with the newest alarm first. After you remove the smoke pop-up window, a SMOKE DETECTED message shows in red on the bottom left of all CAP screens. This message goes off when the smoke detector that set the alarm goesoff.

Function lockout messages show that some menu items do not operate because of these system conditions:

- Cabindecompression
- Loss of ground service bus power

- Loss of data from theECS.

An error message shows for these conditions:

- A system does not operate in relation to a screenselection
- An incorrect screen entry orselection.

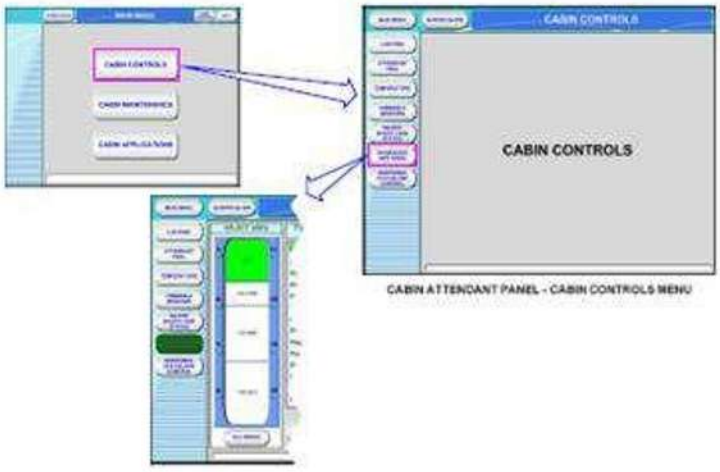


Fig. 20.64 Cabin Core System-Cabin Service/Passenger- Operation

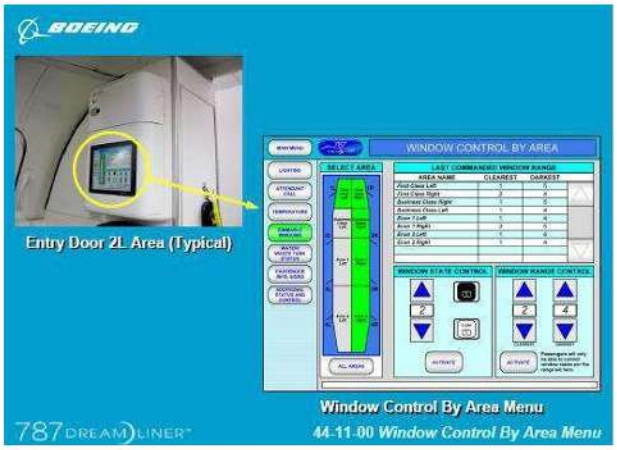


Fig.20.65

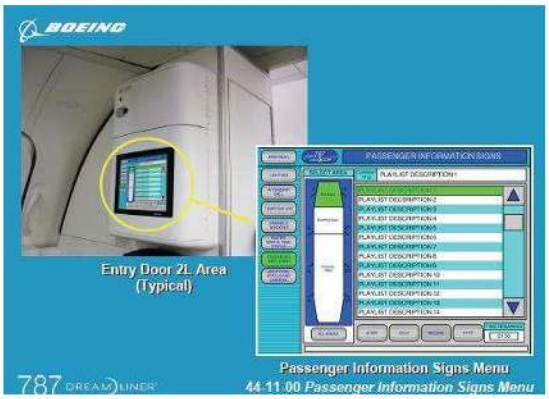


Fig.20.66

Operation - Cabin Maintenance

1. The cabin maintenance function is in the cabin services system controller(CSSC).
- If the CSSC has a failure, you cannot select CABIN MAINTENANCE.

2. Some CABIN CONTROLS selections give other menu selections.

General

The cabin attendant panel (CAP) has touch screens for cabin maintenance functions. The MAINTENANCE selection on the MAIN MENU of the CAP shows the screens for the cabin maintenance functions.
MAINTENANCE Menu

These MAINTENANCE menu selections can show in a column on the left side of thescreen:
-MAIN MENU - returns to the MAIN MENU
-CABIN TESTS - gives more selections
-CABIN DATA LOAD - gives more selections

-CABIN CONFIGURATION STATUS - gives more selections
-CABIN FAULTS REPORTS - gives more selections
-CONFIGURATION DATABASE REPORTS - shows component part numbers and addresses in the configuration database
- CABIN REPORTS TO CIS (crew information system) - sends cabin system reports to CIS or saves reports to a USB (universal serial bus)memory.
There can be different levels of each menu selection.

CABIN TESTS

These selections can show when you touch CABIN TESTS:
- QUICK TEST - collects real-timefailures
- ALL TESTS - starts a full system test (approximately 2 minutes arenecessary)
- ENGINEERING TESTS - gives moreselections
- LAMP TEST - gives moreselections.

These selections can show when you touch ENGINEERING TESTS:
- INPUT/OUTPUT MONITOR - monitors selected interfacedata
- COMMANDED OUTPUT - sends output commands to selected components
- SHOP FAULTS - shows internal component failures. These selections can show when you touch LAMPTESTS:
- COLOR LIGHTING - sets selected color lighting to on, off, or colorcycle
- WHITE LIGHTING - sets selected white light to on oroff
- INDICATORS AND SIGNS - sets selected call lights and information signs to on oroff
- DIMMABLE WINDOWS - sets selected windows to dark, clear, orcycle.

The END LAMPS TEST selection at the bottom of the screen returns the lights to normal operation.

CABIN DATA LOAD

These selections can show when you touch CABIN DATA LOAD:
-SOFTWARE INSTALLATION - shows software and installation status
- REGISTRYSET-UP
- SOFTWARE MANAGEMENT - gives moreselections.

These selections can show when you touch SOFTWARE MANAGEMENT:
- MANAGE CSS MSD (memory storagedevice)
- LIST OF FILES ON USBMEMORY
- BACK-UP TO CAP STORAGE DEVICE - stores a copy of the cabin services system controller (CSSC) internal software and database in theCAP
- RESTORE TO CSS MSD - loads the software and database back to theCSSC
- MANAGE CAP STORAGEDEVICE
- IPADDRESSING
- SYSTEM LOG/LRURESET.

CABIN CONFIGURATION STATUS

These selections can show when you touch CABIN CONFIGURATION STATUS:
- CONFIGURATION CHECK - shows a short configuration summary of relatedcomponents
- CONFIGURATIONCHECK - Extended - shows a configuration summary with details of relatedcomponents
- SOFTWARE SUMMARYREPORT

- RESPONDING LRUS.

CABIN FAULTS REPORTS

These selections can show when you touch CABIN FAULTS REPORTS:
- QUICK TEST FAULTS - shows the results of the last QUICK TEST
- ALL TEST FAULTS - shows the results of the last ALLTEST
- SOFTWARE INSTALLATION FAULTS - shows faults from the last datainstallation
- FLIGHT DECK EFFECTS FAULTS - gives moreselections
- FAULT SUMMARY - shows a history list offaults
- EXTENDED FAULTPREVIEW

These selections can show when you touch FLIGHT DECK EFFECTS FAULTS:
- ACTIVE
- HISTORY.

These selections can show when you touch EXTENDED FAULT PREVIEW:
- QUICK TEST FAULTS - MASKED &UNMASKED
- ALL TEST FAULTS - MASKED &UNMASKED
- QUICK TEST FAULTS -UNCONFIGURED
- ALL TEST FAULTS -UNCONFIGURED
- QUICK TEST REDUNDANTFAULTS
- ALL TEST REDUNDANTFAULTS.

You can store all fault reports at the CAP.
Maintenance Laptop

You can use the maintenance laptop (CSS menu on the AIRPLANE FUNCTIONS screen) to do the same maintenance functions that you can do from a CAP. The maintenance laptop must have a wired or wireless full connection with the airplane.

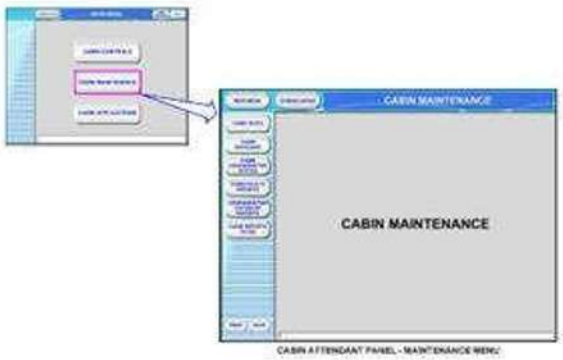


Fig. 20.67 Cabin Core System-Cabin Maintenance-Operation Operation - Fault Isolation

1. You can use QUICK TEST or ALL TEST to find system faults.
2. The maintenance messages show on the FAULT SUMMARY REPORTscreen.

- You use the related fault isolation procedure to do troubleshooting

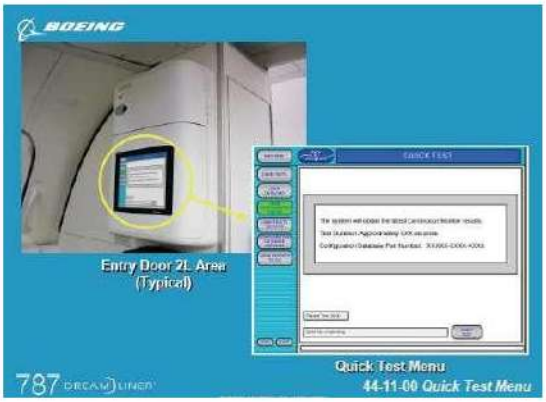


Fig.20.68

Fig.20.69

Operation - Cabin Data Load

1. You use ODLF to load software from the core network file server module to theCSSC.
- The CSSC stores the software for all the CSScomponents.

2. The CAP CABIN MAINTENANCE screen has selections do CSS data management functions suchas:
- Load data (CABIN DATALOAD)
- Check the softwareconfiguration.

3. You use the CABIN DATALOAD selection on the CAP to load data from the CSSC to systemcomponents.
- The CSSC loads software to those LRUs that need updated software.

4. The AMM Part 2 has detailed instructions on how to use the CAP to do CSS data managementoperations.

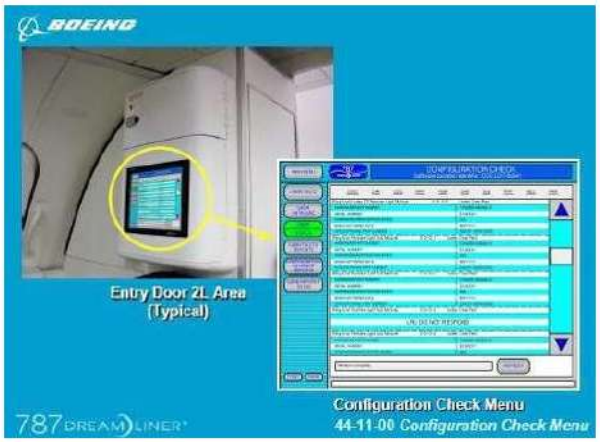


Fig. 20.70

Operation - Maintenance Laptop

1. The maintenance laptop has a CABIN MAINTENANCE screen that lets you do the same functions as the cabinattendant panel (CAP)screens.

2. You get access to the selection from the AIRPLANE FUNCTIONS button on the MCDFtoolbar.
- Select CSS from the pull-downmenu.

Fig. 20.71

ATA 44 CABIN SYSTEMS A-380 CABIN SYSTEMS INTRODUCTION
General

The Cabin systems are composed of:-the Cabin Inter communication Data System(CIDS)
- The In Flight Entertainment System (IFE),

- And the Cabin MonitoringSystem

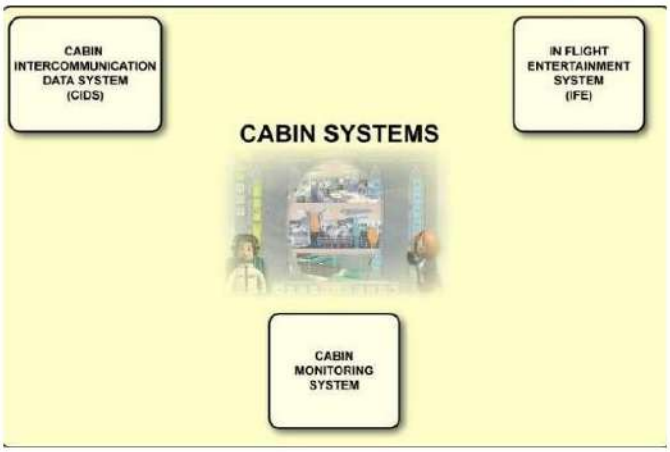


Fig. 20.72

CABIN INTERCOMMUNICATION DATA SYSTEM PRESENTATION

General

The CIDS (Cabin Intercommunication Data System) is the cabin core system. It fulfills an easy interface with some aircraft and cabin support systems for the cabin crew, the passengers, the maintenance personnel and the cockpit crew. The CIDS lets them accomplish the functional control, the testing and the monitoring of these systems through the following four functions: - Communication,

- Indicating,
- Control,
- Programming

GENERAL

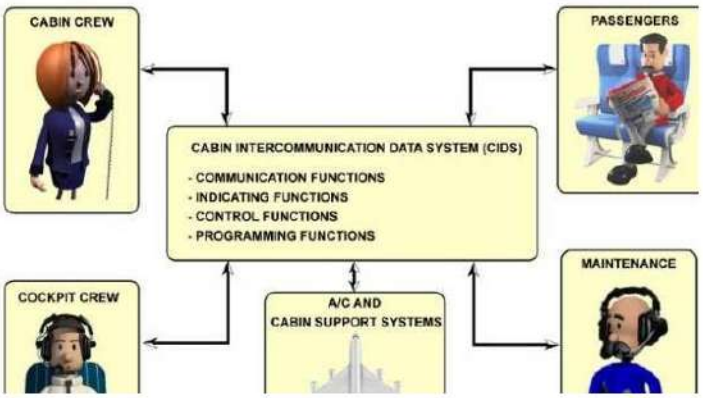


Fig. 20.73

functions as well as the cabin support systems. For that, the active director exchanges data with them through an onboard CIDS network or directly. More over the 3 directors are connected to the cockpit controls and indicating and to dedicated control panels(FAPs and optional MINI-FAPs) to give interactivity to cockpit and cabin crew. They are also connected to some A/C systems to make an automatic activation of some of the CIDS functions.

FAP

The FAPs let the cabin and maintenance crew control and monitor in the whole cabin; the various cabin

support systems and, the passenger and cabin crew related functions. In baseline configuration, there are two independent touch-screens Flight Attendant Panels (FAPs) installed: one in the Upper Deck and one

CABIN INTERCOMMUNICATION DATA SYSTEM
PRESENTATION

System Architecture

The CIDS is designed in a modular way that means the number of installed components will be adapted to the cabin layout and functional requirements. The general CIDS system architecture is based on a controller, bus lines and network concept. Within this concept the CIDS directors fulfill the role of the controllers.

Directors

For redundancy reasons, the CIDS have with 3 identical directors, wired in parallel, which are the heart of the system. One director is active; the two others are in hot standby. The active director controls,operatesandmonitorspassengerandcabincrewrelated
in the Main Deck. However the number of FAPs can be enlarged up to 10 FAPs.

MINI FAP (optional)

As an option it is possible to install some MINI-FAPs. Each mini FAP lets the cabin crew control and monitors some cabin support systems and the passenger related functions in a specific cabin zone.

DEU A

The interface between the active director and the passenger related functions, is ensured via Decoder/Encoder Units type A (DEUs

A).The CIDS uses each DEU A to control the cabin lighting and all the Passenger Service Units (PSUs) functions (PAX individual lighting, PAX signs and calls and the loudspeakers). In baseline configuration, there are 85 DEUs A installed in the whole cabin (a maximum of 192can be installed).

DEU B

The interface between the active director and the cabin crew related functions is done via Decoder/Encoder Units type B (DEUs B).The CIDS uses each DEU B to control the Area Call Panels (ACPs), the Attendant Indication Panels (AIPs), the optional Additional Attendant Panels (AAPs) and the handsets. In baseline configuration, there are 21 DEUs B installed in the whole cabin (a maximum of 72can beinstalled).

CIDS Cabin Crew Related Equipment

The ACPs are used as a remote call facility to inform cabin attendants of a PAX or interphone call, of a lavatory smoke or of an EVAC signaling. They are mainly located on the cabin ceiling above aisles .The AIPs display dial and call information from Passenger Address (PA), interphone and PAX. They display also additional cabin systems information like the LAV smoke location. The optional AAPs let the attendants control certain cabin support systems and the passenger related functions in a specific cabin zone. The optional AAPs and AIPs are mainly located near the attendant stations. Each attendant station has a handset for passenger address and interphonefunctions

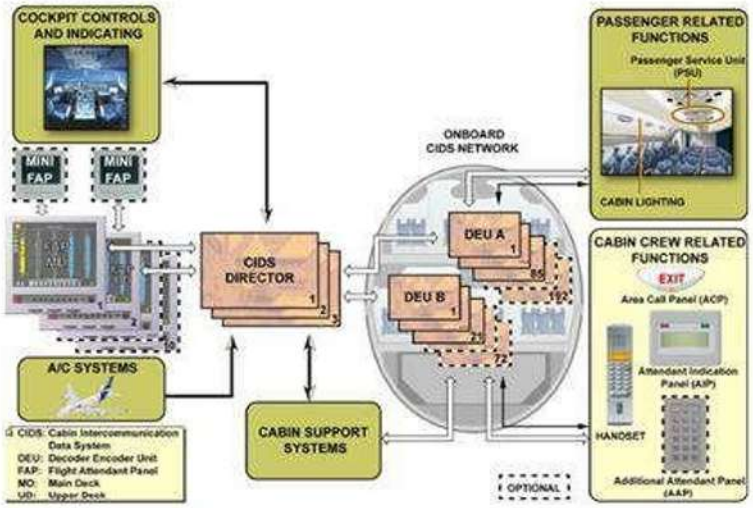


Fig. 20.74 System Architecture-Directors-CIDS Cabin Crew Related Equipment

CABIN INTERCOMMUNICATION DATA SYSTEM PRESENTATION

Communication Functions

The CIDS has several communication functions, which are:

- PassengerAddress
- Cabininterphone
- Serviceinterphone
- Crew signaling andalerting

PA

The Passenger Address (PA) is one of the main functions of the CIDS. It supplies one way voice communication to do announcements from the cockpit or from a cabin crew station to the passengers. These announcements are initiated from the cockpit using either a handset or acoustic devices and from the cabin using cabin crew stations handset. They are then broadcasted to the passengers either through passengers' headset via In Flight entertainment (IFE) or through all cabin loudspeakers. A PA announcement can be director prerecorded voice information and it can also be used to supply prerecorded music.

Cabin Interphone

The cabin interphone system is used for the telephone communication between all cabin crew stations or between the cockpit and the cabin crew stations. From the cockpit the communication is established via the cockpit handset or via any acoustic device. From the cabin the communication is established via any cabin crew station handset.

Service Interphone

The service interphone system is used for the telephone communications, on ground only, between the service interphone jacks or between the service interphone jacks, the cockpit and the cabin crew stations. The service interphone jacks are located within the service areas

Crew Signalling and Alerting

There are different kinds of cockpit and cabin crew signaling and alerting functions depending on the situation. The area ready function lets the cabin crew inform the purser that a dedicated cabin area is ready for takeoff/landing. This function is activated thanks to the FAPs and the optional MINI-FAPs. The cabin ready signaling function lets the purser inform the cockpit crew that all the cabin areas are ready for takeoff/landing. This function is activated thanks to the FAPs. The optional sterile cockpit lets

the cockpit crew inform the purser that they do not want to be disturbed. This function is activated through a sterile cockpit P/B. The optional Emergency Crew Alerting System (ECAS) is used to indicate a possible violent incident against passengers, cabin or cockpit crew members. This function is activated from the cabin thanks to a cabin alert P/B and from the cockpit via a cockpit alert P/B

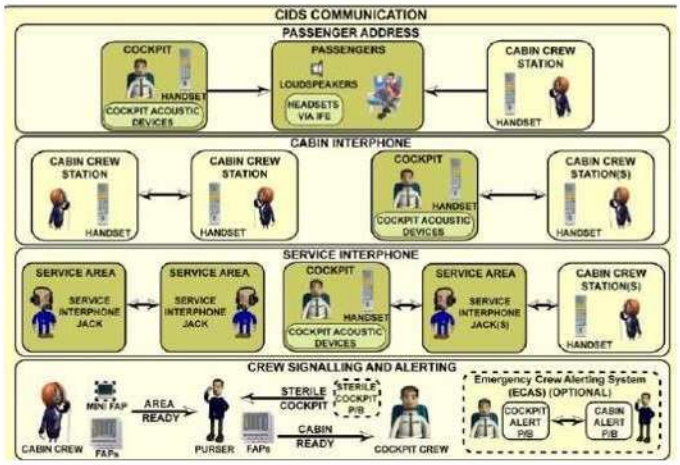


Fig. 20.75 Communication Function Pa, Crew Signalling& Alerting

CABIN INTERCOMMUNICATION DATA SYSTEM PRESENTATION

Indicating Functions

The CIDS fulfills several indicating functions related to:- Smoke Detection Function (SDF),- Emergency lighting power supply,- Ice protection and control,-Trolley lift,- Electrical load management,- Galley cooling,- IFE and seat power,- Doors/slides,- Vacuum System Control Function(VSCF).

SDF

The directors Smoke Detection Function (SDF) receives information directly from the fire protection system to monitor the smoke detectors in the cargo and in the avionics compartments. This information is also used to monitor the fire extinguishing system condition. More over the SDF also receives information from the fire protection system through DEUs B to display the status of the cabin smoke detectors through the FAPs and the optional MINI-FAPs. In all cases, when asmoke is detected or after a successful release of extinguishing agent the SDF reports to the Flight Warning System(FWS).

Emergency Lighting PowerSupply

The CIDS directors fulfill via DEUs B an interface with the emergency lighting system for failure indicating through FWS and for testing.

Ice Protection and Control

The CIDS directors have an interface with the potable and waste water ice protection system via DEUs B to report through FAPs failures related to the protection against freezing of the potable water/waste system and failures related to the floor panel heating as well. In addition, this interface is used for the floor panel temperature display and selection through the FAPs and the optional MINI-FAPs.

Trolley Lift

The CIDS directors fulfill via DEUs B an interface with the trolley lift system to report related failures through theFAPs.

Electrical Load Management Indication

The CIDS directors fulfill via Aircraft Data Communication Network (ADCN) an interface with the electrical load management application to indicate the shedding status of some cabin support systems (such as air conditioning, IFE or light systems) on the FAPs. The doors and the slidesstatus.
Galley Cooling

The CIDS directors fulfill via ADCN an interface with the Supplemental Cooling System (SCS) to display the galley cooling system status and its related parameters through the FAPs.
IFE and Seat Power

The CIDS directors fulfill via the ADCN an interface with the secondary power distribution system to display through the FAPs, the IFE and the seat power status. In addition, this function is used to control: - the FAP initiated power switching, - the IFE power switching and, - the seat power switching.
Doors/slides

The CIDS directors fulfil via ADCN an interface with the Door and Slide Management System (DSMS) to indicate through the FAPs, the doors and the slides status.
VSCF

The CIDS directors Vacuum System Control Function (VSCF) has an interface with the water/waste system to display through the FAPs the monitoring of the potable and waste water tanks fillinglevel.

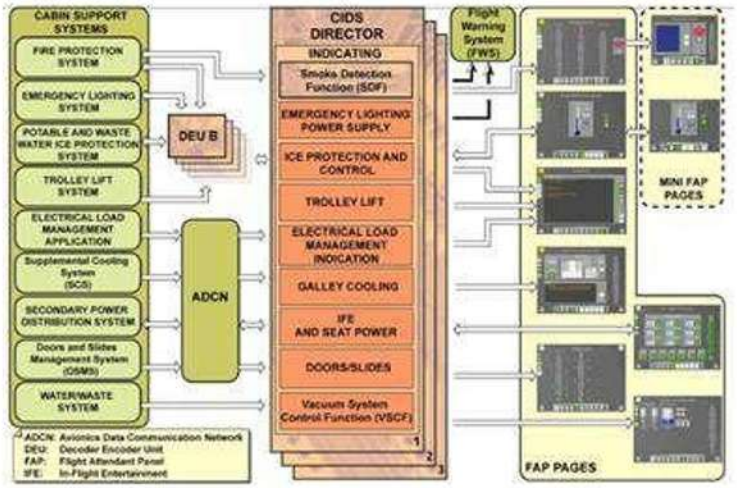


Fig. 20.76 Indicating Functions-SDF-VSCF

CABIN INTERCOMMUNICATION DATA SYSTEM PRESENTATION ControlFunctions

The CIDS fulfills several control functions related to:- Cabin and passenger lighting,- EVAC,- Lighted signs,- PAX call,- IFE,- Air conditioning,- VSCF.
Cabin and Passenger Lighting

The CIDS controls the cabin general lighting and the passenger reading lights independently in each cabin zone, deck and room. Centralized control commands are entered via the FAPs, the optional AAPs and the optional MINI-FAPs. In addition, for the passenger reading light individual control commands are entered via the PSUs and the IFE.
EVAC

The CIDS Emergency EVACuation signaling (EVAC) function controls the evacuation signaling in all

cabin areas and in the cockpit .In case of emergency A/C evacuation, the appropriate signaling can be activated either from the cockpit (via the EVAC panel) or from the cabin (via FAPs, optional AAPs or optional MINI-FAPs).

Lighted Signs

The CIDS lighted signs function controls directly the lighting of the exit signs or, via DEUs A, the lighting of the No Smoking (NS), or the optional Portable Electronic Devices (PED), the Fasten Seat Belts (FSB) and the Return to Seat (RTS) signs. In addition it controls, via DEUs B, the lighting of the lavatory occupied signs. These signs can be manually activated from the cockpit signs panel or automatically according to A/C systems data.

PAX Call

The CIDS passenger call function is activated from the passenger seats (via IFE) and from the lavatories and is reset from the attendant stations via FAPs, optional AAPs or optional MINI- FAPs. Once activated, this function supplies the lighting of the passenger call indications (via the ACPs and the AIPs) and the broadcasting of passenger call chimes in the cabin.

IFE

The CIDS exchanges with the IFE, control commands for CIDS PAX Call and reading lights operation from PAX seats and potential IFE operation from FAP. In addition the CIDS exchanges with the IFE, control commands and audio signals, for broadcasting PA announcements at the PAX seats or IFE video related audio signals in thecabin.

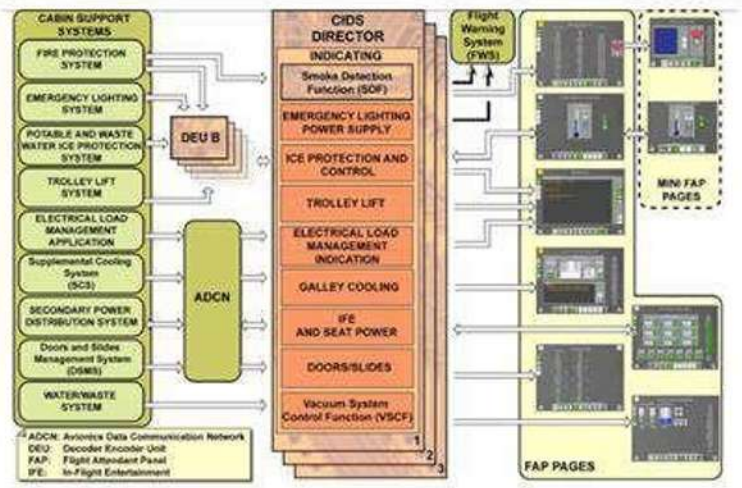
Air Conditioning

The CIDS has an interface with the air conditioning system via the ADCN to remotely control the cabin temperature in a given range. The temperature can be set via the FAPs, the MINI-FAPs (optional) or the AAPs (optional). The actual temperature of all cabin and optional zones is shown on the FAPs. The CIDS also

controls and monitor the optional electrical heaters and optional humidifiers. The control and the status display of these units are done via the FAPs and/or optional MINI-FAPs.

VSCF

The CIDS VSCF fulfills the control of the water/waste system by using the FAPs. It controls the water depressurization, the auto flush, and the shutdown of the water system. Moreover it does, through the



FAPs, the pre-selection of the water quantity for potable water tank refilling.

Fig. 20.77 Indicating Functions-SDF-VSCF Programming Functions

The CIDS fulfills several programming functions which are: - Software loading- Layout selection- Cabin programming- Loudspeakers level adjustment- FAP Set-Up
Software Loading

Via a dedicated FAP menu page, the Software Loading function make seasier update of software of all loadable CIDS components (directors, FAPs, optional MINI-FAPs, handsets and DEU Bs). This function is only available on ground.
Layout Selection

Via a dedicated FAP menu page, the CIDS cabin layout selection function gives the choice of a maximum of three predefined and three modifiable cabin layouts. This function is protected by an access code and is only available on ground.
Cabin Programming

Several functions of the CIDS operate in relation to different cabin zones. The configuration of these zones can be changed via a dedicated programming page on the FAP. Through this page three cabin programming modes are available on ground or in flight: - Cabin Zones Programming, - No Smoking Zones Programming,- Non Smoker Aircraft Programming, They can be all protected by an accesscode.
Loudspeakers Level Adjustment

Via a dedicated FAP menu page, the CIDS loudspeaker level adjustment function is used for manual adjustment of the cabin loudspeakers level for announcements and chimes. This function

is protected by an access code and is available on ground or in flight.

FAP Set-Up

The FAP Set-up page is used to control and indicate the FAP internal settings (such as FAP loudspeaker volume and brightness).

Fig. 20.78

IN-FLIGHT ENTERTAINMENT SYSTEM PRESENTATION
General

The In-Flight Entertainment (IFE) system is an optional system, installed within the cabin on customer request. The IFE system gives mainly to the passenger entertainment supported by the audio, the optional video, the optional interactive functions ('such as games, shopping, and internet) and the optional telephone. These functions are controlled by the cabin crew, the passengers, and/or automatically according to A/C system data. The PAX service system lets the passengers control from their seat some functions of other A/C systems such as CIDS PAX call or PAX reading lights.

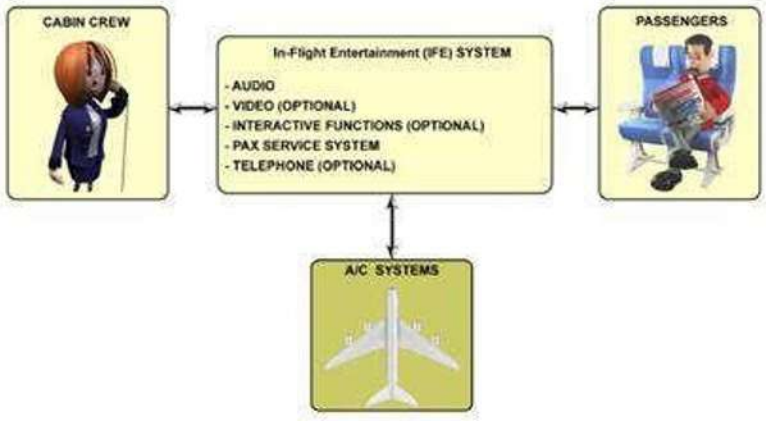


Fig. 20.79

IN-FLIGHT ENTERTAINMENT SYSTEM PRESENTATION
System Architecture Overview

The IFE system architecture is based on a modular concept, which gives a platform for various entertainment systems from different vendors in an add-on principle. It offers flexibility and adaptability for customized configuration. This system isbasically composed of three main parts: the IFE Center (IFEC), an IFE control panel and a cabin network.

IFEC
The IFEC is located in the Emergency Electronic Bay. It is made of one or two racks (IFEC rack two is optional) which contains the IFE system head end equipment. It is composed of computers, video/audio sources, files servers and third party equipment. The IFEC controls and monitors the whole IFE system and gives an interface with the cabin network, the A/C systems and the optional cabinworkstation.
IFE control panel, cabin workstation and RCC

The IFE control panel supplies a centralized control and monitoring of the whole IFE system for the cabin attendants. It is an application, which may run either as one of the FAP application or hosted in an optional and specific device called remote control console. Note that the FAP may be located within an optional cabin workstation while the remote control console is located either within the optional cabin workstation or within an optional Remote Control Center (RCC).The IFE control panel controls other optional equipment such as additional audio/video sources (except in RCC), fax unit, data loader, credit card reader, etc...The cabin workstation when installed is the main working area of the purser and offers the centralized operation for IFE, CIDS, logbook, email, PAX profile and electronicdocumentation.

In addition to or instead of the cabin workstation, the RCC when installed offers additional IFE control through a remote control console.

Cabin Network

The cabin network supplies audio, video, data, telephone and downloadable software to and from the

passenger seats. It supplies also video data to the overhead or wall mounted video equipment. It comprises: - The cabin distribution network, which is composed of Area Distribution Boxes (ADBs) (a maximum of 12 can be installed). They facilitate the distribution of the cabin network data to and from the passengers' seats via the seat network and to the overhead video equipment via the overhead network. Moreover the ADBs give the connection of RCC to the cabin distribution enabling the cabin staff to control the IFE system from locations other than the cabin work station: - The overhead network, which is composed of Tapping Units (TUs).Each one is able to supply 3 overheads or wall mounted DUs- The seat network, which is composed of Floor Disconnect Boxes (FDBs) and Seat Electronic Boxes (SEBs). It sends the data received from the cabin distribution network to the seat equipment.

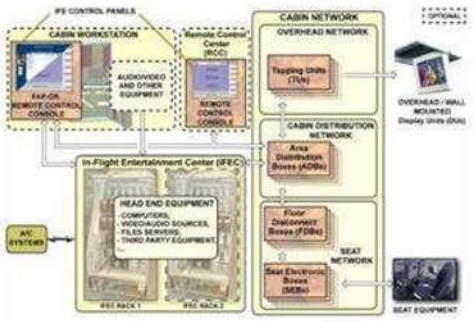


Fig. 20.80 System Architecture overview-IFEC-Cabin Network

Audio / Optional Video Audio

The audio part of the IFE system is made of the broadcast audio including the boarding music and the audio from safety demos. It includes also the optional Audio On Demand (AOD) programs, which allow individual passenger selection and control. The broadcast audio and the AOD programs are stored in the IFEC. Note that broadcast audio can also be stored in the optional cabin workstation audio/video reproducers. Broadcast audio programs and AOD programs are selectable at the PCU and/or at a touch screen Seat Display Unit (SDU) while the boarding music and the safety demos are controlled from the optional cabin workstation or at the optional RCC. They are all sent through the cabin distribution network and the seat network to the PAX headset. However the boarding music and the safety demos are also sent in parallel to the CIDS to be broad casted through the cabin loudspeakers.PA messages from the CIDS are also broadcasted to the passengers through the headset. These announcements have priority over music entertainment channels.

Overhead Video

The overhead video function supplies visual entertainment from the broadcast video, the Passenger Video Information System (PVIS),the camera systems and optional broadband system (for live TV).Note that the broadcast video reproducers are located either in the IFEC or in the optional cabin workstation. The overhead video is sent via the cabin distribution and overhead network either to overhead Display Units (DU) in the cabin and/or wall-mounted DUs. The related audio is sent either via the CIDS to the cabin and room loudspeakers, or via the cabin distribution network and the seat network to the passenger headsets. The video program is selected on the IFE controlpanel.

In Seat Video

The In-Seat Video function supplies visual and aural entertainment from broadcast video, PVIS, camera systems and optional broadband system (for live TV). In addition, an interactive function offers Video on Demand (VOD) from the IFEC and supplies individual passenger selection and control of video

programs. The in seat video is sent via the cabin distribution and the seat networks to each passenger seat. The program images are displayed on SDUs and the related audio is delivered to the passenger headsets. In all cases channel selection and volume controls are selected on the PCUs and/or through a touch screen SDU.

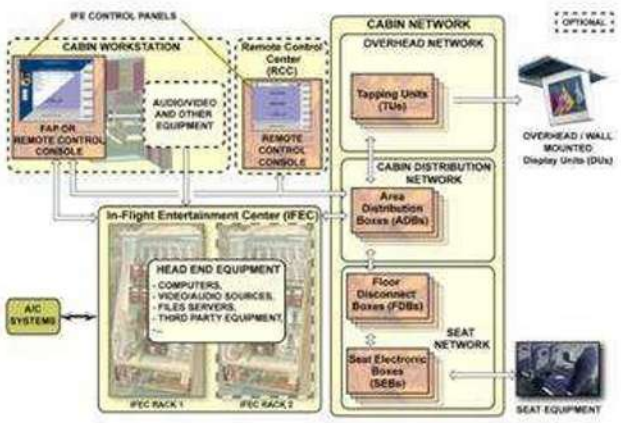


Fig. 20.81 System Architecture overview-IFEC-Cabin Network

Interactive Functions (Optional)

In addition to the in seat video, the passengers can access from their seats to interactive functions such as games, pay per view, duty free shopping, web, etc. The dedicated data are stored in the IFEC and/or in the Network Server System (NSS). The interactive functions are controlled by the passengers through a PCU with extended functions or via a menu on the touch-screen SDU. Note that interactive functions may also be supplied to the crew rest compartments.

Fig. 20.82 Interactive Functions (Optional) PAX Service System

In baseline configuration the PAX service system functions give reading light and attendant call control to the passengers. Each Passenger Service Unit (PSU) reading light and attendant call light is controlled from the related PCU. This control is done via the cabin network, the IFEC and theCIDS

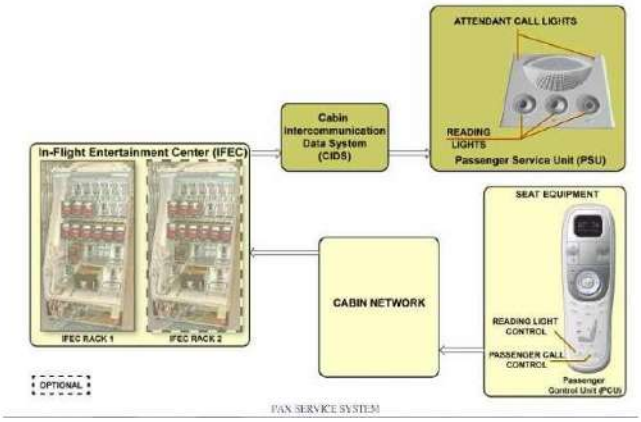


Fig. 20.83 PAX Service System Telephone (Optional) in seat telephone

The In-Seat Telephone function supplies the cabin internal seat- to-seat communication and air to ground communication (voice and data) .The telephone handset is integrated in the passenger seat but it can also be integrated in the optional crew rest compartments. The telephone handset is connected to the IFEC via the seat and cabin distribution networks. The air to ground communication is then established via the telephone function in the IFEC and via the SATCOM system. Passengers are able to set-up and complete air to ground phone calls from the seat by following the instructions on the handset supplied either as displayed lettering and/or audible voice prompts over the hand set receiver.Asanairlineoption,forcallbillingreasons,theseats maybe equipped with a credit card reader and/or credit cardinformation input device.

Wall mounted telephone

The wall mounted telephone function supplies telephone communication for wall-mounted telephones and fax. The telephone or fax stations are connected to the IFEC via a seat network and a cabin distribution network. The air to ground communication is then established via the telephone function and via the SATCOM system the wall mounted telephone function supplies telephone communication for wall-mounted telephones and fax. The telephone or fax stations are connected to the IFEC via a seat network and a cabin distribution network. The air to ground communication is then established via the telephone function and via the SATCOM system.

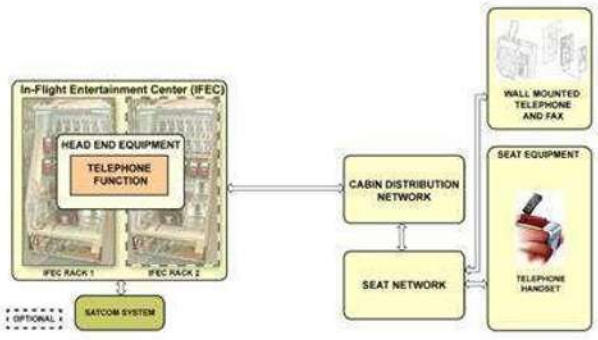


Fig. 20.84 Telephone (Optional)-In Seat Telephone & Wall Mounted Telephone

CABIN MONITORING SYSTEM PRESENTATION

General

The cabin monitoring system is composed of the optional Cockpit Door Surveillance System (CDSS) and of the optional Cabin Video Monitoring System (CVMS).The CDSS is designed to help the cockpit crew to identify a person requesting entrance to the cockpit and to survey the doors 1 hidden cross

section via video camera observation. The CVMS is mainly designed to help the cabin and cockpit crew in video surveillance of the whole cabin (main and upper deck) and of some other areas like the staircases, the crew rest areas and the lower deck facilities. The CVMS is installed to detect unruly passengers, suspicious behaviors or other potential threats occurring in these areas.

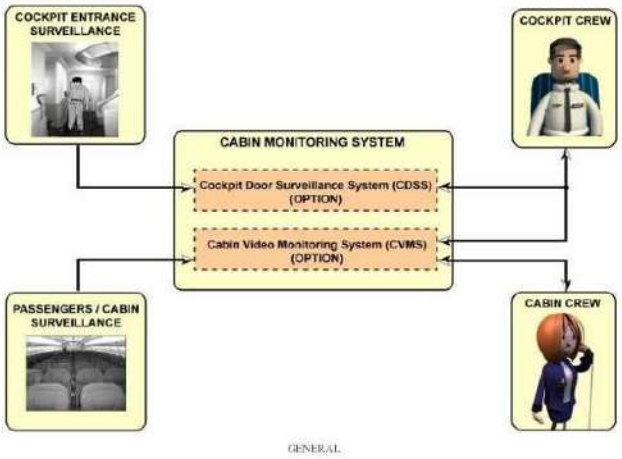


Fig. 20.85

CABIN MONITORING SYSTEM PRESENTATION

Cockpit Door Surveillance System (CDSS) (Option)

The CDSS is composed of: - 3 video cameras located in the cockpit entrance area (a maximum of 6can be installed),- 1 CDSS controller. The CDSS controller manages video signals from the CDSS cameras. It shows, upon selection on the ECAM Control Panel (ECP), the CDSS videos through the Control and Display System (CDS) via the Concentrator and Multiplexer for Video (CMV).These images are shown on the System Display (SD) in split or single screen configuration. The videos are also sent to the optional CVMS and to a dedicated optional Video Recorder Capability (VRC).As an option, in case of hi jacking the cockpit CDSS display can be inhibited either via the Ground Service Panel (GSP) or via the Aircraft Environment Surveillance System (AESS).

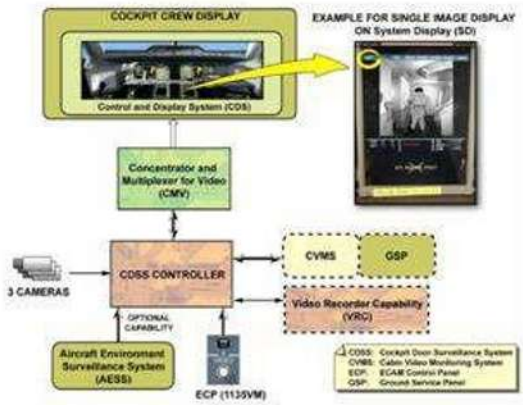


Fig. 20.86 Cockpit Door Surveillance System (CDSS) (Option)

Cabin Video Monitoring System (CVMS) (Option) System architecture

The optional CVMS is composed of:-Cameras (up to 15 cameras can be installed) located in the cabin area,-Area Distribution Units (ADUs) (up to 10 ADUs can be installed),-1 Data Acquisition Unit (DAU).Each ADU receives video signals from its related cameras and sends these signals to the DAU. Then the DAU, which is the CVMS video controller, sends upon request the images to the following systems:-The Control and Display System (CDS) via the CMV for the cockpit crew display (after video selection on the ECP),-The Flight Attendant Panels (FAPs) for the cabin crew display,-The In-Flight Entertainment (IFE) system for passengers display,-The CVMS GSP for ground staff display. The CVMS also interfaces with the CDSS to broadcast upon request the CDSS video images to the previous systems except for CDS, which has a direct connection to theCDSS.

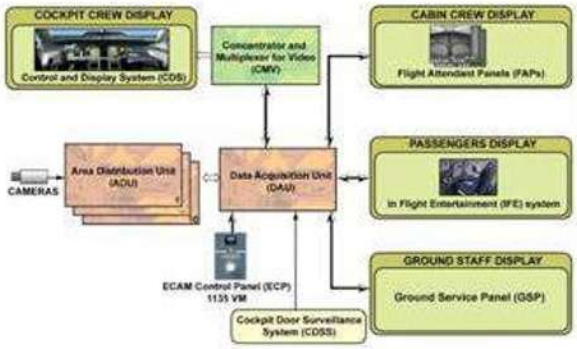


Fig. 20.87 Cabin Video Monitoring System (CVMS) (Option)- System Architecture

Cabin Video Monitoring System (CVMS) (Option) (continued) Cabin CrewDisplay

The cabin crew can display the CVMS images on the FAPs and select the camera to be viewed. The CVMS images are presented on the FAP in split or single screen configuration. Through the FAP, the cabin crew can also have access to the recording function and to the CDSS videos.

Cockpit Crew Display

The cockpit crew can display the CVMS images on the cockpit System Display (SD) upon selection on the ECAM control panel to assess a critical and exceptional cabin event. These images are presented on the SD in single screenconfiguration.

Passengers Display

The CVMS images can be presented on the IFE passenger screen in split or single screen configuration.

Ground Staff Display

In case of an exceptional event on ground it is possible to have access to the video of all CVMS cameras from outside via a laptop connected to the CVMS GSP. The display of the selected camera is presented in split or single screenconfiguration.

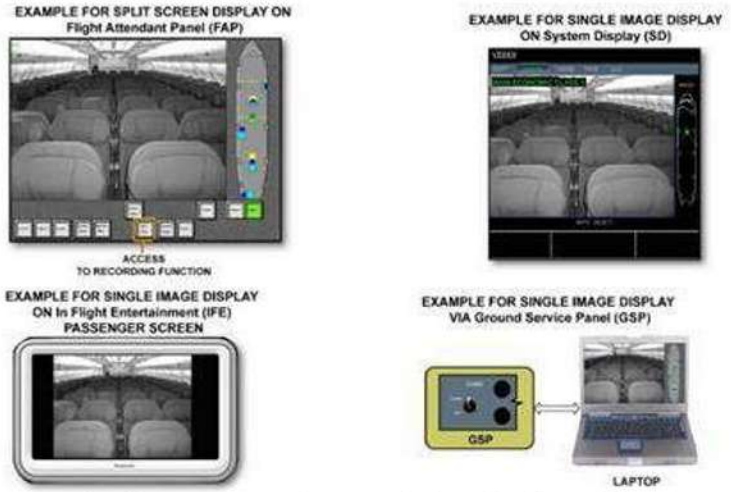


Fig. 20.88 Cabin Video Monitoring System (CVMS) (Option)- Cabin Crew Display-Ground Staff Display

Certification Statement
These Study Notes comply with the syllabus of EASA Regulation (EC) No.2042/2003 Annex III (Part-66) Appendix I, as amended by Regulation (EC) No.1321/2014, and the associated Knowledge Levels as

AIRCRAFT INFORMATION SYSTEM – ATA 46 GENERAL DESCRIPTION :

Main aim of the aircraft information system is to improve flight , cabin and maintenance operation and provide services for passenger.

1 – Systems used in Airbus-380 are comprised of–

The network server system (NSS) which hosts the onboard maintenance system (OIS)) and Air traffic system(ATC)

2 –System used in B-787 are comprised of is part ofCore network system (CNS) is part of crew informationsystem

The core network system lets flight and maintenance crew see and control airplane support and operationaldata.

3 – System used in B-777/737 are comprised of Electronic flight bag.

Aircraft manufacturer developed new computer architectures for their new generation aircraft. The architectures based on a system of networked, real time servers and routers combined with a central acquisition of parameters and secure digital communication. Although open to the world via digital radio link , the whole onboard system is highly secure , both from the point of view of computer security and operational availability.

This system collects, centralizes and complies all the data related to the flight on a single system and provides external communication, data collection and storage. This modular ,

central system also hosts application unique to the aircraft type and particular airline companies, that deal with the actual operation of the aero plane all the way through to the services offered to passengers; for example, onboard electronic documentation, navigation diagrams, performance calculations, flight logs,etc.

Information system improves the airlines' operations on ground
and in flight by:

Supplying electronic forms (e.g. Logbook) and documentations, replacing the use of paper media.
Offering a set of customized applications and documentation developed either by the aircraft manufacturer or the airlines.

Flight crew gets an easy and quick access to the data they may require to make a decision, Maintenance personal finds it easy for maintenance improving the autonomy of the aircraft and leading to the reduction of the troubleshooting time, cabin crew gets an easy access to their electronic documentation and electronic form used for cabinoperations,
Passenger scan avail the facilities for worldwide electronic mail and Internet services.

AIRPLANE HEALTH MANAGEMENT SYSTEM

With the help of on board maintenance system and information system in conjunction with communication system Aircraft manufacturer keeps monitoring the vital parameters of the Aircraft systems and engines. They analise the performance and if any modification is required, operators get the information .Also if

there is a major fault , they informed operator immediately so that job can be done faster with prior preparation . They also provide technical support if required.
Airplane health management (AHM) is the terminology used by BOEING :
Boeing AHM helps the airline to troubleshoot the fault arrises in the aircraft during flight also monitors the performances of the aircraft and its engines.
Boeing operation center gets information from the aircraft through ACARS and they send the required information to the airline operation center through internet, e-mail etc . Airline also gets access through My Boeing fleet to their aircraft and kept themselves ready for the work with all accessories and for critical faults Boeing also respond with technical support. Boeing also provide maintenance tips which is very much helpful for typical snags.
Airbus health management system is called AIRMAN (aircraft maintenance analysis) developed software , constantly monitors the health of the operators aircraft and they kektadvicing to the operators if there is a fault registered through on board maintenance system . Airline can reduce the trouble shoot time by getting advance information.
ELECTRONIC FLIGHT BAG
The Electronic Flight Bag (EFB) lets the flight crew access to the Electronic flight operation data, general purpose computing and communication

The EFB provides the flight crew with a paperless flight deck Environment and enhance the quality of information available to the crew.

Core Network System

1. The core network system is part of the crew information system(CIS).

2. The core network system lets flight and maintenance crews see and control airplane support and operationsdata.

3. The core networksystem:

- Supplies connections between airplane and groundnetworks
- Routes data between the airplane and groundnetworks
-Stores airline data and applications
- Makes sure the network issecure.

The core network system keeps software and data for airplane systems.

4. The core network system keeps software and data for airplane systems. It also supplies wire and wireless connections for the crew and thepassengers.

Onboard
EFB systems having Class 1 hardware are generally commercial-off-the-shelf (COTS) based computer systems used for aircraft operations, are portable, are not attached to an aircraft mounting device, are considered as PortableElectronic

Devices (PEDs) such as PDAs (Personal Data Assistants), tablet PCs (portable tablet computers), laptop computers, etc., may connect to ship's power and/or obtain read-only data through a certified power/data source, and, if using only a Type A software application, are not required to go through an administrative control process for use on anaircraft.
EFB systems having Class 2 hardware are generally COTS based computer systems used for aircraft operations, are portable, are considered a PED, are required to go through an administrative

control process to add, remove, or use in the aircraft, and are attached by means of a mounting device either directly to the aircraft (albeit removable) or by use of devices such as a knee-board, cradle, docking- station, etc. These devices may connect to ship's power and/or obtain read-only data through a certified aircraft power/datasource.
EFB systems having Class 3 hardware are mounted and electrically connected to the aircraft as permanently installed equipment and require TCCA design approval. These devices may be connected to essential and/or critical aircraft data busses and may be used for other aircraft data communication applications.
Type A software applications are pre-composed, fixed presentations of data that are also currently presented in paper format. These software applications may consist of manuals relating to the operation of the aircraft including an operator's MEL..

Type B software applications include dynamic, interactive applications that can manipulate data and presentation. These applications may consist of terminal charts, electronic logbook, electronic weight & balance, aircraft performance data including calculation capability for takeoff, enroute, and landing operations, electronic checklists, air to ground data links, aeronautical weather data,etc.
Type C software applications may include primary flight displays, TCAS, ADSB, moving map displays, own-ship position, etc. These applications require AIR design approval unless the software is user modifiable, which may be utilized to host Type A or Bapplications.
This item specifically addresses relief for Class 3 EFBs and mounting devices, data connectivity, and power connections associated with Class 1, and 2 EFBs.

A TYPICAL DESCRIPTION OF B-777 AIRCRAFT IS GIVEN BELOW WHICH WILL GIVE AN IDEA OF EFB FUNCTIONING
The Electronic Flight Bag (EFB) lets the flight crew access to the Electronic flight operation data, general purpose computing and Communications.

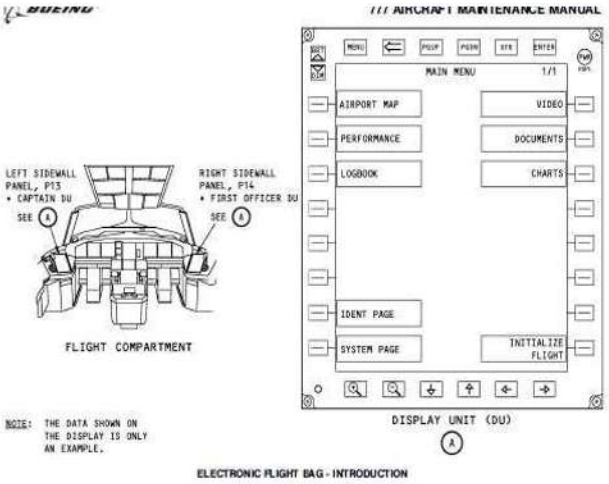
Abbreviations and Acronyms

* AC - advisory circular(FAA)
* ADC - application dispatchcontroller
* AIMS - airplane information managementsystem
* API - application programinterface
* APU - auxiliary powerunit
* ARINC - aeronautical radio,incorporated
* BCA - Boeing commercialairplanes
* BEGGS - Boeing e-plane ground supportsystem
* BIT - Built-in test
* BITE - built-in test equipment
* CAM - CAT application module(e-Plane)
* CAT - common administrative tool(e-Plane)
* CCA - circuit cardassembly
* CCD - cursor controldevice
* CIU - camera interface unit
  CDROM - compact disk read only memory
* CMS - cabin managementsystem
* CPU - central processingunit
* CRC - cyclic redundancycheck
* CSS - cabin surveillancesystem
* DDM - distributed datamanagement

* DFDAU - digital flight data acquisitionunit
* DFIM - DDM flight-bag interface module(application)
* DHCP - dynamic host configurationprotocol
* DCMF - data communication managementfunction
* DNS - domain nameserver
* DSPL -display
* DU - displayunit
* ECMF - eplane communications managementfunction
* EFB - electronic flight bag
* EFIS - electronic flight instrumentsystem
* EICAS - engine indicating and crew alertsystem
* EPT - electronic-enabled portableterminal
* EU - electronicunit

* FAA - federal aviationadministration
* FAR - federal aviation regulation
* FDEVSS - flight deck entry video surveillancesystem
* FIND - find identification of networkdevices
* FTP - file transfer protocol(application)
* FTS - file transfer service(application)
* GPS - global positioningsystem
* ICAO - international civil aviationorganization
* IO - inputoutput
* HST - high speedtransciever
* JAA - joint airworthinessauthorities
* LAN - local areanetwork
* LRU - line replaceable unit
* LSAP - loadable software airplaneparts
* LSK - line selectkey
* MMR - multi-modereceiver
* NIC - network interfacecard
* NOTAM - notice to airmen(FAA)
* NTP - network timeprotocol
* OAS - operationally approved software(FAA)
* OS - operatingsystem
* PDL - portable dataloader
* PMAT - portable maintenance accessterminal
* PPPoE - point to point protocol overEthernet
* PWR -power
* SATCOM - satellitecommunication
* SMF - security managementfunction

* TPA - taxi positionawareness
* TSO - technical serviceorder
* VDC - volts directcurrent
* VPN - virtual privatenetwork
* WPM - windows printmanager
* XFR – transfer



EFB - GENERAL DESCRIPTION

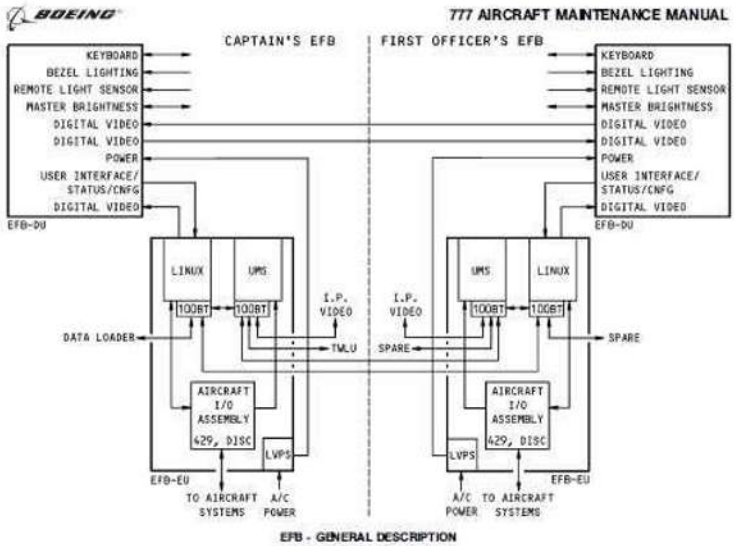
General

The electronic flight bag (EFB) has two display units (DU) and two supporting electronics units (EU). The captain's EFB system is independent from the first officer's EFB system. Each EFB system consists of a DU and an EU Description. The EFB provides the flight crew with a paperless flight deck environment and enhance the quality of information available to thecrew.

The flight crew interacts with the EFB via the display unit (DU) either by pushing the buttons on the DU bezel, or by using a touch -screen that is a feature of certain applications (example: electronic logbook). In addition, the flight crew can also make use of the cursor control device (CCD) and the portable keyboard (optional).

The electronic Unit (EU) has these functions:

* Process aircraft interfacesignals
* Program memory (hard-diskdrive)
* Ethernet communicationsnetwork
* Video inputprocessing
* Convert the digital video output signal to theDU
* Supply 28V DC power to the onsideDU



EFB - FLIGHT DECK COMPONENT LOCATIONS

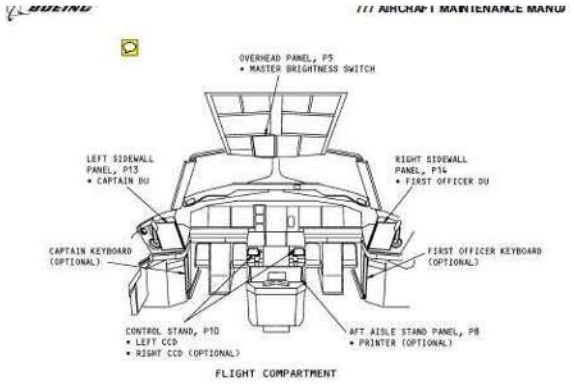
General These are the basic components in the flight deck that interface with the EFB:

* Display units, one for eachpilot
* Master brightnesscontrol

These are the optional components in the flight deck that interface with the EFB:

* Printer
* Cursor control device(CCD)
* Keyboard

NOTE:
While the flight deck entry video surveillance system (FDEVSS) is not installed in the flight deck, the system does interface with the EFB.

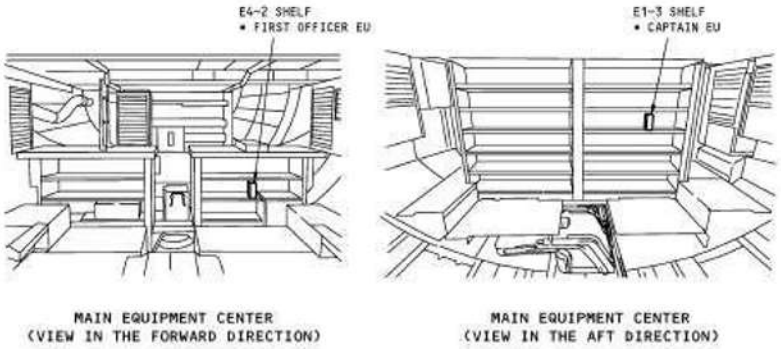


EFB - FLIGHT DECK COMPONENT LOCATIONS

EFB - MAIN EQUIPMENT CENTER COMPONENT LOCATIONS

General
These are the components in the main equipment center that interface with the EFB:

* Electronic units(EU)



EFB - MAIN EQUIPMENT CENTER COMPONENT LOCATIONS

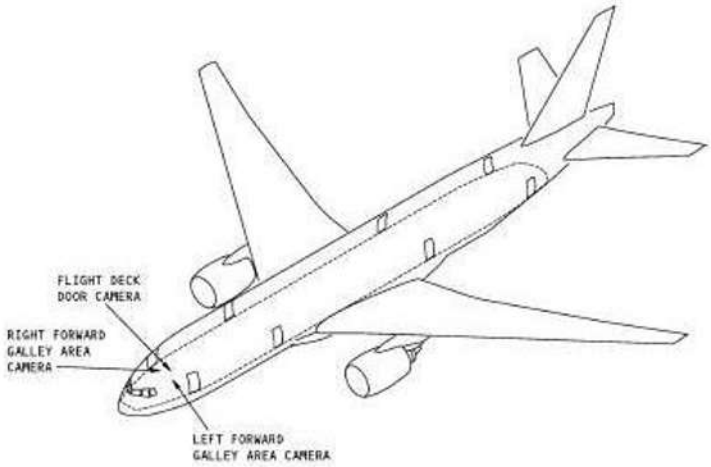
EFB - MAIN EQUIPMENT CENTER COMPONENT LOCATIONS
EFB - CABIN AND COCKPIT DOORWAY COMPONENT LOCATIONS

General

These are the optional components in the cabin and the cockpitdoor way that interface with the EFB.
The flight deck entry video surveillance system (FDEVSS) has an interface with the EFB. The FDEVSS has four components.
There are three infrared cameras installed in the cabin ceiling:

* One flight deck entry door areacamera
* Two forward galley areacameras

The fourth component is the camera interface unit (CIU). The CIU is installed in the lower ceiling panel of the forward galley area.



EFB - CABIN AND COCKPIT DOORWAY COMPONENT LOCATIONS

EFB - DISPLAY UNIT

General

The Display Unit (DU) operates as a computer monitor and input device. The flat-panel is an active matrix liquid crystal display (AMLCD) that shows graphics and video data in color. The panel is also touch-sensitive. It measures where you presson
the screen, and changes that to digital data for the Electronics
Unit (EU). Around the flat panel is a bezel frame with 30 push- buttons, ok eys. The keys across the top and bottom are permanent in function (for example; power). The line selection keys (LSK) on the left and right sides operate in relation to the data shown on the touch screen. You use the keys and touch screen tooperate

the Electronic Flight Bag (EFB).The DUs are rack mounted, and line-replaceable. There is no physical difference between the captain's and first officer's DUs. They are interchangeable.

Physical Description

The DU has these physical characteristics:

* Height - 10.30 in. (26.2 cm)
* Width - 8.00 in. (20 cm)
* Depth - 3.47 in. (8.81 cm)
* Viewing area - 6.21 in. (15.77 cm) x 8.28 in. (21.03 cm)
* Resolution - 768 x 1024 pixels(XGA)
* Weight, maximum - 10.0 lb (4.5 kg)

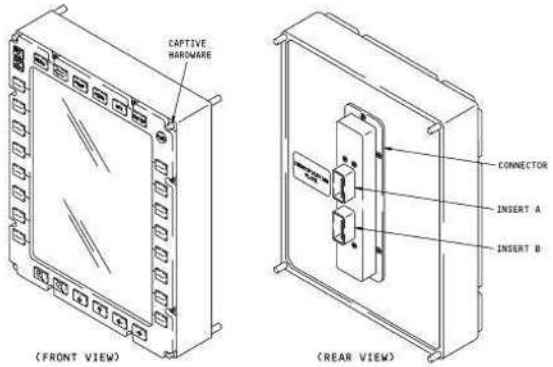
The DU has four (4) captive screws that attach the component to
a rack .On the rear, the DU has one dual-insert connector. One insert contains four (4) fiber-optic connections. The second insert contains wired connectors that transmit power and data.

DU Operation The DU operates on 28V dc (volts direct current) power received from the EU. When the EU is energized, the DU is also energized. The PWR (Power) key controls power only to the LCD backlight assembly. The backlight assembly has four (4) edge-mounted cold-cathode lamps. When energized, the backlight assembly operates continuously while the active matrix screen filters the light. Power for illumination of the bezel keys is variable 0–5V ac (volts alternating current), from the captain's and first officer's panel lighting. The DU receives and shows graphics data from the EU. It can also display the image shown on the opposite-sideDU.
The DU is cooled by natural convection and radiation.

The DU can accept input from a PS/2 keyboard when supplied. Data shown on the DU can be sent to the cockpit printer, when available. The DU also has some memory functions that are separate from the EU.

DU Brightness

When the backlight is energized (PWR), you can adjust display brightness with the BRT/DIM bezel keys. Additional brightness is controlled directly by the DU. It has internal sensors that monitor and adjust the brightness of the backlight assembly according to unit temperature, age, and other factors.



EFB - DISPLAY UNIT

EFB - DU FUNCTIONAL DESCRIPTION

General

The display unit (DU) is a flat panel active matrix liquid crystal Display (AMLCD). The AMLCD makes a high resolution color image of the display data. DU Interface Control.

The DU interface control performs the following functions:

* Processes the video data from the microcontroller and the incoming video fromEU.

* Processes user interface data from the bezelbuttons, external keyboard and touch screendata.

* Selects video data from EU or cross cockpitDU

* Sends displayed video out to the cross cockpitDU

* Creates interface signals to theAMLCD

* Communicates with the microcontroller for brightness control, power and BITE status information

* Runs its internalBITE
* Creates test pattern for the display during initiatedBITE

* Performs optical loop-back data when commanded byEU duringBITE

DU Microcontroller

The main functions of the microcontroller are:

* Interfaces with the DU interface/invertercontrol

* Automatic and master brightnesscontrol

* Remembers last commanded brightnesssetting

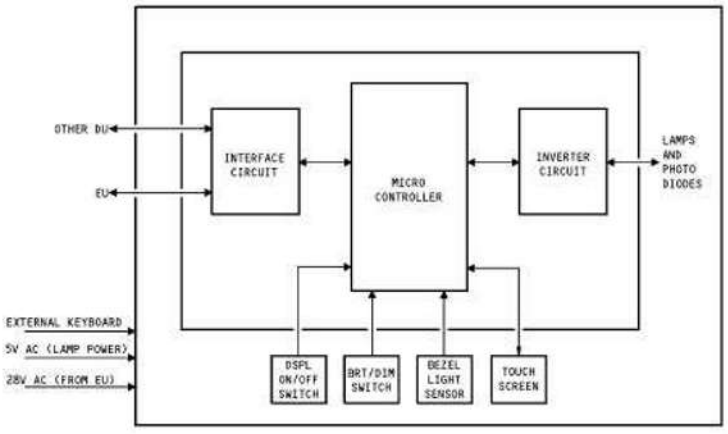
* Processes temperature sensor data to switch heaters/fanon andoff

* Monitors the on/off switch for controlling the DU backlight DU Inverter Control

The DU inverter control is used to drive the backlight, it performs the following functions:

* Generates closed-loop controlled burst of pulses to drive the DUbacklight.

* Turn on/off the DU backlight (commanded by the microcontroller)



EFB - DU - FUNCTIONAL DESCRIPTION

EFB - ELECTRONIC UNIT

General

The Electronics Unit (EU) operates as the central processing Unit for the Electronic Flight Bag (EFB). The airplane has two EUs (left and right) that operate independently, but are Connected to gether by Ethernet. Each EU contains the Hardware, operating systems, and software necessary to Calculate and show data on the applicable Display Unit (DU). The EUs are rack mounted, and line-replaceable. There is no Hardware difference between the left and right EU. They are Interchangeable – when the software also agrees. The rack Location of each EU determines the right or left designation. The EU-L tray

always connects to the captain's DU. The EU-R tray Always connects to the first officer'sDU.

EU-L receives power from the 115V ac (volts alternating current) left bus. EU-R receives power from the 115V ac right bus (section 2). Power is controlled by two circuit breakers on the overhead circuit breaker panel, P-11.
The EUs are cooled by forced air.

Physical Description

The EU is an 2-MCU enclosure with these characteristics:

* Width - 2.27 in. (5.77 cm)
* Height - 7.83 in. (19.89 cm)
* Depth - 15.26 in. (38.80 cm)
* Weight - 12 lb (5 kg), maximum Connector

On the rear surface, each EU has one ARINC 600 rack compa table connector with three (3) inserts. The connections include:

* Inputpower

* Power output for oneDU

* Discrete inputs andoutputs

* ARINC 429 input and output channels
* Ethernet interfaces

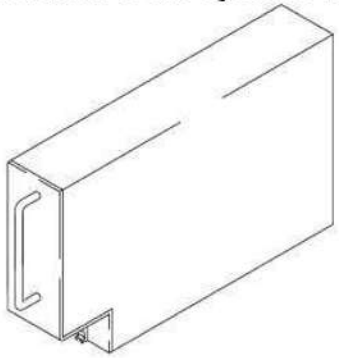
* RS-422 interface to the DU for optional keyboardinputs
* Fiber opticinterfaces.

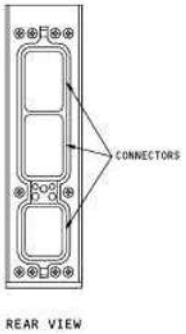
Operation

When the EUs are energized at the circuit breakers, they Automatically start a power-up sequence. The EUs Automatically energize the DUs at the same time. When the Sequence is complete, the DUs show the MAIN MENU page.

NOTE:
The start-up sequence can take approximately eight (8) minutes to complete.

Each EU has two operating systems, Linux and Windows, with each OS on an isolated hard-disk drive. Linux and Windows operate at the same time, and are necessary to operate specific software applications. To the user, operation of the systems is transparent.





REAR VIEW

EFB - EU FUNCTIONAL DESCRIPTION

General

The EU processes the data based upon configuration, operator selections, input data and generate display graphics.
The EU has three circuit card assemblies (CCAs). These arethe cards in theEU:

* CPU CCA

* Modular I/O CCA

* Power supplyCCA

CPU CCA

The CPU CCA has two CPU cores within each EU to support the partitioned system. Each core has a microprocessor and a hard drive.

One core hosts a Linux operating system (OS) and the third party avionics applications. The software functions installed in this core are not intended to be modifiable or changed by the user.

The other core hosts a Windows based operating system. The software functions installed in this core contains the user modifiable software.

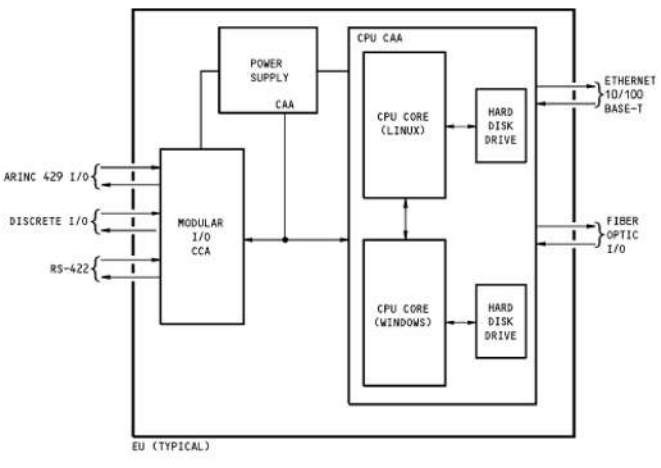
The CPU CCA performs the following functions:
* Interfaces with external input/output channels: ARINC 429, GND/OPEN, 28V/OPEN, Ethernet 10/100BASE-T,1000 Base-SX Fiberoptic channel.

* Sends data to the graphicsgenerator

* Built-in test(BIT)

Modular I/O CCA

The modular I/O CCA is a microcontroller that provides the ARINC 429, RS-422, discrete, high speed serial interfaces, and Interface adaptations for internal signals.
Power Supply CCA The power supply CCA receives 115 VAC, 400HZ power from the aircraft (120 VAC, 60HZ for ground support) and distributes power as required to the DU and EU internal assemblies.



EFB - EU SYSTEM INTERFACES

General

There are two types of Electronics Unit (EU) interfaces: Connections to other components in the Electronic Flight Bag (EFB) system, and connections to non-EFB systems or components that interchange data, or supply power.
Included in the EFB system, each EU connects to the opposite side EU using two isolated ether net links (one for Windows, the other for Linux), one fiber optic ether net link to the same-side Display Unit (DU), and for EU-L there is one remote-access data port.

Each EU also monitors global position, inertial reference, and other flight data from ARINC 429 compatible devices.
The EUs can also send data to the flight deck printer.
1000Base-F Fiber Optic Interface Each EU uses 1000Base-F fiber optic cable to connect to the same-side DU. EU-L only connects to the captain's DU, and EUR only connects to the first officer's DU. A separate fiber optic cable connects the captain's and first officer's DUs directly. Cursor Control Device
Display items such as menus and application specific interfaces may be controlled by one of two Cursor Control Device (CCD)s that are installed in the flight deck.

The cursor control pad will emulate the touch screen for cursor movement. For menu election, the cursor movement and side key tap will emulate line key selection or touch screen tap.
The EFB interfaces with the CCD through ARINC 429. Portable Keyboard (Optional) One keyboard connector is provided to each side display. The keyboard will be stowed external to the crew information System

Printer

EU-L and EU-R each can send text, and graphics-based images to the flight compartment printer.

Text data is sent directly to the printer through the ARINC 429 bus. Graphics images and font-based text are sent to the printer through Ethernet.

Flight Deck Data Load Port

Direct electronic access to EU-L, and indirectly to EU-R, is through the data load port, using 10/100Base-T Ethernet. The data port is an RJ-45 specification connector. The connector receives an external Ethernet cable, connected to the Portable

Data Loader (PDL). The RJ-45 data port location is as follows:

* Flight deck - second observer's panel, P18–1,M23218.

EFB - EU SYSTEM INTERFACES AIMS

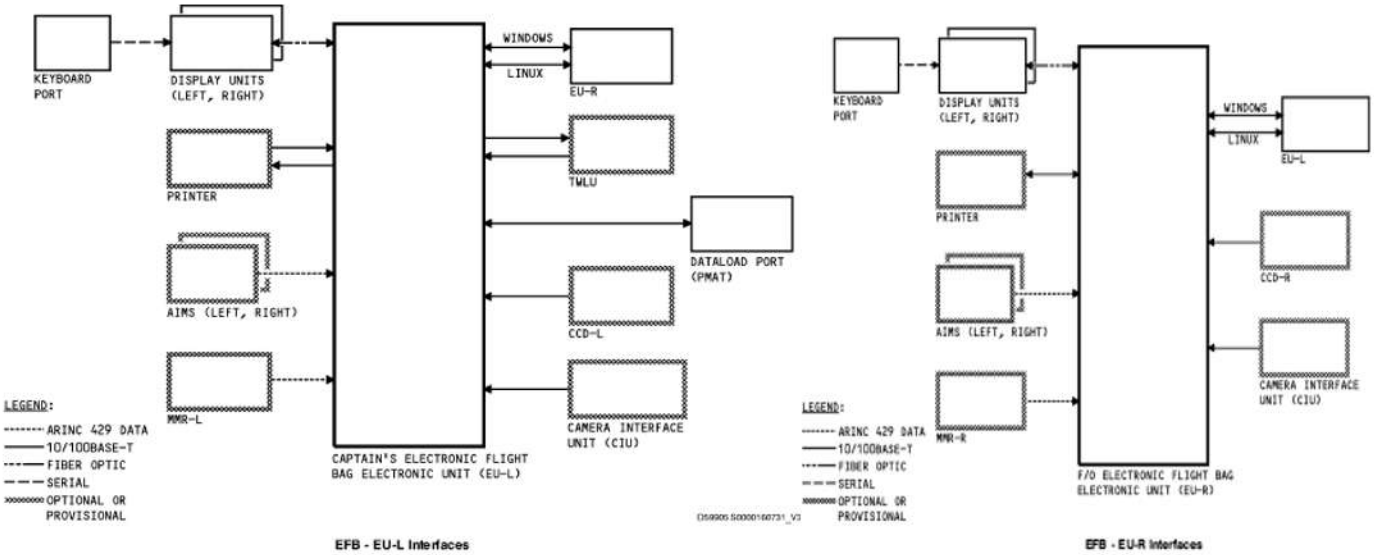
The 777 ACARS communication management function is the data communication management function (DCMF) in Airplane Information Management System (AIMS). EFB EU-L has two ARINC 429 ports connected to the left, and right AIMS. The left EU will receive activities from only one AIMS cabinet at a time; the EU transmits data to both AIMS cabinets, but only one cabinet can process the information.

ACARS is an existing air-ground network consisting of airborne LRUs, satellites, datalink service provider (DSP) systems. On the ground, both airline systems and air traffic service Communication management function manages the air-ground Links and the internal aircraft routing to its peripherals.

MMRs

The EFB system interfaces with the Multimode Receiver (MMR) via a high speed ARINC 429 port.

In support of the EFB functionality, the pilot information displays will receive the data such as aircraft position, ground speed date, and time from the MMRs.,



EFB - POWER AND BRIGHTNESS INTERFACES

EFB Power Interfaces

The electronic unit (EU) is responsible for converting 115V AC Power from the main power bus for use internally by the EU. The EU also provides the 28V DC power to the onside Display Unit (DU) from a single internal power supply. The EU is capable of supplying electrical power to only a single DU.

EU Self Test

When the Electronic Flight Bag (EFB) is energized, the EU and DU do a Built-In-Test (BIT). During the BIT, each DU will flash intermittently, and show the words EU SELFTEST. This is normal operation and continues for approximately one (1) minute. To cancel the test, push the MENU bezel key.

When the test is complete, the DU shows the MAIN MENU.
The system will bypass the BIT if the time between EU shutdown and EU-energize is less than two minutes.

Display Unit Brightness Control

The EFB DU provides an automatic brightness control function the controls display luminance as a function of inputs from the DU brightness control (BRI/DIM rocker switch) inputs, bezel light sensor

(BLS) inputs, master brightness control inputs, and remote light sensor (RLS) inputs.

Manual Brightness Control

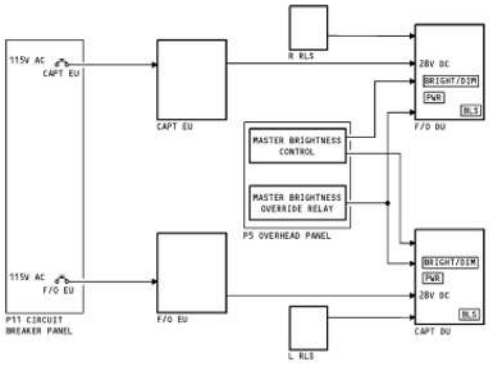
The EFB DU also supports manual brightness adjustments from either the EFB DU brightness rocker switch inputs and the master brightness control inputs.

The EFB DU receives a master brightness enable/disable single discrete input that is either grounded (0 VDC) or open.
When the discrete is grounded, full range luminance control will be applied to the master brightness inputs and the EFB DU rocker switch is limited in its range of control to +/- 20% of the luminance set by the master brightness.

Automatic Brightness Control

Each EFB DU has a bezel light sensor (BLS) on the front of the unit that measures the ambient light. The automatic brightness control calculation uses inputs from the BLS and the remote light sensor (RLS) to adjust the DU brightness.

The RLS sends a signal to the DU and the signal changes with the amount of light in the forward part of the flight deck.

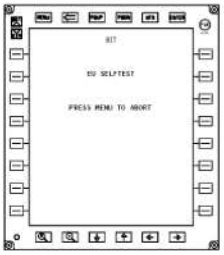


EFB - POWER AND BRIGHTNESS INTERFACES

EFB - POWER AND BRIGHTNESS INTERFACES

DU Backlight Control

A dedicated pushbutton switch is provided for turning power on and off to the DU backlight. Other EFB components such as the EU and the operating system remain on when the DU backlight is turned off.



EU Self Test

EFB - BRIGHTNESS CONTROLS

Purpose

The brightness controls permit manual brightness control by the flight crew for the display units.

P5 Overhead Panel

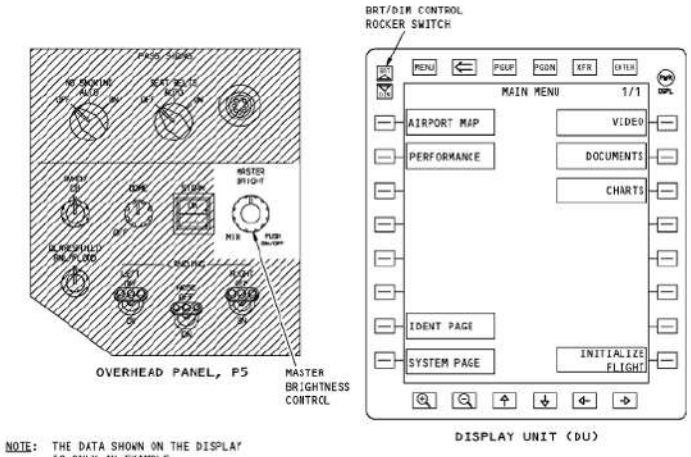
The Electronic Flight Bag (EFB) Display Unit (DU) supports manual brightness adjustments from the master brightness control switch located on the P5 overhead panel.

BRT/DIM Control Rocker Switch

The brightness control rocker switch regulates the screen's
brightness and background illumination for the bezel key labels.

DU Back Light Control

A dedicated push-button switch is provided for turning power on and off to the DU back-light. The EU and the operating system remain on when the DU backlight is turned off.



EFB - BRIGHTNESS CONTROLS

EFB - FUNCTION/APPLICATION SELECTION KEYS

General

The Display Unit (DU) has a bezel frame around the LCD Touch screen with 30 buttons, or keys. The top and bottom horizontal rows are permanent in function. The left and right vertical rows operate in relation to the software shown on the touch screen.

Function Keys

The twelve push-button function keys are located on the top and bottom portions of the DU.

The top function keys are as follows:

* Menu - selects the MAINMENU

* Back (<=) - goes back to the previous screen.

* PgUp (page up) - in a function or application with more than one page, moves the data up by onepage

* PgDn (page down) - in a function or application with more than one page, moves the data down by onepage.

* XFR (transfer) - allows one DU screen display to beshown on the otherDU

* Enter - confirms or activates (currently not supported for all applications)

* PWR (power) - applies and removes power from the DU backlight only

* BRT/DIM (brighten/dim) - rocker switch that changesthe brightness level of theDU.

The bottom function keys are:

* Zoom In(+)

* Zoom Out(–)

* Up

* Down

* Left

* Right.

Application Selection Keys

The DU bezel frame has sixteen push-button Line Select Key (LSK)s. The left-hand, and right-hand vertical columns each have eight LSKs.

You can refer to an LSK based on its location. Key 1L is the top key in the left-hand column. Key 8R is the bottom LSK in the right-hand column.

Each Loadable Software Airplane Part (LSAP) controls the functions of each programmable LSK. The function of key 1L changes in relation to which LSAP is in service, and which page shows.

From the EFB MAIN MENU, you can use the LSKs to start these typical applications:

* AIRPORT MAP - starts the taxi positionalawareness Application

AIN ALL

* TERMINAL CHARTS - starts the terminal chartsapplication.

* PERFORMANCE - starts the performanceapplication.

* DOCUMENTS - starts the e-Documentsapplication.

* VIDEO - starts the video surveillanceapplication.

* SYSTEM PAGE - shows the system page andfunctions.

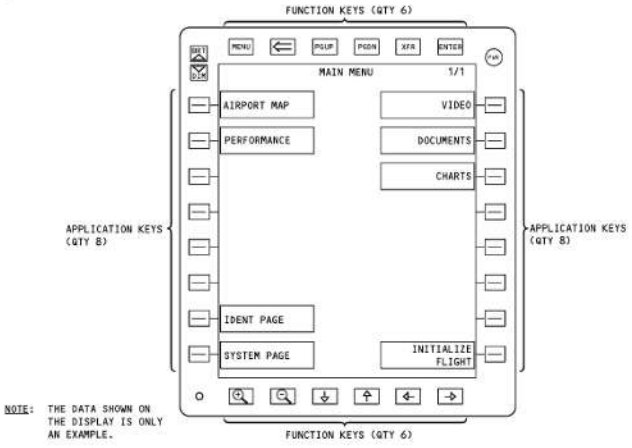
* INITIALIZE FLIGHT - sets the EFB to start flightoperation. This button does not show after the flight is initialized, but shows again after the flight isclosed.

* FLIGHT CLOSE - sets the EFB to stop flight operation.This button does not show after the flight is closed, butshows
again after the flight is initialized.

* IDENT PAGE - shows the airplane tail number and model, current date, current time and source of time, configuration part numbers, and application related information.
NOTE:

To access one of the above applications from the MAIN MENU, push the LSK next to the application, or use the Touch screen to select the application. The touch screen function does not operate in the LOAD MODE. The user must use the bezel LSKs to make a selection when in.

LOAD MODE.
NOTE:
Button application backgrounds are dim at first power up. However, after the application fully loads, the application changes to gray in color to show it is now available for selection.



EFB - FUNCTION/APPLICATION SELECTION KEYS

KEY NAME	KEY FUNCTIONS
MENU	Immediately displays the top-level EFB menu, providing the user quick access to all main EFB applications.
Back	Each actuation of the Back key returns user to previous format or section (not page). Can move between applications or re-trace links of any type.
XFR	First actuation of the View key temporarily slaves the screen to show on opposite EFB unit. No manipulation possible including pan and zoom. Second actuation of the View key returns screen control to home unit. When in view mode, only the Back, and Main Menu keys operate: Back - functions same as second actuation of View key Main Menu - Performs its normal function. The Transfer Mode is active when the word XFR shows green in color.
PG UP	For document applications, conventional paging. For XML documents, page groupings may be large. For other applications, when applicable, moves backward through normal sequence of formats. In menus, displays previous menu choices up the list.
PG DN	For document applications, conventional paging. For XML documents, page groupings may be large. For other applications, when applicable, moves forward through normal sequence of formats. In menus, displays additional menu choices down the list.
ENTER	(Not used, reserved)
Zoom in	Continuously enlarge image, about the document center point. Operates only in Documents, Airport Map, and Terminal Charts.

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EFB - FUNCTION/APPLICATION SELECTION KEYS

KEY NAME	KEY FUNCTIONS
Zoom Out 	Continuously decrease image size until entire page is on screen, about the document center point. Operational only in Documents, Airport Map, and Terminal Charts.
Left Arrow	1) Within a format or a horizontally oriented set of selections, moves the focus point left. 2) Within a windows-style expandable outline, contracts tree - (Documents Only)
Right Arrow	Within a format or a horizontally oriented set of selections, moves the focus point right. Functions as tab when selection list are oriented vertically. 2) Within a windows-style expandable outline, expands tree - (Documents Only)
Up Arrow	Within a format or list, moves the focus point up. (When list extends beyond upper edge of screen, list scrolls down so that focus point just remains on screen.) Can increment a value; should be graphically coded.
Down Arrow	1) Within a format or list, moves the focus point down. (When list extends beyond lower edge of screen, list scrolls up so that focus point just remains on screen.) Functions as tab when selection list are oriented horizontally. Can decrement a value; should be graphically coded.

EFB - MENU FLOW

General

The menu flow data that follows helps to identify different groups of functions, and how they are organized.
You will see that some of the groups have an overlap. The differences can be because of their operating system, installed location, or other shared property.

Operational Mode

The primary level of EFB operation is referred to as operational (or flight) mode. Operational mode is organized for the flight crew, but is also used by maintenance persons.
The essential level application for operation is the Linux operating system, or Disk Linux. Disk Linux is an approved, certified software part, and is installed on an isolated disk partition.

Disk Linux then gives access to the Windows OS, which operates in parallel with Disk Linux. Windows OS is also installed on an isolated disk partition, and supports the Operationally Approved Software (OAS).

The application manager controls the MAIN MENU display screen. Some functions are inhibited when in flight. When a function is inhibited, the touch screen button is grayed out, and the adjacent Line Select Key (LSK) does not operate.

Operationally Approved Software

OAS is a group of Windows OS based applications that are approved for use in flight.

The OAS partition is an isolated single board computer with a Microsoft Windows operating system. The OAS partition is Activated from the Linux operating system.

EFB Maintenance

The EFB MAINTENANCE menu shows functions that do checks, and maintain the EFB. The flight crew, and maintenance
personel each have access to these functions, however some functions are inhibited during flight.

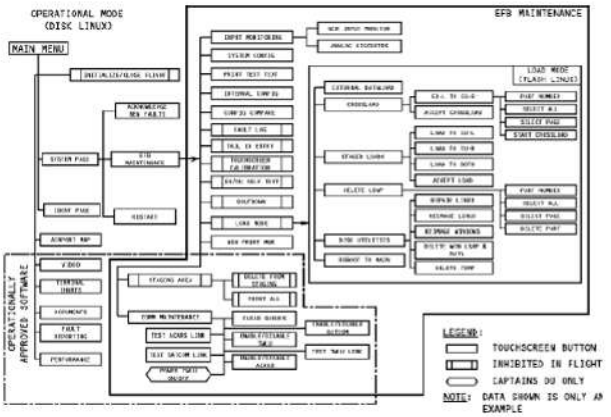
Of the functions shown, most originate from Disk Linux, but some functions are Windows OAS.

Load Mode

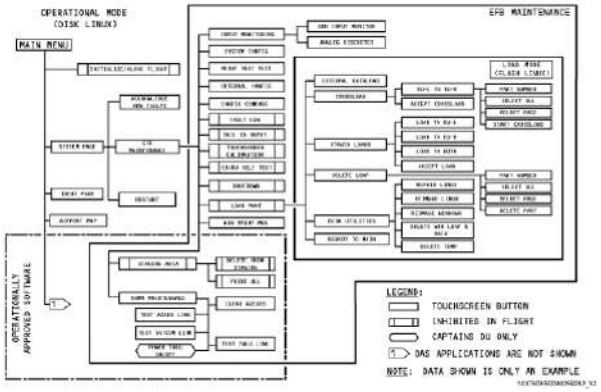
Load mode is each a group of maintenance functions, and another isolated Linux operating system

referred to as Flash Linux. This system is stored in non-volatile flash-memory chips, and becomes the primary operating system when software is installed or deleted in Disk Linux or Disk Windows. All load mode functions are inhibited during flight.

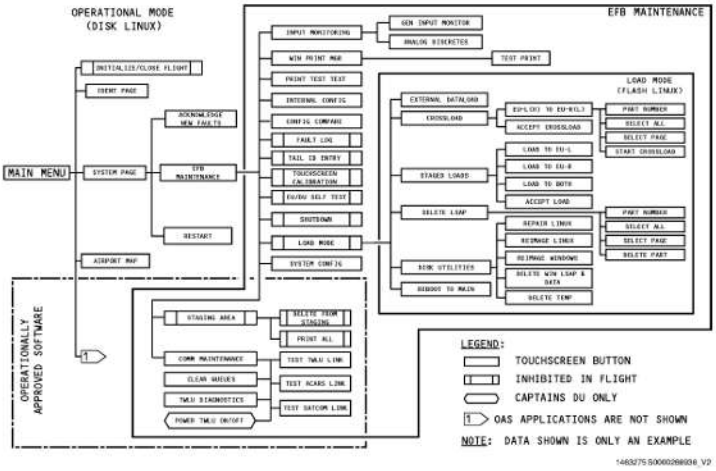
When you exit load mode, the EFB must reboot Disk Linux and Disk Windows.



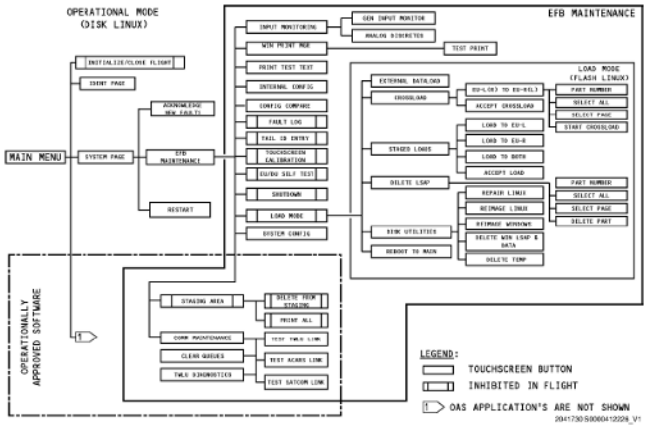
EFB MENU FLOW DIAGRAM



EFB MENU FLOW DIAGRAM



EFB MENU FLOW DIAGRAM



EFB MENU FLOW DIAGRAM

EFB - APPLICATION MANAGER OVERVIEW

General

The application manager is the front-end graphical user Interface for both flight operations and maintenance functions. The application manager provides a central interface for Controlling core Electronic Flight Bag (EFB) functions and Accessing configuration and status information. It loads Automatically upon power up so that it is the first screen
users see when they start the EFB. It then sends all necessary messages to all other EFB applications, controlling when they are started, gain focus, are hidden, or are terminated, and monitoring their health status. Upon start up, the application manager launches all the other applications in the order

defined in a configuration file, subsequently suspending them until a user activates them by using the menu. Asapplications load and are ready for use, their corresponding buttons on the application manager main screen turngray.
The application manager provides a reliable and seamless access path between the two independent operating systems (Linux, Windows) so that the transition between the two operating systems is not apparent to the user.
The application manager controls global EFB services for all applications, including such items as peripheral interfaces, printer functions, QWERTY keyboard, and messaging functions

Application Manager For The Flight Crews

The flight crews use the application manager to perform the following tasks:
* Access allapplications.
* Verify the currency of the applications and data - TheIDENT page shows the tail number, current date, currenttime,airplane major-model provided by program pins, and the airplane minor-model. Also, it shows software effectivity expiration status of all applicable installed software parts (for example, databases, charts, documents, etc.). This allows
the crew to quickly assess the operational readiness of the system along with the dispatch ability of all required data and documents required for that flight.
* Review non-normal status - system status of interest to a pilot is annunciated using the FAULT annunciation in the top left hand of the EFB display. The pilot reviews theparticulars of the fault by accessing the SYSTEM page. However, responses to many of these messages will stillrequire
Maintenance.

* Initialize a flight - when a pilot initialize the flight, the application manager notifies the EFB applications to perform necessary operations to prepare forflight.

* Close out a flight - on flight close, the applicationmanager notifies the EFB applications to perform necessary operations at the end of aflight.

Application Manager For The Maintenance Personnel

The maintenance personnel use the application manager to perform the following tasks:

* Load and install software, including applications and data - the EFB system accepts new software loads from the distributed data management (DDM) or Portable Data Loader (PDL). These software loads may include operating systems upgrades; applications upgrades, additions or removal; data content updates; or configuration file information from the common administration tool(CAT).
Data can be loaded to both EFBs in parallel or if loaded onto any one EFB; the data can then be crossloaded to the other EFB.

* Check fault logs - a continuous log of system errors is maintained by the EFB and can be accessed via the EFB Maintenance page. The log can be downloaded to the PDL for off-aircraftuse.

* Manually initiate built-in tests - the application manager provides a variety of built-in tests and monitors to check the status and overall health of the display unit andthe

electronics unit. These tests run automatically, but can be initiated manually. The open architecture also provides for third-party application tests to be run and display their results through the system maintenance function.

* Check Input Output (I/O) interface connectivity and operability - From the EFB maintenance menu, input monitoring page, the user can view ARINC 429 and Ethernet Line Replaceable Unit (LRU) connectivity status, analog discrete (program pin) status, and Display Unit (DU) connectivitystatus.

* Verify data integrity - 32 bit Cyclic Redundancy Checking (CRC) for the applications and datasets loaded onto the EFB system provide the required level of integrity checking to ensure that the loads are reliably transferred from their source to the system and the end user without any corruption or loss of data. The application manager verifies the application CRCs prior to launching the application; however, the applications themselves must verifytheir data CRCs.

Configuration and Setup

Each airline can configure the application manager to their own specification. Typical changes can:

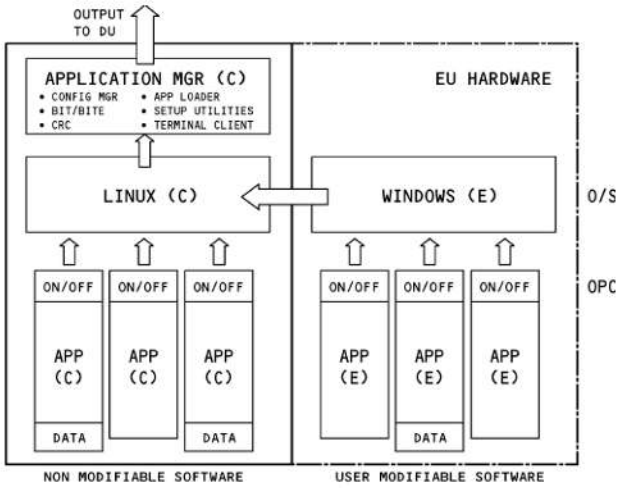
* Specify which flight crew applications toinstall

* Specify which maintenance applications toinstall

* Specify the boot-up sequence of theapplications

* Assign applications to specific buttons on the mainmenu

* Sets the EFB screen colors, fonts, and screendimensions.



EFB - APPLICATION MANAGER OVERVIEW

EFB - APPLICATION MANAGER STATUS

Button Color

The color indicates the status of the function as follows:

* A gray background with white text indicates the function is available forselection.

* A green background with white text indicates thefunction has beenselected.

* A black background with cyan border and text indicatesthe function is not an available selection at this time.

* When the cursor (Cursor Control Device (CCD) or Touch screen) enters an active function area, theborder changes to white in color. When you push the selection switch on the CCD or remove your finger from the touchscreen (when the function is highlighted with the white border), you activate thefunction.

Screen Title

The application manager owns the top two lines of the display regardless of the application being displayed. It uses this space to display the title of the page being displayed, and to provide information about the state of the Electronic Flight Bag (EFB). Messages.

The EFB generates these messages regarding the states of the EFB as follow:

* FAULT

* MEMO

* MSG

* XFR

FAULT

This message, amber in color, indicates that a fault has occurred in an application or the system. Go to the SYSTEM page for more information.

MEMO

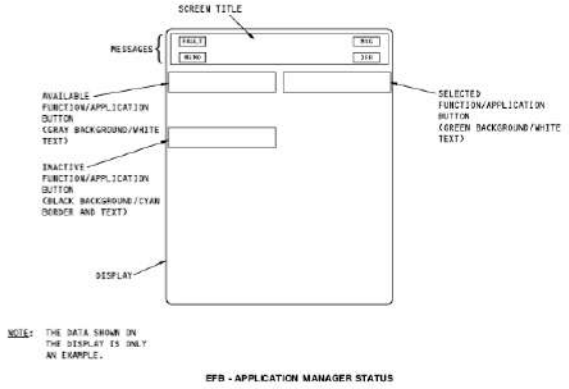
This message, white in color, indicates that an application wants attention for any reason other than a message. When this message is displayed, you should go to the corresponding application to address the issue.

MSG

This message, white in color, indicates that one of the uplink Communication applications has a message. This is used only if the EFB system is connected to external communications devices.

XFR

This message, green in color, indicates that the system is currently in transfer mode, viewing the contents of the other EFB in the cockpit. While in this mode, the display can not be manipulated. Press the XFR bezel key to remove the EFB from transfer mode.



EFB - APPLICATION MANAGER STATUS

EFB - SYSTEM PAGE

MAIN MENU Page
Use the MAIN MENU page to activate these electronic flight bag (EFB) selections:

AIN ALL PRE SB 777-46-0049

* AIRPORT MAP AINALL

* IDENTPAGE

* SYSTEMPAGE

* VIDEO

* Airline, or operator-installedapplications

* INITIALIZE FLIGHT or CLOSEFLIGHT.

SYSTEM PAGE

The SYSTEM PAGE lets you see EFB faults, and do certain functions. The SYSTEM PAGE shows

fault messages from the EFB that require flight crew attention. The fault messages may include names and dates of applications, documents or charts that are not current. The amber FAULT message shows at the top of the screen and adjacent to the SYSTEM PAGE when there are Unacknowledged faults on the SYSTEM PAGE.

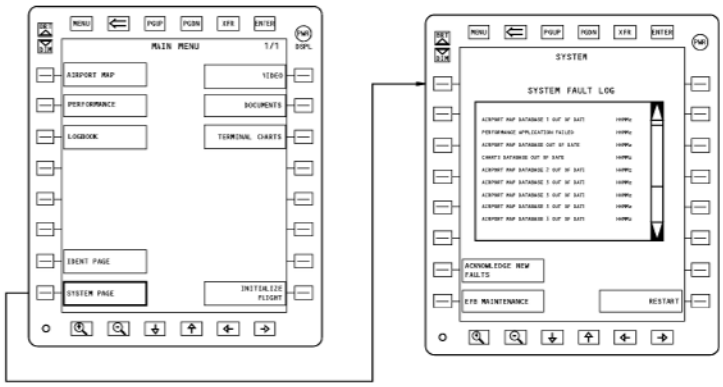
When a new fault message shows on the SYSTEM PAGE, the amber FAULT message shows at the top of the menu header. It also shows adjacent to the SYSTEM PAGE button. When you go to the SYSTEM PAGE and acknowledge the new faults, the FAULT message in the menu header erases.

These functions are available from the EFB SYSTEM PAGE:

ACKNOWLEDGE NEW FAULTS - Gives the user the ability to acknowledge all faults in the fault list. This button stays inhibited until all unacknowledged faults are viewed. If there
are more faults than what are displayed on the SYSTEM page, use the touchscreen arrows or the bezel key arrows to view the remaining faults in the list. Once all faults are acknowledged, the ‘‘FAULT’’ annunciation that shows adjacent to the SYSTEMS button on the MAIN MENU will disappear. Unacknowledged faults show as white in color on the faults list and acknowledged faults show as cyan (blue) in color.

* EFB MAINTENANCE - gives access to all system Maintenance functions, and all application maintenance Functions

* RESTART - stops and reboots the WindowsOS.
The airline can customize the airline modifiable instruction (AMI) software part. This action can change the appearance or Operation of the MAIN MENU.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB SYSTEM PAGE

EFB - IDENT PAGE

General

The IDENT (identification) page gives you the date, time, aircraft model, and tail number as recorded in the applicable EU and
DU.

The IDENT function shows on the EFB MAIN MENU. When selected, the page shows this information:

* Airplane major and minormodel

* Airplane tailnumber

* Current date andtime

* EFB effectivityconfiguration.

NOTE:

To change the data for the TAIL ID, refer to the TAIL ID ENTRY page.

EFB Effectivity Configuration

EFB effectivity configuration gives you a table of EFB datafiles that are date-controlled. Typically, this can be flight crew maps, instructions, or other data. The table shows thisinformation:

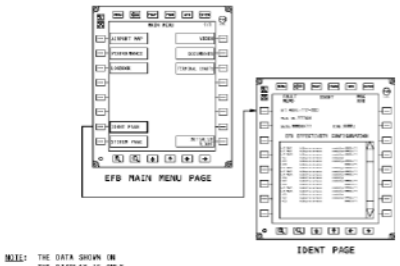
* Partname

* Partnumber

* Effectivedate

* Expirationdate.

Parts that show white in color are serviceable. Parts that show amber in color are unserviceable (that is, expired).
The table updates when the flight crew selects INITIALIZE FLIGHT from the EFB MAINMENU.



EFB IDENT PAGE

EFB - EFB MAINTENANCE PAGE

The EFB MAINTENANCE page provides access to system maintenance functions.

The maintenance page is accessed from the SYSTEM page. All menu pages belonging to maintenance menu tree, unless noted otherwise, should use ‘‘back’’ bezel button in order to return to the previous page.

The functions available from the EFB MAINTENANCE page are:

* SYSTEM CONFIG - shows the system configurationpage, with all loadable software parts in theEFB.

* FAULT LOG - shows all recorded faults and events.

* INPUT MONITORING - shows the EFB interfaces, and condition of connections with onboardsystems.

* PRINT TEST TEXT - shows a function that makes the EFB print a sample text message, using an ARINC 429 connection.

* TOUCHSCREEN CALIBRATION - gives access to afunction that calibrates the touchscreen.

* INTERNAL CONFIG - shows the part numbers forEFB hardware, and non-loadablesoftware.

* LOAD MODE - causes the EFB to terminate the disk Windows and disk Linux operating systems, and then reboot into load mode.

NOTE:
The EFB must boot into load mode to install, remove or upgrade software in disk Linux, and disk Windows operating systems.

* SHUTDOWN - causes the EFB to terminate the disk Windows and disk Linux operatingsystems.

NOTE:
After you select SHUTDOWN, all other buttons are inhibited.

* EU/DU SELF TEST - Provides access to a menu that has the keyboard test, Display Unit (DU) pixel test, Input Output (I/O) test and video switchtest.

* CONFIG COMPARE - lets the user identify any software mismatch between EU-L andEU-R.

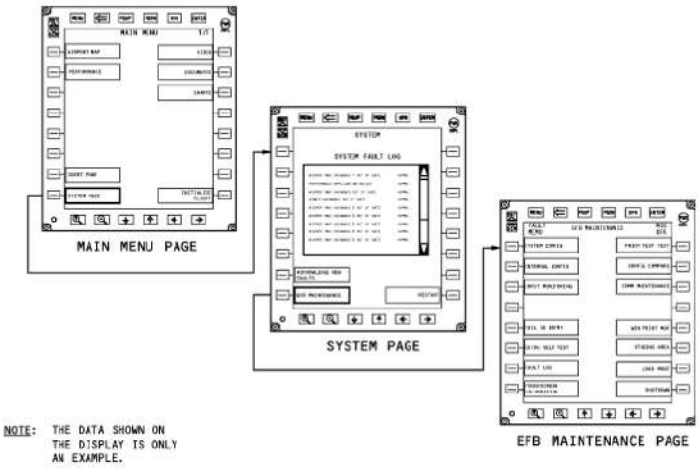
* COMM MAINT - gives the user status and controlfunctions for Electronic Flight Bag (EFB) wirelesscommunication.

* STAGING AREA - gives the user status and control functions for Loadable Software Airplane Part (LSAP) that arestaged.

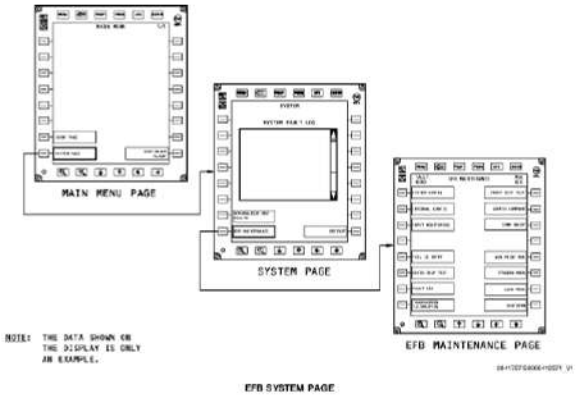
* TAIL ID ENTRY - gives the user status and control functions to add or change the airplane tail number in the EFB DU memory.

* WIN PRINT MGR - shows a function that causes the EFB to print a sample page, that contains graphics images, using an ARINC 744connection.

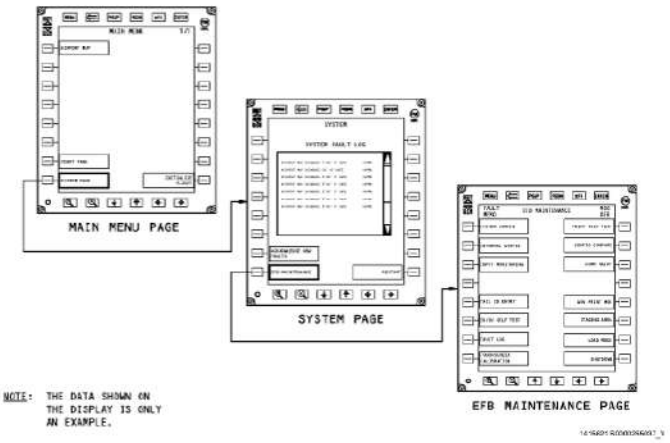
NOTE: LOAD MODE, TAIL ID ENTRY, SHUTDOWN, FAULT LOG, TOUCHSCREEN CALIBRATION andEU/DU
SELF TEST are inhibited in flight.



EFB SYSTEM MAINTENANCE PAGE



EFB SYSTEM PAGE



EFB SYSTEM PAGE

EFB - SYSTEM CONFIGURATION PAGE

General

The SYSTEM CONFIG page is provided to allow the user to access a list of all the software installed on the system. All software titles are listed in the left column with corresponding part numbers listed in the right column.

The color of the software in the list indicates its status, and the color code should follow these rules:

* Cyan indicates that a Cyclic Redundancy Checking(CRC) has not yet been completed on thatsoftware.

* White indicates that the CRC check was completed and passed.

* Amber indicates that the CRC check was completed and failed.

PRINT ALL Button

In addition, the SYSTEM CONFIG page provides the user access to the PRINT ALL button. When this button is selected, it will print the content of the SYSTEM CONFIG page on aprinter connected to the Electronic Flight Bag(EFB).

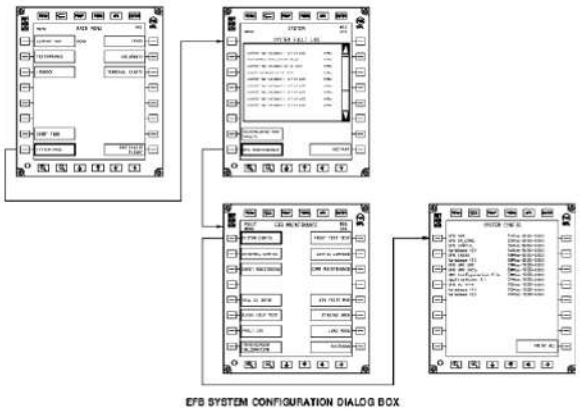
When you print the contents of the SYSTEM CONFIG page, a ‘‘+’’ symbol may precede the software part numbers. This indicates all parts that passed the CRC check. Also, a ‘‘-’’ symbol may precede the software part numbers. This identifies all parts that failed the CRC check. If there is no character before the part number, the CRC check is not complete.
NOTE: The header with TIME/DATE, airplane tail number and EU location (CPT = captain and FO = first officer) is embedded in eachprintout.

Software

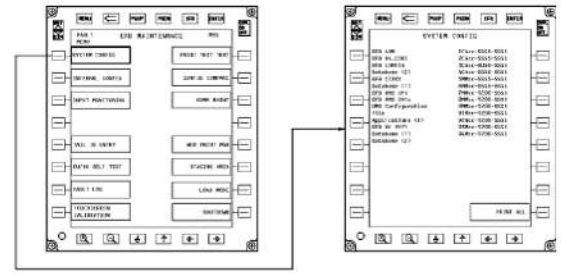
Software that shows on the SYSTEM CONFIG page is listed in alphanumerical order, based on part number. Use the scroll up and scroll down touch screen buttons or the arrow up/arrow down bezel keys to see the complete contents.
When the SYSTEM CONFIG page is selected, the page shows to most recent conditions at the time the page was selected. But after the page is selected, the page does not refresh
continuously. To view an updated condition, you must show again the EFB MAINTENANCE PAGE, and then the SYSTEM CONFIGURATION page again.

The EU calculates the software condition continuously, but at a lower priority than some other functions. After an LSAP condition has changed, it can take up to ten (10) minutes before the system configuration page shows the newcondition.

NOTE:
There can be a delay of up to ten (10) minutes before the configuration page can show a changed condition. To refresh the data on the page, you must exit SYSTEM CONFIG, and again make the SYSTEM CONFIG selection from the EFB MAINTENANCEpage



EFB SYSTEM CONFIGURATION DIALOG BOX



EFB SYSTEM CONFIG PAGE

EFB - FAULT LOG PAGE

General

The FAULT LOG page gives the user access to a record of most recent EFB faults and events, and functions to print, and erase the log data.

The record includes all faults or events shown on the SYSTEM page. Faults and events that show on the fault log page give Information for the maintenance technician. In comparison, faults that show on the system page are intended for the flight crew.

The page shows one line for each fault occurance with a specific fault message, and occurance time and date.
The page shows the most recent event at the top of the first page. Use the PG UP (page up) and PG DN (page down) bezel keys to see other pages of the fault log.

Print Page Function

The PRINT PAGE button sends the data shown on the display unit (DU) to the flight compartment printer. When you look at the FAULT LOG display, you see the first thirty (30) characters.
However, when you print the FAULT LOG, the printed copy shows the first seventy-two (72) characters.
The print function can be activated by pushing the touch-screen, or the adjacent line select key.

Clear Fault Log Function

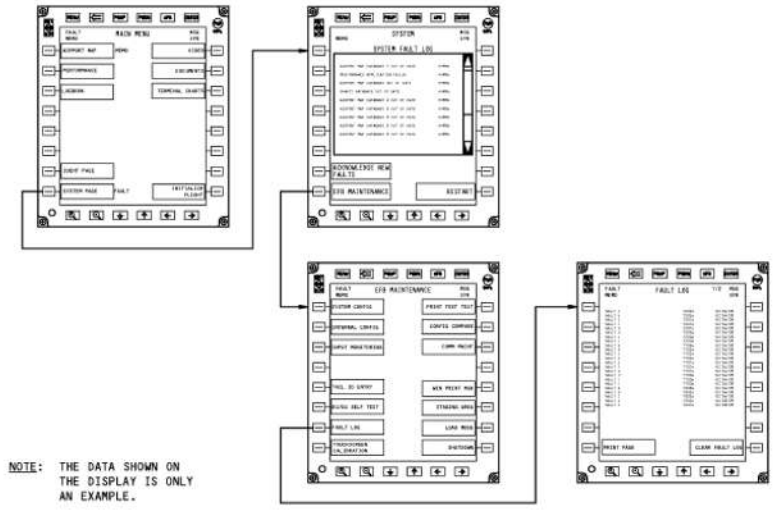
The CLEAR FAULT LOG function permanently erases all data in the fault.log file. At the same time, the same fault data is added to a file identified as fault.log. archive.
The clear fault log function is activated by pushing the touchscreen, or the adjacent line select key. After

CLEAR FAULT
LOG button has been selected, the user is asked to confirm or cancel this action.

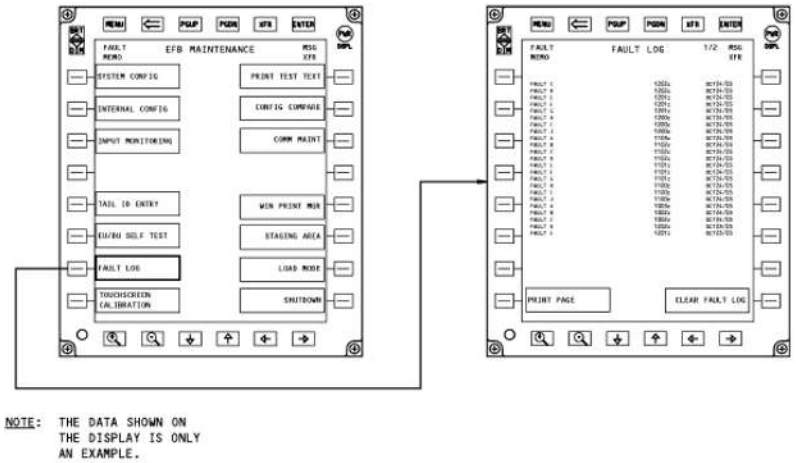
Both the fault.log and fault. log. archive files are available for download using the portable data loader. When the fault log is downloaded, the content of the FAULT LOG page is not erased.

Fault Messages

For information about specific EFB fault messages, refer to Fault IsolationManual(FIM).



EFB FAULT LOG PAGE



EFB FAULT LOG PAGE

EFB - INPUT MONITORING PAGE General

The INPUT MONITORING page lets the maintenance crew monitor the Electronic Flight Bag (EFB) interface activityin realtime.

Access to INPUT MONITORING is from the EFB Maintenance page. The input monitoring page gives access to the functions that follow:

* General inputmonitoring
* Analogdiscretes.

General Input Monitor
The GEN INPUT MONITOR gives the status of ARINC 429 hardware interfaces to the Electronics Unit

(EU). The page shows the status of each interface as present or absent.

The general input monitor page shows the interfaces that follow:

* PR1 –Printer

* CCD - Cursor ControlDevice

* GN1 -MMR/GPSSU

* IR3 - AIMSIRS

* GP1 - AIMS General Purpose BUS4

* FM1L - Left AIMS General Purpose BUS1

* FM1R - RIGHT AIMS General Purpose BUS1

* AD3 - AIMS General Purpose BUS3

AIN 002, 301 PRE SB 777-46-0037 AND PRE SB 777-46-0049 AND (POST SB 777-46-0028 OR POST SB 777-46-0031); AIN 005, 302-305 PRE SB 777-46-0037 AND PRE SB 777-46-0049.

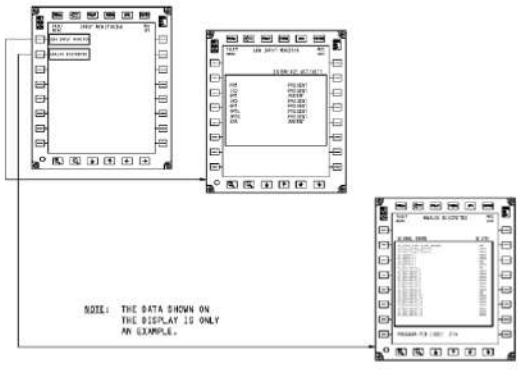
* OFFSIDE EUWINDOWS

* VIDEO - flight deck entry video surveillancesystem.

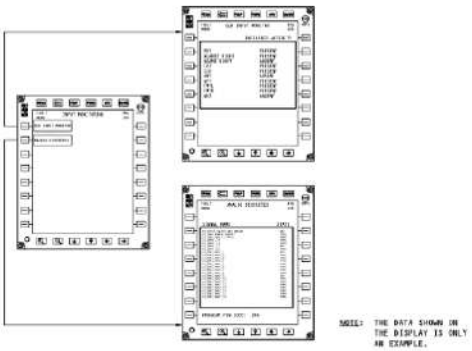
NOTE:
The interfaces shown on GEN INPUT MONITOR are set by the EFB operating system, and how it senses inputs from the devices. If a device is not installed, GEN
INPUT MONITOR does not show that interface. If an installed device is not serviceable, GEN INPUT MONITOR shows the interface as ABSENT.

AnalogDiscretes

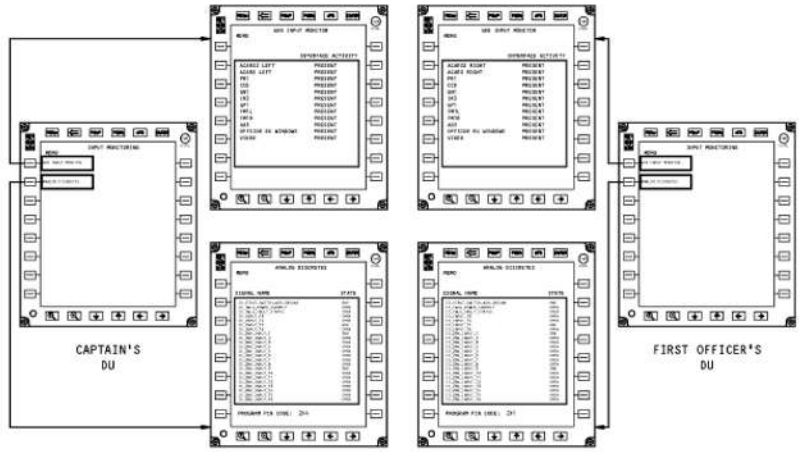
The analog discretes function shows voltage levels, and condition (ground or open) of the analog interfaces on the electronics unit. The list of analog discretes (program pins) varies depending on the aircraft that the EFB is installed.
NOTE: The program pin code for EU-L is 2F4, and for EU-R is 2F1.



EFB - INPUT MONITORING DIALOG BOX



EFB INPUT MONITORING



EFB INPUT MONITORING

EFB - EU/DU SELF TEST - GENERAL DESCRIPTION

General Description

The user gets access to the EU/DU self test function from the EFB MAINTENANCE menu. The EU/DU SELF TEST menu lets the user do thesetests:

* Keyboard / Bezel Test
* Pixeltest
* DUTest
* EUtest
* Video switchtest
* Faulticon
* Memoicon
* Msgicon.

NOTE:
Most of these self test functions are not line maintenance level tests and need to be performed only when

required by a maintenance action.

EFB Power-Up Test
When the Electronic Flight Bag (EFB) is energized, it does an EU and Display Unit (DU) self-test, or Power-up Built-InTest (PBIT).

NOTE:
If two (2) minutes or less has elapsed since the EFB was last energized, the EFB will bypass the P-BIT.
During the Built-In-Test (BIT) the DU shows the EU SELFTEST page and flashes intermittently. This is a normal system Operation and continues for approximately one (1) minute. This test can be cancelled by pushing the MENU bezel key. Refer to the illustration at the end of this pageset. When the test is complete, the DU shows the MAIN MENU.

Keyboard / Bezel Test

The KEYBOARD/BEZEL TEST is a separate page that gives the ability to test each bezel Line Select Key (LSK), the PS/2 keyboard, and printer input interface.

The applicable bezel lamp comes on when you push the LSK. You can not do a test on some bezel LSK, because they have a special function (MENU, for example).

You can make sure that the keyboard connection is serviceable. When you push any alpha-numeric character on the keyboard, the character shows in the box below PS/2 KEYBOARD.
Exit the test page by pressing the Back (<=) button or Menu LSK.

Pixel Test

The PIXEL TEST function lets the user see if pixels on the DU are damaged.

Fault, Memo and Message Icons

The FAULT ICON, MEMO ICON, and MSG ICON functions do a test of the annunciations at the top of the DU. Each button makes the annunciation come on, or go off.

Use the Back (<=) button or Menu LSK to return to the EFB MAINTENANCE page. When you leave EU/DU SELF TEST, the icons go off automatically.

Video Switch Test

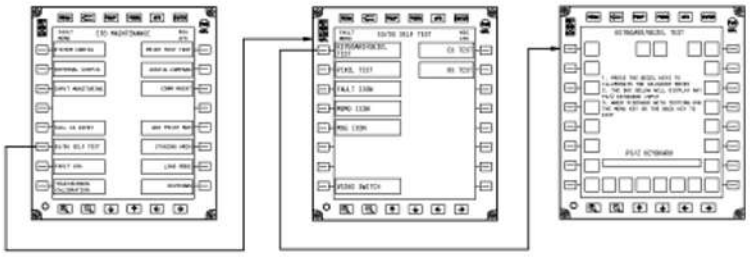
The VIDEO SWITCH test lets you see video input received from the Windows partition.

EU Test

The EU TEST starts the EFB EU initiated BIT. The test result (PASS or FAIL) shows above the EU TEST button.

DU Test
The DU TEST function is a series of display tests. When you

select DU TEST, the DU starts a BIT. The DU shows the results (PASS or FAIL) above the DU TEST button.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB EU/DU SELF TEST

EFB - Power-up Built-in Test

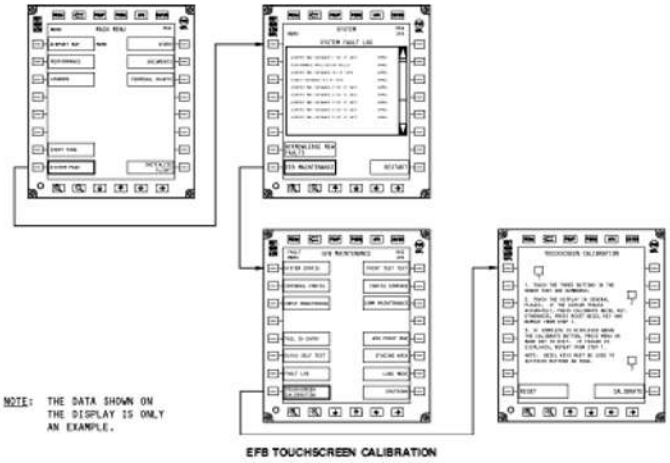
General Description

The Electronic Flight Bag (EFB) Display Unit (DU) lets theuser make selections in two ways. You can push the bezel Line Select Key (LSK) to make a selection. Or, you can push the Touch screen to make a selection for most functions and applications.

NOTE:
In LOAD MODE, you can only make selections using the bezel LSK. The touch screen has no effect inLOAD MODE.

You get access to the touch screen calibration function from the EFB MAINTENANCE menu.

If the button selections on the screen is either not responsive to your touch or is not accurate, the DU requires a touch screen calibration.



EFB TOUCHSCREEN CALIBRATION

EFB - CONFIG COMPARE

General

The CONFIG COMPARE function compares Loadable Software Airplane Part (LSAP) between EU-L and EU-R. If EU-L and EU R have the same software parts, the Display Unit (DU) will show NO MISMATCH. When EU-L and EU-R are different, the DU shows the installed software part and which EU has it.

NOTE:
All LSAP installed in one EU must also be in the opposite EU. After you replace an EU, or do a software LOAD, CROSSLOAD, or STAGED LOAD, you should
compare software between EU-L and EU-R.

Config Compare Function

The CONFIG COMPARE function is shown on the EFB MAINTENANCE page. Before you start, both DUs must be on, and in operational mode. When you select CONFIG COMPARE, The DU will show any of these messages:

* IN PROGRESS - the Electronic Flight Bag (EFB) iscomparing Configurations

* NO MISMATCH - EU-L and EU-R have thesame configuration.

* SOFTWARE MATCH UNABLE - the EFB did not complete theprocedure.

* CONFIG COMPARE results - the DU shows the LSAP that are installed in only oneEU.

No Mismatch

The NO MISMATCH message shows that the installed LSAP are the same for EU-L and EU-R.
Use the MENU Line Select Key (LSK), or BACK button, to return to the EFB MAINTENANCEpage.

Software Match Unable

If the DU shows SOFTWARE MATCH UNABLE, make sure that both EUs are ON and are set to operationalmode.

NOTE:
If any DU is set to LOAD MODE, the EFB can not compare software parts.

Use the MENU LSK, or BACK (<=) button, to return to the EFB MAINTENANCE page.

Con fig Compare Results

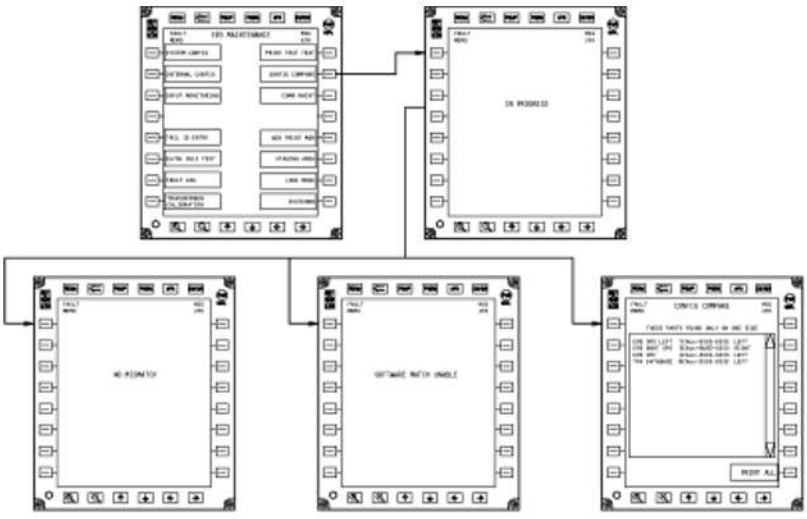
When there is a software mismatch between EU-L and EU-R, the CONFIG COMPARE page shows. It shows a table of LSAPwith name, part number, and which EU has the LSAP installed. This table shows in alphanumerical order based on the part number (does not include the fourth and fifth character - checksum value).

If the result shows LEFT, the LSAP is installed on EU-L but not EU-R.

If the result shows RIGHT, the LSAP is installed on EU-R butnot EU-L.

Long lists can be viewed by using the scroll bar to the right of the table. The results table can be sent to the cockpit printer by selecting the PRINT ALL LSK.

Use the MENU LSK, or BACK (<=) button, to return to the EFB MAINTENANCE page



EFB CONFIG COMPARE PAGE

EFB - TAIL ID ENTRY

General

The TAIL ID ENTRY page records the airplane tail number, or registration number, in the Display Unit (DU) memory

NOTE:
The tail ID must be recorded in DU-L and DU-R each, and they must agree.

Tail ID Entry Function

The TAIL ID ENTRY function is shown on the EFB MAINTENANCE page. The TAIL ID ENTRY page has a Touch screen-based keyboard, with a data field above the keyboard.

NOTE:

Make sure that both EU/DU-L and EU/DU-R are ON, and that the opposite DU is in OPERATIONAL MODE, and not in LOAD MODE.

Use the touchscreen to enter the tail ID number. These are some of the special function keys:

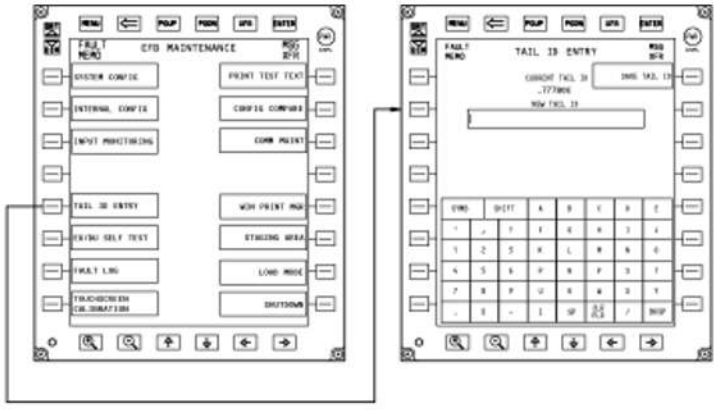
* SYMB - makes the keyboard showsymbols
* SHIFT - makes the keyboard show capitalizedletters
* SP – space
* BKSP –backspace
* CLR FLD - clearfield

Tail ID Comparison

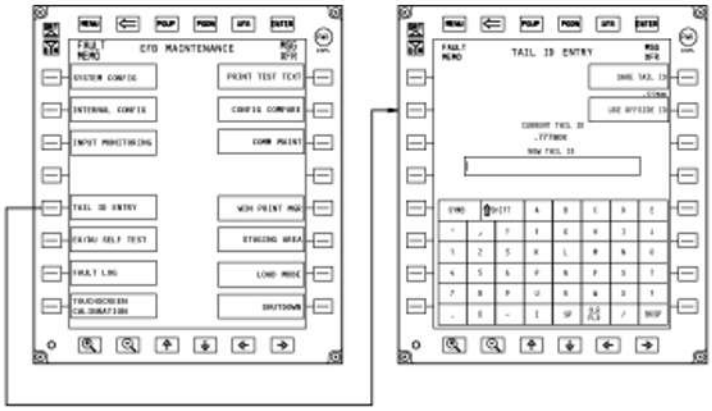
When the tail ID is entered, the EU compares tail ID value with the value entered in the opposite EU. If the two values do not agree, the active DU will show one of these messages:

* UNABLE TO COMPARE - the opposite DU must be ON, and not in LOADMODE
* TAIL ID MISMATCH - the opposite DU does not agree with the recordedvalue.
* ECMF TAIL ID MISMATCH - the opposite DU does notagree with the recordedvalue.
* TAIL ID MISMATCH - the opposite DU does not agree with the recordedvalue.
* UNABLE TO COMPARE - the opposite DU must be ON, and not in LOADMODE
* ECMF TAIL ID MISMATCH - the opposite DU does notagree with the recordedvalue.
* TAIL ID MISMATCH - the opposite DU does not agree with the recordedvalue.
* UNABLE TO COMPARE - the opposite DU must be ON, and not in LOADMODE
* USE OFFSIDE ID - function sets the TAIL ID using therecord from the side-oppositeDU.

The Electronic Flight Bag (EFB) compares tail ID values automatically every time that the system is turned ON. Also, EFB records a fault when TAIL ID mismatch is found.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB TAIL ID ENTRY

EFB - WINDOW

General

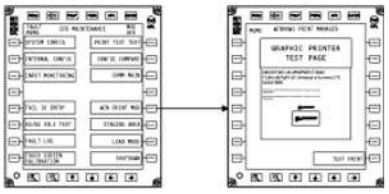
The Windows Print Manager is a page that shows a reference graphical image, and gives access to the TEST PRINT function. The test print function causes the EFB to send the reference image to a graphics-capable printer, using an ARINC 744 connection.

The Windows Print Manager is applicable only to graphical, or bitmap images. The EFB uses a different process to print ARINC 429 text.

Access to the Windows Print Manager page is from the EFB MAINTENANCE page. To return to the EFB MAINTENANCE page, push the BACK (<=) button.

Test Print Function

The TEST PRINT button tells the flight deck printer to print the image shown on the EFB Windows Print Manager page. To print a graphical image successfully, the EFB, and flight deck printer must be serviceable.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB Windows Print Manager

EFB - LOAD MODE - GENERAL DESCRIPTION

General

The LOAD MODE menu shows the Electronic Flight Bag (EFB) load mode functions. You get access to the LOAD MODE menu from the EFB MAINTENANCE page.

These functions let you add, delete, transfer, and repair Loadable Software Airplane Part (LSAP) in EU-L and EU-R. You can also replace the complete Linux and Windows operating systems.

When the EFB operates in load mode, the Electronics Unit (EU) uses a Linux operating system kept in flash-memory, and not the operating systems stored on the diskdrives.

NOTE:
When you exit the normal, flight operational mode and enter the LOAD MODE, the buttons on the screen change to cyan in color, the message ‘‘IN PROGRESS’’ shows above the LOAD MODE button, and then the LOAD MODE page shows.

NOTE:
The EFB shows the LOAD MODE page approximately three minutes after you push the LOAD MODE button. During the reboot sequence, the DU can show the words NO INPUT, followed by NO VIDEO. This is its usual operation, and not a fault.

NOTE:
When the EU is in load mode, the touch screen buttons do not operate. You must push the bezel key adjacent to your selection when in load mode, and in all subsequent load mode functions.

Load Mode Functions

The LOAD MODE menu gives access to the functions that follow:

* EXTERNALDATALOAD

* CROSSLOAD

* DISK UTILITIES

* DELETE LSAP

External Dataload

The EXTERNAL DATALOAD function sets the EU to receive datafrom, and upload data to an approved Portable Data Loader (PDL).

When you push the Line Select Key (LSK) adjacent to EXTERNAL DATALOAD, the Display Unit (DU) then shows the DATA LOADING page. This page shows that the EU is set to receive data from the PDL.

To exit the DATA LOADING page without changes, press the Back (<=) button or MENU LSK.

Crossload

The CROSSLOAD functions let you install software from one EU into the opposite EU.

When you push the LSK adjacent to CROSSLOAD, the DU shows these functions:

* EU-L TO EU-R (shows only on the captain’sDU)

* EU-R TO EU-L (shows only on the first officer'sDU)

* ACCEPT CROSSLOAD (shows on eachDU).

NOTE:
We recommend that you use the cross load functions only when specified by a maintenance action.
To exit the CROSSLOAD page without changes, press the Back (<=) button or MENU LSK.

Disk Utilities
The DISK UTILITIES functions let you repair or delete LSAP, and replace the Linux or Windows operating systems that are installed in each EU.
When you push the LSK adjacent to DISK UTILITIES, the DU shows these functions:

* RE-IMAGEWINDOWS

* RE-IMAGE LINUX

* REPAIRLINUX

* DELETE WIN LSAP ANDDATA

* DELETETEMP.

NOTE:
We recommend that you use the disk utilities functions only when specified by a maintenance action.
To exit DISK UTILITIES without changes, press the Back (<=) button or MENU LSK.

Delete LSAP

The DELETE LSAP function lets you erase loadable software parts from the EU.

When you push the LSK adjacent to DELETE LSAP, the DU shows a list of available LSAP. At the end of the last page is the DELETE PARTS function. When you push the LSK adjacent to DELETE PARTS, all highlighted LSAP will be erased permanently. Make your selections carefully.

NOTE:
We recommend that you use the delete LSAP functions only when specified by a maintenance action.
To exit the DELETE LSAP page without changes, press the Back (<=) button or MENU LSK.

NOTE:
If one or more parts can not be selected and must be removed, refer to the reimage function.

Reboot To Main

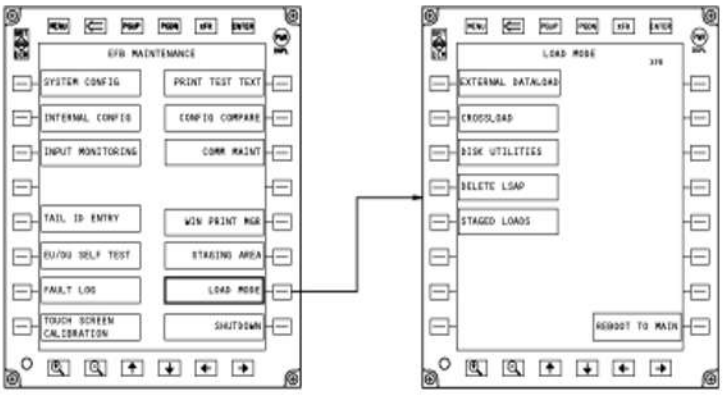
The REBOOT TO MAIN function lets you go back to the EFB MAIN MENU

When you push the LSK adjacent to REBOOT TO MAIN,control of the EU is given to the disk-based Windows and Linux operatingsystems.

It can take two to three minutes for the system to transfer from load mode to operational (flight) mode. Thus, make sure you complete all LOAD MODE procedures before you exit load mode.
This function is the only approved procedure to stop load mode. The Back (<=) button, and MENU LSK

do not operate when the LOAD MODE pageshows.

EFB - EXTERNAL DATALOAD FUNCTION



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB LOAD MODE

General

The EXTERNAL DATALOAD function sets the Electronic Flight Bag (EFB) to receive data from, and upload data to an approved Portable Data Loader (PDL).

You get access to EXTERNAL DATALOAD function from the LOAD MODEpage.

NOTE:
When the EFB is in load mode, the touchscreen buttons do not operate. You must push the bezel key adjacent to yourselection.

When you push the Line Select Key (LSK) adjacent to EXTERNAL DATA LOAD. all buttons on the screen change to cyan in color, and the message ‘‘PLEASE WAIT’’ shows above the EXTERNAL DATALOAD button.

To stop the DATALOAD function before any changes, push the BACK (<=) key, or the MENU bezel key. The Display Unit (DU) then shows the CONFIRM or CANCEL message . Push the LSK adjacent to CONFIRM button to exit, or the LSK adjacent to CANCEL to continue with the software installation.

External Data load Operation

To install software with this function, you will connect an approved PDL to an RJ-45 connector using an Ethernet cable. The EFB data port is located as follows:

* Flight deck, second observer’s panel, P18-1, M23218(direct toEU-L).

The PDL can install Loadable Software Airplane Part (LSAP) to EU-L, EU-R, or EU-L and EU-R at the same time.

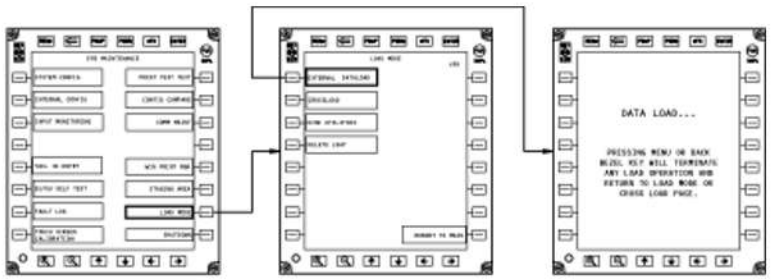
To make a connection between the PDL and EU-L, the captain’s DU is set to show the EXTERNAL DATALOAD page. To make a connection between the PDL and EU-R, the captain’s DU and first officer’s DU are each set to show the EXTERNAL DATA LOAD page. The PDL uses the Ethernet betweenEU-L
and EU-R to connect with EU-R.

NOTE:
To install software to EU-R only, or to EU-L and EU-R at the same time, EU-L and EU-R must each show the DATA LOAD page.

To install software only to EU-L, then EU-L must show the DATA LOAD page.

Make sure you complete all software installations before you exit LOAD MODE.

To exit the data load page, and return to the LOAD MODE page, push the BACK (<=) bezel key.



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB EXTERNAL DATALOAD PAGE

EFB - CROSSLOAD FUNCTION

General

The CROSSLOAD functions set the Electronic Flight Bag (EFB) to install Loadable Software Airplane Part (LSAP) from one Electronics Unit (EU) to the side-opposite EU.
You get access to the cross load function from the LOAD MODE page.

NOTE:
When the EFB is in load mode, the touch screen buttons do not operate. You must push the bezel key adjacent
to your selection.

The cross load functions set each EFB to be a data load source, or data load destination. The source EFB system is where the LSAPs are installed and which are then used to load the other EU. The destination EFB system (or target) is where the LSAPs are copied.
To stop the DATALOAD function before any changes, push the BACK (<=) key, or the MENU bezel key. The Display Unit (DU) then shows the CONFIRM or CANCEL message . Push the Line Select Key (LSK) adjacent to CONFIRM button to exit, or the LSK adjacent to CANCEL to continue with the software Installation.

Cross load Page Functions

From the LOAD MODE menu, when you push the LSK adjacent to CROSSLOAD , the DU shows these functions:

* EU-L TO EU-R, shows only on the captain'sDU.

* EU-R TO EU-L, shows only on the first officer'sDU.

* ACCEPTCROSSLOAD.

The EU-L TO EU-R selection sets the EU-L as the source system. This button is labeled EU-R TO EU-L when this function is accessed from the rightEU.

ACCEPT CROSSLOAD sets the EU as the destination system (or target). This selection allows the EU to receive the cross load operation from the other EU. When you select this button, the DATA LOAD page shows.

To do the cross load installation correctly, the two DUs must be set in the correct sequence. The target DU must be set to ACCEPT CROSSLOAD before you transmit LSAP from the sourceDU.

EU-L to EU-R Page Functions

This page lets the user select software part numbers to be Cross loaded and to start cross load. The user may select one or all software part numbers. There may be more than one page of software partnumbers.

NOTE:
To select individual software part number(s), push the LSK adjacent to each individual software part number. To select all software part numbers on the current page, push the SELECT PAGE option. To deselectall
software on a page, push the DESELECT PAGEbutton. To select all software on all pages, push the SELECT ALL button. To deselect all software, push the DESELECT ALL button. To change pages, push the PGUP and PGDN keys. If time is short and you have many software part numbers to load, you can pushthe
SELECT PAGE or SELECT ALL button and then deselect individual software part numbers that you do not
want to install.

The software part number buttons allows the user to select or deselect (toggle function) a part number to be loaded.
Buttons on the EU-L TO EU-R page are as follows:

* SELECT ALL allows the user to select or deselectall software partnumbers.

* SELECT PAGE allows the user to select or deselectall software part numbers on the displayed pageonly.

* START CROSSLOAD allows the user to install theselected software part numbers. This button shows on the last pageof part numbers.

NOTE:
Before you select a software part to cross load, START CROSSLOAD is inactive and is cyan in color. The START CROSSLOAD button becomes active (and changes to white in color) when you select a minimum of one software part number.

Data Load Page

The Data Load page indicates the EU is communicating with the external data loader, or is cross loading with the other EU. The data load page shows after you make one of selections that follow:

* EXTERNAL DATALOAD from the LOAD MODE pageor

* START CROSSLOAD on the EU-L(R) TO EU-R(L) pageor

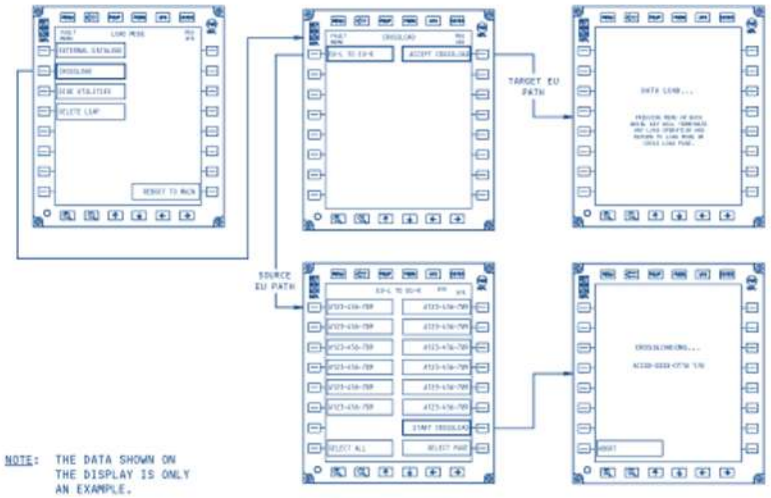
* ACCEPT CROSSLOAD on the CROSSLOADpage.

NOTE:
After the cross load operation starts and the DATA LOAD page shows, you see all software parts as they load, one part number at a time.

NOTE:
The Data Load page may take 30 to 45 seconds to show
after you make one of the sele When crossload is complete, the LOAD MODE menu page shows. At data load completion, you must select the REBOOT TO MAIN button to exit the LOAD MODE and return to the operational (flight) mode.

NOTE:
Make sure you are complete with all LOAD MODE actions (upload, cross load, delete, etc,) before you select REBOOT TO MAIN and exit the LOAD MODE.

Installation of the Windows operating system requires approximately 15 minutes.



EFB - Crossload Dialog Box

EFB - DISK UTILITIES - GENERAL DES

General

The DISK UTILITIES functions can repair or delete Loadable Software Airplane Part (LSAP), and replace the Linux or Windows operating systems that are installed in each Electronics Unit (EU).

You get access to the DISK UTILITIES functions when you make the LOAD MODE selection on the EFB MAINTENANCE menu. Then, on the LOAD MODE menu, push the Line Select Key (LSK) adjacent to DISK UTILITIES.
NOTE:
We recommend that you use the disk utilities functions only when specified by a maintenance action.
The disk utilities page gives access to these functions:

* REPAIRLINUX

* REIMAGE LINUX

* REIMAGEWINDOWS

* Delete WIN LSAP and Data

* DeleteTEMP.

The repair or reimage operation requires two steps. You must first push the bezel LSK adjacent to the applicable repair or reimage operation. Then, push the bezel LSK adjacent to CONFIRM to continue (or CANCEL to stop).
NOTE: When the EU operates LOAD MODE, which includes Disk Utilities, the touch screen buttons do not operate.
You must push the bezel key adjacent to your selection.

Repair Linux

The REPAIR LINUX function repairs the Linux directory structure.

NOTE:
We recommend that you use the REPAIR LINUX

function only when specified by a maintenance action.

Reimage Linux

The REIMAGE LINUX function formats the Linux partition and Linux file directories.

When you select the REIMAGE LINUX option, all loadable software residing on the Linux partition will be deleted.

NOTE:
We recommend that you use the REIMAGE LINUX function only when specified by a maintenance action.

Because the REIMAGE LINUX function deletes files, makesure you know and follow your airline procedure. Your airline procedure may require you to download all downloadable log files before you reimage Linux. If you do not download all Applicable Linux partition data, all files and the data they contain will bedeleted.

Reimage Windows

The REIMAGE WINDOWS function formats the Windows drive partitions. This operation erases completely the Windows operating system, all loadable software parts, and all data files.

This operation takes approximately 15 minutes to complete. After the operation is complete, the operating system, and all applicable software parts must be installed.
NOTE:
Make sure you follow your airline procedure when using this function. Your airline procedure may require you to copy and save all downloadable data files before using this function. We recommend that you use the REIMAGE WINDOWS only when specified by a maintenance action.

Delete WIN LSAP andData

The DELETE WIN LSAP AND DATA function removes all LSAP on the operationally approved (Windows) partitions, but not the operating system. All related files are also removedfrom the Windows partitions such as fault logs, performance calculations, and similarfiles.

NOTE:
The DELETE WIN LSAP AND DATA function does not remove the Windows operating system.

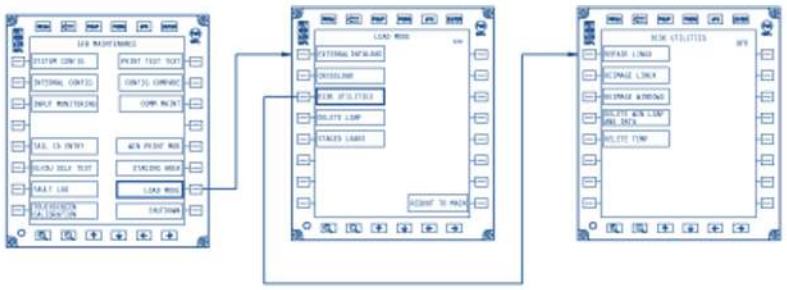
NOTE:
Make sure you follow your airline procedure when using this function. Your airline procedure may require you to copy and save all downloadable data files before using this function.

Delete TEMP

This function erases only the temporary data files (working files, log files, calculation files) from the Windows and Linux partitions, at the same time.

NOTE:
Make sure you follow your airline procedure when

using this function. Your airline procedure may require you to copy and save all downloadable data files before using this function



NOTE: THE DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

EFB DISK UTILITIES

EFB - DELETE LSAP

General

The DELETE LSAP function lets you erase Loadable Software Airplane Part (LSAP) from the Electronics Unit (EU).
NOTE: We recommend that you use the delete LSAP functions only when specified by a maintenance action.

You get access to the DELETE LSAP function from the LOAD MODE page.

When you push the Line Select Key (LSK) adjacent to DELETE LSAP, the Display Unit (DU) shows a list of available LSAP. Use ThePg Up and PgDn keys see the complete list.

The DELETE LSAP page also shows these functions:

* SELECT ALL - highlights all LSAP on all of thepages

* SELECT PAGE - highlights all LSAP only on the pageshown

* DELETE PARTS - sets the EFB to erase all highlightedLSAPs. To exit the DELETE LSAP page without changes, press the Back (<=) button or MENU LSK.

Delete LSAP Operation

To highlight LSAPs, push the LSK adjacent to each part shown. You can highlight one LSAP at a time, one page at a time, or all parts on all of the pages at one time. Make your selections carefully.

When one or more LSAP is highlighted on the DELETE LSAP page, the DELETE PARTS function becomes activated.
When your selections are complete, push the LSK adjacent to DELETE PARTS. A confirmation message then shows. To complete the procedure, push the LSK adjacent to CONFIRM. To stop the procedure, push the LSK adjacent to CANCEL. NOTE: When the EU is in LOAD MODE, the touch screen buttons do not operate. You must push the bezel key
adjacent to your selection to make a selection.

The DELETE LSAP function prevents specific essential parts from removal. To remove these parts, you must refer to the reimage Linux, or reimage Windows functions. DELETE LSAP can not remove the parts that follow:

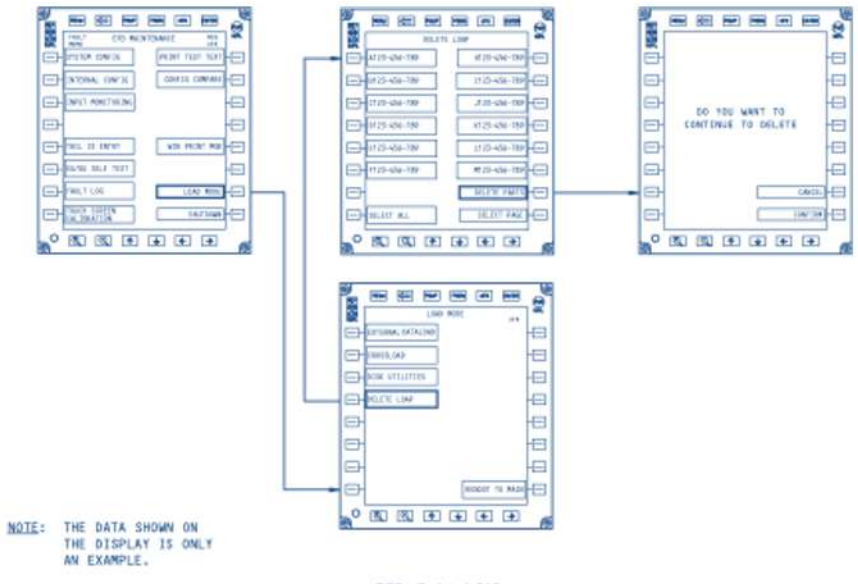
* ADM

* APP_SYS_SUP

* DACORE

* FLIGHT_MM

* MAINTENANCEMODE.



EFB - Delete LSAP

General

The STAGED LOADS page shows functions that install Loadable Software Airplane Part (LSAP) from theEU-L
staging area to EU-L, EU-R, or EU-L and EU-R at the same time. NOTE: We recommend that you use the STAGED LOADS functions only when specified by a maintenanceaction.
The staging area is protected so that LSAPs are separate from the software that is in operation. LSAP are received from a
ground access point to EU-L only.

NOTE:
DU-L and DU-R each can install staged loads, but only
EU-L can receive LSAP from the TWLU. If EU-L and EUR are interchanged, the wireless function remains with
the EU-L tray. Any LSAP that was staged before you interchange EUs moves with the EU.

Staged Load Functions

When you select STAGED LOADS from the LOAD MODE menu, the Display Unit (DU) shows these functions:

* LOAD TO EU-L - installs software from the staging areato EU-L

* LOAD TO EU-R - installs software from the staging areato EU-R

* LOAD TO BOTH - installs software to EU-L and EU-R atthe sametime

* ACCEPT LOAD - tells the EU to receive software from the oppositeEU.

When you push the LSK adjacent to LOAD TO EU-L (or EU-R, or EU-L and EU-R), the DU shows the LOAD TO EU-L (or EU- R, or EU-L and EU-R) page, and gives a list of staged LSAPs.

Load-To Page
The LOAD TO EU-L (or EU-R, or BOTH) page shows these functions:

* A Line Select Key (LSK) for eachLSAP

* SELECT PAGE - highlights all LSAP on that page in onestep.

* SELECT ALL - highlights all LSAP on all pages in onestep.

* START LOAD - starts the installation procedure (shows only on the lastpage).

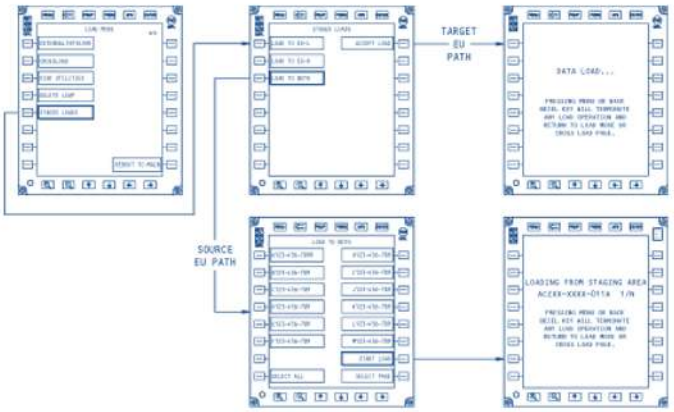
When you install a staged load to the opposite Electronics Unit (EU), set the target EU to ACCEPT LOAD before you continue. The DU then shows the message DATALOADING.

NOTE:
When EU-L is the source and EU-R is the target, the user must set EU-R to ACCEPT LOAD first, and then EU-L to LOAD TO EU-R.

When EU-R is the source and EU-L is the target, you
must set EU-L to ACCEPT LOAD first, and then set EU-R to LOAD TO EU-L.

In the LOAD TO EU-L (or EU-R or BOTH) page, use the LSK next to each LSAP to select it for installation. To de-select, press the LSK again. The SELECT PAGE and SELECT ALL buttons operate the same way to select and de-select parts from the list. Press the START LOAD LSK to perform the installation.
NOTE: The START LOAD button shows only on the last page. You must select at least one LSAP to make the START
LOAD LSK active.

When an installation is in-work, the DU shows PROCESSING. When the installation is finished, the DU shows COMPLETE. To complete the process, you must return to the LOAD MODE
page and select REBOOT TO MAIN.



EFB - STAGED LOADS

A-380 INFORMATION SYSTEM ONBOARD INFORMATION SYSTEM

General

The Onboard Information System (OIS) is a set of Electronic documentation and applications for flight, Maintenance and cabin operations. For the flight crew, these applications replace the previously used paper Documentation and charts.

The main objective of the electronic documentation is to provide the flight crew with attractive documentation, that enables an easy access to the necessary information related to an operational need.

The OIS applications can be divided into:

- Tools for flight operationssupport
- Tools for cabin operationssupport
- Tools for maintenance operationssupport
- Services to the passengers, flight crew and cabincrew.

The applications are hosted on three sub-networks or domains of the Network Server System (NSS):
- The avionicsdomain
- The flight operationsdomain
- The communication and cabindomain.

Avionics Domain

The avionics domain includes the applications that exchange data with the aircraft avionics:

- Tools to support maintenance operations likethe:
  - Electronic Logbook
  - Central Maintenance System(CMS)

- Electronic documentation that needs to be accessedby both flight and maintenance crew:
  - Minimum Equipment List(MEL)
  - Configuration Deviation List(CDL)
  - Cabin Crew Operating Manual(CCOM)

Note:
The CCOM is on the avionics domain to enable its display on the FAP.

- A servicing tool dedicated to the refuelingoperation
- An Airline Operational Control (AOC) applicationthat manages the communication between the aircraft and the operators' operations centers.

Flight Operations Domain

The flight operations domain includes the applications that support the flight crew on ground and in flight. These applications are part of the Airbus Electronic Flight Bag (EFB) and include mainly:

- Performance computation tools for takeoff, in-flightand Landing

- A Weight & Balance (W&B) computationtool

- Electronicdocumentation:
  - Flight Crew Operating Manual(FCOM)
  - Aircraft Flight Manual(AFM)
  - Configuration Deviation List (CDL)
  - Minimum Equipment List(MEL)
  - Flight Crew Training Manual(FCTM)

- ContactManager

- Navigation and weather charts

- The Electronic Flight Folder (EFF) and the FlightFollow Up (FFU)tool.

The flight operations domain can accept customized operators' applications.

The flight operations domain will also be able to receive information from the avionics domain to create contextual access to the applicable tools and documentation.

The aim is to provide faster and easier access to the necessary information during high workload phases, and to improve the flight crew's situational awareness.
Communication and Cabin Domain

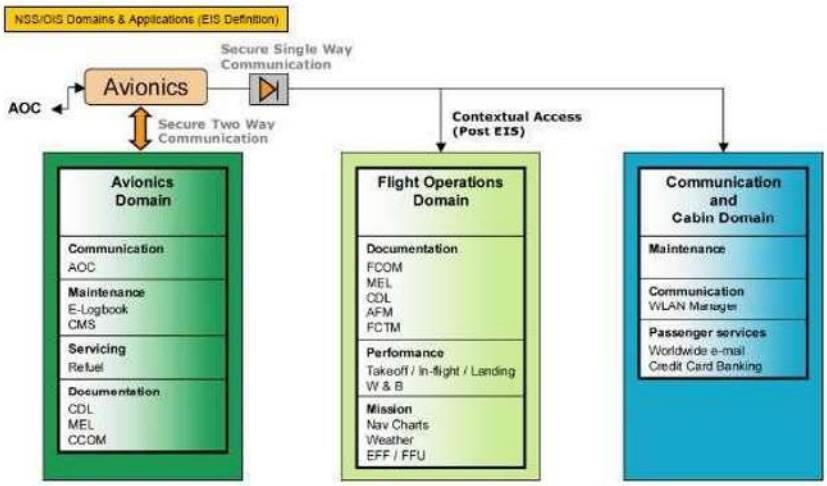
The communication and cabin domain hosts the tools for cabin operations and maintenance, and

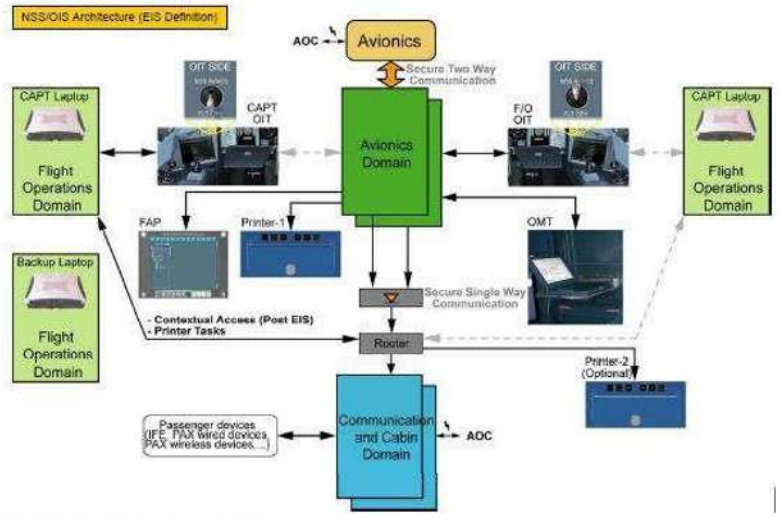
services for passengers:

- Services forpassengers:
- Worldwide electronic mail (wired or wireless)
- Credit cardbanking.

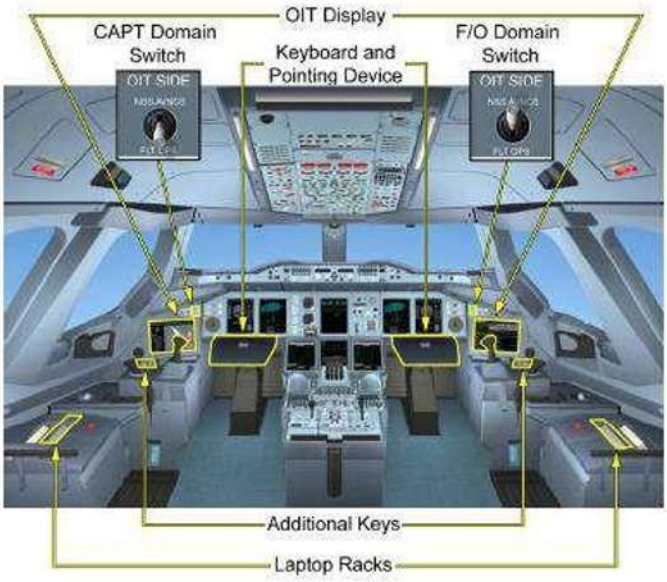
- Tools to support maintenance operations dedicatedto the cabin and communication domain's systems.

- A wireless area network managerapplication.





Controls and Indicators



For the Flight Crew

- The cockpit has two Onboard Information Terminals (OITs). The OITs are the main displays for the OIS applications.

- A keyboard and pointing device, integrated in the sliding table, serves as an interface with the applications within adomain.

- Additional keys enable navigation through applications when the sliding table is foldedaway.

- Domain switches enable switching betweenthe avionics domain and the flight operationsdomain

- The CAPT and the F/O each have alaptop.

Each laptop supplies computing and memory resources for the flight operation applications on its onside OIT. The laptops are stored in their respective stowage boxes.

- A backup laptop is available in the cockpit andcan replace any of the CAPT and F/O laptops.

For Maintenance Personnel

- The Onboard Maintenance Terminal (OMT) is installed in the rear part of thecockpit.

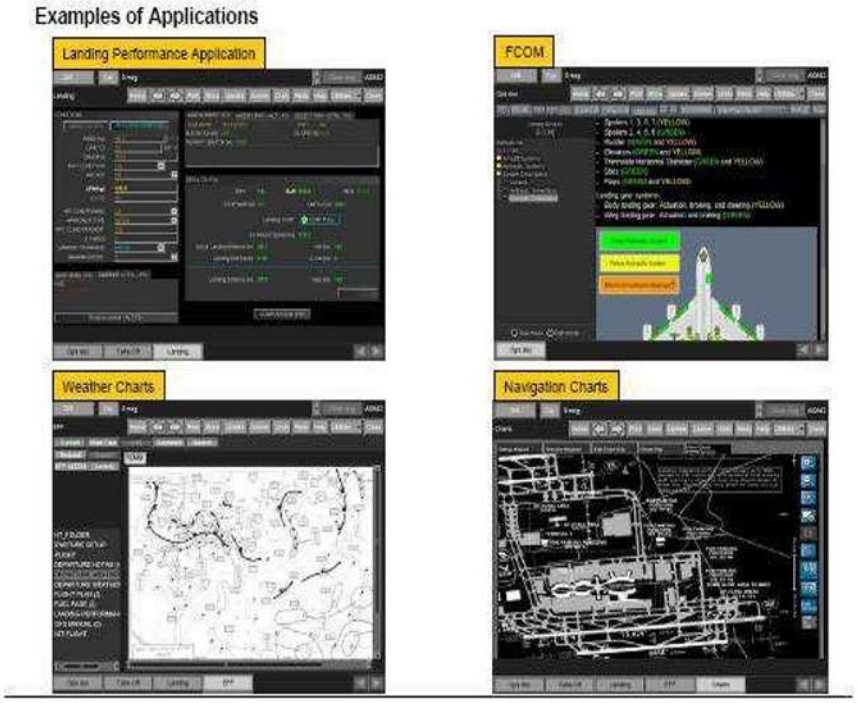
The OMT is used by maintenance personnel to access the avionics domain for maintenance applications, including the logbook.

- The Portable Multipurpose AccessTerminals (PMATs) are laptops that serve for maintenance purposes. They are connected to the NSS through dedicated network ports throughout theaircraft.

For the Cabin Crew

- Flight Attendant Panel (FAP)

The cabin has two FAPs: One on the upper deck and one on the lower deck.
The FAPs are used by the cabin crew for cabin operations. The FAPs also display the CCOM.

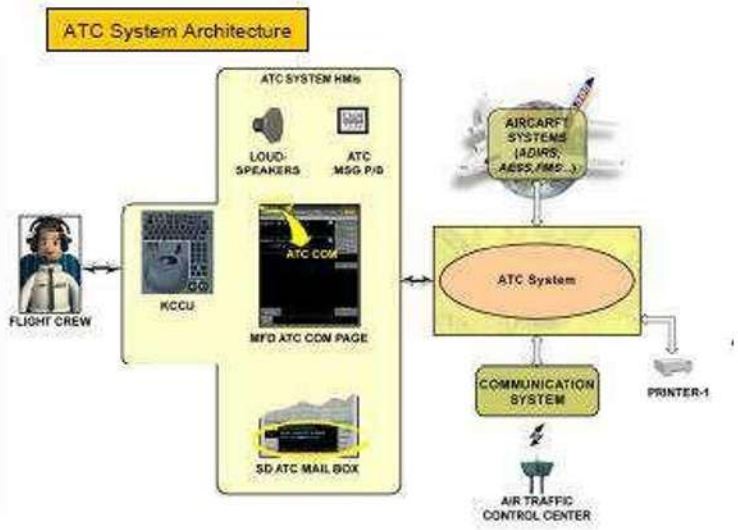


ATC SYSTEM

General

The Air Traffic Control (ATC) system enables data link communication between the aircraft and the ATC centers. The ATC system provides the flight crew and the avionics systems with communication, navigation and surveillance means.

The data link communication between the aircraft and the ground network is made via the HF, VHF or SATCOM communication systems



Architecture

The ATC application includes:

- A notification function to establish a data link connection between the aircraft and the ATC center by sending aircraft identity information such as theaircraft registration number and flightnumber.

- A datalink communication function enabling theflight crewto:

- Sendrequests

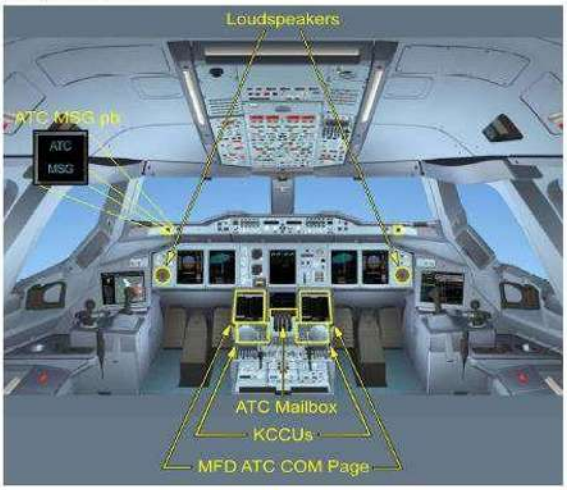
- Send reports: Position reports andothers
- Read uplinkmessages
- Answer uplinkmessages
- Ask for and receive digital ATISmessages.

The datalink communication function also includes

departure clearance and oceanic clearance requests.
The flight crew creates messages by combining a predefined set of messages and/or free text.

• The Automatic Dependant Surveillance (ADS) function which automatically generates surveillancedata reports for transmission to the ATCcenter

Controls and Indicators



The flight crew uses the following interfaces:

- An MFD ATC COM page on the MFD, mainly to create a request/report.
- An ATC MAILBOX on the SD to display ATC system messages exchanged between the flight crew and the ATC centers.

The CAPT and F/O ATC MSG pbs and loudspeakers indicate the arrival of an ATC message.

SD ATC Mailbox

ATC MSG pb

MFD ATC COM Pages

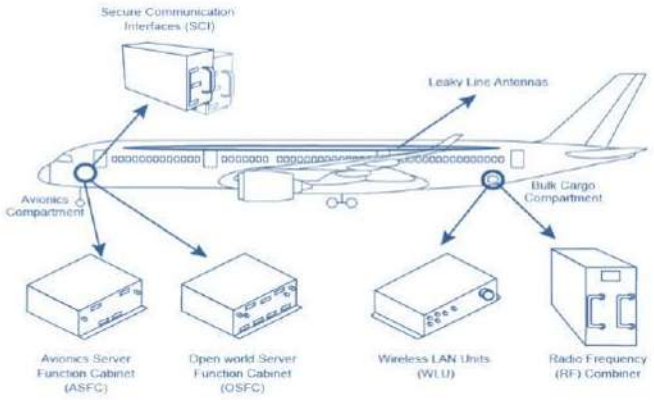
FLIGHT DECK INFORMATION SYSTEM

Flight deck information system is part of on board information system(OIS) Extract from the system used in A-380 and B-787 will be described below:

Function – Flight crew have access to flight operation through flight information system . On A-380 these flight operation application are in two cabinets ASFC and OSFC

Control and indicating- Flight crew can have the access for flight operationthrough
Control and Display system (CDS)
Electronic Flight Bag (EFB) laptop or tablet computers

Secure Communication Interface (SCI) is a link between the world of avionics and the open world. As a basic component for the whole network's security, it uarantees the security of information exchanged between the IFE and the avionics systems, as well as the security of the ground-to-air and air-to-groundexchanges.



Maintenance Information System
The following description is of the Airbus A380 system. It is used as a typical example.

Other aircraft types are similar in principle but differ in detail and terminology.

Function/Description

The maintenance information system gives access to maintenance applications for the maintenance personnel. On the Airbus A380 for example, these maintenance applications are hosted in the two cabinets (ASFC and OSFC).
Control and Indicating

In the cockpit, the maintenance personnel can get access to the maintenance applications:

- via the Onboard Maintenance Terminal (OMT),or
- through the Control and Display System (CDS), if necessary.

In the cabin, the maintenance personnel can get access to the maintenance applications:

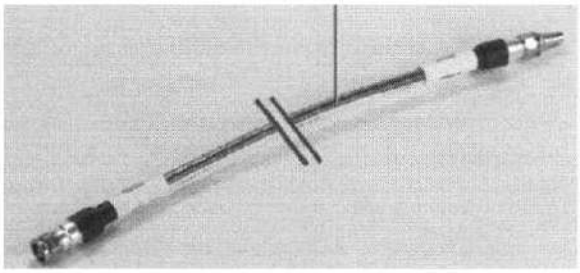
- on the Flight Attendant Panels (FAPs), which are touch screens,or
- through the internal wireless cabin network (i.e. the leaky lineantennas)

MAINTENANCE TOOLS

Primary maintence tools for a modern large commercial aircraft are On board maintenancesystem(OMS)
E- log book available on board or on ground
AIRMAN for Airbus , AHM for Boeing or Airlines own maintenance information system

There are three user profile have an access to the OMS or e- log book Flight crew Maintenance crew Cabin crew

Maintenance crew only has the access to AIRMAN



Cabin Information System

The following description is of the Airbus A380 system. It is used as a typical example.

Other aircraft types are similar in principle but differ in detail and terminology.
Internal Wireless Data link Function/ Description
The cabin information system gives access to cabin applications and documentation for the cabin crew. On the Airbus A380 for example, these cabin applications and documentation are hosted in the Open world Server Function Cabinet (OSFC).

Control and Indicating

The cabin crew can get access to the cabin applications:

- via the Flight Attendant Panels (FAPs), which are touchscreens,or
- through the internal wireless datalink(i.e. the leaky lineantennas).

A printer may be installed in the cabin to print cabin and maintenance data.

The internal wireless datalink system gives the resources necessary for wireless connections in the cabin and in the cockpit areas.

A typical server would have Wireless LAN Units to supply wireless connectivity throughout the Cabin area. This is achieved by connection to Leaky Line Antennas (LLAs). Passengers with personal electronic devices (for example a laptop) can access this wireless connectivity to get email and Internet, which will be independent from the Inflight Entertainment System (IFE).

Passengers can use this function if the service is made available by the airline.

The internal wireless datalink system is part of the Airline Information Services Domain (AISD) in the aircraft information system core and has:

- one or two leaky lineantennas
- two Wireless LAN Units(WLU)

Internal wireless data link architecture and interfaces

Leaky line antenna

LP rovision of a wireless signal throughout the cabin is achieved by calibrated slots along the length of the cable, the size of which is dependent on the IEEE protocol being used. The number of LLAs required to cover the whole of the Cabin area would differ on the size of the aircraft, the A380 for example has four to cover the main and upper decks. Installation of the LLAs is also important, in that the wireless signal must be able to cover the entire Cabin

Leaky line antenna

BOEING – 787 CENTRAL INFORMATION SYSTEM

Core Network System Description
Following are the information on the crew information system (CIS) components, interfaces and operation, including the core network system, which is a primary part of the CIS

Objectives

State the purpose of the system.
Identify the major system components of the system. State the purpose of the major system components.
State the general location of major system components.
Describe the major system interfaces and be able to explain the normal system function

Purpose

1. The core network system is part of the crew informationsystem (CIS).

2. The core network system lets flight and maintenance crewssee and control airplane support and operationsdata.

3. The core networksystem:

- Supplies connections between airplane and groundnetworks
- Routes data between the airplane and groundnetworks
- Stores airline data andapplications
- Makes sure the network issecure

The core network system keeps software and data for airplane systems. It also Supplies wire and

wireless connections for the crew and the passengers

General Description

1. The core network system featuresare:

- Storage for airplane support data and software applications, such as loadable software, manuals, reports

- Functions for data management to load, view, and remove airplane system.

Software

- 2 physical networks with 3 router/switches

- Network securityfunctions

- Wireless connection to the airline ground-based operations network

- Connections for flight and maintenance devices, such as electronic flight bag (EFB) and maintenancelaptop

- Connections with other airplane networks and systems, such as printer, common data network(CDN)

The core network system includes these components:
- Core network cabinet and itsmodules
- Crew wireless local area network (LAN) unit (CWLU)modules
- CWLUantennas.

3. The core network system connects to the terminal wireless LAN unit (TWLU) module andantenna.

4. Most of the core network software applications are service functions and have no crew controls orindications.

5. The core network system has 2 physicalnetworks:
- Open data network (ODN)

- Isolated data network(IDN).

6. The ODN connectsto:
- Airplane systems not critical to flight, such as cabin printerand inflight entertainment equipment(IFE)
- Terminal wireless local area network (LAN) unit(TWLU)
- Crew wireless LAN unit (CWLU)

7. The IDN connects to:
- Airplane systems critical to flight, such as common data network (CDN)
- Wired ethernet ports - for maintenancelaptop.

8. The ODN and IDN give access to data and functions of thecore networksystem.
- They provide different levels of access andsecurity.
9. These core network modules make the ODN andIDN:
- Ethernet gateway module(EGM)
- Network interface module(NIM)
- Controller server module(CSM)
- Crew information system (CIS)/maintenance system (MS)file server module(FSM).

System Description

The core network system gives maintenance and airplane health information
and stores software and data.

These are the components in the core network system:

- Core networkcabinet
- Crew wireless local area network (LAN) unit (CWLU) module- CWLU antenna.

The core network system has these interfaces:

- Common core resource (CCR) cabinet
- Cabin service system(CSS)
- Common core system(CCS)
- Maintenancelaptop
- Flight recorders (FR)
- Flight deck entry video surveillance system(FDEVSS)
- Satellite communications (SATCOM)system
- Flight deckprinter.

The core network cabinet connects with internal components and external airplane systems. Most of the core network functions are service functions and have no crew controls or indications.

The core network cabinet contains electronic modules to store software applications and related data. There are 6 slots for modules in the cabinet.

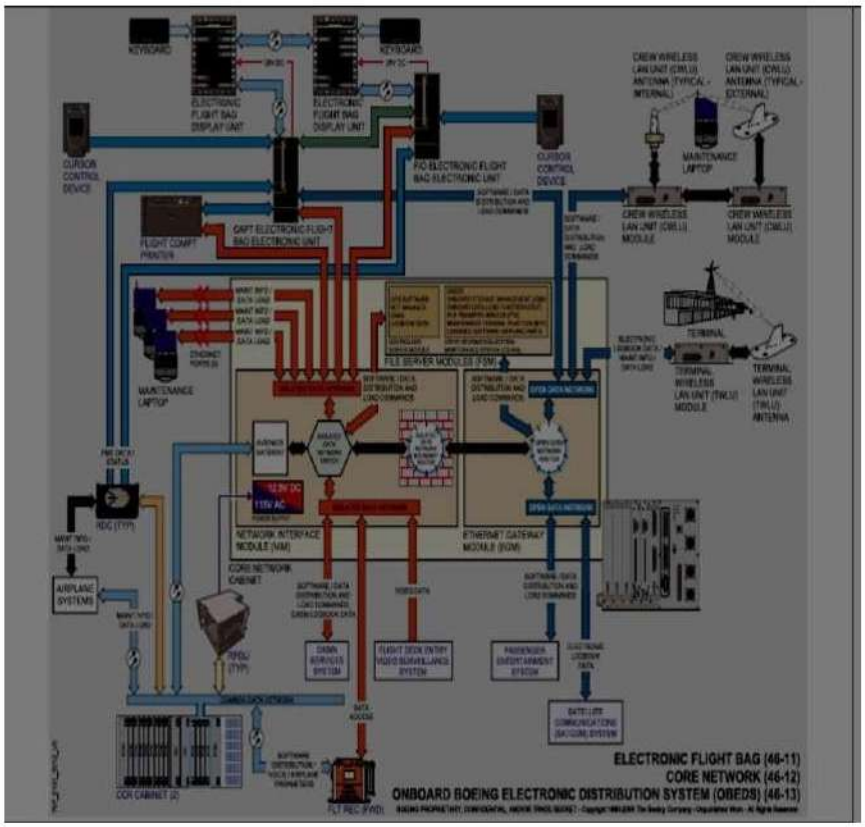
Vacant slots have air blocking modules for cooling considerations.

The core network system is the major part of the crew information system (CIS). It has an open data network (ODN) and an isolated data network (IDN).

Together, the ODN and IDN are the planenet. The ODN connects to less important airplane systems, such as the cabin services system (CSS) and the passenger entertainment system (PES). The IDN connects to more important
flight sensitive systems, such as the flight recorder and the flight deck displays.

The core network system also connects to 3 Ethernet ports to let the ground crew connect maintenance laptops to get maintenance information and sign off maintenance actions. The maintenance laptops also connect through the core network to wireless connections which link the airplane to a ground network.

Core network software and physical isolation provide network security within the CIS.



Core Network Cabinet

1. The core networkcabinet:

- Contains the modules that do the CISfunctions

- Provides the connections to display devices and otherairplane systems.

2. These modules are in the core networkcabinet:

- Ethernet gateway module(EGM)

- Network interface module(NIM)

- Controller server module(CSM)

- Crew information system/maintenance system (CIS/MS)file server module(FSM).

3. Empty cabinet slots have air blocking modules to preventloss of coolingair.

4. Captive screws hold the modules in the core networkcabinet.

5. The cabinet has internal connectors for power distribution and signalrouting.

System Description

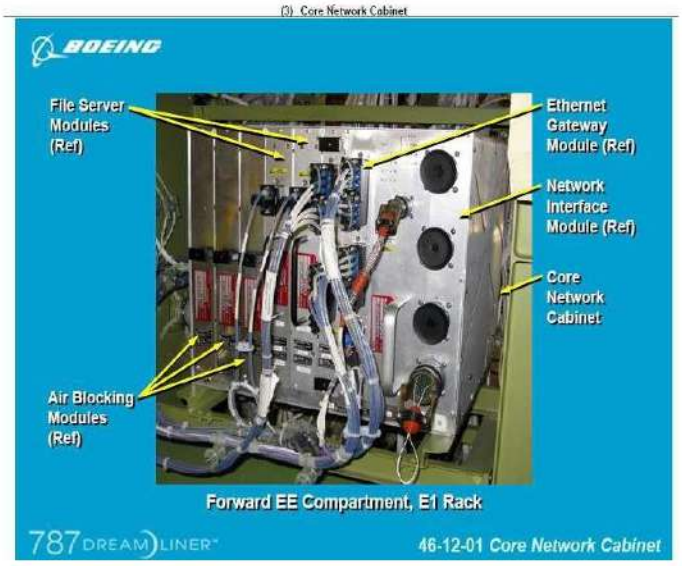
The core network cabinet is an enclosure that contains the modules for the core network and other airplane functions.

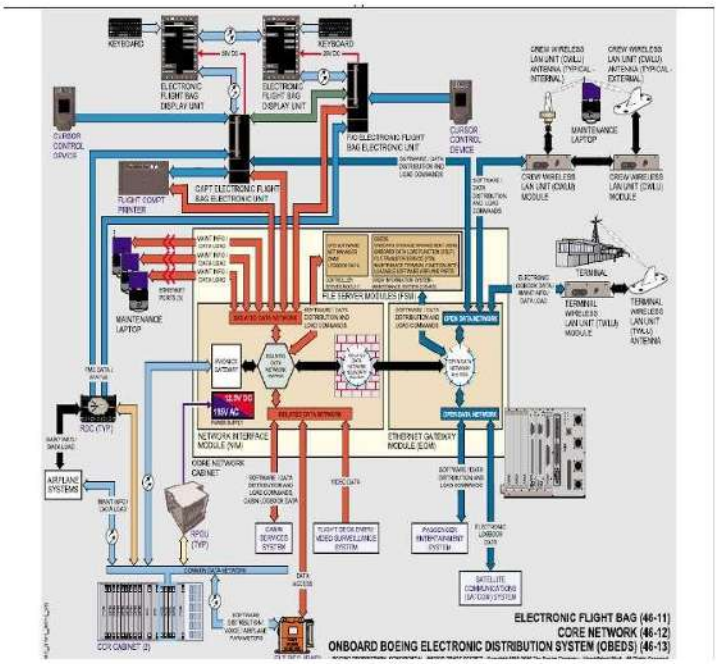
The core network cabinet has the major components of the core network. It is has these server modules:
- Crew information system/maintenance system (CIS/MS)file servermodule
(FSM)

Controller server module(CSM).

The cabinet also has the Ethernet gateway module (EGM) and the network interface module (NIM).
The network interface module filters and supplies power to the rest of the cabinet and modules.
The cabinet supplies the connections between the modules

.The forward equipment cooling system provide air to the modules through an air plenum. There is no auxiliaryfan.
There are no controls or indications for the core network cabinet. The core network cabinet weighs 60 lbs (27 kg).
The cabinet has 6 slots for modules. Air blocking modules cover unused slots.





Ethernet Gateway Module

1. The Ethernet gateway module (EGM) provides network security and data distribution for the open data network(ODN).
2. The EGM has an ODNrouter.
3. The ODNrouter:

Provides connections between systems/components and the ODN

- Connects to the network interface module(NIM).

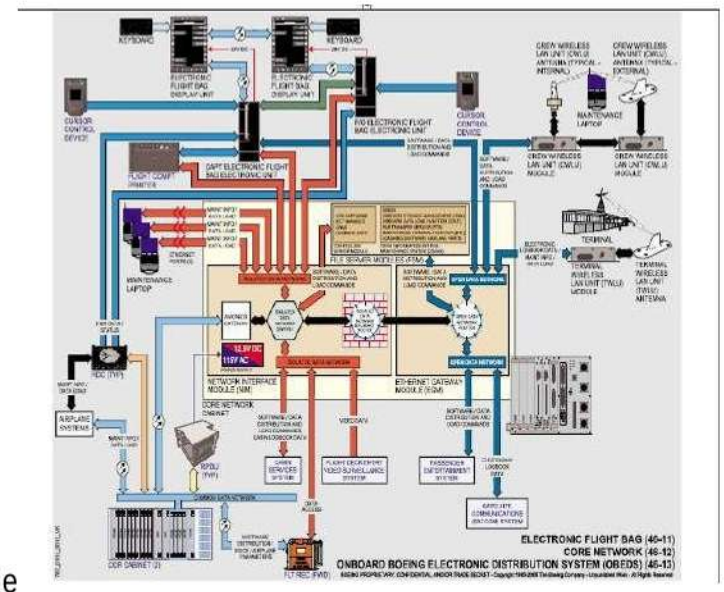
System Description Section (SDS)

The Ethernet gateway module (EGM) connects some airplane systems to an

open data network (ODN).

The EGM has a 26-port switch/router. An internal processor controlled bus sends the data from the ports to assigned users. It has 16 external Ethernet ports and 6 internal Ethernet ports. It uses high-speed data buses to connect the ODN and the isolated data network (IDN).
The EGM supplies network security with an Ethernet switch/router.
The EGM is in the core network cabinet.

The EGM has a thermal sensor to shut it down in overheat conditions.



Network Interface Module

1. The network interface module (NIM) does thesefunctions:

- Network security
- Datadistribution.

2. The NIM has these internalcomponents:

- Avionics gateway
- Isolated data network (IDN)switch
- IDN boundaryrouter.

3. The avionicsgateway:

- Moves data between the common data network (CDN) and the IDN
- Changes electrical-to-light and light-to-electricalsignals
- Provides security between the CDN and theIDN.

4. The IDNswitch:

- Supplies connections between all systems and components that connect tothe IDN
- Supplies wired Ethernet access with the maintenancelaptop
- Sends data on the IDN.

5. The IDN boundaryrouter:

- Moves data between the IDN and theODN
- Supplies security between the IDN and the ODN(firewall).

6. TheNIM:

- Supplies power to all other core network cabinetmodules

- Monitors for powerconditions

- Has fiber optic and electrical (discretes and ARINC data) connections
- Monitors temperature condtions within thecabinet

- Does validity checks of all receiveddata.

7. LEDs on the face of the NIM show status for all installed modules.- Red or flashing green LEDs are observedfaults.
System Description Section (SDS)
The network interface module (NIM) provides network security and data
Distribution between these networks:

- Open data network (ODN)

- Isolated data network(IDN)

- Common data network (CDN).

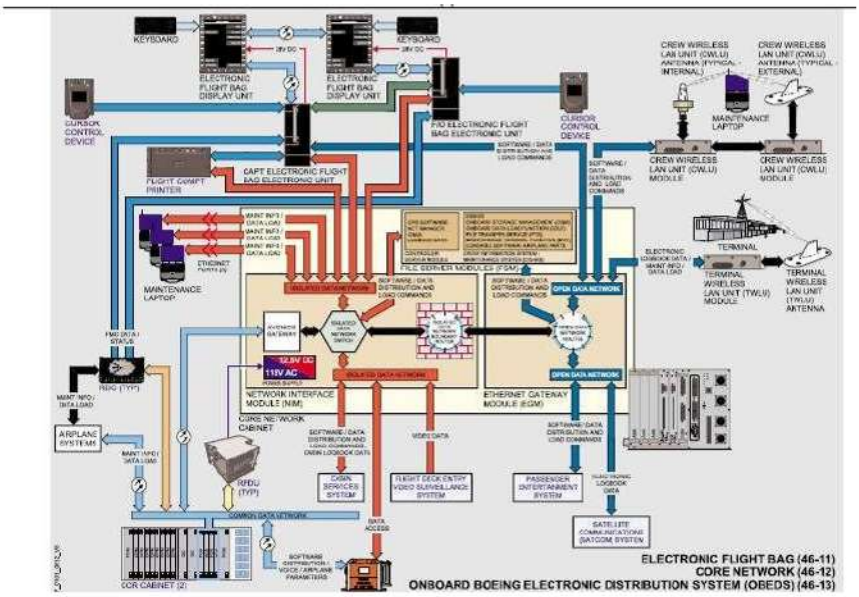
The NIM controls the operation of the core network cabinet and provides power for the other cabinet modules. The NIM also provides network security for the maintenance laptop connections to the airplane.
The NIM makes the IDN with these internal components:

- IDNswitch

- IDN boundaryrouter

- Avionicsgateway.

The IDN switch controls data transfer between the IDN and airplane systems. The IDN switch also connects the core network file server modules to the IDN.
The IDN controls data transfer between the open data network (ODN) and the is olated data network (IDN) for a high level of security. The isolated IDN boundary router is the firewall between the ODN and the IDN.
The avionics gateway controls data transfer and other maintenance functions between the isolated data network (IDN) and the common data network(CDN).
The network interface module is the largest module in the core network cabinet. It has fiber optic and electrical connections on the front panel. Light emitting diodes (LED) on the front panel show the status of the NIM and other modules in the core network cabinet.



Controller Server Module

1. The controller server module (CSM) is a file server module (FSM).
2. The CSMstores:

- Data such as maintenance logbook (MLB), the cabin logbook (CLB), andnavigationdatabase
- Applications for use within the corenetwork.

3. The CSM has these applications andservices:

- Onboard authentication service (OAS) - provides secure access control
- Network manager - collects and reports core network system faults to thecentral maintenance computing function(CMCF)
- Core network application services (CNAS) - data transport service
- Airplane logbook collection and ground logbook synchronization.

4. The CSM controls the operation of the Ethernet gateway module (EGM) inthe core networkcabinet.

System Description Section (SDS)

The controller server module (CSM) keeps applications, data, and manuals to supports the flight and maintenance crews.

The CSM connects to the open data network (ODN). The CSM supplies security protection to the network from access that is not approved. The CSM controls the data load to itself and for the network interface module (NIM) and the Ethernet gateway module(EGM).
The CSM keeps electronic logbook data.

The CSM has these features:

- Networkmanager

- Core network applications system(CNAS)

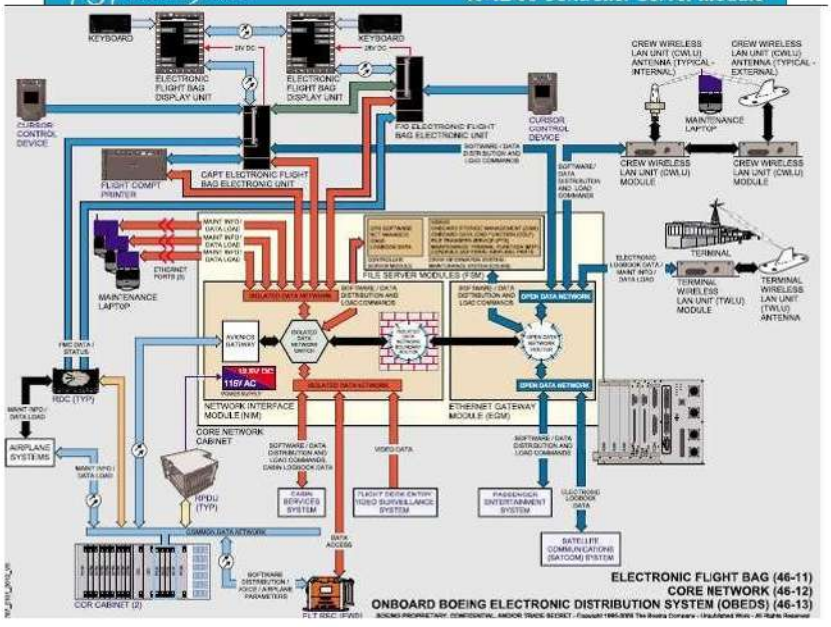
- Onboard authentication service (OAS).

The network manager in the CMS has these functions:

- Onboard authentication service for wirelessoperations
- Core network onboard dataload
- Ethernet gateway module (EGM)control
- Other network managementfunctions.

The core network applications system (CNAS) monitors start-up and shut down operations and core network health.
The onboard authentication service (OAS) uses the digital certificate database in the CMS to check the security of onboard users.

There are 5 FSM slots in the core network cabinet. The CSM must be in the first slot. The crew information system/maintenance system (CIS/MS) fileserver module (FSM) must be in the second slot. The airline can add more FSMs in the core network cabinet for more memory and more functions.
The front panel of the controller server module has electrical connectors to connect to the network interface module (NIM). The internal cabinet back plane bus connects the CSM to other cabinet modules.
The forward equipment cooling system provides cool air for the CSM in the core network cabinet.
There are no controls for the CSM. An LED on the front panel of the network interface module (NIM) shows the power and status of the controllerserver module



CIS/MS File ServerModule

1. The crew information system/maintenance system (CIS/MS) file server module (FSM) is a mass storage device for many different applications anddata.
2. The CIS/MS FSM has software applications and data, suchas:

- Wireless local area network (WLAN) manager - manages the wireless TWLU and CWLU connections
- Maintenance terminal function (MTF) - provides maintenance laptop and EFB user interface services for maintenancefunctions
- File transfer system (FTS) - provides text based services to user systems such as theprinter
- Loadable software airplane parts (LSAP) storage - stores LSAPs for data load to usersystems
- Onboard Boeing electronic distribution of software (OBEDS) – provides LSAP transfer and security between the ground and the airplane
- Onboard storage management (OSM) - view, delete, or transfer onboard data off theairplane
- Onboard data load function (ODLF) - interfaces with user to load onboard LSAPs to usersystems.

3. When a second CIS/MS is installed (airlineoption):

- It operates as a warmspare

- Both CIS/MS FSMs receive the LSAPs when LSAPs areloaded.

System Description Section (SDS)

The crew information system/maintenance system (CIS/MS) file server module (FSM) keeps applications and data to supports the functions of the crew information system (CIS) and the maintenance system (MS).
The CIS/MS FSM has these features:

- Initial operationalsoftware

- Connection security

- Onboard Boeing electronic distribution system(OBEDS)

- Onboard data load function(ODLF)

- Loadable software airplane part (LSAP)management

- Maintenance terminal function(MTF)

- File transfer system(FTS).

The CIS/MS FSM has boot software in its flash memory. This lets the CIS/MS initial operational software load in the CIS/MS hard drive. If the operational software needs to be loaded again, the boot software in the flash memory permits this data load function.
The CIS/MS FSM controls the wireless connection security for the maintenance laptop and the terminal wireless local area network (LAN)unit(TWLU).
The CIS/MS FSM also controls the connection security for the crew wireless local area network (LAN) unit (CWLU).
The onboard Boeing electronic distribution system (OBEDS) manages the communications between the airline ground server and the airplane, and security for data distribution.

The onboard data load function (ODLF) lets the maintenance personnel move the LSAPs kept in the CIS/MS FSM to the applicable airplane systems.
LSAP Management

The CIS/MS FSM makes a list of all LSAPs stored in the file server and makes
That list available on the maintenance laptop or the electronic flight bag (EFB).
Maintenance personnel use the onboard storage management function (OSMF) to view and remove LSAPs from the CIS/MS file server.
The maintenance terminal function (MTF) gives access to these maintenance services through the maintenance laptop and the maintenance control display function (MCDF) interface:

- Onboard data load function(ODLF)

- Airplane condition monitoring function(ACMF)

- Circuit breaker indication and control(CBIC)

- Central maintenance computing function(CMCF).

File Transfer System

The CIS/MS file server module uses the file transfer system (FTS) for these function

- Logs and stores data for airplanesystems

- Controls file uplink anddownlink

- Manages print operations from applications on the common data network (CDN) and corenetwork.

Physical Description

The CIS/MS FSM is a commercial, off-the-shelf, 40 gigabyte file server module. It has a 128 megabyte flash memory to hold a copy of the initial operating system.
There are 5 FSM slots in the core network cabinet. The CIS/MS file server module must be in the second slot. The controller server module (CSM) must be in the first slot. The airline can add more FSMs in the core network cabinet for more memory and morefunctions.
There are electrical connectors on the front panel of the CIS/MS file server module to connect to the network interface module (NIM). The internal cabinet backplane bus connects the CIS/MS to other modules in the core networkcabinet.
The core network cabinet provides air from the forward equipment coolingsystem.
There are no controls for the CIS/MS file server module. An LED on the front panel of the network interface module (NIM) shows the power and status of the CIS/MS file Server module

Component Locations

1. These components of the core network system are in the forward EEbay:
- Core networkcabinet

- Ethernet gatewaymodule

- Network interfacemodule

- Controller servermodule

- Crew information system (CIS)/maintenance system (MS) file server module(FSM)
- Air blockingmodule

- Ethernetport.

2. One Ethernet port is in the flight deck - in a compartment between the observerseats.
3. One Ethernet port is in the aft EEbay.

4. One Ethernet port is in the forward EEbay.

System Description Section (SDS)

These core network system components are in the core network cabinet in the forward equipment center:
- Ethernet gateway module(EGM)
- Network interface module(NIM)
- Crew information system/maintenance system (CIS/MS) file servermodule(FSM)
- Controller server module(CSM)
- Air blockingmodule.

Forward Cargo Compartment

There is 1 crew wireless local area network (LAN) unit (CWLU) module and 1CWLU antenna in the forward cargo compartment.
Passenger Cabin

There are 2 CWLU modules and 2 CWLU antennas in the passenger cabin for maintenance use.
Aft Cargo Compartment

There is 1 crew wireless local area network (LAN) unit (CWLU) module and 1CWLU antenna in the aft cargo compartment.
External to the Airplane

There is 1 CWLU antenna on the bottom of the fuselage, and the related CWLU module is inside the airplane skin.
Operation - Data Networks

1. The core network system has nocontrols.
2. The core network system uses hosted applications for its functions.
3. The maintenance crew uses the core network system to connect the maintenancelaptop.
4. To make a wireless connection to the ODN, a maintenance laptop must have the correct security configurationinstalled.

5. To make a wireless connection to the IDN, a maintenance laptop musthave:
- Access to theODN
- More security requirements, such as network ID and password - to get through the IDN boundary router (firewall).
6. To make a wired connection to the IDN, a maintenance laptop musthave:
- Physical connection to an Ethernet port on theairplane
- Correct security configurationinstalled.

System Description Section (SDS)

The crew wireless local area network (LAN) unit (CWLU) lets the maintenance laptop connect to the core network through a wireless connection. As many as6 maintenance laptops can connect to the airplane at the same time. A maximum of 3 wired connections are permitted. Software in the core network controller server module (CSM) manages, monitors, and configures the CWLUs.
These are the types of wireless connections:

- Wirelessinitial
- Wirelesslimited
- Wirelessfull.

The maximum wireless connection range between the maintenance laptop and the CWLU is 50 feet (14.3 meters). This is less than the wingspan.
The wireless initial connection connects the maintenance laptop to the core network open data network (ODN). No airplane maintenance functions are available with this type of connection.
To make a wireless initial connection to the airplane, do these steps:
- Right click on the wireless utility icon in the Windows tool tray at the bottom of thescreen.
- Select Connect to Profile to show the list of valid airplane tail IDs.
- Select the Tail ID for the airplane, then select the OKbutton.

If you select a tail ID that is out of range, a wireless connection is not made. The CIS/MS FSM has a wireless local area network (WLAN) manager that gets next airport data from flight management function (FMF). The next air port data includes:
- Air/ground
- Altitude
- Airport ID
- Maintenance/data loadenable

- Departureairport
- Destinationairport.

The WLAN manager also uses this CIS airline modifiable information (AMI):
- Maximum radio frequency (RF)power
- CWLU airport WLAN mode (b orb/g)
- TWLU airport WLAN mode (b orb/g)
- CWLU enable or disable for groundmode
- TWLU enable ordisable
- Channel assignments for each CWLU or TWLUmodule
- Legal airportchannels.

When the onboard authentication service (OAS) in the crew information system (CIS) - maintenance server (MS) file server module (FSM) finds the necessary security software certificates on the laptop, the wireless connection is permitted. A dialog box show the connection status. On the MCDF, the

connection type changes from None to Wireless Initial, and the airplane tail ID shows.
If a connection cannot be made, a dialog box shows that a connection cannot be made.

The CIS/MS FSM has a wireless local area network (WLAN) manager that gets next airport data from flight management function (FMF). The next airport data includes:

- Air/ground
- Altitude
- Airport ID
- Maintenance/data loadenable
- Departureairport
- Destinationairport.

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- CWLU enable or disable for groundmode
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- Channel assignments for each CWLU or TWLUmodule
- Legal airportchannels.

The WLAN manager uses the next airport data and the CIS AMI to find the communications configuration for the CWLU and TWLU modules groundoperation.
The wireless limited connection connects the maintenance laptop to the core net work through the ODN to the isolated data network (IDN). The wireless limited connection permits all airplane maintenance functions, except CMCF ground tests and the onboard data load function(ODLF).
To make a wireless limited connection to the airplane, do these steps:

- Make sure there is a wireless initial connection from the maintenance laptop to theairplane.
- Click twice on the virtual private network (VPN) icon on the maintenance laptop desk top.
- Wait for a round, green circle to show in the Windows tool tray at the bottom of the screen. The green icon shows for a wireless limitedconnection.

The OAS in the core network permits the wireless limited connection. On the MCDF, the connection type changes from Wireless Initial to Wireless Limited.
On the right side of the MCDF, 2 circular arrows show and the arrows turn. This is the connection symbol, and shows the connection status between the MCDF and core network IDN.

- When the arrows turn, data transfer is active. This is the usual condition.
- When the arrows do not turn, the connection is complete, but data transfer is notactive.
- If the arrows do not show, there is no connection between the maintenance laptop and the corenetwork.

The wireless limited connection gives limited access to some of the MCDF Air plane Functions.
The wireless full connection connects the maintenance laptop to the core network through the ODN to

the isolated data network (IDN). The wireless limited connection permits all airplane maintenance functions. The wireless full connection process must be completed within 30 seconds of start.
To make a wireless full connection to the airplane, do these steps:

- Make sure there is a wireless limited connection fromthe maintenance lap top to theairplane.
- Make sure you have access to a flight deck or cabininterphone handset.
- On the MCDF banner, click once on the Connection link to change the connection type.

A dialog box shows.

- In the dialog box, select the Change Connection button. Another dialog box shows a dial code and verificationnumber.
- On an interphone handset, use the keypad to enter the dialcode.

- Enter the verification number and push the pound key on the handset. On the maintenance laptop, the MCDF Connection type changes from Wireless Limited to Wireless Full.

The virtual private network (VPN) uses the security data from the OAS in the core network to verify the authenticity of the connection. The wireless full connection has the same functions available as the wired connection.
A Change Connection Failure dialog box shows for these reasons:

- Procedure not complete within 30seconds

- Incorrect verification numberentered

- System busy with other userauthentication.

The maintenance laptop connects to the airplane through any of these wired connection points:

- Flight deck Ethernet port between the observersseats

- Forward electronic equipment (EE) bay Ethernetport

- Aft EE bay Ethernetport.

Onboard Maintenance Systems Access

To get access to the onboard maintenance systems, the maintenance laptop must have the correct hardware and software configurations installed. The correct software configuration includes the maintenance control and display function (MCDF).

To start the MCDF, click on the MCDF icon on the maintenance laptop desktop. The MCDF shows as a banner at the top of the maintenance laptop display. The MCDF also shows the network connection type as WIRED. Click the AIRPLANE FUNCTIONS button to open the Airplane Functions Menu window that shows a list of available functions.
AIRPLANE FUNCTIONS - Wired Access

The core network system monitors the GND TEST switch position to control which AIRPLANE FUNCTIONS areavailable.
These are the AIRPLANE FUNCTIONS:

- CMCF (central maintenance computing function) - gives access to airplane fault data, ground tests, system configuration, and otherfunctions
- ODLF - (onboard data load function) - lets you load software to airplane systems and components

(This function is not available when the GND TEST switch is in the NORM or ENABLE positions.)

- ACMF (airplane condition monitoring function) - lets you select airplane system data to monitor, collect, andreport
- OSM (onboard storage management) - lets you see and delete data files stored on the airplane fileserver
- CB (circuit breaker indication and control) - lets you monitor, open, close, and lock electronic circuit breakers. (This function is read-only when the GNDTEST switch is in the NORMposition.)

- SYS (display systems, system synoptic) - lets you to see diagrams that show real-time airplane systems function andstatus
- MAINT PGS (display systems, maintenance pages) - lets you see display systems, maintenance data pages (MAINT DATA PGS) and display systems, maintenance control pages(MAINT CTRL PGS). MAINT DATA PGS give success to see airplane systems data and status. MAINT CTRL PGS gives address to airplane configuration data (ACD), electrical system indication and control (ESIC), flight deck access system (FDAS), and miscellaneous system control(MSC).
- CCS (cabin service system maintenance) - lets you see cabin faults, do tests, and load software for the cabin servicessystem.

General Description - Crew Wireless LAN

1. The crew wireless local area network (LAN) provides a wireless connection for the maintenance laptop (ML) to thecore network system when the air plane is on theground.
2. The components of the crew wireless LAN are:

- 4 crew wireless LAN unit (CWLU) internal antennas

- 1 CWLU external antenna CWLUmodules.

3. The CIS/MS file server has softwarethat:

- Configures the airplane wireless connection to the maintenance laptop

- Controls and monitors the CWLUmodules.

4. The crew wireless LAN connects to theODN.

- The maintenance laptop uses the CWLU to connect through theODN to the IDN with apassword.

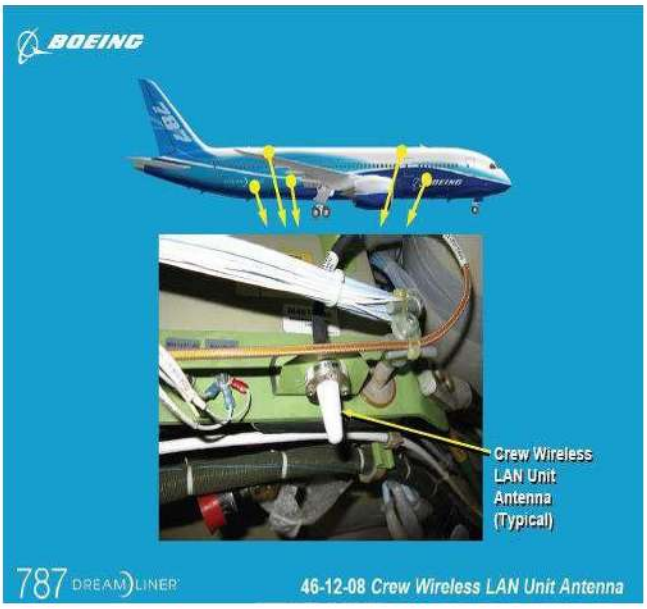
5. There are no CWLU controls orindications.

CWLU External Antenna

1. The crew wireless local area network (LAN) unit (CWLU) external antenna provides wireless communications when the maintenance laptop is outside theairplane.
2. The CWLU antenna connects to its own CWLUmodule.

CWLU Internal Antenna

1. The crew wireless local area network (LAN) unit(CWLU) internal antenna provides wireless communications when the maintenance laptop is inside theairplane.
2. Each CWLU internal antenna connects to a relatedCWLU module.



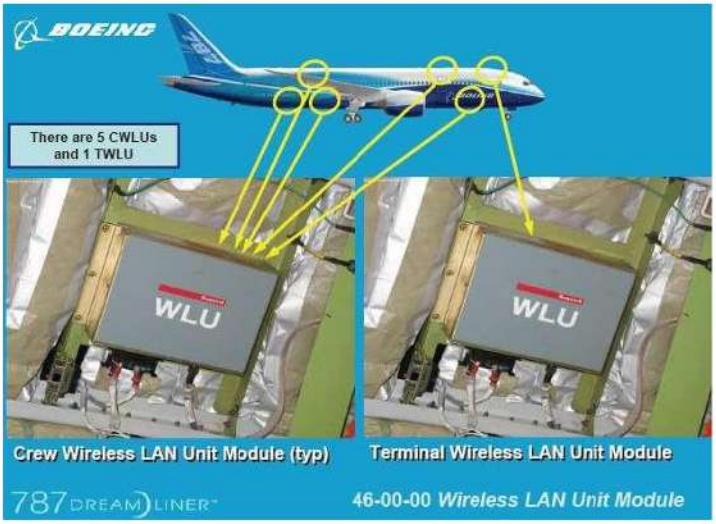
CWLU Module

1. The crew wireless LAN unit (CWLU) module is awireless router for the core networksystem.
2. Each CWLU m odule connects to:

- Its related CWLUantenna

- The open data network(ODN).

3. The module is softwareloadable.



Terminal Wireless LAN

1. The terminal wireless local area netwark (LAN) connectsthe airline ground server to the core network system when the airplane is on the ground.
2. Ground-based airline operations use the terminal wireless LAN to:
- Transfer loadable software airplane parts (LSAP) to theairplane

- Synchronize the electronic logbook (ELB) with the airline log systemservers
- Send updated weight and balance data,etc.

3. The terminal wireless LAN supplies the automatic transfer of software loadable airplane parts (LSAP) to the file server module (FSM).
The CIS/MS file server has the software function that:

- Configures the airplane wireless connection to theterminal

- Controls and monitors the terminal wireless LAN unit (TWLU) module.
5. The terminal wireless LAN connects to the ODNonly.

6. Terminal wireless LAN componentsare:

- 1 TWLUmodule

- 1 TWLUantenna.
7. The terminal wireless LAN has no controls or indictations.

TWLU Antenna

1. The terminal wireless local area network (LAN) unit(TWLU) antenna provide wireless communications between the airplane and the ground- airline wireless network.
2. The antenna connects to the TWLUmodule.

TWLU Module

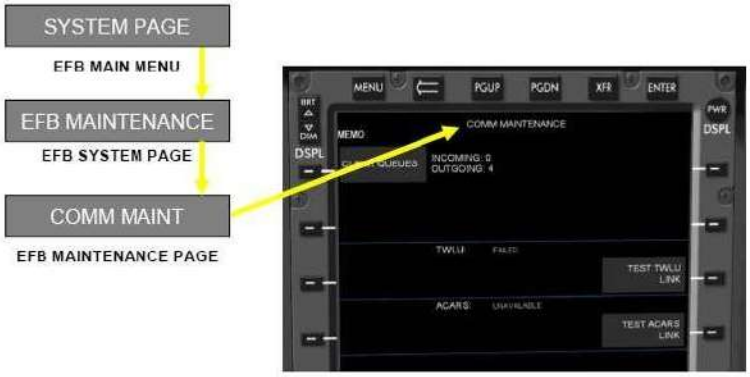
1. The terminal wireless local area network (LAN) unit(TWLU) module:
- Provides a wireless data connection to a ground-based LAN when the aircraft is on theground
- Is a wireless router that connects the airplane network tothe groundnetwork.
1. The TWLU connects to the TWLU antenna and theODN.
2. . The TWLU module is softwareloadable.

Terminal Wireless LAN - Component Location

1. The terminal wireless LAN unit (TWLU) module is inthe forward cabin crown area.
2. The related TWLU antenna is on the top of the fuselage near theTWLU.

Operation - TEST TWLU LINK

1. There is a function to test the TWLU connectionfrom the TWLU to the groundserver.
2. The test is on the electronic flight bag (EFB)COMM MAINTENANCEpage.



EFB COMM MAINTENANCE PAGE

TWLU – OPERATION – TEST TWLU LINK

Maintenance Laptop Operation

Objectives

Operate the maintenance laptop with an airplane ethernet connection. Operate the maintenance laptop with a wireless connection. Demonstrate the authentification process to obtain wired or wireless access to airplane systems. Identify maintenance laptop indications.

Purpose

1. The maintenance laptop (ML) provides thetechnician an interfaceto:
- The airplane maintenancesystems
- The airplane crew information system (CIS)functions
- Maintenance data in Toolbox Remote
- Laptop software applications to maintain theairplane.

MAINTENANCE LAPTOP

General Description

1. The maintenance laptop (ML) uses the crew information system (CIS) to connect with theairplane.

2. Software applications on the airplane and ML must be installed for the interface tooperate.
- There is a Boeing document that describes maintenance laptop set-up andoperation.

3. The ML can connect to the airplane by 2methods:
- Wired Ethernetconnection
- Wireless network(option).

4. The total number of wired and wireless connections can not be more than6.

Component

1. The maintenance laptop(ML):
- Is ground support equipment (GSE) owned and maintained by theairline
- Has a Windows operatingsystem
- Has specific software applications to interface with the airplane.

2. Do not install software that is not specified byBoeing.

Wired Connection Locations

1. The maintenance laptop (ML) can connect to the airplane with a wiredconnection.

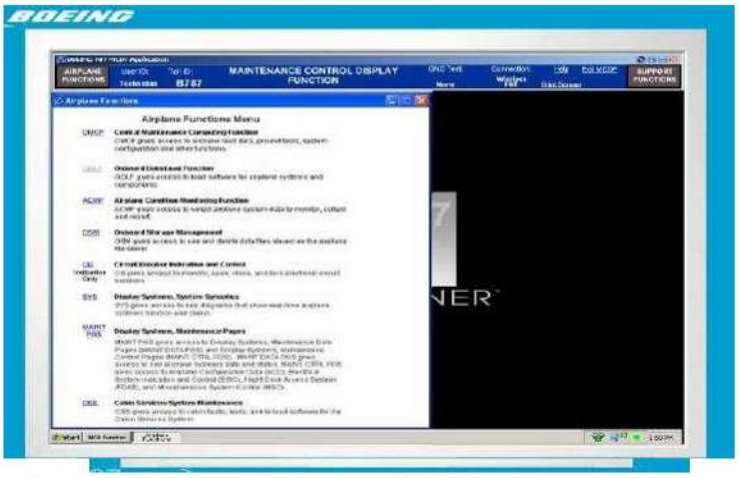
2. There are 3 Ethernet ports for a wiredconnection:
- Flightdeck
- Forward electronics equipment (EE)bay
- Aft EEbay.

2. There is a 115v ac connection near each ether net port.

4. The airline can choose to keep an ML in the flight deck pedestal between the observer seats.

Operation - Log In
1. A log-in screen shows when the maintenance laptop is turnedon.
2. The airline defines the log-inprocedure.

Maintenance Laptop Desktop
1. The maintenance laptop (ML) desktop shows the icons for applications used to interface and maintain the airplane, such as:
- Maintenance control display function(MCDF)
- Maintenance Logbook
- Software maintenance tool(SMT)
- Virtual private network (VPN) clientlauncher
- Core network initial dataloader
- Flight recorderdownload.



2. The airline defines the applications that areavailable.

GND TEST Switch Position	Connection: Wireless Limited, Available Airplane Functions	Connection: Wired or Wir Available Airplane Functic
	CMCF (Ground Test Menu Disabled) ODLF ACMF OSM CB SYS MAINT PGS CSS	CMCF ODLF ACMF OSM CB (Indication Only) SYS MAINT PGS CSS
	CMCF (Ground Test Menu Disabled) ODLF ACMF OSM CB SYS MAINT PGS CSS	CMCF ODLF ACMF OSM CB SYS MAINT PGS CSS
	CMCF (Ground Test Menu Disabled) ODLF ACMF OSM CB SYS MAINT PGS CSS	CMCF ODLF ACMF OSM CB SYS MAINT PGS CSS

ELECTRONIC FLIGHT BAG IN B-787

Salient feature of EFB in B-787 is very similar with B-777 and B- 737NG . B-777 EFB was described in detail earlier to make a clear understanding of the system B-787 EFB will be described in brief.

Electronic Flight Bag Objectives

State the purpose of the system. Identify the major system components of the system. State the purpose