TABLE OF CONTENTS

ATA 23 COMMUNICATIONS 1

23–00 COMMUNICATIONS - GENERAL 2
COMMUNICATIONS INTRODUCTION 2

23–51 AUDIO MANAGEMENT 6
AUDIO MANAGEMENT GENERAL DESCRIPTION ... 6
AUDIO CONTROL PANEL INTRODUCTION 8
AUDIO SWITCHING FUNCTION 10
AUDIO MANAGEMENT UNIT INTERFACES 12
AMS POWER SUPPLY DESCRIPTION 14
AUDIO MANAGEMENT UNIT COMPONENT DESCRIPTION 16
EMERGENCY FUNCTION OPERATION 18
TRANSMIT CIRCUIT OPERATION 20
LOUDSPEAKER MUTING CIRCUIT OPERATION 22
FLIGHT INTERPHONE GENERAL DESCRIPTION 24
MAINTENANCE TIPS - RADIO PTT SWITCH LOCATION 26
RECEPTION CIRCUIT OPERATION 28
SELCAL, MECHANIC & CABIN ATTENDANT CALL FUNCTION 30

23–42 GROUND CREW AND COCKPIT CALL SYSTEM 32
CALL SYSTEM PRESENTATION 32
COCKPIT TO GROUND CREW CALL SYSTEM FUNCTIONAL OPERATION 34

23–13 RADIO MANAGEMENT 36
RMP SYSTEM PRESENTATION 36
RMP COMMUNICATION TUNING PRESENTATION .. 38
RMP NAV BACK UP TUNING 42
RADIO MANAGEMENT SYSTEM COM TUNING DESCRIPTION 44
NAVIGATION SYSTEMS TUNING DESCRIPTION 48
RADIO NAV TUNING FROM RMP AND MCDU 52

23–12 VERY HIGH FREQUENCY SYSTEM 54
COMMUNICATIONS SYSTEM PRESENTATION 54
VHF SYSTEM PRESENTATION 56
VHF INTERFACE DESCRIPTION 58

23–11 HIGH FREQUENCY SYSTEM 60
HF SYSTEM GENERAL 60
HF INTERFACE DESCRIPTION 62
HF COMPONENT DESCRIPTION 64

23–24 AIRCRAFT COMMUNICATION ADDRESSING AND REPORTING SYSTEM (ACARS) 66
ACARS INTRODUCTION 66
ACARS DESCRIPTION 70
ACARS ACTIVATION 74
ACARS APPLICATIONS 76
ACARS MCDU MENU PRESENTATION 80
ACARS INDICATIONS 84
ACARS MISCELLANEOUS PAGE PRESENTATION ... 86
ACARS STATISTICS & PARAMETER PAGES DESCRIPTION 88
ACARS MAINTENANCE MENU PAGE PRESENTATION 90
ACARS RESET FUNCTION 96
ACARS DATA LOADING 98

23–28 SATELLITE COMMUNICATION 100
AERO–I SATCOM SYSTEM OPERATION 100
COMPONENT LOCATION INTRODUCTION 102

23–60 STATIC DISCHARGING 108
STATIC DISCHARGING DESCRIPTION 108

23–71 COCKPIT VOICE RECORDER 112
SSCVR DESCRIPTION AND OPERATION 114
CVR POWER SUPPLY LOGIC DESCRIPTION 116
CVR COMPONENT LOCATION 118

23–72 ANTI HIJACK CAMERA MONITORING 120
ANTI HIJACK CAMERA MONITORING VERSION 1 (AIRBUS) 120
CDSS ARCHITECTURE VERSION 1 (AIRBUS) 122

TABLE OF CONTENTS

ANTI HIJACK CAMERA MONITORING VERSION 2 (AIRBUS) 124
CDSS ARCHITECTURE VERSION 2 (AIRBUS) 126
ANTI HIJACK CAMERA MONITORING EFB-VERSION (POST EO330873–03) 128
CDSS ARCHITECTURE DLH-VERSION (POST EO330873–03) 130

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS) 132
CIDS GENERAL INTRODUCTION 132
CLASSIC CIDS PRESENTATION 134
TYPE A & B DECODER ENCODER UNIT FUNCTION . 136
CIDS DIRECTOR - DEU A & B INTERFACE 140
DEU MOUNT DESCRIPTION 144
FORWARD ATTENDANT PANEL INTRODUCTION . . . 146
AFT / ADDITIONAL ATTENDANT PANEL PRESENTATION 152
ATTENDANT HANDSET PRESENTATION 154
ATTENDANT INDICATION PANEL COMPONENT DESCRIPTION 156
AREA CALL PANEL PRESENTATION 162
PASSENGER ADDRESS SYSTEM DESCRIPTION . . . 164
PASSENGER ADDRESS SYSTEM OPERATION 168
CABIN INTERPHONE SYSTEM OPERATION 170
SERVICE INTERPHONE SYSTEM DESCRIPTION . . . 172
PASSENGER LIGHTED SIGNS OPERATION 174
PASSENGER CALLS SYSTEM DESCRIPTION 176
PROGRAMMING AND TEST PANEL PRESENTATION 178
PTP SYSTEM STATUS PRESENTATION 180
PTP SYSTEM TEST PRESENTATION 184
PTP PROGRAMMING FUNCTIONAL OPERATION . . . 186
CIDS FAILURE DETECTION AND TRANSMISSION OPERATION 192
CLASS 1 CAB, 2, 3 FAULTS 194
CIDS POWER SUPPLY OPERATION 198
CIDS INTERFACES 204
CIDS CFDS MENU PRESENTATION 210
CIDS COMPONENT LOCATION 212

23–32 ANNOUNCEMENT – MUSIC TAPE REPRODUCER SYSTEM 218
PRERECORDED ANNOUNCEMENT & BOARDING MUSIC DESCRIPTION 218

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM - ENHANCED 222
CIDS INTRODUCTION 222
FLIGHT ATTENDANT PANEL INTRODUCTION 224
CIDS DIRECTORS PRESENTATION 226
FLIGHT ATTENDANT PANEL 234
CIDS DIRECTOR DESCRIPTION/OPERATION 236
DEU CONNECTION BOX DESCRIPTION 238
FLIGHT ATTENDANT PANEL 240
SERVICE INTERPHONE COMPONENT DESCRIPTION 260
CIDS DIRECTOR BITE DESCRIPTION 262
CIDS WARNINGS DESCRIPTION 266
COMMUNICATION SYSTEMS MAINTENANCE PRACTICES 268

25–63 EVACUATION SIGNALING EQUIPMENT 272
EVACUATION COMMAND SYSTEM 272
EVAC SYSTEM OPERATION 276

Airbus
A318/A319/A320/A321

ATA 23
Communications

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- The LTT production process ensures that the Training Manual contains a complete set of all necessary pages in the latest finalized revision.

ATA 23 COMMUNICATIONS

23–00 COMMUNICATIONS - GENERAL

COMMUNICATIONS INTRODUCTION

GENERAL

The single aisle aircraft communication system has two sub–systems:

- radio & datalink communication,
- on–board communication.

The radio communication systems are used for communications to and from the aircraft.

Description

The communication system is used for speech communications and optionally for data communications.

The communication system is used for communication between the crew members and between the crew members and the ground personnel.

It is also used to communicate with the passengers, other aircraft and the ground stations (speech and data).

SPEECH COMMUNICATION

23–11 High Frequency (HF) system (optional)

This system has two transceivers and their related equipment for long–range voice communications.

23–12 Very High Frequency (VHF) system

This system has two or three transceivers and their related equipment for short–range voice communications.

The VHF3 system (if installed) is also used to transmit data (Aircraft Communication Addressing and Reporting System (ACARS) or Air Traffic Service Unit (ATSU)).

23–12 Radio Management Panels (RMP)

The RMPs enable a centralized frequency control of the VHF and HF radio communication equipment.

The RMPs also enable the backup frequency control of the radio navigation equipment (VHF Omnidirectional Range (VOR), Distance Measuring Equipment (DME), Instrument Landing System (ILS), Automatic Direction Finder (ADF)) in case of failure of the Flight Management and Guidance System (FMGC).

23–14 Voice privacy system (optional)

The voice privacy system provides a means for coding HF communications between the aircraft and DT.HU.Department in order to protect confidential communications.

DATA TRANSMISSION (OPTIONAL SYSTEM)

23–24 ACARS (optional)

The ACARS management unit allows the management of the data entered by the crews and transmitted to the ground (SDAC, AIDS, CFDS, FMGEC).

It also allows the reception, printing and display of ground messages on the Multipurpose Control and Display Unit (MCDU).These data are transmitted through the VHF3 system (or through the Satellite Communication (SATCOM) system if installed).

23–28 SATCOM (optional)

The function of the SATCOM system is the reception in the L–Band and processing of signals through aeronautical services satellites. This system is used for all aeronautical satellite communications (cockpit voice, passenger telephone and data services) with the ground.

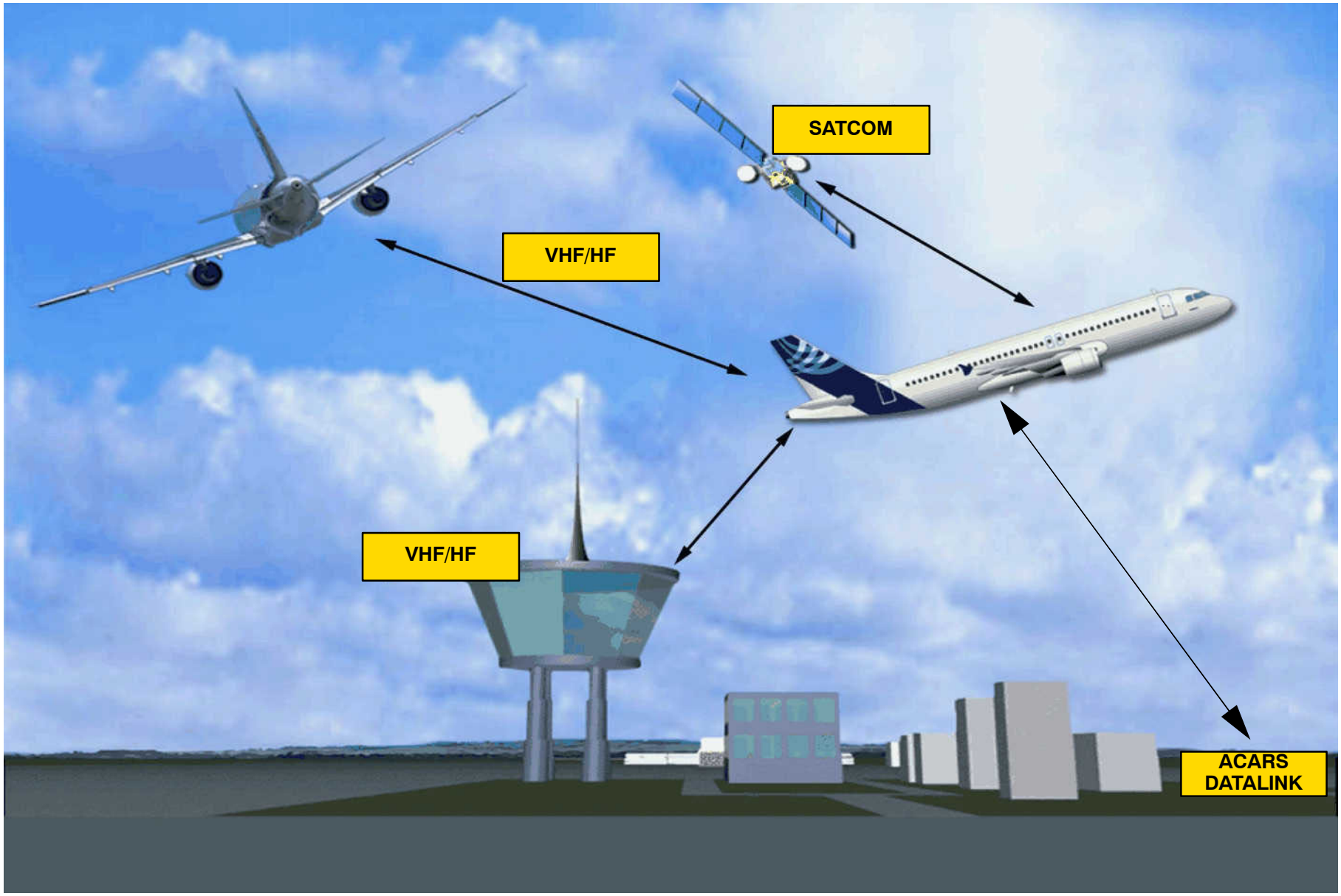


Figure 1 Radio & Datalink Communication

ON BOARD COMMUNICATION SYSTEMS

Passenger Address and Entertainment

This system comprises:

- 23–32Prerecorded Announcements and Music (PRAM) system
- 23–33Passenger Entertainment System (Music)/Passenger Services System (PES (Music)/PSS)
- 23–34 Passenger Visual Information System (PVIS)
- 23–35 Passenger Air–to–ground Telephone System (PATS)
- 23–35 Passenger Entertainment System (Video) (PES (Video))
- 23–37 Passenger facility (AM/FM radio)
- 23–31 The Passenger Address System is part of the Cabin Intercommunication Data System (CIDS) (Ref. 23–73).

Interphone

The Interphone system comprises:

- 23–42 Cockpit–to–ground crew call system
- 23–43 Flight crew interphone
- The cabin and service interphone system is part of the CIDS.

23–44 Cabin and service interphone

The cabin and service interphone system is used for the telephone communications on the ground between the flight crew and the ground service personnel.

Audio Integrating

The Audio Integrating System (AIS) integrates and manages all audio signals (audio outputs, microphone inputs, sidetone and push–to–talk) supplied by and sent to the radio communication and radio navigation systems.

This system also provides the SELCAL function and call and flight interphone functions.

23–60 Static Discharging

Static dischargers are installed on the aircraft to protect the communication systems from interference caused by static electricity.

23–70 Audio–Video Monitoring and Intercommunication

This system comprises:

- 23–71 Cockpit Voice Recorder (CVR)

  The CVR automatically records the crew conversations and audio communications to help investigation after an aircraft accident or incident.
- 23-73 Cabin Intercommunication and Data System (CIDS)

  The CIDS is a microprocessor–based system. It is used to do the functional control, operation, testing and monitoring of the cabin systems.

  These system functions are provided by the CIDS:
  - Passenger address
  - Passenger call
  - Passenger lighted signs
  - General cabin illumination control
  - Cabin and flight crew interphone
  - Emergency evacuation signalling
  - Lavatory smoke warning
  - Escape slide reservoir pressure monitoring
  - Service interphone (partially integrated into the CIDS)
  - Extended emergency lighting test.
- 23–74 Cabin Management System (CMS) (optional)

  The CMS provides a direct contact for the cabin crew with the ground.

  The cabin crew uses the CMS to transmit and receive real–time data (e.g. passenger information and reservations, maintenance reports, security catering and beverages), through the ACARS.

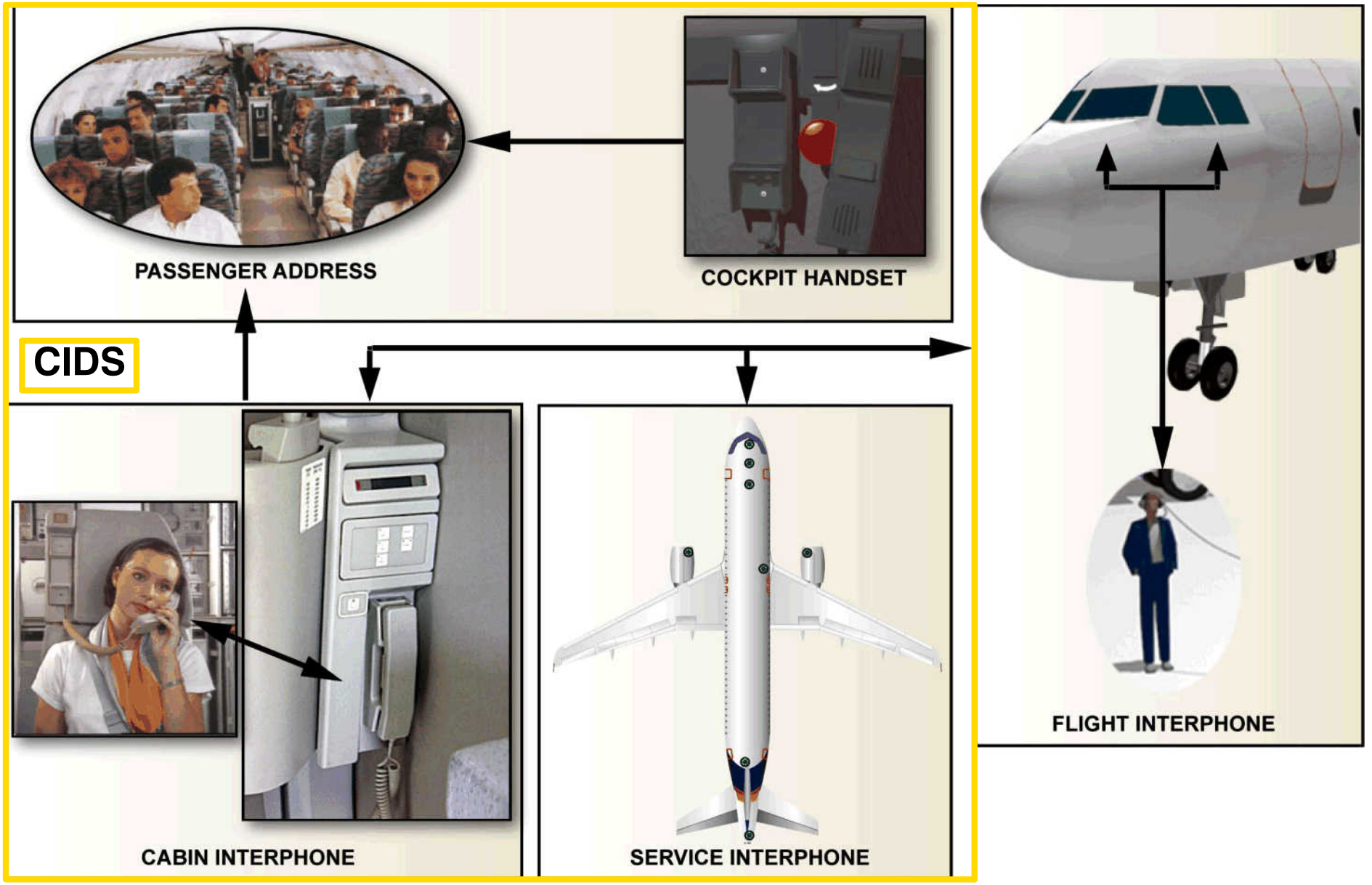


Figure 2 On Board Communication

23–51 AUDIO MANAGEMENT

AUDIO MANAGEMENT GENERAL DESCRIPTION

The Audio Management Unit (AMU) is the heart of the Audio Integrating System.

The AMU acts as an interface between the users and the various radio communication and navigation systems.

The AMU provides the following functions :

- radio transmission,
- radio and navigation reception
- visual and aural warnings of the ground crew and the Cabin Attendant calls,
- flight interphone,
- interface with the Cockpit Voice Recorder (CVR)
- SELCAL calls,
- emergency function for the Captain and the First Officer.

TRANSMISSION

For transmission, the AMU collects the microphone inputs from the various acoustic equipment and directs them to the radio communication transceivers selected on the Audio Control Panels (ACPs).

RECEPTION

For reception, the AMU collects the audio outputs from the various communication and navigation systems and directs them to the various crew stations and acoustic equipment, whatever the election made on the ACPs.

FLIGHT INTERPHONE

The flight interphone allows telephone links between the various crew stations in the cockpit and between the cockpit and the ground mechanic through the External Power Control Panel.

SELCAL (SELective CALling)

The SELCAL system causes visual and aural attention to the flight crew from ground stations equipped with a coding device.

CALLS

Ground crew and cabin Attendants calls are visualized on the Audio Control Panels (ACPs).

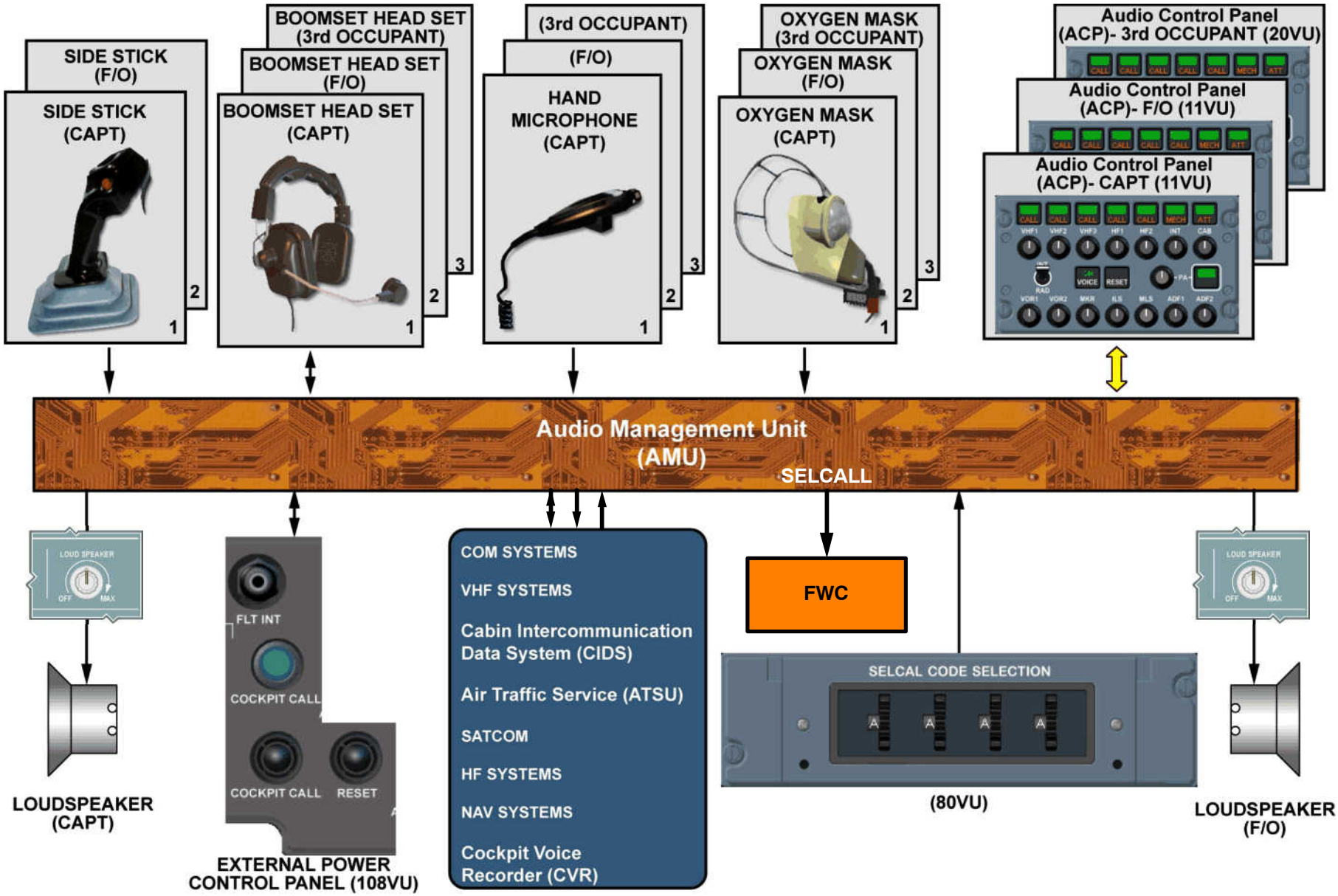


Figure 3 Audio Management Introduction

AUDIO CONTROL PANEL INTRODUCTION

GENERAL

Three basic Audio Control Panels are provided in the cockpit for the Captain, First Officer and 3rd occupant.

Two other optional ACPs can be installed, one in the cockpit for the 4th occupant and one in the avionics bay for ground service.

Each Audio Control Panel (ACP) allows :

- the use of various radio communication and radio navigation facilities installed in the aircraft for transmission and reception of the audio signals,
- the display of various calls (SELCAL, ground crew calls and calls from the Cabin Attendants),
- the use of flight, cabin and service interphone systems.

The Audio Control Panels (ACPs) are connected to the Audio Management Unit (AMU) via an ARINC 429 bus.

TRANSMISSION KEY

The front face features :

- seven rectangular pushbutton keys for transmission.

Transmission channel selection :

- when a transmission key is pressed (CALL, MECH or ATT), three green bars come on.

The selection is accepted (e.g : VHF1):

- the selected system is ready for transmission.
- only one radio system can be selected at a time for transmission.

When a new transmission key is pressed, the green bars come on and the previously selected key is disabled.

When a SELCAL/CALL, MECHanic or ATTendant call is received, the associated system key flashes amber and a buzzer sound is heard.

- **CALL :** For a SELCAL/CALL (HF/VHF).
- **MECH :** For a ground mechanic call.
- **ATT :** For a call from Attendant station.

PASSENGER ADDRESS (PA) KEY

The PA key is used for Passenger Address announcements. When the Passenger Address (PA) key is pressed, three green bars come on (not LH-version).

Boomsets, oxygen masks or hand–microphones can be used for Passenger Address announcements. (The PA key must be pressed and held)

RECEPTION KNOB

The fifteen reception knobs, with associated potentiometers, are used for the selection of reception channels and adjustment of the received audio signals. The 15 reception knobs are also pushbutton switches of the pushpush type :

- Pressed in : The reception is inhibited
- Released out : Reception Knob comes on white and the reception is active.

ON VOICE

The ON VOICE key is used for attenuating morse code identification signals from ADF and VOR/DME navigation systems, in order not to hinder voice reception information. When the VOICE pushbutton key is pressed, the ON legend comes on green.

RESET

The RESET key cancels any amber lighted calls and buzzer sounds.

INT/RAD SWITCH

The INTERPHONE/RADIO selector switch is used for selecting radio or interphone mode. It is a three–position switch.

- **Neutra**l position :

  The transceiver is in reception mode.
- **RAD** position (moment position):

  The radio system selected on the ACP changes from reception mode to transmission mode. For transmission, the switch must be held in the RAD position.
- **INT** position (fix position):

  The flight interphone operates regardless of the transmission key selection.When the PTT is activated, the interphone is cut : Radio transmission has priority over INT selection on the ACP.

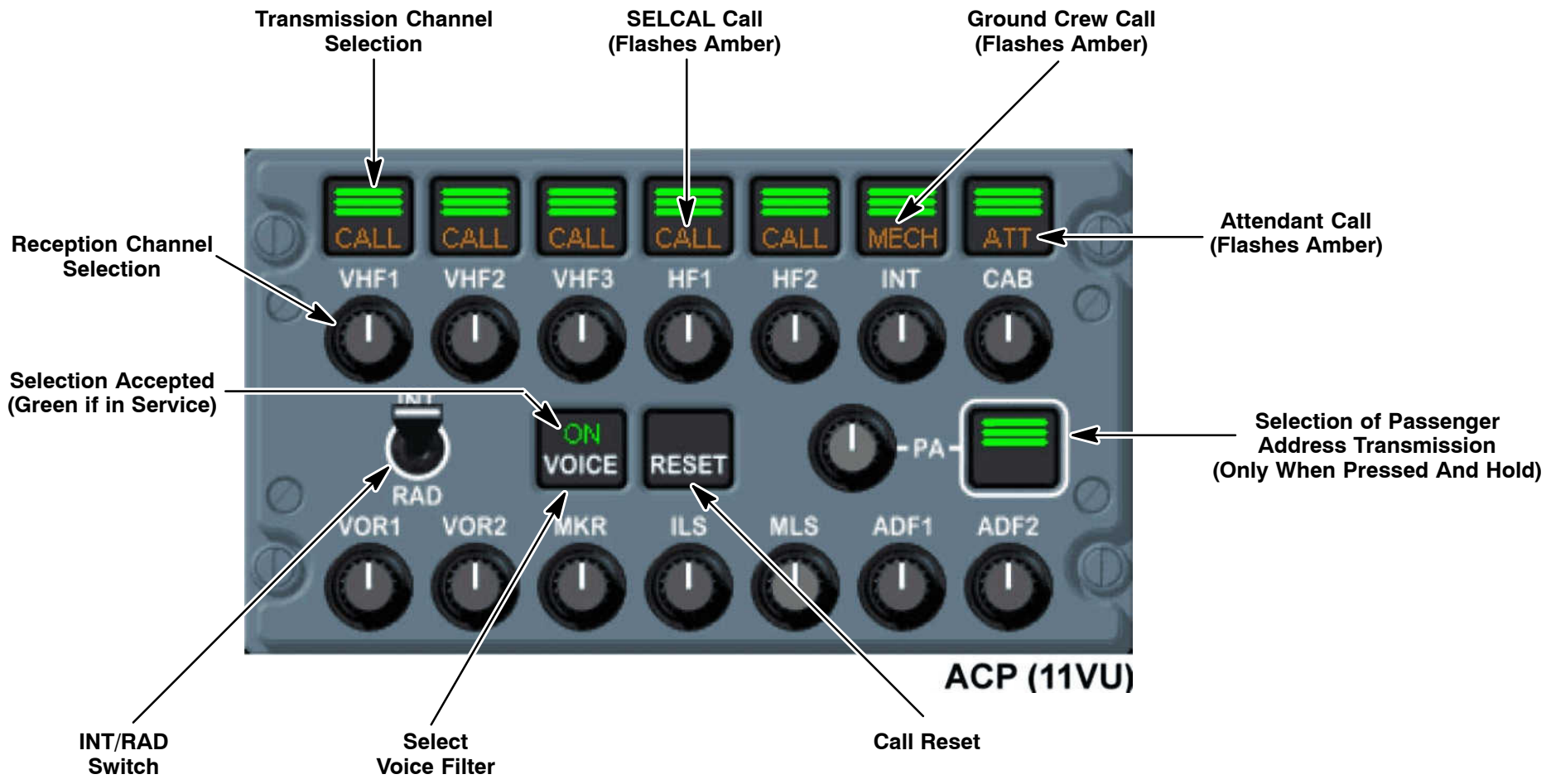


Figure 4 Audio Control Panel

AUDIO SWITCHING FUNCTION

General

The AUDIO SWITCHING selector is used in case of communication failure on captain or first officer channels.

Norm Position

This position corresponds to the normal allocation of the ACPs

F/O 3 Position

In this position, the first officer is switched on the 3rd occupant part of the AMU controlled by the 3rd occupant ACP. The first officer now uses the 3rd occupant ACP.

The 3rd occupant Audio equipment can not be used.

CAPT 3 Position

In this position, the captain is switched on the 3rd occupant part of the AMU controlled by the 3rd occupant ACP. The captain now uses the 3rd occupant ACP.

The 3rd occupant Audio equipment can not be used.

NOTE: If the switch is in the CAPT 3 or F/O 3 position, the message ”AUDIO 3 XFRD” is displayed in green on the ECAM MEMO display.

NOTE: It depends on the AMU standard, if the 3rd Occupant will be disconnected in case of an audio switching or not.

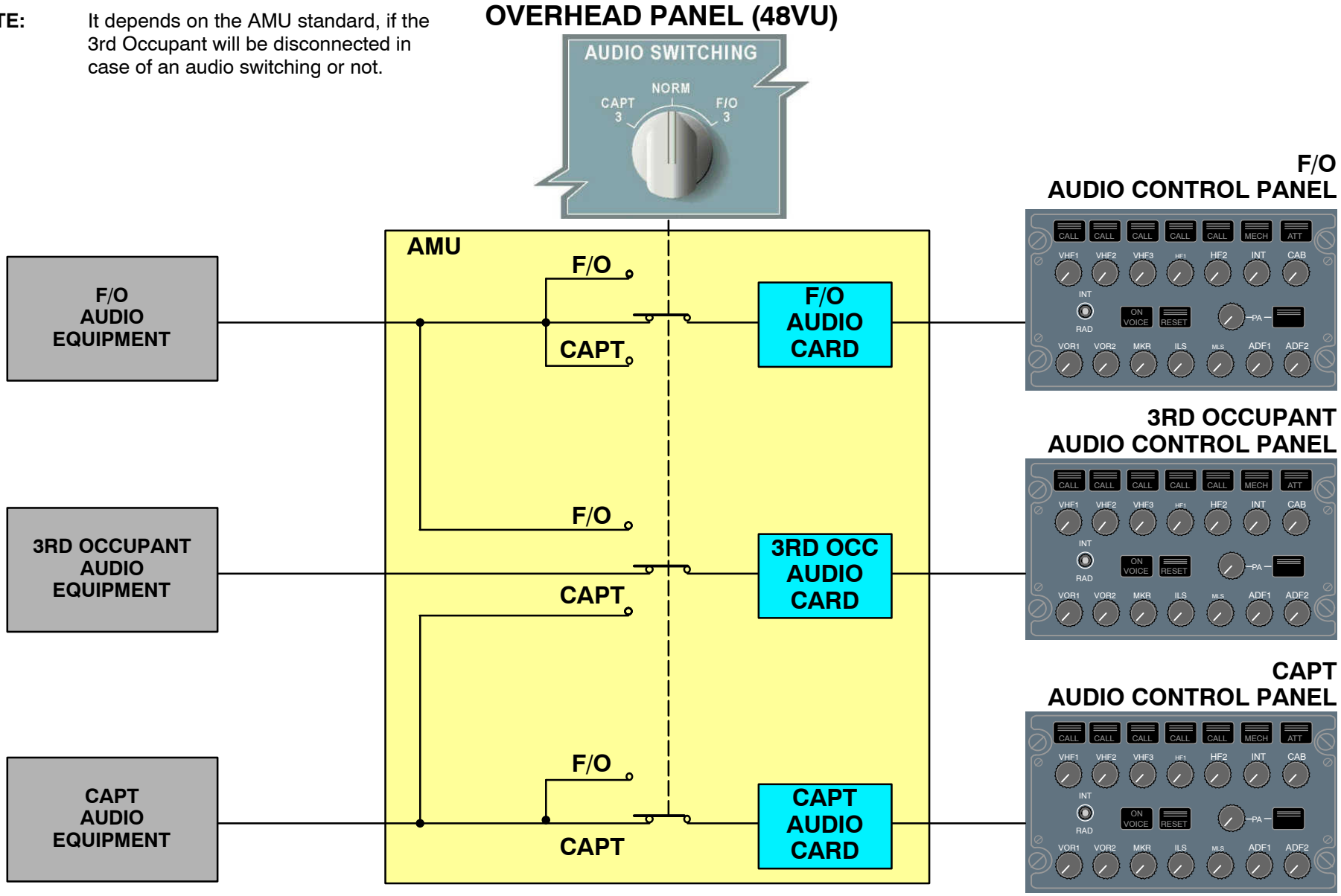


Figure 5 Audio Switching

AUDIO MANAGEMENT UNIT INTERFACES

ACP-AMU Link

Three to five identical Audio Control Panels (ACPs) can be installed. They are linked by an ARINC 429 bus to the related audio cards installed in the Audio Management Unit (AMU). ACP–AMU link is done by ARINC 429 buses. Only digital data are exchanged between the AMU and the ACPs.

NOTE: There are no audio signals inside the ACPs.

AMU Layout

Various functions such as switching, filtering and amplification are done inside the AMU. The AMU includes several identical audio processing cards, one for each ACP.

It also serves to record communications (FAA/CAA recording) and is equipped with a TEST circuit (BITE). This TEST circuit enables the AMU to be connected to the CFDIU.

Volume Control

The volume control function is achieved by digital transmission of the knobs position to the AMU. Volume control is achieved inside the AMU.

FAA/CAA Option

A jumper strap installed on the AMU enables Federal Aviation Administration (FAA) / UK Civil Aviation Authority (CAA) recording selection.

In FAA mode, all the communications heard by the crew members are recorded. This is obtained by the recording of side–tone signal: Audio output. This lets, at the same time record all the communications sent out by these crew members.

In CAA mode, the CAPT, F/O, 3rd occupant boomset microphones are ”HOT ” at all times for voice/noise pick–up to reinforce the sounds picked–up by the area mike. The mask microphones circuits are open until the oxygen pressure switch is closed. The hand microphones are only ”HOT” when the Push–To–Talk (PTT) switch on the microphone is activated.

However, in CAA mode, as in FAA mode, the signal received in the crew’s earphones is recorded on the CVR.

NOTE: There are 2 different AMU generations installed in the A320 family. The one shown below is the older version AMU2790CB. In this version there is a separate audio card for each crew member installed. The other version (AMU4031SA) is described later.

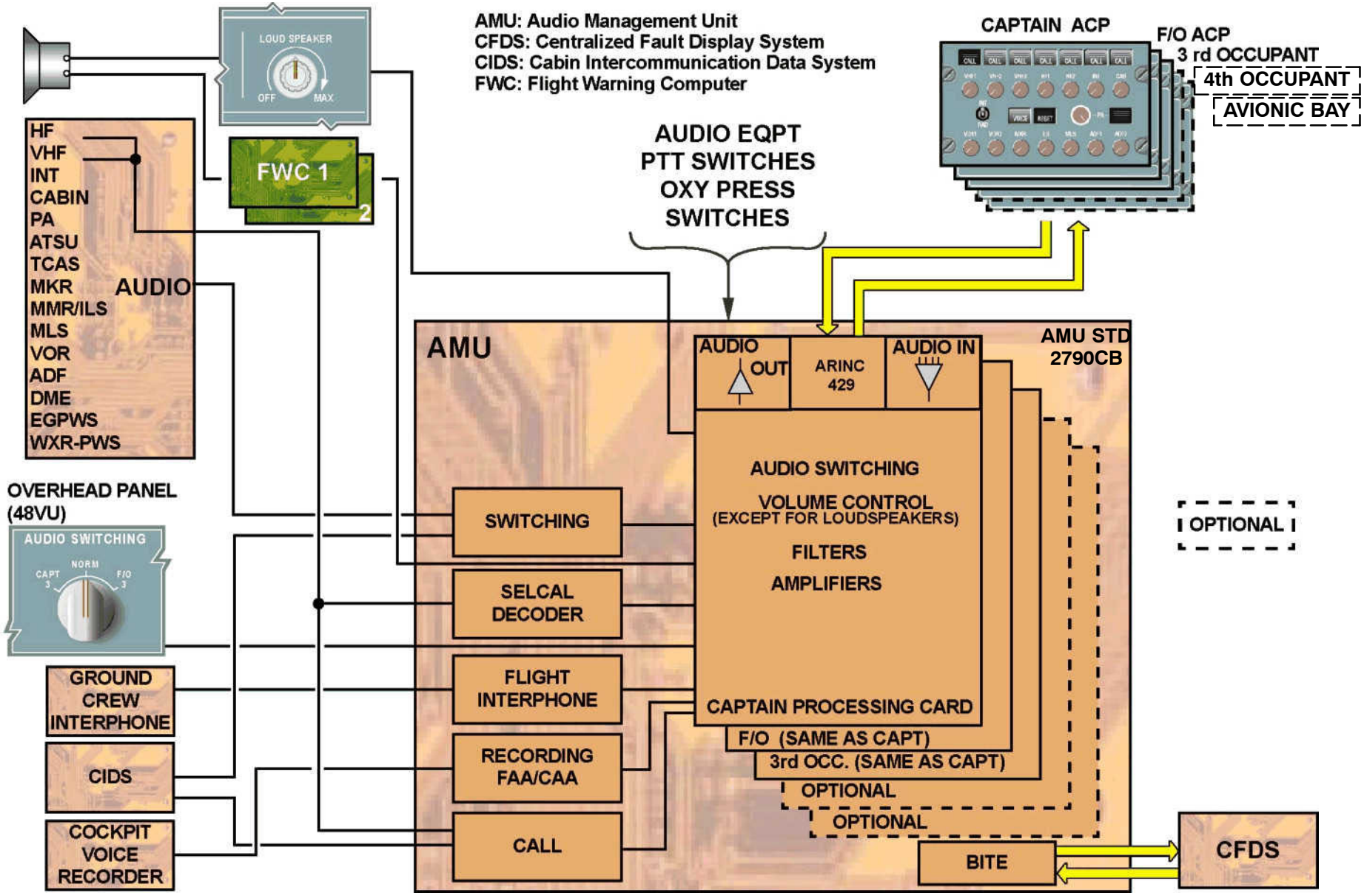


Figure 6 AMU Detailed Schematic

AMS POWER SUPPLY DESCRIPTION

GENERAL

The system components are supplied with 28VDC from busbar 1PP and essential busbar 4PP via 2 sub–busbars 101PP and 401PP respectively.

Two different AMU standards are available with different inner configuration.The STD 2790CB is mainly found on classic-aircraft types.The STD 4031SA is installed on some classic (e.g. LAN-MSN 2295) and all enhanced aircraft types.

NOTE: The different AMU standards are not interchangeable!

AMU STANDARD 2790CB

Busbar 101PP

- Supply of the 3rd Occupant ACP 2RN3 and its associated electronic circuit located in the AMU via 3A circuit breaker 6RN.
- Supply of the calls card in the AMU via 3A circuit breaker 8RN.

Busbar 401PP

- Supply of the Captain ACP 2RN1 and its associated electronic circuit located in the AMU via 3A circuit breaker 4RN.
- Supply of the first Officer ACP 2RN2 and its associated electronic circuit located in the AMU via 3A circuit breaker 5RN.
- Supply of the Flight–Interphone Electronic Card located in the AMU via 3A circuit breaker 9RN.

Circuit breakers 4RN, 5RN and 9RN are located on the overhead panel 49VU.

Circuit breakers 6RN and 8RN are located on the rear wall, on panel 121VU.

AMU STANDARD 4031SA

Busbar 101PP

- Supply of the 3rd Occupant ACP 2RN3 via 3A circuit breaker 6RN located on the circuit breaker panel 121VU .
- Supply of the Avionics Compartment ACP 2RN4 and its associated electronic circuit (if installed) via 3A circuit breaker 7RN located on the circuit breaker panel 121VU (if installed).
- Supply of the 4th Occupant ACP 2RN5 and its associated electronic circuit (if installed) via 3A circuit breaker 20RN located on the circuit breaker panel 121VU (if installed).
- Circuit breaker 8RN is unused.

Busbar 401PP

- Supply of the Captain ACP 2RN1, of the audio board A (capt + bay) and of the SELCAL board via 3A circuit breaker 4RN located on the circuit breaker panel 49VU.
- Supply of the first Officer ACP 2RN2, of the audio boardB (F/O – 3 occpnt) and of the BITE board via 3A circuit breaker 5RN located on the circuit breaker panel 49VU.
- Circuit breaker 9RN is unused.
- Circuit breakers 4RN, 5RN and 9RN are located on the overhead panel 49VU.
- Circuit breakers 6RN and 8RN are located on the rear wall, on panel 121VU.

Power Switching DC ESS/DC BUS 1

In case of loss of the DC ESS BUS both audio cards A & B would be lost. When the AUDIO XFER is activated then the opposite audio card is powered by DC BUS 1 (if powered), to prevent total loss of the communication functions. This is done by two switching relays (68RN & 69RN see ASM).

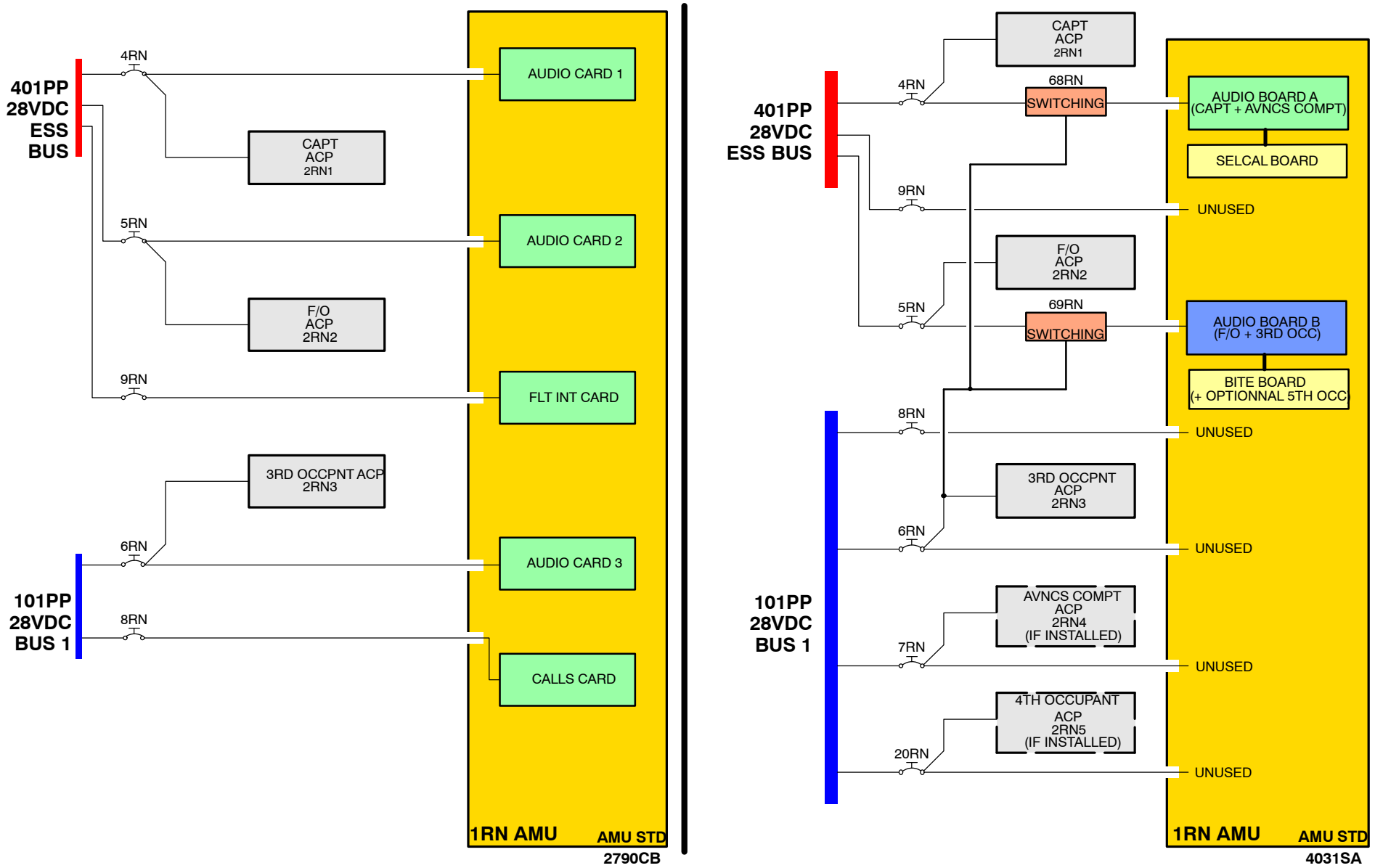


Figure 7 AMS Normal Power Supply

AUDIO MANAGEMENT UNIT COMPONENT DESCRIPTION

Purpose

The Audio Management Unit (AMU) ensures the interface between the user (jack panel and ACP) and the various radio communication and radio navigation systems.

The AMU ensures the following functions:

- Transmission
- Reception
- SELCAL and display of ground crew and Cabin Attendant calls
- Flight interphone
- Emergency function for the Captain and First Officer stations

It also serves to record communications and is equipped with a TEST circuit (BITE). This TEST circuit enables the AMU to be connected to the CFDIU.

Mechanical description

The AMU is in the form of a 4MCU size box in compliance with ARINC 600 Specifications.

Operation

The basic AMU comprises 4 channels: CAPT, F/O, 3rd OCCPNT and avionics bay station (requires activation of a dedicated pin–programming).
It can receive one additional channel for a 4th cockpit occupant.

Transmission Function

The transmission function sets into service and supplies the various microphones used (boomset, hand microphone, oxygen mask microphone)

It selects the transmitter selected by the operator by means of the ACP and ensures the emergency function (for transmission section).

There is an independent transmission channel for each user of the audio integrating system.

Transmission on passenger address channel

Transmissions can be made on the passenger address channels in 2 ways:

(**1**) In normal configuration, the handset installed aft of the center pedestal is used to make the PA announcements. This handset is part of the Cabin Intercommunication Data System (Ref. ATA 23–73–00).

(**2**) In RADIO configuration, the rectangular PA pushbutton switch located on each ACP is used to make the passenger address announcements.
This pushbutton switch is unstable, i.e. hold it pushed to make the announcements: this avoids unwanted transmissions.
The electronic processing of this channel is identical to that of the other transmission channels.
The operation of this pushbutton switch can be made identical to that of the other transmission channels (stable operation). To achieve this, modify the AMU pin–program.

Reception Function

The reception circuit selects and adjusts the volume on the reception channels.
The operator selects and adjusts these channels on the ACP.
Each user of the audio integrating system has a separate associated reception–channel.

It ensures the various supplementary functions of the circuit:

- VOR/DME/LS switching
- VOICE/ON function

The audio signals from the various communication and navigation units are first connected to analog/digital converters, and then to the DSP (Digital Signalling Processor) located on the audio boards.

Dedicated inputs exist on the DSP for filtered signal (ADF and VOR).
The DSP is also connected to a control module which provides information computed from the ACP (potentiometers position, Voice filter selection) and from the FCU (DME coupling to VOR or LS). After digital processing inside the DSP, the resultant signal is converted into analog and sent to the output transformer.

A minimum VHF and HF reception level is ensured when the potentiometers on the ACP are set to minimum. The minimum reception level is deleted when the potentiometers are set to OFF.
Minimum reception level is –32 dB with reference to maximum level.

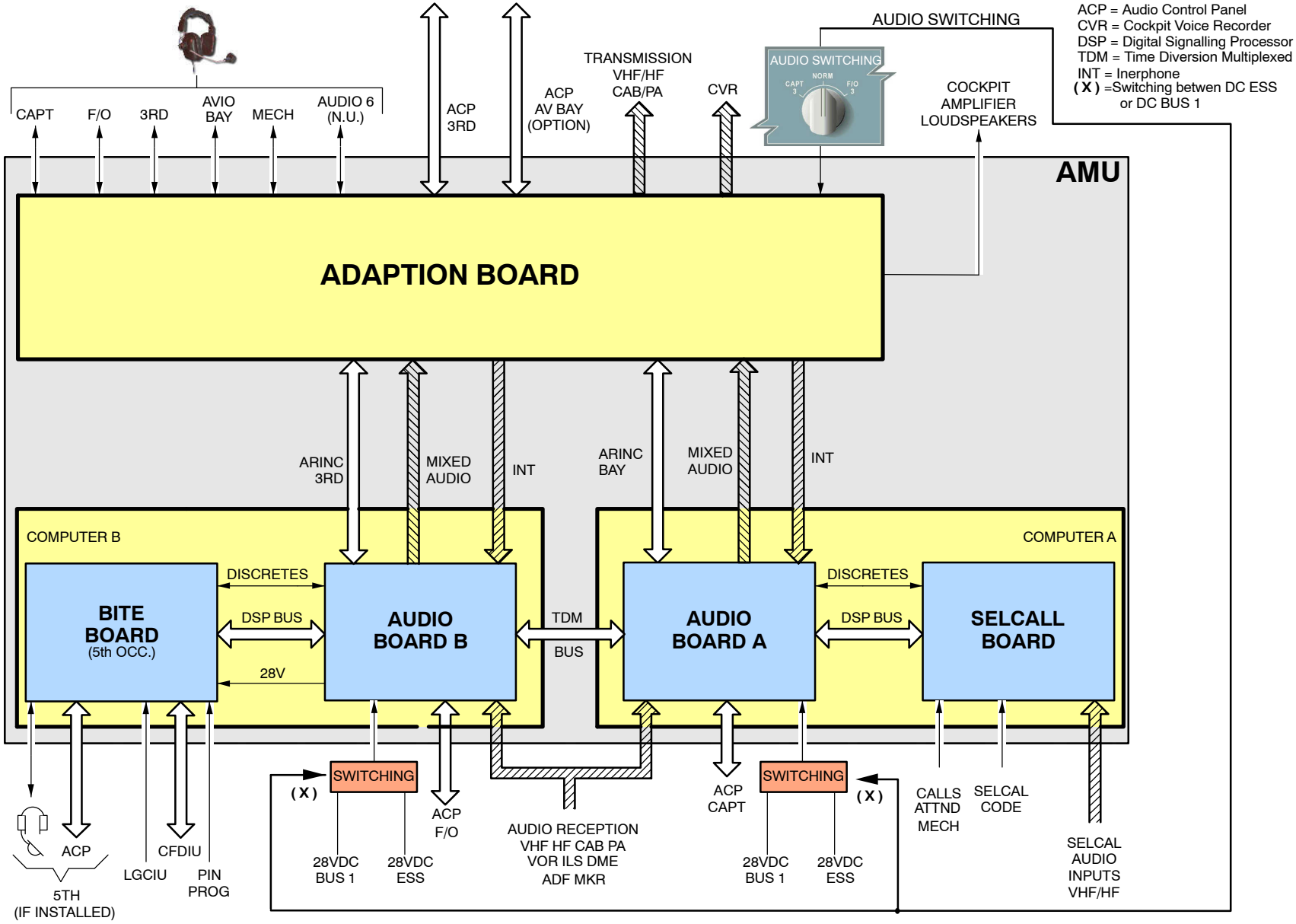


Figure 8 AMU Block Diagramm

EMERGENCY FUNCTION OPERATION

Purpose

The emergency function is used in case of loss of communications on the Captain or the First Officer channels. This function switches the Captain or First Officer communications to the 3rd Occupant station.

In this case, the Captain (or the First Officer) uses the ACP located on the overhead panel to make his microphone or audio selections.

Pilot emergency function

The AUDIO SWITCHING selector–switch 16RN located on the overhead panel is used to switch to emergency configuration.

In case of a failure on the Audio Board A, the pilot's microphones and audio signals are switched through relays in parallel to the 3rd occupant's microphone inputs and audio outputs.

The PTT commands from the pilot's microphones are active.

The pilot's ACP is no longer active.

First Officer emergency function

In case of a failure on the Audio Board B, the copilot's microphones and audio signals are switched through relays to the Avionics Bay microphone inputs and audio outputs, which are no longer active.

The PTT commands from the copilot's microphones are active.

The copilot's ACP is no longer active.

In addition, the 3rd occupant's micro and audio signals are switched in parallel to the Avionics Bay micro and audio signals, and the 3rd ACP ARINC bus is switched to the avionics bay ACP ARINC input/output.

The Avionics Bay ACP ARINC line is cut.

This switchover is indicated on the upper ECAM display unit (Memo Message: **AUDIO 3XFRD**, REF ATA 31–54–SDAC).

Example CAPT3

ACTION	RESULT
On the ACP of the Captain and the 3rd Occupant push the INT transmission and reception P/B.	The green bars on the INT transmission pushbutton switch come on.
On the overhead control and indicating panel set the AUDIO SWITCHING selector switch to CAPT 3.	On the upper ECAM DU the AUDIO 3XFRD indication comes into view in green.
At the CAPT station push the PTT switch on the microphone and at the same time, speak into it.	Make sure that what is said in the microphone is clearly audible in the boomset and loudspeaker of the Captain.
On the 3rd Occupant's ACP push the INT transmission pushbutton switch.	The green bars on the INT transmission pushbutton switch go off.
At the CAPT station speak into the microphone.	Make sure that the reception stops in the boomset & loudspeaker of the Captain
On the 3rd Occupant's ACP push the INT transmission pushbutton switch, then smoothly turn clockwise the INT pushbutton switch for reception and speak into the CAPT microphone.	The green bars on the INT transmission pushbutton switch come on and make sure that the reception volume changes smoothly and that there is no interference in the boomset & loudspeaker of the Captain.
On the CAPT ACP, set the INT/RAD switch to RAD and hold it in this position and speak into the boomset microphone.	Make sure that the reception stops in the boomset & loudspeaker of the Captain.
On the CAPT (F/O) side stick controller, push the PTT switch and speak into the boomset microphone.	Make sure that what is said in the microphone is clearly audible in the CAPT boomset & loudspeaker.
On the 3rd ACP set the RAD/INT switch to RAD and hold it in this position and speak into the microphone of the CAPT (F/O) boomset.	Make sure that what is said in the microphone is clearly audible in the boomset and loudspeaker of the Captain.
Release RAD/INT & set AUDIO SWITCHING selector switch to NORM.	

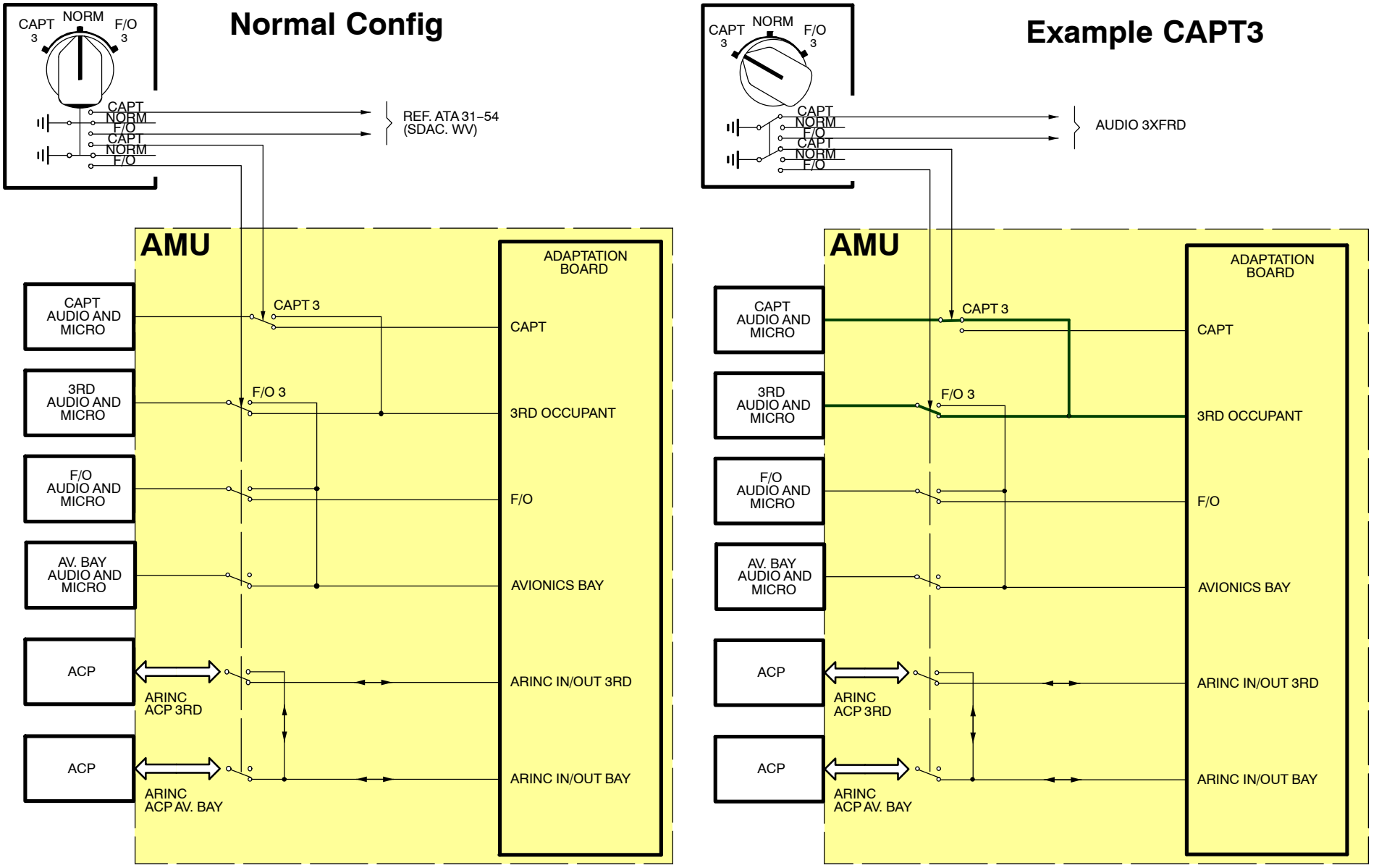


Figure 9 Emergency Switching Function

TRANSMIT CIRCUIT OPERATION

Transmission with various microphones
For transmission, each crew member can use either a hand microphone, a boomset or an oxygen mask.

The analog signals of these three microphones are adapted and filtered on the adaptation board of the AMU, which also receives the hand microphone PTT and oxygen mask control discretes.

The microphone selection is done by a dedicated circuit according to the following logic:		Oxygen Mask Control Discrete	
		0	1
Handmike PTT	0	Boomset signal valid	Boomset and oxygen mask signals valid
	1	Handmike signal valid	

The selected microphone signal is then sent to an output transformer.

At the transformer output, this signal is switched to the transmitter selected by the operator on the ACP, in accordance with information received from the DSP (Digital Signalling Processor).

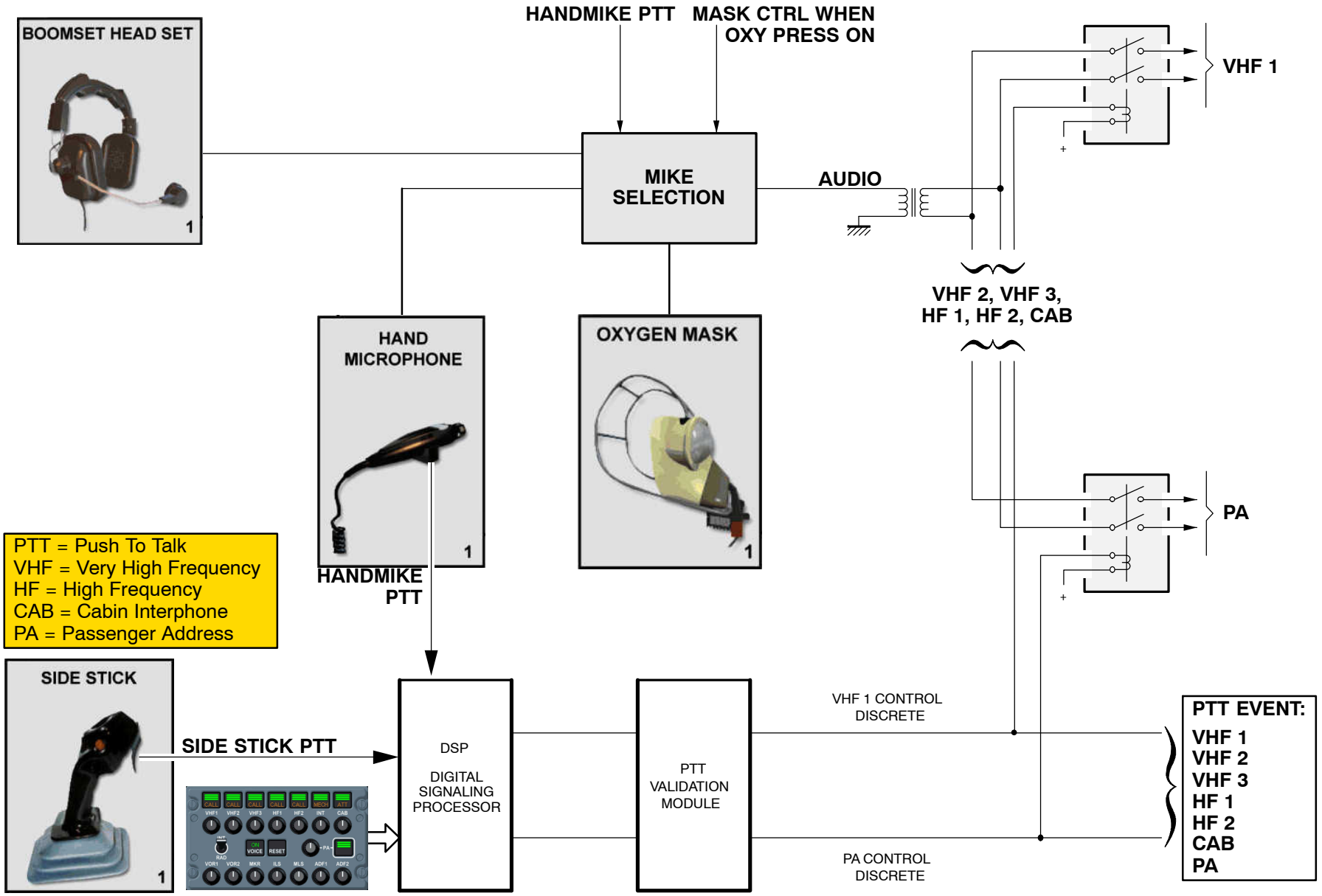


Figure 10 Transmission Function

LOUDSPEAKER MUTING CIRCUIT OPERATION

PURPOSE

The feedback produced by the loud speaker–microphone acoustic coupling when the microphones are used (acoustic feedback) is eliminated by a muting circuit.

To achieve this, the muting circuit reduces the gain and/or the frequency range of the loud speakers.

This attenuating circuit is controlled by the PTT switch of any of the radio communication microphones.

The attenuating circuit is an integral part of the loud speakers.

Operation

The logic processing channel receives PTT switch type information.

From this information it activates the muting module. A ground is sent to the loud speaker units which set the direct muting function into service.

NOTE: This attenuating circuit is not operative with the following warning audio outputs:
- Flight Warning Computer (FWC)
- Traffic Collision Avoidance System (TCAS)
- Enhanced Ground Proximity Warning System (EGPWS)
- Weather Radar Predictive Windshear Warning (PWS)

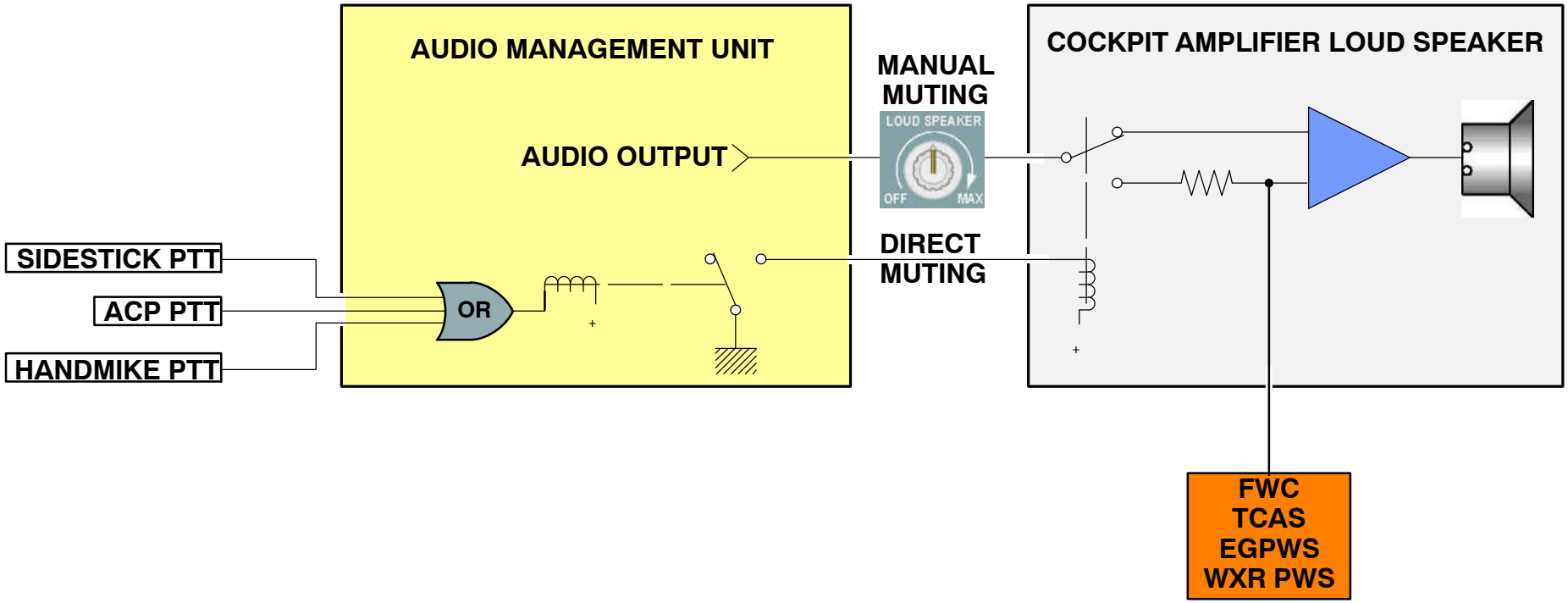


Figure 11 Direct Muting Schematic

FLIGHT INTERPHONE GENERAL DESCRIPTION

General

The flight interphone enables:

- Telephone conversations between the various stations in the cockpit
- Telephone conversations between the cockpit and the ground crew via the external power panel.

Operation

The flight interphone comprises the following functions:

- microphone inputs.
- amplification and summation.
- audio output.

NOTE: Ground Mech microphone is valid when air/ground discrete is set to GND.

INT Selection

The INT position of the INTerphone/RADio selector switch enables permanent use of the flight interphone without any further action and whatever the radio key selected (here VHF 1).This is a stable position.

NOTE: The radio function has priority over the flight interphone function. So, even with the INT/RAD switch in INT position, the flight interphone is momentarily cut during a radio emission (radio key selected and hand microphone or side–stick Push To Talk (PTT) actuated).

RAD Selection

The RAD position of the INT/RAD selector switch puts the pre–selected channel in emission (here VHF 1). This is an unstable position. This position acts like the selection of the hand microphone pushbutton or like the PTT pushbutton of the side–stick.

INT KEY AND KNOB

The flight interphone is selected like a VHF transceiver. Selection of the INT transmission key lights the green bars, indicating that the flight interphone is ready to operate. Pressing and releasing the INT reception knob adjusts the interphone level. If done, the knob comes on white.

Placing and holding the INT/RAD switch in RAD position lets the operator talk through the flight interphone system.

Microphone Inputs

There are two types of microphone inputs:

- normal inputs, which are inputs from the CAPT, F/O, 3rd OCCPNT , Avionics Bay (and optionally 5th OCCPNT).
- protected inputs, which comprise the mechanic input and the Reserve input (Input 6).

Protected Inputs

The mechanic input is disconnected from the interphone amplifier when the flight/ground information from the LGCIU is present (flight configuration).

The input 6 is disconnected from the interphone amplifier when the PTT input 6 is not activated.

The ADDER is used to sum all input signals.

Architecture

The adaptation board perfoms the summing of all the modulation signals. As a security precaution, there are two independent summation circuits. The output of the first summation circuit is transmitted to the ”master” audio board (board A).

The output of the second summation circuit is transmitted to the ”slave” audio board (board B).

The ouputs of the first summation circuit is also transmitted to the MECH and Audio 6 outputs.

Figure 12 Flight Interphone

MAINTENANCE TIPS - RADIO PTT SWITCH LOCATION

GENERAL

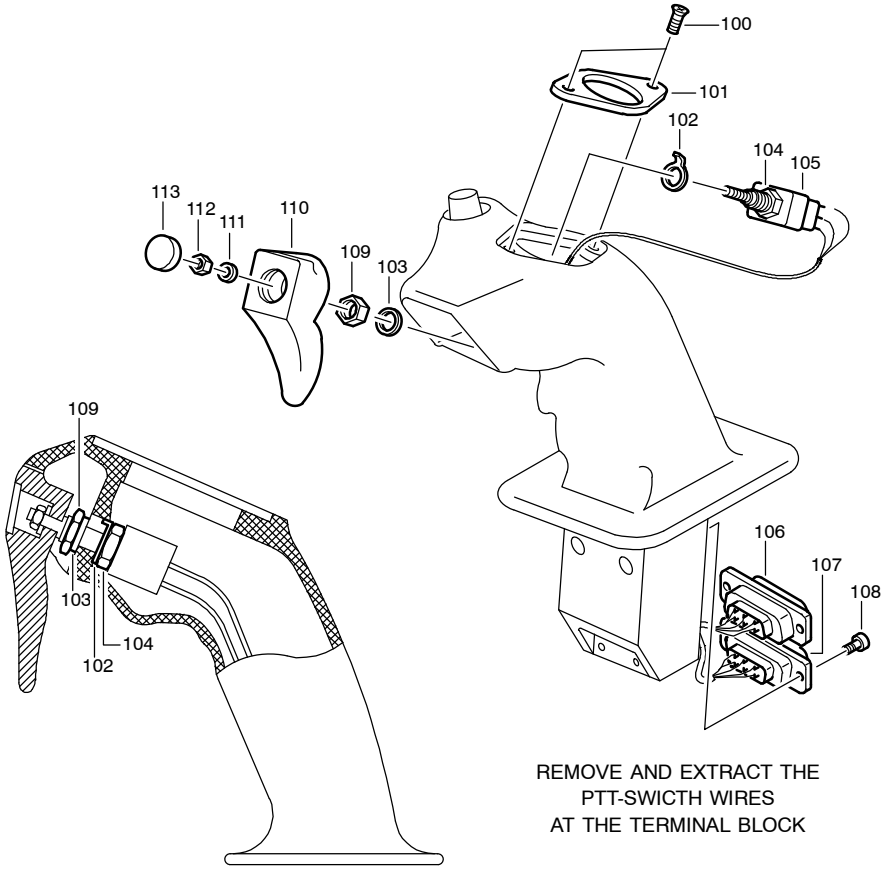
To replace the Radio PTT-Switch it depends on the Side Stick assembly installed in the aircraft.

On the **old–generation side–stick unit** there is the possibility to remove the electrical wires at a terminal block in the lower part aof the side stick control handle. To do so the control handle must be removed first.

On the **new–generation side–stick unit** this is not possible. Here there is either a splice already installed, or you have to do this. When a spilce is already installed you may use a extraction/insertion tool otherwice you have to cut the wire and install a splice.

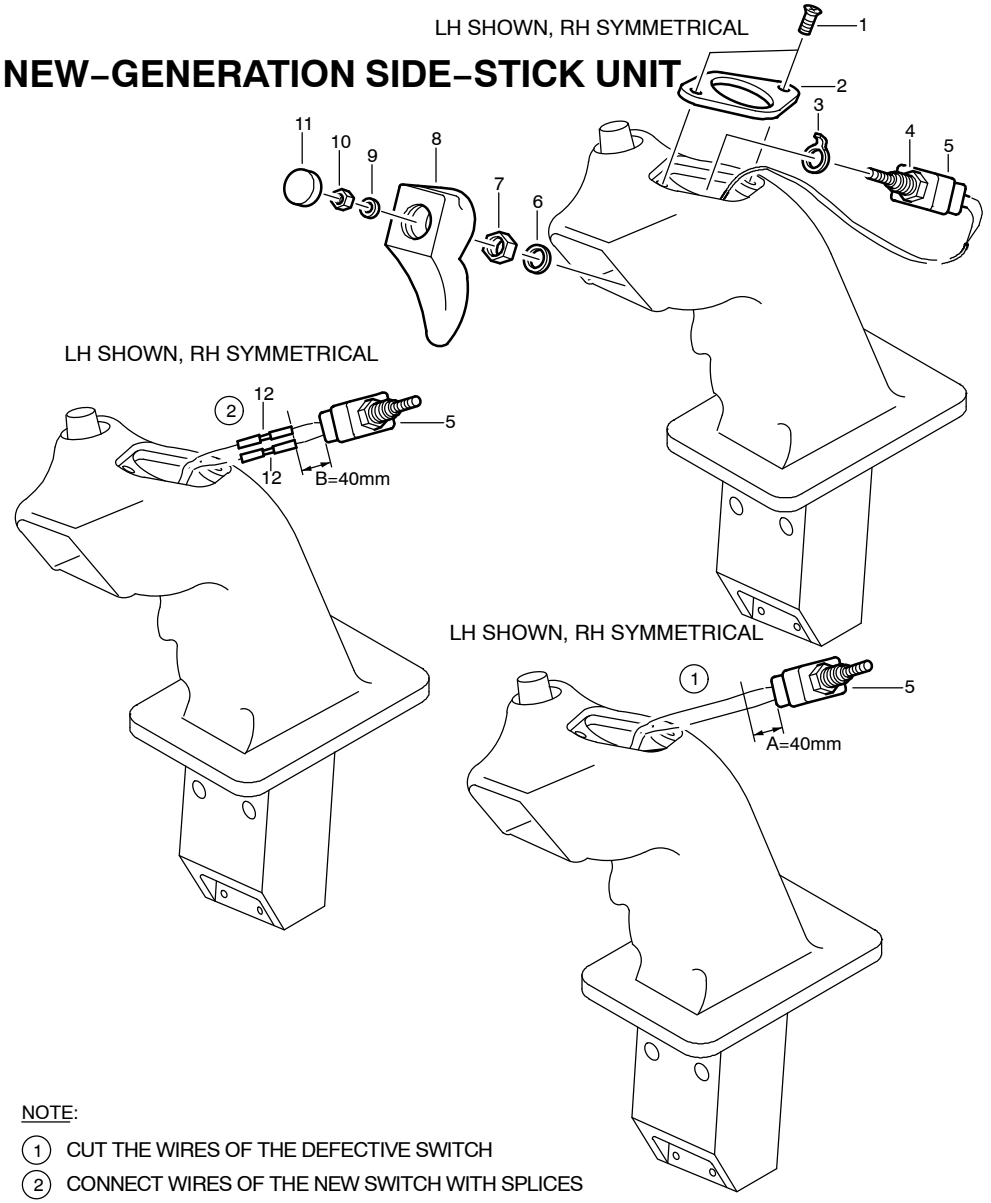
For details refer to AMM 27–92–41PB401

OLD–GENERATION SIDE–STICK UNIT



REMOVE AND EXTRACT THE
PTT-SWICTH WIRES
AT THE TERMINAL BLOCK

NEW–GENERATION SIDE–STICK UNIT



NOTE:

(1) CUT THE WIRES OF THE DEFECTIVE SWITCH

(2) CONNECT WIRES OF THE NEW SWITCH WITH SPLICES

Figure 13 Maintenance Tips - PTT-Switch

RECEPTION CIRCUIT OPERATION

General

The audio signals from the various communication and navigation units are first connected to analog/digital converters, and then to the Digital Software Processor (DSP) located on the audio boards.

Dedicated inputs exist on the DSP for filtered signal (ADF and VOR).

The DSP is also connected to a control module which provides information computed from the ACP (potentiometers position, Voice filter selection) and from the FCU (DME coupling to VOR or LS).

After digital processing inside the DSP, the resultant signal is converted into analog and sent to the output transformer.

DME/VOR/LS Switching

In normal configuration, the DME reception is coupled with the VOR reception. However, in certain landing system approach conditions, the DME used must be aurally identified.

The DME reception must therefore be coupled with the MMR reception. The LS pushbutton switch is used for switching control.

Action on this command sends a ground to the AMU which couples the DME receptions to the MMR receptions.

VOICE/ON Function

The VOR, ADF navigation ground stations transmit a morse code which is used to identify them. However, certain stations, in addition to their code, transmit recorded voice information. This information informs the crew of subjects such as: latest weather information, state or special information concerning terrains etc. (e.g.: ATIS station).

In order not to hinder the reception of this information, the VOICE/IDENT function greatly reduces the morse code reception. It is attenuated until it becomes practically inaudible while this information is being transmitted.

The transmission modulation frequency for ground station codes is 1020 Hz. However, certain onboard equipment (COLLINS ADF) receive a 1020 Hz frequency–modulated signal and at same time transmit this signal at 1000 Hz to the audio system. The 1000 Hz signal is generated by their synthesizer (the aeronautical standards specify that the ADF ground stations must be modulated at a frequency of 1020 Hz plus or minus 50 Hz).

Furthermore, the DME reception is coupled to the VOR reception (in normal operation). Thus the DME marker identification–code is transmitted with a frequency modulation of 1350 Hz.

The filtering circuit of the navigation channels therefore comprises an attenuation filter for the reception bands of the ADF and VOR systems. On older aircraft types also the DME signal is filtered when it is coupled with an VOR, but never in connection with an ILS signal.

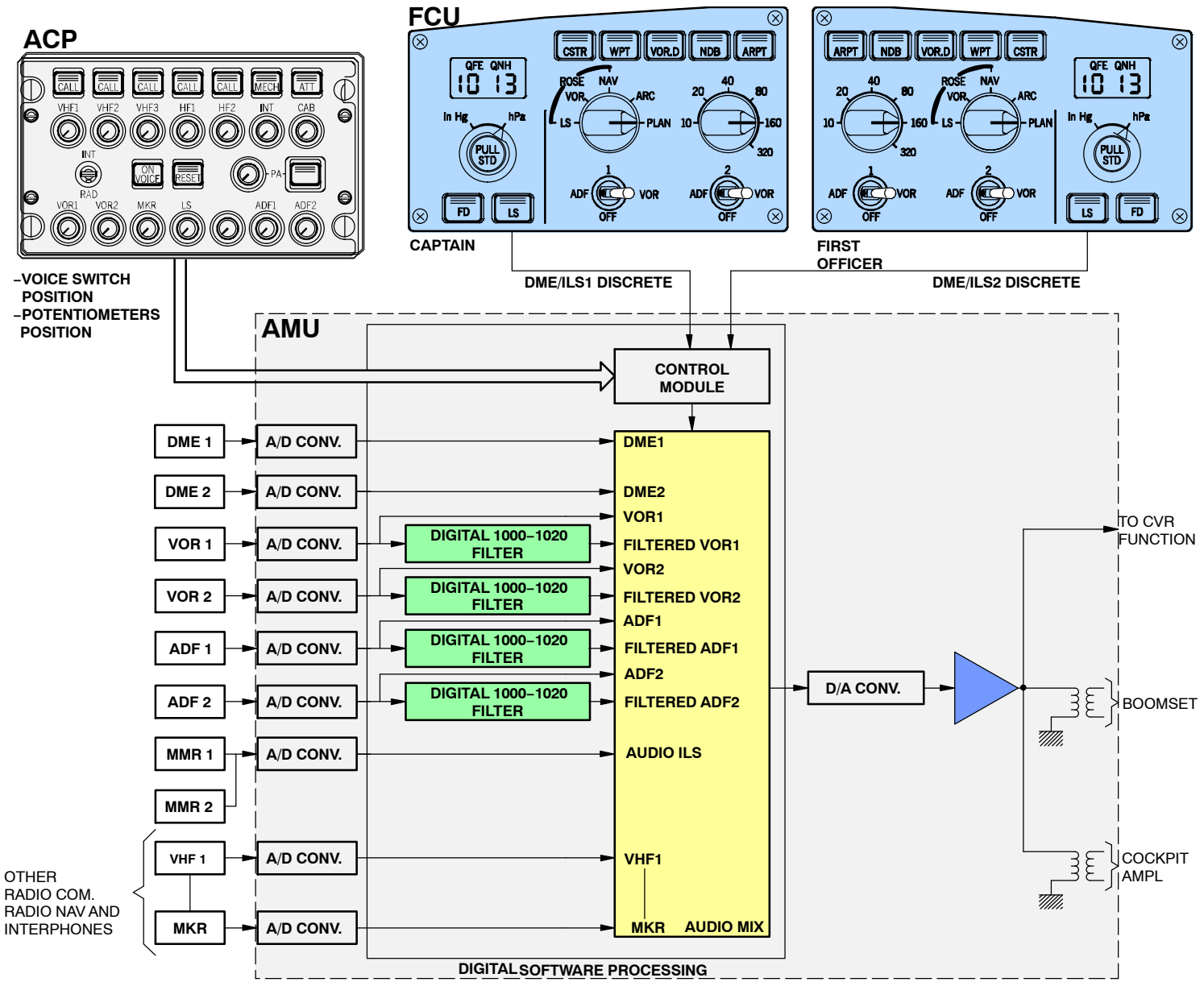
This digital filter attenuates the 1000 and 1020 Hz frequencies by more than 32 dB. Action on the VOICE pushbutton switch located on each ACP has the following effects:

- Released position, VOICE/ON off

  The filters are not used, the operator simultaneously receives the marker identification and the voice transmission
- Pressed in position, VOICE/ON on

  The DSP directly processes the filtered signals. The 1000 – 1020 Hz frequencies are greatly attenuated, the DME identified is cut off (1350 Hz). Only the voice transmissions are audible.

NOTE: The audio outputs of the communication channel and the MMR, MKR navigation do not transit via digital filters.



ABBREVIATIONS:
FCU: Flight Control Unit (EFIS Section)
ACP: Audio Control Panel
AMU: Audio Management Unit
DME: Distance Measuring Equipment
VOR: VHF Omnidirectional Radio
ADF: Automatic Direction Finder
MMR: Multi Mode Receiver (ILS + GPS)
VHF: Very High Frequency
MKR: Marker

Figure 14 Reception Function

SELCAL, MECHANIC & CABIN ATTENDANT CALL FUNCTION

Purpose

A visual and aural indication of the calls from the ground stations equipped with a coding device which can be used by the aircraft installation (SELCAL system – Selective Calling).

The calls are sent on the radio frequencies which link the aircraft to the ground. The communication channels used are :

- VHF1, VHF2, VHF3 and HF1, HF2 if installed.
- A visual indication of the calls from the ground crew or from the Cabin Attendants.

SELCAL Ground System Description

The ground system transmits, via VHF or HF transmitters, a selective call code. This code comprises 2 consecutive pulses each containing a mixture of the 2 frequencies.

According to the ARINC 714 specification, this enables the calls to be differentiated. The call comprises a single–code transmission without repeat.

SELCAL Aircraft System Description

The aircraft receivers detect and capture the call signals transmitted by the ground stations (VHF or HF). Once detected, the signals are sent to the AMU SELCAL board.

The SELCAL function continuously monitors the digital data of the five radio communication channels. It analyzes the received signals to check if they comprise the frequencies relevant to aircraft code. The operator programs this code on the SELCAL code panel.

If the frequencies and aircraft code correspond, the warning system transmits an aural signal. The CALL legend on each ACP associated to the system which received the call (VHF1 – VHF2 – VHF3 – HF1 – HF2) comes on.

SELCAL Operation

The SELCAL signal issued by the various communication assemblies is applied, depending on its source, to one of the 5 input channels (VHF1, VHF2, VHF3, HF1, HF2).

The calculating unit recognizes if the code of the signals received corresponds to the code given by the SELCAL code panel and interprets and manages the various information received from the input circuits: ground crew call, Cabin Attendant call. Then it generates the various messages transmitted to the output circuits which is sent to the audio boards which transmit the information to the various ACPs via their connecting bus in order to switch on the associated lights.

Likewise, data is sent to the FWC system. This enables audio indication of the call.

When an operator pushes the RESET pushbutton switch on one of the ACPs, data is sent to the associated audio card. This data is transmitted via the input stages to the calculating unit. This calculating unit re–initializes the system.

Operation of Ground Crew Call System

When pushbutton switch 10WC located on external power panel is pushed, it sends ground information to the calculating unit via the input stages. The information is processed then a message is sent via the output stages to the various audio cards and then to the ACPs.

This causes the MECH legend to flash (coupled with INT transmission pushbutton switch) for 60 seconds. After 60 seconds, or when the RESET pushbutton switch is pressed, like the SELCAL system, the circuit is re–initialized.

Operation of Cabin Attendant Call

When a call is made from the Cabin Attendant station, the CIDS generates ground information. This information is sent to the calculating unit via the input stages and (after processing) sent via the output stages via the various audio cards and to the ACPs. On the ACPs, this causes ATT legend to flash (coupled with CAB pushbutton switch) for 60 seconds. After 60 seconds or when the RESET pushbutton switch is pushed, the calculating unit re–initializes the circuit.

It also sends information to the CIDS for re–initialization via the output stages.

NOTE: It is possible to inhibit the automatic function which causes the MECH and ATT flashing call legends to stop via Pin Program.

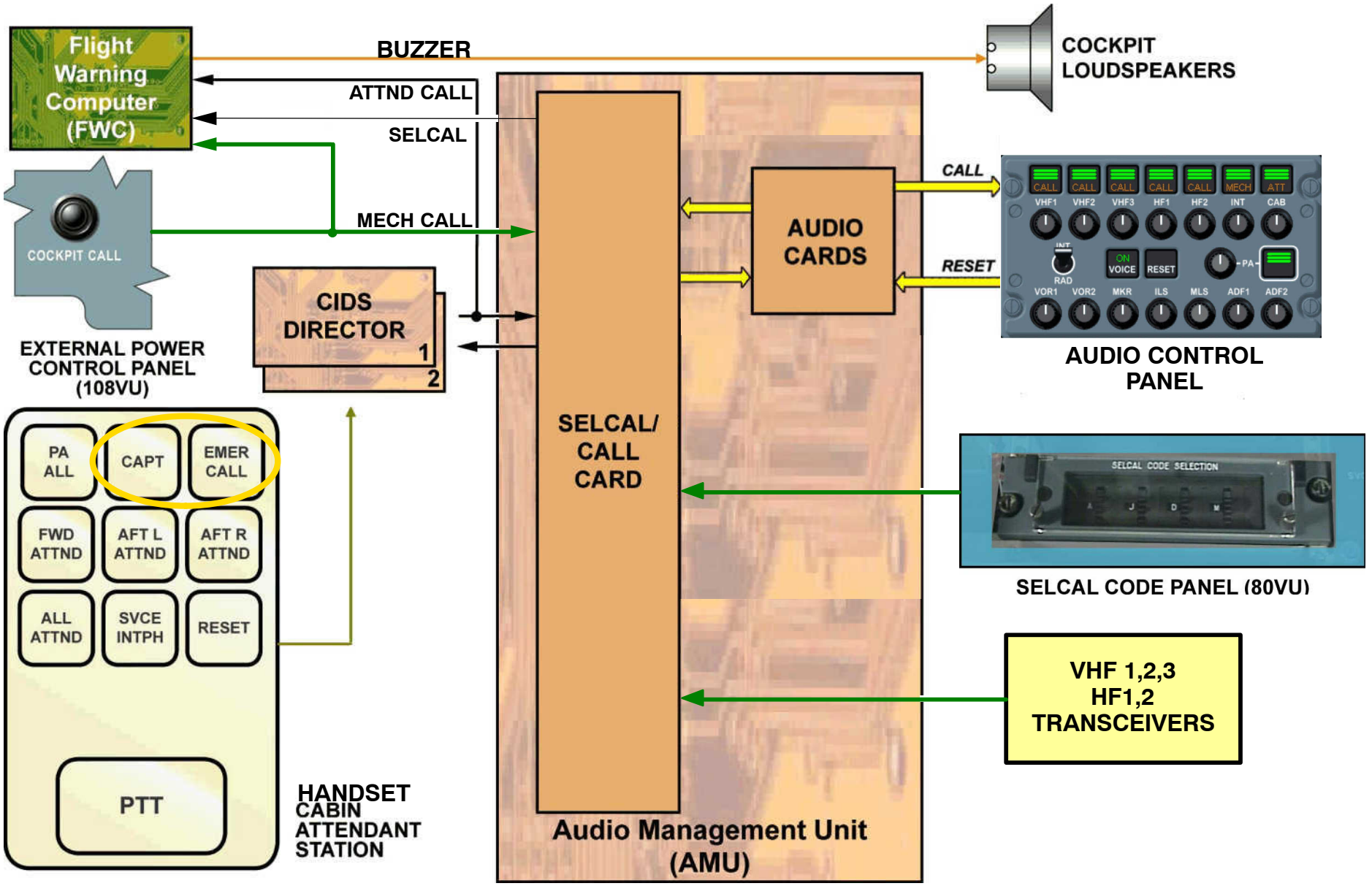


Figure 15 SELCAL, Mechanic and Attendant Call

23–42 GROUND CREW AND COCKPIT CALL SYSTEM

CALL SYSTEM PRESENTATION

General

The Ground Crew Call system enables the member to ground mechanic or ground mechanic to crew member calls.

Ground mechanic to cockpit call

When pressing the COCKPIT CALL pushbutton, the MECH light flashes amber on all ACPs and a buzzer is heard.

An action on the RESET key on any ACP will make all MECH lights go off.

Note: MECH lights go off automatically after 60 sec if the call is not cancelled by the RESET key.

Cockpit to ground mechanic call

The horn sounds as long as the CALL/MECH pushbutton is pressed in and the cockpit CALL blue light on the panel 108 VU stays on.

The RESET pushbutton makes the COCKPIT CALL light go off.

Additional Horn Warnings

The HORN can also be activated by following warnings:

- 26–13 APU FIRE on ground
- 21–26 BLOWERS LO FLOW on ground with engines shut down
- 34–14 ADIRS ON BAT on ground with engines shut down
- 25–65 ELT operation on ground
- 24–38 BATT discharge on ground

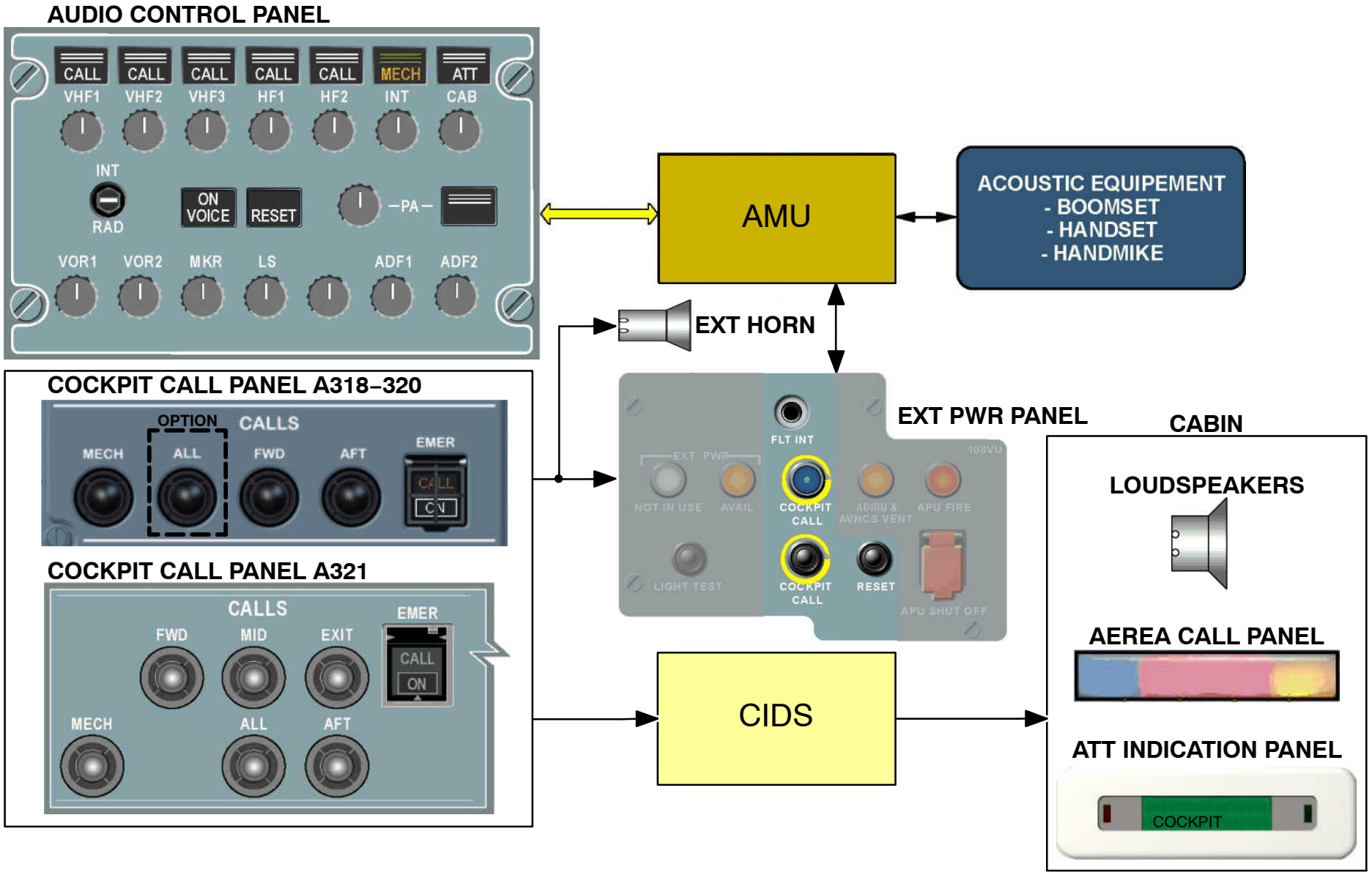


Figure 16 Cockpit Call System Overview

COCKPIT TO GROUND CREW CALL SYSTEM FUNCTIONAL OPERATION

General

The ground crew call system enables crew member–to–ground mechanic or ground mechanic–to–crew member calls.

System Description

The ground crew call system consists of :

- A CALLS/MECH pushbutton switch 1WC located on the overhead panel 21VU in the cockpit. It is associated with the RESET pushbutton switch 12WC located on the panel 108VU of the ground power receptacle.
- A mechanic call horn 15WC located in the nose gear well. The horn sounds to warn the mechanic of a call.
- A COCKPIT CALL indicator light 14WC located on the panel 108VU.This indicator light comes on to warn the mechanic of a call.
- A COCKPIT CALL pushbutton switch 10WC located on the panel 108VU. This pushbutton switch enables the ground mechanic to call the crew members via the circuit WW for the audio function and circuit RN for the visual indication.

The system operates on the ground only, with the left and right main landing gear shock absorbers compressed. However, in flight, if the LGCIU is not energized, the ground crew call is activated following pilot's action.

Ground Mechanic–to–Crew Member Call

When pressing the COCKPIT CALL pushbutton switch 10WC, a ground signal is applied to the FWCs (31–52) triggering the buzzer circuit which feeds the aural warning signal to the loud speakers. This ground signal is applied to the circuit RN for the illumination of the MECH legend on the ACPs.

Crew Member–to–Ground Mechanic Call

During all the time the pilot presses the CALLS/MECH pushbutton switch 1WC located on the overhead panel, the mechanic call horn sounds. The blue COCKPIT CALL indicator light comes on.

When the pilot releases the CALLS/MECH pushbutton switch, the mechanic call horn stops but the indicator light remains on. This indicator light goes off when pressing the RESET pushbutton switch 12WC located on the panel 108VU.

In addition this system provides warnings for the following circuits :

- 26–13 APU FIRE on ground
- 21–26 BLOWERS LO FLOW on ground with engines shut down
- 34–14 ADIRS ON BAT on ground with engines shut down
- 25–65 ELT operation on ground
- 24–38 BATT discharge on ground

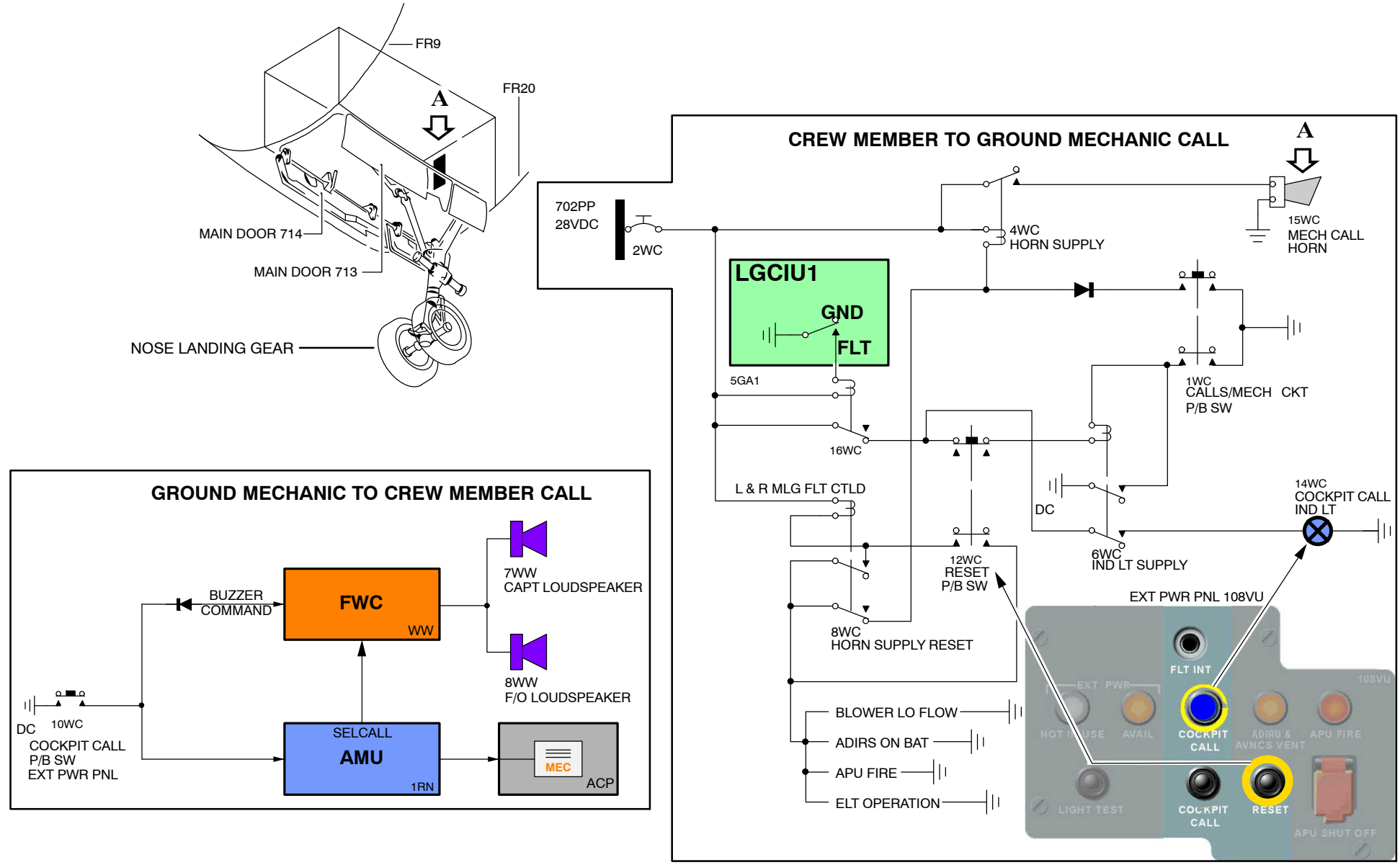


Figure 17 Call System Schematic

23–13 RADIO MANAGEMENT

RMP SYSTEM PRESENTATION

The RMPs are used for the selection of radio communication frequencies.

They are also used for the selection of radio navigation frequencies as back–up of the Flight Management Guidance Computers (FMGCs).

There are 3 RMPs for frequency selection :

- Each RMP can control any VHF or HF system.
- RMP1 and RMP2 can control the radio navigation systems in back–up mode.
- RMP3 cannot control the radio navigation systems.

The 3 RMPs permanently dialog so that each RMP is informed of the last selection made on any of the other RMPs

If two RMPs fail, the remaining RMP controls all the VHF and HF transceivers.

The transmission of data to the communication and navigation systems and the dialog between the RMPs are performed through data buses.

Optional Systems are:

- RMP 3
- HF 1 & 2
- VHF 3
- ACARS or ATSU

1 Windows

There are 2 display windows :

- The ACTIVE window displays the operational frequency.
- The STandBY/CouRSE window displays the standby frequency or the course in back–up navigation mode.

The windows are liquid crystal displays with a high contrast.

2 Communication Keys

There are 5 pushbutton keys for the radio communication systems. When a key is pressed, the ACTIVE and the STandBY frequencies are automatically displayed in the dedicated windows.

3 SEL Indicator

The SEL indicator light comes on WHITE, when a non associated Radio Management Panel takes control of the system frequency selection.
The normal configuration is :

- RMP1 associated with VHF1
- RMP2 associated with VHF2
- RMP3 associated with VHF3, HF1/2.

If VHF2 is selected on RMP1, the SEL light comes on WHITE on RMP1 and RMP2.

4 Dual Selector Knob

The DUAL SELECTOR KNOB is used for the selection of the frequency/course displayed in the STandBY/Course window.

5 ON/OFF Switch

The latching ON/OFF switch allows the crew to set the RMP on or off.

6 Transfer P/B

When the TRANSFER key is pressed, the operational frequency becomes the STandBY frequency and the STandBY frequency becomes the operational frequency.

7 Amplitude Modulation Key

The Amplitude Modulation (AM) key is associated with the HF system for communication with stations using amplitude modulation transceivers.

8 Navigation Receiver Keys

The NAVigation guarded pushbutton key allows the radio navigation systems to be selected, in back–up mode only, when the Flight Management Guidance Computers (FMGCs) are failed.

In radio navigation back up mode, navigation frequency/course selection is performed using the dual selector knob.

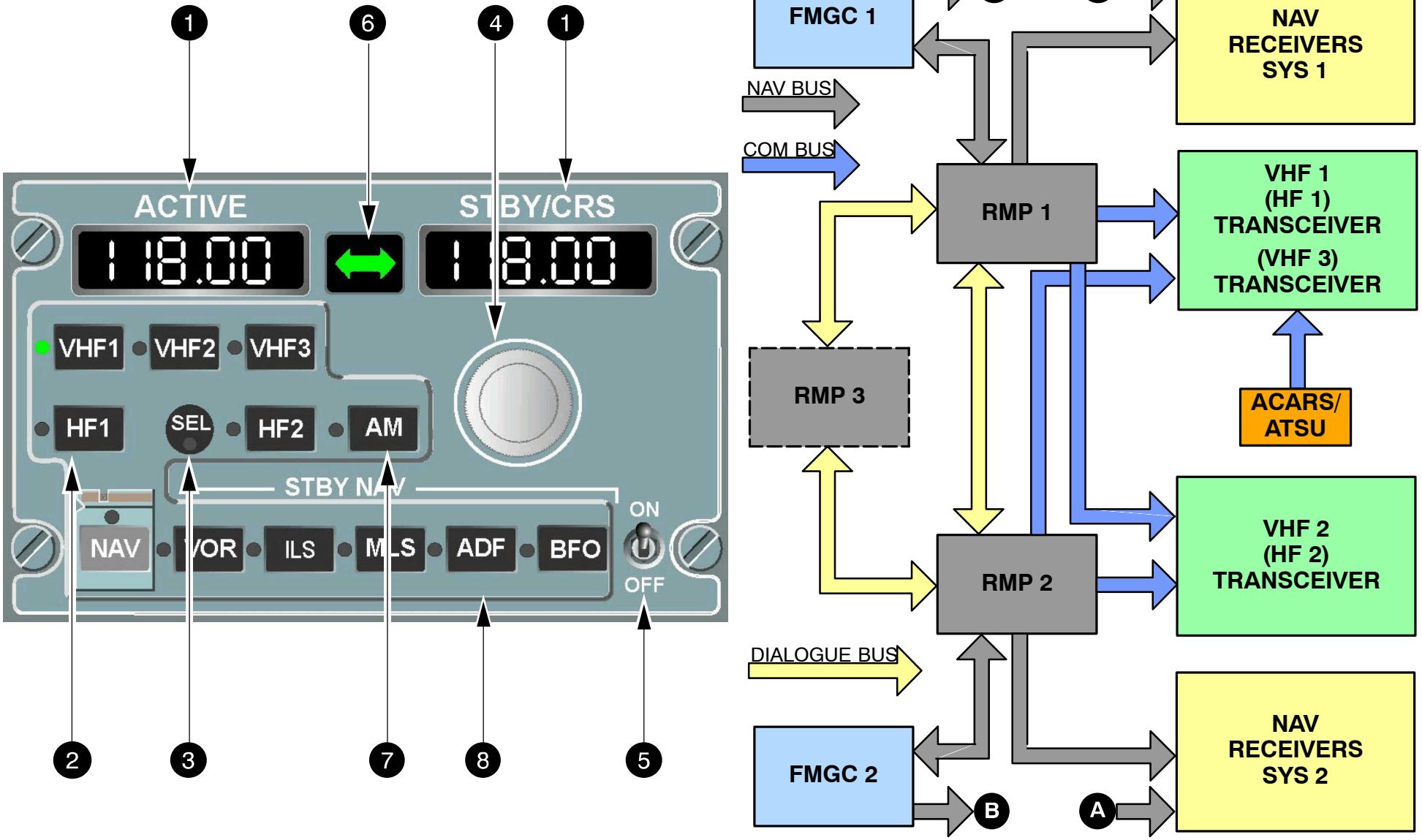


Figure 18 RMS Basic Schematic

RMP COMMUNICATION TUNING PRESENTATION

The radio management panels (RMP) are used for radio communication equipment frequency selection. They are also used for radio navigation equipment frequency selection in back up mode.

When the ON/OFF switch is set to on, the RMP displays the frequency previously selected. By means of the dual selector knob the desired frequency can be selected in the stand by window. The transfer pushbutton must be pressed to render it active and the displayed values are changed over. The RMP modifies its output data accordingly.

NOTE: Only the stand–by frequency can be modified by means of the dual selector knob.

The new active frequency is transmitted to all RMPs through the dialog buses.

NOTE: The AM pushbutton controls the selection of the amplitude modulation (AM) mode for the HF transceivers.

By default, the single side board (SSB) mode is selected on the corresponding HF system.This selection is memorized when another system is selected. The other RMPs take into account this selection through their dialog buses.

Frequency Ranges

- VHF: 118 to 136.975 MHz

  Channel width: 8,33 KHz or 25 KHz according to the pin prog
- HF: narrow band 2.8 to 23.999 MHz or wide band 2 to 29.999 MHz, according to the pin prog.

  Channel width: 1 KHz or 100Hz according to the pin prog.

NOTE: For narrow band, the frequencies between 2 and 2.799 are selectable for operating facilities but the HF transceiver could not be tuned on these frequencies.

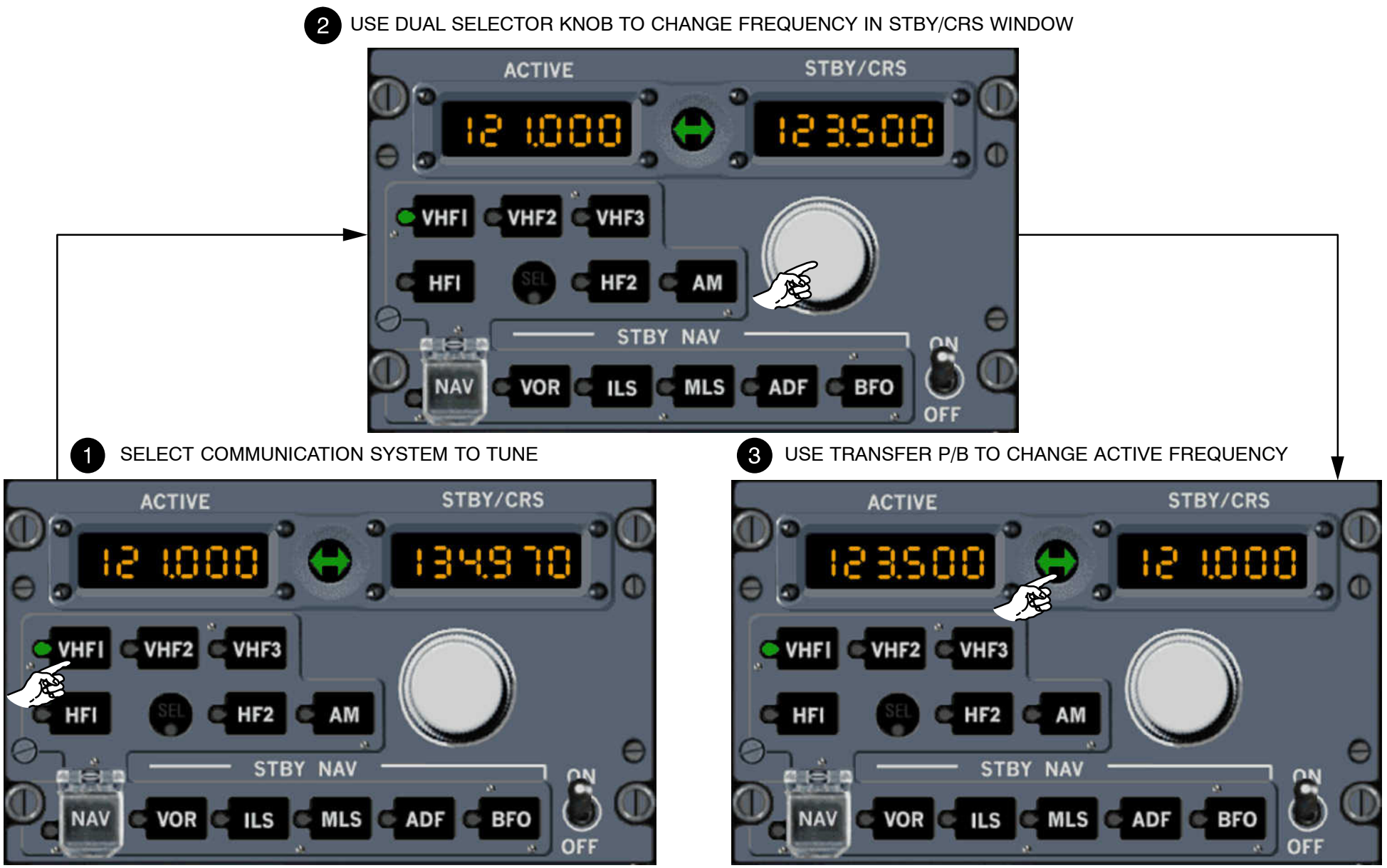


Figure 19 RMP COM Tuning

RMP SELECT LIGHT

The SEL indicator light comes on WHITE, when a non associated Radio Management Panel takes control of the system frequency selection.

The normal configuration is :

- RMP1 associated with VHF1
- RMP2 associated with VHF2
- RMP3 associated with VHF3, HF1 & 2.

When RMP 3 is not installed the systems associated with RMP 3 are then allocated with RMP 1.

For example when VHF2 is selected on RMP 1 the SEL indicator lights on RMP 1 and RMP 2 come ON.

NOTE: Only the active frequencys are exchanged via the RMP dialogue buses. The STBY frequencies are not transmitted by the RMP.

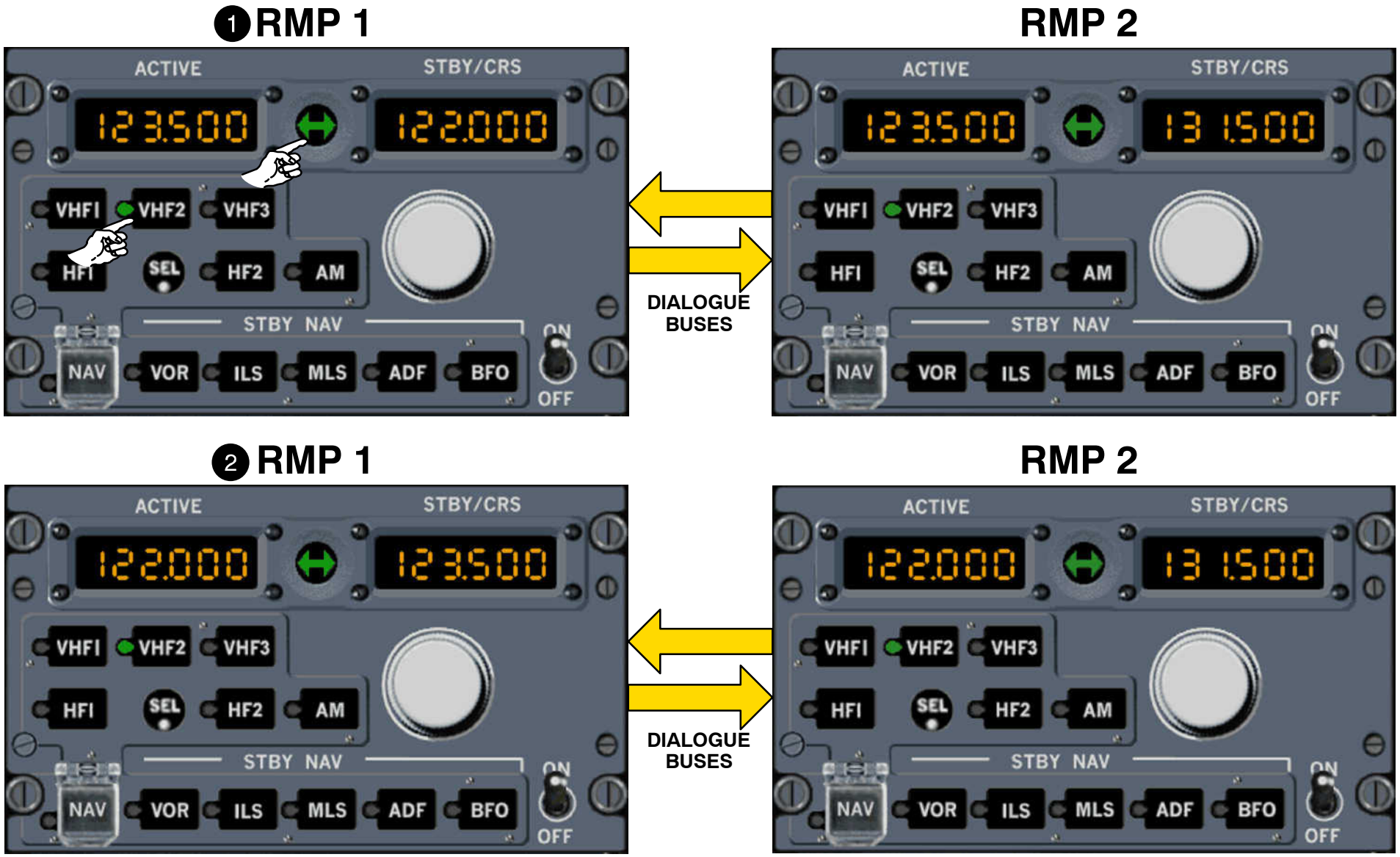


Figure 20 RMP SEL Light Function

RMP NAV BACK UP TUNING

Tuning Example

We are going to study the actions to be performed for a back up tuning of an ADF frequency and a VOR/ILS frequency and course.

The fist thing to do is to open the guard on the NAV key.

When the NAV key is pressed in, the on side VOR/ILS and ADF receivers are controlled by the RMP and no longer by the FMGC.

The green LED comes on indicating that you are in STANDBY tuning mode.

When the STBY NAV key is pressed, (i.e VOR), its green LED comes on and the previously memorized frequency is displayed in both windows.

The knob is turned to select a new frequency.

First, the selected frequency is displayed in the STBY/CRS window.

When the transfer key is pressed, the STANDBY frequency becomes ACTIVE and the active course is displayed in the right hand side window.

The outer knob is turned to select a new course. to select another frequency, the transfer key must be pressed again to get the active frequency displayed in both windows.

NOTE: The operation of course and frequency tuning is the same for VOR and ILS

ADF tuning is performed as for ILS or VOR except that when the transfer key is pressed, the standby and active frequencies are interchanged.

Radio Navigation Frequency Ranges

- ADF: 190 to 1750.5 KHz

  Channel width: 0.5 KHz
- VOR: 108 to 117.95 MHz

  Channel width: 50 KHz

  Between 108 and 112 MHz, the VOR frequencies are the ones in which the figure corresponding to the tenths of MHz is even (e.f. 108.00, 108.05, 108.20... 111.85).

  All the frequencies from 112 MHz included, which end in 50 KHz are VOR frequencies.

Only the frequencies assigned to the VOR system can be displayed when VOR is selected.

Course: 0 to 359.

- ILS: 108 to 111.95 MHz

  Channel width : 50 KHz.

  The ILS frequencies are the one in which the figure corresponding to the tenths of MHz is odd (e.f. 108.10, 108.15, 108.30... 111.95).

  Only the frequencies assigned to the ILS can be displayed when ILS is selected.

  Course: 0 to 359.

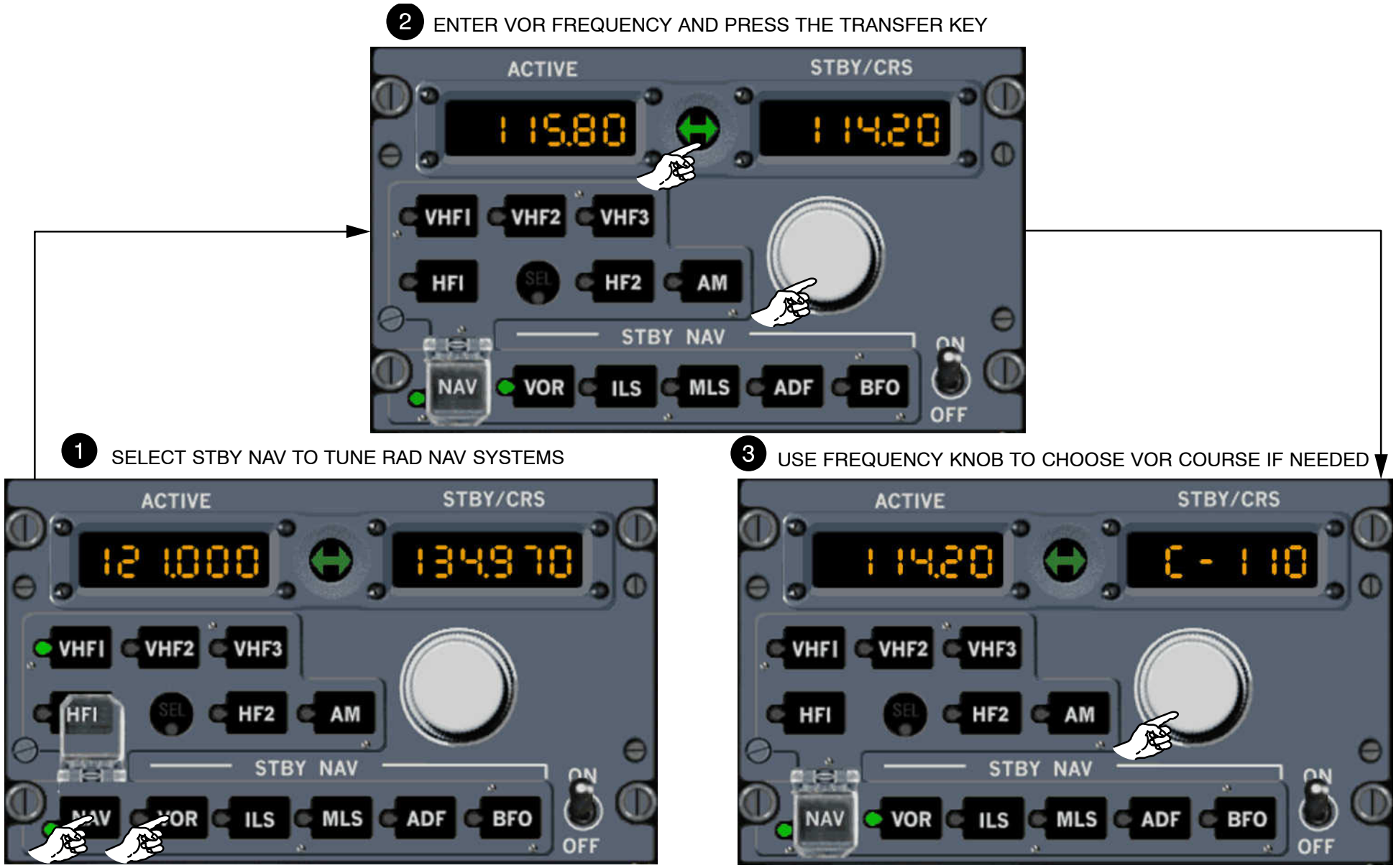


Figure 21 RMP NAV Backup Tuning

RADIO MANAGEMENT SYSTEM COM TUNING DESCRIPTION

OPERATION

The RMPs have two modes of operation:

- the normal mode,
- the radio–navigation back up mode.

Normal Mode

In normal mode the RMPs control the frequencies of the VHF1, VHF2 and HF1, HF2 transceivers. For frequency control on the VHF3 system, refer to the ACARS or ATIMS.

The operating frequencies of all the transceivers can be displayed and modified on one RMP. The RMPs exchange the various frequencies selected for the transceivers through dialogue buses.

Any new selection made on one RMP is taken into account by the two others.

Each RMP has two output buses connected to the radio communication equipment:

- The RMP1(2) COM BUS 1 delivers the VHF1 and HF1 frequencies.
- The RMP2 COM BUS 1 delivers the VHF3 frequencies.
- The RMP2(1) COM BUS 2 delivers the VHF2 and HF2 frequencies.

Each transceiver receives the appropriate output bus from the RMP1 and RMP2. The transceiver only takes into account one of the two signals (depending on the status of a discrete received from the RMP1 or 2).

In addition, the RMP1 or the RMP2 (set to OFF) can be made transparent for the RMP3 (its output buses are linked to the RMP1 and RMP2 only).

Communication Systems Tuning with RMP Fault(s)

In the event of failures of one or two RMPs, the reconfigurations are possible to control the radio communication equipment.

The transceivers have two frequency tuning inputs. Via a discrete the transceivers receive information which input to use. If a RMP is faulty it should be switched to OFF. Then the frequency buses and discretes are routed physically through the faulty RMP. Threrefore it is still possible to tune the systems with only one RMP operative.

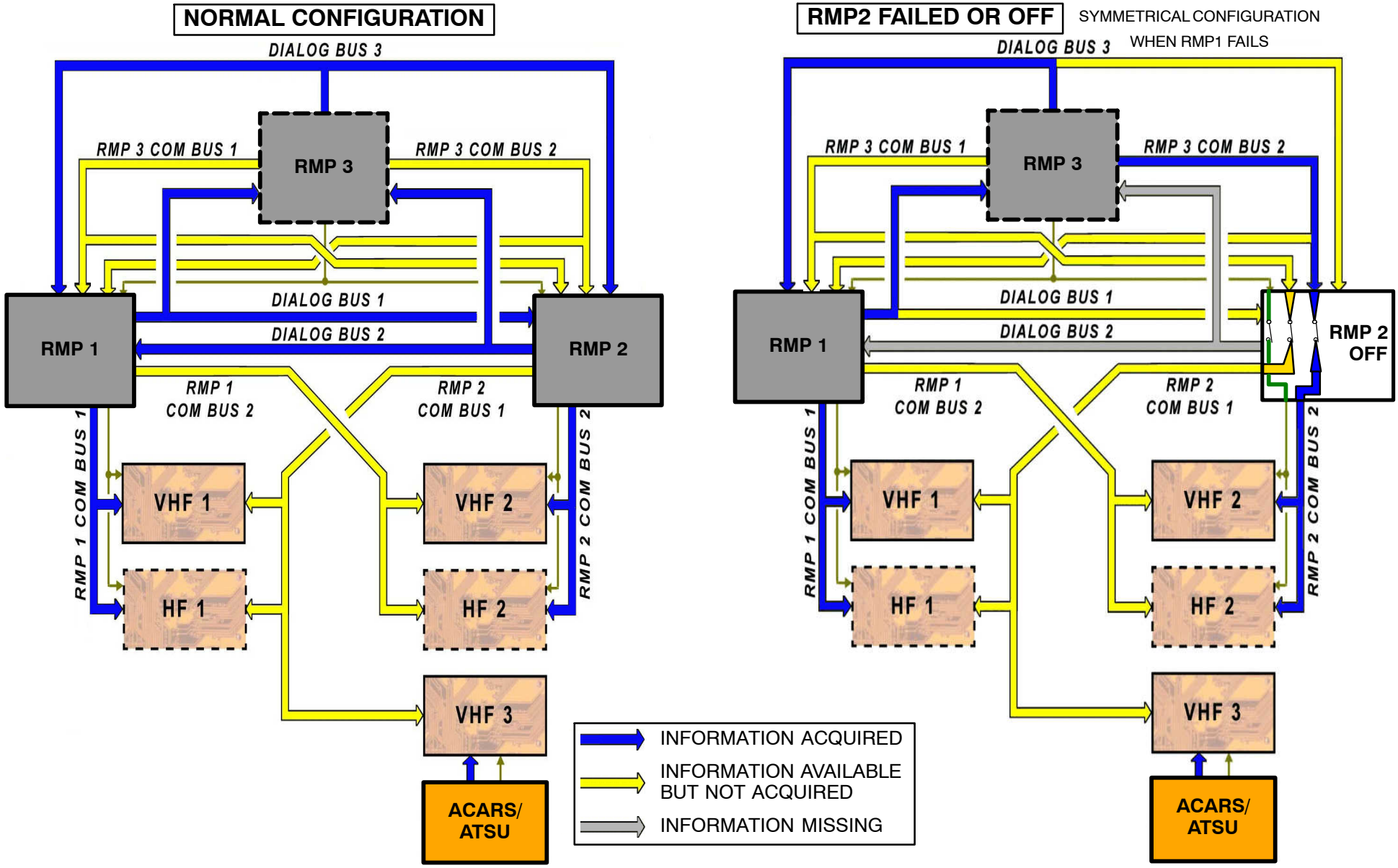


Figure 22 RMP COM Tuning (1)

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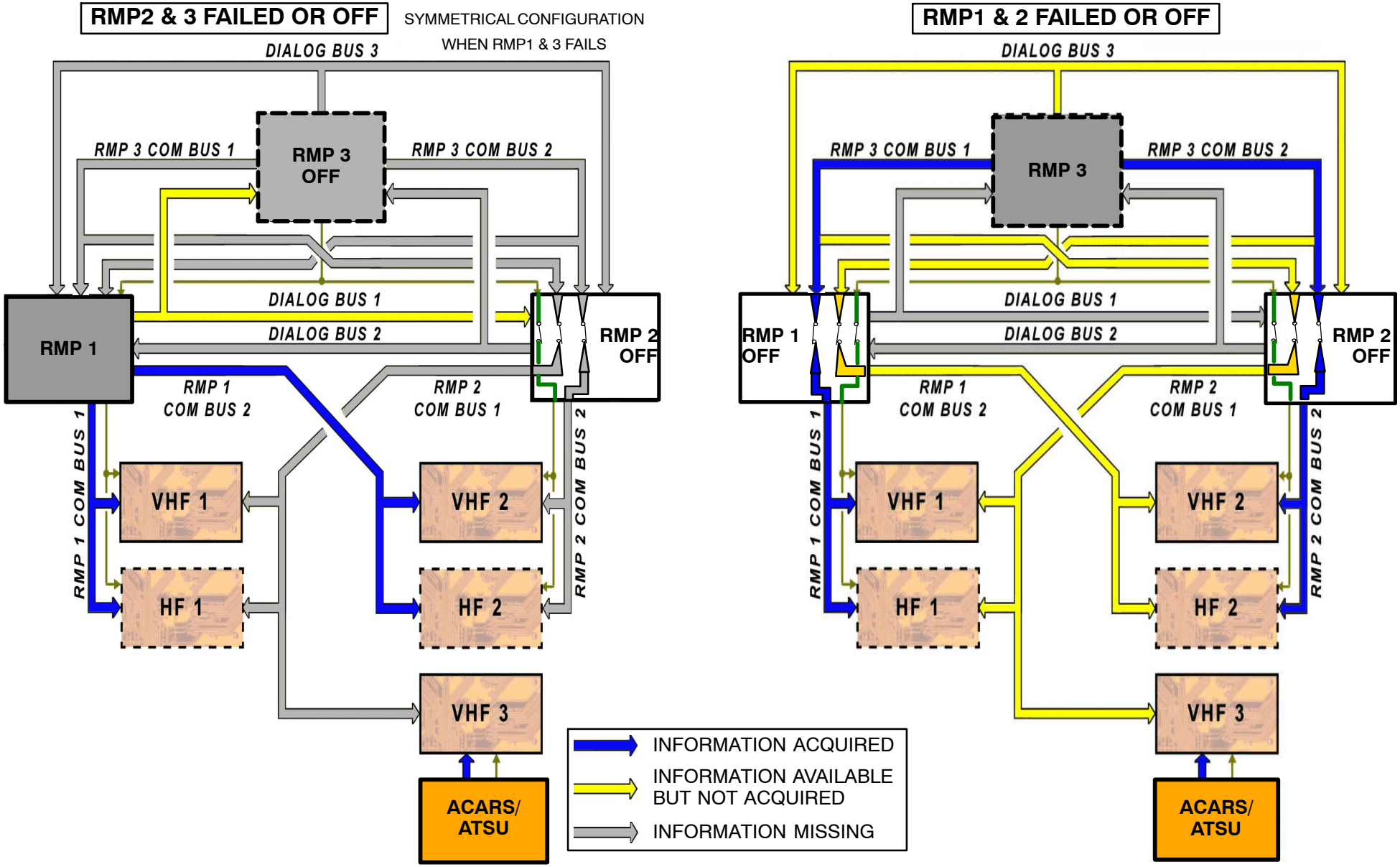


Figure 23 RMP COM Tuning (2)

NAVIGATION SYSTEMS TUNING DESCRIPTION

Selection of Navaids

The FMGC normally ensures the selection of navaids (VOR, DME, ADF, ILS):

- automatically as a function of geographical criteria depending on the planned route and on the aircraft position.
- manually from the MCDUs.

For information displayed on the ND, the selection of VOR and ILS automatically causes the selection of DME. The selection of DME frequencies for the calculation of position of the FMGC is fully automatic.

In standby mode, the pilot can take control of the navaid selections onside through action on the RMP.

NOTE: If an RMP 3 is installed it is NOT involved in the Navaids tuning. It can only be used for COM tuning!

Consequently, any FMGC selection is overridden and in particular, the management of DME frequencies is cancelled for the calculation of position by the FMGC.

1 Normal Navaids Tuning

Normally the Navaids tuning is done by the onside FMGC.

That means that FMGC 1 normally tunes:

- ILS 1,
- VOR 1,
- DME 1,
- ADF 1,

and FMGC 2 normally tunes:

- ILS 2,
- VOR 2,
- DME 2,
- ADF 2.

In normal mode, these input and output are directly interconnected by means of internal relays. The RMP is thus transparent to the onside FMGC.

2 Navaids Tuning in case of FMGC failure

If one FMGC fails it sends a FAULT discrete via the respective RMP to the navigation receivers. Then the offside FMGC frequency input B is taken by the receivers.

NOTE: On many aircraft the ILS is integrated in the Multi Mode Receiver (MMR) which combines an ILS and GPS (Global Positioning System) receiver.

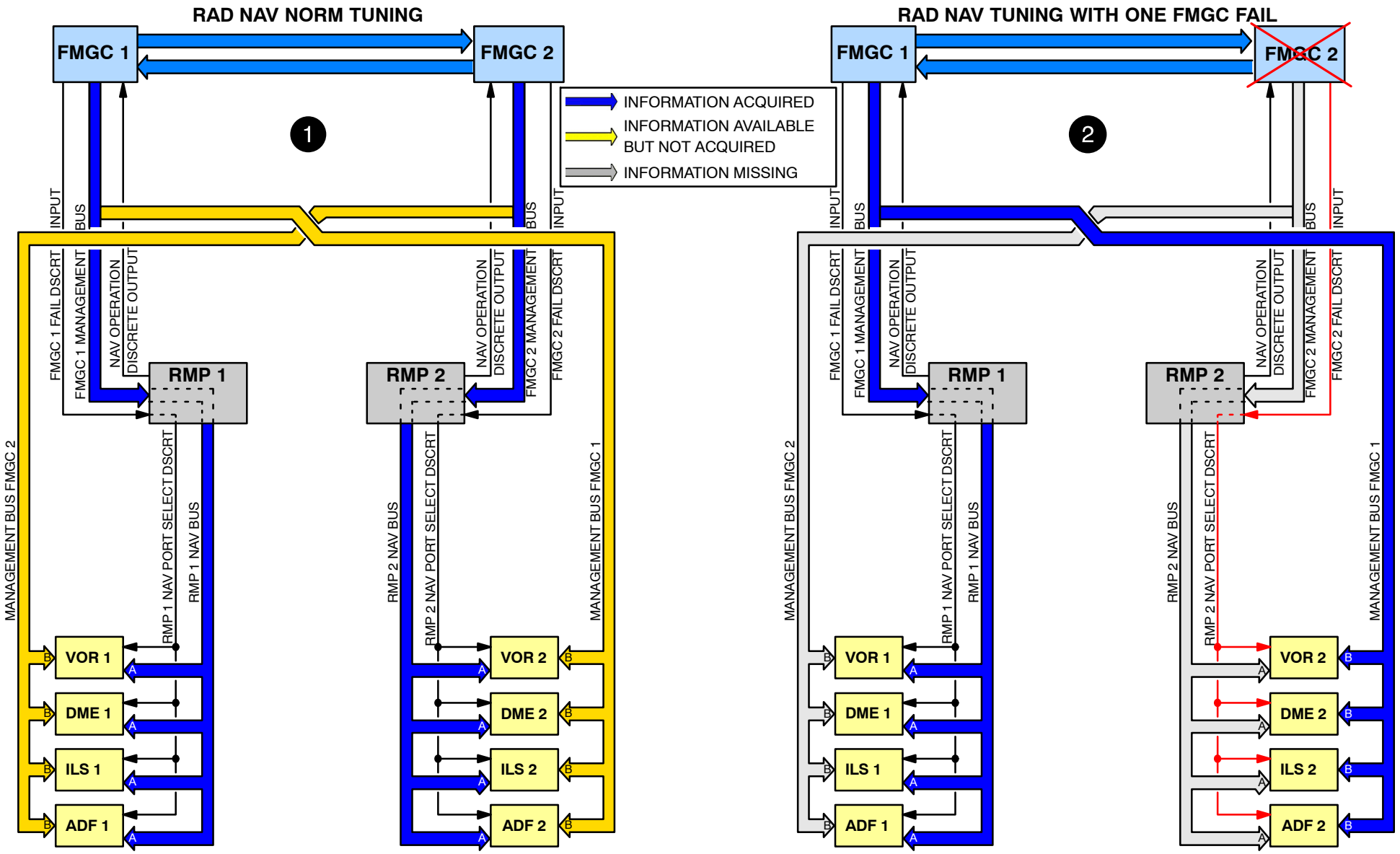


Figure 24 NAVAIDS Auto Tuning

3 Radio Navigation in Standby NAV Mode

This mode is selected on the RMP1 and/or RMP2 in the event of failure of both FMGCs.

In addition to normal mode functions it also enables the frequency control of the radio navigation equipment:

- on Captain side (VOR1, DME1, ILS1, ADF1) for the RMP1
- on First Officer side (VOR2, DME2, ILS2, ADF2) for the RMP2.

The RMP1 and the RMP2 transmit on a dedicated output bus the frequencies to the radio navigation equipment.

In radio–navigation back up mode, the output bus transmits frequencies generated by the RMP.

Each radio–navigation system receives the output bus from the onside RMP and the management bus from the offside FMGC. Only one input is taken into account according to the status of a discrete received from the RMP. This enables reconfigurations in case of failure of one or two FMGCs.

The RMP1 and the RMP2 exchange, through the dialogue buses, the frequency and the course for the ILS : the selected values are identical for the ILS1 and the ILS2 at selection of the back up mode on the RMP1 and the RMP2. The ILS course and frequency are the only radio navigation data exchanged through the dialogue buses.

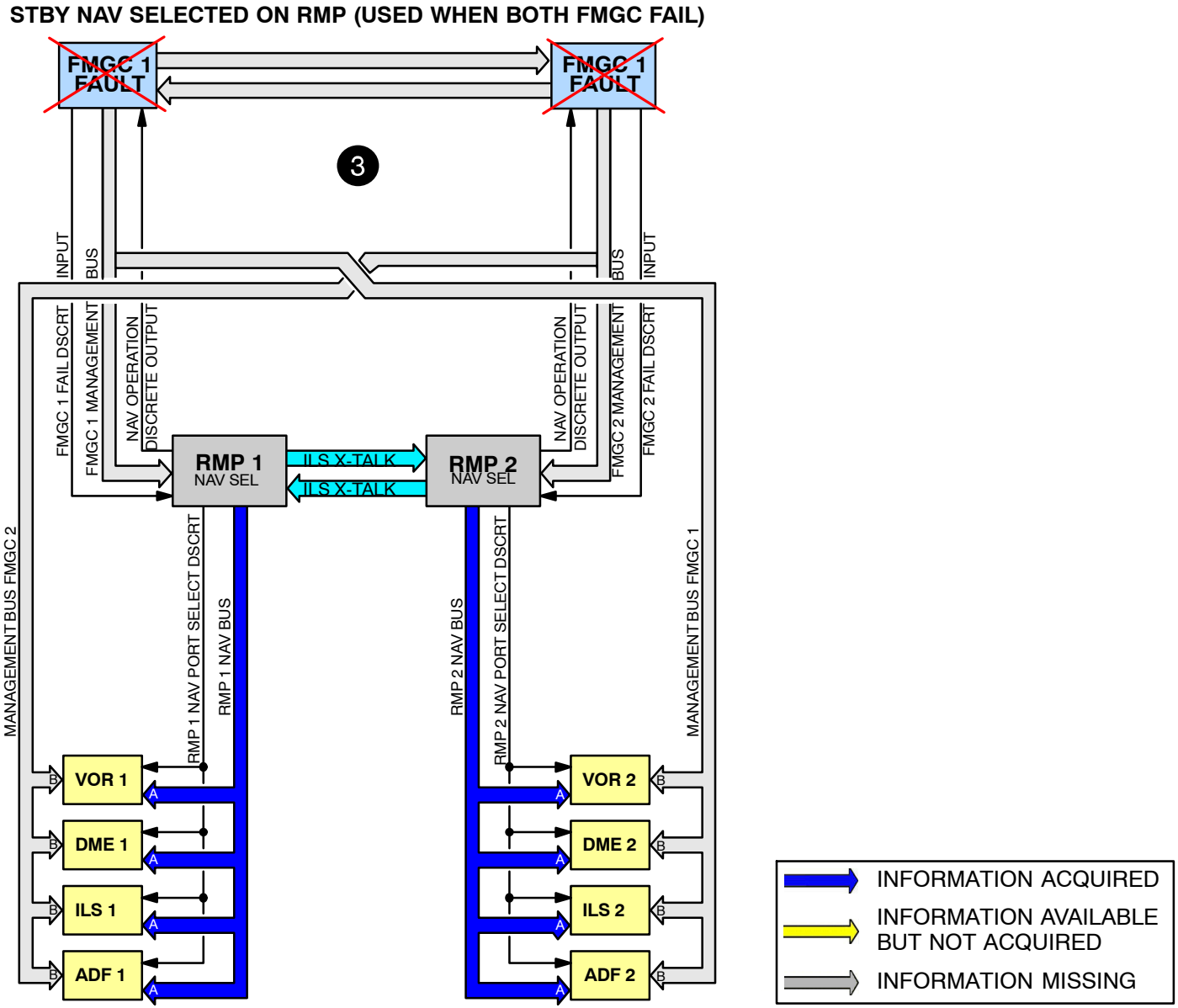


Figure 25 RMP Standby NAV Tuning

RADIO NAV TUNING FROM RMP AND MCDU

General

The navaid selection includes tuning of the following sensors.

- VOR (frequency/course) and DME for display
- ILS (frequency/LOC course)
- ADF (frequency/BFO)

There are three ways of selection which are :

- RMP selection (radio management panel)
- manual selection through the MCDU
- automatic selection (in FMGC software).

RMP Selection

The RMP selection in the radio nav architecture has to be considered as a back–up of selection. It is activated/deactivated upon selection of the nav mode for the RMP (NAV pushbutton switch). Since then, the pilot may select VOR, ILS or ADF. If selection of any RMP is active, neither the pilot nor the FMGCs can tune the radio frequencies on both sides. For display, the selected VOR – ADF are shown on the navigation display with a character R near the ident or frequency to indicate that the navaid selection mode is RMP.

On the MCDU, the RMP select navaids are displayed on the RADIO NAV page or PROG page in green small fonts.

Manual selection through the MCDU

Selection through the MCDU is possible through two pages : RADIO NAV page

- **VOR tuning**

  On RADIO NAV page, the pilot may select for display a VOR by identor frequency in line 1L, 1R. He may also optionally enter a course in line 2L, 2R. Upon modification of the selected VOR, the course is automatically cleared. Manually selected navaids are displayed in cyan large fonts on the MCDU and on the navigation display there is a character M near the navaid ident or frequency.

  – Selection mechanization

    If ident entry is made, the nav data base is searched and if there is a match, the FMGC outputs the frequency. If not, NEW NAVAID page is displayed. If frequency is entered, the ident field is filled if found in data base. If not, brackets are displayed.

    If the VOR field is cleared, the display reverts to autotuned navaid with associated course (if any).

- **ILS tuning**

  On RADIO NAV page only, the pilot may select an ILS by frequency or ident in field 3L. The entry mechanization is the same as for VOR. However upon entry of an ILS by frequency, this frequency is compared :

  – In preflight and takeoff phases to the ILS frequency at origin

  – else to the ILS frequency at destination.

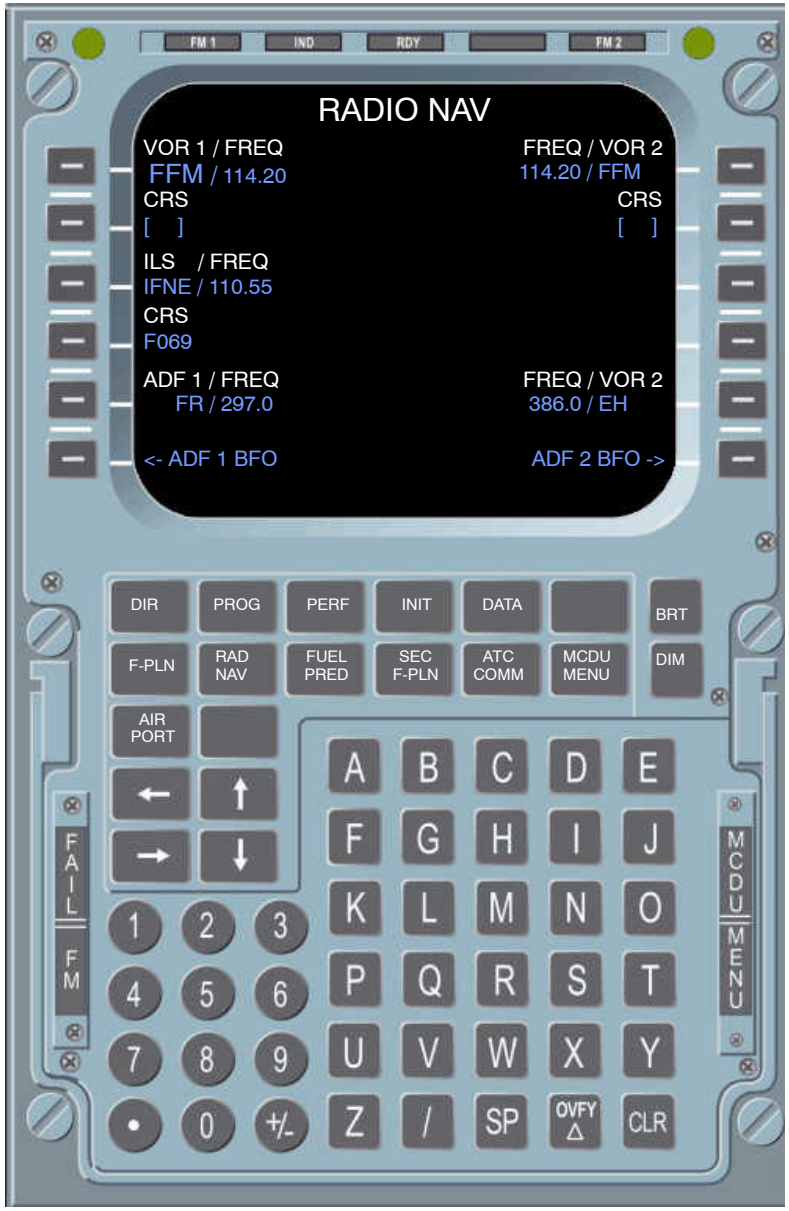
  In both cases, if a match is found, the ident and frequency are displayed (cyan small fonts for the ident, cyan large fonts for the frequency). If not, only the frequency is displayed (in cyan large fonts) and a message appears in scratchpad RWY/ILS MISMATCH. In field 4L, the pilot may select the LOC course. This will be used for LOC capture and ILS guidance in approach. This LOC course may only be entered through the MCDU on the RADIO NAV page. It is cleared if the pilot changes the selected ILS.

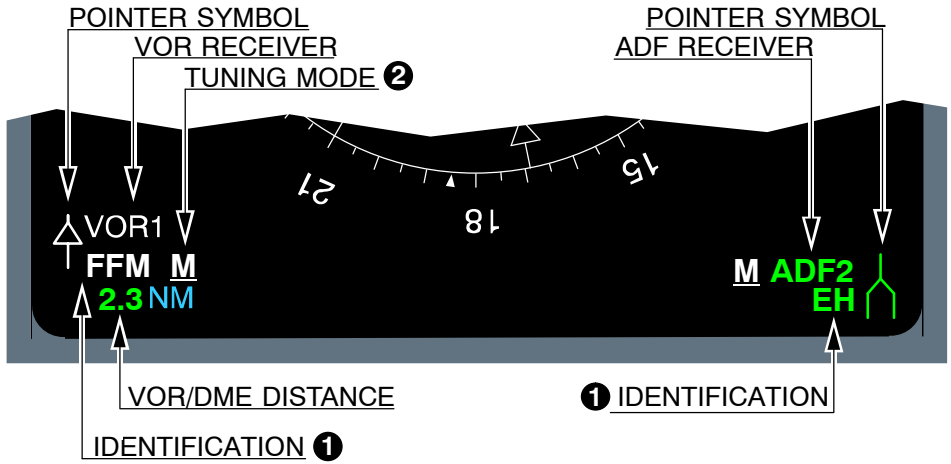
- **ADF tuning**

  With the same mechanization as for VOR, the pilot may select an ADF by ident or frequency in line 5L, 5R. Since the second ADF is an aircraft option (program pin on FMGC), the second ADF is available only when this option is valid. When an ADF is selected, the ADF BFO prompt appears in line 6. Selection of the Beat Frequency Oscillator operation by pressing the LS key displays the prompt ADF BFO and activates the BFO function for the current ADF frequency selection. The BFO operation is deactivated by clearing the associated field. The display reverts to ADF BFO. It is also deactivated by entering a new ADF frequency or ident.

Automatic selection

Automatic selection is performed in the FMGC software. From a display point of view, autotuned VOR, ILS or ADF are displayed on RADIO NAV page or PROG page in cyan small fonts. On navigation display, there is no indicator M or R near the VOR or ADF for display showing that the navaid is autotuned.





❶ If selected Station is valid, the Station Identifier is displayd instead of the frequency.

❷ Tuning Mode: **R** Tuned via the RMP
M Tuned via the MCDU
Nothing when auto tuned by the FMGC

Figure 26 RAD NAV Tuning

23–12 VERY HIGH FREQUENCY SYSTEM

COMMUNICATIONS SYSTEM PRESENTATION

GENERAL

The single aisle aircraft communication system has two sub–systems:

- radio communication,
- on–board communication.

The radio communication systems are used for communications to and from the aircraft.

The following system are used for radio communication:

- Very High Frequency (VHF / minimum 2, maximum 3 systems installed)
- High Frequency (HF / minimum 0, maximum 2 systems installed)
- Satellite Communication (SATCOM / min. 0, maxi. 1 system installed)

The VHF system is used for short range communication, the HF and SATCOM systems may be used fpr long range communication.

Frequency Range

The HF system operates within the frequency range defined by ARINC 719 (i.e. 2.8 to 23.999 MHz, with 1 KHz spacing between channels).

The VHF system operates within the frequency range defined by ARINC 716 (i.e. 118 to 136.975 MHz with 25 or 8.33 KHz spacing between channels).

The SATCOM system operates within the L-band transmission frequency range 1.6265 to 1.6606 GHZ and the L-band transmission frequency range 1.530 to 1.559 GHZ.

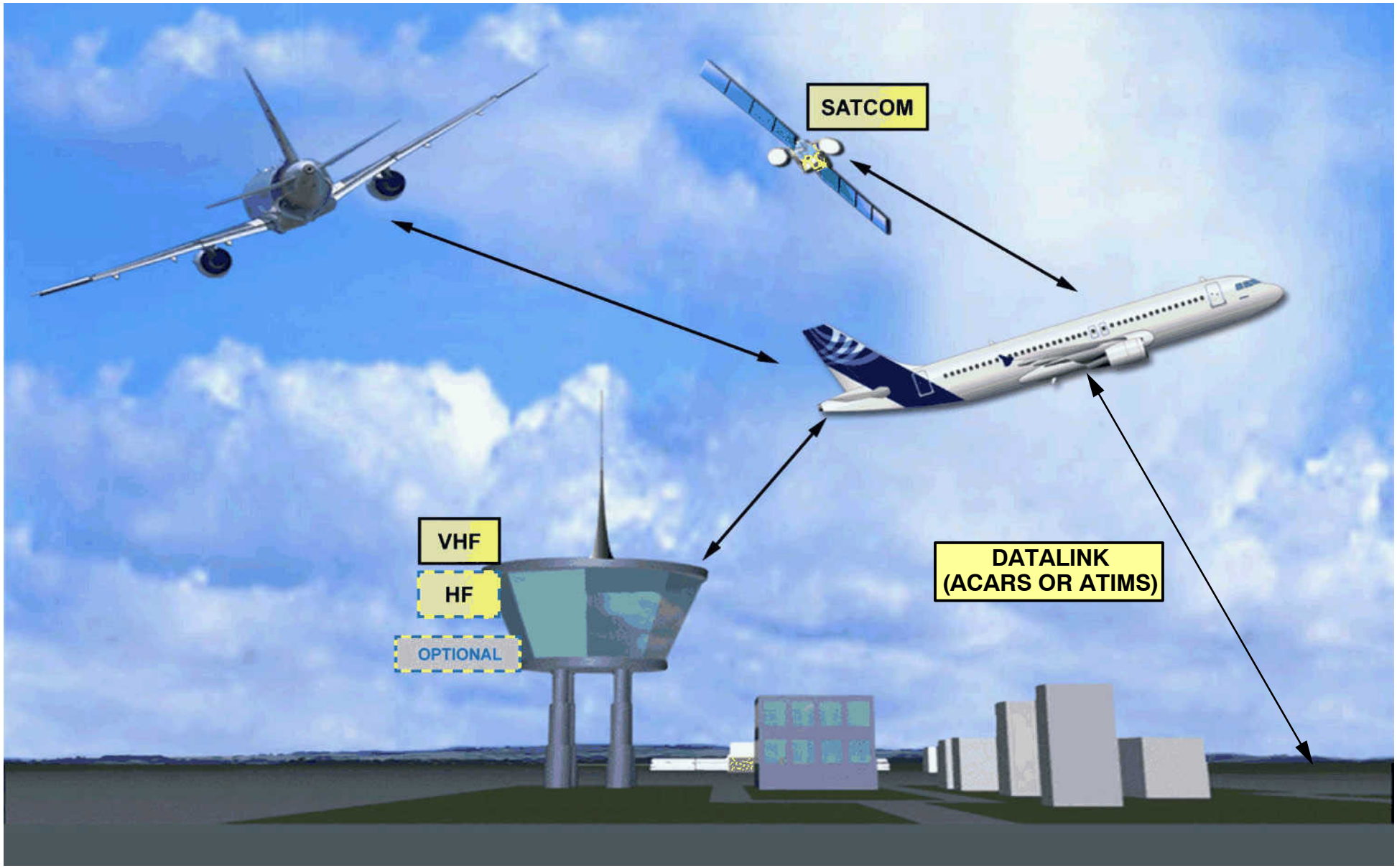


Figure 27 Radio Communication General

VHF SYSTEM PRESENTATION

General

The VHF is used for short range voice communications.

The VHF system allows short distance voice communications between different aircraft (in flight or on ground) or between the aircraft and a ground station.

The VHF system operates within the frequency range defined by ARINC 716 (i.e. 118 to 136.975 MHz with 25 KHz or 8.33 KHZ spacing between channels depending on the VHF system modification status).

Principle

Let's see the main components of the VHF system.

For voice communications, the crew use acoustic equipment.

- 2 side–stick radio selectors.
- 2 loudspeakers.
- 3 oxygen–masks.
- Facilities for boomsets, headsets and hand–microphones.

The Audio Management Unit (AMU) acts as an interface between the crew and the VHF system.

The Audio Control Panels (ACPs) allow selection of the VHF1,2 or 3 transceiver in transmission or reception mode and for the control of the received audio signal.

The Radio Management Panels (RMPs) serve to select the VHF frequencies.

The VHF transceiver, tuned on the frequency selected by one of the 3 Radio Management Panels (RMPs), transforms the audio signals into VHF signals (in transmission mode) or VHF signals into audio signals (in reception mode).

NOTE: The VHF3 system is used to transmit data link messages (ACARS or ATSU) , but can be used for radio voice communications.

Transmit Function

The audio signals from the microphones are transmitted to the VHF transceiver through the AMU. The VHF transceiver tuned on the frequency selected on one RMP, transforms the audio signals into VHF modulated signals. The VHF signals are fed to the antenna by a coaxial cable. They are then transmitted to the various stations.

A connection between the VHF transceiver and the SDAC enables to record the use of the VHF system in transmit mode on the DFDR. The connection is obtained through the PTT switch.

Receive Function

The antenna picks up the VHF radio–communication signals from the stations. These signals are transmitted to the transceiver by a coaxial cable. The transceiver, tuned on the frequency selected on one RMP demodulates the VHF received signals into audio signals.

The AF signals are transmitted via the AMU, to the audio equipment or SELCAL system.

Tuning

The transceiver has two serial inputs: a port A serial input and a port B serial input. It can therefore be controlled through either input depending on the status of a discrete (port select) delivered by the frequency control system. The data corresponding to the frequency selected on the RMP is sent to the transceiver through an ARINC 429 bus. This serial word contains the label, the source / destination identifier, the frequency data, the status and the parity bit.

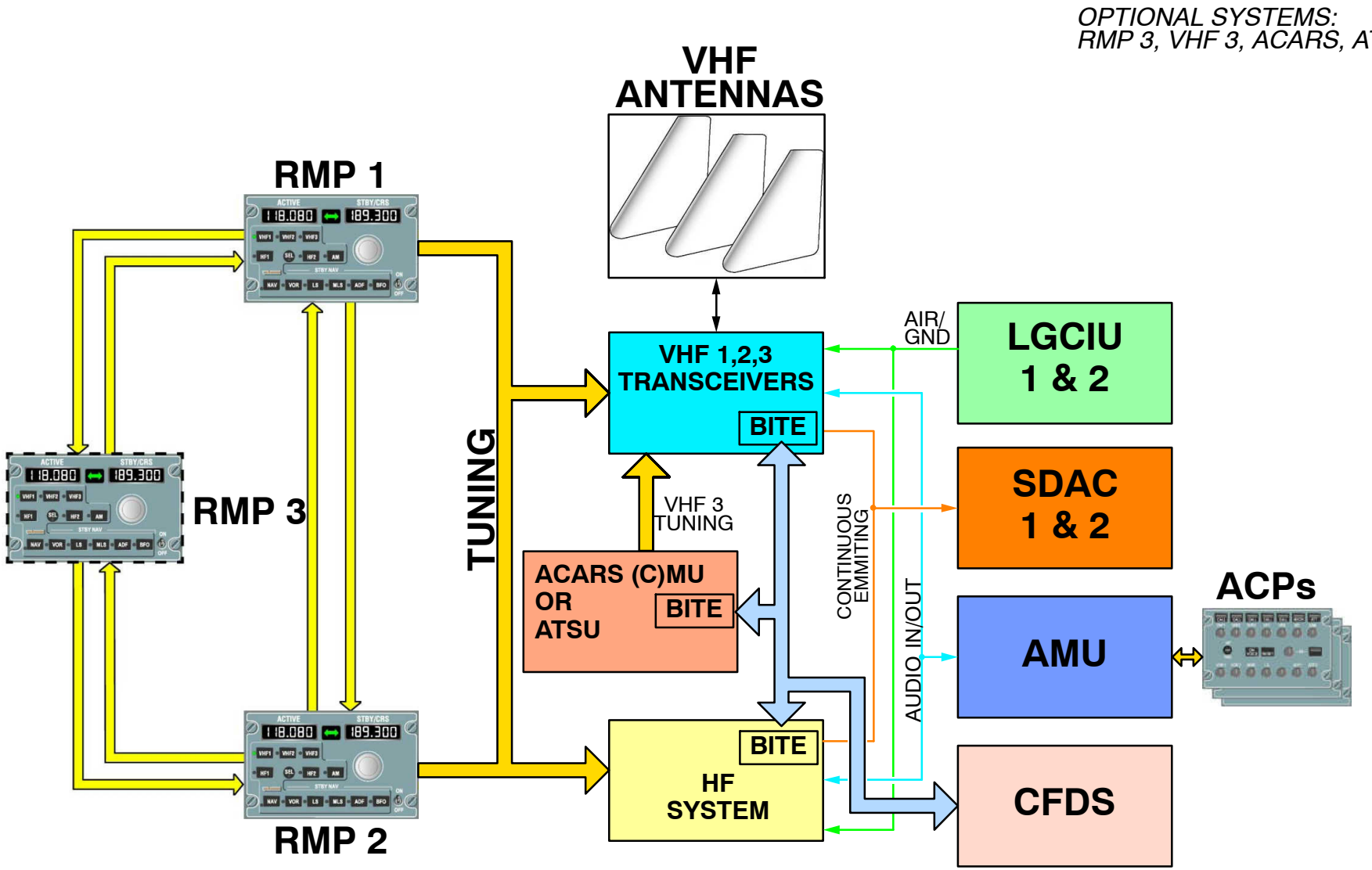


Figure 28 VHF System Presentation

VHF INTERFACE DESCRIPTION

VHF INTERFACE

Each VHF system has an interface with the following systems and components:

Radio Management Panels (RMP),

Audio Management Unit (AMU),

Centralized Fault Display Interface Unit (CFDIU),

Landing Gear Control and Interface Unit (LGCIU),

System Data Acquisition Concentrators (SDAC),

Aircraft Communication Addressing and Reporting System Management Unit (ACARS MU) or,

Air Traffic Service Unit (ATSU).

Interface with the RMPs

The RMPs are centralized systems used for the selection of the frequency/channel and the display of the VHF system. They are also used to switch between the voice/data modes.

Interface with the AMU

The AMU is used for the connection to the audio integrating and SELective CALling (SELCAL) systems by means of the audio Control Panels (ACP).

Interface with the CFDIU

The CFDIU is a centralized maintenance system. Through its interface with the CFDIU, the VHF3 transceiver sends fault reports to the ground.

Interface with the LGCIU

In case of CFDIU failure, the LGCIU gives the aircraft status (in flight or on the ground) to the VHF BITE.

Interface with the ATSU (Option)

The ATSU sends data to the VHF system for data communications. In voice mode and when VHF3 is selected by the MCDU, the ATSU provides the VHF3 system with voice frequencies for aircraft–to–airline & controller communications.

Interface with the ACARS (Option)

The VHF3 system is also associated with the Aircraft Communication Addressing and Reporting System (ACARS).

This system transmits the data from the SDAC, FWC, AIDS, and CFDS to the ground.

Interface with the SDACs

The SDACs receive the transmission information from the VHF system through the KEY EVENT output of the VHF transceiver and record the transmit mode.

When the SDACs detect that the VHF system has been transmitting (Push–To–Talk (PTT) switch on) for thirty seconds, a ”bip–bip” aural warning starts and sounds every second for five seconds. After these thirty–five seconds, the transmission is automatically cut off.

Twenty–five seconds later, if the PTT switch is still on, the VHF–X EMITTING message is displayed on the ECAM Display Units (DU). (X replaces the related system 1,2 or 3)

To start a new transmission, the PTT switch must be released, then pushed again. Data communications are stopped when the RMP or the MCDU switches from data mode to voice mode.

NOTE: In the AMM the VHF system may be also called VDR, VHF Digital Radio, because it is able to transmitt digital data for ACARS and ATIMS. The VDR is able to transmit the data with a higher baud rate than the old VHF transceivers.

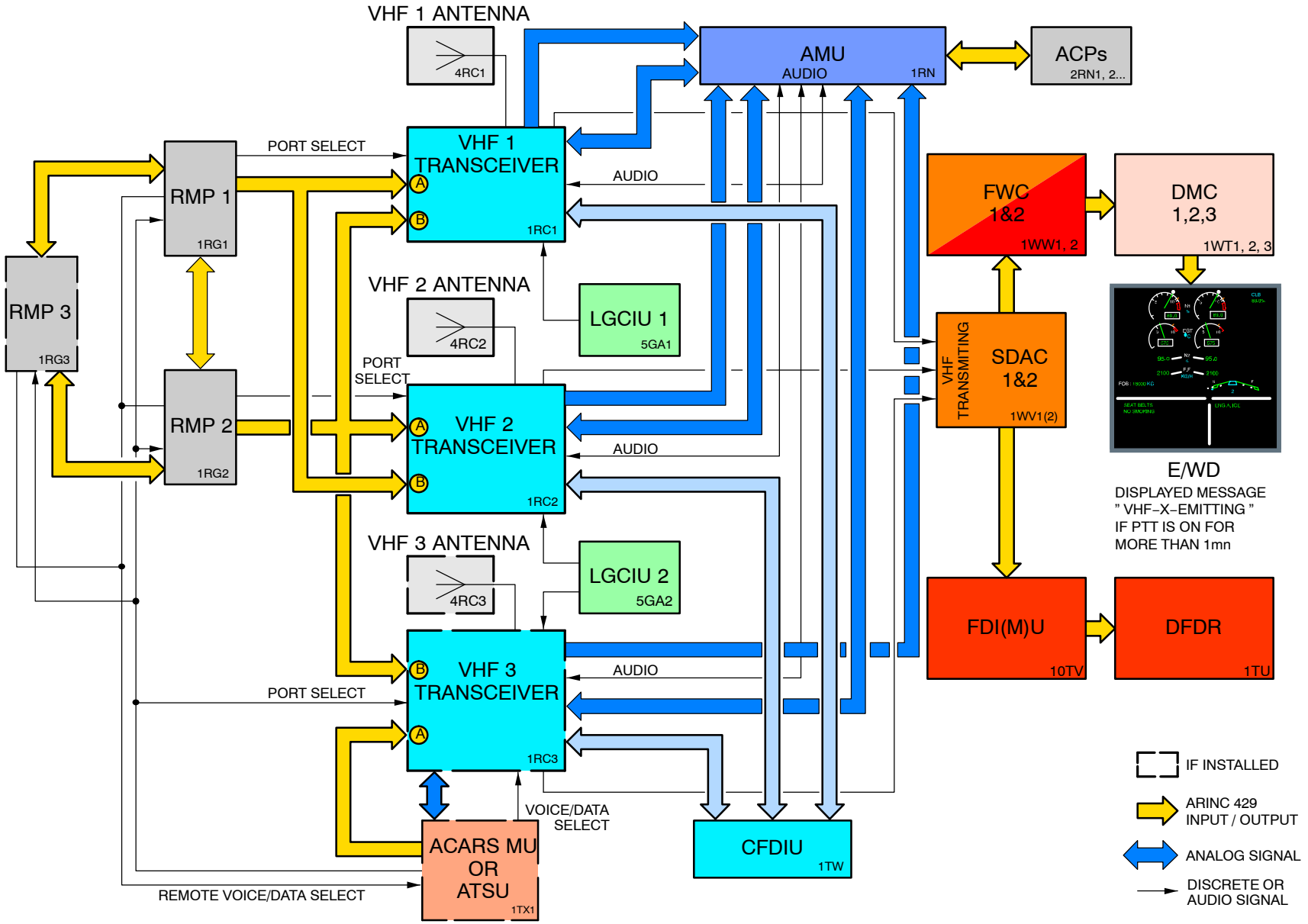


Figure 29 VHF System Interface

23–11 HIGH FREQUENCY SYSTEM

HF SYSTEM GENERAL

The high frequency (HF) system serves for all long–distance voice communications between different aircraft (in flight or on the ground), or between the aircraft and one or several ground stations. The HF system operates within the frequency range defined by ARINC 719, (i.e. 2.8 to 23.999 MHz, with 1 KHz spacing between channels). The aircraft is provided with a single HF system.

The HF system is composed of:

- max. 2 transceivers
- max. 2 antenna coupler
- one shunt–type antenna

The HF system is associated with:

- the Radio Management Panels (RMP) which are centralized systems enabling the frequency display of the HF system and the mode switching
- the Audio Management Unit (AMU) for connection to the audio integrating and SELCAL systems
- the Centralized Fault Display Interface Unit (CFDIU) (by the MCDU) which is a centralized maintenance system
- the Landing Gear Control Interface Unit (LGCIU) which indicates the aircraft status (flight or ground)
- the System Data Acquisition Concentrator (SDAC) which collects transmission information from the HF system (COM: HF1 EMITTING if PTT longer than 60s)
- the Air Traffic Service Unit (ATSU) for routing data towards the HF system for Data communications (Optional).

The HF1 system is supplied with three–phase 115VAC through 5A circuit breaker (1RE1) in cockpit panel 121VU, from sub–busbar 101XP. The HF1 transceiver (3RE1) provides the HF1 antenna coupler (4RE1) with 28VDC and monophase 115VAC.

Indication of Transmission Out of Frequency Range

The HF system is designed to operate within the frequency range from 2.8 to 23.999 MHz.

However, an operational facility enables frequency display in the 2 to 29.999 MHz range on the RMP. If the out–of–range values of the HF transceiver are displayed on the RMP, the operating anomaly is indicated as follows :

- at first activation of the PTT switch : a 1000 Hz audio signal is triggered.
- interruption of the signal after 15 s approximately.
- triggering of the signal at each attempt to transmit.

Operation

The HF transceiver complies with the standards defined in ARINC 719. The transmission and reception of coded messages between the various control units (CFDIU, RMP) comply with ARINC 429.

The RMP controls the various operations which are transmitted to the transceiver by a numeric message in compliance with ARINC 429. This message can be received by the port A or the port B of the transceiver. The RMP performs the selection by a discrete. A microprocessor performs the decoding of the frequency and mode (Amplitude Modulation -AM, or Upper Side Band - USB). The microprocessor checks the message from the RMP and controls the system operation. In case of failure it controls the illumination of the lights located on the face and/or acts on the transmitter.

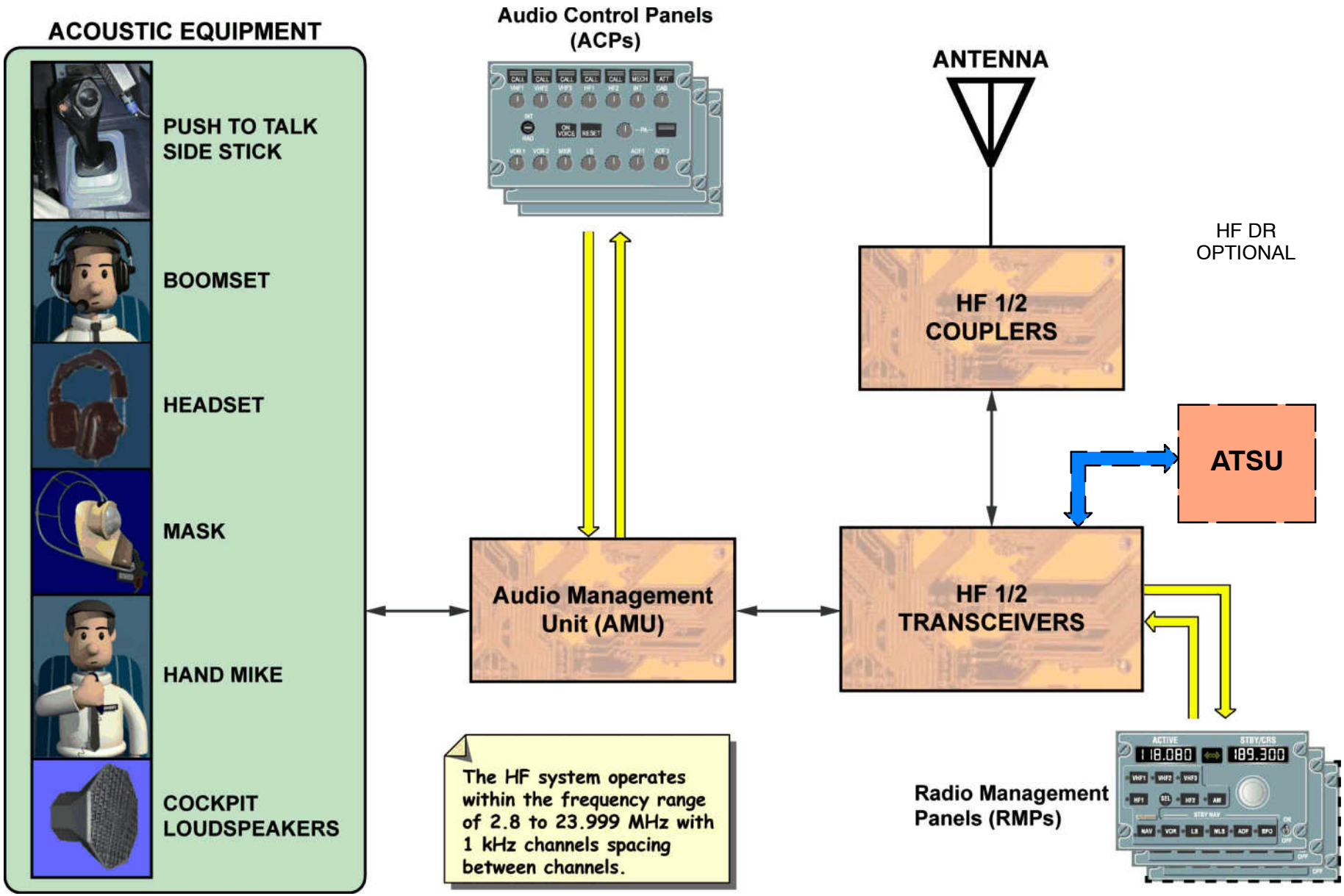


Figure 30 HF System Presentation

HF INTERFACE DESCRIPTION

INTERFACES

Each HF system has an interface with the following systems and components:

- Radio Management Panels (RMP),
- Audio Management Unit (AMU),
- Centralized Fault Display Interface Unit (CFDIU),
- Landing Gear Control Interface Unit (LGCIU),
- System Data Acquisition Concentrator (SDAC),
- Air Data/Inertial Reference Units (ADIRU),
- *Air Traffic Service Unit (ATSU),*
- *Ground HF DATA LINK (GND HF DATA LINK),*
- *International Civil Aircraft Organization (ICAO) address,*
- *Multipurpose Disk Drive Unit (MDDU) or Portable Data Loader (PDL).*

The components written in *cursive* are optionally connected to the HF system, even if they are installed.

Interface with the RMPs

The RMPs are centralized systems used for selection of the frequency/channel and display of the HF system. They are also used to switch between the voice/data modes.

Interface with the AMU

The AMU is used for the connection to the audio integrating and SELective CALLing (SELCAL) systems by means of the Audio Control Panels (ACP).

Interface with the CFDIU

The CFDIU is the centralized maintenance system.

Interface with the LGCIU

In case of CFDIU failure, the LGCIU gives the aircraft status (in flight or on the ground) to the HF BITE.

When the LGCIU informs the HFDR of the ground aircraft status, the HF data link emission is inhibited.

Interface with the SDACs

The SDACs receive the transmission information from the HF system through the KEY EVENT output of the HF transceiver and record the transmit mode.

When the SDACs detect that the HF system has been transmitting (Push–To–Talk (PTT) switch on) for last more 1 minute, the HF–X EMITTING indication is displayed on the ECAM display (EWD).

Interface with the ADIRU

The ADIRU which provides the HFDR with the following information:

- time,
- latitude,
- longitude.

Interface with the ATSU

The ATSU which is in charge of routing data towards the HF system for Data communications. The use of HF for digital data transfer is optional.

Interface with the GND HF DATA Link

The GND HF DATA LINK pushbutton switch which is used to override the data transmission inhibition of the HF1 transceiver on the ground.

Interface with the ICAO address

The ICAO address which is used to uniquely identify the aircraft by the ground station during data link message exchanges.

Interface with the MDDU or PDL

The MDDU or PDL is used to load the HFDR software.

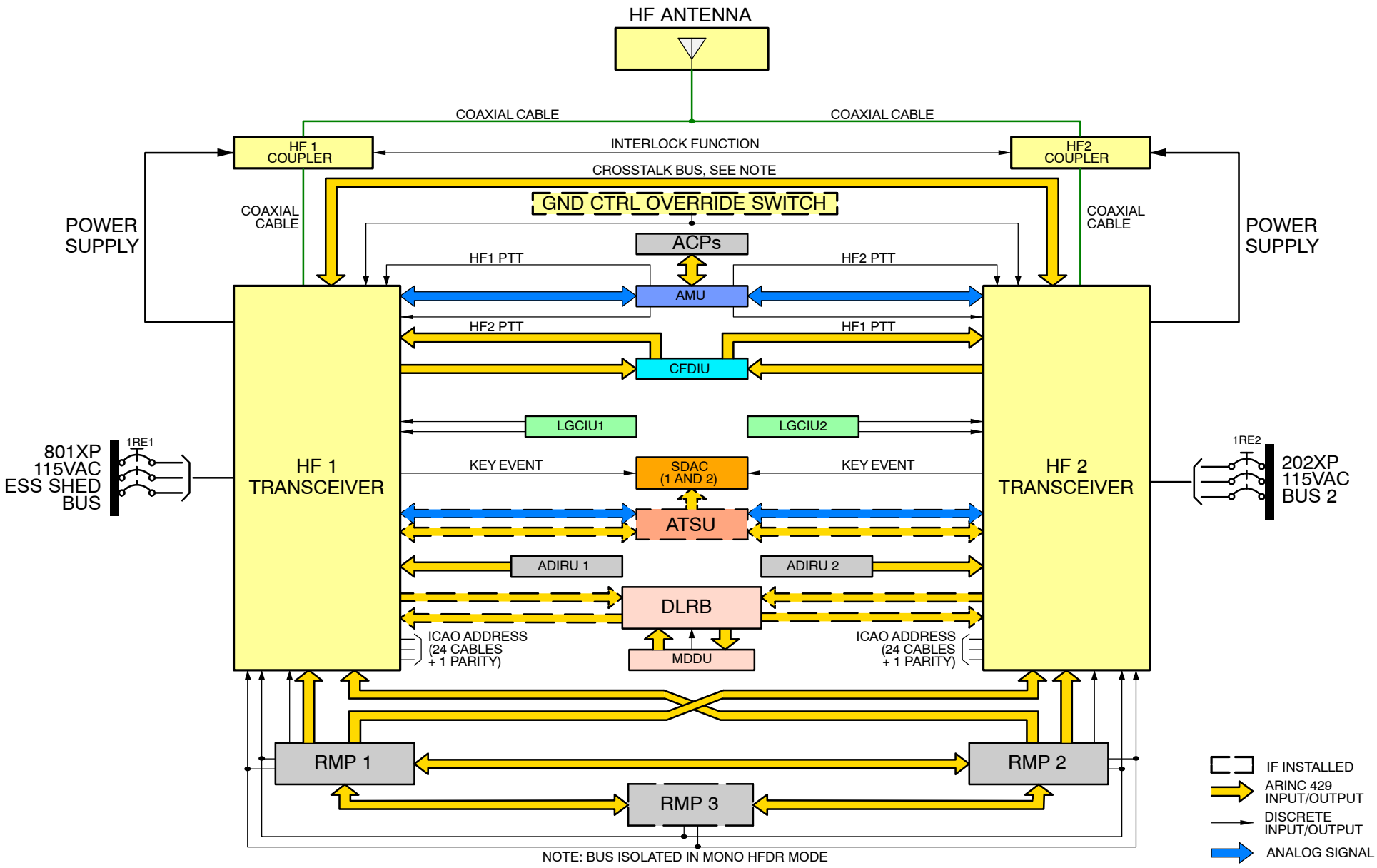


Figure 31 HF System Interface

HF COMPONENT DESCRIPTION

DESCRIPTION

The antenna coupler enables matching of the aircraft HF shunt–type antenna with the output circuit (50 ohms) of the HF transceiver.

The coupler is a pressurized sealed box.

The face features:

- a connector J1 for connection with the transmitter,
- a coaxial connector J2 to connect the coaxial cable from the transmitter,
- a connector J3 for test equipment connection,
- a pressurizing valve,
- a fault warning light (depending on vendor),
- a handle,
- an identification plate.

The back carries:

- a connector providing connection between the coupler and the antenna.

OPERATION

Receive Function

The HF audio integrating signals transmitted by the stations are picked–up by the antenna and transmitted to the antenna coupler. The coupler adapts the impedance between the antenna and the HF transceiver. The signal from the HF coupler is transmitted to the HF transceiver by a coaxial cable.

In voice mode, the HF transceiver, tuned to the selected frequency by one RMP, demodulates HF signals into AF signals.

The AF signals are transmitted via the AMU, to the audio equipment or SELCAL system.

In data mode, the HF1 transceiver, tuned to the auto–selected frequency, demodulates the HF1 received signals into digital information, which is transmitted to the ATSU (through ARINC 429 HS bus).

Transmit Function

Before transmissions, the HF transceiver has to be tuned to the new frequency selected by one RMP. This tuning consists in activating the PTT switch, a 1000 Hz signal is heard during several seconds. The new antenna coupler is now able to reduce the tuning duration thanks to a ”learning mode” which memorizes several last tuned frequencies.

In voice mode, the AF signals from the microphones are transmitted to the HF transceiver through the AMU.

The HF transceiver tuned to the frequency selected by one RMP, transforms the AF signals into HF modulated signals. The HF signals are fed to the antenna by the coaxial cable and antenna coupler. They are then transmitted to the various stations.

A connection between the HF transceiver and the SDACs enables to record the use of the HF system in transmit mode. The connection is obtained through the KEY EVENT output information of the HF transceiver.

In data mode, the digital information is transmitted from the ATSU to the HF1 transceiver (tuned to the frequency auto–selected and transmitted to the transceiver through ARINC 429 HS bus) which modulates it.

The HF signals are fed to the antenna by a coaxial cable. They are then transmitted to the various stations.

HF Data Link Ground Network (Optional)

One service provider (ARINC) proposes the HFDL ground network with a worldwide coverage including polar areas. Its ground stations cover a radius if approximately 3,000 miles and may cover more than one service region.

The continuous communications are offered thanks to overlapping coverage with a total of about 13 ground stations fielded worldwide and with several frequencies for each of them.

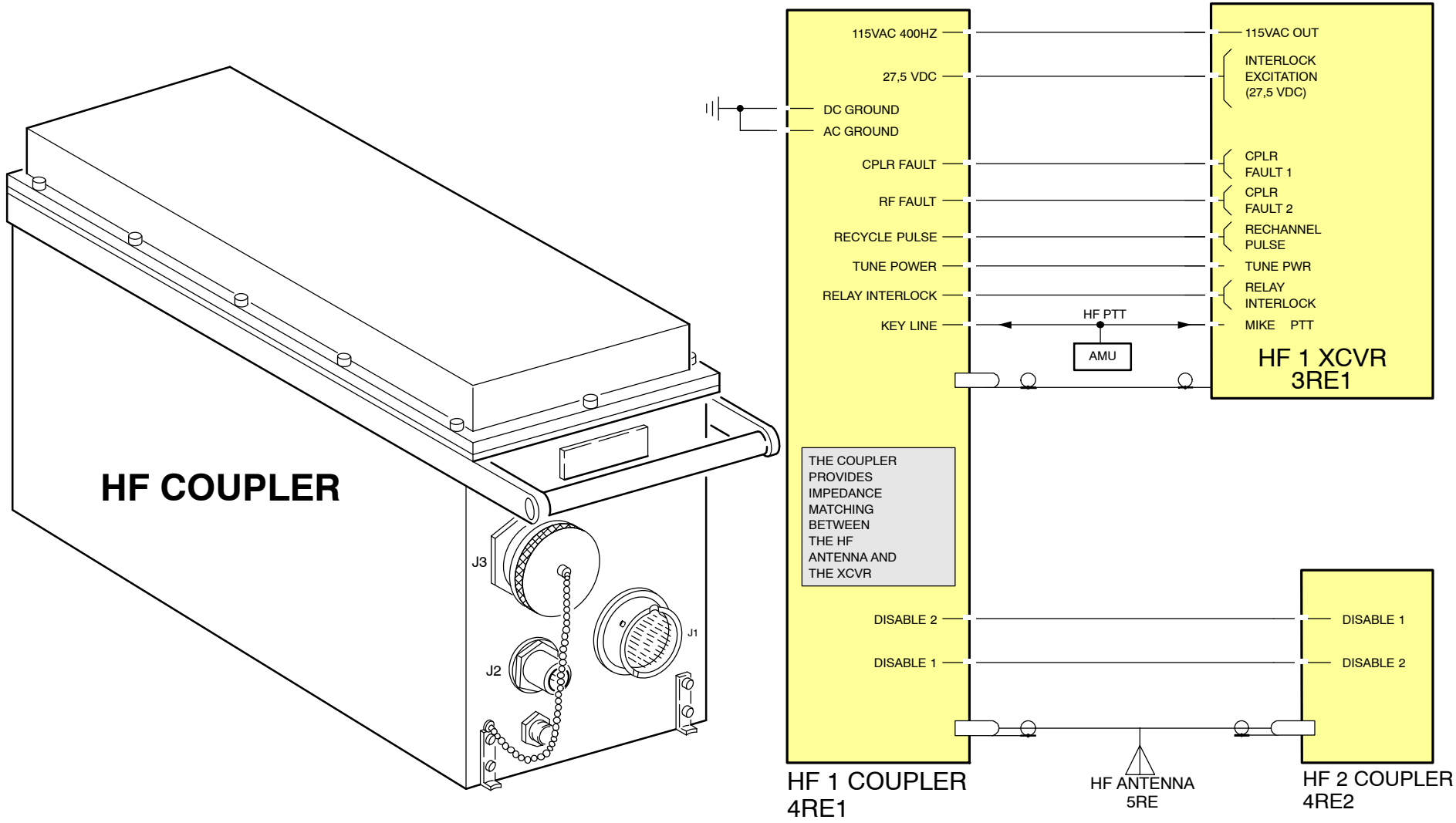


Figure 32 HF Coupler Description

23–24 AIRCRAFT COMMUNICATION ADDRESSING AND REPORTING SYSTEM (ACARS)

ACARS INTRODUCTION

Purpose

The ACARS Data Link System is an air/ground communication network that enables aircraft to function as a mobile terminal associated with modern airline command, control and management systems.

The ACARS is used to transmit or receive automatically or manually generated reports or messages to or from a ground station.

The ACARS is dedicated to Maintenance, Operation and Commercial purposes.

The choice of ACARS applications and the definition of the operational programs are under Airline responsibility because of high customization of the system.

The ACARS is a Buyer Furnished Equipment (BFE).

Principle

The ACARS can manage both transmission or reception of data.

Ground–to–air (uplink UL) and air–to–ground (downlink DL) digital messages are transmitted or received via the VHF3 transceiver.

Optionally ACARS can also use SATCOM or HF datalink systems.

VHF3 is mainly dedicated to the ACARS Data Link System, but can be used as a backup for voice communications.

The transmitted information is relayed via the ground stations to a central computer where data is converted into airline messages.

A ground network (**SITA** for EUROPE, ASIA, AFRICA and SOUTH AMERICA, **ARINC** for the USA and CANADA and **AVICOM** for JAPAN), transmits the data from the ground receiver to the airline main base.

SITA network is exclusively dedicated to the airline community, transmitting technical, commercial, flight operation and safety information.

Any of the ACARS functions can be modified by the airline, through the ACARS MU programming. The unit needs a Operating Software and a Customer Database. Both are loadable via a portable Dataloader direct on the frontface of the MU.

The data transfer rate is 2400 Bit per second.

Components

The ACARS Management Unit is connected to various computers :

- Flight Management function of the Flight Management Guidance Computers.
- Central Fault Display and Interface Unit (CFDIU).
- Data Management Unit (DMU).
- Flight Warning Computers (FWCs) and the System Data Acquisition Concentrator (SDAC1)
- Air Data and Inertial Reference Unit (ADIRU3).
- Fuel Quantity Indication System (FQIS).

Various units are used to control the ACARS MU :

- 2 Multipurpose Control Display Units (MCDUs).
- 1 Printer and 3 Radio Management Panels (RMPs), located in the cockpit.

The Unit receives various discrete informations for several functions.

The table below defines the world zone abbreviations, indicates their associated Service Provider, MCDU label, and ACARS Frequency.

ABBREVIATION	SERVICE PROVIDER	MCDU LABEL	FREQUENCY	Family
SP	SITA PACIFIC	SIT-PAC	131.550 MHz	SITA
SN	SITA NORTH AMERICA	SIT-NAM	136.850 MHz	SITA
SL	SITA LATIN AMERICA	SIT-LAM	131.725 MHz	SITA
SE	SITA EUROPE	SIT-E/A	131.725 MHz	SITA
DE	DEPV BRAZIL	DEPV	131.550 MHz	SITA
AV	AVICOM	AVICOM	131.450 MHz	SITA
AM	ARINC AMERICA	ARI-AM	131.550 MHz	ARINC
AE	ARINC EUROPE	ARI-EUR	136.925 MHz	ARINC
AF	ARINC AFRICA	ARI-AFR	126.900 MHz	ARINC
AK	ARINC KOREA	ARI-KOR	131.725 MHz	ARINC
AS	ARINC ASIA	ARI-ASI	131.450 MHz	ARINC

Figure 33 ACARS Frequency Table

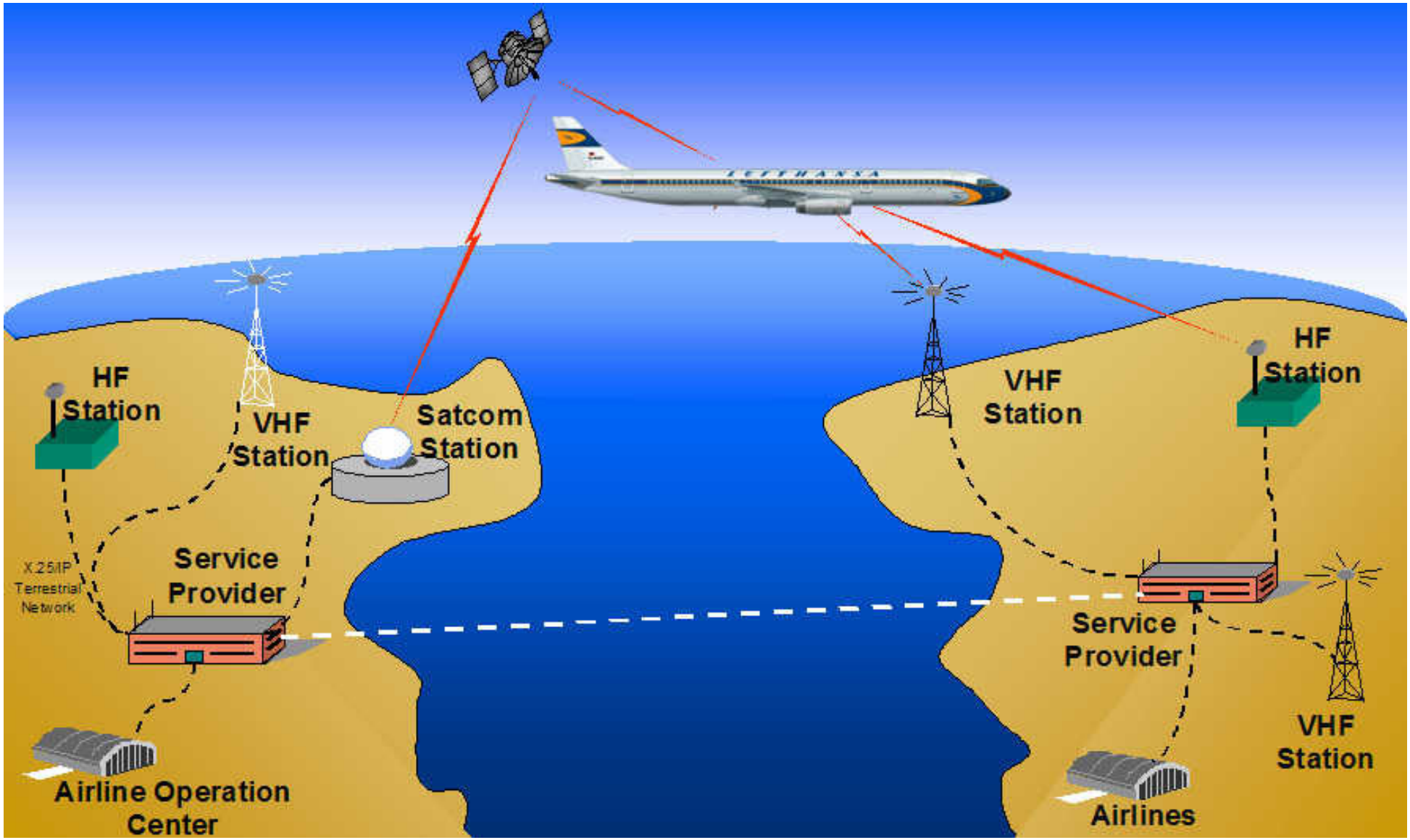


Figure 34 ACARS Principle

General

The Aircraft Communication Addressing and Reporting System (ACARS) allows the direct exchange of data between aircraft and airline ground computers via VHF 3.

Aircraft to ground messages (downlink) comprise operational, maintenance, monitoring, performance and cabin data.

Ground to aircraft messages (uplink) contain crew information (wind for example), or might request data transmissions which are either sent automatically or by crew action.

Automatic report downlinks are carried out by the ACARS Management Unit, which is programmed according to airline needs (Buyer Furnishing Equipment).

Due to highly customized programming, the ACARS functions may vary from one airline to another and are therefore, not described in detail.

Cockpit Arrangement

ACARS operation is performed through the already available cockpit equipment:

- ECAM for operational indications,
- MCDU for control of ACARS related functions,
- PRINTER for hardcopies.

The portable dataloader connector is in the avionics bay.

Manual Access to ACARS Functions

ACARS functions are manually selected through MCDU. They are obtained for FMGC, CFDS or AIDS by selecting the corresponding key. Cabin management functions (if available) are accessible through the cabin installed system.

Automatic Access to ACARS functions

Automatic data transmission can be initiated by MU or aircraft systems programming or an uplink message. There is no cockpit indication nor crew action is required. It is a dialogue between ground and aircraft computers.

Automatic Downlink of Reports

Automatic downlink of reports are provided by ACARS. Each report generated by a peripheral system may be downlinked depending on each airline MU programming.

Uplink Messages

Two types of uplink messages are provided:

- **Messages not indicated to the crew:**
  - There is no indication given to the crew, neither for uplink message nor for downlink answer. It is a dialogue between ground and aircraft computers.
- **Messages indicated to the crew by:**
  - ACARS MSG advisory (pulsing green) on ECAM Memo
  - Message on MCDU (ACARS MSG WAITING for example) or MCDU MENU light illumination if the MCDU is not in the mode where uplink message can be displayed in order to select the correct mode (FMGC, ACARS, AIDS, CFDS)
  - Hard copy on cockpit printer depending on MU programming.

NOTE: A steady green ACARS STBY advisory is displayed in case of ACARS communications loss between aircraft and ground.

ACARS Communication Management Unit

The ACARS Management Unit may be replaced by the Honeywell Communications Management Unit which has a VDL Mode 2 capability for higher data transmission. VDL Mode–2 can carry current ACARS applications at a speed of almost 10 times higher than that of current ACARS. (VDL = 31.5 kb/s, ACARS = 2.4kb/s).

At DLH this is performed with the Engineering Order EO135580. Also the VHF 3 transceiver has to be exchanged by an AHF920 VHF Digital Radio transceiver.

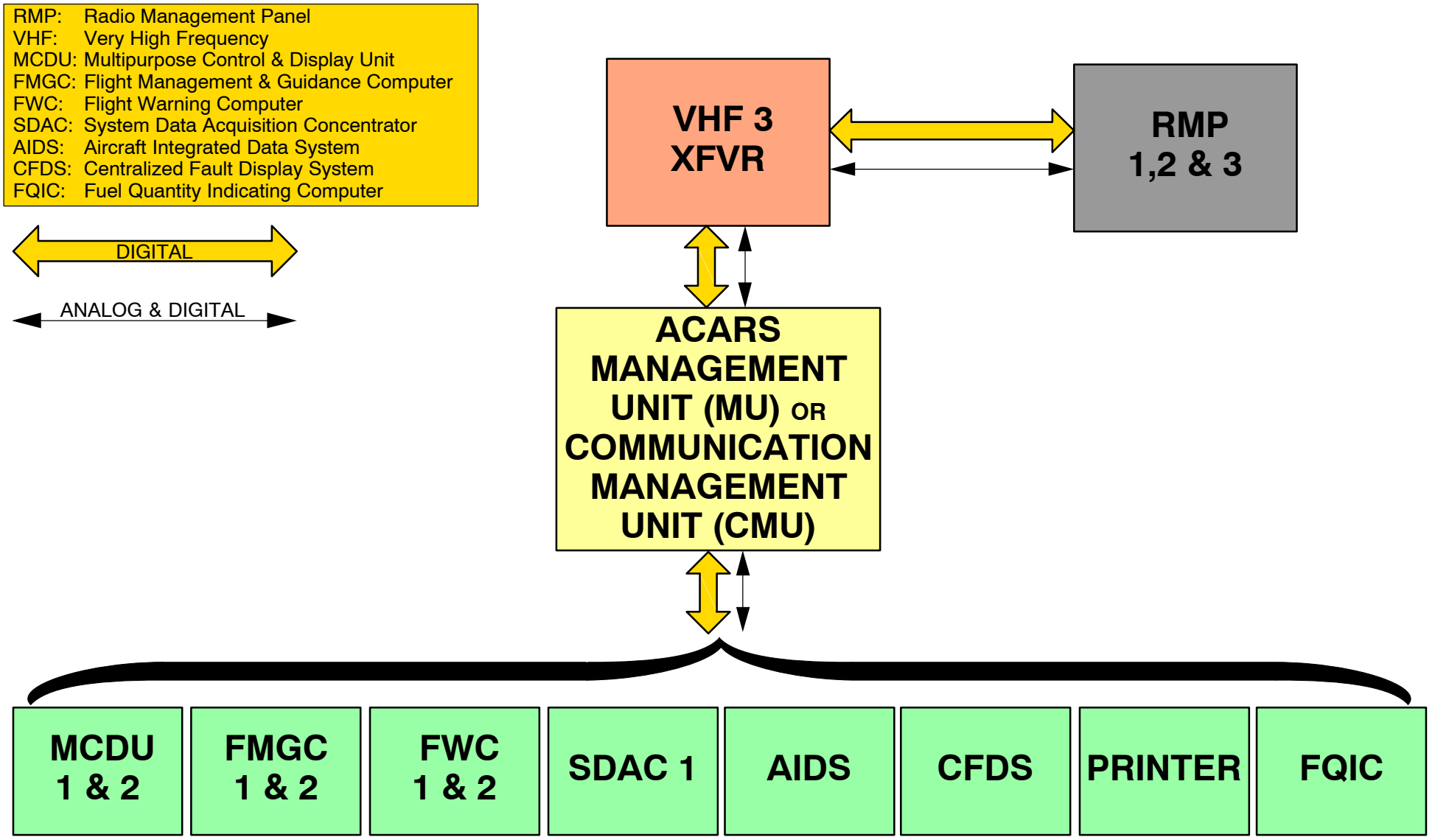


Figure 35 ACARS Overview

ACARS DESCRIPTION

ACARS MU

The ACARS Management Unit (MU) manages all tasks related to the ACARS. It controls both emission and reception of data through the VHF3 transceiver.

The ACARS MU transmits data to the various aircraft systems through its two general output buses. It receives data from the avionics systems through their general input buses.

The ACARS MU is supplied with 115 VAC.

Radio Management Panel

Each RMP receives the same port select discrete signal as VHF 3 from the ACARS MU. In normal condition, any RMP is able to tune the VHF 3 XCVR. When a RMP controls the VHF 3 frequency, it sends a remote voice/data select discrete signal to the ACARS MU to force it to leave the control of the VHF 3 frequency.

Flight Management and Guidance Computer

The ACARS MU is linked to the FMGC1 and 2. The FMGCs transmit the following messages to the ACARS MU either automatically or manually:

- request for flight plan initialization,
- request for wind messages,
- pre–flight report,
- in–flight report,
- PFR.

Each function is rendered operational or not depending on the message transmitted by the ACARS MU to the FMGCs. The ACARS MU transmits the following messages to the FMGCs either automatically or manually:

- flight plan initialization,
- wind message,
- advisory message related to a ”request not transmitted to the ground”,
- request for a pre–flight report,
- request for a PFR.

Very High Frequency Transceiver

The VHF 3 transceiver (XCVR) is normally used for ACARS data transmission and reception, but it can also be used in conventional radio communication mode. The VHF3 XCVR receives a voice/data discrete signal, which determines the mode of operation: DATA mode or RADIO mode. In DATA mode, the XCVR is keyed by the ACARS MU through the DATA keyline. The digital data exchanged between the MU and the VHF 3 XCVR are coded by 1.200 and 2.400 hertz tones. In RADIO–COMMUNICATION mode, the XCVR can be tuned either by the ACARS MU or by any Radio Management Panel (RMP). This is determined by the port select discrete signal sent by the ACARS MU.

FWC/SDAC

The ACARS MU receives parameters sent by the System Data Acquisition Concentrator (SDAC) 1 and the Flight Warning Computers (FWCs) 1 and 2.

The parameters sent by SDAC 1 and FWCs allow the ACARS MU to establish the EVENT TIME OOOI (pax door closed, gear compressed...).

The ACARS MU sends a status parameter to the FWCs. FWC 1 and FWC 2 display on the Engine Warning Display (EWD), one of four ACARS configurations provided by the ACARS MU.

The four possible configurations are:

- ACARS MSG : an ACARS message has been received by the aircraft,
- ACARS STBY : loss of communication between aircraft and ground,
- VHF3 VOICE : VHF3 operates in VOICE mode,
- ACARS CALL : a message requesting a voice conversation has been received from the ground.

A amber COM ACARS FAULT message appears, when the FWCs do not receive normal information from the ACARS MU.

Printer

The ACARS MU is connected to the multi–purpose cockpit printer. The ACARS MU can buffer data printing, when the printer is busy with another system.

FQIC

The Fuel Quantity Indication Computer sends FOB, preselected Fuel e.g. information

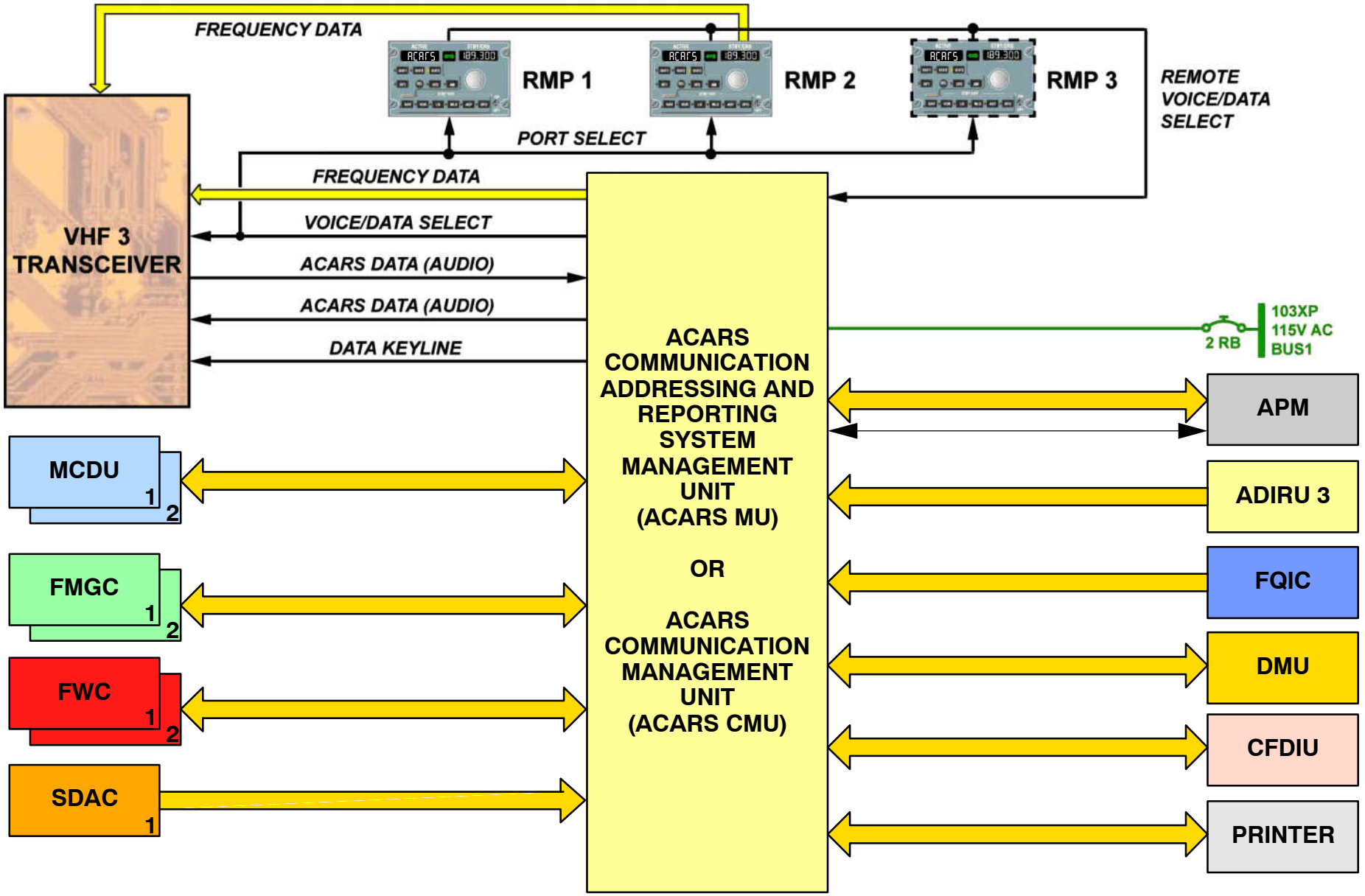


Figure 36 ACARS Architecture

ADIRU 3

The ADIRU 3 sends LAT/LONG information for frequency tuning and groundspeed information.

APM

An Aircraft Personality Module allows information that are strapped at the LRU connector with program pins. The APM permits to hold non–volatile aircraft configuration data. The APM is a self–contained memory device based on ARINC 607–3, which is read on start–up of the ACARS.

The APM is a self–contained memory device based on ARINC 607–3, which is read on start–up of the ACARS MU or CMU.

As a minimum, aircraft registration, aircraft type, and equipment configuration information is held in the APM. The APM is made up of a serial electrically erasable programmable read–only memory (EEPROM) powered and controlled by the CMU. The EEPROM contains 16K bytes of memory that is partitioned by software into two 8K byte memory segments.

Data Management Unit

Each report generated by the DMU can be programmed individually for transmission to the ACARS MU either automatically or manually. The ACARS MU can also require generation and transmission of any report by the DMU. The ACARS MU can send information to the DMU when each report has been duly transmitted to the ground.

MCDU

The ACARS MU is interfaced with the Multipurpose control and Display Units (MCDUs). The dialog between one MCDU and the ACARS MU is initiated when ACARS is selected on the MCDU menu.

The MCDU enables the following functions :

- display of data generated by the MU,
- display of data transmitted by the ground or by peripheral computers,
- selection of the various ACARS MU functions,
- test and entry of data by the crew.

MCDU 1 and 2 are connected to the ACARS MU. Only one can communicate with the system at a time.

Centralized Fault Display Interface Unit

All the fault messages and all the warnings recorded by the CFDIU can be transmitted automatically to the ACARS MU as soon as the CFDIU receives them from a system or a FWC. The CFDIU can transmit the Post Flight Report (PFR) automatically to the ACARS MU at the end of the flight. This report can also be transmitted to the ACARS MU manually. After a dialogue in menu mode between the CFDIU and a system, any page displayed on an MCDU by the CFDIU can be transmitted manually to the ACARS MU.

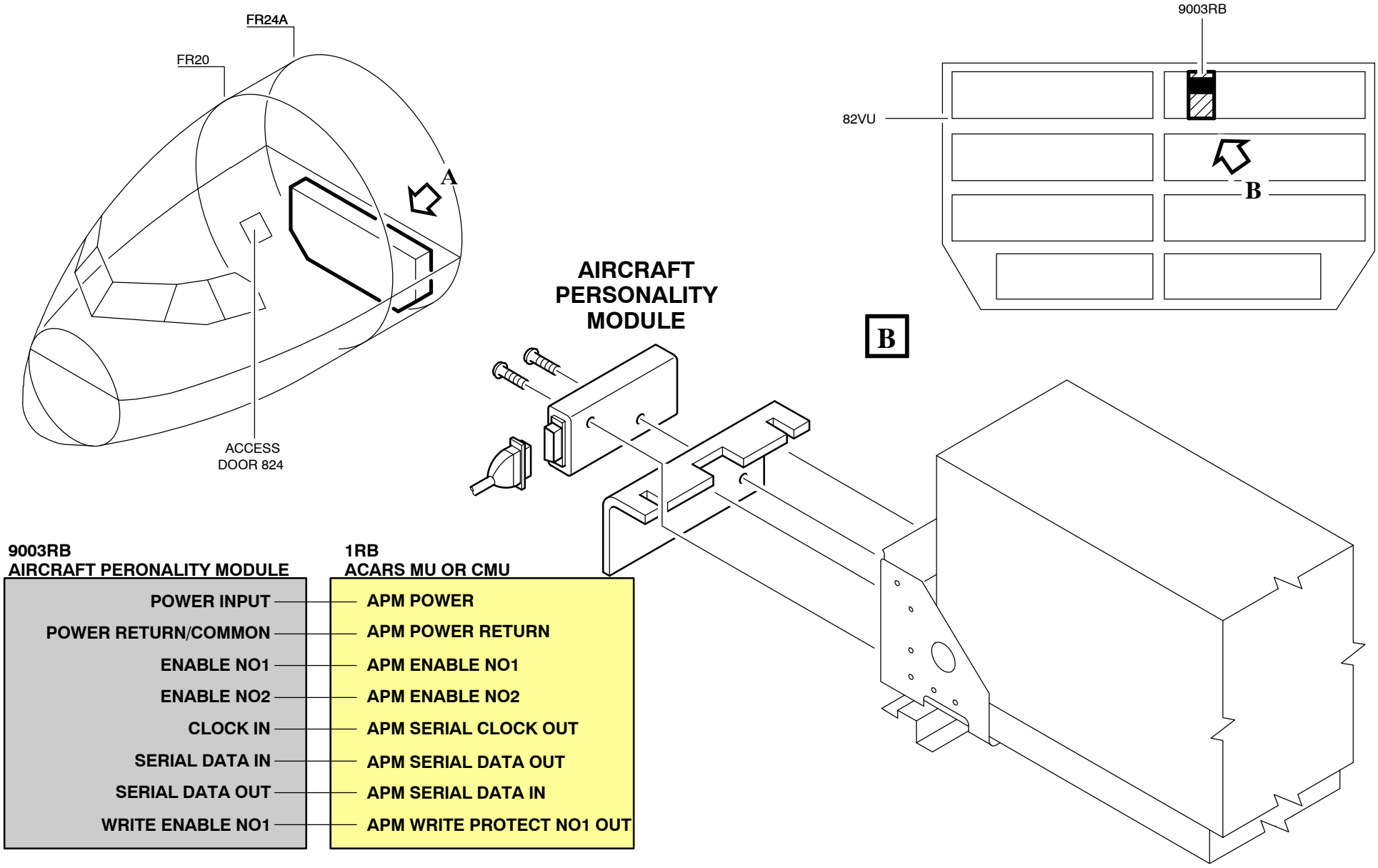


Figure 37 Aircraft Personality Module Schematic

ACARS ACTIVATION

VHF3 FREQUENCY SELECTION

VHF3 can be tuned either via the ACARS MU automatically or manually using the MCDUs, or via the Radio Management Panels (RMPs)

The frequency controlled from the MCDUs is used to force the MU to work with another frequency. In normal case, the frequency is tuned automatically from the MU by using present position information from the ADIRUs. In case of missing this information or other failure a manual selection of the 5 ACARS frequencies is possible via the MCDU.

VHF3 AUDIO SELECTION

VHF3 will handle audio information from ACARS MU or from the Audio Management Unit (AMU) depending on the actual status.

RMP Display

When VHF 3 is automatically tuned by the ACARS MU, the RMP displays:

– ACARS in the ACTIVE window,

– a frequency in the stand–by window.

When VHF 3 is tuned by a RMP, the RMP displays:

– a frequency in the ACTIVE display,

– ACARS in the stand–by display.

As a consequence, VHF3 changes from VOICE to DATA or DATA to VOICE mode and RMPs will switch the display between ACTIVE and STAND–BY windows.

NOTE: If the ACARS is active on VHF 3 and the MU fails, the active window displays dashes. When a transfer is made, ACARS is displayed in the standby window.

Each RMP receives the PORT SELECT discrete. When this discrete is grounded, each RMP displays the same kind of information in VHF3 mode:

– ACARS in the ACTIVE window,

– a frequency in the stand–by window.

VOICE DATA SELECT can be grounded or open.

When this discrete is in open circuit, each RMP displays the same kind of information in VHF3 mode :

– the same frequency in the ACTIVE display,

– ACARS in the stand–by display.

VOICE DATA SELECT is in open circuit.

The PORT SELECT discrete can be changed automatically or manually by the ACARS MU or manually by one RMP.

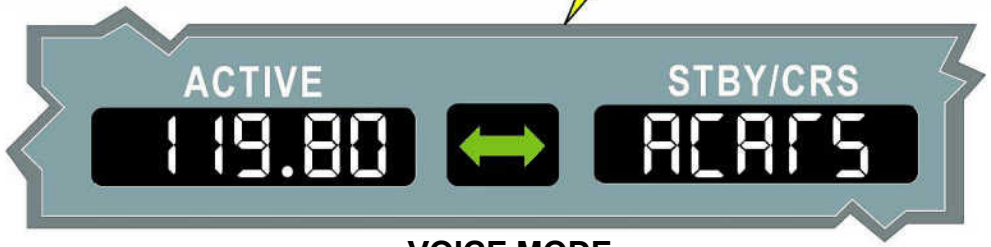
Each time the TRANSFER KEY in one RMP is selected, the REMOTE VOICE/DATA SELECT discrete status will change momentarily forcing the ACARS MU to change the PORT SELECT and VOICE SELECT discrete status.

As a consequence, VHF3 changes from VOICE to DATA or DATA to VOICE mode and RMPs will switch the display between ACTIVE and STAND–BY windows.

NOTE: If the ACARS is active on VHF 3 and the MU fails, the active window displays dashes. When a transfer is made, ACARS is displayed in the standby window.

RADIO MANAGEMENT PANEL 1, 2 OR 3

ACARS IN TRANSMISSION MODE



VOICE MODE

DISPLAYED AFTER ACTIVATION OR ACARS MU FAULT

Figure 38 ACARS Indication on RMP

ACARS APPLICATIONS

TYPICAL DATA LINK PROFILE

Presentation of Downlink (DL) and Uplink (UL) messages.

DL are messages from aircraft to ground.

UL are messages from ground to aircraft.

NOTE: Some UL are generated after a dedicated DL and they can be generated automatic or manually.

Data Link Messages

Initial Request (DL):

- Intitialisation message of flight. Provision of data for INIT and FMS route.

Predeparture Clearance Check (UL)

- Transmission of departure slot information

ATIS & Weather Report (UL)

- UL is sent automatic after FLT INIT. Transmission of airport ATIS and weather information.

Pilots Inputs to Refueling Report (DL)

- This message is used for request for refueling and is sent to the fuel truck.

Loadsheet Report (UL)

- The loadsheet information is sent, after refueling and cargo loading information is available. Crosscheck between pilot and ramp manager is required.

OUT Report (DL)

- Containing airline code,flight number, A/C registration, departure airport and actual time of departure (ATD).

Pax Info List (UL)

- Provision of passenger data (VIPs, special customers, handicapped persons etc.)

Return In Report (DL)

- If aircraft is returning in due to a specific reason (eg technical problem) a message containing airline code,flight number, A/C registration, departure airport and return in time is generated.

OFF Report (DL)

- Containing airline code,flight number, A/C registration, departure & destination airport, operational flight plan,ATD and estimated arrival time at destination.

Refueling Report (DL)

- Contains airline code, flight number, departure airport, fuel added,fuel type, fuel density

AIDS reports (DL)

- the Aircraft Integrated Data system may be configured to send engine trend monitoring and exceedance reports automatically or after an request from ground.

FMS Progress Reports

- The flight management system is able to send reports when the ETA is at -120, -90, -24, -20, -7 minutes or when a destination change is done in the flight plan. This will activate several automatic uplink reports like the ATIS and the Connecting Gate report.

ON Report

- Containing airline code,flight number, A/C registration, destination airport, actual time of arrival

IN Report

- Containing airline code,flight number, A/C registration, arrival airport, ON time, IN time , one door open time.

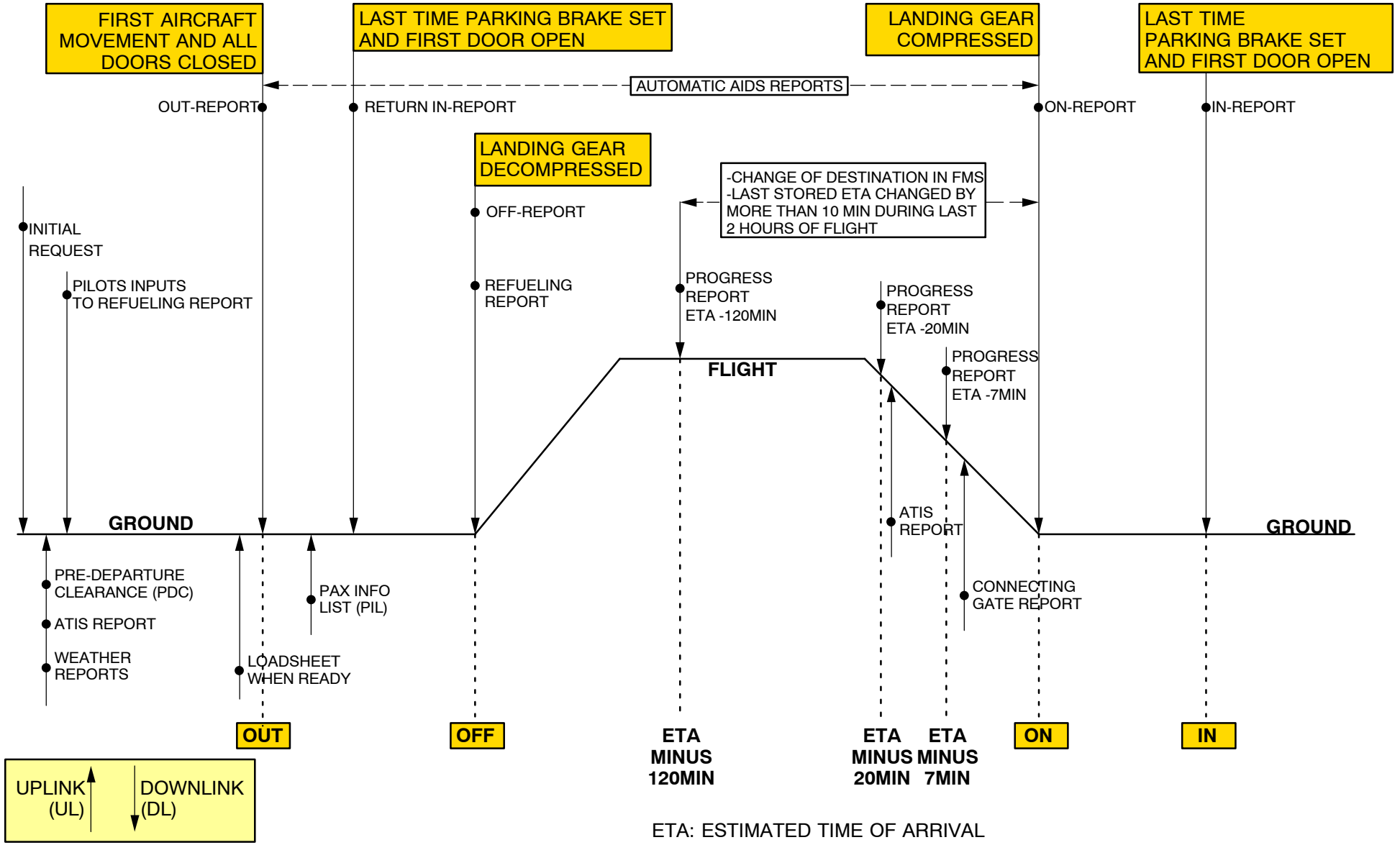


Figure 39 Typical ACARS Applications

DLH DATA LINK PROFILE

Presentation special DLH of Downlink (DL) and Uplink (UL) messages.

NOTE: This is an example how an airline can use the data link intensive. It is the airline decision how it will use the data link capability or if it completely resigns the use of data link.

Insert UL

- Transmission of flight data.

CFMU Status/SLOT UL

- The CFMU (Central Flow Management Unit) which is the operational part of EUROCONTROL. Transmission of CFMU status of flight, taxi time, CTOT (corrected time of take-off).

ATIS/WX UL

- UL is sent automatic after FLT INIT. Transmission of airport ATIS and weather information.

FMS ROUTE UL

- Transmission of airline code, flight number, ATC callsign, FMS flight plan.

TLB HIL DL & UL

- Transmission of handicap open items, important open items.

Door Report DL

- Transmission of flight number, date, airport, time stamp of message, message identifier, one door open Y/N, type of door.

WIM Crew DL & UL

- Where is my crew request, A/C registration, airline, flight number, STA, ETA, gate, checked in Y/N, DH info

NOTOC-DG Report UL

- NOtification TO Captain - Dangerous Goods

OFP Data DL

- The Operational Flight Plan is a shortened version of the flight plan. It contents information about A/C type, flight route, flight level, flight time, departure time, alternate airports and aircraft information.

FMS WIND DL & UL

- After the request predicted wind data for the FMS is transmitted.

T/O Data UL

- Information of V-speed for take off. Provided after load sheet report.

SIGN DL

- Acknowledgement that flight crew received all important messages for this flight (e.g. NOTOC, TLB-HIL)- Pilot has to sign with PK-number and password.,

PIL UL

- Purser (passenger) information list (VIPs, handicap pax ...)

TANGO AGFG

- TANGO is a DLH tool to observe the data of an flight and aircraft rotations.

MET DL & UL

- Provision of meteorological data.

CREW MEALS

- The flight crew can choose between different meals at the destination station in case of a short turn around time.

OCL

- Provision of ATC oceanic clearance.

FANS ADS CPDLC DL & UL

- Controller Pilot Data Link requests, reports and A/C position reports to ATC.

NOTOF DL

- NOTOFication of Fire Brigade. Information about passengers, dangerous goods and crew are sent to the stations affected by the emergency.

CGI Airshow UL

- Connecting Gate Information for Airshow connecting gate page.

HUB Connex

- Information about passenger pick up eventually with a car to catch the connecting flight.

Flight Log

- Flight Log Report to close the flight. Information about pilot in command, landing pilot, remaining fuel and ground power connected.

SUMMARY

The ACARS datalink is today an important item for a normal flight leg.

At DLH there are minimum 14 different departments involved in the management of the Data link messages. For further information goto the DLH eBase address *http://portal.datalink.lsy.fra.dlh.de*.

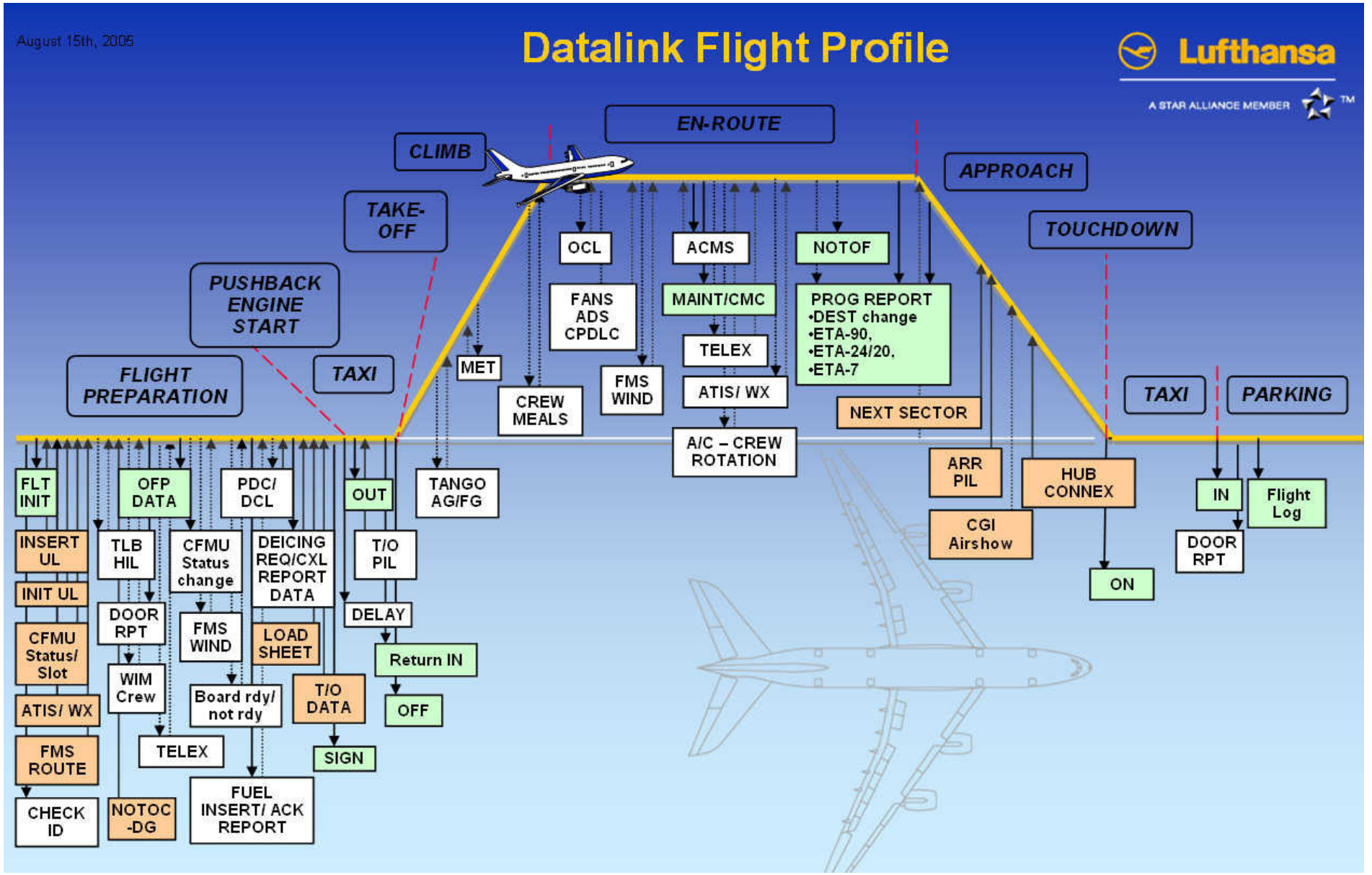


Figure 40 DLH Data Link Profile

ACARS MCDU MENU PRESENTATION

GENERAL

The Multipurpose Control and Display Unit (MCDU) is used as an interface between the operator and the Aircraft Communication Addressing and Reporting System (ACARS). It provides the means necessary to enter the text into the ACARS for data storage, data review and transmission–System Status and ground–to–air voice signaling functions are also presented on the MCDU. The ACARS Management Unit (MU) is interfaced with three MCDUs.

Control and Indicating

Along each side of the display are six line select keys. The arrows on the sides of each display format by the line select keys indicate the section number that defines the display to be called up or the action to be taken for that key.

When the MCDU is initially powered up, it establishes contact with each LRU connected to it.

When the ACARS MU is given control of a MCDU, the MU displays the ACARS or AOC MENU page (AOC = Airline Operating Control). The AOC MENU page is the root page through which all other ACARS pages may be accessed.

Each page of the ACARS Main Menu can display different data bases. These pages are created upon energization of aircraft electrical network and are recreated when the flight phase changes from preflight to inflight, from inflight to postflight, and from postflight to preflight.

When the flight phase changes or the aircraft electrical network is energized, then the MU updates the text and functions displayed on the ACARS Main Menu.

NOTE: The ACARS Menus are developed by the customers AOC application department. For further details refer to the airline Operating Manual 2–2–23 and 12–23–40.

ACARS AOC PRFLT MENU 1/2

FLT INIT Prompt

Initializes next open flight in the Lufthansa ground IT systems and starts various applications (e.g. automatic route and slot uplink).

OFP DATA Prompt

Opens the AOC Operating Flight Plan Data page. The OFP page provides a means to downlink block fuel, taxi fuel, and MTOW. Respective data are used by Weight And Balance (WAB) department for loadsheet calculation. The fuel truck will receive block fuel and an advisory on how to proceed after fueling is performed.

FUEL Prompt

Opens the AOC Fuel Report page. It provides a mask for fuel check and auditing.

SIGN Prompt

Opens the AOC SIGNATURE page. This page is used to sign flight documents electronically and to store them in an electronic trip file. By this, filling of paper documents is no longer required.

TELEX Prompt

Opens the AOC TELEX ADDR page. This allows the pilot to enter and send short free text messages.

DLK MENU Prompt

When available it opens the ATC Downlink menu to enable the Controller Pilot Datalink Communications (CPDLC). Refer to ATA 46.

DEP ATIS Prompt

Pressing this key will perform a downlink of departure airport ATIS request. No further data entry is necessary.

WX/ATIS Prompt

Allows access to combined Weather/ATIS request page. It provides a means to initiate an uplink of ATIS, weather (METAR and FORECAST) or SIGMET.

FLIGHTLOG Prompt

Allows access to the AOC FLIGHTLOG page. It provides downlink of flight related data (e.g. Flight number, departure airport, pilot in command, pilot who performed the landing...)

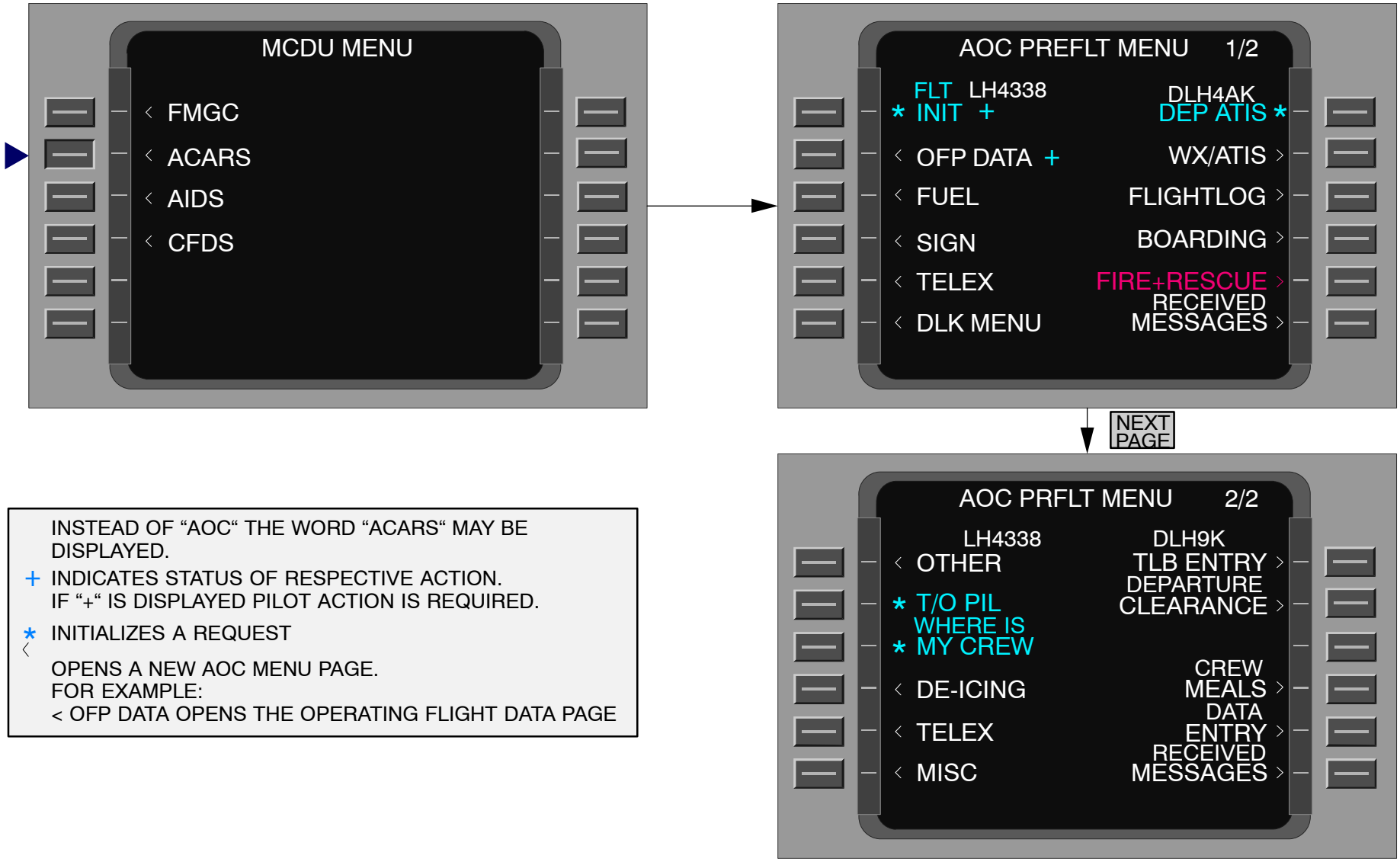


Figure 41 ACARS Main Menu (Ground)

BOARDING Prompt

This page enables the crew to inform ground station whether aircraft is ready for boarding or not.

FIRE + RESCUE Prompt

Opens the AOC FIRE+RESCUE page. This page is used to inform the fire brigade and rescue teams of the destination airport about an emergency landing. This is used to inform automatically the rescue staff about handicap passengers and dangerous goods.

RECEIVED MESSAGES Prompt

Opens the AOC REC MEGS page. It allows selection of messages which have been received.

ACARS AOC PRFLT MENU 1/2

OTHER Prompt

Opens the AOC OTHER FUNCTIONS Page which provides access to different information, that could not assigned to specific pages.

T/O & PIL Prompt

Purser Information List will be requested manually. Manual PIL request is only necessary if PIL is needed before offblock or if no uplink has been received.

WHERE IS MY CREW Prompt

The flight and cabin crews previous flight assignments can be requested from the IT system Cabin Management System.

DE-ICING Prompt

Opens the AOC DE-ICING page to request and cancel aircraft de-icing.

MISC Prompt

This opens the miscellaneous menu for special applications and maintenance.

TLB ENTRY Prompt

This opens the AOC DEFECT REPORT page. This function is used to report TLB entries into the ground maintenance IT system m/techlog for evaluation by the Maintenance Control Centre (MCC).

DEPARTURE CLEARANCE Prompt

At certain European airports it is planned to substitute the voice call for startup by a datalink departure clearance request. After ATC has received and processed the request downlink, startup and/or departure clearance will be uplinked to the aircraft.

CREW MEALS Prompt

Opens the AOC CREW MEALS page, which allows ordering and cancellation of crew meals as well as paying for onboard beverages. Crew meals or beverages taken from board can be charged for on duty crew members. Contents of valid MEALS downlinks appear in the “Flugstundenabrechnung“.

DATA ENTRY Prompt

Opens the AOC DATA ENTRY page. In case of a datalink interruption or after MU reset, this page may be used to insert missing data. During normal operation no entry necessary as data are uplinked with the FLIGHT INIT. Main purpose of the second fields is to document A/C checks performed by the maintenance personnel.

ACARS AOC INFLT MENU

FUEL AT DEST LINE

“A“ = AUTO is the default setting. A fuel truck will come if actual FOB at ETA-20 is less than MINTOF + 30 minutes.

“N“=NO cancels the fuel truck independently of fuel on board (FOB).

“Y“=YES orders the fuel truck independently of fuel on board.

ETA/DEST LINE

The Estimated Time of Arrival (ETA) as calculated by the FMGC and the destination airport are displayed. It is only an indication.

ACARS AOC POSTFLT MENU

NEXT SECTOR Prompt

This enables the request of the NEXT SECTOR uplink, which is normally automatically triggered by the A/Cs ETA-20 PROGRESS report.

ARR PIL Prompt

Initiates an uplink of PIL for destination, including connecting gate information, personnel change of reservation, lost luggage etc.

Figure 42 ACARS PREFLT/INFLT/POSTFLT Menu

ACARS INDICATIONS

ACARS MESSAGES IN E/WD AND MCDU

Messages on E/WD

ACARS CALL

- in green (pulsing), if ACARS has received a message from the ground requesting a voice conversation.

ACARS MSG

- in green (pulsing), if ACARS has received a message from the ground (e.g. Telex, ATIS, Loadsheet, Weather Data).

VHF3 VOICE

- in green, if VHF3 is operating in voice mode and ACARS communication is interrupted. (ACARS is indicated in the ”STANDBY” window on the RMP when VHF3 is selected)

ACARS STBY

- in green, if ACARS communications between the aircraft and the ground are lost.

COM ACARS FAULT

- in amber when there is a MU or CMU fault, ACARS menu is not accessable on the MCDU MENU page.

Messages on the scratch pad of the MCDU

The MCDU scratch pad (SP) shows messages in the following priority:

- user entries
- **ERROR** / **ADVISORY** messages

The ACARS ERROR / ADVISORY messages are shown, when the ACARS system is selected on the MCDU. Most of them can be cleared by pressing the CLR-key on the MCDU.

NO COMM, MSG NOT GEN (white)

- LSK (Line Select Key) that initiates a downlink is pressed while MU is in a NO COMM condition.

VOICE MODE, MSG NOT GEN (white)

- LSK that initiates a downlink is pressed while MU is in VOICE Mode.

PRINTER FAIL (white)

- LSK that initiates a print is pressed, and the printer cannot accept a message.

INVALID ENTRY (white)

- invalid data entry

NO A/C REG, MU IN STBY (amber)

- MU has not received the A / C Registration Number from the APM.

BUFFER FULL, MSG NOT GEN (white)

- LSK that initiates a downlink is pressed, and the downlink buffer is full.

AUTO / MAN FREQ MISMATCH (white)

- Manually selected VHF data frequency differs from frequency indicated by automatic frequency select logic.

NO LAT / LON, USE MAN FREQ (amber)

- MU is not receiving latitude and longitude data from the Flight Management System.

BAD H/W PART NUM (amber)

- Hardware part number is invalid (invalid format).

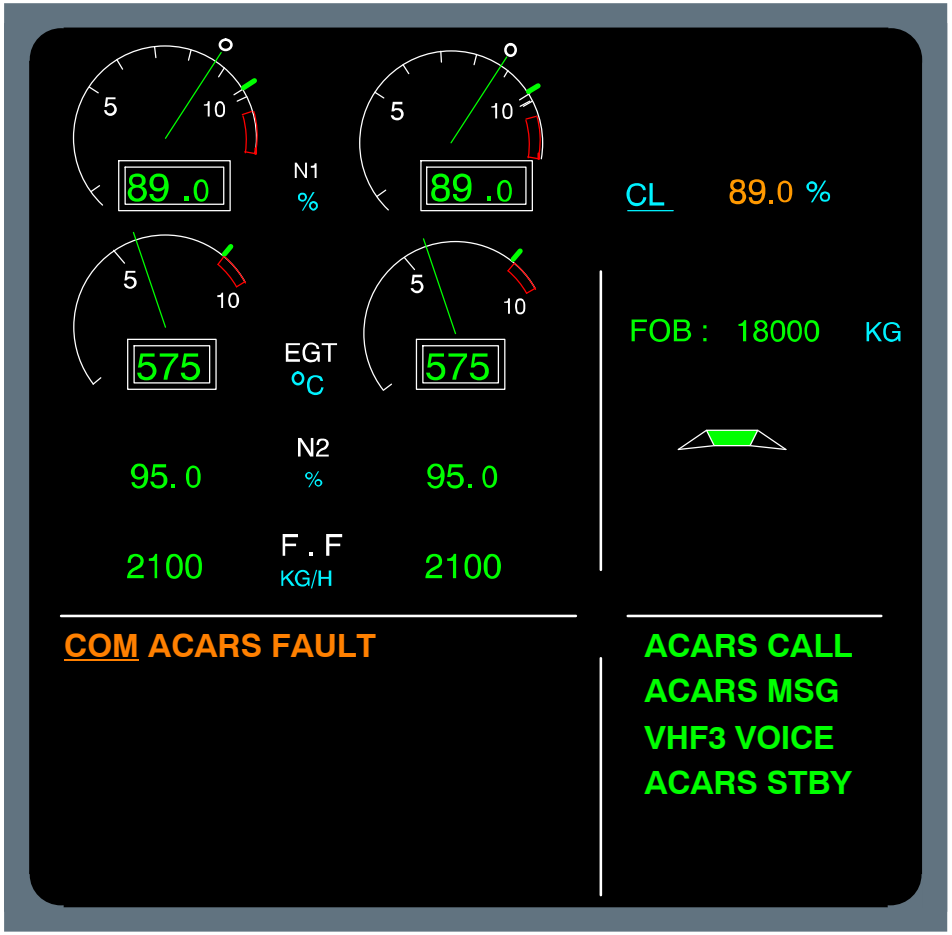
AIRCRAFT TYPE MISMATCH (amber)

- Aircraft type pins are not set for A319/320/321 aircraft

ACRFT REGNUM DBASE FAIL (amber)

- Aircraft registration number initially received from broadcast does not match database.

POSSIBLE INDICATIONS ON E/WD



EXAMPLE OF MESSAGE ON THE MCDU

Figure 43 ACARS Indication on EWD & MCDU

ACARS MISCELLANEOUS PAGE PRESENTATION

ACARS MISC MENU

The access to the ACARS MISC Page is possible via the second ACARS PRFLT Page 2/2. When the Line Select Key 6 Left (LSK 6L) is pressed the ACARS miscellaneous page is displayed.

1 ACARS Data Frequency Page

The ACARS DATA FREQ page is accessed by pushing the line key 1L of the ACARS MISC page.

This page presents a menu of the regions of the world that can be selected by the crew. Each region is associated with a VHF data frequency. The associated data frequency is displayed on the second line of this page.

The first character indicates the following modes:

- A for Automatic Frequency Management mode,
- M for Manual mode (frequency selected by the Pilot),
- R for Remote mode (frequency selected by the Airport),
- S for Automatic search mode (scanning),
- D for Automatic search mode for data.

The left arrow or right arrow will point to the current service provider region determined by the aircraft position data. Action on line key 6L will return the user to the ACARS Main Menu.

Automatic Frequency Management Mode

When line key 6R is pushed, the MU sets the automatic frequency management mode and blanks the star adjacent to line key 6R. The data frequency displayed on the second line of this page will reflect the frequency determined by the MU automatic frequency management mode.

Manual mode

The manual frequency management mode is entered by selecting a line key with a frequency defined. The star adjacent to the name of the frequency in use is blanked in order to indicate the last selection mode. While in Manual mode, if the selected frequency is different from the frequency determined by the aircraft position data, the MU will display the AUTO/MAN FREQ MISMATCH indication in the MCDU scratchpad. The arrow will be displayed next to the line key selected by the automatic frequency management. While in manual mode, the arrow will not be displayed if the MU is not receiving aircraft position.

2 OUT, OFF, ON, IN STATUS Pages

The ACARS OOOI STATUS 1/3 page is accessed by pushing the line key 3L of the ACARS MISC menu screen. These are four ACARS OOOI status pages. On page 1/3, OOOI states not yet encountered will have time values of white dashes. When the aircraft transitions to one of these states, the time will be inserted as hhmm. The current state will be indicated with an arrow in column 12 pointing to the appropriate state name. Absence of the arrow indicates the current state is INIT.

Pages 2/3 and 3/3 display the values of the inputs used to determine the OOOI state and the time of the last change in value. Page 3/3 display the individual door discretes. The door status on page 2/3 represents the output of the door logic.

Door status is displayed in a data field. When minimum one of the doors is open, then the OPEN indication is displayed, and when all the doors are closed then the CLOSED indication is displayed.

Slide status is displayed in a data field. When the slide is armed, then ARMED is displayed, and when the slide is not armed, then UNARMD is displayed.

Parking brake status is displayed in a data field. When the parking brake is set, then the SET indication is displayed, and when the parking brake is released, then the REL indication is displayed.

Aircraft movement status is displayed in a data field. When the aircraft movement is detected, then the MOVE indication is displayed, and when no aircraft movement is detected, then the STABLE indication is displayed.

The flight phase is displayed in a data field. The current OOOI state is displayed in a data field with OUT, OFF, ON, IN, RET IN, INIT, and HOLD. Each entry has a corresponding time tag.

Actuation of line key 6R (PRINT prompt) on any page will attempt to print only that page of the ACARS OOOI STATUS screen on the cockpit printer. Actuation of line key 6L (RETURN TO ACARS MENU prompt) will return the user to the ACARS MENU page.

When the A/C is an A321 there are four OOOI pages displayed because of the additional door status lines.

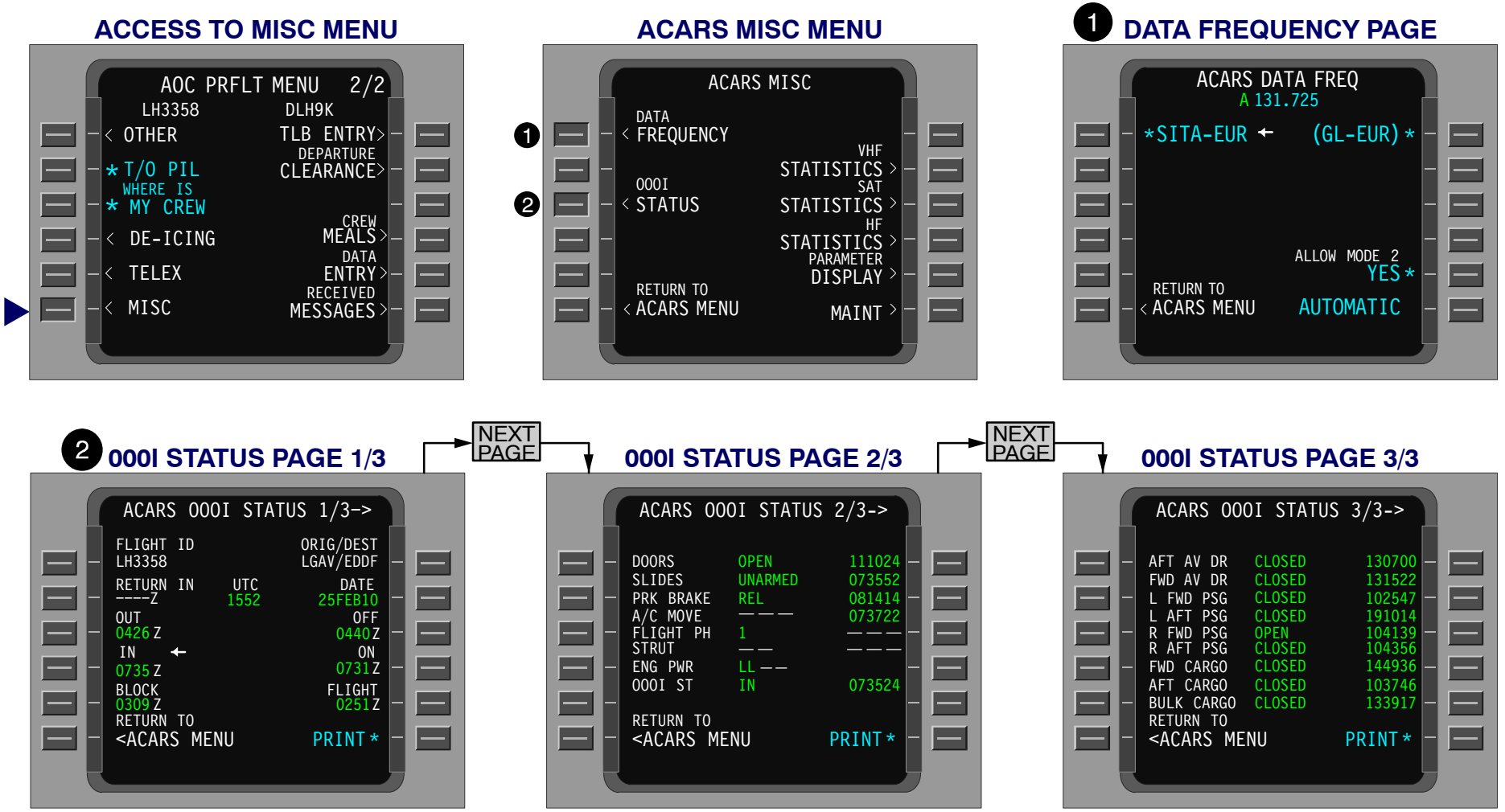


Figure 44 Miscellaneous, Data Frequency & OOOI Status Pages

ACARS STATISTICS & PARAMETER PAGES DESCRIPTION

1 ACARS VHF STATISTICS Page

The ACARS VHF STATISTICS page is accessed by pushing the LSK 2R of the miscellaneous menu page.

This page displays statistics concerning transmissions and receptions of the VHF used by the ACARS.

When LSK 6R is pushed (PRINT prompt), then the MU attempts to print the ACARS VHF STATISTICS page on the cockpit printer. Actuation of LSK 6L (RETURN TO ACARS MENU prompt) returns the user to the ACARS Main menu.

2 ACARS SAT STATISTICS Page

The ACARS SAT STATISTICS page is accessed by pushing the LSK 3R of the Miscellaneous menu page.

This screen displays statistics concerning transmissions and receptions of the SATCOM used by the ACARS.

When LSK 6R is pushed (PRINT prompt), then the MU attempts to print the ACARS SAT STATISTICS page on the cockpit printer. Actuation of LSK 6L (RETURN TO ACARS MENU prompt) returns the user to the ACARS Main menu.

3 ACARS HF STATISTICS Page

The ACARS HF STATISTICS page is accessed by pushing the LSK 4R of the Miscellaneous menu page.

This screen displays statistics concerning transmissions and receptions of the HF used by the ACARS.

When LSK 6R is pushed (PRINT prompt), then the MU attempts to print the ACARS HF STATISTICS page on the cockpit printer. Actuation of LSK 6L (RETURN TO ACARS MENU prompt) returns the user to the ACARS Main menu.

4 ACARS PARAMETER DISPLAY Page

The ACARS PARAMETER DISPLAY page is accessed by pushing the LSK 5R of the Miscellaneous menu page.

This page allows the user to display the value of any parameter in the parameter table. The user selects the parameter by entering a three digit number, representing the parameter index, into the scratchpad and pushing LSK 1L. If the index entered by the user is non–numeric (greater than three digits in length) or exists outside of the range of valid table indexes (000–255), the entry will be discarded and the INVALID ENTRY indication will be displayed in the scratchpad. If the index is valid, the contents of the parameter will be displayed on the page.

Actuation of LSK 6R (PRINT prompt) attempts to print the ACARS PARAMETER DISPLAY page on the cockpit printer. Actuation of LSK 6L (RETURN TO ACARS MENU prompt) returns the user to ACARS Main menu.

Example of parameter number

- 008 Aircraft Registration
- 011 FMC Flight Number
- 036 Fuel on board
- 122 UTC
- 144 Parking brake
- 219 Company route

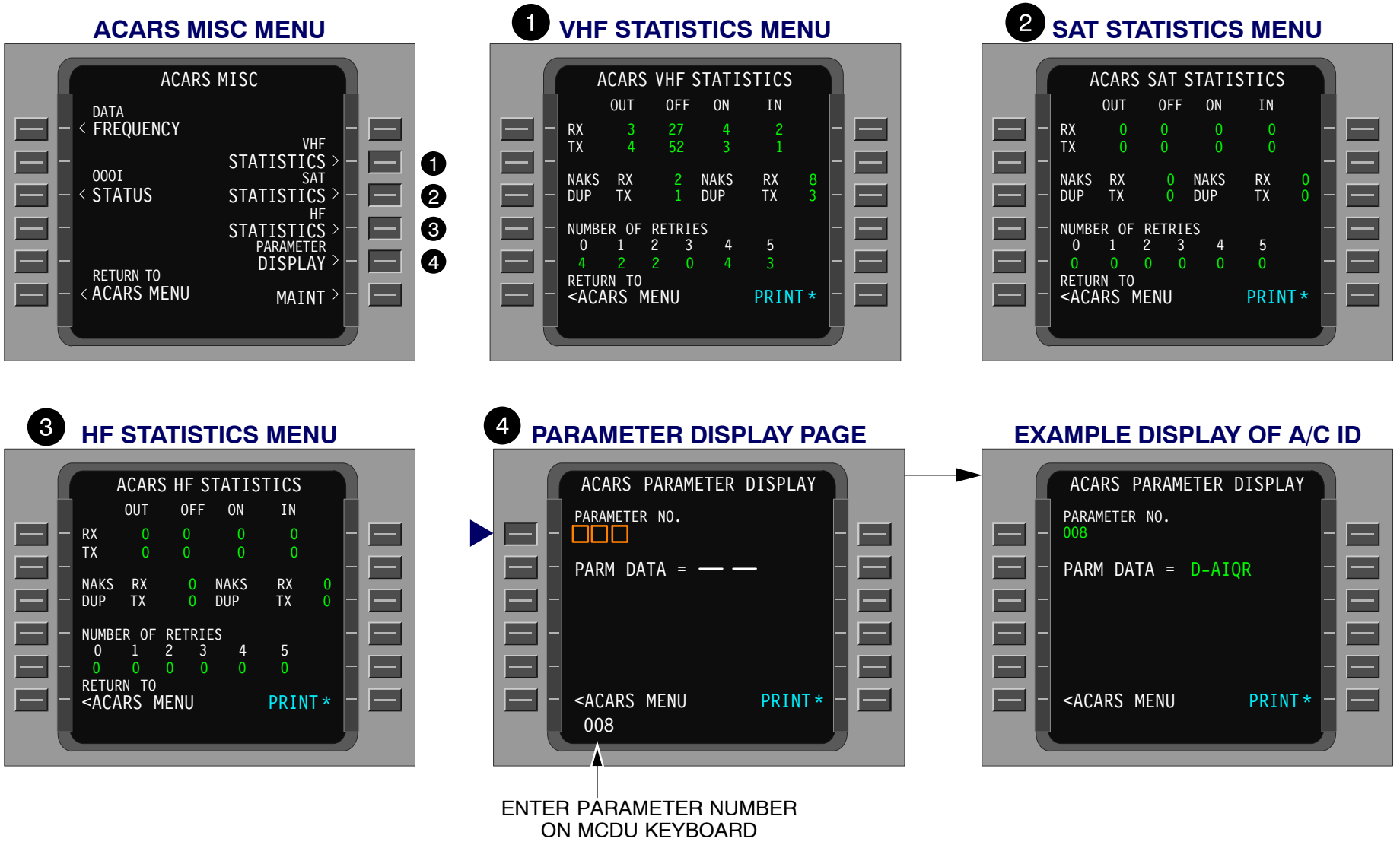


Figure 45 (V)HF & SAT Statistics / Parameter Display

ACARS MAINTENANCE MENU PAGE PRESENTATION

ACARS MAINT MENU

The ACARS MAINTENANCE page is accessed by pushing the line key 6R of the ACARS MISC page.

The user can get access to other maintenance pages through the following MCDU line keys:

- 1L: PART NUMBER prompt:
  - Access to ACARS PART NUMBER page
- 2L: STATUS prompt:
  - Access ACARS STATUS page which may be used to read out the ACARS Class 1, 2, 3 and ground faults.
- 3L: TEST prompt:
  - Access to ACARS TEST page
- 4L: COMM prompt:
  - Access to ACARS COMM STATUS page where it is displayed which communication systems are used for datalink.
- 5L APM prombt:
  - Access to the ACARS APM MENU to see the APM programming and to EDIT the APM program.
- 6R: hidden prompt (enter the password SAM before pressing 6R):
  - Access to ACARS DEBUG page to RESET the ACRS MU or CMU.

Actuation of line key 6L (RETURN TO ACARS MENU prompt) will return the user to the ACARS MENU page.

1 ACARS PART NUMBERS Page

The ACARS PART NUMBER page can be accessed via the ACARS MAINTENANCE page. The ACARS PART NUMBER page displays the following data:

- MU P/N: ACARS MU hardware part number
- MU S/N: MU serial number
- CORE SW P/N REV: Core software part number
- APP SW P/N REV: Application software part number
- DB P/N: Data base part number.

Actuation of line key 6R (PRINT prompt) will attempt to print the ACARS PART NUMBER page on the cockpit printer. Actuation of line key 6L (RETURN TO MAINT MENU prompt) will return the user to the ACARS MAINTENANCE page.

2 ACARS Test Page

The ACARS TEST menu is selected via the ACARS MAINTENANCE menu. The first page of the ACARS TEST menu enables the user to exercise basic features of the ACARS system. The second page of the ACARS TEST menu enables the user to perform a loop back test on LRUs. Test functions are activated by pushing the MCDU keys.

Actuation of LSK 6L (RETURN TO MAINT MENU prompt) returns the user to the ACARS MAINTENANCE menu.

NOTE: The LRU names displayed on the second page are dependent upon which LRUs are installed.

VHF LINK

The VHF LINK test function attempts to downlink a message to the ground network. Success of the test is determined by whether or not the downlink is acknowledged by the service provider.

The data field displayed alongside the LSK indicates the status/results of the test, initially displaying the INITIATE indication. When the function is first selected, the status changes to TEST to indicate that the test is active. The asterisk (*) alongside the LSK also changes to a blank. Attempts to initiate the test while the asterisk is missing are ignored.

If the downlink is acknowledged by the ground station, the status will change to PASS and the asterisk is shown again. If not, the status changes to FAIL and the asterisk is shown again. Five seconds after completing the test, the status changes to INITIATE.

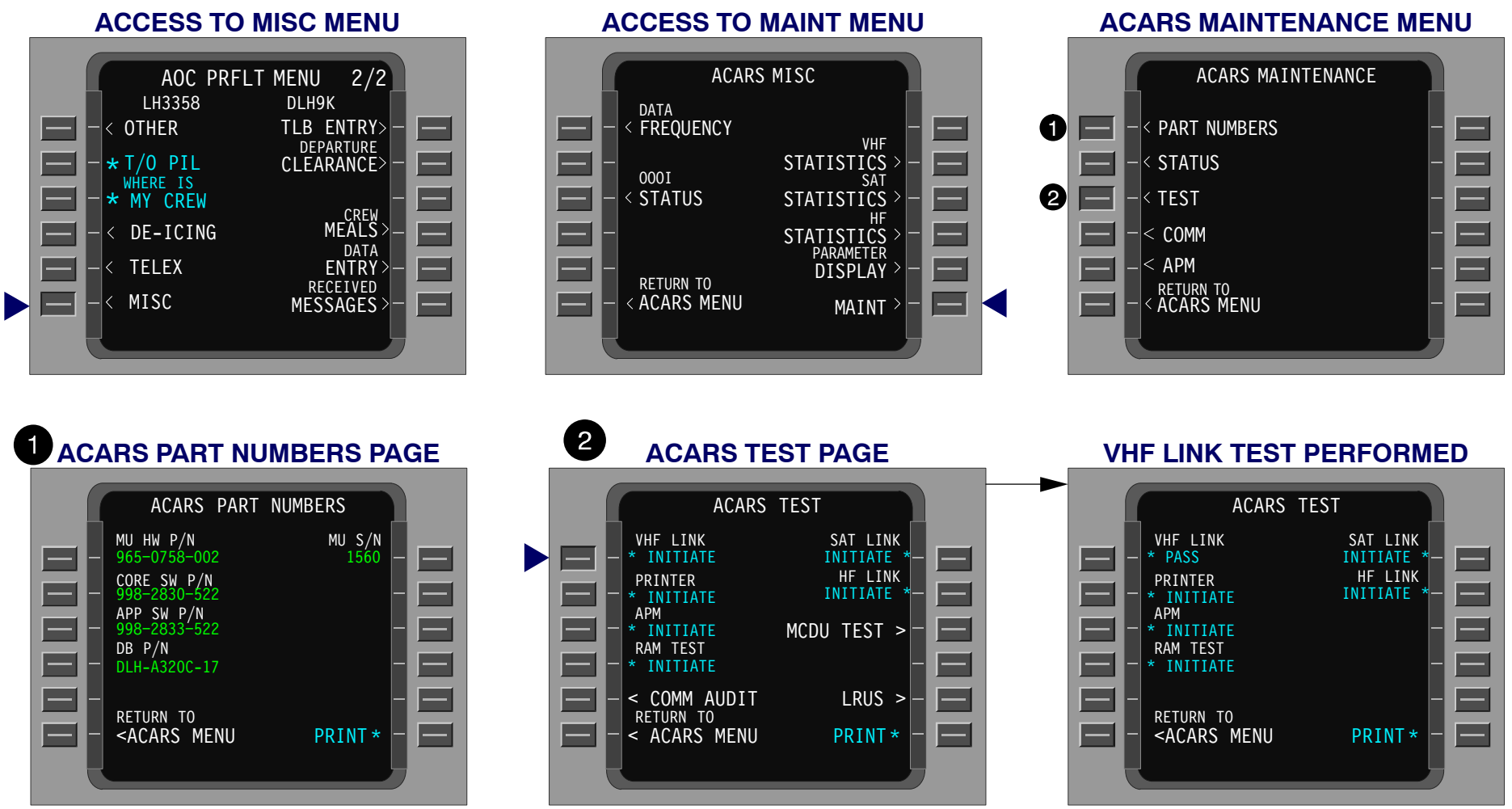


Figure 46 ACARS Maintenance Page

3 PRINTER

The PRINTER test function allows to print all characters on the cockpit printer.

The data field displayed alongside the LSK indicates the status/results of the test, initially displaying INITIATE indication. When the function is first selected, the status changes to TEST to indicate that the test is active. The asterisk (*) alongside the LSK also changes to a blank. Attempts to initiate the test while the asterisk is missing are ignored.

If the message containing the test pattern is determined to be undeliverable, the status changes to FAIL and the asterisk is shown again. If the data transfer is successful, the status changes to PASS and the asterisk. Five seconds after completing the test, the status changes to INITIATE.

APM

This initiates a test of the APM. If no errors are detected, then the status field displays the PASS indication for 5 seconds. If errors are detected, then the status field displays the FAIL indication for 5 seconds. While the test is performed, the status field displays the TEST indication.

RAM

The RAM test performs a simple write/read test over portions of RAM. All data stored in RAM is saved. If no errors are detected, then the status field displays the PASS indication for 5 seconds. If errors are detected, then the status field displays the FAIL indication for 5 seconds. While the test is performed, the status field displays the TEST indication.

4 COMM AUDIT

The VHF and satellite communication AUDIT function is monitored via the ACARS COMM AUDIT page. This page is accessed via the ACARS TEST 1/2 page.

- Line key 1L (VHF AUDIT prompt) toggles VHF audit on and off.
- Line key 2L (UPLINKS prompt) enables/disables printing of uplinks addressed to this aircraft.
- Line key 3L (DOWNLINKS prompt) enables/disables printing of downlinks from this aircraft.
- Line key 2R (LABEL FILTER prompt) enables/disables filtering of uplinks and downlinks.
- Line key 3R (LABEL prompt) enters label to be used for label filter.

Access to each audit function can be separately disabled by the application.

SAT LINK

The SAT LINK test function is disabled because the SDU is not installed, so the MU displays the NO SDU indication and the asterisk is blanked. If a SDU is installed the test works like the VHF LINK TEST.

HF LINK

The HF LINK test function is disabled because the HF is not installed, so the MU displays the NO HF indication and the asterisk is blanked. If a HF transceiver is installed the test works like the VHF LINK TEST.

5 MCDU

The MCDU test function causes the MU to display the ACARS MCDU SCRN TEST page. From this page, the user may select LSK 6L (RETURN TO TEST MENU prompt) to return to the ACARS TEST menu, or select LSK 6R (PRINT prompt) to print the page.

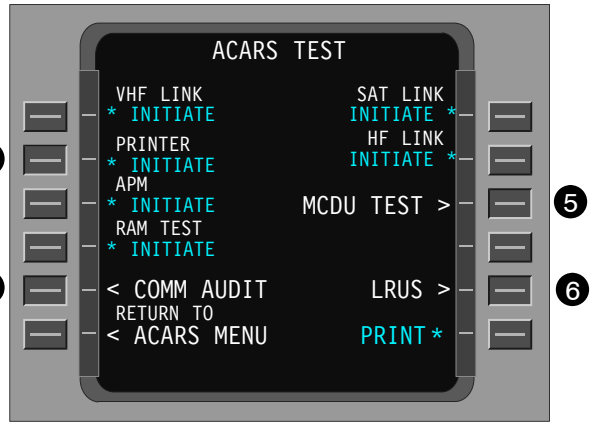
6 LRUS

Pressing the LRU Prompt will open the ACARS LRU Test page.

The LRU TEST function performs a simple loop back analysis to evaluate the status of a displayed LRU connected to the ACARS MU or CMU..

The data field alongside the prompt LSK displays initially the INITIATE indication. Actuation of the function changes the field to TEST, and the asterisk alongside the LSK changes to a blank. Attempts to initiate the test while a file transfer is in progress results in displaying the BUSY indication while a file transfer is in progress, then a return to INITIATE. If the TEST is correct, then the MU changes the status field to PASS and displays the prompt asterisk. Any other results causes the MU to display the FAIL indication. Five seconds after completing the test, the status changes to INITIATE.

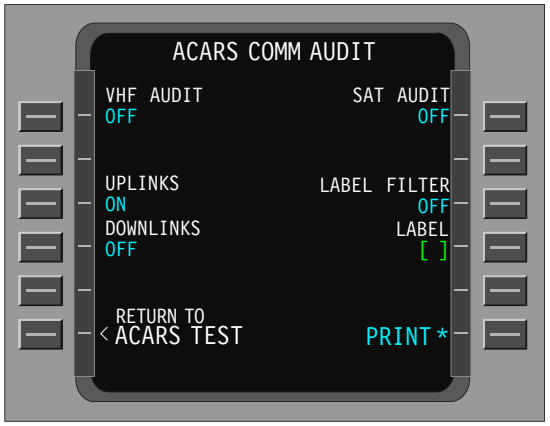
ACARS MAINTENANCE MENU



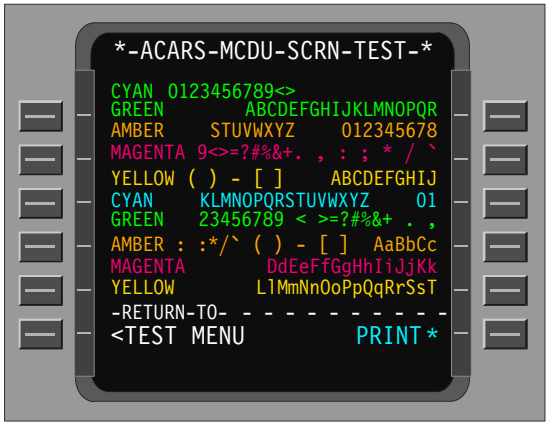
3 PRINTER TEST RESULT

D-AIQR EDDF - - - - - - - - 25FEB10 1554Z
ACARS PRINTER TEST
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789 . , ( ) : ; =? ! “#$%&*+-/@[ ]\ ~_
END OF TEST

4 ACARS COMMON AUDIT PAGE



5 MCDU TEST PAGE



6 LRU TEST PAGE

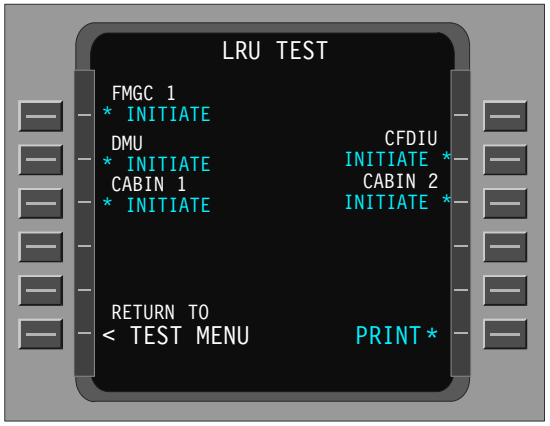


Figure 47 ACARS Test Page

ACARS MAINTENANCE MENU (CONTINUED)

1 ACARS STATUS page

The ACARS STATUS page is accessed via the ACARS MAINTENANCE page.

Actuation of line key 6L (RETURN TO MAINT MENU prompt) returns the user to the ACARS MAINTENANCE page.

ERROR LOG Page

The ACARS ERROR LOG page is accessed via the ACARS STATUS page. The ACARS ERROR LOG page allows access to submenus which provide detailed information about faults detected by the MU.

Actuation of line key 1L (CLASS 1 AND 2 FAULTS prompt) displays the CLASS 1 AND 2 FAULTS page, on the MCDU. Access to this page is prevented if no faults exist for that category.

Actuation of line key 2L (CLASS 3 FAULTS prompt) displays the CLASS 3 FAULTS page on the MCDU. Access to this page is prevented if no faults exist for that category.

Actuation of line key 3L (GROUND FAULTS prompt) displays the GROUND FAULTS page on the MCDU. Access to this page is prevented if no faults exist for that category.

The data fields adjacent to each prompt indicate the number of fault entries residing in memory for that category. Actuation of line key 6R (PRINT prompt) attempts to print the ACARS ERROR LOG screen on the cockpit printer.

Actuation of line key 6L (RETURN TO STATUS MENU prompt) returns the user to the ACARS STATUS page.

Anomalies given by the CLASS 1 and 2 FAULTS page and those given by the CLASS 3 FAULTS page are detected and recorded by the software while the aircraft is in flight.

Anomalies given by the GROUND FAULTS page are detected and recorded by the software while the aircraft is on the ground.

The operation of all FAULTS pages is the same. The most recent error is displayed as the first page. Actuation of the next page function key and down–arrow function key allows the user to advance to less recent entry pages.

2 Communication Status Page

The ACARS COMM STATUS page is selected by pushing line key 4L on the ACARS MAINTENANCE menu.

Depending on customer option it may be possible to select or deselect a VHF, HF or SAT link. In the shown example this is not possible.

When the link is available the data field below VHF, HF or SAT is COMM, when not available the indication is NOCOMM.

The data field below the ROUTER indication displays the number of unsent messages in the router queue.

The data filed below VHF, HF or SAT displays the number of unsent messages in the SAT queue.

APM Prombt

This allows access to the ACARS APM MENU menu to see the APM programming and enter to enter the ACARS APM EDIT page. For more information go to programming chapter.

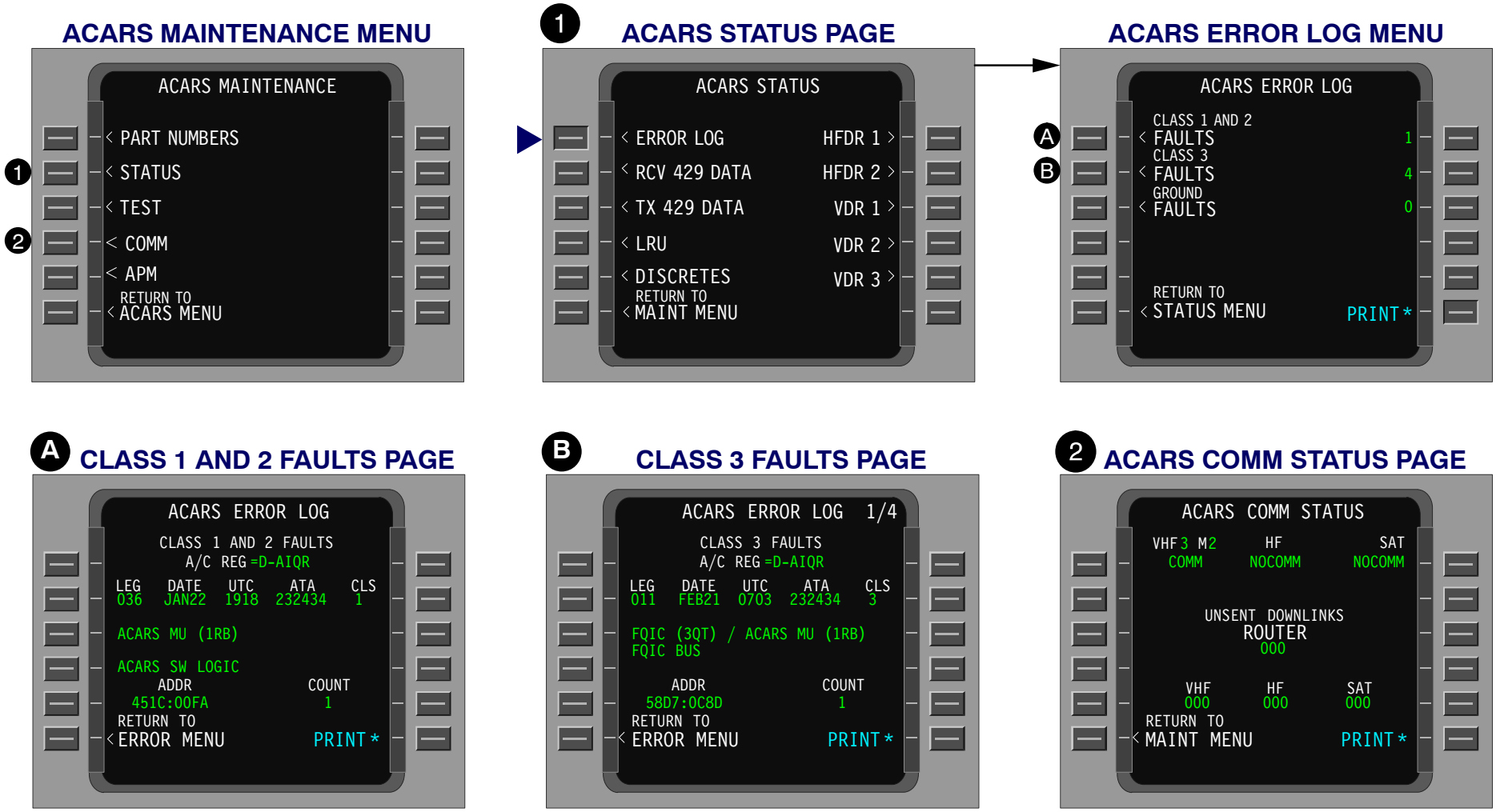


Figure 48 ACARS STATUS & ERROR LOG Pages

ACARS RESET FUNCTION

GENERAL

DataLink is a complex, distributed system. Reasons for malfunctions may be outside the aircraft and therefore not correctable by the following procedure or a ground mechanic. Reset if the ACARS CMU is suspected to be the reason for the DataLink malfunctioning.

ACARS Cold Start

When the ACARS MU or CMU is reenergized after a power up it will use the values stored in its memory. A cold start procedure erases this memory. Afterward a manual entry of ACRAS data have to be performed.

Following actions will activate a MU or CMU cold start:

- Re-racking of the unit.
- Software upload.
- APM programming via MCDU.
- Pressing the test pushbutton switch on the ACARS MU.
- ACARS reset via the ACARS DEBUG menu.

ATTENTION: During reset the QTY BEFORE value on the ACARS FUEL REPORT page is cleared. Type in old value without the dot after MU RESET on the FUEL REPORT page

ACARS FUEL REPORT Page

The purpose of the FUEL REPORT page is to provide a mask for fuel check and auditing.

The ACARS FUEL REPORT page is accessed by pushing the line key adjacent to the FUEL REPORT indication on the ACARS MENU page.

It is used to enter data for the calculation of fuel data for billing purposes only and displaying the results.

VOLUME

- Pilot enters the supplied fuel volume as received by paper receipt or by uplink.

UNITS

- Pilot enters appropriate unit (liters: LT, US gallons: UG, imperial gallons: IG) of supplied fuel as stated on paper receipt or as uplinked LT is default.

DENSITY

- Fuel density may be entered. Default value is 0.800. If measured or calculated by the fuel truck it will be uplinked and displayed for information only, just right of the entered or aircraft sensed density value.

SUPPLIER

- The international 3-letter Supplier Code has to be entered for each flight, if not uplinked automatically. If no refueling takes place, enter “NIL“. If code is unknown, enter “AAA“.

FUEL DEST

- Setting is downlinked as part of the Fuel Report to give the Fueling Company an early notice. See procedure “Refueling at Destination“ in the OM-B.

QTY BEFORE:

- The MU will display the remaining fuel quantity, in metric tons, adjacent to line key 1R. The crew can enter a remaining fuel quantity value.

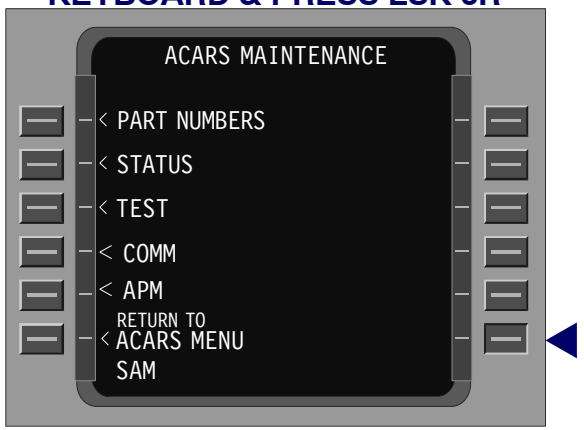
  Fuel Report is sent to HAM MT (Konzerntreibstoffeinkauf). Sending is possible between “FLT INIT“ and “Takeoff“. If not received prior Loadsheet release, a reminder may be uplinked.

NOTE: This value is erased when a MU Reset is performed.

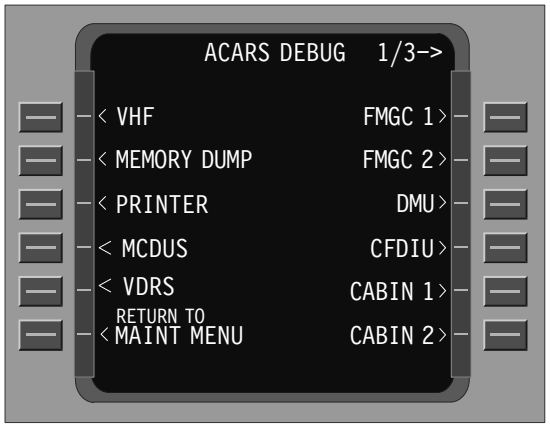
STEP 1:
SELECT FUEL ON ACARS PRFLT MENU PAGE

STEP 2:
PRINT OUT OR WRITE DOWN THE QTY BFOR VALUE

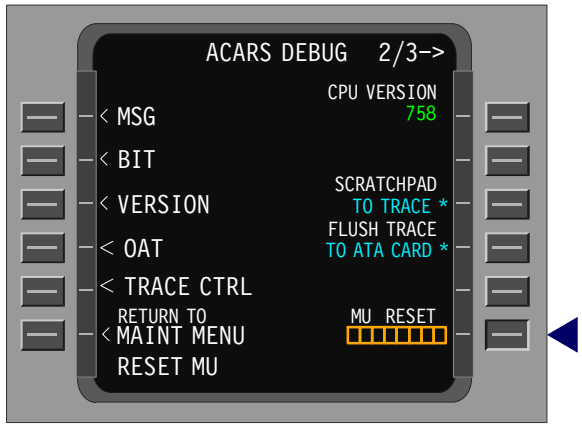
STEP 3:
ENTER “SAM“ ON THE MCDU KEYBOARD & PRESS LSK 6R



STEP 4:
PRESS “NEXT PAGE“ ON THE MCDU KEYBOARD



STEP 5:
ENTER “RESET MU“ ON THE MCDU KEYBOARD AND PRESS LSK 6R



STEP 6:
RE-ENTER THE “QTY BFOR“ VALUE ON THE MCDU KEYBOARD AND PRESS LSK 1R

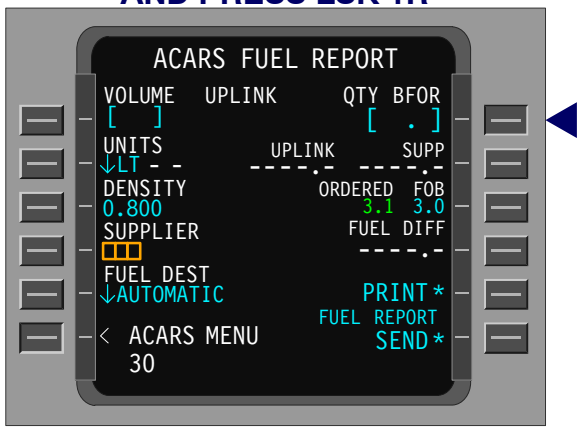


Figure 49 ACARS MU or CMU Reset Procedure

ACARS DATA LOADING

General

For correct operation the ACARS MU needs the correct:

- Operating Software (SW P/N)
- Customer Database (DB P/N)
- Aircraft registration (A/C REG)

The aircraft registration is received from the CFDIU in case of a ”Cold Start”.

A Cold Start is activated in case of:

- MU removal,
- reset via MCDU (see maintenance pages).
- new software load.
- activation of test switch on the MU frontface.
- reprogramming of the APM.

During a COLD Start the ACARS MU is completely new initialized (with A/C registration initialisation) and a self test is activated.

Software Loading

The software have do be loaded via a portable Dataloader direct on the frontface of the MU (not via the installed Airborne Data Loader).

After operating software or database loading the correct SW P/N or DB P/N have to be checked on the MCDU (see maintenance pages – part numbers).

COMMUNICATION MANAGEMENT UNIT

The Mark II Communications Management Unit (CMU) is an airborne communications router that supports datalink service access between the following aircraft data link applications and their corresponding ground service providers:

- Aeronautical Operational Communication (AOC) / airborne flight information system (AFIS),
- Controller Pilot Data Link Communication (CPDLC),
- Automatic dependent surveillance (ADS).

The CMU is based on ARINC 758 . It can be upgraded by software download to an Aeronautical Telecommunications Network (ATN) router when protocols and application infrastructure are available to support communications, navigation and surveillance/air traffic management (CNSIATM) data link applications.

The CMU provides an ARINC 724B compatible data link router through which all character–oriented data are transmitted to and from the ground Aircraft Communications Addressing and Reporting System (ACARS) network.

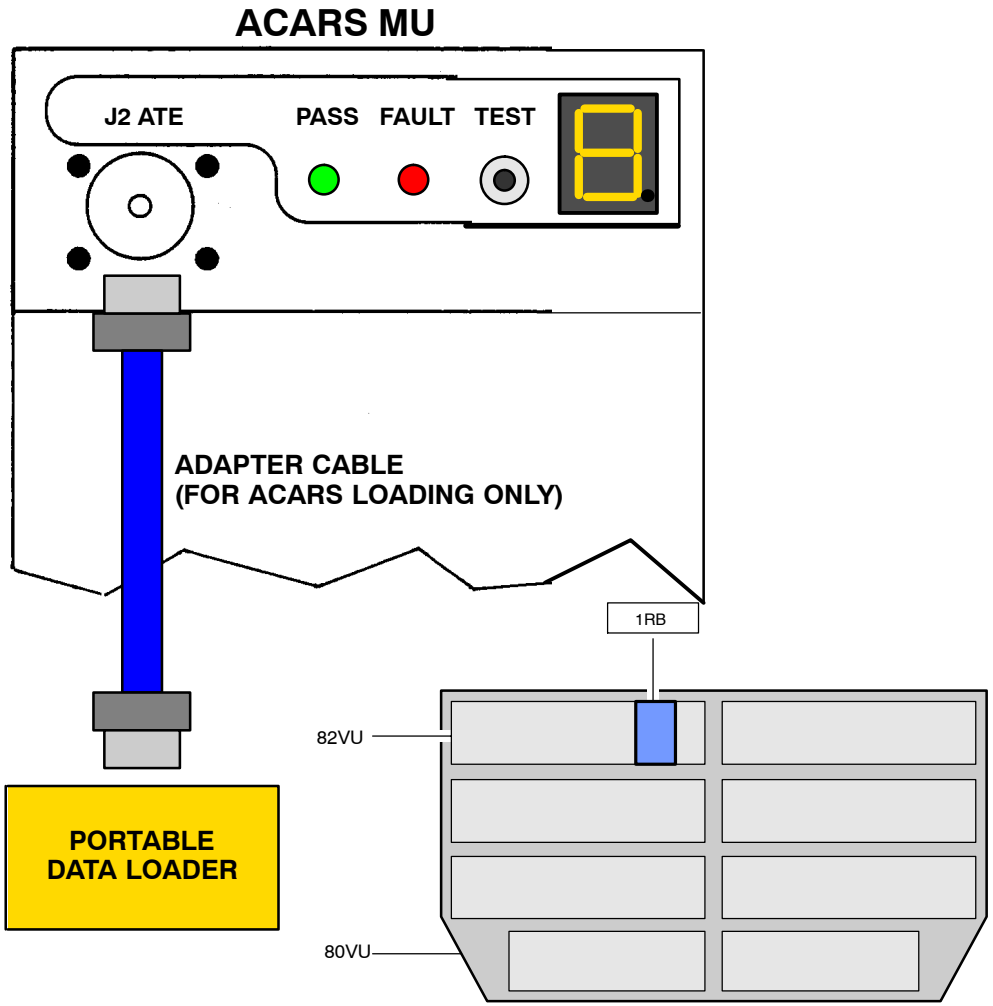
The CMU provides several levels of user interfacing. The CMU operational crew interface is provided through a Multiple Control and Display Unit (MCDU) and printer.

Maintenance and debugging user interfaces include aircraft, MCDU or debug maintenance terminal (DMT) interfaces. Access to the ground network is provided through VHF.

AIRCRAFT PERSONALITY MODULE PROGRAMMING

ON THE MCDU	RESULT
- select ACARS	MAIN MENU page is displayed
- select MISC	MISC MENU is displayed
- select MAINT	MAINTENANCE MENU is displayed
- select APM	APM MENU is displayed
- select EDIT	PASSWORD page is displayed
- enter “THUYVAN“ (default) on scratchpad and select LSK 2L	After correct password is entered the page shows “CONTINUE“ on a LSK
- select CONTINUE	APM EDIT page is displayed
Now A/C type, the tailsign and the ICAO address (MODE-S hex) may be entered or changed.	

NOTE: INSTEAD OF A PDL
A NOTEBOOK MAY BE USED
FOR DATA LOADING



Communication Management Unit (CMU)

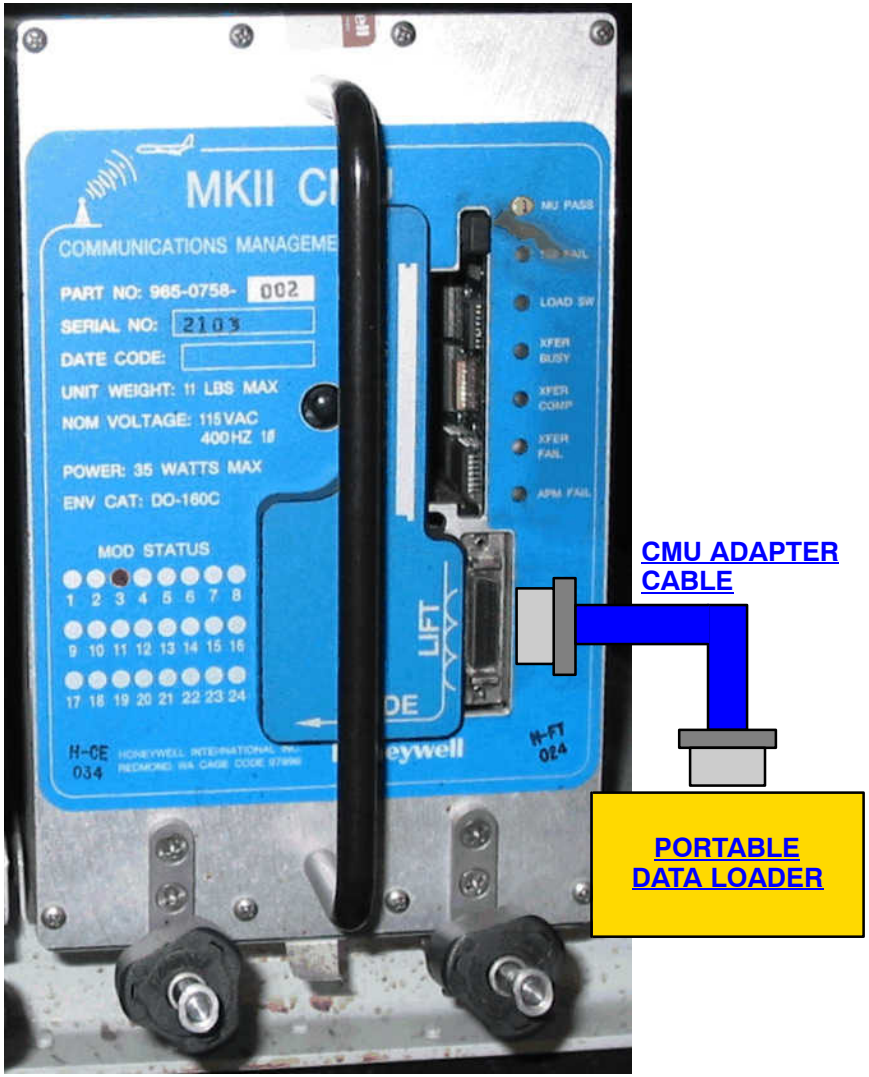


Figure 50 ACARS MU & CMU Data Load

23–28 SATELLITE COMMUNICATION

AERO–I SATCOM SYSTEM OPERATION

GENERAL

The function of the SATCOM system is the reception and processing of signals via satellites supplying aeronautical services in the L–Band. Aero–I SATCOM lets the aircraft fly within spot beam coverage to transmit and receive multichannel voice, fax, e–mail and circuit mode data services. Packet mode data services and emergency calls are available world–wide in the global beam.

The system Aero–I SATCOM is composed of:

- a Satellite Data Unit (SDU - incl. HPA and BSU),
- an Intermediate Gain Antenna (IGA).

The **SDU** is the interface to other aircraft systems. It contains all data processing functions, as well as the modems, channel tuning synthesizers, high stability reference oscillator, to/from intermediate frequency to/from L–band conversion and the **High Power Amplifier (HPA)** used to amplify the SDU generated L–band signal to a power level required for proper transmission to the satellite.

Satellite Data Unit (SDU)

The SDU is the heart of the SATCOM system. It does most of the data–handling, protocol, modulation/coding and demodulation/decoding functions of the Aircraft Earth Station (AES).

The SDU is connected to:

- the Air Data/Inertial Reference System (**ADIRS**) to provide the Beam Steering Unit (**BSU**) with relative azimuth and relative elevation command to let the steerable beam pointing of the IGA for optimum reception and transmission,
- the Centralized Fault Display Interface Unit (**CFDIU**) for BITE,
- the Air Traffic Service Unit (**ATSU**) when the VHF link with ground station is not possible,
- the Cabin Telecommunication Unit (**CTU**) for the cabin/passenger telecommunications equipment to make the best use of resources supplied by the SATCOM,
- the **MCDUs** to display call status information, system configuration information for the SDU,
- the Multipurpose Disk Drive Unit (**MDDU**) located on the pedestal, used for up/download software,
- the Flight Warning Computer (**FWC**), to provide warnings and cautions during the flight,
- the Audio Management Unit (**AMU**) to make audio transmission, calls are initiated by selecting the associated SATCOM channel SAT 1 or SAT 2 transmission key on the Audio Control Panel (ACP),
- the Landing Gear Control and Interface Unit (**LGCIU**) to transmit air/ground information discrete outputs.

The RF signal is sent to the HPA through an attenuator and it is received from the Diplexer/Low Noise Amplifier (D/LNA).

Intermediate Gain Antenna

The IGA is powered by the SDU, and is capable of operating with either 115V AC or 28V DC. The IGA is an electronically steered phased array antenna. Simultaneous transmission and reception of satellite signals (full duplex operation) gives two bands of operation, the receive band and transmit band. Beam steering of the antenna is done via serial transmission of phase shifter data and RF signals from the SDU and reception. The intermediate gain antenna supplies +6 dB nominal gain with near hemispherical coverage.

The IGA has:

- a filter regulator to filter the DC power and data lines,
- an antenna control driver to make the logical control of the beam steering, and also does the BITE functions of the IGA,
- a D/LNA to make the required transmit and receive filtering to get a common internal antenna port while using separate transmit and receive lines into the IGA,
- a feed network/array which contains the functional RF switching and radiating elements for forming the beams.

The SDU is interfaced with the CFDIU for BITE purposes via an ARINC 429 bus. The HPA and BSU can be tested through the SDU via ARINC 429 buses. They also give IGA and LNA status.

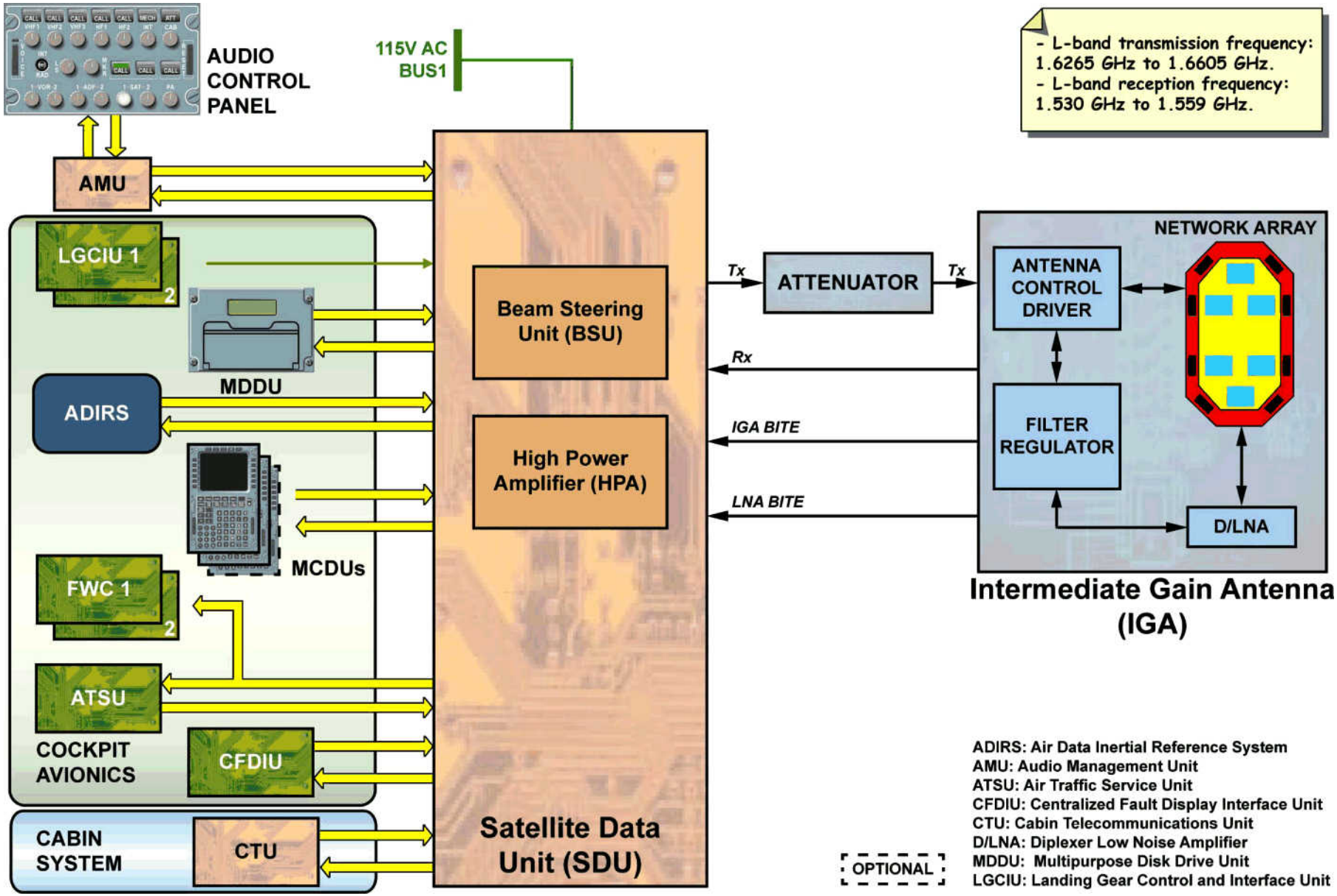


Figure 51 AERO-I SATCOM System Schematic

COMPONENT LOCATION INTRODUCTION

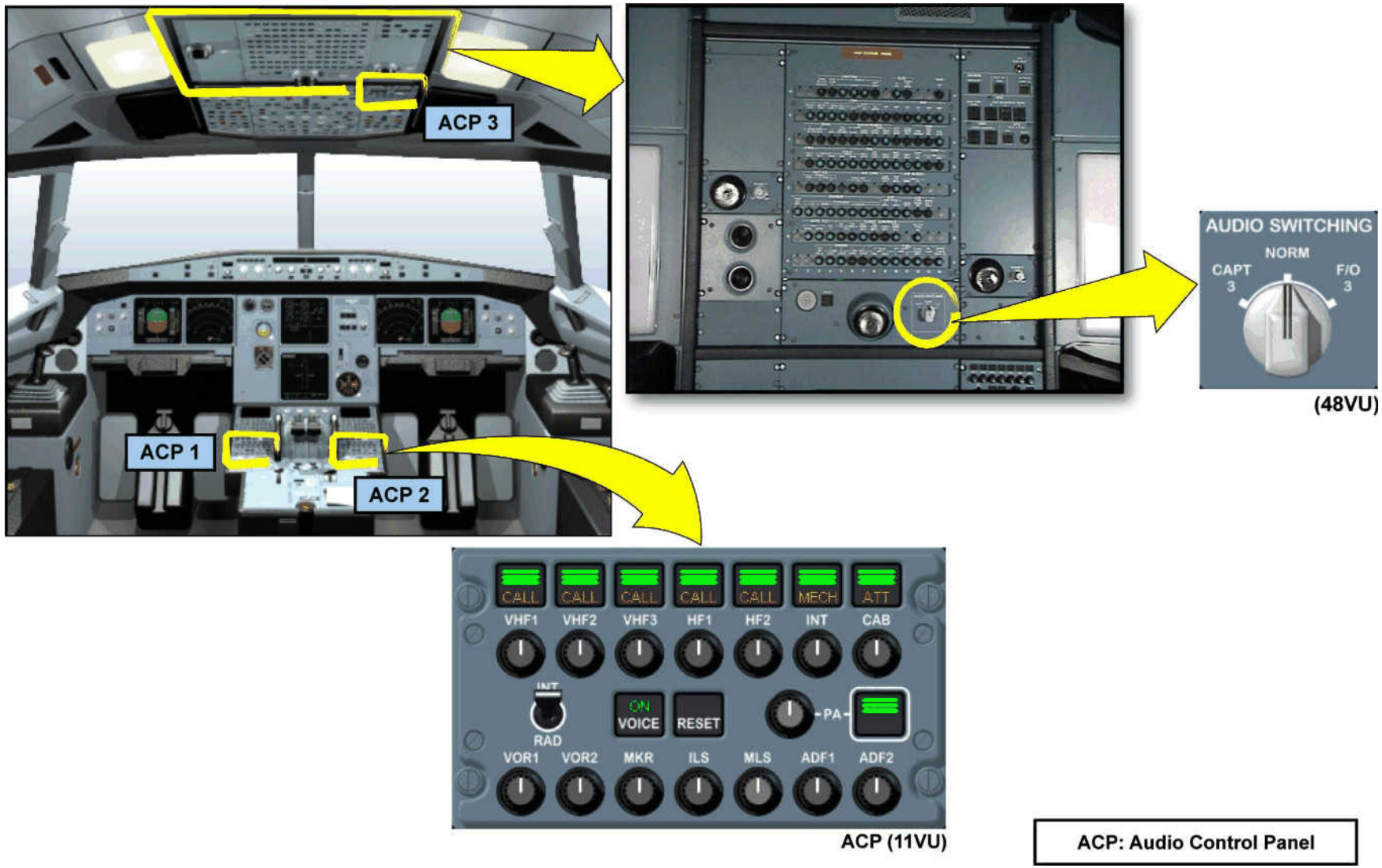


Figure 52 ACP & Audio Switching Selector Location

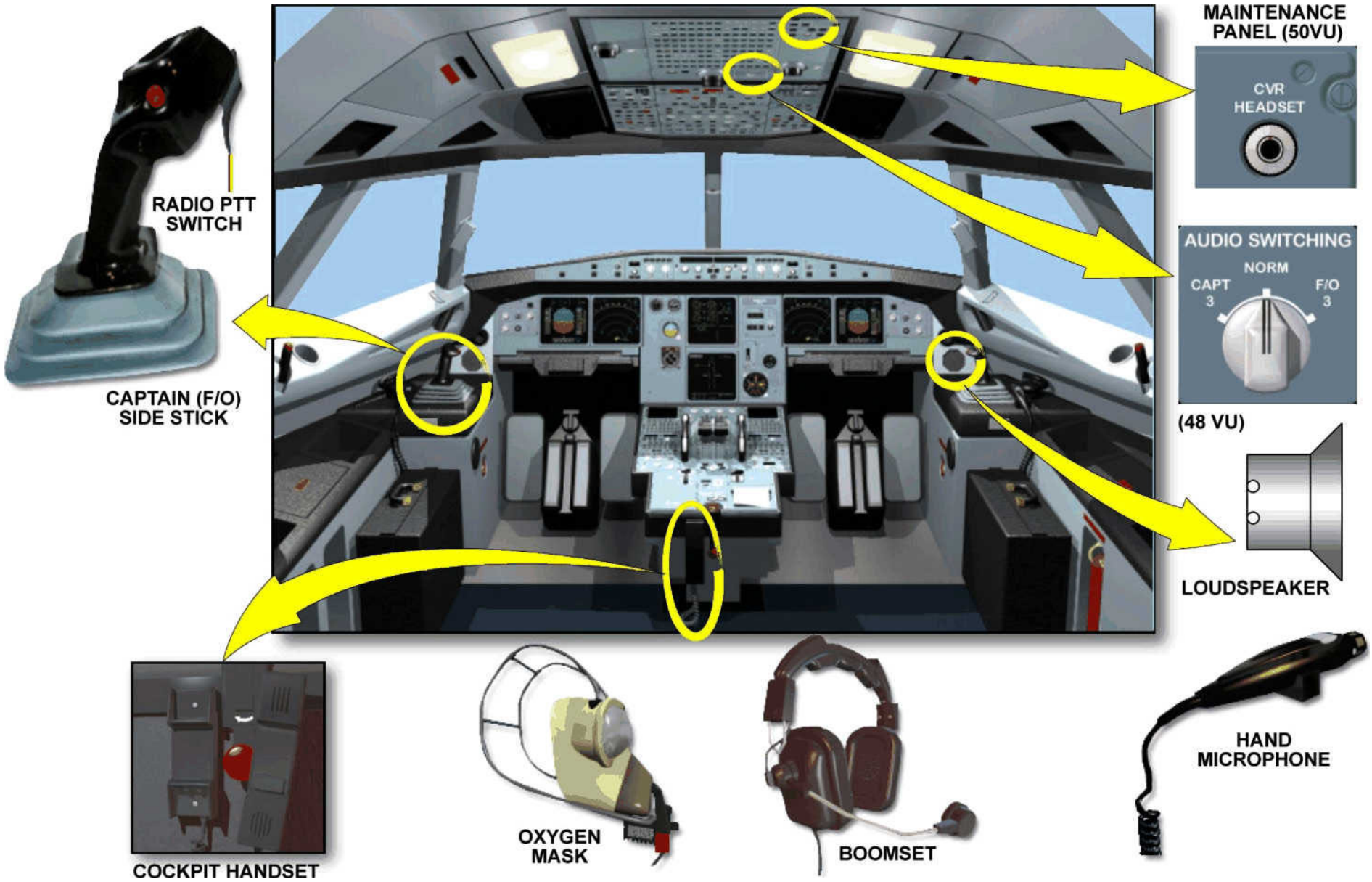


Figure 53 Cockpit Audio Equipment Location

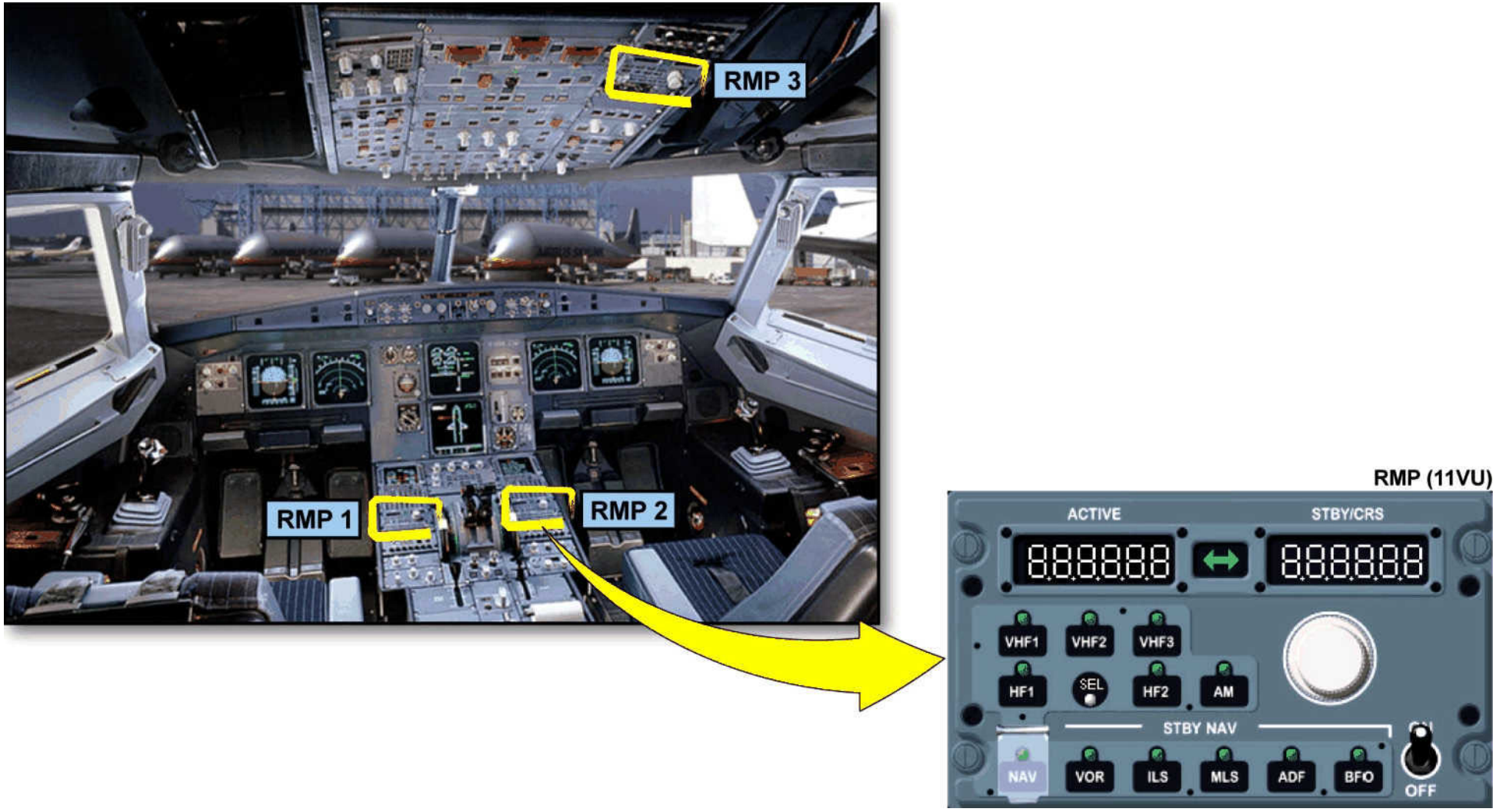


Figure 54 RMP Location

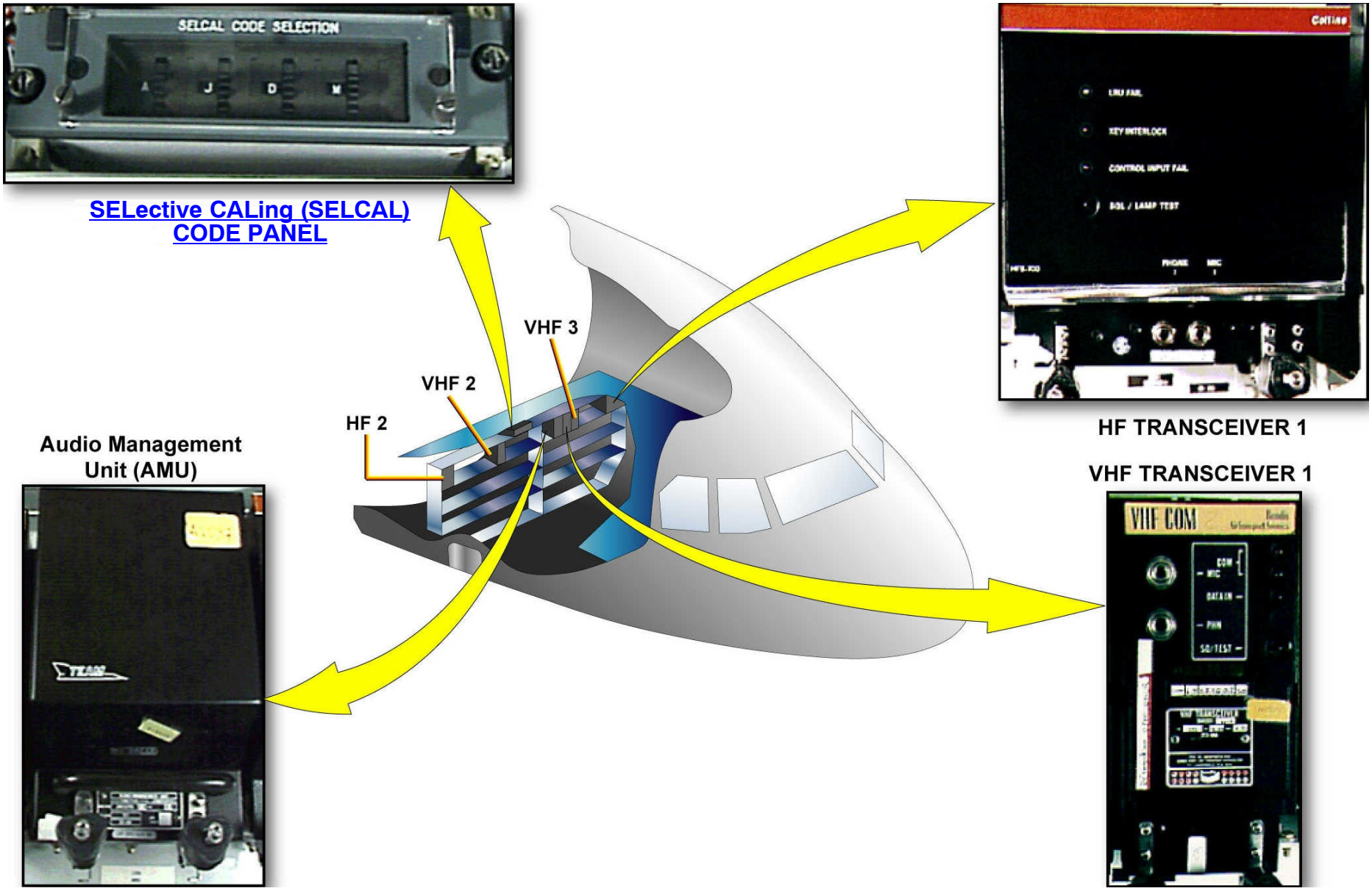


Figure 55 VHF & HF Transceiver, SELCAL Panel and AMU Location

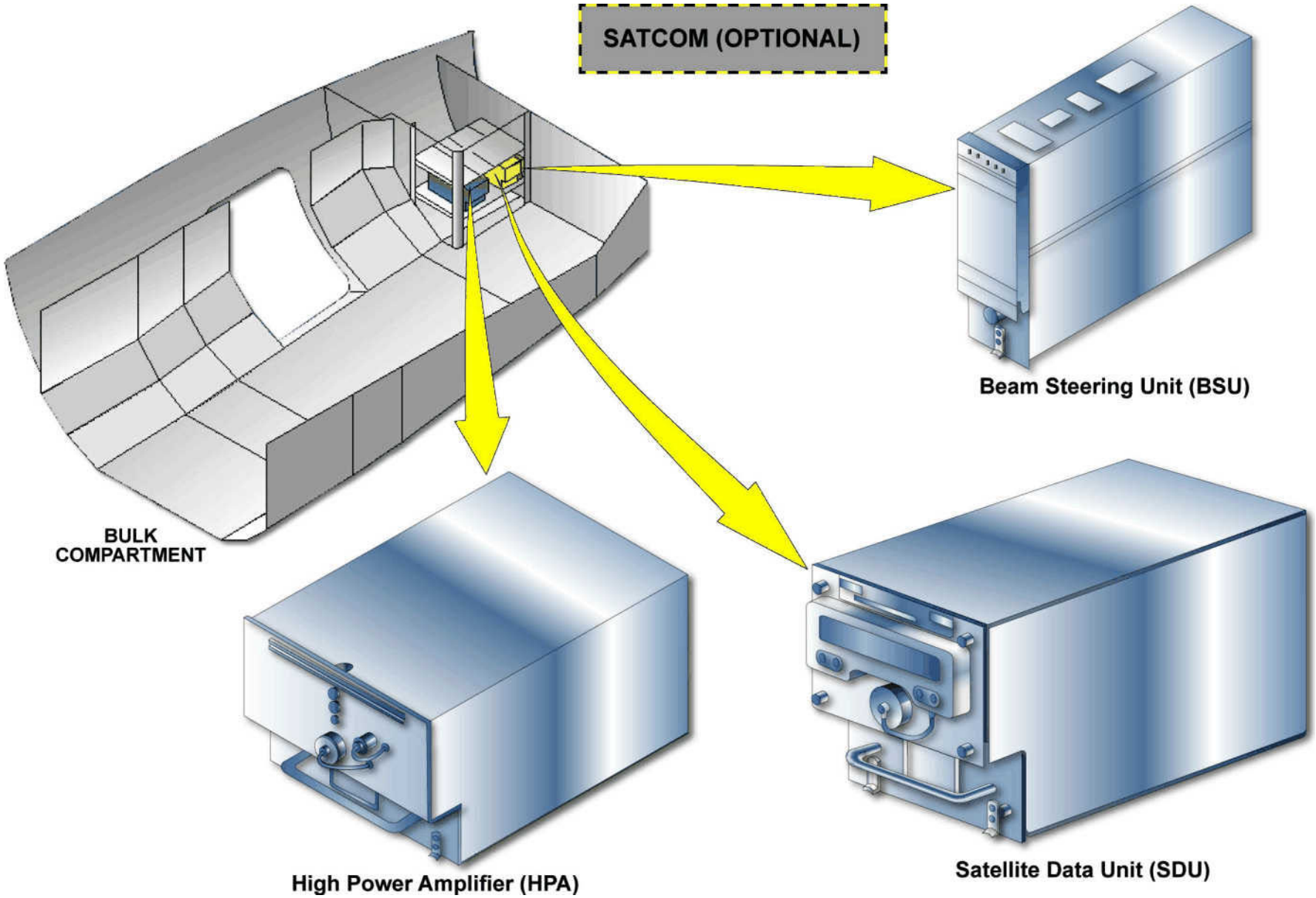


Figure 56 SATCOM Components Location

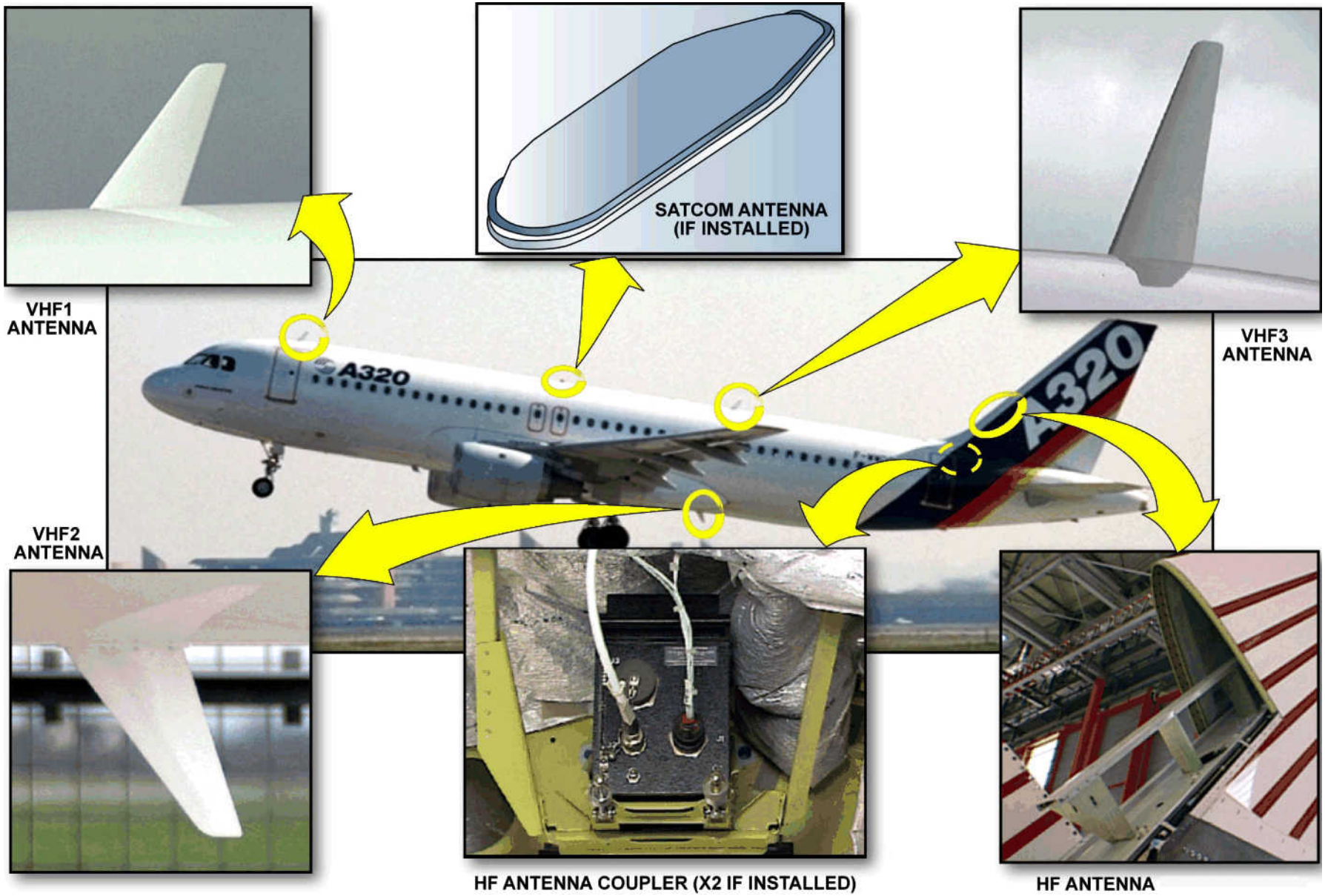


Figure 57 Antennas and HF Coupler Location

23–60 STATIC DISCHARGING

STATIC DISCHARGING DESCRIPTION

PURPOSE

The aircraft behaves like a Faraday cage and should be discharged.

The static dischargers avoid static electricity discharging noise and ensure a good quality of radio transmission, without interference.

The purpose of the static dischargers is:

- to discharge the static electricity accumulated by the aircraft during its flight,
- to supply better intelligibility on the HF and VHF system (avoid static electricity discharge noise).

The static dischargers:

- decrease the voltage level necessary to start corona discharge,
- make regions of very low radio–frequency field–strength and thus cause the discharge to occur in these regions,
- discharge the static electricity charge.

The effect is to decrease the interference in the communications and navigation systems.

LOCALIZATION OF THE STATIC DISCHARGERS

The disposition of the static dischargers is used for the dispatch of the static electricity. They are located around the aircraft extremities.

Each static discharger assembly has a retainer and a static discharger. The retainer is attached to the structure by rivets. The static discharger is attached to its retainer by one screw, to make it easy to replace.

Static discharger assemblies are installed at the tips of:

- the wing–tip fence,
- the horizontal stabilizer,
- the vertical stabilizer,
- the elevators,
- the rudder,

and on the trailing edges of:

- the wing fixed structure,
- the ailerons,
- the elevators,
- the rudder
- the flap–track movable–fairings,
- depending on A/C version at the engine–pylon rear–fairings.

20% of static dischargers may be missing or inoperative on each the following areas:
- Right wing,
- Left wing,
- Vertical stabilizer (including rudder),
- Right horizontal stabilizer (including elevator),
- Left horizontal stabilizer (including elevator).

Note:
If a static discharger is missing or inoperative on a flap track fairing, the VHF sound quality may be slightly degraded

When combined with the case of dispatch with a wing tip fence missing, 20% of the remaining static dischargers of the affected wing are allowed to be inoperative or missing

Only one static discharger may be missing per sharklet.

Figure 58 Static Discharger Location

DISCHARGER AND RETRAINER DESCRIPTION

If the aircraft has been struck by lightning the static dischargers are the first elements destroyed and they can be easily replaced.

Two kinds of static dischargers are installed, depending on their localization on the aircraft:

- one with a straight mounting installed at the trailing edges,
- one with a 30 degree angle mounting, installed at the tips.

Two types of retainer are installed:

- a flat retainer at the trailing edges,
- an angular retainer at the tips.

The two types are not interchangeable.

NOTE: After a replacement of a discharger or retainer you must do a resistance check of tip to retainer and a bonding check of retainer to structure.

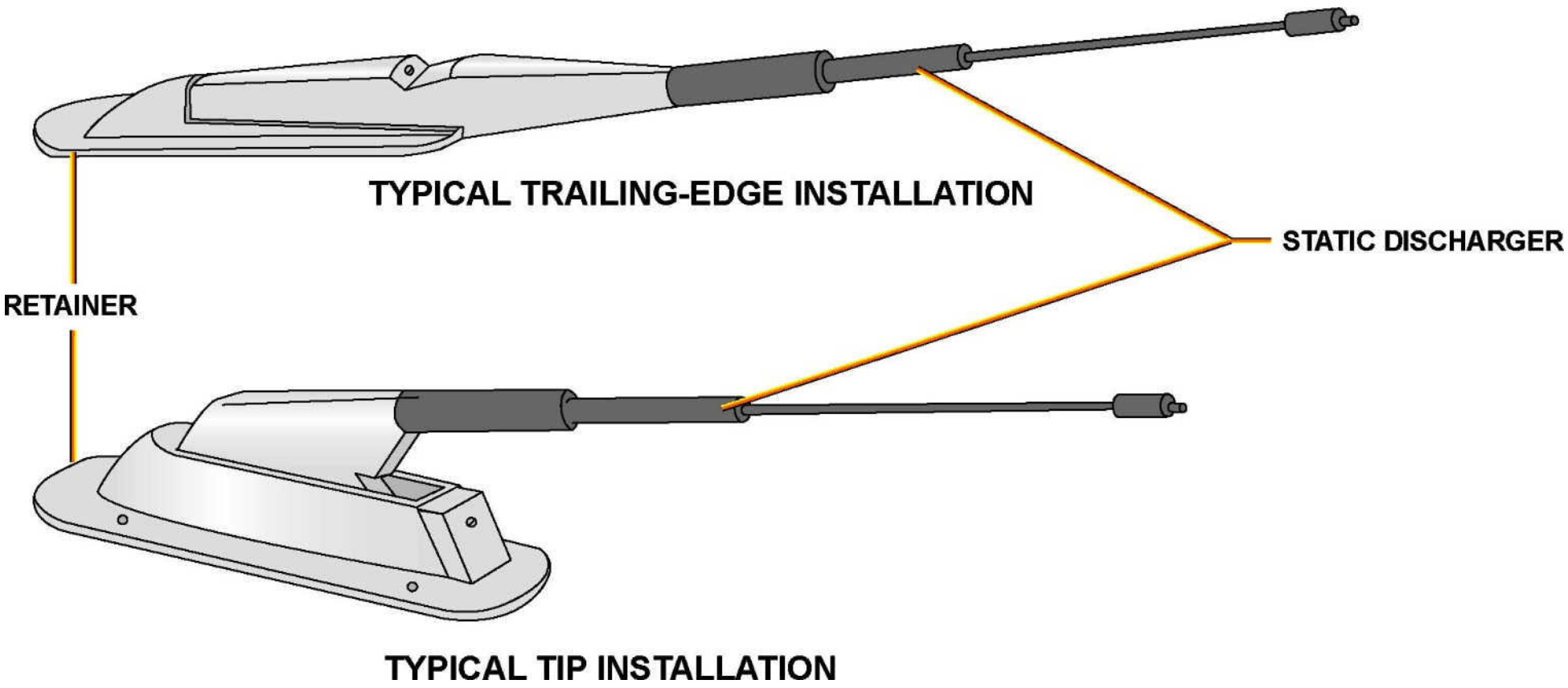


Figure 59 Discharger & Retainer Types

23–71 COCKPIT VOICE RECORDER

Depending on configuration, the A/C can has a magnetic tape Cockpit Voice Recorder (CVR) or a Solid State CVR (SSCVR) which records into memory block unit. In normal mode, the CVR records, on four independent channels, the audio signals from the CAPT, F/O and 3rd occupant via the Audio Management Unit (AMU). Channel 4 records the ambient noise picked up by the area microphone and fed via a pre–amplifier to the CVR.

Power Supply

The CVR is automatically supplied with 115VAC when the aircraft is in one of the configurations given below:

- in flight with engines running or stopped.
- on the ground with at least one engine running
- on the ground during the first five minutes following energization of the aircraft electrical network.
- on the ground up to five minutes after second engine shutdown.

Manual selection of power supply to the CVR allows the functions given below with the aircraft on the ground and both engines shutdown:

- To test the CVR for correct operation.
- To erase tape information if required.
- To record the beginning of the check list before the first engine starts running.

For manual selection of power supply to the CVR press the GND CTL pushbutton on the control panel.

Erase Circuit

The RCDR CVR ERASE P/B must be pressed for a minimum of 2s to activate the erase function. Once activated, this function disables the ability to download the previously recorded data from the Crash Survivable Memory Unit (CSMU) using the normal download function.

A 400 Hz tone is sent through the audio monitor to indicate a successful erase. Erase is only possible, aircraft on the ground, R and L main landing gear shock absorbers compressed and parking brake applied.

Test Circuit

The SSCVR test is initiated by pressing for a minimum of 0.5 second the CVR TEST P/B on the RCDR panel. Once activated, this function makes an extensive set of functional tests to determine the integrity of the system.

An aural 600Hz tone is provided through the audio monitor output received at the CVR/HEAD SET JACK (on the maintenance panel 50VU) or at the two loud speakers and results in one activation of the status Light Emitting Diode (LED) on the solid state CVR. This BITE indicator gives an indication of the health of the SSCVR. If the SSCVR detects a fault, which requires removal of the unit from the aircraft installation, the BITE indicator will activate and will remain activated until repair is accomplished. The BITE indicator remains inactive in all other cases.

NOTE: The installation of a BITE status LED on the SSCVR depends on the manufacturer of the CVR. The CVR has **NO** interconnection to the CFDS-

Underwater Locator Beacon (ULB)

An ULB is mounted on a bracket attached to the recorder. The ULB is a battery–operated device which radiates a pulsed acoustic signal into the surrounding water upon activation of its water–sensitive switch. It consists of a self–contained battery, an electronic module and a transducer. The battery is shock–mounted and separated from the electronic module.

FAA/CAA Recording Selection

A jumper strap installed on the AMU enables Federal Aviation Administration (FAA) /Civil Aviation Authority (CAA) recording selection.

In FAA mode, all the communications heard by the crew members are recorded. This is obtained by the recording of audio output side–tone signal. This lets, at the same time record all the communications sent out by these crew members.

In CAA mode, the CAPT, F/O, 3rd occupant boomset microphones are ”HOT” at all times for voice/noise pick–up to reinforce the sounds picked–up by the area mike. The mask microphones circuits are open until the oxygen pressure switch is closed. The hand microphones are only ”HOT” when the Push–To–Talk (PTT) switch on the microphone is activated. However, in CAA mode, as in FAA mode, the signal received in the crew’s earphones is recorded on the CVR.

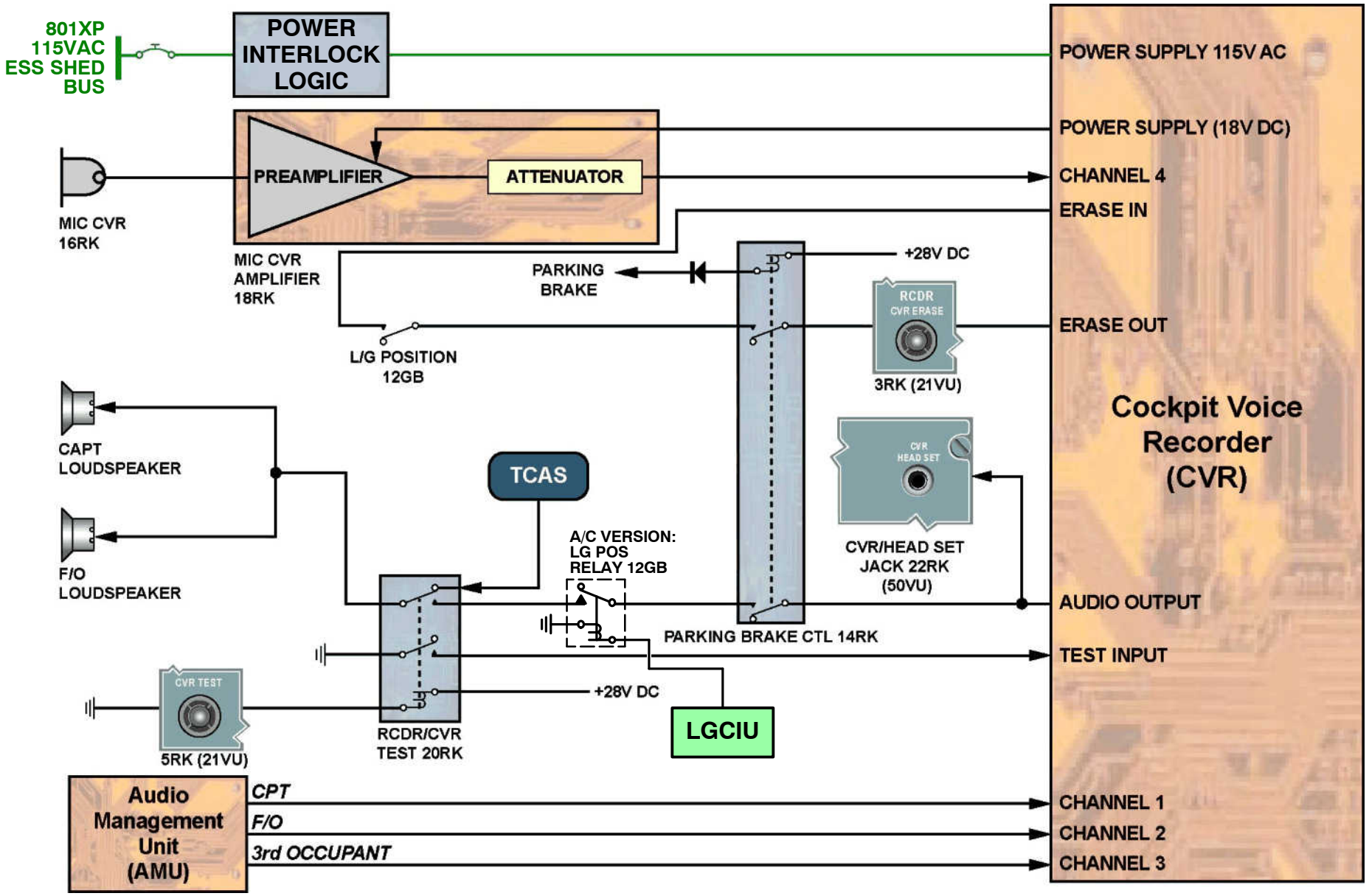


Figure 60 Cockpit Voice Recorder Functions

SSCVR DESCRIPTION AND OPERATION

Inside the Recorder

The SSCVR consists of three Shop Replaceable Units (SRUs) not including the basic system chassis: an interface and Control board, a crash survivable memory unit, and a power supply.

The interface and control board is a single circuit card which controls all states and modes of the system performing the record, erase, and test functions of the system. The interface and control board provides all functional interfaces to external systems.

The crash survivable memory unit is a solid state, non–volatile, mass storage device enclosed in a protective case. The crash survivable memory unit provides storage for all input data. The power supply converts either 115VAC 400Hz or +28VDC aircraft power to the secondary power for the SRUs and provides power on reset, power failure monitoring, and significant power interrupt capability.

Recording

The recording system consists of four recording channels which simultaneously record audio as follows:

Channels 1, 2 and 3 allow the recording of signals from the Captain, First Officer and 3rd Occupant via the Audio Management Unit 1RN.

Channel 4 allows the recording of the ambient noises picked up by the area microphone and fed via a pre–amplifier to the input transformer for channel 4.

Each channel feeds data to separate solid state memory. These audio signals are applied through the rear connector. Then they are digitally converted, compressed and stored in memory.

These four signals are recorded at high audio quality with a 30 min. duration. Three of these audio signals (CH 1 to 3) are combined to provide a fifth audio signal to be recorded at standard audio quality. The Area microphone signal (CH 4) is also recorded at standard audio quality. These two standard quality audio signals have a 120 min. duration.

All six digital–encoded signals are applied to the CSMU for storage in the solid state memory.

The main function of the SSCVR is to record audio digital communications data and Timing data into the CSMU

Monitoring

Simultaneous monitoring of all 4 channels is possible by connecting a headset to the headset jack on the face of the CVR 1RK or to the CVR/HEAD SET jack on the maintenance panel 50VU. The jacks are fed directly from the output of the AF amplifier. The monitor head is a single full–width head and therefore only simultaneous monitoring of all 4 channels is possible. Its output is connected to the input of the AF amplifier.

1 FAA/CAA OPTION

A jumper strap installed on the AMU enables Federal Aviation Administration (FAA) / Civil Aviation Authority (CAA) recording selection.

- **In FAA mode**,

  all the communications heard by the crewmembers are recorded. This is obtained by the recording of side–tone signal: Audio output. This lets, at the same time record all the communications sent out by these crewmembers.

- **In CAA mode,**

  the CAPT, F/O, 3rd occupant boomset microphones are ”HOT ” at all times for voice/noise pick–up to reinforce the sounds picked–up by the area mike. The mask microphones circuits are open until the oxygen pressure switch is closed. The hand microphones are only ”HOT” when the Push–To–Talk (PTT) switch on the microphone is activated.

However, in CAA mode, as in FAA mode, the signal received in the crew’s earphones is recorded on the CVR.

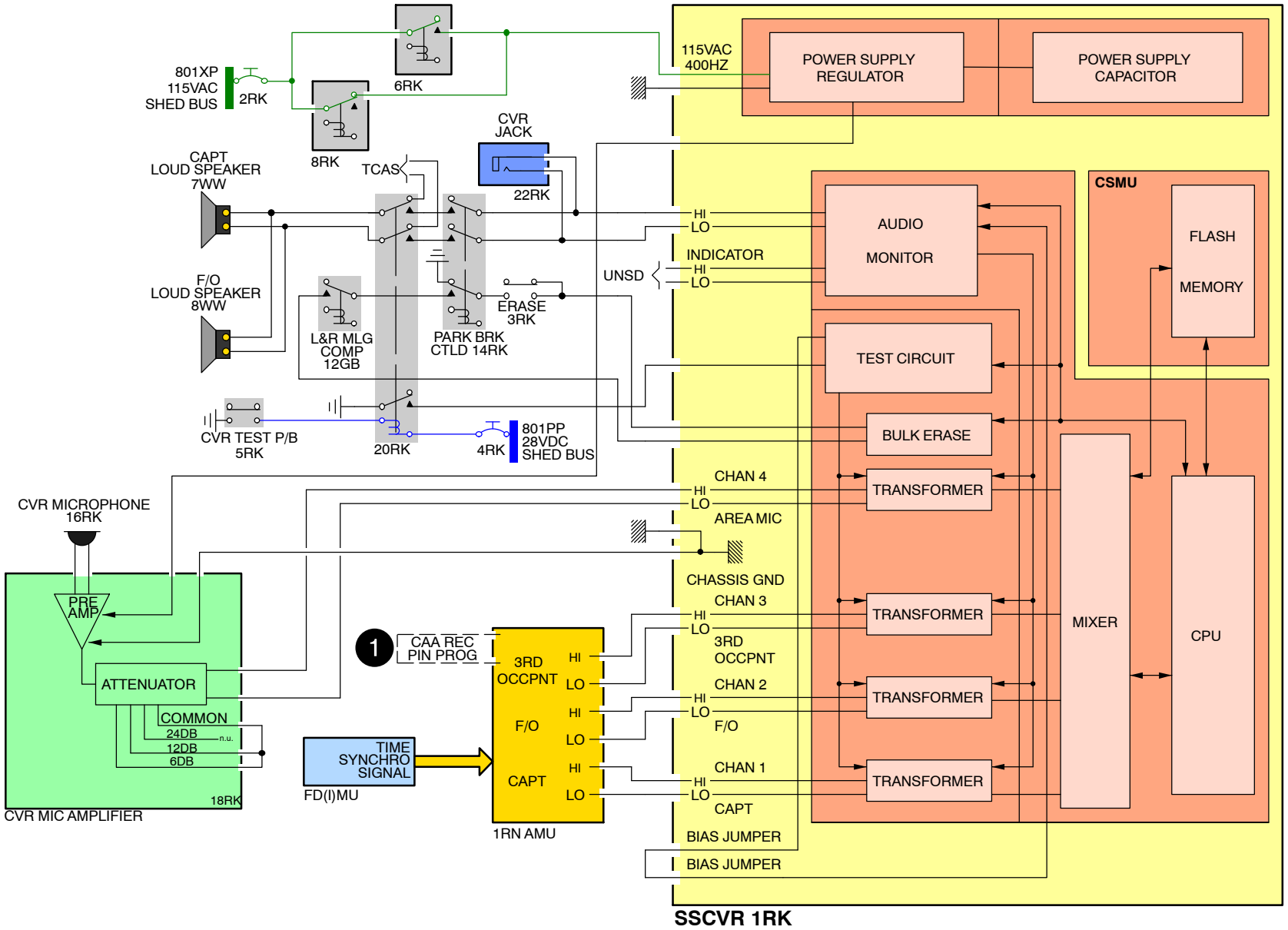


Figure 61 SSCVR Interface

CVR POWER SUPPLY LOGIC DESCRIPTION

POWER INTERLOCK LOGIC

The CVR is automatically supplied with 115VAC SHED BUS when the aircraft is in one of the configurations given below:

- In flight with engines running or stopped
- On the ground with at least one engine running
- On the ground during the first five minutes following energization of the aircraft electrical network
- On the ground up to five minutes after last engine shutdown

The CVR starts recording as soon as the CVR is supplied with power.

The power logic input signals are:

- the ENG OIL LOW PRESS AND A/C ON GROUND relays 12KS 1 & 2 which are closed by the Engine Interface Units (EIU) when the engines are running and/or the aircraft is in flight;
- a flight/ground input delivered by the Landing Gear Control & Interface Unit 1 (LGCIU);
- the RCDR/GND CTRL P/B switch (springloaded).

System Power Up

During the first five minutes of energization of the aircraft electrical network, with both engines shut down, a ground signal is fed to the time–delay relay 10RK. The relay 10RK is supplied with 28VDC from the bus bar 801PP via the circuit breaker 4RK. When energized this relay starts its timing function. During this timing function, the relay 8RK remains open and the CVR is supplied with 115VAC.

NOTE: The same logic also ensures that the CVR is running 5 minutes after the last engine shut down.

5 MIN After Power Up

After 5 minutes, a ground signal is sent via the normally–open contacts of the time–delay relay 10RK to energize the relay 8RK which cuts off the supply of 115VAC to the SSCVR.

NOTE: The same logic also ensures that the CVR stops 5 minutes after the last engine shut down.

One ENG OIL Pressure

With one or both engines running, no ground signal is fed to the relay 10RK. Since the relay 10RK controls the energized or de–energized state of relay 8RK, the relay 8RK is open. The 115VAC is connected from the bus bar 801XP AC ESS SHED via the circuit breaker 2RK through the contacts of the relay 8RK to the CVR.

Nose Gear In Flight

The LGCIU1 5GA1 provides a ground signal to the relay 6RK.

The relay 6RK is supplied directly with 28VDC from the bus bar 801PP DC ESS SHED via the circuit breaker 4RK. The CVR is supplied with 115VAC via the normally–open contacts of the relay 6RK from the bus bar 801XP through the circuit breaker 2RK. The normally–closed contacts of the relay 8RK provide a parallel path with the normally–open contacts of the relay 6RK for the supply of 115VAC ESS SHED to the CVR.

GND CTRL P/B Pressed

With both engines shut down for at least 5 minutes, a ground signal is sent to the relay 8RK. Pushing the springloaded RCDR/GND CTL pushbutton switch 11TU supplies the 28VDC to the relay 12TU1 via the normally–open contacts of the pushbutton switch 11TU and the normally–closed contacts of the relay 13 TU. Through the now closed relay 12TU1 a ground signal is sent to the blue ON legend which comes on. A ground signal is also sent to the relay 6RK which energizes and supplies the CVR with 115VAC ESS SHED BUS power.

GND CTRL P/B released

When the RCDR/GND CTL pushbutton switch is released, the 28VDC is applied via relay 12TU1 and pushbutton switch 11TU to the relay 13TU which is energized. Now the relays 12TU1 and 13TU are self-locked via the released P/B 11TU. When the P/B 11TU is used again the self-locking circuit of the relays 12TU1 and 13 TU is interrupted and they will open. This de–energizes the CVR and the blue ON legend in the P/B 11TU goes off. If one engine is started and the system was energized by the GND CTRL P/B 11TU before, the ground signal to relay 12TU is removed and the relay 12TU is de–energized. Thus the blue ON legend goes off and the relay 6RK is de–energized.

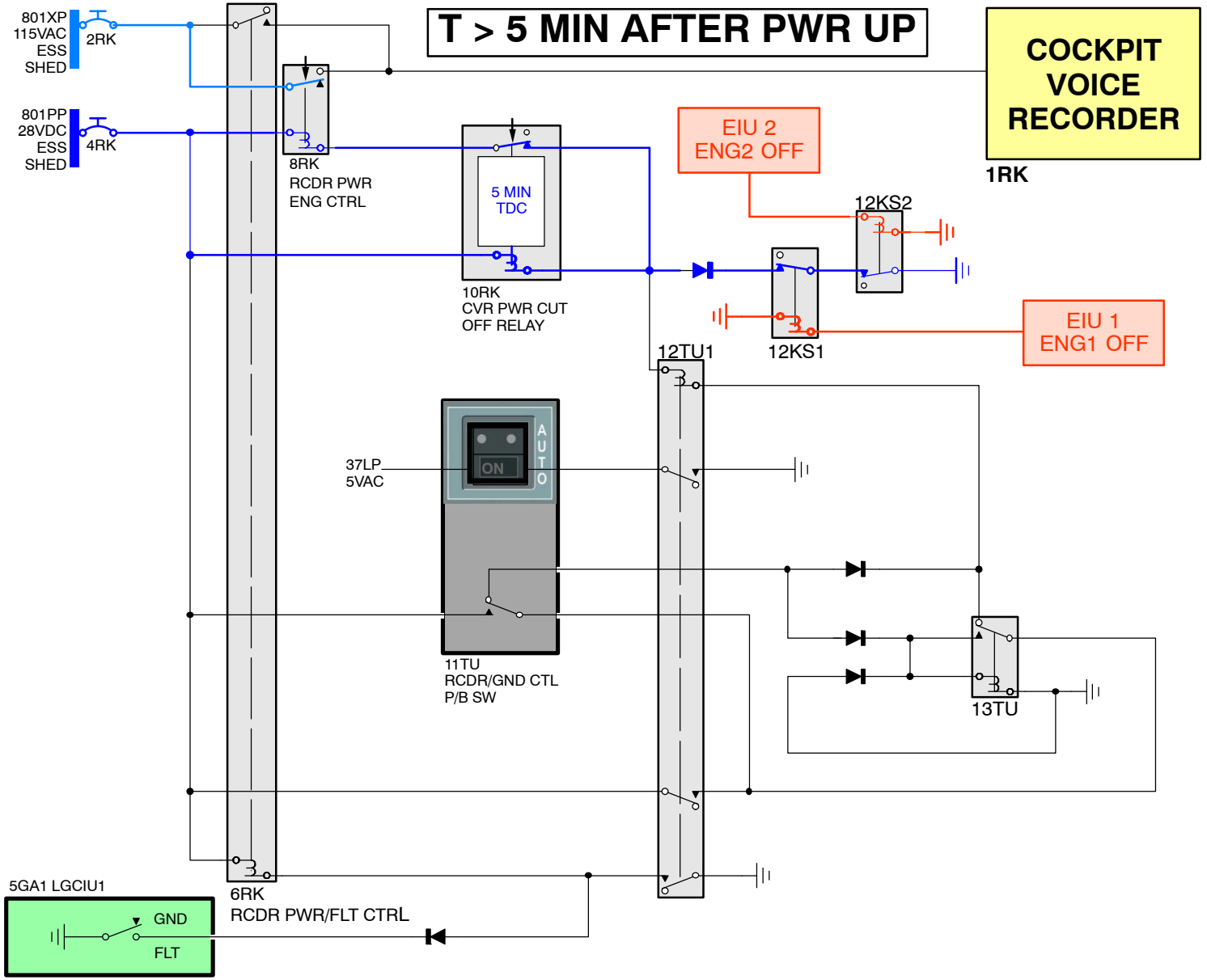


Figure 62 CVR Power Supply Logic

CVR COMPONENT LOCATION

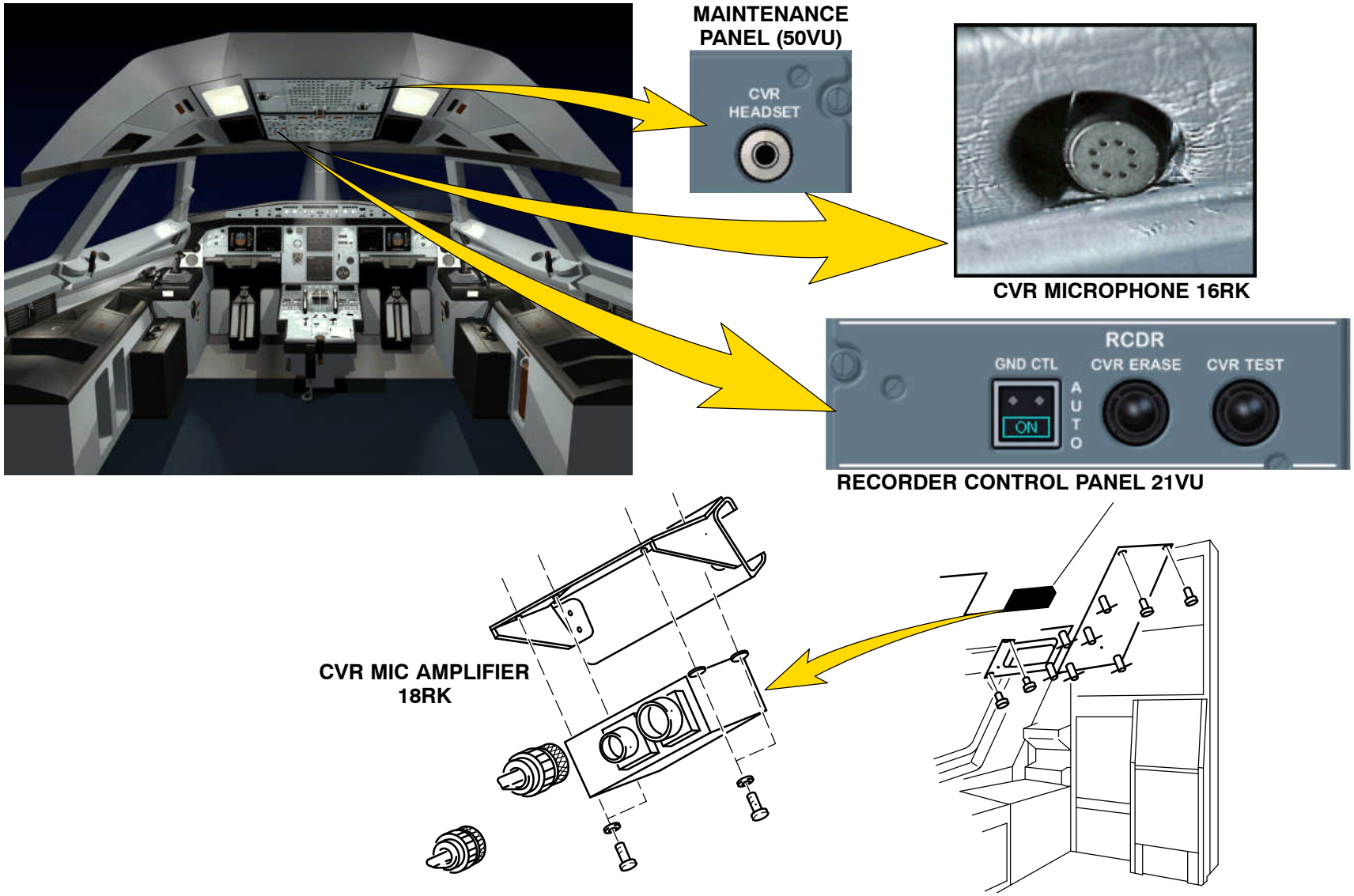


Figure 63 CVR Cockpit Component Location

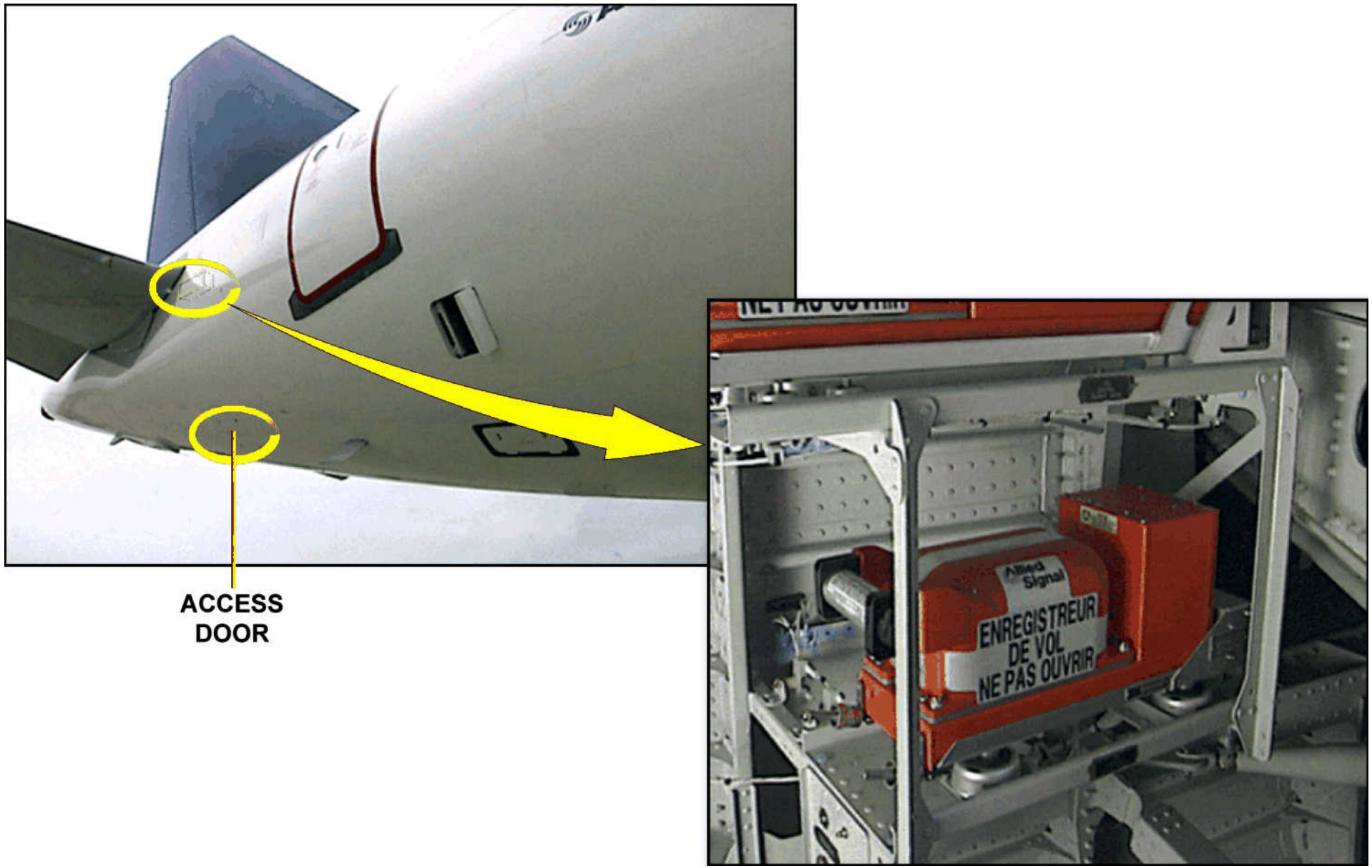


Figure 64 CVR Location

23–72 ANTI HIJACK CAMERA MONITORING

ANTI HIJACK CAMERA MONITORING VERSION 1 (AIRBUS)

GENERAL

The **C**ockpit–**D**oor **S**urveillance **S**ystem (CDSS) uses cameras and a system controller to monitor the cockpit entrance and the left and right door 1 areas.

The CDSS images are shown on the ECAM System Display or the EFB display (Electronic Flight Bag) in the cockpit. This lets the flight crew see persons before they get access to the cockpit.

The Cockpit Door Surveillance System has the following components:

- General three Cameras (up to 6 may be connected),
- One system controller (9RA),
- One COCKPIT DOOR VIDEO pushbutton (17RA),
- One CAM SEL pushbutton (16RA),
- One CKPT Entry rotary switch (19RA).

Cameras

Three cameras are installed in the ceiling panels in the cockpit entrance and the door 1 area.

Camera 1 is installed above the cockpit door. It gives pictures of the area directly in front of the cockpit door.

Camera 2 is installed in the ceiling of the right door 1 area. It gives pictures of the area directly below camera 2 in the right door 1 area.

Camera 3 is installed in the ceiling of the left door 1 area. It gives pictures of the area directly below camera 3 in the left door 1 area.

The images from the cameras are shown on the System Display (SD) or EFB displays. The images from camera 1 are shown as a full screen display and the images from cameras 2 and 3 are shown as a split screen. The images from camera 2 are shown on the right side and the images from camera 3 are shown on the left side.

System Controller

The system controller is installed on the shelf 85VU of the avionics rack 80VU in the avionics compartment. It is supplied with 115VAC through the COCKPIT DOOR VIDEO pushbutton 17RA and gives 12VDC to energize the cameras.

The system controller processes the images from the cameras and sends the images to the SD. The SD shows the images to the flight crew.

NOTE: The camera image will not transfer to the ND if the ECAM/ND XFER switch is selected out of the NORM position.

In this case a system page is shown, the camera image is lost.

COCKPIT DOOR VIDEO Pushbutton

The COCKPIT DOOR VIDEO pushbutton is installed on the overhead panel 27VU. It sets the CDSS on or off.

The pushbutton has a white OFF legend which comes on when the CDSS is off and goes off when the CDSS is on.

CAM SEL Pushbutton

The CAM SEL pushbutton is installed on the pedestal, on panel 119VU.

It lets the flight crew make a selection of the images from camera 1 and from cameras 2 and 3 to show them on the SD or EFB.

CKPT ENTRY Rotary Switch

The CKPT ENTRY Rotary switch is installed on the panel 119VU. It has two positions, CKPT ENTRY and OFF.

When it is set to the CKPT ENTRY position, it gives a signal to the Display Management Computer and to the system controller and when the white OFF legend in the CKPT DOOR VIDEO pushbutton is off (CDSS on), the images from camera 1 are shown on the SD or EFB disülays.

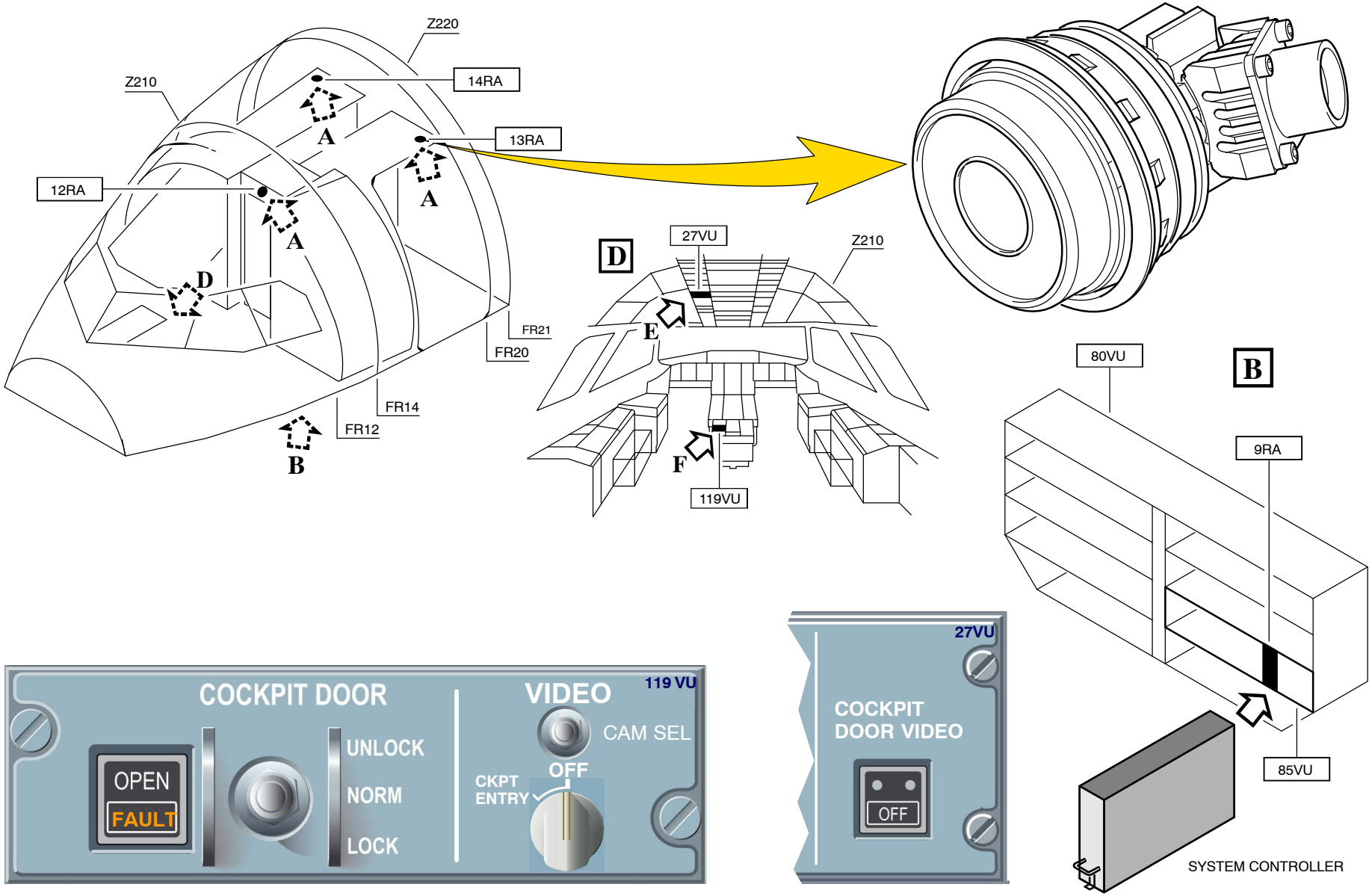


Figure 65 Cockpit Door Surveillance System Version 1

CDSS ARCHITECTURE VERSION 1 (AIRBUS)

POWER SUPPLY

The Cockpit–Door Surveillance System (CDSS) is supplied with 115VAC from the normal busbar 103XP.

The related circuit breaker 15RA is installed on the circuit breaker panel 120VU in the cockpit.

INTERFACE

The CDSS has interfaces with this system:

- Display Management Computers (Ref. 31–63–00)
- ECAM System/Status Display (SD) (Ref. 31–67–00) or EFB
- Cockpit–Door Lock System (Ref. 52–51–00).

COMPONENT DESCRIPTION

Cameras

Camera 1 has a 105 degree lens and cameras 2 and 3 have a 90–degree lens.

System Controller

The system controller has electronic circuits installed in an ARINC 600 enclosure. It receives input signals from the cameras and also monitors the status of the CDSS system. It processes the signals from the cameras and gives a video feed signal to the System Display (SD) where the images from the cameras are shown.

The system controller is energized with electrical power from the 115VAC normal bus, when the white OFF legend in the COCKPIT DOOR VIDEO pushbutton is off. It gives 12VDC electrical power to energize the cameras.

The system controller is cooled by forced air from the inner side of the avionics compartment.

OPERATION/CONTROL AND INDICATING

Push the COCKPIT DOOR VIDEO pushbutton switch on the overhead panel 27VU to set the Cockpit–Door Surveillance System (CDSS) on. On the Video Control Panel 119VU, set the CKPT ENTRY rotary switch to the CKPT ENTRY position.

The picture from camera 1 is shown on the System Display (SD). On the Video Control Panel, push the CAM SEL pushbutton (16RA) to change the images on the SD from camera 1 to camera 2 and 3 (split screen). Push it again to get the picture from camera 1 again.

The images from camera 1 are automatically shown, if:

- the Cockpit–Door Lock–System (CDLS) keypad (Ref. 52–51–00) is used to get access
- the CDSS is on
- the CKPT ENTRY rotary switch is in the CKPT ENTRY position.

Signals from the CDLS keypad are inhibited for 30 seconds after it is used. This lets the flight crew use the CAM SEL pushbutton to change the images between camera 1 and cameras 2 and 3.

TEST BITE

The CDSS contains a Built–In Test Equipment (BITE). There is no connection between the CDSS and the Centralized Fault Display System (CFDS).

Thus for related system test and failure analysis, the CDSS shows any failure messages on the System Display (SD). If the CDSS has an internal failure, the message ”VIDEO FAILED” shows on the SD (if the CDSS is set on the SD).

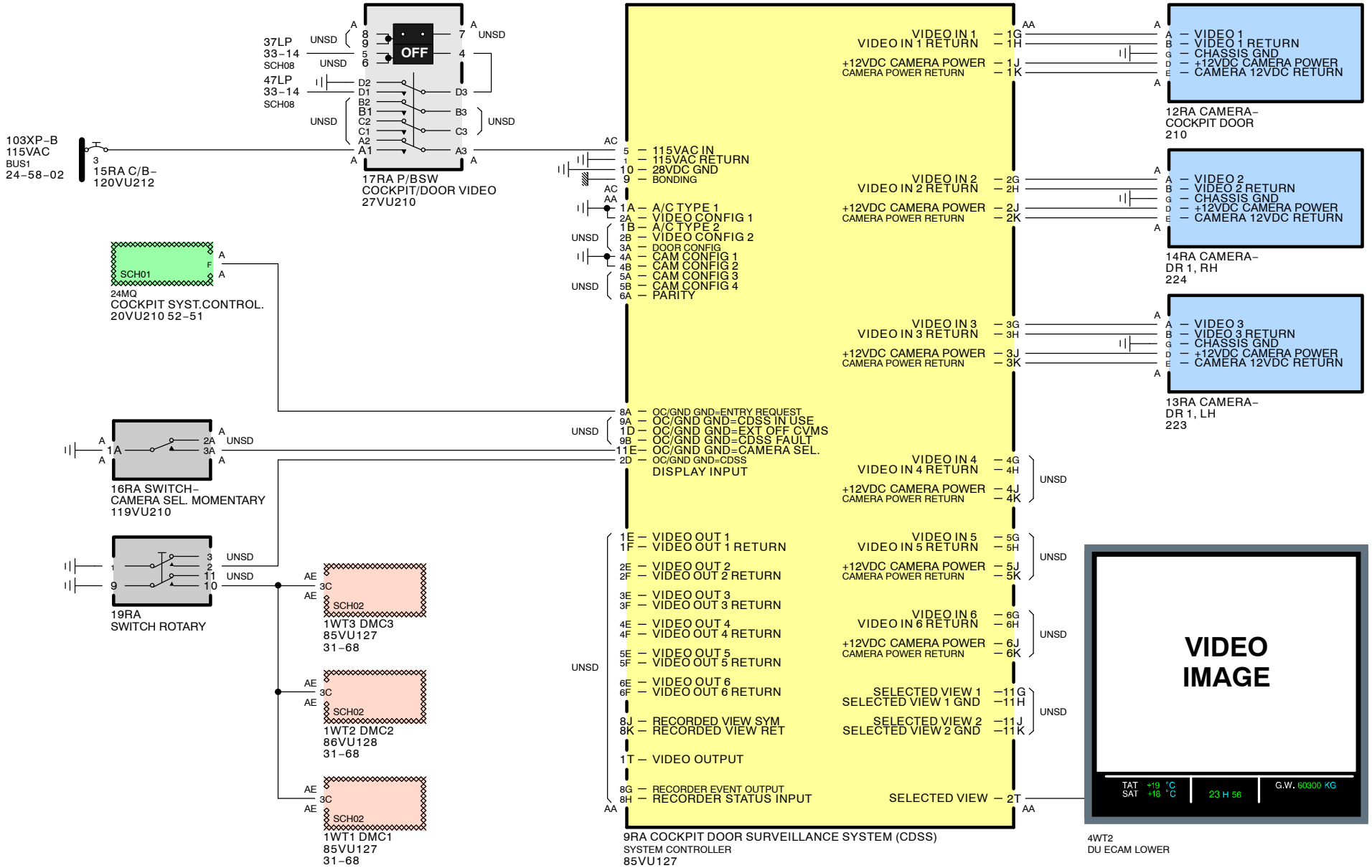


Figure 66 CDSS Architecture version

ANTI HIJACK CAMERA MONITORING VERSION 2 (AIRBUS)

GENERAL

The Cockpit Door Surveillance System (CDSS) uses cameras in the cockpit entrance, and left and right door 1 areas.

They let the flight crew monitor the door 1 area and identify persons who request access to the cockpit.

The Cockpit Door Surveillance System has the following components:

- Generally 3 Cameras (12RA, 13RA, 14RA),
- 1 LCD including the system controller (10RA),
- 1 CKPT DOOR VIDEO switch (17RA),
- 1 VIDEO pushbutton (16RA),

Cameras

Three cameras are installed in the ceiling panels in the cockpit entrance and the door 1 area.

Camera 1 is installed above the cockpit door. It gives pictures of the area directly in front of the cockpit door.

Camera 2 is installed in the ceiling of the right door 1 area. It gives pictures of the area directly below camera 2 in the right door 1 area.

Camera 3 is installed in the ceiling of the left door 1 area. It gives pictures of the area directly below camera 3 in the left door 1 area.

Liquid Crystal Display (LCD)

The LCD is installed on the aft wall of the cockpit. It lets the flight crew see the picture from the cameras. The pictures from camera 1 are shown as a full screen on the LCD and the pictures from camera 2 and 3 are shown as a split screen. The pictures from camera 2 are shown left of the LCD screen and the pictures from camera 3 are shown on right. If the LCD is programmed for the 'not–installed' fourth camera a third screen is shown, which is black.

If the system is programmed for the automatic sleep mode, the LCD automatically shows a blank screen if there is no signal from the VIDEO push button (16RA) or the ENTRY REQUEST KEYPAD (Ref. 52–51–00) for one minute.

If the system is programmed for the pilot–activated–sleep–mode, when the pilot pushes and holds the VIDEO pushbutton (16RA) for two seconds the LCD screen goes blank. If the system gets no signal from the VIDEO push button (16RA) or the ENTRY REQUEST KEYPAD (Ref. 52–51–00) for 5 minutes the LCD automatically goes into the standby/power save mode.

If entry is requested with the keypad (screen is in the standby mode), the screen automatically comes on and shows the picture from camera 1.

If entry is requested again before 30 seconds after the last–entry request the signals are inhibited. This is to let the pilot use the VIDEO pushbutton to select and see the pictures from camera 1 or cameras 2 and 3.

CKPT DOOR VIDEO Switch

The CKPT DOOR VIDEO switch is installed on the overhead panel 27VU.

It sets the CDSS on or off. The switch has an OFF legend which is on when the system is off and off when the system is on.

VIDEO Pushbutton

The VIDEO pushbutton is installed on the pedestal, on panel 119VU. It lets the flight crew select between the pictures from camera 1 and from cameras 2 and 3 and from the 'not–installed' fourth camera (black screen).

If the system is programmed for pilot–activated–sleep–mode, it lets the flight crew set the LCD screen into sleep mode (blank screen).

If the VIDEO pushbutton is pushed during the first two minutes of the standby/power save mode, the last shown pictures come on.

If the VIDEO pushbutton is pushed after the first two minutes of the standby/power save mode, the picture for camera 1 comes on

Optionally there is an indication light installed above the FAP on the left of the door 1 area. It comes on when a camera from the CDSS is selected.

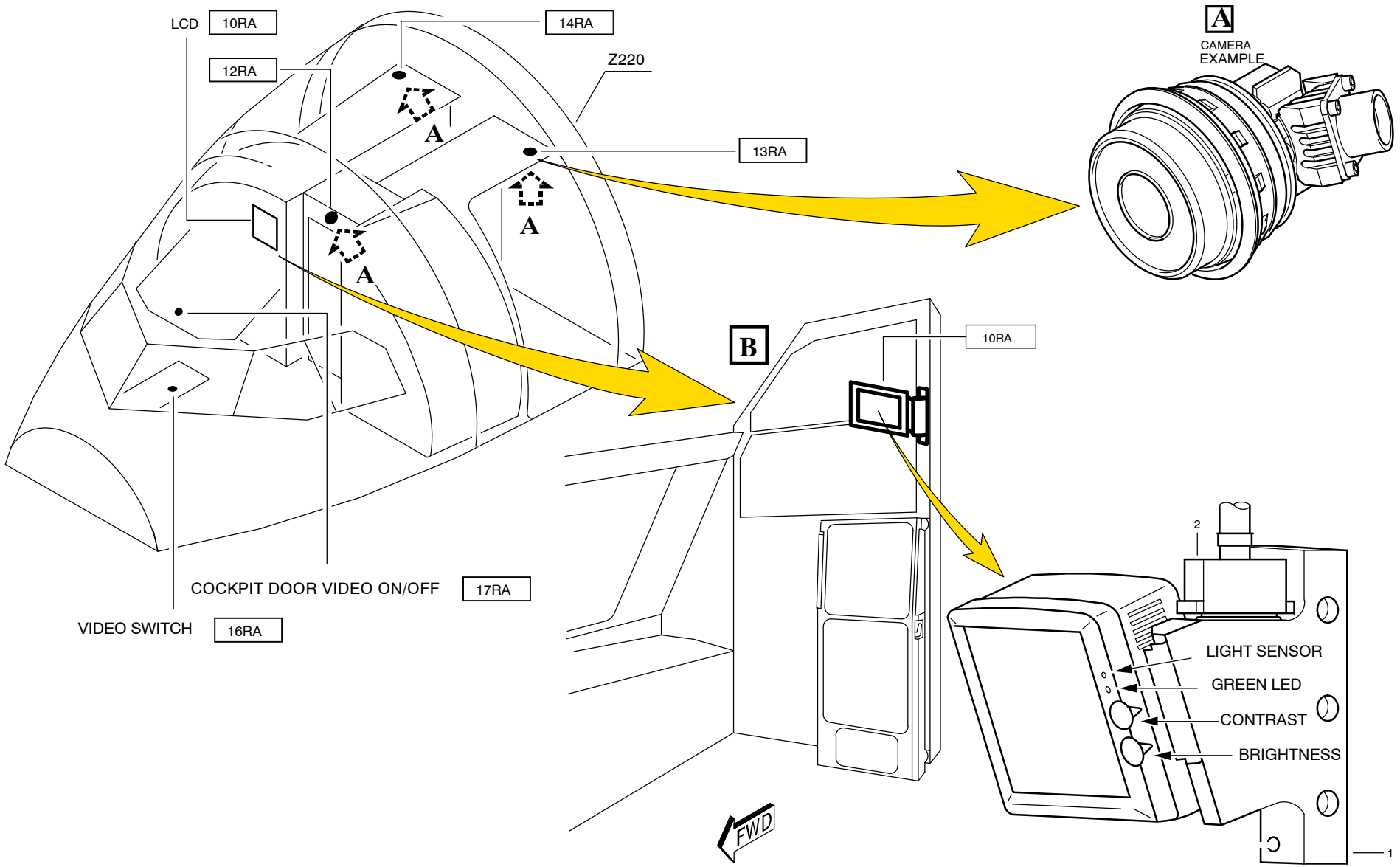


Figure 67 Cockpit Door Surveillance System Version 2

CDSS ARCHITECTURE VERSION 2 (AIRBUS)

POWER SUPPLY

The CDSS is supplied with 28VDC from the normal busbar 101PP. The related circuit breaker 15RA is installed on the circuit breaker panel 122VU in the cockpit.

INTERFACE

The CDSS has interfaces with this system:

- Entry Request Control Unit (52–51–00)

COMPONENT DESCRIPTION

Cameras

Camera 1 has a 105 degree lens and cameras 2 and 3 can have a 70, 90 or 120 degree lenses (as required).

LCD

On the front of the LCD there is one green and one white LED, and two rotary knobs.

The two rotary knobs are used to manually set/adjust the screen brightness and contrast.

The green LED shows the status of the LCD:

- Green LED is on, shows that the system is on.
- Green LED is off, shows that the system is off.
- Green LED is flashing, shows that a failure has occurred in the system.

A light sensor which automatically controls the brightness of the pictures on the LCD screen.

OPERATION/CONTROL AND INDICATING

Push the CKPT DOOR VIDEO switch (17RA) on the overhead panel 27VU to start the CDSS. The images from camera 1 show on the LCD screen (full screen) and the CDSS ”in–use” indication light comes on if installed above the FAP.

On the pedestal–panel 119VU, push the VIDEO pushbutton (16RA) to change the image on the LCD from camera 1 to cameras 2 and 3 (split screen).

If the VIDEO pushbutton is pushed again the screen changes from cameras 2 and 3 to the not–installed fourth camera (black screen). When the system is in the power–down–mode or the CDSS is switched off the CDSS ”IN–USE” indication light is off if installed above the FAP.

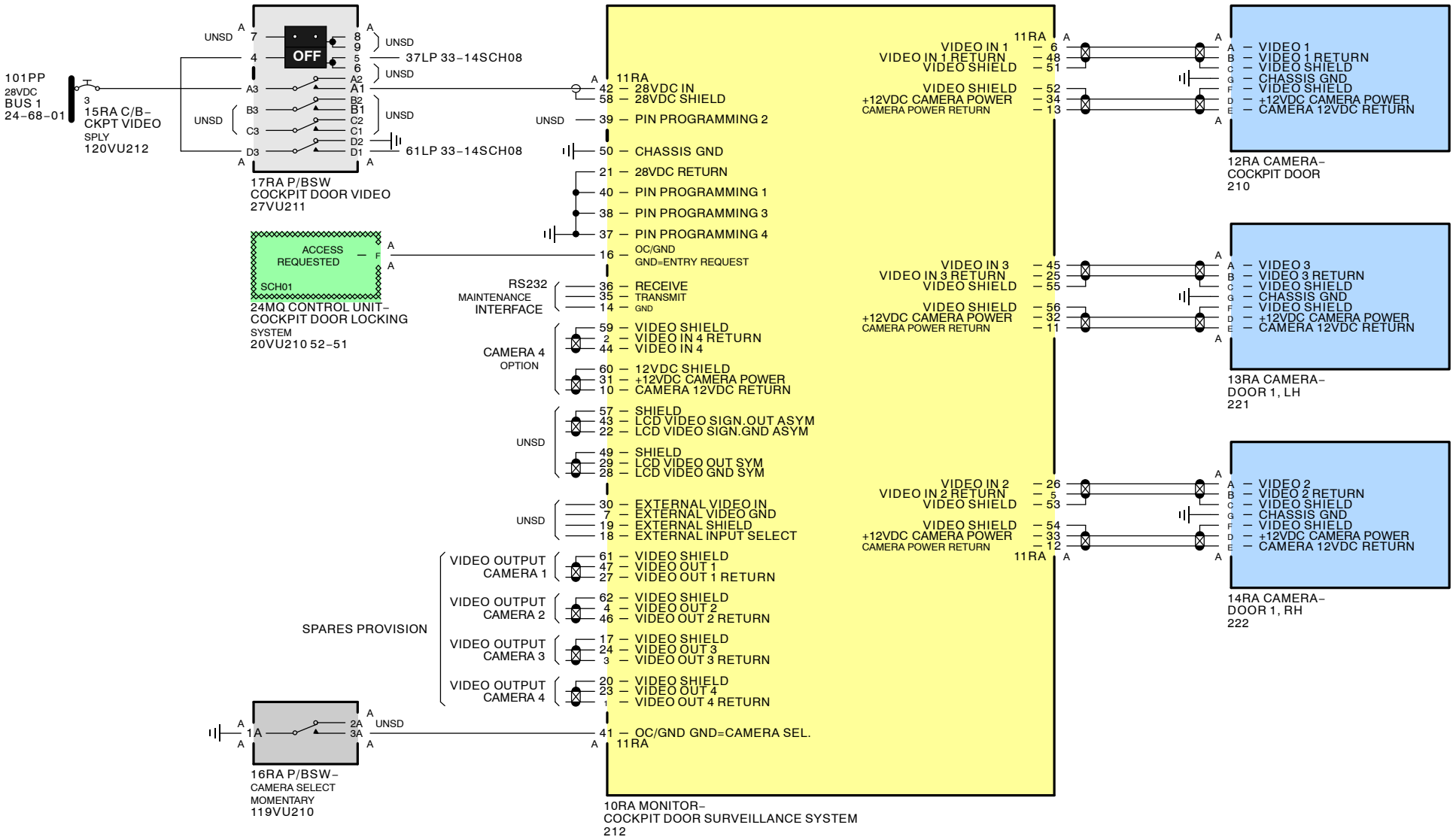


Figure 68 CDSS Architecture Version 2

ANTI HIJACK CAMERA MONITORING EFB-VERSION (POST EO330873–03)

GENERAL

The Cockpit Door Surveillance System (CDSS) uses cameras in the cockpit entrance and in the door 1 area. They let the flight crew monitor the door 1 area and identify persons at the cockpit door.

The Cockpit Door Surveillance System has the following components:

- 3 Cameras (9103–9105RY),
- 1 CDSS ON/OFF switch (20VU),
- 2 Electronic Flight Bag (EFB) Docking stations (Captain and First Officer side)
- one cabin ready switch on A/C version.

  This switch may be additionally installed when there is no cabin ready switch installed on the Forward Attendant Panel (FAP).

Cameras

3 surveillance cameras are installed. Camera 1 gives images of the area directly in front of the cockpit door. Camera 2 gives images of the left door–1–area and camera 3 of the right door–1–area.

The signal for the images is sent to the EFB Docking Stations.

CDSS ON/OFF Switch

When the ON/OFF switch is pushed (OFF legend is off and aircraft electrical power is available) 28VDC goes to the cameras. The switch has an OFF legend to show when the system is off.

CABIN READY SWITCH

The CABIN READY switch is installed to give an indication to the flight crew that the passenger cabin is ready for flight.

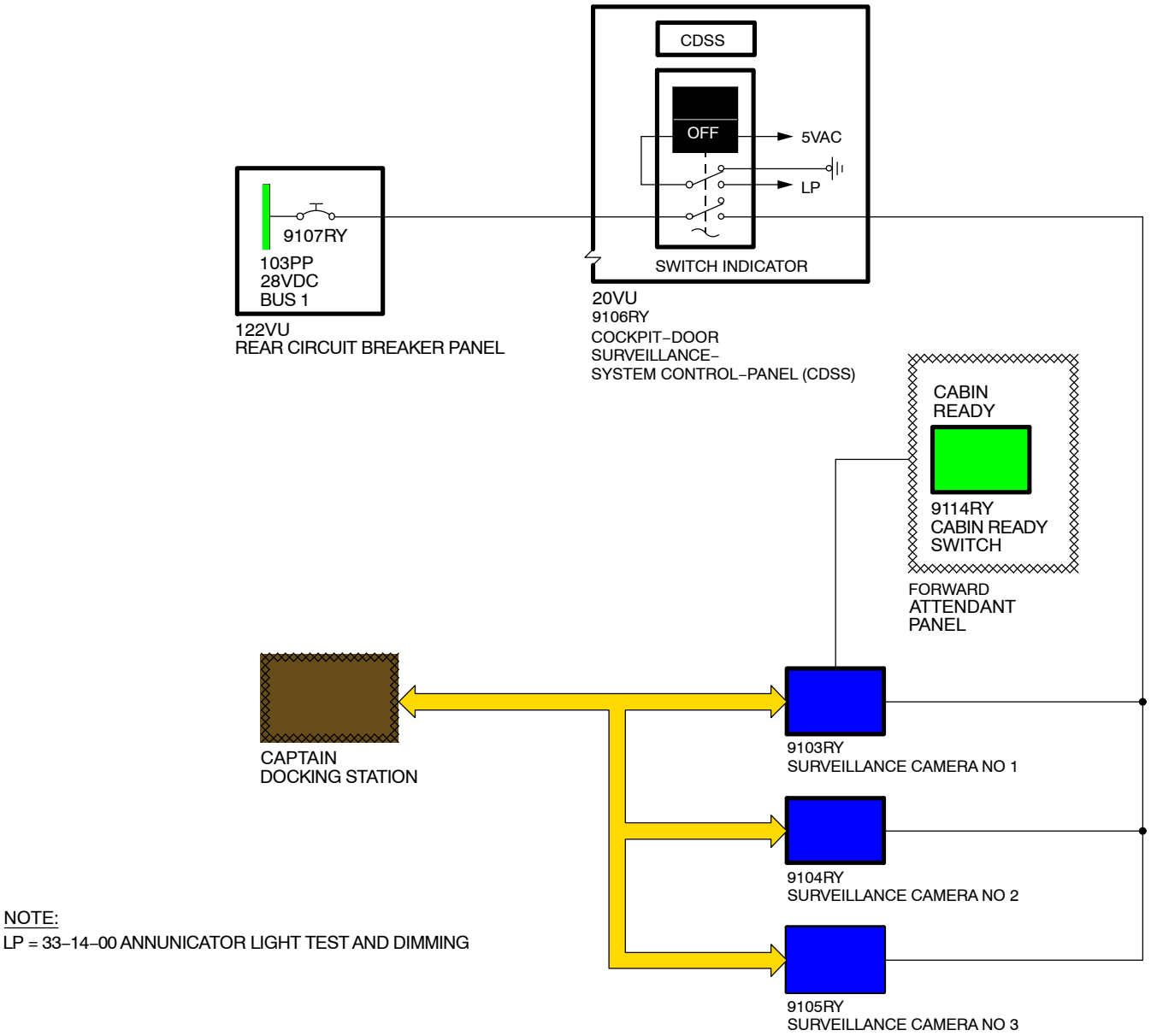


Figure 69 Cockpit Door Surveillance System EFB-Version

CDSS ARCHITECTURE DLH-VERSION (POST EO330873–03)

POWER SUPPLY

The CDSS is supplied with 28VDC thru the circuit breaker 9107RY (CDSS VIDEO) on the rear panel 122VU.

There is also a 5VDC input from the ANN LT TEST and DIM for the FAULT light.

INTERFACE

The CDSS has interfaces with this system:

- Instrument and Panel Integral Lighting
- Annunciator Light Test and Dimming

COMPONENT DESCRIPTION

Cameras

One camera is installed in the ceiling panel in the cockpit entrance and 2 cameras are installed in the ceiling panels of the door–1–area. The cameras have a 90 degree viewing–angle. Cameras 1L and 1R are installed directly adjacent to each other to give views in the opposite directions.

CDSS ON/OFF Switch

The CDSS ON/OFF switch is installed on the overhead panel in the cockpit. The switch is used to set the CDSS on or off. The switch has an OFF and a FAULT legend.

OPERATION/CONTROL AND INDICATING

The CDSS is on when the CDSS is energized and CDSS control switch is on (OFF legend in the CDSS switch is off).

In addition to the CDSS control switch, the display of the video images will be controlled by an application installed on the Electronic Flight Bag (EFB).

To switch the system off, push the CDSS switch (the OFF legend in the switch appears).

If the CABIN READY switch is pushed when the CDSS is on, a green light in the CABIN READY switch appears. Additionally the CABIN READY message in green color is sent through camera No. 1 to the EFB, which will then display within the menu tab VIDEO. The pilot can not acknowledge the signal. After a time period of 10 minutes, the EFB automatically removes the message and the CABIN READY switch illumination terminates.

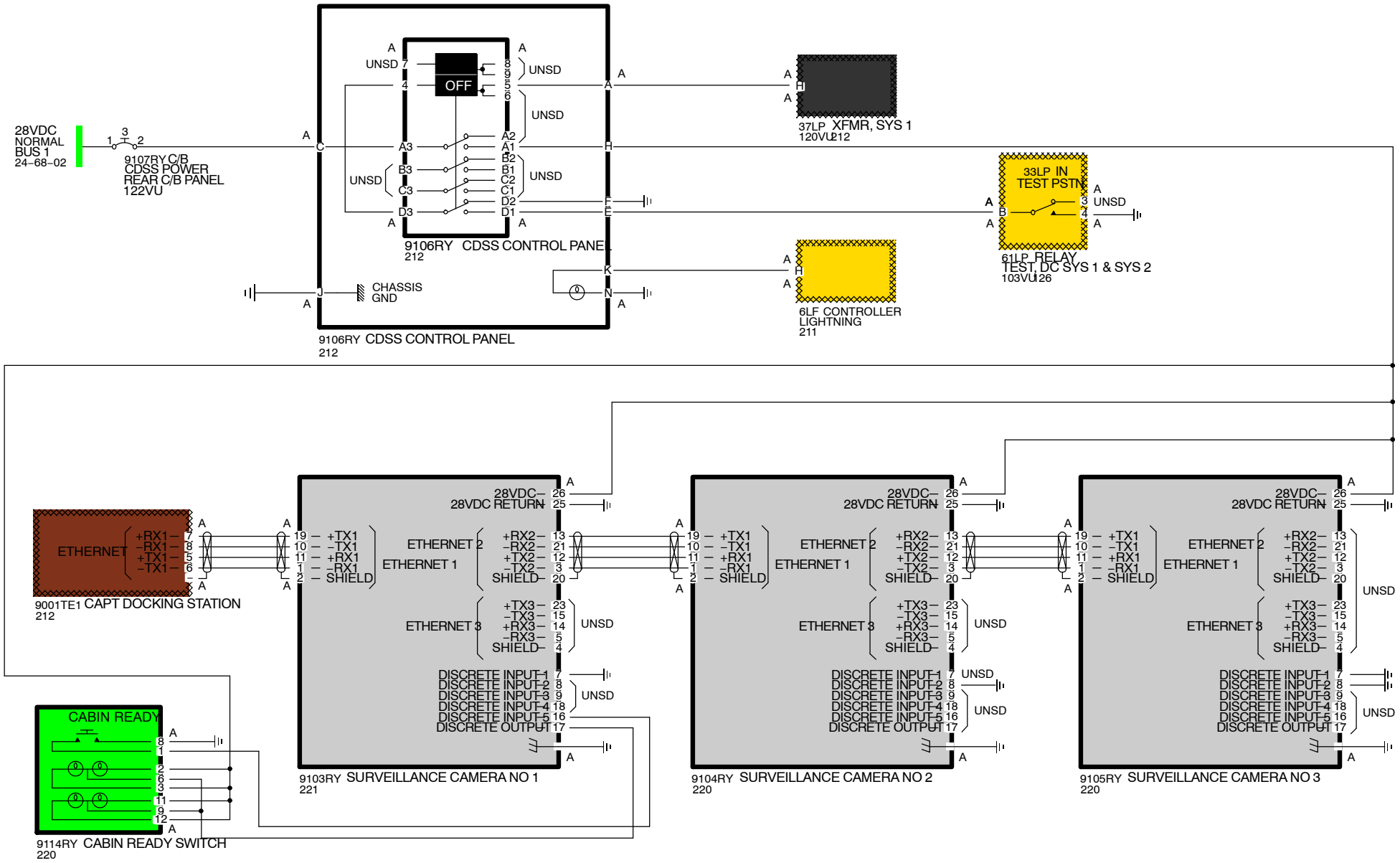


Figure 70 CDSS Architecture EFB-Version

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS)

CIDS GENERAL INTRODUCTION

GENERAL

There are currently two CIDS systems on the single aisle fleet. A classic and an enhanced CIDS. On the classic system the cabin functions are controlled by the Forward Attendant Panel equipped with mebrane switches, on the enhanced CIDS they are controlled by the Flight Attendant Panel which is a touch-screen.

Various cabin systems are controlled, tested and monitored by the CIDS.

The CIDS is composed of two directors, one in active mode, and one in hot standby. It is linked to the Forward Attendant Panel (FAP) to control the cabin functions. The director communicates through Decoder Encoder Units (DEUs) with the cabin, passengers and crew systems.

The Programming and Test Panel (PTP) is used to program and test the CIDS.

The Enhanced CIDS includes two new directors, a new touch–screen Flight Attendant Panel (FAP), and the Enhanced DEUs.

The touch-screen FAP controls and indicates the status of the CIDS.

Integrated within the FAP are Cabin Assignment Module (CAM), On Board Replaceable Module (OBRM) and Prerecorded Announcement and Music (PRAM) in flash card format.

CIDS Functions

The Cabin Intercommunication Data System (CIDS) is used for the control and management for the following cabin system functions:

- Passenger Address System (PA),
- Cabin and Flight Crew Interphone System,
- Service Interphone System,
- Passenger Lighted Signs (control and test),
- Passenger Call (control and test),
- Cabin Illumination (control and test),
- Reading Lights (control and test),
- Emergency Evacuation Signaling (EVAC[option])
- Potable Water Indication,
- Waste Indication,
- Doors and Escape Slides Pressure Monitoring (option),
- BITE & capacity test of the Emergency Power Supply Unit (EPSU),
- Testing of the Drain Mast Control Unit (DMCU),
- The temperature indication of cabin compartment zones,
- The boarding music and pre–recorded announcements (if integrated in the CIDS),
- Air Conditioning (adjustment of cockpit preselected temperature)
- Lavatory Smoke Detection,
- Vacuum System Control Function (VSCF),
- Cargo Smoke Detection,
- Cargo Fire Extinguisher Monitoring,
- CFDS BITE menu Emulation on FAP

The CIDS functions which are underlined are available with the enhanced CIDS.

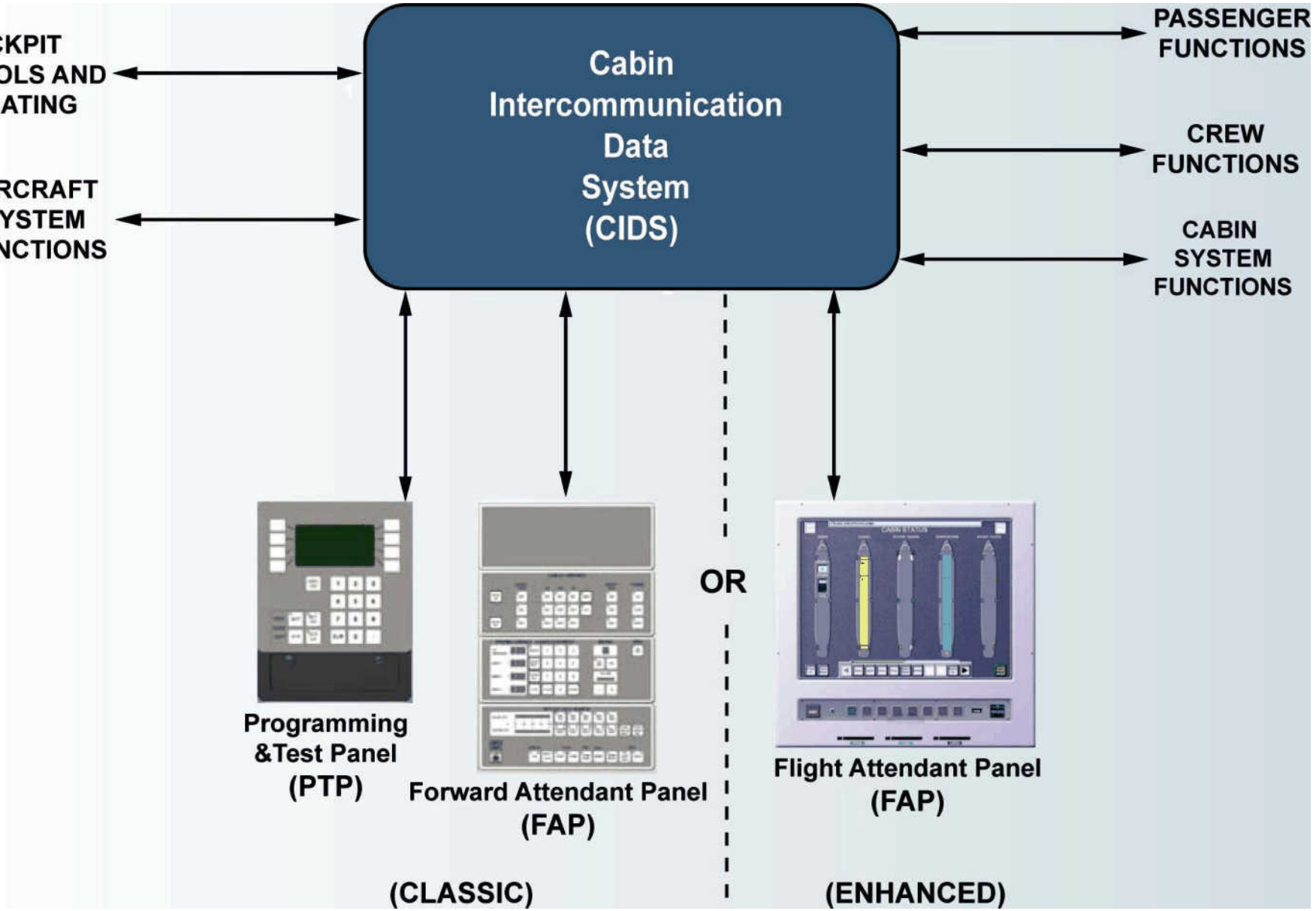


Figure 71 CIDS Introduction

CLASSIC CIDS PRESENTATION

For higher flexibility in changing cabin layouts , the Cabin Intercommunication Data System (CIDS) is designed to accommodate these demands without the need for complex and costly hardware changes. Most cabin systems are interfaced with one of two microprocessor controlled data busses. Digitized audio control and command signals are transmitted along the bus from a central control unit called the 'Director'. CIDS reduces these requirements:

- additional cable bundles,
- Terminal blocks,
- function and relay boxes,
- connectors.

These are normally associated with the installation of optional systems and cabin re–arrangements. When you have to change the cabin layout, only the controlling software is modified. The existing PAX equipment such as loudspeakers and lighting units remain as before. This software is centrally stored in the Cabin Assignment Module (CAM) and you can modify it aboard the aircraft or in the workshop. The CAM data also determines whether certain options are available. For example you can change the appropriate data in the CAM to accompany all Passenger Address (PA) announcements with chimes.

There is a large number of cabin loudspeakers, lighting units, passenger lighted signs, and passenger call buttons including lamps. They are connected to a smaller number (26 or 32) of locally installed driver units, called Decoder Encoder Units (DEU). These DEUs connect to one of two data bus lines, installed along each aircraft side. A second bus system with different DEUs interfaces crew related systems and components. The director units, also connected to the busses, control the individually addressed DEUs.

All other attendant control equipment, cockpit equipment and avionics compartment equipment are interfaced directly to the director. The director converts the different types of input and output signals into low level digital data. The program controls this digital data. The majority of system reconfiguration work needed for installation of options, or CIDS upgrades is reduced to software changes. A removable memory cassette, the Onboard Replaceable Module (OBRM), plugged into the front face of the director, contains the software.

On major CIDS software changes the OBRM is normally replaced with a new preprogrammed unit. A second plug–in memory cassette (the CAM) fits into the programming and test panel This is installed at the forward attendant station.

The CAM defines many of the system properties and all cabin layout information. Also whether chimes should accompany PA announcements and whether each loudspeaker is for attendant or passenger announcements.

BITEs allow the CIDS to detect faults both in connected systems, and within the CIDS unit themselves.

Optional systems such as passenger entertainment video, advanced passenger services, extended emergency lighting system testing, etc. are also provisioned for in the basic installation.

Controls for the cabin systems are centrally provided, for example on the forward attendant panel. The CIDS has sufficient flexibility to accommodate extra sets of controls at other locations.

Attendant handsets allow communication over the interphone system and are used for PA announcements. An integrated keypad is used to establish different types of calls and announcements. An associated Attendant Indication Panel (AIP) provides attendants with PA/Interphone dialling and calling information. It is used for displaying certain system warnings. The activation of colored fields on the Area Call Panels (ACP) give long range visual indications of the CIDS for the attendants.

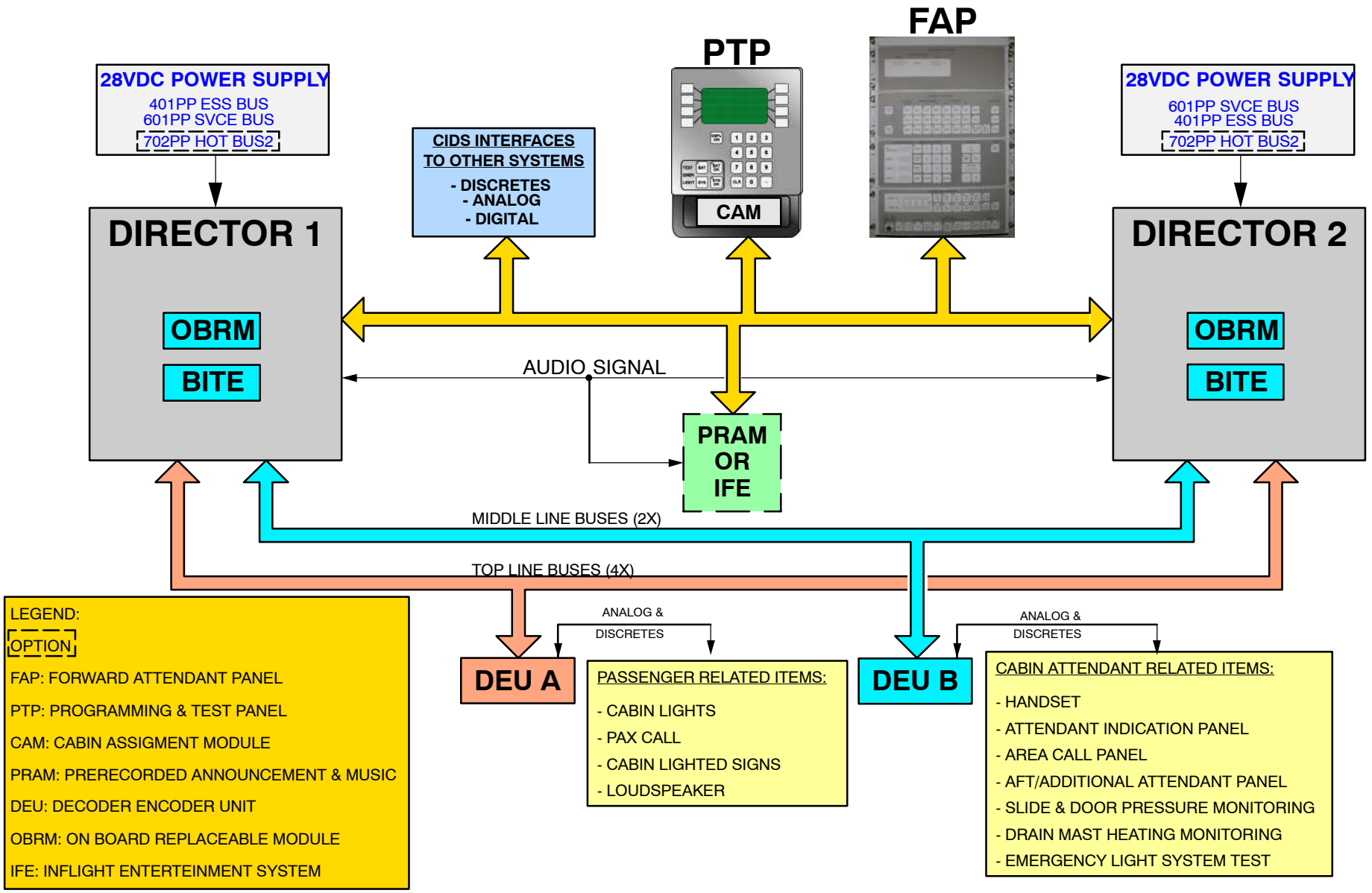


Figure 72 Classic CIDS Presentation

TYPE A & B DECODER ENCODER UNIT FUNCTION

DECODER ENCODER UNIT TYPE A

General

The Decoder–Encoder Unit (DEUs) are located in the left–hand and right–hand sides of the cabin ceiling. Each type A DEU connects to a CIDS top line data bus. Each data bus takes the form of a shielded twisted pair cable.

Functions

Each type A DEU interfaces:

- up to three Passenger Service Units (PSUs), or
- Passenger Interface Units (PIU),
- two loudspeakers,
- four flourescent strip lights which a part of the cabin light system.

The DEU A has these specialized functions:

- a test of lamp current,
- a test of connected loudspeaker impedance and level,
- a frequency filtering according to bus commands.

Top Line Data Bus

Two top line data buses on each side of the passenger cabin connect the type A DEUs to the director

6 (8) of them are connected to the top line number 1 and 7(8) to the top line number 2. A resistor is located on the last DEU A mount of each line for impedance matching.

A broken top line can effect no more than half of the DEUs installed on one cabin side

Coding Switches

A coding switch in each DEU mount gives each DEU a unique address. This method enables removal, interchange and replacement of DEUs without having to consider their address.

NOTE: In the event of mount change it is necessary to select the same code as used before.

CIDS Power Up

When the CIDS is powered–up or reset, the director follows a power up routine. This includes the initialization and testing of each DEU and connected equipment.

The test results are transmitted to the director which compares them with its programmed data to decide on their status.

At least 95% of possible DEU failures are automatically detected.

Audio Outputs

Six audio channels are defined for the top line bus. One DEU A can accept two from these audio channels. The gate array directs these audio input signals to the respective channel 1 or channel 2 Digital to Analog (D/A) converter in the audio circuitry. It also connects the respective volume signal from the gate array to each D/A converter. Each D/A converter volume is controlled separately with commands from the bus. Each level controlled analog audio signal connects to a programmable filter. This is under control of gate array, which in turn receives filter control commands from the director.

Separate power amplifiers amplify these signals for driving the loudspeakers. Each power amplifier is linked to the current measurement circuit. This measures the impedance of each loudspeaker separately. The result is sent via the gate array and bus driver to the director.

Fail Safe Operation

In the event of a data bus failure the DEU maintains the current status of the discrete cabin systems output for a certain time.

After this delay the outputs are switched to a pre–defined fail safe state, that means the four fluorescent strip lights come on with full brightness and all other items go off.

All audio inputs/outputs are immediately switched off.

Emergency Functions

All DEUs operate in emergency mode when the DC service bus is no longer powered. The DEUs are then supplied from DC essential bus.

The type A DEU passenger address circuits and the type B DEU interphone circuits remain operational.

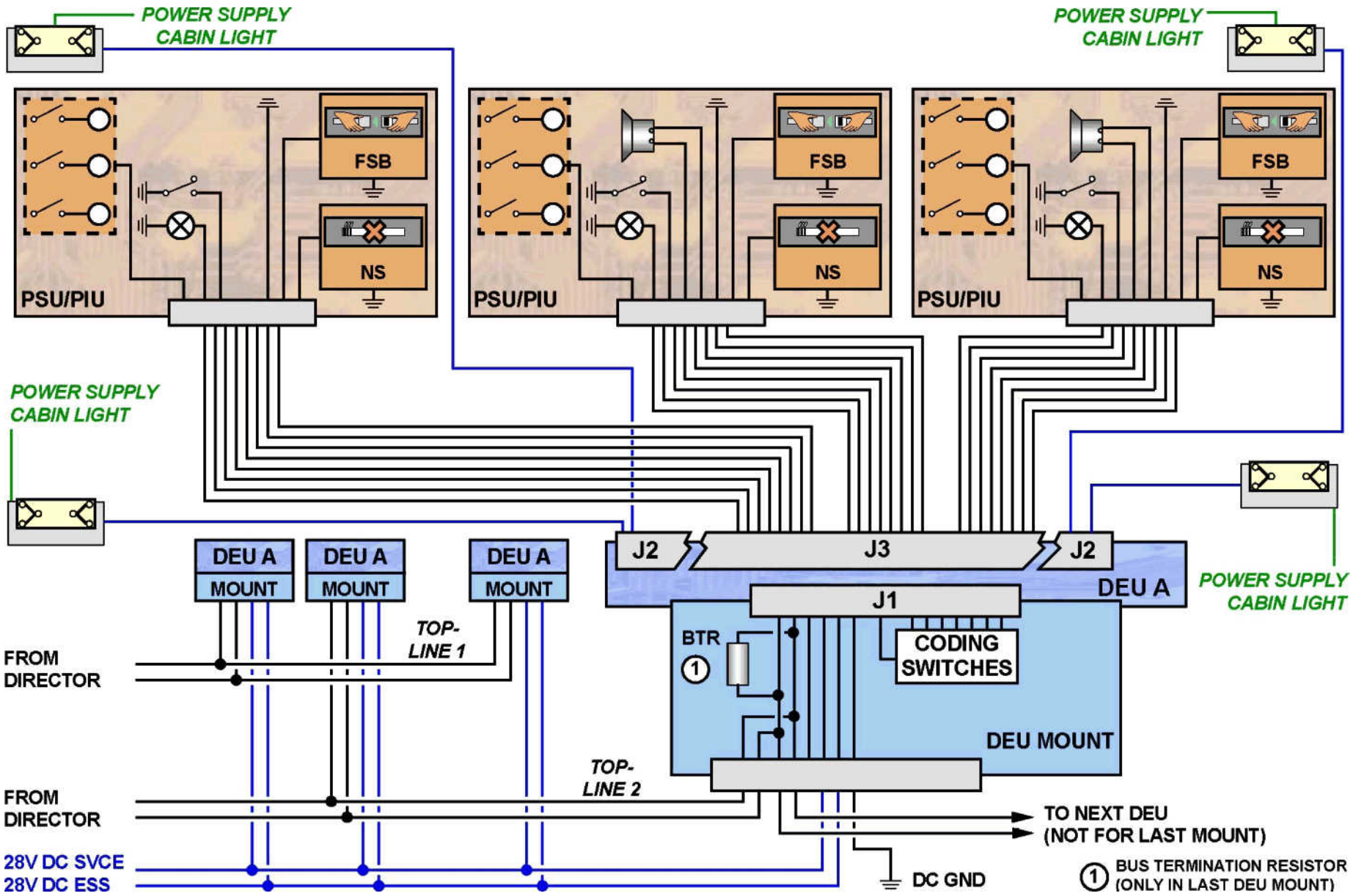


Figure 73 DEU A Schematic

DECODER ENCODER UNIT TYPE B

General

The Decoder–Encoder Unit (DEUs) are located in the left–hand and right–hand sides of the cabin ceiling or the cabin centerline. Each type B DEU connects to a middle line data bus. Each data bus takes the form of a shielded twisted pair cable.

Functions

Each type B DEU interfaces the following components and systems:

- Aft Attendant Panel,
- Additional Attendant Panel,
- Emergency Power Supply Unit,
- Slide/Door Pressure Monitoring,
- Passenger Address/Interphone Handset,
- Attendant Indication Panel,
- Area Call Panel,
- Drain Mast Heating Monitoring.

Middle Line Data Bus

One middle line data bus on each side of the passenger cabin or cabin centerline connect the 2(3) type B DEUs to the director.

A resistor or a bus termination unit (BTU) located in the DEU B mount (end of line) terminates each middle line data bus for impedance matching.

A319/320:Two additional mounts already connected to the middle line data bus are installed near to the forward right hand door and to the left emergency exit.

A321:Three additional mounts already connected to the middle line data bus are installed near to the forward right hand door and to the right and left emergency exit.

Coding Switches

A coding switch in the DEU mount gives each DEU a unique address. This method enables removal, interchange and replacement of DEUs without having to consider their address.

NOTE: In the event of mount change it is necessary to select the same code as used before.

CIDS Power Up

When the CIDS is powered–up or reset, the director follows a power up routine. This includes the initialization and testing of each DEU and connected equipment.

The test results are transmitted to the director which compares them with its programmed data to decide on their status.

At least 95% of possible DEU failures are automatically detected.

DEU B Inputs and Outputs

A DEU B receives digitized audio signals. The gate array transfers these signals to the D/A converter circuit. The analog signals are then filtered and pre–amplified and send to the handset. Audio signals (including dial tone) from the handset connect to a Dual Tone Multiple Frequency (DTMF) decoder and to a filter/amplifier A/D converter. The gate array transfers the data from the decoder to the director for dialling purposes. The digitized audio also connects to the gate array.

An audio Input/Output (I/O) circuit test can be made. The audio output is switched through to a summer which adds the signal to the audio input. This is done via a command line from the gate array. An off–hook serving circuit also connects to the handset and has a connection to the gate array.

A serial RS232 interface is used to communicate between the gate array, the attendant indication panel and the aft attendant panel.

A serial interface is also provided for separate testing of the emergency lighting power supply units.

Emergency Functions

All DEUs operate in emergency mode when the DC service bus is no longer powered. The DEUs are then supplied from DC essential bus.

The type A DEU passenger address circuits and the type B DEU interphone circuits remain operational.

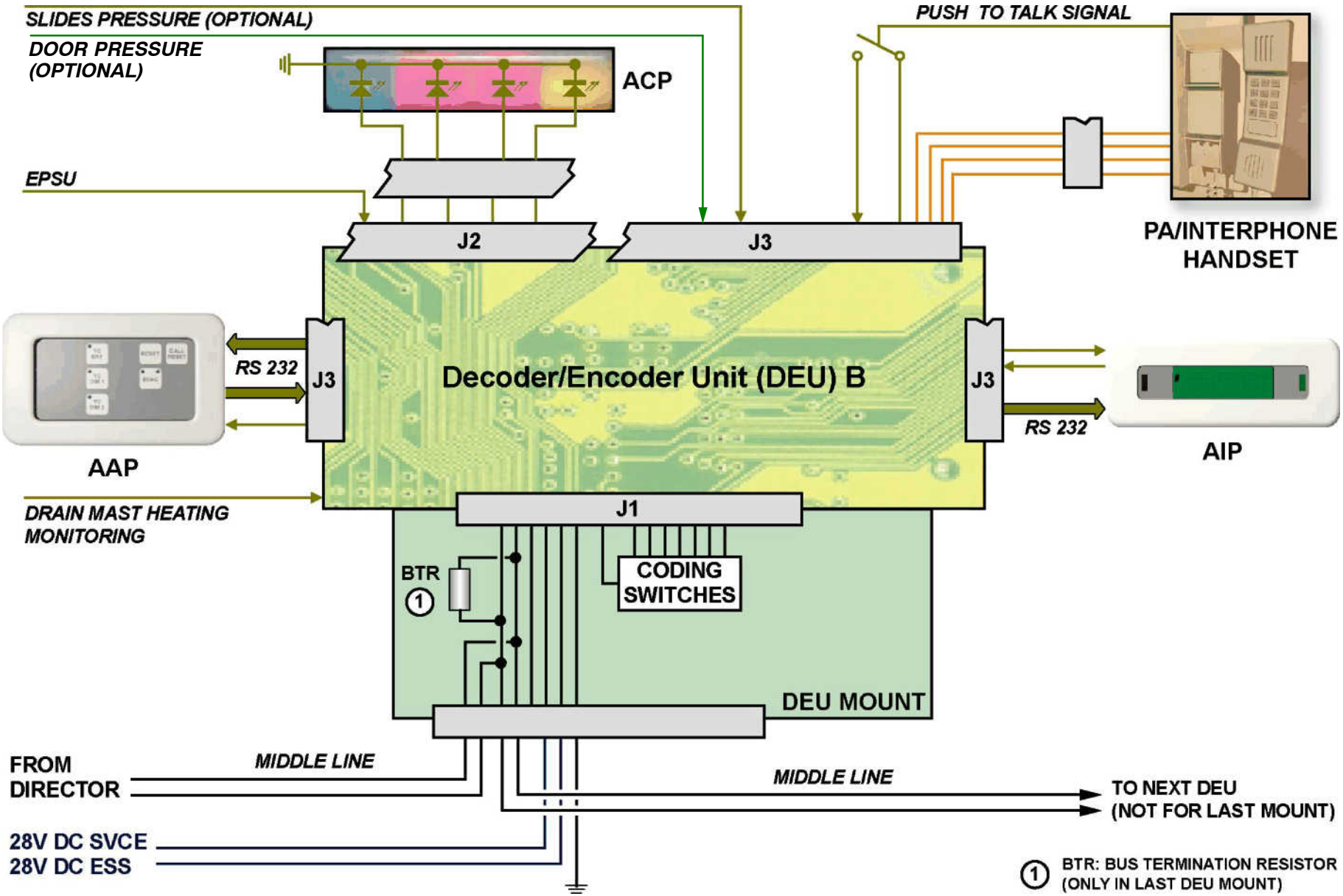


Figure 74 DEU B Schematic

CIDS DIRECTOR - DEU A & B INTERFACE

CIDS COMPONENTS

The CIDS is made up of a number of principle components which connect to two identical control units. The 'active' director 101RH and the 'hot–standby' director 102RH. The principle components are the Onboard Replaceable Modules (OBRM) 101RH1 (102RH1).

CIDS DIRECTORS

For redundancy, two identical directors are provided. The director 102RH is normally in hot–standby. It must receive the same inputs and respond to them in the same way as the active director 101RH. The only exception is that its outputs are normally disabled. Each director contains an OBRM module .The director connects only indirectly to the large amount of cabin equipment, via Decoder Encoder Units (DEU). ARINC links and discrete lines connect the director to individual controls, cockpit equipment and other systems.

FORWARD ATTENDANT PANEL (FAP)

The forward attendant panel 120RH transmits to the director via a serial link which connects to both directors in parallel. For transmission of data to the forward attendant panel, however, two separate ARINC links are provided, one from each director. Separate discrete lines from the panel connect to the power supply units of the reading lights, the attendant work lights and lavatory lights.

DEU TYPE A

DEUs type A 200RH are installed along each side of the passenger cabin. To each DEU type A 3 PSUs and PIUs may be connected. The DEUs type A connect to the directors via a top–line twisted pair data bus. For redundancy purposes, the physical form of this top–line bus are two twisted pairs along each side of the cabin. They connect alternate DEUs. This means that a break in one top–line twisted pair would disable only every other DEU type A along one side of the cabin. A resistor terminates each top–line data bus cable for cable impedance matching. Each DEU type A is identical, which allows the interchange of any DEUs type A. The DEU mount include coding switches. This gives each DEU location a different address.

Passenger Signs

The passenger signs include NO SMOKING or the optional NO ELECTRONIC DEVICE lights, FASTEN SEAT BELT lights, NON SMOKER ZONE lights and RETURN TO SEAT lights in the lavatories. Furthermore, for the passenger call system, the seat row lights are connected to the type A DEUs.

Cabin Lights

The cabin lights include:

- entrance area lights,
- lavatory lights,
- attendant lights,
- reading lights,
- cabin fluorescent strip lights.

Loudspeakers

The loudspeakers are installed in the Passenger Service Unit (PSU), in each lavatory and near the attendant station.

They are all identical and are used for:

- passenger address announcements,
- call chimes (optional),
- boarding music.

Passenger Call

Pushbuttons are installed on the PSU above each seat row and in the lavatories.

Reading Light Power Unit

One Reading/Light (R/L) power unit for three R/L is installed in each PSU.

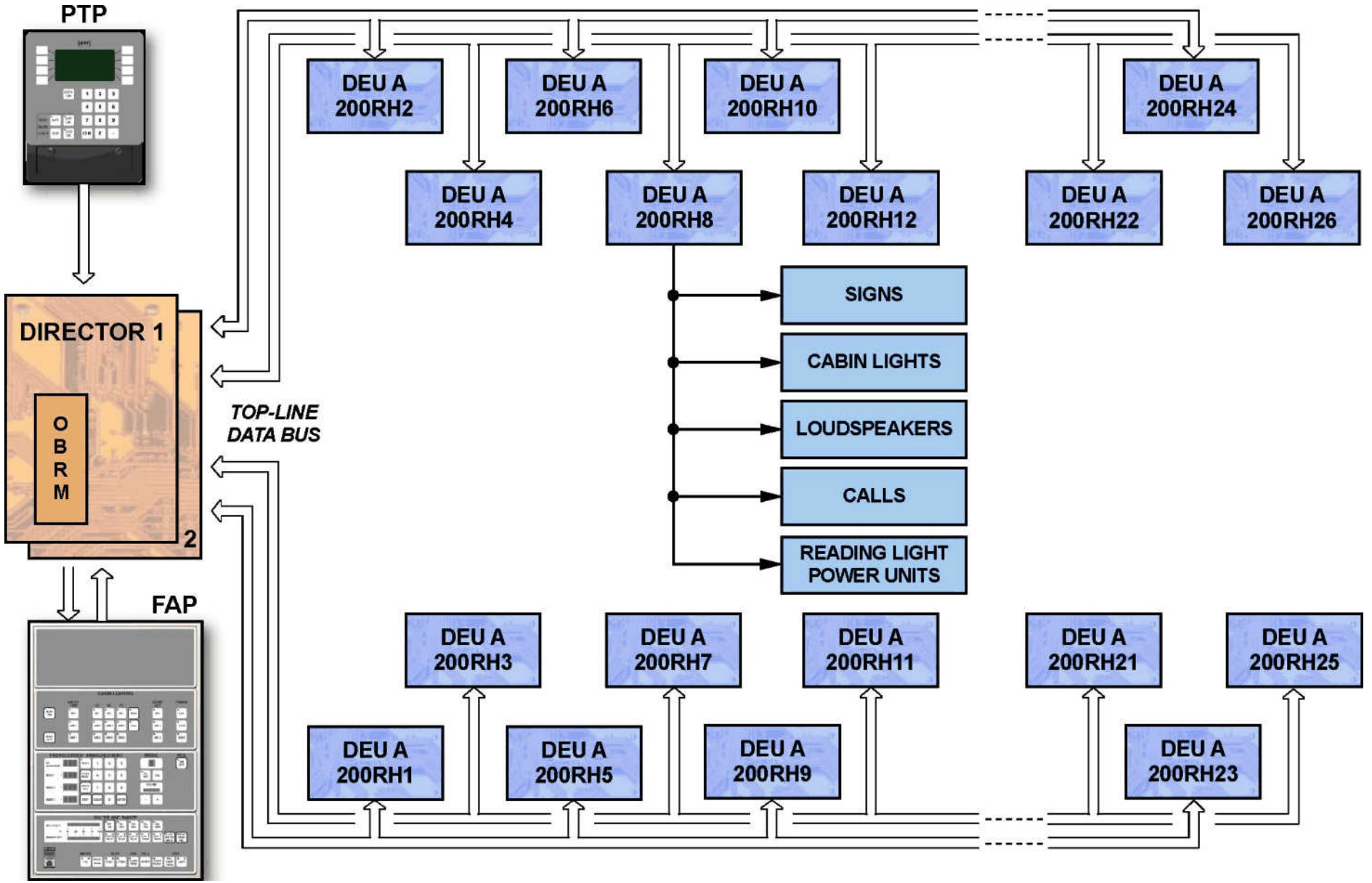


Figure 75 DEU A Interconnection

PROGRAMMING AND TEST PANEL (PTP)

The programming and test panel 110RH transmits to the director via a serial link which connects to both directors in parallel. For transmission of data to the panel, however, two separate ARINC links are provided, one from each director. The Cabin Assignment Module (CAM) 115RH plugs directly into the front face of the panel. Interaction between director and CAM is via the programming and test panel ARINC links.

Prerecorded Announcement and Boarding Music (PRAM)

The function of the Prerecorded Announcement and Boarding Music (PRAM) Reproducer is to play prerecorded messages. It also plays boarding music programs on a cassette tape to the passengers through the aircraft passenger address system. The PRAM is controlled by the audio module, which is a part of the Fwd Attnd panel . It is installed in the cabin at the forward attendant station. The PRAM is controlled through the Cabin Intercommunication Data System (CIDS) director to receive and transmit control data.

DEU TYPE B

DEUs type B 300RH are installed in their DEU–mounts on both cabin sides (A320) or on both sides of the cabin centerline (A321). They are located near to the exit doors. The DEUs type B connect to attendant and safety equipment. DEUs type B connect with discrete lines to this equipment:

- the area call panels,
- the attendants handsets,
- the slide and door pressure sensors,
- the emergency power supply units.

The aft attendant panel receives and transmits serial data, also it is connected to the DEU type B with discrete lines. A serial link transmits data to each AIP too. Discrete connections provide AIP power and reception of AIP BITE status. Not all inputs and outputs are used on each DEU, however, it depends on the cabin layout. The DEUs type B connect to the directors via a middle–line twisted pair data bus. One twisted pair cable on each aircraft side or the cabin centerline connects to all DEUs type B on that side. A resistor or a bus termination unit (BTU) terminates each middle–line data bus cable for cable impedance matching. Each DEU type B is identical. Coding switches in each DEU mount are used to define a different address for each DEU B location.

Crew Interphone System

The crew interphone system is used for the communication between cockpit crew and cabin attendants and between each attendant station.

NOTE: From each attendant station it is possible to communicate with personnel at the service interphone connections.

Emergency Power Supply Units (EPSU)

The Emergency Power Supply Units (EPSU) are connected to type B DEUs for the emergency lighting system test.

Drain Mast

The DIRs receive signals from the drain mast control unit via type B DEUs. If the drain mast heater or the control unit fails the CIDS CAUT light on the FAP comes on.

Attendant Indication Panel

One Attendant Indication Panel (AIP) is installed near each attendant seat for message purposes.

Area Call Panel

One basic and one optional Area Call Panel (ACP) can be connected to each DEU B.

Additional Attendant Panel

One Additional Attendant Panel (AAP) is installed near the aft attendant station and on the A321 at the middle attendant station.

Slide Pressure System

The DIRs receive signals from the bottle pressure sensors via type B DEUs. If the pressure is low, the Cabin Intercommunication Data System (CIDS) CAUTion light on the Forward Attendant Panel (FAP) comes on.

Door Pressure System

The DIRs receive signals from the bottle pressure sensors via type B DEUs. If the pressure is low, the CIDS CAUT light on the FAP comes on.

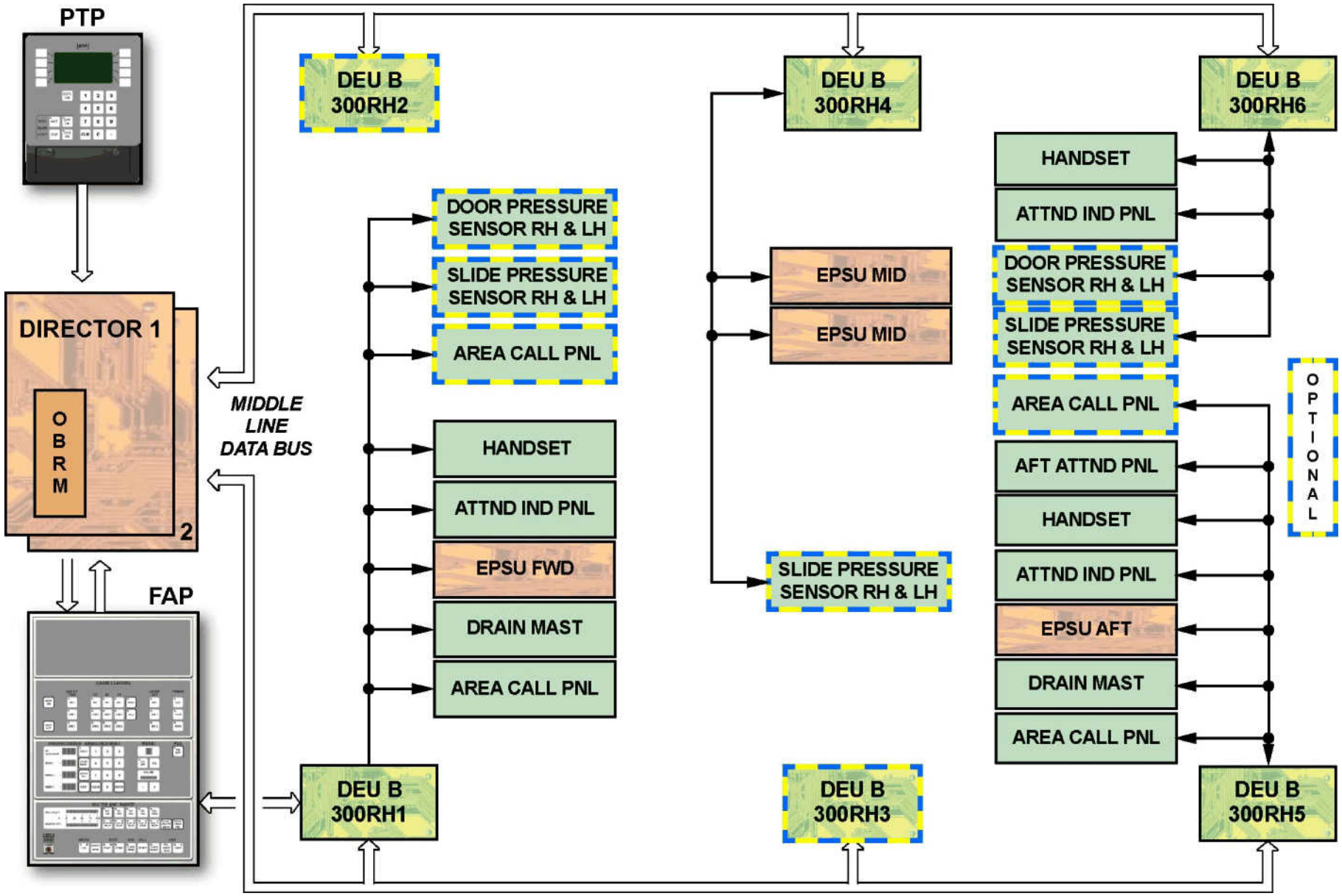


Figure 76 DEU B Interconnection

DEU MOUNT DESCRIPTION

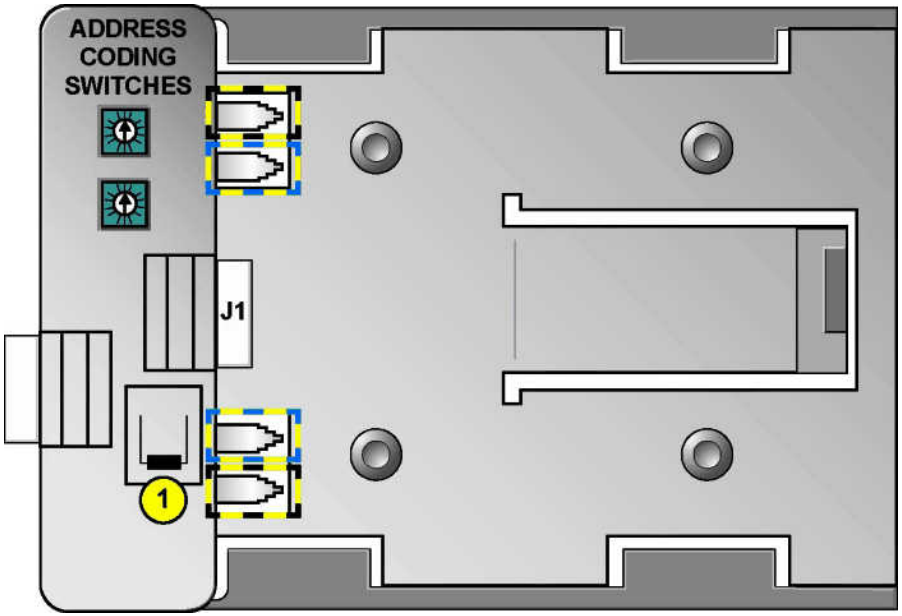
DEU MOUNTS

The mounts for type A and type B Decoder/Encoder Units (DEUs) are basically the same. Due to index pins it is not possible to install a type A DEU on a type B DEU mount.

The mounts for the type A DEUs have the index pins on the outer side of the slot and the type B DEUs on the inner side of the slot. On each DEU mount there are address coding switches. In case of a mount change the old code must be selected.

A bus termination resistor is installed on the last DEU mount of each line, for impedance matching.

NOTE: A placard giving the address code is placed close to the mount. The complete table of codes are found in the AMM removal/installation task of the DEU mounts.

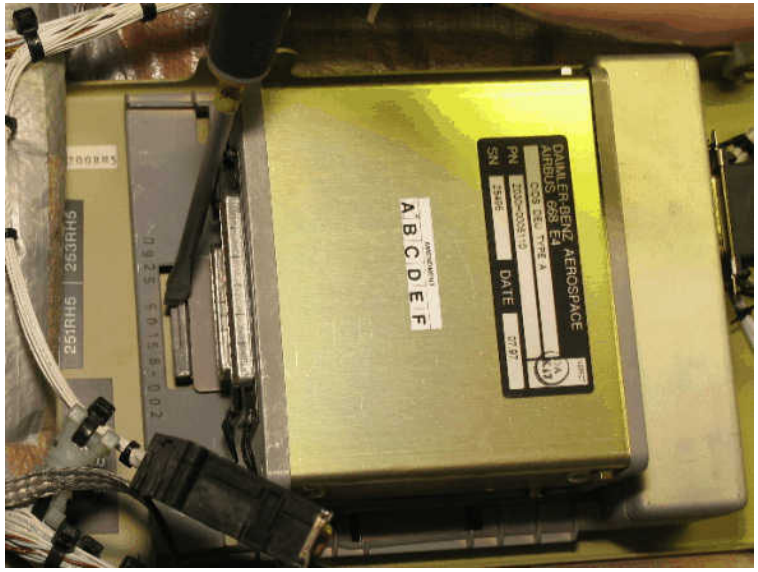


DEU A INDEX PIN
(ONLY ON DEU A MOUNT)

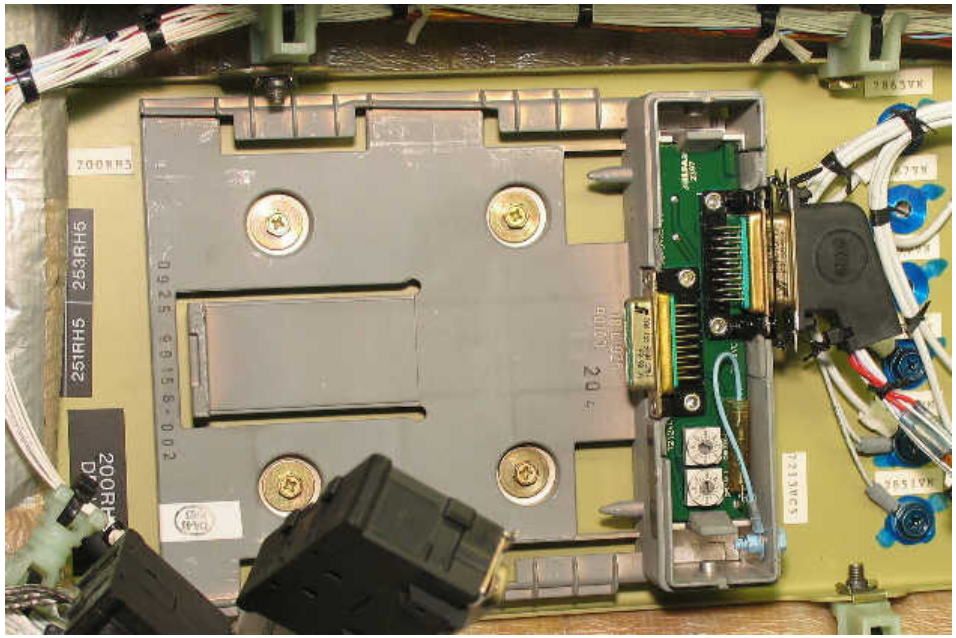
DEU B INDEX PIN
(ONLY ON DEU B MOUNT)

1 BTR: BUS TERMINATION RESISTOR
(ONLY IN LAST DEU MOUNT)

DEU A/B MOUNT
INDEX PINS



EXAMPLE:
DEU A
EJECTION



EXAMPLE:
DEU A
MOUNT

Figure 77 DEU Mount

FORWARD ATTENDANT PANEL INTRODUCTION

FORWARD ATTENDANT PANEL (FAP) DESCRIPTION

General

The forward attendant panel 120RH is installed in the forward entrance area of the aircraft. The attendant controls the different cabin systems from the attendant panel.

1 Air Temperature Module

- TEMPERATURE FWD

  The TEMPERATURE FWD display indicates the cabin temperature of the forward passenger compartment.

- TEMPERATURE AFT

  The TEMPERATURE AFT display indicates the cabin temperature of the aft passenger compartment.

NOTE: There is no temperature regulation available on the classic CIDS.

2 Light Module

- MAIN OFF

  The MAIN OFF membrane switch, switches off the following systems:

  – general illumination in the cabin and the entrance areas,
  – reading lights,
  – attendant work light,
  – lavatory light,

NOTE: The function MAIN OFF is disabled in flight.

- **MAIN ON**

  The MAIN ON membrane switch, switches on the general illumination in the cabin and entrance areas with a brightness of 100%. The integral light in the membrane switches BRT, WDO, and CLG comes on. If a membrane switch for the cabin or entry area is already pressed the MAIN ON membrane switch has no effect for the respective area.

- **ENTRY FWD BRT/ENTRY AFT BRT**

  The ENTRY FWD BRT or ENTRY AFT BRT membrane switches, switch on the general illumination in the respective entrance area with a brightness of 100%. The integral light in the membrane switch comes on. Pushing the membrane switch a second time, switches off the general illumination of the respective entrance areas and the integral lights.

- **ENTRY FWD DIM 1/ENTRY AFT DIM 1**

  The ENTRY FWD DIM 1 or ENTRY AFT DIM 1 membrane switches, switch on the general illumination in the respective entrance areas with a brightness of approx. 50%. The integral lights in the membrane switches come on. Pushing the membrane switches a second time, switches off the general illumination in the respective areas and the integral lights.

- **ENTRY FWD DIM 2/ENTRY AFT DIM 2**

  The ENTRY FWD DIM 2 or ENTRY AFT DIM 2 membrane switches, switch on the general illumination in the respective entrance areas with a brightness of approx.. 10%. The integral lights in the membrane switches come on. Pushing the membrane switches a second time, switches off the general illumination in the respective entrance areas and the integral lights.

- **CABIN LIGHTING FWD/AFT–BRT–DIM 1–DIM 2**

  The CABIN LIGHTING FWD/AFT–BRT–DIM 1–DIM 2 membrane switches, for the cabin area, have the same function as the ENTRY–BRT–DIM 1–DIM 2 membrane switches, for the entrance area.

- **CABIN LIGHTING WDO**

  When the general illumination for a cabin area is switched on, the CABIN LIGHTING WDO membrane switch integral light comes on. Pushing the membrane switch, switches off the general illumination at the windows left and right and the integral light. Pushing the membrane switch a second time, switches on the general illumination at the windows and the membrane switch integral light comes on.

- **CABIN LIGHTING CLG**

  When the general illumination for a cabin area is switched on, the CABIN LIGHTING CLG membrane switch integral light goes on. Pushing the membrane switch, switches off the general illumination in the ceiling and the integral light. Pushing the membrane switch a second time switches on the general illumination in the ceiling and the membrane switch integral light comes on.

- **POWER READ**

  The POWER ATTN membrane switch, switches on the power supply for the attendant work lights. The integral light in the membrane switch comes on. Pushing the membrane switch a second time switches off the power supply and the membrane switch integral light goes off.

- **POWER ATTN**

  The POWER ATTN membrane switch, switches on the power supply for the attendant work lights. The integral light in the membrane switch comes on. Pushing the membrane switch a second time switches off the power supply and the membrane switch integral light goes off.

- **POWER LAV**

  The POWER LAV membrane switch, switches on the power supply for the lavatory lights to a brightness of approx.. 50%. The integral light of the membrane switch comes on. Pushing the membrane switch a second time switches off the power supply and the membrane switch integral light goes off.

- **DECOR LIGHT**

  The DECOR LIGHT membrane switch, switches on and off special reading lights which illuminate special panels, logos or pictures.

- **RDL MAN HOLD**

  The RDL MAN HOLD membrane switch, switches off the reading lights without removing power. When used twice the reading lights which where on before will be on again. Used for Take/Off and Landing.

3 Audio Module

- **MUSIC ON/OFF**

  The MUSIC ON/OFF membrane switch, switches on the boarding music. The integral light in the membrane switch comes on. Pushing the membrane switch a second time switches off the boarding music and the integral light goes off.

- **MUSIC SEL**

  The MUSIC SEL membrane switch, switches the boarding music to the next channel. The selected channel is shown on the numerical display.

- **MUSIC + / MUSIC –**

  Pushing the MUSIC+/MUSIC– membrane switch increases/decreases the loudness of the boarding music. The loudness is indicated on a 10 step rectangular LED row.

- **PRERECORDED ANNOUNCEMENT**

  This area on the front face of the audio module includes a display for the selected announcements and a keyboard and function keys.

  To start prerecorded announcement push the related key and then the ENTER membrane switch. When the recorder has found the correct announcement the READY indicator comes on. Pushing the START NEXT membrane switch starts the announcement and the READY indicator goes off. If more than one announcement is selected, the START ALL membrane switch activates all announcements. If the ENTER membrane switch is not pushed the selected announcement will be accepted after a delay of approx.. 5 s. A LED in front of each MEMO display indicates which memory is selected for modification.

  To test the emergency announcement, bring the cursor to MEMO 1 and press ”701 ENTER 701” (E–P is displayed in the ON ANNOUNCE display).

- **PES ON/OFF**

  Pushing the PES ON/OFF membrane switch, switches on the passenger entertainment system. The membrane switch integral light comes on. Pushing the membrane switch a second time switches off the passenger entertainment system and the membrane switch integral light goes off.

4 Miscellaneous Module

- **LIGHT EMER**

  The LIGHT EMER pushbutton switch switches on the emergency lighting system. The integral light in the pushbutton switch comes on. Pushing the pushbutton switch a second time switches off the emergency lighting system and the integral light.

NOTE: The function of the pushbutton switch is independent from the CIDS power supply.

- **CIDS PNL LIGHT TEST**

  The CIDS PNL LIGHT TEST membrane switch switches on all the lights in the panel and the membrane switch integral light as long as the membrane switch is pressed.

- **RESET**

  The RESET membrane switch switches off the lavatory smoke and EVAC warning if the warning is activated. The membrane switch switches a discrete input to ground.

- **CIDS CAUTION**

  The CIDS CAUTION light is resettable in flight, but comes on again on the ground (landing gear down and locked).

  The light cannot be reset on the ground. When a CIDS CAUTION occurs, the respective failure message is displayed on the programming and test panel.

- **SMOKE LAV**

  The SMOKE LAV indicator light comes on when a signal from the smoke detector is received.

- **WATER QTY**

  The WATER QTY LED display shows the actual contents in the water tank graduated in 20 steps, each step is equal to 5%.

- **WASTE QTY**

  The WASTE QTY LED display shows the actual contents in the waste tank graduated in 20 steps, each step is equal to 5%

- **IND ON**

  The IND ON membrane switch, switches on the water and waste indicating system.

- **SEL 25%, SEL 50%, SEL 75% and SEL 100%**

  Pushing one of these membrane switches, stores the related value and switches it to the preselection control unit. Pushing a second membrane switch stores the new value and erases the previous value.

- **WTR SYSTEM DEPRE**

  The WTR SYSTEM DEPRE membrane switch, activates the depressurization valve of the water tank. Used in case of cold weather conditions on ground.

- **FPH DOOR 1**

  The Floor Panel Heated Door 1 membrane switch is used to control the heating of the door 1 L & R heater panels.

- **LAV WATER HEAT**

  The LAV WATER HEAT membrane switch, is used to switch off and on the lavatory water heaters.

- **HEAT DRAIN PNL**

  The HEAT DRAIN PNL membrane switch, switches on the heating system and the membrane switch integral light comes on.

- **SYSTEM INOP, LAV INOP**

  The SYSTEM INOP indicator light comes on, if the vacuum waste system fails.

- **EVAC CMD**

  The EVAC CAPT PURS/CAPT switch must be in the CAPT PURS position.

  The system can be activated from any of the attendant stations by using the FAP/AAP EVAC CMD key. When the EVAC CMD key is pressed, the aural and visual signals in the cabin and in the cockpit for evacuation are activated.

- **SLIDES ARMED**

  The SLIDES ARMED indication light is off when all slides are disarmed.

  When at least one slide is armed the indication light flashes (green).

  When all slides are armed the indication light (green) is steady on.

- **DOORS CLOSED**

  The DOORS CLOSED indication light comes on, when all doors are closed. When at least one door is opened, the indication light goes off.

- **CABIN READY function**

  The cabin ready signaling depends on the different Flight Phases (FP). The cabin crew can indicate the status cabin ready for take–off and landing.

  The status is indicated on:

  – the ECAM upper display unit, on the take–off check–list (on, 2min. after both engines running), or on the landing check–list, (on, lower 2000ft and landing gear extended),

  – on the FAP 120RH in the cabin ready membrane switch (LED).

  The take–off check–list and landing check–list shows the message CABIN READY, when the function is activated. It shows the message CABIN CHECK, when the function is not activated, or reset.

  The function is activated, when you push the cabin ready membrane switch on the FAP depending on FWS Flight Phase (FP):

  – in FP1, when oil press is high,

  – in FP2, FP3,

  – FP6 and slats extended,

  – FP7, FP8,

  – FP9, until 80kts +30sec.

  The function is reset:

  when you push the cabin ready membrane switch a second time (FP conditions as for activation),

  at take–off when the A/C is faster than 80kts FP4,

  if an approach in FP6, FP7 is rejected,

  after landing in FP9 when the A/C is slower than 80kts +30sec,

  after touch and go FP8, with retracted slats.

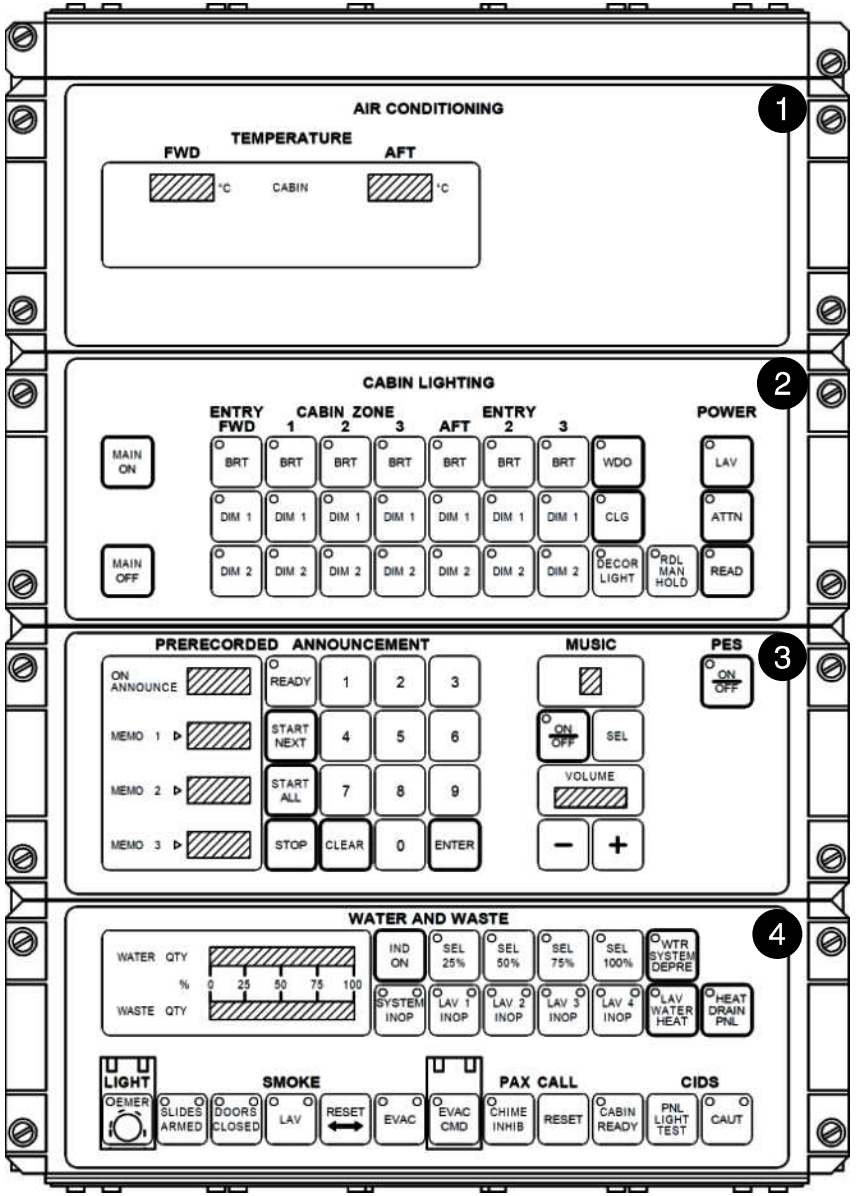


Figure 78 Forward Attendant Panel with All Options

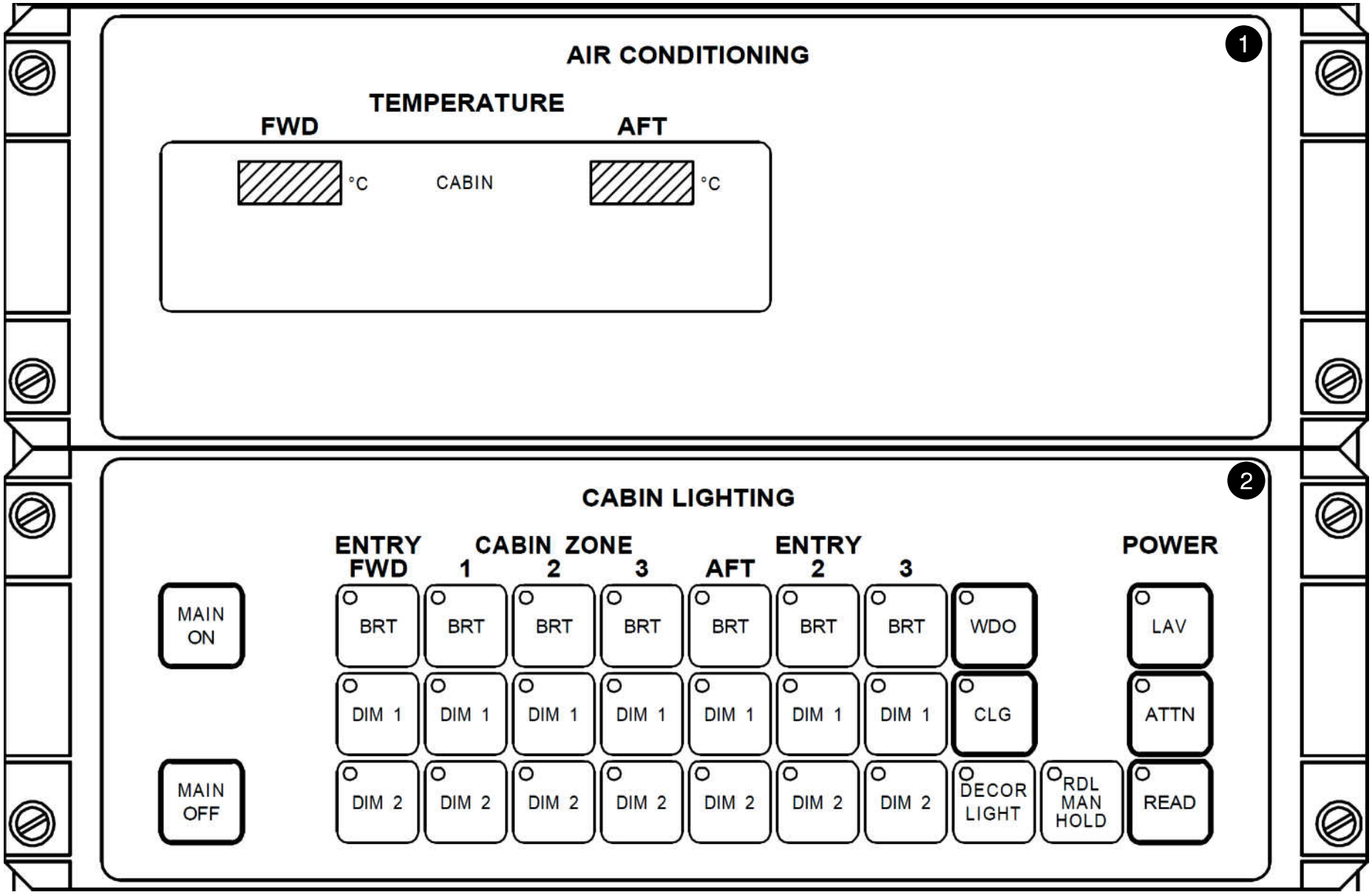


Figure 79 FAP - Air Temperature and Light Module

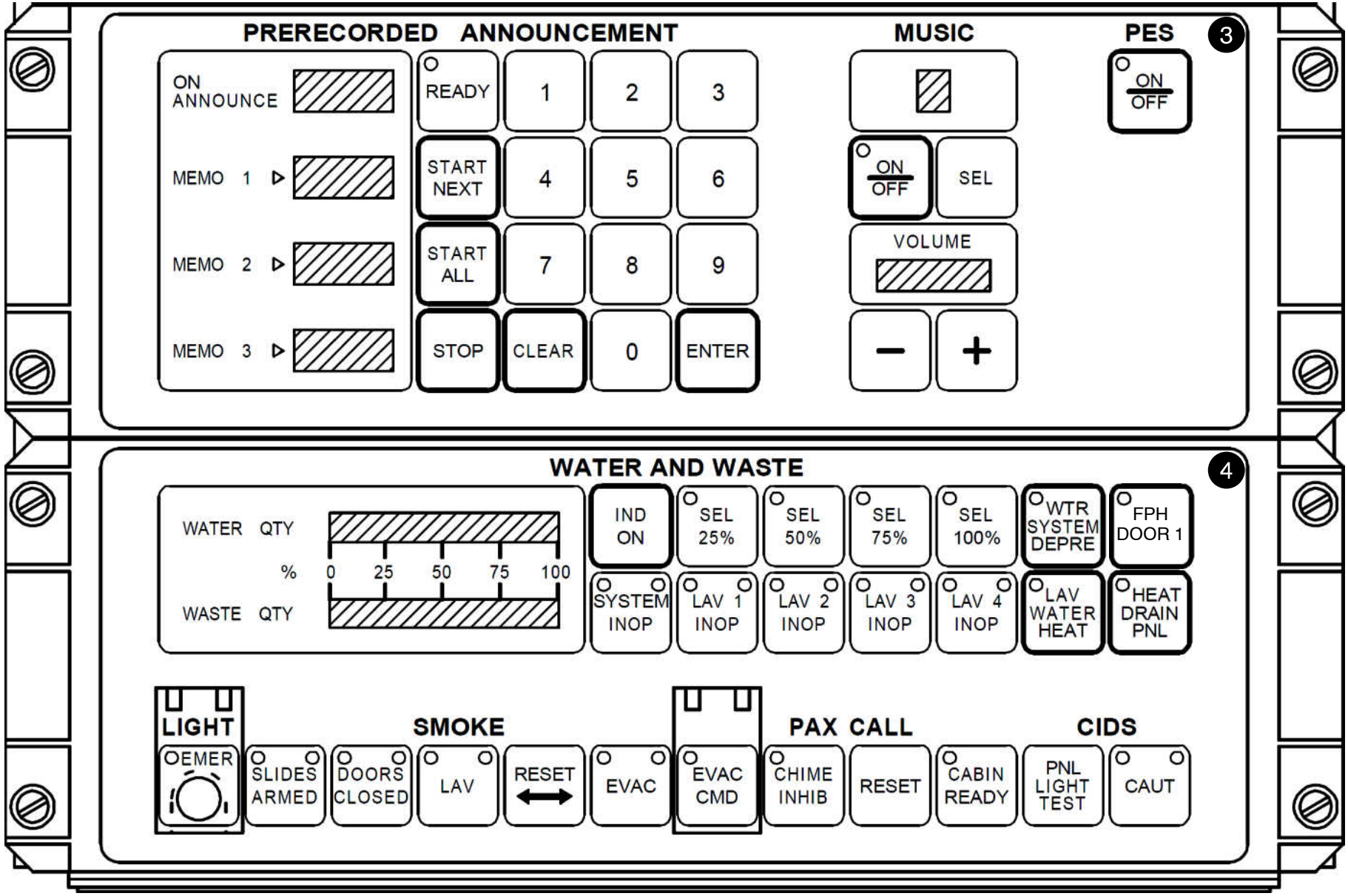


Figure 80 FAP - Audio and Miscellaneous Module

AFT / ADDITIONAL ATTENDANT PANEL PRESENTATION

General

The AFT ATTND panel is installed in the aft entrance area of the aircraft.

The ADD ATTND panels (A321) are installed in the mid and aft entrance area of the aircraft. They enable attendant to control different cabin systems.

Functions

The cabin light panel comprises control pushbuttons for the different cabin lighting systems. There are controls for the different entrance area and cabin section.

All pushbuttons, except for MAIN ON and MAIN OFF, have integral lights for visual confirmation of the pushbutton activation.

The RESET pushbutton resets the lavatory smoke warnings (same than FAP).

Aft Attendant Panel

The Aft attendant panel performs these functions:

- the adaptation of received data bus signals,
- the processing of addressed commands and controls,
- the processing of inputs from cabin systems,
- the processing of inputs from membrane switches on AFT attendant panel,
- the transmission of data at assigned intervals via the data bus,
- the fail passive for data bus transmission and reception in case of AFT attendant panel failure,
- the short–circuit protection of discrete outputs.

The Aft Attendant Panel comprise:

- the MAIN ON/OFF membrane switches,
- the ENTRY BRT/DIM 1/DIM 2 membrane switches,
- the AFT BRT/DIM 1/DIM 2 membrane switches,
- the (SMOKE) RESET membrane switch (optional),
- the CALL RESET membrane switch (optional),
- the EVAC CMD membrane switch (optional).
- the EVAC indicator (optional).
- the LAV WATER HEAT membrane switches (optional),

Additional Attendant Panels (AAPs)

The AAPs perform these functions:

- the adaptation of received data bus signals,
- the processing of addressed commands and controls,
- the processing of inputs from cabin systems,
- the processing of inputs from membrane switches on AAP,
- the transmission of data at assigned intervals via the data bus,
- the fail passive for data bus transmission and reception in case of AAP failure,
- the short–circuit protection of discrete outputs.

The AAPs comprise:

- the MAIN ON/OFF membrane switches,
- the ENTRY BRT/DIM 1/DIM 2 membrane switches,
- the C/M BRT/DIM 1/DIM 2 membrane switches, or
- the AFT BRT/DIM 1/DIM 2 membrane switches,
- the SMOKE RESET membrane switch (optional),
- the CALL RESET membrane switch (optional),
- the EVAC membrane switch & indicator (optional).

AAP Interface

The Additional Attendant Panel (AAP) is connected to the relevant type B DEU, for the control of the cabin systems, through RS 232 lines.

The AAP receives 28V DC power supply from the relevant type B DEU. Discrete signals connect the AAP to the relevant type B DEU for activation of the EVAC system signaling, reset and indication.

A discrete signal controls the relevant lavatory water heater. A discrete signal, out of the AAP, is used for call indication reset.

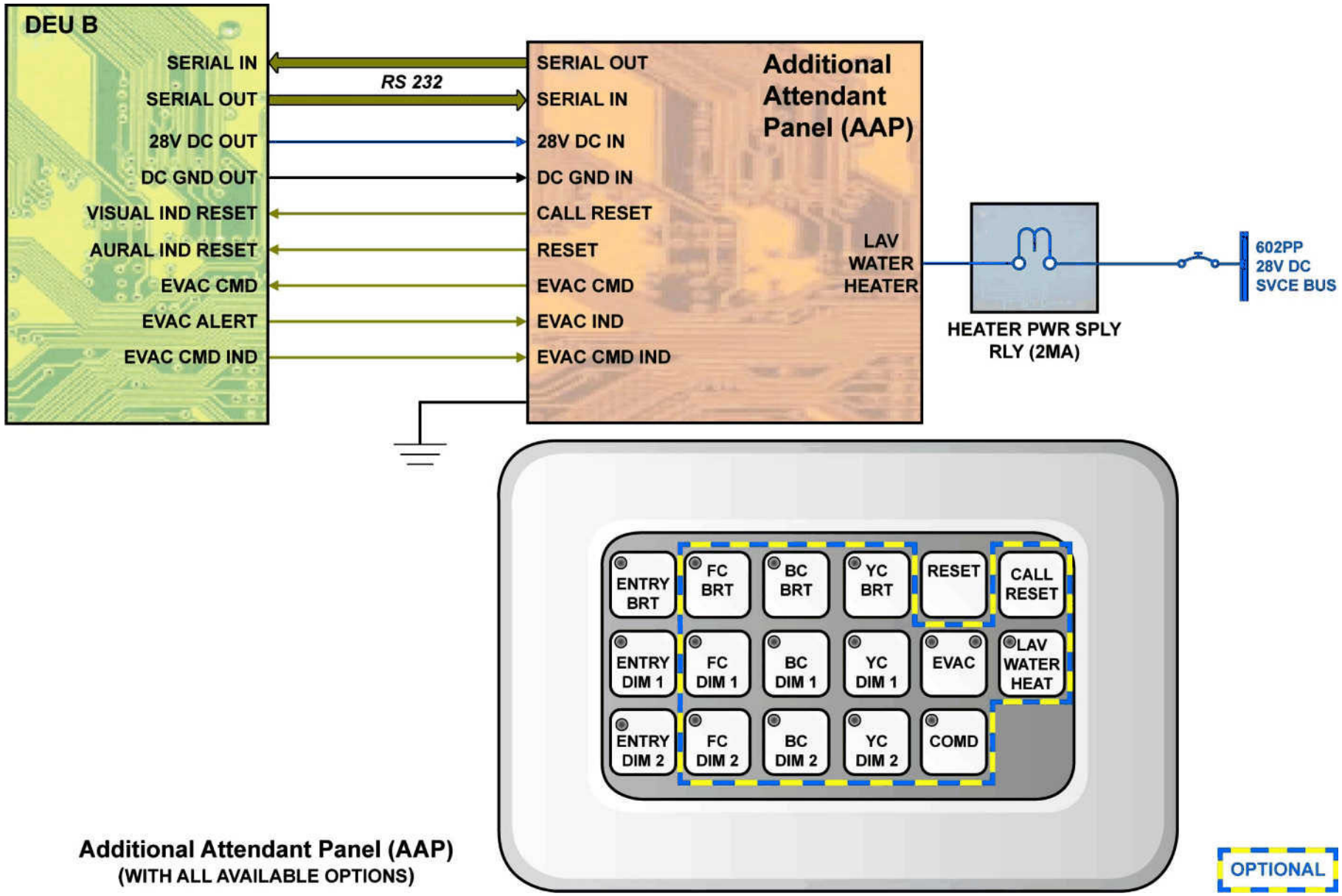


Figure 81 Aft / Additional Attendant Panel

ATTENDANT HANDSET PRESENTATION

General

Each attendant station is equipped with a handset for public announcement, interphone dailing and communication. The handset rests in a cradle.

Handset Functions

The handset and cradle provide the following functions:

- the hook off sensing,
- the Push to Talk (PTT) switching,
- the PA announcement,
- the interphone,
- the single–key (version 1) or double key (version 2) call–activation via integral keypad and telephone conversation.

For handset volume adjustment after removing the keyboard cover, two potentiometers under the PTT button can be adjusted.

To reset any dailing procedure, press the RESET key.

Reed contact

When the handset is not in its cradle, the reed contact connects electrical power to the handset.

Version 1: Single key call activation Handset

For PA announcement, press the PA ALL key on the handset. To make a announcement use the PTT switch.

For Captain call, press the key CPT on the handset. A captain call procedure with aural and visual indication in the cockpit is initiated. The telephone conversation is accomplished as soon as the called handset is hooked off.

For Cabin interphone, press the key related to the station on the handset.

A attendant call procedure with aural and visual indication in the cabin is initiated. The telephone conversation is accomplished as soon as the called handset is hooked off.

For Service Interphone, press the SERV INT key on the handset. If the aircraft is on ground or the SERV INT OVRD pushbutton is on, telephone conversation is accomplished with headset plugged in at any Service Interphone Jack.

NOTE: The position and the naming of the keys may vary depending on airline.

Version 2: Double key call activation Handset

For PA announcement, press the PA and the ALL key on the handset. To make a announcement use the PTT switch.

Pressing the PTT button without key selection activates the ”DIRECT PA” mode of operation with PA announcement in the whole cabin.

For Captain call, press the key (CPT, EMER CAPT) on the handset. A captain call procedure with aural and visual indication in the cockpit is initiated. The telephone conversation is accomplished as soon as the called handset is hooked off.

When the EMER CAPT is pressed the aural sound in the cockpit will repeat.

For Cabin interphone, press the INTPH key and the key related to the station (FWD, MID, EXIT, AFT) on the handset. A attendant call procedure with aural and visual indication in the cabin is initiated. The telephone conversation is accomplished as soon as the called handset is hooked off.

For Service Interphone, press the INTPH key on the handset twice. If the aircraft is on ground or the SERV INT OVRD pushbutton is on, telephone conversation is accomplished with headset plugged in at any Service Interphone Jack.

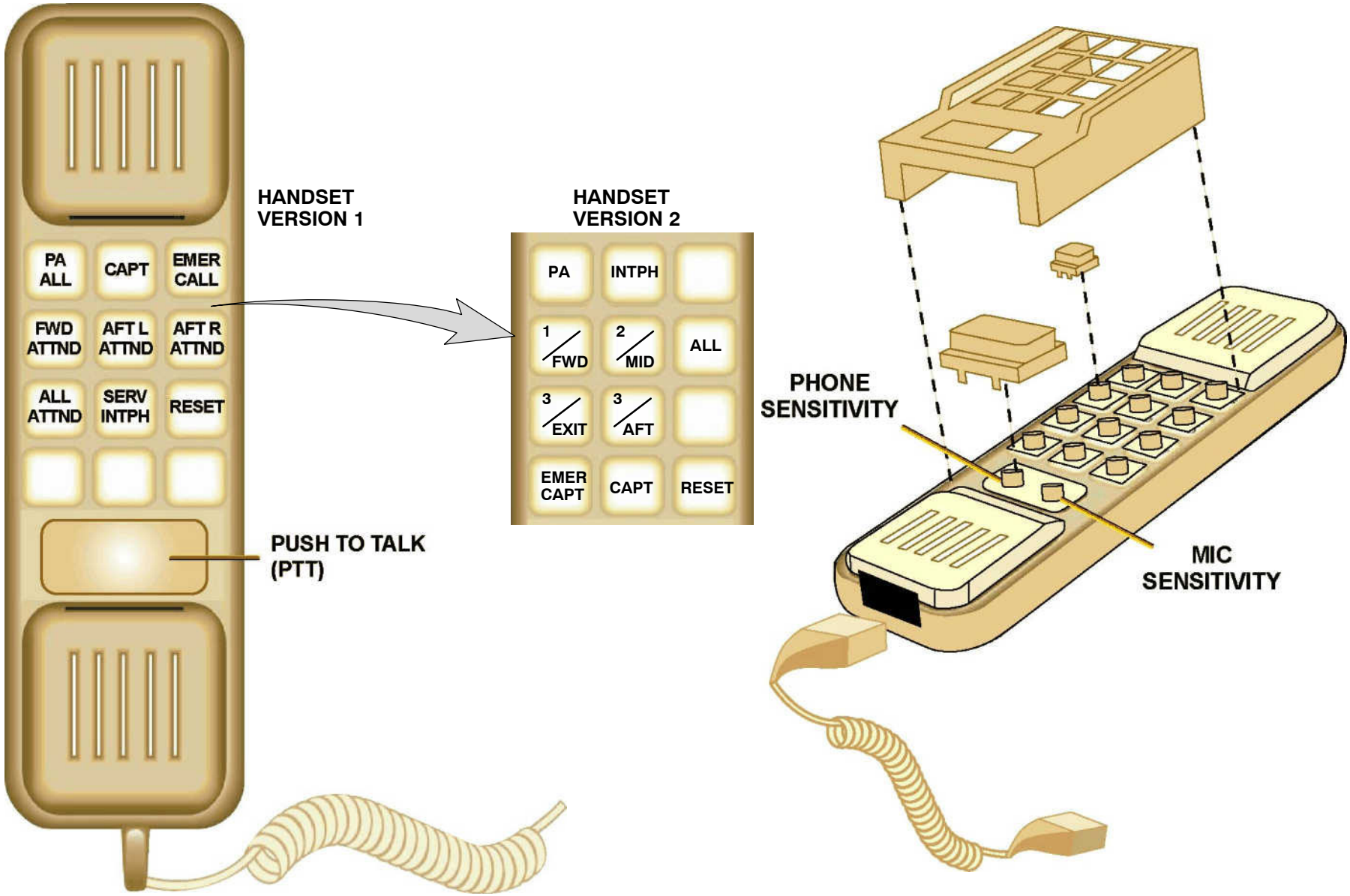


Figure 82 Cabin Handset

ATTENDANT INDICATION PANEL COMPONENT DESCRIPTION

GENERAL

The Attendant Indication Panel (AIP) is a display panel which indicates the system information processed by the Cabin Intercommunication Data System (CIDS). The AIP is installed near all attendant stations which have a handset for Passenger Address (PA) and interphone purposes.

FUNCTIONS

The AIP fulfills the following functions:

- display of handset–related information,
- interphone system messages,
- PA system messages,
- passenger (PAX)–lighted signs activation information,
- PAX call indication,
- miscellaneous information.

ARCHITECTURE

The AIP comprises of these modules:

- a display panel with two lines, each with sixteen characters,
- a display controller which includes a character generator,
- a display driver,
- an single chip microcomputer which includes a serial interface,
- a RAM and READ Only Memory (ROM) as program memory,
- an erasable Programmable Read Only Memory (EPROM),

  used as a memory for the indicated texts, alternatively the EPROM can be part of the single chip microcomputer and can also be used as a program memory,
- a line receiver,
- a power supply circuit,
- an additional circuits to provide an optimized visual range and a far reaching call function,
- a one pink or red indicator light,
- a one green indicator light.

BITE

The circuitry of the AIP includes BITE circuitry. No internal BITE memory is available, but a BITE output indicates the operational status of the AIP. The presence of this output of a 1 Hz waveform indicates ”AIP OK” to the connected Decoder/Encoder Unit (DEU) B. The BITE capabilities include power–up tests and automatic periodic tests.

MESSAGES

The AIP has a display area with an alphanumerical display in two rows, each with 16 characters. Additionally, red (pink) and green indicator lights are available and used as attention getters.

NOTE: The possible messages to be displayed are stored on a memory chip inside the AIP.

If an airline wants special messages there will be a special partnumber for the AIP.

UPPER ROW

The upper row of the display area is used for the indication of information concerning the cabin and flight crew interphone system.

The upper row is divided into 3 sections, 2 sections with 4 characters and one with 8 characters width. The outer left section is used to show the handset status information. The middle section is left blank and will not be used. The outer right section will show information about the desired interphone station or system function. For special high priority calls, the full width of the top line of the display will be used.

LOWER ROW

The lower row of the display indicates the system information which is derived from the CIDS.

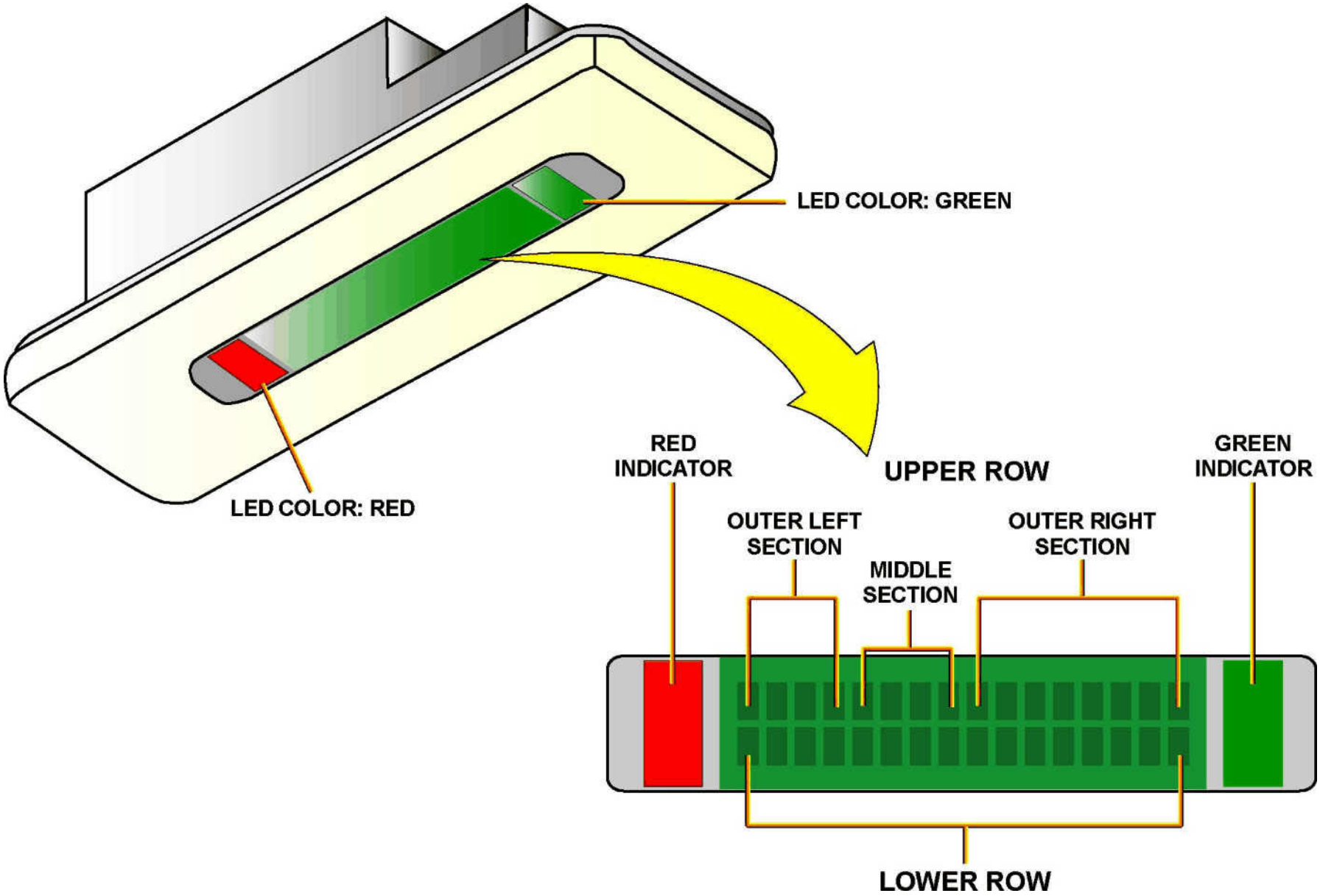


Figure 83 Attendant Indication Panel (AIP)

HANDSET OPERATION RELATED MESSAGES

The texts shown for the handset operation are derived from the combination of 2 texts shown in the outer left and right sections. The text shown in the outer left display indicates the operational status of the associated handset station.

The following text (max. 4 characters) can appear: (see table 1). Text shown in the outer right section of the display area indicate the selected function or, if the station is called, the designation of the calling station will be displayed. The following text will appear:

- PA related messages (see table 2),
- interphone related messages (see table 3),
- indications at called station (outer right section).

For the indications at the calling station (outer right section), see table 4.

For the Indications of high priority interphone functions at all stations (whole upper row), see table 5.

The System Status Related Messages are available and will be displayed on the lower row of the display as long as the respective function is done, (see table 6).

AIP INDICATOR OPERATION

The AIP indicators will be used as attention getters and they will be operated in conjunction with the respective messages.

The operation of the AIP indicators, with respect to the different system functions, is listed in the table 7.

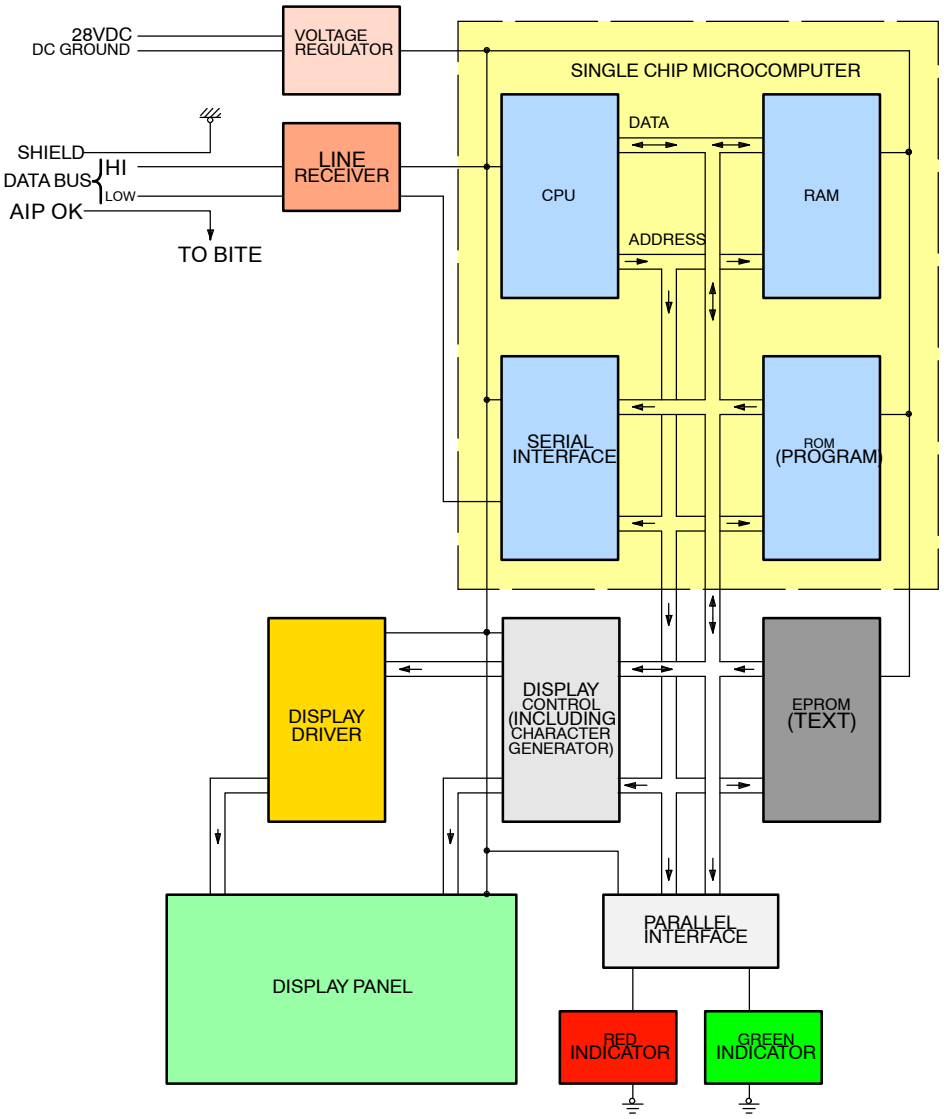


Figure 84 AIP Block Diagram

TABLE 1

TEXT	MEANING
#	Symbolic Indication: The handset has been taken off the hook. The system awaits the first dial code.
##	The system awaits a second dial code (only displayed if this is required).
CALL	The station has been called. Only used in conjunction with designation of the calling station.
CNCL	A previously established link has been cancelled, because the participating station has been called by a higher priority call. Only used in conjunction with the designation of the disconnected station.
OVER	The station has been called by a high priority call while another link has been established previously. Only used in conjunction with the designation of the calling station.
WAIT	A previously selected PA function has been overidden by a high priority station. The function is interrupted until the overidden station has been put back on the hook. Only used in conjunction with the designation of the selected PA function.
RST	The "RESET" button has been pushed. This text is displayed for approx. 1 sec. Then the "#" symbol appears.
ERR	A selected function is not available, e.g. the link to the Service Interphone System has been requested in flight.

TABLE 2

TEXT	SELECTED FUNCTION	
PA ALL	PA ALL and Direct PA	
PA 1	PA 1st zone	*
PA 2	PA 2nd zone	*
PA 3	PA 3rd zone	*

TABLE 3

TEXT	SELECTED FUNCTION	
CAPTAIN	normal call from cockpit	
FWD L	normal call from FWD L attendant	
FWD R	normal call from FWD R attendant	*
AFT L	normal call from AFT L attendant	
AFT R	normal call from AFT R attendant	

* = OPTIONAL

Figure 85 Possible AIP Messages (1)

TABLE 4

TEXT	SELECTED FUNCTION
CAPTAIN	call captain
PURSER	call purser
FWD	call FWD attendant
AFT	call AFT L attendant
SERV INT	service interphone selected

TABLE 5

TEXT	SELECTED FUNCTION
EMERGENCY CALL	emergency call
CONFERENCE CALL	call all attendants (conference call)
CAPTAIN CALL	call all attendants from cockpit

TABLE 6

TEXT	MEANING	
SMOKE LAVATORY A	Smoke has been detected at the indicated lavatory. Available lavatories are: A, B, C, D, E, F G, H, K, L, M, S, T, W.	
PA ALL IN USE	PA ALL or Direct PA is made.	
PA 1 IN USE	PA 1 announcement is made.	*
PA 2 IN USE	PA 2 announcement is made.	*
PA 3 IN USE	PA 3 announcement is made.	*
PA 1+2 IN USE	PA 1 and PA 2 announcement are made.	*
PA 1+3 IN USE	PA 1 and PA 3 announcement are made.	*
PA 2+3 IN USE	PA 2 and PA 3 announcement are made.	*
SERV INT IN USE	Service Interphone is available.	*
EVACUATION ALERT	Evacuation alert has been activated.	*
PAX 25R	A passenger Call has been activated. The seat row number and seat position (L or R) are displayed.	*

* = OPTIONAL

Figure 86 Possible AIP Messages (2)

TABLE 7

ACTIVATED FUNCTION	INDICATOR LIGHT		
	RED	GREEN	
LAVATORY SMOKE DETECTION	flashing	–	
EVACUATION SIGNALLING	–	–	*
SERVICE INTERPHONE	–	–	
PASSENGER CALL	–	–	
PASSENGER ADDRESS	–	–	
CABIN INTERPHONE			
- EMERGENCY CALL from cockpit	flashing	–	
- ALL ATTND CALL from cockpit	–	steady	
- PUSER CALL from cockpit	–	steady	*
- NORMAL CALL from cockpit	–	steady	
- ALL ATTND CALL from cabin	–	steady	
- PUSER CALL from cabin	–	steady	*
- NORMAL CALL from cabin	–	steady	

Figure 87 Possible AIP Messages (3)

AREA CALL PANEL PRESENTATION

GENERAL

The Area Call Panel (ACP) is installed at each end of the cabin to the right and left hand sides of the centerline in the ceiling.

The ACP has four separately controlled fields, each field contains colored Light Emitting Diodes (LEDs). The lights can be seen from the front or rear of the ACP.

The following colors are the standard colors for the lamps:

- color 1: amber,
- color 2: red (optionally green),
- color 3: red (optionally pink),
- color 4: blue.

The fields are activated either continuously or flashed. They are used as cabin attendants attention getters.

OPERATION

Five discrete connections link each ACP to a nearby Decoder/Encoder Unit (DEU) B. One is for each field and one for a common connection to the LEDs. The DEU B switches the LEDs. Any field or combination of fields can be flashed.

Cockpit Call

A call from the cockpit results in lighting the **red** field on the ACP.

Passenger Call

A call from a passenger to the cabin attendant results in lighting the **steady blue** field on the ACP of that side of the forward, middle or aft section from where the call was initiated.

Passenger calls are accompanied by one high chime on the attendant loudspeakers.

Lavatory Call

A call from the lavatory results in lighting the **amber** field on the ACP allocated to the lavatory from where the call was initiated.

A lavatory call is accompanied by one high chime on the attendant loudspeakers.

NOTE: Simultaneously, the lavatory call pushbutton comes on.

Lavatory Smoke

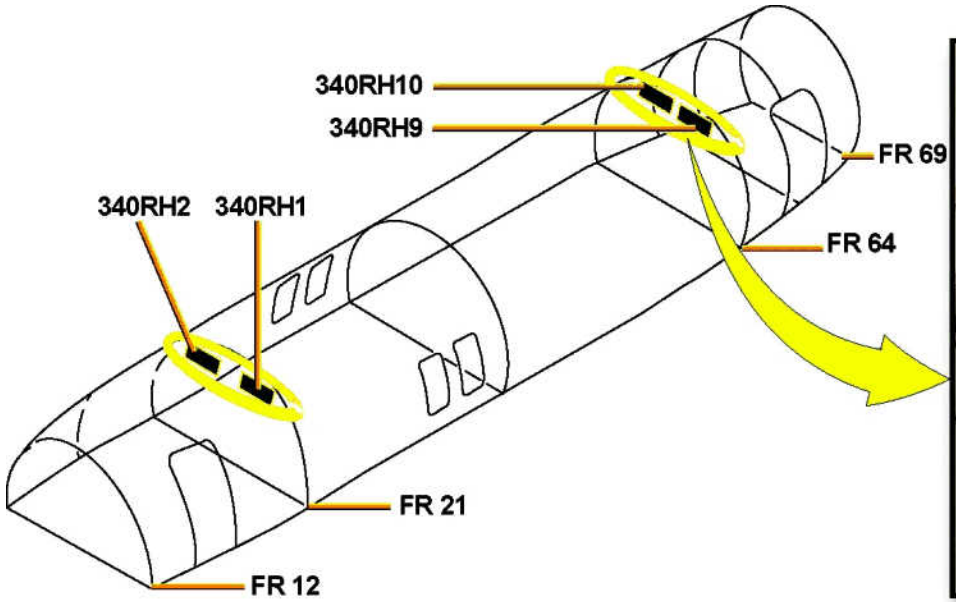
The **amber** field of the corresponding ACP will **flash** whenever smoke is detected in a lavatory.

A smoke warning in lavatories is accompanied by three low chimes on the attendant loudspeakers.

Attendant Call

The **green (option)** field comes on at the ACP when a Attendant call is initiated from a attendant handset.

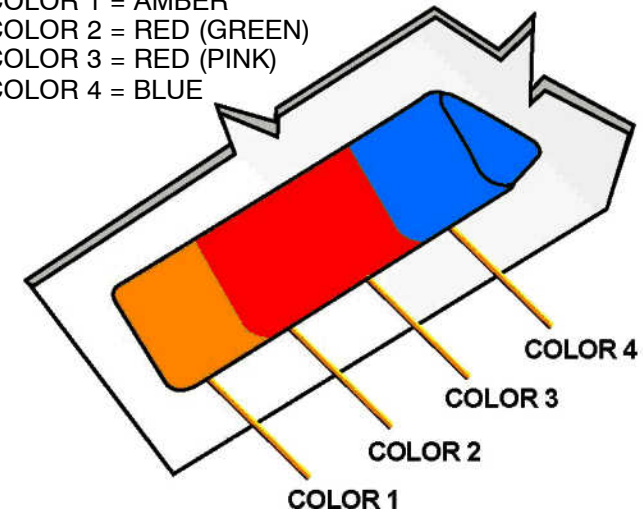
Attendant calls are accompanied by one low chime on the attendant loudspeakers.

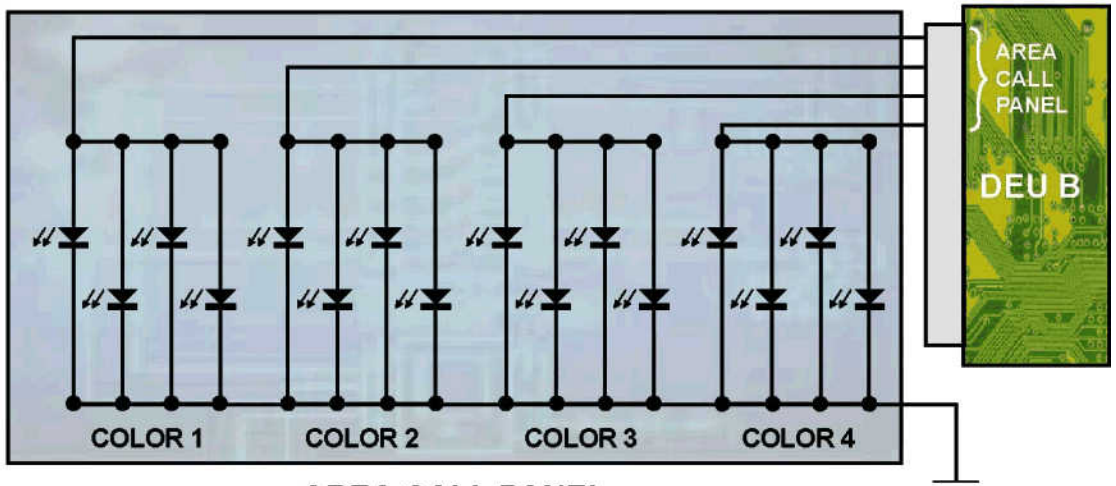


TYPICAL AFTER ATTENDANT STATION

AT DLH:
COLOR 1 = AMBER
COLOR 2 = RED (GREEN)
COLOR 3 = RED (PINK)
COLOR 4 = BLUE

ACP
STANDARD VERSION





AREA CALL PANEL

Figure 88 Area Call Panel

PASSENGER ADDRESS SYSTEM DESCRIPTION

PASSENGER ANNOUNCEMENT FROM COCKPIT

Handset

A handset is mounted on the cockpit center pedestal and contains a Push–To–Talk (PTT) switch. Pressing on the PTT switch keys the Passenger Address (PA) system, overriding lower priority PA sources and broadcasting the speech over all PA loudspeakers. A ”PA ALL IN USE” indication appears on all Attendant Indication Panels (AIPs).

The fastest way to make a passenger announcement from the cockpit is, to pick–up the handset, push the PTT switch and talk.

Handmike

To select an announcement using the handmike, the PA transmission key located on the Audio Control Panel (ACP) must be pressed and held. It comes on green and connects the microphone audio to the PA system. Then, pressing the PTT switch on the mic, keys the PA system with audio and broadcasts the speech through the cabin loudspeakers. To get the side tone and to control the volume, when using the headset, the PA reception knob must be pressed and released. It comes on white. A ”PA ALL IN USE” indication appears on all AIPs.

Boomset or Oxygen Mask

To make an announcement using the boomset or the oxygen mask, the PA transmission key must be pressed and held. It comes on green. To switch on the PA side tone, the PA reception knob must be pressed and released. It comes on white and controls the side tone volume.

A ”PA ALL IN USE” indication appears on all AIPs.

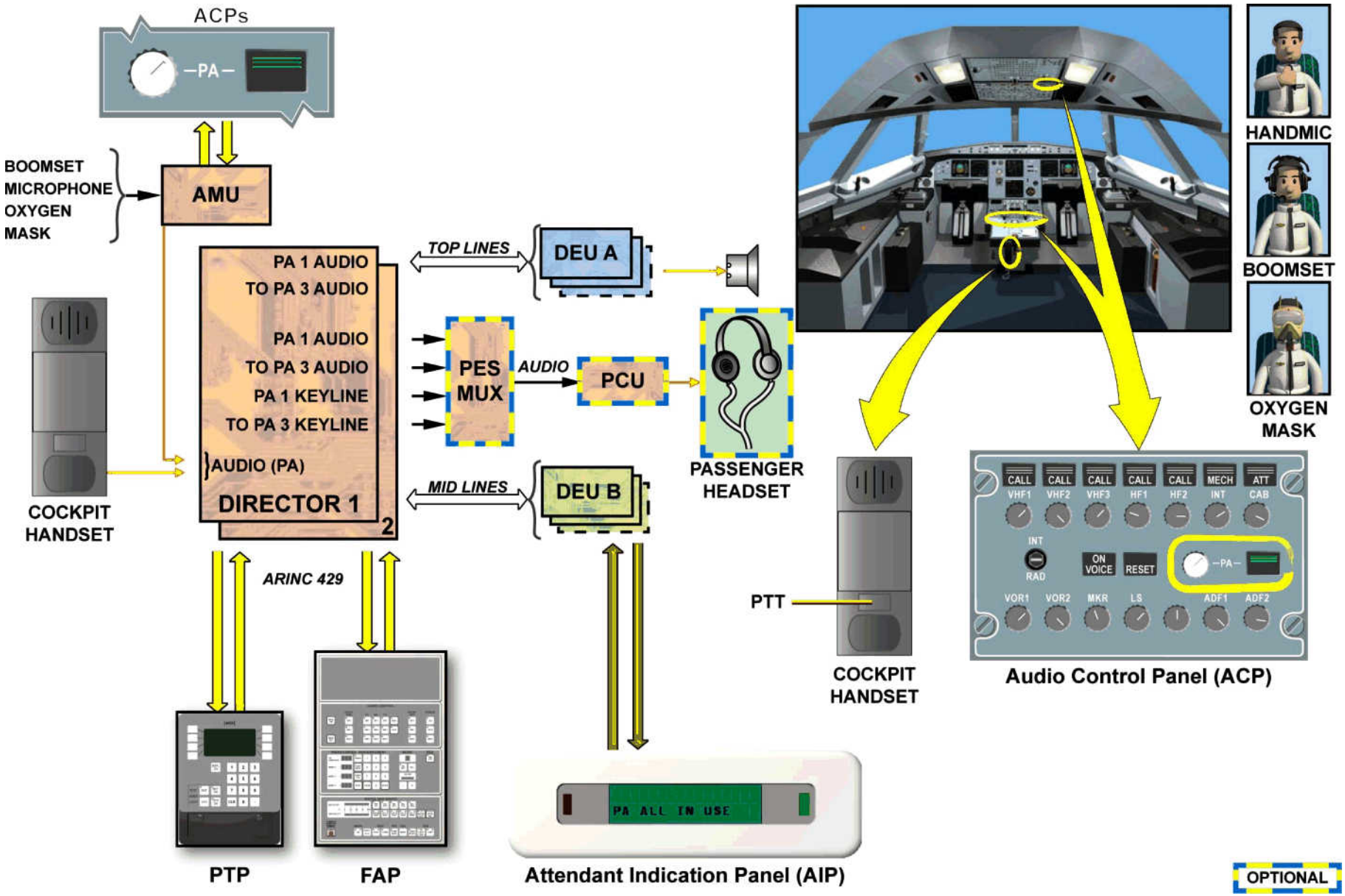


Figure 89 Passenger Announcement From Cockpit

PASSENGER ANNOUNCEMENT FROM CABIN

The cabin can be split into a maximum of three cabin zones, depending on the airline options. This information is stored in the Cabin Assignment Module (CAM). The director (DIR) uses it to identify the commands received from the cabin attendant handsets and to transmit the passenger announcements to the relevant cabin zone. An attendant handset is mounted at each attendant station.

An AIP is installed near each handset for display of PA–use information. When the handset is lifted, a dialing tone (440 Hz) is heard. The top line of the AIP displays a sharp ”#” symbol. When you press the PA ALL key, a confirmation message is displayed on the AIP. If the PA call is impossible due to the priority of a call already in progress, then the word ”BUSY” appears on the AIP display.

To press the keypad RESET key always clears any handset operation and lets you make a new key selection. The numbers of all selectable PA zones and the respective keypad keys, are stored in the CAM.

The CAM also contains a priority list which establishes if an announcement can be broadcast. Once a PA call is established, the respective ”PA IN USE” message is displayed on the bottom line of all AIPs. Cockpit ”PA IN USE” indicator, located on the calls panel is provided as an option. The PTT switch keys the PA system. Side tone audio is fed to the handset earpiece. When the PA announcement is over, you can disconnect the handset from the PA system as follows:

- put the handset into the cradle or,
- press the RESET button.

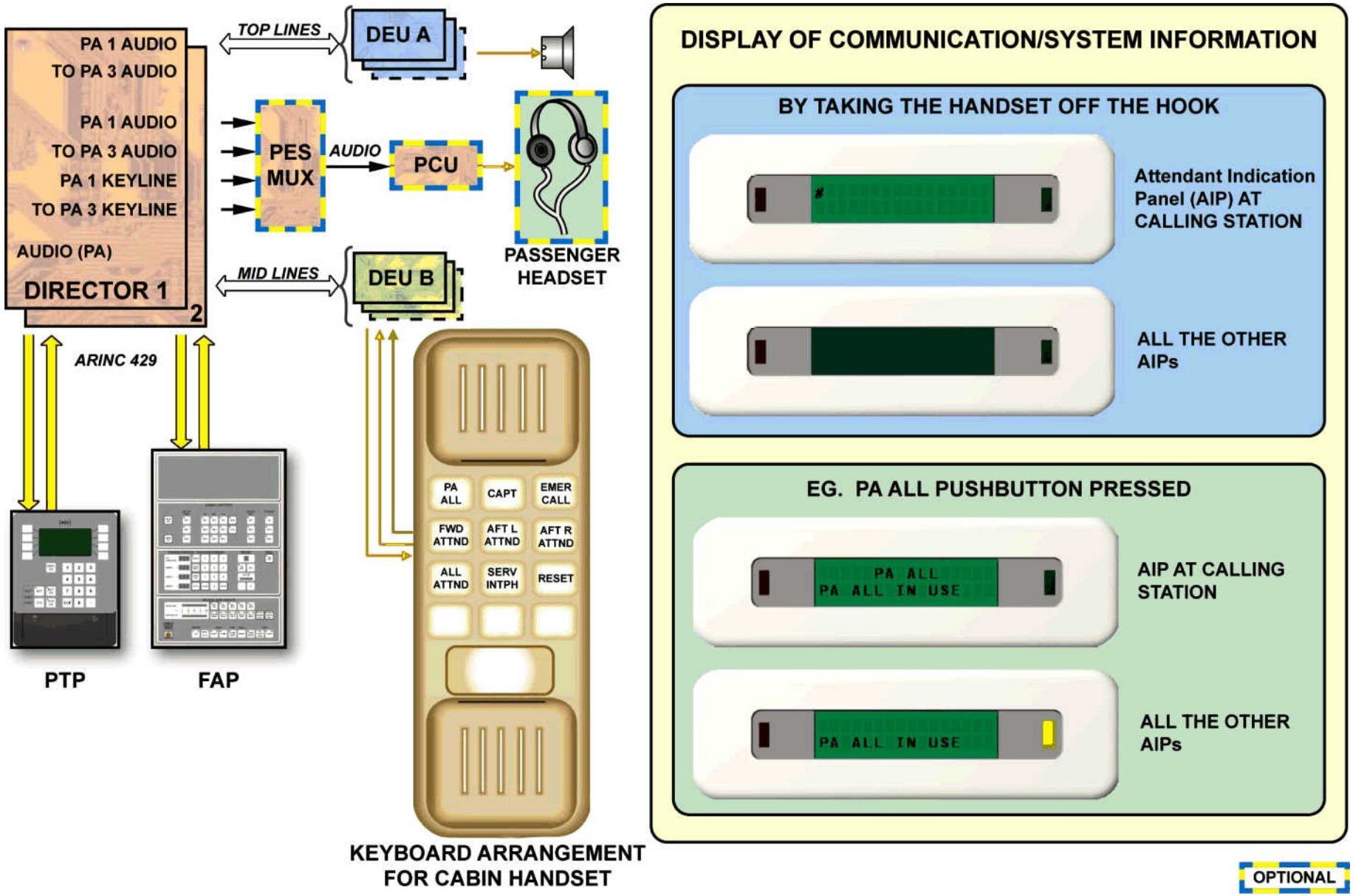


Figure 90 Passenger Announcement From Cabin

PASSENGER ADDRESS SYSTEM OPERATION

GENERAL

The CIDS directors accept audio signals from the various Passenger Address (PA) sources in the aircraft. The active DIR assigns priorities to each source. It transmits the signal in digital form via the four top–line data buses to the type A Decoder/Encoder Units (DEUs) and, optionally via the Passenger Entertainment System Main MUltipleXer (PESMMUX), to each Passenger Control Unit (PCU). The type A DEUs send the signal to the cabin loudspeakers for broadcasting. The announcements can be heard, at each passenger seat, with a headset.

SOURCES

A PA announcement can be manually initiated from the cockpit and from the cabin.

The announcement from the cockpit can be initiated with:

- The cockpit handset,
- Handmic,
- Boomset mic,
- Oxygen–mask mic in conjunction with the Audio Control Panels (ACPs),
- The NO SMOKING and SEAT BELTS switches set to ON (Chime only).

The announcement from the cabin can be initiated with:

- The attendant handsets,
- the Forward Attendant Panel (FAP): from which the prerecorded announcements, stored in the PRerecorded Announcement and Music (PRAM), can be selected and initiated, as the BoardinG Music (BGM),
- if a video system is installed, PA announcements can be initiated from the Video Control Unit (VCU) (optional).

A PA announcement can be automatically initiated from the PRAM when:

- the NO SMOKING and SEAT BELTS cockpit switches are set to AUTO and according to the airline definition,
- a cabin decompression occurs.

PRIORITY

The basic levels of priority are:

- 1st priority: Flight compartment (first ACP initiated, 2nd Handset initiated),
- 2nd priority: Cabin attendant stations,
- 3rd priority: Prerecorded announcement (if installed),
- 4th priority: Boarding music and/or entertainment system (if installed).

As an option the FWD attendant station could have the 2nd level of priority, in this case the other attendant stations will have the 3rd level of priority. The levels of priority and the defined options are programmed in the Cabin Assignment Module (CAM).

PA LEVEL

The volume of PA announcements can be automatically adjusted if several conditions are met. It is the active DIR which establishes the level according to the software, sending the level setting to each individual type A DEU. Then the type A DEUs do the required amplification. When an engine is running, the PA volume is increased automatically by + 6 dB. The PA volume is also increased by + 4 dB in the event of cabin depressurization. Depending on software, PA level may be adjustable via Programming and Test Panel (PTP) menu screens.

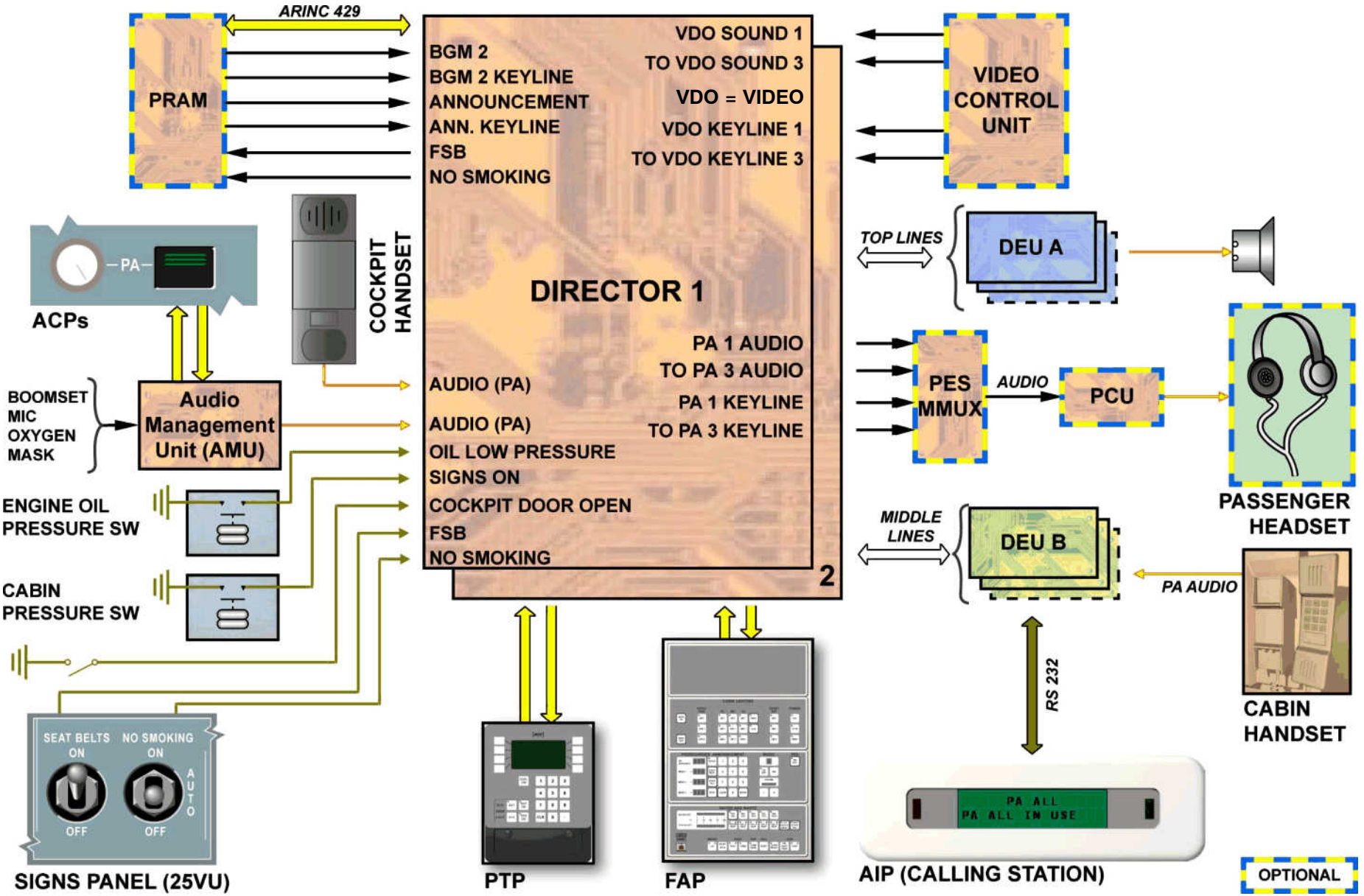


Figure 91 Passenger Address System Schematic

CABIN INTERPHONE SYSTEM OPERATION

GENERAL

The cabin and cockpit interphone system is used for the telephone communications between the ATTeNDant stations and, between the ATTND stations and the cockpit. A communication is always initiated by a dial procedure with the attendant handset or by pushbuttons on the CALLS panel in the cockpit.

SYSTEM DESCRIPTION

The CIDS director accepts audio signals from the various interphone sources in the aircraft and assigns priorities to each source. The DIR does telephone exchange switching and call functions from cockpit call switch settings or the attendant handset keypad entries. All this is done with reference to the parameters defined in the CAM. Chimes are transmitted via the top line data bus and the DEU A to PA loudspeakers. In the cockpit, the amber light (flashing) on the ATTendant transmission key on the audio control panel annunciate interphone calls, accompanied by a buzzer sounds. In the cabin, the area call panels and AIPs are used for annunciation.

PRIORITY

All communication modes are handled with respect to the predefined priorities listed below:

1. emergency call,
2. call from cockpit including an all call from cockpit,
3. all call from cabin station,
4. normal call from cabin station.

Additionally, all interphone sources have interrelated priorities, as assigned in the CAM. If more than one interphone source requests the same communication mode, the source with the higher priority will have preference. If they have the same priority, the interphone source which was dialed first will be given preference.

CALL FROM THE CABIN

Interphone communications are done with the attendant station handsets which are connected to the DEUs B. To initiate a call, take the handset off the hook and then select the pushbutton on the keyboard. When the communication link is established, all the visual indications in the cabin are reset when the cabin handset is taken off its hook. All ATTND stations in the cabin have a RESET key to reset the interphone function, and proceeds to a new dialing

CALL FROM THE COCKPIT

Calls from the cockpit are initiated from the CALLS panel which is connected to the DIRs. Connection of the cockpit to the cabin interphone system is done using the CABin key and knob on the audio control panels.

The call pushbuttons on the CALLS panel let the crew select the ATTND station. On the A321, the CALLS panel has two additional pushbuttons:

- the MIDdle pushbutton is used by the crew to select the middle station,
- the EXIT pushbutton is used by the crew to select the exit station.

ALL ATTENDANT CALL (CONFERENCE CALL/OPTIONAL)

The conference mode is used for the communication between more than two interphone sources.

When the ALL key is selected on the cockpit CALLS panel, all the called stations are switched to a common link to the calling station including cockpit.

When the ALL ATTND key on the cabin handset is selected, all the called stations are switched to a common link to the calling station except the cockpit.

EMERGENCY CALL

The EMERgency CALL pushbutton on the CALLS panel must be pressed in order to initiate an emergency call from the cockpit. This initiates a communication between the cockpit and all cabin stations on a common link.

The EMER CALL key on one of the cabin ATTND handsets must be pressed in order to initiate an emergency call from the cabin. The calling handset only calls the cockpit.

CALL INDICATIONS

When a call is initiated, visual indications are activated on the AIPs and area call panels, associated to the called station. High/low chimes are also broadcast in the assigned zones through the cabin loudspeakers.

In case of an emergency call activation, the EMER CALL light on the cockpit CALLS panel and the amber ATT light on the audio control panels are activated, a buzzer is also broadcast. The aural and visual cockpit indications are reset with the RESET key on the audio control panel.

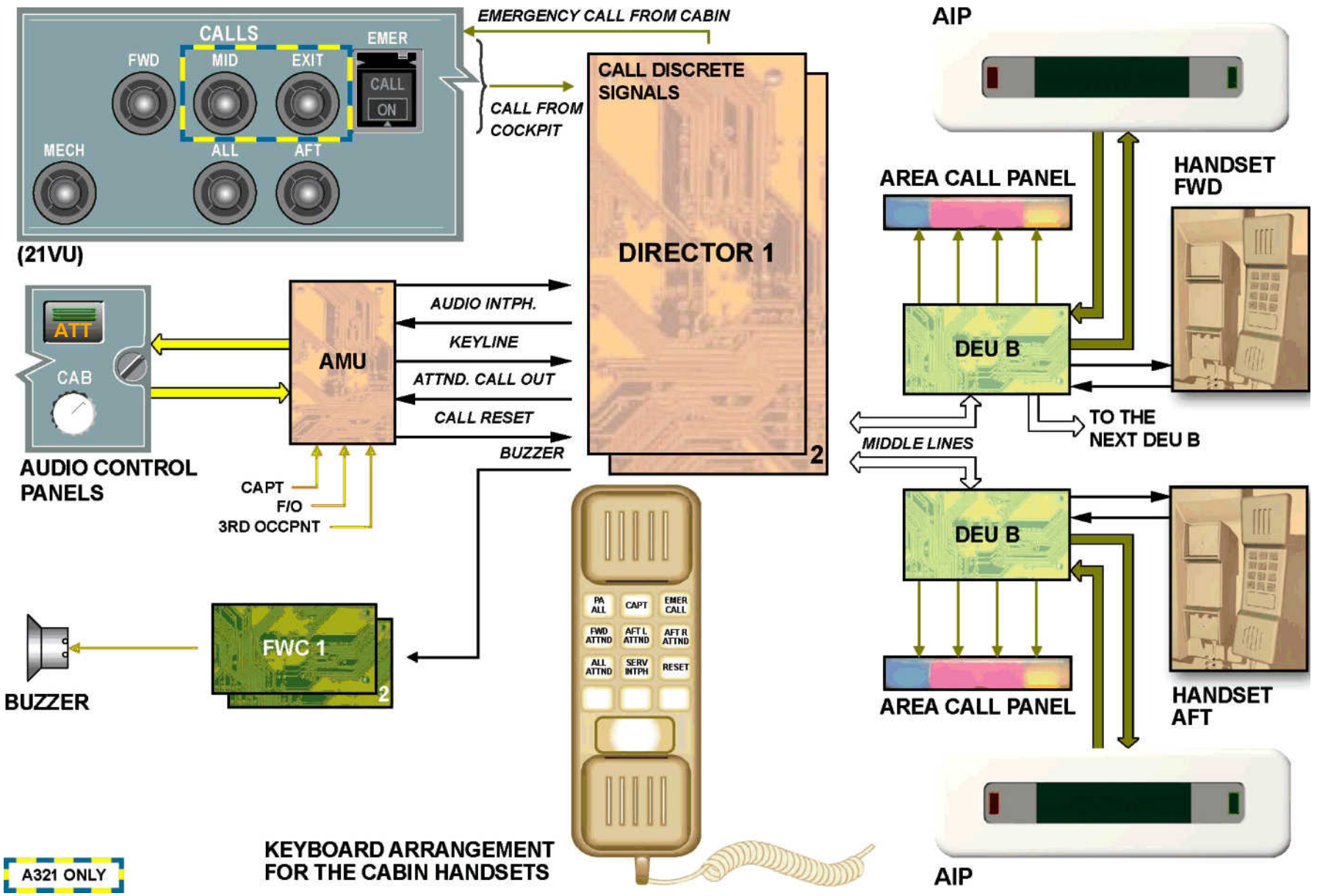


Figure 92 Cabin Interphone System & Calls

SERVICE INTERPHONE SYSTEM DESCRIPTION

GENERAL

The SerViCE INTerPHone SYStem is a voice communications system on the ground, between the flight crew and the ground service personnel.

A communication can also be made between the attendant stations and the dedicated jacks around or in the aircraft.

SYSTEM DESCRIPTION

The SVCE INTPH SYS is made of:

- eight interphone jacks,
- a SVCE INTerphone OVerRiDe switch, with an integral indicator light located on the maintenance panel in the cockpit,
- optionally five isolation units,

  If there is a short–circuit condition in a maintenance–interphone jack–socket, the isolation unit will keep the effects of the failure on the service interphone system to a minimum.

The audio lines from the cockpit, cabin and interphone jacks are routed to the amplifiers in both CIDS directors.

LGCIU And Service Interphone Override Conditions

The SVCE INTPH SYS is integrated in the CIDS directors. There are 2 modes to connect the jacks to the SVCE INTPH.

The automatic mode:

- On ground only, with the landing gear down and compressed or with the ground power connected the Landing Gear Control and Interface Units (LGCIUs) send a ground signal to the SVCE INTPH SYS, integrated in the directors. Refer to ASM 32–62–00 SCH01.

The manual mode:

- The SVCE INT OVRD pushbutton, on the maintenance panel, must be pressed. Then the white ON light comes on. The aircraft is on the ground with no signal from the LGCIUs (e.g: The LGCIUs are not supplied).

  When the SVCE INT OVRD pushbutton is pressed or when the aircraft is on jacks, a ground signal is sent to the directors.

Operation From the Cockpit

To establish a speech communication from the cockpit with the SVCE INTPH jacks, the CABin key and knob on any Audio Control Panel (ACP), must be pressed. The audio signals are transmitted to the jacks through the Audio Management Unit (AMU), the SVCE INTPH SYS, integrated in the CIDS directors and the audio lines.

Operation From a Cabin Station

To establish a speech communication from the cabin with the SVCE INTPH jacks, the SVCE key on the cabin attendant handset version 1 must be pressed. With cabin handsets version 2 the INTPH switch has to be pressed twice.

The message ”SERV INT” is displayed on the calling station Attendant Indication Panels (AIPs). On all other AIPs, the steady ”SERV INT IN USE” message appears. The audio signals are digitized through the type B Decoder/Encoder Units (DEUs) and transmitted through the middle data bus lines to the directors. After conversion to analog signals, they are transmitted to the jacks through audio lines.

NOTE: When the CAB and INT keys are pressed (respectively on the ACPs in the cockpit and on the handset in the cabin), speech communications can be established between the cockpit, the cabin stations and the jacks.

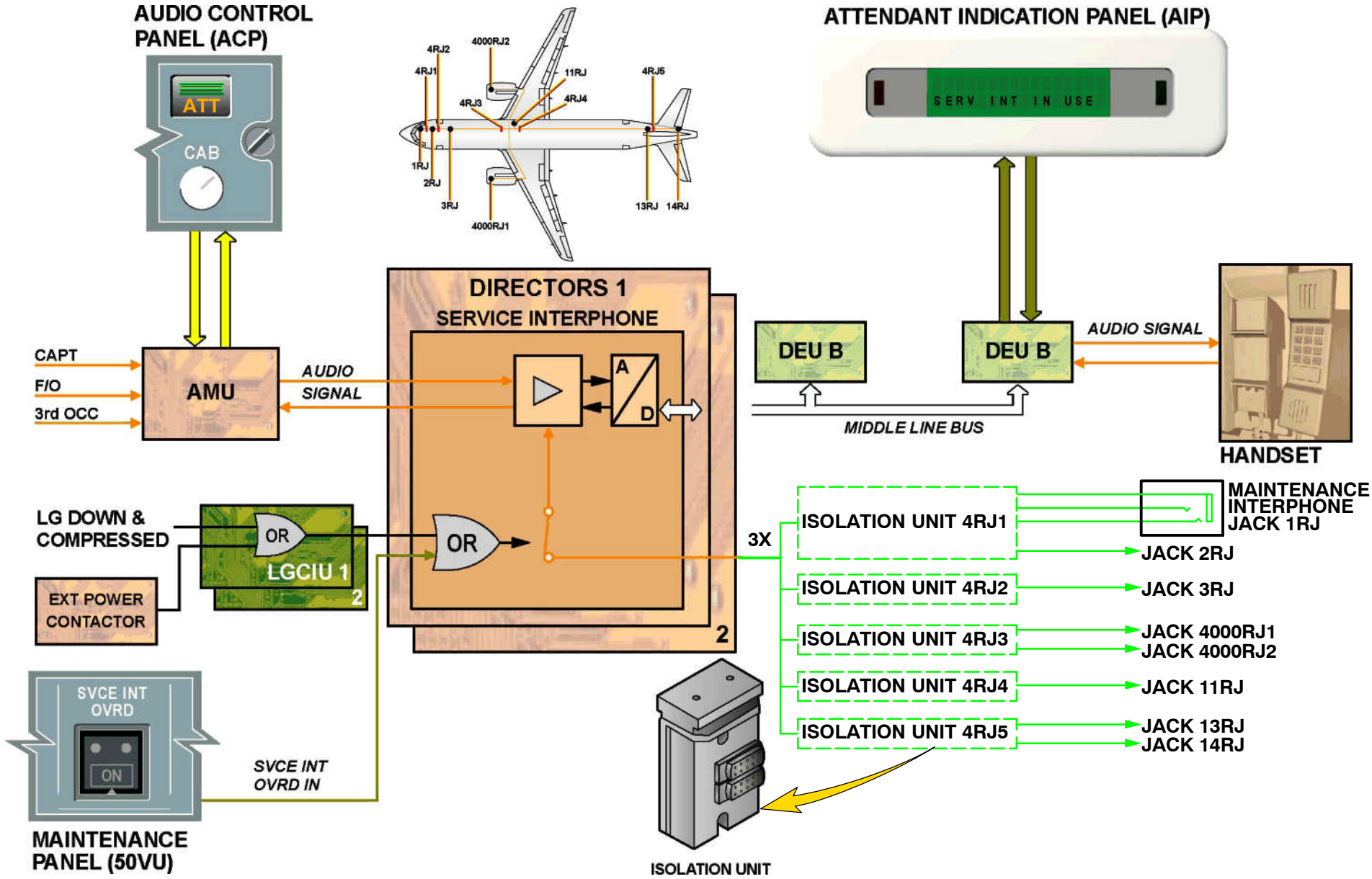


Figure 93 Service Interphone Schematic

PASSENGER LIGHTED SIGNS OPERATION

GENERAL

The state of input signals to the director control these signs:

- the NO SMOKING and FASTEN SEAT BELT lighted signs in the cabin,
- the RETURN TO SEAT signs in the lavatories,
- the EXIT signs.

No Smoking (NS) signs on is achieved by a 3–position switch (ON/AUTO/OFF) in the flight compartment for NS and EXIT signs in the passenger compartment. Fasten Seat Belt (FSB) and return to seat signs on is achieved by a 2–position switch (ON/OFF) in the flight compartment for FSB signs in the passenger compartment and the return to seat signs in the lavatories. A class divider will be installed in the cabin when more than one cabin zone is adopted.

NS AND EXIT SIGNS

Manual Mode

In manual mode, the 3–position switch installed in the flight compartment can be set in the ON/OFF position for activation/deactivation of the NS and EXIT signs.

Visual indication:

- the NS at the seat rows and the EXIT signs are switched on/off.

Aural indication:

- one low chime is broadcast via all passenger and all attendant (ATTND) loudspeakers when the signs are switched on/off.

Automatic Mode

For the automatic mode, the 3–position switch installed in the flight compartment has to be set in the AUTO position. When the landing gear is down and locked the NS and EXIT signs are switched on. The visual and aural indications are the same as in the manual mode.

FSB AND RETURN TO SEAT SIGNS

Manual Mode

The 2–position switch installed in the flight compartment can be set in the ON/OFF position for activation/deactivation of the FSB and return to seat signs.

Visual indication:

- the FSB signs at the seat rows and the return to seat signs at the lavatories are switched on/off.

Aural indication:

- One low chime is broadcast via all cabin and all ATTND loudspeakers when the signs are switched on/off.

Automatic Mode

There is no automatic mode.

EXCESSIVE ALTITUDE

In case of excessive altitude the FSB, return to seat, NS and the EXIT signs switch on automatically.

OPTIONS

The following options can be embodied upon customer request:

- flashing mode of passenger light signs,
- chime activation at signs ”ON” operation only,
- automatic FSB signs control at landing gear down and locked,
- automatic FSB signs control when slats and flaps are activated,
- automatic NS signs control when slats and flaps are activated,
- combined NS/seat row numbering signs.

Any of these options, once adopted, will be integrated in the CAM.

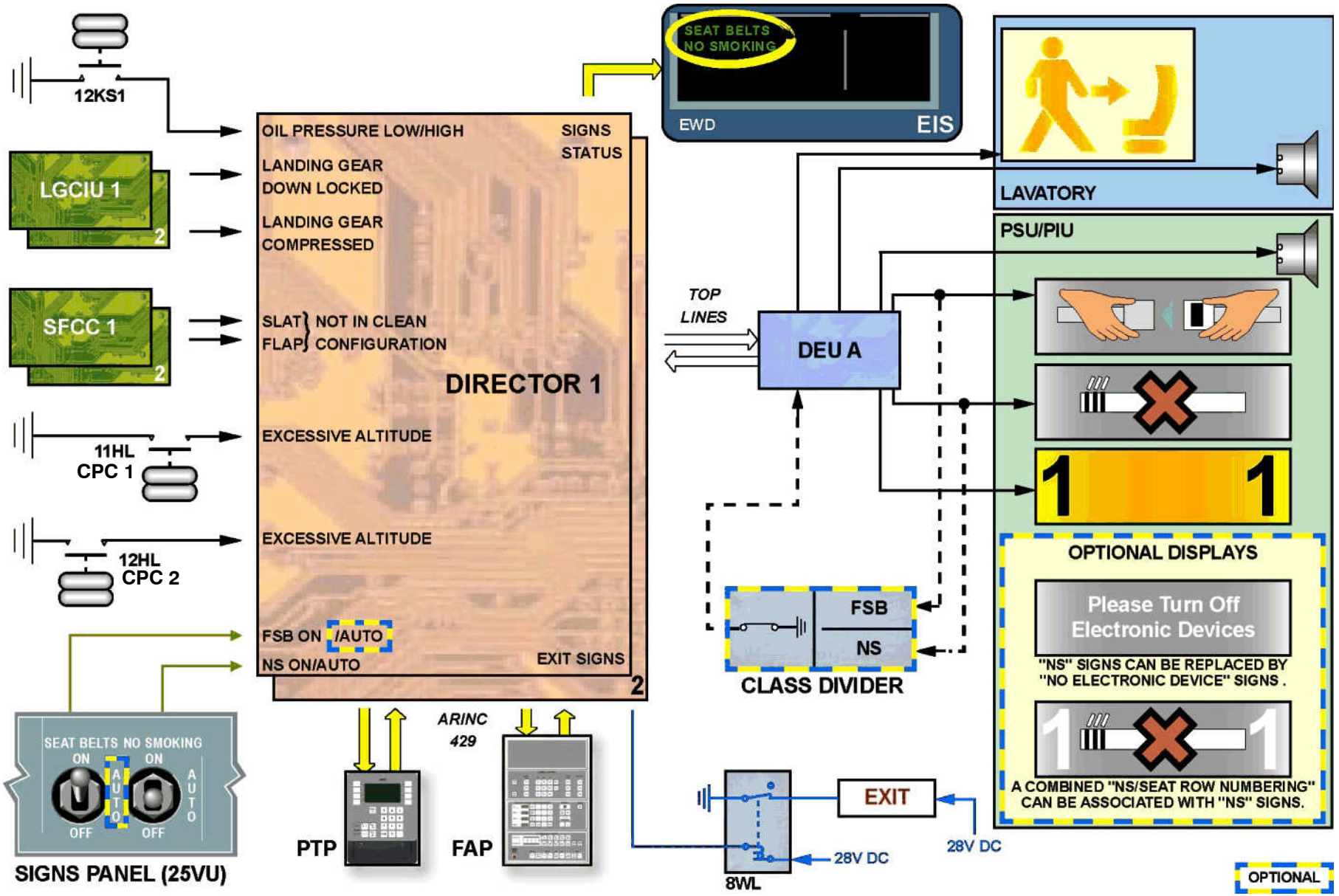


Figure 94 Passenger Lighted Signs

PASSENGER CALLS SYSTEM DESCRIPTION

DESCRIPTION

The equipment interface to the directors via DEUs type A as follows:

- one PAX call pushbutton and the seat row numbering light at each passenger seat row,
- one PAX call pushbutton with an integral lamp in each lavatory.

Each DEU type A can interface up to three PAX call pushbuttons and lights.

Each pushbutton and light is separately addressable. The CAM data assigns each pushbutton and light to a LH or RH cabin zone. First activation of a PAX or lavatory pushbutton activates a chime. The chime is digitally stored in the CIDS directors and sent to the DEUs A. Visual indications come on. A second activation of a PAX or lavatory pushbutton reset the visual indications.

CALL TO ATTENDANTS FROM PAX SEAT

When a passenger seat PAX call pushbutton is pressed:

- the associated call light seat row number with a L/H or R/H reference comes on or flashes (aircraft on ground and at least one passenger door open),
- a high 1 chime is broadcast over loudspeakers,
- the steady illumination of a blue light in the respective ACP (FWD or AFT, and RH or LH).
- the seat row number with a LH/RH reference is shown on the AIPs. The AIPs are related to the PAX call zones.

CALL TO ATTENDANTS FROM LAV

When a lavatory seat PAX call pushbutton is pressed:

- the call light integrated in the pushbutton comes on,
- a high 1 chime is broadcast over loudspeakers,
- the steady illumination of a amber light in the respective ACP (FWD or AFT, and RH or LH).
- the pink light on the related AIP comes on.the number and the location of the related lavatory is shown on the AIP.

The BITE status in the DEUs type A signals defective PAX call lamps to the director. Faults may be examined via the PTP.

CALL INDICATION IN THE CABIN

CALL	TONE	SPKR ATTND	SPKR-PAX	INDIV	AIP	ACP-ZONE ALL	ACP-LIGHT
PAX-Call	1x High	X	X	Resp. Pax row-Light	—	Z	Blue-steady L/H or R/H
PAX-Call LAV	1X High	X	X	LAV Call Light Amber steady	Pink	Z	Amber steady L/H & R/H
CAPT – ATTND	1X High/ Low	X	X	—	Pink	Z	Pink steady
CAPT – ALL	1X High/ Low	X	X	—	Pink	A	Pink steady
CAPT– EMER CALL	3X High/ Low	X	X	—	Pink	A	Pink flashing
ATTND - ATTND	1X High/ Low	X	—	—	Green	Z	Green steady
LAV Smoke	3X High	X	X	LAV Call Light Amber flashing	—	A	Amber flashing L/H & R/H
FSB NS	1X Low	X	X	FSB NS Signs	—	—	—

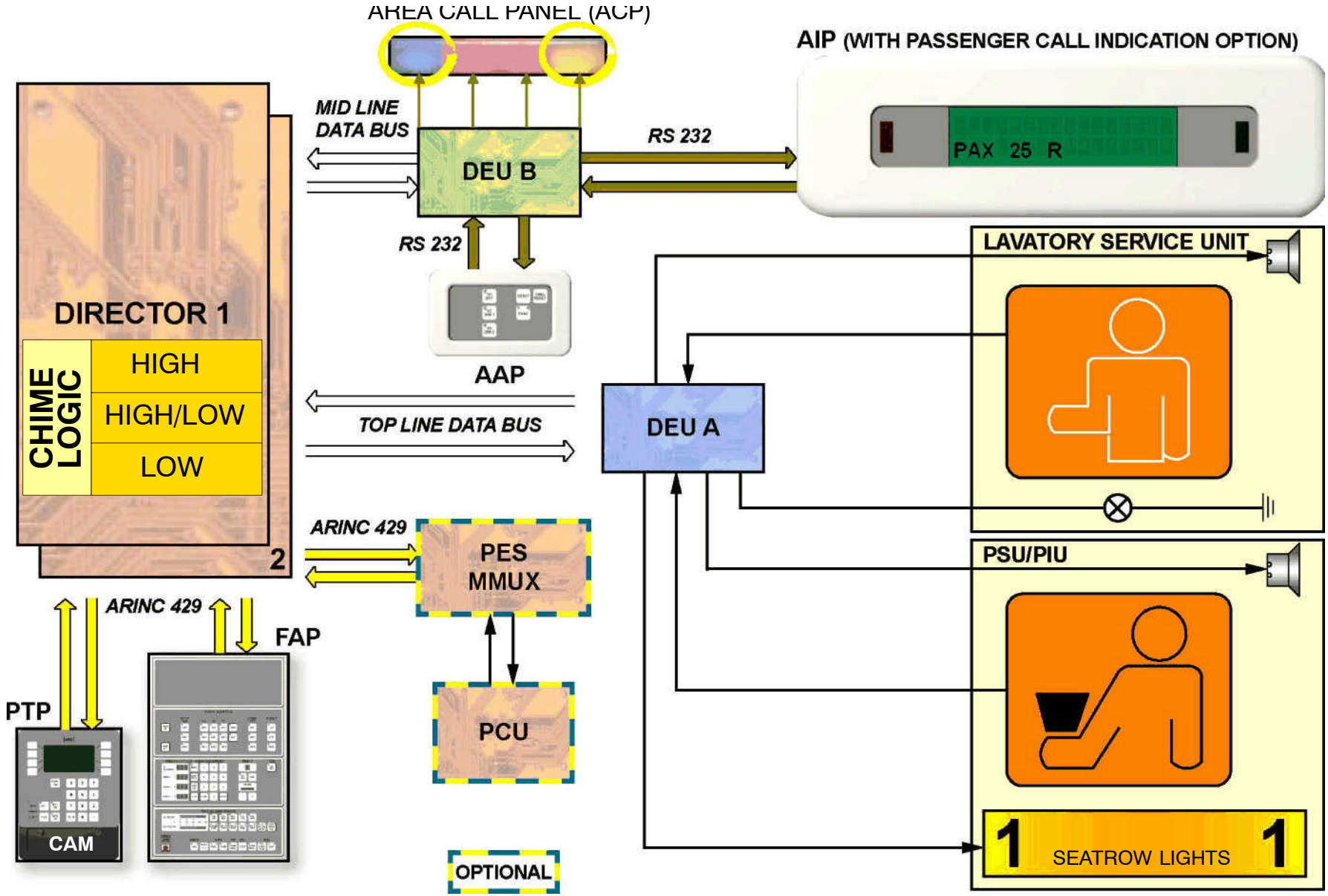


Figure 95 Passenger Calls Schematic

PROGRAMMING AND TEST PANEL PRESENTATION

PROGRAMMING AND TEST PANEL (PTP) GENERAL

The Programming and Test Panel (PTP) 110RH is installed in the rear wall of lavatory A.

It is located at the FWD attendant station, behind a hinged access door next to the installed FWD attendant panel. For correct CIDS operation, the Cabin Assignment Module (CAM) must be installed in the socket.

This is provided on the panel front face. The PTP enables the forward attendant and other personnel to extensively test and re–program the CIDS.

Functions

The functions of the Programming and Test Panel are as follow:

- to monitor the failure status of the CIDS and certain connected systems,
- to activate CIDS component tests and readout of the results,
- to examine in detail the fault data held in the director BITE memory,
- to program the CIDS properties and cabin layout information into the CIDS directors, which are copied from the CAM,
- to manually down–load the alternative CAM layout into the directors and cause this layout to be down–loaded automatically in subsequent CIDS start–ups.
- to onboard reprogram:
  - CAM data,
  - activation of the provisioned CIDS extra functions,
  - change cabin layout,
  - implement cabin zoning.
  - change cabin PA volume level (not at DLH).

Description

The PTP has an alphanumeric display with four rows of twenty characters. The display is used to present messages, test results and selection menus.

There are keys at each end of the display rows. They are labelled on the display with ”< “ or ” >“ characters.There is no power supply switch.

The Programming and Test Panel is automatically supplied if the DC service bus is supplied. The DISPL ON pushbutton is used to switch on the display.

The display is automatically switched off if the panel is not used for 10 minutes.

A keypad is provided for entry of numerical data.

The Programming and Test Panel contains two pushbuttons and two annunciator lights for testing the emergency light system.

The CAM defines all of the modifiable system properties and layout information for the CIDS. It contains four cabin layouts.

The CAM contains the cabin layouts 1, 2, 3 and M. In the basic configuration, only layout 1 is programmed to the airline request.

Only layout M can be modified via the PTP.

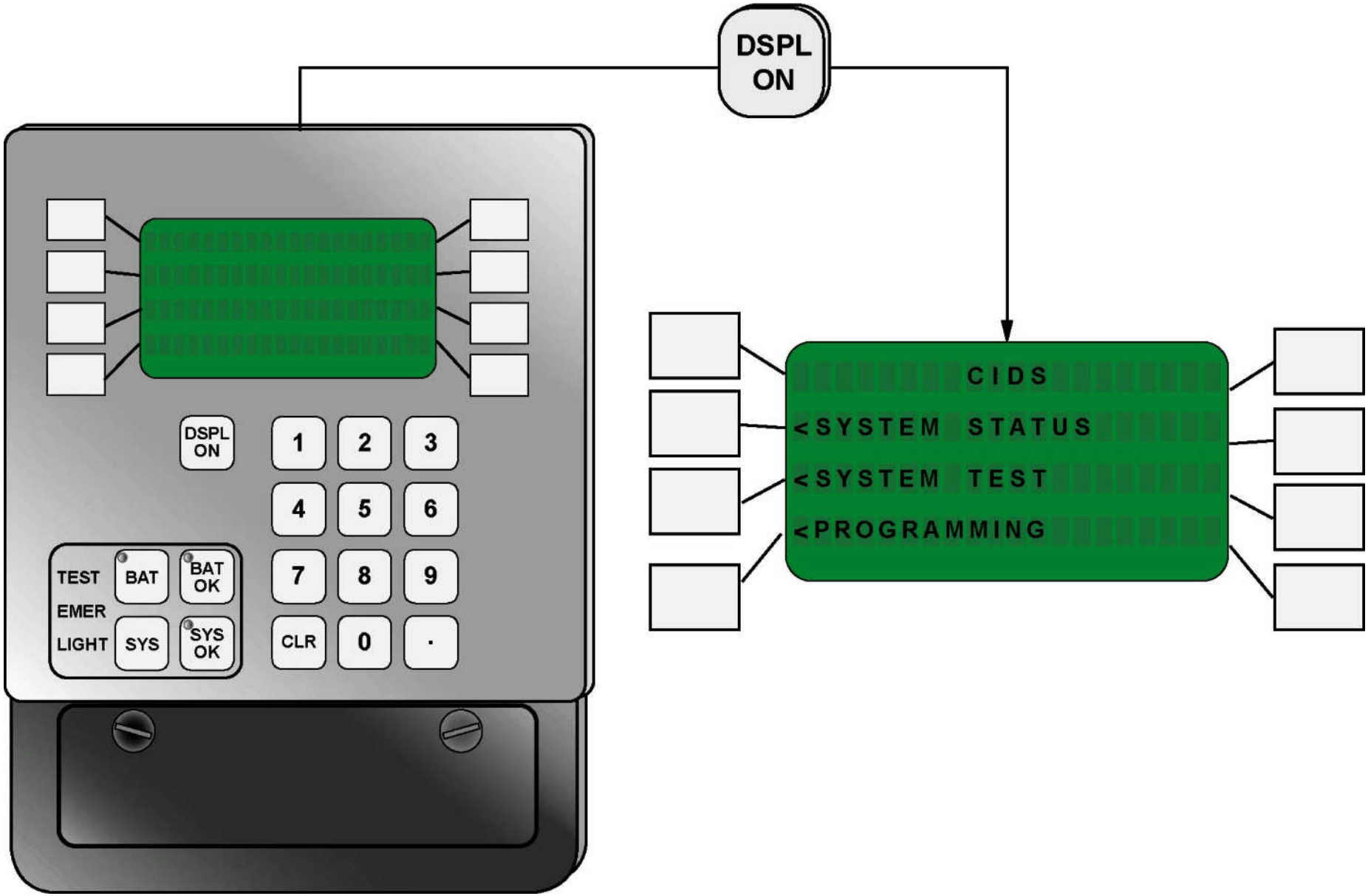


Figure 96 Programming and Test Panel (PTP)

PTP SYSTEM STATUS PRESENTATION

SYSTEM STATUS MENU

The SYSTEM STATUS function lets the current status of the CIDS be monitored. This includes the CIDS and the interfaces to other systems.

In case of no failure, the message is ”OK” E.g.: ”CIDS OK”. In case of failure, the message is indicated first. E.g.: ”SLIDE PRESS LOW”.

Selecting the membrane switch next to the failure message gives more details on the related failure. For maintenance/cabin crew support, the following systems functions are also monitored:

- lavatory smoke system,
- slide bottle pressure,
- doors bottle pressure,
- drain masts,
- doors closed/slides armed status.

NOTE: If an optional system/function is not requested by the customer, it will not be monitored or shown on the display.

MAINTENANCE

The MAINTENANCE page gives access to the same items as the Centralized Fault Display System (CFDS) SYSTEM REPORT/TEST concerning the CIDS:

- last leg report,
- previous legs report,
- Line Replaceable Unit (LRU) identification,
- fault data,
- class 3 faults,
- ground scan.

In flight, only the ”CURRENT LEG REPORT” item is displayed and available.

Last Leg Report

This display shows the LAST/CURRENT LEG REPORT, with the date and time of the failure occurrence, the ATA chapter and the name of the failed unit. It contains class 1+2 failures.

Previous Legs Report

This display shows the previous legs. It contains class 1+2 failures of the last 64 flight legs and includes the date, time and ATA chapter.

LRU Identification

The Part Number of the relevant unit is shown.

Fault Data

This display contains the same DATA as ”TROUBLE SHOOTING DATA” when using the MCDU with the CFDS. It shows:

- the date
- the leg number,
- the hour,
- the number of occurrences,
- a 6 digits code which gives a more precise failure identification.

For example, code 240A07 means DEU A 200RH07 discrete output or wiring connection pin J2–2.

Class 3 Faults

This display shows class 3 fault messages.

Ground Scan

The GROUND SCAN indicates all class 1 and 2 failures which are present on ground.

For the continuously monitored systems, the ground memory will be updated when the failure has been cancelled. For non–monitored systems, the update will occur after a DIR power–on or after a test activation via the PTP or MCDU.

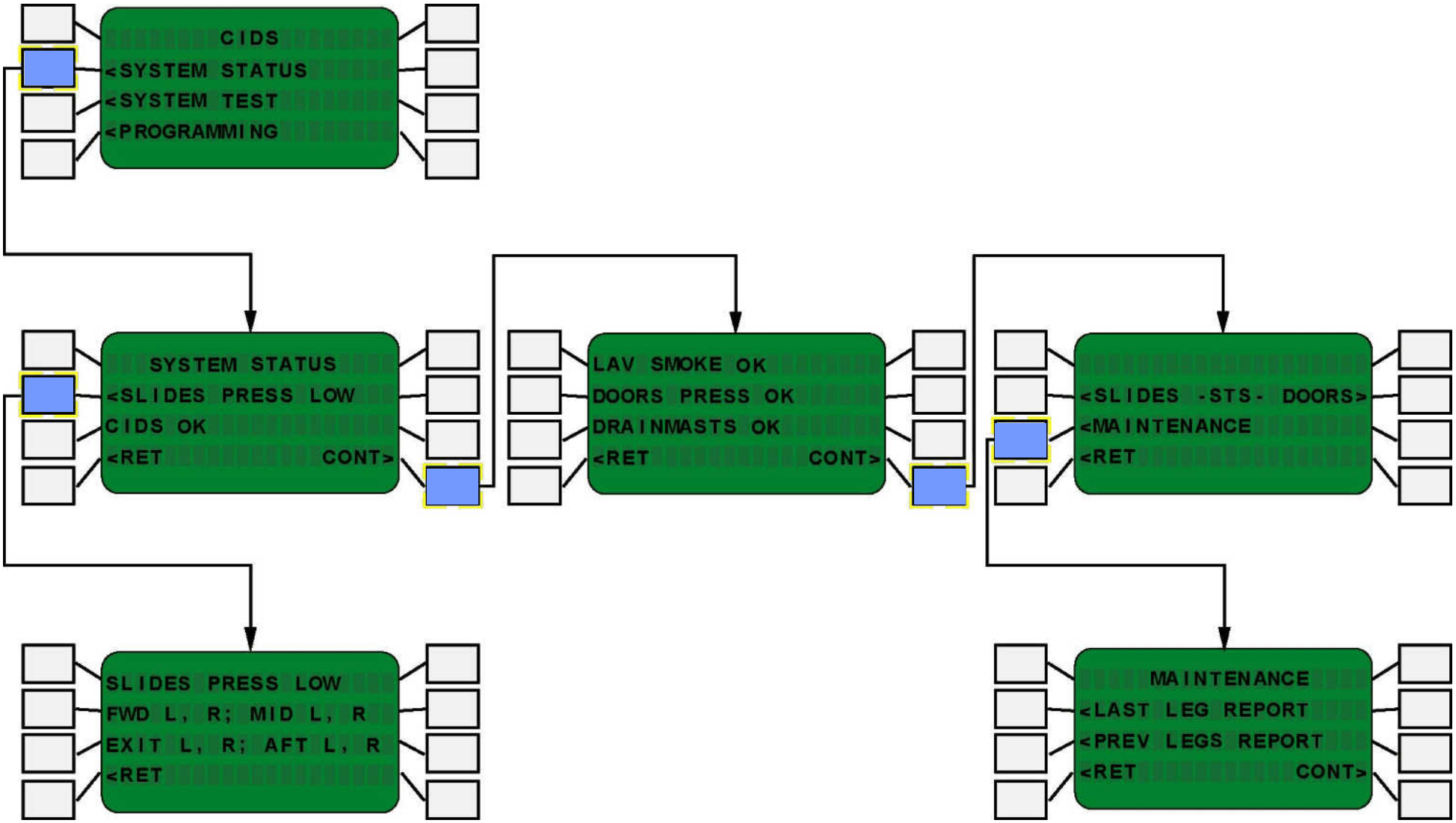


Figure 97 PTP System Status Menu

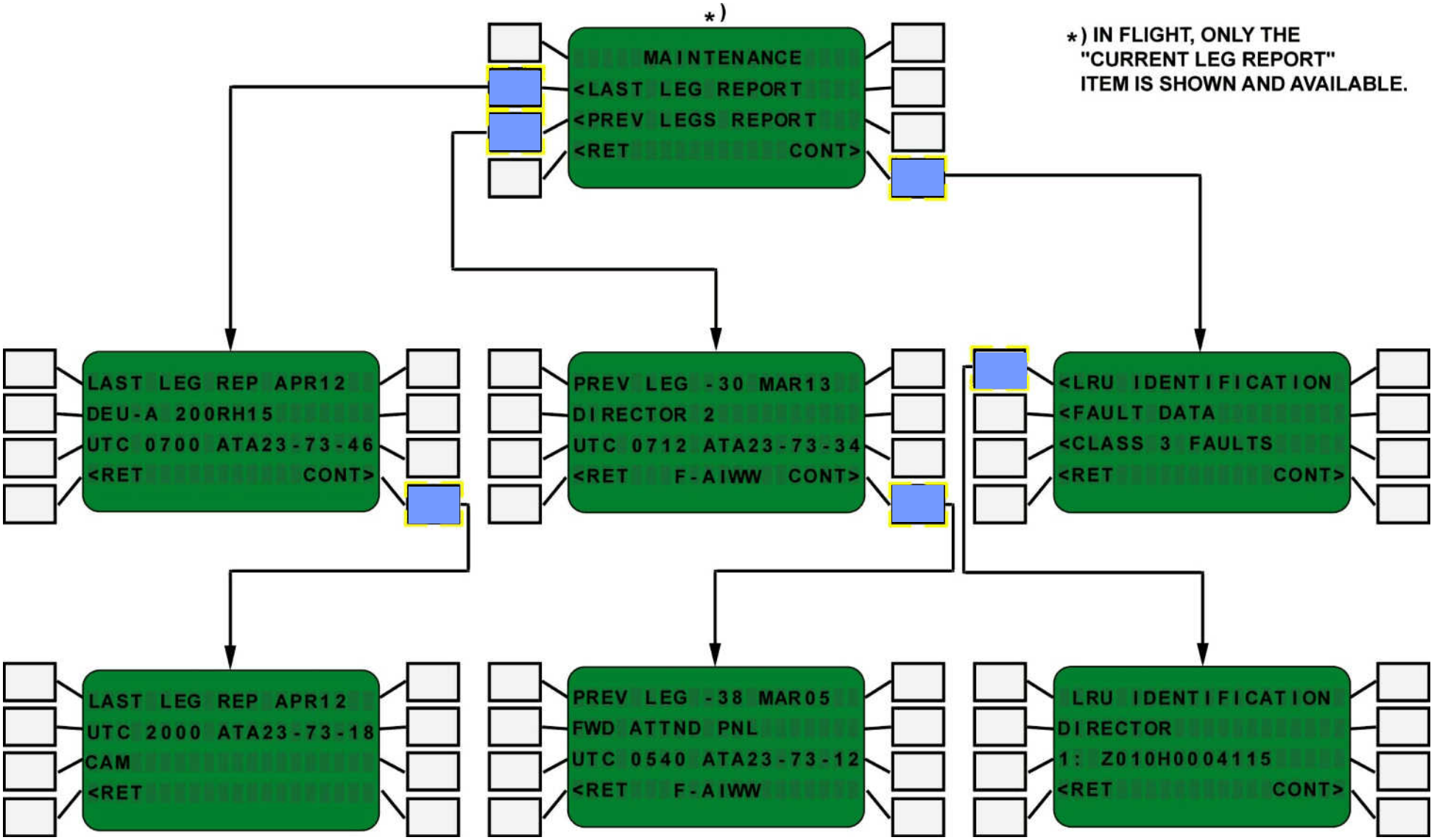


Figure 98 PTP System Status - Maintenance Menu (1)

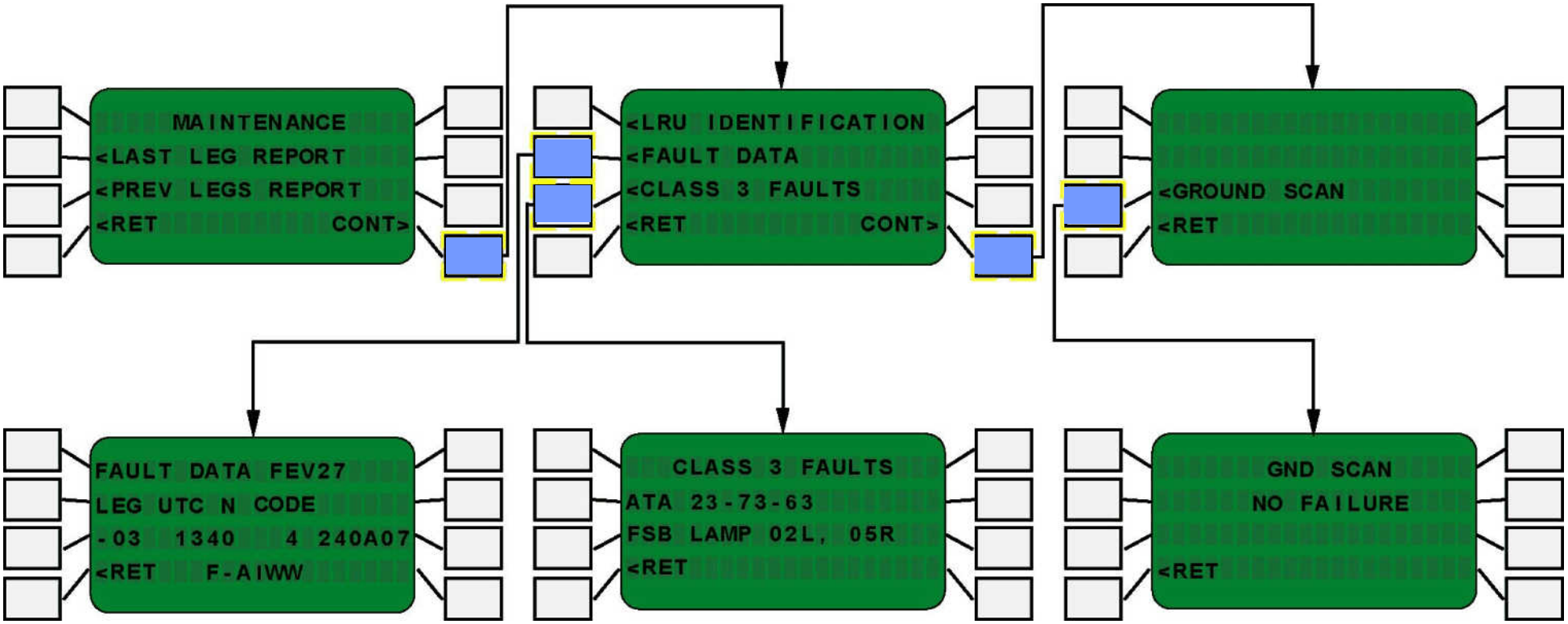


Figure 99 PTP System Status - Maintenance Menu (2)

PTP SYSTEM TEST PRESENTATION

SYSTEM TEST MENU

The SYSTEM TEST function is used for the test on ground only.

These devices are tested:

- Director 1 (the currently active director is marked, example DIR1 (ACT), the passive director can only be tested via the MCDU),
- Director 2 (see Director 1),
- CIDS BUS,
- DEUs A,
- DEUs B,
- Programming and Test Panel (membrane switches are not checked),
- CAM,
- FWD ATTND Panel (the pushbutton and membrane switches are not checked),
- Additional ATTND Panels (membrane switches are not checked),
- ATTND Indication Panels,
- Loudspeakers (only operational test),
- Sign Lamps (not applicable for LED NS/FSB signs),
- Passenger Call Lamps,
- Area Call Panels (only operational test),
- VIDEO (if installed),
- Reading/Work Lights,
- emergency light battery (not possible via MCDU),
- drain masts (not possible via MCDU).

NOTE: Test of the passive director 2 is only available via the MCDU. (ACT) indicates that director 1 is active.

The RESET function (not possible via MCDU) initiates a CIDS power on reset including the complete power on test. The complete power on test is only done if there is at least one cabin door open. If there is a failure, it can be read using the automatically displayed SYSTEM STATUS/MAINTENANCE mode on the PTP.

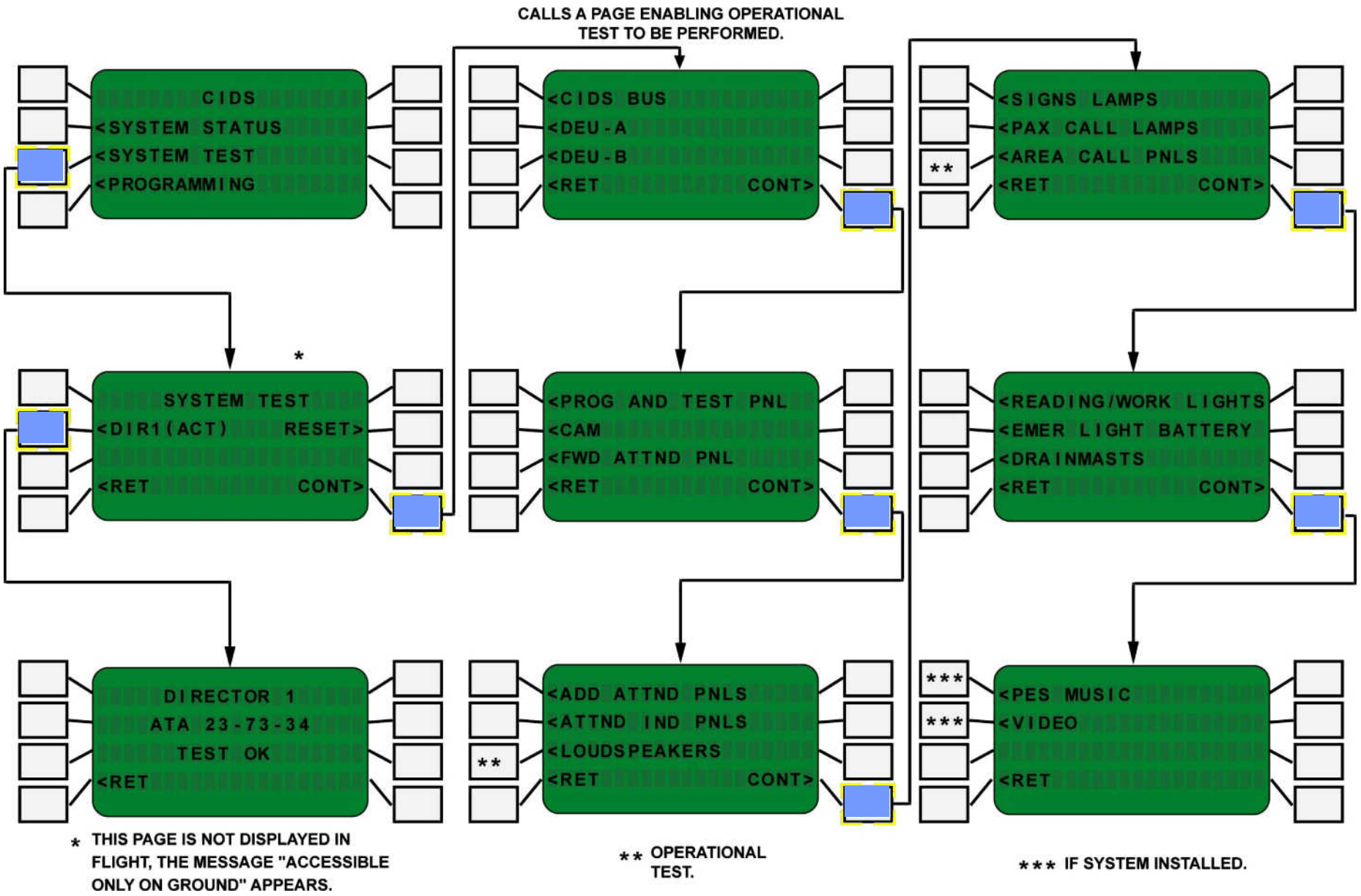


Figure 100 PTP System Test Menu

PTP PROGRAMMING FUNCTIONAL OPERATION

GENERAL

The programming mode is one of the main modes. It is divided into:

- the zoning (needs no access code),
- the cabin programming

  (needs a 3 digit access code, A/C delivered with access code 333).

The programming function is used to change the ZONING or to make a CABIN PROGRAMMING. For the ZONING mode, no access code is required. But for the CABIN PROGRAMMING mode, an access code is required. The ZONING function is used for the selection of the number of zones inside the cabin as well as the various No Smoking (NS) areas and the class divider. The class divider is a device which separates the cabin zones. Each cabin zone begins with a NS zone.

Cabin Zones

For CABIN ZONES programming, the end seat–row number of each zone has to be entered. The specific functions will then be automatically adapted. The NS zones begin in accordance with the respective cabin zones. The NS signs in these zones come on steady.

Here are three asymmetrical cabin zones. The FWD zone ends at seat–row 03 Right/04 Left, the MIDdle zone ends at seat row 14R/16L and the AFT zone starts at seat row 15R/17L. In case of symmetrical cabin zones the numbers will appear only in the right hand positions of the menu without left hand or right hand separations.

NOTE: Symmetrical or asymmetrical cabin zones are customer options.

To increase the FWD zone by 3 seat rows on the right section select 06 for the end of the FWD zone. The FWD zone ends now at seatrow 06R/04L and the MID zone starts at seat row 07R/05L. If a change was made, the flashing message ”PARAMETER SAVING” appears.

With the message ”PARAMETER SAVED” the saving of the new configuration to layout M (Modifiable) and into the director (DIR) is completed. The MODIFICATION counter is incremented and displayed (Here M = 019).

Class Divider (DIV)

There can be passive class dividers without sign lamps or active with sign lamps. The CLASS DIVIDER programming is used for BITE related current sensing. In case of cabin reprogramming, the class divider should be moved manually.

CAM LAYOUT SELECTION

The CABIN PROGRAMMING function is protected by an access code. Note that each code digit is marked by a * sign. The Cabin Assignment Module (CAM) LAYOUT SELECTION function is used for the selection of a new CAM layout. When activating the Cabin Intercommunication Data System (CIDS), the last selected layout is loaded from the CAM into the DIR memory. The programmed layouts are marked with a ”<” or ”>” sign. The number of the last selected layout flashes. A new layout can be selected by pressing the related labeled key. Then this number flashes and the layout is downloaded into the DIR. The CIDS system will then be completely updated. The CAM shown here includes three fixed layouts 1, 2 and 3 (a maximum of 3 fixed layouts can be programmed) and the modifiable layout M. If layout 1, 2 or 3 are loaded and modified, they are saved into layout M. The key M should be pressed in order to load the layout M. If no CAM is available, the last downloaded layout is maintained in the DIR. If no CAM is available and the last downloaded layout is defective, the CIDS works with its own layout. In these cases, the failure message ”CIDS FAIL” appears on the SYSTEM STATUS page.

Steps To Modify a Selected Cabin Layout

Load the desired layout 1, 2, 3 or M into DIR: Layout 2 is shown as example. Select ”ZONING” on the PTP:

- by programming steps, the layout data (cabin zones, no–smoker zones, class divider) is modified in the memory of the DIR (in the RAM),
- after completing the programming, press ”RETurn” on the PTP, PTP displays ”PARAMETER SAVING”,

  this stores the modified data in the CAM, layout ”M” and in the memory of the DIR: Electrical Erasable Programmable Read Only Memory (EEPROM),
- reselection of layouts 1 – 2 – 3 is possible, but ”M” holds the modified ”2” version, until a new programming is made.

NOTE: If ”RET” is NOT pressed, the system will operate with the modified data, until a power interruption causes a restart of the system. In this case the modified data will be lost and the old layout ”2” will again control the function of the CIDS.

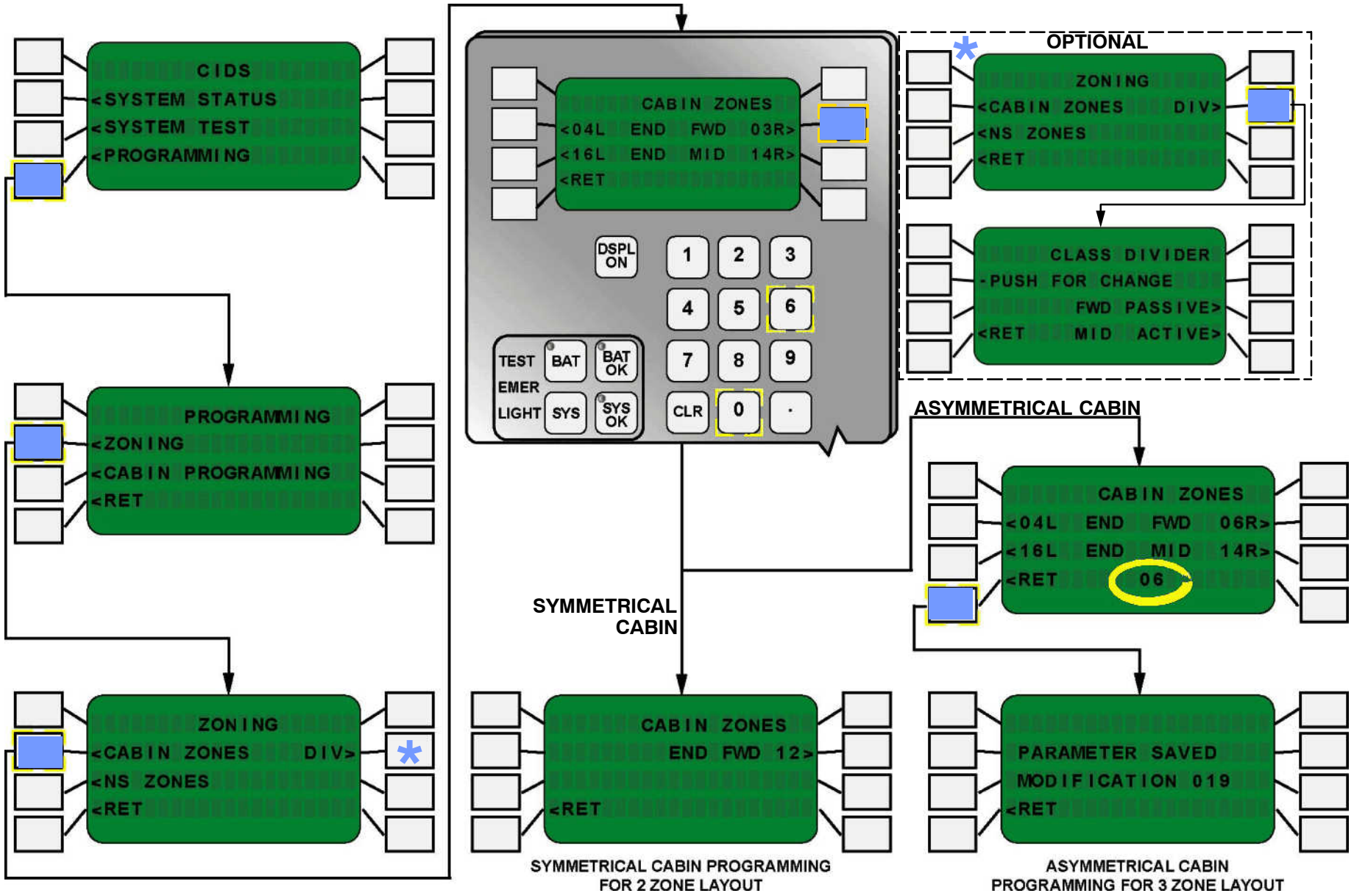


Figure 101 PTP Programming - Cabin Zones Menu

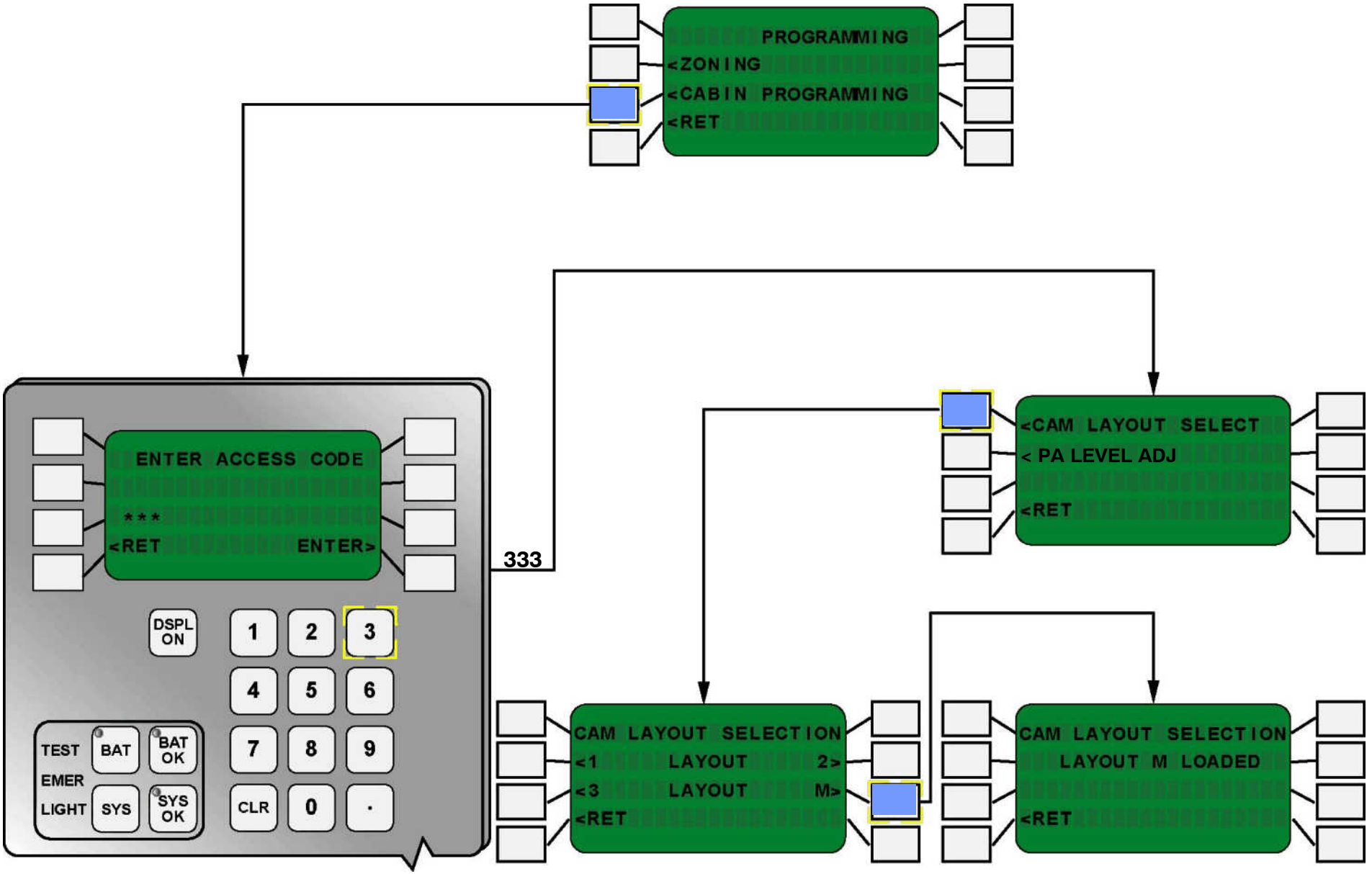


Figure 102 PTP Programming - Cabin Programming Menu

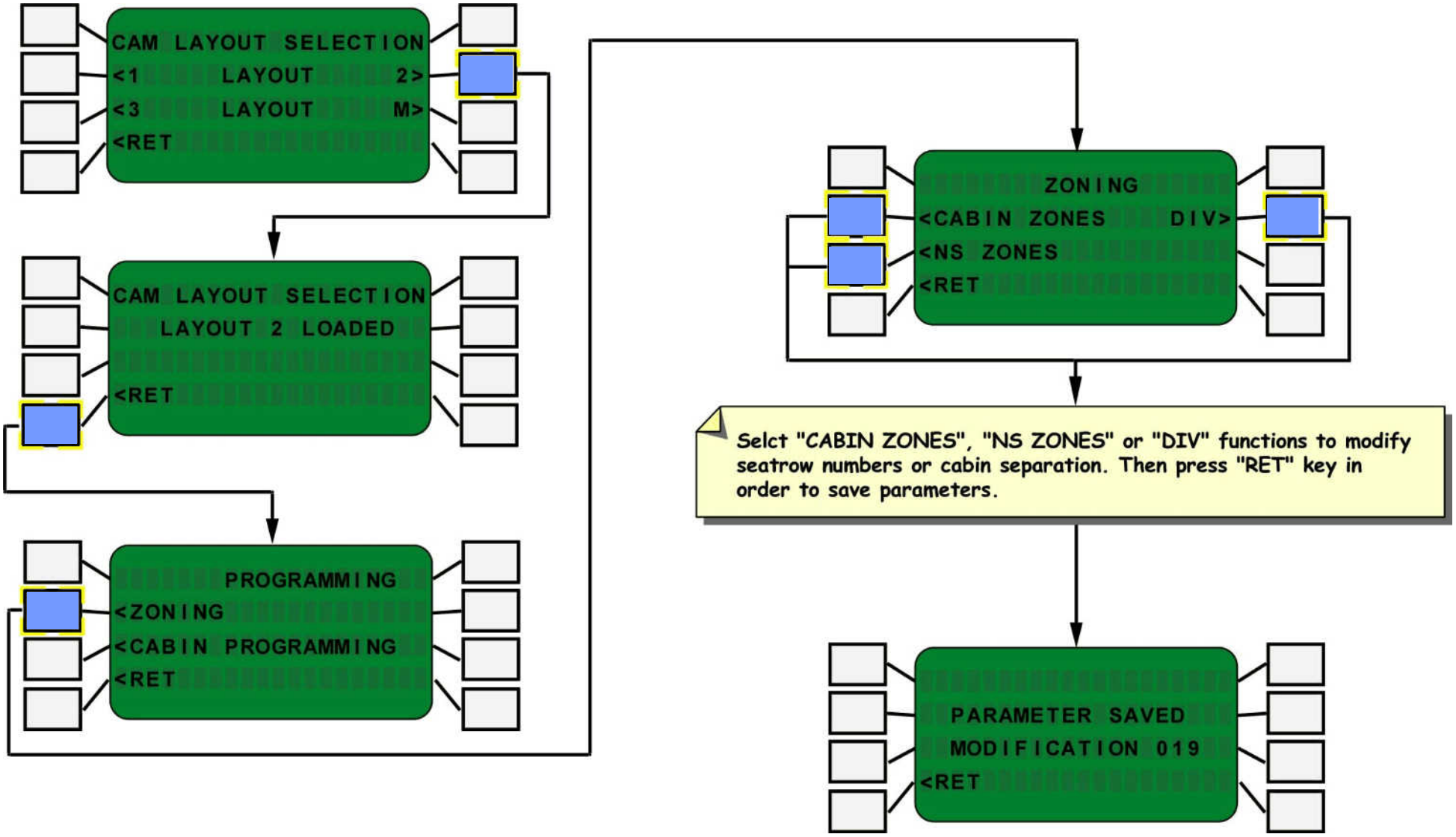


Figure 103 PTP Programming - CAM Layout Menu

PA LEVEL ADJUSTMENT (NOT ON DLH A/C)

When you enter the 6 digit access code (level 2) the PA LEVEL ADJ item appears additionally on the display.

The following menus allow to adjust the basic loudness levels for 3 cabin segments and for the separat attendant areas. These segments/areas are fixed and independent of the cabin zones. The definition is laid down in the CAM.

Additionally the 'automatic increase' levels for the cases 'engines running (flight)' and 'cabin depressurization (emergency)' can be adjusted.

The acoustic loudness in the cabin for these auto increase cases is always according to the basic loudness level plus the auto increase level.

After selection of a segment/area/auto increase case at the right side of the respective menu, the related currently active loudness value is flashing. It can be adjusted in +/– 2 dB steps by pushing the related +/– key at the left side of the menu. The respective loudness level in the cabin is updated immediately (for the auto increase cases only if the cases are currently activ).

The following table shows the default values and the possible range:

	DEFAULT	FROM	TO
SEGMENTS/ AREAS	0 dB	-6 dB	+4 dB
ENGINES RUNNING	+6 dB	+4 dB	+8 dB
CABIN DECOMPRESS.	+4 dB	+4 dB	+6 dB

If the max. or the min. limit of the range is reached, the respective prombt '<' in front of the '+' or '–' disappears. A further pushing shows no reaction. For each page a 'RES' (reset) function is selectable. If a segment/area/auto increase case has been selected this flashing value becomes the default value after pushing the 'RES'.

If non has been selected before pushing the 'RES' (no flashing), all values of the page become default values.

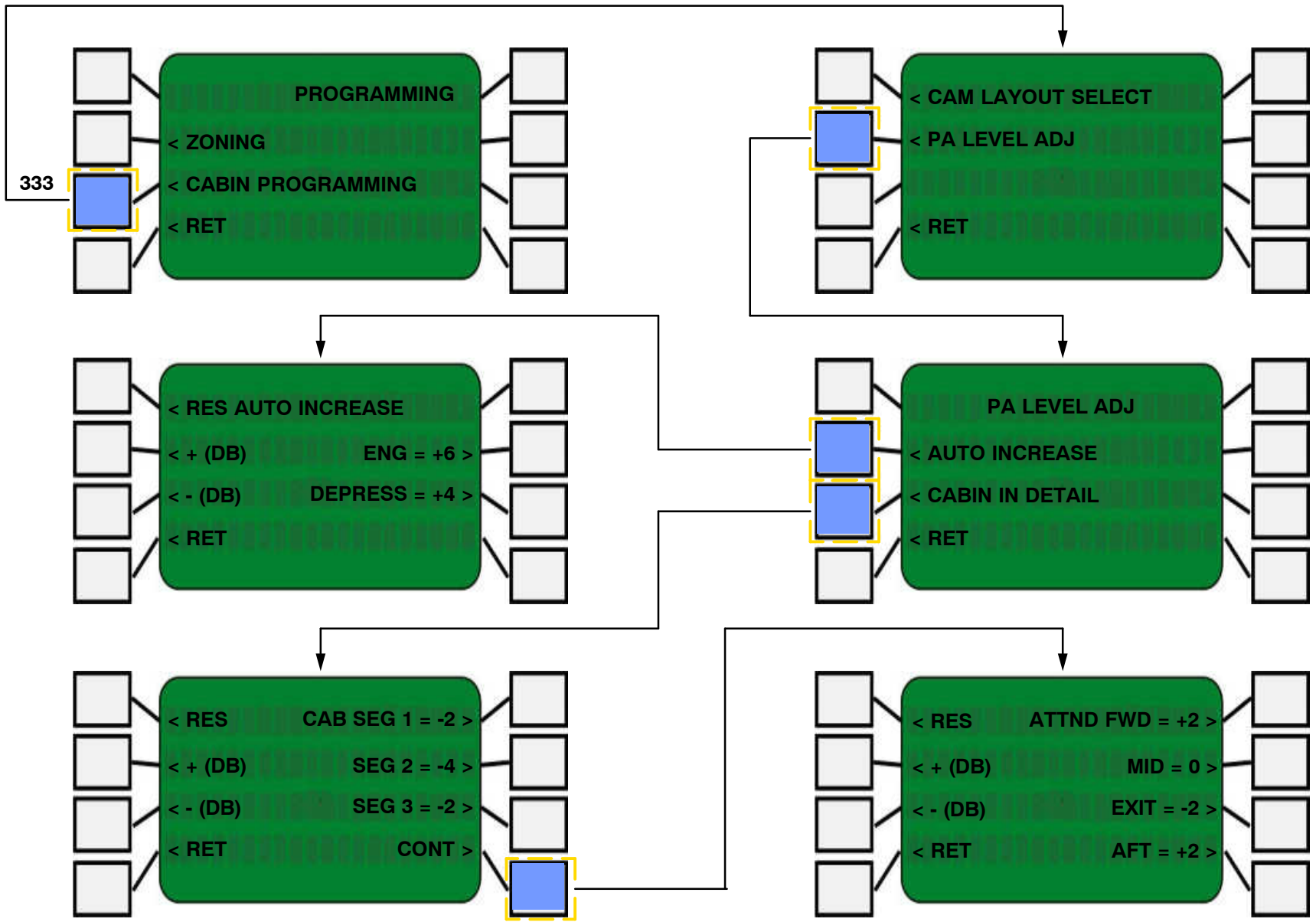


Figure 104 PTP Programming - PA Level Adjustment Menu (Not at DLH)

CIDS FAILURE DETECTION AND TRANSMISSION OPERATION

GENERAL

There are 3 types of test available in the CIDS for failure detection:

- the power on test (activated after every power connection to the CIDS),
- the continuous test (automatic periodical system test),
- the manually activated test (via PTP, CFDS ...).

The status is transmitted to the CFDS (via ARINC 429) and ECAM (via discret outputs to the SDAC). The failure indication is possible on:

- the FAP (CIDS caution light),
- the PTP,
- the CFDS/MCDU display,
- the ECAM displays.

In flight, it is possible to reset the illuminated caution light on the FAP. After landing, if the failure still exists, the light comes on again and the SYSTEM STATUS mode is displayed.

The failures are divided into 4 failure classes, 1, 1CAB (cabin), 2 and 3.

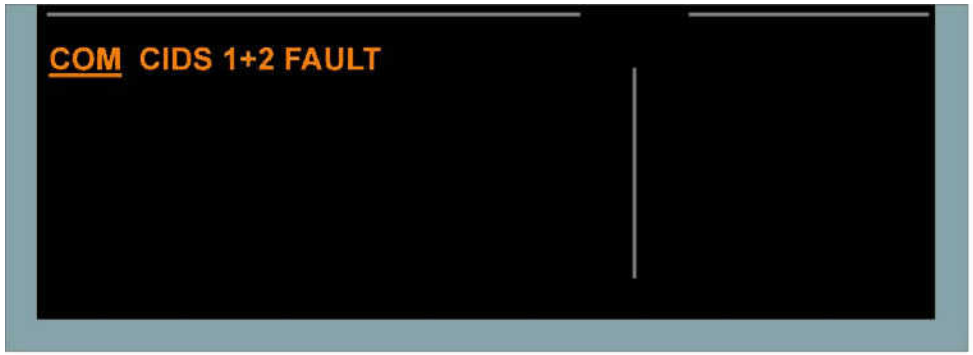
CIDS CLASS 1 FAULT

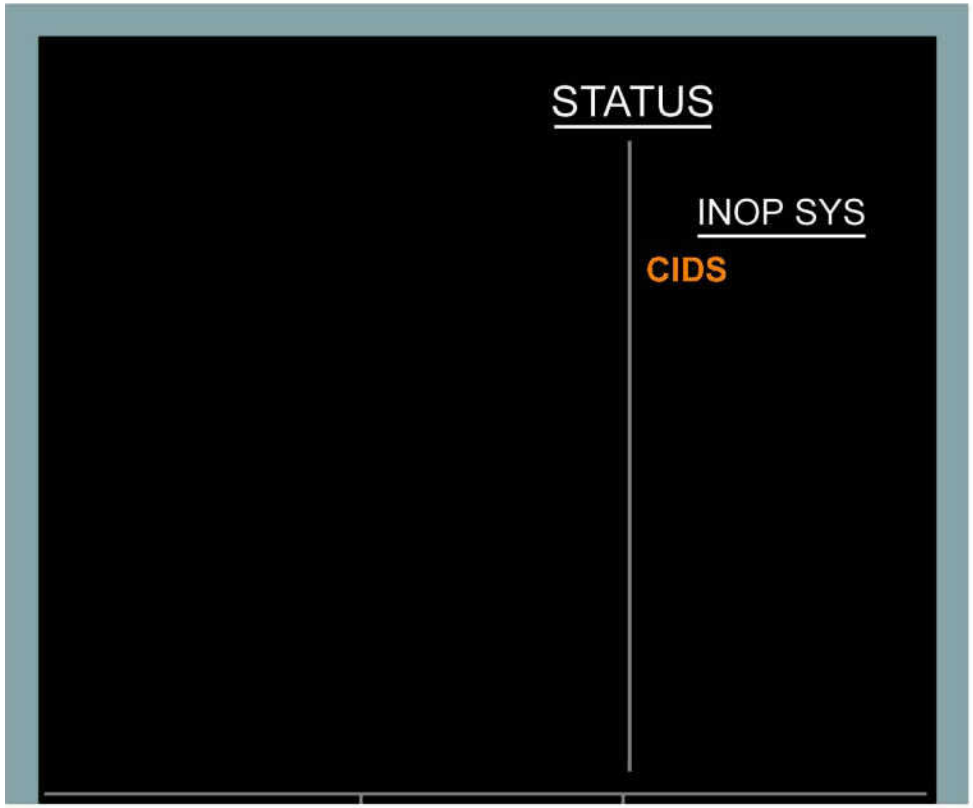
If a failure of:

- both directors,
- 50% of all type A Decoder/Encoder Units (DEUs),
- 20% of adjacent type A DEUs zone wise,
- all type B DEUs with connected handset,

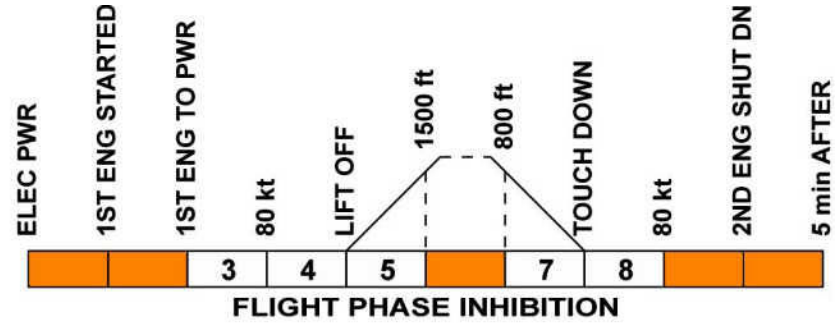
happens, the single chime sounds, the ECAM MASTER CAUT comes on in the cockpit and the CIDS CAUT light comes on, on the Forward Attendant Panel (FAP). The failure message is shown on the ECAM EWD, and on request, on the STATUS page. A ”CIDS FAIL” (check CIDS functions) message is displayed for cabin crew on the PTP for all cases. The related message is sent to the PTP:

- DIR (via DIR 1 + 2),
- 50% type A DEUs,
- 20% type A DEUs in (x) zone,
- all type B DEUs with handset.



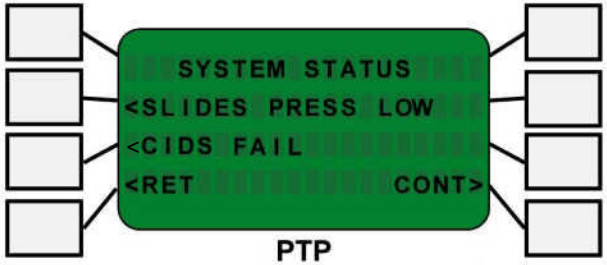


ECAM STATUS PAGE IS NOT CALLED AUTOMATICALLY

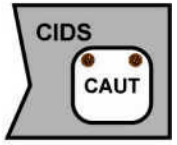


(131VU)

SINGLE CHIME



PTP



FAP

Figure 105 CIDS Class 1 Fault

CLASS 1 CAB, 2, 3 FAULTS

CIDS CLASS 1 CAB FAULT

Some CIDS failures activate the CIDS CAUT light on the FAP withaout a cockpit effect. No message is shown on the ECAM.

NOTE: The CIDS CAUT light can be reset in flight, but comes on again on the ground (landing gear down and locked). The light cannot be reset on the ground. When a CIDS CAUT occurs, the respective failure message is displayed on the PTP.

The CIDS CAUT light comes on if there is a CIDS Class 1 fault or when there is a CIDS Class 1 CAB fault.

CLASS 1 CAB Failures are:

- no data from Smoke Detection Control Unit (SDCU) channel 1 and 2,
- the lavatory smoke detector fails (option),
  In this case there will be a ECAM message generated by the SDCU.
- the heater of the drain mast fails,
- the control unit of the drain mast fails,
- the slides bottle pressure is low (option),
- the doors bottle pressure is low (option),
- CIDS top bus,
- CIDS mid bus,
- DEU–A,
- DEU–B,
- FAP, PTP, Cabin Assignment Module (CAM),
- no data from CAM,
- no data from FAP,
- no data from PTP.

CIDS CLASS 2 FAULT (MAINTENANCE STATUS)

When a CIDS maintenance status message is displayed on the System Display, the detailed failure message is memorized in the PTP and available on ground on request.

The maintenance status messages on the ECAM are the STS reminder on the EWD, and the class 2 maintenance message on the STATUS page which is displayed on request.

The DIR continues to send CIDS caution message to the System Data Acquisition Concentrator (SDAC) until the fault is corrected.

Class 2 Failures are:

- DIR 1 or DIR 2 Fault

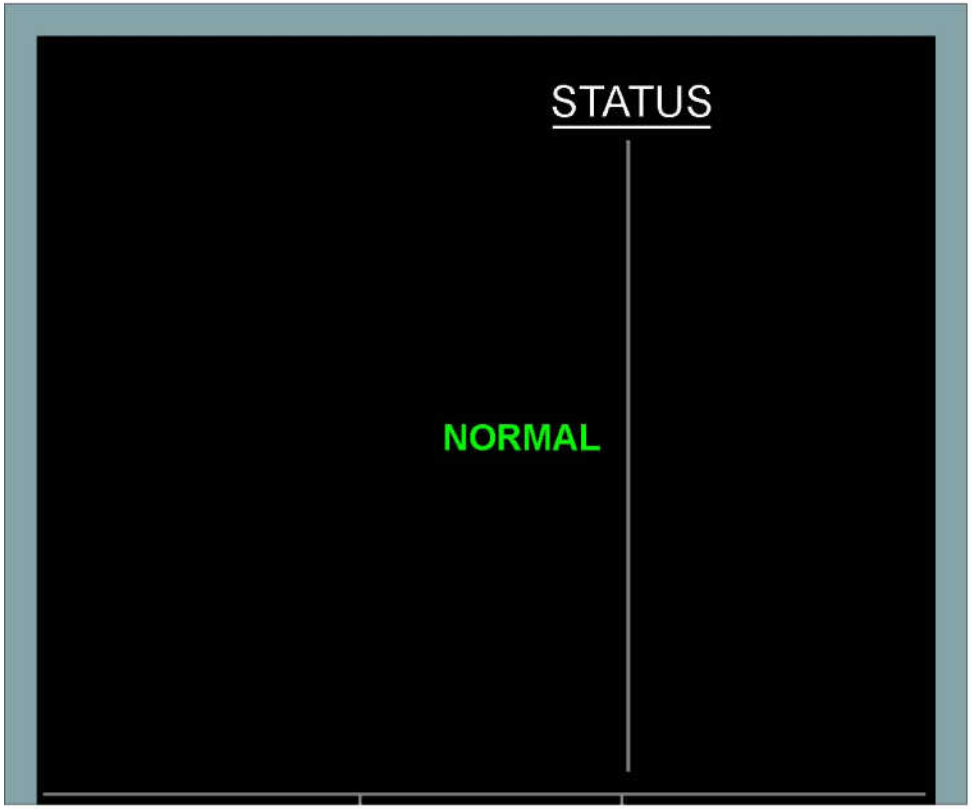
CIDS CLASS 3 FAULTS

Class 3 failures have no operational consequence to the CIDS. They are only shown on request via the PTP or via the CFDS menu on the MCDU.

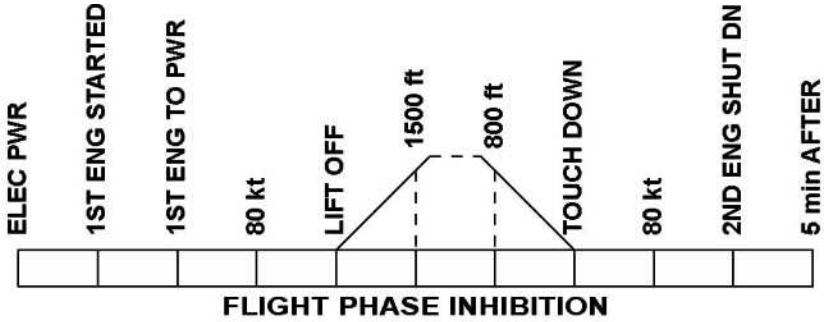
Class 1, Class 1 CAB and Class 2 failures will be shown on the CFDS Post Flight Report (PFR).

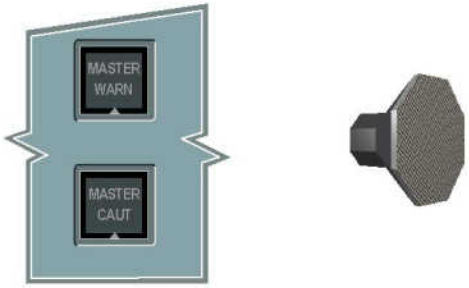
Class 3 Failures are:

- No data from other DIR via crosslink,
- No data from Announcement Reproducer, SDAC 1, SDCU Channel 1 or 2, CFDIU or Video reproducer (if installed),
- sign lamp faults:
  - max 10 NS, FSB, NS area
  - max 5 RTS
  - max 25 PAX CALL,
- max 5 AIP,
- max 5 AAP,
- max 10 Reading Lights or related printed circuit boards,
- max 5 Attendant Work Lights or related printed circuit boards.

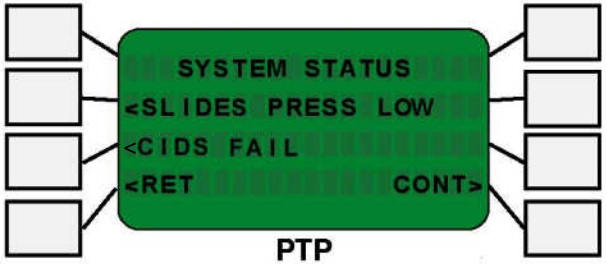


ECAM STATUS PAGE IS NOT CALLED AUTOMATICALLY

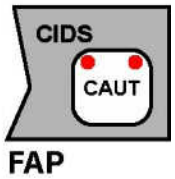




(131VU)

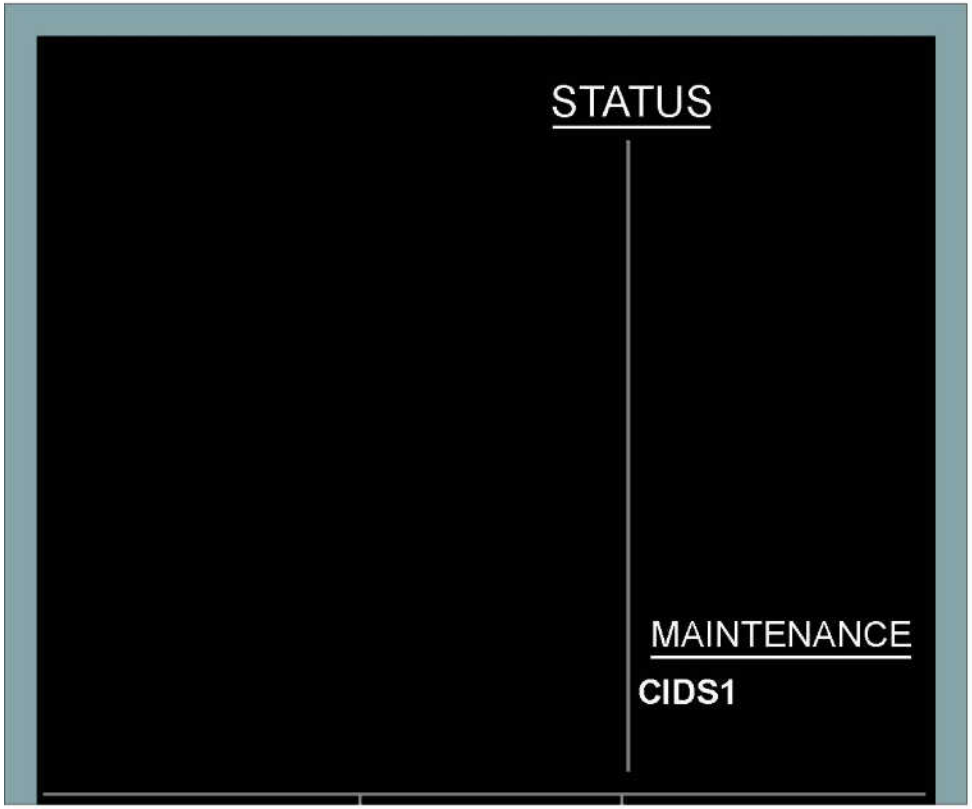


PTP
(ON GROUND ONLY)

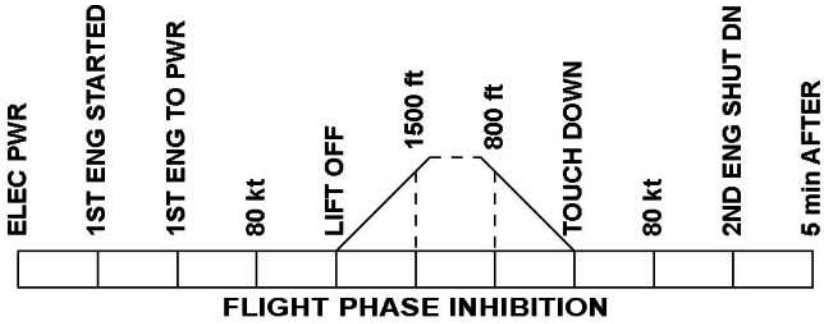


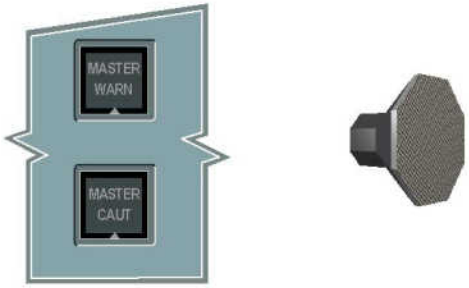
FAP

Figure 106 CIDS Class 1 Cabin Fault



ECAM STATUS PAGE IS NOT CALLED AUTOMATICALLY





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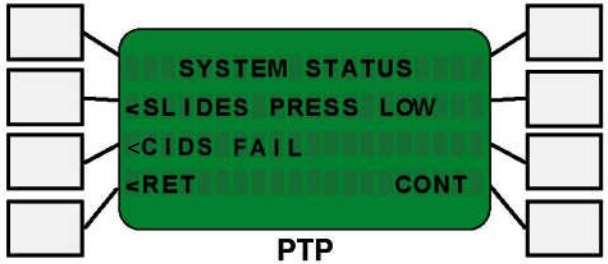
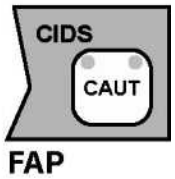


PTP
(ON GROUND ONLY)



FAP

Figure 107 CIDS Class 2 Faults

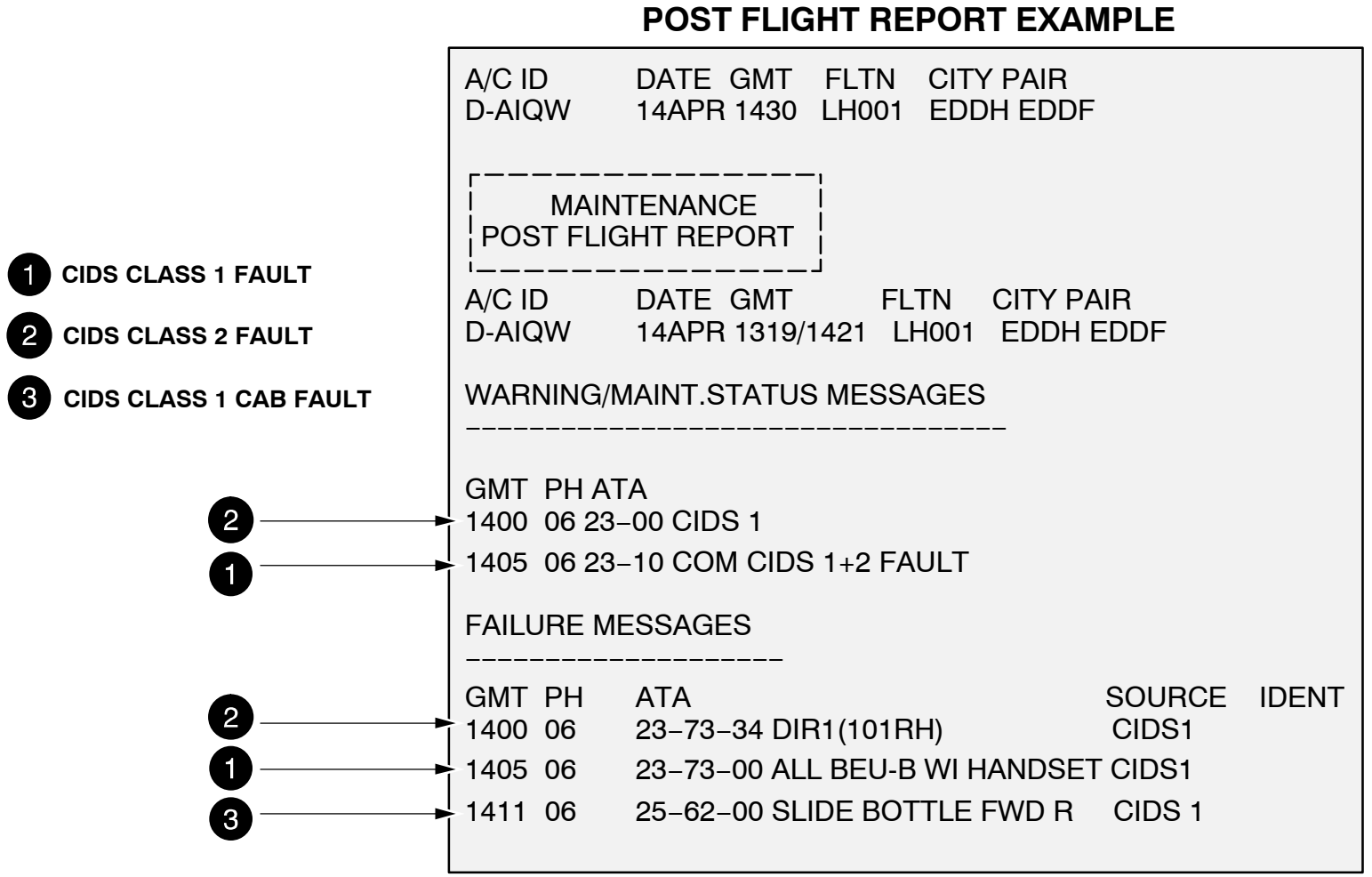


Figure 108 CIDS Failures on PFR

CIDS POWER SUPPLY OPERATION

CIDS DIR FUNCTIONS

The DIR is a central control and interface component of the Cabin Intercommunication Data System (CIDS). The current cabin layout and properties of layout related equipment are stored in the DIRs.

The DIR gives the following functions:

- the handling of six data bus lines,
- the transmission of digitized audio signals,
- the transmission of control data and commands,
- the adaptation of received Decoder/Encoder Unit (DEU) data,
- the control of other CIDS functional units,
- the Forward Attendant Panel (FAP),
- the Programming and Test Panel (PTP),
- the data transfer to the Passenger Entertainment System (PES),
- the service interphone system,
- the Additional Attendant Panel (AAP) via type B DEUs,
- the interface to cockpit and avionics compartment,
- the handling of cabin systems related inputs and outputs,
- the control and interface of other systems,
- the realization of programming functions,
- the realization of test functions,
- the activation of emergency mode with minimum power consumption.

On CIDS energization or reset, all DIR interfaces are disabled and the DIRs are initialized (self–test). The self–test is repeated periodically.

It also includes a test of the data bus lines. The power connections are arranged such that DIR 1 is normally fully active and in control of the CIDS. DIR 2 is normally partially active, in a hot–standby mode.

A failure in the initialization process in DIR 1 causes a deactivation of the DIR 1 hardware and a switchover of control to DIR 2. If the self–test of DIR 1 fails, DIR 2 takes over. At the same time, the power transfer relay is de–energized. This prepares DIR 2 to be supplied from the essential bus in abnormal or emergency mode. The second contact of the relay prepares the control from DIR 2 to the top line cut–off relay for the emergency mode.

CIDS NORMAL POWER SUPPLY

The DIRs are continuously energized when the ESSential and SerViCE busbars are energized.

In normal operation the ESS busbar supplies:

- the active DIR,
- all the circuitry in DEU A which is necessary for Passenger Address (PA) operation,
- all the circuitry in DEU B which is necessary for PA and interphone.

In normal operation, the SVCE busbar supplies:

- the active and the second DIRs,
- the remaining non essential circuitry of the DEUs,
- the PTP,
- the FAP.

The SVCE busbar also supplies, the Area Call Panels (ACPs), the Attendant Indication Panels (AIPs) and the AAP, via DEU B.

NOTE: The configuration with the DEU A PWR transfer relay 107RH and the DIR PWR transfer relay 105RH is optional.

To find out if an A/C is equipped with this configuration just search for the relay FIN in the ASM.

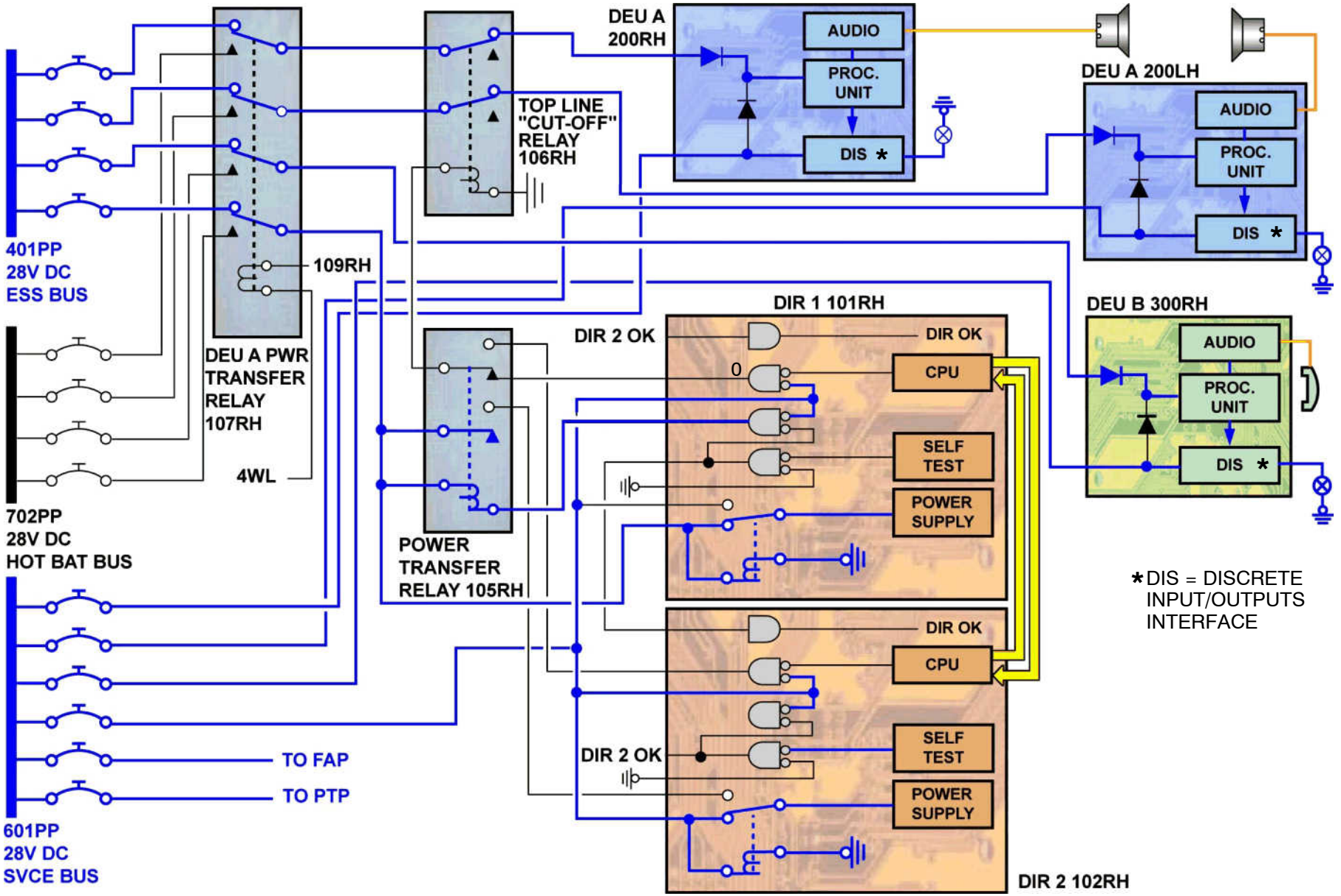


Figure 109 CIDS Normal Power Supply

CIDS NORMAL ABNORMAL POWER SUPPLY

If service bus power is unavailable, the following items of equipment are inoperative:

- the second DIR,
- the non essential DEU circuits,
- the PTP and the FAP.

NOTE: The AIPs and the ACPs are also inoperative because they are supplied with service bus power by the type B DEUs.

Passenger Address Operation

If a PA operation is done, the top line cut–off relay 106RH is no longer energized, and then the ESS busbar supplies the circuitry in type A DEU which is necessary for PA operation.

Essential Bus Unavailable

If the ESS bus power is unavailable, circuitry in the DIRs and DEUs switches the essential circuits to the SVCE busbar. This ensures full CIDS capabilities except for emergency mode operation.

Main Buses Unavailable (Optional Configuration)

If the aircraft loses main power (the SVCE bus and the ESS bus), and the emergency exit lights switch is set to arm or on, all CIDS units, which are supplied by ESS bus, are switched automatically to the HOT BATtery bus.

Service Bus Unavailable

The DIRs internal normal power sensing circuits are always checking if power is available on the SVCE bus. If the power fails, as long as DIR 1 is OK, the power transfer relay remains energized. Via the closed contact, DIR 1 sends a signal to energize the top line cut–off relay.

With the top line cut–off relay energized the emergency mode is activated. In emergency mode, the power from the ESS busbar is disconnected from all type A DEUs as long as no PA announcements are made.

NOTE: Type B DEUs are directly supplied from the ESS bus but only for PA and interphone operations.

Passenger Address Activation

Activation of the PA system sets the DIR 1 internal logic–gate to 0, which de–energizes the top–line cut–off relay. Power from the ESS busbar supplies the two ESS circuits of type A DEUs. All BITE results are stored in the DIR BITE dedicated memory.

Failure indications may be given by:

- the CIDS CAUTion light,
- the ECAM warning page,
- the ECAM status page,
- the PTP display,
- the respective MCDU pages.

The following items of equipment have their own BITE functions and send their BITE status to the DIR:

- each DEU,
- the PTP,
- the FAP,
- the connected equipment such as PES.

The DEUs are able to test the connected equipment.

NOTE: For more power supply configurations look into the DIN A3 Grafics Book.

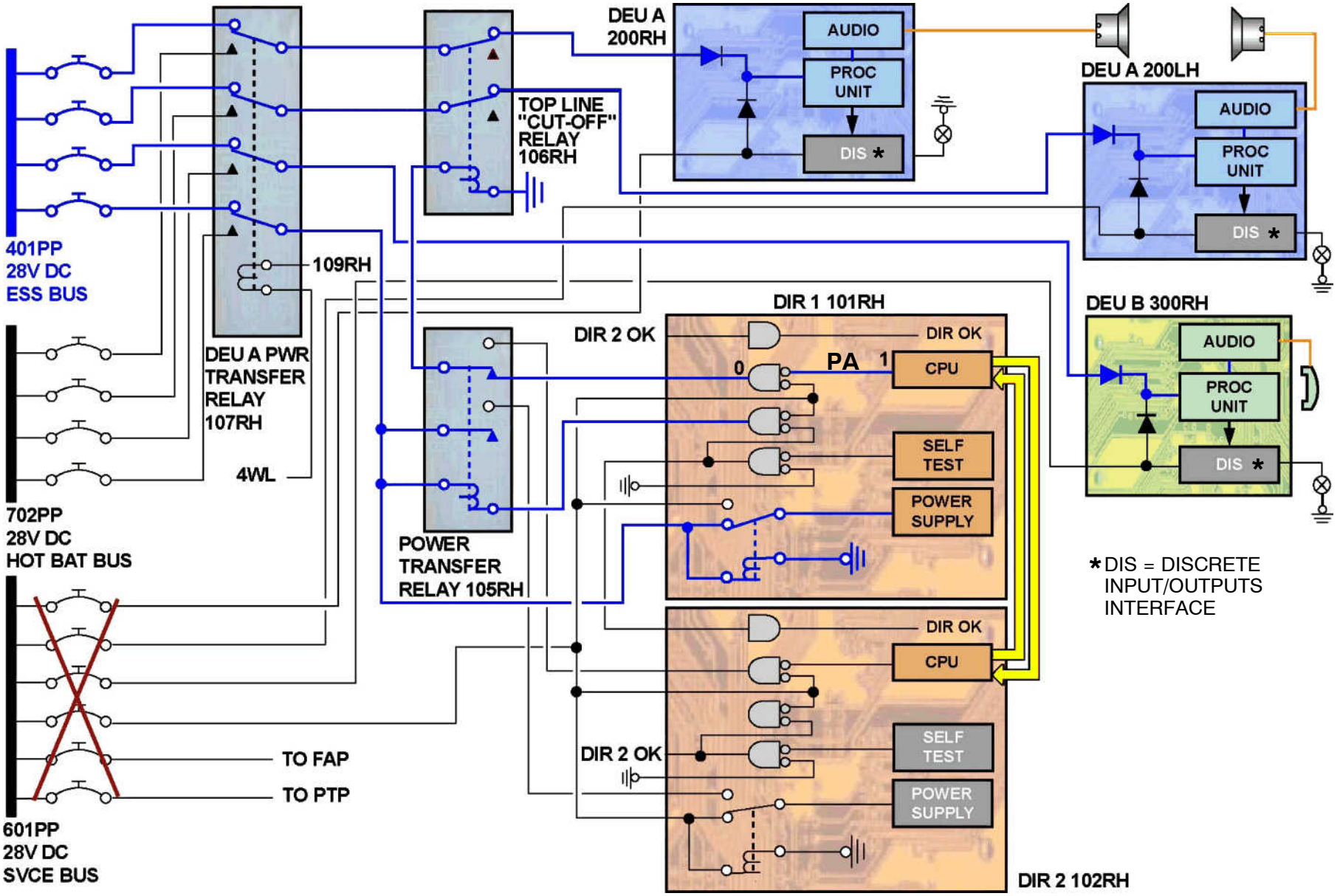


Figure 110 CIDS Abnormal Power Supply Example

CIDS NORMAL POWER SUPPLY WITHOUT THE HOT BUS OPTION

The DIRs are continuously energized when the ESSential OR SerViCE busbars are energized.

In normal operation the ESS busbar supplies:

- the DIR1 normal power input,
- the DIR 2 backup power input
- all the circuitry in DEU A which is necessary for Passenger Address (PA) operation,
- all the circuitry in DEU B which is necessary for PA and interphone.

In normal operation, the SVCE busbar supplies:

- the DIR1 backup power input,
- the DIR 2 normal power input
- the remaining non essential circuitry of the DEUs,
- the PTP,
- the FAP.

The SVCE busbar also supplies, the Area Call Panels (ACPs), the Attendant Indication Panels (AIPs) and the AAP, via DEU B.

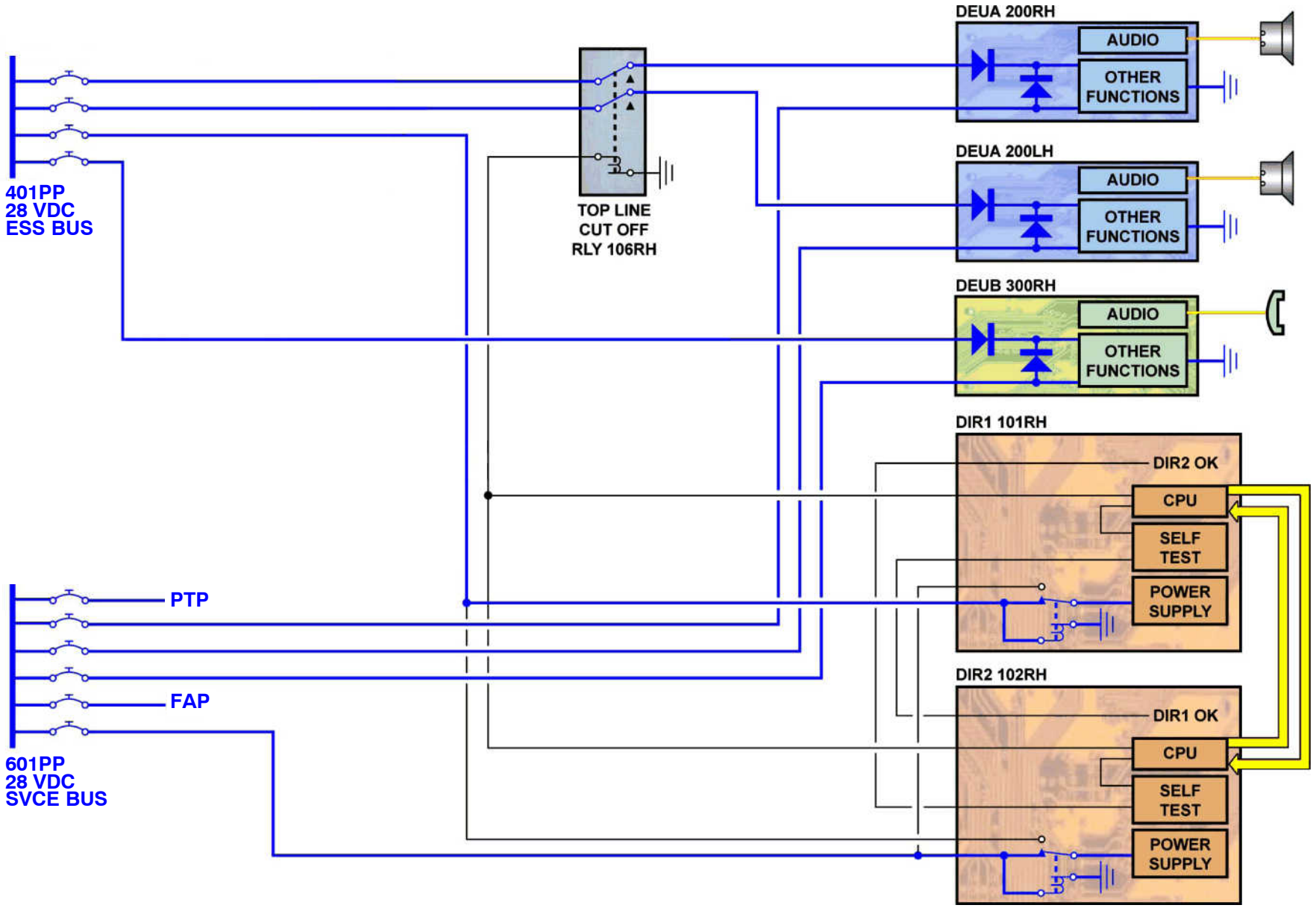


Figure 111 CIDS Power Supply without Hot Bus option

CIDS INTERFACES

DIRECTOR INTERFACES

Smoke Detection Control Unit (SDCU)

The SDCU provides the directors with the lavatory smoke detection signal to activate the audio and visual warnings in the cockpit and in the passenger cabin.

Electronic Centralized Aircraft Monitoring (ECAM)

The two Flight Warning Computers (FWCs) and the two System Data Acquisition Concentrators (SDACs) are the main computers of the ECAM.

In case of CIDS malfunctions or CIDS related systems malfunction, a message is sent to the ECAM.

NOTE: The buzzer sound for the Crew Call System is generated by the FWCs. The cabin door position and slide armed information given by the SDACs is sent to the directors to control the seat row lighting and FAP indications (A321).

Slat Flap Control Computer (SFCC)

The SFCCs provide signals to the directors to control the FASTEN SEAT BELT and NO SMOKING signs in automatic mode.

Landing Gear Control & Interface Unit (LGCIU)

The LGCIUS are also used by the directors to control the NO SMOKING and FASTEN SEAT BELT signs in automatic mode.

A signal from the LGCIUs switches on the Service Interphone System 10 seconds after landing.

Passenger Address Handset

The cockpit handset is directly connected to the directors.

NOTE: The cockpit mounted handset has priority over all attendant passenger address announcements and over the PES.

Audio management Unit (AMU)

The AMU is used to establish and reset cockpit interphone operation.

Evacuation Signaling Equipment (EVAC)

The EVAC is operated if the aircraft has to be evacuated.

Engine Oil Pressure Switch/Cockpit Door Switch

When the engines are running, signalled by the Engine Interface Unit (EIU) and the cockpit door is open, the forward left entry light goes automatically to 10% lighting intensity.

With cockpit door open, the forward attendant station loudspeaker volume will decrease by 10 dB (PA from cockpit).

Cabin Pressure Switches

In case of cabin depressuration signals are sent to the CIDS directors to control the following items:

- Cabin lights (full bright),
- Exit lights (via **EM**ergency **L**ight **S**ystem EMLS),
- NO SMOKING and FASTEN SEAT BELT signs.

NOTE: The lavatory RETURN TO SEAT signs are not affected in this case.

Service Interphone

The service interphone connects the handsets to the eight service interphone plugs. The eight service interphone plugs are located around the aircraft for maintenance purposes.

Cockpit Call Panel

The cockpit call panel provides call facilities between flight crew and attendant stations, and enables emergency calls to all attendant stations.

Annunciator Light Control Box

The control box is used to test and dim the CIDS related illuminated pushbuttons.

Centralized Fault Display Unit (CFDIU)

The CFDIU is used as an interface between the CIDS and the MCDUs, for testing and trouble shooting. The selecting CIDS on the MCDU main menu permits access to the almost same menu, as on the PTP.

No Smoking/Fasten Seat Belts Switches

The NO SMOKING and FASTEN SEAT BELTS switches are directly connected to the directors for manual and automatic control of the signs.

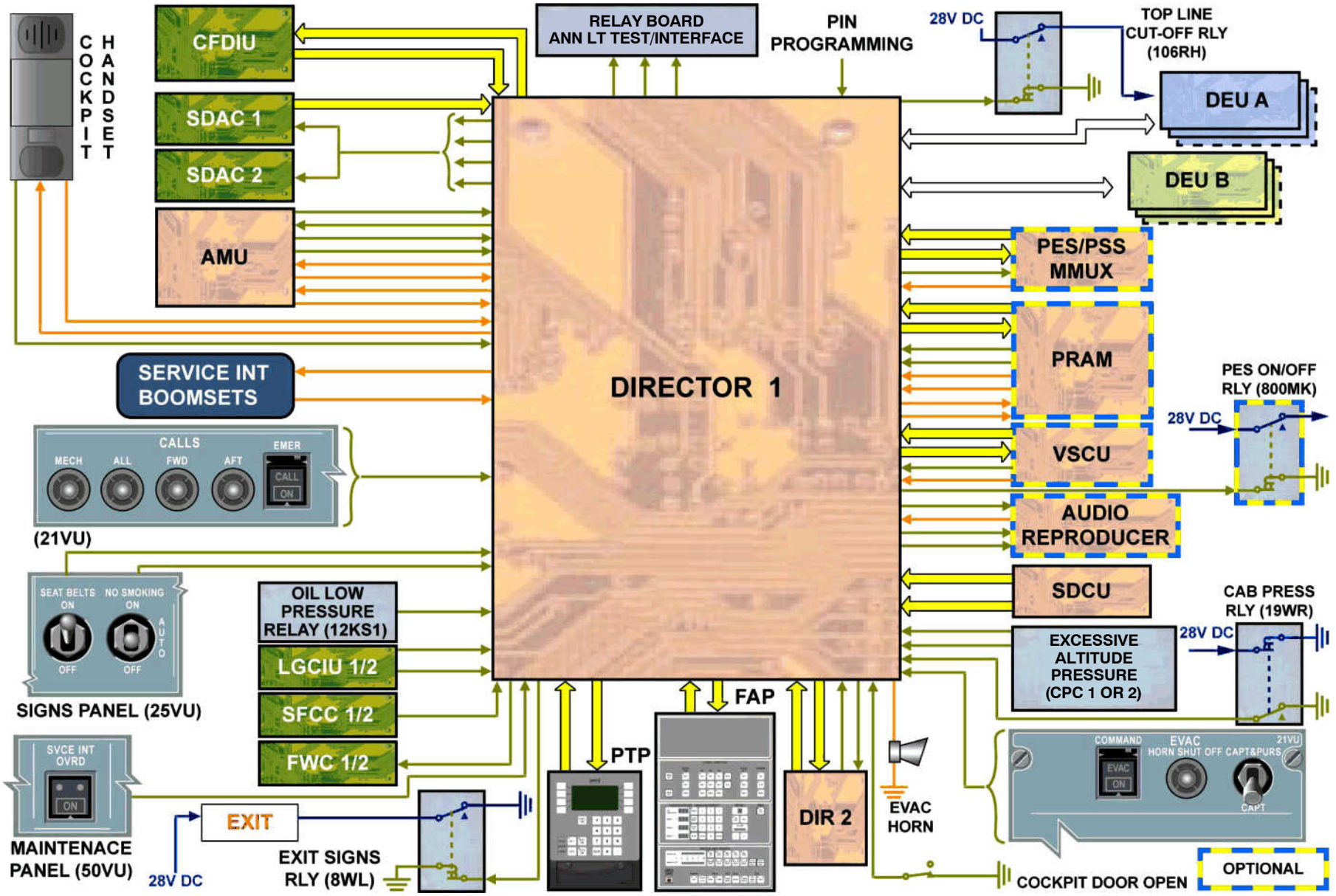


Figure 112 Director Interfaces

FAP INTERFACES

The Forward Attendant Panel (FAP) is connected to the directors (DIRs) through two ARINC 429 low speed data buses.

Through these buses, the FAP transmits data for controlling and monitoring of the cabin systems and receives data from the active DIR for signaling. The FAP also transmits, through these lines, its BITE information:

- a discrete signal is transmitted to the Emergency Power Supply Units (EPSUs) for activation of the emergency lighting,
- discrete signals connect the FAP and type B Decoder/Encoder Units (DEUs) for EVACuation activation, reset and indication,
- an analog signal connects the FAP and the water quantity transmitter for potable water quantity indication,
- an analog signal connects the FAP with the vacuum system controller for waste quantity indication,
- discrete signal, out of the FAP, for lavatory lighting, passenger reading lights and cabin attendant work lights,
- a discrete signal for activation of the lavatory water heater,
- a discrete signal for switching on the heating on the FWD and AFT waste service panel.

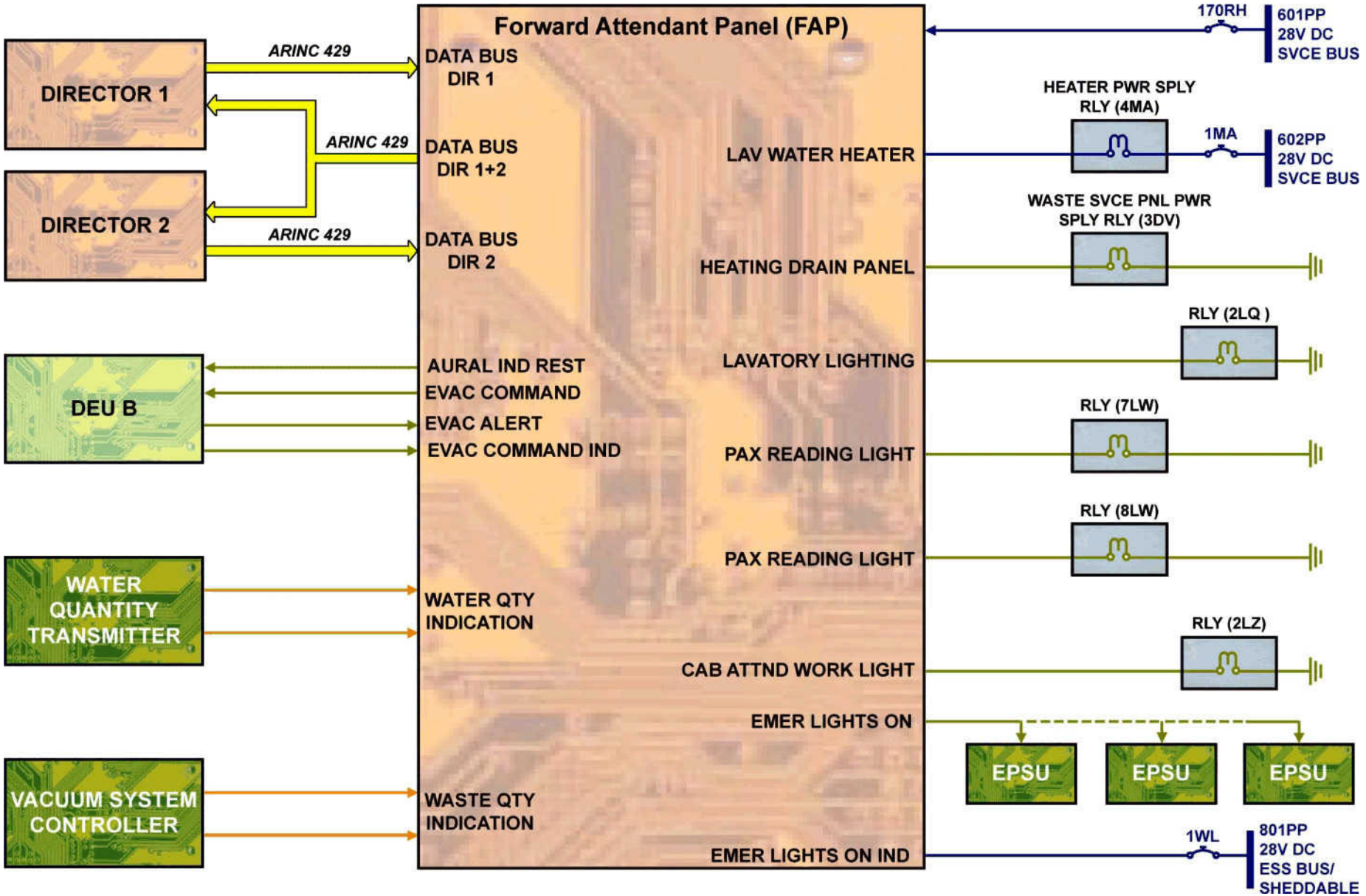


Figure 113 FAP Interfaces

PTP INTERFACES

The PTP is connected to the DIRs through ARINC 429 low speed buses.

The programming and test panel 110RH transmits data to the director via a serial ARINC 429 link which are connected to both directors in parallel.

For transmission of data from the directors to the panel, two separate ARINC links are provided, one from each director.

The Cabin Assignment Module (CAM) 115RH plugs directly into the front face of the panel. Interaction between director and CAM is via the programming and test panel ARINC links. The CAM is interfaced within the PTP to allow the panel to read, and also to modify the CAM data. The PTP is able to transfer any of the CAMs internal layouts to the director.

A discrete, out of the PTP, initiates the system or battery test of the EPSUs.

The PTP receives a discrete signal which indicates the result of the system/battery test.

Cabin Assignment Module

The Cabin Assignment Module (CAM) 115RH defines all of the modifiable system properties and layout information for the CIDS. It contains the possibility for four cabin layouts, LAYOUT 1 – 3 and LAYOUT M.

All cabin layouts are programmed according to the airlines requests. You can modify these layouts via the PTP.

At the end of the modification procedure the new layout is automatically stored as layout M.

PTP Operation

The Programming and Test Panel (PTP) 110RH transmits data to both CIDS directors via a single ARINC 429 bus. It receives data via two ARINC 429 busses, one from each director.

Four discrete connections are provided to the emergency lighting system. A DC ground and 28 V DC line connect to the PTP for BAT indication and for switch–over functions. +28 V DC is fed to the PTP from service busbar 601PP circuit breaker 161RH.

After CIDS power–up the panel display stays on for approx. 10 minutes, then the DSPL ON membrane switch must be pressed to activate the panel display. The first selection menu then appears and shows the modes available.

The various modes are explained under the separate section. 'System Testing and Programming' in this chapter.

The selection of displayed RET function returns to the previous menu when the display labelled key is pushed. When the DSPL ON key is pushed, it always returns the user to the first menu. When numerical data is to be entered, one of the blank keys displays ENTER. The word ENTER is displayed on the blank keys when a data input is required. A sign flashes to show the correct position for the data input. When the data is entered, the sign does not flash. The digits of the data input replace the sign. The sign will flash in the next row which now requires an input. Pushing the CLR membrane switch deletes all the digits so far entered. Pushing the menu–labelled ENTER key enters the complete number and the PTP can then use it.

For correct CIDS operation, the CAM must be plugged in. There is no possibility of programming the CIDS while the CAM is missing.

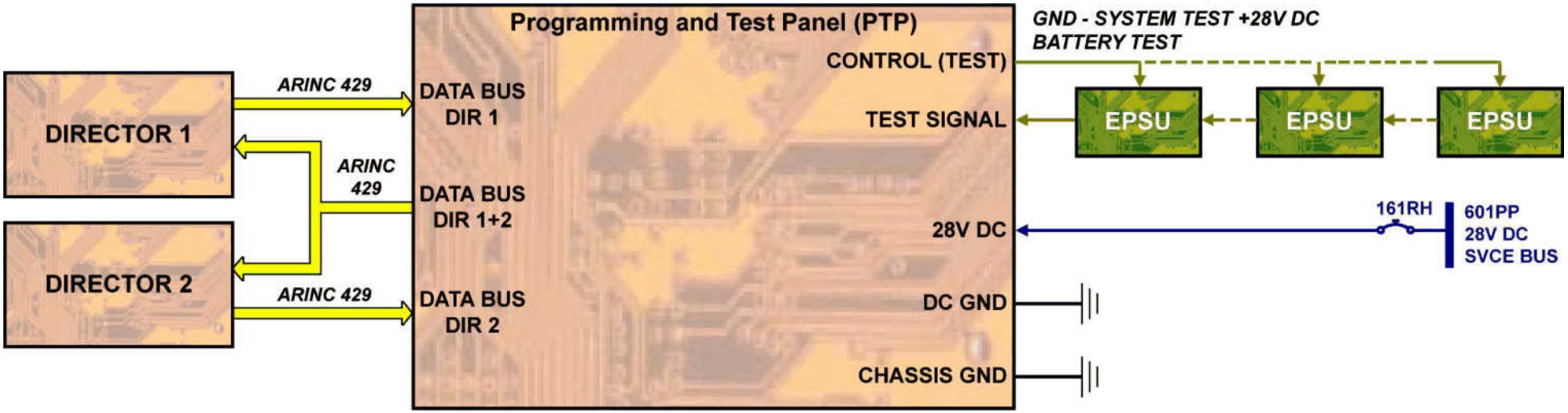


Figure 114 PTP Interfaces

CIDS CFDS MENU PRESENTATION

CFDS BITE

When the CIDS is energized, the directors perform a comprehensive hardware and software self–test. The CIDS top and middle line data busses, the PTP with the CAM, the FAP and the DEUs with the connected loads are tested.

The BITE Test Menu is accessable in the cabin from the PTP and in the cockpit from the MCDU. The test functions from PTP and MCDU are nearly the same except some special tests.

Test functions only accessable from the PTP:

- the emergency light system test,
- the emergency light battery capacity test
- the drainmast heater test
- reset of the active director.

Test functions only accessable from the MCDU:

- test of the passive director,
- print out function.

Maintenance via CFDS–MCDU

The CIDS maintenance mode is available via the CFDS–MCDU in the SYSTEM REPORT/TEST mode. All failures, which are written in the CIDS director BITE ground/flight memory can be read via this mode.

The maintenance menu in the CFDS–MCDU follows the same procedure as the maintenance menu via the PTP. A test procedure is selectable via the MCDU. A CIDS director 2 (passive) test is also available, the Emergency Light Battery/System tests and the drainmast heater test are not available.

System Test Mode

The SYSTEM TEST mode initiates the test except:

- when the aircraft is in flight,
- normal power is not available (PTP not powered),
- the mandatory layout is in use.

These devices are tested:

- Director 1 (the currently active director is marked, example DIR1 (ACT), the passive director can only be tested via the MCDU),
- Director 2 (see Director 1),
- CIDS BUS,
- DEUs A,
- DEUs B,
- Programming and Test Panel (membrane switches are not checked),
- CAM,
- FWD ATTND Panel (the pushbutton and membrane switches are not checked),
- Additional ATTND Panels (membrane switches are not checked),
- ATTND Indication Panels,
- Loudspeakers (only operational test),,
- Sign Lamps (not applicable for LED NS/FSB signs),
- Passenger Call Lamps,
- Area Call Panels (only operational test),
- VIDEO (if installed),
- Reading/Work Lights.

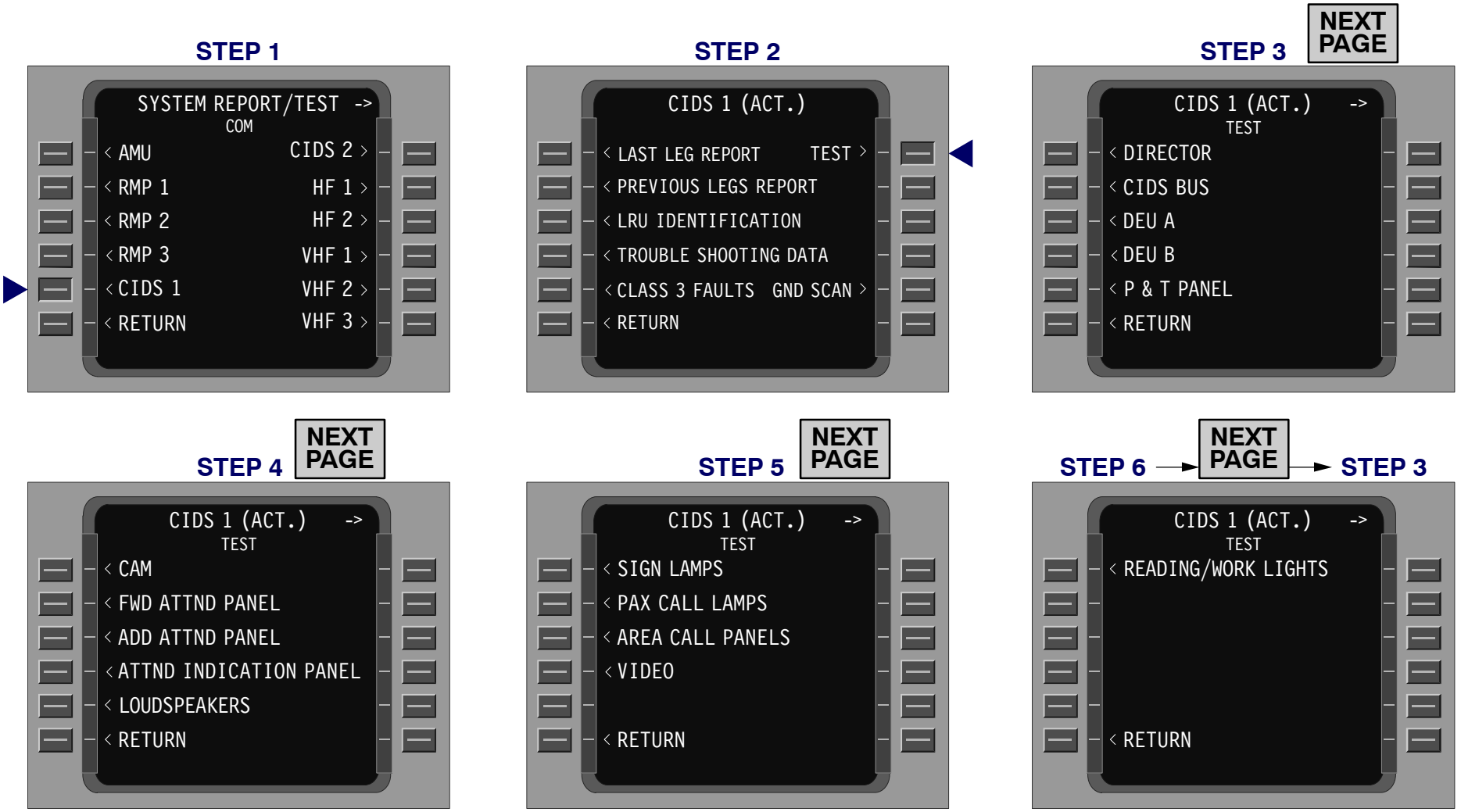


Figure 115 CIDS CFDS Menu

CIDS COMPONENT LOCATION

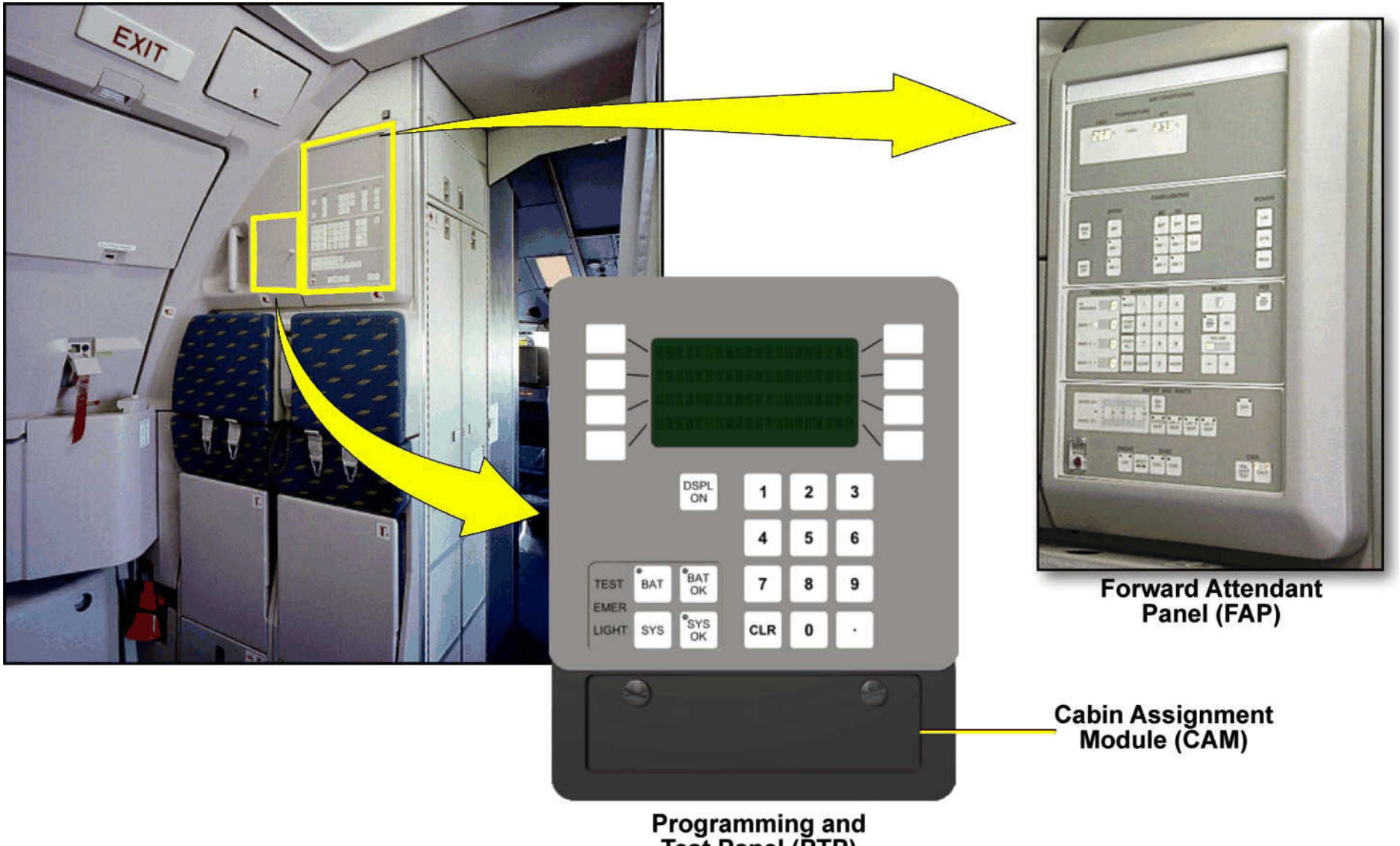


Figure 116 FAP & PTP Location

Figure 117 Handset, AIP & AAP Location

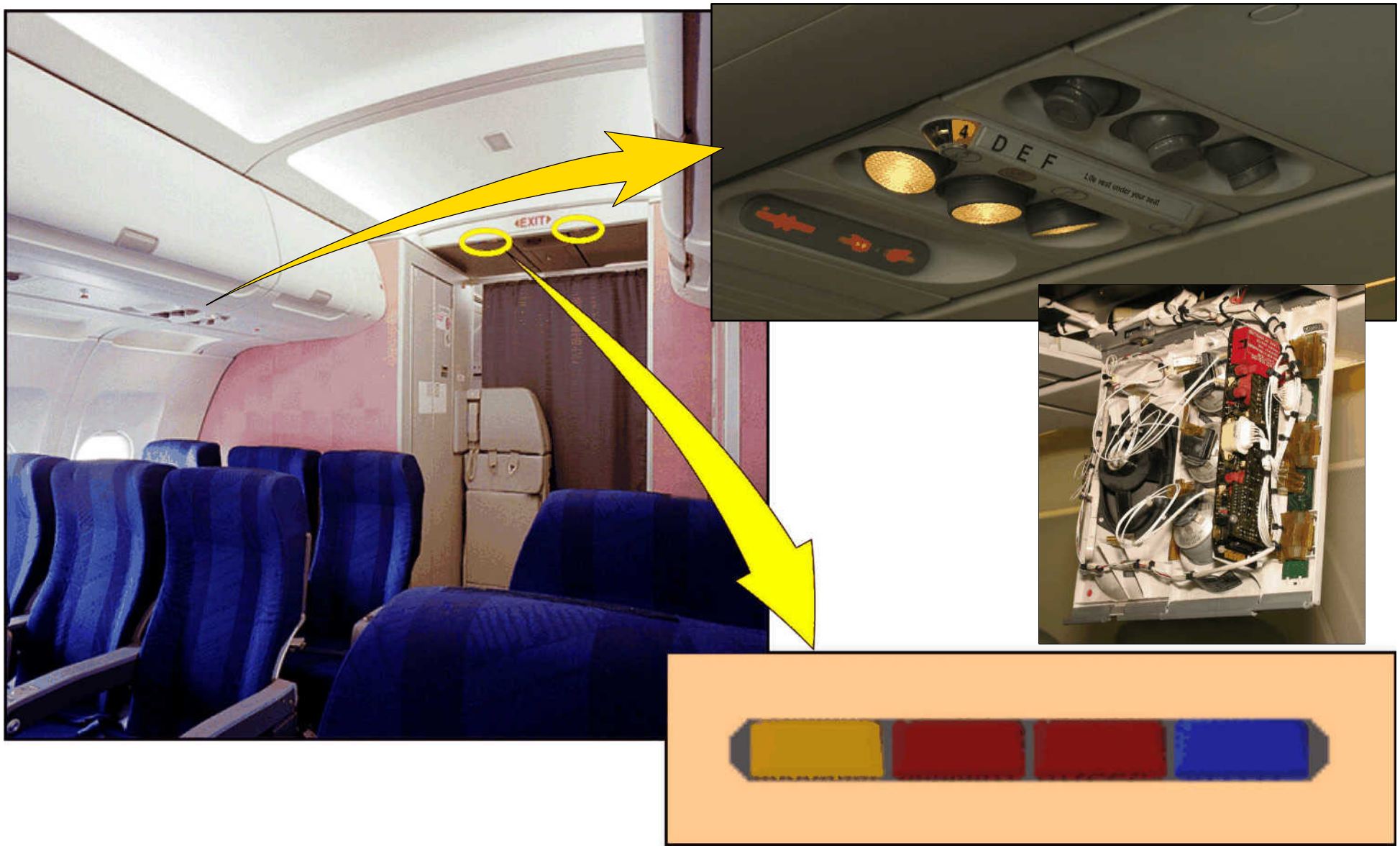
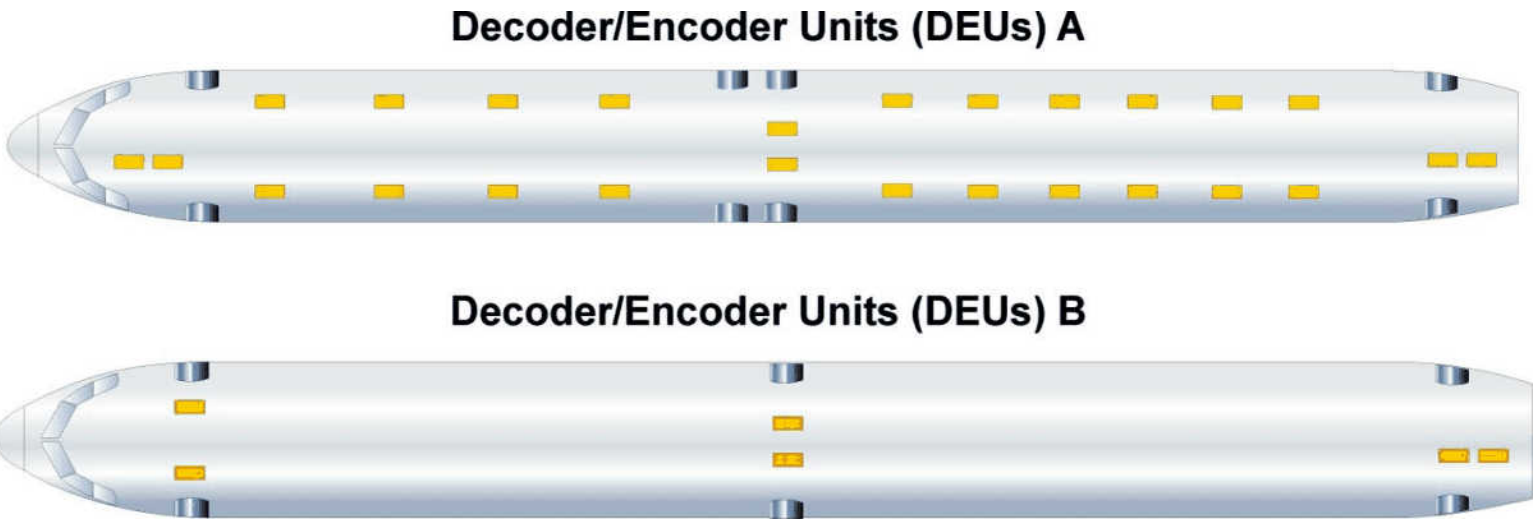
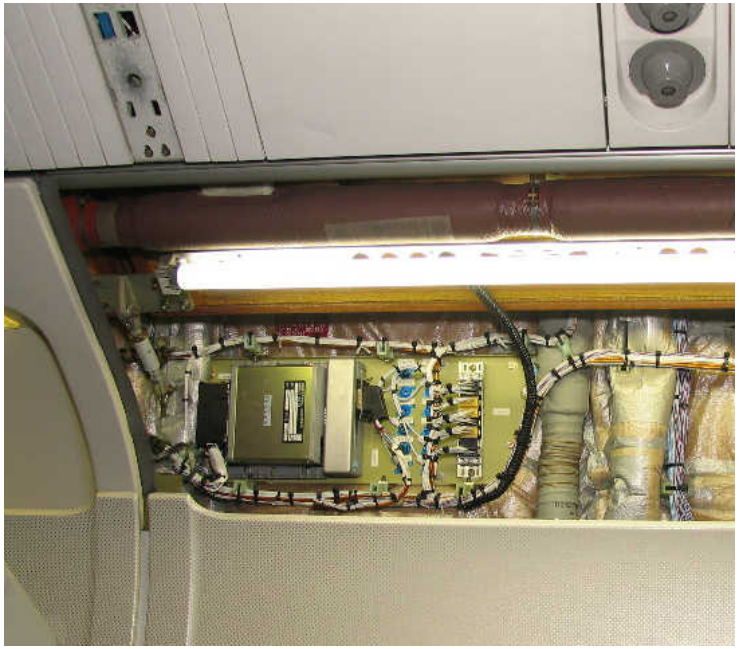


Figure 118 ACP & PSU Location



DEU A BEHIND COVE LIGHT PANEL



DEU A & B BEHIND AFT GALLEY CEILING PANEL

Figure 119 DEU A & B Location

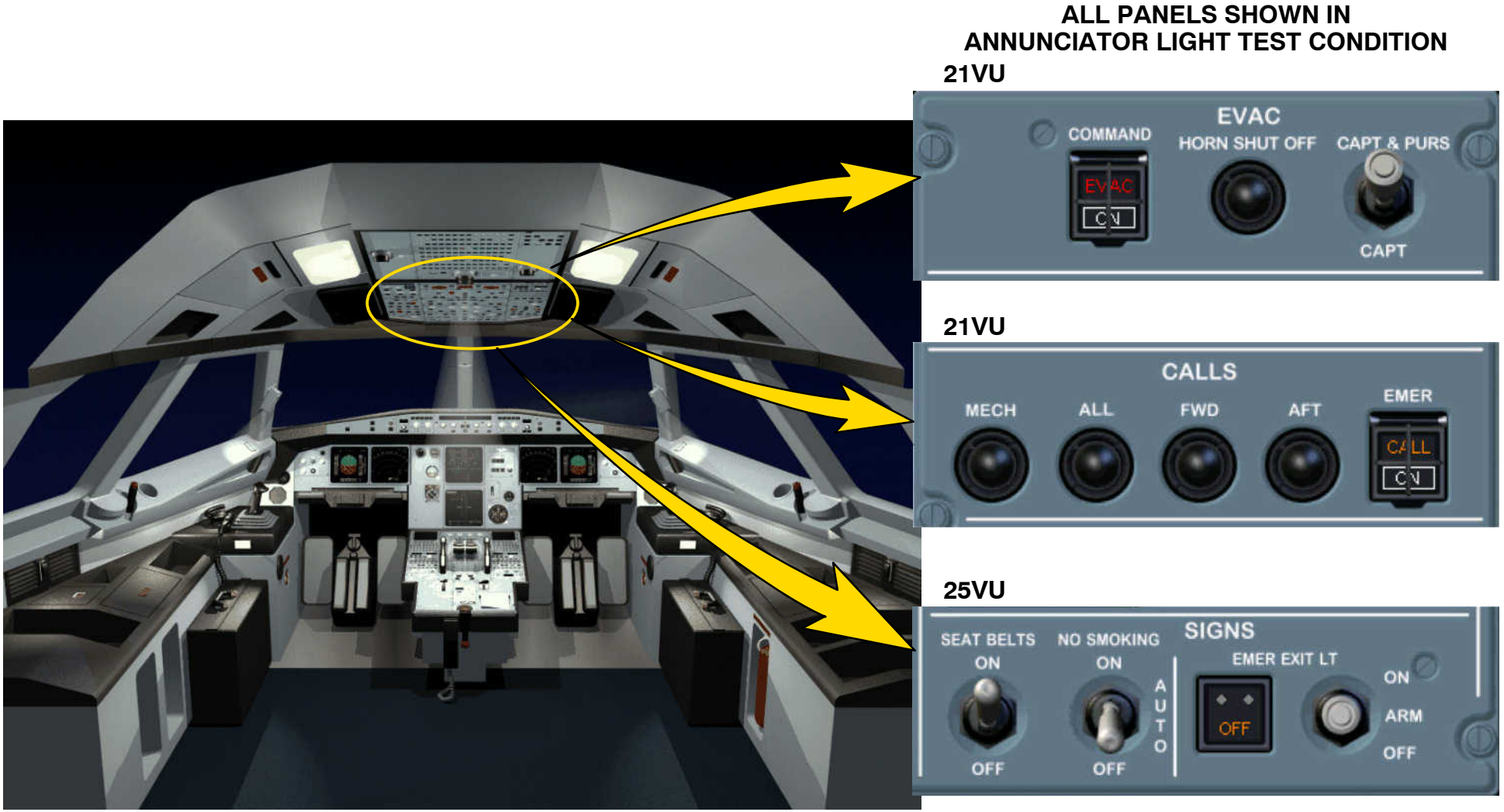


Figure 120 CIDS Cockpit Controls Location

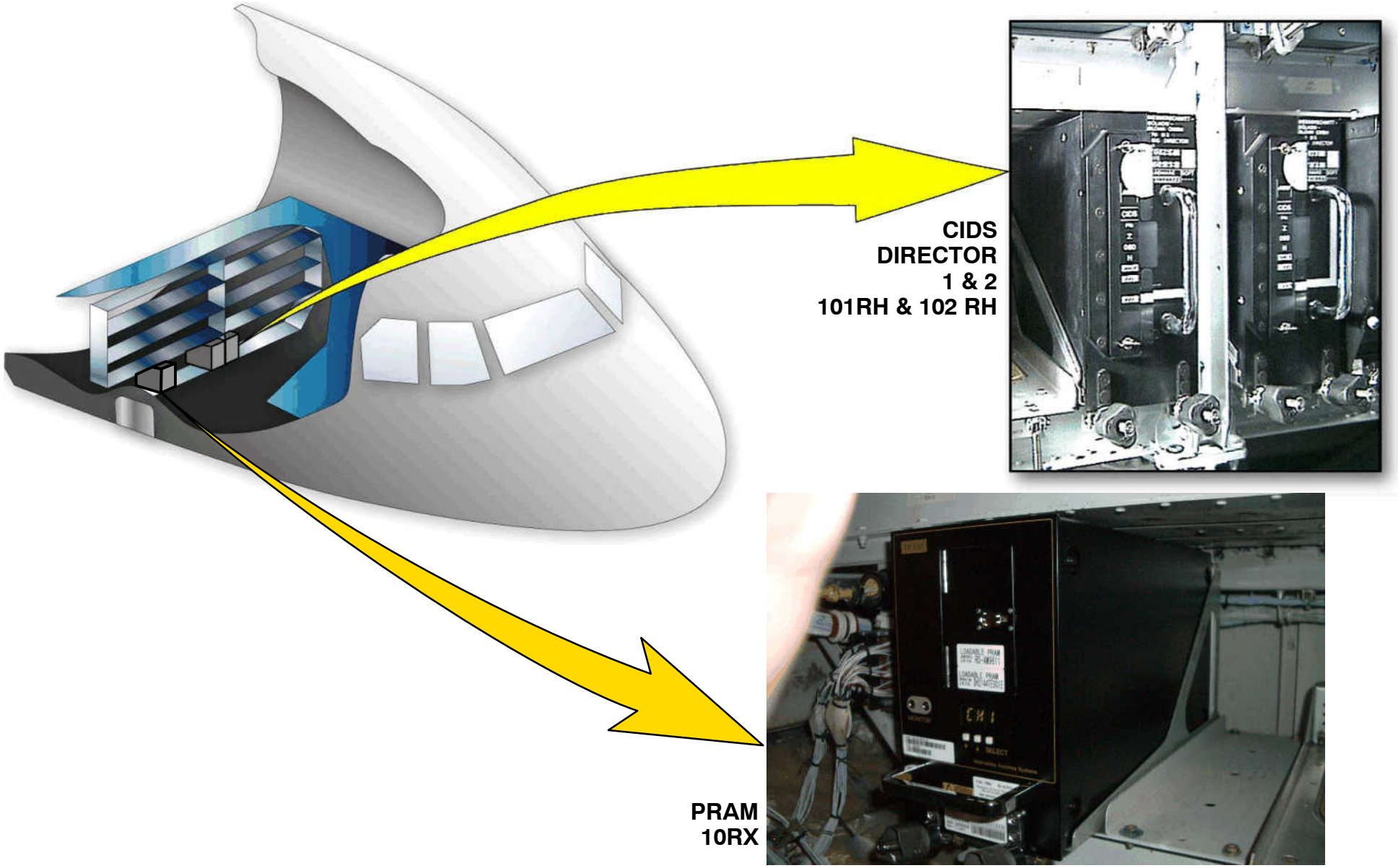


Figure 121 DIR & PRAM Location

23–32 ANNOUNCEMENT – MUSIC TAPE REPRODUCER SYSTEM

PRERECORDED ANNOUNCEMENT & BOARDING MUSIC DESCRIPTION

GENERAL

The function of the Prerecorded Announcement and Music (PRAM) reproducer is to play prerecorded messages. It also plays Boarding Music (BGM) programs on a cassette tape to the passengers through the aircraft Passenger Address (PA) system. The PRAM is controlled by the audio module, which is a part of the Forward Attendant Panel (FAP). It is installed in the cabin at the forward attendant station. The PRAM and the audio module are connected with two ARINC 429 data buses through the Cabin Intercommunication Data System (CIDS) active director (DIR) to receive and transmit control data. The PRAM reproducer is installed in the aft avionics compartment.

PRERECORDED ANNOUNCEMENTS

Version 1 (Tape)

The PRAM reproducer has two cassette decks. Up to 256 prerecorded announcements are stored on two tapes in the prerecorded announcement reproducer (each minimum 30 s). The PRAM has the capability to produce an emergency announcement in the event of a rapid cabin decompression.

An emergency announcement is stored in a solid state stored voice. A ground signal from a rapid decompression, triggers, the emergency announcement. All functions are remotely controlled from the audio module in the FAP (except the output level of normal and emergency announcements). They are adjustable at the front of the reproducer. The prerecorded announcements can be controlled from the audio module in the FAP.

Version 2 (Memory–Card)

The PRAM reproducer has three integrated Personal Computer Memory Card International Association (PCMCIA) memory cards for the storage of the pre–recorded announcements, the boarding–music and the emergency announcement. The files are stored in Moving Picture Experts Group (MPEG) 1 Layer II compressed digital data. One flash memory card is for the message data and two for the music data. All functions are remotely controlled from the audio module in the FAP.

BOARDING MUSIC (BGM)

There are two sources for the BGM: the PRAM and the Passenger Entertainment System (PES) audio reproducer. The choice of the BGM channels is established by each customer. The two cassette decks in the PRAM, give four music channels. The cassette tapes are used alternately.

When one is playing the other one rewinds in order to give continuous play. Both reproducers are controlled from the audio module installed on the FAP. The PRAM is automatically initialized at aircraft power–up when the reproducer receives 115V AC. The PES audio reproducer is powered when the PES ON/OFF pushbutton is selected on the audio module in the FAP.

PRERECORDED ANNOUNCEMENTS OPERATION

During the initialization, the Light Emitting Diode (LED) display on the audio module is not shown. The least significant digit LED of the announcer display on the audio module in the FAP will show ”0” when the initialization is complete. The operation procedures to program and play the announcements are controlled via keys on the audio module in the FAP:

ENTER

When the ENTER pushbutton is pushed, the cursor moves into the MEMO 1 position. The required message is keyed–in on the keyboard and appears on the MEMO 1 display. When the ENTER pushbutton is pushed again, the keyed–in data is accepted. The READY light comes on when the PRAM has found the corresponding announcement. The required messages for the MEMO 2 and 3 displays are keyed–in the same way as for the MEMO 1 display. The messages keyed–in into the MEMO 1, 2 and 3 display are alternately played from tape deck A and B.

CLEAR

When the cursor has moved into the related position (MEMO 1, 2 or 3) and the CLEAR pushbutton switch is pushed, the display clears.

START NEXT

When the START NEXT pushbutton switch is pushed the message shown on the MEMO 1 display moves up to the ON ANNOUNCE display. The MEMO 2 display message then moves up to the MEMO 1 display. The message shown on the MEMO 3 display moves up to the MEMO 2 display.

START ALL

All messages keyed in into MEMO 1, 2 and 3 will be announced continuously until the last announcement has finished.

STOP

When the STOP pushbutton switch is pushed, the message announcement stops immediately.

BGM OPERATION

The BGM from the PRAM or the PES audio reproducer, when it is installed, is controlled from the audio module in the FAP with the following keys: ON/OFF, SEL and VOLUME.

NOTE: Due to DLH request the Boarding Music is removed from the PRAM. On the Announcement Placard the BGM is marked with an INOP label (EO 165662/01).

ON/OFF

When the ON/OFF pushbutton switch is pushed, the light in the pushbutton switch comes on. Channel 1 is automatically displayed on the BGM channel display. When the ON/OFF pushbutton is pushed again, the light goes off.

SEL

When the SEL pushbutton switch is pushed, the system selects one of the available channels. These are displayed in a numerical ascending code (four channels in the mono mode, two in the stereo mode).

VOLUME

The LEDs on the volume display show the volume level (2 dB steps). When the (–) pushbutton switch is pushed the volume level decreases. When the (+) pushbutton switch is pushed the volume level increases.

OPTIONS

The No Smoking (NS) and Fasten Seat Belt (FSB) announcements can be stored in the PRAM and can automatically be broadcast through the PA system in the cabin when the NO SMOKING and SEAT BELTS switches are set to AUTO position in the cockpit, and the landing gear and/or flaps/slats conditions are met.

PRAM REPRODUCER DESCRIPTION (PCMCIA)

The PRAM reproducer has three integrated Personal Computer Memory Card International Association (PCMCIA) memory cards for the storage of the pre–recorded announcements, the boarding–music and the emergency announcement. The files are stored in Moving Picture Experts Group (MPEG) 1 Layer II compressed digital data. One flash memory card is for the message data and two for the music data.

The message files and music files are loaded into the PRAM reproducer from external flash memory cards. You can change the announcements and boarding music, when you insert the flash memory card with new software. The card slots are behind the access door at the front of the PRAM.

The PRAM has four channels for stored music data in analog audio mode. The PRAM uses these four channels as distributors for audio to the individual passenger through the passenger entertainment system.

The LCD display at the front of the PRAM shows the active announcement and boarding music channel.

The Prerecorded Announcement and Boarding Music (PRAM) system is controlled during normal operation from the audio module in the Fwd Attnd panel 120RH. The system initialization is made automatically when the reproducer receives 115 V AC. During the initialization the LED display on the audio module is not shown. The least significant digit LED of the announcer display will show ’0’ when the initialization is complete.

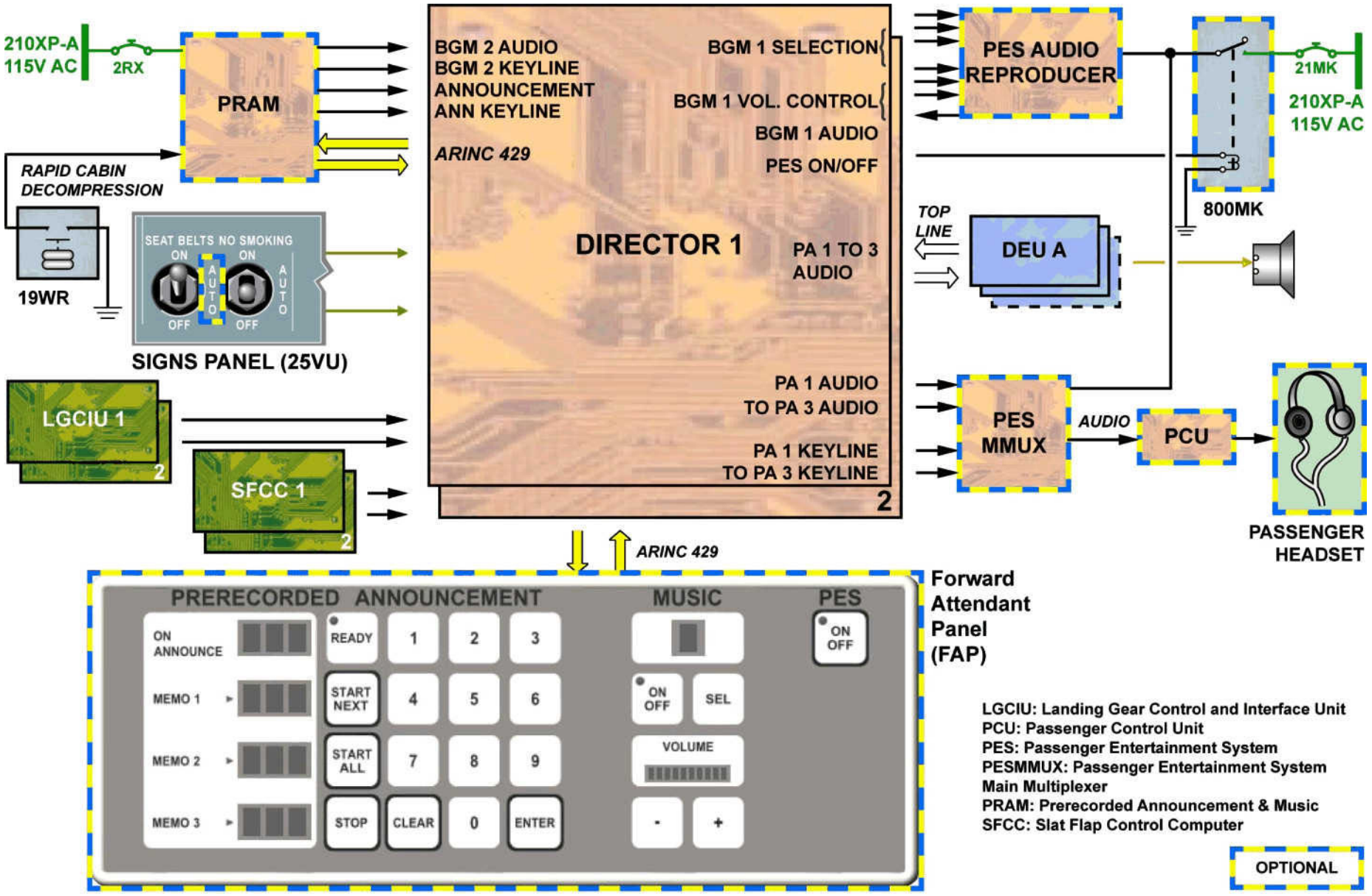
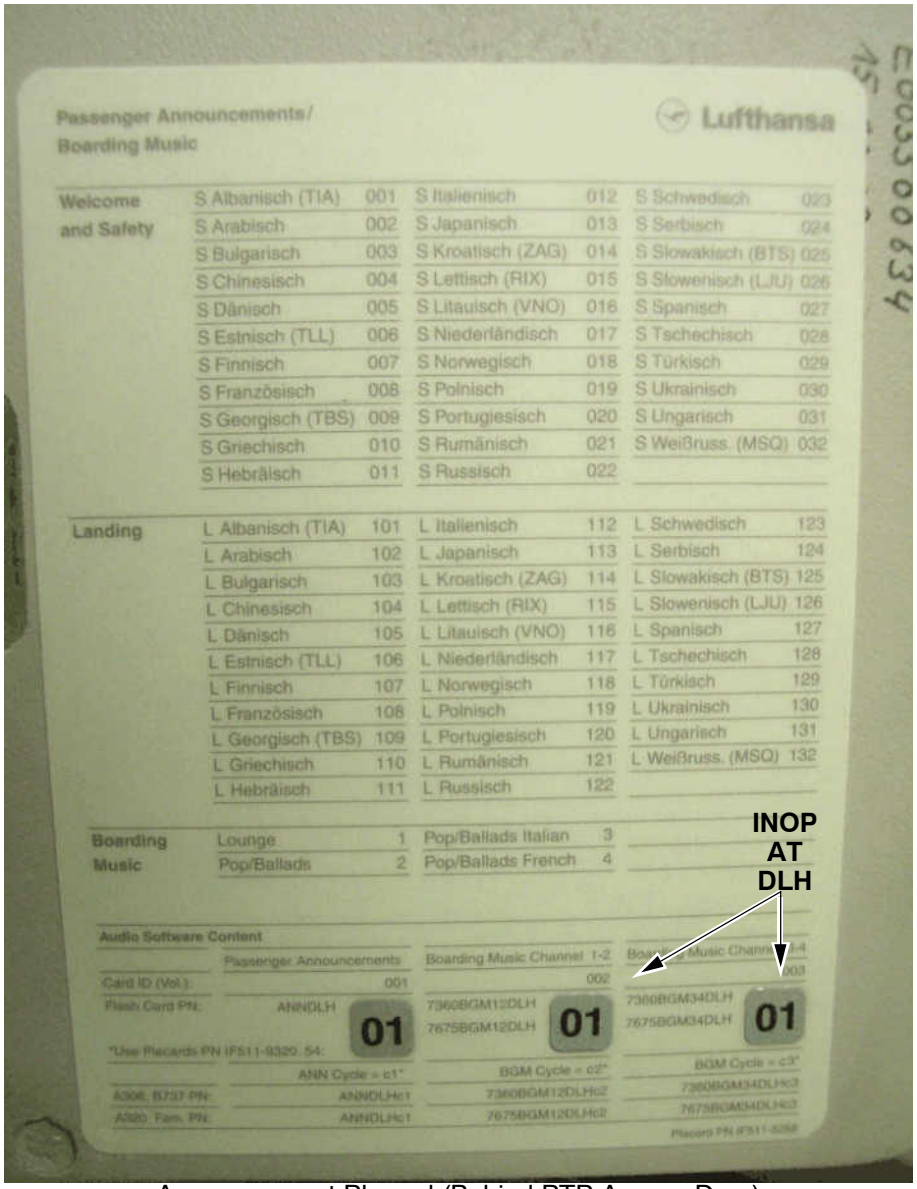


Figure 122 Prerecorded Announcement & Boarding Music Operation

PCMCIA PRAM (88VU)



Announcement Placard (Behind PTP Access Door)

Figure 123 PCMCIA PRAM & Announcement Placard

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM - ENHANCED

CIDS INTRODUCTION

A319–A321 Classic CIDS Presentation

For higher flexibility in changing cabin layouts, the CIDS (**C**abin **I**ntercommunication **D**ata **S**ystem) is designed to accommodate these demands without the need for complex and costly hardware changes. Most cabin systems are interfaced with one of two microprocessor controlled data busses. Digitized audio control and command signals are transmitted along the bus from a central control unit called the 'Director'. The CIDS software program controls this digital data.

For changes in aircraft configuration or CIDS upgrades only the software program is required to be changed. Two replaceable modules are used to accomplish these changes. To upgrade the CIDS software program, OBRM (**O**n **B**oard **R**eplaceable **M**odule) are used. These removable memory modules are installed in the front face of the CIDS directors.

These are normally associated with the installation of optional systems and cabin re–arrangements. When you have to change the cabin layout, only the controlling software is modified. The existing PAX equipment such as loudspeakers and lighting units remain as before. This software is centrally stored in the CAM (**C**abin **A**ssignment **M**odule) and you can modify it aboard the aircraft or in the workshop. The CAM data also determines whether certain options are available.

The SDCU (**S**moke **D**etection **C**ontrol **U**nit) controls the smoke detectors. In case of a smoke warning the SDCU inform the CIDS director about the smoke and the location of the affected toilet.

The VSC (**V**acuum **S**ystem **Controller**) controls the toilet system. It activates the vacuum generator and sends signal of the waste level to the CIDS for indication.

The PRAM (**P**rerecorded **A**nnouncement and **M**usic) sends the signal of announcements or music to the CIDS.

A318–A321 CIDS Enhanced Presentation

CIDS ARCHITECTURE

On the A318, the new CIDS includes the central control components (the directors), the main user interface (the FAP) and the data interfaces (the DEUs).

The Directors includes a VSCF (**V**acuum **S**ystem **C**ontrol **F**unction) to control and indicate the status of the vacuum toilet system and a SDF (**S**moke **D**etection **F**unction) to give a warning of smoke in the lavatories and in the cargo compartment.

The directors command:

- through 2 top line busses type A DEUs which are the interface with the passenger related functions and the cabin illumination.
- through 2 middle line busses type B DEUs which are the interface with the cabin crew related systems.

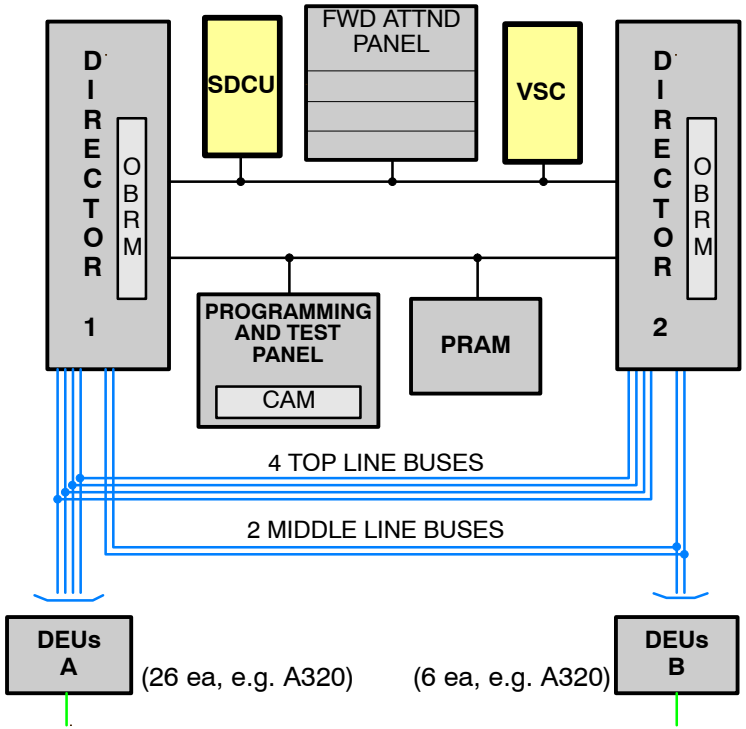
The new touch screen FAP (**F**light **A**ttendant **P**anel**)** controls and indicates the status of the CIDS. The CAM, OBRM and PRAM flash cards are integrated into the FAP for easy exchange.

There are provisions for additional FAP (**F**light **A**ttendant **P**anels).

The PRAM (**P**rerecorded **A**nnouncement and **M**usic) audio database is plugged into the FAP. This memory card contains Boarding Music audio and PRAM announcement audio–files.

All BITE tests related to the CIDS can be done by the MCDUs (**M**ultipurpose **C**ontrol & **D**isplay **U**nits).

A319–A321 CLASSIC



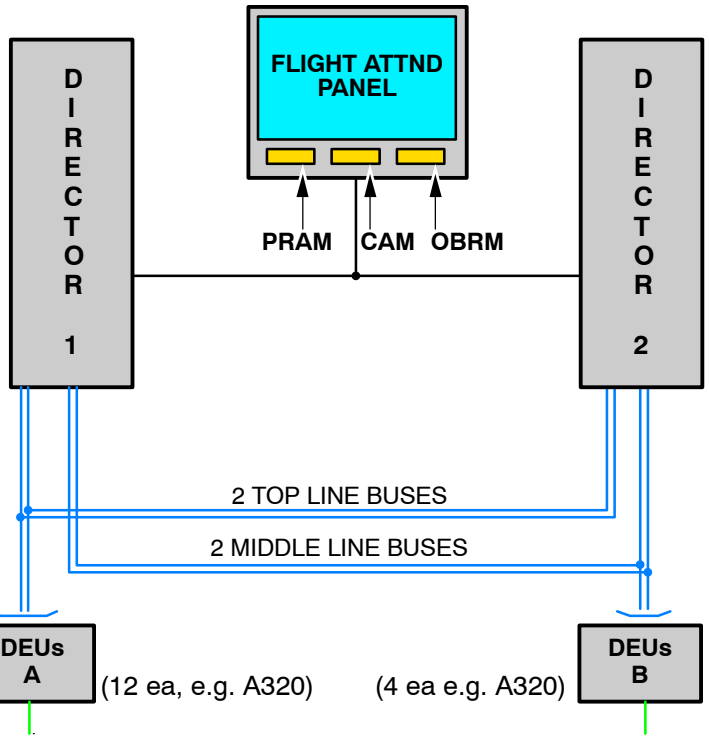
Passenger Related Items:

- Cabin Lights
- Cabin Signs
- Pax & LAV Calls
- Reading Lights
- Loudspeakers

Cabin Attendant Related Items:

- Handsets
- Attendant Indictation Panel
- Area Call Panels
- Additional Attenadant Panels
- Slide / Door Pressure Monitoring
- EPSU Test
- Drain Mast Heating

A318–A321 ENHANCED



Passenger Related Items:

- Cabin Lights
- Cabin Signs
- Pax & LAV Calls
- Reading Lights
- Loudspeakers

Cabin Attendant Related Items:

- Handsets
- Attendant Indictation Panel
- Area Call Panels
- Additional Attenadant Panels
- Slide / Door Pressure Monitoring
- EPSU Test
- Drain Mast Heating
- *Lavatory Smoke Detection*
- *Flush Control Unit (FCU)*
- *Liquid Level Sensor (LLS)*
- *Liquid Level Transmitter (LLT)*

Figure 124 Differences Between Classic and Enhanced CIDS

FLIGHT ATTENDANT PANEL INTRODUCTION

The Layout of the new ENHANCED FAP

The FAP is the main user interface with the CIDS. It programs, controls and indicates the status of the CIDS and related cabin systems.

It is made of a touch screen and a sub panel.

The FAP display structure is made of different pages related to the different systems connected to the CIDS. The FAP has its own software to build the screens using data from the directors.

On the top left hand corner of the screen, the CAUTion button will turn from grey to amber in case of CIDS fault. A message related to this caution will be displayed on the heading row to indicate which page to select. In some cases, system pages will come up automatically under failure detection.

The SCREEN OFF button is located in the lower left corner of the touch screen. Pushing that button switches the screen off.

The screen is also switched off, if no input is made for more than 10 minutes. The screen is switched on again, if you touch the screen or in case of an auto event.

The CABIN STATUS button on the bottom right hand corner of the screen calls the CABIN STATUS page, which gives an overview of the cabin status. This button will be green when the CABIN STATUS page is displayed or grey if not. At the bottom of the screen, the system and function keys are used to navigate through the different pages.

The sub panel is used for major functions, which have to operate independently from the FAP touch screen. The sub panel contains all hard keys and some interfaces and is protected under a transparent cover.

The following hard keys are installed on the sub panel:

- PED POWER
  to switch the PED (**P**ortable **E**lectronic **D**evice) power ON or OFF in all class seats,
- LIGHTS MAIN ON/OFF
  to switch the main cabin lights ON or OFF (100% or 0%),
- LAV MAINT
  standing for lavatory maintenance to switch lavatory lights on
- SCREEN 30 sec LOCK
  to lock the touch function of the screen and be able to clean it,
- EVAC CMD
  to initiate an emergency evacuation,
- EVAC RESET
  to reset the evacuation lights and audio alert,
- SMOKE RESET
  to reset the audio smoke alert,
- FAP RESET.

The following switches are installed on the sub panel:

- EMER
  standing for emergency,
- PAX SYS
  to cut off the In IFE (**In**flight **E**ntertainment) system, normally enabled upon power–up.

The following interfaces are installed on the sub panel:

- USB plug
  for Personal Computer connections,
- Headphone plug
  to listen to PRAM before broadcasting.

On the lower part of the FAP panel, 3 flash card readers are installed:

- OBRM flash card
  contains the system software.
- CAM flash card
  contains the system properties and cabin layout information e.g. for: Cabin zoning, Seat relation to loudspeakers and passenger lighted signs, Chime sequences, Audio levels.

The third flash card is optional:

- PRAM
  This module stores the prerecorded announcement and boarding music audio data.

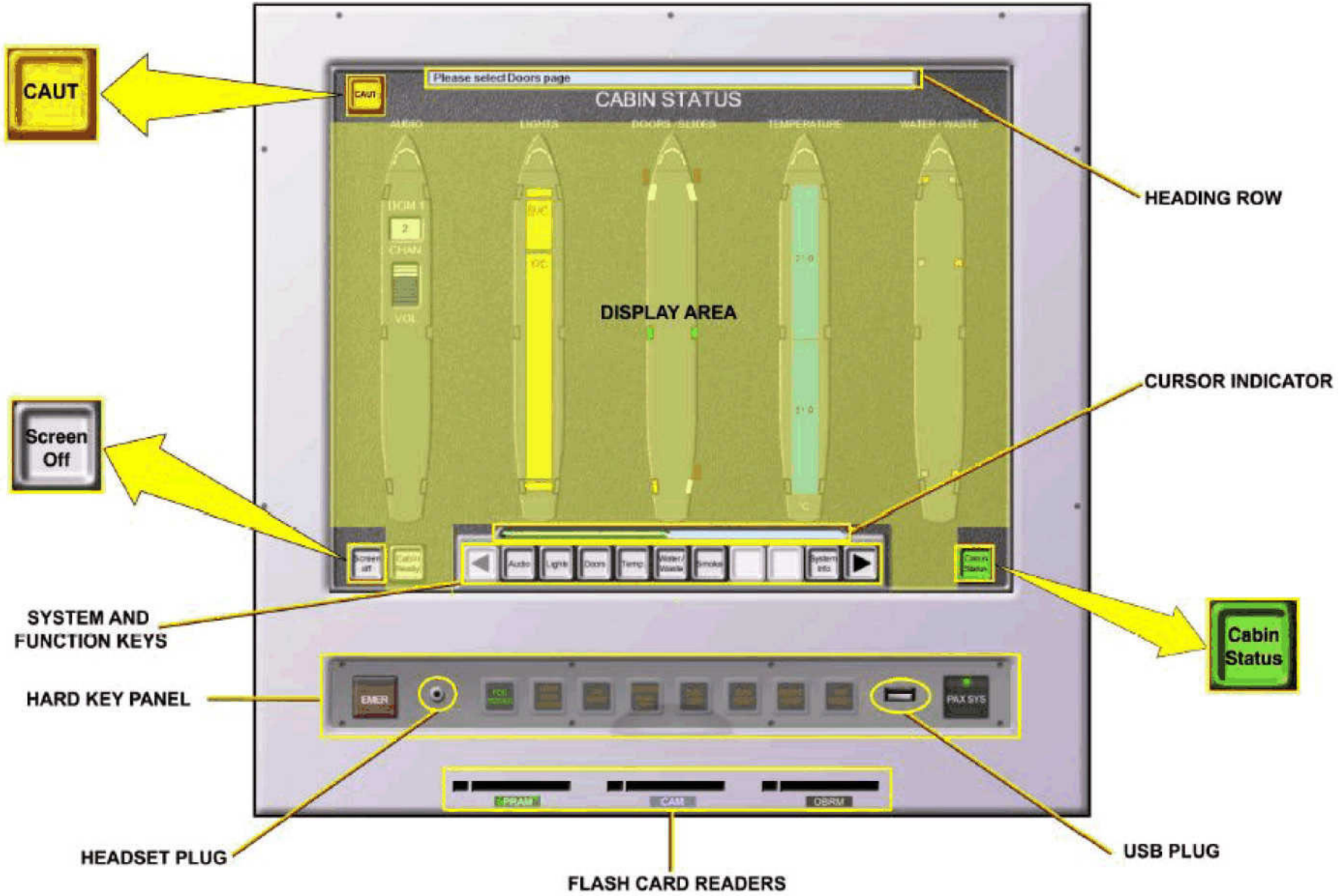


Figure 125 Flight Attendant Panel

CIDS DIRECTORS PRESENTATION

DIRECTOR

To make it easy to change the cabin layout, the CIDS hardware has spare inputs, outputs and circuits. These allow the connection of new and additional equipment without a hardware change of CIDS components.

Furthermore the software of the CIDS defines all operations. If any equipment is changed, only the CIDS software database has to be modified. A system reconfiguration for the installation of options, cabin reconfiguration or CIDS expansion is thus decreased to software database changes and decreases the aircraft out–of–service time. CIDS is also designed to detect faults in CIDS components and in the connected equipment by itself. Thus scheduled maintenance is unnecessary.

The system philosophy is based on:

- A microprocessor–controlled data–bus system,
- The connection of cabin systems via data bus cables,
- Four data bus lines (two top lines for PAX related systems and the cabin illumination and two middle lines for crew related systems),
- Two functional units for the data bus control, the CIDS directors 1 and 2,
- One director in active mode and the second one in hot–standby,
- Immediate switchover to the second director if a failure of the first one occurs,
- A FAP (**F**light **A**ttendant **P**anel) to program, to control and to indicate the status of the CIDS and related cabin systems,
- Provisions for additional FAP (**F**light **A**ttendant **P**anels),
- Addressable DEU (**D**ecoder/**E**ncoder **U**nits) type A for the interface between top line data buses and cabin related systems,
- PISA (**P**assenger **I**nterface and **S**upply **A**dapters) for the interface between DEU type A and some cabin related systems/units,
- Addressable DEU type B for the interface between middle line data buses and crew related systems,
- Easy exchange of the CAM which is plugged into the FAP,
- One OBRM (**O**n **B**oard **R**eplaceable **M**odule) which is plugged into the FAP and where the whole System Software is stored,
- A VSCF (**V**acuum **S**ystem **C**ontrol **F**unction) to control and indicate the status of the vacuum toilet system,
- BITE (**B**uild **I**n **T**est **E**quipment) to make scheduled maintenance unnecessary,
- A SDF (**S**moke **D**etection **F**unction) to indicate a detected smoke in the lavatories.

DATA BUSSES

The data bus interface is an unidirectional or bidirectional interface:

- **Unidirectional interfaces**

  The CIDS uses three different unidirectional interfaces for data–transmission:

  – **ARINC 429**

  This data bus transmits 32 bit data words. The bus operates as a lowspeed (**12KB/sec**) or highspeed interface (**100KB/sec**).

  – **RS 232**

  This data bus transmits 8 bit data words with **9600B/sec**.

  – **CAN** (Controller Area Network)

  This data bus operates as a highspeed interface with a speed of **83.33KB/sec**. It has a CAN bus terminator installed.

- **Bidirectional interfaces**

  The CIDS uses the CIDS busses (Top Line and Middle Line) and the Ethernet for bidirectional transmissions.

  – Top Line and Middle Line

  These busses transmit data between director and all Decoder/Encoder Units (DEUs). The busses transmit 14 bit data words with 4MB/sec.

  – Ethernet

  This bus transmits data words with 10MB/sec.

Power supply

The DC service bus and the DC essential bus supply electrical power to the CIDS directors (inclusive the SDF board).

Depending on the available bus the CIDS operates in the:

- Normal mode: both busses are available. All functions (also BITE) are active.
- Emergency mode: only the ess. bus is available. PA, smoke det., EVAC and cab int. are available.

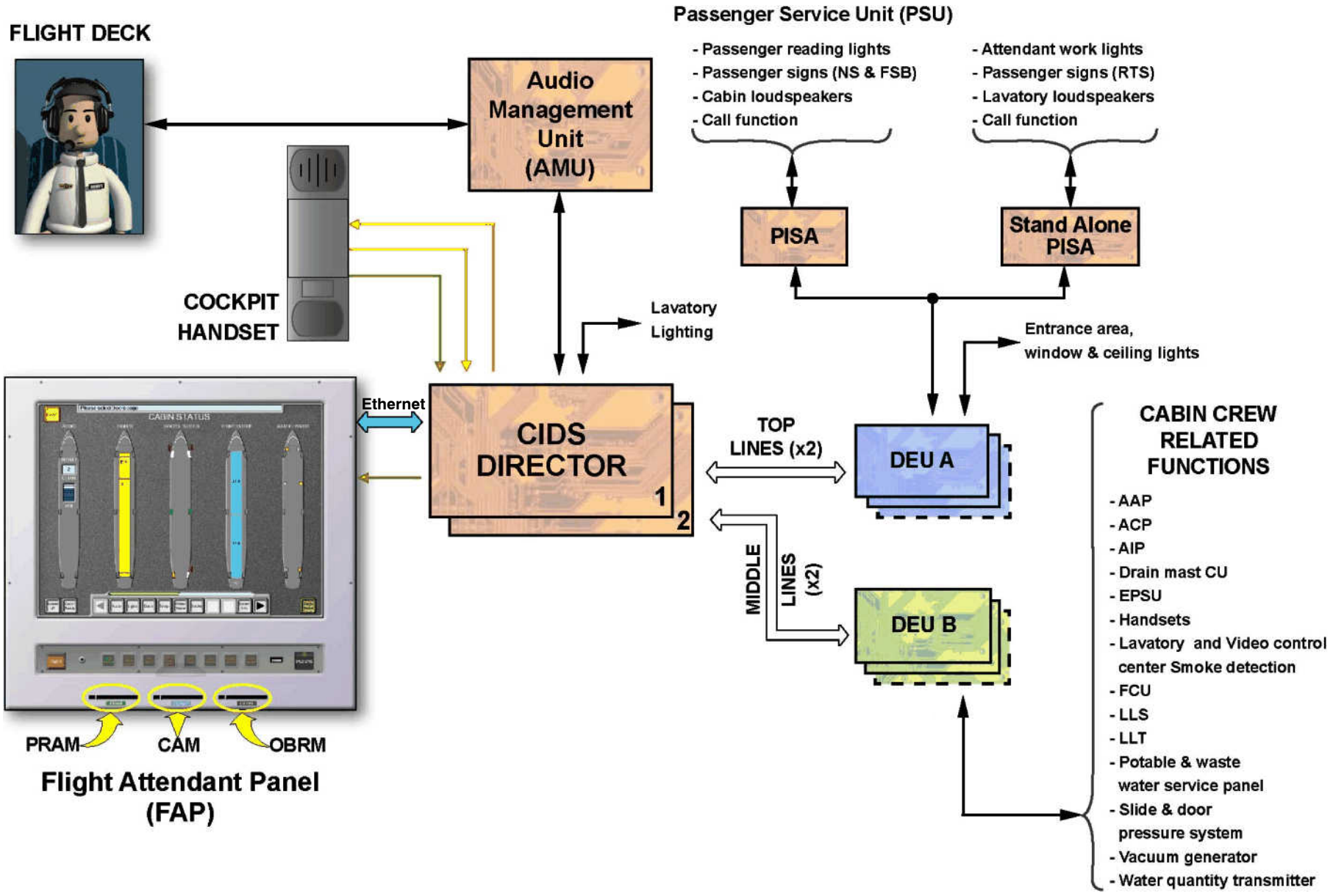


Figure 126 CIDS Schematic

DEU A

Control

Each DEU type A is controlled by the active director. The DEUs type A are connected to one of the two data–bus top lines via connection–boxes. One top line is installed along each A/C side.

Every DEU type A on one A/C side is connected to the same top line. Every connection–box of the DEU includes coding switches which give each DEU type A its own address. The last connection–box connected to a top line includes also a termination resistor for impedance matching and is therefore called a termination box. (10 DEU A are installed in A318. The maximum number of DEU A is 17)

INTERFACES

The DEU type A has direct interfaces to the:

- Director (both),
- Ballast units (up to 8),
- Loudspeakers (2 direct and 8 via PISA)
- NS, FSB and RTS signs,
- PISA (**P**assenger **I**nterface and **S**upply **A**dapters) (up to 6),
- StA PISA (**St**and **A**lone **P**assenger **I**nterface and **S**upply **A**dapters)

NOTE: StA PISA are used for the interface between DEU type A and equipment/ indications installed near the cabin attendant stations fwd and aft.

The DEU type A has interfaces via PISA or StA PISA to the:

- Loudspeakers,
- Reading lights,
- Attendant work lights,
- Seatrow Identifiers
- PAX call/reset pushbuttons,
- PAX call lights,
- NS, FSB and RTS signs.

Power supply

The DEUs type A are supplied by the DC service bus 601 PP or the DC ESS BUS 401 PP. In emergency mode, when the main power is lost the DEU A are only supplied with power when an audio signal is present. If there is no audio signal, the director operates the Top Line cut–off relay 106 RH to stop the power supply to the DEUs.

PISA (Passenger Interface and Supply Adapter)

The PISA is the interface between the DEU type A and components of the PSU (**P**assenger **S**ervice **U**nit). The PISAs are installed in each PSU in the pressurised area of the cabin.

Architecture

The PISA has two boards:

- a Main board,
- an Audio board.

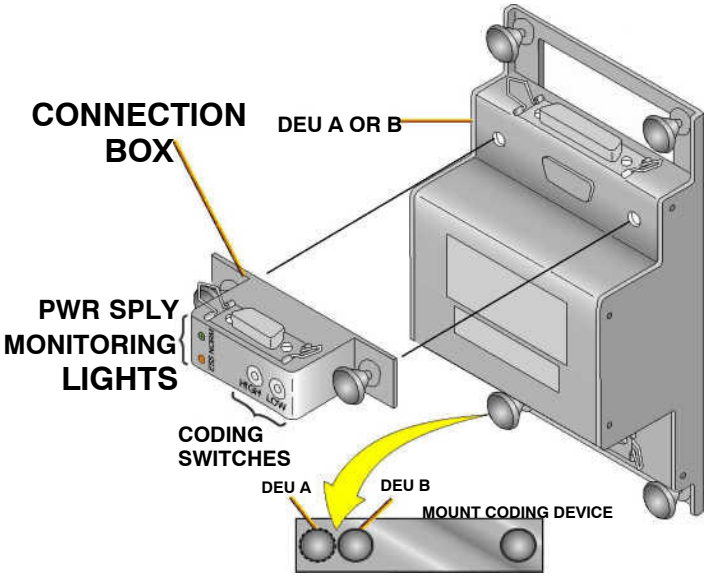


Figure 127 Example DEU

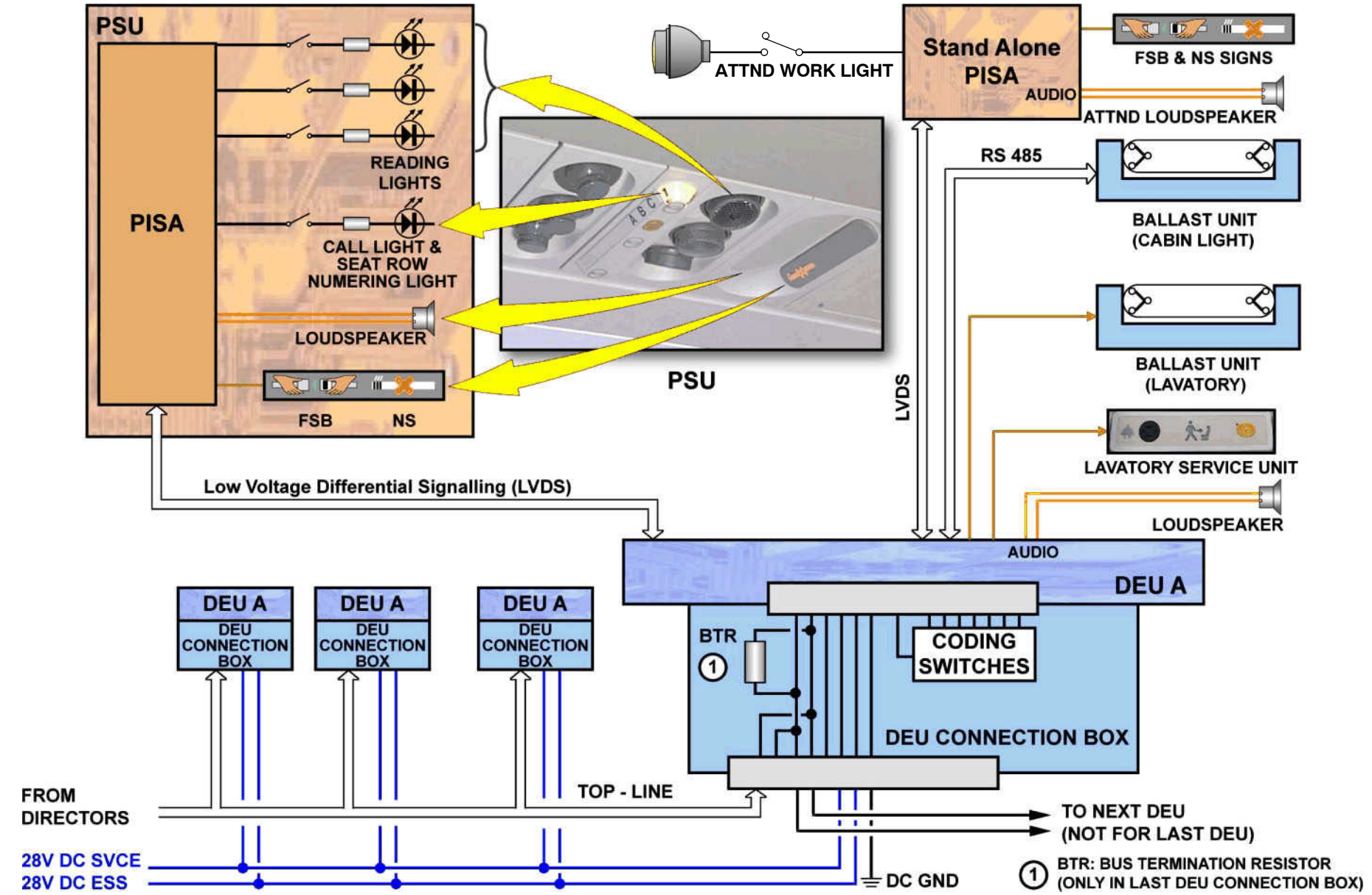


Figure 128 DEU A Interconnection

DEU B

Control

Each DEU type B is controlled by the active director. The DEUs type B are connected to one of the two data–bus middle lines via connection–boxes. The middle lines are installed along each A/C side. The middle line at one A/C side (left and right) connects every DEU type B at the same A/C side.

Every connection–box of an DEU includes coding switches which give each DEU type B its own address. The last connection–box connected to a middle line includes also a termination resistor for impedance matching and is therefore called termination box. (4 DEU B are installed in a A318. Up to 6 DEU B are the maximum)

INTERFACES

The DEU type B has data bus interfaces to the:

- Director,
- AIP (**A**ttendant **I**ndication **P**anel),
- AAP (**A**dditional **A**ttendant **P**anel)
- EPSU (**E**mergency **P**ower **S**upply **U**nit),
- Lavatory Smoke Detector.

The DEU type B has discrete interfaces to the:

- ACP (**A**rea **C**all **P**anel),
- DMCU (**D**rain **M**ast **C**ontrol **U**nit),
- LLS (**L**iquid **L**evel **S**ensor),
- Door pressure sensor,
- Slide pressure sensor,
- LLT (**L**iquid **L**evel **T**ransmitter),
- FCU (**F**lush **C**ontrol **U**nit),
- Waste Service Panel,
- Vacuum Generator,
- Fan Phase Off Relay,
- Prime Level Indicator (Precharge) OPTION,
- Water Service Panel,
- Vacuum Power Control Relay,

Discrete and audio interface to the Handsets.

Power supply

The DEU typ B are supplied by the DC service bus 601 PP. If this bus is lost the DEUs can be powered by the DC ESS BUS 401PP.

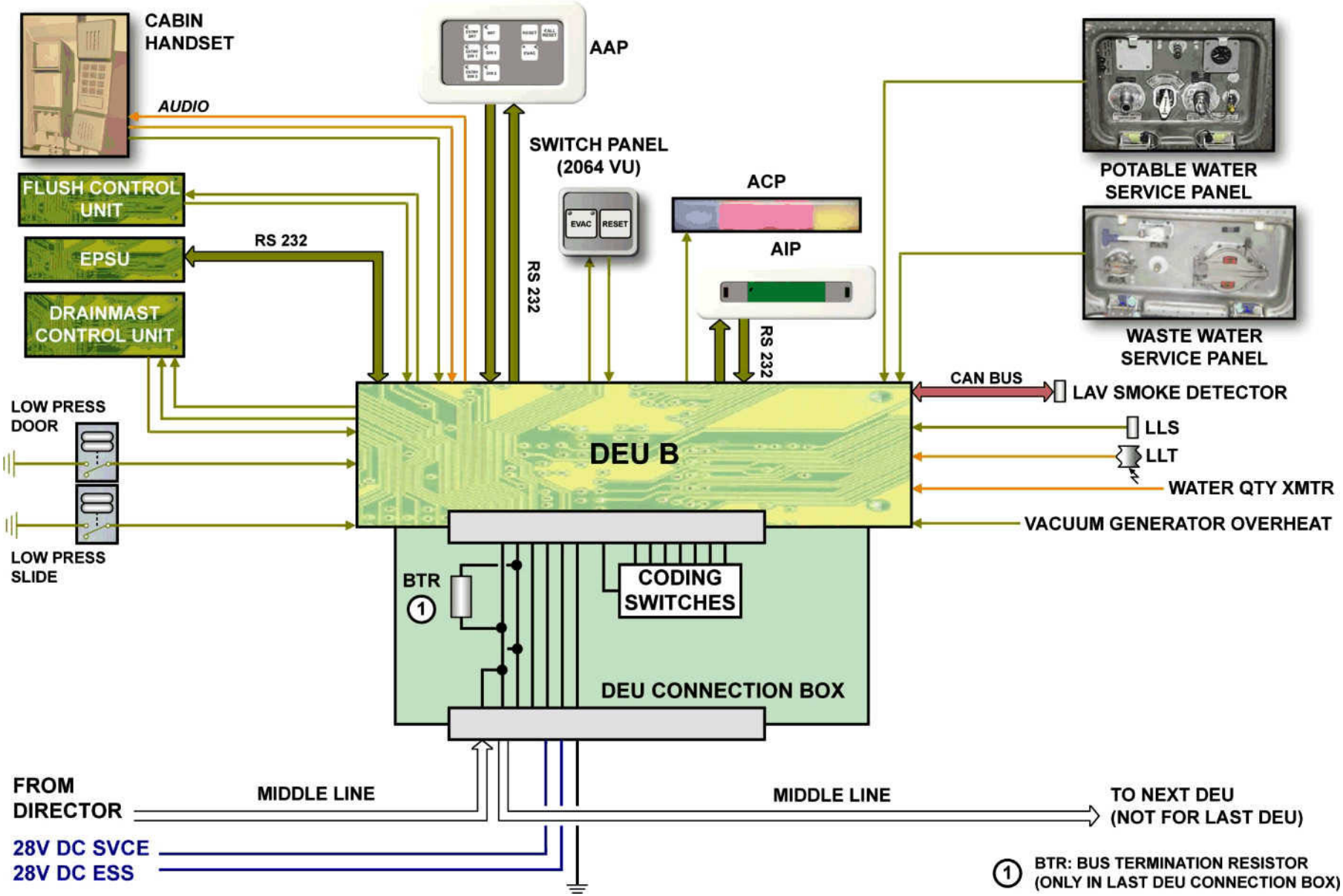


Figure 129 DEU B Interconnection

CABIN ATTENDANT HANDSET

The attendants use the cabin handsets for the Cabin and Flight Crew Interphone functions and for PA announcements. An integrated keyboard is used to make different types of calls/announcements.

The cabin handsets are installed in a vertical position near the attendant stations in the pressurized area of the cabin.

Each attendant station has a handset for public announcement, interphone dialing and communication. The handset rests in a cradle.

Handset Functions

The handset and cradle fulfill the following functions:

- the hook–off sensing,
- the Push–To–Talk (PTT) switching,
- the Passenger Address (PA) announcement,
- the interphone.

Architecture

The handset has these components:

- Integrated keyboard,
- Direct PA - 'Push To Talk' pushbutton,
- Microphone unit with a pre–amplifier,
- Earphone,
- Tone dialling interface circuit,
- Hall–effect switch.

Integrated Keyboard

With the integrated keyboard the related functions are selected and establish a communication link. The keys give a tactile feedback when you push them.

Direct PA - 'Push To Talk' (PTT) Pushbutton

This pushbutton activates the microphone in the handset. In special cases this button establishes also a communication link.

Microphone Unit With a Pre–Amplifier

The microphone changes the voice into the related signals. The pre–amplifier provides a stable output power in all environmental conditions.

Earphone

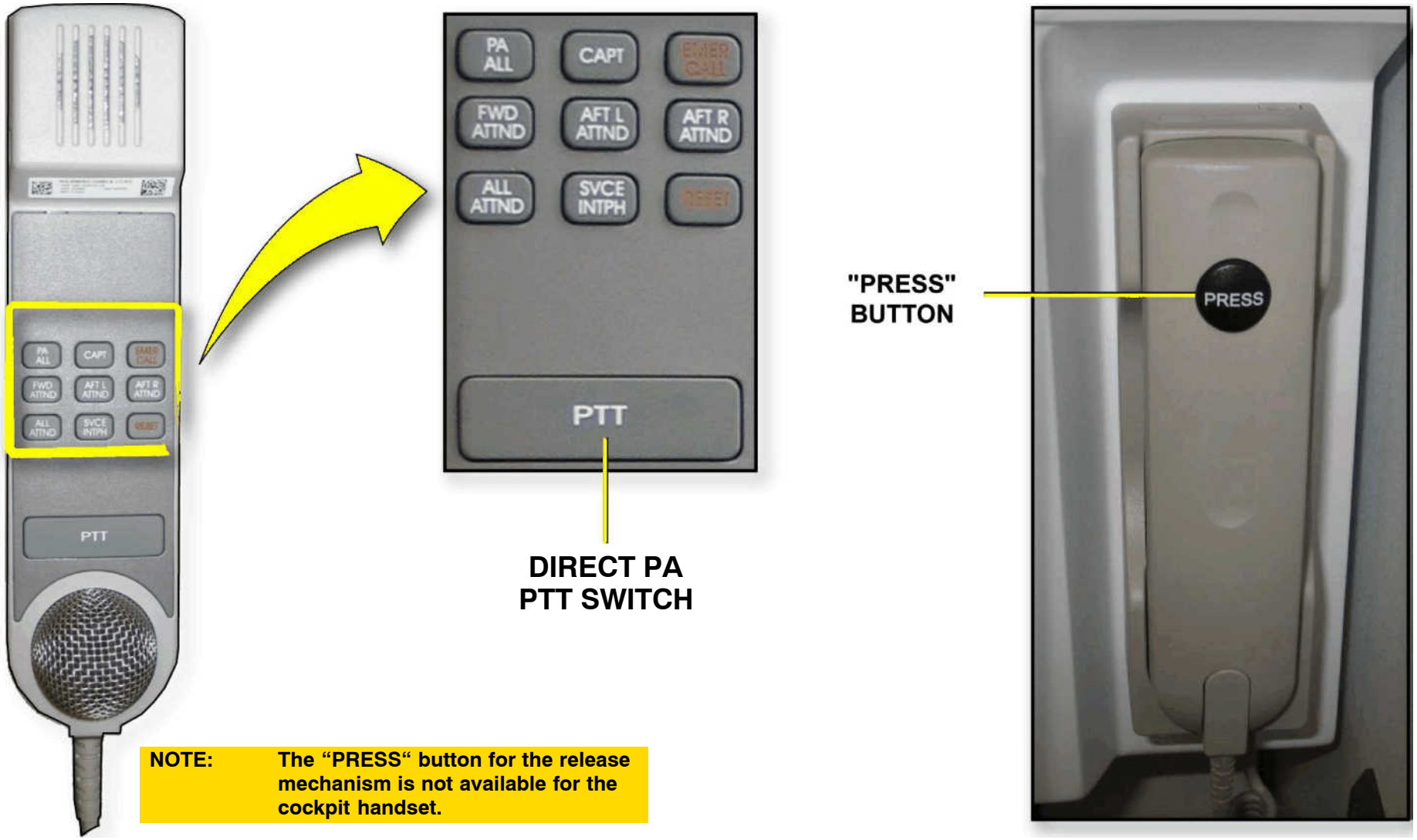
The earphone changes the related signals into the voice.

Tone Dialling Interface Circuit

The interface decodes the keyboard signals and generates Dual Tone Multiple Frequency (DTMF) coded dial signals. Voice signals are routed through to the outputs of the interface.

Hall–Effect Switch

When the handset is in its cradle, the hall–effect switch senses the field of a permanent magnet in the handset cradle. The hall–effect switch then transmits an internal command to set the handset into a standby mode with minimized power consumption. When the handset is not in its cradle, the hall–effect switch connects electrical power to the handset.



NOTE: **The “PRESS“ button for the release mechanism is not available for the cockpit handset.**

Figure 130 New Cabin Handset

FLIGHT ATTENDANT PANEL

General

The FAP (**F**light **A**ttendant **P**anel) is used to control different cabin systems and the CIDS, to indicate the status of different systems and for on–board changes of the CAM data (e.g. cabin layout and no smoking zones).

Architecture

The FAP has the following modules:

- Display unit, for display and containing the processing module
- Sub panel with the hardkeys and some interfaces (e.g. USB)

Interfaces

The FAP has data bus interfaces to the:

- Director 1,
- Director 2,
- CINS (**C**abin **I**nformation **N**etwork **S**ystem).

The FAP has discrete interfaces to the:

- Director 1,
- Director 2,
- Emergency Lighting System,

OBRM (On Board Replaceable Module)

This module is the storage device for system software (e.g. director S/W, FAP S/W). It is installed in the sub panel of the FAP.

CAM (Cabin Assignment Module)

In this module the CIDS configuration data base is stored. Minor CAM data are changed by on–board programming, major CAM data are changed by replacement of the CAM with a reprogrammed CAM. It is installed in the sub panel of the FAP and includes the cabin definition, e.g. for:

- Cabin zoning,
- Seat relation to loudspeakers and passenger lighted signs,
- Chime sequences,
- Audio levels.

PRAM (Prerecorded Announcements and boarding Music system)

This third removable memory card is option. The integrated PRAM stores prerecorded announcement and boarding music audio data.

Power supply

The FAP is powered by the DC service bus 601PP. In emergency mode the DC ess bus 401PP can be used.

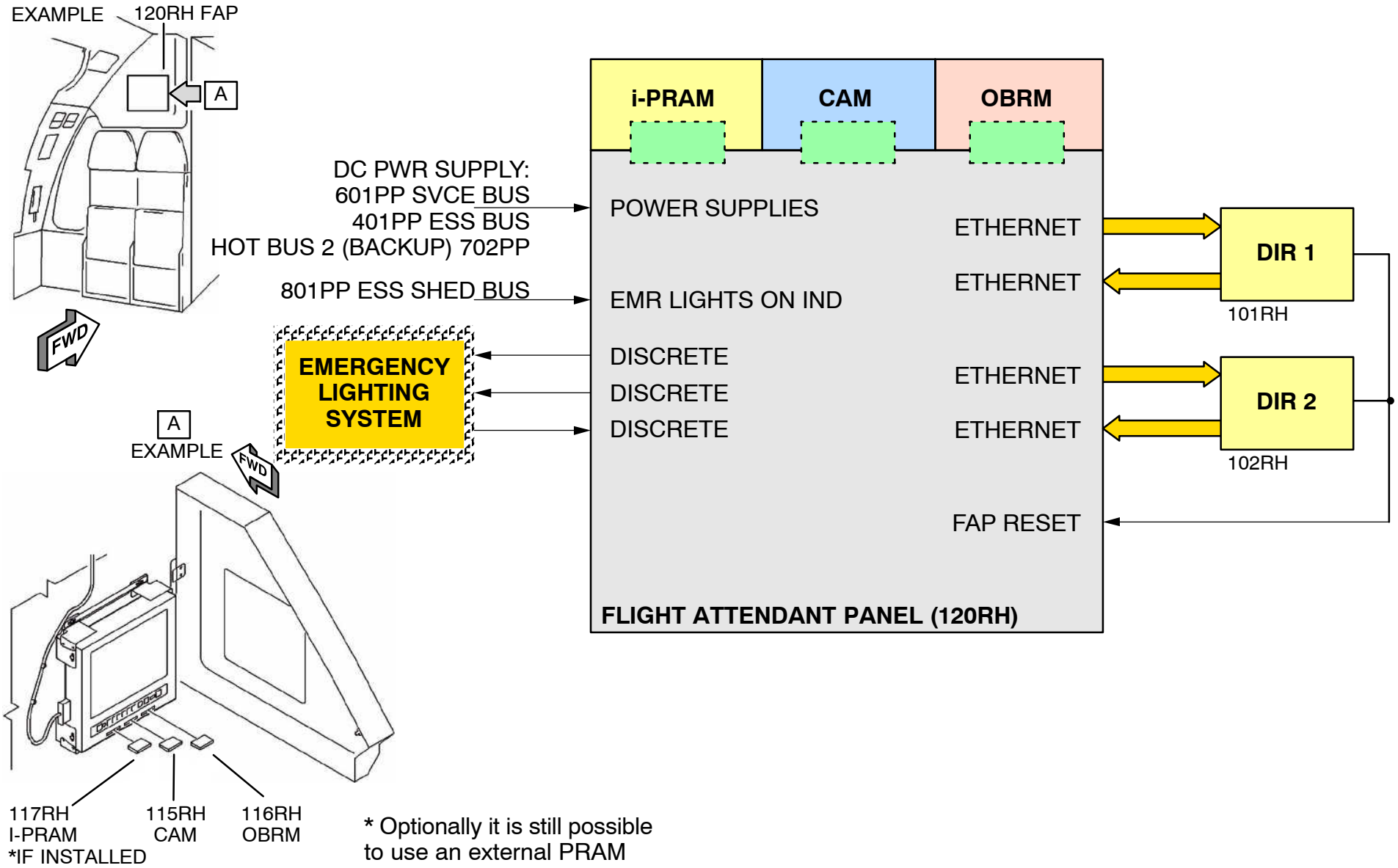


Figure 131 Flight Attendant Panel Schematic

CIDS DIRECTOR DESCRIPTION/OPERATION

GENERAL

For redundancy, the system has two identical directors (DIRs). In normal operation, DIR 1 is active and DIR 2 is in hot stand–by. DIR 2 receives and computes the same data as DIR 1 but its outputs are disabled when director1 is available.

The director commands cabin equipment via Decoder/Encoder Units (DEUs). The cargo smoke system is linked by Controller Area Network (CAN) buses. The Flight Attendant Panel (FAP) is linked by ethernet buses.

Each DIR is separated in two parts:

- the DIR main functions with the integrated Vacuum System Control (VSC) function,
- the smoke detection board.

Both parts work independently with segregated hardware and software.

System reconfiguration for the installation of options, cabin reconfiguration or Cabin Intercommunication Data System (CIDS) expansion is limited to software database changes. These databases are the On Board Replaceable Module (OBRM) and Cabin Assignment Module (CAM).

The CIDS is also designed to detect internal and external faults. The CIDS is a Type 1 BITE system. The DIRs are connected by ARINC data buses to the Centralized Fault Display System (CFDS) for maintenance purposes.

CIDS Power

In the normal mode, the SerViCE BUS supplies the FAP (with the optional power supply with CIDS A318 type, the FAP is supplied by the HOT BAT BUS), all DIRs, and all DEUs with 28V DC.

The system operates at full capacity. In the emergency mode, only the ESSential BUS supplies 28V DC to the CIDS. The type A DEUs, which are connected to the top lines, are then only supplied with power when a Passenger Address (PA) signal is present. If there is no PA signal, the DIR operates the top line cut–off relays to stop the power supply to the DEUs.

CIDS Function

The DIR is a central control and interface component of the CIDS. The current cabin layout and properties of layout related equipment are stored in the DIRs. The DIR provides the following functions:

- the transmission of digitized audio signals,
- the transmission of control data and commands,
- the adaptation of received DEU data,
- the control of other CIDS functional units,
- the control of the FAP,
- the data transfer to the Passenger Entertainment System (PES),
- the service interphone system,
- the control of the Additional Attendant Panel (AAP) via type B DEUs,
- the interface to cockpit and avionics compartment,
- the handling of cabin systems related inputs and outputs,
- the control and interface of other systems,
- the realization of programming functions,
- the realization of test functions,
- the activation of emergency mode with minimum power consumption.

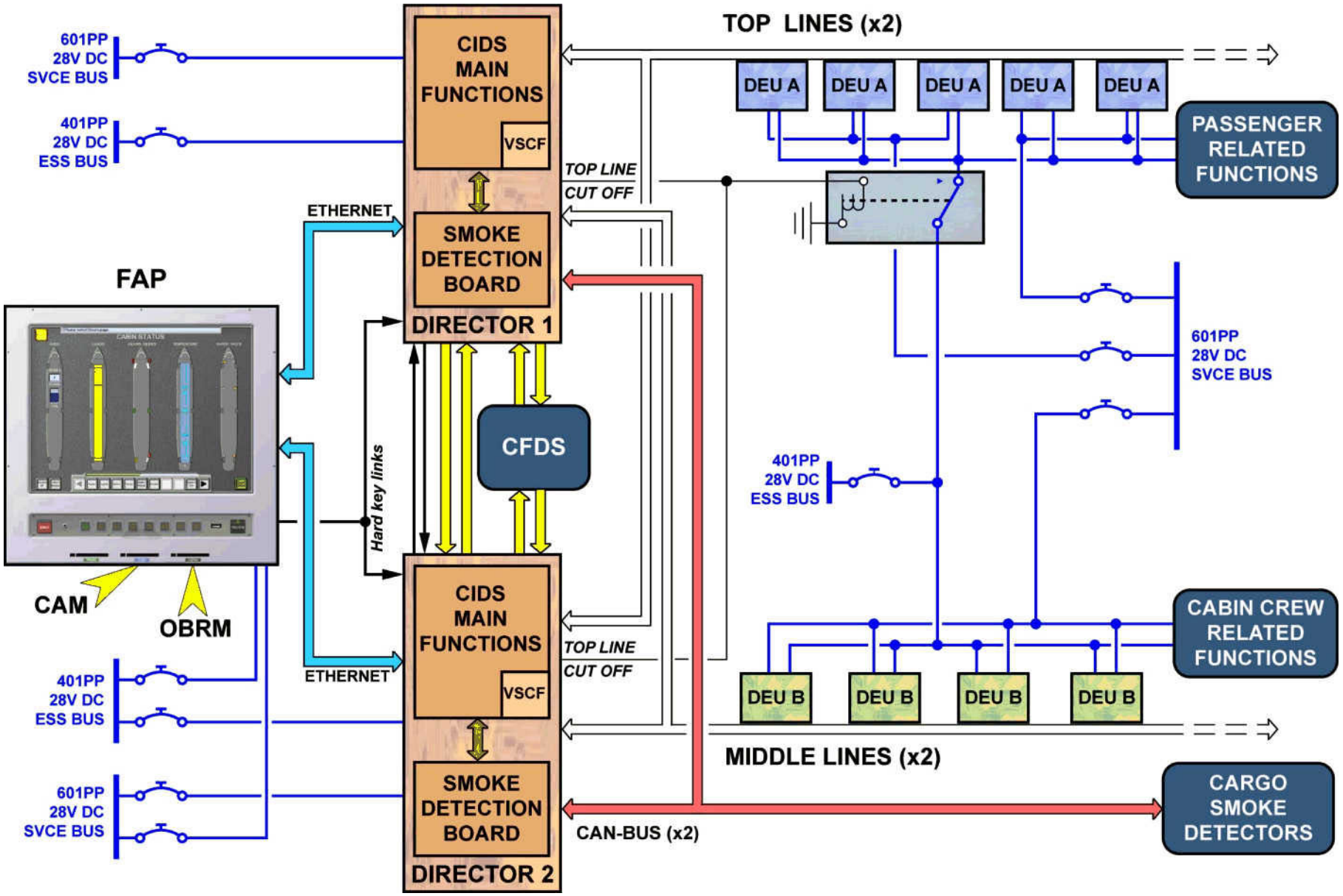


Figure 132 CIDS Power Supply and Smoke Detection Function

DEU CONNECTION BOX DESCRIPTION

The type A and type B Decoder/Encoder Units (DEUs) are physically the same, however a type A DEU cannot be replaced by a type B DEU and vice versa due to a mount coding device.

Connection boxes connected to the middle line are physically the same as the ones connected to the top lines. On each DEU connection box, there are two address–coding switches which give the DEU its own address.

In case of a connection box change make sure that the coding switches are correctly set for the location.

There are power supply monitoring lights on each connection box.

The green NORMal LED is on if the DC SerViCE BUS power is good.
The amber ESSential LED is on if the DC ESS BUS power is good.

ATTENTION: A bus termination resistor is installed on the last DEU connection box of each line, for impedance matching.
Therefore it is called TERMINATION BOX and is not interchangeable with the other connection boxes.

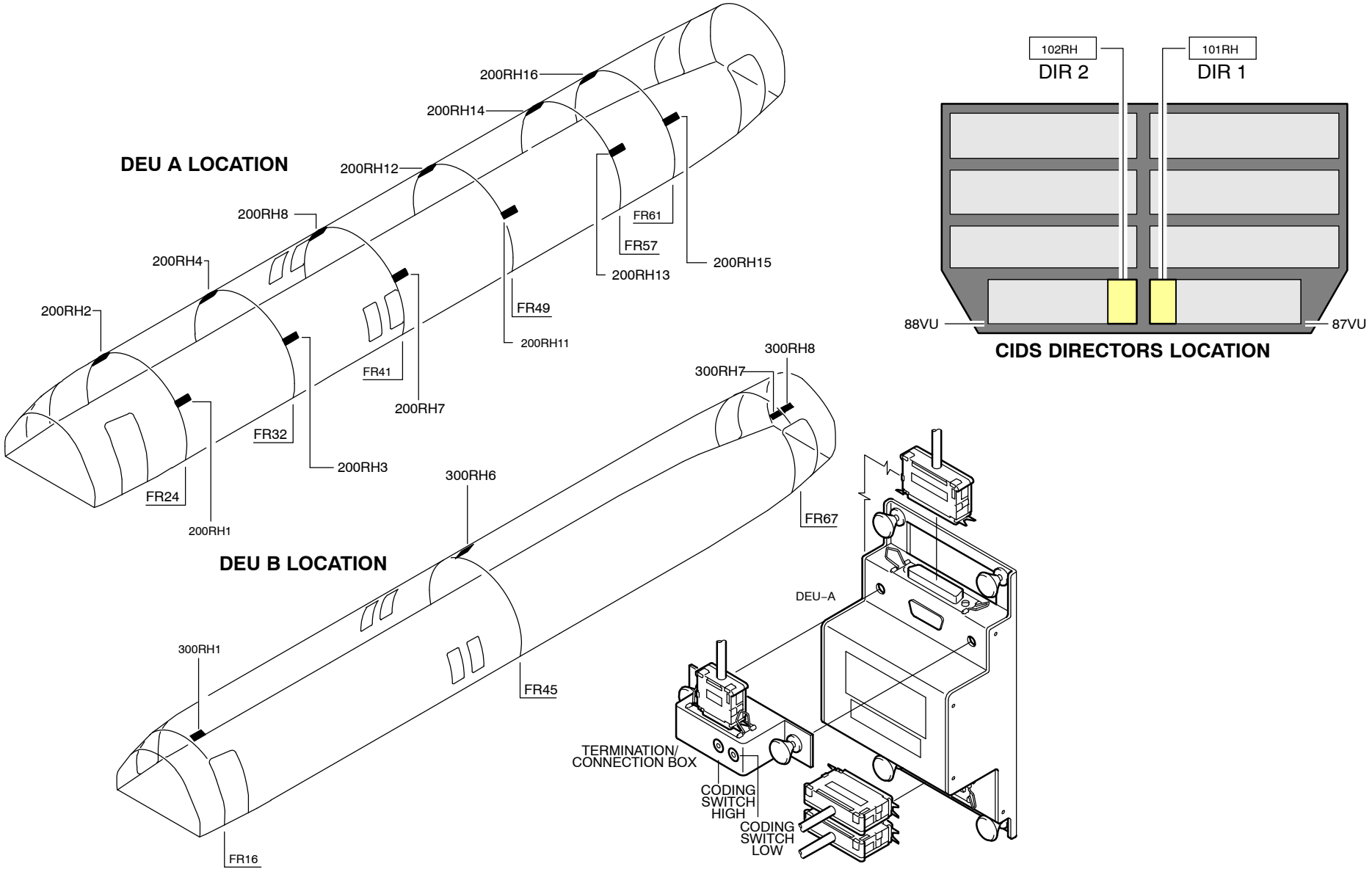


Figure 133 Enhanced DEU A, B & DIR Location (Ex. A320)

FLIGHT ATTENDANT PANEL

PAGES

- **CABIN STATUS** page

  To select the CABIN STATUS page push the button in the lower right corner of the touchscreen. This page is used to give a general overview of the current cabin status. The following system overview pages are available by pressing the FAP system keys or the respective fields on the screen:

- **AUDIO** page

  This page provides controls and displays for PRAM. The BGM (**B**oardin**g** **M**usic) controls and displays are: ON/OFF, CHANnel select and VOLume control. The prerecorded announcement controls and displays are:

  An alphanumerical keyboard and keys for ENTER, CLEAR, up/down (memo search), CLEAR MEMO, CLEAR ALL, STOP, START NEXT, START ALL. The page also has switches for cabin settings:

  – PA LEVEL (+/– 6dB if the engines are stopped),
  – CALL RESET to reset passenger calls,
  – CHIME INHIBIT (passenger calls turn on the call lights without chimes),

- **CABIN LIGHTING** page

  This page is used to control the cabin lighting for the cabin zones.

- **DOORS** / **SLIDES** page

  This page displays the doors/slides status onto the aircraft:

  – A red symbol indicates a door unlocked/open,
  – A green symbol indicates a door locked and its escape slide armed,
  – An amber symbol indicates a door locked but its escape slide disarmed. The words ”SLIDE DISARMED” are also shown in amber near the associated symbol.

- **CABIN TEMPERATURE** page

  This page is used for remote control of the air conditioning system. The page indicates the selected target and actual temperature of the forward and aft cabin areas.

  Note that the temperatures are basically displayed in metric units and, as an option, can be displayed in US units. Forward and aft areas can be individually selected and controlled. Push the RESET switch to reset the temperature control to the cockpit selected values.

- **WATER/WASTE** page

  This page is used to give information about the water and waste systems. Refer to ATA CHAPTER 38 for more information.

- **SMOKE DETECTION** page

  This page indicates cabin related smoke alert and smoke sensor faults..

- **SYSTEM INFO** page

  This menu provides the status indication of several cabin systems (CIDS Internal, Ice Protection, Miscellaneous).

  Additionally, this menu appears during all flight phases if there is a message for the cabin crew. An amber light, next to a system switch, indicates that a fault status message is loaded. Push the related switch to display the message.

FAP ACCESS CODES

For some functions an access code has to be entered. This code is generally **318** and **813** for the software loading.

DLH FAP ACCESS CODES

For some functions an access code has to be entered. This code is generally **346** and **654** for the software loading (same as on the A340–600 fleet).

Additionally the following system pages are protected by a password:

- SOFTWARE LOADING,
- LAYOUT SELECTION,
- CABIN PROGRAMMING,
- LEVEL ADJUSTMENT (deactivated at DLH),
- MCDU Simulation.

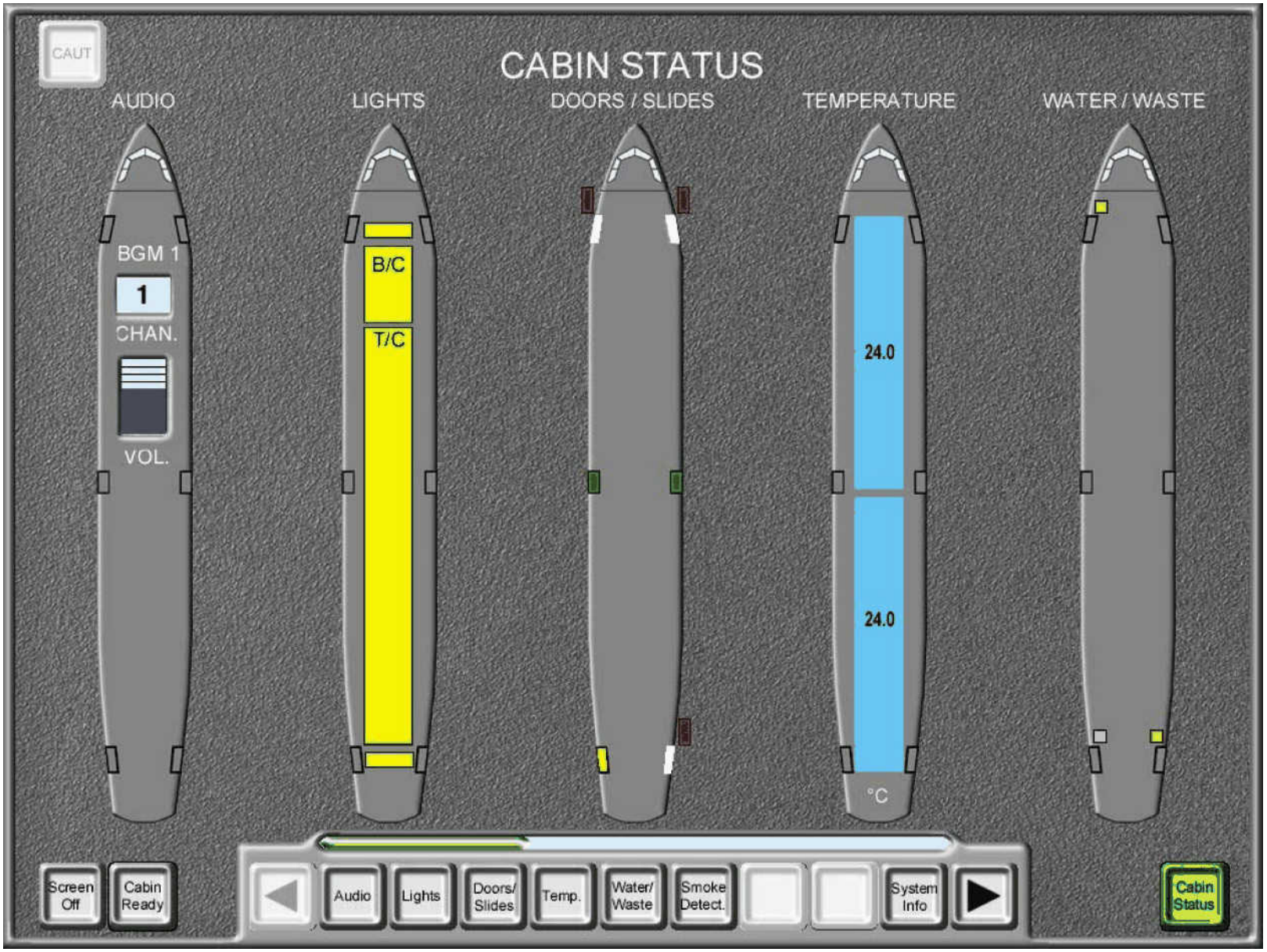


Figure 134 Cabin STATUS Page

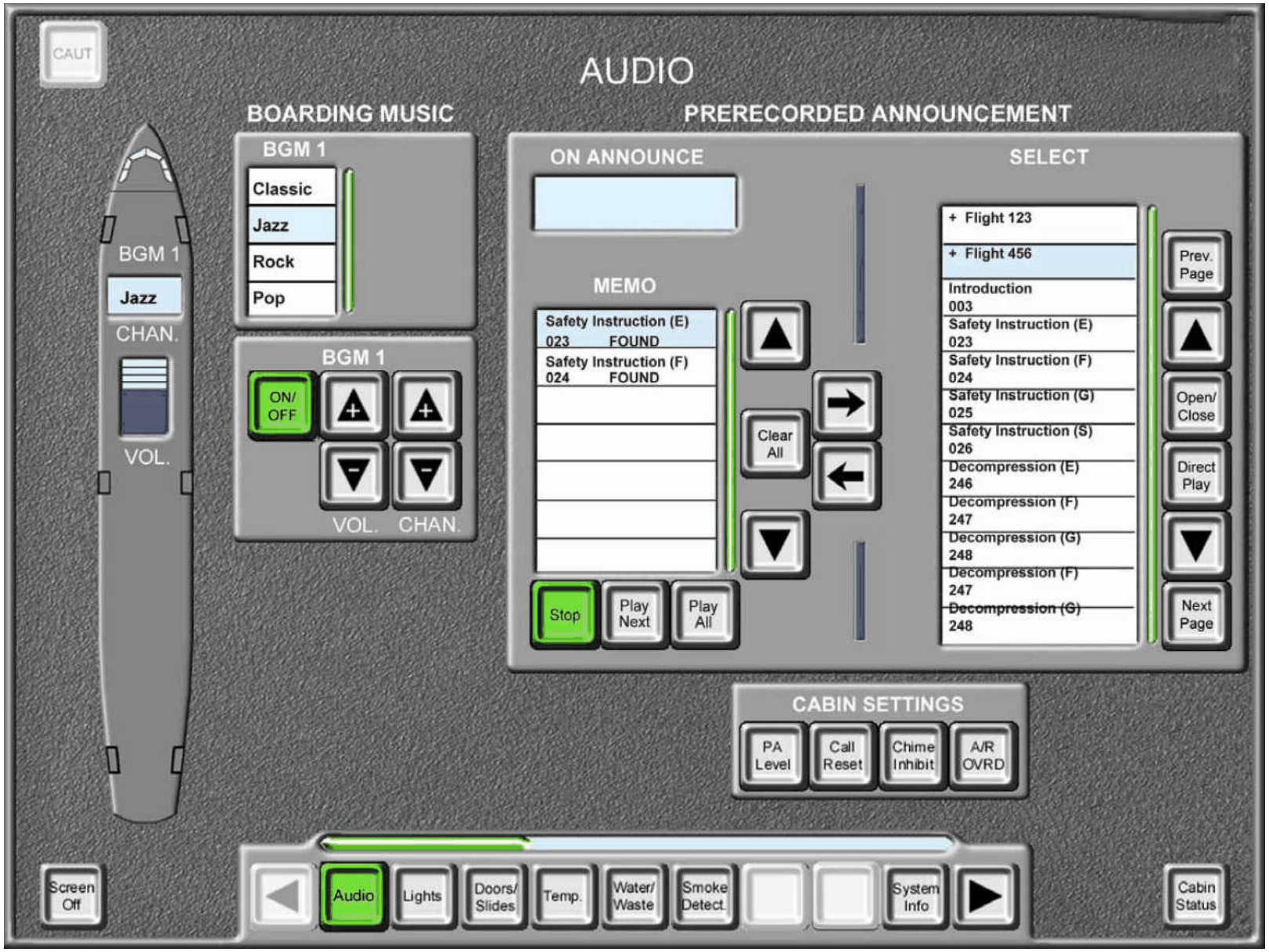


Figure 135 AUDIO Page

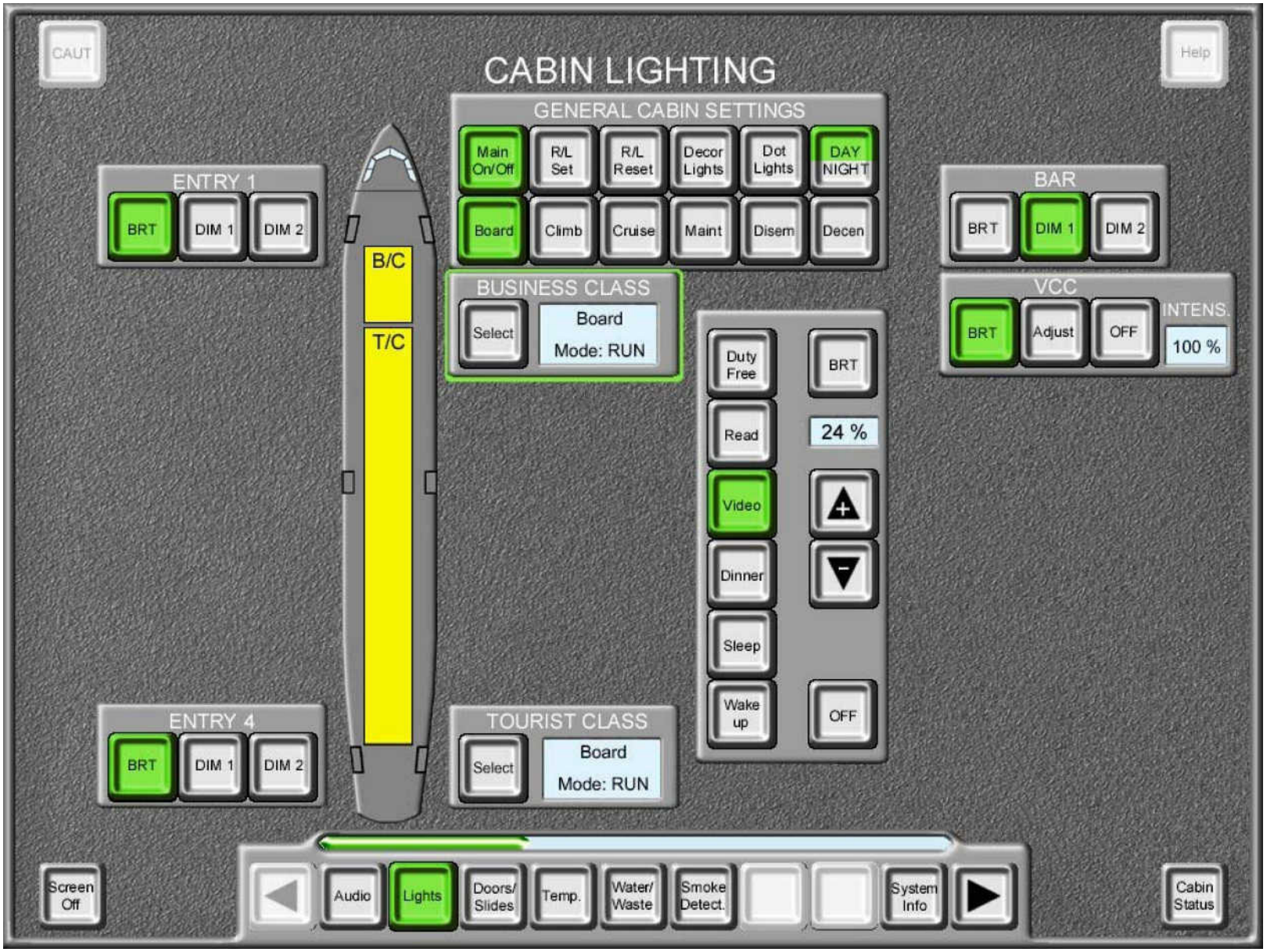


Figure 136 CABIN LIGHTING Page

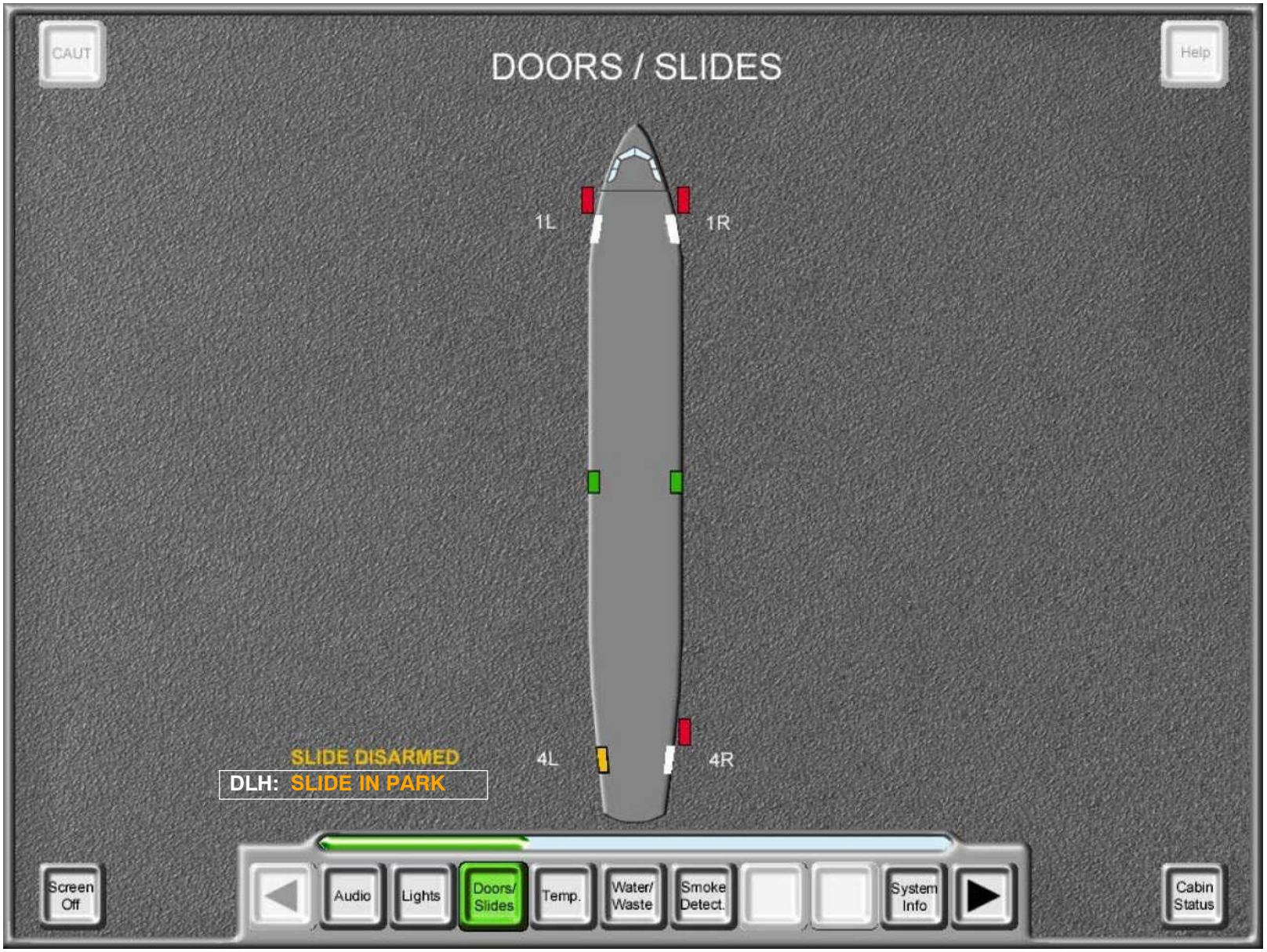


Figure 137 DOORS/SLIDES Page

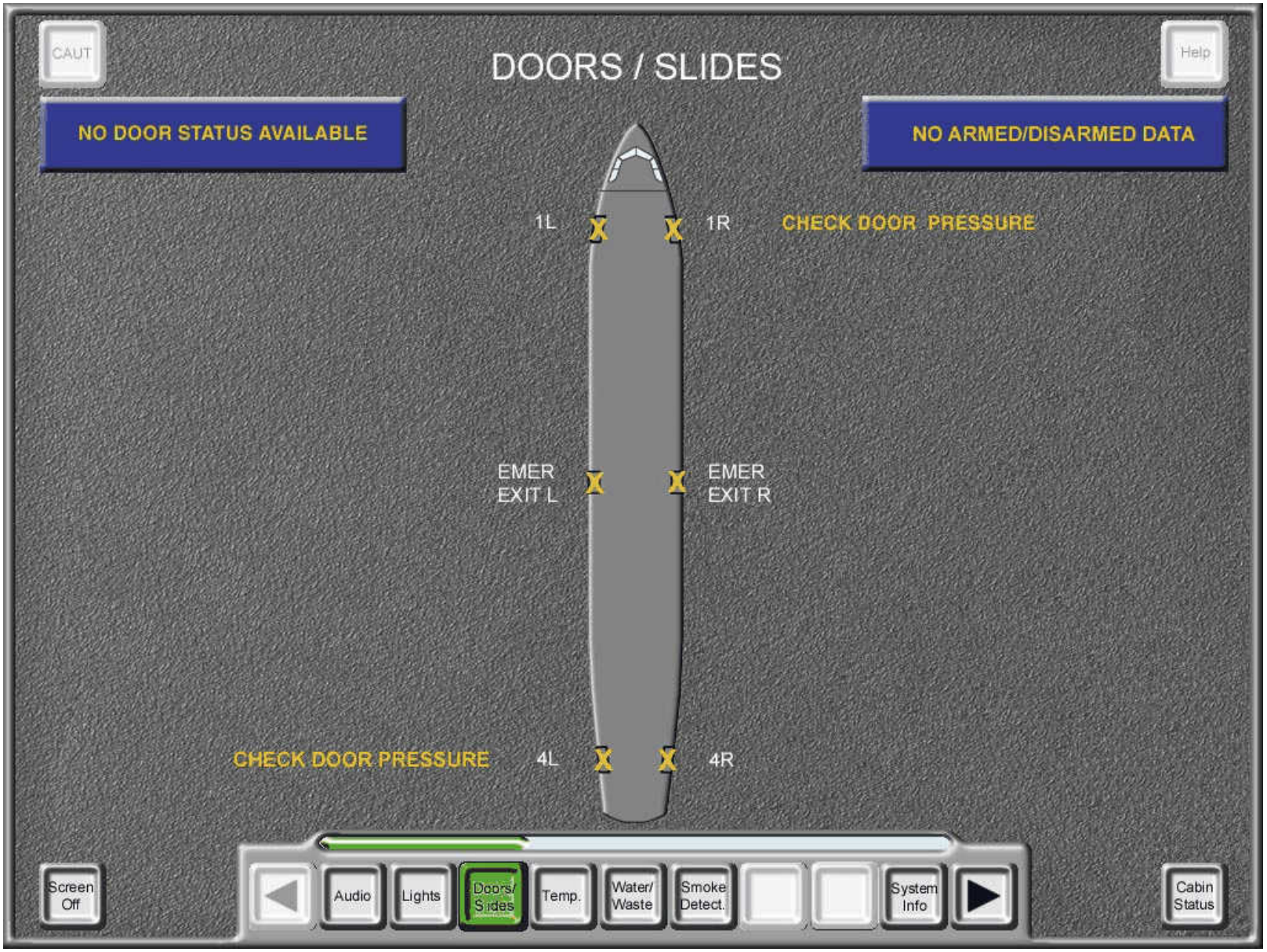


Figure 138 Failures on DOORS/SLIDE Page

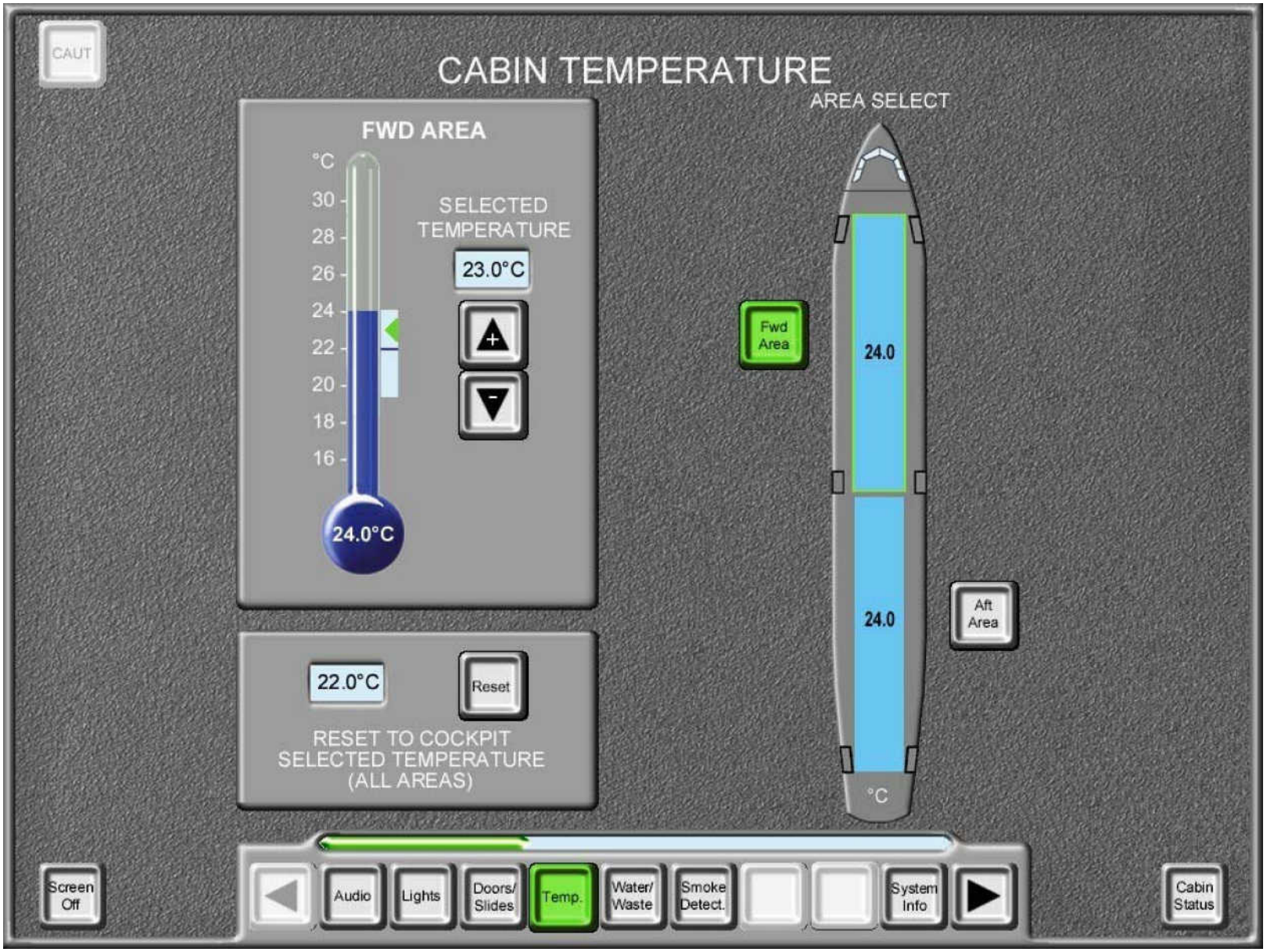


Figure 139 CABIN TEMPERATURE Page

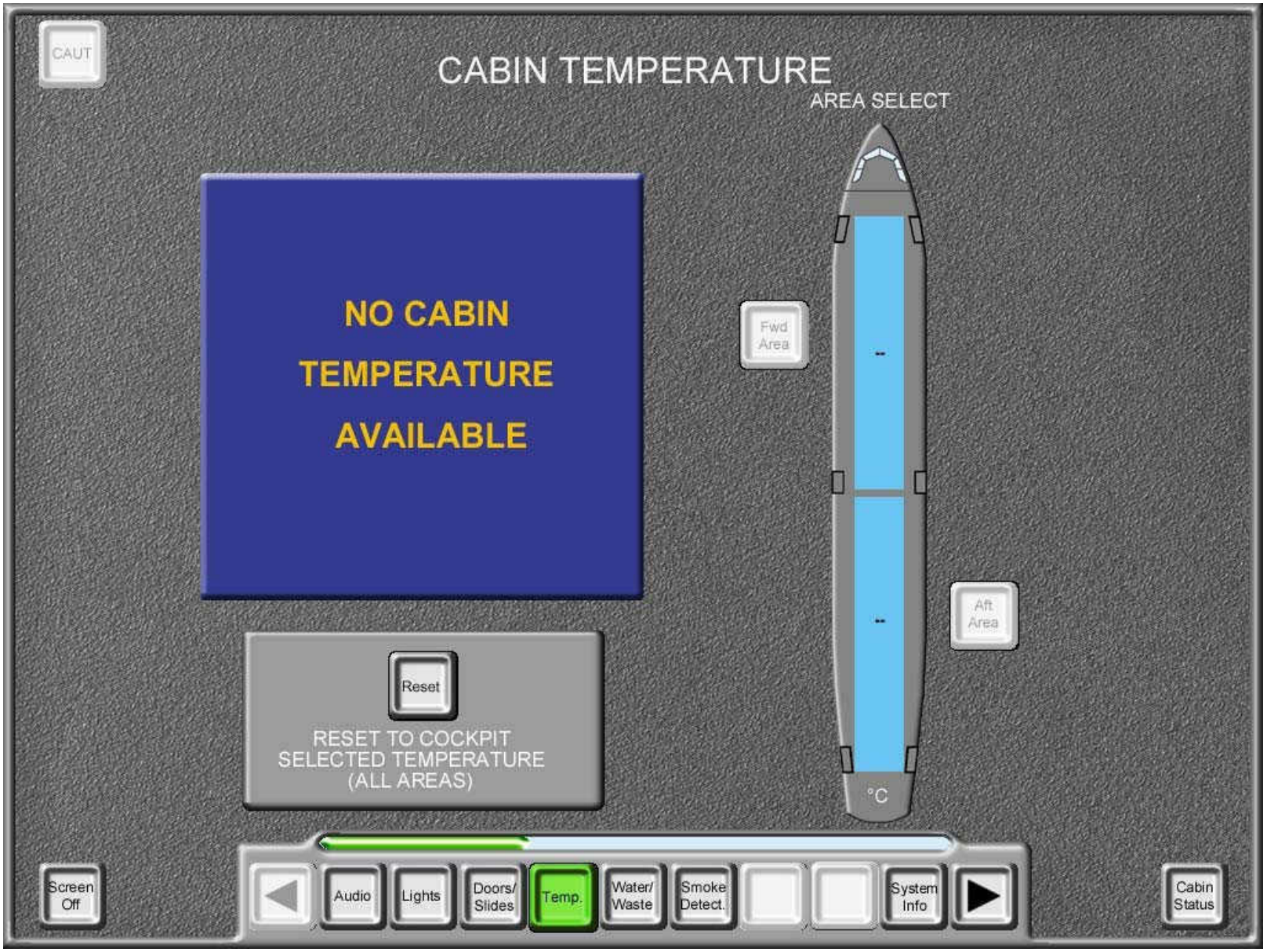


Figure 140 Failures on CABIN TEMP Page

Figure 141 WATER/WASTE Page

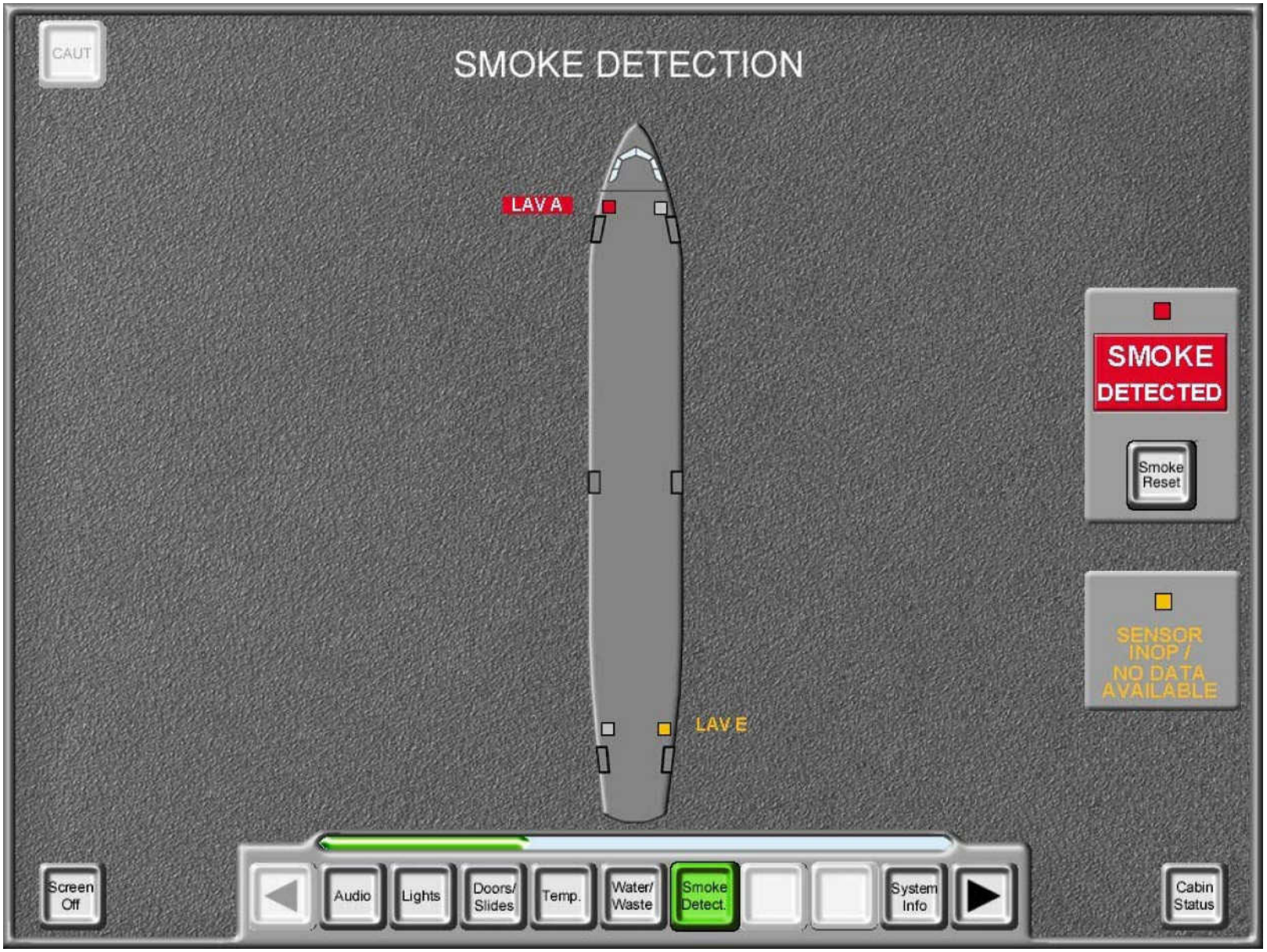


Figure 142 SYSTEM INFO Page

AUTOMATIC ACTIVATION OF SYSTEM PAGES

If CIDS receives an important message the related system page comes up automatically. The automatically activated pages are displayed until the page is quit.

A smoke alert calls up the SMOKE DETECTION page and overrides any other page.

The following page comes up automatically:

- SMOKE DETECTION.

CAUTION HANDLING

The CAUT button is always shown in the upper left corner of the touchscreen. If CIDS receives a message which cannot be shown immediately, the CAUT button turns amber and flashes.

After displaying the pages related to the messages or after pushing the CAUT button, the CAUT button comes on steady.

The CAUT illumination goes off, if CIDS does not receive any further messages.

An information text shows in the heading row of the touchscreen as long as the respective page is not displayed on the touchscreen.

NOTE: Failures displayed on the FAP show defective systems to the cabin crew. The source of the Fault will NOT be displayed (e.g. DEU B Fault).
Refer to the CFDS failure messages generated by the CIDS.

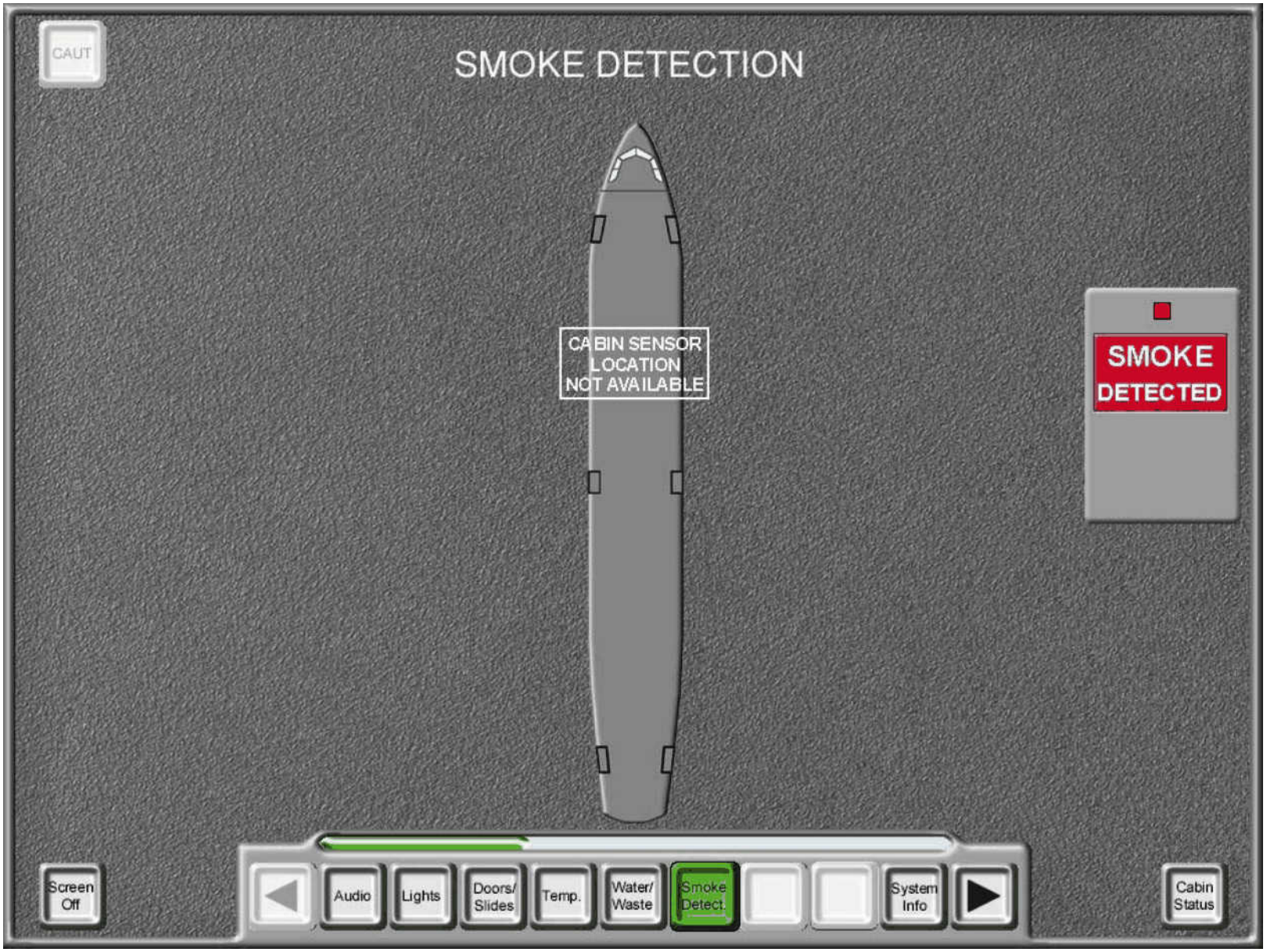


Figure 143 Failures on SMOKE DETECTION Page

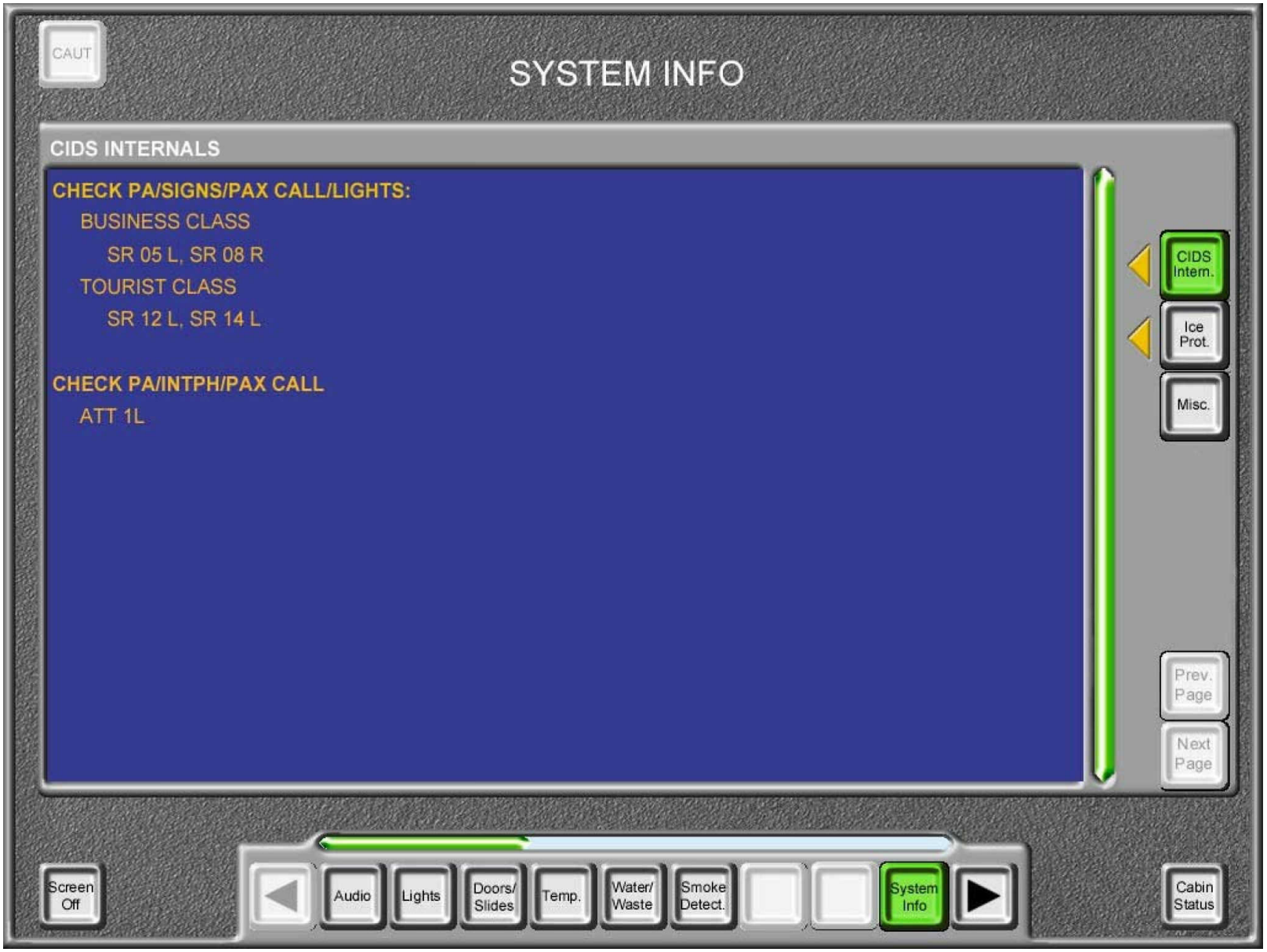


Figure 144 SYSTEM INFO Page

Figure 145 SYSTEM INFO Page with GND/SVCE PWR Connected

ACCESS CODE REQUIRED!

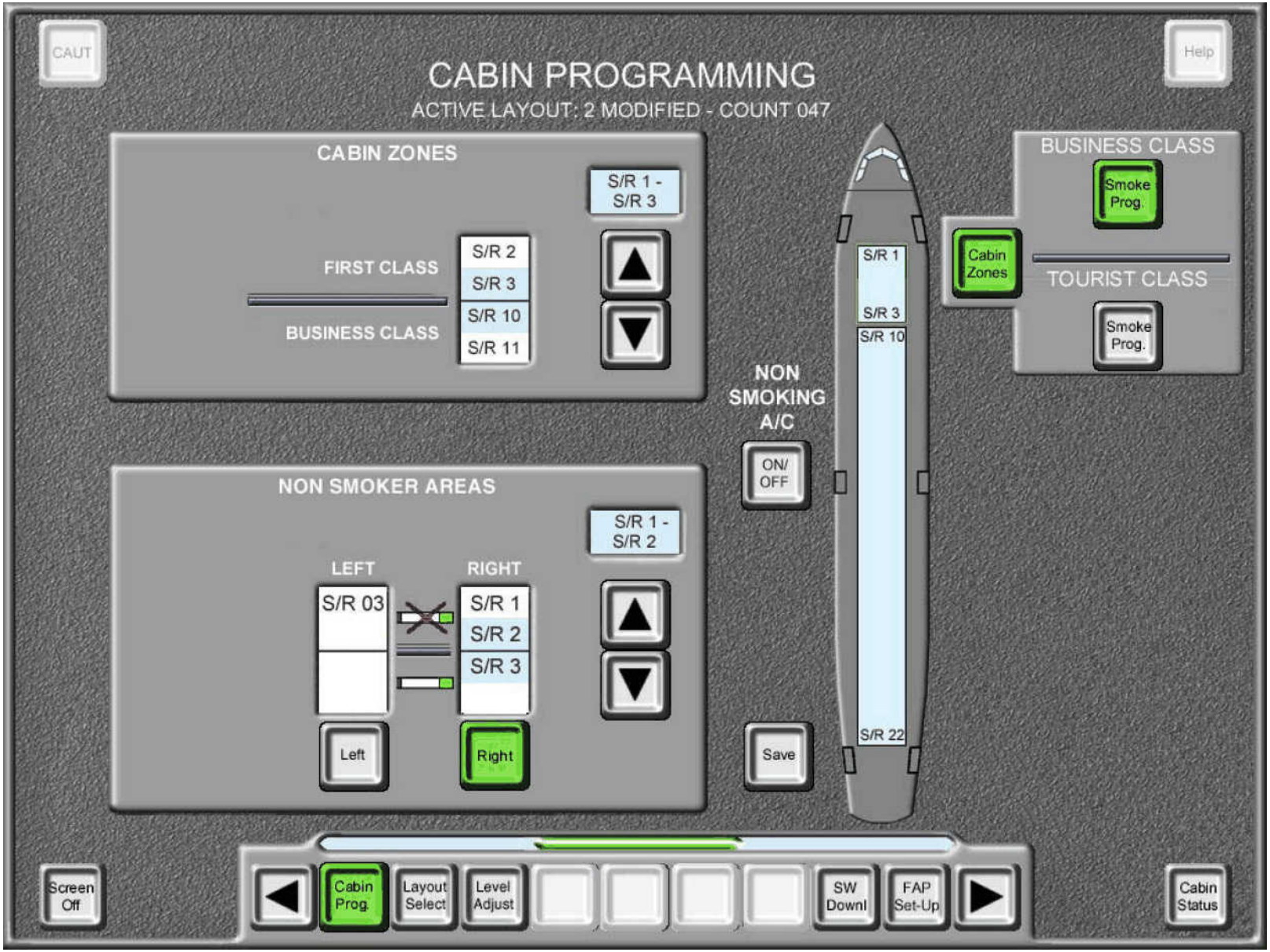


Figure 146 CABIN PROGRAMMING Page

ACCESS CODE REQUIRED!

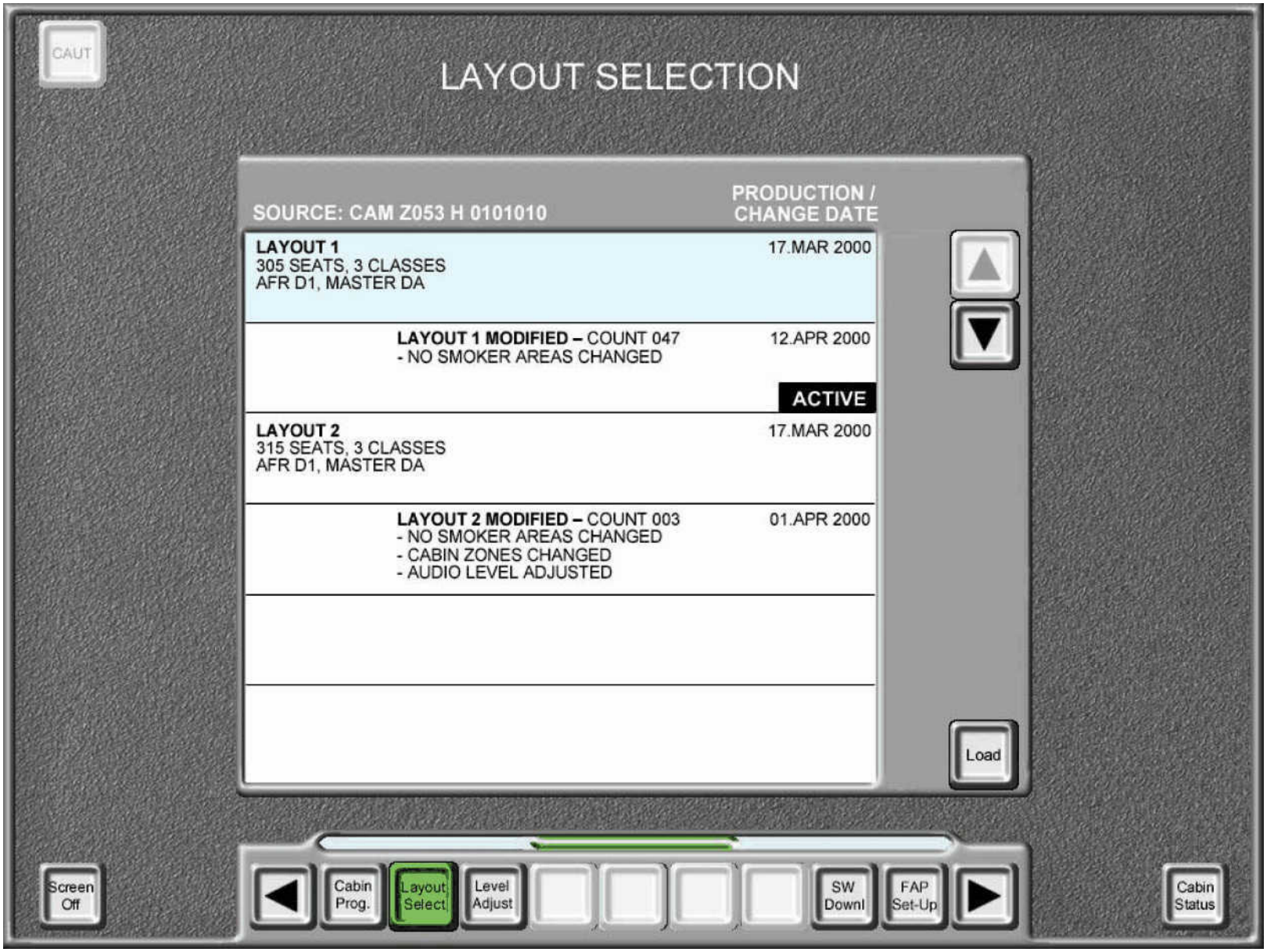


Figure 147 LAYOUT SELECTION Page

ACCESS CODE REQUIRED!

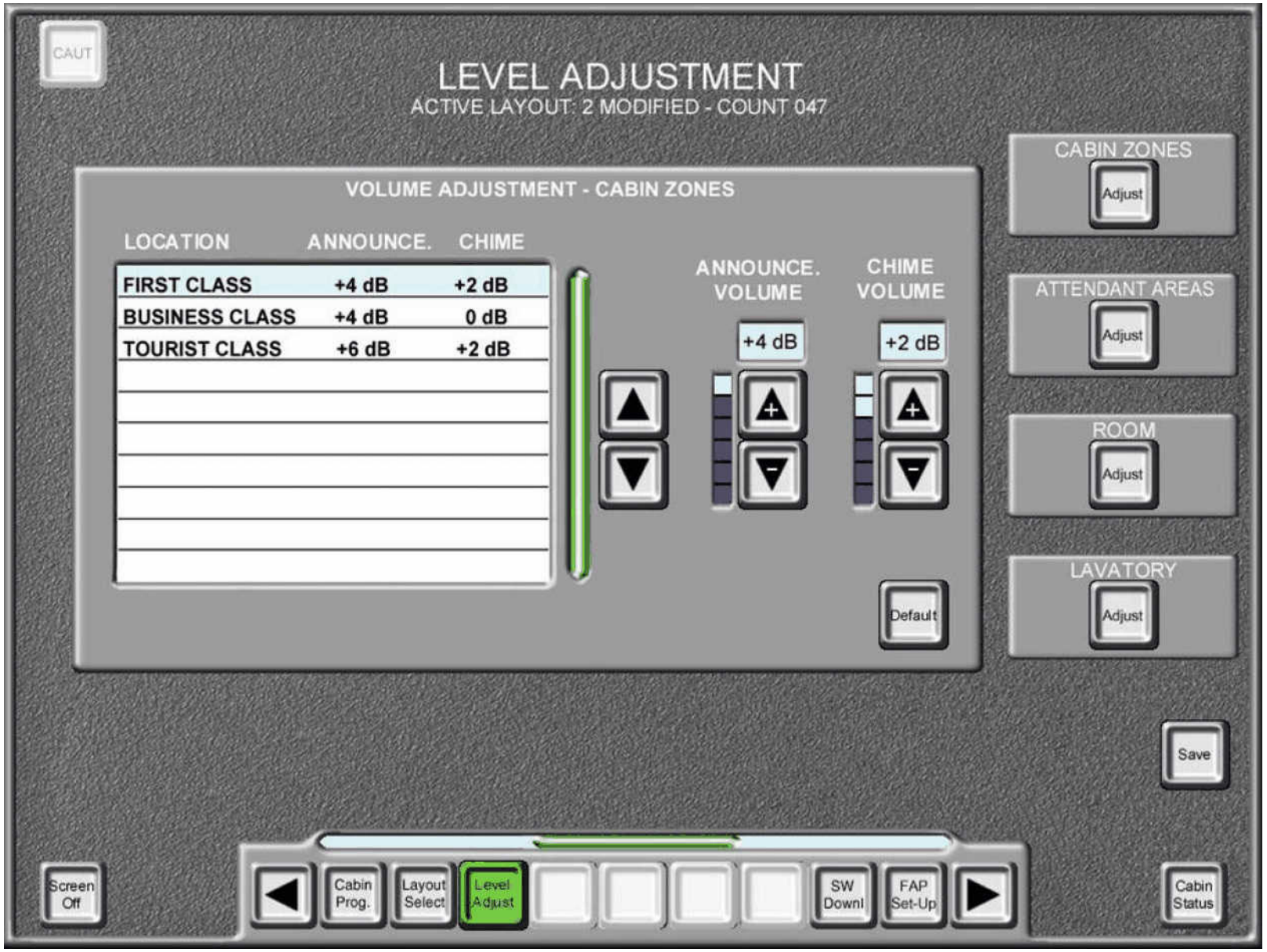


Figure 148 LAYOUT ADJUSTMENT Page (Not at DLH)

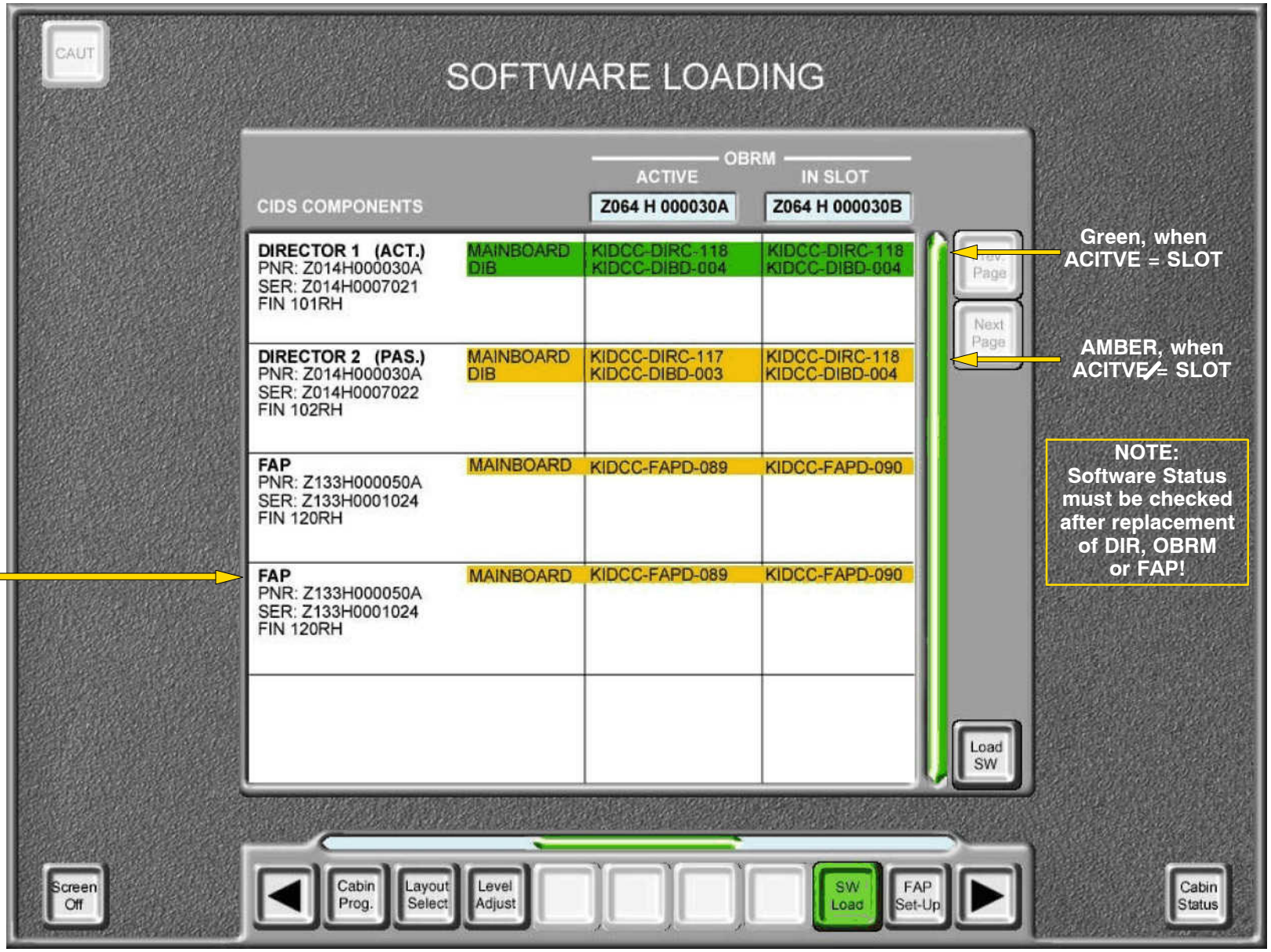


Figure 149 SOFTWARE LOADING Page

ACCESS CODE REQUIRED!

Only available via CFDS menu on MCDU!

Figure 150 CIDS SYSTEM MENU Page

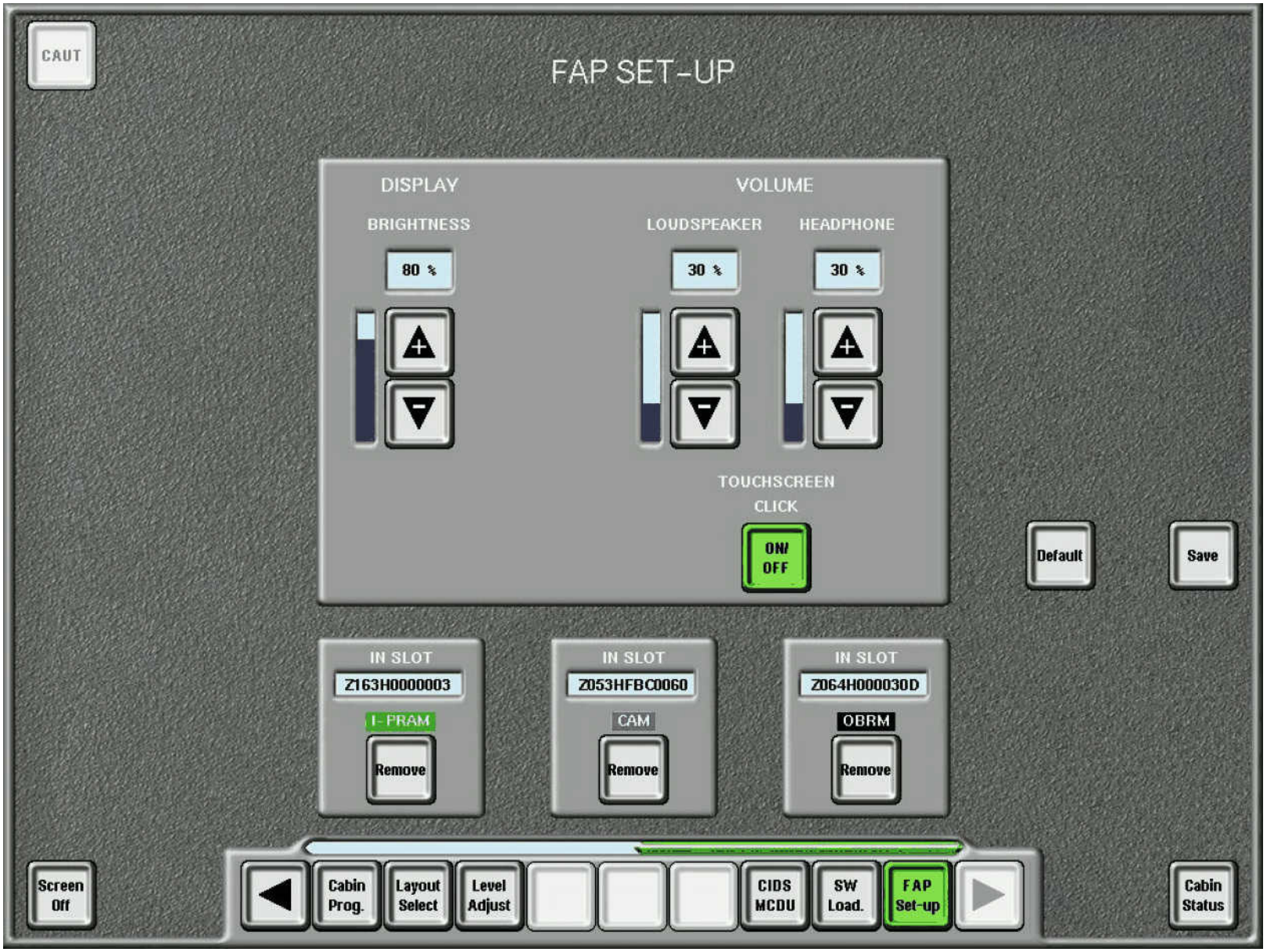


Figure 151 FAP SET-UP Page

SERVICE INTERPHONE COMPONENT DESCRIPTION

System Description

The SVCE INTPH SYS is made of:

- eight interphone jacks,
- a SVCE INTerphone OVerRiDe switch, with an integral indicator light located on the maintenance panel in the cockpit,
- five isolation units.

The audio lines from the cockpit, cabin and interphone jacks are routed to the amplifiers in both Cabin Intercommunication Data System (CIDS) directors.

Isolation Unit Normal Operation

- Under normal operation the isolation unit provides analog microphone and headphone communication from the connected boomset to the service interphone system. Additionally, the 28 VDC supply of the boomset pre–amplifiers is provided via the director.
- If no boomsets are connected to the service interphone system, the plug–in activation function will not be triggered. A microphone circuit resistance of 600 Ohms or more does not cause an isolation to occur.
- In the absence of a microphone short circuit, the isolation unit provides a low impedance path (max. 10 Ohms) between each microphone input and the protected output. This allows DC current to be supplied to the boomset pre–amplifier and for the microphone signals to be transferred from the boomset microphone to the director.

Isolation Unit Degraded Operation

- In the event of a short circuit occurring at either boomset jack socket, the isolation unit will isolate the effects of this fault on the service interphone system. When the short circuit is removed, normal operation of the service interphone jack is restored automatically.
- Both jack sockets that are connected to the isolation unit have the ability to operate independently from each other. In case of a triggering, communication to other isolation units and jack sockets is not disturbed.

NOTE: The isolation unit is also directly compatible with the interface to the **CLASSIC** CIDS director.
No modification of the CIDS director is necessary.

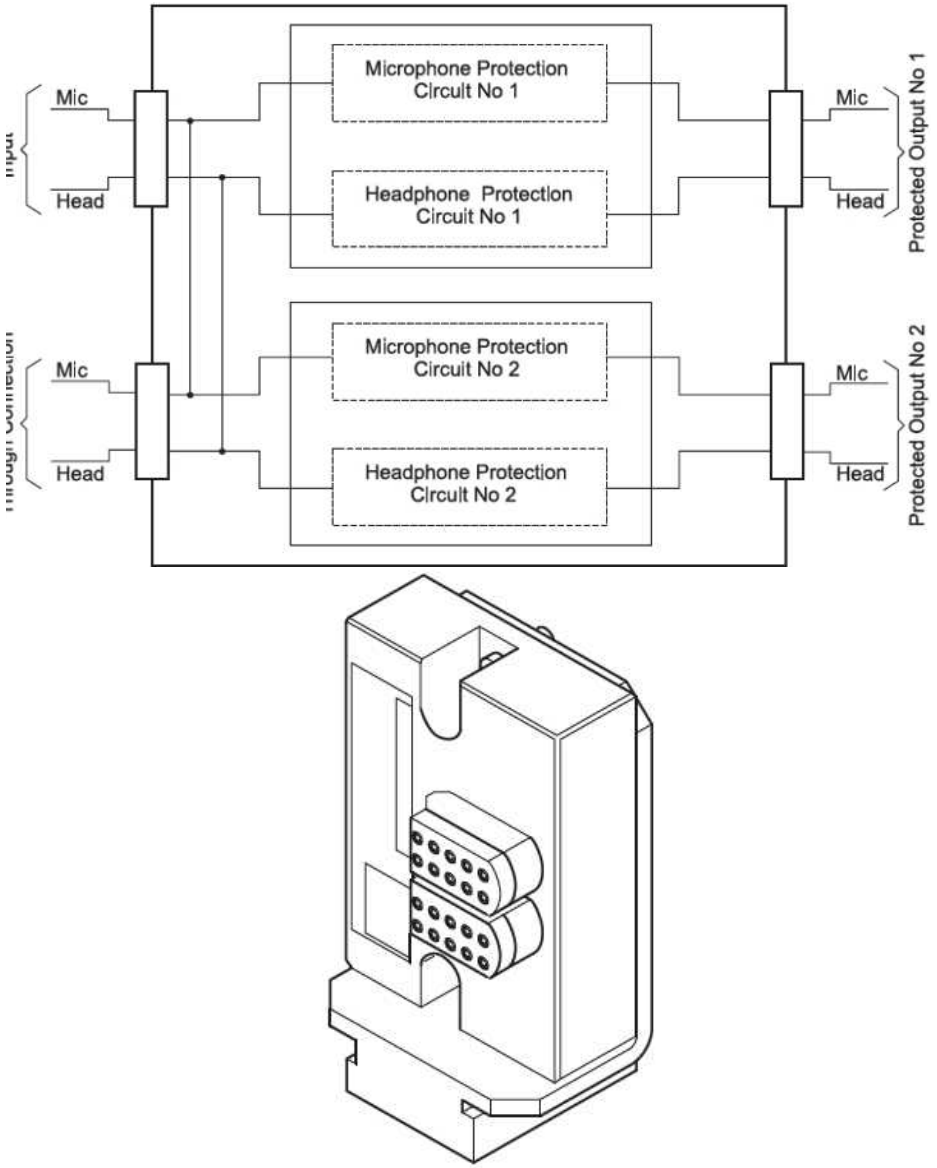


Figure 152 Isolation Unit

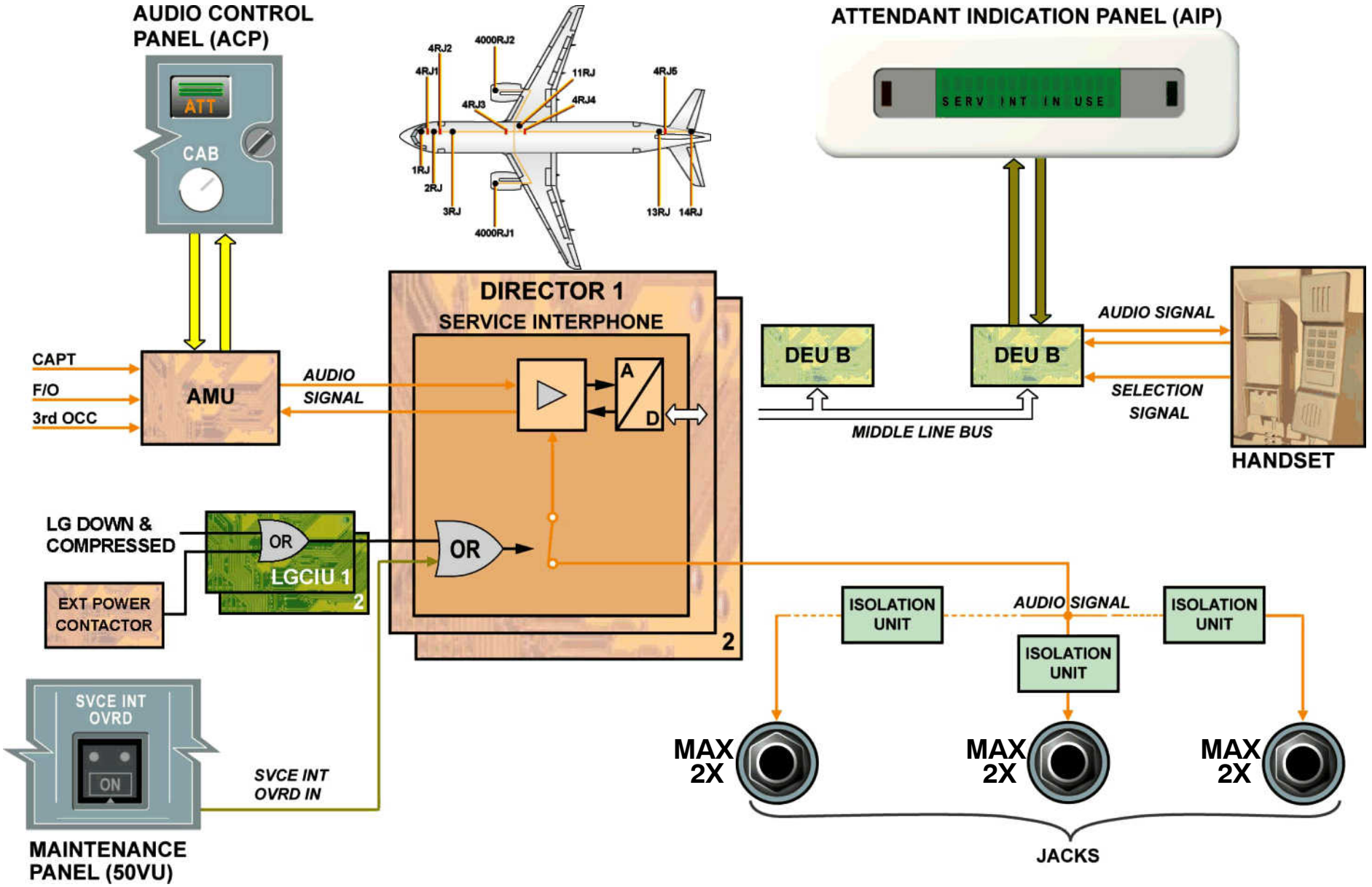


Figure 153 Service Interphone with Isolation Unit

CIDS DIRECTOR BITE DESCRIPTION

CIDS BITE GENERAL

The CIDS has an extensive self–monitoring capability. When all electrical power (normal and essential power at director inputs) is connected to the CIDS, a power–up test of the system is started. The progress of the test is shown with a bar graph on the FAP.

The BITE finds at least 95% of the failures and isolates at least 85%. These failures are written into the BITE memory of the directors and are sent to the Centralized Fault Display System (CFDS) in normal and interactive mode. The display units of the CFDS are called MCDUs. There are two MCDUs in the cockpit.

The indication of the failures depends on their importance. Example:

- The CIDS caution light comes on (flashing),
- The messages are shown on the FAP and/or on the ECAM in the cockpit (the ECAM is activated via SDAC).

The CIDS also memorizes failures which are reported from the connected systems and sends the failure messages to the CFDS. Parts of the failure messages (ATA references, FIN's and locations) are stored in the Cabin Assignment Module (CAM). The failure handling/memorization is done in relation to the flight phases. The commands are sent from the CFDS to the CIDS. The failures are classified as class 1, 2 or 3 and as internal or external failures.

Normal Mode

In the normal mode only failures (class 1 and 2) which are detected during the current/last flight are sent continuously to the CFDS. It is started when the system is supplied with power. If a failure is detected during a flight, the related failure message is stored in the BITE memory and transmitted continuously to the CFDS until the start of the next flight. A disappearance of the failure has no effect, the failure is still in the BITE memory.

Interactive Mode

In the interactive mode a dialogue between the CIDS and the CFDS happens. On request from the MCDU, the CIDS sends menu pages related to the MCDU keys.

The interactive mode is not related to the flight phases or to the landing gear status. Instead, the interactive mode is operated by commands. This means for example that when a DC1 or DC2 command is received, the interactive mode is stopped.

The interactive mode also stops and the normal mode comes on, when the RETURN command is pushed on the MAIN MCDU page.

Each A/C has a printer. The print function is available on every MCDU page except for the MAIN page.

CIDS Main Page

The CIDS Main page shows the subsequent selectable pages:

- < LAST LEG REPORT

  This page shows the failure messages that came on during the last flight and it shows the subsequent data
- < PREVIOUS LEGS REPORT

  this page shows the failure messages that came on during the 63 flights before the last leg.
- < LRU IDENT

  This page shows the identity of all electronic LRUs which can report their part number and serial number.
- < GND SCANNING

  The GND SCANNING does an analysis of the CIDS status at this time and in case of a failure all existing internal and external failures are shown.
- <TROUBLE SHOOT DATA

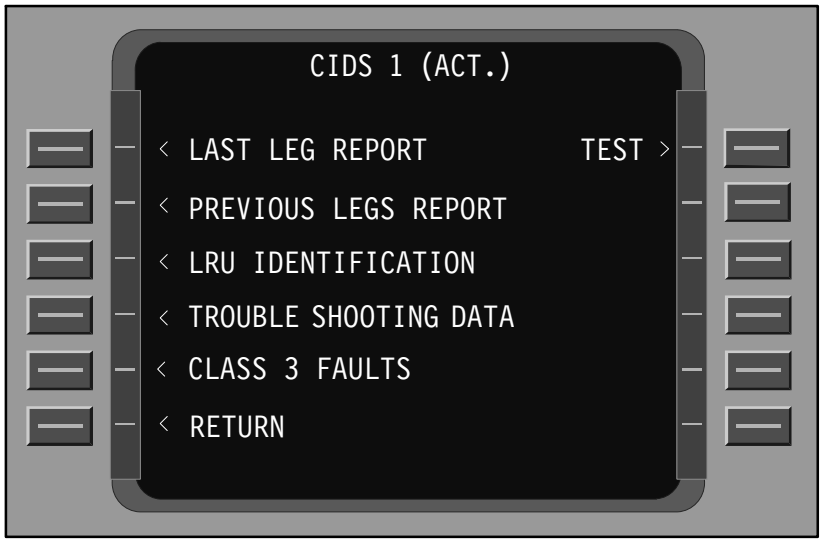
  This page shows the date and the time of the message in clear language and snapshot data at the moment of the fault (e.g. aircraft configuration etc.) shown in hexadecimal code.
- CLASS 3 FAULTS >

  This page shows each class 3 failure message that came on during the last flight.
- SYSTEM TESTS >

  When selected, the SYSTEM TEST menu page comes on.
- EPSU BAT CAP TEST > (Code: 3351)

  When selected the EPSU battery capacity test can be performed, which takes approximately 3 hours.

A319–A321 CLASSIC



A318–A321 ENHANCED

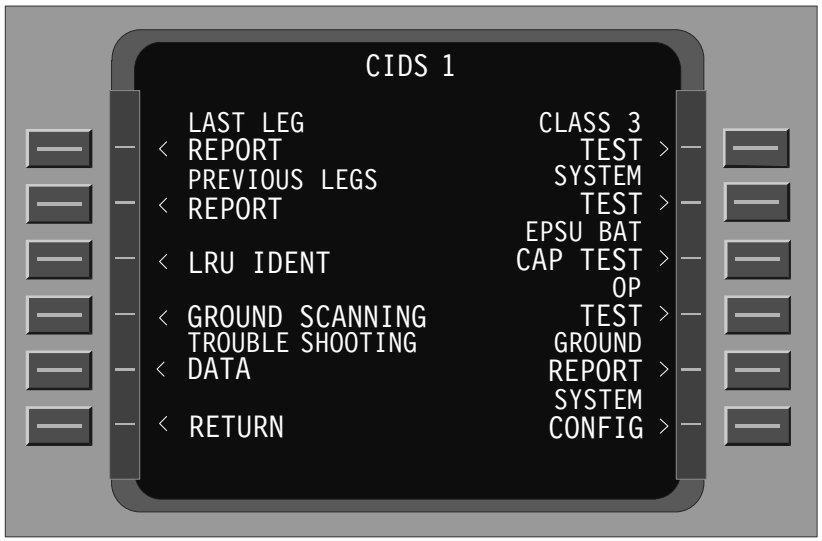


Figure 154 CIDS Classic & Enhanced CFDS Menu

CIDS Main Page (continued)

- OP TESTS >

  When selected, the OP TEST menu page comes on.
- GROUND REPORT >

  This page shows the internal failure messages that come on when the aircraft is in ground configuration. Failures detected during the last flight which are still valid are not shown in the GROUND REPORT.
- SYSTEM CONFIG >

  The SYSTEM CONFIGURATION page shows:
  - the current date,
  - the UTC,
  - the aircraft ident,
  - the ACTIVE DIR,
  - the CAM P/N,
  - the ACTIVE LAYOUT,
  - the LAST CAM MODIFICATION,
  - informative text,
  - < LSP VOLUME REPORT.

    When you push the <LSP VOLUME REPORT line key, the system shows pages where the CAM defined loudspeaker volume is shown.
- < RETURN

  When selected the system will leave the menu.

SYSTEM TEST

The INTERFACE + POWER TEST is selectable for the active or the passive director.

All other tests are done with the active director. On the A320, the CIDS test is used to test each component (Directors, CIDS Bus, DEUs...). On the A318, this function is deleted and replaced by a passive or active director test. For the active director, the CIDS does a power up test on certain CIDS components and starts the internal BITE (**B**uilt **I**n **T**est **E**quipment) of the associated systems. It can last up to 6 minutes. If there is a failure, the subsequent data about this failure is displayed:

- The ACTIVE DIR,
- The ATA reference,
- The identity of the unserviceable LRU (**L**ine **R**eplaceable **U**nit),
- The class of the failure (1,2 or 3) with a prompt > to get access to the trouble shooting data or to the submenus for the class 3 failures. If there are no failures found during the test, the message „TEST OK“ is shown in the center of the screen.

The passive director does a self–test for 30 seconds. It checks all power related conditions, all FAP / CAM / Director interlink and ARINC / ETHERNET items.

OPERATIONAL TESTS

These tests are for audio and visual checks. Cabin loudspeakers, lights and signs are activated during the related tests.

When you push the

- < LOUDSPEAKERS ACTIVATION line select key,

all CIDS loudspeakers are supplied with a test tone until you push the

- < RETURN line select key.

When you push the LAMPS ACTIVATION line select key, all lamps in the READING LTs, ACPs, PAX CALLs and SIGNS are illuminated until you push the

- < RETURN line select key.

NOTE: There is no CAM relation, all DEU outputs are activated, even when they are deactivated in the CAM.

NOTE: After the test (when you push the <RETURN line select key) the system performs a reset.

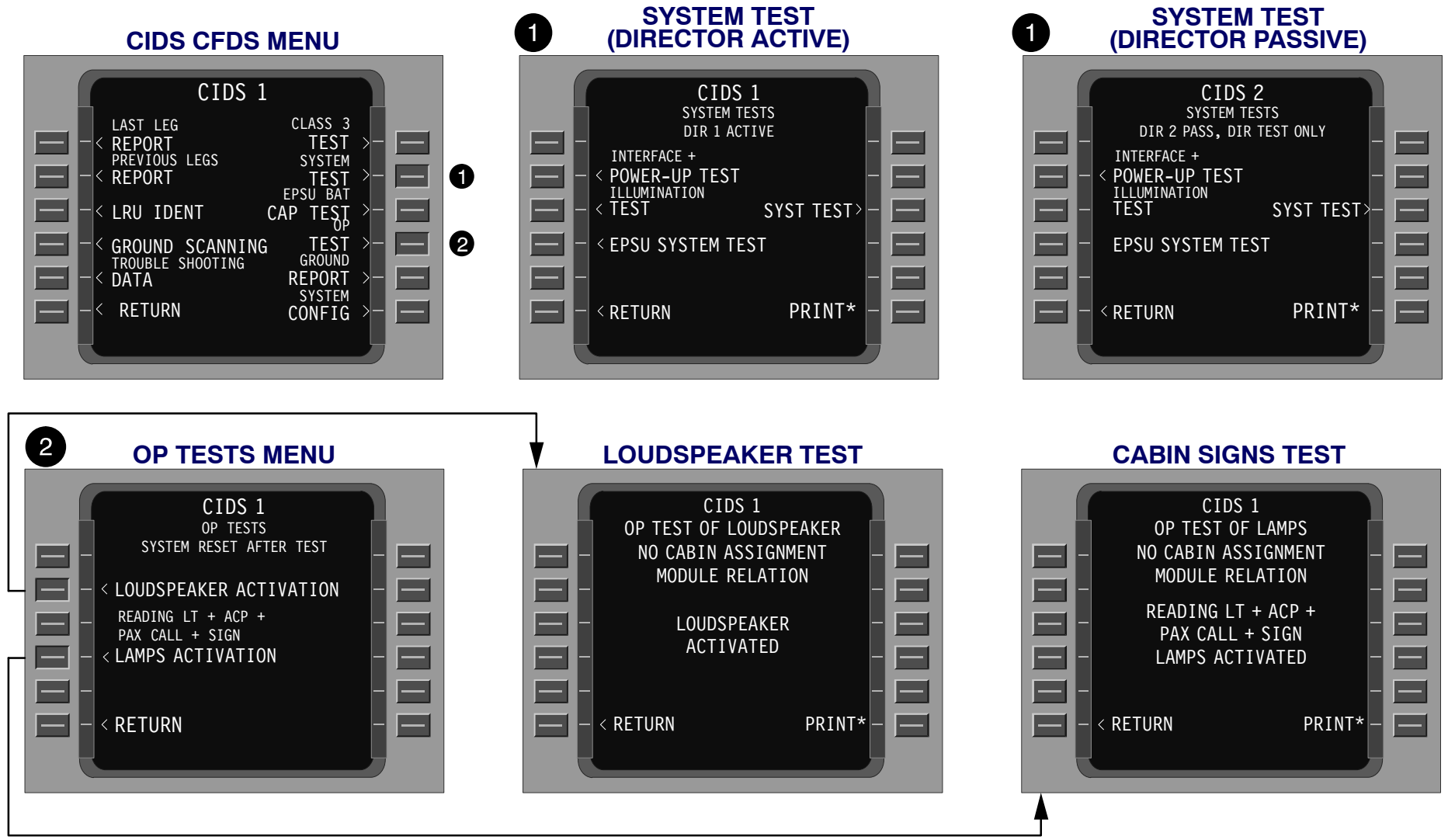


Figure 155 CIDS System and OP Test Menus

CIDS WARNINGS DESCRIPTION

GENERAL

The indication of the failures depends on their importance. On the Flight Attendant Panel (FAP), there is a Cabin Intercommunication Data System (CIDS) CAUTion light in the upper left corner of the touchscreen. It is normally off. The CAUT light comes on amber and flashes when the active director (DIR) detects a fault that needs cabin crew action. The action needed is shown in the heading row (e.g. Please select Doors page).

When you select the page, the CAUT light stops flashing and remains on continuously. If the fault is cleared the CAUT light goes off. For some faults, the required page is automatically shown on the FAP, there can also be a blue card message. This is a blue rectangle with a fault message written in amber. Major CIDS faults (class 1) are also indicated to the flight crew with Flight Warning System (FWS) level 2 or level 1 alerts.

All CIDS faults generate Centralized Fault Display System (CFDS)/MCDU class 1, 2, 3 messages. Contrary to cockpit indications, the FAP failures indications do not depend on flight phases.

NOTE: The STATUS page does not appear automatically after a warning.

Major CIDS Faults (Class 1)

Class 1 CIDS faults are:

- CIDS DIR 1 and 2 fault,
- a top line bus failure,
- a middle line bus failure,
- 25 % of Decoder/Encoder Units (DEUs) type A failed,
- 50 % of DEUs type B with failed connected handsets.

In each case the cockpit display will be the MASTER CAUT light (amber), single stroke chime, and an ECAM message CIDS 1+ 2 FAULT on the EWD (inhibited in flight phases 3, 4, 5, 7 and 8). CIDS 1+2 message will be added to the INOP SYStem list on the ECAM STATUS page.

Class 1 faults are recorded in the CFDS LAST/CURRENT LEG REPORT and the POST FLIGHT REPORT.

Non Critical CIDS Faults (Class 2)

Non critical CIDS faults (e.g. Cabin Assignment Module (CAM) layout transmission failure) have no flight crew related effects, so there are no 'in flight' cockpit alerts.

In most cases there is no FAP CAUT and/or message. However some of these faults are class 2 maintenance faults only. The cabin crew is not alerted, but these class 2 faults are indicated to the cockpit crew in flight on the ECAM STATUS page after manual selection and are the subject of an ECAM report (POST FLIGHT REPORT) on the ground after engines shutdown. The ECAM STATUS page shows MAINTENANCE CIDS 1 (2).

CIDS CLASS 1 AND 2 FAULTS (FOR MORE INFORMATION REFER TO TSM 23–73–00 PB201)

FAILURE	ECAM MESSAGE	AURAL WARNING	MASTER CAUTION LIGHT	FAP CAUTION LIGHT	MESSAGE ON FAP	FLIGHT PHASE INHIBIT
TWO DIRECTORS Director internal failure, other director not OK.	CIDS 1+2 FAULT	SINGLE CHIME	ON	ON	CHECK ATTENDANT AND PAX RELATED FUNCTIONS [PA/INTPH/SIGNS/PAX CALL/ LIGHTS]	3, 4, 5, 7, 8 (ONLY FOR COCKPIT WARNINGS)
ONE TOP LINE One Top Line Bus Failure.					CHECK PAX RELATED FUNCTIONS [PA/SIGNS/PAX CALL/ LIGHTS]	
DEU A 25% of all DEU-As.						
ONE MIDDLE LINE One Middle Line Bus Failure.					CHECK ATTENDANT RELATED FUNCTIONS [PA/INTPH/PAX CALL]	
DEU B 50% of DEU-Bs with connected handset.						
DIRECTOR Director internal failure, other director OK.	MAINTENANCE CIDS 1 (2)	NIL	OFF	OFF	NIL	NIL
Passive Director receives no data from FAP.						
Director working with the nadatory layout, other Director OK.						
CAM CAM layout transmission fail to passive Director.						
CAM layout transmission fail to actice Director. **(CLASS 1 Cabin Fault)**	NIL			ON	CHECK ATTENDANT AND PAX RELATED FUNCTIONS [PA/INTPH/SIGNS/PAX CALL/ LIGHTS]	
CAM failure by passive Director.	MAINTENANCE CIDS 1 (2)			OFF	NIL	
Passive Director receives no data from CAM.						
FAP FAP no data from passive Director.						

COMMUNICATION SYSTEMS MAINTENANCE PRACTICES

COMMUNICATION SYSTEM BITE

VHF/HF SYSTEM

The BITE facilitates maintenance on in–service aircraft.

The BITE detects and determines a failure related to the VHF / HF system.

The BITE:

- transmits permanently VHF / HF system status and its identification message to the CFDIU
- memorizes the failures occurred during the last 63 flight segments
- monitors data input from the various peripherals (RMP and CFDIU)
- transmits to the CFDIU the result of the tests performed and self–tests
- can communicate with the CFDIU by the menus.

RADIO MANAGEMENT SYSTEM

The RMP1 is linked to the CFDS by means of two buses:

The RMP1 receives a bus from the CFDIU which transmits general parameters (UTC, date, flight phase etc.) and interrogations (selection of the menu mode, etc.).

The RMP1 then transmits these data to the RMP2 and the RMP3 through its output dialogue bus.

AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM

The state of the ACARS is determined by monitoring the exchanges of information that it can have with the associated processing card.

If the exchange protocol is correct, the data transmitted is in the correct format and the ACARS does not declare that it is wrong further to its own internal test, then the ACARS is said to be operational.

If not, it is declared to be faulty. The state of the ACARS is determined by monitoring the exchanges of information that each of the processing cards can have with its corresponding ACARS and by analysing the results of the internal tests of each of the processing cards.

There are two operation modes:

- normal mode: during the normal mode, the BITE monitors cyclically the status of the ACARS cards and transmits these data to the CFDIU during the concerned flight. In case of fault detection the BITE stores the information in the fault memory.
- menu mode: the menu mode can only be activated on the ground and the command is given by the CFDIU via the MCDU. This ground data is supplied by the CFDIU, otherwise it can be given by a Flight–Ground discrete provided by the ACARS.
- The menu mode enables communications between the CFDIU and the ACARS BITE through the MCDU.

AUDIO MANAGEMENT SYSTEM

The audio system BITE (Built–In Test Equipment) serves as an aid for line maintenance in workshop and Service Department. It is used when faulty units are to be detected, replaced or repaired. It limits the number of unwanted removals of the system components.

The BITE:

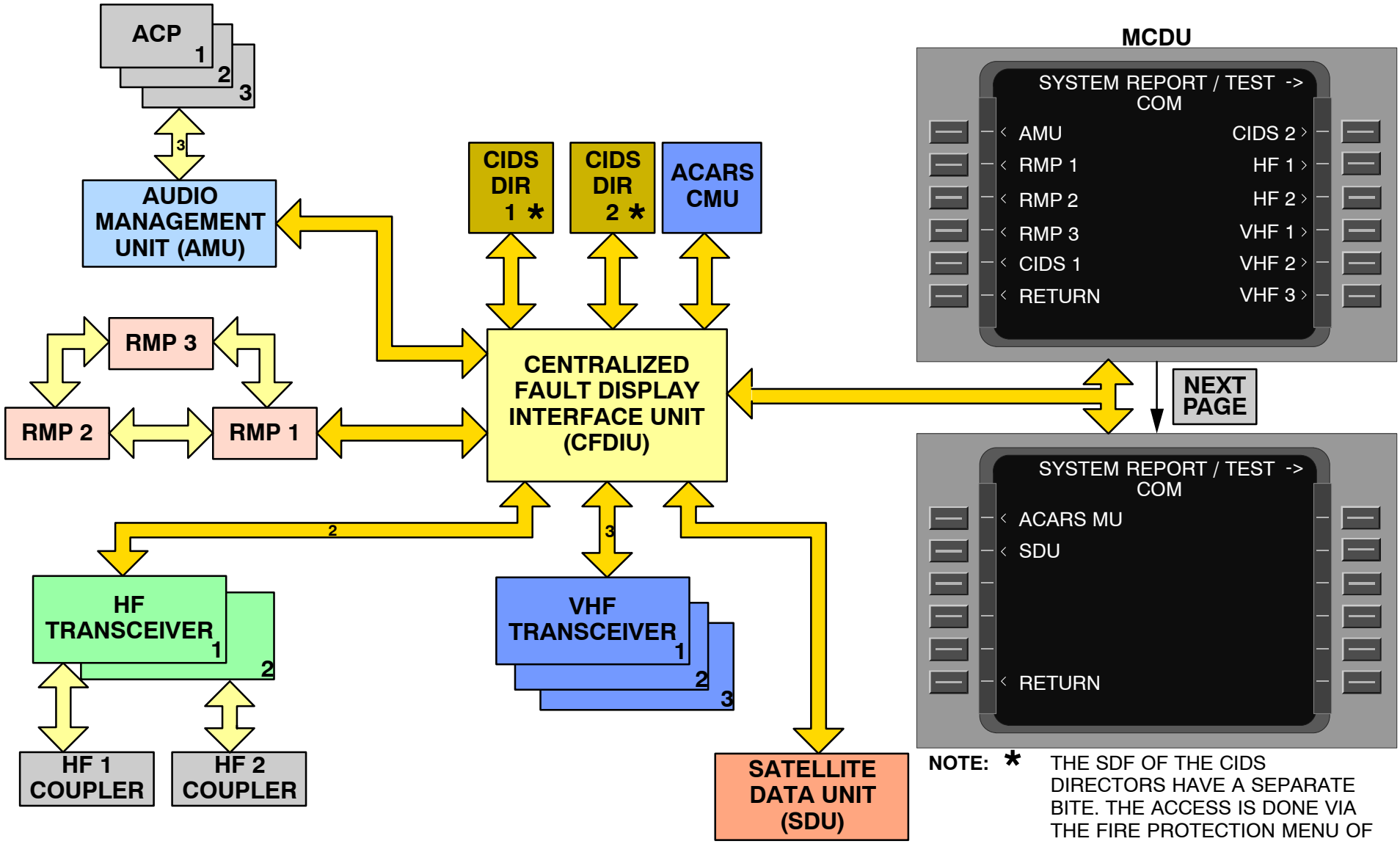
- Constantly transmits the actual status of the system (availability–unavailability).
- Memorizes any failures which occurred during the 63 previous flight segments or up to memory capacity.
- Monitors the data exchanges between the system components.
- Centralizes the triggered tests or self–test results.
- Dialogs with the CFDIU by means of menus.
- An additional function is the transmission of the pin–program and a message which serve to identify the system.

CABIN INTERCOMMUNICATIONS DATA SYSTEM

When the CIDS is energized, the directors perform a comprehensive hardware and software self–test. The CIDS top and middle line data busses, the PTP with the CAM, the FAP and the DEUs with the connected loads are tested.

The CIDS maintenance mode is available via the CFDS–MCDU in the SYSTEM REPORT/TEST mode. All failures, which are written in the CIDS director BITE ground/flight memory can be read via this mode. A test procedure is selectable via the MCDU. A CIDS director 2 (passive) test is also available, the Emergency Light Battery/System tests are not available.

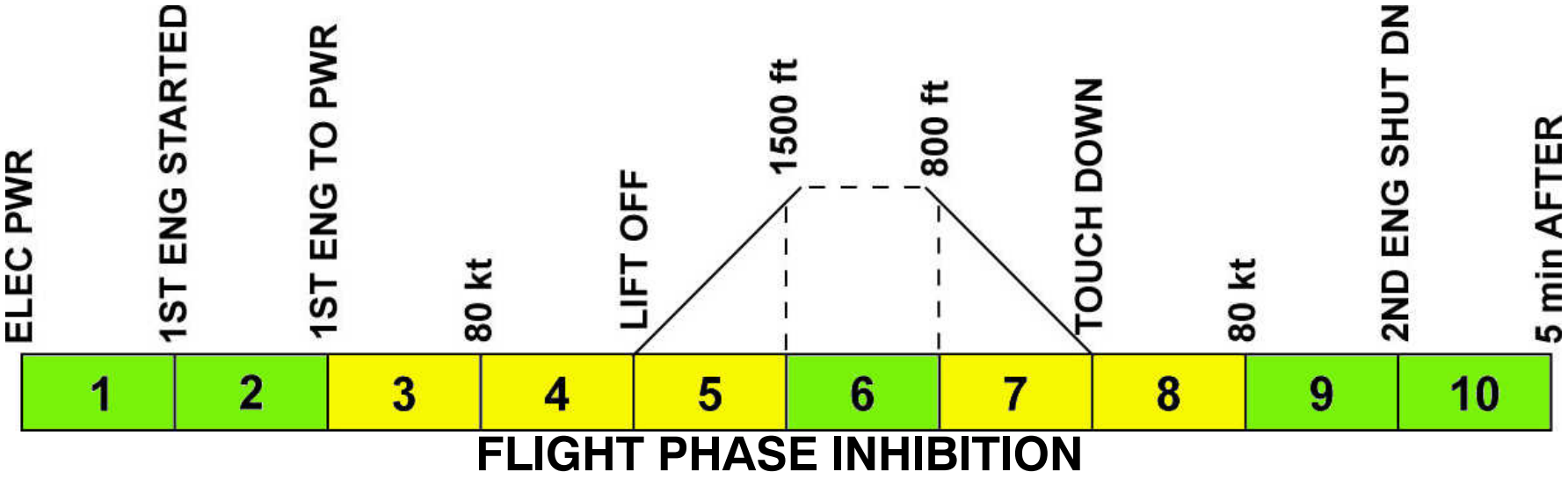
NOTE: Some system computers may have a front panel test switch because they can also be installed in other A/C types without a central maintenance system.



NOTE: * THE SDF OF THE CIDS DIRECTORS HAVE A SEPARATE BITE. THE ACCESS IS DONE VIA THE FIRE PROTECTION MENU OF THE CFDS. REFER TO ATA 26

Figure 156 Communication Systems BITE Connection

COMMUNICATION WARNING AND CAUTION AND CAUTION MESSAGES



E/WD FAILURE MESSAGE	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLIGHT PHASE INHIBIT
COM CIDS 1 + 2 FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	3,4,5,7, 8
COM VHF 1 (2, 3) EMITTING COM HF 1 (2) EMITTING (Transmitter emitting more than 60 seconds)					
COM SATCOM FAULT COM ACARS FAULT COM HF 1 (2) DATA FAULT COM VHF 3 DATA FAULT COM SATCOM DATA FAULT	NIL	NIL			

Figure 157 ATA 23 Warning & Caution Messages

COMMUNICATION BUS EQUIPMENT LIST (IF SYSTEM INSTALLED)

		NORM BUSES		EMER ELEC BUSES		
		AC	DC	AC ESS	DC ESS	HOT
RADIO COMMUNICATIONS	VHF 1				X	
	VHF 2		BUS 2			
	VHF 3		BUS 1			
	HF 1	BUS 1 OR ->		-> SHED		
	HF 2	BUS 2				
	SATCOM	BUS 2				
	RMP 1				X	
	RMP 2		BUS 2			
	RMP 3		BUS 1			
	ACP 1				X	
	ACP 2				X	
	ACP 3		BUS 1			
	ACP 4		BUS 1			
	SELCAL		BUS 1			
	FLT INTERPHONE				X	
	CAPT LOUDSPEAKER				X	
	F/O LOUDSPEAKER		BUS 2			
	EXT HORN					BUS 2
CABIN INTERCOMMUNICA-TION DATA SYS (CIDS)	CIDS 1		SERVICE BUS		X	BUS 2 (OPT)
	CIDS 2		SERVICE BUS		X	BUS 2 (OPT)
	DEU (A/B)		SERVICE BUS		X	BUS 2 (OPT)
COCKPIT VOICE RECORDER	CVR CTRL				SHED	
	CVR			SHED		
ACARS	MU OR CMU	BUS 1				

25–63 EVACUATION SIGNALING EQUIPMENT

EVACUATION COMMAND SYSTEM

ATTENTION: The Evacuation Command System is belonging to ATA Chapter 25–63 - EVACUATION SIGNALING EQUIPMENT, but because it is completely controlled by the CIDS it is described in this book!

GENERAL

The emergency evacuation command may be activated from the purser station or from an optionally–installed Additional Attendant Panel (AAP).

The emergency evacuation command and reset pushbuttons at the purser station are located on the FAP.

On the EVAC panel in the cockpit, a switch lets the evacuation command be activated from the purser station and the cockpit, or from the cockpit only.

NOTE: On DLH the evacuation command system is not used and not installed on the majority of aircraft.

Evacuation Signaling Components – Cockpit

The evacuation signaling components and signal sources installed on the overhead panel in the cockpit include:

- a warning horn 5WP on panel 48VU,
- a COMMAND pushbutton switch 3WP on panel 21VU, with 'EVAC' and 'ON' indicator lights included in the switch unit,
- a CAPT & PURS and CAPT, two–position selector switch 2WP, installed on panel 21VU,
- a HORN SHUT OFF pushbutton switch 7WP on panel 21VU.

Evacuation Signaling Components – FWD Utility Area

The evacuation signaling components, interfaces and signal sources installed in the FWD utility area include:

- a COMD pushbutton switch with an internal indicator light,
- a RESET pushbutton switch,
- an EVAC indicator light is installed on the FWD ATTENDANT panel,
- an EVAC ALERT indicator light (optional) is installed on the standard AREA CALL panel.

The components of the CIDS installed in the FWD utility area, that interface with the evacuation signaling system include:

- Decoder/Encoder Units types A and B located in the overhead compartment. The type A DEU has two amplifiers that function independently,
- a Programming and Test Panel (PTP) which contains a cabin Assignment Module (CAM), installed adjacent to the FWD ATTENDANT panel (behind an access cover), has the cabin configuration,
- cabin loudspeakers.

Evacuation Signaling Components – AFT Utility Area

The evacuation signaling components, interfaces and signal sources installed in the AFT utility area include:

- a TONE OFF pushbutton switch and EVAC indicator light installed on the left AFT ATTENDANT panel,
- COMD and RESET pushbutton switches, EVAC and COMD indicator lights (optional) on the left and right AFT ATTENDANT panels,
- EVAC ALERT indicator lights (optional) on the standard AREA CALL panels.

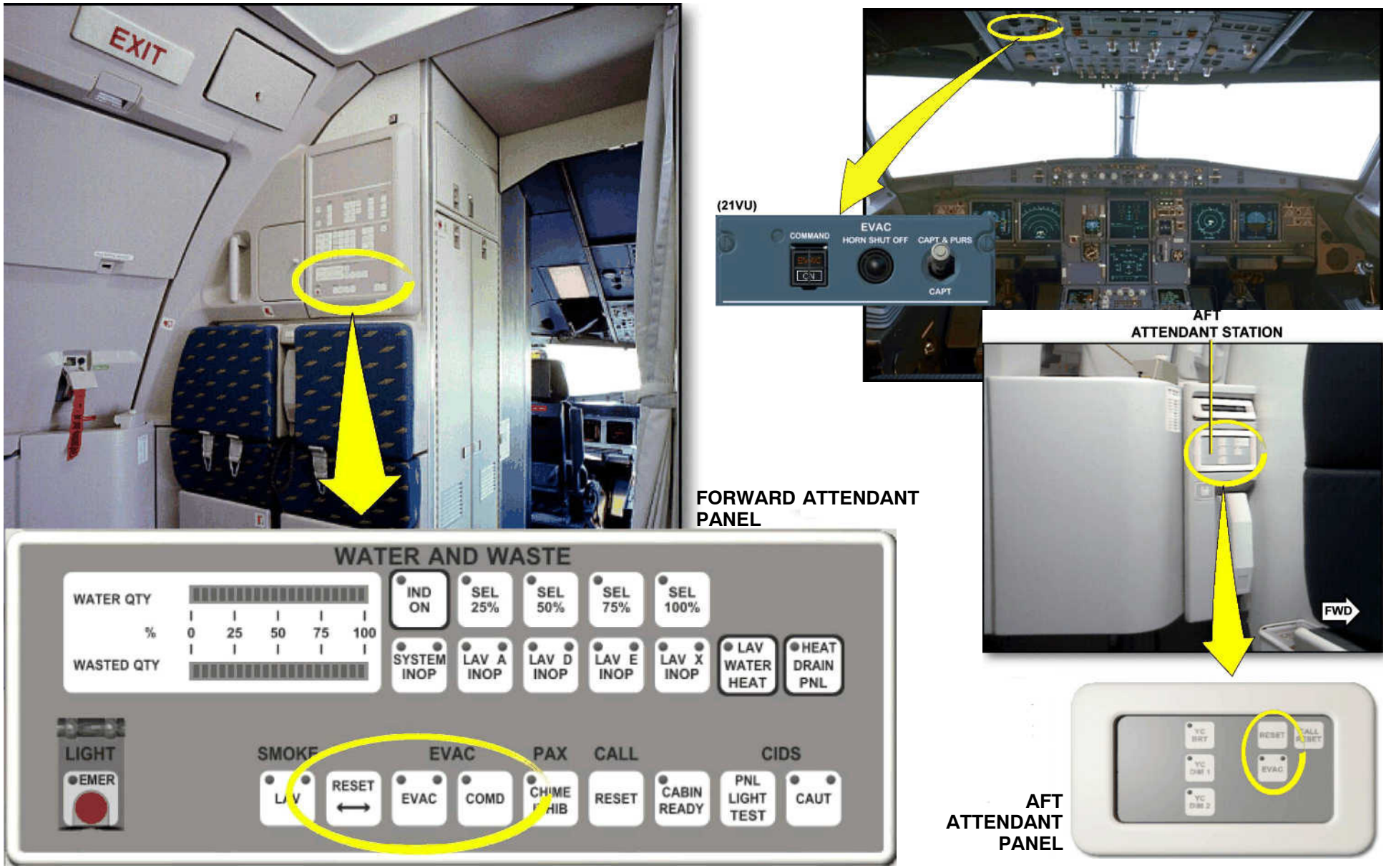


Figure 158 Evacuation Command Controls & Indications

EVAC ON ENHANCED CIDS

On the Enhanced FAP these pushbuttons are located on the hard key panel to be available at any time whatever the FAP page presented.

Evacuation Signaling Equipment Control

Discrete input signals, supplied to the No. 1 CIDS director (active) from the cockpit, control the evacuation signaling equipment. If the No. 1 CIDS director becomes unserviceable, the No. 2 CIDS director (hot–standby) keeps the system in operation.

Facilities to supply other input signals to the CIDS director from the AFT utility area or the FAP are optional.

Operation of the FAP EVAC CMD pushbutton switch causes:

- the CMD indicator light (part of the switch) to come on,
- the transmission of evacuation tone from the CIDS director to specified loudspeakers in the cabin,
- the EVAC indicator light on the FAP to come on,
- a flashed indication for a general alert.

If the COMMAND switch 3WP (on the overhead panel in the cockpit) is selected ON, a visual EVAC ALERT indication comes on steady or flashes (optional).

Operation of the RESET pushbutton switch cancels the evacuation tone transmission to the respective loudspeakers in the cabin.

ENHANCED

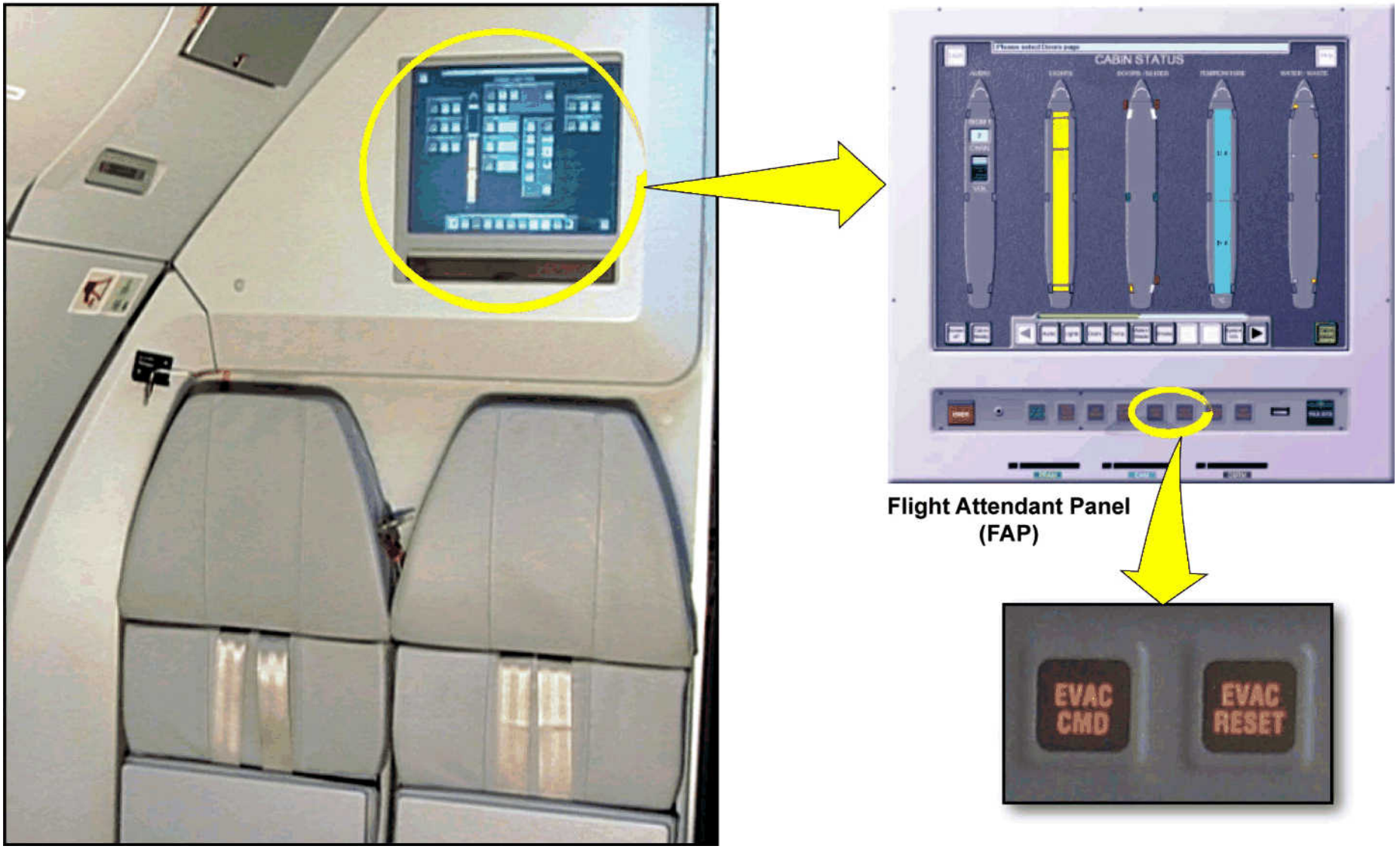


Figure 159 Evacuation Controls On Enhanced FAP

EVAC SYSTEM OPERATION

COCKPIT CONTROLS AND INDICATIONS

The COMMAND pushbutton switch 3WP supplies the electrical ground connection for the evacuation command signals of the system. Operation of the COMMAND pushbutton switch to the ON position causes:

- The ON indicator light (part of the switch) to come on.
- Transmission of a signal from the CIDS director to the warning horn 5WP.
- The EVAC indicator light (part of the COMMAND switch) to come on.
- A flashed indication for a general alert.

The CAPT & PURS and CAPT (only) selector switch 2WP, selects who is able to activate an EVAC ALERT.

The selection sequence of the switch is:

Switch set to CAPT & PURS position

		COCKPIT COMMAND SWITCH	
		OFF	ON
PURSER CONTROL SWITCH	OFF	NO ALERT	ALERT
	ON	ALERT	ALERT

The selection sequence of the switch is:

Switch set to CAPT

		COCKPIT COMMAND SWITCH	
		OFF	ON
PURSER CONTROL SWITCH	OFF	NO ALERT	ALERT
	ON	ALERT COCKPIT ONLY	ALERT

Operation of the HORN SHUT OFF pushbutton switch cancels the evacuation tone transmission to the warning horn in the cockpit.

CONTROLS AND INDICATIONS IN THE CABIN

FAP:

Operation of the EVAC CMD pushbutton switch causes:

- The CMD indicator light (part of the switch) to come on.
- The transmission of evacuation tone from the CIDS director to specified loudspeakers in the cabin.
- The EVAC indicator light on the FAP to come on.
- A flashed indication for a general alert.

If the COMMAND switch 3WP (on the overhead panel in the cockpit) is selected ON, a visual EVAC ALERT indication comes on steady or flashes (optional).

Operation of the RESET pushbutton switch cancels the evacuation tone transmission to the respective loudspeakers in the cabin.

Left AFT ATTENDANT Panel:

A visual EVAC indication comes on steady or flashed.

Operation of the RESET pushbutton switch cancels the evacuation tone transmission to the respective loudspeakers.

Facilities for other EVAC CMD and EVAC indications (optional) are installed at the AFT ATTENDANT stations and AREA CALL panels (in the AFT utility area).

EVACUATION SIGNALING EQUIPMENT CONTROL

Discrete input signals, supplied to the No. 1 CIDS director (active) from the cockpit, control the evacuation signaling equipment.

If the No. 1 CIDS director becomes unserviceable, the No. 2 CIDS director (hot–standby) keeps the system in operation. Facilities to supply other input signals to the CIDS director from the AFT utility area or the FAP are optional.

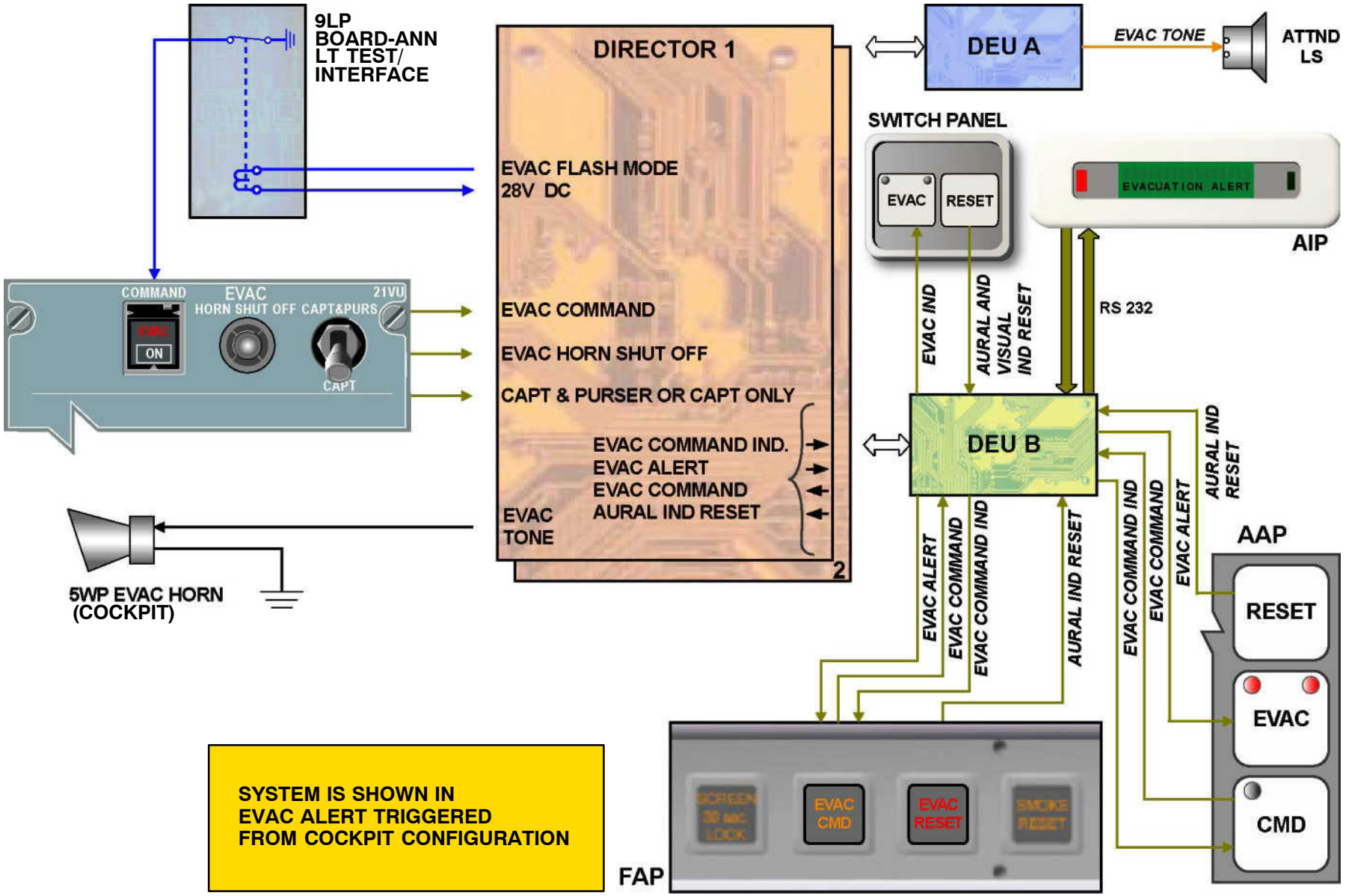


Figure 160 EVAC System Schematic

TABLE OF CONTENTS

ATA 23 COMMUNICATIONS 1

23–00 COMMUNICATIONS - GENERAL 2
COMMUNICATIONS INTRODUCTION 2

23–51 AUDIO MANAGEMENT 6
AUDIO MANAGEMENT GENERAL DESCRIPTION ... 6
AUDIO CONTROL PANEL INTRODUCTION 8
AUDIO SWITCHING FUNCTION 10
AUDIO MANAGEMENT UNIT INTERFACES 12
AMS POWER SUPPLY DESCRIPTION 14
AUDIO MANAGEMENT UNIT COMPONENT DESCRIPTION 16
EMERGENCY FUNCTION OPERATION 18
TRANSMIT CIRCUIT OPERATION 20
LOUDSPEAKER MUTING CIRCUIT OPERATION 22
FLIGHT INTERPHONE GENERAL DESCRIPTION 24
MAINTENANCE TIPS - RADIO PTT SWITCH LOCATION 26
RECEPTION CIRCUIT OPERATION 28
SELCAL, MECHANIC & CABIN ATTENDANT CALL FUNCTION 30

23–42 GROUND CREW AND COCKPIT CALL SYSTEM 32
CALL SYSTEM PRESENTATION 32
COCKPIT TO GROUND CREW CALL SYSTEM FUNCTIONAL OPERATION 34

23–13 RADIO MANAGEMENT 36
RMP SYSTEM PRESENTATION 36
RMP COMMUNICATION TUNING PRESENTATION .. 38
RMP NAV BACK UP TUNING 42
RADIO MANAGEMENT SYSTEM COM TUNING DESCRIPTION 44
NAVIGATION SYSTEMS TUNING DESCRIPTION 48
RADIO NAV TUNING FROM RMP AND MCDU 52

23–12 VERY HIGH FREQUENCY SYSTEM 54
COMMUNICATIONS SYSTEM PRESENTATION 54
VHF SYSTEM PRESENTATION 56
VHF INTERFACE DESCRIPTION 58

23–11 HIGH FREQUENCY SYSTEM 60
HF SYSTEM GENERAL 60
HF INTERFACE DESCRIPTION 62
HF COMPONENT DESCRIPTION 64

23–24 AIRCRAFT COMMUNICATION ADDRESSING AND REPORTING SYSTEM (ACARS) 66
ACARS INTRODUCTION 66
ACARS DESCRIPTION 70
ACARS ACTIVATION 74
ACARS APPLICATIONS 76
ACARS MCDU MENU PRESENTATION 80
ACARS INDICATIONS 84
ACARS MISCELLANEOUS PAGE PRESENTATION ... 86
ACARS STATISTICS & PARAMETER PAGES DESCRIPTION 88
ACARS MAINTENANCE MENU PAGE PRESENTATION 90
ACARS RESET FUNCTION 96
ACARS DATA LOADING 98

23–28 SATELLITE COMMUNICATION 100
AERO–I SATCOM SYSTEM OPERATION 100
COMPONENT LOCATION INTRODUCTION 102

23–60 STATIC DISCHARGING 108
STATIC DISCHARGING DESCRIPTION 108

23–71 COCKPIT VOICE RECORDER 112
SSCVR DESCRIPTION AND OPERATION 114
CVR POWER SUPPLY LOGIC DESCRIPTION 116
CVR COMPONENT LOCATION 118

23–72 ANTI HIJACK CAMERA MONITORING 120
ANTI HIJACK CAMERA MONITORING VERSION 1 (AIRBUS) 120
CDSS ARCHITECTURE VERSION 1 (AIRBUS) 122

TABLE OF CONTENTS

ANTI HIJACK CAMERA MONITORING VERSION 2 (AIRBUS) 124
CDSS ARCHITECTURE VERSION 2 (AIRBUS) 126
ANTI HIJACK CAMERA MONITORING EFB-VERSION (POST EO330873–03) 128
CDSS ARCHITECTURE DLH-VERSION (POST EO330873–03) 130

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS) 132
CIDS GENERAL INTRODUCTION 132
CLASSIC CIDS PRESENTATION 134
TYPE A & B DECODER ENCODER UNIT FUNCTION . 136
CIDS DIRECTOR - DEU A & B INTERFACE 140
DEU MOUNT DESCRIPTION 144
FORWARD ATTENDANT PANEL INTRODUCTION . . . 146
AFT / ADDITIONAL ATTENDANT PANEL PRESENTATION 152
ATTENDANT HANDSET PRESENTATION 154
ATTENDANT INDICATION PANEL COMPONENT DESCRIPTION 156
AREA CALL PANEL PRESENTATION 162
PASSENGER ADDRESS SYSTEM DESCRIPTION . . . 164
PASSENGER ADDRESS SYSTEM OPERATION 168
CABIN INTERPHONE SYSTEM OPERATION 170
SERVICE INTERPHONE SYSTEM DESCRIPTION . . . 172
PASSENGER LIGHTED SIGNS OPERATION 174
PASSENGER CALLS SYSTEM DESCRIPTION 176
PROGRAMMING AND TEST PANEL PRESENTATION 178
PTP SYSTEM STATUS PRESENTATION 180
PTP SYSTEM TEST PRESENTATION 184
PTP PROGRAMMING FUNCTIONAL OPERATION . . . 186
CIDS FAILURE DETECTION AND TRANSMISSION OPERATION 192
CLASS 1 CAB, 2, 3 FAULTS 194
CIDS POWER SUPPLY OPERATION 198
CIDS INTERFACES 204
CIDS CFDS MENU PRESENTATION 210
CIDS COMPONENT LOCATION 212

23–32 ANNOUNCEMENT – MUSIC TAPE REPRODUCER SYSTEM 218
PRERECORDED ANNOUNCEMENT & BOARDING MUSIC DESCRIPTION 218

23–73 CABIN INTERCOMMUNICATION DATA SYSTEM - ENHANCED 222
CIDS INTRODUCTION 222
FLIGHT ATTENDANT PANEL INTRODUCTION 224
CIDS DIRECTORS PRESENTATION 226
FLIGHT ATTENDANT PANEL 234
CIDS DIRECTOR DESCRIPTION/OPERATION 236
DEU CONNECTION BOX DESCRIPTION 238
FLIGHT ATTENDANT PANEL 240
SERVICE INTERPHONE COMPONENT DESCRIPTION 260
CIDS DIRECTOR BITE DESCRIPTION 262
CIDS WARNINGS DESCRIPTION 266
COMMUNICATION SYSTEMS MAINTENANCE PRACTICES 268

25–63 EVACUATION SIGNALING EQUIPMENT 272
EVACUATION COMMAND SYSTEM 272
EVAC SYSTEM OPERATION 276

TABLE OF FIGURES

Figure 1 Radio & Datalink Communication . . . 3
Figure 2 On Board Communication . . . 5
Figure 3 Audio Management Introduction . . . 7
Figure 4 Audio Control Panel . . . 9
Figure 5 Audio Switching . . . 11
Figure 6 AMU Detailed Schematic . . . 13
Figure 7 AMS Normal Power Supply . . . 15
Figure 8 AMU Block Diagramm . . . 17
Figure 9 Emergency Switching Function . . . 19
Figure 10 Transmission Function . . . 21
Figure 11 Direct Muting Schematic . . . 23
Figure 12 Flight Interphone . . . 25
Figure 13 Maintenance Tips - PTT-Switch . . . 27
Figure 14 Reception Function . . . 29
Figure 15 SELCAL, Mechanic and Attendant Call . . . 31
Figure 16 Cockpit Call System Overview . . . 33
Figure 17 Call System Schematic . . . 35
Figure 18 RMS Basic Schematic . . . 37
Figure 19 RMP COM Tuning . . . 39
Figure 20 RMP SEL Light Function . . . 41
Figure 21 RMP NAV Backup Tuning . . . 43
Figure 22 RMP COM Tuning (1) . . . 45
Figure 23 RMP COM Tuning (2) . . . 47
Figure 24 NAVAIDS Auto Tuning . . . 49
Figure 25 RMP Standby NAV Tuning . . . 51
Figure 26 RAD NAV Tuning . . . 53
Figure 27 Radio Communication General . . . 55
Figure 28 VHF System Presentation . . . 57
Figure 29 VHF System Interface . . . 59
Figure 30 HF System Presentation . . . 61
Figure 31 HF System Interface . . . 63
Figure 32 HF Coupler Description . . . 65
Figure 33 ACARS Frequency Table . . . 66
Figure 34 ACARS Principle . . . 67
Figure 35 ACARS Overview . . . 69
Figure 36 ACARS Architecture . . . 71
Figure 37 Aircraft Personality Module Schematic . . . 73
Figure 38 ACARS Indication on RMP . . . 75
Figure 39 Typical ACARS Applications . . . 77
Figure 40 DLH Data Link Profile . . . 79
Figure 41 ACARS Main Menu (Ground) . . . 81
Figure 42 ACARS PREFLT/INFLT/POSTFLT Menu . . . 83
Figure 43 ACARS Indication on EWD & MCDU . . . 85
Figure 44 Miscellaneous, Data Frequency & OOOI Status Pages . . . 87
Figure 45 (V)HF & SAT Statistics / Parameter Display . . . 89
Figure 46 ACARS Maintenance Page . . . 91
Figure 47 ACARS Test Page . . . 93
Figure 48 ACARS STATUS & ERROR LOG Pages . . . 95
Figure 49 ACARS MU or CMU Reset Procedure . . . 97
Figure 50 ACARS MU & CMU Data Load . . . 99
Figure 51 AERO-I SATCOM System Schematic . . . 101
Figure 52 ACP & Audio Switching Selector Location . . . 102
Figure 53 Cockpit Audio Equipment Location . . . 103
Figure 54 RMP Location . . . 104
Figure 55 VHF & HF Transceiver, SELCAL Panel and AMU Location . . . 105
Figure 56 SATCOM Components Location . . . 106
Figure 57 Antennas and HF Coupler Location . . . 107
Figure 58 Static Discharger Location . . . 109
Figure 59 Discharger & Retainer Types . . . 111
Figure 60 Cockpit Voice Recorder Functions . . . 113
Figure 61 SSCVR Interface . . . 115
Figure 62 CVR Power Supply Logic . . . 117
Figure 63 CVR Cockpit Component Location . . . 118
Figure 64 CVR Location . . . 119
Figure 65 Cockpit Door Surveillance System Version 1 . . . 121
Figure 66 CDSS Architecture version . . . 123
Figure 67 Cockpit Door Surveillance System Version 2 . . . 125
Figure 68 CDSS Architecture Version 2 . . . 127
Figure 69 Cockpit Door Surveillance System EFB-Version . . . 129
Figure 70 CDSS Architecture EFB-Version . . . 131

TABLE OF FIGURES

Figure 71 CIDS Introduction 133
Figure 72 Classic CIDS Presentation 135
Figure 73 DEU A Schematic 137
Figure 74 DEU B Schematic 139
Figure 75 DEU A Interconnection 141
Figure 76 DEU B Interconnection 143
Figure 77 DEU Mount 145
Figure 78 Forward Attendant Panel with All Options 149
Figure 79 FAP - Air Temperature and Light Module 150
Figure 80 FAP - Audio and Miscellaneous Module 151
Figure 81 Aft / Additional Attendant Panel 153
Figure 82 Cabin Handset 155
Figure 83 Attendant Indication Panel (AIP) 157
Figure 84 AIP Block Diagram 158
Figure 85 Possible AIP Messages (1) 159
Figure 86 Possible AIP Messages (2) 160
Figure 87 Possible AIP Messages (3) 161
Figure 88 Area Call Panel 163
Figure 89 Passenger Announcement From Cockpit 165
Figure 90 Passenger Announcement From Cabin 167
Figure 91 Passenger Address System Schematic 169
Figure 92 Cabin Interphone System & Calls 171
Figure 93 Service Interphone Schematic 173
Figure 94 Passenger Lighted Signs 175
Figure 95 Passenger Calls Schematic 177
Figure 96 Programming and Test Panel (PTP) 179
Figure 97 PTP System Status Menu 181
Figure 98 PTP System Status - Maintenance Menu (1) 182
Figure 99 PTP System Status - Maintenance Menu (2) 183
Figure 100 PTP System Test Menu 185
Figure 101 PTP Programming - Cabin Zones Menu 187
Figure 102 PTP Programming - Cabin Programming Menu 188
Figure 103 PTP Programming - CAM Layout Menu 189
Figure 104 PTP Programming - PA Level Adjustment Menu (Not at DLH) 191
Figure 105 CIDS Class 1 Fault 193
Figure 106 CIDS Class 1 Cabin Fault 195
Figure 107 CIDS Class 2 Faults 196
Figure 108 CIDS Failures on PFR 197
Figure 109 CIDS Normal Power Supply 199
Figure 110 CIDS Abnormal Power Supply Example 201
Figure 111 CIDS Power Supply without Hot Bus option 203
Figure 112 Director Interfaces 205
Figure 113 FAP Interfaces 207
Figure 114 PTP Interfaces 209
Figure 115 CIDS CFDS Menu 211
Figure 116 FAP & PTP Location 212
Figure 117 Handset, AIP & AAP Location 213
Figure 118 ACP & PSU Location 214
Figure 119 DEU A & B Location 215
Figure 120 CIDS Cockpit Controls Location 216
Figure 121 DIR & PRAM Location 217
Figure 122 Prerecorded Announcement & Boarding Music Operation 220
Figure 123 PCMCIA PRAM & Announcement Placard 221
Figure 124 Differences Between Classic and Enhanced CIDS 223
Figure 125 Flight Attendant Panel 225
Figure 126 CIDS Schematic 227
Figure 127 Example DEU 228
Figure 128 DEU A Interconnection 229
Figure 129 DEU B Interconnection 231
Figure 130 New Cabin Handset 233
Figure 131 Flight Attendant Panel Schematic 235
Figure 132 CIDS Power Supply and Smoke Detection Function 237
Figure 133 Enhanced DEU A, B & DIR Location (Ex. A320) 239
Figure 134 Cabin STATUS Page 241
Figure 135 AUDIO Page 242
Figure 136 CABIN LIGHTING Page 243
Figure 137 DOORS/SLIDES Page 244
Figure 138 Failures on DOORS/SLIDE Page 245
Figure 139 CABIN TEMPERATURE Page 246

TABLE OF FIGURES

Figure 140 Failures on CABIN TEMP Page 247
Figure 141 WATER/WASTE Page 248
Figure 142 SYSTEM INFO Page 249
Figure 143 Failures on SMOKE DETECTION Page 251
Figure 144 SYSTEM INFO Page 252
Figure 145 SYSTEM INFO Page with GND/SVCE PWR Connected .. 253
Figure 146 CABIN PROGRAMMING Page 254
Figure 147 LAYOUT SELECTION Page 255
Figure 148 LAYOUT ADJUSTMENT Page (Not at DLH) 256
Figure 149 SOFTWARE LOADING Page 257
Figure 150 CIDS SYSTEM MENU Page 258
Figure 151 FAP SET-UP Page 259
Figure 152 Isolation Unit 260
Figure 153 Service Interphone with Isolation Unit 261
Figure 154 CIDS Classic & Enhanced CFDS Menu 263
Figure 155 CIDS System and OP Test Menus 265
Figure 156 Communication Systems BITE Connection 269
Figure 157 ATA 23 Warning & Caution Messages 270
Figure 158 Evacuation Command Controls & Indications 273
Figure 159 Evacuation Controls On Enhanced FAP 275
Figure 160 EVAC System Schematic 277