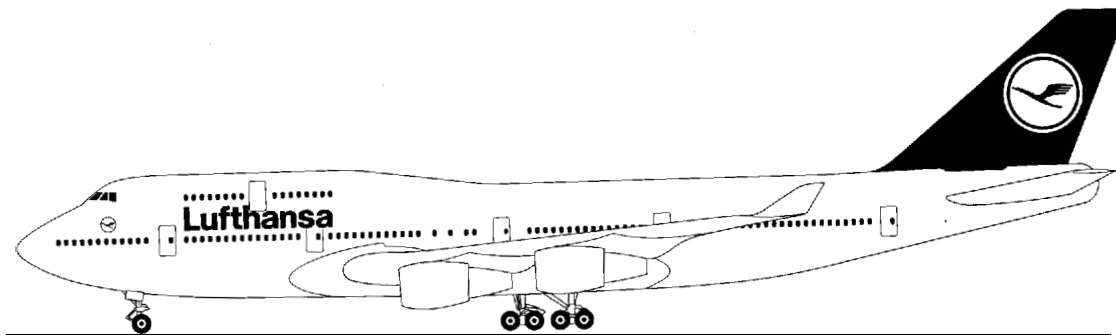




Lufthansa Technical Training

Training Manual B 747-400

ATA 23-51 FLIGHT INTERPHONE ATA Spec 104 Level 3



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Lufthansa
Technical Training GmbH
Lufthansa Base

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Lufthansa Technical Training GmbH

Lufthansa Base Frankfurt

D-60546 Frankfurt/Main

Tel. +49 69 / 696 41 78

Fax +49 69 / 696 63 84

Lufthansa Base Hamburg

Weg beim Jäger 193

D-22335 Hamburg

Tel. +49 40 / 5070 24 13

Fax +49 40 / 5070 47 46



ATA 23-51 FLIGHT INTERPHONE

FLIGHT INTERPHONE



FLIGHT INTERPHONE SYSTEM - INTRODUCTION

The flight interphone system provides voice communications and audio monitoring between the:

- Flight crew personnel
- Flight crew and ground crew
- Flight crew and communications systems and navigation radio

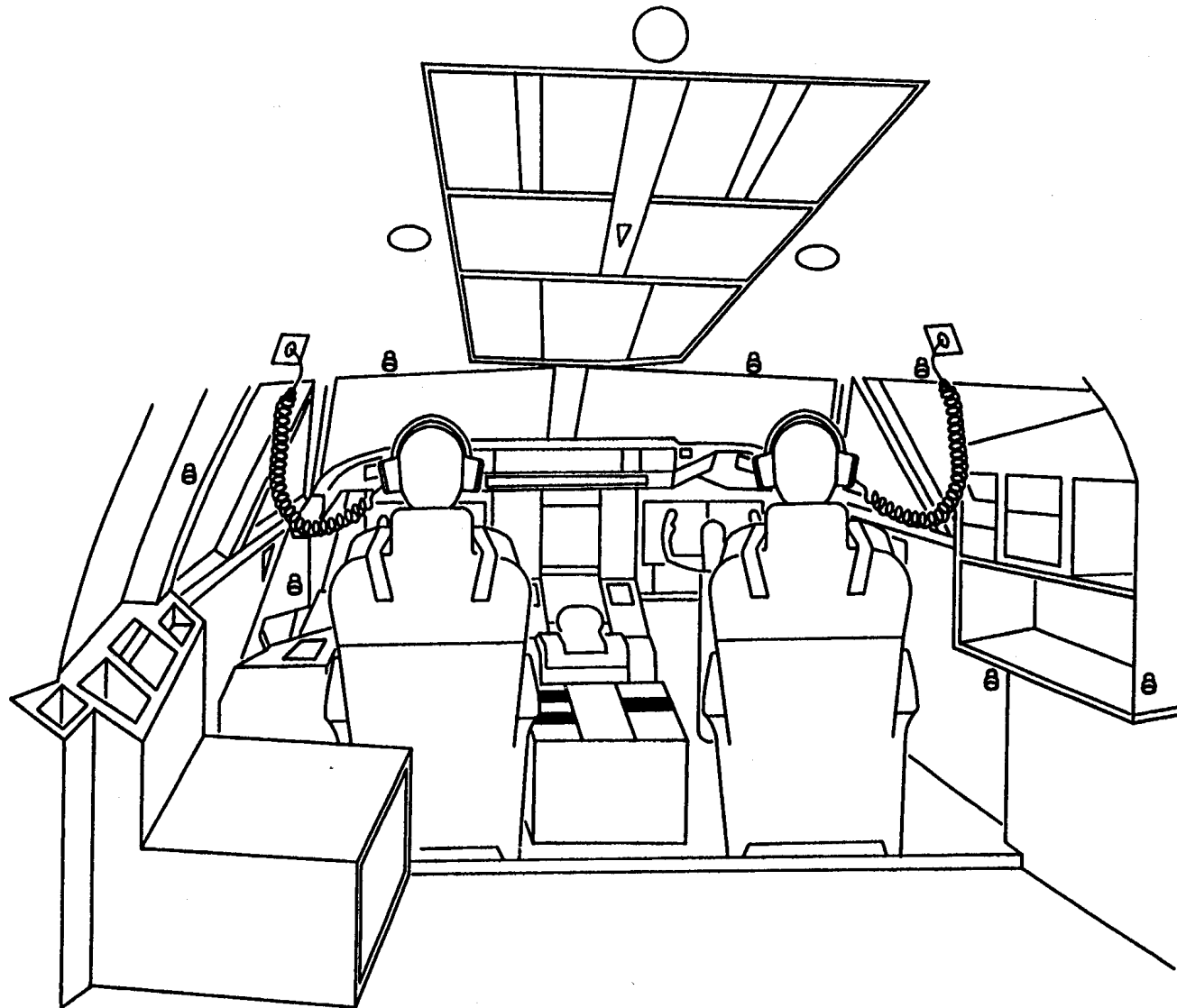


Figure 1 FLIGHT INTERPHONE SYSTEM - INTRODUCTION

FLIGHT INTERPHONE



FLIGHT INTERPHONE SYSTEM

General Description

The flight interphone system's audio management unit (MU) controls audio signals going to and from the flight crew. The flight crew select audio signals to monitor, and connect their microphone (handheld, headset, or oxygen mask) to a communications transceiver, passenger address-system, or cabin interphone system using an audio control panel (ACP). The microphone (MIC) is keyed using either the ACP, control wheel PTT switch, or the switch on the handheld microphone. Audio signals are sent to a headset or the cockpit speaker.

Interfaces

The AMU sends PTT and MIC audio to the communications systems, and gets audio back from them.

The AMU gets audio from the navigation radios. The control display units (CDUs) send a distance measuring equipment (DME) pairing discrete to put DME audio on either the VHF omni range (VOR) or instrument landing system (ILS) audio channel.

Ground crew interface with the flight interphone system through jacks in the main equipment center (MEC) and nose wheel well control panel.

The service interphone system interfaces with the flight interphone system and is paralleled with the flight interphone using a switch on the miscellaneous switch control module. The module also has the observer's audio system switch that controls a backup mode used when the captain's or first officer's audio system fails.

The AMU receives a discrete from the radio communication panels when they are tuned to the emergency frequency. This selects VHF audio monitoring automatically.

The SELCAL decoder and ACARS send discretes which turn on call lights on the ACPs.

The voice recorder gets three channels of both MIC and selected audio signals.

Fault information goes to the central maintenance computer system so it may record faults as they occur.

FLIGHT INTERPHONE



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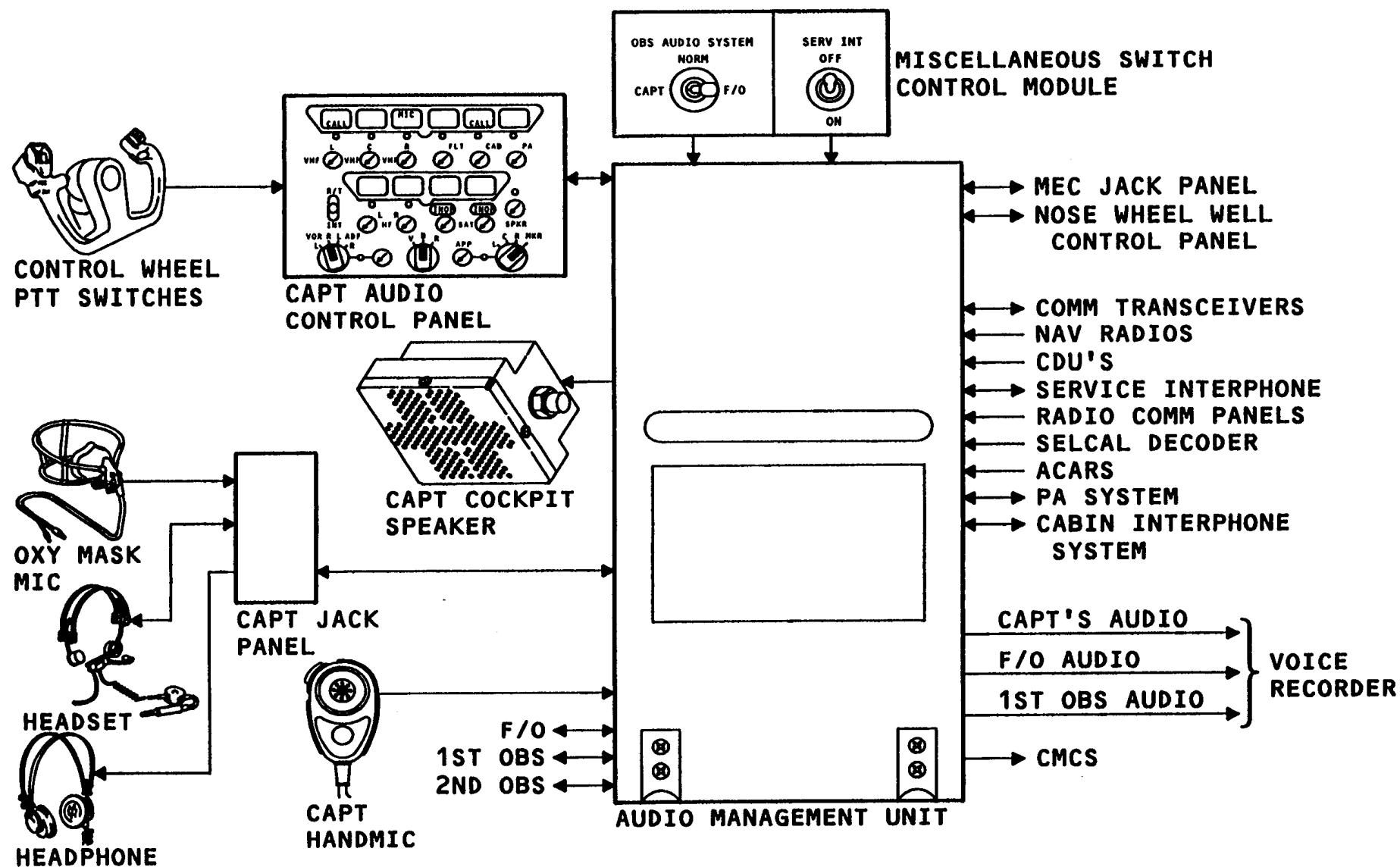


Figure 2 FLIGHT INTERPHONE SYSTEM

FLIGHT INTERPHONE



COMPONENT LOCATIONS - 1

The flight interphone system components are:

- Captain's interphone circuit breaker
- First officer's interphone circuit breaker
- Observer's interphone circuit breaker
- Captain's cockpit speaker
- First officer's cockpit speaker
- Control wheel PTT switches
- Captain's audio control panel (ACP) First officer's ACP
- First observer's ACP
- Second observer's ACP
- Miscellaneous switch control module

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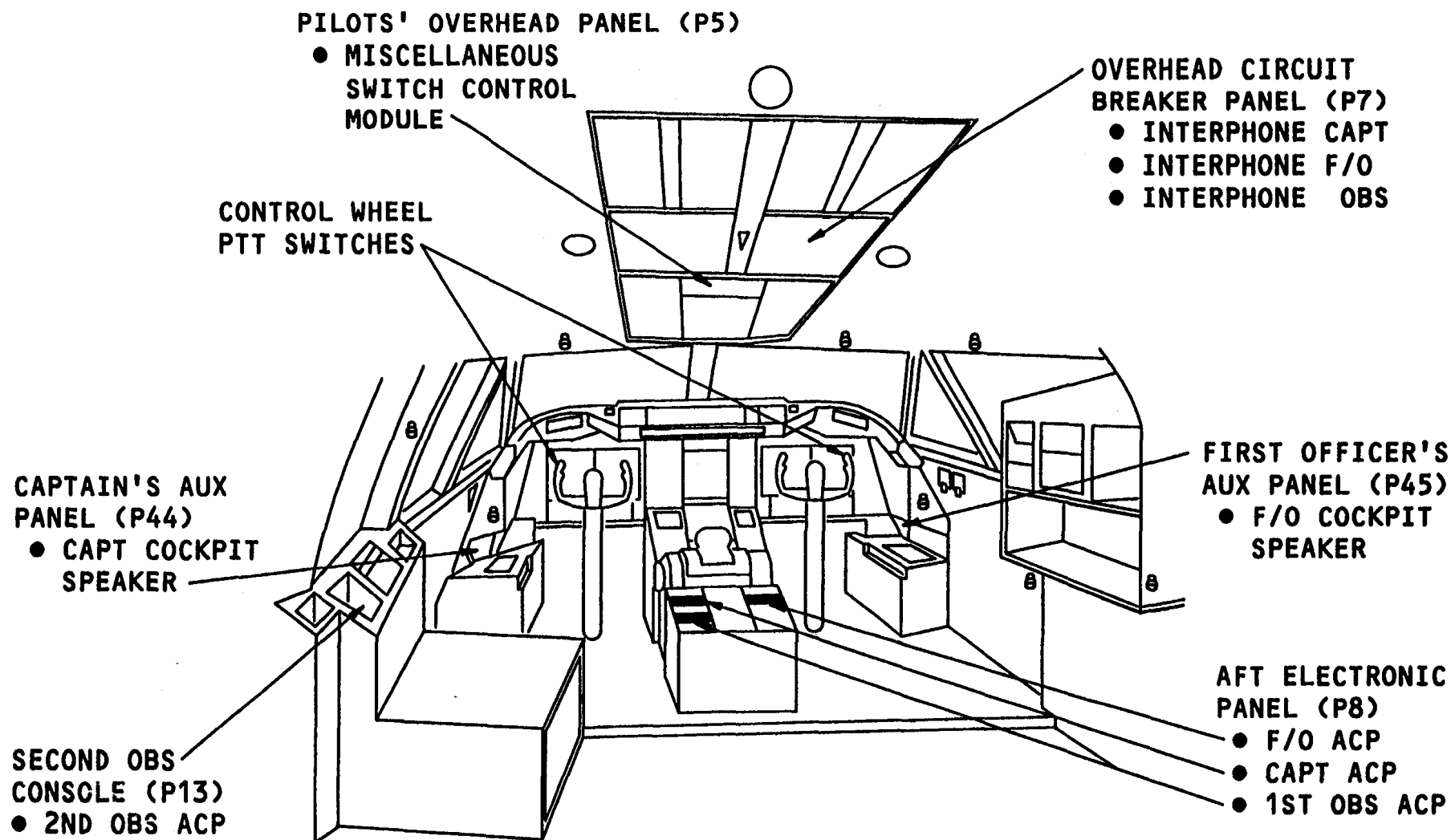


Figure 3 COMPONENT LOCATIONS - 1

FLIGHT INTERPHONE



COMPONENT LOCATIONS - 2

These are also flight interphone system components:

- Captain's oxygen mask stowage box (mask mic)
- Captain's jack panel Captain's handmic jack
- Second observers mask stowage box (mask mic)
- Second observer's jack panel

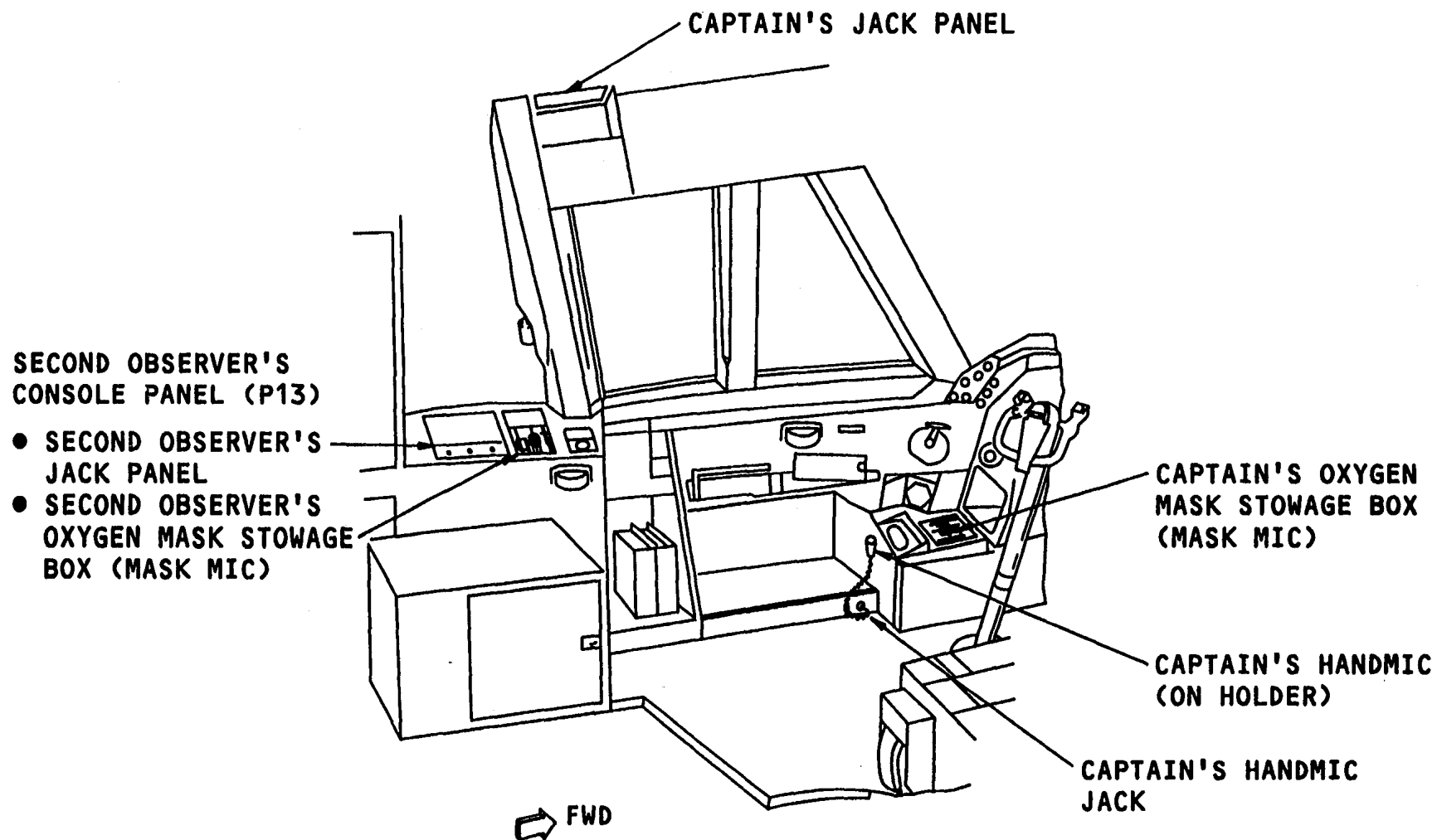


Figure 4 COMPONENT LOCATIONS - 2

FLIGHT INTERPHONE



COMPONENT LOCATIONS - 3

These are also flight interphone system components:

- First officer's oxygen mask stowage box (mask mic)
- First officer's Jack panel
- First officer's handmic Jack First observer's oxygen mask stowage box (mask mic)
- First observer's Jack panel First observer's handmic jack

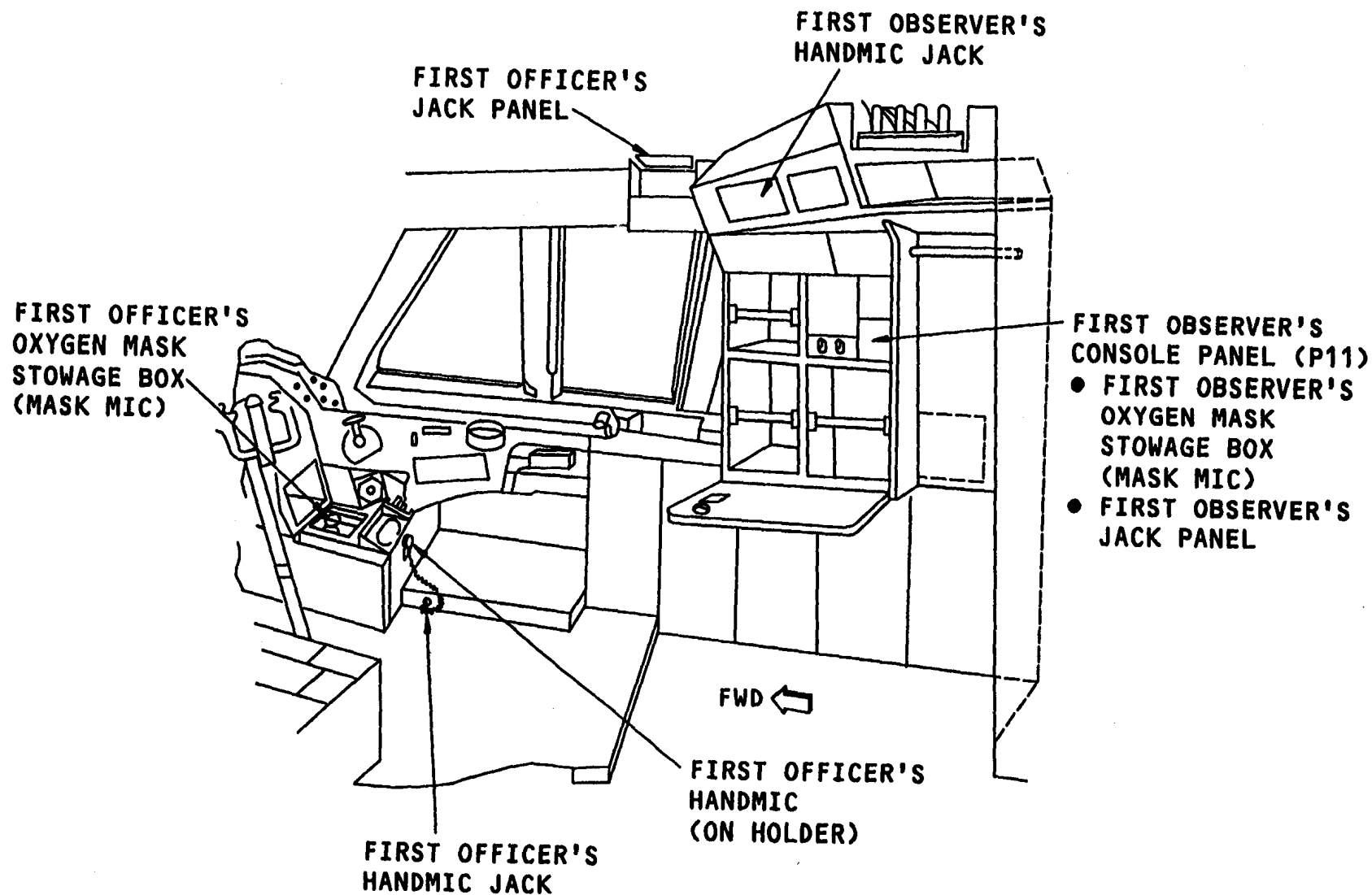


Figure 5 COMPONENT LOCATIONS - 3

FLIGHT INTERPHONE



COMPONENT LOCATIONS - MEC

These components are in the main equipment center (MEC):

- AMU
- Flight interphone headphone Jack
- Flight interphone handmic jack

The jacks are at station 440, waterline 160.

These components can be found on the nose wheel well control panel (P37):

- Flight interphone headset jack
- Flight deck call switch

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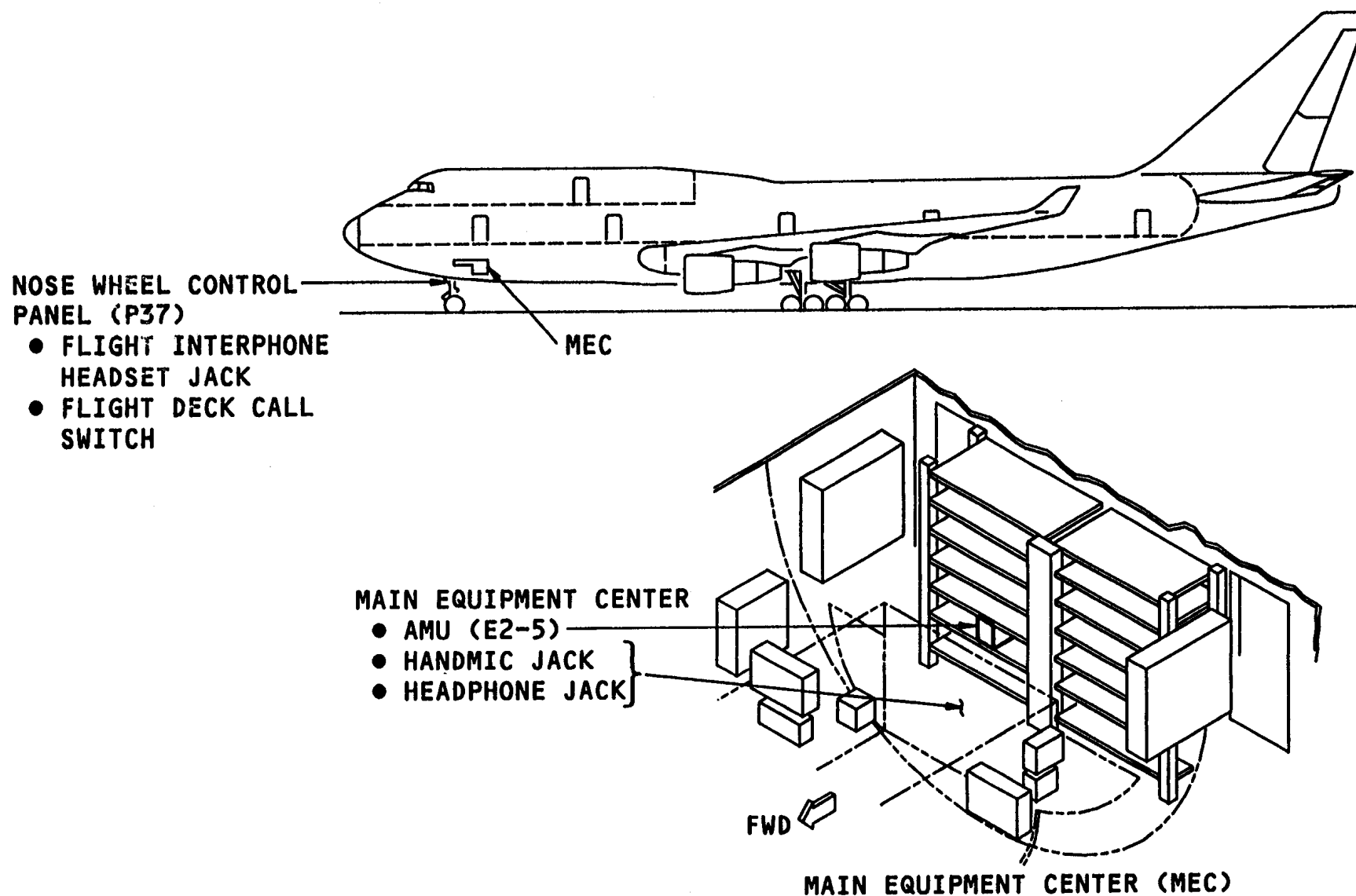


Figure 6 COMPONENT LOCATIONS - MEC

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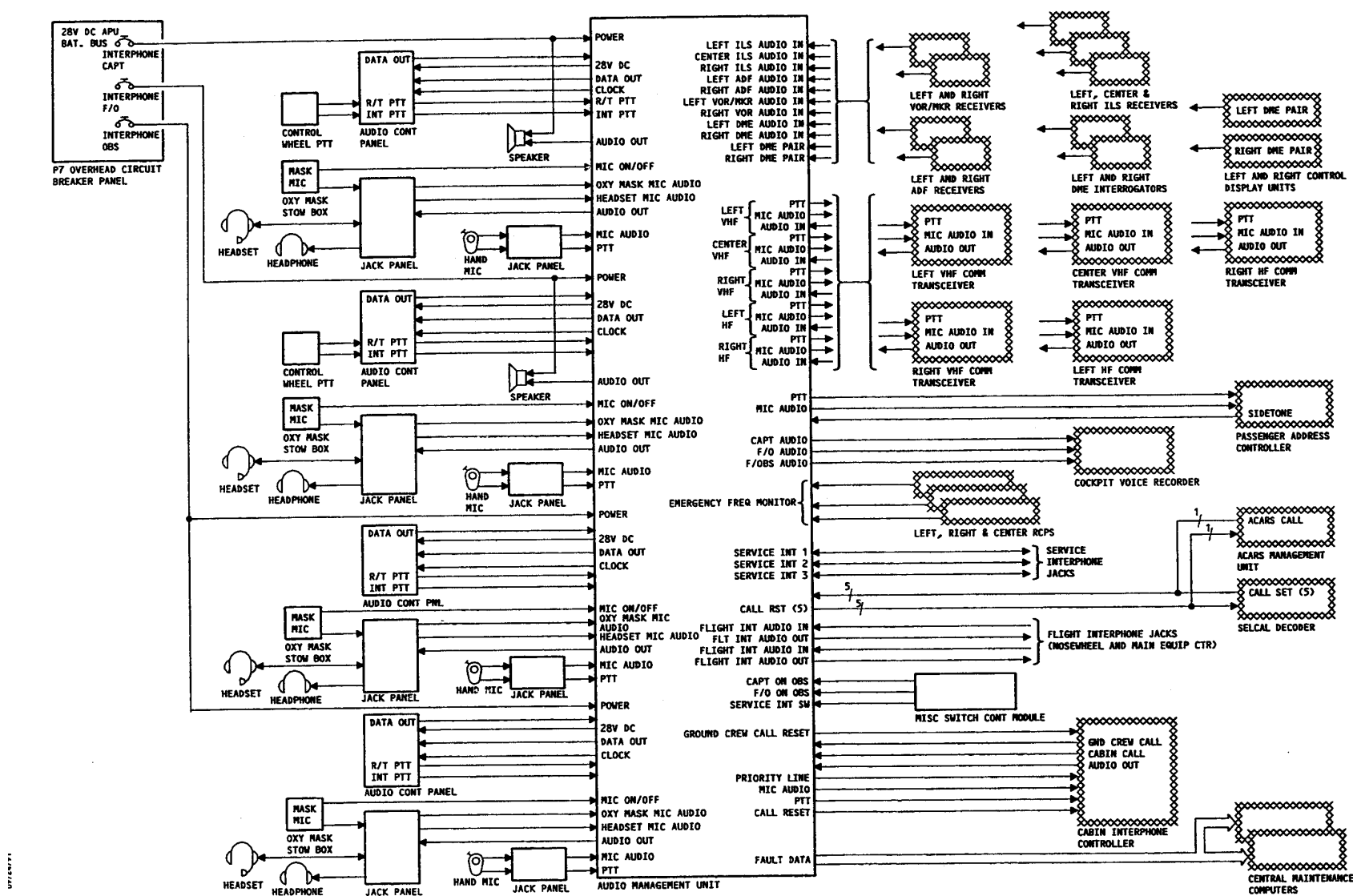


Figure 7 INTERFACE DIAGRAM

FLIGHT INTERPHONE



POWER

Each circuit card in the audio management unit (AMU) has a voltage regulator which provides operating voltages to that card.

The captain's interphone circuit breaker goes to the:

- Captain's card
- Captain's cockpit speaker
- Interface card
- Captain's audio control panel (ACP)

The first officer's circuit breaker goes to the:

- Interface card
- First officer's card
- First officer's cockpit speaker
- First officer's ACP

The observer's interphone circuit breaker goes to the:

- First observer's card
- Second observer's card
- Interface card
- First observer's ACP
- Second observer's ACP

Each ACP also gets voltages from the master dim and test system (MD&T). 28 volt dc is for the:

- Call lights
- MIC lights
- Receive LEDs

Five volts ac is for the panel lights.

The voltage regulator on the interface card provides operating voltages to the flight interphone circuits on that card. This voltage regulator gets power from all of the pilot's station circuit cards. The diodes provide isolation of this output between the pilot's station circuit cards.

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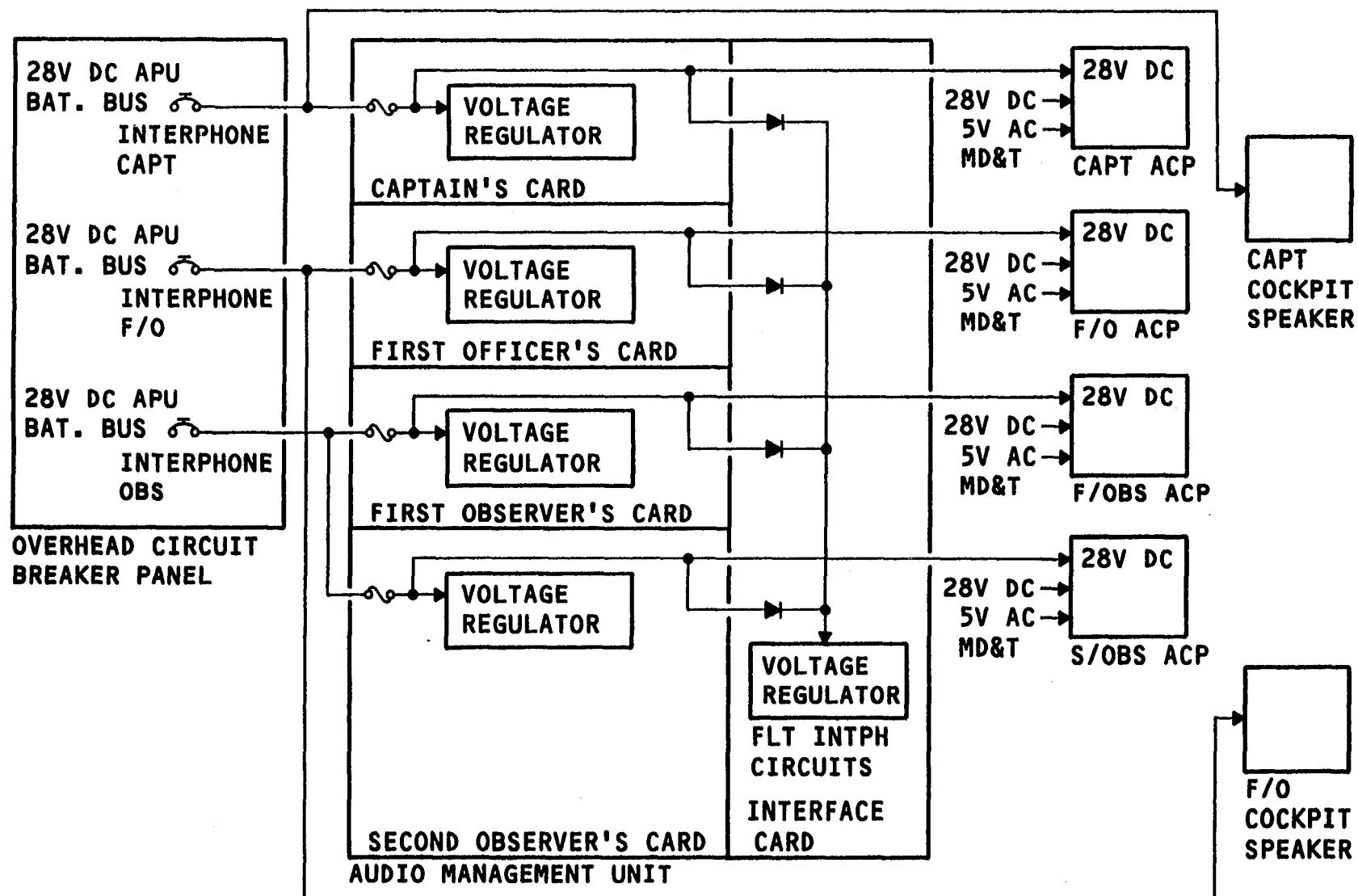


Figure 8 POWER

FLIGHT INTERPHONE



FLIGHT DECK INTERFACES

The flight interphone system's flight deck interfaces are arranged into these four audio stations:

- captain's station
- first officer's station
- first observer's station
- second observer's station

Each station is connected to a circuit card within the audio management unit. These circuit cards receive inputs from the station, route the appropriate audio signals, and provide indications of the selections made.

Each station has these controls and audio interfaces:

- Audio Control Panel
- Hand held microphone Headset
- Headphone
- oxygen mask microphone and door switch (mask mic on/off)

The captain's and first officer's stations also have these interfaces:

cockpit speaker control wheel PTT switches

The control wheel PTT switches are connected in parallel with the station's audio control panel PTT switches. The receive/transmit (R/T) and interphone (INT) PTT signals then go to the audio management unit.

The miscellaneous switch control module has two switches that go to the audio management unit.

- Observer's audio system switch
- Service interphone switch

FLIGHT INTERPHONE

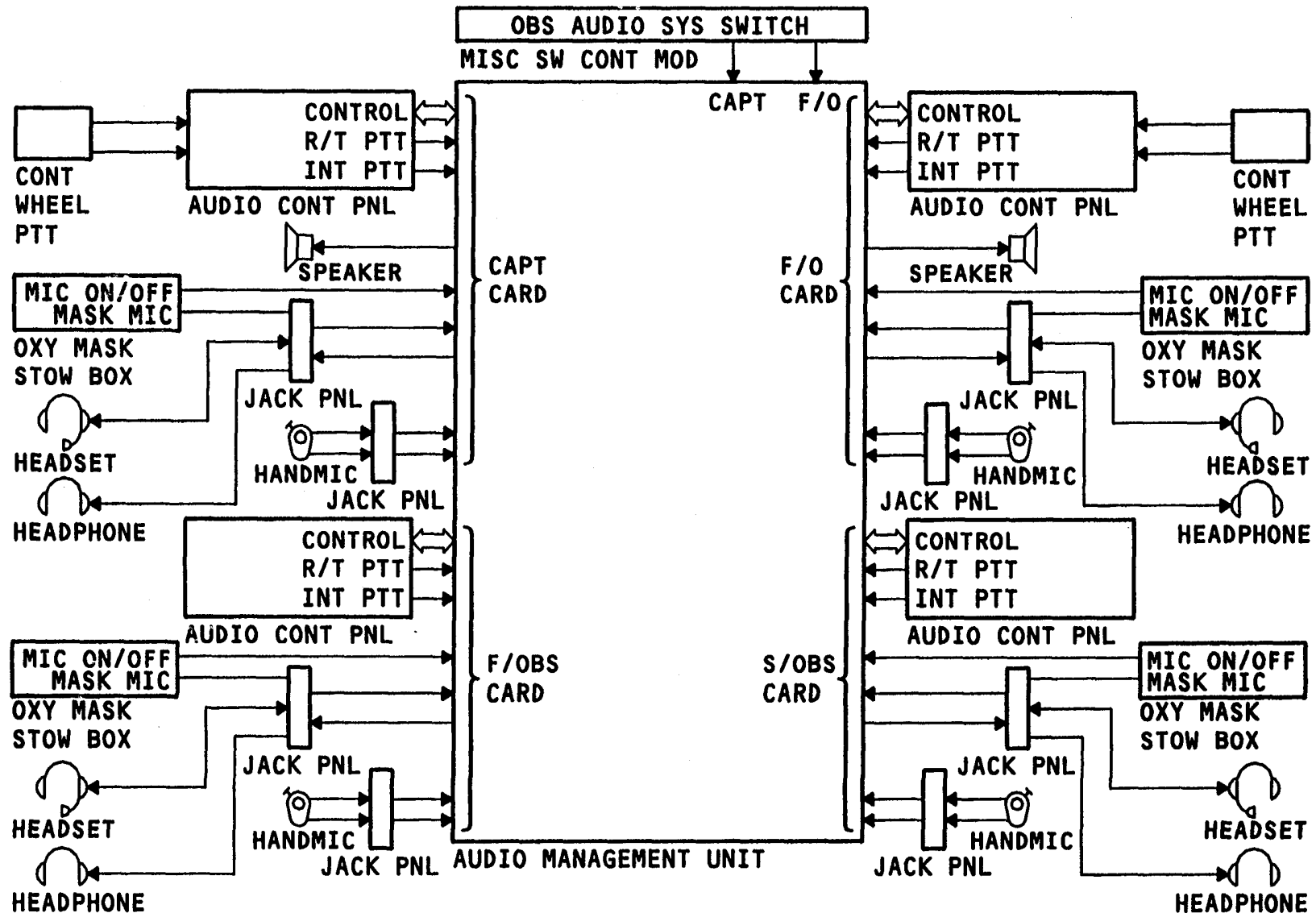


Figure 9 FLIGHT DECK INTERFACES

FLIGHT INTERPHONE



COMMUNICATION SYSTEM INTERFACES

The audio management unit (AMU) sends all audio signals based on the selections made at the audio control panel (ACP).

The five communications transceivers provide audio outputs to the AMU and receive microphone audio and PTT signals.

The SELCAL decoder and ACARS send call set discretes to the AMU to turn on the call lights of the ACPs. The AMU sends call reset discretes to the SELCAL decoder and ACARS to cancel the call discrete, which turns out the call lights.

The service interphone switch on the miscellaneous switch control module connects the service interphone jacks with flight interphone audio.

The cabin interphone controller (CIC) sends a cabin call pulsed discrete to the AMU to turn on the CAB call light on the ACPs. The CIC sends a call reset pulse to the AMUs which turns out the call lights. Cabin interphone audio also goes to the AMU.

The AMU sends a priority call discrete when a CAB transmit switch is pushed twice. Microphone audio and a PTT signal go to the CIC during cabin interphone calls.

The passenger address controller receives microphone audio and a PTT signal during PA announcements, and sends the sidetone and announcements back to the AMU.

Flight interphone jacks on the P37 nose wheel well panel and in the main equipment center are used to communicate with the ground crew.

The three radio communication panels (RCPs) send a discrete to the AMU when 121.5 MHz is the active frequency.

The AMU sends ARINC 429 data to the central maintenance computers to report faults as they are detected.

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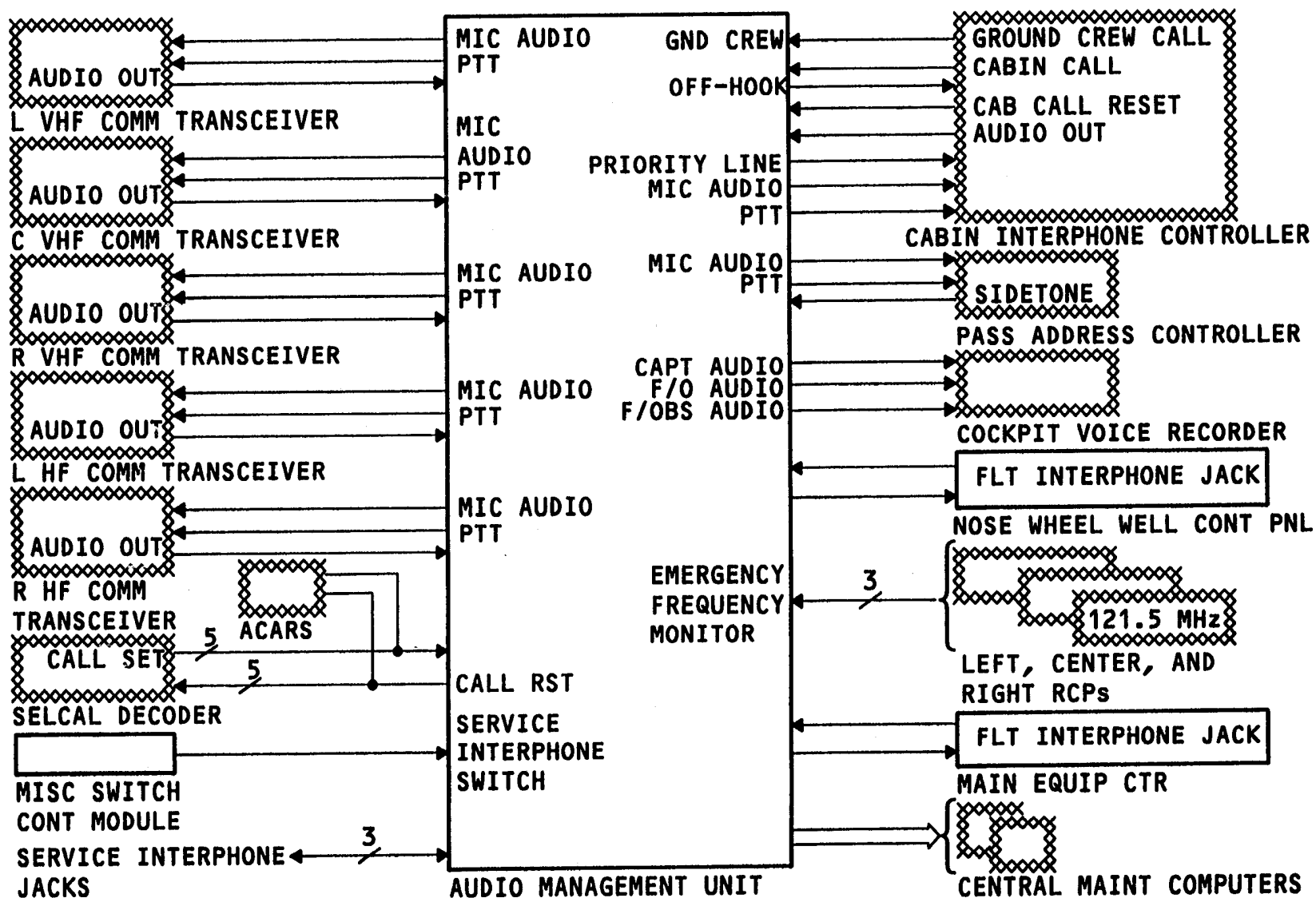


Figure 10 COMMUNICATION SYSTEM INTERFACES

FLIGHT INTERPHONE



NAVIGATION SYSTEM INTERFACES

These navigation radios provide audio outputs to the audio management unit:

- Left instrument landing system (ILS) receiver
- Center ILS receiver
- Right ILS receiver
- Left VHF omni-range (VOR) receiver
- Right VOR receiver
- Left automatic direction finder (ADF) receiver
- Right ADF receiver
- Left distance measuring equipment (DME) interrogator
- Right DME interrogator

The left and right electronic flight instrument system (EFIS) control panels send navigation display mode selection data to the on-side control display units (CDUs). The CDUs send a DME pairing discrete to the AMU based on the EFIS control panel data. The DME pairing discrete tells the AMU to place DME audio on either the VOR or ILS audio channel.

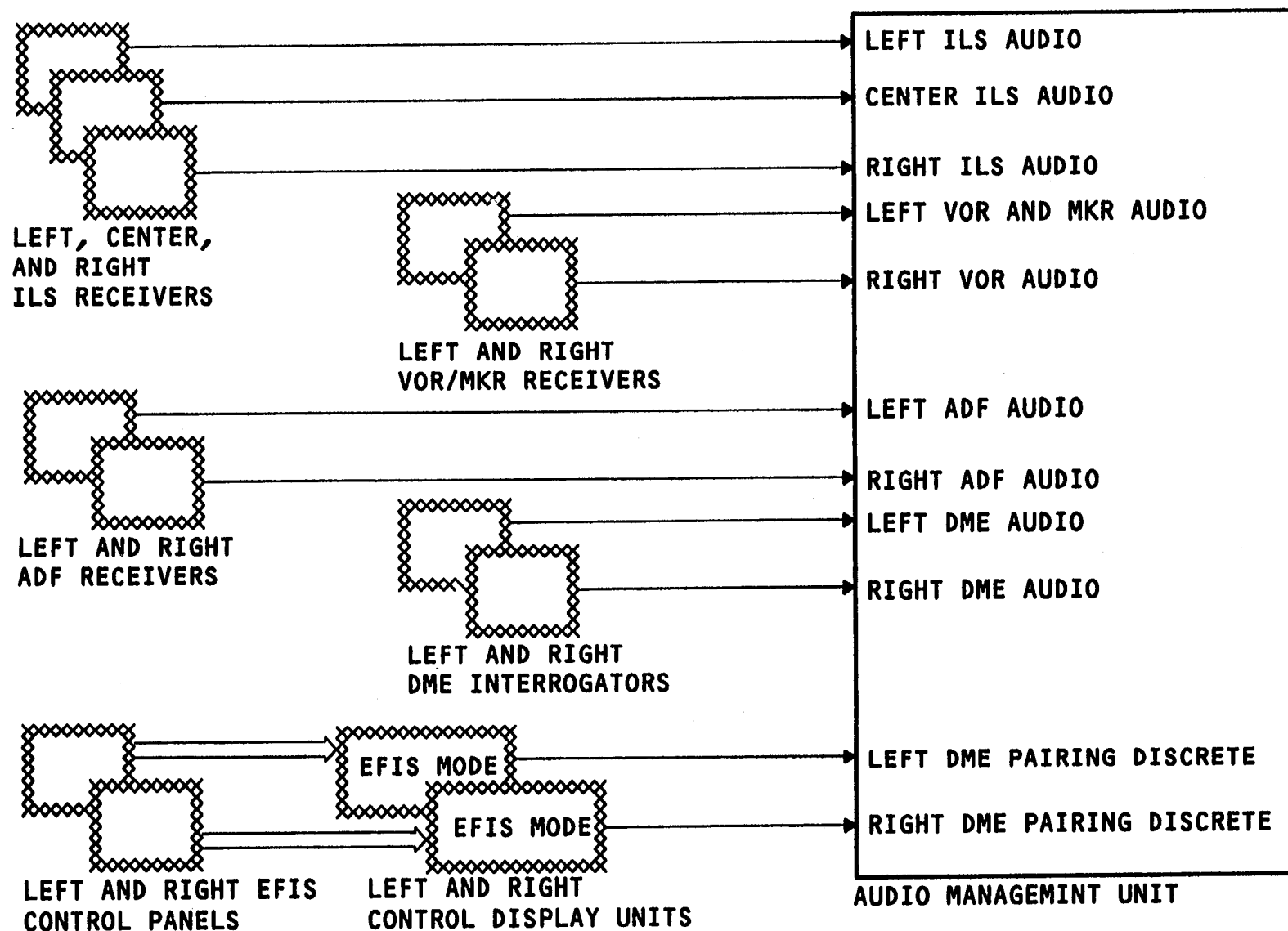


Figure 11 NAVIGATION SYSTEM INTERFACES

FLIGHT INTEPHONE



AUDIO CONTROL PANEL

Purpose

The audio control panel (ACP) gives the flight crew control of the communication and navigation systems audio.

Controls

Controls on the audio control panel are:

- Transmit switches
- Receiver controls
- PTT switch
- Approach receiver selector VOR/ADF receiver selector
- Filter selector
- Cockpit speaker control

Indications

These indications are on the ACP:

- Receive lights Call lights
- Mic lights

Operation

To connect a microphone (boom, OXY, or handheld) to a communication radio or system, push the associated transmit switch. Only one system can be selected at a time. Once pushed, the transmit switch causes:

- The white MIC light on the upper half of that transmit switch to turn on.
- The audio of the associated system to turn on to the volume selected by the receiver control.

When the ACP first gets power, all transmit switches are de-selected.

When the cabin interphone (CAB) transmit switch is pressed twice within three seconds, a call is made to an attendant's station. The attendant's station is determined by the configuration program of the advanced cabin entertainment and service system (ACESS).

The lower half of the transmit switches is a white call light. This light turns on when the respective system calls the flight crew.

A call light goes out when the associated transmit switch is pushed. If the transmit switch is already selected, key the microphone to reset the call light.

The flight interphone call light can also be reset with the INT position of the PTT switch on the ACP.

The VHF and HF call lights are turned on by the SELCAL input to the AMU. The CAB call light is activated by the cabin interphone controller input while the FLT call light is activated by the flight deck call switch on the P37 nose wheel panel.

To listen to a communication or navigation system's audio, push the receiver control (push-on, push-off) and turn it to adjust the volume. Any combination of systems can be monitored at any given time. The green receive light turns on to show that the associated receiver control is on.

The PTT switch is a spring loaded, return to center switch. In the R/T position, it keys either the oxygen mask mic or the boom mic to the system selected by a transmit switch. In the INT position it keys the oxygen mask mic or boom mic to the flight interphone system, regardless of which transmit switch is selected.

The position of the approach receiver

selector determines which of these navigation radio's audio is selected by the associated receiver control:

- Left ILS receiver
- Center ILS receiver
- Right ILS receiver
- Marker beacon receiver.

The VOR/ADF selector determines which VOR or ADF receiver is selected by the associated receiver control.

The filter selector determines how the VOR, ADF, and ILS audio is processed by the AMU. In the B (both) position, voice and range (coded station identification) frequencies are both passed through to the audio output. In the V (voice) position, only voice frequencies are passed while the 1020 Hz range frequency is filtered out. In the R (range) position only the range frequency is passed while the voice frequencies are filtered out.

The cockpit speaker control turns on or off and adjusts the volume of the cockpit speaker. This function only operates on the audio control panels in the captain's or first officer's positions.

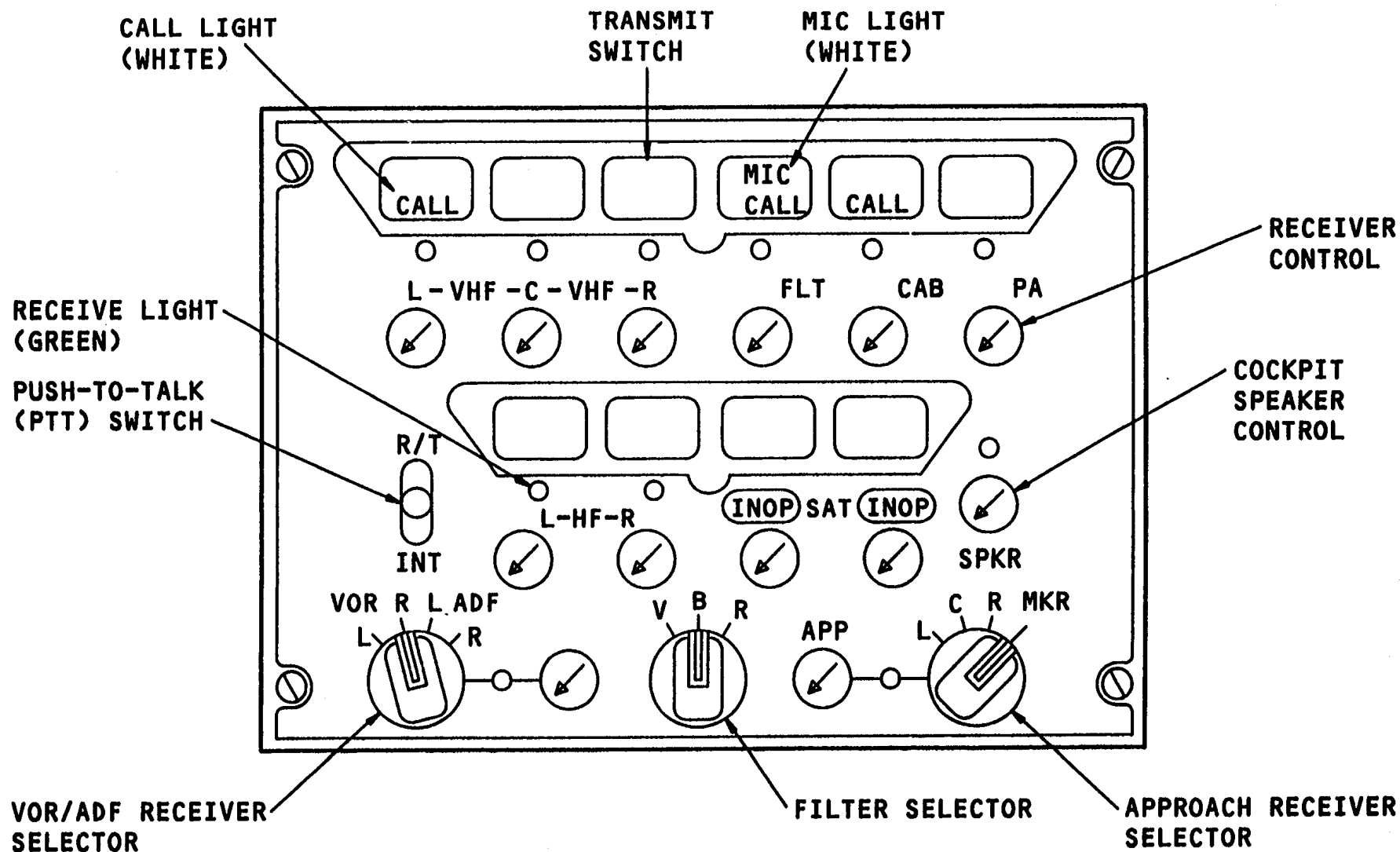


Figure 12 AUDIO CONTROL PANEL

FLIGHT INTERPHONE



AUDIO MANAGEMENT UNIT

Purpose

The audio management unit (AMU) monitors the inputs from the audio control panels (ACPs) to provide correct routing and signal processing of the:

- COMM transceivers audio
- Nav transceivers audio
- Passenger address (PA) audio
- Cabin interphone audio
- Flight interphone audio
- SELCAL and ACARS call alerts and resets

CAUTION: CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-02/201). CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

Characteristics

The AMU has five circuit cards (four crew interface cards and one general interface card):

- Captain's card
- First officer's card
- First observer's card
- Second observer's card
- AMU interface card

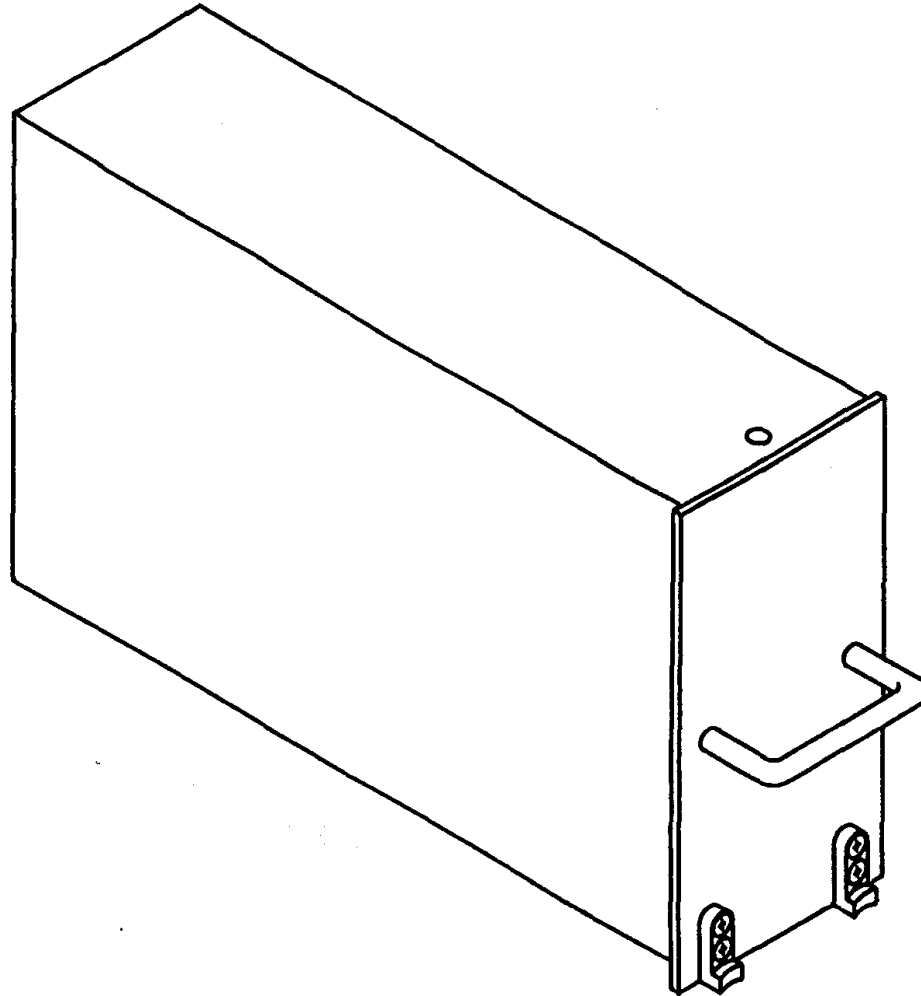


Figure 13 AUDIO MANAGEMENT UNIT

FLIGHT INTEPHONE



OBS AUDIO SYSTEM SWITCH & SERV INT. SWITCH

General

The miscellaneous switch control module contains two switches affecting the flight interphone system:

- Service interphone switch
- Observer audio system switch

Service Interphone Switch

When the service interphone switch (SERV INT) is in the ON position, the flight interphone system and the service interphone system audio signals are combined.

Observer Audio System Switch

The observer (OBS) audio system switch controls the inputs and outputs into the first observer's card in the audio management unit (AMU). When the switch is in the CAPT position, the captain's inputs and outputs are connected to the first observer's card.

When the switch is in the F/O position, the first officer's inputs and outputs are connected to the first observer's card.

In the NORM position, the first observer's inputs and outputs connect to the first observer's card.

This feature lets the captain or first officer use the first observer's audio control panel (ACP) to replace their associated ACP, in case it or their pilot's station circuit card fails.

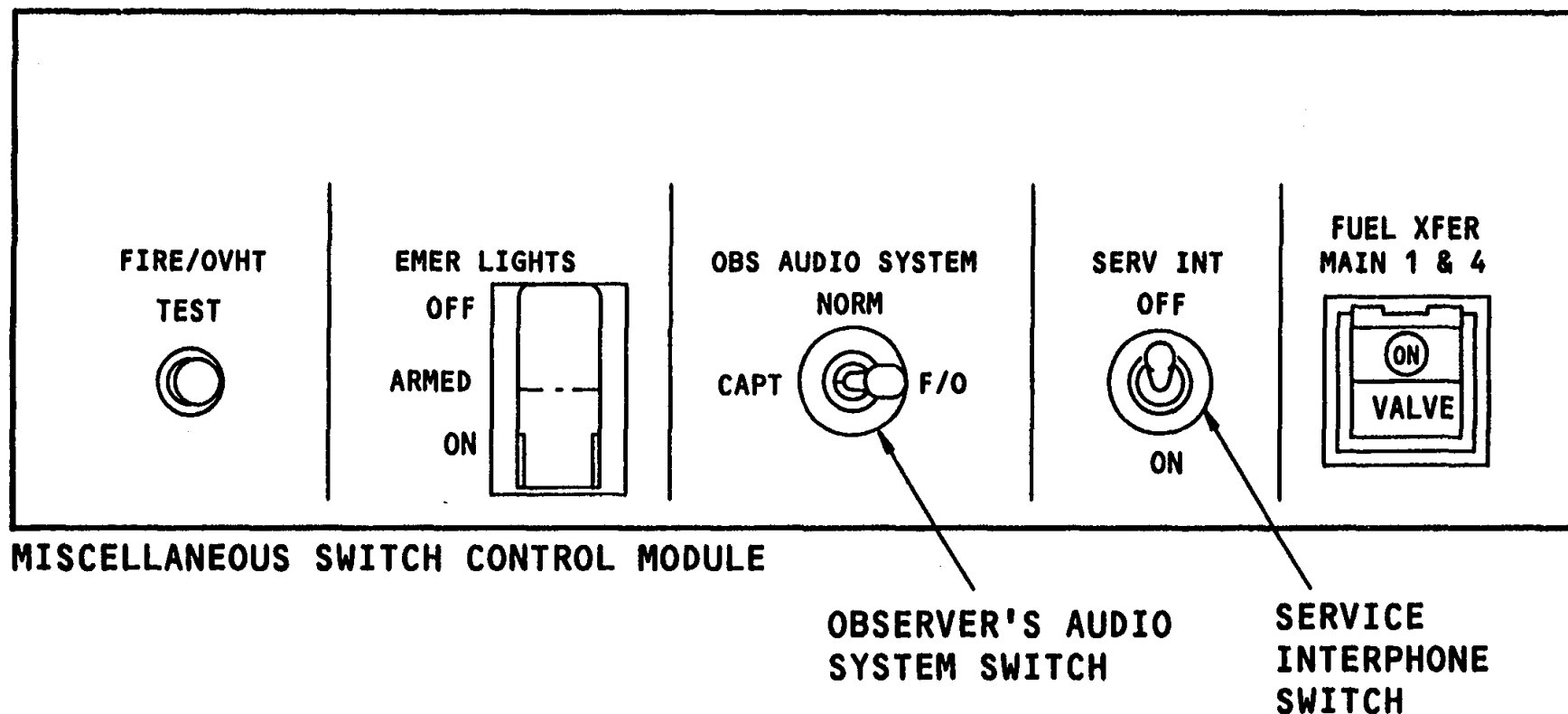


Figure 14 OBS AUDIO SYS SWITCH AND SERV INT SWITCH

FLIGHT INTERPHONE



JACK PANELS

Headsets and headphones are connected to Jack panels at these crew stations:

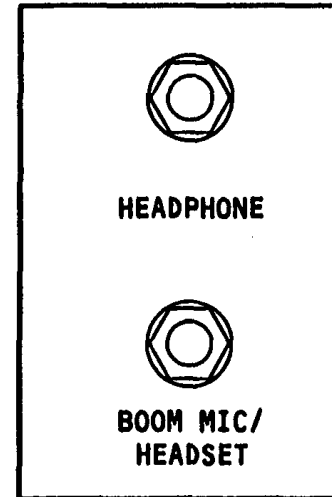
- Captain's Jack panel
- First officer's Jack panel
- First observer's Jack panel
- Second observer's Jack panel

The second observer's Jack panel also has a handmic Jack. The captain, first officer and first observer handmic jacks are in a remote location from the related Jack panels.

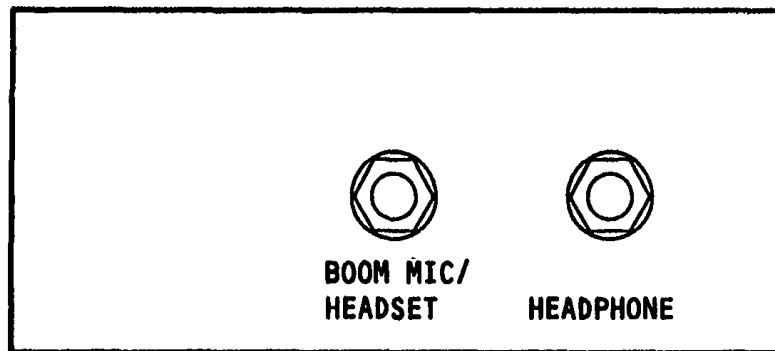
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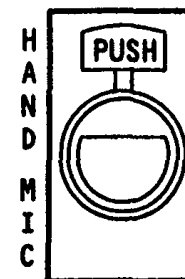
SEC OBS JACK PANEL



FIRST OBS JACK PANEL



CAPT AND F/O JACK PANEL



**CAPT, F/O, AND FIRST
OBS HANDMIC JACK**

Figure 15 JACK PANELS

FLIGHT INTERPHONE



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FLIGHT INTERPHONE JACK

The ground crew can talk to the flight crew on the flight interphone system. To do this a headset is connected to the flight interphone Jack on the nose wheel well control panel.

When pushed, the flight deck call switch causes the flight interphone CALL light on all audio control panels (ACPs) to turn on.

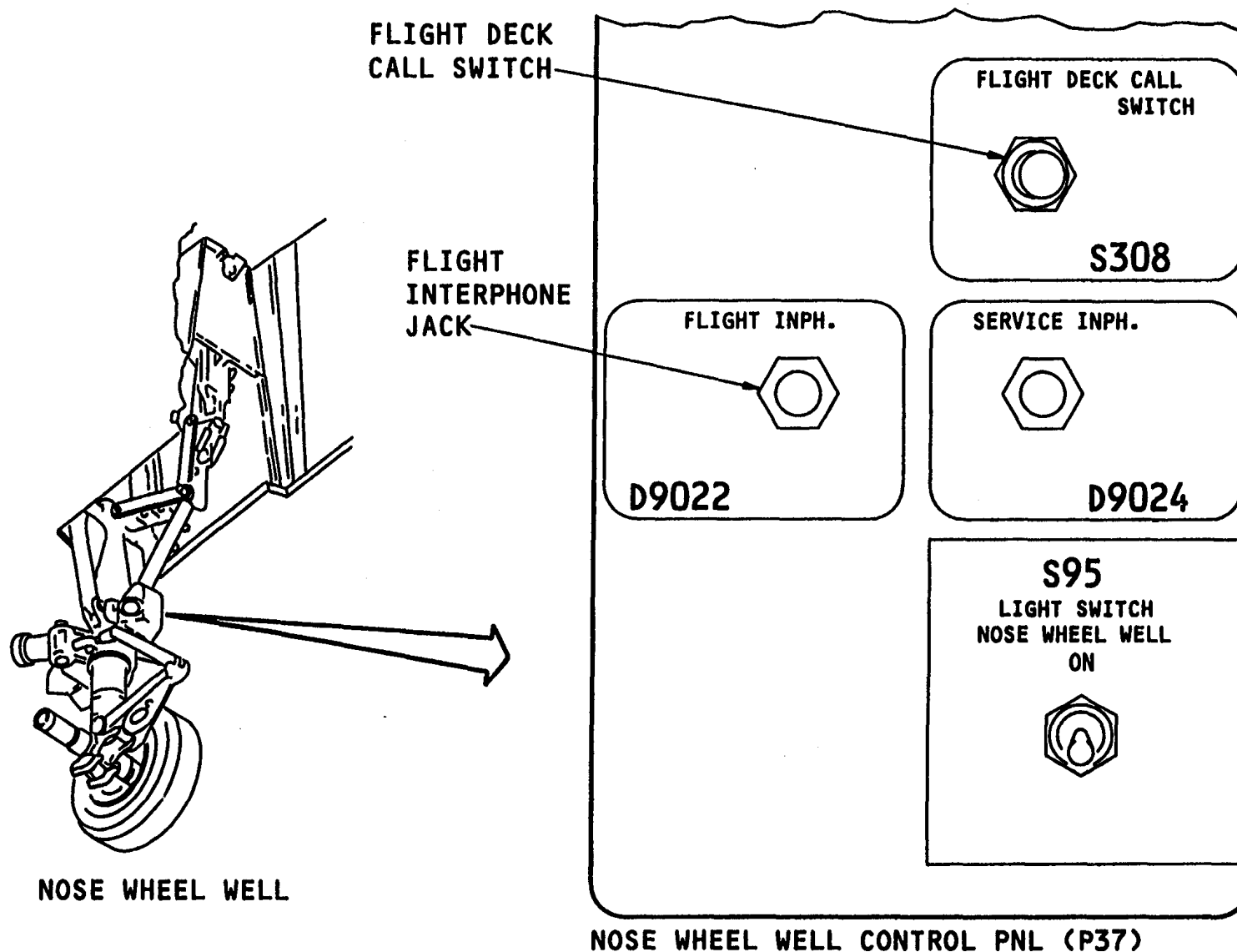


Figure 16 FLIGHT INTERPHONE JACK

FLIGHT INTERPHONE



MICROPHONES AND HEADSETS

Purpose

The microphones and headsets give audio input and output to and from the audio management unit (AMU).

Headset

The headset is a combination boom microphone and headphone. It allows the crew members hand free operation. It contains a microphone, and amplifier which transmits audio at the level that is required by the AMU. The boom microphone is activated by the PTT switches on the control wheels or the audio control panels (ACPs). The headset also has an earpiece to allow audio monitoring.

Handheld Microphone,

The handheld microphone has a transistorized preamplifier that sends audio signals at a level required by the AMU. A PTT switch is on the microphone.

Oxygen Mask

A carbon microphone is in the oxygen masks to allow communications during an emergency condition. These units do not have a preamplifier. An oxygen mask microphone is activated by the PTT switches on the control wheels, glareshield or the ACPs.

Headphones

The headphones monitor audio from the AMU.

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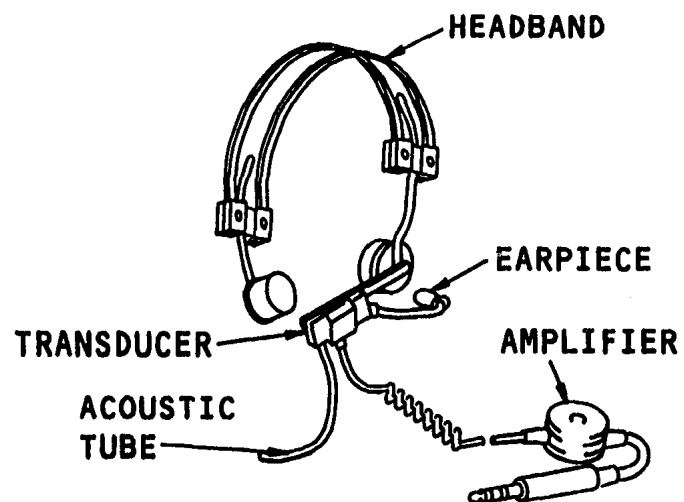


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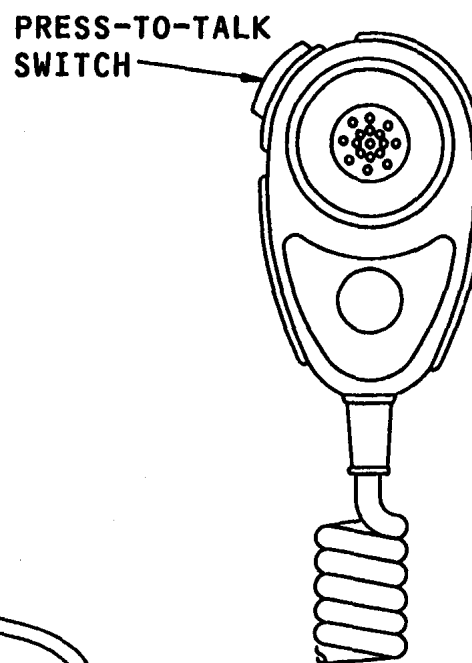
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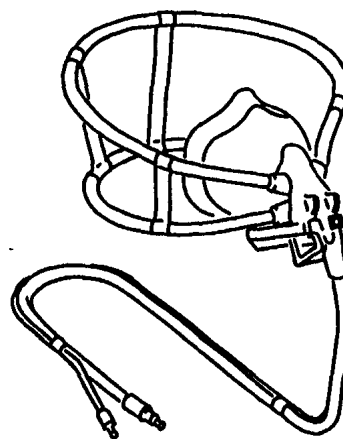
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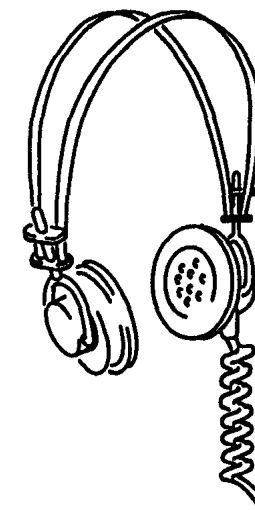
HEADSET



HANDMIC



OXYGEN MASK



HEADPHONE

Figure 17 MICROPHONES AND HEADSETS

FLIGHT INTERPHONE



CONTROL WHEEL PTT SWITCH

The Control Wheel PTT switch gives PTT inputs to the audio management unit (AMU) for the boom or oxygen mask microphones. The switch is a three-position switch and is on the out-board horn of the captain's and the first officer's control wheel.

In the MIC position, MIC audio is sent to the selected communication system. In the INT position, MIC audio goes directly to the flight interphone system without selecting the FLT transmit switch on the audio control panel (ACP).

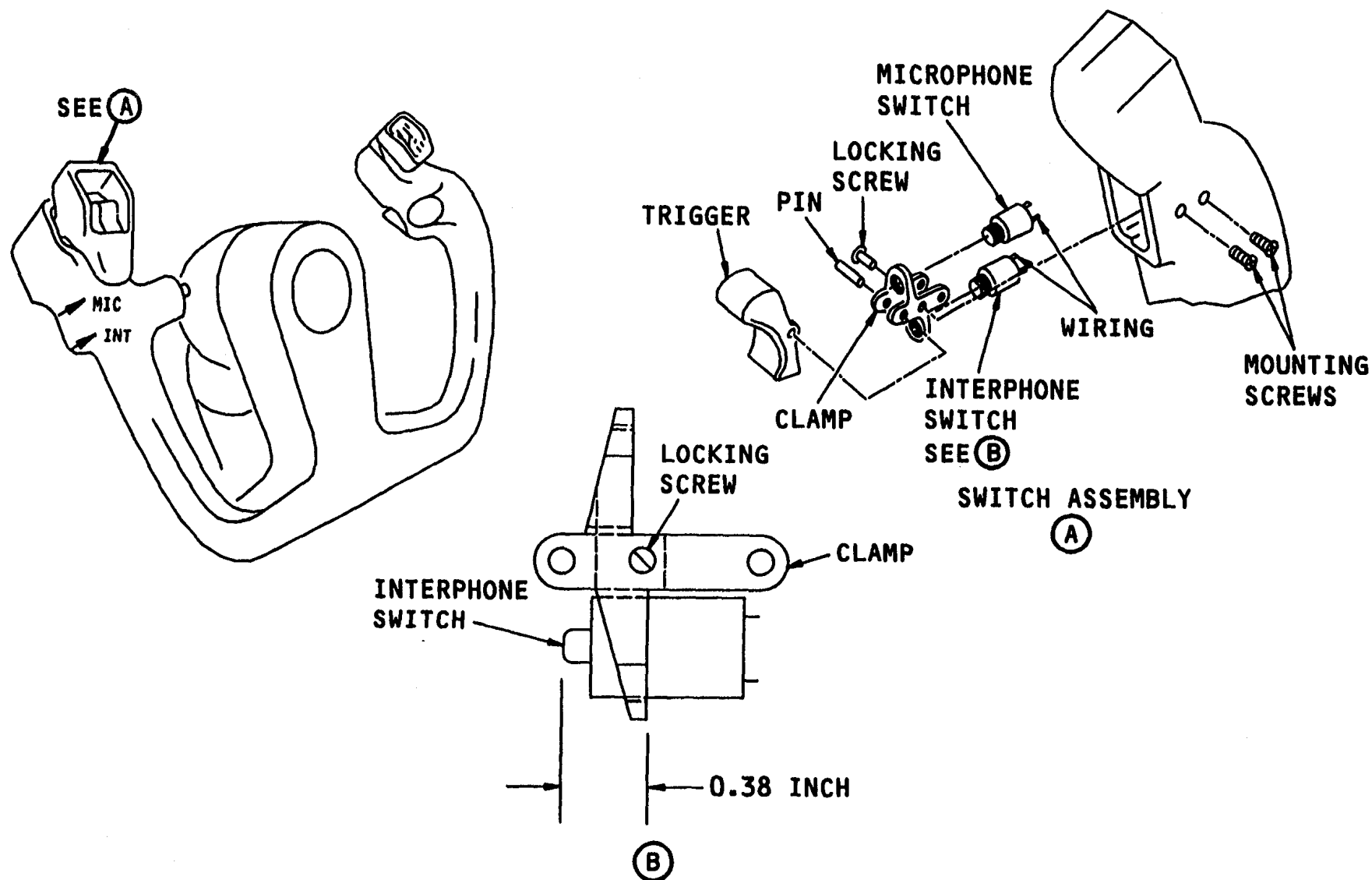


Figure 18 CONTROL WHEEL PTT SWITCH

FLIGHT INTERPHONE



COCKPIT SPEAKER

The captain's and first officer's cockpit speakers get audio from the AMU. They are controlled from the captain's and first officer's ACPs.

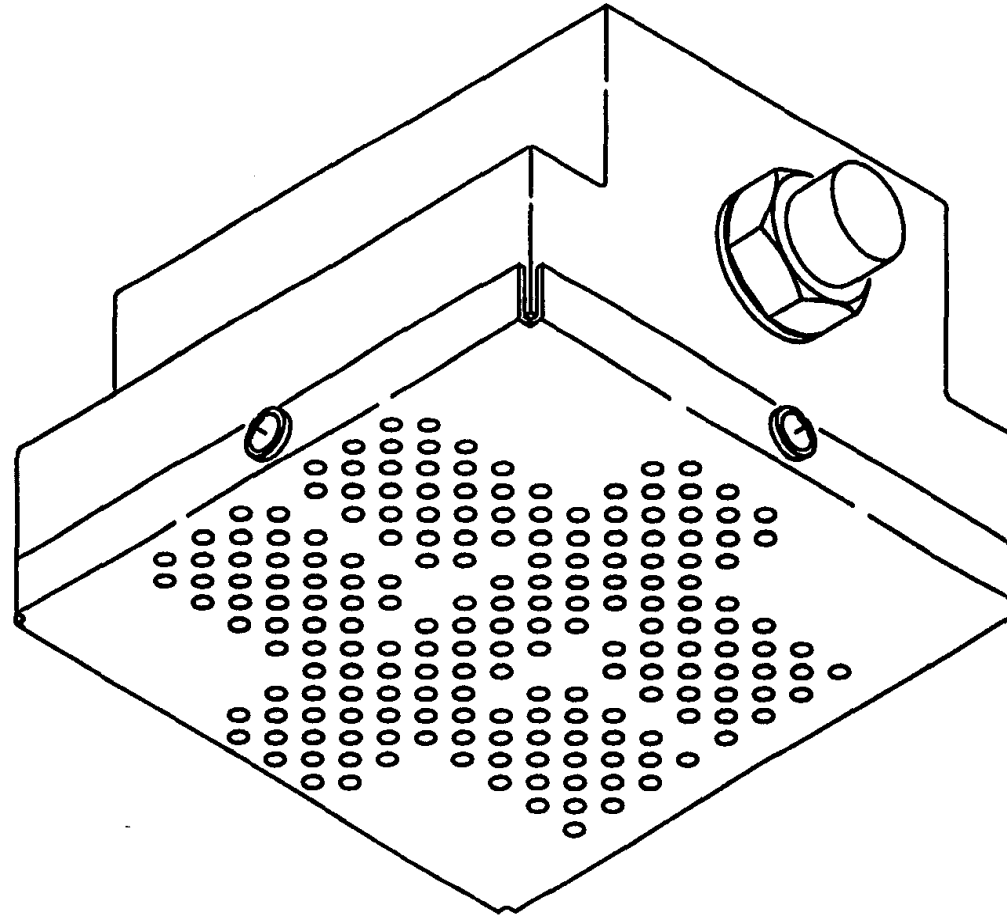


Figure 19 COCKPIT SPEAKER

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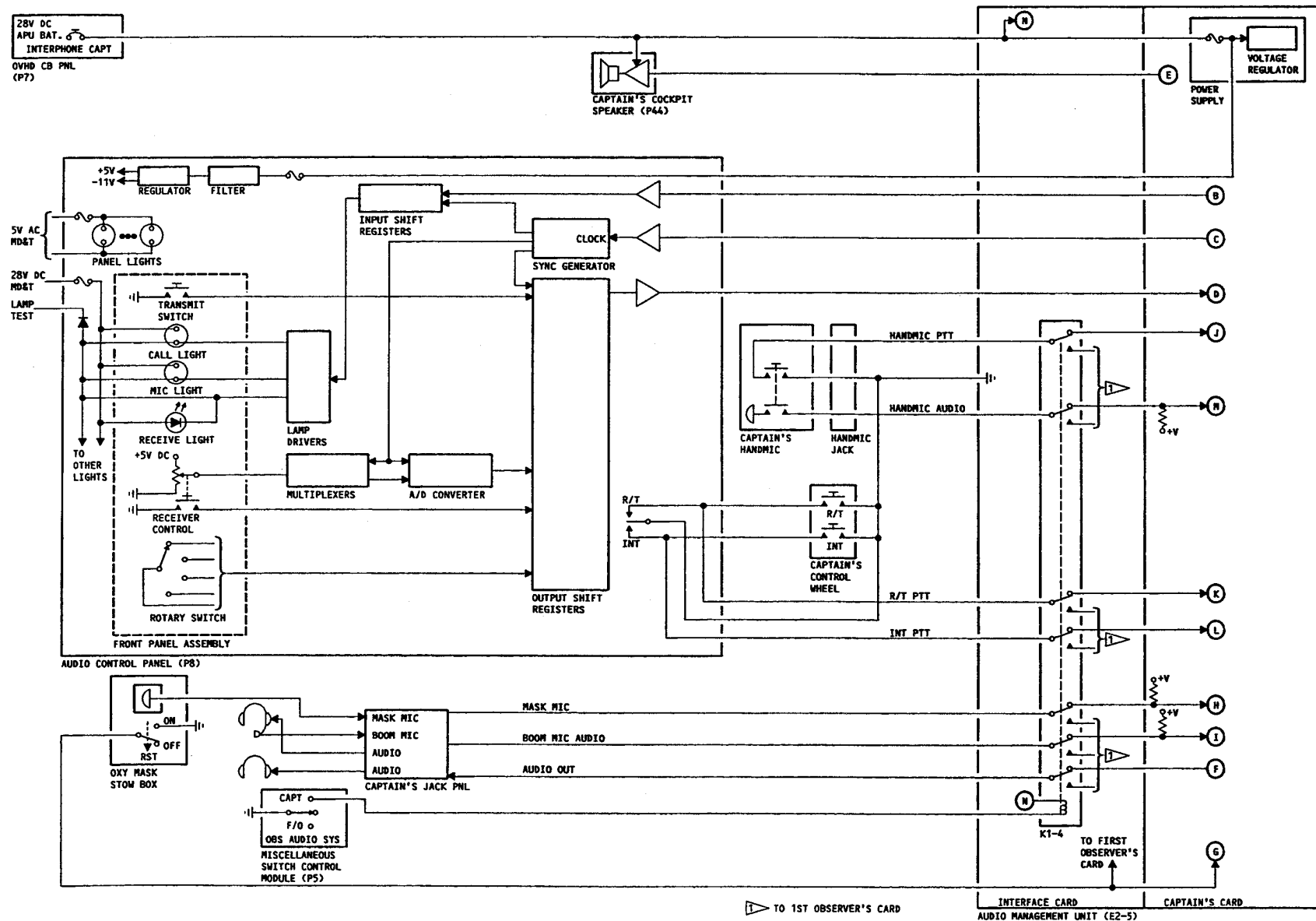


Figure 20 FLT INT - SCHEMATIC DIAGRAM - 1

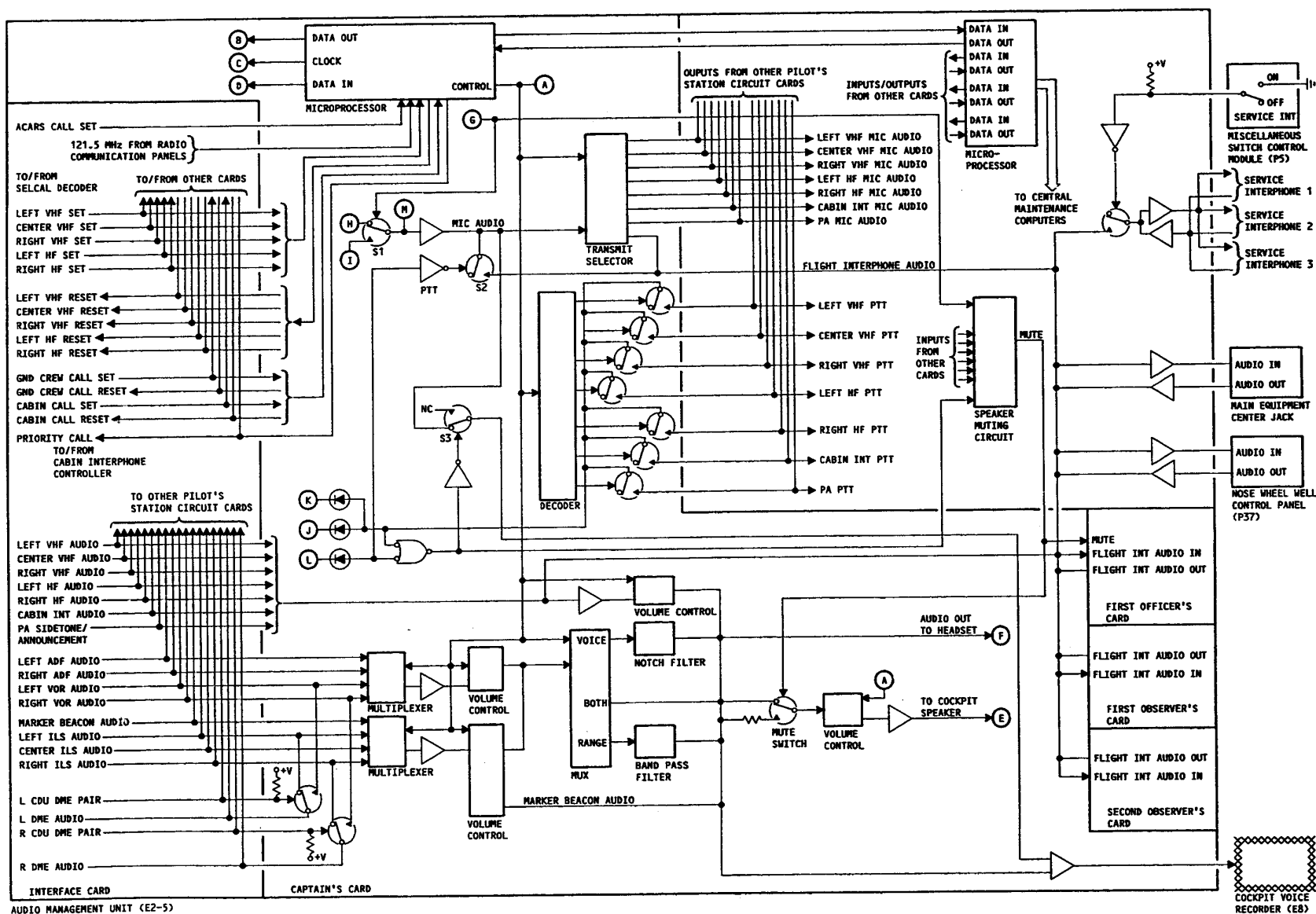


Figure 21 FLT INT - SCHEMATIC DIAGRAM - 2

FLIGHT INTERPHONE



AUDIO CONTROL PANEL

general

Each audio control panel (ACP) has an interface with the audio management unit (AMU) on a three-line bidirectional bus. The clocking signals to the ACPs are produced by the AMU.

AMU Interface

The pilot's station circuit cards in the AMU are controlled by a microprocessor. Each microprocessor has an interface with its on-side ACP. It also:

- Produces the clocking signal that is sent to the ACP
- Processes the serial data input from the ACP
- Sends the serial data to the ACP according to the serial data it received from the ACP

ACP Operation

The serial data output to the ACP from the AMU is amplified by the input data amplifier. The input shift registers change the serial input to a parallel output. The parallel outputs from the input shift registers control the lamp drivers to turn on the different front panel lights. The sync provides clock signals to the input shift registers, analog to digital converter and the the multiplexer.

Then the multiplexer sends the selected receiver control potentiometer setting to the analog to digital converter. There the potentiometer analog input setting is changed to a parallel digital word. The parallel digital word then goes to the output shift registers.

The output shift registers also receive position inputs from the:

- Transmit switches
- Cockpit speaker control
- Filter selector
- Approach receiver selector
- - VOR/ADF receiver selector

The shift registers change parallel inputs to serial data outputs. The serial data is amplified by the output data amplifier and transmitted to the AMU.

The ACP front panel lights receive 28 volts dc from the master dim and test circuits. Each of the CALL and MIC lights and the receiver control lights are turned on by the lamp drivers in the ACP.

The transmit switches that are electronically interlocked send a ground to the output shift register when they are pushed.

The receiver control switches also send a ground to the output shift register when they are turned on.

The potentiometer (POT) setting output to the multiplexer changes in voltage as the receiver control is turned.

The serial output from the input shift register to the serial input of the output shift register is used to test the ACP data shifting capabilities.

To test the lights on the ACP, the master dim and test circuits send a ground to the lamp drivers.

This causes all the lights on the panel to come on.

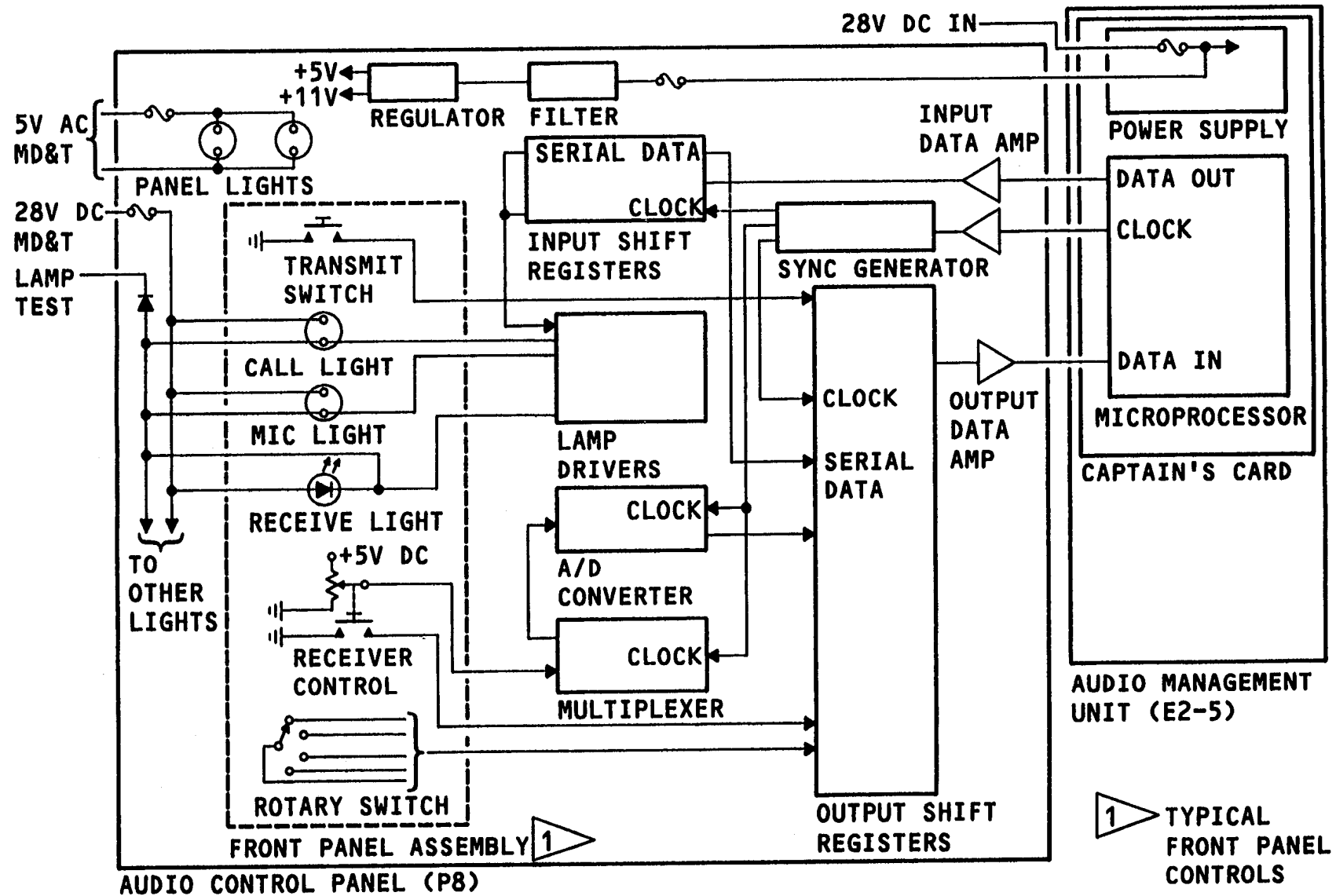


Figure 22 AUDIO CONTROL PANEL

FLIGHT INTERPHONE



PUSH-TO-TALK

The captain and first officer send a PTT through the audio management unit (AMU) to the appropriate communication system with:

- The control wheel PTT switch
- The handmic PTT
- The audio control panel (ACP) PTT switch

The control wheel and ACP also have a switch to key the flight interphone.

The first and second observers send a PTT only from the handmic and ACP.

FLIGHT INTERPHONE

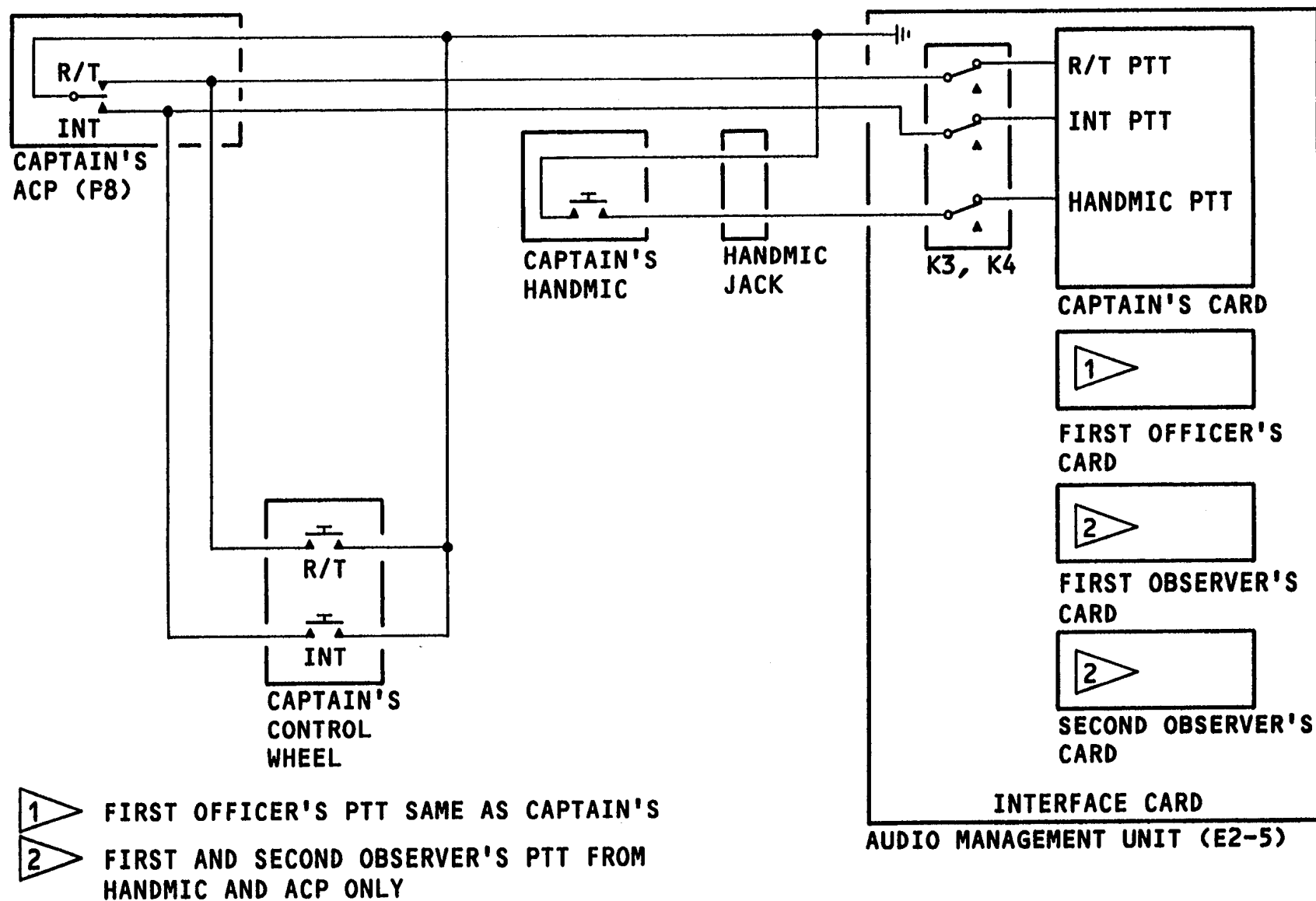


Figure 23 PUSH-TO-TALK

FLIGHT INTERPHONE



TRANSMIT AUDIO / PTT

General

The captain's audio control panel (ACP) sends the transmit switch selections to the captain's card in the audio management unit (AMU). The AMU sends the hand mic, oxygen mask mic, and headset mic audio along with the PTT signal to these locations:

- Transceivers
- Passenger address system (PA) Cabin interphone system (CAB)
- Flight interphone system

Mic Excitation

All microphones at the captain's station receive 15 volts dc excitation (+V) from the captain's card.

Oxygen Mask Mic/Headset Mic Selection

The headset mic audio normally goes through S1 to the transmit selector. If the oxygen mask stowage box is opened, a ground goes to S1. This lets the oxygen mask mic audio go to the transmit selector. To remove the

ground from S1. close the stowage box doors and push the reset Switch.

Mic Input Processing

The hand mic audio is combined with either the headset or oxygen mask mic audio. The combined audio then goes to the transmit selector. The microprocessor monitors the transmit switch selection on the ACP. The microprocessor then sends a signal to the transmit selector. The transmit selector then routes the mic audio to the appropriate communication system. Audio outputs of the other pilot's station circuit cards connect with these outputs.

PTT Processing

The microprocessor monitors the transmit switch selections on the ACP and sends a signal to the decoder to close the appropriate switch. These switches allow the PTT signal to go to the selected communication system. PTT outputs of the other pilot's station circuit cards connect with these outputs.

The interphone (INT) PTT goes through an inverter to switch S2. When the interphone is keyed, S2 closes and the mic audio bypasses the transmit selector. This is done so that flight interphone transmissions may be heard at the other pilot's stations without having to select the interphone receiver control.

Speaker Muting

When either the captain or first officer keys a microphone, a signal goes to the speaker muting circuit on the interface card. The speaker muting circuit causes both speakers to be muted if the oxygen mask is not selected. The PTT signal can also come from the first observer's card when the observer's audio system switch is not in the normal position.

FLIGHT INTERPHONE



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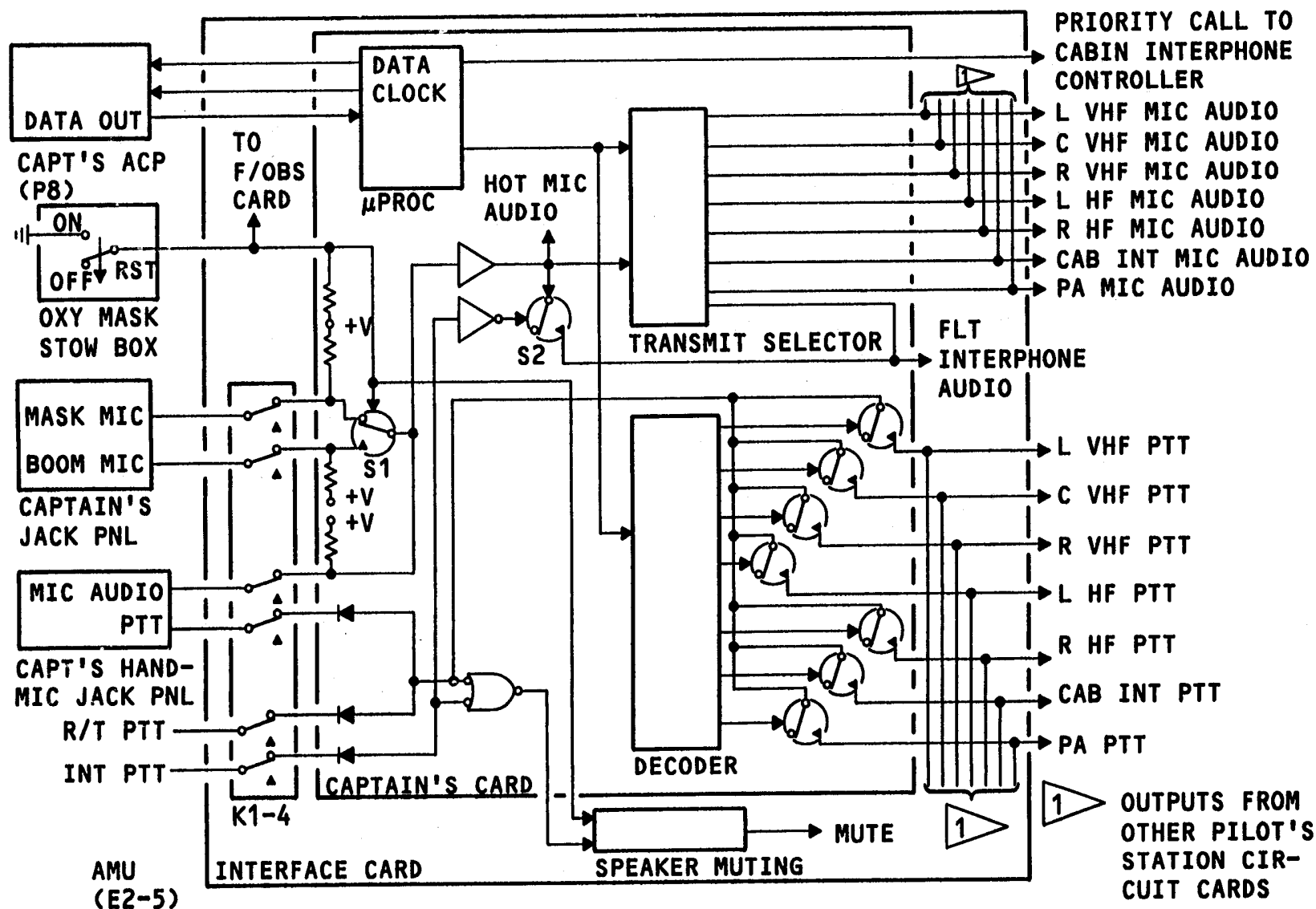


Figure 24 TRANSMIT AUDIO / PTT

FLIGHT INTERPHONE



COMM SYS RECEIVE AUDIO / CVR OUTPUT

The captain's card receives audio inputs from the different communication systems. The microprocessor sets the eight volume control circuits for the eight audio inputs according to the setting of the captain's audio control panel (ACP) receiver controls. The outputs from the volume control circuits are summed with any NAV receiver audio.

The summed audio is then:

- Summed with the hot mic audio and sent to the voice recorder
- Amplified and sent to the captain's Jack panel
- Amplified and sent through the muting circuit and the-volume control circuit to the captain's cockpit speaker.

The mute circuit monitors the captain's and first officer's PTT inputs and the oxygen mask on/off inputs. The first observer's PTT and oxygen mask on/off is monitored when the observer's audio system switch is not in the normal position. When the oxygen mask is off and there is an active PTT, the mute circuit attenuates input to the volume control circuit of the captain cockpit speaker.

This avoids feedback at the Captain's station.

The mute circuit also sends a mute signal to the mute switch in the first officer's card. The captain's or the first officer's card causes a mute of both the captain's and the first officer's cockpit speakers.

The microprocessor controls the volume control circuit for the captain's cockpit speaker. It uses the setting of the cockpit speaker control on the captain's ACP.

The first officer's, first observer's and second observer's cards operate the same as the captain's card. Both observer's cards cockpit speaker output is not connected. The second observer's card voice recorder output is not connected.

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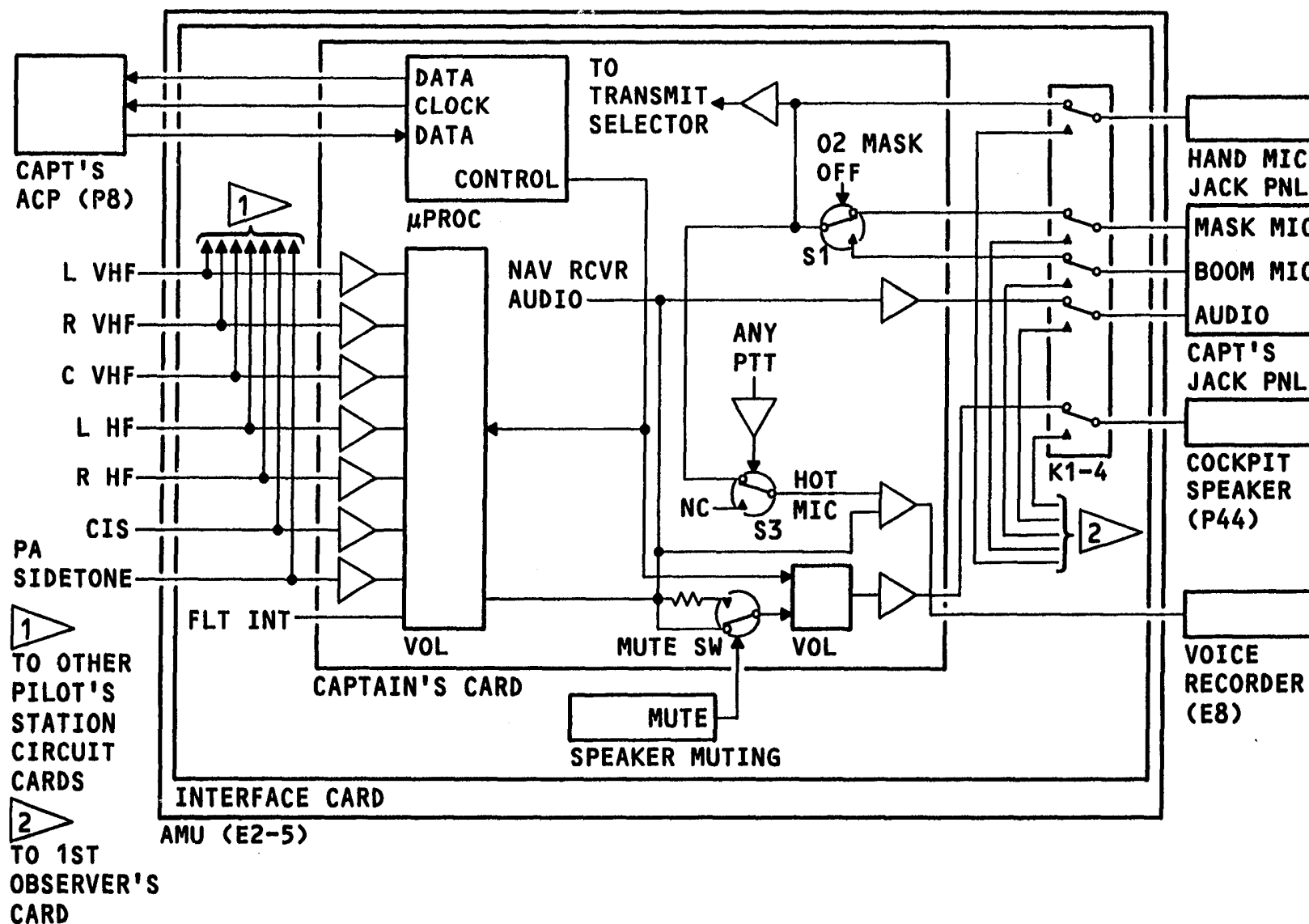


Figure 25 COMM SYS RECEIVE AUDIO / CVR OUTPUT

FLIGHT INTERPHONE



EMERGENCY FREQUENCY MONITOR

The radio communication panels (RCPs) send an analog discrete (ground) to the audio management unit (AMU) when the emergency frequency of 121.5 MHz is tuned. This ground from the RCP lets the VHF audio of the transceiver tuned to 121.5 MHz to be heard at all stations without having to press a receiver control switch.

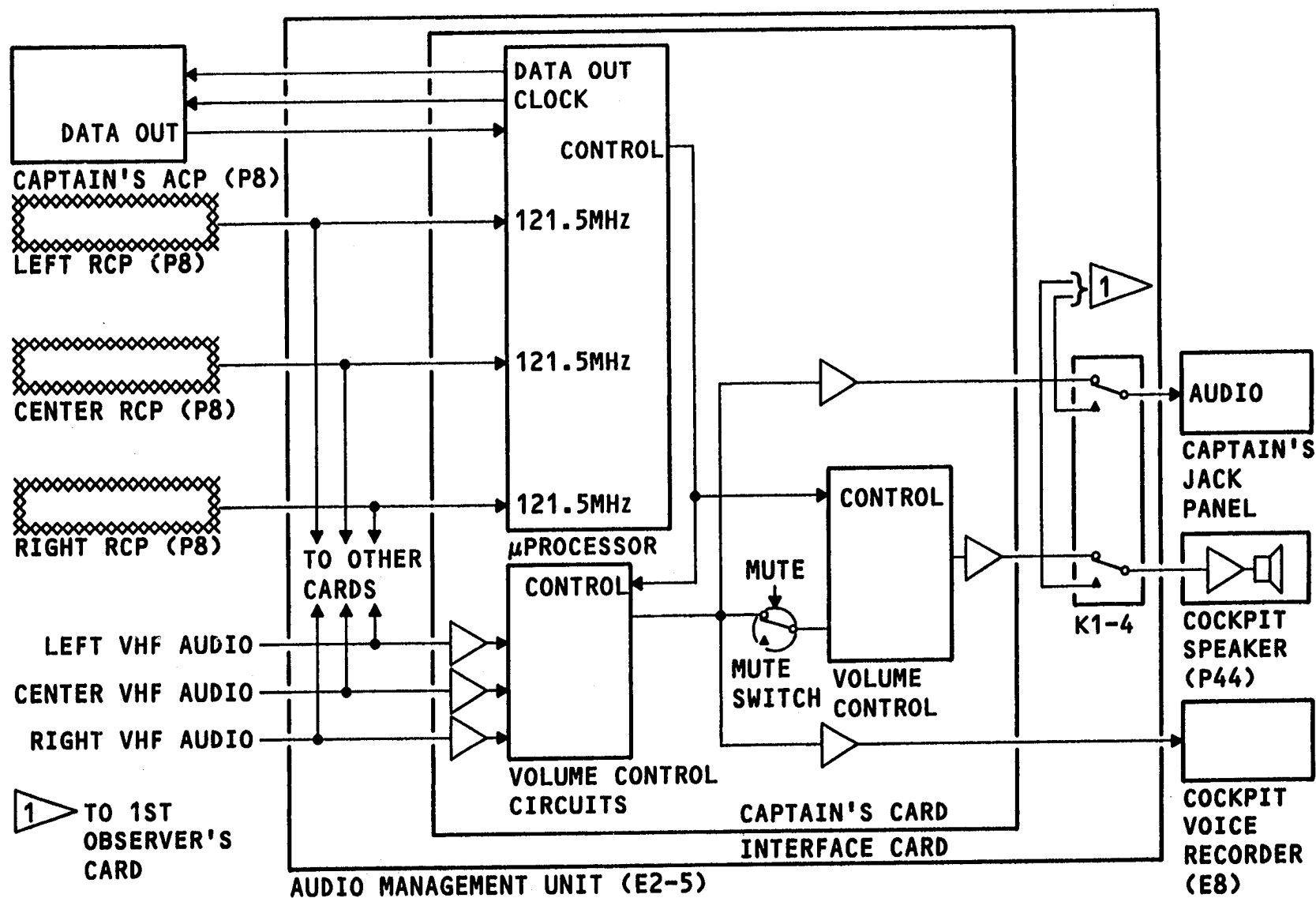


Figure 26 EMERGENCY FREQUENCY MONITOR

FLIGHT INTERPHONE



FLT/SERV INTERPHONE AUDIO

General

When the SERV INT switch on the miscellaneous switch control module is ON, the flight interphone system and the service interphone system audios are mixed together.

Flight Interphone Audio

The flight interphone audio from the captain's first officer's first observer's and second observer's cards are mixed together. This is done in the AMU interface card.

The output of the cards also mixes the flight interphone audio with the ground crew flight interphone audio. The flight interphone input from the ground crew comes through the;

- Flight interphone Jack(s) on the nose wheel well control panel
- Main equipment center Jack

The output of the cards also goes to a switch which mixes the flight interphone audio with the service interphone audio. This happens when the SERV INT switch is in the ON position.

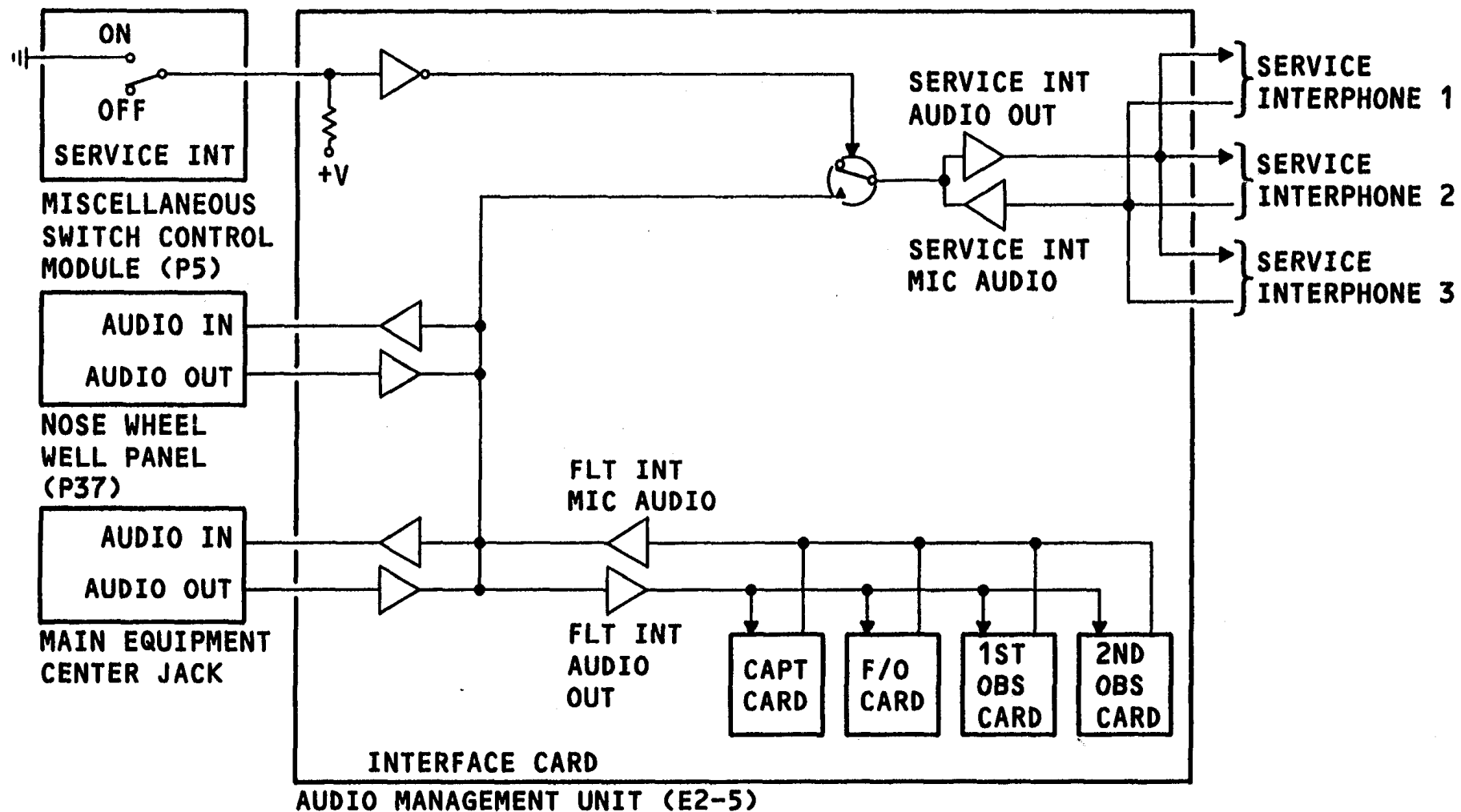


Figure 27 FLT/SERV INTERPHONE AUDIO

FLIGHT INTERPHONE



CALL LIGHT OPERATION

General

The audio management unit (AMU) turns on a call light, on all the audio control panels (ACP's), when a call set signal comes from the SELCAL decoder, ACARS, or cabin interphone controller.

The call light goes out on all ACPs when the associated transmit switch on any ACP is selected. If the transmit switch is already selected, the call light goes out when the microphone is keyed.

SELCAL Decoder Interface

The SELCAL decoder receives audio from the five communications transceivers to detect a call from the ground. The SELCAL decoder sends a ground discrete on one of five outputs to the AMU when a call is received. The AMU sends the discrete to the four pilot's station circuit cards, which then send a signal to their ACP to turn on the call light. A pilot's station circuit card sends a reset signal to the SELCAL decoder to turn off the set discrete when the transmit switch is selected, or microphone is keyed (transmit switch already selected).

Cabin Interphone Controller Interface

The cabin interphone controller sends a call set signal to the AMU when a cabin interphone handset calls the flight deck or the flight deck call switch on the nose wheel well panel is pressed. The call set discrete is processed and reset the same way as a call set from the SELCAL decoder.

ACARS Interface

ACARS sends a call set signal to the AMU when a request for voice communications is received. The input to the AMU is through a separate pin, but does the same thing as a call to the AMU by the SELCAL decoder for the center VHF. The call set discrete is processed and reset the same way as a call set from the SELCAL decoder.

FLIGHT INTERPHONE



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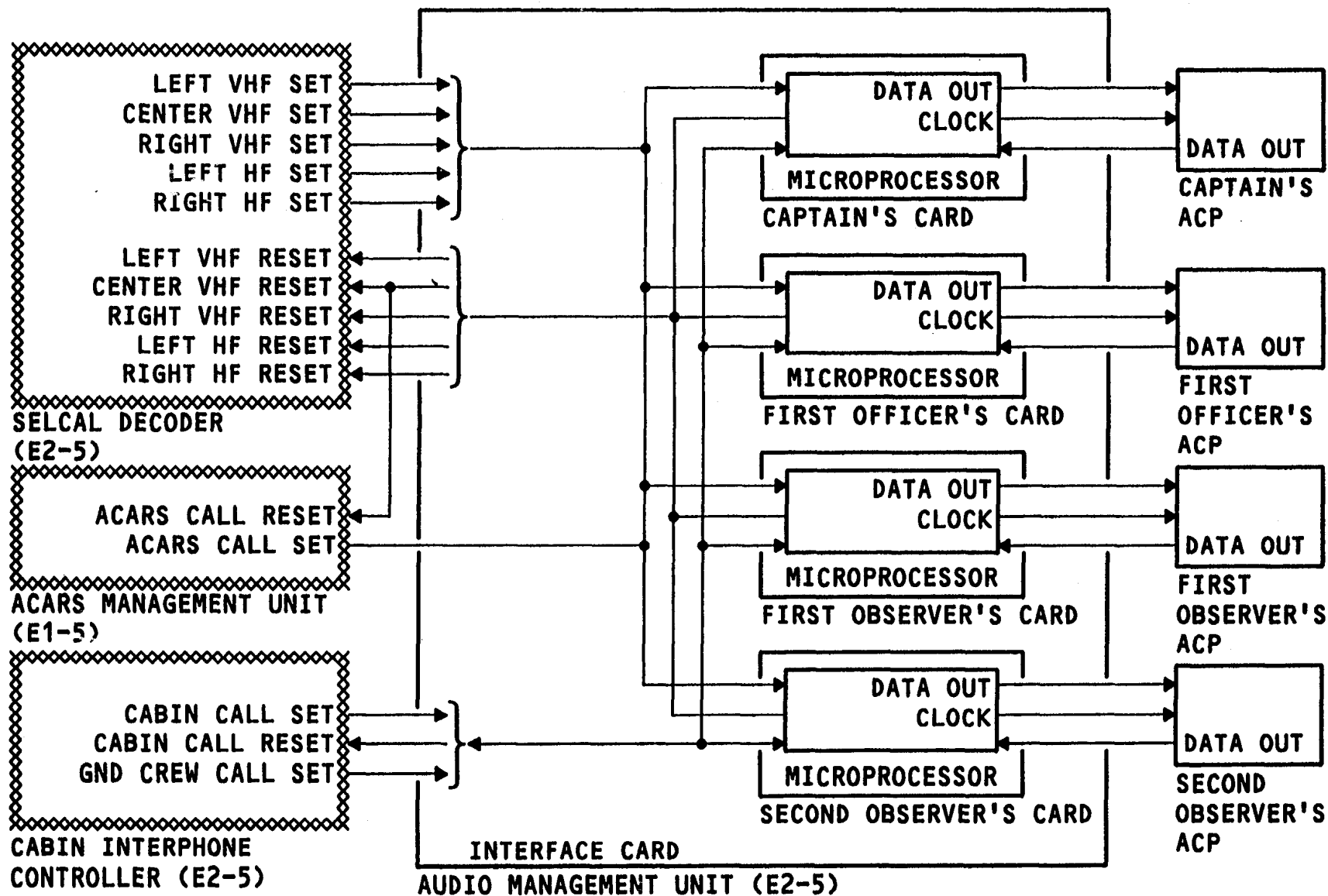


Figure 28 CALL LIGHT OPERATION

FLIGHT INTERPHONE



NAVIGATION RADIO AUDIO

General

The captain's card receives audio from these navigation radios:

- Left and right VOR (VHF omni range)
- Left and right ADF (automatic direction finder)
- Left, center, and right ILS (instrument landing system)
- Marker beacon
- Left and right DME (distance measuring equipment)

Only one of the VOR or ADF receivers is selected at a time. Only one of the ILS or marker beacon receivers is selected at a time.

Audio Processing

The navigation radio audio inputs go to multiplexers, which pass only the signals selected on the audio control panel (ACP). The selected audio signals then go to a volume control circuit which adjusts the audio level based on the ACP receiver volume control. This audio goes through the range and notch filters. From the filters, the audio goes to another multiplexer which passes audio, based on the ACP filter switch, to a junction where the navigation radio audio is combined with communication system audio. This combined audio then goes to:

- The speaker muting switch which feeds the cockpit speaker.
- Headset audio.
- The cockpit voice recorder.

DME Pairing

The electronic flight instrument system control panel (EFIS CP) tells the onside control display unit (CDU) which navigation display mode is selected. The CDU then sends this information to the AMU in the form of an open/ground discrete. A ground represents the approach mode selected while an open represents the VOR, MAP, or PLAN mode selected.

This discrete is then used by the AMU to pair the DME audio with either the VOR audio (VOR, MAP, or PLAN mode) or the ILS audio (APPROACH mode).

Filters

Filters are used to pass or inhibit the 1020 Hz Morse code tones used to identify the selected navigation radio stations. The filter switch on the ACP has three positions:

- VOICE
- BOTH
- RANGE

When VOICE is selected on the ACP, navigation radio audio is sent through the notch filter which inhibits the 1020 Hz tones. When RANGE is selected, the navigation radio audio is sent through the band filter which passes only the 1020 Hz tones. When BOTH is selected, navigation radio audio is not filtered. There are two exceptions to audio going through the filters:

- Marker beacon audio does not go through the notch or band filters.
- DME audio is heard in the range and both modes only.

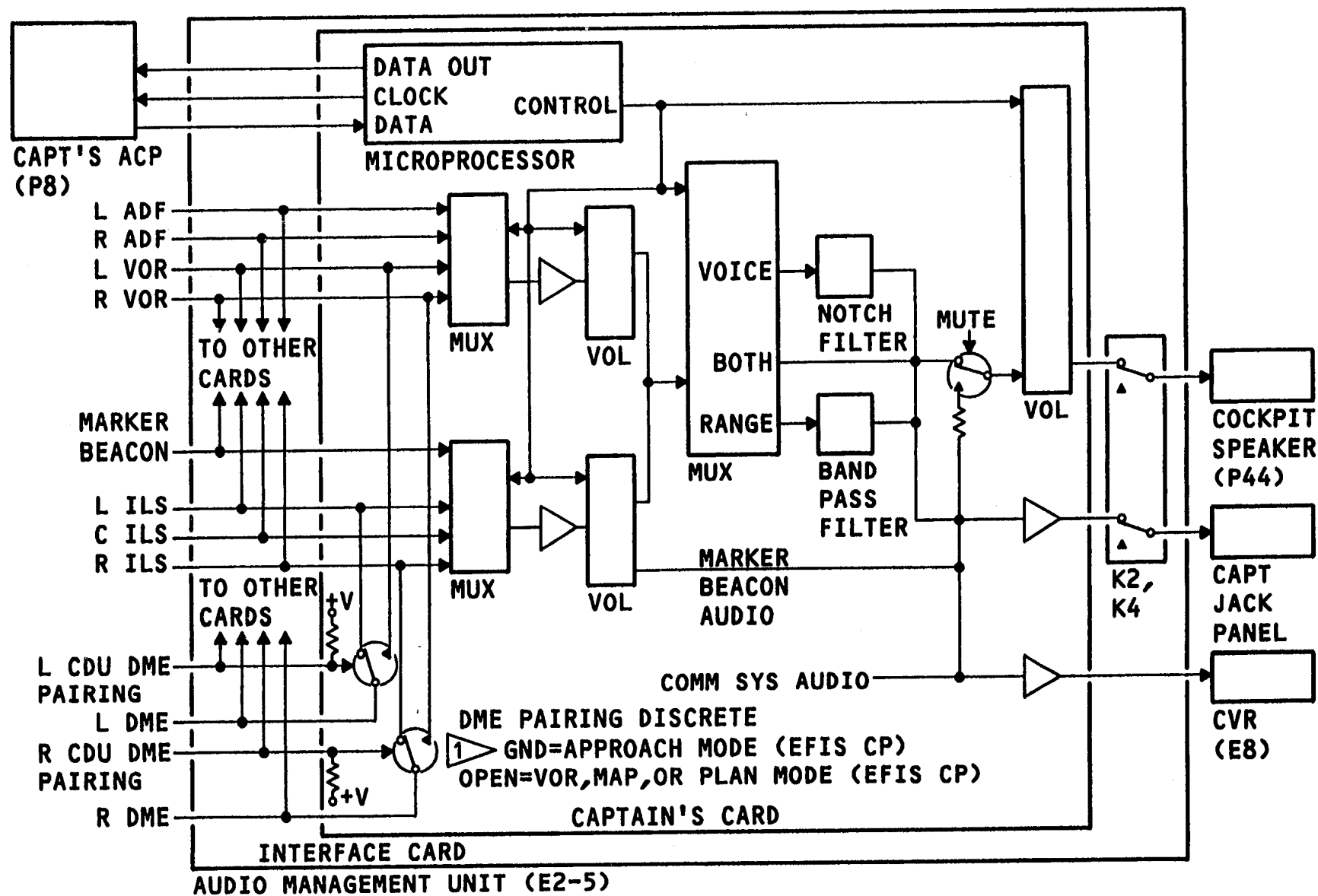


Figure 29 NAVIGATION RADIO AUDIO

FLIGHT INTERPHONE



OBSERVER AUDIO SYSTEM SWITCHING

The observer audio system switch controls the inputs and outputs of the first observer's card in the audio management unit (AMU).

The switch has three positions:

- NORM (normal)
- CAPT (captain on observer)
- F/O (first officer on observer)

With the switch in the NORM position, the first observer's AMU inputs and outputs are connected to the first observer's card.

When the switch is in the CAPT position, relays K1-K4 and K5-K8 energize. This causes the captain's AMU inputs and outputs to be disconnected from the captain's card and connected to the first observer's card. The captain then controls his audio using the first observer's audio control panel (ACP).

When the switch is in the F/O position, relays K5-K8 and K9-K12 energize. This causes the first officer's AMU inputs and outputs to transfer to the first observer card. The first observer's AMU inputs and outputs are disconnected. The first officer then controls his audio using the first observer's ACP.

The first observers PTT and audio out signals do not go through the relays. In the backup mode, the observer can still monitor the audio selections made, and the captain can key his microphone from the observers ACP.

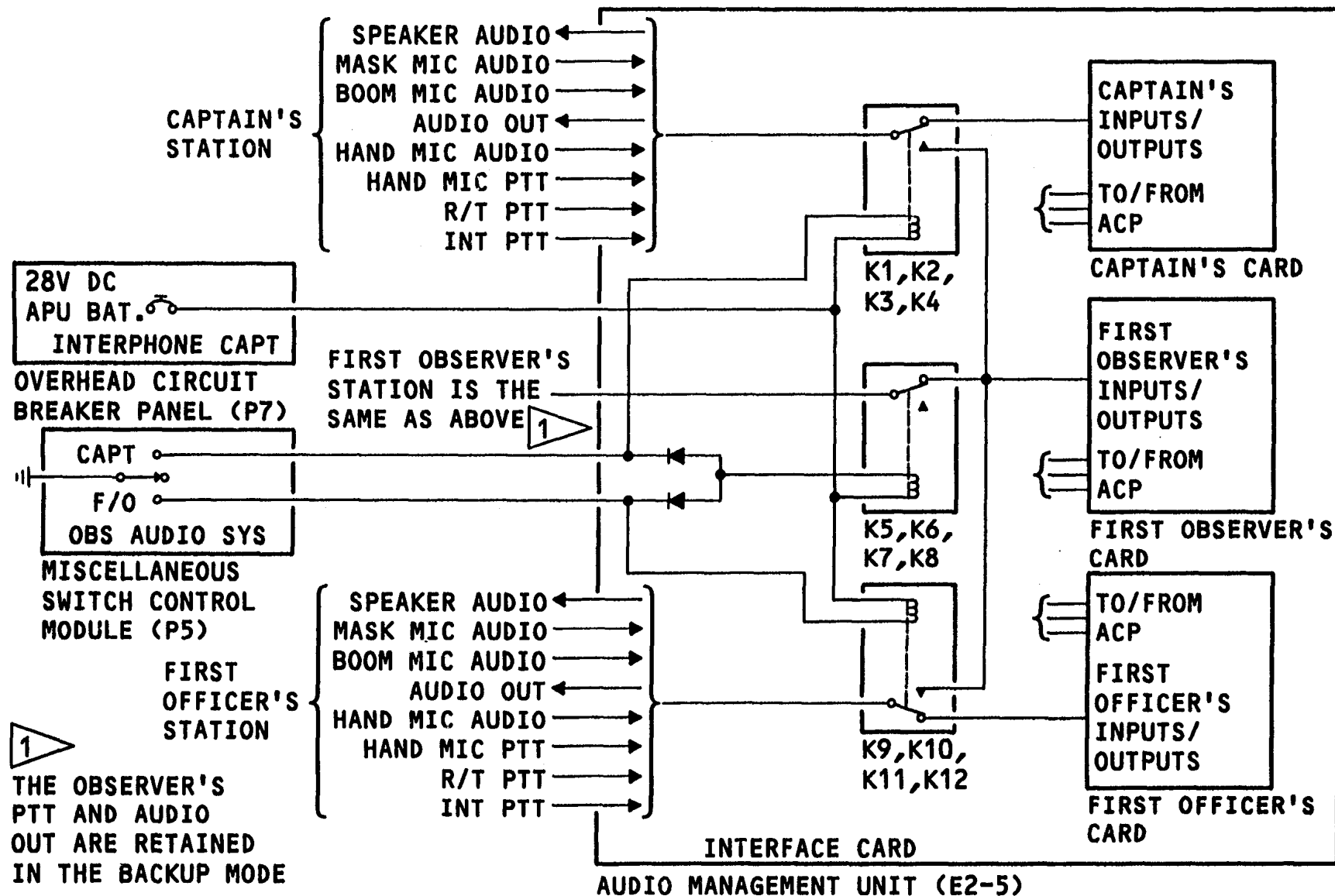


Figure 30 OBSERVER AUDIO SYSTEM SWITCHING

FLIGHT INTEPHONE



CMC INTERFACE

The audio management unit (AMU) does a continuous BITE and provides real-time fault status to both central maintenance computers (CMCs).

The AMU interface card microprocessor gives fault data to the left and right CMC's. The fault summary word sent to the CMCs gives status on:

- The captain first officer first observer's, and second observers' cards.
- The captain first officer first observer's, and second observer's audio control panels (ACPs).

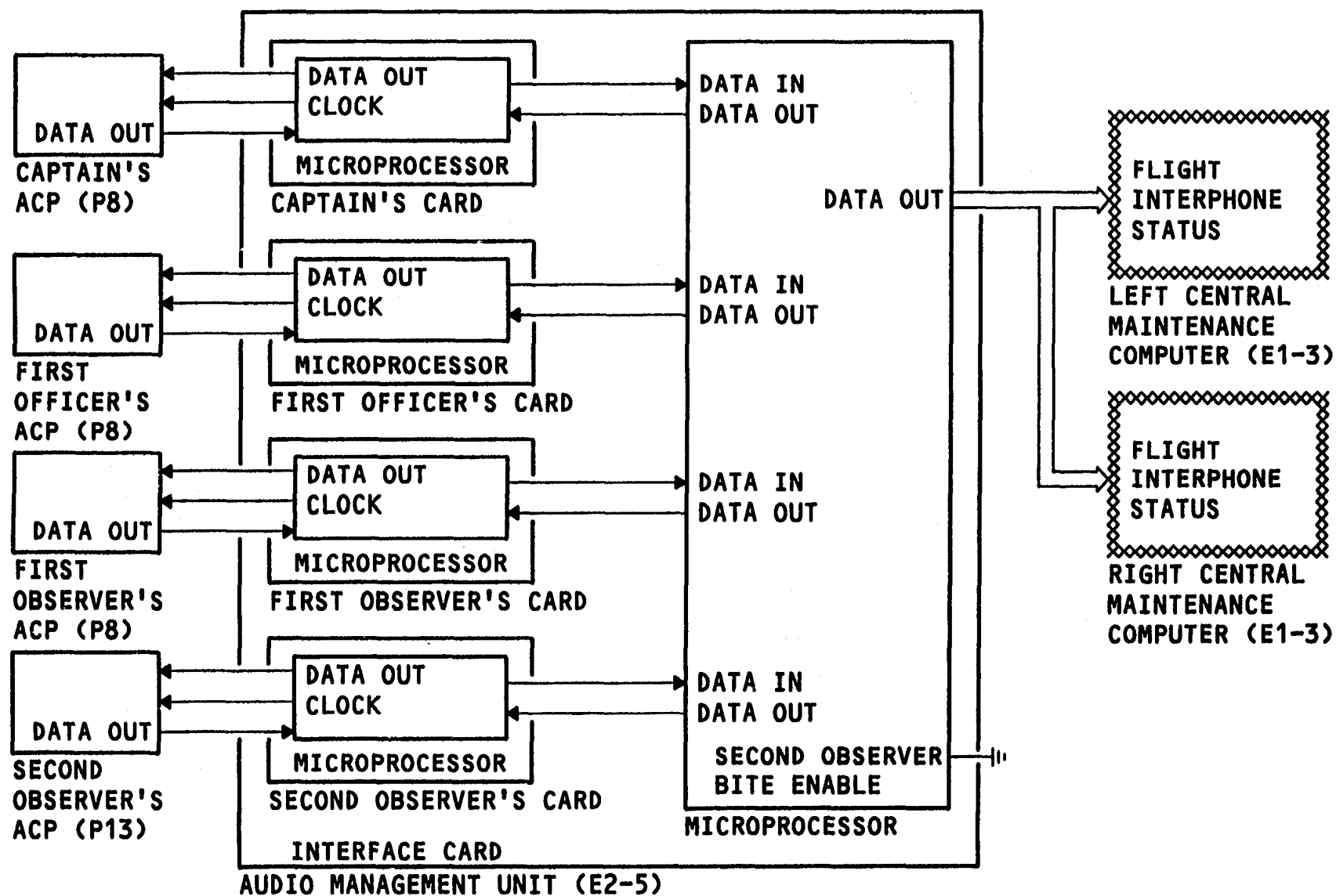


Figure 31 CMC INTERFACE

FLIGHT INTERPHONE



FLIGHT DECK EFFECTS AND CMCS MESSAGES

Flight Deck Effects

There are no maintenance related flight deck effects for the flight interphone system.

LRU Internal Fault Messages

These central maintenance computer system (CMCS) fault messages show when an LRU detects internal faults and reports them directly to the CMCs or EIUs:

- AUDIO MANAGEMENT UNIT FAIL X CHANNEL

LRU Faults Reported by Other LRUs

These CMCS fault messages show when an LRU reports another component's status or when an LRU that monitors other components detects and reports a fault or condition of those components to the CMCS or EIUs:

- X AUDIO CONTROL PANEL FAIL

Interface Fault Messages

The CMCS has logic to monitor the combination of interface faults reported to the CMCS. This logic determines the messages that show. The CMCS fault messages associated with interface faults are:

- AUDIO MANAGEMENT UNIT--CMC BUS FAIL

NOTE: X = CAPTAIN FIRST OFFICER FIRST OBSERVER'S, OR SECOND OBSERVER'S.

FLIGHT DECK EFFECTTYPEDESCRIPTION

THERE ARE NO FLIGHT DECK EFFECTS
FOR FLIGHT INTERPHONE

CMCS MESSAGES

LRU INTERNAL FAULT MESSAGES:

AUDIO MANAGEMENT UNIT FAIL X CHANNEL

LRU FAULTS REPORTED BY OTHER LRUs:

X AUDIO CONTROL PANEL FAIL

INTERFACE FAULT MESSAGES:

AUDIO MANAGEMENT UNIT ~ CMC BUS FAIL

NOTE: X = CAPTAIN'S, FIRST OFFICER'S, FIRST
OBSERVER'S OR SECOND OBSERVER'S

Figure 32 FLIGHT DECK EFFECTS AND CMCS MESSAGES

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