CHAPTER 5 – COMMUNICATIONS

Page

LIST OF ILLUSTRATIONS

RADIO COMMUNICATION SYSTEM

1. **INTRODUCTION**

The communications system consists of the following:

- Audio Integrating System

- Announcement and Boarding Music System <1035>

- Radio Communication System

Two radio tuning units are used to frequency tune the radios. A back-up standby tuning unit is provided in the event of a failure of one of the radio tuning units. The audio integrating system receives inputs from the radios and the intercom/interphone systems. The system then provides audio output to the flight crew speakers, headsets, passenger address system, communication radios and recorders. All incoming, outgoing and internal communications are recorded on the cockpit voice recorder.

The flight crew intercom system permits communications between stations within the aircraft, selection and monitoring of audio on the communications and navigation receivers, and selection for transmission on the communications transceivers. The flight crew can select and monitor the audio output of one or more communications transceivers and navigation receivers.

Individual speakers, installed above the pilot and copilot, are used to monitor audio selected at the audio control panels. Hand microphone jacks are installed at the rear of each control column. Headset jacks are installed below the pilot's and copilot's side consoles and the right side of the observer's station.

The service interphone system provides intercommunication between various service and maintenance areas and the flight compartment. The service interphone and passenger address systems are interconnected. The flight attendants use their telephone-type handsets for both systems. One handset is located on each attendant's panel. Switches located on the interphone control panel in the flight compartment centre pedestal, access the external maintenance interphone stations and flight attendant's handsets.

The passenger address system enables the pilots and flight attendants to address passengers through speakers located throughout the cabin and in the lavatory.

The announcement and boarding music system provides voice messages and music through the passenger address system. <1035>

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1. AUDIO INTEGRATING SYSTEM

The audio integrating system provides display, switching and control of all incoming and outgoing audio signals from the aircraft navigation and communication systems. The audio integrating system receives inputs from various radio sources and from internally generated audio systems. The system provides audio output to the flight crew speakers, headsets, passenger address system, communication radios and to the cockpit voice recorder.

A. Audio Control Panels

Three audio control panels, located in the centre pedestal, provide the primary interface between flight crew and audio system. Each audio control panel provides a rotary transmit switch for selection of communication transceivers, interphone/service and passenger address systems.

Audio from the selected system is enabled by pressing the corresponding pushbutton and adjusting the desired volume. A switch and a potentiometer are combined in each pushbutton. Audio sources selected on the audio control panel can be routed to the flight compartment speakers by pressing in the speaker switch. Speaker volume is controlled by rotating the speaker control.

A radio transmit (R/T) and intercom (I/C) switch is used to transmit on the radios or passenger address system. The R/T position, when pressed, allows the pilot to transmit. When released, it returns to the OFF position, to receive. Continuous ("hot mike") conversation is provided in the I/C position for the intercom systems. A radio transmit (R/T) and intercom (I/C) switch is also provided on each pilot control wheel.

Selecting VOICE on the VOICE/BOTH switch eliminates the station Morse code identifier from VOR, ILS and ADF received signals. The MASK/BOOM switch gives the flight crew a choice between headset with boom mike (or hand mike) with BOOM selected, or the oxygen mask microphone, when MASK is selected.

During normal operation, the latching EMER/NORM switch is in the NORM position. The EMER position is used only when the audio integrating system fails. The EMER/NORM switch is disabled at the observer's station.

When the pilot's audio control panel EMER/NORM switch is set to EMER, the pilot's headset is connected directly to NAV 1 navigation radio and VHF 1 communication radio. Most of the system is bypassed making most audio control panel functions inoperative. Cockpit speakers are disabled and all warnings and tones are heard through the headsets. The observers station, passenger address and interphones are disabled in emergency mode.
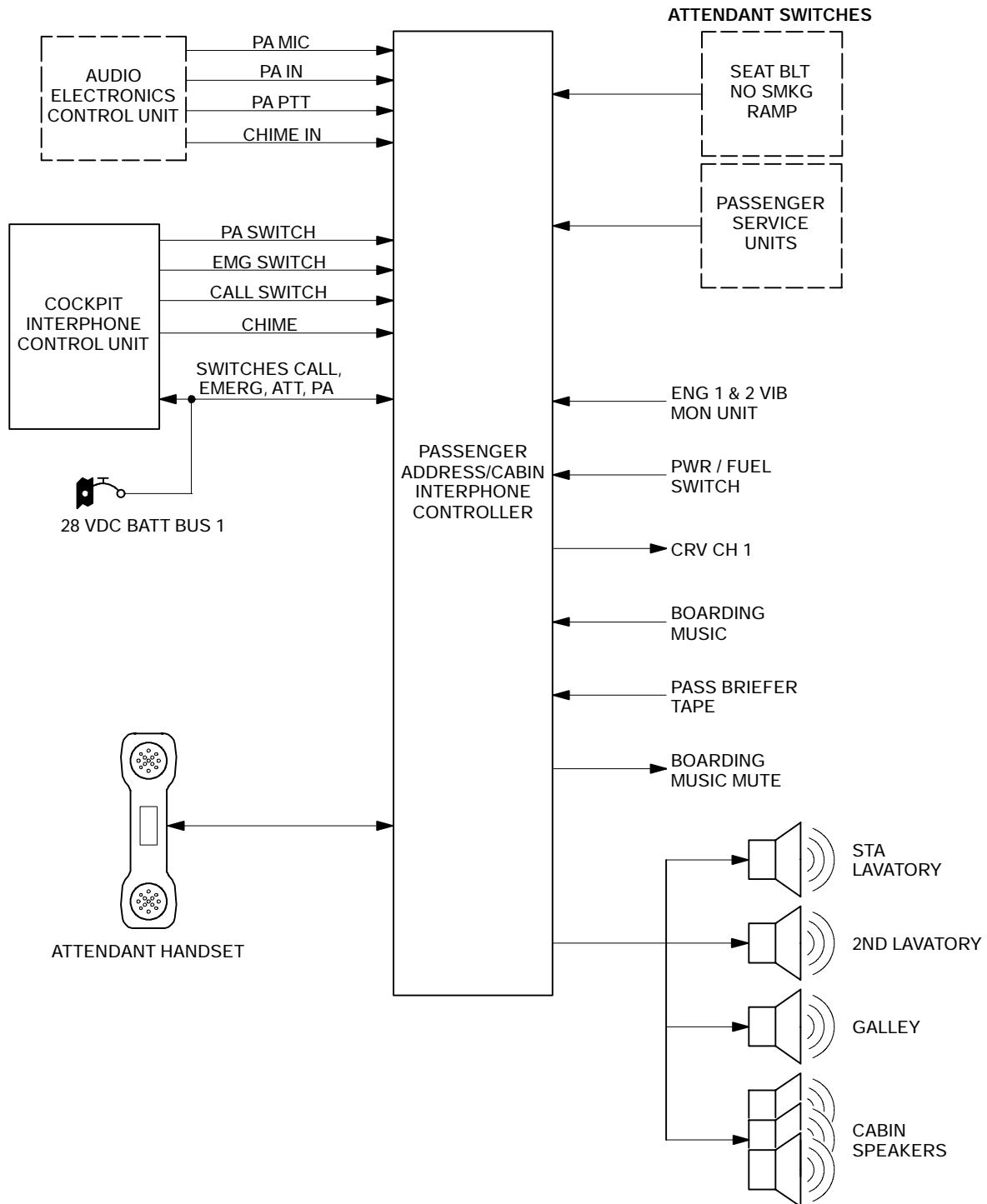
Passenger Address System Interface Diagram
Figure 05−20−1

Transmit Selector
Selects desired communications system and energizes channel. Only one channel at a time may be selected.

Receive Pushbuttons
Press to monitor respective navigation or communication system. Press again to deselect. Switches are lit when pressed. Any number of audio sources can be monitored at the same time. Rotate clockwise to increase volume.

**Audio Control Panel
Center Pedestal**
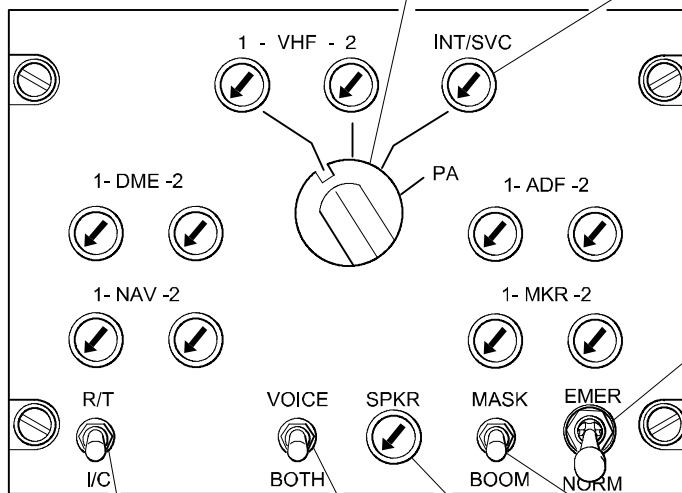
EMER / NORM (Lever-locked)
- NORM -- Normal functions.
- EMER -- Bypasses audio electronics control unit.
  Pilot has two-way communication on VHF 1, audio on NAV 1 and aural warnings.
  Copilot has two-way communication on VHF 2, audio on NAV 2 and aural warnings.
  Observer has aural warnings only.

NOTE
Inoperative at observer's audio control panel.

MASK/BOOM
- MASK -- Oxygen mask microphone of respective station is active.
- BOOM -- Boom microphone of respective station is active.

SPKR
Press to select and deselect audio on the flight compartment speakers. Rotate to adjust volume.

NOTE
Inoperative at observer's audio control panel.
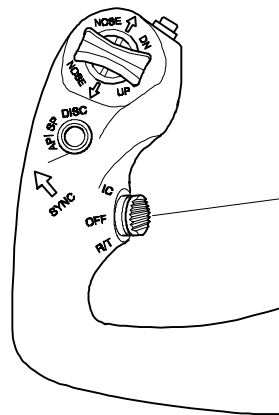
**Radio Transmit (RT)
Intercom (IC)**
Used to transmit on radios or passenger address system.
- RT -- When held, permits communication using headset or oxygen mask microphones.
- IC -- Provides hot mic talk through interphone system.

VOICE/BOTH
- VOICE -- Station identification is filtered out allowing only voice signals to be audible.
- BOTH -- Station identification and voice signals are audible.

Audio Control Panel
Figure 05-20-2

Radio Transmit (RT)
Intercom (IC)
Used to transmit on radios
or passenger address
system.
- RT – When held, permits
  communication using
  headset or oxygen mask
  microphones.
- IC – Provides hot mic talk
  through interphone
  system.

Pilot's Control Wheel
(Copilot's Opposite)

Pilot's Control Wheel (Copilot's opposite)
Figure 05‑20‑3

B. Ground Crew Interphone

There are four external interphone stations in the aircraft in the following locations:

- External service panel

- Refuel/defuel panel

- Avionics bay

- Aft equipment bay

When pressed, the CALL switch on the interphone or external service panels allows either position to call the other. When either switch is pressed and released, both lights are illuminated for 30 seconds and a two tone chime sounds in the aircraft.

Interphone Panel
Center Pedestal
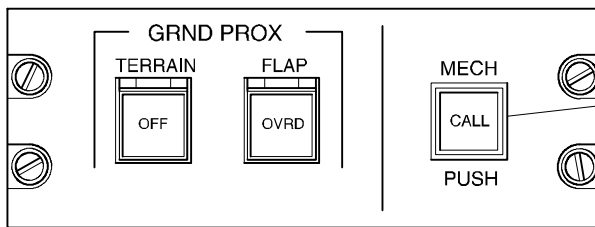
CALL
Used by flight crew to call ground crew or answer ground crew call.
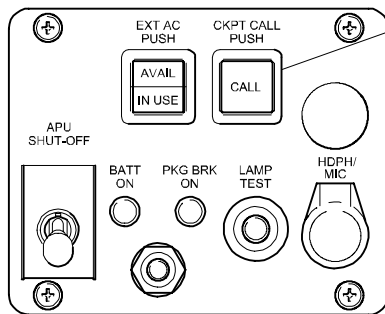
CALL
Used by ground crew to call flight crew or answer flight crew call.

External Service Panel
Right Forward Fuselage
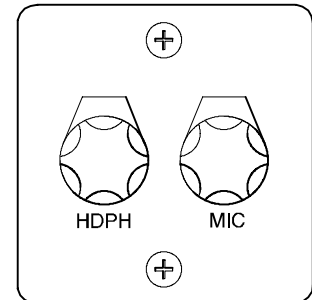
Typical Interphone Panel
Avionics Bay,
Rear Equipment Bay,
Refuel/Defuel Panel

GND Crew Interphone <2040,1205>
Figure 05–20–4

C.   **Attendant's Handset**

Switches on the attendant's handset cradle and on the intercom control panel, in the flight compartment, are used for routing communications to the crew and passengers. On the handset cradle, the ATT button signals both attendant stations by illuminating the ATT indicators green. To call the flight crew, the attendant removes the handset from the hook and presses the FLT or the EMG button. This will illuminate the CALL or EMER light on the intercom control panel and sound a high-low chime on the flight compartment speakers. When PA is selected on the intercom control panel, and the RT/IC switch, on the control wheel, is set to IC, two-way conversation is established. The galley speaker is muted when a flight attendant's handset is activated.

Press to Talk
Used when cabin
attendants talk on
passenger address
system.

Attendant's Handset

EMG (amber led)
Used to call
flight crew.

ATT (green led)
Used to call
other flight
attendant.

FLT (green led)
Used to call
flight crew.

PA (green led)
Used to address
passengers.
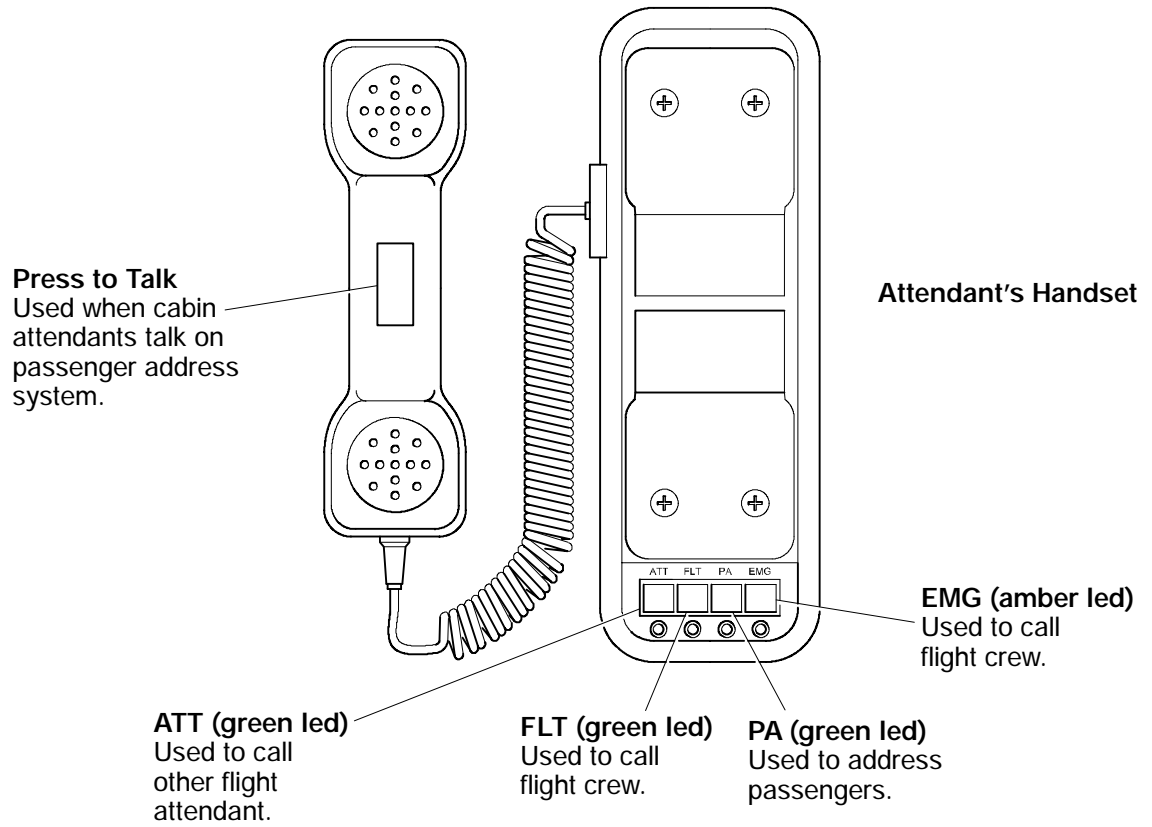
Attendant's Handset
Figure 05‑20‑5

D. Passenger Address System

The passenger address system allows both pilots and flight attendants to make announcements to the passengers.

Cabin speakers are installed in the passenger service unit above each passenger seat. Additional speakers are installed in the lavatories and the galley(s). Volume of the cabin speakers is automatically adjusted for engine background noise.

Pressing in the PA button on the handset cradle and pressing the PTT switch in the handset allows either flight attendant to make an announcement on the PA system. The announcement will interrupt any entertainment system that may be operating. To ensure priority access to the system, all other PA transmissions are overridden when the pilot pushes the PA switch on the intercom control panel.

E. Intercom Control Panel

The intercom control panel is located on the centre pedestal and is used to select one of four communication modes. When a button is pressed the labeled mode is activated and any previous mode is deactivated.

To make an announcement from the flight compartment:

* Set the audio control panel rotary transmit selector to PA

* Press the PA pushbutton on the intercom control panel

* Use any press to talk switch to transmit

The PA indicator light on both flight attendant handset cradles will illuminate (green) and the PA pushbutton on the intercom control panel will illuminate (green).

Pressing the CHIME pushbutton, only sounds a high-low chime in the passenger compartment (there are no indicator lights for this action).

When the CALL is pressed, it illuminates green and sounds a high-low chime in the passenger compartment. The green FLT indicator light on both flight attendant's handset cradles illuminate and a red light comes on in the mid-cabin overhead exit sign.

The EMER button is used to notify the flight attendants of an in-flight emergency. When activated, the EMER indicator light, on the intercom panel, flashes (amber) and a high-low chime sounds. In the passenger compartment, The amber EMG light, at both flight attendant stations, flashes on the handset cradles and a red light flashes on the mid-cabin overhead exit sign.

CHIME
Used to sound chime
cabin speakers.

CALL
Used to sound chime and enable
intercom with flight attendant.
• Green – Indicates call to flight
attendants.

EMER
Used for emergency call
on cabin interphone
system.
• Flashing (amber) –
Indicates emergency
call to flight attendants.

**Intercom Control Panel
Center Pedestal**

PA
Used to address
passengers in cabin.
• Green – Indicates in use.
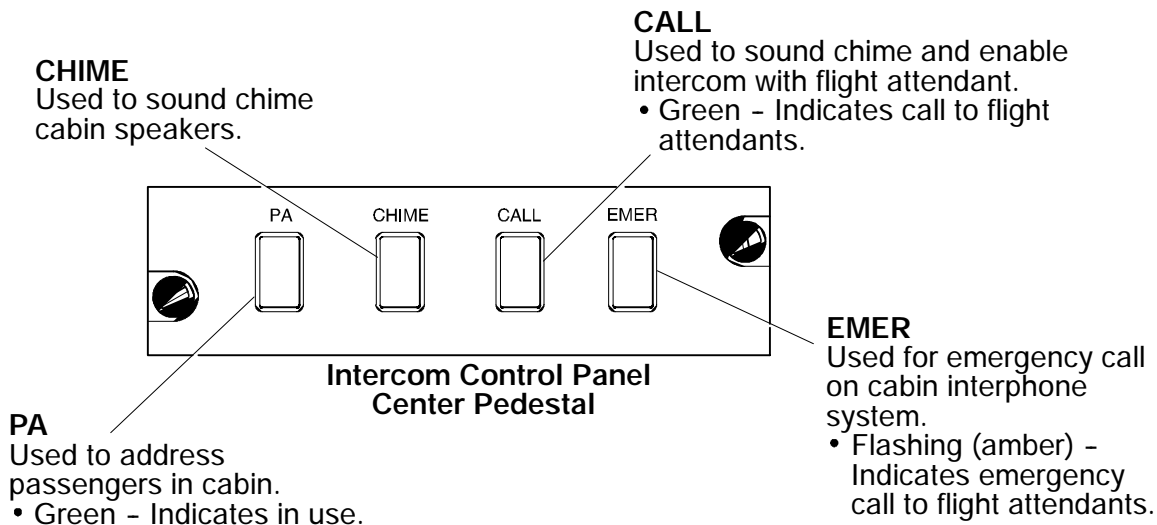
CKPT Intercom Control Panel
Figure 05-20-6

F.   Passenger Service Units

An attendant call button is installed in each overhead passenger service unit. When a
passenger activates the attendant call button:

• the cabin speakers sound a high tone chime

• an amber light on the passenger service unit illuminates

• a ceiling mounted call light comes on

When the NO SMKG or SEAT BLTS switch is turned on in the flight compartment, the
passenger compartment speakers sound a low tone chime and the NO SMKG and
SEAT BLTS lights are illuminated.

G.   System Circuit Breakers

SYSTEM	SUB-SYSTEM	CB NAME	BUS BAR	CB PANEL	CB LOCATION	NOTES
Audio Integrating System	Audio	AUDIO PILOT	BATTERY BUS	1	Q6	
		AUDIO C/PLT			Q7	
		AUDIO OBS			Q8	
		AUDIO OBS	DC BUS 2	2	H4	
		AUDIO PILOT	DC ESSENTIAL		V2	
	Interphone	CABIN INPH	BATTERY BUS		Q3	
	Passenger Address	PASS ADDR			Q4	

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1. **ANNOUNCEMENT AND BOARDING MUSIC SYSTEM** <1035>

The announcement and boarding music system is a source of voice messages and music for the passenger address system. The digital boarding music unit is located in the top of the forward wardrobe. The unit is energized by pressing and releasing the momentary action ON. During power up, the system performs a self test that checks the system components and data file integrity.

System configuration, messages and music are contained in a memory card installed in the unit. The flight crew can not access the card.

Pressing the language/volume key, labeled L/V, activates the language selection mode. The up and down arrows and the SEL (select) key may then be used to select up to four languages. The order of selection is the order that the languages will play.

The liquid crystal display (LCD) lists the languages as they are selected. When in play mode, the active (cued) language will be highlighted. If the flight attendant activates a message, the SEL key is inhibited for the duration of the message.

After pressing the A (announcement) key, the up and down arrows and the PLAY key may be used to scroll up and down the list of available message and music files and select a particular group of messages to be played.
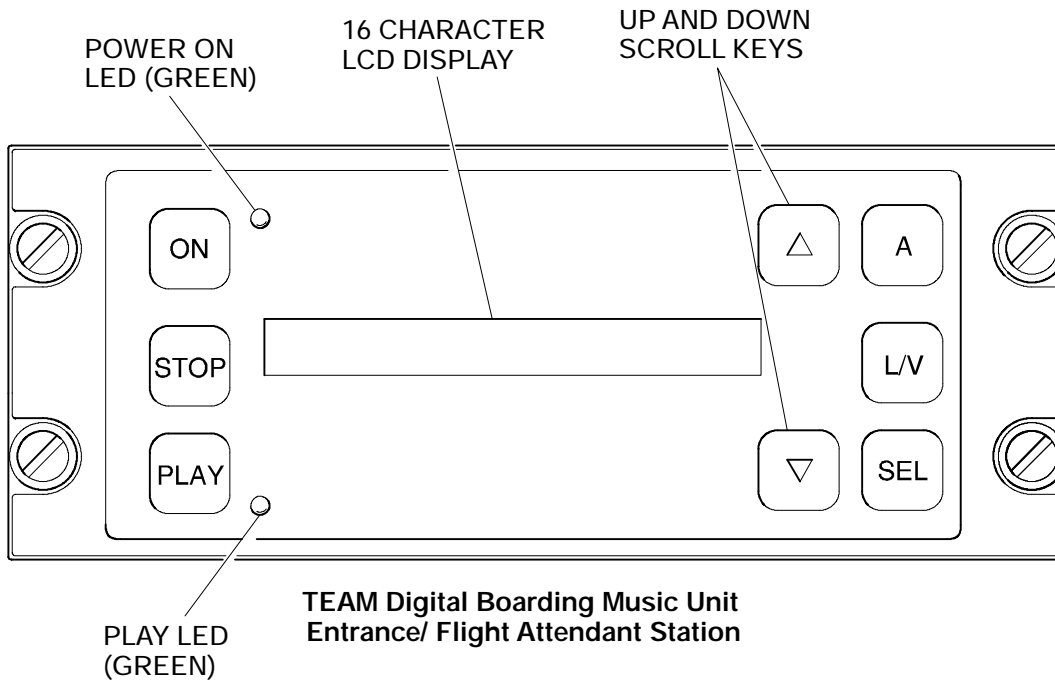
The selected message or music group name will appear on the LCD and the first cued up message will be highlighted. Music can be selected by scrolling through the displayed titles and pressing the SEL key. The PLAY key will cause the highlighted file, message or music, to be broadcasted. When no music is selected for three minutes, the system defaults to announcement mode.

In play mode, selecting the L/V key will allow the user to adjust the volume of the broadcast by pressing the up and down arrows. The broadcast can be interrupted by pressing STOP.

A signal from the PSEU (oxygen deployment at cabin altitude greater than 10,000 feet) keys up to three prepared messages. These messages supersede all other system outputs. The music system is, also, muted when a crew member makes an announcement using the passenger address system.

Control Panel Function Keys:

• ON – Turns the system ON and OFF

• STOP – Stops the broadcast

• PLAY – Plays the announcement or music

• A – Announcement, used to enter the Announcement Menu

• L/V – Language/volume used to select the Language Menu or adjust volume

• SEL – Selects the language or music

POWER ON LED (GREEN)

16 CHARACTER LCD DISPLAY

UP AND DOWN SCROLL KEYS

ON

STOP

PLAY

△ A

L/V

▽ SEL

PLAY LED (GREEN)

TEAM Digital Boarding Music Unit Entrance/ Flight Attendant Station

Announcement and Boarding Music System <1035>
Figure 05–25–1

A. System Circuit Breakers

SYSTEM	SUB-SYSTEM	CB NAME	BUS BAR	CB PANEL	CB LOCATION	NOTES
Boarding Music System	Boarding Music Unit	BOARD MUSIC	DC BUS 1	1	G3	

1. RADIO COMMUNICATION SYSTEM

Two VHF radio communication systems provide AM voice communication with ground stations and other aircraft. The radios work with the audio integrating system to provide full two way communication. The audio control panels provide selection and control of the audio outputs. <1012>

Transceiver tuning range is 118.000 to 136.975 MHz. Frequency tuning and mode selection is done by two primary radio tuning units (RTU). Frequency tuning can also be done by a backup standby tuning unit or the FMS control display unit.

A. Radio Tuning Unit

The radio tuning units and radio systems have an on-side relationship. RTU 1 monitors and controls COM 1 and RTU 2 monitors and controls COM 2. In the event of total AC power loss or failure of both radio tuning units, the backup tuning unit provides reversionary control of COM 1.

Radio information is presented on two levels of the radio tuning units. The top level page displays the overall status of all radios and allows the operator to make frequency changes. A COM main page provides the means to change frequencies, codes and operating modes.
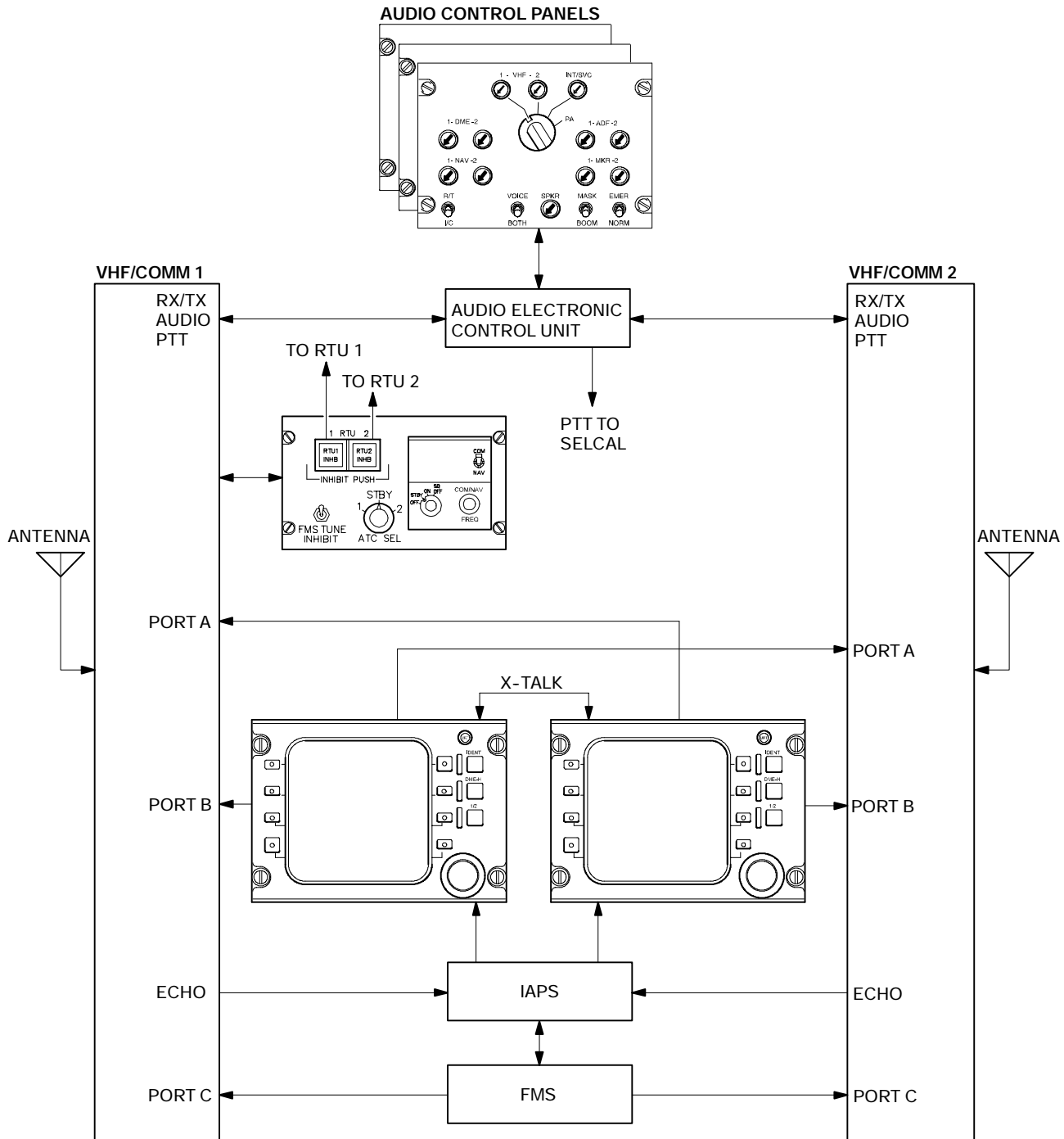
The active VHF COM frequency is shown on the top left hand side of the radio tuning unit top level page, while the preset frequency is displayed on the top right hand side. Pressing the line select key adjacent to any frequency brings the tuning window to that frequency. It is then possible to modify that frequency with the frequency select knobs. Pressing the line select key adjacent to the preset frequency twice, swaps the active frequency with the preset frequency. Pressing the line select key adjacent to the active frequency twice, brings up the COM main page.

On the main page, pressing the line select key adjacent to the SQUELCH field toggles the squelch ON or OFF. The selected state is displayed in large cyan letters. The inactive state is displayed in smaller white letters.
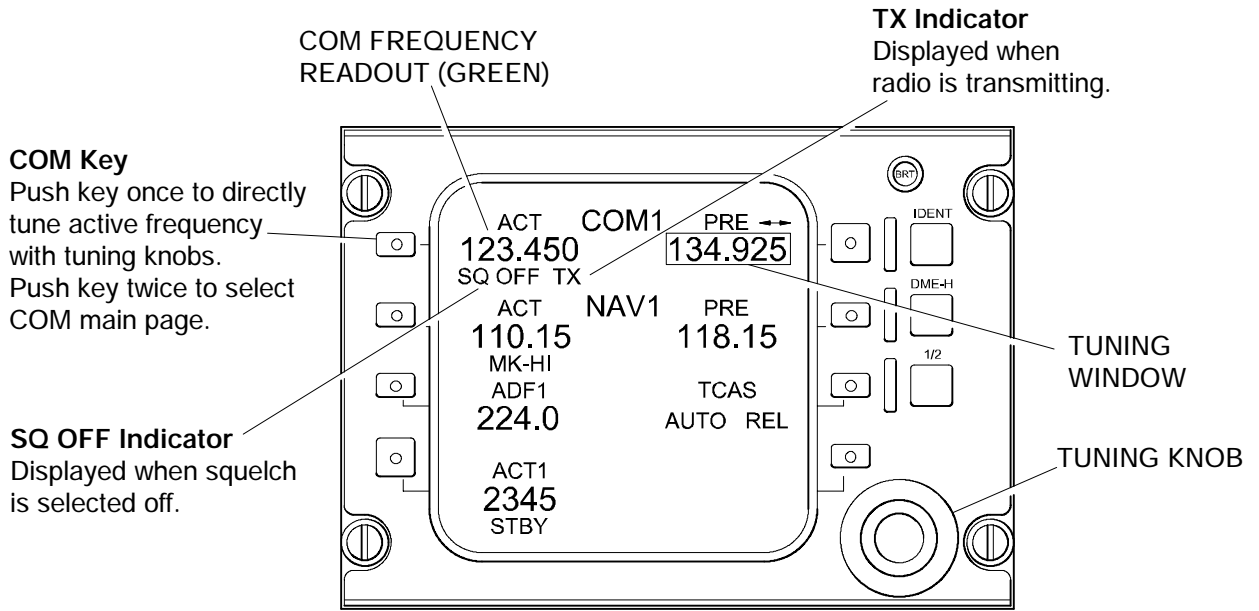
If no entry is made on the main page within 20 seconds, the radio tuning unit display will return to the default top level page. The operator can press the line select key next to the RETURN line to return to the top level page at any time.

If the squelch is selected OFF, a SQ OFF message is displayed on the top level page. Since Squelch ON is considered the normal operating mode it is not displayed on the top level page. When a COM transceiver is transmitting, a TX annunciation is displayed in cyan letters below and to the right of the active frequency field on the top level page.
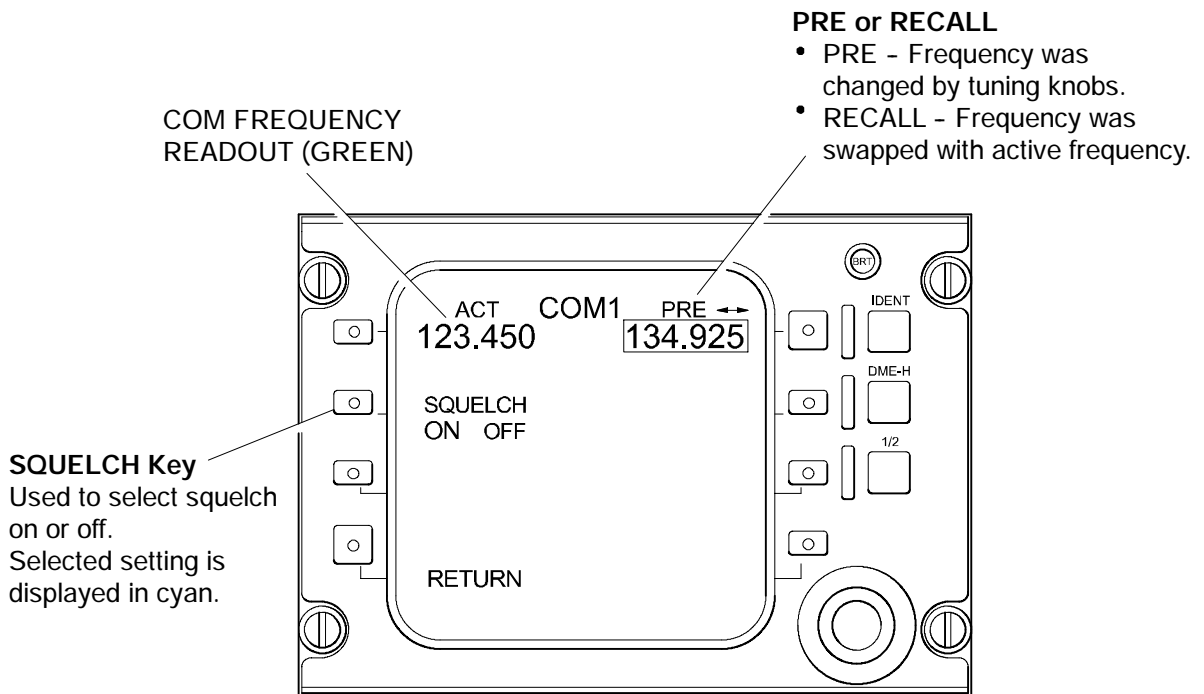
The radio tuning units continuously monitor the status of the VHF COM transceivers and if any discrepancy is detected between the commanded frequency and the actual tuned frequency, the frequency indication is replaced by white dashes to warn the pilot of the inconsistency.

AUDIO CONTROL PANELS

VHF Communication Interface
Figure 05-30-1

TX Indicator
Displayed when
radio is transmitting.

COM FREQUENCY
READOUT (GREEN)

COM Key
Push key once to directly
tune active frequency
with tuning knobs.
Push key twice to select
COM main page.

SQ OFF Indicator
Displayed when squelch
is selected off.

TUNING
WINDOW

TUNING KNOB

Radio Tuning Unit – Top Level Page
Center Pedestal

PRE or RECALL
• PRE – Frequency was
changed by tuning knobs.
• RECALL – Frequency was
swapped with active frequency.

COM FREQUENCY
READOUT (GREEN)

SQUELCH Key
Used to select squelch
on or off.
Selected setting is
displayed in cyan.

Radio Tuning Unit – COM Main Page
Center Pedestal
Radio Tuning Unit <1012>
Figure 05–30–2

B.   Backup (Standby) Tuning Unit

Under normal conditions the backup tuning unit is in standby mode and acts as a system monitor displaying the echoed frequencies from the radios. The backup tuning unit provides radio control in the event of the loss of both radio tuning units and the flight management system. The active frequencies are stored in non-volatile memory and can be recalled after a power interruption.

When the backup tuning unit is switched on, it takes over control of the left side VHF COM 1 and NAV 1, and overrides all other controls.

Radio tuning unit inhibit switches, on the backup tuning unit, are used to disable a failed primary radio tuning unit. Cross-side tuning can then be accessed by using the 1/2 cross-side key on the serviceable radio tuning unit. Not all available radios can be displayed on the radio tuning unit at once. Switching back and forth with the 1/2 key is required to display all of the radios. When both radio tuning units fail, the displays go blank and cross-side tuning becomes inoperative.

RTU INHIBIT PUSH
Used to disable a failed radio tuning unit and enable cross-side tuning.
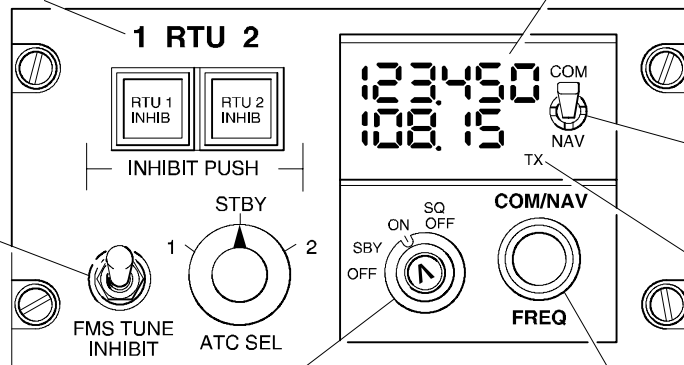* RTU 1 or 2 INHIBIT (white) light comes on to indicate that radio tuning unit is disabled.

FMS TUNE INHIBIT
Used to inhibit the auto tune functions of the FMS.

Backup Tuning Unit Center Pedestal

Frequency Readouts
Displays frequencies set on COM 1 and NAV 1 radios.

Tuning Selector
Selects COM 1 or NAV 1 for tuning.

TX Indicator
Indicates that VHF 1 transceiver is transmitting.

Mode Selector
* OFF - Display is off.
* STBY - Displays frequency selected by RTU 1.
* ON - Frequency controlled by frequency knobs.
* SQ OFF - Squelch is selected off.
Audio volume controlled by centre knob.

Tuning Knobs
Used to change displayed frequencies.
* Outer knob – Changes frequency in 1–MHz steps.
* Inner knob – Changes frequency in 50–kHz steps (NAV), or in 8.33 kHz steps (COM).

Backup Tuning Unit <1012>
Figure 05–30–3

C.   **System Circuit Breakers**

SYSTEM	SUB-SYSTEM	CB NAME	BUS BAR	CB PANEL	CB LOCATION	NOTES
Radio Communication System	Backup Tuning Unit	EMER TUNING	BATTERY BUS	1	Q4	
	Transceiver	VHF COM 1			Q3	
		VHF COM 2	DC BUS 2	2	H10	
	Radio Tuning Unit	RTU 1	DC ESSENTIAL		U9	
		RTU 2	DC BUS 2		K7	