

**COMMUNICATIONS  
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**CHAPTER 6**

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## GENERAL

The intercom system, VHF and HF communications transceivers, selective calling (SELCAL), comprise the basic communications system. All communication and navigation radios are tuned through the Radio Management Unit (RMU) installed in the centre pedestal. The RMU controls the TCAS modes and provides direct tuning of the NAV, COM, ADF, TCAS, ATC and HF radios. RMU color LCD can display several pages of radio system data including channels, frequencies, codes, backup engine data, strap options, maintenance data log and software versions.

A cockpit voice recorder (CVR) is installed in the flight compartment, on the copilot's side console. All incoming, outgoing and internal communications are recorded on the cockpit voice recorder. Radio frequency interference is reduced through a series of electrostatic dischargers and through an equipment bonding/grounding system.

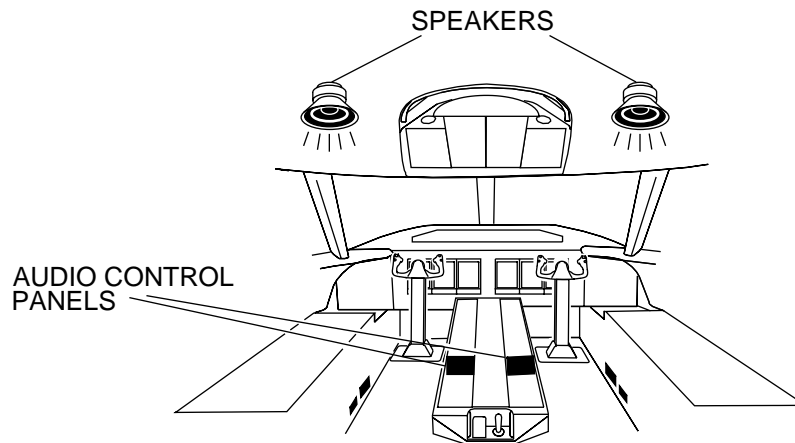
Audio control panels (centre pedestal) and the optional (completion centre installation) function as the interface to the remote NAV and COM units.

## INTERPHONE COMMUNICATION

The interphone communication consists of the following internal and external components:

### Flight Compartment Speakers

Individual speakers are installed in the flight compartment to monitor audio selected at pilot/copilot audio control panels. A speaker volume control is located on each audio panel and can be selected off by the "ST" switch on each control panel, unless the oxygen mask mic is in use.



GF0610\_001

### Flight Crew Intercom

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

Crew members can key communications transmission as follows:

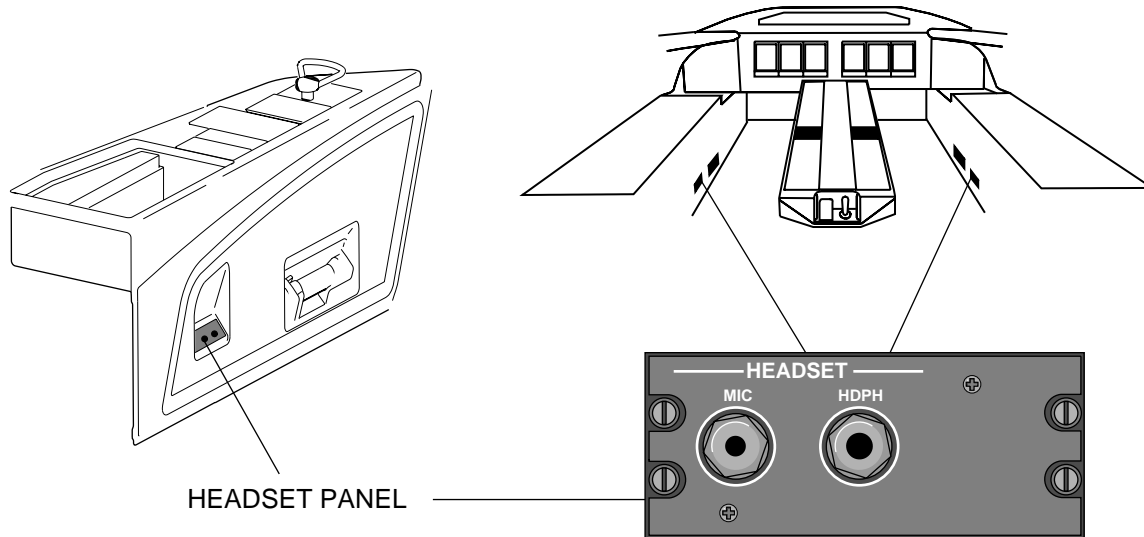
- Audio control panel – hot mic (H'MIC) and intercom (INT) switch.
- RT/IC switch on the back side of each control wheel.

**INTERPHONE COMMUNICATION (CONT'D)**

**Flight Crew Intercom (Cont'd)**

Flight compartment microphone and headset jacks are installed at the following locations:

- Below pilot's side console.
- Below copilot's side console.



GF0610\_002

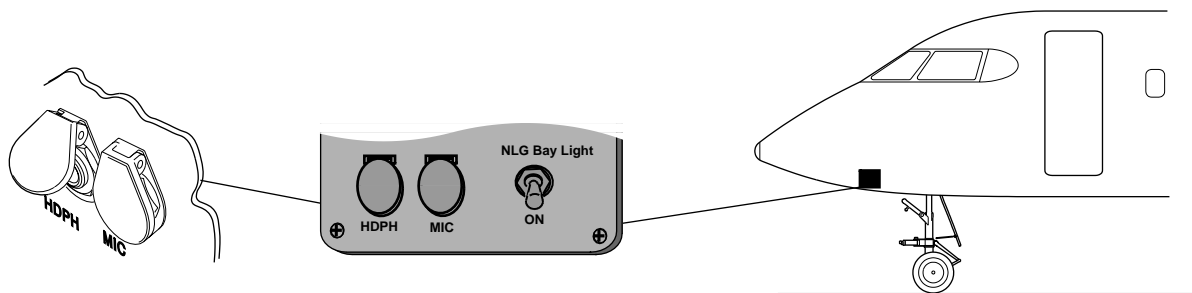
**Service Intercom Panels**

Service intercom panels are provided throughout the airplane and permit hot microphone communication between locations and interface with the flight compartment when selected on the audio control panel. A headphone and microphone jack are installed at each location. Hand microphones with a Press-To-Talk (PTT) switch are attached to the front of each control wheel.

Microphone and headset jacks are installed at the following external airplane locations:

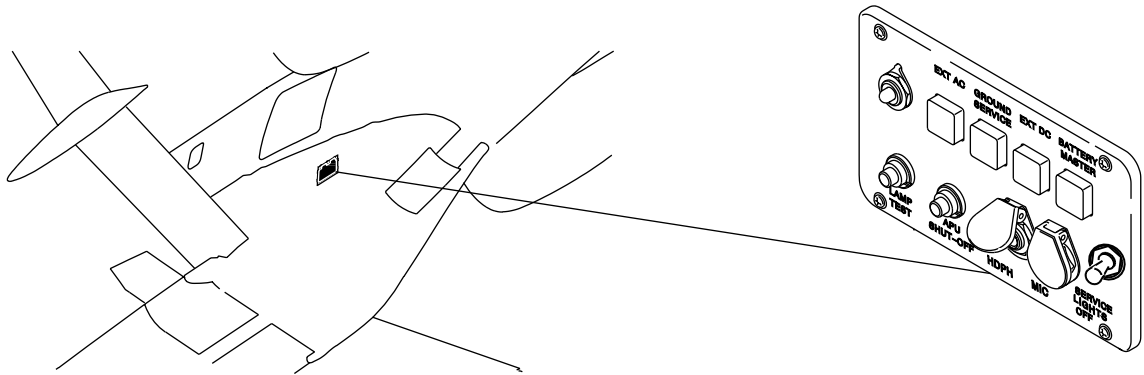
- Forward and rear externals services panel.
- Aft equipment bay.
- Avionics bay.

**Forward External Services Panel Interphone Station**



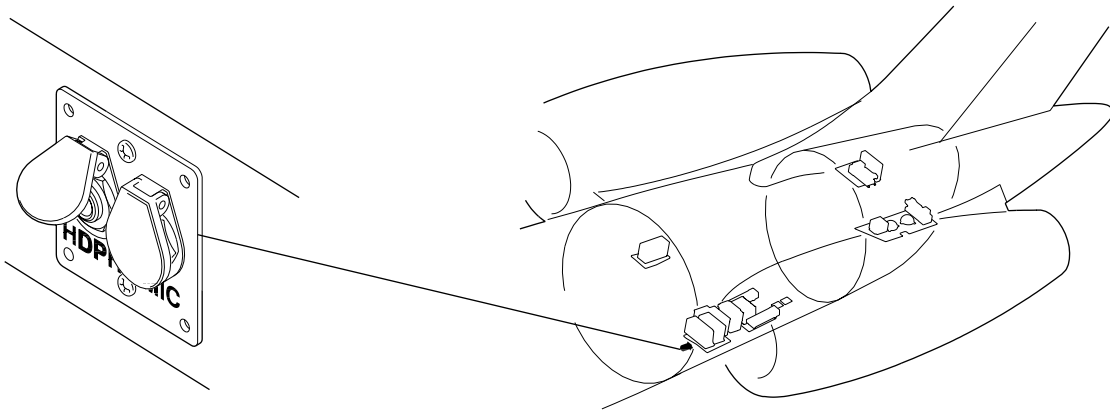
GF0610\_003

**INTERPHONE COMMUNICATION (CONT'D)**  
**Aft External Services Panel Interphone Station**



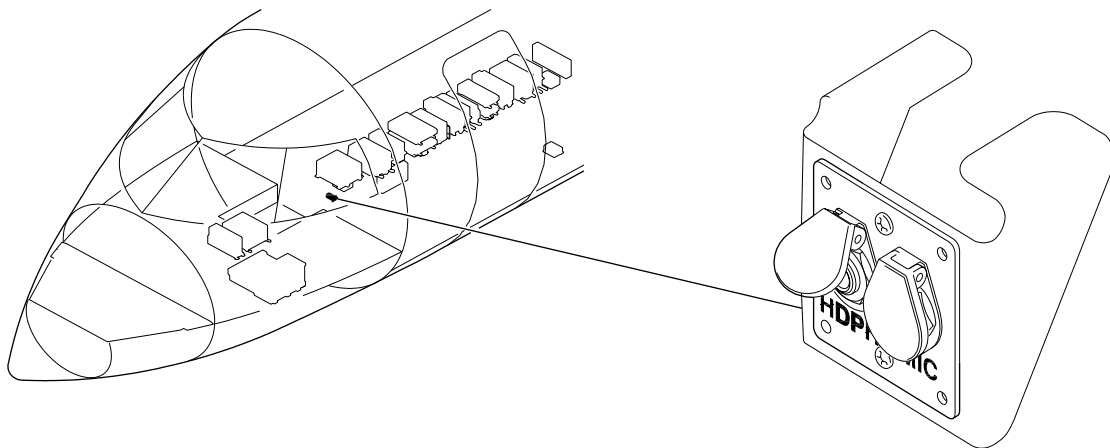
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**Aft Equipment Bay Interphone Station**



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**Avionics Bay Interphone Station**



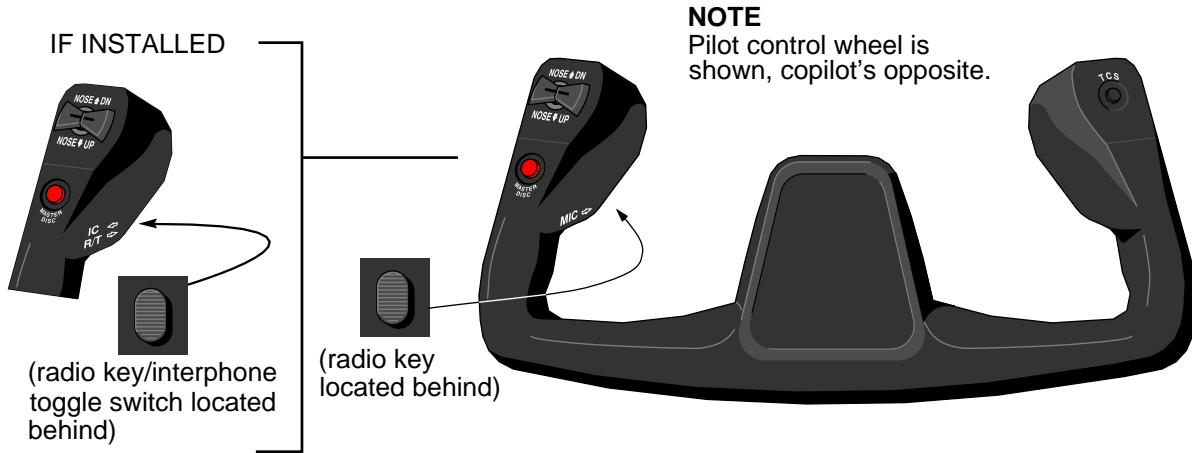
GF0610\_006

**INTERPHONE COMMUNICATION (CONT'D)**

**Control Wheel Radio Key / Control Wheel Toggle Switch (If Installed)**

Each control wheel has a radio key which activates the selected radio transmitter.

**If installed,** each control wheel has a toggle switch which activates the selected radio transmitter or the interphone.

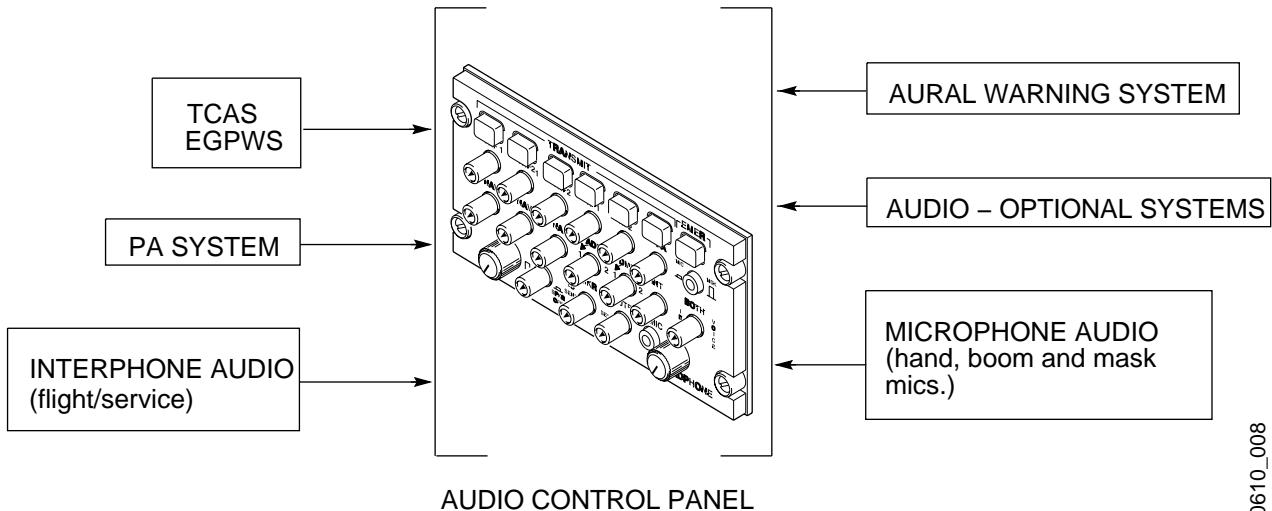


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**AUDIO CONTROL PANEL**

The Audio Control Panels (ACPs) operate independently to the remote COMM and NAV units and provide on-side/cross-side selection. They also control the audio to and from the radios, intercom, PA and aural warning system.

**AUDIO CONTROL PANEL INPUT SCHEMATIC**



GF0610\_008

**AUDIO CONTROL PANEL SWITCH OPERATION**



The audio control switch panel operation is as follows:

**Transmit/Emer**

The channel is active when the associated bar illuminates. Only one push-button can be selected at a time.

- EMER – When pressed, the microphone is connected directly to the on-side VHF (COMM) transceiver and the audio is connected directly to the airplane’s headphone. This mode disables all other audio control unit modes. When the EMER key is pressed, headphones are required regardless of the position of the MIC/MASK. Both the oxygen mask and headphones are to be worn simultaneously in EMER and MASK operation with EMER selected.

**Microphone Selection**

Connects the MIC audio and PTT to the selected COMM or NAV radios, or PA when pushed in.

- MIC/MASK – When selected in, the headset microphone is available. When selected out, the mask microphone is available and intercom audio is connected to the speaker (regardless of the position of the SPKR switch).
- INT – Adjusts the intercom headset audio level. When selected out, the audio panel is connected to other audio control panel(s) and to external audio jacks.
- ID/BOTH/VOICE – “ID” – Allows only NAV tone ident to be heard . “VOICE” – Allows only VOICE audio on NAV frequency to be heard. “BOTH” – allows voice and ID to be heard simultaneously .

**Speaker/Headphone**

- Speaker – Adjusts the audio level of the flight compartment speakers.
- ST switch – Sidetone switch adjusts the speaker audio level in transmit. Turns the speakers ON/OFF unless oxygen mask is in use.
- MKR/MUTE – Marker beacon controls on-side receiver sensitivity. Mute silences the marker beacon audio. Rotating MUTE selects HI or LO SENSitivity.
- H’MIC – Button selected out, interphone functions operate in hot mic mode. Button selected in, connects microphone to the interphone PTT function.
- Headphone – Adjusts the audio level of headphone (master volume control).

**RADIO COMMUNICATION SYSTEM**

The capability for controlling the operating modes, frequencies and codes can be accomplished by using the Radio Management Unit (RMU) which is the central control unit for the entire radio system.

The RMU controls all of the VHF COM tuning functions and allows emergency tuning by the FMS. When an FMS tunes the radios, the digital signals from the FMS enter the system where they act in much the same manner as if the RMU tuning knob was being operated. This will allow the FMS to enter into the system in an organized manner. For FMS operation, refer to Pilot's Operating Manual Pub No A 28-1146-116-00.

The audio section of the VHF COM provides SELCAL outputs used for airplane addressing by transmitting tones across a VHF COM channel.

**VHF 1 and 2 Communications Systems**

Two separate, but identical, narrow band width VHF communications systems (VHF 1, VHF 2) which can be operated separately or simultaneously, are provided. These systems are used to provide AM voice communication between the airplane and a ground station and/or another airplane. Frequency tuning and mode selection is by CRT pages and controls on the RMU.

The integrated communications units with transceivers (located in the forward fuselage avionics bay) provide VHF communication (VHF COM) and Mode S Transponder data link capabilities. The communication transceiver tuning range is as follows:

System	Frequency Range	Channel Spacing
VHF 1 and 2	118.00 to 151.975 MHz	8.33 kHz

**VHF 3 Communications System (On airplanes with SB 700-23-002 incorporated)**

An optional VHF 3 is located in the forward fuselage avionics bay and is used primarily as a data radio. It does not have an ATC transponder but has the capability of operating in the data mode as well as the voice mode.

The RMU automatically senses when the optional third VHF COM radio is installed and adds a menu selection to the MENU page. Control of frequency and operating mode is performed by the RMU and FMS CDU. VHF COM 3 works in conjunction with the Data Link System as the data radio. The communication transceiver tuning range is as follows:

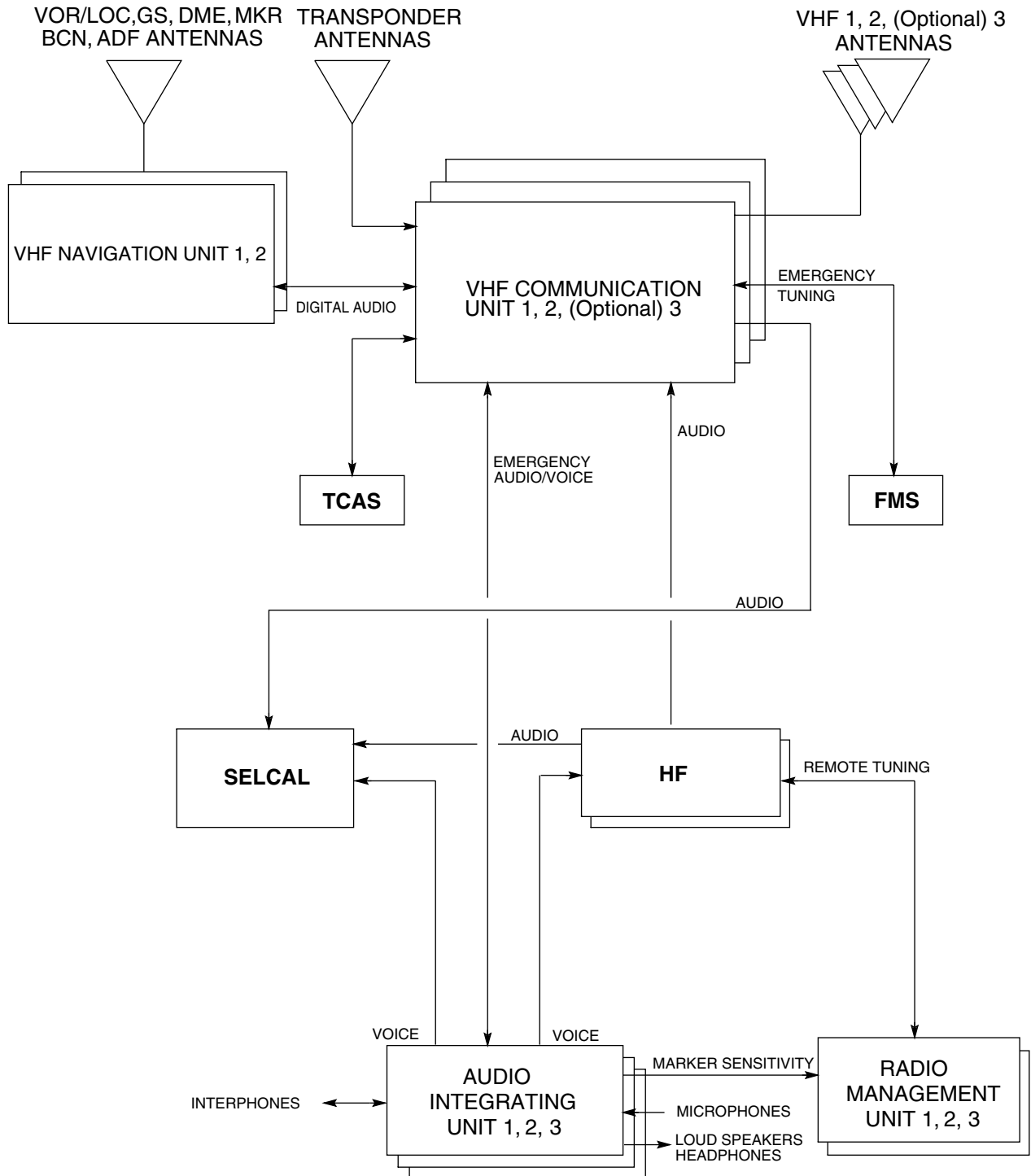
System	Frequency Range	Channel Spacing
VHF 3	118.00 to 151.975 MHz	8.33 kHz



**INTEGRATED RADIO SYSTEM**

The radio communications unit provides VHF communication (VHF COM) and Mode S Transponder data link capabilities. It interfaces with the FMS, SELCAL, TCAS, HF, audio control panels and is controllable from either RMU.

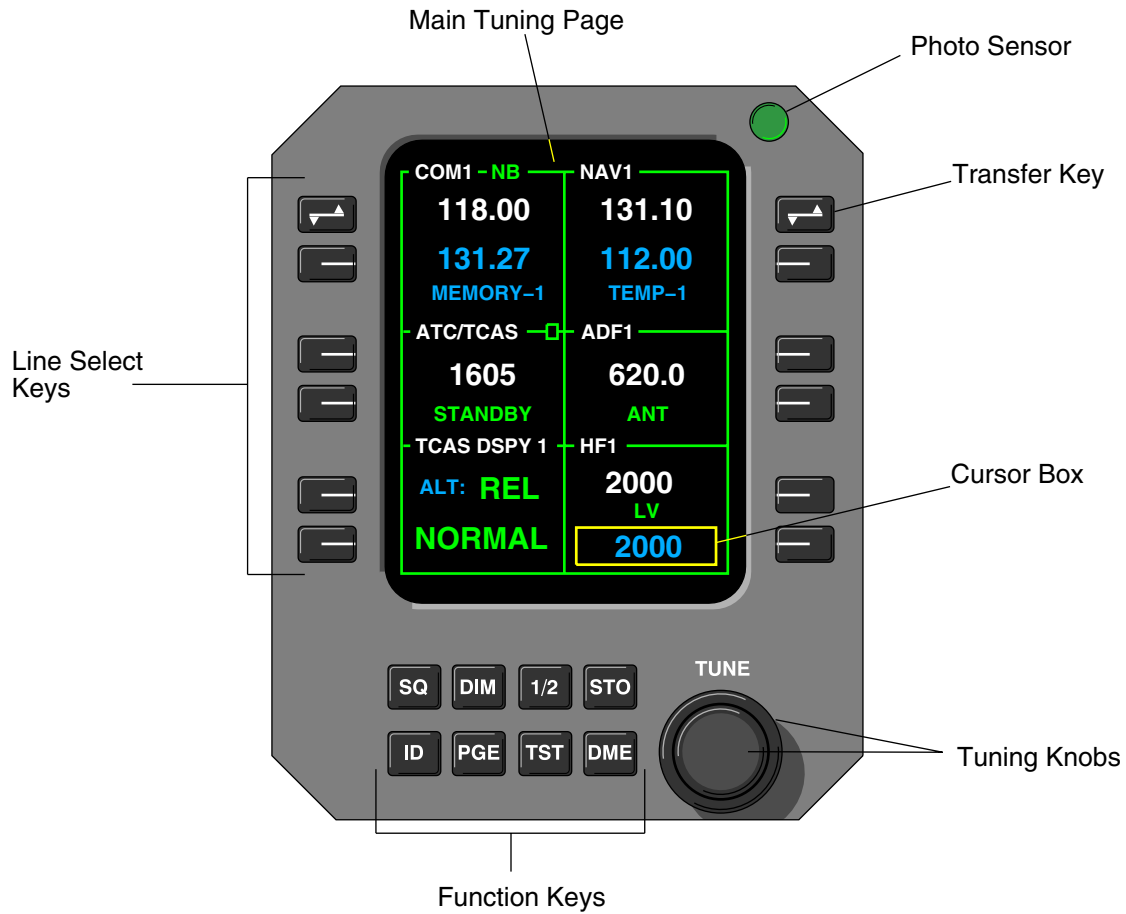
**INTEGRATED RADIO SYSTEM SCHEMATIC**



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**RADIO MANAGEMENT UNIT (RMU) DISPLAY**

The following is a description of the panel controls and information available on the RMU.



GF0610\_013

**RMU 1 (Pilot's)**

**RMU 2 (Copilot's)**

**PILOT'S WINDOW**

Contains the following:

- COM 1
- NAV 1
- ATC/TCAS
- ADF 1
- TCAS DSPY 1
- HF 1



**COPILOT'S WINDOW**

Contains the following:

- COM 2
- NAV 2
- ATC/TCAS
- ADF 2
- TCAS DSPY 2
- HF 2



GF0610\_014

**RADIO MANAGEMENT SYSTEM**

The RMU is mounted in the centre pedestal. It is a colour Liquid Crystal Display (LCD) based radio tuning controller that provides centralized control and display of frequencies, channels, codes and modes set on the communications and navigation receivers. Each RMU provides single point control of both the on-side and cross-side radios. The RMUs provide on-side and cross-side access to the following radios:

<b>RMU – 1</b>	<b>RMU – 2</b>
VHF COM – 1	VHF COM – 2
VHF NAV – 1	VHF NAV – 2
DME – 1	DME – 2
ADF – 1	ADF – 2
ATC – 1	ATC – 2
TCAS DSPY 1	TCAS DSPY 2
HF – 1	HF – 2

The RMU uses the concept of selecting a function by pushing a line select key next to the parameter that you wish to control. Any selectable parameter may be changed by pressing the corresponding line key next to the displayed parameter and then rotating the concentric tuning knobs to set the desired value.

The RMU display is divided into dedicated windows. Each window groups the data associated with a particular function of the radio system. The windows COM, NAV, ATC, HF, ADF and TCAS each provide for complete control of frequency and operating mode of the associated function.

The RMU also has other display modes, called pages, which perform additional features and functions for the control of the radio system. A menu of the pages is provided to access these additional functions.

Located on the front of the RMU is a button labeled PGE, which when pressed, causes the system page menu to be displayed. Pressing PGE will allow the selection of other functions such as:

- Radio page: Normal tuning.
- COMM memory: Preset COMM frequencies.
- NAV memory: Preset VOR NAV frequencies.
- ATC/TCAS: ATC/TCAS display parameters.
- HF control: Preset and Direct tune modes.
- Maintenance: Access to maintenance data only on ground.

RADIO MANAGEMENT SYSTEM (CONT'D)

General Colour Philosophy



GF0610\_016

For radio parameters the RMU provides a local tune colour and a remote tune colour. Local tune is performed on same RMU it is observed on. Remote tune is performed on another tuning source: the other RMU or the FMS. Following local tune, the tuned item changes to the local tuned colour.

Item	Local Tune Colour	Example
VHF 1 and 2	White	NAV Display Channel
Preset Data	Cyan	COM Preset Channel
Mode Data	Green	ADF Mode
FMS Data	Magenta	Nav Auto Annunciator

Following remote tune, the tuned item changes to yellow, with one exception – an FMS database tune (auto tune) of the NAV display channel, which is magenta.

Item	Remote Tune Colour	Example
Channel Data	Yellow	NAV Display Channel
Preset Data	Yellow	COM Preset Channel
Mode Data	Yellow	ADF Mode
FMS Data Base	Magenta	Nav AUTO Annunciator

**RADIO MANAGEMENT SYSTEM (CONT'D)**

**General Colour Philosophy (Cont'd)**

Other items which are not radio parameters, such as page banners and window labels, also follow a general colour philosophy. The page banners and window labels are white when the on-side is selected and are magenta when the off-side system is selected. Example: on RMU #1 the HF window label is white when HF 1 is selected and magenta when HF 2 is selected.

Item	Fixed Tune Colour	Example
Field Labels	Cyan	TCAS INTRUDER ALTITUDE
Key Labels	Cyan	Page Menu HF CONTROL Key
Caution/Notice	Yellow	Transponder ATC ERR

**Transfer Keys**

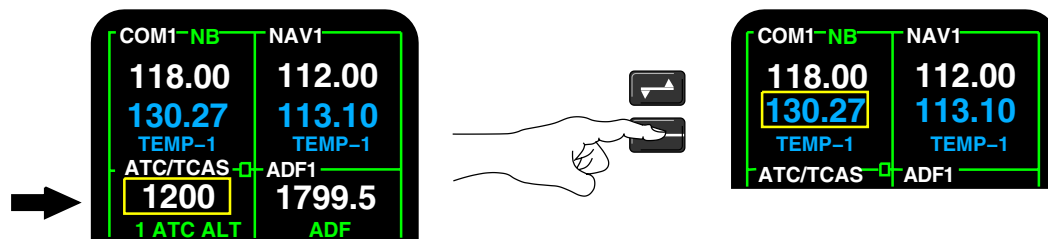
The transfer key when pushed, flip-flops the active (top line) frequency and the preset (bottom line) frequency of the respective VHF COM, VHF NAV or HF COM window. Example below:



GF0610\_020

**Line Select Keys**

The first push of the line select key moves the yellow cursor to surround the data field associated with that particular line select key. It also electronically connects that data field to the tuning knobs so that the frequency or mode may be changed. For some functions, additional pushes of the line select key will toggle modes or recall stored frequencies. The line select key, when pressed and held for certain functions, allows the ADF and ATC memories to be recalled and to enter and exit direct tune mode for the VHF COM and the VHF NAV.



GF0610\_021

**Function Keys and Tuning Knobs**

Function keys provide control of system data/configuration. The tuning knobs are used to modify the data field included by the cursor. This may be frequency or mode depending on the data field.



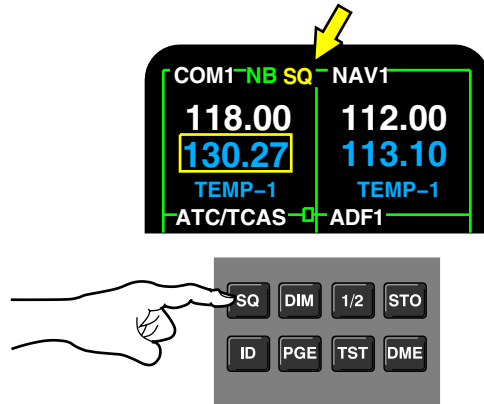
GF0610\_022

RADIO MANAGEMENT SYSTEM (CONT'D)

Function Keys

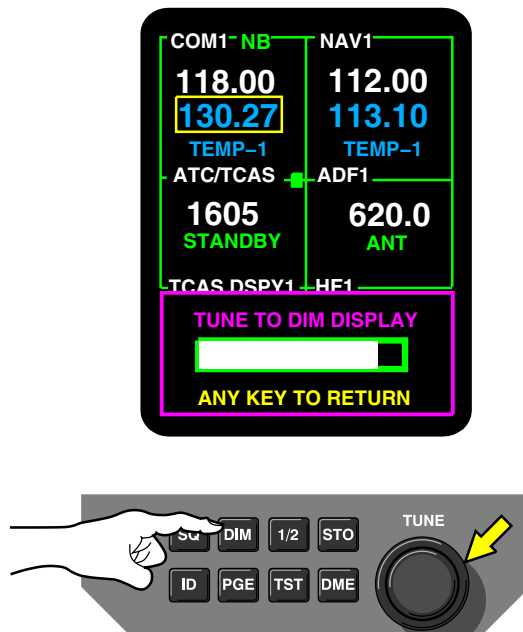
Pressing the squelch **SQ** key opens the COM radio squelch and allows any noise or signal present in the radio to be heard in the audio system. The letters “SQ” are annunciated along the top line of the VHF COM window (if the cursor is in the window) or the HF COM window (cursor in the HF COM window)

The “SQ” for the HF-9000 toggles between “SQ OFF” and the previously selected “SQ” level (MIN, MED, MAX). The “SQ” level is selected on the HF control page.



GF0610\_024



Pressing the **DIM** key connects the RMU brightness control to the tuning knob and the RMU brightness display will appear. The display brilliance is then adjustable using the “TUNE” control knob on the RMU.

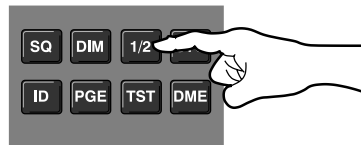
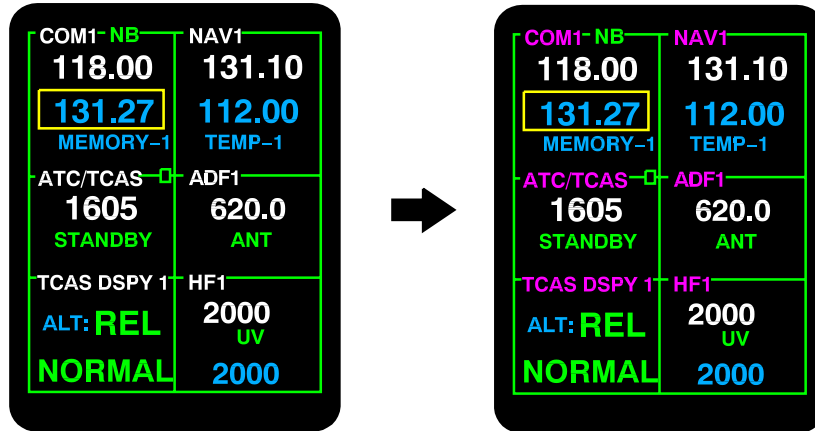


GF0610\_026

**RADIO MANAGEMENT SYSTEM (CONT'D)**

**Function Keys (Cont'd)**


Pressing the cross-side  key, with the cursor in a window (except ATC /TCAS) display transfers the entire RMU operation and display to the cross-side radio system. The legend colour changes from white to magenta when the RMU is displaying and is in control of, data associated with the cross-side system. Pressing the  key with the cursor on the mode line of the ATC-TCAS window and the transponder in other than STANDBY mode allows to switch between transponder 1 and 2.

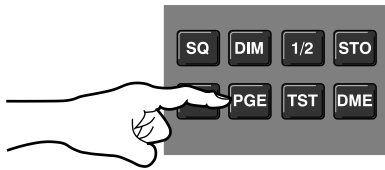
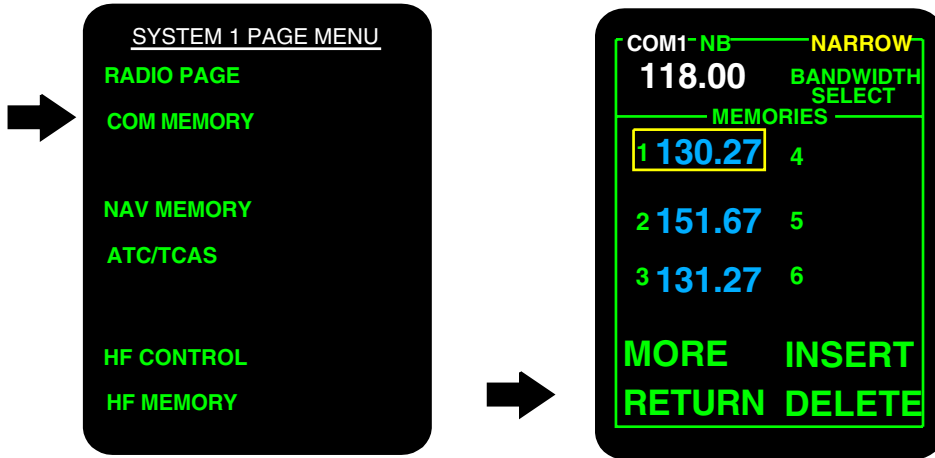


GF0610\_028


RADIO MANAGEMENT SYSTEM (CONT'D)

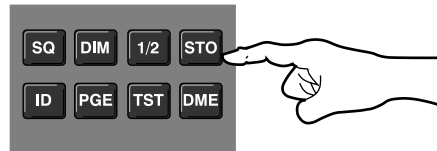
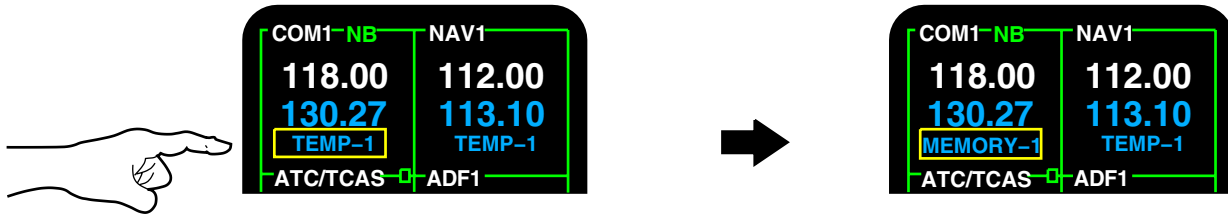
Function Keys (Cont'd)

Pressing the page  key once will change the RMU display to the Menu page. When not on the radio tuning page (main or system page), the RMU assigns a RETURN function to the lower left line select key. Pressing this key returns the display to the radio tuning page.



GF0610\_030

Pressing the store  key results in a temporary (TEMP) COM/NAV preselect frequency to be stored in memory.




GF0610\_032

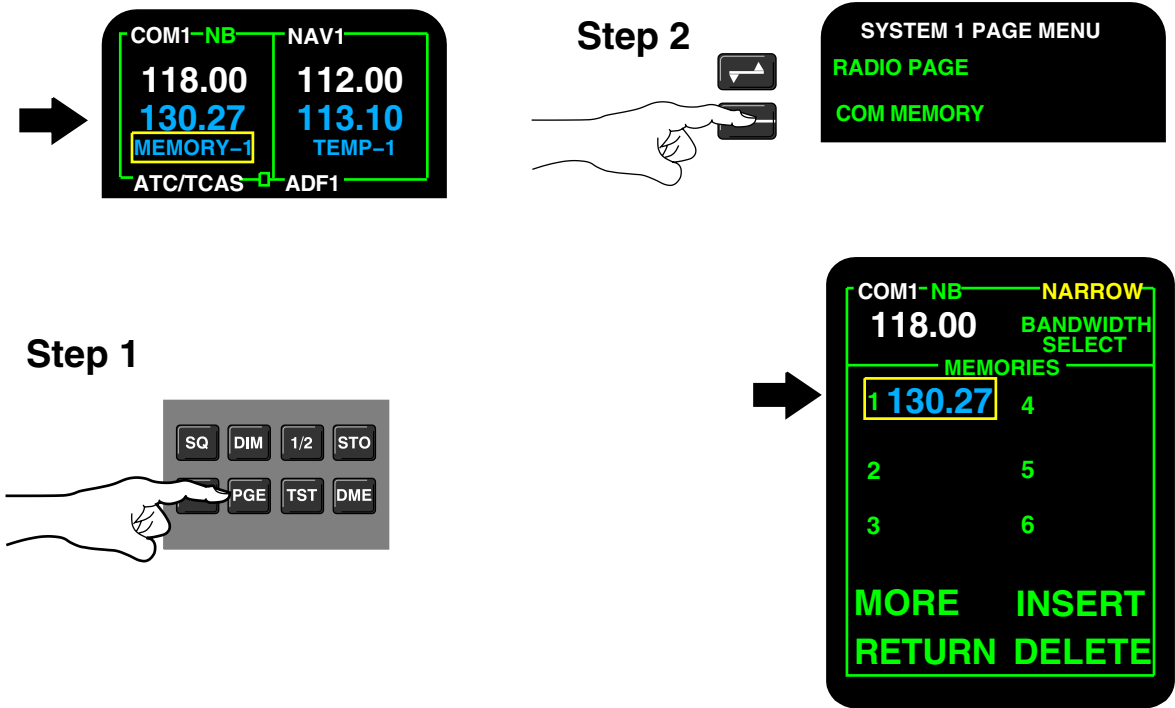
The temporary preselect frequency is assigned a numbered location, provided the cursor has been first placed around that frequency or code.




**RADIO MANAGEMENT SYSTEM (CONT'D)**

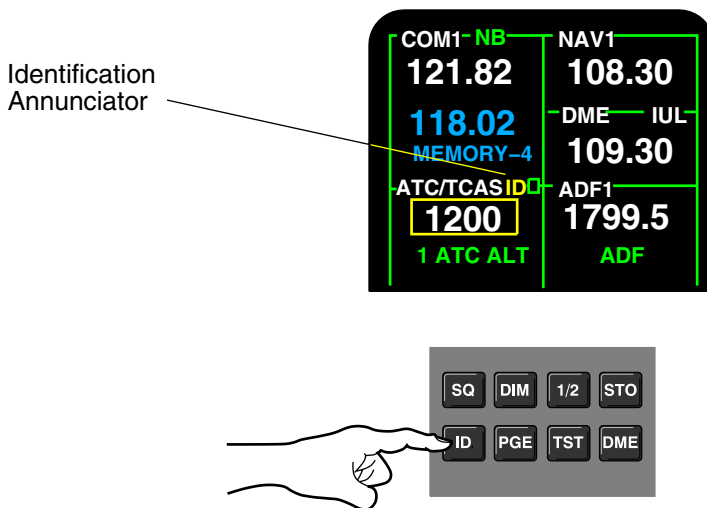
**Function Keys (Cont'd)**

While on the main tuning page, press the  function key once to display the SYSTEM 1 PAGE MENU. Next press the line select key for the COM MEMORY to view the frequency held in memory.



GF0610\_033

Pressing the identification  key places the transponder in the identification response mode. The transponder will go into ident mode for approximately 18 seconds when the ID function key is pushed and an ID annunciator will appear.

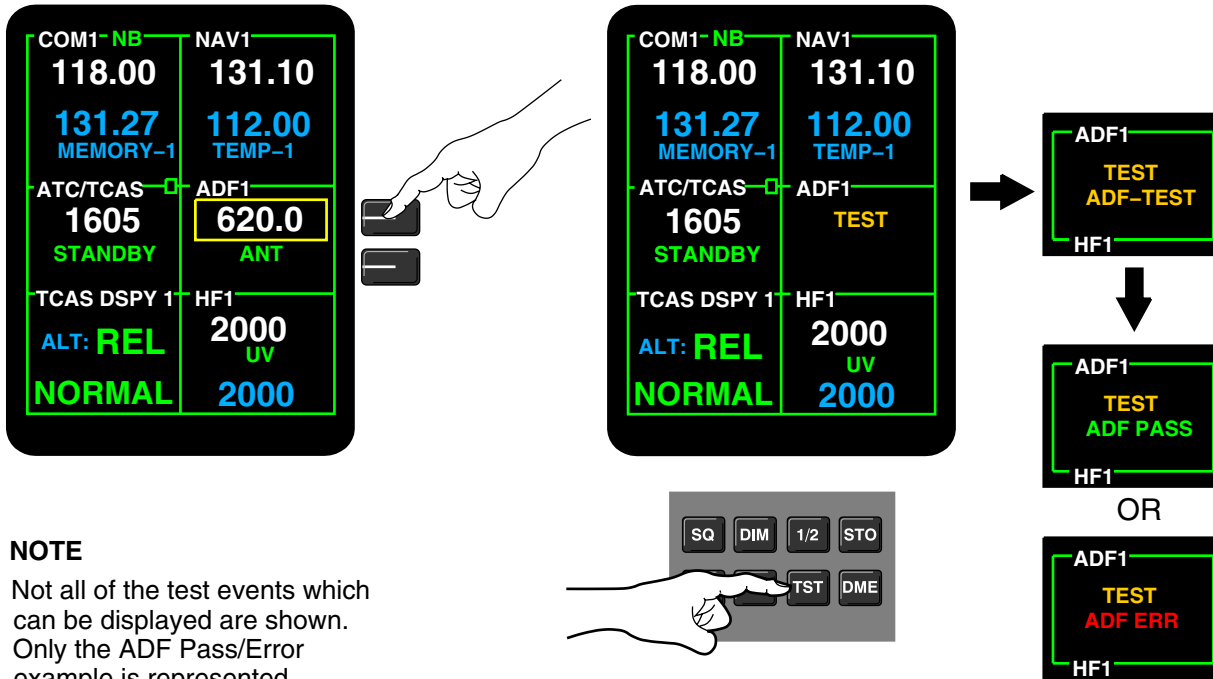


GF0610\_035

RADIO MANAGEMENT SYSTEM (CONT'D)

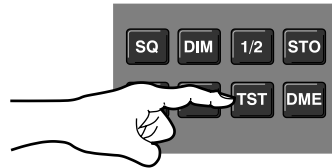
Function Keys (Cont'd)

A self test sequence of any radio is available. Press/hold the **TST** key with the cursor placed around the frequency or code to activate an internal test sequence of the selected system.



NOTE

Not all of the test events which can be displayed are shown. Only the ADF Pass/Error example is represented.



GF0610\_037

The **TST** key must be held down for the duration of the test for approximately:

- 2 seconds for VHF COM and HF COM.
- 5 to 7 seconds for DME, ATC, ADF.
- 20 seconds for NAV (VOR/ILS).
- The TCAS test function is as follows.

After the test is complete, a "PASS" or "ERR" (error) legend will appear in the window.


NOTE

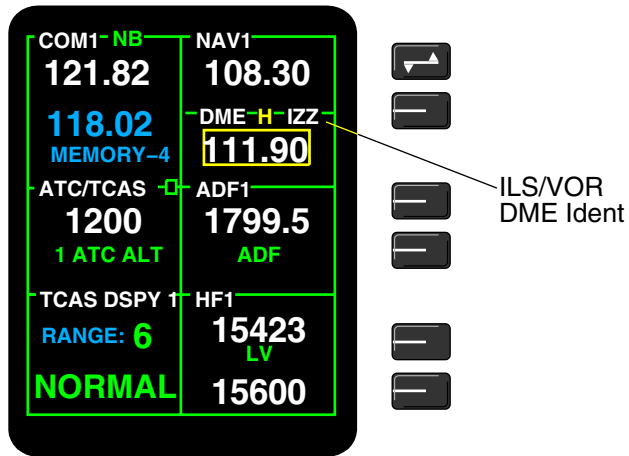
If the **TST** key is held for 30 seconds or more, the radios are automatically commanded back into normal operation.

Releasing the **TST** key at any time, immediately returns the function to normal operation.

**RADIO MANAGEMENT SYSTEM (CONT'D)**

**Function Keys (Cont'd)**

Pressing the  key “de-slaves” the DME from the active VOR frequency, so a different DME channel may be tuned, without changing the active VOR. Successive presses of the “DME” key enables display and selection of the DME channels in VHF and TACAN formats.



**NOTE**

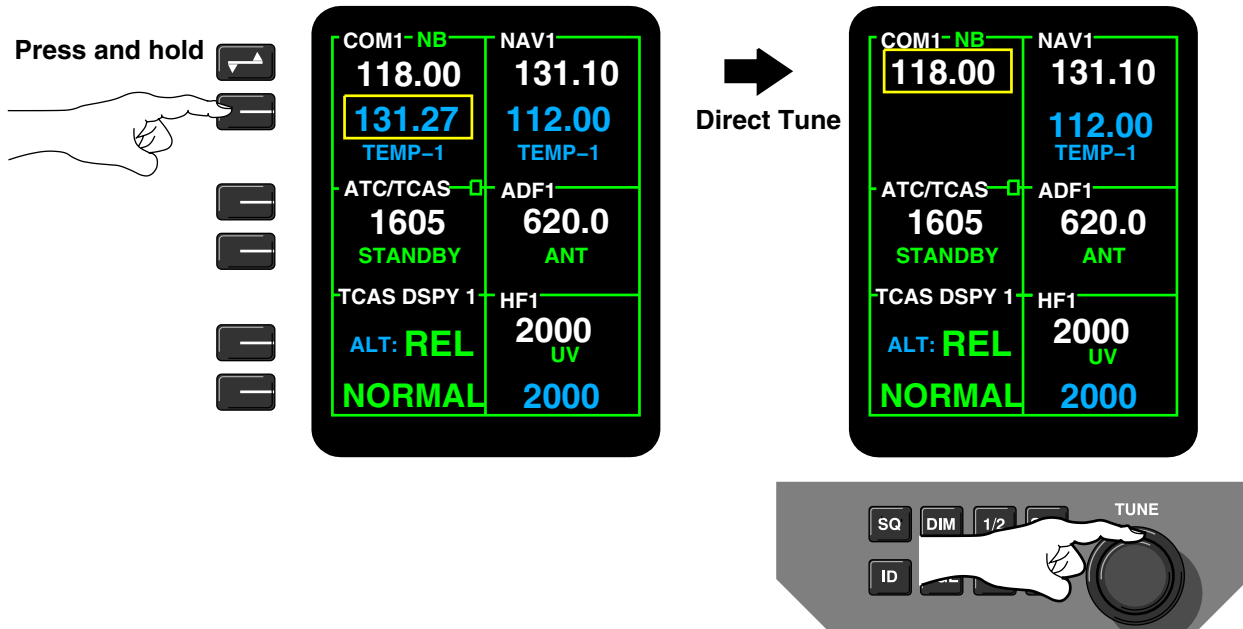
Cycling the DME function button will display the following in sequence:  
VOR/ILS – VOR/ILS and DME – VOR/ILS and TACAN – VOR/ILS

GF0610\_039

**DIRECT COM TUNING**

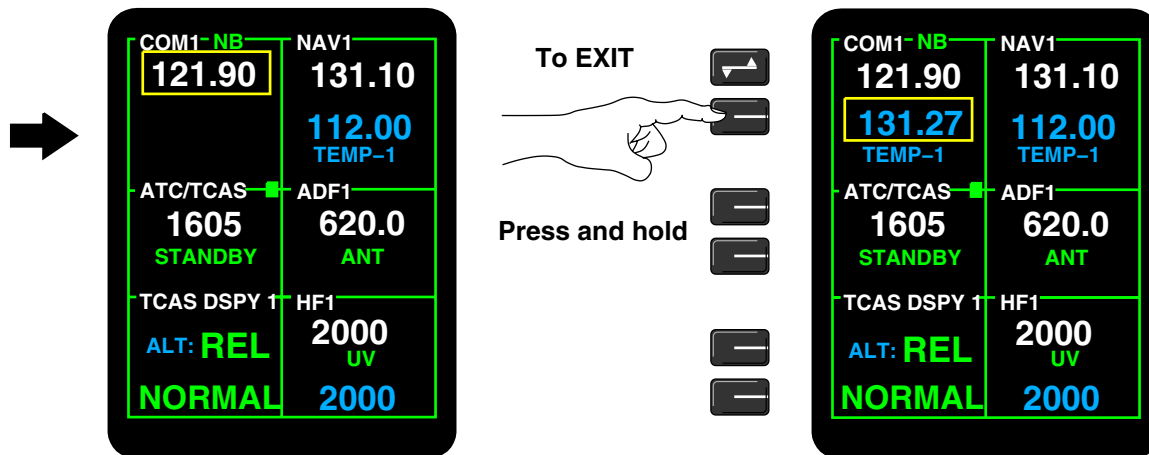
To direct tune the COM, press the line select key beside the preset COM frequency and hold for approximately 3 seconds. The following events will occur:

- The cursor will first move through the TEMP-1 selection.
- The preset window will go blank.
- The cursor will appear at the active frequency allowing direct tuning.



GF0610\_040

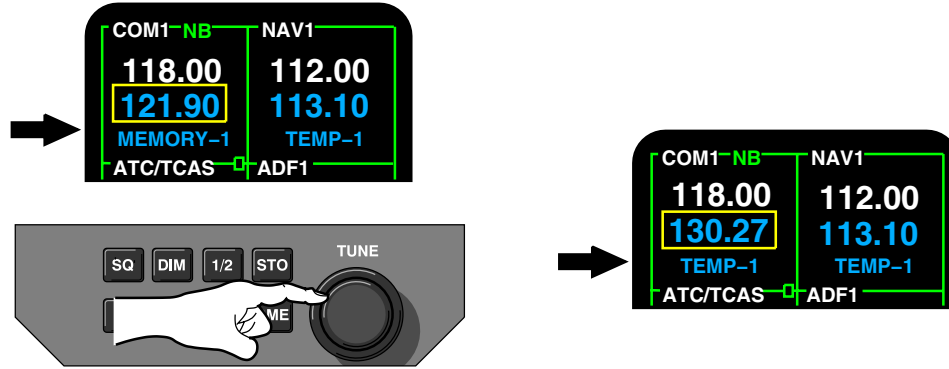
To exit from direct tuning, press the line select key beside the preset COM frequency window and hold until the preset frequency appears.



GF0610\_041

COM MEMORY

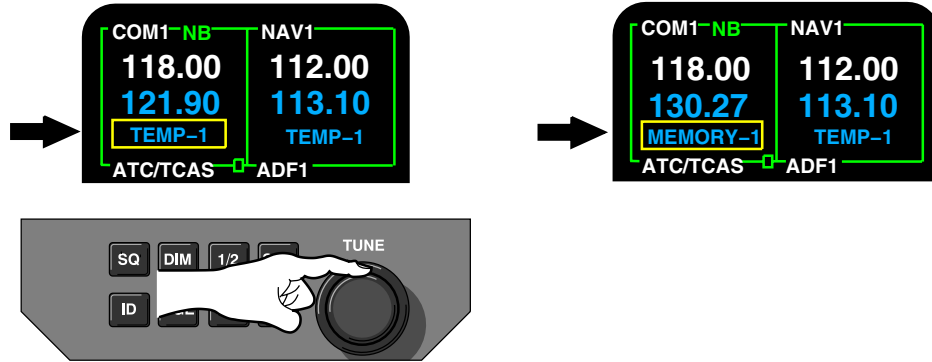
Any of the memory locations displayed inside the cursor can be changed by tuning and storing a new frequency. When the new frequency is tuned, the identifier will change from “MEMORY” to “TEMP”.



GF0610\_042

To recall stored frequencies, select the cursor to the memory location annunciator on the main radio page, by pushing the line select key adjacent to the preset com frequency two times. Rotate the tune control knob to view the frequencies stored (1–12) in memory.

Recall Stored Frequencies



GF0610\_043

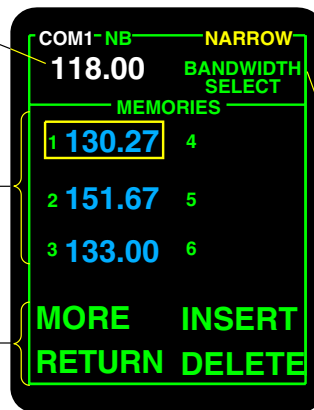
The temporary preselect frequency is assigned a numbered location, provided the cursor has been first placed around the identifier. While on the main tuning page, press the “PGE” function key to go to page menu, then select the com memory page. The COM MEMORY page provides the following:

Comm Memory Page

Active COM Frequency

Memory Location

Selectable from Function Keys



NOTE

Pressing the top right transfer key while on the COM memory page will toggle the receiver bandwidth from narrow to wide or vice versa.

Bandwidth Select Annunciator



GF0610\_044

## HIGH FREQUENCY (HF) COMMUNICATION SYSTEM

The HF communication system is a dual configuration integrated with the radio system on the airplane. The system provides long range air-to-air and air-to-ground communications, operates in the 2.0000 to 29.9999 Mhz range and consists of:

- Two transceivers/antenna couplers.
- One antenna.

The basic radio control functions are:

- HF COM mode and frequency.
- Audio selection and volume control.

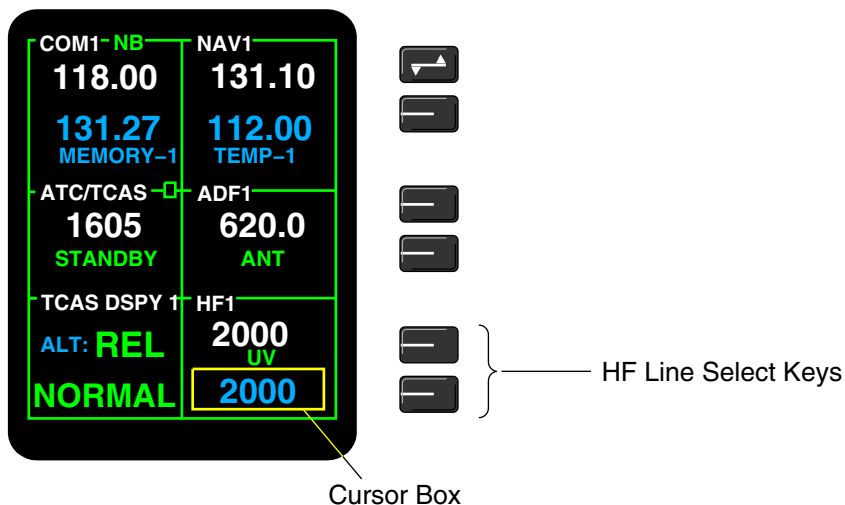
Frequency and mode control of the remotely located HF radios can be input from either the RMUs or the Flight Management System (FMS) CDUs. Both normal Simplex Tuning mode and Emergency Tuning mode are supported by the FMS. The audio control panels provides microphone selection, radio headset/speaker audio selection, volume control and audio control switching.

The HF transceiver units (HF COM 1 and HF COM 2) are located in the Aft Avionics Bay. The HF antenna coupler units are located in the upper Aft Fuselage. The antenna is located in the Vertical Stabilizer (forms the leading edge).

The RMUs are the central control for the HF Communication System, providing complete capability for controlling the operational mode and frequencies. Each RMU has the capability to control operation of its primary (on-side) radio or its secondary (cross-side) radio.

The HF information on each RMU is displayed at the lower right of the radio tuning page. HF emission mode and status are displayed in the HF window. In order to tune a frequency on HF, one of the two line select keys on the lower right side of the RMU is pressed. This selection will place the "cursor tune box" around the frequency to be tuned and using the RMU tuning knobs will accomplish the desired frequency. The HF System can operate in the following modes: Upper Sideband Voice (UV), Lower Sideband Voice (LV), Amplitude Modulation Equivalent (AM) and Continuous Wave (CW).

### RMU HF DISPLAY



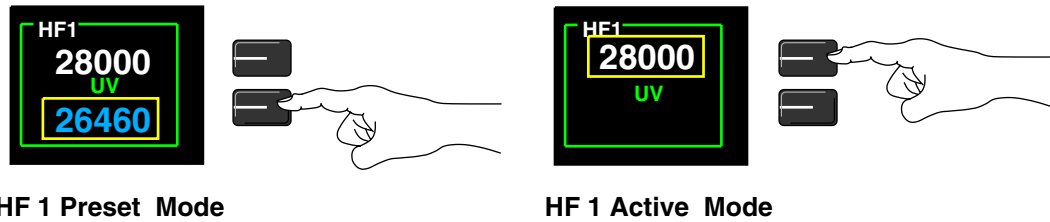
GF0610\_045

### RMU HF DISPLAY (CONT'D)

The RMU HF window is optimized for use with Upper Sideband voice mode. The HF window has two modes of operation: Preset Tune mode and Direct Tune mode. Both the active and preset are displayed when the RMU is in preset tune mode, while only the active frequency is displayed in direct tune mode.

The HF will keep the most recently keyed HF tuned to the antenna for 20 seconds after the push-to-talk key opens. Following 20 seconds the HF reverts to “Dual Receive mode” (neither HF antenna remains tuned to the antenna) providing the squelch is not open.

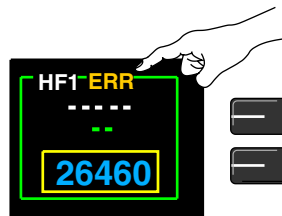
#### HF Preset and Direct Tuning Modes



GF0610\_046

When the coupler is tuning to match the antenna, a steady tone will be heard from the transceiver. If tuning takes longer than six seconds, the tone will begin to beep, signaling that the coupler was not able to tune properly. If this occurs, an “ERR” annunciator is displayed and the frequency data will dash (– – – –) on the RMU HF window. To clear this fault, tune any HF parameter on the RMU. For information on additional message annunciations, refer to the manufacturer pilot handbook on HF communication.

#### HF Fault Annunciation



GF0610\_047

HF communication control and status are accessed and/or displayed on “back” pages of the RMU. These pages are accessed via RMU “PAGE MENU” page:

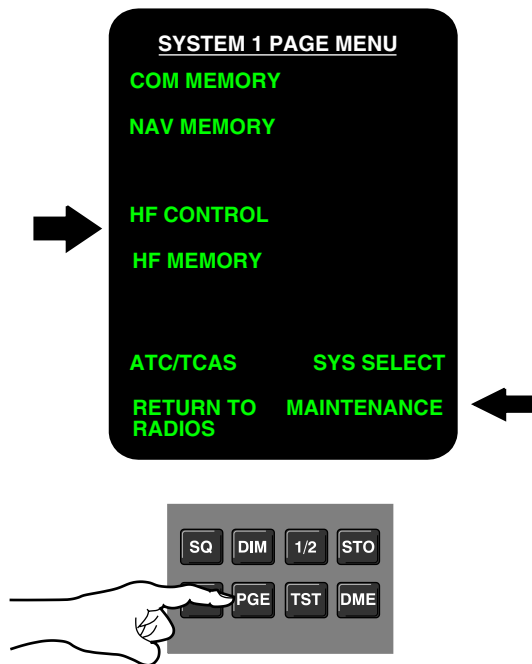
- HF Control Page.
- HF Memory Page.
- Maintenance Log.

## RMU HF DISPLAY (CONT'D)

### Menu Page

The menu page is accessed from the radio tuning page by pressing the “PAGE” function key on the front face of the RMU. All stored frequencies are displayed and there are six memory locations on the first page and an additional six available on the second page.

The HF Maintenance Log provides the maintenance log for on-side HF radio operation. The Maintenance page is a ground maintenance function and will not be covered in this manual.



GF0610\_048

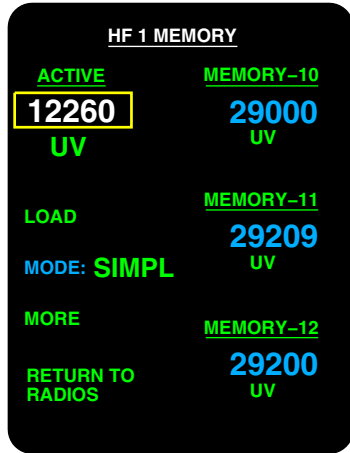


RMU HF DISPLAY (CONT'D)

HF Memory and Control Pages

The HF Control page provides active and preset channel tuning, emission mode control, memory channel recall/store, HF status, squelch level tuning and transmitter power level tuning.

The HF Memory page provides active channel tuning, memory channel tuning and HF status.



HF 1 MEMORY Page



HF 1 CONTROL Page

GF0610\_049

## SELCAL

The Selective Calling System (SELCAL) monitors the ground stations for a four letter tone code that is transmitted to the airplane on the VHF or HF communication systems. When the SELCAL receives the code, it sends a visual and aural message to alert the flight crew.

The SELCAL decoder unit located in the forward avionics equipment bay, has five audio input channels used to monitor the audio output from:

- VHF COM 1.
- VHF COM 2.
- VHF COM 3 (On airplanes with SB 700-23-002 incorporated).
- HF COM 1.
- HF COM 2.

The SELCAL interfaces with the audio integrating system (audio control panels), flight compartment speakers and EICAS. Each airplane is assigned its own SELCAL code at the time of installation. Upon receiving the code for which it was programmed, the SELCAL will signal the audio integrating and EICAS systems that a call has been received.

### Operation

The VHF and/or HF communication systems are tuned to a SELCAL frequency that has been assigned to a ground station.

When a ground station wants to talk to the flight crew, the ground station sends a SELCAL code on the assigned frequency. The SELCAL unit monitors the VHF and HF communication systems audio output channels.

When a SELCAL signal is received, the decoder checks the signal tones for the correct frequency, sequence, amplitude, and duration.



GF0610\_050

If all the parameters are met, a SELCAL HF or VHF advisory message will be displayed on EICAS and the audio integrating system will command an aural message “SELCAL, SELCAL” in the flight compartment speakers and headsets.

The pilot selects the respective VHF or HF system on the audio panel and when the Push-To-Talk (PTT) switch is pushed, the EICAS message is cancelled.

**RADIO ALTIMETER**

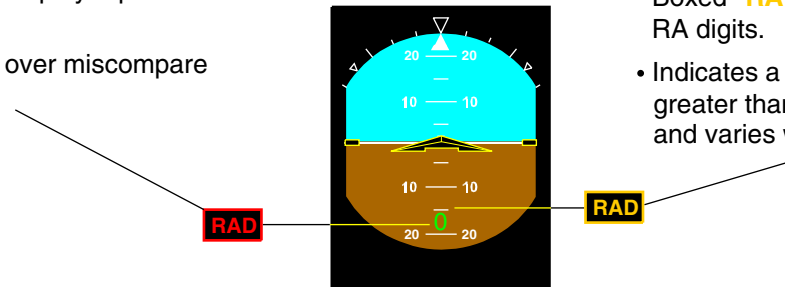
The Radio Altimeter (RA) system provides airplane altitude above the terrain up to +2550 feet. The RA system is comprised of two RA transceivers, each connected to two separate antennas. The antennas are identical and dedicated, one for transmitting and the other for receiving. The antennas are positioned on the bottom centerline of the fuselage to minimize performance degradation in turns and prior to landing while in the flare on landing.

**Radio Altitude Failure**

- Boxed "RAD" display replaces RA digits.
- Takes priority over miscompare annunciation.

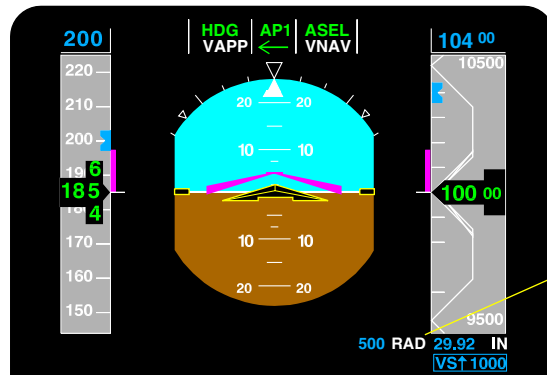
**Radio Altitude Miscompare**

- Boxed "RAD" display above RA digits.
- Indicates a miscompare of greater than 10 feet on ground and varies with altitude in flight.



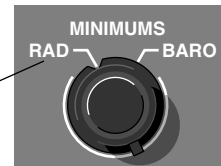
GF0610\_051

The altitude above the terrain indication for approach and landing phases of operation is displayed on the Primary Flight Display (PFD).



**MINIMUMS Outer Knob**

**RAD** – Sets the Decision Height (DH) value on PFD.



GF0610\_052

The Decision Height (DH) is displayed on the PFD when the minimums on the PFD controller is set to RAD.

The following systems receive RA information:

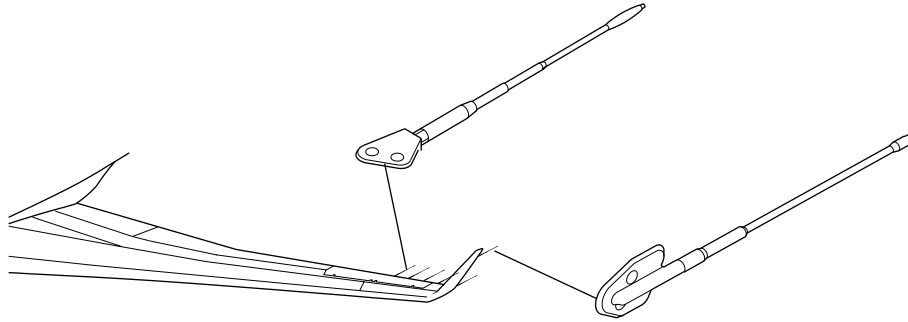
- TCAS.
- EGPWS.
- FCUs.
- DAUs (to display processors for PFD displays).

Refer to FLIGHT INSTRUMENTS Chapter 11, for additional information on RA indications.

## I STATIC DISCHARGER

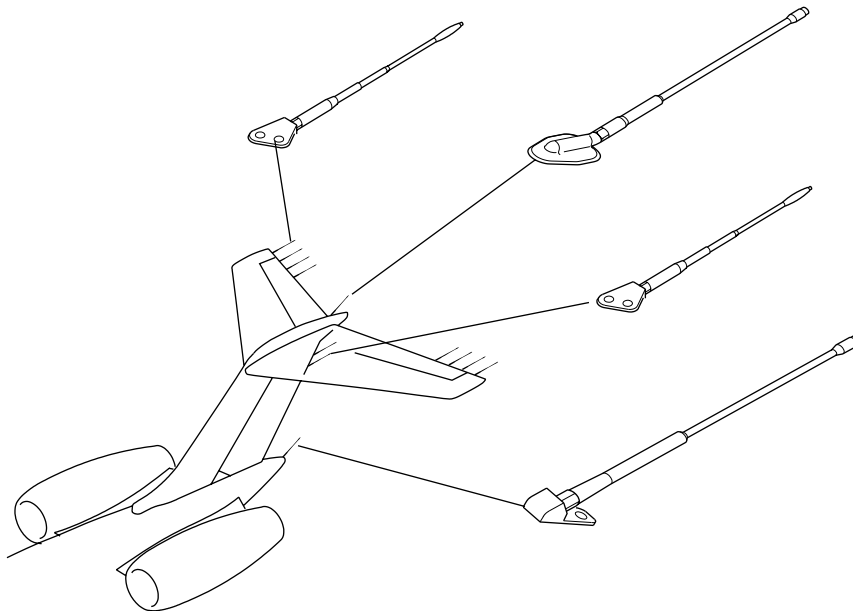
The airplane wings and tail sections contain static wicks installed to discharge static electricity, reducing radio interference. They are installed at the following locations:

- Winglets/wingtips and ailerons.
- Elevators, rudder, vertical stabilizer, horizontal stabilizer and tail cone.



GF0610\_053

There are two parts to each static discharge assembly: the static discharger and the mounting base. If any are found missing during the walkaround, refer to the configuration deviation list of the AFM to verify if you can dispatch.



GF0610\_054

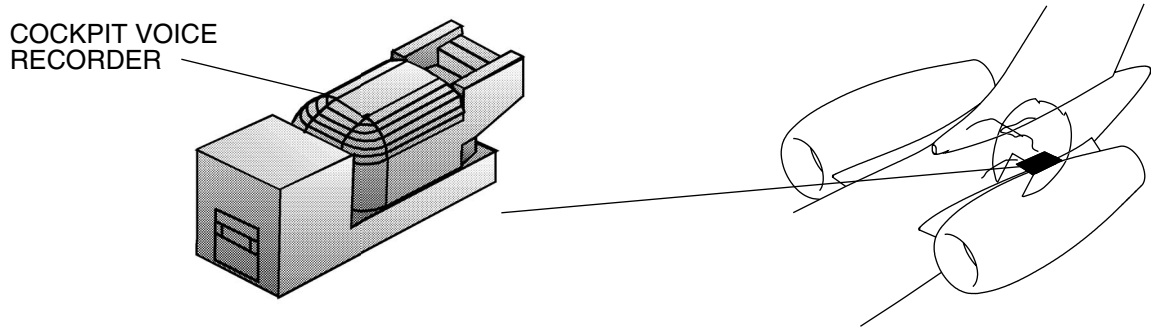
**COCKPIT VOICE RECORDER**

The Cockpit Voice Recorder (CVR) is a crash survivable recording device that simultaneously records four channels of audio data representing the cockpit acoustic environment. The system consists of:

- CVR.
- Microphone monitor/control panel.
- Remote area microphone.
- Impact switch.

**CVR LOCATION**

The CVR retains the most recent two hours of recorded information in memory. Input is received from each audio control panel and CVR area microphone. The CVR also receives digital data (GMT time) from DAU #4 to synchronize the CVR with the flight data recorder.



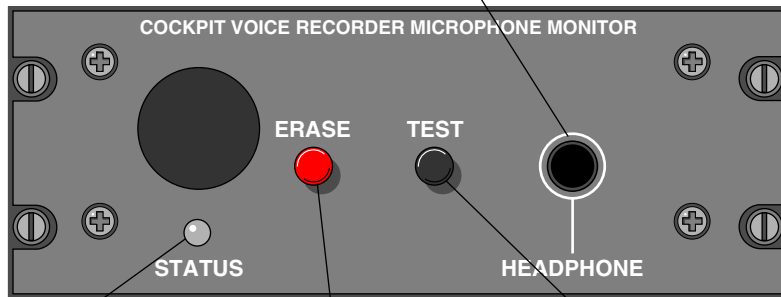
GF0610\_055

The CVR is mounted in the aft equipment bay. The microphone monitor/control panel is located in the flight compartment right side panel.

**MICROPHONE MONITOR CONTROL PANEL**

**HEADSET Monitor Jack**

- Used to monitor tone transmissions during test and audio signals currently being recorded.



- STATUS Display**
- Illuminates as a function of test and/or failure.

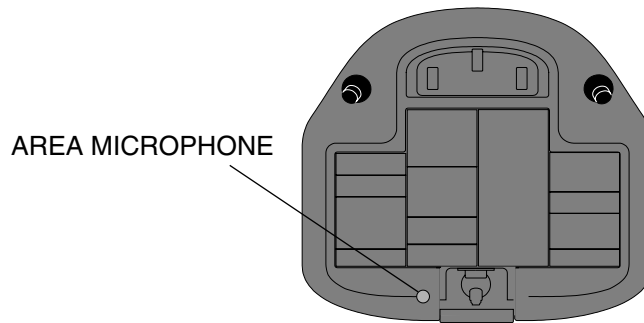
- ERASE Push button**
- Pushing the ERASE push button initiates a memory erase sequence within the CVR.

- TEST Push button**
- Pushing the test button will activate the CVR internal self-test.

GF0610\_056

**REMOTE AREA MICROPHONE**

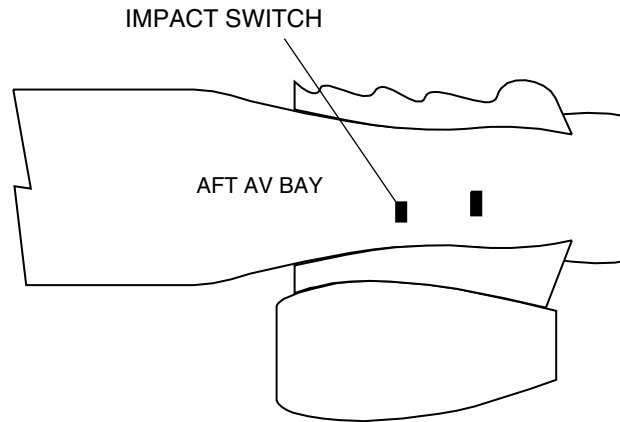
An area microphone is mounted in the flight compartment overhead panel.



GF0610\_057

**IMPACT SWITCH**

The impact switch mounted in the aft avionics bay removes electrical power to the CVR when the airplane experiences an impact.



GF0610\_058

**Audio Control Panel Input**

The audio panels provide audio inputs to the CVR for recording flight crew voice communications and other flight compartment audio signals.

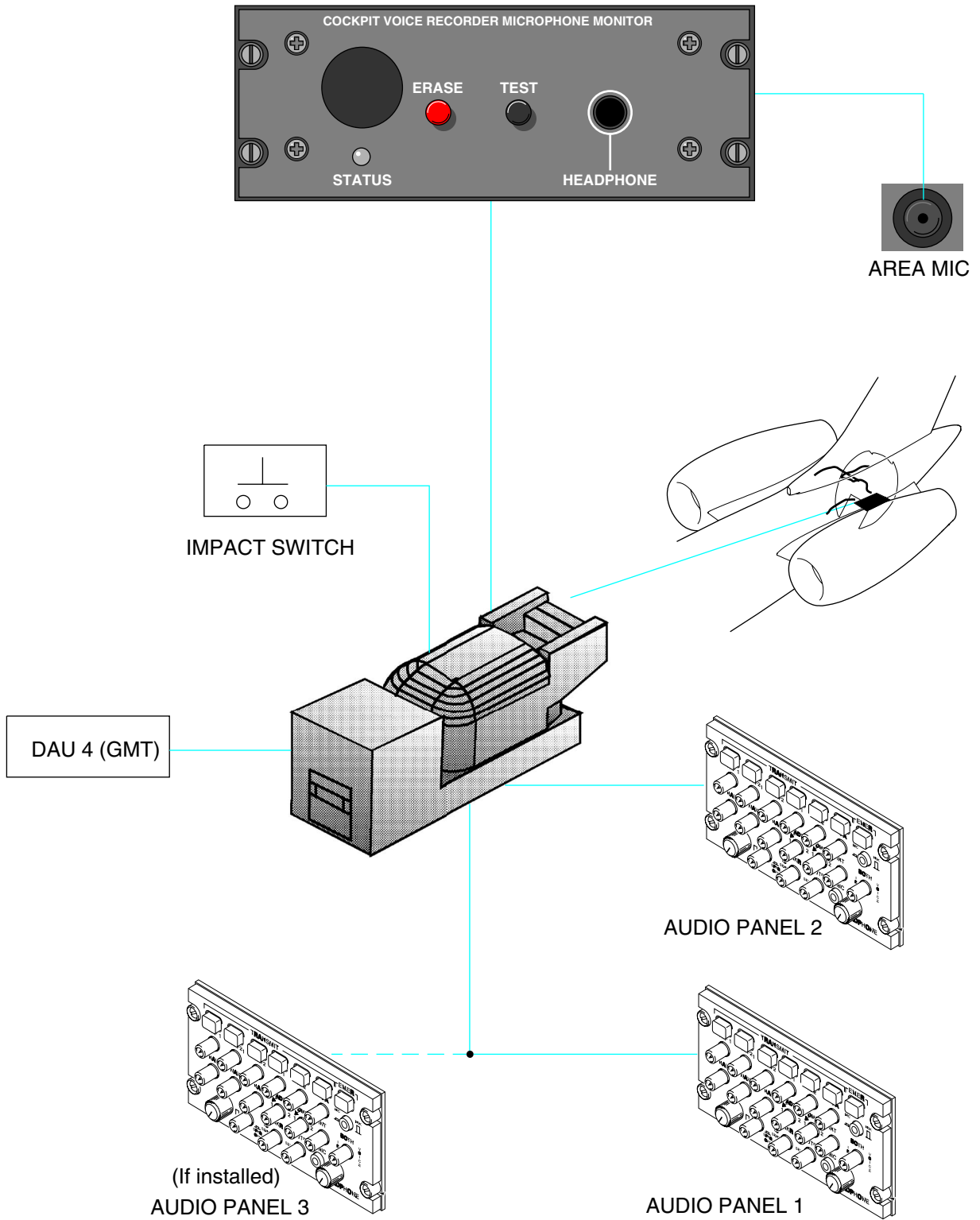


**Audio Control Panel**

GF0610\_059

The various audio signals are summed together in the audio panels to form a single audio input to the CVR from each audio panel.

CVR SYSTEM SCHEMATIC

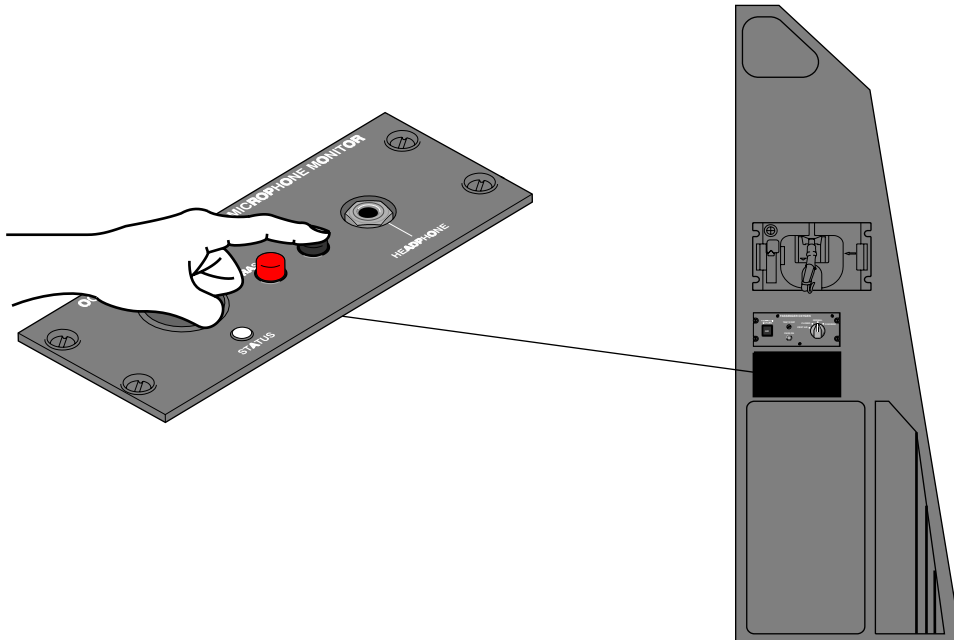


GF0610\_060

### MICROPHONE MONITOR CONTROL PANEL TEST

The cockpit voice recorder microphone monitor panel “TEST”, “STATUS” and “ERASE” functions are as follows:

- TEST – Push and hold the “TEST” push-button for approximately one second to activate the CVR internal self-test.

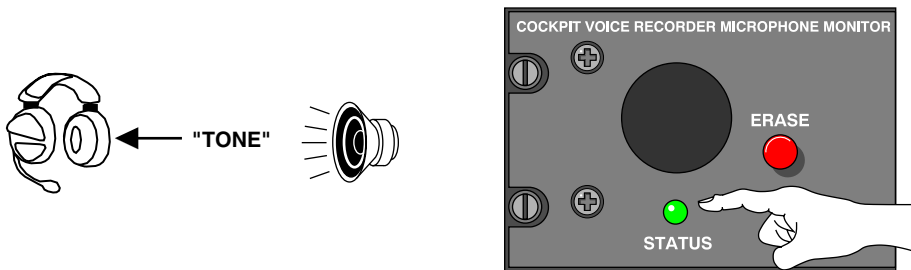


GF0610\_061

A successful test will result in the green “STATUS” LED illuminating for one second and a two second aural tone will be heard using the headphone.

#### NOTE

If a failure occurs during the self test, the green “STATUS” LED will illuminate continuously and no aural tone will be heard.



GF0610\_062

- STATUS – The operation of the green “STATUS” LED is described above under the “TEST” function.
- ERASE – The “ERASE” push-button is used to initiate a memory erase sequence within the CVR. The CVR logic ensures that the “ERASE” function is only enabled when the airplane is on the ground (WOW) and the parking brake set.



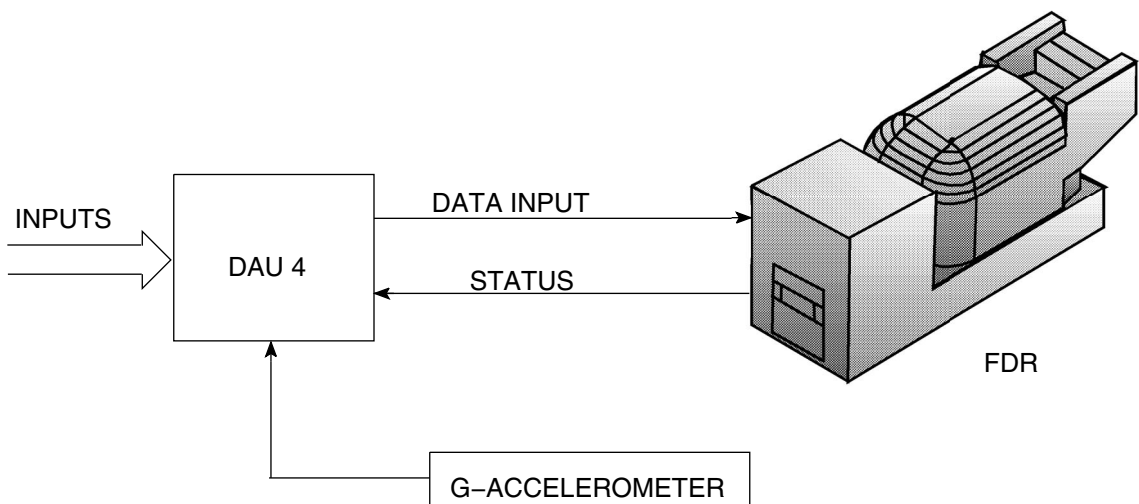
### FLIGHT DATA RECORDER

The Flight Data Recorder (FDR) is a crash survivable data recorder capable of retaining up to 25 hours of airplane parameters/flight data. The FDR system consists of:

- Solid state flight data recorder.
- High-G accelerometer.

The High-G accelerometer is mounted in the airplane landing gear bay and provides the normal acceleration data for the FDR system.

The DAU 4 receives airplane parameters/flight data from various systems and normal acceleration input from a dedicated accelerometer. The FDR receives its systems information from DAU 4 and sends status information back to the DAU 4. A FDR self-test is performed on airplane power-up and if a failure is detected at any time (including self-test), an advisory message will be displayed on EICAS.



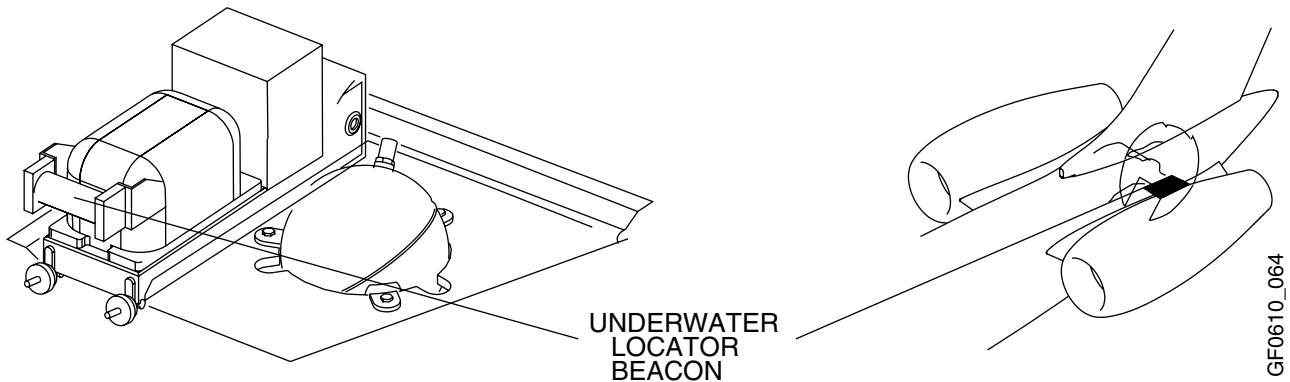
GF0610\_063

### ■ QUICK ACCESS RECORDER (IF INSTALLED)

The optional Quick Access Recorder (QAR) is an independent flight data recording device that records the same data as the FDR. The QAR can retain up to 750 hours of airplane parameters/flight data. If a QAR failure occurs, the FDR FAIL message will be displayed on EICAS.

## UNDERWATER LOCATOR BEACON

An Underwater Locator Beacon (ULB) is attached to the CVR as part of the handle to help locate it in the event of a crash.



The ULBs operating frequency is 37.5 KHz and will operate for 30 days.

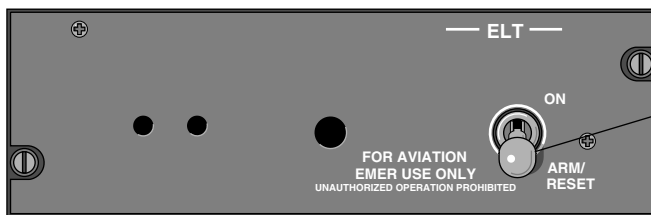
## EMERGENCY LOCATOR TRANSMITTER (IF INSTALLED)

The Emergency Locator Transmitter (ELT) is an optional system and consists of:

- ELT switch.
- Emergency locator transmitter.
- ELT antenna.

A flight compartment switch located on the overhead panel provides “ON” and “ARM” modes of operation. The switch can be used to manually activate the ELT for test purposes or emergency situations.

## LIGHT SENSOR - ELT PANEL



LIGHT SENSOR – ELT (OPTIONAL) PANEL

### ELT Switch

- **ON** – When selected the ELT will begin to transmit.
- **ARM/RESET** – Normal position selected to arm the system for automatic activation.

### NOTE

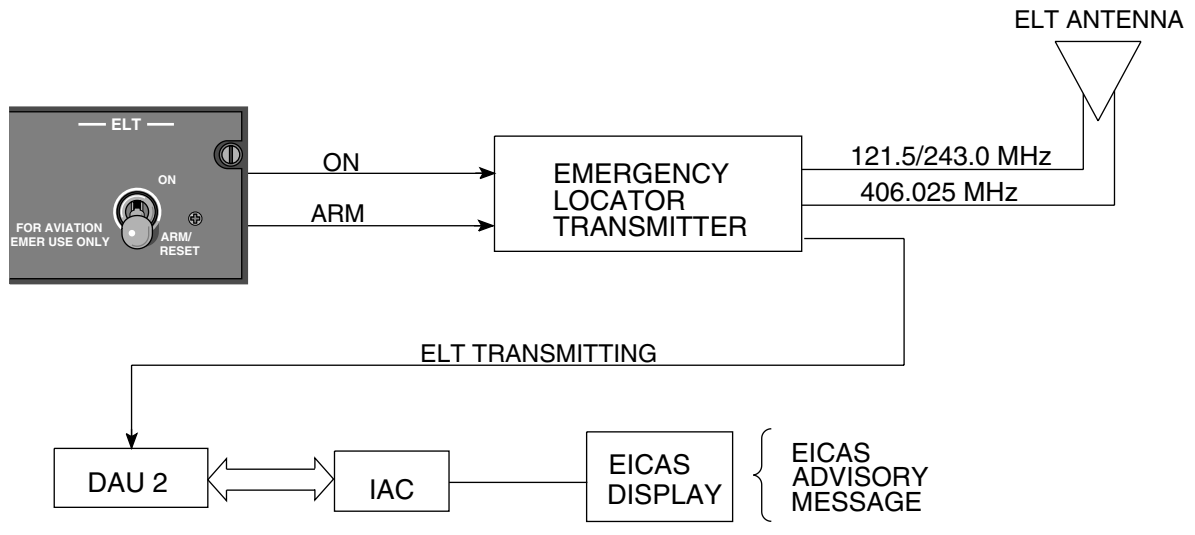
If the system is accidentally activated, the unit can be reset by placing the switch to ON, then back to ARM/RESET.

GF0610\_065

**LIGHT SENSOR - ELT PANEL (CONT'D)**

The ELT transmits signals on 121.5, 243.0 and optional 406.025 MHz. The 406.025 MHz may be installed as part of the ELT and its signal is transmitted for satellite relay. Upon activation, the 121.5, 243.0 signals operate continuously until the self contained battery pack power is exhausted (typically last at least 72 hours) or the unit is reset. If the optional 406 MHz transmitter module is installed, the output signal is transmitted for 24 hours (once every 47 seconds) then automatically shuts off. The 121.5, 243.0 signals are shut off while the 406 MHz signal is transmitting.

**ELT SCHEMATIC**



An internally mounted “G” switch is triggered on impact and activates the ELT. The ELT antenna is mounted on the top aft exterior of the airplane and interfaces with all signal outputs. When the ELT is transmitting, a signal is sent to the transmitter to DAU 2. This signal used by the DAU provides an ELT transmitting advisory message to EICAS.

**AIRBORNE DATA LINK SYSTEM (IF INSTALLED)**

Data link operation is via the third VHF comm, UHF (telephony) or SATCOM and controllable from all FMS CDUs. The system utilizes the same data loading unit as the FMS with printer interface, air-ground-air and air-to-air capabilities. Crew advisory messages are displayed on the CDU scratch pad.

**Communication Links**

**Third VHF COMM (On airplanes with SB 700-23-002 incorporated)** – Using the SYSTEM SELECT page on the RMU, the pilot can select COM 3 MODE to be VOICE or DATA. When DATA is selected, the data link is in control of the radio; data frequency is selectable only through the data link.

**SATCOM** – Automated to this link as required (VHF or UHF not available). Pilot selectable if desired.

**UHF (Telephony)** – Available through the Cabin Communication System. Weather maps (graphical weather) could be routed to the airplane via this medium.

**Data Link Features**

## Flight Planning

- Requests flight plans from service provider.
- Reports current flight plan to service provider.

## Enroute Winds Aloft

- Request winds aloft for flight plan.
- Report current wind at present position.

## Position Reporting (ICAO format)

- Send crew initiated position report.
- Automatically send position report.

## Pre-flight Data Request

- ATIS, terminal weather, departure clearance and oceanic clearance.

## In flight Communication

- 000I reports, ETA update, diversion, fuel update, flight delay and airplane problem report.

## Messages

- Send message, messages received.

## Text Weather

- Terminal, Sigmets and Pireps.

## Graphical Weather Maps

- Composite, significant, tops/movement, depiction, satellite and winds/temp aloft.

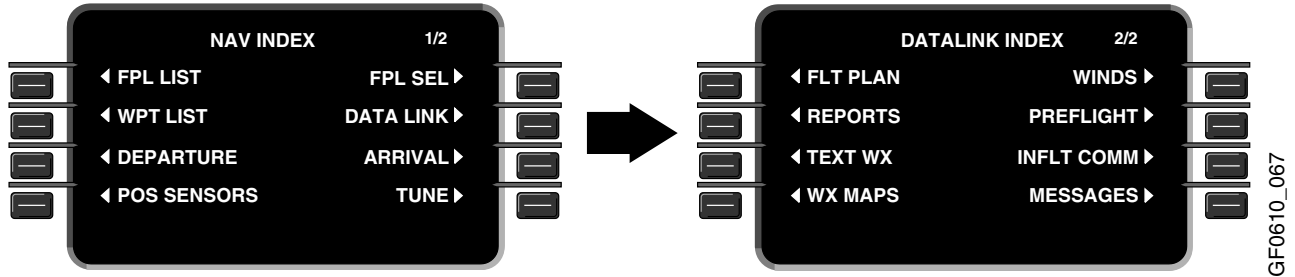
## Configure Data Link System

- VHF, SATCOM, telephony, display telelink configuration, discretes configuration, ARINC ports/devices configuration and display telelink faults.

**AIRBORNE DATA LINK SYSTEM (IF INSTALLED) (CONT'D)**

**Data Link Features (Cont'd)**

The crew can access the DATALINK INDEX PAGE from the NAV INDEX page of the flight management system.



For additional system description and operation, refer to the applicable manufacture handbook.

**SATCOM (IF INSTALLED)**

The optional multi-channel Satellite Communications (SATCOM) System is provided for worldwide voice and data communications over L- band frequencies.

The SATCOM system interfaces with a dedicated antenna sub-system to provide satellite communications. A minimum of three satellite communications channels are required: two voice channels and one data channel. One voice channel is dedicated to the flight compartment and another voice channel is dedicated to the Office In The Sky (OITS) telephone. The data channel is assigned for either the Airborne Flight Information System (AFIS) or the OITS facsimile or modem.

- The factory option consists of a multi-channel SATCOM system and antenna. Components include:
  - Satellite data unit (forward avionics bay).
  - High power amplifier (vertical stabilizer).
  - Radio frequency unit (forward avionics bay).
  - High gain antenna (top of vertical stabilizer).
  - Cabin communication system interface via handset.
  - IRS.
  - Airborne data link system.
  - Maintenance system through CAIMS.
  - PC data and FAX capability.

**Satellite Data Unit (SDU)**

Provides interface to all airplane avionics and contains the location of the applicable satellites and rate/frequency translation for two voice communication.

**Radio Frequency Unit (RFU)**

The RFU provides three additional simultaneous voice communication channels when operated in conjunction with the SDU.

**High Power Amplifier (HPA)**

The HPA provides rate/frequency power amplification on the L band signals generated by the satellite data unit or radio frequency unit to a power level required for transmission to the satellite.

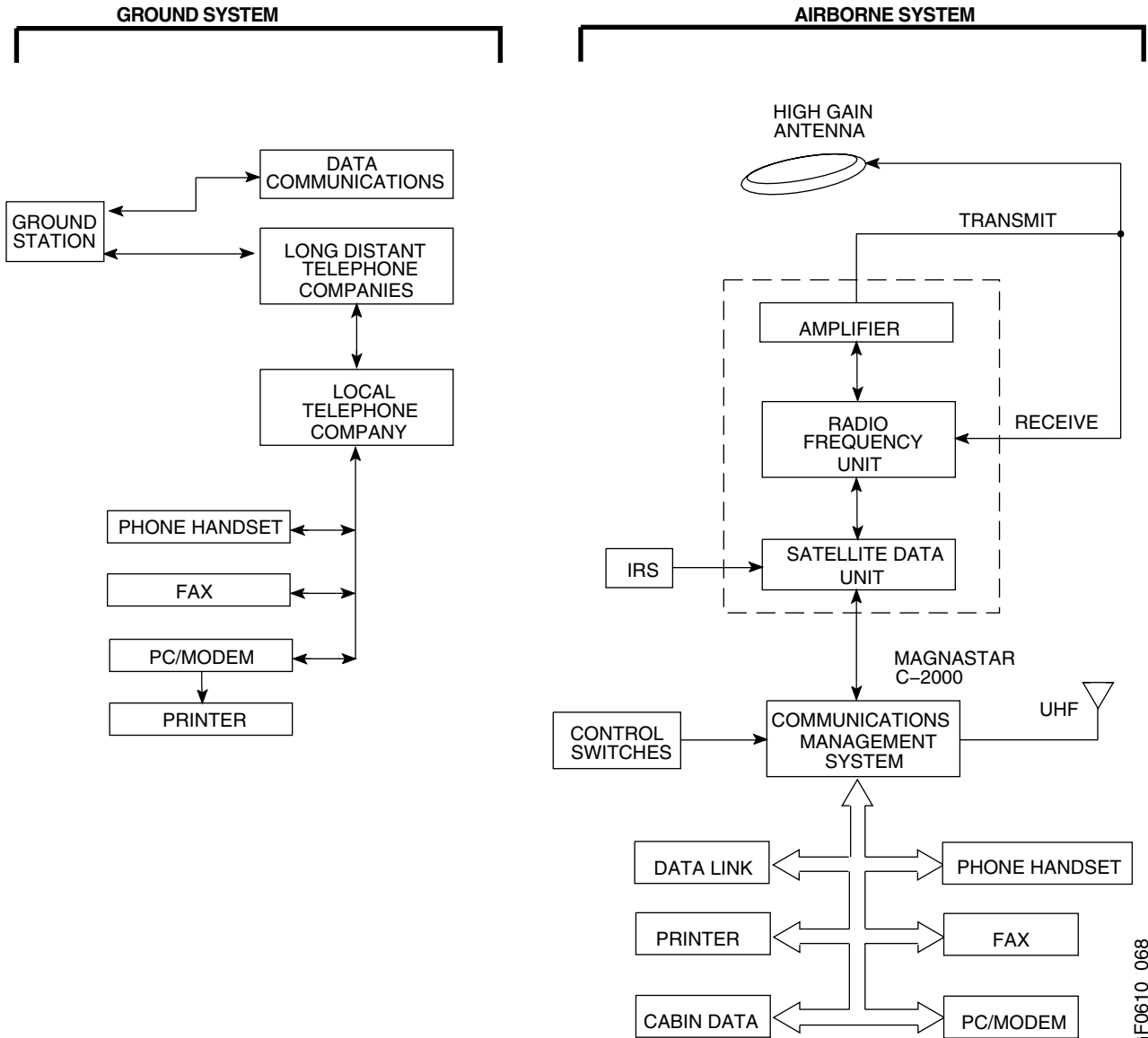
**SATCOM (IF INSTALLED) (CONT'D)**

**High Gain Antenna/Antenna Control Unit**

The antenna is steered by the antenna control unit to point a high gain beam in the direction of the desired satellite.

COMMUNICATION LINK SCHEMATIC

The following schematic depicts the interface between the various components as related to the MCS-6000, minus buyer furnished equipment. Example: PC data provision, FAX and analog phones.

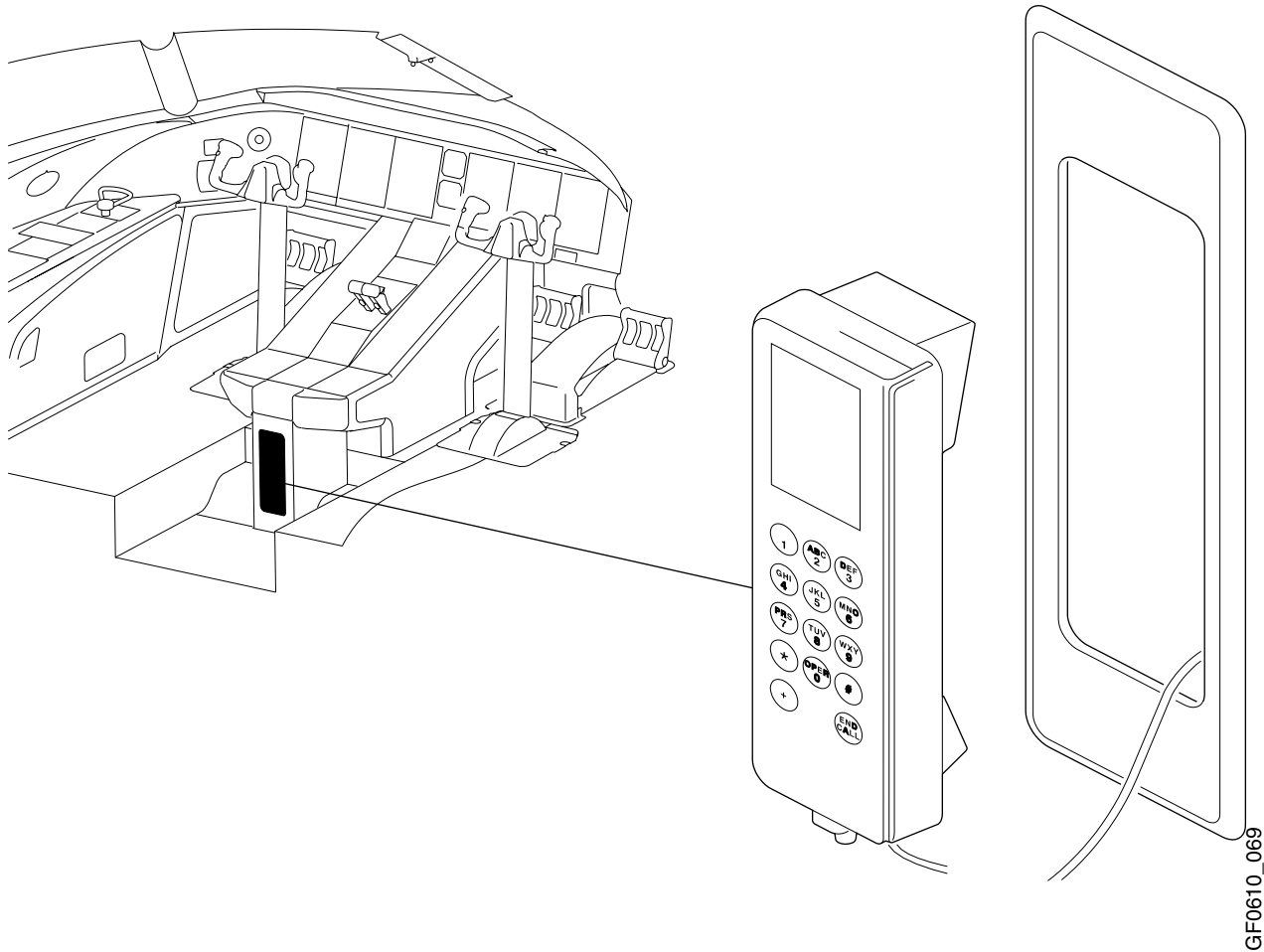


GF0610\_068

**CABIN COMMUNICATION SYSTEM (IF INSTALLED)**

The Cabin Communication System (CCS) option provides a private automatic branch exchange switching network. This network routes voice and data communications to and from up to nine active devices (handsets/FAXs/modems/data link etc.) in the airplane and provides two air-to-ground channels. The systems includes connections of basic telephone/telecomputing equipment to UHF antenna and SATCOM links. In the event a data link device is installed on the airplane, the CCS has the capability to communicate with the data link device using an internal modem.

The digital radio components consist of: one UHF antenna, duplexer and one airborne radio telecommunication unit. The CCS plus all customer supplied handsets/FAXs/Modems is known as the Office-In-The-Sky (OITS).



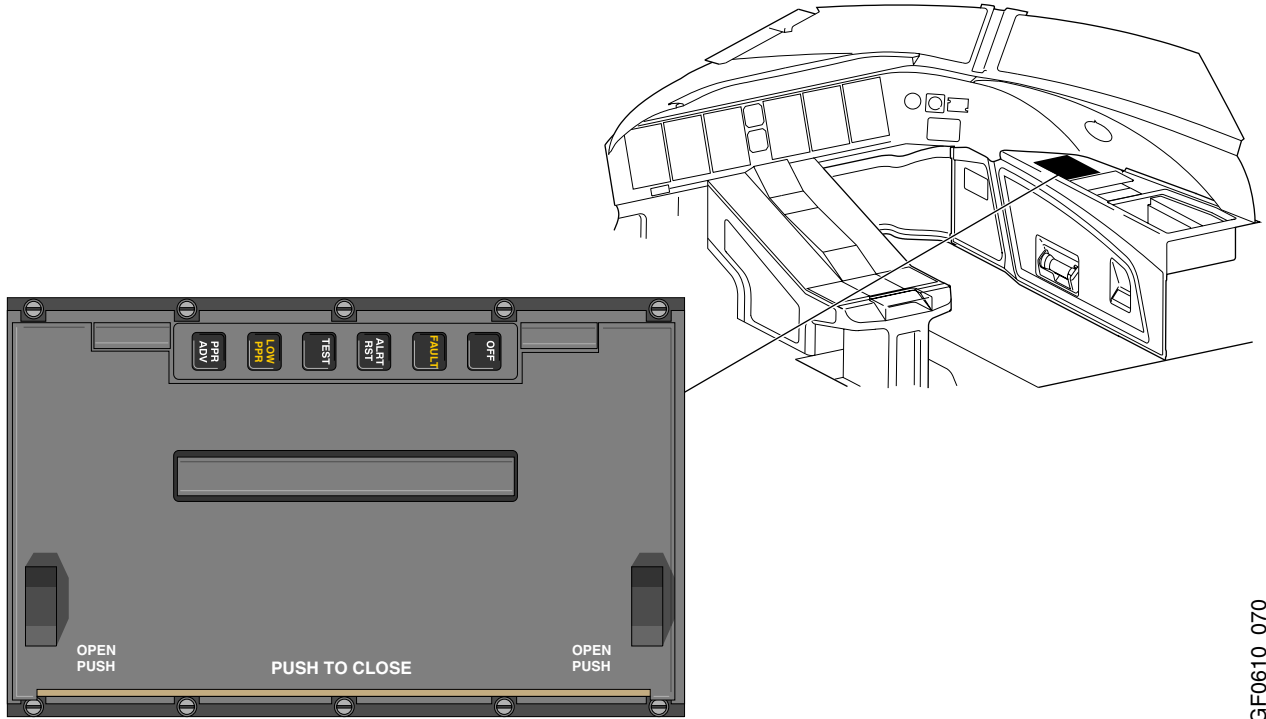
The digital handset is located in the flight compartment and has a backlit LCD display and telephone style keypad used to dial calls and select various options. A credit card reader (for optional billing) is built into the handset and a two-button increase/decrease volume control (side of handset) is also installed.

Refer to the Magnastar C-2000 user guide CA1030 for description/function and operation of the system.



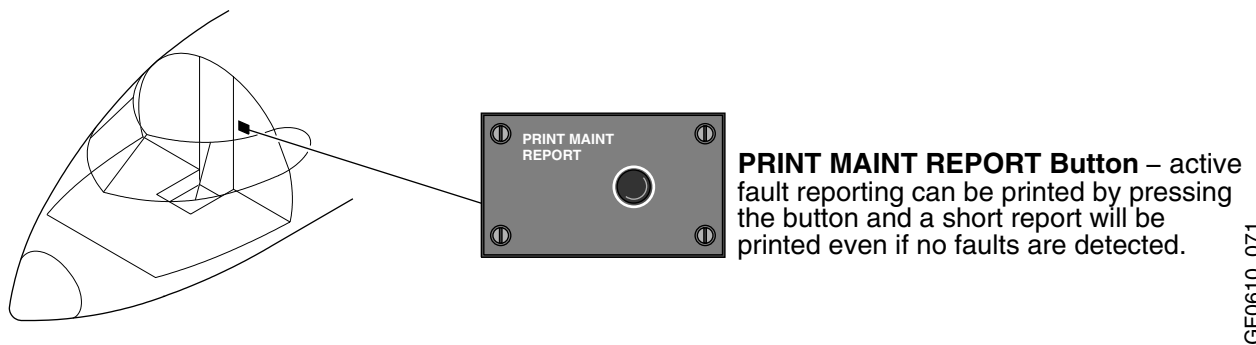
**FLIGHT COMPARTMENT PRINTER (IF INSTALLED)**

The optional flight compartment printer is installed in the copilot's side console. The printer has ARINC 429 and standard PC interfaces and is capable of full format and graphic printing of information from CAIMS and DATALINK.



GF0610\_070

The printer can be used to print selected messages and weather data sent to it via the Airborne Data Link System (ADLS). The printer is also used by the Central Aircraft Information Maintenance System (CAIMS) to print out certain maintenance fault and status information. This is accomplished via the Portable Maintenance Access Terminal (PMAT).



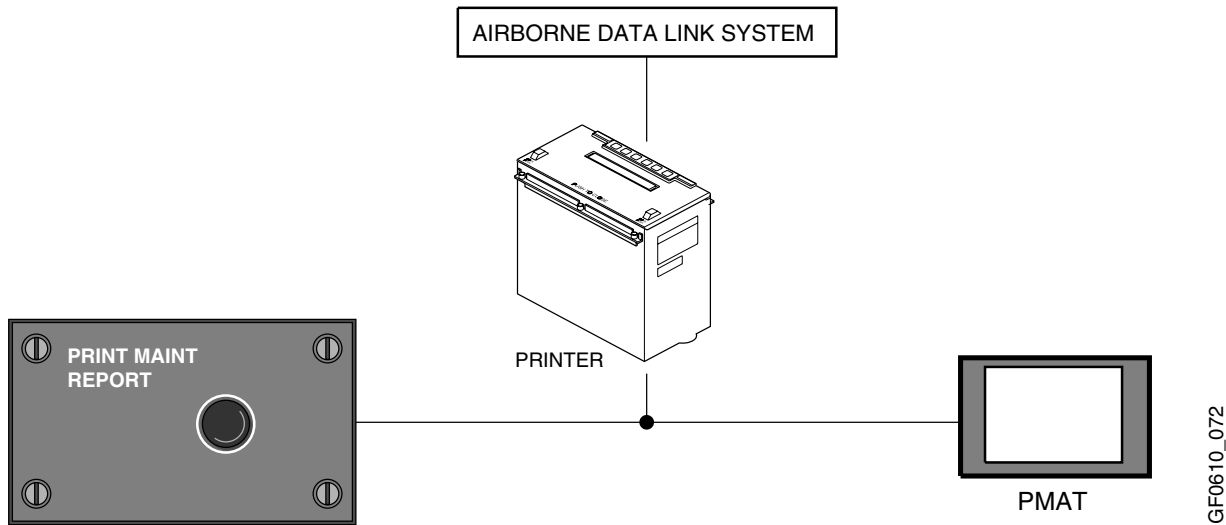
**PRINT MAINT REPORT Button** – active fault reporting can be printed by pressing the button and a short report will be printed even if no faults are detected.

GF0610\_071

The PMAT can be used to generate an active fault report to the printer by operating the “PRINT MAINT REPORT” button located on the left forward bulkhead in the flight compartment.

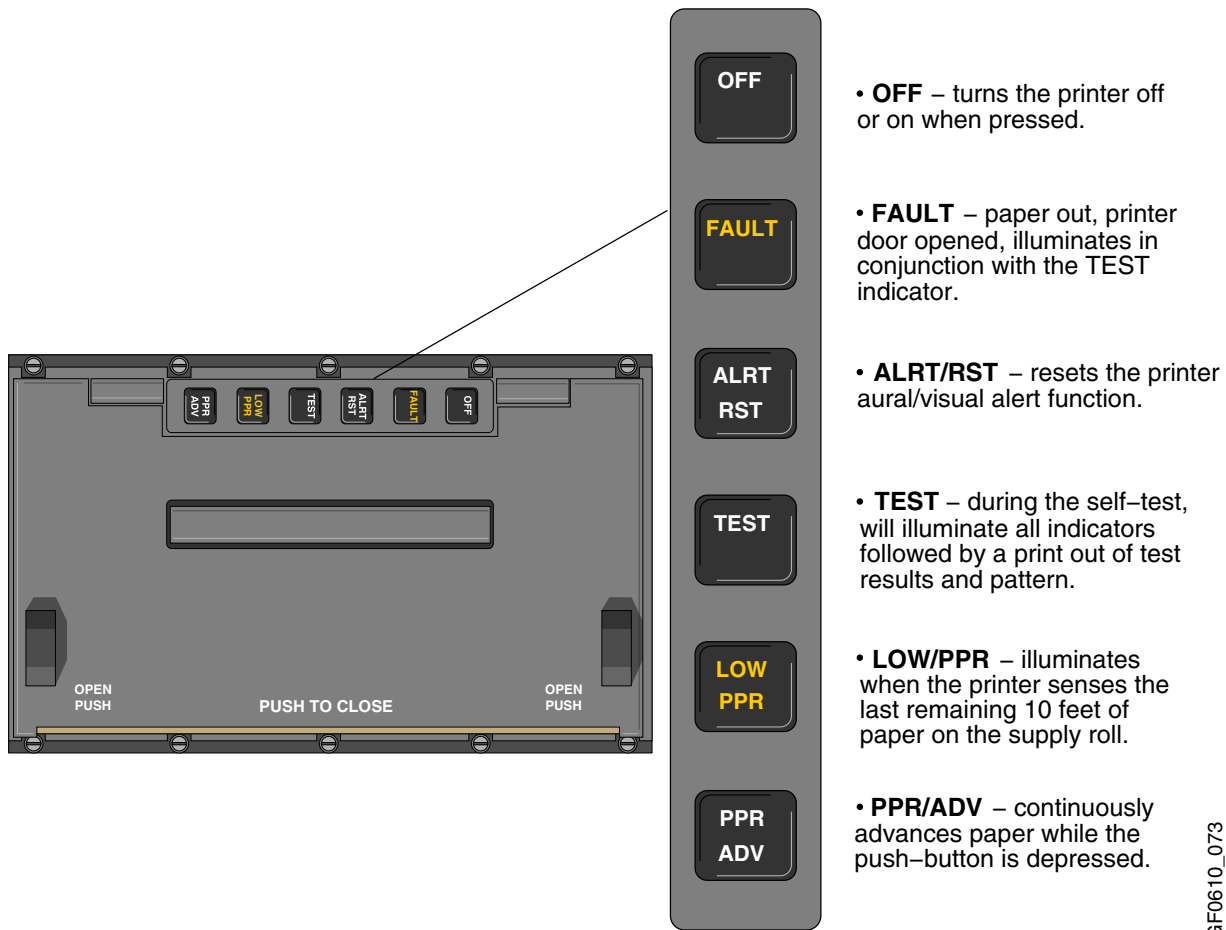
**FLIGHT COMPARTMENT PRINTER (IF INSTALLED) (CONT'D)**

The printer interfaces with a communication link to the Airborne Data Link System (ADLS) and a parallel interface from the PMAT.



GF0610\_072

The printer push-buttons provide the following functions:

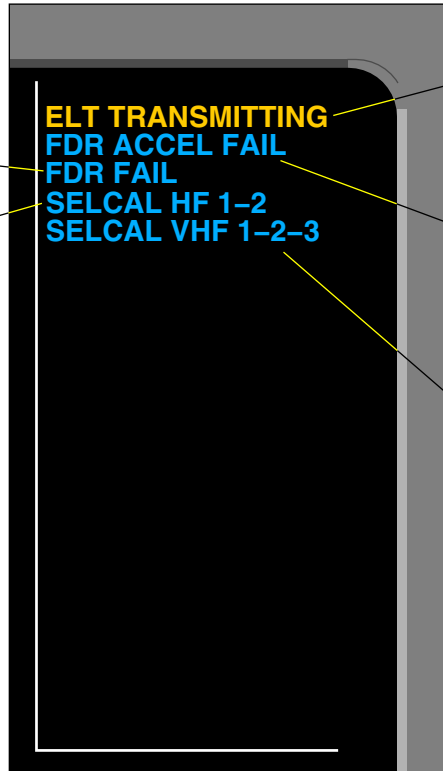


GF0610\_073

**EICAS MESSAGES**

**FDR FAIL**  
Flight Data Recorder  
has failed.

**SELCAL HF 1-2**  
Annunciated when HF1  
or 2 indicates an  
incoming message.



**ELT TRANSMITTING**  
Emergency locator  
transmitter is  
transmitting.

**FDR ACCEL FAIL**  
Flight Data Recorder  
accelerometer has  
failed.

**SELCAL VHF 1-2-3**  
Annunciated when VHF1  
or 2 (or 3 on airplanes  
with SB 700-23-002  
incorporated) indicates  
an incoming message.

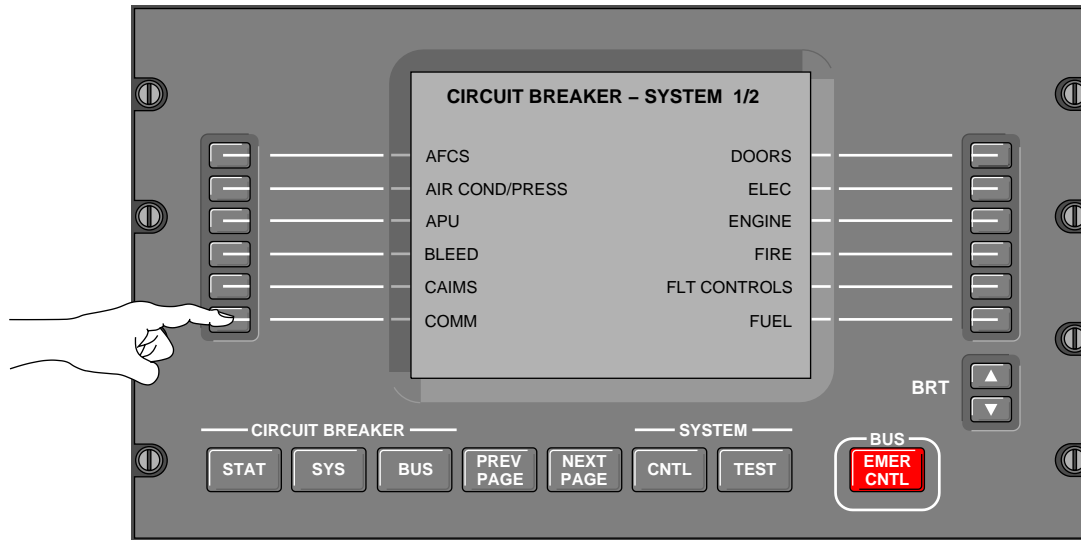
GF0610\_074a

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# COMMUNICATIONS

## EMS CIRCUIT PROTECTION

### CB - COMM SYSTEM



CB - COMM SYSTEM 1/5		
AIRPHONE REPEATER	DC 1	IN
AIRPHONE SYSTEM	DC 1	IN
AUDIO PANEL 1A	DC 1	IN
AUDIO PANEL 1B	BATT	IN
AUDIO PANEL 2A	DC 2	IN
AUDIO PANEL 2B	BATT	IN
CB - COMM SYSTEM 2/5		
AUDIO PANEL 3A	DC 1	IN
AUDIO PANEL 3B	DC ESS	IN
BATT CABIN FEED	BATT	IN
DATA LINK	DC 1	IN
HF 1 COUPLER	DC 2	IN
HF 1 TRANSCVR	DC 2	IN
CB - COMM SYSTEM 3/5		
HF 2 COUPLER	DC 1	IN
HF 2 TRANSCVR	DC 1	IN
RMU 1 PWR A	DC 1	IN
RMU 1 PWR B	DC ESS	IN
RMU 2 PWR A	DC 2	IN
RMU 2 PWR B	BATT	IN

CB - COMM SYSTEM 4/5		
SATCOM AMP	AC 2 ACPC	IN
SATCOM ANT CTLR	DC 1	IN
SATCOM DATA UNIT	DC 1	IN
SATCOM FREQ UNIT	AC 1 CCBP	IN
SATCOM HPA FAN	AC 4	IN
SELCAL	DC 1	IN
CB - COMM SYSTEM 5/5		
TRANSPONDER	DC 2	IN
TRANSPONDER 2	BATT	IN
VHF COM 1	DC 2	IN
VHF COM 2	BATT	IN
VHF COM 3	DC 1	IN

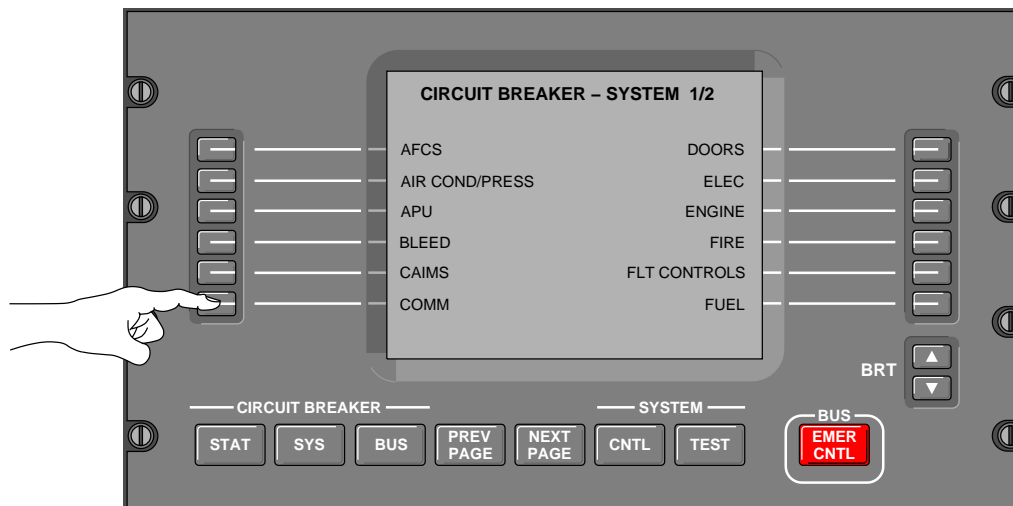
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# COMMUNICATIONS EMS CIRCUIT PROTECTION

## CB - COMM SYSTEM (CONT'D)

### Effectivity:

- Airplanes 9002 thru 9122 **not incorporating** Service Bulletin:
  - SB 700-24-045, AC and DC Power Distribution – Unit Change and Activation of Build 4 Electrical System.



CB - COMM SYSTEM 1/5		
AIRFONE REPEATER	DC 1	IN
AIRFONE SYSTEM	DC 1	IN
AUDIO PANEL 1A	DC 1	IN
AUDIO PANEL 1B	BATT	IN
AUDIO PANEL 2A	DC 2	IN
AUDIO PANEL 2B	BATT	IN
CB - COMM SYSTEM 2/5		
AUDIO PANEL 3A	DC 1	IN
AUDIO PANEL 3B	DC ESS	IN
DATA LINK	DC 1	IN
HF 1 COUPLER	DC 2	IN
HF 1 TRANSCVR	DC 2	IN
HF 2 COUPLER	DC 1	IN
CB - COMM SYSTEM 3/5		
HF 2 TRANSCVR	DC 1	IN
PASSENGER ADDRESS	BATT	IN
RMU 1 PWR A	DC 1	IN
RMU 1 PWR B	DC ESS	IN
RMU 2 PWR A	DC 2	IN
RMU 2 PWR B	BATT	IN

CB - COMM SYSTEM 4/5		
SATCOM AMP	AC 2 ACPC	IN
SATCOM AMP CTLR	DC 1	IN
SATCOM DATA UNIT	DC 1	IN
SATCOM FREQ UNIT	AC 1 CCBP	IN
SELCAL	DC 1	IN
TRANSPONDER 1	DC 2	IN
CB - COMM SYSTEM 5/5		
TRANSPONDER 2	BATT	IN
VHF COM 1	DC 2	IN
VHF COM 2	BATT	IN
VHF COM 3	DC 1	IN

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