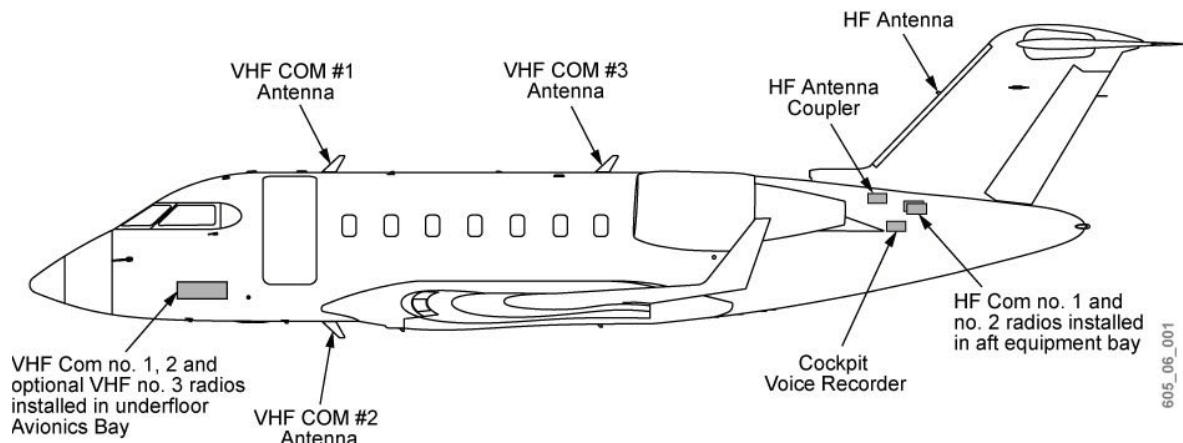


Bombardier Challenger 605 - Communications

GENERAL

The aircraft communication system includes those components and subsystems providing air-to-ground, interphone and cabin communications. The system is also responsible for recording communications and cabin audio. It includes the following:

- Audio integrating system;
- Communication radios;
- Radio tuning system;
- Cockpit voice recorder; and
- Static dischargers.



Communication System
Figure 06-10-1

AUDIO INTEGRATING SYSTEM

Description

The audio integrating system integrates and manages audio from several audio sources, including crew and service interphone, communication radios and navigation receivers. In addition, the system integrates audio signals, tones and messages from the engine indication and crew alerting system (EICAS), and provides a summation of crew communications to the cockpit voice recorder (CVR).

Components and Operation

The audio integrating system includes the following components:

- Audio electronics control unit;
- Audio control panels;
- Flight compartment speakers;
- Microphone and headphone jacks;
- Hand-held microphones;
- Microphone push-to-talk (PTT) keying switches; and
- External ground interphone jacks.

AUDIO INTEGRATING SYSTEM (CONT'D)

Audio Electronics Control Unit

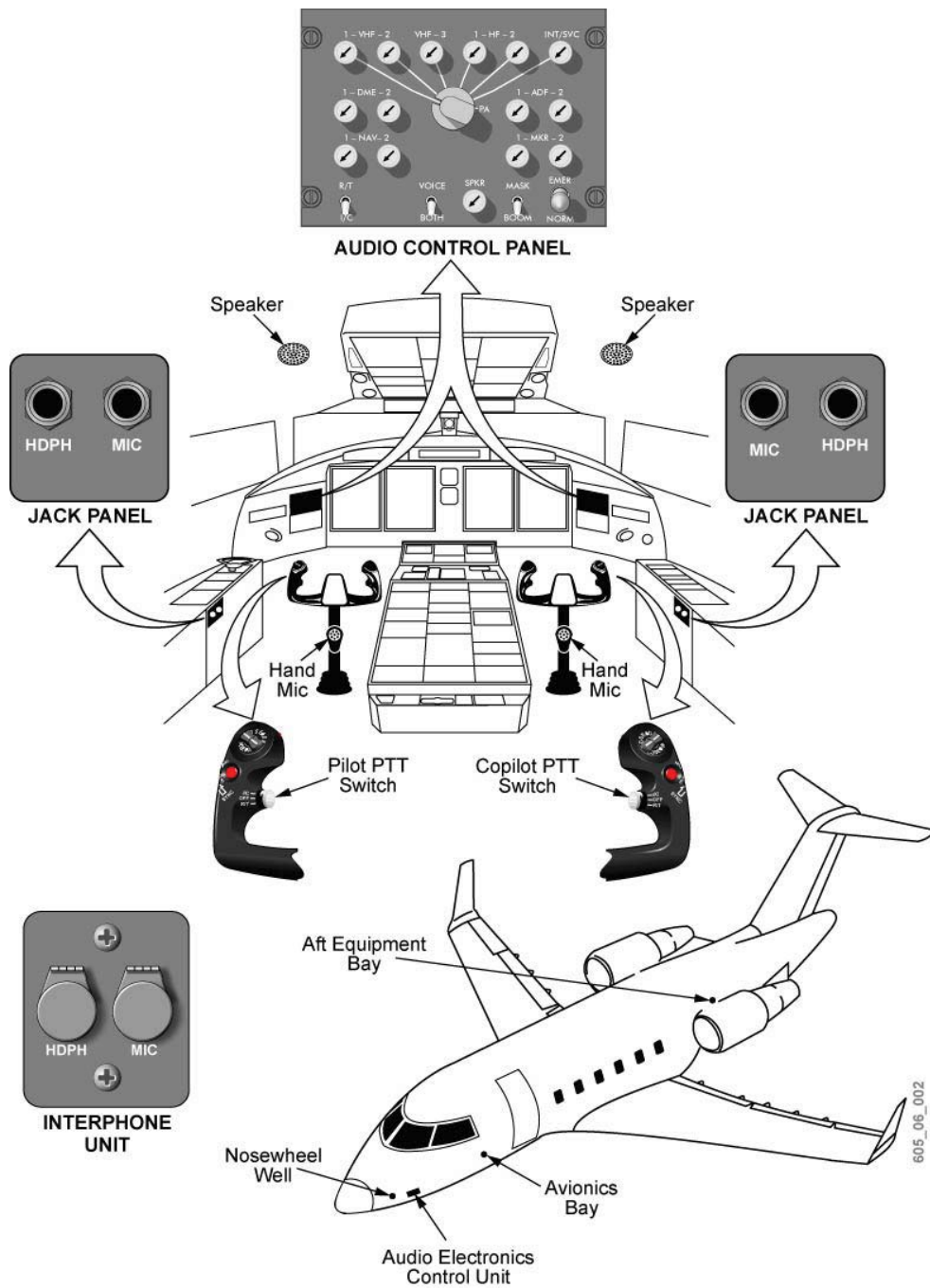
The audio electronics control unit is responsible for receiving and processing audio and microphone keying input. The unit interfaces with the following:

- Boom, hand-held and oxygen mask microphones;
- Microphone keying switches;
- Ground interphone communication stations;
- Communication and navigation radios;
- Engine indication and crew alerting system (EICAS); and
- Recording systems (voice, flight data).

The unit integrates audio from the crew intercom, communication and navigation radios, and receives command input from the audio control panels. In addition, the unit receives microphone keying and audio, and routes it to the associated radio system. The audio is also provided to the voice recorder system for recording.

EICAS audio is provided in the form of aural tones, chimes and voice messages. This audio is triggered by the DCUs, processed by the audio electronics control unit, and played through the headphones and flight compartment speakers. Crew alerting audio cannot be muted or volume controlled.

AUDIO INTEGRATING SYSTEM (CONT'D)



Audio Integrating System Components
Figure 06-10-2

AUDIO INTEGRATING SYSTEM (CONT'D)

Audio Control Panel

The audio control panels are used to select and control received audio from the communication and navigation systems, as well as to connect microphone keying and audio to the HF/VHF communication radios, the PA system, and the crew and service interphone.

The audio control panel includes the following controls, switches and selectors:

- Audio On/Off and volume controls;
- Microphone selector;
- Radio Transmit/Off/Intercom switch (R/T I/C);
- Voice/Both switch;
- Speaker On/Off/Volume switch;
- Mask/Boom switch; and
- Emergency/Normal switch.

Audio On/Off and Volume Controls

Individual controls are provided for each system where audio is available. Audio is heard when the associated control is pressed, while rotating it adjusts the volume. Each control is provided with backlighting when selected.

Microphone Selector

The position of the microphone selector switch determines which system receives push-to-talk (PTT) commands and crew audio. Audio and sidetone for the selected system is automatically enabled without the requirement for a separate selection of the audio on/off control.

Radio Transmit/Off/Intercom Switch

The R/T I/C switch is a three-position, center-off switch providing PTT functionality for the intercom, boom or oxygen mask microphones. When selected OFF, PTT function is provided by the control wheel PTT switch or the hand microphone. The momentary position R/T selection is used as a PTT switch for the boom or oxygen mask microphone. It returns to the center OFF position when released. The I/C position is latched, when selected, to enable a hot microphone intercom between the flight crew.

Voice/Both Switch

The VOICE/BOTH switch allows the crew to separate audio when monitoring the navigation radios. When BOTH is selected, the station Morse identification tone and voice message may be heard. When VOICE is selected, all station Morse identification tones are filtered out, to allow a clear voice signal to be heard.

Speaker Switch

The SPKR switch provides on/off and volume control of the overhead speaker. The audio control unit automatically mutes the speakers when any microphone push-to-talk switch is activated.

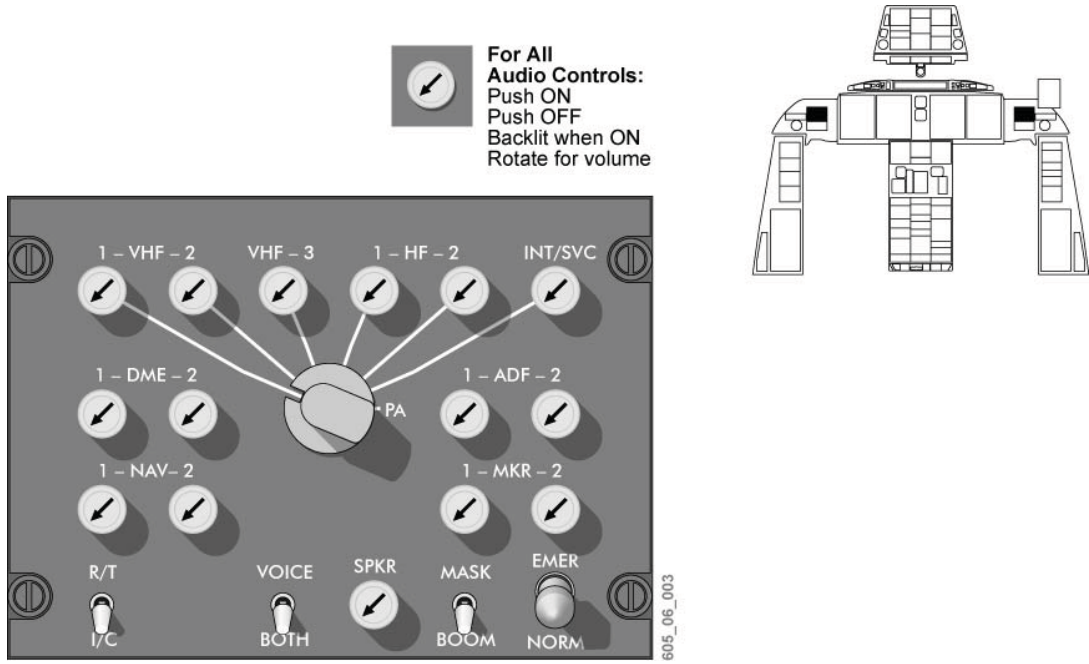
Mask/Boom Switch

The MASK/BOOM switch is used to enable keying operation of the oxygen or boom microphone.

AUDIO INTEGRATING SYSTEM (CONT'D)

Emergency/Normal Switch

The latching EMER/NORM switch is normally selected to the NORM position. Moving the switch to the EMER position results in audio bypassing the audio control panel. As a result, the crew microphone, headset and speaker is connected directly to the onside radio system.



Audio Control Panel
Figure 06-10-3

COMMUNICATION RADIOS

Description

The aircraft's basic communication radio installation includes two VHF and two HF communication transceivers. There are no master control switches for the radios. They are automatically powered when electrical power is applied to the aircraft. Radio selection and tuning can be carried out using the flight management system (FMS) control display unit (CDU), or the cursor control panel (CCP) and the multifunction display (MFD).

VHF Communications

The basic VHF communication system includes two transceivers, installed in the avionics compartment. The VHF antennas are installed on the upper and lower fuselage. The system provides short range voice communications in the frequency range of 118.000 to 136.975 MHz, with 25 kHz or 8.33 kHz tuning functionality.

A third VHF transceiver may be installed for additional voice communication capabilities. A third VHF is also required if the optional VHF digital datalink function is installed (VDL - ModeA/2). The datalink supports the integrated flight information system (IFIS), which provides enhanced maps, graphical weather and electronic charts on the MFD.

COMMUNICATION RADIOS (CONT'D)

HF Communications

The HF communication system includes two high-frequency transceivers and two antenna couplers, installed in the aft equipment compartment. The HF system provides long-range voice communications in the frequency range of 2 to 30 MHz.

The antenna is an integral part of the leading edge of the vertical stabilizer. The antenna couplers match the impedance of the transceivers to the antenna as different frequencies are selected and keyed.

A selective call (SELCAL) decoder monitors the HF radios for coded, aircraft-specific calls from a ground station. In the event that the decoder detects a ground station selective call, a **SELCAL HF 1 (2)** advisory EICAS message is displayed, and a "SELCAL" audio alert is heard. The EICAS message and alert are reset when a PTT switch is pushed for an HF system transmission.

RADIO TUNING

Description

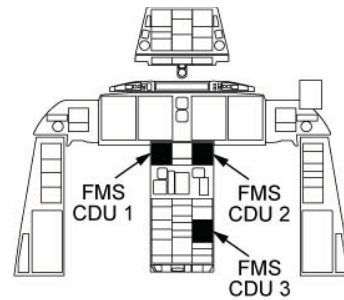
VHF and HF radio tuning is carried out primarily using the control display units (CDUs) associated with the flight management system (FMS). Alternatively, the cursor control panels (CCPs) may be used to control a tuning menu presented on the on-side MFDs.

All tuning input is provided directly to the associated radio, as well as to the integrated avionics processing system (IAPS). The IAPS echoes the display of radio tuning information on all MFDs and CDUs, regardless of the tuning method used.

CDU Tuning

Two FMS control display units (CDUs) are installed on the center pedestal. Each CDU is a liquid crystal display, equipped with an integrated keyboard, function keys and line select keys. In addition to FMS functions, the CDUs provide single point tuning and control of the on-side or cross-side radios. Tuning of the VHF and HF radios is not possible by the optional third CDU.

RADIO TUNING (CONT'D)



Flight Management System Control Display Units
Figure 06-10-4

TUNE Page

The TUNE pages are accessed by pressing the TUN function key on the left side of the CDU. TUNE pages provide operational summaries and allow for primary control of all installed radios, including COMM, NAV, ADF, TCAS, DME and ATC transponder. It should be noted that only VHF and HF radio control and tuning is discussed here.

VHF radio titles, COM1 and COM2, are shown on page 1 of the TUNE page, while VHF COM3 is shown on page 2. HF radio titles HF1 and HF2 are also shown on page 2. CDU function keys PREV and NEXT are used to move between the pages.

Active frequencies appear in green on the data line directly below the corresponding radio title. RECALL or PRESET frequencies are shown in white below the active frequency.

HF and VHF radios can be tuned by making a frequency entry on the CDU scratchpad, followed by pushing the radio's line key. As a result, the active frequency line shows the new frequency. The CDU also routes the frequency to the associated radio and to the integrated avionics processing system (IAPS). The IAPS echoes the data presentation on the opposite CDU as well as on the MFD radio tuning windows.

VHF radio frequency entry and display can be carried out using 25 kHz or 8.33 kHz tuning. Since the VHF radios are capable of 8.33 kHz tuning, the CDU automatically adapts the display to show a 5 or 6 digit frequency selection, according to the data being entered.

RADIO TUNING (CONT'D)

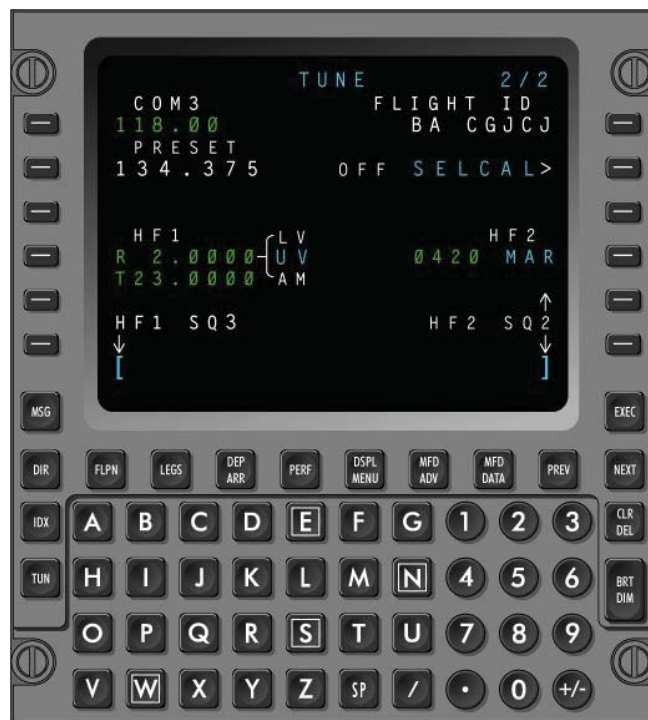
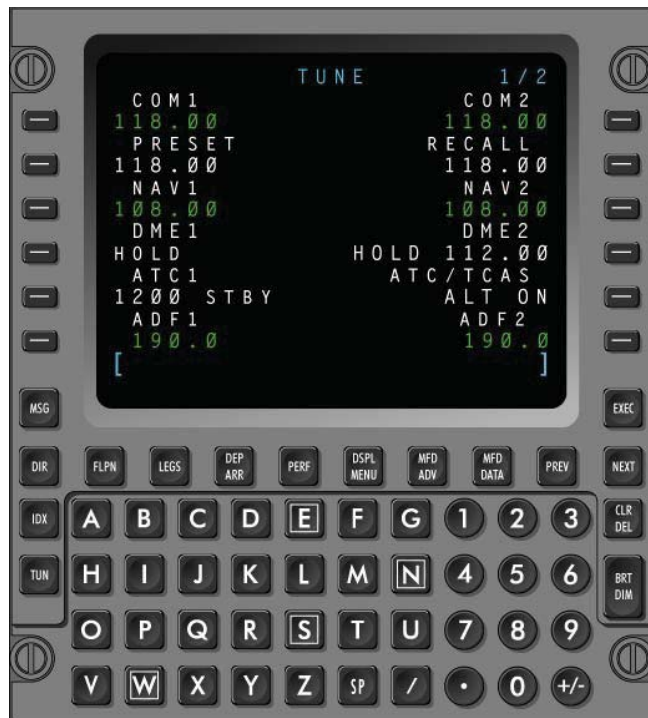
When the tuning data is moved to the active frequency line, the existing active frequency is displaced to the line below it, identified with the label RECALL. At any time, the crew may select the RECALL line to switch the active and recall frequencies. The scratchpad must be empty when these selections are made.

If the scratchpad tuning data is moved to the RECALL line rather than the active line, the RECALL title changes to PRESET, indicating that this preset frequency is awaiting transfer to the active line. Pressing the PRESET line key moves this frequency to the active frequency line, and makes the previously active frequency a RECALL frequency.

Depending on the radio being tuned (VHF or HF), if an invalid entry is made, a message: INVALID FREQUENCY, INVALID ENTRY or INVALID CHANNEL is displayed on the scratchpad.

The TUNE page also allows the crew to enable or disable SELCAL system operation. The adjacent line key is used to alternate between OFF and SELCAL. The SELCAL text enlarges and is shown in cyan, when it is enabled.

RADIO TUNING (CONT'D)



CDU TUNE Page
Figure 06-10-5

605_06_005

RADIO TUNING (CONT'D)

VHF Control Page

The VHF control page, labelled COM (1, 2 or 3) CONTROL, is accessed by pressing the line key adjacent to the desired VHF radio title. Pressing the key adjacent to the active (green) frequency line, with no data in the scratchpad, returns the display to the TUNE page.

The control page provides control and display of the following functions and selections for the VHF radios:

- Active frequency selection;
- Recall frequency selection;
- Preset frequency selection;
- Squelch mode selection;
- Test function; and
- Voice/Data selection (VHF 3 only).

Selection and control of the active, preset and recall frequencies are made in the same way as on the TUNE page.

The VHF radio's squelch mode is enabled (ON) and disabled (OFF) by pressing the SQUELCH line key. The squelch legend enlarges when active. The SQ icon is also shown on the TUNE page when squelch is off.

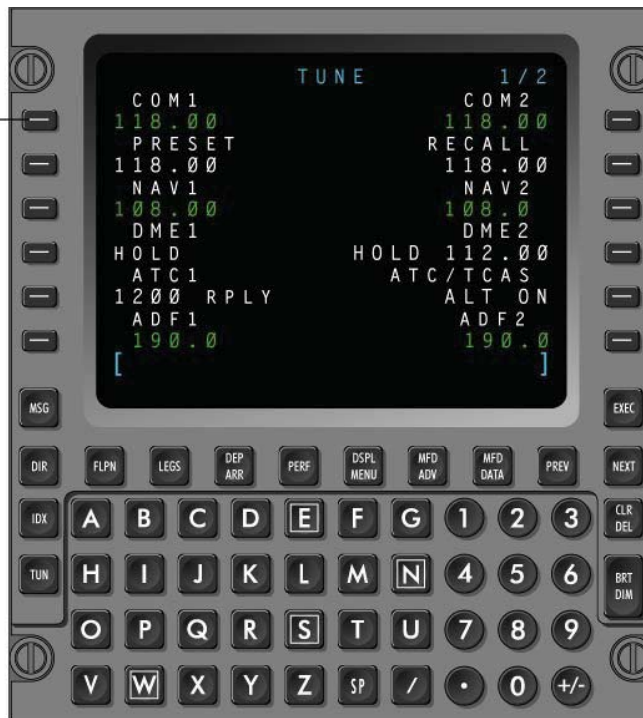
Pushing the TEST line key on the control page for any VHF radio causes the unit to perform a self-test. The test lasts 10 seconds, during which the TEST annunciator enlarges. A single aural beep is heard if the test was successful, while two beeps are heard if the test failed.

Up to 20 preset frequencies may be stored on the VHF control page. The CDU keyboard is used to enter the preset frequency and alpha-numeric identifier on the scratchpad. Once entered, the preset frequency is moved to a line key, where it is stored until required.

If the third (optional) VHF is installed, an additional control selection is available. VOICE or DATA allows the crew to select the function of VHF 3. The active status is indicated with larger, cyan text. The radio must be in the DATA mode for operation of the datalink. Frequency selections are not permitted when VHF 3 is operating in DATA mode.

RADIO TUNING (CONT'D)

Select line key of active COM frequency with scratchpad empty to access COM CONTROL page



605_06_006

VHF Radio CONTROL Page
Figure 06-10-6

RADIO TUNING (CONT'D)

HF Control Page

An HF control page, labelled HF (1 or 2) CONTROL, is accessed by pressing the line key adjacent to the desired radio title. Pushing the active frequency line, with no data in the scratchpad, returns the display to the TUNE page.

The HF radio control page provides control and display of the following:

- Squelch mode selection;
- Test function;
- Frequency/Emergency/Maritime mode selection;
- Recall frequency selection;
- Preset frequency selection;
- Transmission mode;
- Power level; and
- Simplex or duplex operation.

The squelch level is indicated as one of four levels (SQ 0/SQ 1/SQ 2/SQ 3). SQ 0 is the squelch "off" position, while SQ 3 is the maximum squelch level.

Pressing the TEST line key for either HF radio causes the unit to perform a 15 second self-test. The TEST indication is replaced with a green PASS or yellow FAIL annunciator following completion of the test.

The FREQ/EMER/MAR mode is displayed on the HF control page. It allows for the use of manually entered frequencies, or selection of defined emergency or international telephone union (ITU) maritime channels. The inactive modes are displayed in white, and the active mode is displayed larger and in cyan.

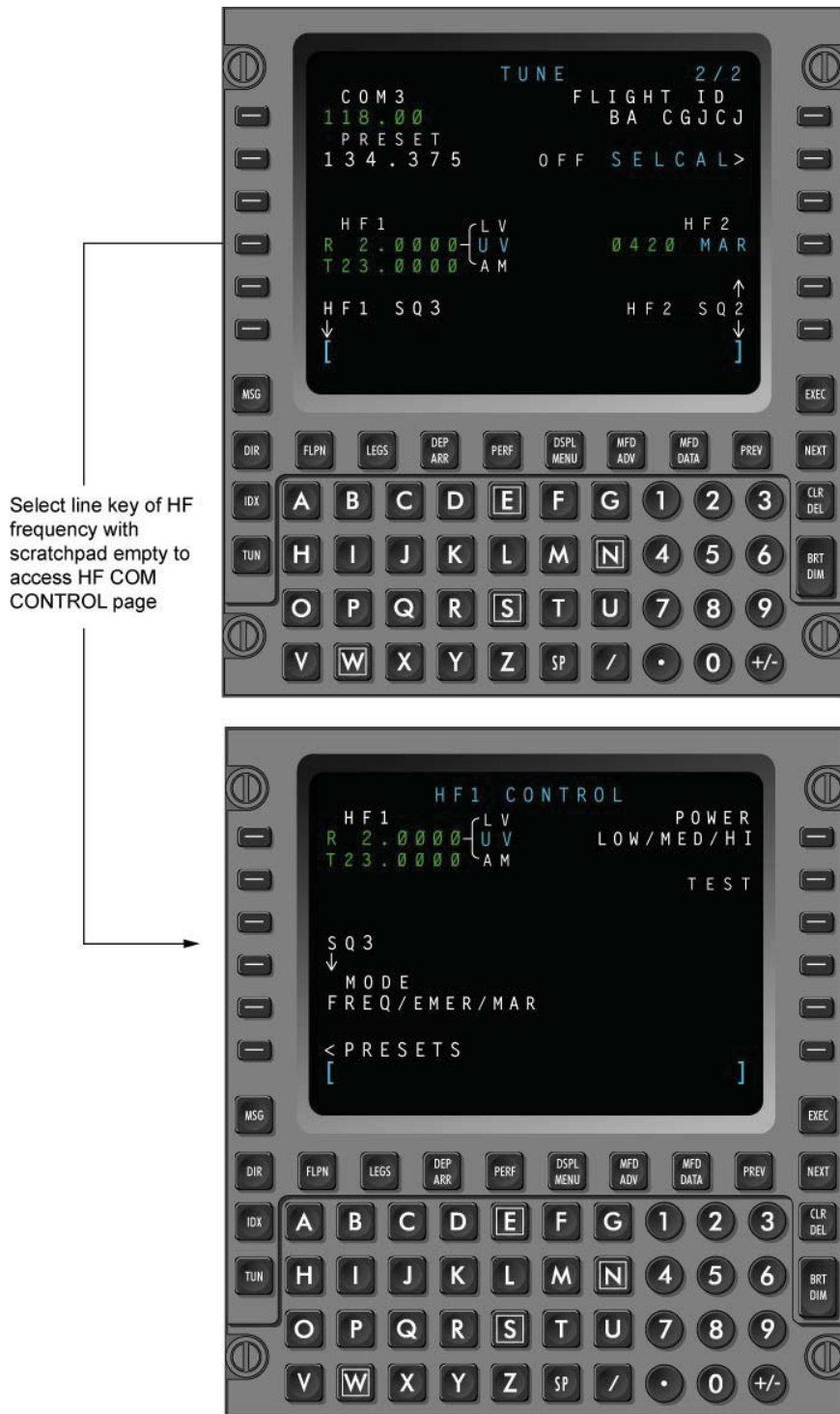
The power level (LO/MED/HI) is displayed on the HF control page. The active level is displayed larger and in cyan.

The HF operates in simplex or half-duplex mode, using three types of modulation: lower sideband voice (LV), upper sideband voice (UV), or amplitude modulation equivalent (AM). The active emission mode enlarges and is displayed in cyan next to the HF frequency.

Valid scratchpad entries for the HF depend on which tuning or operating mode has been selected from the HF control page. The selectable tune modes that affect how data is entered into the TUNE page scratchpad include:

- Manual frequency entry (FREQ);
- Emergency channel (EMER);
- Maritime channel (MAR);
- Simplex or duplex frequency operation (SIMP, DUP); and
- Emission mode operation (LV, UV, AM).

RADIO TUNING (CONT'D)



HF Radio CONTROL Page
Figure 06-10-7

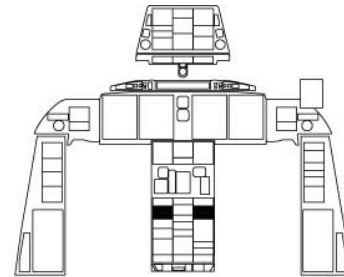
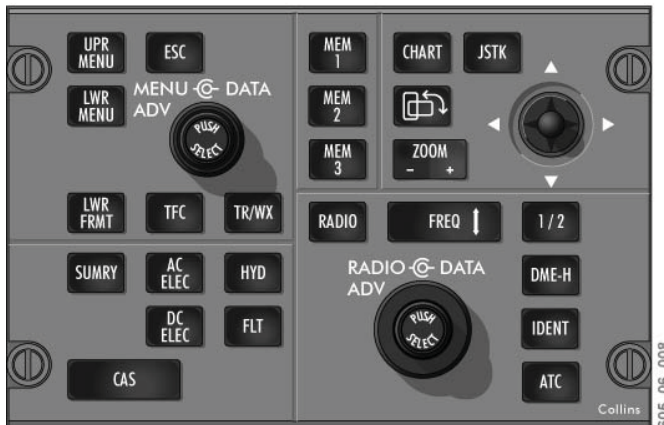
RADIO TUNING (CONT'D)

MFD Tuning

The VHF and HF radios may be tuned using the cursor control panel (CCP) to navigate a menu shown on the MFD radio tuning window.

Tuning and mode selection within the radio tuning window is carried out via controls on a dedicated section of the cursor control panel (CCP). The following controls on each CCP are used for tuning and functional control of the VHF and HF radios;

- RADIO ADV/DATA selector/PUSH SELECT knob – Used for tuning, mode and operational selections.
- RADIO button – Shows the radio control submenu when pressed. Pressing the button again returns the display to the main radio tuning block.
- FREQ button – Swaps the active/recall/preset frequency for the highlighted radio.
- 1/2 button – Enables cross-side tuning. When pressed, the on-side MFD shows tuning data from the opposite MFD.



Cursor Control Panel
Figure 06-10-8

MFD Radio Tuning Window

The MFD radio tuning window is divided into systems which have selectable frequencies, functions, or operating modes. The cyan tuning box is defaulted to surround the RECALL frequency of VHF radio no.1 when power is first applied.

When the RADIO ADV selector is rotated, the tuning box moves over selectable systems and functions, including tuning, mode and operational selections. Changes can only be made to the selected system when the PUSH SELECT button is pushed.

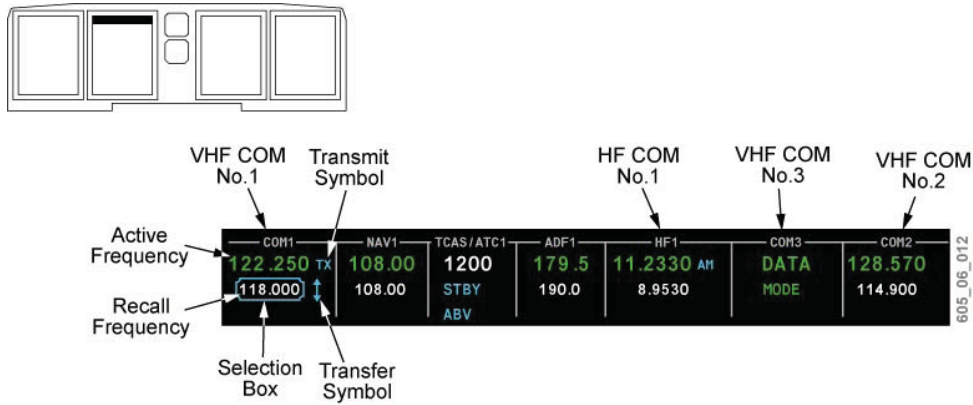
When a VHF radio frequency is selected and the tune box is made active, the box is split in two. The left half, the most significant digit (coarse), is controlled by the RADIO ADV selector, while the right half, the least significant digits (fine), is controlled by the DATA selector.

When the tune box is enabled for the current active frequency and a frequency change is made, the previous frequency moves to the recall frequency line. When the tune box is made active for the recall frequency and a frequency change is made, the previously indicated frequency is lost while the new frequency is shown. Unlike tuning from the CDU method, the words RECALL and PRESET are not shown on the tuning window.

RADIO TUNING (CONT'D)

No frequency selection can be made to VHF COM no.3 when operating in a VHF datalink mode. This is annunciated by the word DATA in green on the tuning window.

When an HF radio frequency is selected and made active, the tune box surrounds the left digit only. The DATA selector is used to change the digit while the RADIO ADV selector is rotated to move to the next digit.



MFD Radio Tuning Block
Figure 06-10-9

MFD Radio Tuning Control Page Navigation

Pressing the RADIO button on the CCP causes the radio's submenu to be shown. The RADIO ADV/DATA selector and PUSH SELECT button are used to move and make selections.

The submenu functions are similar to what is displayed on the CDU CONTROL page, with the exception that no preset frequencies or channels are available.

The VHF radio control submenu provides control and display of the following:

- Squelch mode selection;
- Test function;
- Active/Recall frequency transfer; and
- Voice/Data selection (VHF 3 only).

RADIO TUNING (CONT'D)

Note: Pilot side shown, co-pilot side is similar.

VHF COM No.1

COM1	NAV1	TCAS/ATC1	ADF1	HF1	COM3	COM2
122.250 TX 118.000 ↓	108.00 108.00	1200 STBY ABV	179.5 190.0	11.2330 AM 8.9530	DATA MODE	128.570 114.900

Position selection box over desired VHF radio and press RADIO button on CCP to access the radio's control menu.

COM1	COM1 CONTROL
122.250 TX 118.000 ↓ SQ OFF	SQUELCH ON OFF
	FREQ SEL 8 . 33 25
	TEST

VHF COM CONTROL MENU



CURSOR CONTROL PANEL (CCP)

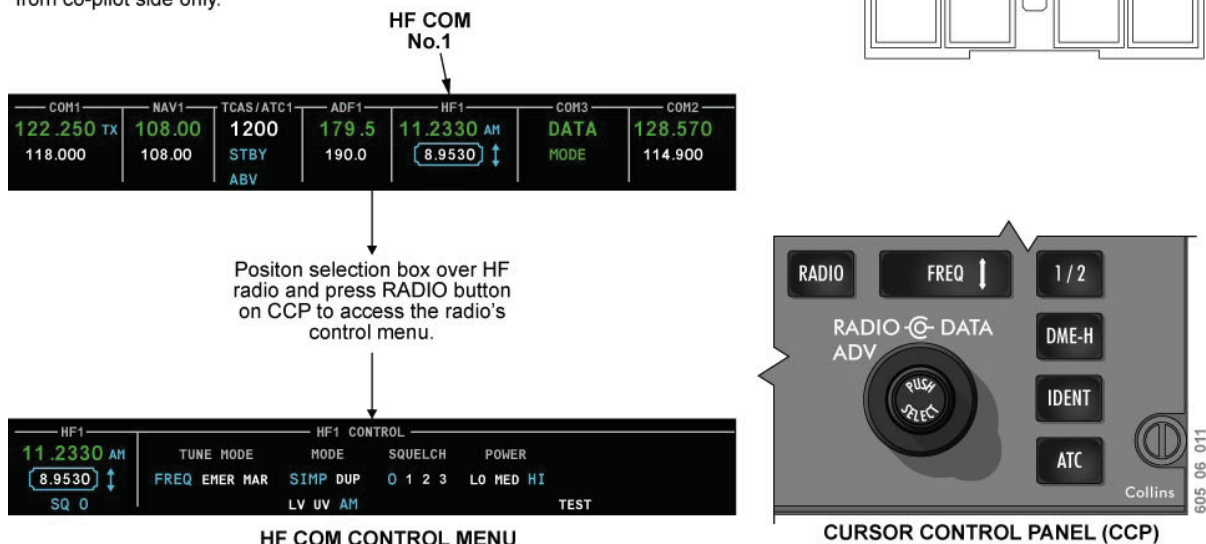
VHF Comm Submenu Control
Figure 06-10-10

The HF radio control submenu provides control and display of the following:

- Active/Recall frequency transfer;
- Frequency/Emergency/Maritime mode selection;
- Simplex or half-duplex emission mode;
- Squelch mode selection;
- Power level;
- Transmission mode; and
- Test function.

RADIO TUNING (CONT'D)

Note: Pilot side shown, co-pilot side is similar. HF2 is accessed from co-pilot side only.



HF Comm Submenu Control
Figure 06-10-11

Tune Inhibiting

Since the radios can receive tuning commands from either the CDU or the MFD tuning methods, in the event of a tuning malfunction, the crew can isolate one or all of the tuning sources.

The reversionary control panel includes three TUNE INHIBIT PUSH switch/lights providing tuning inhibit functions. The switch/lights illuminate white when selected, and are labelled as follows:

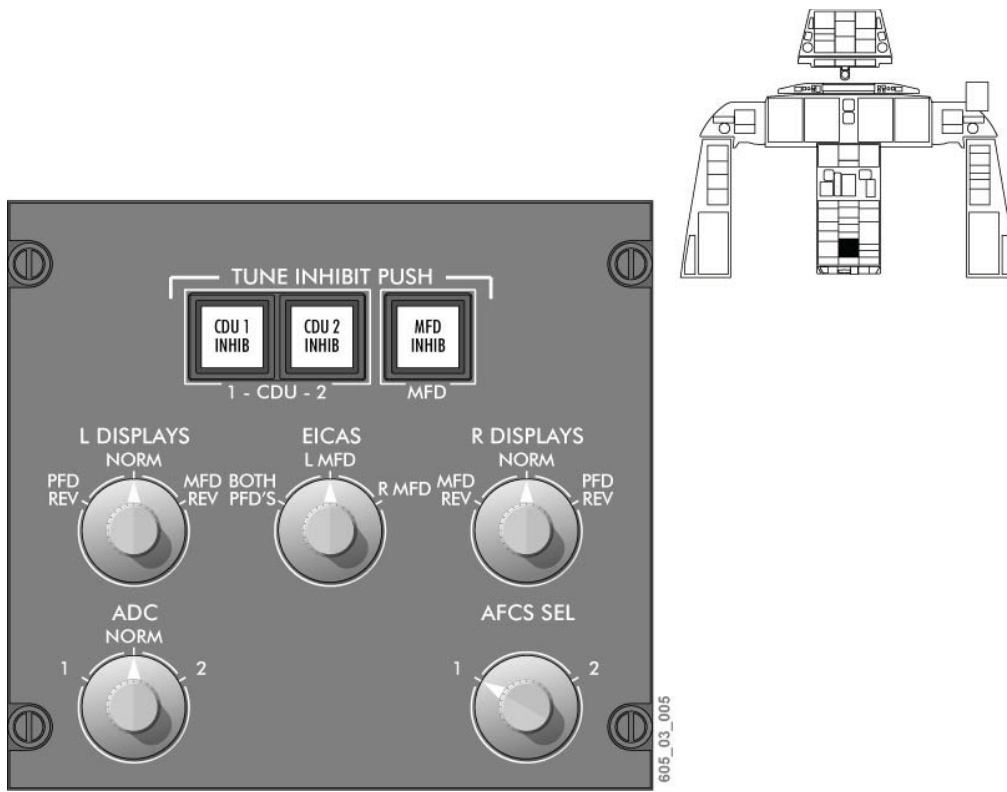
- CDU 1 INHIB – used to inhibit tuning control from the left CDU;
- CDU 2 INHIB – used to inhibit tuning control from the right CDU; and
- MFD INHIB – used to inhibit tuning control from both MFDs.

When a CDU 1 (2) INHIB switch/light is pressed, the TUNE page is blanked on the associated CDU. The on-side MFD ignores tuning requests from the disabled CDU, and displays inputs provided from the opposite CDU. If both CDU INHIB switch/lights are pressed, the MFD ignores tune requests from both CDUs. As a result, tuning is only available by the MFD/CCP tuning method.

If MFD TUNE INHIBIT is selected, the CDU ignores MFD tune requests, and the MFD radio tuning window is blanked. Only the vertical division lines remain in view.

Should all three TUNE INHIBIT switch/lights be pressed, all radio tuning is inhibited. VHF Comm. no.1 is automatically tuned to the emergency frequency of 121.5 MHz. The MFD radio tuning window shows a frequency display of 121.50 in the COM 1 data block, along with the abbreviation EMER shown below it. All other tuning and control data is removed.

RADIO TUNING (CONT'D)



TUNE INHIBIT Switch/lights
Figure 06-10-12

COCKPIT VOICE RECORDER SYSTEM

Description

The cockpit voice recorder (CVR) continuously records:

- Radio communications;
- Flight crew conversations;
- Aural warnings; and
- General sounds from the flight compartment.

The CVR is installed in the aft equipment compartment, and is colored orange for quick identification. An underwater locator device is installed on the unit, to aid in unit location if submerged. The device contains an acoustic beacon, battery and a water-activated switch.

The CVR begins recording automatically when electrical power is applied to the aircraft. Audio is recorded on audio channels and stored in the CVR solid state memory. Up to 120 minutes of data is stored on the CVR, with older voice data being overwritten as time progresses. An additional audio channel is used to record a time signal, which aids in synchronizing data between the CVR and flight data recorder (FDR).

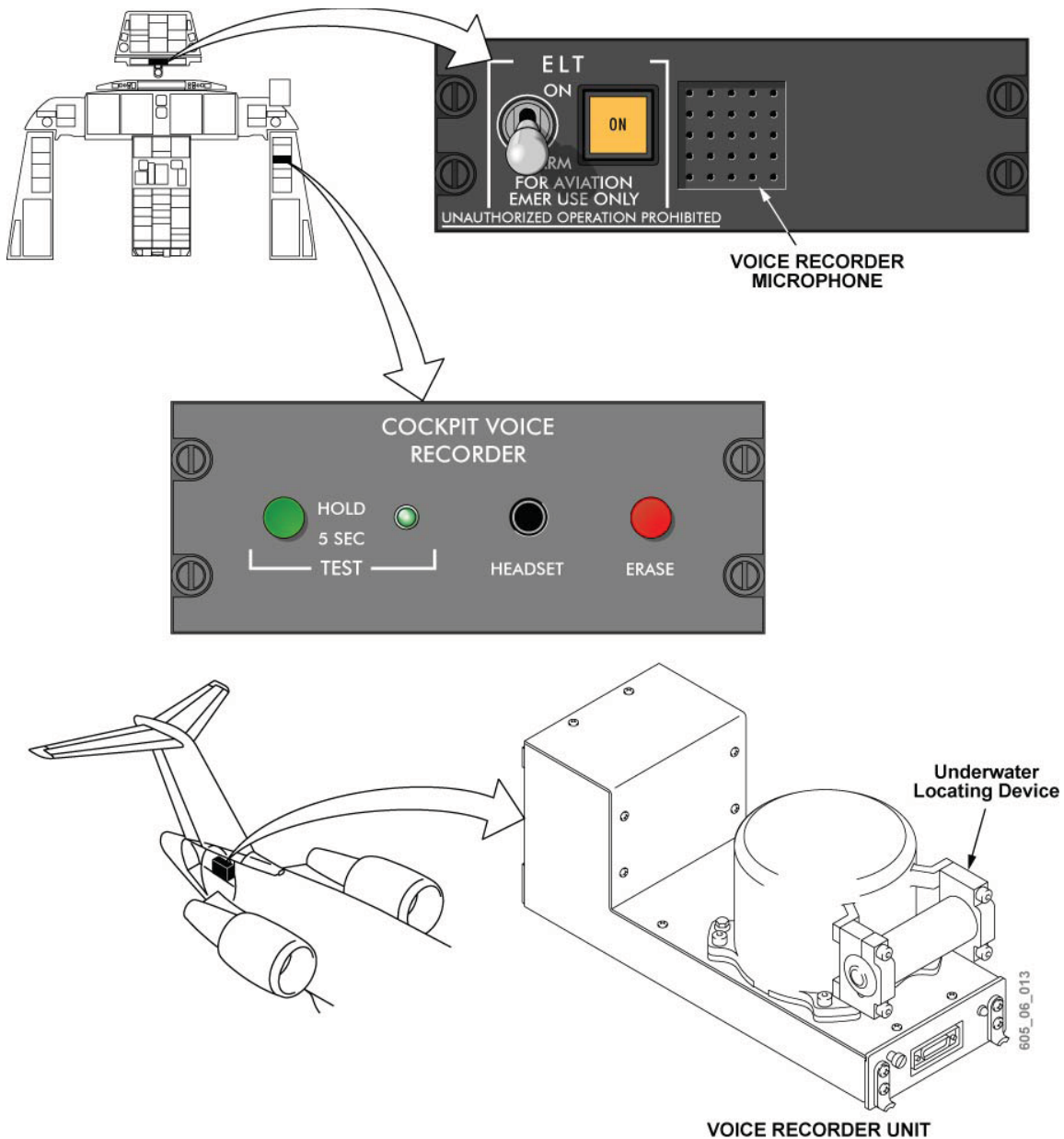
COCKPIT VOICE RECORDER SYSTEM (CONT'D)

A CVR control panel is located on the right side console and includes:

- Test button – Enables an audio tone to be generated by the CVR.
- Test light – Illuminates when test indicates CVR is functioning correctly.
- Headset jack – For monitoring of audio and test tone during a test.
- Erase button – For bulk erase of CVR memory. This function is only possible when aircraft is on ground with parking brake applied.

A flight compartment general area microphone is installed on the forward overhead panel, next to the ELT control switch. The microphone picks up compartment sounds and provides it to the CVR.

COCKPIT VOICE RECORDER SYSTEM (CONT'D)



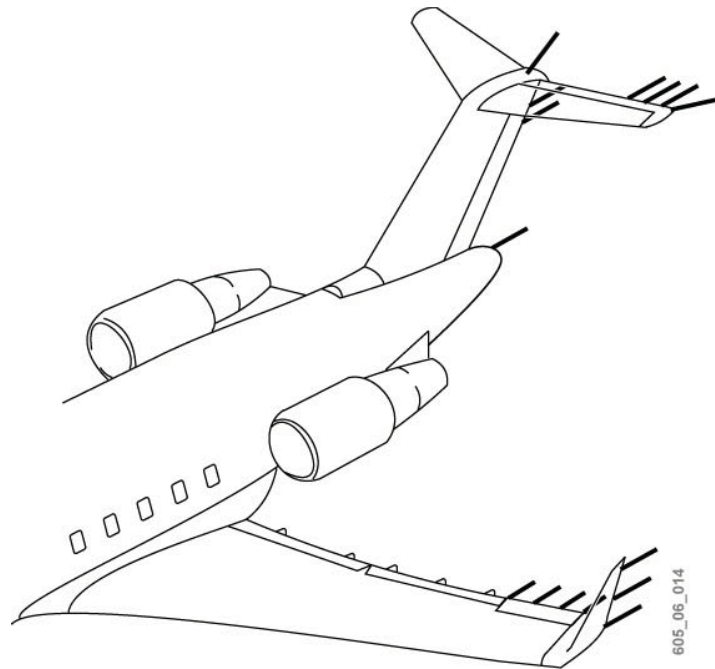
Cockpit Voice Recorder
Figure 06-10-13

STATIC DISCHARGERS

Description

Static dischargers are installed on the trailing edges of the primary flight control surfaces. The static dischargers allow for the gradual bleed-off of static electrical charges during flight.

STATIC DISCHARGERS (CONT'D)



Static Dischargers Location
Figure 06-10-14

EICAS MESSAGES

MESSAGE	MEANING	AURAL WARNING (IF ANY)
<p>SELCAL HF 1 SELCAL HF 2</p>	<p>A call for this aircraft has been detected on the respective high-frequency radio. Message will be cancelled when that radio is keyed to reply.</p>	<p>“SELCAL”</p>

Bombardier Challenger 605 - Communications

POWER SUPPLY AND CIRCUIT BREAKER SUMMARY

SYSTEM	SUB-SYSTEM	CB NAME	BUS BAR	CB PANEL	CB LOCATION	NOTES
Communication	VHF	VHF COMM 1	DC BATT	1	Q2	
		VHF COMM 2	DC BUS 2	2	H2	
		VHF COMM 3	DC ESS	4	D8	POST SB 605-23-001
	HF	HF COMM 1 TX/RX, CPL	DC BUS 1	1	K5-7	
		HF COMM 2 TX/RX, CPL	DC BUS 2	2	L8-10	
	Selective Calling	SELCAL	DC BUS 2	2	H1	
		AUDIO PLT	DC BATT	1	Q6	
		AUDIO C/PLT	DC BATT	1	Q7	
		AUDIO PLT, C/PLT	DC ESS	4	D6	
	Cockpit Voice Recorder	CVR	DC ESS	4	D1	
	Datalink System	DATALINK	DC BUS 1	1	H9	POST SB 605-23-002