**Calls Control Panel**

**HF/VHF2 LIGHT/BUTTON**
- HF (white)
- The light illuminates and a brief chime is given when a call is received on the HF communication system.
- VHF2 (white)
- The light illuminates and a brief chime is given when a call is received on the VHF2 communication system.
- When pushed, decoder channels and lights are reset.

**GROUND CREW CALL LIGHT/BUTTON**
When pushed, communication with the ground crew is possible.
The GND CALL light illuminates if this mode is selected or flashes and a brief chime is given to indicate that a call from the ground crew is received.

**TEST BUTTON**
When pushed, self test of the SELCAL system is initiated.

**EMERGENCY CALL LIGHT/BUTTON**
When pushed, emergency communication with the flight attendant station is possible.
The EMG CALL light illuminates if this mode is selected, or flashes and a brief chime is given to indicate that a call from the flight attendant is received.

**CABIN CALL LIGHT/BUTTON**
When pushed, communication with the flight attendant phone is possible.
The CABIN CALL light illuminates if this mode is selected, or flashes and a brief chime is given to indicate that a call from the flight attendant is received.

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**Calls Control Panel**

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Page 1
Lights

CABIN
- LH/RH
- CENT

CABIN DIM
- 100%
- 50%
- 10%

BOARDING
- ON/OFF
- TIMER

READING
- ON/OFF
- TEST

STAIRS
- ON/OFF
- AUTO

SIGNS
- WASTE TANK FULL
- WATER LEVEL LOW

TEMP ADJUST CABIN
- COLD
- WARM

CALLS
- CAPT
- LH/RH
- TOILET

CAPT CALL LIGHT
A brief chime is given in the cabin and the light illuminates to indicate that a call from the flight crew is received.

Flight Attendant Control Panel (Call Lights)
Flight Attendant Phone

**EMG BUTTON AND LED**
When pushed emergency communication with the flight crew is possible. A brief chime is given in the cockpit and the LED above the button flashes if this mode is selected. 
or
A brief chime is given in the cabin and the LED above illuminates to indicate that a call from the flight crew is received.

**PA BUTTON AND LED**
When pushed passenger announcements are possible. The LED above the button illuminates if this mode is selected.

**FLT BUTTON AND LED**
When pushed communication with the flight crew is possible. A brief chime is given in the cockpit and the LED above the button flashes if this mode is selected. 
or
A brief chime is given in the cabin and the LED above illuminates to indicate that a call from the flight crew is received.

**ATT BUTTON AND LED**
When pushed communication with the 2nd flight attendant phone is possible (if installed). A brief chime is given in the cabin and the LED above the button at the respective flight attendant phone illuminates to indicate that a call is received.
Ground Control Panel
MICROPHONE BUTTONS (6)
When pushed microphone audio signals are supplied directly to the appropriate transceiver or to an interphone channel (INT).

EMER BUTTON
When pushed, the microphone is directly connected to the adjacent COM transmitter (LH inside to COM1, RH side to COM2). All interconnections are isolated and the Cockpit Speaker is disconnected.

SPEAKER VOLUME CONTROL
Adjusts the volume of the speaker.

HEADPHONE VOLUME CONTROL
Adjusts the headphone volume.

ST/SPKR ON/SPKR OFF CONTROL
Prevents undesirable feedback of speaker sidetone audio into the transmitting microphone. When pushed in the speaker is turned OFF. When pushed out the speaker is ON.
COM AUDIO ON/OFF/VOLUME CONTROLS (5)
These latching controls select the connected COM receivers. The audio channel is energized in the out (unlatched) and de-energized when in (latched) position of control. Rotation of control adjusts the audio level from minimum at the ccw position to maximum at the cw position.

NAV AUDIO ON/OFF/VOLUME CONTROLS (4)
These latching controls select the connected NAV receivers. The audio channel is energized in the out (unlatched) and de-energized when in (latched) position of control. Rotation of control adjusts the audio level from minimum at the ccw position to maximum at the cw position.

DME AND MLS AUDIO ON/OFF/VOLUME CONTROLS
These dual channel selectors energize the audio of two channels when unlatched. Each channel's audio level is at a minimum when the control is at a center position. Rotating the control in either direction from center increases the volume of one channel only. The audio signal of both channels is de-energized when the control is latched.
**MIC/MASK SELECTOR**
In MIC position (pushed in) microphone signals are supplied from the headset or hand microphone to the transmitter. In MASK position (pushed out) signals are supplied from the oxygen mask microphone and the speakers are switched on.

**MKR VOLUME CONTROL**
This control is a latched button used to control the marker audio volume.

**MKR MUTE/LO SENS/HI SENS CONTROL**
Selects the marker receiver sensitivity by turning the control ccw (LO SENS) or cw (HI SENS). It also provides muting capability.

**ID/VOICE/BOTH CONTROL**
This control selects the ident filter. In ID position the VOR or ADF identification code is audible. In VOICE position the morse code audio is suppressed. In BOTH position ID and VOICE audio are audible.
Cockpit Voice Recorder

- **CVR AREA MICROPHONE**

- **ERASE BUTTON**
  When pressed for 5 seconds on ground the recording will be erased.

- **TEST BUTTON**
  Selects the system’s self-test.

- **STATUS ANNUNCIATOR**
  Indicates the level of recorded volume.

- **HEADPHONE JACK**
  Used to plug in a headset for monitoring the test tone or the audio being recorded.

**Cockpit Voice Recorder**
**Radio Management Unit (Sheet 1 of 3)**

**PHOTO SENSOR**
Controls the LCD brightness of the RMU display automatically.

**COM/NAV FREQUENCY TRANSFER BUTTON**
The frequency transfer buttons COM (LH) and NAV (RH) change the active frequency (line 1) and the preset frequency (line 2) of the COM or NAV window.

**LH/RH LINE SELECT KEYS**
Move the cursor box on the display or select additional modes. The first push causes the cursor box to surround the data field associated with that particular line select key. This connects the data field to the tuning knobs for frequency or mode change.

**FUNCTION KEYS**
Refer to next page.

**TUNING KNOBS**
These knobs control the data field enclosed by the cursor box. This may be a frequency or mode depending upon the selected data field. The larger knob also controls the CRS selector when in NAV mode. When the DIM button is pushed the larger knob allows for brightness control of the display for night flight.
1/2 BUTTON
The 1/2 (cross side) button transfers the RMU operation and display to the cross side radio system. The legend color changes from white to amber. When the cursor box is in the ATC field, the 1/2 button switches over to the other ATC unit if two ATC units are installed.

DIM BUTTON
The DIM (dimming) button connects the RMU brightness control to the tuning knob allowing the display brightness to be adjusted.

SQ BUTTON
When pushed the COM radio opens its squelch circuit. The letters SQ are annunciated in the message line of the COM window.

ID BUTTON
The ID (identification) button puts the ATC transponder in the identification response mode. The ident squawk terminates after 18 seconds.

PGE BUTTON
Pressing the PGE (page) button allows access to all possible pages on the RMU. The accessible pages are listed and can be displayed by pressing the adjacent line select key.

DME BUTTON
The DME button de-slaves the DME from the active VOR frequency and allows tuning of a different DME channel without changing the active VOR (DME HOLD function).

TST BUTTON
The TST (test) button causes the connected radio system enclosed with the cursor box on the RMU display, to activate its internal self–test circuits.

STO BUTTON
The STO (store) button stores a preselected frequency in memory and assigns a numbered location, provided the cursor has first been placed around the TEMP display.

Radio Management Unit (Sheet 2 of 3)
Radio Management Unit (Sheet 3 of 3)
SYSTEM INSTALLATION ANNUNCIATOR
The annunciator 1 indicates that the CDH is connected to the COM 1 and NAV 1 radio systems. Annunciators 2 and 3 are not used.

NAV AUDIO ANNUNCIATOR
This annunciator indicates when NAV audio is on.

TX ANNUNCIATOR
The TX (transmit) annunciator indicates when the COM system is transmitting.

SQ ANNUNCIATOR
The SQ (squelch) annunciator indicates that the squelch is open.

COM 1 HOT BUTTON
Normal operation (COM 1 white)
- Normal VHF 1/2 operation
- When pressed in, the HOT light is illuminated. Battery power is supplied directly from the DC HOT BUS 2 to the VHF COM 1 system and CLR DLY as well as to the audio control panel 2 without having electrical power set to on.

EMERG ANNUNCIATOR
The EMRG annunciator indicates when the CDH is selected for use in the emergency mode.

REMOTE ANNUNCIATOR
The RMT (remote tune) annunciator is inactive.

NAV AUDIO BUTTON
The NAV AUDIO button toggles NAV 1 audio on or off.

Clearance Delivery Head (Sheet 1 of 2)
RADIO TUNING ANNUNCIATOR
The tuning knobs change the frequency indicated by the tuning cursor.

TRANSFER BUTTON
The transfer button selects either the COM frequency or the NAV frequency to be connected to the tuning knobs.

MODES SELECTOR KNOB
The mode selector knob provides alternate selection of normal and emergency modes.

SQ BUTTON
The SQ (squelch) button opens and closes the COM 1 squelch filter.

INNER/OUTER TUNING KNOB
These tuning knobs change the frequency indicated by the tuning cursor.

TUNING CURSOR
It indicates which frequency can be changed by the tuning knobs.

Clearance Delivery Head (Sheet 2 of 2)
## CAS Field and System Messages

<table>
<thead>
<tr>
<th>MESSAGE (SYNOPTIC)</th>
<th>WARN TONE</th>
<th>CONDITION</th>
<th>INHIBIT</th>
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</thead>
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<tr>
<td>Location (COLOR)</td>
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<td></td>
</tr>
<tr>
<td>RMU 1 – 2 FAIL</td>
<td></td>
<td>RMU 1 or 2 has failed.</td>
<td>X</td>
</tr>
<tr>
<td>CAS Field (AMBER)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA IN USE</td>
<td></td>
<td>PA system is used by the flight attendant.</td>
<td>X</td>
</tr>
<tr>
<td>CAS Field (BLUE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VHF COM 1 – 2 INOP</td>
<td></td>
<td>VHF 1 or 2 is inoperative.</td>
<td>X</td>
</tr>
<tr>
<td>CAS Field (BLUE)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Message inhibit logic:
1. WOW, Engines off and Electrical Bus Failure refer to section 12–31–17–04
2. Takeoff phase
3. Landing phase
HF Communication System – Component Location
HF Control Unit

FREQ/CHAN DISPLAY WINDOW
The display window shows the frequency and the channel number as well as the various annunciators.

MODE BUTTON
This button is used to select the USB, LSB, or AM mode.

FREQ/CHAN BUTTON
This button selects either direct tuning or preset channel operation.

SQUELCH CONTROL KNOB
The squelch knob controls the background noise.

CLARIFIER CONTROL KNOB
If the receiving transmission is unclear, push the knob out and rotate it either way to achieve natural voice quality. When the knob is pushed in the clarifier control has no effect. Use clarifier operation only when necessary.

FREQ/CHANNEL SELECTOR KNOB
These knobs (large and small) are used to select either frequency or channel.

OFF/VOLUME CONTROL KNOB
The off/volume control knob turns the system on or off and controls the volume.
Dornier 328Jet - Communications

**MODE ANNUNCIATOR**
The mode annunciate displays the mode being selected (USB, LSB, AM).

**TX ANNUNCIATOR**
The TX (transmit) annunciate flashes during tuning sequence and as a prompt to stow the transmit frequency.

**AUTOMATIC READOUT DIMMING**
The automatic readout dimming controls the brilliance of the display.

**STO BUTTON**
The STO button is used to program simplex as well as receive–only frequency.

**PGM BUTTON**
The PGM button is used to change the frequency and emission mode of a preset channel.

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**HF Control Unit (Sheet 2 of 2)**
COMMUNICATION

GENERAL
This section describes those units and components which furnish a means of communicating from one part of the airplane to another and between the airplane and ground stations. It includes voice, data, and CW communicating components, PA system, intercom and tape reproducers as follows:

- Speech Communication (Subsection 12–23–03–00)
- Data Transmission and Automatic Calling (Subsection 12–23–04–00)
- Passenger Address and Entertainment (Subsection 12–23–05–00)
- Audio Integrating (Subsection 12–23–06–00)
- Static Discharging (Subsection 12–23–07–00)
- Audio and Video Monitoring (Subsection 12–23–08–00)
- Integrated Automatic Tuning (Subsection 12–23–09–00).

SPEECH COMMUNICATION
This subsection describes the system which utilizes voice modulated electromagnetic waves to transmit and/or receive messages from air to air, or air to ground installations. It includes VHF, HF, UHF, and other communication transmitting and receiving equipment.

DATA TRANSMISSION AND AUTOMATIC CALLING
This subsection describes the system which presents information derived from pulse coded transmission. It includes SELCAL, CALSEL, ACARS, teleprinter etc.

PASSENGER ADDRESS AND ENTERTAINMENT
This subsection describes the system which is used to address the flight crew and passengers and entertain the passengers. It includes items such as amplifiers, speakers, handsets, reproducers, control panels, audio equipment, etc.

AUDIO INTEGRATING
This subsection describes the system which controls the output of the communication and navigation receivers into the flight crew headphones and speakers and the output of the flight crew microphones into the communication transmitters. It includes items such as audio control panels, microphones, headphones, flight compartment speakers, etc.
STATIC DISCHARGING
This subsection describes the system which is used to dissipate static electricity.

AUDIO MONITORING
This subsection describes the system which records or monitors crew or passenger conversation for security or safety purposes. It includes voice recorders.

INTEGRATED AUTOMATIC TUNING
This subsection describes the system which maintains integrated control of the operating frequencies of communication and navigation transmitter/receivers after either a manually inserted command or a preprogrammed integration flight system command. The subsection includes such items as integrated frequency selector panels, digital frequency control computers, integrated frequency display panels, etc.

OPERATION

Bus Systems
The communication systems are connected via different busses and discrete connections. The busses transfer communication and navigation information as well as control and tune signals.

The following busses are provided in the airplane for the communication systems:

- RSB (Radio System Bus) PRIM
- RSB SEC SYST 1 (secondary system 1)
- RSB SEC SYST 2 (secondary system 2)
- AUDIO BUS 1
- AUDIO BUS 2.

The radio management units (RMUs) control and tune the COM and NAV radio systems via the RSBs. The COM and NAV radio systems transfer the navigation and system status information to the RMUs via the RSBs. RSB PRIM is the main bus for the LH and RH COM and NAV radio systems. The RSB SEC SYST 1 connects the LH COM and NAV radio systems with the RMU 1 and IAC 1. The RSB SEC SYST 2 connects the RH COM and NAV radio systems with the RMU 2 and IAC 2.

The audio integrating system controls and monitors the audio signals of the COM and NAV radio system via the AUDIO BUS 1 and the AUDIO BUS 2.

In case of a RSB failure the L/H and R/H audio control panels can be cut off from the RSB by pressing the associated EMERG button. The L/H microphone and headset are directly linked to the COM 1 unit as the R/H microphone and headset are linked to COM 2. As the two units are strictly separated, no loudspeaker and no intercom is available.

For a detailed description of the busses refer to the HONEYWELL SYSTEM MAINTENANCE MANUAL.
VHF COMMUNICATION SYSTEM

GENERAL
The airplane has two VHF COM systems designated as VHF COM 1 and VHF COM 2. The VHF COM system is a short range voice communication system. The frequency range is 118.000 to 136.975 MHz (extended 151.975 MHz) with a channel spacing of 8.33 kHz.

INTEGRATED COMMUNICATION UNIT (ICU)
The ICU is installed in a mounting tray which is fitted with connectors and a fan. The fan operation is controlled by the power signals of the ICU according to their internal cooling requirements. The ICU 1 is located in the LH avionic rack and the ICU 2 in the RH avionic rack.

The ICU consists of the following modules:

- VHF COM transceiver module
- Digital audio interface circuitry
- Cluster module
- ATC transponder module.

The VHF COM transceiver consists of the following modules:

- Power supply
- Receiver
- Synthesizer
- Transmitter
- Audio circuitry.

The VHF COM transceiver module has a dual bandwidth, a squelch function and an automatic time out. After approximately two minutes of continuous transmission, the transmitter returns to receive mode and sounds a tone to trigger crew awareness in case of a stuck PTT button.

If the unit transmits for extended periods the transmitter temperature rises. The transmitter power is automatically reduced to protect the device from overheating.

The system interface is made via the main connector and the antenna interface via the RF connectors.

The cluster module is a single printed circuit board. It distributes all signals from the airplane wiring harness, with the exception of the antennas, via the digital audio interface circuitry to the various ICU modules.

VHF COM ANTENNA
The two VHF COM antennas are identical. The VHF COM 1 antenna is located on the upper fuselage and the VHF COM 2 antenna on the lower fuselage.
COM 1 HOT BUTTON AND CLEARANCE DELIVERY HEAD
The COM 1 HOT button is used to operate the COM 1 communication unit without the aircraft having powered up. It connects COM 1, the clearance delivery head (CDH) audio control panels 1 and 2 directly to DC HOT BUS 2. For information about the CDH see chapter 12–23–09–00.

SYSTEM OPERATION
When airplane electrical power is set to on, 28 VDC ESS BUS supplies the VHF COM 1 system with 28 VDC via the circuit breaker COM 1.

The 28 VDC BUS 1 supplies the VHF COM 2 system with 28 VDC via the circuit breaker COM 2.

If the airplane power is disconnected, the VHF HOT button must be pushed in to supply power from DC HOT BUS 2 to the VHF COM 1 system and CLR DLY as well as to the audio control panel 2.

The radio management units (RMUs) of the integrated automatic tuning system control the VHF COM system. To transmit the PTT button on the control wheel or the hand mike must be pressed.

OPERATION WITH OTHER SYSTEMS
Integrated Tuning System
The RMU 1 controls the VHF COM 1 system. The RMU 2 controls the VHF COM 2 system. The integrated tuning system provides the clearance delivery head (CDH) as a standby control panel for the VHF COM 1 system. With the 1/2 button on the RMU it is possible to control the off–side system as well.

Audio Integrating System
The audio control panels of the audio integrating system select all audio signals produced by and feeding the ICUs.

Data Acquisition System
The DAU 1 records the PTT events of the VHF COM 1 and VHF COM 2 system.

Landing Gear Position and Warning
The landing gear position and warning system supplies a weight–on–wheels (WOW) signal to the ICU 1 and 2.

Flight Management System (FMS)
The FMS in the integrated avionic computer 1 (IAC 1) is able to tune the COM frequency via the RMU.
HF COMMUNICATION SYSTEM

GENERAL
The HF radio set provides long range voice communication in the frequency range from 2.0 to 29,9999 MHz. The set's 280,000 frequencies, spaced 100 Hz apart, are combined with three modes of operation (upper side band (USB), lower side band (LSB) and amplitude–modulation equivalent (AM)) to make it a highly effective and reliable communication system. 99 of these 280,000 frequencies can be preset in channels. The components of the set are a single side band controlled transmitter/receiver, an antenna with tuning and coupling devices, and a control unit.

The HF radio set is powered by 28 V DC NON ESS BUS and protected by a circuit breaker labeled HF1.

HF TRANSCEIVER
The HF transceiver is located in the rear avionic compartment. It is a single sideband (SSB) transmitter/receiver programmable over the range of 2,0 MHz to 29,9999 MHz with a channel spacing of 100 Hz. It can be operated in USB, LSB or AM modes. The transmitter drives a 100 W power amplifier.

The HF transceiver is connected to the HF control unit and the HF antenna coupler.

HF ANTENNA
The HF antenna is located on the upper fuselage RH rear of the wings. It is a wire antenna positioned between frame 39 and the top of the leading edge of the vertical stabilizer.

HF ANTENNA COUPLER
The HF antenna coupler is located in the rear avionic compartment.
It contains a 150 W SSB amplifier and a microprocessor for antenna tuning. The output is 150 W peak envelope power in SSB mode and 37.5 W in AM mode.

HF CONTROL UNIT
The HF control unit is located on the center pedestal panel.

It indicates and controls all the functions of the HF communication system. Frequencies are displayed on self dimming gas discharge numerics and all modes are annunciated.

There are two methods of frequency selection:

– direct tuning or
– preset frequencies stored under a channel number.
SYSTEM OPERATION

HF Antenna Coupler
The HF antenna coupler is controlled by the HF control unit and driven by the HF transceiver. The coupler circuit automatically tunes the HF antenna once the PTT switch is pushed. This takes about 3 seconds.

HF Control Unit
The following controls are grouped on the HF control unit which is located on the lower left hand side of the center pedestal:

FREQ/CHAN DISPLAY WINDOW
The display shows the frequency and the channel number as well as the various annunciators. During tuning the frequency digits are blank. The frequency digits flash if there is a fault during tuning or transmission. The fault indication can be cleared by pushing the PTT switch or changing channels. Repeated tuning failures indicate a system malfunction.

MODE ANNUNCIATOR
The mode annunciator displays the modes USB, LSB, AM and AM + USB.

PGM ANNUNCIATOR
The PGM annunciator shows when the system is in program mode.

TX ANNUNCIATOR
The TX annunciator flashes during the tuning sequence and as a prompt to store the transmit frequency when programming a channel.

MODE BUTTON
The following modes are set by pushing the MODE button:

- LSB
- AM
- USB
- AM + USB : reduced carrier mode A3A.

FREQ/CHAN BUTTON
The FREQ/CHAN button selects either direct tuning or preset channel operation. If all 99 channels have been preset, push this button in (CHAN operation) and select the desired preset channel by using the frequency/channel selector knob.
PGM BUTTON
The PGM button is used to change the frequency and emission mode of a preset channel. The program mode must be used for setting or changing any of the 99 preset frequencies. Each of the 99 channels may be preset receive-only or transmit and receive on the same frequency (simplex).

The operating mode (USB or AM) must be the same for both receive and transmit and can also be preset. When the PGM switch is activated, the letters PGM will appear in the lower right part of the display window.

NOTE: Use a pencil or similar pointed object to push the PGM button “in” or “out”. The button is recessed to prevent an accidental activation.

FREQ/CHAN SELECTOR KNOB
The frequency/channel selector knob consists of two concentric knobs (large and small) for selecting either frequencies or channels. The larger concentric knob when rotated causes one of the displayed frequency digits to flash.
This flashing “cursor” indicates which frequency digit will be changed by twisting the smaller concentric knob. Working from right to left or left to right, position the “cursor” on each digit with the larger knob and select the new number with the smaller knob. Once all digits are changed, twist the larger knob one more click right or left, and the “cursor” will disappear (stow). To recall the “cursor” simply twist the larger knob in either direction until the “cursor” is positioned on the digit to be changed.

Channel Mode:
The outer knob has no function. The inner knob changes the channel number. The preset frequency allocated to a channel is displayed next to the channel number.

Frequency Mode:
The outer knob controls the position of the cursor. The selected digit flashes. Rotating the inner knob changes the selected digit.

STO BUTTON
The STO button is used to program simplex channels as well as receive-only channels except the STO button is pressed twice after a frequency is entered to store it in both receive and transmit positions.

NOTE: Use a pencil or similar pointed object to push the STO button “in” or “out”. The button is recessed to prevent an accidental activation.
OFF/VOLUME CONTROL KNOB
The OFF/VOLUME control knob turns the system on or off. Clockwise rotation past the first click activates the system. Further rotation increases the audio level.

NOTE: Warm-up takes about two minutes.
If the FREQ/CHAN button is out, the system becomes operational on the frequency last transmitted (direct tuning operation).
If the FREQ/CHAN button is in, the system becomes operational and will display the channel last transmitted, along with the corresponding frequency (channelized operation).

AUTOMATIC READOUT DIMMING
The automatic readout dimming provides control of the light intensity of the display characteristics during day/night condition.

SQUELCH CONTROL KNOB
The SQUELCH control knob is set by rotating it clockwise until background noise can be heard, then counterclockwise until the noise is just barely audible or absent. Readjustment may be required frequently.

CLARIFIER CONTROL KNOB
The CLARIFIER control knob assists in SSB (single sideband) reception when the ground station is slightly off frequency resulting in unnatural voice quality. When receiving an unclear transmission, pull out the knob and rotate it either way to achieve natural voice quality. When the knob is pushed in the clarifier control has no effect and should be left in this position. Use clarifier operation only when necessary.
OPERATION WITH OTHER SYSTEMS

VHF Communication System
The VHF COM 2 system digitizes the HF audio signal and feeds it to the digital audio bus. The input signal to the VHF COM system is muted during HF transmission.

Audio Integrating System
The microphones and loudspeakers are controlled from the audio panels.

VHF Navigation System
The input signal to the ADF system is muted during HF transmission.
SELCAL SYSTEM

GENERAL
The SELCAL system allows a suitably equipped ground station to call a particular airplane using HF/VHF COM without the pilot having to monitor the station frequency continuously. The ground station transmits a coded dual tone signal which is received by the HF/VHF receiver tuned to the appropriate frequency and then routed to the SELCAL decoder. The decoder activates the HF/VHF2 button light on the CALLS control panel and the alarm tone generator if the received code corresponds to the 4–letter code selected on SELCAL unit.

SELCAL UNIT
The SELCAL unit is located in the rear avionic bay. It is a two channel decoder with solid state circuitry. A self–test checks the alert and indicator circuitry when activated by the flight crew. The airplane’s SELCAL code is set with 4 thumbwheels (4–letter code) on the SELCAL unit.

SYSTEM OPERATION
The NON ESS BUS supplies the SELCAL system with 28 VDC via the circuit breaker SELCAL.

When a call is received, the passenger address amplifier alerts the flight crew with a brief chime in the flight crew headset and the cockpit loudspeaker.

HF/VHF2 Button
HF BUTTON LIGHT
The button light illuminates when a call is received on the HF communication system. Pushing the annunciator after a call resets the system.

VHF 2 BUTTON LIGHT
The button light illuminates when a call is received on the VHF 2 communication system. Pushing the annunciator after a call resets the system.

TEST BUTTON
Pushing this button activates the self–test. Both annunciators illuminate if the test is successful.

OPERATION WITH OTHER SYSTEMS
Passenger Address System
The passenger address amplifier provides a brief chime when the SELCAL system receives a call.

VHF Communication System
The VHF COM 2 system provides the VHF audio signal to channel 2 of the SELCAL unit.

HF Communication System
The HF COM system provides the HF audio signal to channel 1 of the SELCAL unit.
PASSENGER ADDRESS SYSTEM

GENERAL
The passenger address (PA) system consists of a passenger address part and an interphone part.

The passenger address system allows the crew to make announcements to the passengers (passenger address part) and to communicate between the flight compartment, the passenger compartment and the ground crew (interphone part).

Passenger announcements are made via the passenger compartment speakers, ground crew communication via the ground crew jack box, and passenger compartment crew communication via the flight attendant phone.

The PA system is controlled from the calls control panel, the flight attendant phone(s), and the audio control panels.

PA AMPLIFIER
The PA amplifier is installed in the LH avionic rack. It consists of an audio amplifier, a signal generator and a voltage regulator.

The PA amplifier supplies and amplifies the microphone input signals from the flight compartment crew, the passenger compartment crew and the ground crew. It controls the passenger call system and generates a chime when the passenger information lights are switched on.

CALLS CONTROL PANEL
The CALLS control panel is installed in the overhead panel. It controls the FLT call and EMG call lights on the flight attendant phone(s), the CAPT light in the flight attendant panel and the sonalert signal provided on the ground control panel. The HF/VHF 2 SELCAL lights are also provided on this panel.

The CALLS control panel indicates call signals from the flight attendant phone(s) and the flight attendant control panel, from the GROUND control panels crew jacks to the flight compartment and from the HF/VHF2 communication system.

FLIGHT ATTENDANT PHONE
The flight attendant phone is located on the LH front passenger compartment wall and at the galley location if installed. The flight attendant phone provides communication with the flight crew/second flight attendant and also allows PA announcements.

The flight attendant phone consists of a handset with microphone, microphone button and earphone, and a chassis with microphone power amplifier, receiver, buttons, and indicator lights.
GROUND CREW JACKS
The ground crew jacks are located in the GROUND control panel behind an access door. The jacks consist of a MIC jack and a PHONE jack. A CALL button and a sonalert are also provided. A headset can be connected to enable a ground crew outside the airplane to communicate with the flight crew or vice versa.

SYSTEM OPERATION
The 28 VDC ESS BUS supplies the passenger address system via the circuit breaker PAX ADDRESS.

Passenger announcements by the flight crew are controlled from the audio control panels.

CALLS Control Panel
The CALLS control panel operates as follows:

– EMG CALL button
  Push for emergency communication with the flight attendant station (flight attendant phone). The button light illuminates amber if this mode is selected. It flashes and a brief chime is given to indicate that an emergency call from the flight attendant is received.

– CABIN CALL button
  Push for communication with the flight attendant station (flight attendant control panel). The button light illuminates white if this mode is selected, or flashes and a brief chime is given to indicate that a call from the flight attendant is received.

– GND CALL button
  Push for communication with the ground crew. The button light illuminates white if this mode is selected, or flashes to indicate that a call from the ground crew is received.

NOTE: The ground crew communication is disabled when flight attendant mode is selected.

Pushing a button once initiates a call, and a second push cancels it. Each button illuminates when the mode is selected, and also to indicate a call from the flight attendant phone or ground crew jacks as appropriate. A chime is initiated at the destination to alert the crew to the call. If a call is received, pushing the illuminated button establishes communication with the hot mike.

– HF/VHF2 button
  The HF light illuminates and a brief chime is given when a call is received on the HF communication system.
  VHF2 (white)
  The VHF 2 light illuminates and a brief chime is given when a call is received on the VHF2 communication system.

Pushing this button resets the decoder channels and lights.
Flight Attendant Phone
For communication with the flight crew and for passenger announcements the flight attendant phone has the following buttons with the corresponding LEDs:

- **ATT Button**
  Push the button to communicate with the second flight attendant phone if installed. A brief chime is given at the other station and the LED illuminates if this mode is selected, or illuminates to indicate that a call from the flight attendant is received.

- **FLT Button**
  Push the button to communicate with the flight crew. A brief chime is given in the cockpit and the LED flashes if this mode is selected, or illuminates to indicate that a call from the flight crew is received.

- **PA Button**
  Push the button to make a passenger announcement. The LED illuminates if this mode is selected.

- **EMG Button**
  Push the button for emergency communication with the flight crew. A brief chime is given in the cockpit and the LED flashes if this mode is selected, or illuminates to indicate that a call from the flight crew is received.

- **PTT Button**
  Push the PTT switch (inside the handset) to talk.

Ground Crew Jacks
The ground control panel has a MIC and a PHONE jack to connect the ground crew headset. When the GND CALL button is pressed, the ground crew can communicate with the flight crew. A sonalert sounds to indicate a call from the flight crew.
OPERATION WITH OTHER SYSTEMS

Audio Integrating System
The audio integrating system supplies PTT and audio signals to the PA system. The audio control panels 1 and 2 control the flight crew and passenger announcements. The PA system supplies a side tone signal and chimes to the audio integrating system.

Cockpit Voice Recorder System
The PA system supplies PA audio signals to the CVR.

Furnishing
The PA system supplies PA audio signals to the flight compartment speakers and the speaker in the passenger service units.

Data Acquisition System
The PA system supplies a PA in use signal to the data acquisition system.

Control and Dimming
The control and dimming system supplies 28 VDC lighting power to the PA system.

Passenger Service Lighting and Call
The passenger service unit supplies a passenger call signal to the PA amplifier.

Miscellaneous Components
The PA system supplies a call signal to the call lights on the forward/aft flight attendant phone.

Passenger Information Light
The PA amplifier generates a chime when the FASTEN SEAT BELTS or NO SMOKING lights illuminate.
AUDIO INTEGRATING SYSTEM

GENERAL
The airplane has an audio integrating system with an intercommunication part and an interphone part.

The audio control panels 1 and 2 control the audio integrating system. The intercommunication part allows voice communication via the airplane communication systems and monitoring of the audio outputs of all communication and navigation systems.

The interphone part allows voice communication between CAPT, F/O, observer, flight attendant and the ground crew.

The audio integrating system communicates with all connected systems via the radio system bus (RSB).

Audio signals from any system, from the ground crew and from the airplane audio warning system are supplied to the CAPT’s, F/O’s, and observer headphones and additionally to the speakers. Audio output signals can be supplied from a headset microphone or from a hand microphone.

An emergency operation mode can be initiated by pressing the emergency selector. In this mode the microphone is connected directly to a predetermined COM transmitter and the received audio is connected directly to the headphone.

AUDIO CONTROL PANEL
The audio control panels are installed in the flight compartment. The audio control panels 1 and 2 are provided for the pilots and located in the upper LH and RH corner of the center pedestal. A third audio control panel is provided for the observer at the RH position of the jump seat.

Each audio control panel is equipped with microphone input selectors and with audio on/off/volume controls. Interphone communication and all installed radio systems can be selected for monitoring and transmission from either audio control panel.

In case of power down or audio system failure the audio control panel provides an emergency operation mode. The emergency selector bypasses all circuitry within the audio control panel and feeds the emergency COM and/or NAV audio directly to the headphone. It also connects the microphone signals to the emergency COM system.

The audio control panel contains all amplifying and buttoning circuits necessary for radio and interphone communication.

Ten audio channels are associated with each radio system for a total of twenty in the airplane. The other ten channels are available for optional radio systems.
In each channel, all input signals received are combined in mixing circuits in which each signal can be buttoned on and off separately.

After the input signals are buttoned and mixed, each channel divides into headphone and speaker channels. Microphone signals are divided into interphone and transmitting audio channels.

The audio control panel also includes circuits for the passenger address system and a cockpit voice recorder output.

HAND MICROPHONE
One hand microphone is located on the outboard side of the flight compartment on both the CAPT’s and F/O’s side panel.

The microphone can be used for passenger announcements or it can be connected to the desired COM transmitter. Pressing the PTT button on the hand microphone activates the transmitter.

FLIGHT COMPARTMENT SPEAKERS
The flight compartment speakers are located in the flight compartment ceiling.

When selected, the speakers deliver the same audio as the headsets. The speakers are disabled when EMER is selected on the audio control panels.

PTT BUTTON
The PTT buttons are located on the outboard horn of each control wheel.

The PTT button is a three–position type. In the upper position (IC) the button allows normal intercommunication (hot mike). In the centered position it provides cold mike feature. In the lower position (XMT) the button activates the COM transmitter and keys the headset microphone. This position is spring–loaded to the center position.

SYSTEM OPERATION
The audio integrating system is supplied with 28 VDC. The audio control panel 1 is connected to the 28 VDC ESS BUS via the circuit breaker AUDIO 1.

The audio control panel 2 is connected to the 28 VDC BUS 2 via the circuit breaker AUDIO 2.

The system communicates with all connected COM, NAV and audio systems via a digital bus system (RSB). Audio connection is made when headset connectors are plugged into the appropriate mic and phone jacks or when flight compartment speakers are selected. The PTT button on the control wheels or on the hand microphones, activate the transmit mode and apply the microphone audio signals to the selected set or interphone system. Incoming audio signals are applied to speaker and headphone.
Audio Control Panel
The audio control panel operates in the following modes:

- **Interphone Mode (INT)**
  Used for crew intercommunication.

- **Transmit Mode**
The required transmitter is selected by pushing the appropriate microphone button. Radio transmission is controlled by the PTT button on the control wheels or on the hand microphones.

- **Receive Mode**
The required receiver is selected by the appropriate audio on/off/vol selector.

- **Passenger Address Mode (PA)**
  Used for passenger announcements.

The function of the front panel controls is as follows:

- **MICROPHONE Buttons**
  When pushed in, microphone audio signals are supplied directly to the appropriate transceiver or to an interphone channel (INT). The PA control selects the passenger address amplifier.

- **EMER Button**
  When pressed the emergency selector connects the microphone signals directly to the selected COM transmitter and the received audio signals are connected directly from the receiver to the headphone. When EMER is selected, headphone volume is controlled by the HEADPHONE audio control. All electronic circuitry in the audio control panel is eliminated in EMER mode. This mode disables all other audio control panel modes.

- **COM and NAV Audio On/Off/Volume Controls**
  These latching controls select the connected COM/NAV receivers. The audio channel is energized in the out (unlatched) position of the control and de-energized when in (latched). Rotation of the control adjusts the audio level from minimum at the ccw position to maximum at the cw position.

- **DME and MLS Audio On/Off/Volume Controls**
  These dual channel selectors energize the audio of two channels when unlatched. Each channel's audio level is at a minimum when the control is at the center position. Rotating the control in either direction from center increases the volume of one channel only. The audio signals of both channels are de-energized when the control is latched.

- **MIC/MASK Button**
  In MIC position (pushed in) the microphone signals are supplied from the headset or hand microphone to the transmitter. In MASK position (pushed out) the signals are supplied from the oxygen mask microphone, the headset microphone is disabled and the speakers are switched on.

- **ID/VOICE/BOTH Control**
  This control selects the ident filter. In ID position the VOR and ADF ground station identification morse code is audible. In VOICE position the morse code audio is suppressed. In BOTH position both ID and VOICE audio are audible.
– SPEAKER Volume Control
This control adjusts the volume of the speaker. It works in series with the COM and NAV audio on/off/volume controls.

– ST/SPKR ON/SPKR OFF Control
This control is used to prevent undesirable feedback of speaker sidetone audio into the transmitting microphone. When transmitting, both the on–side and off–side speaker sidetone audio levels will be lowered. In addition, the off–side headphone and sidetone are lowered. When latched the flight compartment speaker is turned OFF. When unlatched the speaker is ON.

– MKR Volume Control
This control is a latched button used to control the marker audio volume. This control will not turn down the volume below a level which is set by a potentiometer inside the audio control panel. When pushed out and turned it adjusts the volume of the audio signal.

– MUTE/HI SENS/LO SENS Control
To select the marker receiver sensitivity the control can be turned ccw (LO SENS) or cw (HI SENS). It also provides muting capability.

– HEADPHONE Volume Control
This control adjusts the headphone volume. It works in series with the COM and NAV audio on/off/volume controls.

OPERATION WITH OTHER SYSTEMS
VHF Communication System
The VHF COM system supplies audio input signals via the audio bus system to the audio integrating system.

The audio integrating system supplies PTT and microphone audio signals via the audio bus system to the VHF COM transmitter.

Emergency COM microphone and audio signals are supplied directly to and from the VHF COM 1 system.

Passenger Address System
The passenger address system supplies the side tone and warning chimes to the audio integrating system.

The audio integrating system supplies PTT and microphone audio signals to the PA system.

Cockpit Voice Recorder System
The audio integrating system supplies microphone, headphone and area microphone audio signals to the cockpit voice recorder.

Integrated Automatic Tuning System
The audio integrating system communicates via the audio bus with the integrated automatic tuning system and supplies marker sense signals to the RMUs.
Integrated Avionics Computer System
Warn tone audio is supplied from the integrated avionics computer system to the audio integrating system.

Control and Dimming
The control and dimming supplies 28 VDC lighting power to the audio control panels.

VHF Navigation System
The VHF navigation system supplies identify audio input signals via the audio bus system to the audio integrating system.

Emergency NAV audio signals are supplied directly from VHF NAV 1 and 2 system to the audio integrating system.

ADF System
The ADF system supplies ADF audio signals to the audio integrating system.

DME System
The DME system provides DME ground station identify audio to the audio integrating system.
STATIC DISCHARGING

GENERAL
The static discharging system is used to reduce radio frequency electromagnetic interference associated with the discharge of airplane electrostatic charges accumulated during flight. In conjunction with the bonding the static dischargers provide a low resistance electrical path between all metal parts of the airplane.

STATIC DISCHARGER
Each static discharger consists of a base and a removable discharger wick. The static dischargers are positioned at suitable points on the airplane such as wing and empennage trailing edges. The static discharger is a graphite–coated rod of aligned fibres, tapered to improve flexibility and to provide a graded resistance that increases towards the tip. This improves the noise–quieting qualities. A resistive, heat–stabilized coating, graduated at both ends, avoids abrupt transition from the resistive film to the metallic end fittings. The discharge tip is a brush of fine nichrome wires. The discharge function remains effective with a significant reduction in the number and length of the brush strands.
COCKPIT VOICE RECORDER SYSTEM

GENERAL
The CVR system records communication between the flight compartment and the passenger compartment, the sound in the flight compartment, and passenger announcements. An impact switch prevents further recording if a crash occurs. The CVR contains an underwater locating beacon.

COCKPIT VOICE RECORDER
The CVR is a four channel tape recorder. The tape is a continuous loop with a recording duration of 30 minutes.

CONTROL UNIT
The control unit contains a microphone monitor meter, a phone jack, and a TEST and ERASE button.

REMOTE MICROPHONE
The remote microphone is installed on the flight compartment ceiling panel above the standby compass. The CVR records conversation and noises in the flight compartment via a remote microphone.

IMPACT SWITCH
The impact switch automatically cuts power to the CVR. This stops further recording and erasing of the recorded signals. A force of 3 g in the direction of flight triggers the button.

UNDERWATER LOCATING BEACON WITH BATTERY
The underwater locating beacon (ULB) is a waterproof battery–powered transmitter. A water sensitive detector starts transmission of a 35 to 40 kHz wobble tone when the CVR is under water.

SYSTEM OPERATION
The INV BUS 2 supplies 115 VAC to the CVR via the circuit breaker CVR and the impact switch.

Cockpit Voice Recorder
The CVR records crew and passenger communication on four separate channels simultaneously. The channel allocation is:

- Passenger address amplifier
- Audio line RH (headset output)
- Audio line LH (headset output)
- Remote microphone.

The CVR automatically erases and re–records the tape, so that only the last 30 minutes remains.
Control Unit
The control unit has the following functions:

- **TEST Button**
  Press the TEST button to perform a self-test of the CVR.

- **ERASE Button**
  Press the ERASE button to erase the recording. This operates only when the airplane is on the ground. If the weight–on–wheels button WOW 1 is open, ERASE is disabled.

- **Microphone Monitor**
  The microphone monitor meter shows the audio recording level. It also indicates a successful self-test.

- **Phone Jack**
  Connect a headphone to the phone jack to monitor the CVR recording.

**OPERATION WITH OTHER SYSTEMS**

**Passenger Address System**
The CVR records the output of the passenger address amplifier on channel 1.

**Audio Integrating System**
The CVR records the headset output LH from the audio control panel 1 on channel 3. It records the headset output RH from the audio control panel 2 on channel 2.

**Landing Gear Position and Warning**
When the airplane is on ground, the weight–on–wheels signal WOW 1 enables the ERASE function of the CVR.
INTEGRATED AUTOMATIC TUNING SYSTEM

GENERAL
Radio system tuning is made by a radio management unit (RMU). The LH radio system is
controlled by the RMU 1, the RH radio system by the RMU 2. It is possible to control the
off–side system by pressing the 1/2 button on the RMU.

The clearance delivery head (CDH) is an auxiliary control unit for controlling the COM 1 and the
NAV 1 radios.

The integrated automatic tuning system is the central control system for the following radio
systems:

- VHF communication system
- VHF navigation system
- ATC transponder system
- ADF system
- TCAS system
- MLS system.

The radio tuning can also be made by the flight management system (FMS). When using the
FMS to tune the radios, the digital signals from the FMS are supplied to the integrated
automatic tuning system and then are fed into the RMU where they act as if the RMU tuning
selectors were being operated.

RADIO MANAGEMENT UNIT (RMU)
The RMU 1 is installed on the LH side of the center pedestal and controls the operating mode,
frequencies, and codes in all the units of the LH radio systems, the RMU 2 is installed on the
RH side and controls the operating mode, frequencies, and codes in all the units of the RH radio
systems. Each RMU has the capability to button its operation from its primary radio system to
the cross–side system.

The RMU is a control unit featuring a color LCD display. The RMU screen is divided into six
windows. Each window groups the data associated with a particular function of the radio
system. Five windows (COM, NAV, ATC, ADF, TCAS and MLS) each provide for complete
control of both frequency and operating mode of the associated device.

The RMU has two frequency transfer buttons and five line select keys on each side of the
screen display. There are two rows of function keys with a large and a small tuning knob below
the display.

The RMU has display pages which perform functions for the control of the radio systems. The
normal six–window frequency display is called the main tuning page and is always present
under normal conditions. The other pages are associated with preset memory location and
operation for the NAV and the COM windows.
Further maintenance pages are available by a non–marked combination of keys to enable the display of various maintenance data from the radio system. In the maintenance mode of operation, a readout of various codes and operating parameters is available. This mode also allows the MLS and TCAS windows to be turned off if an MLS and/or TCAS receiver is not installed.

Circuitry within the RMU controls the light intensity and colors of the screen. The display brightness is adjusted manually by a DIM button or automatically by a photo sensor.

**SYSTEM OPERATION**

The integrated automatic tuning system is supplied with 28 VDC. The RMU 1 is connected to the 28 VDC BUS 1 via the circuit breaker RMU 1 for primary power and to the 28 VDC ESS BUS via the circuit breaker RMU 1 for backup power.

The RMU 2 is connected to the 28 VDC BUS 2 via the circuit breaker RMU 2 for primary power and to the 28 VDC ESS BUS via the circuit breaker RMU 2 for essential power.

Additionally the RMUs and the CDH are supplied with 28 VDC for panel lighting from the control and dimming system.

System interconnection is made via the PRIMARY RSB BUS. The communication with connected systems is made via the AUDIO BUS 1, the AUDIO BUS 2, the PRIMARY RSB BUS, the RSB SEC SYSTEM 1 and the RSB SEC SYSTEM 2.

The integrated tuning system controls the radio systems. It provides complete capability for controlling the operating mode, frequencies, and codes within all the units of the radio system. The RMUs provide the primary control function of the integrated radio system. Frequency may also be controlled by a radio control input from the FMS. When the FMS tunes the radios, the digital signals from the FMS come into the RMU where they act in the same manner as if the RMU tuning knob was being operated. A third method of frequency control is via the clearance delivery head.

The entire system is fitted with a built–in–test (BIT). The system BIT has three major functions:

- Preflight test
- Redundancy failures check
- Troubleshooting assistance.

Each function of the radio systems has a pilot–activated self test (PAST) that performs checks of all system functions. In addition, a power–on self test (POST) is initiated whenever power is applied. POST causes the RMU to test itself, the primary digital bus which connects both sides' radio systems, each side’s secondary bus and the interface to the remote radio units.
The BIT performs a check of numerous system and internal unit parameters. The BIT also
monitors important parameters and temperatures. When a discrepancy occurs, a code is
recorded in nonvolatile memory along with the power–up count, the elapsed time since
power–up, the module temperature and the measured value of the discrepant parameter.

To aid in troubleshooting, the maintenance memory can be read on the RMU when the airplane
is on the ground.

RMU
The RMU controls the operating modes, frequencies, and codes within all the units of the
integrated radio system.

As a safety feature, if any of the components of the radio system fails to respond to commands
from the RMU, the frequencies or operating commands associated with that particular function
will be removed from the display and replaced with dashes.

The RMU has an airplane maintenance mode of operation when not in flight. In this mode,
various pages show the maintenance log data and operating conditions of the radio system.

Photo Sensor
The photo sensor controls the LCD brightness of the RMUs automatically.

Frequency Transfer Buttons
The frequency transfer buttons COM (LH) and NAV (RH) change the active frequency (line 1)
and the preset frequency (line 2) of the COM or NAV window.

Pushing the COM and the NAV frequency transfer buttons simultaneously, while on the ground,
starts the airplane maintenance mode.

Line Select Keys
The line select keys move the cursor box on the display or select additional modes. The first
push causes the cursor box to surround the data field associated with that particular line select
key. This connects the data field to the tuning knobs for frequency or mode change.

Tuning Knobs
The tuning knobs control the data field enclosed by the cursor box. This may be frequency or
mode depending upon the selected data field.

SQ Button
When pushed the COM radio opens its squelch circuit. This allows any signal present (and
background noise) in the radio to be heard in the audio system. The letters SQ are annunciated
in the message line of the COM window.

DIM Button
The DIM (dimming) button connects the RMU brightness control to the tuning knob allowing the
display brightness to be adjusted.
1/2 Button
The 1/2 (cross side) button transfers the RMU operation and display to the cross side radio system. The legend color changes from white to magenta, digits always into amber (on–side/off–side tuning). When the cursor box is in the ATC field the 1/2 button switches over to the other ATC unit if two are installed.

STO Button
The STO (store) button stores a preselected frequency in memory and assigns a numbered location, provided the cursor has first been placed around the TEMP display.

The ADF and ATC each have one memory location. Pushing the STO button for 2 seconds stores the current ADF frequency or ATC code in the memory, provided the cursor box has first been placed around that frequency or code.

Pushing the STO button again for 2 seconds calls up the stored ADF frequency or ATC code.

ID Button
The ID (identification) button puts the ATC transponder in the identification response mode. The ident squawk terminates after 18 seconds.

PGE Button
Pressing the PGE (page) button allows access to all possible pages on the RMU. The accessible pages are listed and can be displayed by pressing the adjacent line select key.

TST Button
The TST (test) button causes the connected radio system enclosed with the cursor box on the RMU display, to activate its internal self–test circuits. The TST button must be pushed and held for the duration of the test:

- 2 seconds for the COM system
- 5 to 7 seconds for the ADF, ATC, and DME systems
- about 20 seconds for the NAV system.

Releasing the TST button at any time immediately returns the function to normal operation.

DME Button
The DME button de–slaves the DME from the active VOR frequency and allows tuning of a different DME channel without changing the active VOR (DME HOLD function). Successive pushes of the DME button enable display and selection of the DME channels in VHF and TACAN formats.

The RMU has a memory page which displays 6 of the 12 memory locations at one time. This shows the active COM or NAV frequency on the top row and below it six locations for preset frequencies followed by two rows of function messages.
To change a preset frequency move the cursor box to that position by pushing the appropriate line select key. This connects the tuning knobs to that memory location. The frequency can now be changed. Locations which are not preset to a frequency show blanks.

Pushing the COM frequency transfer button moves the frequency in the cursor box into the active window. This does not affect the memory but replaces the active frequency with the frequency stored in the selected memory location.

To add a new frequency in a particular location move the cursor box to that position. Then push the line select key next to INSERT to shift all the data from the selected location upward one position higher. The position of the cursor box remains and allows the frequency at this location to be changed.

To remove a frequency from the memory, use the line select key to position the cursor box there, and then push the line select key next to DELETE.

Pushing the line select key next to MORE displays the memory locations 7 through 12. Pushing the line select key next to RETURN brings the RMU display back to the main tuning page.

On the COM memory page the NAV frequency transfer button changes the bandwidth of the COM receiver. On the NAV memory page this button enables or disables FMS tuning.

The RMU provides a backup navigation display. The backup navigation display is accessible by the PGE button. NAV data are supplied from the NAV radios via the radio system bus (RSB). The following information can be displayed on the backup navigation page:

- **NAV:**
  Operating frequency of the NAV receiver 1 and ADF receiver 1. Pushing the line select key next to the appropriate frequency moves the cursor box to surround the frequency. The tuning knobs now control this frequency. If the frequency is changed by any other source, the change will be indicated on the backup navigation display in amber. The cursor box returns to the CRS window 20 seconds after the last tuning command is entered.

- **VOR and ADF bearing pointers** (or single and double arrows when pointers out of view).
- **Digital VOR and ADF bearing readouts** and their diamond and circle identifiers.
- **VOR/LOC lateral deviation**
- **VOR TO/FROM indication**
- **DME distance to tuned station**
- **Marker beacon indicator**
- **GS (glide slope) vertical deviation**
- **Heading information from AHRS1 or IRS 1**

- **CRS:**
  Selected course. Pushing the line select key next to the CRS readout moves the cursor box to surround it. With the tuning knobs the desired course can be selected. The large knob changes the course in 10 degree increments, the small knob changes the course in 1 degree increments.
The backup navigation display receives ADF and DME information via the RSB. VOR/ILS data are received via the RS–422 data bus directly from the NAV receiver 1.

The heading information is received from the AHRS 1 or IRS 1 via the ARINC 429.

When VOR/ILS information is not available on either the RSB or RS–422, the scale on the display is overwritten with a red X, or the digital information is replaced with amber dashes.

The backup engine display is selected by pushing the menu page button and then the line select key next to the ENGINE PG1 or ENGINE PG2 legend. The parameters displayed on the backup engine page 1 are:

- N1: Rotor speed left /right
- ITT: Inner turbine temperature left /right
- N2: High pressure turbine speed left /right
- FQ: Fuel quantity left /right
- ALT: Cabin altitude
- DP: Cabin differential pressure
- IGN: Ignition left /right
- MSG: When MSG indication flashes in amber it indicates that there is a new message on the backup engine page 2.

On the backup engine page 2 these parameters are displayed for both engines:

- FF: Fuel flow
- OIL TMP: Oil temperature
- OIL PRS: Oil pressure.

The following lines about the engine information are normally blank. The following messages appear on the display only when system conditions require:

- CPCS: Cabin pressurization control system
- PITOT S HEAT FAIL: Pitot/static system
- L AOA FAIL: Left angle of attack sensor
- R AOA FAIL: Right angle of attack sensor
- BATT 1 FAIL: Battery 1
- BATT 2 FAIL: Battery 2
- RUDDER LIMITED: Rudder is limited

This engine and airplane system data are supplied by the various system sensors via the data acquisition unit (DAU).
CLEARANCE DELIVERY HEAD (CDH)
The CDH is installed nearly in the center of the instrument panel above the landing gear control lever and provides an alternate or emergency backup capability for tuning the COM 1 and NAV 1 radios in the event RSB tuning is not available, or if the flight crew wants to override the BUS tuning via RMU or FMS.

The CDH is fitted with a liquid crystal display.

The clearance delivery head provides an alternate or emergency backup capability for tuning the VHF COM 1 transceiver and the VHF NAV 1 receiver on a separate data bus which remains operational in the event of a primary radio system bus (RSB) failure, both RMU failures, or if the pilots want to override the bus tuning. The CDH listens on the RSB and displays the active frequencies of the COM 1 and NAV 1 systems.

The CDH can be activated for initial communication on ground prior electrical power up of the airplane by switching on the adjacent COM 1 HOT button. The COM 1 HOT button connects the BAT 2 BUS exclusively to the CDH, the VHF 1 COM and the First Officer’s audio panel. Volume control and speaker selection is possible on the F/O audio panel. The Headset of the F/O, hand mike and speaker can be used for communication while the Captain’s headset and hand mike are not supported in the COM 1 HOT mode. The unit operates as a backup third control in the clearance delivery mode.

During the power up sequence, the CDH may post a power up message (ERR 13). This message will be cleared on operation of any button on the CDH.

SYSTEM OPERATION
System Installation Annunciator
The annunciator 1 indicates that the CDH is connected to the COM 1 and NAV 1 radio systems. Annunciators 2 and 3 are not used.

RMT Annunciator
The RMT (remote tune) annunciator is inactive.

NAV AUDIO Annunciator
This annunciator indicates when NAV audio is on.

EMRG Annunciator
The EMRG (emergency) annunciator indicates when the CDH is selected for the emergency backup mode. This mode locks out all other tuning sources for the COM 1 and NAV 1 radio systems. The COM 1 and NAV 1 are now tuned exclusively by the CDH. This annunciator is not related to the emergency frequency of 121.500 MHz.

SQ Annunciator
The SQ (squelch) annunciator indicates that the squelch is open.

TX Annunciator
The TX (transmit) annunciator indicates when the COM system is transmitting.
NAV AUDIO Button
The NAV AUDIO button toggles NAV 1 audio on or off.

SQ Button
The SQ (squelch) button opens and closes the COM 1 squelch filter.

Tuning Knobs
The tuning knobs change the frequency indicated by the tuning cursor.

Tuning Cursor
The tuning cursor is a lighted triangle which is controlled by the transfer button. It indicates which frequency can be changed by the tuning knobs.

MODES Selector Knob
The modes selector knob provides alternate selection of normal and emergency modes.

Transfer Button
The transfer button selects either the COM frequency or the NAV frequency to be connected to the tuning knobs.

Radio Tuning Annunciators
The annunciators are indicated individually to identify the frequencies displayed.

OPERATION WITH OTHER SYSTEMS
The integrated automatic tuning system controls the following COM and NAV systems:

– VHF communication system
– VHF navigation system
– ADF system
– ATC transponder system
– DME system.

Data Acquisition System
The data acquisition systems (DAU 1 and DAU 2) monitor the RMU backup events. Additionally the DAUs distribute engine and airplane system data to the RMUs.

Flight Management System
The flight management system (FMS) is able to tune the COM and NAV radio.

Landing Gear Position and Warning
For the RMU airplane maintenance mode (available only when the airplane is on the ground) the landing gear position and warning supplies a weight–on–wheels (WOW) signal to the RMUs.
Control and Dimming
The control and dimming supplies 28 VDC lighting power to the RMUs and to the CDH.

Audio Integrating System
The audio integrating system communicates with the integrated automatic tuning system via the audio bus and supplies marker sense signals to the RMUs.