

OPERATIONS MANUAL

SECTION 6-19

COMMUNICATION

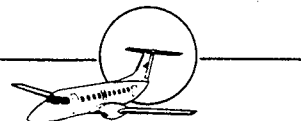
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GENERAL DESCRIPTION

The communication equipment consists of the following:

- **VHF COMMUNICATION** – Used for air-to-air and air-to-ground communication.
- **HF COMMUNICATION (OPTIONAL)** – Used for air-to-air and air-to-ground communication for distance in excess of line-of-sight.
- **AUDIO SYSTEM** – Used to select the audio signals from navigation receivers and provide communication between:
 - Crew members in the cockpit by the cockpit interphone
 - Flight crew members and ground stations via ramp interphone
 - Flight crew members and ground station via radio link
 - Flight crew members and passengers
- **SELCAL (OPTIONAL)** – Permits ground stations equipped with transmitting equipment to call individual aircraft by transmitting audio tones, which will key only an airborne decoder unit which is set to detect that particular combination.
- **VOICE RECORDER (OPTIONAL)** – An endless magnetic tape device that records all audio signals generated and received by crew members for a maximum period of 30 minutes of continuous operation. After 30 minutes new data erases and replaces the oldest data on the tape.
- **ENTERTAINMENT SYSTEM (OPTIONAL)** – Provides boarding music and messages to the passengers.



VHF COMMUNICATION (COLLINS VHF-22A)

VHF PANEL DESCRIPTION

1. **ACTIVE FREQUENCY DISPLAY** — Displays the active frequency (frequency to which the equipment is tuned) and diagnostics messages.
2. **COMPARE ANNUNCIATOR** — ACT momentarily illuminates when frequencies are being changed. ACT flashes if the actual radio frequency is not identical to the frequency shown in the active frequency display.
3. **PRESET FREQUENCY DISPLAY** — Displays the preset (inactive) frequency and diagnostics messages.

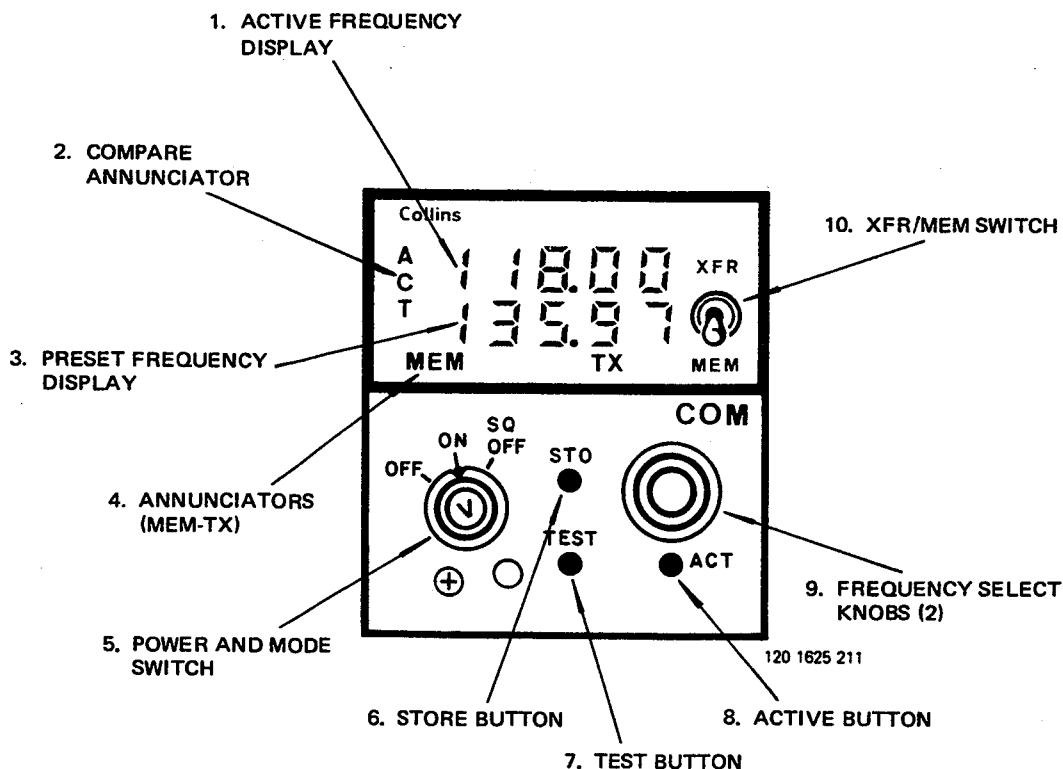
The frequencies displayed on the COM control show only five of the six digits. The sixth digit is zero (when the fifth digit is 0 or 5) or 5 (when the fifth digit is 2 or 7). For airplanes Pre-Mod. SB 120-023-0034, the equipment provides 720 channels from 118.000 through 135.975 MHz. For airplanes Post-Mod. SB 120-023-0034 or S/N 120.176, 120.187 and on, the equipment provides 760 channels from 118.000 through 136.975 MHz.

4. **ANNUNCIATORS** — The COM control contains MEM (memory) and TX (transmit) annunciators. The MEM annunciator illuminates whenever a preset frequency is being displayed in the lower window. The TX annunciator illuminates whenever the VHF-22A is transmitting.
5. **POWER AND MODE SWITCH** — The ON and OFF positions switch system power. The SQ OFF disables the receiver squelch circuits, so you should hear noise. Use this position to set volume control or, if necessary, to try to receive a very weak signal which cannot operate the squelch circuits.
6. **STORE BUTTON** — The STO button allows up to six preset frequencies to be selected and entered into the controls nonvolatile memory. After presetting the frequency to be stored, push the STO button. The upper window displays the channel number of available memory (CH1 through CH6); the lower window continues to display the frequency to be stored. For approximately 5 seconds, the MEM switch may be used to advance through channel numbers without changing the preset display. Push the STO button a second time to commit the preset frequency to memory in the selected location. After approximately 5 seconds, the control will return to normal operation.
7. **TEST BUTTON** — The self-test diagnostic routine is initiated in the transceiver by pushing the TEST button. The active and preset display intensity will be modulated from minimum to maximum to annunciate that self-test is in progress. Several audio tones will be heard from the audio system while the self-test routine is being executed. At the completion of the self-test program, dashes will appear in the active display, and 00 in the preset display. This indicates normal operation, no trouble found. If any out-of-limit condition is found, DIAG (diagnostic) letters will appear in the active and a 2-digit fault code in the preset display. Record any fault codes displayed to help the service technician locate the problem.

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8. **ACT BUTTON** – Push the ACT button for about 2 seconds to enable the frequency select knobs to directly retune the VHF-22A. The bottom window will display dashes and the upper window will continue to display the active frequency. Push the ACT button a second time to return the control to the normal 2 display mode.
9. **FREQUENCY SELECT KNOBS** – Two concentric knobs control the preset or active frequency displays. The large knob changes the three digits to the left of the decimal point in 1 MHz steps. The smaller knob changes the two digits to the right of the decimal point in 0.05 MHz steps (or in 25 kHz steps for the first two steps after the direction of rotation has been reversed). Numbers roll over at the upper and lower frequency limits.
10. **XFR/MEM SWITCH** – This is a 3-position, spring loaded toggle switch. When held to the XFR position, the preset frequency is transferred up to the active display and the equipment retunes. The previously active frequency becomes the new preset frequency and is displayed in the lower window.
 When held to the MEM position, one of the six stacked memory frequencies is loaded into the preset display. Successive pushes cycle the six memory frequencies through the display (... 2, 3, 4, 5, 6, 1, 2, ...).



CTL-22 VHF PANEL
(CENTER PANEL)

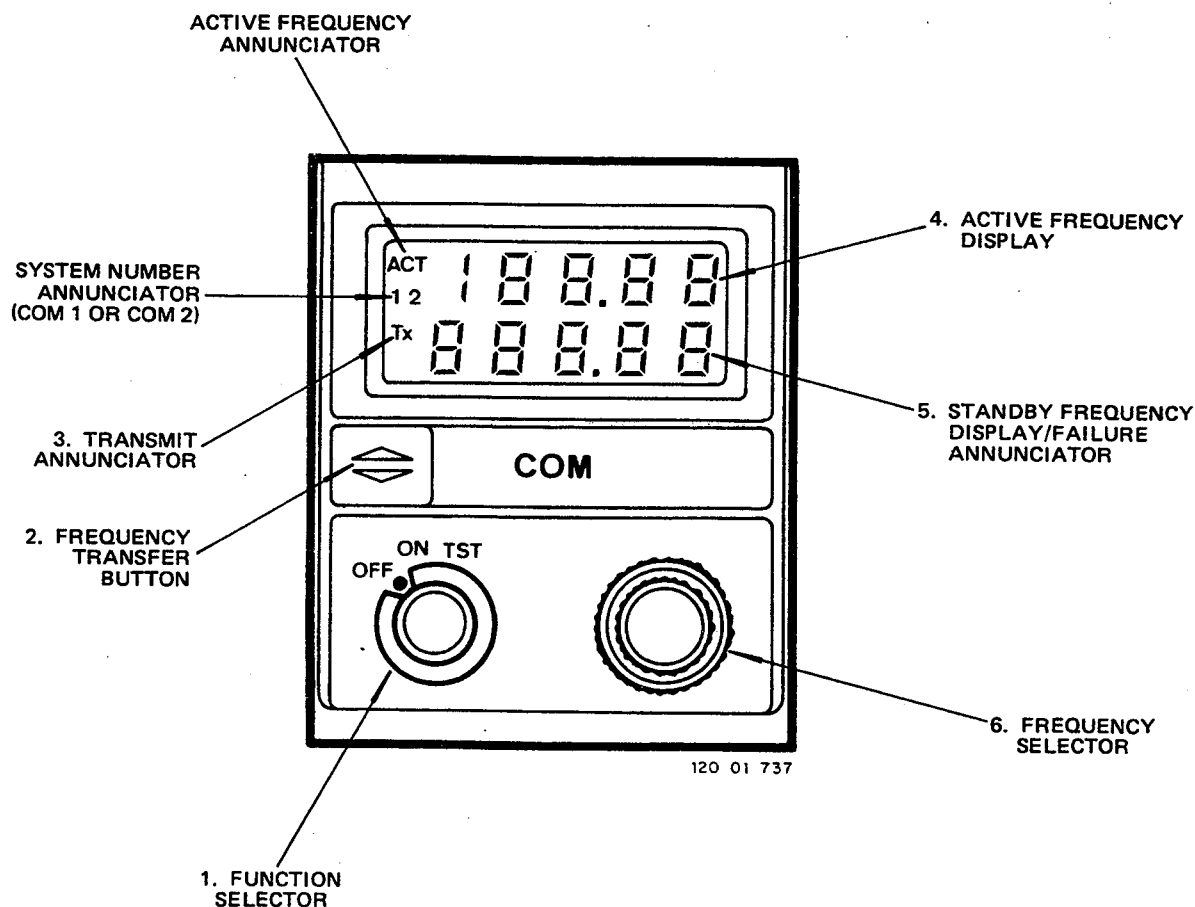
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VHF COMMUNICATION SYSTEM (BENDIX VCS-40)

The VHF communication system provides a 720 (for airplanes Pre-Mod. S.B. 120-023-0032) or 760-channel voice communication link (for airplanes Post-Mod. S.B. 120-023-0032). Nonvolatile memory retains the last frequency used. The system uses full time self-test to monitor key internal circuits and to display the word FAIL, followed by a preassigned number to indicate which module has failed. Frequency tuning is accomplished on the COM Control Display and the volume is controlled on the Audio Control Panel.

COM CONTROLS DISPLAY



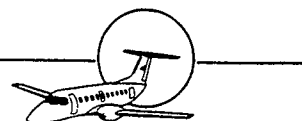
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CD-402B COM CONTROL DISPLAY (AFT PANEL)

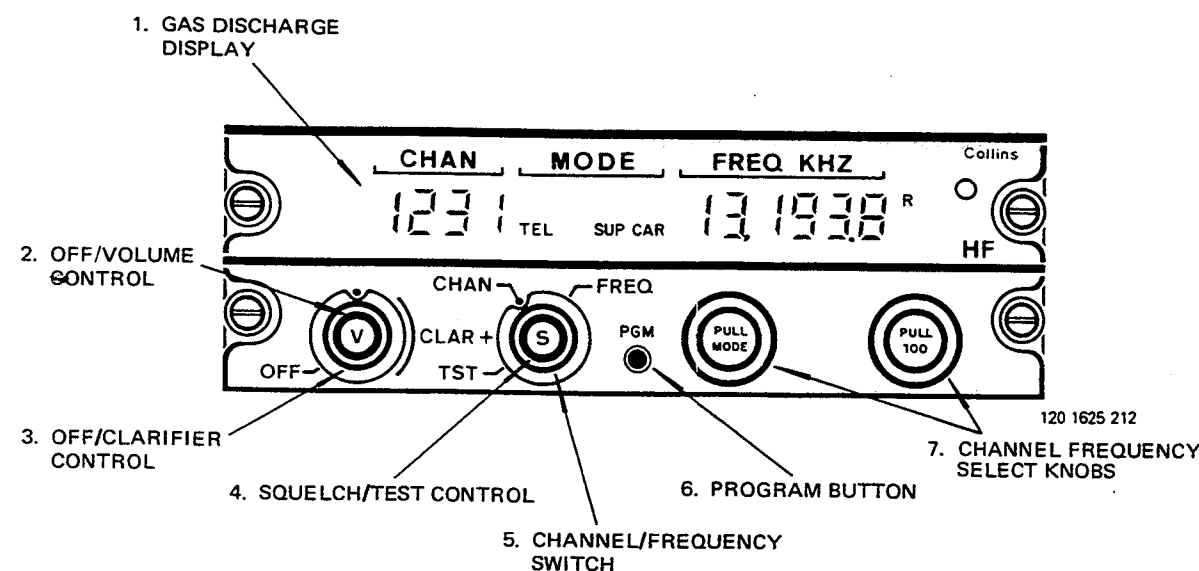
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1. **FUNCTION SELECTOR** – A 3-position rotary switch establishes the operating status of the system as follows:
 - OFF – Removes operating power from the system.
 - ON – Activates the system.
 - TST – inhibits the automatic squelch circuit to permit receiver noise to be heard, thus verifying that the receiver is operational.
2. **FREQUENCY TRANSFER BUTTON** – When pressed, interchanges the active frequency display and the standby frequency display.
 - Pressing and holding it two to three seconds causes the standby frequency display to blank, and allows the operator to change the active frequency.
 - Pressing and holding it for another two seconds restores the standby frequency display.
 - Pressing and holding it for seven seconds causes the system to return to 121.50 MHz. This feature is provided for the event of a total display failure.
3. **TRANSMIT ANNUNCIATOR** – Provides a confidence check of transmitter performance by displaying Tx each time the microphone pushbutton is pressed and an rf output is present.
4. **ACTIVE FREQUENCY DISPLAY** – Top set of numerals display the active (ACT) frequency to which the transceiver is tuned.
5. **STANDBY FREQUENCY DISPLAY AND FAILURE MODE ANNUNCIATOR** – Bottom set of numerals, displays the standby or preselected frequency. Failure mode annunciations are also displayed here as:
 - FAIL 1 – Frequency Synthesizer Lock Detect failed.
 - FAIL 2 – Transmitter output failed.
6. **FREQUENCY SELECTOR** – Dual concentric knobs for selecting frequencies from 118.000 MHz (118.00 displayed) through 135.975 MHz (135.97 displayed) for airplanes Pre-Mod. S.B. 120-023-0032, or 136.975 MHz (136.97 displayed) for airplanes Post-Mod. S.B. 120.023-0032. The outer (large) knob tunes the whole megahertz frequencies and the inner (small) knob tunes the fractional megahertz frequencies. Clockwise rotation of either knob increases frequency and counterclockwise rotation decreases frequency.



HF COMMUNICATION (HF-230 SYSTEM)



CTL-230 HF PANEL
(AFT PANEL)

HF PANEL DESCRIPTION

1. **GAS DISCHARGE DISPLAY** – Shows channel number (CHAN), mode of operation (MODE), transmit and receive frequency in kilohertz, and separate R (receive) and T (transmit) annunciators.
2. **OFF/VOLUME CONTROL** – Turns system off and on and controls volume. Rotating the V knob clockwise from the OFF position turns the system on. Continued clockwise rotation increases audio level. When the system is turned OFF, the discrete frequency or channel, and mode of operation displayed on the CTL-230 will be stored in nonvolatile memory and will be restored to the display the next time the system is turned on.

NOTE: It is recommended that the HF-230 system be turned on at least 15 minutes before use, to ensure frequency stability under varying environmental conditions.

3. **OFF/CLARIFIER CONTROL** – Concentric with the volume knob, and sharing the same OFF position, the CLAR knob is used when receiving SSB signals that may be slightly off frequency. The CLAR knob can help eliminate unnatural sounds when receiving USB, LSB, or either of the telephone modes.

The clarifier function does not affect AM reception, and is disabled during transmit or when the CLAR knob is positioned to OFF.

To operate the clarifier, rotate the CLAR knob clockwise from off until the centering dot is visible on the knob skirt at the midrotation point. This is the neutral or zero shift position. From this position, the CLAR knob is adjusted clockwise or counterclockwise for the best clarity or the most natural sound of the signal being received.

NOTE: When the audio quality of the received SSB signal is good and natural sounding, the CLAR knob should remain in the OFF position.

4. **SQUELCH/TEST CONTROL** – This knob is adjusted to mute undesired background noise. The noise proper setting is made by rotating the S (squelch) knob clockwise from TST (test) position until background noise can be heard and by turning it counterclockwise until the background noise disappears or is just barely audible. When the S knob is in the TST position, the squelch circuit is, in effect, removed from the receiver audio circuit in the TST, maximum background noise (depending on the volume control setting) will be heard. Setting the squelch control too far clockwise can result in blocking out weak signals. There are times when it will be necessary to leave the squelch control in the TST position to maintain satisfactory reception. This is because of conditions relating to propagation and the ionosphere that causes the HF receiver to have to operate with a signal that is subject to considerable fading and which is marginally strong.
5. **CHANNEL/FREQUENCY SWITCH** – The HF-230 provides the user with two methods of frequency selection. First, by setting the CHAN/FREQ switch to FREQ, the system is placed in the discrete frequency mode. In this mode, any of the 280,000 available frequencies between 2.0 and 29.9999 MHz may be selected in 100-Hz steps with the frequency select knobs, and the USB, LSB*, or AM modes can be used. The discrete frequency mode is for simplex operation only (transmit and receive frequencies are the same). The left-side (CHAN) display on the CTL-230 Control shows four dashes when operating in the FREQ mode, but the last selected channel will be recalled to the display upon return to the CHAN mode. Likewise, the last selected discrete frequency and mode will reappear upon selecting the FREQ mode again. The second frequency selection method is channel operation and is obtained by setting the CHAN/FREQ switch to CHAN. In the channel mode, the frequency select knobs select ITU (International Telecommunication Union) and use programmed channels by their channel numbers. The selected channel numbers appear in the CHAN display on the CTL-230, and the corresponding frequency and mode for the channel appear in the FREQ and MODE display respectively. A dashed frequency display on a user channel indicates an invalid or unprogrammed frequency for the channel selected.



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The 176 ITU channels are broken up into separate "bands" corresponding to the range of frequencies occupied by the HF ITU telephone channels. ITU telephone channels are designated by assigned 3- or 4-digit numbers. The first one or two digits are roughly the band transmit frequency in MHz. The second two digits designate the individual channel in that band.

The 40 user programmed channels are designated by 1- or 2-digit channel numbers (the upper two digits in the CHAN display are blanked), and are found below the lowest ITU band (user programmable channels are numbered 1 through 40).

All 176 of the ITU telephone channels are half-duplex (transmit and receive frequencies are different, as may be any user channel so programmed. On these channels, the receive frequency (R annunciator illuminated) will be displayed whenever the microphone is not keyed. Keying the microphone causes the FREQ display to change to the transmit frequency for that channel and the T annunciator to illuminate (the R annunciator will extinguish).

The ITU telephone channels operate only in the TEL PLT CAR or TEL SUP CAR modes with TEL SUP CAR being the preferred mode. The 40 user programmed channels can be programmed to operate in any of the available modes (USB, LSB, AM, TEL PLT CAR, or TEL SUP CAR), and can be simplex, half-duplex, or receive-only channels. All frequencies and modes programmed into the 40 user programmed channels are stored in nonvolatile memory and are instantly available for use by their user-assigned channel numbers. Programming of the user channels may be done at any time, on the ground or in flight, to increase the convenience of frequency selection when the use of the HF-230 system is required.

* The use of LSB is legal for some international and off-shore communications, but is not authorized for use in the United States and most European countries. The LSB mode is not available for those who are not authorized to use it.

6. PROGRAM BUTTON – Allows the user to store frequencies in the 40 user programmed channels.

NOTE: Refer to OPERATING MODES IN THE HIGH-FREQUENCY that follows, for available modes:

USB: Upper sideband

LSB: Lower sideband

AM: Amplitude modulation

TEL PLT CAR: Single sideband reduced carrier

TEL SUP CAR: Single sideband suppressed carrier

SSB: Single sideband

ITU: International Telecommunications Union



7. CHANNEL FREQUENCY SELECT KNOBS

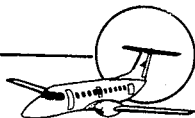
a. KNOB FUNCTIONS WHEN SELECTING A USER PROGRAMMED CHANNEL

CHANNEL SELECT KNOB	KNOB FUNCTION
Left outer	Rotate until brings up user channel number 1 or 40. If user channel 1 is being displaced, the next clockwise increment of the knob will cause user channel 10 to be displayed, then 20, 30, and 40. User channels are designated by 1-or 2-digit channel numbers appearing at the right side of the CHAN display (the upper two or three digits are blanked).
Left inner (pushed in or pulled out)	No effect on user channels.
Right outer	With user channel 1 displayed, clockwise rotation of this knob will increment through the 40 user channels one channel at a time. The next increment past user channel 40 will cause the lowest ITU channel number (401) to be called up. With user channel 40 displayed, counterclockwise rotation of the right outer knob will decrement through the user channels, 1 channel at a time. The next decrement past user channel 1 will cause the highest ITU channel number (2240) to be called up.
Right inner (pushed in or pulled out)	No effect on user channels.

b. KNOB FUNCTIONS WHEN SELECTING AN ITU TELEPHONE CHANNEL

CHANNEL SELECT KNOB	KNOB FUNCTION
Left outer	This knob is used to select the ITU band (the one or two left-hand digits in the CHAN display). Clockwise rotation of the knob increments the CHAN display to the next higher ITU band and counterclockwise rotation decrements to the next lower ITU band. If ITU channel 401 is being displayed, the next clockwise increment of the knob will cause ITU channel 601 to be displayed, then 801, 1201, 1601, and 2201. Rollover occurs between the top ITU band (22 MHz) and user programmed channel number 1, and between the lowest ITU band (4 MHz) and user programmed channel number 40.

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SYSTEMS DESCRIPTION
 COMMUNICATION

CHANNEL SELECT KNOB	KNOB FUNCTION
Left inner (pushed in)	No effect on ITU channels.
Left inner (pulled out)	Rotate to select between TEL SUP CAR and TEL PLT CAR models.
Right outer	This knob selects the individual channel number within the ITU band (the two right-hand digits in the CHAN display). If the channel number is incremented beyond the highest channel for that band, the lowest channel for the next higher band will appear. For example, if ITU channel 426 is being displayed, the next clockwise increment of the knob will cause ITU channel 601 to be displayed. Likewise, decrementing below the lowest channel in a band will select the highest channel in the next lower band.
Right inner (pushed in or pulled out)	No effect on ITU channels.

c. KNOB FUNCTIONS WHEN SELECTING A DISCRETE FREQUENCY

FREQUENCY SELECT KNOB	KNOB FUNCTION
Left outer	Selects the MHz digits (1 through 29) in the FREQ KHZ display.
Left inner (pushed in)	Selects the 100-kHz digit (0 through 9) in the FREQ KHZ display.
Left inner (pulled out)	Rotate to select between USB, AM, and LSB modes.
Right outer	Selects the 10-kHz digit (0 through 9) in the FREQ KHZ display.
Right inner (pushed in)	Selects the 1-kHz digit (0 through 9) in the FREQ KHZ display.
Right inner (pulled out)	Selects the 100-Hz digit (0 through 9) in the FREQ KHZ display.

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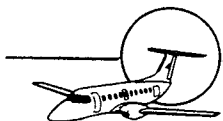


TUNING A DISCRETE FREQUENCY

1. Access discrete frequency operation.
Apply power to the system by rotating the volume (V) knob clockwise from the OFF position. With power applied to the system, ensure that the CHAN/FREQ switch is in the FREQ position. This can be confirmed by noting that four dashes appear in the CHAN display.
2. Enter the frequency.
Use the four frequency select knobs to enter the desired frequency in the FREQ KHZ display.
3. Select the transmission mode.
Pull out and rotate the left inner (PULL MODE) knob in either direction.
4. Tune the antenna.
Momentarily key the mic to initiate the antenna coupler tuning cycle. A steady 1000-Hz tone will be heard in the headset or speaker while the antenna coupler is tuning. Approximately 1 second after completion of the antenna coupler tuning cycle (tuning cycle may require from 5 to 30 seconds), the 1000-Hz tone will cease, indicating that the system is ready for use on the selected frequency. Adjust volume (V) and squelch (S) controls as desired.
The discrete frequency mode always provides simplex operation (transmit and receive frequencies are the same).

NOTE: Always key the mic after selecting a new frequency to initiate the antenna coupler tuning cycle. If this is not done, you may experience poor reception or miss important calls.

During operation, if the receive (R) or transmit (T) annunciators on the CTL-230 flash, this indicates that the receive or transmit (as applicable) frequency data does not match that being sent by the CTL-230. An equipment malfunction is probable and the system should be checked by maintenance personnel.



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OPERATING MODES IN THE HIGH-FREQUENCY

There are two main reasons why hf communications are able to achieve reliable long-range contacts. The first of these, is the skywave propagation. The second reason is due to an hf transmission process known as single sideband (SSB).

Single sideband was developed to increase the effective range of hf signals, as well as decrease the occupied spectrum. The following paragraphs describe in general the operating modes provide by the HF-230 High-Frequency Communication System.

Amplitude Modulation

Amplitude modulation (AM) is a transmission process in which a selected frequency (called carrier frequency) and two sidebands (frequencies above and below the carrier) are generated and transmitted. The upper sideband (USB) is the sum of the carrier frequency and the voice, while the lower sideband (LSB) is the difference between the two. The disadvantages of AM are that it occupies a wide spectrum and is inefficient in the sense that a great deal of unneeded carrier is generated, as well as redundant information in the unused sideband.

Single Sideband

Single sideband operation achieves the same function as AM with considerably greater efficiency. The SSB transmitter electronically eliminates most or all of the carrier wave and one of the sidebands. The major advantages of SSB (either USB or LSB) as opposed to AM are greater talking power (about eight times that of AM for a given power input), reduced power drain, longer range, conservation of the spectrum (since only one sideband is required to transmit the message).

Suppressed Carrier and Reduced Carrier

The SSB operation with the carrier frequency all but eliminated is referred to as single sideband suppressed carrier and is designated as the TEL SUP CAR mode in the HF-230.

If a small portion of the carrier frequency is transmitted along with the sideband, then the operation is referred to as single sideband reduced carrier, and is designated as the TEL PLT CAR mode in the HF-230. This mode was previously used in maritime radiotelephone operations but is not currently in wide use.

Simplex and Half-Duplex Operation

Simplex means that the transmission and receive frequencies are the same. An example of simplex operation would be communications with a control tower using VHF comm transceiver.

Half-duplex means transmit on one frequency and reception on another frequency. All 176 of the ITU channels provided the HF-230 are permanently programmed for half-duplex operation and will normally be worked in the TEL SUP CAR mode. The 40 user programmed channels can be programmed for either simplex or half-duplex operation, and can operate in any of the available modes (AM, USB, LSB, TEL SUP CAR, or TEL PLT CAR).



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**SYSTEMS DESCRIPTION
COMMUNICATION**

THE 40 USER CHANNELS-OPERATION AND PROGRAMMING

The 40 user programmable channels available with the HF-230 system can be programmed on the ground or in flight. All programmed information is stored in nonvolatile memory and can be recalled by selecting the desired user channel number.

There are three types of channels that can be programmed:

1. Half-duplex

The user programs two different frequencies, one for receive and one for transmit. The user also assigns one of the available operating modes (USB, LSB, AM, TEL SUP CAR, or TEL PLT CAR) to the selected channel. Half-duplex operation is used by the maritime radiotelephone network (public correspondence) stations, and is available only when the HF-230 is being operated in the CHAN mode.

2. Simplex

The user programs the same frequency for receive and for transmit. The user also assigns one of the available operating modes (USB, LSB*, AM, TEL SUP CAR, or TEL PLT CAR) to the selected channel. Simplex operation is used by ARINC, ATC (Air Traffic Control), and others.

3. Receive-only

The user programs a frequency for receive and assigns one of the available operating modes (USB, LSB*, AM, TEL SUP CAR, or TEL PLT CAR), but does not program a transmit frequency. The transmitter and power amplifier are locked out and cannot be used when a channel has been programmed for receive-only operation.

Receive-only channels are used to listen to frequency standards (WWV) for example, time, weather, Omega status, and geophysical alert broadcasts.

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OPERATION

1. Access channelized operation.
Apply power to system (rotate the V knob from the OFF position), and position the CHAN/FREQ switch to the CHAN position.
2. Rotate the left outer channel select knob until user channel 1 or 40 appears at the right side of the CHAN display. Use the right outer channel select knob to select the desired channel number within the user programmed channels.
3. Tune the antenna.
Momentarily key the mic to initiate antenna coupler tuning cycle. Adjust volume and squelch controls, as desired.

HALF-DUPLEX CHANNEL PROGRAMMING PROCEDURES

1. Access channelized operation.
Apply power to the system by rotating the volume (V) knob clockwise from the OFF position. With power applied to the system, ensure that the CHAN/FREQ switch is in the CHAN position.
2. Select the desired user channel.
Rotate the left outer channel select knob in either direction until user channel 1 or 40 appears at the right side of the CHAN display.
Then use the right outer channel select knob to select the desired channel number (from 1 to 40) that you wish to program.
3. Initiate program mode.
Press the program (PGM) button once to initiate the programming sequence. At this point, the entire display on the CTL-230 will begin to slowly blink.
4. Enter the receive frequency and mode of operation.
Set the desired receive frequency using the four frequency select knobs. This procedure is identical to tuning a discrete frequency which has been previously described. The receive frequency will appear in the FREQ KHZ display. Next, select the desired operating mode (USB, LSB, AM, TEL SUP CAR, or TEL PLT CAR) by pulling out on the PULL MODE knob and rotating it until the appropriate mode appears in the MODE display.
5. Store the receive frequency and mode of operation.
With the desired receive frequency and mode being displayed, press the PGM button once again to store the data. The CTL-230 display will blank for a short period of time to confirm storage.
6. Enter and store the transmit frequency.
When the display returns, it will be blinking faster with the transmit frequency displayed (initially this is the same as the already programmed receive frequency). At this point, you have approximately 20 seconds to begin entering the desired transmit frequency. If no changes are made during the next 20 seconds, the currently displayed transmit frequency will become invalid and you will have created a receive-only channel. Set the desired transmit frequency using the four

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frequency select knobs. This procedure is identical to entering the receive described above. With the desired transmit frequency shown in the FREQ KHZ display, press the PGM button once again to store the data.

As before, the CTL-230 display will blank for a short period of time to confirm storage. The display will then return to normal with the new channel data (channel number, mode, and receive frequency) showing.

7. Tune the antenna.

Momentarily key the mic to initiate the antenna coupler tuning cycle. Adjust the volume (V) and squelch (S) controls, as desired.

NOTE: If additional user channels are to be programmed, repeat steps 2 through 6 at this time. Ensure that you make and keep for reference a list of channel numbers, and the receive and transmit frequencies as well as the mode of operation that are programmed on the individual channels.

SIMPLEX CHANNEL PROGRAMMING PROCEDURES

When you program a channel for simplex operation, both the receive and the transmit frequency will be the same. Programming a simplex channel is similar to programming a half-duplex channel, except the PGM button is pressed twice after the receive frequency and mode of operation are entered to store the frequency in both the receive and the transmit positions.

RECEIVE-ONLY CHANNEL PROGRAMMING PROCEDURE

When you program a channel for receive-only operation, only a receive frequency is entered and stored. Programming a receive-only channel is similar to programming a simplex channel except the PGM button is pressed only once after the receive frequency and mode of operation are entered. The programming sequence is then terminated without entering a transmit frequency.

Program sequence can be terminated in any one of the three ways:

- a. By momentarily keying the microphone.
- b. By positioning the CHAN/FREQ switch to FREQ and then back to CHAN.
- c. By waiting for the 20-second timer to run out (this is the preferred method).

THE 176 ITU CORRESPONDENCE CHANNELS OPERATION

As previously discussed, all of the 176 ITU (International Telecommunication Union) public correspondence channels (and their receive and transmit frequencies) in the maritime radiotelephone network are permanently programmed in the nonvolatile memory of the CTL-230 Control. The 176 ITU channels all operate halfduplex in TEL SUP CAR (preferred) or TEL PLT CAR modes only. Perform the following steps to operate on the ITU channels.

1. Access channelized operation.

Apply power to the system by rotating the volume (V) knob clockwise from the OFF position. With power applied to the system, ensure that the CHAN/FREQ switch is in the CHAN position.



2. Select the desired ITU channel.

Rotate the left outer channel select knob in either direction until the desired ITU band appears in the one or two left-hand digits in the CHAN display. Next use the right outer channel select knob to select the individual channel number within the ITU band (the two right-hand digits in the CHAN display).

When the ITU channel numbers have been entered, the aircraft receive frequency will appear in the FREQ KHZ display and the R annunciator will be illuminated.

NOTE: Refer to a list of the ITU maritime radiotelephone channels to see that the above incrementing and decrementing changes are consistent with the actual ITU channel numbers.

3. Select the operating mode.

Pull out and rotate the left inner (PULL MODE) knob in either direction to select between TEL SUP CAR or TEL PLT CAR mode.

When the mode has been selected, push the knob back in.

4. Tune the antenna.

Momentarily key the mic to initiate the antenna coupler tuning cycle. A steady 1000-Hz tone will be heard in the headset or speaker while the antenna coupler is tuning. Approximately 1-second after completion of the antenna coupler tuning cycle (tuning cycle may require from 5 to 30 seconds), the 1000-Hz tone will cease, indicating that the system is ready for use on the selected ITU channel. Adjust volume (V) and squelch (S) controls as desired.

When transmitting, the receive frequency and R annunciator in the FREQ KHZ display are replaced with the aircraft transmit frequency and a T annunciator.

FAULT INDICATION

If the antenna coupler does not tune after approximately 35 to 40 seconds, the steady 1000-Hz tone will begin to beep, indicating a fault has occurred. To clear the fault, simply rotate one of the frequency/channel select knobs away from and then back to the desired frequency or channel and initiate another tuning cycle by momentarily pressing the microphone PTT button. The 1000-Hz tone should again be present and then disappear at the end of the tuning cycle. If the beeping recurs, try the clearing procedure a second time; if a fault is still indicated, there is probably an equipment malfunction.



HF COMMUNICATION SYSTEM (KHF-950) – OPTIONAL

The KHF-950 is an HF single side band transceiver system controlled by a KCU 951 control panel installed in the aft panel.

CAUTION: WHEN PERFORMING A RADIO CHECK ON THE GROUND, MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE HF ANTENNA BEFORE TRANSMITTING. SERIOUS RF BURNS CAN RESULT FROM DIRECT CONTACT WITH THE ANTENNA OR ANTENNA TERMINAL WHEN THE SYSTEM IS TRANSMITTING.

KCU 951 CONTROL PANEL

The KCU 951 control panel allows selection of 99 programmable channels and 280,000 operating frequencies in the 2.0 to 29.9999 MHz range.

1. **OFF/VOLUME KNOB** – Clockwise rotation past the first click turns the system on. Further rotation controls audio volume.

NOTE: During a warmup period of two minutes, no frequencies will be displayed. After the KHF 950 system has warmed up the last frequency transmitted will be displayed if the **FREQ/CHAN** button is not depressed (discrete frequency tuning). If the **FREQ/CHAN** button is depressed (channelized operation), the number of the last channel set will be displayed.

2. **SQUELCH KNOB** – Squelch is controlled by rotating the knob clockwise until background noise can be heard and then turning it counterclockwise until background noise is eliminated or just barely audible.
3. **CLARIFIER KNOB** – Due to off frequency ground station transmissions, the radio voice quality may sound unnatural. The **CLARIFIER** can help eliminate this unnatural audio quality by slightly shifting the receiver generated frequency to match the frequency of the ground station signal. To operate the **CLARIFIER**, pull the knob out and rotate it in either direction until the audio quality is optimized. When voice quality is good and natural push the **CLARIFIER** knob in.

NOTE: The **CLARIFIER** knob is for SSB communications only and should not be used when operating in the AM mode.

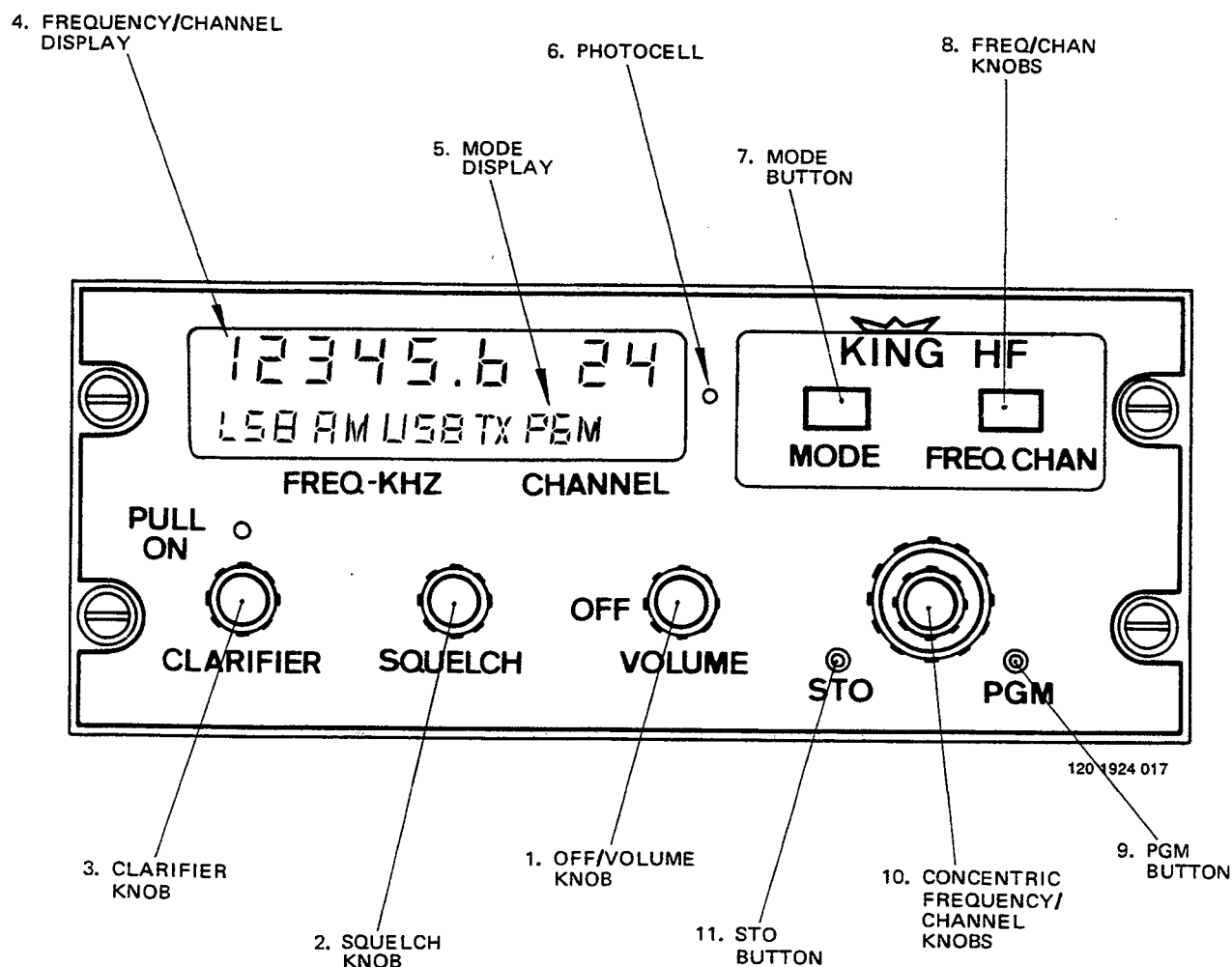
4. **FREQUENCY/CHANNEL DISPLAY** – Displays all frequencies and preset channel numbers.
5. **MODE DISPLAY** – Displays emission mode, transmit indicator and program mode indication.
6. **PHOTOCELL** – Dims the displays automatically, according to the ambient lighting.
7. **MODE BUTTON** – The **MODE** button is used to select transmission and reception modes. Momentary depression of the **MODE** button commutes the system emission modes, sequentially, from upper sideband (USB) to lower sideband (LSB) and to AM.
The selected mode may be changed at any time, the stored mode will not be changed, however.

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OPERATIONS MANUAL

8. **FREQ/CHAN KNOBS** – Two methods of frequency selection are available.
In the first method (FREQ/CHAN button not depressed) the pilot may tune any of 280,000 available discrete frequencies. Discrete frequency tuning is for simplex operation only.
Using the second method (FREQ/CHAN button depressed), the pilot may preset the transmit and receive frequencies in up to 99 available channels.
9. **PGM BUTTON** – The push-on/push-off program button allows to change frequency and emission mode of the preset channel.
10. **CONCENTRIC FREQUENCY/CHANNEL KNOBS** – Allow to set frequency and select preset channel.
11. **STO BUTTON** – The store button stores displayed frequency and emission mode.



KCU 951 CONTROL PANEL
(AFT PANEL)

16-191-001



TUNING A DISCRETE FREQUENCY

1. Access discrete frequency operation.
Check the **FREQ/CHAN** button is not depressed, in the **FREQ** position (no channel number in the frequency display). If the button is depressed, a momentary press will unlatch it and engage **FREQ** operation.
2. Select the desired transmission mode **USB**, **LSB** or **AM**, by pressing the **MODE** button.
3. Enter the frequency.
Each digit of the frequency is selected individually.
The outer concentric knob on the lower right of the control panel when rotated in either direction causes the displayed frequency digits to flash one at a time, as a flashing cursor, indicating which frequency digit may be set.
Turn the outer knob until the digit you wish to select flashes and then set the desired number by turning the inner knob.
Once all digits are set, turn the outer knob one more click right or left, as appropriate, and the cursor will disappear. To recall the flashing cursor simply turn the outer knob in either direction.
4. Tune the antenna
Press the control wheel communication switch momentarily to initiate antenna tuning.
During the tuning process the **TX** annunciator will flash and the frequency display will blank.
When the **TX** stops flashing and the frequency reappears, the antenna cycle is complete and the system is ready to operate on the selected frequency.

NOTE: Always key the control wheel communication switch after selecting a new frequency to initiate antenna tuning. Otherwise you may experience poor reception.

CHANNELS OPERATION AND PROGRAMMING

The 99 programmable channels available in the **KCU 951** system can be programmed on the ground or in the air.

All programmed information is stored in a nonvolatile memory and can be recalled by selecting the desired user channel number.

The three types of channels can be programmed.

A. Semi-duplex

The user programs two different frequencies, one for receiving and one for transmitting. The user also assigns one of the available operating modes (**USB**, **LSB** or **AM**).

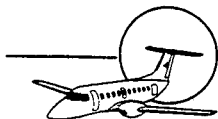
Semi-duplex channels are used by maritime radiotelephone network (public correspondence) stations.

B. Simplex

The user programs the same frequency for receiving and transmitting and assigns one of available operating modes (**USB**, **LSB** or **AM**).

Simplex channels are used by Air Traffic Control, **ARINC** and others.

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C. Receive-only

The user programs a frequency for receiving and assigns one of available operating modes (USB, LSB or AM), but does not program a transmit frequency.

Receive-only channels are used to listen to frequency standards for example, time, weather, omega status and geophysical alert broadcasts.

OPERATION

1. Access the channelized operation.

Make sure the **FREQ/CHAN** is depressed. If it is not depressed, a momentary push will latch in and engage **CHAN** operation.

2. Select the desired channel number.

To utilize the existing programmed channels simply use the inner concentric Frequency/Channel Knob to select the desired channel number. Then momentarily key the control wheel communication switch to tune the antenna.

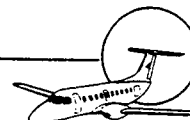
PROGRAMMING

Once in channelized operation, the access to the program mode is obtained by pressing the **PGM** button. The **PGM** annunciator will appear in the mode display and the **KHF 950** will remain in the program mode until the **PGM** button is pressed again.

SEMI-DUPLEX CHANNEL PROGRAMMING PROCEDURES

1. Press **FREQ/CHAN** button to enter the channelized operation and rotate the frequency/channel outer knob to stow the cursor if necessary. Press the **PGM** button with a pointed object. The **PGM** annunciator will appear in the mode display.
2. Use the inner knob to select the channel number to be programmed.
3. Use the **MODE** button to select emission mode (USB, LSB or AM). Press the **MODE** button until the desired mode appears.
4. Use the outer knob to position the flashing "cursor" on each digit of the receive frequency and use the inner knob to select the desired number in each position.
5. Push the **STO** button once and the receive frequency is entered in the electronic memory. The **TX** annunciator will begin to flash in the display window indicating the receive frequency is stored.
6. Using the outer knob to control the "cursor" and the inner knob to select the appropriate numbers, set the transmit frequency in the display window.
7. Press the **STO** button again and the transmit frequency is now stored. Steps 2 to 7 can be repeated to program other channels at this time.

When all programming is complete, press the **PGM** button and remove the system from the program mode.



8. Press the control wheel communication switch to tune the antenna. After tuning is complete the system is ready to operate.

In semi-duplex operation the selected emission mode will always control both receive and transmit frequencies.

Also the receive frequency is displayed until the control wheel communication switch is keyed, at which time the transmit frequency is displayed.

SIMPLEX CHANNEL PROGRAMMING PROCEDURES

Programming a simplex channel is similar to programming a semi-duplex channel except the STO button is pressed twice after the receive frequency and mode of operation are entered.

RECEIVE-ONLY CHANNEL PROGRAMMING PROCEDURES

Programming a receive-only channel is similar to programming a semi-duplex channel except the STO button is pressed only once after the receive frequency and mode of operation are entered.

The programming sequence can be terminated without entering a transmit frequency.

When you have completed all channel programming simply push the PGM button again.

When a receive-only programmed channel is activated, the transmitter is locked out and even though you key the control wheel communication switch, no transmission will take place.

FAULT INDICATION

If the KHF 950 detects a fault during transmission or during the tuning of the antenna coupler, the digits in the KCU 951 will begin to flash.

Simply key the control wheel communication switch and the automatic antenna coupler will begin a new tuning cycle to clear the fault. If the antenna coupler is unable to find an acceptable frequency/antenna match, the frequency digits will continue to flash at the end of the tuning cycle. If repeated antenna tuning cycles fail to clear the flashing digits from the display there is probably an equipment malfunction.



AUDIO SYSTEM (AVTECH)

Is used to transmit audible signals between ground facilities, the pilots, observer and passenger. The system is controlled by the audio control panels, installed in the pilot's and copilot's panels. In normal flight conditions the audio control panels are fed by 28 V DC.

The audio system will be automatically switched to the emergency mode (in case of loss of power supply) or manually by actuating either of the EMG switches (in case of system failure).

AUDIO PANEL DESCRIPTION

1. MICROPHONE SWITCHES – Microphone switches are interlocked to permit that only one switch be selected at time. When the switch is pressed, its illumination turns brighter, and enables transmission via hand microphone or boom microphone.
 - VHF1, VHF2, VHF3, and HF – Provide respective VHF or HF selection for transmission.

NOTE: VHF3 and HF switches are deactivated in case the respective equipment is not installed.

- CAB – Provides intercommunication between the flight attendant station and cockpit. The CAB switch may be pressed in more than one audio panel, allowing the crew members in the cockpit to communicate with each other, and the flight attendant simultaneously. When CAB is pressed, it starts flashing in conjunction with the attendant handset CAB switch and a HI-LO tone is generated by the passenger address system.
- CKPT RAMP – Provides communication between a ramp station and the cockpit. Communication is activated by selecting the PTT position on the control wheel.
- PAX ADRS – Provides the audio signal to the relevant cockpit microphone and general PTT to be routed to the passenger address system. The sidetone generated in the PAX ADRS will be sent to the relevant headphone. The PAX ADRS will also be signalled to emit a HI tone prior to the address.

2. RECEIVER SWITCHES, MAIN VOL/MIC SEL KNOB, AND FILT SWITCH:

- RECEIVER SWITCHES – Provide ON/OFF and volume control for the following selection functions: VHF1, VHF2, VHF3, HF, DME1, DME2, ADF1, ADF2, NAV1, and NAV2. Receiver switches are all of the pull type. Illumination turns brighter when switch is pulled. If two or more switches are simultaneously pulled, their signal will be superimposed.

NOTE: VHF3, HF and ADF2 switches are deactivated in case of the respective equipment is not installed.

- MAIN VOL/MIC SEL – Outer knob selects between the boom or mask microphone. The inner knob is the master volume control acting upon signals sent to headphones and cockpit speakers.

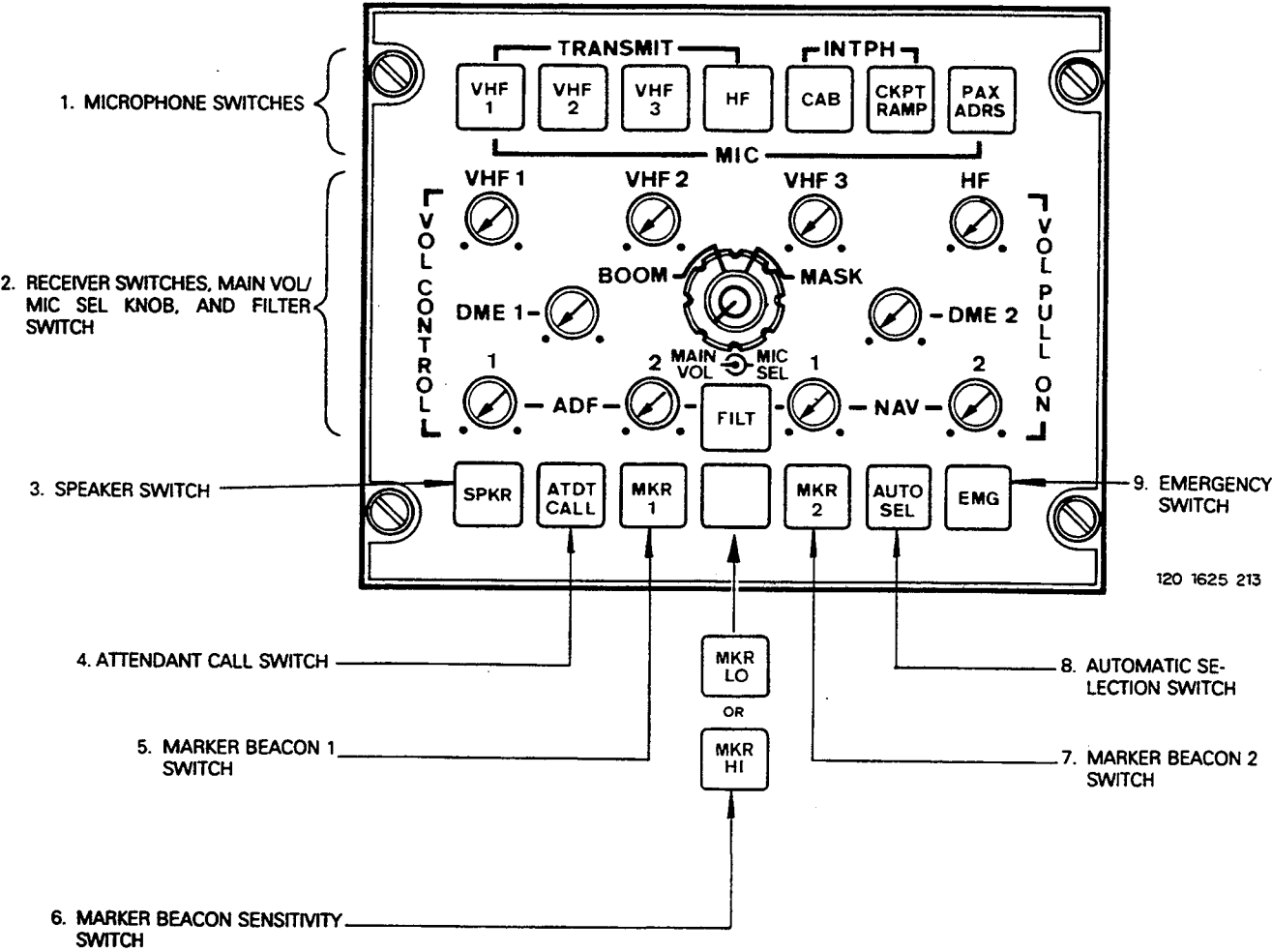
- FILT – Provides ADF and NAV receivers filter, removing the 1020 Hz code identifier and leaving only the voice signal.

3. SPEAKER SWITCH – Provides audio signal to be routed to the headphone and cockpit speaker, the volume being controlled by the MAIN VOL switch. When deselected, maintains only headphone connected to the audio system.
4. ATTENDANT CALL SWITCH – Signals, when pressed, the pax address to emit a HI-LO tone to call the attendant to the cockpit.
5. MARKER BEACON 1 SWITCH – Provides selection of marker beacon system 1.
6. MARKER BEACON SENSITIVITY SWITCH (MKR LO or MKR HI) – Changes sensitivity of the selected marker beacon receiver. Pressing the MKR LO switch will decrease the MB receiver sensitivity. Pressing the MKR HI switch will increase the MB receiver sensitivity. Pressing the switch again on the same or the other audio panel will return sensitivity to the previous state.
7. MARKER BEACON 2 SWITCH - Provides selection of marker beacon system 2.
8. AUTOMATIC SELECTION SWITCH – Provides automatic selection of the relevant receiver, when a transmitter is selected.
9. EMERGENCY SWITCH – Pressing EMG on the associated control panel, or removing power to that panel, provides microphone and headphone connection to a dedicated radio. In addition, station headphone may be connected to another station. Refer to table below for all possible connections.

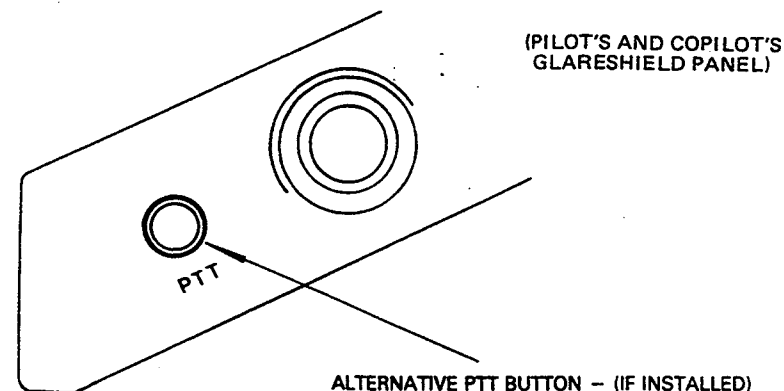
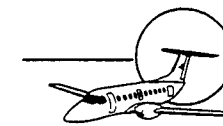
STATION IN EMERGENCY	RECEPTION RADIOS	TRANSMISSION RADIOS	CONNECTED HEADPHONES
PILOT	ADF1, VHF1	VHF1	Pilot monitors Copilot
COPILOT	NAV1, VHF2	VHF2	Copilot monitors Pilot
PILOT AND COPILOT	Pilot: ADF1, VHF1 Copilot: NAV1, VHF2	Pilot: VHF1 Copilot: VHF2	None

NOTE: Passenger address, cabin call, and volume control are not available for the station in emergency.

Mask microphone will not be available during emergency operation, unless mask microphone be plugged in the boom microphone jack.



AVTECH AUDIO PANEL
(PILOT'S AND COPILOT'S PANEL)



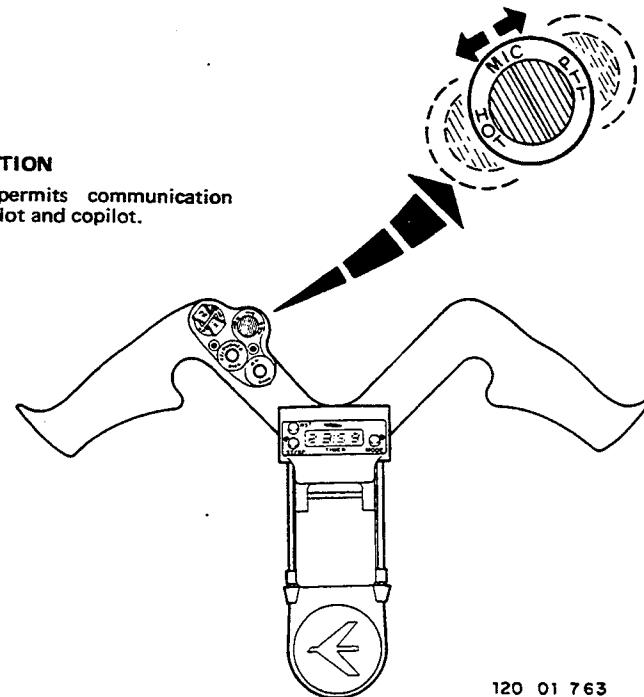
(PILOT'S AND COPILOT'S
GLARESHIELD PANEL)

ALTERNATIVE PTT BUTTON -- (IF INSTALLED)

Pressed, permits VHF transmission or passenger communication through the selected microphone.

HOT POSITION

Selected permits communication between pilot and copilot.

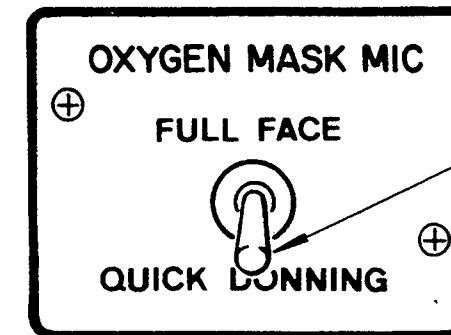


PTT POSITION

Selected permits VHF transmission or communication to the passenger and ramp station through the selected microphone (momentary position).

120 01 763

CONTROL WHEEL COMMUNICATION SWITCH



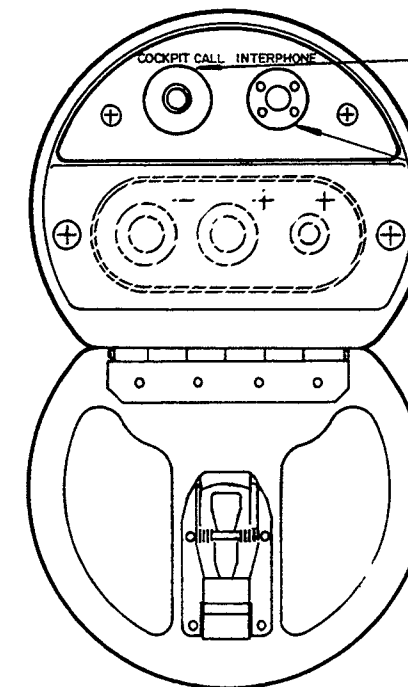
MICROPHONE SELECT SWITCH

Selects either full-face or quick donning mask microphone.

NOTE: To connect the mask microphone to the communication system, the audio control panel MIC SEL knob must be positioned to MASK.

120 01 789

CREW MASK MICROPHONE SELECT SWITCH -- (IF INSTALLED)
(PILOT'S AND COPILOT'S PANELS)

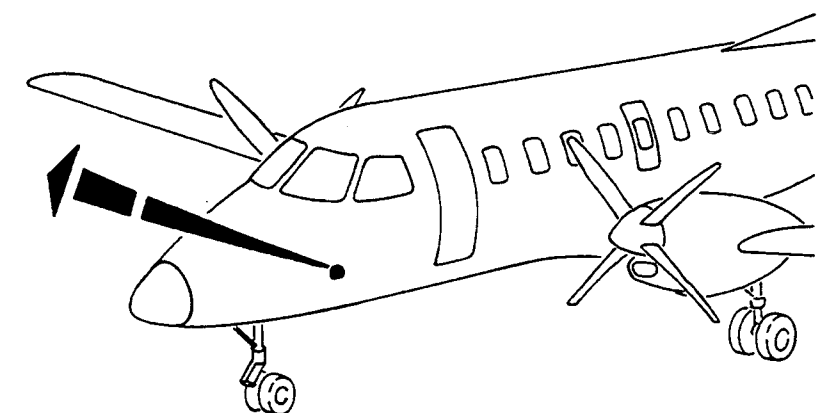


COCKPIT CALL BUTTON

Causes a sound on the headphones and cockpit speakers.

MICROPHONE/HEADPHONE JACK

Permits respective lines to be plugged. These lines include a headphone, a microphone, and a PTT switch.

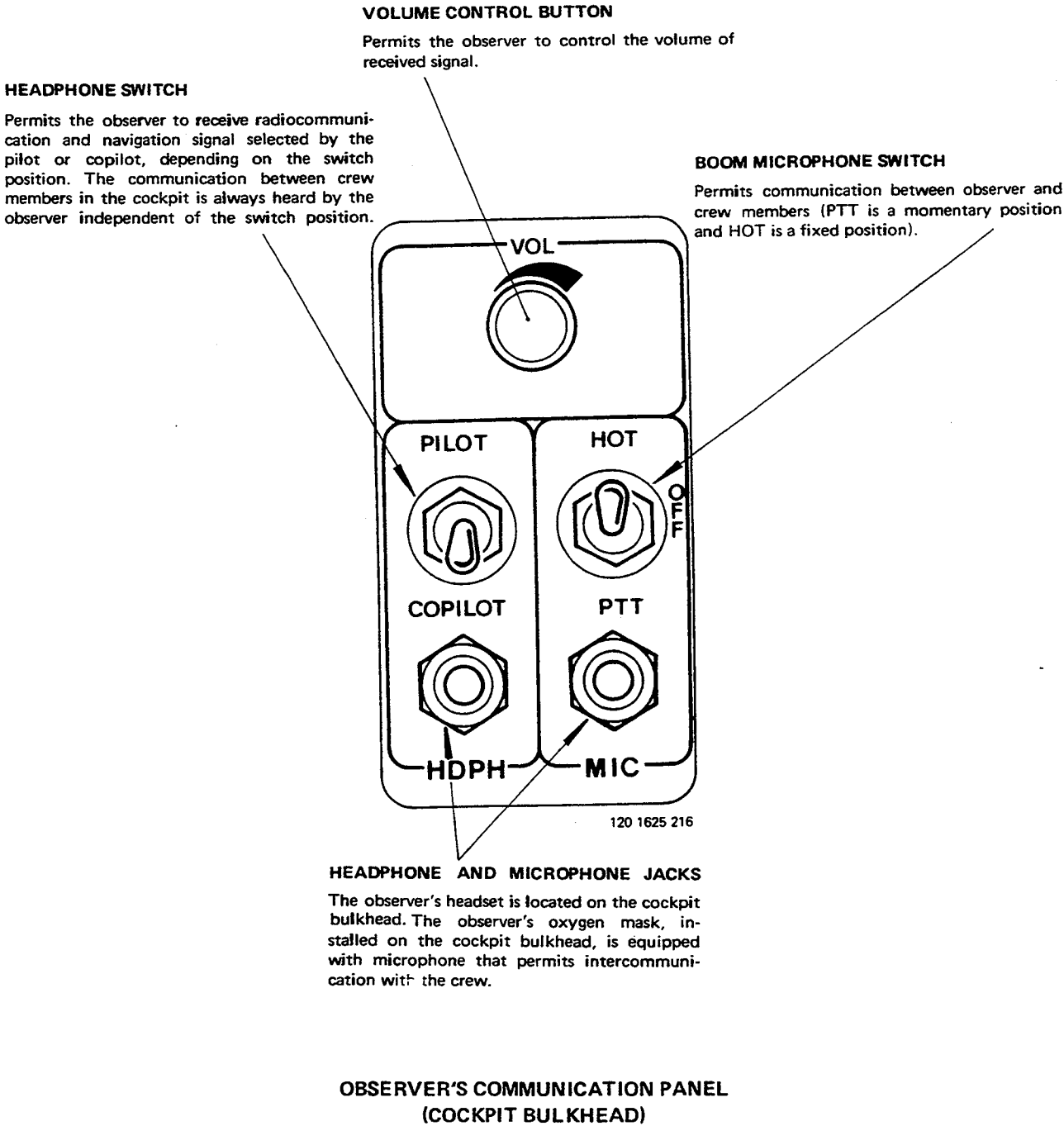


120 1625 215

RAMP STATION



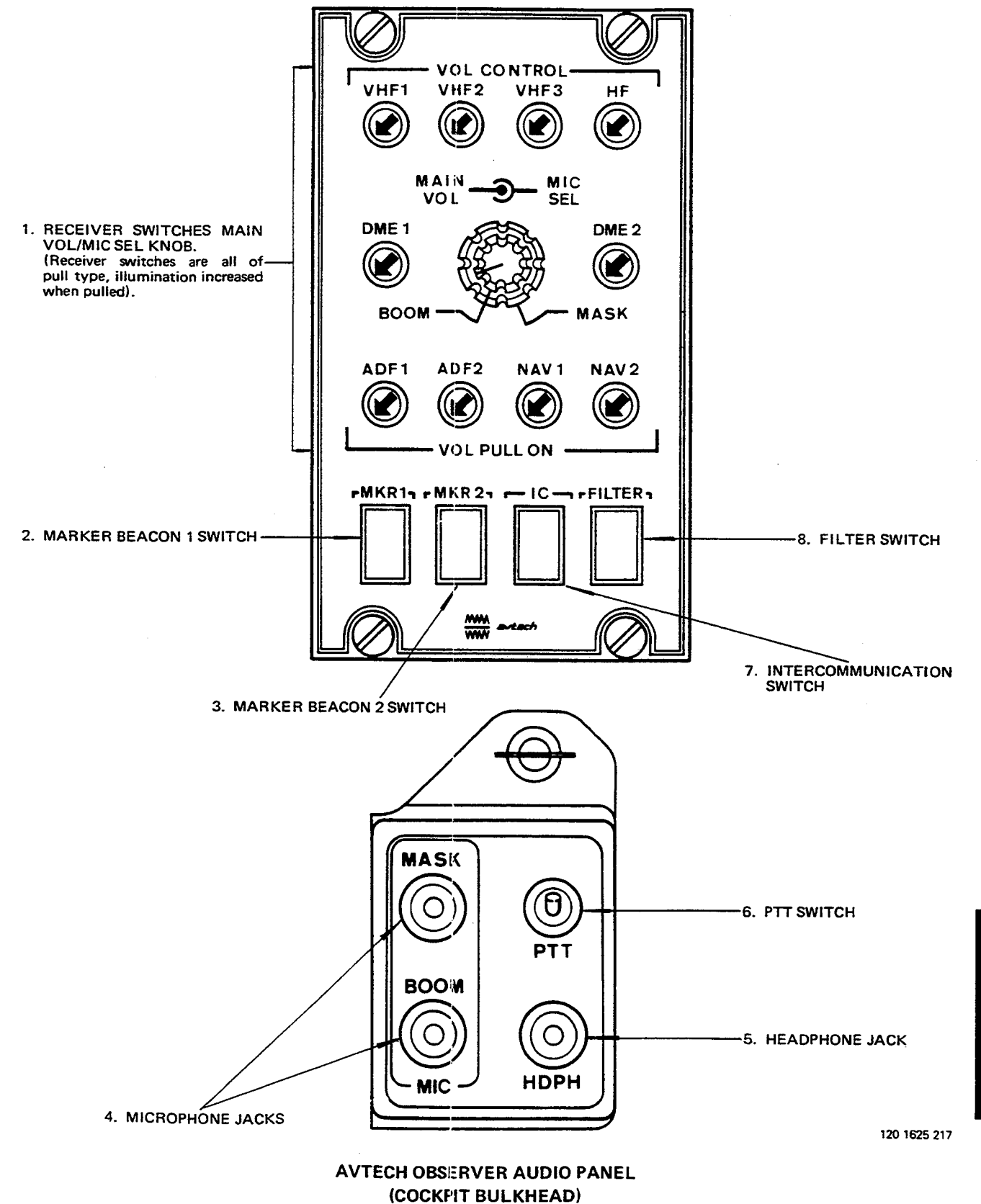
OBSERVER AUDIO PANEL – VERSION 1

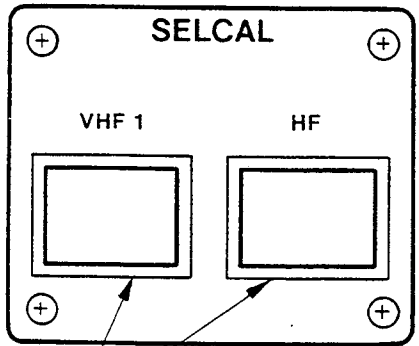
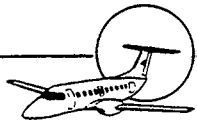




OBSERVER AUDIO PANEL – VERSION 2

1. RECEIVER SWITCHES, AND MAIN VOL/MIC SEL KNOB:
 - RECEIVER SWITCHES – provide ON-OFF and volume control for the following selection functions: VHF 1, VHF 2, VHF 3, HF, DME 1, DME 2, ADF 1, ADF 2, NAV 1, and NAV 2. If two or more switches are pulled their signals will be superimposed.
 - MAIN VOL/MIC SEL-Outer knob selects between the boom or mask microphone. The inner knob is the master volume control acting upon signals sent to headphones and cockpit speakers.
2. MARKER BEACON 1 SWITCH - Provides audio selection of marker beacon system 1.
3. MARKER BEACON 2 SWITCH - Provides audio selection of marker beacon system 2.
4. MICROPHONE JACKS - To plug in the mask microphone or the boom microphone.
5. HEADPHONE JACK - To plug in the observer's headphone.
6. PTT SWITCH - PTT is a momentary position which permits communication between observer and pilots.
7. INTERCOMMUNICATION SWITCH - Permits continuous communication between observer and pilots.
8. FILTER SWITCH - Turns on the radio noise filter.





SELCAL LIGHT/RESET SWITCH – (OPTIONAL)

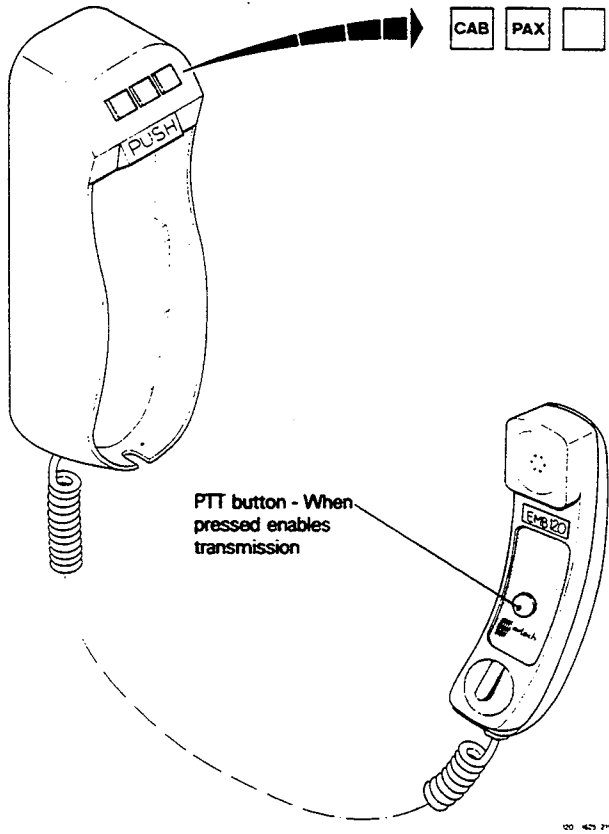
- Illuminates to alert crew that communication is desired on VHF1 or HF.

NOTE: The SELCAL equipment may be connected to VHF1 and VHF2 instead of VHF1 and HF.

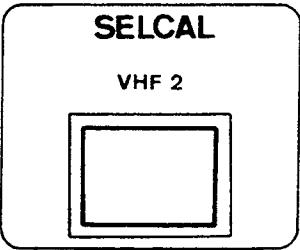
- Push to extinguish SELCAL light and reset SELCAL.

Ground station will alert SELCAL when communication is desired with the airplane. Alert will cause (beyond light illumination) a SELCAL voice on the aural warning system.

SELCAL PANEL (COPLOT'S PANEL)



ATTENDANT'S INTERPHONE



SELCAL LIGHT/RESET SWITCH – (OPTIONAL)

- Illuminates to alert crew that communication is desired on VHF2. SELCAL aural message will sound simultaneously.
- Push to extinguish SELCAL light and reset SELCAL.

SELCAL PANEL (CENTER PANEL)

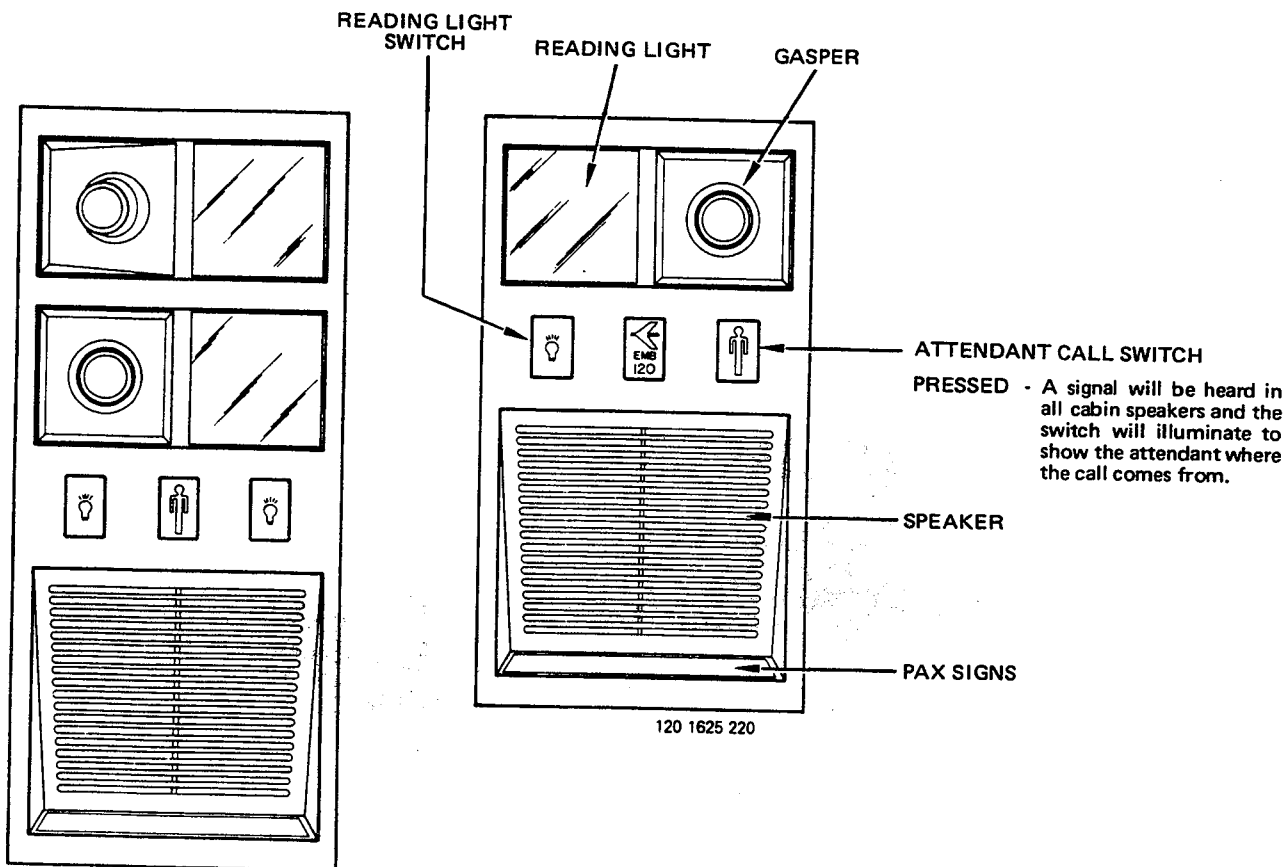
CAB – When pressed, it will alert cockpit by a HI-LO chime, CAB will flash on cradle and on both audio panels, until pilot/copilot selects his respective annunciator. Link is deactivated when the attendant hangs up the phone. Light annunciator extinguishes on attendant cradle and brightness is dimmed on both audio panels, when another interlocked function is selected on cradle and audio control panel.

PAX – Provides attendant transmission to passenger address. When pressed, it will illuminate and cause PAX annunciator on both audio panel to turn brighter. When transmission finishes, the attendant hangs up the phone. Light annunciator extinguishes on attendant cradle and brightness is dimmed on both audio panels, when another interlocked function is selected on cradle.



EMBRAER
EMB120 Brasília
OPERATIONS MANUAL

SYSTEMS DESCRIPTION
COMMUNICATION



RH AND LH PASSENGER SERVICE UNITS
(ABOVE RH AND LH PASSENGER SEATS)

16-191-001

16 DECEMBER 1985



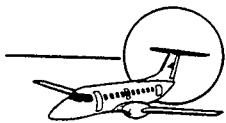
ENTERTAINMENT SYSTEM (OPTIONAL)

The entertainment system consists of an audio retrieval equipment which provides up to 99 pre-recorded passenger messages, boarding music, or a combination of both. The memory function permits the operator to enter up to 16 messages to be played automatically in the order of entry. The information/music is recorded on a standard Philips cassette containing up to 8 hours of programming which is recorded in pre-addressed discreet message positions. Each message position is identified by a one-or two-digit number which is selected by simply "touch-tone" dialing the message code on the ten-digit keyboard. The unit will then automatically search for and play the selected message(s) or music.

The cassette deck door incorporates the keypad which has the following controls and indicators:

1. TEN-DIGIT KEYBOARD – Accepts selectable message codes.
2. OPEN KEY – Opens keyboard door for access to cassette.
3. ON/OFF KEY – When ON, LED indicator is illuminated. Keyboard is enabled. When OFF message code memory and REPEAT function are cleared, all LEDs except the POWER's are blanked, and the rest of the keyboard is disabled.
4. POWER INDICATOR – Illuminates when power is available to the unit.
5. PROGRAM INDICATOR – Illuminates when at least one message code has been entered into memory.
6. TWO-DIGIT NUMERIC DISPLAY – Visually shows the selection entered on the keyboard. When playing, the display shows the digit selection being played. If boarding music is playing the display will be blank if the music has been activated by MUSIC key.
7. PLAY KEY – The unit plays a message or a series of messages.
8. MUSIC KEY – The unit plays boarding music.
A program for a single taped message or multiple messages may be input while boarding music is playing. When the PLAY key is pressed, boarding music will stop and the newly entered program will begin playback. When messages are completed boarding music will resume at the point where it was stopped.
9. REPEAT KEY – When pressed, the REPEAT LED indicator will illuminate and the unit will continually repeat any program which is in message code memory. Pressing the REPEAT key again will disable the repeat function.
10. ENTER KEY – When pressed the message code currently displayed enters into the program memory.
11. PREVIEW KEY – Allows the user to check a multiple message program for errors before playback. After pressing PREVIEW, press ENTER repeatedly to display all message codes entered.
12. CLEAR KEY – When pressed the unit clears the message code memory and/or stops playback of the current message upon completion.

16-191-001

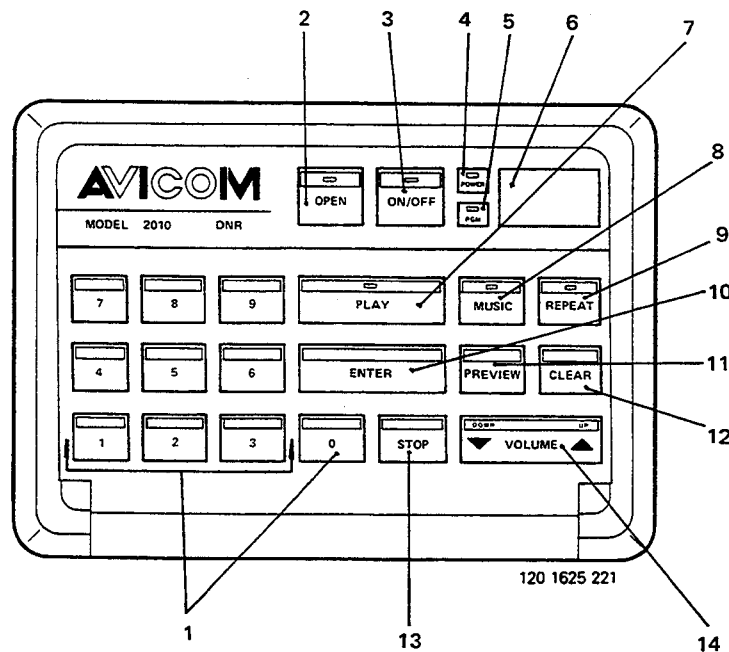


EMBRAER
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OPERATIONS MANUAL

SYSTEMS DESCRIPTION
 COMMUNICATION

13. STOP KEY – Stops unit at any given time. STOP erases any information stored in memory.
14. VOLUME KEY – Volume up and down will ramp volume of any audio signal sent to the P.A. system.

NOTE: The attendant or the crew can interrupt music/message playback, by selecting PAX (on attendant's handset) or PAXADRS (on pilot's audio panel), to transmit information to the passengers. Putting the handset on hook or selecting CAB on audio panel will return to the playback function.

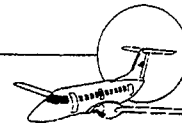


TAPE DECK KEYPAD (FRONT OVERHEAD BIN)

16-191-001

11 JULY 1986

6-19-21



OPERATIONS MANUAL

COCKPIT VOICE RECORDER SYSTEM – OPTIONAL

The cockpit voice recorder (CVR) system records all audio signals transmitted and received by the crew members.

Some airplanes are equipped with tape-based CVR, which uses four independent channels to record cockpit audio signals on a 30 minute continuous-loop tape.

Other airplanes are equipped with solid-state cockpit voice recorder (SSCVR).

The SSCVR also provides four audio inputs, which are recorded for a minimum of 120 minutes. Data older than 30 minutes (tape CVR) or 120 minutes (SSCVR), are replaced by earlier data.

The cockpit conversation and all audible noise in the cockpit are recorded using the cockpit area microphone, installed on CVR control panel (tape CVR) or on the cockpit mounting bracket (SSCVR).

The voice recorder will be enabled to operate as soon as its respective DC bus is energized.

A crash impact switch cuts off electrical power to the voice recorder following impact.

The system is provided with an underwater locator beacon, powered by a self-contained battery. The operation frequency of the beacon is 37.5 kHz.

NOTE: Do not obstruct the CVR microphone so as not to reduce the recording quality.



EMBRAER **EMB120 Brasília** **OPERATIONS MANUAL**

SYSTEMS DESCRIPTION **COMMUNICATION**

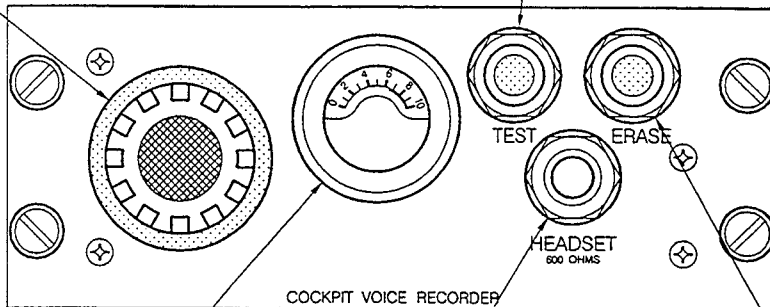
TAPE VOICE RECORDER – CONTROL PANEL DESCRIPTION

TEST BUTTON

- Pressed:
- A tone of 600 Hz will be heard in the headset if a headphone is plugged into the jack. The button must be pressed for at least five seconds to test all the channels.
 - A GO or NO-GO indication will be given in the meter. In case of failure, the meter needle will return to zero or will be out of the green band giving a definite NO-GO indication. At no time this test interrupts voice recording.
 - With the headphone plugged into the jack, speak in a normal voice 15 cm (6 inches) away from the microphone, and note that you can hear what you speak with approximately 0.5 seconds of delay. This test ensures that the microphone is operating.

MICROPHONE

Picks up all conversation in the cockpit.



METER

Gives GO or NO-GO indication when the test button is pressed (GO indication is given when the needle is stabilized on the green band).

HEADSET JACK

A headphone may be plugged into the jack permitting monitoring the 600 Hz test tone or the playback of voice audio.

ERASE BUTTON

Permits entire tape erase, if airplane is on ground and parking brake is applied. To erase, the button must be kept pressed for at least two seconds.

**TAPE VOICE RECORDER PANEL (A152B)
(FORWARD PANEL)**

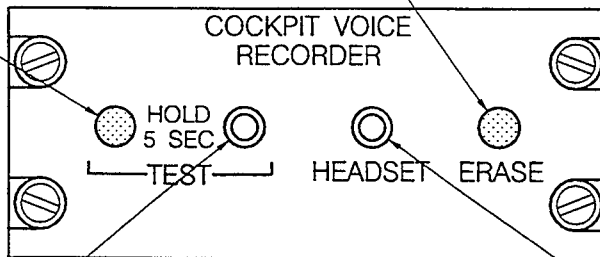
SOLID-STATE VOICE RECORDER – CONTROL PANEL DESCRIPTION

TEST BUTTON

Provides the built-in-test-equipment (BITE), which tests the capability of all of the recorded channels. The button must be pressed for at least 5 seconds.

BULK ERASE BUTTON

Permits erasing the entire solid-state memory, if the airplane is on the ground and the parking brake is applied. To erase, the button must be kept pressed for at least two seconds.



TEST INDICATOR

When the test button is pressed, provides a quick in-service GO/NO-GO indication. Successful BITE test is indicated by its lighting.

HEADSET JACK

A headphone may be plugged into the jack permitting monitoring the 620-660 Hz test tone or the playback of voice audio.

**SOLID-STATE VOICE RECORDER PANEL
(FORWARD PANEL)**

1200886180.MCE

16-191-001

